

**FLORA OF
ETHIOPIA AND ERITREA
VOLUME 6**

**FLORA OF
ETHIOPIA AND ERITREA
VOLUME 6**

HYDROCHARITACEAE TO ARECACEAE

Editors

Sue Edwards

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Cover Illustrations:

Front — *Aloe macrocarpa*, one of the most widely distributed of the *Aloe* species found in the Flora area, drawn by Damtew Teferra.

Back — four species of *Fimbristylis* from wet areas of the plateau, drawn by Gerd Mari Lye.

Spine — a flower from *Habenaria tweedieae*, drawn by Stella Ross-Craig.

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FOREWORD

Volume 6 of the Flora of Ethiopia and Eritrea contains all the monocotyledon families except Poaceae (Gramineae) which was published, for practical reasons, out of sequence as Volume 7 in 1995. Volume 6 covers 48 families with 167 genera and over 700 species. It starts with the aquatic family Hydrocharitaceae and ends with the family that includes the tallest plants in the monocotyledons, the Arecaceae (Palmae). Six of the families are represented only by introduced crop or ornamental plants and a further three families are included because they are expected to be found as knowledge of the plants found in wetlands and the large river valleys in the Flora area increases.

The system of classification used for the present volume is that developed by Prof. Rolf Dahlgren and co-workers and first published in *The Monocotyledons: A Comparative Study* (Dahlgren & Clifford, 1982) and then in *The Families of the Monocotyledons: structure, evolution and taxonomy* (Dahlgren, Clifford and Yeo, 1985). Hutchinson's classification as presented in the first edition of *The Families of Flowering Plants* (Volume 1, Dicotyledons, 1926) has been used to set the sequence for the dicotyledons (Volumes 2–5 of the Flora). Although Hutchinson appreciated the innate diversity of the monocotyledons (Volume 2, Monocotyledons, 1934) and recognised a number of small natural families, he left the petaloid monocotyledons of his Division Corolliferae in large, heterogenous families, particularly Amaryllidaceae and Liliaceae. The aim of modern classification is to identify natural groups and arrange these according to their presumed evolutionary relationships. The possibilities to do this have come with the development of new techniques and equipment to observe details of micromorphology, the recognition of the importance of chemical characteristics and analytical techniques to assess evolutionary relationships. It was, therefore, decided to use the Dahlgren system which recognises many small natural families and can be used practically in both the herbarium and the field. The greatest change in relation to the Hutchinson system involves the splitting up of the Liliaceae which is now represented in the Flora area only by introduced ornamentals. The Dahlgren system, although it is based on highly technical characters, has nevertheless resulted in families of great overall similarity between their genera and species. This can be appreciated from the illustrations in this volume; for example, those for the families Aloaceae, Anthericaceae, Asparagaceae and Hypoxidaceae.

The two biggest families in this Volume are Orchidaceae with 154 species and Cyperaceae with over 180 species. Both these accounts are very well illustrated to facilitate correct identifications. In preparing the account for the Cyperaceae, both the author and the editors encountered a number of difficulties, not all of which could be resolved in time to meet the publishing date of this volume, and it is best to regard the present account as preliminary.

The distribution of endemic species across the 48 families is very uneven. Although there are 90 endemics, 62 are found in four families: Aloaceae, Asphodelaceae, Iridaceae and Orchidaceae. All except the six epiphytic orchids among these endemics are terrestrial plants mostly found on the plateau and its associated cliffs, rocky outcrops and valleys.

An interesting feature of this volume is that 15 of the 48 families have practically all their species restricted to wetlands. The most specialized is Lemnaceae which includes the smallest flowering plant in the world, *Wolffia arrhiza*. Others also found in fresh water are Alismataceae, Aponogetonaceae, Costaceae, Potamogetonaceae, the notorious Pontederiaceae and Ruppiceae. Najadaceae is adapted for water with a high salt content, either saline or alkaline. Cymodoceaceae is one of the few families of flowering plants found only in the sea, while Hydrocharitaceae has some genera found in fresh and others in saline waters. The families at the end of the volume, Xyridaceae through to Cyperaceae, are all more common in swamps or marshes, though some species are also fully aquatic others, particularly in Cyperaceae, are found in drier habitats. The common attitude among many botanists that wetlands are relatively uniform in their plant composition, combined with the well-founded fear that wet areas carry diseases, not least schistosomiasis, has left these areas very poorly known botanically.

It is hoped that the publication of this volume will stimulate studies and make identifications easier for anyone interested in studying the many fascinating and important plants that make up the monocotyledons of the Flora area.

SE, SD & IH,
February 1997

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February 1997

ABBREVIATIONS

(excluding authorities for names)

All units of measurement are given with SDI abbreviations.

Herbarium abbreviations are according to the 7th edition of *Index Herbariorum* (1981).

± - more or less

ACD - Herbarium, Alemaya University of Agriculture, Ethiopia, formerly Agricultural College of Haile Selassie 1st University, Dire Dawa, Ethiopia

ACT - Australian Capital Territory

Acta Bot. Neerl. (also mistakenly as Act. Bot. Nederland) - *Acta Botanica Neerlandica*

Acta Univ. Lund - *Acta Universtatis Lundensis*

Adumb. Fl. Aeth. - *Adumbratio Florae Aethiopiae*

AF - Afar region, Ethiopia

Afr. - Africa

African Bot. Suppl. - *African Botany Supplement*

Agri. Col./Colon. - *Agraria Coloniale*

Agri. Univ. Wageningen - Agricultural University of Wageningen

Agric. Colon. - *l'Agricoltura Coloniale*

ALF - Herbarium, Institut d'Élevage et de Médecine Vétérinaire des Pays Tropicaux, Maisons Alfort, France

alt. - altitude

Amer. - American

Ann (di) Bot. (Roma) - *Annali di Botanica*, Roma

Ann. Cons. Bot. Geneve - *Annales Conservatoire et Jardin Botanique de la Ville de Genève*

Ann. Miss. /Missouri Bot. Gard. - *Annals of the Missouri Botanical Garden*

Ann. Naturh. Mus. Wien. - *Annalen des k.k. naturhistorischen (Hof)museums*, Wien

Ann. R. 1st. Bot. Roma - *Annali di Botanica*, Roma

Ann. Sc. Nat. - *Annales des Sciences naturelles*, Paris

Append. - Appendix

AR - Arsi region, Ethiopia

Arch. Bot. Caen - *Archives de Botanique*, Caen

Arkivr Bot. - *Arkivr för Botanik*

auct. - 'auctorum' Latin for 'of authors'; used to show that a name has been commonly misapplied to a different species from that to which it was originally given

Aug. - August

B - Botanischer Garten und Botanisches Museum, Berlin, West Germany

B-W (also sometimes mistakenly as B-WILLD) - Herbarium Willdenow, Berlin, Germany

BA - Bale region, Ethiopia

Beih. Bot. Centr. - *Beihefte zum Botanischen Centralblatt*

Belg. Journ. Bot. - *Belgium Journal of Botany*

BG - Herbariet, Botanisk Institut, Universitetet i Bergen, Bergen, Norway

BM - Herbarium, The Natural History Museum, formerly The British Museum (Natural History), London, UK

BM-SL - Sloane Herbarium, London, England, UK

BOL - Bolus Herbarium, University of Cape Town, Cape Town, South Africa

Bol. Soc. Brot. - *Boletim da Sociedade Broteriana*, Coimbra

Boll. R. Orto. Bot. Palermo - *Bollettino del R. Orto Botanico*, Palermo

Bot. - botany

Bot. Jahrb. (Syst.) - *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie*, Leipzig

Bot. mag. - *The Botanical Magazine*

Bot. Not./Notiser - *Botaniska Notiser*, Lund

Bot. Tidsskr. - *Botanisk Tidsskrift*

BR - Herbarium, Jardin Botanique National de Belgique, Meise, Belgium

BREM - Herbarium, Übersee-Museum, Bremen, Germany

BRVU - Bruxelles Laboratorium voor Algemene Plantkunde en Natuurbeheer, Pleinlaan, Bruxelles, Belgium

Bull. - Bulletin

Bull. Br. Mus. Nat. Hist. (Bot.) - *Bulletin of the British Museum (Natural History)*, London

Bull. Herb. Boiss. - *Bulletin de l'Herbier Boissier*, Genève & Bâle

Bull. Jard. Bot. Etaj. Brux. - *Bulletin du Jardin botanique de l'Etat à Bruxelles*, Bruxelles

Bull. Jard. Bot. Nat. Belg. - *Bulletin du Jardin Botanique National de Belgique*, Bruxelles

Bull. Misc. Inf. - *Bulletin of Miscellaneous Information*, Royal Kew Botanic Gardens, Kew, London

Bull. Nat. Hist. Mus. Lond. (Bot.) - *Bulletin of the British Museum (Natural History)*, London

Bull. Séanc. Acad. r. Sci. - *Bulletin des Séances. Académie Royale des Sciences*, Paris

Bull. Soc. Bot. Fr./France - *Bulletin de la Société botanique de France*

Bull. Soc. Bot. Ital. - *Bollettino della Società Botanica Italiana*

Bull. Soc. Roy. Bot. Belgique - *Bulletin. Société Royale de Botanique de Belgique*

c - 'circa' Latin for 'about' or 'approximately'

C - (before a place name) central

C - Botanical Museum and Herbarium, Copenhagen, Denmark

CADU - Chilalo Agricultural Development Unit, Asella, Ethiopia

CAL - Central National Herbarium, Botanical Survey of India

cf. - 'confer' Latin for 'compare'

CGE - Herbarium, Botany School, University of Cambridge, UK

Cliff. - Cliffortianus

coll. - collector

cons./conserv. - 'conservandus' Latin for 'to be kept'

Consp. Fl. Afr. - *Conspetus Florae Africae*

Consp. Fl. Angol. - *Conspetus Florae Angolensis*

conv. - 'conservandum' Latin for 'conserved'

cult. - cultivated

Curtis' Bot. Mag. - *Curtis's Botanical Magazine*, London

dbh - diameter at breast height

DES - Herbarium, Desert Botanical Garden, Phoenix, U.S.A.

- destr. - destroyed
diam. - diameter
E - east
e.g. - 'exempli gratia' Latin for 'for example'
EA (also sometimes mistakenly as EAH) - East African Herbarium, Nairobi, Kenya
ed. - edition, edited by, or editor(s)
EE - Eritrea east, below 1000 m contour to the Red Sea coast on the east
Encyc. - Encyclopaedia
Eng. - English
Engl. (Bot.) Jahrb. - *Engler Botanische Jahrbücher*
Engl. Pflanzenreich - *Engler Pflanzenreich*
Enum., also Enum. Pl. Aeth. or Enum. Plant Aethiop. - *Enumeratio Plantarum Aethiopiae*
Enum. Plant. Sperm. - *Enumeratio Plantarum Aethiopiae Spermatophyta*
et al. - 'et alii' Latin for 'and others'
etc. - 'et cetera' Latin for 'and the rest'
ETH - The National Herbarium, Addis Ababa University, Ethiopia
Ethiop. - Ethiopia
EW - Eritrea west, from above 1000 m contour on the east to the border with Sudan on the west
ex - Latin for 'without'
excl. - 'exclusus' Latin for 'excluded'
f. - 'filius' Latin for 'son'
Fam. - family (of plants)
Fam. of Fl. Plants in Ethiopia - *Families of Flowering Plants in Ethiopia*
Feddes Repert. - *Feddes Repertorium*
FHO - Forest Herbarium, Department of Forestry, University of Oxford, UK
FI - Herbarium Universitatis Florentinae, Museo Botanico, Firenze, Italy
fide - Latin for 'according to'
Field Mus. Nat. Hist. - *Field Museum of Natural History*, USA
Fig./fig. - figure
FL-W - Herbarium Michelianum, Firenze, Italy
Fl. Afr. Cent. (also Fl. d'Afrique Centrale) - *Flore d'Afrique Centrale*
Fl. Anal. d'Ital. - *Flore Annali d'Italiana*
Fl. Bras. - *Flora Brasiliensis*
Fl. Cameroun - *Flore du Cameroun*
Fl. Cap. - *Flora Capensis*
Fl. Congo - *Flore du Congo Belge*
Fl. d'Afrique centrale - *Flore d'Afrique Centrale*
Fl. du Congo, du Rwanda et du Burundi - *Flora du Congo, du Rwanda et du Burundi*
Fl. Eth. - *Flora of Ethiopia*
Fl. Europaea - *Flora Europaea*
Fl. Ital. - *Flora Italica*
Fl. Males. /Malesiana - *Flora Malesiana*
Fl. Mascareignes - *Flora de Mascareignes*
Fl. Maurit. & Seych. - *Flora of Mauritania and Seychelles*
Fl. Rwanda - *Flore du Rwanda*
Fl. S. Africa - *Flora of Southern Africa*
Fl. Som. - *Flora Somalia*
Fl. Somalia - *Flora of Somalia*
Fl. South Af. - *Flora of Southern Africa*
Fl. Sudan - *Flora of the Sudan*
Fl. Trop. Afr. - *Flora of Tropical Africa*
Fl. Trop. E. Afr. - *Flora of Tropical East Africa*
Fl. W. Trop. Afr. - *Flora of West Tropical Africa*
Fl. Zam./Zamb./Zambesiaca - *Flora Zambesiaca*
Forest Fl. North. Rhodesia - *Forest Flora of Northern Rhodesia*
FR - Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt, Germany
fragm. - fragment
Fragm. Bot. - *Fragmenta Botanica*
fructu minimo - Latin for 'small fruited'
FT - Erbario Tropicale di Firenze, Firenze, Italy
G - Herbarium, Conservatoire et Jardin botaniques, Genève, Switzerland
GD - Gondar region, Ethiopia
GE - Erbario dell' Instituto Botanico 'Hanbury' e Orto Botanico dell' Università di Genova, Genova, Italy
Gen. Pl. - *Genera Plantarum*
Gen. Sp./Spec. Orch. Pl. - *The Genera and Species of Orchidaceous Plants*
Genera of Fl. Plants - *Genera of Flowering Plants*
GG - Gamu Gofa region, Ethiopia
GJ - Gojam region, Ethiopia
GOET - Systematisch-Geobotanisches Institut, Göttingen, Germany
H - Herbarium, Botanical Museum, University of Helsinki, Finland
HA - Hararge region, Ethiopia
HAL - Martin-Luther-Universität, Sektion Biowissenschaften, Wissenschaftsbereich Geobotanik und Botanischer Garten, Halle, Germany
HBG - Herbarium, Institut für Allgemeine Botanik und Botanischer Garten, Hamburg, Germany
HEID - Institut für Systematische Botanik der Universität Heidelberg, Heidelberg, Germany
Herb. - herbarium
Herb. Linn. Soc. London - Herbarium of the Linnean Society of London
Herb. Thouin - Herbarium of Thouin
Herbar. Amboin. - *Herbarium Amboinense*
Hist. Acad. Roy. Sci. - *Histoire de l'Académie Royale des Sciences*
holo. - holotype
holoneo. - holoneotype
hort. - 'hortorum' Latin for 'of gardens'
Hort. (Ind.) Malab. - *Hortus Indicus Malabaricus*
I.A.R. - Institute of Agricultural Research, Ethiopia
Ibid - 'Ibidem' Latin for 'in the same place'
ICBN - *International Code of Botanical Nomenclature*
Icon. Pl. Rar. - *Icones Plantarum Rariorum*
IDC - Inter Documentation Company, Poststrasse, Zug, Switzerland
IECAMA - (also sometimes IECA) - Imperial Ethiopian College of Agriculture and Mechanical Arts, now Alemaya University of Agriculture, Ethiopia
IL - Ilubabor region, Ethiopia

- ILCA - International Livestock Centre for Africa (now International Livestock Research Institute), Addis Ababa, Ethiopia
- illus. - illustration
- in sched. - 'in schedula' Latin for 'on a herbarium label'
- in syn. - Latin for 'in synonymy'
- incl. - including
- Indet - indeterminate
- Indian J. Bot. - *Indian Journal of Botany*
- ined. - 'ineditus' Latin for 'the item is being prepared for publication'
- Inst. - *Institutiones Rei Herbariae*
- Is. - Islands
- iso. - isotype
- isolecto. - isolectotype
- isoneo. - isoneotype
- isosyn. - isosynotype
- J. Agri. trop. Bot. Appl. - *Journal d'Agriculture Tropicale et de Botanique Appliquée*
- J. Arn. Arb. - *Journal of the Arnold Arboretum*
- J. Bot. - *The Journal of Botany*
- J. E./East Afr. Nat. Hist. Soc. - *Journal of the East African Natural History Society and National Museum*
- J. Linn. Soc. (Bot.) - *Journal of the Linnean Society of London (Botany)*
- J. Roy. Hort. Soc. - *Journal of the Royal Horticultural Society*
- J. S. Afr. Bot. - *Journal of South African Botany*
- J. South Afr. Bot. Suppl. - *Journal of South African Botany, Supplement*
- JE - Herbarium Haussknecht, Friedrich-Schiller-Universität, Jena, Germany
- Jimma Agric. Tech. School - Jimma Agriculture and Technical School
- Journ. Linn. Soc. - *Journal of the Linnean Society of London*
- Journ. S. Afr. Bot. Suppl. - *Journal of the South African Botany Supplement*
- K - The Herbarium, Royal Botanic Gardens, Kew, UK
- K. Svenska Vet.-Akad. Handl. N.F. - *Kongliga Svenska Vetenskaps-Akademiens Handlingar Ny Följd*
- Kew Bull. - *Kew Bulletin*, London
- Kew Bull. Add. Ser. - *Kew Bulletin Additional Series*
- KF - Kefa region, Ethiopia
- KIEL - Botanisches Institut der Universität Kiel, Biologiezentrum Olshausenstrasse, Kiel, Germany
- L - Rijksherbarium, Leiden, Netherlands
- L. - lake
- l.c. - 'loco citato' Latin for 'in the place cited'
- LD - Botanical Museum, Lund, Sweden
- LE - Herbarium of the Department of Higher Plants, V.L. Komarov Botanical Institute of the Academy of Sciences, St. Petersburg (Leningrad), Russia
- lecto. - lectotype
- leg. - 'legit' Latin for 'collected by'
- LINN - Herbarium, The Linnean Society of London, London, England
- LISU - Museu, Laboratório e Jardim Botânico, Lisboa, Portugal
- loc. cit. - 'loco citato' Latin for 'at the place cited'
- LUB - Herbarium, Naturhistorisches Museum zu Lübeck, Lübeck, Germany
- LY - Herbiers de l'Université de Lyon, Villeurbanne, France
- M - Herbarium, Botanische Staatssammlung, München, Germany
- MA - Herbarium, Jardín Botánico, Madrid, Spain
- Man. Cult. Plants - *Manual of Cultivated Plants*
- Mem. Inst. Sc. Madag. - *Mémoires de l'Institut Scientifique de Madagascar*
- Mem. N. Y. Bot. Gard. - *Memoirs of the New York Botanic Garden*
- Mem. Wernerian (Nat. Hist.) Soc. - *Memories of the Wernerian (Natural History) Society*
- MHU - Makerere Herbarium, Makerere University, Kampala, Uganda
- Miss. Biol. Borana - *Missione Biologica nel Paese dei Borana*
- MO - Missouri Botanical Garden, St Louis, USA
- Monogr. Afr. Pfl. -Fam. - *Monographien Afrikanischer Pflanzenfamilien*
- Monogr. Afr. Pfl. -Fam. Und. -Gatt. - *Monographien Afrikanischer Pflanzenfamilien und Gattungen*
- MPU - Institut de Botanique, Montpellier, France
- Mt - mountain
- Mts - Mountains
- N - north
- Nat. Herb. - National Herbarium (of Ethiopia)
- NE - northeast
- neo. - neotype
- NNW - north-northwest
- no. - number
- nom. - 'nomen' Latin for 'name'
- nom. confus. - 'nomen confusum' Latin for 'confused name'
- nom. cons./conserv. - 'nomen conservandum' Latin for 'conserved name'
- nom. illeg./illegit. - 'nomen illegitimum' Latin for 'illegitimate name'
- nom. nov. - 'nomen novum' Latin for 'new name'
- nom. nud. - 'nomen nudum' Latin for 'naked name'; a name published without a description of the taxon
- nom. superfl. - 'nomen superfluum' Latin for 'a superfluous name'
- nomen illegit. - 'nomen illegitimum' Latin for 'illegitimate name'
- non sens. str. - 'non sensu stricto' Latin for 'not in the strict sense'; not in the same sense as the original author of the group
- Nordic./ Nord. J. Bot. - *Nordic Journal of Botany*
- Norw. Journ. Bot. - *Norwegian Journal of Botany*
- Notes R. Bot. Gard. Edinburgh - *Notes from the Royal Botanic Gardens Edinburgh*
- Nouv. Bull. Sci. Soc. Philom. Paris - *Nouveau Bulletin des Sciences par la Société Philomat(h)ique de Paris*
- Nov. Pl. Gen. - *Nova Plantarum Genera*
- nr. - near
- NTM - Herbarium, Muséum d'Histoire Naturelle, Nantes, France
- Nuov. Bot. Ital. - *Nuovo Botanico Italiano*
- Nuovo Giorn. Bot. Ital. - *Nuovo Giornale Botanico Italiano*

NW - northwest

Öfvers. K. Vet.-Akad Frh. - *Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar*

Op. Bot. - *Opera Botanica*

op. cit. - 'opera citato' Latin for 'in the work already cited'

Orch. E. Afr. - *Orchids of East Africa*

OXF - Herbarium, Department of Botany, University of Oxford, England

P - Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France

P-LA - Lamarck Collection, Paris, France

p. - page

p.p. - 'pro parte' Latin 'for in part'; used to show that only a part of the group as circumscribed by the original author is being used by the later author

PAL - Erbario Siculo and Erbario Generale, Palermo, Italy

PAT - Laboratoire d'Ethnobotanique, Muséum National d'Histoire Naturelle, Paris, France

Phyta Canar. - *Phyta Canariensis*

pp. - pages

PRE - National Herbarium, Botanical Research Institute, Pretoria, South Africa

pro maiore parte - Latin for 'for the major part'

prob. - probable or probably

Prodr. - 'prodromus' Latin for 'forerunner', a preliminary work which should be followed by a more complete one

prov. - province

pt. - planta

R. - river

Result. Sci. Miss. Stef-Paoli - *Resultati Scientifici della Missione Stefanini-Paoli nella Somalia Italiana*

RO - Erbario dell'Istituto Botanico dell'Università di Roma, Roma, Italy

Roy. Bot. Gard. Edin. - The Royal Botanic Garden Edinburgh

S - Herbarium, Swedish Museum of Natural History (Naturhistoriska riksmuseet), Stockholm, Sweden

S - south

S. Afr. J./ Journ. Bot. - *South African Journal of Botany*

S. Afr. Journ. Bot. Suppl. - *South African Journal of Botany Supplement*

s. l./lat. - 'sensu lato' Latin for 'in a broad sense'

s. str. - 'sensu stricto' Latin for 'in a narrow sense'

s.n. - 'sine numero' Latin for 'without a number'

SD - Sidamo region, Ethiopia

SE - southeast

Sect. - Section (of a genus)

Sedges and Rushes of E. Afr. Append. - *Sedges and Rushes of East Africa, Appendix*

sensu - Latin for 'in the sense of'

sensu lato - Latin for 'in a broad sense'

Sept. - September

Ser./ser - Series

sine loc. - 'sine loco' Latin for 'place not cited'

sine relat. nom. - 'sine relatatum nomen' Latin for 'without a related name'

SINET: Eth. J. Sci. - *SINET: An Ethiopian Journal of Science*

Sitz. Ber. Kgl. Preuss. Akad. - *Sitzungen-Berichte der Königl. Preussischen Akademie*

Sitzb. Kaiserl. Akad. Wiss. Wien - *Sitzungsblatt der Kaiserlichen Akademie der Wissenschaften, Wien*

sp. - species (singular)

spec. - specimen

spp. - species (plural)

SRGH - National Herbarium and Botanic Garden, Causeway, Harare, Zimbabwe

STR - Institut de Botanique de l'Université Louis Pasteur, Strasbourg, France

SU - Shewa upland, above and to the west of 1000 m contour, Ethiopia

Subgen. - subgenus

subsp. - subspecies (singular)

subsp. - subspecies (plural)

Suppl. - supplement

Svensk bot. Tidskr./ Tidskr. - *Svensk Botanisk Tidskrift*

SW - southwest

Symb. Bot. Ups. - *Symbolae Botanicae Upsalienses*

syn. - synonym

Syst. Nat. - Systema Natural

t./tab. - 'tabula' Latin for 'illustration'

TCD - Herbarium, School of Botany, Trinity College, Dublin, Ireland

Tent. Fl. Abyss. - *Tentamen Florae Abyssinicae*

TO - Herbarium, Museum Botanicum Horti Taurinensis, c/o Istituto ed Orto Botanico dell'Università, Torino, Italy

Trans. Linn. Soc. Lond. - *Transactions of the Linnean Society of London*

Trans. Linn. Soc. Zoo - *Transactions of the Linnean Society (Zoology)*

Trop. - tropical

TRV - Transvaal Museum, Pretoria, South Africa

TU - Tigray region, Ethiopia

TUB - Herbarium, Institut für Biologie I, Tübingen, Germany

U. S. Nat. Herb. - *United States National Herbarium*

Univ. California Public. Bot. - *University of California Publications in Botany*

UPS - The Herbarium, University of Uppsala, Uppsala, Sweden

Ups. Kenya Wild Fl. - *Upland Kenya Wild Flowers*

US - United States National Herbarium, Smithsonian Institution, Washington, U.S.A.

var. - variety

Verz. Vorl. Akad. Braunsberg S. -Sem - *Verzeichnis der Vorlesungen an den Königl. Akademie zu Braunsberg*

vol. - volume of a published work which appears in more than one part

W - Naturhistorisches Museum, Wien, Austria

W - west

WAG - Herbarium Vadense, Laboratory for Plant Taxonomy and Plant Geography, Netherlands

WG - Welega region, Ethiopia

WIR - Herbarium, The All-Union Institute of Plant Industry, St Petersburg (Leningrad), Russia

Wiss. Erge. D. Zentr. Afr. Exp. - *Wissenschaftliche Ergebnisse der Deutschen Zentral-Afrika Expedition*

WNW - west north-west

WRSL - Herbarium, Department of Botany, Museum of
Natural History, Wrocław, Poland

WU - Welo region, Ethiopia

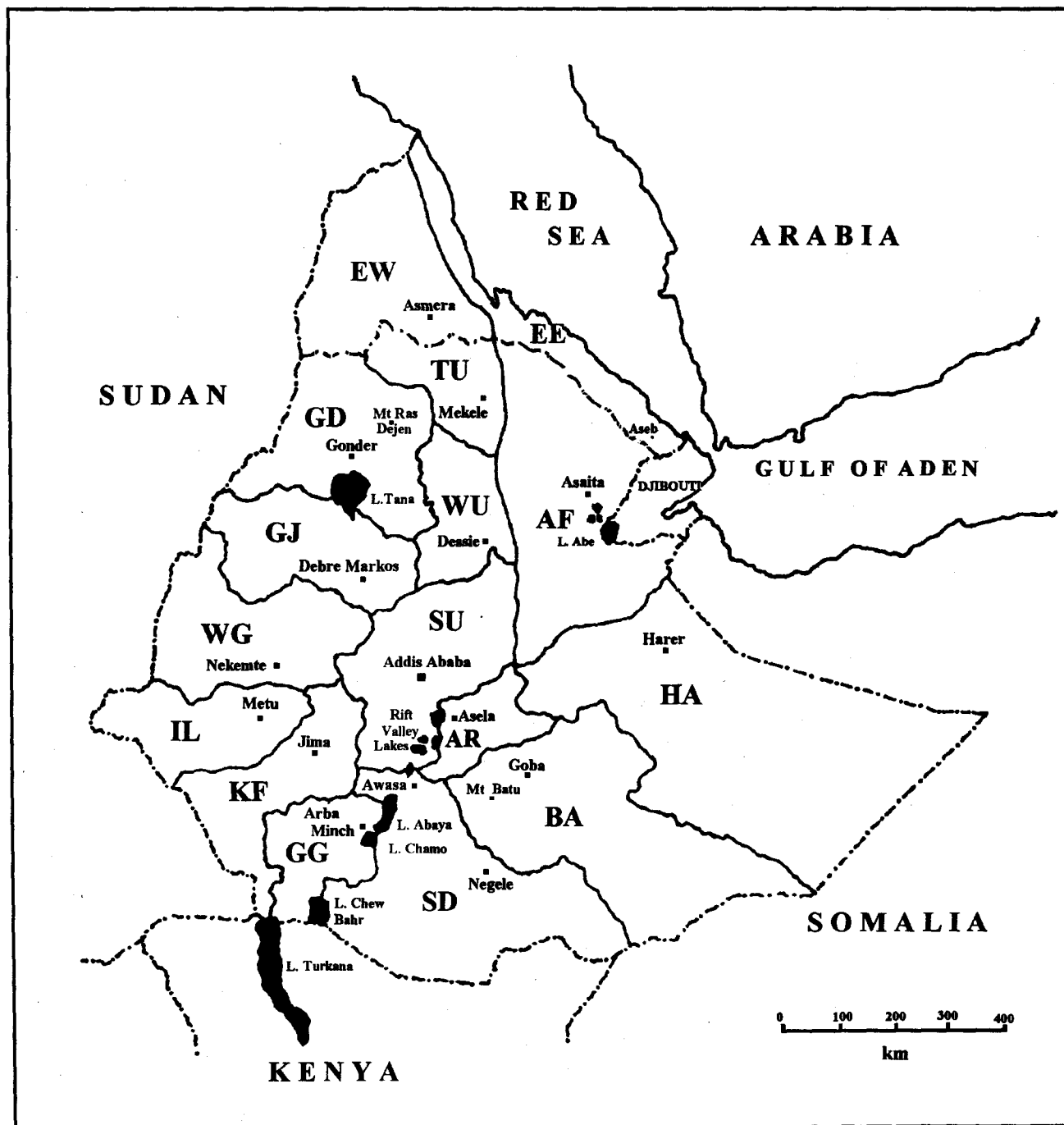
Y - Samuel James Record Memorial Collection, School
of Forestry, Yale University, New Haven, U.S.A.

Z - Institut für systematische Botanik der Universität
Zürich, Zürich, Switzerland

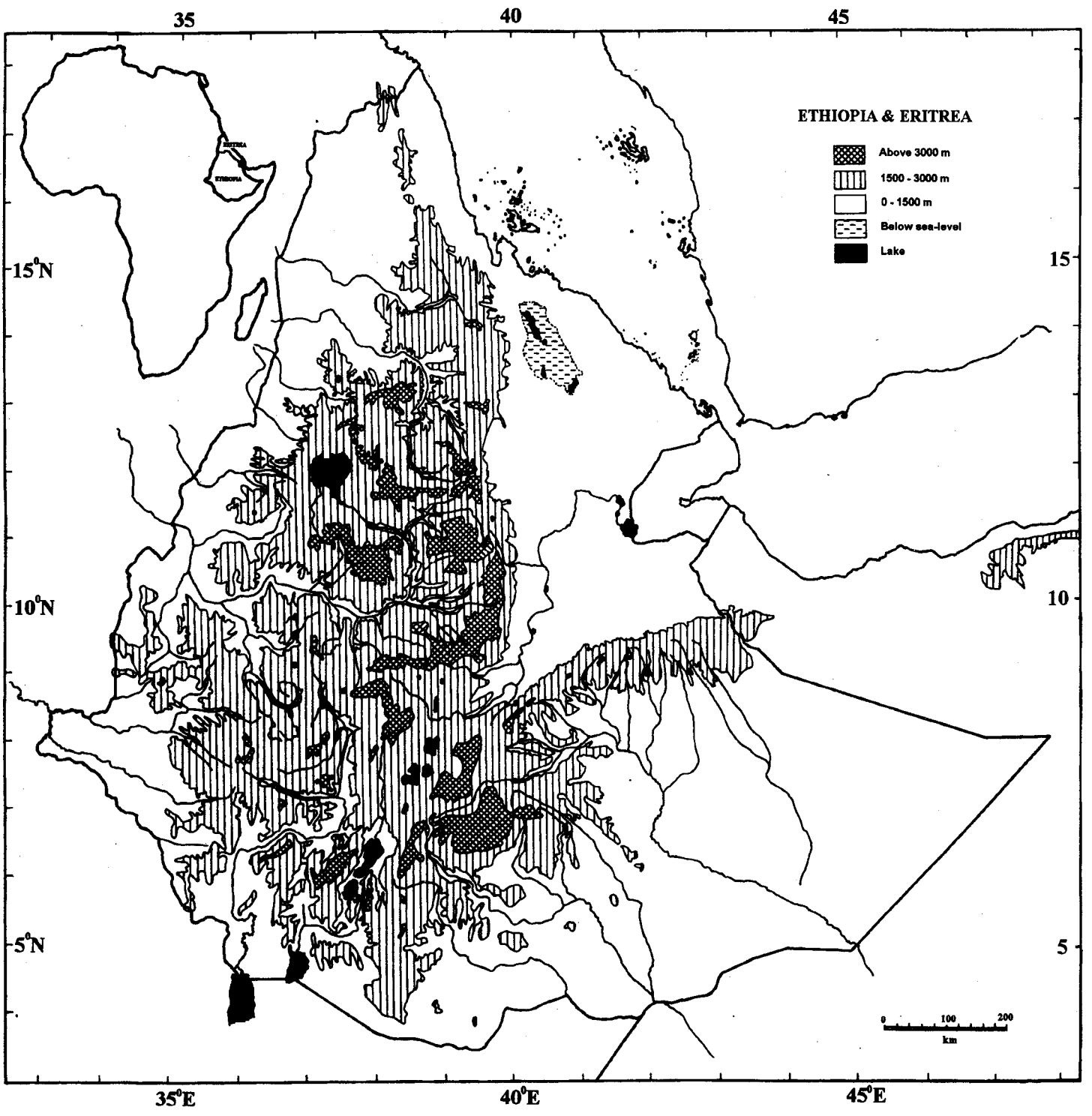
MAP OF THE FLORISTIC REGIONS OF ETHIOPIA AND ERITREA

(These are the regions used in Volume 3 and kept in this volume for continuity. They do not bear any relation to the present administrative structures.)

- | | |
|--|-----------------------|
| EE - Eritrea East, below and to the east of the 1000 m contour | AR - Arsi region |
| EW - Eritrea West, above and to the west of the 1000 m contour | WG - Welega region |
| AF - Afar region, below and to the east of the 1000 m contour to the Eritrean border in the east and the Harerge border in the south | IL - Ilubabor region |
| TU - Tigray region, above and to the west of the 1000 m contour | KF - Kefa region |
| GD - Gonder region | GG - Gamo Gofa region |
| GJ - Gojam region | SD - Sidamo region |
| WU - Welo region, above and to the west of the 1000 m contour | BA - Bale region |
| SU - Shewa region, above and to the west of the 1000 m contour | HA - Harerge region |



MAP OF ETHIOPIA AND ERITREA SHOWING MAJOR PHYSIOGRAPHIC FEATURES



KEY TO THE MONOCOTYLEDON FAMILIES¹ IN THE FLORA OF ETHIOPIA AND ERITREA

by Sebsebe Demissew* & Inger Nordal**

Burger, *Families of Flowering Plants in Ethiopia* (1967); Hutchinson, *The Families of Flowering Plants*, 3rd ed. (1973); Dyer, *The Genera of Southern Africa Flowering Plants 2* (1976); Dahlgren, Clifford & Yeo, *The Families of Monocotyledons* (1985).

1. Plants aquatic, either floating on the surface of water or submerged (they may be found lying flat on mud when water levels drop), or growing erect with only a small part above the surface.

GROUP 8

- Plants growing upright out of water (above water level) or in soil, on rocks or other plants; neither floating or submerged. 2

2. Ovary of 2 or more free carpels with separate styles and stigmas. **GROUP 1**

- Ovary of 1 carpel or 2 or more united carpels with free or united styles. 3

3. Ovary superior; perianth present or absent 4
– Ovary inferior or semi-inferior; perianth present 7

4. Perianth present, composed of 4 or more, free or united sepal-like or petal-like segments, not reduced to bristles or scales. 5
– Perianth absent or reduced to bristles or to 1–3 scales. 6

5. Perianth composed of separate calyx and corolla, the calyx often herbaceous, the corolla usually of petals or otherwise different from the calyx, the sepals and petals either free or united among themselves, but never united into a single perianth tube. **GROUP 2**

- Perianth composed of similar segments in 2 rings, usually petal-like, but sometimes herbaceous or dry and glume-like, either free or united into a single perianth tube. **GROUP 3**

6. Flowers small, usually called florets, bisexual or unisexual, arranged in small spikes (spikelets) with scale-like bracts (glumes or lemmas), spikelets sometimes 1-flowered; grasses and sedges. **GROUP 4**

- Flowers very small, unisexual, without scale-like bracts, usually arranged in compact masses along a central cylinder, or solitary in small aquatic plants. **GROUP 5**

7. Perianth composed of separate calyx and corolla, calyx herbaceous or otherwise different from the petal-like corolla; sepals and petals either free or united among themselves, but never united into a single perianth tube. **GROUP 6**

- Perianth composed of similar segments, usually 6 in 2 rings, sometimes 3 in 1 ring, usually petal-like, either free or united into a single perianth tube. **GROUP 7**

GROUP 1

Plants where the ovary (and usually also the fruit) is made of 2 or more free carpels each with its own style and stigma.

1. Large terrestrial plants; leaves pinnate or palmate. 215. ARECACEAE (PALMAE)

- Aquatic or marsh herbs; leaves simple. 2

2. Plants entirely marine. 179. CYMODOCEACEAE
– Plants in fresh or brackish water. 3

3. Perianth absent or cupular; stamens 1–2. 4
– Perianth present, composed of 1–6 free segments; stamens 4–6. 5

4. Flowers bisexual, in spikes above water during anthesis, spikes consisting of 2 naked flowers facing opposite directions and inserted at unequal heights; carpels 4–8 with short stalks in fruit and appearing as an umbel.

177. RUPPIACEAE

- Flowers unisexual, submerged, as an axillary cyme or solitary; carpels 1–9, sessile or with short stalks in fruit. 178. ZANNICHELLIACEAE

5. Flowers in whorls or simple compound umbels, sometimes spicate, bracts present; perianth of 3 sepals and 3 petals, or petals sometimes absent; plants aquatic and terrestrial.

174. ALISMATACEAE

- Flowers in spikes, bracts absent; perianth of 1–4 similar segments; plants aquatic. 6

6. Leaves all basal; spikes simple or 2-branched on elongated peduncles, at first covered in a spathe; perianth segments 1–3; stamens usually 6, filaments long; ovules 2 or more in each carpel. 173. APONOGETONACEAE

- Leaves on long stems; spikes simple in axillary peduncles, without a spathe; perianth segments usually 4; stamens usually 4, anthers sessile; ovules 1 in each carpel.

176. POTAMOGETONACEAE

GROUP 2

Flowers with both calyx and corolla and a superior ovary. Sepals and petals usually free or united among themselves but never forming a single perianth tube.

1. Large terrestrial plants with woody trunks; leaves pinnate or palmate. 215. ARECACEAE (PALMAE)

- Small herbs; leaves simple. 2

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1. Group 8 also includes aquatic dicotyledons, ferns and the algae Characeae because it can be quite difficult to quickly determine the group for an aquatic plant.

2. Flowers covered with brown scales; ovary 1-locular with many ovules; placentation parietal.

208. XYRIDACEAE

- Flowers with white bracts or enclosed in green folded bracts; ovary 2–3-locular with 1 or more ovules; placentation axile or apical. **3**

3. Flowers unisexual (monoecious), in white bracteate heads on elongated peduncles; corolla inconspicuous, not brightly coloured, often minute in the male flowers; style branched.

209. ERIOCAULACEAE

- Flowers bisexual or polygamous, in open or congested cymes or panicles often subtended by folded or boat-shaped bracts; corolla conspicuous, usually brightly coloured, blue or yellow; style unbranched. **207. COMMELINACEAE**

GROUP 3

Flowers with a perianth of 6 similar segments and a superior ovary. Perianth usually petal-like, but sometimes sepal-like or dry and glume-like, either free or united to form a single perianth tube.

1. Rushes; leaves narrow or reduced to sheaths; perianth segments dry and glume-like or the inner hyaline. **211. JUNCACEAE**

- Aquatic plants or terrestrial herbs or climbers; leaves needle-like or with a well-developed blade or absent and replaced by leaf-like stems; perianth segments petal-like or sepal-like. **2**

2. Aquatic herbs; flowers in spikes or racemes. **3**

- Plants terrestrial; flowers in various types of inflorescence. **4**

3. Perianth segments 6, petal-like, united below into a tube; ovary 1–3-locular with numerous ovules in each locule; fruit a capsule; leaves with an expanded ovate lamina, or linear and submerged. **201. PONTEDERIACEAE**

- Perianth segments 4, sepal-like, free; ovary 1-locular with 1 ovule; fruit a drupe; leaves narrowly linear or filiform, submerged.

176. POTAMOGETONACEAE

4. Inflorescence a spadix (made up of many small, unisexual, flowers closely packed on a central axis) enclosed in a spathe; female flowers below, male above; ovary 1–2-locular.

181. ARACEAE

- Inflorescence not a spadix enclosed in a spathe; flowers bisexual or unisexual; ovary 3-locular. **5**

5. Leaves reduced to scales or spines, their function often fulfilled by modified green branches (cladodes) or flattened leaf-like branches (phyloclades). **6**

- Solitary leaf or leaves well developed, sometimes appearing after the flowers. **7**

6. Flowers solitary or in umbel-like or raceme inflorescences; inflorescences axillary or on tips of branches; ovary 3-locular with 2–12 ovules in each locule; seeds black.

186A. ASPARAGACEAE

- Flowers in racemes on the upper or lower surface

of the phylloclades (*Ruscus*); ovary 1 or 3-locular with 1 or 2 ovules in each locule; seeds pale.

186B. RUSCACEAE

7. Fruit a berry or a drupe. **8**
– Fruit a capsule or schizocarp. **10**

8. Flowers unisexual (dioecious); leaves with reticular venation; stipular tendrils present; stems often prickly. **185. SMILACACEAE**

- Flower bisexual; leaves with parallel venation; stipular tendrils absent. **9**

9. Plants either with a more or less woody trunk and leaves in rosettes at ends of branches, or with rhizomes and short stems producing leaves in clumps; leaf-tip acute; fruit a berry.

187. DRACAENACEAE

- Woody climbers with narrow, solid, cane-like stems; leaves in 2 ranks; leaf-tips ending in tendrils; fruit a drupe.

213. FLAGELLARIACEAE

10. Flowers in spikes; bracts mainly absent, sometimes bracts found with lowest flowers; perianth inconspicuous, sepal-like; fruit a schizocarp. **175. JUNCAGINACEAE**

- Flowers with bracts (except *Dermiopsis* in Hyacinthaceae); perianth conspicuous, petal-like; fruit a capsule. **11**

11. Inflorescence on stems or on branches together with leaves. **12**

- Inflorescence on leafless stems. **14**

12. Plants with corms or rhizomes. **13**

- Plants with bulbs. **199A. LILIACEAE**

13. Pistil with 3 separate styles.

198. COLCHICACEAE

- Pistil with 1 style. **190. ANTHERICACEAE**

14. Perennial herbs with most leaves reduced to scales, only 1–3(–4) leaves developing; tuber globose or sausage-like; seeds covered with long hairs. **193. ERIOSPERMACEAE**

- Annual or perennial herbs with normal leaves; rhizomes or bulbs present; seeds glabrous. **15**

15. Plants with bulbs. **16**

- Plants commonly with corms or rhizomes. **17**

16. Inflorescences spikes or racemes.

194. HYACINTHACEAE

- Inflorescence umbel-like. **195. ALLIACEAE**

17. Rhizomes white when cut, plants not producing anthraquinones; seeds without arils, black and glossy; perianth white with green or brown stripes. **190. ANTHERICACEAE**

- Rhizomes yellow when cut, plants generally producing anthraquinones; seeds generally with arils which cover them giving a dull, brown-grey, appearance; perianth often yellow or red, rarely white. **18**

18. Leaves thick and fleshy, margins usually with spiny teeth; perianth tubular. **192. ALOACEAE**

- Leaves relatively thin, rarely fleshy, margins without spiny teeth; perianth segments α pe ϕ res to base, not succulent. **19**

19. Inflorescence a raceme or spike, usually several

flowers open at the same time; seeds covered with an aril making them dull black or grey.

191. ASPHODELACEAE

- Inflorescence a scorpioid cyme, usually only one flower in a cluster open at a time; seeds with a shiny smooth black surface.

199B. HEMEROCALLIDACEAE

GROUP 4

Grasses and sedges: leaves mostly simple linear with parallel veins. Flowers small, generally called florets, perianth reduced to scales, hairs or bristles, or absent, enclosed in bracts and arranged in few to many-flowered spikelets. Fruit a 1-seeded achene.

1. Grasses: stems usually with hollow internodes, rounded or laterally compressed; leaf-sheaths usually open; inflorescence of spikelets with 2 glumes (empty bracts) at the base and 2 or more florets (rarely reduced to 1); each floret enclosed by a lemma (an outer bract) and palea (inner bracteole); perianth absent or represented by 2-3 minute scales (lodicules); seed usually united to the pericarp of the fruit.

214. POACEAE

- Sedges: stems usually solid, often 3-angled; leaf-sheaths usually closed; inflorescence of 1 or more florets variously arranged; each floret enclosed by a single glume, perianth of scales or bristles or absent; seed free from the pericarp in the fruit.

212. CYPERACEAE

GROUP 5

Plants with very small flowers, not enclosed in scale-like bracts, perianth reduced to scales or bristles or absent. Flowers solitary in small aquatic plants or crowded on a central cylinder.

1. Minute aquatic herbs, the plant body reduced to a thallus-like 'frond' without any roots or with 1 or more pendent rootlets. **182. LEMNACEAE**

- Larger herbs, aquatic or terrestrial; leaves (or solitary leaf) present, well developed; roots well developed. **2**

2. Submerged aquatic herbs of brackish water with \pm elongated stems and narrow linear leaves.

180. NAJADACEAE

- Plants terrestrial or aquatic but not submerged. **3**

3. Floating aquatic herbs, stemless with a rosette of sessile leaves.

181. ARACEAE

- Plants terrestrial, herbs or woody climbers. **4**

4. Leaves narrow, linear; inflorescence a dense cylindrical spike without any covering spathe; swamp herbs, often growing in water at the base.

210. TYPHACEAE

- Leaves (or solitary leaf) broad, often deeply divided; inflorescence a spadix (made up of many small, unisexual, flowers closely packed on a central axis) enclosed in a spathe; terrestrial herbs or climbers or epiphytes. **181. ARACEAE**

GROUP 6

Flowers with an inferior or partly inferior ovary and perianth made of separate calyx and corolla. Sepals and petals either free or united among themselves, but never forming a single perianth tube.

1. Aquatic herbs; flowers regular.

172. HYDROCHARITACEAE

- Terrestrial or epiphytic herbs; flowers irregular. **2**

2. Leaf-margins toothed; inflorescence fleshy; fertile stamens 6.

202B. BROMELIACEAE

- Leaf-margins entire; inflorescence herbaceous or woody; fertile stamens 5 or fewer. **3**

3. Inflorescences with horny, beak-like, lower bracts holding the flowers horizontal.

203B. STRELITZIACEAE

- Inflorescences various, erect or hanging, without beak-like bracts. **4**

4. Plants with leaves generally 1.5 m or more long; fruit a banana with or without large black seeds embedded in pith; stems dying after fruiting.

203A. MUSACEAE

- Plants with leaves less than 1.5 m long; fruit a dry, 3-locular capsule. **5**

5. Stamens not accompanied by petaloid staminodes; pollen in special sacs (pollinia); flowers with the median petal forming a lip \pm different from the lateral petals. **200. ORCHIDACEAE**

- Stamen accompanied by 1 or more petaloid staminodes; pollen not in special sacs; flowers without a special lip. **6**

6. Outer tepals united; flowers bilaterally symmetric; anther with 4 pollen sacs, not petaloid. **7**

- Outer tepals free; flowers asymmetric; anther with 2 pollen sacs on one side only, petaloid. **8**

7. Leaves spirally arranged; oil cells lacking.

204B. COSTACEAE

- Leaves in 2 ranks; oil cells present.

204A. ZINGIBERACEAE

8. Leaves with blade tapering gradually into a sheath, spirally arranged; ovary and fruit surfaces warty; ovary 3-locular, with many ovules in each locule. **205. CANNACEAE**

- Leaves petiolate, in 2 ranks; ovary and fruit surfaces glabrous; ovary 3-locular with one ovule in each locule. **206. MARANTACEAE**

GROUP 7

Flowers with an inferior or partly inferior ovary and perianth made of similar usually petal-like segments, usually 6 in 2 rings. Segments either free or united to form a single perianth tube.

1. Aquatic herbs. **172. HYDROCHARITACEAE**
- Plants terrestrial or epiphytic, herbs or shrubs. **2**

2. Flowers unisexual; fruits 3-winged or 3-angled; mostly woody climbers. **183. DIOSCOREACEAE**

- Flowers bisexual; fruits not winged; plants herbaceous, mostly not climbing. **3**

3. Stamen 1; pollen held in special sacs (pollinia); ovary twisted. **200. ORCHIDACEAE**

- Stamen 3 or 6; pollen not in special sacs; ovary not twisted. 4
 - 4. Stamens 3. 197. IRIDACEAE
 - Stamens 6. 5
 - 5. Leaves with long petioles; blades much divided; bracts with long hanging appendages. 184. TACCACEAE
 - Leaves sessile or with a short false petiole; blades entire; bracts without long hanging appendages. 6
 - 6. Plants with leaves 1 m or more long, fibrous; inflorescence a panicle 2 m or more tall. 188. AGAVACEAE
 - Plants with leaves less than 1 m long; inflorescence less than 1 m tall. 7
 - 7. Flowers in umbel-like inflorescences (sometimes 1-flowered) subtended by 2 or more spathe-like bracts and borne on naked stems; underground part a bulb. 196. AMARYLLIDACEAE
 - Flower solitary or in racemes subtended by small bract; underground part a rhizome or corm. 8
 - 8. Herbaceous geophytes, underground part a tuber or corm; flowers yellow. 189. HYPOXIDACEAE
 - Plants with branched or unbranched fibrous stems densely clothed with persistent bases of old leaves; leaves clustered in apical part of branches; roots arising from stem bases; flowers white to pink. 202A. VELLOZIACEAE
- GROUP 8**
- Plants growing on or under water, freely floating or if rooted in the soil then not growing more than a few (5) centimeters above the water level, lying flat upon the mud during dry periods and not self-supporting. Herbaceous plants without woody stems.
- 1. Plants of ocean water or of salty water close to the ocean shore. 2
 - Plants of fresh or of only slightly salty water. 4
 - 2. Flowers enclosed in 2 opposite bracts; each ovary with 2 to 12 styles. 172. HYDROCHARITACEAE
 - Flowers not enclosed in 2 opposite bracts; each ovary with usually only one style. 3
 - 3. Flowers in the axils of leaves, bisexual or unisexual; perianth of 3 scales or absent; stamens with thread-like pollen. 178. ZANNICHELLIACEAE
 - Flowers in spikes, bisexual; perianth and bracts absent; stamens 2 with powdery pollen. 176. POTAMOGETONACEAE
 - 4. Plants small flat and circular or oval in outline, without leaves, each less than 1 cm long (plants often attached to each other and forming a group longer than 1 cm), floating flat upon the water surface, not attached to rocks or soil. 182. LEMNACEAE
 - Plants with a stem or stem-like portion and/or leaves, or if the stem is absent, then attached to rocks; if less than 1 cm long then with small overlapping leaves. 5
 - 5. Plants cabbage-like and freely floating, leaf rosette above water level; roots not attached to soil; male flowers reduced to several anthers on a stalk above a single ovary with many ovules (reduced female flower), both enclosed in a single tubular bract. 181. ARACEAE (*Pistia*)
 - Plants not cabbage-like and freely floating; leaves usually flat on or beneath surface. 6
 - 6. Leaves floating and round in outline but with 4 fan-shaped parts attached to the central leaf-stalk; dark-coloured nut-like bodies near base of leaf-stalk; a fern. MARSILEACEAE (*Marsilea*)
 - Leaves not as above. 7
 - 7. Plants only a few centimeters long, usually attached to rocks in fast moving water or in the spray of moving water, superficially looking like a liverwort or moss; leaves alternate or absent, flowers very small with usually 1 or 2 stamens and an ovary with 2 or 3 styles. 26. PODOSTEMONACEAE
 - Plants usually more than a few centimeters long with well developed leaves. 8
 - 8. Underwater leaves much divided and very narrow, with small (2 to 5 mm) round bladders that catch very small aquatic organisms; flowers usually on a stalk above the water, with 2 sepals, a 2-lipped corolla-tube, and 2 stamens. 162. LENTIBULARIACEAE
 - Underwater leaves without small bladders. 9
 - 9. Styles or stigmas 2 or more coming from separate ovaries (if more than 1 pistil is present) or from separate areas on the ovary (when only 1 pistil is present). 10
 - Style 1 or if 2 or more then coming from one point on the top of the ovary (ovary or pistil never more than 1), or flowers only male, without a pistil or pistil-like structure. 18
 - 10. Leaves large floating, over 20 cm wide, petiole attached at or near centre of blade; flowers usually over 2 cm in diameter. 11
 - Leaves usually less than 20 cm wide, petiole at or near edge of blade; flowers usually less than 2 cm in diameter. 12
 - 11. Petals 3; pistils 3 or more, separate from each other and from the receptacle of the flower, flowers yellow. 7. CABOMBACEAE
 - Petals many; pistil 1, made up of many carpels united below with the receptacle and separate only near the top. 9. NYMPHAEACEAE
 - 12. Pistils usually 4 or the single pistil with 4 styles and 4 locules. Leaves borne along the stem. 13
 - Pistils 3, 6, or more; leaves usually all arising from near the base of the plant. 16
 - 13. Flowers in spikes, bisexual; sepals 4, narrow at the base and bract-like; stamens 2 or 4; leaves broad and floating. 176. POTAMOGETONACEAE
 - Flowers in the axils of leaves; leaves narrow. 14
 - 14. Leaves in whorls, much divided with thread-like leaflets; pistil 1 with ovary 4-lobed. 51. HALORRHAGACEAE (*Myriophyllum*)
 - Leaves in opposite pairs or alternate, simple, narrow; pistils 4 or more. 15

15. Plant growing erect out of the water, often in dense masses; sepals 4, petals present.
88. CRASSULACEAE (*Crassula*)
- Plant growing submerged; sepals 3, petals absent. 178. ZANNICHELLIACEAE
16. Flowers in 2-branched spike-like inflorescences, sepals united and petal-like or spathe-like, petals absent; leaves with few parallel primary veins and many transverse secondary veins.
173. APONOGETONACEAE
- Flowers in umbels or racemes or solitary in the leaf-axils and in whorls around the stem. 17
17. Flowers usually solitary on a long stalk, with many pistils and stamens in each flower; sepals present; petals 5 or more; leaves lobed or much divided.
5. RANUNCULACEAE
- Flowers usually in umbels or whorls along the stem; sepals 3; petals 3 or absent; leaves entire. 174. ALISMATAACEAE
18. Flowers all male, lacking a pistil or pistil-like structure; no bisexual flowers present. 19
- Flowers with a pistil or pistil-like structure or at least some bisexual flowers present. 24
19. Stamen 1 in each flower. 20
- Stamens 2 or more in each flower. 22
20. Filament absent, the anther sessile and with 1 to 4 thecae (pollen chambers), the anther enclosed in a tubular bract; plants of brackish water; stems and leaves covered in spines.
180. NAJADACEAE
- Filament present, anther on a long and slender stalk; plants of fresh water; stems and leaves without spines. 21
21. Anthers with 1 theca (chamber) each; leaves with a blade, in whorls, at least some forming rosettes at the surface. 52. CALLITRICHACEAE
- Anthers with 2 thecae (chambers); leaves linear, alternate, 2 ranked or 3 together at a node, not forming floating rosettes. 178. ZANNICHELLIACEAE
22. Stamens 10 to 20 in each flower; leaves in whorls along the stem, with many slender divisions that usually have serrulate edges.
8. CERATOPHYLLACEAE
- Stamens 3 to 9 (rarely 10) in each flower; leaves in whorls or from the base of the plant. 23
23. Stamens 3 or 6 in each flower (if more than 6 stamens present the plant should have a few bisexual flowers); flowers in a whorl around the stem or sometimes in umbels; all leaves from the base of the plant. 174. ALISMATAACEAE
- Stamens 8 in each flower; leaves and flowers in whorls along the stem with usually 4 leaves and 4 flowers at each node, the leaves with many slender divisions with entire edges.
51. HALORRHAGACEAE (*Myriophyllum*)
24. Ovary-like structure minute (less than 3 mm long) with a wall with parallel spiral grooves; leaf-like structures borne in whorls along the stem (rough to the touch in *Chara* and smooth in *Nitella*). The algae CHARACEAE
- Ovary not minute nor with a wall of parallel spiral grooves, producing seeds. 25
25. Flowers naked, without perianth or subtending bracts, or with only 1 or 2 subtending bracts, not enclosed by tubular bracts. 26
- Flowers with perianth or subtended by 3 or more bracts, or within tubular bracts. 27
26. Pistil without subtending bracts, ovary with 2 or 4 styles and 1 locule with 1 basal ovule; the fruit not breaking up; plants of brackish water; stems and leaves covered in spines. 180. NAJADACEAE
- Pistil subtended by 2 bracts, ovary with 2 styles and 4 locules, each locule with 1 pendulous ovule; the fruit breaking up into 4 parts; plants of fresh water; stems and leaves without spines. 52. CALLITRICHACEAE
27. Flowers enclosed within 2 opposite bracts or within a tubular bract, ovary 1-locular and with 3 to 6 styles, the style often 2-branched; plants usually submerged. 172. HYDROCHARITACEAE
- Flowers not enclosed within 2 opposite bracts nor enclosed within a tubular bract. 28
28. Leaves opposite or whorled along the stem. 29
- Leaves alternate along the stem or all from the base. 31
29. Flowers with a 2-lipped corolla-tube or with an inferior ovary; the leaves usually opposite and not in whorls. 30
- Flowers lacking a 2-lipped corolla-tube, ovary not inferior; leaves often in whorls, usually very narrow or narrowly divided. 8. CERATOPHYLLACEAE
30. Petals united to form a 2-lipped corolla-tube; stamens 2 or 4; ovary superior. 160. SCROPHULARIACEAE
- Petals free, not forming a tube; stamens usually 4, 5, 8, or 10; ovary inferior. 49. ONAGRACEAE
31. Floating leaves round with a deep notch on one side, petiole attached to centre of blade; sepals 5; petals 5; stamens 5; petals with hairs. 154. MENYANTHACEAE
- Floating leaves with petiole attached at edge. 32
32. Petioles of some leaves with a thicker middle portion made up of spongy tissue. 33
- Petioles without a swollen portion between leaf base and blade. 34
33. Leaves more or less triangular in outline; sepals 4, petals 4; ovary 2-locular and half-inferior. 50. TRAPACEAE
- Leaves rounded in outline; sepals and petals alike in form and color, 3 and 3; ovary 1 or 3 locular, superior. 201. PONTEDERIACEAE
34. Ovary inferior, below sepal and petal attachment; fruit often with dry perianth or scars at the top where perianth has fallen off. 35
- Ovary superior, above sepal and petal attachment; fruit often with dry perianth or scars at the bottom where perianth has fallen off. 36

35. Styles 2; ovary with 2 locules and 1-ovule in each locule; flowers in umbels or heads.
 132. APIACEAE (UMBELLIFERAE)
 - Style 1 or none; ovary with usually 4 locules, 1 to many ovules in each locule; flowers solitary in leaf axils or in racemes or panicles.
 49. ONAGRACEAE
36. Leaves linear, without a definite petiole; ovary with 3 to 6 locules; fruit breaking up into 3 to 6 parts.
 175. JUNGAGINACEAE
- Leaves not linear, narrowly elliptical to rounded or arrow-shaped, a distinct petiole usually present. 37
37. Style and stigma 1; ovary with 1 or 3 locules and usually many ovules; leaves ovate or arrow-shaped with palmate or curved almost parallel venation. 201. PONTEDERIACEAE
- Styles (or stigmas) 2 or 3; ovary only 1 locule and 1 basal ovule; leaves elliptic with pinnate venation. 38. POLYGONACEAE

172. HYDROCHARITACEAE

by J.J. Symoens*

Cufodontis, *Enum.*: 1204–1206 (1968); Symoens, *Hydrocharitaceae* in *Fl. Cameroun* 26: 33–45 (1984); Simpson, *Hydrocharitaceae* in *Fl. Trop. E. Afr.*: 29 pp. (1989); Thulin & Sartoni, 138. *Hydrocharitaceae* in *Fl. Somalia* 4: 7–11 (1995).

Herbs perennial, often rhizomatous or stoloniferous, rarely annual, of fresh water or marine, wholly or partly submerged; air spaces well developed. Leaves in a basal rosette or cauline, alternate, opposite or whorled, submerged or floating, sometimes partly emergent, petiolate or sessile, leaf-base usually sheathing the stem; stipules present or absent; intravaginal scales mostly present. Inflorescence compact, usually few-flowered cyme or a single flower, subtended by 2 opposite, distinct or more often connate bracts, forming a spathe; spathes sessile to long-stalked, often ribbed or winged, mostly bifid at the top. Flowers pedicellate or sessile, regular, sometimes slightly irregular (*Vallisneria*), mostly unisexual, sometimes bisexual, sometimes cleistogamous¹. Perianth composed of 3 free, green, sepals, and 3 free, white or coloured, petals, but the petals sometimes rudimentary or absent, rarely the whole perianth absent. Stamens (1–)2-many, often of unequal heights, in 1–5 usually 3-merous whorls, sometimes staminodal; anthers basifixed, 2-locular, opening dorsally or laterally by longitudinal slits; staminodes sometimes present in pistillate flowers. Pistil: carpels (2–)3–6(–20) united, ovary inferior, ovoid to linear, 1-locular, with parietal placentas that sometimes protrude nearly to centre of ovary; ovules mostly numerous; styles as many as the carpels; stigmas entire or more often 2-lobed or 2-fid, papillate; rudimentary ovary often present in the staminate flowers. Fruits mostly berry-like or sometimes dry, globose to linear, ripening under water, mostly opening irregularly by decay of pericarp, rarely dehiscent. Seeds numerous; testa smooth, warty or spiny.

Cosmopolitan with 17 genera and c 75 species, most of them tropical: 5 genera and 7 species in the Flora area.

The flowers are very delicate and do not dry well. Whenever possible, living material should be used for identification. Spirit material and colour photographs are invaluable. Like most aquatic plants, this family is poorly represented in herbarium collections.

Key to genera

1. Freshwater plants; perianth mostly with 3 sepals and (1–)3 petals, the latter sometimes rudimentary. 2
 - Marine plants; perianth segments 3. 4
2. Leaves in a basal rosette on a short stem; spathes pedunculate. 3
 - Leaves on elongated stems; spathes sessile or nearly so. 3. Lagarosiphon
3. Leaves sessile or differentiated into blade and petiole; spathes often winged; male flower not minute, remaining attached to the plants; petals large and conspicuous. 1. Ottelia
 - Leaves not differentiated into blade and petiole; spathes never winged; male flower minute, breaking off and floating on the water surface; petals rudimentary. 2. Vallisneria
4. Rhizome 2–5 mm thick; leaves more than 10 cm long, linear, not differentiated into a blade and a petiole, sheathing at the base; female flowers with 6–8 styles, each bearing a deeply 2-fid stigma; seeds 3–9. 4. Thalassia
 - Rhizome not more than 2 mm thick; leaves less than 7 cm long; blades elliptic, oblong or linear; petiole distinct; female flowers with 3–5 styles, each bearing a filiform, entire stigma; seeds mostly numerous. 5. Halophila

1. OTTELLIA *Persoon* (1805)*Boottia* Wall. (1830)

Cook, Symoens & Urmi-König, *Aquatic Botany* 18: 263–274 (1984).

Annual or perennial, freshwater herbs; roots simple; stems usually erect, contracted and corm-like, simple (or creeping, rhizomatous and irregularly branched). Leaves usually radical, without stipules; juvenile leaves linear to elliptic or ovate, not differentiated into petiole and blade; adult leaves often with petiole and blade; petiole usually sheathing at base, submerged, flexuose, sometimes laterally winged, armed or unarmed; blade submerged or floating, elliptic to orbicular, base cuneate to cordate with overlapping lobes, apex obtuse to acuminate; margins entire or denticulate, sometimes undulate to crispate; up to 15 prominent longitudinal veins connected by cross-veins, the latter often oblique giving the blade the appearance of a quilt with rhomboidal patches. Flowers bisexual or unisexual. Spathes solitary in leaf-axil, stalked or subsessile, ovoid to narrowly cylindrical, sometimes compressed, with wings, ribs, spines or warts, rarely smooth, 2–6 lobed at the apex, 1–60-flowered. Male flowers up to 60 in the spathe, pedicellate, remaining attached to the plant at anthesis. Bisexual and female flowers 1–few, sessile; bisexual flowers sometimes cleistogamous. Sepals 3,

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1. cleistogamous: flowers which get fertilized and set seed without opening.

free, linear, oblong or ovate, green with membranous margins, often persistent in fruit of bisexual and female flowers. Petals 3, free, oblong, obovate or orbicular, large and showy but very delicate and short-lived. Stamens 3–15, occasionally more, in whorls of 3, sometimes staminodal; filaments often somewhat flattened; anthers opening laterally. Pistil: carpels 3–15(–20 or more), united into an ovoid, ellipsoid or narrowly cylindrical ovary; styles 3–15(–20), each divided in 2 linear, papillose stigmatic arms; rudimentary, usually 3-lobed pistil in male flowers. Fruit a somewhat fleshy capsule, ovoid or cylindrical, attenuate at the apex, opening irregularly by decay of the pericarp or dehiscing regularly. Seeds numerous, small, oblong or fusiform, sometimes with a short apical projection; testa membranous, densely covered with unicellular hairs.

Genus of c 21 species of the warm regions of the Old World; 1 species in Brazil; 1 species naturalized in Europe. So far only 1 species has been recorded from the Flora area although there are 7 in E Africa. Some of these may be found in future collections.

***O. ulvifolia* (Planch.) Walp. (1852);**

Damasonium ulvifolium Planch. (1849) – types: Madagascar, Lyall 149 (K lecto.), Bojer s.n. (K syn.).

Boottia abyssinica Ridl. (1886); *Ottelia abyssinica* (Ridl.) Gürke (1904) – type: Ethiopia, near Carata, Lake Tana ('Zana'), Schimper 1452 (BM holo., K iso., B iso. destr.).

Ottelia lancifolia Rich. (1851) – type: Ethiopia, Shire ('Chiré'), Quartin Dillon & Petit 695 (P holo.).

Submerged herb, with emergent bisexual flowers; roots long, white; stems erect, corm-like. Leaves numerous, often in thick tufts; petiole mostly distinct, 6–30(–100) cm long, often merging gradually into the blade, sometimes indistinct or absent; blade submerged or floating, ovate-lanceolate to linear-lanceolate, (3.5–)8–40(–45) x (1–)2–4.5 (–11.5) cm, pale-green to brownish-green, marked with irregular purple zebra-markings; (5–)7–13 prominent longitudinal veins connected by cross-veins, together with many smaller longitudinal veins. Peduncles ± 3-angled, up to 50(–60) x 0.3–0.7 cm, often coiled and retracted after anthesis. Spathes elliptic, ovate, lanceolate, more rarely subcylindrical, compressed, (1.5–)2.5–3.5(–6) x 0.4–2(–2.8) cm, green, smooth or bearing a few minute prickles, with 9 visible veins on each face, with 2 ± distinct wings, paler and sometimes nearly translucent. Flowers 1 (rarely 2) in each spathe, bisexual, emerging just above water; sepals 3, oblong-linear, 8–15(–20) x 2–3(–4) mm, pale green to pale pinkish-brown, ± translucent, with darker green or brown nerves; petals 3, obovate, (7–)12–22(–30) x 8–9 mm, yellow (sometimes white); stamens (3–)6, 4–7 mm long; anthers oblong, yellow, up to 3 mm long; ovary of (3–)6 carpels, narrowly ellipsoid, pale green; styles (3–)6, each split in 2 long yellow stigmatic arms. Fruits ovoid to oblong-cylindrical, somewhat inflated near the top, opening by decay of the pericarp. Seeds very numerous, small, oblong to fusiform, 2–2.5 x 0.5–0.7 mm; testa brown, covered with fine white hairs. Fig. 172.1.

Mainly in watercourses, also in lakes, dams, pools and swamps, up to 60 cm deep, on clay or sandy bottoms; 500–2700 m. EW GD/GJ WG KF SD; widespread in tropical Africa, from Senegal to Sudan and Ethiopia, southward to Namibia, Botswana and S Africa (Transvaal); also Madagascar. *de Wilde & de Wilde-Duyffes* 7070; *Friis et al.* 53, 1088; *Mooney* 6099.

2. VALLISNERIA L. (1753)

Physkium Lour. (1790)

Lowden, *Aquatic Botany*, 13: 269–298 (1982).

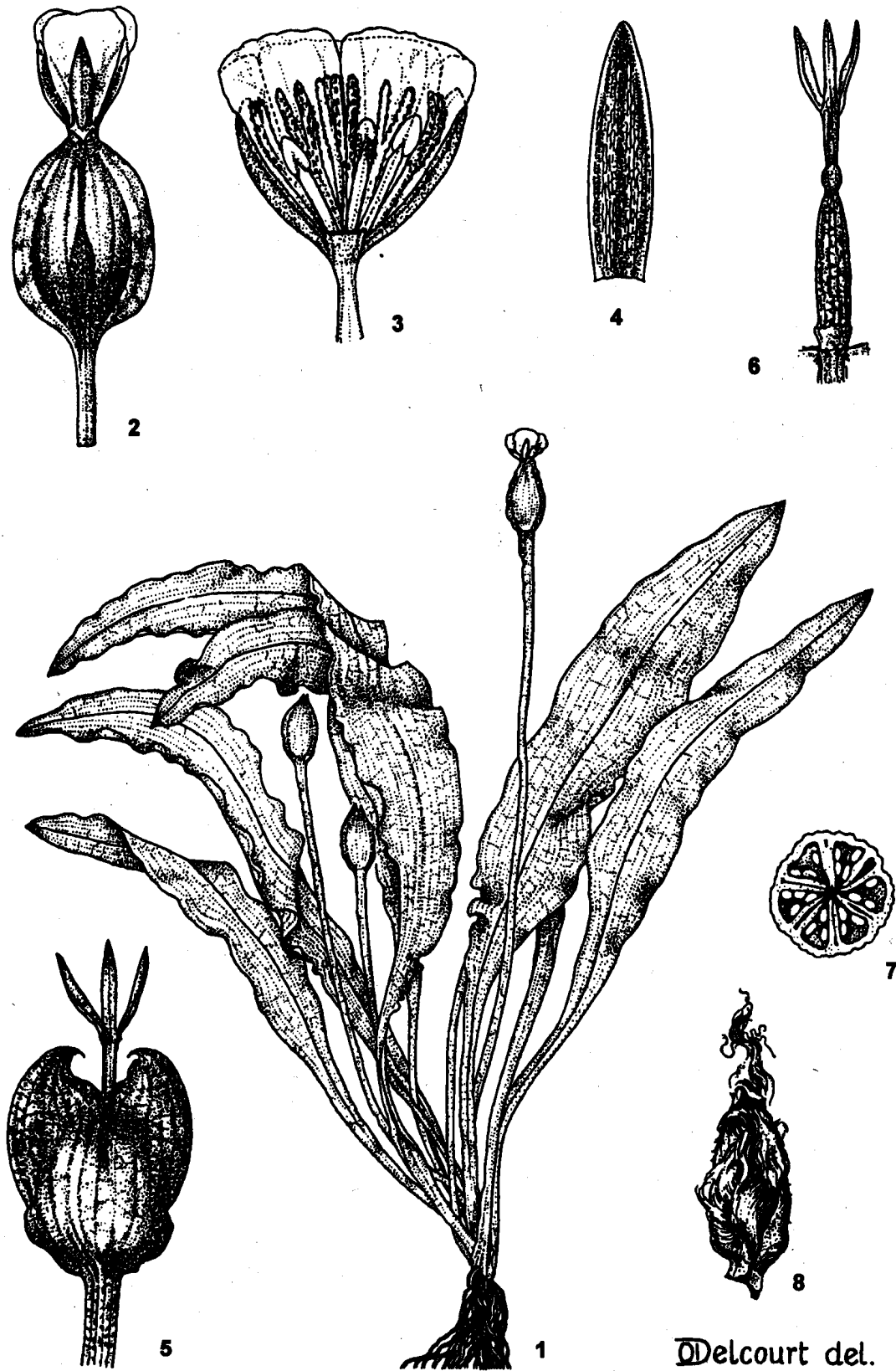
Perennial, fresh water, dioecious herbs; roots simple, fibrous; vertical stem axis short, bearing runners. Leaves radical, without petiole, submerged or floating, linear, strap-shaped; apex obtuse; margins entire or minutely toothed to serrate; nerves 3–5(–9), parallel, connected by cross veins, only the midrib reaching the apex, the other nerves gradually joining together near the apex. Male spathes solitary in leaf axil, shortly stalked, ovoid, 2-lobed at the apex, containing many minute flowers which break off and rise to the water surface. Male flowers pedicellate, slightly irregular; sepals 3 (2 larger and 1 smaller), ovate or oblong-ovate, reflexed at anthesis; petal 1, rudimentary; stamens (1–)2–3: usually 2 fertile, free or with united filaments, and 1 staminode opposite the smallest sepal. Female spathes solitary in leaf axil, tubular, with bifid apex, 1-flowered, on a very long coiled stalk, bringing the flower up to the water surface at anthesis, contracting after fertilization. Female flowers regular; sepals 3, oblong or oblong-ovate; petals 3, rudimentary, translucent; staminodes 3, rudimentary; ovary linear, nodding 1-locular; ovules numerous. Styles 3, short or highly reduced; stigmas 3, linear, 2-fid, papillate. Fruit a linear capsule, often very long, opening by decay of pericarp. Seeds numerous, oblong to fusiform; testa membranous, areolate or striate.

A genus of 2 to 9 species, widely distributed throughout warmer regions of the world: only 1 species in the Flora area.

***V. spiralis* L. (1753)**

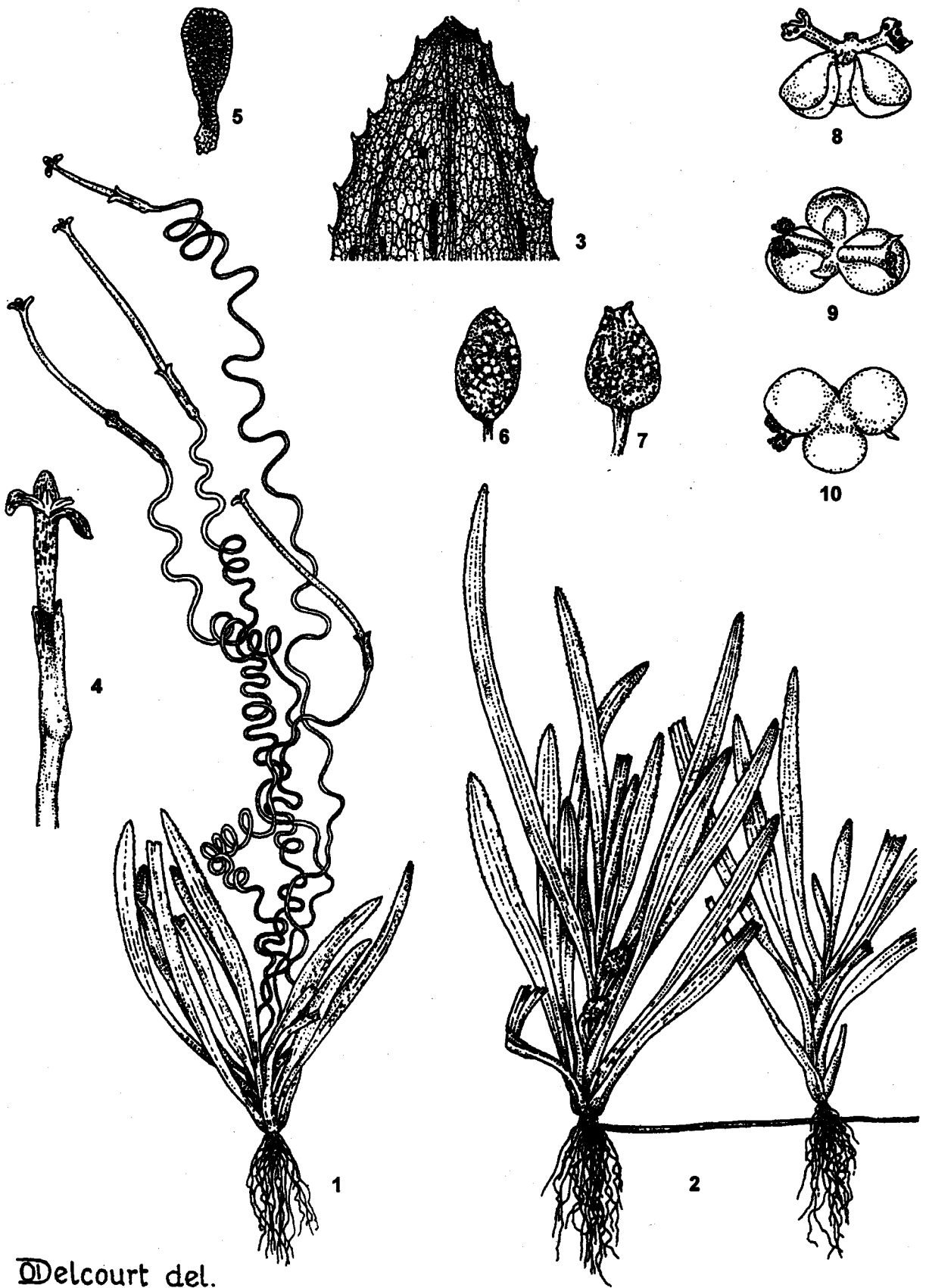
– type: t. 10/1, 2 in Micheli, *Nov. Pl. Gen.* 3: 12 (1729).

Stems creeping and stoloniferous, terete, 0.6–2 mm in diameter. Leaves 10–500 x (1.5–)3–12 mm, green to dark green, with numerous, minute, reddish-brown streaks; margins green, entire to serrate, especially near apex. Male spathes with peduncles up to 7 cm long; spathe ovoid, c 5 x 2.5 mm, containing up to 50 flowers. Male flowers c 1 mm in diameter; sepals 0.5 mm long; stamens free, very divergent, c 0.5 mm long; without hairs at base. Female spathes with peduncles up to 100 cm long; spathe 8–20(–65) mm long, greenish to light brown, with dark reddish streaks. Female flower: sepals ovate, up to 3 mm long, brownish, with dark reddish dots or streaks; petals narrowly ovate, c 0.5 mm long; ovary 10–25 mm long; stigmas bifid, c 2 mm long. Fruit



Delcourt del.

Figure 172.1 *OTTELLIA ULVIFOLIA*: 1 - whole plant $\times 3/10$; 2 - spathe and flower $\times 1 1/2$; 3 - flower, one sepal removed, the reproductive organs seen through the petals $\times 2 2/3$; 4 - sepal $\times 3$; 5 - fruiting spathe $\times 1 1/2$; 6 - young fruit without spathe $\times 1 1/2$; 7 - cross section of fruit $\times 3$; 8 - seed $\times 12$. 1 from *Symoens* 11580; 2-4 from *de Witte* 6475; 5-7 from *Schmitz* 1687; 8 from *Huet* s.n. Drawn by O. Delcourt. (Reproduced with permission from *Flore du Cameroun*, Vol. 26, of Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris.)



Delcourt del.

Figure 172.2 *VALLISNERIA SPIRALIS*: 1 - habit of female plant x 1; 2 - habit of male plant x 1; 3 - leaf apex x 12½; 4 - female spathe and flower x 3; 5 - seed x 40; 6 - male spathe closed x 4; 7 - male spathe dehiscent x 4; 8 - male flower, side view x 22; 9 - male flower seen from above x 22; 10 - male flower seen from below x 22. 1 & 2, & 4-7 from *Symoens* 14973; 3 & 8-10 from *Symoens* 14958. Drawn by O. Delcourt.

10–30 x 1–1.5 mm, brownish, with dark reddish dots or streaks. Seeds 1.3–2 x c 0.5 mm, brown. Fig. 172.2.

forma *aethiopica* (Fenzl) Th. Dur. & Schinz. *Consp.*

Fl. Afr. 5: 2 (1894, non 1892).

V. aethiopica Fenzl (1844) nom. nud.; Id., Sitzb. kaiserl. Akad. Wiss. Wien, math.-nat. Cl., 51 (Abth. I, H.2): 139 (1865) – type: 'Shiluk', White Nile, Sudan, *Kotschy* 284 (W lecto., BM BRVU G K P iso.).

Leaf margins denticulate or serrate from top to lower third, often to base.

In fresh or brackish water, in lakes, streams and irrigation channels, 0.2–2 m deep, mostly on sandy bottoms; sea-level to 1850 m. GJ; widespread in tropical Africa, from Senegal to Sudan and Ethiopia, south to Namibia, Botswana and Zimbabwe. *Pichi-Sermolli* 1735, 1736; *Gilbert* 2145.

V. spiralis as a whole occurs in N Africa, Europe, SE Asia, Japan & Australia.

Lowden (*loc. cit.*) assigned all African material of *Vallisneria* to *V. spiralis* L. var. *denseserrulata* Makino. The diagnostic features used by him to distinguish this variety were the deeply cleft stigmatic lobes and the conspicuously toothed leaves (at least in African and Japanese specimens). Deeply-cleft stigmas were observed on freshly collected plants from Lake Victoria, but are not seen in any previous drawings of African material. Many Sub-Saharan African populations, including Ethiopian specimens, lack the robust habit and broad leaves described by Makino (*Bot. Mag.* 28: 27, 1914) for his var. *denseserrulata*. Instead they have leaves mostly conspicuously denticulate, and sometimes rather coarsely serrate from top to the lower third or even to the base, and may be recognized as forma *aethiopica* assigned by Th. Durand & Schinz. The leaves of typical *spiralis* have margins entire or denticulate only in the upper third.

3. LAGAROSIPHON Harv. (1841)

Symoens & Triest, *Bull. Jard. Bot. Nat. Belg.* 53: 441–488 (1983).

Perennial, aquatic herbs, submerged (except the flowers at anthesis), dioecious; rhizomes persistent, emitting roots. Stems long, cylindrical, with axillary branches, densely leaved at the top, the internodes lengthening afterwards. Leaves alternate, (sub-)opposite or (sub-)verticillate, mostly provided with 2 minute axillary intravaginal scales; blade sessile, linear to linear-lanceolate, often recurved, central area narrow or broad; margins green or with several longitudinal rows of translucent fibres, serrulate or denticulate; apex bearing 2 teeth. Male inflorescences axillary, sessile; spathes of 2 united bracts, ovate or obovate, compressed or cup-shaped, toothed; receptacle bearing numerous stalked flower buds which break off and rise to the water surface where they open. Male flowers: perianth of 2 whorls of 3 segments each (outer slightly narrower); stamens 3, the filaments expand and stretch

out parallel to the water surface with the anthers at right angles to them; staminodes 2–3, longer than the stamens, papillate and usually coloured above, joined at the top, acting as a sail. Female inflorescences axillary, sessile; spathes of 2 united bracts, narrowly ovate to oblong or cylindrical, entire or toothed, 1-flowered. Female flowers: perianth-tube exerted laterally near the apex of the spathe, lengthening so that the flower bud reaches the water surface; perianth consisting of 6 segments, all alike, or petals slightly larger; staminodes 3, minute, filiform; ovary 1-locular, with 3 parietal placentas; styles 3, joined to the perianth-tube, each divided above into 2 long, papillate, often brightly coloured stigmas; ovules 5–30. Capsule ovate, extended into a beak which protrudes and tears the spathe-valves; pericarp honeycombed, becoming mucilaginous and bursting irregularly and so dispersing the seeds. Seeds ellipsoid, with a short stipe at the base, attenuate at the apex, densely ribbed or honeycombed, buoyant at first, sinking later.

An African genus with 9 species: 8 species on the African continent south of the Sahara, 1 endemic to Madagascar, *L. major* (Ridl.) Moss is reported as an adventive in Europe and New Zealand. 2 species, 1 endemic, in the Flora area.

1. Leaf margins green, without rows of translucent fibres; central area broad, usually with transverse septa; leaf teeth on small protuberances; funicle straight. 1. *L. cordofanus*
- Leaf margins almost hyaline, with 2–3 rows of translucent fibres; central area narrow, no transverse septa; leaf teeth not on protuberances; funicle bent, with knee-like thickening. 2. *L. steudneri*

1. *L. cordofanus* Casp. (1858)

– type: Sudan, *Kotschy* 170 (B holo. destr., G lecto., BM K L MPU P Z iso.).

L. crispus Rendle (1895).

L. schweinfurthii Cufod. (1968), non Caspary (1870).

Submerged herb, stems 0.5–2 mm in diameter. Leaves alternate, (sub-)opposite or locally whorled, spreading, linear, (5–)7–20(–29) x (0.3–)0.5–1(–1.5) mm, soft, thin, transparent; apex attenuate to very acute; margin green, without translucent fibres, each side bearing (12–)20–50(–66) teeth, situated on small triangular protuberances, somewhat curved and pointed towards the apex; midrib mostly distinct. Scales colourless, ovate or narrowly ovate, 0.18–0.27 x 0.06–0.1 mm, apex with 1–4 papillae. Male inflorescences with spathe valves, ovate to broadly ovate, 1.3–2.7 x 1.0–2.1 mm, bearing 3–16 teeth containing 7–14 flower buds; male flowers whitish, perianth segments c 1 mm long; stamens c 2 mm long, with pointed tip. Female inflorescences with spathe valves ovate to narrowly ovate, 1.7–2.8 x 0.7–1.2 mm, entire or bearing up to 10 teeth; female flower whitish; perianth segments obovate, 0.7–

1. funicle: the little cord, which attaches the ovule to the placenta.

1.0 x c 0.5 mm; ovary with 10–40 ovules; funicle straight and short. Capsule ovate, tapered above, pale green to reddish near the apex, 3–4 x 1.5–2 mm; pericarp honey-combed when dried. Seeds narrowly ellipsoid, 1.0–1.5 x 0.5 mm.

Lakes, dams, ponds, swamps and flood plains, permanent or temporary pools; (outside the Flora area from nearly sea-level)–1800 m. GD SD BA/HA; widespread in the Sudano-Zambeian Region (distribution map: Symoens & Triest, *loc. cit.*, fig. 4). *Rochet d'Héricourt* s.n.; *Amare Getahun* (IECAMA) I-74; *Ash* 1147.

L. cordofanus is a very variable species, which is well characterized by the leaves having a broad central area with 2 rows of translucent fibres, usually connected by transverse septa, and marginal teeth situated on triangular protruberances.

2. *L. steudneri* Casp. in Schweinf. (1867)

– type: Ethiopia, Wadela, 'am Fusse des Guna-Gebirges', *Steudner* 640 (B holo. destr., K lecto.).

Submerged herb, stems 1–1.5 mm in diameter. Leaves alternate, rarely subopposite, spreading, linear, 7–18.2 x 0.9–2 mm, soft, thin, transparent; apex not acute; margins with 2–3 rows of translucent fibres, almost hyaline, each side bearing 36–105 teeth, not on protruberances, pointing upwards, short, straight and sharp; central area narrow with slightly larger cells between two distinct lines of translucent fibres, midrib faint, no transverse septa. Scales colourless, lanceolate, c 0.5 mm long; apex acute, entire. Male inflorescences with spathe valves, ovate, 3.2–3.7 x 2.0–2.1 mm, bearing 18–45 teeth, containing up to 30 flower buds; male flowers unknown. Female inflorescences with spathe valves ovate to narrowly ovate, 2.3–4.0 x 1.0–2.0 mm, bearing 20–34 teeth. Female flower: sepals reddish, petals slightly larger than sepals; stigmas dark purple-red; ovary containing 5–6 ovules; funicle with bent, knee-like thickening. Capsules narrowly ovate, tapered above, 4.0–5.2 x 1.2–1.4 mm, containing 5–6 seeds. Seeds narrowly ellipsoid, 1.1–1.3 x 0.2–0.4 mm. Fig. 172.3.

Stagnant or slow-flowing pools; 1650–1800 m. GD SU; endemic to the Ethiopian highlands (distribution map: Symoens & Triest, *loc. cit.*, fig. 7). *de Wilde* 10838; *Getachew A. & Weinert* 1931; *Ash* 848.

4. THALASSIA Banks ex König (1805)

Schizotheca Ehrenb. ex Solms in Schweinf. (1867)

den Hartog, *Sea-grasses of the World*: 222–238 (1970).

Perennial, marine, submerged, dioecious herbs; stems dimorphic: rhizomes horizontal, buried in the substrate, with short erect stems produced at regular intervals from nodes along the rhizome; roots simple, sand-binding, covered with fine hairs. Leaves usually 2–6, distichously arranged on the erect stems, sessile, linear, somewhat falcate, opaque or translucent, with up to 19 longitudinal veins and numerous fine, longitudinal air channels, margins green, entire; base distinctly sheathing; apex rounded or obtuse. Male spathes 1–2

in the leaf axil, pedunculate, 1-flowered, composed of 2 bracts united on one side only, the bracts oblong or lanceolate, translucent, entire or serrulate, acute to obtuse. Male flower: pedicellate, remaining attached to the plant; tepals 3, elliptic, hooded, strongly recurved at anthesis; stamens (3–)6–9(–12); anthers nearly sessile, oblong, erect. Female spathes solitary in the leaf axil, distinctly pedunculate, 1-flowered, composed of 2 united bracts, but 2-lobed at the apex, the lobes acute to obtuse. Female flower almost sessile; tepals 3, elliptic, recurved at anthesis; staminodes absent; ovary of 6–8-carpels, conical, muricate, 1-locular or imperfectly 2–3-locular; styles 6–8, each bearing a deeply 2-fid, papillate stigma. Fruit globose, spiny, beaked, opening by irregularly stellate dehiscence. Seeds few, c 8–10, conical with a thickened basal portion.

Only 2 species: *T. testudinum* from the Atlantic coasts of tropical America; *T. hemprichii* from the tropical parts of the Indian Ocean and the western Pacific.

T. hemprichii (Ehrenb. ex Solms) Asch. (1871);

Schizotheca hemprichii Ehrenb. (1834); ex Solms (1867) – type: EE, Mitsiwa (Massaua), *Ehrenberg* 170 (B holo. destr., G lecto., BM K L P iso.).

Rhizome terete, 2–5 mm in diameter, greenish to light brown, bearing many annular scars; erect stems terete, up to 5 mm in diameter. Leaves 4–25(–40) x 0.3–0.7 (–1.1) cm, bright to dark olive green, with red-violet spots or streaks; apex rounded, serrulate; nerves 10–17. Margin of the spathe entire or, sometimes, slightly serrulate at the apex. Tepals 7–8 x 3 mm, entire. Stamens 3–12. Styles 6.5–7 mm long, stigmatic branches twice as long as the style. Fruit 2–2.5 cm long, with a 1–2 mm long beak, splitting into 8–20 valves. Seeds 3–9, c 8 mm long, greenish. Fig. 172.4.

Fine mud to clean-coral sand, especially on reef platforms and sublittoral flats, from low water to 5 m depth, in the eulittoral zone, restricted to shallow pools. EE; widely distributed throughout the tropical region of the Indian Ocean and the western part of the Pacific; along the African coast: from the Red Sea to Inhaca Island, Mozambique, also in Madagascar, the Seychelles, the Maldives. *Schweinfurth* 6; *Hildebrandt* 702; *Ash* 2320.

5. HALOPHILA du Petit-Thouars (1806)

Lemnopsis Zoll. (1854), non Zipp. (1829)

den Hartog, *Sea-grasses of the World*: 238–268 (1970).

Perennial, marine, submerged, monoecious or dioecious herbs; stems elongate, rhizomatous or shortly erect, rooting at the nodes, with 1(–3) roots per node, simple, covered with fine hairs, sand-binding. Each node with 2 scales, one embracing the rhizome, the other embracing a short erect, sometimes non-visible stem, and subtending a pair or whorl of leaves. Flowers unisexual; male and female spathes similar, solitary in leaf-axils, sessile, 1–2-flowered, rarely with 1 flower of each sex in the same spathe, composed of two

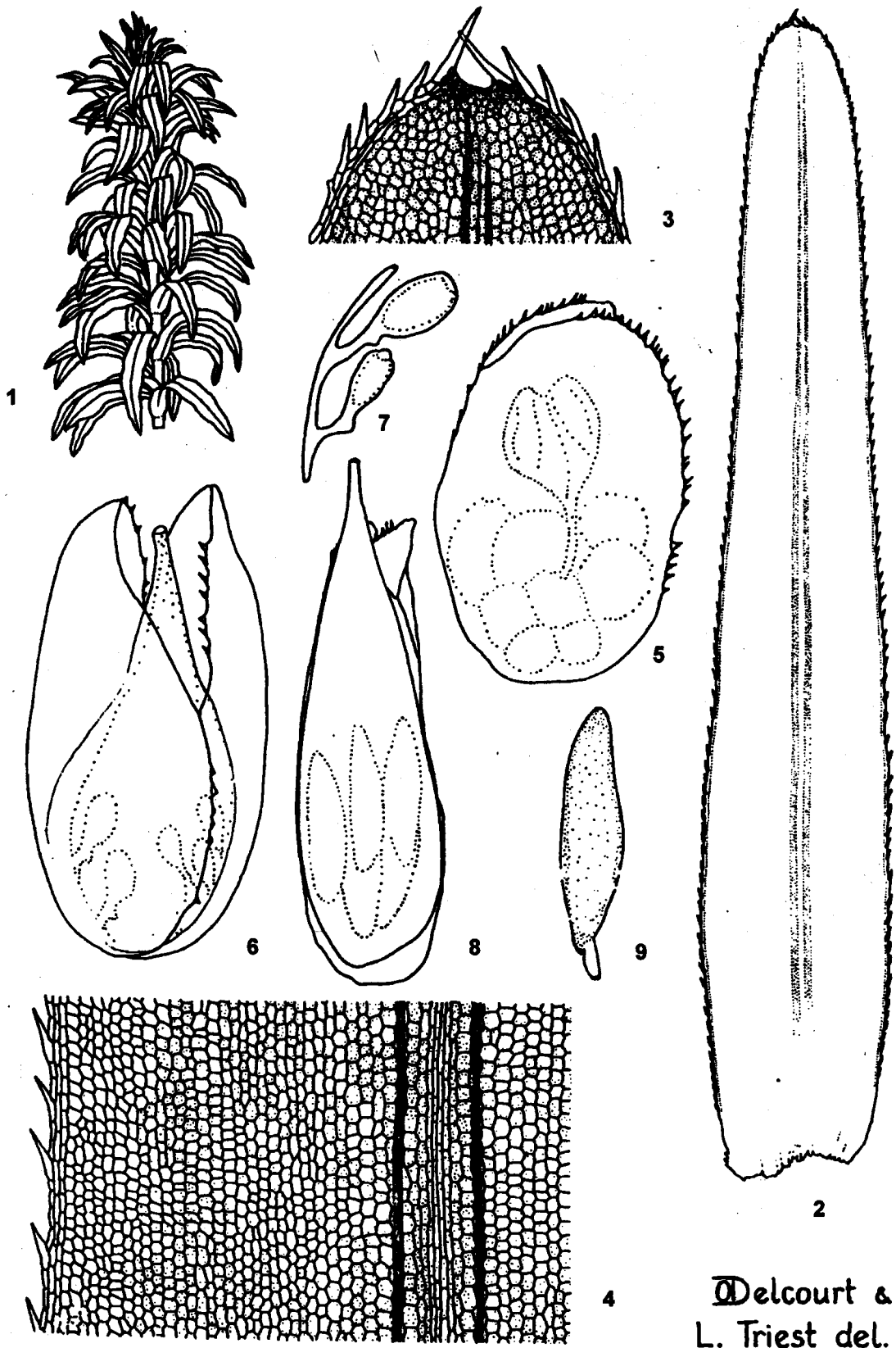


Figure 172.3 *LAGAROSIPHON STEUDNERI*: 1 – top part of plant $c \times 1$; 2 – leaf $\times 28$; 3 – leaf apex $\times 113$; 4 – leaf, central part $\times 113$; 5 – male spathe $\times 18$; 6 – female spathe $\times 18$; 7 – ovule and funicle $\times 45$; 8 – unripe fruit $\times 18$; 9 – unripe seed $\times 30$. 1, 5 & 7 from *de Wilde* 10838; 2–4 from *Steudner* 640; 6 from *Ostini & Buscalioni* 1648; 8 & 9 from *Ash* 848. Drawn by O. Delcourt & L. Triest. (Reproduced with permission from *Bulletin du Jardin botanique national de Belgique*, 53: 473, 1983.)



Figure 172.4 *THALASSIA HEMPRICHII*: 1 - habit x $\frac{3}{4}$; 2 - male flower x $2\frac{1}{2}$; 3 - female flower x $\frac{3}{4}$; 4 - female spathe and young fruit x $\frac{3}{4}$; 5 - dehiscent fruit x $2\frac{1}{2}$; 6 - seed x $4\frac{1}{2}$. 1 & 4 from Rajeshwari & Lakshmanan 3; 2 from Ostenfeld 1920; 3 from Isaac (1968); 5 & 6 from Burkill 1118. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr., Hydrocharitaceae: fig. 9.*)

10–30 x 1–1.5 mm, brownish, with dark reddish dots or streaks. Seeds 1.3–2 x c 0.5 mm, brown. Fig. 172.2.

forma *aethiopica* (Fenzl) Th. Dur. & Schinz. *Consp.*

Fl. Afr. 5: 2 (1894, non 1892).

V. aethiopica Fenzl (1844) nom. nud.; Id., Sitzb. kaiserl. Akad. Wiss. Wien, math.-nat. Cl., 51 (Abth. I, H.2): 139 (1865) – type: 'Shiluk', White Nile, Sudan, *Kotschy* 284 (W lecto., BM BRVU G K P iso.).

Leaf margins denticulate or serrate from top to lower third, often to base.

In fresh or brackish water, in lakes, streams and irrigation channels, 0.2–2 m deep, mostly on sandy bottoms; sea-level to 1850 m. GJ; widespread in tropical Africa, from Senegal to Sudan and Ethiopia, south to Namibia, Botswana and Zimbabwe. *Pichi-Sermolli* 1735, 1736; *Gilbert* 2145.

V. spiralis as a whole occurs in N Africa, Europe, SE Asia, Japan & Australia.

Lowden (*loc. cit.*) assigned all African material of *Vallisneria* to *V. spiralis* L. var. *denseserrulata* Makino. The diagnostic features used by him to distinguish this variety were the deeply cleft stigmatic lobes and the conspicuously toothed leaves (at least in African and Japanese specimens). Deeply-cleft stigmas were observed on freshly collected plants from Lake Victoria, but are not seen in any previous drawings of African material. Many Sub-Saharan African populations, including Ethiopian specimens, lack the robust habit and broad leaves described by Makino (*Bot. Mag.* 28: 27, 1914) for his var. *denseserrulata*. Instead they have leaves mostly conspicuously denticulate, and sometimes rather coarsely serrate from top to the lower third or even to the base, and may be recognized as forma *aethiopica* assigned by Th. Durand & Schinz. The leaves of typical *spiralis* have margins entire or denticulate only in the upper third.

3. LAGAROSIPHON Harv. (1841)

Symoens & Triest, *Bull. Jard. Bot. Nat. Belg.* 53: 441–488 (1983).

Perennial, aquatic herbs, submerged (except the flowers at anthesis), dioecious; rhizomes persistent, emitting roots. Stems long, cylindrical, with axillary branches, densely leaved at the top, the internodes lengthening afterwards. Leaves alternate, (sub-)opposite or (sub-)verticillate, mostly provided with 2 minute axillary intravaginal scales; blade sessile, linear to linear-lanceolate, often recurved, central area narrow or broad; margins green or with several longitudinal rows of translucent fibres, serrulate or denticulate; apex bearing 2 teeth. Male inflorescences axillary, sessile; spathes of 2 united bracts, ovate or obovate, compressed or cup-shaped, toothed; receptacle bearing numerous stalked flower buds which break off and rise to the water surface where they open. Male flowers: perianth of 2 whorls of 3 segments each (outer slightly narrower); stamens 3, the filaments expand and stretch

out parallel to the water surface with the anthers at right angles to them; staminodes 2–3, longer than the stamens, papillate and usually coloured above, joined at the top, acting as a sail. Female inflorescences axillary, sessile; spathes of 2 united bracts, narrowly ovate to oblong or cylindrical, entire or toothed, 1-flowered. Female flowers: perianth-tube exerted laterally near the apex of the spathe, lengthening so that the flower bud reaches the water surface; perianth consisting of 6 segments, all alike, or petals slightly larger; staminodes 3, minute, filiform; ovary 1-locular, with 3 parietal placentas; styles 3, joined to the perianth-tube, each divided above into 2 long, papillate, often brightly coloured stigmas; ovules 5–30. Capsule ovate, extended into a beak which protrudes and tears the spathe-valves; pericarp honeycombed, becoming mucilaginous and bursting irregularly and so dispersing the seeds. Seeds ellipsoid, with a short stipe at the base, attenuate at the apex, densely ribbed or honeycombed, buoyant at first, sinking later.

An African genus with 9 species: 8 species on the African continent south of the Sahara, 1 endemic to Madagascar, *L. major* (Ridl.) Moss is reported as an adventive in Europe and New Zealand. 2 species, 1 endemic, in the Flora area.

1. Leaf margins green, without rows of translucent fibres; central area broad, usually with transverse septa; leaf teeth on small protuberances; funicle straight. 1. *L. cordofanus*
- Leaf margins almost hyaline, with 2–3 rows of translucent fibres; central area narrow, no transverse septa; leaf teeth not on protuberances; funicle bent, with knee-like thickening. 2. *L. steudneri*

1. *L. cordofanus* Casp. (1858)

– type: Sudan, *Kotschy* 170 (B holo. destr., G lecto., BM K L MPU P Z iso.).

L. crispus Rendle (1895).

L. schweinfurthii Cufod. (1968), non Caspary (1870).

Submerged herb, stems 0.5–2 mm in diameter. Leaves alternate, (sub-)opposite or locally whorled, spreading, linear, (5–)7–20(–29) x (0.3–)0.5–1(–1.5) mm, soft, thin, transparent; apex attenuate to very acute; margin green, without translucent fibres, each side bearing (12–)20–50(–66) teeth, situated on small triangular protuberances, somewhat curved and pointed towards the apex; midrib mostly distinct. Scales colourless, ovate or narrowly ovate, 0.18–0.27 x 0.06–0.1 mm, apex with 1–4 papillae. Male inflorescences with spathe valves, ovate to broadly ovate, 1.3–2.7 x 1.0–2.1 mm, bearing 3–16 teeth containing 7–14 flower buds; male flowers whitish, perianth segments c 1 mm long; stamens c 2 mm long, with pointed tip. Female inflorescences with spathe valves ovate to narrowly ovate, 1.7–2.8 x 0.7–1.2 mm, entire or bearing up to 10 teeth; female flower whitish; perianth segments obovate, 0.7–

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1.0 x c 0.5 mm; ovary with 10–40 ovules; funicle straight and short. Capsule ovate, tapered above, pale green to reddish near the apex, 3–4 x 1.5–2 mm; pericarp honey-combed when dried. Seeds narrowly ellipsoid, 1.0–1.5 x 0.5 mm.

Lakes, dams, ponds, swamps and flood plains, permanent or temporary pools; (outside the Flora area from nearly sea-level)–1800 m. GD SD BA/HA; widespread in the Sudano-Zambezi Region (distribution map: Symoens & Triest, *loc. cit.*, fig. 4). *Rochet d'Héricourt* s.n.; *Amare Getahun (IECAMA)* I-74; *Ash* 1147.

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Rhizome terete, 2–5 mm in diameter, greenish to light brown, bearing many annular scars; erect stems terete, up to 5 mm in diameter. Leaves 4–25(–40) x 0.3–0.7 (–1.1) cm, bright to dark olive green, with red-violet spots or streaks; apex rounded, serrulate; nerves 10–17. Margin of the spathe entire or, sometimes, slightly serrulate at the apex. Tepals 7–8 x 3 mm, entire. Stamens 3–12. Styles 6.5–7 mm long, stigmatic branches twice as long as the style. Fruit 2–2.5 cm long, with a 1–2 mm long beak, splitting into 8–20 valves. Seeds 3–9, c 8 mm long, greenish. Fig. 172.4.

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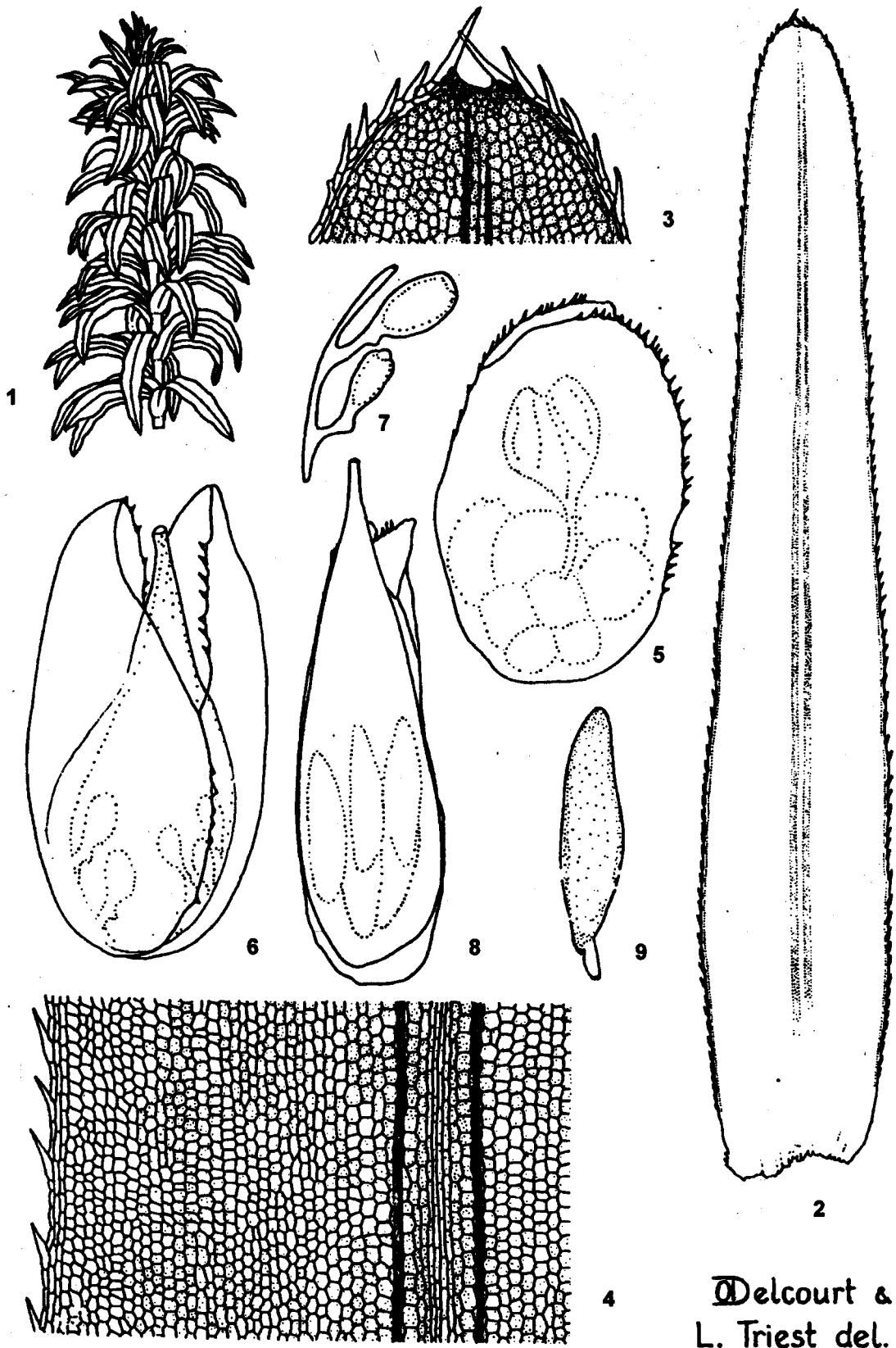


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Figure 172.4 *THALASSIA HEMPRICHII*: 1 - habit x $\frac{3}{4}$; 2 - male flower x $2\frac{1}{2}$ s; 3 - female flower x $\frac{3}{4}$; 4 - female spathe and young fruit x $\frac{3}{4}$; 5 - dehiscent fruit x $2\frac{1}{2}$ s; 6 - seed x $4\frac{1}{2}$ s. 1 & 4 from Rajeshwari & Lakshmanan 3; 2 from Ostenfeld 1920; 3 from Isaac (1968); 5 & 6 from Burkill 1118. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr., Hydrocharitaceae: fig. 9.*)

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forma *aethiopica* (Fenzl) Th. Dur. & Schinz. *Consp.*

Fl. Afr. 5: 2 (1894, non 1892).

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Submerged herb, stems 0.5–2 mm in diameter. Leaves alternate, (sub-)opposite or locally whorled, spreading, linear, (5–)7–20(–29) x (0.3–)0.5–1(–1.5) mm, soft, thin, transparent; apex attenuate to very acute; margin green, without translucent fibres, each side bearing (12–)20–50(–66) teeth, situated on small triangular protuberances, somewhat curved and pointed towards the apex; midrib mostly distinct. Scales colourless, ovate or narrowly ovate, 0.18–0.27 x 0.06–0.1 mm, apex with 1–4 papillae. Male inflorescences with spathe valves, ovate to broadly ovate, 1.3–2.7 x 1.0–2.1 mm, bearing 3–16 teeth containing 7–14 flower buds; male flowers whitish, perianth segments c 1 mm long; stamens c 2 mm long, with pointed tip. Female inflorescences with spathe valves ovate to narrowly ovate, 1.7–2.8 x 0.7–1.2 mm, entire or bearing up to 10 teeth; female flower whitish; perianth segments obovate, 0.7–

1. funicle: the little cord, which attaches the ovule to the placenta.

1.0 x c 0.5 mm; ovary with 10–40 ovules; funicle straight and short. Capsule ovate, tapered above, pale green to reddish near the apex, 3–4 x 1.5–2 mm; pericarp honey-combed when dried. Seeds narrowly ellipsoid, 1.0–1.5 x 0.5 mm.

Lakes, dams, ponds, swamps and flood plains, permanent or temporary pools; (outside the Flora area from nearly sea-level)–1800 m. GD SD BA/HA; widespread in the Sudano-Zambeian Region (distribution map: Symoens & Triest, *loc. cit.*, fig. 4). *Rochet d'Héricourt* s.n.; *Amare Getahun (IECAMA)* I-74; *Ash* 1147.

L. cordofanus is a very variable species, which is well characterized by the leaves having a broad central area with 2 rows of translucent fibres, usually connected by transverse septa, and marginal teeth situated on triangular protruberances.

2. *L. steudneri* Casp. in Schweinf. (1867)

– type: Ethiopia, Wadela, 'am Fusse des Guna-Gebirges', *Steudner* 640 (B holo. destr., K lecto.).

Submerged herb, stems 1–1.5 mm in diameter. Leaves alternate, rarely subopposite, spreading, linear, 7–18.2 x 0.9–2 mm, soft, thin, transparent; apex not acute; margins with 2–3 rows of translucent fibres, almost hyaline, each side bearing 36–105 teeth, not on protruberances, pointing upwards, short, straight and sharp; central area narrow with slightly larger cells between two distinct lines of translucent fibres, midrib faint, no transverse septa. Scales colourless, lanceolate, c 0.5 mm long; apex acute, entire. Male inflorescences with spathe valves, ovate, 3.2–3.7 x 2.0–2.1 mm, bearing 18–45 teeth, containing up to 30 flower buds; male flowers unknown. Female inflorescences with spathe valves ovate to narrowly ovate, 2.3–4.0 x 1.0–2.0 mm, bearing 20–34 teeth. Female flower: sepals reddish, petals slightly larger than sepals; stigmas dark purple-red; ovary containing 5–6 ovules; funicle with bent, knee-like thickening. Capsules narrowly ovate, tapered above, 4.0–5.2 x 1.2–1.4 mm, containing 5–6 seeds. Seeds narrowly ellipsoid, 1.1–1.3 x 0.2–0.4 mm. Fig. 172.3.

Stagnant or slow-flowing pools; 1650–1800 m. GD SU; endemic to the Ethiopian highlands (distribution map: Symoens & Triest, *loc. cit.*, fig. 7). *de Wilde* 10838; *Getachew A. & Weinert* 1931; *Ash* 848.

4. THALASSIA Banks ex König (1805)

Schizotheca Ehrenb. ex Solms in Schweinf. (1867)

den Hartog, *Sea-grasses of the World*: 222–238 (1970).

Perennial, marine, submerged, dioecious herbs; stems dimorphic: rhizomes horizontal, buried in the substrate, with short erect stems produced at regular intervals from nodes along the rhizome; roots simple, sand-binding, covered with fine hairs. Leaves usually 2–6, distichously arranged on the erect stems, sessile, linear, somewhat falcate, opaque or translucent, with up to 19 longitudinal veins and numerous fine, longitudinal air channels, margins green, entire; base distinctly sheathing; apex rounded or obtuse. Male spathes 1–2

in the leaf axil, pedunculate, 1-flowered, composed of 2 bracts united on one side only, the bracts oblong or lanceolate, translucent, entire or serrulate, acute to obtuse. Male flower: pedicellate, remaining attached to the plant; tepals 3, elliptic, hooded, strongly recurved at anthesis; stamens (3–)6–9(–12); anthers nearly sessile, oblong, erect. Female spathes solitary in the leaf axil, distinctly pedunculate, 1-flowered, composed of 2 united bracts, but 2-lobed at the apex, the lobes acute to obtuse. Female flower almost sessile; tepals 3, elliptic, recurved at anthesis; staminodes absent; ovary of 6–8-carpels, conical, muricate, 1-locular or imperfectly 2–3-locular; styles 6–8, each bearing a deeply 2-fid, papillate stigma. Fruit globose, spiny, beaked, opening by irregularly stellate dehiscence. Seeds few, c 8–10, conical with a thickened basal portion.

Only 2 species: *T. testudinum* from the Atlantic coasts of tropical America; *T. hemprichii* from the tropical parts of the Indian Ocean and the western Pacific.

T. hemprichii (Ehrenb. ex Solms) Asch. (1871);

Schizotheca hemprichii Ehrenb. (1834); ex Solms (1867) – type: EE, Mitsiwa (Massaua), *Ehrenberg* 170 (B holo. destr., G lecto., BM K L P iso.).

Rhizome terete, 2–5 mm in diameter, greenish to light brown, bearing many annular scars; erect stems terete, up to 5 mm in diameter. Leaves 4–25(–40) x 0.3–0.7 (–1.1) cm, bright to dark olive green, with red-violet spots or streaks; apex rounded, serrulate; nerves 10–17. Margin of the spathe entire or, sometimes, slightly serrulate at the apex. Tepals 7–8 x 3 mm, entire. Stamens 3–12. Styles 6.5–7 mm long, stigmatic branches twice as long as the style. Fruit 2–2.5 cm long, with a 1–2 mm long beak, splitting into 8–20 valves. Seeds 3–9, c 8 mm long, greenish. Fig. 172.4.

Fine mud to clean-coral sand, especially on reef platforms and sublittoral flats, from low water to 5 m depth, in the eulittoral zone, restricted to shallow pools. EE; widely distributed throughout the tropical region of the Indian Ocean and the western part of the Pacific; along the African coast: from the Red Sea to Inhaca Island, Mozambique, also in Madagascar, the Seychelles, the Maldives. *Schweinfurth* 6; *Hildebrandt* 702; *Ash* 2320.

5. HALOPHILA du Petit-Thouars (1806)

Lemnopsis Zoll. (1854), non Zipp. (1829)

den Hartog, *Sea-grasses of the World*: 238–268 (1970).

Perennial, marine, submerged, monoecious or dioecious herbs; stems elongate, rhizomatous or shortly erect, rooting at the nodes, with 1(–3) roots per node, simple, covered with fine hairs, sand-binding. Each node with 2 scales, one embracing the rhizome, the other embracing a short erect, sometimes non-visible stem, and subtending a pair or whorl of leaves. Flowers unisexual; male and female spathes similar, solitary in leaf-axils, sessile, 1–2-flowered, rarely with 1 flower of each sex in the same spathe, composed of two

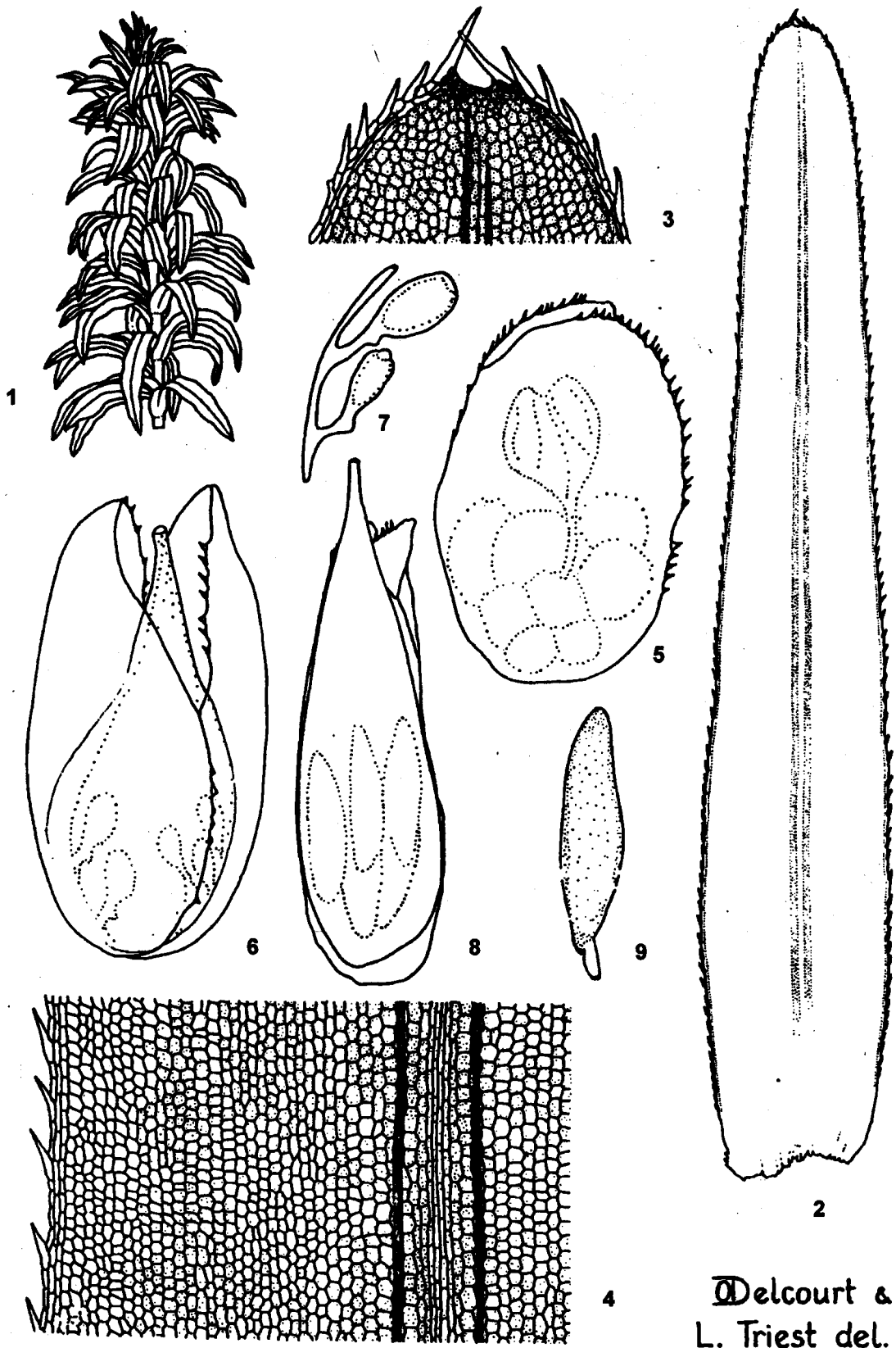


Figure 172.3 *LAGAROSIPHON STEUDNERI*: 1 – top part of plant $c \times 1$; 2 – leaf $\times 28$; 3 – leaf apex $\times 113$; 4 – leaf, central part $\times 113$; 5 – male spathe $\times 18$; 6 – female spathe $\times 18$; 7 – ovule and funicle $\times 45$; 8 – unripe fruit $\times 18$; 9 – unripe seed $\times 30$. 1, 5 & 7 from *de Wilde* 10838; 2–4 from *Stuedner* 640; 6 from *Ostini & Buscalioni* 1648; 8 & 9 from *Ash* 848. Drawn by O. Delcourt & L. Triest. (Reproduced with permission from *Bulletin du Jardin botanique national de Belgique*, 53: 473, 1983.)



Figure 172.4 *THALASSIA HEMPRICHII*: 1 - habit x $\frac{3}{4}$; 2 - male flower x $2\frac{1}{2}$; 3 - female flower x $\frac{3}{4}$; 4 - female spathe and young fruit x $\frac{3}{4}$; 5 - dehiscent fruit x $2\frac{1}{2}$; 6 - seed x $4\frac{1}{2}$. 1 & 4 from Rajeshwari & Lakshmanan 3; 2 from Ostenfeld 1920; 3 from Isaac (1968); 5 & 6 from Burkill 1118. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr., Hydrocharitaceae: fig. 9.*)

free, overlapping bracts, the bracts elliptic to suborbicular, translucent, entire or serrulate, obtuse. Male flowers: pedicellate, remaining attached to the plant; tepals 3, elliptic or ovate, hooded; stamens 3, alternating with the tepals; anthers sessile, linear oblong, erect. Female flowers: sessile; tepals 3, reduced to lobes at the apex of perianth-tube; staminodes absent; ovary of 3–5 carpels, ellipsoid or ovoid, 1-locular; styles 3–5; stigmas 3–5, filiform, entire, papillate on adaxial surface. Fruit ovoid or globose, opening by decay of pericarp. Seeds globose or subglobose, tuberculate, reticulate or smooth.

10 species found in tropical and subtropical seas, extending into some warm-temperate waters. 2 species in the Flora area.

1. Scales suborbicular or obovate, 3–6(–8) x 1.5–3 mm, greenish or transparent; petiole (1–)1.5–2.5(–5) cm long; leaf-blade oblong-elliptic, spathulate, obovate or ovate. 1. *H. ovalis*
– Scales elliptic or ovate, (8–)12–17 x 6–10 mm, bright-white; leaves linear, with a short, sheathing petiole. 2. *H. stipulacea*

1. *H. ovalis* (R. Br.) Hook.f. (1858);
Caulinia ovalis R. Br. (1810) – type: Australia, R. Brown 5816 (K holo., BM iso.).
Lemnopsis major Zoll. (1854).

Dioecious; rhizome narrowly terete, often dichotomously branched, 0.2–1.5(–2) mm thick; roots 1(–2) per node; internodes 1–5 cm long. Nodes each with 2 scales suborbicular or obovate, 3–6(–8) x 1.5–3 mm, mostly greenish or transparent. Erect stems extremely short, mostly not visible, the creeping axis then apparently bearing a pair of petiolate leaves at the node; petiole (1–)1.5–2.5(–5) cm long; blade oblong-elliptic, spathulate, obovate or ovate, rarely linear, 7–16.5(–30) x 2.5–7(–13) mm; base rounded, truncate or cuneate; apex rounded, obtuse or subapiculate; margin entire; cross-veins in 20–25 pairs, often forked, joining the intramarginal nerves. Spathal bracts broadly lanceolate, acute, membranous, 3–5(–10) mm long. Male flower: pedicel up to 2.5 mm long; tepals 4 x 2 mm, elliptic, spreading or reflexed, obtuse or slightly apiculate; anthers oblong, 2–4 mm long. Female flower: ovary 1–1.5(–2.5) mm long; perianth tube 3–5 mm, styles 3, stigmas 10–25 mm long. Fruit globose, 3–4(–6) mm in diameter, with a tuberculate or reticulate testa, light brown. Fig. 172.5.

subsp. *ovalis*

Leaves oblong-elliptic to ovate, with 11–15 pairs of cross-veins.

On fine mud to hard sand bottoms, coral debris and madreporic limestones, from mid-tidal level to 12 m depth. EE; widely distributed along the coasts of the Red Sea, the Persian Gulf, the Indian Ocean and the western Pacific. *W.J.J.O. de Wilde* et al. 7290; *Ash* 711; *Ryding* 1676.

H. ovalis is a variable species: den Hartog considered it as a collective species and recognized 5 subspecies, the Ethiopian population belonging to the typical subsp. *ovalis*. However, according to Sacht & Fosberg, *Taxon* 22: 439–443, 1973, the subsp. *bullosa* (Setchell) den Hartog of the Samoa, Tonga and Fiji Islands is *H. minor* (Zoll.) den Hartog, whilst subsp. *hawaiiiana* (Doty & Stone) den Hartog is to be reinstated in its original specific rank.

2. *H. stipulacea* (Forssk.) Asch. (1867);
Zostera stipulacea Forssk. (1775) – type: Yemen, Forsskål (no type specimen found at any herbarium known to house Forsskål material).

Dioecious; rhizome narrowly terete, unbranched, (0.2–)0.5–2 mm in diameter; roots 1 per node; scales elliptic or obovate, 12–17 x 6–10 mm, mostly bright white, sometimes green or tinged with purple. Erect stems narrowly terete, up to 1.5 x 0.2–0.5 mm. Leaves in pairs; petiole 0.4–1.5 cm long; blade linear to oblong, green, glabrous, papillose or slightly hairy, sometimes bullate; base cuneate or gradually decurrent into the petiole; apex obtuse; margin serrulate, especially in the apical region. Spathe ovate, acute, keeled, hairy; margin at one side glabrous and at the other side ciliate. Male flower: not seen. Female flower: perianth-tube 3–4 mm long; styles 3; stigmas 20–25 mm long; ovary ovoid to ellipsoid, 3–6 mm long. Fruit ellipsoid, 5 mm long; beak 4–6 mm long; pericarp membranous. Seeds 30–40, globular, contracted at both ends.

On muddy or sandy bottoms, also on sediment-covered coral reefs, down to 7 m deep. EE (incl. Dahlak Archipelago); in the Red Sea and the western part of the Indian Ocean, from Egypt to Tanzania, Madagascar, Mauritius, Rodriguez; also in Saudi Arabia, Bahrain and India, migrated via the Suez Canal into the Mediterranean, westward to Malta, and in the Aegean Sea. *Schweinfurth* 8; *J. H. Stock* s.n.

H. stipulacea shows two forms, the plants of the Red Sea, the Bitter Lakes and the Persian Gulf produce leaves which are more or less cartilaginous and become bullate with age, those from the Indian Ocean having more membranaceous leaves that do not become bullate. The latter have been treated by some authors as *H. balfourii* Solereder.



Figure 172.5 *HALOPHILA OVALIS*: 1 – complete plant $\times \frac{4}{5}$; 2 – enlarged portion of plant $\times 2\frac{2}{5}$; 3 – male spathe and flower $\times 2\frac{2}{5}$; 4 – female spathe and flower $\times 1\frac{1}{5}$; 5 – fruit $\times 2\frac{2}{5}$. 1 & 2 from *Faulkner* 3306; 3–5 from *Isaac* (1968). Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr.*, Hydrocharitaceae: fig. 10.)

173. APONOGETONACEAE

by K.A. Lye*

Krause in *Das Pflanzenreich* IV. 13: 9 (1906); Cufodontis, *Enum.*: 1202–1203 (1968); van Bruggen in *Bull. Jard. Bot. Nat. Belg.* 43: 193–233 (1973); van Bruggen, *Aponogetonaceae* in *Fl. d'Afrique Centrale*: 11 pp. (1974); van Bruggen in *Bibliotheca Botanica* 33 (Heft 137): 76 pp, 23 plates; Lye, *Aponogetonaceae* in *Fl. Trop. E. Afr.*: 10 pp. (1986); Thulin, 139. *Aponogetonaceae* in *Fl. Somalia* 4: 12 (1995).

Rhizomatous glabrous perennial herbs with tubers, usually growing submerged in fresh water or on wet soil. Leaves all basal, simple and usually with long petioles; leaf-blades oblong to linear. Inflorescence a simple or bifid spike, at first enclosed in a thin spathe which soon falls off. Flowers bisexual or more rarely unisexual. Tepals 1–6 or absent, petal-like, often persisting in fruit. Stamens 1–6, rarely more, filaments free, filiform or flattened; anthers 2-theous, most often only 0.2–0.5 mm long. Ovaries 3–8, free or slightly united near the base; each ovary superior and 1-locular with 1–12 erect ovules borne along one side of the locule wall or at the base of the locule. Fruit a 1–12-seeded follicle. Seed disk-shaped or tapering, straight or slightly curved with a simple or more commonly double testa.

A monogeneric family with about 40 species widely distributed in the tropical and subtropical parts of the Old World, but absent from the Americas; 3 species in the Flora area.

APONOGETON *L.f.* (1781)

Small to medium-sized perennial aquatics. Tuber often oval or spherical, with numerous roots from upper part. Leaves usually with a long petiole and a distinct leaf-blade with a few parallel primary veins and numerous transverse secondary veins, but in some species, e.g. *A. vallisnerioides* the leaf-blade is sessile and linear. Inflorescence with spirally or unilaterally arranged flowers in a loose or dense, simple or bifid, spike. Spathe often falling off early. Flowers with white, pink, lilac or yellow petal-like appendages (tepals), rarely without tepals. Stamens with yellowish or brown anthers, often soon turning black. Ovaries green, blue or lilac. Follicles bottle-shaped with a distinct beak, containing 1–14 smooth or longitudinally winged seeds.

Distribution as for the family. The 3 species found in the Flora area are distributed throughout East Africa, with 1 reaching West Tropical Africa.

These plants are probably more widespread than present collections indicate.

1. Leaves petiolate with oblong blades; inflorescence with 2 spikes, hardly curved; the spathe falling off quickly and so often missing; tepals 2 or absent, white, pink or mauve. 2
 - Leaves sessile with linear blades; inflorescence with 1 spike, somewhat curved; the spathe often persisting when flowering; tepals 2, white or with a pink-violet tinge. 1. *A. vallisnerioides*
2. Flowers with tepals and stamens; pistils either rudimentary or well developed. 3
 - Flowers without tepals and stamens; pistils well developed. 2. *A. nudiflorus*
3. Tepals white; pistils sterile and rudimentary.
 - 2. *A. nudiflorus*
 - Tepals pink or mauve; pistils fertile; each flower with 3–7 fruits. 3. *A. abyssinicus*

1. *A. vallisnerioides* Baker (1875)

– type: Uganda, Ukidi, *Grant* s.n. (K holo.).

Tuber globular to conical, usually only 5–10 mm in diameter. Leaves submerged, sessile, ligulate with obtuse tips, often 10–20 x 0.4–0.8 cm on larger plants, only 2.5–10 x 0.15–0.4 cm on smaller plants, without a distinct midrib, but with 5–7 or 9 parallel lateral nerves: robust plants may have as many as 25–50 leaves. Inflorescence of white or slight pink-violet tinged flowers in dense, unbranched unilateral spikes on 5–30 cm long peduncles, usually floating on the water surface. Spathe 12–18 mm long when mature, usually persistent when flowering. Spike usually 20–50 x c 10 mm (7–20 x 5 mm on smaller plants) with tepals spreading, the upper part recurved or spirally twisted. Tepals 2, glossy white or with a slightly pink-violet tinge, 4–6 x c 2.5 mm, with several nerves. Stamens 6. Ovaries 3. Follicles green, 5–6 mm long including an about 1 mm long beak. Fig. 173.1.

In pools on rocks with 5–30 cm deep clear water; 600–1800 m. SU IL SD; throughout tropical Africa from Sierra Leone to the Sudan and Ethiopia, and south to the Copperbelt in Zambia. *Gilbert & Thulin* 907; *Gilbert & Friis* 8382; *Gilbert & Sebsebe* D. 8736U.

2. *A. nudiflorus* A. Peter (1928)

– type: Tanzania, Malongwe, A. Peter 41726b (B lecto.).

Plants dioecious. Tuber globular-oval or irregularly shaped, 0.8–2 cm thick. Leaves usually many, with a 0.05–0.2 mm thick petiole and usually oblong floating blade, 2–13 x 0.3–4.5 cm, with distinct midrib; leaf-base cuneate to rounded. Inflorescence with 2 spikes, flowers facing different directions. Spathe 0.3–2 cm long, rather persistent. Spikes 0.5–7 cm long when flowering, but sometimes elongating to 16 cm long when fruiting. Male spikes with rather laxly set flowers. Tepals 2, white or cream, 1.5–3 mm long, broadly ovate. Stamens usually 6 with green or yellowish anthers turning black

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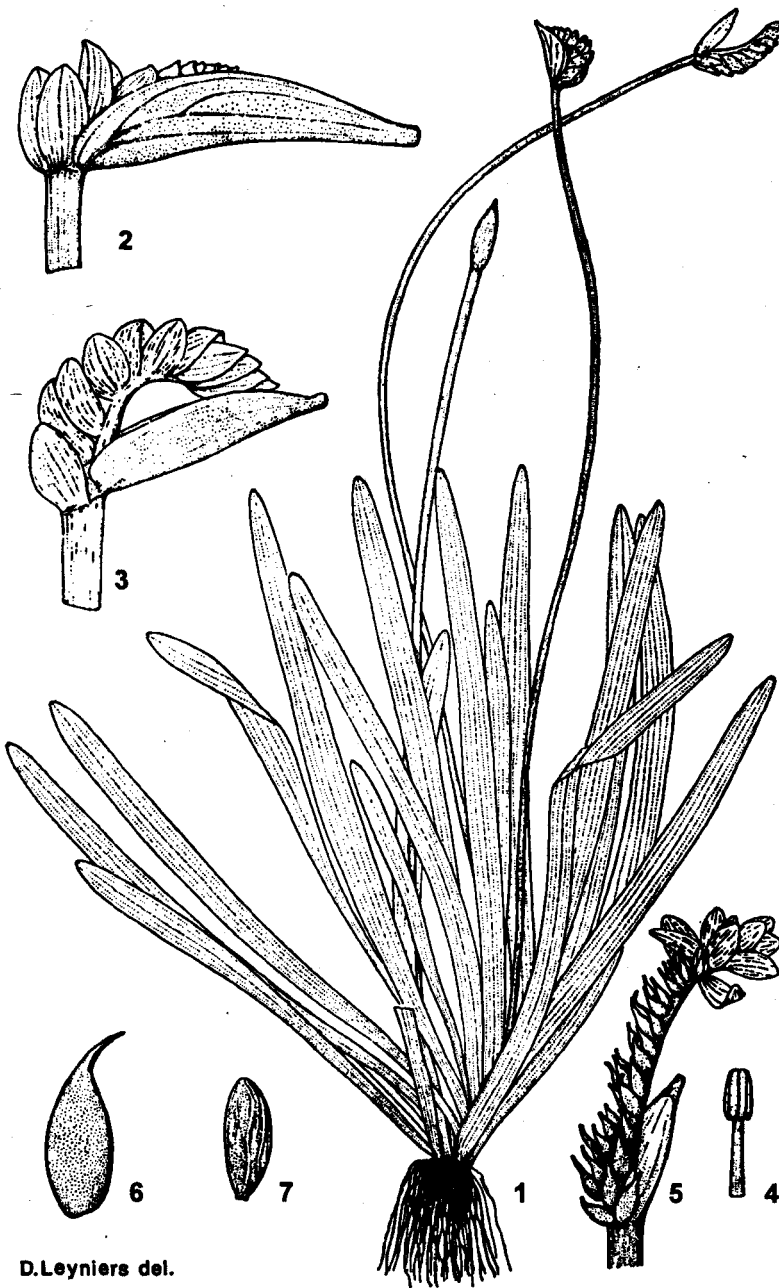


Figure 173.1 *APONOGETON VALLISNERIOIDES*: 1 – flowering plant x 1; 2 & 3 – inflorescence with flowers emerging from the spathe x 3; 4 – stamen x 10; 5 – fruiting spike x 3; 6 – fruit x 10; 7 – seed x 10. 1–3 from *Troupin* 1585; 4 from *César & Ménaut* 167; 5–7 from *Boutique* 112. Drawn by D. Leyniers. (Reproduced with permission from *Fl. d'Afrique Centrale Aponogetonaceae*: Planche 1.)

D. Leyniers del.

with age. Female spikes with more densely set flowers. Tepals absent. Ovaries 3–5, greenish with 3–6 ovules. Follicles green to brown, 3–4 mm long including a 1.0–1.5 mm long beak. Fig. 173.2.4 & 5.

Seasonal ponds and depressions which hold water for a few weeks after rain; 400–900 m. HA; Somali Republic, Kenya and Tanzania. *Ellis* 304; *Simmons* 215.

3. *A. abyssinicus* *Hochst. ex A. Rich.* (1851)
– type: TU, swamp near Aksum (Axum), *Schimper* 1483 (P holo., BR GOET K L & M iso.).

Tuber oval to shortly cylindrical or irregular in shape. Leaves with a 3–50 cm long petiole; blade 3–12 x 0.5–5 cm, ovate to oblong-lanceolate, floating on the surface of the water; base cuneate to rounded. Inflorescence in bifid spikes with pink or blue-violet densely set, flowers

usually floating on the surface, with a peduncle up to 35 cm long. Spathe 0.5–2 cm long. Spikes 1–4 x 0.4–0.8 cm when flowering, but sometimes growing to 5–6 x 1 cm when fruiting. Tepals 2, or rarely 3, pink or blue-violet, ovate to ligulate, usually 3–5 mm long. Stamens usually 6; anthers dark purple to black. Ovaries 3, green with lilac style and black stigma; ovules 4–14. Follicles green with lilac tip, 3.5–5.0 mm long, including a beak c 1 mm long. Fig. 173.2.1–3.

Temporary pools, ponds, water-filled ditches, marshes and other seasonally wet areas, usually in water 50–400 mm deep; 950–2700 m. EW TU SU SD; Somali Republic, Kenya, Uganda, Rwanda, Tanzania and Zaire. *Ash* 2451; *Gilbert & Getachew A.* 2925; *Ryding* 1418.

This species makes an attractive aquarium plant but it is also readily eaten by fish and snails.



Figure 173.2 *APONOGETON ABYSSINICUS*: 1 – flowering plant $\times 1/2$; 2 – flower $\times 10$; 3 – tepals and follicles $\times 11$. *A. NUDIFLORUS*: 4 – male plant $\times 1/2$; 5 – female plant $\times 1/2$. 1–3 from *Verdcourt & Fraser Darling 2294*; 4 & 5 from *Glover & Gilliland 164*. Drawn by Gerd Mari Lye. (1–3 reproduced with permission from *Fl. Trop. E. Afr. Aponogetonaceae: fig. 2.*)

174. ALISMATACEAE

by K. A. Lye*

Carter, *Alismataceae* in *Fl. Trop. E. Afr.*: 16 pp. (1960); Obermeyer, *Fl. South Afr.* I: 96–99 (1966); Hepper, *Fl. W. Trop. Afr.* (ed. 2) 3: 9–14 (1968); Cufodontis, *Enum.*: 1203 (1968); Symoens & Billiet, *Fl. d'Afrique Centrale*: 21 pp. (1975); Symoens, *Fl. Cameroun* 26: 3–26 (1984).

Perennial, rarely annual, aquatic or marsh herbs from creeping rhizomes or tubers. Leaves all from the root stock, either erect or (more rarely) floating on the surface of the water, with prominent basally sheathing but open petioles and linear, elliptic blades with base cordate or sagittate and veins which are distinctly parallel, converging to the apex and lobes and connected by close cross-veins; rarely the blade is reduced or suppressed (especially in plants from deep water) and the petiole flattened and grass-like. Inflorescence with a simple or compound peduncle ending in a terminal raceme or panicle with the pedicels or primary branches in whorls, rarely reduced to a solitary flower. Inflorescence-branches and pedicels subtended by well developed bracts. Flowers bisexual or seldom some or all of them unisexual, regular; ovary superior. Receptacle flat or globose. Sepals 3, green or brownish, persistent. Petals 3 (rarely absent), white or with a slight pink tinge, deciduous. Stamens 3, 6, 9 or more, free; filaments filiform or expanded below; anthers basifixed, opening by longitudinal slits; staminodes present in some species. Carpels 3-many, free or united at the base, unilocular, set in a single whorl or in an apparent spiral; style terminal or ventral; ovules 1–2 or many, usually basal and erect. Fruit a buoyant achene or a basally dehiscent follicle. Seeds oblong, smooth or wrinkled, curved and indented to follow the form of the horseshoe-shaped embryo.

About 13 genera and 70 species widely distributed in temperate as well as tropical countries, but more abundant in the northern hemisphere; 4 genera each represented by 1 species in the Flora area.

Key to genera

1. Inflorescence unbranched; leaves without a distinct blade or blade narrow, up to 15 mm wide.
 4. *Wisneria*
- Inflorescence branched; leaves with distinct blades more than 15 mm wide. 2
2. Leaf-blade sagittate. 2. *Limnophyton*
- Leaf-blade cuneate to truncate. 3
3. Plants dioecious; flowers and branches usually in whorls of 3; petals minute or absent; achenes irregularly placed. 3. *Burnatia*
- Plants monoecious; flowers and branches in whorls of at least 4; petals larger than the sepals; achenes neatly arranged in a whorl. 1. *Alisma*

1. *ALISMA* L. (1753 and 1754)

Perennial aquatic or marsh herbs with an irregular woody rhizome. Leaves erect: blade linear-lanceolate to elliptic; base decurrent or cuneate to truncate. Inflorescence a verticillate, pyramidal compound panicle; flowers and branches in whorls of 4 or more. Flowers bisexual, pedicellate, consisting of 3 sepals, 3 petals (which are larger than the sepals), 6 stamens and 10–20 free carpels, situated in a circle or whorl on the flat torus. Achenes many, compressed laterally, with a ventral beak.

Genus consisting of up to 9 closely related species, most common in the temperate regions of the northern hemisphere; 1 species in the Flora area.

A. plantago-aquatica L. (1753)

– type: from 'Europe' (LINN, holo.).

Plant perennial, 40–120 cm tall with 1–2 cm thick erect rhizome. Leaves with 5–40 cm long petioles; blades 5–30 x 2–14 cm, ovate to lanceolate, with cuneate to truncate (or subcordate) bases; the apex subacute to acuminate, with 2–4 major lateral nerves on each side of the midrib. Inflorescence a much-branched panicle with 5–8 whorls of major branches, ultimately bearing 3–8 pedicelled flowers in terminal umbels. Pedicels up to 2 cm long. Sepals 2–3 mm long, greenish. Petals 4–5 mm long, delicate, obovate, white or whitish with a purplish tinge. Stamens about 2 mm long; anthers yellow, about twice as long as broad. Achenes 2–3 mm long, light brown to yellowish, with 1–3 ridges on the dorsal surface. Fig. 174.1.

Muddy habitats in ponds, marshes, swamps or river-margins, usually in shallow water; 1300–2500 m. E W G J TU WU SU IL KF HA; widespread in Europe and Asia, in tropical Africa found in upland areas of eastern, central and southern Africa. *Amare Getahun* 231; *Friis* et al. 2218; *Getachew A. & Gilbert* 759.

2. *LIMNOPHYTON* Miq. (1855)

Annual or perennial aquatic or marsh herbs. Leaves erect, glabrous or pubescent; blades usually sagittate, rarely lanceolate (only in *L. fluitans* from West Africa). Inflorescence a verticillate, pyramidal, simple or compound panicle. Flowers in lower whorls usually either bisexual or male, in upper whorls male only. Petals white, delicate, larger than the sepals. Stamens 6; the filaments slightly swollen below. Carpels 10–30, free, crowded on a small globose receptacle; style ventral;

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Figure 174:1 *ALISMA PLANTAGO-AQUATICA*: 1 - plant x 1/2; 2 - part of inflorescence with open flower x 6; 3 - fruit x 9; 4 - achene, side view x 12; 5 - achene, dorsal view x 12; 6 - embryo x 12. 1 & 2 from Milne-Redhead & Taylor 7036; 3-6 from D. F. Smith s.n. Drawn by E.M. Stone. (Reproduced with permission from *Fl. Trop. E. Afr. Alismataceae*: fig. 1.)

ovule solitary, basal. Achenes globose to elliptic, symmetrical, shortly stalked, with lateral air-chambers between the exocarp and endocarp, ridged.

A small genus of 3 species, all African, but one species extending to Malaysia; only 1 in the Flora area.

L. obtusifolium (L.) Miq. (1855)

- type: Asia, Plukenet t. 220, Fig. 7 in *Herb. Sloane* (BM lecto.).

Plant 25-100 cm tall with short woody rhizome or rhizome lacking. Leaves with 5-80 cm long petioles

which are triangular in section; blade sagittate with lobes shorter or as long as the upper part of the blade, 4-25 x 3-25 cm, glabrous or slightly short-hairy or scabrid. Inflorescence of 3-7 dense whorls each with 5-10 flowers; the lower whorls often compound with newsecondary whorls of flowers; bracts 10-20 mm long, triangular, glabrous. Male flowers with slender pedicels; female flowers with pedicels thickened to 1-2 mm when fruiting. Carpels about 2 mm long with 0.5 mm long style. Achene 4-5 mm long, ovoid-obpyramidal, light brown, hard, ridged, shortly stalked, forming globose heads 10-15 mm in diameter. Fig. 174.2.

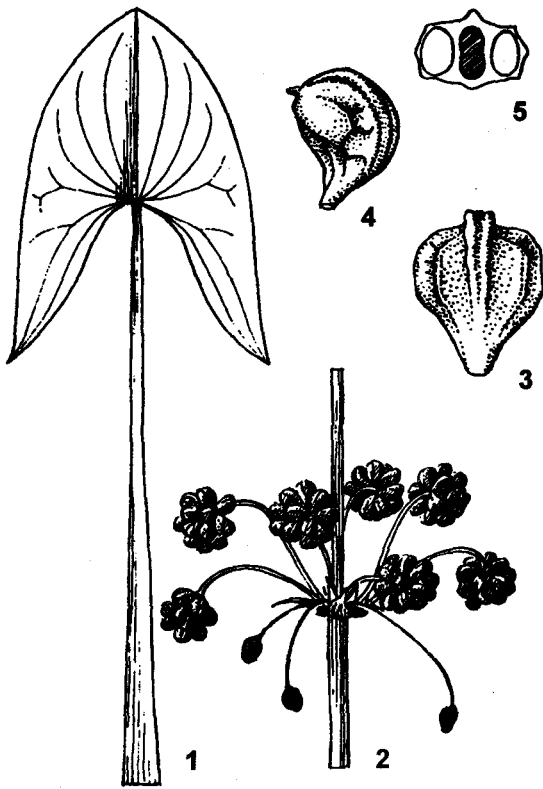


Figure 174.2 *LIMNOPHYTON OBTUSIFOLIUM*: 1 – leaf $\times \frac{1}{2}$; 2 – lower whorl of inflorescence with bisexual flowers in fruit $\times 1$; 3 – achene, dorsal view $\times 4$; 4 – achene, side view $\times 4$; 5 – transverse section of achene showing air chambers $\times 4$. 1, 3–5 from *Wailly* 5387; 2 from *Welch* 375. Drawn by E.M. Stone. (Modified and reproduced with permission from *Fl. Trop. E. Afr. Alismataceae*: fig. 5.)

Shallow water in swamps, ponds and river-basins; near sea-level to 700 m (in East Africa to 1140 m). AF IL HA; throughout tropical Africa, Madagascar, India and Malaysia. *Ash* 3728; *Mesfin T. & Kagnew* 2407; *Beals* B87.

3. *BURNATIA Micheli* (1881)

Perennial aquatic or marsh herbs, all parts glabrous. Leaves erect; blade oval to linear-lanceolate on long petioles. Inflorescence a panicle with many whorls; each whorl of 3 branches or 3 stalked flowers; bracts 3. Male flowers with 3 sepals, 3 petals, 9 stamens and about 12 abortive carpels. Female flowers with 3 sepals, petals absent or reduced to 3 minute scales, and 8–20 free carpels densely arranged on a small receptacle; stigma ventral, discoid; ovule basal, solitary. Fruit an obovate to orbicular laterally compressed achene.

A genus with only 1 species confined to tropical and subtropical Africa, including the Flora area.

B. enneandra Micheli (1881);

Alisma enneandrum Hochst. nom. nud. – type: Sudan, Kordofan, *Kotschy* 192 (BM holo., K P iso.)

Plant 20–90 cm tall with a short woody rhizome. Leaves with 5–60 cm long flattened petioles gradually widened to form a linear or lanceolate blade above; blade 5–25

$\times 0.5$ –7 cm; apex acute. Male inflorescence 15–40 cm long of 2–7 whorls of branches with the flowers on slender 0.5–1.3 cm long pedicels. Female inflorescence shorter than male, 5–15 cm long and with only 1–4 whorls of branches with the flowers subsessile or on up to 3 mm long pedicels. Male flowers with 2–3 mm long greenish to light brown sepals, 1–2 mm long white petals, 2.5–3 mm long stamens (including 1 mm long anthers) and light greenish sterile carpels. Female flowers with 1–1.5 mm long ovate to orbicular sepals, usually with petals lacking (rarely minute and scale-like), and with compressed carpels. Achenes 1.5–3 mm long, greyish-brown with a prominent ear-shaped or horse-shoe-shaped rim on each of the two lateral faces. Fig. 174.3.

Flooded swamps and marshes or other wet habitats, usually in shallow water; 540 m (outside the Flora area from near sea-level to 1500 m). IL; widespread in tropical Africa from Senegal to Ethiopia and south to Botswana and Natal in S Africa. *Ash* 550.

4. *WIESNERIA Micheli* (1881)

Perennial aquatic herbs loosely attached to the bottom or rarely floating. Leaves up to 1 m long, submerged, but the upper part often floating; the petiole cylindrical; the blade lanceolate or linear, sometimes hardly differentiated from the petiole except for a strong central nerve. Inflorescence a lax spike of sessile or subsessile unisexual flowers in unbranched whorls; upper whorls with male flowers, lower with female flowers. Male flowers with 3 sepals, 0–3 smaller petals, 3 stamens, 2 or 3 abortive pistils. Female flowers with 3 sepals, 0–3 very small petals, 3 staminodes and 3–6 pistils; styles terminal; ovule basal, solitary. Fruit an ovate swollen beaked achene with lateral air-chambers when mature.

Genus of 3 species, 2 in tropical Africa and 1 in India; 1 species in the Flora area.

W. schweinfurthii Hook.f. (1883)

– type: Sudan, Jur Ghattas, *Schweinfurth* 2157 (K lecto.) & 2304 (K syn.).

Slender tussocky herb with rather thick septate roots. All leaves radical with a sheathing base; petiole (8–)10–30 \times 0.4–0.7 cm, distinct from blade except in juvenile leaves; blade 10–15 \times (0.5–)1–1.5 cm, linear to oblanceolate, usually 3 longitudinal nerves, 2 lateral nerves close to the margin; apex subobtusely. Inflorescence a spike, 5–12 cm long with 4–10 whorls of sessile or subsessile flowers. Flowers usually white, rarely light pink or mauve. Male flowers: stalk short; sepals 3; petals 3; stamens 3; pistils 3, abortive. Female flowers: sepals 3, unequal; petals absent; pistils 3–6. Achenes 3–6, obovate to ellipsoid, 3–4 mm long, marked by tuberculate crenate ridges and ending in c 2 mm long central beak.

Shallow rock pool, 600 m. IL; widespread but rare in tropical Africa from Senegal east to Ethiopia, and south to Angola. *Gilbert & Friis* 8393.



Figure 174.3 *BURNATIA ENNEANDRA*: 1 – male plant x $\frac{2}{5}$; 2 – part of male inflorescence x $2\frac{1}{2}$; 3 – male flower x 10; 4 – part of female inflorescence x $2\frac{1}{2}$; 5 – female flower x 10; 6 – achene, side view x 10; 7 – achene, dorsal view x 10; 8 – seed x 10. 1 from Dalziel 260; 2 & 3 from Rayner 476; 4 & 5 from A.S. Thomas 3558; 6–8 from Bally 5237. Drawn by E.M. Stone. (Reproduced with permission from *Fl. Trop. E. Afr. Alismataceae*: fig. 7.)

175. JUNCAGINACEAE

by Sebsebe Demissew*

Burger, *Juncaginaceae* in *The Families of Flowering Plants*: 125 (1967); Napper, *Juncaginaceae* in *Fl. Trop. E. Afr.*: 3 pp. (1971); Dahlgren, Clifford & Yeo, *Juncaginaceae* in *The Families of the Monocotyledons*: 310 (1985).

Annual or perennial herbs. Rhizomes short or long, or base bulbous; stolons rarely present. Leaves basal, linear, flat or semi-cylindrical. Inflorescence a spike or raceme. Flowers regular and bisexual, sometimes imperfect or unisexual. Perianth of 6 similar segments in 2 whorls, deciduous, herbaceous; tepals free or united below. Stamens 6, rarely 4, in 2 series opposite the tepals; filaments usually short; anthers 2-locous, dehiscent longitudinally, extrorse. Ovary superior, carpels free or united along the central axis, 6 or 3 plus 3 undeveloped, unilocular; ovules 1 or 2; stigmas sessile or subsessile, plumose or papillose. Mericarps 3-6, indehiscent, free or united along the central axis.

A small but widespread family of swampy and marshy plants with 5 genera, *Cycnogeton*, *Lilaea*, *Maundia*, *Tetroncium*, *Triglochin*, of which only *Triglochin* L. is known to occur in Africa.

Triglochin is represented in Tanzania, Zambia, Zimbabwe, Angola to S Africa by *T. milnei* Horn af Rantzien (1961). *T. milnei* is a slender bulbiferous perennial herb 15-45 cm high. Bulbs solitary or clustered, surrounded by dense layers of fibrous leaf-base remnants. Leaves linear, 3-25 cm long, sheaths 4-6 mm wide, blades narrower, glabrous. Flowers numerous, 2.5-5 mm long, green, perianth and stigmas tinged with purple; pedicel 1-5 mm long, elongating to 3-10 mm in fruit. Outer tepals ovate, 2.5-4 mm long, entire, apex acute; inner tepals shorter and more obtuse, sometimes with the upper margin irregularly toothed. Outer anthers 1.5-3 mm long, inner ones scarcely more than half this size. Ovary 2.5 mm wide, with 3 free stigmas. Fruit narrowly lanceolate to elliptic, 8.5-14 x 3.75 mm, of 3 fertile mericarps alternating with 3 undeveloped carpels; fertile mericarps lanceolate, narrowing above to a recurved tip, separating from the central axis at maturity. Seeds semi-elliptic, compressed, 4-6.5 x 1 mm. This plant grows in open savanna which is periodically flooded.

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176. POTAMOGETONACEAE

by K.A. Lye*

Bennett, *Fl. Trop. Afr.* 8: 219–224 (1901); Graebner in Engler, *Pflanzenr.* IV. 11: 1–142 (1907); Dandy, *J. Linn. Soc. London, Bot.* 50: 507–540, pl. 21–22 (1937); Obermeyer, *Fl. South. Afr.* 1: 60–70 (1966); Hepper, *Fl. W. Trop. Afr.* (ed. 2), 3: 16–18 (1968); Cufodontis, *Enum.*: 1197–1199 (1968); Lisowski, Malaisse, Symoens & van de Velden, *Potamogetonaceae* in *Fl. d'Afrique Centrale*: 12 pp. (1978); Symoens, *Fl. Cameroun* 26: 55–61 (1984); Lye, 141. *Potamogetonaceae* in *Fl. Somalia* 4: 14–15 (1995).

Glabrous herbs, chiefly perennial, growing in fresh or brackish water, rooted in the substrate with creeping sympodial rhizomes. Stems elongated, submerged or floating, rarely prostrate on wet mud. Leaves alternate or rarely opposite or in whorls of 3, sheathing at the base; blades either submerged or floating or both; stipules usually present. Flowers in axillary or terminal bractless spikes; individual flowers inconspicuous, bisexual, regular (see figure 176.2.5). Tepals 4, free, valvate, sometimes regarded as appendages of the connectives of the anthers. Stamens 4, sessile, opposite the tepals and basally united; anthers 2-theous, opening by longitudinal slits. Pistil of 4 (rarely 1–3) free, sessile, superior carpels, each with a solitary ovule and a short, almost sessile, terminal style or stigma. Fruit a nutlet or drupe.

A family of 1–2 genera widely distributed in both temperate and tropical regions. Only 8 species are recorded from the Flora area.

The monotypic genus *Groenlandia* Gay is known from North Africa, but is perhaps not distinct from *Potamogeton*.

POTAMOGETON L. (1753)

Slender to robust aquatic plants surviving cold or dry periods by rhizomes or specialized buds which are borne either on the rhizome or on the leafy stem. Submerged leaf-blades usually thin and translucent, linear and grass-like to oblong, 1 to many-nerved; floating leaf-blades usually more leathery and opaque. Stipules either free from the leaf-bases, or joined to them in the lower parts to form a stipular sheath and then free to form a ligule; in either case the basal part may be open or closed. Spikes cylindrical to ovoid, dense or lax, sometimes interrupted, either raised a little above the water and wind-pollinated, or submerged and water-pollinated. Tepals rounded with a stalk (clawed), green or brown. Fruit brown or green, often asymmetric.

About 90 species; most of the Ethiopian species are widespread in temperate regions.

1. Leaves all submerged, narrowly linear to filiform; stipules joined to the lower part of the leaf where they form a folded sheath with a pale straw-coloured or white margin continuing into a free ligule. **1. *P. pectinatus***
– Leaves submerged or floating, narrow or wide; stipules free from the leaf, forming an independent stipular sheath which sometimes falls off quickly. **2**
2. Leaves all submerged, 0.5–4 mm wide. **3**
– Leaves all floating, if submerged over 4 mm wide. **5**
3. Leaf-margin strongly serrate and undulate; blade with 3–5 veins; fruit with beak nearly as long as the fruit. **4. *P. crispus***
– Leaf-margin flat, smooth or weakly undulate, not serrate; blade with a strong midvein and 1 or 2 pairs of weaker lateral veins; beak much shorter

than the fruit. **4**

4. Leaves usually 1–2 mm wide; fruit 2–2.5 mm long, smooth. **2. *P. pusillus***
– Leaves 1–3 mm wide, fruit 3–3.5 mm long with a prominent ventral wart and a sharp crenulate dorsal keel. **3. *P. octandrus* subsp. *ethiopicus***
5. Leaves prominently amplexicaul with cordate base. **5. *P. perfoliatus***
– Leaves sessile or stalked, not amplexicaul nor with cordate base. **6**
6. Leaves all submerged; margin densely serrate and undulate; fruit with beak nearly as long as the fruit. **4. *P. crispus***
– Leaves floating or submerged; margin entire or with a few teeth; beak much shorter than the fruit. **7**
7. Submerged leaves sessile or with an up to 5 mm long 'pseudo-petiole'. **6. *P. lucens***
– Submerged leaves with a 1–6 cm long stalk or with floating leaf-blades only. **8**
8. Mature leaves all with a stalked ovate-oblong leathery floating blade. **8. *P. thunbergii***
– Most leaves submerged but often with a few ovate-oblong, stalked, leathery, floating blades at the top of the shoots. **7. *P. schweinfurthii***

1. *P. pectinatus* L. (1753)

– type: from 'Europe' (LINN lecto.).

Submerged perennial often forming dense colonies with extensively creeping rhizomes, sometimes forming scaly 'winter buds'. Stems 30–250 cm long depending on depth of water, smooth, rounded, strongly branched. Leaves all submerged with blades 20–150 x 0.2–1.5 mm, linear, smooth, flat at least near the tip, but often triangular to rounded near the base, rarely blades larger and wider; apiculate at the tip; stipules attached to the blade, forming a folded sheath, often with prominent

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white or straw-coloured margins and terminating in a 1–5 mm long erect ligule. Spikes few-flowered, at first cylindrical, later becoming more or less interrupted with 2–4 flowers in each whorl. Fruit usually 3–4 x 2–2.5 mm, yellowish-brown to olive, obovoid and compressed with a straight ventral margin, dorsally with 2 distinct keels; beak short. Fig. 176.1.1.

In shallow water in lakes; 1850–2850 m. EW TU SU AR GG SD HA; almost cosmopolitan. *Burger* 2564; *Gilbert* 4240; *Sue Edwards* 3859.

2. *P. pusillus* L. (1753)

– type: from 'Europe' (LINN lecto.).

P. panormitanus Biv. (1838).

Submerged perennial with poorly developed slender rhizome, or arising from seeds or detached buds. Stems 20–100 cm long, rounded or somewhat angular, strongly branched from the base; internodes of relatively equal length. Leaves translucent, narrowly linear, 20–80 x 1–2.5 mm, with one prominent midrib and 1 (rarely 2) weaker nerves on each side of the midrib; apiculate at the tip; sheath 5–18 mm long, tubular to above half way when young, later splitting almost to the base, light brown, semi-persistent. Spikes axillary, 4–12 mm long, relatively few-flowered (2–15 flowers), rarely interrupted; peduncles 10–30 mm long. Fruit 2–2.5 x 1–1.5 mm, green to olive, obovoid and compressed with convex margins; keel obscure, rounded, smooth; beak 0.3–0.4 mm long, straight or somewhat oblique, almost centrally placed. Fig. 176.2.1–3.

In ponds, creeks and streams; 1550–2900 m. EW TU GD SU AR WG BA HA; scattered in Africa, more common in Europe and temperate parts of Asia and North America. *De Wilde* 6053; *Friis et al.* 1138; *Thulin & Hunde* 3879.

3. *P. octandrus* Poir. subsp. *ethiopicus* Lye in *Lidia* 3: 79 (1993)

– type: SU, about 100 km N of Addis Ababa, between Fitcha and Debra Libanos, *W. de Wilde* 10870 (WAG holo., K iso.).

Partly or entirely submerged perennial with a thin creeping rhizome. Stems 20–100 x c 0.05 cm, cylindrical or almost so; in the upper parts more strongly branched and with shorter internodes. Submerged leaves always present, alternate, translucent, narrowly linear, 30–70 x 1–3 mm, with 1 prominent midrib bordered by a few rows of large rectangular cells, and 1 (rarely 2) weaker nerves on each side; prominently apiculate at the tip; sheath often only 1–6 mm long, convolute, brownish and soon decaying. Spikes 5–15 mm long, few-many flowered, not interrupted; peduncles 10–40 x 0.3–0.5 mm. Fruit 3–3.5 x 2–2.5 mm, oblong to rounded in outline, broad-shouldered above; ventral keel straight to weakly convex with a large wart; dorsal keel rather sharp, crenulate; beak 0.5–0.6 mm long. Fig. 176.1.2.

Submerged in slowly running stream; 2000 m. SU. So far only known from the type.

The species as a whole is widespread throughout the tropics of the Old World. Subsp. *ethiopicus* differs from subsp. *octandrus* in having larger fruits with shorter beaks (2–2.5 mm long in subsp. *octandrus*) and longer and more slender peduncles (1–1.3 mm thick in subsp. *octandrus*).

4. *P. crispus* L. (1753)

– type: from 'Europe' (LINN lecto.).

Submerged perennial with creeping rhizome and 30–150 cm long, 4-angled stem repeatedly branched above. Leaves all submerged, 20–90 x 3–10 mm, sessile, translucent, lanceolate to linear-lanceolate, densely serrate and strongly undulate at the margin, longitudinal veins 3–5; apex obtuse or acute; stipular sheath 3–20 mm long, convolute, soon becoming torn and decayed (or frayed). Spikes 5–15 mm long, rather lax and few-flowered (often 7–10 flowers); peduncle commonly 10–50 mm long. Fruit 4–5 mm long, dark olive, ovoid and compressed below; the beak prominent, somewhat falcate, about as long as the rest of the fruit; margins convex, dorsal margin keeled, somewhat irregular or crenulate. Fig. 176.1.3 & 4.

Irrigation canals or ponds; 1600–2800 m. SU; also in the Sudan, Zambia, Malawi, Zimbabwe and South Africa. More widespread in Europe and in temperate parts of Asia. *Ash* 3744; *Gilbert & Tewolde* 3273.

5. *P. perfoliatus* L. (1753)

– type: from 'Europe' (LINN lecto.).

Submerged perennial with extensive creeping rhizome and 50–200 cm long cylindrical stems strongly branched above. Leaves all submerged, 10–40 x 10–30 mm, very thin and translucent, ovate to almost rounded (orbicular) with blunt apex and plain or undulate minutely denticulate margin, all sessile and prominently amplexicaul at the wide cordate base; stipules to 10 mm long, soon falling off. Spikes 10–25 mm long, dense and many-flowered; peduncle 30–90 mm long. Fruit 3–3.5 mm long, olive brown, broadly ovate with short beak, hardly compressed; ventral margin concave below but convex above; dorsal margin semicircular, not keeled and with faint lateral ridges. Fig. 176.1.5.

In 0.5–3 m deep water in lakes and reservoirs; c 2800 m. SU; common in the northern hemisphere, rare in Africa and Australia. *Smeds* 102.

6. *P. lucens* L. (1753)

– type: from 'Europe' (LINN lecto.).

Submerged perennial with creeping rhizome and 50–200 x 0.1–0.2 cm, rounded, moderately branched stems carrying sessile submerged leaves only. Leaves 60–200 x 10–20 mm, lanceolate, distinctly net-veined, usually strongly attenuate at base and apex; apiculate at the tip; the base without a distinct stalk (the attenuate base may appear stalk-like for about 5 mm); margin with a few scattered teeth (often strongly toothed in material from temperate regions) or almost entire, prominently undulate; stipular sheath 20–50 mm long, folded, persist-



Figure 176.1 *POTAMOGETON PECTINATUS*: 1 – leafy branch showing united sheaths and ligule x $\frac{1}{2}$. *P. OCTANDRUS* subsp. *ETHIOPICUS*: 2 – fruit x 10. *P. CRISPUS*: 3 – leafy shoot with inflorescence x $\frac{1}{2}$; 4 – detail of leaf tip x 10. *P. PERFOLIATUS*: 5 – part of shoot x $\frac{1}{2}$. *P. THUNBERGII*: 6 – leafy shoot x $\frac{1}{2}$; 7 – fruit x 5. 1 from de Wilde 8993; 2 from de Wilde 10870; 3 & 4 from Ash 3744; 5 from de Wilde 5724; 6 & 7 from Gilbert 2211. Drawn by Gerd Mari Lye.



Figure 176.2 *POTAMOGETON PUSILLUS*: 1 – leafy shoot x 1; 2 – detail of node showing tubular leaf sheath x 3; 3 – fruit x 10. *P. SCHWEINFURTHII*: 4 – leafy shoot with submerged blades only x 1/2. 5 – top view of a generalised *Potamogeton* flower showing 4 central stigmas, 4 stamens each with 2 anthers and 4 tepals x 10. 1 & 2 from *de Wilde* 6053, 3 from *Schoü* 1992; 4 from *de Wilde* 10882. Drawn by Gerd Mari Lye.

ent; the apex rounded or bidentate. Spikes 1–3 cm long, many-flowered; peduncle often thickened above. Fruits 3–4.5 mm long, smooth with 3 shallow keels on dorsal side, beak very short, 0.5 mm long, recurved.

Lakes, pools and slowly running water; 1500–2300 m. EW SU GG SD HA; also in Uganda, Sudan and Somalia, more widespread in Europe and other temperate regions. *W. de Wilde* 10882; *Friis* et al. 1160; *Demel* T. 752A.

The African forms of *P. lucens* have mostly long and narrow leaves. Such plants have been named var. *longifolius* Cham. and Schlecht. Plants in the Flora area are possibly to a large extent hybrids with the next species.

7. *P. schweinfurthii* A. Benn. (1901)

– types: Sudan, *Schweinfurth* 1223 (K lecto.) & 1165 (K syn.).

Perennial with creeping woody rhizome. Stems 50–250 x 0.1–0.3 cm, rounded, strongly branched, carrying stalked thin submerged leaves and often also leathery stalked floating leaves at the top of the shoots. Submerged leaves linear-lanceolate, usually 100–200 x 10–20 mm (when mature), distinctly net-veined, strongly attenuated at the base and apex; apiculate at the tip; the base with a 10–60 mm long stalk merging gradually into the blade; margin entire, prominently but finely undulate; stipular sheath 20–50 mm long, folded, persistent. Spikes 20–40 mm long, 15–30-flowered; peduncle to about 100 x 2–3 mm. Fruit only rarely produced, 3–4 mm long with 0.5–0.6 mm long beak, smooth; ventral side fairly straight, dorsal rounded with rounded keel and two weaker lateral keels. Fig. 176.2.4.

Lakes, pools and in open water in swamps; 1500–2850 m. GD GJ SU SD; also in the Sudan and eastern Africa south to the Cape region of S Africa. *Ash* 1857; *Gilbert & Tewolde* B. G. E. 3267; *W. de Wilde* 7015.

The author considers *P. schweinfurthii* to be of hybrid origin, one of its parents being *P. lucens* and the other either *P. thunbergii* or *P. nodosus* Poir. Plants with both well developed submerged and floating leaves are easily recognized from their parents on this character, while plants with submerged leaves only (juvenile plants or back-crosses to *P. lucens*) can be recognized by their distinctly stalked blades.

8. *P. thunbergii* Cham. & Schlecht. (1827)

– type: South Africa (*Thunberg* s. n.).

P. richardii Solms-Laub. in *Schweinf.* (1867) – types: TU, near Adoa, *Schimper* 135 (K lecto.) and Shire, *Quartin-Dillon* s. n. (P syn.).

P. nodosus sensu *Cufod. Enum.* (1968), non sensu Poir. (1816).

Perennial with creeping woody rhizome and 50–200 cm long, rounded, unbranched or little branched stems. Leaves all stalked, mostly with floating blades only; submerged leaves usually disintegrating before or during flowering; petioles mostly 30–200 mm long; floating blades leathery, 40–150 x 15–50 mm, elliptic to ovate, obtuse or rounded (rarely cuneate) at base; apex rounded or acute; stipular sheath 20–70 mm long, folded. Spikes 20–60 x 12 mm, densely many-flowered; peduncle 50–90 x 2–3 mm, thickest below. Fruits often produced in great numbers, 4–5 x 3–3.5 mm with 0.5–1 mm long beak, obovate, somewhat compressed; ventral side straight or convex, dorsal rounded; keels prominent when dry. Fig. 176.1.6 & 7.

Ponds, pools and streams, often in moving water; 1400–3100 m. EW TU GD SU AR WG KF SD BA HA; widespread and common in upland areas in east Africa, southeast Africa and reaching the Cape region of South Africa. *Ash* 1760, 3490; *Gilbert* 2211; *W. de Wilde* 5863.

This species is very closely related to the mainly European *P. natans* L. and should perhaps be considered as an African subspecies of that species.

177. RUPPIACEAE

by K.A. Lye*

Graebner in Engler, *Pflanzenr.* IV. 11: 142–145 (1907); Obermeyer, *Fl. South. Afr.* 1: 70–72 (1966); Symoens, *Fl. d'Afrique Centrale.* (1977); Lye, *Ruppiaceae* in *Fl. Trop. E. Afr.*: 3 pp. (1989).

Submerged glabrous aquatic herbs of alkaline or brackish water, sometimes in sea water. Stems slender, branching freely. Leaves alternate or opposite; blade simple, linear or setaceous, with a single midvein; sheath open distally. Inflorescence usually a 2-flowered terminal spike, when young concealed in the sheath of the uppermost leaf and then just exerted above the water at anthesis; peduncle short or long, sometimes spirally coiled. Flowers bisexual, regular, very small and inconspicuous. Perianth absent. Stamens 2, opposite each other; filaments very short and broad; anthers bilocular, extrorse opening by longitudinal slits. Pollen grains crescent- or sausage-shaped, floating on the water surface. Carpels usually 4, free, superior, sessile at first, with long stalks in fruit; ovule solitary, pendulous; stigma sessile, peltate. Fruits ovoid to pear-shaped, often asymmetric, beaked drupes. Seeds hard.

A monogeneric family widely distributed in temperate regions, rarely in the tropics; 1 species in the Flora area.

RUPPIA L. (1753–1754)

Slender submerged herbs with intricately branched stems up to 80 cm long. Leaves with spreading blades to 10 x 0.1 cm; the sheaths stipular in origin. Flowers inconspicuous when young, but fruits prominent, appearing subumbellate because of the stalked drupes.

A genus of 2–10 closely related species, but regarded as monotypic by some botanists. Widely distributed along sea-coasts; in the tropics rare and then often at higher altitudes.

R. maritima L. (1753)

–type: from 'Europe' (LINN lecto. or plate 35 of Micheli, *Nova Plantarum Genera*, 1729).

Slender aquatic with thin horizontal rhizomes rooting in the mud. Stems 10–50 x 0.02–0.08 cm, filiform, much branched. Leaves numerous, set all along the plant; sheath light to medium, reddish brown, 5–20 mm long; blade 20–150 x 0.2–0.9 mm, linear-filiform with small teeth along margin near the acute tip. Peduncles often 5–10 x 0.2–0.5 mm when flowers open, but usually elongating to 15–25 mm (rarely to 60 mm long) after anthesis, straight or more commonly recurved in fruit but not spirally coiled. Anthers 0.5–1 mm long, elliptic. Fruits 2–3 mm long (excluding the stalk), obliquely ovoid with a prominent beak, medium to dark reddish brown or almost black; the stalk usually 5–10 mm long (rarely to 30 mm long). Fig. 177.1.

Alkaline lakes or brackish water, just below low tide level, sandy beach on the Red Sea coast. EE; rare in tropical Africa, more widespread in temperate regions of Europe, Asia and America. *Terracciano* s.n.; *Ryding* 1167.

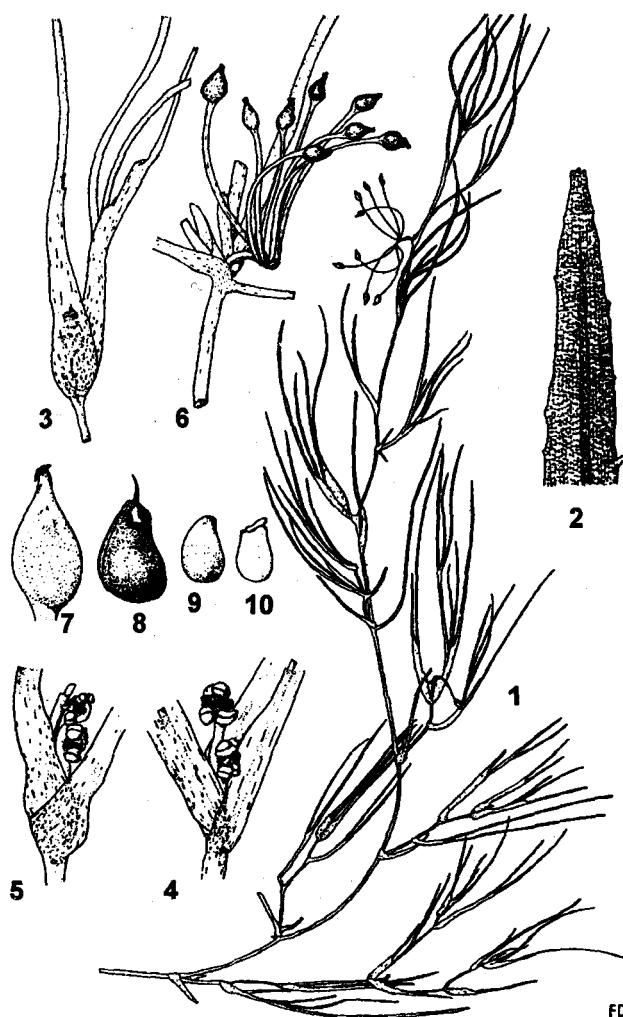


Figure 177.1 **RUPPIA MARITIMA**: 1 – habit x 3/4; 2 – leaf-tip x 36; 3 – young inflorescence with sheath x 3; 4 – young inflorescence, sheath removed x 6; 5 – older inflorescence, sheath removed x 7 1/2; 6 – infructescence x 2 1/4; 7 – fruit x 7 1/2; 8 – endocarp x 7 1/2; 9 – seed x 7 1/2; 10 – embryo x 7 1/2. 1 from *Schmitz* 7313; 2–10 from *Schmitz* 8331. (Reproduced with permission from *Flore d'Afrique Centrale, Ruppiaceae*: fig. 1.)

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178. ZANNICHELLIACEAE

by Sebsebe Demissew*

Obermeyer, *Zannichelliaceae* in *Fl. South. Afr.* 1: 73, 77–81 (1966); Burger, *Zannichelliaceae* in *Families of Flowering Plants in Ethiopia*: 126 (1967); Dahlgren, Clifford and Yeo, *Zannichelliaceae* in *The Families of the Monocotyledons*: 318 (1985).

Annual or perennial submerged herbs. Stems much-branched, arising from slender creeping rhizomes. Leaves linear, 1–3 veined, alternate, distichous, rarely almost opposite, or in pseudo-whorls of 3–4 as in *Zannichellia*; sheath open with a membranous margin, generally attached to the base of the leaf-blade but in *Zannichellia* the sheath is separate from the green blade; scale leaves corresponding to leaf-sheath also present; ligules occur frequently. Flowers terminal, solitary or in cymose aggregates, commonly unisexual, rarely bisexual; tepals absent or forming a small, 3-lobed structure at the base. Male flowers with a single filament, anthers with 4, 8 or 12 pollen sacs (possibly representing 2 or 3 fused stamens) opening by 1 or 2 longitudinal slits. Female flowers with a small cup-like or 3-lobed structure and 1–9 free carpels; style short or long, with dilated funnel-shaped stigma; ovary ovoid, locule contains one pendulous ovule. Fruit usually an achene.

Family with 4 genera, *Althenia*, *Lapilaena*, *Vleisia* and *Zannichellia*, distributed throughout the world. Plants in this family occur in fresh and brackish waters, but not in sea water. Marine species which were previously included in *Zannichelliaceae* are now put in *Cymodoceaceae*.

The wetlands of Ethiopia are poorly known and it is possible that the cosmopolitan species, *Zannichellia palustris* L. might be found in the Flora area.

ZANNICHELLIA L. (1753)

Valentine, *Zannichelliaceae* in *Fl. Europaea* 5: 12–13 (1980).

Submerged plant; stems brittle, slender and elongate. Leaves linear; sheaths free from the leaf base, ligule present. Flowers unisexual, axillary, solitary or 2 or more together. Male flower with 4–8 pollen sacs. Female flowers with cup-shaped perianth; carpels 1–9; styles simple.

Some authors recognize several species while others consider there is only 1 cosmopolitan and polymorphic species.

Z. palustris L. (1753).

Stems erect, thin and brittle. Leaves 1–3 at a node, linear, 1–2 mm wide; sheaths free from the leaf base, membranous, falling off quickly. Achenes 3–6 mm long, often curved, laterally compressed, with a crest of blunt teeth on convex side, style persistent forming a beak.

Submerged plants form dense mats resembling fine grass. A cosmopolitan species found in N and S Africa, and all other continents except Australia.



178.1 ZANNICHELLIA PALUSTRIS: 1 – flowering and fruiting stems $\times \frac{3}{5}$; 2 – part of flowering stem, leaves cut off near base, and some of the bracts removed $\times 4$; 3 – male and female flowers $\times 9$; 4 – carpel $\times 8$; 5 & 6 – ripe carpel and section of the same $\times 5$. Drawn from living material by Stella Ross–Craig. (Reproduced with permission from the artist, Stella Ross–Craig.)

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179. CYMODOCEACEAE

by K. A. Lye*

Bennett, *Fl. Trop. Afr.* 8: 228–230 (1901); Ascherson & Graebner in Engler, *Pflanzenr.* IV. 11: 145–153 (1907); den Hartog, *Blumea* 12: 289–312 (1964); Obermeyer, *Fl. South. Afr.* I: 73–77 (1966); Hepper, *Fl. W. Trop. Afr. (ed. 2)* 3: 18–20 (1968); Isaac, *J. E. Afr. Nat. Hist. Soc.* 27: 29–47 (1968); Cufodontis, *Enum.*: 1200–1201 (1968); den Hartog, *The Sea Grasses of the World* (1970); Sartoni, 142. *Cymodoceaceae* in *Fl. Somalia* 4: 16–19 (1995).

Rhizomatous glabrous marine perennial herbs growing entirely submerged or exposed at low tides; rhizomes creeping, often articulated and rooting at the nodes. Leaves alternate or apparently opposite, sheathing at the base; blades linear and grass-like with 3 to several nerves, apex acute or obtuse; sheaths open, each with a ligule at the junction of sheath and blade; intravaginal scales present. Flowers unisexual, inconspicuous, naked or more rarely subtended by minute hyaline bracts, set in small axillary inflorescences or solitary or paired in the axils. Male flowers of 2 paired anthers, almost sessile; anthers opening by longitudinal slits; pollen grains without exine, filamentous and up to 1 mm long. Female flowers of 2 or 1 carpel each with a terminal style ending in 1–2 thread-like stigmas. Fruit a small 1-seeded nutlet; seed compressed or swollen with a thick testa.

A family of 5 genera and about 15 species widely distributed along tropical and subtropical sea coasts; so far 4 genera and 5 species recorded for the Flora area.

This family has often been included in the *Zannichelliaceae*.

The 'sea grasses' are a main source of food for the threatened marine mammal, the dugong, which still has thriving populations along the Red Sea coast of Eritrea.

Key to genera

1. Leaves cylindrical and pointed, 1–3 mm in diameter. 1. *Syringodium* 2
 - Leaves flat, up to 10 mm wide. 2
2. Rhizome sympodial, woody, with long, erect shoots; leaf-blade shed with its sheath; tip of blade with 0.5 mm long teeth. 4. *Thalassodendron*
 - Rhizome monopodial, thin and not woody, with a short erect shoot at each node; leaf sheaths persisting longer than the blades; leaf tip smooth or with up to 0.2 mm long teeth. 3
3. Blades with 1 or 3 nerves, truncate and toothed at apex; style unbranched. 2. *Halodule*
 - Blades with 7–17 nerves, rounded at apex; style divided into 2 branches. 3. *Cymodocea*

1. *SYRINGODIUM* Kotzing (1860)

Unisexual plants with monopodial rhizomes, and with one or more unbranched or slightly branched roots; an erect stem at each node. Each stem with 2–3 leaves with cylindrical pointed blades and up to 6 cm long sheaths. Inflorescence cymose, on separate non-leafy shoots. Flowers enclosed by a reduced leaf with up to 9 mm long sheath and 5–20 mm long blade. Male flower stalked, consisting of 2 anthers. Female flower sessile, consisting of 2 free ovaries, each with a short style and 2 short stigmas. Fruit 4–7 mm long, ovoid with a short beak; pericarp stony.

A small genus of two species, one in the Old World and the other in the New World.

1. *S. isoetifolium* (Asch.) Dandy (1939);

Cymodocea isoetifolia Asch. (1867) – type: India, Wight 2433 (K lecto.).

Rhizome creeping, thin, fleshy and brittle, whitish or brown; internodes 1–3 cm long. Branches erect, in lower part with several naked internodes from which leaves have fallen. Leaves distichous; sheath 1.5–4 mm long, pale or tinged reddish-brown; auricles rounded; blades 7–30 x 0.1–0.3 cm, rounded; apex when present minutely toothed. Male and female flowers on separate plants in branching cymose inflorescences. Male flowers: stalk ± 7 mm long; anthers 2, ovate, 2 mm long. Female flowers: ovaries 2, elongate, 3–4 mm long; style 2 mm long; stigmas 4–8 mm long; each flower enclosed in a 4–7 mm long, light reddish-brown sheathing bract with a short green leaf-like tip which drops off as the flower matures. Fruit obliquely ellipsoid, 3.5–4 mm long with a 2 mm long beak.

Rooted in sand or mud in shallow or deep water, only below sea-level (sub-littoral zone). EE; widespread along the coast on the eastern side of the African continent, also in Asia and Australia. *Beccari* s.n., 1870.

2. *HALODULE* Endl. (1841)

Unisexual slender grass-like herbs with monopodial rhizomes; 1 or more unbranched roots and a single short erect stem at each node. Each stem with 1–4 leaves. Leaves: sheaths up to 6 cm long; blades with a prominent midrib (at least on dried material) and one inconspicuous intramarginal nerve on each side; apex truncate, usually with 2 or 3 teeth. Flowers solitary on short side branches, enclosed in leaf-sheaths similar to the vegetative ones. Male flower stalked, with 2 fused

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stamens attached at different heights and facing opposite directions. Female flower subsessile, with 2 free ovaries, each with 1 long unbranched style. Fruit subglobose with a short beak and stony pericarp.

A small genus of, at most, 6 species, widely distributed along the shores of tropical and subtropical oceans.

1. Leaf up to 0.3 cm wide, lateral teeth of leaf-tip not conspicuously longer than median tooth.

1. *H. uninervis*

- Leaf up to 0.1 cm wide, lateral teeth of leaf-tip conspicuously longer than median tooth.

H. wrightii

H. wrightii Asch. is recorded from Kenya, Tanzania and Mozambique, and may turn up on the Ethiopian coast also.

1. *H. uninervis* (Forssk.) Asch. (1882);

Zostera uninervis Forssk. (1775) - type: Yemen, Al Mùkha (Mochha), Forsskål s.n. (C holo. lost!).

Rhizome creeping, thin, rather fleshy, with 1-6 roots at each node. Stems or branches usually only 1-5 cm long, rarely up to 30 cm or more long; internodes usually 0.5-2.5 cm long. Leaf-blade 5-15 x 0.05-0.3 cm, linear, straight or slightly curved; leaf-tip truncate with 2 linear lateral teeth and an obtuse or acute median tooth in which the midrib ends; median tooth as long as or shorter than the lateral teeth, rarely slightly longer. Male flower with a 6-20 mm long stalk and 2-3 mm long reddish anthers. Female flower with two ovoid ovaries 1-2 mm long; style 2-4 cm long, the tip protruding from the leaf sheaths. Fruit 1.5-2.5 mm in diameter, orange or brown. Fig. 179.1.

Rooted in sand or mud in relatively shallow water, often above the beds of *Thalassodendron ciliatum*, only below sea-level (sub-littoral or rarely littoral zone). EE; widespread along the coast on the eastern side of the African continent, also in Asia and Australia. *Schweinfurth* 5; *Ash* 717; *Baldrati* 4546.

3. CYMODOCEA Koenig (1805)

Dioecious plants with monopodial rhizomes and 1-5 branched roots and a short erect stem at each node. Each stem with 2-7 leaves with 1-10 cm long compressed sheaths persisting and longer than the blades. Leaf-blades linear, often narrowed at the base, margin mostly entire, but usually minutely dentate or spinulose near the obtuse (rarely emarginate) tip; nerves 7-17, without a prominent midrib. Flowers solitary, enclosed in a sheath similar to the vegetative ones. Male flowers stalked, consisting of 2 fused anthers attached at the same height on the stalk. Female flowers sessile or subsessile, consisting of 2 free ovaries each with a short style divided into 2 strap-shaped stigmas. Fruit elliptic to semiorbicular in outline, laterally compressed, with smooth or dentate dorsal ridges.

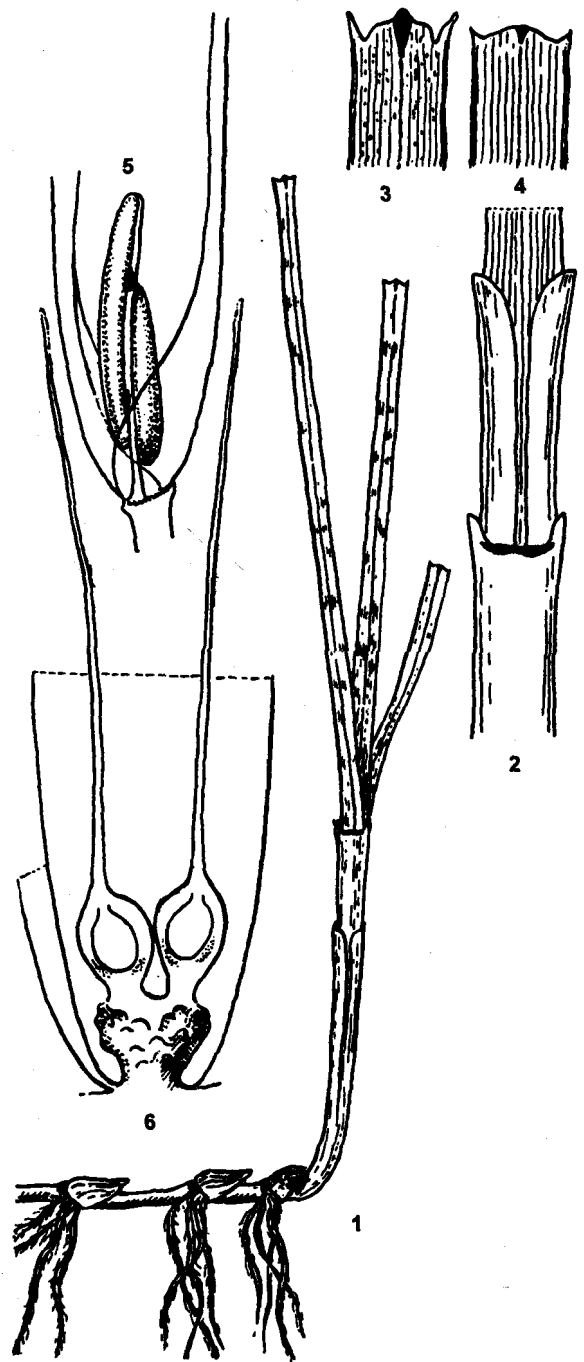


Figure 179.1 *HALODULE UNINERVIS*: 1 - whole plant x 1; 2 - leaf-sheaths x 2; 3 & 4 - leaf-tips x 4; 5 - young male flower x 9; 6 - female flower x 10. (Modified and reproduced with permission from *Fl. South. Afr.* 1, 1966)

A small genus of 4 species, widely distributed along the shores of tropical and warm temperate oceans of the Old World; 2 in the Flora area.

1. Leaf scars closed; sheaths only slightly wider above than below; blades 0.2-0.4 cm wide, entire or minutely toothed especially in young stages; fruit with dentate ridges. 1. *C. rotundata*
- Leaf scars open; sheaths at least twice as wide above as below; blades 0.4-0.9 cm wide, densely serrate at the obtuse tip; fruit with blunt ridges.

2. *C. serrulata*

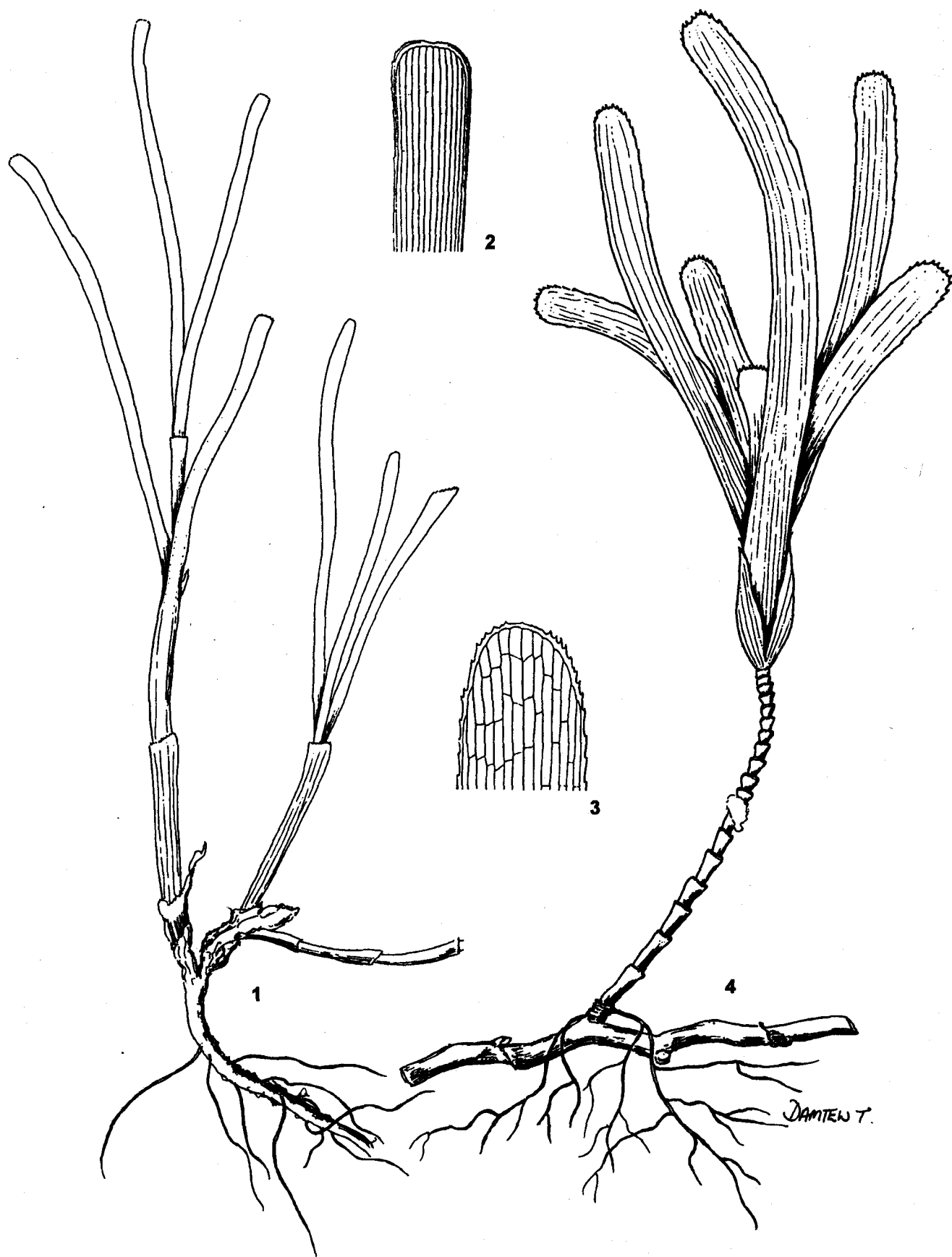


Figure 179.2 *CYMODOCEA ROTUNDATA*: 1 - whole plant x 1; 2 - leaf-tip x 5. *C. SERRULATA*: 3 - leaf-tip x 5. *THALASSODENDRON CILIATUM*: 4 - whole plant x 1. 1 from Ash 2321; 2 from Ash 2319. 1 & 4 drawn by Dantew Teferra.

1. *C. rotundata* *Asch.* (1870)

– type: The Sudan, Sùakin, *Schweinfurth* s.n. (B holo., lost!).

Rhizome creeping, thin, fleshy, with 1–3 irregularly branched roots at each node. Stem usually with 2–3 leaves at each node; internodes on stem often less than 1 mm long. Leaf-sheaths 1.5–6.5 cm long, pale, almost cylindrical and only slightly wider above than below, light reddish-brown or pale purplish with acute auricles, when shed leaving closed circular scars on the stem. Leaf-blades 5–20 x 0.2–0.4 cm; margins usually entire; tip obtusely rounded or emarginate, smooth or minutely serrulate; nerves 9–15. Male flower stalked with 11 mm long anthers. Female flower with two very small ovaries gradually passing into the style; stigmas at least 3 cm long, filiform and spirally coiled. Fruit sessile, semicircular in outline, about 10 mm long, 6 mm wide and 1.5 mm thick with 3 dorsal ridges set with conspicuous teeth. Fig. 179.2.1 & 2.

Rooted in sand or mud, often forming a grass-like carpet; only below sea-level (sub-littoral zone). EE; widespread along the coast on the eastern side of the African continent, also in Asia and Australia. *Ash* 2321; *Beccari* 1870.

2. *C. serrulata* (*R.Br.*) *Asch. & Magnus* (1870);

Caulinia serrulata *R.Br.* (1810) – type: from 'Australia' (BM holo.).

Rhizome creeping, fleshy or somewhat woody when old, with 2–3 sparsely branched roots at each node. Stem usually with 2–3 leaves at each node; internodes on stem often 1–10 mm long. Leaves: sheaths 15–35 x 5–10 mm above, triangular and strongly narrowed at the base (less than half its upper width), light reddish-brown to purple, shed leaving open circular scars on the stem; auricles acute; blades linear or curved, 50–150 x 4–9 mm, slightly dentate on margins in upper parts; tip obtuse, dentate or serrate; nerves 13–17. Male flowers unknown. Female flower with 2 small ovaries each with a 2–4 mm long style and two 2–3 cm long stigmas. Fruit sessile, elliptic in outline, 7–9 mm long, 3.5–4.5 mm wide and 2 mm thick with 3 blunt dorsal ridges. Fig. 197.2.3.

Rooted in sand or mud, only below sea-level (sub-littoral zone). EE; widespread along the coast on the eastern side of the African continent, also in Asia and Australia. *Gilbert* 2541B; *Sue Edwards* 3526; *Baccari* 2.

4. **THALASSODENDRON** *den Hartog* (1970)

Dioecious plants with sympodial woody rhizomes producing erect unbranched or sparsely branched stems at every fourth internode. Roots branched, 1–5 together, occurring only on the internode preceding a stem-bearing internode. Leaves 5–8 at the apex of a stem or branch; sheaths triangular, the older enclosing the younger; blades somewhat curved with obtuse, rounded or somewhat emarginate densely serrate apex; nerves 13–27. Flowers solitary on short lateral leafy shoots immediately below the terminal cluster of leaves, enclosed by 4 leafy bracts. Male flower of 2 fused anthers attached at the same height. Female flower of 2 free ovaries each with a short style divided into 2 strap-shaped stigmas. After fertilization usually only one ovary develops. Mature fruit, surrounded by the fleshy inner bract, germinates when still attached to the parent plant. The young plant is released only when it has 4–6 leaves and a well developed root system.

A monotypic genus.

1. *T. ciliatum* (*Forssk.*) *den Hartog* (1970);

Cymodocea ciliata (*Forssk.*) *Asch.* (1867); *Zostera ciliata* *Forssk.* (1775) – type: Yemen, Al Mùkha (Mochha), *Forsskål* 26 (C holo., BM iso.).

Rhizome creeping, robust, 0.4–0.8 cm thick, reddish-brown; internodes 0.5–2.5 cm long. Stems usually 10–30 (more rarely to 70 cm or more) x 0.2–0.5 cm, with conspicuous annular leaf-scars; at the base of each stem (and sometimes on the stem) there is a bud which usually does not develop. Leaves: sheaths fan-shaped with many prominent nerves, light reddish-brown, often with a pinkish tinge, 15–35 x 10–15 mm wide above, less than 5 mm wide below; blades 100–150 x 10–15 mm (but much shorter and narrower on lateral shoots), serrate on margins in upper half and with about 0.5 mm long teeth at the tip; blades shed with their sheaths. Male flower with 6–7 mm long, anthers linear. Female flower with two about 2 x 0.5–0.7 mm, ovoid ovaries; style 3.5–4.5 mm long with two 2–3 cm long stigmas. Fruit with its surrounding fleshy bracts 3.5–5 cm long. Fig. 179.2.4.

Rooted in sand or mud in shallow or deep water, only below sea-level (sub-littoral zone). EE; widespread along the coast on the eastern side of the African continent; also in Asia and Australia. *Gilbert* 2541A; *Ash* 2319; *Fiori* 866.

180. NAJADACEAE

by K.A. Lye* & Sue Edwards**

Rendle in *Trans. Linn. Soc. Lond.*, ser. 2, 5: 379–436, tab. 39–42 (1899) & 5: 437–444 (1900) & in *Engl. Pflanzenr.* IV. 12 (1901); Bennett in *Fl. Trop. Afr.* 8: 225–228 (1901); Horn af Rantzien in *Kew Bull.* 7: 29–40 (1952); Obermeyer, *Fl. South. Afr.* 1: 81–85 (1966); Cufodontis, *Enum.*: 1201 (1968); Triest, *Najadaceae* in *Fl. Trop. E. Afr.* (1989).

Submerged marine or fresh-water herbs with branched stems rooting from the base and lower nodes. Leaves sessile, sub-opposite or in whorls of 3 or more, basal sheaths open, with two small scales within each sheath; blades linear, 1-nerved, apex acute to acuminate, margins toothed, sometimes also with spines on the midrib. Flowers unisexual, solitary, each at the very base of short axillary shoots, each flower often enveloped in a thin membranous bract or spathe. Male flower tightly enveloped by a tubular or ovate, membranous spathe ending in 2–4 distinct lobes or teeth; anther 1, sessile or stalked; peduncle elongates rapidly at anthesis to push the anther through the spathe. Female flowers consisting of only a pistil: ovary 1 containing 1 ovule and a short style ending in 1–4 often unequal stigmas, naked or with an inconspicuous involucre more or less adherent to the ovary. Fruit indehiscent, a 1-seeded achene with a very thin pericarp closely surrounding the seed. Seed elliptic-oblong or ovate, somewhat recurved or U-shaped.

A family with only 1 genus, *Najas*, found in temperate and tropical regions throughout the world.

NAJAS L. (1753)

Triest, A revision of the genus *Najas* L. (Najadaceae) in Africa and surrounding islands. *Mém. Acad. r. Sci. Outre-Mer, Cl. Sci. nat. méd., nouv. sér.*, 21(4): 88 pp. + xviii plates (1987).

Genus description as for the family.

About 39 species found throughout the world with the greatest diversity in tropical and subtropical areas.

So far 3 species have been recorded from the Flora area but others, particular those found in E Africa and the Sudan, could be found and have been included in this account.

There is so little material from the Flora area, that the descriptions below are based partly on those by Triest (1987).

1. Stems with spines on internodes and midribs of the lower surface of the leaves; seed asymmetrically ovate. 1. *N. marina*
– Stems and midribs without spines; seed elliptic-oblong. 2
2. Leaf teeth on triangular excrescences, $\frac{1}{3}$ to 3 times the leaf width; leaf-sheath rounded. 3
– Leaf teeth not on triangular excrescences, or excrescences less than $\frac{1}{3}$ the width of the leaf; leaf-sheath truncate to deeply auriculate. 4
3. Male and female flower each in a spathe; leaf margins with 6–20 teeth, up to 0.6 mm long. 2. *N. welwitschii*
– Male flower in a spathe, female without a spathe; leaf margins with (2–)5–12 teeth, up to 1.4 mm long. 3. *N. horrida*
4. Leaf margins with very many (30 or more) inconspicuous teeth on each side; seed areoles less than 0.1 mm long, squarish (rectangular to hexagonal), in regular longitudinal rows; both male and female flowers without spathes. *N. graminea*

– Leaf margins with fewer than 30 conspicuous teeth on each side; seed areoles 0.1 mm or more long, irregular in outline, in longitudinal rows; both male and female flowers with spathes. 5

5. Anther with 4 pollen sacs; seeds (1.8–)2.1–2.3 (–2.6) mm long. 5. *N. testui*

– Anther with 1 pollen sac; seeds (1.1–)1.3–1.5 (–1.6) mm long. 4. *N. schweinfurthii*

N. graminea Del. (1813) has been recorded from 'Abyssiniya' without locality by Horn af Rantzien (1952), but no herbarium specimens to substantiate this have been found. In E Africa, it grows in lakes, pools, rivers and ditches, 400–750 m.

1. *N. marina* L. (1753)

– type: a plate subtitled 'Fluvialis pisana denticulatis J.B. 1.38 p. 779' in Vaillant, *Hist. Acad. Roy. Sci.*: 4. 1/2, p. 62 (1722).

Robust dioecious annual rooting in the mud. Stems usually 20–80(–150) x 0.1–0.2 cm, rather laxly branched, the internodes with many prominent spines about 1 mm long often red-tipped. Leaves 3 at each node; sheath entire or with a few spines; blades 3.5–6.5 x 1.5–5.7 mm including the teeth on both sides, thick, acute, flat and straight with 4–10 teeth on each margin and commonly with a few teeth or spines on dorsal midribs; the teeth 1–1.5 mm long, very sharp and sometimes red-tipped. Male flower with the single anther completely enveloped in the spathe and perianth, but before dehiscence the short stalk grows and the flower is pushed through the spathe, which becomes split laterally. Female flower without a spathe and with 3 stigmas. Fruit ovoid, up to 7.5 x 3.3 mm, yellowish to brown. Seed ovate, slightly asymmetrical.

subsp. *armata* (Lindb.f.) H. Horn in *Kew Bull.* 7: 29 (1952)

– type: Egypt, Delile (MPU holo.).

Stems very spiny, (10–)15–25 spines in 2 cm of stem. Leaves 6–20(–24) x (1.1–)1.5–5.3 mm. Seeds 2.5–3.5 x

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0.8–2.1 mm, length: breadth ratio 1.3–2.3(–3.2). Fig. 180.1.1–3.

Shallow lakes preferably with a high mineral content or in brackish water; sea level–300 m. AF (Lake Hertalle); mainly coastal areas and rift-valley lakes of Africa, Spain, Crete, Asia Minor, Sri Lanka and Australia. *Ash* 1773.

The species as a whole is distributed throughout the world with 12 subspecies and 4 varieties recognized in the Old World.

2. *N. horrida* Magnus (1870)

– type: Nigeria, *Barter* 1065 (B holo., K lecto.).

N. pectinata sensu Horn in *Kew Bull.* 7: 38 (1952) non (Parl.) Magnus (1889).

Slender to robust annual rooted in the mud. Stems usually very long and 0.4–2 mm thick, with many short lateral branches especially at the tip of the shoots resulting in dense bushy clumps; the internodes without spines. Leaves 3 or more at each node; sheath rounded, about 1.5–2.3(–3.9) mm long, minutely toothed along the top; blades 3.2–20(–29) x 0.5–2.4(–3.2) mm including the teeth, somewhat curved and grooved with (2–)5–12(–16) sharp teeth which curve upwards on each side; teeth 0.2–1.4 mm long, each on a broad triangular base. Male flower in spathe 1.3–3.5 x 0.3–1.2 mm with pale brown spine cells at the apex. Female flower without a spathe, (1.3–)2–3(–4.2) mm long with a short style and 2–3-lobed stigma. Seed elliptic-oblong, 1.6–3.2 x 0.5–0.9 mm, areoles squarish in outline. Figure 180.1.4–7.

Shallow lakes; 300–2000 m. EW HA; throughout Africa, also in Madagascar. *Burget* 3606; *Ash* 1148.

N. horrida is a very variable in its growth form, some plants being quite robust with curved rigid leaves making them superficially similar to *N. marina*, others have slender straight leaves. Branches easily break off, so it is often difficult to determine in a mounted collection if the material was taken from a single plant or several.

The name *N. pectinata* has been used incorrectly for many collections from Africa. This species is known from the Nile Delta and Sinai. *N. pectinata* has both male and female flowers on the same plant, 1-locular anthers, and female flowers in spathes.

3. *N. welwitschii* Rendle (1899)

– types: from Angola, *Welwitsch* 247, 247b (both BM lecto., K iso.).

Vegetatively very similar to *N. horrida*. Stems 0.4–1.0 mm thick, with many short lateral branches especially at the tip of the shoots resulting in dense bushy clumps; the internodes without spines. Leaves: sheaths c 1–3.9 mm long, minutely spiny along the top; blades 9.2–20(–40) x 0.5–1.6 mm including the teeth, with 6–20 sharp teeth which curve upwards on each side; teeth 0.1–0.5 mm long, each on a broad triangular base. Male flower in spathe 1.5–3 x 0.4–0.7 mm with pale brown spine cells at the apex. Female flower in a spathe, 1.5–3 mm long ending half way along the style, stigma 2-lobed. Seed

elliptic-oblong, 1.6–2.5 x 0.5–0.9 mm, areoles squarish in outline.

Triest (1987) cites *St Ange* 81 which was collected from Fazughli on the border between Sudan and Ethiopia (GJ/WG) where the Abbay river goes into the Roseires Reservoir.

4. *N. schweinfurthii* Magnus (1894)

– type: Sudan, Djur, *Schweinfurth* 2140 p.p. (mixed with *N. graminea*) (K iso.).

Slender aquatic herb, stems ± 0.5 mm in diameter, often looking feathery where the leaves are packed together at the ends of the branches. Leaf-sheath 1.1–2.1 long, truncate to auriculate, the auricle 0.1–0.5 mm long, spiny to thorny with 1–7 spine cells on each side; blade 9.9–23.6 x (0.2–)0.6–1 mm including the teeth, flat, linear-lanceolate; margin with 6–16 conspicuous spiny teeth on small triangular excrescences. Male flower in spathe 1.2–1.5(–2) mm long with brownish spine cells at the apex, neck extending above the anther; anther with 1 pollen sac. Female flower enclosed in spathe 1.1–1.5(–2) mm long, the neck about half way up the style, with or without brown spine cells at the apex; stigma 2-lobed. Seed elliptic-oblong to ovate (1.1–)1.3–1.4(–1.6) long; areoles c 0.1 mm long, irregular in outline; cell walls raised.

Marshes and ponds in shallow water; c 1800 m. GJ; throughout tropical Africa. *De Wilde* 5783.

Flowering and/or fruiting specimens are needed to distinguish *N. schweinfurthii* from *N. testui*.

5. *N. testui* Rendle (1937)

– type: Central African Republic, *Le Testu* 3625 (BM holo., K L P iso.).

Slender aquatic herb, stems c 0.5 mm wide, without spines, often closely packed with leaves. Leaves: sheaths (1.3–)1.9–2.4(–2.9) x (1.4–)2.6(–3.2) mm, truncate to auriculate; blades (6.5–)11.5–32 x (0.3–)0.4–0.7(–1.1) mm including the teeth, flat, linear-lanceolate; margins with 7–30 small brownish teeth; apex acute. Male and female flowers generally on different branches, solitary or several together, each at the base of a (sometimes very short) axillary shoot. Male flower (1.2–)1.9–2.5 x 0.4–1 mm, the neck of the spathe tapering at the top with brownish spine-cells at the apex; anther 1–2.4 x 0.4–1 mm, 1-locular. Female flower with spathe (1.1–)1.5–3 x 0.4–0.6 mm, the neck about half way along the style, without any brownish spine-cells; stigma 2-lobed. Seed elliptic-oblong to ovate, (1.9–)2–2.3(–2.6) x (0.4–)0.5–0.8 mm.

In E Africa, it is found in marshes and ponds, and in and near rivers; 900–1700 m. Throughout tropical Africa.

Not recorded from Ethiopia, but found in E Africa and so similar to *N. schweinfurthii* that it could occur in future collections and a description here will aid proper identification.

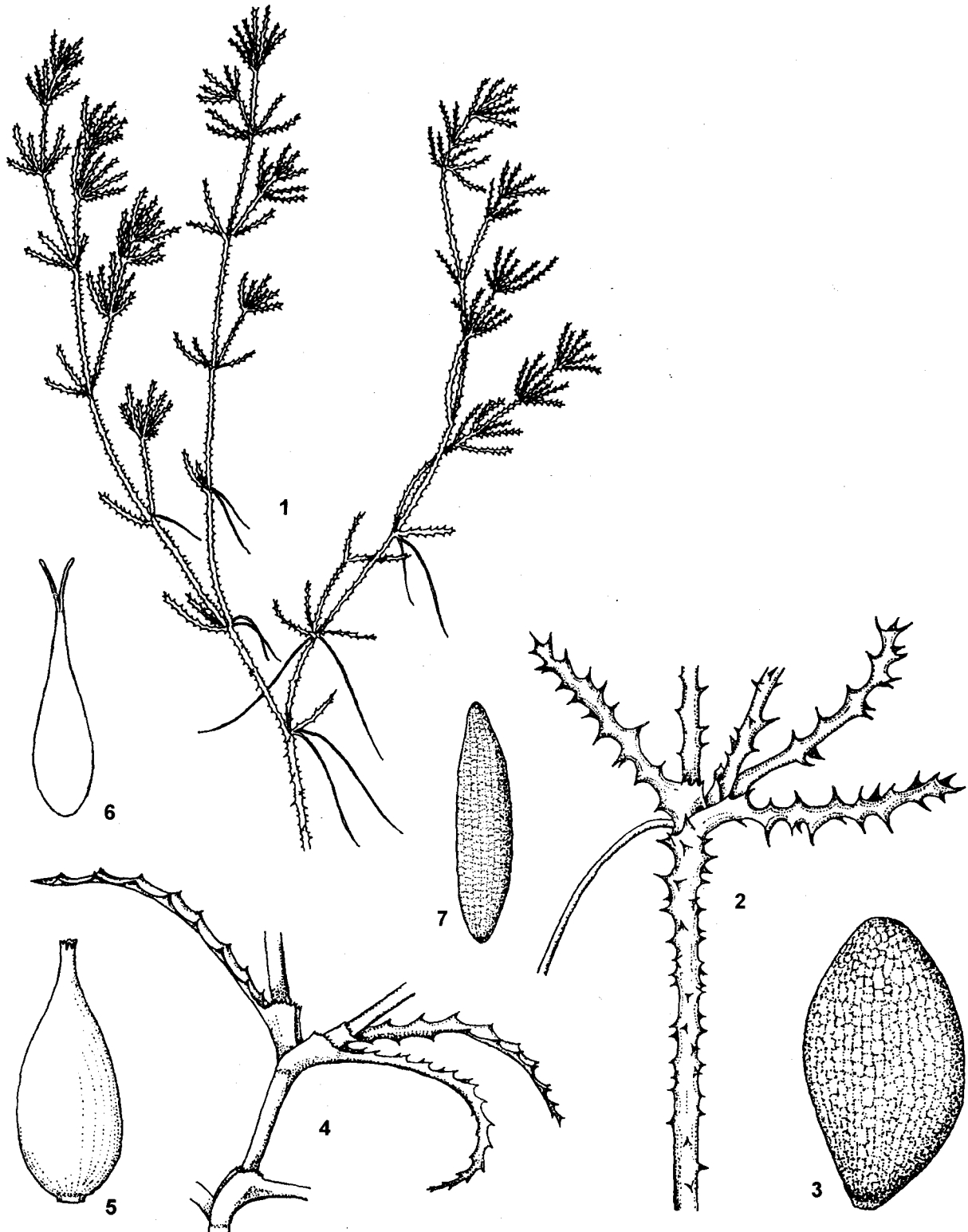


Figure 180.1 *NAJAS MARINA* subsp. *ARMATA*: 1 – part of a plant to show general growth form $\times 2/3$; 2 – detail from an internode and node showing spines on the stem, a simple root, the small sheaths and narrow strongly spiny leaves $\times 3$; 3 – seed showing the rows of irregularly-shaped areoles $\times 16$. *N. HORRIDA*: 4 – portion of stem showing spineless internode and nodes, leaves with auriculate sheaths and curved spiny blades $\times 3$; 5 – sheath of male flower with spiny apex $\times 16$; 6 – female flower with 2-lobed stigma $\times 16$; 7 – seed showing rows of regularly-shaped areoles $\times 16$. 1–3 from Ash 1773; 4–7 from Ash 1148. Drawn by Gerd Mari Lye.

181. ARACEAE

by H. Riedl*

Cufodontis, *Enum. Plant.*: 1500–1504 (1971); Mayo, *Araceae* in *Fl. Trop. E. Afr.*: 71 pp. (1985); Bogner & Nicolson, A revised classification of Araceae with dichotomous keys, *Willdenowia* 21: 35–50 (1991); Ittenbach, Lobin & Thulin, 143. *Araceae* in *Fl. Somalia* 4: 20–23 (1995).

Herbs with larger or smaller aerial stems, tubers or rhizomes, climbers or floating water plants, often with milky or sticky and sharp-smelling juice; adventitious roots are formed in many species, usually above ground, most often in climbers. Leaves simple or divided palmately, pedately or pinnately, often with holes appearing naturally in the blade, some leaves reduced to scales; petiole usually with a distinct sheath. Inflorescence pedunculate; monoecious or dioecious, with small bisexual or unisexual flowers, usually arranged very densely along a cylindrical fleshy axis forming a spadix¹, where flowers are unisexual, the female are found at the base of the spadix and the male above them; spadix enclosed by the leaf- or petal-like spathe². Perianth present and small, or absent. Stamens primarily 6 but usually united in a synandrium³, reduced in number sometimes to 1; part of the stamens may be reduced to staminodes which in turn form a synandrodium⁴ in genera like *Colocasia*. Ovary 1–3-locular, with a short style and stigma, stigma sometimes sessile. Fruit usually a berry.

A family of 105 genera and over 2000 species found in all climatic regions of the world, but predominantly (over 90%) tropical or subtropical. The naturally occurring genera in Ethiopia are members of 3 different subfamilies: LASIOIDEAE, AROIDEAE and PISTOIDEAE. The indigenous taxa are found in 7 genera with 15 species; there are 4 or more cultivated and/or ornamental taxa.

The aroids provide important food plants for many indigenous peoples of the tropics and subtropics as they are well adapted to wet climates and can give good yields in water-logged or swampy soils. Most aroid crops, like *Colocasia*, are grown for their edible corms or tubers, while some have edible leaves or fruits. Other members of this family are highly poisonous being cyanogenic or containing alkaloids and other toxins.

Key to Genera

- | | | | |
|---|------------------------|---|--------------------------|
| 1. Floating aquatic plants with numerous rosettes of sessile leaves. | 11. <i>Pistia</i> | – Cultivated plant (sometimes found 'wild'), never producing such shoots. | 9 |
| – Plants not growing in water; leaves petiolate. | 2 | | |
| 2. Climbers, stems long usually with aerial roots, not forming tubers or rhizomes. | 3 | 9. Leaf-blade of one colour; spathe-tube not inflated; spadix with a sterile apex; plant cultivated for its edible tubers and leaves. | |
| – Plants not climbing, stems short, forming underground tubers or rhizomes. | 5 | | 6. <i>Colocasia</i> |
| 3. Naturally occurring forest climber; leaves entire, lanceolate to obovate, base not cordate or hastate. | 2. <i>Culcasia</i> | – Leaf-blade variegated with white and red patches; spathe-tube inflated; spadix with flowers to the top; plant cultivated for its decorative leaves. | <i>Caladium bicolor</i> |
| – Ornamental pot plants, leaves ovate to orbicular, base cordate to hastate or sagittate. | 4 | | |
| 4. Leaves large, pinnatifid, with naturally occurring holes; flowers bisexual. | 1. <i>Monstera</i> | 10. Fine leaf-venation reticulate; berries borne at or below ground level. | 3. <i>Stylochaeton</i> |
| – Leaves entire or lobed, without naturally occurring holes; flowers unisexual. | 4. <i>Philodendron</i> | – Fine leaf-venation striate, parallel to the primary lateral veins; berries borne on a long peduncle. | 5. <i>Zantedeschia</i> |
| 5. Flowers or fruits found together with the leaves. | 6 | | |
| – Only flowers or fruits, leaves not found with the flowers. | 13 | 11. Leaves much divided, often with 3 main divisions which are divided again in various ways; leaves develop after the inflorescence. | 8. <i>Amorphophallus</i> |
| 6. Leaves undivided. | 7 | – Leaves palmately or pedately divided, primary segments or leaflets entire. | 12 |
| – Leaves divided in various ways. | 11 | | |
| 7. Leaf-blade peltate, pedicel attached near the centre of the blade. | 8 | 12. Plants with 1 large leaf appearing after the inflorescence has emerged; inflorescence appearing at ground level, much shorter than the leaf. | 9. <i>Sauromatum</i> |
| – Leaf-blade not peltate, pedicel attached to the edge of the blade, often in a sinus. | 10 | | |
| 8. Wild plant producing shoots with clusters of burr-like bulbils (see Fig 181.6). | 7. <i>Remusatia</i> | | |

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1. spadix: a spike of flowers with a fleshy axis, enclosed in a spathe.

2. spathe: a large bract, often coloured or membranous, enclosing a spadix.

3. synandrium: a structure of united anthers.

4. synandrodium: a structure of united staminodes.

- Plants with leaves 1-3 leaves developing at the same time as the inflorescence; inflorescence with a long peduncle, usually borne at the same level as the leaves or above them. 10. *Arisaema*
- 13. Spadix without flowers to the top. 14
- Spadix with flowers to the top. 15
- 14. Spathe-tube with margins joined at the base; spadix with sterile structures above the female flowers. 9. *Sauromatum*
- Spathe-tube with free overlapping margins; spadix without such sterile structures. 8. *Amorphophallus*
- 15. Spathe-tube with margins joined at the base; anthers opening by slits. 3. *Stylochaeton*
- Spathe-tube with margins free to the base; anthers opening by apical pores. 7. *Remusatia*

Caladium bicolor (L.) Schott is a very attractive pot plant with peltate variegated leaves having a pattern of white and red patches on the blade. The spathe has an inflated green tube and white, boat-shaped blade. *Mesfin* T. 8061, collected as a pot plant in KF at 1250 m, is the only specimen from the Flora area. This species is highly likely to be grown as a pot plant in Addis Ababa and other places. Mayo (*loc. cit.*) states that this species has naturalised in parts of W Africa, Zanzibar and Pemba and that the sap is an irritant.

1. *MONSTERA* Adanson (1763)

Climbing shrubs sometimes rooting at nodes. Leaves with long petioles and a sheath that is at least half as long as petiole. Leaf-blade of varying shape, often with naturally occurring holes, sometimes pinnatifid. Spathe ovate or ovate-oblong, apiculate, more or less rolled on itself, eventually falling off. Spadix sessile, shorter than spathe, the lower-most flowers sterile, the rest very densely packed together, bisexual, without a perianth. Sterile flowers with 4 minute, conical staminal nodes and a prismatic, bilocular remnant of the ovary. Fertile flowers with 4 stamens and an obconical to prismatic ovary; ovules 2 in each locule.

About 50 species in central and temperate S America, several of which have been taken into cultivation as house plants; 1 ornamental in the Flora area.

M. deliciosa Liebmann (1849-50)

- type: Mexico, distr. Oaxaca, western Cordillere, Liebmann (details not given).

Stem up to 6 m high. Leaves: petiole up to 1 m long, flat on upper side and 2-2.5 cm wide; sheath deciduous; blade of primary leaves small, cordate, later ovate-cordate with long, linear holes sometimes reaching the margin and smaller holes between the primary nerves. Inflorescence: peduncle 10-15 cm long; spathe thick, leathery, broadly ovate, apiculate, more or less rolled inwards from the margins, 20-25 cm long, upper expanded portion 15-18 cm wide, pale yellowish. Spadix nearly cylindrical, 17-20 cm long. Flowers: filaments c 3 mm long, upper part violet; pistil as long as stamens

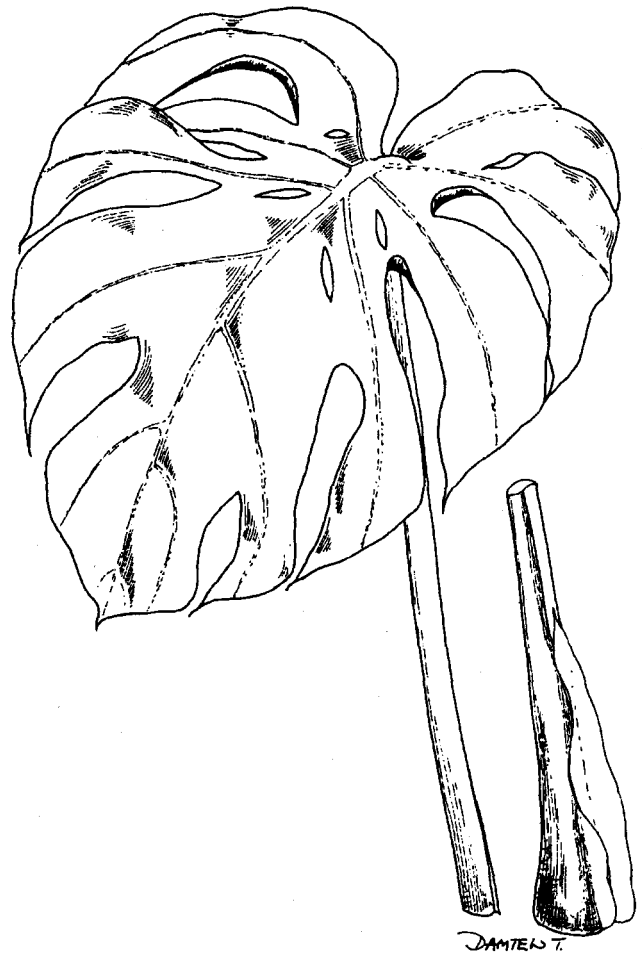


Figure 181.1 *MONSTERA DELICIOSA*: leaf and leaf base x 2 $\frac{1}{3}$. From Edwards et al. 5386. Drawn by Damtew Teferra.

or slightly longer. Berries c 1 x 0.75 cm, pale yellow, often with violet dots. Fig. 181.1

Cultivated plant found in hotels, houses and gardens in Addis Ababa, Asmara and other major towns. An inhabitant of tropical Mexico and Guatemala. Widely cultivated for its ornamental value. Berries edible, with a delicious taste. *Sue Edwards et al. 5386.*

2. *CULCASIA* Palisot de Beauv. (1805)

Climbers or creepers rooting along internodes. Leaves with a sheath, blade ovate, elliptic to obovate, with reticulate venation. Inflorescences 1 to numerous subtended by lanceolate bracts. Spathe short and broad, enveloping at least the lower part of the spadix at anthesis, convolute before, shed soon afterwards. Spadix bearing female flowers at the base followed by a very narrow zone of prism-like columns of staminodal flowers, male flowers in the upper part. Flowers without perianth, unisexual. Stamens free, arranged in groups of 2-4, with thick, fleshy connective. Ovary usually unilocular; stigma sessile, discoid to subglobose, sometimes lobed. Fruit a berry, 1(-3)-seeded.



Figure 181.2

CULCASIA FALCIFOLIA: 1 - portion of leafy stem with inflorescences and an infructescence x 1; 2 - inflorescence, front view x 1; 3 - spadix, spathe removed x 1; 4 - stamen, side view x 10; 5 - stamen from above x 10; 6 - pistil, oblique view x 10; 7 - pistil in longitudinal section, showing ovule and placenta x 10; 8 - berry, side view x 3; 9 - berry in longitudinal section x 3. 1 from Snowden 1043; 2-7 from Dawkins 361; 8 & 9 from Dawkins 350. Drawn by Ann Webster. (Modified and reproduced with permission from *Fl. Trop. E. Afr. Araceae*: fig. 4)

About 20 species confined to tropical Africa, most of which occur in W or C Africa; only 1 species in the Flora area.

***C. falcifolia* Engl. (1899)**

- type: Tanzania, Uluguru Mts., Nghweme (Nglewenu), *Stuhlman* 8817 (B holo.).

Climbers or creepers, 1-9 m long. Leaves: petiole 6-17.5 cm long; blade 8-26 x 3.5-10.5 cm, obliquely ovate to lanceolate, sometimes falcate, pointed at apex, rounded to indistinctly emarginate at base, with linear, pellucid glands. Inflorescences 1-4, usually 2-3 together, on peduncles 4.5-14 cm long. Spathe 2.5-5 cm

long, opening only partly, leathery, with white, green or yellow tinges. Spadix about same length as the spathe; female part 0.6-2.6 cm long, sessile or very shortly stalked with densely crowded, more or less prismatic pistils; ovaries 1-locular with sessile and circular stigma; male part 2.6-3.4 cm long, wider than the female part, apex nearly pointed. Berries obovoid to nearly globose, with one, rarely two seeds. Seeds green becoming dark orange red, up to 1.7 cm long. Fig 181.2

Damp evergreen montane forest in shade; 1100-2000 m. WG IL KF; E Africa, Sudan southward to Mozambique and Zimbabwe. *Mooney* 8792; *Friis et al.* 1877; *de Wilde* 8859.

3. *STYLOCHAETON* Lepr. (1834)

Herbs with underground rhizome and tuberous roots. Leaves 1 to several, radical, subtended by basal sheath-like cataphylls¹; petiole with basal sheath often with purple spots or bands; blade lanceolate, ovate to sagittate or hastate-sagittate. Inflorescence appearing before or with the leaves, produced at or below ground level. Spathe comparatively short, tubular, united in the basal region, limb expanded or only opening by a lateral slit, sometimes thickened. Spadix shorter, (equal or longer) than spathe, with female flowers in the basal part and a longer zone of male flowers to the top, sometimes with sterile flowers between these two zones. Flowers unisexual with a cup-shaped perianth bearing glands. Female flowers: 1 to few in a single whorl or short spiral; glandular perianth strongly thickened; ovary 1- or 2-locular; ovules 1 to many in each locule; stigma capitate to broadly discoid. Male flowers: perianth often with fleshy margin; stamens 2-7. Berries fleshy, few to 1-seeded, often under ground.

About 16 species confined to tropical and southern subtropical Africa; 3 taxa in the Flora area.

1. Leaves lobed. 2
 - Leaves simple, unlobed.

3. *S. sp.* = *Mesfin T. & Vollesen* 4167

2. Lateral lobes of leaves 2.5-3.5 cm long, separated by an oblong to wide sinus. 1. *S. kerensis*
 - Lateral lobes of leaves 7-12 cm long, horizontally spreading. 2. *S. oligocarpum*

S. grandis N.E. Br. (1901) listed by Cufodontis (1971) is confined to Somalia.

1. *S. kerensis* N.E. Br. (1901)
 - type: EW, Keren, *Beccari* 77 (K iso.).

Rhizome fleshy, articulate, branched. Leaves: petiole about 10-20 cm long, sheathed at least to the middle, sheath with purple bands above ground; blade hastate to hastate-sagittate, central lobe 7-10 x 1.8-2.5 cm, lateral (basal) lobes 2.5-3.5 x 1-2 cm. Inflorescence below ground: peduncle 0.6-1.2 cm long, cataphylls 3-4. Spathe with a subterranean tube 3-3.5 cm long and a boat-shaped blade opening only by a lateral slit, c 1.2 cm long, leathery. Spadix about as long as spathe or slightly longer. Female flowers: 5, perianth obliquely urn-shaped, c 7 mm long, joined to the axis for nearly all its length; style c 3 mm long, incurved; stigma discoid. Male flowers: perianth cup-shaped, 0.5-0.8 mm long; filaments filiform c 0.5 mm long. Fruit not known.

Habitat unknown; (900-)1250 m. EW? SD; Sudan. Known only from the type.

A sterile specimen from SD, *Gilbert, Ensermu & Vollesen* 7675, may belong to this species. It is characterised by brown stripes on sheath and leaf stalk that are indistinctly present in the type. [This specimen has also been identified with the *S. borumensis* N.E. Br. which occurs in N Kenya - ed.].

1. cataphylls: a much-reduced leaf, without differentiated petiole and blade.

S. kerensis has sometimes been confused with the W African *S. hypogaeus* Lepr. (1834) which has narrower leaves, is usually taller and has a shorter spadix compared to the spathe.

2. *S. oligocarpum* *Riedl* (1990)
 - type: HA, Ogaden, 13 km E of Degehabur, *Gilbert* 2047 (K holo., ETH iso.).

Rhizome tuberous, densely covered by fibres from old leaves. Leaves: petiole 23-27 cm long; sheath 8-9 cm with broad, patent auricles; blade hastate-sagittate, truncate at base, central part 14-20 x 1.5-2 cm, linear, gradually tapering towards sharply pointed apex, lateral (basal) lobes horizontally spreading, linear-lanceolate, 7-12 x 0.8-1.7 cm. Peduncle about 1.5 cm long, profoundly furrowed, thickened towards spathe. Spathe, spadix and flowers not known. Female inflorescence 2-flowered. Berries subterranean, whitish, shortly before maturity, 2.3 x 1.1-1.2 cm in compressed state. Fig. 181.3.

Growing in deep shade, dense *Acacia* bushland on sandy soil; c 1200 m. HA; not known elsewhere. Known only from the type specimen.

Though the male inflorescence and flowers are not known, the vegetative characters are so remarkable that the species can easily be recognised and is quite distinct also from species outside the Flora area.

3. *S. sp.* = *Mesfin T. & Vollesen* 4167

Perennial herb from tuberous rhizome. Leaf: petiole 18-21 cm long, sheath 9.5 cm long, spotted; blade undivided, ovate, 14.5-17 x 12.5 cm, cordate at the base, obtuse at the apex. No flowers or fruits seen.

Acacia - *Commiphora* bushland on grey sandy soil; 1200 m. SD; not known elsewhere. *Mesfin T. & Vollesen* 4167.

4. *PHILODENDRON* Schott (1829)

Mostly climbing lianas, often with aerial roots, more rarely plants nearly stem-less with a short caudex and a rosette of leaves, or tree-like. Leaves with a long sheath and petiole; blade undivided, entire or deeply lobed, sometimes pinnately dissected, oblong, ovate; nerves all parallel; base cordate, hastate or arrow-shaped. Inflorescence single or several, each formed at the end of a segment in the sympodial stem; peduncle usually short. Spathe thick, fleshy, white, yellow or red with a convolute cylindrical or inflated tube and a valvate, ovate, oblong or lanceolate, persistent blade. Spadix sessile or shortly petiolate, as long as spathe. Female flowers basal, dense; ovary ovoid or obovoid, with 2-many locules; stigma sessile, semiglobose or lobed. Male flowers sterile in lower, fertile in upper part; flowers without perianth, unisexual; stamens 2-6, in sterile flowers without anthers, truncate at apex, anthers sessile with a broad connective. Fruit a berry with 1-many seeds.

About 500 species from tropical S and C America.



Figure 181.3 *STYLOCHAETON OLIGOCARPUM*: 1 – complete plant x $\frac{1}{2}$; 2 – fruit x 1. All from the isotype, Gilbert 2047. Drawn by Dantew Teferra.

Many are cultivated as pot plants as they are able to withstand the dry shady conditions inside buildings and offices. It is difficult to give any names apart from, maybe, *P. scandens* C. Koch & H. Sellow. Many of the species are poisonous.

5. ZANTEDESCHIA K.P.J. Sprengel (1826),

nom. conserv.

Richardia Kunth (1815)

Herbs with stout rhizomes producing leaves and inflorescences together. Leaves petiolate, blade cordate-sagittate, sagittate, hastate or lanceolate with nerves of the first and second order not reticulated near the margin. Inflorescence with peduncle as long as or longer than leaves. Spathe large, white, yellow or rarely pink, with a basal tube and an expanded, free blade recurved and cuspidate at apex. Spadix sessile, shorter than spathe, bearing female flowers in the basal part, and male flowers above to the top. Flowers closely packed, without perianth. Male flowers: stamens 2–3, anthers quadrangular, compressed, sessile. Female flowers: pistil surrounded by 3 staminodes in the only species found in Ethiopia; ovary short, ovoid, 1-locular; ovules usually 4 in each locule. Fruit a fleshy berry.

8 or 9 species in subtropical and temperate Africa; 1 widely cultivated and sometimes naturalised in the Flora area.

Z. aethiopica (L.) K.P.J. Sprengel (1826);

Calla aethiopica L. (1753); *Richardia africana* Kunth (1815) – type: 'Habitat in Ethiopia', from a specimen in *Hortus Cliffortianus* (BM).

Stout leafy herb. Leaves: petiole 40–100 cm long or more; blade cordate-sagittate to sagittate, apex obtuse to nearly acuminate, base cuspidate, 15–45 x 10–25 cm, main lobe at least 1½ times as long as wide, basal lobes short. Inflorescence on a long peduncle. Spathe 10–25 cm long; tube short, yellowish in its innermost part; blade semi-ovate, white, sometimes greenish on inner side, slightly recurved, narrowed into a pointed apex. Female part of inflorescence about ¼ of male in length; ovary 2–5-locular, with a short style, surrounded by 3 staminodes. Berries shortly ovoid, yellowish, 1–1.2 cm in diameter. Fig. 181.4.

Cultivated garden plant; 1900–2400 m. SU HA and seen in gardens of hotels in many of the moister regions, also said to be naturalised in some wet areas of the southwest; native of S Africa, where it occurs widely from the Cape to Natal, cultivated and as an escape growing in moist, shady places especially at higher altitudes in many parts of tropical East and Northeast Africa, and as far north as Spain. *Samuel Tadesse* s.n.; *Demel Teketay* 424.

A very popular ornamental grown for its striking and wilt-resistant inflorescences, used extensively by florists in most parts of the world. Some varieties have variegated leaves.

6. COLOCASIA Schott (1832)

Herbs without proper erect stems, tubers forming short, creeping, subterranean shoots bearing very large leaves on stout, sheathed stalks; blade peltate, undivided, ovate-cordate to sagittate-cordate. Several inflorescence-bearing peduncles appear after the leaves. Spathe longer than spadix, with a comparatively short, rolled tube and a much longer, oblong to lanceolate, blade. Spadix with naked unisexual flowers and a sterile appendix. Basal female flowers with 3 to 4 pistils; ovary with numerous erect ovules; stigma sessile or nearly so, depressed capitate, with 3 to 5 furrows. Sterile male flowers as apically truncate synandrodia. Fertile male flowers with 3–6 stamens united in an apically wide, truncate, irregularly polygonal synandrium. Fruit a greenish, unilocular, oblong to obconical berry with numerous seeds.

8 species distributed naturally from SE Asia to Polynesia; only the cultivated *C. esculenta* in the Flora area.

C. esculenta (L.) Schott (1832);

C. antiquorum Schott (1832); – type: from 'Asia'.

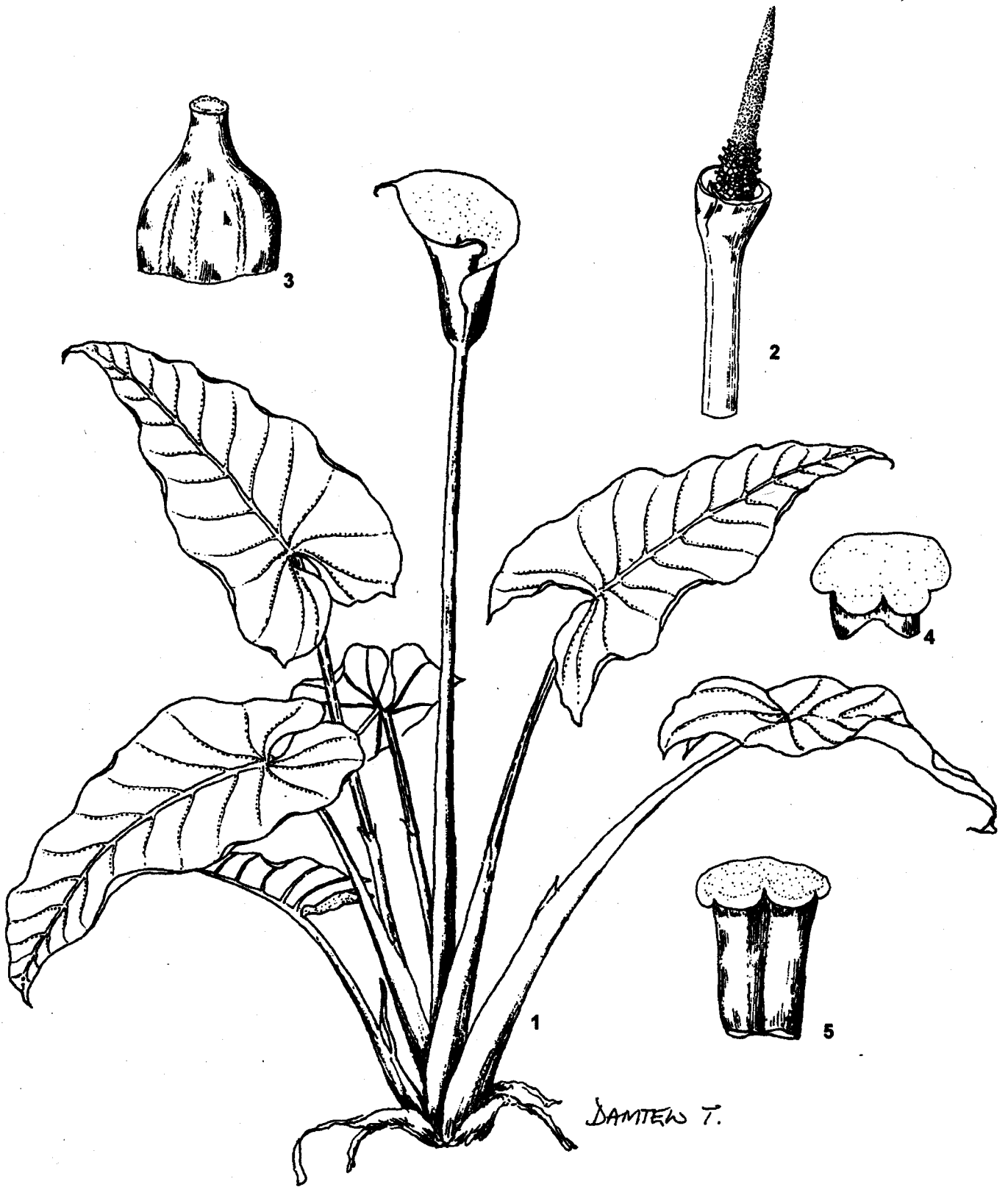
Very variable robust herb, with leaves up to 2 m tall. Stem reduced to a tuber rich in starch. Leaves peltate: petiole stout, over 1 m long; blade with a large ovate, more or less acute main lobe and two basal lobes directed backwards, ovate, obtuse. Inflorescence rarely found; peduncles much shorter than petioles. Spathe 20–30 cm long, tube green, blade yellow to orange, pointed. Spadix shorter than spathe. Female zone about the same length as zone of sterile male flowers, and about twice as long as fertile male zone. Sterile appendix variable, more or less pointed, up to 4 cm long. Fig. 181.5.

Cultivated or naturalised near streams or water falls; 500–2000(–2400) m. IL GG SD and undoubtedly throughout west and southwest Ethiopia; throughout the Old and New World tropics. *Pichi-Sermolli* 1751; *Ash* 1409; *Pavlov* 344.

Cultivated in wet places for its starch-rich tubers, which are ground to give a kind of flour, known as taro. The species may have had its origin in SE Asia, as is supposed by most authors, or on the Hawaiian Islands, see e.g. *Cufodontis* (1971).

7. REMUSATIA Schott (1832)

Fleshy, tuberous herbs. Leaves solitary, 2–3, subtended by several basal cataphylls; petiole fleshy; blade peltate-cordate, ovate to lanceolate. Inflorescence solitary, appearing before leaves. Spathe with lower part rolled into a tube with constricted apex. Spadix with basal part pistillate, central part slender, subconic, with prismatic sterile flowers. Flowers without perianth, unisexual. Male flower composed of 2–3 united stamens. Female flowers ovoid; ovary unilocular, ovules numerous; stigma sessile, discoid, subglobose. Berries subglobose, many-seeded.



181.4 *ZANTEDESCHIA AETHIOPICA*: 1 – whole plant x 7; 2 – spadix with spathe removed x 1; 3 – pistil x 10; 4 – stamen seen from the top x 10; 5 – stamen x 20. All from living material. Drawn by Damtew Teferra.

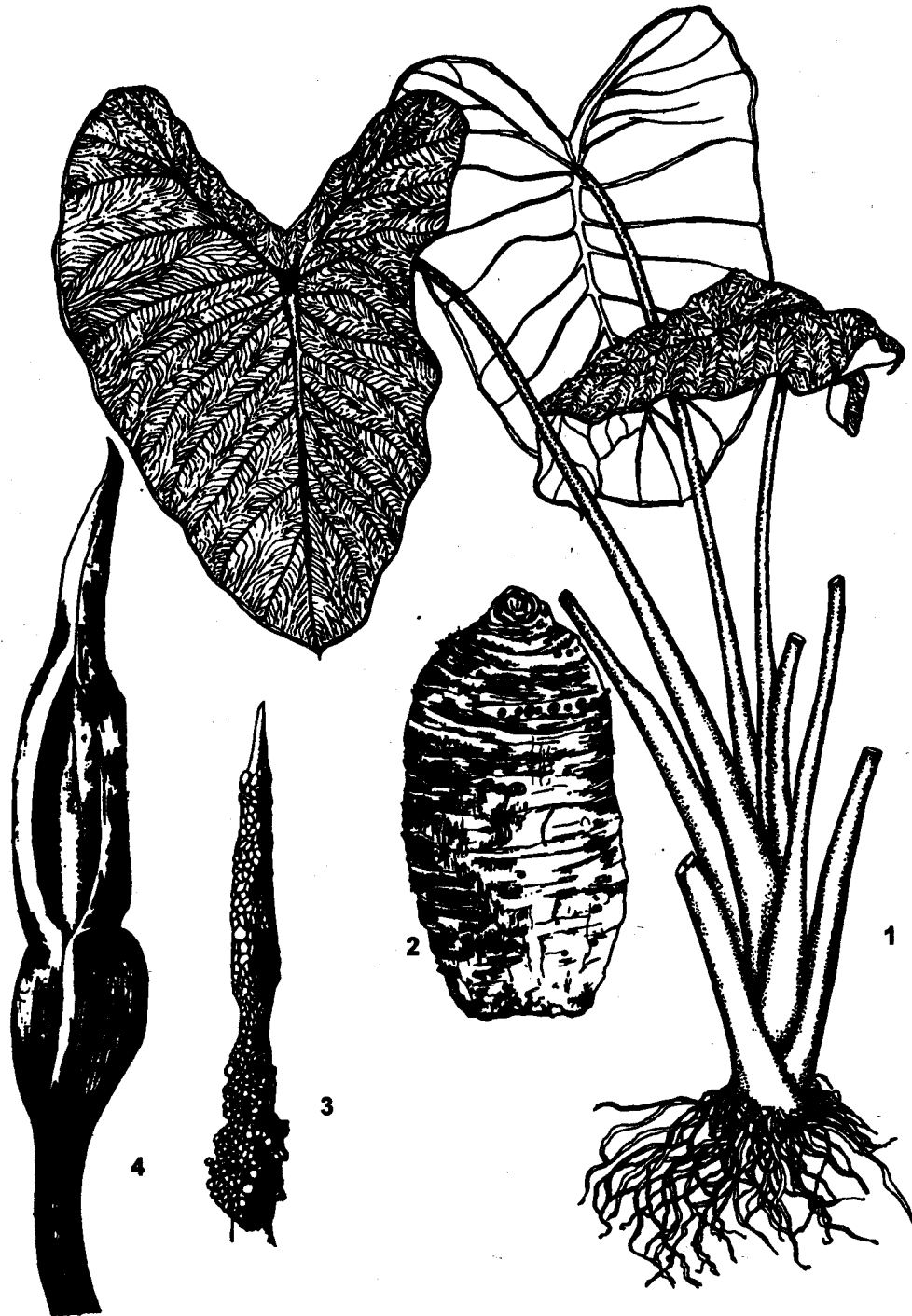


Figure 181.5 *COLOCASIA ESCULENTA*: 1 – young plant x $\frac{1}{2}$; 2 – corm x $\frac{1}{6}$; 3 – inflorescence x $\frac{1}{2}$; 4 – spadix x $\frac{1}{2}$. (Reproduced from Pursglove, *Tropical Crops: Monocotyledons*: fig 7)



Figure 181.6

REMUSATIA VIVIPARA: 1 - lower part of plant $\times c \frac{1}{6}$; 2 - plant with inflorescence and cluster of stems carrying bulbils $\times c \frac{1}{2}$; 3 - details of bulbil-cluster $\times 2$; 4 - bulbil $\times 4$; 5 - leaf $\times \frac{1}{2}$; 6 - detail of leaf, showing marginal venation $\times \frac{2}{3}$; 7 - inflorescence $\times \frac{2}{3}$; 8 - spadix $\times 1$; 9 - staminate flowers (synandria), side view $\times 8$; 10 - staminate flower from above $\times 8$; 11 - sterile staminate flowers packed together from above $\times 8$; 12 - pistils, side view and longitudinal section $\times 8$; 13 - sterile pistillodes at extreme base of spadix, side view $\times 8$. 1 & 2 from photos at K; 3 from Brummitt et al. 14015; 4 from Deighton 3824; 5 & 6 from cultivated plant, Kew 577-68.05188; 7-13 from sprit collection no. 19155. Drawn by Eleanor Catherine. (Reproduced with permission from *Fl. Trop. E. Afr. Araceae*: fig 11)

2 species native to Himalayas, but *R. vivipara* is widespread in the old world, including the Flora area.

R. vivipara (Roxb.) Schott (1832);

Arum viviparum Roxb. - type: India, Kerala, illustration in Rheede, *Hort. Malab.* 12, t.9 (1693)

Seasonally dormant, epiphytic herb. Tuber 2-4 cm in diameter, covered with brown fibrous cataphyll remnants, producing erect stems bearing clusters of bulbils covered in scales with recurved tips. Leaves 1 or 2, solitary; petiole green, 30-40 cm long; blade broadly peltate, ovate-cordate, 20-30 x 14-19 cm, bright green, acute-acuminate. Inflorescence subtended by several

broadly oblong cataphylls; peduncle 9-12 cm long. Spathe 70-110 mm long, strongly constricted at apex of the tube, blade wide, pale yellow. Spadix 30-45 cm long. Male flowers club-shaped, creamy white. Female flowers subcylindric, green. Fig. 181.6.

Riverine forest; 1300 m. WG; West & Central Africa, part of Asia and N Australia. *Gilbert & Thulin* 724.

8. AMORPHOPHALLUS Blume (1834)

Hydrosme Schott (1857)

Stemless herbs with a single leaf and inflorescence usually emerging at different times from the depressed

top of a sub-globose tuber. Leaf: petiole often conspicuously spotted; blade large, spreading widely and forming a shallow inverted cone with 3 major segments, each segment in turn pinnately or irregularly divided, ultimate leaflets linear to ovate with acuminate tips and decurrent bases. Inflorescence usually produced before leaf, peduncle normally shorter than the petiole. Spathe with a basal, rolled, tubular portion and expanded upper part, margin often undulate. Spadix with female flowers at base, immediately or with a short sterile part followed by male flowers, apical part sterile, spongy within. Flowers unisexual, without perianth. Ovary 1–4-locular with a single ovule in each locule; style elongated or lacking; stigma subglobose or lobed. Stamens arranged in groups of 6 or less, filaments usually lacking. Berries 1 to several-seeded.

About 100 species found throughout the Old World; the 3 species in the present account, like the genus as whole for Africa, need further study in the field and are poorly represented in herbarium collections.

The corms of some species are edible and are used as famine food in Ethiopia.

1. Spadix markedly shorter than spathe.
 1. *A. abyssinicus*
 - Spadix markedly longer than spathe. 2
2. Spathe constricted at mouth of tube, inner side of tube with more or less distinct, sometime verrucose ridges.
 2. *A. gallaensis*
 - Spathe not constricted at mouth of tube, smooth inside tube. 3. *A. gomboczianus*

1. *A. abyssinicus* (*A. Rich.*) *N.E. Br.* (1901);
Arum abyssinicum *A. Rich.* (1851); *Sauromatum abyssinicum* (*A. Rich.*) *Schott* (1856) – type: TU, Tacazze (Tekeze) River, nr. Tchelatckanne (Djeladjeranne), *Quartin Dillon* s.n. (P holo.).
Hydrosme schweinfurthii *Engl.* (1879); *A. schweinfurthii* (*Engl.*) *N.E.Br.* (1901).

Tuber about 10 cm in diameter, forming side shoots. Leaves: petiole 40–60 cm long, with purplish spots. Leaflets of ultimate order, linear to oblanceolate or obovate, acuminate sometimes with a cusp, up to 12 x 1–2.8 cm. Inflorescence: peduncle 7–25 cm long, purplish dotted, elongating after anthesis. Spathe 16–30 cm long, tube cylindrical to obconical, greenish purple with darker lines and spots or glaucous purple, inner surface with longitudinal ridges, blackish purple. Spadix up to 16 cm long, shorter than spathe; female part at base 1–3.5 cm long; male part without a gap, about as long as the female. Female flowers: ovary 2(–4)-locular with 1 ovule per locule; stigma sessile. Male flowers: stamens free or 2–3 filaments united. Sterile appendix cylindrical, conical to club-shaped, 4–11.5 cm long, tapering towards base, apex rounded, densely wrinkled, dark purple. Berries 0.5–1 cm, long, 1–2-seeded. Fig. 181.7.3–6.

Deciduous woodland, grassland and rocky areas; 950–2300 m. TU GJ IL; widespread in tropical Africa south to Namibia, north to Sudan, mainly at altitudes

above 1000 m. *Ash* 350; *Mesfin T.* 8796; *Thulin & Hunde* 4015.

Its wide distribution and variability have led to the description of a great number of separate species from various parts of its area, all of which are certainly synonymous.

2. *A. gallaensis* (*Engl.*) *N. E. Br.* (1901);
Hydrosme gallaensis *Engl.* (1899); – type: BA, Mt. Robe nr. the springs of Daua (Dawa) River, *Ruspoli & Riva* 410. (FT holo.).
A. gallaensis (*Engl.*) *N.E.Br.* var. *major* *Chiovenda* in *Fl. Som.* 2: 431 (1932).

Herb with 1 large leaf from a tuber about 6 cm in diameter. Leaf: petiole at least 30 cm long; blade with 3 main segments; leaflets of ultimate (third) order lanceolate, widest in lower half, 2.5–6 x 0.5–1.5 cm, with long decurrent base, long acuminate at the apex, secondary and tertiary veins, margin entire. Peduncle about 30 cm long or longer. Spathe: tube of spathe about 10 cm long, blackish-purple inside in its lower part, expanded part comparatively narrow, about the same length, with wavy, purple margin. Spadix about 1½ times as long as spathe. Female inflorescence 1–2.5 cm long; ovary with 1 ovule, style short but distinct, stigma capitate, 3-lobed. Male inflorescence contiguous, 2–3.5 cm long, without sharp upper limit. Sterile appendix about 30 x 2.5 cm at base, gradually tapering towards apex. Berry obovoid, 5–7 mm long, pale yellowish before maturity. Fig. 181.7.1–2.

Moist meadows, rocky woodland and bushland, along stream margins in wet forest; 1450–2000 m. GJ SU IL KF; not known elsewhere. *Ash* 1434; *Friis* 2139; *Mooney* 8699.

3. *A. gomboczianus* *Pichi-Serm.* (1950);
A. abyssinicus *Gombocz* (1936), non (*A. Rich.*) *N.E.Br.* (1901) – type: SD, (leaves only) *Saska* s.n. (specimen not located).

Tuber up to 12–14 cm in diameter. Petioles up to 70–100 cm in stouter plants, white striate and punctate; blade pinnatisect, leaflets of first order dichotomously divided; segments of second order pinnatisect, decurrent; segments of last order, decurrent, 3–4 x 2 cm, long acuminate. Peduncle up to 1 m long, white striate and punctate. Spathe about 30 cm long, purple to bluish, silky in appearance, tube 6–8 cm long, smooth inside, not markedly constricted at mouth. Spadix 35–45 cm long. Female inflorescence 2–3 cm long. Male inflorescence 1.5 to 3 times longer than female one. Appendix up to 4–5 cm wide, blackish to bluish-purple.

Moist meadows and wet forests; altitude not given. SD; not known elsewhere.

No well named material of *A. gomboczianus* has been seen by either the author or the editors. This species has been accepted on the advice of Dr Hettterscheid who regards it as a good species different from *A. gallaensis*. The description is taken primarily from that of the *Gombocz* (*Annales Musei Nationalis Hun-*



Figure 181.7 **AMORPHOPHALLUS GALLAENSIS**: 1 – part of leaf blade x 1; 2 – inflorescence x 1. **A. ABYSSINICUS**: 3 – young inflorescence emerging from corm with two basal bracts x 1; 4 – longitudinal section through infructescence x 1; 5 – single berry x 5; 6 – seed x 7. 1 from *Frits & Lawesson* 5412; 2 from *Mesfin T.* 8023; 3 from *Mesfin T. & A. Hunde* 4015; 4–6 from *Mesfin T.* 8796. Drawn by Damtew Teferra.

garici, 30 *pars botanica*: 1–3) with some additions provided by Dr Hetterscheid.

A. gallaensis and *A. gom boczianus* are both confined to Ethiopia. Further collections and studies in the field are needed to establish the relationship of these two taxa.

The large, highly dissected leaves without an inflorescence, can be confused with those of *Tacca leontopetaloides* in the Taccaceae. Both genera are found in moist meadows.

9. SAUROMATUM Schott (1832)

A single leaf and inflorescence arising at different times but persisting together from a subglobose tuber. Leaf with several cataphylls, petiolate; blade pedately divided. Inflorescence produced before leaf; spathe at ground level, lower part shorter forming a tube, upper part expanded, free. Spadix with a short, basal, female inflorescence followed by a sterile zone with filiform to club-shaped projections and a short, cylindrical male inflorescence; apical part a sterile, cylindrical appendix. Flowers unisexual, without perianth. Ovary unilocular with 1–4 ovules; stigma nearly sessile, capitate. Stamens free, sessile. Berries purple to red.

A small genus of only two species in tropical Asia north to the Himalayan Mountains and tropical Africa; 1 in the Flora area.

S. nubicum Schott considered as native to Africa proved to be only a synonym of *S. venosum* (Ait.) Kunth, that is extremely widespread in cultivation but of unknown origin.

S. venosum (Ait.) Kunth (1832)

–type: plant of unknown origin introduced into cultivation at Kew by William Malcolm in 1774, (BM hol.).

Tuber 4–10 cm in diameter. Leaves: petiole up to 90 cm long, with purple spots or purplish suffused; blade pedately divided, with 4–11 leaflets; central leaflets gradually decreasing in size. Inflorescence: peduncle 2–8(–15) cm long. Spathe 25–50 cm long, tube with inflated basis, 5–10 cm long, purplish green on the outside deep purple inside, expanded part lanceolate widest near base, reflexed at maturity, twisted inner surface pale, with purple spots. Spadix 20–42 cm long. Female inflorescence 0.7–1.6 cm long; ovaries with 1–2 ovules; stigmas capitate; sterile zone 3.5–8 cm long. Male inflorescence 1–1.7 cm long. Berries obovate, about 1 cm long. Fig. 181.8.

In shade under bushes in river valleys at the base of boulders, rocky bushland and moist fallow fields; 1350–2220 m. EW EE TU SU KF SD HA; tropical Africa, Yemen, India. *Burger* 2992; *Meyer* 7470; *Schweinfurth & Riva* 1570.

10. ARISAEMA Martius (1831)

Mayo & Gilbert, A preliminary Revision of *Arisaema* (Araceae) in tropical Africa and Arabia. *Kew Bull.* 41(2): 261–278 (1986).

Tuberous herbs with 1–3 leaves subtended by cataphylls and a solitary inflorescence appearing at the same time. Leaves: petiole sheathed; blade pedately to radially divided. Spathe with a tubular basal and an expanded upper part, acuminate, variously coloured or striped. Spadix unisexual or bisexual with a basal female part contiguous with the male inflorescence and a sterile, apical appendix. Flowers unisexual, perianth lacking. Female flowers congested, with unilocular ovary containing 1–9 ovules; style short or lacking; stigma capitate. Male flowers with 2–5 stamens, filaments united, anthers free or united. Berries orange to red, few-seeded.

About 150 species, most of them in subtropical and temperate eastern and south-eastern Asia, extending to tropical Asia, north central America, southern Arabia and central to eastern Africa.

1. Leaves pedately divided, kidney-shaped in outline; spathe very small, 3.5–7.2 cm long.

1. *A. flavum*

–Leaves palmately divided, leaflets meeting at a point at the end of the petiole, more or less orbicular in outline; spathe 8–17. 2

2. Leaflets with serrate margins, teeth usually ending in short bristles. 2. *A. schimperianum*

–Leaflets with smooth, crenate or irregularly serrate margins, teeth not cuspidate. 3

3. Number of leaflets more than 12 in a leaf; expanded part of spathe white, shorter than tube.

3. *A. polydactylum*

–Number of leaflets 5–9 (rarely 12) in a leaf; expanded part of spathe not as above. 4

4. Margins of leaflets irregularly serrate; expanded part of spathe white, distinctly longer than tube.

4. *A. enneaphyllum*

–Margins of leaves more or less entire; expanded part of spathe not as above. 5

5. Expanded part of spathe broadly auriculate at base, curved forwards, with purple veins.

5. *A. mooneyanum*

–Expanded part of spathe not auriculate at base, erect, with narrow white stripes.

6. *A. addis-ababense*

1. *A. flavum* (Forssk.) Schott (1860)

–type: Yemen, Jebel Sobr, nr. Taizz *Forsskål* s.n. (C hol.).

Slender, up to 50 cm high or more. Leaves 2 with overlapping sheaths and short free part of the petiole, 32–47 cm long altogether; blade pedately divided, leaflets lanceolate to elliptic, acuminate, 3–10.5 x 0.6–3.8 cm, with entire margin, decreasing in size from the



Figure 181.8 *SAUROMATUM VENOSUM*: 1 – tuber $\times \frac{1}{6}$; 2 – plant in leaf $\times \frac{1}{6}$; 3 – central leaf-lobe $\frac{2}{3}$; 4 – inflorescence $\times \frac{1}{6}$; 5 – lower part of spadix, spathe partly removed $\times 1$; 6 – stamen, side view $\times 10$; 7 – stamen, from above $\times 10$; 8 – sterile projections $\times 3$; 9 – pistil, side view $\times 10$; 10 – pistil in longitudinal section, showing ovules and placentation $\times 10$; 11 – pistil, from above $\times 10$; 12 – infructescence $\times \frac{1}{3}$; 13 – berry, side view $\times 2$; 14 – berry in longitudinal section, showing seed (seed-coat hatched) $\times 2$. 2–11 from Milne-Redhead & Taylor 10446; 12–14 from Tanner 692. Drawn by Ann Webster. (Reproduced with permission from *Fl. Trop. E. Afr. Araceae*: fig 15.)

centre outwards. Inflorescence usually longer than leaves. Peduncle 6–18.5 cm long. Spathe 3.5–7.2 cm long, with broadly cylindrical tube constricted at its upper end, up to 2 cm long, free part oblong-ovate, long acuminate, yellow with purplish-brown patch at base, bent sharply forwards at upper end of tube. Spadix bisexual, 1.3–2.7 cm long; female part 0.3–1 cm long, male part about 0.7 cm long, conical, sterile apex 0.5–0.7 cm, club-shaped. Berries red, with several seeds, 0.5 cm in diameter. Fig. 181.9.

In shade of *Ficus* growing on limestone; 1400–1850 m. SD; Ethiopia to Somalia through the Arabian Peninsula to India and Pakistan. *Ash* 813, 2415.

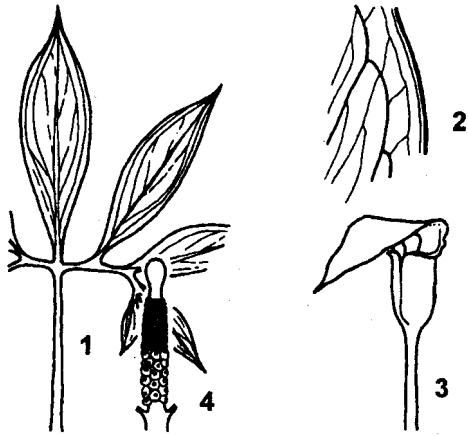


Figure 181.9 *ARISAEMA FLAVUM*: 1 – leaf; 2 – leaflet margin; 3 – inflorescence; 4 – spadix. Drawn by Simon Mayo. (Reproduced with permission from *Kew Bull.* 41(2) 1986. Specimens and scales not given in the original.)

2. *A. schimperianum* Schott (1859)

– type: GD, Simen, nr. Endschedcap, *Schimper* 1125b (W lecto., BM FI K isolecto.).

Herb up to 2 m high. Leaves 2–3, with overlapping sheaths and shorter free part of the petiole which is 80–120 cm long altogether; blade circular in outline; leaflets (5–)9–15, narrowly elliptic to elliptic or oblanceolate to obovate, fairly equal in size, 4.5–27 x 1–9 cm; apex acuminate; base cuneate; margin finely serrate-dentate with teeth ending in a bristle. Inflorescence with peduncle about as long as or longer than leaves; part of peduncle above sheath 9–35 cm long. Spathe 8–31 cm long, tube 3–12 cm long, cylindrical to narrowly obconical, green with white to yellowish stripes outside; free upper part oblong-lanceolate often with very long, filiform tip, green, rarely purple-brown suffused. Spadix usually unisexual (rarely with flowers of both sexes), 3.8–12.8 cm long. Female inflorescence slightly conical, 3–5 cm long, ovaries with short styles and capitate stigmas. Male inflorescence subcylindrical, 1.4–4.3 cm long, flowers loosely arranged, each with 2–3 stamens; sterile appendix usually conical, rarely cylindrical, tapering basally or with a short, distinct stalk. Berries scarlet at maturity, green with yellowish stripes before, 0.5–0.8 cm in diameter, 3–4-seeded. Fig. 181.10.

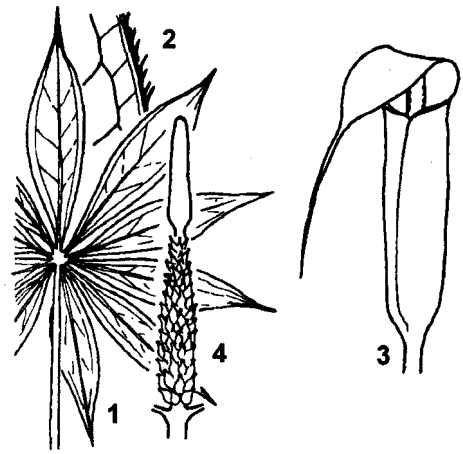


Figure 181.10 *ARISAEMA SCHIMPERIANUM*: 1 – leaf; 2 – leaflet margin; 3 – inflorescence; 4 – spadix. Drawn by Simon Mayo. (Reproduced with permission from *Kew Bull.* 41(2) 1986. Specimens and scales not given in the original.)

Under forest, on steep slopes in evergreen bushland, roadsides, banks of streams, hill tops; 1800–2820 m. GD GJ SU AR KF SD BA HA; Sudan, Uganda, and Zaire. *Burger* 783; *M. & S. Gilbert* 1350; *de Wilde* 6583.

3. *A. polydactylum* Riedl (1990)

– type: GJ, by the road from Injibara to Debre Markos, *Thulin & Hunde* 4088 (UPS holo.).

Riedl in *Linz. Biol. Beitr.*, 22: 298 (1990).

Plant about 50 cm high. Leaves: one leaf reduced to a herbaceous, pointed sheath of 25 cm enveloping the peduncle, the second well developed, at least 30 cm long, fleshy; blade nearly circular; leaflets 12 or more, narrowly lanceolate, radiating, up to 12.5 x 2.5 cm, decreasing in size from the central one outwards, widest below middle, entire. Inflorescence slightly longer than leaf; peduncle *c* 35 cm long, thickened towards spathe. Spathe 11.5–12.5 cm long; tube 6–6.5 cm long; cylindrical, outside and inside green; free part 3 cm wide, with a long, drawn out apex, slightly constricted but not auriculate at base, white inside and out, curved forwards to downwards above mouth of tube. Spadix about 4.5 cm long, unisexual; only male inflorescence known, 2.2 cm long, flowers with 2 stamens, very densely congested; sterile appendix neither tapering towards base nor stalked, very narrowly conical, about 0.3 cm wide at base. Female flowers and fruits unknown.

Open grassland and fields; *c* 2550 m. GJ; not known elsewhere. Known so far only from the type collection.

4. *A. enneaphyllum* Hochst. ex *A. Rich.* (1851)

– type: GD, Simen, nr. Endschedcap, *Schimper* 1125a (P lecto., B BM FI K isolecto.).

A. schimperianum sensu Milne-Redh.

Tall herb to *c* 120 cm high. Leaves usually 2, sheaths overlapping *c* 75 cm long; free part of petiole 7–25 cm long; blade circular in outline; leaflets 5–10 radiating, lanceolate, elliptic to oblanceolate; 7–19 x 1.5–6.5 cm, apex acuminate; base cuneate; margin irregularly serrate to nearly entire. Inflorescence longer than leaves;

free part of peduncle 11–24 cm long, green. Spathe 9–24 cm long; tube 3.5–7.5 cm long, shortly cylindrical, slightly constricted apically, green with white stripes outside; free upper part much longer, ovate, acuminate, white outside, white and green striped inside, blackish near base at margin, curved forwards above mouth of tube. Spadix unisexual, 4.3–8.6 cm long. Female inflorescence 2.7–3.5 cm long, cylindrical to conical, flowers densely congested; ovaries bearing short styles, green. Male inflorescence stalked, 1.7–4.5 cm long, cylindrical, flowers dense, each with 2–3(–4) stamens. Sterile appendix widely to narrowly conical, usually tapering towards base, sometimes spindle-shaped, rarely sessile on fertile part with broad base. Berry nearly globose, 5–7 mm in diameter, 3–5-seeded. Fig. 181.11 & 12.

Grassy road banks in valley in *Erica arborea* scrub, steep slopes, road sides; 2250–3100 m. GJ SU AR SD; Sudan, Uganda and Kenya. Ash 3035; Evans & Hiller 89; Mooney 7294.

A. schimperianum and *A. enneaphyllum* have often been confused, as in Agnew, *Upl. Kenya Wild Fl.* (1980). They grow in the same locality and have been found mixed in collections. *A. enneaphyllum* has a short constriction at the top of the spathe-tube which is not found in *A. schimperianum*.

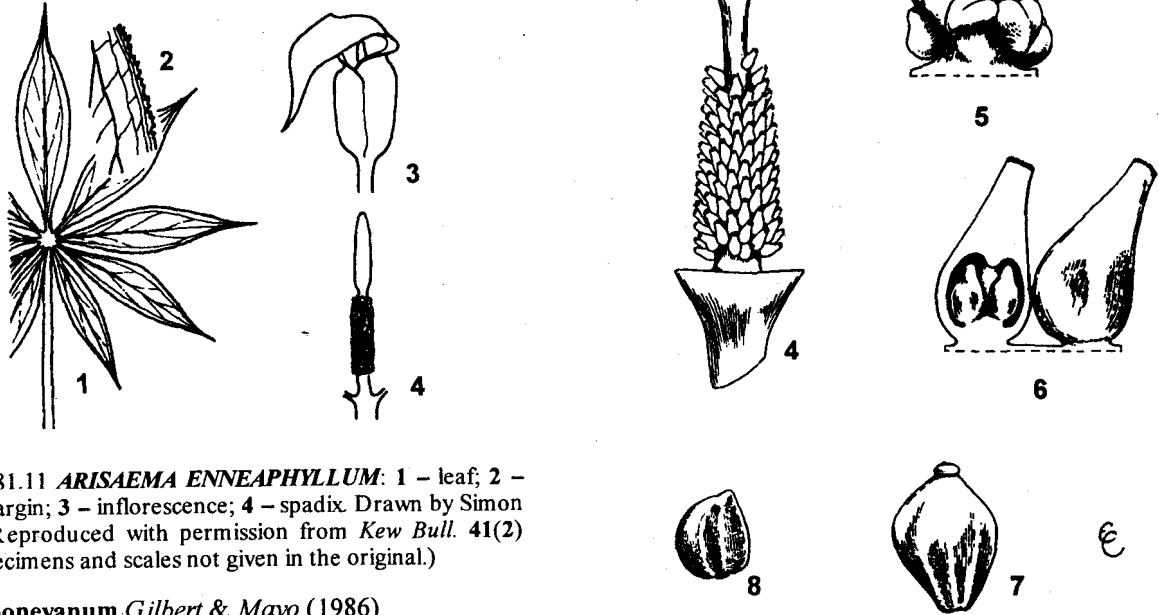


Figure 181.11 *ARISAEMA ENNEAPHYLLUM*: 1 – leaf; 2 – leaflet margin; 3 – inflorescence; 4 – spadix. Drawn by Simon Mayo. (Reproduced with permission from *Kew Bull.* 41(2) 1986. Specimens and scales not given in the original.)

5. *A. mooneyanum* Gilbert & Mayo (1986)

–type: SD, 2 km S of Fisseha Genet, M.G. Gilbert & Jefford 4275. (K holo., ETH iso.)

Herb about 50 cm high. Leaves 1–2, subtended by 1–2 cataphylls; petiole shortly sheathed in its lower part, 17–30 cm long, green; blade circular in outline; leaflets (6–)8–12, lanceolate to broadly elliptic, equal in size, 6.5–26 x 1.5–6.5 cm; apex long acuminate; base cuneate; margin entire or serrulate. Inflorescences of a large central shoot, usually longer than leaves, with only female or both female and male flowers, surrounded by smaller shoots with male flowers from subsidiary tubers. Female inflorescence: free part of peduncle 10–20

Figure 181.12 *ARISAEMA ENNEAPHYLLUM*: 1 – leaf centre x 2½; 2 – inflorescence x 1; 3 – staminate spadix, spathe removed x 1; 4 – pistillate spadix x 1; 5 – staminate flower, side view x 6; 6 – pistils, side view and longitudinal section x 6; 7 – berry, side view x 2; 8 – seed, side view x 2. 1 from Hedberg 1056; 2, 3 & 5 from Tweedie 1167A; 4 & 6 from Tweedie 1167; 7 & 8 from Tweedie 1167B. Drawn by Eleanor Catherine. (Modified and reproduced with permission from *Fl. Trop. E. Afr. Araceae*: fig 16)



Figure 181.13 *ARISAEMA MOONEYANUM*: 1 – leaf $\times \frac{2}{3}$; 2 – staminate inflorescences $\times \frac{2}{3}$; 3 – pistillate spadix $\times \frac{2}{3}$; 4 – group of flowering plants $\times \frac{1}{9}$. 1 & 3 from Gilbert & Jefford 4275; 2 from Ash 770; 4 from photograph. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Kew Bull.* 41 (2) 1986. Specimens not given in the original.)

cm long, green or suffused with maroon towards apex. Spathe 16–39 cm long, tube cylindrical, not constricted at apex, 6.5–13 cm long, outside glaucous or greenish-yellow suffused with purple; free upper part ovate, broadly auriculate at base, with rolled margins, both surfaces glossy, brown or very dark blackish-purple at base, upper part olive-green with fine dark brown veins, long acuminate, curved forwards and downwards above mouth of tube. Spadix unisexual or bisexual, 8–17 cm long, fertile part of both sexes variable, 2–9 cm long; flowers dense or loose; sterile part stalked, tapering gradually from a broad, rounded base, nearly pointed at apex. Female flowers with green ovary bearing a small, paler stigma. Male flowers of 2(–3) stamens. Berry unknown. Fig. 181.13.

Grassland associated with montane forest; 2000–3450 m. SD BA; not known elsewhere. *Mooney* 7138; *Gilbert & Jones* 191; *Gilbert et al.* 7415.

Mayo and Gilbert, l.c., mention several other collections that show slight aberrations from the typical form. Such collections require further investigations in the field.

This species is named after H.F. Mooney whose collections form the basis of the National Herbarium in Addis Ababa.

6. *A. addis-ababense* *Chiov.* (1940)

–type: SU, Addis Ababa, *Senni* 1308. (FT lecto.).

Herb up to 70 cm high. Leaves 1–2; petiole with up to 60 cm long sheath streaked purplish-brown, free part 4–17 cm; blade nearly circular in outline; leaflets 5–7, radiating, 6.5–15 x 1.6–6.3 cm, broadly elliptic to oblanceolate, equal in size, acuminate to long acuminate. Inflorescence shorter or longer than leaves; free part of peduncle 11–16 cm long. Spathe 11–12 cm long; tube cylindrical to slightly obconical, not constricted, 3–3.7 cm long, outside green with white stripes along veins; free upper part ovate-lanceolate, long acuminate, with nearly filiform tip, green with white stripes along veins. Spadix unisexual, 5.2–5.5 cm long; fertile part of both sexes 2.1–2.5 cm long with more or less distant flowers; sterile part nearly cylindrical, slender, tapering towards base. Female flowers with ovary bearing a short style and small, capitate stigma. Male flowers composed of 2–3 stamens. Berries 0.8 cm in diameter, with several seeds. Fig. 181.14.

In shaded sites in areas formerly covered by *Olea* – *Juniperus* forest, now mainly under shrubs of *Carissa edulis*; 2400–2650 m. SU; not known elsewhere. *Ash* 495; *M.G. & S.B. Gilbert* 2565; *de Wilde* 7435.

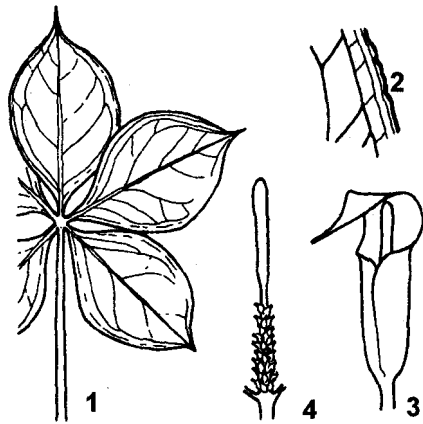


Figure 181.14 *ARISAEMA ADDIS-ABABENSE*: 1 – leaf; 2 – leaflet margin; 3 – inflorescence; 4 – spadix. Drawn by S. Mayo. (Reproduced with permission from *Kew Bull.* 41 (2) 1986. Specimens and scales not given in the original.)

11. *PISTIA* L. (1753, 1754)

Floating aquatic plants with rosettes of spirally arranged, sessile leaves and a very short-stalked inflorescence. Spathe leaf-like, margins of tube united to the middle, free part opening obliquely. Spadix without sterile appendix. Flowers unisexual, without perianth. Female flower solitary, with a unilocular ovary containing many erect ovules. Male inflorescence with spirally arranged flowers composed of two stamens. Berry ovoid, with many or few seeds by abortion.

A monotypic genus widespread throughout tropical and subtropical regions of the earth, widely cultivated also as an aquarium plant.

P. stratiotes L. (1753)

–lectotype: India, Kerala; 'Kodda Pail', *Rheede, Hort. Malab.* ii, t.32 (1962).

Primary leaves suborbicular to obovate, appressed to the surface of water, later leaves more or less erect, obovate-cuneate to obovate-oblong, with 7 to 15 sub-parallel nerves, covered with water-repelling hairs. Spathe whitish, glabrous inside, densely covered with few-celled, short hairs outside; tube ovoid, free part ovate, pointed. Spadix shorter than spathe, united dorsally to two-thirds of spathe's length with the female flower; male inflorescence composed of 2–6 flowers. Axis between female flower and male inflorescence forming a thickened ring. Berry breaking up irregularly at maturity. Fig. 181.15.

Open swamps and lakes; 550–1650 m. SU IL GG SD; tropical and subtropical regions of Africa, Asia and America. *Riva* 1598; *Ash* 1602, 2153; *Beals & Prosser* 14.

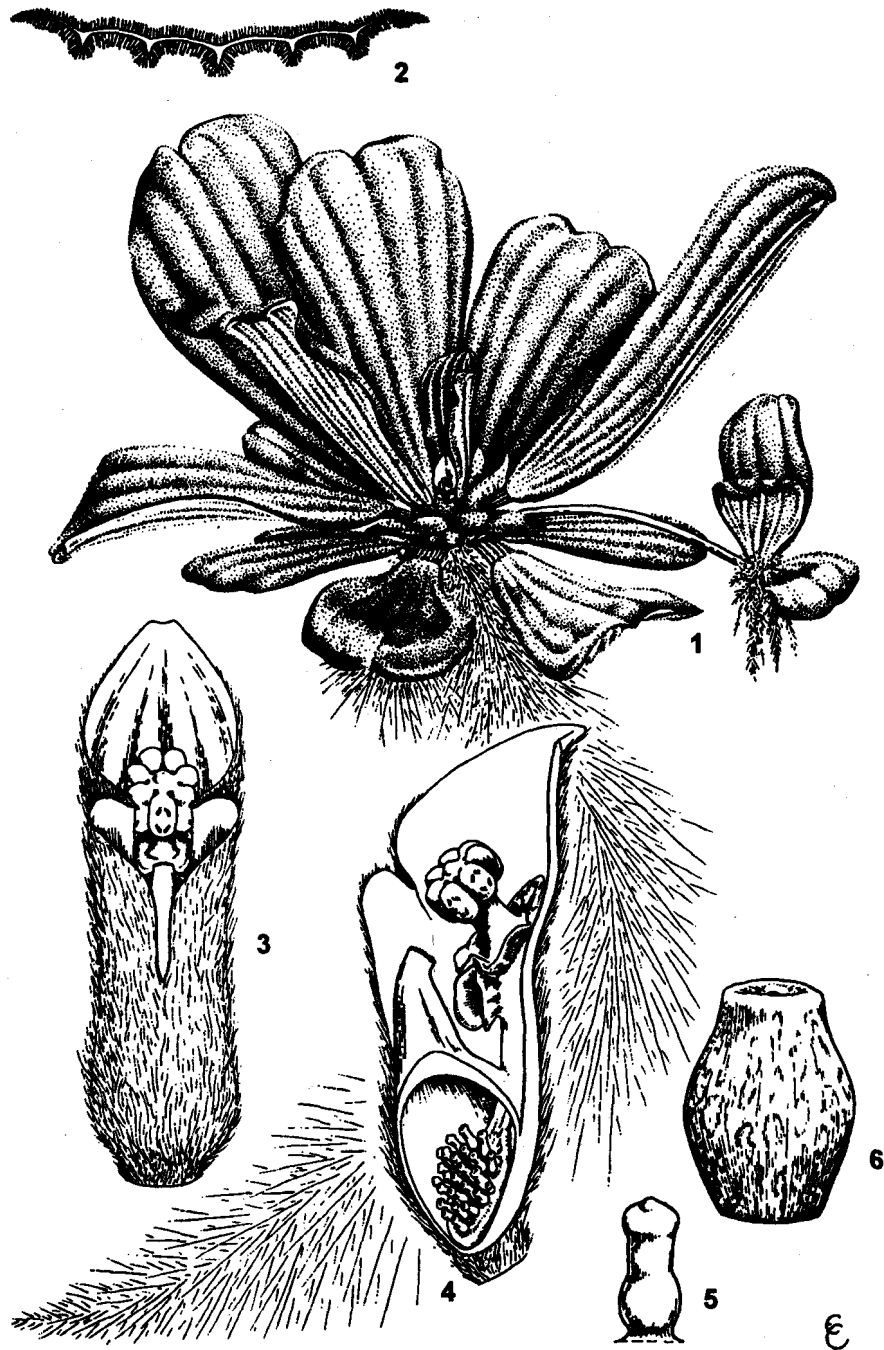


Figure 181.15 *PISTIA STRATIOTES*: 1 – flowering plant with stolon $\times \frac{2}{3}$; 2 – leaf in transverse section $\times 2$; 3 – inflorescence, front view $\times 5$; 4 – inflorescence, side view, with spathe and ovary-wall partly removed $\times 5$; 5 – ovule $\times 32$; 6 – seed, side view $\times 15$. 1 & 2 from Giles & Woolliams PB30, cult. Kew; 3–5 from Wild in SRGH 26411; 6 from Greenway & Kanuri 15152. Drawn by Eleanor Catherine. (Reproduced with permission from *Fl. Trop. E. Afr. Araceae*: fig. 17)

182. LEMNACEAE

by E. Landolt*

Hegelmaier, *Lemnaceae* (1868); Den Hartog & van der Plas, *Syn. Lemnaceae* (1970); Cufodontis, *Enum.*: 1504–1505 (1971); Landolt, *Monogr. Lemnaceae* (1986); Thulin, 144. *Lemnaceae* in *Fl. Somalia* 4: 23–24 (1995).

Plants reduced to small leaf-like fronds of which two or more remain together and float on or below the surface of the water. Propagation is mostly vegetative through the budding of daughter fronds out of 1 or 2 reproductive pouches or cavities at the base of the frond. Flowering and fruiting are rare in most species. Fronds 0.5–18 mm long, consisting of a lower and an upper epidermis and several cell layers between with conspicuous air spaces (except in *Wolffia*), with 0–21 nerves, with 0–21 roots originating at the node on the lower surface of the frond. Roots surrounded at the base by a tubular sheath and enclosed at the tip by a cap; no root hairs present. Flowers¹ 1–2 per frond, bisexual, without petals, with 1–2 stamens and 1 ovary. Ovary with 1–7 ovules, bottle-shaped, tapering into short style with a funnel-shaped stigma. Pollen grains globular, with one pore, covered with small spiny protuberances. Ovules with 2 integuments, and cellular endosperm. Fruit with a dry pericarp and 1–5 seeds. Seeds ovoid, longitudinally ribbed or nearly smooth.

Two subfamilies with 4 genera and 37 species, widely distributed; 6 species in 3 genera have been recorded from the Flora area. However, the account also includes *Wolffiella* as the plants are so small they are rarely collected. The centre of distribution is South America, with secondary centres in North America, Southern Africa, South-eastern Asia and Australia.

Key to subfamilies

1. 1–21 roots present; fronds with 1–21 nerves; daughter fronds and flowers originating from 2 lateral pouches at the base of the fronds; flowers surrounded by an utriculose scale-like membranous leaflet, with two 4-locular stamens; seeds longitudinally ribbed; crystal cells present. **Lemnoideae**
- No roots present; fronds without nerves; daughter fronds originating from a single terminal pouch or cavity at the base of the frond; flowers without any utriculose leaflets, originating in a cavity on the upper surface of the frond, with one 2-locular stamen; seeds nearly smooth; no crystal cells present. **Wolffioideae**

Subfamily LEMNOIDEAE

Fronds orbicular to narrowly elliptic, somewhat asymmetric (the side where the first daughter frond is formed is more convex), flat or sometimes gibbous; with air spaces throughout the whole frond or only around the node; 1–21 nerves present, usually with tracheids at least near the node; 2 triangular lateral reproductive pouches at the base of the frond, from which the daughter fronds originate, with numerous stomata on the upper surface of the frond (no stomata on the submerged fronds of *Lemna trisulca*); crystal cells present. Roots 1–21 (rarely broken off or undeveloped in resting fronds). Flowers originating in the lateral pouch, surrounded at the base by an urn-shaped membranous leaflet; 2 stamens per flower, each anther with 4 locules, elongating and ripening one after the other. Seeds with 8–60 longitudinal ribs.

Subfamily with 2 genera and 16 species.

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Key to genera

1. Roots 2–21 per frond (no roots in turions²); nerves 3–21 per frond; fronds surrounded at the base by a small scale-like leaflet (prophyllum³) covering the root attachment; pigment cells present (visible in dead fronds as brown dots); both raphids⁴ and druses⁵ present. 1. **Spirodele**
– Roots only 1 per frond; nerves 1–5 (very rarely 7 in *L. gibba*); no leaflet at the base of the frond; no pigment cells (but red pigmentation present in some species); crystal cells only with raphids. 2. **Lemna**

1. SPIRODELA Schleiden (1839)

Fronds lanceolate, ovate or suborbicular, floating on the surface of the water (only turions sink to the bottom of the water), 1 or more staying together (often rosette-like), with 3–21 nerves; with anthocyanins (dark-red colour), and also pigment cells in the frond tissue, in the roots, in the prophyllum, in the ovary, around the stigma and along the dehiscence line of the stamens; both raphids and druses present. Fronds surrounded at the base by a two-segment, scale-like leaflet (prophyllum) covering the point of attachment of the roots; roots 2–21 per frond (not developed in turions). Ovary with 1 amphitropous or 2–5 anatropous ovules.

One species in South and Central America, 2 species with worldwide distribution.

1. Some authors refer to the flower as an inflorescence, in analogy to the inflorescence of *Araceae*.

2. turion: an asexual reproductive unit, in this case a resting frond without roots which sinks to the bottom of the water.

3. prophyllum: an immature leaf, or the first leaf.

4. raphid: needle-shaped crystals.

5. druse: clump-like crystals.

1. *S. polyrrhiza* (L.) *Schleiden* (1839).

Fronds rounded or pointed at the tip, 1.5–10 x 1.5–8 mm, 1–1½ times as long as wide, thin or (rarely) gibbous, sometimes with red pigmentation on the lower surface and along the margin and above the node of the upper surface; roots 7–21, 1 (rarely 2) of which perforate the prophyllum. Under unfavourable conditions small orbicular to reniform, brownish to olive, turions are formed which have no roots and sink to the bottom of the water. Fruit 1–1.5 x 1–1.2 mm, with winged edges near the top. Seeds 1, rarely 2 per fruit, with 12–20 ribs, 0.7–1 x c 0.7 mm. Fig. 182.1.1.

Quiet water in regions with warm summers; 0–2000 m. GJ WU SU SD; distributed throughout most parts of the world except regions with cool summers in all continents; in South America only in the northwestern part. *Getachew A.* 1558, 1625, 2468.

2. LEMNA L. (1753)

Fronds lanceolate to ovate, floating on or below the surface of the water, 1 or more joined together sometimes forming chains, with 1–5 (rarely 7) nerves; no pigment cells present; crystal cells with raphids only present; fronds not surrounded by a leaflet at the base; 1 root per frond. Ovary with 1 orthotropous or amphitropous ovule or 2–7 anatropous ovules.

Genus with 13 species with a centre of distribution in America.

1. Margin of fronds in the distal part denticulate; fronds narrowed to a green stalk at the base, 3–50 cohering together, submerged (except when flowering) and often forming long and branched chains. 1. *L. trisulca*
– Margin of fronds entire; fronds rounded at the base, with a very small white stipe often decaying (no green stalk present), floating on the surface of the water. 2
2. Root sheath winged at the base; root tip sharply pointed; root not longer than 3 cm; fronds without reddish colour. 4. *L. aquinoctialis*
– Root sheath not winged; root tip usually rounded; root often longer than 3 cm; fronds often with a reddish tinge or spots of anthocyanin. 3
3. Largest air spaces more than 0.3 mm in diameter; lower surface of the frond often reddish and gibbous; usually 4–5 (rarely 7) nerves present, originating independently from the node; ovary with 1–7 ovules. 2. *L. gibba*
– Largest air spaces very rarely wider than 0.3 mm in diameter; lower surface of the frond neither reddish nor gibbous; usually 3 nerves present, if 4–5 nerves, the outer lateral ones originating from the lower part of the inner lateral ones; ovary with 1 ovule. 3. *L. minor*

1. *L. trisulca* L. (1753).

Vegetative fronds submerged, with denticulate margins, tapering into a long green stalk, 3–50 cohering

together and often forming long and branched chains, without stomata, 3–15 x 1–5 mm (stalk not included), 2–3 times as long as wide, without papules¹, with 3 (rarely 1) nerves, sometimes reddish; with 1 root (rarely without root). Flowering fronds much shorter, floating on the surface of the water. Ovary with 1 amphitropous ovule; fruit 0.6–0.9 x 0.7–1(–2) mm, with winged margin. Seed 0.6–1.1 x 0.5–0.8 mm, whitish, with 12–18 ribs.

Quiet water in regions with temperate climate; 1500–2800 m. SU; all continents except South America. *Gilbert & Tewolde B.G.E.* 3272.

All other African species of *Lemna* are found floating, 2–10 cohering together on the surface of the water with entire margin, without green stalk, but with a very small white stipe often decaying, with many stomata on the upper surface.

2. *L. gibba* L. (1753).

Vegetative and flowering fronds similar, 1–8 x 0.8–6 mm, 1–1.6 times as long as wide, usually without distinct papules (except in small fronds), mostly with 4–5 (rarely 3 or up to 7) nerves; the lateral nerves originating independently from the node; lower surface often reddish and gibbous (up to 4 mm thick); the upper surface occasionally with distinct red spots especially near the tip; larger air spaces more than 0.3 mm in diameter. Ovary with 1 amphitropous or 2–7 anatropous ovules; fruit 0.6–1 x 0.8–1.2 mm with winged margin. Seeds 1–5 per fruit, 0.7–0.9 x 0.4–0.6 mm, whitish, with 8–16 ribs.

Quiet water in regions with temperate climate (mild winters, often dry summers); 1000–3000 m. EW WU SU; all continents except Australia. *Getachew A. & Weinert* 1923; *Ryding et al.* 1077; *Sue Edwards & Tewolde B.G.E.* 3536.

3. *L. minor* L. (1753).

Vegetative and flowering fronds similar, 1–10 x 0.6–7 mm, 1.3–2 times as long as wide, with some indistinct papules along the median line (papules near the tip and above the node somewhat larger than the ones between), with 3 (rarely 4–5) nerves, if 4–5 nerves, the outer lateral nerves originate from the lower part of the inner lateral ones; lower surface of the fronds neither reddish nor gibbous (not thicker than 1 mm), the upper surface occasionally diffusely reddish (especially during the cold season); largest air spaces rarely wider than 0.3 mm. Ovary with 1 amphitropous ovule; fruit 0.8–1 x 0.8–1.1 mm, with narrowly winged margin. Seed 0.7–1 x 0.4–0.6 mm, whitish, with 10–16 ribs.

Quiet water in regions with temperate climate; 1500–3400 m. EW GD SU SD HA; all continents except Central and South America, introduced into Australia. *Burger* 3832; *Sue Edwards* 3587; *Getachew A.* 2455.

1. papule: small pustules or raised lumps on the surface.

4. *L. aequinoctialis* *Webw.* (1859);
L. paucicostata *Hegelm.* (1868).
L. perpusilla *auct. non Torr.*

Vegetative and flowering fronds similar, 1–6.5 x 0.8–4.5 mm, 1–3 times as long as wide, with 1 or more prominent papules above the node and one prominent papule near the tip of the frond; with 3 nerves; never reddish; largest air spaces not wider than 0.3 mm. Root sheath laterally winged; root cap sharply pointed. Ovary with 1 orthotropous ovule; fruit 0.5–0.7 x 0.4–0.5 mm, not winged. Seed 0.5–0.6 x 0.3–0.4 mm, brownish, with 8–22 ribs. Fig. 182.1.2.

Quiet water (often seasonal) in regions with subtropical and tropical climate; 0–1500 m. SU IL; all continents. *Burger* 2092; *Meyer* 1870; *Getachew* A. 2898.

Subfamily WOLFFIOIDEAE

Fronds in various shapes, thin or thick with or without aerenchymatic tissue; without nerves and tracheids; 1 triangular terminal pouch or funnel-shaped cavity from which the daughter fronds originate; with or without stomata; no crystal cells present; no roots present. Flowers originating in a cavity on the upper surface, without a leaflet at the base; stamens 1 per flower with 2 locules. Seeds nearly smooth (indistinctly reticulate).

Subfamily with 2 genera and 21 species.

1. Fronds flat, with air spaces at least around the node; flowers originating in a cavity at the side of the median line on the upper surface.
3. *Wolffiella*
- Fronds thick, globular to ellipsoid (the African species); no air spaces present; flowers originating in a cavity in or near the median line of the upper surface.
4. *Wolffia*

3. WOLFFIELLA *Hegelm.* (1895)

Fronds flat, orbicular to ovate and floating on the surface of the water, or ribbon- to tongue-shaped and floating below the water surface, 1 or more cohering together; one layer of air spaces present at least around the node; at the base with 1 terminal, triangular and flat pouch out of which daughter fronds emerge. Flowers originating in a cavity at the side of the median line on the upper frond surface.

10 species, restricted to America and Africa.

1. Fronds floating on the surface of the water, ovate to trapezoid; no pigment cells present; lower wall of the pouch elongated in a ribbon-like appendage which is bent vertically down; fronds with 2 papules on the upper surface.
1. *W. hyalina*
- Fronds floating just below the surface of the water, tongue-shaped, with pigment cells (visible as brown dots in dried specimens); without appendage, without papules.
2. *W. welwitschii*

1. *W. hyalina* (*Delile*) *Monod* (1949);
Wolffia hyalina (*Delile*) *Hegelm.* (1868).

- Pseudowolffia hyalina* (*Delile*) *Hartog & Plas* (1970).

Fronds floating on the surface of the water, ovate to trapezoid, cohering 1–2 together, 1–3 x 0.8–2 mm, 1–1½ as long as wide, with more than 60 stomata, without pigment cells, with a papule near the tip and one above the node; lower wall of the pouch elongated in a ribbon-like appendage which is bent vertically down; appendage 0.5–5 x 0.6–1.8 mm, ½–4 times as long as the frond. 1 flower per frond. Seed 0.5–0.6 x 0.4 mm. Fig. 182.1.3.

Quiet water in subtropical and tropical regions; 0–1700 m. No records from the Flora area; occurring in Sudan (Kordofan), Kenya (Rift Valley), Uganda (Toro, East Mengo); elsewhere throughout Africa except the Northwest, Southwest and South.

2. *W. welwitschii* (*Hegelm.*) *Monod* (1949);
Wolffia welwitschii *Hegelm.* (1865)
Wolffiopsis welwitschii (*Hegelm.*) *Hartog & Plas* (1970).

Fronds floating just below the water surface, with the basal part near the surface, the tip bent down, cohering 2–3 together, tongue-shaped, 3–7 x 2.5–5 mm, 1–2 times as long as wide, with 0–12 stomata (especially along the lateral margins of the base), with pigment cells (visible as brown dots in dried specimens), without papules, without an appendage. 2 flowers per frond. Seed 0.5–0.6 x 0.4–0.5 mm.

Quiet water in tropical regions with dry semi-arid climate; 0–1700 m. No records from the Flora area; occurring in Sudan (Bahr el Ghazal), Kenya (Central Prov., Rift Valley), Uganda (Buganda, Toro) and throughout tropical Africa and America.

4. WOLFFIA *Horkel ex Schleiden* (1844)

Fronds thick, in various shapes, floating at the surface of the water, partly submerged, 1–2 cohering together; without air spaces; at the base 1 terminal funnel-shaped cavity out of which daughter fronds emerge. Flowers originating in a cavity on or near the median line of the upper frond surface.

11 species; world-wide distribution (except cold regions).

1. Fronds 1–1.3 times as long as wide, with 10–100 stomata, deep green on the surface (not transparent).
1. *W. arrhiza*
- Fronds 1.3–2 times as long as wide, with 1–15 (rarely to 30) stomata, light and somewhat transparent green.
2. *W. cylindracea*

1. *W. arrhiza* (*L.*) *Horkel ex Wimmer* (1857).

Fronds spherical to ellipsoid, 0.5–1.5 x 0.4–1.2 mm, 1–1.3 times as long as wide, with 10–100 stomata, deep green on the surface (not transparent).

Quiet water in regions with relatively mild winters and not very hot summers; 500–2000 m. SU-SD; occurring in Kenya (Central Prov., Rift Valley), Uganda

(Buganda, Kizegi), throughout Africa, Europe, south-western Asia, eastern Brazil. *Getachew A. & de Wit* 1959.

2. *W. cylindracea* Hegelm. (1868);

Wolffia globosa auct. non Hartog & Plas (1970).

Fronds ellipsoid, 0.4–0.8 x 0.3–0.5 mm, 1.3–2 times as

long as wide, with 1–10 (rarely 30) stomata, light and somewhat transparent green on the surface.

Quiet water (often seasonal) in regions with mild winters and warm summers; 0–1500 m. No records from the Flora area; occurring in Kenya (Coast, Rift Valley), eastern and southern Africa.

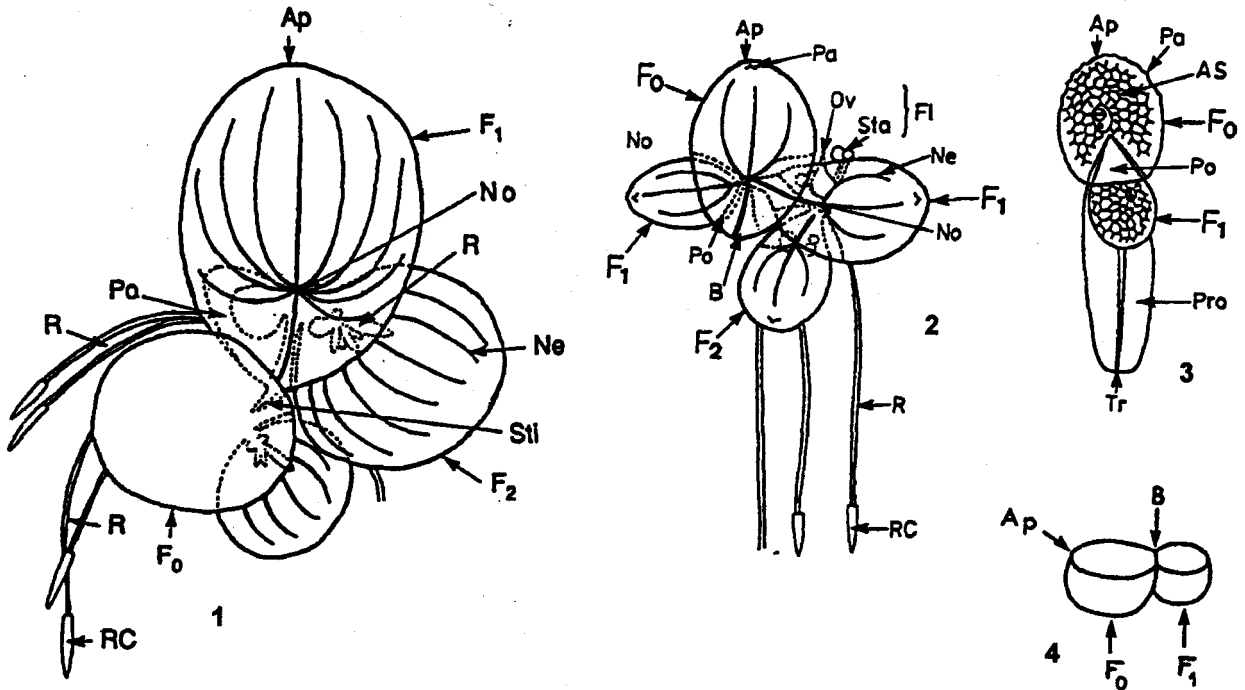


Figure 182.1 Fronds group of various Lemnaceae seen from above. 1 – *SPIRODELA POLYRRHIZA*; 2 – *LEMNA AEQUINOC-TIALIS*; 3 – *WOLFFIELLA HYALINA*; 4 – *WOLFFIA ARRHIZA*. Ap - apex; As - air space; B - base; F₀ - mother frond; F₁ - daughter frond of the first generation; F₂ - daughter frond of the second generation; Fl - flower; Ne - nerve; No - node; Pa - papule; Po - pouch; Pro - prolongation; R - root; RC - root cap; Sti - stipe connecting daughter frond and mother frond; Tr - track of elongated cells connecting stipe and node. 1–3 after *Hegelmaier* 1868; 4 drawn by *Landolt*.

183. DIOSCOREACEAE

by J. Miège (deceased)* & Sebsebe Demissew**

Knuth, *Engler & Prantl. Pflanzenreich*. 4 (43): 1–387 (1924); Cufodontis, *Enum.*: 1582–1584 (1972); Burkill, *J. Linn. Soc. Bot.* 56: 319–412 (1960); Milne-Redhead, *Dioscoreaceae in Fl. Trop. E. Afr.*: 1–26 (1975); Nkounkou, La section Enantiophyllum du genre *Dioscorea* en Afrique centrale, *Belg. Journ. Bot.* 126 (1): 45–70 (1993).

Twining, climbing or seldom erect herbs arising from tubers derived from a starchy rhizome or more often from the lowest internodes of the stem or the hypocotyl. Plants with raphides commonly producing steroidal saponins. Leaves alternate or opposite, petiolate, often ovate-cordate, but sometimes with 3–7 digitate leaflets. Inflorescence spike, raceme or panicle. Flowers unisexual or bisexual, the former usually dioecious, perianth segments 6, biseriate, usually united basally. Stamens 3 + 3, but the inner ones sometimes staminoid. Ovary inferior, rarely semi-inferior or superior, 3-locular, with axile placentation. Fruit a dehiscent capsule, samara or berry. Seed mostly winged.

A family of 7 genera, only one of which, *Dioscorea*, occurs in tropical Africa. The remaining 6 genera are very small and are found in Madagascar, central America, Indo-Malaysia, Micronesia and Europe.

DIOSCOREA L. (1753)

Miège, *Dioscoreaceae of Ethiopia. Symb. Bot. Ups.* 24(2): 157–168 (1986).

Twining or climbing, dioecious, pubescent or glabrous herbs. Stems annual or rarely perennial, arising from tubers, often prickly below, but sometimes unarmed. Tubers perennial or renewed annually. Leaves alternate or opposite, petiolate, often ovate-cordate, usually entire, sometimes deeply or shallowly lobed, occasionally compound with 3–7 leaflets; apex of leaves often glandular; main nerves of entire leaves conspicuous, curved-convergent towards the apex; petiole twisted and jointed at the base or with leathery auricles. Aerial bulbils absent or present arising in the axils of leaves. Basal leaves transformed into scales (cataphylls). Male inflorescences spicate, racemose or rarely cymose, axillary or forming panicles at the ends of leafless branches. Male flower: perianth campanulate or spreading, 6-lobed; sessile or shortly pedicelled; stamens 6, all fertile or 3 reduced to staminodes, shorter than the perianth; filaments free or shortly united; anthers 2-locular; rudimentary ovary often found. Female inflorescences spicate, axillary. Female flower: perianth similar to male; staminodes 0, 3 or 6; ovary 3-locular with 2 ovules in each locule; placentation axile; styles 3, short. Capsule rigid, deeply 3-lobed or triangular-ellipsoid, dehiscent into 3 valves. Seeds 1–2 per locule, variously winged or rarely wingless.

The genus is represented by 600 species, occurring mainly in the old and new tropics; many representatives in tropical Asia; 11 species in the Flora area.

These plants are commonly known as yams. Several species are widely cultivated. The major species used as food worldwide are: *D. alata* L., *D. esculenta* (Lour.) Burkill, *D. cayenensis* Lam. – *D. rotundata* Poir. complex. At least 20 others are used as food in times of famine, and a similar number have medicinal and other uses.

Steroidal saponins related to sex hormones and corticosteroids occur in several species.

Key to plants with male flowers

1. Stems twining to the left (sinistrorse i.e. clockwise); leaves simple or compound. 2
 - Stems twining to the right (dextrorse i.e. anti-clockwise); leaves simple. 6
2. Leaves compound. 3
 - Leaves simple, entire. 5
3. Plants unarmed; leaflets (1–)3–5(–7); inflorescence in catkins; bracts embracing the flower; stamens 3, staminodes 3. 1. *D. quartiniana*
 - Plants with stem spines; leaflets 3; inflorescence in much-branched panicles of dense spikelets formed by cymules of 2–6 flowers; bracts embracing the cymules; stamens 6, at least in the first flower of the cymules. 4
4. Leaflets usually 3-nerved; ultimate spikelets of inflorescence 5–10(–15) mm long, subsessile or on peduncles up to 5 mm long; perianth glabrous. 3. *D. dumetorum*
 - Leaflets usually 3–5-nerved; ultimate spikelets of inflorescence 20–25 mm long, on peduncles up to 15 mm long; perianth pubescent. 2. *D. cochleari-apiculata*
5. Plants with stems less than 2 m long; leaves 1.5–7 x 1–6.5 cm; perianth spreading; stamens 3, staminodes 3. 4. *D. gillettii*
 - Plants with stems 3–10 m long; leaves 6–22 x 4.5–17 cm; perianth not spreading; stamens 6. 5. *D. bulbifera*
6. Plants pubescent with stellate hairs; perianth c 2.5 mm long. 6. *D. schimperiana*
 - Plants glabrous; perianth 1–2 mm long. 7
7. Stems 4-winged or 4-angled; flowers on a zigzag axis. 7. *D. alata*
 - Stems rounded, not winged or angled, sometimes slightly furrowed; axis of inflorescence straight. 8
8. Plants usually cultivated with superficial tubers

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1. catkin: a dense hanging spike of unisexual flowers, each flower usually enclosed in a bract.

- (numerous cultivars and clones); spikes 1–2 (–3) in the axils of leaves; petioles not widened at the base. 8. *D. cayenensis*
- Plants mostly wild, without superficial tubers; spikes 2–6(–8) in the axils of leaves; petioles widened at the base. 9
9. Stems prickly; leaf-blade thin. 11. *D. prae-hensilis*
- Stems unarmed; leaf-blade thicker. 10
10. Leaves cordate to ovate, basal lobes ± rounded, length/width ratio less than 1.8; perianth 1–1.5 mm long, white or grey, base thickish, not scarious; flower axis stout; roots unarmed.
9. *D. abyssinica*
- Leaves ovate-lanceolate, basal lobes sometimes auriculate; length/width ratio more than 1.8; perianth 1.5–2 mm long, base scarious; flower axis slender; roots thorny. 10. *D. sagittifolia*
- Key to plants with female flowers or fruits**
1. Leaves compound, leaflets all entire. 2
- Leaves simple, entire or lobed. 4
2. Plants unarmed; leaflets (1–)3–5(–7).
1. *D. quartiniana*
- Plants armed with stem spines; leaflets 3. 3
3. Leaflets up to 28 cm long, 3–5-nerved; capsules puberulous at maturity, 5–7 x 2.5 cm.
2. *D. cochleari-apiculata*
- Leaflets up to 16 cm long, usually 3-nerved; capsules glabrous at maturity, 2.5–4.5 x 1.4–2.4 cm.
3. *D. dumetorum*
4. Capsules longer than broad, reflexed; seeds winged at the basal end. 5. *D. bulbifera*
- Capsules broader than long; seeds without a wing or winged all round. 5
5. Plants pubescent with stellate hairs.
6. *D. schimperiana*
- Plant glabrous. 6
6. Plants with stems less than 2 m long; seeds without a wing. 4. *D. gillettii*
- Plants with stems 3–15 m long; seeds winged all round. 7
7. Stems 4-winged or 4-angled. 7. *D. alata*
- Stems rounded, without wings or angles, sometimes slightly furrowed. 8
8. Plants usually cultivated, with rather superficial tubers (numerous cultivars and clones); petioles not widened at the base. 8. *D. cayenensis*
- Plants usually wild, without superficial tubers; petioles widened at the base. 9
9. Stems prickly; leaf-blade thin. 11. *D. prae-hensilis*
- Stems unarmed; leaf-blade thicker. 10
10. Leaves cordate-ovate, basal lobes rounded; length/width ratio generally less than 1.8.
9. *D. abyssinica*
- Leaves ovate-lanceolate, basal corners sometimes auriculate; length/width ratio more than 1.8. 10. *D. sagittifolia*

1. *D. quartiniana* A. Rich. (1851)
– type: TU, Aderbati, *Quartin Dillon* s.n. (P holo.).

D. beccariana Martelli (1886) – type: EW, Keren, Mt. Deban, *Beccari* 303 (K iso.).

D. pentaphylla sensu A. Rich. (1851) non L. (1753); *Botryosicyos pentaphyllus* Hochst. (1844) – type: TU, near Djeladgeranne, *Schimper* III:1590 (BR K iso.).

D. quartiniana A. Rich. var. *subpedata* Chiov. in *Ann. Di. Bot.* 9: 142 (1911) – type: GD, Tzellemti, near Dugussit, *Chioventa* 749 (FT syn. not seen); Mai Teclit in Tzellemti, *Chioventa* 712 (FT syn., not seen).

D. stuhlmannii sensu Cufod. (1972) non Harms (1895) including *Corradi* 8315.

Unarmed climber, 2–6 m long, stems glabrous or sparsely pubescent. Bulbils rarely present, globose in outline, 0.7 x 0.7 cm, flushed purple. Tubers annual, 8–15 cm long, irregularly lobed, generally thin and assembled together in groups of 3–6. Leaves alternate with (1–)3–5(–7) leaflets; petiole 0.1–0.5(–1) cm long; leaflets with petiolule 0.1–0.3(–0.5) cm long, extremely variable in size and shape, usually broadest in the lower two-thirds, 2–14 x 1–8 cm, acute to acuminate or rounded at the apex, rounded to cuneate at the base, often at least thinly hairy beneath. Male inflorescences: 2–10 pedunculate catkins in the axils of leaves or in pendulous leafless axillary panicles, up to 30 cm long; peduncle 0.3–3 cm long; catkins 0.6–3(–4) cm long; axis not visible between the flowers; bracts usually concave, ovate, acuminate. Male flower: perianth completely hidden by the bracts; stamens 3; staminodes 3. Female inflorescences: one to several axillary spikes with flowers close together at first, the internodes elongating greatly with age; spikes pendulous, 7–18 cm long. Female flowers: perianth and ovary pubescent. Capsule oblong-elliptic, 2–3.7 x 1–1.7 cm, glabrescent, reflexed. Seeds winged on basal side only. Fig. 183.1 & 183.2.1.

Acacia – *Commiphora* woodland, deciduous wooded grassland with *Anogeissus*, *Boswellia*, *Acacia* and *Cussonia* species, grassland with thickets and riparian forests; 1200–2650 m. EW TU GD GJ WU SU AR WG IL GG SD BA HA; to Gambia in the west to South

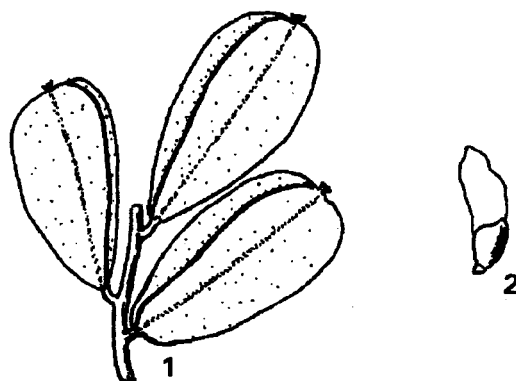


Figure 183.1 *DIOSCOREA QUARTINIANA*: 1 – group of fruits x1; 2 – seed x1. Both from *Gilbert & Getachew* A. 2993. Drawn by Damtew Teferra.

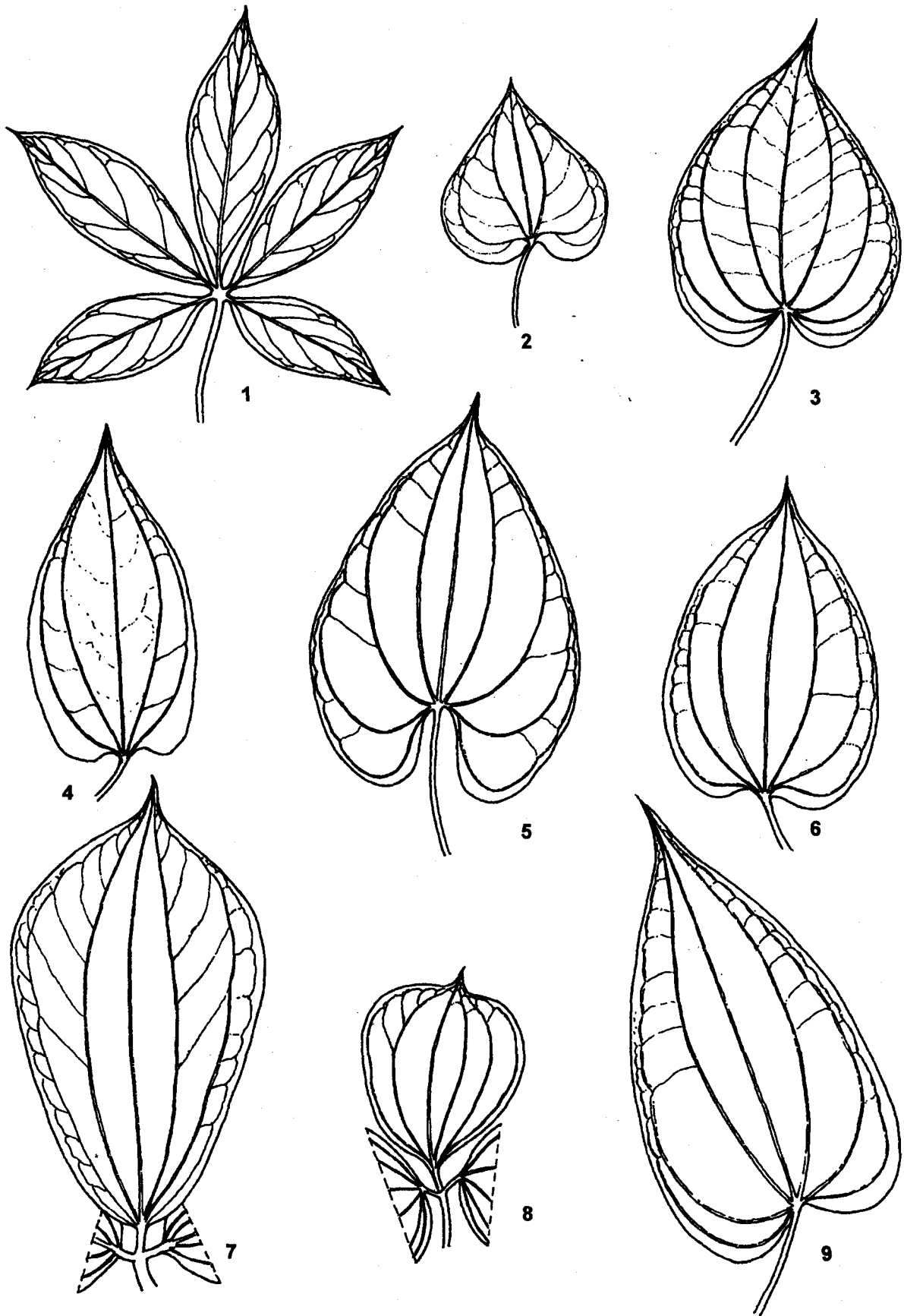


Figure 183.2 Leaves of *DIOSCOREA* spp.: 1 - *D. QUARTINIANA* $\times 1$; 2 - *D. GILLETI* $\times 1$; 3 - *D. SCHIMPERIANA* $\times 1$; 4 - *D. SAGITTIFOLIA* var. *LECARDII* $\times 1$; 5 - *D. BULBIFERA* $\times \frac{1}{2}$; 6 - *D. ABYSSINICA* $\times 1$; 7 - *D. COCHLEARI-APICULATA*, middle leaflet $\times \frac{1}{2}$; 8 - *D. DUMETORUM*, middle leaflet $\times \frac{1}{2}$; 9 - *D. PRAEHENSILIS* $\times 1$. 1 from Gilbert & Getachew A. 2993; 2 from Friis et al. 2809; 3 from Friis et al. 183; 4 from Mooney 9196; 5 from Mesfin T. & Kagne G. Y. 2314; 6 from Mesfin T. 3215; 7 from Gilbert & Getachew A. 2913; 8 from Tewelde BGE 781; 9 from Tesfaye A. 126. Drawn by Damtew Teferra.

Africa (Transvaal) in the south, Angola and Madagascar. *Gilbert & Getachew A.* 3164; *Gilbert & Getachew A.* 2993; *Mooney* 8937.

This is a polymorphic species and about four varieties are recognized in East Africa. The most widespread, var. *quartiniana*, occurs in the Flora area; var. *latifolia* Knuth occurs in Tanzania and Namibia; var. *schliebenii* (Knuth) Burkill is restricted to Tanzania and var. *stuhlmanii* (Harm.) Burkill occurs in Tanzania and Mozambique.

The tubers are edible after detoxification and are used as a famine food

Although most specimens have 3–5 leaflets, *Gilbert & Gelahun A.* 3152 has 1–3-foliolate leaves at tips of shoots in addition to the 5 leaflets lower down. Specimens of *Gilbert & Getachew A.* 2993 and *Schimper* 271 bear small reddish bulbils, although bulbils are uncommon in this species.

2. *D. cochleari-apiculata* De Wild. (1914)

– type: Zaire, Katanga, Lukaafu, *Verdick* 267b (BR holo.).

Climber, closely allied to *D. dumetorum*, but more vigorous and with larger leaves and flowers. Stems prickly, growing 12–15 m long, densely pubescent when young, later becoming glabrescent. Bulbils often present in the axils of the leaves. Tubers 4–6, globose, renewed annually. Leaves alternate, 3-foliolate; petiole up to 28 cm long, prickly; leaflets with petiolule 0.6–0.7 cm long; lateral leaflets asymmetrical, median leaflet obovoid to broadly obovoid, 13–20 x 12–13 cm, acutely acuminate at the apex, cuneate to rounded at the base, conspicuously 3–5-nerved from just above the base. Male inflorescences: branched panicles of dense, cylindrical and divergent spikelets, 2–2.5 cm long; peduncle up to 1.5 cm long. Male flower: perianth subglobose c 1 mm long, densely pubescent; stamens 6. Female inflorescences: pendulous spikes 15–20 cm long, in the axils of leaves. Capsule 5–7 x 2.5 cm, velutinous, reflexed upwards. Seeds with a wing on the basal side only. Fig. 183.2.7.

Broad-leaved deciduous woodland with *Adansonia digitata*, *Boswellia papyrifera*, etc. along river valleys; 900–950 m. TU; Tanzania, Burundi, Zaire, Zambia, Malawi and Zimbabwe. *Gilbert & Getachew A.* 2913.

The distribution of the species is curious. The specimen cited here is from northern Ethiopia, which is far from the nearest collection in eastern Africa (Tanzania). The specimen might belong to *D. dumetorum*. It has leaflets 13–20 x 12–13 cm with petiolules 0.6–0.7 cm long; median leaflet 20 x 13 cm; petiolule 0.7 cm long, 5-nerved; female inflorescence spike c 16 cm long. Besides the 5-nerved nature of the leaflet, it is difficult to separate it from *D. dumetorum*, and the female inflorescence does not have mature fruits which could have shown the distinctions. Material of the male inflorescence and mature fruits are needed to differentiate these two taxa. In other areas, *D. cochleari-apiculata* has leaflets up to 30 x 30 cm and petiolule up to 1 cm long.

3. *D. dumetorum* (Kunth) Pax (1888);

Helmia dumetorum Kunth (1850) – types: TU, Djeladjeranne, *Schimper* III:1449 (B isosyn., not seen); R. Taccaze, *Schimper* II:786 (B isosyn., not seen).

D. triphylla L. var. *abyssinica* R. Knuth, *Engl. & Prantl, Pflanzenreich* 4 (43): 136 (1924) – types: TU, Djeladjeranne, *Schimper* III:1449 (B isosyn., not seen); R. Taccaze, *Schimper* II:786 (B isosyn., not seen); GD, Galabat bei Matama, *Schweinfurth* 589, 591 (K syn.).

D. triphylla sensu A. Rich (1851), non L. (1754).

Prickly twiner or climber, stems growing 8–10 m long. Bulbils in the axils of leaves, prickly, 3–5 cm long, pubescent. Tubers renewed annually with several per plant; each tuber subglobose or cylindrical. Leaves alternate, 3-foliolate, pubescent above, tomentose below, rarely glabrescent; petiole 5–20 cm long, generally prickly; petiolules, 0.3–1 cm long; lateral leaflets obovate, 5–16 x 3–15 cm, acute to acuminate at the apex, cuneate or rounded at the base, conspicuously 3-nerved from just above the base. Male inflorescences: axillary or terminal, much branched panicles of dense spikes; spikes short, 0.5–1(–1.5) cm long, subsessile or with peduncle up to 0.3 cm long, cylindrical; bracts broadly ovate, adpressed to the perianth and partly concealing it, densely pubescent. Male flower: perianth subglobose, glabrous, opening little; stamens 6 at least in the first flowers and 5 or fewer in successive ones. Female inflorescences: pendulous axillary spikes, 10–20 cm long. Female flowers: directed downwards, softly tomentose all over; ovary densely pubescent. Capsules directed upwards 2.5–4.5 x 1.7–2.4 cm, glabrous to sparsely pubescent. Seeds with a wing on the basal side only. Fig. 183.2.8.

Combretum – *Terminalia* woodland and secondary thickets, and along river valleys; 900–1525 m. EW TU GD WG; to Senegal in the west and south to South Africa (Transvaal) and Angola. *Getachew A.* and *Gilbert* 906; *Gilbert* and *Thulin* 743; *Ash* 3075.

This species includes wild varieties with poisonous tubers and bulbils with such alkaloids as dioscorine and dihydrocortisone. The wild tubers are eaten in times of famine only after repeated washing.

Some of the syntypes of var. *abyssinica* Knuth are the same as the ones cited for *Helmia dumetorum* by Kunth. Thus var. *abyssinica* is an illegitimate name.

4. *D. gillettii* Milne-Redh. (1963)

– type: Kenya, Northern Frontier Province, Moyale, *Gillett* 14137 (K holo.).

Small herbaceous twiner less than 2 m high. Stems unarmed, glabrous. Tuber perennial, spreading horizontally just below the soil surface with fringing roots, 3.5–4.5 x 2.5–3.2 cm. Leaves alternate, rarely subopposite; petiole 0.5–5 cm long; blade ovate-cordate, 1.5–9 x 1–7.5 cm, acute to acuminate at the apex, deeply cordate at the base, glabrous, 7–10-nerved. Male inflorescences: panicle in the axils of leaves, 1–14 cm long;

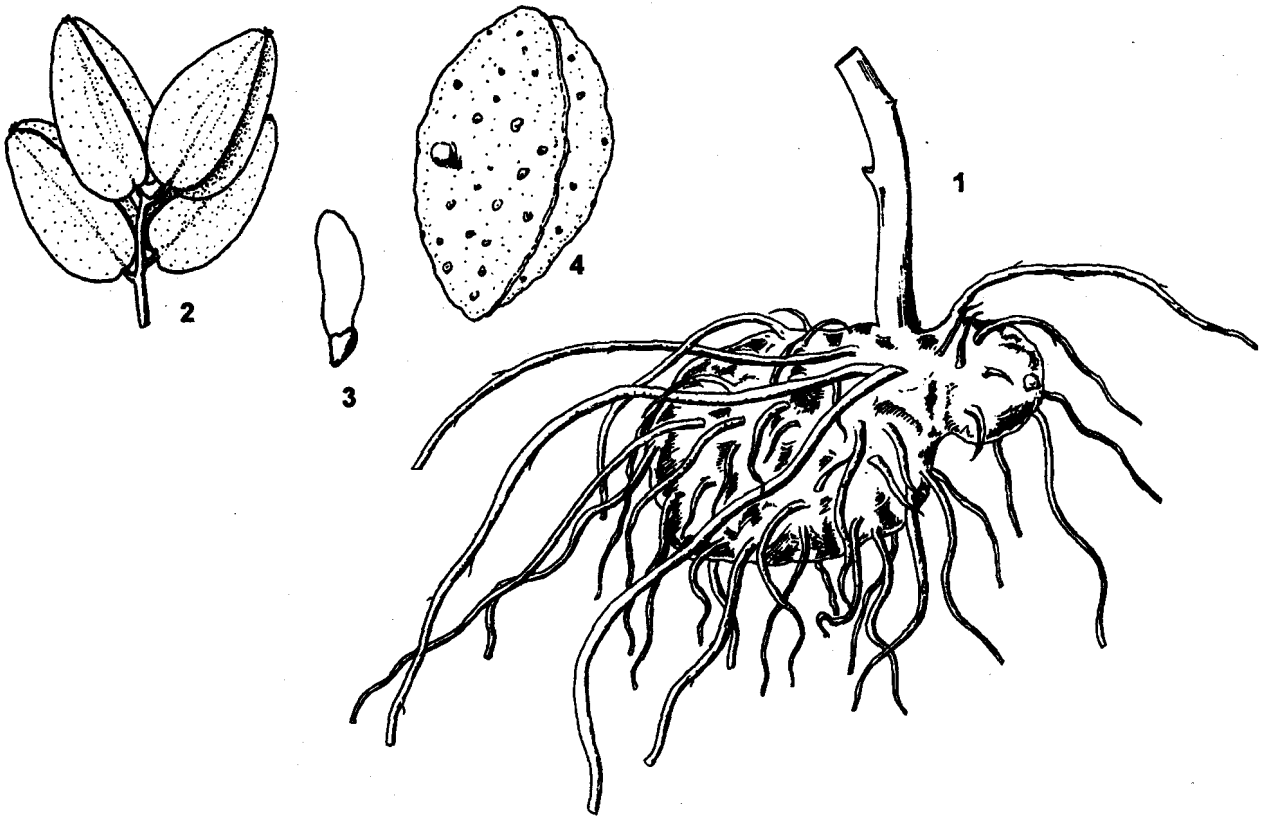


Figure 183.3 *DIOSCOREA BULBIFERA*: 1 – tuber with many adventitious roots x 1; 2 – group of fruits x 1; 3 – seed x 1; 4 – aerial tuber x 1. All from *Tesfaye A.* 223. Drawn by Damtew Teferra.

with single pedicillate flowers or short 2–4 flower cymes at each node. Male flower: perianth spreading, 4–5 mm wide; segments elliptic; stamens 3 and staminodes 3. Female inflorescences: one raceme per leaf axil usually 2-flowered rarely one or more. Female flower: perianth spreading, 5–6 mm wide; ovary glabrous. Capsule obovate to suborbicular 2.2–2.7 x 2–3 cm, winged, with parallel nerves extending from the suture towards the axis, not reflexed. Seeds without a wing. Fig. 183.2.2.

Acacia – *Commiphora* – *Boswellia* woodland, wooded grassland; 850–1650 m. SD BA; Kenya. *Ash* 2418; *Friis, Gilbert & Vollesen* 3630; *Thulin, Asfaw H. & Mesfin* T. 3445.

5. *D. bulbifera* L. (1753)

–type: Plate facing P. 217 in Hermann, *Paradisus Batavus* (1698) (lecto.).

D. anthropogophagorum A. Chev. (1913); *D. bulbifera* var. *anthropogophagorum* (A. Chev.) Summerh., *Trans. Linn. Soc. Zool.* 19: 293 (1931) – type not cited fide Milne-Redhead, *Fl. Trop. Afr.* 10 (1975).

Climber, growing 3–10 m high with twining stems, not

prickly. Tuber renewed annually, subglobose, absent in several cultivars. Aerial axillary bulbils variable, 1–10 cm in diameter, weighing up to 2 kg; skin grey, brown, violate or purple; smooth or verrucose; angular or irregularly subglobose or flattened; flesh mucilaginous, white, yellow, purplish or liver coloured; toxic or edible. Leaves always alternate; blade broadly ovate to cordate, 6–22 x 4.5–17 cm, 6–8 nerves, acuminate at the apex, cordate at the base. Male inflorescences: 3–5 spikes, 3–12 cm long in the axils of leaves or on a leafless panicle, not spreading. Male flowers all point towards the apex of inflorescence; perianth white turning pink or purple with age; stamens 6, those of the outer whorl longer than the inner ones. Female inflorescence: 1–6 spikes at a node, up to 25 cm long. Female flowers: perianth white turning pink or brown when old. Capsule oblong ellipsoid, 2–3 x 1.2–1.6 cm, reflexed at maturity. Seeds winged at the basal end, c 2 x 0.7 cm. Some edible varieties have lost their ability to produce flowers. Figs. 183.2.5 & 183.3.

On steep slopes in broad-leaved deciduous woodland, riverine forest and edges of forest, also cultivated in home gardens; 600–1500 m. EW TU GD GJ KF IL

SD GG; widespread in tropical Africa and Asia, Pacific Islands and introduced to tropical America. *Tadesse E.* 556; *Gilbert & Getachew A.* 2965; *Sebebe D.* et al. 5117.

D. bulbifera is the most widespread species of the genus occurring in tropical Africa and Asia, and in the Pacific Islands. It has been in cultivation in Asia and Africa for thousands of years. The species has numerous varieties, both wild and cultivated. Theoretically it is possible to distinguish the varieties, the wild variety var. *bulbifera* being characterised by the presence of aerial tubers and bulbils which are rounded and poisonous while the edible variety, var. *anthropogophagorum*, is characterised by the reduction of aerial tubers which are angled, or absent. But in practice it is often difficult. For example, the two sheets of *Gilbert & Friis* 8413 (K) have different shaped bulbils, one angled, the other rounded. Thus, no attempt is made to distinguish them in this account.

6. *D. schimperiana* Kunth (1850);

D. schimperiana Hochst. ex A. Rich. (1851)

—type: TU, Djeladjeranne, *Schimper* III:1642 (B holo., L iso.).

D. schimperiana var. *vestita* Pax in *Bot. Jahrb. Suppl.* 15: 148 (1892) — types: Sudan, Equatoria, Gumango Hill, *Schweinfurth* 3920 (B syn., K isosyn.) & Malawi, Shire highlands, *Buchanan* 112 (B syn., K isosyn.).

Climber, with stems 3–6 m long, covered with stellate or branched hairs, generally green, sometimes red-violet. Small bulbils borne in the axils of upper leaves, subglobose, 0.8–4 x 0.6–2.5 cm. Tuber annual, irregularly cylindrical, descending vertically, 35–50 cm long, 5 cm thick, ± branched. Leaves usually opposite, occasionally subopposite or alternate; petiole 4–14 cm long; blade cordate, suborbicular or ovate, 4.5–22 x 4–17 cm, acuminate at the apex, cordate at the base with scattered stellate hairs above, denser below; 7–9-nerved, secondary nerves parallel; petiole 5–14 cm long. Male inflorescences: 2–12 pendulous spikes, 3.5–14 cm long in the axils of leaves, covered with stellate hairs. Male flowers: perianth sessile, 2–2.5 mm in diameter, cup-shaped; outer whorl ovate-lanceolate, obtuse, stellate-pubescent outside; inner whorl glabrous; stamens 6. Female inflorescences: 1–2 pendulous spikes in the axils of leaves, 8–18(–25) cm long with 10–22 flowers or fruits along the axis, pubescent to tomentose. Capsule subtriangular to trapezoidal, 1.8–3 x 1–3 cm reflexed at maturity, pilose when young, glabrescent when old. Seeds with annular wings, 1.1–2.3 x 1–1.4 cm. Fig. 183.2.3.

Gallery forest, edges of forest, *Acacia seyal*–*Entada abyssinica*–*Stereospermum kunthianum* woodland, disturbed areas on dark-brown loamy soil or on lava; 1600–2000 m. TU GD GJ WU SU AR WG IL KF GG SD; to Nigeria and Cameroon in the west, and to Zimbabwe and Mozambique in the south. *Breheme* in *Mooney* 8999; *Gilbert & Tewolde B.G.E* 2515 *Thulin & Asfaw H.* 4089.

7. *D. alata* L. (1753)

—types: Ceylon, *Hermann* 2: 23 (BM syn.) & Linnean Herb. 1184.2 (LINN syn., IDC microfiche).

Vigorous twiner with stem 10–12 m long, unarmed, glabrous, 4-angled or 4-winged. Some forms bear bulbils. Tuber annual, often large, varying in size and colour; single or digitate, descending vertically, branched or recurved as a tusk of an elephant, sometimes twisted; flesh generally white, sometimes mottled with purple or wholly purple. Leaves opposite sometimes the lower alternate or with 2–4 cataphylls at the base, higher up sometimes in whorls of 3 or 4; petiole 8–10 cm long, winged and decurrent on the stem; blade ovate to broadly elliptic to deeply cordate, with overlapping lobes in the basal leaves; 6–22 x 3–18 cm, acute at the apex, subtruncate to cordate at the base; 5–7(–9)-nerved. Male inflorescences: axillary panicles of several leafless spikes, 15 cm or more long; each spike with 12–20 sessile alternately arranged flowers on a zigzag axis. Male flower: perianth subglobose; outer whorl oval-elliptic, inner whorl subspathulate; stamens 6. Female inflorescences: solitary spikes in the axils of leaves, 20–30 cm long, glabrous. Capsule emarginate, 20–25 x 30–35 mm, glabrous. Seeds suborbicular, winged all round.

In cultivation for its edible tubers; 1900 m. IL; pan-tropical cultivated plant. *Smeds* 1404, 1405.

The species has been introduced from Asia and a number of cultivars have become established. This crop appears in local markets in the west and southwest of Ethiopia, but little is known of its economic importance.

8. *D. cayenensis* Lam. (1789)

—type: Guyane française, Cayenne, *Stoups* s.n. (P holo.).

D. rotundata Poir (1813) — type: Puerto Rico, *Desfontaines* s.n. (P holo., not seen).

Annual twiner. Stems prickly or unarmed. Superficial roots prickly or unarmed. Leaves opposite above, alternate at the base, sometimes the basal leaves modified and reduced to cataphylls; petiole 5–12 cm long; blade broadly ovate to suborbicular, 6–12 x 5–10 cm, acuminate at the apex, broadly cordate at the base; 5–7-nerved. Male inflorescence: 1–3 spikes, 4–6 cm long in the axils of leaves. Female inflorescence: 1–2 spikes in the axils of leaves, 10–12 cm long, few-flowered. Capsule 2–2.5 x 3–3.5 cm. Seeds winged all round, 1–1.5 x 1–1.5 cm.

Cultivated; c 1700–1800 m. EW ?SU SD; grown throughout tropical Africa. *Fiori* 550; *Terracciano & Pappi* s.n.

The criteria used to differentiate the two species, *D. cayenensis* and *D. rotundata*, are not satisfactory as the original diagnoses are not complete enough to define them precisely. Moreover, many forms are intermedi-

ate between the two species and thus it is impossible to separate and delimit the two species satisfactorily. The main character used in the past, the flesh colour of the tuber — white-fleshed (*D. rotundata*) and yellow-fleshed (*D. cayenensis*), does not work. The other characters used were associated with the length of the growing season which cannot be used with herbarium material. The two taxa are thus better treated as *D. cayenensis*-*D. rotundata* complex and kept together (for the Flora) under the earlier name, *D. cayenensis*.

9. *D. abyssinica* Hochst. ex Kunth (1850)

— type: TU, Djeladgeranne, *Schimper* III:1720 (K iso.).

Climber, stems growing 2–5 m long, unarmed, glabrous. Tubers annual, edible, growing deep in the ground, up to 6 x 2–3 cm, cylindrical, slender, sometimes branched; flesh generally white or light lilac. Roots unarmed. Leaves generally opposite; petiole 3–6 cm long, glabrous; blade cordate-ovate broadly elliptic to triangular, 4–12 x 2–6 cm, acuminate, cuspidate at the apex, cordate at the base; 5–7-nerved; venation on either side of the midrib fairly close. Male inflorescences: 3–6 spikes, 2–7(–10) cm long in the axils of leaves. Male flowers: perianth segments suborbicular. Female inflorescences: 1–2 spikes, 8–15 cm long in the axils of leaves. Capsule glaucous, slightly emarginate at the apex, 2–2.2 x 3–3.5 cm. Seed with wing all round, 1.5–2 x 1.5–2 cm. Fig. 183.2.6 & 183.4.

Woodland or wooded grassland with *Combretum*, *Terminalia*, *Stereospermum*, *Oxytenanthera* species; 1000–1800 m. EW TU GD GJ WG KF GG SD; to Senegal. *Gilbert & Getachew* A. 2973; *Mesfin T. & Kagnew G.Y.* 2317; *Ash* 3091.

The species is close to *D. sagittifolia* var. *lecardii*. Although widespread from the Flora area to Senegal, Milne-Redhead in *Fl. Trop. E. Afr.* did not cite it as occurring in East Africa. *D. abyssinica* is one of the wild parents of several cultivars of the *D. cayenensis*-*D. rotundata* complex used mainly in drier areas.

10. *D. sagittifolia* Pax (1892)

— type: Central Africa, Djur near Okel, Schweinfurth (B holo., K iso.).

var. *lecardii* (De Wild.) Nkounkou, *Belg. Journ. Bot.*

126 (1): 62 (1993); *D. lecardii* De Wild. (1903) — type: Mali, *Lecard* 214, 235 (BR syn.).

Climber, stem 4–5 m long, unarmed, glabrous. Tubers annual, descending vertically and found deeply (to 40 cm) below the surface, protected by thorny roots. Leaves opposite, rarely alternate; petiole 1.5–3.5(–5.5) cm, glabrous; blade firm in texture, ovate-lanceolate, to deltoid, 3.7–12 x 1.5–6 cm, tapering, acute at the apex, often broadly cordate to hastate at the base; 5–7-nerved. Male inflorescences: (1–)2–4 spikes, 1.5–3(–5) cm long, in the axils of leaves. Male flower: perianth glabrous, subglobose, 1.5–2 mm; outer perianth segments with or without a small scarious base. Female inflorescences: 1–2 spikes, 15–20 cm long, in the axils

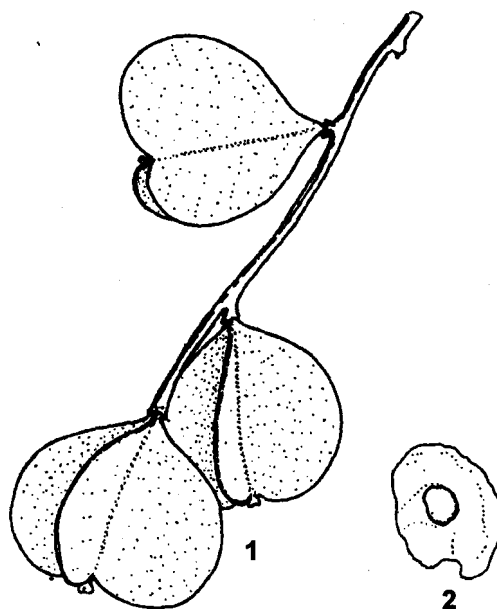


Figure 183.4 *DIOSCOREA ABYSSINICA*: 1 — group of fruits x 1; 2 — seed x 1. Both from *Mesfin T. & Kagnew G. Y.* 2317. Drawn by Dامتew Teferra.

of leaves. Female flower: perianth subglobose c 2 mm in diameter. Capsule with a waxy covering, 1.9–2.2 x 2.8–3.2 cm. Seeds winged all round, c 1.5 x 1.5 cm. Fig. 183.2.4.

Open montane forest with *Trichilia dregeana*, wooded grassland; 1350–1700 m. SU KF; Uganda, Tanzania, Sudan to Senegal. *De Wilde* 5249; *Getachew* A. 1621; *Mooney* 9196.

Cultivated on trellises for tubers (fide *Mooney* 9196).

The other variety, var. *sagittifolia*, differs from var. *lecardii* (De Wild.) Nkounkou by the leaf-blade being c 4 times longer than wide, while var. *lecardii* has the leaf-blade c 2 times longer than wide.

11. *D. praehensilis* Benth. (1849).

— type: Sierra Leone, *Vogel* 21 (K syn.); Niger, Attah, *Vogel* 86 (K syn.).

D. odoratissima Pax (1892) — types: Togo, Bismarckburg, *Buttner* 103 (B syn.); & 104 (B lecto., K isolecto.).

A sturdy climber, stems 10–15 m or more long and 12–20 mm thick, prickly below, less so above, with a waxy covering, often purplish or brown towards the base. Tuber annual, often more than 60 x 5 cm, descending vertically, protected above by horizontal thorny roots with thorns 2–3 cm long; flesh cream or purplish. Leaves opposite, occasionally alternate, glabrous; 5–7-nerved; basal leaves often modified and reduced to cataphylls. Blade ovate to ovate-lanceolate, 4–10 x 3–5 cm, thin, acute at the apex, deeply cordate at the base; petiole 2.5–5 cm long. Male inflorescences: 3–5 slender, flexuous spikes, 3–5 cm, long in the axils of leaves. Male flower: perianth 1–1.5 mm long, outer perianth segments scarious at the base. Female inflorescence: 1–2

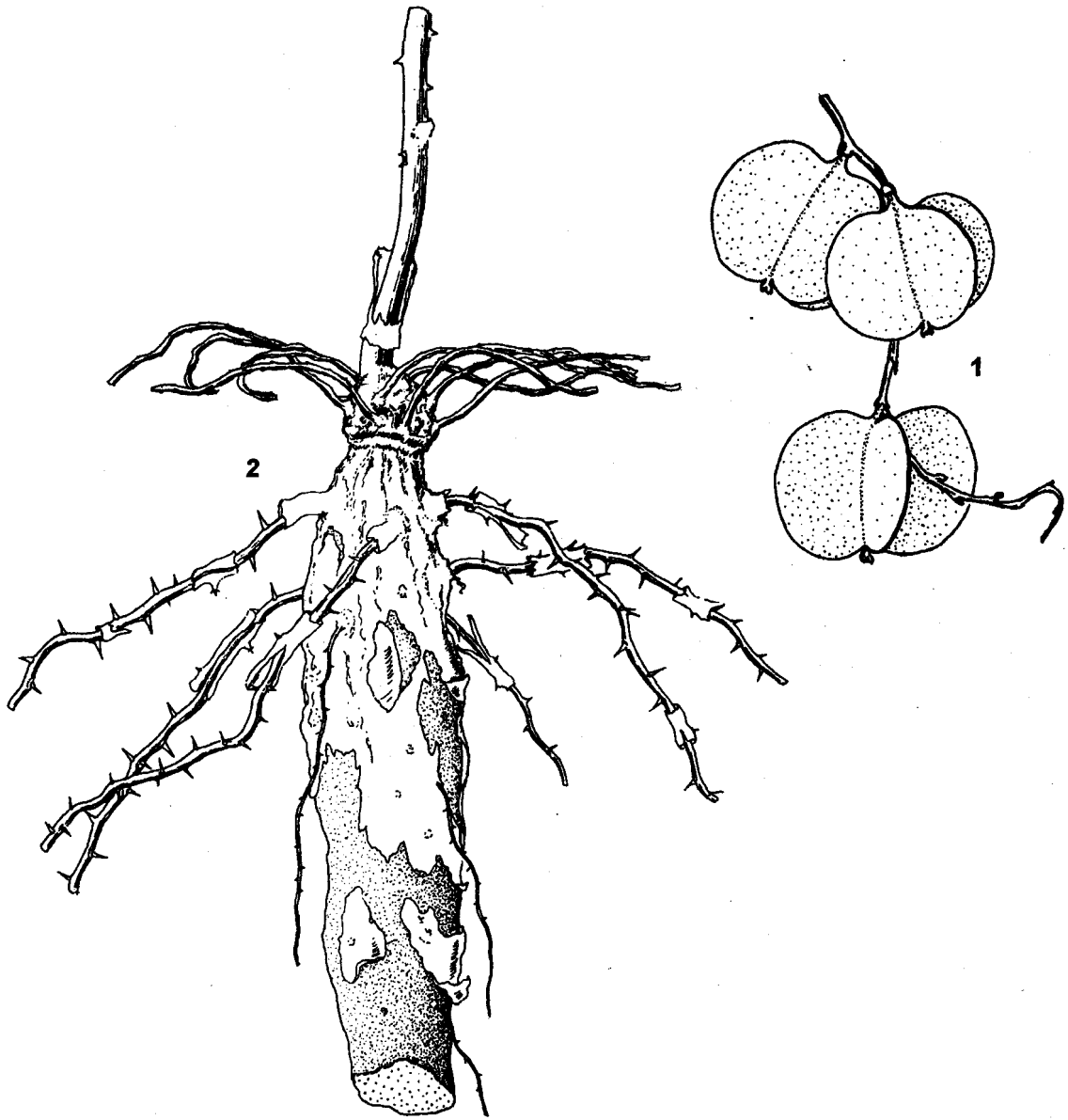


Figure 183.5 *DIOSCOREA PRAEHENSILIS*: 1 – group of fruits $\times 4/5$; 2 – tuber showing thorny adventitious roots and flaking surface (epidermis) of the main tuber $\times 2/3$. Both from *Tesfaye A. 126*. Drawn by Dantew Teferra.

pendulous spikes, 10–25 cm long, in the axils of leaves. Female flower: perianth subglobose, 1–1.5 \times 1–1.5 mm. Capsule 2.2–2.5 \times 3–3.2 cm. Seeds winged all round 1.7–2 \times 1.7–2 cm. Fig. 183.2.9 & 183.5.

In secondary forest; 550–720(–1600) m. IL; widespread to Sierra Leone in the west, and Malawi,

Mozambique, Zambia and Angola in the south. *Germain 1034; Sebsebe, Tesfaye & Okeatch 5111; Tesfaye, Sebsebe & Okeatch 126.*

The tuber is eaten during famine. This species is one of the parents for many varieties in the *D. cayenensis*-*D. rotundata* complex.

184. TACCACEAE

by K.A. Lye*

Carter, *Taccaceae* in *Fl. Trop. E. Afr.* (1962); Cufodontis, *Enum.*: 1581–1582 (1972); Drenth in *Blumea* 20: 367–406 (1972) & *Fl. Malesiana* 7: 806–819 (1976).

Perennial erect scapose herbs with starchy globose or elongated tuberous rhizomes. Leaves all basal, erect, large, long-petiolate; the blade entire, pinnatifid, palmate (palmatipartite or palmatisect) or digitate. Inflorescence terminal, umbellate with numerous stalked flowers surrounded by many bracts in 2 whorls. Flowers bisexual, regular, with an inferior ovary, producing a smell of bad meat. Perianth-segments 6 in 2 whorls of 3, united and persistent. Stamens 6, inserted on the corolla tube; filaments short, wide and flattened, extended into a broad connective forming a kind of hood over the anther; pollination by carrion and dung flies. Carpels 3, united to form a unilocular inferior ovary with 3 parietal placentas; style short with the 3 stigmatic branches often petaloid and incurved; ovules many. Fruit berry-like with a fleshy pericarp, 6-ribbed, disintegrating irregularly, very rarely dehiscent. Seeds 10 or more, often completely filling the fruit.

Family with 1 genus (although some botanists recognize a second genus with dehiscent fruits) with about 10 species, widely distributed in tropical regions: only 1 species recorded from the Flora area.

TACCA J.R. & G. Forst. (1776)

Small to large glabrous or slightly pilose herbs 20–200 cm tall, the basal leaves often as long as the inflorescence. Involucral bracts prominent, green or coloured; outer bracts 2–12, large, foliaceous; inner bracts smaller. Floral bracts when present filiform. Perianth-segments subequal, green to dark purplish brown or almost black, reflexed, spreading or erect.

A genus of about 10 species, only 1 in Africa.

T. leontopetaloides (L.) O. Ktze. (1891);

Leontice leontopetaloides L. (1735) – type: India.

T. abyssinica Hochst. ex Baker nom. nud. – type:

Ethiopia (TU or GD) 'Abyssinia' s.l., *Schimper* III: 1964 (K syn.).

Plant growing from a tuber which is flattened-globose to ellipsoid, up to 10 cm across. Base of the leaves and the inflorescence, at least in young plants, surrounded by 1–3 sheathing linear-lanceolate cataphylls. Leaves 1–3; petiole 20–150 x 0.5–2.5 cm, hollow, with a sheath-

ing base; blade up to 120 x 70 cm, but usually much smaller, palmately 3-sect, with each of the 3 segments pinnately lobed or dissected. Inflorescence 1 or 2, but usually 1, 10–40 flowered (but only a few produce fruit); stem 20–170 x 1–2.5 cm, hollow; leafy bracts 5–6; filiform bracts many, 5–20 cm long. Pedicels usually 2–3 cm long (to 4 cm in fruit). Flowers greenish yellow or purplish green, drooping, smelling of rotten flesh. Perianth-segments rather fleshy with thinner margins; the lobes 3–8 mm long. Fruit subglobose, up to 3 cm in diameter, green to light orange. Seeds many, 5–8 x 3–5 mm, ovate, longitudinally ridged. Fig. 184.1.

Thickets, grassland or open woodland; 540–1250 m. ?TU/GD GJ SU IL; widespread in tropical Africa, Asia and the Pacific Islands. *Ash* 537; *Gilbert & Getachew* A. 3076; *Puff & Ensermu* K. 8208.13-6/1.

Parts of the plant are used elsewhere in traditional medicine and the tubers are a source of starch once the bitter principal has been removed.

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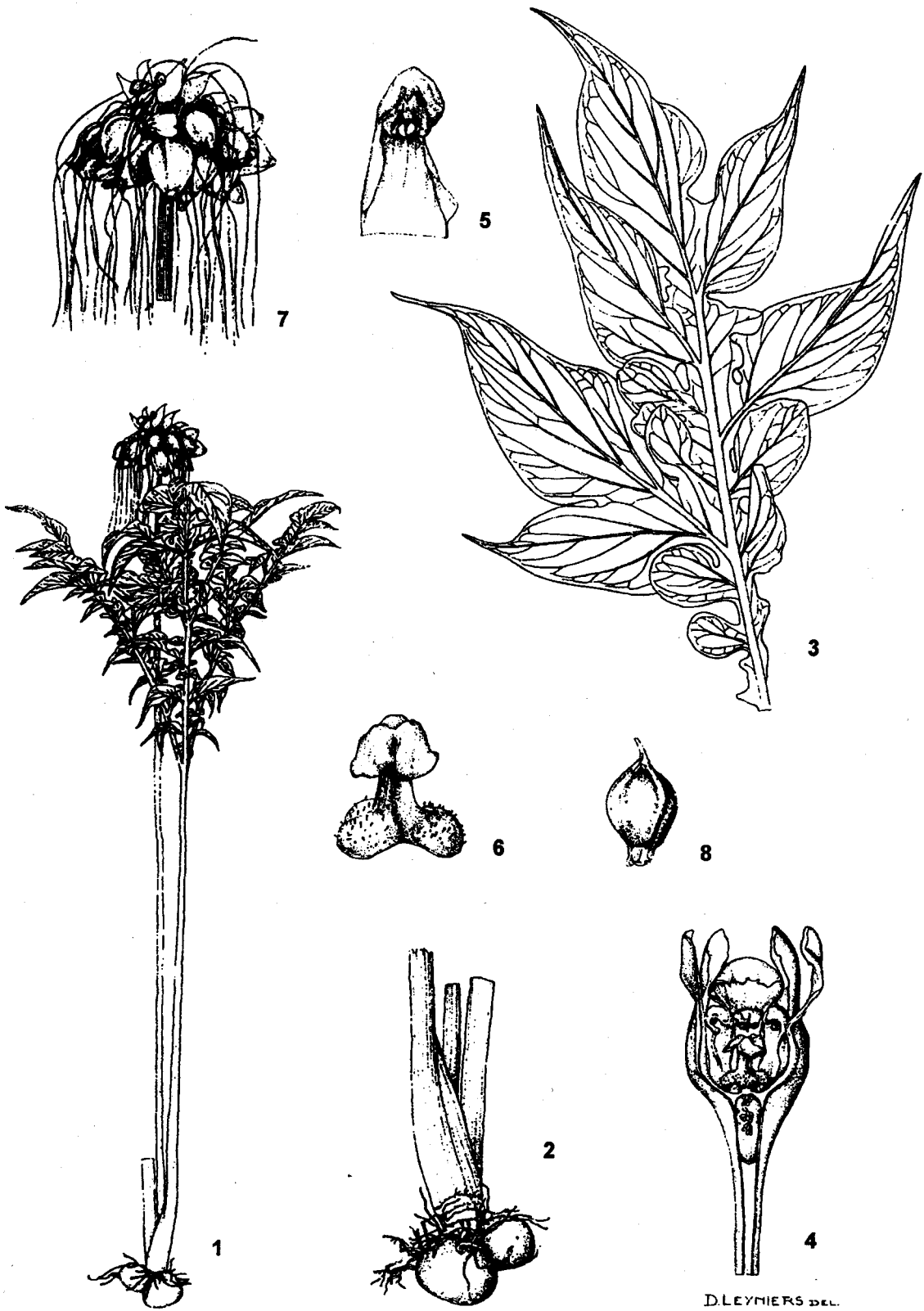


Figure 184.1 *TACCA LEONTOPETALOIDES*: 1 - complete plant with its fruiting head $\times \frac{1}{8}$; 2 - base of plant showing tubers $\times \frac{1}{4}$; 3 - part of leaf-blade $\times \frac{1}{2}$; 4 - longitudinal section through a flower $\times 3$; 5 - stamen $\times 8$; 6 - pistil $\times 8$; 7 - fruiting head $\times \frac{1}{4}$; 8 - fruit $\times \frac{1}{2}$. All from *Malaisse* 8694. Drawn by D. Leyniers. (Modified and reproduced with permission from *Fl. d'Afrique Centrale*, planche 1, 1976.)

185. SMILACACEAE

by K. A. Lye* & Sebsebe Demissew**

De Candolle, *Monograph. Phan.* 1: 1–217 (1878); Cufodontis, *Enum.*: 1567 (1971); Cowley, *Smilacaceae* in *Fl. Trop. E. Afr.* (1989).

Perennial climbers, less often erect herbs or branching shrubs. Rhizome horizontal, often thickened or with tubers. Stems often branching, sometimes twining, with or without tendrils. Leaves usually alternate, rarely opposite; blade simple with 3–7 curved-convergent main nerves with reticulate venation between the primary veins; usually with a definite petiole and often with a pair of tendrils arising from the petiole. Inflorescence commonly of axillary umbels or racemes or spikes of umbels. Flowers unisexual, rarely bisexual, regular with parts in whorls of 3, small or large and showy. Perianth of 6 petaloid tepals in 2 whorls, almost identical, free or united below. Male flowers: stamens usually 6, rarely more numerous, filaments free or rarely joined to the tepals or united into a column; without a pistillode. Female flowers: usually with staminodes; carpels 3, united to form a 3-locular (rarely 1-locular) superior ovary with axile or parietal placentation; styles usually 3 and distinct; ovules 1-many in each locule. Fruit a berry, rarely the fruit-wall becomes dry and dehiscent. Seeds 1–3, rarely more; embryo mostly small.

Found in both tropical and temperate regions, the family is dominated by the genus *Smilax*. The number of other genera depends on whether a broad or narrow definition of the family is used. According to Cronquist (1981), who takes a broad definition, there are 11 more genera while Dahlgren, Clifford & Yeo (1985) include only 3 more, *Heterosmilax*, *Pseudosmilax* and *Rhipogonum*. Only *Smilax* occurs in Africa.

SMILAX L. (1753 and 1754)

Plants scrambling or climbing with the aid of two coiling tendrils from the petiole; sometimes the stem has sharp thorns. Leaves alternate, more rarely opposite (not in Flora area species), often rather thick and leathery. Flowers small, greenish or yellowish white, unisexual, very rarely bisexual. Perianth of 6 free tepals, rarely fused near the base. Fruit a berry with 1–3 seeds.

The genus has between 200 and 300 species, widely distributed in tropical and warm temperate regions, only 3 species known from tropical Africa, with 2 from the Flora area.

The starchy tubers are edible and the flavouring agent sarsaparilla is obtained from some tropical American species. Other species, including *S. anceps*, are grown as ornamentals. The *Smilax* of florists is *Asparagus (Myrsiphyllum) asparagoides* in the Asparagaceae.

1. Leaf-blades rounded or cuneate at the base, widest at the middle; inflorescence a simple umbel.
 1. *S. anceps*
- Leaf-blades usually truncate or cordate at the base, widest much below the middle; inflorescence of several umbels appearing racemose. 2. *S. aspera*

1. *S. anceps* Willd. (1806)

– type: Mauritius, *W. Heyne* 9B-W 18393 (holo.).

S. kraussiana Meissner (1845) – type: S Africa, Natal, *Drege* 4503 (LUC holo.).

Glabrous climbing shrub with slender woody stems up to 6 m long, often prickly at least for the lower 1 m. Leaves alternate; petiole (0.5–)1.2–2.2(–2.5) cm long, without prickles, angular to winged with two coiling

stipular tendrils, up to 10 cm long; blade usually 5–16.5 x (2–)2.5–10(–12) cm, leathery, broadly oblong to elliptic, cuneate or rounded at the base (larger leaves sometimes subcordate), conspicuously 3–5-nerved from base to apex; apex acute, acuminate, rounded or emarginate with or without the midrib extending into a short straight or recurved awn. Inflorescence a pedunculate, simple spherical umbel with 10–20 flowers; peduncle up to 5 cm long in fruit, with a basal bract and 2 opposite bracteoles at the middle, up to 8 mm long; pedicel (5–)7–11 mm long when flowering, to 25 mm long when fruiting. Perianth-segments (3.5–)5–6 x 0.5–1 mm, linear-oblong, greenish to cream-yellow. Male flower: stamens 6, free, *c* 5 mm long with spatulate anthers. Female flower: ovary *c* 2 mm long, 3-locular with 1 ovule in each locule; placentation axile; style absent; stigma 3-branched, sessile. Berry (5–)7–8(–9) mm in diameter, globose, green (immature) to purple-black. Seeds pale brown, 2–3, spherical, flattened on one side, 3.5–4 mm in diameter. Fig. 185.1.5–7.

Gallery forests near streams and rivers; 1150–1700 m. WG KF; widespread from Sudan to W Africa and from Kenya to S Africa, also in Madagascar, Mauritius and Reunion. *Friis, Gilbert & Vollesen* 3978; *W. de Wilde & de Wilde-Duffes* 8869, 10775.

2. *S. aspera* L. (1753)

– type: plant grown in Clifford's garden in Netherlands (BM-CLIFF).

S. goetzeana Engl. (1901) – type: Tanzania, Njombe District, Kinjika Div. [Kingika] Mt. Piku-rugwe ridge, *Goetze* 1251 (B holo.).

Glabrous climbing shrub with slender woody stems up to 5 m long, often with short prickles. Leaves alternate; petiole up to 3(–4) cm long, flattened, with or without prickles, with two long coiling tendrils; blade usually

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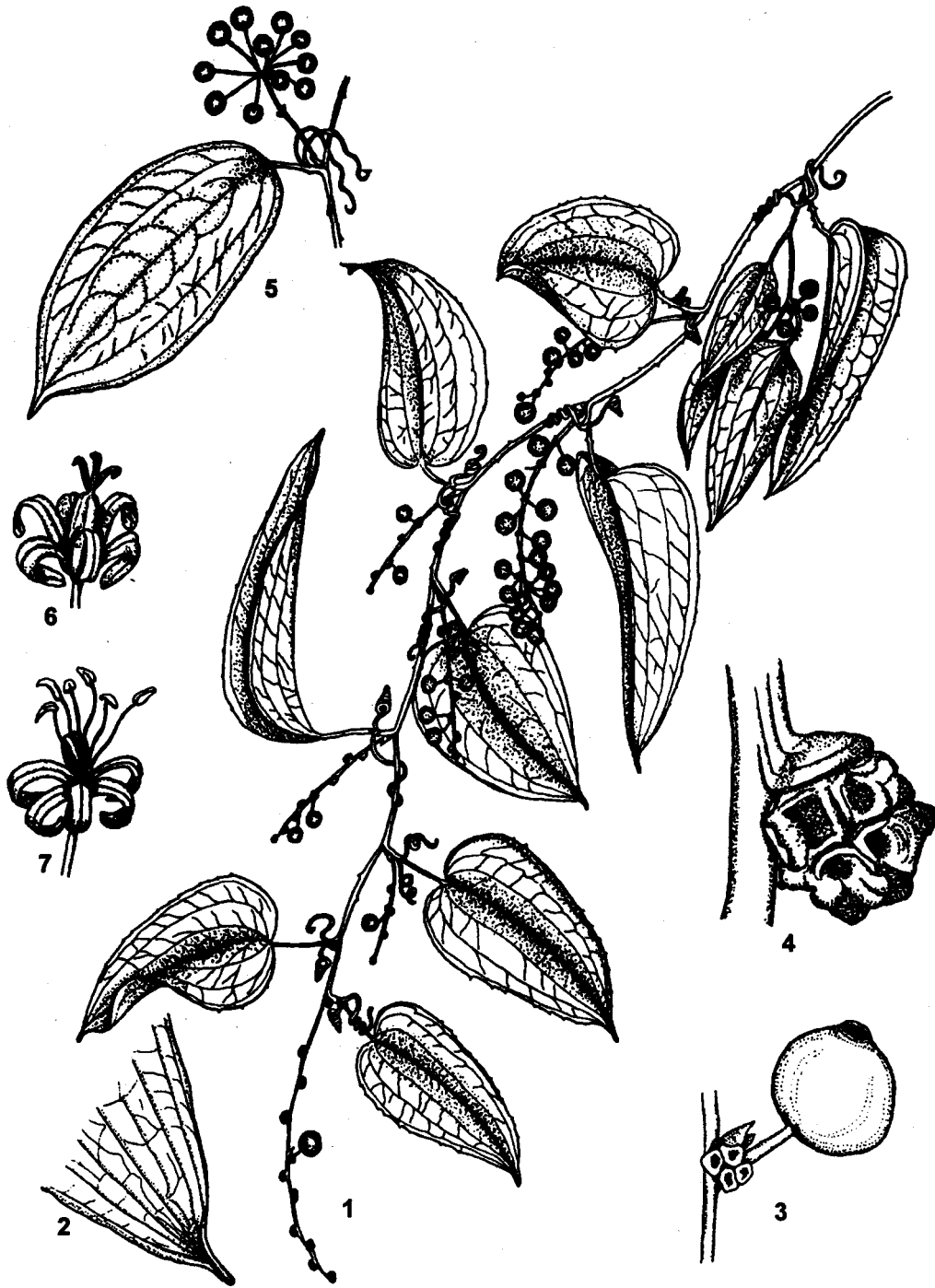


Figure 185.1 *SMILAX ASPERA*: 1 – branch with fruits, leaves and tendrils $\times \frac{1}{2}$; 2 – detail of leaf tip $\times 1$; 3 – mature fruit showing basal cluster of bracts and bracteoles $\times 2$; 4 – detail of basal cluster $\times 10$. *S. ANCEPS*: 5 – node with leaf, fruits and tendrils $\times \frac{1}{2}$; 6 – female flower $\times 5$; 7 – male flower $\times 5$. Specimens not cited. Drawn by Gerd Mari Lye.

(2.5–)3–10.6(–12) \times 1–8.5(–9) cm, leathery, cordate or triangular-elliptic with sagittate, cordate or truncate base, 5–7-nerved from base to apex, sometimes with prickles on margin and major nerves; apex acute or acuminate, sometimes revolute with a sharp point. Inflorescence of small umbels along terminal and axillary branched or unbranched axes 2.5–7.5 cm long; each umbel with 3–10 flowers on 2–5 mm long pedicels from a globose cluster of scale-like bracts and bracteoles. Flowers unisexual. Perianth-segments 2.5–4 \times 0.8–1.3 mm, linear-oblong, white or cream, free to the base, the outer larger than the inner ones. Male flowers: stamens 6,

free, c 3 mm long. Female flowers: staminodes 9, short; ovary 2–2.5 mm long, 3-locular with one ovule in each locule; placentation axile; style absent; stigma 3-branched, sessile. Berry 4–8 mm in diameter, globose, green when young, red to purple when mature. Seeds 2–3, pale brown, spherical, flattened on one side, c 3 mm in diameter. Fig. 185.1.1–4.

Scrambling over shrubs or trees in forest or forest edges, sometimes on roadsides; 1900–3200 m. EW WU SU AR KF SD HA; also in Uganda, Kenya, Tanzania, Zaire, the Mediterranean area, the Himalayas and Sri Lanka. Mooney 7043; Ash 226; E.F. Gilbert 474.

186A. ASPARAGACEAE

by Sebsebe Demissew*

Juisseau, *Gen. Plant.* 40 (1789); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 140 (1985); Sebsebe D., 145. *Asparagaceae* in *Fl. Somalia* 4: 24–27 (1995).

Perennial climbing or erect shrubs or subshrubs. Rhizomes sympodial from where the branches are growing. Roots often swollen and fusiform. Leaves normally reduced and scale-like, the assimilating function taken over by modified green branches (cladodes). In some genera the branches are transformed into leaf-like cladodes (phylloclades). Inflorescence axillary or terminal, solitary, fascicled¹ or assembled in racemes or 'umbels'. Flowers unisexual or bisexual, regular, small. Perianth with 6 tepals in 2 whorls, all similar in shape, free or fused at the base, white, yellow or green. Stamens 6, in 2 whorls, found both in unisexual and bisexual flowers, but non-functional in female flowers; filaments free from each other, anthers opening inwards, dorsifixed. Pistil with 3 carpels united to form a 3-locular ovary with axile placentation; style short with capitate or lobed stigma; ovules 2–12 per locule. Fruit a globose berry with 1–2(–3) black seeds.

Family represented by the genus *Asparagus* with two subgenera: subgenus *Asparagus* and subgenus *Myrsiphyllum* – Malcomber & Sebsebe Demissew in *Kew Bull.* 48 (1): 63–78 (1993). The members are widely distributed in the Old World. Most species are found in arid tropical regions and Mediterranean climates.

ASPARAGUS L. (1753)

Baker in Thiselton-Dyer (ed.), *Fl. Trop. Afr.* 7: 425–436 (1898); Jessop in *Bothalia* 9 (1): 31–96 (1966); Cufodontis *Enum.*: 1562–1566 (1971).

Erect or scandent branching shrubs or subshrubs. Spines present or absent, when present these are formed from reduced leaves. Cladodes solitary or fascicled, subulate, angled, linear; phylloclades when present flattened. Leaves greatly reduced. Inflorescence axillary or terminal. Flowers erect, unisexual or bisexual. Perianth with 6 tepals, free or united at the base forming a tube. Stamens 6, fused to the perianth segments. Ovary 2–3 locular with 1–12 ovules per locule. Fruit a berry, globose, usually red or white-flushed purple when mature. Seeds black, globose or truncate on one side, convex on the other.

About 300 species distributed throughout Africa, parts of Europe, Asia and Australia. Both subgenera with 10 species have been found in the Flora area. *A. aspergillus* Jessop and *A. buchananii* Baker are not so far recorded within the Flora area, but occur in areas very close to the borders, and are hence included here.

Key to subgenera

1. Cladodes subulate, linear or filiform; flowers usually erect, rarely pendulous; filaments free.
 - Subgen. *Asparagus*
 - Cladodes flattened, leaf-like (phylloclade); flowers pendulous; filaments united, forming a tube around the ovary.
 - Subgen. *Myrsiphyllum* (12. *A. asparagoides*)

Subgenus ASPARAGUS

Protasparagus Oberm. in *S. Afr. J. Bot.* 2: 243–244 (1983).

1. Flowers solitary or fasciculate. 2

- Flowers racemose or umbel-like in condensed inflorescences. 6
- 2. Main stems and primary branches with spines; flowers bisexual. 3
 - Main stems and primary branches without spines; flowers unisexual. 11. *A. officinalis*
- 3. Inflorescence axillary and/or terminal, 2–10 flowers in a cluster; perianth white; ovary 3-locular with 5–8 ovules in each locule. 4
 - Inflorescence axillary, 1 flower or 2 together; perianth pink, purple or white; ovary 3-locular with 1 ovule in each locule. 4. *A. flagellaris*
- 4. Young branches with ridges, scabrid; final branches and cladodes not all on the same plane; cladode subulate, thick; flowers axillary and/or terminal, 3–10 together; berry 4–6 mm in diameter. 5
 - Young branches without ridges, smooth; final branches and cladodes all on the same plane; cladode fine; flowers usually terminal, 2–3 together; berry 7–10 mm in diameter. 3. *A. setaceus*
- 5. Terminal branches glabrous to puberulous, commonly without spines; cladodes 3–12 mm long, rounded or angled, stiff; perianth segments 4–5 mm long. 1. *A. africanus*
 - Terminal branches glabrous and always with spines; cladodes 15–26 mm long, flattened or with grooves above, flexible; perianth segments c 3 mm long. 2. *A. scaberulus*
- 6. Cladode subulate or only slightly flattened, 8–35 x less than 1 mm. 7
 - Cladode linear, flattened 15–85 x 1.3–2.5 mm. 10
- 7. Racemes branching or umbel-like; pedicels 1–2 or more, terminal, articulated in the middle or below. 8
 - Raceme simple, not branching; pedicel solitary

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1. fascicled: clumped or held together like bristles in a toothbrush.

or rarely 2, articulated above the middle or just below the perianth. 9

8. Flowering branches commonly with cladodes; racemes 2–6, elongate, lax, 1.5–17 cm long; flowers persistent on pedicels. 7. *A. racemosus*

– Flowering branches without cladodes; racemes 1(–2), condensed, umbel-like, 1–2.5 cm long; flowers easily fall off from the pedicels.

8. *A. leptocladius*

9. Young branches grey, scabrid to puberulous; pedicels 1.5–2.5 mm long; ovary with style 0.8–1 mm long; anthers black. 9. *A. aspergillus*

– Young branches pale brown, glabrous, smooth; pedicels 2–5 mm long; ovary with style c 0.5 mm long; anthers cream to yellow. 10. *A. buchananii*

10. Branches smooth, not grooved, glabrous to puberulous; inflorescence branching; pedicel articulated in the middle or above; native.

5. *A. falcatus*

– Branches grooved, always glabrous; inflorescence simple, unbranched; pedicel articulated in the middle or below; cultivated. 6. *A. aethiopicus*

1. *A. africanus* Lam. (1783)

– type: South Africa, Cape without precise locality, *Sonnerat* s.n. (P holo.).

A. mitis A. Rich. (1851); *A. asiaticus* var. *mitis* (A. Rich.) Chiov. *Nuovo Giorn. Bot. Ital.* 26: 166 (1919)

– types: TU, Tcheleucote, *Petit* s.n. (P syn., not seen); Adwa, *Schimper* I: 296 (K isosyn.).

A. sidamensis Cufod. (1969) – type: SD, Mt. Damot near Soddo, *Kuls* 453 (FR holo., not seen).

A. asiaticus L. var. *ellenbeckianus* Engler in *Sitz. Ber. Kgl. Preuss. Akad.* Berlin 40: 737 (1906), nom. nud. – type: BA, Ladjo, *Ellenbeck* s.n. (B ? destr.).

A. asiaticus sensu Baker (1875) & Cufodontis (1971), non L. (1753).

A. asiaticus L. var. *amharicus* Pichi-Sermolli, in *Ricerche Botaniche, parte prima, in Missione Studi Lago Tana*, 7: 194 (1951) – type: GJ, Zeghe Peninsula, *Pichi-Sermolli* 2027 (FT holo., K iso.).

Erect or climbing or scrambling shrub to 6 m. Branches glabrous to puberulous, terete to angled, with spines 3–5 mm long; terminal branches without spines. Cladodes 5–25 together, subulate, stiff, 3–10(–15) mm long. Flowers 2–10 together, axillary and terminal; pedicels 3–8 mm long, articulated below the middle. Bracts lanceolate c 1.5 mm long, falling off quickly. Perianth parts white, equal, 4–5 mm long, entire. Stamens shorter than the perianth; anthers yellow. Ovary 3-locular with 6–8 ovules in each locule with 1 mm long 3-branched style. Berry red, 4–6 mm in diameter, 1-seeded. Seed c 4 mm in diameter, smooth with reticulate surface. Fig. 186A.1.1–6.

Acacia woodland, secondary forest and forest margins and as hedgerow; (700–)1450–2900(–3800) m. EW TU GD GJ WU SU AR WG KF GG SD BA HA; Sudan, Somalia, Uganda, Kenya, Tanzania to S Africa, and in Arabia to India. *Burger* 1639; *M.G. & S.B. Gilbert* 1107A; *Sebsebe D. & Tamrat B.* 2305.

This widespread species has not so far been collected from WG, IL and BA, but is expected to occur there.

2. *A. scaberulus* A. Rich. (1851);

A. asiaticus var. *scaberulus* (A. Rich.) Engl. in *Über die Hochgebirgsflora des tropischen Afrika*: 169 (1892) – type: TU, Choho, *Quartin-Dillon* s.n. (P holo. & iso.).

Erect to climbing shrub to 2 m high. Branches glabrous, rounded, smooth or lined with spines 1–3 mm long, curved downwards, seen also in the terminal branches. Cladodes 2–25(–35) together, flexible, straight or bent, 13–26 mm long, flattened, angled, sometimes forming grooves on the upper side. Flowers 3–6 together, axillary or terminal; pedicel 5–8 mm long, articulated at the middle or below. Perianth white, equal, c 3 mm long. Stamens shorter than the perianth; anthers yellow. Ovary 3-locular with 5 ovules in each locule; style c 1 mm long with 3-branched stigma. Bracts ovate, c 1 mm long, membranous. Berry red, 4–5 mm in diameter, 1-seeded. Fig. 186A.1.7 & 8.

Acacia – *Commiphora* woodland, dry river beds; 400–1500 m. EE EW TU GD KF GG SD BA; Somalia, Kenya and Tanzania, and also extending to Arabia. *Gilbert & Sebsebe D.* 8753; *Ryding & Ermias K.* 1009; *Schimper* 2216.

The specific epithet *A. scaberulus* has not been in use since Engler (1892), who considered it to be a variety of the widespread *A. africanus*. However, the species is very distinct as shown in the key.

3. *A. setaceus* (Kunth) Jessop (1966);

Asparagopsis setacea Kunth (1850) – type: 'Drege, Herb. no. 8584.c.v.s. in Herb. reg. Berol. et Luc.' (KIEL lecto.).

Climbing shrub to 6 m high. Branches glabrous, terete or slightly grooved with spines 2–7 mm long, mainly on the main branches; terminal branches where the flowers are borne resemble a short stalk. Cladodes 3–25 together, linear, fine, 3–10 mm long; final branches and cladodes arranged on the same plane. Flowers solitary or 2–3 together on terminal branches (rarely some flowers seen also in an axillary position); pedicels 3–8 mm long, articulated at the middle or below. Bracts minute falling more or less quickly. Perianth segments white, equal, c 3 mm long. Stamens shorter than the perianth; anthers yellow. Ovary 3-locular, with 6–8 ovules in each locule; style 1 mm long, 3-branched. Berry red, 7–8(–10) mm in diameter, 1–3-seeded. Fig. 186A.1.9 & 10.

Forest and forest margins; 550–2400 m. SU WG IL KF BA; Kenya, Tanzania, Malawi, Zambia, Zimbabwe and S Africa. *Chaffey* 368; *Friis et al.* 2100; *Sebsebe D. & Ensermu K.* 1322.

The species is sometimes confused with *A. africanus*, from which it is easily distinguished by the shorter perianth segments, c 3 mm long, and larger berry, 7–10 mm long. In contrast *A. africanus* has longer perianth

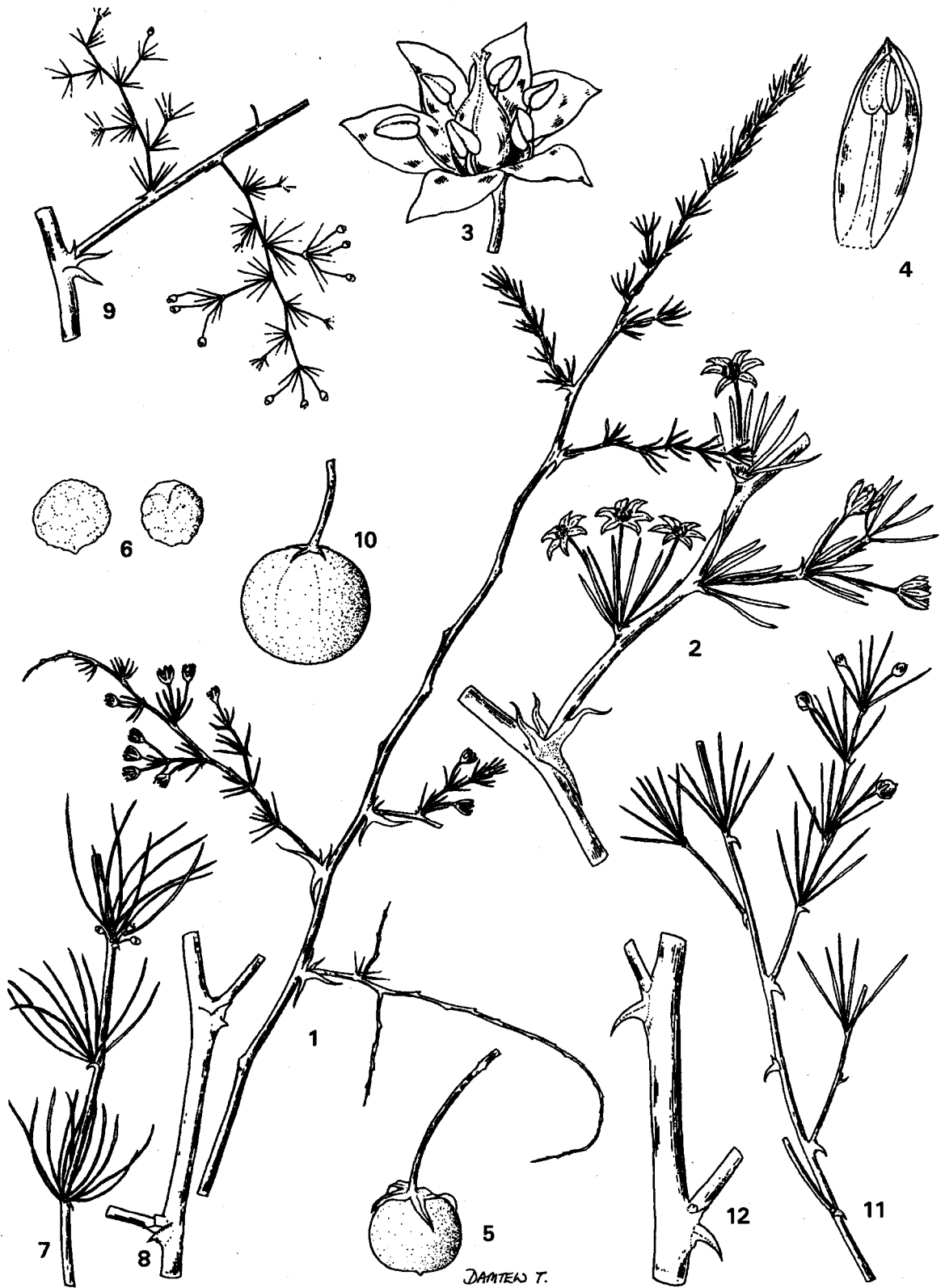


Figure 186A.1 *ASPARGUS AFRICANUS*: 1 – flowering branchlet x 1; 2 – flowering branchlet x 2; 3 – flower x 10; 4 – a stamen in a perianth lobe x 12; 5 – fruit x 3; 6 – seed x 6. *A. SCABERULUS*: 7 – flowering branchlet x 1; 8 – branch showing spines x 2. *A. SETACEUS*: 9 – flowering branchlet x 1; 10 – fruit x 3. *A. FLAGELLARIS*: 11 – fruiting branchlet x 12; 12 – branch showing spines x 3. 1–4 from *IECAMA H-43*; 5 & 6 from *Burger 375*; 7 & 8 from *Gilbert & Sebsebe D. 8753*; 9 from *Friis et al. 2100*; 10 from *Chaffey 368*; 11 & 12 from *Thulin & Asfaw H. 4036*. Drawn by Damtew Teferra.

segments, 4–5 mm long and a smaller berry, 4–6 mm in diameter.

4. *A. flagellaris* (Kunth) Baker (1875);

Asparagopsis flagellaris Kunth (1850) – type: S nagambia, near Richard Toll, *Lelievre* s.n. (not seen).

A. schweinfurthii Baker (1875) – type: Ethiopia/Sudan border, Galabat on the banks of the river Gendua, *Schweinfurth* 29 (K holo.).

A. pauli-guilelmi Solms (1867) – types: Akaro in Fesoghlu, *Herzog & Wurtemberg* s.n.; Kassan in Fesoghlu, *Cienkowski* s.n. (both syn. not seen).

A. abyssinicus Hochst. ex A. Rich. (1851); *A. africanus* Lam. var. *abyssinicus* (A. Rich.) Fiori, in *Boschi Piante Legnose dell'Eritrea*, 106 (1910) – type: TU: Djeladjekanne, *Schimper* III: 1474 (P holo., BM iso.).

Erect shrub to 2 m high. Branches glabrous, terete or grooved, smooth to lined with spines, 2–4 mm long, straight or curved, seen also on terminal branches. Cladodes 1–8 together, subulate, stiff, 5–20(–60) mm long. Flowers axillary, solitary or paired; pedicels 5–10 mm long, articulated below the middle, sometimes near the base. Perianth white to purple (pink), equal 2.5–3 mm long. Stamens shorter than the perianth; anthers white. Ovary 3-locular with 1–2 ovules in each locule; style *c* 1 mm long, slender, stigma 3-branched. Berry orange-red, 5–7 mm in diameter with 1(–3) seed. Seeds black, rounded, rugose. Fig. 186A.1.11 & 12.

Acacia – *Commiphora*, *Combretum* – *Terminalia*, *Tecllea* – *Acokanthera* woodland; (550–)600–1800 m. EW TU GD GJ WG IL GG SD; Somalia, Sudan, Uganda, Kenya, Tanzania, Zaire, Central African Republic to W Africa. *Getachew* A. & *Gilbert* 963; *Mooney* 7737; *Thulin & Asfaw* H. 4036.

A. flagellaris was previously distinguished from *A. schweinfurthii* on the basis of the length of the cladodes. *A. flagellaris* having shorter cladodes, 1–2 cm long and *A. schweinfurthii* *c* 2.5–6 cm long. However, the cladodes on specimens from W Africa that belong to *A. schweinfurthii* range from 1.5–6 cm long. Thus, in the absence of additional morphological characters to distinguish the two taxa, they are here considered conspecific.

5. *A. falcatus* L. (1753)

– type: *Burmans*, *Flora Zeylanica* t. 13, f. 2 (1737).

Climbing or scrambling shrub to 3 m high. Branches glabrous to shortly puberulous, with well-developed spines, 3–7 mm long, recurved, seen also on the terminal branches. Cladodes 3–6(–12) together, flattened, straight or falcate, with a distinct vein, 13–85 mm x 1.3–2.5 mm, usually very dark when dried. Raceme 2–9 cm long, glabrous to puberulous, branched or unbranched; pedicels 3–4 mm long, articulated at the middle or above. Perianth segments white to cream, obovate, 3–3.5 mm long. Stamens shorter than the perianth; anthers yellow. Ovary 3-locular with 4–5

ovules in each locule; style short 0.7–1 mm long including stigma. Berry red or white-flushed purple, about 7–13 mm in diameter, 1–3-seeded. Fig. 186A.2.1–3.

Two subspecies are recognised.

1. Cladodes long, thin and flexible, 35–85 mm long.

var. *falcatus*

– Cladodes short, thick and stiff, 13–34 mm long.

var. *ternifolius*

var. *falcatus*

Acacia – *Commiphora* – *Terminalia* woodland; 1200–1350 m. KF; also in Somalia and from S Africa to Asia. *Smeds* 1408; *Mesfin* T. 4759.

This taxon is known only from the above two sterile collections. The inflorescence of the taxon is described as simple, i.e. not branching.

var. *ternifolius* (Bak.) Jessop in *Bothalia* 9(1): 70 (1966);

A. aethiopicus L. var. *ternifolius* Baker in *Saund. Ref. Bot.* t. 261 (1871) – type: South Africa, Natal, Inanda, *Medley Wood* 1351 (K holo.).

A. africanus var. *pubescens* Chiov., *Webbia* 8: 9 (1951) – type: ?SD, Asile, near Meno River, *Corradi* 4653 (FT lecto.).

Acacia – *Commiphora* – *Combretum* woodland, wooded grassland, mixed deciduous woodland on sandy soil and limestone; 1100–1900 m. GG SD HA; widespread in tropical Africa, S Africa, Arabia to India. *Gilbert & Sebsebe* D. 8776; *Mooney* 9737; *Thulin* et al. 3532.

Both glabrous and puberulous forms with intermediates are encountered within this subspecies. In the absence of additional morphological characters and due to the lack of ecological features to separate the two varieties, they are kept in the same taxon.

A. falcatus L. has been confused with *A. aethiopicus*. However, *A. aethiopicus* var. *aethiopicus* is characterised by its grooved branches.

A. aethiopicus var. *angusticladus* Jessop, which has smooth (not grooved) main stems, is superficially similar to *A. falcatus* var. *ternifolius*. Close examination shows that in *A. aethiopicus* var. *angusticladus* the cladodes are light and translucent when dry and the pedicels are articulated at the middle or below.

6. *A. aethiopicus* L. (1767)

– type: South Africa, Cape (LINN No. 434.6 neo.).

A. sprengeri Regel (1890); Green in *Plantsman* 7(4): 249–250 (1986) – type: A cultivated plant from South Africa, Durban.

Cultivated shrub, stems up to 2 m long, erect or decumbent. Branches grooved with prominent ridges, glabrous with spines 3–5 mm long. Cladodes flattened, solitary or 2–6 together, slightly curved, 1-nerved, 10–32 x 1–2 mm. Inflorescence racemose, solitary or paired, unbranched, 1.5–3.5 cm long; flowers solitary or 2 together. Pedicels 4–6 mm long, articulated near the middle. Bracts ovate-lanceolate, 1–2 mm long. Perianth

white, oblong obovate, 2.5–3 mm long, equal. Style, including stigma, 0.7 mm long. Stamens shorter than the perianth; anther orange. Berry red globose, c 5 mm in diameter.

Cultivated; sea level–2600 m. EE EW (site record) SU and probably elsewhere; widely cultivated throughout the world. *Sue Edwards* et al. 3849; *Sebsebe D.* 4058.

The species is native to South Africa. However, several cultivars of the species are grown in various parts of the world. The cultivar found in Ethiopia and Eritrea is cv. 'Sprengeri' (*A. sprengeri* Regel). It is common in pots and gardens and grows even in very hot areas if it is well watered. Plants are characterised by the drooping, loose and spreading branches.

Jessop (1966: 69) included *A. ternifolius* sensu Hook. f. in *Bot. Mag.* t. 7728 (1900) and *A. sprengeri* sensu Wright in *Bot. Mag.* t. 8052 (1906) under *A. aethiopicus* var. *angusticladus* Jessop. He described the variety as having smooth stems, which agrees with specimens collected from the wild. However, the cultivated varieties have grooved stems, and belong to *A. aethiopicus* cv. *Sprengeri*. P. Green (1986) has discussed the correct naming of *A. sprengeri*.

7. *A. racemosus* Willd. (1799)

– type: India, in Herb. Willdenow (B holo.).

A. petitianus A. Rich. (1851) – type: TU, Mt. Semajata, *Schimper* I: 374 (K iso.).

A. racemosus var. *longicladodius* Chiovenda, in *Malpighia* 34: 530 (1937) – type: GJ, Moyat in Agaumedir, *Taschdjian* 273 (FT holo.).

Climbing shrub to 7 m high. Branches terete, lined or angled, glabrous, spines 2–3 mm long in young parts, 5–8 mm long when older. Cladodes 2–6 together, subulate to flattened, 8–35(–40) x 0.5–0.7 mm. Inflorescence racemose 1.5–17 cm long, glabrous; racemes solitary or fascicled; pedicel 4–6 mm long (elongating to 10 mm long in fruit), articulated at the middle or below. Bracts ovate, concave, 2.5–4 mm long, glabrous, membranous, sometimes falling quickly. Perianth greenish white to white, (3–)4–5 mm long. Stamens shorter than the perianth parts; anthers orange to red. Ovary obovate 3-locular, 6–7 ovules in each locule; style 1–1.3 mm long with 3-branched stigma. Berry green turning red at maturity, 8–10(–13) mm in diameter, commonly 1-seeded, sometimes with 2–3 seeds. Fig. 186A.2.5 & 6.

Forests, valley bottoms, and along streams; 1350–3100 m. EW TU GD GJ WU SU AR WG KF GG SD BA HA; Sudan, Somalia, Kenya, Tanzania, Mozambique, Angola and Asia. *Friis* et al. 374; *Thulin* et al. 3391; *J.J.F.E. de Wilde* 5595.

The stem is used to make writing pens.

8. *A. leptocladodius* Chiov. (1940)

– type: BA, El Marra, Mt. Elliot, *Reghini* 8 (FT holo.).

A. racemosus Willd. var. *ruspolii* Engler, *Ann. R. Ist. Bot. Roma* 9: 245 (1902) – type: BA, between Elb & Web Rivers, *Ruspoli & Riva* 771 [851 (521)] (FT syn.)

Erect or scandent shrub to 2 m high. Branches glabrous to puberulous, rounded, white, surface peeling off, with erect spines 4–12 mm long. Cladodes 2–15 together, flattened, curved, 10–60 x 0.5 mm, triangular. Raceme 0.5–2 cm long, often condensed and reduced giving impression of an umbel. Pedicel 5–6 mm long, articulated in the middle or below. Bracts ovate, 1–1.5 x 0.5 mm, white, falling quickly. Perianth white, equal 3–4 mm long. Stamens shorter than the perianth; anthers black. Ovary 2–3 locular with 6–8 ovules in each locule; style 0.3–0.7 mm long with 2–3 branched stigma. Berry red, 6–9 mm in diameter, 1-seeded. Seeds black, 4–5 mm in diameter.

Acacia – *Commiphora* woodland, (850–)1500–1650 m. SD BA; Kenya, Djibouti and Somalia. *Friis* et al. 5754; *Corradi* 4631; *Sebsebe D.* 2176C.

9. *A. aspergillus* Jessop (1966)

– type: South Africa, Transvaal, Letaba District near Birthday road at Mamaranga, *Breyer* in TR V 19063 (PRE holo.).

Climbing or erect herb or shrub to 2 m. Branches glabrous to scabrid, pale grey, with spines 8–10 mm long on main branches, 3–4 mm long on terminal branches. Cladodes fasciculate, subulate, 10–20 x 0.5 mm, absent during the flowering period. Bracts ovate, c 1 mm long. Raceme solitary or 2–4 together, 12–45 mm long, scabrid; pedicels solitary 1.5–3.5 mm long, articulated at the apex (base of flower). Perianth oblong to obovate, c 3 mm long, equal. Stamens 6, slightly shorter than the perianth parts; anthers black. Ovary 3-locular with 4–6 ovules in each locule; style 0.8–1 mm long, 3-branched. Berry red, globose, c 6 mm in diameter, 1–2-seeded.

Acacia – *Commiphora* woodland; elsewhere 1050–1200 m. ?SD; Somalia and Kenya to South Africa and Namibia. *Gillett* 13590.

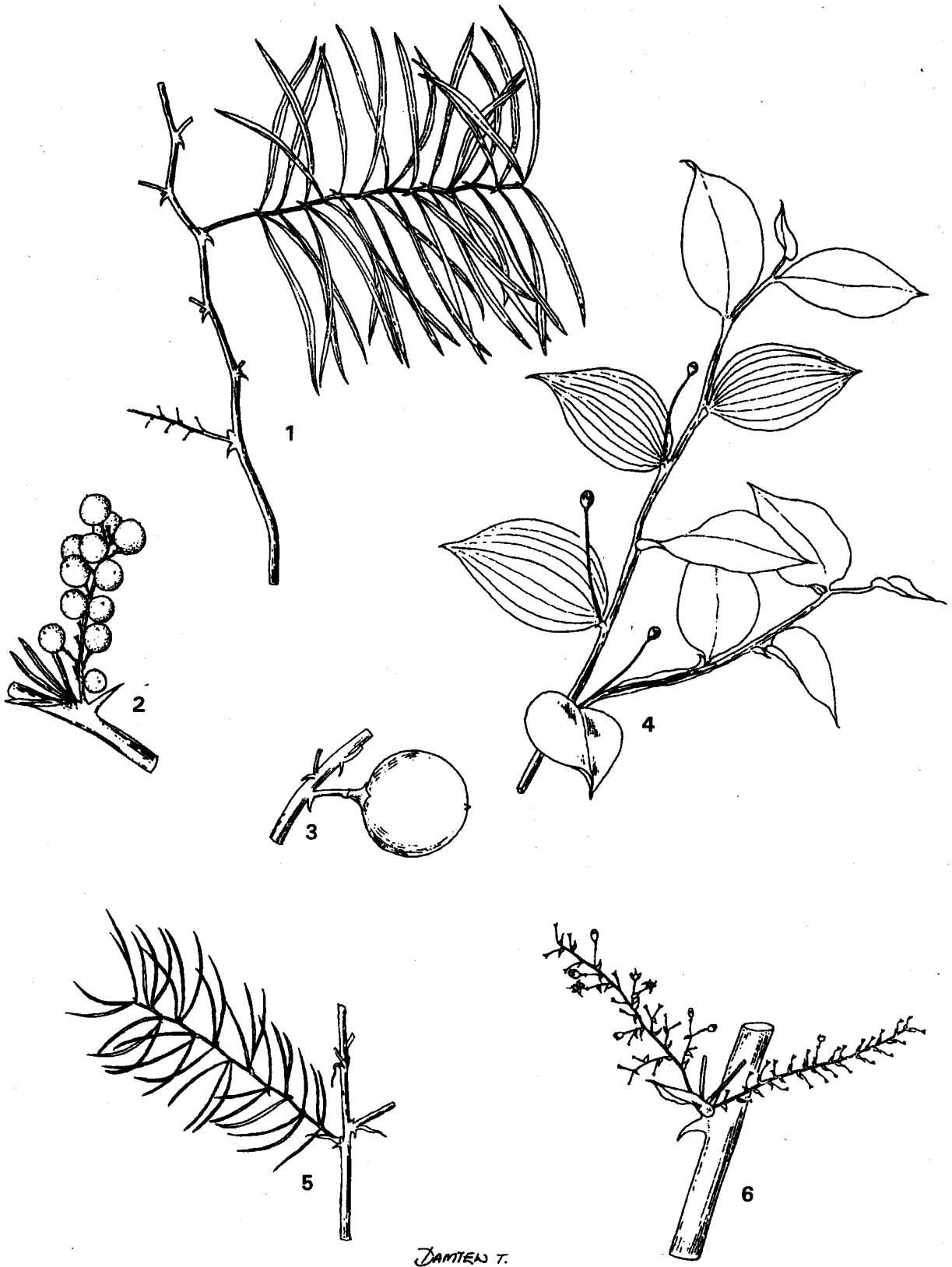
The species resembles *A. racemosus* Willd. but is easily distinguished by the articulation of the pedicel at the apex (base of perianth); anthers black at maturity and perianth 2–3 mm long.

So far the species is not recorded from the Flora area. However, *Gillett* 13590, collected from Moyale in northern Kenya just across the border from Ethiopia, indicates that the species could turn up.

10. *A. buchananii* Baker (1893)

– type: Malawi, *Buchanan* 1503 (K lecto.).

Climber, commonly to 5 m high, sometimes higher. Branches glabrous, pale brown, smooth, shiny, with spines on main branches, 1–4 cm long, dorsally flattened towards the base. Cladodes 3–5 together, subulate, 10–17(–27) mm long. Bracts ovate, 0.5–2 mm long. Racemes solitary or 2–3 together, 1.5–4 cm long, glabrous; pedicels solitary or 2 together, 2–5 mm long, articulated at the apex or sometimes at the middle. Perianth white to cream, elliptic to obovate, 2–3 mm long. Stamens shorter than the perianth parts; anthers yellow. Ovary 3-locular, obovate with 6–8 ovules in



DAMTEW T.

Figure 186A.2 *ASPARGUS FALCATUS*: 1 – leafy branch x 1; 2 – fruiting node x 1; 3 – fruit x 3. *A. ASPARAGOIDES*: 4 – fruiting branch x 1. *A. RACEMOSUS*: 5 – leafy branch x 1; 6 – flowering branch x 1. 1 from Burger 1614; 2 & 3 from Gilbert & Sebsebe D.; 4 from Mesfin T. & Vollesen 4350; 5 & 6 from Meyer 8052. Drawn by Damtew Teferra.

each locule; style c 0.5 mm long with 3-branched stigma. Berry red, c 5 mm in diameter, 1–2-seeded.

Forest or wet savannah; elsewhere 750–1850 m. ?IL; southern Sudan, N Kenya, N Uganda to S Africa and Angola. *Tweedie* 3491 (from K3 in Kenya); *Friis & Vollesen* 1165 (from southern Sudan).

The species is not yet recorded from the Flora area, but, due to its wide distribution in the region and its occurrence in S Sudan not far from the Ethiopian border, it is expected to turn up in SW Ethiopia.

11. *A. officinalis* L. (1753)

– type: described from Europe (Hb. LINN. 434/1).

Cultivated herb to 2 m high. Branches glabrous, terete or angled, without spines. Cladodes 2–6 together, subulate, 3–20 mm long. Flowers axillary, solitary or 2–3 together; pedicel 4–8.7 mm long, articulated in the middle or above. Bracts lanceolate, 2–3 mm long, membranous. Flowers unisexual. Functional male flowers: perianth white, 5.5–7 mm long, the inner tepals longer than the outer ones; stamens 6, shorter than the perianth parts, anthers yellow; pistillode globose with very reduced style. Functional female flowers: perianth elliptic, equal, c 4 mm long; ovary obovate, 3-locular, 2 ovules in each locule; style 1 mm long with 3-branched stigma; staminodes 6, less than half the size of the perianth parts. Berry green turning red, 7–8 mm in diameter with 1–3 seeds. Seeds black, smooth, rounded or truncate on one side and convex on the other.

In cultivation; 2050–2450 m. SU HA; native to Europe but in cultivation in many parts of the world. *Westphal & Westphal-Stevens* 1203; *Sebsebe* D. 4015.

Subgenus *MYRSIPHYLLUM* Willd. (1808)

Obermeyer in *Bothalia* 15, 1&2: 77–78 (1984).

12. *A. asparagoides* (L.) Wight (1909);

Medeola asparagoides L. (1753); *Myrsiphyllum asparagoides* (L.) Willd. (1808) – type: Tilli, *Cat. Plant. Horti Pisani* t. 12, f. 1.2 (1723).

Climbing or suberect annual herb to 3 m high. Branches glabrous, terete or angled, without spines. Cladodes broadly ovate to lanceolate, 1.2–4.5 x 0.7–2.7 cm, acute at the apex, rounded at the base, with numerous (15) parallel lateral veins. Racemes solitary or 2 together; pedicel 5–22 mm long, articulated at the apex (base of flower). Bracts ovate, membranous, c 3 mm long. Perianth greenish white, 5–6 mm long. Stamens 6, c 6 mm long, shorter than the perianth. Ovary 3-locular with 4–6 ovules in each locule; style 2–3 mm long without distinct stigma lobes. Berry red, globose, 6–10 mm in diameter, up to 8-seeded. Fig. 186A.2.4.

In secondary scrub and juniper forest; 1900–2130 m. SD; also widespread in tropical Africa and extending to warmer parts in Europe. In recent years, it has been naturalised in Australia. *Bally* 9180; *Mesfin T. & Vollesen* 4350; *Mooney* 7236.

186B. RUSCACEAE

by Sebsebe Demissew*

Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 142 (1985).

Small shrubs, often forming thickets, or climbers. Basal parts woody. Branches develop as flat leaf-like structure called phylloclades. Roots with multiple velamen¹. Leaves reduced and scale-like. Flowers small and inconspicuous, found in raceme-like clusters on the upper or lower surface of the phylloclades (*Ruscus*), in umbel-like clusters on their margins (*Semele*), or in terminal racemes quite separately from the phylloclades (*Danae*). Inflorescence usually subtended by a single, scale-like or herbaceous leaf. Flowers regular, bisexual or unisexual; pedicels articulated. Perianth 6, pale-yellowish white, petal-like tepals in 2 series, all similar in shape, free or fused at the base; stamens 6, fused by their filaments into a column; anthers extrorse, tetrasporangiate. Pistil of 3 carpels, without or with a very short style ending in a sessile or subsessile stigma. Ovary superior, 3-locular, each with (1)2 ovules in each locule. Fruit a globose berry with 1–4 seeds. Seeds pale.

The family is mainly Mediterranean–Macaronesian in distribution and consists of three genera: *Danae* in the forests from Syria to Iran, *Semele* in Macronesia and *Ruscus* in Mediterranean and Europe, often found as a pot plant.

RUSCUS L.

Yeo, P.F., A contribution to the taxonomy of the genus *Ruscus* in *Notes R. Bot. Gard. Edinburgh* 28 (3): 237–264 (1968).

Evergreen shrubs with stems branched once or unbranched. Leaves minute, bract-like, the apparent leaves being leaf-like branchlets or phylloclades. Inflorescence generally found centrally on the adaxial or abaxial side of the phylloclades. Flowers generally unisexual; tepals green, often minutely dotted with violet. Stamens 3, filaments united to form a tube, fleshy, papillate and violet which is found in both female and male flowers. Fruit a red or yellow berry.

6 species, only 1 so far confirmed in the Flora area, the other 3 are widely cultivated and likely to be found.

These are popular pot plants because they require little attention and are drought resistant.

1. Stems branched; phylloclade spinose.
 1. *R. aculeatus*
 - Stems simple, unbranched; phylloclade non-spinose. 2
 2. Inflorescence bract joined to phylloclade for at least 1/6 of its length, 5–10 mm broad.
 2. *R. hypoglossum*
 - Inflorescence bract free from or scarcely joined to phylloclade, 1–3 mm broad. 3
 3. Phylloclades dark green, commonly ovate; inflorescence bracts green or scarious, 1–4-veined; flowers monoecious; staminal column clavate or almost cylindrical.
 4. *R. hypophyllum*
 - Phylloclades usually pale green, usually obovate-lanceolate or oblanceolate; inflorescence bracts green, 3–4-veined; flowers female only; staminal column narrowly ovoid.
 3. *R. microglossus*

1. *R. aculeatus* L. (1753)

– type: described from France & Italy (BM-Hb. Cliff.).

Stems erect 10–100 cm tall, 7–20 branched, striate; branches alternate or the lower three whorled. Phylloclades sclerophyllous, broadly ovate-acuminate or lanceolate acuminate, 1–4 x 0.5–3 cm, spine-tipped. Subdioecious. Inflorescence adaxial. Staminal column c 2 mm long. Bract ovate-triangular, 2–4.5 x c 1.5 mm.

Occurs naturally in Azores, NW Africa, W & C Europe. Widely cultivated as an ornamental.

2. *R. hypoglossum* L. (1753)

– type: described from Hungary and Italy (BM-Hb. Cliff. lecto.).

Stems simple, suberect or slightly spreading, 20–50 cm long. Phylloclades leathery, narrowly to broadly elliptic (to obovate-lanceolate), 3–10 x 2–2.5 cm, broadly acuminate at the apex, narrowed and twisted at the base. Dioecious. Inflorescence adaxial bract, lanceolate, herbaceous, 11–30 x 5–10 mm, 7–15 veined, edges at base joined to cladode for less than 1/6 of their length. Staminal column 2.5–3.5 mm long.

Native of SE & Ecentral Europe: Bulgaria, Turkey to N Greece.

3. *R. microglossus* Bertol. in *Fl. Ital.* 10: 401 (1854)

– type: from 'Italy'.

Stems simple, up to 60 cm long. Phylloclades leathery; obovate-lanceolate to oblanceolate, 5–9 x 1.5–3 cm, acuminate at the apex. Inflorescence adaxial or abaxial or both. Flowers dioecious. Commonly only female flowers observed. Bracts herbaceous, 5.5–15 x 5–3 mm, 3–4 veined, edges at the base not or scarcely joined to phylloclade. Staminal column of male flower unknown; female flower 2.8–3.5 mm long.

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1. velamen: water-absorbing tissue formed on the outside of roots.



Figure 186B.1 *RUSCUS HYPOPHYLLUM*: 1 – branch x 1; 2 – inflorescence x 8. All from *Sebsebe D. 4421*. Drawn by Dantew Teferra.

R. microglossus Bertol. (1854) is probably a hybrid of garden origin between *R. hypophyllum* and *R. hypoglossum*. Naturalized in S Italy since the 19th century, and more recently found in SE France and W Yugoslavia.

4. *R. hypophyllum* L. (1753)

– type: described from Italy (BM-Hb. Cliff. lecto.).

Stems simple, erect, 20–70 cm high, rarely with lateral branches. Phylloclades leathery, broadly elliptic to oblanceolate, 5–11 x 1–4 cm, acuminate at the apex,

abruptly contracted into 'petiole', not or slightly twisted at the base. Monoecious. Inflorescence adaxial or abaxial or both; bract linear or lanceolate, scarious or sometimes herbaceous, 2–2.5 x 1–2; not or scarcely joined to phylloclade. Berry spherical, apiculate, 10 x 11 mm. Fig. 186B.1.

Cultivated as an ornamental; 2300–2450 m. SU (Addis Ababa); native to NW Africa and from Spain to Turkey. Cultivated in parts of Europe and N Africa. *Sebsebe D. 4421*.

187. DRACAENACEAE

by J.J. Bos (*Dracaena*)* & Demel Teketay (*Sansevieria***

Cufodontis, *Enum. Agavaceae* in part: 1567–1572 (1971); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 144–146 (1985); Thulin, 146. *Dracaenaceae* in *Fl. Somalia* 4: 27 (1995).

Trees, sometimes very large, or shrubs with woody stems (*Dracaena*) or xerophytic herbs with rhizomes (*Sansevieria*). Leaves leathery to thickly succulent, generally crowded in terminal rosettes, sometimes in 2 opposing ranks, linear to ovate, sometimes cylindrical, often containing hard fibres, the ones below an inflorescence in a gradual to rather abrupt series from leaves to bracts. Inflorescence axillary, simple or branched, racemes or panicles, sometimes forming false umbels, pedicels articulate, flowers solitary to densely crowded, accompanied by minute bracts and bracteoles or not. Perianth of 6 segments fused at the base into a short or long tube, tips of lobes minutely hooded and blistered. Stamens opposite the tepals, inserted at the throat, filaments usually somewhat inflated and narrowly awl or spindle shaped, anthers versatile, oblong. Pistil: ovary superior, cylindrical to bottle shaped, 3-locular with a single ovule in each locule, style filiform, stigma at the same level as the anthers, capitate to 3-lobed. Fruits usually a berry, globose to depressed globose, 1–3-seeded and unlobed when 1-seeded. Seeds globose, flattened on the sides towards adjacent seeds, testa obsolescent.

A family with 2 genera and between 130 and 200 species in the tropics and subtropics of the Old World. Both genera are represented in the Flora area: *Dracaena* with 5 species and *Sansevieria* with 6.

In most older Floras Dracaenaceae and Agavaceae (which follows) are combined under Agavaceae. The work of Dahlgren *et al.* (loc. cit.) which compiled data from many sources, has shown that these two families are very distinct.

Key to genera

1. Plant a tree or shrub with a woody trunk or stem; leaves often in false rosettes. 1. *Dracaena*
- Plant a herb, with rhizomes or aerial stems; leaves in 2 ranks or clusters, not rosettes. 2. *Sansevieria*

Bos, in *Dracaena* in W Africa, *Agric. Univ. Wageningen Papers* 84–1 (1984), *Belmontia* 17, *New Series no. 80* (1985) considers that the distinction between *Dracaena* and *Sansevieria* cannot be maintained. Although species of both are quite distinct, the characters used to distinguish the genera overlap. For example, *D. ombet* has succulent leaves similar to those normally found in *Sansevieria*. Outside the Flora area, species of *Dracaena* are found with rhizomatous stems. For the present account, however, the editors prefer that the genera are kept distinct.

1. DRACAENA L. (1767)

Trees or shrubs with a ± woody stem; roots usually orange. Leaves often in false rosettes, sessile, linear to lanceolate. Inflorescence a large panicle with 2 or more flowers in each floral bract; flowers white or pale green, fragrant and opening at night. Tepal-lobes spreading or recurved. Stamen-filaments slender or thickened. Fruit a globose coloured berry with 1–3 seeds.

80 or more species, the majority in Africa; 5 species in the Flora area. A sixth species, *D. laxissima* Engl., known from S Sudan and Kenya and readily recognised

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by its elliptic, slightly falcate leaves, has not yet been recorded in the Flora area but could be present in forests in south and southwest Ethiopia.

Several species produce commercially important resins which are often called DRAGON'S BLOOD.

1. Leaves oblanceolate, sometimes variegated in cultivated plants; flowers in conspicuous stalked and sessile spherical multi-flowered heads. 3. *D. fragrans*
- Leaves sword or dagger-shaped; flowers variously arranged, not in multi-flowered heads. 2
2. Leaves distinctly succulent, about 1 cm thick at the base, margins minutely scabrid. 4. *D. ombet*
- Leaves much thinner, leathery, margins smooth. 3
3. Trees; fully developed leaves more than 80 cm long; ripe fruits dark purplish maroon. 5. *D. steudneri*
- Trees or shrubs; fully developed leaves not more than 70 cm long; ripe fruits orange. 4
4. Usually producing several stems from a common base; inflorescence erect, not reflexed; perianth up to 10 mm long. 2. *D. ellenbeckiana*
- Usually 1 main trunk and many branches; inflorescence sharply reflexed on the supporting branch; perianth 15 mm long. 1. *D. afromontana*

1. *D. afromontana* Mildbr. (1914)

– type: Mildbr., *Wiss. Erge. D. Zentr. Afr. Exp. 1907–1908, Leipzig II*, p. 63, tab. V (lectotype designated here, the syntypes *Milbraed* 1033, 1360 & 2525 have been lost).

Shrub or shrubby tree, sometimes straggling, 2–6(–10) m tall, main trunk up to 25 cm in diameter, usually

much less, branches arching, hollow when dry, ultimate branches usually not exceeding 1 cm in diameter, showing a distinct reticulate pattern of horseshoe-shaped leaf scars. Leaves shiny dark green, paler below, thinly leathery, dagger-shaped, 15–30 x 1.5–3 cm, only slightly constricted above the clasping base, gradually widening to parallel margins, top portion of about 4–6 cm, acute. Inflorescence hanging, sharply reflexed on the supporting branch, *c* 20–40 cm long, axis about 5 mm in diameter, branches at about 90° and ascending, 5–15 cm long, flowers point in all directions, pedicels 4–12 mm long, articulated at *c* 2 mm below the flower. Perianth white, pale-green or with purple tinge outside, somewhat translucent and showing a single rib, 15 mm long; tube *c* 1 mm long, lobes 14 x 2–3 mm, spreading at anthesis to give an open flower up to 23 mm wide. Filaments *c* 9 mm long, inserted 3 mm above the base of each tepal, swollen in the basal part; anther 3 mm long. Ovary obovoid, 4 x 2.5 mm; stigma-lobes not well developed. Fruits orange, if 1-seeded globose and 12–13 mm in diameter, if 2-seeded bilobed, 14 mm long and 13 x 20 mm in diameter, if 3-lobed, 16 mm long, 20 mm in diameter. Seeds dirty white, 6–9 mm in diameter. Fig. 187.1.1–4.

Moist undergrowth of montane forest, often along streams; 1750–2800 m. TU SU WG IL KF HA; E Africa, W to eastern Zaire, S to Malawi. *Bos* 9378; *J.J. de Wilde* 4400; *Friis* et al. 1832.

Often also found as a pot plant in hotels and offices.

2. *D. ellenbeckiana* Engl. (1902)

– type: BA, Sheikh Hussein, *Ellenbeck* 1232 (B holo., EA K photo).

Tree 3–8 m tall, usually producing several (up to 20) stems from a common base, branches few, bark silvery grey showing a reticulate pattern of leaf scars, older stems longitudinally fissured. Leaves pale greyish-green, up to 65 cm long when fully developed, base clasping, up to 9 cm wide, 2 cm above the base abruptly narrowed to 4 cm, elongate acuminate, nerves and mid-rib obscure. Inflorescence paniculate, erect, up to 80 cm long, with 2–3 racemose branches at each node, up to 35 cm long, pedicels in fascicles (1–)2–7 together, up to 5 mm long, articulate at the top, accompanied by narrow triangular bracts up to 1 mm wide and as long as the pedicel. Perianth white, fused at the base for 2 mm, lobes about 8 mm long, translucent with a single rib. Filaments distinctly swollen with a narrow pointed tip. Ovary bottle-shaped, widest at the truncate top; stigma very shallowly 3-lobed. Fruit orange-scarlet, globose to 3-lobed, 8–9 x 9–14 mm. Seeds globular, brown, about 6 mm in diameter.

Rocky outcrops and escarpments, *Acacia*–*Combretum*, *Lannea* and *Combretum* bushland on reddish-brown loamy soil; 1300–1350 m. SD BA HA; Uganda, Kenya, ?Somalia, ?Sudan. *Sandford* in *Ash* 2622; *Gilbert* in *Bos* 8260; *J.J. de Wilde* 7327.

Seedlings may occasionally have variegated leaves.

3. *D. fragrans* (L.) Ker Gawl. (1808)

– type: Commelin, *Hort. Med. Amst.* II, t. 4, f. 2 (1701).

Rather weak shrubs producing one to several whip-like stems to branched trees, 1–15 m or more tall, main trunk occasionally more than 30 cm in diameter, usually much thinner. Leaves bright green above, paler below, colour uniform or variegated (usually in cultivated plants), strap-shaped to narrowly oblanceolate, the widest part usually above the middle (12–)20–125(–150) x (1–)2–10(–12) cm, narrowly cuneate towards the base, narrowest part just above the base (0.4–)0.7–3.5(–4.5) mm wide, tip acute. Inflorescence simple or branched, erect, inclined or bent over to hanging, usually with a zig-zag axis, (15–)20–100(–160) cm long, flowers arranged in well separated, multi-flowered, spherical, stalked or sessile heads, pedicels 2–5 mm long, articulated at the top. Perianth white with some purple tinges on the outside, (15–)17–22(–25) mm long, receptacle obconical 1.5–3(–5) mm long; perianth tube (5–)8–10(–11) mm long, lobes (7–)9–11(–12) x 3 mm with a single rib. Stamens with inflated filaments. Ovary cylindrical to bottle-shaped, 2–3(–4) mm long; stigma 3-lobed. Fruits orange, depressed globose, 11–19 mm in diameter. Seeds white, globose to bean-shaped, 4–14 mm in diameter.

Undergrowth of forests, also planted as a hedge; 1200–1750 m. WG IL KF; tropical Africa from Gambia and Ethiopia south to Angola and Mozambique. *Bos* 9384; *Friis* 1999; *W.J. de Wilde* 10240.

4. *D. ombet* Kotschy & Peyritsch (1867)

– type: Frontispiece in *Plantae Tinneanae*.

Tree (2–)4–8 m tall, single trunk up to 0.4 m in diameter, eventually branching into an umbrella-shaped crown, bark pale brown showing a dense annular pattern of leaf scars, branches short, stout and diverging with wide angles. Leaves congested at the ends of branches, grey-to blue-green, up to 90 x 3 cm, very tough and thick (*c* 1 cm at the base) like in *Aloe*; base ovate, about twice as wide as long, rather abruptly constricted into a sword-shaped blade, strongly red-brown tinged, upper surface flat to somewhat concave, lower surface convex to obscurely keeled; margins cartilaginous. Inflorescence an erect panicle to about 50 cm long, lower branches paniculate, upper and ultimate ones racemose, quite glabrous, subtended by a series of bracts rapidly declining in size, pedicels paired to clustered, about 2 mm long and articulate in the middle. Perianth white, 6 mm long including the 0.5 mm long tube, lobes about 1.5 mm wide with a single rib. Filaments subulate; anthers slightly shorter than the filaments. Ovary oblong; stigma shallowly 3-lobed. Fruits orange, globose, usually 1-seeded, 1 cm in diameter. Seed globose, 6 mm in diameter.

1. Leaf margin smooth; leaf base width *c* twice as wide as long; end branches of the inflorescence quite glabrous. subsp. *ombet*
– Leaf margin scabrid; leaf base width *c* 3–4 times

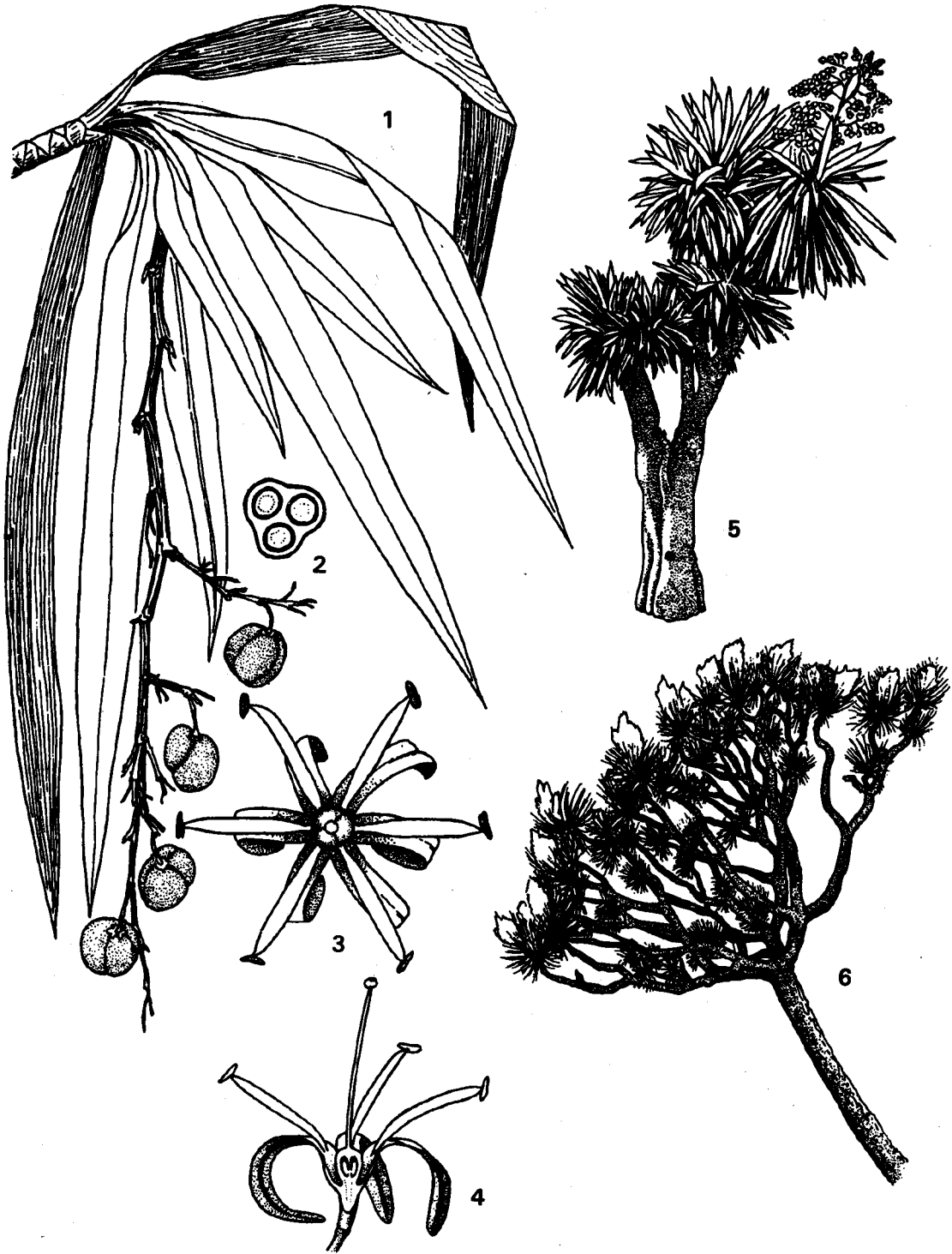


Figure 187. 1 *DRACAENA AFROMONTANA*: 1—fruiting branch; 2—cross section of fruit; 3 & 4—top view and longitudinal section of flower. *D. STEUDNERI*: 5—mature tree in fruit, about 4 m tall. *D. OMBET* subsp. *SCHIZANTHA*: 6—mature tree in flower, about 5 m tall. Drawn by William Burger. Specimen citations and magnification not given in the original. (Modified and reproduced with permission of Oklahoma Agricultural Experiment Station from Experimental Station Bulletin No. 45, *Fam. Fl. Plants in Eth.*: fig. 70, 1967.)

as wide as long; end branches of the inflorescence pubescent
subsp. *schizantha*

subsp. *ombet*

Tree up to 4 m tall. Leaves without a keel and crescent-shaped in cross section; margins smooth; base only twice as wide as long. Inflorescence with glabrous branches throughout.

Granitic outcrops in mountain ridges along the Red

Sea coast; altitude range not known. EE; Egypt & Sudan. *Baldrati* 2449, *Schweinfurth* & *Riva* 1464, 1821.

subsp. *schizantha* (*Baker*) *Bos* in *SINET: Eth. J. Bot.* 20 (1997);

Dracaena schizantha *Baker* (1877) — type: Somalia, Mts. Ahl & Serut, *Hildebrandt* 1472 (K holo., ?B BM HBG K WAG iso.).

Dracaena rhabdophylla *Chiov.* apud *Chiaruggi*, *Webbia* 8: 12 (1951); *Bally*, *Candollea* 22: 255 (1967)

– type: SD, Filtu, *Corradi* 4585 (FI holo., WAG photoprint copy).

Tree up to 8 m tall, old bark becoming very smooth, grey. Leaves generally narrow with a keel and rather triangular in cross section, margin distinctly scabrid, blade widened abruptly to a clasping base, 3–4 times as wide as long. Inflorescence with smaller branches minutely pustulose pubescent. Fig. 187.1.6.

Mountain slopes; *Acacia* – *Commiphora* bushland on limestone, also evergreen bushland dominated by *Buxus* and *Acokanthera*; 1450–1750 m. SD BA HA; Somalia, possibly Yemen. *Burger* 1516; *J.J. de Wilde* 4105; *Westphal & Westphal-Stevens* 4010.

A red resin used in traditional medicine is collected from this species.

5. *D. steudneri* Engl. (1895)

– type: GD, *Steudner* 477 (B holo. destroyed, BR K photoprint copy).

Shrub to tall tree up to 15(–25) m tall, trunk 20–45 cm in diameter, often seriously stunted by excessive pruning, freely branched in the crown, leaf scars remain visible for a long time. Leaves leathery, shiny, bright to dark green, sword-shaped, up to 130 x 16 cm, base clasping, narrowing to 2–6 cm at 5–10 cm from the base, blade widest around the middle, upper part gradually tapering towards the acute tip, margin smooth. Inflorescence initially erect, eventually bending in fruit, paniculate, up to 100(–200) x 70–150 cm wide with many perpendicular glabrous branches terminating in contracted multi-flowered racemes, pedicels 2.5 mm long, articulated at the top. Perianth greenish-white, 15 mm long including the 4 mm long tube, lobes translucent with a single rib. Stamens slightly shorter than perianth; anthers about 2 mm long. Ovary 3–4 x 2 mm. Fruits first bronze-coloured, later dark-purple to black-maroon with orange pulp, 15–20 x 15–30 mm. Seeds white, globose, 10 mm in diameter. Fig. 187.1.5.

Forest relicts and secondary forests, often planted as an ornamental in large gardens and parks; 1500–2000 m. TU GD GJ SU WG KF SD HA; E Africa, west to eastern Zaire, south to Zimbabwe and Mozambique. *Bos* 9437; *Bos & Jansen* 10200; *Friis* et al. 416.

2. SANSEVIERIA *Thunb.* (1794), *nom. cons.*

Demel Teketay, *The Sansevieria Journal* 4 (9): 43–58 (1995).

Evergreen perennial plants with thick and creeping cylindrical rhizomes. Aerial stems distinct and branching at or near the base, or absent. Leaves sessile, in clusters or 2 opposite ranks, erect or spreading, fleshy or thick and leathery, flat, channelled, half-cylindrical, cylindrical or laterally compressed, rigid, firm or flexible, often full of fibre. Inflorescence a raceme or panicle, simple or branched. Flowers solitary or 2 or more in a cluster, on pedicels that are jointed near the middle or at apex, the upper part falling off with the flower,

always with membranous or thin scale-like bracts at the base; flowers remaining open only one day or night; often fragrant. Perianth with a distinct tube and 6 narrow lobes that are usually rolled back or spreading when fully expanded. Stamens 6, with slender thread-like filaments and versatile anthers. Ovary trilobular, with one ovule in each locule; styles slender, thread-like, about as long as the stamens. Fruit a berry, containing 1–3 stony seeds.

About 50 species naturally occurring in the tropics and subtropics of the Old World, most in Africa; 6 indigenous species in the Flora area and probably 1 or more introduced species cultivated in gardens and as pot plants, see below.

In Africa, the string is used for bows; hence the common name for the genus as BOWSTRING HEMP. The flat-leaved species are sometimes called MOTHER-IN-LAW'S TONGUE.

Many species of this genus are cultivated in various parts of the tropics for their valuable high quality fibres which are fine, elastic and strong, although the quality varies with the species. In the Flora area, fibres are used for making ropes of different sorts and elsewhere for nets, sails and paper. Attempts in the past to produce fibres commercially from *Sansevieria* spp., both from wild stands and under cultivation as a substitute for sisal, have not been successful. Of the species known in Ethiopia *S. ehrenbergii* is harvested in the largest quantities, followed by *S. forskaoiana*, both of which are easy to handle.

Domestic animals, particularly goats, browse on young leaves, and baboons, kudu and rhinoceros have been observed eating the older leaves right down to the ground. Leaves of *Sansevieria* have also been reported as being chewed as a thirst quencher by baboons in Kenya, especially during dry periods. *S. forskaoiana* is a favoured food of rhinos and elephants who suck the green juice off the fibre in the leaves and spit out the white fibres, dry and clean.

Species of this genus are used as in-door and out-door ornamental plants both in the tropics and temperate regions throughout the world as they are easily propagated from cuttings. Usually the rhizomes are cut into pieces and planted. However, leaves which are planted whole or cut into small pieces also develop roots readily under moist conditions. Plants can also be grown from suckers or seeds.

1. Plants without easily seen aerial stems; leaves flat or if cylindrical, without a channel at the base. 2
- Plants with stems 10 cm or more tall; leaves laterally compressed or cylindrical with a channel at the base. 5
2. Leaves cylindrical. 3
- Leaves flat or nearly flat. 4
3. Leaves solitary. 3. *S. fischeri*
- Leaves several together. 4. *S. erythraeae*
4. Leaves with acute, brown, apical points and reddish-brown margins. 6. *S. forskaoiana*
- Leaves with soft green subulate points and green margins. 5. *S. nilotica*

5. Stem up to 10 cm high, branching at or near the ground, leaves channelled for about 2 cm at the base otherwise cylindrical. 2. *S. phillipsiae*
 - Stem up to 23 cm high, not branching, leaves laterally compressed, with a channel through out their length. 1. *S. ehrenbergii*

1. *S. ehrenbergii* Schweinf. ex Baker (1875)

- type: Sudan, Wady Ossir, south of Suakin (Nubia) Schweinfurth 31 (B holo. not seen).

Xerophytic plant, stem up to 25 cm tall, usually concealed by leaf bases. Leaves 5-9, crowded, 2-ranked, erect or more or less spreading fan-wise, up to 1 m or more long, laterally compressed, with flattened sides, rounded on the back, tapering upwards, rather abruptly ending in a stout hard spine-like point about 2 cm long; margins reddish-brown, with white membranous edges, which get wider than the rest of the leaf at the base. Inflorescence a panicle up to 2 m tall, much branched in the upper three-fourths of its length; branches up to 25 cm or more long, curved, ascending, lower branched again, upper simple. Flowers 4-7 in a cluster, pedicels 2-4 mm long; perianth purple to white, tube 5-6 mm long. Fruits green, spherical, turning orange at maturity.

On rocky ground, under shade or in the open in *Acacia* - *Combretum* woodland; 400-1100 m. EW GG HA KF SU SD; Arabia, Djibouti, Kenya, Nubia, Somalia, Sudan and Tanzania. *Bally* 7030; *Demel* T. 1988, 1989; *Hailu* 65.

This is the most common species in the Flora area sometimes forming dense stands, particularly in northern Eritrea, the Afar and the southern Rift Valley.

The specimens cited as *S. powellii* N.E.Br. by Cufodontis (*Burger* 665, 1063) belong to *S. ehrenbergii*. No specimen matching *S. powellii* has been seen from the Flora area. However, since this species occurs in Kenya and Somalia, it may also be found in Ethiopia. It can be distinguished by its greater size, with stems generally over 1 m tall, but the panicle smaller, only up to 50 cm tall.

Plants of *S. ehrenbergii* produce edible gum. The fibres are made into soft brushes for cleaning houses. The fibres are also used as straps for carrying water gourds and to tie up bundles. Beads are made from the stony fruits. Cattle eat the rhizomes and goats eat the fruits. The plant has some traditional medicinal applications.

2. *S. phillipsiae* N.E.Br. (1913)

- type: Somalia, *Lort Phillips* s.n. (K holo.).

Dwarf plant with short, 10 cm, erect stems branching at or above ground level, and forming irregular clumps. Branches c 20 cm long, 1.5 cm thick, more or less horizontal or spreading on the ground and ultimately rooting, ending in a tuft of leaves, clothed below the tuft with overlapping broadly deltoid-ovate sheaths or scales; scales taper from the base into an apical spine, margin with a membranous white edge to a narrow brown border, withering to whitish-brown. Leaves 5-10

together, closely set, spreading and slightly recurved, rigid, smooth, up to 45 cm long, channelled for about 2 cm at the sheathing base, otherwise cylindrical and gradually tapering to an acuminate apex with a spine-like tip; surface covered with minute, irregular transverse ridges, young leaves with paler bands, older uniform dark green. Inflorescence a spike-like raceme about 46 cm long and minutely white mottled; basal part bearing 2-3 brown membranous, lanceolate, many-nerved sheaths, 1-3 cm long, acuminate at the apex. Flowers white, 2-6 in a cluster, upper clusters with fewer flowers than the lower, opening in the late afternoon towards sunset, closing after sunrise and only open for one night, perianth-lobes often sticking together and spreading unevenly; pedicel c 3 mm long. Perianth up to 40 mm long; tube up to 30 mm long, 20 mm in diameter, slender, cylindrical, not enlarged at the base; lobes linear, up to 20 mm long. Stamens 15 mm long; filaments inserted at the base of the perianth lobes; anthers up to 3 mm long, versatile. Ovary cylindrical, 3 mm long; style exerted, slightly longer than the stamens. Fig. 187.2.2.

In shade of trees, *Acacia*, *Commiphora* and *Combretum* on sloping areas and along road sides; 1250-1450 m. KFGG HA; Somalia. *Burger* 3358; *Gilbert* 14; *Gilbert* et al. 263.

3. *S. fischeri* (Baker) Marais (1986);

Boophane fischeri Baker (1898) - type: East Africa, *Fischer* 9 (B holo., K fragment).

S. singularis N.E.Br. (1911) - types: Kenya, *Powell* 2, 10 (K syn.); Uganda, *Tompson* s.n. (K syn.).

Plant without an aerial stem. Leaves solitary, erect, rigid, cylindrical, 45-160(-240) x 2-5 cm, slightly tapering upwards; apex suddenly narrowed to a stout white spine-like tip; outer surface with 4-6 furrows on the sides and back which extend from base to apex, and a narrow concave channel all along above; surface slightly rough, marked with numerous closely placed transverse pale green bands, not always seen in older leaves. Inflorescence a spike-like raceme. Free parts of tepals 5-13 mm long, linear, obtuse; tube 20-50 mm long. Fruit not known.

Habitat unknown; but the only specimen seen, *Riva & Ruspoli* 556, was collected along a river. BA; Kenya, Somalia and Tanzania.

The description of the flower is based on East African material, and is taken from Rauh in *Sukkulentenkunde* 7-8: 108-127 (1963) and Pfennig in *Bot. Jahrb. Syst.* 102: 175 (1981).

4. *S. erythraeae* Mattei (1918)

- type: described from living plants cultivated in Palermo Botanic Gardens (no specimen was indicated as the type in the original description).

S. schweinfurthii Täckh. & Drar (1954)

S. cylindrica sensu auct. non Bojer (1837).

Plant without an aerial stem, growing in patches. Leaves 6-8 together, irregularly arranged, cylindrical,



Figure 187.2 *SANSEVIERIA NILOTICA*: 1 – habit $\times \frac{2}{3}$. *S. PHILIPSIAE*: 2 – habit $\times \frac{2}{3}$. *S. FORSKALIANA*: 3 – flower $\times \frac{3}{2}$; 4 – fruit $\times \frac{3}{2}$. 1 from Friis et al. 1902; 2 from Burger 3358; 3 from Burger 3205; 4 from Mesfin T. s.n. Drawn by Damtew Teferra.

pointed, erect, 40–50 cm long, with a short channel above and 5 furrows or grooves on the outside. Inflorescence a leafy raceme, almost as tall as the leaves; bracts membranous, ovate-lanceolate, acute. Flowers in clusters of 3–5, white, sweet smelling; pedicel 7–8 mm long, slender. Perianth tube 5–7 mm, narrow; lobes linear, subobtusate, revolute. Fruit not seen.

Along river sides in semi-arid areas; 1200–2100 m. EW; ?Sudan. *Schweinfurth* & *Riva* 1468.

The type of *S. erythraeae* Mattei is a plant cultivated in the Botanical Garden of Palermo, Sicily; no specimen or surviving plant in cultivation have so far been traced, although *Baldrati* 4417 may belong here. The above description was taken from Mattei (1918). Mattei referred to collections made by Schweinfurth and published in *Bull. Herb. Boiss* 2, Appendix 2: 77–78 (1894), where they are listed as *S. cylindrica*: according to Mattei they all represent his *S. erythraeae*. The collections are: *Schweinfurth* 830, Arbaroba, 1800 m.; *Schweinfurth* 1468, Aidereso, 1300 m.; *Schweinfurth* 1833 & 1886, below Geleb, 1600 m. No duplicates of these specimens have been traced, and the original material may all have been destroyed in Berlin. Live plants of what could have been this species were also taken from Eritrea by Schweinfurth, but no certainly identified surviving plant has been traced. *S. schweinfurthii* Täckh. & Drar (in *Fl. Egypt* 3: 305–306, 1954) is based on cultivated plants in Egypt said to have been introduced from Eritrea by Schweinfurth, but no material of these plants has been seen, and the name *S. schweinfurthii* is invalid because it was published without a Latin diagnosis.

5. *S. nilotica* Baker (1875)

– type: Sudan, Wayo in Muro Territory, White Nile, *Murie s.n.* (K holo.)

Acyntha massae Chiov. (1940); *S. massae* (Chiov.) Cufod. (1971) – type: KF, Jimma, *Massa* 209 (FT holo.)

Plant without an aerial stem. Leaves 2–3 together, when well developed up to 125 x 0.6 cm, strap-shaped with margins quite parallel, narrowing above into a soft green subulate point up to 2 cm long and gradually narrowing at the base into a deeply concave channel, smooth, conspicuously marked with numerous, narrow, closely placed, irregular, zigzag, transverse pale and dark green bars; margins green. Inflorescence a raceme up to 200 cm tall. Flowers white, in clusters, 4–10 in the lower and 2–3 in the upper clusters; pedicels up to 12 mm long. Perianth tube c 10 mm long; lobes c 12 mm long, linear, subacute. Fruit not known. Fig. 187.2.1.

Riverine forest, associated with *Ficus vallis-choudae*, *Celtis* sp., *Argomuelleria macrophylla*, etc.; 900–1450 m. IL KF; Sudan, Uganda and C Africa. *Friis et al.* 1902; *Meyer* 9012.

Chioevda described a new species under the name *Acyntha massae* in 1940. His description was based on specimens collected by *Massa* (209) at Jimma. There are two sheets of the holotype at FT, one of which contains only a portion of a leaf. In his description, he

indicated that the leaves have red margins. However, the type specimens have green margins. It is difficult to make clear distinctions between this species and *S. nilotica*, and until more material becomes available and field studies are carried out, *Acyntha massae* is made a synonym of *S. nilotica*.

6. *S. forskaoliana* (*Schult. f.*) *Hepper & Wood* (1984);

Smilacina forskaoliana Schult. f. (1829, as *for-skaliana*) – type: N Yemen, Hadie, *Forsskål* 9 (C holo.).

S. guineensis (L.) Willd. var. *angustior* Engl. (1902); *S. abyssinica* N.E.Br. var. *angustior* (Engl.) Cufod. (1971) – type: BA, Scheik-Hussien, *Ellenbeck* 1242 (?B holo.).

S. abyssinica N.E.Br. (1913) – type: ?TU, On mountains near Dschana (Jana), Ethiopia, *Schim-per* 1468 (P holo. not seen, K drawing of holo.).

Acyntha abyssinica (N.E.Br.) Chiov. (1916)

Acyntha abyssinica (N.E.Br.) Chiov. var. *sublaevigata* Chiov. (1932); *S. abyssinica* N.E.Br. var. *sublaevigata* (Chiov.) Cufod. (1971).

S. guineensis sensu auct. non (L.) Willd.

Plant without an aerial stem; rhizome 2 cm or more in diameter. Leaves 1–2(–4) together, usually erect, firm, up to 100 x 9 cm, sometimes longer, lanceolate, acute, with a hardened apical point 0.2 cm long or more, brown, fading to white later on, narrowed from the middle into a stout concave-channelled base, margins mostly wavy with hardened 1 mm wide reddish-brown edges, rough with fine transverse ridges or entirely smooth on both sides; surface green, mottled and speckled whitish green or without markings on either side. Inflorescence 95 cm or more high; peduncle 1 cm or more thick at the base, with 5–6 ovate-lanceolate, acute or acuminate sheaths on the lower half, and flower-clusters occupying the upper half. Flowers 4–5 in a cluster, fewer in upper clusters, pedicels up to 10 mm long. Perianth white. Stamens with white filaments and yellowish green anthers. Fruit 6–13 mm in diameter (dried), 1–3-seeded, pale to dark green, ripening to orange or red. Fig. 187.3 & 4.

In a wide range of habitats in dry areas including rocky places, combretaceous woodland with tall grasses, riverine vegetation, and under trees and shrubs; 550–2000 m. EW SU IL GG SD BA HA; Djibouti, Somalia, Kenya, Sudan and Congo. *Burger* 3076, 3205; *Demel T.* 1987.

Ash reported that this species occurs in the Mereb River Valley (TU), but no specimen has been seen to confirm this.

This species is harvested in large quantities and the fibre extracted and used in a similar way to that of *S. ehrenbergii*. Its leaves and fruits are eaten by several different animals. The rhizomes are dug up and sucked by thirsty travellers.

Excluded species:

It was not possible to confirm previous reports about the occurrence of *S. patens* N.E.Br. in the Flora area.

188. AGAVACEAE

by Sue Edwards & Yilma Tesfaye*

Burger, *Families of Flowering Plants in Ethiopia*: 127 (1967); Gentry, *Agaves of Continental North America*: 278–285 & 628–631 (1982); Maquet, 156. *Agavaceae* in *Fl. Rwanda IV*: 62–65 (1988); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 157–160 (1985); Lebrun and Stork, *Enum. des plants à fleurs d'Afrique tropicale: III Monocotyledones*: 99 (1995); Thulin, 147. *Agavaceae* in *Fl. Somalia 4*: 30–31 (1995).

Large herbs or trees with stout trunks and terminal rosettes of large leaves. Leaves large, thick and succulent, or tough and fibrous, simple, sessile, often wider at the base, gradually narrowing to a sharp point; margins often with spines or teeth. Inflorescence large, terminal, sometimes growing to 2 m tall or more, stem with many large scale leaves. All plants of *Agave* flower once and then die. Flowers bisexual, mostly regular with parts in 3s, often strongly scented. Tepals 6, white or yellow, free or fused into a tube. Stamens 6, opposite and attached to the base of the tepals or on the perianth tube. Pistil of 3 carpels, 3-locular, superior (*Yucca*) or inferior (*Agave*), each with many ovules; style slender; stigma 1- or 3-lobed. Fruit a capsule (sometimes a berry in *Yucca*) with several seeds. Seeds flat, plate-like, crescent-shaped or semi-circular.

The Agavaceae come originally from drier and warmer parts of the American continent, but several species are now found throughout drier areas of the world. There are 2 species of *Agave* widely distributed in the Flora area and an unidentified species of *Cordyline* (*Mesfin T.* 379) in some gardens in Addis Ababa.

The Agavaceae as circumscribed by Dahlgren *et al.* (*loc. cit.*) consists of 2 subfamilies: Yuccoideae with 2 genera and Agavoideae with 6. Older treatments and even some recent ones, combine these genera with the Old World *Dracaena* and *Sansevieria*. Based on cytology, morphology and distribution, Dahlgren *et al.* (1985) separate these latter genera into their own family, Dracaenaceae.

AGAVE L. (1753)

Large, usually perennial, plants which die after flowering once. Stem short and thick or absent. Leaves forming a basal rosette, large, stiff, fleshy and persistent, often with a terminal spine and several teeth on the margin. Inflorescence a spike or panicle. Tepals united into a short or long tube with 6 narrow lobes. Stamens 6, inserted on perianth tube; filament filiform, long exserted; anther versatile. Ovary inferior, 3-locular; ovules many; style awl-shaped. Capsule oblong, locules opening by 3-valves. Seeds numerous, thin, flat and black.

Over 100 species, all originally from Central America, particularly Mexico; now several species naturalised in hotter regions of the world, particularly around the Mediterranean. There are 2 species in the Flora area.

Agave spp. can be seen in many parts of the country, but their large size has prevented them from being collected as herbarium specimens.

1. Leaves blue-green, light green or variegated, in a basal rosette attached to a very short stem; marginal teeth of leaves *c* 8 mm long; apical spine 3–5 cm long; flowers pale yellow. 1. *A. americana*
- Leaves green, densely arranged around a stem up to 1 m tall; leaves without marginal teeth; apical spine *c* 2.5 cm long; flowers green. 2. *A. sisalana*

1. *A. americana* L. (1753)

– type: sheet no. 443.1, Herb. Linn. Soc. London (not seen).

Plant medium to large. Stem short. Rosettes 1–2 x 2–4 m. Leaves 100–200 x 15–25 cm, lanceolate, narrowed above thickened base, usually acuminate, light blue-grey to light green, sometimes variegated; margin undulate to crenate, teeth variable in shape and size, 2–10 mm long; apical spine 3–5 cm long, shallowly grooved for half its length, shiny brown to blue-grey. Inflorescence 5–9 m tall, straight, panicle long, oval, rather open. Flowers slender, 70–100 mm long with yellow tepals and green tapering ovary, shorter than the perianth. Tepals united into a deeply-grooved tube, 8–20 mm long; outer tepal lobes large, thick, fleshy, inner smaller with a conspicuous inner pair or ridges. Stamens 6, filaments often 60–90 mm long, emerging well above the perianth. Stigma 3-lobed, exceeding the stamens after anthesis. Capsule oblong, 4–5 cm long, with a short beak. Seed curved, 7–8 x 5–6 mm, shiny black. Fig. 188.1. 3 & 4.

Planted in public and private gardens and other places, including on roadsides; sea level to 2450 m. TU SU, site records from EE EW WU, probably also in most floristic regions; the original habitat has not been established, now planted in many of the warmer parts of the world. *Getachew T. s.n.*; *Sue Edwards et al.* 5206.

Many varieties have been developed from this species: Gentry (*loc. cit.*) gives a key to 9 varieties based on characters of the marginal teeth, and leaf size and colour. These varieties are widely grown as both ornamentals and hedging plants in both wet and dry climates.

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Figure 188.1 *AGAVE SISALANA*: 1 – young plantlet showing teeth on leaf margin; 2 – mature leaf without marginal teeth. *A. AMERICANA*: 3 – mature leaf; 4 – flower. All x 1. 1 from *Demel T.* 66; 2 from *Demel T.* 289; 3 & 4 from *Sue Edwards et al.* 5206. Drawn by Damtew Teferra.

2. *A. sisalana* Perrine ex Engl. (1875)

– type: Mexico, Chiapas, Gentry 16434 (DES neo., not seen).

Plants forming rosettes, 1.5–2 m tall. Stems 40–100 cm long. Leaves ensiform, 90–130 x 9–12 cm, green, fleshy, finely fibrous, smooth; margin of mature leaves usually toothless, young leaves may have small spines; apical spine 2–2.5 cm long, dark brown. Panicle 5–6 m tall, with 10–15 lateral branches with umbel-like clusters, often forming small plantlets either in the place of flowers or after flowering. Flowers 55–65 mm long, greenish-yellow, often with a strong unpleasant smell which attracts flies; ovary short, fusiform, 20–25 x 8–9 mm, nearly neckless. Tepals 6, united into a tube 15–18 mm long, lobes all similar, linear-lanceolate, 17–18 x 5–6 mm. Stamens 6; filaments 50–60 mm long, reddish or dark-spotted. Capsules and seeds rarely formed. Fig. 188.1.1 & 2.

Widely planted as a hedge plant around home gardens, fields, roads and tracks and on terraces, particularly in drier areas; sea level to 2450 m. Undoubtedly throughout the Flora area, only as a large-scale farm crop near Awassa. As one of the leading natural fibres, SISAL is now grown on a large scale throughout the tropics and subtropics. *Demel T.* 66, 289.

SISAL gets its name from the port of Sisal in Yucatán, Mexico, from which it was originally exported. According to Gentry (*loc. cit.*) it is not found either wild or cultivated in Yucatán but it is grown by peasant farmers for the extraction of fibre in the neighbouring state of Chiapas, Mexico.

This is an important source of fibre, called KATCHA, in many parts of the country. In Eritrea, the dead inflorescence stems are used in making houses and fences, and also as firewood.

189. HYPOXIDACEAE

by I. Nordal*

Hepper in *Fl. W. Trop. Afr.* 3: 172 (1968); Geerinck in *Fl. Afr. Centr.*: 4 (1971); Nordal & Iversen in *Fl. Cameroun* (1987); Zimudzi in *Fl. Zambesiaca* (in press).

Rhizomatous plants, with corms or elongated rhizomes carrying several, spongy, contractile roots. Leaves in a basal rosette, often in 3 rows, always hairy. Scape leafless, hidden among the leaves (*Curculigo*) or exserted (*Hypoxis*). Inflorescence a raceme, rarely a spike or single-flowered. Flowers with an inferior ovary. Tepals free, 3 +3, yellow, pubescent on the outside. Stamens 3 +3, free; filaments filiform or subulate; anthers basifixed, sagittate, with lateral openings. Ovary beaked (*Curculigo*) or not (*Hypoxis*), 3-locular with many ovules in two rows on an axile placenta. Style subulate with a 3-lobed or capitate stigma. Fruit a dehiscent capsule (*Hypoxis*), or more or less fleshy (*Curculigo*). Seeds black or brownish, smooth or papillate.

9 genera and around 100 species in tropical to subtropical areas around the world; 2 genera with 4 species in the Flora area.

Key to genera

1. Flowers in a raceme or spike, rarely single; narrow bracts never enveloping the ovaries; tepals directly from the ovary; fruit a dry capsule; seeds more or less papillate, without an appendage.

1. *Hypoxis*

– Flowers solitary; broad bracts enveloping the ovaries; an elongated beak between the ovary and tepals; fruit more or less fleshy, seeds with a hook-shaped appendage.

2. *Curculigo*1. *HYPOXIS* L. (1759)

Nordal, Laane, Holt & Staubo, *Nord. J. Bot.* 5(1): 1530 (1985); Zimudzi in *XIIIth AETFAT Proceedings* (1994).

Corm subglobose to elongated, yellowish or whitish inside, with contractile roots around the middle. Leaves in a basal rosette, often in 3 rows, linear to narrowly lanceolate, canaliculate. Flowers in a raceme or more rarely a spike or single. Bracts narrow, never enveloping the capsule. Pedicels distinct, 0.3–2.5 cm. Tepals directly from the ovary, never separated from it by a beak, perianth persistent to fruiting stage. Style subulate with elongated stigmatic lobes along the upper part of the style. Capsule a pyxis¹ or opening by longitudinal slits. Seeds several, subglobose, black to brownish, more or less papillate.

1. Slender to robust plants; leaves linear to lanceolate, broader than 0.5 cm; seeds glossy, black, more or less papillate, without cuticular folding on the papillae.

1. *H. villosa* complex

– Slender plants, leaves linear, narrower than 0.5 cm; seeds dull, brownish, papillate, with cuticular folding on the papillae.

2

2. Capsule cone-shaped, opening by longitudinal slits; distinctly longer than broad when ripe; inflorescence with (1–)3–5 flowers; lower pedicel longer than 1 cm; tepals 0.5–0.8 cm; anthers with apical slit.

2. *H. angustifolia*

– Capsule conical, opening with a lid, length about equalling the diameter in the apical part when ripe; inflorescence with 1(–2) flowers; pedicels shorter than 0.5 cm; tepals 0.7–1 cm; anthers without apical slit.

3. *H. schimperi*1. *H. villosa* complex

An extremely variable complex: this widespread aggregate taxon has been proved to be an apomictic polyploid complex with reticulate evolution. It is thus difficult to apply a normal species concept. The variation within this complex exceeds by far the normal intraspecific variation. At the moment it seems best to treat the more recognizable forms as 'micro-species' without formal taxonomic rank.

The following taxa described or reported from the Flora area belong within this complex:

H. villosa Lnn. f. (1781); Cufodontis, *Enum.*: 1579 (1971) – type: S Africa, Cape (LINN holo.).

H. sobolifera Jacq. (1794); *H. villosa* var. *sobolifera* (Jacq.) Baker (1878); Cufodontis, *Enum.*: 1580 (1971).

H. obtusa Burch. ex Ker-Gawl. (1816); Cufodontis, *Enum.*: 1578 (1971).

H. petitiana A. Rich. (1851); *H. villosa* forma *petitiana* (A. Rich.) Beck in *Paulitschke* (1888) – type: TU, Ouogerate, *Petit* s.n. (P holo.).

H. abyssinica Hochst. ex A. Rich. (1851) – type: TU, Mt Scholoda, *Schimper* s.n. (K holo.).

H. simensis Hochst. ex A. Rich. (1878) – type: GD, *Schimper* 1368 (G S iso.).

H. villosa L. var. *schweinfurthii* Harms (1895), *nomen nudum*.

H. apiculata Nel (1914); Cufodontis, *Enum.*: 1577 (1971).

H. schweinfurthiana Nel (1914) – type: EW, Abe-laco, near Maldi, *Schweinfurth* 142 (Z holo.).

H. boranensis Cufod. (1939) and in *Enum.*: 1578 (1971) – type: SD, Mega, *Cufodontis* 638 (FT holo.).

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1. pyxis: a capsule opening by a lid.

H. neghellensis Cufod. (1939) and in *Enum.*: 1578 (1971) – type: SD, Neghelle, *Cufodontis* 16 (FT holo.).

H. tristycha Cufod. (1939) and in *Enum.*: 1580 (1971) – type: SD, Mega, *Cufodontis* 637 (FT holo.).

Plant tiny to very robust, 3–75 cm tall. Corms 1–7 x 1–4 cm. Leaves linear, erect to prostrate, 20–75 x 0.5–2.5 cm, always covered by a more or less dense indumentum of whitish to yellowish hairs, which may be simple, divided or star-shaped. Peduncles from the leaf axils, 2.5–30 cm long carrying a (1–)2–15-flowered inflorescence, few-flowered ones tend to be racemose, many-flowered more spicate. Tepals 0.8–1.5 cm long. Anthers with entire apex. Capsule a pyxis, the lid carrying the persistent perianth. Seeds black, slightly papillate, more or less glossy, never dull and brownish, lacking the special cuticular folding found in *H. angustifolia* and *H. schimperi*.

Widespread in different woodland and grassland formations, some forms seem to be favoured by heavy grazing or burning; 1300–3100 m. EW TU WU SU GJ WG KF AR SD BA HA; also widespread through most of the the Sudano-Zambezian region to S Africa.

A characteristic feature is that distinct forms belonging to this complex grow side-by-side without intermediates. This is due to their apomictic reproduction. Some forms found in the Flora area can be recognized, and they are listed below. The complex shows the largest variation in S Ethiopia (SD).

'abyssinica' -form

Fairly small plants with corms subglobose to cylindrical 1–6 x 1–4 cm. Leaves with strong ribs, most often recurved to almost prostrate, but seem to turn more erect during the growing season, 5–20 x 0.5–1.0 cm; hairs whitish or yellowish, dense on margin and midrib, but also scattered on the lamina. Peduncles 2.5–10 cm. Inflorescence a raceme with pedicels of uneven length 0–1.5 cm. Flowers (1–)2–4, tepals 0.8–1 cm long. Capsule 5–7 mm long. Seeds black and glossy, almost without papillae, *c* 1 mm diameter. Fig. 189.1.1–4.

Growing in disturbed woodland and grassland, evergreen bushland, *Eucalyptus* plantations and montane forest to the ericaceous belt; 1800–3100 m. EW TU WU SU GJ WG KF AR SD BA HA; *Gilbert & Tewolde* 3261; *Mooney* 7931; *Thulin & Asfaw* *H.* 4083.

The 'abyssinica' -form is the most widespread within the complex in the Flora area. Narrow-leaved specimens within this form have often been confused with *H. angustifolia*, from which they differ in capsule and seed characters, and also having slightly larger flowers and wider leaves. In some cases whole populations are characterized by having 4 instead of 6 tepals (e.g. *Thulin & Hunde* 4084).

'boranensis' -form

Resembles the 'abyssinica' -form, but somewhat more robust with longer and broader leaves, 25–50(–75) x 1–2 cm which are more erect. Inflorescence 2–5-flowered, with pedicels 1–2 cm long. Tepals 0.9–1 cm long.

Occurring in less grazed and disturbed areas compared to 'abyssinica' -form; 1700–2900. EW SU AR WG SD. *Ash* 2016; *Mesfin T. & Sebsebe D.* 331; *Sebsebe D. & Melaku W.* 750.

'tristycha' -form

Resembles the 'abyssinica' -form, but more densely pubescent and more robust in every quantitative trait. Corms *c* 7 x 4 cm. Leaves falcate, in 3 rows, *c* 20 x 2–2.5 cm. Inflorescence 2–6-flowered with tepals 1–1.5 cm long.

Rocky places; 1700–2100 m. SD; *Ensermu K. & Melaku W.* 2903; *Gillett* 14200.

'neghellensis' -form (sometimes identified as 'H. textilis Nel')

Resembles the 'boranensis' -form, but leaves narrower, 15–35 x 0.3–0.5 cm. Inflorescence 1–2(–5)-flowered.

Dry grassland and open combretaceous woodland; 1500–1800. SD. *Thulin et al.* 3530; *Mooney* 9716, 9728.

An undescribed form from WG (*Mooney* 7742) is 'hysteranthus', has a very dense almost silvery indumentum, spicate inflorescence with 10–15 flowers, and tepals up to 1.5 cm long. It is close to '*H. fischeri* Pax' described from E Africa. Another many-flowered form also from WG (*Mooney* 6851) is 'synanthus' with dense yellowish indumentum, has *c* 8 flowers in a racemose inflorescence with lower pedicels up to 2 cm long; tepals *c* 1 cm long. It is close to '*H. multiflora* Nel' described from Uganda.

The complex is obviously in need of more thorough study including analyses of cytology and reproductive behaviour.

2. *H. angustifolia* Lam. (1789)

– type: Mauritius, *Comerson* s.n. (P holo.).

H. luzuloides Robyns & Tournay (1955).

Grass-like plant from a corm 1–2.5 x 0.8–2 cm, whitish or yellowish inside. Leaves erect or lax, linear (10–)25–35 x 0.2–0.7 cm, except for very early in the growing season, always by far overtopping the flowers, covered by long whitish to yellowish hairs. Peduncle 3–12 cm long. Inflorescence a corymb with (1–)3–5 flowers supported by linear bracts, all pedicels longer than 1 cm. Tepals 0.5–0.8 cm long. Anthers with the two theca not fully fused making it appear to have an apical split. Capsule cone-shaped with loculicidal opening, distinctly longer than broad when ripe, thin-walled so that the seed contours are visible through it. Seeds with a special cuticular folding on the papilla of the testa making them dull brownish. Fig. 189.1.5–7.

In open woodland and bushland, but most frequent in treeless and seasonally water-logged grassland, often heavily grazed; black to red, more or less, heavy clay

1. hysteranthus: a plant which produces its leaves after flowering.

2. synanthus: a plant which produces flowers and leaves at the same time.

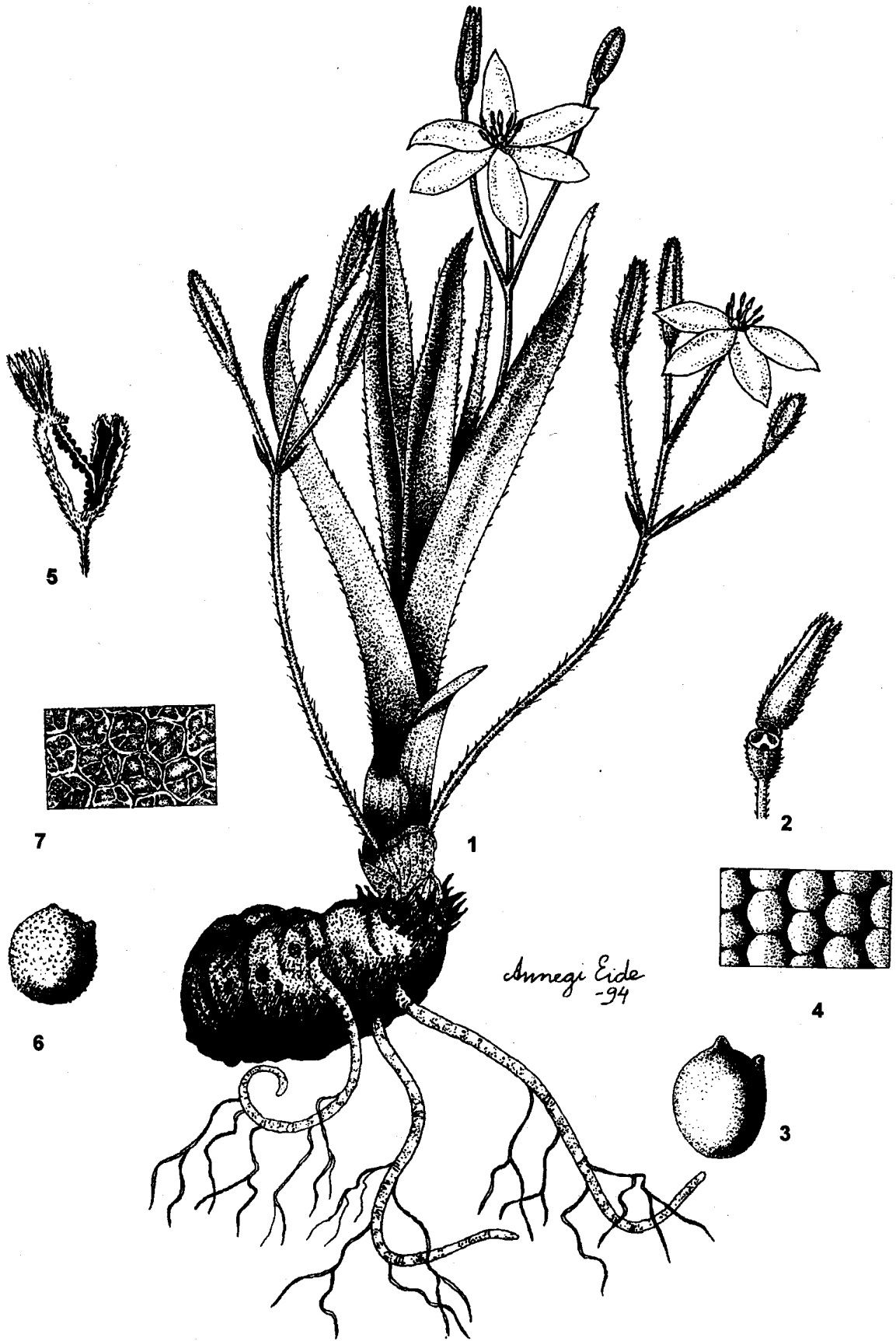


Figure 189.1 *HYPOXIS VILLOSA* complex, the 'ABYSSINICA'-form. 1 – habit x $1\frac{3}{10}$; 2 – fruit, a pyxis x $1\frac{3}{10}$; 3 – seed x 10; 4 – details of seed surface x 100. *H. ANGUSTIFOLIA*: 5 – fruit, a loculicidal capsule x $1\frac{3}{10}$; 6 – seed x 10; 7 – details of seed surface x 100. 1–4 from Nordal 2268; 5–7 from Nordal 2223. Drawn by Annegi Eide.

soils; 1275–2800 m. GD SU WG KF SD BA; otherwise widespread in the Sudano-Zambesian region of tropical Africa and Mauritius. *Ensermu* K & *Tamrat* B. 477; *Friis* et al. 2640; *Thulin* et al. 3369.

Cufodontis (1971) wrongly reduced *H. camerooni* and *H. biflora* to synonymy of *H. angustifolia*.

3. *H. schimperi* Baker (1878)

–type: GD, Begemder, *Schimper* 1118 (K holo.).
H. macrocarpa Holt & Staubo (1985).

Corm subglobose, 1.5–2 cm wide, often carrying a dense tuft of fibres. Leaves linear, 20–25 x 0.2–0.3 cm, almost glabrous, 1–2-flowered, pedicels short, up to 0.5 cm long. Tepals 0.7–1 cm long. Capsule a pyxis with a more or less regular lid. Seeds dull brown due to the special cuticular folding.

In flat valley bottoms with grassland with high water table, growing between tussocks, also in *Podocarpus* forest, often on black soils; 1950–2700 m. GD SU SD; also in E Africa, and possibly south to Zimbabwe and Angola. *M.G. Gilbert* 3309; *Gilbert & Jefford* 4682, *Sue Edwards* et al. 2311.

This species is similar to *H. cuanzensis* Welw. ex Baker, described from Angola, which also has narrow erect leaves and seeds with the special cuticular folding, and they may be conspecific. In that case the latter has priority being published in January 1878, *H. schimperi* in November the same year (*Journ. Linn. Soc.* 17: 110).

2. CURCULIGO Gaertn. (1788)

Rhizome cylindrical and vertical, whitish inside, with contractile roots scattered. Leaves in basal rosette, petiolate, linear to lanceolate, folded longitudinally. Scape enclosed by scale leaves. Flowers single and sessile. Involucral bracts large, enclosing the ovary. Tepals separated from the ovary by a long beak. Style subulate with capitate stigma. Fruits more or less fleshy, indehiscent, crowned with the persistent beak and always enclosed in the remains of old leaves. Seeds ellipsoidal, black and glossy, never papillate, but with a distinct hooked appendage.

Genus with its main center of variation in tropical Asia, only 2 species indigenous to tropical Africa; 1 in the Flora area.

C. pilosa (Schum. & Thonn.) Engl. (1908);

Gethyllis pilosa Schum. & Thonn. (1828).

C. gallabatensis Schweinf. ex Baker (1878) –
type: Sudan, Djur, *Schweinfurth* 220 (K holo.).

C. minor Guinea (1946).

Plants up to 25 cm tall from a rhizome up to 8 cm long. Leaves 0.3–2.5 cm broad, very short at the start of flowering, elongating to 25 cm through the growing season, lamina sparsely pilose. Peduncle 0.5–1.5 cm long, hidden among scale leaves and leaf bases, subterranean. Flowers up to 2.5 cm in diameter when fully open. Tepals 0.9–1.5 x c 0.3 cm. Filaments 2–4 mm long, anthers c 3 mm. Ovary subterranean, up to 1.5 cm long,

surrounded by bracts up to 2 cm long, beak 2.5–5 cm. Fruits up to 3 cm long. Seeds 2–3 mm long. Fig. 189.2.

Woodland or riparian forest, seasonally swampy, seems to be favoured by frequent burning; on black alluvium or on limestone; 550–3000 m. TU IL GG HA; rare but widely scattered in the Sudano-Zambesian phytogeographical region. *Friis* et al. 2440; *Hildebrandt* 535; *Seyoum* A. 17.

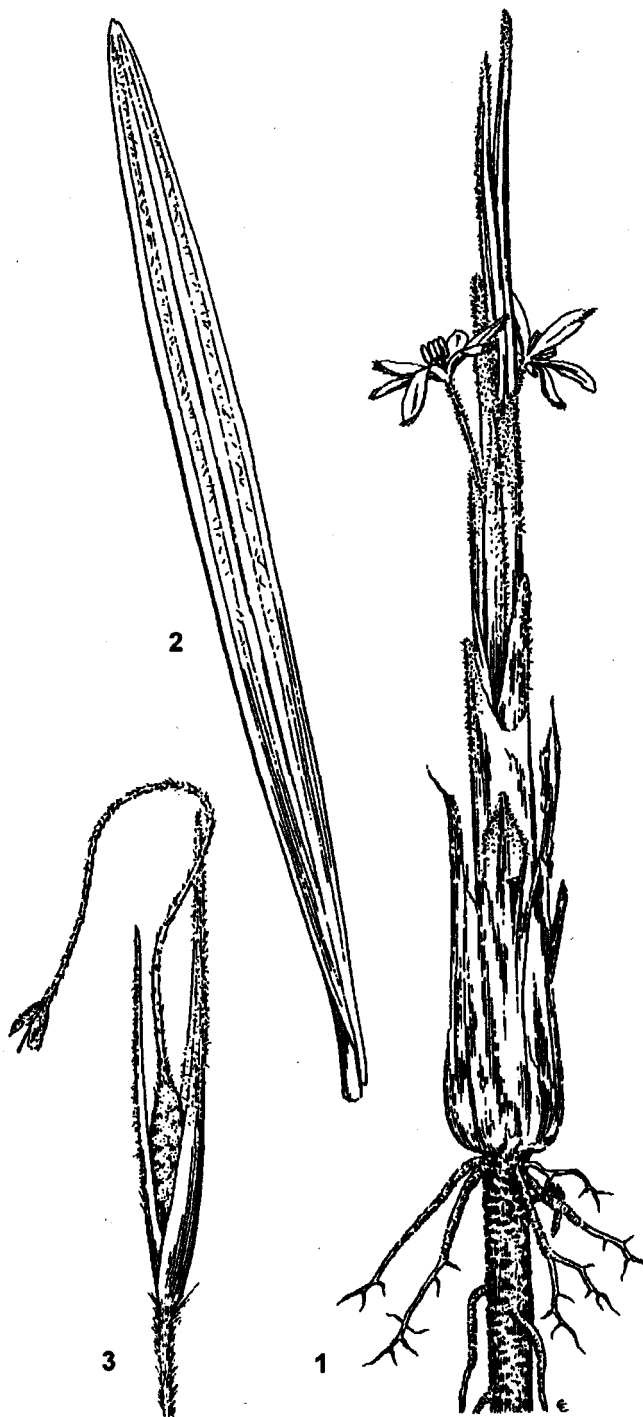


Fig. 189.2 *CURCULIGO PILOSA*: 1 – habit x 1; 2 – leaf, later in season x 2½; 3 – fruit x 1. 1 from *Milne-Redhead & Taylor* 7704; 2 from *Jackson* 2093; 3 from *Langdale-Brown* 1937. Drawn by Eleanor Catherine. (Reproduced with permission from *Fl. Zambesiaca*.)

190. ANTHERICACEAE

by I. Nordal*

Obermeyer, *Bothalia* 7: 669–767 (1962); Kativu & Nordal, *Nord. J. Bot.* 13: 59–65 (1993); Nordal & Thulin, *Nord. J. Bot.* 13: 257–280 (1993); Stedje & Nordal, *XIII AETFAT Proceedings* (1994); Thulin, 151. *Anthericaceae* in *Fl. Somalia* 4: 42–49 (1995).

Rhizomatous perennial herb. Rhizome white, never yellow inside. Leaves in basal rosette, sometimes in 2 ranks, linear to lanceolate, rarely terete. Peduncle with leaves or leafless, sometimes reduced. Inflorescence a panicle, raceme or spike. Flowers bisexual, regular to slightly irregular. Tepals, in two whorls of 3+ 3, free, white, often keeled with a green, red or brown coloured line, all similar or one whorl slightly different. Stamens 3+ 3, free; filaments filiform to fusiform; anthers basifixed, never versatile, dehiscing to the inside by longitudinal slits. Carpels 3, united to form a 3-locular superior ovary, usually several ovules per cell; placentation axile; style slender with a small stigma. Fruit a loculicidal capsule. Seeds black, glossy, without an aril.

A tropical and temperate family with *c* 20 genera of which only 2 with *c* 100 species occur in Africa. 2 genera and 26 species in the Flora area; 1 of which, *C. comosum*, has several forms grown as ornamentals.

The family is closely related to Asphodelaceae and may sometimes be difficult to distinguish on gross morphology. Representatives of Asphodelaceae always contain anthraquinones, displayed especially by the yellow rhizomes when cut; in Anthericaceae the inside of the rhizome is always white or near white. The seeds of Asphodelaceae are covered by a thin aril making them dull brown to grey; in Anthericaceae the seeds are always black and often glossy.

Key to genera

1. Roots somewhat swollen without tubers; flowers solitary at each node of the inflorescence, each supported by only one bract; pedicels without a joint (not articulate); seeds swollen.
 1. **Anthericum**
 - Roots swollen or, if not, carrying tubers; flowers usually more than one at each node of the inflorescence or, if only one, then each supported by two bracts; pedicels usually articulate; seeds thin, flat or folded. 2. **Chlorophytum**
 - Peduncle distinct, up to 15 cm long; inflorescence a raceme, unbranched or with few basal branches, pedicels shorter than 25 mm. 2
2. Leaves *c* 0.5 cm wide, semi-succulent to fistulose (a hollow tube); inflorescence never branched; capsules slightly ridged, but not warty.
 2. **A. corymbosum**
 - Leaves *c* 1 cm wide, flat, inflorescence often with 1–3 basal branches; capsules covered in wart-like projections. 3. **A. jamesii**

1. **ANTHERICUM** L. (1753)

Cufodontis, *Enum.*: 1530 (1971).

Small plant up to 20 cm tall. Rhizome very short, roots more or less swollen without tubers. Bract-like leaves (cataphylls) membranous, often hidden by fibres from leaves of previous year. Leaves in a basal rosette, linear, \pm succulent. Peduncles often several to a plant, reduced or elongated, up to 15 cm long, never with leaves. Inflorescence a simple raceme or umbel-like, in the latter case, with pedicels emerging from inside the leaf rosette. Pedicels never articulate. Tepals white, often with green tinge or stripe outside. Capsule rounded or shallowly 3-lobed in cross section. Seeds swollen, only slightly folded.

An Old World temperate genus with *c* 10 species, only 3 of which occur in Tropical Africa.

1. Peduncle completely reduced; inflorescence umbel-like with pedicels 30–80 mm long, emerging directly from the leaf rosette.

1. **A. angustifolium**

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1. **A. angustifolium** Hochst. ex A. Rich. (1851)
 - type: TU, Chiré, *Quartin-Dillon* s.n. (P lecto., K isolecto.).

A. humile Hochst. ex A. Rich. (1851) – type: TU, Oudgerate, *Petit* s.n. (P lecto., K isolecto.).

Small plant up to 10 cm tall. Leaves linear, 5–10 x 0.2–0.5 cm, glabrous or with ciliate margins. Peduncle very short and hidden among the leaves; rachis almost completely reduced, making the inflorescence umbel-like. Pedicels 30–80 mm long. Flowers white, slightly green outside, star-like, 2–10 per plant; tepals 8–12 x 2–3 mm, 3-veined. Stamens shorter than the tepals, with filaments *c* 4 mm, longer than the yellow anthers which curl up after anthesis. Capsules 5–8 mm long, subglobose, smooth or slightly ridged, on reflexed pedicels so that they end up lying on the ground. Seeds *c* 2 mm long.

Growing in clumps in upland grassland, seasonally waterlogged, often heavily grazed and eroded, also on black shallow soils; (1300–)2000–3000 m. EW TU GD WU; also in Uganda and Kenya. *Gilbert* et al. 2161, 2635; *Mooney* 7937; *Sebsebe D. et al.* 2387.

2. *A. corymbosum* Baker (1877)

– type: Somalia, *Hildebrandt* 1471 (K holo.).

A. gregorianum Rendle (1895).

A. corymbosum var. *floribundum* Chiov. in *Result. Scient. Miss. Stefanini-Paoli*: 173 (1916).

Plant 10–20 cm high. Leaves linear, 5–25 x 0.2–0.8 cm, often with ciliate margins, more or less succulent. Peduncles often several to a plant, 3–15 cm long, glabrous. Inflorescence a simple raceme, 3–6 cm long, with 3–12 flowers. Pedicels somewhat spreading, 5–25 mm long, elongating to 40 mm with age. Flowers white with green stripes on the outside; tepals 9–10 x 2–3 mm. Capsule slightly ridged, but not warty, 4–8 mm long, subglobose, with a rounded triangular cross-section. Seeds 2–3 mm across. Fig. 190.1.1–4.

Growing in clumps in grassland, bushland and more or less degraded *Acacia* – *Combretum* woodland, also in degraded *Juniperus* forest; on black soils which are seasonally waterlogged, or on lighter brown to red soils; often in areas heavily grazed and eroded; 1000–2850 m. SD BA HA; also in Somalia, Kenya and northern Tanzania. *Friis* et al. 3655; *Gilbert* et al. 8271; *Mooney* 9738.

3. *A. jamesii* Baker (1898)

– type: HA, Hahi, *James & Thrupp* s.n. (K lecto.).

A. verruficerum Chiov. (1916).

Plant up to 15 cm tall. Leaves linear, 10–15 x c 1 cm, forming a neck-like sheath around the base of the peduncle, 3–5 cm long, margins scabrid. Peduncle (above the neck) 1–4 cm long. Inflorescence a raceme, often with one or two basal branches, 5–10 cm long with 10–15 flowers. Pedicels somewhat spreading, c 10 mm long at anthesis, elongating with age. Flowers similar to those of *A. corymbosum*. Capsules distinctly warty, otherwise similar to *A. corymbosum*.

Growing in clearings in bushland, and on temporarily waterlogged red sandy soil; c 800 m. HA; with a narrow distribution also in adjacent parts of Kenya and Somalia. *Ellis* 127.

2. CHLOROPHYTUM Ker-Gawl. (1807)

Anthericum sensu Cufodontis, *Enum.* (1971), p.p.

Dasystachys Baker (1898), *nomen illegit.*, Cufodontis, *Enum.* (1971).

Cufodontis, *Enum.*: 1533 (1971).

Plant very variable in size and robustness from a few centimetres to more than a metre tall. Rhizome reduced or prominent, sometimes moniliform (consisting of a series of corms attached in a chain); roots either swollen without tubers or more or less wiry with distinct tubers. Leaves in a basal rosette or in 2 ranks, linear to broadly lanceolate, sometimes narrowed towards the base to a pseudopetiole (called 'petiolate'). Peduncles reduced or elongated, leafless or with more or less bract-like leaves. Inflorescence a spike, raceme or panicle. Pedicels, except in very few cases, articulate (with a distinct joint which may be difficult to see when it is immediately below the flower as in *C. longifolium* and

C. silvaticum). Tepals white, with or without pale green or red stripes on the outside. Capsule more or less triangular to deeply 3-lobed in cross section. Seeds thin, flat or sharply folded.

An Old World tropical genus of c 150 species with the main centre of diversity in tropical Africa; 23 species in the Flora area.

1. Pedicels apparently not articulated (check carefully immediately below the flower), less than 3 cm long; the flowers and fruits appearing within the leaf rosette. 2
- Pedicels articulated (check carefully immediately below the flower), most often longer than 3 cm (shorter in *C. inconspicuum*). 4
2. Inflorescence lax, longer than 4 cm, prostrate; bracts broadly lanceolate; capsules 6 mm or more long. 1. *C. neghellense*
- Inflorescence up to 4 cm long, condensed, not prostrate; bracts linear to narrowly lanceolate; capsules up to 5 mm long. 3
3. Leaves broadly lanceolate, 4–8 cm wide, petiolate; inflorescence a raceme, often with a few short branches; tepals semi-spreading, pale green. 2. *C. geophilum*
- Leaves narrowly lanceolate, up to 3 cm wide, without petiole; inflorescence umbel-like; tepals spreading to reflexed, white. 3. *C. tetraphyllum*
4. Peduncle with leaves all along its length. 5
- Peduncle without leaves, except occasionally 1–2 sterile bracts just below the inflorescence. 7
5. Rhachis papillate or pubescent; flowers bell-shaped or urceolate; tepals covering the ovary at anthesis, papillate on the inside just above the ovary. 4. *C. longifolium*
- Rhachis glabrous; flowers open, star-shaped; tepals not covering the ovary at anthesis, not papillate. 6
6. Leaves produced after the flowers; capsules transversely ridged, with 3 shallow lobes in cross-section; seeds irregularly folded. 5. *C. nubicum*
- Leaves produced with the flowers; capsules not ridged, deeply 3-lobed in cross-section; seeds flat. 6. *C. ducis-aprutii*
7. All nodes of the inflorescence with a single flower (rarely 2 flowers at the lowermost node in *C. bifolium*). 8
- At least some of the lower nodes of the inflorescence with 2 or more flowers. 11
8. Flowers subsessile, the very short pedicels articulate at the apex; perianth bell-shaped, tepals erect and papillate inside in a zone just above the ovary, each tepal with 1 vein. 7. *C. silvaticum*
- Flowers distinctly pedicellate, the pedicels articulate below the apex; perianth glabrous with spreading tepals, each with 3 veins. 9
9. Flowers irregular with tepals longer than 10 mm; capsule usually at least 10 mm long. 8. *C. somaliense*
- Flowers irregular with tepals shorter than 7 mm; capsule less than 8 mm long. 10

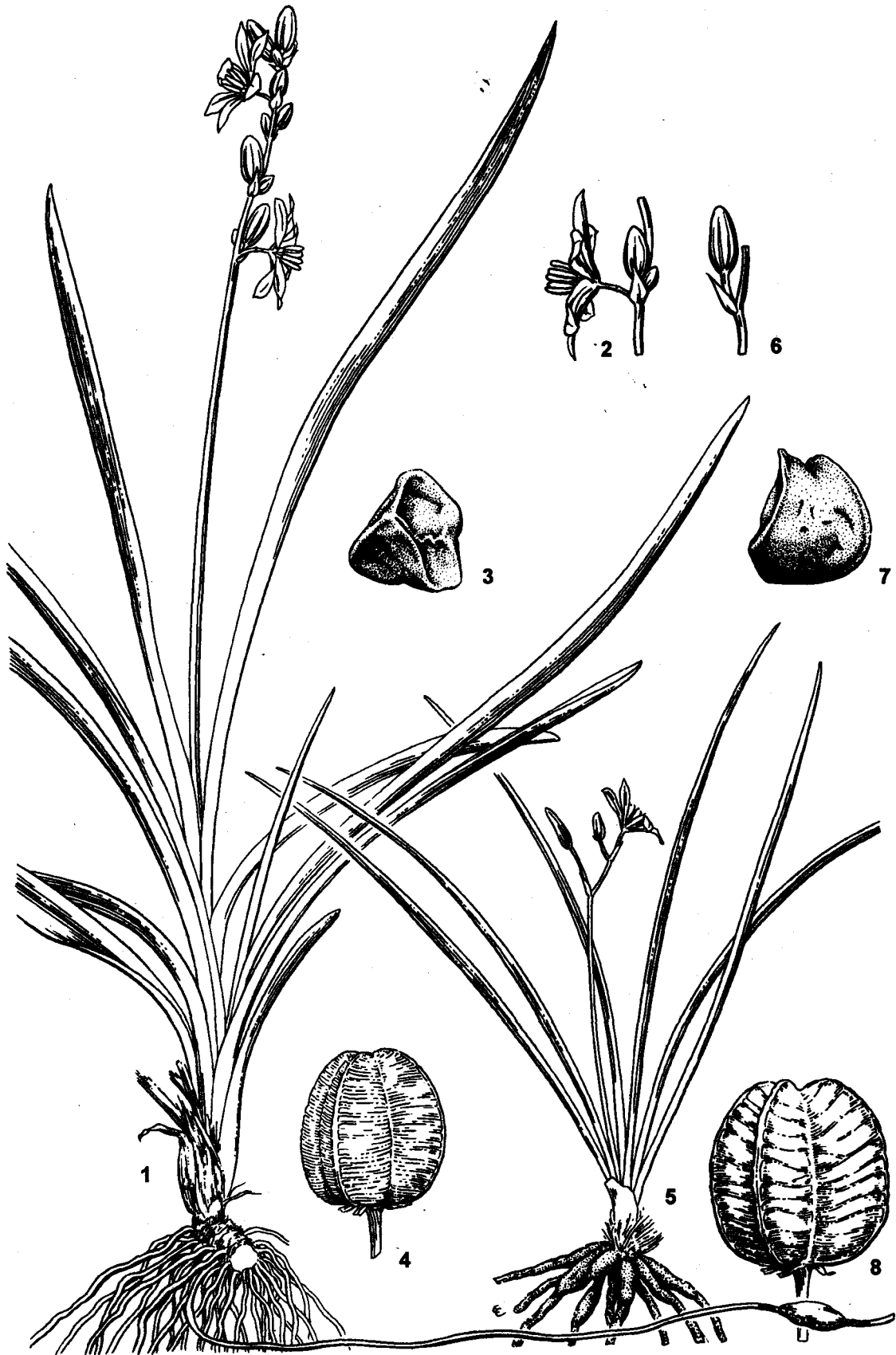


Figure 190.1 *ANTHERICUM CORYMBOSUM*: 1 - whole plant $\times \frac{2}{3}$; 2 - node from inflorescence $\times 1$; 3 - seed $\times 8$; 4 - capsule $\times 2$. *CHLOROPHYTUM CAMERONII*: 5 - whole plant $\times \frac{2}{3}$; 6 - node from inflorescence $\times 1$; 7 - seed $\times 8$; 8 - capsules $\times 2$. 1 & 2 from *Mathew & Hanid 6050*; 3 & 4 from *Biggood, Mwasumbi & Vollesen 1226*; 5 & 6 from *Mathew 6039*; 7 & 8 from *Polhill 372A*. Drawn by Eleanor Catherine. (Reproduced with permission from *Nord. J. Bot.* 13 (1): 60)

10. Pedicels articulate near the middle; rachis pubescent; capsules triangular with shallow lobes; seeds about 2 mm wide. 9. *C. bifolium*
 – Pedicels articulate near the apex; rachis glabrous; capsules deeply 3-lobed with wing-like compartments; seeds 3–4 mm wide. 10. *C. pterocarpum*
11. Leaves filiform, 0.1–0.3 cm wide, folded; tepals up to 5 mm long. 11. *C. inconspicuum*
 – Leaves lanceolate, more than 0.3 cm wide; tepals more than 5 mm long. 12
12. Tepals 6–9 mm wide, with 9 or more veins. 12. *C. tuberosum*
 – Tepals less than 6 mm wide, with 3–5(–7) veins. 13
13. Pedicels stiffly spreading, articulate in upper part, the lower ones more than 15 mm long. 13. *C. zavattarii*
 – Pedicels not stiffly spreading, articulate near the middle or in the lower half, less than 10 mm long. 14
14. Root tubers most often on short lateral branches; flowers often pale green (white in *C. humifusum*). 15
 – Root tubers as swellings in the distal parts of the roots, not on lateral branches, or roots fusiform and fleshy without tubers; flowers white. 17
15. Leaves produced after the flowers; tepals up to 5 mm long. 14. *C. micranthum*
 – Leaves produced with the flowers; tepals 5–7 mm long. 16
16. Leaves 2–4 cm wide, in a rosette; peduncle and the branched inflorescence more or less erect. 15. *C. gallabatense*
 – Leaves up to 1 cm wide, in 2 ranks; peduncle and the simple, rarely slightly branched, inflorescence prostrate. 16. *C. humifusum*
17. Pedicels drooping at anthesis, completely drooping in fruit, capsules pendent, shaped like a deeply 3-lobed pyramid. 17. *C. pendulum*
 – Pedicels spreading to erect at all stages, capsules erect, shaped differently. 18
18. Leaves in 2 ranks; seeds irregularly folded. 19
 – Leaves in a rosette; seeds flat to saucer-shaped. 21
19. Roots fleshy, fusiform, without tubers. 18. *C. subpetiolatum*
 – Roots wiry with distal tubers. 20
20. Leaves up to 0.6 cm wide; peduncle pubescent; tepals less than 10 mm long, with 3 veins. 19. *C. tordense*
 – Leaves usually more than 0.6 cm wide; peduncle glabrous; tepals 15 mm or more long, with 5–7 veins. 20. *C. cameronii*
21. Leaf margin glabrous; pedicels 8–13 mm long; tepals 9–15 mm long. 21. *C. macrophyllum*
 – Leaf margin scabrid to ciliate; pedicels up to 8 mm long; tepals up to 7 mm long. 22
22. Bract-like leaves not prominent; inflorescence leaning over or prostrate, often with pseudo-

- vivipary (small plantlets develop in the axils of the bracts in the inflorescence); capsules most often broader than long. 22. *C. comosum*
 – Bract-like leaves prominent and distinctly ciliate; inflorescence erect, never with pseudo-vivipary capsules, most often longer than broad. 23. *C. blepharophyllum*

1. *C. neghellense* Cufod. (1939)
 – type: SD, *Cufodontis* 169 (FT holo.).
C. ellenbeckii Poelln. (1943) – type: BA, *Ellenbeck* 2019 (B holo.).
C. gallarum Poelln. (1943) – type: SD, *Ellenbeck* 2081a (B probably destr.).

Small more or less prostrate plant. Rhizome horizontal carrying fibre remnants from old leaves; roots thin with small (*c* 1 x 0.3 cm) tubers on lateral root branches. Leaves in a rosette, lanceolate, obtuse with a hyaline, ciliate, often crisply undulate margin, 6–20 x 1.5–2.5 cm. Peduncle 2–3(–5) cm, prostrate. Inflorescence unbranched, or rarely with one basal branch, 4–12 cm long, flat on the ground. Bracts large and leaf-like, with several veins, ciliate margin, up to 15 x 5 mm. Flowers 2–4 at each node. Pedicels curved, *c* 10 mm at anthesis, elongating in fruit stage, apparently without articulation. Flowers white, tepals spreading, *c* 8 mm long with 3–5 veins. Stamens shorter than the tepals; filaments *c* 4 mm; anthers shorter and coiled after anthesis. Infructescence more or less hidden under the leaves; capsules triangular, slightly ridged, 6–8 x 4–5 mm. Seeds irregularly folded, 2 mm across.

In *Acacia* – *Combretum* – *Commiphora* dominated woodland to degraded bushland, often heavily grazed, on red (rarely black) sandy soils; 1050–1700 m. SD BA; endemic to South Ethiopia. *Friis* et al. 3255; *Mooney* 9730; *Sebsebe* D. 2174.

2. *C. geophilum* Peter ex Poelln. (1946)
 – type: Tanzania, *Peter* 35409 (B holo.).

Plant up to 5 cm. Rhizome short, carrying narrow roots with elongated tubers. Leaves in a prostrate rosette, 4–6 per plant, petiolate, broadly lanceolate, acute, glabrous, rather thick, with prominent veins, up to 20 x 4–8 cm. Peduncle terete, 0–2 cm long so that the inflorescence appears at the ground level among the leaves. Inflorescence up to 4 cm long, dense, branched, sometimes looking almost like a head; floral bracts large, up to 10 mm long. Pedicels apparently not articulate, *c* 5 mm long. Perianth white, *c* 6 mm long, stamens as long as the perianth; anthers shorter than the filiform filaments. Style filiform, as long as the stamens. Capsule triangular, *c* 5 x 4 mm, smooth. Seeds saucer-shaped, *c* 2 mm across.

Growing in clumps in open grassland with bare patches; *c* 590 m. IL (Gambella); also in woodland west to Burkina Faso and south to Malawi and Zambia. *Ash* 539.

The species is very similar to another widespread, more or less prostrate species with reduced peduncle,

C. pusillum Schweinf. ex Baker (1878), with type from the Sudan. Petiolate leaves which are rather thick with prominent veins and branched inflorescences characterise *C. geophilum*, whereas *C. pusillum* has broad-based thin leaves and unbranched inflorescences. The relation between the two species should be further investigated.

3. *C. tetraphyllum* (L.f.) Baker (1876);

Scilla tetraphylla L.f. (1781) – type: Yemen, *Fabricius* s.n. (LINN holo.).

C. schimperi Engl. (1891) – type: TU, Gafat, *Schimper* 1203 (B holo., BM K iso.).

Small more or less prostrate plant. Rhizome short carrying fibre remnants from leaves of previous year; roots swollen, often also with elongated tubers up to 4 cm long. Leaves in a rosette, narrowly lanceolate, acute, with a hyaline ciliate margin, 3–25 x 1–3 cm. Peduncle reduced, hidden amongst the leaf bases. Floral bracts large and leaf-like, with several strong veins, sometimes hyaline, 20–40 x 2–4 mm. Rachis most often reduced making the inflorescence umbel-like, sometimes a few umbel-like clusters along an up to 1 cm rachis. Pedicels curved, 15–30 mm, and apparently without articulation. Flowers white, tepals spreading to reflexed, 6–8 mm, 3-veined. Stamens shorter than the tepals, and filaments longer than the anthers which are bright orange. Capsules subglobose, slightly triangular, c 3 mm long. Seeds saucer-shaped to slightly irregularly folded, c 1 mm across.

In open scrub or grassland, often in degraded and overgrazed areas, on red or black soils; 1250–3400m. EW TU GD GJ WU SU WG SD BA; also in Yemen. *Mooney* 7904; *Thulin* et al. 3953; *de Wilde* et al. 7278.

4. *C. longifolium* Schweinf. ex Baker (1877)

– type: TU, Beless, *Quartin-Dillon* s.n. (P holo.).

Anthericum longifolium Rich. (1850), nomen illegit. non Jacq. (1787) – type: TU, Beless, *Quartin-Dillon* s.n. (P holo.).

A. drimiopsis Baker (1876); *Chlorophytum drimiopsis* (Baker) Poelln. (1945).

C. papillosum Rendle (1895).

Plant 50–105 cm high. Rhizome thick, horizontal, moniliform, up to 10 cm long, with concentric rings of old leaf attachments, and fibrous remains of old leaf bases. Roots spongy, often swollen towards the tips. Leaves in a rosette, linear, to narrowly lanceolate, often with channels, 20–50 x 1–2.2 cm, with undulate, ciliate margins. Peduncle terete, glabrous below, densely papillate above, with up to 15 cm long leaves all along its length. Inflorescence a simple spike, or with 1–3 basal branches, flowers congested. Floral bracts linear, subulate, lower ones up to 2 cm long. Pedicels 1–5 at each node, c 5 mm long in fruit, articulate at the apex. Perianth white, bell-shaped or urceolate, 3-veined, scabrid at the tips, densely glandular papillate on the inside, especially above the ovary. Stamens exerted; filaments fusiform, longer than the anthers. Style bent, as long as the stamens. Capsule oblong, deeply 3-lobed,

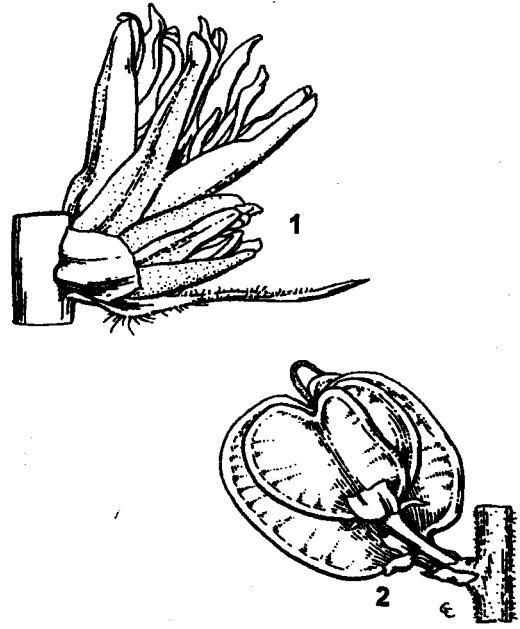


Figure 190.2 *CHLOROPHYTUM LONGIFOLIUM*: 1 – node from inflorescence, 3-flowered x 3; 2 – node of infructescence, 2-fruited x 3. 1 & 2 from *Philcox, Leppard & Dini* 8722. Drawn by Eleanor Catherine. (Modified and reproduced with permission from *Fl. Zambesiaca*.)

up to 10 mm long, smooth. Seeds rounded, flat, c 4 mm across. Fig. 190.2.

Rare, in woodland; c 1400–2000 m. TU GD; also in Tanzania, Zambia, Zimbabwe, Botswana and Namibia. *Chiovenda* 529, 654; *Schimper* 637, 1989.

5. *C. nubicum* (Baker) Kativu (1993);

Anthericum nubicum Baker (1878) – type: Sudan, *Petherick* s.n. (K holo.).

Chlorophytum pleurostachyum Chiov. (1951) – type: SD, *Corradi* 4667 (FT lecto.).

Plant producing leaves after flowering, loosely tufted, with leafy sterile shoots, 10–40 cm high. Rhizome thick, moniliform, often carrying fibrous remains of old leaf bases. Roots spongy and thick. Leaves in a rosette, linear, sheathing at the base, glabrous, up to 25 x 0.5 cm; margins minutely papillate, scabrid or ciliate. Peduncle terete, with small leaves along its entire length; bracts lanceolate to ovate, breaking up on drying. Inflorescence unbranched. Pedicels articulate below the middle, 2–4 together at the lower nodes, c 10 mm long in fruit. Perianth white with dull pink to brown stripes on the outside, the tepals 3(–5)-veined, 7–15 mm long. Stamens shorter than the perianth; filaments 4–5 mm, glabrous, filiform; anthers up to 4–5 mm long, often curved on drying. Style as long as the stamens. Capsule subglobose, triangular, c 5 x 4 mm, shallowly transversely ridged. Seeds irregularly folded, c 2 mm in diameter.

In lava grassland or burnt areas in dry woodland,

550–2300 m. IL SD; rare, but widely distributed in tropical Africa, west to Guinea and south to northern Mozambique and Zambia. *Corradi* 4667; *Gillett* 14408; *Jansen* 5067.

6. *C. ducis-aprutii* Chiov. (1929)

– type: BA, Tomono, *Basile* 277 (FT holo.).

C. burgeri Cufod. (1971) p.p., quoad *Burger* 1025 (K).

Very robust plant, 0.06–2 m tall from a thick moniliform rhizome, carrying the fibrous remains of old leaf bases; roots spongy without tubers. Leaves several, basal, in 2 ranks (might appear more of a rosette in older stages), linear to narrow lanceolate 45–105 x 1.5–3 cm, acute, sheathing below, margin often shortly ciliate, with a more or less distinct midrib. Peduncle terete, glabrous, up to 1 m long and with a diameter of about 1 cm at the base, with clasping bract-like leaves, 4–15 cm long. Inflorescence a simple or branched raceme, rachis glabrous; bracts, ovate, cuspidate, 10–30 mm long, sometimes ciliate along margin; flowers 1–4 at each node; pedicels 4–9 mm long, glabrous, articulate near or below the middle, green below and white above the articulation. Tepals spreading, subequal, 3-veined, white with pale green stripes on the outside, inner ones 12–17 x 4–6 mm, outer slightly narrower. Stamens subequal, as long as the perianth; filaments fusiform, glabrous, 8–10 mm long; anthers 5–8 mm, slightly curved apically at anthesis. Style bent, exserted. Capsule deeply 3-lobed, smooth, 9–14 x 7–9 mm, with the perianth persistent at the base. Seeds thin, flat, black, c 2.5–4 mm across. Fig. 190.3.

On grassy slopes, in thickets or evergreen forest, sometimes in ravines or near ditches, on more or less loamy, dark brown to red soils; 1200–3000 m. EW BA HA; endemic to the Flora area. *Burger* 1369; *Nordal* 1045; *Pappi* 5467.

This species is the most robust of all *Chlorophytum* species occurring in the Flora area. There is a slight infraspecific variation: the northern populations lack the ciliate leaves which characterises the more southern populations. Subspecific recognition might be justified.

7. *C. silvaticum* Dammer (1912)

– type: Tanzania, *Busse* 1310 (B holo.).

Dasystachys debilis Baker (1898); *C. bakeri* Poelln. (1946).

Plant often clumped, 10–15 cm high. Rhizome short, roots spongy, fusiform, occasionally reduced to sessile or subsessile tubers. Leaves in a rosette, erect, glabrous, linear-lanceolate, sheathing at the base, 5–15 x 0.5–1 cm, margins often undulate. Bract-like leaves more or less membranous. Peduncle slender, terete, leafless, scabrid to slightly pubescent, up to 10 cm long. Inflorescence dense, subspicate, 2–5 cm long; floral bracts lanceolate, up to 5 mm long. Pedicels solitary, articulate at the apex, c 0–2 mm long in fruit. Perianth united at the base, more or less bell-shaped, white, 6 mm long; tepals narrow, 1-veined. Stamens slightly exserted; an-

thers small c 1 mm long, much shorter than the filiform filaments. Style exserted. Capsule subglobose, deeply 3-lobed, c 3 x 3–4 mm. Seeds disc-shaped, c 2.5 mm in diameter.

In degraded *Acacia* – *Commiphora* woodland or in remnants of *Juniperus* forest on red sandy soil; 850–1900 m. SD; widespread in eastern tropical Africa, south to Zimbabwe and Mozambique. *Gilbert & Jefford* 4607; *Gilbert & Jones* 144; *Nordal et al.* 2245.

8. *C. somaliense* Baker in Baker & Engl. (1893)

– type: Somalia, *Hildebrandt* 1468 (B holo.).

C. tenuifolium Baker (1895).

C. baudi-candeanum Chiov. (1911) – type: HA, *Baudi & Candeo* s.n. (FT holo.).

C. pauciflorum Dammer in Poellnitz (1946).

C. boranense Chiov. (1951) – type: SD, *Corradi* 1629 (FT holo.).

C. tertalense Chiov. (1951) – type: SD, *Corradi* 4662 (FT holo.).

Plant 30–70 cm high. Rhizome short, moniliform, carrying fibres from leaf bases of former years. Roots thick and spongy throughout, or narrow near the base growing into very long, conspicuous tubers. Leaves in a rosette, erect or sometimes falcate with clasping bases, channelled, glabrous, often blue to grey-green, narrowly lanceolate to linear, 20–40 x 0.5–3 cm, margin undulate, bract-like leaves with hyaline margin. Peduncle, erect, leafless, 15–40 cm. Inflorescence a simple raceme with one flower at each node, rachis glabrous; floral bracts short, indistinct. Pedicels glabrous, c 10 mm at anthesis, elongating with age, articulate in upper half. Flowers conspicuous, slightly irregular. Tepals white with pale-green midrib, 15–17 mm long, narrow, 3-veined, constricted and thus forming an urceolate structure around the ovary, outer parts reflexed at anthesis. Stamens longer than the perianth, exserted; filaments bent up to 15 mm, anthers 2–3 mm long. Style bent, exserted. Capsule with remnants of the perianth at the base, deeply 3-lobed, emarginate, variable in size, but often very large, (7–)10–15 mm long and most often distinctly longer than wide. Seeds several, disc-shaped, 3–5 mm across. Fig. 190.4.

In more or less degraded *Acacia* – *Combretum* – *Commiphora* woodland to bushland, also on treeless grassland; on black cotton-soil or red lateritic-soils, but also in sand, limestone or gypsum-type rocks; 800–1650 m. SU GG SD BA HA; also widespread in Somalia and Kenya. *Friis et al.* 2669B; *Mooney* 9740; *Thulin et al.* 3403.

9. *C. bifolium* Dammer (1905)

– type: BA (?), between Marta and Djaru, *Ellenbeck* 2042 (B holo.).

Small plant up to 15 cm high from a very short rhizome; roots reduced to a fascicle of elongated tubers, 1.5–2 cm long. Leaves 2–5, in a rosette, lanceolate, 8–14 x c 1.5 cm, acute, with hyaline margins. Peduncle slender, scabrid, leafless, 5–7 cm long. Inflorescence a simple



Figure 190.3 *CHLOROPHYTUM DUCIS-APRUTII*: 1 - whole plant $\times 1/10$; 2 - leaf margin $\times 4 1/2$; 3 - flower & buds $\times 1 1/2$; 4 - capsule with pedicel and bract $\times 1 1/2$; 5 - seed $\times 7 1/2$. All from *Nordal* 1045. Drawn by Kerstin Thunberg. (Reproduced with permission from *Nord. J. Bot.* 13(3): 261)

raceme; rachis puberulous; bracts narrow, membranous, up to 3 mm long. Flowers inconspicuous, one at each node (rarely 2 at the lower nodes); pedicels suberect, 3 mm long at anthesis, glabrous, articulate near to slightly above the middle. Tepals semispreading, white, 6 mm long, 3-veined. Stamens shorter than the perianth. Capsule triangular, transversely indistinctly ridged, 6–9 x 9–12 mm, emarginate, with withered remnants of the perianth at the base. Seeds flat, slightly folded, 2 mm across.

Growing in shallow, poorly drained soils on limestone (information from Somalia, no data on ecology or altitude from Ethiopia). BA(?); in Ethiopia only known from the type locality; also in adjacent Somalia and NE Kenya.

10. *C. pterocarpum* Nordal & Thulin (1993)

– type: BA, Nordal, Melaku & Petros 2288 (O holo., ETH iso.).

Small plant up to 10 cm high, from a very short rhizome, carrying the fibrous remains of old leaf bases; roots swollen, narrow in the proximal part, then expanding to a tuber-like structure, 1.5–2.5 x 0.5 cm. Leaves 2–5, in a rosette, lanceolate 5–7 x c 1.5 cm, acute to almost obtuse, often prostrate, with a finely undulate-crispate hyaline margin. Peduncle slender, glabrous, leafless, 3–5 cm long. Inflorescence a simple raceme, rachis glabrous; bracts, small, membranous, 0.5–2 mm long; flowers, inconspicuous, 1 at each node; pedicels stiffly spreading, 5–12 mm long at anthesis, glabrous, articulate near the apex, c 1 mm below the flower. Tepals semispreading, subequal, oblong, white, 6–8 mm long, 3-veined. Stamens shorter than the perianth; filaments filiform, slightly scabrous, c 3 mm long; anthers c 2 mm, straight at anthesis. Style straight reaching as long as the stamens. Capsule deeply 3-lobed, with three flat wing-like compartments, slightly transversely ridged, 6–9 x 9–12 mm, emarginate, with withered remnants of the perianth at the base. Seeds thin, flat, black, c 3–4 mm across. Fig. 190.5.

In *Acacia*–*Commiphora* woodland and bushland on limestone; 1400–1500 m. BA; a narrow endemic only known from the Sof Omar area. Friis et al. 3639.

11. *C. inconspicuum* (Baker) Nordal (1993);

Anthericum inconspicuum Baker (1877) – type: Somalia, Hildebrandt 1469 (K holo.).

A. laxum auct. non R.Br., p.p., quoad specimen, Schimper 2231 (Gurrsarja) Cufodontis (1971).

Slender herb from a short rhizome, roots thin in the proximal parts, swelling to elongated tubers distally. Leaves filiform or narrowly linear, 10–25 x 0.1–0.3 cm, glabrous except for the sometimes scabrid margins; basal sheaths somewhat white to purple. Peduncle reduced so that the lower flowers/fruits are found within the leaf rosette. Inflorescence a very lax, simple raceme 2–15 cm long, prostrate, rachis glabrous to slightly scabrid; bracts ovate-acuminate c 2 mm long; flowers 1–2 per node; pedicels 2–5 mm long, articulate near or

below the middle, glabrous, curved. Tepals white, with an outside pale green stripe, 3–5 mm long, 3-veined. Stamens 3–4 mm; filaments c 2.5 mm, glabrous, anthers c 1 mm long. Capsule deeply 3-lobed, large compared to the size of the plant, 8–10 x 5–6 mm when ripe, with withered perianth remains at the base. Seeds deeply folded, c 2 mm across.

In woodland or degraded bushland, on shallow soils overlying volcanic rocks or limestone; 750–1800 m. SU SD; also in Somalia, northern Kenya, probably also in Yemen and Oman. Beccari 247; Gilbert et al. 3975; Schimper 471.

12. *C. tuberosum* (Roxb.) Baker (1876)

– type 'from India.'

C. russii Chiov. (1916) – type: Somalia, Paoli 275 (FT lecto.).

C. kulsii Cufod. (1969) – type: GG, Kuls 401 (FR holo.).

Plant 20–40 cm high. Rhizome short, irregular, often carrying fibrous remnants from leaves of previous years; roots swollen with robust distal tubers up to 7 x 1 cm. Leaves in a rosette, glabrous, lanceolate, 10–40 x 1–3 cm, sheathing below, apex acute to obtuse, sometimes reduced to bract-like leaves with ciliate margin. Peduncle stout, 10–20 cm long, leafless, glabrous, terete. Inflorescence unbranched, racemose, up to 15 cm long, bracts hyaline, lanceolate up to 10 mm. Pedicels 1–3 at each node, up to 10 mm long, articulate near the middle. Flowers large and showy, sweet scented, shallowly bowl-shaped, about 30 mm in diameter. Tepals 20 x 6–9 mm, 9-veined (the only species in the genus with this feature). Stamens 9–12 mm; filaments filiform, 5–6 mm; anthers 3–6 mm. Style straight and exerted. Capsule deeply 3-lobed, c 15 x 8–12 mm, slightly emarginate. Seeds irregularly folded, c 2 mm across.

In woodland or bushland, often in degraded *Combretum/Terminalia* vegetation on heavy black soils or more sandy soils, often in seasonally flooded areas and flood plains; 550–1600 m. EW TU GD GJ WU SU IL KF GG SD; also in a wide belt from Nigeria east to Somalia and India and south to northern Tanzania. Friis et al. 2553; Thulin et al. 4037; de Wilde et al. 7340.

13. *C. zavattarii* (Cufod.) Nordal (1993);

Anthericum zavattarii Cufod. (1939) – type: SD, Zavattari 689 (FT holo.).

Plant 30–60 cm. Rhizome short, carrying fibrous remnants from leaves of previous years; roots swollen and thick throughout their length. Leaves in a rosette, broadly lanceolate with more or less rounded apex, 10–20 x 2.5–5 cm, sheathing below, often with a hyaline margin. Sheathing bract-like leaves sometimes present. Peduncle terete, 10–25 cm, leafless, but sometimes with one sterile bract below the inflorescence. Inflorescence a much-branched panicle. Bracts supporting stiffly-spreading lateral branches up to 30 mm long; floral bracts short, lanceolate and acute. Pedicels stiffly



Figure 190.4 *CHLOROPHYTUM SOMALIENSE*: 1 – whole plant x 1/2; 2 – flower x 1 1/2; 3 – young fruits x 1 1/2. All from Nordal 2286, (plant cultivated in Oslo, originating in Sof Omar, Ethiopia). Drawn by Annegi Eide.

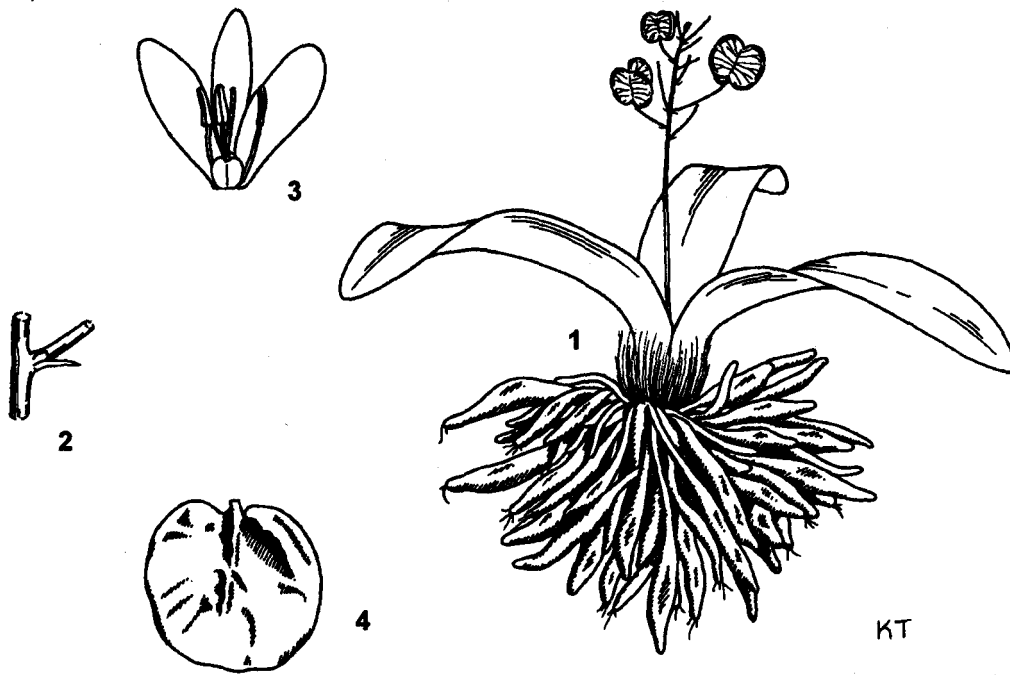


Figure 190.5 *CHLOROPHYTUM PTEROCARPUM*: 1 – whole plant $\times \frac{3}{4}$; 2 – base of pedicel showing bract and bracteole $\times 3$; 3 – flower with 3 tepals and stamens removed $\times 3$; 4 – seed $\times 7\frac{1}{2}$. All from the type, Nordal, Melaku & Petros 2288. Drawn by Kerstin Thunberg. (Reproduced with permission from *Nord. J. Bot.* 13 (3): 270.)

spreading to semi-spreading, 1–3 at each node, up to 25 mm long, articulate near the apex. Tepals spreading, 5–6 mm, white with pale green dorsal stripe, 3-veined. Stamens shorter than the tepals, anthers slightly shorter than the filaments. Style straight, not exserted. Fruits not seen.

In open woodland or bushland dominated by *Acacia*, *Commiphora*, and/or *Combretum*, often in degraded and heavily grazed vegetation, on red soils or on rocky limestone; 1400–1700 m. SD BA; also in Somalia and northern Kenya. Friis et al. 3646; Mesfin T. & Vollesen 4146; Mooney 9939.

Cufodontis, *Enum.* (1971) in the subgeneric classification of *Chlorophytum* considered that this species should be in *Trachyandra* (now in *Asphodelaceae*). However, the species is a typical *Chlorophytum* in all aspects.

14. *C. micranthum* Baker (1878)

– type: Sudan, Schweinfurth 1745 (K holo., B iso.).

Plant with leaves appearing after flowering, up to about 20 cm high. Rhizome short, moniliform, carrying fibrous remains from leaves of previous years. Roots fairly narrow, with small tubers on lateral root-branches. Leaves in a rosette, glabrous, narrowly lanceolate, never collected when fully developed. Peduncle leafless, up to 10 cm long. Inflorescence simple or slightly paniculate, rachis glabrous; floral bracts small. Pedicels 2–4 at a node, up to 20 mm long, articulate near the middle. Tepals spreading to slightly reflexed, pale green, 4–5 mm long, 3-veined. Stamens as long as the perianth; filaments 3–4 mm long, anthers shorter. Style filiform, exserted. Capsules 3-lobed, c 4

mm long. Seeds not known.

In *Pterocarpus* – *Anogeissus* woodland on sandy soils; 600 m. IL; also known from adjacent Sudan and Kenya. Friis et al. 2549.

This species is rather close to *C. gallabatense* and might just be a small form producing leaves after flowering, and thus not deserving more than subspecific rank.

15. *C. gallabatense* Schweinf. ex Baker (1876)

– type: Sudan, Schweinfurth 10 (K lecto.).

C. ukambensis Baker (1898).

C. ginirese Dammer (1905) – type: BA, Ellenbeck 1960 (B holo.).

C. elachistanthum Cufod. (1969) – type: GG, Kuls 357 (FR holo.).

Plant 15–60(–75) cm high. Rhizome horizontal, short, moniliform. Roots fairly narrow, shortly branched, bearing tubers 2–3 \times c 1.5 cm, mainly on the lateral branches. Leaves in a rosette, (3–)5–8 to a stem, glabrous, lanceolate, broadest at the middle, narrowed and clasping below, occasionally petiolate, 10–75 \times 2–4 cm, margins glabrous or minutely scabrid, often undulate; peduncle glabrous, leafless, occasionally with a single sterile bract below the inflorescence, up to 20 cm long. Inflorescence paniculate; branches most often with short internodes, more elongated (and *C. comosum*-like) in shade-forms; rachis glabrous to scabrid; bracts 5–15 \times 1–2 mm, larger in shade forms. Pedicels scabrid, 2–4 at a node, articulate near or above the middle, 3–10 mm long. Perianth with reflexed tepals, pale green, 5–7 mm long, 3-veined. Stamens as long as the perianth; anthers 2–4 mm long before anthesis and shorter or longer than the fusiform filaments. Style

filiform, exserted. Capsule emarginate, deeply 3-lobed, *c* 3–5 x 5–7 mm, smooth. Seeds disc- to saucer-shaped, *c* 2.5 mm in diameter.

In more or less degraded and heavily grazed woodland dominated by *Acacia*, *Combretum*, *Commiphora* and/or *Terminalia*; *c* 700–2100 m. EW TU SU WG GG SD BA HA; also widespread west to Senegal and through East Africa south to Zimbabwe. *Friis* et al. 2669; *Mooney* 9724; *Sebsebe D. & Enserwu K.* 2896.

Shade forms (*Gilbert & Thulin* 638) are superficially similar to *C. comosum* by having almost trailing, semi-prostrate inflorescences. They can be distinguished by flower colour (pale green in *C. gallabatense*, white in *C. comosum*) and root system (small tubers on lateral branches in *C. gallabatense*, long and spongy in *C. comosum*). Sometimes dwarf shade forms with prostrate inflorescences tend to resemble *C. humifusum* (*Friis* et al. 3459, *Gilbert* 4019, *de Wilde* 6620), but this species has narrower leaves in 2 ranks.

16. *C. humifusum* *Cufod.* (1939)
– type: SD, *Cufodontis* 690 (FT holo.).

Small plant, rarely more than 12 cm tall, from a moniliform rhizome carrying short fibrous remnants from older leaves; roots wiry, shortly branched, bearing small tubers up to 1 x 0.5 cm, mainly on the lateral root branches. Leaves more or less in 2 ranks, glabrous, narrowly lanceolate, petiolate, up to 12 x 1 cm. Peduncle short, only up to 1 cm long. Inflorescence up to 15 cm long, prostrate, simple or with one basal branch, lax with elongated internodes; rachis scabrid; floral bracts up to 4 mm, sometimes ciliate. Flowers 1(–2) at each node. Pedicels 6–8 mm at anthesis, elongating slightly in fruit, articulated in the lower half. Perianth open, white, tepals 5–7 mm long, 3-veined. Stamens shorter than the tepals. Style straight. Capsule *c* 4 x 4 mm. Seeds not known.

In shallow stony soils in bushland or woodland often dominated by *Acacia* & *Commiphora*; *c* 1000–1300 m. SD BA; restricted to southern Ethiopia and adjacent parts of Kenya. *Friis* et al. 2719; *Gilbert & Sebsebe D.* 8593; *Nordal* et al. 2251.

This species has sometimes been confused with slender shade-forms of *C. gallabatense* (see under that species).

17. *C. pendulum* *Nordal & Thulin* (1993)
– type: BA, *Nordal, Melaku & Petros* 2294 (O holo., ETH iso.).

Slender, tufted plant 15–40 cm tall from a short, sometimes moniliform rhizome, carrying the fibrous remains of old leaf bases. Roots thin and wiry with tubers, 1–2 x 0.5–1 cm. Leaves several, in a rosette, green to olive green, linear with a distinct midrib, 20–45 x 0.4–0.9 cm, sheathing below, erect but upper part drooping, margin distinctly ciliate; bract-like leaves more or less membranous, sometimes with a characteristic white/green striping. Peduncle slender, lax, glabrous, leafless, 5–30 cm long. Inflorescence a simple raceme; rachis glabrous to

slightly papillose, often drooping; bracts, small, membranous, ovate, cuspidate, 1–4 mm long, sometimes ciliate along margin. Flowers 1–4 at each node; pedicels very thin, glabrous, 5–12 mm long at anthesis, articulate near the base. Tepals spreading, white, with pale green to brown stripes on the outside, 5–9 mm long, 3-veined. Stamens shorter than the perianth; filaments linear, scabrous to papillate, *c* 5 mm long; anthers *c* 2 mm, curved at anthesis. Style straight, reaching as long as the perianth. Capsule pendent, deeply 3-lobed, slightly transversely ridged, 10–15 x 6–10 mm, triangular in longitudinal section, emarginate, with remnants of the perianth at the base. Seeds thin, flat, black, *c* 3–4 mm across. Fig. 190.6.

In woodland dominated by *Acacia*, *Combretum*, and/or *Commiphora*, more or less in shade, on dark or red stony soils, sometimes on limestone; 1000–1650 m. SD BA; also in N Kenya. *Friis* et al. 3641; *Gilbert & Jones* 75; *Thulin* et al. 3444.

The species is fairly homogenous within the distribution area, but there is some variation in indumentum and capsule shape. The closest relative seems to be the more or less sympatric *C. tordense* *Chiov.*, from which it differs by the glabrous peduncle and pendent triangular capsules.

18. *C. subpetiolatum* (*Baker*) *Kativu* (1993);
Anthericum subpetiolatum *Baker* (1876) – type:
Mozambique, Kirk s.n. (K holo.).
A. monophyllum *Baker* (1878).

Plant 10–30 cm tall. Rhizome moniliform, bearing fibrous remains of old leaf bases. Roots spongy, fusiform, swollen at the base, tapering towards the tips. Leaves in 2 ranks, sometimes irregularly arranged, 1–7 to a stem, more or less firm, sometimes distinctly ribbed, petiolate, linear-lanceolate to lanceolate, glabrous, 5–30 x 0.5–2 cm, outer ones wider, curved and bract-like. Peduncles often glabrous below and pubescent in the upper half, 5–25 cm long. Floral bracts oblanceolate, scabrid to ciliate on the margins, lower ones up to 20 mm long, upper ones gradually smaller. Pedicels 1–2 at each node, articulate below the middle, up to 6 mm long in fruit. Flowers white, star-like, tepals 7–15 mm long, 3–5-veined, sometimes streaked brown or green on the outside. Stamens shorter than the tepals; anthers longer than the filaments, often curled on drying. Ovary with 14–20 ovules per cell; style slightly bent, exserted. Capsule shallowly 3-lobed, smooth, 5–7 mm long, slightly emarginate. Seeds irregularly folded, *c* 1.5 mm across. Fig. 190.7.

In overgrazed grassland and degraded woodland, on black, brown to red, more or less barren soils; *c* 1200–2000 m. SU SD HA; a variable polyploid species complex, widely distributed in tropical Africa west to Nigeria and south to Angola, Zimbabwe and Mozambique. *Burger* 2714; *Gilbert & Jefford* 4449; *Sebsebe D. & Tamrat B.* 2326.



Figure 190.6 *CHLOROPHYTUM PENDULUM*: 1 – whole plant $\times \frac{2}{5}$; 2 – flower with 3 tepals and stamens removed $\times 3$; 3 – seed $\times 7\frac{1}{2}$. All from Nordal, Melaku & Petros 2294. Drawn by Kerstin Thunberg. (Reproduced with permission from Nord. J. Bot. 13 (3): 268)

19. *C. tordense* Chiov. (1916)

– type: Somalia, Paoli 321 (FT holo.).

Slender, tufted plant *c* 25 cm tall, from a distinctly moniliform rhizome, carrying the fibrous remains of old leaf bases; roots thin and wiry with tubers, 1 x 0.5 cm. Leaves grass-like, in 2 ranks, erect or falcate, linear, channelled, 15–20 x 0.4–0.8 cm, sheathing below, margin and midrib distinctly ciliate; short bract-like leaves ciliate on margin and veins, with a characteristic cross-banded pattern of white and green. Peduncle slender, bent below, stiffly erect above, scabrid to pubescent, leafless, 10–15 cm long. Inflorescence a simple raceme, rachis scabrid, often sinuate (zigzagging); bracts membranous, ovate, cuspidate, up to 5 mm long with ciliate margins. Flowers single at each node; pedicels stiffly erect, up to 7 mm long, articulated near the base. Tepals spreading, white with green-brown stripe on the outside, 8–9 mm long, 3-veined. Stamens shorter than the perianth. Capsule erect, deeply 3-lobed, slightly transversely ridged, *c* 5 x 7 mm, emarginate, with remnants of the perianth at the base. Seeds thin, folded, *c* 3 mm across.

In *Acacia*–*Commiphora* bushland or wooded grassland, on shallow soils often overlying limestone; 950–1450 m. SD BA; also in southern Somalia and northern Kenya and Uganda. Friis et al. 2811; Gilbert et al. 1495; Thulin et al. 3444.

20. *C. cameronii* (Baker) Kativu (1993);

Anthericum cameroni Baker (1876) – type: Tanzania, Cameron s.n. (K holo.).

A. uyuiense Rendle (1895).

Plant tufted, 40–70 cm high. Rhizome short, knobby, horizontal, moniliform, carrying fibrous remains of old leaf bases. Roots thin, wiry, bearing distinct distant tubers. Leaves in 2 ranks, sometimes somewhat irregularly arranged, linear to linear-lanceolate, sheathing below, glabrous, 30–70 x 0.6–0.9 cm; midribs prominent. Bract-like leaves and outer leaf bases with red-brown spots or stripes. Peduncle flat, narrowly winged, glabrous, up to 40 cm long. Inflorescence unbranched, up to 16 cm long; rachis sinuate (zigzagging), winged below, terete above, glabrous; floral bracts small, lanceolate, acute. Pedicels 1–4 at each node, articulate below the middle, up to 8 mm long in fruit. Tepals 10–15 mm long, (3–)5–7-veined, white, outer ones pink on the outside. Stamens slightly shorter than the perianth, arranged in two groups, 4 in the upper and 2 in the lower; filaments glabrous, as long as the anthers. Style bent, slightly exerted. Capsule obovoid, triangular, transversely ridged, up to 7 mm long. Seeds irregularly folded, *c* 1 mm in diameter. Fig. 190.1.5–8.

In *Combretum* – *Terminalia* woodland with tall grasses on sandy soils; 500–600 m. WG IL; otherwise widespread through eastern Africa, south to Zambia and Malawi. Ash 532, 3516; Benedetto 106; Pavlov 242.

The species is closely related to *C. zanguibaricum* (Baker) Nordal (1993), which is based on *Anthericum zanguibaricum* Baker (1876) described from East Af-

rica. The only difference seems to be the absence of red spots on the bract-like leaves and leaf bases in the latter. The complex needs to be revised.

21. *C. macrophyllum* (A. Rich.) Asch. (1867)

– type: TU, Quartin-Dillon s.n. (P lecto.).

C. schweinfurthii Baker (1898) – type: Sudan, Schweinfurth 1968 (B lecto.).

Dasystachys melanocarpa Chiov. (1951) – type: SD, Corradi 4681 (FT holo.).

Plant often clumped, 30–90 cm high. Rhizome short, compact. Roots thick, spongy with spindle-shaped elongated tubers up to 6 cm long. Leaves in a rosette, petiolate, broadly lanceolate, glabrous, with undulate or crisped margins, 15–90 x 3–7 cm. Peduncle leafless (or with a few sterile bracts in the inflorescence), stout, erect, glabrous up to 50 cm long. Inflorescence up to 30 cm, dense, unbranched, or sometimes with 1–2 branches in lower part; rachis slightly scabrid; floral bracts 10–25 mm, drying off black. Pedicels fascicled, up to 9 at each node, articulate in the middle or upper half, 8–13 mm long. Perianth white, spreading, but slightly urceolate around the lower part of the ovary, then spreading, 3–5-veined, 9–15 mm long. Stamens as long as the perianth; filaments fusiform, scabrid, shorter than the anthers; style slightly bent. Capsule triangular, 5–12 mm long, most often slightly longer than wide, black when ripe. Seeds saucer-shaped, *c* 2.5 mm in diameter. Fig. 190.8.

In forest and along streams, also in woodland and open bushland, on black soils; 1500–2000 m. EW TU WG IL KF SD; widespread in tropical Africa west to Sierra Leone and south to Mozambique and Zimbabwe. Ash 2009; Lemma G. Selassie 768; De Wilde & De Wilde-Duyffes 6715.

Intermediate forms towards *C. comosum* are sometimes found, see comment under that species.

22. *C. comosum* (Thunb.) Jacq. (1862);

Anthericum comosum Thunb. (1794). – type: South Africa, Thunberg s.n. (UPS holo.).

Chlorophytum sparsiflorum Baker (1876).

Plant quite large, often growing in clumps, often with pseudo-vivipary; i.e. producing small plantlets from the bracts of the inflorescence. Rhizome vertical, short. Roots spongy, long, often with spindle-shaped tubers. Leaves lax, in a rosette, petiolate, lanceolate, usually glabrous, sometimes with ciliate to scabrid margin, 10–60 x 1–5 cm, often variegated in cultivated forms. Peduncles 1–4 to a plant, lax, more or less curved, glabrous. Inflorescence elongated to 75 cm, lax, open, paniculate or simple; rachis sometimes scabrid; bracts 5–20 mm, acute to acuminate. Pedicels articulate near or above the middle, (1–)2–4 at each node, 4–10 mm long. Perianth white to pale green, tepals spreading to slightly reflexed at anthesis, 4–7 mm long, 3-veined. Stamens exerted; filaments scabrid, dilated above the middle, longer than the anthers. Ovary sessile, with *c* 4 ovules per locule; style as long as the stamens. Capsule



Figure 190.7 *CHLOROPHYTUM SUBPETIOLATUM*: 1 - whole plant x 2; 2 - detail of open flower x 2; 3 - mature fruit x 5; 4 - seed x 15. 1 from *Milne-Redhead* 3076; 2 from *Kativu* 261; 3-5 from *Pawek* 3078. Drawn by Eleanor Catherine. (Reproduced with permission from *Fl. Zambesiaca*.)



Figure 190.8 *CHLOROPHYTUM MACROPHYLLUM*: 1 – complete plant in flower $\times \frac{1}{2}$; 2 – inflorescence node with flowers in various stages of development $\times \frac{2}{3}$. Both from *Nordal 1033* (plant cultivated in Oslo, originating in Nekemte, Ethiopia). Drawn by Annegi Eide.

deeply 3-lobed, emarginate, often broader than long, 3–6 x 4–8 mm. Seeds saucer-shaped, slightly folded, *c* 2–3 mm across.

Undergrowth in rain and riverine forest on brown to black loamy-clay, in crevices in rocks along streams, sometimes epiphytic, also as an ornamental; 1050–1900 m. IL KF; otherwise throughout tropical Africa, south to Cape. *Fris* et al. 2160; *Mooney* 3758, 9199.

A variable species which sometimes has forms with more dense and erect inflorescences, thus resembling *C. macrophyllum* (*Fris* et al. 3902). The taxonomy of these intermediate forms should be further investigated. The non-viviparous form has usually been called *C. sparsiflorum*. The Ethiopian populations seem to mix viviparous and non-viviparous forms more or less randomly and taxonomic separation is not recommended.

Forms of *C. comosum* (Thunb.) Jacq. are common and widespread as ornamentals used as pot-plants in both buildings and in gardens. The most common variety in Ethiopia has variegated leaves, a brown somewhat woody peduncle and white flowers.

23. *C. blepharophyllum* *Schweinf. ex Baker* (1876)
 – type: Sudan, *Schweinfurth* 9 (K holo.).
C. ciliatum *Baker* (1878).

Plant very variable, 10–40 cm high. Rhizome small covered with fibrous remains of old leaf bases. Roots spongy, with elongated tubers near the tips. Leaves in a rosette, olive green above, paler below, lanceolate, moderately firm, clasping the peduncle; blade 10–30 x

1.5–4 cm long, margins ciliate; bract-like leaves orange to purple or with coloured veins, with ciliate and often crisped margins. Peduncle leafless, smooth, shorter than the leaves. Inflorescence usually unbranched, occasionally with a few short branches at the base; floral bracts linear to lanceolate, lower ones up to 25 mm long, often shortly ciliate and hairy. Pedicels articulate near or above the middle, up to 10 mm long in fruit, 2–4 at each node. Perianth white, tinged with brown, slightly bell-shaped near the base, tepals 6–8 mm long, 3–5-veined, scabrid on margins and veins, spreading except for the base. Stamens shorter than the perianth; anthers small, much shorter than the filaments. Ovary with *c* 14 ovules per cell; style straight, as long as the stamens. Capsule obovoid, emarginate, deeply 3-lobed, 6–10 mm long, usually longer than broad, with persistent perianth remnants at the base. Seeds disc-shaped, *c* 2–3 mm in diameter.

In open deciduous woodland (*Combretum*) and grassland margins, often on light sandy or stony soils; 550–1200 m. TU GJ IL; rare in Ethiopia, but otherwise widespread in tropical Africa, west to Senegal, through Central and East Africa, south to Angola, Zimbabwe and Mozambique. *Ash* 1094; *Mesfin T.* et al. 6219; *Thulin & Hunde* 4016.

The plants from TU and GJ are similar to the widespread form with erect fruits, whereas the IL plants seem to have more pendent fruits. More material is needed to decide whether this form deserves a taxonomic rank.

191. ASPHODELACEAE

by Sebsebe Demissew* & I. Nordal**

Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 179 (1985); Thulin, 149. *Asphodelaceae* in *Fl. Somalia* 4: 32–34 (1995).

Rhizomatous perennial herbs, generally producing anthraquinones which make the rhizome yellow inside, sometimes with thickened storage roots, but without distinct tubers. Leaves in basal rosette, rarely on a short woody stem, thin and flat to distinctly terete. Peduncles without leaves. Inflorescences simple, rarely branched; bracts 1 per flower. Pedicel always solitary, with or without a joint (articulation). Flowers bisexual, hypogynous, regular; tepals free or fused, white, green or pale yellow, pink, yellow or red. Stamens 6, free or slightly fused with the perianth; filaments linear, glabrous, scabrid or hairy; anthers dorsifixed, more or less versatile dehiscing to the inside along longitudinal slits. Ovary superior with 3 carpels, united to form a 3-locular ovary with 2-several ovules per cell; placentation axile; style slender with small stigma. Fruit generally a loculicidal capsule. Seeds enveloped with an aril making them dull brown or grey to black, sometimes glutinose.

A family with 8 genera and c 250 species in the Old World. The main distribution of the family is from the Mediterranean west to central Asia and Africa, particularly South Africa. It is represented by 5 genera and 12 species in the Flora area.

This family is closely related to Anthericaceae and may sometimes be difficult to distinguish on gross morphology (especially the genus *Trachyandra*, which until recently was even referred to the genus *Anthericum*).

Key to genera

- | | |
|---|-----------------------|
| 1. Perianth segments fused. | 1. <i>Kniphofia</i> |
| – Perianth segments free to the base. | 2 |
| 2. Perianth white, pink or yellow; filaments densely bearded. | 3 |
| – Perianth white with a red streak abaxially on the tepals; filaments glabrous or scabrid, never hairy. | 4 |
| 3. Tepals yellow, all 1-nerved. | 2. <i>Bulbine</i> |
| – Tepals pink, the outer 3–5-nerved. | 3. <i>Jodrellia</i> |
| 4. Pedicels without a joint; filaments scabrid, not expanded at the base. | 4. <i>Trachyandra</i> |
| – Pedicels with a joint; filaments completely glabrous, expanded at the base. | 5. <i>Asphodelus</i> |

1. *KNIPHOFIA* Moench (1794)

Baker in *Fl. Trop. Afr.* 7: 450–454 (1898); Codd in *Bothalia* 9: 394 (363–515) (1968); Cufodontis, *Enum.*: 1538–1541 (1971); Marais in *Kew Bull.* 28(3): 465–483 (1973).

Plants perennial, herbaceous, caespitose or solitary from a thick rhizome, rarely with a thick well-developed stem; rhizome simple or branched. Leaves in a basal rosette, usually in 4 or 5 ranks, rarely 2-ranked, linear, tapering gradually to the apex, usually keeled; margin smooth to minutely serrulate. Inflorescence peduncle terminal, stout, erect, subequal to the leaves, simple or very rarely branched, naked except for occasional sterile bracts below the inflorescence. Inflorescence a subcapitate raceme of usually numerous flowers, dense or somewhat lax; bracts scarious or brown, persistent, longer than the pedicels; pedicels short to almost ab-

sent, articulated at the apex; flowers spreading or pendulous, white, yellow, brown or various shades of red, the red pigment often more conspicuous at the apex producing a two-coloured appearance. Perianth tubular; tube campanulate to cylindrical or somewhat funnel-shaped, lobed; lobes short, subequal. Stamens 6, usually as long as or longer than the perianth at anthesis, three stamens opposite the inner perianth segments longer than the others; anthers dorsifixed, versatile, dehiscing to the inside. Ovary sessile, ovoid, 3-locular with many ovules in each locule; style filiform, subequal to the stamens at anthesis, usually finally exerted; stigma minute, capitate. Fruit globose to ovoid, often 3-angled with loculicidal dehiscence. Seeds somewhat flattened, acutely 3-angled or winged.

A genus of about 70 species distributed essentially in eastern and southern Africa, with one species in Madagascar and one in Arabia. About 45 species are recognised in southern Africa, 7 species occur in the Flora area.

- | | |
|--|----------------------|
| 1. Raceme very dense, stamens exerted for 8–15 mm. | 2 |
| – Raceme lax or subdense, stamens exerted for only up to 4 mm long at anthesis and later withdrawn. | 3 |
| 2. Perianth campanulate, 10–14(–18) mm long; flowers opening from top downwards. | 1. <i>K. pumila</i> |
| – Perianth funnel-shaped; 18–27 mm long; flowers opening from base upwards. | 2. <i>K. foliosa</i> |
| 3. Flowers white, pink, yellow, orange or red; bracts white or green, reflexed at or after anthesis. | 4 |
| – Flowers pale green or yellow white; bracts brown, not reflexed at anthesis or afterwards. | |

3. *K. hildebrandtii*

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4. Inflorescence cylindrical, flowers opening from base upwards. 5
 – Inflorescence capitate, flowers opening from top downwards. 4. *K. isoetifolia*
5. Perianth yellow, orange or red; usually growing in well-drained soil. 6
 – Perianth white, buds pale pink; growing in waterlogged meadows. 5. *K. insignis*
6. Inflorescence lax, with 1–3 flowers per cm, secund (flowers found on one side); bracts narrow, 1.2–2 mm wide. 6. *K. schimperi*
 – Inflorescence subdense, with 5–7 flowers per cm, on all sides (not secund); bracts broad, 3–4 mm wide. 7. *K. thomsonii*

1. *K. pumila* (Ait.) Kunth (1843);

K. comosa Hochst. (1844) – type: GD, Jan Meda (Dchara Meda), *Schimper* 1192 (K iso.).

K. abyssinica (DC. in Red.) Schweinf. ex Asch. (1867); *Veltheimia abyssinica* DC. in Red. (1807) – type: J. Bruce (origin from Abyssinia, introduced and cultivated in Paris, depicted in Redouté in *Lil.* 4: t. 186 1'1808').

K. leichtlinii Baker ex Hook.f. (1883) – type: Ethiopia, cultivated plants by Leichtlin in 1881, introduced into cultivation by Schimper (K holo.).

K. leichtlinii Baker var. *distachya* Baker in *Gard. Chron.* II, 22: 230 (1884) – type: cultivated, *Leichtlin* in Aug. 1884, original collection from Abyssinia (K holo.).

K. micrantha Chiov. (1951) – type: SD, between Aferara and Irba Moa (Yirba Muda), *Vatova* 763 (FT holo., not seen).

Plants slender, solitary with erect, corm-like root-stock, with some fibrous remains of leaves at the base. Leaves (15–)30–100 x 0.5–2 cm, linear, dark green to grey green, keeled; keels and margin smooth or minutely tuberculate, but not scabrid. Peduncle (including raceme) 30–90 cm long. Raceme 4–15 cm long (to 18 cm long in fruit), very dense 15 per cm, cylindrical. Bracts white, lanceolate to ovate-lanceolate, 3–10 x 1.5–5 mm, serrulate. Perianth yellow, orange, pale red to vermilion, campanulate, 9–13 mm long (14–18 mm long in cultivation), widening at the mouth and only slightly constricted at the base; perianth lobes small, 1–2 x 1–3 mm. Pedicel 1.5–3.5 mm long elongating to 6 mm long in fruit. Stamens and styles exerted, 10–15 mm long; stamens spirally twisted on fading. Fruit ovoid, each part of the capsule 5–9 x 4–6 mm. Fig. 191.1.

Grassland, grassy slopes, on steep-sided valleys and near streams in tall grass; 1200–2650 (–3150) m. EW TU GD GJ WU SU WG IL KF SD HA; also in Sudan, Uganda and Zaire. *Gilbert & Getachew* A. 2643; *Sue Edwards & Tewolde* B.G.E. 3670; *Sebsebe D. & Ensermu* K. 2598.

Marais (1973) considered specimens *Gilbert & Thulin* 807 (ETH K) from WG and *Ash* 1020 (K) from Ankober, SU, as hybrids between *K. pumila* and *K. schimperi*. The first mentioned specimen clearly belongs to *K. pumila* and it is not clear why Marais con-

sidered it a hybrid as one of the assumed parental species, *K. schimperi* is not found in WG. The second specimen, *J. Ash* 1020 is closer to *K. schimperi* than *K. pumila*.

K. erythraea Fiori in *Nuov. Bot. Ital.* 19: 427 (1912) – type: Eritrea, Hamasen, *Fiori* 883 (FT holo.) is probably a hybrid between *K. pumila* and *K. schimperi*. Flowers open from top downwards it has a perianth tube of c 4 mm long as in *K. pumila*. However, the lax inflorescence and the short protrusion of the anthers, only about 2 mm, are characters of *K. schimperi*. A second specimen *J. de Wilde* 4486 (B) from Eritrea, 18 km from Asmera to Massawa, is also a hybrid between *K. pumila* and *K. schimperi*. The perianth opens from the top down and measures 12–13 mm long as in *K. pumila*. The lax flowers, 3–4 per cm and anthers protruding only to 5 mm are features found in *K. schimperi*.

2. *K. foliosa* Hochst. (1844)

– type: TU, Adwa, *Schimper* 1003 (K fragment).

K. quartiniana A. Rich. (1851) – type: TU, Wodjerat, *Quartin-Dillon & Petit* 179 (K iso.).

K. densiflora Engl. (1892) – type: GD/TU, Urahut, Mt. Erareta, *Schimper* 701 (B holo.).

K. arussi Rendle (1929) – type: AR, ex *Hort. Haig-Thomas* (BM holo.).

Robust plants forming dense clumps, with thick erect rhizomes, sometimes with a stem up to 40 cm long, with some fibrous remains of leaves at the base. Leaves 20–100 x (1.6–)2–4(–7) cm; linear lanceolate, dark green to grey green, keeled; margin serrulate, keels smooth below, serrulate above. Peduncle (including raceme) 30–150 cm long. Raceme 15–40 cm long (to 50 cm long in fruit), very dense, cylindrical. Bracts white, drying brown, ovate to ovate-lanceolate, 4–12 x 2.5–3.5 mm, serrulate. Perianth pale yellow, orange or red, cylindrical, 18–27 mm long, widening at the mouth and only slightly constricted at the base; perianth lobes 3.5–6 x 2–3 mm. Pedicel 3–4 mm long. Stamens and style exerted, 8–15 mm long; stamens spirally twisted on fading. Fruit ovoid, each part of the capsule 7–8 x 6 mm. Fig. 191.2.

Grows on roadsides, overgrazed areas with scattered trees, hillsides with rocky outcrops and tops of mountains; 2500–4000 m. TU GD GJ WU SU AR BA HA; not known in the wild elsewhere. *Hedberg* 4200; *Mesfin T. & Kagnev G.Y.* 1537; *Friis et al.* 3815.

The type of *K. quartiniana* A. Rich. has narrower leaves c 16 mm wide and shorter bracts c 4 mm long. Otherwise it agrees with other characters of *K. foliosa*.

3. *K. hildebrandtii* Cufod. (1971)

– type: SU, between Guder and Jimma, c 140 km West of Addis Ababa, 2000 m, *Hildebrandt* 160 (WU holo., not seen).

Plants slender with fibrous remains of leaves at the base. Leaves 30–70 x 0.3–0.6 cm, linear, dark green to grey green, keeled; keels and margin smooth. Peduncle (including raceme), (35–)65–110 cm long. Raceme 13–26 cm long at flowering, flowers to one side, lax. Bracts



Figure 191.1 *KNIPHOFIA PUMILA*: 1 - whole plant x $\frac{2}{3}$; 2 - flower showing perianth, style and stamens x 2. 1 from Gilbert & Getachew A. 2621; 2 from Sebsebe D. & Ensemu K. 2598. Drawn by Damtew Teferra.

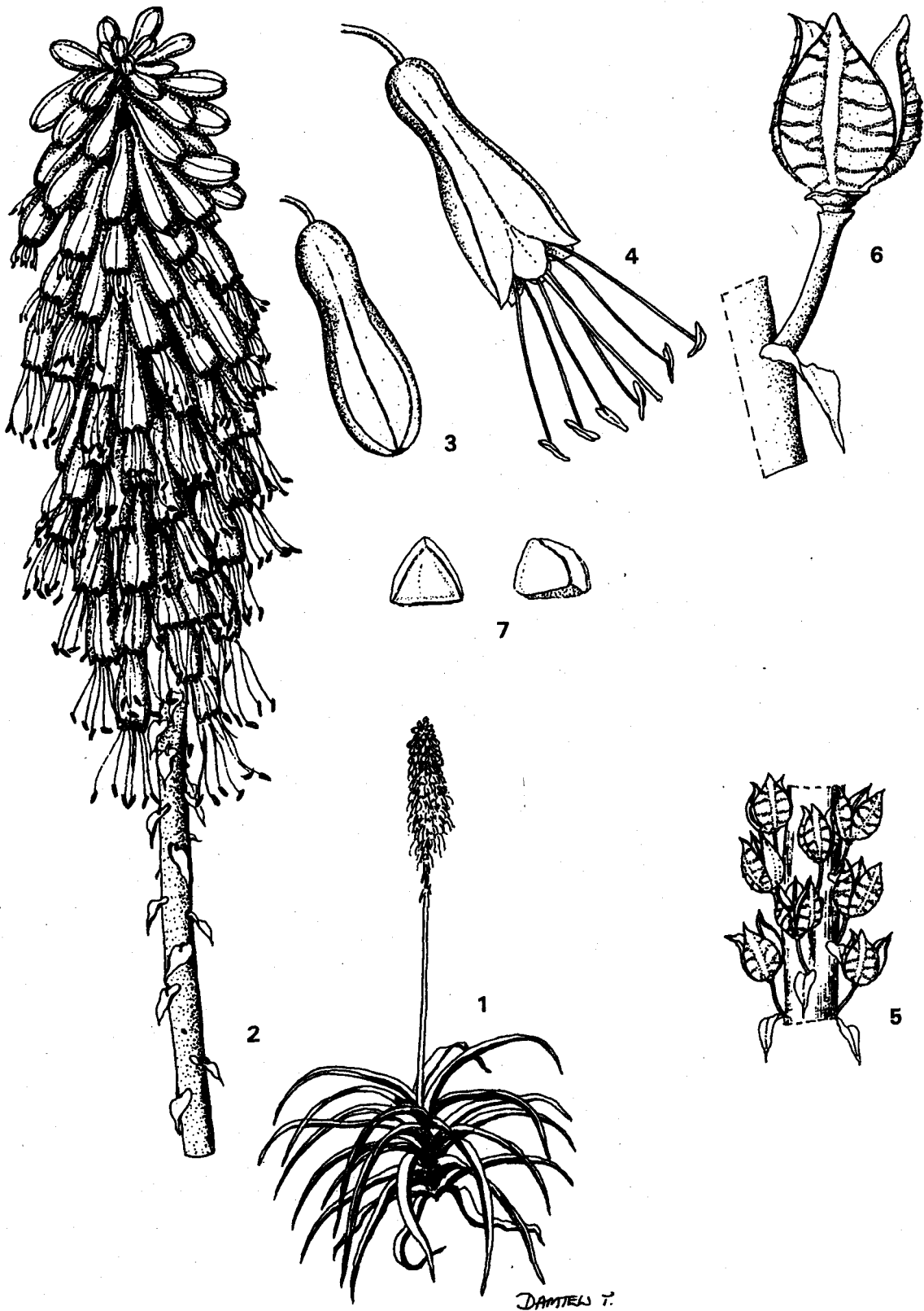


Figure 191.2 *KNIPHOFIA FOLIOSA*: 1 - whole plant x $\frac{1}{4}$ s; 2 - inflorescence x 1; 3 - closed flower x 2; 4 - opened flower x 2; 5 - inflorescence x 1; 6 - capsule x 3; 7 - seeds x 5. 1 from live material; 2-7 from Mesfin T. 661. Drawn by Damtew Teferra.

brown, cuspidate, 6.5–9 x 2–3 mm, serrulate. Perianth white, pale green, pale yellow, pendulous, cylindrical, 13–16 mm long, not widened at the mouth and not constricted at the base; perianth lobes small, 0.5–1 mm long. Pedicel slender, 4–6 mm long, elongating up to 7–8 mm in fruit. Stamens and style only shortly exerted up to 3.5 mm and stamens eventually withdrawn. Fruit ovoid and pointed, each part of the capsule 6 x 5 mm.

Growing in wet grassland; 2000–2450 m. SU: not known elsewhere. *De Wilde* 7271; *Ash* 1059; *Ensermu K. & Tamirat B.* 506.

This species has so far been collected from a relatively small area 6–10 km west of Ghedo.

4. *K. isoetifolia* Steud. ex Hochst. (1844)

– type: GD, Endjetcab (= Enchetcab), *Schimper* 752 (B holo., BR K iso.).

K. neumanii Engl. (1902) – type: AR, Sero, Ellenbeck 1434 (B holo.).

?*K. aloysii-sabaudii* Chiov. (1929) – type: AR, Mt. Lajo, *Basile* 193 (TO, not seen).

K. abyssinica sensu Berger (1908).

Plants slender, usually solitary or sometimes in groups of 5–6 stems with few fibrous remains of leaves at the base. Roots fusiform. Leaves 7–45 x 0.2–1.1 cm, linear, blue-green, keeled; keels and margin papillate. Peduncle (including raceme) 9–65 cm long. Raceme 4–8(–12) cm long at flowering, dense or subdense. Bracts white, cuspidate, 7–12 x 1–2.5 mm. Perianth pale or bright yellow, orange or bright red; pendulous, cylindrical, 30–42 mm long, widening at the mouth and constricted at the base; perianth lobes 2.5–3 x 2–2.5 mm long. Pedicel slender 2–4 mm long, elongating up to 5 mm in fruit. Stamens and style only shortly exerted up to 3–4 mm and stamens eventually withdrawn. Fig. 191.3.

Overgrazed hill tops and river banks, on steep rocky slopes and in montane grassland, sometimes in wet meadows; 2050–3650 m. TU GD GJ SU AR KF GG BA HA; not known elsewhere. *Gilbert & Thulin* 499; *Ash* 1737; *Sebsebe D.* 2442.

Drake-Brockman 192 (K) from Arsi and *Drake-Brockman* 239 (K) from Seru Abas that were included under *K. insignis* by Marais are here included under this species. The perianth shows older flowers and fruits at the apex of the raceme which is characteristic of this species. In the description of *K. insignis*, Marais indicated the perianth size to be up to 40 mm, the specimen from which this measurement was taken is possibly *Drake-Brockmann* 239.

Lythgoe 751 (K) collected in the upper Godeb (Ghedieb) valley is cited by Marais to come from Kefa. However, Godeb is in the Choke Mountains in Gojam.

5. *K. insignis* Rendle (1896)

– type: AR, Sheikh-Mohammed, *Donaldson-Smith* s.n. (BM holo.).

K. neumanii Engl. var. *albiflora* Engl. in *Bot. Jahrb.* 32: 90 (1902); *K. insignis* Rendle var. *albiflora* (Engl.) Cufod., *Enum. Plant. Aethiop.* II: 1540

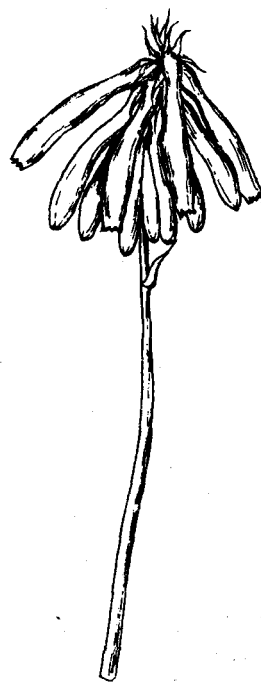


Figure 191.3 *KNIPHOFIA ISOETIFOLIA*: inflorescence x 1. From *de Wilde & de Wilde-Duyffes* 8000. Drawn by Damtew Teferra.

(1971) – type: AR, Diddah, *Ellenbeck* 1488 (B holo., not seen).

Plants slender, solitary without fibrous remains of leaves at the base. Roots fusiform. Leaves 30–100 x 0.3–1.5 cm, linear, blue green, keeled; keels and margin papillate. Peduncle (including raceme) 20–65 cm long, sometimes up to 100 cm long in cultivation. Raceme 8–22 cm long at flowering, lax. Bracts white, cuspidate, 12–17 x 2–5 mm. Perianth white, pendulous, cylindrical, 24–28 mm long, widened at the mouth and constricted at the base; perianth lobes 2–3 x 1–2 mm long. Pedicel slender 2.5–4 mm long, elongating to 5 mm in fruit. Stamens and style only shortly exerted up to 3 mm and stamens eventually withdrawn. Fruit ovoid and pointed, each part of the capsule 8–9 x 6 mm.

Water-logged or flooded meadows; 2450–2850 m. SU AR; not known elsewhere. *M.G. & S.B. Gilbert* 1380; *Ash* 2076; *Masresha F. et al.* 90.

Drake-Brockman 192 (K) from Arsi and *Drake-Brockman* 239 (K) from Seru Abas that were placed in this species by Marais are here transferred to *K. isoetifolia*; see under that species.

6. *K. schimperii* Baker (1874)

– type: GD, Debre-Tabor, *Schimper* 1200 (K holo.).

K. elegans Engl. (1892) – type: EW, Habab, *Hildebrandt* 378 (B holo., not seen).

K. ellenbeckiana Engl. (1902) – type: BA/AR, Abul Casin, *Ellenbeck* 1410 (B holo.).

Plants slender with fibrous remains of leaves at the base. Leaves 30–50 x 0.4–1 cm, linear, dark green, keeled; keels and margin minutely papillose-scabrid or smooth.

Peduncle (including raceme) 43–130 cm long. Raceme 15–35(–52) cm long, flowers to one side, lax, 1–3(–4) flowers per cm. Bracts white, cuspidate, 5–12 x 1.2–2 mm. Perianth orange-red, or pale red to orange, pendulous, cylindrical, 15–26 mm long, widening at the mouth and not constricted at the base; perianth lobes 1.5–2.5 x 1–2 mm long. Pedicel slender, 1.5–4.5 mm long. Stamens and style only shortly exerted up to 3.5 mm and stamens eventually withdrawn. Fruit ovoid, each part of the capsule, c 8 x 5 mm.

On steep grassy or stony slopes, in rocky outcrops; 1500–3580 m. EW GD GJ WU SU AR BA; not known elsewhere. *Ash* 2038; *Chojnacki* in *Mooney* 7504; *M.G & S.B. Gilbert* 2202.

The type specimen of *K. ellenbeckiana* Engl., *Ellenbeck* 1410 has a smaller perianth, 15–17 mm long. Otherwise, it fits very well with the other specimens of *K. schimperi*.

7. *K. thomsonii* Baker (1885)

– type: Tanzania, Kilimanjaro, *Thomson* s.n. (K hol.).

Plants slender with fibrous remains of leaves at the base. Leaves 25–90 x 0.6–1.3 cm, linear, dark green, keeled; keels and margin minutely papillose-scabrid or smooth. Peduncle (including raceme) 40–65 cm long. Raceme 6–35 cm long, flowers on all sides, subdense, 5–10 flowers per cm. Bracts white, cuspidate, 9–15(–30) x 3–4 mm. Perianth yellow, orange, lemon yellow to orange red, pendulous, cylindrical, 23–40 mm long, widened at the mouth and slightly constricted at the base; perianth lobes 2–3 x 1.5–2 mm. Pedicel slender, 3–4 mm long. Stamens and style only shortly exerted up to 2.5 mm and stamens eventually withdrawn. Fig. 191.4.

On steep grassy or rocky slopes and marshy ground; 2400–3300 m. SU AR SD BA HA; Tanzania. *Gillett* 14954; *Burger* 1010; *Mesfin* T. 5073.

Specimens from the Flora area now included in this species were considered by Marais (1973) to belong to *K. schimperi*. However, he commented 'the more southerly specimens have denser inflorescences which may not be strictly secund'. Cufodontis (1971) indicated the presence of *K. thomsonii* in AR, but no specimen from that area has been seen which matches this species.

2. BULBINE Wolf (1776), *nom. cons.*

Cufodontis, *Enum.*: 1529 (1971); Baijnath, Taxonomic studies in the genus *Bulbine* Wolf. Ph.D. thesis, Univ. of Reading (unpublished).

Erect perennial herbs with wiry or fusiform roots. Leaves more or less fleshy, subulate or flattened. Inflorescence a many-flowered raceme; bracts small, membranous, persistent. Pedicels without a joint. Perianth



Figure 191.4 *KNIPHOFIA THOMSONII*: inflorescence x 1. From *Friis* et al. 3616. Drawn by Damtew Teferra.

bright yellow, tepals free, subequal, spreading, 1-nerved. Stamens shorter than the tepals; filaments filiform, densely covered with long hairs. Ovary ovoid, sessile, 3-locular, with few to many ovules in each locule; style short with minute capitate stigma. Capsule subglobose. Seeds 3-angled, dark brown.

Genus with c 50 species worldwide, mostly in South Africa, 2 in Australia. Only 1 species from the Flora area.

B. abyssinica A. Rich. (1851)

– type: TU, Chair (=Shire), *Quartin-Dillon & Petit* 177 (K iso.).

B. asphodeloides sensu Baker (1898) & Cufod. (1971) non (L.) Spreng. (1825).

Perennial herb often forming clumps. Leaves 7–30 x 0.2–0.5 cm, gradually dilating to a broad, sheathing, membranous base, sometimes covered by fibers. Peduncles (including the raceme) 10–50 cm long, several to a plant, erect or arcuate, terete, most often taller than the leaves. Bracts cuspidate, 6–15 x 2–3 mm long. Raceme 2.5–20 cm long, dense-flowered in the upper part; pedicel patent to erect, 1.5–2.5 cm long, elongating to

3 cm in fruit. Tepals bright yellow, sometimes with a purple to red-brown stripe outside, subequal, 6–9 x 2–2.5 mm, closing around the developing ovary leaving a small rim below the ovary when falling off. Filaments 3–5 mm long, densely covered with long yellow hairs especially in the middle to upper part; anthers c 3 mm long. Capsule subglobose, constricted at the base, 3–5 x 3–4 mm. Seeds almost smooth, 2.5–3 x 2.5 mm. Fig. 191.5.

In degraded *Acacia* bushland, *Acacia* – *Combretum* bushland on red-brown loamy soil, grassland, also on flat plains without trees and shrubs on sandy soil; 1200–2200 m. TU WU SU SD HA; also in Somalia, Kenya, Uganda, Tanzania, Burundi, Rwanda and Zaire. *Mesfin T. & Vollesen* 4111; *Thulin et al.* 3408; *Sebsebe D. & Tamirat B.* 2285.

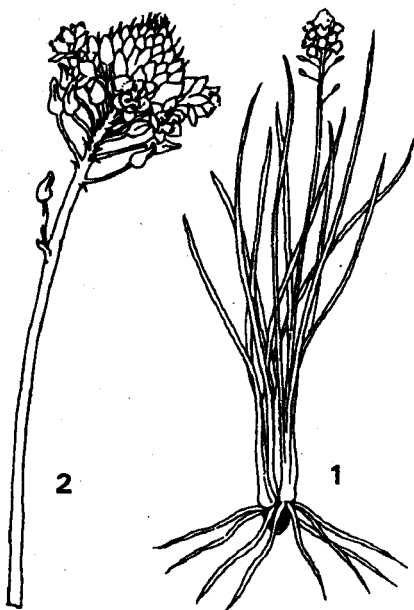


Figure 191.5 *BULBINE ABYSSINICA*: 1 – whole plant; 2 – inflorescence. (Reproduced with permission from *Fl. Somalia* 4: fig 23) [scale and specimen citation not given]

3. JODRELLIA *Bajjnath* (1978)

Leaves linear, terete or subterete. Inflorescence a many-flowered raceme, bracts membranous; pedicels without a joint. Tepals subequal, white to pink, spreading, the inner 1-nerved, the outer 3–5-nerved, during fruit development falling off and leaving a small rim below the ovary. Stamens shorter than the tepals; filaments with long hairs. Capsules few-seeded, sometimes inflated with a papery wall.

The genus is poorly known and certainly closely related to *Bulbine*. Generic rank might be disputed.

1. Capsules 4.5–5.5 x 4–5 mm, non-inflated; seed surface almost smooth; pedicels shorter than bracts. 1. *J. fistulosa*
- Capsules 8–15 x 12–22 mm, inflated; seed surface verrucose; pedicels longer than bracts. 2. *J. migiurtina*

1. *J. fistulosa* (*Chiov.*) *Bajjnath* (1978);

Bulbine fistulosa *Chiov.* (1911) – type: TU, Scire (Shire) near Mai Timchet, *Chioventa* 557 (FT holo.).

B. breviraecemosa von *Poelln.* (1944) – type: EW, Abita, Keren, *Beccari* 129 (B holo., destroyed, FT iso.).

Erect perennial herb 30–40 cm tall. Roots fibrous or fusiform. Leaves glabrous, terete to fistulose (tubular), up to 45 x 0.8 cm, gradually dilating to a broad sheathing base. Inflorescence racemose. Peduncle (including the raceme) 12–29 cm long, shorter than the leaves. Raceme dense, 15–40-flowered, 1.5–7 cm long. Bracts 7–14 x 1.5–4 mm, white, transparent, lanceolate, apex filiform. Pedicels 5–9 mm long, slender, recurved after flowering. Tepals white to pink, with slightly hooded apex; outer segments, 6 x 2 mm, 3-nerved; inner ones 5 x 1 mm, 1-nerved. Ovary obovoid with papillose stigma, 3-locular with 2 ovules per locule. Capsule 4.5 mm long; seeds few, dark brown to black, slightly angled, almost smooth, c 2 mm across.

Along slopes on river edge; 900 m. EW TU; also in Tanzania, Zambia and Zimbabwe. *Getachew A. & Gilbert* 916.

In order to justify delimitation from the next species, it is important to observe whether the fruits remain small without inflation when mature. If this is not the case, then the two *Jodrellia* species in the Flora area might be conspecific. More material should be collected, especially with fully ripe fruits.

2. *J. migiurtina* (*Chiov.*) *Bajjnath* (1978);

Bulbine migiurtina *Chiov.* (1928) – type: Somalia, between 'Balli Scillin' and 'Bur Inaoshin', *Puccioni & Stefanini* 777 (FT holo.).

J. macrocarpa *Bajjnath* (1978) – type: Kenya, Northern Province, Dandu, *Gillett* 13141 (K holo.).

Erect perennial herb 15–40 cm tall. Rhizome short with many fleshy roots. Leaves glabrous, succulent, terete, 20–38 x 0.2–0.6 cm. Inflorescence racemose. Peduncle (including the raceme) 7–18 cm long, shorter than the leaves; raceme 2–6 cm long, dense; pedicels 8.5–16 mm long, slender, recurved. Bracts white, transparent, 4–5(–8) x 1–2 mm, lanceolate, cuspidate. Tepals white to pink, with apex slightly hooded, outer ones 3–5 x 1–1.5 mm, narrowly elliptical, 3–5-nerved; inner ones 3–4.5 x 0.6–1 mm, 1-nerved. Filaments c 2 mm long, densely covered with long hairs in the apical part; anthers c 2 mm long. Capsule inflated and globose 8–15 x 8–15 mm, dehiscence unknown; seeds 1–2, dark brown, 4–4.5 x 2–2.5 mm with verrucose surface. Fig. 191.6.

Rocky slopes with mixed woodland of *Acacia*, *Commiphora*, *Delonix*, etc.; 900 m. BA; also in Somalia and Kenya. *Gilbert et al.* 7676; *Nordal et al.* 2287.

J. migiurtina was believed to have non-inflated fruits by *Bajjnath* (1978), who accordingly reduced the name to a synonym of *J. fistulosa*. *Thulin* in *Fl. Somalia* has reinterpreted the specimens and believes that the type material of *J. migiurtina* has small fruits due to imma-

4. Inflorescence cylindrical, flowers opening from base upwards. 5
 – Inflorescence capitate, flowers opening from top downwards. 4. *K. isoetifolia*
5. Perianth yellow, orange or red; usually growing in well-drained soil. 6
 – Perianth white, buds pale pink; growing in waterlogged meadows. 5. *K. insignis*
6. Inflorescence lax, with 1–3 flowers per cm, secund (flowers found on one side); bracts narrow, 1.2–2 mm wide. 6. *K. schimperi*
 – Inflorescence subdense, with 5–7 flowers per cm, on all sides (not secund); bracts broad, 3–4 mm wide. 7. *K. thomsonii*

1. *K. pumila* (Ait.) Kunth (1843);

K. comosa Hochst. (1844) – type: GD, Jan Meda (Dchara Meda), *Schimper* 1192 (K iso.).

K. abyssinica (DC. in Red.) Schweinf. ex Asch. (1867); *Veltheimia abyssinica* DC. in Red. (1807) – type: J. Bruce (origin from Abyssinia, introduced and cultivated in Paris, depicted in Redouté in *Lil.* 4: t. 186 1'1808').

K. leichtlinii Baker ex Hook.f. (1883) – type: Ethiopia, cultivated plants by Leichtlin in 1881, introduced into cultivation by Schimper (K holo.).

K. leichtlinii Baker var. *distachya* Baker in *Gard. Chron.* II, 22: 230 (1884) – type: cultivated, *Leichtlin* in Aug. 1884, original collection from Abyssinia (K holo.).

K. micrantha Chiov. (1951) – type: SD, between Aferara and Irba Moa (Yirba Muda), *Vatova* 763 (FT holo., not seen).

Plants slender, solitary with erect, corm-like root-stock, with some fibrous remains of leaves at the base. Leaves (15–)30–100 x 0.5–2 cm, linear, dark green to grey green, keeled; keels and margin smooth or minutely tuberculate, but not scabrid. Peduncle (including raceme) 30–90 cm long. Raceme 4–15 cm long (to 18 cm long in fruit), very dense 15 per cm, cylindrical. Bracts white, lanceolate to ovate-lanceolate, 3–10 x 1.5–5 mm, serrulate. Perianth yellow, orange, pale red to vermilion, campanulate, 9–13 mm long (14–18 mm long in cultivation), widening at the mouth and only slightly constricted at the base; perianth lobes small, 1–2 x 1–3 mm. Pedicel 1.5–3.5 mm long elongating to 6 mm long in fruit. Stamens and styles exerted, 10–15 mm long; stamens spirally twisted on fading. Fruit ovoid, each part of the capsule 5–9 x 4–6 mm. Fig. 191.1.

Grassland, grassy slopes, on steep-sided valleys and near streams in tall grass; 1200–2650 (–3150) m. EW TU GD GJ WU SU WG IL KF SD HA; also in Sudan, Uganda and Zaire. *Gilbert & Getachew* A. 2643; *Sue Edwards & Tewolde* B.G.E. 3670; *Sebsebe D. & Ensermu* K. 2598.

Marais (1973) considered specimens *Gilbert & Thulin* 807 (ETH K) from WG and *Ash* 1020 (K) from Ankober, SU, as hybrids between *K. pumila* and *K. schimperi*. The first mentioned specimen clearly belongs to *K. pumila* and it is not clear why Marais con-

sidered it a hybrid as one of the assumed parental species, *K. schimperi* is not found in WG. The second specimen, *J. Ash* 1020 is closer to *K. schimperi* than *K. pumila*.

K. erythraea Fiori in *Nuov. Bot. Ital.* 19: 427 (1912) – type: Eritrea, Hamasen, *Fiori* 883 (FT holo.) is probably a hybrid between *K. pumila* and *K. schimperi*. Flowers open from top downwards it has a perianth tube of c 4 mm long as in *K. pumila*. However, the lax inflorescence and the short protrusion of the anthers, only about 2 mm, are characters of *K. schimperi*. A second specimen *J. de Wilde* 4486 (B) from Eritrea, 18 km from Asmera to Massawa, is also a hybrid between *K. pumila* and *K. schimperi*. The perianth opens from the top down and measures 12–13 mm long as in *K. pumila*. The lax flowers, 3–4 per cm and anthers protruding only to 5 mm are features found in *K. schimperi*.

2. *K. foliosa* Hochst. (1844)

– type: TU, Adwa, *Schimper* 1003 (K fragment).

K. quartiniana A. Rich. (1851) – type: TU, Wodjerat, *Quartin-Dillon & Petit* 179 (K iso.).

K. densiflora Engl. (1892) – type: GD/TU, Urahut, Mt. Erareta, *Schimper* 701 (B holo.).

K. arussi Rendle (1929) – type: AR, ex *Hort. Haig-Thomas* (BM holo.).

Robust plants forming dense clumps, with thick erect rhizomes, sometimes with a stem up to 40 cm long, with some fibrous remains of leaves at the base. Leaves 20–100 x (1.6–)2–4(–7) cm; linear lanceolate, dark green to grey green, keeled; margin serrulate, keels smooth below, serrulate above. Peduncle (including raceme) 30–150 cm long. Raceme 15–40 cm long (to 50 cm long in fruit), very dense, cylindrical. Bracts white, drying brown, ovate to ovate-lanceolate, 4–12 x 2.5–3.5 mm, serrulate. Perianth pale yellow, orange or red, cylindrical, 18–27 mm long, widening at the mouth and only slightly constricted at the base; perianth lobes 3.5–6 x 2–3 mm. Pedicel 3–4 mm long. Stamens and style exerted, 8–15 mm long; stamens spirally twisted on fading. Fruit ovoid, each part of the capsule 7–8 x 6 mm. Fig. 191.2.

Grows on roadsides, overgrazed areas with scattered trees, hillsides with rocky outcrops and tops of mountains; 2500–4000 m. TU GD GJ WU SU AR BA HA; not known in the wild elsewhere. *Hedberg* 4200; *Mesfin T. & Kagnew* G.Y. 1537; *Friis* et al. 3815.

The type of *K. quartiniana* A. Rich. has narrower leaves c 16 mm wide and shorter bracts c 4 mm long. Otherwise it agrees with other characters of *K. foliosa*.

3. *K. hildebrandtii* Cufod. (1971)

– type: SU, between Guder and Jimma, c 140 km West of Addis Ababa, 2000 m, *Hildebrandt* 160 (WU holo., not seen).

Plants slender with fibrous remains of leaves at the base. Leaves 30–70 x 0.3–0.6 cm, linear, dark green to grey green, keeled; keels and margin smooth. Peduncle (including raceme), (35–)65–110 cm long. Raceme 13–26 cm long at flowering, flowers to one side, lax. Bracts



Figure 191.1 *KNIPHOFIA PUMILA*: 1 - whole plant x $\frac{2}{3}$; 2 - flower showing perianth, style and stamens x 2. 1 from Gilbert & Getachew A. 2621; 2 from Sebsebe D. & Ensemu K. 2598. Drawn by Damtew Teferra.

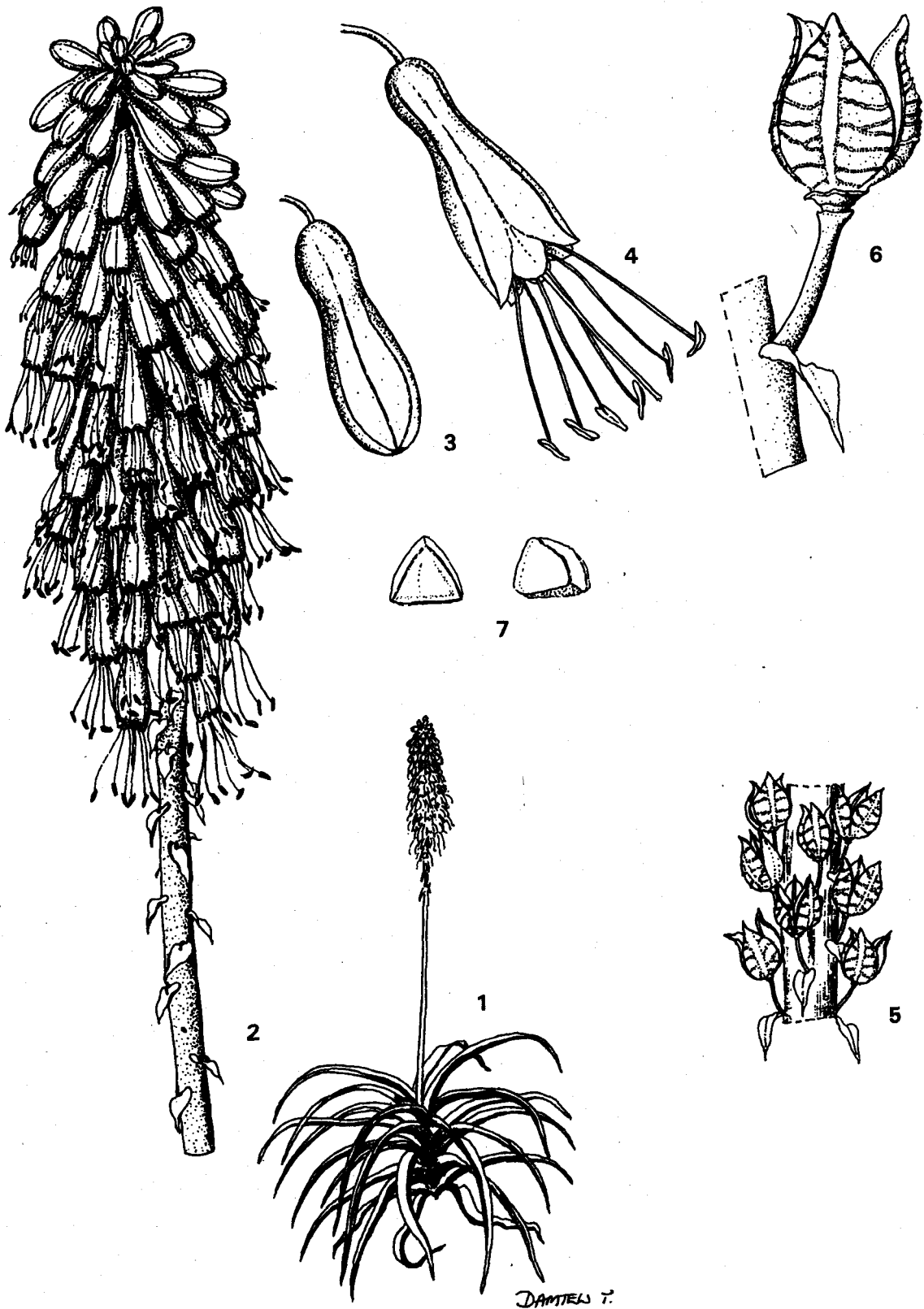


Figure 191.2 *KNIPHOFIA FOLIOSA*: 1 - whole plant x $\frac{1}{4}$ s; 2 - inflorescence x 1; 3 - closed flower x 2; 4 - opened flower x 2; 5 - inflorescence x 1; 6 - capsule x 3; 7 - seeds x 5. 1 from live material; 2-7 from Mesfin T. 661. Drawn by Damtew Teferra.

brown, cuspidate, 6.5–9 x 2–3 mm, serrulate. Perianth white, pale green, pale yellow, pendulous, cylindrical, 13–16 mm long, not widened at the mouth and not constricted at the base; perianth lobes small, 0.5–1 mm long. Pedicel slender, 4–6 mm long, elongating up to 7–8 mm in fruit. Stamens and style only shortly exerted up to 3.5 mm and stamens eventually withdrawn. Fruit ovoid and pointed, each part of the capsule 6 x 5 mm.

Growing in wet grassland; 2000–2450 m. SU: not known elsewhere. *De Wilde* 7271; *Ash* 1059; *Ensermu K. & Tamirat B.* 506.

This species has so far been collected from a relatively small area 6–10 km west of Ghedo.

4. *K. isoetifolia* Steud. ex Hochst. (1844)

– type: GD, Endjetcab (= Enchetcab), *Schimper* 752 (B holo., BR K iso.).

K. neumanii Engl. (1902) – type: AR, Sero, Ellenbeck 1434 (B holo.).

?*K. aloysii-sabaudii* Chiov. (1929) – type: AR, Mt. Lajo, *Basile* 193 (TO, not seen).

K. abyssinica sensu Berger (1908).

Plants slender, usually solitary or sometimes in groups of 5–6 stems with few fibrous remains of leaves at the base. Roots fusiform. Leaves 7–45 x 0.2–1.1 cm, linear, blue-green, keeled; keels and margin papillate. Peduncle (including raceme) 9–65 cm long. Raceme 4–8(–12) cm long at flowering, dense or subdense. Bracts white, cuspidate, 7–12 x 1–2.5 mm. Perianth pale or bright yellow, orange or bright red; pendulous, cylindrical, 30–42 mm long, widening at the mouth and constricted at the base; perianth lobes 2.5–3 x 2–2.5 mm long. Pedicel slender 2–4 mm long, elongating up to 5 mm in fruit. Stamens and style only shortly exerted up to 3–4 mm and stamens eventually withdrawn. Fig. 191.3.

Overgrazed hill tops and river banks, on steep rocky slopes and in montane grassland, sometimes in wet meadows; 2050–3650 m. TU GD GJ SU AR KF GG BA HA; not known elsewhere. *Gilbert & Thulin* 499; *Ash* 1737; *Sebsebe D.* 2442.

Drake-Brockman 192 (K) from Arsi and *Drake-Brockman* 239 (K) from Seru Abas that were included under *K. insignis* by Marais are here included under this species. The perianth shows older flowers and fruits at the apex of the raceme which is characteristic of this species. In the description of *K. insignis*, Marais indicated the perianth size to be up to 40 mm, the specimen from which this measurement was taken is possibly *Drake-Brockmann* 239.

Lythgoe 751 (K) collected in the upper Godeb (Ghedieb) valley is cited by Marais to come from Kefa. However, Godeb is in the Choke Mountains in Gojam.

5. *K. insignis* Rendle (1896)

– type: AR, Sheikh-Mohammed, *Donaldson-Smith* s.n. (BM holo.).

K. neumanii Engl. var. *albiflora* Engl. in *Bot. Jahrb.* 32: 90 (1902); *K. insignis* Rendle var. *albiflora* (Engl.) Cufod., *Enum. Plant. Aethiop.* II: 1540

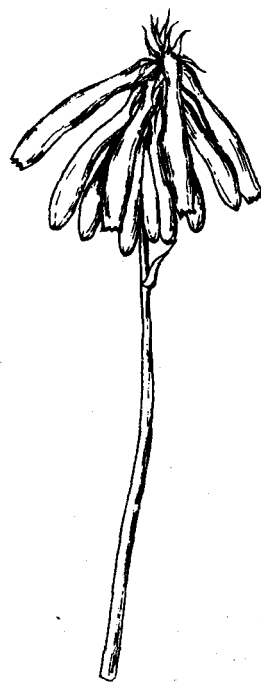


Figure 191.3 *KNIPHOFIA ISOETIFOLIA*: inflorescence x 1. From *de Wilde & de Wilde-Duyffes* 8000. Drawn by Damtew Teferra.

(1971) – type: AR, Diddah, *Ellenbeck* 1488 (B holo., not seen).

Plants slender, solitary without fibrous remains of leaves at the base. Roots fusiform. Leaves 30–100 x 0.3–1.5 cm, linear, blue green, keeled; keels and margin papillate. Peduncle (including raceme) 20–65 cm long, sometimes up to 100 cm long in cultivation. Raceme 8–22 cm long at flowering, lax. Bracts white, cuspidate, 12–17 x 2–5 mm. Perianth white, pendulous, cylindrical, 24–28 mm long, widened at the mouth and constricted at the base; perianth lobes 2–3 x 1–2 mm long. Pedicel slender 2.5–4 mm long, elongating to 5 mm in fruit. Stamens and style only shortly exerted up to 3 mm and stamens eventually withdrawn. Fruit ovoid and pointed, each part of the capsule 8–9 x 6 mm.

Water-logged or flooded meadows; 2450–2850 m. SU AR; not known elsewhere. *M.G. & S.B. Gilbert* 1380; *Ash* 2076; *Masresha F. et al.* 90.

Drake-Brockman 192 (K) from Arsi and *Drake-Brockman* 239 (K) from Seru Abas that were placed in this species by Marais are here transferred to *K. isoetifolia*; see under that species.

6. *K. schimperii* Baker (1874)

– type: GD, Debre-Tabor, *Schimper* 1200 (K holo.).

K. elegans Engl. (1892) – type: EW, Habab, *Hildebrandt* 378 (B holo., not seen).

K. ellenbeckiana Engl. (1902) – type: BA/AR, Abul Casin, *Ellenbeck* 1410 (B holo.).

Plants slender with fibrous remains of leaves at the base. Leaves 30–50 x 0.4–1 cm, linear, dark green, keeled; keels and margin minutely papillose-scabrid or smooth.

Peduncle (including raceme) 43–130 cm long. Raceme 15–35(–52) cm long, flowers to one side, lax, 1–3(–4) flowers per cm. Bracts white, cuspidate, 5–12 x 1.2–2 mm. Perianth orange-red, or pale red to orange, pendulous, cylindrical, 15–26 mm long, widening at the mouth and not constricted at the base; perianth lobes 1.5–2.5 x 1–2 mm long. Pedicel slender, 1.5–4.5 mm long. Stamens and style only shortly exerted up to 3.5 mm and stamens eventually withdrawn. Fruit ovoid, each part of the capsule, c 8 x 5 mm.

On steep grassy or stony slopes, in rocky outcrops; 1500–3580 m. EW GD GJ WU SU AR BA; not known elsewhere. *Ash* 2038; *Chojnacki* in *Mooney* 7504; *M.G & S.B. Gilbert* 2202.

The type specimen of *K. ellenbeckiana* Engl., *Ellenbeck* 1410 has a smaller perianth, 15–17 mm long. Otherwise, it fits very well with the other specimens of *K. schimperi*.

7. *K. thomsonii* Baker (1885)

– type: Tanzania, Kilimanjaro, *Thomson* s.n. (K holotype).

Plants slender with fibrous remains of leaves at the base. Leaves 25–90 x 0.6–1.3 cm, linear, dark green, keeled; keels and margin minutely papillose-scabrid or smooth. Peduncle (including raceme) 40–65 cm long. Raceme 6–35 cm long, flowers on all sides, subdense, 5–10 flowers per cm. Bracts white, cuspidate, 9–15(–30) x 3–4 mm. Perianth yellow, orange, lemon yellow to orange red, pendulous, cylindrical, 23–40 mm long, widened at the mouth and slightly constricted at the base; perianth lobes 2–3 x 1.5–2 mm. Pedicel slender, 3–4 mm long. Stamens and style only shortly exerted up to 2.5 mm and stamens eventually withdrawn. Fig. 191.4.

On steep grassy or rocky slopes and marshy ground; 2400–3300 m. SU AR SD BA HA; Tanzania. *Gillett* 14954; *Burger* 1010; *Mesfin* T. 5073.

Specimens from the Flora area now included in this species were considered by *Marais* (1973) to belong to *K. schimperi*. However, he commented 'the more southerly specimens have denser inflorescences which may not be strictly secund'. *Cufodontis* (1971) indicated the presence of *K. thomsonii* in AR, but no specimen from that area has been seen which matches this species.

2. BULBINE Wolf (1776), *nom. cons.*

Cufodontis, *Enum.*: 1529 (1971); *Baijnath*, Taxonomic studies in the genus *Bulbine* Wolf. Ph.D. thesis, Univ. of Reading (unpublished).

Erect perennial herbs with wiry or fusiform roots. Leaves more or less fleshy, subulate or flattened. Inflorescence a many-flowered raceme; bracts small, membranous, persistent. Pedicels without a joint. Perianth



Figure 191.4 *KNIPHOFIA THOMSONII*: inflorescence x 1. From *Friis* et al. 3616. Drawn by *Damtew Teferra*.

bright yellow, tepals free, subequal, spreading, 1-nerved. Stamens shorter than the tepals; filaments filiform, densely covered with long hairs. Ovary ovoid, sessile, 3-locular, with few to many ovules in each locule; style short with minute capitate stigma. Capsule subglobose. Seeds 3-angled, dark brown.

Genus with c 50 species worldwide, mostly in South Africa, 2 in Australia. Only 1 species from the Flora area.

B. abyssinica A. Rich. (1851)

– type: TU, Chair (=Shire), *Quartin-Dillon & Petit* 177 (K iso.).

B. asphodeloides sensu Baker (1898) & *Cufod.* (1971) non (L.) *Spreng.* (1825).

Perennial herb often forming clumps. Leaves 7–30 x 0.2–0.5 cm, gradually dilating to a broad, sheathing, membranous base, sometimes covered by fibers. Peduncles (including the raceme) 10–50 cm long, several to a plant, erect or arcuate, terete, most often taller than the leaves. Bracts cuspidate, 6–15 x 2–3 mm long. Raceme 2.5–20 cm long, dense-flowered in the upper part; pedicel patent to erect, 1.5–2.5 cm long, elongating to

3 cm in fruit. Tepals bright yellow, sometimes with a purple to red-brown stripe outside, subequal, 6–9 x 2–2.5 mm, closing around the developing ovary leaving a small rim below the ovary when falling off. Filaments 3–5 mm long, densely covered with long yellow hairs especially in the middle to upper part; anthers c 3 mm long. Capsule subglobose, constricted at the base, 3–5 x 3–4 mm. Seeds almost smooth, 2.5–3 x 2.5 mm. Fig. 191.5.

In degraded *Acacia* bushland, *Acacia* – *Combretum* bushland on red-brown loamy soil, grassland, also on flat plains without trees and shrubs on sandy soil; 1200–2200 m. TU WU SU SD HA; also in Somalia, Kenya, Uganda, Tanzania, Burundi, Rwanda and Zaire. *Mesfin T. & Vollesen* 4111; *Thulin et al.* 3408; *Sebsebe D. & Tamirat B.* 2285.

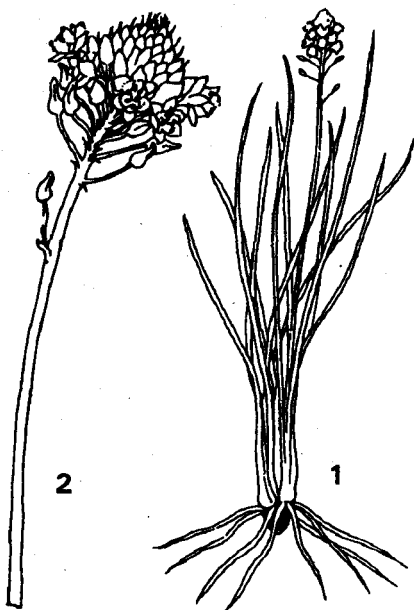


Figure 191.5 *BULBINE ABYSSINICA*: 1 – whole plant; 2 – inflorescence. (Reproduced with permission from *Fl. Somalia* 4: fig 23) [scale and specimen citation not given]

3. JODRELLIA *Bajjnath* (1978)

Leaves linear, terete or subterete. Inflorescence a many-flowered raceme, bracts membranous; pedicels without a joint. Tepals subequal, white to pink, spreading, the inner 1-nerved, the outer 3–5-nerved, during fruit development falling off and leaving a small rim below the ovary. Stamens shorter than the tepals; filaments with long hairs. Capsules few-seeded, sometimes inflated with a papery wall.

The genus is poorly known and certainly closely related to *Bulbine*. Generic rank might be disputed.

1. Capsules 4.5–5.5 x 4–5 mm, non-inflated; seed surface almost smooth; pedicels shorter than bracts. 1. *J. fistulosa*
- Capsules 8–15 x 12–22 mm, inflated; seed surface verrucose; pedicels longer than bracts. 2. *J. migiurtina*

1. *J. fistulosa* (*Chiov.*) *Bajjnath* (1978);

Bulbine fistulosa *Chiov.* (1911) – type: TU, Scire (Shire) near Mai Timchet, *Chioventa* 557 (FT holo.).

B. breviracemosa von *Poelln.* (1944) – type: EW, Abita, Keren, *Beccari* 129 (B holo., destroyed, FT iso.).

Erect perennial herb 30–40 cm tall. Roots fibrous or fusiform. Leaves glabrous, terete to fistulose (tubular), up to 45 x 0.8 cm, gradually dilating to a broad sheathing base. Inflorescence racemose. Peduncle (including the raceme) 12–29 cm long, shorter than the leaves. Raceme dense, 15–40-flowered, 1.5–7 cm long. Bracts 7–14 x 1.5–4 mm, white, transparent, lanceolate, apex filiform. Pedicels 5–9 mm long, slender, recurved after flowering. Tepals white to pink, with slightly hooded apex; outer segments, 6 x 2 mm, 3-nerved; inner ones 5 x 1 mm, 1-nerved. Ovary obovoid with papillose stigma, 3-locular with 2 ovules per locule. Capsule 4.5 mm long; seeds few, dark brown to black, slightly angled, almost smooth, c 2 mm across.

Along slopes on river edge; 900 m. EW TU; also in Tanzania, Zambia and Zimbabwe. *Getachew A. & Gilbert* 916.

In order to justify delimitation from the next species, it is important to observe whether the fruits remain small without inflation when mature. If this is not the case, then the two *Jodrellia* species in the Flora area might be conspecific. More material should be collected, especially with fully ripe fruits.

2. *J. migiurtina* (*Chiov.*) *Bajjnath* (1978);

Bulbine migiurtina *Chiov.* (1928) – type: Somalia, between 'Balli Scillin' and 'Bur Inaoshin', *Puccioni & Stefanini* 777 (FT holo.).

J. macrocarpa *Bajjnath* (1978) – type: Kenya, Northern Province, Dandu, *Gillett* 13141 (K holo.).

Erect perennial herb 15–40 cm tall. Rhizome short with many fleshy roots. Leaves glabrous, succulent, terete, 20–38 x 0.2–0.6 cm. Inflorescence racemose. Peduncle (including the raceme) 7–18 cm long, shorter than the leaves; raceme 2–6 cm long, dense; pedicels 8.5–16 mm long, slender, recurved. Bracts white, transparent, 4–5(–8) x 1–2 mm, lanceolate, cuspidate. Tepals white to pink, with apex slightly hooded, outer ones 3–5 x 1–1.5 mm, narrowly elliptical, 3–5-nerved; inner ones 3–4.5 x 0.6–1 mm, 1-nerved. Filaments c 2 mm long, densely covered with long hairs in the apical part; anthers c 2 mm long. Capsule inflated and globose 8–15 x 8–15 mm, dehiscence unknown; seeds 1–2, dark brown, 4–4.5 x 2–2.5 mm with verrucose surface. Fig. 191.6.

Rocky slopes with mixed woodland of *Acacia*, *Commiphora*, *Delonix*, etc.; 900 m. BA; also in Somalia and Kenya. *Gilbert et al.* 7676; *Nordal et al.* 2287.

J. migiurtina was believed to have non-inflated fruits by *Bajjnath* (1978), who accordingly reduced the name to a synonym of *J. fistulosa*. *Thulin* in *Fl. Somalia* has reinterpreted the specimens and believes that the type material of *J. migiurtina* has small fruits due to imma-

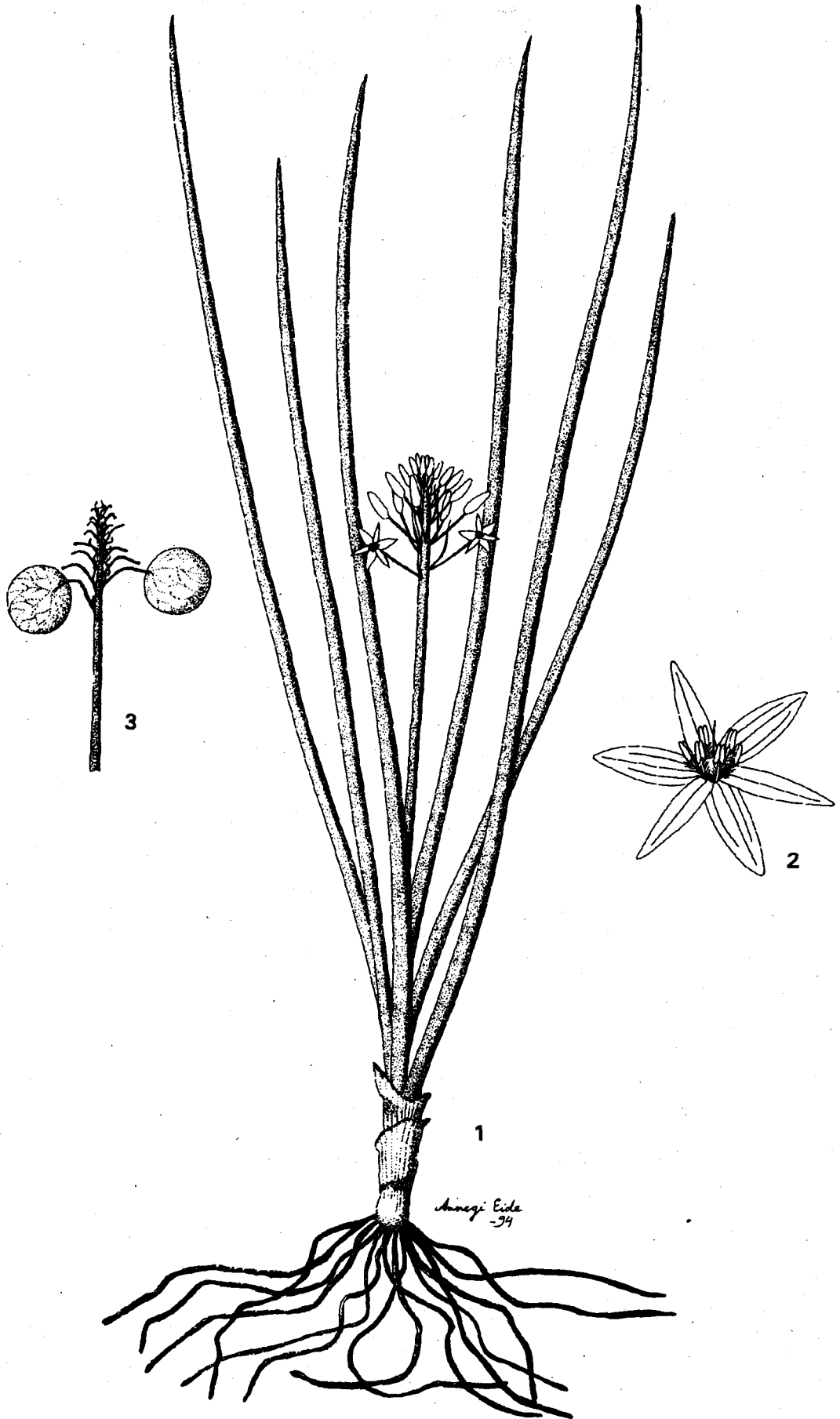


Figure 191.6 *JODRELLIA MIGIURTINA*: 1 - whole plant x 1; 2 - flower x 4; 3 - inflated fruits x 1. All from *Nordal et al.* 2987. Drawn by *Annegi Eide*.

turity. Accordingly *J. migiurtina* and *J. macrocarpa* are conspecific with priority to the former name. The specific delimitation is, however, uncertain; see under *J. fistulosa*.

4. TRACHYANDRA Kunth (1843)

Anthericum sensu Cufod. (1971) p.p.

Obermeyer in *Bothalia* 7: 669–778 (1962).

Grass-like pubescent plants, growing from a vertical rhizome with fleshy roots. Several peduncles from the leaf axils. Inflorescence of simple racemes. Bracts membranous. Pedicels without a joint. Flowers open star-like, tepals subequal, 1-nerved, white, leaving a small rim or cup below the ovary when falling off. Stamens subequal, filaments scabrid, but never hairy. Capsule subglobose, few to many-seeded.

A predominantly South African genus with about 50 species, most of which are endemic in the winter rainfall areas in southwestern Cape. Only 1 species reaches northeast Africa and has its northernmost limit in Yemen.

T. saltii (Baker) Oberm. (1962);

Anthericum saltii Baker (1876) – type: Ethiopia, without precise locality, *Salt* s.n. (BM holo.).

Urginea pilosula Engl. (1903) – type: HA, near the Hararmaja lakes, *Ellenbeck* 754 (B holo.).

Anthericum lanzae Cufod. (1939) – type: SD, Yavello, *Cufodontis* s.n. (FT lecto.).

A. harrarense Poelln. (1941) – type: HA, Harar, *Ellenbeck* 629 (B holo.).

Plant growing from a short vertical rhizome with many fleshy roots, sometimes with fibers from previous years leaves. Leaves up to 35 x 0.4 cm, slightly olive-green, filiform to linear, often involute, gradually expanding to broad sheathing membranous base, more or less pubescent with long white hairs. Peduncles (including the raceme) pubescent, 13–45 cm long, curved near the base and protruding outside the leaf rosette. Raceme lax; bracts narrow, cuspidate, up to 10 mm long; pedicels 8–15(–20) mm long, patent or recurved, elongating somewhat in fruit. Tepals white, *c* 10 mm long, with a brown dorsal median band; stamens slightly shorter than the tepals, anthers light yellow, *c* 1 mm. Capsule subglobose, *c* 5 mm in diameter, constricted at the base, with dull-grey angled seeds. Fig. 191.8.

In *Acacia* – *Commiphora* – *Terminalia* woodland, bushland, in grassland with scattered trees or on rocky outcrops, also in disturbed *Juniperus procera* woodland; on eroded sandy soils, red loamy soil or black cotton soil; 1250–3550 m. TU GG SD BA HA; widespread in Africa from the Cape in S Africa through the eastern parts of the continent to Yemen. *Friis* et al 3297; *Gilbert & Jefford* 4579; *Mooney* 5627.

Information from Cufodontis (1971) for '*Anthericum lanzae*' indicates that the species also occurs in Eritrea, but no specimen to confirm this has been seen.

The species is very variable and has been subdivided into three varieties: var. *saltii* with pedicels 8–15 mm long, var. *oatesii* (Baker) Oberm. with pedicels longer than 20 mm and var. *secunda* (Krause & Dinter) Oberm. with reflexed pedicels in the fruiting stage. Among the Ethiopian material there are a few specimens (e.g. *Gillett* 14277, K) with pedicels longer than usual and which have been identified as var. *oatesii*. Plants with reflexed pedicels in the fruiting stage are also recorded (e.g. *Ash* 2414, K). The slightly deviating forms are scattered more or less randomly, and infraspecific delimitation is not recommended.

5. ASPHODELUS L. (1753)

Leaves linear. Inflorescence a many-flowered raceme or panicle; pedicels with a distinct joint, often thickened above when in fruit. Tepals subequal, white or pale pink, free or slightly united at the base, spreading, 1-nerved, soon falling and leaving a basal cup below the ovary. Stamens equal to subequal, shorter than the tepals; filaments expanded at the base, glabrous. Capsule 3–6-seeded. Seeds angled, transversely sulcate.

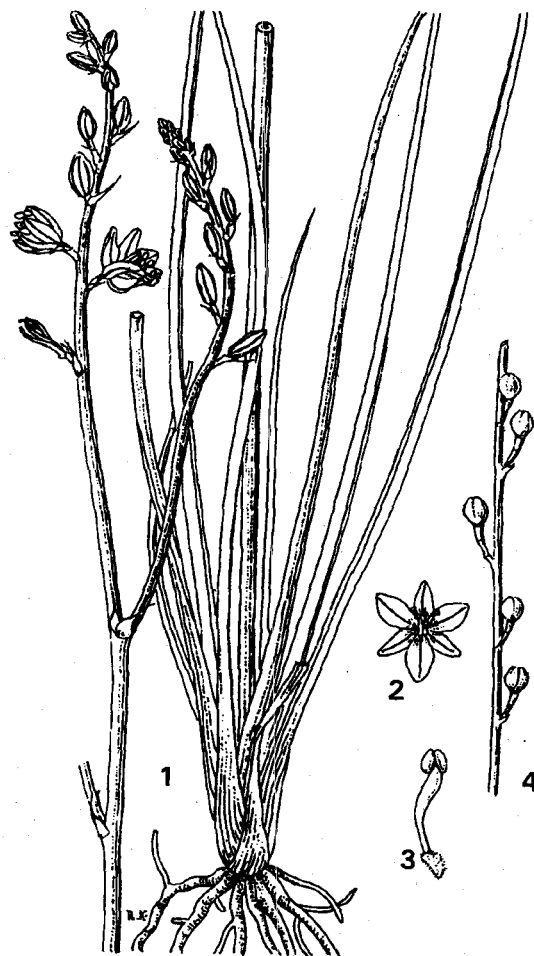


Figure 191.7 *ASPHODELUS FISTULOSUS*: 1 – whole plant x $\frac{1}{10}$; 2 – flower x $\frac{1}{10}$; 3 – stamen x 2; 4 – peduncle with fruits x $\frac{1}{10}$. (Reproduced with permission from *Fl. Somalia* 4: fig 21)

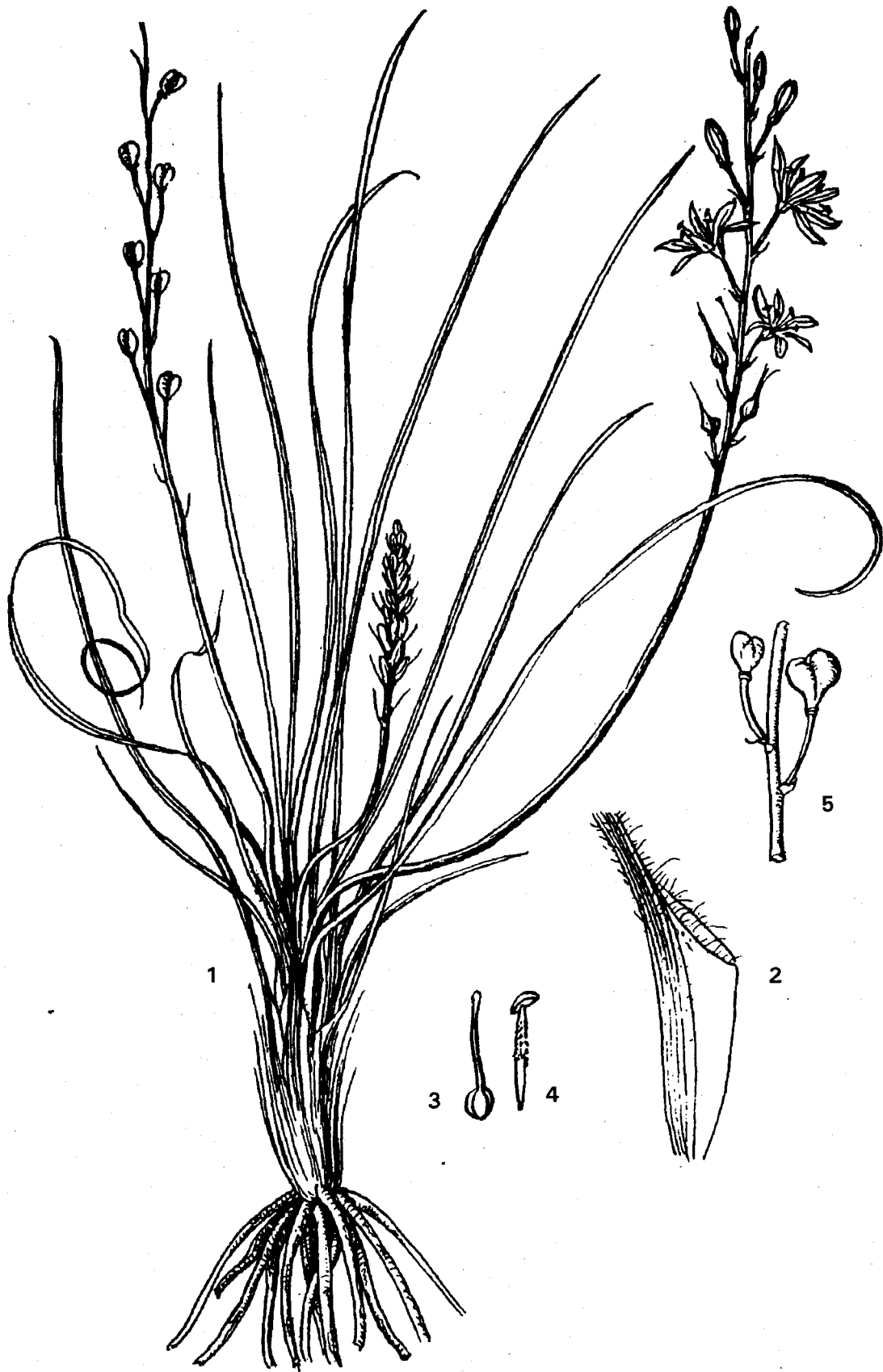


Figure 191.8 *TRACHYANDRA SALTII*: 1 - whole plant $\times 1/2$; 2 - tubular leaf base, enlarged; 3 - gynaecium; 4 - stamen; 5 - capsule. Drawn by M. E. Connell. [specimen citation not given]

Some 18 species from the Canary Islands and the Mediterranean area eastwards to Himalaya; 1 species in the Flora area.

***A. fistulosus* L. (1753)**

A. tenuifolius Cav. (1801); *A. fistulosus* L. var. *tenuifolius* (Cav.) Baker, *J. Linn. Soc. Bot.* 15: 272 (1876).

Annual or short-lived perennial with numerous slender roots. Leaves up to 40 x 0.4 cm, hollow subterete, minutely scabrid. Peduncle hollow, with inflorescence 15–70 cm long, inflorescence simple or branched;

bracts 4–7 mm long; pedicels with joint near the middle. Tepals 5–12 mm long, white or pink with brown mid-nerve. Capsule 4–7 x 4–5 mm, transversely wrinkled. Fig. 191.7.

Rocky places. EW; also in the Canary Islands, the Mediterranean area, Arabia, Somalia and Socotra, naturalized in Australia. No specimens from the Flora area belonging to this species have been seen. It is included on the basis of personal communication with M. Thulin.

192. ALOACEAE

Sebsebe Demissew* & M.G. Gilbert**

Carter, *Aloaceae* in *Fl. Trop. E. Afr.* 60pp. (1994); Lavranos, *Aloaceae* in *Fl. Somalia* 4: 35–42 (1995).

Succulent perennials varying from small herbs to large woody trees. Roots often with yellow pigments. Leaves usually spiral, rarely distichous, mostly crowded, usually very succulent, often with marginal teeth, usually without obvious fibres. Inflorescence an axillary pedunculate raceme, often branched; most bracts small and scarious, lowermost rarely leafy. Flowers 3-merous; bisexual; tepals 3+3, usually fused into tube, very rarely free (*Aloe steudneri*), fleshy, mostly pink, red, orange or yellow, less often white or purple, usually very slightly zygomorphic, rarely strongly so (*Haworthia* and *Gasteria* in S Africa). Stamens 3+3, inserted at base of ovary, free; anthers dorsifixed, longitudinally dehiscent. Ovary 3-locular, placentation axile, ovules usually many; style simple, long with small stigma. Fruit a loculicidal capsule (fleshy in *Lomatophyllum*), many-seeded. Seeds flat or 3-winged, dry.

About 7 genera and 650 species, mostly restricted to southern Africa with only *Aloe* extending into tropical Africa and Arabia and *Lomatophyllum* restricted to Madagascar and Mascarenes. 1 genus and 38 species in the Flora area.

ALOE L. (1753)

Berger in Engler, *Pflanzenr.* 4.38. III. ii. Liliac.-Aloin. (1908); Reynolds, *The Aloes of Tropical Africa and Madagascar* (1966); Cufodontis, *Enum.*: 1542–1552 (1971).

Perennials with succulent leaves, sometimes developing into shrubs or even trees. Roots thick, rarely fusiform, usually bright yellow. Stems often hidden, very fibrous, rarely with well-developed secondary thickening (not in Flora area). Leaves usually crowded into rosettes, less often more widely spaced along stem, amplexicaul with thin basal sheath, sublinear to ovate, very fleshy, glabrous, often marked with pale spots, upper surface often canaliculate (concave to form groove); margin usually armed with sharp horny teeth, horny tissue sometimes contiguous along margin, spines sometimes on leaf surface (not in species native to Flora area). Inflorescence an axillary, very rarely terminal, raceme, occasionally simple, usually branched, sometimes compoundly branched (with lower branches branching again). Flowers 1 per bract, pedicel never articulated. Perianth usually very fleshy and slightly zygomorphic, lobes 6, the inner 3 joined into a tube, the outer free to almost completely joined to inner, usually only tips recurving, glabrous or hairy, red, orange or yellow, very rarely white. Stamens 6, free for most of their length, exerted at anthesis; anthers linear to oblong. Ovary superior; ovules numerous; style longer than stamens; stigma lobes capitate. Fruit a loculicidal capsule, papery or slightly woody when mature. Seeds irregularly 3-sided to flattened, narrowly to broadly winged.

About 350 species in Africa, south of the Sahara, Madagascar and tropical Arabia; one species widely naturalised in the Mediterranean, Caribbean and elsewhere. Many species are now very widely grown as ornamentals in drier, frost-free parts of the world.

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All measurements in the keys are based on dried material and are thus smaller than would be the case for fresh material. Shrinkage of the very fleshy flowers is significant, usually about 20(–25) % in well-pressed flowers. Marginal teeth of the leaves are counted towards the leaf base, in most species per 10 cm length of margin, for a shorter distance only in those species with very small leaves or with very small close-set teeth.

Herbarium material of this group is often poorly prepared and without adequate field notes. Photographs to show the habit are thus valuable. It is vital to have information on the overall size and habit of the plant and to take precautions to ensure that herbarium material dries reasonably quickly. Leaves should have most of the lower surface removed, keeping the upper surface and margin intact where possible, and all the central water storage tissue scraped away, after which drying is easy. Strongly recurved, deeply canaliculate leaves may need to be split along the middle into 2 halves so that they can dry flat. If this is not done, leaves can take weeks, even months, to dry and often rot or discolour badly. Flowers are best killed by dipping them in boiling water or petrol or some similar substance or placing in a deep-freezer. If this is not done most flowers will drop off and there is excessive shrinkage and distortion.

1. Perianth and bracts shortly hairy or tuberculate; racemes over 40 cm long, erect; inflorescence unbranched or with up to 4 lateral racemes. 2
 - Perianth and bracts glabrous; racemes up to 35 cm long, usually less; inflorescence often profusely branched, rarely with fewer than 4 racemes. 6
2. Perianth and bracts shortly hairy. 3
 - Perianth and bracts minutely papillate. 5
3. Bracts spreading or gently recurved; pedicels 8.5–20 mm long. 3
 - Bracts at anthesis sharply reflexed from base; pedicels up to 2–8(–11) mm long.

1. *A. trichosantha*

4. Adult leaves prominently spotted; bracts 3–4 mm wide; perianth greenish-yellow or grey-green.

2. *A. citrina*

- Adult leaves without spots (juvenile plants sometimes profusely spotted); bracts 6–14 mm wide; perianth pink or red. 3. *A. pubescens*
- 5. Marginal teeth c 3 mm long; perianth (20–)25–28 mm long, outer lobes free for c 1/3 length. 4. *A. eumassawana*
- Marginal teeth almost absent; perianth and bracts minutely papillate; perianth c 15 mm long; outer lobes free for c 2/3 length. 5. *A. schoelleri*
- 6. Flower buds with subglobose basal swelling constricted into narrower tube; leaves very soft, always with longitudinal lines and usually profusely spotted. 7
- Flower buds clavate, cylindrical or conical, sometimes 3-angled; leaves varying but if spotted then rather hard in texture and not with longitudinal lines. 10
- 7. Leaves lanceolate to ovate, more than 5 cm wide and/or less than 5 times as long as broad; marginal teeth up to 24 per 10 cm, 2–4.5 mm long. 8
- Leaves linear-oblong, up to 2.5 cm wide, more than 8 times as long as broad; marginal teeth 28–40 per 10 cm, up to 1.5 mm long. 8. *A. ellenbeckii*
- 8. Leaves very fleshy; basal swelling of perianth very well developed, globose (widespread in drier highlands). 9
- Leaves much less fleshy than typical for genus, spotting rather sparse, sometimes absent; basal swelling of perianth not as clearly globose as in other species (KF GJ?). 9. *A. kefaensis*
- 9. Leaf margin with 10–24 teeth per 10 cm; capsules ellipsoidal, 25–31 mm long. 6. *A. macrocarpa*
- Leaf margin with 8–10 teeth per 10 cm; capsules cylindrical, 37–40 mm long. 7. *A. lateritia*
- 10. Marginal teeth 0.3–1 mm long, sometimes absent; leaves always very soft and thin-skinned, pale grey-green, sometimes yellowish, rarely obscurely spotted. 11
- Marginal teeth (1–)1.5–5.5 mm long, usually dark-tipped; leaves various but never as thin-skinned, often dark green and/or clearly pale spotted. 13
- 11. Stems suckering freely from base; leaves smelling strongly of mice when cut; marginal teeth minute but many and well defined; perianth yellow, up to 20 mm long (found at 300–1450 m.). 12
- Stems branching dichotomously at apex within leaf rosette; leaves without such smell when cut; marginal teeth almost lacking, traces widely spaced; perianth red, 32–33 mm long (found at 2500–2750 m.). 22. *A. pulcherrima*
- 12. Plant stemless or rarely with stems to 50 cm long; inflorescence erect, long-pedunculate, 100–200 cm high; bracts c 3 mm long. 10. *A. ruspoliana*
- Plant with stout erect stems 1–2 m high; inflorescence spreading, short-pedunculate, up to 45 cm high; bracts c 5 mm long. 11. *A. retrospecticiens*
- 13. Leaves dark green with prominent white spots, skin thick so leaf hard textured. 14
- Leaves usually without spots, rarely grey-green and obscurely spotted, skin thin or thick. 19
- 14. Leaf surface smooth, glossy; bracts acuminate to acute, relatively inconspicuous. 15
- Leaf surface rugulose, rough to the touch; bracts obtuse, prominently white, scariosus. 15. *A. rugosifolia*
- 15. Plant stemless or nearly so; inflorescence always branched. 16
- Plant with distinct slender stems to 20 cm long; inflorescence not branched. 38. *A. vituensis*
- 16. Leaves only occasionally spotted, bright, glossy green, with brown horny margin continuous between teeth at least in places; perianth red or bright yellow, not striped; bracts 9.5–15 mm long. 16. *A. harlana*
- Leaves always spotted, dark green, margin pale, only tips of teeth brown and horny; perianth glaucous pink or pale yellow to red; bracts 3–10 mm long. 17
- 17. Marginal teeth 3–5.5 mm long; perianth 18–26 mm long, not glaucous, clearly striped. 18
- Marginal teeth 1–2.5 mm long; perianth 26–30 mm long, glaucous pink, obscurely striped. 14. *A. parvidens*
- 18. Perianth broadest at base, 17–20 mm long, pink. 12. *A. mcloughlinii*
- Perianth cylindrical to subclavate, (20–)23–25 mm long, yellow or orange, rarely reddish. 13. *A. pirottae*
- 19. Plant stemless or with stout, completely prostrate or pendent stems, rarely some old plants with short erect stems covered with persistent leaf-bases. 20
- Plant soon developing obvious erect or ascending stems and eventually forming shrubs. 33
- 20. Inflorescence a much branched panicle with spreading, one-sided (secund) racemes. 21
- Inflorescence with erect, radially symmetrical racemes, often little branched. 23
- 21. Marginal teeth with minute brown tip only; perianth (23–)25–32 mm long, not pale-flecked, base truncate. 22
- Marginal teeth mostly dark brown, often with colour continuous along margin; perianth 19–23 mm long, white-flecked (visible only in fresh material), base rounded. 25. *A. secundiflora*
- 22. Plant only occasionally stemless; leaves deeply canaliculate, dull grey-green. 33. *A. gilbertii*
- Plant nearly always stemless; leaves shallowly canaliculate towards the tip only, dull olive- to brown-green. 24. *A. rivae*
- 23. Perianth cylindrical or clavate (widest towards tip), relatively slender. 24
- Perianth conical-trigonous, very fleshy, widest very near to the truncate base and prominently indented above so as to be 3-sided. 23. *A. trigonantha*
- 24. Flower buds cylindrical or nearly so. 25

- Flower buds clavate to subclavate. 32
 - 25. Plant suckering from base; leaves not or only slightly glaucous, margins with sharp teeth over 1.5 mm long; dead leaves brown. 26
 - Plant often unbranched, branching, when present, dichotomous at tip within leaf rosette; leaves pale blue-green, margins smooth (teeth widely spaced, less than 0.3 mm high), reddish at least in dry season; dead leaves dark purple. 22. *A. pulcherrima*
 - 26. Leaves spreading or recurved; inflorescences ascending, sometimes much-branched, racemes less than 30 cm long; tepals without obviously pale margins (inland). 27
 - Leaves incurved or erect; inflorescences erect, little branched, racemes up to 35 cm long; tepals margins prominently pale so flower looks striped (in plants on or near sea coast). 4. *A. eumassawana*
 - 27. Inflorescence with 1-6 racemes; perianth 35-40 mm long (plants of high altitudes, 2600 m, often growing on cliffs). 28
 - Inflorescence with 5-many racemes; perianth 15-34 mm long (various altitudes, rarely if ever growing on cliffs). 29
 - 28. Outer perianth lobes free (GD GJ). 20. *A. steudneri*
 - Outer perianth lobes all joined for 15-20 mm (SU). 21. *A. ankoberensis*
 - 29. Leaves with horny margin continuous between teeth at least in places; leaves glossy green, sometimes spotted; populations with a significant proportion of yellow-flowered plants. 30
 - Leaves with pale margin, only the marginal teeth horny-brown or red; leaves often glaucous, never glossy nor spotted except obscurely in seedlings; yellow flowered plants extremely rare. 31
 - 30. Bracts 9.5-15 mm long (HA). 16. *A. harlana*
 - Bracts 20-22 mm long (TU WU). 17. *A. monticola*
 - 31. Bracts (8-)10-16(-20) mm long; leaves usually slightly glaucous; inflorescences with just one level of branching (EW TU GD). 18. *A. percrassa*
 - Bracts 3.5-6.5(-8.5) mm long; leaves not glaucous; inflorescences often with two levels of branching (SU WU). 19. *A. debrana*
 - 32. Leaves spreading or recurved; bracts conspicuously white and scarious, longer than pedicels; buds erect till just before anthesis; perianth segments with distinctly raised rugose midribs. 26. *A. otallensis*
 - Leaves erect or incurved; bracts inconspicuous, much shorter than pedicels; buds horizontal for most of their development; perianth segments smooth. 27. *A. elegans*
 - 33. Leaves up to 2.2 cm wide, linear; inflorescence a simple unbranched raceme. 34
 - Leaves 5 cm wide or more, never linear; inflorescence usually much branched. 35
 - 34. Leaves spotted; inflorescence moderately compact, 3-4 flowers per cm; pedicels 7-8 mm long. 36. *A. jacksonii*
 - Leaves unspotted; inflorescence very lax, flowers per cm apart; pedicel c 12 mm long. 37. *A. tewoldei*
 - 35. Perianth clavate, broadest near tip. 36
 - Perianth cylindrical to cylindrical-trigonous. 39
 - 36. Bracts 7-12 mm long; perianth 23-27(-33) mm long. 37
 - Bracts 3-6 mm long; perianth 17-22 mm long. 38
 - 37. Racemes 12-22 cm long; bracts 9-12 x 2.5-4 mm. 29. *A. adigratana*
 - Racemes 5.5-8.5(-14) cm long; bracts 7-8 x 2 mm. 30. *A. sinana*
 - 38. Leaves up to 60 cm long, often less, green, spotted whitish at least near base (EE EW TU WU). 28. *A. camperi*
 - Leaves c 80 cm long, uniformly grey green, not spotted (GG SD). 31. *A. calidophila*
 - 39. Inflorescences each with 8 or more racemes. 40
 - Inflorescences each with up to 3 racemes. 34. *A. schelpei*
 - 40. Stems stout, 5 cm wide or more; perianth 23-28 mm long. 41
 - Stems slender, 3-4 cm thick; perianth 20-22 mm long. 35. *A. yavellana*
 - 41. Marginal teeth 5-7 per 10 cm, 5-6 mm long; bracts (5-)7-12 mm long. 32. *A. megalacantha*
 - Marginal teeth 7-12 per 10 cm, 3-5 mm long; bracts 4-6 mm long. 33. *A. gilbertii*
1. *A. trichosantha* Berger (1905)
 - syntypes: EW, Selet Valley above Saganeiti, Schweinfurth & Riva 1664 & Valley above Ghinda, Schweinfurth & Riva 2291 (both FT K syn.).
- Rosettes stemless, solitary or suckering to form groups. Leaves 12-20 per rosette, 25-70 x 2.5-13.5 cm, suberect with slightly incurved tips, slightly canaliculate, dull grey-green without spots in adult plants, juveniles densely pale-spotted; marginal teeth 4-12 per 10 cm, 2-5.5 mm long with brown tip. Inflorescence up to 200 m high, erect; racemes 1-3(-4), 40-70 cm long, cylindrical-conical, dense (2-3 flowers per cm). Bracts lanceolate, 10-19(-23) x 4-8 mm, finely pubescent, sharply reflexed after anthesis. Pedicels 2.5-8(-11 in fruit) mm long. Perianth cylindrical-trigonous, curved slightly upwards towards tip, 20-30 x 4.5-6.5(-7) mm when pressed, pale to bright pink with short, sometimes dense, white indumentum; outer lobes free, 6-9 mm. Capsule 19-23 x 7.5-8 mm. Seeds 3-angled, 4.5-6 mm long, brown to almost black with pale spots and pale narrow wings.
- 1. Marginal teeth 8-12 per 10 cm, 4.5-5.5 mm long; perianth 20-23 mm long. subsp. *trichosantha*
 - Marginal teeth 4-8 per 10 cm, 2-4 mm long; perianth (23-)25-30 mm long. subsp. *longiflora*
- subsp. *trichosantha*
A. percrassa var. *albopicta* Schweinf. in Bull.

Herb. Boiss. 2, App. 2: 64 (1894) – types: EW, Ghinda Valley (1200 m), *Schweinfurth & Riva 1846 & 1847* (B syn. not seen).

A. percrassa sensu Schweinf. (1894), non Tod. (1875).

Fig. 192.1.8.

Locally abundant in open dry bushland; 900–1700 m. EE BW; ?Sudan. *Bally 6696; Reynolds 8045; Schweinfurth & Riva 1664.*

Reynolds (loc. cit.: 134) tentatively suggested that *Schweinfurth & Riva 2291* would make a satisfactory lectotype. The FT and K sheets of number 2291 are more incomplete than number 1664 so there may be reason not to accept that suggestion.

subsp. *longiflora* Gilbert & Sebsebe (ined.)

– type: HA, slopes above Gobelli River W of Daletti, *Burger 3394* (K holo., ETH FT iso.).

A. rigens sensu Cufod. (1971) quoad spec. Ethiop. non s. str.

Locally abundant in open deciduous bushland on volcanic rocks and alluvial soils; 1000–1950(–2200) m. GD WU SU SD BA HA; Somalia. *Burger 3394; M.G. & S.B. Gilbert 1131; Westphal 1876.*

The differences from the northern subspecies are small but consistent and numerous enough to justify treating the southern plants as a distinct subspecies. At present there is a wide gap in distribution between them but this might be filled in as the plants of the very poorly explored eastern escarpment become better known.

Some collections of this subspecies were listed by Cufodontis as *A. rigens* Bally & Reynolds, known only from Somalia.

2. *A. citrina* Carter & Brandham (1983)

– type: Somalia, 3 km S of Bulu Burti, *Bally & Melville 15278* (K holo.).

Rosettes stemless, solitary or in small groups. Leaves dense, c 16, erect to slightly incurved, 36–60 x 8.5–12 cm, pale grey-green with numerous pale spots often in transverse bands, canaliculate; marginal teeth 5–9 per 10 cm, 1.5–3 mm long with brown tips. Inflorescence to 200 cm high; racemes 2–6, (25–)40–50 cm long or longer, cylindrical-conical, dense (2–5 flowers per cm). Bracts lanceolate-triangular, 8–14 x 3–4 mm, finely pubescent. Pedicel 8.5–15 mm long. Perianth similar in form to that of *A. trichosantha*, 26–34 x 4–4.5 mm when pressed, grey-green to greenish-yellow, tomentose; outer lobes free for 14–18 mm. Capsule 22–24 mm long, cylindrical. Fig. 192.1.1–4.

Open deciduous bushland on sandy soils; 275–1000 m. SD; Somalia, Kenya. *Sebsebe D. & Ensermu K. 2721; Reynolds 7076; Gilbert et al. 8152.*

Plants of this species were mentioned by Reynolds under *A. trichosantha* but he never formally described them.

3. *A. pubescens* Reynolds (1957)

– type: SU, 16 km N of Shashemene, by old

bridge along stream crossing main Addis Ababa road just S of Arsi Negele, *Reynolds 8144* (PRE holo. not seen, K iso.).

Rosettes stemless (in cultivation with stems to 30 cm long), usually suckering freely to form groups. Leaves c 16, 35–45 x 6–13 cm, suberect with slightly recurved tips, grey-green without markings except for seedlings; marginal teeth 8–11 per 10 cm, 2–3.5 mm long, upper half reddish-brown. Inflorescence 70–150 cm high; racemes 1–2(–3), 20–35 cm long, cylindrical-conical, dense (3–5 flowers per cm). Bracts ovate-triangular, 15–21 x 6–14 mm, acute. Pedicels 12–20 mm long. Perianth similar in form to that of *A. trichosantha*, 33–40 x 4–5 mm when pressed, minutely pubescent, pink or red; outer lobes free for c 12 mm. Capsule 21 x 7.5 mm, ellipsoidal. Seeds black, 3-angled to winged, 5 mm long, terminal wing 1.2 mm wide, densely dark-veined. Fig. 192.1.5–7.

Growing along rocky banks of streams, along field margins, where there are remnants of *Podocarpus* forest; 1800–2550 m. SU HA. *Gilbert et al. 9302; Sebsebe D. & Tamrat B. 2345; Reynolds 8144A.*

Collections from Harerge have narrower bracts (9–14 mm) and shorter pedicels (12–15 mm) than material from the type locality but these are linked by more recent collections from near Butajira (*Sebsebe D. 3180, 3334*)

4. *A. eumassawana* Carter, Gilbert & Sebsebe (1996)

– type: EE, Mitswa (Massawa) southern border of town, c 2 km from sea, *Ash 1816* (K holo.).

Rosettes stemless or nearly so, suckering to form large clusters. Leaves erect, c 16, 45–50 x 9.5–18 cm, tips slightly incurved to slightly recurved, shallowly canaliculate, dull grey-green sometimes with a few pale spots; marginal teeth c 7 per 10 cm, 3 mm long, reddish-brown at tip only. Inflorescence erect, 120–150 cm high; racemes 1–3, (15–)20–25+ cm long, cylindrical-conical, dense (8–16 flowers per 5 cm). Bracts 6.5–7 x 2.5–3 mm. Pedicels 4.5–7 mm long. Perianth cylindrical-triangular, (8–)20–21–28 x c 7 mm when pressed, pale scarlet or orange with pale margins to lobes; outer lobes free for 9–12 mm.

Coastal bushland with *Euphorbia cactus* on sandy soil; near sea level. EE; not known elsewhere. *Ash 1816; Reynolds 8047.*

Reynolds believed that *A. massawana* had been introduced from the Red Sea coast to Tanzania and Mozambique where it seemed to be associated with old Arab graves and named it accordingly but used a Tanzanian collection as the type. It is now agreed that *A. massawana* is indigenous to E Africa and distinct from the Eritrean plants which have been named as the 'true Massawa aloe'.

5. *A. schoelleri* Schweinf. (1894)

– type: EW, Kohaito Plateau, along river coming down from Andal to Eschka basin, *Schweinfurth 158* (B holo. inflorescence only, K iso. leaf only).

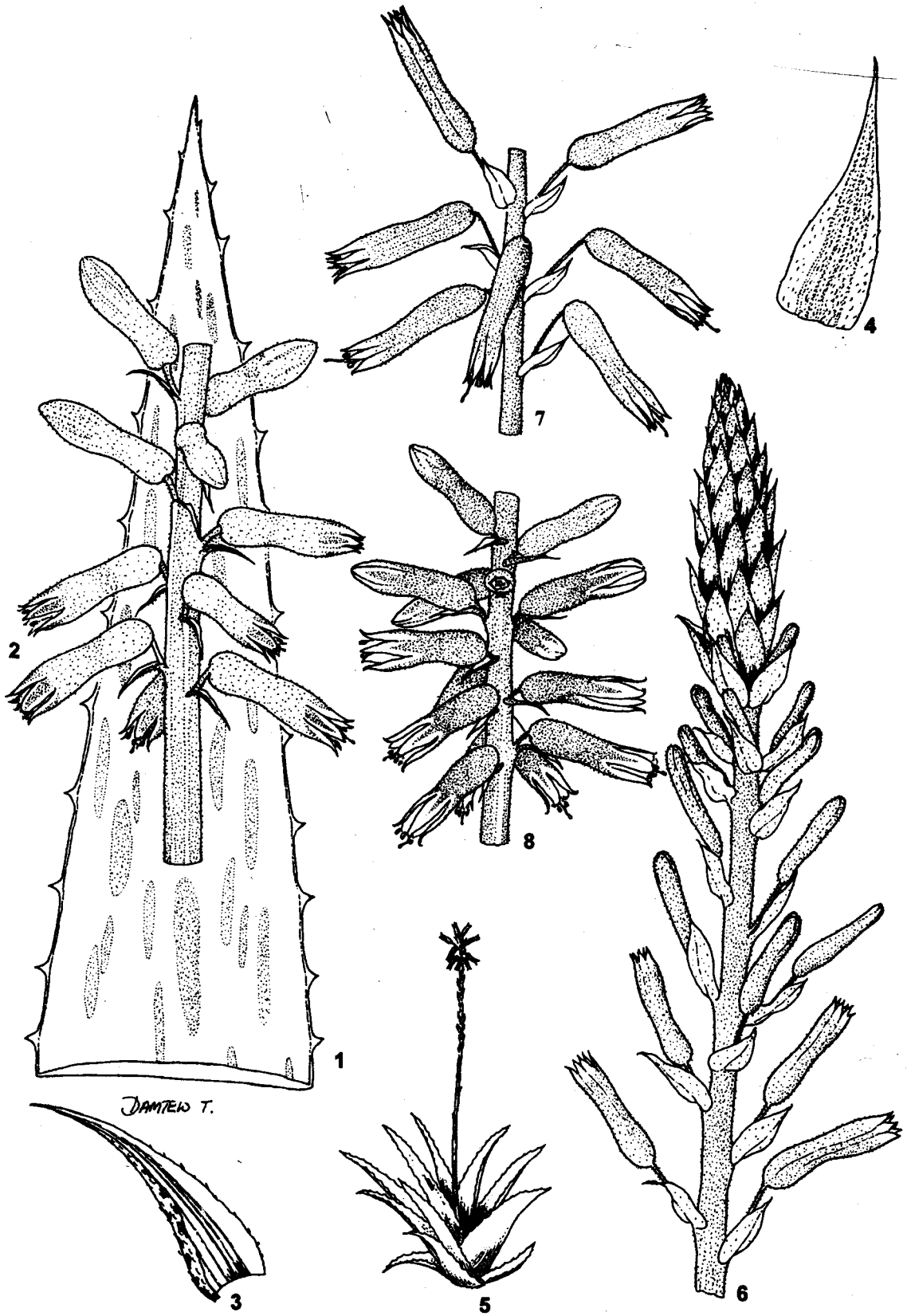


Figure 192.1 *ALOE CITRINA*: 1 - part of a leaf x 1; 2 - part of inflorescence x 1; 3 - front view of a stipule x 5; 4 - back view of stipule x 5. *A. PUBESCENS*: 5 - whole plant x 1/5; 6 - inflorescence x 1; 7 - part of inflorescence x 1. *A. TRICHOSANTHA* subsp. *TRICHOSANTHA*: 8 - part of inflorescence x 1. 1-4 from Gilbert, Sebsebe D. & Vollesen 8152; 5 based on a photo from *The Aloes of Tropical Africa and Madagascar*. 136 (1966); 6 from Reynolds 8144; 7 from Reynolds 8144A; 8 from Schweinfurth & Riva 1664. Drawn by Damtew Teferra.

Growth form not known. Leaves 40–45 x 10–13 cm; marginal teeth almost absent. Inflorescence apparently solitary, 50–60 cm high; raceme *c* 30 cm long, very densely flowered. Bracts rhomboidal to obovate, 14–17 x 9–10 mm, apex acute, minutely papillate. Mature flowers not known; immature pedicels *c* 10 mm long, reddish, densely minutely papillate. Perianth at least 15 mm, lobes free for 11 mm.

EW; known only from the type collection.

The protologue suggests a relationship with *A. trichosantha*.

6. *A. macrocarpa* Tod. (1875)

– type: t. 9 of protologue based on material of Ethiopian origin, apparently sent as seed by Schimper in 1870 and thus probably originally from TU.

?*A. borziana* Terracc. (1897) – type: cultivated plant grown from seed sent from Ethiopia by Schimper and Braun (?PAL holo. not seen).

A. macrocarpa var. *major* Berger in Engler, *Pflanzenr. Liliac.-Aloin.* 210 (1908) – type: TU, above Lake Vongi (= ?Wonchi), Schimper (1862) 798 (?B holo. not seen, BM iso.).

Rosettes stemless, rarely developing short erect stems in shaded sites, solitary or forming small groups. Leaves 16–20, (10–)20–35 x 3–11.5 cm, very soft, green, usually with numerous pale spots, always with distinct darker longitudinal lines; marginal teeth 10–24 per 10 cm, 2–3 mm long, tipped with brown. Inflorescence erect, up to 100 cm high; racemes (1–)3–5(–7), (2–)4–22 cm long, lax to capitate. Bracts 6–20 x 2–4 mm. Fruiting pedicels 11–45 mm long. Perianth 19–30(–35) mm long, with a distinct globose basal swelling, 4.5–7 mm wide when pressed, abruptly constricted into subcylindrical limb, 2.3–5 mm wide, red with paler margins to lobes, very rarely yellow; outer lobes free for 5–6 mm. Capsule cylindrical to ellipsoidal, 22–40 x 12–15 mm. Fig. 192.2.

Open grassland, often between clumps of evergreen bushes, on rocky slopes to level areas with darker soil; 1400–2200(–3000) m. EW TU (WU) SU AR HA; Sudan west to Benin, Somalia. *Burger* 3615; *W. de Wilde* 10028.

A variable species, perhaps only dubiously separable from *A. lateritia*, below and *A. saponaria* Haw. from southern Africa.

Plants from high altitudes in AR (*Mooney* 5299; *Gilbert* 1150) are much smaller with very broad leaves, less than 10 cm long, and very brightly coloured capitate inflorescences less than 2 cm high. The differences are much less in cultivation and they seem best treated as an ecotype.

A. borziana is placed here on the basis of the description which clearly indicates that it is a member of the *A. saponaria* complex, with presumed northern Ethiopian origin (it was possibly even grown from the same batch of seeds as the type of *A. macrocarpa*). It was not mentioned by Reynolds.

7. *A. lateritia* Engl. (1895)

– type: Tanzania, Moshi District, Rombo,

Volkens 404 (B holo., BM iso.).

A. graminicola Reynolds (1953); *A. lateritia* var. *graminicola* (Reynolds) Carter, *Aloaceae* in *Fl. Trop. E. Afr.*: 17 (1994) – type: Kenya, N Nyeri District, 13 km S of Nanyuki, *Reynolds* 6576 (PRE holo., ED K iso.).

Closely related to *Aloe macrocarpa* but rather larger. Leaves to 60 cm long, marginal teeth 8–10 per 10 cm, 2–3 mm long. Inflorescence to 130 cm high; racemes lax to capitate. Capsule cylindrical, 37–40 mm long.

In open deciduous bushland; *c* 1550 m. SD; Kenya, Tanzania, Uganda, Rwanda, Zaire. *Gillett* 14367; *Reynolds* 7058.

Collections with capitate inflorescences, which includes the Ethiopian material have been placed in *A. graminicola*. Carter (loc. cit.) has recognised this as a variety of *A. lateritia* but we prefer not to follow this treatment: the type of *A. lateritia* has inflorescences comparably dense and there is a continuity of variation between the extremes.

8. *A. ellenbeckii* Berger (1905)

– type: Somalia, Jubbada Dhere Region, Ferschit (Heleschid), *Ellenbeck* 2340 (B holo.).

A. dumetorum Mathew & Brandham (1977) – type: Kenya, northern frontier 10.5 km S of Moyale, *Brandham* 1800 (K holo.).

Rosettes stemless, solitary (or suckering to form clumps). Leaves 5–10, up to 26 x 1.6–2.6 cm, narrowly oblong, canaliculate to cylindrical, green with numerous pale spots; marginal teeth 28–40 per 10 cm, (0.5–)1.5 mm long, white, sometimes with minute dark tip. Inflorescence and perianth similar to those of *A. macrocarpa*. Inflorescence 50–75 cm high; racemes (1–)2–3, to 20 cm long, lax. Bracts (5–)11 x (1.5–)3 mm. Pedicel (7–)20 mm long. Perianth (20–)28 x base 6 mm, limb 4.5–6 mm wide.

In partial shelter of bushes in deciduous bushland overlying limestone; *c* 1600 m. SD (30 km E of Negele); N Kenya, S Somalia. *Gilbert* in *Kew* 434–74.02822.

The description is based primarily on the few Ethiopian plants seen. Kenyan material suckers profusely and is smaller in most parts: figures in brackets in the description are all from that material. Further collecting could justify a formal separation but at present it seems best to regard the differences as indicative of the vigour of the relevant plants.

9. *A. kefaensis* Gilbert & Sebsebe (ined.)

– type: KF, cultivated in Jimma Agricultural College, *Lissanework N.* in *Sebsebe D.* 2411 (ETH holo., K UPS iso.).

Rosettes stemless. Leaves 35–45 x 8–11 cm, less fleshy than usual for genus, green with obscure longitudinal dark-lines and sparse or no pale spots; marginal teeth 12–19 per 10 cm, 3–4.5 mm long, pale, sometimes with minute dark tip. Inflorescence *c* 150 cm high, little branched; racemes 30–35 cm long, lax (2–3 flowers per cm). Bracts 11–14 x 4.5–6 mm. Pedicels 16–22 mm long.

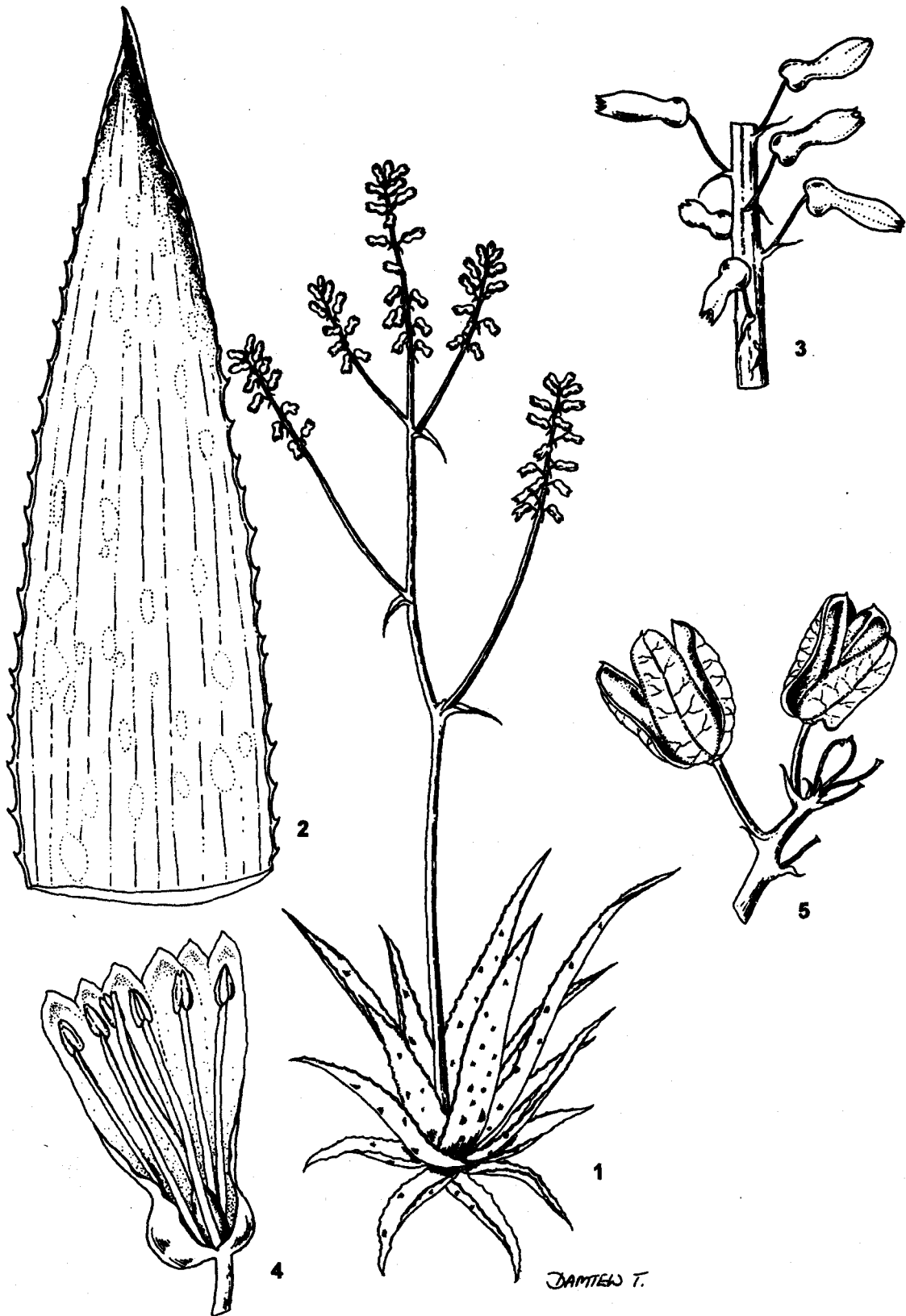


Figure 192.2 *ALOE MACROCARPA*: 1 - whole plant x 1/6; 2 - section of leaf x 1; 3 - portion of inflorescence x 1; 4 - opened flower x 1 1/2; 5 - fruits x 1. 1 based on a photo from *The Aloes of Tropical Africa and Madagascar*. 92 (1966); 2-4 from Reynolds 8126; 5 from Sebsebe D, Ermias D & Steglich 2380. Drawn by Damtew Teferra.

Perianth as in *A. macrocarpa* but with basal swelling not so sharply delimited and not clearly globose, 28–32 mm long, base *c* 6 mm wide, limb 4.5–5 mm wide when pressed.

Wooded grassland; *c* 1800 m. GD? SU KF; not known elsewhere. *Bally* 12021; *Friis* et al. 421; *Reynolds* 8146.

This plant appears to be widely cultivated in Addis Abeba and Jimma. The record from GD is based on *Mesfin & Kagnev* 1914, an incomplete collection of uncertain identity.

10. *A. ruspoliana* *Baker* (1898)

– type: HA, 'Milmil and Imi' (from date collected, near 'Pozzo da Carbadan' Cavernay and Dabanach; Cufodontis gives 'Sassabeneh'), *Ruspoli & Riva* 918 (B holo., FT iso.).

Rosettes stemless or with decumbent or ascending stems to 50 cm long, suckering to form groups, often quite large. Leaves 37–60 x 7.6–12 cm, *c* 16, suberect to spreading, very soft, pale yellowish green, sometimes obscurely pale-spotted, not canaliculate, smelling strongly of mice when cut; marginal teeth 14–30 (–60) per 10 cm, 0.3–0.7 mm long. Inflorescence long-pedunculate, 120–200 cm high; racemes 12 or more, 2–4 cm long, subcapitate. Bracts *c* 3 x 1.5 mm. Pedicels 5 mm long. Perianth cylindrical-trigonous, 13–16 x 4–5 mm when pressed, yellow; outer lobes free for 5–6 mm.

In Kenya on open rocky hillsides; 300–1450 m. SD BA HA; *Reynolds* 7083; *Sebsebe D.* et al. 4275.

A very distinct species easily recognised by the soft yellow-green leaves with minute marginal teeth; some Kenyan material suckers very freely and has much smaller leaves than indicated by Reynolds.

11. *A. retrospicimens* *Reynolds & Bally* (1958)

– type: Somalia, Darburruk, 90 km from Hargeissa on road to Berbera, *Reynolds* 8482 (PRE holo., EA K iso.).

A. ruspoliana var. *dracianiformis* *Berge* loc. cit.: 266 (1908) – type: 'Ogaden, Aradeis (Araday)' (from date more likely near Hargeisa in Somalia), *Ruspoli & Riva* 227 (FT iso.).

Succulent shrub, stem erect, 1–2 m high, 3–4 cm thick, branching from base. Leaves rather lax, spreading to gently recurved, 25–32 x 5–5.5 cm, grey-green sometimes flushed red, smelling of mice when cut; marginal teeth (24–)33–34 per 10 cm, minute, white, *c* 1 mm long. Inflorescence *c* 45 cm high, divaricately branched with 8–11 racemes; racemes 2–5 cm long, lax (2–3 flowers per cm). Bracts 5 x 2–2.5 mm, scarious. Pedicels 7–8 mm long. Perianth cylindrical-trigonous, 15–20 x 5–7 mm when pressed, pale yellow; outer segments free for 6–7 (–10) mm.

Locally abundant in very open deciduous bushland on limestone escarpments; *c* 1000 m. AF/HA; N Somalia. *Gilbert* 2343.

Very easily recognised by the thick erect stems and soft leaves with minute very closely-spaced marginal teeth.

12. *A. mcloughlinii* *Christian* (1951)

– type: HA, near Dire Dawa, plant collected under *McLoughlin* 826, cultivated and preserved under *Christian* 1170 (PRE holo., not seen).

Rosettes solitary or in small groups, stemless or nearly so. Leaves 40–50 x 7–8 cm, ascending to spreading with recurved tips, upper surface convex, dark green with numerous elongated pale spots; marginal teeth 7–10 per 10 cm, 3–4.5 mm long, with small reddish-brown tips. Inflorescence 100–120 cm high overall, branching above middle; racemes 6–11, erect, cylindrical, 11–20 cm long, lax (2–3 flowers per cm), sometimes secund on branches. Bracts ovate, 3–6 x 2–3 mm. Pedicels 5–9.5 (–12 in fruit) mm long. Perianth cylindrical to slightly conical, 17–20 x 5–7.5 mm when pressed, truncate at base, pink, lobes with paler margins so flower looks to be striped; outer lobes free for 10–16 mm.

Level stony ground with disturbed *Acacia* bushland, often growing with *Aloe megalacantha* and large *Sansevieria*; 1060–1250 m. GG HA; not known elsewhere. *Ash* 2277; *Bally* 11649; *Sebsebe D. & Tamrat B.* 2341.

13. *A. pirottae* *Berger* (1905)

– type: GG/SD, Sarati, River Sagan-Omi¹, *Ruspoli & Riva* 1682 (1682) 1525 (B holo. destr., FT iso.).

Rosettes forming small groups, stemless or nearly so. Leaves 45–60 x 6.5–13 cm, spreading with recurved tips, shallowly canaliculate at least near tip, dark green with many elongated pale spots; marginal teeth 7–10 per cm, (3–)4–5.5 mm long, often curved, brown-tipped. Inflorescence with up to 28 mostly spreading branches; racemes cylindrical, often secund, 7–33 cm high, lax (2–4 flowers per cm). Bracts ovate, 3–10 x 2–5 mm, acute or acuminate. Pedicel 3–9 (–12 in young fruit) mm long. Perianth cylindrical or clavate, 20–28 x 4–5 mm when pressed, yellow, orange or sometimes red, striped; outer lobes free for 6–12 mm. Capsule small, *c* 15 mm long. Seeds *c* 4 mm long, 3 winged, brown with white cystoliths² and pale wings. Fig. 192.3.

Open *Acacia* woodland, sometimes on dark soil; 1300–1820 m. GG SD BA HA; not known elsewhere.

The material available shows clear regional variation. HA: racemes very clearly secund, bracts acute, 4–6 x 2–3 mm, perianths cylindrical, 23–25 mm long, clear yellow or, less often, orange or red, striped (*Burger* 2487, 3408; *Gilbert & Lavranos* 2260; *Sebsebe D.* 2328); BA: racemes only obscurely secund; bracts acute, 8–10 x 2.5–5 mm; perianths cylindrical, 21–28 mm long,

1. The handwriting on Ruspoli and Riva labels is often very difficult to read. Berger misread the locality as 'Saviti, Flusse Lagonomi' and the date as 25 March 1893. These were repeated by Reynolds who never examined the material at FT and supposed, from the date given by Berger, that the locality was near Marro, not far North of Dolo in SD. The label on the FT sheet has the date as '25–30 1893' and it is clear that the month has been omitted and Berger must have read 30 as the 3rd month. In fact Ruspoli and Riva were near the Sagan river 25–30 November 1893, just prior to Ruspoli's death on 4 December (he was killed by an elephant).

2. cystoliths: a crystal or deposit of lime, within a cell.

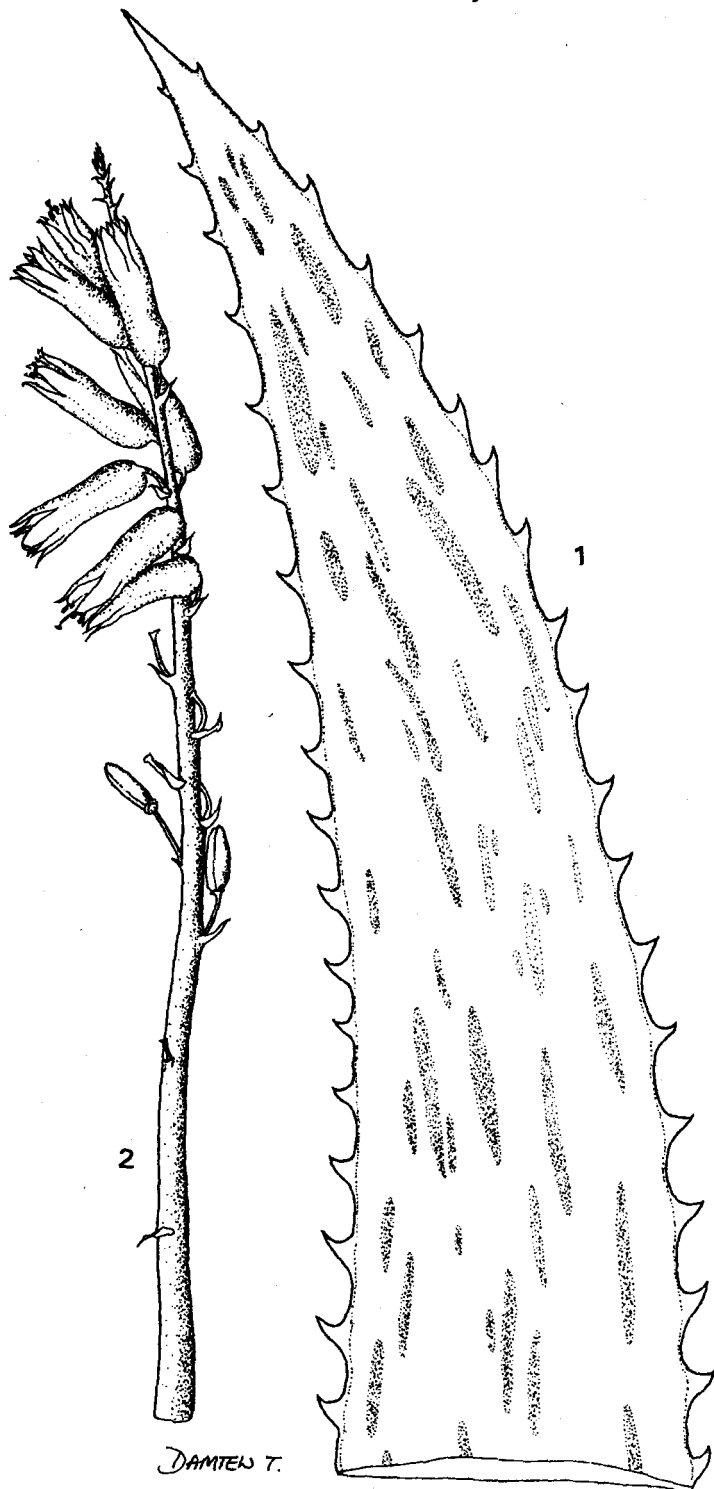


Figure 192.3 *ALOE PIROTTAE*: 1 – leaf x 1; 2 – inflorescence x 1. Both from Gilbert & Lavranos 2260. Drawn by Damtew Teferra.

clearly striped, pale yellow (Fris 3707; Fris et al. 5764; J. de Wilde 7320); East SD: racemes not secund; bracts acuminate, 10 x 4 mm; perianth distinctly clavate, 24 mm long, obscurely striped 'grey-red' (W. de Wilde; 6656); GG/west SD: racemes subsecund; bracts acute, 3 x 2 mm; perianth subclavate, 20 mm long, colour not

known (type of the species). This material closely approaches the preceding species, *A. mcloughlinii*.

14. *A. parvidens* Gilbert & Sebsebe (1992)

– type: SD, 16 km SE of Filtu on road to Dolo, Gilbert, Ensermu K. & Vollesen 7714A (ETH holo., K iso.).

A. pirottiae sensu Reynolds (1966), non Berger (1908).

Rosettes solitary or in small groups, stemless or nearly so. Leaves spreading with recurved tips, 25–42 x 4.5–6.5(–9) cm, dark green to almost brown with many elliptical pale spots; marginal teeth 8–13 per 10 cm, 1–2.5 mm long with minute brown tips. Inflorescence up to 100(–120) cm high; racemes (1–3)–4–8, erect, cylindrical sometimes subsecund, 9–20 cm long, lax (2–3 flowers per cm). Bracts 5–6 x 3–4.5 mm, acute. Pedicels 5.5–12 mm long. Perianth cylindrical-trigonous, 26–30 x 4–6 mm when pressed, pink to red, sometimes glaucous with paler lobe margins; outer lobes free for 6–10 mm.

Acacia – *Commiphora* bushland or woodland in relatively flat areas, often hidden under smaller bushes; 1200–1450 m. SD BA; Kenya, Somalia. Ash 2468; Gilbert et al. 7714A; Friis et al. 3642.

Reynolds this plant as *A. pirottiae*, partly because of a mistake in the type locality and partly because he did not look at relevant types. Plants from Somalia and Kenya are rather more robust and regularly form small clumps in contrast to Ethiopian material which usually does not form clumps; the only collections from BA, Friis et al. 3642 and Sebsebe 4278, have an unbranched or 2–3-branched inflorescence. They thus resembles *A. hemmingii* Bally & Reynolds from Somalia but that species has more prominent marginal teeth.

15. *A. rugosifolia* Gilbert & Sebsebe (1992);

A. otallensis Baker var. *elongata* Berger loc. cit.: 226 (1908) – type: Kenya, Ruspoli & Riva 476 (B holo. not seen, FT iso.).

Rosettes solitary or in small groups, stemless. Leaves spreading, recurved in young plants, later erect to incurved, 20–40 x 5.5–8 cm, finely rugose, green with clearly defined pale spots; marginal spines 10–16 per 10 cm, 4–5 mm long, brown, sometimes almost touching. Inflorescence 150–180 cm high, branched; racemes up to 10, 10–20 cm long, cylindrical-conical, 7–8 flowers per cm. Bracts 9–11(–13) x 4–8 mm, obtuse, prominently white-scarious. Pedicels 5–7 mm long. Perianth subclavate to cylindrical, 25–28 x c 5 mm when pressed, pink; outer lobes free for c half their length. Capsule 17 mm long. Seeds 4 mm long, dark brown with 2 broad white scarious wings to c 4 mm wide overall.

In shelter of bushes in *Acacia* – *Commiphora* bushland; c 1350–1700 m. SD; N Kenya. Ash 2809; Reynolds 7046; Sebsebe D. et al. 2553.

This species was included by Reynolds under *A. otallensis* but it lacks the ornamented midribs of the perianth lobes of that species. It has also a very distinc-

tive finely rugose to rugulose leaf surface quite distinct at least from any other species in tropical Africa and Arabia. Reynolds made no comment on this in his description though it was mentioned by Berger in the description of *A. otallensis* var. *elongata*.

16. *A. harlana* Reynolds (1957)

— type: HA, 15 km SE of Dire Dawa on road to Harer, near Harla, Reynolds 8158 (PRE holo. not seen).

Mostly stemless but eventually developing a stem up to 30 cm long. Leaves numerous, 40–50 x 8–12 cm, glossy dark-green, sometimes spotted when young; marginal spines 8–10 per 10 cm, 4–5 mm long, dark brown with horny layer often continuous along margin between spines. Inflorescence with 3–8 racemes; racemes subcapitate to cylindrical, 4–9(–20) cm long, densely flowered. Bracts ovate, 9.5–15 x 3–6.5 mm, acuminate. Pedicels 11.5–18(–28 in fruit) mm. Perianth cylindrical-trigonous, 22–28 x 4.5–7 mm when pressed, bright yellow or red; outer lobes free for 10–15 mm. Capsule 20–25 x 6–9 mm.

Sparsely vegetated slopes, often on limestone; 1650–2100 m. HA; not known elsewhere. Bally 10076; Gilbert & Lavranos 2263; Sebsebe D. & Tamrat B. 2338.

17. *A. monticola* Reynolds (1957)

— type: TU, 7 km N of Maychew ('Maichew'), Reynolds 8118 (PRE holo. not seen, K iso., EA iso. not seen).

Stemless, usually solitary. Leaves many, 43–52(–60) x 12–13.5(–18.5) cm, gently recurved, slightly canaliculate, glossy olive-green; marginal spines 9–16 per 10 cm, 3–5 mm long, brown with the horny tissue usually forming continuous edge between spines. Inflorescence with 3–6(–8) racemes; racemes subcapitate to conical, 6–18 cm long, densely flowered. Bracts lanceolate, 20–30 x 6–7 cm, acute. Pedicels 12–18 mm long, 20 mm long or more in fruit. Perianth cylindrical-trigonous, 26–32 x 6–7 mm when pressed, usually yellow, occasionally bright red; outer lobes free for 12–14 mm.

On steep bare mountain slopes; 2460 m. TU WU; not known elsewhere. Gilbert & Getachew 2311; Reynolds 8117; Sebsebe D. & Berhanu A. 3398.

Closely related to *A. harlana*.

18. *A. percrassa* Tod. (1875);

A. abyssinica var. *percrassa* (Tod.) Baker in *J. Linn. Soc.* 18: 175 (1880) — lectotype: t.21 of protologue based on plant grown from seed sent by Schimper to St Petersburg (Leningrad) from where seed was sent to Todaro.

A. oligospila Baker (1902) — type: cultivated plant, grown at Cambridge Botanic Garden from seed sent by Schinz of Zürich from Ethiopia (K holo.).

Succulent herb, suckering from base to form small groups, mostly stemless but sometimes developing erect or decumbent stem to 80 x 10–15 cm. Leaves

crowded, 40–55 x 13–15 cm or larger, glaucous green or grey-green, often flushed red, old leaves drying brown; marginal spines 6–16 per 10 cm, (2–)3–5 mm long, tipped pale-pink to brown. Inflorescence 60–80 cm high; racemes 5–12, cylindrical to conical, 6.5–25 cm long, with 2–5 flowers per cm. Bracts ovate-acuminate, (8–)10–16(–20) x (2.5–)3–6 mm. Pedicels 11–17(–20) mm long. Perianth cylindrical, 17–23 x 4–6 mm when pressed; outer lobes free for 5–7 mm.

Sparsely vegetated rock slopes and outcrops; 2100–2700 m. EW TU GD; not known elsewhere. Gilbert & Getachew A. 2313; Reynolds 8065, 8116.

The only collection from GD, Tekle H. 95, has smaller bracts (8 x 2.5 mm) than the rest of the material.

19. *A. debrana* Christian (1947)

— type: McLoughlin 812A, live plant collected from SU, Debra Berhan, cultivated in Pretoria, specimen preserved under PRE 27173 (PRE holo. not seen).

A. berhana Reynolds (1957) — type: SU, 9 km SW of Debra Berhan, Reynolds 8135 (PRE holo. not seen, K iso.).

Succulent herb, suckering from base to form small groups, mostly stemless but some old plants developing thick, prostrate stems. Leaves in very dense rosette, spreading-recurved, 25–60 x 7.5–15 cm, dull-green, old leaves drying brown; marginal teeth 7–10(–14) per 10 cm, 2–4 mm long, red tipped. Inflorescence c 100 cm high, compoundly branched; racemes 8–15, capitate to cylindrical, 5–15 cm long, lax or dense (4–9 flowers per cm). Bracts ovate-triangular, 3–6.5(–8.5) x 1.5–3 mm, scarious. Pedicels 10–15(–17 in fruit) mm long. Perianth cylindrical, 17–30 x 4–6 mm when pressed; outer lobes free for 5–10 mm. Fig. 192.4.

Common in grassland on thin soil overlying basalt, usually on gentle slopes; 2000–2700 m. WU SU; not known elsewhere. W. de Wilde 6098; Sebsebe D. & Ermas D. 2209; Sebsebe D. & Berhanu A. 4011.

Reynolds treated *A. debrana* as a synonym of *A. percrassa*, presumably on the basis of the similar sized flowers. There is, however, a marked discontinuity in bract size, as well as more subtle differences in coloration and inflorescence form, between true *A. percrassa* in northern Ethiopia and the plants from Shewa and Wello, bracts (10–16 mm) as opposed to 3–6(–8) mm. *A. berhana* was previously distinguished from *A. debrana* on the basis of only a larger perianth (24–30 mm long) as opposed to 17–20 mm long. Recent collections and observations have made it clear that there is no discontinuity between the two and hence the later name *A. berhana* is reduced to a synonym.

20. *A. steudneri* Schweinf. (1894)

— types: GD, Semien Mts, Ghaba (Ataba) Valley, Steudner 448 (B syn. not seen, K isosyn.) & EW, Mt Saber, Penzig 1424 (B syn. not seen, K ?isosyn.).

Stemless or with short decumbent stem. Leaves very numerous, up to 50–60 x 10–15 cm, slightly recurved, blue- or grey-green sometimes flushed with red, not

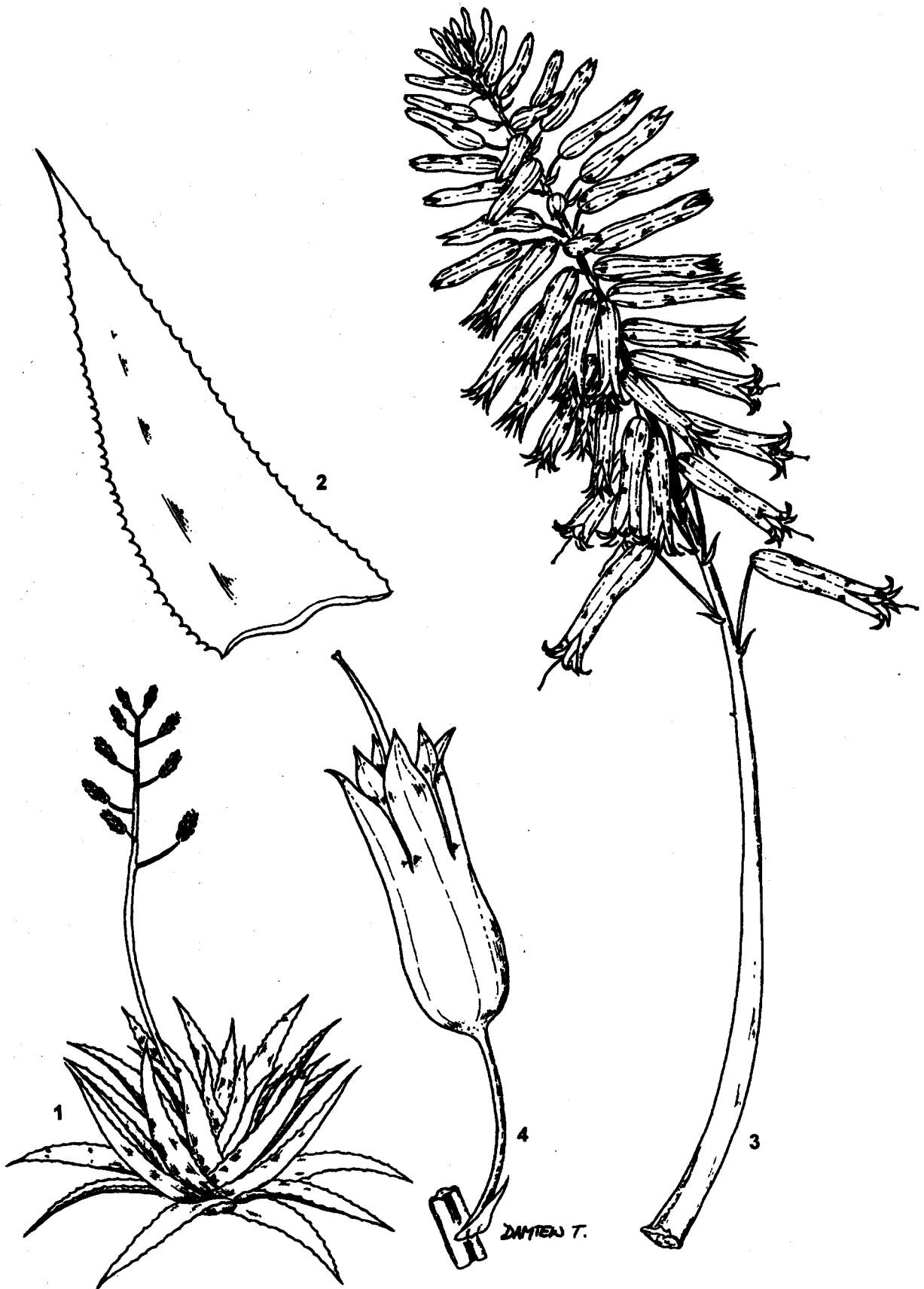


Figure 192.4 *ALOE DEBRANA*: 1 – whole plant x $\frac{1}{10}$; 2 – leaf x $\frac{1}{10}$; 3 – inflorescence x 1; 4 – perianth x $2\frac{3}{10}$. 2, 3 & 4 from Sebsebe D. & Ermias D. 2209. Drawn by Damtew Teferra.

spotted; marginal teeth 4–12 per 10 cm, 1.5–3(–4) mm long, reddish. Inflorescence few-branched; racemes 1–5, cylindrical, 11–35 cm long, dense. Bracts ovate-lanceolate, 11–15(–28) x 6–8 mm. Pedicels 8–15(–17 in fruit) mm long. Perianth cylindrical, (30–)35–40 x 60–90 mm when pressed, pale to orange red; outer lobes free to base.

Very steep slopes and cliff-faces, sometimes seasonally wet; 2600–3150 m. EW TU GD ?GJ; not known elsewhere. *J. de Wilde & Gilbert* 215; *Lemma G-S*. 621; *Tekle H.* 62.

21. *A. ankoberensis* Gilbert & Sebsebe (ined.)

– type: SU, near Ankober, *Ash* 2353 (K holo.).

Pendent shrub, mostly unbranched, stem to 6 m long (according to Ash), hanging down cliffs. Leaves numerous, dense, 20–30(or more) x 7–17.5 cm, dull grey- to blue-green; marginal spines 7–19 per 10 cm, 2–3 mm long, pale with minute dark red-brown tips (sometimes absent). Inflorescence with 1–6 racemes; peduncle U-shaped; racemes cylindrical, 6–18 cm long, dense. Bracts ovate-lanceolate, 14–23(–25) x 5–6.5 mm, tip acute. Pedicels (6–)10–25(–30 in fruit) mm. Perianth cylindrical, 35–40 x 6–10 mm when pressed, bright orange-red; outer lobes free for 12–22 mm. Capsule 28–30 mm long. Seeds 3-sided, winged margins *c* 0.5 mm wide, 4 mm long overall, dark brown with pale round-spots.

Steep rocky slopes and cliff-faces, often near seasonally running water; 3000–3500 m. SU (near Ankober and Debra Sina); not known elsewhere. *Ash* 3723; *Friis* et al. 1356; *W. de Wilde* 9623.

22. *A. pulcherrima* Gilbert & Sebsebe (ined.)

– type: SU, 17 km from Addis Abeba on road to Debra Berhan, *M.G. & S.B. Gilbert* 1669 (K holo., ETH iso.).

Prostrate or pendent shrub, mostly unbranched, stem to 1 m long, *c* 8 cm thick, sometimes branching dichotomously at apex within leaf rosette, especially when cultivated. Leaves 35–50 in dense rosette, arcuate, up to 50 x 12 cm, pale blue-green, slightly glaucous, with fine but distinct longitudinal lines and, especially in dry season, red margin; marginal teeth almost absent, up to 3 per 10 cm, 0.2–0.3 mm high, hardly visible; sap turning purple, as do old leaves. Inflorescence at first descending then ascending forming a U-shape, branched; racemes 3–6(–11), erect, 12–28 cm long, lax (3–5 flowers per cm). Bracts ovate, 8–9(–15) x 7–8 mm, acuminate, rather fleshy. Pedicels 8–12 mm long. Perianth cylindrical, 32–33 x 6–8.5 mm when pressed, red; outer lobes free for *c* 20 mm.

Steep basalt slopes or cliffs with sparse cover of evergreen bushland; 2480–2700 m. SU; not known elsewhere. *Sebsebe D. & Mesfin B.* 2384; *Sebsebe D.* et al. 2385, 3331.

23. *A. trigonantha* Leach (1971)

– type: GD, between Gondar and Lake Tana, collected by Macleay, cultivated in Pretoria and pre-

served under *Reynolds* 11618 (PRE holo. not seen, SRGH iso. not seen).

Plant stemless or nearly so. Leaves in dense rosette, 25–40 x 5–8 cm, uniformly green; marginal spines 9–10 per 10 cm, 2–2.5 mm long, ?brown-tipped. Inflorescence with 5–13 racemes; racemes 8–24 cm long, lax (2–4 flowers per cm). Bracts ovate, 6–8 x 3–4 mm, acuminate. Pedicel 5–10 mm long. Perianth markedly trigonous with truncate base, 28–33 x 8–11 mm near base when pressed, 7–8 mm wide near mouth, pale yellow to orange red; outer lobes free for 6–9 mm.

Dry stony ground near roads and along field margins; *c* 2100 m. GD GJ; not known elsewhere. *Ash* 1825; *Hillier* 952; *Macleay* s.n.

24. *A. rivae* Baker (1898)

– types: SD, Gobbo Duaya (between Coromma, and Burgi), *Ruspoli & Riva* 1509 (?B syn. not seen, K fragm. of syn., FT isosyn.) & near Coromma, *Ruspoli & Riva* 1766 (?B syn. not seen, FT isosyn.).

Plant usually stemless, sometimes with procumbent to ascending stem to 60 cm, solitary or in small groups. Leaves *c* 20 in rosette, 40–60 x 9–13.5(–17) cm, ascending, incurved to slightly reflexed, dull olive- to brown-green flushed red towards margins; marginal teeth 7–14 per 10 cm, 3.5–4 mm long, with minute brown tip. Inflorescence 60–70 cm high, many branched, conical, racemes up to 50, (10–)15–20 cm long, cylindrical, lax (1–2 flowers per cm). Bracts (2–)3–4.5 x (2–)3–3.5 mm. Pedicels 7–12 mm long. Perianth cylindrical-trigonous with truncate base, 25–32 x 9.5–10.5 mm near base when pressed, scarlet, rarely yellow; outer lobes free for *c* 10 mm. Capsule 18–20 mm long.

Margins of deciduous woodland and *Juniperus* forest, sometimes on rocky outcrops; 1365–2000 m. SU SD; N Kenya. *Ash* 1757; *Gillett* 14366; *Sebsebe D.* 2559.

25. *A. secundiflora* Engl. (1895)

– type: Tanzania, Moshi District, foot of Kifaru Hill, *Volkens* 530 (B holo.).

Plant stemless or nearly so, usually solitary. Leaves *c* 20 in rosette, 35–45 x 8–14 cm, suberect with recurving tips, dark green, slightly glossy, sometimes obscurely pale-spotted; marginal teeth 9–10 per 10 cm, *c* 4 mm long, dark brown, colour sometimes continuous along margin. Inflorescence 100–150 cm high, many spreading branches, lower branches always branching again; racemes up to 50, 12–20 cm long, distinctly 1-sided with flowers all erect, lax (3–4 flowers per cm). Bracts 4–5 x 2.5(–4) mm. Pedicels 5.5–6(–10) mm long. Perianth cylindrical, 19–23 x *c* 4.5 mm when pressed, pale red, minutely flecked with white when fresh. Fig. 192.5.

Open grassland and *Acacia* bushland on well drained soils; 1350–1550 m. GG SD; S Sudan, Kenya, Tanzania. *Ash* 2779; *M.G. & S.B. Gilbert* 1504; *Sebsebe D. & Ensermu K.* 2883.

Reynolds (loc. cit.: 234, 1966) reports hybrids of *A. secundiflora* with *A. otallensis* var. *elongata* (= *A. ru-*

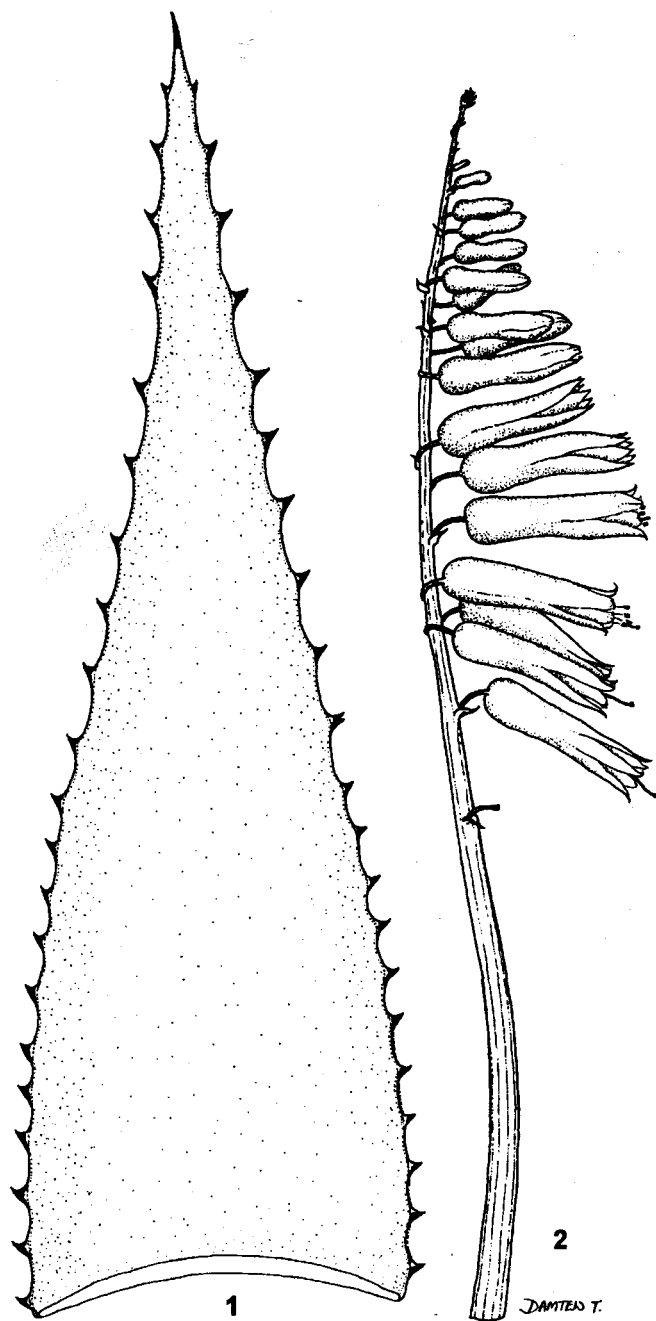


Figure 192.5 *ALOE SECUNDIFLORA*: 1 – leaf x 1; 2 – inflorescence x 1. Both from Reynolds 7065. Drawn by Damtew Teferra.

gosifolia) and claimed that *A. boranensis* was described from one such hybrid. *A. boranensis* is here treated as a synonym of *A. otallensis*, a perfectly good species.

26. *A. otallensis* Baker (1898)

– type: SD, Ahele Bekaka, between Coromme and Otallo (c 19 km south of Yavello), *Ruspoli & Riva* 1711 (B holo. not seen, K drawing and fragments of holo., FT iso.).

A. boranensis Cufod. (1939) – type: SD, Dubuluk, N of Mega, *Cufodontis* 617 (FT holo.).

A. wrefordii Reynolds (1966) p.p. quoad spec. Ethiop., non s. str.

Plant solitary or forming small clumps, stemless. Leaves c 24 in a rosette, erect to slightly recurved, 35–70(–80) x 6.5–10 cm, canaliculate, grey-green, sometimes very finely spotted, seedlings conspicuously spotted; marginal teeth 8–14 per 10 cm, 3–4.5 mm long, reddish-brown. Inflorescences glaucous throughout, branched; racemes up to 12, erect, 5–8 cm long, cylindrical, very dense with overlapping bracts. Bracts oblanceolate, 11–17 x 4–6.5 mm, acute, scarious. Pedicels 7–12(–17) mm long. Perianth cylindrical to clavate, 19–23(–27) mm x 4.5–6 mm when pressed, pale pink with grey or yellow tip; outer lobes free for c 10 mm, with conspicuous warty or papillose midrib. Capsule 16 mm long, papillose. Seeds 3-sided, 4.5 mm long, dark brown with long pale-brown wings.

Open *Acacia* bushland, often on dark soils; 1200–1600 m. GG SD; not known elsewhere. *Ash* 2260; *Gilbert* 4152A; *Sebsebe D. & Ensermu K.* 2893.

This species was misinterpreted by Reynolds, both in field and herbarium. He restricted the name *A. otallensis* to the type collection. Other material of this species he included under *A. wrefordii* or as a hybrid between *A. secundiflora* and *A. otallensis* var. *elongata* believing that *A. boranensis* was such a plant. *A. wrefordii* s. str. does not occur in the Flora area. The supposed hybrid has been collected much more often than either of the supposed parent species and is found in very large pure stands. It is most easily recognised by the unusual ornamented midribs of the outer perianth lobes, that is striking in fresh flowers and still discernible in dried materials, a character not known in any other species and not mentioned by Reynolds. Another striking feature is the very glaucous inflorescence.

A. otallensis var. *elongata* is a distinct species, *A. rugosifolia*, more closely related to *A. pirottae*.

27. *A. elegans* Tod. (1882);

A. abyssinica var. *peacockii* Baker in *J. Linn. Soc. Bot.* 18: 175 (1880) – lectotype (designated here): tab. 6620 in *Bot. Mag.* 108 (1882) drawn from a plant of Ethiopian origin, perhaps grown from seed sent by Schimper c 1870.

Plant solitary or forming small groups, rarely developing decumbent stem to 30 cm long. Leaves dense, 16–20(–30) per rosette, up to 60 x 15–18 cm, usually incurved, grey- to blue-green, sometimes obscurely spotted near base, slightly canaliculate towards tip; marginal spines 4–7(–9) per 10 cm, 2–3(–4) mm high, brownish-red. Inflorescences with 3–11 racemes, often corymbose; racemes subcapitate to cylindrical, 5–15 cm long, dense (more than 10 flowers per cm). Bracts ovate, 7–12(–15) x 2.5–4 mm, acuminate. Pedicel 10–20(–23 in fruit) mm long. Young buds horizontal to slightly reflexed. Perianth subclavate, 21–26 mm long, 3–6/6–9 mm wide when pressed, yellow, orange or scarlet; outer segments free for 7–13 mm.

Rocky slopes, mostly on sandstone or limestone, in areas of evergreen bushland or wooded grassland; 1500–2400 m. EW TU SU HA; not known elsewhere. *Bally* 6813; *Ermi*as in *Sebsebe D.* 2211; *Sebsebe D.* 2383.

This species is very variable in the form and colour of the racemes with some suggestion of a correlation between dense inflorescences and yellow flowers as opposed to more elongated inflorescences and red flowers. Both forms occur together and there is no justification for recognition of infraspecific taxa. The only record from HA, *W. de Wilde* 9933, has the outer perianth segments free for 17 mm but otherwise seems to be a good match.

Todaro described and illustrated a plant grown from seed sent by Schimper, perhaps in 1870 from TU, which he considered identical to Baker's variety. Plate 44 of Reynolds is a good match. Baker based his description on a plant of Ethiopian origin in the collection of a Mr Peacock. He later illustrated this plant in the *Botanical Magazine*. This illustration, well matched by plate 43 of Reynolds, has been selected as lectotype.

A. sinkatana Reynolds, described from the Red Sea Hills of Sudan is closely related and possibly not specifically distinct.

28. *A. camperi* Schweinf. (1894)

– types: EW, Ghinda, *Schweinfurth* 514a; Asmera, *Schweinfurth* 605; Arbashiko, *Schweinfurth* 668; Gheleb, *Schweinfurth* 1074; Acrur, *Schweinfurth* 1342, 1306 (all B syn. not seen).

A. eru Berger (1908) – types: EW, Ghinda, *Schweinfurth* 514a; Asmara, *Schweinfurth* 605a; Gheleb, *Schweinfurth* 1234, 1430, 1796; Acrur, *Schweinfurth* 730, 1350, 1696, 1797; Kohaito Plateau, *Schweinfurth* 156; Haddas, *Schweinfurth* 155 (all B syn.).

A. abyssinica sensu Salm Dyck (1817 & 1842), Baker (1898) and Berger (1908) p.p. and others, non Lam. (1783).

Succulent shrub, stems erect or ascending, 0.5–1 m long, 6–10 cm thick. Leaves crowded, 40–60 x 5.5–8 (–12) cm, recurved, canaliculate, dark green or brownish, often spotted especially towards base, margin with 6–7 spines per 10 cm, spines 3–5 mm long, brown tipped. Inflorescence branched; racemes 2–6, cylindrical, 3–14 cm long, dense, 8–12 flowers per cm. Bracts triangular-ovate, 2–3(–5) x 1–2 mm. Pedicels 12–25 mm long. Perianth clavate, 180–220 x 3–4 mm near base when pressed, 7–8 mm at widest point, yellow, orange or scarlet, outer segments free for 7–8 mm.

Locally abundant on rocky slopes and sandy alluvial plains along eastern escarpment; 550–2700 m. EE EW TU WU; not known elsewhere. *Bally* 122; *Reynolds* 8051; *Sebsebe D. & Berhanu A.* 4009.

A polymorphic species, particularly with regard to pedicel length with specimens falling into two non-overlapping size classes: 12–16 mm long including the type of *A. camperi* and 22–25 mm long including the

type of *A. eru*. The two forms overlap in distribution and no other characters correlate, so it does not seem feasible to recognise the two groups as distinct taxa.

The separation from the following species, *A. adigratana* and *A. sinana*, is not clear cut and intermediate populations almost certainly occur.

29. *A. adigratana* Reynolds (1957)

– type: TU, 10 km W of Adigrat, *Reynolds* 8076 (PRE holo. not seen; K iso.).

A. abyssinica sensu Hook.f. (1900) non Lam; *A. eru* Berger var. *hookeri* Berger in *Pflanzenr. Liliac. - A loin.*: 251 (1908) – type: t. 7712 in *Bot. Mag.*

Shrub, stem erect to 1 m tall or decumbent to 2 m long. Leaves crowded, 40–60 x 7–15 cm, deeply canaliculate, dull-green with numerous pale-green spots on the lower third to quarter of both surfaces, margin with 4–5 spines per 10 cm, spines 3–4 mm long, red-brown. Inflorescence to 100 cm high, branched; racemes 3–5, cylindrical-conical, 12–22 cm long, densely flowered (c 8 flowers per cm). Bracts ovate-acuminate to almost triangular, 8–12 x 2.5–4. Pedicels (12–)14–20 mm long. Perianth subclavate, 25–27(–33) x 6–8 mm when pressed, orange or yellow, outer segments free for 13–16 mm.

Rocky places, mostly on sandstone, also on basement complex; 2000–2700 m. EW TU; not known elsewhere. *Ash* 1815; *Reynolds* 8073; *Sebsebe D.* 3190.

The separation from the following species needs investigation: populations of the two occur intermingled along the eastern escarpment.

30. *A. sinana* Reynolds (1957)

– type: SU, 18 km NE of Debra Sina, *Reynolds* 8126 (PRE holo. not seen, EA K iso.).

Succulent shrub, stems 1–2 m long, sprawling or ascending. Leaves crowded, 40–60 x 10–15 cm, canaliculate only towards tip, blue- to grey-green, sometimes flushed reddish, with elongated whitish spots on underside and towards base on upperside; marginal teeth 6–7 per 10 cm, 3–4 mm long. Inflorescence with 4–6 racemes; racemes subcapitate to cylindrical, 5.5–8.5(–14) cm long, 6–12 flowers per cm. Bracts ovate 7–8 x 2 mm, tip attenuate. Pedicels 18–25(–27 in fruit) mm long. Perianth clavate, 23–27 x 3–4 mm when pressed near base, 6–7 mm at widest point, orange to pink; outer segments free for 12–13 mm.

Slopes with basalt blocks and patches of evergreen bushland with *Euclea* – *Rhus natalensis* – *Flueggea virosa*; 1250–1950 m. SU; not known elsewhere. *Ash* 1810; *Gilbert & Getachew A.* 2323A; *Sebsebe D. & Ermi*as *D.* 2210.

31. *A. calidophila* Reynolds

– type: SD, Dida Cheena Plains, 49 miles WNW of Moyale on road to Mega, *Reynolds* 7029 (PRE holo. not seen, K iso.).

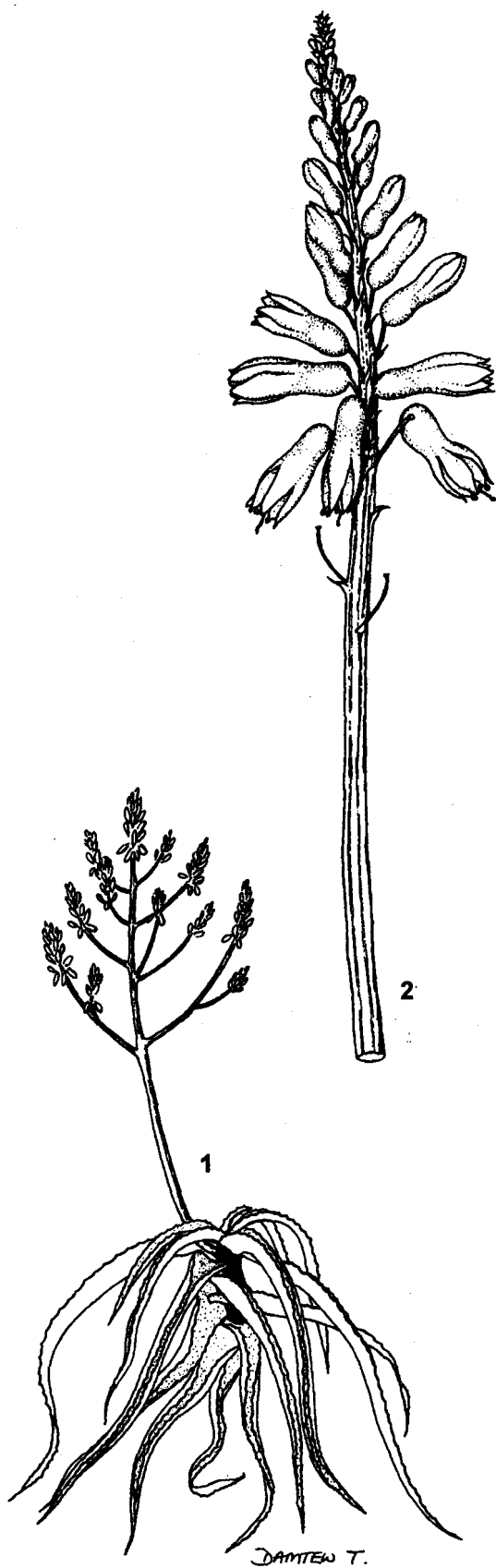


Figure 192.6 *ALOE CALIDOPHILA*: 1 – whole plant; 2 – inflorescence. Both drawings based on a photo from *The Aloes of Tropical Africa and Madagascar*. 218 (1966). Drawn by Damtew Teferra.

Succulent shrub, stems 1–1.5 m, erect or basally decumbent. Leaves crowded, 60–80 x 16 cm, spreading with recurved tip, deeply canaliculate, uniformly dull green to grey-green; margin with *c* 5 spines per 10 cm, spines 3–5 mm high, dull white. Inflorescence branched; racemes up to 20, cylindrical, 5.5–24 cm long, densely flowered with 6–7 flowers per cm. Bracts ovate, 3–5 x 1.5–2 mm, scarious. Pedicels 10–15 mm long, extending to 22 mm in fruit. Perianth clavate, 17–20(–22) mm long, widest part 6–7 mm when pressed, scarlet turning orange towards throat; outer segments free for 8–10 mm. Fig. 192.6.

Acacia – *Commiphora* woodland to bushland or open wooded grassland; 1200–1620 m. GG SD; N Kenya. *Mooney* 9772; *Sebsebe D. et al.* 2198, 4213.

32. *A. megalacantha* Baker (1898)

– type: HA, Ogaden, Milmil, *Ruspoli & Riva* 905 (FT holo.).

Succulent shrub, 0.5–2 m high. Leaves crowded, 60–80 x 13–15 cm, deeply canaliculate (impossible to flatten when making herbarium specimens), recurved, dull light-green to blue-green, marginal spines 5–7 per 10 cm, 5–6 mm long, pink- to red-brown. Inflorescence 50–100 cm high; racemes 6–13, cylindrical to conical, 5–14 cm long, lax or dense. Bracts triangular ovate, 4–12 x 2–4 mm. Pedicels (8–)10–15(–17 in fruit) mm long. Perianth cylindrical-trigonous, 23–30 x 4–7 mm when pressed, yellow orange or scarlet; outer segments free for 10–14 mm.

1. Bracts 4–7 mm long; racemes dense with (6–)7–10 flowers per cm; plant sessile or with sprawling stems. subsp. *megalacantha*
- Bracts 11–12 mm long; racemes lax, 3–5 flowers per cm; plant forming compact erect shrubs. subsp. *alticola*

subsp. *megalacantha*;

A. magnidentata Verdoorn & Christian (1947) – type: plant collected HA, Dire Dawa, cult. Pretoria, *McLoughlin* 824 in PRE 27281 (PRE holo., not seen).

Fig. 192.7.

On rocky hillsides and sandy alluvial plains in open *Acacia* – *Commiphora* – *Balanites* bushland; frequently planted on graves; 1100–1850 m. BA HA; N Somalia. *Burger* 487; *Reynolds* 8155; *Sebsebe D. & Tamrat B.* 2282.

The collections from BA (*Friis et al.* 3708; *Friis* 5763) have subclavate perianths and thus approach *A. calidophila*.

subsp. *alticola* *Gilbert & Sebsebe* (ined.)

– type: HA, 31 km from Alemaya on road to Grawa, *M.G. & C.I. Gilbert* 4080 (ETH holo., K iso.).

Margins of evergreen thickets on limestone slopes; 2100–2150 m. HA; not known elsewhere. *Burger* 3164; *Sebsebe D. & Tamrat B.* 2344.

33. *A. gilbertii* Sebsebe & Brandham (1991)

– type: SD, Alamura Hill, c 4 km S of turning for Awassa on main Addis Ababa – Dilla road, Gilbert, Sebsebe D. & Ermias D. 9307 (K holo., ETH iso.).

Usually a succulent shrub, stem erect to 1–1.5 m long, occasionally stemless. Leaves crowded, 40–60 x 9–11 cm, canaliculate, recurved towards tip, dark green or glaucous, often flushed brown or mauve above and below; marginal teeth 7–10 per 10 cm, 3–5 mm high, tips brown. Inflorescence up to 120 cm high, compoundly branched; racemes 15–25 or more, cylindrical, 6–15 cm long, lax, 2–4(–5) flowers per cm. Bracts ovate, acute, 4–6 x 2–3 mm. Pedicels 9–10 mm long. Perianth cylindrical to subclavate, trigonously indented, 23–27 x 4.5–8 mm when pressed, orange to red; outer segments free for 8–11 mm.

1. Leaves only slightly recurved, easily flattened when prepared for drying; perianth 23–27 mm long. subsp. *gilbertii*

– Leaves strongly recurved, impossible to flatten when making herbarium material; perianth 27–28 mm long. subsp. *megalacanthoides*

subsp. *gilbertii*

Acacia woodland, often found in hedges and along field margins; 1300–1800(–1900) m. SU GG SD; not known elsewhere. Friis et al. 1097; Sebsebe D. et al. 2207; W. de Wilde 7063.

subsp. *megalacanthoides* Gilbert & Sebsebe (ined.)

– type: GG, 3 km from Konso on road to Yabello. Gilbert & Phillips 9135 (K holo., ETH UPS iso.).

Open or dense *Acacia* – *Commiphora* bushland, with *Adenia* on rocky slopes; 1200–1350 m. GG; not known elsewhere. Gilbert & Phillips 9104.

This subspecies closely resembles *A. megalacantha* in habit. Apart from the difference in the sizes of the marginal teeth and bracts, there is also a striking difference in the epidermis when seen at very high magnification; it is strongly papillate in *A. megalacantha* but smooth in *A. gilbertii*.

Brandham 1852, a plant collected near the type locality of *A. pubescens* but now in cultivation, is close to *A. gilbertii* subsp. *megalacanthoides* but differs by the obscurely spotted leaves, longer raceme (25 cm), bracts 8 mm long, pedicel 13 mm long and perianth 31 mm long. It is possibly of hybrid origin.

34. *A. schelpei* Reynolds (1961)

– type: SU, Bole ('Boli') Gorge, Mulu Farm, Curle & Schelpe 61 (BM holo.).

Succulent shrub, stems decumbent or pendent, 0.5–1 m long, 5–6 cm thick. Leaves crowded, 45–50 x 8–12 cm, spreading to recurved, shallowly canaliculate, glaucous grey- to blue-green with pinkish margin, sometimes spotted above and below towards base, marginal spines 10–11 per 10 cm, 3–4 mm long, pink. Inflorescence with 1–3 racemes; racemes cylindrical to conical, 6–16 cm long, 6–8 flowers per cm. Bracts ovate, 6–8 x 2–4 mm.

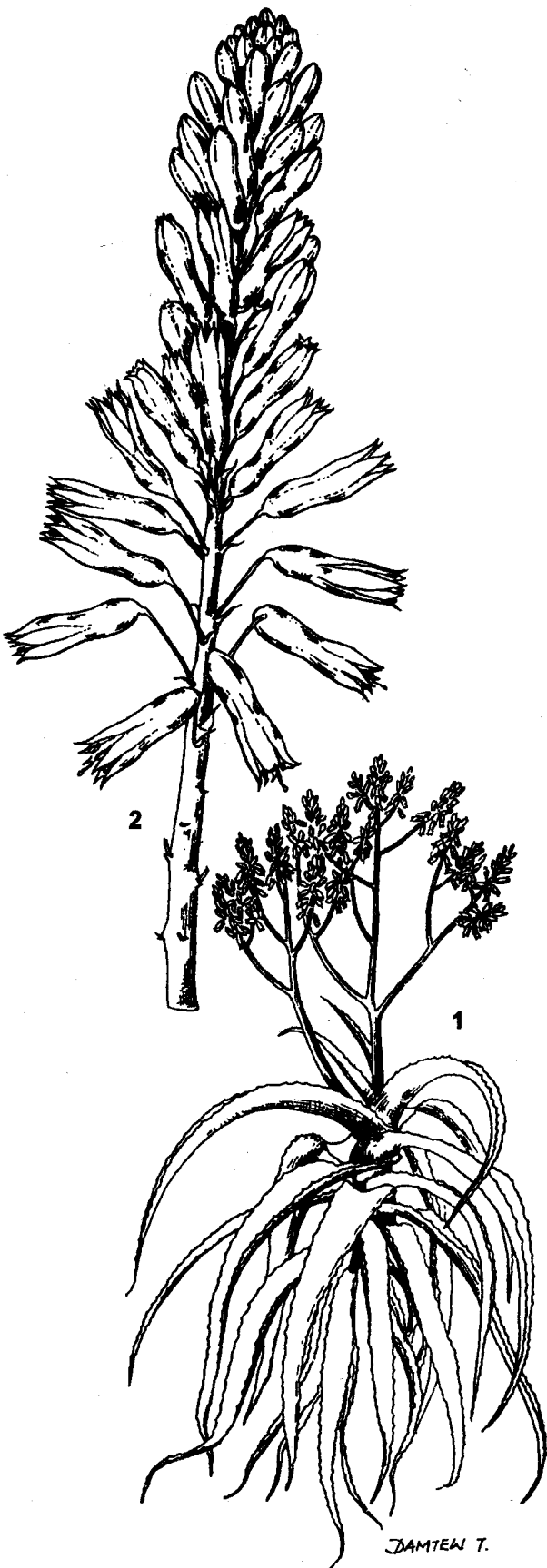


Figure 192.7 *ALOE MEGALACANTHA*: 1 – whole plant; 2 – inflorescence x1. 1 based on a photo from *The Aloes of Tropical Africa and Madagascar*. (1966) by G. W. Reynolds; 2 from Friis, Gilbert & Vollesen 3701. Drawn by Damtew Teferra.

Pedicels (10–)15–17(–20 in fruit) mm long. Perianth cylindrical, (24–)27–30 mm long, 5–7 mm wide when pressed, orange to orange-red; outer segments free for (8–)12–15 mm.

More open areas within evergreen bushland on steep slopes and cliffs of basalt; 1700–2470 m. SU; not known elsewhere. *Ash* 1749, 2377; *Sebsebe D. & Ermias D.* 2391.

The smallest pedicel and perianth measurements are taken from cultivated material (*Leach* 9838).

35. *A. yavellana* Reynolds (1954)

– type: SD, 1.6 km (1 mile) W of Yavello, Reynolds 7063 (PRE holo. not seen, EA K iso.).

Succulent shrub, stems erect to 1 m high or sprawling, up to 3 m long, 3–4 cm thick. Leaves spaced along stem, 30–40 x 5–7 cm, recurving towards tip, slightly canaliculate, brown above, pale below and in shade; marginal spines (10–)14–17 per 10 cm, *c* 3 mm high, tips reddish. Inflorescence with 8–10 racemes; racemes capitate to cylindrical, 4–10 cm long, dense, 6–10 flowers per cm. Bracts triangular-ovate, 3–6 x 1–2 mm, scarious. Pedicels 8–10(–12 in fruit) cm long. Perianth cylindrical-trigonous, 20–22 x 4–6 mm when pressed, dull scarlet to orange; outer segments free for 8–10 mm.

Rocky slopes in *Juniperus* forest clearings, also in more disturbed areas near roads; 1600–1900 m. SD, not known elsewhere. *Bally* 9393; *Reynolds* 7041; *Sebsebe D.* et al. 4218.

Known only from around Yavello and Mega. Most closely allied to the *A. dawei* Berger – *A. rabaiensis* Baker complex of East Africa, mainly Kenya.

36. *A. jacksonii* Reynolds (1955)

– type: BA, El Kere ('El Carre'), coll. T.H.E. Jackson, cult. Johannesburg, Reynolds 6224 (PRE holo. not seen). (Plants from the same clone have also been distributed under Reynolds 8005).

Dwarf succulent shrub, stems erect or sprawling, 10–20 cm long. Leaves separated along stem, linear-lanceolate, 11–15 x 1.2–2.2 cm, upper surface almost flat, dull green, with pale spots above and below; marginal teeth 16–20 per 10 cm, *c* 1 mm long, pale pink. Inflorescence not branched, *c* 30 cm high; raceme lax, 9–11 cm long, 3–4 flowers per cm. Bracts ovate, 4.5–5 x 2–2.5 mm. Pedicel 7–8 mm long. Perianth cylindrical, *c* 23 x 7–8 mm when pressed, scarlet; outer segments free for 5–6 mm. Fig. 192.8.

Along the edge of a narrow limestone ravine, area generally with *Acacia* – *Commiphora* bushland; 1050 m. BA; Somalia. Known only from the type collection in the Flora area.

The species is known from the Flora area only from the original living collection made by the entomologist T.H.E. Jackson in 1943, later widely distributed among botanical gardens. Plants of this or a very similar species are known from Somalia.

37. *A. tewoldei* Gilbert & Sebsebe (ined.)

– type: HA, along road South from Asbe Teferi, collected by Tewolde-Berhan Gebre-Egziabher s.n., cult. Kew under 219-76.01591 (K holo.).

Lax shrublet, sometimes pendent; stems to 50 cm long, *c* 6 mm thick. Leaves spaced along stem, sometimes pendent, oblong-lanceolate, up to 13.5(–32) x 1.5–2(–2.2) cm, subterete, grey-green obscurely spotted; marginal spines 20–30 per 10 cm, *c* 0.5 mm long, white. Inflorescence not branched; raceme very lax, *c* 27 cm long, flowers 10–40 mm apart one flower per cm. Bracts *c* 4 x 2 mm. Pedicel *c* 12 mm long. Corolla trigonous-cylindrical, 20 x 7 mm when pressed, base truncate, greyish orange with greenish tip.

Hanging from limestone cliff-face. ?BA HA; not known elsewhere. *Tewolde Berhan G.E.* s.n.

Friis et al. 3736 is tentatively assigned here but flowers have not been seen.

38. *A. vituensis* Baker (1898)

– type: Kenya, Witu on Tana River, Thomas 113 (B holo., K photo).

Low succulent shrub, stems erect, up to 20 cm high, slender. Leaves lax, spreading with recurving tips, slightly canaliculate, 21–32 x 2.5–5 cm, light green to bronze, clearly spotted above and below; marginal spines 9–12 per 10 cm, 3–4 mm long, brown-tipped. Inflorescence unbranched, to *c* 75 cm high; raceme cylindrical, 9–12 cm long, lax (*c* 3 flowers per cm). Bracts ovate acute, 6.5–7 x 4 mm. Pedicel 4–7(–12 in fruit) mm long. Perianth cylindrical to subclavate, 21–23 x 4–6(–7) mm when pressed, coral pink; outer segments free for *c* 7 mm.

Acacia – *Commiphora* bushland; *c* 1200 m. ?SD; N Kenya.

A. vituensis is known only from the Kenyan side of the border with Ethiopia but could very easily turn up in Ethiopia. It should be easily recognised by the combination of a very low shrubby habit, stems to *c* 20 cm long, and spotted dark-green leaves and/or a simple inflorescence.

Taxa of uncertain status:

A. vera var. *puberula* Schweinf. in *Bull. herb. Boiss. Append.* 2: 61 (1894);

A. puberula (Schweinf.) Berger (1908) – type: EW, Barasio Mt, Schweinfurth 2076.

Dismissed, probably correctly, by Reynolds as a natural hybrid between *A. trichosantha* and *A. camperi*.

A. abyssinica Lam. (1783)

– type: 'brought back from Africa by James Bruce and cultivated in Paris' (P holo.).

Growth form not known. Leaves 75 x 10 cm, clear green, canaliculate, marginal teeth red. Inflorescence 100 cm high or more; racemes 1–3, conical, *c* 20 cm long. Bracts overlapping, *c* 20 mm long. Pedicels up to 45 mm long. Perianth *c* 32 mm long, yellow.

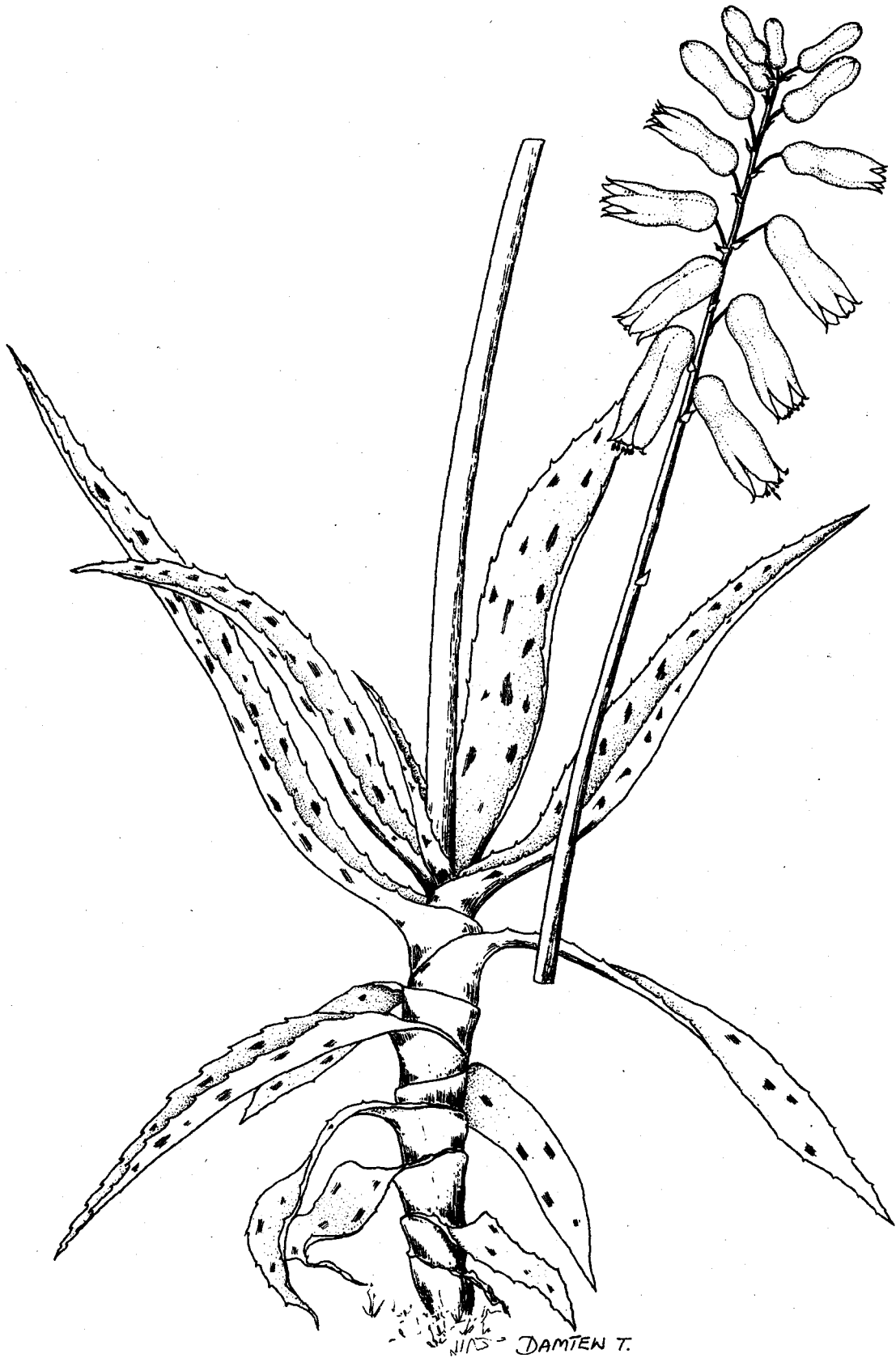


Figure 192.8 *ALOE JACKSONII*: whole plant x 1. From Reynolds 8005. Drawn by Damtew Teferra.

?Northern Ethiopia. Known only from the type collection.

No material matching the rather distinctive type has yet been found.

A. agrivifolia ('agavefolia') Tod. (1875)

– type: t. 23 of protologue (based on cultivated clone of *Schweinfurth & Riva* 1342 from EW, Acrur according to Cufodontis).

Todaro based his excellent description and illustration on a cultivated plant of unknown origin, presumed to be tropical Africa. It does not match other Ethiopian material of *Aloe*. Reynolds compared the flowers to those of *A. buettneri* but other features do not fit. It is best dismissed as an inadequately known species.

A. leucantha Berger (1905)

– type: BA, Tarro Gumbi, *Ellenbeck* 2103 (B holo.).

Stem 1 m high. Leaves lanceolate. Inflorescence divaricate; racemes 7–10 cm long. Bracts *c* 1 mm long. Pedicels 8–10(–15) mm long. Perianth 17 mm long, 'white'.

BA; known only from the type collection.

The type is an inflorescence only. The stem, divaricate inflorescence and short 'white' flowers, possibly suggest a plant close to *A. ruspoliana* or *A. retrospiciens* but the information is much too inadequate for this to be more than a guess.

193. ERIOSPERMACEAE

by Sebsebe Demissew*

Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 168 (1985).

Perennial herbs with a single, globose sausage-like tuber or with a complex of tubers and stolons. Cut surfaces of tubers white, yellow, pink or red. Leaves mostly scale-like and reduced, but with one or up to four dorsiventral leaves with a well-developed blade. Blade linear, lanceolate, ovate or cordate, glabrous or with simple or compound hairs. Inflorescence bearing stem an erect scape, leafless or with bract-like leaves, ending in a sparse raceme with bracts, flowers sometimes having long pedicels. Flowers superior, bisexual, regular, trimerous, those in the uppermost part of the raceme sometimes minute and sterile. Perianth 6, petaloid, in two series, free from each other, white, pink or yellow, the outer upright or spreading. Stamens 6, in two series, joined to the base of the petals; filaments narrow or flat; anthers peltate, dehiscent to the inside through longitudinal slits. Ovary superior, 3-locular; style simple with punctiform stigma. Fruit a loculicidal capsule, subglobose, often 3- or 6-lobed, with few seeds. Seeds clothed with long unicellular hairs. Seeds white or green-brown, pear-shaped to narrowly ovate.

A monogeneric family confined to Africa with only the genus *Eriospermum*.

ERIOSPERMUM Jacq. (1796)

Benth. & Hook. f. *Gen. Pl.* iii. 786; Baker in *Fl. Trop. Afr.* 7: 470 (1898); Cufodontis, *Enum.*: 1538 (1971).

Characters as in the family. 80 species confined to Africa, of which c 50 occur in S Africa. The taxonomy of the species in this genus is often difficult because the inflorescence and leaves sometimes develop separately.

Represented by 2 species in the Flora area. A third species *E. somalense* Schinz (1896) described from the Ogaden type: Abdallah, *Keller* 172 (Z holo.) has now been shown to belong to *Scilla carunculifera* Chiov. which is a synonym of *Ledebouria cordifolia* (Baker) Stedje & Thulin in Hyacinthaceae.

1. Lower pedicels longer than 5 cm; leaf usually not found at the same time as flowers; blade rigid, longitudinal nerves raised and conspicuous.

1. *E. abyssinicum*

- Lower pedicels shorter than 2.5 cm; leaf found at the same time as the flowers; blade flexible, longitudinal nerves inconspicuous.

2. *E. triphyllum*1. *E. abyssinicum* Baker (1876)

- type: GD, Ethio-Sudan border, Gallabat, banks of River Gendua, area near Metema, *Schweinfurth* 26 (K iso.).

Tuber globose, 2-4.5 cm in diameter, crowned with copious fibers. Leaf solitary, usually lanceolate, usually not found at same time as flowers, leathery, glabrous, 11-20 x 0.8-2(-3.5) cm in the middle, narrowed gradually to the apex and base; petioles channelled, 2-4(-8) cm long. Peduncle slender, wiry, (5.5-)-8-15(-19) cm long; pedicels ascending, upper ones 2-3.5 cm long, lower ones 5-11 cm long. Bracts minute, 1-2 x 1-1.5 mm. Perianth white or yellow; segments linear-oblong to oblanceolate, 5-9.5 x 1-2.5 mm. Stamens unequal, rather shorter than the perianth; filaments flattened. Capsule 3-locular, obovate, 6-9 x 6-7 mm with reflexing

valves, each valve 6-9 x 4-5 mm. Seed c 4 x 2.5 mm covered with hairs, 5-7 mm long. Fig. 193.1.1-3.

Grows on rocky outcrops and wet flushes in grasslands, cleared areas near stream; 1800-2300 m. GD; Sudan, Uganda, Kenya, Tanzania, Burundi, Zaire, Malawi, Zambia, Zimbabwe and in W Africa (Cameroun, Nigeria, Ghana, Ivory Coast, Togo and Upper Volta), S Africa and Socotra. *Friis & Vollesen* 419, 944 from Imatong Mt in Sudan.

2. *E. triphyllum* Baker (1893)

- type: Kenya, Ukamba, Kitui, *Hildebrandt* 2651 (K iso.).

E. heterophyllum Cufod. (1939) - type: SD, Neghelle, *Cufodontis* 197 (WU holo. not seen).

Tuber globose to subglobose, 1.5-2.5 x 1.5-4 cm thick. Leaves 2-3(-4), enveloping the peduncle, somewhat leathery, glabrous, the lower (outer) leaf with blade lanceolate 3.5-10.5 x 0.7-1.7 cm, the upper (inner) leaf with blade linear to sublinear 6-13 x 0.5-1 cm; all with acute apex, and attenuated sheathing base. Peduncle glabrous, 2-11(-15) cm long. Pedicels arcuate, upper 0.3-1.3 cm long, lower 1-2-5(-3) cm long. Bracts minute, ovate, 1 x 1 mm. Perianth pale yellow, flushed red-pink outside with green mid-rib; linear oblong to oblanceolate, 6-9 x 1.5-2.5 mm. Stamens unequal, shorter than perianth; filaments flattened. Capsule 3-locular, 8-10 x 8 mm, each part c 3-4 x 2 mm covered with hairs, 7-8 mm long. Fig. 193.1.4-7.

In open *Combretum* - *Terminalia* - *Acacia* woodland; 1600-1700 m. SD; Uganda, Kenya and Tanzania. *Haugen* 1815.

Cufodontis described *E. heterophyllum* from SD around Neghelle indicating that the plant has two different kinds of leaves, hence the epithet. Specimens of *E. triphyllum* from Kenya, for example *Gillett* 12883 in K, have 2-3 leaves and other characters given in the species description of *E. heterophyllum*. Thus *E. heterophyllum* falls within the variation of *E. triphyllum* and is considered synonymous.

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Figure 193.1 *ERIOSPERMUM ABYSSINICUM*: 1 – whole plant x 1; 2 – leaf x 1; 3 – opened flower x 9. *E. TRIPHYLLUM*: 4 – whole plant x 1; 5 – fruiting branch x 2; 6 – fruit x 3; 7 – seed covered with hairs x 3. 1–3 from Schweinfurth 26; 4 from Gillett 12883; 5–7 from Tweedie 906. Drawn by Damtew Teferra.

194. HYACINTHACEAE

by Brita Stedje*

Cufodontis, *Enum.*: 1525–1562 (1971), p.p.; Stedje, *Hyacinthaceae* in *Fl. Trop. E. Afr.*: 32 pp. (1996); Stedje & Thulin, *Nord. J. Bot.* 15: 591–601 (1995); Thulin, 152. *Hyacinthaceae* in *Fl. Somalia* 4: 49–54 (1995).

Plants bulbous. Leaves in a basal rosette or lacking, filiform, lanceolate or cordate, with or without spots. Scape¹ glabrous. Inflorescence usually a raceme or a spike, rarely much branched and complex, if much branched then leaves lacking or strongly reduced. Flowers greenish to white or yellowish, or purplish to purple often with a green or purplish midrib. Perianth segments six, free to fused into a shorter or longer tube. Ovaries with one to many ovules per locule. Fruit a loculicidal capsule, rarely schizocarpous. Seeds black and subglobular or flattened, sometimes winged.

About 40 genera and 900 species; 7 genera in the Flora area.

Key to genera

1. Inflorescence much branched; leaves lacking or strongly reduced. 1. *Schizobasis*
– Inflorescence a spike or raceme, not branched; leaves normal, synanthous² or hysteranthous³. 2
2. Inner perianth segments forming a tube, outer perianth segments usually with a caudate appendage. 2. *Dipcadi*
– Inner perianth segments not forming a tube, outer perianth segments without caudate appendages. 3
3. Bracts absent; flowers up to 6 mm long, globose or shortly cylindrical; at least the inner perianth segments connivent; ovaries with 2 ovules per locule. 3. *Drimiopsis*
– Bracts present; flowers usually larger, perianth segments usually spreading or reflexed, if connivent at least 8 mm long; ovaries with 2 to many ovules per locule. 4
4. Filaments usually purple; ovaries with 1–2 ovules per locule; seeds subglobose. 4. *Ledebouria*
– Filaments whitish or greenish; ovaries with many ovules per locule; seeds flattened. 5
5. Bracts with a longer or shorter spur; perianth segments usually fused; seeds winged. 5. *Drimia*
– Bracts not spurred; perianth segments always free; seeds not winged. 6
6. Perianth segments cream, yellow or greenish with a broad green midrib, inner perianth segments usually connivent, outer perianth segments spreading; filaments clasping the ovary. 6. *Albuca*
– Perianth segments white, with or without a green midrib, all spreading; filaments not clasping the ovary. 7. *Ornithogalum*

1. *SCHIZOBASIS* Baker (1873)

Leaves filiform, withering early. Inflorescence glabrous, much branched. Bracts lanceolate, spurred. Perianth segments free, broadly lanceolate, whitish, occasionally with a coloured midrib, cohering above and loosening from the base when faded, forming a cap on the developing capsule. Capsule ellipsoid. Seeds black, flattened.

5 species in East Tropical to S Africa.

1. *S. intricata* (Baker) Baker (1874);
Anthericum intricatum Baker (1872) – type: South Africa, Zeyher 4284 (K holo.).

Leaves not seen. Bulb up to 3 cm in diameter. Inflorescence 25 cm long, prostrate. Bracts *c* 1 mm; spurs up to 2 mm. Pedicels *c* 10 mm long. Perianth segments *c* 3 mm long. Capsule ellipsoid, about 4 mm long. Seeds black, flattened, up to 2 mm long. Fig. 194.1.

On steep shaded rocky bank in degraded bushland/low woodland; 1400–1900 m. SU HA; Tanzania, Zimbabwe, Zambia, Mozambique, Angola, Namibia and S Africa. *M.G. & C.I. Gilbert* 3976; *Bos & Jansen* 9885.

2. *DIPCADI* Medic. (1790)

Leaves filiform to lanceolate, rarely hairy. Scapes 1–3. Inflorescence a raceme. Pedicels erect in bud and fruit, recurved in flower. Bracts linear, lanceolate to ovate, acuminate. Flowers yellow-green, green, green-brown or brown. Inner perianth segments fused $\frac{1}{4}$ – $\frac{1}{2}$ of their length, forming a tube. Outer perianth segments spreading outwards from near the middle, apex cucullate with glands, usually extended into a short to long caudate appendage. Inner perianth segments without caudate appendages, erect with only the upper part recurved, usually connivent, forming a tube inside the outer segments. Filaments flattened, inserted at the top of the tube. Ovary sessile or shortly stipitate⁵; many ovules per locule; style as long as the ovary. Capsule sessile or shortly stalked. Seeds black, flattened, suborbicular.

About 30 species in the Mediterranean region, Africa, Madagascar and SW Asia.

1. Plants small to large; leaves filiform to lanceolate, without hairs; outer perianth segments with caudate appendages. 1. *D. viride*
– Plants small; leaves filiform, with hairs; outer perianth segments without caudate appendages. 2. *D. marlothii*

1. scape: a leafless flower-stalk arising from the ground.

2. synanthous: producing leaves at the same time as flowers.

3. hysteranthous: producing leaves after the flowers have formed.

4. stipitate: having a stalk.

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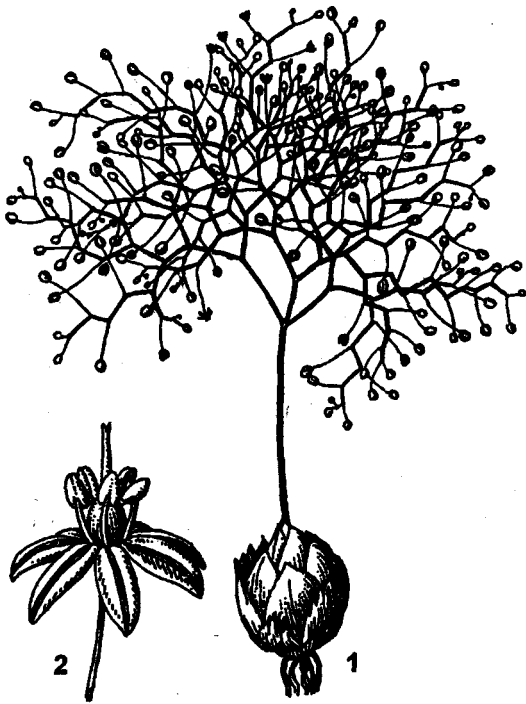


Figure 194.1 *SCHIZOBASIS INTRICATA*: 1 – whole plant $\times 2/5$; 2 – flower $\times 4 1/2$. Both from Krause 1930.

1. *D. viride* (L.) Moench (1802);

Hyacinthus viridis L. (1762) – type: Cape, collector unknown (LINN holo.).

D. minimum Webb & Berthelot (1848) – type: GD, Semen, Endjekap (= Enchetkab), *Schimper* 1168 (FI-W holo., K iso.).

D. tacazeanum Baker (1871) – type: TU, at the foot of the mountains in the valley of the river Tacazze, *Schimper* 1696 (K holo., G iso.).

D. erlangeri Dammer (1907) – type: BA, Dageia near Burkare Burca towards Mana-Uebi river, *Ellenbeck* 2009 (B holo.).

D. rupicola Chiov. (1911) – type: GD, Mai Taclit in Tzellemti, *Chiovenda* 701 (FT holo., B iso.).

D. nitens Krause (1921).

Albua hyacinthoides Chiov. (1951) – type: SD, El Banne, *Corradi* 4669 (FT holo.).

D. longifolium auct. non. Baker, Hepper (1968).

Plants 10–60 cm long. Leaves 1–15 up to 80 \times 2 cm, filiform or linear to broadly lanceolate, smooth, margin sometimes undulate. Raceme with 5–40 flowers. Pedicels 2–8 mm, up to 11 mm in fruit. Bracts 6–17 mm. Flowers yellow-green, green to brown. Perianth segments 8–13 mm, outer with up to 30 mm long caudate appendage. Capsule 6–14 mm long, 6–15 mm in diameter. Seeds 4–7 mm long. Fig. 194.2.

In grassland, bushland or woodland; in sandy, stony or blackish soil; 450–3200 m. EE GD GJ SU AR SD WG HA; widespread in tropical and S Africa. *M.G. & S.B. Gilbert* 1773; *Gilbert, Ermias & Waterman* 8834; *Ryding & Edwards* 1027.

D. viride is very variable especially regarding leaf width. Lack of clear discontinuities and of correlation with other characters prevent further delimitation.

2. *D. marlothii* Engl. (1889)

– type: Botswana, Kuruman, *Marlot* 1041 (B holo., PRE iso.).

Small plants about 15 cm long, bulb c 1.5 cm across. Leaves filiform with a white membranous base and hairs, c 5 cm long. Raceme few-flowered. Bracts c 6 mm, pedicels c 3 mm. Perianth segments up to 15 mm, the outer lacking caudate appendages. Capsules and seeds not seen.

In bushland on red, sandy soil; 830 m. HA; Kenya, Zimbabwe, Botswana, Namibia and S Africa. *Ellis* 195.

The association of this specimen with *D. marlothii* is not quite certain and further investigations are needed on this point.

Doubtful species.

D. kelleri Baker (1901).

It has not been possible to trace the type specimen. May prove to be a synonym of *D. viride*.

3. DRIMIOPSIS Lindl. & Paxt. (1851–1852)

Stedje in *Nord. J. Bot.* 14: 45–50 (1994).

Plants glabrous. Leaves narrowly to broadly lanceolate, with or without a pseudopetiole, often spotted. Scapes 1–2 per plant. Inflorescence a spike or a raceme, bracts lacking. Flowers approximately globular or short cylindrical. Perianth segments united at the base, greenish with white or purple, often persistent in fruit. Apex of inner perianth segments hooded and often yellow. Filaments free or united at the base, flattened and triangular. Ovary sessile with 1–2 basal ovules per locule; style slender and as long as the ovary. Capsules subglobose, usually with 1–2 seeds. Seeds globose to ovoidal with a folded, black and shiny surface.

About 15 species in Africa south of the Sahara.

1. Leaves narrowly lanceolate; both inner and outer perianth segments connivent at anthesis.

1. *D. barteri*

– Leaves broadly lanceolate; inner perianth segments connivent, outer spreading at anthesis.

2. *D. botryoides*

1. *D. barteri* Baker (1870)

– type: Niger Territory, Nupe, Plains of Ilorin, *Barter* 3449 (K lecto.); Niger Territory, Nupe, *Barter* 1512 (K syn.).

Plants 15–22 cm long. Leaves narrowly lanceolate c 17 \times 2 cm. Inflorescence a dense spike. Perianth segments greenish to purple, 2–2.5 mm long, both inner and outer segments erect with connivent tips. Inner perianth segments shortly ligulate and usually narrower than the outer.

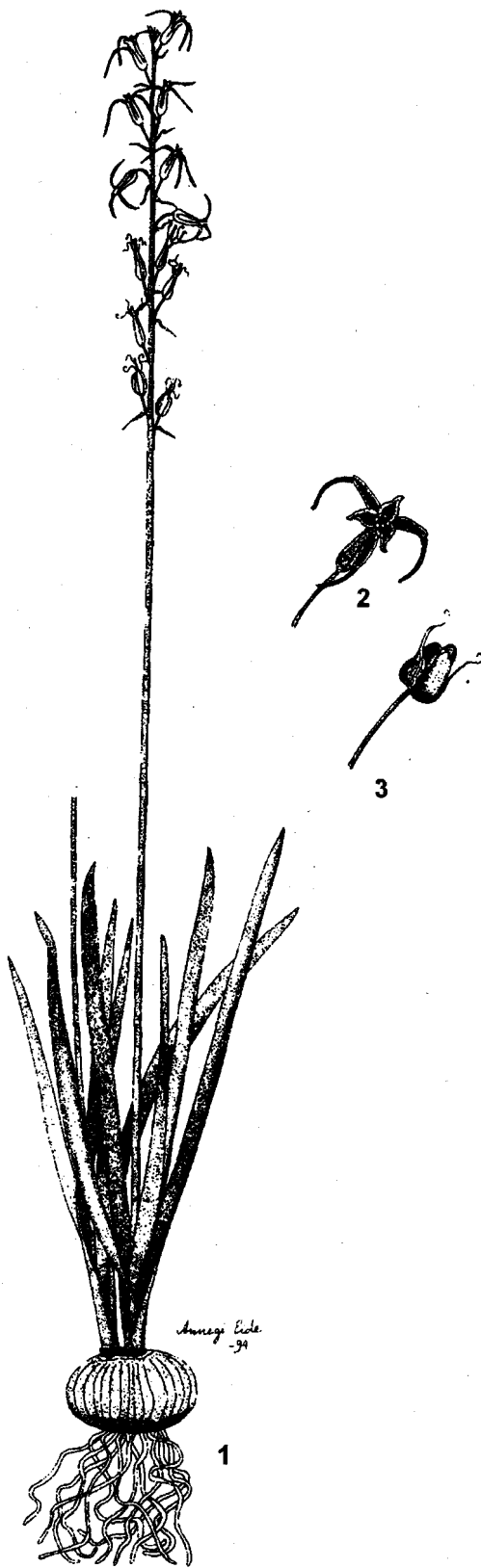


Figure 194.2 *DIPCADI VIRIDE*: 1 – whole plant $\times \frac{1}{4}$; 2 – flower $\times \frac{7}{10}$; 3 – capsule $\times \frac{7}{10}$. All from *Nordal* 2205. Drawn by *Annegi Eide*.

Common in grass at margins of *Combretum* – *Terminalia* woodland and annually flooded meadows near river banks, on black soil; 550 m. IL; west to E Africa. *Ash* 3502.

2. *D. botryoides* *Baker* (1870)

– type: Africa orientalis, sine loc., *Blackburn* s.n. (K hol.).

D. erlangeri *Dammer* (1905) – type: SD, Marta, *Ellenbeck* 2043; SD/BA, Genale, *Ellenbeck* 2081 (B syn.).

Plants up to 20 cm long. Leaves lanceolate to broadly lanceolate, shortly petiolate, leaf blade up to 17 \times 8 cm. Inflorescence subspicate pedicels c 1 mm long. Perianth segments white to greenish white, elliptical, c 3 mm long. Outer perianth segments spreading, inner perianth segments erect with connivent tips, usually wider than the outer. Fig. 194.3.

Bushland. SD SD/BA; Somalia, Kenya and Tanzania. Only the type specimen of *D. erlangeri* is known.

4. **LEDEBOURIA** *Roth* (1821)

Scilla L., p.p.

Jessop in *J. S. Afr. Bot.* 36: 233–266 (1970).

Plants small to tall. Leaves synanthous, cordate to linear, sometimes petiolate, often spotted or with stiff hairs or purple papillae. Scape glabrous, more or less flexuose. Inflorescence a lax to dense raceme. Bracts minute often shallowly or deeply split in two. Pedicels erect to ascending. Perianth segments free or united at the base, reflexed in the larger part or just on tips, greenish to purple. Filaments united with the perianth segments for 0.5–2 mm. Ovary 3-locular with 2 ovules per locule, stipitate and conical or obconical; style slender with a minute stigma. Capsule ovoid to subglobose, sometimes a schizocarp. Seeds black, subglobose.

About 20 species in Africa south of the Sahara and S Asia.

- | | |
|---|--------------------------|
| 1. Perianth segments 9 mm long or more. | 2 |
| – Perianth segments 8 mm long or less. | 3 |
| 2. Pedicels up to 3 mm long. | 1. <i>L. somaliensis</i> |
| – Pedicels 5 mm long or more. | 2. <i>L. kirkii</i> |
| 3. Leaves linear, up to 7 mm wide. | 3. <i>L. edulis</i> |
| – Leaves lanceolate to cordate, more than 15 mm wide. | 4 |
| 4. Perianth segments about 3 mm wide and one to two times longer than wide, only the tips reflexed. | 4. <i>L. urceolata</i> |
| – Perianth segments 0.8–2 mm wide and longer than 2x the width, the larger part reflexed. | 5 |
| 5. Leaves cordate to broadly lanceolate, often with purple papillae above. | 5. <i>L. cordifolia</i> |
| – Leaves lanceolate, without papillae, but often with purple spots. | 6. <i>L. revoluta</i> |

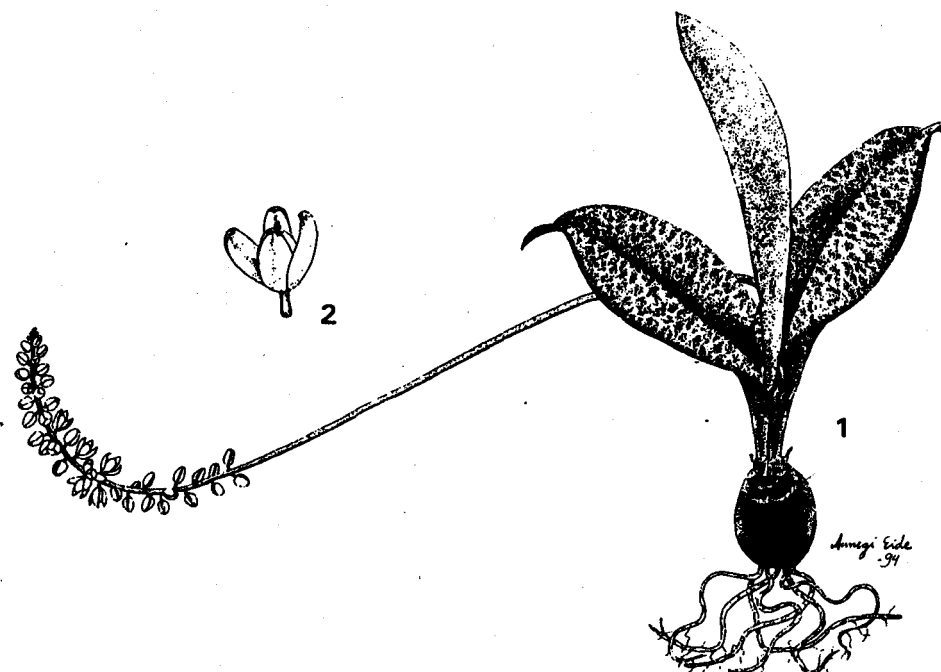


Figure 194.3 *DRIMIOPSIS BOTRYOIDES*: 1 – whole plant x 2/5; 2 – flower x 1 1/2. All from *Nordal* 1113. Drawn by *Annegi Eide*.

1. *L. somaliensis* (Baker) Stedje & Thulin (1995);

Scilla somaliensis Baker (1892) – type: Somalia, Ahl mountains, near Meid, *Hildebrandt* 1470 (K holo.).

Drimia colae Baker (1897) – type: Somalia, 'Golis range', *Cole* s.n. (K holo.).

Drimia confertiflora Dammer (1905) – type: Somalia, Borau, Malkare, *Ellenbeck* 2150a (B holo.).

Plants robust, up to 30 cm long. Leaves lanceolate to broadly lanceolate, up to 17 x 3 cm. Inflorescence 5–20 cm long, relatively lax with up to about 70 flowers. Pedicels 1–3 mm. Perianth segments greenish to purplish, 9–11 mm long. Filaments filiform, usually purple, 7–9 mm long. Ovary c 1.5 mm long. Capsule c 8 mm long. Seeds c 5 mm long.

In grassland, bushland or open woodland, on sandy or rocky ground; 400–1500 m. SD HA; Somalia and Kenya. *Gilbert & Jones* 116; *Friis* et al. 1023; *Haugen* 1775.

2. *L. kirkii* (Baker) Stedje & Thulin (1995);

Scilla kirkii Baker (1873) – type: Tanzania, Zanzibar, *Kirk* 66 (K holo.).

Drimia hildebrandtii Baker (1892) – type: Kenya, Mombasa, *Hildebrandt* 2001, 2017 (B syn.).

Urginea corradii Chiov. (1951) – type: Somalia, Baidoa, *Corradi* 4632 (FT holo.).

Plants relatively robust up to 40 cm long. Leaves lanceolate, not seen mature. Inflorescence c 8 cm long, relatively lax. Pedicels 5–9 mm long. Perianth segments greenish c 10 mm long. Filaments filiform, purple c 8 mm long. Ovary c 1.5 mm long. Capsule and seeds not seen.

Open woodland, in brown soil on rocky places; 900 m. SD; Kenya and Tanzania. *Gilbert & Jones* 148.

3. *L. edulis* (Engl.) Stedje (1995);

Scilla edulis Engl. (1892) – type: Sudan, Seriba Ghattas, *Schweinfurth* 159 (K holo.).

Plants small and slender c 15 cm long. Leaves linear c 12 x 0.7 cm. Inflorescence c 3 cm long. Pedicels c 2 mm long. Perianth segments c 5 mm. Capsule and seeds not seen.

Habitat and altitude not known. WG; Sudan, Kenya, Uganda and Tanzania. *Benedetto* 403.

4. *L. urceolata* Stedje (1995)

– type: BA, 8.4 km W of Goro, *Nordal* 2297 (O holo.).

Plants relatively small, up to 30 cm long. Leaves lanceolate up to 9 x 3 cm. Inflorescence 3–12 cm, moderately dense with up to 50 flowers. Pedicels 5–10 mm. Flowers purple, pitcher-shaped. Perianth segments 4–6 x c 3 mm. Filaments filiform c 4 mm long. Capsule c 5 mm long. Fig. 194.4.

In rocky outcrop or on river bank; 2500–2700 m. GJ SU BA; not known elsewhere. *Aweke* 2973; *Sebsebe* D. 33; *Sebsebe, Nigist & Wondimagegn* 2388.

5. *L. cordifolia* (Baker) Stedje & Thulin (1995);

Scilla cordifolia Baker (1898) – type: Malawi, Shire highlands, *Buchanan* 194 (K holo.).

Eriospermum somalense Schinz (1896), non *Ledebouria somaliensis* (Baker) Stedje & Thulin – type: HA, Abdallah, *Keller* 172 (Z holo.).

Tanzania, Malawi and Angola. *Gilbert & Jones* 193; *Ellis* 136; *Ash* 490.

6. *L. revoluta* (L. f.) *Jessop* (1970);

Hyacinthus revolutus L. f. (1782) – type: Cape, *Thunberg* s.n. (UPS holo.).

Ledebouria hyacinthina Roth (1821); *Scilla indica* Baker (1870), nom. illegit.; *Scilla hyacinthina* (Roth) *Macbride* (1918) – type: India orientalis, *Heyne* s.n. (K holo.).

S. richardiana *Burchinger* ex *Baker* (1870) – types: Ethiopia, Walcha Plateau, Sana prov., *Schimper* 1622 (K syn); Ethiopia, *Schimper* 572 (K syn); Ethiopia, between Mai Gouagoua and Debra Sina, *Quartin-Dillon & Petit* 46 (not seen).

Drimia brevifolia *Baker* (1898) – type: Somalia/Ethiopia border, near the River Daua, at Dolo, *Riva* 1251 (B holo., FT iso.).

Scilla neumannii *Engl.* (1902) – type: HA, Gara Mulata, *Ellenbeck* 490 (B holo.).

S. chiovendae *Cufod.* (1939) – type: SD, Neghelle, *Cufodontis* 170, 199, 229 (FT syn.).

Plants small to relatively robust 9–35 cm long. Leaves lanceolate up to 18 x 8 cm, often with purple spots or lines, rarely petiolate. Inflorescence 3–10 cm long, relatively lax to dense with up to 60 flowers. Pedicels 3–12 mm long. Flowers greenish to purple. Perianth segments 4–8 mm long. Filaments filiform. Capsule c 5 mm long. Fig. 194.5.

Grassland or open bushland, in clay or sandy soil; 450–2800 m; EE EW GD GJ SU WG IL SD BA HA; widespread in tropical and southern Africa, also in India and Sri Lanka. *Mooney* 8903; *Friis* 4546; *Gilbert & Jones* 103.

Excluded species:

Scilla liliacina (Fenzl ex *Kunth*) *Baker* (1870)
– type: Sudan, Kordofan (K holo.).

Closely related to or conspecific with *L. revoluta*.

5. **DRIMIA** *Jacq.* (1797)

Urginea *Steinheil* (1834)

Stedje in *Nord. J. Bot.* 7: 655–666 (1987) & *Nord. J. Bot.* 14: 43–44 (1994).

Plants slender to robust. Leaves usually hysteranthous, linear to lanceolate. Scape usually erect. Inflorescence a lax to dense raceme. Pedicels erect or ascending. The lower bract, at least, bearing a pit or a spur, sometimes two, one in the middle of the bract and one close to the scape. Perianth segments free or united. Filaments free or united with the perianth segments. Ovary with many ovules per locule. Capsule ovoid to subglobose, sometimes with an emarginate apex. Seeds black, most often flattened and winged with an approximately semiorbicular outline.

About 115 species in Africa and the Mediterranean area with extensions to India.

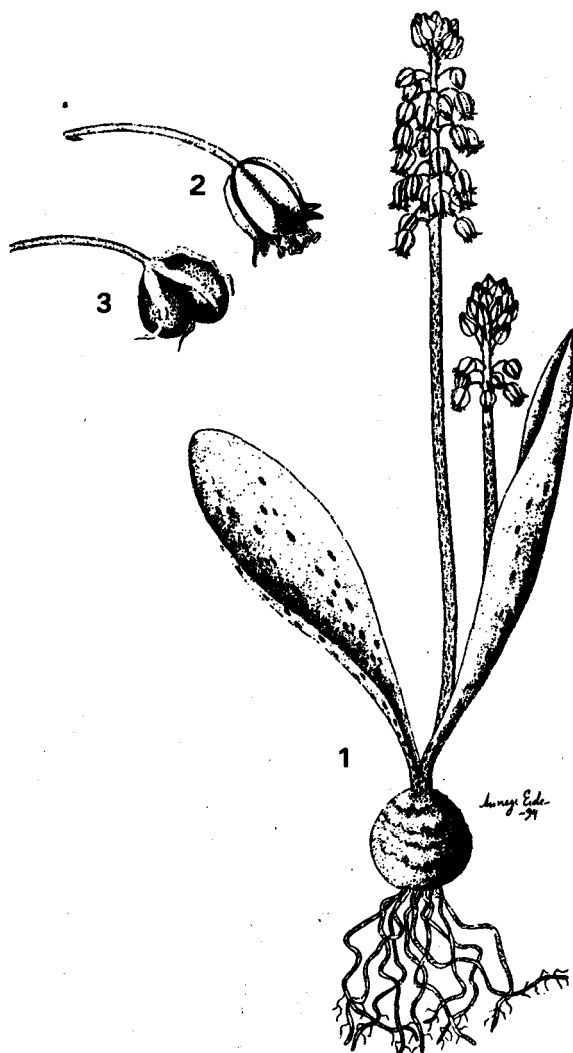


Figure 194.4 *LEDEBOURIA URCEOLATA*: 1 – whole plant x $\frac{3}{5}$; 2 – flower x 2; 3 – capsule x 2. All from *Nordal* 2297. Drawn by *Annegi Eide*.

Scilla carunculifera *Chiov.* (1916) – type: Somalia, between Usciacca Guràn and El Uré, *Paoli* 1045 (FT holo.).

S. carunculifera var. *glandulosa* *Chiov.* in *Fl. Somalia* 2: 429 (1932); *S. glandulosa* (*Chiov.*) *Chiov.* (1951) – type: Somalia, Bender Saguma, *Senni* 203 (FT holo.).

S. glandulosa forma *major* *Chiov.* in *Webbia* 8: 29 (1951) – type: Somalia, Baidoa, *Corradi* 4628, 4633, 4636 (FT syn.).

Plants small, up to 15 cm long. Leaves cordate to broadly lanceolate, usually petiolate; petiole up to 5 cm long; leaf blade up to 8 x 4.5 cm, often covered with purple papillae on the upper surface. Inflorescence up to 8 cm long with up to c 60 flowers. Pedicels 5–8 mm long. Flowers purple. Perianth segments 3–4 mm long. Capsule and seeds not seen.

Grassland or in clearings in bushland or woodland; 1000–1980 m. SU SD BA HA; Somalia, Kenya, Uganda,

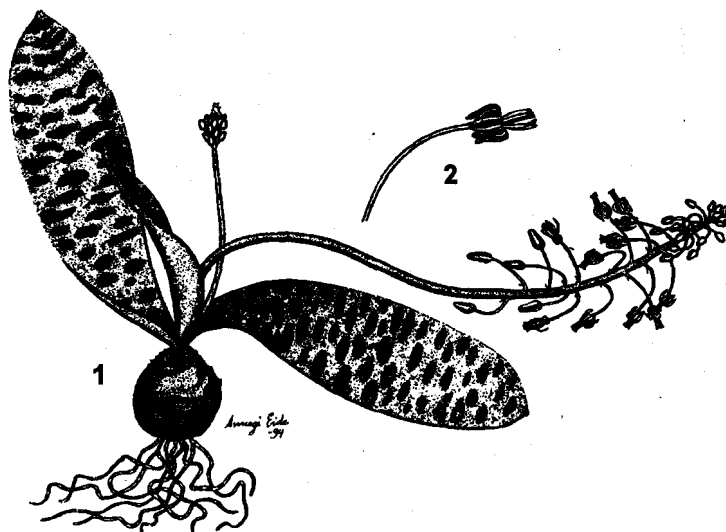


Figure 194.5 *LEDEBOURIA REVOLUTA*: 1 – whole plant x 1; 2 – flower x 2. All from *Nordal* 1123. Drawn by Annegi Eide.

1. Perianth segments up to 5 mm long; pedicels up to 5 mm long. 1. *D. exigua*
 – Perianth segments 5 mm or more long; pedicels usually more than 5 mm, or if shorter, perianth segments at least 8 mm. 2

2. Raceme dense, about $\frac{1}{10}$ of the total plant length, pedicels 5–8 mm long. 2. *D. simensis*
 – Raceme lax to moderately dense, more than $\frac{1}{4}$ of the total plant length, pedicels usually more than 8 mm long. 3

3. Perianth segments *c* 18 mm long, pedicels more than 30 mm long. 3. *D. macrocarpa*
 – Perianth segments up to 11 mm long; pedicels usually shorter than 30 mm. 4

4. Raceme lax, up to 15 flowers per 10 cm; flowers greenish-brown. 4. *D. indica*
 – Raceme dense, more than 25 flowers per 10 cm; flowers whitish with a coloured abaxial band. 5

5. Raceme more than 20 cm long. 5. *D. altissima*
 – Raceme up to 10 cm long. 6. *D. brachystachys*

1. *D. exigua* *Stedje* (1994)
 – type: SU, Guder river valley, *Nordal* 1015 (O holo.).

Plants small and slender. Leaves linear, hysteranthous, red spotted towards the base, *c* 25 x 0.8 cm. Raceme up to 15 cm long with about 30 flowers. Bracts up to 3 mm long; spurs up to 5 mm long. Pedicels up to 5 mm long. Perianth segments 4–5 mm long, united for about 1 mm, light greenish-brown with a purplish-brown abaxial band. Filaments filiform and white, anthers light yellow. Ovary ovoid, light green. Capsule subglobose, emarginate, up to 11 x 10 mm. Seeds black, winged, up to 6 mm long. Fig. 194.6.

In recently burnt open savanna woodland; 1400–1600 m. KF SU; not known elsewhere. *De Wilde* 6124, 6313.

2. *D. simensis* (*Hochst.*) *Stedje* (1995);
Urginea simensis *Hochst* (1851) – type: SU, *Petit* s.n.; GD, *Schimper* 1317 (K syn.).

Plants tall and robust up to 60 cm. Leaves lanceolate, about 33 x 3.5 cm. Raceme dense and short, up to 8 cm. Pedicels 5–8 mm long. Perianth segments free, lanceolate, *c* 10 x 3 mm. Capsule and seeds not seen.

Habitat not known; 2880–3270 m. GD SU; not known elsewhere. *Lemma Gebre-Selassie* 650; *Buscalioni* 1666; *Schimper* 641.

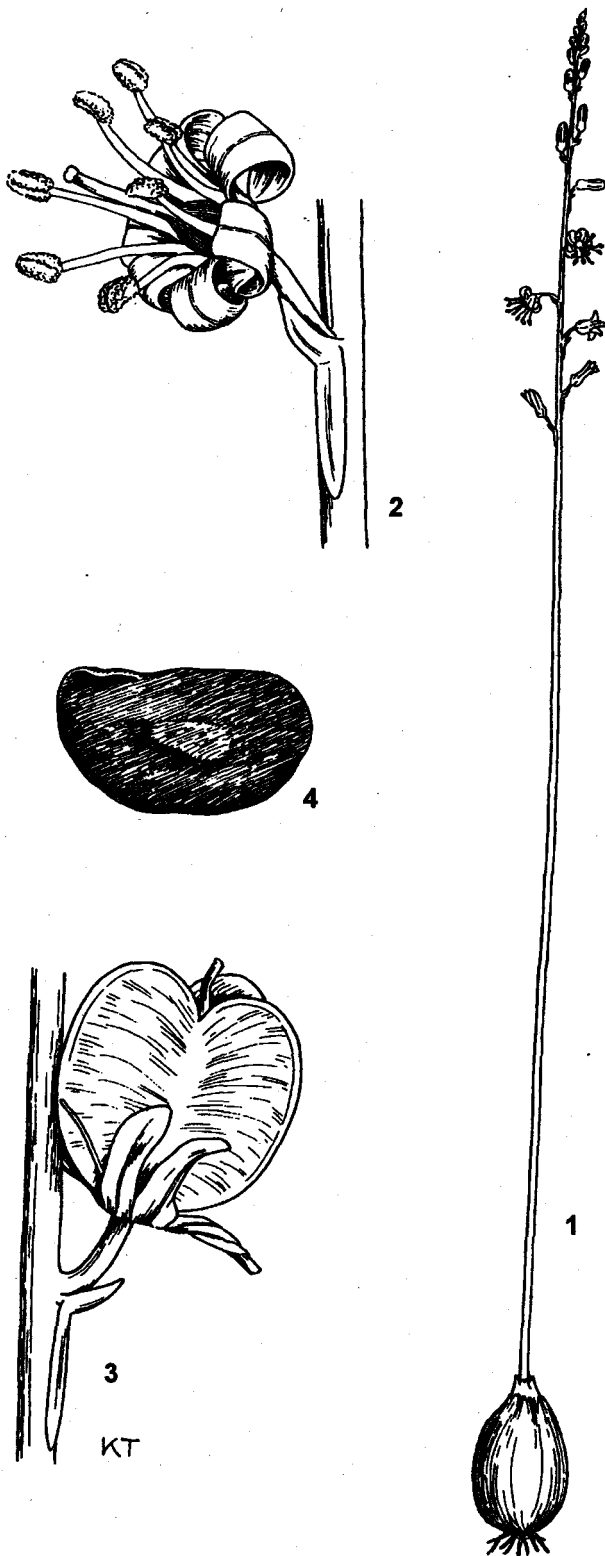
3. *D. macrocarpa* *Stedje* (1987)
 – type: Tanzania, Mpanda District, *Richards & Arasululu* 26126 (K holo.).

Plants 45–55 cm tall. Inflorescence a lax raceme with *c* 10 flowers. Bracts 6 mm long, spurs 4 mm long. Pedicels *c* 40 mm long. Perianth segments 18–25 mm long, united at the base, pale brownish. Filaments approximately triangular. The base of the filaments clasps the ovary and the upper part is bent outwards. Ovary ovoid. Capsule and seeds not seen.

In disturbed *Acacia drepanolobium* bushland or in burnt, heavily grazed grassland; 1270 m. SD; Kenya and Tanzania. *Nordal* 2253; *Petelin* 460.

4. *D. indica* (*Roxb.*) *Jessop* (1977)
Scilla indica *Roxb.* (1824); *Urginea indica* (*Roxb.*) *Kunth* (1843) – type: India, Coromandelia, *Roxburgh* s.n. (K holo.).

Plants up to 50 cm. Leaves not seen. Inflorescence a very lax raceme with 5–25 flowers. Bracts often early caducous, up to 2 mm long, spurs up to 2 mm long. Pedicels about 45 mm long, erect or ascending. Perianth segments free or united up to 1.5 mm, brownish or greenish, 10–11 mm long. Filaments linear, free or united with the perianth segments, free part 5–6 mm. Ovary ovoid, 3–4 mm long; style 4–5 mm long. Capsule ellipsoid 16–18 mm long. Seeds *c* 9 mm long.



In bushland or open land on thin sandy soil or rocky ground; 1350–2280 m. SU; tropical to South Africa and Asia. Meyer 7467; Gilbert, Ermias & Waterman 8833; De Wilde 6085.

5. *D. altissima* (L.f.) Ker-Gawl. (1808);

Ornithogalum altissimum L.f. (1781); *Urginea altissima* (L.f.) Baker (1873) – type: Cape, Thunberg s.n. (UPS holo.).

Scilla micrantha A. Rich (1851); *Urginea micrantha* (A. Rich.) Solms (1867) – type: TU, Quartin Dillon s.n. (P holo., K iso.).

Drimia paolii Chiov. (1916) – type: Somalia, Paoli 1096 (FT holo.).

Plants usually tall and robust, up to 180 cm. Bulbs up to 10 cm across. Leaves usually hysteranthous, lanceolate, up to 40 x 4 cm. Scape erect, up to 1 cm in diameter. Inflorescence a more or less dense raceme up to 60 cm long with up to 500 flowers. Bracts up to 5 mm long, spurs up to 2 mm. Pedicels 13–45 mm long, spreading. Perianth segments free or united up to 2 mm, 5–10 mm long, white or greenish white with a green or purple abaxial band. Filaments linear to slightly triangular, free or united with the perianth segments, free part 4–7 mm long. Ovary ovoid, about 2–5 mm long; style about as long as the ovary. Capsule subglobose, sometimes with an emarginate apex, 10–14 x 9–15 mm. Seeds semiorbicular, 5–9 mm long. Fig. 194.7.

In grassland, bushland or wooded grassland, often overgrazed or recently burnt, on rocky ground or black loamy soil; 800–2600 m. EW TU WU SU WG IL KF GG SD BA HA; in tropical and southern Africa, from Senegal in the west to E Africa and to the Cape in S Africa. Friis et al. 2352; Gilbert 2537; Gillett 15066.

6. *D. brachystachys* (Baker) Stedje (1987);

Urginea brachystachys Baker (1892) – type: Tanzania, Musoma District, 8 km from the Simiyu River, NE to the Eastern Boundary, S Extension, Greenway 10211 (EA holoneo., K isoneo.).

Plants c 5 cm tall. Bulb extended into a neck. Leaves hysteranthous, not seen. Inflorescence a dense subglobose raceme with c 30 flowers. Bracts broadly lanceolate, membranous and whitish (at least in herbarium specimens), c 2 mm long, with a pit in the middle. Pedicels c 3 mm long, spreading. Perianth segments united at the base, dirty white with a purple abaxial band, 8–9 mm long. Filaments linear to triangular. Ovary ovoid, c 4 mm long; style about as long as the ovary. Capsule and seeds not seen.

On open stony places; c 2000 m. SU; Tanzania. De Wilde & Wilde-Duyfjes 10843.

Uncertain species:

Urginea bakeri Chiov. (1911).

It has not been possible to trace the type specimen. May prove to be a synonym of *Ornithogalum tenuifolium*.

Figure 194.6 *DRIMIA EXIGUA*: 1 – whole plant x 3/4; 2 – flower x 5; 3 – capsule x 3; 4 – seed x 6. All from Nordal 1015. Drawn by Kerstin Thunberg.



Figure 194.7 *DRIMIA ALTISSIMA*: 1 – inflorescence $\times \frac{3}{5}$; 2 – flower $\times 2$. All from *Bjornstad* 373. Drawn by Ellen Kresse.

Urginea beccarii Baker (1873) and *Urginea quartini-ana* (Rich.) Solms (1867).

It is not been possible to trace the type specimen. May prove to be a synonym of *Albuca abyssinica*.

Excluded species:

Urginea pilosula Engl. (1902).

Synonym of *Trachyandra saltii* (Baker) Oberm. (Asphodelaceae).

6. *ALBUCA*. (1762)

Knudtzon & Stedje in *Nord. J. Bot.* 6: 773–786 (1986).

Bulbous plants, slender to robust. Leaves filiform to lanceolate, glabrous, ciliate or pubescent. Scape glabrous. Inflorescence a raceme with 3–150 flowers. Pedicels erect or ascending. Bracts lanceolate to ovate acuminate with filiform apex, never spurred. Perianth segments free, inner connivent, outer connivent to slightly spreading, cream to greenish yellow, with a dorsal green band, apex cucullate with glands. Fila-

ments free, the inner with an expanded base that clasps the ovary, the outer flattened or clasping the ovary. Ovary 3-locular with many ovules per locule. Capsule ovoid. Seeds black, flattened, semiorbicular.

About 50 species in Africa south of the Sahara, with extensions to Arabia.

1. Plants robust; leaves lanceolate, more than 1 mm wide. 1. *A. abyssinica*
- Plants small and slender; leaves terete, 1 mm wide. 2. *A. tenuis*

1. *A. abyssinica* Jacq. (1783)

– type: t. 64 in Jacq., *Icon. Pl. Rar.* 1, origin unknown.

Scilla petitiana A. Rich. (1851); *Urginea petitiana* (A. Rich) Solms (1867) – type: SU, *Petit* s.n. (P holo.).

A. abyssinica Welw. ex Baker (1872).

Ornithogalum melleri Baker (1873); *A. melleri* (Baker) Baker (1898).

A. subspicata Baker (1878) sensu Cufod. (1971).

A. erlangeriana Engl. (1902) – type: HA, *Ellenbeck* s.n. (B holo., not seen).

A. hysteraantha Chiov. (1911) – type: GD/GJ, Amhara-Dembia, *Chioventa* 2835; EW, Hamasen, *Chioventa* 27, 225, 265 (FT syn.).

A. nemorosa Chiov. (1911) – type: GD, Buja in Tzellemti, *Chioventa* 680 (FT holo.).

A. chaetopoda Chiov. (1928).

A. asclepiadea Chiov. (1932).

A. blepharophylla Cufod. (1937) – type: SD, *Cufodontis* 709 (photo! FT).

A. beguinotii Cufod. (1939) – type: SD, *Cufodontis* 254 (FT holo.).

Plants up to 150 cm tall. Bulbs up to 8 cm wide, scales with or without fibrous apex. Leaves lanceolate up to 100 \times 5 cm, pubescent and/or ciliate. Pedicels 2–20 mm long. Perianth segments 8–35 mm long. Filaments clasping the ovary. Style slender and 1.5–3 times as long as the ovary. Capsule 1–2 cm long. Seeds 3–7 mm across. Fig. 194.8.

In grassland, bushland or woodland, on red or brown loamy soil, often in rocky places; 700–3240 m. EE EW TU GD GJ SU AR WG KF SD BA HA; widely distributed in tropical Africa, also in Arabia. *Gilbert & Getachew* 2995; *Friis, Mesfin T. & Vollesen* 3265; *Nordal* 1049.

A form with pubescent leaves has been collected in SD, Tanzania and Kenya, and referred to *A. blepharophylla*. As this form is interfertile with *A. abyssinica*, and as both pubescent and not pubescent individuals may be found within one population this form can not be maintained as a separate species.

2. *A. tenuis* Knudtzon (1986)

– type: Kenya, Kajiado District: Old Kajiado Road, 16 km SE of Kiserian at Ketengela river, *I. Bjornstad* 705 (O holo.).

Plants small and slender, up to c 15 cm. Bulbs c 2 cm across, with or without fibrous apex. Leaves filiform, pubescent or not, sometimes spirally twisted, up to c 10

7. *ORNITHOGALUM* L. (1753)

Stedje & Nordal in *Nord. J. Bot.* 4: 749–759 (1985).

Plants slender to robust, all parts glabrous. Leaves filiform or lanceolate. Scapes 1–2 per plant. Inflorescence a raceme with 10–200 flowers. Pedicels erect or patent at anthesis, erect in fruit. Bracts lanceolate to ovate-acuminate with filiform apex, never spurred. Perianth segments free, spreading, white or white with a dorsal green band, apex cucullate with glands. Filaments free, white and flattened. Ovary sessile or with a short carpophore¹, 3-locular with many ovules per locule. Style slender and as long as the ovary. Capsules subglobose. Seeds black, irregularly flattened, with sub-to semiorbicular outline.

About 200 species in Europe, Africa and western Asia; 54 species in S Africa; 3 in the Flora area.

1. Plants small, up to 15 cm tall; leaves filiform; flowers 2–10; perianth segments with few, scattered vascular bundles; ovary with a short, delicate carpophore.
 1. *O. gracillimum*
- Plants taller; leaves never filiform; flowers usually more than 30 in number, vascular bundles assembled in one green midrib; carpophore short and wide or missing.
 - 2
2. Perianth segments 1.5–1.7 cm long with 3 or 5 distinct green vascular bundles; ovary with a short wide carpophore; pedicels 2.5–4.5 cm long.
 2. *O. donaldsonii*
- Perianth segments 0.6–0.9 cm long with many vascular bundles; carpophore missing; pedicels shorter than 1.2 cm.
 3. *O. tenuifolium*

1. *O. gracillimum* R.E. Fries (1927)

– type: Kenya, Mt Kenya, R.E. & Th.C.E. Fries 950 (UPS holo.).

Plants small and slender, up to 15 cm tall. Bulb up to 2 cm in diameter. Leaves filiform, up to 12 cm long. Scape up to 8 cm. Inflorescence with 2–10 white flowers. Pedicels 5–20 mm. Bracts lanceolate, 2–4 mm long. Perianth segments obovate, c 4 mm long, with few, scattered vascular bundles. Filaments triangular. Ovary globose to subglobose, c 1.5 mm long, with a short, delicate carpophore, 0.3 mm long. Capsule 3–4 mm long. Seeds 1.5–2 mm across.

On granite outcrop with much bare rock; 1450 m. SD; Kenya and Uganda. *Gilbert, Ensermu & Vollesen* 7764.

2. *O. donaldsonii* (Rendle) Greenway (1969);

Albuca donaldsonii Rendle (1896) – type: HA, East of Shebeli River, *Donaldson Smith* s.n. (BM holo.).

Urginea somalensis Chiov. (1932).

Robust plants, 20–50 cm high. Bulb up to 6 cm in diameter. Scape erect, up to 35 cm long. Leaves lanceolate to linear lanceolate, up to c 40 x 3.5 cm. Inflorescence with 50–150 flowers. Pedicels 2.5–3.5 cm during

1. carpophore: a prolongation of the torus bearing the carpels or ovary.

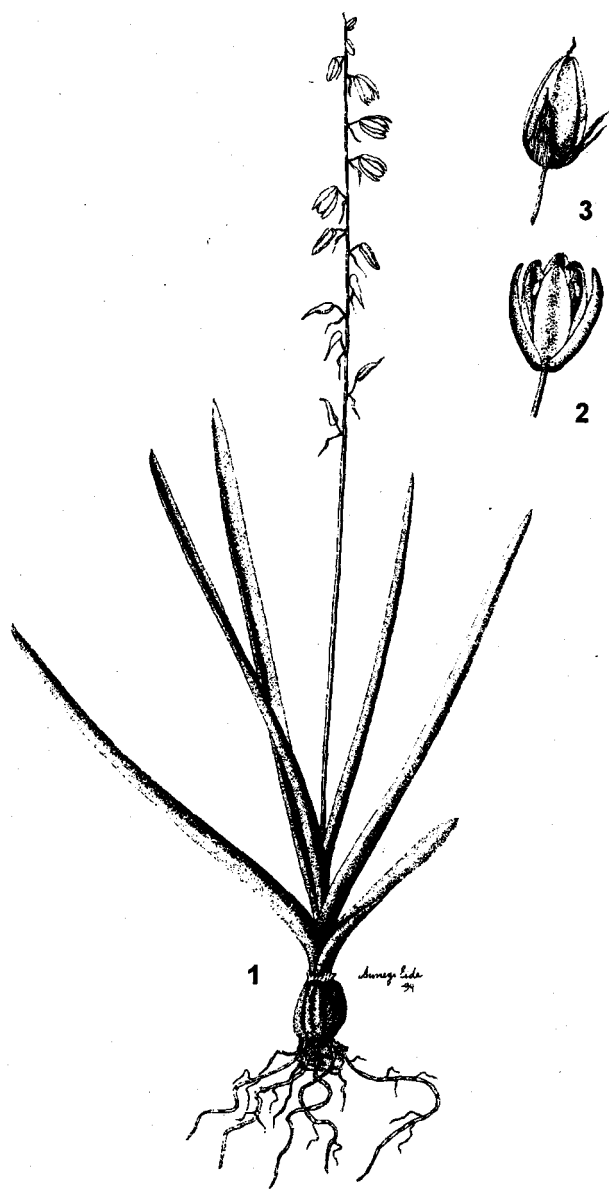


Figure 194.8 *ALBUCA ABYSSINICA*: 1 – whole plant x 1/4; 2 – flower x 1 1/4; 3 – capsule x 1 1/4. All from *Nordal* 22. Drawn by *Annegi Eide*.

cm. Pedicels c 2 mm long. Perianth segments c 11 mm long. Filaments clasping the ovary. Style slender and about as long as the ovary. Capsule and seeds not seen.

In disturbed or eroded *Acacia* bushland or woodland; 1450–1900 m. SU BA; Kenya. *Gilbert & Tewolde* 2449; *Friis, Gilbert & Vollesen* 3638; *Nordal* 2292.

The collections *Friis, Gilbert & Vollesen* 3638 and *Nordal* 2292 represent a form with spiral leaves. They probably both belong to the same population as they are collected at the same place. The status of this species is uncertain as an individual from Kenya has been proved to be interfertile with *A. abyssinica*.

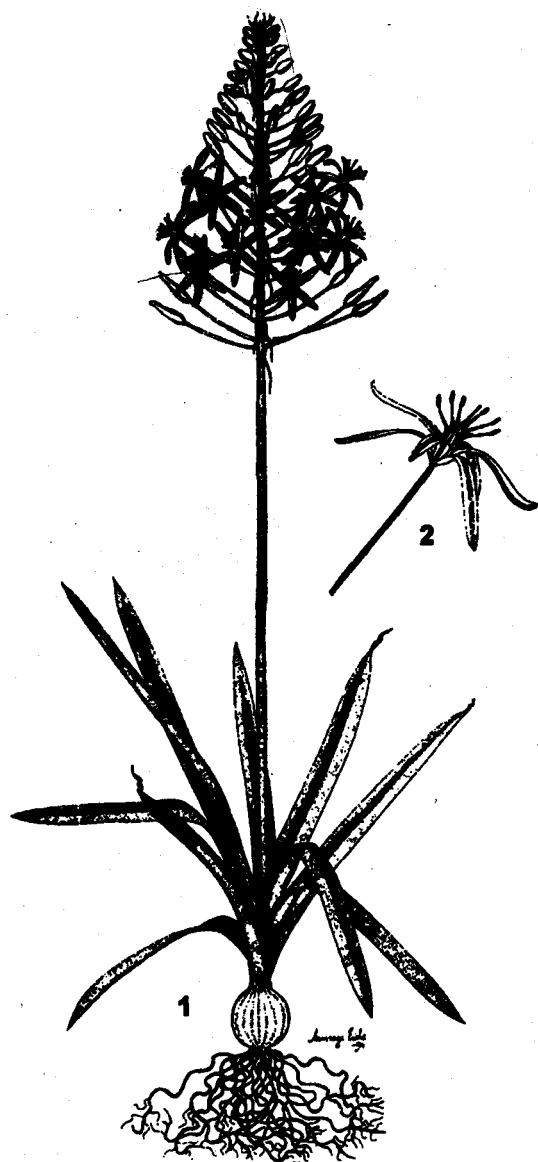


Figure 194.9 *ORNITHOGALUM DONALDSONII*: 1 - whole plant x 3/4; 2 - flower x 1. All from Nordal 2283. Drawn by Annegi Eide.

anthesis. Bracts lanceolate, up to 3.5 cm. Perianth segments 15-17 mm, oblong, with 3 or 5 distinct green vascular bundles in the middle of each perianth segment. Filaments flattened, approximately triangular, c 10 mm. Ovary ovoid, 6-8 mm long, with a short wide carpophore, 0.5-1 mm. Capsule c 15 mm long. Seeds c 8 mm across. Fig. 194.9.

In woodland, bushland or wooded grassland; 850-1520 m. SD BA HA; Kenya and Tanzania. *Friis, Tadesse & Vollesen* 2678, 2961; *Burger* 2821.

3. *O. tenuifolium* *Delaroché* (1811)

- type: t. 312 in Red., Lil. 6, origin unknown.

O. longibracteatum non Jacq., sensu Cufod. (1971).

O. sordidum *Baker* (1895) - type: Somalia, *E. Cole* s.n. (K holo.).

Urginea cepaeifolia (*Baker*) *Welw. ex Rendle* (1899) sensu Cufod. (1971).

Albuca parviflora *Chiov.* (1951) - type: SD, *Corradi* 4607 (FT syn.).

Plants relatively small to tall and robust, up to 150 cm. Scape erect to curved, 35-110 cm. Leaves lanceolate to linear lanceolate, up to 70 x 3 cm. Inflorescence a raceme with 30-150 flowers. Pedicels 2-11 mm during anthesis. Bracts lanceolate to ovate-acuminate, 6-22 mm long. Perianth segments 6-9 mm long, with many vascular bundles assembled in a green midrib. Filaments 4-6 mm long, ovate-acuminate with or without a tooth on each side. Ovary ellipsoid, 3-5 mm, without a carpophore. Capsule c 9 mm long. Seeds c 5 mm across.

Bushland or woodland on black, sometimes rocky soil, sometimes in extensively grazed areas; 1150-2300 m. EW GG SD HA; widely distributed in south to tropical Africa. *Friis et al.* 832; *Burger & Amare G.* 271; *Gilbert, Thulin & Getachew A.* 476.

195. ALLIACEAE

by Tewolde Berhan Gebre Egziabher* & Sue Edwards**

Purseglove, *Tropical Crops: Monocotyledons: 37-57* (1972); Dahlgren & Clifford, *The Monocotyledons: A Comparative Study: 378 pp.* (1981); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons: 193-199* (1985); Thulin, 153. *Alliaceae in Fl. Somalia 4: 56* (1995).

Herbs with bulbs or bulb-like corms covered with membranous or fibrous scales, or a rhizome, or both; many produce a strong or weak smell of garlic or onion when crushed. Leaves in a basal rosette or 2 ranks, partly forming the bulb, sometimes appearing cauline when the sheaths surround the inflorescence stem; blades entire, flat, angular or tubular; base sheathing, rarely with a false petiole at the base of the blade (not in the Flora area). Inflorescence a false umbel or globose head of short or long-stalked flowers, subtended by (1-)2 or more conspicuous membranous spathe-like bracts. Flowers mostly regular, white, pink, blue, violet, or purple, sometimes yellow. Perianth segments 6, generally all similar and petal-like, free or united at the base into a perianth tube. Stamens usually 6, attached to the base of the tepals or on the perianth tube; filaments flat, sometimes with elongated extensions either side of the anther. Pistil of 3 united carpels; ovary superior with nectar-producing grooves on the surface; style single, erect; stigma capitate; ovules numerous. Fruit a loculicidal capsule. Seeds few to many, often somewhat triangular in cross-section and half-ovoid or tetrahedral in shape.

According to Dahlgren *et al.* (1985), there are c 30 genera in 3 subfamilies with a total of over 700 species, the majority of which belong to *Allium* which is widely distributed. Subfamily Gilliesioideae with about 9 small genera and the tribe Brodiaeae (10 genera) in subfamily Allioideae are found only in C and S America, mostly Chile. Subfamily Agapanthoideae comes from southern Africa. In the Flora area 2 genera and 7 species have so far been recorded, 4 of which are widely cultivated plants.

The plants in this family were for a long time considered members of the Liliaceae because their flowers had a superior ovary and were regular. Then they were put in Amaryllidaceae because of their umbel-like inflorescence. The distinctive combination of features, including the smell due to sulphur-containing essential oils, was first recognized by Agardh who established the family Alliaceae in 1858. This was accepted by Purseglove (1972) and confirmed in the work of Dahlgren & Clifford (1981) and Dahlgren *et al.* (1985).

Key to genera

1. Plants smelling of onion or garlic when crushed; rhizomes absent, bulbs usually well developed; stamens and style straight; seeds 3-angled or almost globose. 2. *Allium*
- Plants not smelling of onion or garlic when crushed; rhizome present, small bulbs sometimes present, formed by leaf-bases; stamens and style bent downwards; seeds flat, winged.

1. *Agapanthus*

1. AGAPANTHUS L'Hér. (1788)

Leighton, *The Genus Agapanthus L'Héritier, J. South Afr. Bot. Suppl. IV: 50 pp.* (1965); Dyer, *The Genera of Southern African Flowering Plants 2: Gymnosperms and Monocotyledons: 930* (1976); King, *Agapanthus* in Walters *et al.*, *The European Garden Flora 1: Pteridophyta, Gymnospermae, Angiospermae — Monocotyledons (Part 1): 230-233* (1986).

Perennial herbs, often growing in large clumps from thick fleshy rhizomes with many simple fleshy roots;

bulbs sometimes formed from leaf-bases. Leaves in 2 ranks, but appearing irregularly arranged when plants in large clumps; blade linear, smooth, often somewhat fleshy, evergreen or deciduous. Inflorescence a single large terminal umbel on a leafless stalk projecting above the leaves; umbel in bud enclosed in 2 membranous spathes; flowers generally large, showy, blue or white; bracts small, linear, persistent; peduncle stiff, spreading. Perianth united, cylindrical to bell-shaped, splitting along one side, lobes 6, held together or spreading. Stamens 6, loosely held together, bending downwards. Pistil superior, ovoid or oblong, 3-locular with many ovules; style filiform, somewhat persistent; stigma apical, small. Capsule loculicidal, ovoid; seeds black, flat, winged.

A South African genus with about 10 species, several of which have been taken into cultivation for their beautiful flowers and glossy dark green leaves; 1 widely cultivated subspecies in the Flora area.

Leighton (*loc. cit.*) and others have found that *Agapanthus* species readily cross when grown together and many garden forms are probably hybrids. It has even been suggested by McNeil (*J. Roy. Hort. Soc. 97*, 1972)

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** The National Herbarium, Addis Ababa University, P.O. Box 3434, Addis Ababa, Ethiopia.

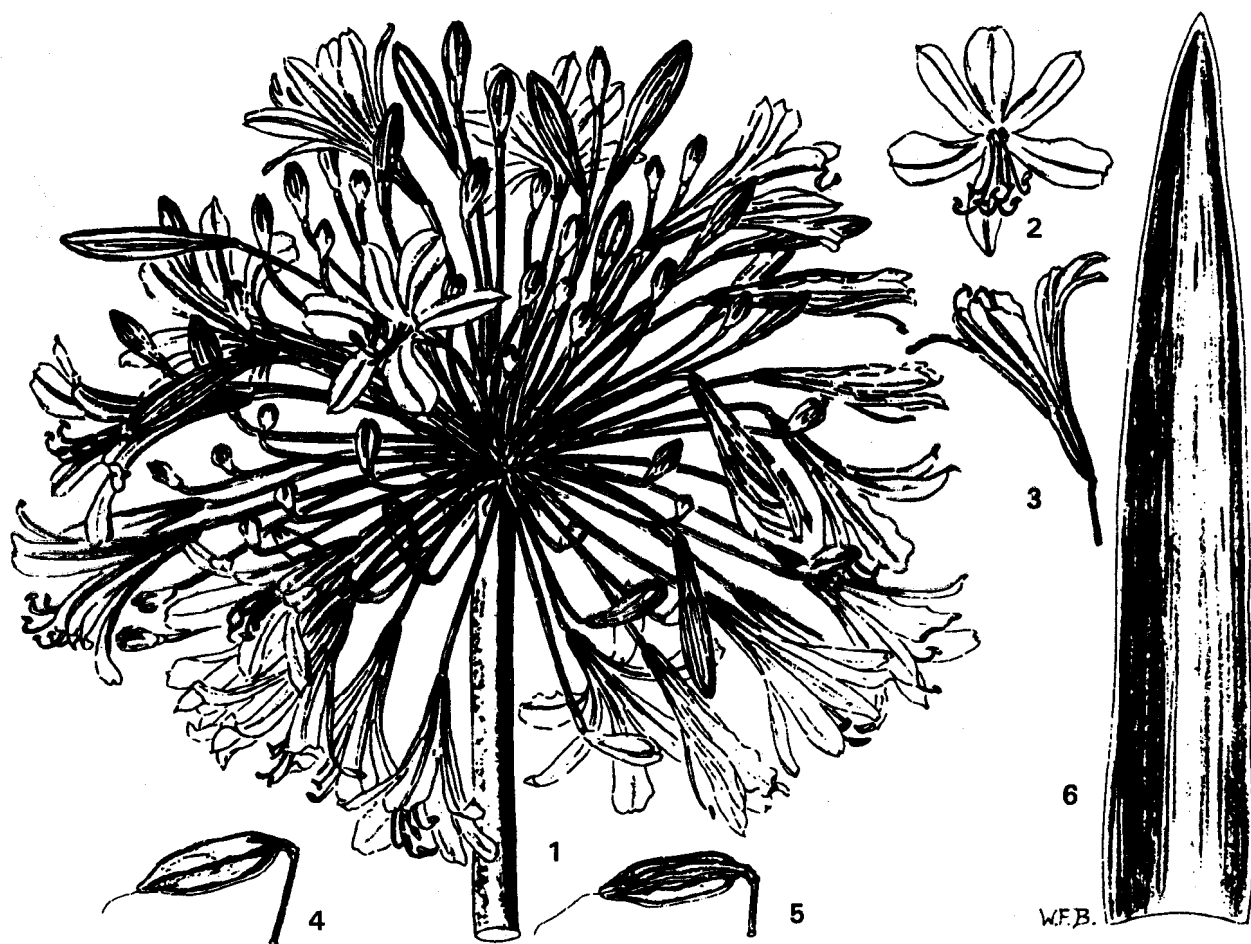


Figure 195.1 *AGAPANTHUS PRAECOX* subsp. *ORIENTALIS*: 1 – inflorescence; 2 & 3 – flower, front and side views; 4 & 5 – young fruits; 6 – upper part of leaf $\times 2\frac{1}{2}$. Drawn from Leighton NBG 1/53. (Reproduced with permission from *J. South Afr. Bot. Suppl. IV*: plate 4, 1965.)

that all *Agapanthus* should be considered as belonging to one polymorphic 'mega-species'.

1. Perianth thick and waxy, usually deep blue, margins smooth. *A. africanus*
– Perianth not thick and waxy, sometimes almost translucent, pale to medium blue or white, margins often wavy/undulate. *A. praecox*

The *Agapanthus* found in the Flora area has usually been referred to *A. africanus* (L.) Hoffmanns., but this species has waxy flowers as described in the key, smaller leaves 10–35 \times 0.8–2 cm and stiff pedicels only 15–50 mm long. *A. africanus* is generally considered more difficult to cultivate than *A. praecox*.

A. praecox Willd. (1809)

– type: South Africa, the Cape, Willdenow 6423 (B, print of holo in Leighton, 1965).

Plants in dense clumps or small groups. Leaves evergreen, dark green, somewhat fleshy, linear, 20–70 \times 1.5–5.5 cm; apex obtuse. Inflorescence few to many-flowered; stalk always longer than the leaves, 40–100

cm tall; pedicels 4–12 cm long. Perianth blue, sometimes white, 30–70 mm long, tube 7–26 mm long, lobes spreading, outer lanceolate, inner oblanceolate to ovate-lanceolate. Stamens and style as long as the perianth. Capsules hanging, producing many black, flat seeds with papery wings.

1. Perianth 5 cm or more long; leaf-apex somewhat pointed. subsp. *praecox*
– Perianth less than 5 cm long; leaf-apex obtuse. 2
2. Plants in dense clumps; inflorescence dense, stalk 60 cm or more tall; leaves flexible, bending over, 3–4.5 cm wide. subsp. *orientalis*
– Plants in small groups; inflorescence open, stalk less than 60 cm tall; leaves usually stiff, up to 2.5 cm wide. subsp. *minimus*

subsp. *orientalis* (Leighton) Leighton in *J. South Afr. Bot. Suppl. IV*: 50 pp. (1965);

A. orientalis Leighton (1939) – type: South Africa, Pillans 7198 (BOL not seen).

Fig. 195.1

Cultivated in both public and private gardens, also grown as a cut flower; 1900–2450 m. EW SU HA and probably in most larger towns above 1900 m; indigenous to Cape Province, South Africa, now cultivated in many temperate regions of the world, occasionally naturalised. *Demel Teketay* 343; *Sue Edwards* 5341.

A. praecox is a variable species and Leighton has recognised 3 subspecies. These have been included in the keys they could be found in cultivation in the Flora area.

2. ALLIUM L. (1753)

Don, A Monograph of the Genus *Allium*, *Mem. Wernerian Nat. Hist. Soc.* 6: 1–102 (1827); Cufodontis, *Enum.*: 1573–1574 (1971); de Wilde-Duyfjes, Typification of 23 *Allium* species described by Linnaeus and possibly occurring in Africa, *Taxon* 22 (1): 57–91 (1973); A revision of the genus *Allium* L. (Liliaceae) in Africa. *Meded. Landb. Wag.* 76-11: 1–237 (1976); Mathew, B., *A review of Allium section Allium*: 176 pp. (1996).

Bulbous herbs smelling of onion or garlic when cut or crushed; basal parts a single bulb or several to many bulblets; bulb-coat papery in species from the Flora area, elsewhere sometimes fibrous. Leaves tubular, narrow and hollow, or linear, flattened and solid, base sheathing. Inflorescence a terminal umbel on a leafless stalk, developed in a membranous spathe; pedicels usually with 2 basal bracteoles; flowers sometimes replaced by bulbils, particularly in cultivated plants. Perianth star- or bell-shaped, or somewhat spherical; segments 1–3-veined, free or joined at the base. Stamens 6, in 2 whorls of 3, or absent; filaments free or somewhat united, often fused to base of tepals, inner with lateral projections. Ovary 3-locular, style filiform. Capsule loculicidal, with 2 or more seeds in each locule. Seeds black, compressed, 3-angled or almost globose, not winged.

Between 500 and 600 species with a centre of diversity around the Mediterranean; other centres in Asia and N America where there is a marked dry period each year. The Flora area has 5 species recorded, 3 of which are cultivated as vegetables; ornamental species may have been introduced, but none have been seen for this account.

The term 'bulblet' is used for small bulbs and offsets from the main bulb, while 'bulbil' refers to a small bulb developed in the place of a flower.

1. Leaves cylindrical, hollow; spathe persistent; inner filaments with a small basal tooth at each side. 2
 - Leaves flattened, keeled, not hollow; spathe falling off early; inner filaments, when present, with 3 or more lateral projections or teeth. 3
2. Leaves and inflorescence stalk slender, less than 0.4 cm in diameter, base not widened; flowers lilac; bulbs attached to a rhizome.

A. schoenoprasum

- Leaves and inflorescence stalk 0.4 cm or more

wide, stalk widening at the base; flowers white or greenish-white; bulbs solitary or clustered, rhizome absent.

1. *A. cepa*
2. Bulb made of several more or less equal bulblets or single and virtually indistinguishable from the base of the scape; plants cultivated. 3
 - Bulb single and prominent, with or without small, spherical bulblets, plant not cultivated. 4
3. Bulb well developed, spherical or ovoid, with several to many angular bulblets (cloves) held in a common covering; leaves less than 2.5 cm wide; flowers often poorly developed and replaced by bulbils. 3. *A. sativum*
 - Bulb more or less indistinguishable from base of stalk except for being lighter coloured, bulblets, if present, small and spherical; leaves over 2.5 cm broad; umbels with well developed flowers. 5. *A. porrum*
4. Umbel with a ring of scarious bracteoles; anthers longer than the perianth; leaves smooth. 4. *A. alibile*
 - Umbel without bracteoles; anthers shorter than the perianth; leaves hairy at least along margins. 2. *A. subhirsutum*

A. schoenoprasum L., CHIVE, is a popular pot and garden herb in Europe, SE Asia and America. The leaves have a light onion flavour and are used in preparing salads, soups, etc. It is grown as a pot plant in Addis Ababa.

1. *A. cepa* L. (1753)

– type: *van Royen*, sub no. 908 105 610 (L lecto. not seen).

Cultivated herb; bulb single, 2–10(–15) cm wide, broadly ovoid to globose and flattened, or bulbs several and smaller, ovoid to lanceolate, attached at the root, or single and hardly distinguished from the base of the shoot except in colour; outer coats papery, yellow-brown, red-purple or white; inner flesh translucent and juicy with a strong smell of onion often irritating the eyes when cut. Leaves 3–8 per bulb, close together near the base, 0.4–2 cm broad, hollow, semicircular in cross-section. Inflorescence-stalk up to 100 cm tall, hollow, inflated in the lower half and tapering towards the inflorescence, lower part covered in closed leaf-sheaths. Spathe thin, papery, splitting into 2(–4) parts. Umbel 2–8 cm broad, spherical, dense, producing flowers, a mixture of flowers and bulbils, or bulbils only. Pedicels unequal, 8–40 mm long, with bracteoles at base. Flowers green-white, perianth segments 3–5 mm long, narrow elliptic-oblong, apex obtuse to subacute, filaments as long as or longer than the perianth segments, inner ones with a blunt tooth on each side of the broad base. Capsule 4–6 mm broad, splitting down the centre and down each locule; seeds black and wrinkled when dry, $c\ 6 \times 4$ mm.

1. Bulbs large, usually single and globose; inflorescence with true flowers; propagated by seed. var. *cepa*
 - Bulbs smaller, in clusters or single, similar in

width to the stem and leaf-bases; usually propagated by bulbs, bulblets or bulbils. 2

2. Bulbs well developed, in clusters, broadly to narrowly ovoid; inflorescence usually produces seed, but propagated by bulbs or bulblets.

var. *aggregatum*

- Bulbs poorly developed; inflorescence produces bulbils which are used for propagation.

var. *proliferum*

Var. *proliferum* Targioni-Tozzetti (1813) — synonyms: var. *bulbelliferum* Bailey (1901); var. *viviparum* Metz. ex Alef. (1866), sometimes called the TREE ONION — has not been seen or heard of in the Flora area. It is generally a large plant in which the inflorescence produces a cluster of 2–16 bulbils.

var. *cepa*

Cultivated on large farms and by vegetable growers' cooperatives with irrigation facilities; 500–2400 m. Probably throughout the Flora area; only known from cultivation with a centre of genetic diversity in SE Asia (Afghanistan). *Sereke Berhane* 7; *O. Ryding & Sileshi N.* 1990; *O. Ryding* 1903.

Large scale cultivation started in the 1970s with the establishment of a state Horticultural Enterprise. In the Flora area only pungent, red-skinned, heat-tolerant cultivars are acceptable.

var. *aggregatum* *G. Don* in *Mem. Wenerian Soc.*, 6: 27 (1827);

A. cepa var. *solaninum* Alef., in *Landwirtschaft. Fl.*: 300 (1866).

A. cepa var. *multiplicans* Bailey, in *Princip. Veg. Gard.*: 316 (1901).

non *A. ascalonicum* L. (1756).

Fig. 195.2

Cultivated in home gardens and by peasant farmers, often with supplementary irrigation; (1500–)1800–2500 m. Grown throughout the Flora area above 1500 m; only known in cultivation throughout the world. *Sebsebe D. & Tewolde B.G.E.* 923; *Mesfin T. & Tewolde B.G.E.* 2721; *Sue Edwards & Tewolde B.G.E.* 5340.

Generally three forms of *A. cepa* var. *aggregatum* are recognised: the POTATO OR MULTIPLIER ONION, the EVER-READY ONION and the SHALLOT.

The SHALLOT produces a cluster of red-brown ovoid bulbils which are not enclosed in a common covering. Although it flowers and produces viable seed, propagation is generally by bulbs. This is the most widely grown and preferred type of onion in the Flora area as it is used in preparing a wide variety of foods, including those for long storage.

The EVER-READY ONION has narrow leaves and bulbils which are not clearly distinct from the leaves. It is a prolific producer of new bulbils and both bulbils and leaves are used in cooking. It has not been confirmed as growing in the Flora area but *Sebsebe D. & Tewolde B.G.E.* 923 and *Mesfin T. & Tewolde B.G.E.* 2721, collected from SD, are similar to this type of onion. The notes with the specimens comment on the absence of

well developed bulbils and the use of both leaves and bulbils in cooking. They also note that this form of onion is being replaced by the SHALLOT.

The POTATO OR MULTIPLIER ONION is not reported from the Flora area. It has numerous bulbils enclosed by outer scales each of which produce separate bunches of leaves and bulbils in the second growing season; flowers are very seldom produced.

The JAPANESE BUNCHING OR WELSH ONION (*A. fistulosum* L.) is often confused with *A. cepa* var. *aggregatum*. *A. fistulosum* has leaves which are circular in cross-section, the stem is inflated for most of its length and the flowers are yellow.

2. *A. subhirsutum* L. (1753)

– type: LINN 419.3 (LINN holo. not seen).

Herb smelling mildly of garlic when crushed; bulb globose to ovoid, to 1.5 cm diameter, bulb coat membranous, greyish. Leaves (1–)2–3, linear, flat or slightly keeled when fresh, 8–50 x 0.2–2 cm, hairy at least along margins; sheaths 1.5–14 cm, mostly below ground, pale white or yellow, glabrous or hairy especially near the top. Inflorescence-stem single (sometimes 2 or 3), solid, uniform in thickness, shorter or longer than leaves. Spathe opening along 1 slit, persistent, up to 1.3 cm long, with green or pale purple veins, shorter than pedicels. Inflorescence an umbel or spherical cluster, 2–7 cm in diameter, few- to many-flowered. Pedicels to 10–40 mm long, bracteoles absent. Flowers campanulate to stellate; perianth segments white, elliptic or oblong, (5–)7–9 mm long, obtuse or acute, joined together and also to the filaments for c 1 mm at the base; stamens ($\frac{1}{2}$) $\frac{2}{3}$ to as long as the length of the perianth, filaments simple; pistil shorter or longer than perianth, ovary globose to obovoid with style attached about half way above the base; style 3–6 mm long, slender with 3-lobed stigma. Capsule subglobose, 3–6 mm in diameter. Seeds black.

subsp. *spathaceum* (Steud. ex A. Rich.) *Duyffjes* in *Meded. Landb. Wag.* 76–11: 142 (1976);

A. spathaceum Steud. ex A. Rich. (1851); *A. subhirsutum* var. *spathaceum* (Steud. ex A. Rich.) Regel (1875) – type: GD, Demerki in Simen, *Schimper* 1266 (not seen).

Outer covering of bulb has a conspicuous sinuate structure when dry. Perianth segments white with a pale-red midvein; filaments $\frac{1}{2}$ – $\frac{2}{3}$ length of perianth. Fig. 195.3.

In uncut grassy meadow; c 1750–3500 m. EW GD HA; N Sudan, N Somalia. *De Wilde & Gilbert* 1; *IE-CAMA* 3142.

De Wilde–Duyffjes (1976) recognised 3 subspecies of *A. subhirsutum* based on the outer covering of the bulb, stamen length relative to the perianth and geographic distribution: subsp. *subhirsutum* occurs in S Europe and the Middle East, subsp. *subvillosum* is found in the Canary Islands, N Africa, S Spain and Portugal, Mallorca and Sicily.

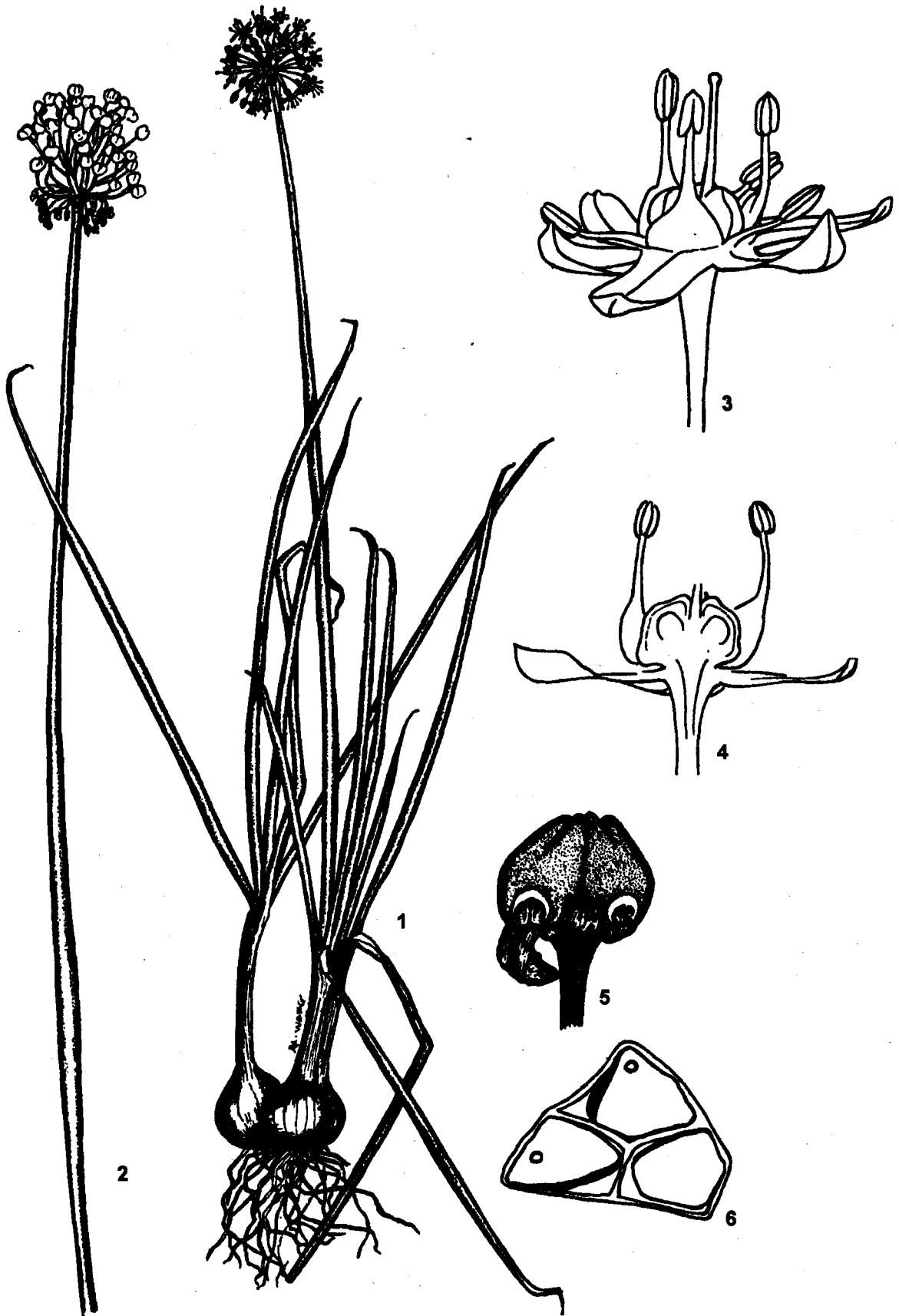


Figure 195.2 *ALLIUM CEPA* var. *AGGREGATUM*: 1 – plant x 1/2; 2 – inflorescence x 1/2; 3 – flower x 5; 4 – flower in longitudinal section x 5; 5 – capsule x 10; 6 – capsule in transverse section x 20. All from living material. Drawn by Marjorie Wong. (Reproduced with permission from *Tropical Crops: Monocotyledons*, fig. 4)



Figure 195.3 A *SUBHIRSUTUM* subsp. *SPATHACEUM*: 1 - plant with the inflorescence detached x 1/2; 2 - bulb and bulblets x 1/2; 3 - upper part of leaf x 5; 4-7 - inflorescence from just opening to formation of fruits x 1/2; 8 & 9 - young plants x 1/2; 10 - sprouting bulblet with first leaf x 1/2; 11 - apical part of sprout leaf x 2 1/2; 12 & 13 - pieces of contractile and smooth roots, respectively x 5; 14 - seed, side view x 10; 15 - detail of testa, seen from above and then in profile, x 50; 16 - old seedling x 2 1/2. 1-15 from De Wilde and Gilbert 1, spirit material; 16 from WAG 20/9/73, spirit material. (Reproduced from *Medeb. Landb. Wageningen* 76-11: fig. 24, 1976.)

3. *A. sativum* L. (1762)

— type: *Burser* no. 90 (UPS neo. not seen).

Cultivated herb; bulb 2–7 cm in diameter, ovoid to somewhat globose; covered in a white or purple coat enclosing several ± equal bulblets (cloves) each enclosed in a tough prophyll. Leaves 4–10, in 2 ranks, glabrous, often blue-green; blade 20–50 × 0.4–2.5 cm, flat or with a longitudinal canal in the middle, keeled below. Inflorescence-stalk 1, longer than the leaves, straight or coiled towards the apex, 25–70(–150) cm tall, covered in a leaf sheath for more than half its length. Spathe 4–20 cm long, pale green with long green beak, falling off slowly, opening towards base along a single slit. Inflorescence 2–5 cm in diameter, spherical, either with bulblets only, or with bulblets and flowers, or with flowers only in the Flora area. Pedicels unequal, with lacerated bracteoles at base. Flowers often poorly developed; perianth segments pale pink, green, rarely pale purple, *c* 3 mm long when developed, lanceolate, acuminate, smooth; filaments *c* 1/2 as long as the segments, outer 3 entire or with 2 short lateral teeth, inner 3 with 2, 4, (6) lateral teeth, two of which are extended above the perianth; ovary rudimentary. Capsule abortive, seeds not produced.

1. Inflorescence stalk straight; bulblets ovoid-oblong; inner filaments with 2 or 4 teeth; outer filaments simple. var. *sativum*

– Inflorescence stalk coiled or with distinct curve; bulblets subglobose to ovoid; inner filaments with 4 or 6 teeth; outer filaments with 2 teeth.

var. *ophioscorodon*

var. *sativum*.

Cultivated in home gardens, in small irrigated fields and by vegetable grower's cooperatives; 1800–2800 m. Probably throughout the cooler parts of the Flora area; cultivated in the Middle East and Egypt since pre-historic times and now grown in all parts of the world; place of origin unknown but possibly C Asia. *Zemed* A. 2025.

GARLIC is used both medicinally for a range of skin and stomach problems and also in preparing food, particularly some kinds of stew and in making dried food for storage.

Var. *ophioscorodon* (Link) Doll (1843) has not been recorded for or heard of in the Flora area. De Wilde-Duyfjes (1976) notes that it is grown in gardens in many subtropical and temperate countries.

4. *A. alibile* Steud. ex A. Rich. (1851)

— type: TU, Tsmbla (Temmbella), Shire, *Quartin-Dillon* s.n. (P holo. not seen).

Wild herb with a strong smell of garlic when crushed; bulb small, corm-like, globose to oblong, bulb coat papery and somewhat tough, removed as a single unit, white or pale yellow or brown, 0.5–1.5 cm across, new bulb produced below old; bulblets few, globose, sessile, produced at base of flowering bulb. Leaves 2–5, in 2 ranks, glabrous; sheaths enclosing the bottom 1/3 or

more of inflorescence-stalk, open in the upper 1 cm with a slight constriction before the blade; blades flat with midrib and keel in lower parts, margins smooth, sometime slightly scabrid near the top; top part much extended and weak. Inflorescence stalk slender, 30–60 cm tall, ridged below the umbel. Spathe single, white, papery, with green veins, apical extension pink, 2–4 cm long, opening on one side from base, soon falling off leaving a conspicuous ring of scarious bract/bracteoles around the base of the flowers. Inflorescence a dense spherical umbel, few- to many-flowered. Pedicels unequal, the central ones twice as long as the outer ones, and 2–8 times as long as the perianth. Flowers white, flushed pale purple, with dark green mid-veins; perianth segments 3.5–5 mm long, elliptic to elliptic-obovate, the outer 3 keeled, acute, inner 3 with rounded tips; stamens projecting above the perianth, filaments joined to perianth near base, papillose in the lower half which shows through the perianth, outer 3 elongate triangular, inner 3 about as broad as subtending perianth segments, elliptic-ovate, with one sterile extension about 3/4 the length of the filament on either side of the anther-bearing central axis, anthers yellow. Capsule enclosed by persistent perianth; ripe seeds not seen. Fig. 195.4.

Dry *Acacia* open bushland on light gypsum soil with a rich herb flora, also in montane grassland; *c* 1600 m. TU SU; possibly Darfur in W Sudan. *Gilbert & Thulin* 998; *Sue Edwards & Tewolde B.G.E.* 5346.

This species was poorly known and included in *A. ampeloprasum* L. by De Wilde-Duyfjes (1976) mainly because she had not seen any authentic material and the protologue fits to *A. ampeloprasum*. The two collections cited above come from the same locality in the Abbay (Blue Nile); the type locality has not been visited. The description has thus been expanded based on recently collected material. It is certainly true that many of the characters of *A. alibile* are similar to those found in smaller forms of *A. ampeloprasum*. But it has two features not noted or discussed before: the corm-like nature of the bulb with the main new bulb being produced below the current flowering bulb, and the ring of scarious bracteoles inside the spathe. Richard interpreted these as a multivalvate spathe in the description but in a following note he commented that they were probably an involucre of small scarious bracts. The spathe is shed very soon and plants with open flowers, like *Gilbert & Thulin* 998, have lost their spathes; the leaves are also withered. The protologue lacks a description of the leaves. It is thus likely that *Quartin-Dillon*'s collection was similar to that of *Gilbert & Thulin* 998 and lacked the true spathe.

The record from Darfur in Sudan is taken from *Cufodontis* and needs to be confirmed. It is possible that *A. alibile* is an endemic confined to limestone soils which occur in quite extensive patches in Tigray and as small outcrops in the main river valleys like that of the Abbay (Blue Nile), but not on the main Ethiopian plateau. It is highly unlikely that this is an escape from cultivation, as claimed by De Wilde-Duyfjes (1976).

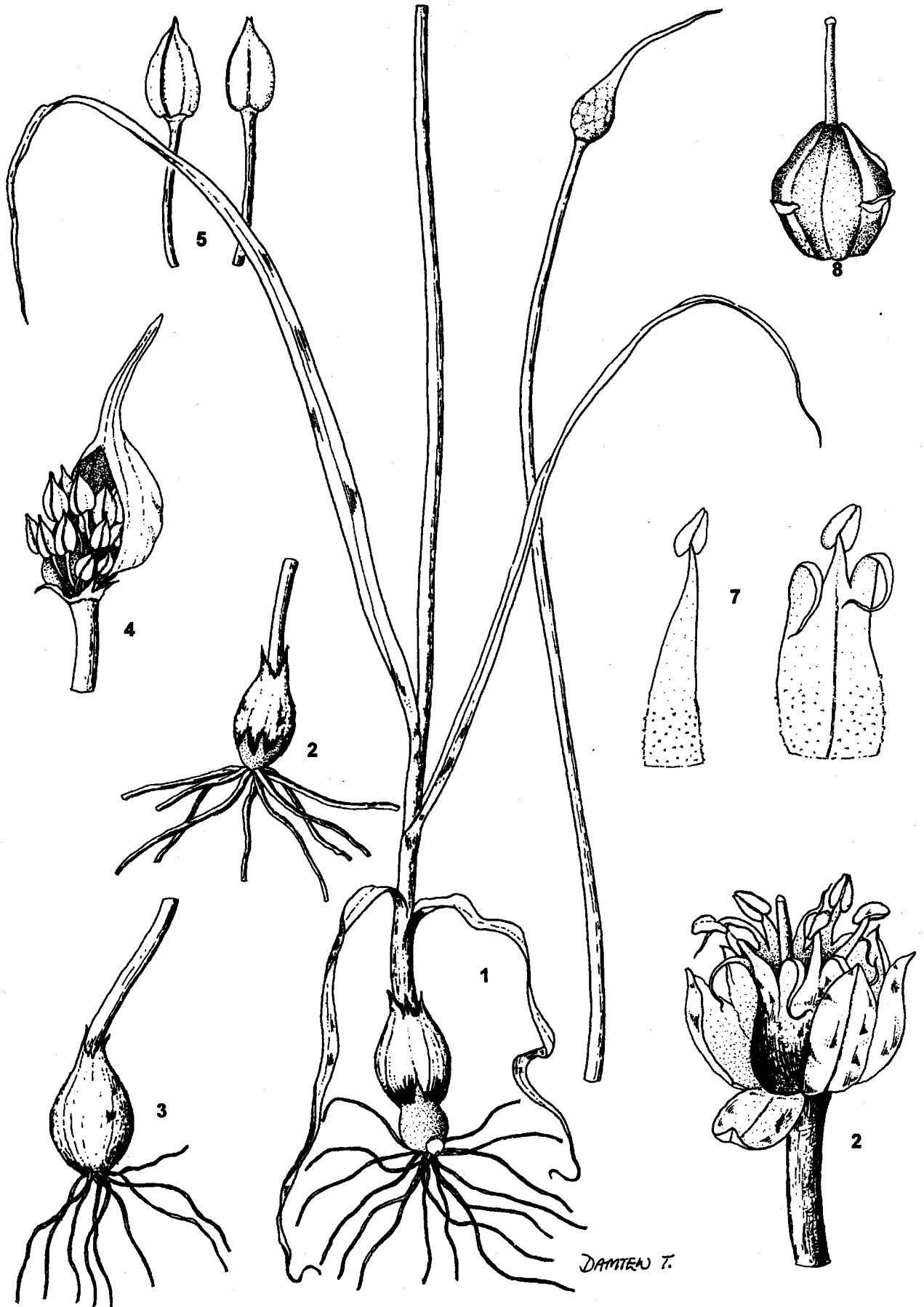


Figure 195.4 *ALLIUM ALIBILE*: 1 – plant with scape cut x 1; 2 & 3 – bulb x 1; 4 – opening umbel x 2; 5 – buds x 4; 6 – enlarged opening flower x 10; 7 – stamens x 10; 8 – pistil x 10. All from Sue Edwards & Tewolde B.G.E. 5346. Drawn by Damtew Teferra.

5. *A. porrum* L. (1753)

-type: Dodoen's figure entitled 'porrum', *Pemptades*, 688 (1616).

Cultivated herb; bulb white, the same width as the stem, without bulblets. Leaves many, in 2 ranks, blade linear, 30-80 x 1.2-2.5 cm, flat, sharply keeled and tightly folded inside each other, scabrid on margins and keel; sheaths all about the same length, white if kept below soil surface. Inflorescence-stalk solid, straight, 60-100 cm tall. Spathe single, green, with a long beak. Inflorescence a large globose many-flowered umbel, mostly without bulbils, 7-10 cm across. Flowers: perianth parts pink or white; stamens projecting above perianth, inner

filaments with lateral teeth that are longer than the anther bearing axis in between. Seeds black.

Cultivated by vegetable grower's cooperatives with access to markets where expatriates buy vegetables; probably 2000-2400 m. EW SU ?HA; only known in cultivation, originally from SE Asia but now grown in cool temperate climates in many parts of the world. *Ryding* 2016.

This recently introduced horticultural crop is considered by many taxonomists as a cultivated form of *A. ampeloprasum* L.

196. AMARYLLIDACEAE

by I. Nordal*

Nordal, *Amaryllidaceae* in *Fl. Trop. E. Afr.* (1982) & in *Fl. Cameroun* (1987); Nordal, 154. *Amaryllidaceae* in *Fl. Somalia* 4: 56–62 (1995).

Perennial herbs with bulbs. Leaves in a basal rosette or in a double fan (biflabellate); sometimes petiolate, petioles when present, forming a false stem; blade simple, linear to lanceolate or strap-shaped. Scape leafless, with 1-many flowers in an umbel-like inflorescence, subtended by an involucre of 1-several, most often free bracts, and with ephemeral hyaline bracts between the flowers. Flowers showy, bisexual, 3-merous, regular or slightly irregular. Tepals in 2 series, equal to subequal, inserted above the ovary, fused to a more or less prominent tube, sometimes with a corona between the tube and the perianth segments. Stamens 3+3, inserted at the top of the tube; filaments free or united at the base to a ring-like 'false corona'; anthers dorsifixed, versatile, introrse, opening by longitudinal slits. Ovary 3-locular, each locule with 1-several ovules in axile placentation; style long and slender, with capitate or slightly 3-lobed stigma. Fruit a berry or a capsule, with loculicidal or irregular opening. Seeds black or greyish-green, globose or flattened.

About 60 genera and some 800 species, in warm temperate and tropical areas around the world. 4 genera and 9 species in the Flora area

The family is of great horticultural and ornamental importance. Cultivars of *Hippeastrum puniceum* (Lam.) Kuntze with large red and white showy flowers, *Narcissus pseudonarcissus* L. with yellow flowers, and *Zephyranthes rosea* (Spreng.) Lindl. with white flowers are cultivated in some gardens.

Key to genera

1. Rhizomes or bulbs with an elongated rhizomatous part; leaves thin with petioles sheathing to form a false stem; involucre bracts 4 or more; fruit a berry. 1. *Scadoxus*
 - Bulbs without an elongated rhizomatous part; leaves without a petiole; involucre bracts 1–2; fruit a capsule, dry with thin pericarp or fleshy with thick pericarp. 2
2. Flowers red, pink or white tinged pink, rarely pure white, most often (except *Ammocharis*) irregular (laterally symmetrical, zygomorphic), without a ring-like corona. 3
 - Flowers white or yellow, regular (radially symmetrical), with a cylindrical corona, either as a ring outside the stamens or formed by the fused filament bases. 6
3. Scape solid, perianth tube cylindrical, most often longer than perianth segments; seeds green and fleshy. 4
 - Scape hollow, perianth tube funnel-shaped, shorter than perianth segments; seeds black and flat. 5
4. Leaves in a basal rosette; flowers irregular with curved tube and free part of tepals connivent to form a funnel or bell; stamens and style declinate¹. 2. *Crinum*
 - Leaves arranged in 2 prostrate fans; flowers regular with straight tube and free part of tepals recurved; stamens and style straight (or almost so). 3. *Ammocharis*
5. Large plants (more than 30 cm tall), with several flowers in the inflorescence, scales present in

- the transition between the perianth tube and segments; only cultivated. *Hippeastrum*
- Small plants (less than 30 cm), with one flower in the inflorescence, without scales in the transition between the perianth tube and segments; only cultivated. *Zephyranthes*
- 6. Flowers white, with a long cylindrical perianth tube; filaments fused to a (false) corona. 4. *Pancratium*
 - Flowers yellow, with a short funnel-shaped perianth tube; corona forming a ring outside the stamens; only cultivated. *Narcissus*

1. *SCADOXUS* Raf. (1838)

Friis & Nordal in *Norw. Journ. Bot.* 23: 64 (1976).

Rhizomatous or bulbous plants. Petioles sheathing to form a false stem, most often with red spots. Leaves thin, lanceolate, acute, with prominent midrib. Many-flowered inflorescence subtended by 4 or more, free or partly fused involucre bracts. Flowers, pink to red, on long pedicels, with a distinct narrowly cylindrical tube and spreading, linear perianth segments. Filaments red, filiform, anthers yellow, small. Fruits red berries with 1–3 rather large seeds with pale testa.

6 species in tropical Africa, south to S Africa (Natal), 1 species also reaching the southern part of the Arabian Peninsula.

Species of the genus *Scadoxus* were up to recently referred to *Haemanthus*; the latter is, however, a distinct genus restricted to S Africa.

1. Bulbous plant with scape lateral in relation to the false stem; inflorescence erect; berries globose. 2

* University of Oslo, Department of Biology, P.O. Box 1045, N-0316 Oslo, Norway.

1. declinate: bent or curved upwards.

- Rhizomatous plant with scape centrally initiated, but piercing through the false stem to become lateral; inflorescence nodding; berries ovoid.

1. *S. nutans*

- 2. Inflorescence a semiglobose to globose umbel; involucre bracts membranous, most often colourless and early drooping, perianth segments red and patent during anthesis. 2. *S. multiflorus*

- Inflorescence a conical umbel; involucre bracts herbaceous, persistent, suberect to erect, green or more often spotted or tinged with deep purple; perianth segments most often green, erect to suberect during anthesis. 3. *S. puniceus*

- 1. *S. nutans* (Fries & Bjørnstad) Fries & Nordal (1976); *Haemanthus nutans* Fries & Bjørnstad (1971) - type: KF, Bonga, Fries et al. 410 (C holo., ETH iso.).

Herb 30–50 cm high. Rhizome horizontal, carrying roots, thin runners and terminal leaves at the same time as the flowers; false stem 25–40 cm, often with red to brown spotting at the base and on the cataphylls; new shoots pierce the base of the false stem; leaf blade 30–40 x 6–8 cm. Scape 25–30 cm, terminal on the rhizome but piercing the basal part of the false stem. Involucre bracts 4 or more, partly fused, somewhat red, encompassing the pedicels. Inflorescence nodding, conical, 20–30-flowered. Pedicels 0.3–1 cm long. Perianth, filaments and style pale red, with tube c 0.8 cm; segments erect, 1.8–2.0 x 0.2–0.3 cm, with 3 veins. Filaments 2–2.5 cm long; anthers 2 mm long. Infructescence ultimately erect, berries ovoid, 1.5–1.8 cm long. Fig. 196.4–6.

Evergreen forests on forest ground or epiphytic on branches; (1000–)1450–2300 m. IL KF; endemic to SW Ethiopia. Fries et al. 1782; Mesfin T. 8010; Mooney 8713.

- 2. *S. multiflorus* (Martyn) Raf. (1831);

Haemanthus multiflorus Martyn (1795).

H. abyssinicus Herb. (1837) - type: Ethiopia, sine loc. Salt s.n. (BM holo.).

H. bivalvis G. Beck (1888) - type: HA, Paulitschke s.n. (lost?, Plate 1 in Paulitschke, Harar, lecto.).

H. somaliensis Baker (1895).

H. zambesiacus Baker (1898).

Herb up to c 70 cm. Bulb with diameter 2–5 cm with a distinct, often elongated rhizomatous part. Leaves produced at the same time or after the flowers; false stem 10–40 cm, often with red to brown spotting at the base and on the cataphylls; leaf blade 15–40 x 2.5–7 cm. Scape 12–50 cm. Involucre bracts membranous, colourless or sometimes tinged with red, drooping at the time of anthesis. Inflorescence semiglobose to globose 10–50-flowered. Pedicels 1–3 cm long. Perianth, filaments and style scarlet, turning more pink when fading, segments often paler than filaments. Perianth tube 0.5–1.5 cm; segments patent 1.2–2.5 x 0.1–0.2 cm, with 1–3 veins. Filaments 1.5–3 cm long; anthers 1–3 mm. Berries globose, 0.5–1 cm in diameter. Fig. 196.1–3.

In deciduous woodland (more or less in shade) or in riverine or montane forests with *Arundinaria*, *Hagenia*,

Podocarpus or *Juniperus*, on dark brown to black soils; 1000–3000 m. EW GD SU AR WG KF IL GG SD BA HA; widespread in tropical Africa west to Senegal, east to the Arabian Peninsula, and south to (S Africa) Natal. Ash 1866; Fries et al. 302; Gilbert 1158.

This variable and widely distributed species has been subdivided into 3 subspecies; all the Ethiopian material belongs to subsp. *multiflorus*. There is a characteristic form in Ethiopia (represented by Ash 1866, de Wilde 6184, and Mooney 9109), differing from the common forms elsewhere, by having stolons and partly fused involucre bracts. This form has been described as *H. bivalvis*, but is here regarded to be conspecific with *S. multiflorus*. More studies are needed to justify its formal taxonomic recognition.

- 3. *S. puniceus* (L.) Fries & Nordal (1976);

Haemanthus puniceus L. (1753).

H. fax-imperi Cufod. (1939) - type: SD, Arero, Cufodontis 278 (FT holo., W iso.).

Herb up to c 80 cm. Bulbs up to 8 cm in diameter, on a prominent corm up to 6 x 9 cm. Leaves very similar to those of *S. multiflorus*; cataphylls and the false stem, 30–50 cm long, with dark red to almost black coloration. Scape 30–75 cm. Involucre bracts herbaceous, green, green tinged with dark red to almost black, persistent and erect at anthesis. Inflorescence conical, 30–100-flowered. Pedicels 0.5–2.5 cm long. Perianth as in *S. multiflorus* except that the perianth segments have 1 vein, are most often yellow green, sometimes more red, and more or less erect at anthesis. Berries globose, 0.5–1 cm in diameter.

In deciduous woodland and grassland on heavy black clay soils, often on basalt; 1400–2600 m. GD SU AR KF SD HA; disjunct, Southern Africa and also in Tanzania, Zambia and Mozambique. Gilbert et al. 2014; Sue Edwards et al. 2308; de Wilde & de Wilde-Duyffes 6465.

The species might be difficult to distinguish from *S. multiflorus*, particularly in young stages and when fruiting. There seems to be heterogeneity as to colour in bracts/flowers. One specimen from GD, Fries & Lawesson 5403, with 'large and wide involucre bracts' has been referred to *S. multiflorus*, but might belong here, in which case the distribution of the species is wider than indicated above.

2. *CRINUM* L. (1753)

Verdoorn in *Bothalia* 11: 27 (1973); Nordal in *Norw. Journ. Bot.* 24: 179 (1977); Nordal & Wahlström in *Nord. Journ. Bot.* 2: 465 (1982).

Plants with large bulbs. Leaves rosulate, strap-shaped or lanceolate, with or without a thickened midrib. Inflorescence with 1–15 flowers subtended by 2 free involucre bracts. Flowers, sessile or on relatively short pedicels; tube up to 12 cm long, narrow cylindrical, curved, perianth segments white, most often with a red to pink dorsal streak, or with pink flush, connivent to a bell or a funnel. Filaments white or tinged pink, filiform

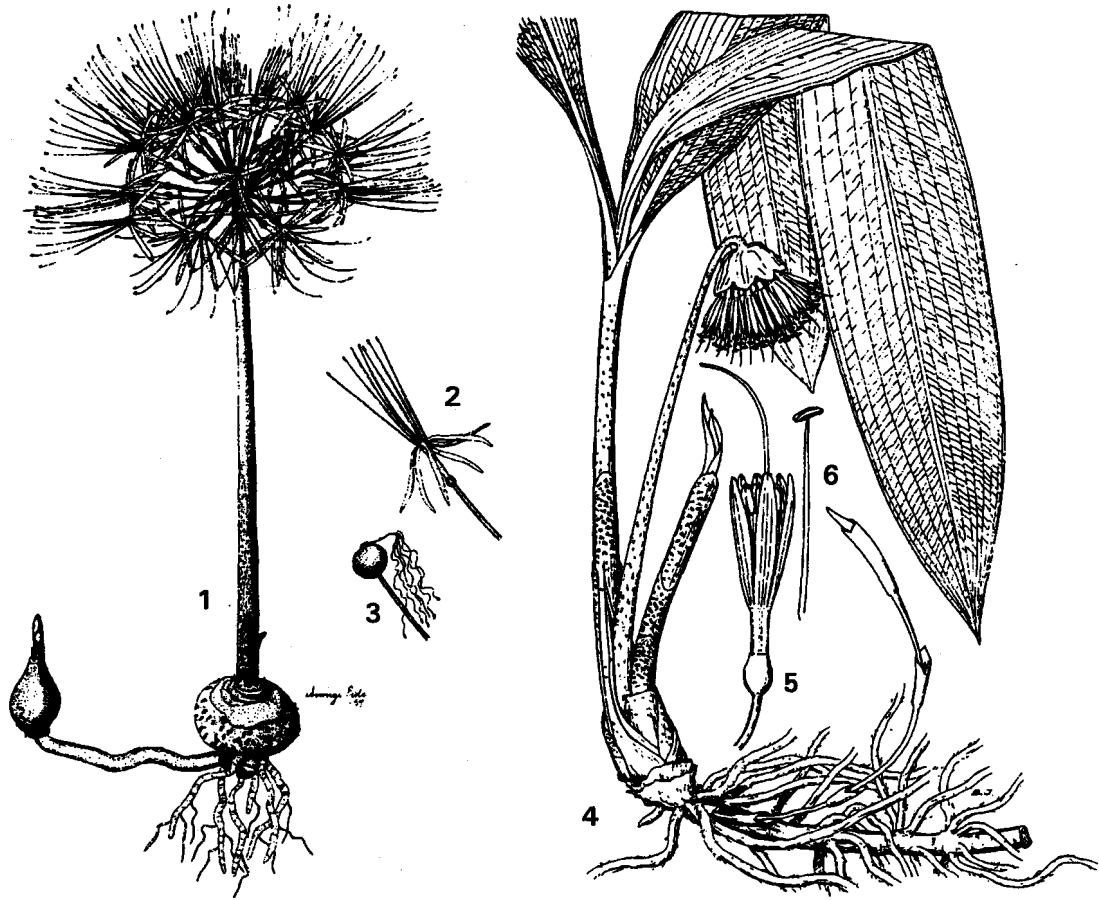


Figure 196.1 *SCADOXUS MULTIFLORUS*: slender, hysteranthous, stoloniferous form. 1 – complete flowering plant $\times \frac{1}{3}$; 2 – flower $\times \frac{1}{3}$; 3 – fruit $\times \frac{1}{2}$. *S. NUTANS*: 4 – whole plant in flower $\times \frac{2}{3}$; 5 – flower, in female phase $\times 1$; 6 – mature stamen $\times 1$. 1–3 from plant cultivated in Oslo, from Nordal 2257 (SD, Moyale). Drawn by Annegi Eide. 4–6 from Friis et al. 410 (type specimen from KP). Drawn by Bengt Johnsen.

and declinate, anthers curved, yellow, light brown, grey or black. Fruit a capsule with more or less fleshy pericarp, bursting or decaying irregularly, large with several large grey or green, subglobose to irregularly compressed seeds, sometimes germinating in the fruit.

Some 100 species, pantropical with about 50 species in Africa. Both native and exotic species are grown as ornamentals.

1. Leaves semiprostrate or with upper parts drooping, midrib usually not very prominent, flowers (5–)7–14, distinctly pedicellate, involucre bracts drooping at anthesis.
 - Leaves more or less erect with distinct midrib, flowers 2–7(–9), sessile, subtended by more or less erect involucre bracts until anthesis. 2
2. Leaves never forming a false stem, more or less prostrate, often slightly glaucous, only few young leaves in the middle with intact apices; perianth segments white with pink keels; anthers grey-black. 3
 1. *C. macowanii*
 - Leaves forming a false stem, drooping in upper part, bright green, most leaves with intact api-

ces; perianth segments pink or white flushed/spotted pink, rarely with pink keels; anthers yellow, only cultivated. *C. cf. moorei*

3. Leaves semierect, never glaucous; perianth segments with a sharply bordered broad dark-red band, visible on both sides of the segment.

2. *C. ornatum*

- Leaves erect, glaucous; perianth segments pure white or slightly pink-flushed outside in apical parts, pure white on the inside.

3. *C. abyssinicum*

Cultivated *Crinum* seem to be closest related to the Eastern Cape species *C. moorei* Hook.f., even if they display some variation indicating that they are special cultivars or hybrid products. *C. papillosum* Nordal is distributed in adjacent Kenya and Somalia. It differs from the species so far recorded from Ethiopia by having distinctly ciliate leaves, very narrow connivent perianth segments forming a funnel rather than a bell, and green papillate seeds which blacken when exposed to air. The general distribution of the species makes it probable to appear in HA.



Figure 196. 2 *CRINUM MACOWANII*: whole plant $\times \frac{1}{2}$. From *I. Bjørnstad* 551. Drawn by Aasne Aarhus. (Reproduced with permission from *Fl. Trop. E. Afr. Amaryllidaceae*: fig. 3.)

1. *C. macowanii* Baker (1878);

C. corradii Chiov. (1951) – type: Somalia, *Corradii* 4634 (FT holo.).

Bulbs 10–25 cm in diameter, often with a neck. Leaves glaucous, broadly lanceolate, 10–60 \times 6–10 cm at anthesis, more or less prostrate, without a distinct midrib, only new very narrow leaves with intact apices. Scape 10–30 cm, contemporary or slightly earlier than the leaves. Spathe-valves grey and papery, and early drooping. Pedicels 1–5 cm. Flowers 7–14, heavily scented, perianth tube green to crimson, curved 8–12 cm, perianth segment white with a faint pink dorsal band only visible on the outside, broadly lanceolate, 8–11 \times c 2–3 cm, forming a bell, reflexed in outer parts during anthesis; filaments white, declinate shorter than the perianth segments; anthers dark grey to black, c 10 mm, curved. Style white, tinged pink distally. Fruits green, fading to dull yellow, with thin pericarp closely investing the seeds, giving an irregular undulate surface, often distinct beaked by the remains of the perianth tube. Seeds green, covered with a silvery grey water repellent membrane making them very smooth, 20–60, variable in shape and size, often flattened. Germination often starts within the fruit. Fig. 196.2.

In grassland and open *Acacia* bushland, often heavily grazed and degraded, on sandy red soils or on more

or less heavy black soils; 1000–1600 m. AR WG GG SD HA; common and widespread in eastern Africa from Ethiopia and Somalia to South Africa. *Ash* 821; *Cufodontis* 316; *Mooney* 9855.

2. *C. ornatum* (Ait.) Bury (1834);

Amaryllis ornata Ait. (1789).

C. zeylanicum auct. non L., Nordal in *Fl. Trop. E. Afr.*: 15 (1982).

Bulbs up to 10 cm in diameter, often with a neck, usually propagating vegetatively to form clusters. Leaves not glaucous, semierect, narrowly lanceolate, most leaves with intact apices, 30 \times 2.5–6 cm, with distinct midrib. Scape 20–50 cm, contemporary with the leaves. Spathe-valves persistent until after anthesis, green tinged red. Flowers 3–7(–9), heavily scented, buds dark green red; tube green red, curved 8–10 cm, perianth segment white with a broad, sharply bordered, dark red, crimson or violet band, visible on both sides, broadly lanceolate, 8–10 \times c 2 cm, forming a bell, reflexed in outer parts during anthesis; filaments white tinged red, declinate, shorter than the perianth segments; anthers dark black or brown, 8–10 mm. Style tinged red distally. Fruits green, tinged red, with thick pericarp, subglobose without or with a very short apical beak. Seeds light green, not particularly smooth, closely stacked and irregularly compressed, 15–45 per fruit.

Wooded grassland, woodland or open forests, sometimes in abandoned cultivations, often along rivers or in swampy depressions, on red sandy or dark brown loamy soils; 600–2240 m. EW EE TU GJ SU AR IL KF BA HA; widespread in tropical Africa, west to Senegal and south to Tanzania. *Burger* 3663; *Thulin* et al. 4025; *De Wilde* 6134.

This taxon was regarded as conspecific with *C. zeylanicum* (L.) L. in *Fl. Trop. E. Afr.* Recent investigations (Nordal & Fangan in *XIIIth AETFAT Proceedings*, 1994) have revealed that the two morphologically very similar taxa, the African *C. ornatum* and the Asiatic *C. zeylanicum* deserve specific rank.

3. *C. abyssinicum* *Hochst. ex A. Rich.* (1850)
– type: GD, *Schimper* 1375 (K holo.).
C. schimperi *Vatke ex K. Schum.* (1889) – type:
Ethiopia *sine loc.*, plant cultivated in Berlin, *Schimper* s.n. (Plate 1309 in *Gartenfl.* 38).

Bulbs up to 15 cm in diameter, with a considerable neck, often propagating vegetatively to form dense clusters. Leaves glaucous to grey-green, erect, linear to narrowly lanceolate, most often with intact apices, 40 x 1–3.5(–5) cm, with a distinct midrib. Scape 40–80 cm, contemporary with the leaves or somewhat earlier. Spathe-valves erect until anthesis, papery, grey. Flowers 2–6, sessile (rarely subsessile), heavily scented, buds red to pink, colour fading during development making flowers pure white or sometimes tinged pink, only rarely with a pink dorsal streak; tube curved (3–)6–10 cm, perianth segment broadly lanceolate, 8–10 x c 2 cm, forming a bell, reflexed in outer parts during anthesis; filaments white, declinate, 4–6 cm, of uneven length in the same flower, anthers 6–10 mm, curved, black to brown, style white and as long as the perianth segments. Fruits green, sometimes tinged red, with a thick fleshy pericarp, subglobose without an apical beak. Seeds not seen.

In waterlogged valley grasslands and swampy depressions or along stream banks, sometimes in fallow fields, on black clay and loam soils, 1650–3300 m. EW GD GJ WU SU AR WG SD BA HA; outside the Flora area only known from the Horn of Africa. *Friis & Lawesson* 5421; *Mooney* 7806; *Thulin* et al. 3376.

C. abyssinicum and *C. schimperi* have up to now been regarded as two separate species delimited on different length of the perianth tube. *C. abyssinicum* in the strict sense is represented by a few specimens from GD with 3–4 cm long tubes, but is in every other character identical to *C. schimperi* which otherwise has tubes longer than 6 cm. Some specimens are bridging the gap (*Greathead* 91 and *Mooney* 8948), and in addition the tube length increases during the development of the flowers. The two taxa are here considered conspecific.

3. AMMOCHARIS *Herb.* (1821)

Plants with bulbs, leaves in two opposite fans (biflabelate). Leaves falcate to strap-shaped, without intact apices and midrib. Scape with a multiflowered inflorescence, subtended by two free bracts. Flowers pedicel-

late, regular, hypocrateriform, with a long narrow tube and segments, linear, spreading and reflexed. Filaments filiform. Ovary with many ovules. Capsule fleshy, opening irregularly. Seeds fleshy, subglobose, pale green.

3 species, all African, one widespread from Botswana north to Sudan and Ethiopia, one from Angola to Kenya and one restricted to South Africa.

- A. tinneana* (*Kotschy & Peyr.*) *Milne-Redh. & Schweick.* (1939);
Crinum tinneanum *Kotschy & Peyr.* (1867) – type: Sudan, *Tinné* 7a (W lecto.).
C. thruppii *Baker* in *James, Unknown Horn Afr., Append.*: 322 (1888) – type: BA, Ogaden, Hahi, *James & Thrupp* s.n. (K holo.).

Bulb up to 12 cm in diameter with a neck. Leaves spreading on the ground in two opposite fans, 1–3 cm broad, sometimes with ciliate margin, length varying with age, appearing before to after the flowers. Scapes 5–25 cm, prostrate. Inflorescence 10–30 flowered. Pedicels 1–4 cm long. Flowers pale pink with darker midribs, fading to crimson or magenta with age, sweetly scented; tube 6–10 cm long; segments 4–8 x 0.3–0.5 cm, spirally recurved at anthesis. Stamens slightly spreading, pink, 3–6 cm long, anthers yellow, 4–9 mm, curved. Fruit red, subglobose, 2–2.5 cm in diameter. Fig. 196.3.

Open *Acacia* – *Commiphora* bushland, on more or less bare red to brown soils, tolerating heavy grazing and also erosion; 1000–1800 m. SD BA; widespread from Somalia west to Chad and south to Namibia and Botswana. *Gilbert & Jones* 85; *Mooney* 9857; *Nordal* et al. 2237.

4. PANCRATIUM *L.* (1753)

Björnstad in *Norw. Journ. Bot.* 20: 281 (1973).

Small to medium sized plants with bulbs. Leaves linear, sometimes twisted. Inflorescence 1–7 flowered, subtended by 1–2 partly fused bracts. Flowers white or sometimes tinged green, regular, (sub-)sessile with a long cylindrical perianth tube, opening to a funnel in the apical part, segments linear, spreading. Filaments united into a conspicuous cup at the base ('false corona'), filiform and free above. Style long with a small capitate stigma. Fruit a dry loculicidal capsule, with many black angular seeds.

About 20 species in Africa, the Mediterranean region and southern Asia, 4 species in tropical Africa.

1. Leaves less than 1 cm wide, finely pubescent in lower parts, sometimes slightly twisted spirally; inflorescence 1-flowered. 1. *P. tenuifolium*
– Leaves wider than 1 cm, glabrous, conspicuously twisted spirally (tortuose); inflorescence 2–7 flowered. 2. *P. cf. tortuosum*

1. *P. tenuifolium* *A. Rich.* (1850)
– type: TU/GD, valle fluvii Takazze, *Schimper* 1695 (P lecto., B FT K L M iso.).

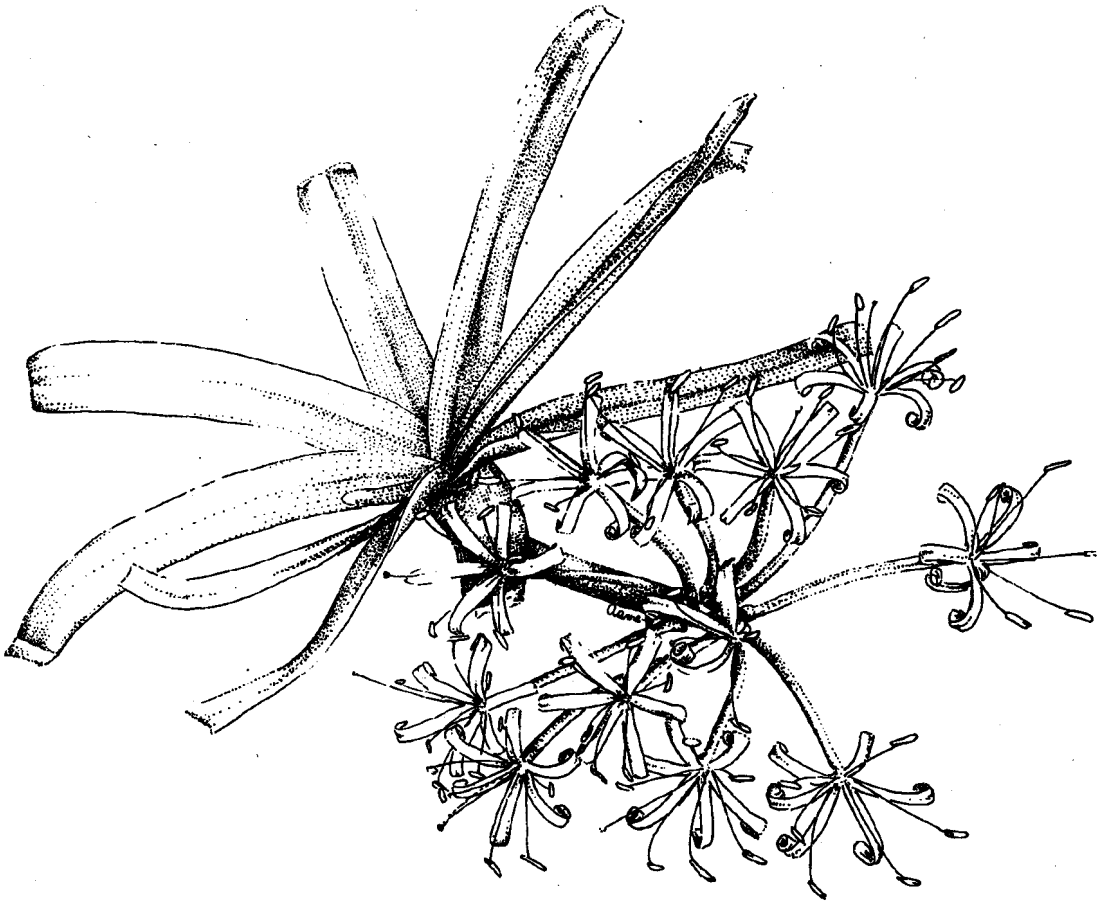


Figure 196. 3 *AMMOCHARIS TINNEANA*: whole plant $\times \frac{3}{8}$. From I. Bjornstad 261. Drawn by Aasne Aarhus. (Reproduced with permission from *Fl. Trop. E. Afr. Amaryllidaceae*: fig. 5.)

P. trianthum auct. non Herb., Cufodontis in *Enum.* (1971).

Bulb globose up to 4 cm in diameter, narrowed into a neck. Leaves 30–40 \times 0.3–1 cm, developing after anthesis, finely pubescent near the base, sometimes twisted or undulate. Peduncle 1–10 cm, slightly to finely pubescent, bearing 1 flower with basis enclosed in a pale membranous bifid involucre. Perianth tube 9–12 cm, slender, pale green; segments 5–10 cm long, up to 1 cm broad, white or cream with green median stripe. False corona 2–4 cm with 2 triangular lobes between each pair of stamens. Filaments 1–2 cm long, anthers 5–8 mm. Capsule subglobose to cylindrical up to 2.5 cm long. Seeds up to 30, glossy, black, subglobose to angular, c 4 mm in diameter, furnished with a white appendage. Fig. 196.4.

In open woodland, thorn scrub or sparsely vegetated grassland, on sandy, silt or clay soils; 550–1800 m. EE TU GD SU AF WG IL HA; widespread in the Sahel

belt and drier parts of the savannah, west to Senegal and south to Namibia and Botswana. Friis et al. 2429; Mooney 9101; de Wilde & de Wilde-Duyffes 7302.

2. *P. cf. tortuosum* Herb. (1840).

Bulb globose up to 5 cm in diameter, narrowed into a neck. Leaves 15–30 \times 1–2 cm, glabrous, conspicuously spirally twisted. Peduncle short, bearing 2–7 flowers with bases enclosed in an involucre. Flowers and fruits similar to those of *P. tenuifolium*.

On consolidated sand dunes; 30 m. EE; scattered occurrences in Egypt and Arabia. D.J. Greathead 63.

The species is only known from one specimen (Eritrea, Wakiro), more material should be collected to establish clearly its identity.

A tall and robust up to 5-flowered *Pancratium* species, with perianth tube shorter than in the species above (c 5 cm), cultivated in EW (Ryding 1264), might be the Mediterranean *P. maritimum* L.



Figure 196. 4 *PANCRATIUM TENUIFOLIUM*: x $\frac{3}{4}$; 2 – stamen x 5. Drawn by Trevithick Del. (Reproduced with permission from *Fl. Trop. E. Afr. Amaryllidaceae*: fig. 8.)

197. IRIDACEAE

by P. Goldblatt*

Baker in *Fl. Trop. Afr.* 7: 337–376 (1898); Cufodontis, *Enum.*: 1584–1592 (1972); Goldblatt in *Fl. Zamb.* 12: 1–106 (1993); Goldblatt, 155. *Iridaceae* in *Fl. Somalia* 4: 62–67 (1995).

Perennial evergreen or seasonal herbs with rhizomes, bulbs or corms, rarely annuals or shrubs with a woody caudex. Leaves basal and cauline, sometimes the lower 2–3 membranous below, entirely sheathing, and not reaching much above the ground (thus cataphylls); foliage leaves mostly distichous, the base of one leaf clasping the base of the next (equitant), the blade either oriented edgewise to the stem, and then usually equitant and ensiform, parallel-veined, plane, plicate or rarely terete; or bifacial and channelled to flat in a few genera. Flowering stems aerial or subterranean, simple or branched, terete, angled or winged. Inflorescence either composed of umbellate clusters (rhipidia) enclosed in opposed leafy to dry bracts (spathes) with flowers usually pedicellate (to more or less sessile) and each subtended by one bract; or a spike of sessile flowers, each subtended by two opposed bracts; or occasional flowers solitary. Flowers hermaphrodite, with a petaloid perianth of two equal or unequal whorls (rarely one whorl absent), radially symmetric or bilaterally symmetric. Tepals usually large and showy, free virtually to the base or united in a tube. Stamens 3, inserted at the base of the outer tepals, or in the tube, symmetrically disposed or unilateral and arcuate (or declinate); filaments filiform, free or partly to completely united; anthers 2-thecae, exorse, usually dehiscent longitudinally. Ovary inferior (but superior in the Tasmanian *Isophysis*), trilobular with axile placentation (rarely unilocular with parietal placentation), ovules many to few; style filiform, usually 3-branched, sometimes simple, or 3-lobed, the branches either filiform or distally expanded, sometimes each divided in the upper half, stigmatic towards the apices, or the branches thickened or flattened and petal-like, the stigmas then abaxial, below the apices. Fruit a loculicidal capsule, rarely indehiscent; seeds globose to angular or discoid, sometimes broadly winged, usually dry, rarely fleshy.

A family of c 80 genera and 1750 species, more or less world-wide, but rare in tropical lowlands; best represented in southern Africa. The family is represented by 7 indigenous genera and 27 species in the Flora area.

Iridaceae are of considerable economic importance in horticulture and the cut-flower industry, especially *Iris*, *Gladiolus* and *Freesia*. Several other genera (*Diets*, *Crocus*, *Watsonia*) are cultivated in gardens in both tropical and temperate areas. *Moraea* and the southern African *Homeria* are poisonous, and cause significant losses in cattle- and sheep-raising areas, especially in southern Africa. Some genera are of importance in traditional medicine, especially *Gladiolus*. Corms of several species of *Lapeirousia* and *Gladiolus* are eaten locally. The corms of several genera were an important source of food for humans in prehistoric time.

[Ed note: The most commonly found cultivated Iridaceae in Addis Ababa are *Crocsmia x crocosmiiflora* (Lemoine) N.E. Br. (syn. *Montbretia crocosmiiflora* Lemoine) which grows from a corm and has flattened ribbed leaves and a bilateral panicle of spikes of bright orange flowers, and *Iris* belonging to the subgenus *Iris* and probably derivatives of *I. germanica* L. and *I. pallida* Lam. The cultivated *Iris* grow from rhizomes and have flattened, grey-green sword-shaped leaves and white, purple or even brown flowers of the *Iris* form as illustrated for *Moraea*.]

Explanation of special terms

bifacial: (of leaves) with clearly defined upper and lower surface throughout leaf.

cataphylls: reduced leaf, scale-like leaf, usually used for reduced leaves other than bracts.

caudex: a trunk or stock.

cauline: (of leaves) placed on aerial stem.

ensiform: (of leaves) sword-like (always unifacial in upper part).

equitant: (of leaves) 2-ranked with leaves arranged so that their bases overlap (fit into) each other.

iris-like: (of flowers) having a special set of characters in the flower which cause it to work as a combination of three bilaterally symmetrical flowers with a mechanism by which self-pollination is avoided or diminished: the outer sepals are narrow or wide, but

always erect, the inner sepals are broad and always recurved; the petaloid stigma-lobes are more or less adpressed to the inner tepals and include a stamen and the receptive part of the stigma lobes. [see Garden Flora Vol. 1, fig 39.1]

plicate: folded like a fan.

rhipidium (pl. **rhipidia**): inflorescence consisting of umbellate clusters.

spathe (pl. **spathes**): large leaf-like bract supporting or enclosing inflorescence.

tunicate: (of corms) with dry, scale-like or fibrous covering, the tunic.

unifacial: (of leaves) with only lower surface visible, at least in upper part. The leaf is folded so it is only the lower surface seen on both sides.

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Key to genera

1. Stamens opposite and adpressed to style branches; flowers Iris-like with petaloid style branches with paired terminal crests; leaves bifacial and channelled or terete. **2. *Moraea***
 - Stamens alternate or opposite style branches, but never adpressed to them, or style not significantly divided; flowers not Iris-like, style filiform and simple or terminating in short lobes or filiform branches; leaves unifacial and equitant, sometimes terete or almost so. **2**
2. Tepals free virtually to base; flowers arranged in clusters of 2 or more in biseriate rhipidia, these stalked or sessile; perianth blue, short-lived, open in the morning, collapsing spirally and deliquescing in the early afternoon; rootstock a rhizome. **1. *Aristea***
 - Tepals clearly united in a perianth tube, and flowers either solitary per branch, or arranged in a spike; perianth variously coloured, lasting at least one full-day and fading slowly, not deliquescing; rootstock a corm. **3**
3. Flowers solitary on aerial axes; leaves linear (nearly filiform), in section oval to round with 4-longitudinal grooves, and all inserted below ground; perianth tube shorter than tepals. **6. *Romulea***
 - Flowers 2-many, arranged in a spike or panicle; leaves usually with an expanded plane blade, some at least inserted above ground level; perianth tube shorter or longer than tepals. **4**
4. Styles dividing at mouth of perianth tube into three long spreading branches. **5. *Hesperantha***
 - Styles usually well exerted from tube and either simple or dividing remotely from tube into 3 branches, these sometimes again divided. **5**
5. Corms campanulate with a flat base; stems somewhat compressed to angled or winged; style branches usually deeply divided. **3. *Lapeirousia***
 - Corms globose to depressed globose with a rounded base; stems round in section; style branches simple. **6**
6. Flowers radially symmetric, pendent and facing the ground; floral bracts scarious and translucent with brown streaking; perianth tube shorter than tepals. **4. *Dierama***
 - Flowers bilaterally symmetric, stamens unilateral and arcuate to horizontal, perianth usually facing to the side; floral bracts green; perianth tube shorter or longer than tepals. **7. *Gladiolus***

1. ARISTEA Aiton (1789)

Weim. in *Acta Univ. Lund. n. s.* 36 (1): 44 (1940); Vincent in *S. Afr. Journ. Bot.* 51: 209 (1985); Goldblatt in *Fl. Zamb.* 12: 3-8 (1993).

Evergreen herbs with rhizomes. Leaves equitant, linear to lanceolate, distichous, crowded basally, usually a few also cauline. Stems rounded to compressed and 2-sided, or strongly winged, simple or branched, bearing reduced leaves or leafless. Inflorescences binate rhipidia

(umbellate flower clusters in 2 series, unless reduced to 1-2 flowers); binate rhipidia 1-many, either terminal on main and secondary axes or axillary, then stalked or sessile; spathes (enclosing binate rhipidia) herbaceous to membranous or scarious, entire or lacerate; floral bracts (within spathes) membranous or scarious, entire or lacerate. Flowers frequently sessile, radially symmetric, blue, each lasting one morning only, perianth twisting spirally on fading; tepals basally connate for *c* 1 mm or less, usually subequal, lanceolate to obovate, spreading horizontally. Stamens erect, anthers oblong. Ovary ovoid to oblong and trigonous, often included in the bracts; style filiform, usually eccentric, dividing apically into 3 short stigmatic lobes. Capsules ovoid-ellipsoid to oblong-cylindrical and usually 3-lobed (in some S African species 3-winged), usually exerted from spathes, remains of perianth usually persisting on capsules. Seeds few to many per locule, rounded to angular (laterally compressed in some S African species).

A genus of *c* 50 species, most diverse in southern Africa, extending to Senegal in the west and Ethiopia in the north, and with 7 species in Madagascar. 2 species in the Flora area, most frequent in well-watered highlands in grassland or rocky outcrops.

1. Flowering stem flattened and 2-winged, leafless except for 1 short subapical leaf or leafy bract; flower clusters 1-2 (rarely 3 or 4) per stem.

1. *A. abyssinica*

- Flowering stem rounded to weakly compressed or 2-angled, bearing 2 or more leaves, these not subapical but mostly inserted below middle; flower clusters several (usually more than 3).

2. *A. angolensis***1. *A. abyssinica* Pax (1892);**

A. alata Baker subsp. *abyssinica* (Pax) Weim. in *Acta Univ. Lund n.s.* 36(1): 44 (1940); *A. cognata* subsp. *abyssinica* (Pax) Marais in *Kew Bull.* 42: 932 (1987) - type: Ethiopia, Ambasea, *c* 2100 m, *Schimper* 279 (B hol., BR K iso.).

Plant 12-25(-50) cm high. Leaves several, linear to narrowly lanceolate, 2-5(-8) mm wide, usually about half as long as stem, all basal except for one (rarely 2) near stem apex, this 3-5 cm long. Stem compressed and broadly winged, 2-4 mm wide, unbranched or with a short subapical and often axillary branch subtended by a short subapical leaf. Flower clusters 1-2(-3), terminal or subterminal, nearly sessile (shortly stalked), 4-flowered; spathes broadly lanceolate, scarious with herbaceous keels, 8-10 mm long, margins entire in bud, becoming lacerate, floral bracts similar, entirely scarious. Flowers blue, more or less sessile. Tepals obovate, 10-12 x 6-7 mm. Filaments *c* 4 mm long; anthers 1.5-2 mm long. Style *c* 5 mm long, apex 3-fid. Capsules ovoid-oblong, 7-9 mm long, more or less sessile or on short pedicels up to 4 mm. Seeds angular. Fig. 197.1.1.

Short grassland, especially thin rocky soils in highlands; above 1500-2500 m. WU SU KF AR GG SD; Kenya, Tanzania, Nigeria, Cameroon, Zaire and south

to the eastern Cape, S Africa. *de Wilde & de Wilde-Duyffes* 7540; *Hildebrandt* 518; *de Wilde* 5553.

The taxonomy of the *A. abyssinica* complex requires reassessment. Slightly more slender plants from S Africa and elsewhere in tropical Africa are sometimes treated as *A. cognata*, but appear to differ in no other way from more robust and broader-leaved collections from the Flora area and tropical Africa that correspond to the type of *A. abyssinica*. It seems best to circumscribe the complex broadly and I recognise only one species here. *A. alata*, closely related to *A. abyssinica*, and a more robust species with broader, more softly textured leaves, and capsules with long pedicels 2–12 mm long, occurs in the high mountains of Kenya and Tanzania, but has not been recorded from the Flora area, where all collections of *A. abyssinica* have capsules on pedicels 2 mm long or less, although in leaf and stem dimensions they match *A. alata*.

For the many East and SE African synonyms of *A. abyssinica* see Goldblatt (1993).

2. *A. angolensis* Baker (1898)

– type: Angola, Huila, Lopollo R., *Welwitsch* 1550 (K holo., BM C iso.).

A. nandiensis Baker (1898).

Plant 25–90 cm high. Leaves several, linear to narrowly lanceolate, 2.5–7(–9) mm wide, mostly basal and about half as long as stem, cauline leaves progressively shorter above. Stem 2–6 branched (rarely simple), compressed, more or less elliptic in section, 2-angled but not winged, branches fairly short, slender and erect. Flower clusters 4–14, terminal and axillary, 4–6-flowered; spathes ovate, 9–11 mm long, herbaceous with scarious transparent margins, inner bracts 8–10 mm long, scarious and transparent entirely or with herbaceous keels, margins entire initially or slightly lacerate, becoming increasingly so. Flower blue, more or less sessile. Tepals obovate, *c* 12 x 4–5 mm. Filaments 4 mm long; anthers *c* 1.5 mm long. Style 6–7 mm long, exceeding anthers, apex 3-lobed. Capsules ovoid-obovoid, 5–7 mm long, sub-sessile or on pedicels up to 4 mm long.

Well-watered to marshy grassland, sometimes in seepage areas and seasonal marshes; 1800–2300 m. SU AR SD; Zambia, Zimbabwe, Malawi, S Africa, Angola, Tanzania, Kenya, Nigeria and western Cameroon. *de Wilde* 5713; *Mesfin T.* et al. 3638; *Mesfin T. & Sebsebe D.* 360.

2. MORAEA Miller (1758), *nom. conserv.*

Goldblatt, *Ann. Missouri Bot. Gard.* 64: 243 (1977); *Ann. Kirstenbosch Bot. Gard.* 13 (1986).

Seasonal perennial with tunicate corm. Leaves several to few, lower cataphylls 2–3, entirely sheathing and membranous; foliage leaves usually bifacial and channelled, sometimes terete, several to only one, inserted on lower part of stem, cauline leaves shorter or entirely sheathing and bract-like. Stem simple or branched (entirely subterranean in some S African species). Inflorescence(s) rhipidia, single per branch or occasionally

crowded terminally, each enclosed in a pair of spathes concealing buds. Flowers iris-like, radially symmetric, usually pedicellate, borne serially; usually blue or yellow with contrasting nectar guides on outer tepals. Tepals free (rarely united), outer larger and strongly clawed, limbs spreading to reflexed, inner often erect, or spreading. Filaments partly to completely united around style; anthers adpressed to style branches. Style filiform below, dividing into 3 flat, usually petaloid branches, these diverging and usually forked apically into 2 crests (crests occasionally lacking), stigma transverse and abaxial below crests. Capsules globose to cylindrical. Seeds numerous, rounded, angular or discoid.

Some 120 species, 20 in tropical Africa, more than 100 in southern Africa; 2 species in the Flora area. Several species are known to be toxic to livestock, and all are suspected to be poisonous to some extent; especially in the early stages of growth plants may be fatal to livestock.

1. Leaves terete (often dry and dead at flowering time); outer tepals 19–24 mm long; seed angular in capsules 8–11 mm long. 1. *M. stricta*
- Leaves bifacial and channelled (often emerging at flowering time); outer tepals 40–65 mm long; seeds flattened and discoid in capsules 30–45 mm long. 2. *M. schimperii*

1. *M. stricta* Baker (1904)

– type: South Africa, Northern Province, Shilouvane, *Junod* 563 (Z holo., K LD iso.).

M. tellinii Chiov. (1911) – type: GD, Simien, Debarek, *Chiovenda* 3007 (F lecto. designated by Goldblatt, 1977).

M. thomsonii sensu Goldblatt (1977) non Baker (1892).

Plant small to medium, usually 15–25 cm high. Corm 1–3 cm in diameter, with tunics of medium to coarse fibres, dark brown in colour, often bearing cormlets among the fibres. Cataphylls dry and irregularly broken at flowering time. Leaf solitary, usually absent at flowering time (or dead and still attached to base of stem), rarely the new leaf emerging, eventually produced to about 60 cm or more, terete, without an adaxial groove, *c* 1.5 mm thick. Stem erect, usually bearing 3–6 branches, these held close to the main stem, sessile or on short branches concealed by subtending sheathing bract-leaves; bract-leaves brown, 3–6 cm long, membranous, usually dry and pale straw coloured, apices often lacerated. Spathes dry and papery, rarely green near base, inner (2.5–)3–4 cm long, apices membranous, speckled darker brown, sometimes lacerated, outer usually about 2/3 as long as inner, sometimes shorter. Flowers pale lilac to blue-violet with yellow-orange spotted nectar guides on outer tepals; outer tepals 19–24 mm long, claw ascending, narrow, slightly shorter than limb, limb about 11–14 x 5–8 mm, obovate to lanceolate, reflexed; inner tepals linear-lanceolate, erect or ascending, 15–18 x 2–4 mm. Filaments 3–4 mm long, united in lower third only; anthers 5–6 mm long,



Figure 197.1 *ARISTEA ABYSSINICA*: 1 – fruiting plant. *MORAEA STRICTA*: 2 – flowering plant. *M. SCHIMPERI*: 3 – flowering plant. All from several specimens and photographs, x c ½ life size. Drawn by J. C. Manning and J. E. Klein.

pollen orange. Ovary nearly cylindrical, 5–6 mm long, usually exerted from spathes; style branches 7–8 mm long, diverging about 1.5 mm above base, crests narrow, 3–6 mm long. Capsules obovoid, (8–)9–11 mm long. Seeds angular. Fig. 197.1.2.

Usually in open stony grassland, flowering in dry grass at the end of the dry season; 1650–1950 m. SD HA; widespread in Africa, from Ethiopia to the eastern Cape, S Africa. *Mooney* 5629; *Burger* 1827.

Recognised by the absence of a green leaf at flowering time, more or less sessile lateral branches, and small blue-violet flowers. The lanceolate inner tepals are often erect and the style branches have long, narrow erect crests.

2. *M. schimperi* (Hochst.) Pic.-Serm. (1950);

Hymenostigma schimperi Hochst. (1844); *Viesseuxia schimperi* (Hochst.) A. Rich. (1850) – type: GD, Simien, 'Enschedeap', *Schimper* 1173 (B holo., BM F K M MO P S iso.).

H. tridentatum Hochst. (1844); *Viesseuxia tridentatum* (Hochst.) A. Rich. (1850) – type: GD, Begemdir and Simien, Barnam, Mt Bachit, *Schimper* 1296 (K lecto. designated by Goldblatt, 1977).

Xiphion diversifolium Steud. ex Klatt (1866) nom. illeg. superfl. pro *Hymenostigma schimperi* Hochst.

M. diversifolia (Steud. ex Klatt) Baker (1877) nomen et basionym illeg.

Plant medium to large, 20–50 cm high, solitary or sometimes growing in clumps. Corm about 1.5–2 cm in diameter, with brown firm-textured tunics covered by cataphylls. Cataphylls dark brown, innermost longest, initially unbroken, but often persisting and then becoming fragmented. Leaf solitary, linear, initially shorter than stem, 9–15 mm wide, channelled below, flat above, eventually much exceeding stem. Stem erect, unbranched, sheathing bract-leaves dry, often dark brown, 1 or more, concealing stem and overlapping spathes. Spathes dry and often brown, attenuate, inner (6–)7–10(–12) cm long, outer 2–3 cm shorter than inner. Flowers blue-purple with yellow nectar guides on outer tepals; outer tepals lanceolate, 40–65 mm long, limb about as long to slightly longer than claws, spreading to slightly reflexed; inner tepals erect, lanceolate, 3.5–4.5 cm long. Filaments 9–15 mm long, joined in lower half; anthers 8–12 mm long, pollen white. Ovary 15–20 mm long, cylindrical; style branches 15–20 mm long, crests 10–20 mm long. Capsules 25–35 mm long, cylindrical. Seeds flattened and more or less discoid. Fig. 197.1.3.

Montane grassland and woodland; 2500–3250 m. SU AR WG KF BA HA; widespread in highland eastern tropical Africa and Angola, Cameroon and Nigeria. *Mooney* 7729; *Thulin* et al. 3662; *Gilbert* 1150A.

3. LAPEIROUSIA Pourret (1788)

Goldblatt, *Ann. Missouri Bot. Gard.* 77: 340–484 (1990). Perennials with bell-shaped, flat-based corms with densely compacted fibrous or woody tunics. Leaves

several, lower cataphylls 2–3, membranous and sheathing base; foliage leaves few, sometimes solitary, lowermost longest and inserted on the stem near ground level, blade either plane, or shallowly plicate-corrugate, or terete, upper leaves cauline and progressively smaller. Stem somewhat compressed and angular, sometimes entirely subterranean. Inflorescence either panicle-like, or a simple to branched spike, or flowers clustered at ground level, bracts green to membranous, outer sometimes ridged, keeled, crisped or toothed. Flowers blue, purple, red, white or pink, radially symmetric or bilaterally symmetric, tube short to long, tepals subequal or unequal. Stamens symmetrically disposed around style or unilateral and arcuate. Style filiform, branches usually forked for up to half their length, sometimes entire or barely bifid. Capsules membranous to leathery, more or less globose. Seeds globose.

A genus of c 40 species widespread across sub-Saharan Africa, from SW Cape to Nigeria and Ethiopia; 2 species in the Flora area.

1. Flowers blue-violet with darker nectar guides on lower tepals; perianth tube c 9 mm long.
 1. *L. abyssinica*
- Flowers white and lacking nectar guides; perianth tube 70–120 mm long.
 2. *L. schimperi*

1. *L. abyssinica* (R. Br. ex A. Rich.) Baker (1878);

Geissorhiza abyssinica R. Br. ex A. Rich. (1850) – type: TU, Maigoigoi to Debre Sina, *Quartin-Dillon & Petit* s.n. (P lecto. designated by Goldblatt, 1990; BR isolecto.).

G. abyssinica R. Br. in Salt (1814) nom. nud.

Montbretia abyssinica Hochst. ex A. Rich. (1850) – type: TU, hills near Adowa, *Schimper* 329 (P lecto. designated by Goldblatt, 1990; BM BR G K M P isolecto.).

Plant generally small, 9–15 cm high but occasionally to 35 cm, sparsely branched. Corm 8–12 mm in diameter, tunics brown to grey, densely fibrous, outer layers becoming finely fibrous and reticulate. Cataphylls 2, inner pale and membranous, reaching shortly above ground, outer shorter and dark brown. Leaves 3, lower 2 at least usually inserted near ground level, lowermost longest and about as long as, to slightly exceeding, inflorescence, lanceolate, 3–5 mm wide in the mid-line. Stem compressed, 2–3-angled, sometimes narrowly winged above. Inflorescence a spike or few-branched pseudopanicle, main axis 5–7-flowered, secondary axes with fewer flowers; bracts herbaceous, often flushed red to purple, becoming dry in late flower, 6–8(–10) mm long, outer nearly always exceeding inner. Flower bilaterally symmetric, violet, lower three tepals each with a white median streak edged with a darker band of purple in the lower mid-line; perianth tube more or less straight, narrowly funnel-shaped, c 9 mm long; tepals unequal, lanceolate, lower three horizontal to descending, held close together and forming a lip, c 9 x up to 2 mm, upper three larger, dorsal more or less erect, upper laterals reflexed, c 9 x up to 3 mm. Filaments c 6 mm long,



Figure 197.2 *LAPEIROUSIA ABYSSINICA*: 1 – flowering plant. *L. SCHIMPERI*: 2 – corm and part of the shoot system. 1 from Edwards et al. 97; 2 from Goldblatt & Manning 8831. All $\times \frac{2}{3}$ life size. Drawn by J. C. Manning.

unilateral, exerted 3 mm from tube; anthers *c* 3 mm long. Ovary ovate-obovate, *c* 2 mm long; style dividing between middle and apex of anthers, branches *c* 2 mm long, barely notched apically. Capsules globose-trigonal, 3–4 mm long, showing outline of seeds. Seeds globose, *c* 1.2 mm in diameter. Fig. 197.2.1.

Mostly rocky sites, in shallow soils, often on limestone; 1800–2600 m. EW TU GJ WU SU; not known elsewhere, but possibly in Sudan. *Mooney* 8071; *Gilbert & Getachew A.* 2625; *de Wilde* 6984.

2. *L. schimperi* (*Asch. & Klatt*) *Milne-Redh.* (1934);

Tritonia schimperi *Asch. & Klatt* (1866) – type: TU, woods and thickets near Goelleb on the Tekeze (Tacazze), 1200 m, *Schimper* 2304 (B lecto. designated by Goldblatt, 1990; K P isolecto.).

Anomatheca unicolor *Hochst. ex Baker* (1878) nom. illegit. superfl. pro *Tritonia schimperi* *Asch. & Klatt* (1866).

Lapeirousia cyanescens *Welw. ex Baker* (1878).

L. erythrae *Chiov.* (1911) – type: EW, Achele Guzai (Ocule Cusai) near Loggo Sarda, Deggahen, *Pappi* 1414 (G lecto. designated by Goldblatt, 1990; GH MO isolecto.).

L. montaboniana *Chiov.* (1911) – type: EW, Bogos near Cheren (Keren), *Pappi* 7087 (?FI not seen).

Plant (20–)30–80 cm high, usually with several branches. Corm 18–22 mm in diameter at base, tunics composed of compacted fibres, light to dark brown, outer layers becoming loosely fibrous and reticulate. Leaves linear, 3 or more, lower 2 largest and usually slightly longer than inflorescence, decreasing in size above and becoming bract-like, narrowly lanceolate, 5–10(–15) mm wide, midrib lightly raised. Stem rounded below to nearly square and 4-angled to 4-winged above. Inflorescence a lax pseudo-panicle, ultimate branches with 1–3 sessile flowers; bracts nearly equal, (10–)20–35(–45) mm long, green becoming membranous above to almost completely dry and papery, then light to dark brown, apices dark brown. Flowers bilaterally symmetric, white to cream, rarely pale violet, when whitish sometimes fading or drying lilac especially on the tube, opening in evening, then sometimes scented; perianth tube cylindrical, slender, 10–14(–15) cm long; tepals lanceolate, extended more or less at right angles to tube, 18–22 x 6–7 mm. Filaments unilateral, erect, exerted 5–7 mm from tube; anthers 6–7 mm long. Ovary *c* 4 mm long, rapidly elongating after fertilisation; branches *c* 2 mm long, forked for *c* 1/3 their length. Capsules obovoid-oblong, 8–12 mm long, partly enclosed in bracts. Seeds globose (or slightly angular), 2–2.5 mm in diameter. Fig. 197.2.2.

Moist habitats in largely arid country, stream sides and seasonal marshes as well as in damp grassland; 1200–2150 m. EW TU GD SD; Kenya, Sudan, Tanzania, southern Zambia, Zimbabwe, possibly Malawi, Angola, Namibia and northern Botswana. *Schimper* 2304; *Hildebrandt* 374; *Mesfin T. & Vollesen* 4143.

Some collections from Ethiopia and Somalia (e.g., *Schimper* 2304, 431) have particularly short bracts, 10–15 mm long, either pale or fairly dark brown, and a perianth tube only 7–8 cm long. These plants may be depauperate owing to a particularly dry growing season or they may represent an ecotype or race.

4. *DIERAMA* *K. Koch* (1855)

Hilliard, Burt & Batten, *Dierama*, *Hairbells of Africa* (1991).

Evergreen perennials with large persistent corms with coarsely fibrous tunics. Leaves several, lower cataphylls 2–3, sheathing the base, often dry and become fibrous; foliage leaves linear, plane, fibrous, often without a midrib. Stem terete, slender and wiry, usually branched. Inflorescence a spike, axes wiry, usually drooping, or erect; bracts scarious, solid or membranous, then often translucent, lacerate above and usually brown-streaked or veined. Flowers usually pink (also red, purple, yellow or white in southern Africa), radially symmetric, usually pendent and campanulate, with a fairly short funnel-shaped tube; tepals subequal, including stamens and often style. Stamens symmetrically disposed. Style exerted from tube, seldom from perianth, branches simple, short, filiform. Capsules globose, leathery. Seeds globose or lightly angled, hard, smooth and often shiny.

44 species, extending from the E Cape in S Africa through east tropical Africa to Ethiopia, but most in southern Africa.

Recognised by the wiry, usually drooping spikes, pendent radially symmetric flowers and dry, either solid or scarious floral bracts, generally pale with brown streaks and veins. Most likely closely allied to the southern African *Ixia* L. (*c* 45 species).

D. cupuliflorum *Klatt* (1879)

– type: Tanzania, Kilimanjaro, *Decken & Kersten* s.n. (B holo.).

D. vagum *N.E.Br.* (1929).

Plant in clumps of few to many stems. Corms 10–20 (–25) mm in diameter. Leaves several, basal 20–85 x 0.4–0.7(–1.1) cm, cauline sheathing leaves 5. Stems 0.3–1–3.5 m long, 2–4-branched. Spikes pendulous, terminal 2–6(–7)-flowered, lateral spikes 2–4(–5)-flowered, flowers usually laxly arranged (bracts usually less than 2 internodes long, or longer when apical acumen very well developed); bracts 14–26(–32) mm long, oblong to obovate, acute to shortly acuminate, often more or less solidly coloured dark brown, lighter but heavily flecked on shoulders, or sometimes lighter in tone but heavily flecked; veins 5–6 each side of midvein, up to 0.3 mm apart, but intermediates often strongly developed, fading out in upper third of bract. Flower 18–30 mm long, pale lilac to purple or reddish; tube 4–8 mm long; tepals 12–15 x 4.5–9 mm. Anthers 5–7.5 mm long. Stigmas reaching to 3–6 mm below tepal apices. Ovary ovoid, *c* 4 mm long; style reaching to anther apices or shortly beyond them, and 3–4 mm short of tepal apices. Capsules globose, 6–8 mm long. Fig. 197.3.1.

Grassland and heath; 2000–3200 m. AR BA; Kenya, Tanzania, Uganda and Malawi. *de Wilde* 6800; *de Wilde* 6601.

[Ed note: Cufodontis included this species in *D. pendula* (L.f.) Baker (1877).]

5. HESPERANTHA Ker-Gawl. (1805)

Goldblatt, *Ann. Miss. Bot. Gard.* 73: 135 (1986); *Fl. Zamb.* 12: 59–62 (1993).

Perennials with small corms with woody to leathery tunics. Leaves few to several, lower cataphylls 2–3, membranous and entirely sheathing, foliage leaves lanceolate to linear (rarely terete), blades plane or sometimes with raised margins and midrib. Stem simple or occasionally branched. Inflorescence a spike; bracts green or membranous to dry apically, inner smaller than outer and bicarinate. Flowers radially symmetric, hypocrateriform (bilaterally symmetric in one S African species), usually white or pink and frequently closed in the day and opening in the evening; tepals united in a cylindrical or curved tube, subequal, spread horizontally or cupped. Filaments straight; anthers facing inwards or articulated on filaments and horizontal. Style usually dividing at the mouth of the tube (or within the tube in a few S African species), branches long and spreading, stigmatic along the entire length. Capsules broadly ovoid to cylindrical, sometimes dehiscent only in upper third. Seeds many, subglobose to angular, sometimes lightly winged on angles.

About 65 species mostly of southern Africa, 3 in tropical Africa, 1 in Ethiopia.

H. petitiana (A. Rich.) Baker (1878);

Ixia petitiana A. Rich. (1850) – type: TU, near Maigouagoua, *Quartin-Dillon & Petit* s.n. (P lecto. designated by Goldblatt, 1986).

I. hochstetteriana A. Rich. (1850) – type: GD, Semien, Mt Bachit, *Schimper* 1239 (P lecto., B BM BR G L S Z iso.).

Hesperantha volkensii Harms (1894); *H. petitiana* var. *volkensii* (Harms) R. Foster in *Contrib. Gray Herb.* 166: 22 (1948).

Plant 8–30(–45) cm high. Corm globose to ovoid, 7–12 mm in diameter, tunics dark brown, woody to somewhat membranous, concentric. Leaves 3–4, lower 2(–3) basal and longest, 2–6 mm wide, about half to two-thirds as long as stem, margins and midrib usually lightly thickened; upper leaf inserted in the middle of the stem, short and usually entirely sheathing. Stem erect, very occasionally branched. Spike (1–)2–6(–9)-flowered; bracts (9–)12–15 mm long. Flowers pink, lilac or white; perianth tube 6–9 mm long, cylindrical and straight. Tepals (9–)12–18 mm long, ovate-elliptic, 5–7 mm wide, outer often flushed darker on reverse. Filaments 3–4 mm long; anthers (3–)4–7.5 mm long. Style branches 6 mm long. Capsules oblong-ellipsoid, 10–15 mm long. Fig. 197.3.2.

Rocky sites and short grassland, often on cliffs and

rock outcrops; above 1800 m. TU GD SU AR SD BA HA; Kenya, Uganda, Tanzania, Cameroon, Zimbabwe, and Malawi. *Schimper* 544; *de Wilde* 8158; *Hedberg & Getachew* A. 5354.

The species is remarkably variable, sometimes only 8–12 cm high with 1–3 relatively small flowers per spike, or as much as 30 cm high and with six or more larger flowers per spike.

6. ROMULEA Maratti (1772) nom. conserv.

De Vos, *J. S. African Bot., Suppl.* 9: 49 (1972); *Fl. S. Africa* 7 (2): 10 (1983).

Perennials with small globose corms with woody to cartilaginous or papery tunics. Leaves few to several, lower cataphylls 2–3, entirely sheathing, membranous or firm and green, foliage leaves all basal, 1–several, linear to more or less filiform, margins and midribs raised and often winged, thus with 2 narrow longitudinal grooves on each surface, blade oval to terete in transverse section with 2 sinuses on each surface between margin and midrib, occasionally nearly plane with lightly thickened margins and midrib. Stem short, aerial or subterranean, sometimes above ground in fruit, simple or branched, branching usually below ground. Inflorescence composed of solitary flowers terminal on the peduncles, flowers each subtended by 2 opposed bracts; bracts green, often margins membranous to scarios and pale or red-brown, occasionally inner bract dry entirely. Flowers radially symmetric, cupulate (hypocrateriform in a few S African species), variously coloured, often yellow in centre; tepals united in a short to long tube, subequal, usually ascending below and spreading above. Filaments erect, more or less contiguous, sometimes united; anthers diverging or contiguous. Ovary ovoid; style dividing at or above the level of the anthers, branches short, usually divided for half their length. Capsules oblong. Seeds several per locule, more or less globose or lightly angled, hard, glossy or matt.

Some 95 species, centred in the SW Cape (S Africa), and a secondary centre in the Mediterranean Basin and Middle East.

1. Inner floral bracts rust-coloured and entirely membranous to scarios; peduncles comparatively thick, 1–1.3 mm in diameter. 3. **R. congoensis** – Inner floral bracts entirely green or with narrow to broad scarios margins, these either transparent or streaked with brown; pedicels 0.6–1 mm in diameter. 2
2. Inner floral bracts with a broad scarios margin irregularly streaked with brown; tepals 10–18 mm long. 1. **R. fischeri** – Inner floral bracts green, or with pale narrow membranous margins; tepals 12–18 mm long. 2. **R. camerooniana**

1. **R. fischeri** Pax (1892)

– type: Kenya, Aberdare Mts., *Fischer* 587 (B hol.).

Ixia bulbocodium sensu A. Rich. (1851) non sensu L. (1753).

Romulea linaresii Parl. subsp. *abyssinica* Beg. in *Malpighia* 21: 98, 468 (1907) – type: GD, Simien, Mt Bachit, Schimper 550 (B holo., K P iso.).

R. ramiflora sensu Baker (1898) non sensu Ten. (1832).

R. columnae sensu Cufod. (1972) non Seb. & Maur. (1818).

R. campanuloides sensu Cufod. (1972) non Harms (1894).

Plant (1)–7–12 cm high excluding leaves. Corm globose, tapering below to an oblique rounded base, 7–10 mm in diameter, tunics woody or cartilaginous, red-brown. Foliage leaves (2)–3–5, mostly 8–15 mm long, oblong in transverse section (when dried appearing plane), midrib slightly raised, and with a narrow central hyaline ridge, usually straight and erect (falcate to spreading on ground in depauperate plants), c 1 mm in diameter. Flowering stems 1–4 per plant, more or less erect, becoming slightly falcate after anthesis, 0.6–1 mm in diameter; outer bracts green, usually with narrow membranous margins, inner bracts with broad scarious margins streaked with brown, 12–18 mm long, as long or slightly shorter than the outer. Flowers blue, purple, or violet, occasionally almost white, yellow in centre, tepals with bands of darker pigment over 3 main veins, particularly so on reverse; perianth tube 4–5 mm long; tepals lanceolate, erect below, curving outwards above, 10–16 x 3–4 mm. Filaments c 3–4 mm long, erect, free, exerted c 1 mm from the wide part of the tube; anthers c 3 mm long. Ovary ovoid, c 3 mm long; style dividing between the upper third and apex of the anthers, branches c 1.5 mm long, usually arching outward shortly above anther apices, occasionally exceeding anthers by 2–3 mm. Capsules ovoid-oblong, 7–10 mm long.

Rocky sites, and low, often heavily grazed grassland; 2000–4200 m. EW TU GD SU AR GG SD BA HA; Kenya, Uganda and Saudi Arabia. *Mooney* 7936; *de Wilde & Gilbert* 176; *de Wilde* 7143.

Closely related to the eastern and southern African *R. camerooniana*, and difficult to distinguish from that species, which has the inner bracts entirely green or with narrow membranous margins, and a corm which tapers to a blunt point below. Plants from HA have the largest flowers for the species in Ethiopia (tepals 12–16 mm long), and closely match the type (from Kenya). Elsewhere in Ethiopia plants have smaller flowers, tepals 10–12 mm long. A few collections of apparently depauperate *R. fischeri* from very high elevations, with leaves spreading on the ground, and the flowering stems entirely underground (e.g., *Sue Edwards* 74, *Hedberg* 5591) may represent a new taxon, but floral details are not well preserved, leaving the question open.

2. *R. camerooniana* Baker (1876);

– type: Cameroon, Mt. Cameroon, *Mann* 2135 (K holo.).

R. campanuloides var. *camerooniana* (Baker) Cufod. in *Bull. Jard. Bot. Nat. Belg.* 43(2) suppl: 1585 (1972).

R. campanuloides Harms (1894).

Plant 5–8 cm high excluding leaves. Corm ovoid, tapering below to a blunt point, 8–15 mm in diameter, tunics woody or cartilaginous, red-brown, usually extending upward in a fibrous neck around base of stem. Foliage leaves 2(–3) plus one more for each additional flowering stem, oval in transverse section, usually straight, c 1 mm in diameter, midrib with a broad central hyaline ridge. Flowering stems 1–4 per plant, more or less erect, 0.7–1 mm in diameter; outer bracts green and lightly striate, 12–18 mm long, inner bracts similar or often with narrow membranous margins, as long or slightly shorter than outer. Flowers blue, purple, or violet, yellow in centre, tepals with darker bands of pigment over 3 main veins, particularly so on the reverse; perianth tube 7–8 mm long; tepals lanceolate, erect below, curving outwards above, 12–18 mm long. Filaments 4–5 mm long, erect, free, exerted c 1 mm from the wide part of the tube; anthers c 5 mm long. Ovary ovoid, c 3 mm long; style dividing opposite upper third of anthers, branches c 1 mm long, usually arching shortly above anther apices, occasionally substantially exceeding anthers. Capsules ovoid-oblong, 7–10 mm long. Fig. 197.3.3.

Rocky sites; above 1800 m. SD; Kenya to S Africa, also Cameroon and Sudan. *Mesfin T. & Vollesen* 4262.

3. *R. congoensis* Bég. (1938)

– type: Zaire, Karisimbi, Rukuki Plateau, *Lebrun* 4952 (BR holo.).

R. keniensis Hedberg (1957).

Plant 2–5(–10) cm high including leaves. Corm depressed-globose, 5–9 mm in diameter, tunics membranous, reddish brown. Leaves 3–5(–7), linear, usually arcuate, oval in transverse section with 4 narrow longitudinal grooves, 1–1.3 mm wide, midrib evidently without a central hyaline ridge. Flowering stems 1–2 per plant, more or less erect at anthesis, soon curving outward, sharply so in fruit, 1–1.3 mm in diameter (occasionally stem reaching only to ground level and then straight); bracts 12–15 mm long, outer green with broad membranous margins, inner bracts entirely membranous to scarious, slightly shorter than outer. Flowers blue to white, with a white to yellow centre; perianth tube funnel-shaped, c 7.5 mm long; tepals lanceolate, erect below, patent in upper half, 15–20 x c 6 mm. Filaments 5–6 mm long; anthers c 6 mm long. Ovary oblong, c 3 mm long; style reaching to about middle of anthers, branches not exceeding anther apices. Capsules ovate, c 10 mm long, usually pendent (erect when pedicel not reaching above ground).

Rocky places; 3300–4000 m. AR GG BA; Kenya and Uganda. *Hedberg* 4206, 5642; *Mesfin T.* 5437.



Figure 197.3 *DIERAMA CUPULIFLORUM*: 1 – corm and leaves, flowering spike and floral bract. *HESPERANTHA PETITIANA*: 2 – corm, leaves and stem, and flowering spike and enlarged flower. *ROMULEA CAMEROONIANA*: 3 – flowering plant and enlarged flower. 1 from *de Wilde* 6601 & 6800; 2 & 3 from several specimens and photographs; corms, leaves and flowering spikes $c \times 2\frac{1}{2}$; separate flowers full size, floral bract $\times 2$. Drawn by J. C. Manning.

7. *GLADIOLUS* L. (1753)*Antholyza* L. (1753)*Petamenes* Salisb. ex J. W. Loudon (1841)*Acidanthera* Hochst. (1844)*Homoglossum* Salisb. (1866)*Oenostachys* Bullock (1930)

Lewis, Obermeyer & Barnard, *J. S. African Bot., Suppl.* 10 (1972); Goldblatt & de Vos in *Bull. Mus. Natn. Hist. Nat. ser. 4, sect. B, Adansonia* 11: 417–428 (1989); Goldblatt, *Gladiolus in Tropical Africa* (1996).

Perennials with corms with leathery to fibrous and reticulate tunics. Leaves few to several, lower cataphylls (2–)3, entirely sheathing and mostly below ground; foliage leaves usually contemporary with flowers (or developing after flowering and borne on separate shoots), few to several, basal or cauline, blades well developed or reduced and largely to entirely sheathing, lanceolate to linear and plane (or filiform to terete in species from elsewhere). Stem terete, simple or branched. Inflorescence a spike, flowers on one side (distichous in a few species); bracts usually green, soft to firm, sometimes dry and brown at anthesis, relatively large, inner usually smaller than outer. Flowers bilaterally symmetric (radially symmetric in a few species from elsewhere in Africa and Madagascar), tepals united in a well-developed, sometimes very long tube; subequal to unequal, then dorsal broader and arching to hooded over stamens, lower three narrower, shorter or longer than dorsal. Filaments unilateral and arcuate, included or exerted from the tube; anthers unilateral (symmetrical in radially symmetric flowers). Style exerted, branches simple, expanded above and sometimes apically bilobed. Capsules large and slightly inflated. Seeds usually many, with a broad membranous wing around the circumference (wingless in a few species).

A genus of c 250 species, centred in southern Africa and extending through tropical Africa and Madagascar, a few in Europe and the Middle East, 16 in the Flora area.

1. Perianth tube about twice as long as tepals (or longer), exceeding bracts (and at least 50 mm long); flowers white to cream, with or without red to purple marks on lower tepals. 2
 - Perianth tube shorter to slightly longer than both upper tepal and bracts (never twice as long); flowers variously coloured including white to cream. 4
2. Lower tepals splashed with dark purple in lower half, and anthers with acute apiculate appendages. 15. *G. muriclae*
 - Lower tepals not marked with contrasting colours; anthers either with acute apiculate appendages or with rounded apices and without obvious apiculate appendages. 3
3. Anthers with acute apiculate appendages. 16. *G. candidus*
 - Anthers with obtuse apices (without apiculate apices). 9. *G. gunnisii*
4. Dorsal tepal 2–3 times as long as other tepals and

twice as long as wide. 5

- Dorsal tepal up to 1.5 times as long as other tepals and usually less than twice as long as wide. 6
- 5. Bracts 35–70 mm long, usually red or purple; dorsal tepal 20–40 mm long. 11. *G. abyssinicus*
 - Bracts 18–24(–30) mm long, usually dull purple; dorsal tepal 12–18(–22) mm long. 12. *G. schweinfurthii*
- 6. Flowers fairly large, 55–95 mm long; perianth tube 30–45 mm long. 7
 - Flowers of moderate size, 25–45(–54) mm long; perianth tube 12–25(–30) mm long. 10
- 7. Lower tepals half to a third as long as dorsal. 8
 - Lower tepals about as long or not much shorter than dorsal. 9
- 8. Flowers predominantly red; perianth tube comprising a slender lower part 20–25 mm long, abruptly expanded into a wide horizontal cylindrical upper part c 15 mm long; dorsal tepal extended forward horizontally. 10. *G. longispathaceus*
 - Flowers orange, yellow or sometimes brownish; perianth tube not abruptly expanded above into a wide cylindrical upper part, gradually expanding above and narrowly and obliquely funnel-shaped; dorsal tepal hooded over stamens and concealing them 6. *G. dalenii*
- 9. Plant with only 2–3 foliage leaves on stem; floral bracts 20–27(–35) mm long. 3. *G. negeliensis*
 - Plant with (3–)4–5 foliage leaves; floral bracts (35–)40–60 mm long. 8. *G. pauciflorus*
- 10. Flowering stem lacking long-bladed foliage leaves, these produced on separate shoots after flowering has begun; flowers white to pale pink. 7. *G. roseolus*
 - Flowering stem with foliage leaves present at flowering time; flowers various colours including white and pale pink. 11
- 11. Flowers 25–35 mm long. 12
 - Flowers 36–54 mm long. 13
- 12. Perianth tube c 12 mm long; bracts 20–25(–30) mm long; anther apices obtuse, without appendages 5. *G. calcicola*
 - Perianth tube c 15 mm long; bracts 14–20(–25) mm long; anther apices with short acute apiculate appendages. 3. *G. mensensis*
- 13. Perianth tube about half as long as dorsal tepal, and c 15 mm long. 4. *G. boranensis*
 - Perianth tube about as long as dorsal tepal and at least 16 mm long. 14
- 14. Flower red or pink and with broad longitudinal cream or white nectar guides on lower tepals; anthers with acute apiculate appendages c 1 mm long. 13. *G. sudanicus*
 - Flower shades of white or pink, but then without longitudinal pale markings on lower tepals; anthers without pale acute apiculate appendages. 15
- 15. Flower more than 45 mm long. 8. *G. pauciflorus*
 - Flower 36–42 mm long. 16

16. Perianth white, lower lateral tepals with yellow to greenish transverse blotches; erect plant of open grassland or light woodland. 1 *G. balensis* – Perianth pink, lower tepals evidently without markings; plant of rock outcrops and cliffs, usually hanging downward. 14. *G. lithicola*

1. *G. balensis* Goldblatt (1996)

– type: BA, 5–6 km from Ghinir on road to Robi via Sof Omar, basalt outcrops, 1750–1850 m, *Gilbert, Ensermu K. & Vollesen* 7931 (K holo., C ETH UPS iso.).

Plant 50–60 cm high. Corm 18–22 mm in diameter, tunics membranous or breaking into vertical fibres. Foliage leaves 3, only lower most basal, this longest, upper 2 leaves inserted above ground level and shorter than the basal, blades narrowly lanceolate to linear, initially short and none reaching base of spike, at the end of flowering often longer and basal leaf sometimes as long as spike, margins and midribs slightly thickened. Stem erect, unbranched, 2–3 mm in diameter at the base of the spike. Spike 5–9-flowered, straight and erect; bracts initially green, sometimes becoming membranous and dry above, 20–27(–40) mm long, inner only slightly shorter than outer. Flowers white, usually pink in midline of upper lateral tepals and flushed pink on fading, lower lateral tepals each with a yellow median streak outlined distally in light pink to purple; perianth tube 18–20 mm long, expanded in upper 5 mm; tepals unequal, dorsal longest and arched over stamens, broadly lanceolate, *c* 22 x 15 mm, upper laterals slightly smaller, lower 3 tepals *c* 24 mm long, lower laterals 6–7 mm wide, lower median *c* 10 mm wide. Filaments *c* 14 mm long, exerted 4–5 mm from the tube; anthers 8–10 mm long, yellow. Ovary *c* 4 mm long; style dividing just beyond anther apices, branches extending well past anthers, 3–4 mm long. Capsules and seeds unknown. Fig. 197.4.1.

Rock outcrops on forested mountain slopes; 1750–1850 m. BA; not known elsewhere. *Thulin* et al. 3830.

2. *G. negeliensis* Goldblatt (1996)

– type: SD, 14 km south of Negeli on the road to Melka Guba, 1500 m, *Friis, Mesfin T. & Vollesen* 3060 (ETH holo., C K UPS iso.).

Plant 15–30 cm high. Corm 10–14 mm in diameter, tunics membranous, becoming lacerated at base and apex with age, ultimately irregularly fibrous. Foliage leaves usually 3 (or less), all basal or upper inserted on lower part of stem, blades narrowly lanceolate to linear, reaching to about middle of stem or, in short plants, reaching apex of spike, 2.5–4 mm wide, margins and midribs slightly thickened. Stem unbranched, generally flexed outward at base of spike or above sheath of upper leaf, 1.5–2 mm in diameter at the base of the spike. Spike 2–5-flowered; bracts green, 20–27(–35) mm long, inner about two-third as long as outer. Flowers white to pale pink, tepals each with a median pink streak and lower 3 with greenish to yellow markings, throat often streaked with pink; perianth tube 30–40 mm long,

obliquely funnel-shaped, narrow part 25–30 mm long and reaching or exceeding apices of bracts; tepals lanceolate, dorsal 25–28 x 10–12 mm, lower 3 tepals 25–27 x 8–10 mm. Filaments 8–10 mm long, exerted 4–5 mm from tube; anthers 7–8 mm long, yellow. Ovary oblong, 4–5 mm long; style dividing near anther apices, or sometimes beyond them, branches 4–5 mm long, spreading beyond anthers. Capsules and seeds unknown. Fig. 197.4.2.

Open flat grassland, sometimes waterlogged in the rainy season; 1500–1700 m. SD; not known elsewhere. *Gilbert* 3334; *Thulin* et al. 3630.

Distinguished by the slender habit and moderate-sized, white to pale pink flowers; plants consistently with only three leaves, all with relatively well-developed, but short blades that do not normally reach the base of the spike at flowering time, although they may increase in length later in the season.

3. *G. mensensis* (*Schweinf.*) Goldblatt (1996);

Tritonia mensensis Schweinf. (1894) – type: EW, Gheleb, 2200 m, *Schweinfurth* 1188 (G lecto. designated by Goldblatt, 1995, B C G K isolecto.).

Plant 25–50(–80) cm high. Corm 12–14 mm in diameter, tunics pale, fairly fine reticulate fibres. Foliage leaves 4–5, lower 2–3 more or less basal, seldom reaching beyond middle of spike, blades linear, 2–4 mm wide, upper 2 or 3 leaves much shorter than basal and largely to entirely sheathing. Stem erect, unbranched, *c* 2 mm in diameter at base of spike. Spike 4–7-flowered, erect; bracts 14–20(–25) mm long, green below but dry and membranous apically, outer usually slightly exceeding inner. Flowers pink or white, nectar guides unknown; perianth tube *c* 15 mm long, obliquely funnel-shaped; tepals more or less equal, possibly dorsal slightly larger, 18–20 mm long, *c* 8 mm wide, their orientation uncertain. Filaments 9–12 mm long, exerted 4–5 mm from tube; anthers 6–7 mm long. Ovary oblong, *c* 3 mm long; style arched over stamens, dividing just beyond anther apices, branches *c* 2.5 mm long. Capsules obovoid-ellipsoid, *c* 13 mm long. Seeds *c* 5 x 4 mm, wing well-developed.

Rocky grassland; *c* 2200 m. EW (near Gheleb); not known elsewhere. *Pappi* 4638.

The species is poorly known, and additional collections are needed to assess its relationships.

4. *G. boranensis* Goldblatt (1996)

– type: SD, Mega, 2100 m, *Mooney* 9815 (ETH holo., WAG iso.).

Plant 38–55 cm high. Corm 18–20 mm in diameter, tunics membranous, becoming irregularly broken with age. Foliage leaves 6–7, lower 3–4 basal and longest, usually exceeding spike by 5–15 cm, blades linear, 2–4(–6) mm wide, midrib and margins moderately thickened, upper (1–)2–3 leaves short and largely to entirely sheathing, usually without blades. Stem erect, unbranched, 2–3 mm in diameter at base of spike. Spike 5–10-flowered, straight and erect; bracts green below,

dry and brownish above, 25–30 (–40) mm long, inner about two-third as long as outer. Flowers pale to deep pink, pale in the throat and toward bases of lower tepals; perianth tube *c* 15 mm long, obliquely funnel-shaped; tepals apparently nearly equal or dorsal slightly larger, 24–32 x *c* 15 mm, lower 3 tepals 24–30 x *c* 13 mm. Filaments 12–15 mm long, exerted *c* 5 mm from tube; anthers 8–10 mm long. Ovary oblong, *c* 5 mm long; style arching over stamens, dividing near anther apices, branches *c* 4 mm long. Capsules and seeds unknown.

Juniper woodland and *Commiphora* scrub, sometimes in rocky sites; 1800–2400 m. SD; Sudan and Kenya. *Bally* 9226.

5. *G. caleicola* Goldblatt (1996)

– type: HA, Mt Hakim, 4 km south of Harar, rocky limestone slopes, *c* 2200 m, *de Wilde* 7225 (ACD holo., BR K MO WAG iso.).

Plant 30–70 cm high. Corm 10–16 mm in diameter, tunics membranous, becoming fibrous, fibres mostly vertical. Foliage leaves 5–6, lower longest and reaching base of spike, eventually (after flowering) about as long as spikes, linear, (2–)3–5 mm wide, margins and midribs slightly thickened, upper leaves shorter and narrower than lower, largely sheathing but always with blades developed, sheaths imbricate and enveloping stem almost to first flower. Stem erect, rarely with 1 short branch, 2–3 mm in diameter at base of spike. Spike 2–4(–7)-flowered; bracts initially green, becoming membranous and dry above, 20–25(–30) mm long, apices attenuate, inner about two-third as long as outer. Flowers pale salmon pink, tepals darker along midline; perianth tube *c* 12 mm long, curving outward and widening above; tepals subequal, 16–18 mm long (often shorter when dry), narrowly lanceolate, straight and directed forward. Filaments 11–12 mm long, exerted *c* 3 mm from tube; anthers *c* 6 mm long, yellow, with short apiculi *c* 0.5 mm long. Ovary ellipsoid, *c* 4 mm long; style arching over stamens, dividing opposite middle of anthers, branches *c* 3 mm long, not reaching anther apices. Capsules ellipsoid, 17–22 mm long. Seeds *c* 6 x 4 mm, broadly winged.

Stony limestone soils; *c* 2000 m. HA; not known elsewhere. *Bally* 10050; *Bos & Amare* *G.* 9120; *Jansen* 7133.

6. *G. dalenii* van Geel (1829)

– type: South Africa, illustration in van Geel, *Sert. Bot. Fasc.* 28, 1827 (lecto.).

Plant (50–)70–120(–150) cm high. Corm (15–)20–30 mm in diameter, tunics of brittle membranous layers, outer becoming irregularly broken, sometimes fibrous, reddish-brown, usually bearing numerous tiny cormlets around base. Foliage leaves either contemporary with flowering stem (subsp. *dalenii*) and 4–6(–7), or borne later on separate shoots (subsp. *andongensis* and subsp. *welwitschii*) and 2–4 on the flowering stem, then foliage leaves produced on separate shoots after flowering; when borne on the flowering stem at least lower

2 basal or nearly so, blades narrowly lanceolate to more or less linear, (5–)10–20(–30) mm wide, about half as long as spike, firm textured with moderately raised and thickened midribs and margins, upper 1–2 leaves cauline and sheathing for at least half their length, sometimes entirely sheathing, often imbricate; when foliage leaves borne on separate shoots, then leaves of flowering stem entirely sheathing or with blades up to 6 cm long, foliage leaves of separate shoots usually only two, lanceolate, or in subsp. *welwitschii* linear and margins moderately thickened. Stem unbranched, 4–6 mm in diameter below first flower. Spike (2–)3–7(–14)-flowered; bracts green, (2.5–)4–7 cm long, sometimes dry and pale apically, inner slightly shorter than outer. Flowers either red to orange with a yellow mark on each of 3 lower tepals, or yellow to greenish and often with red to brown streaks on upper tepals; perianth tube (25–)35–45 mm long, nearly cylindrical and curving outward in upper half; tepals unequal, 3 upper broadly elliptic-ovate, dorsal largest, 35–50 x 22–30 mm, horizontal to down-curved and concealing stamens, upper laterals about as long to *c* 5 mm shorter than dorsal, 20–30 mm wide, directed forward, often curving outward distally, lower 3 tepals curving downward, 20–25(–30) x 8–12 mm, lowermost somewhat longer and narrower than lower laterals. Filaments *c* 25 mm long, exerted 15–18 mm from tube; anthers 12–16 mm long, pale yellow. Ovary 6–8 mm long; style arched over stamens, dividing near apex of anthers, branches (4–)5–6 mm long. Capsules ellipsoid to ovoid, (18–)25–35 mm long, 12–14 mm in diameter at widest. Seeds 8–12 x 5–9 mm, wing well-developed, lightly undulate, glossy light brown, seed body *c* 2 mm in diameter. Fig. 197.4.3.

1. Leaves of flowering stem with long well-developed blades (i.e., leaves and flowers contemporaneous). subsp. *dalenii*
– Leaves of flowering stem either entirely sheathing or with short blades to 10(–15) cm long and long-bladed foliage leaves always produced on separate shoots later in the season (i.e., leaves and flowers not contemporaneous). subsp. *andongensis*

A third subspecies, subsp. *welwitschii* (Baker) Goldblatt, is restricted to Angola.

subsp. *dalenii*;

Watsonia natalensis Eckl. (1827).

Gladiolus psittacinus Hook. f. (1830).

G. natalensis Reinw. ex Hook. f. (1831) nom. illeg. superfl.

G. quartinianus A. Rich. (1851) – type: TU, damp sites in Shire (locis humidis provinciae Shiré), *Quartin-Dillon* s.n. (P lecto. designated by Goldblatt, 1995).

G. taylorianus Rendle (1895) – type: Kenya, Rabai Hills at Mwele (Mombasa district), *Taylor* s.n. (BM holo.).

G. louwii L. Bol. (1929) – type: Kenya, without precise locality, cultivated at Cape Town, *Louw* s.n. (BOL holo.).

G. gallaënsis Vaupel (1913) – type: AR, Galla

Highlands, Abinas Mts, 2880 m, *Ellenbeck* 1338 (B holo).

G. caffensis Cufod. (1947) – type: KF, without precise locality, *Bieber* s.n. (WU holo).

Plant (50–)70–120 cm high. Leaves borne on flowering stem, 4–6(–7), at least lower 2 basal or nearly so, narrowly lanceolate to more or less linear, (5–)10–20(–30) mm wide, about half as long as spike, firm textured with moderately raised and thickened midrib and margins, upper 1–2 leaves cauline and sheathing for at least half their length, sometimes entirely, often imbricate. Bracts (3.5–)4–7 cm long. Flowers with tube 35–45 mm long, dorsal tepal (35–)40–50 mm long. Filaments 25–30 mm long, exerted 15–20 mm from tube; anthers 12–16 mm long.

Grassland, light woodland and bush; 870–1600 m. SU WG SD HA; widespread and common throughout tropical Africa and in east southern Africa. *Ash* 3106; *Fris* et al. 3320; *Pappi* 3881.

The plants in this taxon are very attractive and have been given very many names which have been reduced to synonymy of *G. dalenii* subsp. *dalenii*; for those based on plants from S Africa, including *G. dracocephalus* Hook. f., see Lewis et al., 1972, Goldblatt & de Vos 1989, and Goldblatt, 1996.

subsp. *andongensis* (Baker) Goldblatt in *Fl. Zamb.*

12(4): 93 (1993);

Gladiolus andongensis Welw. ex Baker (1892).

Plant 60–90 cm high. Leaves not contemporaneous with flowers, those on flowering stem 2–4, short and entirely sheathing, 6–14 cm long, or sometimes with blades 20–30(–50) x 6–12 mm, imbricate and sheathing lower half of stem; foliage leaves emerging from separate shoots later, usually at least 2, narrowly lanceolate, 300–500 x 4–16 mm. Bracts (25–)40–55 mm long. Flowers with tube 25–33(–40) mm long; dorsal tepal 35–45 x 22–25 mm. Filaments c 25 mm long, exerted 15–18 mm from tube; anthers 12–15 mm long.

Mainly in highlands, in grassland or light woodland; 1300 m. WG KF GG; widespread in tropical Africa. *Burger* 3660; *de Wilde* 10189; *Mooney* 6811.

7. *G. roseolus* Chiov. (1911)

–type: GD, Simien, rocky meadow on the slopes of Limalmo, *Chiovenda* 778 (FI lecto. designated by Goldblatt, 1996).

Plant (40–)60–90 cm high. Corm 25–30 mm in diameter, tunics of firmly membranous layers, outer more or less fibrous, red-brown to straw. Foliage leaves (of flowering stem) (1–)2–4, short and almost entirely sheathing, sometimes with short blades, 6–14 cm long, imbricate and sheathing lower half of stem; laminate foliage leaves produced from 1 or more separate shoots, these narrowly lanceolate, c 4 mm wide, midrib and margins moderately thickened and hyaline, sheaths sometimes lightly pubescent. Stem unbranched, 2–3 mm in diameter below first flower. Spike (2–)5–10-flowered; bracts green below at anthesis, becoming dry

and straw-coloured above, (20–)25–30 mm long, inner somewhat shorter than outer. Flowers whitish with a pink flush to pink, sometimes speckled with minute red dots, these densest near base of tepals, evidently without markings on lower tepals; perianth tube 18–22 mm long, cylindrical, curving outward and widening above; tepals unequal, upper three largest, ovate-elliptic, 26–30 mm long, 10–12 mm wide in midline, dorsal arched almost horizontally over stamens, lower 3 tepals lanceolate, curving downward, 20–24 x 4–6 mm, lower laterals smallest. Filaments c 12 mm long, exerted 4–5 mm from tube; anthers 10–12 mm long, pale yellow. Ovary oblong, 5–6 mm long; style arching over stamens, dividing 2–4 mm beyond apex of anthers, branches 4–5 mm long. Capsules narrowly obovoid, 20–25 mm long. Seeds broadly winged, c 9 x 6 mm. Fig. 197.4.4.

Light woodland, often on rocky sites; 1400–2200 m. GD GJ SU KF; Togo, Nigeria and Cameroon. *de Wilde* et al. 7476; *Thulin & Asfaw* H. 4020; *Sue Edwards* et al. 2377.

Sometimes confused with *G. dalenii* subsp. *andongensis*, which also has the foliage leaves produced from separate shoots after flowering time, but this has larger flowers, 60–95 mm long, and longer stamens with the anthers well-exserted from the perianth tube.

8. *G. pauciflorus* Baker (1886)

–type: Tanzania, Kilimanjaro, in 1885, *Johnston* s.n. (K holo.).

Plant 80–105 cm high. Corms 15–22 cm in diameter, tunics of matted fibres, dark brown. Foliage leaves (3–)4–5, lower (2–)3–4 basal and largest, narrowly lanceolate, (6–)8–15 mm wide, reaching to about base of spike; upper 1–2 cauline, with blades often shorter than sheaths, uppermost almost entirely sheathing. Stem unbranched, 3–3.5 mm in diameter at base of spike, sometimes sheathed almost to first flower, 2–4 mm in diameter at base of spike. Spike (2–)4–8(–10)-flowered; bracts (3.5–)4–6 cm long, green, inner half to two-third as long as outer, shortly forked apically. Flowers cream to yellowish-green, or sometimes pink to reddish, or flushed orange, lower 3 tepals often with a dark purple median streak; perianth tube (20–)35–45 mm long, cylindrical below, widening toward apex; tepals broadly or narrowly lanceolate, upper 3 largest, 30–45 x 18–24 mm, lowermost nearly as long as upper, lower laterals substantially smaller. Filaments 22–24 mm long, exerted 10–14 mm from tube; anthers 8–11 mm long, acute (not apiculate), yellow. Ovary c 5 mm long; style arched over stamens, dividing just below anther apices, branches 4–7 mm long, ultimately exceeding anthers. Capsules obovoid, 15–20 mm long. Seeds more or less oblong, 6–7 x c 4 mm. Fig. 197.5.1.

Highlands in open grassland or woodland; mostly above 1000 m. SD BA HA; Kenya, northern Tanzania, and Uganda. *M.G. & S.B. Gilbert* 1839; *De Wilde & Tadesse* E. 5040; *Gilbert & Sebsebe* D. 8610.

A collection from Sidamo, *Gilbert* 3870, is especially puzzling. The flowers are described as rose with the



Figure 197.4 *GLADIOLUS BALENSIS*: 1 – corm, flowering spike, and enlarged flower. *G. NEGELIENSIS*: 2 – corm and flowering spike. *G. DALENI*: 3 – flowering spike. *G. ROSEOLUS*: 4 – corm with flowering stem and emergent leafy shoot, and flowering spike. All $\times \frac{2}{3}$ life size. 1 from Gilbert et al. 7931; 2 from Thulin, Hunde & Mesfin T. 3630; 3 from Ryding 1488; 4 from Thulin & Hunde 4020. Drawn by J. C. Manning.

lower laterals yellow with blackish streaks and these have the shortest perianth tubes, 25–30 mm long, of all specimens assigned to the species. It may be a separate species, but until more is known about *G. pauciflorus* it seems prudent to maintain a broad concept of the species.

9. *G. gunnisii* (Rendle) Marais (1973)

– type: Somalia, Toghdeer, top of Mt Wagga, *Lort Phillips* s.n. (BM lecto.).

Acidanthera gunnisii Rendle (1898) – type: Somalia, Toghdeer, top of Mt Wagga, 2000 m, *Lort Phillips* s.n. (BM lecto. designated by Goldblatt, 1996, K isolecto.).

Acidanthera nelloi Chiov. (1919) – type: EW, Ghinda, *Beccari* 266 (FI holo.).

Plant 25–35(–45) cm high. Corm globose-conic, 11–14 mm in diameter, tunics of fine (–medium-textured) compacted fibres. Foliage leaves 3–5, lower 2–3 basal, about a third as long as stem, blades linear, 2–3(–4.5) mm wide, midribs and sometimes margins slightly thickened, upper leaves cauline and progressively shorter, sometimes uppermost entirely sheathing. Stem unbranched, c 1.5 mm in diameter at base of spike. Spike (1–)2–3-flowered; bracts green, 25–40(–45) mm long, inner nearly equal or 2–4 mm shorter than outer. Flowers white to pale yellow, strongly fragrant; perianth tube slender, 80–120 mm long, expanding in upper 10 mm; tepals evidently subequal, nearly elliptic, dorsal probably horizontal, remaining tepals spreading, 25–30 mm long. Filaments c 9 mm long, included in tube or barely exerted for c 1 mm; anthers 8–9 mm long, bases sometimes within tube. Ovary 4–5 mm long; style dividing c 5 mm beyond anther apices, branches c 5 mm long. Capsules and seeds unknown.

Mountainous areas, in rocky habitats; 1500–2300 m. EE EW SD BA; Somalia & northern Kenya. *Tellini* 7; *Gilbert* et al. 8024; *Friis* et al. 3153.

Easily recognised by the white to cream flower, long perianth tube, included filaments and narrow grass-like leaves; sometimes confused with *G. candidus* (which has anthers with long apiculate appendages), and sometimes with *Lapeirousia schimperii*, distinguished by its divided style branches and flat-based corms.

10. *G. longispathaceus* Cufod. (1969)

– type: GG, Mt Dita, 3000 m, *Kuls* 720 (FR holo.).

Plant (45–)60–90 cm high. Corm 15–30 mm in diameter, tunics softly membranous, breaking irregularly into thin strips, rarely becoming almost fibrous, straw-coloured, usually with numerous small cormlets clustered around base. Foliage leaves 5–6, lower 4–5 more or less basal and largest, upper 1–2 cauline and reduced, narrowly lanceolate to nearly linear, plane, reaching at least to base of spike, sometimes slightly exceeding it, 7–15 mm at widest, fairly firm-textured but margins and midribs not thickened. Stem unbranched, 3–4 mm in diameter at base of spike. Spike 8–12-flowered; bracts very large, green or flushed red above or almost entirely

reddish, 6–8 (–10.5) cm long, inner about two-third as long as outer. Flowers bright red, lower 3 tepals yellow; perianth tube in lower part slender and erect, 20–25 mm long, expanding and curved outward into a cylindrical, more or less horizontal upper part c 15 mm long; tepals unequal, dorsal largest, extended nearly horizontally, 32–35 mm long, broadly ovate, 20–22 mm wide, upper laterals also broadly ovate, c 28 mm long, lower tepals reduced, lower laterals lanceolate, c 15 mm long, lowermost ovate, 18–23 mm long. Filaments 27–35 mm long, exerted 12–15 mm from tube; anthers 7–10 mm long. Ovary c 5 mm long; style arched over stamens, dividing just beyond apices of anthers, branches c 4 mm long, strongly expanded above when unfolded. Capsules broadly ovoid, 10–14 mm long. Seeds angular with reduced wing-like extensions at one or both ends, 3–4 mm long. Fig. 197.5.2.

Highlands, in moist habitats, streams and wet rocks; 2400–3000 m. GG BA; not known elsewhere. *Mesfin* T. 4845, 5118; *Friis* et al. 3809.

Allied to the northern Ethiopian *G. abyssinicus* but readily distinguished by the flowers with the upper laterals about as long as the dorsal tepals, and the lower 3 tepals not cusp-like.

11. *G. abyssinicus* (Brongn. ex Lemaire) Goldblatt & de Vos (1989);

Antholyza abyssinica Brongn. ex Lemaire (1845); *Oenostachys abyssinica* (Brongn. ex Lemaire) N. E. Br. (1932) – type: TU, Mt Selleuda, (Soloda), *Quartin-Dillon* s.n. (P lecto. designated by Goldblatt & de Vos, 1989 BR P isolecto.).

Petamenes latifolius N.E.Br. (1932) – type: Ethiopia, Hedja (Mt Hedscha, 2800 m.), *Schimper* s.n. (K lecto. designated by Goldblatt, 1996).

Plant 45–65 cm high. Corm 15–25 mm in diameter, tunics soft-membranous, breaking irregularly into thin strips, rarely becoming almost fibrous, often with numerous small cormlets concealed around base. Foliage leaves 5–6, lower 4–5 more or less basal and largest, upper 1–2 cauline and reduced, narrowly lanceolate to nearly linear, plane, reaching at least to base of spike, sometimes slightly exceeding it, 7–15 mm at widest, fairly firm-textured but margins and midribs not thickened. Stem sometimes with 1 branch, usually 3–4 mm in diameter at base of spike. Spike 8–12-flowered; bracts usually very large, firm, green or more often flushed red above or almost entirely, (35–)45–60(–70) mm long, outer twisted to lie between axis and flower, glossy within, inner about half as long or less. Flowers red on upper three tepals, greenish tipped yellow on lower, throat and perianth tube yellowish, in life sometimes only upper tepals exposed; tube 27–32 mm long, lower part slender and erect, c 15 mm long, expanding and gradually curved outward into a cylindrical, more or less horizontal upper part, 12–16 mm long; tepals very unequal, dorsal largest, extended nearly horizontally, (20–)24–35(–40) mm long, up to 14 mm wide, upper laterals directed forward, lanceolate, 12–20 x 12 mm, lower tepals reduced, laterals lanceolate, 8–15 mm



Figure 197.5 *GLADIOLUS PAUCIFLORUS*: 1 – leaves and flowering spike $\times \frac{2}{3}$. *GLADIOLUS LONGISPITHACEUS*: 2 – leaves and flowering spike $\times \frac{1}{2}$. *GLADIOLUS ABYSSINICUS*: 3 – corm, and flowering spike $\times \frac{1}{3}$. 1 from Gilbert 3903; 2 from Friis, Gilbert & Vollesen 3809; 3 from Collenette 3492. Drawn by J. C. Manning.

long, lowermost nearly linear 6–12 mm long. Filaments 25–30 mm long, exerted for up to 1–5 mm; anthers 8–12 mm long. Ovary *c* 5 mm long; style dividing near to or slightly beyond apices of anthers, branches *c* 4 mm long, much expanded in upper half. Capsules obovoid-ellipsoid, 10–12 mm long. Seeds angular with reduced wing-like extensions at one or both ends, *c* 4 mm long. Fig. 197.5.3.

Highlands, in well-watered grassland, cliffs and rock outcrops, and stream sides; mostly 2000–3350 m. EW TU GD GJ WU SU HA; Saudi Arabia. *de Wilde & Gilbert* 86; *Tewolde BGE & Gelahun A.* 2469; *Mooney* 5807.

Recognised by the strongly bilaterally symmetric flower with the dorsal tepal about twice as long as the upper lateral tepals and the lower three tepals reduced to short cusps; possibly confused with *G. schweinfurthii* which has similar, but smaller flowers (see discussion under that species).

12. *G. schweinfurthii* (Baker) *Goldblatt & de Vos* (1989);

Petamenes schweinfurthii (Baker) N.E.Br. (1932).

Homoglossum schweinfurthii (Baker) Cufod. (1972).

Antholyza schweinfurthii Baker (1894) – type: Eritrea, without precise locality, in 1890, *Schweinfurth* s.n. (K presumed lecto.).

Plant (30–)50–75 cm high. Corm 8–15 mm in diameter, tunics soft-membranous, fragmenting irregularly into narrow vertical strips, rarely becoming almost fibrous, light brown. Foliage leaves (3–)4–5, at least lower 2 basal and largest, upper 1–2 cauline and reduced, lanceolate to nearly linear, plane, half to two-third as long as stem, not reaching base of spike, 4–12(–20) mm at widest, usually rather soft-textured (*Pappi* 1677), margins and midribs not thickened. Stem simple or with 1–2 branches, *c* 3 mm in diameter at base of main spike. Spike 2–7(–12)-flowered; bracts herbaceous, flushed red to purple, 18–24(–28) mm long, inner about or less than half as long as outer. Flowers bright red to orange-red on upper tepals, greenish fading to yellow on lower tepals, throat and perianth tube, in life tube included in bracts; tube 11–16 mm long, lower part slender and erect, 5–8 mm long, fairly abruptly expanded and curved outward into a cylindrical, more or less horizontal upper part, 6–8 mm long; tepals very unequal, dorsal largest, extended horizontally 12–18(–22) mm long, upper laterals directed forward, lanceolate, 8–12(–14) mm long, lower tepals reduced, laterals narrowly lanceolate, 6–8 mm long, lowermost a linear cusp 3–6 mm long. Filaments 16–20 mm long, exerted 5–8 mm from tube; anthers 4.5–8 mm long, reaching 1–2 mm below apex of upper tepal. Ovary 3–4 mm long; style ultimately reaching near to apices of anthers, branches 3–4 mm long, extended beyond anthers and much expanded above. Capsules globose-ovate; (7–)9–12 mm long. Seeds *c* 2.5 mm long, somewhat angular, with vestigial wings at longer ends.

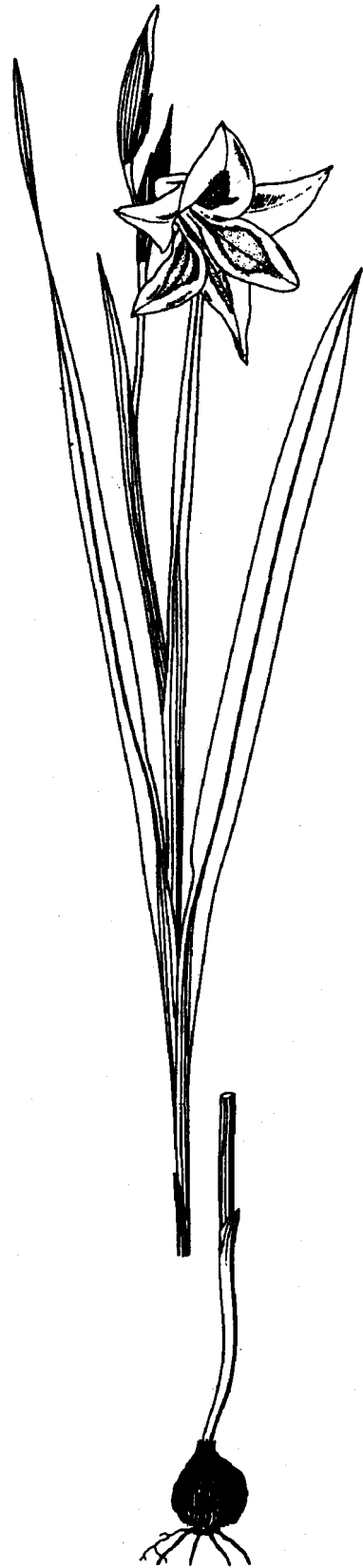


Figure 197.6 *GLADIOLUS SUDANICUS*: flowering stem and corm $\times 2\frac{1}{3}$. From *M.G. Gilbert & S.B. Gilbert* 2155. Drawn by J. C. Manning.

Dry bush and grassland; 750–2600 m. EE EW AR; Somalia and Kenya. *De Wilde* 4679; *Mesfin T. & Sebsebe D.* 3833; *Lemma G.S.* 400.

Closely related to, and possibly not separate from *G. abyssinicus*, but distinguished by its shorter flowers and fairly short floral bracts, usually reddish in colour.

13. *G. sudanicus* Goldblatt (1996)

– type: SU, Blue Nile Gorge near 205 km on Addis Ababa-Debre Marcos road, c 1050 m, *M.G. Gilbert & S.B. Gilbert* 2158 (ETH holo., C EA K iso.).

Plant 15–20 cm high. Corms 10–12 mm in diameter, tunics of medium-textured to fine netted fibres. Foliage leaves 4–5, lower narrowly lanceolate to linear and about as long as stem, 5–9 mm wide, uppermost smallest and partly to entirely sheathing, fairly soft-textured, midvein and one pair of secondary veins evident but not noticeably thickened. Stem erect below, flexed outward above sheath of uppermost leaf, unbranched, c 1.5 mm in diameter at base of spike. Spike erect, 2–3-flowered; bracts green, 20–25 mm long, inner slightly shorter than outer. Flowers pale to deep pink, lower 3 tepals each with a yellow-green median streak outlined in red; perianth tube 16–20 mm long, arching outward and expanded above; tepals unequal, narrowly lanceolate, 3 upper 20–24 x 4–5 mm, 3 lower joined to upper laterals for c 3 mm and to one another for c 3 mm, 16–18 mm long, in profile exceeding upper by 3–6 mm. Filaments 10–12 mm long, exerted 2–3 mm from tube; anthers c 6.5 mm long, violet, with short acute apiculi 0.5–1 mm long. Ovary 3–4 mm long; style dividing opposite middle of anthers, branches c 2 mm long, not exceeding anthers. Capsules and seeds unknown. Fig. 197.6.

Relatively arid country in grassland or among shrubs in seasonally wet sites; 1000–1200 m. SU (only Blue Nile Gorge); also in Sudan. Only so far known from the type in Ethiopia.

Allied to the W African *G. mirus*, and to the Zambian endemic, *G. serenjensis*, which also have soft-textured leaves, reddish flowers, and anthers with acute apiculate appendages.

14. *G. lithicola* Goldblatt (1996)

– type: HA, Harerge, slopes above Mojjjo R. and south of Mt Gara Mullata, c 2100 m, *Burger* 3150 (K holo.).

Plant (8–)12–28 cm high. Corm 8–10 mm in diameter, tunics of fine netted fibres. Leaves 2–4, lowermost longest, 1.5–2.5 times as long as stem, blades linear, (2–)3–4 mm wide, uppermost smallest and with oblong blades or largely to entirely sheathing. Stem erect below, flexed outward above sheath of uppermost leaf, unbranched. Spike (1–)2–3-flowered; bracts green, 15–30(–35) mm long, usually attenuate, inner about two-third as long as outer. Flowers bluish-purple (mauve), tepals evidently unmarked; perianth tube narrowly funnel-shaped, c 18 mm long; tepals lanceolate, unequal, dorsal and upper laterals c 18 mm long, 3 lower c 20 mm long. Filaments short, c 6 mm long, included in tube; anthers c 5 mm long, dark violet, apices drawn into short acute appendages. Ovary oblong, c 4 mm long; style arching over anthers, dividing

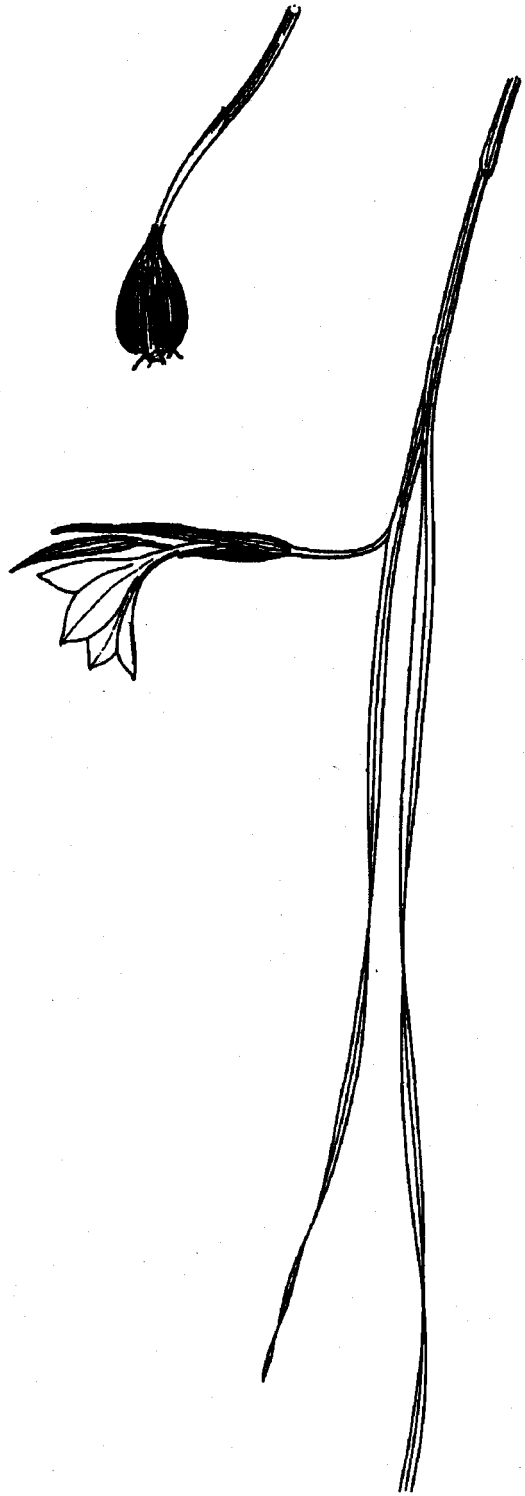


Figure 197.7 *GLADIOLUS LITHICOLA*: flowering stem and corm x 2/3. From *de Wilde* 5840. Drawn by J. C. Manning.

at or 1–2 mm beyond anther apices, branches c 2.5 mm long. Capsules and seeds unknown. Fig. 197.7.

Steep rocky slopes and cliffs, originally in forest, but today largely cleared; 2100–2750 m. HA (only Mt Gara Mullata); not known elsewhere. *de Wilde* 5840; *Burger* 1019.

G. lithicola is one of the most distinctive of the Ethiopian species of the genus *Gladiolus*, and is readily recognised by the short stems, much shorter than the

long drooping leaves, the relatively small pale mauve perianth, and short dark-violet stamens borne at the mouth of the perianth tube.

15. *G. muriclae* *Kelway* (1932)

– type: Ethiopia, without precise locality, *Erskine* s.n. (location unknown).

Acidanthera bicolor Hochst. (1844) non *G. bicolor* Baker, (1877) – type: TU, hills and valleys on wet rocks 'in collibus vallium districtus Schoata ad rupes humentes,' *Schimper* s.n. (no type material has been located, but protologue leaves no doubt about the identity of the species).

Ixia quartiniana A. Rich. (1851) non *G. quartinianus* A. Rich. (1851) – types: TU, fields near Adowa, *Quartin-Dillon* s.n. (P lecto. designated by Goldblatt, 1995, P isolecto.).

Sphaerospora gigantea Klatt (1866) nom. illeg. pro *Ixia quartiniana*.

G. callianthus Marais (1973).

Plant 30–65 cm high. Corm 15–22 mm in diameter, tunics firm to softly membranous, fragmenting irregularly, sometimes becoming subfibrous, dark red-brown. Foliage leaves 4–8, lower 3–5 basal, narrowly lanceolate, reaching at least to base of spike, sometimes slightly exceeding it, 5–12 mm at widest, relatively soft-textured and without thickened margins or midrib. Stem unbranched, 3–4 mm in diameter at base of spike. Spike often inclined, 3–5-flowered; bracts green, 5–8 (–10) cm long, inner shorter than and concealed by outer. Flowers white, with a prominent dark purple median streak in lower 3 or all of tepals, sweetly scented particularly strongly in evenings; perianth tube cylindrical and straight, slightly wider near throat, (90–)120–150 mm long; tepals more or less equal, lanceolate, 35–45 x 17–22 mm. Filaments exerted for 10–15 mm; anthers c 15 mm long, with a rigid filiform point 2–4 mm long. Ovary 6–8 mm long, style arching over stamens, dividing beyond anthers, branches c 5 mm long, much expanded in upper half. Capsules oblong-ellipsoid, 20–25 mm long. Seeds c 8 x 5 mm, broadly winged. Fig. 197.8.

Highlands in rocky, partly shaded, places, on cliffs, rocky outcrops and by forest margins; 1800–2400 m. TU GD SU WG; Burundi, Tanzania, Malawi and Mozambique. *Gilbert & Getachew* A. 2758; *Tewolde* BGE. 882; *de Wilde* 7029.

Closely related to the West African *G. aequinoctialis*, both immediately recognised by the white flowers with purple splashes on the lower tepals, a perianth tube 120–150 mm long, and anthers with prominent acute apiculate appendages. Differences in leaf venation and length of the anther appendages separate the two species.

16. *G. candidus* (*Rendle*) *Goldblatt* (1995);

Acidanthera candida Rendle (1895) – type: Kenya, Athi Plains, Lanjaro, *Gregory* s.n. (BM holo.).

A. laxiflora Baker (1887).

A. gracilis Pax (1892); *A. zanzibarica* Baker (1892),



Figure 197.8 *GLADIOLUS MURICLAE*: flowering spike, corm and leaf base, and enlarged flower x ¼. From *la Croix* 2728. Drawn by J. C. Manning.

nom. illeg. superfl. – (based on the same type).

A. ukambanensis Baker (1898).

Gladiolus ukambanensis var. *alatus* Marais in *Kew Bull.* 28(2): 314 (1973).

Plant 20–40 cm high. Corm globose, 12–25 mm in diameter, tunics firm-papery, breaking into vertical fibres above and below. Foliage leaves 2–3, all more or less basal, narrowly lanceolate, about half as long as stem, 5–10 mm wide, margins and midribs evident but not noticeably thickened. Stem erect, unbranched, c 2.5 mm in diameter below first flower. Spike erect, 2–4-flowered; bracts (25–)40–50 (–80) mm long, inner shorter and narrower than outer. Flowers white (rarely pink), occasionally with purple median streaks in lower tepals, sweetly scented; perianth tube (70–)80–100 mm long, more or less straight and cylindrical; tepals subequal, broadly lanceolate to elliptic, (20–)25–30 x c 15 mm. Filaments c 20 mm long, included in tube (or exerted 1–2 mm); anthers 8–10 mm long, with acute apiculate appendages 1.3–1.8 mm long. Ovary oblong, c 5 mm long; style dividing opposite anther apices, branches 5–7 mm long, often unusually broad and fringed above. Capsules narrowly elliptic to obovate, 18–22 mm long; seeds fully to partly winged to angled or rounded and wingless.

Woodland and dry grassland, both in highlands and dry lowlands; 1450–2250 m. AR SD BA HA; Djibouti, Somalia, Kenya, Tanzania and Oman. *Gilbert* et al. 8024; *Friis* et al. 2674; *Thulin* et al. 3529.

198. COLCHICACEAE

by Sebsebe Demissew*

Dahlgren, Clifford & Yeo, *The Families of Monocotyledons*: 226 (1985); Thulin, 156. *Colchicaceae* in *Fl. Somalia* 4: 67 (1995).

Low or erect or sometimes twining herbs, with a subterranean, starch-rich corm which is sometimes stoloniferous. Leaves basally concentrated or scattered on the stem; blade linear to lanceolate, sessile or rarely constricted into a pseudopetiole, sheathing at the base, parallel veined, rarely cirrhose (ending in a tendril). Inflorescence raceme, rarely a single flower. Flowers 3-merous, radially symmetrical and bisexual. Tepals 3+3, more or less similar in size and shape, free from each other or basally connate or forming a narrow basal tube; colour varying from white to purple, red or yellow, brown, or more often two coloured, base with a different colour from the rest. Stamens free from each other; filaments narrow or basally broad, glabrous; anthers short, ovate, longitudinally dehiscent, usually extrorse, rarely latrorse or nearly introrse. Pistil with a superior ovary, 3-locular with many ovules; placentation axile; style 1 with 3-branched stigma lobes or with 3 free stylodia. Fruit a capsule, dehiscing usually septicidally or sometimes loculicidally. Seeds globose to ovoid.

A family with 17 genera and 170 species distributed mainly in the summer rainfall regions of South Africa. It also occurs in other parts of Africa, the Mediterranean, western Asia to Australia. Represented by 5 genera and 7 indigenous species in the Flora area.

This family includes several species which are highly toxic and are used medicinally. *Colchicum* spp. are the original source of colchicine used in the study of chromosomes. Species of both *Colchicum* and *Gloriosa* are grown as ornamentals.

Key to genera

1. Leaves cauline, alternate on usually scandent annual stems; flower solitary; leaf-apex with tendrils. 2
 - Leaves basal, in a rosette or distichous, or on peduncles or on annual or perennial stems; flowers variously arranged; leaf apex without tendrils. 3
2. Perianth segments reflexed; style at right angles to ovary. 1. *Gloriosa*
 - Perianth segments spreading, not reflexed; style straight. 2. *Littonia*
3. Flowers in a head overtopped by exterior petaloid bracts. 3. *Androcymbium*
 - Flowers not in a head overtopped by exterior petaloid bracts. 4
4. Flowers solitary or two together, rarely three from a rosette of leaves; perianth with a claw; stamens attached to the perianth segments; pedicels absent. 4. *Merendera*
 - Flowers solitary or 3-10 in a lax scorpioid arrangement on the stem; perianth without a claw; stamens not attached to the perianth segments; pedicels present. 5. *Iphigenia*

1. *GLORIOSA* L. *Sp. Pl.* 305 (1753)

Baker in *Fl. Trop. Afr.* 7: 563-565 (1898); Cufodontis, *Enum.*: 1525-1527 (1971); Field, *Kew Bull.* 25: 243-244 (1971), The genus *Gloriosa*, Lilies and other Liliaceae 1973: 93-95 (1972); Dyer, *Genera of Southern African Flowering Plants* 2: 919 (1976).

Climbing geophytes with corms and scandent stems. Leaves cauline, sessile, alternate or crowded in places, simple, ovate, attenuated into a terminal recurved tendril. Flowers on upper part of stem on long pedicels, placed beside a leaf or without a leaf. Perianth 6, free, equal, narrowly ovate-acuminate, entire or crisped, reflexed, yellow or red, or both colours together. Stamens with firm spreading filaments; anthers 2-thealous, versatile. Ovary 3-locular, with numerous axile ovules; style filiform, bent sharply outwards at base, with 3 short stigmatic branches. Capsule ovoid or cylindrical, 3-valved, septicidally dehiscent, leathery. Seeds subglobose, fleshy, red.

A genus of 2 species, one of which is widespread in Africa and Asia, while the second is a narrow endemic to NE Africa.

1. Suberect climbing herb; blade 1.3-6 cm wide; stamens with filaments 2.2-3 cm long; style with deeply divided stigma, up to 12 mm long. 1. *G. superba*
- Erect herb; blade 0.2-1 cm wide; stamens with filaments 1.2-2.3 cm long; style with shallowly divided stigma, 1.5-3 mm long. 2. *G. baudii*

1. *G. superba* L. *Sp. Pl.* ed. 2, 437 (1753)

-type: India, Malabar, *Hermann* s.n. (type not seen).

G. simplex L. (1767) - type: Senegal, *Adanson* cat. nos 4000 & 4001 (P, not seen.), *nom. incert. sedis*.

G. abyssinica A. Rich. (1851); *Methonica abyssinica* (A. Rich.) Walpers (1852) - types: TU, Chire (Shire), *Quartin-Dillon* s.n. (K isosyn.); TU, Djeladjekanne, *Schimper* 1437 (K isosyn.).

G. speciosa (Hochst.) Engl. (1892); *Clinostylis speciosa* Hochst. (1844) - type: TU, near Djeladjer-

* The National Herbarium, Addis Ababa University, P.O. Box 3434, Addis Ababa, Ethiopia.

anne, *Schimper* III: 1437 (K isosyn.).

Variable, suberect or climbing herb up to 3 m high. Corm \pm globose, c 3 cm in diameter or more. Leaves along stem, sessile, opposite, subopposite or ternate or alternate; blade elliptic, lanceolate to ovate, 7.5–16 x 1.3–6 cm, glabrous, apex with coiled tendrils. Flowers solitary in axils of leaves; pedicels 4.5–16.5 cm long, nodding at the tip. Perianth segments broadly elliptic to obovate, 3.5–8 x 1–3 cm, acute at apex, narrowing to base, entire to margin crisped; variable in colour, bright red, orange or yellow, or with two colours together. Stamens: filaments 2.2–3 cm long; anthers linear, 0.8–1.5 cm long. Ovary cylindrical-ovoid, 0.8–1.5 cm long; style 2.5–3.8 cm long including 3 stigma branches, 0.4–1.2 cm long. Capsule 3.5–7 cm long.

Acacia – *Commiphora*, *Combretum* – *Terminalia* woodland, in open places in forest, in thickets on roadsides and along ditches; 400–2000 m. EE EW TU GJ SU AR WG GG IL KF SD BA HA; widespread in tropical Africa, southern Africa, Madagascar and Asia. *Gilbert & Gelahun* A. 3163; *Mesfin* T. & *Vollesen* 4117; *Mooney* 9144.

2. *G. baudii* (*Terracc.*) *Chiov.* (1916);

Littonia baudii *Terracc.* (1892) – type: HA: Ogaden, Gerar-Amaden, *Baudi & Candeo* 1891 (?FT holo., not seen).

G. abyssinica A. Rich. var. *gaminifolia* *Franch.* in *Sert. Somal.*: 67 (1882); *G. gaminiflora* (*Franch.*) *Chiov.* (1916).

G. minor *Rendle* (1896) – type: BA, West of Shebelle River, *Donaldson-Smith* (BM holo., not seen).

Erect herb 20–50 cm high. Corm obovate, 4.5 x 1 cm; tunics brownish. Leaves along the stem, sessile, subopposite to alternate; blade linear-elliptic, 5–12.8 x 0.2–1.2 cm, glabrous to pubescent, apex attenuate or with tendrils. Flowers solitary; pedicel 3.5–9 cm long. Perianth bright red or yellow and red, sometimes fused for 4–5 mm long at the base; blade oblanceolate, 25–65 x 4–8(–15) mm. Stamens with filaments 12–23 mm long, anthers 3–7 mm long. Pistil with style 14–25 mm long with 3-branched stigma, 1.5–3 mm long. Young capsule 15 mm long. Fig. 198.1.

Stony ground and open bush on red sandy soil; 400–800 m. ?GG HA; Somalia and Kenya. *Bally* 12999; *Ellis* 174; *Simmons* 152.

This species is treated as a synonym of the widespread *G. superba* by Thulin in *Flora of Somalia*, but here the author prefers to keep it as a separate species. More material is needed to determine the relationship of these two species.

2. *LITTONIA* *Hook.f.*

Baker in *Flora Trop. Afr.* 7: 565–567 (1898); *Cufodontis*, *Enum.*: 1527–1528 (1971); *Dyer*, *Genera of Southern African Flowering Plants* 2: 919 (1976).

Climbing geophyte with a small corm bearing short



Figure 198. 1 *GLORIOSA BAUDI*: 1 – flowering stem x 2/3; 2 – pair of leaf-bases x 2/3; 3 – young flower x 1 1/2; 4 – opened flower x 1; 5 – pair of leaves x 2/3. 1–4 from *Peggy E. Ellis* 174; 5 from *E. Ellis* 129. Drawn by *Damtew Teferra*.

spreading lobes. Stems usually simple, scandent or erect. Leaves cauline, whorled below, alternate above, linear to ovate, attenuated into a recurved tendril at the apex. Flowers cymose on the upper part of the stem; pedicels long, axillary and appearing beside a leaf at a later stage. Perianth 6, equal, persistent, ascending segments, slightly sac-like at the base. Stamens short, filiform; anthers 2-theous, erect, basifixed. Ovary 3-locular, ovoid, 3-angled, with many axile ovules; style short with 3 sickle-shaped stigmatic branches. Capsule ovoid, 3-

valved, septicidally dehiscent, leathery. Seed globose, fleshy, on long funicles.

A genus represented by *c* 7 species in Africa and Arabia; 1 species in the Flora area.

L. revoilii Franch. (1882)

– type: Somalia, 'Barroz' valley, *Revoil* s.n. (P holo., not seen).

L. minor Defflers (1885).

L. hardeggeri Beck (1888) – type: HA, between Agarwejna (Aroueina) and Dadab, *Hardegger & Paulitschke* s.n. (W holo., not seen).

L. obscura Baker (1895).

Erect or scandent geophyte, 15–35 cm high, glabrous. Corm ovoid to globose *c* 1.7 x 1.5 cm. Blade linear to elliptic, 4.5–8.5(–10) x 4.5–6 cm. Flowers solitary; pedicel 20–50 mm long. Perianth 6, elliptic, narrowing from the middle towards the base, reddish yellow, cream flushed with brown or yellow; each tepal 12–25(–40) x 2–5 mm. Stamens 6; filaments 8–10(–20) mm long; anthers 3–4(–8) mm long. Ovary with style 3–10(–30) mm long and 3-branched stigma *c* 0.5 mm long. Capsule 3-locular, 15–17 mm long, manyseeded. Seeds globose and fleshy when fresh, angular when dry, obovate, 3 x 3 mm. Fig. 198.2.

Occurs in sandy or stony ground in Somalia, habitat not recorded for Ethiopia; *c* 10–570 m in Somalia. HA; Somalia, Djibouti and Yemen. So far only known in the Flora area from the type specimen of *L. hardeggeri*.

3. ANDROCYBIUM Willd.

Baker in *Fl. Trop. Afr.* 7: 559–560 (1898); Cufodontis, *Enum.*: 1528 (1971); Dyer in *Genera of Southern African Flowering Plants* 2: 920–921 (1976).

Stemless or scapose geophytes, with an asymmetrical corm covered with hard dark tunics. Shoot usually forming a long neck enclosed in a tubular, truncate sheath, or stemless, or produced into a leafy scape. Leaves distichous, 2-many, linear to ovate-acuminate, channelled with a broad sheathing base; stemless species with leaves spreading at ground level and sessile inflorescence in the centre. Flowers solitary or many in a terminal head surrounded by often large petaloid, colourful bracts, the whole resembling one flower. Perianth segments 6, free, ovate acuminate, margins involute, with a pair of nectaries above claw. Stamens arising from claw, exerted or included; anthers basifixed, introrse. Ovary 3-locular, ovoid, deeply 3-sulcate, each locule attenuated into a style ending in a minute stigma; ovules axillary, many. Capsule 3-sulcate, ovoid-acuminate, topped with 3 subulate style bases, or obtusely obovoid, with style bases divergent, septicidally 3-valved. Seeds globose or angled, minutely verrucose.

The genus is represented by 30 species, mostly in S Africa, with 1 in N Africa and the Mediterranean region; 1 species in the Flora area.



Figure 198. 2 *LITTONIA REVOILII*: 1 – lower part of the plant showing corm x 2½; 2 – flowering stem x 2½; 3 – flower x 2½; 4 – capsule x 2½; 5 – enlargement of the flower showing details x 1½; 6 – seeds x 4. 1 from *Defflers* 517; 2–5 from *Defflers* 541; 6 from *Glover & Gilliland* 670. Drawn by Damtew Teferra.

A. striatum Hochst. ex A. Rich. (1851);

A. melanthoides Willd. var. *striatum* (A. Rich.) Baker in *Journ. Linn. Soc.* 27: 442 (1879) – type: GD, Simien, Enchetkab, *Schimper* II: 1338 (K iso.).

Geophyte 15–30 cm high. Corm ovoid, 1.0–2.5 x 0.6–2 cm; tunics firm, dark brown. Scape erect, bearing 2–3

ascending, glabrous leaves; blade linear or lanceolate 4–2 x 1.5–17 mm. Flowers 3–5 in a cluster; pedicels erect, 4–10 mm long, elongating to 22 mm long when fruiting; bracts ovate-cuspidate or oblong, 1.5–6.5 x 0.4–1.6 cm, whitish with green veins. Perianth white, 7–9 mm long; blade of segments 5–7 mm long and claw c 2 mm long. Stamens equal to perianth or shortly exerted. Capsule ovoid, 9–11 mm long with persistent style, 3–5.5 mm long. Seeds red-brown, c 1.3–1.5 x 1.3–1.5 mm.

Open grassland with scattered *Acacia abyssinica*, *Euclea* scrub, degraded *Juniperus* – *Olea* forest remnants, open shallow, bare gravelly soil and in *Acacia drepanolobium* dominated grassland on black clay soil; 1500–2600 m. EW TU GD SU AR SD BA HA; Kenya, Uganda, Tanzania, Zimbabwe to S Africa. *Gilbert & Getachew A. 2634; Mooney 9502; Thulin et al. 3839.*

4. *MERENDERA* Ramond (1798)

Baker in *Fl. Trop. Afr. 7: 558–559* (1898); Cufodontis, *Enum.: 1529* (1971).

Geophytic stemless herbs with a corm covered with tunics. Leaves basal. Flowers solitary or 2, rarely 3. Perianth segments 6. Stamens 6, inserted at the base of the blade of the perianth segments; filaments filiform; anthers versatile or basifixed. Ovary 3-locular; styles 3, filiform; stigmas small and capitate. Capsule septically 3-valved. Seeds subglobose, small.

The genus is represented by 15 species in Africa, Europe and western Asia; 1 species in the Flora area. Some authorities include *Merendera* in the genus *Colchicum* L, but *Merendera* has free tepals.

M. schimperiana Hochst. (1842)

– type: GD, between Enchetcab and Schoata, *Schimper II: 1126* (K iso.).

M. longispatha Hochst. (1842) – type: GD, near Enchetcab, *Schimper II: 1167* (K iso.).

M. abyssinica A. Rich. (1851) – types: TU, Taczazze valley near Djeladjeranne, *Quartin-Dillon s.n.* (P syn., not seen); Goumassa in Ougerate, *Petit s.n.* (P syn., not seen), and syntypes from other specimens which were labelled as *M. schimperiana* and *M. longispatha*.

M. longifolia Hutch. (1931) – type: Somalia, Sugulin Al-Hills (= Al-Madu); *Collenette 254* (K holo.).

Geophytic herb. Corm globose to ovoid, 1–3.5 x 1–3 cm; tunics rigid, brownish-black, produced over its neck; underground neck 2–7 cm long, covered with a cylindrical membranous sheathing leaf. Leaves 2–6, ascending or spreading; blades linear, 30–85 x 1.5–5 mm long. Flowers 1–2, rarely 3, subsessile in the centre of a rosette of leaves. Perianth purple, with filiform claw, c 1.5–2.5 cm long, segments linear oblong, 17–35(–50) x 1.5–5 mm. Stamens attached to the perianth; filaments 3.5–4(–6) mm long; anthers yellow, linear, almost basifixed, 4.5–7 mm long. Capsule not seen. Fig. 198.3.

Open grazed grassland, wasteland and open hillside in montane and ericaceous belt; 2050–3880 m. TU GD GJ WU SU AR SD BA HA; Somalia & Arabia. *Gilbert 1149; Hedberg & Getachew A. 5365; Sebsebe D. 2147.*

Until recently this taxon was called *M. abyssinica*. However, *M. schimperiana* Hochst. was validly published on printed herbarium labels with the following protologue 'A.M. Bulbocodio Ram. foliis omnino synanthiis, petalorum unguibus spatham longe egredientibus et stigmatibus recurvulis differt, a *Merendera caucasica* Bbst., cui habitu similis, antheris longis adnatis aliisque notis sat superque recidit.' *M. longispatha* Hochst. (1842) was also validly published on printed herbarium labels with 'a nr. 1126 spatha longiore et petalorum nervis anastomosantibus praeter alia differt'. These labels were also placed on collections distributed as types of *M. abyssinica* which are too numerous to mention here.

Specimens of this species from Somalia known previously under *M. longifolia* have longer leaves up to 10 x 1.5 cm and perianth segment to 5 cm long. The material now available shows that this is an extreme form of *M. schimperiana*.

5. *IPHIGENIA* Kunth (1843)

Baker in *Fl. Trop. Afr. 7: 561–562* (1898); Cufodontis, *Enum.: 1528* (1971); Dyer in *Genera of Southern African Flowering Plants 2: 923* (1976).

Slender geophyte with ovoid corm covered with thin dark tunics. Stem straight or flexuose, with 1–2 tubular, basal spathes. Leaves in the lower part 1–3 with free tubular sheathing bases and linear to filiform blade spirally arranged; in the upper part sessile, decurrent, placed beside flower. Flowers solitary or 3–10 in a raceme; pedicels erect or recurved. Perianth segments 6, free, deciduous, linear. Stamens with short filaments; anthers basifixed, extrorse. Ovary ovoid, with many axile ovules; style 3 with papillate stigma branches. Capsule ovoid to cylindrical, loculicidal. Seeds small, globular, papillate, with a distinct raphe.

The genus is represented by 15 species distributed in mainland Africa, Madagascar, India, Australia and New Zealand; 2 species are known from the Flora area.

1. Flowers erect; stamens ± equal to or longer than ovary; filaments 2.5–3 mm long. 1. *I. pauciflora*
- Flowers bending down; stamens shorter than the ovary; filament 1–1.5 mm long. 2. *I. oliveri*

1. *I. pauciflora* Martelli (1886)

– type: EW, Keren, *Beccari 248* (FT holo., not seen).

I. abyssinica Chiov. (1911) – type: TU/GD, Mai-Aini in Tzelemti, *Chiovenda 641* (FT holo., not seen).

Herb 10–30 cm high. Corm subglobose to ovoid, 0.8–1.5 x 0.8–1.3 cm; tunics brown, muricate. Leaves linear, clasping the stem; blade 55–150 x 1–3 mm. Flowers solitary or few to many, erect. Pedicel 7–32 mm long. Perianth 6, dark-brown to yellowish-green or greenish-



Figure 198. 3

MERENDERA SCHIMPERIANA:
 1 – complete flowering plant; 2 – upper part of perianth segment; 3 – outer tunic; 4 – corm. All $\times 1$; 1 & 2 from Ensemu K. & Melaku W. 2967; 3 & 4 from Olove Hedberg & Getachew A. 5365. Drawn by Damtew Teferra.

yellow, 4–7 \times 0.5–0.7 mm. Stamens 6, with filaments 2.5–3.5 mm long; anthers 0.5 mm long. Ovary with 3 styles, 0.6–1 mm long, recurved. Capsule obovoid to oblong, 8–20 mm long. Seeds many, brown, each ovoid, $c 2 \times 1.5$ mm.

Flat open area with *Euclea* – *Dodonaea*, *Acacia* – *Dichrostachys* – *Anogeissus* scrub, in open bare land, eroded area of volcanic ash near gullies with exposed subsoil and in rocky outcrops in *Acacia* – *Commiphora* – *Terminalia* woodland on limestone slopes with sandy

soil; 1250–2000 m. EW TU SU SD BA; wide spread in tropical Africa. Friis et al. 3306; M.G. & S.B. Gilbert 2160; Gilbert & Getachew A. 2941.

Some specimens from southern Ethiopia, Sidamo region (Gilbert & Jefford 4391 and Gilbert et al. 7765) have greenish-yellow perianth parts, but are otherwise similar to other specimens from Ethiopia including Sidamo. Gilbert & Tewolde 2450, with erect flowers has filaments shorter than usual, 1.5 mm long, but is included. *I. ledermanii* known from W Africa is possibly conspecific. However, a thorough examination of speci-



mens throughout the range of the species is needed before making a decision on their relationship.

2. *I. oliveri* Engl. (1893)

—type: Kenya, Tavetta, Johnston s.n. (K iso.).

I. somaliensis Baker (1895).

Herb 20–30 cm high. Corm ovoid, 1.2–2 x 8–15 cm; tunic light to dark-brown, slightly muricate. Leaves linear, clasping the stem, alternate; blade 65–170 x 2–5 mm. Flowers solitary or few to several, recurved, rarely erects. Pedicels 6–20 mm long. Perianth segments 6, brown to purple red, 30–120 x 0.1–0.4 mm. Stamens 6; filaments 1–1.5 mm long; anthers 0.5 mm long. Ovary with 3 styles, 0.2–0.6 mm long, recurved. Capsule obovoid to oblong, 7–17 mm long. Seeds many, brown, each globose, 2–3 x 2–3 mm. Fig. 198.4.

Acacia–*Commiphora*–*Terminalia* bushland/woodland on limestone slopes with sandy soil; 850–1650 m. SD HA; Somalia, Kenya and northern Tanzania. Burger 2778; Friis et al. 2995; Thulin, Asfaw H. & Mesfin T. 3446.

Specimens from HA & SD (Burger 2778 and Thulin et al. 3446) which have longer perianth segments (10–12 mm long) were previously placed in *I. somaliensis* and a specimen from SD (Friis et al. 2995) with shorter perianth segments (3–5 mm long) was placed in *I. oliveri* in the strict sense. However, because of the existence of intermediate specimens from Somalia which bridge the gap, all the specimens are now treated under *I. oliveri*.

Figure 198. 4 *IPHIGENIA OLIVERI*: 1 – stem with leaves, flowers and fruits x 1/2; 2 – flower x 4; 3 – pistil, wall partly removed to show placentation x 6; 4 – capsule x 1 1/2; 5 – seed showing raphe x 5. (Modified from *Nat. Pflanzenfam.* 15a: 271 (1930) as reproduced in *Fl. Somalia*, fig. 45.)

199A. LILIACEAE

by Sebsebe Demissew*

Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 233 (1985).

Erect herbs with bulbs. Stems erect. Leaves alternate or rarely verticillate, linear to ovate-lanceolate, often sheathing at the base. Inflorescence racemose (*Lilium*), umbel-like (*Gagea*) or with a solitary flower (*Tulipa*). Flowers bisexual, generally radially symmetrical, rarely bilaterally symmetrical, ovary superior. Tepals 6, free from each other to the base, in two whorls. Stamens 6 in two whorls with epipeltate or pseudobasifixed anthers (the filament tip being surrounded by the tubular connective). Pistils with 3 carpels, 3-locular, each with many ovules; styles short to long, 3-lobed or with three stigmatic crests. Fruits loculicidal capsules. Seeds usually flat and disc-shaped, often with a marginal rim, rarely ellipsoidal or sharp-angled, not winged.

Liliaceae mainly occurs in the northern hemisphere with many taxa in SW Asia, the Himalaya and China.

Liliaceae, in the strict sense, includes 13 genera, of which *Lilium* and *Tulipa* occur in cultivation in the Flora area.

The genus *Lilium* (Lilies) has bulbs with generally many overlapping fleshy scales, with or without stolons; leaves all cauline, alternate or in whorls, usually linear or lanceolate with attenuated apices; flowers in a terminal raceme or umbel, often showy and strongly scented, funnel- to bell-shaped or like a turk's-cap (see Figure 199A); perianth segments free, spreading to curled back; stamens and style usually long and protruding. There are about 100 species several of which have been taken into cultivation and also used to form ornamental hybrids. Popular ornamentals from among the true lilies generally have long-lasting, large, showy green-white, white, pink, yellow or orange flowers, sometimes spotted, often heavily scented particularly in the evenings, which are grown in public and private gardens. No attempt has been made to collect and name the ornamental species found in Ethiopia.

Tulipa (Tulips) are characterised by few-leaved bulbs, erect stems and mostly a single terminal cup-shaped flower with variable coloured tepals. These plants can only be grown from imported bulbs as they require chilling by a northern hemisphere winter before they will flower.

In the past, the family Liliaceae included many genera that were kept together because they often grew from a bulb, and/or had petaloid often showy flowers and a superior ovary. Evidence from a wide range of sources has now shown that Liliaceae is better narrowed to a group of similar genera, as described above. Thus there are no longer any indigenous members of this family in Ethiopia. Following are the families found in the Flora area which were included as genera in the Liliaceae of Cufodontis, *Enum.*: 1525–1566 (1971): Aloaceae (*Aloe*), Anthericaceae (*Anthericum* and *Chlorophytum*), Asparagaceae (*Asparagus*), Asphodelaceae (*Kniphofia*, *Bulbine*, *Jodrellia*, *Trachyandra* and *Asphodelus*), Colchicaceae (*Gloriosa*, *Littonia*, *Androcymbium*, *Merendera*, *Iphigenia*), Eriospermaceae (*Eriospermum*) and Hyacinthaceae (*Schizobasis*, *Dipcadi*, *Drimopsis*, *Ledebouria*, *Albuca* and *Ornithogalum*).

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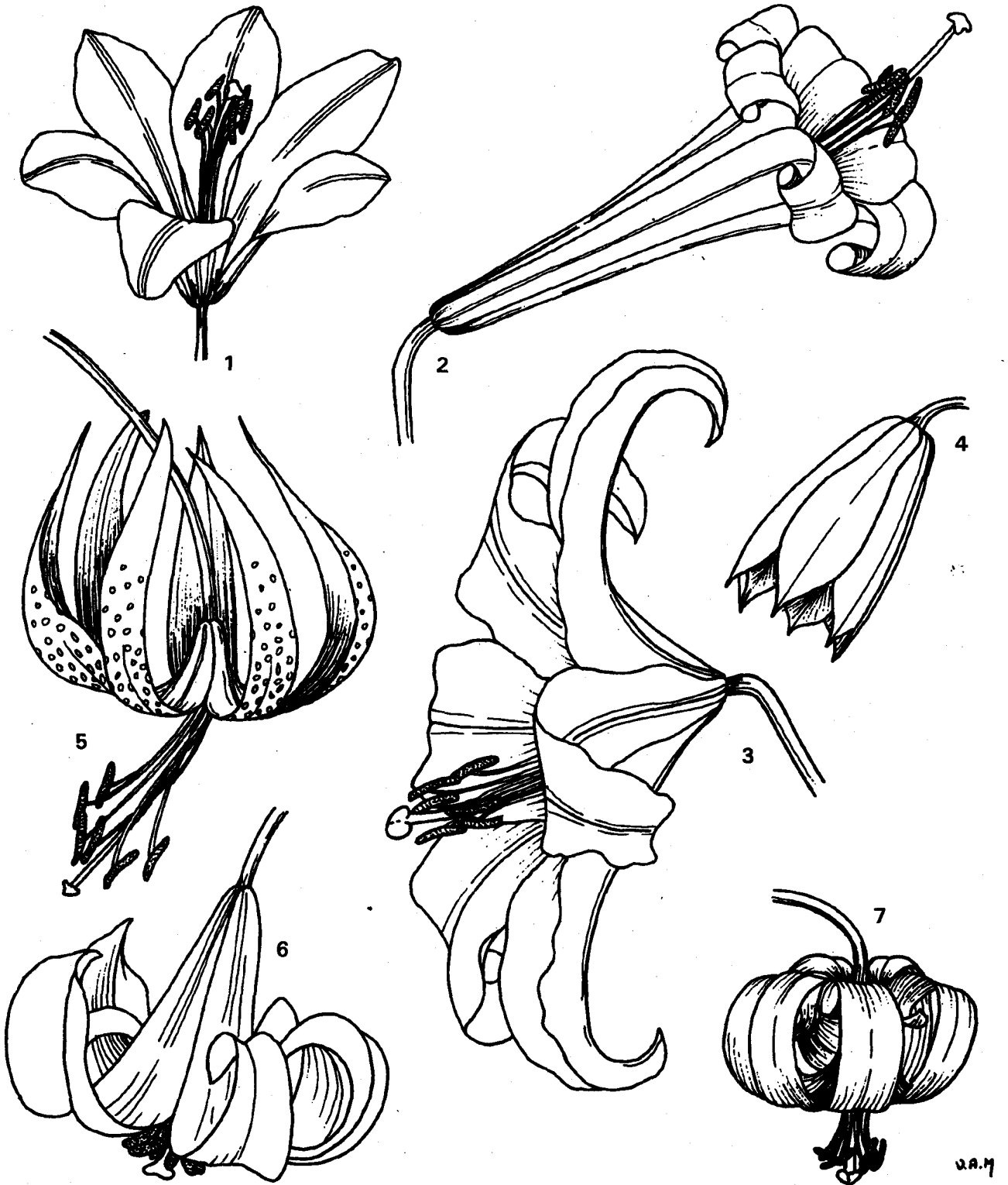


Figure 199A.1 Types of *Lilium* flowers. 1 - cup-shaped; 2 - narrowly funnel-shaped; 3 - bowl-shaped; 4 - bell-shaped; 5-7 - turk's-cap types. Drawn by V.A. Matthews. (Reproduced from *The European Garden Flora* 1: 194.)

199B. HEMEROCALLIDACEAE

by Sue Edwards & Mirutse Giday*

Baker, *Hemerocallis*: the Day Lily, in *J. Roy. Hort. Soc.* 62: 399–411 (1937); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 176–178 (1985); Brickell (ed.), *The Royal Horticultural Society Gardens' Encyclopaedia of Plants and Flowers*: 483–484 (1992).

Glabrous herbs to c 1 m tall. Rhizomes short, fleshy and swollen; roots sometimes nearly fusiform. Leaves linear, parallel veined, flattened dorsiventrally, sheathing at the base. Inflorescence of a few (5–12) flowers in one (or two) double helicoid cymes on a leafless stem with a few bracts. Flowers fairly large, pedicel not jointed, funnel-shaped in outline. Tepals 6, petal-like, yellow to orange or brick-red, united into a tube at the base. Stamens inserted in the perianth tube, slightly upcurved, making the flowers bilaterally symmetrical; filaments long, glabrous and free from each other; anthers often twisted. Pistil 3-locular with a long, slender, slightly upcurved style and a capitate stigma. Fruit a capsule opening from the apex. Seeds subglobose to irregularly shaped or slightly elongated, shiny black.

The family consists of the genus *Hemerocallis* with 16 species found naturally in temperate regions of Asia and extending into southern Europe. *Hemerocallis fulva* L. and several garden hybrids with different flower colours are widely cultivated. This species (A. Addi 306, Sue Edwards 5213) and some garden hybrids (*Sebebe D. et al.* 4285) have been found in the Flora area. *H. fulva* is particularly well established in the Wondo Genet area near Shashemanne (SU) where it sets seed. Garden hybrids have been noted in hotel gardens in Addis Ababa and Holetta Bee Research Station (both in SU), and Bahir Dar (GJ), and are probably grown elsewhere in the Flora area.

These plants are called DAY LILIES and were long thought to belong to the Liliaceae, but are distinguished by the presence of rhizomes and fusiform roots, and the seeds being round or irregularly shaped with a black seed coat. Closest relatives of Hemerocallidaceae are probably Alliaceae and Asphodelaceae. The name DAY LILY comes from the fact that each flower only stays open for a day.

In China, *H. fulva* is very well known for its medicinal properties. It has been chemically examined and found to contain vitamins A, B and C. Besides these, the plant is rich in protein, fat and asparagin. The dried flower buds of *H. fulva* have also been used in the flavouring of foods.

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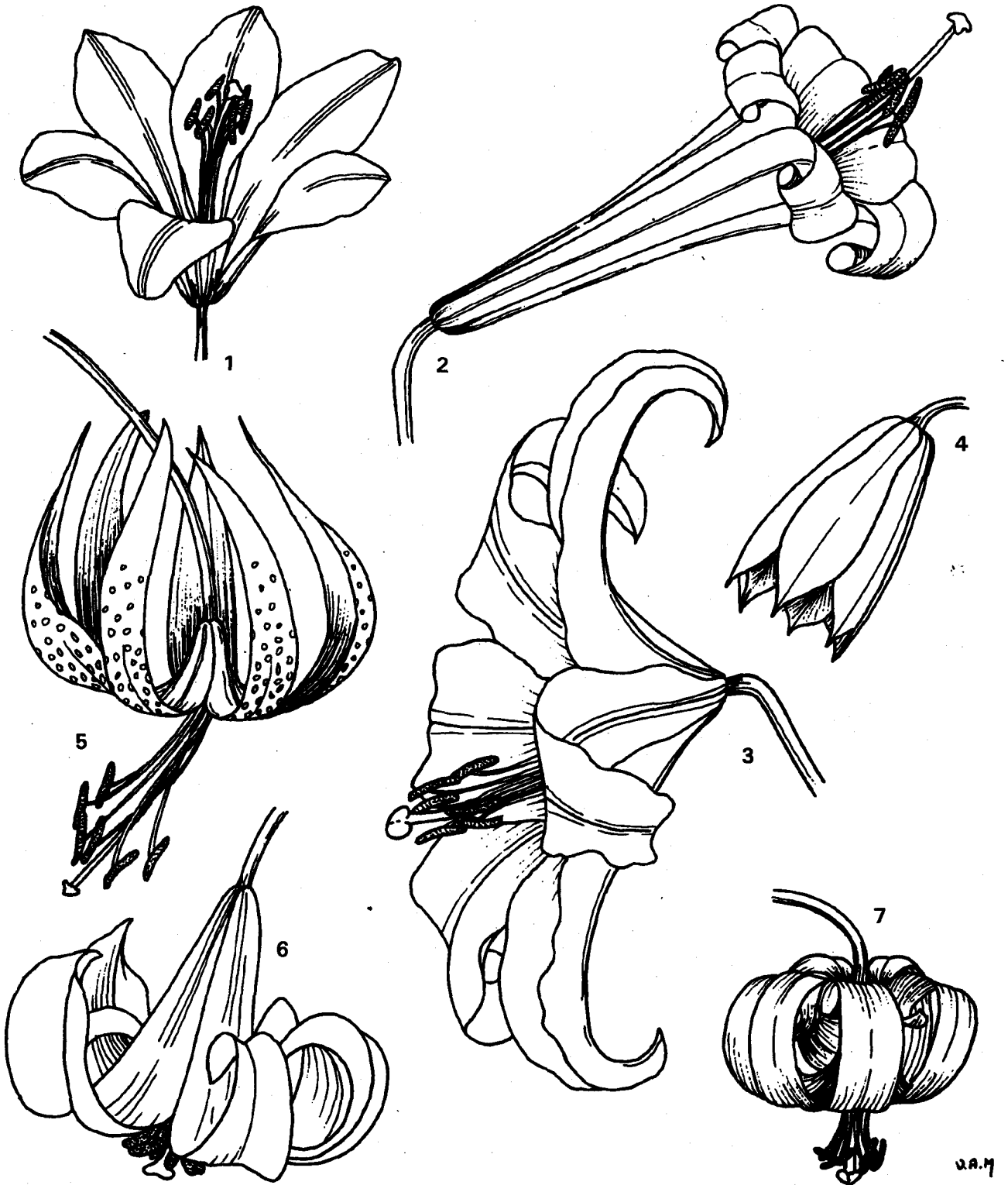


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200. ORCHIDACEAE

by P. J. Cribb* & S. Thomas*

with assistance from K. Batty* & S. Blakey*

Rolfe in Thiselton-Dyer, *Fl. Trop. Afr.* 7: 12–292 (1897–98); Piers, *Orch. E. Afr.*: 304 pp. (1968); Summerhayes, *Orchidaceae* in *Fl. Trop. E. Afr.* 1: 1–235 (1968); *Fl. W. Trop. Afr.*, ed. 2, 3: 180–276 (1968); Cufodontis, *Enum.*: 1597–1622 (1972); Stewart in Agnew, *Upl. Kenya Wild Fl.*: 726–802 (1974); Cribb, *Orchidaceae* in *Fl. Trop. E. Afr.* 2: 237–411 (1984) & 3: 413–651 (1989); Dressler, *The Orchids. Natural History and Classification*: 332 pp. (1981), *Phylogeny & Classification of the Orchid Family*: 314 pp. (1993); Pettersson, 157. *Orchidaceae* in *Fl. Somalia* 4: 70–77 (1995).

Perennial, terrestrial, saprophytic, epiphytic or lithophytic herbs or rarely scrambling climbers, with rhizomes, root-stem tubers or rootstocks with mycorrhizal fungi in the roots and often elsewhere. Growth either sympodial or less commonly monopodial. Stems usually leafy, but leaves often reduced to bract-like scales, one or more internodes at the base often swollen to form a pseudobulb; epiphytic species with aerial, assimilating, adventitious roots, often bearing one or more layers of dead cells called a velamen. Leaves glabrous or occasionally hairy, entire except at the apex in some cases, alternate or occasionally opposite, often distichous (see Fig. 200.1), frequently fleshy and often cylindrical or grooved, almost always with a basal sheath which frequently covers the stem, sometimes articulated at the base of the lamina and sometimes with a false petiole. Inflorescences erect to hanging, spicate, racemose or paniculate, one to many-flowered, basal, lateral or terminal, the flowers rarely secund (see Fig. 200.5) or distichously arranged. Flowers small to large, often quite showy, hermaphrodite (rarely monoecious and polymorphic outside Africa), sessile or variously pedicellate, most often twisted through 180 degrees, occasionally not twisted or twisted through 360 degrees. Ovary inferior, unilocular and the placentation parietal, (rarely trilobular and the placentation axile but not in Africa). Perianth of two whorls of three segments. Sepals: outer whorl usually free but sometimes variously joined together, the median (dorsal) often dissimilar to the laterals, the laterals sometimes joined to the column foot to form a sack-like, conical or spur-like mentum. Petals: similar to sepals or not, often showy; inner whorl comprising two laterals and a median lip, free or rarely partly joined to the sepals; lip entire, variously lobed or two or three-partite, ornamented or not with calli (see Fig. 200.40), ridges, hair cushions or crests, with or without a basal spur or nectary, margins entire to deeply fringed. Column short to long, with or without a basal foot, occasionally winged or with lobes or arms at apex or ventrally; anther one (rarely two or three but not in Africa), terminal or ventral on column, cap-like or opening by longitudinal slits; pollen in tetrads, agglutinated into discrete masses called pollinia; pollinia mealy, waxy or horny, 2, 4, 6 or 8, sessile or attached by caudicles, a stipe or stipes to one or two sticky viscidia; stigma 3-lobed, the midlobe often modified to form a rostellum, the other lobes either sunken on the ventral surface of the column behind the anther or with two lobes pointing forwards (see Fig. 200.15). Fruit a capsule, opening laterally by 3 or 6 slits; seeds numerous, dust-like, sometimes markedly winged.

The orchids comprise the largest families of flowering plants, with an estimated 800 genera and over 17,000 species, some estimates suggesting as many as 30,000 species. They are distributed in all continents except for Antarctica, but are most numerous in the humid tropics and subtropics. Some 154 species in 35 genera are found in the Flora area. 27 species, including six epiphytes, are endemic to the Flora area of which 23 species are only known from Ethiopia.

Orchids have such a specialised structure that many terms have been made specially to describe them. Explanations for those used in this account can be found in the main glossary at the end of this volume, but to assist immediate understanding of the descriptions, a small glossary of terms for this family have been put together with a labelled illustration (Fig. 200.1) on the following pages.

Orchids are extensively grown around the world as ornamentals but other economic uses are few. Two or possibly three species of *Vanilla* Miller are grown commercially to produce the flavouring vanillin, tubers of several species are used for food and as an aphrodisiac, and a number of species are used in folk medicine, particularly in China.

The classification of the family is currently the subject of some debate, particularly the number of subfamilies that should be recognised and the placement in those of certain tribes, subtribes and genera. The classification of the Orchidaceae outlined by Summerhayes (1968) in his account of the family for the

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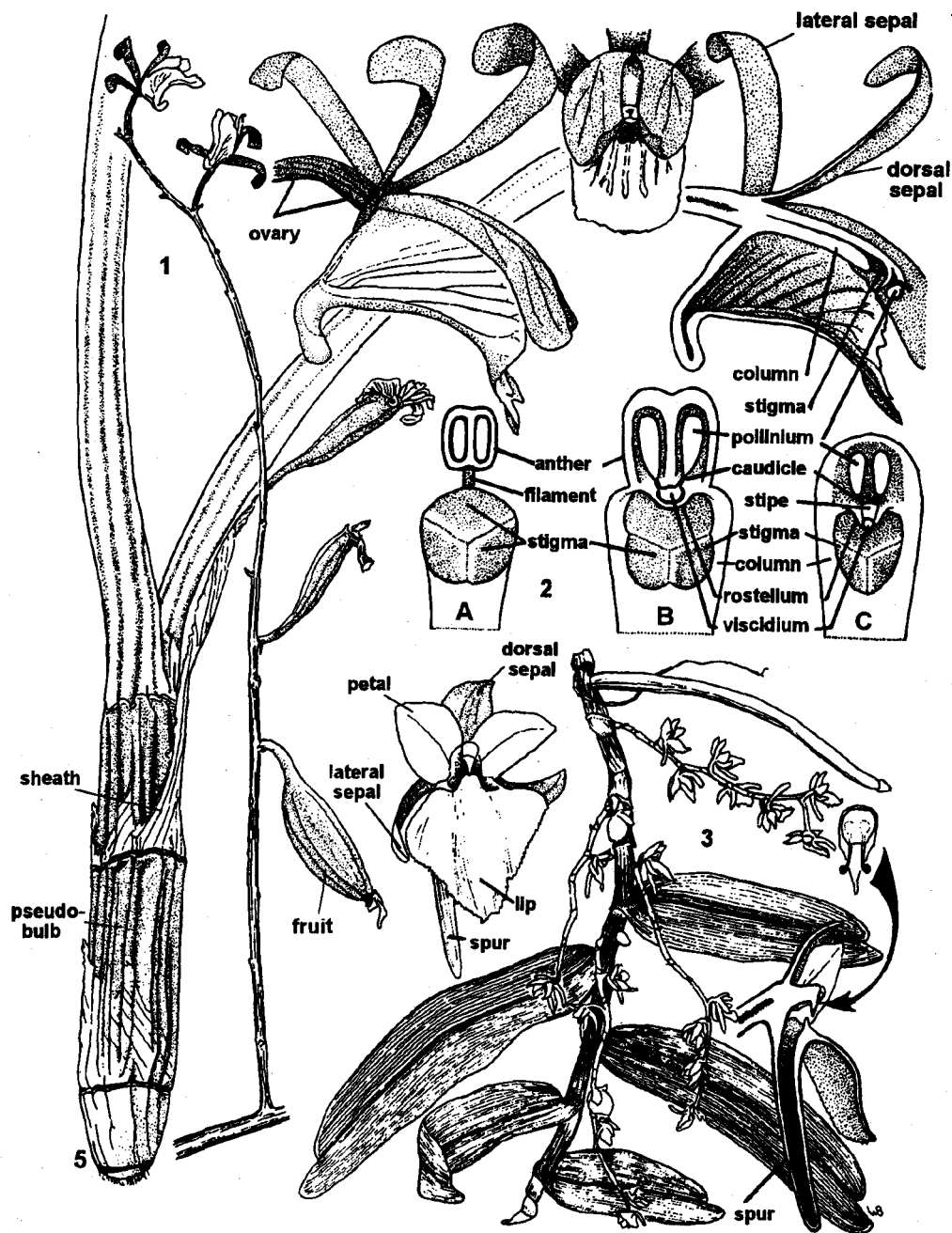


Figure 200.1 *EULOPHIA PETERSII*: 1 – basal portion of the plant to show pseudobulb (bottom left), portion of the inflorescence, floral diagram, side view (top centre), and longitudinal section (upper right) of flower; 2 – hypothetical sequence to illustrate the origin of the orchid column with a possible ancestral type in which the filament has become united with the style and the back of the stigma (A) and 2 more advanced types in which the anther and filament become completely united (B & C). *DIAPHANANTHE SCHIMPERIANA*: 3 – front view of flower (lower centre) and longitudinal section of flower (lower right) with front view of the column (note the aerial root just above the upper inflorescence). (Reproduced with permission from Burger, *Families of Flowering Plants in Ethiopia*, fig. 74, 1967.)

Flora of East Tropical Africa differs in only relatively minor features from the most widely accepted of recent classifications (Dressler 1981, 1993). Summerhayes accepted three subfamilies; Apostasioideae, Cyripedioideae and Orchidoideae, dividing the last into four tribes; Orchideae, Neottieae, Epidendreae and Vandaeae. All African orchids are placed in Summerhayes' Orchidoideae, neither the Apostasioideae nor the Cyripedioideae being represented in the continent. Dressler (1993) accepts five subfamilies: Apostasioideae, Cyripedioideae, Spiranthoideae, Orchidoideae and Epidendroideae, the last three equivalent to the Neottieae, Orchideae and a combined Epidendreae and Vandaeae of Summerhayes. Changing the rank of these suprageneric categories does not essentially change the backbone of the classification of the family. In this treatment we have followed Dressler's 1993 classification but arranged the subfamilies in the same order as Summerhayes in the *Fl. Trop. E. Afr.* to facilitate comparisons.

Explanation of terms

- amplexicaul:** stem-clasping.
androclinium: the bed of the anther, in the excavation at the top of the column.
auricles: ear-like outgrowths of the anther
callus (calli): fleshy outgrowths found on the lip
clinandrium: that part of the column where the anther is connected.
column: structure found in the centre of the flower and formed from style and stamen tissue.
epichile: terminal portion of a complex labellum (lip).
flexuous: zigzag, bent alternately to one side and then the other; bent alternately in opposite directions.
hood: formed from dorsal sepal/petal in an orchid flower.
hypochile: basal portion of a complex labellum (lip), often gullet-shaped.
lithophytic: growing on rocks.
mentum: extension of the flowers composed of the column foot and the lateral sepal bases, often sulcate (with a pocket).
mesochile: the mid portion of a complex labellum (lip), between the epichile and the hypochile.
pandurate: violin-shaped, narrower in the middle.
pendent: hanging

Key to genera

1. Plants leafless; roots photosynthetic.
 27. *Microcoelia*
 - Plants with leaves; rarely flowering when leafless. 2
2. Plants terrestrial. 3
 - Plants epiphytic or lithophytic. 23
3. Anther attached at its base to column; plants with tuberous roots. 4
 - Anther attached by its apex to column; plant with a fleshy rhizome, pseudobulbs or elongated stem. 13
4. Flowers with 2 spurs on hood. 11. *Satyrrium*
 - Flowers with 1 spur on hood or lacking a spur on hood. 5
5. Dorsal sepal with an erect or pendent spur. 10. *Disa*
 - Dorsal sepal lacking a spur; lip or lateral sepals sometimes spurred. 6
6. Lip with a basal sack-like to cylindrical or club-shaped spur; lateral sepals not spurred or pouched. 7
 - Lip lacking a spur or sack-like base, enclosed within hood, much reduced but often with complex appendages; lateral sepals with sack-like or spur-like pouches. 12. *Disperis*
7. Flowers yellow or orange. 8. *Platycoryne*
 - Flowers not so coloured. 8
8. Flowers pink or purple; often glandular.
 5. *Cynorkis*
 - Flowers white or green, rarely flushed with violet; seldom glandular. 9
9. Stigmas bilobed; petals erect, wing-like either side of dorsal sepal, often with an undulate margin. 9. *Roeperocharis*
 - Stigmas not bilobed; petals simple or bilobed. 10
10. Stigma lobes sessile. 11

- pollinaria (single pollinarium):** pollen-bearing structure together with its pollinia.
pollinia (single pollinium): pollen grains held together to form a dispersal unit, derived from anther locules.
porrect: directed forward.
proteranthus: leaves produced before the flowers.
reclinate: bent down onto another part.
resupinate: inverted or twisted through 180° so the flower is upside down.
rostellum: beak-like projection formed from the upper edge of the stigma.
sectile: divided into small segments, usually applied to the pollen mass in the anther/pollinium.
secund: flowers all facing the same direction along the inflorescence.
spur: cylindrical or sack-like outgrowth from the perianth, usually containing nectar.
stipe (plural stipes): a small stalk connecting a pollinium to a viscidium.
velamen: covering of the aerial roots which can absorb moisture from the atmosphere.
viscidium: (plural viscidia): sticky pad at the base of a caudicle or stipe.

- Stigma lobes elongated, club-shaped. 12
- 11. Lip more or less fused to column at base.
 3. *Holothrix*
 4. *Brachycorythis*
- 12. Lateral sepals and front lobe of petals fused to the stigma lobes. 7. *Bonatea*
 - Lateral sepals and petals free from stigma lobes. 6. *Habenaria*
- 13. Plants with creeping short to long, fleshy or woody rhizomes. 14
 - Plants with pseudobulbs, stems or underground corm-like rhizomes or tubers. 17
- 14. Stems woody, bamboo-like; inflorescences branching; sepals and petals spatulate, more than 5 times as long as broad. 2. *Corymborkis*
 - Stems and rhizomes fleshy; inflorescences terminal, unbranched; sepals and petals less than 3 times as long as broad. 15
- 15. Plants usually more than 50 cm high; leaves distichous, folded; lip bipartite, hypochile deeply sack-like, lacking paired glands within, epichile fleshy and articulated. 13. *Epipactis*
 - Plants mostly less than 40 cm high; leaves spirally arranged, fleshy; lip not bipartite, with paired glands at the base within. 16
- 16. Sepals free; flowers glandular pubescent. 15. *Platylepis*
 - Sepals united for half length; flowers glabrous. 1. *Cheirostylis*
- 17. Inflorescence produced and setting fruit before single leaf develops. 14. *Nervilia*
 - Inflorescence produced with leaves. 18
- 18. Inflorescence terminal, produced between the terminal leaves on the stem or pseudobulb. 19
 - Inflorescence lateral from base of stem or pseudobulb. 20

19. Column very short, enveloped by basal auricles of lip; lip flat bearing 1 or 2 cushion-like calli. 16. *Malaxis*
 - Column elongate, not enveloped by basal auricles of lip; lip bearing fleshy, entire or obscurely bilobed callus. 17. *Liparis*
20. Plants with pseudobulbs. 21
 - Plants lacking pseudobulbs. 22
21. Pseudobulbs of 1 node, 1-3-leaved at apex. 21. *Oeceoclades*
 - Plants with pseudobulbs of several nodes, 3-many-leaved. 23. *Eulophia* in part
22. Lip lacking a spur; column very short, lacking a foot. 22. *Pteroglossaspis*
 - Lip spurred or sack-like at base; column elongated with a foot. 23. *Eulophia* in part
23. Plants sympodial, each shoot of limited growth, often with pseudobulbs. 24
 - Plants monopodial, each shoot of potentially unlimited growth, never with pseudobulbs. 27
24. Pseudobulbs of 1 node, 1- or 2-leaved at apex. 25
 - Pseudobulbs or stems of 2 or more nodes, usually several-leaved. 26
25. Inflorescences 1-flowered; flowers with 8 pollinia. 19. *Stolzia*
 - Inflorescences 2- or more-flowered; flowers with 4 pollinia. 20. *Bulbophyllum*
26. Lip spurred; lateral sepals not forming a mentum with the column-foot; roots of two types, erect and sharp, and spreading and branched. 24. *Graphorkis*
 - Lip unspurred; lateral sepals forming a mentum with the column-foot; roots of one type only. 18. *Polystachya*
27. Flowers many in a head; rhachis obscured by bracts and flowers; rostellum mid-lobe recurved strongly in apical half. 33. *Ancistrorhynchus*
 - Flowers solitary or in an long raceme. rostellum mid-lobe not recurved strongly in apical half. 28
28. Leaves bilaterally flattened and arranged as in a fan. 29. *Bolusiella*
 - Leaves flat or cylindrical. 29
29. Rostellum deeply 3-lobed. 34. *Angraecopsis*
 - Rostellum not 3-lobed. 30
30. Rostellum retuse; stipes very short and obscure. 26. *Angraecum*
 - Rostellum elongate; stipes or stipe elongated. 31
31. Pollinia attached by a single stipe to a viscidium. 32
 - Pollinia attached by separate stipes to separate or a single viscidium. 33
32. Lip 3-lobed, sometimes obscurely; flowers small yellow and greenish, spur short to long. 35. *Tridactyle*
 - Lip entire; flowers white, sepals and petals spread out like a star, spur very long. 30. *Aerangis*
33. Inflorescence zigzag; spur with a distinct sharp bend in the spur. 25. *Calyptrochilum*

- Inflorescence not as above; spur straight or gently incurved. 34
34. Pollinia attached to a single viscidium; flowers more or less stellate, white. 35
 - Pollinia attached to separate viscidia; flowers usually not stellate, pale yellow, green or rarely white. 28. *Diaphananthe*
35. Lip entire; pollinia attached by oblanceolate stipes to a saddle-shaped viscidium. 32. *Cyrtorchis*
 - Lip 3-lobed, sometimes obscurely so; pollinia attached by 2 stipes to a single, oblong viscidium. 31. *Rangaeris*

1. CHEIROSTYLIS Blume (1825)

Mariarisqueta Guinea (1946)

Small terrestrial herbs with erect leafy stems arising from fleshy rhizomes. Leaves membranous, petiolate, with a sheathing base, erect. Inflorescence terminal, erect; flower stalk with few sheaths; raceme short, pubescent, up to 20-flowered. Flowers small, white. Sepals joined for half their length. Petals equalling the sepals and joined to the dorsal sepal. Lip equal to or longer than the perianth, joined to base of column, erect, sack-like at base with 2 calli, lobed at the apex; lobes broad, divergent, entire or toothed. Column short, erect, with 2 apical appendages parallel to the elongate rostellum and 2 lateral stigmas; anther dorsal, acuminate; pollinia 2, sectile; caudicle short; viscidium oblong. Capsule obovoid or oblong.

A genus of about 22 species found mainly in tropical Asia across to Australasia, with only 3 species in Africa, 1 of which extends to Madagascar and the Comores; 1 species in the Flora area.

C. lepida (Rchb.f.) Rolfe (1897);

Monochilus lepidus Rchb.f. (1881); *Zeuxine lepida* (Rchb.f.) Rolfe (1892) - type: Mt. Cameroun, Mann 2130 in part (K holo., W illus. of holo.).

Perennial herb up to 30 cm high, usually about 15 cm; stem creeping at base. Leaves membranous, ovate, shortly acuminate, rounded or slightly cordate at the base, up to 5 x 2.5 cm; petiole shorter than the lamina, widening at the base to sheath the stem. Inflorescence terminal; flower stalk erect, sparsely pilose; raceme dense, with up to 20 white flowers; bracts glabrous, up to 13 mm long, exceeding the sparsely pilose ovary. Perianth-segments 3.5-4.8 x 1.1-2.7 mm. Sepals joined for half their length, apices acute. Petals joined to the dorsal sepal, obovate with acute apices. Lip up to 5.6 mm long, equalling or exceeding the perianth, erect, sack-like at the base with 2 hooked calli, bilobed at the apex; lobes broad, divergent, entire or slightly toothed. Column up to 2 mm long. Fig. 200.2.

Ocotea forest floor; 1750-1900 m. KF; Nigeria, Cameroun, Sao Tomé, Zaire, Rwanda, Tanzania, Kenya and Uganda. Friis et al. 2231 & 2121.

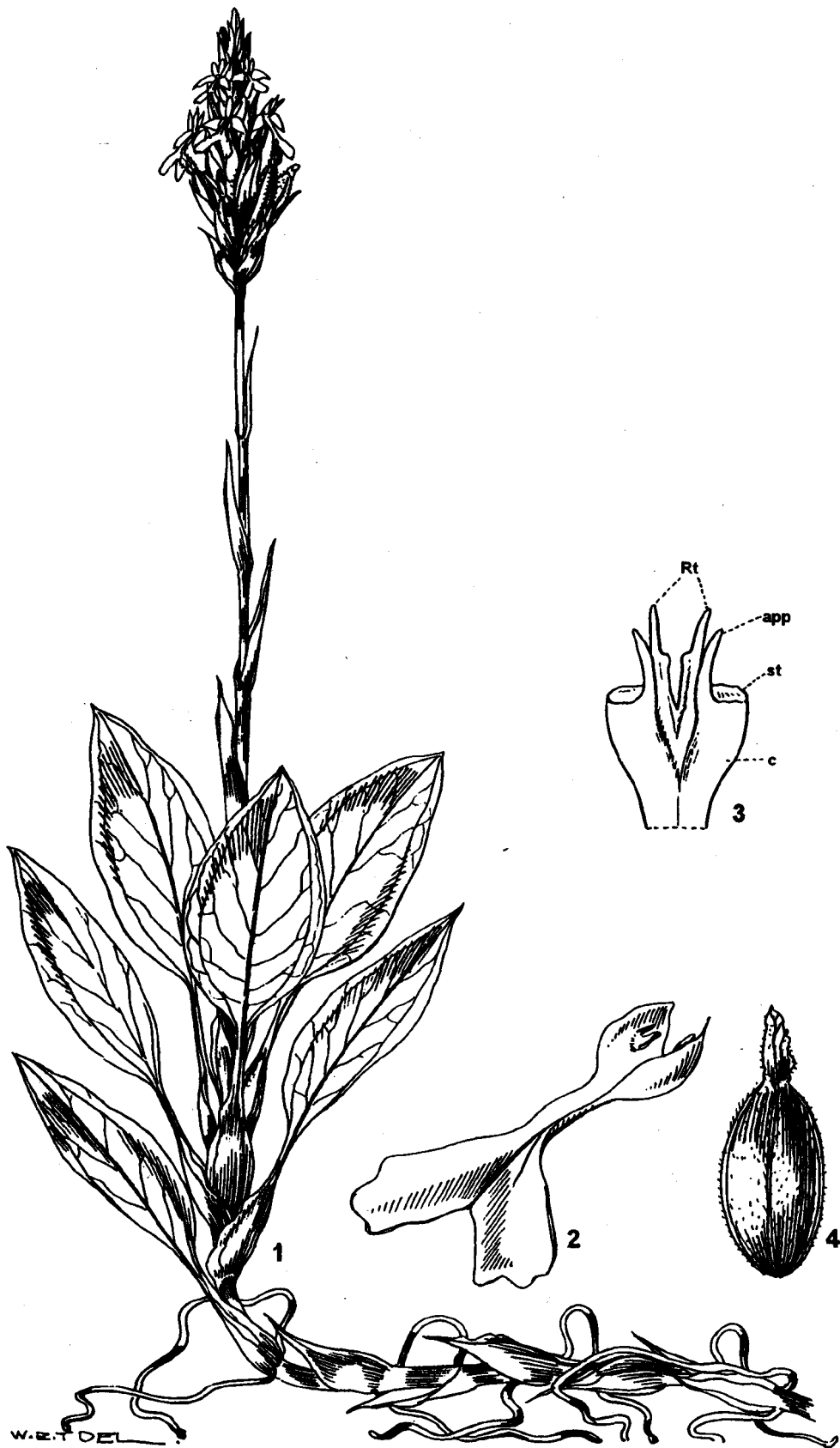


Figure 200.2 *CHEIROSTYLIS LEPIDA*: 1 – whole plant in flower x 1; 2 – lip x 15; 3 – column (c) from beneath showing staminodes (st), rostellum (Rt) and appendages (app) x 20; 4 – capsule x 5. Specimens not cited in original drawing. Drawn by W. Trevithick. (Reproduced with permission from *F. W. Trop. Afr. III* (1), fig. 388.)

2. *CORYMBORKIS* Thouars (1809)*Corymborchis* Thouars (1822)*Corymbis* Thouars (1822)Rasmussen, *Bot. Tidsskr.* 71: 161–192 (1977).

Terrestrial herbs with short rhizomes. Stems erect to several meters, rigid, leafy. Leaves distichous but often appearing spiral, sessile to shortly petiolate, folded, lanceolate to elliptic. Inflorescences 1–4 axillary panicles, few to many-flowered. Flowers white to greenish white. Sepals and petals similar, long, linear, subequal, basally joined. Lip similar but broadly ovate at apex. Column long, slender, straight, dilated at apex with 2 lateral auricles; anther erect, narrow, acuminate, more or less as long as column; pollinia 2, narrow, sectile, on a long slender caudicle attached to a peltate viscidium descending behind the column; stigma broad, deeply 2-lobed; rostellum erect, bifid. Capsule retaining remnants of perianth and column.

7 pantropical species, 2 in Africa, 1 of these in Madagascar and the Mascarene Isles, probably 2 in Asia and 3 in South America; only 1 species in the Flora area.

C. corymbis Thouars (1822)

– type: Reunion, *Du Petit Thouars* (B-WILLD lecto., L ?P isolecto.).

Plants often forming colonies. Stems semi-woody, 0.5–2 m long. Leaves elliptic-lanceolate, acuminate, 11–35 x 3–10 cm, deep glossy green, with narrow sheathing base and short petiole. Inflorescences 1–4, panicles erect to drooping, more or less secund, up to 9 cm long, 10–16-flowered; bracts small. Flowers white or greenish white, turning creamy white with age. Sepals and petals linear-spathulate, acute, 45–90 x 2–5 mm, petals often with crenulate margins. Lip clawed, 45–90 x 5–13 mm; apical dilated part a fifth to a tenth of the total length. Column partially enveloped by lip, cylindrical. Capsule up to 3 cm long, extended by persistent remains of column. Fig. 200.3.

Evergreen forest in deep shade; 550–1400 m. IL KF; throughout tropical Africa and Madagascar. *Friis* et al. 3883 & 4119.

3. *HOLOTHRIX* Rich. ex Lindl. (1835), *nom. conserv.**Deroemera* Rchb.f. (1852)

Summerhayes, *Kew Bull.* 14: 128–130 (1960) & 16: 253–255 (1962); Cribb, *Kew Bull.* 33: 656–658 (1979) & *Kew Bull.* 42: 461 (1987).

Terrestrial herbs with small ovoid or ellipsoid tubers and 1 or 2 sessile ovate or orbicular radical leaves. Flower stalk erect, with or without sheaths, unbranched. Flowers often secund, sessile or shortly stalked. Sepals subequal, free from one another, often hairy, thin in texture. Petals usually longer (often much longer) than sepals, entire or divided in the upper part into 3 or more finger-like, more or less fleshy lobes. Lip similar to petals but broader with more lobes, spurred at the base, joined to the column. Column very short;

anther-locules parallel, pollinia granular, caudicles very short, viscidia small, naked; stigma sessile.

55 species in tropical Africa, South Africa and tropical Arabia, 7 of which are found in the Flora area.

1. Plants flowering after the leaves have withered; peduncle and rhachis glabrous bearing lanceolate bracts along length. 2
- Plants leaf bearing when in flower; peduncle pubescent, lacking sterile bracts or rarely with a few along length. 4
2. Lip entire; spur less than 2 mm long; petals blunt or rounded at apex; inflorescence a dense cylindrical head. 5. *H. squammata*
- Lip with 1–3 apical slender lobes; spur 3–15 mm long; petals lobed at apex, mid-lobe slender, linear; inflorescence laxly many-flowered, more or less secund. 3
3. Spur 12–15 mm long; petals and lip margins papillose; petals with 3 linear lobes at apex. 3. *H. praecox*
- Spur 3.5–8.5 mm long; petals and lip margins glabrous; petals obscurely 3-lobed at apex, side-lobes less than length of mid-lobe. 1. *H. aphylla*
4. Basal leaf solitary; lip obscurely 3-lobed in basal half; mid-lobe obovate, pubescent. 7. *H. unifolia*
- Basal leaves 2; lip 3–7-lobed in apical half or if entire then lilac, blue or violet. 5
5. Lip lilac, blue or violet, 4 times or more longer than sepals and petals. 4. *H. brongniartiana*
- Lip green, pinkish, dark red or purple, less than twice as long as sepals and petals. 6
6. Lip 7-lobed, pubescent, pinkish, central 3 lobes blunt. 6. *H. tridentata*
- Lip 3-lobed, glabrous, green flushed with purple or violet, lobes acute. 2. *H. arachnoidea*

1. *H. aphylla* (Forssk.) Rchb.f. (1881);

Orchis aphylla Forssk. (1775); *Habenaria aphylla* (Forssk.) Spreng. (1826) – type: Yemen, *Forsskål* s.n. (BM holo., W iso.).

Deroemera acuminata Rendle & Schltr. (1895) – types: GD, Mt. Edda Girges, *Schimper* 790 and Kenya, *Scott-Elliott* 7049 (both BM syn., K isosyn.).

Perennial herb 6–27 cm high, quite glabrous except for the petals and lip. Leaves 2, basal, suborbicular or kidney-shaped, up to 3 x 4 cm, usually shrivelled at or about time of flowering. Flower stalk erect, with numerous lanceolate acuminate sheaths, the lower ones overlapping. Inflorescence many-flowered, secund, somewhat lax. Bracts lanceolate, acuminate, shorter than the ovary. Flowers white, slightly tinged purple or bluish. Sepals lanceolate or ovate-lanceolate, acute, the laterals oblique, 2.5–4 mm long. Petals in general shape narrowly ovate or oblong, 4–8 mm long; more or less 3-lobed at the apex, the mid-lobe often longer than the side-lobes, linear, more or less papillose. Lip from a narrow base, orbicular or almost transversely elliptic, 4–8 x 2.5–6.5 mm, 3-lobed at the apex, the outer lobes broad and rounded, rarely acute, the mid-lobe often



Figure 200.3 *CORYMBORKIS CORYMBIS*: 1 – portion of flowering stem x 1½; 2 – base of stems with roots x 1½; 3 – dorsal sepal x 1½; 4 – lateral sepal x 1½; 5 – lateral petal x 1½; 6 – lip x 1½; 7 – column x 1½; 8–10 – top of column, from above, from below, with anther-cap removed, from below, all x 6; 11 & 12 – anther-cap from behind and from front x 6. 1 from Chapman 445; 2–11 from Drummond & Hemsley. Drawn by Judi Stone.

much longer, linear, papillose; spur more or less incurved, slender, tapering at the apex, 3.5–8.5 mm long.

Grazed grassland with scattered *Acacia*; 2000–2400 m. SD; Yemen, Nigeria, Uganda, Kenya, Zaire and Cameroun. *de Wilde* 6478; *Gillett* 14774; *Hildebrandt* 40.

2. *H. arachnoidea* (A. Rich.) Rchb.f. (1881);

Peristylus arachnoideus A. Rich. (1840) – type: TU, Mt. Sholoda near Adua, *Quartin-Dillon* s.n. (P holo.).

Holothrix vatkeana Rchb.f. (1876).

H. richardii Rolfe (1897) – type: TU/GD, *Schimper* 504 (K holo., BM iso.).

Perennial herb 20–70 cm high. Tubers 4–12 x 4–8 mm, ovoid to ellipsoid. Leaves 2, lanceolate, very broadly ovate or orbicular, acute or apiculate, up to 4 x 4 cm, with long soft hairs. Flower stalk somewhat long-hairy. Inflorescence erect, densely many-flowered, secund. Bracts lanceolate, long-hairy, very acute, about equaling the shortly pedicellate ovary. Flowers very small, glabrous, green flushed with violet or purple; ovary glabrous or sparsely hairy. Sepals ovate, acute, the laterals very oblique, 1.5–2.25 mm long, glabrous. Petals obliquely lanceolate-ligulate or ligulate, 2–3 mm long, fleshy in the upper part. Lip in general shape narrowly ovate, 2.2–3.2 mm long, 3-lobed in the upper half or third; lobes nearly equal; spur conical-cylindrical, slightly incurved, 1.5 mm long. Ovary glabrous or sparsely hairy.

Montane grassland, granite slopes covered by scrub; 1300–3000 m. TU SU GG; Kenya, Somalia, Sudan, Yemen and Saudi Arabia. *Ash* 1404; *Mooney* 5832.

3. *H. praecox* Rchb.f. (1881);

Deroemera praecox (Rchb.f.) Rendle & Schltr. ex Rolfe (1898) – type: GD, Debra Eski in Semien, *Schimper* 1576 (W holo., P iso.).

Terrestrial herb up to 30 cm high. Tubers ellipsoid, up to 2 x 1 cm. Leaves not seen, shrivelled at time of flowering. Flower stalk glabrous, bearing about 10 triangular, aristate, sterile bracts. Racemes elongate, laxly 10–16-flowered. Bracts lanceolate, equalling or slightly longer than the ovary. Ovary 8 mm long. Dorsal sepal ovate-lanceolate, 4.6 x 1.5 mm. Lateral sepals triangular, 3.9 x 1.7 mm. Petals oblong, margins papillose 7.8 x 2 mm, extended at apex into 3 linear lobes up to 2.2 mm long. Lip oblong, acuminate, boat-shaped, margins papillose, overall 4.5 x 2.1 mm, 3-lobed; side-lobes deflexed, sometimes bidentate; mid-lobe sometimes long-toothed or filiform, up to 1.4 mm. Spur cylindrical, gently curved forwards, 12–15 mm long. Fig. 200.4.

Montane grassland; 2600–2800 m. TU GD; Zaire. *Ash* 374; *de Wilde* 4928; *Schimper* 1536.

4. *H. brongniartiana* Rchb.f. (1881)

– types: GD, *Schimper* 1329 (W syn., BM isosyn.) & Debra Eski and Agrina in Semien, *Schimper* 651 (W syn.).

H. puberula Rendle (1895).

H. plowdenii Kraenzl. nom. ined. based on *Plowden* s.n. (W).

Perennial herb 5–20 cm high. Leaves 2, kidney-shaped to orbicular, apiculate, 2–5 x 3–5 cm, glabrous. Flower stalk hairy. Bracts lanceolate, acuminate, shorter than the pedicellate ovary, nearly glabrous. Flowers lilac or pale mauve, scented. Sepals ovate or broadly lanceolate, the laterals very oblique, acute, 2.5–4.5 mm long, almost glabrous. Petals obliquely lanceolate, acute, 3.5–4.5 mm long. Lip much longer than other perianth members, oblanceolate or narrowly elliptical from a narrow base, rounded or very shortly 2-lobed at the very tip, 7.5–10 mm long; spur narrowly conical, incurved, 3.5–4 mm long. Ovary hairy.

On steep slopes with *Erica* and *Juniperus* shrubs or under *Carissa edulis*, *Rosa abyssinica*, *Maesa lanceolata*, montane grassland, often among rocks; 1200–3500 m. TU GD SU; Uganda, Kenya, Tanzania, Zambia and Malawi. *Ash* 937; *de Wilde* 6949; *Mooney* 7044.

5. *H. squammata* (A. Rich.) Rchb.f. (1881);

Peristylus squammatus A. Rich. (1851); *Deroemera squammata* (A. Rich.) Rchb.f. (1852) – type: GD, Simen [Semien] Enschedcap, *Schimper* 1164 (P holo., BM K W iso.).

Spiranthes abyssinica Hochst. (1850) – type: Ethiopia, *Schimper* 982 (P holo., W K iso.).

Perennial herb 5–18 cm high. Leaves 2, generally shrivelled at time of flowering, ovate or orbicular to kidney-shaped, up to 4 x 4 cm. Flower stalk glabrous, with numerous lanceolate acuminate, often overlapping, sheaths. Inflorescence dense, many-flowered. Bracts lanceolate, acuminate, as long as or shorter than the flowers. Flowers white. Sepals triangular-ovate, acute, 2–4 mm long, glabrous. Petals elliptical, rounded at the apex, 3–5 mm. Lateral sepals elliptical to ovate-elliptical, rounded at the apex, 3–4.5 x 2–3.5 mm. Lip entire, ovate, obtuse, obovate, 4.5 x 3.5 mm; spur slightly incurved, narrowly conical, 1.3–2.5 mm long. Ovary glabrous, 1 cm long.

Montane grassland or moor, dry open places and in shade of *Juniperus procera*; 2400–2800 m. GD GJ SU AR SD; Sudan and Uganda. *Ash* 2390; *Gilbert* 1988; *Mooney* 5129.

6. *H. tridentata* (Hook.f.) Rchb.f. (1881);

Peristylus tridentatus Hook.f. (1864); *Platanthera tridentatus* (Hook.f.) Engl. (1892) – type: Mt. Cameroun, *Mann* 2128 (K holo.).

H. platydictyla Kraenzl. (1893).

Perennial herb 6–14 cm high. Tubers 4–9 x 3–5 mm, ovoid-globose. Leaves 2, very broadly ovate or orbicular, acute or apiculate, up to 3 x 3 cm, with ciliolate margins. Flower stalk pilose, more pubescent above, mostly lacking sterile bracts. Inflorescence erect, 4–12-flowered. Bracts triangular-ovate, acute or subacuminate, about equalling the ovary, long-hairy. Flowers very small, secund, glabrous, green flushed with violet or purple, lip pinkish. Sepals ovate, acuminate, the

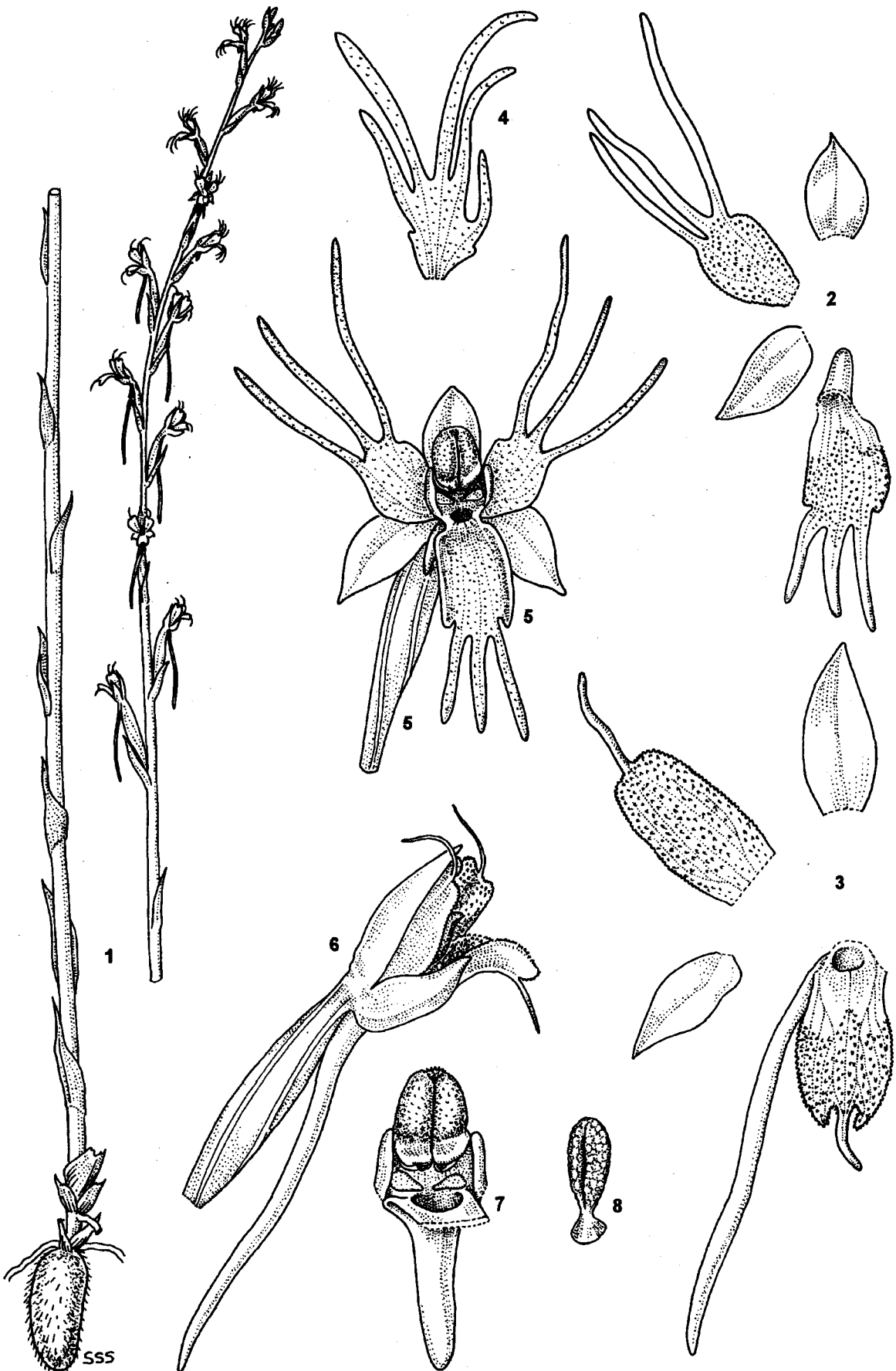


Figure 200.4 *HOLOTHRIX PRAECOX*: 1 – flowering plant x 1½; 2 – dorsal and lateral sepals, lateral petal and lip from flower near the apex of inflorescence x 9; 3 – dorsal and lateral sepals, lateral petal and lip from flower near the base of inflorescence x 9; 4 – petal from flower near the apex of inflorescence to show variation x 9; 5 – flower, front view x 9; 6 – flower, side view x 9; 7 – column and spur x 15; 8 – pollinium x 15. All from *Schimper 1536* (type). Drawn by Susanna Stuart-Smith.

laterals somewhat oblique, 2.0–2.8 mm long, glabrous. Petals broadly-obovate, long-acuminate or obscurely tridentate; side-lobes reduced and obtuse, 2.4–3.1 mm long, Lip in general shape ovate, pubescent, 3.2–4.5 mm long, 7-lobed in the upper half or third; central lobes blunt, outer lobes acute; spur conical, 1.5 mm long. Anther 1 mm high. Ovary hairy.

Grassland, steep slopes; 2100–2250 m. GD/TU SD GG; Sudan & Cameroun. *Gilbert et al.* 484; *Flenley & Miller* 270; *Schimper* 759.

7. *H. unifolia* (Rchb.f.) Rchb.f. (1881);
Deroemera unifolia Rchb.f. (1855); *Peristylus unifolius* Hochst. ex Rchb.f. (1855) – type: GD, Debra Eski in Semien, *Schimper* 129 (W holo., P iso.).
Holothrix schimperi Rchb.f. (1881); *Deroemera schimperi* (Rchb.f.) Rolfe (1898) – type: Ethiopia, *Schimper* s.n. (W holo.).
H. montigena Ridl. (1886); *Deroemera montigena* (Ridl.) Rolfe (1898) – type: GD, Gaffat in Begemder, *Schimper* 1372 (BM holo.).

Perennial herb 10–20 cm high. Tubers 9–16 x 7–15 mm, ovoid-globose. Leaf solitary, very broadly ovate or orbicular, rounded, up to 3 x 3 cm. Flower stalk hispid, upper part with several sessile, triangular, acuminate, sterile bracts. Inflorescence erect, densely many-flowered. Bracts triangular-ovate, acute or subacuminate, about equalling the ovary. Flowers white with red or purple markings. Dorsal sepal ovate, acute, 2.1–3.2 x 1.1–1.3 mm. Lateral sepals somewhat oblique, ovate, acute or rounded, 2.3–3 x 1.3–1.5 mm. Petals ovate, acuminate, more or less pubescent, exceeding the sepals, 3.8–4.2 x 1.0–1.6 mm. Lip in general shape oblong, pubescent, 3.8–4.5 x 2.5–2.7 mm, obscurely and minutely 3-lobed, rarely 5–7-lobed; spur cylindrical, acute, 2.5–3 mm long. Anther 1 mm high. Fig. 200.5.

Open, dry grasslands sometimes with scattered shrubs; 2500–2900 m. GD SU; not known elsewhere. *Ash* 595; *Mooney* 6366; *Friis et al.* 1164.

More field work is needed to assess the variation in this highly variable species.

4. BRACHYCORYTHIS Lindl. (1838)
Gyaladenia Schltr. (1921)
Diplacorchis Schltr. (1921)

Reichenbach, H.G., *Otia Bot. Hamb.*: 104–105 (1881); Summerhayes, *Kew Bull.* 10: 253–260 (1955).

Terrestrial herbs up to 1 m high with fusiform or ellipsoid tuberous roots. Stems usually leafy, the leaves often numerous and overlapping usually lanceolate. Flowers few to numerous (up to 100), stalked, in a terminal inflorescence, white, yellow, pink or various shades of mauve or purple, often spotted darker; bracts leafy, the lower exceeding the flowers. Sepals free, the lateral ones spreading and oblique. Petals usually joined at the base to the side of the column. Lip projecting forwards, rarely deflexed; basal part (hypochile) boat-shaped, sack-like or spurred; upper part (epichile)

flattened, entire or 2–3-lobed. Column erect, somewhat slender; anther-locules parallel, canals absent; caudicles of pollinia usually very short, viscidia naked; stigma hollowed out, rostellum mid-lobe small, erect, folded, the side-lobes often fleshy, surrounding the viscidia.

32 species in tropical and South Africa, and tropical Asia; 3 in the Flora area.

1. Leaves covered all over by a velvety pubescence.
 – Leaves glabrous. 2. *B. pubescens*
 2. Lip with a small conical callus at base of epichile; dorsal sepal 4–5 mm long 1. *B. buchananii*
 – Lip lacking a callus at base of epichile; dorsal sepal 5–14 mm long 3. *B. ovata* subsp. *schweinfurthii*

1. *B. buchananii* (Schltr.) Rolfe (1898);
Platanthera buchananii Schltr. (1897) – type: Malawi, *Buchanan* (B holo.).

Slender terrestrial herb, 20–55 cm high. Tuberous roots narrowly ellipsoid or fusiform, up to 6 x 1 cm. Leaves numerous, lanceolate, acute, up to 4.5 x 1 cm, decreasing in size up the stem. Inflorescence slender, densely many-flowered, up to 14 x 2 cm; bracts lanceolate, the lower equalling the flowers. Flowers pink, mauve or purple; ovary with pedicel 5–7 mm long. Sepals lanceolate-elliptical, the laterals slightly oblique, 4–6 mm long. Petals obovate or semi-orbicular, rounded at apex, a little longer than the sepals and much broader, many-veined. Lip: hypochile boat-shaped with triangular sides, 1.5–2.5 mm long; epichile kidney-shaped or transversely elliptical, 3-lobed with the side-lobes longer than middle one, bearing a small callus just in front of the hypochile, 2.5–3.5 x 4–4.5 mm. Column somewhat stout, 2 mm long.

Savanna country with scattered trees and gallery forest along the rivers and creeks; 1250–1800 m (in E Africa). KF; Nigeria, Zaire, Angola, Uganda, Kenya, Tanzania, Malawi, Zambia and Zimbabwe. *de Wilde* 5347.

2. *B. pubescens* Harv. (1859)
 – type: South Africa, Natal, near Durban, *Sanderson* 482 (TCD holo., K W iso.).
Peristylus hispidulus Rendle (1895); *Platanthera hispidula* (Rendle) Gilg (1895); *Brachycorythis hispidula* (Rendle) Schltr. (1921).
Brachycorythis goetzeana Kraenzl. (1900).
B. stolzii Schltr. (1921).

Terrestrial herb 25–80 cm high. Roots tuberous, fleshy, ellipsoid or cylindrical, 1 cm in diameter, densely woolly. Leaves numerous, lanceolate or broadly lanceolate, acuminate, those in middle of stem up to 6 x 2.5 cm, decreasing in size up the stem, more or less densely velvety hairy. Inflorescence densely many-flowered, up to 35 x 2–6 cm; bracts similar to leaves, the lower ones usually longer than the flowers, velvety hairy. Flowers various shades of pink or purple, often with an orange centre; pedicel with ovary 1–2 cm long, velvety. Dorsal sepal elliptical, obtuse or rounded at

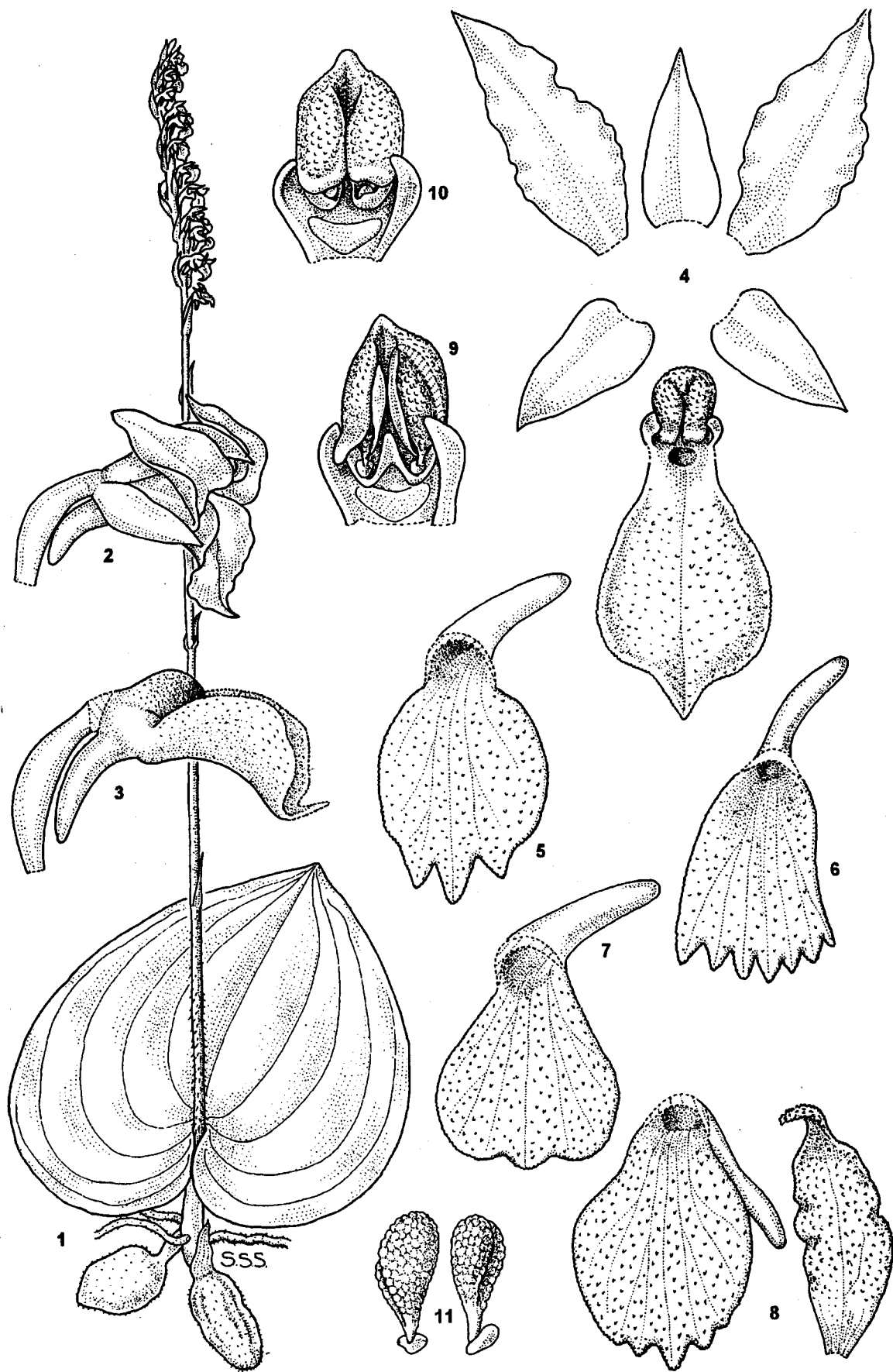


Figure 200.5 *HOLOTHRIX UNIFOLIA*: 1 – whole plant in flowers $\times 1\frac{1}{2}$; 2 – flower, side view $\times 9$; 3 – column and lip, side view $\times 12$; 4 – sepals, petals and lip $\times 12$; 5–7 – variations in lip $\times 12$; 8 – lip and petal $\times 12$; 9 – column front view, locule partly removed $\times 21$; 10 – column, front view, with locule covering anther $\times 21$; 11 – pollinarium with 2 pollinia $\times 33$. 1–4, 9 & 10 from Ash 62/595; 5 & 6 from de Wilde 9558; 7 & 11 from Mooney 6366; 8 from Friis, Gilbert et al. 1164. Drawn by Susanna Stuart-Smith.

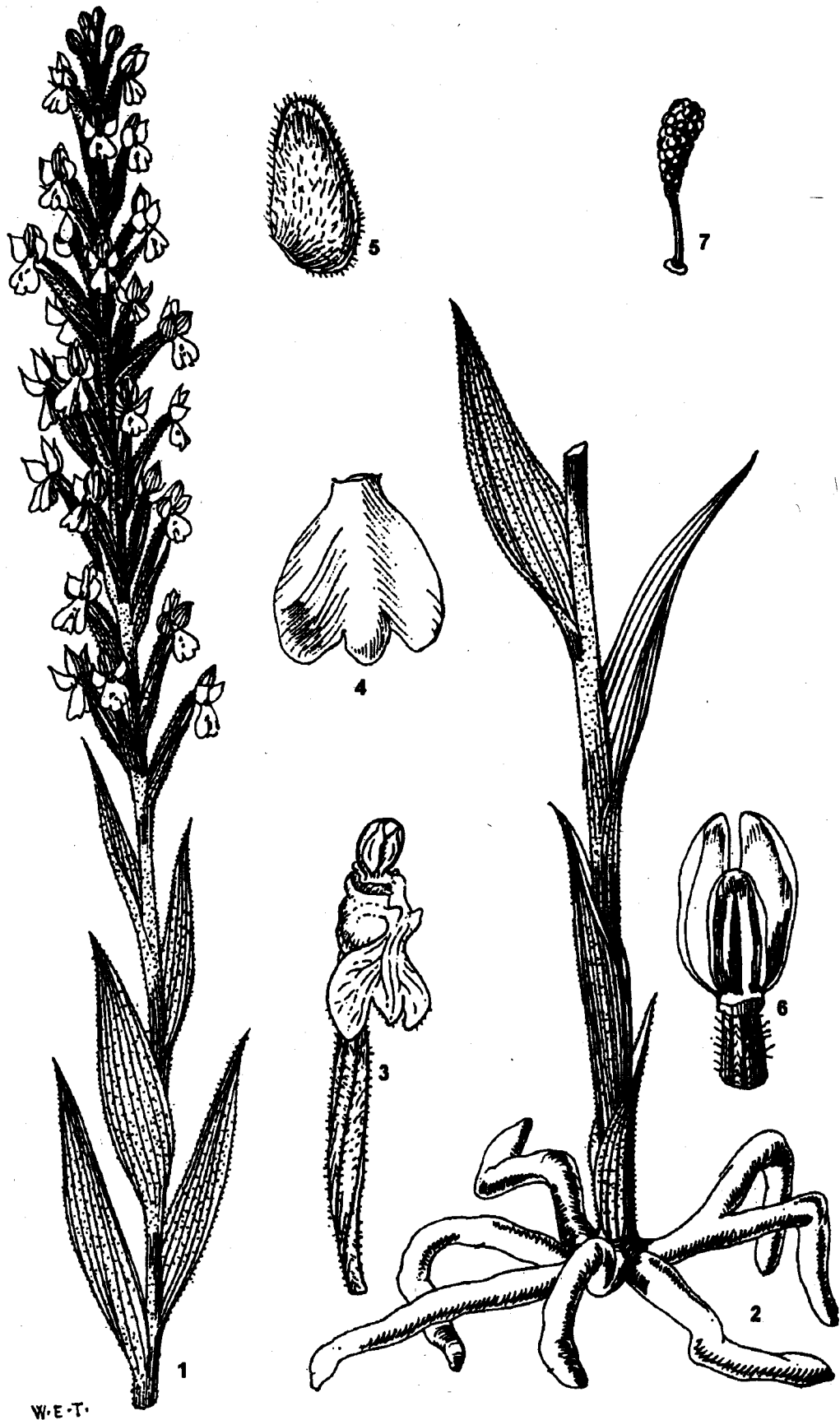


Figure 200.6 *BRACHYCORYTHIS PUBESCENS*: 1 - upper part of stem with inflorescence x 1; 2 - base of stem and roots x 1; 3 - flower, sepals and petals removed x 4; 4 - lip x 7; 5 - lateral sepal x 7; 6 - column and lateral petals, lip removed x 7; 7 - pollinarium, much enlarged. Drawn by W. E. Trevithick. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 6.)

apex, 4.5–7.5 mm long; laterals obliquely ovate or elliptical, obtuse or rounded, a little longer than the dorsal; all sepals pubescent outside. Petals erect on each side of column, very obliquely elliptical or oblong, rounded at apex, a little shorter than the dorsal sepal with a few hairs on the outside. Lip-hypochile shortly bowl-shaped, 2–3 mm long from back to front, the margins angular; epichile bent downwards in a knee-like manner from its attachment, broadly wedge-shaped or fan-shaped, 3-lobed at the apex, 5–10 x 6–14 mm, the lobes triangular, often rounded, the middle one smaller than or equalling the side-lobes. Column somewhat stout, 2.5–4 mm long. Fig. 200.6.

Grassland or open woodland; 1800 m. KF; tropical Africa and South Africa. *Beals* B179; *Mooney* 7286; *Hildebrandt* 520.

3. *B. ovata* Lindl. (1838)

– type: South Africa, Cape Province, Pondoland, between Umtata R. and Umsikaba R., *Drége* 4569 (K holo.)

subsp. *schweinfurthii* (Rchb.f.) *Summerh.* in *Kew Bull.* 10: 257 (1955);

B. schweinfurthii Rchb.f. (1878) – type: Sudan, *Schweinfurth* 3577 (W holo.).

B. ugandensis Schltr. (1922).

B. grandis Kraenzl. var. *ugandensis* Braid (1925).

Terrestrial herb 20–100 cm high. Roots very fleshy, cylindrical. Leaves very numerous, narrowly to broadly lanceolate, very acute, the middle ones up to 8 cm long and 2.5 cm broad, decreasing in size up the stem. Inflorescence densely to somewhat laxly many-flowered, up to 35 cm long, 3–6 cm in diameter; bracts leaf-like, lanceolate, the lower ones usually and sometimes nearly all of them longer than the flowers. Flowers lilac with darker spotting, various shades of purple and mauve, often with an admixture of white; ovary with pedicel 1–2 cm long. Dorsal sepal elliptical, obtuse or rounded at apex, 5–9 mm long; laterals obliquely ovate, subacute, 6.5–11 mm long. Petals erect on each side of column, obliquely oblong-ovate with a marked rounded auricle in front, truncate or toothed at the apex, about as long as the dorsal sepal. Lip-hypochile boat-shaped, somewhat curved, 4–6 mm long, upper margins almost straight; epichile broadly obovate, 3-lobed in the upper part with a keel running along the centre into the triangular mid-lobe, the side-lobes more or less incurved, shorter than, equalling or longer than the mid-lobe. Column more or less stout, 3–4 mm long.

Open secondary scrub, pasture, *Combretum* woodland and *Eucalyptus*-planted grassland; 1600–2000 m. KF SD; Senegal, Ivory Coast, Nigeria, Cameroun, Zaire, Sudan, Uganda, Kenya and Tanzania. *Beals* 147; *De Wilde* 5259; *Gilbert & Jefford* 4356.

5. CYNORKIS *Thouars* (1809)

Kraenzlin in Engler, *Pflanzenw. Ost Afr. C.*: 151 (1895).

Terrestrial herbs with elongated fleshy or tuberous

roots. Stems often glandular pubescent. Leaves almost all radical, few or solitary, the cauline ones small or sheath-like. Flowers few or numerous in a lax or dense terminal raceme, usually twisted through 180° but rarely not so, usually pink or mauve, less frequently orange, rarely white. Sepals free or slightly joined to the lip, the laterals spreading, the dorsal often forming a helm with the 2 petals. Lip free, entire or 3–5-lobed, usually larger than the tepals, spurred at the base. Column short and broad; androclinium erect or sloping; anther-locules parallel, canals short or long and slender, caudicles of pollinia slender, viscidia 2, rarely 1, naked, auricles distinct; stigmatic processes oblong, papillose, usually united to the rostellum-lobes; rostellum prominent, several-lobed, the side-lobes usually elongated, the mid-lobe often large, projecting forward. Capsules oblong or fusiform.

A genus containing about 125 species, mostly natives of Madagascar and the Mascarene Island, 17 species in Africa, but only 2 from the Flora area.

1. Lip ligulate; inflorescence pyramidal, densely many-flowered; sepals and petals 3–5 mm long; spur 3–5 mm long, tapering-incurved.

1. *C. anacamptoides*

– Lip ovate or broadly lanceolate, 3-lobed in middle; inflorescence cylindrical; sepals and petals 5–8 mm long; spur 6–9 mm, cylindrical, slightly club-shaped, straight

2. *C. kassneriana*

1. *C. anacamptoides* Kraenzl. (1895)

– type: Ruwenzori, *Stuhlmann* 2346 (B holo.).

Terrestrial herb 10–60 cm high; roots numerous, slender. Stem slender, erect, usually glandular pubescent in the upper part, bearing 2–6 leaves near the base and several smaller sheath-like ones above. Leaves lanceolate or lanceolate-elliptic, the lowest ones often stalked, acute, the largest 2–13 x 8–18 mm, glabrous. Inflorescence densely many-flowered, 2.5–20 cm long. Bracts lanceolate, glabrous or more or less glandular pubescent, the lower ones longer than the ovary. Flowers pink, mauve or purple, suberect. Dorsal sepal ovate, very convex, subacute, 3 mm long, forming a hood with the petals; laterals spreading, obliquely and broadly oblanceolate, subacute, 3.5–5 mm long. Petals lanceolate or oblanceolate, curved, acute, 3–4 mm long. Lip ligulate or narrowly wedge-shaped, obtuse, 3–5 x 1 mm; spur incurved-cylindrical, slightly swollen in apical half, 3–5 mm long. Column short; rostellum mid-lobe erect, triangular, more or less hooded, slightly overtopping the anther.

Wetlands with tall grasses and grassland, by streams or in open places in rain-forests; 600–3000 m. KF SD; Cameroun Republic, Fernando Po, Zaire Uganda, Tanzania, Angola, Zambia, Malawi and Zimbabwe. *de Wilde* 6939 & 7531; *Friis* et al. 106.

2. *C. kassneriana* Kraenzl. (1914)

– type: Zaire, Ruwenzori, *Kassner* 3124 (B holo., K iso.).

subsp. *kassnerian**C. rupicola* Schltr. (1915).

Terrestrial or rarely epiphytic herb 15–50 cm high; root-tubers ellipsoid, up to 2–5 x 1 cm, more or less woolly. Stem slender, erect, glandular hairy, especially in upper part with 1 or 2 sheaths and a single leaf (rarely 2 leaves) at the base and several lanceolate acuminate sheaths above. Leaf erect or spreading, lanceolate, elliptical-lanceolate or oblanceolate, acute or acuminate, 4–20 x 1–4 cm broad, glabrous. Inflorescence laxly or more or less densely 4–22-flowered, 3–10 cm long; rhachis glandular hairy. Bracts lanceolate, acuminate, shorter than the ovary, glandular ciliate. Flowers pinkish-purple or mauve, suberect; pedicel with ovary 1–2 cm long. Ovary glandular hairy. Dorsal sepal very convex, ovate, hooded at the apex, 5–7 mm long; laterals spreading, obliquely ovate or lanceolate-ovate, obtuse, 6.5–8 mm long; all more or less sparsely glandular hairy outside. Petals obliquely lanceolate, acute, 4.5–7.5 mm long, joined at the inner base to the column. Lip ovate or broadly lanceolate in outline, more or less distinctly 3-lobed at the middle, 5–8.5 x 2.5–5 mm, the mid-lobe triangular and much larger and longer than the side-lobes; spur descending, cylindrical, 6–9 mm long. Column short and stout; anther-canals short; rostellum projecting forward, almost equally 3-lobed; stigmas shortly club-shaped. Fig. 200.7.

Mossy banks by streams, on forest floor, or epiphytic on moss covered branches in rain-forest; 1300–2580 m. KF BA; Zaire, Uganda, Tanzania, Malawi, Zambia, Zimbabwe, South Africa (Transvaal). *Friis* et al. 3567; *Thomas* 47; *Mooney* 10019.

Subsp. *tenuior* Summerh. in *Kew Bull* 8: 129 (1953) occurs in Zaire.

6. *HABENARIA* Willd. (1805)

Podandria Rolfe (1898), non Baill. (1890), *nom. illegit.* Lindley, *Gen. Spec. Orch. Pl.*: 306–326 (1835); Durand & Schinz, *Consp. Fl. Afr.*: 73–89 (1895); Thomas & Cribb, *Kew Bull.* 51: 145–154 (1996).

Terrestrial, or rarely epiphytic, herbs with elongated fleshy or tuberous roots. Stems unbranched, sometimes very short. Leaves variously arranged along the stem, sometimes 1 or 2 radical and addressed closely to the ground, the cauline ones sometimes sheath-like. Inflorescence terminal, 1- to many-flowered. Flowers usually twisted through 180°, but in a few species not so, usually white and/or green, rarely yellow, orange or pink. Sepals usually free, the laterals spreading, the dorsal often forming a helm with the 2 petals. Petals often adherent to the dorsal sepal, entire or variously divided, often 2-lobed nearly to the base. Lip usually slightly joined at the base to the column, the free part entire or variously divided or lobed, spurred at the base; spur short, sac-like to long and slender. Column long or short, slender or thickened; anther upright or reclinate, the locules adjacent and parallel with a narrow connective, or separated from one another by a much

broadened filament and more or less divergent, canals short or much elongated, joined to the lateral lobes of the rostellum, auricles (staminodes) sometimes elongated or 2-lobed, usually wrinkled; pollinaria 2, each with a sectile pollinium, short or elongated caudicle and somewhat small naked viscidium; stigmatic processes distinct, shortly club-shaped to very long with capitate or club-shaped apices, usually free, but sometimes united in the lower part to the rostellum, the rostellum side-lobes divergent, short or long, mid-lobe long and overtopping the anther to short and very blunt or scarcely developed. Capsules oblong or fusiform.

A genus containing approximately 600 species, distributed throughout tropical and subtropical regions. With 45 species, this is the largest genus for this family in the Flora area.

Key to sections

1. Leaves 1 or 2, basal, orbicular or heart-shaped, pressed to the ground. Sect. *Diphyllae* spp. 39–45, p. 228
 - Leaves borne along stem, not pressed to the ground. 2
2. Petals entire. 3
 - Petals bipartite. 6
3. Spur short, 0.5–2 mm, globose; stigmatic processes less than 1 mm long. Sect. *Pseudoperistylus* spp. 4–6, p. 209
 - Spur usually much longer than 2 mm, cylindrical or inflated at the apex but not globose; stigmatic processes usually more than 1.5 mm long. 4
4. Inflorescence cylindrical, densely many-flowered. Sect. *Commelynifoliae* spp. 7–10, p. 211
 - Inflorescence slender, narrow and/or laxly flowered. 5
5. Side-lobes of lip divided into narrow segments or, if not divided, then over 5 mm broad. Sect. *Multipartitae* spp. 11–21, p. 214
 - Side-lobes of lip entire and less than 2 mm broad. Sect. *Chlorinae* spp. 1–3, p. 208
6. Dorsal sepal strongly reflexed. Sect. *Replicatae* spp. 23–27, p. 219
 - Dorsal sepal more or less erect. 7
7. Leaves oblanceolate; anther canals less than 1 mm long; stigmatic processes 1.5–2.5 mm long. Sect. *Pentaceras* 22. *H. malacophylla*, p. 219
 - Leaves linear to lanceolate to suborbicular but not oblanceolate; anther canals longer than 1 mm; stigmatic processes longer than 3 mm. 8
8. Petals papillate, pubescent or ciliate at least in part. 9
 - Petals glabrous. 10
9. Stigmas curved downwards over base of lip.

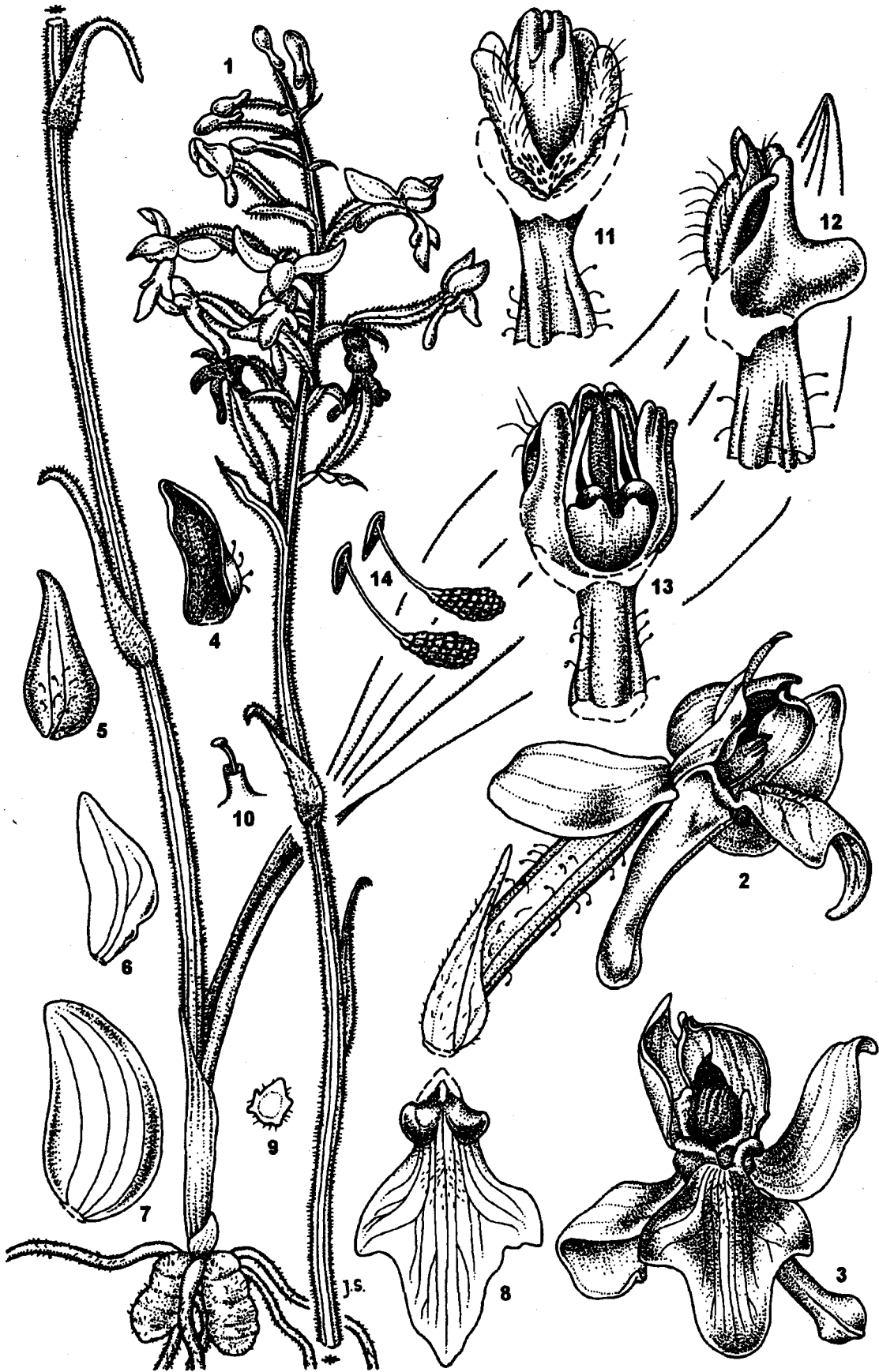


Figure 200.7 *CYNORKIS KASSNERIANA*: 1 - whole plant in flowers x 1; 2 & 3 - flower, side and front views x 3; 4 & 5 - dorsal sepal, front and back views x 3; 6 - lateral sepal x 3; 7 - lateral petal x 3; 8 - lip, spur removed x 3; 9 - cross-section of immature ovary x 4; 10 - close-up of individual hair on ovary x 16; 11-13 - column, front, side and back views x 6; 14 - pollinarium of 2 pollinia x 6. 1 from C.E.H. Thomas 47; 2-14 from spirit material by Osmaston 5889. Drawn by Judi Stone.

Sect. *Mirandae*33. *H. rautaneniana*, p. 224

- Stigmas more or less porrect. Sect. *Cultratae*
spp. 28–32, p. 221

10. Anther canals 4–20 mm long.

Sect. *Ceratopetalae*

spp. 34–37, p. 224

- Anther canals less than 3 mm long.

Sect. *Macrurae*38. *H. perbella*, p. 228Section *Chlorinae* Kraenzl.

Leaves cauline, lanceolate or linear. Flowers small. Petals entire, forming a hood with the dorsal sepal. Lateral sepals reflexed, longer than the dorsal sepal. Lip 3-lobed; spur as long as or longer than the lip. Stigma processes short.

1. Length of mid-lobe of lip 7 or more times width, only slightly wider than side-lobes.

3. *H. filicornis*

- Length of mid-lobe of lip less than 4 times width, much wider than side-lobes. 2

2. Leaves 2, well developed at base of stem; apical half of bracts drying with dark staining; lip mid-lobe length exceeding or only just exceeding side-lobes. 1. *H. distantiflora*

- Leaves well developed all along stem; bracts of uniform colour; lip side-lobe length exceeding or only just exceeding mid-lobe. 2. *H. bracteosa*

1. *H. distantiflora* A. Rich. (1851)

– type: Ethiopia, Gouagoua in Chire, *Quartin-Dillon* s.n. (P holo.).

H. attenuata Hook.f. (1864) – type: Cameroun Mt., *Mann* 2118 (K holo.).

H. variabilis Ridl. (1886) – type: Ethiopia, *Schimper* 1265 (BM holo., K iso.).

H. variabilis var. *parviflora* Ridl. in *Journ. Bot.* 24: 295 (1886) – type: Ethiopia, Dschau Meda, *Schimper* 1292 (BM holo.).

H. variabilis var. *acutifolia* Ridl. in *Journ. Bot.* 24: 295 (1886) – type: GJ, Mt. Gunna, *Schimper* 1304 (BM holo.).

Terrestrial herb 15–50 cm high. Tubers ovoid, 1 x 0.7 cm. Leaves 4–7, very unequal, 1–2 at base of stem, lanceolate-oblong, acute, up to 13 x 1.3–2 cm, the upper ones much smaller, similar to the bracts. Inflorescence slender, up to 16 cm long, somewhat laxly up to 20-flowered. Bracts broadly lanceolate, acuminate, the lower ones, and often all, longer than the flowers, apical half with darker coloration. Flowers apparently in a single spiral row, suberect, green or yellowish-green with brown markings; pedicel with ovary 1 cm long. Dorsal sepal incurved, convex, 2.7–3.3 x 2.1–2.4 mm. Lateral sepals deflexed, obliquely broadly lanceolate, acute, 3–4 mm long; all sepals ciliate. Petals broadly lanceolate, back margin infolded, equalling the dorsal sepal and forming a helm with it. Lip 3-lobed nearly to the base, the claw 0.5–1 mm long; lobes oblong, rounded, the mid-lobe equalling or longer and broader than the spreading side-lobes; spur pendent, slender, slightly swollen in the

distal half, 10–17 mm long. Column short; anther-locules parallel, canals very short; stigmas club-shaped, 1–2 mm long, rostellum mid-lobe broadly rounded and hooded, equalling the anther.

Montane grassland among bracken, *Juniperus procera* or *Erica arborea*; 2000–3800 m. TU GD SU AR HA; Fernando Po, Cameroun, Zaire, Sudan, Kenya, Uganda and Yemen. *Ash* 3177a; *Chiovenda* 1029; *de Wilde & de Wilde-Duyffes* 8156.

This and the following species are sometimes difficult to tell apart and several specimens that are somewhat intermediate have been examined. Further work is needed to clarify their respective status.

2. *H. bracteosa* A. Rich. (1851)

– type: Ethiopia, Simen [Semien], *Enschedeab, Schimper* 1189 (P holo., K record of holo., S W iso.).

H. clarencensis Rolfe (1898) – type: Fernando Po, *Mann* 645 (K holo.).

Terrestrial herb 15–95 cm high. Tubers ellipsoid, almost globose or carrot-shaped, 1.5–3 x 0.5–2 cm. Leaves 5–10, the lowest 2 sheath-like, the middle 3–5 lanceolate or oblong-lanceolate, acute, up to 30 x 3 cm, the uppermost smaller but similar, bract-like. Inflorescence more or less densely many-flowered, 5–50 cm long. Bracts narrowly lanceolate, acuminate, the lower ones longer than the flowers. Flowers suberect with curved ovaries, green or yellowish-green with yellow anther; pedicel with ovary 1 cm long. Dorsal sepal ovate or narrowly ovate, subacute, 2.5–4.5 mm long. Lateral sepals obliquely and broadly oblong-lanceolate, obtuse, 3.5–5.5 mm long. Petals very obliquely triangular-ovate, subacute, equalling the dorsal sepal but a little broader. Lip deflexed, 3–8 mm long, 3-lobed from a short broad claw; lobes oblong or ligulate, obtuse, the side-lobes a little longer or equalling the mid-lobe; spur slender, more or less incurved, 15–28 mm long. Column short; anther-locule parallel, horizontal, canals very short; stigmas club-shaped, truncate, 1–2 mm long, rostellum mid-lobe short, rounded and hooded.

Grassy glades in montane forest, especially by streams, and in damp places in heath and other areas above forest; 2200–3600 m. GD SU AR KF; Fernando Po, Cameroun, Sudan, Uganda, Kenya and Tanzania. *Ash* 3128, *de Wilde & de Wilde-Duyffes* 7997; *Schimper* 595.

3. *H. filicornis* Lindl. (1835)

– type: Ghana, *Thonning* s.n. (C holo., W iso.).

H. chlorotica Rchb.f. (1865); *H. filicornis* var. *chlorotica* (Rchb.f.) Geerinck (1982) – type: Angola, Huilla, *Welwitsch* 725 (W holo., BM K iso.).

H. deflexa Hochst. ex Engl. (1893) – type: Ethiopia, *Schimper* s.n. (FI iso.).

H. erythraeae Rolfe (1897) – type: Eritrea, *Schweinfurth* 164 (K holo.).

H. tridactyla A. Rich. (1851) – type: TU, Abba-Garima nr. Adua. *Quartin-Dillon* s.n. (P holo., W iso.).

Terrestrial herb 15–50 cm high. Tubers globose or ellip-

soid, 10–20 x 5–12 mm, more or less woolly. Stem slender with scattered leaves. Leaves 3–9, nearly erect or recurved, 1 or 2 lowest sheath-like, white with dark reticulations, remainder lanceolate or elliptical-lanceolate, acute, the largest 3–11 x 0.7–1.8 mm, the others decreasing in size up the stem. Inflorescence narrow, 5–19 cm long, more or less laxly up to 20-flowered. Bracts lanceolate, acuminate, shorter than the flowers. Flowers curved outwards, green; ovary 8–11 mm long; pedicel 3–6 mm long. Dorsal sepal elliptical or ovate-elliptical, obtuse, convex, 2.5–5.5 x 2.1–2.6 mm. Lateral sepals deflexed, obliquely semi-ovate, obtuse, 3.5–7 x 1.9–2.2 mm. Petals very obliquely lanceolate, as long as the dorsal sepal and adherent to it. Lip divided almost to the base, 5–13 mm long, the undivided part less than 1 mm long; lobes linear, somewhat fleshy, more or less incurved, the mid-lobe a little longer and broader than the side-lobes; spur slender, slightly swollen towards the apex, 20–30 mm long. Anther 2–3 mm long, locules parallel, canals scarcely 1 mm long; stigmas club-shaped, 1.5 mm long, thickly papillose-pubescent on the lower surface, mid-lobe of rostellum narrow, acute, variable in length, median keel absent or very low.

Open grassy slopes, coarse grassland with herbs and shrubby thickets or secondary bushland; 1350–2000 m. EW TU SU AR KF SD GG HA; Ghana, Ivory Coast, N. Nigeria, Zaire, Tanzania, Uganda, Angola, Malawi, Zambia and Zimbabwe. *de Wilde* 5422; *Gilbert & Getachew* 2669; *Gilbert & Jefford* 4382.

A very variable species.

Section *Pseudoperistylus* P.F. Hunt

Leaves cauline, ovate. Flowers very small. Petals entire, adnate to the dorsal sepal to form a hood. Lip 3-lobed with a callus on the mid-lobe; lobes more or less equal in length, triangular; spur much shorter than the lip.

1. Lip with 2 calli, 1 at base, the other on mid-lobe; leaves more or less basal; sepals and petals ciliate. 5. *H. montolivaea*
– Lip with a single central or apical callus; leaves spread along stem; sepals and petals glabrous. 2
2. Lip side-lobes longer than the mid-lobe, falcate-lanceolate; callus on lip mid-lobe; plants usually more than 18 cm high. 6. *H. petitiana*
– Lip side-lobes equalling mid-lobe, very short, triangular; callus on middle of lip; plants usually less than 15 cm high. 4. *H. lefebureana*

4. *H. lefebureana* (A. Rich.) Dur. & Schinz (1895);
Peristylus lefebureanus A. Rich. (1840); *Hermidium lefebureanum* (A. Rich.) Rchb.f. (1852); *Platanthera lefeburiana* (A. Rich.) Engl. (1892) – type: TU, Adua, *Quartin-Dillon & Petit* 227 (P holo., BM K iso.).

Small terrestrial herb, 8–15(–40) cm high; tubers 5–13 x 3–9 mm, elliptic, tomentose. Stem leafy. Leaves up to 4.6 x 0.7–2.6 cm, elliptic to elliptic-ovate, obtuse, largest in middle of stem. Inflorescence 2–5 x 0.8–1.3 cm, cylin-

dric or rarely pyramidal, densely many-flowered. Bracts 6–8 mm long, ovate to lanceolate, acute or subacute. Flowers small, fragrant, white. Dorsal sepal 3–4 x 1.6–1.7 mm, elliptic to elliptic-ovate, rounded at the apex; lateral sepals 3.5–4 x 1.5 mm, similar to dorsal sepal. Petals 2.5–3 x 1.2–1.6 mm, oblique at base, elliptic, rounded at the apex. Lip 2.5–3 x 2.3–2.5 cm, subquadrate, 3-lobed at apex; lobes 0.5–0.7 mm long, subtriangular; callus fleshy extending onto mid-lobe; spur 0.5 mm long, obscure. Column 0.8–1.2 mm long; stigma lobes 0.7 mm long; rostellum side arms 0.7 mm long.

Short grassland on rocky slopes and in scrub; 2600–3800 m. EW GD SU AR BA; Yemen. *Ash* 2937; *de Wilde* 6854; *Mooney* 7928.

Two collections [*de Wilde* 20 (K) & *Chioventa* 824 (FI)] have flowers twice the size of typical *H. lefebureana* but are otherwise identical.

5. *H. montolivaea* Kraenzl. ex Engl. (1892);
Montolivaea elegans Rchb.f. (1881) non *H. elegans* (Lindl.) Bol. (1870) – type: GD, Debra Tabor, *Schimper* 1268 (B holo., K iso.).
Peristylus albidulus Chiov. (1911) – types: Ethiopia, *Negri* 1386, *Chioventa* 1046 & 1292 (FI syn.).

Terrestrial herb 10–20 cm high. Tubers globose or ellipsoidal, 10–25 x 7–13 mm. Stem erect, leafy along length. Leaves 4–7, olive-green, the basal 3 spreading, obovate, acute or obtuse, the largest 2–4 x 1–3 cm, the uppermost much smaller, bract-like. Inflorescence up to 4 cm long, densely or subdensely many-flowered. Bracts lanceolate, acuminate, the lower ones often longer than the flowers. Flowers suberect, white or greenish white; pedicel and ovary 4–6 mm long. Dorsal sepal erect, ovate, obtuse, 2.5–2.8 x 1.5–1.9 mm. Lateral sepals spreading, oblong or oblong-elliptical, obtuse to subacute, 2.5–2.6 x 1.5–1.7 mm. Petals triangular or obliquely curved, obtuse, ciliate, 2–2.6 x 0.8–1.7 mm. Lip 3-lobed in apical half, 2.5–3 x 3.5–4.2 mm, with a large fleshy callus or keel at base and apex; side-lobes shorter or equalling mid-lobe; mid-lobe triangular, short; spur subglobose, 1.2–1.9 mm long. Column 0.8–1.2 mm long; locules erect, parallel; stigmas ellipsoidal from a narrow base, scarcely 1 mm long; rostellum mid-lobe folded and hooded, 1 mm long, side-lobes very small. Fig. 200.8.

Open grassland; 1000–2600 m. GD SU WU AR; not known elsewhere. *Ash* 500; *de Wilde* 6827; *Mooney* 7930.

6. *H. petitiana* (A. Rich.) Th. Dur. & Schinz (1895);
Peristylus petitianus A. Rich. (1840); *Platanthera petitiana* (A. Rich.) Engl. (1892) – type: TU, *Quartin-Dillon & Petit* 229 (P holo., K W iso.).
P. snowdenii Rolfe (1918) – type: Kenya, Limuru, *Snowden* 554 (K holo.).
P. ugandensis Rolfe (1918) – type: Kenya, Limuru, *Scheffler* 244 (K holo.).

Terrestrial herb up to 1 m high. Tubers globose or ellipsoid, 10–25 x 7–13 mm, more or less woolly. Stem

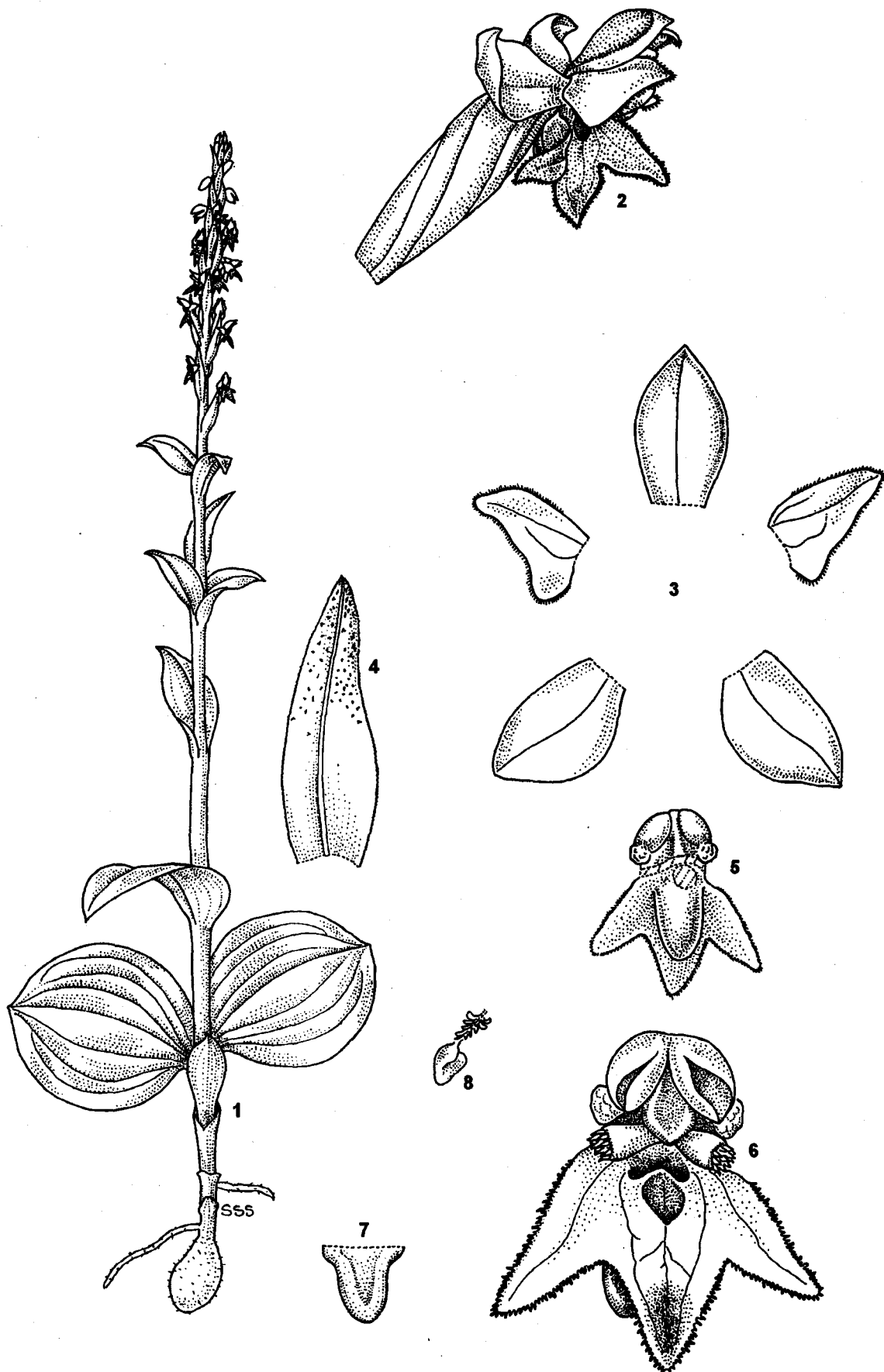


Figure 200.8 *HABENARIA MONTOLIVAEA*: 1 – whole plant in flower x 1½; 2 – flower, side view x 10½; 3 – sepals and petals x 12; 4 – bract x 12; 5 – lip and column, rear view, showing short spur x 9; 6 – column and lip, front view x 15; 7 – spur x 15; 8 – pollinium x 15. All from *Ouven* 20–450. Drawn by Susanna Stuart-Smith.

erect, leafy along its whole length. Leaves 7–14, the lowest 2 or 3 sheath-like, most of the rest ovate or broadly lanceolate, acute, the largest 3–8.5 x 1.5–4.3 cm, the uppermost often much smaller, bract-like. Inflorescence slender, up to 28 cm long but very rarely exceeding 20 cm, more or less densely many-flowered. Bracts lanceolate, acuminate, the lower ones often longer than the flowers. Flowers suberect or curved outwards, green or yellow-green, glabrous; ovary almost sessile, 4–6 mm long. Dorsal sepal ovate or lanceolate-ovate, acute, 2.5–4 mm long. Lateral sepals spreading, oblong or oblong-elliptical, obtuse or subacute, a little longer but narrower than the dorsal sepal. Petals obliquely oblong, obtuse, 2–3.5 x 1–1.5 mm. Lip broadly cuneate or almost fan-shaped, 2.5–4 mm long and nearly as broad, 3-lobed in the apical half; lobes more or less divergent triangular or ligulate-triangular, the laterals often longer than the mid-lobe, the latter with a distinct median keel; spur almost globose, just exceeding 1 mm in length. Locules erect, parallel, canals absent; stigmas ellipsoid from a narrow base, scarcely 1 mm long, rostellum mid-lobe folded and hooded, 0.4 mm long. Fig. 200.9.

Short grassland, among scrub or at edges of forest, montane or riverine; 1200–3150 m. EW TU GD GJ SU KF SD; Zaire, Kenya, Tanzania, Uganda, Malawi and Zambia. *Ash* 499; *Gilbert & Getachew* 2766; *Mooney* 5998.

Section *Commelynifoliae* Kraenzl.

Leaves cauline, elliptic. Flowers small to medium-sized. Petals entire. Dorsal sepal smaller than the cuneate lateral sepals. Lip 3-lobed or entire; spur elongate. Stigma lobes elongate, more or less lying on base of lip.

1. Spur deeply bilobed at the apex. 7. *H. platyanthera* – Spur not deeply bilobed at the apex. 2
2. Spur more than 25 mm long; side-lobes of lip absent or less than a fifth the length of mid-lobe. 3 – Spur 1.5–3 mm long; side-lobes of lip half the length of the mid-lobe. 9. *H. peristyloides*
3. Lip 3-lobed; spur 25–30 mm long. 8. *H. epipactidea* – Lip entire, rarely toothed at base; spur 30–65 mm long. 10. *H. zambesina*

7. *H. platyanthera* Rchb.f. (1949);

Roeperocharis platyanthera (Rchb.f.) Rchb.f. (1881) – type: GD, Simen, *Rueppel* s.n. (FR holo.).

Terrestrial herb 20–30 cm high. Tubers globose or ellipsoid, 0.7–1.5 x 0.6–1 cm. Stem erect, leafy. Leaves more or less erect, 3–5, the lowest 1 or 2 sheath-like, the remainder oblong-lanceolate or lanceolate-linear, gradually tapering to an acute point, the longest 6–18 cm long and 0.5–1.8 cm, the upper ones decreasing in size up the stem, the uppermost often bract-like. Inflorescence cylindrical, 5–10 x 1.5 cm, densely many-flowered. Bracts narrowly lanceolate, acuminate, shorter than the pedicel and ovary. Flowers suberect. Dorsal sepal obovate, acuminate, convex, 4 x 2 mm. Lateral sepals spreading, very obliquely lanceolate-ovate or

lanceolate, acuminate, 5 x 2.3 mm. Petals erect, curved-elliptical or oblong, rounded at apex, 3.6 x 1.2 mm. Lip with a broad undivided base 2 mm long, 3-lobed in the apical three-quarters; lobes ligulate to linear, the mid-lobe a little longer than the side-lobes, 5 x 8 mm; side-lobes more or less spreading or recurved, narrower than the mid-lobe, 4.1 x 0.6 mm; spur inflated and distinctly bilobed in apical half, 8 mm long. Anther erect, 1.5 mm high, locules parallel, canals scarcely developed; stigmas ellipsoid, decumbent, 1.5–2 mm long, rostellum lacking a distinct mid-lobe, inverted V-shape. Fig. 200.10.

Montane grassland; altitude unknown. GD; not known elsewhere. *Schimper* 1333.

8. *H. epipactidea* Rchb.f. (1867)

– type: Angola, *Welwitsch* 735 (BM holo., W part of holo., K iso.).

Terrestrial herb 15–55 cm high. Tubers globose, ellipsoid, ovoid or cylindrical, 2.5–6.5 x 1–3 cm, woolly. Stem erect, stout, usually densely leafy, the leaves overlapping. Leaves suberect, 8–15, the lowest 1 or 2 sheath-like, the remainder lanceolate or broadly lanceolate, acute, the largest 5–12 x 1–2.5 cm, gradually decreasing in size up the stem, the uppermost similar to the bracts. Inflorescence cylindrical, 6–16 x 3–5 cm, densely 7- to many-flowered. Bracts lanceolate, acuminate, mostly shorter than the flowers. Flowers curved outwards, white or greenish-white; ovary and pedicel 15–22 mm long. Dorsal sepal erect, ovate or elliptical, subacute, convex, 9–14 x 6–9 mm. Lateral sepals spreading, oblong-lanceolate, subacute, longer but narrower than the dorsal. Petals broadly elliptical or almost orbicular, rounded, as long as the dorsal sepal, 6–12 mm broad, thicker and opaque in the upper part. Lip cuneate at base, 3-lobed almost from the base, mid-lobe linear, 11–16 x 2 mm; side-lobes much shorter and narrower than the mid-lobe, 4 mm long; spur pendent, swollen towards the apex, 25–31 mm long. Anther short; canals short; stigmas club-shaped, truncate, 2.5 mm long; rostellum mid-lobe broadly triangular, exceeding and almost covering the anther.

Open areas with *Acacia*; 1150–1800 m. KF SD HA; Kenya, Tanzania, Uganda, Angola, Zimbabwe, Namibia and South Africa. *Gilbert* 2044a; *Ash* 1182; *Mesfin* et al. 1154.

9. *H. peristyloides* A. Rich. (1840);

– type: TU, Adua [Adowa], *Quartin-Dillon & Petit* 3 (P holo., K record of holo., W iso.).

Peristylus quartinianus A. Rich. (1840) non *Habenaria quartiniana* A. Rich. (1840); *Platanthera quartinianus* (A. Rich.) Engl. (1892) – type: TU, Adua, *Quartin-Dillon* s.n. (P holo.).

Habenaria combusta Ridl. (1886) – type: Ethiopia, *Schimper* 1312 (not located).

H. cardiochila Kraenzl. (1893) – type: Ethiopia, Abba Gerima, *Schimper* s.n. (B holo., K record of holo.).

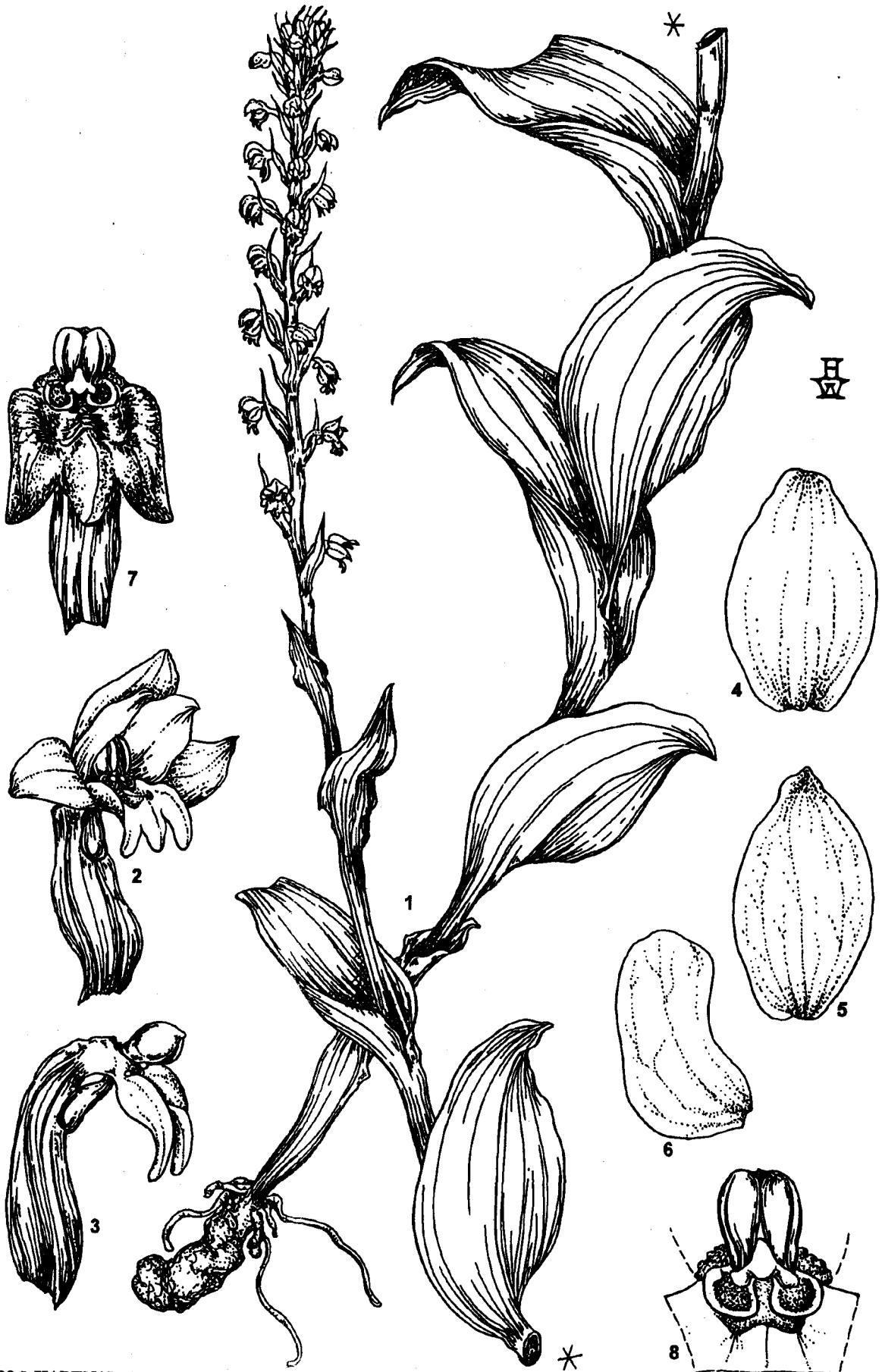


Figure 200.9 *HABENARIA PETTIANA*: 1 – whole plant in flower x 1½; 2 – flower x 7; 3 – flower, sepals and petals removed to show lip and column x 7; 4 – dorsal sepal x 15; 5 – lateral sepal x 15; 6 – petal x 15; 7 – column and lip, front view x 7; 8 – column, front view x 7. All from *Drummond & Hemsley 2423*. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae: fig. 11.*)

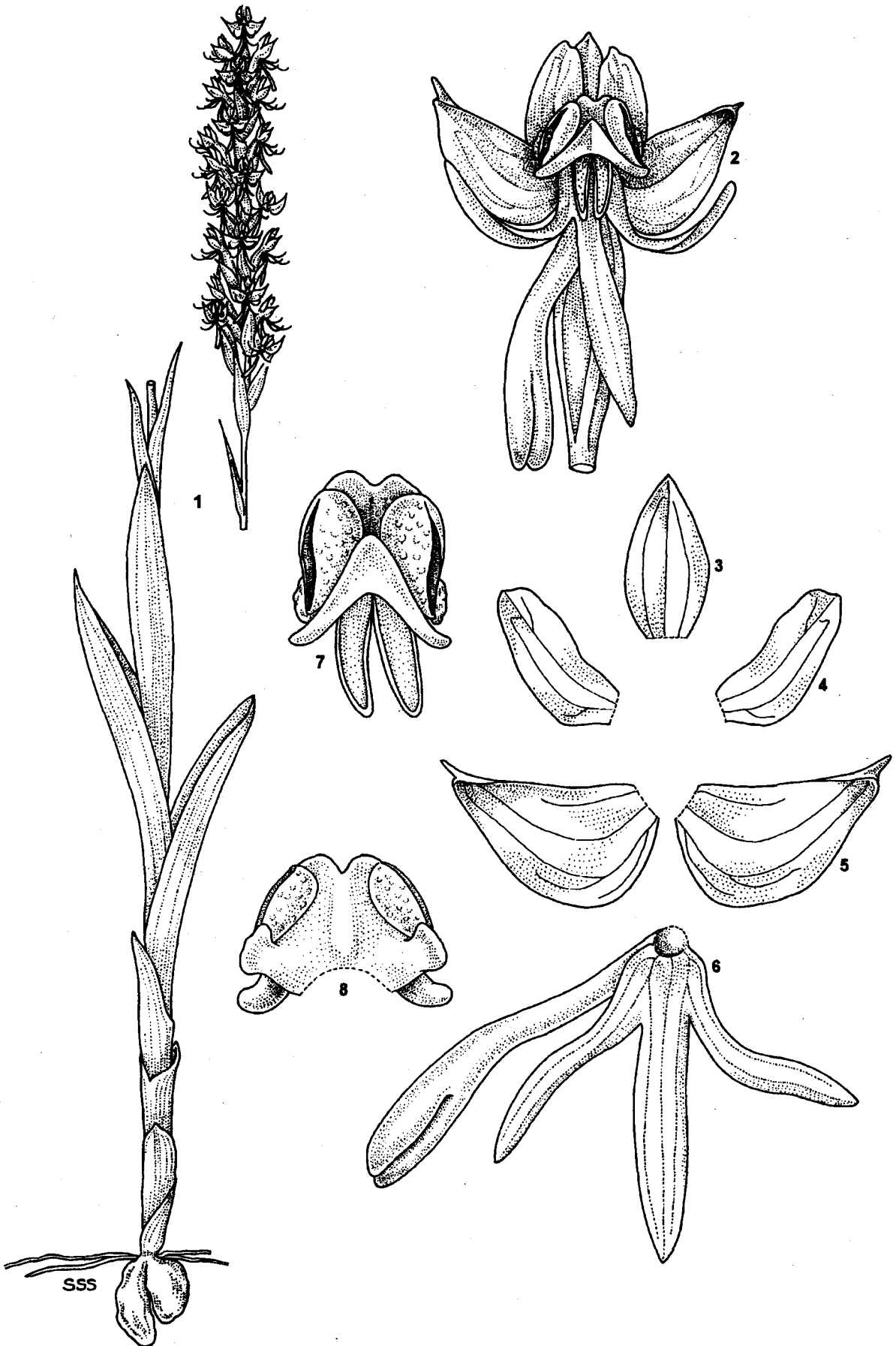


Figure 200.10 *HABENARIA PLATYANTHERA*: 1 - whole plant in flower x 1; 2 - flower x $7\frac{1}{2}$; 3 - dorsal sepal x 9; 4 - petals x 9; 5 - lateral sepals x 9; 6 - lip with spur x 9; 7 & 8 - column, front and back views x 12. All from *Schimper 1273*. Drawn by Susanna Stuart-Smith.

H. dillonii Rchb.f. nom. ined. based on *Quartin-Dillon* s.n. (W).

Terrestrial herb 10–80 cm high. Tubers globose or ellipsoid, 1–2.5 x 1 cm. Stem erect, leafy. Leaves more or less erect, 4–9, the lowest 1 or 2 sheath-like, the remainder lanceolate, oblong-lanceolate or lanceolate-linear, gradually tapering to an acute point, the longest 6–24 cm long and 0.5–2.5 cm, the upper ones decreasing in size up the stem, the uppermost often bract-like. Inflorescence cylindrical, 5–30 x 1–3 cm, densely many-flowered. Bracts narrowly lanceolate, acuminate, the lower ones usually longer than the flowers. Flowers suberect or curved outwards, green; ovary almost sessile. Dorsal sepal elliptical-lanceolate, acuminate, convex, 4–6.5 x 2–3 mm. Lateral sepals spreading, very obliquely lanceolate-ovate or lanceolate, acuminate, 5–9.5 mm long, broader than the dorsal. Petals curved-elliptical or oblong, rounded at apex, equalling the dorsal sepal. Lip with a broad cordate undivided base, 3-lobed in the apical two-thirds, 7–12 mm long; lobes ligulate to linear, the mid-lobe about twice as long as the side-lobes, 5–9.5 mm long, the side-lobes more or less spreading or recurved, narrower than the mid-lobe; spur cylindrical, 1.5–3 mm long. Anther erect, 1.5–3 mm high, locules parallel, canals scarcely developed; stigmas club-shaped, rounded at apex, 1.5–2 mm long, rostellum very broad but folded, the mid-lobe short and blunt.

Short montane grassland, marshes and open scrub; 1650–2550 m. GD/TU SU SD KF; Nigeria, Congo, Sudan, Uganda, Kenya and Tanzania. *Ash* 3131; *de Wilde* 5412; *Scott* 99.

10. *H. zambesina* Rchb.f. (1881)

– type: Mozambique, *Kirk* s.n. (K holo.).

Terrestrial herb 40–120 cm high. Stem erect, stout, leafy; roots fleshy, cylindrical, woolly. Leaves 9–14, the lowest 2–3 sheathing, the middle ones broadly lanceolate or elliptic-ovate, acute, 4–23 x 2–7.5 cm, the uppermost bract-like. Inflorescence cylindrical, up to 40 cm long, densely many-flowered; bracts lanceolate, acuminate, the lowermost longer than the flowers. Flowers white; pedicel and ovary 15–20 mm long. Dorsal sepal broadly ovate, obtuse, hooded, 4–6 x 3–5.5 mm. Lateral sepals deflexed, obliquely semi-orbicular, obtuse, 5–7.5 x 4–6 mm. Petals very obliquely broadly ovate, obtuse, 3.5–6 x 3.5–6 mm. Lip entire or slightly toothed at base, ligulate, acute, convex, 6–9 x 2 mm; spur pendent, narrowly cylindrical 35–60 mm long. Column 2 mm high; stigma lobes club-shaped, parallel and close together; anther canals very short. Fig. 200.11.

Swampy grassland; 950–2700 m (in E Africa). WG; throughout tropical Africa. *Benedetto* 118.

Section *Multipartitae* Kraenzl.

Leaves cauline. Flowers large. Petals entire, forming a hood with the small dorsal sepal. Lateral sepals reflexed, larger than the dorsal one. Lip 3-lobed; side-lobes pectinate or rarely entire; mid-lobe entire; spur as long as or longer than the lip.

1. Side-lobes of lip entire. 2
- Side-lobes of lip divided into a number of narrow segments. 3

2. Dorsal sepal 23–25 mm long; spur 15 mm long; side-lobes of lip just exceeding mid-lobe.

20. *H. excelsa*

- Dorsal sepal 45–50 mm long; spur 20–35 mm long; side-lobes of lip just shorter than mid-lobe.

19. *H. taeniodema*

3. Anther connective between the 2 locules wide, over 8 mm broad. 4

- Anther connective between the 2-locules narrow, up to 6 mm broad. 6

4. Basal part of lip glabrous; staminodes not stalked. 17. *H. macrantha*

- Basal part of lip pubescent; staminodes stalked. 5

5. Spur 15–25 mm long. 21. *H. praestans*

- Spur 30–40 mm long. 18. *H. splendens*

6. Lip undivided for almost half its total length; side-lobes of lip not divergent. 7

- Lip undivided for less than 1/3 of its total length; side-lobes divergent. 9

7. Spur more than 110 mm long. 11. *H. cavatibrachia*

- Spur less than 80 mm long. 8

8. Spur 25–35 mm long. 12. *H. tricruris*

- Spur 65–80 mm long. 13. *H. aethiopica*

9. Dorsal sepal only slightly smaller than lateral sepals; mid-lobe of lip tapering from base.

14. *H. decorata*

- Dorsal sepal much smaller than lateral sepals; mid-lobe of lip parallel-sided. 10

10. Spur sharply folded in lower third; dorsal sepal 10–11 mm long; side-lobes of rostellum acute.

16. *H. gilbertii*

- Spur not sharply folded; dorsal sepal 4.5–9 mm long; side-lobes of rostellum truncate.

15. *H. quartiniana*

11. *H. cavatibrachia* *Summerh.* (1942)

– type: Kenya, S of Elgon, *Mainwaring* K2 (K holo.).

Terrestrial herb 15–55 cm high. Tubers ovoid, 1.5 x 2 cm, tomentose. Stem somewhat slender, loosely leafy. Leaves 4–7, the lowest 1 or 2 sheath-like, the remainder lanceolate or broadly lanceolate, shortly acuminate, the largest 6–12 x 2–3.5 cm. Inflorescence 5–10 cm long, 2–6-flowered. Bracts lanceolate, acute, up to 5 cm long, shorter than the flowers. Flowers curving outwards, green, the side-lobes of the lip whitish, the column brown; pedicel with ovary 3–4 cm long. Dorsal sepal erect, broadly elliptical, rounded, convex, 13–20 x 11–13.5 mm. Lateral sepals spreading, obliquely lanceolate, subacute, 15–25 x 10 mm. Petals obliquely oblong-elliptical, apiculate, 11–16 x 6.5–8 mm, ciliate on outer margin. Lip deflexed, 3-lobed just below the middle, the wedge-shaped claw 4–9 mm long; mid-lobe ligulate, obtuse, 14 mm long; side-lobes 16–22 mm long, divided on the outer margin into 3–8 threads which are up to 12 mm long; spur pendent, swollen in the apical

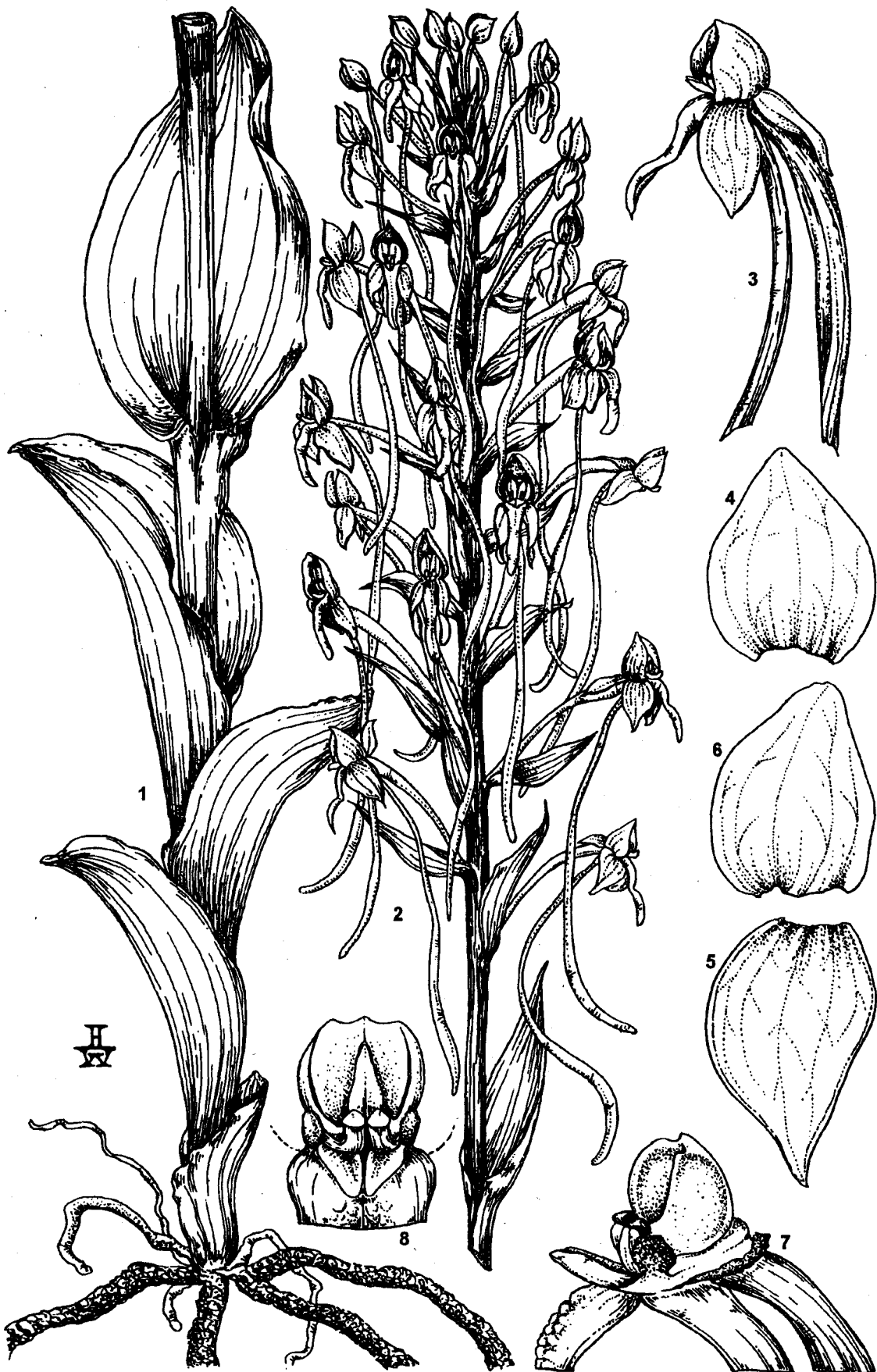


Figure 200.11 *HABENARIA ZAMBESINA*: 1 – lower part of plant showing roots and leaves $\times 2\frac{1}{2}$; 2 – inflorescence $\times 2\frac{1}{2}$; 3 – flower $\times 4$; 4 – dorsal sepal $\times 12$; 5 – lateral sepal $\times 12$; 6 – petal $\times 12$; 7 – column $\times 12$; 8 – column front view $\times 12$. All from Milne-Redhead & Taylor 7958. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 12.)

half, 110–140 mm long. Anther erect, 4.5–6.5 mm long, the locules adjacent, canals scarcely developed; stigmas club-shaped, receptive surfaces obliquely truncate, 6 mm long, rostellum mid-lobe very short and broad, the side-lobes hollowed out at the apex.

Montane grassland; 2100–2700 m (in E Africa). BA; Kenya and Uganda. *Drake-Brockman* 203.

12. *H. tricuris* (*A. Rich.*) *Rchb.f.* (1855);

Platanthera tricuris *A. Rich.* (1840) – type: TU, Mt. Selleuda [Scholoda] nr. Adua, *Quartin-Dillon* s.n. (P holo., W iso.).

Terrestrial herb 13–30 cm high, stem leafy, 2–3 mm in diameter. Tuber ellipsoid, 15 x 0.7 mm. Leaves 4–6, lowermost sheath-like, upper leaves sheathing at the base, ovate-oblong, acute, largest 40–60 x 20–35 mm. Inflorescence 5–7 cm long, 4–6 flowers. Bracts ovate-lanceolate, acute, up to 25 x 10 mm. Flowers with pale green sepals, petals cream to white, lip pale green; pedicel with ovary 2 cm long. Dorsal sepal erect, ovate, apically ciliate, obtuse, 10.2–11.5 x 5.5–8.5 mm. Lateral sepals spreading, ovate-oblong, oblique, acute, indistinctly keeled, 12–17 x 6.5–7.5 mm. Petals erect, ovate, obtuse, ciliate, 9–11 x 5–6 mm. Lip with broad, pubescent, undivided basal part, 5–7 mm long, above this 3-lobed; mid-lobe linear, rounded, 6–8 x 2 mm; side-lobes slightly shorter than mid-lobe, divided almost to the base by 3–7 finger-like fimbriations; spur 25–35 mm, pendent, slightly swollen in apical half. Column with anther locules 2.5 mm high, adjacent; connective short; canals undeveloped; stigma straight, club-shaped, 3 mm long; rostellum 6 mm across when spread, mid-lobe very small, side-lobe upturned and convex at apex forming a small hollow.

Gentle grassy slopes, marshy borders of stream in valley bottom; 2000–3000 m. EW TU GJ SU AR SD; not known elsewhere. *de Wilde* 6833; *Mooney* 7389; *Schimper* 623.

Similar to *H. aethiopica* and *H. cavatibrachia* from which it can be distinguished by its smaller flowers and shorter spur.

13. *H. aethiopica* *Thomas & Cribb* (1996)

– type: GJ, near Giga, 74 km NW of Debra Marcos along road to Dangela, *Burger* 502 (K holo.).

Terrestrial herb 30–55 cm high, stem leafy. Tuber ellipsoid, 0.5–1.5 x 2–3 cm; roots few, up to 3 cm. Leaves 4–7, lowermost sheath-like, upper leaves sheathing at the base, ovate-oblong to ovate-lanceolate, acute, largest 70–110 x 30–55 mm, decreasing in size up the stem. Inflorescence with 6–13 flowers, 8–13 cm long. Bracts oblong to lanceolate, acute, 8–15 x 20–50 mm. Flowers sweetly scented, sepals green, petals white, lip green fading to white at the base; pedicel with ovary 15–30 mm. Dorsal sepal erect, ovate, rounded, apically ciliate, 12.5–16 x 6.5–8.5 mm. Lateral sepals spreading, ovate-oblong, acute, apically keeled, 14–17 x 6–7 mm. Petals erect, oblique, acute, ovate, ciliate, 12.5–16 x 6–7 mm. Lip with broad undivided basal part, pubescent, 7–10

mm long, above this 3-lobed; mid-lobe linear, rounded, 8–11 x 2 mm; side-lobes equalling or just exceeding mid-lobe, divided almost to the base into 4 or 5 finger-like fimbriations; spur pendent, slightly swollen in apical half, 65–80 mm. Column with anther locules 3 mm high; connective short; canals undeveloped; stigma club-shaped, 4 mm long; rostellum with short mid-lobe, side-lobes 3 mm long, upturned and convex at the apex forming a small hollow.

On grassy slopes, marshy grassland, amongst *Acacia* bushes; 2250–2450 m. GJ SU WG KF; not known elsewhere. *Ash* 3064; *Burger* 502; *Puff* et al. 8208.07.

Similar to *H. cavatibrachia* and *H. tricuris* from which it is best distinguished by the length of the spur, and longer inflorescence with a greater number of flowers.

14. *H. decorata* *A. Rich.* (1851)

– types: TU, Mt. Semaita, *Quartin-Dillon* s.n. (P syn., W isosyn.), & GD, Simen [Semien], Mt. Buahit, *Schimper* 1253 (P syn., K FI isosyn.).

Terrestrial herb 10–45 cm high. Tubers globose or ellipsoid, 1–3 x 1 cm, somewhat woolly. Stem erect, leafy. Leaves 3–7, the lower 1 or 2 sheath-like, the remainder suberect or spreading, lanceolate or oblong-lanceolate, acute, the largest 5–12 cm long, 1.5–4 cm broad, decreasing in size up the stem. Inflorescence up to 15 cm long, somewhat laxly 1–11-flowered. Bracts similar to upper leaves, lanceolate, acute, the lower ones overtopping the flowers. Flowers suberect, the sepals pale green, the petals and lip white; pedicel with ovary 2–2.5 cm long. Dorsal sepal erect, elliptical-ovate, obtuse or subacute, very convex, 8–12 x 5–8 mm. Laterals spreading, obliquely ovate-lanceolate, acute, as long as but narrower than the dorsal. Petals erect, adherent to the dorsal sepal and forming a hood with it, obliquely semi-ovate or almost semiorbicular, somewhat curved, 8.5–13 x 4.5–8 mm, the outer margins ciliate. Lip with a broad undivided basal part 3–5 mm long, above this 3-lobed; mid-lobe projecting forwards, narrowly or triangular lanceolate, 10–18 x 3.5–6 mm; side-lobes divergent, often curving upwards, 16–22 mm long, divided on the outer margin into 4–6 narrow threads; spur pendent, somewhat swollen in the apical half, 30 mm long. Column short, anther connective narrow, locules a little divergent, canals very short; stigmas shortly club-shaped, truncate, 2–3 mm long, rostellum mid-lobe very short and broad.

Rocky places in montane moorland with *Erica arborea* and scattered junipers; 2200–3800 m. TU GD GJ WU SU AR; Uganda and Kenya. *de Wilde* 6795; *Gilbert & Getachew* 2594; *Mooney* 7929.

15. *H. quartiniana* *A. Rich.* (1840)

– type: TU, Mt. Sholoda, near Adua [Adowa], *Quartin-Dillon* 104 (P holo., K iso.).

H. anisoptera *Rchb.f.* (1881) – type: Ethiopia, *Schimper* 1320 (W holo.).

Terrestrial herb 25–70 cm high. Tubers ellipsoid, ovoid

or nearly globose, 15–45 x 8–15 mm, sparsely woolly, as are the roots. Stem erect, leafy. Leaves 5–7, the lowermost 1 or 2 sheath-like, the remainder lanceolate or ovate-lanceolate, acute, the largest 6–9.5 x 2–5 cm, decreasing in size up the stem. Inflorescence 7–23 cm long, closely or somewhat laxly 6–20-flowered. Bracts leaf-like, lanceolate or narrowly lanceolate, acute, the lower ones usually longer than the flowers. Flowers curved outwards, the sepals green, the petals and lip white; pedicel with ovary 2–2.5 cm long. Dorsal sepal erect, lanceolate or elliptical-lanceolate, acute, 4.5–9 mm long. Lateral sepals spreading or deflexed, very obliquely semi-orbicular, curved, acuminate, 7–13 mm long, broader than the dorsal. Petals obliquely triangular or triangular-lanceolate, somewhat curved, more or less acute, equalling the dorsal sepal but somewhat broader, ciliate. Lip with a wedge-shaped undivided base 3–4.5 mm long, then deeply 3-lobed; mid-lobe linear or ligulate, obtuse, 7–14 mm long; side-lobes much diverging, 9–17 mm long, with 6–11 slender threads on the outer margins; spur pendent, somewhat curved, a little swollen in the apical part, 2.5–4 cm long. Anther-connective horseshoe-shaped, 1.5–2 mm high and just over 3 mm broad, locules at the 2 ends, canals erect, slender, 1–1.5 mm long; stigmas somewhat curved back, club-shaped, 3–4 mm long, rostellum mid-lobe very short and broad.

Montane grassland, light shade amongst shrubs, edges of montane forest, often among rocks; 2100–2600 m. TU-GD SU BA; Uganda and Kenya. *Ash* 3409; *Gilbert* 2149; *de Wilde* 7554.

16. *H. gilbertii* Thomas & Cribb (1996)

– type: SU, 5 km W of Addis Alem, *Gilbert* 2149 (K holo.).

Terrestrial herb to 45 cm high. Stem erect, leafy. Tubers up to 2 x 1 cm, ellipsoid or ovoid. Roots few, to 5 cm long, woolly. Leaves 3–5, lowermost sheath-like, largest around centre of stem, 9–11 x 3–3.5 cm, oblong, acute. Inflorescence 14–16 x 6–7 cm, 9–11 flowers, lax. Bracts lanceolate, acute, up to 50 x 12 mm, decreasing in size towards apex of inflorescence. Flowers pale green; pedicel with ovary c 2 cm long. Dorsal sepal, erect, elliptic, acute, ciliate, 10.6–11.5 x 6.1–7.6 mm. Lateral sepals spreading, ovate-oblong, sub-oblique, acute, ciliate, mid-nerve keeled, 12–14 x 5–5.2 mm. Petals oblong, falcate, acute, ciliate, 11–11.5 x 4.5–4.7 mm. Lip with undivided basal part 5 mm long then deeply 3-lobed; mid-lobe linear, rounded, pubescent, 10 x 1 mm, side-lobes diverging, 14–17 mm long, 6–12 slender threads along outer margin, longest 7 mm; spur hook-like, 37–50 mm, pendent, strongly reflexed through 180° in apical third, and lightly reflexed just above this. Anther-connective horse-shoe shaped, 3–4 mm long, locules elliptic, 3 mm high, canals erect, slender, 1–1.5 mm long; stigmas recurved, club-shaped, 6 mm long, rostellum with very short, rounded mid-lobe; side-lobes narrowly triangular, acute, 5 mm long.

Humus-rich soil, grassy spots among cultivated

fields and in wet evergreen bushland with *Carissa edulis*; 2100 m. SU; not known elsewhere. *de Wilde* 5176, *de Wilde & de Wilde-Duyffes* 7427.

Similar to *H. quartiniana* from which it differs in having larger flowers, longer stigmas, a hook-shaped spur, acute apices to rostellum side-lobes and the lip broader in all parts. It can be distinguished from *H. decorata* by the shorter, broader fimbriations on the lip.

17. *H. macrantha* A. Rich. (1851)

– type: GD, Simen [Semien], between Enschede and Schoata, *Schimper* 1256 (P holo., K FI W iso.).

Terrestrial herb 20–50 cm high. Tubers ovoid or ellipsoid, 1–4 x 1–2 cm, woolly. Stem erect, leafy, somewhat stout. Leaves 5–7, the lowermost 1–2 sheath-like, the remainder lanceolate, ovate-lanceolate or elliptical-lanceolate, acute, the largest 5–12 x 1.5–5 cm, the upper ones smaller, similar to the bracts. Inflorescence up to 12 cm long, somewhat laxly 2–9-flowered. Bracts leaf-like, lanceolate, acute, the lower ones equalling or longer than the flowers. Flowers suberect, green or whitish-green; pedicel with ovary 23–30 mm long. Dorsal sepal erect, adherent to petals, ovate to narrowly lanceolate, acute, 20–26 x 7–11 mm. Lateral sepals spreading or deflexed, obliquely lanceolate, acuminate; all sepals ciliate. Petals adherent to the dorsal sepal, lanceolate, much curved, 20–25 x 7–11 mm, very shortly pubescent-hairy and ciliate. Lip united to the base of the column for 6 mm, almost glabrous, with a narrow undivided claw, 9–15 mm long, then 3-lobed, 30 mm long; mid-lobe linear, obtuse, 14–23 x 1–2 mm, with a longitudinal ridge; side-lobes diverging but more or less incurved, somewhat longer than the mid-lobe, with 6–10 narrow threads on the outer margins; spur more or less incurved, often sharply bent in the middle, slightly swollen in the apical half, 20–35 mm long. Anther connective horseshoe-shaped, 2–3 mm high and 12–15 mm broad, locules at each end, canals slender, erect, 3.5 mm long, auricles sessile; stigmas 10–17 mm long, attached in the lower half or third to the rostellum side-lobes, receptive part swollen, 3–6 mm long, rostellum mid-lobe scarcely distinguishable, very broad.

Montane grassland and swampy areas among *Erica arborea* and *Juniperus procera*; 1900–3000 m. EW GD GJ WU SU AR SD BA; Uganda, Kenya, Somalia and Yemen. *Gilbert* 1377; *Hildebrandt* 366; *Mooney* 7282.

Schimper 626 (K P) has an anther connective only 5 mm wide, but in other respects matches *H. macrantha*. This may be an undescribed species but currently only two sheets of poor material has been seen.

18. *H. splendens* Rendle (1895)

– types: Tanzania, *H.H. Johnston* s.n. (K syn.) & *W.E. Taylor* s.n. (BM syn.).

Terrestrial herb 30–75 cm high. Tubers ellipsoid, 15–30 x 8–15 mm, woolly. Stem erect, somewhat stout, leafy. Leaves 6–8, the lowermost 1 or 2 sheath-like, the remainder lanceolate, ovate lanceolate or ovate, very

acute, the largest 6–20 x 2.5–8 cm. Inflorescence 8–27 x 6–10 cm, somewhat laxly 4–17-flowered. Bracts lanceolate or broadly lanceolate, acuminate, the lowest ones equalling or longer than the flowers. Flowers suberect, sepals pale green, petals and lip white, often fragrant; pedicel with ovary 2.5–3 cm long. Dorsal sepal erect, broadly lanceolate or lanceolate-elliptical, apiculate, 2–3 x 9–15 mm. Lateral sepals spreading, very obliquely lanceolate, acuminate, a little longer than the dorsal but narrower. Petals erect, adherent to the dorsal sepal, very curved, ligulate or lanceolate-ligulate, often angled on the outside below the middle, 20–30 x 5–9 mm. Lip with a narrow undivided claw 7–13 mm long, then deeply 3-lobed, the claw and lobe-bases densely pubescent; mid-lobe often more or less deflexed, linear, 2–3 x 1–2 mm; side-lobes diverging, a little longer than the mid-lobe with 6–12 threads on the outer margins; spur incurved, S-shaped, swollen in apical part, 30–40 mm long. Anther connective horseshoe-shaped, 3–4 x 11–18 mm, locules at each end, canals erect, slender, 4–6 mm long, auricles with slender stalk and ellipsoid apex; stigmas united to rostellum side-lobes in lower half, receptive terminal parts somewhat swollen, 5–7 mm long, mid-lobe of rostellum scarcely recognizable, very broad and short.

Reported to occur in Ethiopia by Summerhayes (1966), but no Ethiopian specimens seen during the preparation of this account. Found in Kenya, Tanzania, Uganda, Malawi and Zambia.

19. *H. taeniodema* Summerh. (1966)

– type: SU, *K. Hildebrandt* 27 (W holo., K part of holo.).

Anatraphandra insignis Chiov. nom. ined.

Terrestrial herb to 1 m high. Tuber and roots not seen. Leaves suberect, 3–4, narrowly-lanceolate, acute, largest 12–19 x 2.5–4 cm. Inflorescence up to 20 cm long with up to 5 flowers. Bracts lanceolate, acute, 8–12 x 1.5–3 cm. Flowers 8 cm in diameter; pedicel and ovary 2.5–3.5 cm long. Dorsal sepal convex, lanceolate, shortly acuminate, 45–50 x 25–30 cm. Lateral sepals, narrowly lanceolate, acuminate, 45–50 x 7 mm, joined to column for basal 6 mm. Petals erect, oblanceolate, shortly acuminate, 50–55 x 15 mm, joined to column for basal 5 mm. Lip porrect, overall obovate-oblong 50–55 x 20–25 mm, 3-lobed apically, mid-lobe linear-triangular, acute, 15–20 x 5 mm; side-lobes just shorter than mid-lobe, triangular, acute, 14 x 7 mm; spur 20–35 x 5–7 mm, apex inflated. Column with sessile anther; connective ribbon-like, 13 x 3 mm; locules elliptic, 3 mm high; canals erect, 1.5 mm long; stigma porrect, club-shaped, apex oblique, 12 mm long, rostellum nearly absent.

Damp scrub; 2200 m. SU WG; not known elsewhere. *Benedetto* 484; *Cheesman* s.n.; *Hildebrandt* 27.

Similar to *H. falciloba* from Zambia and to *H. excelsa* but distinguished by much larger flowers.

20. *H. excelsa* Thomas & Cribb (1996)

– type: Ethiopia, *Leaky & Evans* 541 (K holo.).

Terrestrial herb to 37 cm high. Stem 4–5 mm in diameter, leafy. Tubers and roots not seen. Leaves 5–7, linear lanceolate, acute, largest 13–15 x 1.7–2 cm. Inflorescence 5–10 x 5 cm, 3–5-flowered. Bracts ovate-oblong, acute, 3–5 x 1–1.5 cm. Flowers green with yellow-orange tint; pedicel and ovary 18–22 mm long. Dorsal sepal concave, obovate, acute, 23–25 x 10–11 mm. Lateral sepals ovate-lanceolate, oblique, shortly cuspidate, 20–23 x 6–8 mm, basal 3–4 mm fused to column. Petals oblique, obovate, rounded, minutely ciliate, 23–25 x 7.5–8 mm, basal 3–4 mm fused to column. Lip 18–21 mm long, undivided basal part 9–11 x 10–13 mm, fused to column for 4 mm, 3-lobed above; mid-lobe 7–8.5 mm, linear to narrowly triangular; side-lobes just exceeding mid-lobe, spreading, narrowly-falcate, curving away from mid-lobe; spur 15 x 2–3 mm, swollen at base. Column erect, 7 mm high, base of stigma and anther connective fused to lip, petals and lateral sepals; locules 3 mm long; connective ribbon-shaped, 8–9 mm long; canals truncate, 1 mm long; stigmas linear, 4 mm long; rostellum reduced.

Rock crevice; 3150–3500 m. GJ; not known elsewhere. *Ash* 3720; *Smeds* 297.

The column structure is similar to *H. taeniodema* but the flowers are much smaller and the shape of the lip different. This species bears a resemblance to *H. falciloba* from Zambia which has the same sized flowers. However, the column is quite different in being fused to the base of the tepals, also in *H. falciloba* the side-lobes of the lip curve in the opposite direction, inwards towards the mid-lobe.

21. *H. praestans* Rendle (1895)

– type: Uganda, Ruwenzori, *Scott Elliot* 7808 (BM holo., K iso.).

Robust terrestrial herb 25–105 cm high. Tubers ovoid or ellipsoid, 1.5–3.5 x 1–2 cm, woolly. Stem erect, leafy, often stout and up to 1 cm in diameter at the base. Leaves 6–12, the lowermost 2–3 sheath-like, the remainder lanceolate or broadly lanceolate, very acute, the largest 8–30 x 2.5–7.5 cm, decreasing in size up the stem, the uppermost similar to the bracts. Inflorescence cylindrical, usually between 10 and 20 cm long, but exceptionally reaching 30 cm, densely 4–30-flowered, 5–10 cm in diameter. Bracts leaf-like, lanceolate, acute, the lower ones usually longer than the flowers. Flowers suberect, green with white lip; pedicel with ovary 2–2.5 cm long. Dorsal sepal erect, broadly lanceolate or elliptical-lanceolate, acute, 1.5–2.7 x 1–1.5 cm. Lateral sepals spreading, obliquely broadly lanceolate, acuminate, equal in size to the dorsal. Petals adherent to the dorsal sepal, much curved, ligulate-lanceolate or ligulate, often broadly angled in the lower part, as long as the dorsal sepal but usually much narrower, glabrous. Lip with a linear undivided part 7–10 mm long, then deeply 3-lobed, 3–4 cm long, thickly pubescent on the claw and main lobes; mid-lobe linear, side-lobes diverging, somewhat longer than the mid-lobe with 8–15 slender threads on the outer margins; spur slightly curved, a little swollen towards the end, 15–25 mm long. Con-

nective horseshoe-shaped, 2.5–4.5 mm high, 8–18 mm broad, locules at each end, canals erect, very slender, 3.5–5 mm long, auricles with a slender stalk and globose or ellipsoid head; stigmas united in the lower part to the rostellum side-lobes, projecting forwards, 13–18 mm long, receptive part swollen, 4–7 mm long, rostellum mid-lobe scarcely distinguishable, very short and broad.

Montane grassland and in shade of shrubs; 1250–2400 m. SU KF; Kenya, Tanzania, Uganda, Malawi, Zimbabwe, Zambia and Rwanda. *Benedetto* 179; *de Wilde & de Wilde-Duyffes* 7554; *Gilbert* 2156.

Mooney 5967 (K) has an anther connective only 5 mm wide and a spur only 12 mm long, but in other respects is similar to *H. praestans*. This may be an undescribed species but currently only one sheet of poor material has been seen.

Section *Pentaceras* (Thou.) Schltr.

Leaves cauline, often sheath-like and covering the stem, or elliptic to obovate and spreading. Flowers small to medium-sized. Petals bifid. Dorsal sepal erect, forming a hood with the posterior lobes of the petals. Lateral sepals reflexed. Lip 3-lobed; spur as long as or longer than the lip.

22. *H. malacophylla* Rchb.f. (1881)

— types: South Africa, Cape Province, Katberg, *Hutton* 45 (W syn.) & Tsono R., *Barber* 4 (W syn., K isosyn.).

Terrestrial herb 30 cm to 1 m high, glabrous except for the roots. Tubers ovoid or ellipsoid, 1.5–3 x 0.5–2 cm, tomentose. Stem erect, slender or stout, leafy in centre with a somewhat bare lower part. Leaves 10–19, spreading, soft in texture, the lowermost 2–5 sheath-like, the middle ones oblanceolate with a somewhat narrow basal part above the sheath, acute, the largest 7–20 x 2–5 cm, the upper 2 or 3 smaller, lanceolate, acuminate. Inflorescence 8–34 x 2.5–3.5 cm, many-flowered. Bracts lanceolate, acuminate, 9–20 mm long, shorter than the flowers. Flowers spreading, curved outwards, green; pedicel with ovary 10–17 mm long, bow-shaped. Dorsal sepal erect, broadly elliptical-ovate, obtuse or subacute, convex, 3.6–3 x 2.5–4.5 mm broad. Lateral sepals deflexed, obliquely lanceolate, 4–7.5 x 2–3.3 mm. Petals bipartite nearly to the base; posterior lobe adherent to dorsal sepal, ligulate, 4–7.3 x 0.5–1.5 mm, curved; anterior lobe curved upwards from near base, linear, 4.5–9.5 mm long, narrower than the posterior. Lip projecting outwards, 3-lobed nearly to the base; lobes linear, obtuse; mid-lobe 4.5–7 mm long, the side-lobes usually a little longer; spur pendent, somewhat thicker in the middle than at either end, 9–18 mm long. Anther 1.5 mm long, rounded, locules parallel, canals very short, less than 1 mm long; stigmas curved back, pressed to lip, bluntly club-shaped, 1.5–2.5 mm long, rostellum triangular, small.

Usually in montane rain-forest, rarely in montane grassland in forested areas; 1200–2400 m. EW SU AR

WG KF; Oman, Sierra Leone to Nigeria, Zaire, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and South Africa (Transvaal, Natal, Cape Province). *Gilbert & Friis* 8410; *Gilbert & Thulin* 843; *Mooney* 8728.

Section *Replicatae* Kraenzl.

Leaves cauline, linear or lanceolate to ovate. Flowers small, gnat-like. Petals bifid or bipartite. Dorsal sepal reflexed, smaller than the laterals. Lateral sepals with markedly eccentric apex. Lip 3-lobed; spur as long as or longer than the lip, often spirally twisted.

1. Spur strongly spirally twisted at least once in the middle. 24. *H. schimperiana*
- Spur not spirally twisted or scarcely so. 2
2. Ovary less than one-quarter the length of the pedicel. 26. *H. ichneumonea*
- Ovary more than one-third the length of the pedicel. 3
3. Spur narrow-cylindrical, not dilated at or near apex. 23. *H. chirensis*
- Spur inflated at the apex. 4
4. Side-lobes of lip shorter than mid-lobe; stigmas 3–5 mm long, spur 15–25 mm long. 25. *H. humilior*
- Side-lobes of lip longer than mid-lobe, stigmas 2 mm long, spur 10–13 mm long. 27. *H. vollesenii*

23. *H. chirensis* Rchb.f. (1881)

— type: TU, Tigre, Sehire [Chire], *Quartin-Dillon* s.n. (W holo., K record of holo.).

Terrestrial herb 20 cm to 1 m high, glabrous except for the petals. Tubers globose to elongate-ellipsoid or ovoid, 10–40 x 5–13 mm, glabrous. Stem erect, slender to stout, leafy throughout its length. Leaves 7–13, the lowermost sometimes reduced almost to a sheath, the lowest 4–7 more or less spreading, linear or lanceolate-linear, acute, the largest 8–30 x 0.5–1.5 cm, the upper ones smaller, more or less pressed to the stem, lanceolate, acuminate. Inflorescence 6–30 x 3–5 cm, 12- to many-flowered. Bracts lanceolate, acuminate, 8–19 mm long, usually distinctly shorter than the pedicel with ovary. Flowers spreading, white or greenish-white, with an unpleasant smell; pedicel with ovary straight or slightly curved, 2 cm long. Dorsal sepal reflexed, narrowly elliptical, obtuse, convex, 4.5–6 mm long, 2 mm broad. Lateral sepals deflexed, obliquely obovate, rounded with a lateral apiculum, 6–9 x 3–5 mm. Petals bipartite nearly to the base, papillose and ciliate; posterior (upper) lobe reflexed, linear, 4–6 x 0.5 mm; anterior lobe spreading forwards, narrowly lanceolate, 5–9 mm long, 1 mm broad. Lip deflexed, tripartite from a short undivided part; lobes linear, the mid-lobe 9–12 x 0.5 mm, the side-lobes 6–8 mm long, narrower than the mid-lobe; spur parallel to the ovary or more or less incurved, equally cylindrical almost to the apex which is very slightly swollen and truncate, 10–20 mm long. Anther erect, nearly 3 mm long, canals slightly incurved, slender, 4.5–5 mm long, auricles large, white, 2-lobed, nearly 2 mm long; stigmas correct, slender with

truncate widened apices, 4–6 mm long, rostellum narrow, acute, nearly 2 mm long.

Damp grassland, swamps, or wet places among rocks; 1050–2600 m. TU AR KF; Nigeria, Cameroun, Uganda, Kenya and Tanzania. *Ash* 1105; *de Wilde & de Wilde-Duyffes* 7584; *Seeger* 2622.

24. *H. schimperiana* A. Rich. (1857)

– type: GD, Simen [Semien], near Jomara, *Schimper* 1210 (P holo., S W iso.).

Habenaria peltastes Rchb.f. (1881) – type: Eritrea, *Steudner* 701 (W holo.).

Terrestrial herb 30 cm to 1 m high, glabrous except for the roots and petals. Tubers ellipsoid to ovoid, 1–4 x 1–2 cm, sparsely papillose. Stem erect, slender to stout, to 1 cm in diameter at base, leafy throughout its length. Leaves 6–10, the lowermost sometimes reduced to a sheath, lowest 4–7 more or less suberect or less frequently spreading, linear or linear-lanceolate, acute, the largest 7–28 x 1–2 (rarely 3–7) cm broad, the upper ones smaller, pressed to the stem, lanceolate, acuminate. Inflorescence 6–35 x 5.5–10 cm, somewhat loosely or sometimes more densely 4- to many-flowered. Bracts clasping the pedicel, lanceolate, acuminate, 1–3 cm long, usually much shorter than the pedicel with ovary. Flowers spreading, green with white central parts, with an unpleasant smell; pedicel with ovary slightly curved, 2–3.5 cm long. Dorsal sepal reflexed, narrowly elliptical, obtuse, convex, 6–8 x 4 mm. Lateral sepals deflexed and twisted, obliquely obovate with apiculum lateral, 9–11 x 5–8 mm. Petals bipartite nearly to the base, both lobes ciliate, especially the anterior; posterior lobe reflexed, linear or narrowly lanceolate, 5–8 x 1 mm; anterior lobe spreading downwards, much longer, elongate-lanceolate, acute, 14–18.5 x 2 mm. Lip deflexed or incurved, tripartite from an undivided base 2–3 mm long; mid-lobe linear, more or less incurved, 13–17 mm long; side-lobes very narrowly lanceolate, 8–11 mm long; all lobes 0.5 mm broad; spur more or less straight or incurved beneath the flower, several times twisted in the middle, much swollen in the apical half, 10–16 mm long. Anther 3 mm long, locules reclinate, canals porrect or more or less incurved, 5–6 mm long; stigmas porrect or incurved, suddenly thickened and truncate at apex, 5–7 mm long; rostellum triangular-linear, acute, 1–2 mm long.

Swamps or wet grassland on badly drained soil; 1600–2550 m. EW TU GD GJ SU KF WG SD; Sudan and Zaire, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and Yemen. *Burger* 510; *Fris* et al. 3283; *Mooney* 8051.

25. *H. humilior* Rchb.f. (1881)

– type: GD, Begemeder, Gerra Abuna Tekla, *Schimper* 1373 (W holo., K S iso.).

H. replicata A. Rich. (1851), non. A. Rich. (1850), nom. illegit; *H. hochstetteriana* Kraenzl. (1892) – type: TU, Djeladjeranne, *Schimper* 1645 (P holo., K S W iso.).

Terrestrial herb 15–70 cm high. Tubers globose, ellipsoid or ovoid, 1–2 x 0.7–1.5 cm, glabrous or sparsely tomentose. Stem erect, somewhat stout, leafy throughout its length. Leaves 7–13, the lowermost 1–2 sometimes reduced to sheaths, the middle 4–7 suberect or more often more or less spreading, lanceolate or almost linear, acute, the largest 6–23 cm long and 0.5–1.5 (rarely 2–3) cm broad, the upper ones pressed to the stem, much smaller, lanceolate, similar to the lower bracts. Inflorescence 5–25 x 3.5–5 cm, somewhat laxly to densely 6- to many-flowered. Bracts somewhat thin and chaff-like, lanceolate, acuminate, 1–2 cm long, usually somewhat shorter than the pedicel with ovary. Flowers spreading, green or greenish-white; pedicel with ovary straight or more or less curved, 1.5–2 cm long. Dorsal sepal reflexed, narrowly elliptical, obtuse, convex, 4–6.5 x 1.5–3 mm. Lateral sepals deflexed, obliquely obovate with apiculum lateral, 6–9.5 x 3–5 mm. Petals bipartite nearly to the base; posterior (upper) lobe more or less reflexed, linear, 4–6 x 0.5 mm, ciliate; anterior lobe much longer and broader, elliptical-ligulate, narrowly oblong or oblong-lanceolate, usually obtuse, 6–11 x 1.5–3 mm. Lip deflexed, tripartite from an undivided base less than 1 mm long; mid-lobe linear, incurved, obtuse, 6–11.5 x 0.5–1 mm; side-lobes lanceolate-linear, acute, 5–9 x 0.1–1 mm; spur parallel to the ovary and more or less incurved, only slightly twisted, swollen in the apical half, 15–25 mm long. Anther 1.5–3 mm long, locules reclinate, canals porrect or slightly incurved, 3–4.5 mm long; stigmas porrect, widened and truncate at the very apex, 3–5 mm long, rostellum narrowly triangular, acute, 2 mm long.

Short grassland, often on shallow poorly drained soil over rocks; 1650–2400 m. EW GD SU AR KF WG BA; Congo, Zaire, Sudan, Uganda, Kenya, Tanzania, Malawi, Zambia and Zimbabwe. *de Wilde* 7502; *Gilbert & Thulin* 783; *Schimper* 1373.

26. *H. ichneumonea* (Sw.) Lindl. (1835);

Orchis ichneumonea Sw. (1805) – type: Sierra Leone, *Afzelius* (UPS holo.).

Habenaria pedicellaris Rchb.f. (1881) – type: GD, Dembia Plain, N. of Lake Tana, *Schimper* 1369 (W holo., K record of holo.).

Terrestrial herb 20–85 cm high. Tubers ellipsoid or ovoid, 0.7–2.5 x 4–12 mm, sparsely tomentose. Stem erect, slender, leafy throughout its length. Leaves 5–12, the lowermost often reduced to a sheath, the lower 3–5 more or less erect or suberect, linear, acute, the largest 7–20 x 5–10 mm, the upper ones smaller, pressed to the stem, lanceolate, acute. Inflorescence 6–22 x 3–5 cm, more or less loosely 7- to many-flowered. Bracts lanceolate, acute, 0.5–1.7 cm long, usually much shorter than the pedicel with ovary. Flowers curving upwards or suberect, green with white centre; pedicel with ovary straight or more or less incurved, 1.5–3 cm long, the pedicel slender, the ovary ellipsoid, 0.5 cm long. Dorsal sepal reflexed, narrowly elliptical, obtuse, convex, 3.5–5 x 1.5–2.5 mm. Lateral sepals deflexed, obliquely ellipti-

cal or obovate, apiculum very markedly lateral, 5–8.5 x 3–5 mm. Petals bipartite nearly to the base; posterior (upper) lobe reflexed, linear, 3–4.5 x 0–5 mm, ciliate; anterior lobe spreading forwards, narrowly lanceolate, acute, curved, 6.5–11 x 1.5 mm, glabrous. Lip deflexed, tripartite from an undivided base 1.5–4 mm long; lobes linear, more or less incurved, the mid-lobe 7–13 mm long, the side-lobes usually a little shorter, all less than 0.5 mm broad; spur more or less incurved, apex much swollen, 10–25 mm long. Anther nearly 2 mm high, locules reclinate, canals porrect with upcurved ends, 3.5–6.5 mm long; stigmas porrect, slender with swollen truncate apices, 3.5–7 mm long, rostellum narrowly triangular, acute, 1.5 mm long.

Damp grasslands or swamps; 1000–1300 m. EW TU GD KF; Guinea and Senegal to Zaire, Burundi, Uganda, Tanzania, Angola, Malawi, Zambia, Zimbabwe and Botswana. *Chiovenda* 2243; *Schimper* 1369; *Thomas* 86.

27. *H. vollesenii* *Thomas & Cribb* (1996)
– type: SD, 10 km NW of Moyale, *Mesfin & Vollesen* 4139 (K holo.).

Terrestrial herb 25–40 cm high, glabrous except for the roots and petals. Tubers globose, ellipsoid or ovoid, 18–23 x 8–12 mm, sparsely tomentose. Roots few, up to 3 cm long. Stem erect, leafy in lower half. Leaves 2–5, suberect or more or less spreading, lanceolate or almost linear, acute, the largest towards the base, 50–110 x 8–14 mm, the upper ones pressed to the stem, much smaller, lanceolate, similar to the lower bracts. Inflorescence 12–14 x 3–4 cm, more or less laxly 20–35-flowered. Bracts narrowly-lanceolate, acuminate, 1–1.5 cm long, usually somewhat shorter than the pedicel with ovary. Flowers spreading, green or greenish-white; pedicel with ovary straight or more or less curved, 1–1.5 cm long. Dorsal sepal more or less reflexed, elliptic, obtuse, convex, 3.2–3.9 x 1.7–2.2 mm. Lateral sepals deflexed, obliquely obovate, 4.0–5.2 x 2.3–2.8 mm. Petals bipartite nearly to the base; posterior (upper) lobe more or less erect, linear, 3.5–4 x 0.5 mm, ciliate; anterior lobe much longer, linear, ciliate, 7.5–8.7 x 0.5–0.3 mm. Lip tripartite from an undivided base less than 1 mm long; mid-lobe linear, rounded, 5.5–6.5 x 0.6–1.2 mm; side-lobes lanceolate-linear, acute, 7.5–8 x 0.4–0.5 mm; spur curving away from ovary, slightly swollen in the apical half, 10–13 mm long. Anther 1.5 mm long, canals porrect, 1 mm long; stigmas porrect, widened and truncate at the very apex, 2 mm long, rostellum lobes triangular, acute.

Low woodland/ high bushland on side of hill with *Acacia* and *Lannea rivae*; 1200–1575 m. SD; not known elsewhere. *Gilbert et al.* 8062.

Differs from *H. humilior* in having non-reclinate locules, anterior lobes of petals not broader than posterior lobes, side-lobes of lip longer than mid-lobe, shorter spur, shorter stigmas and anther canals.

Section *Cultratae* *Kraenzl.*

Similar to sect. *Replicatae* but with an erect dorsal sepal.

1. Lip entire; bracts overtopping flowers. 31. *H. rivae*
– Lip 3-lobed; bracts not overtopping flowers. 2
2. Spur less than 15 mm long. 3
– Spur more than 17 mm long. 4
3. Plants more than 40 cm high; leaves all along stem, largest up to 19 x 4.8 cm; stigma lobes 5 mm long, club-shaped. 29. *H. cultrata*
– Plants usually less than 30 cm high; leaves towards base of stem, largest less than 8 x 2.7 cm; stigma lobes 2–4 mm long. 28. *H. antennifera*
4. Spur usually 28 mm or more long; stigma lobes less than 2.5 mm long; lateral sepals with apex slightly eccentrically placed at top; inflorescences usually 5–6 cm in diameter. 32. *H. tweedieae*
– Spur 17–23 mm long; stigma lobes 3 mm or more long; lateral sepals with a very eccentrically placed apex; inflorescence usually 4–5 cm in diameter. 30. *H. cultriformis*

28. *H. antennifera* *A. Rich.* (1840)
– type: TU, Adua [Adua or Adowa], *Quartin-Dillon* s.n. (P holo., W iso.).
H. simense *Rchb.f.* (1849) – type: GD, Simen [Simien] *Rueppel* N4 (W holo., K record of holo.).
H. leptobrachiata *Ridl.* (1886) – type: GD, Dschau Meda, *Schimper* 1324 (in part) (BM holo., K W iso.).
H. pantothrix *Kraenzl.* (1892) – type: GD, Dschau Meda, *Schimper* 1324 (in part) (B holo., K W iso.).

An erect terrestrial herb up to 45 cm high. Tubers up to 2.5 x 1.3 cm, ovoid to ellipsoid. Stems leafy throughout their length. Leaves 4–7, the largest 4–14 x 2–3.5 cm, ovate to elliptic-lanceolate, acute, often folded together and curved, sheathing below. Inflorescence 4.5–20 x 2.5–3.5 cm, cylindrical, subdensely many-flowered. Bracts mostly longer than the ovary, ovate-elliptic, acute or acuminate, glandular-pubescent. Flowers green, yellow-green or green and white. Dorsal sepal 3.7–4.2 x 1.7–2.5 mm, ovate to elliptic, rounded or obtuse and more or less recurved at the apex, concave, lying over the column; lateral sepals 6.5–7 x 5–5.5 mm, reflexed, obliquely oblong-elliptic, dorsally obtuse or apiculate. Petals bipartite to base; upper (posterior) lobe 3.5–4 x 1–1.5 mm, oblanceolate, obtuse, ciliate; lower (anterior) lobe up to 12 x 2 mm, reflexed, linear-lanceolate, acute (often reduced in some plants). Lip 3-lobed at base; side-lobes 5–7 x 1 mm, linear to linear-lanceolate, acute; mid-lobe 6–9 x 1–1.7 mm, linear to lanceolate, acute; spur 9–12 mm long, club-shaped, straight or slightly bent in middle but never very twisted. Column short; stigmatic arms 1–5 mm long, tapering from a broad truncate apex to the base, somewhat papillate; anther canals 1–5 mm long, slender.

Grassland or open scrub, often amongst rocks;

2000–3300 m. TU GD GJ SU AR KF; Yemen. *Gilbert* 2153; *Mooney* 5801; *de Wilde* 7891.

29. *H. cultrata* A. Rich. (1851)

– type: TU, Chire, *Quartin-Dillon* s.n. (P holo., W iso.).

• *H. ridleyana* Kraenzl. (1892) – type: Ethiopia, *Schimper* s.n. (B holo., K record of holo.).

An erect terrestrial herb, 30–60 cm high; tubers up to 6 x 2 cm, ellipsoid to subfusiform. Stem leafy throughout its length. Leaves 5–9, the largest in the middle of the stem, 9–24 x 2–4 cm, narrowly elliptic or elliptic-lanceolate, acute, the basal 1 or 2 sheath-like, the uppermost 1 or 2 bract-like. Inflorescence 10–16 cm long, laxly many-flowered. Bracts 1–1.7 cm long, shorter than the pedicel and ovary, lanceolate to oblanceolate, acuminate. Flowers greenish, sometimes apparently cleistogamous. Dorsal sepal 3.5–4.5 x 1.5–2.6 mm, elliptic, subacute, concave, lying over the column; lateral sepals 6–8 x 4–6 mm, reflexed, obovate, with an obliquely set blunt apex, slightly pubescent within. Petals bipartite at the base; upper (posterior) lobe 3.5–4 x 0.8 mm, more or less joined to dorsal sepal, linear, acute, ciliate; lower (anterior) lobe 7.5–11.5 x 2–2.6 mm, deflexed, lanceolate, rounded at the apex, fleshy, pubescent. Lip shortly clawed, 3-lobed almost at base; side-lobes 5–7 mm long, linear; mid-lobe 9–14 mm long, linear; spur 12–15 mm long, dilated towards apex, parallel to ovary, twisted in the middle. Column short; stigmas 4–5 mm long, club-shaped; anther canals 4–5 mm long, slender, slightly upcurved at the apex; staminodes slightly bilobed.

Grassland near permanent water or in shade of bushes or amongst rocks. 1700–2100 m. EW TU SU; Yemen and Oman. *Ash* 1046; *Boulos* 11367.

30. *H. cultriformis* Kraenzl. (1893)

– types: TU, Mettgallo, *Schimper* 548 (B syn., K part of & record of syn.); Amba Sea, *Schimper* s.n. (B syn.).

H. incompta Kraenzl. (1898) – type: GD, Woina, *Schimper* s.n. (P holo.).

Bonatea guidottii Chiov. nomen ined.

An erect terrestrial herb, 20–68 cm high. Stem leafy throughout its length, leaves largest at base. Leaves up to 18 x 2.3–4 cm, lanceolate, acuminate, folded together, uppermost leaves bract-like. Inflorescence up to 18 x 4–5 cm, densely to many-flowered. Bracts 1.6–2.4 cm long, mostly longer than the pedicel and ovary, elliptic-lanceolate, acuminate, slightly glandular. Flowers sweetly scented, greenish with yellow-green sepals. Dorsal sepal 4 x 1.8 mm, elliptic, obtuse, concave, lying over the column; lateral sepals 9 x 6.5 mm, elliptic with an obliquely set blunt apex, reflexed. Petals bipartite at the base, fleshy; upper (posterior) lobe 3–5 x 0.5 mm, linear-curved, connate with dorsal sepal forming a hood, papillate; lower (anterior) lobe 14 x 4.2 mm at base, ovate below, tapering somewhat abruptly just above base, reflexed, curved back. Lip 3-lobed just above the base, deflexed; side-lobes 8 x 0.5 mm, linear, acute; mid-lobe 14 x 0.8 mm, linear, obtuse, slightly

curved forwards towards apex; spur 16–20 mm long, slightly incurved or sinuous, dilated towards apex. Column 2.5 mm long; stigmas 3–4 mm long, club-shaped, fleshy; rostellum side-lobes 3.8 mm long, tapering, truncate at apex, mid-lobe 1.5 mm long, triangular, cucullate.

Grassland or open bushland; 1140–2200 m. TU SD KF GG HA; Yemen. *de Wilde* 7047; *Gillett* 14287; *Gilbert & Thulin* 917.

31. *H. rivae* Kraenzl. (1897)

– type: SD, Giaribuli, *Ruspoli & Riva* 1506 (FI holo.).

Large terrestrial herb to 120 cm high. Stem stout, leafy. Leaves 6, the largest oblong-lanceolate, acute, up to 30 x 5 cm. Inflorescence erect, densely many-flowered; bracts lanceolate, acuminate, overtopping flowers, 2 cm long. Flower colour unknown; pedicel and ovary 1.2 cm long. Dorsal sepal cucullate, oblong, acute, 6 mm long. Lateral sepals subobliquely ovate, 6 mm long. Petals ovate, acute, 6 mm long, with a small angular anterior lobe, posterior lobe looking like an anther. Lip simple, ovate-lanceolate, acuminate, 6 mm long with a central fleshy mid-line; spur filiform, inflated a little at apex, 18 mm long. Column with long curved stigma lobes; anther canals as long as stigma lobes; rostellum mid-lobe a little longer than the anther locules.

Habitat and altitude unknown. SD; only known from the type.

The flowers of the type are abnormal, the petals being anther-like and the lip lacking side-lobes. Further material is needed to ascertain the status of this taxon.

32. *H. tweedieae* Summerh. (1933)

– type: Kenya, Elgon, *Tweedie* 25 (K holo.).

Terrestrial herb 40–100 cm high. Tubers elongate-ovoid. Stem erect, somewhat stout, leafy. Leaves 9–15, the lowermost often reduced to a sheath, the middle 2–5 lanceolate, elliptic-lanceolate or oblong-elliptic, acute, the largest 8–25 x 2–5 cm, the upper ones bract-like, more or less pressed to the stem. Inflorescence 10–45 x 4.5–6.5 cm, densely 15- to many-flowered; bracts lanceolate, acuminate, sparsely glandular, 1.5–3.8 cm long. Flowers green and white, scented, pedicel and ovary almost straight, 2.5–3.5 cm long, sparsely hairy. Dorsal sepal erect, convex, elliptic, obtuse, 6–7 x 2.5–4 mm, somewhat glandular on the outside. Lateral sepals reflexed, obliquely semi-orbicular, subacute, 8–10 x 4.5–6.5 mm. Petals bipartite; posterior lobe joined to dorsal sepal, linear, puberulous, ciliate, 6–7.5 x 1 mm; anterior lobe lanceolate-falcate, acute, 9–11 x 1.5–3 mm, puberulous in lower part. Lip deflexed, 3-lobed to base; side-lobes linear, 5–8.5 x 0.5 mm; mid-lobe linear, 10.5–12.5 x 1 mm; spur more or less parallel to ovary or somewhat incurved, untwisted, slightly apically dilated, 25–36 mm long. Column 3 mm long; stigmatic lobes club-shaped, 2.5–3 mm long; anther canals slightly upcurved. Fig. 200.12.

On roadsides in forest, in degraded juniper forest;



S.R.-C.

Figure 200.12 *HABENARIA TWEEDIEAE*: 1 – base of plant showing roots and leaves x1; 2 – inflorescence x1; 3 – portion of bract to show glandular margin x9; 4 – flower with anterior petal lobe folded down x3; 5 – rostellum spread out x4½. All from *Tweedie* 25. Drawn by Stella Ross-Craig. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 18.)

1950–2250 m. SD GG; Uganda, Kenya and Tanzania. *Gilbert et al.* 446; *Gillett* 14287 in part; *Smeds* 544.

Section *Mirandae* *Summerh.*

Leaves cauline. Flowers medium-sized to large. Petals bifid. Dorsal sepal forming a hood with the posterior lobes of the petals. Lip 3-lobed or entire; spur long. Anther elongate, much longer than the mid-lobe of the rostellum.

33. *H. rautaneniana* *Kraenzl.* (1902)

– type: Namibia (South West Africa), Aniboland, Ondonga, *Rautanen* (?Z holo., not seen).

Terrestrial herb 30–80 cm high. Tubers ovoid or ellipsoid, 2–3.5 x 0.75–2 cm, densely tomentose. Stem erect, slender to stout, leafy throughout its length. Leaves 5–11, the lowermost sometimes with a much reduced lamina, all but the top 2 or 3 more or less erect, linear, acute, the largest 18–33 x 7–16 mm, the upper 1 or 3 much shorter, lanceolate, acuminate, similar to the bracts. Inflorescence 8–24 x 5.5–7 cm, loosely to more or less closely 6–35-flowered. Bracts lanceolate, acuminate, 1.2–3.3 cm long. Flowers suberect or half spreading, green or yellow-green, with a disagreeable smell at night; pedicel with ovary straight or slightly curved, 2.5–4 cm long. Dorsal sepal erect or somewhat incurved, very convex, narrowly elliptical, obtuse, 10–15 x 3–5.5 mm. Lateral sepals spreading, obliquely ovate or ovate-lanceolate, shortly acuminate, 11–18 x 6–8.5 mm. Petals bipartite nearly to the base; posterior (upper) lobe erect, adherent to the dorsal sepal, linear, 9–15 x 1 mm; anterior lobe curved upwards, linear, 14–23 x 0.5–1.5 mm. Lip projecting forwards or deflexed, tripartite from an undivided base 3 mm long; mid-lobe linear, sub-obtuse, 12–17 x 1 mm; side-lobes much diverging, ligulate or lanceolate-ligulate, obtuse or subacute, 11–15 x 1.5–3 mm broad; all lobes, and especially the side-lobes, pubescent in the basal half; spur recurved and much swollen in the basal half, 14–23 mm. Anther erect, 6.5–9.5 mm high, narrowed in the lower part, canals partly joined to the column, the free part more or less incurved, about 2 mm long; stigmas curved downwards over the base of the lip, club-shaped in the apical half, 5.5–7.5 mm long, rostellum triangular-linear, acute, 2.5–4 mm long. Fig. 200.13.

Boggy grassland; 1250–1650 m. GJ KF; Tanzania, Angola, Malawi, Zambia, Zimbabwe and South Africa. *Hillier* 906; *de Wilde* 7830.

Section *Ceratopetalae* *Kraenzl.*

Leaves cauline, sheathing, ovate or lanceolate. Flowers medium sized to large. Petals bifid or bipartite; lobes fleshy, horn-like, curved upwards. Dorsal sepal erect; laterals reflexed, larger than the dorsal. Lip 3-lobed; lobes fleshy, the lateral horn-like, sometimes erose or pectinate; spur long, clavate. Rostellar lateral arms upcurved. Stigma lobes clavate.

1. Spur less than 40 mm long; stigmatic arms less than 12 mm long. 2

– Spur over 55 mm long; stigmatic arms over 13 mm long. 3

2. Stigmatic arms 3–8 mm; side-lobes of lip widest above base, often with teeth on outer margin.

34. *H. cornuta*

– Stigmatic arms 8–11 mm long; side-lobes of lip narrowed from the base, entire. 35. *H. clavata*

3. Spur 55–75 mm long. 36. *H. holubii*

– Spur 130–220 mm long. 37. *H. cirrhata*

34. *H. cornuta* *Lindl.* (1837)

– type: South Africa, Cape Province, near Umsikaba [Omsamcalo] R., *Drège* 4570 (K holo., P W iso.).

H. ceratopetala A. Rich. (1840) – type: TU, Adua [Adowa], *Quartin-Dillon* (P holo.).

Terrestrial herb 20–80 cm high. Tubers ellipsoid, elongate-ovoid or nearly globose, 1.5–3.5 x 1–2 cm, densely tomentose. Stem erect, slender to more or less stout, leafy throughout its length. Leaves 9–15, the lowermost 1 or 2 reduced to sheaths, the middle 4–6 spreading or recurved, linear-lanceolate to ovate, acute, the largest 2–10 x 0.7–4.5 cm, the upper ones smaller, pressed to the stem, lanceolate, decreasing in size upwards, similar to the bracts. Inflorescence 5–19 x 3–6 cm, loosely to densely 4- to many-flowered. Bracts leafy, lanceolate, acute, 2–7 cm long, mostly shorter than the pedicel with ovary. Flowers suberect, pale green or yellow-green; pedicel with ovary almost straight, 1.8–2.8 cm long. Dorsal sepal erect, very convex and almost boat-shaped, subacute, 5–16 x 4–8. Lateral sepals deflexed, obliquely semi-orbicular, more or less rolled up lengthwise, acute, 6–16 x 5.5–10.5 mm. Petals bipartite nearly to the base; posterior (upper) lobe more or less erect, usually adherent to the dorsal sepal, linear, 6.5–14.5 x 0.5 mm; anterior lobe curling upwards like a long horn, linear below, subulate above, 2–4.5 x 1–2 mm. Lip deflexed, tripartite from an undivided basal part 1 mm long; mid-lobe more or less incurved in the apical part, linear, obtuse, 9.5–19 x 1 mm; side-lobes somewhat diverging, narrowly lanceolate or lanceolate-linear from a broad base, tapering in the apical part, often with 1 or 2 short teeth or shortly pectinate on the outer margin at about the middle, 8–18 x 1–2.5 mm towards the base; spur pendent, much swollen in the apical half or third, 14–27 mm long. Anther erect, 3–7.5 mm long, canals porrect or more or less incurved, more or less slender, 4.5–8.5 mm long; stigmas porrect, widened at the truncate apex, 3–8 mm long, rostellum triangular, acute, 1 mm long. Fig. 200.14.

Open, often badly drained grassland or in *Combretum* – *Terminalia* woodland; 850–2400 m. TU SU WG GG; Nigeria to Zaire, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and South Africa (Transvaal, Natal, eastern Cape Province). *Gilbert & Thulin* 450; *Mooney* 9076; *Schimper* 1176.

35. *H. clavata* (*Lindl.*) *Rchb.f.* (1865);

Bonatea clavata *Lindl.* (1837) – type: South Africa, *Drège* 4568 (K holo., W part of holo.).



Figure 200.13 *HABENARIA RAUTANENIANA*: 1 - whole plant in flower x $1\frac{1}{2}$; 2 - base of plant x $1\frac{1}{2}$; 3 - inflorescence x $1\frac{1}{2}$; 4 - dorsal sepal x $4\frac{1}{2}$; 5 - lateral sepal x $4\frac{1}{2}$; 6 - petal x $4\frac{1}{2}$; 7 - column with part of lip, spur and ovary x $4\frac{1}{2}$; 8 - rostellum x $4\frac{1}{2}$. All from Polhill & Paulo 1700. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 19.)



Figure 200.14 *HABENARIA CORNUTA*: 1 - whole plant in flower x 1; 2 - flower, sepals and petals removed x 2; 3 - dorsal sepal x 2; 4 - lateral sepal, flattened, x 2; 5 - lateral petal x 2; 6 - column, with part of lip, spur and ovary x 4; 7 - column, front view x 4. All from Milne-Redhead & Taylor 8655A. Drawn by Heather Wood. (Reproduced with permission from *Fl Trop. E. Afr. Orchidaceae*: fig 20.)

Terrestrial herb 20–80 cm high. Tubers ellipsoid or elongate-ovoid, 2–3.5 x 1–2 cm, more or less tomentose. Stem erect, somewhat stout, leafy throughout its length. Leaves 8–13, the lowermost 1–3 reduced to sheaths, the middle 4–5 suberect or more or less spreading or recurved, ovate, elliptical-lanceolate or lanceolate, acute, the largest 7–13 x 1.5–4 cm, the upper leaves smaller, more or less pressed to the stem, lanceolate, acute, similar to the bracts. Inflorescence 4–17 x 6–8.5 cm, more or less laxly 5–16-flowered. Bracts leafy, lanceolate, acute, 1.5–3.5 cm long, distinctly shorter than the pedicel with ovary. Flowers upcurved, green with whitish centre; pedicel with ovary incurved, 3.5–4.5 cm long. Dorsal sepal erect, very convex, ovate-elliptical, apiculate, 11–19 x 5–8 mm. Lateral sepals deflexed, rolled up lengthwise, obliquely obovate, sub-acute with the apex on one side, 12–18 x 6–9 mm. Petals bipartite nearly to the base; posterior (upper) lobe erect, adherent to the dorsal sepal, 9–15 mm long, narrowly linear to filiform; anterior lobe curved upwards like a long horn, linear, acute, 25–40 mm long, just over 1 mm broad. Lip projecting forwards, tripartite from an undivided base 2 mm long; mid-lobe often more or less incurved, linear, 17–23 mm long; side-lobes linear, 12–18 mm long; all lobes scarcely 1 mm broad; spur more or less parallel to the ovary and pedicel, much swollen in the apical third or quarter, 25–40 mm long. Anther erect, 4–6 mm long, canals porrect with the apices upcurved, slender, 8.5–13 mm long; stigmas porrect, suddenly thickened and truncate at the apex, grooved on upper surface, 8–12 mm long.

Combretum – *Terminalia* woodland and montane grassland; 1100–2285 m. SD HA; Nigeria, Cameroun, Zaire (Katanga), Tanzania, Malawi, Zambia, Zimbabwe and South Africa (Transvaal, Cape Province, Natal). *Gilbert* 4028; *Gilbert & Jefford* 4667; *Mesfin & Vollesen* 4351.

36. *H. holubii* Rolfe (1898)

–types: Zimbabwe, *Holub* 446, 447, 599 (K syn.).

Terrestrial herb, 25–80 cm high. Tubers elongate-ovoid, ellipsoid or nearly globose, 2.5–5 x 1–2.5 cm, densely tomentose. Stem erect, usually somewhat stout, leafy throughout its length. Leaves 7–11, the lowermost 1 or 2 more or less reduced to sheaths, the middle 3–5 suberect, spreading or somewhat recurved, ovate to narrowly lanceolate, acute, the largest 7–15 x 2–4.5 cm, upper ones smaller and pressed to the stem, lanceolate, acute, similar to the lower bracts. Inflorescence 4–20 x 7–13 cm, loosely 3–19-flowered. Bracts leafy, lanceolate, acute, 2–6 cm long. Flowers curved upwards, pale green or greenish-white; pedicel with ovary curved upwards, 4.5–7.5 cm long. Dorsal sepal erect, very convex, elliptical-lanceolate, acute, 15–20 x 6–10 mm. Lateral sepals deflexed, rolled up lengthwise, obliquely oblanceolate or semi-orbicular, acute, 18–24 x 10–15 mm. Petals bipartite nearly to the base; posterior lobe erect, adherent to the dorsal sepal, narrowly linear, 15–20 x 0.5 mm; anterior lobe curving upwards and

outwards like a horn, linear, tapering in the upper part, fleshy, 20–40 x 2–3 mm. Lip tripartite from a basal undivided part about 2 mm long; mid-lobe deflexed and incurved, linear, obtuse, 20–35 x 1 mm; side-lobes projecting forwards but upright on each side of the column, lanceolate or rarely lanceolate-linear, acute, 6–10 x 1.5–3 mm; spur parallel to the ovary and pedicel, club-shaped and swollen at the apex, 55–75 mm long. Anther erect, 5–8 mm long; canals porrect with upcurved ends, 13–19 mm long; stigmas porrect, widened and truncate at the apex, 13–18 mm long; rostellum triangular, acute, 3–5 mm long.

Swampy grassland and in black soils in grassland; 1000–1200 m (in E Africa). IL; Guinea to Central African Republic, Zaire, Uganda, Kenya, Tanzania, Angola, Zambia, Zimbabwe and Namibia. *Ash* 531.

37. *H. cirrhata* (Lindl.) Rchb.f. (1865);

Bonatea cirrhata Lindl. (1835) – type: Madagascar, *Lyll* (K hol.).

Habenaria schweinfurthii Rchb.f. (1878) – type: Sudan, Blue Nile, Gallabat, *Schweinfurth* 2458 (W hol.).

Terrestrial herb 50–130 cm high. Tubers ellipsoid or elongate-ovoid, 3–4.5 x 1–2.5 cm, densely tomentose. Stem erect, somewhat stout, leafy throughout its length. Leaves 9–16, the lowermost 1 or 2 reduced to sheaths, the middle 5–8 more or less spreading, from almost orbicular to lanceolate, obtuse or acute, the largest 7–22 x 3.5–9 cm, the upper ones smaller, adpressed to the stem, lanceolate, similar to the bracts. Inflorescence 4–28 x 11–15 cm, loosely 3–11-flowered. Bracts lanceolate, acute or acuminate, 2–6.5 cm long, usually distinctly shorter than the pedicel with ovary. Flowers half-spreading or curved upwards, green with white central parts; pedicel with ovary straight or somewhat curved, 5.5–8 cm long. Dorsal sepal erect, very convex, elliptical-lanceolate, acute, 20–25 x 7–10 mm. Lateral sepals deflexed, rolled up lengthwise, very obliquely obovate or semi-orbicular, acute, 20–30 x 10–15 mm. Petals bipartite nearly to the base; posterior (upper) lobe more or less adherent to the dorsal sepal, narrowly linear, 2–2.5 x 0.5 mm; anterior lobe curved forwards and upwards like a horn, linear below, subulate above, fleshy, 5–9 x 1 mm. Lip projecting forwards, tripartite from an undivided basal part 2–4 mm long; mid-lobe linear, obtuse, 3–4 x 1 mm; side-lobes more tapering and narrower, 20–30 mm long; spur hanging, the apex often caught in the bracts so that spur is much coiled, swollen in the apical third or quarter, 13–22 x 3–4 mm. Anther erect, obtuse, 7–10 mm long, canals porrect with upcurved ends, 16–20 mm long; stigmas porrect, abruptly widened and truncate at the apex, upper side channelled, 15–22 mm long, rostellum narrowly triangular, acute, 4 mm long.

Grassland with scattered bushes and *Combretum* – *Terminalia* woodland; 300–1200 m. GD SU WG IL; Guinea Republic to Nigeria, Cameroun, Zaire, Sudan,

Uganda, Kenya, Tanzania, Malawi and Zambia, Madagascar. *Ash* 504 & 1100; *Ouren* 20727.

Section *Macrurae* Kraenzl.

Leaves cauline, sheath-like and covering the stem. Flowers large. Petals bifid, the lobes curved upwards and fleshy. Lip 3-lobed, fleshy, the side-lobes often upcurved, rarely slightly erose or pectinate; spur very long, pendent.

38. *H. perbella* Rchb.f. (1881)

– type: TU/GD, (probably Simen) *Schimper* 592 (W holo., K record of holo., P iso.).

Terrestrial herb up to 40 cm high. Leaves more or less spreading or ascending, 7, all along the stem, up to 10 x 2.6 cm. Rhachis 9 cm long, 3-flowered. Bracts similar to leaves. Dorsal sepal ovate, acute, 14 x 8.5 mm. Lateral sepals obliquely ovate-oblong, acute, 15.5 x 5 mm. Petals bipartite almost to the base; posterior lobe ovate-oblong, acute, 10.5 x 3.5 mm; anterior lobe narrowly triangular, acute, 14 x 2.6 mm, joined to column for basal 2 mm. Lip 3-lobed with an undivided base 5 mm long; mid-lobe linear, 8.5 x 2.2 mm; side-lobes linear-lanceolate, acute, 13.5 x 2.8 mm; spur pendent, 115–135 mm. Anther 8 mm long; canals 3 mm long; stigmatic arms 4 mm long; rostellum mid-lobe triangular, acute, 3.5 mm long, side-lobes truncate, 3.2 mm.

Habitat unknown. 1200–1500 m. EW, TU/GD; not known elsewhere. *Bellini* 395; *Hildebrandt* 164.

This species is very close to the widespread *H. walleri* Rchb.f. and may indeed prove to be conspecific.

Section *Diphyllae* Kraenzl.

Leaves 1–2, basal, appressed to the substrate. Flowers small to large, resupinate or not. Petals entire, bifid or bilobed. Lip 3-lobed; spur elongate.

- | | |
|---|------------------------------|
| 1. Leaves 2. | 2 |
| – Leaf solitary. | 6 |
| 2. Petals entire. | 39. <i>H. vaginata</i> |
| – Petals bipartite. | 3 |
| 3. Spur curved in the middle to form a complete loop. | 46. <i>H. helicoplectrum</i> |
| – Spur straight or slightly curved, never curved to form a complete loop. | 4 |
| 4. Lip lobes broad, obovate, obtuse or subacute. | 40. <i>H. macrura</i> |
| – Lip lobes narrow, linear. | 5 |
| 5. Spur with a knee-like bend 3 mm from base; anterior petal lobe linear, 20 mm long, emerging well above base of posterior lobe. | 42. <i>H. decumbens</i> |
| – Spur lacking angular bends; anterior petal lobe filiform, 30–40 mm long, emerging from base of posterior lobe. | 41. <i>H. armatissima</i> |
| 6. Stem and sepals glabrous. | 43. <i>H. busseana</i> |
| – Stem and sepals pubescent. | 7 |
| 7. Spur 7–10 mm long; dorsal sepal 3–4 mm long. | 44. <i>H. holothrix</i> |

– Spur 15 mm long; dorsal sepal 7 mm long.

45. *H. keayi*

39. *H. vaginata* A. Rich. (1840)

– type: TU, between Adua [Adowa] and Menisa, Sept. 1839, *Quartin-Dillon* s.n. (P holo., W iso.).

Habenaria microcorys Hochst. ex Engl. (1892) – type: Ethiopia, *Schimper* 634 (B holo.).

Terrestrial herb 10–50 cm high. Tubers ovoid or ellipsoid, 1–3 x 0.7–2 cm, densely tomentose. Stem erect, slender to somewhat stout, with 2 leaves at or near the base and a number of sheaths along the rest of the stem. Leaves more or less adpressed to the ground, the upper one sometimes 1–2 cm above the lower, spreading, the lower one kidney-shaped, orbicular or ovate, apiculate, the upper one normally narrower, broadly ovate to lanceolate-ovate, acute, 7–10 x 5–9 cm; sheaths usually adpressed to the stem, lanceolate, acuminate, often overlapping, up to 4 cm long. Inflorescence 4–20 x 2–3 cm, more or less densely 6- to many-flowered. Bracts leafy, lanceolate, acuminate, 7–25 mm long, the lower ones longer than the ovary with pedicel. Flowers curving outwards, green; pedicel with ovary curved, 1–1.5 cm long. Dorsal sepal more or less erect, very convex, elliptical, obtuse, 3.5–5.2 x 2–5 mm. Lateral sepals deflexed, obliquely and curved semi-ovate, subacute, 5–6.5 x 2–3 mm. Petals entire, erect, adherent to the dorsal sepal, obliquely oblong-lanceolate or lanceolate, subacute, 3.5–5.3 x 1.5–1.7 mm. Lip deflexed, tripartite from an undivided base ± 1 mm long; lobes more or less incurved, linear, more or less fleshy, the mid-lobe 4.5–7 x 1 mm, the side-lobes a little shorter and narrower; spur pendent, more or less curved forwards, 1.7–35 cm long, slightly swollen in the apical half. Anther erect, 2.5–4 mm long, locules parallel, canals porrect, scarcely 1 mm long; stigmas porrect, club-shaped, papillose beneath, nearly 2 mm long, rostellum erect, triangular-linear, subacute, 1–2.5 mm long.

Short grassland, especially where damp, or at edge of forest, sometimes with bushes; 1500–2700 m. EW GD SU AR KF SD HA; Kenya and Tanzania. *Ash* 2046; *de Wilde* 5474; *Mooney* 7927.

Some of the Ethiopian material shows considerable variation in the length of the spur, the size of the flowers, and the length of the rostellum mid-lobe. No discontinuity can be found in this variation.

40. *H. macrura* Kraenzl. (1892)

– type: Angola, Malange, *Mechow* 369 (B holo.).

Terrestrial herb 20–65 cm high. Tubers ovoid, ellipsoid or almost globose, 2–3 x 1–2 cm, densely tomentose. Stem erect, slender to somewhat stout, with 2 leaves at the base and a number of adpressed sheaths almost covering its whole length. Basal leaves adpressed to the ground, ovate, elliptical or nearly orbicular, rounded, acute or apiculate, only slightly cordate at the base, 2.5–9.5 x 2–5 cm; sheaths 3–9, lanceolate, acute, up to 6 x 2–5 cm. Inflorescence up to 16 x 4–6 cm, more or less densely up to 11-flowered. Bracts similar to the

sheaths, lanceolate, acute, 2–4 cm long, shorter than the pedicel with ovary. Flowers suberect or curved outwards, white or cream with sepals green outside, sometimes fragrant; pedicel with ovary more or less curved, 2.5–4.5 cm long. Dorsal sepal erect, ovate or broadly ovate, acute, convex, 8–13 x 4.5–11 mm. Lateral sepals spreading or reflexed, obliquely semi-ovate, acute, 9–16.5 x 3.5–6 mm; all sepals with numerous cross-veins. Petals bipartite nearly to the base; posterior (upper) lobe erect, curved-lanceolate to obliquely semi-ovate, acute, 7.5–11.5 x 2.5–7.5 mm; anterior lobe projecting forwards or spreading, obliquely oblanceolate, subacute or rounded, 9.5–19 x 2.5–6 mm. Lip projecting forwards, tripartite from an undivided base 2–6.5 mm long; mid-lobe lanceolate-ligulate, subacute, 10.5–19 x 3–6.5 mm; side-lobes diverging but the apical part somewhat incurved, similar to the anterior lobe of the petals, obliquely oblanceolate, obtuse or rounded, 8.5–23 x 3–8 mm; spur pendent, narrowly cylindrical, often more or less covered by the stem-sheaths, 9–17 cm long. Anther erect, apiculate, 5–6 mm high, canals very short and stout, usually scarcely 1 mm long; stigmas porrect, somewhat stout with swollen truncate ends, 2.5–4.5 mm long, rostellum triangular-linear, acute, 2–3 mm high.

In E Africa found in grassland or *Brachystegia* bushland; 1200–2400 m. Nigeria to Zaire, Uganda, Tanzania, Angola, Malawi and Zambia. Reported to occur in Ethiopia by Summerhayes (1968), but no Ethiopian specimens seen during the preparation of this account.

41. *H. armatissima* *Rchb.f.* (1881)

– type: GD, Simen [Simien] Bellagas R. near Taserotsch, *Schimper* 630 (W holo., P iso.).

Terrestrial herb 30–70 cm high. Tubers ellipsoid or elongate-ovoid, 2.5–4.5 x 1–2.5 cm, densely tomentose. Stem erect, somewhat stout, with 2 large leaves at the base and several much smaller ones along its length. Basal leaves opposite, adpressed to the ground, broadly ovate to kidney-shaped, apiculate to rounded, often somewhat cordate at the base, 6–18 x 7–22 cm, more or less fleshy; cauline leaves 4–8, more or less adpressed to stem, lanceolate, acuminate, up to 5 cm long. Inflorescence 10–20 x 8–12 cm, densely 10- to many-flowered. Bracts lanceolate, acuminate, similar to the cauline leaves, 1–3.5 cm long, distinctly shorter than the pedicel with ovary. Flowers more or less spreading, white; pedicel with ovary often slightly curved, 3.5–5 cm long. Dorsal sepal erect, elliptical-ovate, acuminate, very convex, 11.5–16 x 5–8 mm. Lateral sepals reflexed, very obliquely semi-orbicular or semi-ovate, acuminate, 13–17.5 x 4–7.5 mm. Petals bipartite nearly to the base; posterior (upper) lobe erect, curved-linear, 11.5–14.5 mm long, scarcely 1 mm broad; anterior lobe projecting forwards or spreading, almost filiform, 3–4 cm long, about as broad as the posterior in the lower part. Lip projecting forwards, tripartite from an undivided base 2 mm long; all lobes linear or nearly filiform, 0.5–1 mm broad, the mid-lobe 1.5–2 cm long, the side-lobes 3–4.5 cm long; spur pendent, narrowly cylindrical,

hardly swollen in the apical part, 8.5–21.5 cm long. Anther erect, apiculate, 6–9 mm high, canals curved upwards, 3.5–5 mm long; stigmas porrect or slightly curved back, club-shaped from a very slender base, truncate, 5.5–10 mm long, rostellum narrowly triangular, acute, 4–6 mm high. Fig. 200.15.

Forest, open marshy ground, grassland by streams, deciduous thicket or mixed dry woodland; 1000–1650 m. EW GD SD HA; Mali, Cameroun, Sudan, Kenya, Tanzania, Mozambique, Zambia, Zimbabwe, Malawi and Namibia. *de Wilde* 6927; *Gilbert* 2044; *Mooney* 8124.

42. *H. decumbens* *Thomas & Cribb* (1996)

– type: AR, along road to Dodollo, *de Wilde* 6834 (K holo., WAG iso.).

Terrestrial herb 16–35 cm high. Tuber ellipsoid, 2.5 x 1.5 cm. Stem with 3–4 sheaths along its length, and 2 leaves at the base. Leaves adpressed to ground, broadly ovate, acute or obtuse, 5–7 x 4–5 cm; sheaths up to 4 cm long, narrowly triangular, acute. Inflorescence 8–9 x 4–5 cm, 5–8-flowered. Bracts ovate-oblong, acute to acuminate, up to 22 x 9 mm. Flowers pale green; pedicel with ovary 20–25 mm. Dorsal sepal ovate-oblong, acute, convex, 17–18 x 11 mm. Lateral sepals obliquely ovate-lanceolate, acute, 20 x 5.5 mm. Petals bipartite, basal undivided part 6 mm long; posterior lobe partly covered by dorsal sepal, narrowly triangular, acute to acuminate, 12.2 x 4.5 mm; anterior lobe narrowly linear, rounded, 20 x 1.2 mm. Lip 3-lobed, basal 3–4 mm triangular, undivided and fused to column; mid-lobe linear to narrowly triangular, widest at the base, 15 x 1.7 mm; side-lobes exceeding mid-lobe, linear, 25 x 1.1 mm; spur 20–22 mm long, distinctive knee-like bend 3 mm above base, gently curved above this, slightly widened at the apex. Anther reclinate, locules 2 mm long; canals slender, 2–3 mm long; stigmatic arms porrect, 6 mm long; rostellum triangular, mid-lobe very reduced, side-lobes 6 mm long, triangular.

Grassland; 1900–2600 m. AR SD; not known elsewhere. *de Wilde* 5582 & 6834; *Drake Brockman* 225.

Distinct from other species in this section in having flowers with a knee-like bend in the spur, basally undivided petals and reclinate anther locules.

43. *H. busseana* *Kraenzl.* (1902)

– type: Tanzania, Songea District, Matengo Hills, *Busse* 923 (B holo.).

Terrestrial herb 20–40 cm high, glabrous. Tubers ellipsoid, woolly, 1–3 x 0.5–1 cm. Stem erect, somewhat flexible/zigzag with a single leaf at the base and numerous sheaths along its length. Leaf fleshy, adpressed to the ground, broadly ovate or kidney-shaped, 3–4 x 5–7 cm; sheaths triangular, acuminate. Inflorescence 6–12 x 4 cm long, loosely 13–25-flowered. Bracts lanceolate, acuminate, scarcely as long as the pedicel. Flowers green; pedicel with ovary 2.5–3 cm long. Dorsal sepal oblong-lanceolate, acute, convex, 4–4.5 x 2.4–4 mm. Lateral sepals reflexed, ovate, obtuse, 5–7 x 3–4.5 mm. Petals bipartite nearly to the base; posterior lobe erect,



Figure 200.15 *HABENARIA ARMATISSIMA*: 1 – whole plant in flower $\times 1/2$; 2 – inflorescence $\times 1$; 3 – dorsal sepal, side view $\times 2$; 4 – lateral sepal $\times 2$; 5 – petal $\times 2$; 6 – column, with part of lip, spur and ovary $\times 2$. All from Polhill & Paulo 1370. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig 23.)

lanceolate, hidden beneath the dorsal sepal and joined to it at the base, 3–4 mm long; anterior lobe curved upwards, linear-lanceolate, acute, 10 mm long. Lip tripartite nearly to the base; undivided part 1.5 mm long, lobes lanceolate, acute, equal, 7–8 mm long; spur incurved, narrow at the base, swollen in apical part, 20–25 mm long. Anther somewhat long, canals arising from the middle of the column and somewhat long; stigmas deflexed and surrounding the mouth of the spur; rostellum triangular.

Grassland; 1580–2450 m. BA SD; Tanzania. *Gilbert & Jefford* 4433 & 4668; *Gilbert et al.* 8288.

The Ethiopian specimens match the Tanzanian material well. This disjunct distribution suggests that further information is needed about the Ethiopian material before its identity can be confirmed.

44. *H. holothrix* *Schltr.* (1903)

– type: Angola, *Baum* 578 (B holo., W iso.).

Terrestrial herb 10–30 cm high. Tubers ellipsoid, 1–1.5 cm long, scarcely 1 cm in diameter, sparsely tomentose. Stem erect, slender with a single leaf at the base and 2 or 3 lanceolate, more or less adpressed, sheaths scattered along its length, spreading, hairy. Leaf adpressed to the ground, broadly ovate to almost orbicular, very shortly apiculate-acuminate, 1–3 x 1.5–3 cm, cordate at the base, glabrous or with a few scattered hairs on the upper surface, margins ciliate; sheaths up to 1 cm long, hairy. Inflorescence 1–11 x 1.5 cm, loosely 2–21-flowered. Bracts lanceolate, acuminate, 3–7 mm long, softly hairy. Flowers suberect and slightly curved outwards, green or yellow green, sometimes fragrant; pedicel with ovary 7–11 mm long, softly hairy. Dorsal sepal erect, ovate or elliptical-ovate, obtuse, convex, 3–4 x 2–3 mm, spreading, hairy. Lateral sepals deflexed, obliquely elliptical-lanceolate, obtuse or subacute, 3.5–4.5 x 1.5 mm, spreading, hairy outside. Petals erect, 2-lobed or bipartite from below the middle, glabrous; posterior lobe curved-lanceolate, subacute, 2.5–3 x 1 mm; anterior lobe very variable in length, 0.5–5 x 0.25 mm. Lip curved downwards, tripartite from an undivided base 0.5–1 mm long, glabrous; all lobes linear, obtuse; mid-lobe 3–6 x 0.75 mm; side-lobes 1.5–5.5 x 0.25 mm; spur parallel to the ovary, only slightly thickened in the apical half, 7–10 mm long. Anther slightly incurved, 1.5 mm long, rounded; canals upcurved, 0.5–1 mm long; stigmas stout with much broadened truncate apices, 1 mm long; rostellum triangular, somewhat hooded, scarcely 1 mm long.

Open *Combretum* woodland; 950–2000 m. WU WG; Tanzania, Angola and Zimbabwe. *Mercier* 2538; *de Wilde* 7196.

45. *H. keayi* *Summerh.* (1951)

– type: Nigeria, *Keay* in *Forest Herb.* 25395 (K holo.).

Terrestrial herb to 25 cm high. Tubers spherical to ellipsoid, 1 x 1.5 cm, roots few. Stem densely pubescent, 1 lanceolate acuminate sheath in the middle of the

stem, 1.5 cm long, pubescent. Single leaf up to 7.5 x 10 cm, cordate, heart-shaped, adpressed to the ground, pale green, with darker reticulation, upper side densely pubescent, lower side glabrous. Inflorescence 5–8 cm long, 8–17-flowered. Bracts lanceolate, acuminate, 10 mm long, pubescent. Flowers green and white; pedicel with ovary, pubescent, 13–15 mm long. Dorsal sepal erect, ovate, subacute, pubescent, 7 x 3 mm. Lateral sepals obliquely lanceolate, acute, pubescent, reflexed, 7.5 x 3 mm. Petals bipartite, glabrous, posterior lobe narrowly lanceolate, acute, joined to dorsal sepal, 7 x 1.5 mm; anterior lobe linear, curved upwards, 12 x 0.6 mm. Lip 3-lobed, glabrous; mid-lobe linear, obtuse, reflexed, 10 x 1 mm; side-lobes spreading, linear, 12 x 1 mm; spur swollen near apex, 15 mm long. Anther 2 mm long. Stigma nearly sessile.

Combretum – *Terminalia* grassland; altitude not known. SD; Nigeria & Oman. *Ash* 3120.

46. *H. helicomplectrum* *Summerh.* (1931)

– type: Tanzania, *Haarer* 1435A (K holo.).

Terrestrial herb, 25–55 cm long, glabrous except for the roots. Tubers ellipsoid or elongate-ovoid, 2.5–5 x 1.5–2 cm, tomentose. Stem erect, slender to more or less stout with large leaves at the base and several much smaller ones along its length. Basal leaves adpressed to the ground, broadly ovate to reniform-orbicular, rounded or obtuse at apex, sometimes somewhat cordate at base, 5–11 x 5–16 cm, more or less fleshy; cauline leaves bract-like, 5–7, lanceolate, acuminate, up to 3 cm long. Inflorescence 8–22 x 4.5–6.5 cm, more or less densely many-flowered; bracts lanceolate, spreading or half spreading, white to greenish-cream; pedicel with ovary often slightly curved, 2–2.5 cm long. Dorsal sepal erect, elliptical lanceolate, acute, very convex, 9–12 x 4–6 mm. Lateral sepals deflexed to reflexed, obliquely semi-ovate, acuminate, 10–14 x 4–5.5 mm. Petals bipartite nearly to the base; posterior lobe erect, falcate-lanceolate, acute, 9–12 x 1–2 mm; anterior lobe projecting forwards or curving upwards, filiform, 20–30 x 0.5–1 mm. Lip projecting forwards, tripartite nearly to the base; mid-lobe linear, 8–15 x 1 mm; side-lobes narrowly linear to filiform, 20–25 mm long, a little narrower than the mid-lobe; spur incurved in the middle to form a complete loop, narrowly cylindrical, a little swollen in the apical part, c 35 mm long. Anther erect, apiculate, 6 mm long, canals upcurved in the apical half, nearly 4 mm long. Stigmas porrect, club-shaped and truncate at the apex, slender near the base, 6 mm long, rostellum narrowly triangular, acute, nearly 4 mm long.

Acacia – *Commiphora* bushland; 1250–1600 m. SD; Kenya, Tanzania. *Friis et al.* 3324; *Haugen* 1095.

7. *BONATEA* *Willd.* (1805)

Terrestrial herbs with elongated fleshy and tuberous roots. Stems unbranched, usually very leafy. Leaves arranged all along the stem, but sometimes withered by the time the flowers are open. Inflorescence terminal, 1- to many-flowered. Flowers twisted through 180°,

green or yellow and white. Dorsal sepal free, but usually forming a helm with the upper petal-lobes, the laterals united for some distance to the base of the lip, the anterior petal-lobes and the stigmatic arms. Petals 2-lobed, the upper lobe usually adherent to the dorsal sepal, the lower (anterior) joined at the base to the stigmatic arm and the lip. Lip joined in the basal part to the stigmatic arms and lateral sepals, the free part 3-lobed, spurred at the base; disk usually with a distinct tooth in front of the spur-opening; spur long or short, cylindrical. Anther upright, the locules adjacent and parallel, canals usually more or less elongated, joined to the side-lobes of the rostellum, auricles undivided, rugulose; pollinaria 2, each with a sectile pollinium, somewhat long, slender caudicle and small naked viscidium; stigmatic processes elongated, the lower part joined to the lip, the free part club-shaped; rostellum standing out in front of the anther, convex and usually hooded, 3-lobed, with a relatively short mid-lobe and often long slender side-lobes.

A genus of nearly 20 species, almost restricted to the mainland of Africa with 1 species in Arabia (Yemen); only 1 species confirmed for the Flora area.

1. Spur 5–6.5 cm long; lip with claw 1–1.5 cm long, mid-lobe 15–20 mm long. 1. *B. rabaiensis*
- Spur 10–21 cm long; lip with claw 1.5–3 cm long; mid-lobe 20–35 mm long. 2. *B. steudneri*

1. *B. rabaiensis* (Rendle) Rolfe (1898);

Habenaria rabaiensis Rendle in *J. Linn. Soc.* 30: 390 (1895) – type: Kenya, Rabai Hills near Mombasa, W.E. Taylor s.n. (BM holo.).

Terrestrial herb 25–50 cm high, almost glabrous except for the roots. Stem nearly erect, somewhat stout, leafy along its entire length, 5 mm in diameter at the base. Leaves 8–9, the lowermost 1–2 bract-like, the middle leaves spreading, lanceolate, elliptical-lanceolate or oblanceolate, acute, the apex itself mucronate, the largest 6–11 x 3–4.5 cm, the uppermost much smaller, similar to the bracts. Inflorescence 5–11 x 6–11 cm, more or less loosely 3–7-flowered. Bracts scarious, lanceolate, acuminate, 1–2.5 cm long, usually less than half as long as the pedicel with ovary. Flowers spreading or half-spreading, green and white; pedicel with ovary straight, 3.5–5 cm long. Dorsal sepal erect or incurved, very convex, ovate, acute, 1.7–2 x 1.3 cm; laterals deflexed, united to the lip and stigmatic arms for 1 cm, very obliquely lanceolate-ovate, acuminate, 2 x 1 cm. Petals bipartite nearly to the base; posterior (upper) lobe erect, adherent to the dorsal sepal, linear, 1.5–2 cm long, 1.5 mm broad; anterior lobe joined to the lip for 7 mm, above this curved upwards and outwards, linear, narrowed upwards, 2.5–3 cm long. Lip deflexed, tripartite from a narrow basal part 1–1.5 cm long; mid-lobe linear-ligulate, subacute, 1.5–2 cm long, 1–2 mm broad; side-lobes linear, 2.5–3 cm long, only 1 mm broad; spur pendent, swollen in the apical half, 5–6.5 cm long. Anther erect with a long apiculum, 1 cm long, locules parallel, canals porrect, slender, just over 1 cm long. Stigmatic arms curved downwards a little, 1.5 cm long,

joined to the lip to above their middle, free part club-shaped; rostellum placed in front of the anther and nearly as long, very convex and hooded, 8 mm high, 3-lobed, with the mid-lobe much incurved and ciliolate, the side-lobes porrect, 2.5 mm long, not much overtopping the hood.

Reported to occur in Ethiopia by Cufodontis but no Ethiopian specimens seen during the preparation of this account; Kenya and Tanzania.

2. *B. steudneri* (Rchb.f.) Th. Dur. & Schinz (1895);

Habenaria steudneri Rchb.f. (1881) – type: EW, Keren, Steudner 700 (B holo., W part of holo.).

Bonatea pirottae Cortesi (1905) – types: EW, Amasen, Baldrati (RO syn., FI iso.); Tellini 3392 (RO holo., FI iso.); Mt. Arbaroba, Pappi 3392 (RO syn., P W isosyn.); Dongollo, Pappi 4514 (RO syn., FI isosyn.); Cophain, Pappi 3002 (RO syn., FI isosyn.).

Terrestrial herb 25–125 cm high, glabrous except for the roots. Tubers several, elongated, sub-cylindrical, fusi-form or irregular in shape, 3–21 x 1–4 cm, densely tomentose. Stem erect, more or less robust, leafy throughout its entire length, up to 1 cm in diameter at the base. Leaves 10–20, the lowest 1–3 sheath-like, the middle leaves half-spreading, lanceolate, oblong-lanceolate or ovate-elliptical, acute, base of lamina more or less enfolding the stem, the largest 7–19 x 3–5 cm, decreasing in size above the middle of the stem, the uppermost smaller, similar to the bracts. Inflorescence cylindrical or almost corymbose, 3–28 x 10–20 cm, more or less loosely 3–30-flowered. Bracts similar to the upper leaves but thinner, lanceolate, acuminate, 2–5 cm long, shorter than the ovary with pedicel. Flowers spreading, white and green; pedicel with ovary slender, 4–7 cm long. Dorsal sepal erect, very convex, elliptical-lanceolate, acuminate, apex often recurved, 2–3 x 1–2 cm; laterals deflexed, very obliquely broad-lanceolate, acuminate, the upper margin united for 1–2 cm with the claw of the lip and the stigmatic branches, 2–3 x 1–1.5 cm. Petals bipartite almost to the base; posterior (upper) lobe erect, adherent to the dorsal sepal, linear, slightly curved, 1.7–2.7 x 1–2 mm; anterior lobe joined to the claw of the lip for 0.6–2 cm, then curving downwards and outwards, narrowly linear or almost filiform, 30–70 x 1 mm. Lip tripartite from a long narrow claw, 1.5–3 cm long; mid-lobe curved back and usually sharply bent back in the middle, linear, 2–3.5 x 1–3 mm; side-lobes spreading, much longer and narrower, 2.5–8.5 cm long, 1–2 mm broad; spur pendent, narrowly cylindrical with the apical part somewhat swollen, 10–21 cm long. Anther erect, apiculate, 1–1.8 cm long, locules parallel, canals slender, porrect, 1.8–2.5 cm long. Stigmatic arms projecting forwards, 2.2–3.2 cm long, the lower part joined to the lip, the free part 7–20 mm long, club-shaped; rostellum placed in front of the column, 3-lobed, the mid-lobe helmet-shaped with an acute often incurved apiculum, 5–8 mm long from the base, the margins ciliolate, the side-lobes slender, porrect, 1–2 cm long. Fig. 200.16.

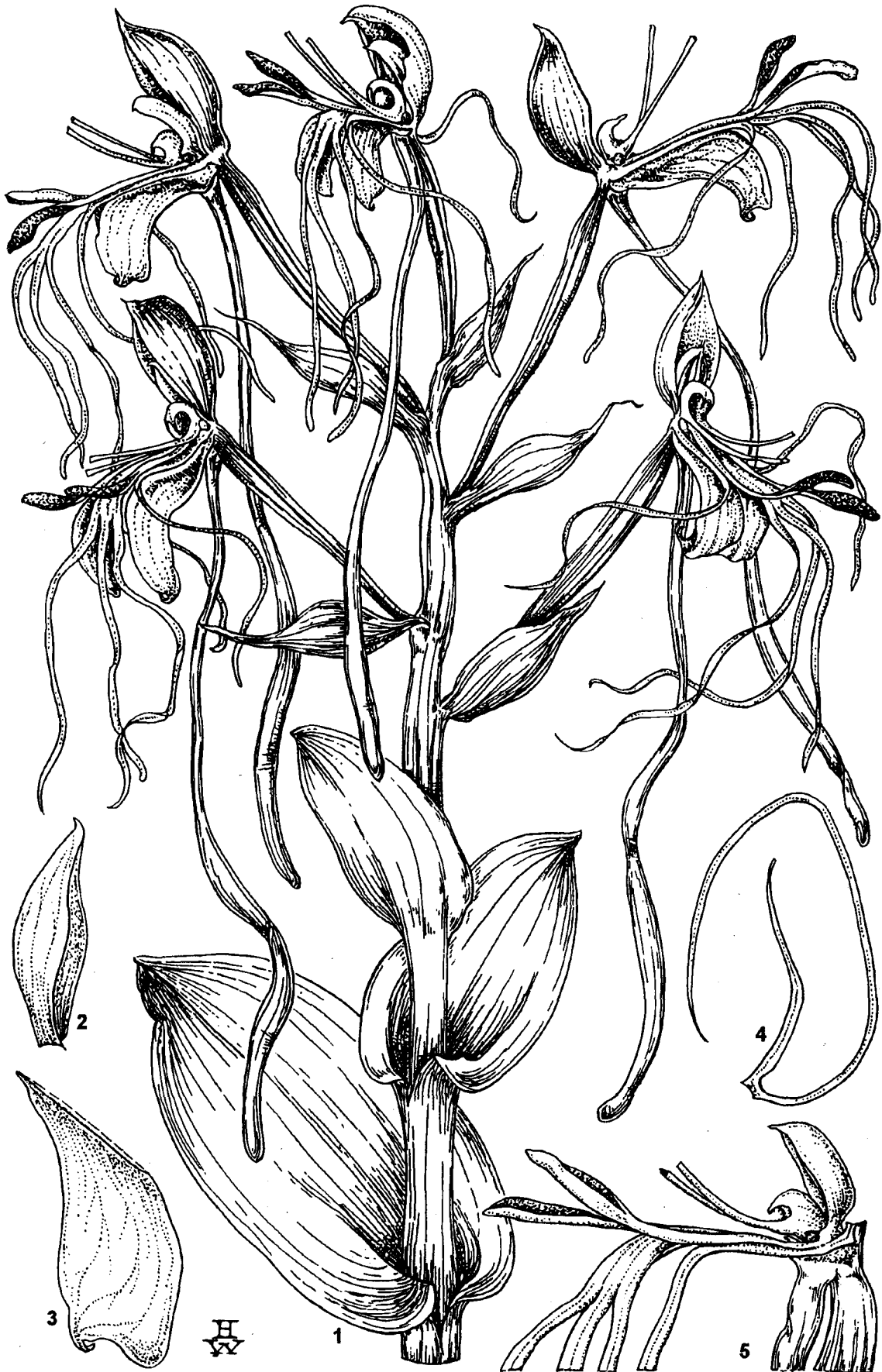


Figure 200.16 *BONATEA STEUDNERI*: 1 – upper part of stem and inflorescence x 1; 2 – dorsal sepal x 1½; 3 – lateral sepal x 1½; 4 – petal x 1½; 5 – column, with part of lip, anterior petal-lobe, spur and ovary x 1½. All from Drummond & Hemsley 2523. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 24.)

Bushland and scrub, at edges of thickets, rocky places in rain-forest, rocky slopes; 1000–2800 m. EW GD WU SD HA; Sudan, Somali to Arabia, also eastern Zaire, Uganda, Kenya, Tanzania, Zambia and Zimbabwe. *Beals* 431; *de Wilde* 7386; *Jansen* 1744.

8. PLATYCORYNE *Rchb.f.* (1855)

Summerhayes, *Kew Bull.* 13: 58–75 (1958) & 17: 532–533 (1964).

Terrestrial herbs with fleshy or tuberous roots. Stems unbranched, more or less leafy. Leaves scattered along the stem or the majority in a tuft at the base, usually narrow. Inflorescence terminal, 1- to many-flowered. Flowers twisted through 180°, usually orange or yellow or greenish, rarely white. Sepals free, the laterals deflexed, the dorsal forming a helm with the 2 petals. Petals usually adherent to the dorsal sepal, usually simple, rarely with a short lobe at the base of the front margin. Lip free, spurred, simple or with short side-lobes; spur cylindrical. Column erect, the anther upright, locules parallel, contiguous, canals varying in length, rarely scarcely developed, joined to the side-lobes of the rostellum; pollinaria 2, each with a sectile pollinium, a long caudicle and elliptical viscidium; stigmatic processes distinct, curved back, thick with rounded knob-like apices, the rostellum either between the anther-locules or standing out in front of the anther, 3-lobed, more or less erect, the mid-lobe often overtopping the anther, the side-lobes porrect and usually projecting beyond the hood, sometimes short and shoulder-like. Capsules oblong or fusiform.

A genus of 17 species, restricted to the mainland of Africa except for 1 species in Madagascar; only 1 species from the Flora area.

P. crocea (*Rchb.f.*) *Rolfe* (1898);

Habenaria crocea *Rchb.f.* (1878) – types: Sudan Republic, S. of Lesi [Leshi], *Schweinfurth* 3968 (W syn., K isosyn.) & near Matluoli, *Schweinfurth* 4031 (W syn.).

subsp. *montis-elgon* (*Schltr.*) *Summerh.* in *Kew Bull.* 17: 533 (1964);

Habenaria montis-elgon *Schltr.* (1922); *Platycoryne montis-elgon* (*Schltr.*) *Summerh.* (1932) – type: Kenya, Elgon, *Lindblom* (S holo.).

Terrestrial herb 10–40 cm high, glabrous except for the roots; tubers ellipsoid or almost globose, 8–18 x 5–10 mm, densely tomentose. Stem erect, often somewhat flexible/zigzag, slender, cylindrical or angled, with a tuft of leaves at the base and several more scattered along its length. Leaves 5–12(–16), the lowermost sometimes reduced to a sheath, the lower 3–8 forming a tuft, suberect or variously spreading, linear or linear-lanceolate, acute, the largest 15–80 x 2–8 mm, the upper ones at intervals on the stem, more or less adpressed, lanceolate, acute, shorter than the basal ones. Inflorescence short, 0.5–5 x 2–3.5 cm, densely 2–9-flowered. Bracts leafy, lanceolate, acuminate, 7–18 mm long, usually

shorter than the pedicel with ovary. Flowers suberect or curving outwards, yellow or orange; pedicel with ovary more or less curved, 14–19 mm long. Dorsal sepal erect or curved forwards, very convex, broadly ovate, acute, 6.5–12 x 3.5–7.5 mm. Lateral sepals deflexed, obliquely oblong-lanceolate, acute or acuminate, 5.5–11.5 x 2–3.5 mm. Petals erect, adherent to the dorsal sepal, much curved, obliquely ligulate-lanceolate, subacute or obtuse, 4.5–10.5 x 2 mm. Lip deflexed, often upcurved in the apical part, 3-lobed at the base, altogether 5–12 mm long; mid-lobe ligulate, fleshy, obtuse, 1–2 mm broad; side-lobes more or less spreading, almost tooth-like or up to nearly 2 mm long, narrow, acute; spur pendent, swollen in the apical part, 9–15 mm long. Anther erect, obtuse or shortly apiculate, 2 mm long, canals porrect, 1–2.5 mm long. Stigmas horizontal or somewhat curved back, club-shaped, obtuse, 1.5–3 mm long; rostellum erect, 3-lobed, the mid-lobe narrowly triangular, acute, 1–2.5 mm long, the side-lobes shorter, truncate. Fig. 200.17.

Grassy areas in shallow soil over rocks or lava pavements; 1200–2350 m. GD GJ SU WG KF GG; Sudan Republic, Uganda and Kenya. *Ash* 2020; *Gilbert* 2011; *Mooney* 9137.

Platycoryne crocea subsp. *crocea* from Kenya differs in having 3 basal leaves not much longer than cauline ones; dorsal sepal 6–7 mm long; side-lobes of lip less than 0.5 mm long. Subsp. *ochrantha* (*Schltr.*) *Summerh.* from Tanzania differs in having 2–6 cauline leaves and triangular side-lobes of the lip which are 0.3–1 mm long.

9. ROEPEROCHARIS *Rchb.f.* (1881)

Summerhayes, *Kew Bull.* 17: 533–535 (1964).

Terrestrial herbs with tuberous roots. Stems unbranched, leafy. Leaves usually narrow, scattered along the stem. Inflorescence terminal, few to many-flowered. Flowers twisted through 180°, green. Sepals free, the laterals spreading. Petals free, simple but often toothed or irregular, more or less fleshy. Lip free, spurred, 3-lobed or rarely simple; spur cylindrical. Column erect, the 2 anther-locules separate at the sides of the broad connective and more or less divergent, canals scarcely developed, auricles large, elliptical or quadrate; pollinaria 2, each with a sectile pollinium, a long caudicle and small viscidium; stigmatic processes distinct, each 2-lobed, 1 lobe projecting downwards in front of the lip-base, the other upright in front of the anther-connective, rostellum 3-lobed, the side-lobes spreading, narrowed towards the apex, the mid-lobe low and rounded or emarginate, joined to the connective.

A genus of 5 species, restricted to eastern Africa with 3 species occurring in the Flora area.

1. Lip entire; spur pendent at first then sharply curved upwards in apical half, upwardly curved part greatly inflated. 1. *R. alcicornis*

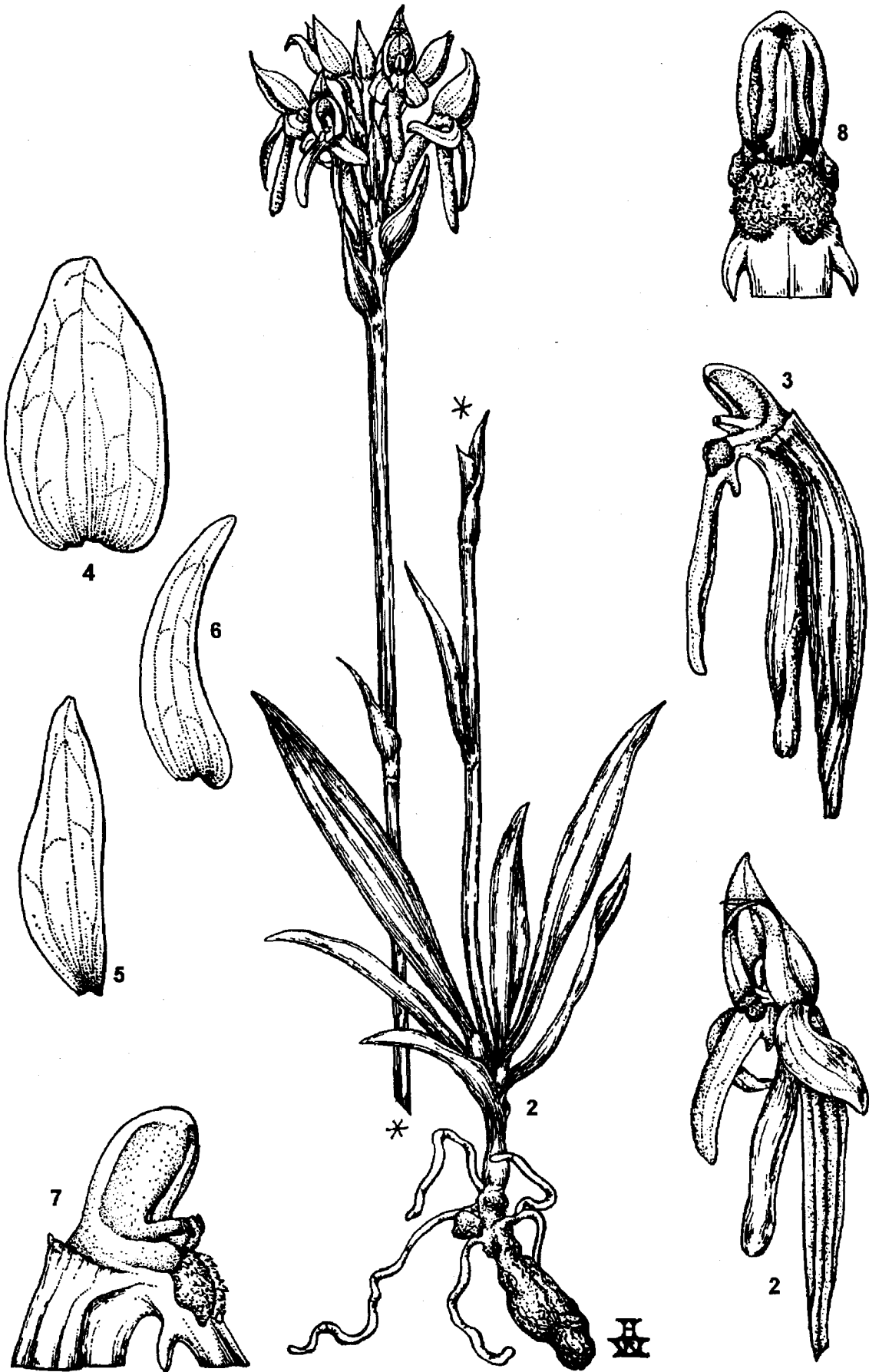


Figure 200.17 *PLATYCORYNE CROCEA* subsp. *MONTIS-ELGON*: 1 – whole plant in flower $\times 1\frac{1}{2}$; 2 – flower, oblique view $\times 3$; 3 – flower, sepals and petals removed, side view $\times 3$; 4 – dorsal sepal $\times 5$; 5 – lateral sepal $\times 5$; 6 – petal $\times 5$; 7 – column and base of lip, side view $\times 7$; 8 – same front view $\times 7$. 1 from *C.G. Rogers* 453; 2–8 from *Piers* 117. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 25.)

- Lip tripartite; spur pendent, cylindrical or subclub-shaped, gently curved or straight. 2
- 2. Spur bifid at apex; leaves not mucronate; petals very obliquely lanceolate and almost S-shaped, twisted and folded in the middle, acute, 5.5–11.5 x 2.5–5.5 mm. 2. *R. bennettiana*
- Spur not bifid at apex; leaves mucronate; petals obliquely falcate-ovate, acuminate, 5–6 x 2 mm. 3. *R. urbaniana*

1. *R. alpicornis* Kraenzl. (1892)

- type: Ethiopia, *Schimper* 1364 (B holo.).

Terrestrial herb to 40 cm high, glabrous; tubers not seen. Stem erect, up to 0.5 cm in diameter at the base, leafy. Leaves 5, the lowermost 1 or 2 reduced to sheaths, the remainder more or less erect, linear or narrowly lanceolate, acute, the largest 11 x 1 cm, decreasing in size up the stem, the uppermost often similar to the bracts. Inflorescence narrow, 8 x 2 cm, more or less densely 15-flowered. Bracts adpressed to the ovary, leafy, narrowly lanceolate, acute or acuminate, up to 15 x 5 mm, usually longer than the pedicel with ovary. Flowers suberect, greenish yellow; pedicel with ovary almost straight, 10–13 mm long. Dorsal sepal erect, ovate, acute, convex, 5 x 3.1 mm, 3-nerved. Lateral sepals reflexed, very obliquely lanceolate-ovate, acuminate, 6.5 x 3.8 mm. Petals erect, obliquely lanceolate, margins wavy, crenulate, twisted and folded in the middle, apex distinct, acute, 5.6 x 4.1 mm, more or less fleshy. Lip pendent, entire, very narrowly triangular, 10 x 2.5 mm; spur pendent at first then sharply curved upwards in apical half, upwardly curved part greatly inflated, 7.5 mm long. Column 2–5 mm high; anther-connective 4 mm broad, locules diverging, canals very short or up to 1–5 mm long, auricles elliptical, more or less half the length of the locules. Stigmas bilobed from the base, papillose, the lower lobe oblong, 3.5 mm long, the upper lobe 2 mm long, just projecting above the connective; rostellum side-lobes spreading, tapering, the mid-lobe rounded, very broad. Fig. 200.18.

Plateau devoid of any tree growth, small creek with marshy borderlands in bottom of valley; 2600 m. GD/TU AR; not found elsewhere. *Cheesman* s.n.; *de Wilde* 6850.

2. *R. bennettiana* Rchb. f. (1881)

- type: GD, Begemder, Jan Meda, *Schimper* 1327 (W holo., BM K iso.).

Terrestrial herb, 35–95 cm high, almost entirely glabrous; tubers ellipsoid or globose, 2–2.5 x 1–2 cm, glabrous. Stem erect, slender to stout, up to 1 cm in diameter at the base, leafy throughout its length, cylindrical. Leaves 5–10, the lowermost 1 or 2 reduced to sheaths, the remainder more or less erect, linear or narrowly lanceolate, acute, the largest 11–25 x 1–2.5 cm, decreasing in size up the stem, the uppermost often similar to the bracts. Inflorescence narrow, 9–27 x 2–3 cm, more or

less densely 15- to many-flowered. Bracts adpressed to the ovary, leafy, narrowly lanceolate, acute or acuminate, 1–2.5 cm long, usually longer than the pedicel with ovary. Flowers suberect, green; pedicel with ovary almost straight, 10–13 mm long. Dorsal sepal erect, broadly lanceolate or lanceolate-ovate, acuminate, convex, 6–11.5 x 4–6.5 mm, 5-nerved; laterals spreading or almost reflexed, curving upwards, very obliquely lanceolate-ovate with the lower margin very rounded, acuminate, 6.5–12.5 x 4–6.5 mm, 5–6-nerved. Petals erect, very obliquely lanceolate and almost S-shaped, twisted and folded in the middle, apex distinct, acute, 5.5–11.5 x 2.5–5.5 mm, more or less fleshy. Lip pendent, 3-lobed; undivided basal part oblong, 2.5–4.5 mm long; mid-lobe linear, obtuse, 7–16.5 x 1–1.7 mm; side-lobes divergent, linear, tapering towards the apex, 4.5–8.5 x 0.5–1 mm; spur pendent, cylindrical, shortly bifid at the apex, 5.5–14.5 mm long. Column 2–5 mm high; anther-connective 3–3.5 mm broad, papillose, locules diverging, 2.5–3.5 mm long, canals very short or up to 1–5 mm long, auricles elliptical, more or less half the length of the locules. Stigmas bilobed from the base, papillose, the lower lobe 3–5 mm long, the upper lobe 2–4 mm long, often just projecting above the connective; rostellum side-lobes spreading, tapering, the mid-lobe rounded, very broad. Fig. 200.19.

Swamps and damp grassland; 2000–2500 m. GD AR KF SD; Kenya, Tanzania, Malawi and Zambia. *de Wilde* 5706 & 6725; *Mooney* 5928.

3. *R. urbaniana* Kraenzl. (1892)

Habenaria setigera Chiov. (1911) - type: GD, Mt. Gunna, *Schimper* 1333 (B holo., BM FI iso.).

Terrestrial herb to 35 cm high; glabrous. Tubers 2, ellipsoid, 12–15 x 5–8 mm. Stem slender, leafy throughout. Leaves 4–6; oblong-lanceolate or lanceolate, acute, mucronate, 5–12 x 10–15 mm. Inflorescence lax, short, up to 7 cm long, 8–13-flowered. Bracts elliptic to narrowly triangular, acute, exceeding pedicel and ovary. Dorsal sepal erect, ovate, long acuminate, 7 x 5 mm. Lateral sepals falcate-ovate, acute, 9–10 x 3.5 mm. Petals entire, obliquely falcate-ovate, acuminate, 5–6 x 2 mm. Lip 3-lobed in apical two-thirds; basal undivided part 4 x 2.5 mm; mid-lobe linear, acute to obtuse, 9 x 1 mm; side-lobes linear, acute, 8 x 1 mm; spur subclub-shaped, 15 mm long. Column 2–5 mm high; anther-connective 3.5–4.5 mm broad, locules diverging, canals very short, auricles elliptical, about half the length of the locules. Stigmas bilobed from the base, papillose, the lower lobe oblong, 3 mm long, the upper lobe 1.5–2 mm long, often just projecting above the connective; rostellum side-lobes spreading, tapering, the middle lobe rounded, very broad. Fig. 200.20.

Grassy Meadows with shrubs of *Hypericum* and *Erica*; c 2750 m. GD; not known elsewhere. *Chiovenda* 1784; *Schimper* 1334; *Tewolde* BGE 654.

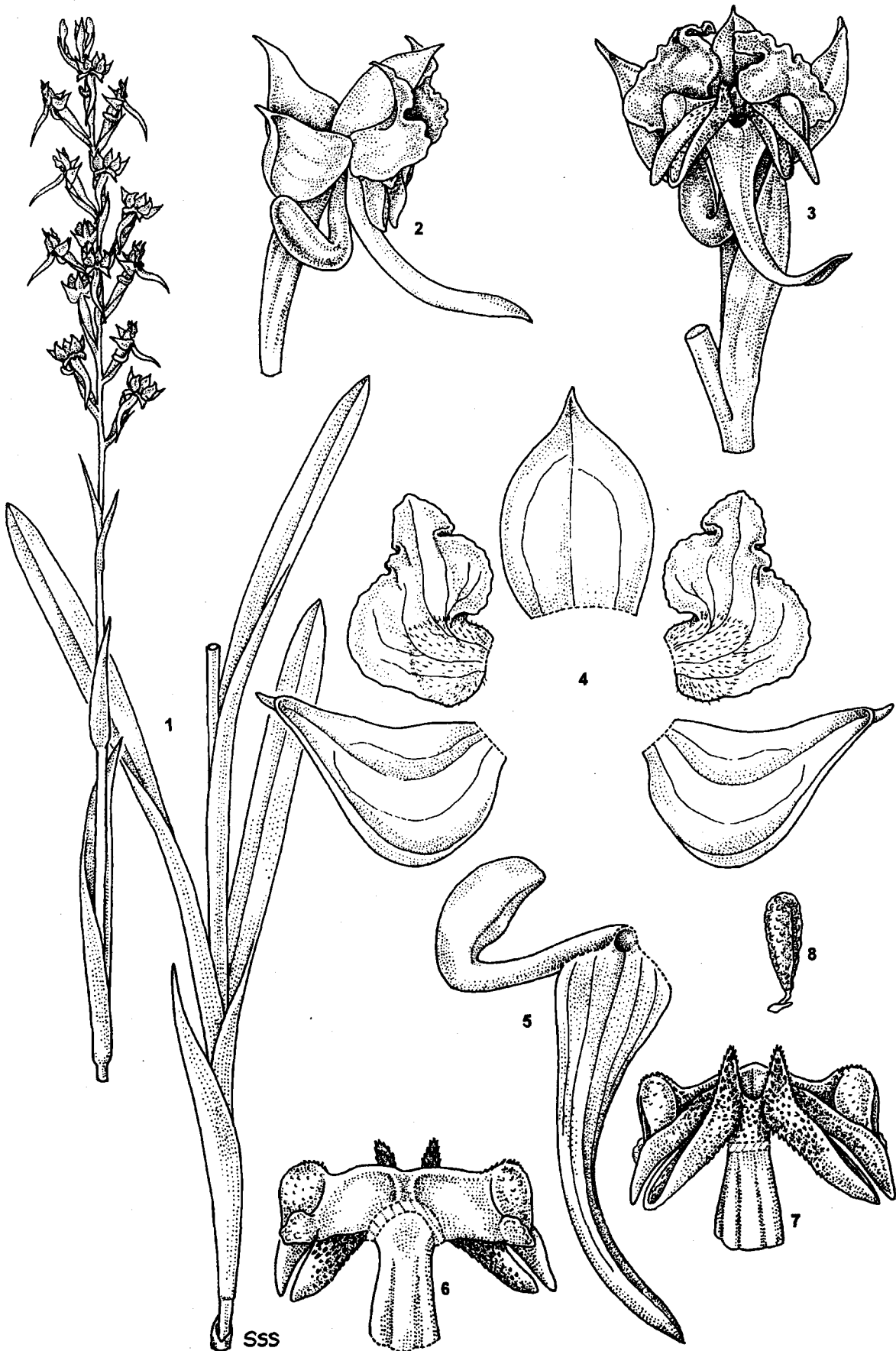


Figure 200.18 *ROEPEROCHARIS ALCICORNIS*: 1 – plant in flower x 1; 2 & 3 – flower, side and front views x 8; 4 – sepals and petals x 12; 5 – lip x 12; 6 & 7 – column, rear and front views x 12; 8 – pollinium x 12. All from *de Wilde* 6850. Drawn by Susanna Stuart-Smith.



Figure 200.19 *ROEPEPOCHARIS BENNETTIANA*: 1 – whole plant x $\frac{1}{4}$; 2 – lower part of plant x 1; 3 – inflorescence x 1; 4 – flower x 3; 5 – dorsal sepal x $4\frac{1}{2}$; 6 – lateral sepal x $4\frac{1}{2}$; 7 – petal x $4\frac{1}{2}$; 8 – column, front view x $4\frac{1}{2}$. 1–3 from *Stolz* 2492; 4–8 from *Holmes* 227. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 26.)

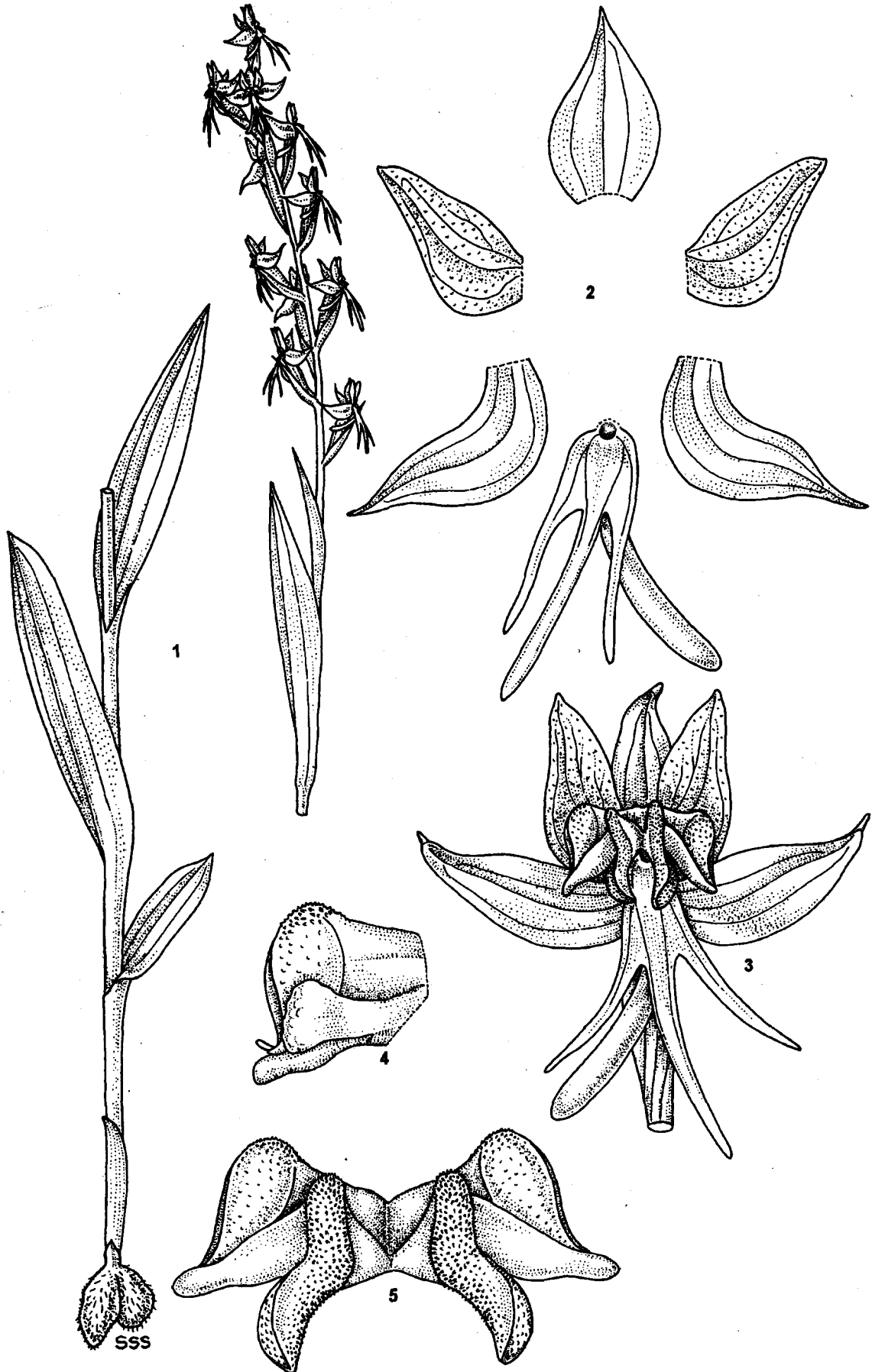


Figure 200.20 *ROEPEROCHARIS URBANIANA*: 1 – complete flowering plant x 1; 2 – sepals, petals and lip x 6; 3 – flower x 6; 4 – column, side view x 12; 5 – column, front view, spread open slightly x 12. All from *Schimper* 1333. Drawn by Susanna Stuart-Smith.

10. *DISA* Berg. (1767)

Linder, *Contr. Bol. Herb.* 9: 1-370 (1981).

Terrestrial herbs with tuberous roots. Stems unbranched, leafy. Leaves scattered along the flowering stem or on separate sterile shoots. Inflorescence terminal, 1- to many-flowered. Flowers twisted through 180°, variously coloured. Sepals free, the dorsal erect, hooded or helmet-shaped, usually spurred, the laterals more or less spreading. Petals at the base more or less joined to the column, often included in the dorsal sepal, variable in shape. Lip usually small and narrow, entire, not spurred. Column short; anther erect, horizontal or reflexed, the locules parallel; pollinaria 2, each with a sectile pollinium, caudicle and naked viscidium; stigmas united into a cushion below the rostellum, rostellum small, 3-lobed, the mid-lobe small, folded, the side-lobes short, fleshy, often joined to the petals. Ovary twisted, almost cylindrical. Capsule cylindrical, club-shaped or narrowly ellipsoid.

A genus of about 130 species, occurring mostly on the African mainland, predominantly South African with 4 species in Madagascar and the Mascarene Islands; 4 also in the Flora area.

1. Spur pendent. 2
- Spur erect or suberect. 3
 2. Petals bilobed in upper half; dorsal sepal erect, orbicular, obovate or ovate from a very short narrowed base, convex, 6-14.5 x 5-11 mm.
4. *D. scutellifera*
- Petals entire; dorsal sepal incurved, broadly elliptical, rounded, very convex, 4-6 x 3.5-5.5 mm.
2. *D. deckenii*
 3. Petals broader than long, 3 x 4 mm, transversely oblong, truncate and obscurely bilobed on front margin. 3. *D. pulchella*
- Petals longer than broad, 4-6 x 2.5 mm, curved, oblanceolate or oblanceolate-oblong, acute, the front margin slightly widened at base, basal half attached to the column by a thin keel or ridge. 1. *D. aconitoides* subsp. *goetzeana*
 1. *D. aconitoides* Sonder in *Linnaea* 19: 91 (1847)
- type: South Africa, Cape Prov., *Ecklon & Zeyher* s.n. (S hol., K iso.).
- subsp. *goetzeana* (Kraenzl.) Linder, *Contr. Bol. Herb.* 9: 92 (1981);
D. goetzeana Kraenzl. (1900) - type: Tanzania, *Goetze* 544 (B hol.).
D. vaginata Chiov. (1911), non Harvey (1842).
D. chiovendae Schltr. (1920) - type: Ethiopia, *Chiovenda* 668 (FI hol.).

Terrestrial herb 20-65 cm high, glabrous except for the roots; tubers almost globose to elongate-ovoid, 1.5-3 cm long, 1-2 cm in diameter, shortly tomentose or nearly glabrous; roots very slender, flexible/zigzag, pubescent or glabrous. Sterile stems very short with 2-3 overlapping sheaths and 1-2 leaves at the apex; leaves linear-oblanceolate, acute, 9-12 x 0.7-1 cm. Flowering stems erect, more or less slender, leafy throughout their

length, cylindrical; leaves 4-6(-8), the lowest 1 or 2 sheath-like, the remainder more or less erect and adpressed to the stem, lanceolate, acute, the largest 4-10 x 7-20(-30) mm. Inflorescence 7-20(-28) cm long, 2-4 cm in diameter, loosely to more or less densely 10- to many-flowered, the rachis spotted purple. Bracts thin in texture, narrowly lanceolate, acuminate, 6-16(-25) mm long, usually shorter than the flowers. Flowers suberect or half-spreading, whitish to purple with purple or darker purple spots or markings; pedicel with ovary straight, 7-12 mm long, the ovary spotted with purple. Dorsal sepal with mouth inclined forwards, more or less shortly conical, passing gradually into the spur in the middle, base to apex 6-10 mm long, more or less as broad at the mouth when spread out, the spur more or less erect, rounded or acute, tapering towards the apex, base of sepal to apex of spur 6-10 mm long; laterals spreading forwards, obliquely oblong or elliptical, rounded, often with a slender dorsal point, 6-8.5 x 2-4 mm. Petals erect, inside the dorsal sepal, curved, oblanceolate or oblanceolate-oblong, acute, the front margin slightly widened at base, 4-6 x 1-2 mm, basal half attached to the column by a thin keel or ridge. Lip projecting forwards, narrowly oblong or elliptical from a narrower base, rounded, 5-7 x 1.5 mm. Column erect, short. Anther horizontal, 2 mm long. Stigma in front of anther, suborbicular, 2 mm in diameter.

Grassland, sometimes with scattered shrubs, or *Combretum* - *Terminalia* woodland; 1450-2850 m. GJ WU SU WG KF SD GG; Zaire Uganda, Kenya, Tanzania, Malawi, Zambia and Zimbabwe. *Burger* 489; *Gilbert & Thulin* 448; *Mooney* 8929.

2. *D. deckenii* Rchb. f. (1881)

- type: Tanzania, Kilimanjaro, *Kersten* s.n. (B hol., W part of & record of hol.).

Terrestrial herb 5-55 cm high, glabrous except for the roots; tubers cylindrical or more or less fusiform, 20-50 x 5-7 mm, densely tomentose; roots slender, flexible/zigzag, pubescent. Sterile stems up to 4 cm long with 1 or 2 sheaths at the base and a single leaf at the apex; leaf 9-10 x 2 cm. Flowering stems usually slender, almost covered by the often sheathing leaves; leaves 7-13, the lowermost 1-3 short, sheath-like, spotted or striped red, sometimes the next 1-3 long with false petioles, up to 17 x 1-2 cm, the remainder erect or suberect, usually more or less adpressed to the stem, lanceolate, acute, the largest 3-9 x 1-1.5 cm, the uppermost often much smaller, acuminate. Inflorescence cylindrical, 2-7 x 1.5-2.5 cm, very densely 10- to many-flowered. Bracts lanceolate, acute, 9-18 mm long, usually not noticeably overtopping the flowers. Flowers half-spreading or suberect, pink or rose-coloured, rarely crimson or mauvish-pink; pedicel with ovary almost straight, scarcely 1 cm long. Dorsal sepal incurved, broadly elliptical, rounded, very convex, spurred below the middle, 4-6 x 3.5-5.5 mm, the spur pendent, cylindrical, 2.5-6 mm long; laterals spreading, obliquely elliptical or oblong-elliptical, 5.5-6.5 x 3-4

mm. Petals erect, lanceolate with a somewhat narrowed base, acute, 3.5–6 x 1.2–1.4 mm. Lip pendent, ligulate or ligulate-ob lanceolate from a narrower base, obtuse, 3–5 mm long, scarcely 1 mm broad. Anther erect, 2–5 mm high. Stigma nearly orbicular or transversely elliptical, 1–5 mm in diameter.

Glades at upper edge of forests, grassy spots in amongst *Erica*; 2600 m. AR SD; Sudan, Uganda, Kenya, Tanzania and Congo. *Burger* 1790; *Drake-Brockman* 200; *de Wilde* 6841.

3. *D. pulchella* Hochst. ex A. Rich. (1851)

– type: GD, Semien Province, near Entchebkab, *Schimper* 1192 (P lecto., W isolecto.).

Erect terrestrial herb, 12–35 cm high; tubers 3 x 2 cm, ovoid to ellipsoid, tomentose. Stem leafy, 2–6 mm in diameter. Leaves 5–8, up to 13 x 2 cm, largest in centre of stem, lanceolate to linear-elliptic, acute or subacute, suberect. Inflorescence 3.5–11 x 2 cm, densely 3- to many-flowered, cylindrical; bracts c 1.6 cm long, lanceolate, acuminate, longer than the ovary. Flowers sweetly scented, red-violet to purple with white petals. Dorsal sepal 5 mm long and broad, circular, convex, spurred in the middle on the dorsal surface; spur 4–6 mm long, cylindrical, erect or suberect; lateral sepals 7 x 4 mm, spreading forwards and downwards, oblong-elliptic, apiculate towards apex on outer surface. Petals 3–3.3 x 4–4.7 mm, erect inside dorsal sepal, transversely oblong, truncate and obscurely bilobed on front margin. Lip 5.5 x 1.2 mm, porrect or deflexed, linear or oblanceolate, rounded at apex, somewhat fleshy, and folded back on itself. Column enclosed by dorsal sepal, erect. Anther canals 0.8 mm long, porrect. Stigmas sessile.

Erica thickets and alpine grassland, scrub, river banks and woodland; 1800–3800 m. GD GJ AR SD BA; Yemen. *de Wilde* 6785; *Evans* 411; *Mooney* 7287.

4. *D. scutellifera* A. Rich. (1840)

– type: TU, Mt. Sholoda near Adua [Adowa], *Quartin-Dillon* s.n. (P holo., BR iso.).

D. schimperi N.E. Br. (1898) – type: GD, Sanka Berr on Reb R., *Schimper* 1309 (K holo.).

Terrestrial herb 25–75 cm high, glabrous except for the roots; tubers ellipsoid, ovoid or elongate-ovoid, 2–4.5 x 1–2 cm, shortly tomentose; roots slender, flexible/zig-zag, pubescent. Sterile stems up to 13 cm long, covered by several overlapping sheaths, 1–2-leaved at the apex. Leaves lanceolate or narrowly lanceolate, 10–30 x 1–2 cm. Flowering stems somewhat stout, almost entirely covered by adpressed sheathing leaves, cylindrical, often 1 cm in diameter at the base; leaves 9–13, the lower most short, sheath-like, the remainder lanceolate, acute, the largest 7–12 x 1–2 cm. Inflorescence 5–19 x 2.5–4.5 cm, densely 14- to many-flowered. Bracts leafy, lanceolate, acuminate, 2–3.5 cm long, the lower ones often longer than the flowers. Flowers suberect, pink, bright carmine or mauve, often with darker spots, rarely white; pedicel with ovary straight, 1.5 cm long.

Dorsal sepal erect, orbicular, obovate or ovate from a very short narrowed base, convex, spurred below the middle, 6–11(–14–5) x 5–8(–11) mm, the spur pendent, often slightly swollen in the apical part, 4.5–6(–10) mm long; laterals spreading upwards, obliquely oblong or elliptical, obtuse or rounded, 8–10(–13) x 4–5(–6–5) mm. Petals erect, 2-lobed in the upper part, altogether 6.5–8(–11) mm long; lower (front) lobe obliquely elliptical with a somewhat cordate base on the outside, rounded at the apex, 5–7 x 3.5–5 mm; upper (back) lobe much smaller, linear-oblong, curved, 3.5–5.5 x 1–1.5 mm. Lip pendent, linear, 6.5–10.5 x 0.7–1.7 mm. Anther erect, shortly stalked, 4–5 mm high. Stigma orbicular, 2.5–3 mm in diameter. Fig. 200.21.

Damp grassland or grassy rocky slopes; 1800–2750 m. TU GD GJ SU SD; Sudan, Uganda and Kenya. *Burger* 603; *de Wilde* 6838; *Mooney* 7392.

11. SATYRIUM Sw. (1800), *nom. conserv.*

Cribb, Kew Bull. 33: 667–669 (1979).

Terrestrial herbs with sessile undivided tubers. Stems unbranched, leafy, or covered with leaf-like sheaths. Foliage leaves either towards or at the base of the stem, or on separate sterile shoots. Inflorescence terminal, few to many-flowered. Bracts often reflexed. Flowers not twisted through 180°, variously coloured. Sepals more or less united to the petals and the lip, the intermediate linear or ligulate, the laterals obliquely semi-elliptical or oblong. Petals more or less spatulate, linear or lanceolate, more or less united to the sepals at the base. Lip erect, more or less hooded, with a broad or narrow mouth, the apex sometimes recurved, usually with 2 spurs at base, sometimes with 2 extra shorter ones, rarely spurs absent; spurs long and slender to short and obtuse. Column erect and more or less incurved, included in the lip; anther pendent from the front of the column, the locules parallel; pollinaria 2, each with a sectile pollinium, caudicle and usually, separate naked viscidium, rarely the 2 viscidia are united to form 1. Stigma forming the upper lobe of the column, flat or hooded, rostellum projecting forward between the stigma and anther-locules, more or less 3-lobed or 3-toothed, the mid-lobe sometimes longer than side-lobes; ovary not twisted, often 6-ribbed. Capsules usually ellipsoid.

A genus of over 100 species, occurring mostly on the African mainland, predominantly South African with 5 species in Madagascar and 2 in Asia; 6 recorded for the Flora area and 1 more not confirmed.

1. Foliage leaves born on flowering stem. 2
- Foliage leaves born on separate, sterile stems, the leaves on flowering stems sheath-like. 5
2. Flowering stem with 1 or 2 basal heart-shaped or orbicular leaves adpressed to the ground; flowers large, white, more than 2 cm in diameter.

1. *S. aethiopicum*

– Flowering stem with a number of leaves, those near the base not adpressed to the ground;

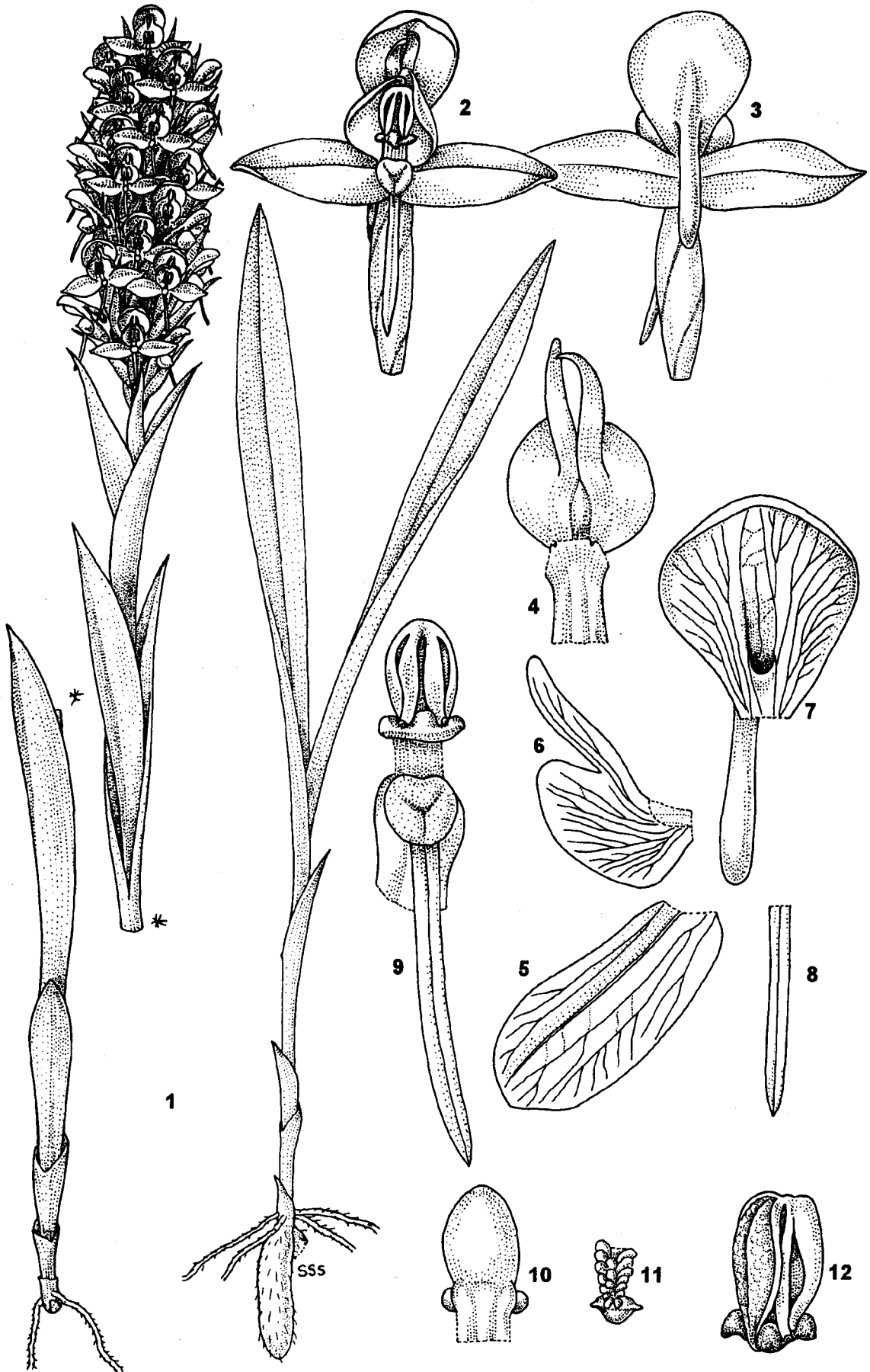


Figure 200.21 *DISA SCUTELLIFERA*: 1 – complete plant in flower x 1; 2 & 3 – flower, front and back views x 3; 4 – united lateral petals x 8; 5 – lateral sepal x 9; 6 – petal x 9; 7 – dorsal sepal and spur x 9; 8 – lip x 9; 9 – column and lip x 12; 10 – column from behind x 6; 11 – pollinium x 15; 12 – anther x 9. All from *de Wilde 6572*. Drawn by Susanna Stuart-Smith.

- flowers small, green, red, brown or pink, less than 1 cm in diameter. 3
3. Spurs shorter than the lip. 3. *S. breve*
– Spurs longer than the lip. 4
4. Flowers pink; sepals and petals projecting forwards. 5. *S. crassicaule*
– Flowers green or yellow; sepals and petals sharply deflexed. 7. *S. schimperii*
5. Flowers green or greenish-purple; spurs tapering to the apex. 2. *S. brachypetalum*
– Flowers red; spurs rounded at the apex. 6
6. Mid-lobe of rostellum spade-shaped, acute, narrowed at the base. 4. *S. coriophoroides*
– Mid-lobe of rostellum broadly-ovate, truncate. 6. *S. sacculatum*

1. *S. aethiopicum* *Summerh.* (1958);

Satyrium bifolium A. Rich. (1840) non L. (1753)

– type: TU, Mt. Scholoda, nr. Adua, *Quartin-Dillon* s.n. (P holo.).

Erect terrestrial herb up to 60 cm high; tubers 1.5–3 x 0.8–1.5 cm, ellipsoid; roots slender, flexible/zigzag. Stem up to 8 mm in diameter with 3–5 sheathing bracts spread along entire length, bracts up to 5 cm long. Leaves 2, basal, addressed to the ground, very broadly-ovate to orbicular or heart-shaped, up to 10 x 10 cm. Inflorescence 6–13 cm long, broadly cylindrical, more or less densely 3–15-flowered; bracts 12–34 x 6–12 mm, obovate, rounded or obtuse, soon reflexed. Flowers suberect, white; ovary 10–15 mm long. Dorsal Sepal 12–16 x 3–4 mm, narrowly obovate, rounded at the apex. Petals similar to the dorsal sepal but slightly shorter and narrower. Lateral sepals 14–16 x 5–7 mm, oblong-ob lanceolate, rounded at the apex. Lip overall excluding the spurs 14–16 x 14–16 mm, cucullate, broadly ovate to orbicular, obscurely 3-lobed; mid-lobe small, sub-triangular, obtuse; side-lobes rounded, enclosing column; spurs dorsal, 14–20 mm long, tapering to the apex, parallel to the ovary. Column 7 mm long, curved forwards, with a stalk 5 mm long, enclosed within the lip; stigma 4 mm broad, terminal, with irregularly toothed margins; rostellum obscurely trifid, truncate, with broad, rounded side-lobes and a shorter, broadly ovate mid-lobe, overall 4 mm long; anther locules lying behind the rostellum, sack-like, touching the column-stalk below. Fig. 200.22.

Open hill sides on steep slopes and with low shrubs; 2000–2500 m. TU SU WG KF SD; not known elsewhere. *Ash* 570; *Mooney* 5823; *Schimper* 1232.

2. *S. brachypetalum* A. Rich. (1850)

– type: TU, Chire, *Quartin-Dillon* s.n. (P holo.).

S. macrostachyum Hochst. nom. ined. based on *Schimper* 1606 (P W).

Erect terrestrial herb up to 35 cm high; tubers 1.5–3 x 0.8–1.5 cm, ellipsoid; roots slender, flexible/zigzag. Sterile stem up to 7 cm long, 2–5-leaved; the lower 1–3 leaves sheath-like, obtuse, the upper 1–2 up to 15 x 2.6 cm, narrowly oblong to oblanceolate or lanceolate,

obtuse to acute. Fertile stem slender to robust, almost covered with more or less sheath-like leaves. Leaves 4–19 x 1.6–3 cm, elliptic to lanceolate above, subacute or acute. Inflorescence 4.5–15 cm long, narrowly cylindrical, densely many-flowered; bracts 12–24 x 3–6 mm, lanceolate, acute or acuminate, soon reflexed. Flowers suberect, dull reddish green to brown or green tinged with red-brown; ovary 0.7–0.9 cm long, papillose. Dorsal sepal 2.2 x 0.7 mm, similar to the petals, oblong, rounded at the apex. Lateral sepals 2 x 0.5 mm, oblong-ob lanceolate, rounded at the apex, papillose on the margins. Petals 3 x 1.8 mm broad, obovate, rounded at apex, recurved. Lip 6 x 4 mm, cucullate, reflexed at apex; spurs dorsal, 11–14 mm long, tapering to the apex, parallel to the ovary. Column 4 mm long, curved forwards, with a stalk 2.5 mm long, enclosed within the dorsal sepal; stigma 2 mm broad, terminal, with irregularly toothed margins; rostellum 3-fid, truncate, with very short side-lobes and a much longer, broadly elliptic-spathulate mid-lobe. Anther locules lying behind the rostellum, sack-like, touching the column-stalk below.

Grassland, amongst scrubby vegetation, on slopes; 2000–3200 m. TU SU AR SD; Yemen. *Ash* 571; *Burger* 1789; *de Wilde* 7907.

3. *S. breve* *Rolfe* (1898)

– type: Malawi, Shire Highlands, *Buchanan* 314 (K holo.).

Terrestrial herb 10–70 cm high, mostly glabrous; tubers ellipsoid, ovoid or fusiform, 1–4 x 0.5–2.2 cm, glabrous or tomentose; roots slender, flexible/zigzag, pubescent. Sterile stem up to 19 cm long, 4-leaved, lower leaves sheath-like, addressed; the upper leaves lanceolate, up to 31 x 2 cm. Flowering stem erect, slender to somewhat stout, leafy along its entire length; leaves 5–8, the lowermost 1–3 sheath like, obtuse, the remainder more or less erect, lanceolate or narrowly lanceolate, acute, up to 6–21 x 1–4 cm, the uppermost much smaller. Inflorescence pyramidal, 2–13 x 2–5 cm, densely 10- to many-flowered; bracts spreading, the lower ones reflexed, lanceolate, acute, 7–35 mm long, hairy inside. Flowers almost spreading, sessile, pink, deep red, mauve or purple, sometimes with darker markings; ovary 6–8 mm long. Sepals and petals projecting forwards, united with one another in their lower half or third and with the lip in their lower third or quarter. Dorsal sepal narrowly oblong-ob lanceolate, rounded, 7.5–22 x 1.5–3 mm broad. Lateral sepals obliquely oblong-elliptical, obtuse, shorter than the dorsal sepal, 2.5–7 mm broad. Petals similar to dorsal sepal but narrower; all tepals pubescent inside at the base. Lip very convex with a wide mouth, the apex narrowed and erect, 7–16 mm long; spurs short and broad, 1.5–5.5 x 2 mm. Column slightly curved, the slender stalk longer than the fertile part, 5–8 mm long, glabrous; stigma semi-orbicular, concave, 1.5 x 2.3–3.5 mm; rostellum porrect, truncate, shortly and equally toothed in front.

Reported to occur in Ethiopia by *Cufodontis* but no

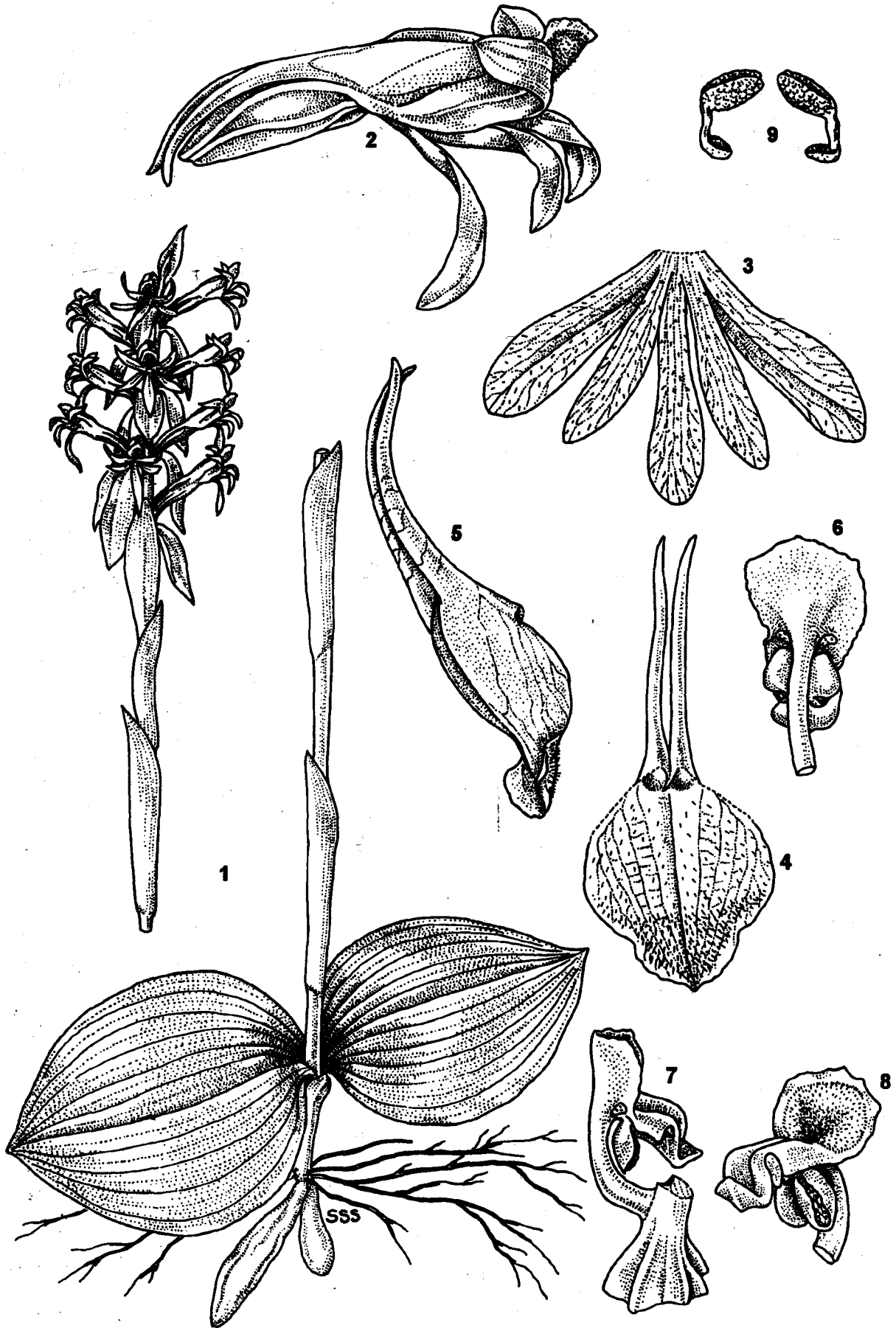


Figure 200.22 *SATYRIUM AETHIOPICUM*: 1 – complete flowering plant $\times \frac{3}{4}$; 2 – flower, side view $\times 3$; 3 – sepals and petals $\times 3$; 4 & 5 – lip with twin spur, front and side views $\times 3$; 6 – column viewed from behind $\times 6$; 7 & 8 – column, side and front views $\times 6$; 9 – pollinarium of 2 pollinia $\times 6$. All from Mooney 9141. Drawn by Susanna Stuart-Smith.

Ethiopian specimens seen during the preparation of this account; Kenya, Zambia, Zimbabwe, Malawi and Angola.

4. *S. coriophoroides* A. Rich. (1840)

— type: TU, Mt. Sholada near Adua [Adowa], *Quartin-Dillon* s.n. (P holo.).

Terrestrial herb 40–100 cm high, glabrous except for the roots; tubers ellipsoid to fusiform, 3–3.5 x 1–1.5 cm, tomentose, roots slender, flexible/zigzag, pubescent. Sterile stem up to 5 cm high, 4–5-leaved; lower 2–3 leaves sheath-like, obtuse, the upper 1–2 lanceolate to elliptical-lanceolate, acute, up to 7–16 x 2.5–4.5 cm. Fertile stem slender to somewhat robust, almost covered by adpressed sheathing leaves; sheaths 10–15 cm, lanceolate, acute, up to 4–10 x 1–3 cm. Inflorescence narrowly cylindrical, 8–23 x 1.5–2.5 cm, more or less densely many-flowered. Bracts soon reflexed, lanceolate, acute, 1–2.5 cm long. Flowers curved outwards, sessile, white to crimson-red; ovary 5 mm long. Sepals and petals deflexed and more or less rolled up, united to one another and to the lip in the basal quarter. Dorsal sepal oblong-elliptical, rounded, 5–6.5 x 1 mm. Lateral sepals very obliquely elliptic-oblong, obtuse, equalling the intermediate, 5–6.5 x 1.5–2.5 mm. Petals oblong-oblancheolate, rounded, 4.5–6 x 0.5–1 mm, margins more or less ciliate. Lip almost globular, with a narrow mouth, the apex shortly reflexed, 5–7 mm long; spurs parallel to the ovary, 11–17 x 1–2 mm. Column inside lip, much curved, 3.5–5 mm high; stigma erect, transversely elliptical, 1.5–2 mm high, 2–3 mm broad; rostellum porrect, 3-lobed, side-lobes short, tooth-like, mid-lobe a little longer, triangular, fleshy.

Grassland; 1800–2250 m. TU GD GJ WU SU WG KF SD HA; Kenya and Cameroun. *Ash* 1047; *Burger* 500; *Gilbert* 4026b.

5. *S. crassicaule* Rendle (1895)

— types: Uganda, Ruwenzori, R. Ruimi [Wimi], *Scott Elliot* 7851 (BM syn.), 7812 (BM syn.) & Zaire, Ruwenzori, Butagu, *Scott Elliot* 8059 (BM syn., K isosyn.) & 7949 (BM syn.).

Terrestrial herb 30–120 cm high, glabrous except for the roots; rootstock short and thick; roots numerous, in a dense tuft, slender, pubescent. Stem erect, slender to robust, up to 1.5 cm in diameter at the base, cylindrical, leafy along its entire length. Leaves 8–13; lower ones spreading or somewhat erect, in a tuft, broadly lanceolate to ligulate or narrowly ligulate, up to 8–48 x 2–7.5 cm, the upper 3–5 smaller, sheath-like, adpressed to the stem, lanceolate, acute. Inflorescence cylindrical, 5–37 x 2–3.5 cm, densely many-flowered; bracts usually reflexed, lanceolate, acute, 1–4 cm long, the lower ones often longer than the flowers. Flowers spreading or curved outwards, pink to mauve or rarely white; pedicel with ovary curved, 1 cm long. Sepals and petals projecting forwards or somewhat curved back, united to one another and to the lip in their basal third; intermediate sepal narrowly oblanceolate-elliptical, obtuse, 4.5–8 x

1.5–2.5 mm. Lateral sepals obliquely oblong-elliptical, very obtuse, equalling the intermediate but a little broader. Petals similar to the intermediate sepal, 4–7 x 1.5 mm; all tepals 2–3-veined. Lip very convex and hooded with a shortly pointed apex and a somewhat broad mouth, 5–7.5 mm long, somewhat broader when spread out, 2-spurred at base; spurs slender, parallel to the ovary, 8–13 x 1.5 mm. Column enclosed in the lip, 3–5 mm high, the slightly curved stalk equalling the fertile part; anther-locules pendent, ellipsoid; stigma erect, semi-orbicular, 1 x 1.5–2 mm, rostellum projecting forwards, 3-lobed, the side-lobes short, tooth-like, incurved, the mid-lobe much larger, spoon-shaped from a narrow base. Fig. 200.23.

Grassland with mixed scrub and scattered juniper; 1500–2700 m. GJ SU KF GG SD HA; Uganda, Kenya, Tanzania, Zambia, Malawi, Cameroun and Nigeria. *Burger* 1788; *Gillett* 14927A; *de Wilde* 6845.

6. *S. sacculatum* (Rendle) Rolfe (1898);

S. coriophoroides A. Rich. var. *sacculata* Rendle in *Journ. Bot.* 33: 295 (1895) — types: Zaire, Ruwenzori, Butahu, valley, *Scott Elliot* 7964 (BM syn.) & Nyamwamba Valley, *Scott Elliot* 8097 (BM syn., K isosyn.).

S. coriophoroides sensu Kraenzl. (1899), p.p., non A. Rich.

Terrestrial herb 30–120 cm high, glabrous except for the roots; tubers ellipsoid, ovoid or fusiform, 2.5–6.5 x 1–2 cm, tomentose. Roots flexible/zigzag, pubescent. Sterile stem up to 7 cm long, 3–6-leaved; lowest 2–4 leaves sheath-like, obtuse, the upper 1–2 lanceolate to elliptic or elliptical-ovate, acute, up to 6–24 x 1–7 cm. Fertile stem slender to robust, almost entirely covered by more or less adpressed sheathing leaves; sheaths 13–17, lanceolate, acute, up to 6–11 x 1.5–4 cm, the upper ones smaller and similar to the bracts. Inflorescence narrowly cylindrical, 7–38 x 1.5–2.5 cm, densely many-flowered. Bracts spreading at first, later reflexed, lanceolate, acute, usually longer than the flowers. Flowers sessile, curved outwards, red to orange-brown, rarely white; ovary thick, 5 mm long. Sepals and petals much deflexed and more or less rolled up, united to one another and to the lip in their basal third. Dorsal sepal elliptical-oblong, rounded at apex, 4.5–7 x 1 mm. Lateral sepals obliquely oblong-oblancheolate, obtuse, a little longer than the intermediate, 1.5–2 mm broad. Petals oblong-oblancheolate, rounded, 4.5–6.5 x 1 mm, margins ciliate, 1-veined. Lip almost spherical, the mouth very narrow, only 2 mm broad, the apex very shortly recurved, 5.5–7.5 mm long; spurs parallel to ovary, 8.5–10.5 x 1.5 mm, usually with a pair of additional very short spurs in front. Column inside lip, much curved forwards, 4–5 mm long, the stalk slightly longer than the fertile part; anther-locules pendent, ellipsoid; stigma transversely elliptical, more or less concave, 1.5–2 x 2–2.5 mm; rostellum porrect, 2 mm long, 3-lobed, side-lobes short, tooth-like, mid-lobe much longer, spoon-shaped from a narrow base.



Figure 200.23 *SATYRIUM CRASSICAULE*: 1 – whole plant in flower $\times 1/4$; 2 – lower part of plant $\times 1$; 3 – inflorescence $\times 1$; 4 – flower, three-quarter front view $\times 3$; 5 – same, back view $\times 3$; 6 – sepals and petals $\times 3$; 7 – lip with twin spur $\times 3$; 8 & 9 – column, side and front views $\times 10$. 1–3 from Richards 14150; 4–9 from Richards 15857. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig 34.)

Wet meadows and in *Eucalyptus* plantation; 1600–2000 m. GD WG KF; Uganda, Kenya, Tanzania, Cameroun, Zaire, Rwanda, Sudan, Zambia and Malawi. *Ash* 2019; *Mooney* 9142; *Schimper* 1263.

7. *S. schimperi* A. Rich. (1851)

– types: TU, Shire [Chire], Maigouagoua, *Quartin-Dillon* s.n. (P syn.) & GD, Simen [Simien], Entchedkap, *Schimper* 1185 (P syn., K isosyn.).

S. parviflorum Sw. var. *schimperi* (A. Rich.) Schltr., *Bot. Jahrb. Syst.* 31: 176 (1901), p.p.

Terrestrial herb 15–60 cm high, glabrous except for the roots; tubers ellipsoid to fusiform-ovoid, 10–30 x 5–15 mm, apparently glabrous; roots slender, flexible/zigzag, pubescent. Stem erect, slender, with 2 nearly opposite leaves towards the base. Leaves altogether 5–7, the lowest 1–2 short, sheathing, subacute, the middle 2 more or less spreading, elliptical to elliptical lanceolate, acute, up to 4–16 x 2–5 cm, the upper 2–3 distant, lanceolate, adpressed to the stem, the largest 30–80 x 8–14 mm. Inflorescence narrowly cylindrical, 5–22 x 1.5–2 cm, more or less closely 9- to many-flowered. Bracts reflexed, lanceolate, acute, 8–28 mm long. Flowers half-spreading, sessile, green or yellow-green; ovary 5–7 mm long. Sepals and petals with papillose margins, sharply curved back, united to one another and to the lip in their basal third. Dorsal sepal oblanceolate-oblong, rounded, 4–5 x 1 mm. Lateral sepals oblong-oblanceolate, obtuse, twisted, 5 x 1.5 mm. Petals similar to Lateral sepals but only 4 mm long. Lip fleshy, ellipsoid, hooded, the apex shortly recurved, 5–6 mm long; spurs parallel to ovary, 5–8 mm long, slender. Column curved, 4 mm high; stigmas erect, transversely oblong, rostellum porrect, 3-lobed, the side-lobes short, triangular, the mid-lobe much longer, broadly shovel-shaped from a short narrow base.

Grassland amongst herbs and shrubs, in grassy places in open forest of *Juniper* and *Erica arborea*, often in volcanic soils; 2000–3500 m. TU GD SU AR SD BA; Tanzania, Burundi, Zaire, Angola, Malawi, Zambia and Zimbabwe. *Ash* 591; *de Wilde* 6711; *Gilbert & Getachew* 3059.

12. *DISPERIS* Sw. (1800)

Reichenbach, *Otia Bot. Hamburg.* 2: 102–103 (1881); Schlechter, *Bull. Herb. Boiss.* 6: 911–951 (1898); Verd-court, *Disperis* in *Orchidaceae* in *Fl. Trop. E. Afr.* 1: 216–230 (1968).

Erect mostly small terrestrial herbs arising from small tubers and in the Flora area usually growing in very shallow soil or leaf-mould in forest. Stems with 1-several sheathing scale-leaves at the base. Leaves 1-few, alternate or opposite, rarely almost obsolete. Flowers small, mostly under 2.5 cm long, white, yellow, green, pink or magenta, solitary or in several- to many-flowered racemes; bracts leaf-like. Dorsal sepal united with the petals to form a structure which varies from an almost flat limb to an elongate spur; lateral sepals each with a conspicuous spur or pouch near the inner margin

(lacking in 1 South African species). Petals variously shaped, often falcate, obliquely acute or lobed at the apex, sometimes auriculate at the base. Lip remarkably modified, its claw joined to the face of the column and ascending above it, variously curving into the spur if present, often dilated into a smooth or papillate, straight or reflexed limb and usually bearing a simple or 2-lobed appendage which varies greatly in shape from species to species. Column erect, mostly stout; rostellum large, membranous, 2-lobed, produced in front into 2 rigid cartilaginous arms (fitting into the lateral sepal-pouches when in bud) holding the glands of the pollinia at their apices; anther-bearing part of column horizontal or ascending; anther-locules distinct, more or less parallel; pollinia-granules secund in a double row on the margins of the flattened caudicles which curl up in a spiral on removal; staminodes present in some species; stigma 2-lobed, the lobes situated on either side of the joined claw of the lip. Capsule cylindrical or ovoid, ribbed.

A genus of about 75 species extending from Togo and Ethiopia through tropical Africa to South Africa, the Mascarene Is., India and thence to New Guinea; 6 in the Flora area.

- | | |
|---|---------------------------|
| 1. Leaf solitary, prostrate. | 2. <i>D. crassicaulis</i> |
| – Leaves 2 or more, borne along stem. | 2 |
| 2. Leaves opposite. | 3. <i>D. dicerochila</i> |
| – Leaves alternate. | 3 |
| 3. Hood longer than broad, not deeply sack-like or conical; basal appendage of lip deeply bilobed and papillose, apical appendage papillose, circular and with a basal raised callus. | |
| | 6. <i>D. johnstonii</i> |
| – Hood wider than long; lip not as above. | 4 |
| 4. Dorsal sepal recurved, obliquely bluntly conical. | |
| | 4. <i>D. galerita</i> |
| – Dorsal sepal erect, conical. | 5 |
| 5. Dorsal sepal 5–7 mm long; lip with linear claw 4 mm long. | 5. <i>D. meirax</i> |
| – Dorsal sepal 10–22 mm long; lip with linear claw 8–15 mm long. | 1. <i>D. anthoceros</i> |

1. *D. anthoceros* Rchb. f. (1881)

– type: GD, *Schimper* 1210 (W syn.) & 1295 (W syn., BM K isosyn.).

var. *anthoceros*

Herb, 8–30 cm high, arising from a hairy ovoid-oblong tuber 0.7–2.3 x 0.6–1.2 mm. Leaves 2, opposite, subsessile, sheathing at the base, ovate, 1.3–3.8 x 1–4 cm, subacute or apiculate, truncate or cordate above the sheath, purplish beneath. Racemes 1–3-flowered; bracts leaf-like, ovate, 0.6–1.6 x 0.5–1.2 cm, subacute to acuminate. Flowers white, tinged greenish or partly pale pink, sometimes spotted. Dorsal sepal practically reduced to an erect, slender elongate spur 1–2.2 cm long mostly greenish, the petals united to the margins; lateral sepals obliquely obovate, 6.5–15 x 3–10 mm, united to about the middle, often purple-spotted, bearing

conical sacs 1–1.5 mm long. Petals falcate, oblong, broadly rounded at the apex, auriculate at the base, ribbed inside. Lip with elongate linear claw 0.8–1.5 cm long not reaching apex of spur, recurved at apex, the limb 1–1.5 mm long, the appendages reduced to 2 fimbriate lobules up to 1.5 mm long.

Leaf-litter in montane forest, also in secondary forest; 1100–2700 m. GD GJ; Nigeria, Zaire and Sudan, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and South Africa (Transvaal and Natal). *Chioyenda* 1525; *Gilbert & Getachew* 3049; *Schimper* 1295.

Disperis anthoceros var. *grandiflora* Verdc. (*Kew Bull.* 22: 99, 1968) from Tanzania is distinguished by having much larger flowers with a coarser spur.

2. *D. crassicaulis* Rchb.f. (1850);

Pterygodium biflorum Hochst. ex A. Rich. (1851)
– type: GD/TU, between Entched Kab and Choata, *Schimper* 570 (W holo., BM K P iso.).

Terrestrial herb, 2–5 cm high, arising from an ovoid tuber, 6 mm x 4 mm. Leaf 1, prostrate, acute, 10–18 x 5–12 mm, slightly cordate at the base, sheathing, suffused with purple. Bracts leaf-like, ovate, 5–10 x 4–7 mm, acute. Flowers 1–2; lateral sepals pale yellow; hood pale yellowish brown to deep maroon; lip yellowish green. Dorsal sepal linear-lanceolate, 7–8 x 1 mm, joined to the petals to form an open hood. Lateral sepals ovate, oblique, 6–7 x 4 mm bearing small spur like sacs 0.5 mm long. Petals obovate, highly concave, 6 x 4 mm. Lip with a linear claw, 3 mm long, reflexed apically and bearing a triangular appendage of similar length, bent back over the claw; appendage covered in fimbriate hairs. Column short, erect, long, bearing 2 staminodes at the point of attachment for the lip. Fig. 200.24.

Montane grassland and *Podocarpus* forest; 2000–2500 m. TU GD SU SD HA; not known elsewhere. *Ash* 2491; *Gilbert et al.* 7417; *Thulin et al.* 3333.

3. *D. dicerochila* Summerh. (1935)

– type: Uganda, Ruwenzori, *Eggeling* 1382 (K holo.).

Glabrous herb, 6–26 cm high, arising from a densely hairy ellipsoid or almost round, 1–3 x 0.6–1.2 cm. Leaves 2, opposite, sheathing at the base, ovate or ovate-lanceolate, 1.5–5 x 1–4 cm, acute or shortly acuminate, rounded or almost cordate above the sheath, often purplish beneath. Racemes 1–3-flowered; bracts leaf-like, lanceolate, 0.7–2.6 x 0.3–1.1 cm, acuminate. Flowers white often tinged rose or purple. Dorsal sepal narrowly linear-lanceolate, 0.7–1.1 cm long, joined to the petals to form an open boat-shaped hood; lateral sepals rhomboid-ovate, 0.7–1 x 4–7.5 mm, acute, practically free, bearing obtuse sacs 1.5–2 mm long. Petals B-shaped or elliptic, slightly curved, 0.7–1 x 3.5–4 mm, obtuse. Lip 7–9 mm long with long claw bearing a short reflexed limb at apex together with 2 appendages each with the upper lobule elongate and narrowed to a papil-

late apex and the lower lobule shorter, recurved and usually auriculate. Fig. 200.25.

Leaf-litter, on mossy branches, rocks etc. in montane forest; 1650–2600 m. GJ SU HA; Zaire, Uganda, Kenya, Tanzania, Malawi, Zambia and Zimbabwe. *Burger* 1964 & 3135; *de Wilde* 8596.

4. *D. galerita* Rchb.f. (1881)

– type: GD, Semien, Debra Tabor, *Schimper* 631 (W holo., BM K P iso.).

Terrestrial herb 10–30 cm high, arising from a narrowly ovoid underground tuber. Leaves 2, rarely 3, alternate, sheathing, ovate, 1.5–3.5 x 1.0–2 cm, acute. Bracts leaf-like, 10–26 x 5–18 mm. Flowers 1–3, pink or purple. Dorsal sepal hooded and joined to the petals apically, forming a short spur 3–4 mm long; hood 7–10 mm high. Lateral sepals obliquely ovate, 7–10 x 4–5 mm, apiculate, bearing spur-like sacs 2 mm long. Petals oblong, 7–8 x 2–3.5 mm, acute, irregular on free margin. Lip 8–10 mm long; claw linear, 3–4 mm, reflexed in basal portion and bearing a linear appendage; appendage 4–5 mm long, with rounded lateral lobes at the base. Column short; stigmatic arms twisted, 2 mm long.

Grassland, mixed grassland with *Erica arborea* forest and *Hypericum* shrub; 2000–3800 m. GD GJ SD; not known elsewhere. *de Wilde* 6576; *de Wilde & Gilbert* 2; *Leakey & Lythgoe* 630.

Similar to *D. kilimanjarica* Rendle from Uganda, Kenya and Tanzania but differs in having a shorter spur on the hood, larger, more distinctive lateral lobes at the base of the appendage.

5. *D. meirax* Rchb.f. (1881)

– type: Ethiopia, *Schimper* 632 (W holo., K P iso.).

Terrestrial herb 8–11 cm high, arising from round underground tuber 4 mm in diameter. Leaves 2, 10–22 x 5–9 mm, alternate, ovate, sheathing, acute. Bracts leaf-like, 6–11 x 3–6 mm, acute. Flowers 1–2, pink to pale red. Dorsal sepal forming a conical hood, 7 x 3 mm. Lateral sepals obovate, oblique, 2.6 x 2 mm, irregular on the outer margin, inrolled on the inner margin. Petals ovate, oblique, 5 x 1 mm. Lip 5 mm long; claw linear, 4 mm long, the apical 1 mm sharply reflexed, linear bilobed appendage attached at point of reflexion and bent back over claw, 1.5 mm long, lobes with globose apices. Column short, erect.

Erica arborea forest with Afro-alpine meadows on steep slopes; 3500–3800 m. GD; not known elsewhere. *de Wilde* 7148 & 8108; *de Wilde & Gilbert* 62.

6. *D. johnstonii* Rolfe (1898)

– type: Tanzania, Kilimanjaro, *Johnston* (K iso.).
D. stolzii Schltr. (1915) – type: Tanzania, Rungwe District, *Stolz* 672 (B holo., K iso.).

Glabrous herb, 4.5–15 cm high, arising from a hairy globose or narrowly cylindrical tuber 0.4–1 cm long and wide. Leaves 2, remotely alternate, sessile, sheathing at the base, rounded-ovate to ovate-lanceolate or elliptic,

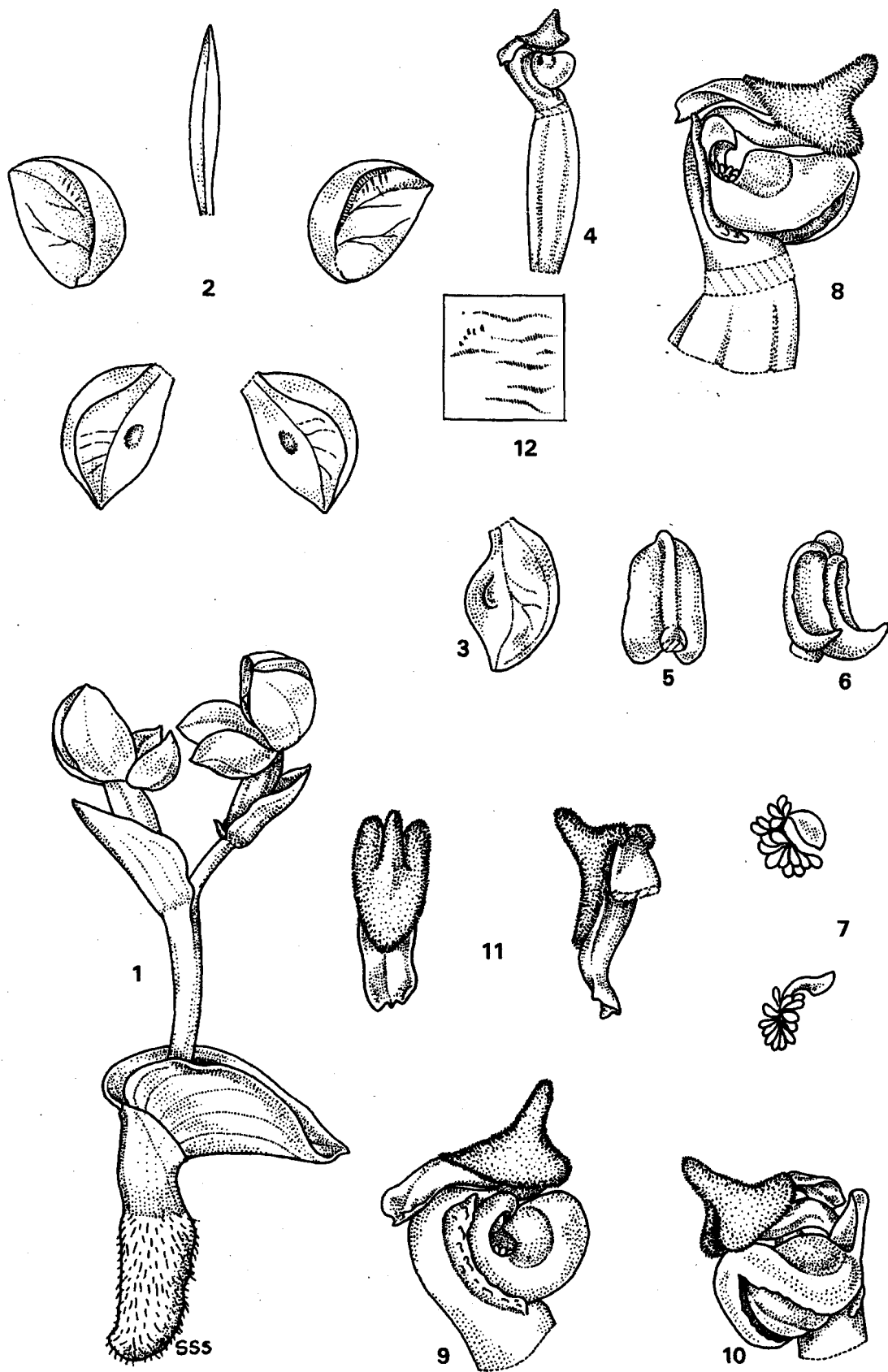


Figure 200.24 *DISPERIS CRASSICAULIS*: 1 – complete flowering plant x 3; 2 – sepals and petals x 4½; 3 – lateral sepal x 4½; 4 – column and lip x 4½; 5 & 6 – lip, top and side view x 12; 7 – pollinarium of 2 pollinia x 12; 8 – column and lip, side view x 12; 9 & 10 – column and lip, partial back and front views x 15; 11 – anther-cap, top and side views x 15; 12 – inner surface of petals x 24. All from *Gilbert & Vollesen 7417*. Drawn by Susanna Stuart-Smith.

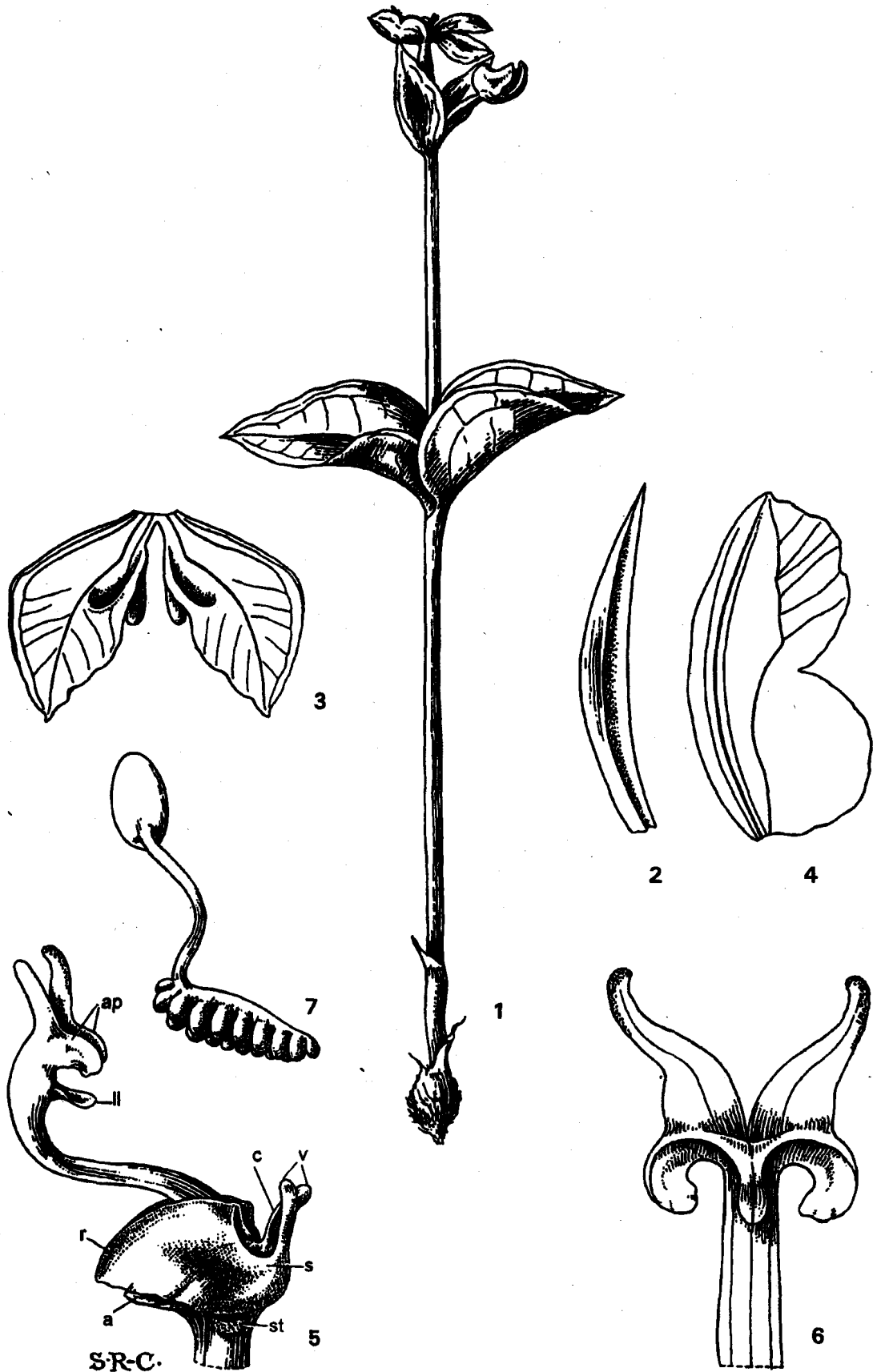


Figure 200.25 *DISPERIS DICEROCHILA*: 1 – complete flowering plant x 1½; 2 – dorsal sepal x 9; 3 – lateral sepals with pockets x 6; 4 – petal x 9; 5 – column and lip (a, anther; ap, appendages of lip; c, caudicle; ll, apex of lip; r, mid-lobe of rostellum; s, stigma; st, staminode; v, viscidia) x 12; 6 – lip apex opened out x 18; 7 – pollinarium x 24. 1 from *Napier* 635; 2–7 from *Eggeling* 1382. Drawn by Stella Ross-Craig.

0.8–3 x 0.4–2.2 cm, acute or apiculate, subcordate to cordate and stem-clasping above the sheath, mostly crimson or purplish beneath. Racemes 2–5-flowered; flowers white and pale purple or pink; bracts leaf-like, broadly elliptic, 6–10 x 3.5–7 mm, acute or shortly acuminate. Intermediate sepal linear, 0.8–1 x 0.6 mm, joined to the petals to form an open concave hood, 0.8–1.2 x 0.7–1 cm, sometimes with a purple-margined yellow spot on either side; lateral sepals obliquely semi-circular, 8–14 x 4.5–6.5 mm, obtusely acuminate, joined for about a third of their length, bearing small sacs 0.5–1 mm long. Petals narrowly elliptic, falcate, 9–10 x 2–3 mm, mostly whitish with yellow apex. Lip cream or yellowish, 4–6.5 mm long, with claw sharply bent back on itself near base and there bearing a 2-lobed appendage, the lobes diverging and papillate; claw terminating in a rounded ovate limb which bears a median densely papillate crest or protuberance.

Savannah woodland, dark brown soil; 2000 m. SD; Nigeria, Cameroun, Zaire, Tanzania, Zimbabwe and Malawi. *De Wilde* 5622.

13. EPIPACTIS Zinn (1757), *nom. conserv.*

Helleborine Mill. (1754)

Amesia Nels. & Macbr. (1913)

Terrestrial, occasionally saprophytic herbs with horizontal or vertical, very short rhizomes, numerous fleshy roots and simple, erect, leafy stems. Leaves ovate or lanceolate, folded, occasionally very small. Flowers in more or less secund racemes, more or less inconspicuous, spreading or pendulous, shortly pedicelled. Tepals spreading or remaining closed, dull reddish or greenish. Sepals free, subequal. Petals scarcely smaller than sepals. Lip usually in 2 parts articulated by a narrow joint or fold (mesochile); the basal part (hypochile) forms a nectar-containing cup often with a pair of basal knobs; the apical part (epichile) forms a more or less cordate or triangular downwardly directed terminal lobe; spur absent. Column short, flat or concave in front with a shallow cup at apex; anther free, hinged at the back of the summit of the column, behind the stigma and rostellum, ovate, slightly convex, 2-celled; pollinia 2, tapering towards their apices near which they are attached to the rostellum, each more or less divided longitudinally into halves; caudicles absent; pollen grains forming friable masses loosely bound by fine threads; stigma prominent, broad; rostellum placed centrally above the stigma, large, globular, persistent, evanescent or absent. Capsule oblong, spreading or pendulous.

About 25 species mainly in north temperate regions but with 3 species in tropical Africa of which 2 are recorded for the Flora area.

1. Epichile of lip broadly ovate, acute, margins forming a suberect callus on either side of mid-point; callus globular, central on epichile, extended at base in a series of warts. 1. *E. africana*
– Epichile of lip fleshy, obscurely 3-lobed, with a

central, raised longitudinal ridge and suberect side-lobes.

2. *E. veratrifolia*

1. *E. africana* Rendle, *J. Bot.* 33: 252 (1895);

Serapias africana (Rendle) Eaton (1908). *Helleborine africana* (Rendle) Druce (1909); *Amesia africana* (Rendle) Nels. & Macbr. (1913) – type: Zaire, Ruwenzori, Butahu [Butagu], *Scott-Elliot* 8005 (BM holo., K iso.).

Erect terrestrial herb up to 3.5 m high, ferruginous-pubescent in most parts. Stem up to 1 cm broad at base, 2 cm broad in middle, purple-green below, deep blue-green above. Leaves recurved, evenly spaced along stem at 5–10 cm intervals, lanceolate to ovate, subobtusely, strongly veined, more or less amplexicaul at base, up to 20 x 9 cm; lowermost reduced to sheaths; uppermost bract-like. Inflorescence elongate, few to several-flowered; bracts 2–11 x 2 cm. Flowers more or less inconspicuous, subcampanulate; sepals greyish purple on outer surface, greenish yellow within, pubescent; petals greenish yellow, purplish tinged on veins and margins; lip yellowish brown; pedicel up to 2 cm long when ovary matures. Dorsal sepal concave, lanceolate, somewhat acuminate, 3-nerved, 2 x 0.7 cm; lateral sepals oblique, concave at base, broadly ovate, acuminate, up to 2.4 x 0.8 cm. Petals glabrous, lanceolate to ovate, acuminate, subfalcate, up to 2.5 x 0.6 cm, with a warty keeled mid-vein on outer surface. Lip up to 2.5 cm long; hypochile narrowly oblong, concave, 1.2 x 0.3 cm, warty within; side-lobes attached at base, as long as hypochile, linear-oblong, membranous; epichile broadly ovate, acute, 1.3 cm long, margins forming a suberect callus on either side of mid-point; callus globular, central on epichile, extended to base in a series of warts. Fig. 200.26.

Amongst *Pteridium*, *Erica* or coarse grass patches by rivers and in montane forests; 2350–3750 m (in E Africa). GG; Zaire, Uganda, Kenya, Tanzania and Malawi. *Gillett* 14947.

2. *E. veratrifolia* Boiss. & Hohenack. (1854)

– types: Iran, *Kotschy* 401 (G syn.) & 632 (G syn.).

E. somaliensis Rolfe (1898); *Serapias somaliensis* (Rolfe) Eaton (1908); *Helleborine somaliensis* (Rolfe) Druce (1909); *Amesia somaliensis* (Rolfe) Nelson (1913) – types: Somalia, *Lort-Phillips* (K syn.) & *Cole* (K syn.).

Epipactis abyssinica Pax (1907) – type: Ethiopia, *Rosen* s.n. (B holo.).

Erect to scrambling terrestrial herb, 20 to 100 cm high; rhizome 0.3–0.4 cm in diameter, creeping. Stem erect, leafy throughout, 8–20-leaved. Leaves 10–28 x 3–6 cm, folded, linear-lanceolate, acuminate, sheathing at the base, prominently veined on lower surface, upper leaves merging into the bracts. Inflorescence 9–24 cm long, laxly many-flowered; rachis pubescent; bracts 5–15 x 1–1.5 cm, reflexed or spreading, lanceolate to narrowly elliptic, acuminate, pubescent. Flowers becoming pendulous with age, tepals green, buff or yellow, with broad marginal purple bands; lip white or buff

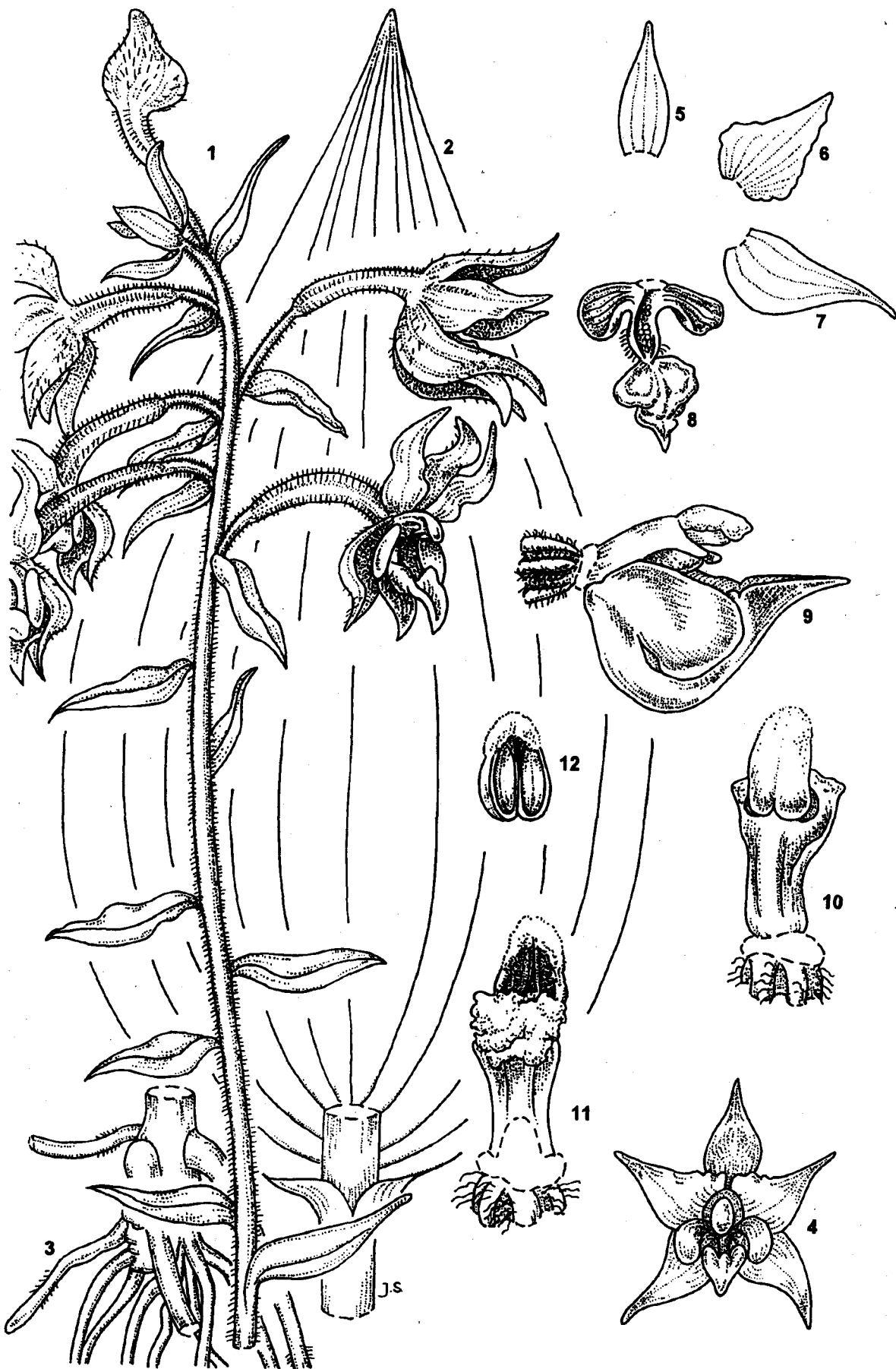


Figure 200.26 *EPIPACTIS AFRICANA*: 1 - inflorescence x 1½; 2 - leaf x 1½; 3 - base of stem with roots x 1½; 4 - flower front view x 1½; 5 - dorsal sepal x 1½; 6 - petal x 1½; 7 - lateral sepal x 1½; 8 - lip x 1½; 9 - column and lip side view x 3; 10 - column from above x 4½; 11 - column from below x 4½; 12 - anther-cap x 4½. All from Richards 24048. Drawn by Judi Stone.

with a purplish hypochile and a purple band on the epichile; pedicel, ovary and outer surface of flower densely pubescent. Dorsal sepal 10–19 x 4–7 mm, lanceolate, acute to obtuse; lateral sepals 10–20 x 4–8 mm, obliquely ovate, acute. Petals 8–18 x 4–8 mm, ovate, acute. Lip bipartite, 9–21 x 7–12 mm; hypochile up to 1 cm long, narrowly sack-like with erect sides and auriculate at base; epichile fleshy, obscurely 3-lobed, with a central, raised longitudinal ridge and suberect side-lobes. Column 4–7 mm long, suberect, with 2 porrect teeth on ventral margins towards apex; anther semi-ellipsoidal; rostellum porrect, subtriangular. Fig. 200.27.

Moist areas below cliffs and on grassy hillsides or near springs and irrigation canals; 1800–2600 m. SU; Cyprus and Turkey east to the Himalayas and south to Yemen, Oman and Somalia. *Ash* 437; *Negri* 25.

14. *NERVILIA* Gaud. (1829), *nom. conserv.*

Schlechter, *Bot. Jahrb. Syst.* 45: 399–405 (1911) & 53: 550–555 (1915); Cribb & Fay, *Kew Bull.* 42: 720–721 (1987); Pettersson, *Lindleyana* 4: 37–41 (1989) & *Nord. J. Bot.* 9: 487–497 (1990); Robbins, *Kew Bull.* 47: 721–724 (1992).

Terrestrial herbs arising from small tubers. Tubers ovoid or ellipsoid, more or less dorsi-ventrally flattened, more or less pubescent. Hysterantherous with the leaf appearing after the flowering stem has withered. Leaf erect, suberect or prostrate, solitary, lanceolate, ovate, cordate or kidney-shaped, glabrous or pubescent; petiole short or long, often sulcate, subtended at the base by a sheathing, acute or obtuse scale-leaf. Inflorescence erect, 1- to many-flowered, racemose. Flower stalk bearing 3–4 more or less sheathing scale-leaves, more or less elongating after fertilisation. Flowers erect, horizontal or pendent (mostly pendent when fertilised), green, yellow, brown, white, pink or purple; bracts lanceolate, very acute; pedicel thin, ridged; ovary ellipsoidal, 3- or 6-ridged. Sepals and petals subsimilar, lanceolate. Lip entire or trilobed, more or less papillate or pubescent, sometimes spurred. Column more or less club-shaped; anther terminal, conical to oblong; pollinia 2, granular; stigma ventral, orbicular to triangular, towards apex of column, separated from anther by a broad blunt rostellum.

About 80 species, extending from Togo and Ethiopia through tropical Africa to South Africa, also Yemen, Oman, Madagascar, Mascarenes, India and SE. Asia to Japan, the Pacific islands and Australia. A difficult genus to collect, hence only 3 species recorded so far for the Flora area.

1. Inflorescence 1-flowered, elongating after pollination; leaves pubescent. 3. *N. crociformis*
- Inflorescence 2- to many-flowered, not elongating after pollination; leaves glabrous. 2
2. Tepals 22–40 mm long; leaves very large, up to 13 x 22 cm, more or less 20-veined. 1. *N. bicarinata*

- Tepals less than 22 mm long; leaves up to 13 x 10 cm, often pleated along veins. 3
- 3. Leaf ovate, erect, on petiole more than 6 cm long. 2. *N. kotschy* var. *purpurata*
- Leaf cordate or broadly cordate (rarely ovate) on petiole less than 6 cm long.

2. *N. kotschy* var. *kotschy*

1. *N. bicarinata* (Bl.) Schltr. (1911);

Pogonia bicarinata Blume (1859) – type: Madagascar, Sambirano, Nossi-Bé, Ile Nossi-Keili, *Perville* 383 (L lecto., P isolecto.).

P. ghindana Fiori (1912); *Nervilia ghindana* (Fiori) Cufod. (1972) – type: EW, Eritrea, *Fiori* 900 (FI holo.).

Terrestrial erect herb to 60 cm high. Tubers more or less globose, 1.4–2.8 cm in diameter, sparsely pubescent, 3–4-noded. Leaves more or less 20-veined, very large, kidney-shaped to 13 x 22 cm, apiculate, deeply cordate at base, sinuses between leaf base and petiole deep and rounded; petiole slender to stout, holding leaf well above the substrate, to 20 cm long, dark green above, more or less purple below, subtended when young by a large tubular sheathing scale-leaf. Inflorescence erect, laxly 4–12-flowered, flowers borne at intervals of 2–4 cm, spaced evenly along rachis; bracts filamentous to lanceolate, slightly boat-shaped, to 1.7 cm long. Flowers greenish with a paler white or greenish lip, veined purple or green. Dorsal sepal ligulate-lanceolate, acute, 20–30 x 1–4 mm. Lateral sepals slightly falcate, similar to dorsal sepal. Petals ligulate-lanceolate, acute, 17–26 x 1–4 mm long, slightly falcate. Lip ovate, obscurely trilobed just below middle, to 28 x 20 mm, bearing 2 more or less parallel fleshy pubescent ridges from base to base of mid-lobe; side-lobes oblong to very shortly triangular, rounded; mid-lobe much longer than side-lobes, triangular to ovate, acute, margin entire. Column curved, dilated towards apex, 1.2–1.4 cm long; stigma almost semi-elliptic. Fig. 200.28.

Primary and mixed secondary forest; 1190–1900 m. EW WG; throughout tropical Africa from Senegal and Sierra Leone across to Kenya, Tanzania and south to South Africa, Comoro Is, Madagascar, the Mascarene Islands, Yemen and Oman. *Ash* 419; *Fiori* 900; *Pappi* 3723.

2. *N. kotschy* (Rchb.f.) Schltr. (1911);

Pogonia kotschy Rchb.f. (1864) – type: Sudan, *Cienowski* 236 (W holo.).

var. *kotschy*;

P. abyssinica Chiov. (1911); *Nervilia abyssinica* (Chiov.) Schltr. (1920) – type: Ethiopia, *Chiovenda* 699 (FI holo.).

Small to medium-sized, erect, terrestrial herb. Tuber ovoid or ellipsoid, up to 2 cm in diameter, tomentose. Leaf solitary, usually produced after the inflorescence has set seed, horizontal to erect, broadly cordate or more rarely broadly ovate, acute to apiculate, 3–7.5 x 4–13 cm, dark green above, sometimes purple beneath,



Figure 200.27 *EPIPACTIS VERATRIFOLIA*: 1 - complete flowering plant x $\frac{2}{3}$; 2 - upper part of stem with inflorescence x 1; 3 - flower x $1\frac{1}{2}$; 4 - column and lip x 3; 5 - capsule x 1. All from Hepper 5871. Drawn by Emmanuel Papadopoulos.

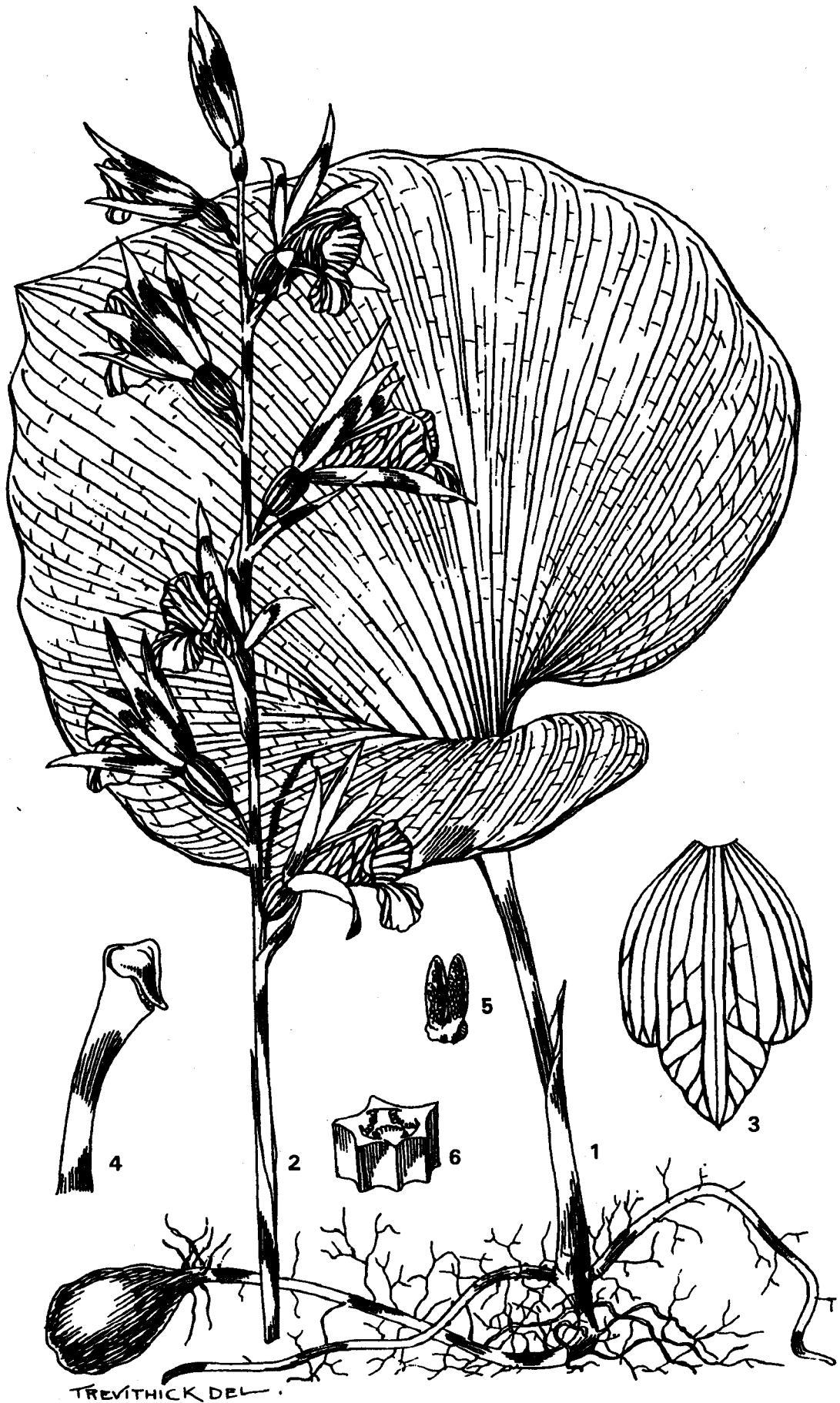


Figure 200.28 *NERVILIA BICARINATA*: 1 - plant in leaf $\times \frac{3}{4}$; 2 - inflorescence $\times \frac{3}{4}$; 3 - lip, flattened out $\times 1$; 4 - column $\times 1\frac{1}{4}$; 5 - pollinarium; 6 - section through ovary. Drawn by W.W. Trevithick. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 57.)

veins often bearing a raised more or less raggedly-lacinate keel; petiole slender, sulcate, 0.5–5.5 cm long. Inflorescence erect, 2–7-flowered, up to 28 cm long; bracts linear-setose, acuminate, up to 1.5 cm long. Flowers suberect to pendent, not opening widely, pale to olive-green with a white or off-white lip lined on veins with purple. Sepals and petals linear-lanceolate, acute, 1.4–1.9 x 0.3 cm. Lip porrect, obscurely 3-lobed in apical half, elliptic in outline, 1.4–1.8 x 0.9–1.2 cm; side-lobes shortly triangular, acute or subacute; mid-lobe ovate-triangular or triangular, acute or subacute, 0.6 cm long; callus of 2 longitudinal fleshy ridges, pubescent within. Column club-shaped, slightly curved, glabrous, 0.7–0.9 cm long.

Poor sandy or limy soils in grassland, rocky ridges in *Calpurnia aurea* scrub and in shady places in deciduous *Combretum*–*Terminalia* woodland; 1280–2200 m. GD SU HA BA KF WG; Africa across to Sudan, Uganda, Kenya and Tanzania and south to Zambia and Zimbabwe. *Ash* 2474; *de Wilde* 6264; *Gilbert & Sebsebe* 8532.

var. *purpurata* (*Rchb.f. & Sond.*) *Börge Pett.*, in *Nord.*

J. Bot. 9: 489 (1990);

Pogonia purpurata *Rchb.f. & Sond.* (1865); *Nervilia purpurata* (*Rchb.f. & Sond.*) *Schltr.* (1903) – type: S Africa, *Zeyher* 1584 (W lecto., BM isolecto.).

Medium-sized terrestrial herb up to 22 cm high. Tuber spherical or elliptical, 1.8 cm in diameter, tomentose. Leaf solitary, appearing after the inflorescence has withered, erect, ovate or elliptic, acute, up to 10 x 4 cm, green above, more or less purple beneath, prominently veined, borne on a more or less elongate slender petiole up to 13 cm or more long. Inflorescence 2–4-flowered, to 22 cm long; flower stalk cylindrical, 1.5–3 mm in diameter, bearing more or less inflated sheaths along its length; bracts reflexed, linear-subulate, to 2 cm long. Flowers not opening widely, horizontal or pendulous, with green or yellow-green sepals and petals and pale green or yellowish lip lined with purple-brown on veins. Sepals and petals linear-lanceolate, acute, 1.8–2.2 x 0.4 cm. Lip obscurely 3-lobed, elliptic-oblong in outline, 1.8 x 1.3 cm, pubescent between the 2 central longitudinal fleshy ridges; side-lobes erect, narrowly oblong, truncate; mid-lobe triangular-ovate, obtuse, slightly reflexed. Column club-shaped.

Grassland and eroded slopes; 475–2300 m (in E Africa). SU; Tanzania, Zaire, Zambia and Angola south to South Africa. *Pettersson* 244.

[Ed. Collection not seen by authors, note from B. Pettersson.]

3. *N. crociformis* (*Zoll. & Mor.*) *Seidenf.* (1978);

Bolborchis crociformis *Zoll. & Mor.* (1846) – type: Java, *Zollinger* 762 (W holo.).

Erect herb to 10 cm high, glabrous except for tuber. Tuber globose, 1 cm in diameter. Leaf pressed to ground, kidney-shaped, minutely apiculate, very cordate at base, densely covered above with short white

hairs, 1.5–4 x 3.5–7 cm. Flower stalk cylindrical, 1-flowered at apex, with 2–3 clasping sheathing scale-leaves; bract linear, acute, equal to pedicel in length. Flower erect, becoming pendent, brownish green; lip white with a yellow centre. Sepals spreading, linear-ligulate, acute, 12–19 x 3–3.5 mm; lateral sepals oblique. Petals similar to sepals but shorter. Lip oblong-cuneate, trilobed in apical third, 1.3 x 0.8 cm, surface covered with scattered long hairs, base finely 3-keeled, with mid-keel muricate-mammillate; lateral lobes triangular, slightly obtuse; mid-lobe a little longer, ovate-triangular to ovate, subacute or obtuse, margin crenulate-undulate. Column club-shaped, 5.5 mm long, glabrous; pedicel elongating after anthesis.

Grassland and forest, in rich soil; 1200–2200 m. EW GD; throughout tropical Africa, Madagascar, Thailand, Indo-China, Malaysia, Indonesia, Philippines, New Guinea, Australia (Queensland). *Friis* et al. 3485; *Terracciano & Pappi* 135.

15. *PLATYLEPIS* *Rich.* (1828), *nom. conserv.*

Erporkis Thouars (1809)

Erporchis Thouars (1822)

Notiophrys Lindl. (1857)

Diplogastra *Rchb.f.* (1865)

Summerhayes, *Kew Bull.* 11: 223–224 (1956).

Terrestrial herbs; stem creeping at base with tomentose roots. Leaves ovate, petiolate, sheathing at the base. Inflorescence terminal; flower stalk with several sheaths; raceme few to many-flowered, short or long, narrow or wide; bracts conspicuous, often broad and glandular-pilose, longer than the ovaries. Sepals free; petals joined with the dorsal sepal. Lip erect, joined to the column for part of its length, sack-like at the base with variously shaped calli, and reflexed at the apex. Column elongate; rostellum erect; bilobed; clinandrium and anther oblong, erect behind the rostellum; stigma papillose. Capsules oblong.

10 species in tropical and South Africa, Madagascar and the Mascarenes; only 1 recorded for the Flora area.

P. glandulosa (*Lindl.*) *Rchb.f.* (1877);

Notiophrys glandulosa *Lindl.* (1862) – type: Principe, *Barter* 1952 (K holo.).

Terrestrial herb 15–50 cm high; stem creeping at the base. Leaves aggregated on the lower part of the stem; blade ovate and slightly oblique, acute to shortly acuminate at the apex, 4–16 x 2–5.5 cm; petiole sheathing at the base, 2–9 cm long. Flower stalk with several acuminate sheaths. Raceme densely many-flowered, 5–12 cm long; bracts broad, ovate, glandular-pilose. Flowers shortly pedicellate. Sepals pale pink brown or yellowish green, sparsely pilose on outer surfaces, 7–9 x 1.4–2.7 mm; dorsal sepal slightly broader than the lateral sepals, ovate-oblong, subobtuse. Petals white, joined with the dorsal sepal to form a hood, spatulate, 7.5–8.5 x 1 mm. Lip white, joined to the column for half its length, 6.5–8.5 x 2.2–2.5 mm, bigibbous at the base

with 2 rounded calli, 2 parallel linear swellings beneath the free part of the lip, rounded apex reflexed. Column 6.5 mm long; rostellum bilobed, lobes acuminate, as long as the anther; stigma central, immediately below the rostellar lobes, papillose. Fig. 200.29.

Shady, marshy places on river banks and swamps; 1000–1500 m (in E Africa). HA; throughout tropical Africa south to Natal. *Burger* 509.

16. MALAXIS Sw. (1788)

Microstylis Nutt. (1818)

Summerhayes, *Kew Bull.*: 208–209 (1934); Cribb, *Kew Bull.* 32: 737–741 (1978).

Small terrestrial lithophytic or epiphytic herbs arising from a creeping rhizome. Secondary stems erect, leafy, more or less swollen at base, clustered or not, 1-several-leaved. Leaves thin-textured, folded, mostly ovate or broadly ovate, with sheathing more or less elongate leaf-bases. Inflorescence terminal, erect, mostly densely many-flowered, racemose to subumbellate. Flowers mostly small, not twisted through 180°, green, buff, orange, or purple. Sepals and petals subsimilar or petals filiform, spreading. Lip larger than other floral segments, flat, entire or lobed, more or less auriculate at base on either side of column, margins more or less toothed. Column short, porrect, more or less auriculate; stigma ventral; anther terminal, flap-like; pollinia ovoid, 4 in 2 pairs joined at base.

A large genus of about 300 species of cosmopolitan distribution, but predominantly in tropical Asia; about 7 species known from Africa and only 1 in the Flora area.

M. weberbaueriana (Kraenzl.) Summerh. (1934);

Microstylis weberbaueriana Kraenzl. (1908) – type: Cameroun, Cameroun Mt., *Weberbauer* 42 (B hol., K drawing of hol.).

Small to medium sized terrestrial plant reaching 25 cm high, often growing in large groups; rhizome creeping, slender. Secondary stems erect, 2.5–8 cm long, leafy near apex, 3–5 leaved. Leaves spreading, thin-textured, ovate or elliptic-ovate, subacute or obtuse, up to 5.5 x 3 cm, shortly petiolate. Inflorescence erect, laxly many-flowered, up to 17 cm long; bracts ovate, acuminate, 3–4 mm long. Flowers small, flat, purple or less commonly green. Dorsal sepal ovate, obtuse, 2.3–3.3 x 1.7 cm. Lateral sepals obliquely ovate, obtuse, 2–3 x 1.6 mm, shortly united at base. Petals obliquely linear-lanceolate, rounded, 2.2–3 x 0.6 mm. Lip subcircular to subquadrate, 2 x 2 mm, bearing 2 lateral lunate pubescent calli. Column fleshy, 0.6–1 mm long. Fig. 200.30.

Leaf-litter in riverine and montane forest; 1500–1800 m. IL KF; Cameroun, Fernando Po, Kenya, Tanzania, Malawi, Zambia and Zimbabwe. *de Wilde* 9420; *Gilbert & Friis* 8409.

17. LIPARIS L.C. Rich. (1817), *nom. conserv.*

Leptorchis Thouars (1809)

Terrestrial and epiphytic herbs; stems usually more or less swollen at the base to form pseudobulbs. Leaves basal or sometimes cauline, either broad, folded, thin in texture and not jointed at the base, or else small, narrow, firm-textured and jointed at the base. Inflorescences few to many-flowered, terminal, mostly erect; rachis cylindrical or sometimes flattened or angular. Flowers somewhat small, usually yellowish green or purplish. Tepals spreading or reflexed, narrow, mostly with entire margins; petals often linear. Lip usually more fleshy than the tepals, simple or bilobed, with entire, dentate or crenulate margins, often bent in the middle, with 2 simple calli at the base. Column relatively elongated, usually curved over, cylindrical or slightly winged, with or without a small foot; pollinia 4, gourd-shaped, in 2 pairs.

A genus of about 250 species, mainly in the tropics, but also in Europe, North America, Australia and New Zealand; 3 species recorded for the Flora area.

1. Pseudobulbs well separated on a long rhizome; lateral sepals united almost to apex.
 2. *L. deistellii*
- Pseudobulbs clustered on very short rhizome; lateral sepals not united. 2
2. Leaves lacking prominent pleats; pseudobulbs subterranean; lip subrhombic, with an obscure callus.
 1. *L. abyssinica*
- Leaves pleated; pseudobulbs above ground, green or yellow; lip transversely elliptic or orbicular, with a bilobed basal callus. 3. *L. bowkeri*

1. *L. abyssinica* A. Rich. (1851)

Sturmia abyssinica (A. Rich.) Rchb.f. (1881);

Leptorchis abyssinica (A. Rich.) Kuntze (1891) – type: TU, Mt. Sulloda, near Adua (Adowa), *Quartin-Dillon* s.n. (P hol.).

Terrestrial or epiphytic herb 8–12 cm high. Pseudobulbs subterranean, conical to subcylindrical, up to 2 cm long, borne at an angle to the previous year's growth, 2–5-leaved. Leaves lanceolate to ovate or broadly ovate, acute, 2–7 x 0.5–1.8 cm, lacking prominent longitudinal pleats. Inflorescence up to 11 cm long, few-flowered, petiole clasping at the base; peduncle bearing 1–several sterile bracts; bracts narrowly lanceolate, acuminate, 5–10 x 1 mm. Dorsal sepal oblong-lanceolate, acute, 6 x 2 mm. Lateral sepals joined in basal half, falcate, narrowly elliptic, obtuse, 4.5 x 2 mm. Petals deflexed-spreading, linear, rounded at apex, 5.5 x 0.8 mm. Lip strongly reflexed, subrhombic, obtuse or rounded at apex, 5–7 x 6–8 mm; callus near base of lip small, somewhat bifid, truncate in front. Column more or less incurved at right angle in middle, 3 mm long.

Grassland; altitude not known. TU; only known from the type.

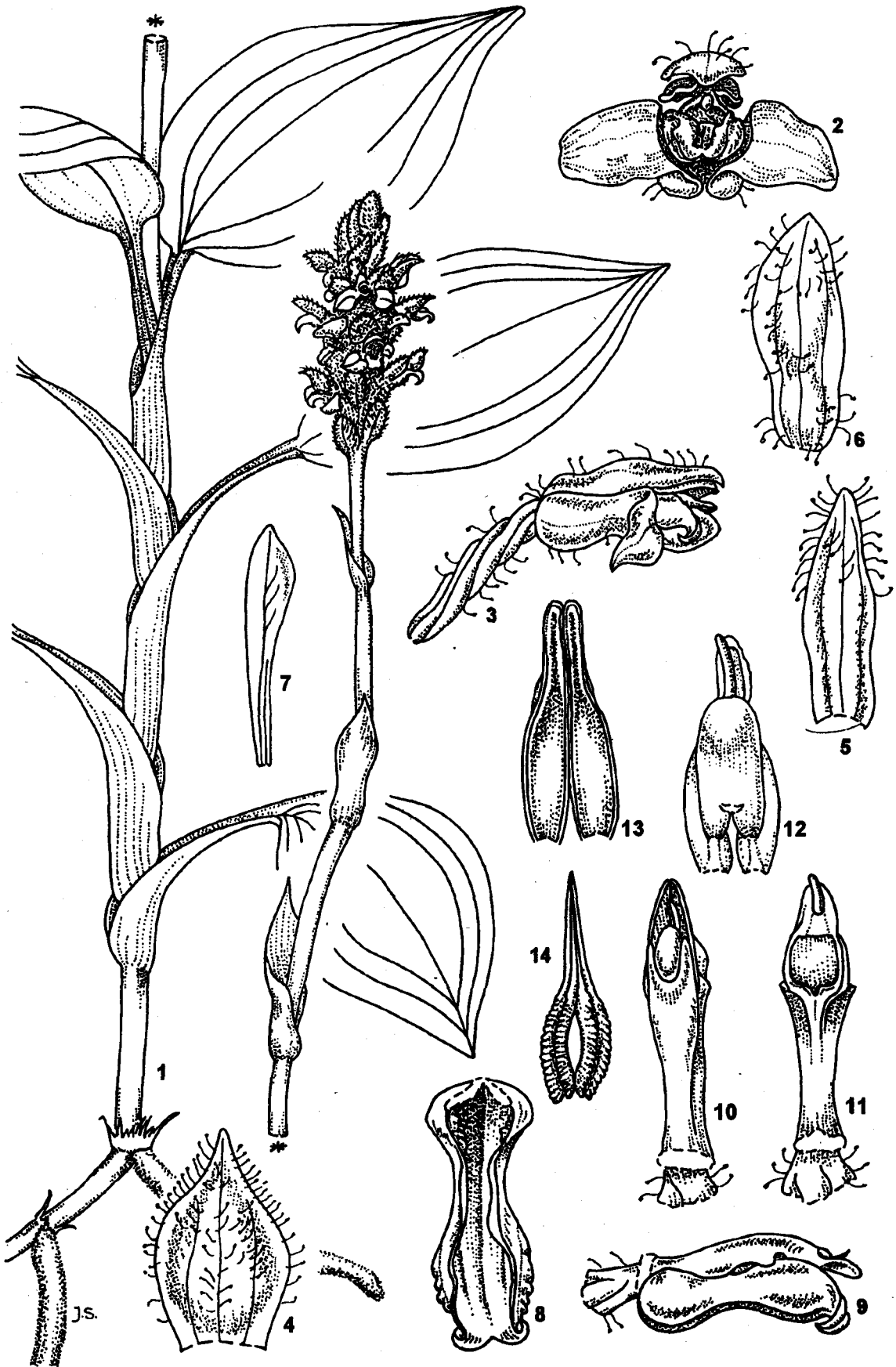


Figure 200.29 *PLATYLEPIS GLANDULOSA*: 1 - complete flowering plant $\times 1\frac{1}{2}$; 2 & 3 - flower, front and side views $\times 6$; 4 - bract $\times 6$; 5 - dorsal sepal $\times 6$; 6 - lateral sepal $\times 6$; 7 - petal $\times 6$; 8 - lip $\times 6$; 9 - column and lip side view $\times 6$; 10 & 11 - column, back and front views $\times 6$; 12 & 13 - anther-cap, back and front views $\times 12$; 14 - pollinarium $\times 12$. 1 from *La Croix & Spurrier* 523; 2-14 from *Cribb & Grey-Wilson* 245. Drawn by Judi Stone.

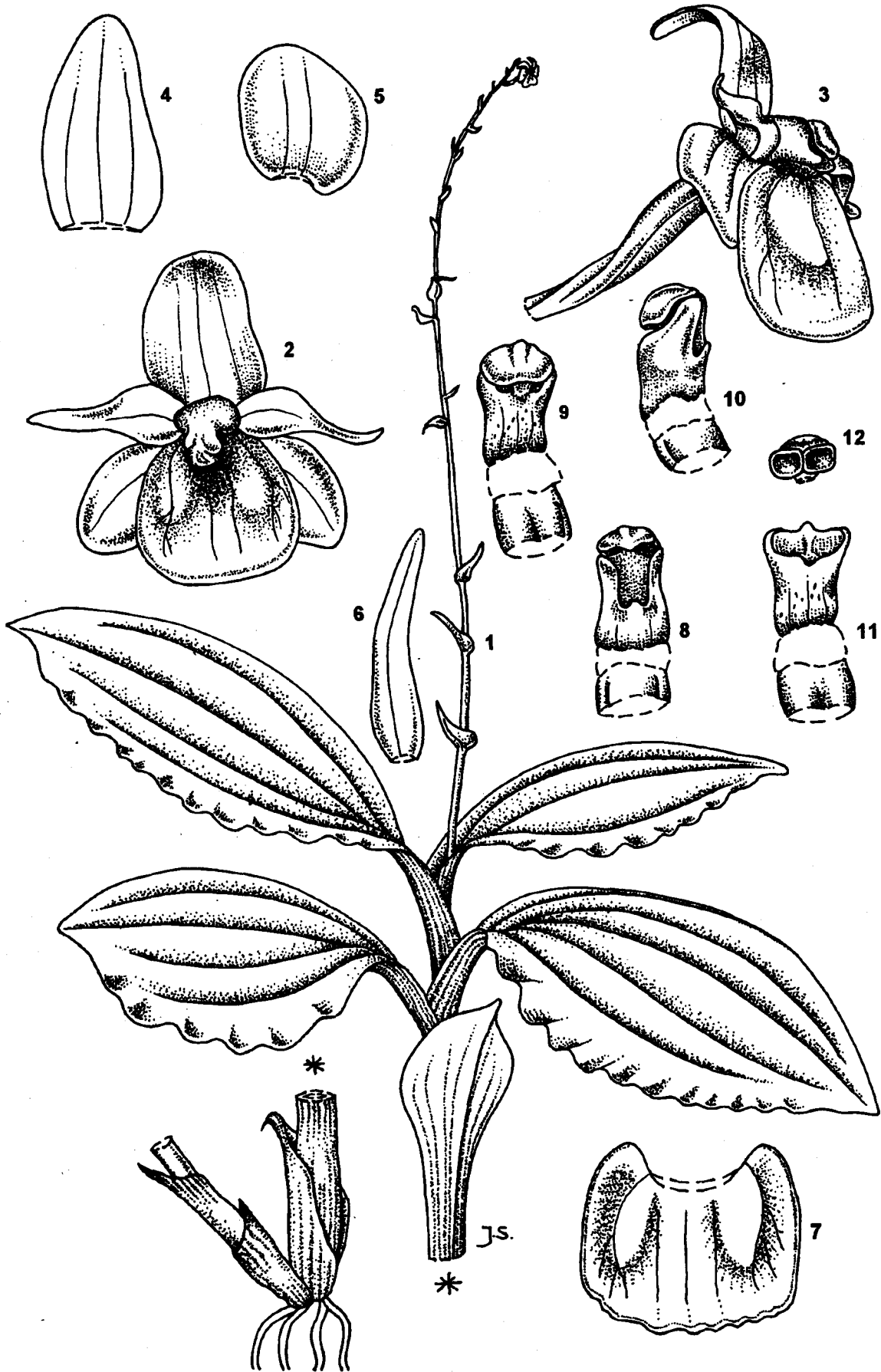


Figure 200.30 *MALAXIS WEBERBAUERIANA*: 1 - complete plant in flower x 1; 2 & 3 - flower, front and side views x 9; 4 - dorsal sepal x 9; 5 - lateral sepal x 9; 6 - petal x 9; 7 - lip x 9; 8-10 - column, front, back and side views x 14; 11 - column, back view anther cap removed x 14; 12 - anther cap x 14. 1 from Gilbert & Friis 8409; 2-12 from spirit material by Lucas 29765. Drawn by Judi Stone.

2. *L. deistellii* Schltr. (1906)

– type: Cameroun, Cameroun Mt., above Buea, *Deistel* s.n. (B holo., K drawing of holo.).

L. odontochilos Summerh. (1951) – type: Kenya, E Aberdare Mts., near Roi [Roi], *Dale* in *F.D.* 1860 (K holo., BA iso.).

Terrestrial or epiphytic herb with shoots up to 15 cm high arising at intervals of 4–12 cm from a slender cylindrical creeping rhizome up to 2 mm in diameter and partly concealed by sheaths 1 cm long. Roots slender, flexible/zigzag, arising at base of shoot and at intervals along the rhizome. Pseudobulbs fleshy, up to 40 x 4 mm, rarely broader, tapering to 1 mm in diameter at apex, with 2–3 small sheathing leaves at the base and 3 larger foliage leaves arising at intervals up the pseudobulb. Leaves light green, membranous, ovate to oblong-lanceolate 5–12 x 1.5–3 cm, acute to acuminate at the apex, gradually tapering to a sheathing base, 5-veined, margins smooth or slightly crinkled. Inflorescence terminal, longer or shorter than the leaves with 2–10 flowers; rachis up to 3 cm long; peduncle up to 90 x 1 mm, slender and curving; bracts up to 5 mm long, 2 mm wide at the base, acuminate, lower ones sometimes sterile. Ovaries slightly longer than the bracts. Flowers cream or yellowish green to light and dark reddish purple. Dorsal sepal up to 10 x 3 mm at the auricled base, tapering to an obtuse apex; lateral sepals joined almost to the apex although they may pull apart slightly; united part up to 6.5 mm long and wide, orbicular, slightly auricled at the base, curved up beneath the lip. Petals linear, up to 11.5 x 0.8 mm, rounded to acute at the apex. Lip narrow at the auricled base with a bilobed callus, then abruptly widening to become flabellate, emarginate, apiculate, margins crenulate to dentate, up to 7.5 x 7 mm. Column slender, cylindrical, winged at the apex, curved, up to 5 mm. Fig. 200.31.

Epiphyte on second storey trees in montane forest, frequently with mosses and ferns; 1700–2750 m. IL; Cameroun, Gabon, Zaire, Uganda, Kenya, Tanzania and Malawi. *Ash* 3481; *Friis* et al. 4513; *E. Gilbert* K42.

3. *L. bowkeri* Harv. (1963)

– type: South Africa, near Fort Bowker, *Bowker* (TCD holo., K iso.).

Terrestrial or rarely epiphytic herb 12–27(–40) cm high. Pseudobulbs conical to subcylindric, up to 7 x 1.5 cm, borne at an angle to the previous year's pseudobulb, 2–5-leaved. Leaves lanceolate to ovate or broadly ovate, acute, mostly 6–12 x 3–6 cm, many-nerved; petiole up to 7 cm long but mostly shorter, clasping at the base. Inflorescence up to 15 cm long, 2–25-flowered; rachis bearing 1 to several sterile bracts; fertile bracts lanceolate, acuminate, 1–1.5 x 2–4 mm. Flowers green, becoming yellowish or buff-orange with age; pedicel and ovary 7–11 mm long. Dorsal sepal oblong-lanceolate or linear, acute, 8–11.5 x 1.2–2.5 mm; lateral sepals more or less free to base, falcate, narrowly elliptic, obtuse, 5.7–8.5 x 2.5–4 mm. Petals spreading, deflexed, linear, acute, 5–11.5 x 0.3–0.75 mm. Lip recurved, some-

what auriculate at the base, orbicular to transversely elliptic, obtuse or rounded at the apex, 5–7 x 6–8 mm; callus near base of lip small, somewhat bifid, truncate at apex. Column more or less incurved at a right angle in middle, 3–3.6 mm long, dilated at base.

Forests and plantations in wet shaded places, and also on mossy rocks on open hillsides; 1350–2700 m (in East African region). Ethiopia (region unknown), Uganda, Kenya, Tanzania Zaire, Ruwanda, Burundi, Malawi, Zambia, Zimbabwe and South Africa. *Mandlos* 91.

18. POLYSTACHYA Hook. (1824), *nom. conserv.*

Epiphora Lindl. (1836)

Kraenzlin, *Fedde. Repert. Spec. Nov., Beih.* 39: 45–118 (1926); Cribb, *Kew Bull.* 32: 747–766 (1978).

Small, medium-sized or rarely large epiphytic or less commonly lithophytic or terrestrial herbs. Stems often pseudobulbous, caespitose or less commonly spaced on a creeping rhizome, sometimes branched or superposed, 1-several-noded, 1-several-leaved. Leaves suberect to spreading, thin-textured, leathery or rarely fleshy, often distichous, linear or lanceolate to oblong-elliptic or oblanceolate, emarginate, acute, obtuse or acuminate at the apex. Inflorescence terminal, erect to pendulous, 1- to many-flowered, simple or branching; branches sometimes secund; bracts suberect to reflexed, setose or lanceolate to ovate or obovate, acute or acuminate to mucronate. Flowers minute to fairly large, mostly with lip uppermost, not twisted through 180°, mostly somewhat drably coloured, more or less fragrant, often pubescent. Dorsal sepal mostly porrect, lanceolate to ovate-elliptic; lateral sepals more or less oblique, attached to the column-foot to form a more or less prominent mentum. Petals linear to obovate. Lip entire to 3-lobed, with or without a basal callus, glabrous, pubescent or mealy, often recurved and difficult to flatten. Column porrect, mostly short and stout, with a more or less elongate foot; pollinia 2, ovoid; stipe 1, square or subtriangular to oblong or linear; viscidium small to large, circular or elliptic; rostellum mostly obscure, bifid in front, rarely slightly elongate and beak-like.

A large genus of about 200 species, predominantly African but also found in the tropics of Central and South America, and from Madagascar across to the Philippines and the Malay archipelago; 11 species recorded from the Flora area.

1. Leaf solitary at apex of pseudobulb.

11. *P. cultriformis*

– Leaves 2 or more on pseudobulb or stem. 2

2. Pseudobulbs or stems superposed, each new growth emerging from a node above the base of the previous one. 3

– Pseudobulbs or stems clustered arising from base of previous growth. 5

3. Flowers fairly large, mentum 35 mm or more



Figure 200.31 *LIPARIS DEISTELII*: 1 - complete plants in flower and with stolon x 1½; 2 - flower, side view x 6; 3 - lateral sepal x 9; 4 - lip, flattened out x 9; 5 - column, side view x 13; 6 - upper part of column, front view x 18; 7 - anther and cap with pollinia separated out x 24. All from Eggeling 5851. Drawn by Stella Ross-Craig. (Reproduced with permission from *Fl. Trop. E. Afr., Orchidaceae*: fig 67.)

- high; stems slender, less than 2 mm in diameter; inflorescence unbranched. 4
- Flowers small, mentum 3 mm high or less; stems fusiform to narrowly cylindrical, more than 3 mm in diameter; inflorescence branching or not. 5. *P. simplex*
4. Leaves more than 6.5 mm broad; lip claw glabrous, mid-lobe pubescent. 6. *P. aethiopica*
- Leaves less than 6 mm broad; lip with pubescent claw and glabrous mid-lobe. 7. *P. lindblomii*
5. Plants flowering when leafless. 6
- Plants flowering when in leaf. 7
6. Inflorescence branched; peduncle and rachis covered with many scarios papery sheaths; lip with a fleshy obconical callus; mentum 2 mm long. 9. *P. steudneri*
- Inflorescence unbranched peduncle bearing 2 scarios sheaths; lip without callus, mealy; mentum 3–35 mm long. 10. *P. eurychila*
7. Inflorescence branched. 8
- Inflorescence simple. 9
8. Inflorescence pyramidal in outline; flowers brick red to orange with red venation; pseudobulbs bilaterally compressed. 3. *P. paniculata*
- Inflorescence with short secund branches; flowers pale yellow, green or pink; pseudobulbs obscure ovoid. 4. *P. tessellata*
9. Plants with elongate stems, never pseudobulbous, more than 15 cm high. 10
- Plants pseudobulbous at base, less than 8 cm high. 8. *P. caduca*
10. Mentum 5.8–6.2 mm long or less; sepals long acuminate; lip usually longer than broad when flattened. 1. *P. bennettiana*
- Mentum 6–8 mm long; sepals acute or shortly acuminate; lip as broad as or broader than long when flattened. 2. *P. rivae*

1. *P. bennettiana* Rchb.f. (1881)

Dendrorchis bennettiana (Rchb.f.) Kuntze (1898) – type: GD/TU, *Schimper* 1210 (W holo., BM K iso.).

Polystachya stricta Rolfe (1909) – type: Kenya, Lynch (K holo.).

Epiphytic plant 13–35 cm high, glabrous except for the inflorescence. Stems clustered, erect, cylindrical, 9–24 x 3–5 mm, covered with loose tubular leaf-bases, 2–6-leaved. Leaves well separated, suberect or spreading, ligulate to narrowly elliptic, acute or minutely acutely bilobed at the apex, 10–23 x 1.2–2 cm. Inflorescence erect but often recurved in apical half, often equalling the stem in length, rarely shorter, many-branched, 9–31 cm long; peduncle cylindrical, covered with scarios acute sheaths, 1–9 cm long; rachis cylindrical, pubescent, more or less covered with scarios sheaths; branches recurved, well spaced, secund, 0.5–4 cm long; bracts ovate to ovate-lanceolate, recurved, shortly acuminate, 2–3(–5) mm long. Flowers pubescent on outer surface, light greenish yellow or cream, lip lined with brown or red at base and on side-lobes, scented of

vanilla; ovary densely pubescent. Dorsal sepal oblong-lanceolate, concave, subacute, 6.7–9.7 x 2.2–3.5 mm; lateral sepals obliquely triangular-ovate or lanceolate, acute, 9.5–11.5 x 5.5–6.7 mm; mentum broadly conical, 5.8–6.2 cm long. Petals oblanceolate, subacute, 6–8 x 1.6–2.5 mm. Lip shortly clawed, 3-lobed at or above the middle, 7.5–10 x 6–7.3 mm, club-shaped-pubescent all over upper surface; side-lobes obliquely triangular, subacute; mid-lobe ovate to rotund, recurved, acute or acuminate, 3.3–5 x 2.7–3.3 mm; disc with a central pubescent fleshy keel in basal third of lip. Column broad, 2 mm long.

Open woodland, *Podocarpus* forest, secondary or riverine forest; 900–2070 m. GD GJ SU WU WG KF SD HA; Uganda, Kenya, Tanzania, Nigeria, Cameroun, Zaire, Zambia. *Ash* 1743; *Burger* 1053; *Mooney* 6915.

2. *P. rivae* Schweinf. (1894)

– types: EW, *Schweinfurth & Riva* 1272, (K isosyn.), Selet, Saganeiti, *Schweinfurth & Riva* 1686 (K isosyn.), & Mt. Alan Kale nr. Aideres, *Schimper* 1809 (K isosyn.).

Eulophia menelikii Pax. (1907) – type: SU, Urga Mumitsche, *Rosen* 3 (B holo. destr.).

Erect to pendulous epiphyte with clustered cylindrical stems, 7–30 cm long, covered by tubular sheaths and sheathing leaf bases. Leaves 2–5, suberect, linear, subacute to obtuse, 8–22 x 0.8–2.9 cm, glossy olive green above, prominently veined beneath. Inflorescence simple or weakly branched at base, 3–17 cm long, densely many-flowered; peduncle covered by imbricate, slightly bilaterally compressed sheaths; rachis pubescent; bracts lanceolate, acuminate, 5–10 mm long. Flowers cream, white or greenish yellow, marked with yellow or pink on lip, sparsely pubescent on outside, sweetly scented; pedicel and ovary 3–7 mm long, pubescent. Dorsal sepal ovate, shortly acuminate or acute, 6–9.5 x 3.5–4.6 mm. Lateral sepals obliquely triangular, acute or shortly acuminate, 8–12.5 x 6.5–10 mm; mentum obliquely conical, 6–8 mm long. Petals obovate to oblanceolate, obtuse, 7–8 x 1.2–2.9 mm. Lip 3-lobed in apical half, as broad as or broader than long, 7–9 x 8–10 mm, usually mealy on inner surface and callus; side-lobes almost as long as mid-lobe, rounded in front; mid-lobe broadly ovate-subcircular, shortly apiculate; callus fleshy, in middle of lip. Column 2–2.5 mm long; foot 6–8 mm long. Fig. 200.32.

On trunks and limbs of small trees and in gallery forest by streams and on scattered trees in grassland; 1770–2490 m. EW SU WG KF; not known elsewhere. *de Wilde* 6156; *Meyer* 7681; *Mooney* 6878.

Very closely allied to *P. bennettiana* but apparently differing in having larger flowers with less acuminate sepals, a lip that is broader than long, sepals that are more or less as long as broad, and a prominent conical mentum more than 6 mm high. In other features it resembles a large *P. bennettiana* and it may prove on further study to be no more than a variety of that widespread species.

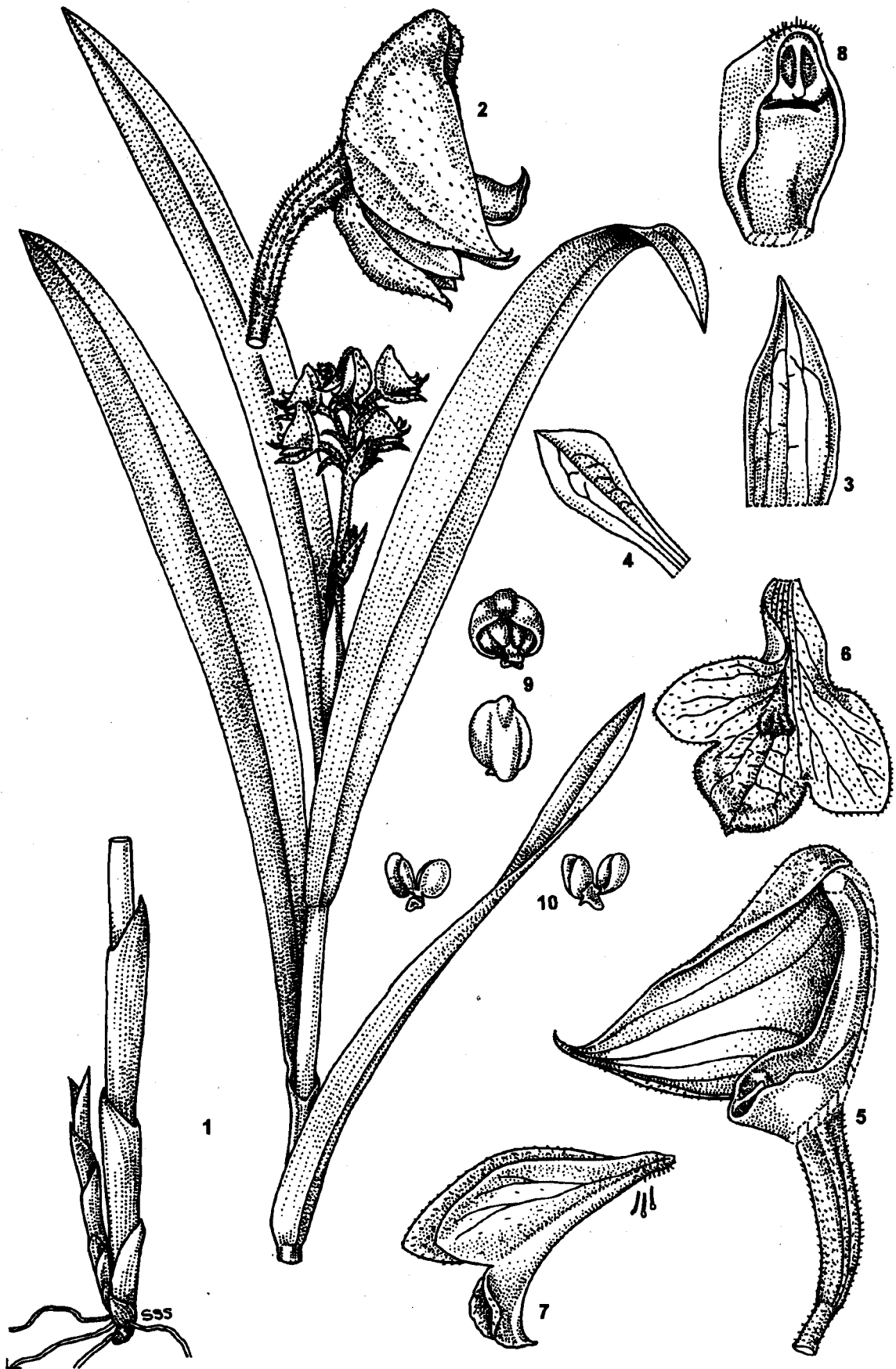


Figure 200.32 *POLYSTACHYA RIVAE*: 1 – flowering stem with new shoot at base x $\frac{3}{4}$; 2 – flower, side view x $4\frac{1}{2}$; 3 – dorsal sepal x $7\frac{1}{2}$; 4 – petal x $7\frac{1}{2}$; 5 – column and lateral sepal x $7\frac{1}{2}$; 6 – lip, spread open x $7\frac{1}{2}$; 7 – lip, side view x $7\frac{1}{2}$; 8 – column apex x 15; 9 – anther, top and underside views x 15; 10 – pollinarium, two views x 15. All from *de Wilde & de Wilde-Duyffes 6229*. Drawn by Susanna Stuart-Smith.

Unfortunately the type of *Eulophia menelikii* Pax has been destroyed. It has been placed in synonymy here based on the rather inadequate description which agrees well with *P. rivae*.

3. *P. paniculata* (Sw.) Rolfe (1897);

Dendrobium paniculatum Sw. (1805) – type: Sierra Leone, *Afzelius* (UPS holo., K drawing).

Erect epiphytic plant, 22–40 cm long. Pseudobulbs cylindrical, clustered, strongly compressed, 3–4-noded, grooved when old, 5–18 cm long, 13–22 mm in diameter, 3–4-leaved. Leaves distichous, ligulate, suberect-spreading, narrowed to the more or less unequally bilobed apex, 10–30 x 2–3.4 cm. Inflorescence generally longer than the leaves, a many-branched raceme, many-flowered, to 21 cm long, subtended by 1–3 obtuse to acute, two-edged sheaths; peduncle glabrous, 5–13 cm long, covered by the basal sheaths; rachis cylindrical, glabrous; branches suberect, slightly incurved, to 6 cm long, many-flowered. Flowers small, flame-red or orange with red markings on the lip. Dorsal sepal lanceolate, acute, 3 x 0.8 mm; lateral sepals obliquely lanceolate, acute, 3.7 x 1.8 mm, forming with the column-foot an obscurely conical mentum 1.3 mm long. Petals oblanceolate, subacute, 2.7–2.8 x 0.5 mm. Lip ovate to elliptic, entire, acute, 2.8 x 1.7 mm, disc with a callus, concave in front. Column semi-cylindrical, truncate, 1 mm long.

Montane forest; 900–1150 m. KF; Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroun Gabon, Congo (Brazzaville) and Zaire. *Friis* et al. 4051; *Moult* 62.

4. *P. tessellata* Lindl. (1862)

– type: Nigeria, Niger delta, mouth of the Nun R., *Mann* (K holo.).

Epiphytic herb (9–)20–62 cm long. Stems pseudobulbous at base, to 15 x 0.7 cm, 3–5-leaved; pseudobulbs ovoid, 0.6–1.3 x 0.5–0.8 cm. Leaves suberect, somewhat distichous, oblanceolate, elliptic or oblong-elliptic, minutely unequally bilobed at apex, obtuse or rounded, 13–30 x 1.3–5.7 cm. Inflorescence much longer than the leaves, paniculate, 18–47 cm long; peduncle cylindrical, covered with scarios imbricating sheaths; rachis more or less covered with papery acute sheaths, sparsely pubescent; branches secund, distant, 1–5 cm long, densely many-flowered; bracts linear-lanceolate, acuminate, 2–4 mm long. Flowers sparsely pubescent on outer surface, very variable in colour, creamy yellow, pale green, pink or dull red, lip white with a pink mid-lobe. Dorsal sepal oblong-elliptic, acute, 3–4.3 x 1.8–2.3 mm; lateral sepals obliquely ovate, apiculate, 3–5.6 x 2.8–3.6 mm, forming with the column-foot a conical mentum to 3.4 mm high. Petals ligulate to spatulate, apiculate, 2–3.6 x 0.6–1.1 mm. Lip clawed, 3-lobed at or above the middle, 3.5–5.2 x 2.5–4 mm; side-lobes falcately oblong, subacute or obtuse, 1.2 mm long; mid-lobe suborbicular, emarginate, tessellated when dry, margins crenulate-undulate, 1.6–2.5 x 2–2.2

mm; callus a fleshy ridge 1.7 mm long, tapering towards the base and rounded at the apex. Column 1–1.6 mm long.

Growing with mosses and ferns on trees in damp valleys, in canopy of forest with *Aningeria altissima*, *Antiaris toxicana* etc., and in riverine forest; 1100–1800 m. SU KF; throughout tropical Africa. *Friis* et al. 4005; *Jansen* 5733; *Mooney* 9232.

5. *P. simplex* Rendle (1895)

– type: Uganda, Toro District, Ruimi [Wimi], *Scott Elliot* 7827 (BM holo., K iso.).

P. aristulifera Rendle (1905) – type: Uganda, Kigezi District, Rukiga [Ruchigga], *Bagshawe* 446 (BM holo.).

Pendulous epiphytic plant to 50 cm or more long. Stems (or pseudobulbs) cylindrical or narrowly fusiform, 3–20 x 0.3–0.9 cm, yellow or purple, superposed, given off from the middle of the previous growth. Leaves spreading, somewhat undulate, elliptic, oblong or oblanceolate, 5–15 x 1.5 cm, acute or subacute, nerves prominent. Inflorescence 3.5–9 cm long, pubescent, branching or unbranched, shorter than the terminal leaves; bracts narrowly lanceolate, acuminate, 0.4–0.7 cm long. Flowers green or yellowish green, tinged with brown or mauve, lip yellow marked with purple. Dorsal sepal ovate-lanceolate, acute or acuminate, 4.8 x 2 mm; lateral sepals obliquely ovate-triangular, acuminate, 5.5 x 3 mm, forming with the column-foot a mentum 2.6 mm long. Petals linear or lanceolate, acute, 3.8 x 1 mm. Lip shortly clawed, 3-lobed above or at the middle, 5 x 3.8 mm, without callus or with a slight fleshy thickening between the side-lobes; side-lobes erect, elliptic, rounded; mid-lobe ovate or rotund, acuminate or apiculate, 2.3 x 2.2 mm. Column cylindrical, 1.2 mm long.

On tree branches in montane forest; 1200–1800 m (in E Africa). GG; Uganda, Kenya, Tanzania, Zaire, Malawi and Zimbabwe. *Moreau* s.n.

6. *P. aethiopica* Cribb (1978)

– type: AR, near Kofole, *Mooney* 7283 (K holo.).

Erect, suberect or ascending epiphytic herb, glabrous except for the inflorescence. Stems cylindrical to very narrowly fusiform, clustered below, superposed above, several-noded, when young covered with loose, scarios, crimson-marked sheaths below and leaf bases above, 2.5–8 cm long, 2.5 mm in diameter, 2–4-leaved. Leaves suberect, narrowly oblong-ligulate, 4–8.5 cm x 6–8.5 mm, acutely and unequally bilobed at apex, prominently 5-veined below. Inflorescence erect, 7–16-flowered, 5–7 cm long; bracts setaceous, 2–12 mm long. Flowers yellow-green; lip crimson; pedicel and ovary and outside of flower pubescent. Dorsal sepal lanceolate, acuminate, 5 x 2 mm; lateral sepals very obliquely falcate-lanceolate, acuminate, 5–6 mm long and 5–6 mm broad at base, forming with the column foot a curved, cylindrical-conical mentum 3–4 mm long. Petals linear-lanceolate, 5 x 1 mm, acute. Lip clawed, ob-

scurely 3-lobed in the middle, 6.5–6.6 x 4 mm, pubescent on upper surface; side-lobes erect, oblong-auriculate; mid-lobe oblong, apiculate, margins irregularly toothed; callus small, at base of mid-lobe, fleshy. Column short, truncate, 1–2 mm long.

In low shrubs; 1350–2200 m. SU AR; not known elsewhere. *Ash* 407 & 1034; *Mooney* 7283.

7. *P. lindblomii* Schltr. (1922)

– type: Kenya, N. Kavirondo District, Kitosh, *Lindblom* s.n. (B holo., K drawing of holo.).

P. ugandae Kraenzl. (1926) – type: Uganda, Toro, *Snowden* 737 (K holo.).

Pendulous or erect epiphytic plant to 35 cm or more long. Stems (or pseudobulbs) caespitose, cylindrical, to 25 x 1 mm, secondary and tertiary stems given off from apical half of older growths, 2–9 x 0.1 cm, all covered in scarious tubular sheaths and leaf bases, 5–8-leaved in apical half. Leaves linear, grass-like, acute, flexible/zigzag, 5–11 x 0.2–0.4 cm. Inflorescence unbranched, much shorter than the leaves, 4–8-flowered, 1.5–3 cm long; bracts lanceolate, long-acuminate, 1.5–2.5 mm long. Flowers suberect, white, greenish yellow or yellow with a yellow or purple lip. Dorsal sepal ovate, acuminate, cucullate, 3–5 mm, long longest margin, 4–5.5 mm wide, forming with the column-foot a shortly and broadly cylindrical mentum 4–5.2 mm long. Petals linear to oblong-elliptic, 2.7–3.5 x 0.8–1.1 mm, acute. Lip with a long claw, obscurely 3-lobed in apical half, 6.5 x 4 mm; side-lobes erect, narrowly oblong, rounded at apex; mid-lobe much larger than side-lobes, broadly ovate to orbicular, apiculate; claw pubescent; callus a fleshy transverse ridge between side-lobes, sometimes sparsely pubescent. Column short, fleshy, subcylindrical, truncate, 2 mm long; foot slightly curved, 4 mm long, long-pubescent within.

On branches in dense forest and at forest margins; 1000–2000 m. KF; Zaire, Uganda, Kenya, Tanzania, Mozambique, Malawi and Zimbabwe. *Friis* et al. 4009; *Mooney* 9230; *Pettersson* 279.

8. *P. caduca* Rchb.f. (1852);

Dendrorchis caduca Kuntze (1891) – type: Ethiopia, without locality, *Schimper* 1159 (W holo., BM K iso.).

Small epiphytic herb with clustered or sequences of small subglobose to conical or obliquely conical pseudobulbs, 5–20 x 2–10 mm, green drying dull yellow, 2–4-leaved at apex. Leaves suberect to erect, linear to narrowly elliptic or oblanceolate, obtuse, 15–90 x 2–9 mm. Inflorescence erect, laxly 2–8-flowered, 2.5–6 cm long, shorter than the leaves; peduncle slender, 1.5–3 cm long, pubescent; rachis pubescent; bracts linear, acuminate to setose, 2–6 x 1 mm. Flowers white with a yellow mark on the lip and a yellow anther cap; pedicel and ovary 4–5 mm long, pubescent. Dorsal sepal lanceolate, acuminate, 5–7 x 1.5–2 mm. Lateral sepals very obliquely falcate-ovate, acuminate or acute, 6–8 x 6–7.5 mm; mentum obliquely conical-cylindrical,

rounded at apex, 4–5 mm long. Petals oblong-lanceolate, acute, 4–4.5 x 1–1.2 mm, 3-veined. Lip long-clawed, obscurely 3-lobed and cordate-ovate in front, obtuse, 7–7.5 x 3.5–3.7 mm; mid-lobe 3.5–3.6 x 3 mm. Column very short; foot 4–5 mm long.

On branches of trees in montane *Podocarpus* forest and on scattered *Acacia* and *Albizia* in montane grassland; 2400–2600 m. GD SU AR WG KF SD BA; not known elsewhere. *Gilbert & Jefford* 4325; *Mooney* 7281; *Negri* 497; *Thulin & Hunde* 3922.

The authors suspect that the report by Engler (1906) of *P. confusa* Rolfe based on a collection by Ellenbeck from Mt. Abunas is referable here. This specimen was probably destroyed in Berlin but, if correct, the distribution of *P. caduca* should be extended to include WU.

9. *P. steudneri* Rchb.f. (1881)

– type: Ethiopia, Guang R., *Stuedner* 704 (W holo.).

P. beccarii Rchb.f. ex Martelli (1886) – type: EW, Keren near Mald, *Beccari* s.n. (F1 holo., W part of holo.).

P. ellenbeckiana Kraenzl. (1902) – type: SD, Adessa, *Ellenbeck* 1809 (B holo.).

Epiphytic plant 11–35 cm high. Pseudobulbs very obscure, narrowly conical, 2–5 x 0.5–0.9 cm, 2–3-leaved at apex, subtended by 2–3 leaf-bearing sheaths. Leaves suberect, linear to narrowly oblong-lanceolate, up to 12 x 0.5–1.3 cm, subacute or obtuse, apex obscurely unequally bilobed. Inflorescence produced after the leaves have fallen (proteranthous), 8–33 cm high, paniculate; peduncle and rachis cylindrical, completely enclosed by scarious sheaths; branches short, densely many-flowered, second; bracts lanceolate, 1.5–3 x 1 mm, acute or acuminate. Flowers white, yellow or yellow-green, heavily spotted or lined with crimson. Dorsal sepal lanceolate, 3–6 x 1.6 mm, subacute; lateral sepals obliquely ovate-lanceolate, 3.7–4 x 1.8–2.3 mm; mentum short, to 2 mm long. Petals oblong-lanceolate, up to 3.5 x 0.7 mm, acute. Lip 3-lobed, shortly clawed, 3 x 2.3 mm; side-lobes at right-angles to mid-lobe, rounded; mid-lobe oblong-ovate, acute, 1.6 x 1 mm; callus on claw of lip, obconical, fleshy. Column very small, fleshy.

On branches of trees and shrubs in deciduous woodland or dry scrub; 1500–2300 m. EW GJ SU WG IL KF SD; Nigeria, Cameroun, Sudan, Uganda and Kenya. *Friis* et al. 2356; *Ash* 1557; *Jansen* 2353.

10. *P. eurychila* Summerh. (1939)

– type: Uganda, Elgon, between Butandiga and Bulambuli, *Eggeling* 2438 (K holo.).

Epiphytic or lithophytic plant, 8–39 cm high. Stems clustered, erect, fleshy, somewhat pseudobulbous at base, narrowly conical, to 200 x 8 mm, 3–5-leaved towards apex; roots pinkish purple when cut. Leaves deciduous, suberect, narrowly linear-lanceolate, grass-like, acute, to 290 x 6–8.5 mm. Inflorescence un-

branched, mostly borne after the leaves have fallen, shorter than the leaves, 4–11 cm long, subdensely many-flowered; peduncle covered with 2 scarious acute sheaths; rachis sparsely setulose-pubescent; bracts broadly deltoid-ovate, acuminate, 1–2 mm long. Flowers erect-spreading, pale lilac-rose with purple to magenta. Dorsal sepal oblong-elliptic, rounded or slightly emarginate, 3.5–4 x 1.7–2 mm; lateral sepals rotund-triangular, obtuse, dorsally shortly cuspidate below the apex, 4–5 mm long and wide; mentum conical, subacute, 3–3.5 mm long. Petals ligulate or spatulate-ligulate, 3.5 x 0.6–1.4 mm. Lip shortly clawed, without callus, very broadly 3-lobed in apical half, 3.5–4.5 x 6–7.1 mm, whole surface mealy pubescent; side-lobes spreading, elliptic-oblong, 3 x 2–2.5 mm; mid-lobe broadly triangular, obtuse, 1–1.5 x 1.5–2 mm. Column 2 mm long, almost cylindrical.

In riverine forest or on wet rocks; 1700–2000 m. AR SU KF SD; Uganda and Kenya. *Mooney* 7110; *Gilbert* 1832; *Ash* 2255.

11. *P. cultriformis* (Thouars) Spreng. (1826);

Dendrobium cultriforme Thouars (1822); *Polystachya cultrata* Lindl. (1824), *nom. superfl.* – type: Mauritius, *du Petit Thouars* s.n. (P holo.).

Glabrous epiphytic or lithophytic plant, 6–24.5 cm high; pseudobulbs from a short creeping rhizome, loosely clustered, narrowly cylindrical to conical, 1.4–1.8 x 0.2–1.2 cm, clothed in 1–6 membranous basal sheaths. Leaf obovate, ovate or elliptic, acute, to obtuse, auriculate at the base, 3.2–3.6 x 1.2–5.5 cm, leathery, articulated 2–6 mm above the apex of the pseudobulb. Inflorescence usually longer than the leaf, paniculate or rarely racemose, 4.4–29 cm long, bearing up to 50 flowers successively; peduncle slender to stout, 3.2–21.5 cm long; basal sheath membranous; bracts ovate-triangular, acuminate, amplexicaul, 2.5–4.5 mm long. Flowers very variable in colour and size, white, yellow, green, pink or purple, more or less yellow at the base of the lip. Dorsal sepal ovate-triangular, apiculate, 4–8 x 2–4.5 mm; lateral sepals obliquely triangular, apiculate, 5–8 x 3–6 mm; mentum conical, up to 7 mm high. Petals linear to spatulate, acute or obtuse, 3.5–7.5 x 1–2.5 mm. Lip strongly recurved, more or less shortly clawed, distinctly 3-lobed in the apical half, 4–7.8 x 3–6 mm; side-lobes porrect, rounded in front; mid-lobe oblong-quadrate, shortly apiculate, 1.2–4.5 x 1.5–3.5 mm; callus fleshy, more or less central. Column semi-cylindrical, 0.5–3.5 mm long; foot 1.5–6.5 mm long; pollinia ellipsoid-globose.

Montane and secondary forest; 1700–2000 m. IL KF; Uganda, Kenya, Tanzania, Cameroun, Fernando Po, Gabon, Zaire, Burundi, Malawi, Mozambique, Zimbabwe, South Africa, Madagascar, Mascarenes and the Seychelles. *Ash* 1493; *Meyer* 8882; *Mooney* 8750.

19. *STOLZIA* Schltr. (1915)

Mansfeld, *Notizbl. Bot. Gart. Bull.* 11: 1061–1063 (1934); Summerhayes, *Kew Bull.* 8: 140–144 (1953); Cribb, *Kew Bull.* 33: 79–89 (1978), 40: 405–407.

Dwarf epiphytic or rarely lithophytic herbs. Stems pseudobulbous, creeping, forming mats on the surface of the substrate. Pseudobulbs asymmetrical, fleshy, ovoid, fusiform to club-shaped, bearing 1–2 leaves at the apex which is often offset. Leaves fleshy or leathery, spreading or erect, oval, ligulate or obovate. Inflorescence erect, 1- to many-flowered. Flowers more or less secund, somewhat campanulate, yellow, orange, brown, red or green. Lateral sepals fused at base, forming with the column-foot a more or less prominent mentum. Lip entire, curved, V-shaped in cross-section. Column truncate with a long curved foot more than 3 times as long as the column; pollinia 8, in 2 groups, 4 larger and 4 smaller; stigma concave with a flap-shaped rostellum in front.

A genus of about 15 species, all from tropical Africa; 2 species in the Flora area.

1. Lip 4 mm long with a fleshy knob-like callus at the base; leaves 1–2.7 cm long; flowers pale yellow or greenish-yellow with a pale brownish-red lip.

1. *S. grandiflora*

– Lip 2 mm long, lacking a callus at the base; leaves 0.5–1.4 cm long; flower yellow, brown or reddish, more or less striped red or brown.

2. *S. repens*

1. *S. grandiflora* Cribb (1985)

– type: SU, Wonchi Crater Lake, S of Hagera Hiwot, *Gilbert* 3290 (K holo.).

Creeping epiphytic herb. Pseudobulbs slender club-shaped, rhizomatous, somewhat wiry, swollen below each pair of leaves, 2–4 cm long, up to 3 mm in diameter; roots emerging along each growth. Leaves more or less fleshy, elliptic to obovate, rounded at apex, shortly petiolate below, 1–2.7 x 0.6–1 cm. Inflorescence terminal, 1-flowered; peduncle short, 3–8 mm long; bract ovate, acute, 2–5 mm long. Flowers pale yellow or greenish yellow with a pale brownish-red lip; ovary 3–4 mm long. Dorsal sepal lanceolate-acute, 9–10.5 x 2.5–3 mm; lateral sepals recurved, falcate, lanceolate, acute, 8 x 3.5 mm; forming with the column foot a short, incurved-conical mentum 2–4 mm long. Petals falcate, linear-lanceolate, acute 9 x 1.5–2 mm. Lip very fleshy, recurved, entire, ovate, subacute with an obscure fleshy knob-like callus at base 4 x 2 mm. Column short, 1 mm long; anther minutely verrucose; pollinia 8, of 2 sizes, flattened, gourd-shaped; column-foot incurved, 2.5 mm long. Fig. 200.33.

On branches at the edge of montane forest; 1900–2850 m. SU WG SD BA; not known elsewhere. *Friis* et al. 3557; *de Wilde* 6093; *Gilbert* 3290.

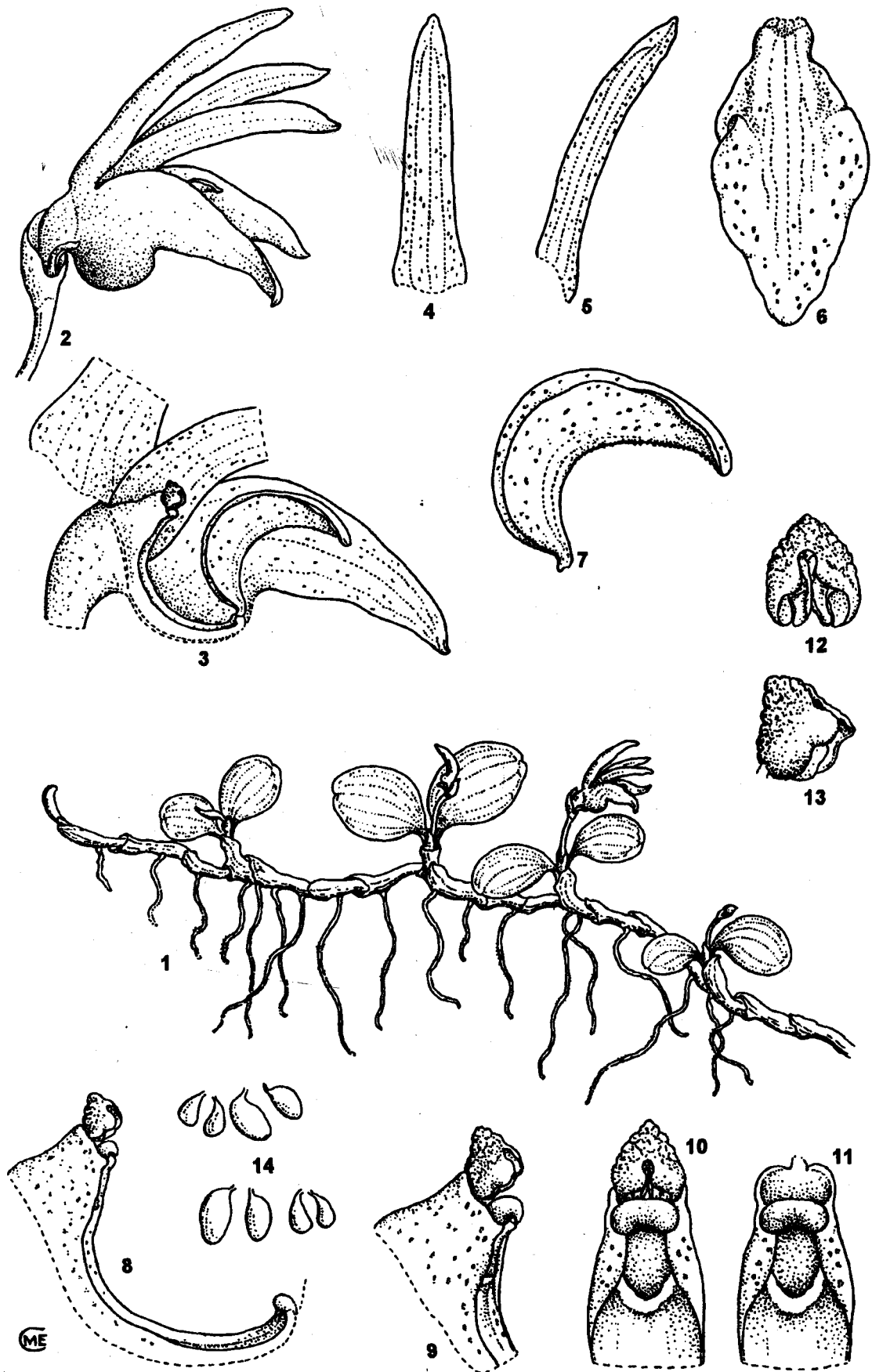


Figure 200.33 *STOLZIA GRANDIFLORA*: 1 – flowering plant on creeping stolon x 1½; 2 – flower, side view x 6; 3 – flower with lateral sepal and petal removed x 9; 4 – dorsal sepal x 6; 5 – petal x 6; 6 & 7 – lip, flattened out and side views x 15; 8 – column x 18; 9–11 – column apex, from side and front, and lacking anther x 30; 12 & 13 – anther cap x 36; 14 – pollinia x 30. All from *de Wilde* 6093. Drawn by Maureen Church.

2. *S. repens* (Rolfe) Summerh. (1953);
Polystachya repens Rolfe (1912) – type: Uganda,
 Brown (K holo.).

Creeping dwarf epiphytic herb up to 1 cm high. Pseudobulbs prostrate except at apex, elongate-club-shaped or rhizomatous, up to 3 x 0.3 cm, bearing 2 leaves near insertion of next pseudobulb where the pseudobulb is broadest. Leaves 2, elliptic or obovate, 5–14 x 3–8 mm, rounded. Inflorescence 1-flowered, borne between leaves on very short peduncle. Flower yellow, brown or reddish, more or less striped red or brown. Dorsal sepal oblong-ligulate, up to 7 x 2.5 mm, obtuse; lateral sepals obliquely oblong, up to 6 x 2.4 mm, obtuse, united towards base with each other and the column-foot to form a sack-like mentum. Petals slightly falcate-lanceolate, up to 5 x 1.5 mm, acute. Lip tongue-like to narrowly ovate, 2 x 1 mm, more or less acute, slightly papillate below. Column truncate, 7 mm long; rostellum flap-like; column-foot curved, 2 mm long; anther-cap spherical-compressed, smooth.

On mossy trunks and branches in forest; 900–2200 m. SU WG KF SD; Ghana, Nigeria, Cameroun, Zaire, Uganda, Kenya, Tanzania, Zambia, Malawi and Zimbabwe. *Ash* 1534; *Friis* et al. 2328; *Thulin* et al. 3647.

20. **BULBOPHYLLUM** Thouars (1822), *nom. conserv.*
Cirrhopetalum Lindl. (1824)
Megaclinium Lindl. (1826)

Epiphytic or lithophytic sympodial herbs; rhizome short or long and creeping, often branched, slender to quite stout. Pseudobulbs 1-noded, clustered or distant, stem-like or more often swollen, more or less angled in cross-section, arising from rhizome at intervals, 1–2-leaved (rarely more) at the apex. Leaves mostly leathery or fleshy or rarely thin-textured, small to large. Inflorescences arising from base of pseudobulb or rarely from node on rhizome, 1- to many-flowered, racemose or rarely umbellate. Flowers more or less fleshy, often not opening widely, mostly small in African species, white, cream or green to orange and purple. Dorsal sepal subequal and less commonly much shorter than lateral sepals; lateral sepals free or rarely joined, united at base to column-foot to form a more or less prominent mentum. Petals mostly much smaller than sepals. Lip often much smaller than sepals, hinged to end of column-foot, often highly mobile, often fleshy, ligulate and curved, mostly entire. Column short, often winged and with apical stelia; anther small, 2-chambered, with 4 pollinia in pairs; column-foot mostly incurved, united to base of lateral sepals.

A large genus of perhaps 1000 species with a tropical distribution. About 100 species are found in tropical Africa and a further 160 or more in Madagascar. Only 4 species recorded for the Flora area.

1. Floral bracts 1.5 times as long as flower (including pedicel and ovary). 3. *B. lupulinum*
 – Floral bracts much shorter than flower (including pedicel and ovary). 2

2. Pseudobulbs with 2 leaves. 4. *B. scaberulum*
 – Pseudobulbs with 1 leaf. 3
 3. Inflorescence over 4 times longer than leaf; leaf 1–5 cm long; lip dentate-ciliate. 1. *B. intertextum*
 – Inflorescence less than twice the length of the leaf; leaf 8–16 cm long; lip papillose but not dentate-ciliate. 2. *B. josephii*

1. *B. intertextum* Lindl. (1862)
 – type: Nigeria, Nun R., *Mann* 527 (K holo.).

Very small epiphytic herb up to 5 cm high. Pseudobulbs 1-leaved, clustered on very short rhizome, ovoid, 3–10 x 3–7 mm. Leaf thin-textured, erect, linear-oblong, obtuse, rounded or subacute, 1–5 x 3–7 cm. Inflorescence erect, 5–10 cm long; peduncle and rachis cylindrical, wiry, very slender; bracts lanceolate, acute, 2–2.5 mm long. Flowers very small, greenish cream to purple-red. Dorsal sepal ovate, acute, 3.5 x 2 mm; lateral sepals ovate, acute or acuminate, 4 x 1.8 mm. Petals oblong-elliptic, rounded, 2 x 1 mm. Lip fleshy, recurved, obscurely 3-lobed in basal half, 1.8 x 1 mm, 2-ridged in basal half; side-lobes auricular, dentate-ciliate; mid-lobe minutely ciliate, papillate. Column short, 0.8 mm long; stelia porrect, blunt, 0.3 mm long. Fig. 200.34.

Growing on branches of trees in montane, riverine and mist forest; 1200–1600 m. IL KF BA; Sierra Leone to Cameroun, Kenya, Tanzania Angola to Malawi and Zimbabwe and the Seychelles. *Friis* et al. 3581 & 4048.

2. *B. josephii* (Kuntze) Summerh. (1945);
Phyllorchis josephii Kuntze (1891) – type: *Mann* 2124 (K holo.).
Bulbophyllum aurantiacum Hook. f. (1864), non *B. aurantiacum* F. Muell. (1862).
B. sennii Chiov. (1940) – type: SD, Adola *Senni* 2434 (FI holo., photo. in K).

Medium-sized epiphytic herb with a short stout creeping rhizome. Pseudobulbs clustered, 1-leaved, conical-ovoid, wrinkled when dry, 1.4–3.6 x 0.7–2.3 cm, reddish, green or brownish green, turning orange-yellow on drying. Leaf leathery, erect, narrowly oblong or oblanceolate, obtuse or rarely rounded, shortly petiole, 8–16 x 1–2.4 cm. Inflorescence pendulous, 8–26 cm long, densely many-flowered; peduncle and rachis slender, flexible/zigzag, cylindrical; bracts narrowly elliptic, obtuse or subacute, 5–6 mm long. Flowers white, greenish white or yellow more or less tipped with crimson or pink. Dorsal sepal narrowly lanceolate, acuminate, 7–7.5 x 1 mm; lateral sepals linear-lanceolate, long-acuminate, 7–8 x 1.5–2 mm. Petals obovate-elliptic, rounded, 3 x 1.2 mm, papillose in apical half. Lip recurved, ovate, obtuse, 2.2 x 1.3 mm, with 2 longitudinal central ridges, margins papillose. Column short; stelia short, acute, 0.5–1 mm long; anther transversely ellipsoid with a short central apical ridge. Fig. 200.35.

Growing on branches in montane forest; 850–2100 m. KF SD BA; Zaire, Rwanda, Uganda, Kenya, Tanzania Zambia, Malawi, Mozambique and Zimbabwe. *Friis* et al. 3544; *Seeger* 2665.

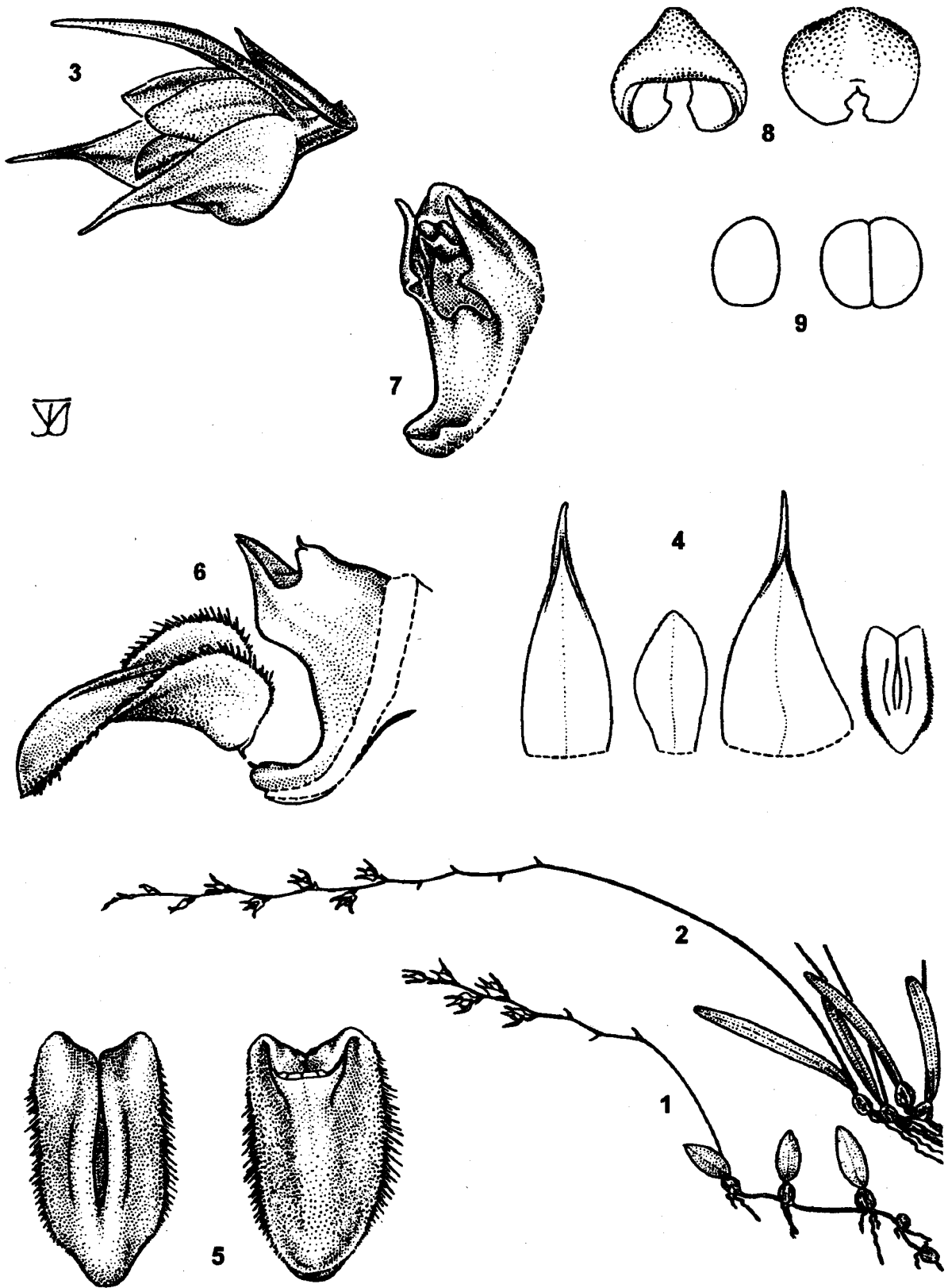


Figure 200.34 *BULBOPHYLLUM INTERTEXTUM*: 1 & 2 – complete plants in flower with stolons and pseudobulbs $\times 4/5$; 3 – flower $\times 10$; 4 – perianth parts, from left to right: median sepal, petal, lateral sepal, lip $\times 10$; 5 – lip, viewed from above and below $\times 20$; 6 – column and lip, side view $\times 20$; 7 – column, front view $\times 20$; 8 – anther cap, viewed from above and below $\times 40$; 9 – pollinia, single and both together $\times 40$. 1, 3–9 from *Jongejan cult.* 6; 2 from *Waterman & McKeay* 814. (Reproduced with permission from *Orchid Monographs* 2: fig. 24, 1987.)

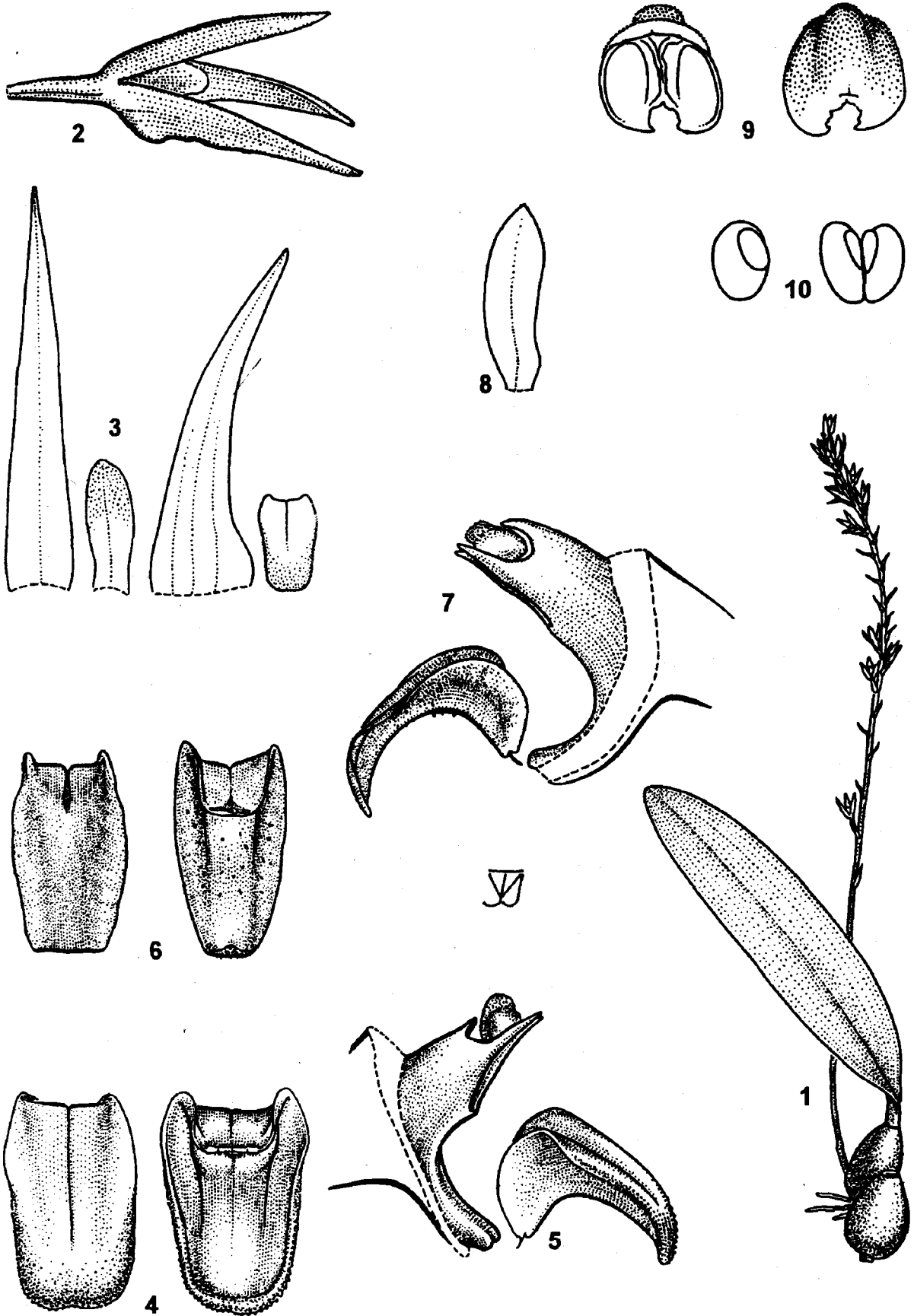


Figure 200.35 *BULBOPHYLLUM JOSEPHII*: 1 – complete plant in flower x 4/5; 2 – flower, side view x 6; 3 – perianth parts, from left to right: median sepal, petal, lateral sepal, lip x 10; 4 – lip, viewed from above and below x 35; 5 – column and lip, side view x 35; 6 – lip variation, viewed from above and below x 35; 7 – column and lip, lateral view x 35; 8 – petal x 10; 9 – anther, viewed from above and below x 40; 10 – pollinia, left: single pair, right: both pairs x 40. 1–3 from *Stolz* 638; 4 & 5 from *Cribb et al.* 11315; 6–8 from *Mann* 2124; 9 & 10 from *Schlieben* 3578. (Reproduced with permission from *Orchid Monographs* 2: fig. 33, 1987.)

3. *B. lupulinum* Lindl. (1862);

Phyllorchis lupulina (Lindl.) Kuntze (1891) – type: Cameroun, Mann 783 (K holo.).

Roots 0.5–1.7 mm in diameter. Rhizome 2–5 mm in diameter. Pseudobulbs 1–2-leaved, ovoid to narrowly ovoid or ellipsoid, 2.7–7.5 x 1.2–2.5 cm, slightly flattened, sharply 4-angled. Petiole 2–15 mm long. Leaf blade lanceolate to linear-lanceolate, 8–23 x 1.2–5 cm, obtuse, emarginate, oblique. Inflorescence 15–38 cm long, 28–68-flowered. Peduncle more or less erect, somewhat sturdy, 65–190 x 2.5–5 mm, orbicular in section, with fine dark hairs towards the tip. Rachis erect, slightly flattened, 4-angled in section, 5–23 cm long, edges more or less sharp, straight, entire, glabrous; surface with dots of fine dark hairs. Floral bracts recurved, triangular, 9.5–16 x 7–13 mm. Flowers distichous. Pedicel and ovary 1.3–2.2 mm long with fine dark hairs. Dorsal sepal broadly to narrowly triangular, 4–5.2 x 1.5–3 mm, acute. Lateral sepals free, slightly falcate, oblique, 3.8–5.2 x 1.5–2.9 mm. Petals slightly falcate, obovate-lanceolate to linear, oblique, 2.5–3.2 x 0.25–0.5 mm, tip obtuse; margins entire. Lip with a reflexed top part, more or less rectangular in outline (not spread), 1.5–2.4 x 0.8–1.7 mm. Column 1.8–2.6 mm long from the base of the free part up to the tip of the steldia; steldia deltoid, acute, 0.3–0.5 mm long; anther c 1 x 0.8 mm; pollinia 4, ellipsoid. Fig. 200.36.

Growing on branches in lowland, montane and semi-deciduous forest, also frequently found on rocks, even on exposed places such as rocky mountain slopes; 1050 m. KF; Guinea Bissau, Nigeria, Cameroun, Zaire and Zambia. *Fris* et al. 3901 (1050 m).

4. *B. scaberulum* (Rolfe) Bolus (1889);

Megacolinium scaberulum Rolfe (1888) – type: South Africa, Pondoland, *Tillett* (K holo.).

Medium-sized epiphytic herb with a stout creeping rhizome 2–3 mm in diameter. Pseudobulbs 2-leaved, ovoid, narrowly ovoid or ellipsoid, 4–5-angled, 2–5.5 x 0.8–1.3 cm, 2–10 cm apart on rhizome. Leaves suberect, leathery-fleshy, narrowly elliptic, rounded, 4.5–12.5 x 1–1.9 cm. Inflorescence erect, 5.5–24(–30) cm long, many-flowered; peduncle cylindrical, bearing several well-spaced loosely tubular sheaths along length; rachis fleshy, bilaterally flattened, more or less slightly curved, 3–8 mm broad, with a scabrid indumentum; bracts ovate-triangular, subacute, reflexed, 3–4 mm long, eccentrically placed on rachis. Flowers fleshy, scabrid, maroon, green or ochre, heavily marked with maroon. Dorsal sepal linear-lanceolate, acute or rounded, concave, 6–7 x 1.5 mm; lateral sepals falcate, ovate, acuminate, 4–5.5 x 2–3 mm, with a curved back apex. Petals falcate, linear, acute, 3–4 x 0.3–0.4 mm. Lip deflexed, ovate, rounded at apex, 2–2.5 x 1.8–2 mm; apical half fleshy, sulcate; basal sides thin-textured. Column 1.5 mm long; steldia shortly 2-lobed, subacute; anther-cap conical-hemispherical, with a low apical ridge.

Growing on branches of trees in riverine and mon-

tane forests; 1000–1800 m. WG KF; widespread in tropical and southern Africa. *de Wilde & de Wilde-Duyfjes* 8912; *Meyer* 8998; *Mooney* 6926.

21. *OECEOCLADES* Lindl. (1832)

Aeceoclades Duchartre (1849)

Eulophidium Pfitz. (1887)

Garay & Taylor, *Bot. Mus. Leaflet. Harv. Univ.* 24: 266–273 (1976).

Terrestrial, rarely epiphytic herbs. Pseudobulbs close together, usually more or less ovoid to fusiform, usually heteroblastic (with only 1 internode elongated, the remaining basal ones very short), apex 1–3-leaved, up to 15 x 3 cm, but often narrower. Leaves usually with duplicate vernation, leathery, folded together, often variegated, usually petiolate, the petiole articulate some distance above the base and sometimes above the middle, the line of articulation consisting of a number of irregular blunt or acute teeth or occasionally more or less regular. Inflorescences arising from the base of the pseudobulb, often exceeding the leaves, simply racemose or frequently paniculate; bracts inconspicuous, rarely with a basal extrafloral nectary. Flowers twisted through 180°, somewhat small, thin in texture. Sepals and petals free, variously spreading, similar, the petals usually slightly shorter and broader. Lip curved back, spurred, 3- or apparently 4-lobed; side-lobes erect; mid-lobe usually lobulate or emarginate; disc either with 2 more or less quadrate or triangular calli at the spur entrance or with 3 variously thickened, parallel ridges which together with the lateral nerves are sparsely but distinctly hirsute. Column erect, short, oblique at the base or with a short foot; anther hooded or with a crest; pollinia 2, ovoid or pyriform, on a short or rudimentary stipe; viscidium large; stigmata confluent; rostellum short.

A genus of some 31 species in tropical and South Africa, Madagascar and the Mascarene Islands with a single widespread species in tropical America; 2 species in the Flora area.

1. Plant 40–80 cm high; pseudobulbs caespitose; leaves 10–26 x 3–8 cm, petiole 6–7 cm long; inflorescence with extrafloral nectaries exuding viscid liquid; flowers greenish yellow.

1. *O. saundersiana*

– Plant 12–26 cm high; pseudobulbs superposed; leaves 6–11 x 2.5–4.5 cm; petiole 2–6 cm long; inflorescence without extrafloral nectaries, flowers mostly white with purple on lip.

2. *O. ugandae*

1. *O. saundersiana* (Rchb.f.) Garay & Taylor (1976); *Eulophia saundersiana* Rchb.f. (1866); *Graphorchis saundersiana* (Rchb.f.) Kuntze (1891); *Eulophidium saundersianum* (Rchb.f.) Summerh. (1957) – type: West Africa, without precise locality, *Mann*, cult. Saunders (W holo.).

Terrestrial herb 40–80 cm, glabrous except for the callus on the lip. Roots numerous, smooth, fleshy, white, 3–4

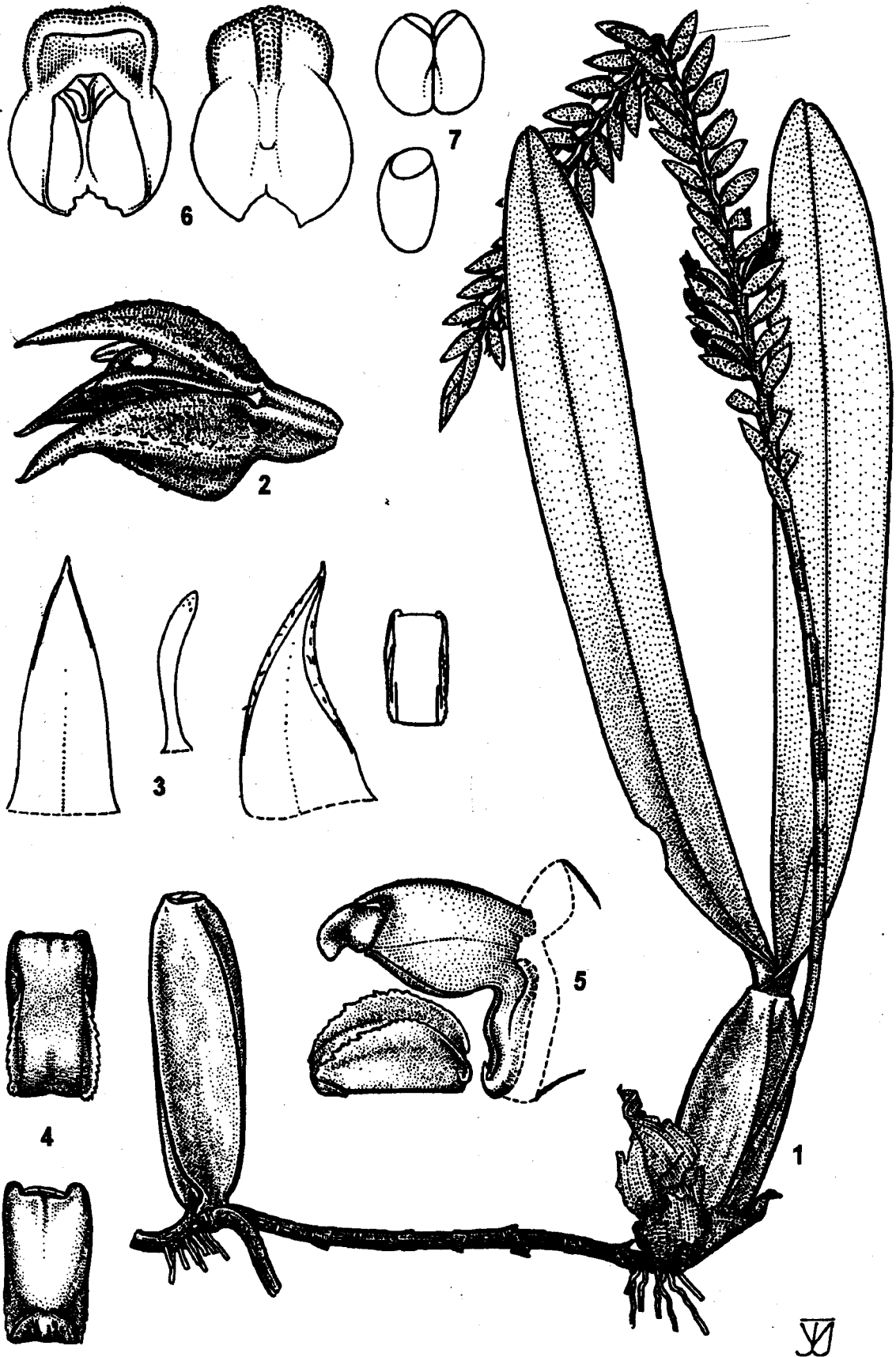


Figure 200.36 *BULBOPHYLLUM LUPULINUM*: 1 - complete plant in flower with stolon and pseudobulbs x 4/5; 2 - flower, side view x 8; 3 - perianth parts, from left to right: median sepal, petal, lateral sepal, lip x 8; 4 - lip, viewed from above and below x 12; 5 - column and lip, side view x 12; 6 - anther, viewed from above and below x 40; 7 - pollinia, above: both pairs, below: single pair x 40. 1-5 from *Hepper* 1923; 6 & 7 from *Ndi* 51. (Reproduced with permission from *Orchid Monographs* 2: fig. 86, 1987.)

mm wide. Pseudobulbs caespitose, narrowly ovoid to fusiform, very slightly compressed, obscurely sulcate, erect or spreading, 4–15 cm long, the widest part up to 2.5 cm wide, dark, slightly glossy green, 2- or occasionally 1-leaved, the base enclosed when young by 2 or 3 scarious, straw-coloured evanescent sheaths. Leaves narrowly elliptic or ovate-elliptic, sometimes oblique, acute or acuminate, margin gently undulate, obscurely nerved; blade spreading, 10–26 x 3–8 cm, slightly glossy dark green; petiole irregularly articulated, shorter than the blade, 6–17 cm long. Inflorescence erect, simple or with 1 or 2 short branches at the base, 16–30 x 4–5 cm, dense or lax, 15–28-flowered; bracts ovate-deltoid to narrowly ovate-elliptic, acute, 2–8 mm long, with a basal extrafloral nectary exuding copious viscid sweet liquid. Flowers porrect at first, becoming somewhat deflexed with age; sepals and petals pale greenish yellow with 3–5 vinous nerves; lip pale yellow or greenish cream with vinous nerves on the lobes, green towards the spur-entrance; calli creamy white; spur reddish brown; column green, anther yellow; pedicel and ovary slender, 12–18 mm long, reddish brown. Dorsal sepal narrowly oblong or oblong-obovate, obtuse or mucronate, 3-nerved, erect or somewhat reflexed, 8.5–14 x 3–5 mm. Lateral sepals narrowly oblong or oblong-obovate, obtuse or mucronate, 4-nerved, slightly concave distally, spreading, 9.7–14 x 3–5 mm. Petals ovate, obtuse, 5-nerved, curving forwards, 8–13 x 4.5–7 mm. Lip bent forwards from and articulated at the base, distinctly 3-lobed, mostly glabrous, 10–15 mm long; mid-lobe divided into 2 lobules, each oblong to oblong-orbicular, usually divaricate, longer than side-lobes, 8–12 x 7–14 mm; side-lobes more or less orbicular, not sack-like at the base, erect to spreading; disc proximally callose, papillose, sometimes with 3 or 4 low, longitudinal ridges distally; callus composed of 2 more or less parallel fleshy, glabrous keels, shortly pubescent at the spur-entrance and at the apex; spur cylindrical, obtuse, descending, 4–6 mm long. Column erect, oblong or ovoid, with a very short pubescent foot, 2.5–5 mm long, foot 1 mm long; anther ovate-oblong, papillose, 2 mm long. Fig. 200.37.

Damp shady places in forest and thickets; 1200–1300 m. KF; Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Uganda, Kenya, Tanzania, Zaire, Zambia and Angola. *Gilbert* K30; *Jansen* 5774; *Friis* et al. 3900.

2. *O. ugandae* (Rolfe) *Garay & Taylor* (1976);

Eulophia ugandae Rolfe (1913) – type: Uganda, Mengo District, Mabira Forest, *E. Brown* 443 (K holotype).

Terrestrial, occasionally epiphytic herb 12–26 cm high, glabrous except for the lip; roots smooth, fleshy, white, 3–5 mm broad. Stem climbing. Pseudobulbs superposed, more or less fusiform, attenuate towards apex, 75–110 x 5–8 mm, 2–3-leaved, enclosed when young by several scarious, straw-coloured, tubular ovate-elliptic, acute, evanescent sheaths. Leaves narrowly elliptic or

ovate-elliptic, acute; blade 6–11 x 2.5–4.5 cm, green; petiole irregularly articulated, shorter than the blade, 2–6 cm long. Inflorescence erect, paniculate, compact, 6–14 x 2–3 cm, many-flowered, lax or subdense; lowermost bracts ovate-elliptic to narrowly elliptic; uppermost linear-subulate, acute, 4–15 mm long. Flowers small; sepals and petals white, sometimes flushed green; lip white with a few purple nerves and a purple throat; column with a few purple flecks; pedicel and ovary 6–13 mm long. Dorsal sepal oblong, more or less acute, 3-nerved, 6.5–8.5 x 2 mm; lateral sepals oblong or narrowly oblanceolate, acute, slightly carinate at apex, 3-nerved, 7–9 x 2–2.5 mm. Petals oblong-elliptic, mucronate, 3-nerved, 6–7.8 x 1.5–2.3 mm. Lip not articulated at the base, distinctly 3-lobed, with very short hairs at the spur entrance and along the nerves, otherwise glabrous, 7–8 x 4.3–6.2 mm; mid-lobe truncate, emarginate or divided into 2 very short lobules, broadly obovate, somewhat undulate, 2.7–3 x 4 mm; side-lobes oblong, obtuse, not sack-like at the base; disc with 2 somewhat obscure, low, parallel keels, otherwise smooth; spur short, club-shaped, much dilated and globose at the apex, descending, 3–4 mm long. Column porrect or erect, oblong to club-shaped, 3–5.5 mm long, foot 1 mm long; anther ovate-oblong, papillose at apex, 1.3 mm long.

Montane forest; 1170–1200 m. KF; Ghana, Zaire and Uganda. *Gilbert* 3907; *Friis* et al. 3907.

22. *PTEROGLOSSASPIS* *Rchb.f.* (1878)

Terrestrial, sympodial herbs. Subterranean stem composed of a series of lobed fleshy tubers; aerial stem very short. Leaves 1–3, linear-lanceolate, long-petiolate, folded, enclosed in sheaths towards base, arising with flower stalk from the current year's growth. Flower stalk erect, covered with scarious, tubular sheaths. Inflorescence a several-flowered, short dense, rarely elongated and lax, terminal raceme; bracts usually conspicuous, long, narrow, rarely broad, scarious, often exceeding the flowers. Flowers twisted through 180° or not twisted, medium-sized. Sepals and petals similar, free, usually spreading, the petals usually shorter than the sepals. Lip sessile, 3-lobed, rarely entire, neither spurred, sack-like nor clawed, flat, never concave, mid-lobe larger than side-lobes, apex usually recurved, disc either entirely tuberculate or the nerves variously tuberculate, verruculose or lacerately keeled, median nerve of the side-lobes often raised and ridge-like at the base. Column very short, rarely elongated, broad, curved and 2 auricles at the base, the 2 auricles merging with the base of the lip, wings absent, foot absent or very rarely rudimentary, more or less horizontal; anther terminal, ovate, obtuse, apiculate, 1-locule; pollinia 2, subglobose, united on a short broad stipe; viscidium large, scale-like.

A genus of 7 species, 5 in tropical and subtropical Africa with 1 in the south-eastern USA and Cuba and another in Argentina and Brazil; 1 in the Flora area.

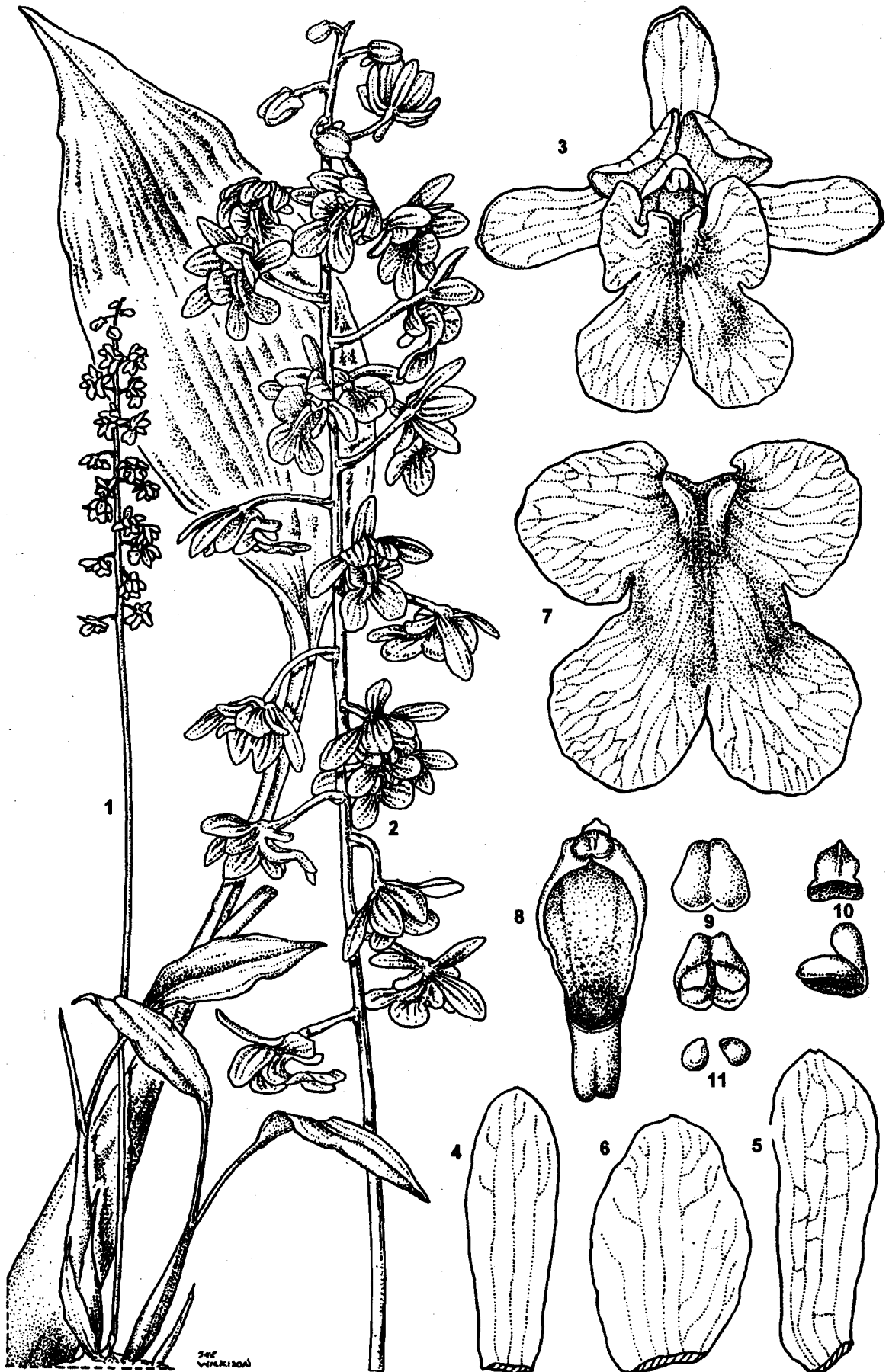


Figure 200.37 *OECEOCLADES SAUNDERSIANA*: 1 – plant in flower $\times 1\frac{1}{2}$; 2 – leafy shoot and inflorescence $\times 2\frac{1}{2}$; 3 – flower, front view $\times 2$; 4 – dorsal sepal $\times 3$; 5 – lateral sepal $\times 3$; 6 – petal $\times 3$; 7 – lip $\times 3$; 8 – column, ventral view $\times 3$; 9 – anther cap, viewed from below and above $\times 6$; 10 – stipes and viscidium, two views $\times 17$; 11 – pollinia $\times 6$. All from Kew spirit 18861-13. Drawn by Sue Wickison. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 90.)

Similar in habit to *Eulophia*, particularly to *E. albo-brunnea* Kraenzl., *E. shupangae* (Rchb.f.) Kraenzl. and allied species, which differ however, in having a spurred lip and column with a foot.

P. eustachya Rchb.f. (1878)

— type: TU/GD, without locality, *Schimper* 1235 (W holo., K iso.).

P. engleriana Kraenzl. (1894) — type: Tanzania, Moshi District, Marangu, *Volkens* 266 (B holo., K iso.).

Terrestrial herb 22–65 cm high, glabrous except for the lip. Leaves linear to linear-lanceolate, acute to acuminate, folded; petiole 12–18 cm long, enclosed in 1–3 greyish brown, tubular, obtuse to acute, scarious sheaths below; blade 26–40 x 1.5–2 cm. Inflorescence cylindrical or ovoid, many-flowered, dense; flower stalk erect, bearing 4–8 remote, greyish brown, tubular, obtuse to acute, scarious sheaths; rachis 2–8 cm long; bracts pale brown, lanceolate or linear-lanceolate, often finely acuminate, scarious, with prominent venation, lowermost 3–8 cm long, uppermost shorter. Flowers twisted through 180°, variable in colour; sepals and petals white, dull yellow, suffused maroon or entirely purple-maroon; mid-lobe of lip dark purple-maroon or deep crimson, side-lobes yellow or pale purple-red with darker purple-red veins; pedicel with ovary 1–2 cm long. Sepals and petals obtuse and mucronate to acute, carinate at the base. Sepals oblong to oblong-elliptic; dorsal 10–11 x 3.5–4 mm. Lateral sepals usually slightly oblique, 10 x 4–4.5 mm. Petals narrowly oblong-elliptic, 9–11 x 3.5–4 mm. Lip 3-lobed, 7–9 x 12–14 mm; mid-lobe broadly oblong-elliptic, oblong, obcordate or quadrate-elliptic, obtuse or retuse, very rarely subentire, 6–8.5 mm long, the disc bearing 3–7 tuberculate to lacerately-keeled veins, the veins and ridges of both disc and side-lobes sometimes very sparsely pilose; side-lobes broadly oblong, obtuse, often slightly curved, asymmetrical, divaricate, 5–6 mm long, median vein usually raised and ridge-like at the base. Column straight above, 1.5–3.5 x 1.5–3 mm; anther ovate, operculate, 1 x 1 mm. Fig. 200.38.

Wooded grassland, damp grassland, stream sides, short-grassed lava plains; 1650–2000 m. TU GD SU KF SD; Uganda, Kenya, Tanzania, Mozambique and Zimbabwe. *de Wilde* 5557; *Gilbert & Thulin* 593; *Schimper* 1235.

23. EULOPHIA Lindl. (1821), *nom. conserv.*

Lissochilus Lindl. (1821)

Cyrtopera Lindl. (1833)

Orthochilus A. Rich. (1850)

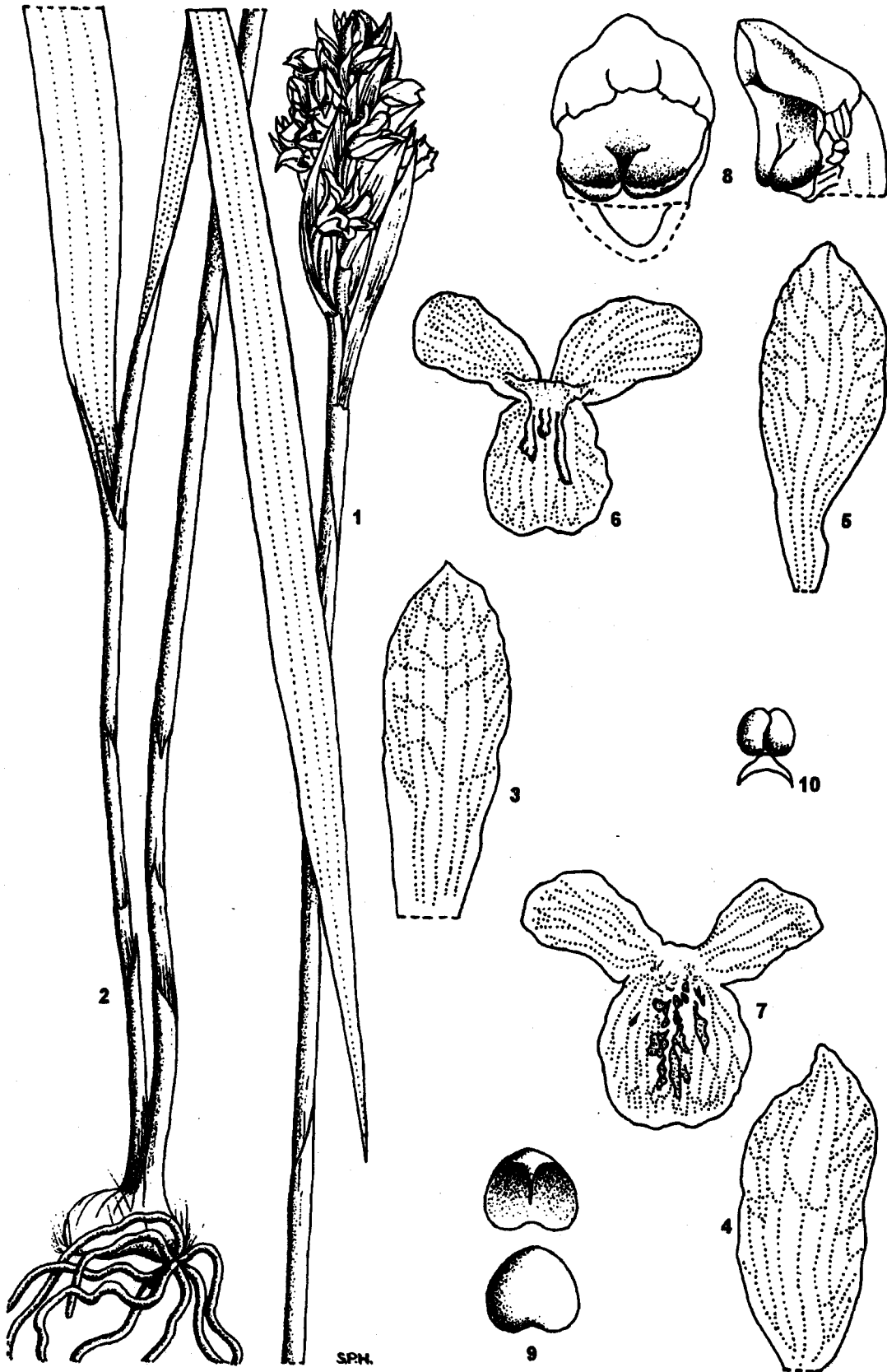
Hypodematium A. Rich. (1850)

Lindley, *Gen. Sp. Orch. Pl.*: 180–186 (1833); Reichenbach, H.G., *Walp., Ann. Bot. Syst.* 6: 644–645 (1863); *Otia Bot. Hamb.* 5: 66 (1878) & 6: 116 (1881); Hall, *S. Afr. Journ. Bot., Suppl.* 5: 1–248 (1965); Williamson, *Orch. Sc. Afr.*: 151–177 (1977); Stewart et al., *Wild Orch. S. Afr.*: 229–251 (1982).

Small, medium or large terrestrial or rarely lithophytic herbs; roots slender to stout, basal or adventitious, often with a well-defined velamen. Perennating organs stem-like, pseudobulbous or tuber-like, above the ground or more commonly underground, conical, cylindrical or irregular in shape, several-noded. Leaves usually present and green but in some species much reduced, scale-like and brown or buff; green leaves 1-many, thin-textured to fleshy or leathery, with or without prominent longitudinal veins, linear, lanceolate, ovate or elliptic, sheathing at the base; scale leaves when present sheathing. Inflorescences basal, laxly to subdensely many-flowered, usually racemose, rarely branching. Flowers small to large, sometimes showy and brightly coloured. Sepals and petals similar or with the petals much broader, free to base or with the lateral sepals fused at the base to the column-foot. Lip 3-lobed, usually spurred at the base, usually with a callus of ridges and/or papillae on upper surface. Column short to long, with or without a column-foot; anther-cap entire or 2-lobed at the apex; pollinia 2, subglobose; stipe solitary, triangular to oblong; viscidium oblong, elliptic or lunate.

A large genus of about 250 species widespread in tropical and southern Africa, Madagascar, the Mascarenes, tropical and subtropical Asia, SE Asia, Australasia and the tropical Americas; 18 species confirmed as occurring in the Flora area and 1 species recorded in the literature but not confirmed for this account.

1. Pseudobulbs conspicuous, above ground, leafy, covered by leaf-bases or bare. 2
 - Pseudobulbs absent; perennating organs underground, tuberous. 5
2. Pseudobulbs not covered by leaf sheaths, green turning yellow or orange with age, 2–3-leafed; leaves fleshy and leathery, tapering from base to apex, serrate; inflorescence often branching; sepals and petals recurved strongly towards apex. 3. *E. petersii*
 - Pseudobulbs covered in leaf sheaths in first season; leaves folded, linear or lanceolate, not serrate; inflorescence unbranched; sepals and petals not recurved in apical part. 3
3. Petals yellow; sepals much smaller than the petals; lip yellow marked with red venation on side-lobes, mid-lobe folded back on itself; spur 2–3.5 mm long. 4. *E. streptopetala*
 - Petals green, white, pink or rose-coloured; sepals as long as petals albeit narrower; lip white or rose-coloured, mid-lobe flat or concave; spur 5–20 mm long. 4
4. Spur 15–20 mm long, straight and parallel with ovary; lip obscurely 3-lobed. 2. *E. guineensis*
 - Spur 5–7 mm long, club-shaped; lip markedly 3-lobed. 1. *E. euglossa*
5. Lip virtually lacking a spur or sack-like base. 17. *E. albobrunnea*
 - Lip with a spur or sack-like base; column with a short foot. 6



SPH.

Figure 200.38 *PTEROGLOSSASPIS EUSTACHYA*: 1 - inflorescence x 1; 2 - lower part of plant with tuber, roots and leaves x 1; 3 - dorsal sepal x 9; 4 - lateral sepal x 9; 5 - petal x 9; 6 & 7 - lip x 6; 8 - column, side and front views x 9; 9 - anther-cap, viewed from below and above x 9; 10 - pollinarium x 9. 1 & 2 from *Bullock* 3685; 3-5 from *Gilbert & Thulin* 5906; 6 from *Bally* 6208; 7 from *Drake-Brockmann* 209; 8 from *Schimper* 1935; 9 & 10 from *Pollock* 17. Drawn by Susan Hillier. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig. 110.)

6. Base of lip distinctly sack-like; callus on lip with 2 quadrate erect lamellae in centre. 7
 - Base of lip more or less spurred; calli on lip not quadrate. 8
7. Lip 18-34 x 20-40 mm; petals elliptic or obovate, 10-21 mm wide. 9. *E. cucullata*
 - Lip 14-19 x 8-12 mm; petals oblong-ligulate, 3-5 mm wide. 5. *E. alta*
8. Petals elliptic to subcircular, less than twice as long as broad. 9
 - Petals not as above, more than twice as long as broad. 16
9. Flowers very small; sepals and petals 5-8 mm long. 15. *E. pyrophila*
 - Flowers larger; sepals and petals 9 mm long or more. 10
10. Lip mid-lobe flat or concave; petals 19-35 x 10-18 mm long, rich rose-purple; lip 20-40 mm long. 15
 - Lip mid-lobe folded back on itself, convex; petals not as above. 11
11. Flowers with a yellow lip, sometimes more or less strongly marked with red; spur often obscure. 12
 - Flowers with white or rose-coloured sepals and petals and a purple or pink lip; spur obvious. 14
12. Flowers yellow, sometimes with red venation on side-lobes of lip. 12. *E. speciosa*
 - Flowers yellow and red, the petals strongly marked with red on inner side. 13
13. Spur 13-16 mm long, pendent, narrowly conical. 13. *E. orthoplectra*
 - Spur short, slightly upcurved, 8-9 mm long. 14. *E. schweinfurthii*
13. Lip mid-lobe with crested-papillose raised ridges. 10. *E. cristata*
 - Lip with smooth ridges. 11. *E. livingstoniana*
15. Sepals spatulate, yellow or maroon; petals and lip yellow; callus in basal part of lip, of 5 papillate ridges in front. 8. *E. angolensis*
 - Sepals obovate or obliquely obovate; petals and lip purple; callus in centre of lip, comprising 3 raised lamellae. 7. *E. horsfallii*
16. Lip lacking papillae or hairs on mid-lobe; sepals, petals and lip pale yellow. 16. *E. abyssinica*
 - Lip papillate on mid-lobe. 17
17. Sepals and petals yellow; lip yellow with red papillae; peduncle covered by papery sheaths. 18. *E. odontoglossa*
 - Sepals and petals green, sometimes mottled with brown or reddish; lip white or greenish, often marked with purple; peduncle bearing well spaced green sheaths. 18
18. Sepals and petals 16-23 mm long; lip 14-15 mm long. 6. *E. stachyodes*
 - Sepals and petals 8-12 mm long; lip 7.5-10 mm long. 19. *E. clavicornis* var. *nutans*

1. *E. euglossa* (*Rchb.f.*) *Rchb.f.* (1866);
Galeandra euglossa *Rchb.f.* (1852) - type: Sierra Leone, cult. van Hees (W holo.).

Terrestrial herb 60-150 cm high. Perennating organs above ground, pseudobulbous, cylindrical-conical, swollen at base, 5-10-noded, 16-25 x 1-1.5 cm; roots basal, 3 mm in diameter, white. Leaves 5-10, folded, ovate to lanceolate, acuminate, 16-42 x 2.5-5.5 cm, petiolate, lower most sheathing. Inflorescence laxly many-flowered; peduncle stout, 10-12 mm in diameter, bearing several bracts, lower most sheathing, upper ones lanceolate; rachis 10-38 cm long; bracts spreading, lanceolate, acuminate, 15-36 mm long. Flowers not opening widely; sepals green with a brownish apex; petals similar; lip white with a pink or purple band across base of mid-lobe and a greenish spur; pedicel and ovary 17-21 mm long. Dorsal sepal lanceolate, acuminate, 20-24 x 3 mm; lateral sepals similar, 18-24 x 3 mm. Petals lanceolate, acuminate, 15-18 x 3 mm. Lip 3-lobed, 13-14 x 7.5-9 mm; side-lobes narrow, subacute; mid-lobe elliptic, obtuse to acute, 8 x 6.5 mm, margins undulate; callus of 2-3 obscure ridges in basal half of mid-lobe; spur club-shaped, 5-7 mm long, pointing backwards and slightly curved back. Column 5 mm long, papillose at base of foot 1 mm long. Fruit pendent, 23-30 mm long.

In E Africa, found in dense forest on red-brown sandy loam over ironstone, also in secondary forest; 1200-1300 m. Uganda, Sierra Leone, Liberia, Ivory Coast, Nigeria, Cameroun and Gabon.

Listed as occurring in Ethiopia in *Fl. Trop. E. Afr.* but no Ethiopian specimens seen during the preparation of this account.

2. *E. guineensis* *Lindl.* (1823);
E. quartiniana A. Rich. (1850) - type: TU, *Quartin-Dillon* s.n. (P holo.).

Terrestrial or lithophytic herb 30-65 cm high. Perennating organs above ground, pseudobulbous, conical, proximate, 3-3.5 x 1.5-2 cm; roots from base of pseudobulbs, 4-6 mm in diameter. Leaves 3-4, folded, suberect, elliptic, acute, 10-35 x 3-9.5 cm, shortly petiolate, articulated to the leaf-base. Inflorescence laxly 5- to many-flowered, opening before or with leaves; peduncle 4-9 mm in diameter, bearing up to 7 papery sheaths in lower half; rachis 7-29 cm long; bracts suberect, papery, lanceolate, acuminate, 10-30 x 2-4 mm. Flowers subnutant, showy; sepals and petals purplish brown; lip pinkish purple with a paler or white base and spur; pedicel and ovary 13-25 mm long. Dorsal sepal reflexed, linear-lanceolate, acuminate, 16-26 x 3-4.5 mm; lateral sepals similar. Petals linear-lanceolate, acuminate, 15-20 x 4-5 mm. Lip obscurely 3-lobed at base, obovate, obtuse, 20-35 x 13-32 mm; mid-lobe 20-26 x 17-32 mm; callus absent or basal veins only slightly thickened; spur straight, tapering from a broad mouth, very slender at apex, 15-25 mm long. Column 5-7 x 4-5 mm; foot absent. Fruit pendent, 2-2.5 cm long, with a persistent column.

Shade or semi-shade amongst rocks, in scrub and in woodland; 550-2000 m. TU GJ SU WG IL KF GG SD BA; tropical Africa from Sierra Leone across to

Uganda, Kenya, Tanzania, and south to Malawi and Zambia, also in N Yemen and Oman. *Friis* et al. 2601; *Miles* 93; *Smeds* 1240.

3. *E. petersii* Rchb.f. (1865)

Galeandra petersii Rchb.f. (1847) – type: Mozambique, *Peters* s.n. (W holo.).

Eulophia schimperiana A. Rich. (1850) – type: Ethiopia, without locality, *Schimper* 1592 (P holo., G W iso.).

E. baginsensis Rchb.f. (1878) – type: Sudan, Niamniam, *Schweinfurth* 24 (W holo., K iso.).

E. coleae Rolfe (1897) – type: Somalia, Golis range, *Woob, Cole* s.n. (K holo.).

E. phillipsiae Rolfe (1897) – type: Somalia, Golis range, *Woob, Lort Phillips* s.n. (K holo.).

Large terrestrial herb, 1–3.5 m high. Perennating organs pseudobulbous, conical, 6–23 x 1.4–4 cm, 4–6-noded, green turning yellow, covered with 5 papery sheaths when young; roots stout, 5 mm in diameter, white. Leaves 2–3(–4), erect or suberect, fleshy-leathery, somewhat folded together, linear-ligulate, acute, 14–80 x 1.4–6 cm, serrate on margins. Inflorescence 3–7-branched, laxly many-flowered; branches to 35 cm long; peduncle stout, up to 90 x 1–1.4 cm, with 4 well-spaced bracts; bracts lanceolate, acuminate, 5–16 x 4–5 mm. Flowers fleshy; sepals olive-green flushed or striped maroon; lip white, veined red or purple; pedicel and ovary 20–26 mm long. Dorsal sepal, erect, oblanceolate, acuminate or apiculate, 17–23 x 4–5 mm, recurved at apex; lateral sepals similar, 18–24 x 5–7 mm. Petals oblanceolate or oblong, shortly apiculate, recurved at apex, 16–18 mm long. Lip 3-lobed, 14–20 x 8–15 mm; side-lobes elliptic; mid-lobe circular to subquadrate, emarginate or obtuse, 4 x 6 mm; callus of 3 fleshy ridges, raised and irregularly toothed on the mid-lobe; spur incurved, cylindrical to club-shaped, 4–6 mm long. Column 8–9 mm long; foot 1–2 mm long. Fruit pendent, ellipsoidal, 40–46 mm long. Fig. 200.1.1 & 2.

In sandy soil by the sea, in rocky places and on volcanic rocks in *Acacia* – *Commiphora*, *Grewia* and other thickets and bushland; sea-level to 1800 m. EE GD SU SD HA; Uganda, Kenya, Tanzania, Zanzibar, Zaire, Sudan south to South Africa and also in Arabia. *Ash* 1502; *Sue Edwards* et al. 3819; *Jensen* 6465.

4. *E. streptopetala* Lindl. (1826);

Lissochilus streptopetalus (Lindl.) Lindl. (1833) – type: cult. *Colvill* (K holo.).

L. rueppelii Rchb.f. (1847); *Eulophia rueppelii* (Rchb.f.) Summerh. (1953) – type: TU, between Halei and Temben, *Rueppel* s.n. (W holo.).

Hypodematium abyssinicum A. Rich. (1851); *Lissochilus abyssinicus* (A. Rich.) Th. Dur. & Schinz (1895) – type: TU, Ouodgerate, *Petit* s.n. (P holo.).

L. erythraeae Rolfe (1897) – types: EW, *Schweinfurth* & *Riva* 1833 (K syn.) & *Schweinfurth* 168 (K syn.).

var. *streptopetala*

Terrestrial herb 0.5–1.5 m high. Perennating organs pseudobulbous, clustered, conical to cylindrical-fusiform, 2.5–10 x 1.7–2.5 cm, covered in first year by leaf-bases; roots 4–6 mm in diameter, white. Leaves 4–9, arranged as in a fan, suberect, lanceolate, acuminate, 40–65 x 0.4–8 cm. Inflorescence laxly flowered; peduncle 9 mm in diameter with 5–11 sheaths along length; rachis 15–35 cm long; bracts lanceolate or ovate, acuminate, 7–20 x 5–8 mm. Flowers spreading; sepals green or dull yellow veined and mottled with brown; petals yellow; lip darker yellow with reddish purple side-lobes and a pale purple spur; column white; pedicel and ovary 15–22 mm long. Dorsal sepal oblanceolate to elliptic, acute or obtuse, 8–18 x 3–9.5 mm; lateral sepals similar but longer. Petals elliptic, circular or obovate, obtuse, 8–21 x 6–17 mm. Lip difficult to flatten, 3-lobed, 8–12 x 7.5–11 mm; side-lobes erect, rounded; mid-lobe folded, obovate or elliptic, 7.5–12 mm long; callus of 3–5 low fleshy rugulose ridges on mid-lobe; spur conical, tapering to apex, 2–3.5 mm long, pointing backwards. Column 5–8 mm long. Fruit pendent, oblong-ellipsoidal, 35–50 mm.

Rocky limestone slopes with scattered shrubs, mixed shrubby slopes, along creeks with *Juniperus* and *Eucalyptus*; 1700–2600 m. TU WU SU WG SD HA; throughout tropical and southern Africa, also in SW Arabia. *Ash* 227; *Burger* 1678; *Gilbert & Mesfin* 6715.

Var. *stenophylla* (Summerh.) Cribb in *Fl. Trop. E. Afr.* 2: 471 (1989) occurs in Kenya.

5. *E. alta* (L.) Fawcett & Rendle (1910);

Limodorum altum L., *Syst. Nat.*, ed. 12, 2: 594 (1767) – type: based on Plumier's *Limodorum foliis nervosis lanceolatis*, etc. in *Burm., Pl. Amer.*, t.189 (1758).

Large terrestrial herb 1–2 m high with white roots 1.5 cm in diameter. Perennating organ a fleshy elongate subterranean rhizome 1 cm in diameter. Leaves 4, folded, erect, lanceolate, acuminate, up to 120 x 5–7.5 cm, long-petiolate, sheathing at base. Inflorescence densely many-flowered; peduncle 8–10 mm in diameter, green, bearing 3 sheaths along length; rachis 16–35 cm long; bracts reflexed, linear-aristate, acuminate, 10–30(–80) mm long. Flower not opening widely; sepals olive-green or green; lip and petals red-purple (albino variants are rare); pedicel and ovary 15–23 mm long. Dorsal sepal oblong-lanceolate, subacute, 18–20 x 4–5 mm; lateral sepals oblong or ligulate, subacute to acute, 18–22 x 4–6.5 mm. Petals oblong-ligulate, acute to obtuse, 15–19 x 3–5 mm. Lip 3-lobed in apical half, sack-like at base, 14–19 x 8–12 mm; side-lobes rounded; mid-lobe semicircular, 5–6 x 8 mm, with an undulate margin; callus of 2 obliquely subquadrate flap-like ridges in middle of lip and with papillae on the central 5 veins of the mid-lobe. Column 7–10 mm long; foot 4 mm long. Fruit pendent, 30 mm long.

Papyrus and other swamps and in wet grassland; 1150–1300 m (in E Africa). KF; Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Central African Republic, Sudan, Zaire, Uganda, Angola, Zambia and Zimbabwe, also in tropical America. Rankin 169

6. *E. stachyodes* Rchb.f. (1878)

– type: Sudan, Niamniam, *Schweinfurth* 3554 (W holo., K iso.).

E. variopicta Chiov. (1911) – type: GD/GJ, Amhara, *Chioyenda* 692 (FI holo.).

Terrestrial herb 30–80 cm high. Perennating organs underground, tuberous, ellipsoidal or cylindrical, 3–4.6 x 1 cm; roots 1.5–2 mm in diameter, emerging all over tuber, white. Leaves 4–5, suberect, folded, lanceolate or oblanceolate, acuminate, 17–100 x 3–8.5 cm, long-petiolate, basal 1–2 sheathing. Inflorescence produced with the leaves, densely many-flowered; peduncle 3–5 mm in diameter; rachis 6–26 cm long; bracts linear-lanceolate, acuminate, 10–55 mm long. Flowers spreading; sepals dull greenish, bronze or greenish red; petals white, lip green with a purple callus; spur green flushed with purple; pedicel and ovary 15–16 mm long. Dorsal sepal narrowly oblong, obtuse to acute, 18–23 x 2.5–4.5 mm; lateral sepals similar. Petals elliptic-oblong, obtuse, 16–18 x 6.5–8 mm. Lip 3-lobed, 14–15 x 9 mm; side-lobes broadly oblong, rounded in front; mid-lobe oblong, obtuse, 6 x 4.5 mm, undulate on margin; callus of 3 ridges with 3–5 rows of short papillae on mid-lobe; spur incurved, conical-cylindrical, 4 mm long. Column 6.5–7 mm long. Fruit pendent, 20–25 mm long.

Grassland, bushland and woodland on damp black soils; 950–2100 m. GD/GJ SD KF; Uganda, Kenya, Tanzania, Nigeria to Sudan and south to Zimbabwe. *Chioyenda* 692; *de Wilde* 5399; *Hildebrandt* 124.

7. *E. horsfallii* (Batem.) Summerh. (1936);

Lissochilus horsfallii Batem. (1865) – type: Nigeria, Old Calabar R., cult. J.B. Horsfall, coll. *Cheetham* s.n. (K holo.).

L. roseus Lindl. (1843) – type: Sierra Leone, cult. *Rucker* s.n. (K holo.).

L. porphyroglossus Rchb.f. (1878) – type: Sudan, Niamniam, *Schweinfurth* 22 (W holo.).

Large terrestrial herb 1.2–3 m high. Perennating organ subterranean, rhizomatous, fleshy, 4–6 or more cm long, 2–3 cm in diameter; roots elongate, 4–5 mm in diameter, white. Leaves suberect, 3–5, erect, lanceolate to oblanceolate, acuminate, 30–140 x 1.6–15.5 cm, long-petiolate. Inflorescence erect, laxly 5–50-flowered; peduncle stout, up to 3.5 cm in diameter at base, bearing 5 tubular sheaths along length; rachis 16–37 cm long; bracts elliptic or obovate, obtuse to acuminate, 19–35 x 10–18 mm. Flowers large, fleshy; sepals dull purple or brown; petals rose-purple; lip side-lobes green striped with dull purple, mid-lobe purple; callus yellow; column and ovary purple; pedicel and ovary 30–40 mm long. Dorsal sepal reflexed, oblanceolate, acuminate,

17–26 x 7–8 mm; lateral sepals oblique at base but similar, 17–27 x 7–8 mm. Petals covering column, elliptic, obtuse, 19–35 x 15–24 mm. Lip 3-lobed, 20–40 x 14–40 mm; side-lobes erect, semicircular; mid-lobe elliptic-oblong, obtuse with undulate margins; callus in basal two-thirds of lip with 3 crests, raised at base, undulate and lower in front; spur conical, 4–8 mm long, slightly retrorse. Column club-shaped, 10 mm long. Fruit pendent, ellipsoidal, 30–65 mm.

Swampland; 1530 m. KF; throughout tropical Africa and south to South Africa. Rankin 167.

8. *E. angolensis* (Rchb.f.) Summerh. (1958);

Cymbidium angolense Rchb.f. (1865); *Lissochilus angolensis* (Rchb.f.) Rchb.f. (1878) – type: Angola, Huilla, *Welwitsch* 734 (W holo., G Y iso.).

Lissochilus paludicolus Rchb.f. (1878) – type: Sudan, Niamniam, *Schweinfurth* 3983 (W holo.).

L. validus Rendle var. *minor* Rendle in *J. Bot.* 33: 197 (1895) – type: Uganda, Kampala, *Scott-Elliot* 7305 (BM holo.).

L. ugandae Rolfe (1905) – type: Uganda, Entebbe, *Mahon* s.n. (K holo.).

Terrestrial herb 0.6–2.1 m high. Perennating organs fleshy, subterranean, rhizomatous, stout, cylindrical, many-noded, branching, 1–5 cm in diameter, with white, 2 mm in diameter roots emerging all over surface. Leaves 2–4, folded, erect, linear-lanceolate, acuminate, 50–130 x 0.7–4.3 cm. Inflorescence laxly many-flowered, rarely 1-branched; peduncle stout, 1–2 cm in diameter, bearing 5 acute to acuminate sheaths; rachis 16–40 cm long; bracts ovate, lanceolate or oblanceolate, 1–2.5 cm long. Flowers spreading or sub-nutant; sepals purple-brown or yellow; petals and lip yellow; pedicel and ovary 14–21 mm long. Dorsal sepal erect or reflexed, ligulate-spathulate, obtuse, concave towards apex, 16–27 x 5.3–7.5 mm; lateral sepals similar but suberect or reflexed, 16–25 x 5.3–7.5 mm. Petals parallel to and covering column, elliptic, rounded at apex, 16–25.5 x 9.5–13.8 mm, 3-lobed, sack-like at base, 16–25 x 10–16 mm; side-lobes elliptic, rounded; mid-lobe oblong or obovate, obtuse or rounded, undulate on margin; callus of 3 long crenulate ridges, flexible/zig-zag in front. Column 10–11 mm long; foot 3–4 mm long; anther-cap 2-horned at apex. Fruit pendent 3–4.5 cm long.

Marshy grassland; 1800–2000m. KF; throughout tropical Africa. *de Wilde* 5415; *de Wilde & de Wilde-Duyfjes* 6937 & 7736.

9. *E. cucullata* (Sw.) Steud. (1840);

Limodorum cucullatum Sw. (1800) – type: West Africa, without exact locality, *Afzelius* s.n. (UPS holo.).

Terrestrial herb 40–130 cm high. Perennating organs irregularly fusiform-conical potato-like tubers, 4–5.5 x 2–3 cm; roots emerging all over tuber and at base of new growth, 1–2.5 mm in diameter, white. Leaves 3–4, folded, erect, linear, acuminate, 20–70 x 0.4–1.7 cm;

leaf-sheath purple-veined. Inflorescence produced before or with young leaves, laxly 3–8-flowered; peduncle stout, 3–12 mm in diameter, bearing 3 tubular acute sheaths in lower part; rachis 6–25 cm long; bracts spreading, linear, acuminate, 35–55 mm long. Flowers showy, variable in size; sepals maroon, brown or ochre; petals rose-purple; lip rose-purple with a white to cream throat speckled and streaked with purple, side-lobes greenish striped with brown; pedicel and ovary 8–25 mm long. Dorsal sepal erect or reflexed, lanceolate, acuminate, 14–24 x 3–8 mm; lateral sepals erect or reflexed, obliquely lanceolate, acuminate, 14–25 x 3–10 mm. Petals parallel to column, elliptic or obovate, rounded, 15–24 x 10–21 mm. Lip 3-lobed, sack-like, 18–34 x 20–40 mm; side-lobes erect, rounded; mid-lobe occasionally clawed, transversely oblong, emarginate, 11–12 x 16–22 mm; callus of 2 parallel quadrate ridges at base of mid-lobe. Column white, 13–15 mm long; foot 1 mm long. Fruit pendent, 20 mm long.

Combretum – *Terminalia* woodland and grassland, sandy soil; 1500–2000 m. WG IL KF HA; throughout tropical and southern Africa, also in Madagascar. *de Wilde* 6864 & 7195; *Gilbert* 1998.

10. *E. cristata* (Sw.) Steud. (1840);

Limodorum cristatum Sw. (1805) – type: Sierra Leone, *Afzelius* s.n. (S holo.).

Terrestrial herb 60–130 cm high. Perennating organs underground, tuberous, potato-like, cylindric-ellipsoidal, 3–9 x 1.3–4 cm, whitish, in chains; roots 2 mm in diameter, white, produced all over tubers. Leaves 4–6, erect, folded, lanceolate, acuminate, 40–70 x 0.7–3.5 cm, petiolate, basal 1–3 sheathing. Inflorescence appearing before leaves, laxly 10–30-flowered; peduncle 3–8 mm in diameter, with 3–5 sheaths along length; rachis 13–44 cm long; bracts aristate, acuminate, 10–30 mm long. Flowers with lilac sepals and petals, a dark purple lip and greenish column; pedicel and ovary 15–27 mm long. Dorsal sepal oblanceolate to narrowly elliptic, acute, 14–23 x 3–5.5 mm; lateral sepals similar but slightly larger and oblique at base. Petals elliptic, obtuse, 12.5–19 x 6.5–9.5 mm. Lip 3-lobed, 12.5–22 x 10–13.5 mm; side-lobes erect, semicircular, recurved; mid-lobe deflexed, somewhat convex, elliptic, obtuse, crisped on margin; callus of 2 raised rounded ridges at base with 5–9 crenulate ridges in front on mid-lobe; spur slightly upcurved, conical, 2.5–5 mm long. Column 7–7.5 mm long; foot 1 mm long. Fruit pendent, 30 mm long.

Seasonally burnt grassland, *Commiphora* – *Albizia* and *Entada* – *Acacia* bushland and woodland; 700–1850 m. WG IL KF; Senegal and Gambia across to Sudan and Uganda. *Erskine* s.n.; *Mooney* 6800 & 7757.

11. *E. livingstoniana* (Rchb.f.) Summerh. (1948);

Lissochilus livingstonianus Rchb.f. (1881) – types: Malawi, Manganja Hills, Margomero, *Meller* (W syn., K isosyn.) & Manganja Hills, *Waller* s.n. (W syn., K isosyn.).

L. fallax Rchb.f. (1881) – type: Kenya, Mombasa, *Hildebrandt* 1951 (W holo.).

L. mediocris Rendle (1895) – type: Kenya, Central Kavirondo District, Samia, *Scott Elliot* 7128 (BM holo., K iso.).

L. cornigerus Rendle (1895) – type: Uganda, E. side of Lake Albert Edward Nyanza, Kahimbe, *Scott Elliot* 8031 (BM holo., K iso.).

Terrestrial herb 50–100 cm high. Perennating organs underground, tuberous, irregularly cylindrical, horizontal, branching occasionally, 5–9.5 x 1.1–2.5 cm; rhizome short, up to 1 cm in diameter; roots scattered along tuber, 1.5 mm in diameter, white. Leaves 3–6, linear, acute, 10–40 x 5–17 mm, lowermost 1–2 sheathing. Inflorescence produced before leaves develop, laxly few to many-flowered; peduncle 37–75 cm long, with 2–3 sheaths in lower half, rachis 10–26 cm long; bracts spreading, linear-lanceolate, acuminate, lowest 17–19 mm long. Flowers with pale to darker lilac sepals and petals; lip purple with darker callus ridges and green or yellowish side-lobes flushed and edged with pink; pedicel and ovary 22–30 mm long. Dorsal sepal reflexed, lanceolate or oblanceolate, acute or obtuse, 15–20 x 4–5 mm; lateral sepals similar but slightly wider. Petals erect, elliptic-obovate, obtuse, 14–20 x 8–9 mm. Lip 3-lobed, 12–17 mm long; side-lobes erect, rounded; mid-lobe bent back on itself, upcurved towards apex, elliptic, obtuse, 8–12 mm long; callus of 5 low ridges to apex of mid-lobe; spur narrowly conical, 3–7 mm long, slightly upcurved at apex. Column club-shaped, 7–9 mm long, purple or pink. Fruit pendent, 18–20 mm long.

Alluvial soil by rivers; 1200 m. ?SU; widespread in tropical East and South-central Africa from Sudan south to Botswana, also in Madagascar. *Smeds* 928.

12. *E. speciosa* (Lindl.) Bolus (1889);

Lissochilus speciosus Lindl. (1821) – type: South Africa, cult *Griffin* (K holo.).

Lissochilus graniticus Rchb.f. (1881); *E. granitica* (Rchb.f.) Summerh. (1975) – type: EE, Habab, *Hildebrandt* 382 (W holo.).

Terrestrial herb 60–120 cm high. Perennating organs underground, tuberous, irregularly conical, 4–6 x 2.5–4 cm, orange, separated by a stout rhizome up to 7 mm in diameter and 2 cm long; roots 2–3 mm in diameter, white. Leaves fleshy, not folded, 3–6 arranged as in a fan, 30–65 x 0.6–2.2 cm, basal one sheathing. Inflorescence produced before the leaves, laxly many-flowered; peduncle stout, purplish, bearing 4–5 sheaths mostly near base, upper most lanceolate; rachis 11–29 cm long; bracts lanceolate, acuminate, 4–14 mm long. Flowers variable in size; sepals greenish; petals yellow; lip yellow with red veins on side-lobes; column pale greenish; pedicel and ovary 12–19 mm long. Dorsal sepal reflexed, elliptic, apiculate, 5–11 x 2–4 mm; lateral sepals similar. Petals spreading, elliptic-ovate, obtuse, 11–18 x 8–15 mm. Lip difficult to flatten, 3-lobed, 12–16 x 10–14 mm; side-lobes erect but reflexed above, obscurely rounded; mid-lobe convex, elliptic, subacute, 10–13 x 8–12 mm; callus of 3–5 low fleshy rugulose

ridges on mid-lobe; spur shortly conical, 1–3 mm long. Column 4–6 mm long. Fruit pendent, 3.5 cm long.

Grassland, deciduous bushland and woodland, in shade of *Euphorbia* species; sea-level to 2000 m. EE SU GG SD HA; Uganda, Kenya, Tanzania, Zanzibar, SW. Arabia, Sudan south to Zimbabwe and South Africa. *de Wilde* 6488; *de Wilde & Gilbert* 424; *Gilbert* 3389.

13. *E. orthoplectra* (*Rchb.f.*) *Summerh.* (1939);

Lissochilus orthoplectrus *Rchb.f.* (1878) – type: Sudan, Niamniam, *Schweinfurth* 3270 (W holo.).

Terrestrial herb 60–100 cm high. Perennating organs underground, tuberous, irregularly ovoid-fusiform, flattened dorso-ventrally, 3.5–6 x 2–5 cm, up to 1 cm apart on short rhizome; roots 3 mm in diameter, white. Leaves 2–4, fleshy, linear, acute, 18–50 x 0.7–2 cm. Inflorescence laxly 6–20-flowered, produced before leaves; peduncle with 4–6 sheaths, 2–3 basal ones sheathing, upper lanceolate, spreading; rachis 9–20 cm long; bracts linear-lanceolate, acuminate, 8–12 mm long. Flowers with red-brown sepals; petals yellow, red-brown within and red-veined; lip yellow with red-veined side-lobes and a brown spur; pedicel and ovary 10–13 mm long. Dorsal sepal reflexed, oblanceolate, apiculate, 8.5–12.5 x 3.8–6.3 mm; lateral sepals similar. Petals elliptic-subcircular or elliptic-ovate, apiculate, 12–17.5 x 13–19 mm. Lip 3-lobed, difficult to flatten, 11–15 mm long; side-lobes erect, rounded; mid-lobe convex, elliptic-obovate, obtuse or apiculate; callus of 5 fleshy rugulose ridges; spur deflexed or straight, conical-cylindrical with a broad mouth, 13–16 mm long. Column 7–8 mm long. Fruit pendent.

Grassland, wooded grassland, swamp and *Combretum* – *Terminalia* woodland; 1100–2100 m. SD; Nigeria and Cameroun to Sudan, Zaire, Rwanda, Uganda, Kenya, Tanzania, Malawi, Zambia, Mozambique and Zimbabwe. *de Wilde* 6630; *Burger* 3803 & 3757.

14. *E. schweinfurthii* *Kraenzl.* (1893)

– type: Sudan, Bongoland, *Schweinfurth* 2671 (B holo., K record of holo.).

Terrestrial herb 45–110 cm high. Perennating organs underground, tuberous, in chains, irregularly cylindrical, somewhat dorso-ventrally flattened, 3.5–5 x 1.3–2.5 cm; roots 1.5–3 mm in diameter, white. Leaves 4–7, arranged as in a fan, slightly succulent, folded together when young, linear, acuminate, 21–38 x 2.5–10 mm. Inflorescences 1–2, produced before the leaves; peduncle up to 7 mm in diameter, with 5–6 papery sheaths along length, lowermost 2 basal; rachis 7–23 cm long; bracts linear-lanceolate, acuminate, 4–15 mm long. Flowers fleshy; sepals purplish; petals yellow with red veins; lip yellow with pale purplish side-lobes and a purplish margin to the mid-lobe; pedicel and ovary 10–20 mm long. Dorsal sepal reflexed, oblong, apiculate, 9–10.6 x 3.5–6 mm; lateral sepals similar. Petals broadly ovate or subcircular, acute or obtuse, 11.5–16.5 x 9.5–17 mm. Lip 3-lobed, 14–16 x 19–21 mm; side-lobes erect, rounded; mid-lobe convex, elliptic, 7–12 mm

long; callus of 3–5 verrucose ridges to apex on mid-lobe; spur upcurved, conical, 8–9 mm long. Column 3–5 mm long. Fruit pendent, 3–3.5 cm long.

Bushland with *Acacia* and *Clerodendrum*, wooded grassland with *Terminalia* and *Grewia*, stony ground, limestone or sandstone; 1200–1800 m. KF HA; Uganda, Kenya, Tanzania, Sudan, Zaire, Angola, Zambia, Malawi, Mozambique, Zimbabwe and Botswana. *Burger* 2070; *de Wilde* 6434; *Friis et al.* 3929.

15. *E. pyrophila* (*Rchb.f.*) *Summerh.* (1948);

Lissochilus pyrophilus *Rchb.f.* (1878) – type: Sudan, near Kuraggera, *Schweinfurth* 2795 (W holo., K iso.).

Terrestrial herb 13–45 cm high. Perennating organs underground, tuberous, irregularly conical, 1–3 x 1–2.5 cm, in chains, yellow, 2–4-noded; roots 2–3 mm in diameter, white. Leaves 4–5, leathery, linear-lanceolate, acute, 3–14 x 0.2–0.3 cm, lowermost sheathing. Inflorescence produced before the leaves, laxly many-flowered; rachis 2–3 mm in diameter, with 3 short acute sheaths along length; bracts spreading, linear, acuminate, 3–9 mm long. Flowers chocolate or dull brown with a cream or yellow lip striped brown and with a yellow callus; pedicel and ovary 9–20 mm long, plum-coloured. Dorsal sepal oblong-elliptic, obtuse, 5–6.7 x 2.5–3.6 mm; lateral sepals similar. Petals elliptic or oblong-elliptic, obtuse, 5.8–8 x 4.3–5.7 mm. Lip 3-lobed, 5.7–7.5 x 5–6.8 mm; side-lobes triangular, subacute, united for half their length to the column; mid-lobe convex, elliptic, margin undulate; callus of 5–9 fleshy rugulose ridges on to basal half of mid-lobe; spur conical, 1.5–2.5 mm long. Column 2.5 mm long. Fruit pendent, 17–20 mm long.

Short, often burnt, grassland and amongst rocks; 1600 m. KF; Uganda, Kenya, Tanzania, Ivory Coast and south to Zimbabwe. *de Wilde* 6307.

16. *E. abyssinica* *Rchb.f.* (1850);

Orthochilus abyssinicus (*Rchb.f.*) *Hochst. ex A. Rich.* (1851); *Graphorchis abyssinica* (*Rchb.f.*) *Kuntze* (1891) – type: TU, nr. Adde Schum Eschet, *Schimper* 1700 (W holo., K iso.).

Terrestrial herb growing from underground irregularly shaped tubers. Leaves erect, folded, lanceolate, acuminate, up to 40 x 5.5 cm, subtended by 2 sheaths at base forming a pseudostem. Inflorescence erect, subcapitate to cylindrical, up to 75 cm long, densely many-flowered; peduncle almost covered by hard tubular sheaths; bracts lanceolate or linear, acuminate, 1–3 cm long, reflexed after anthesis. Flowers spreading, not opening widely, mustard yellow, sometimes with an orange mark on lip; pedicel and ovary 10–14 mm long. Dorsal sepal lanceolate, acuminate, 20–25 x 6–8 mm. Lateral sepals slightly obliquely lanceolate, acuminate, 21–30 x 6–8 mm. Petals lanceolate, acute, 15–25 x 7–8 mm. Lip 3-lobed in middle, 14.5–18 x 9–10 mm; side-lobes rounded in front; mid-lobe broadly ovate to subcircular, half length of lip, glabrous; callus of 2 low papillose



Figure 200.39 *EULOPHIA ABYSSINICA*: 1 – leaf, flowering stem and inflorescence $\times \frac{3}{4}$; 2 – dorsal and lateral sepals, lateral petal and lip $\times 3$; 3 – column and lip side-view $\times 3$; 4 – column, anther removed $\times 6$; 5 – column with anther $\times 4\frac{1}{2}$; 6 – anther and pollinium $\times 9$; 7 – pollinarium $\times 9$. All from *Harrington* 536. Drawn by Susanna Stuart-Smith.

ridges in basal half of lip; spur conical, 3–4 mm long. Column 3–4 mm long. Fig. 200.39.

Terrestrial in moorland, montane pasture and on shrubby hillsides; 2250–2600 m. EW TU GD GJ KF SD; not known elsewhere. *Chiovenda* 771; *E.F. Gilbert* 335; *Harrington* 536.

17. *E. albobrunnea* *Kraenzl.* (1902)

– type: Ethiopia, Diddah, *Ellenbeck* 1510 (B hol., K flowers & photo of hol.).

Terrestrial herb with underground subglobose to cubical rhizome-like white tubers, 2–2.5 cm long, with 2–3 leaf scars. Leaves erect, 2, folded, linear-lanceolate, acuminate, 9–70 x 1.5–2.6 cm, glaucous or pale green with yellow-green venation. Inflorescence erect, subcapitate or shortly cylindrical, 20–70 cm long; peduncle covered by whitish hard sheaths, turning brown with age; bracts lanceolate, acuminate, up top 25 x 5 mm. Flowers waxy, somewhat fragrant, white to pale pink or lilac with a dark purple mid-lobe and papillae on the lip; pedicel and ovary glabrous. Dorsal sepal oblong-ovate, acute to obtuse, 11–12 x 4–5 mm. Lateral sepals oblong or oblong-elliptic, obtuse, 10–12.5 x 4.5–5 mm. Petals oblong, obtuse or slightly mucronate, 10.5–12.5 x 4.5–5 mm, margins somewhat undulate. Lip 3-lobed in apical half, 7–9 x 7–7.5 mm; side-lobes semi-elliptic, obtuse in front; mid-lobe subcircular, 3 x 2.5–3 mm, densely covered with long papillae; spur very obscure, less than 1 mm long. Column 5–6 mm long; foot obscure 1 mm long. Fig. 200.40.

Montane grassland with scattered trees, wet meadows and rough montane grassland; 1650–2500 m. GJ WU SU AR KF SD BA HA; not known elsewhere. *Ash* 517; *de Wilde & de Wilde-Duyffes* 7604; *Hildebrandt* 158.

18. *E. odontoglossa* *Rchb.f.* (1847)

– type: South Africa, Natal, *Gueinzus* s.n. (W hol.).

Terrestrial herb 60–100 cm high. Perennating organs underground, tuberous, irregularly fusiform-conical or subglobose, 2–4 x 1.8–2.5 cm, white with brown nodes; roots fine, from base of new growth, 1 mm in diameter. Leaves 5–6, erect, folded, oblanceolate, acuminate, 40–70 x 1–2.1 cm, basal 3 sheathing. Inflorescence densely many-flowered; peduncle covered by 7 papery pale brown sheaths; rachis 4–13 cm long; bracts linear-aristate, 8–22 mm long. Flowers yellow with yellow, orange or red papillae on lip, less commonly brown or crimson; pedicel and ovary 12–21 mm long. Dorsal sepal ovate-elliptic, obtuse, 9.3–12 x 4–5.8 mm; lateral sepals obliquely ovate, acute, 9–14 x 3.8–5.2 mm. Petals obliquely elliptic, subacute to obtuse, 8–12 x 3.3–5 mm. Lip 3-lobed, 8–11.5 x 4–8 mm; side-lobes porrect, acute to rounded at apex; mid-lobe oblong, subquadrate or obovate, obtuse or truncate; callus of 2 basal ridges with long papillae over basal three-quarters of mid-lobe; spur shortly conical-cylindrical, 1–3 mm long. Column 4–4.7 mm long; foot 3–4.3 mm long. Fruit pendent, 18 mm long.

Grassland and bushland, and in rocky areas; 1800–2350 m. SU KF; Uganda, Kenya, Tanzania, throughout tropical Africa from Guinea and Sierra Leone south to South Africa (Transvaal and Natal). *de Wilde* 5193 & 5442; *Seegeler* 2489.

19. *E. clavicornis* *Lindl.* (1837)

– type: South Africa, Katberg, *Drège* s.n. (K hol.).

var. *nutans* (*Sond.*) *A.V. Hall*, in *Journ. S. Afr. Bot.*, Suppl. 5: 77 & 82 (1965).

E. nutans *Sond.* (1846) – types: South Africa, Uitenhage, *Ecklon & Zeyher* s.n. (W syn.) & Katrieviersberg, *Ecklon & Zeyher* s.n. (W syn.).

Terrestrial herb, 26–45 cm high. Perennating organs subterranean, tuberous, flattened-conical, in chains, 1.2–1.5 x 2 cm; roots 2 mm in diameter, white. Leaves 5–6 arranged as in a fan, folded, linear, acuminate, 17–40 x 3–8 mm, lowermost sheathing. Inflorescence produced with leaves, laxly few to many-flowered; peduncle 2–3 mm in diameter, with 4–5 papery acuminate sheathing bracts along length; rachis 6–16 cm long; bracts spreading, lanceolate, acuminate, 9–18 mm long. Flowers somewhat small, often self-pollinating; sepals brown or green flushed with brown; petals white flushed with pink; lip white or yellowish flushed dull red-purple on edges; callus yellowish or greenish; pedicel and ovary 10–14 mm long. Dorsal sepal oblong-elliptic, apiculate, 10–11 x 3–4 mm, keeled on outer side; lateral sepals similar but oblique, 11–12 x 4–4.5 mm. Petals elliptic, obtuse or apiculate, 8.5–10 x 3.5–5 mm. Lip 3-lobed, 7.5–10 x 5–9 mm; side-lobes rounded in front; mid-lobe subcircular-oblong, obtuse, 3 x 4.5 mm; callus of 2 ridges below and 4 lines of papillae on mid-lobe, all papillate; spur incurved, cylindrical-club-shaped, 2–3 mm long. Column 2–3 mm long; foot 0.5 mm long. Fruit pendent, 18–20 mm long.

Grassland and bushland; 1650–2450 m. BA; Kenya, Tanzania, Malawi, Zambia, Zimbabwe and South Africa, also in Madagascar and Yemen. *Drake-Brockman* 266 & 275; *Copley* 119.

24. *GRAPHORKIS* *Thouars* (1809)

Thouars, *Nouv. Bull. Sci. Soc. Philom. Paris* 1: 318 (1809).

Epiphytic, sympodial herbs with clustered, cylindrical-fusiform, conical-ovoid or ovoid, several-noded pseudobulbs, partly covered by fibrous persistent leaf bases, leafy towards apex. Roots of two types: long, spreading ones attached to the substrate and erect tapering acuminate ones clustered around the base of the pseudobulb. Leaves folded, suberect to erect, narrowly elliptic, acute or acuminate, shortly petiolate. Inflorescence appearing after the leaves have fallen, erect, paniculate, many-flowered. Flowers small to medium-sized, twisted through 180°, yellow marked with brown or purple on the sepals and petals. Sepals and petals free, spreading. Sepals spatulate to oblong-elliptic, subacute. Petals narrowly elliptic. Lip 3-lobed, spurred at

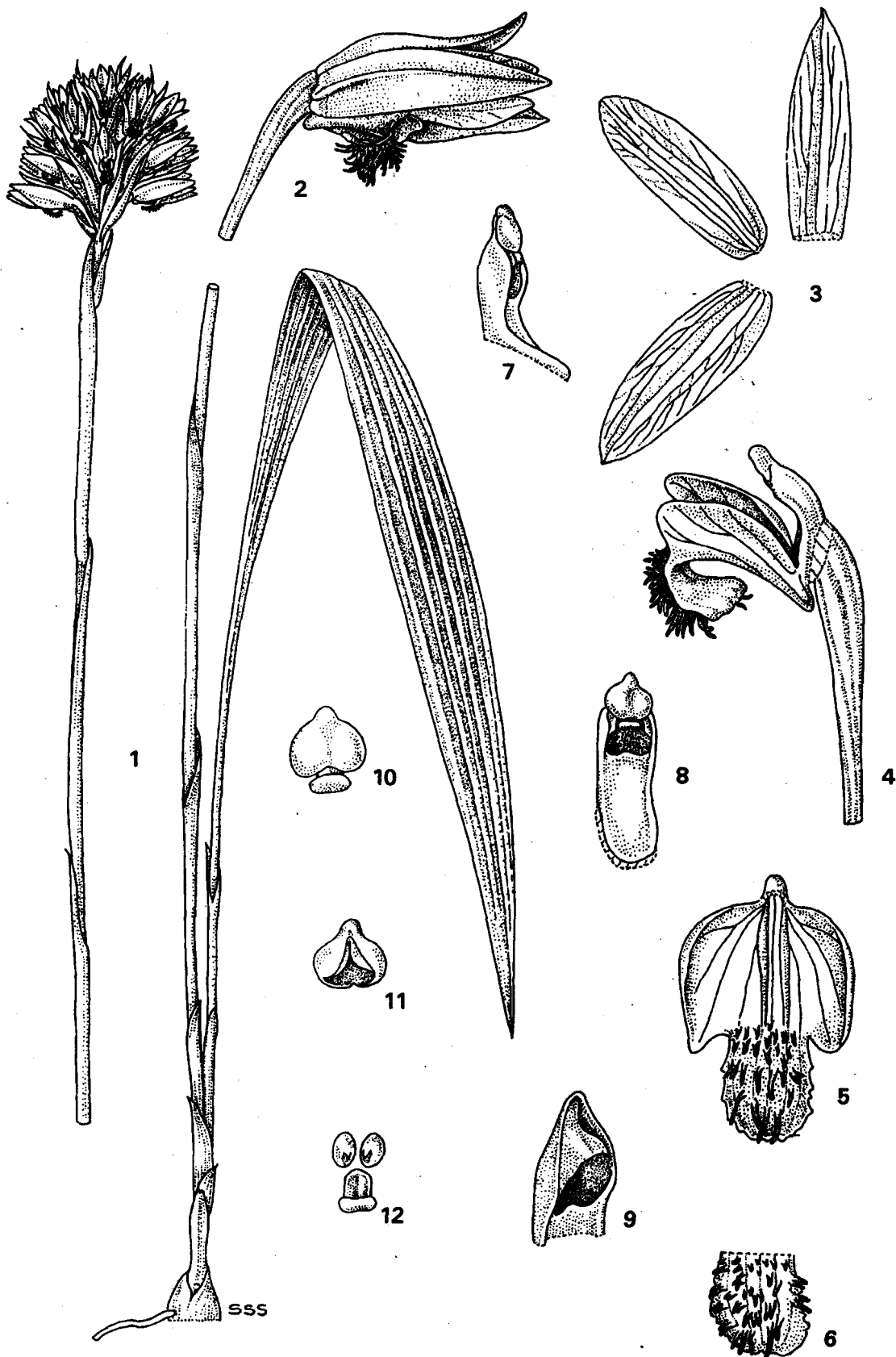


Figure 200.40 *EULOPHIA ALBOBRUNNEA*: 1 - complete plant in flower x $\frac{3}{4}$; 2 - flower, side-view x 3; 3 - dorsal and lateral sepals and lateral petal x 3; 4 - lip and column side-view x $4\frac{1}{2}$; 5 - lip, front view x $4\frac{1}{2}$; 6 - apex of lip x $4\frac{1}{2}$; 7 - column, side-view x 6; 8 - column, front-view x 6; 9 - apex of column, anther-cap removed x 9; 10 - anther-cap, from above x 9; 11 - anther-cap, from below x 9; 12 - pollinarium x 9. All from *de Wilde 7604*. Drawn by Susanna Stuart-Smith.

base; disc with keels; mid-lobe crenulate to bifid; spur often bent forward. Column with hirsute basal auricles; rostellum elongate; pollinia 2, waxy, sessile, attached to a solitary viscidium.

5 species in Madagascar and the Mascarene Islands, only 1 in tropical Africa, including the Flora area.

G. lurida (Sw.) Kuntze (1891);

Limodorum luridum Sw. (1805); *Eulophia lurida* (Sw.) Lindl. (1833); *Eulophiopsis lurida* (Sw.) Schltr. (1914) – type: Sierra Leone, *Afzelius* s.n. (UPS holo.).

Erect epiphytic herb. Pseudobulbs clustered, cylindrical-fusiform or conical-ovoid, yellowish, 3–5-noded, 3–9 x 1–3 cm, 4–6-leaved; roots of two types, branching prostrate ones and erect tapering ones around base of pseudobulbs. Leaves narrowly elliptic, acute to acuminate, 20–40 x 1.5–4.5 cm, articulated to a persistent sheathing leaf-base, 2–4 cm long; petiole 2–4 cm long. Inflorescence erect, paniculate, 15–50 cm long, basal; branches 3–22 cm long; bracts ovate-elliptic or narrowly elliptic, acute, 8–25 mm long. Flowers with purple or brown sepals with pale green inner surfaces, pale green or cream petals flushed with brown or purple, and a yellow lip with greenish side-lobes striped with brown; pedicel and ovary slender, 10–15 mm long. Sepals oblong-spathulate, obtuse, 5–6.5 x 1.5–2 mm. Petals elliptic, obtuse, 4–6 x 2.5–3 mm. Lip 3-lobed, 5–6 x 3 mm; side-lobes erect, oblong, obtuse; mid-lobe obovate, retuse to bifid; callus of 2 fleshy keels on disc; spur cylindrical sharply bent forwards, 3–4 mm long. Column erect, 3 mm long, 2 auricles at base. Fig. 200.41.

Growing on branches of *Ficus lutea* and other canopy trees in forest of *Aningeria altissima*, *Morus mesozygia*, *Antiaris toxicaria*, etc.; 1100–1200 m. KF; Senegal, Sierra Leone and Guinea across to Uganda and Tanzania and south to Zaire and Burundi. *Friis* et al. 4006 & 4049.

25. CALYPTROCHILUM Kraenzl. (1895)

Kraenzlin, *Bot. Jahrb. Syst.* 22: 30 (1895).

Epiphytic, entirely glabrous monopodial herbs. Stems elongated, pendulous. Leaves fleshy, unequally bilobed at apex, alternate, twisted at base to lie in a parallel plane. Inflorescence abbreviated, lax or dense axillary racemes hidden beneath the leaves; bracts conspicuous or inconspicuous. Flowers twisted through 180°, medium-sized. Tepals free, similar, apiculate, spreading, the petals slightly shorter. Lip 3-lobed with a curved or bent spur which is inflated at the apex. Column short with a small foot; rostellum prominent; anther apiculate; pollinia 2, globose, united to a long linear caudicle; viscidium solitary, large, triangular, grooved at the base to clasp rostellum.

A genus of 2 species in tropical Africa, extending as far south-east as Zimbabwe; 1 in the Flora area.

C. christyanum (Rchb.f.) Summerh. (1936);

Angraecum christyanum Rchb.f. (1880) – type: W Africa, *Christy* s.n. (W holo.).

A. schoellerianum Kraenzl. (1894) – type: Eritrea, *Schweinfurth* 169 (B holo.).

Stem simple, woody, rooting at nodes, leafy, 14–50 cm long. Leaves ligulate, unequally bilobed with sheathing base, leathery, fleshy, almost succulent, born in one plane in 2 alternating rows, (4–)6–8(–13) x (0.8–)1.5–2(–2.5) cm. Inflorescences much shorter than leaves, (3–)6–9(–12)-flowered; peduncle and rachis bent in a zigzag, 1.5–4 cm long; bracts ovate, apiculate, scarious, 2–4 mm long. Flowers scented or not, white or greenish white, fading to apricot; base of lip yellow or green; spur yellow at base or entirely green; pedicel with ovary 0.8–1 cm long. Dorsal sepal ovate to ovate-elliptic, apiculate, 5–10 x 2.5–4 mm; laterals similar but slightly oblique, apiculate. Petals oblong-elliptic, obtuse to apiculate, 5–8 mm x 2–3 mm. Lip distinctly 3-lobed, 7–12 x 7–10 mm; side-lobes short, rounded, erect to spreading, 2.5–5 x 3–5 mm; mid-lobe oblong or more or less rectangular, emarginate, 5–7 mm long and broad, lobules entire or irregularly toothed with or without a mucro in the sinus; spur conical, strongly bent, broad below mouth, constricted in middle, inflated distally, 9–11 mm long. Column 1–2 mm long; anther ovate, apiculate, 2 mm long and wide. Fig. 200.42.

Riverine forest, wooded grassland; 650–1200 m. EW WG IL; throughout E Africa through to W Africa and south to Angola. *Friis* et al. 2481; *Jansen* 6378.

26. ANGRAECUM Bory (1804)

Angorkis Thouars (1809), nom-illegit.

Aerobion Spreng. (1826)

Macroplectrum Pfitz. (1889)

Pectinaria (Benth.) Cordemoy (1899)

Lepervenchea Cordemoy (1899)

Ctenorchis K. Schum. (1901)

Monixus Finet (1907)

Schlechter, *Beih. Bot. Centr.* 36: 157–160 (1918); Summerhayes, *Kew Bull.* 13: 260–277 (1958); Garay, *Kew Bull.* 28: 495–516 (1973); Senghas in Schlechter, *Die Orchideen*, ed. 3, 1: 987 (1986).

Dwarf to large epiphytic, lithophytic or rarely terrestrial herbs. Stems short to elongate, unbranched or branching, erect to pendent, covered by leaf-bases. Leaves thin-textured, fleshy or leathery, flattened or rarely iris-like, unequally bilobed at the apex, often twisted at the base and articulated to persistent leaf-bases. Inflorescences axillary, 1- to many-flowered, racemose or rarely paniculate. Flowers fleshy, small to large, often stellate; ovary often twisted through 180°, sessile or pedicellate. Sepals and petals free, subsimilar. Lip concave, entire to 3-lobed, enveloping the column at the base, spurred at the base. Column fleshy, very short, lacking a foot; clinandrium somewhat shallow, cleft in front with a short tooth-like rostellum in the sinus; pollinia 2, globose, sulcate, attached to a common viscidium or each attached to a separate viscidium.

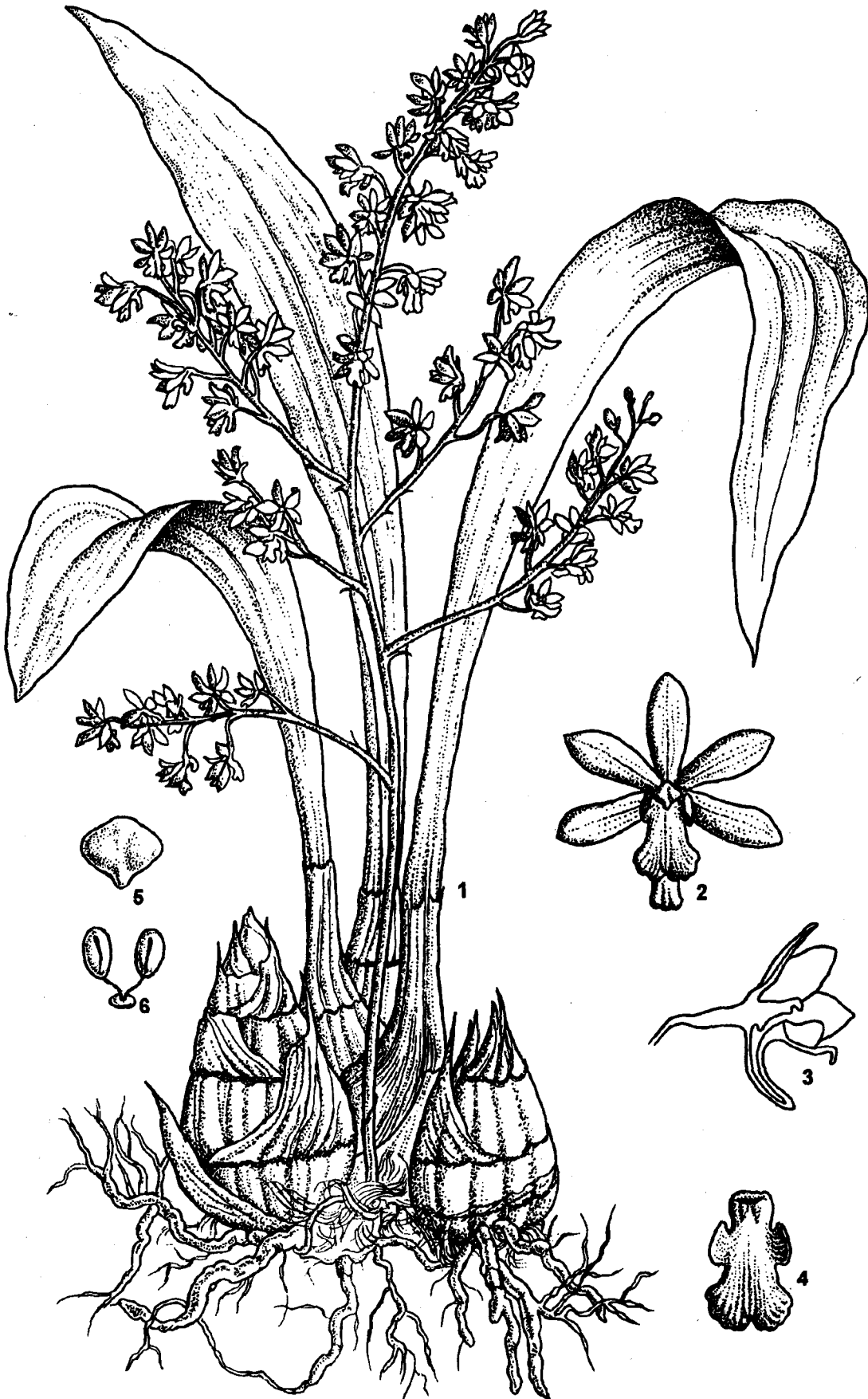


Figure 200.41 *GRAPHORKIS LURIDA*: 1 – complete plant in flower with leaves and pseudobulbs x 1; 2 – flower, front view x 6; 3 – longitudinal section of flower x 4; 4 – lip x 14; 5 – anther x 21; 6 – pollinarium x 21. 1 from *Brown* 361; 2–6 from *Eggeling* 5183. Drawn by Cherry Ann Lavrih.

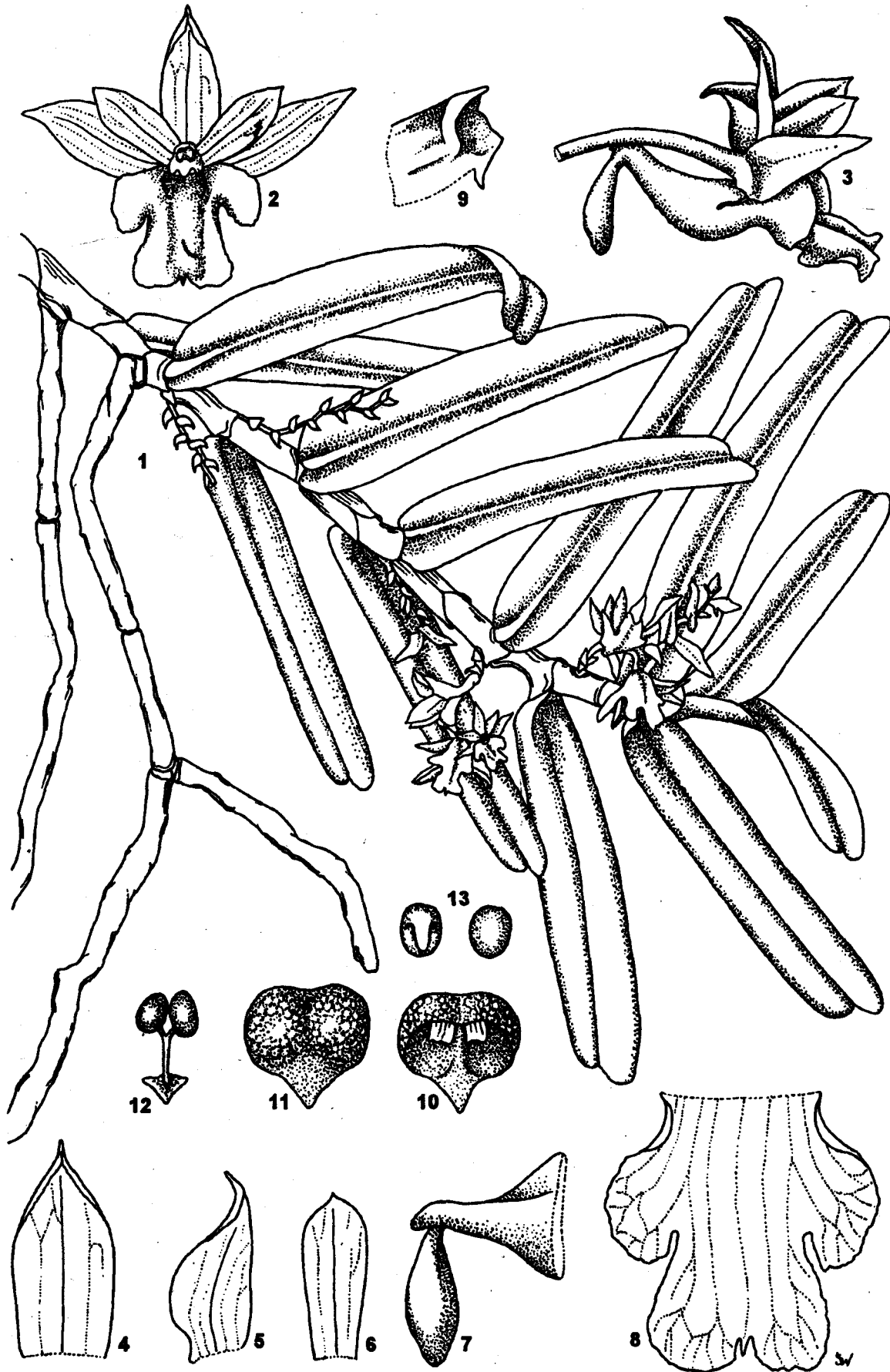


Figure 200.42 *CALYPTROCHILUM CHRISTYANUM*: 1 - leafy stem with flowers and aerial roots x 1; 2 - flower, front view x 4½; 3 - flower, side view x 4½; 4 - dorsal sepal x 6; 5 - lateral sepal x 6; 6 - petal x 6; 7 - spur, side view x 6; 8 - lip x 6; 9 - column x 12; 10 & 11 - anther cap, front and back view x 12; 12 - pollinarium x 9; 13 - pollinia x 12. All from Pollock in Moreau 601. Drawn by Sue Wickison.

A genus of about 200 species from tropical Africa, Madagascar and the adjacent islands; only 2 species in the Flora area.

1. Plants with elongate stems up to 60 cm long; leaves well spaced along stem, 11–21.5 x 1.5–3 cm; flowers large; lip funnel-shaped, 6.5–8.5 cm long with a long slender point; spur sharply bent, 16–21 cm long. 1. *A. infundibulare*
 – Plants dwarf, less than 3 cm long; leaves arranged as in a fan, 1.4–5.2 mm long; flowers minute; lip broadly ovate, obtuse, c 1.5 x 1.5 mm; spur conical, 0.6 mm long. 2. *A. minus*

1. *A. infundibulare* Lindl. (1862);

Angorkis infundibularis (Lindl.) Kuntze (1891);
Mystacidium infundibulare (Lindl.) Rolfe (1897) – type: Principe, Barter 2005 (K holo.).

Pendent epiphyte with bilaterally compressed, rarely branching stems, up to 60 cm long, 4–7 mm in diameter. Leaves distichous, narrowly elliptic-ligulate or oblanceolate, unequally obliquely roundly or obtusely bilobed at the apex, 11–21.5 x 1.5–3 cm, twisted at the base and articulated to leaf-sheaths 2.2–5 cm long. Inflorescences 1-flowered; peduncle 3–5.5 cm long; bracts elliptic-ovate, obtuse, 6 mm long. Flowers white, tinged with green on the spur, suffused with yellow inside lip, fragrant; pedicel and ovary 5.5–6.5 cm long. Sepals linear-lanceolate, acuminate, 6–8.5 x 0.3–1 cm. Petals linear, acuminate, slightly shorter than the sepals, 5.5–6 x 4–5 mm. Lip concave, ovate-elliptic to oblong-ovate, 6.5–8.5 x 5–5.6 cm, with a point up to 12 mm long; spur funnel-shaped at the base, sharply bent then cylindrical above, S-shaped, incurved or pendent, 16–21 x 1.5 cm. Column fleshy, 5 mm long. Fruit 5.5 cm long. Fig. 200.43.

In montane forest in very deep valley, growing on branches of *Polyscias ferruginea* with tree ferns; 1400 m. KF; Nigeria, Cameroun, Uganda, Kenya, and ?Principe. Mooney 9195.

2. *A. minus* Summerh. (1958)

– type: Zimbabwe, Mutare [Umtali] District, Wild 4541 (K holo., SRGH iso.).

Dwarf epiphyte with a short stem, 2–10 mm long; roots flattened, 0.5–1 mm in diameter. Leaves distichous, arranged as in a fan, suberect to curved, linear, acute or subacute, 1.4–5.2 x 1–2 mm, articulated at the base to a 6–9 mm long leaf-sheath. Inflorescences suberect or erect, 3–5.2 cm long, 3–14-flowered; peduncle slender, wiry, 1.4–2.1 cm long; bracts broadly ovate, apiculate, sheathing at the base, 0.5–1 mm long. Flowers white with a green spur; pedicel and ovary 1 mm long. Dorsal sepal elliptic, obtuse or rounded, 1–1.1 x 0.7 mm; lateral sepals obliquely oblong or obovate, obtuse, 1.3–1.5 x 0.5–0.6 mm. Petals lanceolate, acute, 1.2 x 0.6–0.7 mm. Lip fleshy, concave, broadly ovate, obtuse, 1.4 x 1.6 mm; spur conical, slightly upcurved at the tip, 0.6 mm long. Column 0.2–0.3 mm long. Fruits elliptic, 2.5–3 mm long.

Growing on branches in tree crowns in forest with *Aningeria altissima*, *Antiaris toxicaria*, *Lannea welwitschii*, *Ficus mucoso*, *Celtis gomphophylla*, *C. zenkeri* etc.; 1100 m. KF; Tanzania, Zambia and Zimbabwe. Friis et al. 3990.

27. **MICROCOELIA** Lindl. (1830)

Dicranotaenia Finet (1907)

Encheiridion Summerh. (1943)

Summerhayes, *Bot. Mus. Leaflet. Harv. Univ.* 11: 140–158 (1943) & 250–260 (1945); Jonsson, *Symb. Bot. Upsal.* 23, 4: 63–131 (1981).

Leafless epiphytic or rarely lithophytic herbs with short stems. Roots firmly or loosely attached to the substrate, often dense, cylindrical or less commonly dorso-ventrally flattened, smooth or rarely verrucose, unbranched or with a few branches, usually elongate. Scales on stem protecting the stem apex, acute to rostrate. Inflorescences few to axillary, racemose, concentrated in the apical part of the stem, few to many-flowered; peduncle long or short; rachis cylindrical or angular, smooth or with processes; bracts sheathing or not. Flowers small to minute, more or less sessile or pedicellate, usually white variously tinged with green, brown or pink on spur and other segments. Sepals and petals free, subsimilar. Lip entire or obscurely 3-lobed, free, usually with fleshy calli at the base either side of the mouth of the spur; spur globose, cylindrical or variously swollen. Column fleshy; androclinium short to long; anther-cap hemispherical, often elongated at the apex; pollinia 2, subglobose to gourd-shaped; stipe linear to oblanceolate, entire or bifid at the apex; viscidium linear or oblong, short to long; rostellum bifid, short to as long as the column.

A genus of some 27 species from Madagascar, tropical and southern Africa; 1 species in the Flora area.

M. globulosa (Hochst.) L. Jonsson (1981);

Angraecum globulosum Hochst. (1844); *Gussonia globulosa* (Hochst.) Ridl. (1885); *Mystacidium globulosum* (Hochst.) Th. Dur. & Schinz (1895) – type: TU, *Schimper* 1565 (K lecto., BM BR FT G H P W isolecto.).

Angraecum guyonianum Rchb.f. (1849); *Aeranthus guyonianus* (Rchb.f.) Rchb.f. (1865); *Epidorkis guyoniana* (Rchb.f.) Kuntze (1891); *Microcoelia guyoniana* (Rchb.f.) Summerh. (1943) – type: TU, Sana, *Schimper* s.n. (W holo., P iso.).

Epiphytic plant with a short to long stem, up to 65 x 2–3 mm. Roots few to many, characteristically undulating and twisting, cylindrical, smooth, up to 35 x 1–2 mm. Scale-leaves acuminate to obtuse, up to 3.5 mm long, with 5–7 nerves. Inflorescences stiff, erect or descending, 5–10, up to 90 mm long, each with up to 15 flowers; peduncle 15 mm long; rachis flexible/zigzag, variously furrowed and excavated with hook-shaped processes below the bracts; bracts sheathing at base, ovate, acute to subacuminate, up to 2.5 mm long. Flowers 10 mm long, white, base of perianth and ovary yellow-green, tip

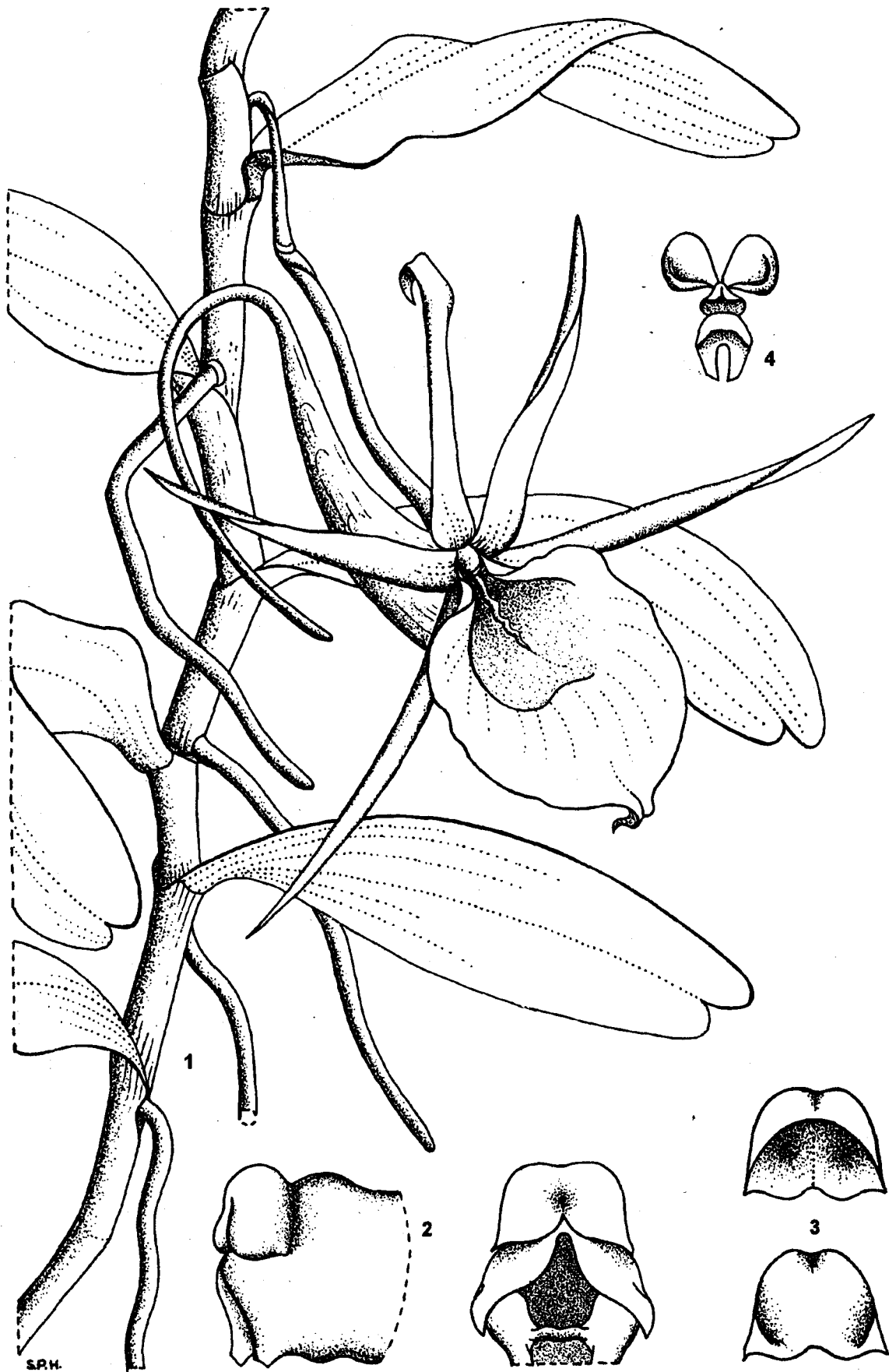


Figure 200.43 *ANGRAECUM INFUNDIBULARE*: 1 – leafy stem with single flower and aerial roots x 1; 2 – column, side and front views x 6; 3 – anther cap, viewed from above and below x 6; 4 – pollinarium x 6. 1 from *Thomas* 1382 and *Meyer* K72; 2–4 from *Meyer* K72. Drawn by Susan Hillier.

of spur orange-brown; pedicel forming a distinct angle with the ovary, up to 3 mm long; ovary 0.3–0.8 mm long. Dorsal sepal slightly convex, ovate, acute, more or less apiculate, with a distinct outer central groove, 2.2–3.1 x 1.0–1.4 mm; lateral sepals ovate to narrowly ovate, acute, more or less apiculate, 2.5–3.5 x 0.9–1.3 mm. Petals obovate to elliptic, more or less apiculate, narrowly thickened along central nerve, 2.1–3 x 0.8–1.2 mm. Lip pandurate, apically folded with a distinct cushion-like thickening at each side of spur-mouth, 2.2–3.3 x 1.2–1.8 mm. Spur characteristically incurved, base conical, tapering into a bent cylindrical part, apex obtuse and slightly inflexed, 2.1–3.3 mm long. Column 0.3–0.6 mm long. Fig. 200.44.

Found on branches of trees at margins of evergreen, relict, and riverine forest; 1190–2150 m. GD SU WG KF SD; Uganda, Kenya, Tanzania, Nigeria, south to Angola, Zambia, Malawi and Zimbabwe. *Ash* 894; *Schimper* 560; *Friis et al.* 2480.

28. DIAPHANANTHE *Schltr.* (1914)

Rhipidoglossum *Schltr.* (1918)

Sarcorrhynchus *Schltr.* (1918)

Schlechter, Beih. Bot. Centr. 36: 95 (1918); *Summerhayes, Bot Mus. Leaflet Harv. Univ.* 12: 89–116 (1945) & *Kew Bull.* 14: 140–143 (1960); *Rasmussen, Norw. Journ. Bot.* 21: 225–232 (1974); *Cribb, Kew Bull.* 34: 335–338 (1979).

Epiphytic or rarely lithophytic herbs with short or long monopodial stems, usually unbranched and covered by sheathing leaf-bases; roots elongate, emerging all along stem through the leaf-bases, often prominent and rarely branched. Leaves distichous, leathery or fleshy, rarely thin-textured, unequally bilobed at apex, articulated at base to a sheathing leaf-base, often twisted at base to lie in one plane. Inflorescences 1-many, emerging through the sheathing leaf-bases in upper part of stem, usually several- to many-flowered; bracts usually amplexicaul, rarely prominent. Flowers white, pale green or yellow, rarely pinkish, usually translucent, rarely showy. Sepals free, subsimilar. Petals free. Lip entire or obscurely lobed, spurred, usually with a tooth-like or transverse callus in the mouth of the spur. Column porrect; stipes 2; viscidia 1 or 2; rostellum pendent or reflexed, linear or tapering and bifid to pendent, club-shaped and obscurely 3-lobed.

A genus of about 50 species confined to continental, and mostly tropical Africa; only 6 species found in the Flora area.

1. Stem 5 cm or less long; leaves arranged as in a fan. 2
– Stem 7 cm or more long, often much longer, leaves scattered along stem. 3
2. Flowers yellow-green; spur 1.1–1.2 cm long. 4. *D. rohrii*
– Flowers white; spur 3–4 cm long. 2. *D. candida*
3. Leaves slender, 1.5–5 mm wide; flowers minute; sepals and petals 20–35 mm long; spur club-shaped, 1.5–2 mm long. 1. *D. adoxa*

- Leaves broader, more than 10 mm wide; flowers larger; sepals and petals more than 7 mm long; spur more than 5 mm long. 4

4. Flowers white; spur slender from a broad mouth, 15–25 mm long. 6. *D. tenuicalcar*

- Flowers yellow, brown or greenish; spur less than 12 mm long. 5

5. Leaves oblong to oblanceolate, 6.5–14 cm long; inflorescence less than 8.5 cm long.

5. *D. schimperiana*

- Leaves falcate, oblong to oblanceolate, 10–45 cm long; inflorescence over 10 cm long.

3. *D. fragrantissima*

1. *D. adoxa* *Rasm.* (1974);

Rhipidoglossum adoxum (*Rasm.*) *Senghas* (1986) – type: KF, *DEBL* 73–52 (C holo.).

Epiphyte with 5–75 cm long pendent stems, 2–2.5 mm in diameter, often forming dense clumps; roots prominent, much longer than leaves. Leaves 5–12 in upper part of stem, falcate, linear, unequally bilobed at apex, 35–120 x 1.5–5 mm, twisted at base and articulated to a 7–10 mm long leaf-sheath. Inflorescences 1-several, 2–3.5 cm long, 3–8-flowered; peduncle 2–7 mm long; bracts amplexicaul, 2 mm long. Flowers green or pale yellowish green; pedicel and ovary up to 2 mm long. Dorsal sepal lanceolate, acute, 2–2.5 x 1 mm; lateral sepals lanceolate, acute, 3–3.2 x 1 mm. Petals ovate, obtuse or rounded, 2.1 x 1.2 mm. Lip entire, ovate, obtuse, 2 mm long and wide, without callus; spur club-shaped, 1.5–2 mm long. Column 0.7 mm long; stipes 2; viscidia 2; rostellum pendent, club-shaped.

Montane evergreen and riverine forest; 1300–2300 m. WG IL KF SD BA; Uganda, Kenya. *Ash* 280; *de Wilde* 7743; *Friis et al.* 3560.

2. *D. candida* *Cribb* (1979)

– type: WG, 30 km from Ghimbi on road to Asosa, *Gilbert & Thulin* 802 (UPS holo.).

Epiphytic herb, erect, up to 15 cm high. Stem short, leafy, 3 mm in diameter. Leaves 11–16 x 0.9–2 cm, suberect, linear, obscurely bilobed at the apex, articulated at the base. Inflorescence suberect or spreading, 6–14-flowered, up to 10–22 cm long, peduncle glabrous; bracts ovate, acute, auriculate, 3–4 x 3 mm. Flowers pure glossy white, becoming yellowish-brown with age. Dorsal sepal oblong-ovate or lanceolate, subacute, 7–8 x 2–3 mm. Lateral sepals falcate, lanceolate, acute to acuminate, 10–11 x 2.5 mm. Petals oblique, ovate, 7 x 3–3.5 mm. Lip deflexed, entire, narrowly-elliptical, obtuse to rounded, 9–10 x 4–5 mm; spur cylindrical, curved, 3.2–3.4 cm long, entrance bearing a fleshy tooth-like callus. Column porrect, short, 1.5 mm long; rostellum deflexed, fleshy, peg-like, 1 mm long. Fig. 200.45.

On branches of *Acacia* on rocky hillside; 2000–2100 m. SD KF WG; not known elsewhere. *Gilbert & Thulin* 802; *E.F. Gilbert* K41; *Seeger* 2541.

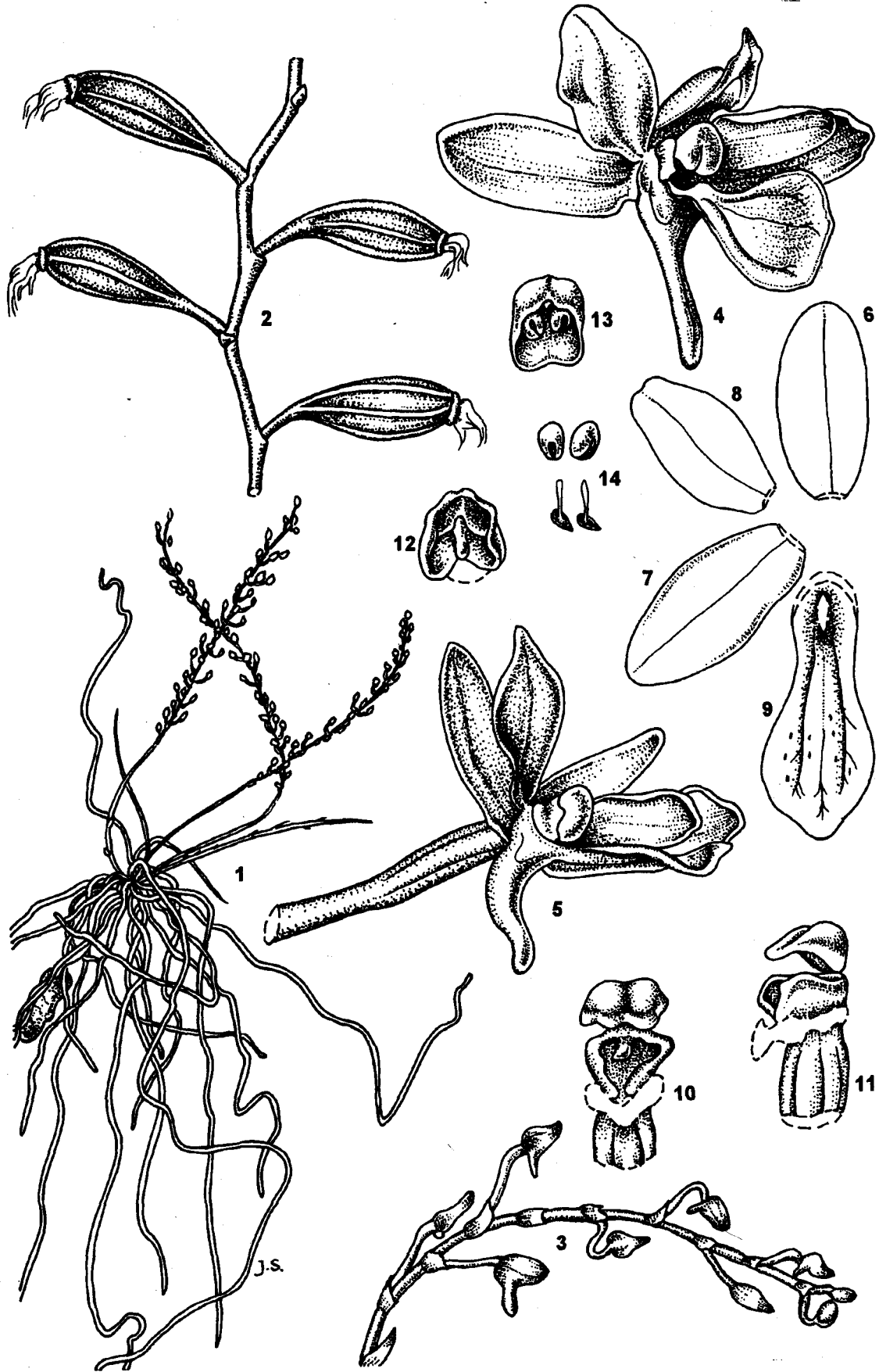


Figure 200.44 *MICROCOELIA GLOBULOSA*: 1 - complete plant in flower x 2½; 2 - capsules x 3; 3 - part of inflorescence x 3; 4 & 5 - flower, front and side view x 8; 6 - dorsal sepal x 8; 7 - lateral sepal x 8; 8 - petal x 8; 9 - lip x 8; 10 & 11 - column, front and side view x 14; 12 - column, from above, anther cap removed x 14; 13 - anther cap with pollinia x 14; 14 - pollinarium of 2 pollinia x 14. 1 redrawn after drawing by *N. Cuthbert*; 2-14 from spirit material by *Ash 36363*. Drawn by *Judi Stone*.



Figure 200.45 *DIAPHANANTHE CANDIDA*: 1 - leafy stem with flowers and aerial roots x 1; 2 - flower x 3; 3 - flower with petal turned back x 3; 4 - dorsal sepal x 6; 5 - lateral sepal x 6; 6 - petal x 6; 7 - lip x 6; 8 - column, side view x 14; 9 - column, front view x 14; 10 - anther-cap x 14; 11 - viscidia and stipes x 14. All from the *Gilbert & Thulin 802*. Drawn by Maureen Church.

3. *D. fragrantissima* (Rchb.f.) Schltr. (1918);

Listrostachys fragrantissima Rchb.f. (1865) – type: Angola, Pungo Adongo, Welwitsch 702 (W holo., K iso.).

Epiphyte or rarely a lithophyte with long pendulous stems 7–50 x 5–10 mm, covered in leaf-sheaths. Leaves up to 9, distichous, falcate, linear-oblongate, unequally bilobed at apex, 10–44 x 1–3.5 cm, twisted at base, articulated to a sheathing base 1.2–3 cm long. Inflorescences pendulous, 1–several, up to 60 cm long, up to 60-flowered; peduncle 2–20 cm long; bracts amplexicaul, 3–5 mm long. Flowers usually borne in whorls of up to 4, greenish yellow, day-time scented; pedicel and ovary 1–2.2 mm long. Dorsal sepal linear, acute, 7–10.5 x 2–2.2 mm; lateral sepals slightly falcate, linear, acute, 9.7–11.2 x 2–3 mm. Petals linear to obovate, acuminate, 8.3–8.5 x 2–2.2 mm. Lip rectangular, 3-lobed at apex, 10–13 x 6.5–7 mm, with irregularly toothed lateral margins, with a marked tooth at the mouth of the spur; mid-lobe elongated and acuminate; spur bent at base, fusiform, 6–9 mm long. Column 2 mm long; rostellum deeply bifid; stipes 2; viscidium 1.

Growing on branches of *Acacia* and other trees, sometimes found on rocks; 700–1900 m. KF GG; Burundi, Cameroun, Rwanda, Zaire, Sudan, Uganda, Kenya, Tanzania, Angola, Malawi, Mozambique, Zambia, Zimbabwe and South Africa. Gereau 1323; Meyer 7904; Seegeler 2570.

4. *D. rohrii* (Rchb.f.) Summerh. (1960);

Angraecum rohrii Rchb.f., *Otia Bot. Hamb.* 2: 117 (1881); *Angorchis rohrii* (Rchb.f.) Kuntze (1891) – type: Ethiopia, without exact locality, Rohr s.n. (W holo., K iso.).

Epiphyte with an irregular short stems 2–5 x 5–7 mm. Leaves 2–7, somewhat falcate, linear to obovate, slightly unequally bilobed at the apex, 5–15 x 0.7–2.2 cm, articulated to a 5–10 mm long base. Inflorescences 5–17 cm long, laxly many-flowered; peduncle 3–4 cm long; rachis zigzag; bracts amplexicaul, 2–8 mm long. Flowers waxy, yellow; pedicel and ovary 4 mm long, scabrid. Dorsal sepal oblongate, subacute, 3.6–4 x 1.5–2 mm; lateral sepals linear to obovate, obtuse, 3.7–4 x 1–1.4 mm. Petals linear, obtuse, 3.4–4.3 x 1 mm. Lip ovate, acute, 3.4–3.8 x 1.7–2.3 mm, with an obscure tooth in the mouth of the spur; spur incurved, club-shaped, 11–12 mm long. Column 2.4 mm long; stipes 2, obovate, coherent, ciliate; viscidium 1; rostellum pointed, pendent. Fruit ellipsoidal, 7–10 mm long.

Montane forest; 2100–3000 m. SU; Liberia, Ivory Coast, Ghana, Togo, Cameroun, Sao Tomé, Fernando Po, Zaire, Burundi, Uganda, Tanzania, Kenya and Angola. Ash 2522; Gilbert 1833A.

5. *D. schimperiana* (A. Rich.) Summerh. (1945);

Dendrobium schimperianum A. Rich. (1850); *Angraecum schimperianum* (A. Rich.) Rchb.f. (1852) – type: GD, Mt. Taber (Aber), near Gerar, Schimper 1318 (P holo., K FI W iso.).

Pendent epiphyte or rarely a lithophyte with stems up to 40 cm or more long, 3–5 mm in diameter; roots smooth, 2–3 mm in diameter. Leaves falcate, narrowly oblong to oblanceolate, unequally and roundly bilobed at apex, 6.5–14 x 1.3–2.5 cm, twisted at base to lie in one plane, articulated to a 1.4–1.7 cm long sheathing base. Inflorescences 5.5–8.5 cm long, laxly 5–10-flowered; peduncle 1–1.5 cm long; bracts obconical, acute or apiculate, 2–3.5 mm long. Flowers translucent white or cream; pedicel and ovary 2–4 mm long. Dorsal sepal ovate, acute, 5–5.6 x 2.8–3.4 mm; lateral sepals falcate, lanceolate, acute, 7–7.5 x 1.8–2 mm. Petals obliquely triangular-ovate, acuminate, 5–5.7 x 3–3.6 mm, irregularly toothed. Lip obscurely 3-lobed in basal half, oblong-ovate in outline, emarginate to obtuse and shortly apiculate at apex, 6–7.7 x 6.6–7.5 mm, with a tooth-like callus in the mouth of the spur; spur incurved, slightly dilated in middle, 8–9 mm long. Column 1.5 mm long; rostellum pendent, club-shaped; stipes 2; viscidia 2. Fig. 200.1.3.

Growing on branches and also on rocks in montane forest, frequently on *Podocarpus*; 2100–2850 m. GD SU AR KF SD BA HA; Sudan and Uganda. de Wilde 6592; Mooney 7280; Meyer 9045

6. *D. tenuicalcar* Summerh. (1945)

– type: Uganda, Karamoja District, Napak, A.S. Thomas 3645 (K holo.).

Epiphyte often growing in masses with spreading or pendulous stems, 9–26 x 1–3 mm. Leaves 3–8, towards apex of stems, falcate, linear-lanceolate, obliquely bilobed at acute apex, 10–60 x 7–13 mm, twisted at base and articulated to a sheathing leaf-base 5–11 mm long. Inflorescences 1–many, shorter than or equal to leaf, 1–3 cm long, up to 7-flowered; peduncle 5–7 mm long; bracts amplexicaul, conical, 2 mm long. Flowers white, sweetly scented; pedicel and ovary 4–12 mm long. Dorsal sepal oblong-elliptic, obtuse, 4–4.5 x 2–2.8 mm; lateral sepals obliquely ovate or elliptic, obtuse, 4.2–5.1 x 2–2.5 mm. Petals obliquely ovate, obtuse or acute, 4.2–4.8 x 2.5 mm. Lip flabellate, obscurely 2–4-lobed on apical margin, retuse, 4.5–6.5 x 6.2–7.6 mm, with a tooth in the mouth of the spur; spur slender, cylindrical from a broad mouth, 15–25 mm long. Column 2 mm long; stipes 2; viscidia 2; rostellum pendent, club-shaped.

On trees in and at the edge of montane forest and in wooded grassland; 1350–2400 m. GD GJ SU WG KF SD; Uganda, Kenya. de Wilde 7186; Friis et al. 3561; Mooney 9008.

29. *BOLUSIELLA* Schltr. (1918)

Schlechter, *Beih. Bot. Centr.* 36: 105–106 (1918); Robyns & Tournay, *Flore Sperm. Parc Nat. Albert* 3: 524 (1955).

Erect epiphytic or occasionally lithophytic, entirely glabrous monopodial herbs. Stems abbreviated, simple, leafy above with numerous tufted roots below. Leaves iris-like, imbricate, arranged in a vertical plane forming

a fan, narrowly elliptic or sword-shaped to linear-ligulate, obtuse to acute, rigid and articulated to a sheathing base, fleshy, sometimes sulcate-canalicate and falcate-recurved. Inflorescence exceeding leaves, densely or laxly many-flowered, arising from axils of old leaf-sheaths; peduncle shorter than or equalling rachis, rarely longer; bracts small or large, imbricate and partially concealing flowers, membranous, grey to blackish brown or olive. Flowers through 180°, very small, white. Tepals free, oblong or narrowly elliptic, obtuse to acuminate, subequal, spreading. Lip entire or obscurely 3-lobed, spurred, oblong or ovate-elliptic, obtuse to acuminate, sometimes recurved; spur cylindrical, ellipsoid or conical, obtuse, usually shorter than lip. Column oblong, fleshy, constricted above, without a foot; rostellum subulate, hooked; anther quadrate, cucullate; pollinia 2, oblong or ellipsoid, each attached by a linear stipe to a large ovate viscidium.

A genus of 5 species distributed in tropical and southern Africa; only 1 species in the Flora area.

B. iridifolia (Rolfe) Schltr. (1918);

Listrostachys iridifolius Rolfe in *Fl. Trop. Afr.* 7: 167 (1897) – type: Angola, Golungo Alto, *Welwitsch* 679 (K holo., BM iso.).

subsp. *iridifolia*

Epiphytic or lithophytic herb. Stem short, 0.5–2 cm long. Leaves 4–6(–10), sword-shaped, obtuse, falcate-recurved, upper surface sulcate, 10–45 x 1.5–4 mm. Inflorescence dense, 3.5–6 cm long; bracts ovate, acute to acuminate, brown or black, shorter than or longer than flowers, 1–4 mm long, well-spaced. Flowers white; pedicel with ovary 2 mm long. Tepals oblong, obtuse, 2–3 x 0.7–1.4 mm. Lip oblong-ligulate, obtuse, slightly S-shaped, 2.5–5 x 0.7–1.1 mm; spur cylindrical-ellipsoid and inflated or conical and sack-like, obtuse, strongly incurved at right-angles to lip, 1.5–2 mm long. Column 0.5–0.9 mm. Fig. 200.46.

Growing on branches in the canopy of *Aningeria altissima*, *Antiaris toxicaria* etc. forest; 950–1100 m. KF; Ivory Coast, Ghana, Equatorial Guinea, Cameroun, Uganda, Kenya, Tanzania, Zaire, Angola and Grand Comores. *Friis* et al. 4007 & 3847.

B. iridifolia subsp. *picea* Cribb in *Kew Bull.* 32: 180 (1977) occurs in Zambia and differs from subsp. *iridifolia* in having a shorter, conical sack-like, more or less straight spur.

30. **AERANGIS** *Rchb.f.* (1865)

Radinocion Ridl. (1887)

Rhaphidorrhynchus Finet (1907), p.p.

Stewart, *Kew Bull.* 34: 239–319 (1979) & *Aerangis* in *Orchidaceae* in *Fl. Trop. E. Afr.* 3: 549–570 (1989).

Epiphytic herbs with short or elongated woody stems bearing numerous elongated aerial roots in the lower part. Stems usually unbranched, covered with the remains of overlapping leaf-bases, bearing few-several leaves apically. Leaves in 2 rows, usually thick and

fleshy in the living state, sometimes leathery during the dry season, sheathing at the base, much longer than broad and usually wider in the upper half, unequally bilobed at the apex. Inflorescence lateral, a short or elongated raceme, rarely branched, few to many-flowered. Flowers twisted through 180°, white or variously tinted with green or brown. Sepals and petals free, spreading or reflexed. Lip entire, often similar to the sepals and petals, spurred at the base. Column short and stout or somewhat elongated and more slender, often narrowed towards the base and enlarged at the level of the stigma; androclinium straight or sloping, the anther-cap sometimes beaked; rostellum entire, elongated, deflexed or porrect; pollinia 2, sessile on a single stipe; viscidium variously shaped; stigma an oval or rhomboid sticky depression. Ovary elongated, straight or curved. Capsule cylindrical or ellipsoid, often much elongated.

A genus of about 50 species, at least 26 occur in Africa and the remainder in Madagascar and the Comoro Islands; 5 species in the Flora area.

Several of the more widely distributed species have been grown in cultivation for many years.

1. Spur less than twice as long as lip, 23–40 mm long; column bright red.
 1. *A. luteoalba* var. *rhodosticta*
 - Spur much longer than the lip, usually more than 3 times as long; column white. 2
 2. Spur loosely spiralling. 3
 - Spur straight; pendent. 4
 3. Stem elongate, 20–100 cm long; spur 10–15 cm; lip elliptic-lanceolate, 20–25 x 7–8 mm in basal half when flattened. 2. *A. thomsonii*
 - Stem short, usually less than 10 cm; spur 13–22 cm; lip subpandurate, 15–20 x 8–15 mm in apical half. 3. *A. kotschyana*
 4. Leaves grey-green with reticulate venation; sepals and petals oblong-elliptic, twice as long as wide or less. 4. *A. somalensis*
 - Leaves dark green; sepals and petals lanceolate, more than 4 times as long as wide. 5. *A. brachycarpa*

1. *A. luteoalba* (*Kraenzl.*) *Schltr.* (1918);

Angraecum luteoalbum Kraenzl. (1895); *Rhaphidorrhynchus luteoalbus* (Kraenzl.) Finet (1907) – types: Zaire, *Stuhlmann* 2650 & 2720 (B syn.).

var. *rhodosticta* (*Kraenzl.*) *J. Stewart* in *Kew Bull.* 34: 310 (1979);

Angraecum rhodostictum Kraenzl. (1896); *A. rhodosticta* (*Kraenzl.*) *Schltr.* (1918) – types: Cameroun, Yaounde, *Zenker & Staudt* 434 (K iso-syn.) & Ethiopia, *Ruspoli & Riva* 1360 (FI syn.).

Stem 1–3 cm long, often pendent with numerous thin flexible/zigzag roots which are relatively long for the size of the plant. Leaves 2–8, lying in one plane, linear-ligulate or linear-lanceolate, up to 15 x 6–15 mm, sometimes falcate, unequally bilobed at the apex, the lobes rounded, the shorter lobe sometimes suppressed, fleshy

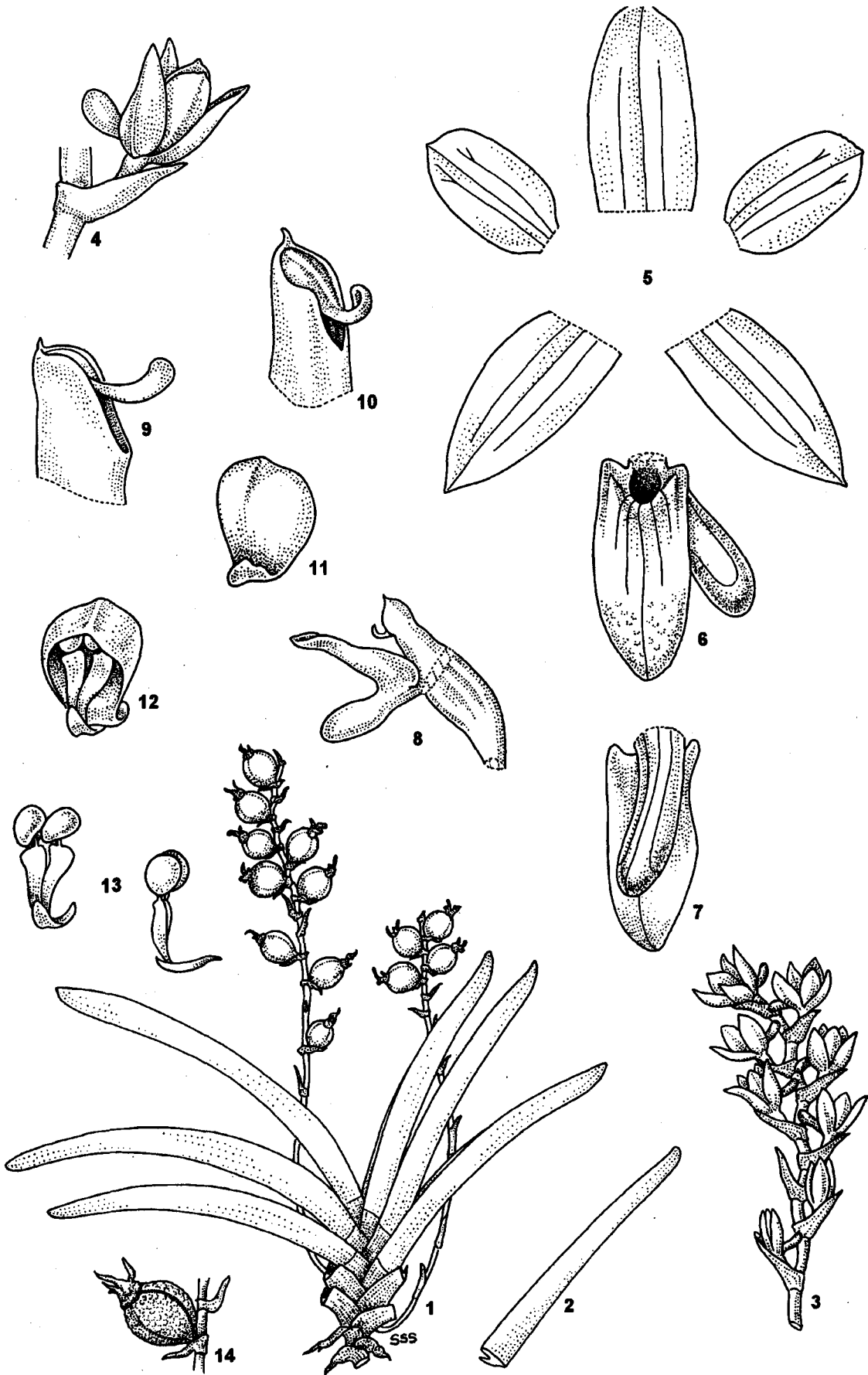


Figure 200.46 *BOLUSIELLA IRIDIFOLIA* subsp. *IRIDIFOLIA*: 1 - complete plant in fruit x3; 2 - leaf x3; 3 - part of inflorescence x4.5; 4 - flower x12; 5 - sepals and petals x21; 6 & 7 - lip and spur, front and rear-view x33; 8 - lip and column, side-view x21; 9 & 10 - column, side and partial front view x33; 11 & 12 - anther-cap, viewed from above and below x39; 13 - pollinia x39; 14 - capsule x6. 1 & 2 from Gilbert & Vollesen 4007; 3-14 from Moreau 50A. Drawn by Susanna Stuart-Smith.

and brittle in the rainy season becoming leathery in the dry season. Inflorescences arising from the stem below the leaves, arching or pendent racemes bearing few-25 flowers in the upper half or two-thirds, up to 35 cm long; peduncle slender, cylindrical, bearing 2-3 sheaths; rachis similar, slightly zigzag; bracts spreading or slightly reflexed, ovate, acute, 3-4 mm long. Flowers arranged in 2 rows all in the same plane, 7-20 mm apart; perianth parts all spreading, white, cream, greenish, or yellowish white; column similar in colour, or bright red; pedicel with ovary slender, 1-2 cm long. Sepals oblanceolate, acute, 10-15 x 37 mm. Petals obovate or broadly oblanceolate, equalling or a little longer than the sepals, 5-10 mm. Lip obovate or rhomboid, widest above the middle, acute, 15-20 x 7-15 mm; spur slender, incurved, slightly thickened in the apical half, 2.3-4 cm long. Column short and thick, 2-3 mm long; androclinium slightly sloping; rostellum projecting straight downwards; pollinia ovoid; stipe considerably widened in the upper half, viscidium oval or round. Capsule 2-2.5 cm long.

Montane forest and on coffee bushes near swampy areas; 1900-2200 m. KF SD BA; Central African Republic, Cameroun, Zaire, Uganda, Kenya and Tanzania. *Meyer* 8874a; *Mooney* 8729; *Seeger* 2518.

The typical variety from Zaire differs from var. *rhodosticta* in having a creamy white column.

2. *A. thomsonii* (Rolf) Schltr. (1918);

Angraecum thomsonii Rolfe (1897) - type: Kenya, Thomson 131 (K holo.).

Aerangis friesiorum Schltr. (1924) - type: Kenya, Fries 2561 (UPS holo.).

Stem woody, up to 10 mm in diameter, 10-100 cm long, usually upright, at least in the terminal leafy part, covered with old leaf-bases in the lower part from which whitish roots up to 9 mm in diameter arise. Leaves 8-20, alternate, distichous, 1-3 cm apart, ligulate, 8-28 x 1.5-4.5 cm, apex unequally lobed, the lobes rounded or obtuse, the longer 5-10 mm long, the shorter up to 5 mm long or absent, fleshy or leathery in texture, deep green, margins entire. Inflorescences borne at the nodes, arching racemes bearing 4-10 flowers; peduncle cylindrical, up to 9 x 6 mm in diameter, bearing 2-3 tubular sheaths; rachis more or less straight, green, to 20 cm long, with a short projection, 2-3 mm long, in the axil of each bract; bracts very broadly triangular-ovate, obtuse or apiculate, cucullate, 10-15 mm long. Flowers held erect in 2 rows, 1.5-3.5 cm apart, white; pedicel with ovary green, 3-6 cm long. Dorsal sepal erect, sometimes curving forward at the tip, lanceolate-elliptic, cuspidate, 22-30 x 7-9 mm; lateral sepals strongly reflexed, lanceolate-elliptic, acuminate, winged on the back in the upper half, 25-32 x 5-6 mm. Petals reflexed, oblique, lanceolate-elliptic, acute, 20-25 x 6-8 mm. Lip reflexed, elliptic-lanceolate, acuminate, margins recurved below, inrolled above, 20-25 x 7-8 mm; spur pendulous, flexible/zigzag, cylindrical but widened and flattened in its terminal half, 10-15 cm long. Column

erect, widened towards the apex, 6-8 mm long; anther-cap conical, rounded; pollinia oblong; stipe very slender, 3 mm long; viscidium round. Fig. 200.47.

Growing in shady places, usually somewhat low down on trunks and branches in montane forest; 1600-2600 m (in E. Africa). KF SD; Uganda, Kenya and Tanzania. *Meyer* 7869.

3. *A. kotschyana* (Rchb.f.) Schltr. (1918);

Angraecum kotschyianum Rchb.f. (1864); *A. kotschyi* Rchb.f. (1880), misspelling of *A. kotschyana*; *Aerangis kotschyi* (Rchb.f.) Rchb.f. (1881); *Rhaphidorrhynchus kotschyi* (Rchb.f.) Finet (1907) - type: Ethiopia, Kotschy 449 (W holo.).

A. grantii Baker (1873); *Aerangis grantii* (Baker) Schltr. (1918) - type: Sudan, Grant 716 (K holo.).

A. semipedale Rendle (1895) - type: Kenya, Rabai, W.E. Taylor s.n. (BM holo.).

Stem stout and woody, upright, up to 15 x 20 cm, bearing numerous greyish roots 7-9 mm in diameter. Leaves 3-20, distichous, very close together, obovate-oblong, 6-20(-30) x 2-8 cm, base attenuate, apex unequally or subequally bilobed, the longer lobe subobtuse or acute, up to 12 mm long, the shorter lobe rounded or absent, fleshy or leathery in texture, the margins undulate. Inflorescences axillary, often several, arching or pendent racemes bearing up to 20 flowers; peduncle cylindrical, up to 12 cm long; bracts triangular, ovate, up to 8 mm long. Flowers in 2 rows, 2-3 cm apart, white, often tinged with salmon pink at the centre and in the tips of the perianth; pedicellate ovary pinkish green, 2-3 cm long. Dorsal sepal erect, or arching forward over the column, elliptic-lanceolate, apiculate, winged on the back near the tip, (12-)20-25 x 9 mm; lateral sepals spreading, lanceolate, winged on the back near the tip, apiculate, (14-)20-28 x 7 mm. Petals strongly reflexed, oblanceolate, apiculate, 10-23 x 8 mm. Lip deflexed, subpendulate, apiculate, winged on the back near the tip, margins strongly recurved in the lower half, 2 prominent crests on the upper surface in front of the mouth of the spur, (10-)15-20 x 8-15 mm; spur pendulous, thickened in its lower third and curved or twisted just below the middle, becoming more twisted as the flowers age, 13-22 cm long. Column thick, 3-6 x 5 mm; rostellum porrect, straight or slightly curved; pollinia ovoid; viscidium oblanceolate. Capsule 3-5 cm long, up to 1.5 cm in diameter.

Growing on old trees in humid wooded grassland, woodland, and sometimes in forests; (sea-level in E Africa) 1500 m. EW GD; Guinea, Nigeria, Burundi, Central African Republic, Rwanda, Zaire, Sudan, Kenya, Tanzania, Uganda, Zanzibar, Malawi, Mozambique, Zambia and Zimbabwe. *Kotschy* 449; *Pappi* 9010.

4. *A. somalensis* (Schltr.) Schltr. (1918);

Angraecum somalense Schltr. (1906) - type: GG, without locality *Ruspoli & Riva* s.n. (B holo.).

Stem short, upright, bearing numerous greyish, flexible/zigzag roots, 5-7 mm in diameter. Leaves 2-6,

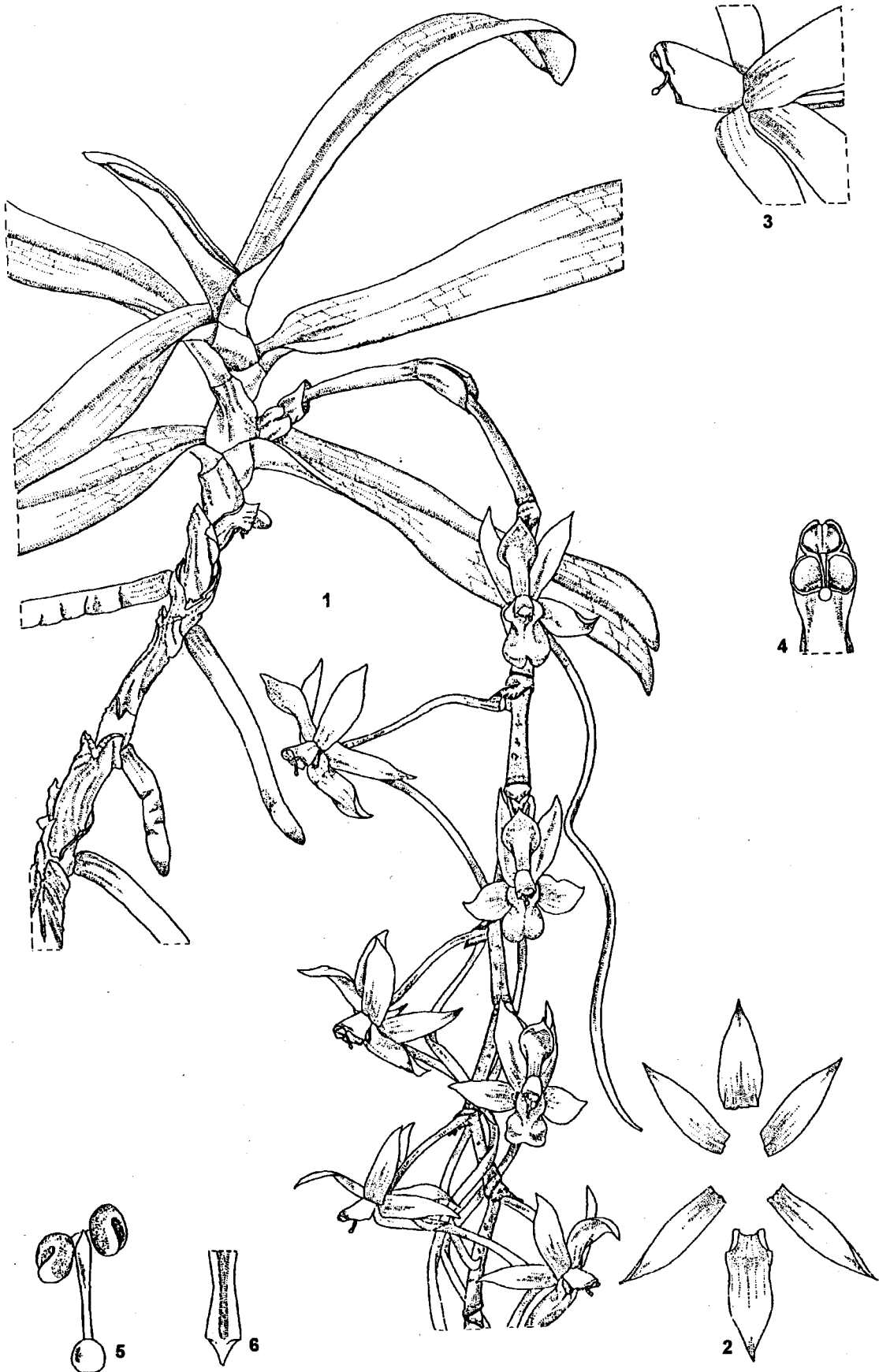


Figure 200.47 *AERANGIS THOMSONII*: 1 – complete plant in flower $\times 2\frac{1}{2}$; 2 – sepals, petals and lip $\times 2\frac{1}{3}$; 3 – column and base of perianth, side view $\times 2$; 4 – column, front view $\times 2$; 5 – pollinarium $\times 7$; 6 – rostellum $\times 7$. All from *Greenway & Kanuri*. Drawn by L.S. Cowan. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig 133.)

distichous, oblong-ligulate, 2–11 x 1.3–3.4 cm, leathery, greyish green, with a markedly reticulate venation darker coloured and raised on the upper surface, conspicuous even in the dried state, unequally or subequally bilobed at the apex, the lobes subacute or rounded, 5–15 mm long, margins thickened and undulate, sometimes the whole leaf with a pink or reddish cast, others pale green. Inflorescences arising below the leaves, usually several, 10–20 cm long, bearing 4–17 flowers; bracts brownish, ovate, up to 5 mm long. Flowers white, sometimes tinged with pink, 1–2 cm apart; pedicellate ovary 1.5–2 cm long. Dorsal sepal arching forward over the column, ovate, concave, apiculate, 8–10 x 4–6 mm; lateral sepals oblique or reflexed, oblong-ligulate, concave, apiculate, 9–14 x 3–5 mm. Petals spreading, oblong-apiculate, 8–11 x 3–5.5 mm. Lip oblong-ligulate, the margins reflexed in the lower half, apiculate, 9–13 x 4–7 mm; spur straight or slightly curved, sometimes slightly inflated in the lower half but narrowing again towards the tip, 10–15 cm long. Column more or less thick, to 4 mm high; anther-cap slightly beaked; pollinia globose, 0.8 mm long; stipe slender but enlarged in the upper third; viscidium ovoid, 1–1.5 long with outer margins rolled over the pointed rostellum. Fig. 200.48.

On trees and at the base of branching shrubs in relict patches of woodland along streams and near rock outcrops in essentially dry areas; 1000–1200 m. GG; Kenya, Tanzania, Zimbabwe and South Africa (Transvaal). *Ruspoli & Riva* 223 & 1648

5. *A. brachycarpa* (A. Rich.) Th. Dur. & Schinz (1892); *Dendrobium ?brachycarpum* A. Rich. (1850); *Angraecum brachycarpum* (A. Rich.) Rchb.f. (1852) – type: GD, Wogera, *Schimper* 1314 (P holo., K FI iso.).

Angraecum rohlfsianum Kraenzl. (1882); *Aerangis rohlfsiana* (Kraenzl.) Schltr. (1918); *Rhaphidorhynchus rohlfsianus* (Kraenzl.) Finet (1907) – type: Ethiopia, Wadi Woina, *Rohlf's & Stechert* s.n. (B holo., W iso.).

Angraecum carusianum Severino (1916); *Aerangis carusiana* (Severino) Garay (1972) – type: Ethiopia, *Caruso* (not seen).

Stem woody, upright or pendent, up to 20 cm long but usually much shorter, bearing greyish roots 5–6 mm in diameter. Leaves 4–12, alternate, usually distichous, 5–12 mm apart, obovate or spatulate, up to 25 x 2–6 cm, with a sheathing base and unequally bilobed apex, the lobes rounded or acute, the longer up to 12 mm long, fleshy or leathery in texture, dark green and often black-dotted, margins entire. Inflorescences axillary racemes, arching or pendent, up to 40 cm long, bearing 2–12 flowers; peduncle cylindrical up to 10 x 3 mm, bearing 2–3 tight sheaths; rachis slightly zigzag, gradually tapering, greyish green, black-dotted; bracts triangular, acute, up to 9 mm long, enclosing a small outgrowth of the rachis 1–2 mm long. Flowers in 2 rows, 1.5–3.5 cm apart, pale green when first opening, becoming white, and often with a pink or brownish tinge in the

petals and spur. Sepals often with the margins recurved so that they appear very narrow. Pedicel with ovary straight or arching, 3.5–7 cm long. Tepals all narrowly lanceolate, acuminate, 20–45 x 4–8 mm; dorsal sepal erect, lateral sepals and petals becoming sharply reflexed within a few days of the flowers opening. Lip deflexed, 5–10 mm wide near the base, narrowing gradually or abruptly at a point about one-third from the tip to a slender acumen; spur straight or slightly curved, pendulous, gradually tapering towards the tip which is sometimes minutely bifid, 12–20 cm long. Column slender, cylindrical below, dilated above, 6–8 mm long; androclinium sloping; rostellum porrect; pollinia kidney-shaped, viscidium heart-shaped. Fruit a slender capsule up to 20 cm long.

Growing in dense shade, usually somewhat low down on tree trunks, branches, or in the forking bases of bushes in montane forests and grassland with scattered trees; 1600–2300 m. GD SU WG KF SD; Uganda, Kenya, Tanzania, Malawi, Zambia and Angola. *Ash* 282; *de Wilde* 5253; *Pettersson* 266.

31. *RANGAERIS* Summerh. (1936)

Summerhayes, *Kew Bull.* 4: 435–440 (1949).

Epiphytic or rarely lithophytic herbs with short to long stem entirely covered with persistent leaf-bases; roots emerging along the stem opposite the leaves, somewhat stout, unbranched or little branching. Leaves leathery, distichous, folded together, linear or oblong, unequally bilobed at the apex. Inflorescences pendent or spreading to suberect, usually laxly few to several-flowered. Flowers small to relatively large, usually white or yellowish; pedicel and ovary longer than the bract. Sepals and petals free, subsimilar, spreading to recurved. Lip entire or obscurely 3-lobed, without callus; spur pendent, filiform, elongate from a narrow mouth. Column short to long, glabrous or puberulent, lacking a foot; rostellum bifid; anther cucullate, produced in front and truncate at the apex; pollinia 2, gourd-shaped; stipes 2, linear or oblanceolate; viscidium relatively large, oblong or cordate.

A small genus of about 6 species confined to tropical Africa; only 1 species in the Flora area.

R. amaniensis (Kraenzl.) Summerh. (1949);

Listrostachys amaniensis Kraenzl. (1909); *Leptocentrum amaniense* (Kraenzl.) Schltr. (1918) – type: Tanzania, E Usambara Mts., Amani, *Braun* in *Herb. Amani* 1551 (B holo., K iso.).

Cyrtorchis cufodontii Chiov. (1939) – type: SD, Arero, *Cufodontis* 317 (FI holo.).

Erect to pendent epiphyte or lithophyte, often forming dense clumps. Stems up to 45 cm long, unbranched or little branching, covered by persistent leaf-bases; roots little branched, 3–4 mm in diameter. Leaves leathery, folded together, narrowly oblong, unequally roundly bilobed at the apex, 3.5–11.5 x 1–2.3 cm, articulated to distichous, imbricate leaf-bases. Inflorescences spread-

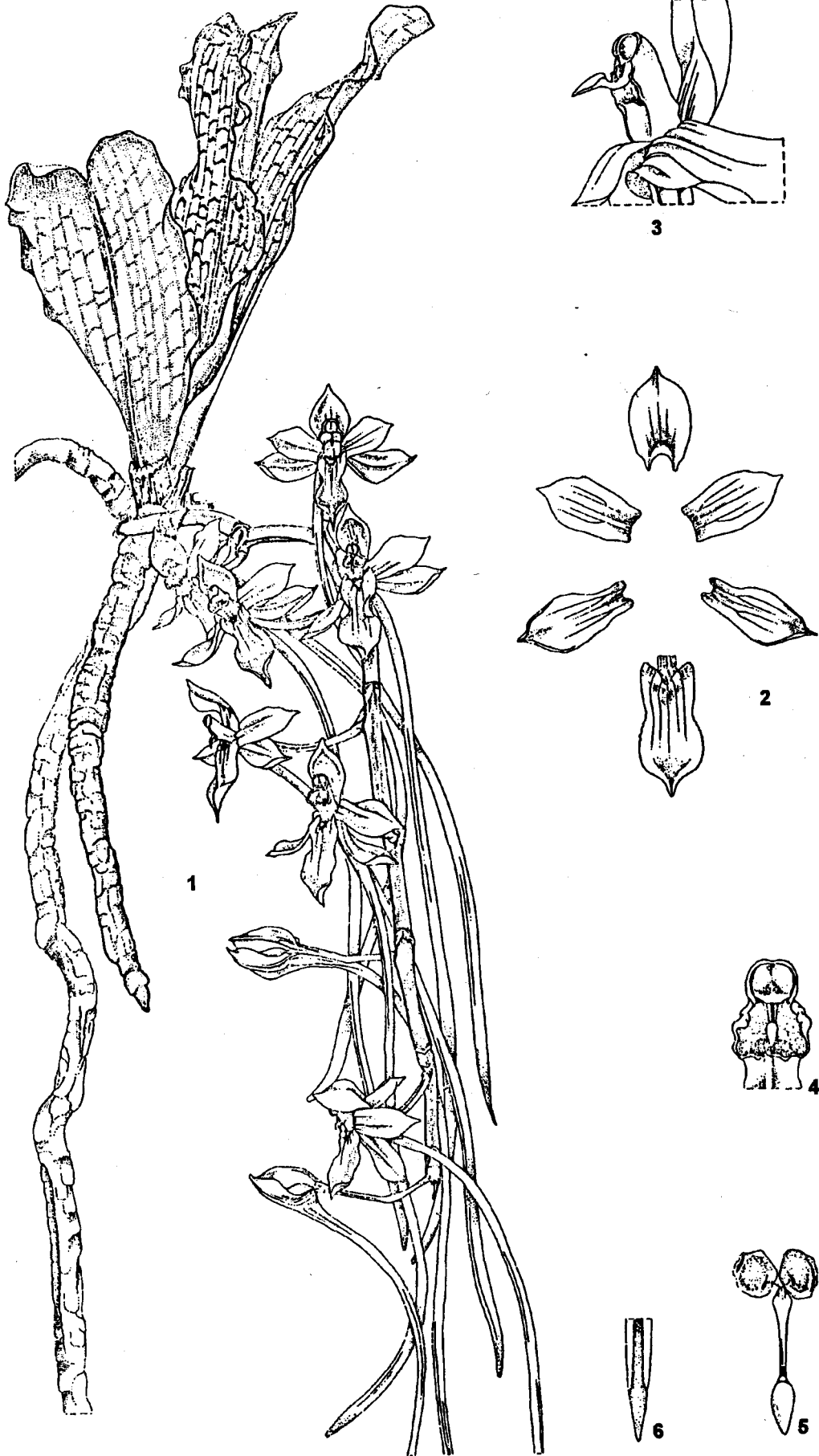


Figure 200.48 *AERANGIS SOMALENSIS*: 1 – leafy stem with inflorescence and aerial roots $\times 2\frac{1}{2}$; 2 – sepals, petals and lip $\times 1\frac{1}{3}$; 3 – column, and base of perianth, viewed from side $\times 2\frac{1}{2}$; 4 – column, front view $\times 3\frac{1}{3}$; 5 – pollinarium $\times 5$; 6 – rostellum $\times 5$. All from *J. Stewart* 1168. Drawn by L.S. Cowan. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig 132.)

ing, 6–9 cm long, 5–13-flowered; peduncle 1–1.5 cm long; bracts 5–6.5 mm long, drying black. Flowers very variable in size, white fading to yellow, greenish on the outer surface and spur, day-time scented; pedicel and ovary 2.5–5.5 cm long, scabrid. Sepals lanceolate, acuminate, 10–25 x 2.7–5.6 mm. Petals lanceolate, acuminate, 9–21 x 2.2–5 mm. Lip obscurely 3-lobed in the middle, 10–24 x 5–11 mm; side-lobes rounded; mid-lobe lanceolate; spur pendent, filiform, 7.5–16 cm long. Column 4.5–5 mm long; stipe bifid, each lobe linear; viscidium oblong. Fig. 200.49.

On trees and rocks in montane forest of *Juniperus procera*, etc. and in open woodland; 1100–2600 m. SD; Uganda, Kenya, Tanzania and Zimbabwe. *Bally* 9218; *Gillett* 14331; *Mooney* 9820.

32. CYRTORCHIS Schltr. (1914)

Schlechter, *Beih. Bot. Centr.* 36: 127–133 (1918); Summerhayes, *Kew Bull.* 14: 143–156 (1960).

Epiphytic or rarely lithophytic herbs with short to long, erect or pendent stems, covered by distichous leaf-bases; roots emerging all along stem, elongate, branching. Leaves distichous, leathery or fleshy, flat or folded together, much longer than broad, unequally bilobed at apex, articulated at base to a sheathing base, deciduous, leaving obvious sharp edges of leaf-bases free. Inflorescences 1-several, usually shorter than the leaves, few to many-flowered, axillary in upper part of stem; peduncle short, often covered by sterile sheathing bracts; bracts usually large. Flowers stellate, sweetly scented, white, sometimes with a greenish, pinkish or brownish spur. Sepals and petals subsimilar, free, linear-lanceolate, acuminate, usually recurved. Lip similar, entire or very obscurely 3-lobed, without callus, with a long tapering spur at the base; spur S-shaped or slightly incurved. Column short, fleshy; rostellum 3-lobed, pendent, outer lobes much longer than the mid-lobe, often papillate towards apex; pollinia 2; stipes 2, oblanceolate; viscidium either hyaline or made up of a hardened saddle-shaped upper part and a hyaline lower part; anther-cap elongated at apex. Fruit a 3–6-winged capsule.

A genus of about 16 species confined to tropical and southern Africa; 2 species in the Flora area.

1. Largest leaves up to 11.5 cm long; bracts 12 mm long. 1. *C. arcuata*
- Largest leaves 13–15 cm long; bracts less than 10 mm long. 2. *C. erythraeae*

1. *C. arcuata* (Lindl.) Schltr. (1914);

Angraecum arcuatum Lindl. (1837); *Listrostachys arcuata* (Lindl.) Rchb.f. (1864); *Angorchis arcuata* (Lindl.) Kuntze, *Rev. Gen. Pl.* 2: 651 (1891) – type: South Africa, Cape Province, Albany, *Drège* 4580C (K holotype).

Epiphytic or lithophytic herb, often forming large masses; stems 15–30 cm or more long. Leaves linear, narrowly oblong or narrowly elliptic, rarely oblanceo-

late, 8–11.5 x 1.5–2 cm. Inflorescences 6–20 cm long, 5–14-flowered; peduncle 1.5–2 cm long; bracts cymbiform, ovate, acute or subacute, 15–33 x 5–17 mm. Flowers white with a greenish spur, sweetly scented; pedicel and ovary 20–40 mm long. Sepals lanceolate, acuminate, recurved, 18–49 x 5–7 mm. Petals similar, 14–27 x 4.5–6 mm. Lip lanceolate, acuminate, recurved, 15–36 x 4–6 mm; spur incurved to somewhat S-shaped, 30–70 mm long. Column 2–2.5 mm long; rostellum pendent 4.5–5 mm long; viscidium bipartite. Fig. 200.50.

Growing on trees and rocks in bushes, woodland and forest; (sea-level in E Africa) 1350–2000 m. KF SD; Sierra Leone to Zaire Uganda, Tanzania, Kenya, Zanzibar and south to Zimbabwe and South Africa. *de Wilde* 11027; *Mooney* 9214; *Vatova* 2141.

2. *C. erythraeae* (Rolfe) Schltr. (1918);

Angraecum erythraeae Rolfe (1897) – types: EW, *Schweinfurth* 387 (K syn., FI iso.) & 2143 (K syn., FI P isosyn.).

Epiphytic herb with an erect leafsystem, up to 22 x 1 cm; roots grey, 3–5 mm in diameter. Leaves leathery, distichous, linear, unequally roundly bilobed at apex, 6–11 x 0.7–1.4 cm, twisted near base; articulated to sheathing, leathery imbricate leaf bases. Inflorescence 1-several, 2–5.5 cm long, shorter than the leaves, 3–5-flowered; bracts ovate, cucullate, acute, 9–15 x 5–9 mm, drying brown. Flowers white, star-shaped; pedicel and ovary 11–24 mm long. Sepals and petals subsimilar, recurved, linear-tapering, acuminate, 12–16 x 2–3 mm; petals slightly falcate. Lip similar to sepals and petals, cucullate, tapering to an acuminate point, 12–14 x 3–4 mm; spur pendent, incurved, 26–32 mm long. Column short; viscidium bipartite.

Growing on branches of *Olea chrysophylla* in dry scrub and secondary forest; 1350–1700 m. EW KF SD; not known elsewhere. *Mooney* 9214, 9877; *Lemma G/Selassie* 90.

33. ANCISTRORHYNCHUS Finet (1907)

Cephalangraecum Schltr. (1918)

Schlechter, *Beih. Bot. Centr.* 36: 137–139 (1918); Summerhayes, *Bot. Mus. Leaflet Harv. Univ.* 11: 203–213 (1944).

Small to medium-sized monopodial epiphytic herbs. Stems short, thick, covered by persistent sheathing leaf-bases; roots elongate, clustered towards the base of the stem. Leaves imbricate, suberect, spreading or recurved, ligulate or tapering to apex, more or less unequally bilobed at the apex, lobes sometimes toothed, leathery or fleshy. Inflorescences axillary from the lower leaves, almost sessile, usually forming globose or ellipsoidal heads; bracts hard to membranous, as long as the flowers. Flowers mostly white, often marked with green on the lip. Sepals and petals free, subsimilar. Lip oblong to orbicular, entire to 3-lobed, spurred at the base, without callus; spur straight to S-shaped or bent, sometimes swollen at the apex and/or the mouth. Column

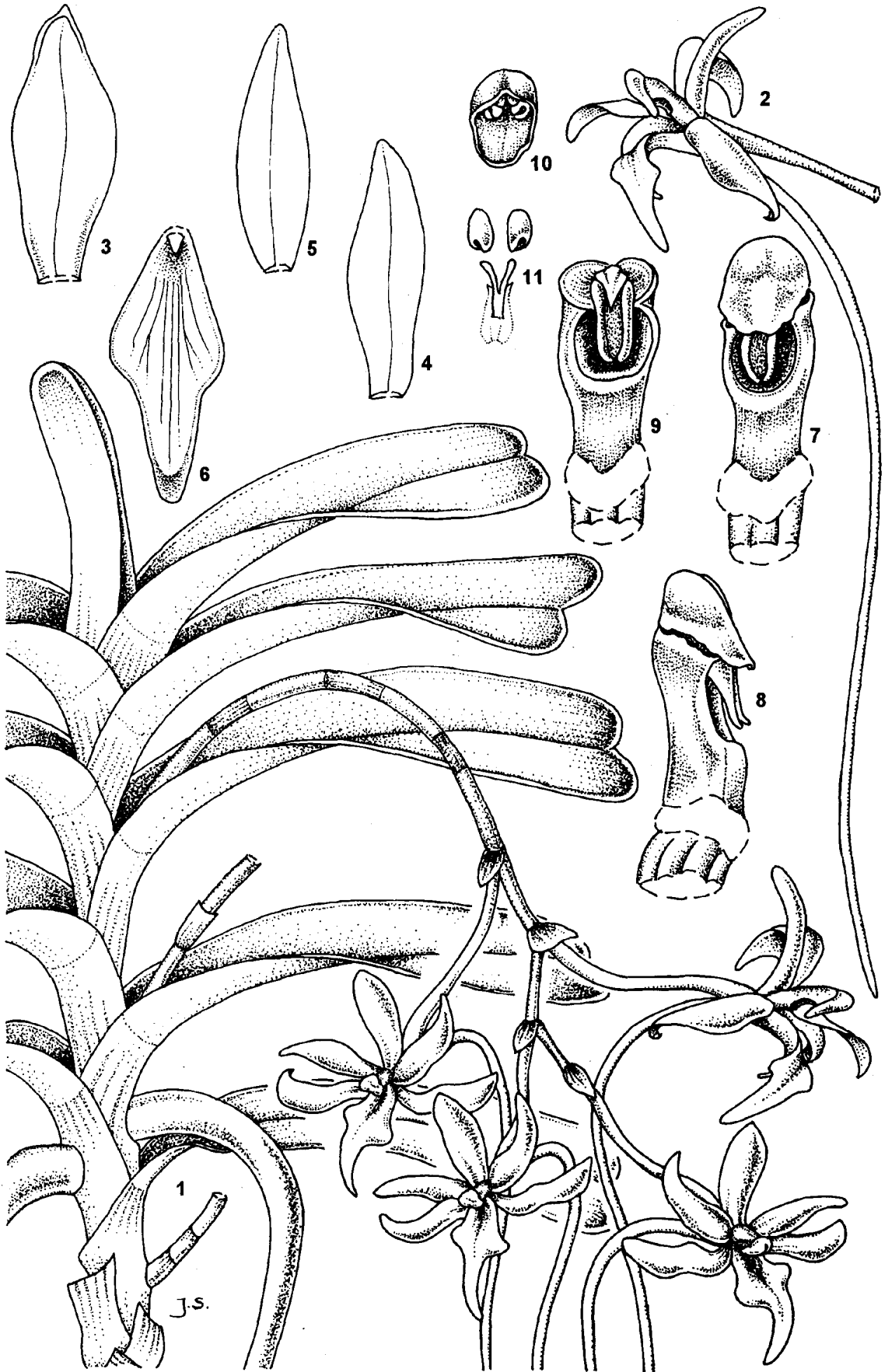


Figure 200.49 *RANGAERIS AMANIENSIS*: 1 – leafy stem with inflorescence x 1; 2 – flower, side view x 1; 3 – dorsal sepal x 2; 4 – lateral sepal x 2; 5 – petal x 2; 6 – lip x 2; 7 & 8 – column, front and side view x 4; 9 – column, front view, anther cap removed x 4; 10 – anther cap, with pollinia x 4; 11 – pollinarium x 4. 1 from *Bally* 9218; 2– 11 from spirit material by *Bally* 12110. Drawn by Judi Stone.

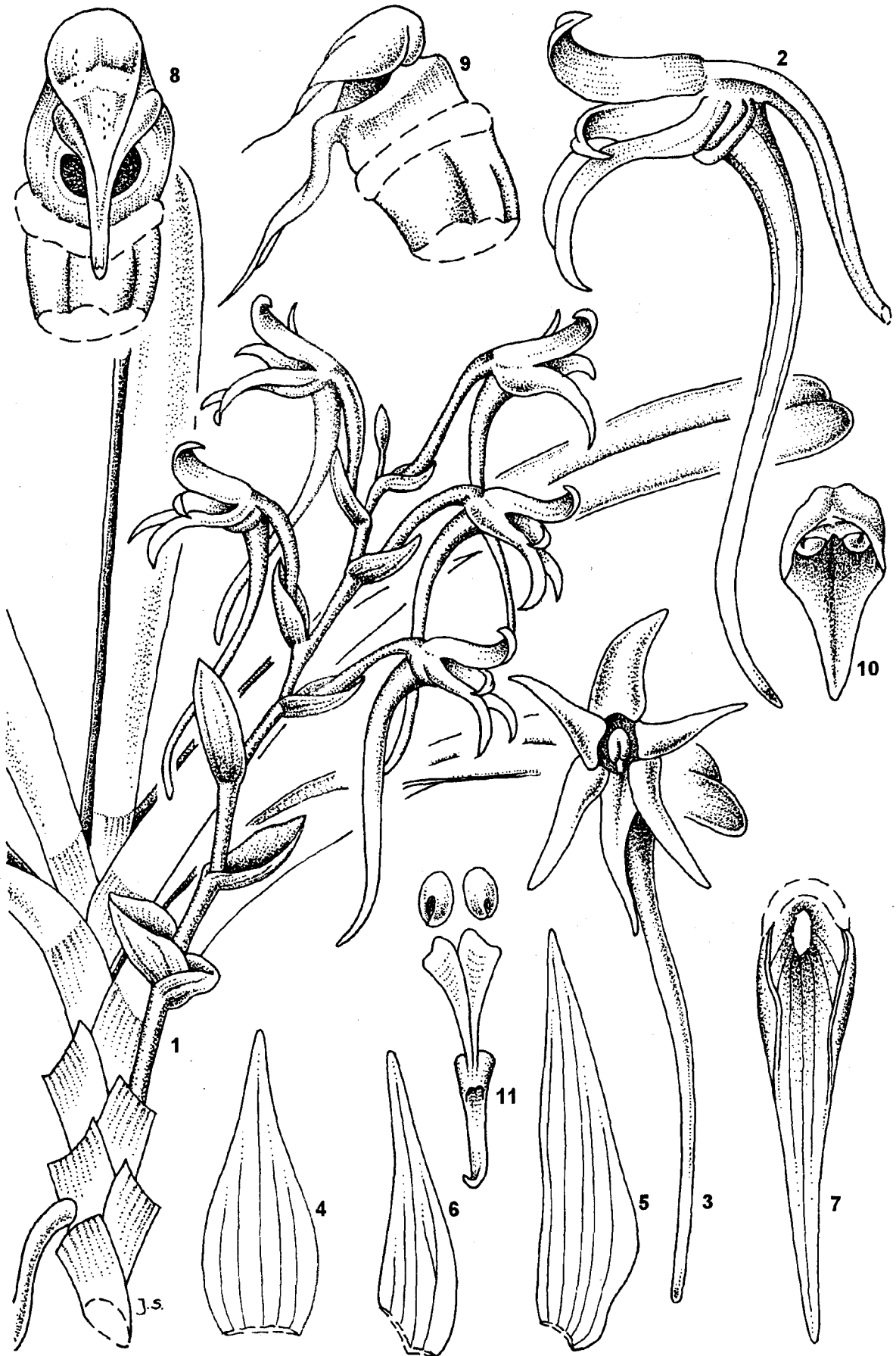


Figure 200.50 *CYRTORCHIS ARCUATA*: 1 – leafy stem with inflorescence x 1; 2 & 3 – flower, side and front view x 3; 4 – dorsal sepal x 3; 5 – lateral sepal x 3; 6 – petal x 3; 7 – lip x 3; 8 & 9 – column, front and side view x 6; 10 – anther cap with pollinarium x 6; 11 – pollinarium x 6. 1 from Mooney 9214; 2–10 from spirit material by Mooney 29270. Drawn by Judi Stone.

short fleshy; rostellum projecting down then abruptly bent in the middle and upcurved in the apical half, 2-lobed, each lobe falcate and acute; anther-cap hemispherical, produced in front into a short truncate appendage; pollinia 2, globose; stipes either 2 and subspathulate-oblancoolate or 1 and bifid; viscidium 1, long and narrow.

A genus of about 16 species widespread in tropical Africa; only 1 in the Flora area.

A. metteniae (Kraenzl.) Summerh. (1944);

Listrostachys metteniae Kraenzl. (1893); *Cephalangraecum metteniae* (Kraenzl.) Schltr. (1918); *Listrostachys braunii* Th. Dur. & Schinz (1895), nom. superfl.; *C. braunii* (Th. Dur. & Schinz) Summerh. (1936) –type: Cameroun, Braun 19 (B holo., K iso.).

Pendent epiphyte with a short stem 2–7 cm long; roots branching, 2–3 mm in diameter. Leaves linear, unequally bilobed at the apex, 16–25 x 1.1–1.6 cm, each lobe 2-toothed, articulated at the base to leaf-sheaths 1–1.5 cm long. Inflorescences densely many-flowered, 1.5–1.7 cm long; bracts papery, ovate, acute, 6–10 x 3–5 mm. Flowers white with a green mark on the lip; pedicel and ovary 4–5 mm long, scabrid. Dorsal sepal elliptic, obtuse, 3.6–5.1 x 2.1–2.3 mm; lateral sepals obliquely oblong, obtuse, 4–5.1 x 2 mm. Petals elliptic-oblong, obtuse, 3.7–4.7 x 1.7–2.4 mm. Lip broadly ovate-subcircular, obtuse, 3.5–4 x 4.3–4.5 mm; spur club-shaped, straight, 3–4.3 mm long. Column 1.6–1.7 mm long; stipes 2, oblanceolate; viscidium linear. Fig. 200.51.

Growing on branches in montane forest with *Aninergia altissima* and in light riverine forest; 900–1300 m. KF; Sierra Leone to Nigeria, the Central African Republic, Uganda and Tanzania. Friis et al. 4037; Moulton 75; Rankin in Ash 3716.

34. ANGRAECOPSIS Kraenzl. (1900)

Holmesia Cribb (1977) non Agardh. (1890)

Microholmesia Cribb (1987)

Schlechter, *Die Orchideen*: 600 (1914), *Beih. Bot. Centr.* 36: 62–181 (1918); Summerhayes, *Bot. Mus. Leaf. Harv. Univ.* 14: 240–261 (1951); Rasmussen, *Norw. Journ. Bot.* 25: 137–144 (1978); Cribb, *Kew Bull.* 32: 175 (1977).

Small epiphytes or rarely lithophytes with short or very short monopodial stems. Roots long, flexible/zigzag, cylindrical or flattened, simple or branching. Leaves distichous, ligulate to oblanceolate, often falcate, unequally bilobed at the apex, sometimes twisted at the base and articulated to imbricate sheathing bases. Inflorescences axillary, 1-several, racemose, few to many-flowered; peduncle wiry, often longer than the rachis; bracts small. Flowers small, white, pale green or yellow-green. Dorsal and lateral sepals similar or dissimilar; lateral sepals often oblanceolate and produced at one side at the base. Petals often joined at the base to the lateral sepals and obliquely triangular. Lip 3-lobed or rarely entire, without callus, spurred at the base; spur sometimes inflated at the apex. Column fleshy, short;

rostellum short or rarely elongate, 3-lobed; pollinia 2, globose; stipes 2, linear or rarely oblanceolate; viscidia 2 or rarely 1, elongate.

A small genus of about 15 species in tropical Africa, Madagascar and the Mascarene Islands; 2 species in the Flora area.

1. Stem less than 5 mm long; inflorescence 4–5 cm long, laxly few to 8-flowered; flowers pale green, yellowing with age; lip entire; spur 14–23 mm long, not swollen at apex. 1. **A. holochila**

– Stem 3–6 cm long; inflorescence 10–20 cm long, many-flowered; flowers white; lip strongly 3-lobed; spur 10–11 mm long, swollen at apex.

2. **A. macrophylla**

1. **A. holochila** Summerh. (1945)

–type: Uganda, Karamoja District, Napak, A.S. Thomas 3646 (K holo.).

Dwarf epiphyte or rarely a lithophyte with a very short stem less than 5 mm long; roots flattened, 2 mm wide. Leaves linear, obtuse, 4–9 x 0.4–0.6 cm, twisted and articulated at the base. Inflorescences 4–5 cm long, laxly few to 8-flowered; peduncle 1–2 cm long, very slender, wiry; bracts ovate, acute, 1–1.5 mm long. Flowers pale green turning yellow with age; pedicel and ovary 5–10 mm long. Dorsal sepal elliptic, obtuse, 3–4.2 x 1.5–2.9 mm; lateral sepals oblanceolate, rounded, 4.5–5.3 x 1.6–2.3 mm. Petals obliquely ovate, obtuse, 3–3.5 x 1.8–2.7 mm. Lip entire, ovate, obtuse, 3 x 1.6–1.8 mm; spur narrowly cylindrical, slightly incurved, 14–22.5 mm long. Column 0.7 mm long; rostellum 3-lobed, short; stipes 2, slender; viscidia 1.

On trees at edge of montane forest in ravine, on trees and on exposed rocks; 1500–2300 m. TU GD SD; Uganda. de Wilde 6698; Gilbert & Getachew 2991; Pettersson 270.

2. **A. macrophylla** Summerh. (1951)

–type: Uganda, Bunyoro District, Budongo Forest, Eggeling 5386 (K holo.).

Pendent epiphyte with a short stem 3–6 cm long; roots verrucose. Leaves 2–4, falcate, linear to oblanceolate, unequally acutely or subacutely bilobed at the apex, 13–33.5 x 2.2 cm, twisted at the base and articulated to imbricate leaf-sheaths, 2–3 cm long. Inflorescences 10–20 cm long, many-flowered; peduncle 6.5–8.5 cm long; bracts triangular, 1 mm long. Flowers white; pedicel and ovary 8–13 mm long. Dorsal sepal elliptic, obtuse, 2.4–2.6 x 2–2.2 mm; lateral sepals spathulate, rounded, 5.5–5.7 x 1.7–1.8 mm. Petals obliquely ovate-triangular, acute, 2.5 x 2.7–3 mm. Lip 3-lobed in the middle, 5.5–6.5 x 4 mm, subauriculate at the base; side-lobes linear-lanceolate, subacute, 1–1.5 mm long; mid-lobe narrowly elliptic, obtuse, longer than the side-lobes, 2.5 mm long; spur incurved, cylindrical, swollen at the apex, 10–11 mm long. Column 1.5–2 mm long; foot 1.5 mm long; rostellum deeply 3-lobed; stipes 2, oblanceolate; viscidia 2, linear. Fig. 200.52.

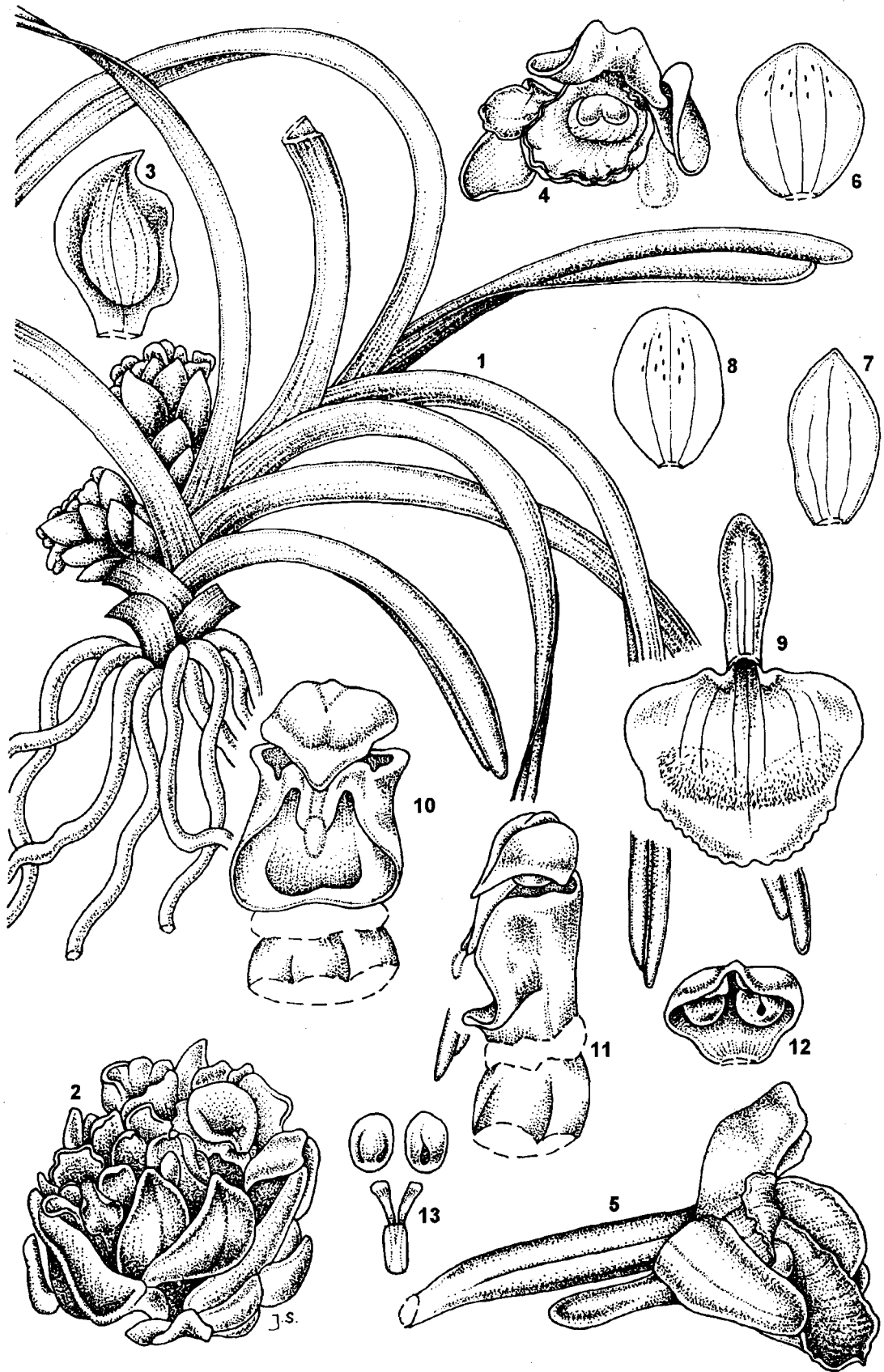


Figure 200.51 *ANCISTRORHYNCHUS METTENIAE*: 1 – complete plant with inflorescences and aerial roots x 1; 2 – inflorescence x 3; 3 – bract x 3; 4 & 5 – flower, front and side view x 6; 6 – dorsal sepal x 6; 7 – lateral sepal x 6; 8 – petal x 6; 9 – lip x 6; 10 & 11 – column, front and side view x 14; 12 – anther cap with pollinarium x 14; 13 – pollinarium x 14. 1 from *Gilbert et al.* 4037; 2–13 from spirit material *Moult* 37714. Drawn by Judi Stone

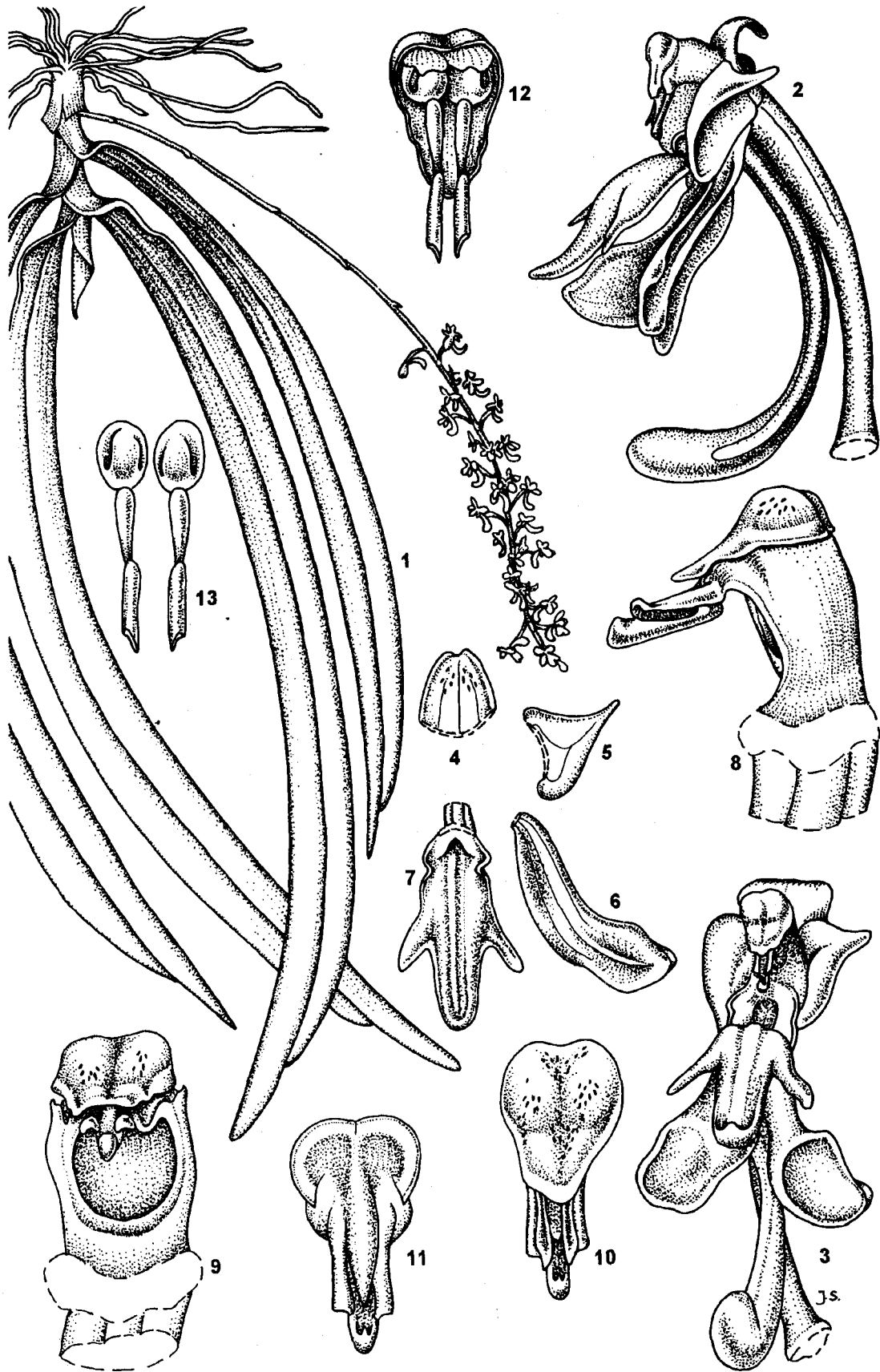


Figure 200.52 *ANGRAECOPSIS MACROPHYLLA*: 1 – leafy shoot with inflorescence and aerial roots $\times 2\frac{1}{2}$; 2 & 3 – flower, side and front view $\times 6$; 4 – dorsal sepal $\times 4$; 5 – petal $\times 4$; 6 – lateral sepal $\times 4$; 7 – lip, spur removed $\times 4$; 8 & 9 – column, side and front view $\times 14$; 10 – column, from above, anther cap in place $\times 14$; 11 – column, from above, anther cap removed $\times 14$; 12 – anther cap with pollinarium $\times 14$; 13 – pollinarium $\times 14$. 1 redrawn from illustration by *F. Perez-Vera*; 2–13 from spirit material by *Eggeling 5368*. Drawn by *Judi Stone*.

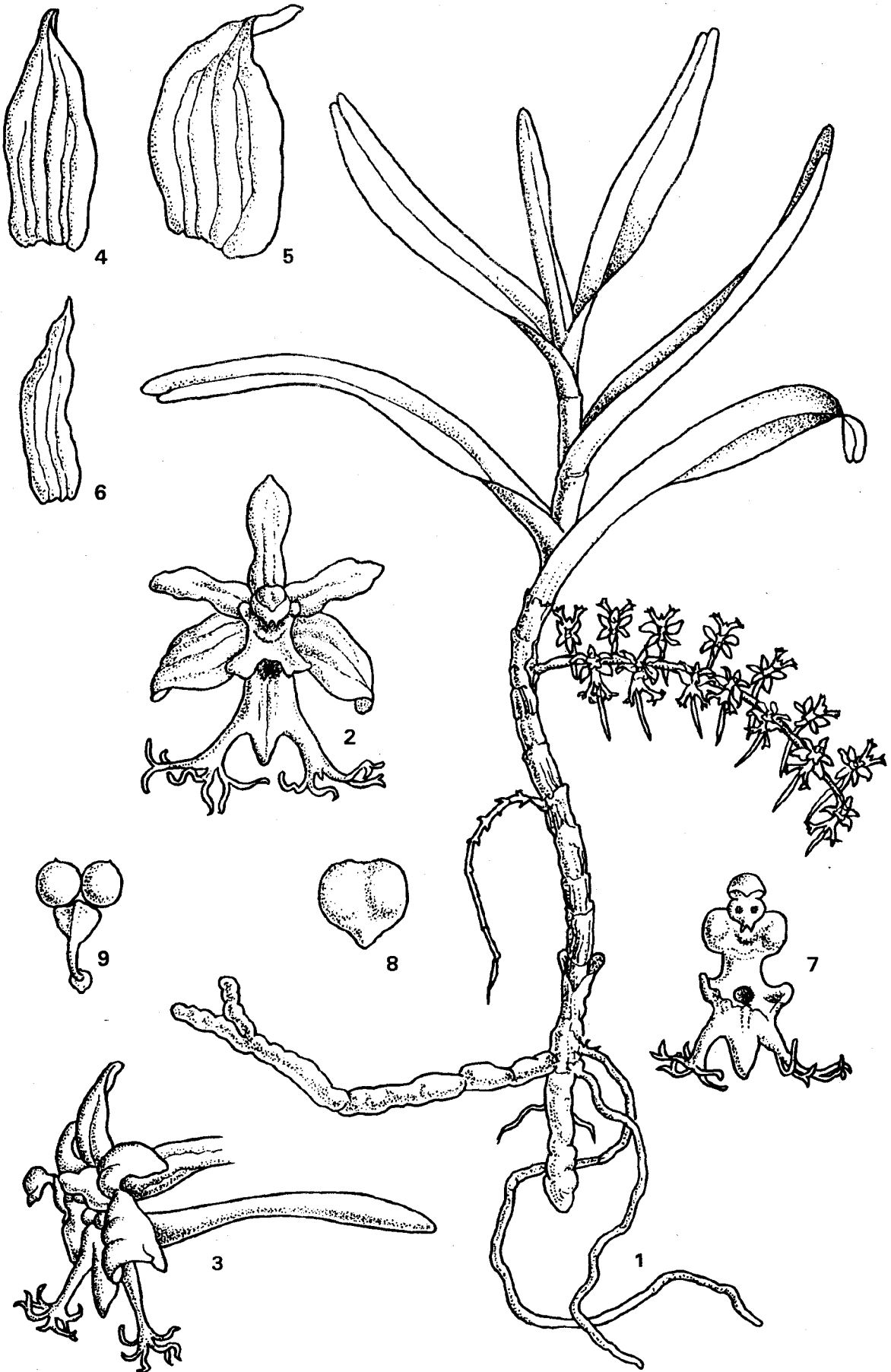


Figure 200.53 *TRIDACTYLE BICAUDATA*: 1 – complete plant with inflorescence and aerial roots $\times 2\frac{2}{3}$; 2 & 3 – flower, front and side views $\times 4$; 4 – dorsal sepal $\times 8$; 5 – lateral sepal $\times 8$; 6 – petal $\times 8$; 7 – lip and column $\times 4$; 8 – anther-cap $\times 13\frac{1}{3}$; 9 – pollinarium $\times 13\frac{1}{3}$. 1 from Lovett et al. 1801; 2–9 from Greenway in Moreau 401. Drawn by Cherry Ann Lavrih. (Reproduced with permission from *Fl. Trop. E. Afr. Orchidaceae*: fig 157.)

On the trunk of a tree by a stream; 1000–1200 m. IL; Ivory Coast and Uganda. *Friis et al.* 4133.

Friis et al. 4133 is a fruiting specimen only. No flowering material of this species seen from Ethiopia. Description from Ugandan and Ivory Coast specimens.

35. TRIDACTYLE *Schltr.* (1914)

Schlechter, *Die Orchideen*: 602 (1914), *Beih. Bot. Centr.* 36: 142–149 (1918); Summerhayes, *Kew Bull.* 3: 281–301 (1948).

Epiphytic or rarely lithophytic monopodial herbs with short to long unbranched or little branched, erect to pendent stems, covered by sheathing leaf-bases. Leaves thin-textured or fleshy, all along stem, distichous, usually twisted at base to lie in one plane, linear to elliptic or narrowly lanceolate, unequally bilobed at apex, articulated at base to a sheathing leaf-base. Inflorescences emerging through the leaf-sheaths opposite the leaves, 2- to many-flowered; peduncle usually short; rachis often zigzag; bracts amplexicaul. Flowers usually somewhat small and seldom showy, white, yellow, orange or green, usually scented; pedicel and ovary short, often covered in fine scaly hairs. Sepals and petals subsimilar, free, spreading. Lip entire to 3-lobed, auriculate at base, with a short to long spur at the base. Column short, fleshy, lacking a foot; anther-cap thin-textured, smooth or papillate; pollinia 2; stipe 1, entire or lobed; viscidium circular or elliptic, usually somewhat small; rostellum elongate, tapering into a slender apex.

About 42 species in tropical and South Africa; 2 species from the Flora area.

1. Leaves flat, 5–13 mm wide; inflorescence more than 3.5 cm long, 8–25-flowered; lip side-lobes fimbriate; spur 11–17 mm long; straight.

1. *T. bicaudata*

– Leaves semi-terete, c 1 mm wide; inflorescence less than 1 cm long, 2–3-flowered; lip side-lobes entire; spur 6–8.3 mm long, incurved.

2. *T. filifolia*

1. *T. bicaudata* (*Lindl.*) *Schltr.* (1914);

Angraecum bicaudatum *Lindl.* (1837); *Listrostachys bicaudata* (*Lindl.*) *Finet* (1907), excl. tab. – type: South Africa, Zwartkopsrivier, *Drège* (K holo.).

Pendent epiphyte often forming large hanging masses on trees; stems 120–800 x 3.5–6 mm, few-branched; roots smooth, 2–3 mm in diameter. Leaves linear, un-

equally roundly bilobed, 9–14.5 x 0.5–1.3 cm, usually twisted at base to lie in one plane or less commonly folded together, articulated to 1–1.5 cm long leaf-sheaths. Inflorescences suberect-spreading, 3.5–13 cm long, 8–25-flowered; bracts amplexicaul, 1–2 mm long. Flowers white, parchment-yellow or greenish yellow, fragrant; pedicel and ovary 2–3 mm long, glabrous. dorsal sepal oblong-ovate, acute or apiculate, 4.4–5.9 x 2.3–3.2 mm. Lateral sepals obliquely ovate, acute or apiculate, 4.7–6 x 2.6–3.6 mm. Petals oblong, acute or obtuse, 3.7–6.2 x 1.2–12.2 mm. Lip 3-lobed in the middle, articulate at the base, 3–5.7 x 8–11.5 mm; side-lobes spreading, linear, spread into finger-like threads at the apex, 3.6–5.5 mm long; mid-lobe narrowly triangular, fleshy apiculate at the apex, 2–2.5 mm long; spur straight, (7.5–)10–16 mm long. Column 1–1.6 mm long; stipe oblanceolate, notched at the apex. Fig. 200.53.

Growing on trees in forest of *Aningeria altissima*, *Morus mesozygia* etc. and in forest partially cleared for coffee plantations; 1050–1200 m. KF; Uganda, Kenya, Tanzania, Zambia, Sierra Leone and south to Zimbabwe and South Africa. *Friis et al.* 3882 & 4050.

2. *T. filifolia* (*Schltr.*) *Schltr.* (1918);

Angraecum filifolium *Schltr.*, *Westafr. Kautsch.-Exped.*: 284 (1900) – type: Gabon, by Sanga R., *Schlechter* 1279 (B holo., K holo.).

Pendent epiphyte often forming large masses. Stem with a few branches, 10–80 cm or more long, 1.2–1.5 mm in diameter; roots basal, smooth, 1–2 mm in diameter. Leaves suberect to falcate, semi-terete, 35–140 x 0.3–1 mm, usually grooved on the upper surface, articulated to 0.8–1 cm long bases. Inflorescences 2–8 mm long, 2–3-flowered; pedicel 1–2 mm long; bracts amplexicaul, triangular, 0.5 mm long. Flowers off-white; pedicel and ovary 2.2–4 mm long, covering in small flat scale-like hairs. Dorsal sepal lanceolate, acute, 2.3–3.3 x 1–1.8 mm.; lateral sepals obliquely ovate, acute, 2.4–3.5 x 1.2–2 mm. Petals linear-lanceolate, acute, 2–2.9 x 0.6–1.1 mm. Lip articulate at the base, 3-lobed in the apical half, 1.7–3.4 x 0.8–2 mm; side-lobes spreading, acute, half the length of the mid-lobe; mid-lobe triangular, acute, spur filiform, incurved, 6–8.3 mm long. Column 0.7–1.2 mm long.

Disturbed forest with much secondary undergrowth; 1050 m. KF; Uganda, Kenya, Tanzania, Zambia, Zaire and Sierra Leone. *Friis, Gilbert & Vollesen* 3899.

201. PONTEDERIACEAE

by Getachew Aweke*

Backer in *Fl. Malesiana*: 259 (1951); Burger, *Families of Flowering Plants in Ethiopia*: 130 (1967); Verdcourt, *Pontederiaceae* in *Fl. Trop. E. Afr.* (1968); Cook, *Pontederiaceae* in *Aquatic Plants of the World*: 482 (1974); Lawalrée & Bruynseels, *Pontederiaceae* in *Fl. d'Afrique Centrale* (Zaire, Rwanda, Burundi): 11 pp. (1981); Getachew A., *Bull. Séanc. Acad. r. Sci. Outre-Mer Meded. Zitt. K. Acad. Overzeese Wet.* 39 (1993-3): 399-404 (1994).

Herbs, floating on or growing in fresh water and rooted in the soil beneath the water surface. Leaves alternate, opposite, or whorled, usually in 2 opposite ranks, simple and entire, cordate at the base, venation pinnate, palmate or subparallel and curved, a distinct leaf-stalk present, the blade floating or more often growing upright out of the water and the base clasping the stem. Stipules absent, or a clasping single stipule-like or ligule-like structure present. Inflorescence subtended by a spathe-like bract. Flowers bisexual and usually somewhat irregular. Sepals and petals 6, alike in size and colour or somewhat different and in 2 whorls of 3 each, free or united to form a tube, imbricate in bud. Stamens 6, 3 or rarely 1, opposite the perianth parts, filaments free, borne at the base of the perianth or on the perianth-tube, equal or unequal in length; anthers 2-thecous, opening by slits or pores. Pistil 1 (carpels 3, united), ovary superior, 3-locular with axile placentation or 1 locular with 3 parietal placentas, ovules many on each placenta; style 1; stigma 1, 6-lobed or papillose. Fruit a capsule opening into the locules, often enclosed in the dry perianth.

About 9 small genera and 25 species, 6 genera confined to the New World; 1 widely distributed in the Old World, including the Flora area. Some species occasionally cultivated as ornamentals.

EICHORNIA¹ Kunth (1843), *nom. conserv.*

Annuals or perennials. Stems floating, creeping, often stoloniferous. Leaves submerged, floating or emergent, linear or stalked; stalk occasionally inflated; blade linear to orbicular. Inflorescence spike-like or paniculate; 2 spathes unlike, the lower leaf-like, the upper bract-like. Flowers di- or tristylis, perhaps also monostylis. Perianth blue, tubular 6-lobed; the adaxial lobe somewhat larger. Stamens 6, anthers subequal. Ovary 3-locular; style elongated, long or short. Fruit a capsule. Seeds numerous.

A genus with 7 species, most of which are found in tropical America; 1 species indigenous in Africa, another naturalised in tropical Africa, Asia and elsewhere. Both these species occur in the Flora area.

1. Leaves all in rosettes floating on the water and connected by submerged stolons; petiole inflated; flowers in spikes. 1. *E. crassipes*
- Leaves inserted along the stems, of two kinds, one type submerged and linear, without leaf-blade, the other floating on the surface, with round to cordate or reniform leaf-blade; petiole not inflated; flowers solitary. 2. *E. natans*

1. *E. crassipes* (Mart.) Solms in *A. DC.* (1883);
Pontederia crassipes Mart. (1824) - type: from 'Brazil'.

Aquatic herb with sympodial branching, floating or creeping, rooting from the nodes. Leaves in a rosette, leaf-blade broadly ovate-rhomboid; petioles inflated, spongy, in young specimens short and very much swollen at or below middle, in adult ones up to 30 cm long, tapering almost from the base, rarely on stolons, alternate, often long and inflated. Inflorescence a long

peduncled spike 5-15 cm long, subtended by 2 bracts. Perianth zygomorphic, lilac-blue, 4-5 cm long. Stamens inserted in the throat of the corolla, or deeper; anthers inserted near the base. Ovary sessile. Fruit a dehiscent capsule. Fig. 201.1.1 & 2.

In still or gently moving fresh water, often preferring micro-habitats in rivers where the current is not too strong and where soil particles tend to settle; 200-500 m. SU IL; a native of Brazil, now widely introduced because of its attractive flowers and naturalised. *Getachew A.* 2817; *Ash* 2372; *de Wilde* 8987.

This is the notorious WATER HYACINTH, which, because of its luxuriant growth and extremely rapid propagation, has become a very troublesome weed locally, covering the surface of water, choking water courses, disrupting hydro-electric installations and sheltering disease vectors. It can change the ecology of an area, affecting the fish, harbouring malaria mosquitoes and snails carrying schistosomiasis.

In Ethiopia, WATER HYACINTH is problematic at Koka Dam along the Awash River, and in Gambela along Baro, Gilo, Pibor and Sobate rivers.

WATER HYACINTH is capable of reproducing both by seed and vegetatively; however, the vegetative method is by far the most important. New plants grow at the ends of the stolons. In this way the plant, under favourable conditions, is capable of doubling its number every 2 weeks and a single plant can be the source of 60,000 offspring in one season.

In other countries, scientists have found an integrated control program which uses biological, chemical and mechanical methods to be the most effective in controlling this weed as no single method works on its own.

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1. also spelt *Eichhornia*



DAMTEW T.

Figure 201.1 *EICHORNIA CRASSIPES*: 1 – floating plant showing inflated leaf bases and an inflorescence x 1; 2 – flower with part of ovary wall removed x 2. *E. NATANS*: 3 – floating plant with aerial leaves x 1. 1 & 2 from *Getachew A.* 2850; 3 from *Gilbert & Friis* 8396. Drawn by Damtew Teferra.

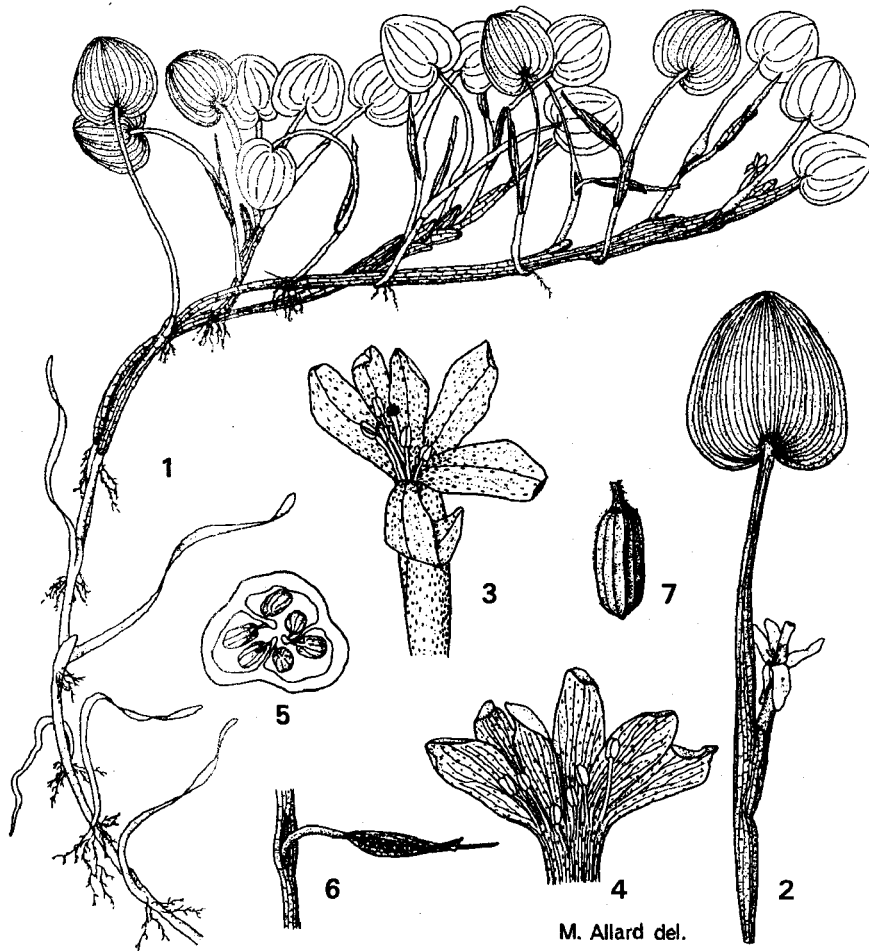


Figure 201.2 *EICHORNIA NATANS*: 1 – complete plant x 1/2; 2 – stem with leaf and flower x 1; 3 – flower x 3; 4 – perianth opened out to show stamens x 3; 5 – cross-section of ovary x 12 1/2; 6 – fruit x 1; 7 – seed x 12 1/2. 1 from *Troupin* 1342; 2–5 from *Gilbert & Friis* 8396; 6 & 7 from *Troupin* 111. Drawn by M. Allard. (Reproduced with permission from *Fl. d'Afrique Cent.*: figure 1.)

2. *E. natans* (*P. Beauv.*) *Solms.* (1882).

Brown & Massey in Fl. Sudan: 384 (1929); *White, The Vegetation of Africa*: 265 (1983).

Aquatic herb, stems floating or creeping in the mud. Submerged leaves sessile, linear, 1–2 cm long; floating leaves petiolate, 5–6.5 cm long; leaf-blade reniform, broadly ovate or orbicular; stipule 8 x 1 mm. Flowers solitary in leaf axils, blue. Perianth inferior; segments 5, united below, blue, 3–4.5 cm long. Stamens 6. Ovary

3-celled; style shortly 3–6 ribbed. Fig. 201.1.3 & fig. 200.2.

Floating aquatic plant in fresh water, rivers and lakes; 600 m. SU IL; from Senegal to Angola and Zimbabwe. *Gilbert & Friis* 8396; *Friis et al.* 7299.

An indigenous species which is not normally troublesome but is regarded as a potential pest in Gambia (West Africa).

202A. VELLOZIACEAE

by K. A. Lye* & Sue Edwards**

Baker in *J. Bot.* 13: 231–236 (1875); Greves in *J. Bot.* 59: 273–284 (1921); Ayensu in *Kew Bull.* 23: 315–335 (1969); Cufodontis *Enum.*: 1580–1581 (1972); Smith & Ayensu in *Kew Bull.* 29: 181–205 (1974); Smith & Ayensu, *Velloziaceae* in *Fl. Trop. E. Afr.* (1975); Thulin, 158. *Velloziaceae* in *Fl. Somalia* 4: 76–77 (1995).

Perennial xerophytic herbs or shrubs, often covered with a distinctive indumentum which includes simple and complex hairs. Stems woody and fibrous, often long and sub-dichotomously branched, covered with persistent leaf-sheaths. Leaves clustered at the end of the stem or branches; sheaths densely overlapping with a v-shaped sinus opposite the blade; blades leathery, narrow and grass-like, parallel-veined, deciduous by a symmetrical transverse line or persistent and gradually decomposing with age. Flowers solitary from the axils of the leaves, regular, parts in threes, bisexual (rarely functionally unisexual in an American genus), usually large and showy; peduncle short or long. Perianth of 6 petal-like tepals in 2 series, but usually almost identical, free or united into a basal tube. Stamens 6 in 2 series or numerous; filaments free and distinct or attached to the perianth-tube or to the tepals, slender or flattened and forming a corolla-like ring; anthers linear, opening by longitudinal slits. Carpels 3, united, 3-locular; ovary inferior with axile placentation; style slender; ovules numerous. Fruit a loculicidal often hairy or sticky capsule. Seeds numerous, flattened.

A family of 6 genera and between 250 and 300 species, most numerous in Brazil and adjacent countries in South America: 1 genus, *Xerophyta*, in Africa, Madagascar and southern Arabia represented by 4 species in the Flora area.

XEROPHYTA Juss. (1789)

Relatively small to large herbs or soft-wooded shrubs. Leaf-blades usually deciduous along a regular transverse line, but one species has persistent blades. Flowers bisexual with uniform perianth; the perianth-tube small, slightly exceeding the ovary; tepals white, yellow, blue or mauve. Filaments flattened and almost completely fused with the tepals so that the anthers appear sessile. Stigmas linear and vertical.

A genus of around 29 species; 3 in Madagascar, 1 in Arabia and the others in tropical Africa. So far 4 species are known from the Flora area with a centre of diversity in the south and southeast where other taxa may be found.

Plants of *Xerophyta* are well adapted for semi-arid to desert conditions by being able to almost completely dry out and then, when it rains, rapidly imbibe water and revive. Many species have striking and distinctive hairs.

1. Plant 20–200 cm tall with well developed branches; leaves with both simple and complex stiff flattened hairs in digitate clusters on lower surface. 4. *X. spekei*
 - Plant usually less than 20 cm tall, unbranched or slightly branched; leaves glabrous or with fine hairs. 2
2. Ovary and fruit covered by globular gland-cells; leaves mostly in a basal rosette, sheaths not distinct, broken up into fibres. 3. *X. humilis*
 - Ovary and fruit densely covered by stiff non-glandular hairs with a broad base; leaves mostly on

stems, sheaths remaining distinct, only splitting up into fibres when old. 3

3. Leaves mostly glabrous, sometimes a few hairs on margins and lower surface; only simple hairs present. 1. *X. schnizleinia*
 - Leaves mostly pubescent; both simple and complex hairs present. 2. *X. rippsteinii*

1. *X. schnizleinia* (Hochst.) Baker (1875);

Hypoxis schnizleinia Hochst. (1844); *Barbacenia schnizleinia* (Hochst.) Pax (1892) – type: GD, Semien, Sabra, *Schimper* 1365 (P holo., K BM iso.).

Xerophyta hildebrandtii (Pax) Dur. & Schinz (1895).

Plant of very variable size, forming tussocks. Stem short or long, 0.5–1.5 cm wide across the sheaths, simple or rarely slightly branched. Leaf-blades usually 5–10 per stem, 5–40 x 0.2–0.7 cm, linear, scabrid on margin and midrib, otherwise glabrous or with a few soft simple hairs on the margins and lower surface; sheaths light to dark brown, outer older sheaths splitting into coarse, usually black or dark brown fibres. Flowers 1–3 at the apex of the stem; peduncles 3–30 cm long. Top of peduncle and ovary densely covered with thick stiff simple hairs. Tepals white with or without a pink or mauve tinge, but drying yellowish to dark brown or almost black, linear-lanceolate, 10–40 mm long. Stamens: anthers yellow, 7–15 mm long. Capsule globose, 7–15 mm in diameter when mature, densely covered by stiff, dark brown, hairs which have a very broad base.

1. Fairly robust plant; stem 1–1.5 cm thick at base; leaf-blade 10–40 x 0.4–0.7 cm, usually straight; peduncle 10–30 cm long; tepals (15–)20–40 mm long; anthers 10–15 mm long; capsule 12–15 mm wide, hairs c 1.5 mm long. var. *schnizleinia*
 - Small plant; stem 0.5–0.8 cm thick at base; leaf-blade 5–15 x 0.2–0.4 cm, often curved; peduncle

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3–10 cm long; tepals less than 10 mm long; anthers 7–10 mm long; capsule 7–12 mm long, hairs up to 1 mm long. var. *somalensis*

var. *schnizleinia*

Fig. 202A.1.1 & 2.

Rock crevices, particularly in lava flows, also on limestone, or sandy or stony soils in grassland or open *Acacia*–*Commiphora* woodland, often on steep slopes; 30–1500 m. EE EW TU GD SU AR KF GG SD BA HA; Somalia, Kenya, Uganda and Nigeria. *Ash* 2454; *Gilbert & Getachew A.* 2953; *Thulin et al.* 3501.

var. *somalensis* (Terracc.) Lye in *Lidia* 3: 143 (1995); *Vellozia schnizleinia* var. *somalensis* Terracc. in *Boll. Soc. Bot. Ital.* 1892: 425 (1892); *Vellozia somalensis* (Terracc.) Chiov. (1911); *Xerophyta somalensis* (Terracc.) Menezes (1971) – type: HA, Gerar-Amaden, *Baudi di Vesme & Candeo* s.n. (FT holo.).

Fig. 202A.1.3.

In shallow soil pockets on rocks or dry sandy open habitats in low rainfall areas; 300–750 m. HA; not known elsewhere. *Ellis* 340, 375.

The coordinates (40°00' E / 6°50' N) given in the publication of var. *somalensis* (Lye, 1995) are very close to those of Goba town (39°59' E / 7°01' N) which is in the Bale Mountains at an altitude much above that where this taxon has been found. Friis, *A List of Botanical Collectors in Ethiopia* (1982) gives a summary of the travels of Conte E. Baudi di Vesme and G. Candeo. They visited '... the territory of the Amaden [tribe and] reached to Ime on the Webi Shebelle river in the territory of the Amaden [tribe] ...'. Imi (42°10' E / 6°28' N) is on the Wabi-Shebelle river, the border between BA and HA. According to a map of the journey made by James & Aylmer in 1885, the Amaden occupied a fairly extensive area (42°15' and 44°00' E and 6°30' and 8°00' N) to the northeast of Imi between the Fafan and Webi Shebelle rivers. Thus the type locality must be somewhere in this area of HA.

Schimper 1365 (the type of *X. schnizleinia*) is labelled as *Schnizleinia amica* Steud., but this name was never published. The specific epithet is sometimes found spelt as 'schnizleiniana'.

Cufodontis gives *Xerophyta somalensis* (Terracc.) Cufod. (1972) as a *comb. nov.*, but this is pre-dated by the combination made by Menezes.

X. schnizleinia has the widest distribution within the Flora area of all the species recorded and shows considerable variation. Some collections do not fit easily into the present treatment. *Gilbert* 3984 has slender stems 0.6 cm wide with the sheaths forming an almost continuous cover, leaves 0.3 cm wide and tepals 30 mm long. One plant from this gathering (3984A) has an entirely glabrous ovary. Another (*Gilbert* 2173) has leaves 0.4 cm wide, stem 1 cm wide and tepals 14 mm long. It was collected at 1360 m in the Abbay (Blue Nile) gorge. Further collection and study are needed to sort out the taxonomy of the infraspecific variation in this species.

2. *X. rippsteinii* Smith, *Lebrun & Stork* (1986)

– type: BA, west of Wachsen, *Rippstein* 1131 (US holo. not seen, K iso.).

Plant forming fairly dense tussocks of unbranched stems from short rhizomes, stem densely covered in persistent fibrous leaf-sheaths. Leaves: sheaths 0.5–1 cm long, brown when young, breaking up into grey fibres when old; blades few, linear, strongly recurved, up to 10 x 0.7 cm, lower surface densely covered with soft cylindrical hairs, some of which are complex with a central disk and digitate clusters on either side, upper surface with simple hairs or glabrous. Flowers solitary; peduncle 2–5 cm long. Top of peduncle and ovary densely covered with thick stiff simple hairs; ovary *c* 5 mm long. Tepals 6, linear, 15–25 mm long, apex obtuse to acute. Stamens with the base of the anther attached to the corresponding tepal; anthers linear, *c* 12 mm long. Style cylindrical with 3 long unequal stigmatic surfaces. Capsule 10 mm wide, as wide or wider than it is long. Mature seeds not seen. Fig. 202A.2.

On coarse sandy soil with outcrops of whitish-grey rock, locally common with *Sporobolus ruspolianus*; 400–500 m. BA; not known elsewhere. *Gillett & Hemming* 24411; *Kuchar* 16931.

3. *X. humilis* (Baker) Th. Dur. & Schinz (1895);

Vellozia humilis Baker (1889) – type: S Africa, Transvaal, *Burke* 122 (K holo.).

Small plant with a short, compact, underground (rhizome) stem which branches to form dense tussocks. Leaves all at ground level in dense rosettes mostly represented by their sheaths; blades 2–6 x 0.1–0.2 cm, stiff, thick and flat when fresh, somewhat curved and strongly folded when dry, often dark purple with a distinct midrib, glabrous but strongly scabrid on margin; leaf-tip rather long and sharp; leaf-sheaths (hidden behind the old ones) thick and leathery, up to 2 cm wide with many nerves, when old splitting into coarse fibres often connected by thinner cross-fibres. Flowers solitary; peduncles slender, up to 5.5 cm long, with scattered globular stalked and sessile glands; ovary densely covered with small sessile globular glands. Tepals 7–10 (–15) mm long, oblong-lanceolate, outer with a mucronate tip, lower parts with scattered globular glands. Anthers linear, *c* 3 mm long. Fruit subglobose, 4–6 x 5–8 mm, covered by numerous irregularly globular glands. Fig. 202.1.4 & 5.

In shallow soil and crevices on large granite inselberg and also in *Commiphora* bushland on red soil; 1300–1400 m. SD; southern Sudan, Zambia, Botswana, Namibia and S Africa (Transvaal). *Gilbert & Sebsebe D.* 8739; *Gilbert & Jefford* 4537; *Nordal et al.* 2244.

3. *X. spekei* Baker (1895)

– type: Tanzania, Tabora District, *Grant* 628 (K holo.).

Large plant with a well developed and branched, somewhat woody, trunk up to 0.2–2 (–5) m tall, up to 10 cm wide at the base; branches covered in discrete leaf-

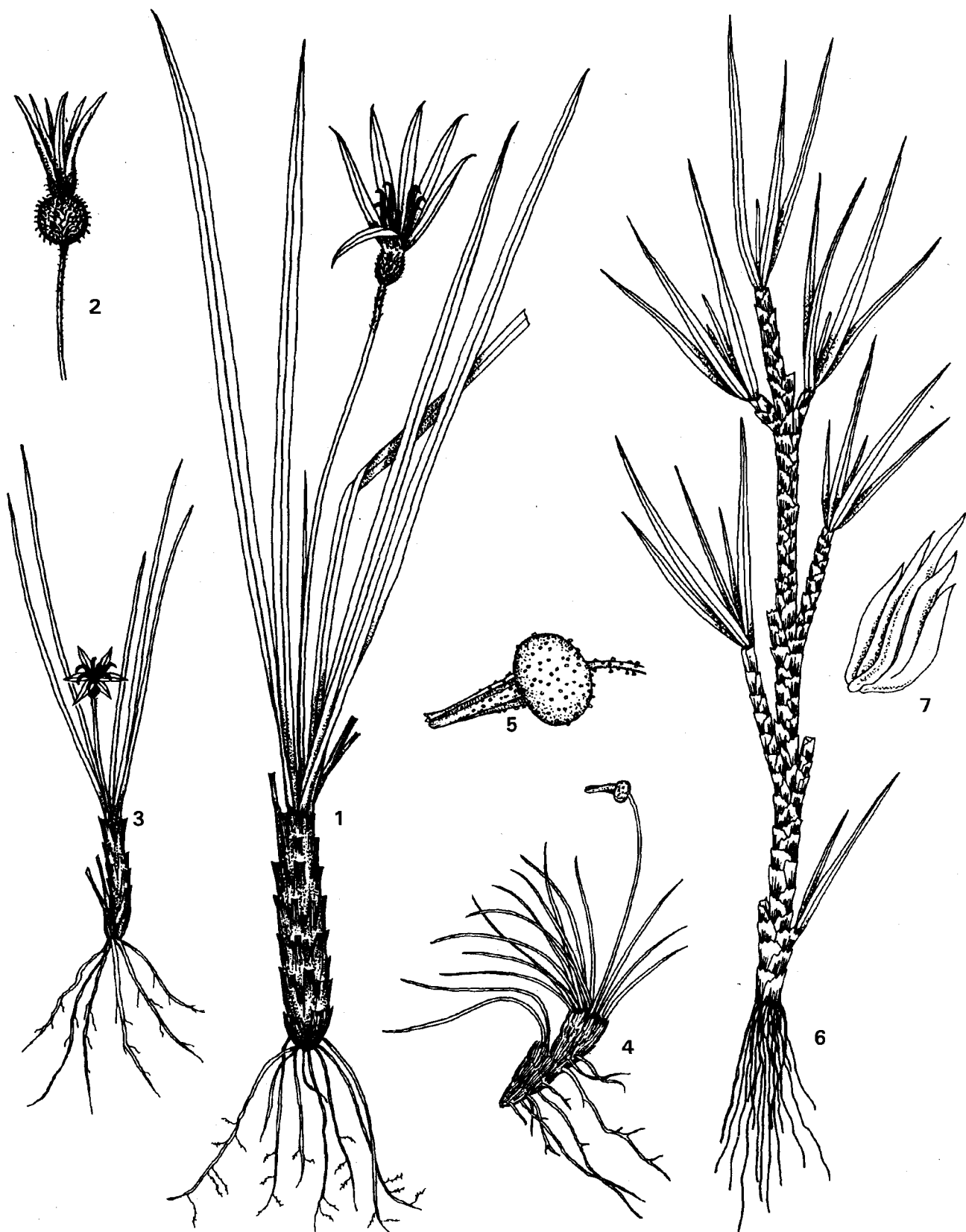


Figure 202A. 1 *XEROPHYTA SCHNIZLEINIA* subsp. *SCHNIZLEINIA*: 1 – complete plant in flower $\times \frac{1}{2}$; 2 – hairy fruit with persistent perianth $\times \frac{1}{2}$. *X. SCHNIZLEINIA* subsp. *SOMALENSIS*: 3 – complete plant in flower $\times \frac{1}{2}$. *X. HUMILIS*: 4 – plant in flower with part of underground stem $\times \frac{1}{2}$; 5 – fruit covered with globular glands, with persistent perianth $\times 2$. *X. SPEKEI*: 6 – main stem with leafy branches $\times \frac{1}{2}$; 7 – digitate hair-cluster from lower part of leaf-blade $\times 150$. 1 & 2 from *Ash* 2454; 3 from *Ellis* 340; 4 & 5 from *Gilbert & Sebsebe D.* 8739; 6 & 7 reconstruction from *Ruspoli & Riva* 1029(1025). Drawn by Gerd Mari Lye.



Figure 202A.2 *XEROPHYTA RIPPSTEINI*: 1 – plant with massive leaf-sheath and solitary flower x 2½; 2 – part of flower opened up to show central style with 3 stigmatic surfaces and 2 stamens at the base of the tepals x 4; 3 – leaf apex x 2½; 4 – hair from the ovary x 17; 5 – details of a leaf x 2½. All from the type, *Rippstein* 1131. Drawn by Madame I. de Zborowski. (Reproduced with permission from *Bull. Mus. natn. Hist. nat.*, Paris, 4^e sér., 8, section B, *Adansonia*, no. 3: Pl. 1, 1986.)

sheaths. Leaves: blades linear to filiform, green or brownish, 7–30(–70) x 0.2–1.2 cm, densely covered with white hairs beneath, some of these hairs in digitate clusters, soon becoming glabrous above, somewhat scabrid with stiff hairs towards apex, along margins and midrib beneath, some of these hairs also in digitate clusters; sheaths only breaking up at the base of the stem, convex, shiny dark brown at the base, keeled with the mid-nerve enlarged into a broad rounded projection, densely covered with simple and complex stiff white or golden-brown hairs towards the apex. Flowers 1–3 together at top of stem; peduncles 2–8 cm long with widely spaced glandular hairs; ovary ellipsoid, 0.5–1 cm long, densely covered with almost sessile, globular glands. Tepals 20–35(–50) cm long, white to pale blue, lilac or mauve, linear-lanceolate, apex acuminate to

rounded or retuse-apiculate. Filaments broadly triangular, almost completely united with tepals; anthers 13(–20) cm long. Fruit subglobose, up to 15 mm long. Fig. 202.1.6 & 7.

Rocky outcrops in dry areas; 300(–1900) m. ?SD ?BA; Kenya, Tanzania and Zambia. *Gillett* 12635.

This species occurs in N Kenya and was collected at Dandu on the Ethiopian/Kenyan border (*Gillett* 12635).

Ruspoli & Riva 1029(1025) is a very striking but sterile specimen collected in 1893 among dry rocks, near the Web river (BA). The leaf-sheaths and leaves are densely covered with digitately-branched white and golden hairs. This could represent a new taxon related to *X. spekei*, but flowering and/or fruiting material are needed to confirm its identity.

202B. BROMELIACEAE

by Sue Edwards & Mirutse Giday*

Purseglove, *Tropical Crops: Monocotyledons*: 75–91 (1972); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 329–333 (1985); Heywood, *Flowering Plants of the World*: 294 (1993).

Mostly terrestrial or epiphytic, rarely climbing herbs, semi-woody plants or small trees, often with elaborate peltate hairs used for absorbing water. Roots in epiphytes used for climbing. Stem often grows downwards below ground where it is covered with a thick periderm. Leaves spirally arranged, often forming a rosette, linear, broadly subulate, lanceolate, or rarely ovate; margins often dentate or spiny; apex often with a thorny tip; base often broad and sheathing, forming a structure to catch and hold water, particularly in epiphytes which are called 'tank plants'. Inflorescences terminal on erect leafy stems, simple or compound spikes, racemes or thyrses, often with brightly coloured bracts. Flowers generally radially symmetrical, rarely somewhat bilaterally symmetrical. Tepals 6, more or less unequal, outer generally sepal-like, smaller than inner, green or hyaline, free or somewhat united; inner petal-like, often brightly coloured with blue, violet, red, yellow, white or green. Stamens 6; filaments narrow, free from each other, inserted at base of free tepals or joined with the short perianth tube at the base; anthers basifixed or peltate, usually long and linear. Ovary trilocular; style slender. Fruit often fleshy. Seeds rather small and often winged.

A large family of over 50 genera with around 1520 species native to tropical and warm temperate America, extending from the southern USA, through Meso-America south to central Argentina and Chile. Only 1 species possibly native to West Africa and 1 very widely cultivated species grown in the Flora area.

The epiphytes in this family make up a conspicuous proportion of the epiphytic flora in equatorial and tropical rain forests of tropical America. Many of these species are also grown as ornamentals. Species of *Puya* grow above the tree line on the 'alto-plano' of the Andes mountains. These plants have a similar growth form to the giant *Lobelia* of the Afro-alpine zone in eastern Africa.

ANANAS (L.) Adans. (1763)

Bentham & Hooker, *Genera Plantarum* III: 662 (1880); I.H. Burkill, *A Dictionary of the Economic Products of the Malay Peninsula, Vol. 1 (A-H)*: 149–155 (1966); H.M. Burkill, *The Useful Plants of West Tropical Africa, ed. 2, families A-D*: 298–299 (1985).

Herbs with somewhat woody stems, sprawling or erect to 80 cm long. Leaves forming a dense terminal rosette, narrow, lanceolate, somewhat fleshy, with a waxy covering; margins serrate; apex spiny. Inflorescence a dense terminal raceme. Sepals free, keeled with a wide base, apex acuminate. Petals erect, united with the filaments at the base; often with 2 small scales at the base. Stamens 3 or 6, anthers linear, shorter than the petals. Ovary inferior, fleshy, often sunk into the rachis of the inflorescence. Fruit a large, sugar-rich, fleshy structure formed from the fusion of the floral parts and inflorescence axis. Seeds small, ovoid to oblong, somewhat compressed.

Genus of 3 or 5 species with its centre in Brazil. It includes the widely cultivated PINEAPPLE.

A. comosus (L.) Merr. (1917)

Bromelia comosa L. (1754).

A. sativus Schult. f. (1830)

Perennial herb 50–150 cm tall with short, thick, erect stems; internodes short, often with adventitious roots wind round the stem. Leaves numerous, sessile, fleshy

and fibrous, crowded into a rosette, longest leaves in the middle up to 100 cm long or more and 5–8 cm wide at base, upper surface smooth, curved, channelling water to stem and base of plant; under surface silvery white, covered with flat-topped, multicellular hairs; margin with few to many spines, depending on variety; apex elongated and spine-tipped. Inflorescence a compact spike of very many (up to 200) flowers, each subtended by a pointed bract; peduncle 7–15 cm long. Sepals 3, short, fleshy. Petals 3, narrow, free but held together with only a small opening at the top, base white, purple or red to blue above. Stamens 6, half as long as petals. Style with 3-branched stigma. Ovary 3-locular with fleshy septa; ovules 14–20 per locule. Fruit formed from the thickened floral axis and fused fruits; outer surface formed from the persistent sepals and bracts; usually cylindrical, c 20 x 14 cm, weighing 1–2.5 kg; top of fruit with a 'crown' of small leaves. Seeds not often formed in widely grown cultivars.

Cultivated; 1000–1700 m. KF SD; originally from Brazil, now widely cultivated throughout the tropics. *Sue Edwards and Mirutse G.* 5355.

The cultivar grown in Ethiopia is probably 'Cayenne' which has almost spineless leaves and a smooth fruit with pale yellow flesh. It never forms seed. While the fruit is developing, axillary buds elongate to form lateral branches or stolons which develop into new flowering branches. If left untended, a plant can continue growing and producing fruit for up to 50 years. However, in cultivation, these branches are usually removed and planted to grow as new plants with the old

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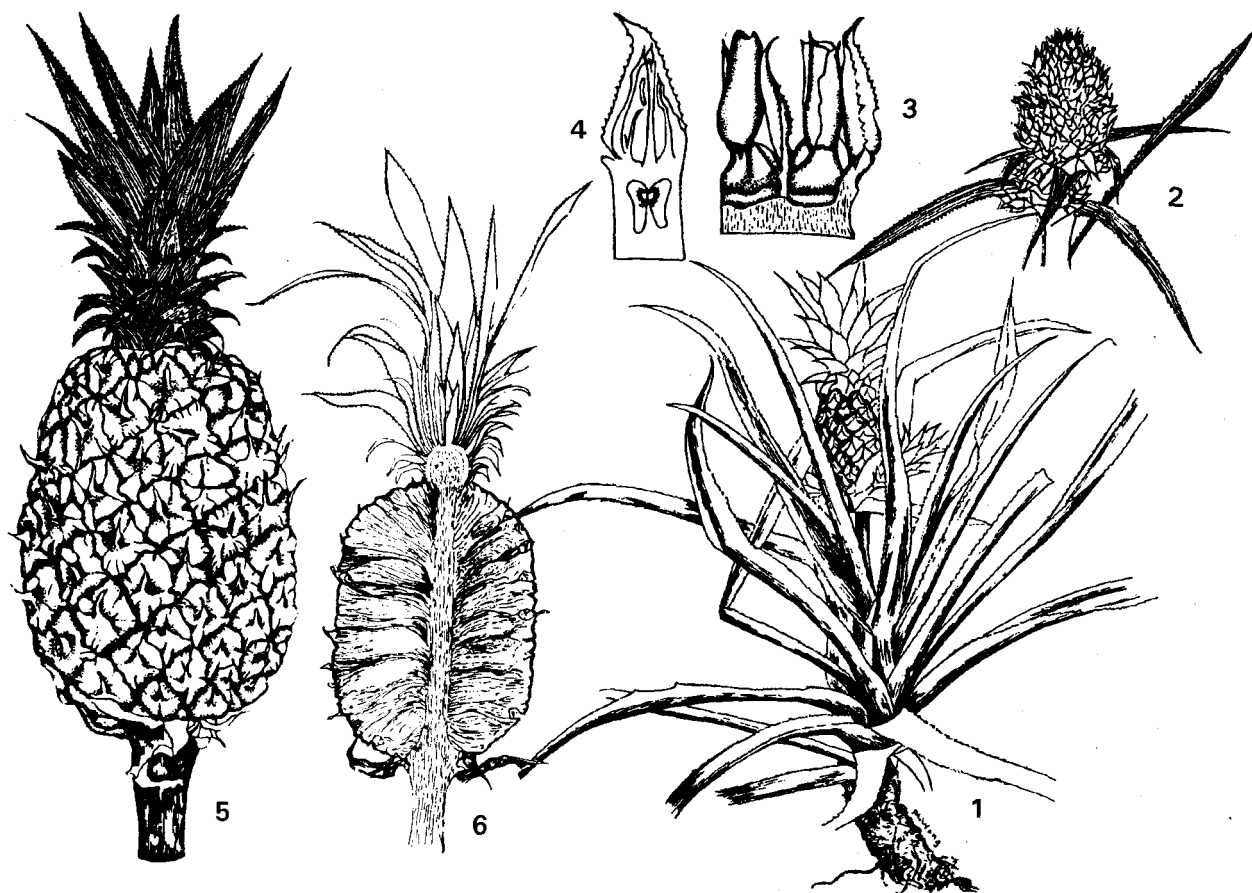


Figure 202B.1 *ANANAS COMOSUS*: 1 - whole plant $\times \frac{1}{10}$; 2 - inflorescence $\times \frac{1}{8}$; 3 - flowers $\times 2$; 4 - flower in longitudinal section $\times 3$; 5 - fruit $\times \frac{3}{8}$; 6 - fruit in longitudinal section $\times \frac{1}{4}$. Drawn by M. Wong. (Reproduced from Purseglove, *loc. cit.*: fig 10)

one being uprooted. New plants can also be grown from the small shoots, called 'slips' which form on the stem below the inflorescence. A new plant can not usually be grown from the 'crown'. Vegetative suckers can also develop from below ground.

The leaves contain about 3 per cent fibre which has similar qualities to flax; it is strong, white and silky. In some countries it is extracted and woven into high quality cloth. Leaves are usually processed fresh, similar to the traditional way in which fibre is taken out of

leaves of *Agave*. Leaves can also be retted and the waste used to make strong paper.

PINEAPPLE is one of the most popular canned fruits with Cayenne being the most suitable cultivar. Sugar can be extracted from the waste which can also be processed to make animal feed.

Unripe pineapple is highly toxic and contains a very strong purge. Ripe fruits and leaves are also used medicinally as they have antihelminthic properties.

203A. MUSACEAE

by K. A. Lye* & Sue Edwards**

Baker, *Fl. Trop. Afr.* VII: 328–331 (1893); Langhe, *J. Agric. Trop. Bot. Appl.* 8: 417–449 (1961); Burger, *Families of Flowering Plants in Ethiopia*: 136 (1967); Cufodontis, *Enum.*: 1592–1594 (1972); Purseglove, *Tropical Crops: Monocotyledons*: 343–384 (1972); Lock, *Musaceae in Fl. Trop. E. Afr.*: 6 pp. (1993); Thulin, 159. *Musaceae in Fl. Somalia* 4: 77–78 (1995).

Large, often tree-like, glabrous perennial herbs with a short rhizome or corm and unbranched, erect, hollow pseudotrunk that are made up of the sheathing leaf-bases. Leaves spirally arranged, large to very large; blade with stout midrib and numerous pinnately parallel nerves, simple and entire at first, often becoming frayed and breaking up with age; petiole with open sheath, clasping the stem at its base; new leaves, formed from meristem near ground level, push up through pseudotrunk in a tightly rolled condition. Axis of inflorescence arising from the corm or rhizome, growing up through the hollow stem, and exerted from the top, often drooping or turned to one side; emergent part of the axis with closely set boat-shaped, spirally arranged bracts; each bract subtending a monochasial cyme. Flowers asymmetrical, bisexual but functionally unisexual; those subtended by the lower bracts female with reduced stamens; those subtended by the upper bracts male with septal nectaries and reduced ovaries. Tepals 6, petal-like in 2 series, free or more commonly united, often quite variable in size and shape. Stamens 5 rarely 6, or the 6th represented by a staminode; filaments slender, free; anthers linear, 2-locular, opening by longitudinal slits. Carpels 3, united to form a 3-locular inferior ovary, ovules 1-many, on axile placentas in each locule; style 1 with usually 3 stigmas. Fruit (a banana) a fleshy or woody berry with a leathery outer pericarp and few-many hard seeds.

A family of 2 genera and about 40 species, widely distributed in tropical and subtropical regions of the Old World and Pacific, cultivated banana found also in the New World; 2 genera represented by 2 species, each with several cultivars, in the Flora area.

Members of two closely related families, *Heliconia* in the *Heliconiaceae*, and *Strelitzia* in *Strelitziaceae* are occasionally cultivated as ornamentals. These two families are sometimes included in the *Musaceae*.

Key to genera

1. Plants producing suckers at their bases; only flowering shoot dying back after fruiting; bracts and flowers inserted independently on the axis; seeds small, rarely produced. **2. *Musa***
- Plants not producing suckers, monocarpic, i.e. whole plant dying after fruiting; bracts and flowers not inserted independently on the axis; seeds large, usually more than 10 mm in diameter. **1. *Ensete***

1. *ENSETE* Horan. (1862)

Robust, tree-like, perennial monocarpic herbs with pseudo-trunk swollen at the base, not producing suckers, except when cut or damaged. Sheaths of the lower leaves sometimes short (rosette habit), sometimes long and forming a pseudostem like that of *Musa*. Inflorescence pendulous with bracts usually persistent. Flowers many to each bract, and in two rows. Fruit rather dry or woody with very little pulp, containing 1–5 large seeds (usually exceeding 10 mm in diameter). Seeds globose or irregular with a conspicuous hilum.

A genus of less than 10 species, most common in tropical Africa; 1 species in the Flora area.

***E. ventricosum* (Welw.) Cheesman (1947);**

Musa ventricosa Welw. (1859) – type: Angola, Welwitsch 6447 (LISU holo., BM K iso.).

M. ensete Gmel. (1791); *Ensete edule* Horan. (1862) – type: Ethiopia, *Icones*, p. 47 in Bruce (1790).

E. ventricosum (Welw.) Cheesman var. *montbeliardii* (Bois) Cufod. in *Enum.*: 1593 (1972); *Musa ensete* Gmel. var. *montbeliardii* Bois in *Bull. Mus. Hist. Nat. Paris*, 2. sér. 2: 688 (1931) – type: SU, near Addis Ababa, *M. de Scøy-Montbéliard* s.n. (P holo. not seen).

Robust perennial with swollen base up to 3 m in circumference. Pseudo-trunk can grow to about 12 m tall, but usually only 2–5 m, basal rosette of leaves only when young; about 40 produced during the life-time of the plant. Leaves oblong to oblanceolate-oblong, up to 7 x 1 m, bright to dark-green, midrib, petiole and margin sometimes pale to dark red or dark-purple, rarely the lower side reddish. Leaves die back before flowering, and after fruiting the whole plant dies. Exserted part of inflorescence axis commonly 1–2 m long, drooping, with strongly sweet-scented flowers inside densely crowded bracts, lower (covering female flowers) 25–40 cm long, brown to deep red-purple. Sepals 3, 3–6 cm long; in female flowers often almost free, linear and only 1–2 mm wide; in functional male flowers united and forming a tubular envelope around young stamens, pushed aside as stamens mature. Petals united, 10–15 mm long (excluding awns, up to 15 mm long), whitish

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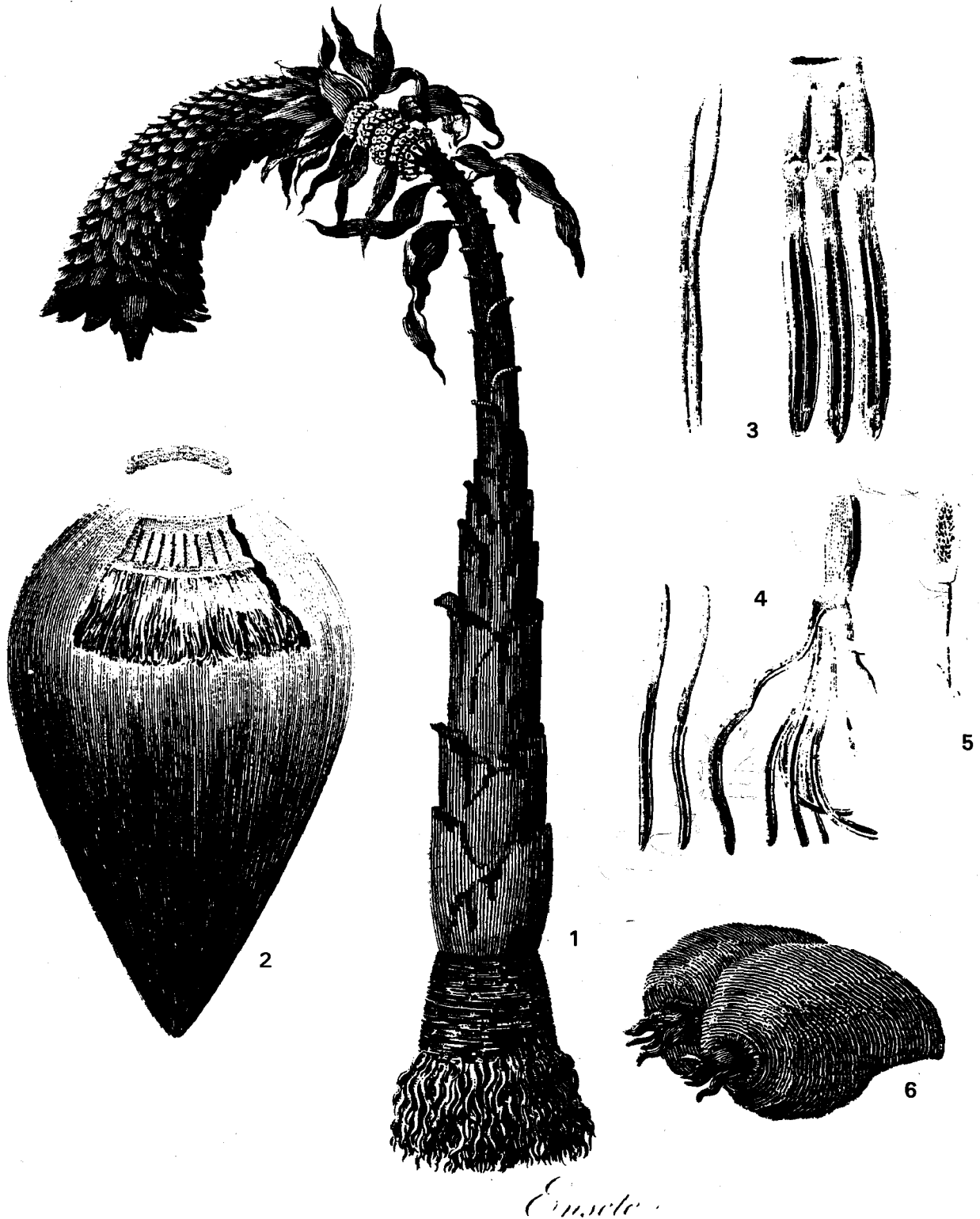


Figure 203.1 *ENSETE VENTRICOSUM*: 1 – mature plant, all leaves dead and cut off, showing the large terminal inflorescence with mature fruits at the base; 2 – bract with a row of male flowers; 3 – detail of stamens; 4 – hermaphrodite flower with smaller stamens and central pistil; 5 – detail of pistil with ovary opened to show ovules; 6 – mature fruits. Drawn by Luigi Balugani. Reproduced with permission of the Yale Center for British Art, from the book *Luigi Balugani's Drawings of African Plants*: plate 45 (1991)



Ensete

Figure 203A.2 *ENSETE VENTRICOSUM*: drawing of complete mature plant showing the large number of leaves with swollen sheathing bases, and a young inflorescence. Drawn by Luigi Balugani. Reproduced with permission of the Yale Center for British Art, from the book *Luigi Balugani's Drawings of African Plants*: plate 318 (1991)

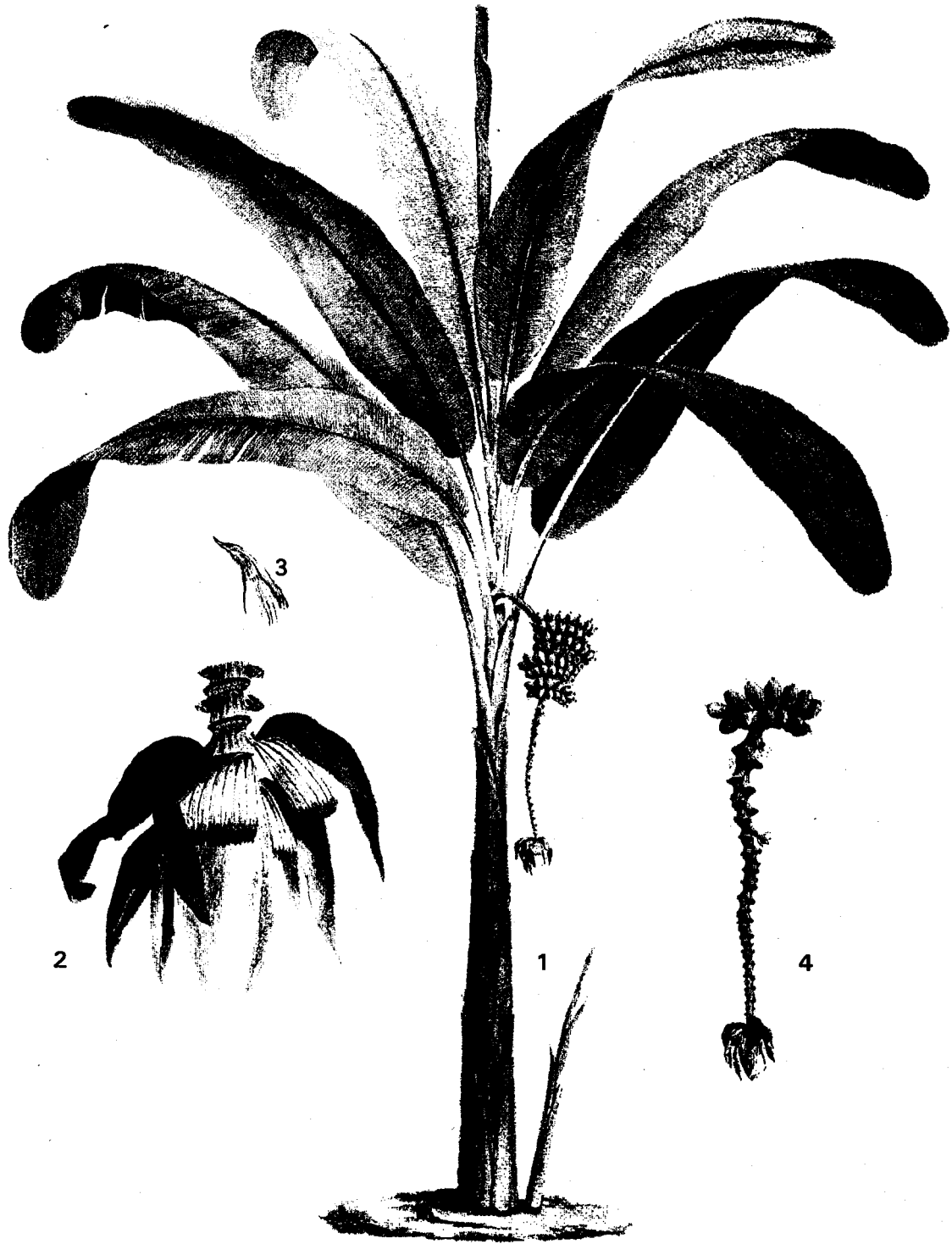


Figure 203A.3 *MUSA PARADISIACA*: 1 – complete plant with a young sucker and mature inflorescence; 2 – tip of the inflorescence showing the deciduous bracts and clusters of male flowers; 3 – detail of a hermaphrodite flower; 4 – inflorescence with almost mature fruits of the type grown by peasant farmers. Drawn by Luigi Balugani. Reproduced with permission of the Yale Center for British Art, from the book *Luigi Balugani's Drawings of African Plants*: plate 46 (1991)

or pale lilac to pink; apex irregularly frayed or dentate, with or without 1-several awns. Stamens 1–6, number varies among flowers on the same plant; fertile anthers 15–35 x 1–1.5 mm. Fruit 8–15 x up to 5 cm, orange when mature, rather dry and fibrous with 1–10 large blackish seeds about 1.5–2.5 cm in diameter. Fig. 203A.2 & 3.

Widely cultivated, wild plants grow in montane and riverine forest, often in clearings, gullies and near streams; (500–)1000–2400 m. TU GD GJ SU WG IL KF, cultivated throughout; widespread in upland regions of tropical Africa south to Angola. *M.G. & S.B. Gilbert* 1949; *Friis et al.* 326; *Zemede et al.* 1018.

This species is cultivated mainly for its edible pseudotrunk and corms which are cut up, pounded and fermented in leaf-lined pits for several weeks after which the resulting material is further processed for eating, commonly after making into a flat bread KOTCHO, or flour for gruel BULLA.

The leaves are the most widely used of all wrapping material, particularly for butter and other products that need to be kept cool and moist. Temporary ovens for baking special bread are made out of Enset leaves on which smouldering dung cakes are placed.

In Ethiopia the fiber of the plant is also widely used for making bags and ropes and for basketry. The strength is, however, less than that of *Musa textilis* or *Agave*, but is said to be resistant to sea water.

The male flowers produce copious pollen and the female much nectar which attract large numbers of honeybees.

2. MUSAL. (1753, 1754)

Cheesman, *Kew Bull.* 2: 97–117 (1948); 3: 11–28, 145–157 (1948), 323–328 (1949); 4: 23–28, 133–137, 265–272 (1949), 445–452 (1950); Simmonds, *Bananas*, 2nd. ed. (1966); Simmonds & Shepherd, *J. Linn. Soc. London, Bot.* 55: 302–312 (1956); Simmonds, *Evolution of Crop Plants*: 211–215 (1976); FAO, *Assistance to Land Use Planning, Ethiopia: Land Evaluation, Part Two: Land Utilization Types*: 184–187 (1984).

Perennial, often tree-like, herbs producing suckers at the base of the pseudo-trunk. Inflorescence pendulous or erect. Bracts of inflorescence usually deciduous. Flowers in a single row or in two rows to each bract. Stamens 5. Fruit soft and fleshy, with numerous small seeds, except in parthenocarpic forms where seeds are usually absent. Seeds cylindrical, lenticular or irregularly globose, usually less than 1 cm in diameter, embryo straight.

A genus of about 30 species in SE Asia and the Pacific, widely cultivated throughout the tropics.

M. x paradisiaca L. (1753)

–type: from 'India.'

M. paradisiaca L. subsp. *sapientum* (L.) K. Schum., in *Das Pflanzenreich* IV, 45: 20 (1900); *M. sapientum* L. (1759) –type: Jamaica, *Sloane* s.n. (not seen).

Tree-like perennial herbs, 2–9 m tall, stem up to 20 cm wide, stoloniferous at the base, but stolons very short, turning upwards as soon as they are clear of the parent plant to produce clumps. Stem completely enclosed by circular leaf-sheaths which are tightly packed to form a pseudo-trunk. Leaves on new suckers first scale-like and then sword-shaped with the lamina gradually widening to produce mature leaves when the sucker is about 6 months old. Mature leaf-blades narrowly oblong, 70–100 x 150–250(–400) cm, bright green, base obtuse or rounded, apex first with a narrow appendage about 10 cm long which soon falls off leaving the tip acute, truncate or notched; petiole 30–90 cm long. Inflorescence a complex spike-like panicle with a thick peduncle which pushes up through the centre of the pseudo-trunk and supports the large hanging panicle over 1 m long; flowers produced in nodal clusters of 12–20, each cluster covered by a large, usually dark red, spathe-like bract which falls off before or just after the flowers have opened; first 5–15 nodes at the base produce female flowers while the upper nodes produce male flowers. Perianth bilaterally symmetrical; sepals 5, united into a 5-lobed structure; petal 1, ovate, generally half as long as the calyx, yellow, cream or white, sometimes pale pink. Male flowers about 6 cm long with 5 stamens; anthers long, well developed, but rarely containing pollen in most cultivars. Female flowers about 10 cm long, with well-developed, 3-locular, inferior ovary longer than perianth; ovules numerous but rarely developed in most cultivars. Fruit a fleshy berry, seedless and bright yellow when ripe. Fig. 203A.3

Cultivated on large irrigated farms and in house gardens throughout the Flora area wherever there is sufficient moisture; sea level to 2200 m. In all regions: throughout the tropics. *Sue Edwards et al.* 5214; *Mesfin T.* 607.

Simmonds has established that the edible bananas cultivated in Africa are either developed from *M. acuminata* Colla or from hybrids between *M. acuminata* and *M. balbisiana* Colla. These have usually been given the specific names *M. sapientum* L. for cultivars where the fruits are sugary and ripen to be eaten fresh as 'bananas' and *M. paradisiaca* L. for the plantains or cooking 'bananas' which are more starchy and are used unripe and ripe. However, these are not true species but triploid interspecific hybrids from which a large range of cultivars have been developed. No study has been made on the genetic make-up of the traditional varieties found in Ethiopia.

Elsewhere in Africa, bananas are cultivated as much or more for their starchy fruits than as the sweet desert banana. In Ethiopia, they are only used as a fruit. Irrigated farms in the main river valleys produce the modern varieties of the Poyo, Giant Cavendish and Dwarf Cavendish types. Peasant farmers grow clones of the 'Red' and 'Green Red' types where the fruits are plump, not more than 3–4 times as long as broad, with a thin skin and sweet musky flesh. These types do not travel well, but can be important in the economy of local groups.

203B. STRELITZIACEAE

by Sebsebe Demissew*

Argent in Walters et al. (eds), *The European Garden Flora 2, Monocotyledons 2*: 119 (1984); Dahlgren, Clifford & Yeo, *The Families of Monocotyledons*: 358 (1985).

Giant or medium-sized perennial herbs or unbranched trees, with well-developed rhizomes or underground stems. Basal leaves in a rosette, stem leaves distichous, usually differentiated into sheath, petiole and blade; blade not developed in some populations (*Strelitzia reginae*), then leaves become spear-like. Inflorescence complex, of one to several lateral, distichously arranged cincinni², in the axil of a large, stiff, lanceolate or boat-shaped bract (spathe) which is often brightly coloured. Flowers more or less bilaterally symmetrical and bisexual. Outer tepals free and equal. Functional stamens 6 (in *Ravenala*) or 5, in which case the median stamen of the inner whorl is staminodial or lacking. Ovary inferior, 3-locular with 2–4 rows of ovules in each locule; placentation axile. Fruit a woody loculicidal capsule with numerous shiny seeds usually enveloped by an aril which consists of a dense hair-like covering or lacinate lobes.

The family is represented by 3 genera *Phenakospermum* Endl., *Ravenala* Adanson and *Strelitzia* Aiton, with a disjunct distribution, occurring in S America, Madagascar and Southern Africa respectively. *Strelitzia* occurs in cultivation in the Flora area.

STRELITZIA Aiton (1789)

Moore & Hyppio, *Baileya* 17: 6574 (1970).

Plants with or without stems. Leaves distichous, sheathing at base, usually large, rarely reduced to a blade-less petiole. Inflorescence arising from a leaf axis, producing a boat-shaped bract (spathe) in which a cincinnus of flowers develops, sometimes secondary inflorescences are produced from the axils of the first. Flowers bisexual, bilaterally symmetrical. Sepals 3, petaloid, lowest boat-shaped towards the base, attenuate above, keeled; laterals attenuate. Petals 3, free, the two lower joined to form a common blade, with a central channel containing the stamens and style; third (upper) petal much smaller. Stamens 5; anthers 2-the-cous, with parallel locules. Ovary 3-locular with many ovules per locule; style with 3 linear stigmatic branches. Fruit a woody 3-angled loculicidal capsule. Seeds few, globose with a woolly aril.

A genus of about 5 species, mainly in Southern Africa, 2 cultivated species in the Flora area.

1. Herbaceous plant, without woody trunks; sepals and petals orange, yellow or red and blue.

1. *S. reginae*

– Plant with a woody trunk; sepals and petals white or pale mauve.

2. *S. nicolai*

1. *S. reginae* Aiton (1789).

Stemless, herbaceous plant to 1.5 m high. Leaves petiolate; petiole 30–100 cm long, oval in cross section, not channeled; blade oblong-lanceolate 25–50 x 10–25 cm, acute to rounded or tapering at the base, margin wrinkled, especially in the lower half. Inflorescence a solitary green or purple spathe, 12–19 cm long. Perianth 10–11 cm long, sepals orange to yellow; petals blue, the

two lower ones 7–7.5 cm long, upper portion joined to form a sagittate blade c 5 cm long including lobes; basal lobes 0.8–1.2 cm long; upper petal 1.3–1.5 cm long. Fig. 203B.1.1–9.

In cultivation; 2000 m. (EW SU site records) HA; cultivated in many parts of the world. Native in south-eastern and eastern part of Cape Province and Zululand in Natal, South Africa. *Demel T.* 430 (sterile).

2. *S. nicolai* Regel & Koernick (1858).

Trunk forming tree to 4 m high. Stems in clumps. Leaves petiolate; petiole up to 200 cm long; leaf-blade oblong or ovate-oblong, up to 150 x 60 cm, base rounded or cordate. Inflorescence axillary with 3–5 bluish red spathes, 30–45 cm long. Perianth 17–20 cm long, outer 3 ('sepals') white, sometimes mauve tinged towards base; inner 3 ('petals') light mauve, bluish white to white, two lower ones 12–13 cm long with base forming a boat-shaped structure, 4–4.5 x 1–1.5 cm with margins inflexed and meeting over the centre, upper portions forming a sagittate blade, 9–10 cm long (including basal lobes); basal lobes c 1.5(–3.5) cm long; upper petal c 1.5 x 0.7 cm. Fig. 203B.1.10–14.

In cultivation; 2000 m. SU; cultivated in many places in the subtropics in both hemispheres. Native of S Africa in the coastal regions of Natal and northern cape province. *Mesfin T.* 486; *Sue Edwards* 5208.

The species is often confused with another trunk forming species, *S. alba* (L.) Skeels, which is also a native of S Africa from the south coast of the Cape Province. *S. alba* has a simple inflorescence and the inner perianth parts ('corolla') are always white, with the lower ones with small auricles (not sagittate).

1. thyse: a more or less ovoid or ellipsoid panicle, with cymose branches.

2. cincinni: flowers opening in succession.

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Figure 203B.1 *STRELITZIA REGINAE*: 1 - habit; 2 - inflorescence $\times \frac{3}{16}$; 3 - single flower $\times \frac{1}{4}$; 4 - flower in longitudinal section, with sepals removed $\times \frac{3}{8}$; 5 - stamens, style and stigma $\times \frac{3}{4}$; 6 - stigma $\times 2$; 7 - ovary in cross-section $\times 1\frac{1}{2}$; 8 - opened capsule $\times \frac{3}{4}$; 9 - seed $1\frac{1}{2}$. *S. NICOLAI*: 10 - base of leaf-blade $\times \frac{1}{4}$; 11 - inflorescence $\times \frac{1}{4}$; 12 - basal part of perianth, showing structure of petals $\times \frac{2}{3}$; 13 - stigma $\times \frac{2}{3}$. (Reproduced with permission from *Baileya* 17: fig. 1 & 3.)

204A. ZINGIBERACEAE

by J. M. Lock*

Cufodontis, *Enum.*: 1594–95 (1953); Lock in Polhill (ed.), *Zingiberaceae in Fl. Trop. E. Afr.*: (1985); Thulin, 160. *Zingiberaceae in Fl. Somalia* 4: 78 (1995).

Herbs, sometimes large, with upright leafy shoots arising from underground rhizomes or corms; all parts aromatic when crushed. Leaves distichous, alternate, simple, entire, often ligulate. Inflorescence arising at the base of the leafy shoots, sometimes below ground level, or from the center of a rosette of leaves (*Curcuma*) and sometimes appearing before the leaves. Flowers zygomorphic, bisexual. Sepals 3, delicate, whitish. Petals 3, the posterior often larger than the laterals, coloured. Androecium probably of three elements, the posterior alone being fertile. Stamen single, with two longitudinally dehiscent subterminal anthers, and a sterile entire or three-lobed apex; staminode petaloid, forming a large entire or three-lobed coloured labellum¹. Ovary inferior, 3-carpellate, with axile placentation; style elongated, with a trumpet-shaped stigma which lies between the apices of the anthers at maturity. Fruit a fleshy 3-locular berry, often large and sometimes (in *Siphonochilus*) subterranean.

About 50 genera and 1300 species, pantropical, but most abundant and diverse in SE Asia. There are 3 indigenous genera and about 60–80 species in Africa. For the Flora area, 2 indigenous genera with 4 species are recorded.

Zingiber officinale Roscoe (GINGER) and *Curcuma longa* L. (TURMERIC) are cultivated in Ethiopia (see Jansen; P.C.M., Spices, condiments and medicinal plants in Ethiopia, their taxonomy and agricultural significance. *Belmontia*, n.s. 12, 1981). *Elettaria cardamomum* (L.) Maton (CARDAMOM) is widely available in spice markets and cultivation has recently been tried in SW Ethiopia. Others, particularly species of *Hedychium* and *Alpinia*, are widely cultivated elsewhere as ornamentals but do not appear to be recorded from Ethiopia.

The family *Costaceae* is here treated separately from *Zingiberaceae*. The spiral phyllotaxy² and the absence of oil cells (therefore no smell) are, among others, useful distinguishing characters.

Key to genera

1. Flowers usually appearing before the leafy shoots; apex of stamen petaloid, much longer than the style and basal anthers; labellum 3-lobed.
 2. *Siphonochilus*
 - Flowers appear after the leafy shoots; apex of stamen 2–3-lobed or short and rounded, or style as long as or longer than the anther crest. 2
 2. Plant appearing stemless, with whorled leaves; inflorescence arising from the center of the leaf whorl; swollen rhizomes orange-yellow inside.
 3. *Curcuma*
 - Plant with elongated stems with distichous leaves; inflorescence lateral; rhizomes pale inside. 3
 3. Labellum 3-lobed; anther-crest simple, tubular; fruit very rarely formed. 4. *Zingiber*
 - Labellum entire; anther-crest three-lobed or rounded; fruits common, large, red at maturity. 1. *Aframomum*

1. AFRAMOMUM K. Schum. (1904)

Lock in *Bull. Jard. Bot. Nat. Belg.* 48: 129–134 & 387–391 (1978), & in *Fl. Trop. E. Afr.* (1985).

Perennial herbs with leafy shoots from underground rhizomes. Leaves present at flowering time. Inflores-

cences pedunculate, 4 to many-flowered, arising at the base of a leafy shoot (which may be of the previous growing season). Posterior petal oblong, retuse; lateral petals narrowly triangular, acute. Labellum suborbicular, entire. Fruit beaked, red at maturity.

An African genus of about 40–50 species, mostly in the wetter areas.

1. Inflorescence at least 10-flowered, on a peduncle at least 15 cm long; flowers small; labellum less than 2.5 cm in diameter; fruits and seeds slightly rough. 2. *A. zambesiacum*
 - Inflorescences 2–6-flowered on peduncles shorter than 15 cm; flowers larger with labellum usually more than 5 cm in diameter; fruits and seeds smooth. 2
2. Leaves with a membranous ligule up to 2 cm long; inflorescence 4–6-flowered on a peduncle up to 10 cm long from the base of a leafy shoot; forest plants, often also cultivated. 1. *A. corrorima*
 - Leaves with a leathery unequally bilobed ligule, the lobes either short and rounded or longer and spirally twisted; inflorescence 2–5-flowered, arising at the base of an old leafy shoot sometimes represented only by its charred base; woodland or grassland plants. 3. *A. alboviolaceum*

3. A. alboviolaceum

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1. labellum: lip-like petal.

2. phyllotaxy: the arrangement of leaves on the stem.

1. *A. corrorima* (Braun) Jansen (1981);

Amomum corrorima Braun (1848) – type: Ethiopia, Schimper (P lecto., not seen).

Amomum korarima Pereira (1849); *Aframomum korarima* (Pereira) Engl. (1908) – type: Ethiopia, Beke (BM lecto.).

Jansen, Spices, condiments and medicinal plants in Ethiopia, their taxonomy and agricultural significance. *Agric. Res. Rep. (Versl. landbouwk. Onderz.)* 906: 10–20 (1981)

Leafy shoots up to 2 m tall. Leaves 10–30 x 2.5–6 cm, elliptic, acuminate, cuneate, almost glabrous; margin entire; sheaths sulcate; ligule up to 3 cm long, bilobed, membranous, sparsely appressed-pubescent. Inflorescence 4–6-flowered, arising singly or two together at the base of a leafy shoot, ascending; peduncle 3–8 cm long; bracts broadly ovate, the upper with broad apically bilobed scarious margins. Calyx spathaceous, 2.7–3.5 cm long. Petals mauve-pink, the posterior 4.5–5 x 2–3 cm long, ligulate, apex trilobed, the apical lobe up to 1.5 mm long, rounded, the laterals *c* 4 mm long, subulate; anthers *c* 9 mm long, the basal 5 mm, dehiscent. Ovary glabrous; style filiform with a trumpet-shaped stigma; stylodia 2, subulate, up to 20 mm long. Fruit indehiscent, 6–7 cm long when dry, including a solid sterile beak *c* 2 cm long and a persistent calyx *c* 2 cm long, red and smooth when fresh. Seeds *c* 2 x 3 mm, depressed-spherical, finely striate. Fig. 204A.1.

Frequent in moist forests, usually in open places and/or in valleys; 1350–2000 m. Range perhaps extended by cultivation. KF IL WG (also SD *fide* Jansen). Reportedly cultivated in the above areas and GD and/or GJ EE and/or EW HA (according to Jansen, *loc cit.*). The species is restricted to Ethiopia and perhaps Sudan (Aloma Plateau). Friis et al. 2133; Mooney 9187; W. de Wilde & B. de Wilde-Duyffes 7788.

The seeds (CORARIMA) are widely used as a spice in preparing BERBERI (hot red pepper sauce), and also to flavour coffee. They also have medicinal uses. The dried fruits (often pierced near the upper end and strung on strings), are traded throughout Ethiopia and also into NE Africa, Arabia and India.

2. *A. zambesiacum* (Baker) K. Schum. (1904);

Amomum zambesiacum Baker (1898) – type: Malawi, Zomba, Kirk s.n. (K holo., P iso.).

Leafy shoots to 2 m tall. Leaves 20–45 x 5–13.5 cm, broadly lanceolate, apex caudate-acuminate; blade glabrous except for the midrib and margins, which are densely appressed-pubescent beneath. Inflorescences 25–50-flowered, rising from the base of the leafy shoots; peduncle bracts papery, ovate. Calyx spathaceous, 1.5–2 cm long. Petals white, the posterior *c* 1.8 x 1 cm, ovate, the laterals *c* 1.8 x 0.7 cm, oblong. Labellum 3.5–4 cm long, the free portion spatulate, *c* 2 x 1.5 cm, creamy-white with a large dull-crimson patch at the base; free filament *c* 1–1.2 cm their whole length. Ovary glabrous; stigma densely hairy. Fruit ovoid, *c* 7 x 4–5 cm, thick-walled, red, with prominent longitudinal ridges. Seeds

5 x 4 mm, irregularly ellipsoid, dark brown, shiny, with a lumpy surface.

subsp. *puberulum* Lock (1978) – type: KF, Bonga, Mooney 8654 (K holo., FI iso.).

Peduncle usually less than 25 cm, shorter than in other areas; peduncle bracts densely appressed-puberulent.

In forests usually in river valleys; 1460–2000 m. KF IL; not known elsewhere. Mooney 8654; Gilbert 2021; Friis et al. 1648.

The nominate subspecies occurs in montane forests in Nigeria, Cameroun, Zaire, Uganda, Kenya, Tanzania and Malawi.

3. *A. alboviolaceum* (Ridl.) K. Schum. (1904);

Amomum alboviolaceum Ridl. (1887) – type: Angola, Welwitsch 6453 (BM holo.).

Aframomum biauriculatum K. Schum. (1904).

Aframomum latifolium K. Schum. (1904).

Leafy shoots to 1.5 m tall. Leaves up to 32 x 9 cm, lanceolate, acuminate, cuneate, glabrous except for minute tooth-like hairs on the margins near the leaf apex; sheaths sulcate, often reticulate towards the base; ligule up to 1 cm long, leathery, bifid, sometimes spirally twisted, pubescent with simple appressed hairs and reddish glands which collapse and become blackish after long drying. Inflorescence 2–5-flowered, arising at the base of an old leafy shoot which may be represented only by its charred base; bracts broadly ovate, usually pubescent near the apex with an indumentum like that of the ligule. Calyx spathaceous 4–5 cm long. Petals pale mauve to almost white, the posterior 4.5–6 x 2–3.5 cm, oblong, concave; the laterals 4–6 x 0.7–1.4 cm, narrowly lanceolate. Labellum *c* 8 cm long, the free portion *c* 6 cm in diameter, suborbicular. Free filament *c* 2 cm long, ligulate, apex trilobed, the apical lobe 2.5 x 5 mm, triangular with a bifid apex, the laterals to 9 mm long, subulate. Ovary glabrous; style filiform with a trumpet-shaped stigma. Fruit up to 10 x 7 cm, ovoid, smooth, with a short beak. Seeds 4–6 x 3–4 mm, ellipsoid, dark brown, shiny.

In open, well-drained woodland and grassland; 1200 m. KF; widely distributed in tropical Africa from Angola, Zimbabwe and north Mozambique to Sudan and Ethiopia, and west to Senegal. Friis et al. 3928; Jansen 6315.

Probably under-recorded as it tends to flower early in the wet season.

2. SIPHONOCHILUS Wood & Franks (1911)

Cienkowskia Schweinf. (1867)

Kaempferia subgen. *Cienkowskia* K. Schum. (1904)

Cienkowskiella Kam (1980)

Burt in *Notes Roy. Bot. Gard. Edinb.* 40 (2): 369–373 (1982).

Perennial herbs from a short rhizome or corm. Roots often tuberous. Leaf sheaths sometimes forming a pseudostem; blade glabrous, elliptic. Inflorescence 2–

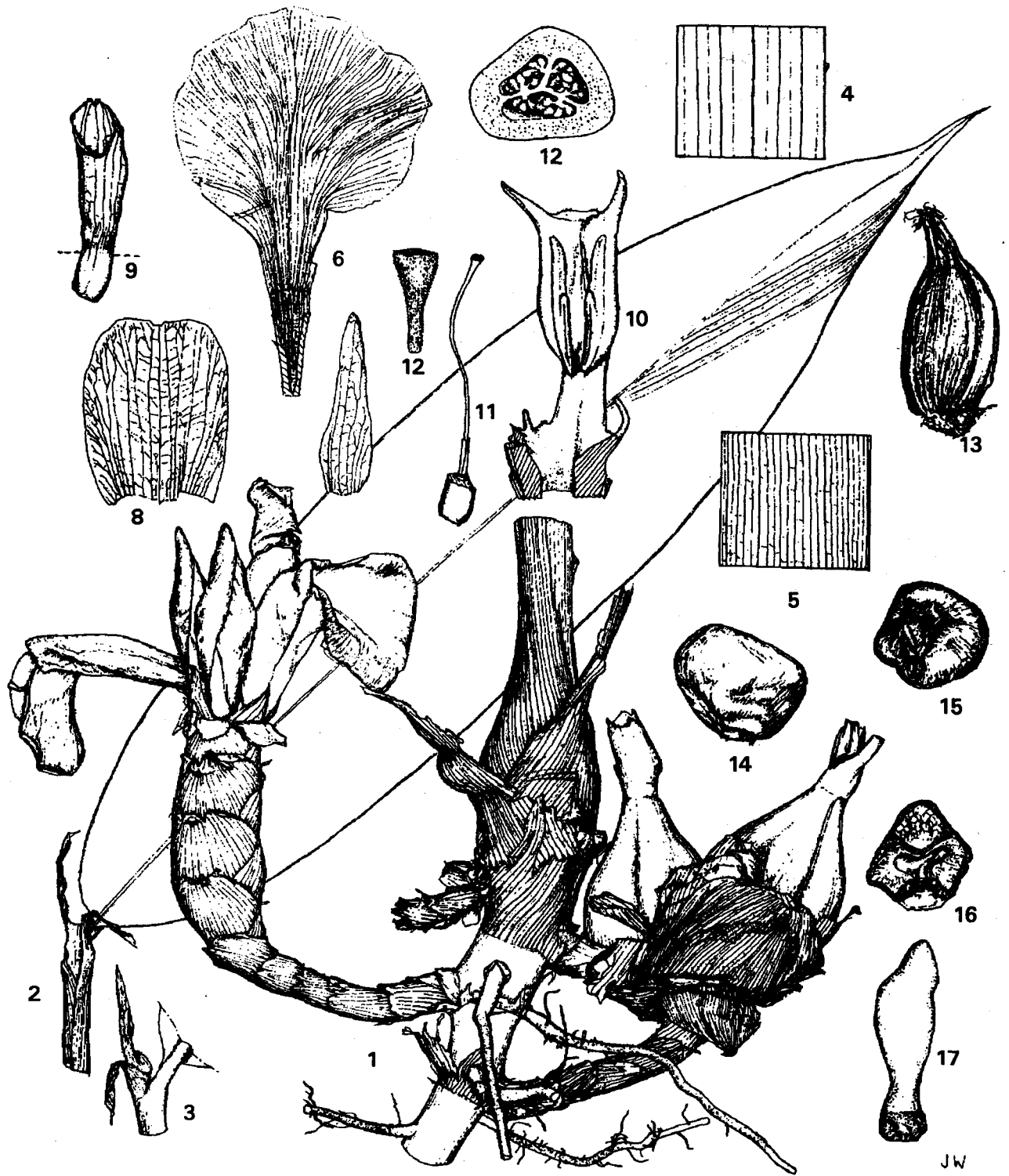


Figure 204A.1 *AFRAMOMUM CORRORIMA*: 1 – basal part of plant showing old sheaths, flower and young fruits x 1; 2 – leaf x 1; 3 – detail of ligule x 1; 4 & 5 – venation from upper and lower side of leaf x 3; 6 – lip x 1; 7 – lateral petal x 1; 8 – dorsal petal x 1; 9 – calyx x 1; 10 – anther x 3; 11 – pistil x 1; 12 – stigma x 4; 13 – cross-section of ovary x 5½; 14 – dried fruit x 1; 15 – fresh seed x 5½; 16 – dried seed x 5½; 17 – seed section taken through hilum x 5½; 18 – embryo x 27. 1–5, 12 & 13 from *P. Jansen 5544* (spirit material); 6 reconstructed from *P. Jansen 5544* and *Westphal & Westphal-Stevens 5536* (spirit material); 7–11 from *Westphal & Westphal-Stevens 5536* (spirit material); 14 from *P. Jansen 5910*; 15, 17 & 18 from *P. Jansen 2206* (spirit material); 16 – from *Westphal & Westphal-Stevens 135*. Drawn by Miss J. Williamson. (Reproduced from *Jansen, loc. cit.*: fig. 1, 1981.)

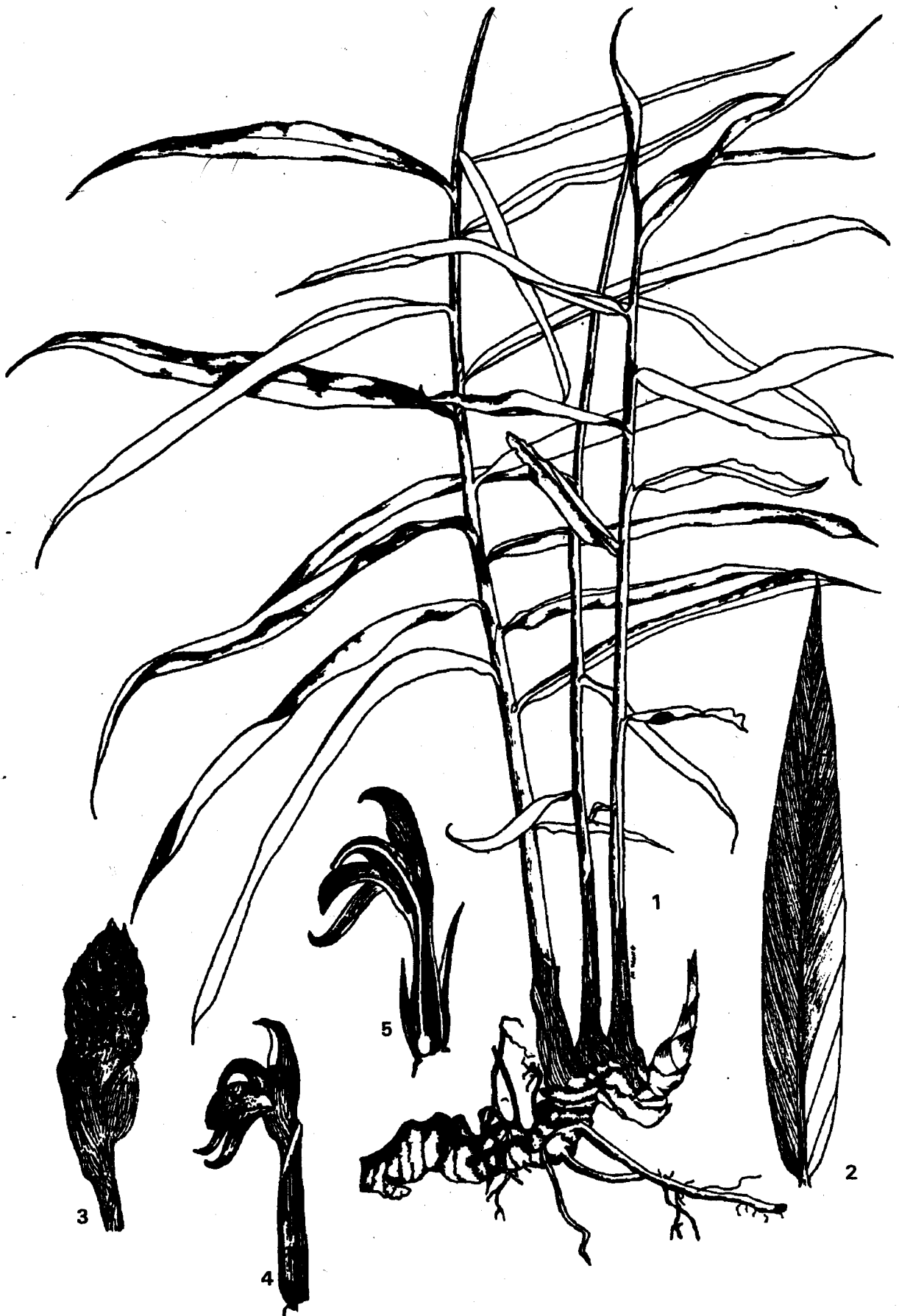


Figure 204A.2 *ZINGIBER OFFICINALE*: 1 – leafy plant with rhizome $\times 1/6$; 2 – leaf $\times 1/2$; 3 – young inflorescence $\times 1/2$; 4 – flower $\times 2$; 5 – flower in longitudinal section $\times 2$. Drawn by Marjorie Wong. (Reproduced with permission from *Tropical Crops: Monocotyledon*: fig. 32, 1972.) [Specimens not cited in original drawing]

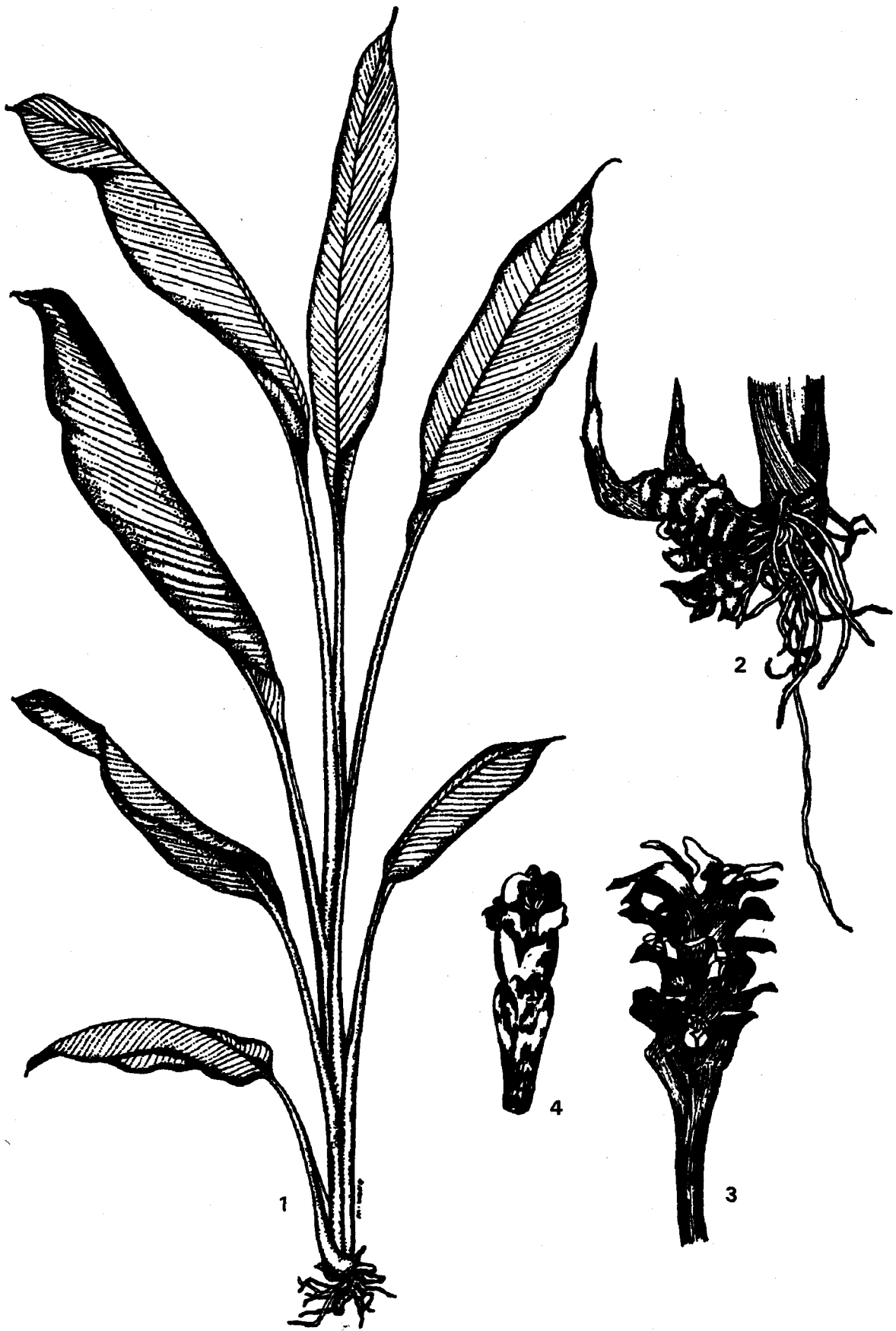


Figure 204A.3 *CURCUMA DOMESTICA*: 1 - leafy plant x $\frac{1}{4}$; 2 - base of plant with rhizomes x $\frac{1}{2}$; 3 - inflorescence x $\frac{1}{2}$; 4 - flower x 1. 3 & 4 after *Brown* (1951). Drawn by Marjorie Wong. (Reproduced with permission from *Tropical Crops: Monocotyledon*: fig. 31, 1972.) [Specimens not cited for 1 & 2]

20-flowered, arising at the base of the leafy shoot, often appearing before the leaves on a bracteate peduncle, which is either very short and largely subterranean, or elongated. Calyx tubular or turbinate, 3-lobed at the apex. Corolla with a basal tube and three free subequal petals. Androecium of a three-lobed petaloid labellum, and a single stamen with sub-basal anthers and a long membranous terminal lobe. Ovary subterranean (except in long-peduncled species). Mature fruits and seeds not well known.

About 15 species in the drier, more seasonal parts of Africa.

S. aethiopicus (Schweinf.) B.L. Burt (1982);

Cienkowskia aethiopica Schweinf. (1867); *Cienkowskiella aethiopica* (Schweinf.) Kam (1980) – types: Sudan, Fassogli, *Cienkowski* s.n. & Ethiopia, Wochni (?=Wahni), *Stuedner* s.n. (B syn. ?destroyed.).

Perennial herb from an ovoid rhizome 3–5 cm long. Roots with fusiform tubers 3–10 cm long. Leaves undeveloped or developing at anthesis; mature lamina 17–36 x 2–4.5 cm, narrowly elliptic, glabrous, forming a pseudostem up to 70 cm tall. Inflorescence arising at the base of the leafy shoot, 4–12-flowered; peduncle very short and mostly or entirely below ground. Calyx tubular, shortly 3-lobed, 2.7–3.5 cm long. Corolla tube 2.5–5.5 cm long; petals elliptic, 2.8–5.5 x 0.6–0.8 cm, whitish. Labellum mauve to purple, 3-lobed, 5–11.5 cm long, central lobe rounded and usually deeply emarginate, with a central deep yellow mark at the base; lateral lobes broadly triangular, obtuse. Stamen oblong, up to 5 cm long; anthers sub-basal, 8–9 mm long. Ovary obovoid, 5–7 mm long, glabrous. Fruit subterranean, c 1.5 cm in diameter. Seeds (immature) ± 6 x 2 mm, ellipsoid, pale, shiny. Fig. 204A.1.

In seasonally wet (but not water-logged) grasslands and woodlands, flowering after the first rains; 550–1200 (–1800) m. GJ WG IL; widespread in the seasonally dry parts of tropical Africa from Senegal to S Africa. *Ash* 3503, 2999; *Thulin & Hunde* 4021.

3. ZINGIBER Boehm. (1760)

Perennial herbs with leafy shoots from underground rhizomes. Leaves present at flowering time. Inflorescences pedunculate, c 15-flowered, arising at the base of the leafy shoots. Corolla three-lobed, posterior lobe largest. Labellum three-lobed. Fruits very rare in cultivated material.

About 85 species in Indo-Malesia and NE Australia. One species very widely cultivated.

Z. officinale Roscoe (1807)

– type: fig. 12 in Rheede, Hortus Malabaricus (1692) *fide* Jansen (1981).

Rhizomatous herb; rhizomes thick. Leafy shoots to 1 m tall. Leaves linear to lanceolate, up to 20 x 2 cm, apex acuminate, narrowly cuneate at base; ligule up to 5 mm long, bilobed, glabrous, later scarious. Inflorescence arising from rhizome at base of leafy shoots, peduncle 10–20 cm long; spike ellipsoid, 4–7 x 1.5–2.5 cm; bracts 2–3 x 1.5–2 cm, green with scarious margins, each subtending a single flower. Calyx whitish. Corolla pale yellow. Labellum 3-lobed, the central lobe largest, dark purplish with yellow spots. Fruits very rare in cultivation. Fig. 204A.2.

Cultivated for the spicy rhizome, which is dried and powdered (GINGER), in IL KF SD (*Jansen* 1981). No specimens seen; those cited by Jansen are all market samples, presumably of the rhizome.

4. CURCUMA L. (1753)

Perennial rhizomatous herbs. Rhizome short, erect, bearing a rosette of leaves whose sheaths may form a pseudostem. Inflorescences terminal on the leafy shoots, thus appearing from the center of the leaf rosette. Labellum 3-lobed. Fruits not produced by the cultivated taxon.

About 40 species in tropical Asia. One species widely cultivated as a spice and dye-plant (turmeric).

C. domestica Valetton (1918);

Curcuma longa sensu auct., non L. see Burt & Smith, *Notes Roy. Bot. Gard. Edinb.* 31: 185 (1972).

Perennial herb from a short erect rhizome which is bright orange-yellow internally and which bears numerous similar lateral rhizomes. Leaves forming a rosette, the petioles sometimes forming a pseudostem to 1 m tall. Lamina usually c 30 x 7–8 cm, acute at apex, abruptly cuneate at base; ligule small, c 1 mm long. Inflorescence terminal on the leafy shoot, thus arising in the center of the leaf rosette, 10–15 x 5–7 cm; bracts 5–6 cm long, curved outwards, green sometimes with pinkish tips, each subtending two flowers. Corolla white; labellum white with yellow central band. Fruits not produced. Fig. 204A.3.

Jansen (1981) states that this taxon is grown occasionally, perhaps on an increasing scale. He does not cite any material, and I have not seen any. He uses the name *Curcuma longa* but *C. domestica* is now regarded as the most satisfactory name for the cultivated plant. It is a sterile triploid which does not produce fruit. The parents are uncertain but may include *C. aromatica* Salisb. (Purse-glove, *Tropical Crops: Monocotyledons*, 1972).

204B. COSTACEAE

by Getachew Aweke*

Cufodontis, *Enum.*: 1595–1596 (1953); Lock, *Kew Bull.* 39: 842 (1984); Lock, *Zingiberaceae* in part in *Fl. Trop. E. Afr.*: 2–10 (1985); Dahlgren, Clifford & Yeo, *The Families of the Monocotyledons*: 366–368 (1985).

Herbs, small to medium sized, growing from rhizomes which can be thick and fleshy or tuberous, roots and fruits sometimes aromatic, branches and leaves often hairy. Leaves alternate, spirally arranged or in 2 ranks; sheath closed, tubular, with a ligule at the upper end; leaf-blade entire, pinnate-veined, lanceolate or oblanceolate to linear. Inflorescence terminal spikes or heads with bracts that have nectar producing glands below their apex; flowers irregular. Calyx of 3 fused sepals united as a collar at the base. Petals 3, larger than sepals, fused at the base, middle one often largest. Lip formed from 5 fused petaloid staminodes within the petals, often with a bright colour. Stamen 1, often petaloid with 2 pollen sacs either side. Ovary inferior with 2 or 3 axile placentas; ovules mostly numerous. Fruit a capsule, sometimes dry and indehiscent.

The family has 4 genera with *Costus* being the dominant one, the other 3 occurring in Malasia, N Australia and the tropical New World. They are plants of moist shady habitats, particularly in rain forests, some are aquatic. Only *Costus* occurs in Africa with 3 species recorded from the Flora area.

This family is often treated as a subfamily in Zingiberaceae, but differs in a number of features: the arrangement of leaves, lack of oil cells, and presence of multicellular raised hairs in Costaceae as against sunken ones in Zingiberaceae.

There are some species of *Costus* which are grown as ornamentals.

COSTUS L. (1753)

Herbs with rhizomes, sometimes very short and tuberous. Leafy stems usually erect, but short or absent in aquatic species. Leaves spirally arranged, sometimes forming a rosette; sheaths closed, often with a conspicuous ligule; blade of lower leaves reduced; base contracted into a pseudo-petiole. Flowers usually large, in heads or spikes. Calyx-tube with 3 apical teeth, sometimes split on one side. Petals 3, similar, usually with the middle one largest. Lip forming a funnel-shaped structure. Stamen 1, petaloid, folded round the style. Stigma dilated into a funnel-shaped structure in the middle of the petaloid stamen. Fruit an indehiscent berry. Seeds hard, usually black, with an aril.

Around 150 species of which 25 occur in tropical Africa; 3 species so far recorded for the Flora area.

1. Aerial stem absent; leaves in a basal rosette or solitary; inflorescence amongst the leaves.
 1. *C. spectabilis*
 - Aerial stems present; leaves numerous along the stems; inflorescence terminal on leafy stems, or arising directly from the rhizome on short leafless stems. 2
2. Calyx tube equalling or just exceeding the bracts; ligule with inconspicuous ridges below at the base, more or less glabrous. 2. *C. afer*
 - Calyx tube longer than the bracts, usually densely puberulous; ligule with conspicuous ridge at the base, ciliate. 3. *C. lucanusianus*

1. *C. spectabilis* (Fenzl) K. Schum. 1892;
Cadalvena spectabilis Fenzl (1865) – type: Sudan, Fassogli, Boriani s.n. (?W holo., destr.).

Perennial herb, rhizome covered in brown, papery scales, hairy in their lower half. Leafy stem below ground with several reduced leaves and 4 (occasionally 3) normal leaves at ground level, blades overlapping in a cross-like pattern; 4–12 cm long, glabrous above, adpressed pubescent beneath particularly on the midrib, green with a pink or sometimes brownish margin, apex obtuse to retuse, base cuneate. Inflorescence from the centre of the 4 terminal leaves, 6–12 flowered, usually only 1 flower open at a time; floral bracts delicate, triangular, 1.7 x 0.8 cm; flowers yellow. Calyx-tube 2.5–4.5 cm long. Petals 3, yellow, narrowly ovate, acuminate, glabrous or pubescent at the apex, 2–4.5 cm long. Lip large, delicate, yellow, 2.5 cm long. Fertile stamen ligulate, petaloid, narrowed above the anther thecae. Fruit formed below ground. Fig. 204B.1.3–6.

On black soil in *Oxytenanthera* thicket with some *Combretum* – *Terminalia* woodland, also in shade on sandy soil in open *Combretum* – *Terminalia* woodland, elsewhere in seasonal grassland; 550–1250 m. GJ WG II; from western Ethiopia to Sierra Leone, south to Zimbabwe and Angola. Ash 3065, 3525; Thulin & Hunde 4017.

2. *C. afer* Ker-Gawl (1823)
– type: plate 683 in *Bot. Reg.* 8: (1823) of a plant introduced from Sierra Leone.

Herb with leafy stems, 2–4 m tall. Leaves large, petiole c 1 cm long; blade 15–35 x 3.5–9.5 cm, elliptic to obovate, usually glabrous above, sometimes pubescent beneath; apex acuminate; base rounded or subcordate; margin sparsely ciliate. Sheaths smooth in living plants but ridged when dry, green often with purple blotches; ligule leathery. Inflorescence terminal, bracts 3.5–3 cm, upper ones often smaller, green with purple markings,

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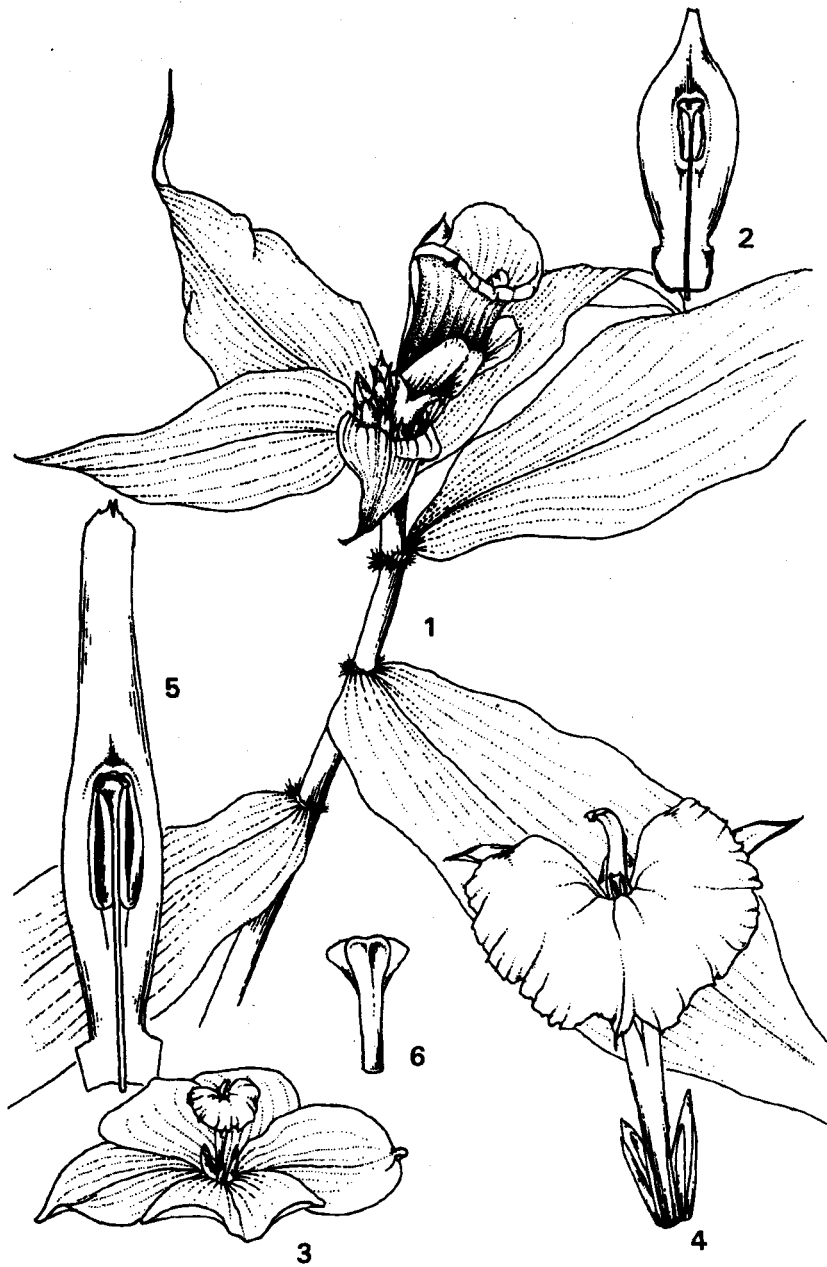


Figure 204B.1

COSTUS LUCANUSIANUS: 1 - flowering shoot $\times 2\frac{1}{2}$; 2 - stamen and style $\times 1$. **C. SPECTABILIS:** 3 - habit $\times 1/4$; 4 - flower $\times 2\frac{1}{3}$; 5 - stamen and style $\times 2$; 6 - stigma, rear view $\times 6$. 1 & 2 from Dawkins 537; 4-6 from Dale s.n. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr. Zingiberaceae*: fig. 1.)

each subtending 2 fully developed flowers; bracteoles boat-shaped, keel thick and rigid, pale green with pink markings and thin pink papery margin, 2.5 x 0.8 cm. Calyx-tube 1.7-2 cm long, teeth 0.5 cm long, unridged, with pink margins. Corolla-tube 2 cm long, hairy inside; petals white, 3-4 x 1.2-1.4 cm, oblong to ovate, forming a hood at the top. Lip broadly triangular, funnel-shaped c 2.5 x 2.5 cm, white or coloured pink with an orange-yellow central stripe to the base. Stamen white, ovate, 3 x 1.2 cm; anther sacs 0.7-0.8 cm long. Mature fruits and seeds not known.

Moist to almost swampy places in transitional lowland montane forest with *Aningeria altissima* and other tall trees, and riverine forest, sometimes forming almost pure stands, also in wet muddy area in a ravine;

800-1700 m. KF IL WG; west to Sierra Leone. Friis et al. 3906, 1731; Mooney 7764.

There are variations in the ridges on the leaf-sheaths and sometime the ligules are short, slightly rigid, and hairy.

3. *C. lucanusianus* J. Braun & K. Schum. (1889)
- type: Cameroun, Braun s.n. (?B destr.).

Herb with erect leafsystems 1.5-3 m tall. Leaves: petiole 0.5-0.9 cm long; blade elliptic, 21-24 x 4.5-6 cm, pubescent beneath, otherwise glabrous; apex acuminate, base rounded or subcordate. Sheaths smooth, glabrous, slightly ridged when dry, green, often with dark red markings when alive; ligule surrounding the stem at the base, leathery, 0.1-0.3 cm long, with a raised ridge,

margin long ciliate, apex acuminate. Inflorescences terminal; floral bracts 2.5 x 1 cm, green, with basal purple markings, each with 2 fully developed flowers; bracteoles 2, boat-shaped, keeled, leathery, pale green, the larger up to 2 x 1 cm, the smaller narrower to 2 x 0.6 cm. Calyx-tube, 2.2–3 cm long, green, longer than the bracts; teeth 3, acute, often recurved, c 0.5 cm long with narrow, scarious, pubescent margins. Corolla-tube 2 cm long, hairy inside; petals white, c 2.5 cm long, oblong, apex acute and hooded, base narrow. Lip triangular, 3 x 3 cm, funnel-shaped, dark red towards the margin, central yellow stripe not extending into the

tube. Stamen narrowly triangular, tinged red at the tip, 2.5 x 1 cm; anthers 0.8–1 cm long. Mature fruits and seeds not known. Fig. 204B.1.1 & 2.

On moist ground in lowland transitional montane forest with *Aningeria altissima* and other large trees, also in lowland disturbed secondary forest with much undergrowth; 1000–1400 m. KF; Uganda, westwards to tropical Africa and in a distributed secondary forest to Sierra Leone. Friis et al. 3891; Sebsebe D. & Nigist A. 2243.

205. CANNACEAE

by K. A. Lye*

Burger, *Families of Flowering Plants in Ethiopia*: 137 (1967); Segeren & Maas in *Acta Bot. Neerl.* **20**: 663–680 (1972); Richardson & Smith, *Cannaceae* in *Fl. Illustr. Catarinense*: (1972); Cufodontis, *Enum.*: 1596 (1972); Purseglove, *Tropical Crops: Monocotyledons*: 92–93 (1972); Thulin, **161. Cannaceae** in *Fl. Somalia* **4**: 78 & 79 (1995).

Rhizomatous erect perennial herbs with sympodial rhizomes. Leaves alternate; sheath short and open, gradually passing into the petiole; blade simple, entire, pinnately-nerved with a prominent midrib; ligule and stipules absent. Inflorescence a terminal raceme or panicle of showy, solitary flowers or 2-flowered cymes, each subtended by a conspicuous bract. Flowers usually large, red and/or yellow, bisexual, asymmetrical, with an inferior ovary. Sepals 3, free, erect, green or usually somewhat coloured, persistent on top of the fruit. Petals, staminodes and stamen united at the base into a short or long tube. Petals 3, one usually smaller than the other two, greenish or commonly coloured, but smaller than the staminodes and stamen. Staminodes 2–5, petal-like and brightly coloured, larger than the petals, usually with 3 outer ones and 1–2 inner ones narrower, one of which forms the lip which curves outwards. Functional stamen 1; filament flat, coloured and petal-like; anther 1-locular with the single pollen sac joined to the edge of the filament. Pistil with 3 united carpels forming an inferior 3-locular ovary with axile placentation; style and stigma 1, flat and wide. Fruit a warty capsule, sometimes indehiscent. Seeds very hard.

A small family of one genus native to tropical and subtropical parts of the New World but some species and ornamental hybrids now widely cultivated and naturalized throughout the tropics of the Old World.

CANNAL. (1753 & 1754)

Coarse and robust herbs. Leaves with distinct petiole with somewhat asymmetric blades. Inflorescence openly branched or almost unbranched. Flowers showy, asymmetrical, with inferior ovary. Fruit elliptic to globose, mostly longitudinally dehiscent. Seeds globose, dark brown or black, very hard.

A genus of the New World with the number of species recognized varying between 5 or 6 and up to 50, 1 of which is an important root crop both in S America and Australia. In Africa 1 or 2 species have become naturalized and others are cultivated; 1 species and cultivated hybrids known from the Flora area.

1. Staminodes 40–70 x 1–15 mm. 1. *C. indica*
– Staminodes 80–120 x 25–50 mm. 2. *C. hybrids*

1. *C. indica* L. (1753);
C. edulis Ker. (1823).
C. bidentata Bertol. (1859).

Plant usually 1–2 m tall, growing from short underground rhizomes and corms to produce clumps. Stem green and rounded with slightly swollen nodes. Leaves petiolate; blades narrowly ovate to elliptic, 10–60 x 4–25 cm; apex acute to acuminate; base abruptly cuneate or gradually narrowing to sheath. Inflorescence usually narrow and simple, 2–20-flowered bearing several solitary or paired flowers on 1–10 mm long pedicels. Bracts broadly obovate, 1–2 cm long. Sepals ovate to lanceolate, 10–15 x 4–9 mm, green or coloured. Corolla yellow or orange to dull red, 4–5 cm long with the tube about 1 cm long. Outer 3 staminodes usually red, spatulate, 40–70 x 1–15 mm wide. Lip red or scarlet or yellow spotted with red, narrow oblong-

obovate. Stamen 4–5 cm long; anther 7–10 mm long, united for a third of its length to its petal-like filament. Style 4–5 cm long, red or yellow, petal-like. Capsule 2–3 cm long, ovoid to elliptic, dark brown to black and covered with short warty-spines. Seeds about 5 mm in diameter, globose, black. Fig. 205.1.

Grown in home gardens, particularly in association with other root crops, such as *Ensete*, and found as an escape beside roads and along streams, rarely in secondary forest, also grown in public and private gardens in towns; 500–2400 m. SU IL KF and probably elsewhere where there is good moisture but very poorly represented in herbarium collections; widespread throughout the tropics and subtropics, native to America, naturalized in Africa and Asia. *Archer* 9207; *Meyer* 7811; *Sue Edwards* 5351.

This species is very variable particularly in the size and colour of flowers, and, in this account, even includes *C. edulis*. In Ethiopia, there are no records of the corms being eaten, but the leaves are used as wrapping material for butter and KOCHO, the fermented food product from ENSET. Elsewhere the rhizomes are cooked and eaten. The hard black seeds are used in rattles and percussion instruments in Gambella and probably elsewhere in the southwest.

2. *C. hybrids*
C. x generalis L. H. Bailey (1923).

Plants (in the Flora area) very similar in vegetative characters to *C. indica*, but generally more robust. Leaves light or dark green, or bronze (red-brown) and somewhat shiny. Inflorescences usually (in the Flora area) with less than 20 flowers, only one or two of which are open at any one time. Flowers very large and showy with bright deep red, or yellow, or yellow with some red

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Figure 205.1 *CANNA INDICA*: 1 & 2 – inflorescence, subtending leaf and leaf from central part of stem x 1/2; 3 – flower opened out to show parts x 3 (H = ovary, s = sepals, p = petals, st = petaloid staminodes, a = anther, l = lip, stg = stigma) 1 & 2 from Lye 1993. Drawn by Gerd Mari Lye.

markings on the petal-like staminodes. Fruits with few (5 or less) large black or dark brown seeds.

Planted in both public and private gardens in Addis Ababa and many other towns, and sometimes escaped on roadsides; 1800–2400 m. SU KF SD, and undoubtedly elsewhere; widely planted throughout the tropics and subtropics, also as escapes. *Sue Edwards et al.* 5210.

The ornamental garden Cannas are hybrids of three or four American species, particularly *C. iridiflora* Ruiz & Pavon, *C. indica* L., *C. glauca* L. and *C. flaccida* Salisb. The bronze colour of the leaves has probably come from *C. warcewiczii* Dietr.

206. MARANTACEAE

by K.A. Lye* & Ib Friis (*Thalia*)**

Leonard and Mullenders in *Bull. Soc. Roy. Bot. Belgique* 83: 5–32 (1950); Milne-Redhead, *Marantaceae* in *Fl. Trop. E. Afr.*: 11 pp. (1952); Koechlin, *Marantaceae* in *Fl. Cameroun* 4: 99–157 (1965); Cufodontis, *Enum.*: 1596–1597 (1972); Lye in *Lidia* 3: 123–130 (1994).

Perennial usually 1–4 m tall herbs with rhizomes or tubers, sometimes with bamboo-like shoots. Leaves alternate with a distinct stalk and a usually large blade; petioles sheathing at the base, round in cross-section and with a hard thickened area, the pulvinus¹, just below the blade; blades often asymmetric at the base or at the apex, elliptic or oblong-elliptic, with numerous parallel secondary veins arising at an angle from the midvein. Inflorescence simple or branched with each cymose partial inflorescence in the axil of a primary bract; each branch usually with 2 sessile or stalked flowers. Flowers bisexual and asymmetric. Sepals 3, free, of equal size. Corolla 3-lobed, united to form a tube below. Stamines 4–5, petal-like, united with the petal-like stamen to form a tube that is fused to the corolla tube; outer stamines 1–2, petal-like and subulate, equal or unequal; inner stamines 3, unequal, one bearing the anther and another hooded, with or without appendages. Stamen 1, with petal-like filament and a 1-theous anther. Pistil 1, of 3 united carpels. Style with its solitary stigma first held erect by the hood of the staminode, later suddenly bending downwards. Ovary inferior, usually 3-locular (but 2 locules often empty) with 1 erect basal ovule in each locule. Fruit dry or fleshy, dehiscent or indehiscent with 1–3 seeds. Seed with or without a basal aril.

About 30 genera and 350 species of generally wet habitats widely distributed in all tropical countries, but particularly abundant in tropical America; represented by 2 genera and 4 species in the Flora area.

In East Africa, there are at least 4 other genera with species found in Uganda and/or southern Sudan. Some of these might also occur in SW Ethiopia.

Key to genera

1. Stem with several to many leaves; blade very asymmetrical; ovary 3-locular, with one ovule per locule; fruit with (1–)3 seeds.

1. *Marantochloa*

– All leaves basal (except sometimes one subsessile leaf on the stem below the inflorescence); blade nearly symmetrical; ovary unilocular, with one ovule; fruit with one seed.

2. *Thalia*

– Inflorescence congested, less than 10 cm long

3. *M. mannii*

2. Flower 5–8 mm long; fruit with about 0.5 mm long hairs but becoming glabrous when mature; perianth deciduous in fruit.

1. *M. leucantha*

– Flower 15–18 mm long; fruit with about 1–1.5 mm long hairs and mature fruit still hairy; perianth persistent.

2. *M. purpurea*

1. *M. leucantha* (*K. Schum.*) *Milne-Redh.* (1950)

– type: Cameroun, *Preuss* 495.

1. *MARANTOCHLOA* *Brongn. ex Gris.* (1860)

Perennial glabrous or pubescent herbs. Stems erect or spreading, usually branched and with many leaves, rarely unbranched and with 1 leaf only. Leaf-blade strongly asymmetric with one half of the blade more rounded than the other. Inflorescence lax or congested, each branch with about 4 nodes, with one or two partial inflorescences at each node. Flowers with 2 petal-like outer stamines; inner stamines hooded with a spur-like appendage. Ovary 3-locular, sometimes hairy. Fruit a tardily dehiscent and not fleshy capsule. Seed with one rounded and two flat sides and a small basal aril.

About 12 species, widely distributed in the wetter parts of tropical Africa.

1. Inflorescence lax, 15–50 cm long.

2

Stems up to 4 m high and 2–5 mm thick in upper part, much branched. Leaves with sheathing part of petiole 3–25 cm long and unsheathing part 0.5–2.5 cm long; blade 6–25 x 3–14 cm, blade slightly to strongly asymmetric, apex usually with a prominent extended blunt tip, when fresh bright green on upper surface, whitish green (rarely somewhat purplish) on lower surface. Inflorescence lax, 15–30 cm long, much branched. Primary bract 2.5–3.5 cm long. Flowers greenish-white or cream, about 6–8 mm long. Ovary shortly pilose. Capsule 8–9 mm in diameter, subglobose, glossy, almost glabrous, green as young, orange or bright red when mature; the withered perianth deciduous. Seed 6–8 mm long, grey or brownish. Fig. 206.1.1.

Moist places in forest, often in swamp or gallery forest; 1000–1500 m. IL KF; tropical Africa from Sierra

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1. pulvinus: an area between the top of the petiole and the blade which has a different texture and appearance, and which can alter the angle of the blade.



Figure 206.1 *MARANTOCHLOA LEUCANTHA*: 1 – fruit x2. *M. PURPUREA*: 2 – leaf and inflorescence x1; 3 – flower x3; 4 – fruit x2. *M. MANNII*: 5 – leaf and inflorescence x $\frac{2}{3}$. 1 from Lye 2984; 2–4 from Lye 2698 and *Fl. Trop. E. Afr.*; 5 from Giordano 2460. Drawn by Gerd Mari Lye.

Leone to Angola, its eastern limit in Ethiopia. *De Wilde & De Wilde-Duyffes* 7853; *Mooney* 8783; *Friis et al.* 4047.

2. *M. purpurea* (Ridl.) *Milne-Redh.* (1950);
Clinogyne purpurea Ridl. (1887) – type: Angola,
Golungo Alto, *Welwitsch* 6440 (BM holo.).

Stems 1–3 m high and 2–4 mm thick above, much branched. Leaves with sheathing part of petiole up to 40 cm long and unsheathing part up to 40 cm long; blade 10–40 x 4–16 cm, strongly asymmetric with the midrib ending beside the acumen; lateral nerves prominent. Inflorescence lax; 15–45 cm long, branched. Primary bract 2.5–4 cm long. Flower pink to purple with two inner lobes of staminode bright yellow, 14–18 mm long. Ovary densely pilose with 1–1.5 mm long hairs. Capsule 7–9 mm in diameter, subglobose, hairy (even when mature), red with the withered perianth persisting. Seed 5–6 mm long, brown, smooth with a small whitish aril. Fig. 206.1 2–4.

In tropical deciduous forest, often secondary forest or at stream-sides; 800–900 m. IL; widespread in tropical Africa from Sierra Leone to Angola and with the eastern limit in Ethiopia. *Moult* 23; *Chaffey* 1260.

This plant has been identified as *M. leucantha*, but differs in its larger pinkish flower and the more hairy capsule with persisting perianth.

3. *M. mannii* (Benth) *Milne-Redh.* (1952)
Calathea manni Benth (1883) – type: Fernando Po, *Mann* 1173 (K holo.).

Stems 1–2 m high and 2–5 mm thick above, branched. Leaves with sheathing part of petiole up to 25 cm long and unsheathing part up to 18 cm long; blade 10–40 x 4–20 cm, strongly asymmetric with the midrib ending slightly beside the prominent acumen; lateral nerves whitish and prominent on upper surface. Inflorescence dense, 5–9 x 3–5 cm, zigzag-branched, rhachis and bracts somewhat reddish at least on margins; primary bracts 3–5 cm long, concealing the almost sessile cyme. Flower 15–18 mm long, pinkish or white. Ovary somewhat pilose. Capsule and seed not seen. Fig. 206.5.

In or along rivulet with stagnant pools in forest; 1500 m. SD; tropical Africa from Ghana and Zaire to Ethiopia. *Giordano* 2460.

2. THALIA L. (1753)

Erect swamp-plants. Leaves all basal, petiolate, or one with a much-reduced petiole on the stem carrying the inflorescence; transition from pulvinus to midnerve of lamina marked above by a depression at right angles to midnerve. Inflorescence branched, rarely unbranched, lax, axis of older inflorescences usually zig-zag, nodes with bracts that fall quickly, each supporting a single two-flowered cyme with adaxial bract. Flowers subsessile, without bracteoles. Sepals equal, corolla tube short. Outer staminodes petaloid with clawed-base; inner hooded staminode with two linear appendages; functioning stamen partly free. Ovary unilocular with

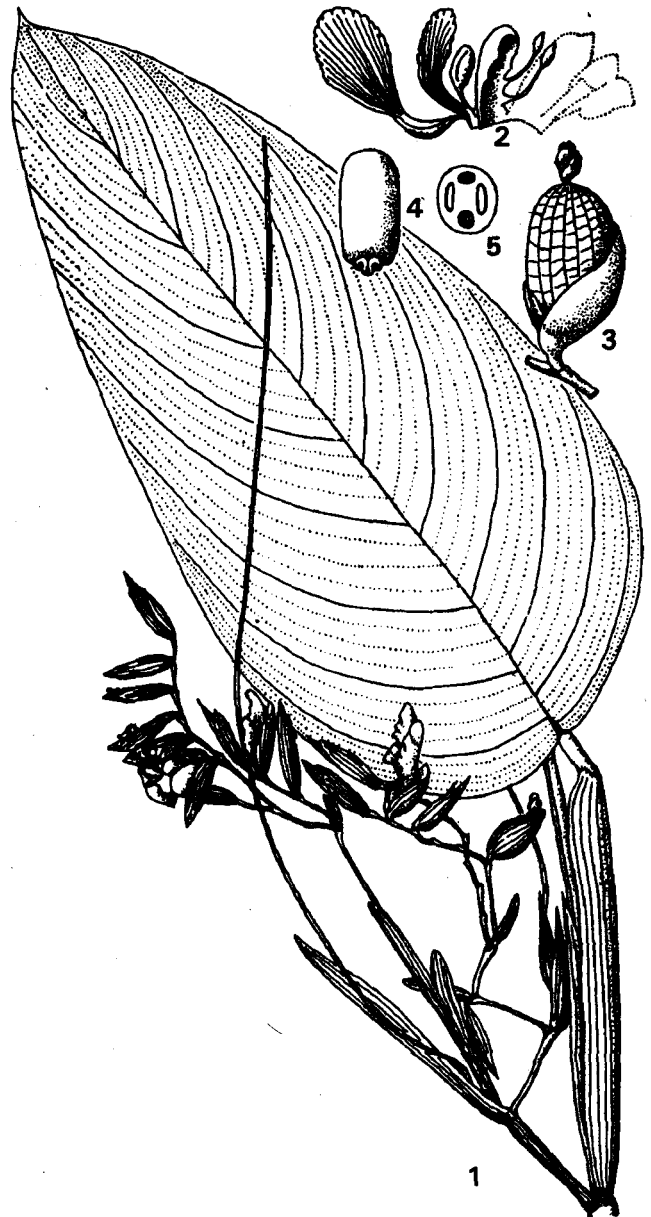


Figure 206.2 *THALIA GENICULATA*: 1 – Inflorescence and adjacent leaf x 2/3; 2 – staminodes and stamen x 1; 3 – fruit x 2; 4 – seed x 2; 5 – transverse section of seed. All from *Maclaud* 130. Drawn by Helen Lamouredieu. (Modified and reproduced with permission from *Fl. du Gabon* 9: 137, 1964.)

one ovule; fruit indehiscent with membranous pericarp. Seed globular to ellipsoid, with a small basal aril; perisperm with double furrow.

About 7 species in tropical America; one of these also widespread in tropical Africa.

T. geniculata L. (1753);
Marantha geniculata (L.) Lam. (1783) – type: from 'Tropical America'.
Thalia welwitschii Ridl. (1887).

Herb, 1–2 m high, with short rhizome. Leaves: basal sheath 20–40 cm, petiole 20–40 cm long, pulvinus 0.8–2 cm long, glabrous or puberulous; lamina ovateoblong or ovatelanceolate, glabrescent, 30–40(–60) x 7–15

(-20) cm; apex acute to acuminate; base obliquely rounded. Inflorescence: peduncle arising among the basal leaves, up to *c* 40 cm long, sometimes with a single leaf with short or no petiole; a lax raceme, internodes 0.4-0.8 cm long. Bracts green or with purple flush, *c* 15 x 8 mm. Flowers dark purple, sessile or on pedicel up to *c* 2 mm long. Sepals ovate to elliptic, up to *c* 2 mm long. Petals 8-10 mm long. Outer staminodes with lobes *c* 2 x as long as petals; inner staminodes with hood *c* 2 x as long as the other parts, with two long, lateral appendages. Fruit with persistent remains of flower, up

to 8 x 4 mm. Fruit wall reticulate when dry. Seed furrowed, with bilobed aril. Fig. 206.2.

In swamps and beside temporary pools; *c* 600 m. IL; from Senegal to Sudan and Ethiopia, south to Zambia, also widespread in tropical America. *Friis* et al. 7215, 8027.

The African material is sometimes (e.g. in *Flore du Gabon* 9: 139-140, 1964) regarded as a separate species, *Thalia welwitschii* Ridl., but the diagnostic characters overlap.

207. COMMELINACEAE

by Ensermu Kelbessa* & Bob Faden**

Richard, *Tent. Fl. Abys.* II: 340 (1851); Cufodontis, *Enum. Plant. Sperm.*: 1507 (1974); Brenan in *Kew Bull.* 7: 179 (1952), 14: 280 (1960), 15: 207 (1961), 19: 63 (1964), in *J. Linn. Soc. Bot.* 59: 349 (1966), in *Fl. W. Trop. Afr.* (ed. 2) 3: 22 (1968); Clarke in *DC. Monogr. Phan.* 3: 113 (1881), in *Fl. Trop. Afr.* 8: 25 (1901); Faden in Agnew, *Upland Kenya Wild Flowers*: 653 (1974); Obermeyer and Faden in *Fl. S. Africa* 4(2): 23 (1985); Faden, 162. *Commelinaceae* in *Fl. Somalia* 4: 79–94 (1995).

Perennials or annuals with fibrous or tuberous roots or rarely forming small bulbs, often succulent. Leaves cauline or basal, spirally arranged or distichous, sheath usually closed, often ciliate at the mouth; blade sessile or petiolate, entire. Inflorescences terminal, or terminal and axillary, leaf-opposed, rarely all axillary, composed of 1-many cymes aggregated into thyrses or variously reduced, sometimes subtended by spathaceous bracts (spathes). Flowers regular or bilaterally symmetrical, bisexual or male, occasionally cleistogamous. Sepals 3, free or fused, persistent. Petals 3, free or fused, equal or unequal, deliquescent. Stamens 6, all fertile or some reduced to staminodes or lacking, hypogynous or united with corolla; filaments bearded or glabrous; anthers opening by longitudinal slits or rarely by basal or apical pores. Ovary superior, 2–3-locular with 1-many ovules in each locule; style simple; stigma small or capitate. Fruit a 2–3-valved dehiscent capsule, rarely indehiscent. Seeds 1-several per locule, with a dot-like or linear hilum and a dorsal to lateral (rarely terminal) circular embryotege or operculum covering the embryo.

A cosmopolitan family in temperate and tropical regions, with about 40 genera and 630 species. Represented in the Flora area by 9 genera and 56 species; *Tradescantia*, with four species, is only known in cultivation. A few species are widespread weeds.

Key to genera

1. Inflorescences enclosed in or subtended by leafy bracts (spathes). 2
- Inflorescences not enclosed in or subtended by spathes. 4
2. Spathes solitary or in clusters; flowers bilaterally symmetrical; stamens 3, staminodes (2–)3, filaments glabrous. 9. *Commelina*
- Spathes mostly paired; flowers regular; stamens 6, filaments bearded. 3
3. Stamens with filaments bearded in the upper half; seeds with terminal embryotege¹. 1. *Cyanotis*
- Stamens with filaments bearded on the lower half; seeds with dorsal embryotege. 2. *Tradescantia*
4. Fruits indehiscent, blue-grey to metallic-blue; seeds biseriate; flowers white; forest plants. 7. *Pollia*
- Fruits usually dehiscent, brown to grey; seeds uniseriate; flower colour and habitat various. 5
5. Fertile stamens 6; sepals often glandular pubescent. 6
- Fertile stamens 2–3; sepals glabrous or non-glandular pubescent. 7
6. Flowers regular, white; capsules 3-locular; seeds 6–10 per locule, smooth. 5. *Stanfieldiella*
- Flowers bilaterally symmetrical, purple to lilac; capsules 2-locular; seeds 1 per locule, transversely ribbed. 6. *Floscopa*
7. Capsules 2–3-locular, 2-valved; petals unequal; stamens 3, 2 opposite the sepals, 1 opposite the petal; staminodes posterior. 8. *Aneilema*

- Capsules 3-locular, 3-valved; petals equal; stamens 2–3, opposite the sepals, alternating with the staminodes or staminodes lacking. 8
- 8. Pedicels 1–4 cm long; flowers white to pale pink; filaments glabrous; capsules 20–35 mm long; locules 8–12-seeded. 3. *Anthericopsis*
- Pedicels less than 1.2 cm long; flowers blue to mauve or lavender; filaments bearded; capsules 3–6 mm long; locules 2–3-seeded. 4. *Murdannia*

1. *CYANOTIS* D. Don (1825)

Succulent perennials or annuals, perennials with storage organs such as corms or tubers. Roots fibrous or tuberous. Stems erect or creeping and rooting at lower nodes. Leaves succulent, spirally arranged or distichous, sessile. Inflorescences of terminal and axillary cymes, each cyme subtended by spathe(s) and consisting of 2-ranked or rarely solitary sessile or stalked flowers, and usually provided with conspicuous herbaceous bracteoles. Flowers regular, bisexual, small, open for a few hours only in the morning. Calyx tubular below, with hairy lobes, persistent. Corolla with a short tube, the lobes ovate to orbicular, acute to rounded or retuse at the apex, blue, purple, violet or pink. Stamens 6, equal, erect, white or coloured like corolla; filaments filiform or sometimes fusiform in upper half, beaded hairs always present in upper half; anthers yellow, orange-yellow or rarely blue, locules opening from a basal aperture, sometimes basifixed, then splitting open at the apex. Ovary ovoid, 3-locular, hairy all over or above only; ovules 2 per locule, superimposed; style thin, filiform or in some species fusiform below small apical stigma or just above the middle and filiform above, bearded or glabrous. Capsules narrowly ovoid, erect,

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3-valved, 3-loculed, 6-seeded. Seeds oblong-ovate or oblong-globose; embryotega terminal.

The genus contains about 45 species occurring in warm regions of Africa, Asia and northern Australia; 8 species in the Flora area, 1 of which is endemic.

1. Plant producing basal leaf-clusters; roots tuberous. 2
 - Plant not producing basal leaf-clusters; roots fibrous. 4
2. Plant forming elongate root-stocks; tubers tapering at base and then uniformly thickened; usually leaf less at times of flowering. 3
 - 2. *C. caespitosa*
 - Plant forming compact root-stocks or without distinct root-stock; tubers uniformly thickened or tapering toward the apex; leaf-bearing at times of flowering.
3. Plant without distinct root-stock; tubers carrot-like tapering toward the tip; pubescence of wiry hairs. 3
 - 3. *C. polyrrhiza*
 - Plant forming compact woody root-stock; tubers uniformly thickened; pubescence of woolly hairs. 1
4. Plant producing corms; style swollen away from the stigma; perennials. 5
 - Plant not producing corms; style swollen adjacent to the stigma; annuals. 6
5. Corms far below the surface of soil; stem creeping or spreading; inflorescence in 5-12 upper nodes, sessile; style glabrous. 5
 - 5. *C. foecunda*
 - Corms just below the surface of soil; stem erect; inflorescence in 1-3 upper nodes, long-stalked; style hairy. 4
6. Stems densely or rarely sparsely hairy with woolly hairs all over; style hairy. 6
 - 6. *C. lanata*
 - Stems hairy with wiry hairs on one side only; style glabrous. 7
7. Inflorescences mostly terminal, long-stalked, several-flowered; spathes (bracts) 23-45 x 14-18 mm. 8
 - 8. *C. cristata*
 - Inflorescences terminal and axillary, nearly sessile, 1-2-flowered; spathes (bracts) 6-9 x 1-2 mm. 7

1. *C. longifolia* Benth. (1849)

- type: Zaire [Congo], *Curror* 1 (K holo.).

Perennial herb with tuberous roots and compact woody root-stock. Stems 2-3, arising from the woody root-stock, erect, up to 100 cm high, sparsely woolly; internodes 10-23 cm long. Leaf-sheaths 2-4 cm long, closed, sparsely woolly; blade 30-40 x 1-1.5 cm, linear, sparsely woolly. Inflorescences terminal and axillary, borne at 1-3 upper nodes, stalked; stalk 1-6 cm long, sparsely woolly at least at apex. Cymes subtended by a spathe, all bracteoles in 2-series or ranks, bent upwards toward the bract which subtends the top flower. Spathe 30-65 mm long, folded, broadened below and narrowed above, woolly at least on broader part. Bracteoles in 2 ranks, each subtending a flower, all bent upward, fal-

cate, apex short-acuminate, 10-15 x 3-4 mm, the smallest borne at the base and the largest next to the spathe, sparsely woolly. Sepals nearly free, 4-5 x 1-1.6 mm, densely hairy with white woolly-wiry hairs. Corolla c 9 mm long, blue or purple-blue; tube c 4.5 mm long; lobes c 4.5 x 4 mm, ovate, apex rounded. Stamens with filaments c 13 mm long, upper 4 mm densely covered with beaded purple-blue or blue hairs, glabrous below; anthers c 1 mm long, yellow or orange-yellow with red-purple connective. Ovary c 1.3 mm long, red-orange, hairy nearly to the base with ascending white hairs; style c 12 mm long, lower c 7 mm glabrous, upper 4 mm swollen and hairy, top 1 mm glabrous and slender; stigma minute, yellow. Capsules 3-4 x 2.5 mm, sparsely hairy nearly all over, denser towards the apex. Seeds c 1.5 mm long and wide, oblong-globose.

Woodland; 500-600 m. IL; Senegal, Gambia, Guinea, Mali, Sierra Leone, Cote d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroun, Gabon, Congo, Central African Republic, Zaire, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, ?Mozambique, Malawi, Zambia, Zimbabwe, Angola and Namibia. *Ash* 540; *Seyoum Ayeahunie* 4.

2. *C. caespitosa* Kotschy & Peyr. (1867)

- type: Bongo, Djur, XII.1863, *Herb. Caes. Palat. Vindob. Exp. Tinn.* n. 6 (W ?destr.).

Erect perennial herb. Roots tuberous away from the axis. Stems somewhat compact, with more or less woody root-stock, reddish-purple, covered with woolly hairs. Rosette leaves 8-13 x 7-9 cm, linear, nearly sessile, dull-purple underneath, sparsely woolly. Inflorescence-bearing axis 7-30 cm long, sparsely woolly to nearly glabrous; internodes up to 6-11 cm long. Leaf-sheaths 0.7-1.2 cm long, sparsely woolly. Inflorescences terminal and sub-terminal, borne at 1-2 upper nodes, stalked; stalk 1-6 cm long, sparsely provided longitudinally with a row of woolly hairs. Spathe and bracteoles 7-8 x 2-3 mm, ovate-elliptic, apex short-acuminate to acute, glabrous to woolly and at least ciliate at the apex with some hairs. Calyx tube c 1.5 mm long, hairy; lobes c 3.5 x 1.6 mm, linear-oblong, hairy. Corolla 7.7-8.5 mm long, blue; tube 4.7-5 mm long, c 1.1 mm wide at base, c 3.6 mm at the apex; lobes 3 x 3.5 mm, broader than long, sub-orbicular, apex rounded. Stamens with filaments c 11 mm long, lower c 5.5 mm glabrous, upper c 4.5 mm with beaded blue hairs, top c 1 mm glabrous; anthers c 1.1 mm long, yellow. Ovary c 1 mm long, hairy all over with beaded hairs, orange; style c 10 mm long, lower c 5 mm glabrous, upper 4 mm hairy and swollen, top 1 mm glabrous, only slightly tapering towards the tip; stigma minute. Capsules c 2.2 mm long, with wiry hairs above. Seeds 1.5-1.7 x 0.9-1 oblong-ovate. Fig. 207.1.

Grassland and woodland; 500-1900 m. WG IL SD; Cameroun, Zaire, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Angola and Namibia. *Eukine* s.n.; *Friis* et al. 2550; *Gilbert & Jones* 10.

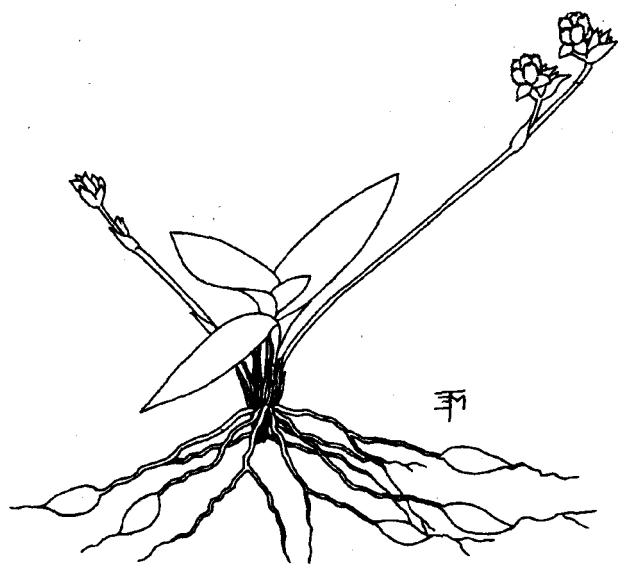


Figure 207.1 *CYNOTIS CAESPITOSA*: whole plant $\times \frac{1}{2}$. Drawn by Mrs E.M. Tweedie. (Reproduced from Agnew, *Upland Kenya Wild Flowers*: 660, 1974)

3. *C. polyrrhiza* Hochst. ex Hassk. (1870);

Zygomenes polyrrhiza Hassk. in Schweinf. (1867)
-type: GD, Acallo Meda in Semien, 3200 m, Schimper 504 (K iso.).

Perennial herb. Roots fusiform and carrot-like, tapering away from the axis. Stems creeping with ascending branches or spreading, to 30 cm long, pubescent with longitudinal row of wiry hairs; internodes 4–6 cm long. Leaf-sheaths 0.5–2 cm long, nearly glabrous except for the line of fusion which is densely covered with wiry hairs; blades of lower rosette leaves 10–13 \times 0.8–1.4 cm, linear-subulate, those of flowering branches c 6 \times 0.8 cm, linear, all glabrous to sparsely hairy with wiry hairs. Inflorescences terminal and axillary, borne in upper 5 nodes, subtended by a single spathe; peduncle 5–40 mm long, hairy. Bracteoles variable in size, lower larger, 6–8 \times 2.5–3.5 mm, oblanceolate-oblong, broadest near the apex, oblique and acute at apex, white with purple tinge, glabrous. Calyx tube c 1.2 mm long; lobes c 4 \times 2 mm, oblong-elliptic, acute at apex, whitish with purple tinge, deep purple towards the apex. Corolla c 9 mm long, blue; tube c 4.5 mm long, c 1 mm wide at base, c 4.7 mm at apex; lobes c 4.5 \times 5 mm, ovate-orbicular, apex retuse. Stamens with filaments c 10 mm long, lower c 5 mm glabrous, upper 4 mm with beaded blue hairs, top 1 mm glabrous; anthers c 1.1 mm long, orange-yellow, glabrous. Ovary c 1.2 mm long, yellow with purple apex, hairy with up to 0.6 mm long beaded blue hairs; style c 8.3 mm long, lower c 6 mm glabrous, upper c 1.5 mm swollen and hairy, top 0.8 mm glabrous and slender; stigma minute. Seeds c 1–1.2 \times 0.9–1 mm, oblong-globose.

Montane grassy slopes on rock, very shallow moist soils overlying rock and wet grassland; 1900–3800 m. GD GJ SU AR KF BA HA; not known elsewhere.

Evans 38; De Wilde & Gilbert 192; Hedberg & Getachew A. 5366.

4. *C. barbata* D. Don (1825)

-type: Nepal, Wall. Cat. 8988 & 8994 (K syn.).

C. parasitica Hochst. ex Hassk. in Schweinfurth (1870).

Zygomenes parasitica Hochst. ex Hassk. in Schweinfurth (1867) -type: GD, Acallo Meda in Semien, 3200 m, Schimper 506 (K iso.).

C. pauciflora A. Rich. (1851).

Z. pauciflora (A. Rich.) Hassk. in Schweinfurth (1867) -type: TU, Soloda [Selleuda], *Quartin-Dillon* s.n. (K iso.).

C. hirsuta (Hochst.) Fisch. & E. Mey. (1842).

Commelina hirsuta Hochst. ex C.B. Clarke (1881).

Cyanotis abyssinica A. Rich. (1851), nom. illeg. -type: TU, Djeladjeranne, 1.VIII.1852, Schimper 14 (K iso.).

C. abyssinica A. Rich. var. *glabrescens* A. Rich. in *Tent. Fl. Abyss.* 2: 344 (1851), nom. illeg. -types: TU, Shire [Chire], 1862, *Quartin-Dillon* s.n. and Djeladjeranne, 1841, Schimper 1556 (K syn.).

Erect herb with small corm lying just below the soil surface. Stems unbranched, hairy on one side or sometimes all over with wiry golden-yellow hairs; internodes up to 8–16 cm long. Leaf-sheaths 1–2.5 cm long, sparsely hairy with golden-yellow wiry hairs; blade 15–22 \times 0.6–1.4 cm, linear, glabrous or sometimes sparsely hairy near the base, ciliate along the margins with wiry hairs. Inflorescences in the upper 1–3 nodes, normally with 2–3 cymes on unequal stalks in leaf-axils; stalk 1.5–6 cm long, with longitudinal row of wiry hairs on the side below the lower flower, away from the spathe. Spathe 1, subtending and facing the upper flower in the cyme, 20–30 mm long, folded along midrib, broadest about the base, purple tinged, nearly glabrous except for the margins which are sparsely ciliate. Bracteoles oblique, curved upwards toward the bract, hairy with golden-yellow wiry hairs to nearly glabrous, ciliate along the margins. Calyx c 5.5 mm long; tube c 1.1 mm long, hairy, lobes c 4.4 \times 1.1 mm, linear-lanceolate, hairy. Corolla 9–11 mm long, blue, purple or purple-blue; tube 5–6 mm long, c 1.2 mm wide at base, c 4.5 mm at the apex; lobes 4.2–5 \times 4.2–5 mm, orbicular with retuse apex. Stamens with filaments c 10 mm long, lower c 5 mm glabrous, middle c 4.5 mm with beaded hairs, top c 0.5 mm glabrous; anthers c 1.1 mm long, yellow. Ovary c 1.4 mm long, yellow-orange, provided with beaded hairs all over; style c 10 mm long, lower c 5.5 mm glabrous, upper c 3.5 mm slightly thicker, very densely pilose with beaded hairs, tapering toward the glabrous c 1 mm apex; stigma minute. Capsules 3–4 mm long, hairy with wiry hairs and marked with brown bars. Seeds 1.1–1.3 \times 0.6–1 mm, oblong-ovate. Fig. 207.2.

Grassland, often marshy places, shaded stream and river banks, under bushes in open bushland and woodland, *Euclea* or *Erica* scrub, roadside, weed of gardens and crops, on black-clay soils overlying volcanic rocks;



Figure 207.2 *CYNOTIS BARBATA*: whole plant $\times 1/2$. Drawn by Mrs E.M. Tweedie. (Reproduced from Agnew, *Upland Kenya Wild Flowers*: 659, 1974)

(1400–)1600–4200 m. EW TU GD GJ WU SU WG AR KF GG SD BA HA; Guinea, Mali, Sierra Leone, Ghana, Cote d'Ivoire, Nigeria, Cameroun, Fernando Po, Zaire, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, Mozambique, Malawi and Zimbabwe, and Yemen, India, Nepal, China, and Burma. *Ensermu K. & Seyoum A.* 1016; *Hedberg* 4184; *Mooney* 7397.

5. *C. foecunda* *Hochst. ex Hassk.* (1870)

– type: TU/GD, Serraba in Uschan, 1520–1830 m., *Schimper* 459 (K iso.).

Succulent perennial herb growing from corm deep in the soil. Stems creeping and rooting at lower nodes and ascending above up to 30 cm long with zigzag flowering shoots, hairy with wiry hairs; internodes 2–4 cm long. Leaf-sheaths closed, 0.5–1.1 cm long, hairy with wiry hairs; blade 4–8.5 \times 0.5–1.5 cm, lanceolate, linear-lanceolate, or rarely ovate, rounded to truncate at base, short-acuminate at the apex, nearly glabrous to hairy with wiry hairs. Inflorescences terminal and axillary, borne at 5–12 nodes, terminal cyme sessile, subtended by leafy spathe which is similar to ordinary leaves. Bracteoles minute, 2–3 \times 0.3 mm, subulate, with few hairs. Calyx tube c 2.2 mm long, sparsely hairy along midrib leading to midribs of lobes; lobes c 4 mm long,

ovate-elliptic, acute at apex, hairy, slightly oblique near the apex. Corolla c 9 mm long, blue or purple; tube c 6 mm long, c 1.1 mm wide at base, c 3 mm at apex; lobes c 3 \times 3 mm, ovate to ovate-elliptic, apex acute. Stamens with filaments c 9 mm long, lower c 5 mm glabrous, upper c 3 mm densely hairy with beaded blue or mauve hairs, top 1 mm glabrous; anthers c 0.9 mm long, orange- or golden-yellow. Ovary c 1 mm long; style c 7.4 mm long, lower c 6 mm glabrous and slender, upper c 0.5 mm swollen, top c 0.9 mm slender (but thicker than the lower 6 mm length); stigma minute. Capsule c 2 mm long, upper half hairy, with dense tuft of hairs at tip. Seeds 1.1–1.3 \times 0.6–0.8 mm, oblong-ovate.

Juniperus forest among rocks and in rock crevices in mixed woodland; 900–1700 m. TU GD GG SD; Cameroun, Zaire, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Angola and Namibia. *Bally* 9224; *Getachew A. & Gilbert* 918; *Gilbert & Phillips* 8895.

6. *C. lanata* *Benth.* (1849)

– types: Nigeria, Lower Niger, Patteh Mountain, *Vogel* 183 & River Niger [Quorra], *Vogel* 122 (K syn.).

Annual herb; roots fibrous. Stems creeping and rooting at lower nodes, with several ascending branches to 30 cm high, red-brown or purple tinged, sparsely to densely hairy with woolly hairs; internodes 20–80 mm long. Leaf-sheaths 0.5–1 cm long, provided with woolly hairs; blade 3–7 \times 0.5–0.7 cm, linear to linear-lanceolate, acuminate at apex, glabrous above, woolly beneath. Inflorescences borne at 1–3 upper nodes, sessile, each terminal inflorescence normally subtended by a pair of spathes. Spathes 2, the outer larger than the inner: 25–70 \times 6–9 mm versus 15–25 \times 4–7 mm, both folded, the outer partially covering the inner. Bracteole 1, subtending 1–3 flowers in each cyme, minute. Calyx c 4.2 mm long; tube c 1.2 mm long, hairy; lobes c 3 \times 1.2 mm, linear-oblong, hyaline white, hairy above. Corolla c 7 mm long, blue, purple or pink; tube 4.5–6 mm long, 0.9 mm wide at base, 2.3–2.5 mm at apex; lobes 1.1–2.3 \times 1.5–2.3 mm, more or less oblong-orbicular, apex rounded. Stamens with filaments 5–6 mm long, lower c 4 mm glabrous, upper c 1.7 mm with beaded blue or purple hairs, top c 0.3 mm glabrous; anthers 0.5–0.7 mm long, yellow, glabrous. Ovary c 1 mm long, orange, hairy along sutures above; style 5–6 mm long, lower c 3–4 mm glabrous, slender for, middle c 1 mm hairy, top 1 mm swollen and glabrous; stigma minute. Capsules 2.6–3.2 \times 2.1–2.3 mm, sparsely hairy above half of its length and with a tuft of white hairs at the apex, only slightly shorter than the persistent calyx lobes. Seeds 1.2–1.6 \times 0.9–1.4 mm, oblong-ovate.

Rock crevices in *Acacia* – *Balanites* woodland, and exposed moist places on shallow soils overlying rocks, steep rocky slopes with open tree-cover (*Acacia*, *Commiphora*, *Combretum* or *Boswellia papyrifera*, *Terminalia*, etc.); 900–1900 m. TU GD SU GG SD BA HA; Liberia, Cote d'Ivoire, Burkino Faso, Ghana, Togo,

Benin, Niger, Nigeria, Cameroun, Chad, Central African Republic, Zaire, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Angola, South Africa (Transvaal) and Swaziland and Yemen. *Lewis* 5893; *Gilbert & Thulin* 218; *Tadesse Ebba* 206.

7. *C. sp.* = *Gilbert & Thulin* 707 (ETH K UPS).

? Annual. Stems branched, lower branches rooting at lower nodes and ascending above, provided with longitudinal row of wiry hairs; internodes up to 4 cm long. Leaf-sheaths 0.4–0.6 cm long, closed, hairy with golden-yellow wiry hairs, fimbriate along free edges; blade 2.5–4 x 0.2 cm, linear, glabrous. Flowers terminal and axillary, borne at the upper (2–)3 nodes, with 1–2 flowers subtended by each leaf; terminal cyme can be up to 4-flowered and each flower subtended by a pair of spathes and a bracteole. Spathes: outer 7–9 x 1.5–2 mm, linear-oblong to linear-lanceolate, thick, grey-brown, glabrous; inner 6–7 x 1.1–1.4 mm, linear-lanceolate, thin, whitish, only slightly oblique at apex or not. Calyx: tube *c* 1.2 mm long, 0.5 mm wide at base, *c* 1.3 mm at apex; lobes *c* 2 x 1.2 mm, ovate-triangular, apex acute, hyaline white, thick, glabrous. Corolla 5.8 mm long, blue: tube *c* 3.7 mm long, 0.9 mm wide at base, *c* 2 mm above; lobes one seems to be broader than the other 2, *c* 2.1 x 1.4 mm versus 1.2 x 1.7 mm, oblong-elliptic. Stamens with filaments 6 mm long, lower *c* 4.5 mm glabrous, upper 0.5 mm coiled part hairy, top 1 mm glabrous; anthers *c* 0.5 mm long, blue. Ovary *c* 1.1 mm long, orange-yellow, hairy along sutures at apex; style 6–6.5 mm long, glabrous, slender below, top 1.2 mm swollen including the stigma. Capsule and seed not known.

In crevices of basalt rock in river valley; *c* 1300 m. WG; not known elsewhere.

Only known from the one collection, *Gilbert & Thulin* 707. Further collections of complete plants are needed to determine the taxonomic relationship of this distinct plant.

8. *C. cristata* (L.) D. Don (1825);

Commelina cristata L. (1753) – type: Plate in Hermann Herb. (BM).

Annual herb with fibrous roots. Stems creeping and rooting at lower nodes and ascending above, rarely erect and 10–30 cm high, provided with longitudinal row of wiry hairs; internodes 40–50 cm long. Leaf-sheaths 0.3–0.6 cm long, provided with some hairs; blade 3.5–4.0 x 0.9–1.2 cm, linear-oblong or linear-lanceolate, rounded at the base, acute at the apex, glabrous except for the ciliate margins. Inflorescences terminal or rarely sub-terminal at 1 node, terminal ones 2–3 cymes with scorpioid unilateral flowers, stalked; stalk 30–60 mm long, hairy on one side with wiry hairs. Spathes 23–45 x 14–18 mm, ovate to ovate-lanceolate, broadest at base and cordate, acute at the apex, ciliate along the margins, otherwise glabrous, straight and never curved. Bracteoles 8–10 x 3.5–4 mm, oblique,

curved upward, each subtending a flower and the uppermost flower is subtended by the spathe, apex short-acuminate, glabrous or sometimes hairy with wiry hairs, ciliate at the margins. Calyx tube 1–1.5 mm long; lobes 3–3.8 x 1.3–2 mm, oblong-elliptic, sparsely hairy about the apex with wiry hairs, acute at the apex. Corolla *c* 7 mm long, purplish-blue; tube *c* 5 mm long, *c* 1.5 mm wide at base, *c* 2.5 mm above; lobes *c* 2 x 2.5 mm, obovate, glabrous. Stamens with filaments covered with beaded blue hairs except for the base and tip which are glabrous; anthers *c* 0.7 mm long, yellow. Ovary *c* 1.5 mm long, hairy at the apex only; style *c* 7 mm long, upper 1 mm swollen and broadest at tip, glabrous; stigma broad. Capsules 2.5–3 x 2–2.2 mm, ellipsoid, much shorter than the persistent calyx lobes, glabrous except for some hairs at the tip. Seeds *c* 1.2 x 1.2 mm, oblong-globose.

Slopes with scattered trees; *c* 700 m. EE; Madagascar and Mauritius, Socotra (Yemen), India, Sri Lanka, China, Burma, Thailand, Malaya, Java, Sumatra, Lesser Surda Islands and Philippines. *de Wilde* 4621.

2. TRADESCANTIA L. (1753)

Setcreasea K. Schumacher & Sydow (1901)

Separothesa Waterfall (1959)

Perennial herbs. Stems simple or branched, erect or creeping and rooting at lower nodes. Leaves sessile to pseudo-petiolate; blade linear to ovate. Inflorescence terminal and/or axillary, composed of paired sessile cymes, each pair subtended by spathes. Bracteoles present or absent. Flowers regular, pedicellate, few to numerous. Sepals 3, free or fused, green or coloured. Petals 3, free or fused, obovate to orbicular, sometimes clawed, blue, rose, purple or white. Stamens 6, all fertile, equal; filaments bearded to smooth. Ovary 3-loculed, with 2(–1) superimposed ovules in each locule. Capsules loculicidally dehiscent. Seeds variable.

There are about 60 species in North, Central and South America and West Indies. Several taxa are in cultivation, 4 of which are known in the Flora area.

1. Leaves crowded on a short axis; blade 25–40 cm long. 1. *T. spathacea*
– Leaves well-spread on long axis; blade less than 25 cm long. 2
2. Leaf-blade uniformly greenish above; ovary hairy. 2. *T. pallida*
– Leaf-blade variegated above with longitudinal silvery-white or white bands; ovary glabrous. 3
3. Outer spathe with a tuft of hairs near the base, otherwise glabrous; pedicel 3–4 mm long; 2 calyx lobes fused to near apex; petals fused; filaments borne on corolla tube. 3. *T. zebrina*
– Outer spathe pubescent or glabrous, but without tuft of hairs; pedicel 8–14 mm long; calyx lobes free; petals free; filaments borne on receptacle. 4. *T. fluminensis*

1. *T. spathacea* Swartz (1788)

- type: Jamaica, Swartz s.n. (S holo).
Rhoeo spathacea (Swartz) Stearn (1957).
Tradescantia discolor L'Her. (1788/89).
Rhoeo discolor (L'Her.) Hance (1853).
Ephemerum discolor (L'Her.) Moench (1802).

Perennial herb with more or less woody root-stock. Stems unbranched, stout, up to 15 cm high, glabrous; internodes very short with crowded nodes. Leaves crowded (somewhat as a rosette) on a short axis with the sheaths covering the stem; blade 25–40 x 3–6 cm, linear to linear-lanceolate, base sessile, margins entire, apex acute or acuminate, purple beneath, dark green above, glabrous. Inflorescences axillary, pedunculate; peduncles 2–5 cm long, bearing several flowers, subtended by 2 spathes. Spathes folded, overlapping, the outer larger, 20–45 x 35–46 mm, folded, obovate or ovate, cordate at base, acute to obtuse at the apex, glabrous. Bracteoles 10–12 x 3–5 mm; pedicel 10–15 mm long. Sepals 3, free, equal, *c* 5.2 x 2.2 mm, oblong-elliptic, apex obtuse, purplish. Petals 3, free, white, *c* 4.5 x 5.2 mm, broader than long, obovate to sub-orbicular. Stamens with filaments *c* 5.5 mm long, filaments of upper 3 stamens glabrous for (*c* 3.3 mm) above and hairy below (*c* 2.2 mm), lower stamens hairy all over; anthers yellow, thecae separated by a triangular *c* 0.6 x 0.9 mm connective; connective yellow-orange at the middle, otherwise white. Ovary *c* 1.3 mm long, brown, glabrous; style *c* 3.5 mm long, brown at base, white above, glabrous; stigma minute. Capsules *c* 4 x 4 mm, 3-loculed and valved, glabrous, 3-seeded. Seeds 3.2–4 x 1.8 mm, elongate, indistinctly transversely ridged.

Cultivated; sea level. EE; native of West Indies and Central America. *Ryding* 2108.

2. *T. pallida* (Rose) Hunt (1975);

- Setcreasea pallida* Rose (1911) – types: Mexico, Tamaulipas, near Victoria, Palmer s.n., US 572818 (US holo.); US 1010460 & 1490476 (US iso.).
Setcreasea purpurea Boom. (1955).

Rhizomatous succulent perennial. Stems creeping and rooting below, with ascending erect flowering branches, glabrous or rarely hairy with woolly hairs; internodes 4–7 cm long. Leaf-sheaths 0.5–1.5 cm long, glabrous except for the ciliate free edge or rarely woolly; blade 6–10 x 2–3 cm, linear-oblong to oblong-elliptic, base sessile, margins entire, apex short-acuminate, purple beneath, dark green above, glabrous or rarely woolly. Inflorescences terminal, pedunculate; peduncle 4–14 cm long, glabrous or very rarely hairy with woolly hairs; cymes dense, enclosed in inner spathe. Spathes 2: the outer larger, 40–75 x 20–27 mm; inner 33–37 x 22–24 mm, both folded, margins entire, apex short-acuminate, glabrous or very rarely hairy. Pedicel 5–7 mm long, glabrous. Sepals 3, free, 8–9 x 2–2.5 mm, narrowly-elliptic, densely hairy below half with up to 5 mm long hairs. Petals fused, tube 5–7 mm long, white; lobes 4–6 mm long, pink or rose. Stamens borne at the apex of corolla tube; filaments *c* 5 mm long, with beaded hairs

on lower half; anther thecae yellow, separated by a large connective; connective square with invagination on its upper part, white. Ovary *c* 1.2 mm long, 3-loculed, each locule with 2 ovules, densely hairy; style *c* 12 mm long, glabrous; stigma capitate, large, 3-lobed. Capsules 4–5 mm long, glabrous.

Cultivated; 1800–2500 m. EW SU KF HA; native of Mexico, now grown in several tropical and sub-tropical countries and naturalized in North, Central and South America and the West Indies. *Ensermu K. & Melaku W.* 2923, 2972; *Demel Teketay* 1620.

3. *T. zebrina* Hort. ex Bosse (1849)

- type: not designated, based on material cultivated in Europe.

Zebrina pendula Schnizlein (1849).
T. pendula (Schnizlein) Hunt. (1981).

Rhizomatous perennial. Stems creeping and rooting at lower nodes below and ascending above, glabrous; internodes 6–9 cm long. Leaf-sheaths 0.8–1.2 cm long, purple-veined, hairy along free edges; blades 5–9 x 2.2–3.4 cm, ovate to ovate-lanceolate, base rounded to obtuse, margins entire, apex short-acuminate, dark purple beneath, with 2 green and 2 silvery-white longitudinal regions alternating above, purple along margins, or rarely entirely purple, glabrous except for a few long hairs at the base above, pseudo-petiolate; pseudo-petiole up to 4 mm long, ciliate. Inflorescences terminal, pedunculate; peduncles 8–50 mm long, glabrous. Spathes 2, the outer larger, 25–60 x 12–18 mm, ovate to lanceolate; inner 18–45 x 8–13 mm, lanceolate to linear-lanceolate, both short-acuminate at the apex, glabrous except for a tuft of hairs on outer spathe near the base on both sides of midrib. Pedicel 3–4 mm long. Calyx 5.5–6 mm long; tube 2.2–3 mm long, pubescent on lower side; lower lobe 2.5–3.8 x 1.3 mm, ciliate and hairy along midrib; the 2 upper lobes fused to near the apex, 2.5–3.8 x 2 mm, bifid near apex, with *c* 0.3 mm long free ends, glabrous. Corolla tube *c* 8 mm long, *c* 1 mm wide at base, *c* 1.2 mm above, white, glabrous; the 3 lobes subequal, 5.5–6.5 x 2.5–3.2 mm, linear-oblong, apex rounded, mauve or pale purple with deeper coloured-veins. Stamens borne on corolla tube; filaments *c* 5 mm long, white, bearded with mauve hairs on lower half; anthers light yellow, with thecae separated by broad connective *c* 0.7 mm long. Ovary *c* 1 mm long, 3-loculed, each locule 2-ovuled, glabrous; style *c* 12 mm long, white, glabrous; stigma small. Capsule and seeds have not been seen.

Cultivated; 1200–2500 m. SU HA; native of West Indies and Central and South America, now cultivated in several tropical and sub-tropical countries. *Amare G.* E-39; *Ensermu K. & Melaku W.* 2973; *Tadesse Ebba* 223.

4. *T. fluminensis* Vell. (1825)

- type: Brazil, t. 152 in *Fl. Flum.* III: 140.
T. albiflora Kunth (1843).

Procumbent succulent herb. Stems creeping and rooting at the lower nodes below, ascending above, glabrous

except for the uppermost internode which is pubescent along a vertical line; internodes 3–10 cm long. Leaf-sheaths normally closed, 0.5–0.7 cm long, pubescent along the line of fusion and fimbriate at the mouth. Leaves nearly sessile; blade 6–9.5 x 2.5–3.5 cm, broadest near the base, ovate-lanceolate to elliptic, short-acuminate at the apex, green with white variegation showing longitudinal white bands of varying thickness on both surfaces, glabrous except for the ciliate margins. Inflorescence sub-terminal, or falsely terminal cymes, pedunculate; peduncle 15–50 mm long, pubescent along a vertical line. Spathes 2, subequal, the outer the largest, 15–30 x 7–20 mm, ovate, glabrous except for the ciliate margins. Flowers pedicellate; pedicel 9–14 mm long, pubescent for over half of its length. Calyx nearly free to the base; lobes 4–6 x 2–3 mm, ovate, acute at the apex, pubescent, pubescence more dense along the dark and thickened mid-rib. Petals white, 7–9 x 5 mm, broadly elliptic, glabrous. Stamens 6; filaments 4–5 mm long, with beaded hairs on lower half; anther thecae separated by orange connective. Ovary c 1.5 mm long, glabrous; style 5–6 mm long, glabrous; stigma with 3 minute lobes. Capsules c 3.5 x 2.5 mm, shorter than calyx lobes, glabrous, 6-seeded. Seeds c 2 x 1.5 mm.

Cultivated in public and private gardens; c 2400 m. SU (Addis Ababa); a native of Brazil and Paraguay, now cultivated in several countries. *Ensermu K. & Lemessa Kenei* 3506.

3. ANTHERICOPSIS Engl. (1895) *Gilletia* Rendle (1897)

Geophytes with tubers at the ends of thin, wiry roots. Leaves in a basal rosette, spirally arranged, blade sessile. Inflorescences terminal and axillary, on leafless stalks, composed of 1 or 2 sessile, contracted, bracteolate cincinni at the summit of the peduncle, when 2, opposite, but not fused. Flowers pedicellate, regular, bisexual. Sepals free, equal. Petals free, equal, not clawed. Stamens 3, opposite the sepals, filaments glabrous, anthers longer than filaments, basifixed; staminodes 3, opposite the petals, filaments glabrous, antherodes small unlobed. Ovary 3-locular. Capsules 3-locular, 3-valved, locules c 8–12-seeded. Seeds uniseriate, hilum linear, embryotega semilateral.

A single species restricted to eastern Africa.

A. sepalosa (C.B. Clarke) Engl. (1897);

Anilema sepalosum C.B. Clarke (1881); *Gilletia sepalosa* (C.B. Clarke) Rendle, *J. Bot.* 34: 56 (1897) – types: Kenya, Hildebrandt 2640 (K syn.) and Malawi, mountains E of Lake Malawi, Bishop Steene s.n. (K syn.).

Anthericopsis fischeri Engl. (1895).

Anthericopsis tradescantioides Chiov. (1951) – type: SD, Neghelli-Filtù road, Corradi 4693 (FT hol.).

Tubers ovoid to ellipsoid, 0.7–1.5 x 0.6–0.9 cm. Leaves in a basal rosette, ovate to lanceolate-oblong, 4–21 x 1.2–2.5 cm, apex acute to acuminate, surfaces glabrous.

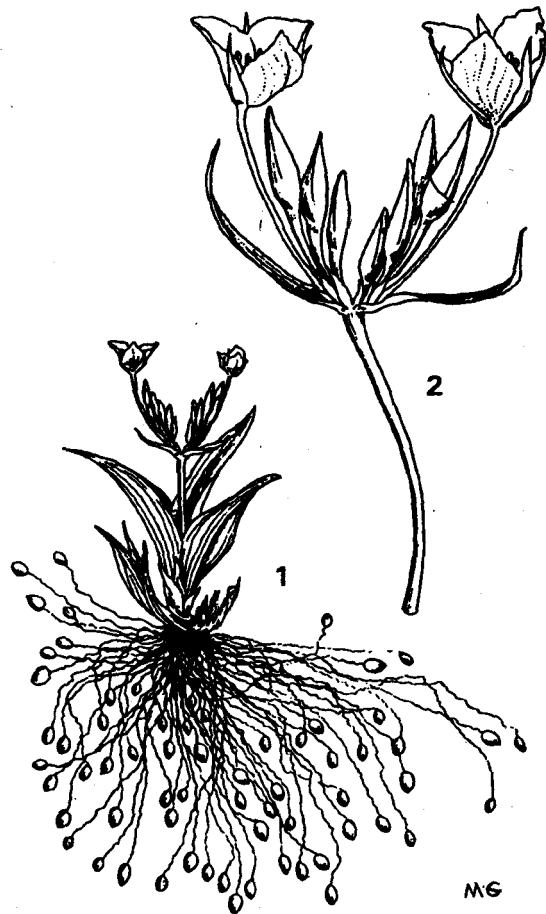


Figure 207.3 *ANTHERICOPSIS SEPALOSA*: 1 – whole plant x 1/2; 2 – inflorescence x 2. All from *J. Linn. Soc. Lond. Bot.* 59: 364, 1966. Drawn by M. Grierson.

Inflorescence usually solitary, erect, on a leafless stem (2–)6–10(–15) cm long, occasionally with a second branch; bracts and bracteoles herbaceous, 0.7–5 cm long, glabrous. Flowers c 2.5 cm wide; pedicels 1–4 cm long, glabrous. Sepals linear-lanceolate to lanceolate, 10–17(–22) mm long, glabrous. Petals elliptic, c 15–20 x 13 mm, white or flushed with pink. Stamens with filaments c 3 mm long; anthers linear-oblong, 3–3.5 mm long, yellow. Ovary 2.5 mm long, style nearly straight, 3 mm long. Capsules oblong-lanceolate to linear-oblong, (2–)2.5–3.5 cm long, 0.2–0.3(–0.4) cm wide, brown glabrous. Seeds transversely oblong, c 1 mm long, 1.5–3 mm wide, testa smooth, brown to grey, hilum raised within an oblong pit. Fig. 207.3.

Grassland, bushland and woodland; 900–1850 m. BA SD; Somalia, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zaire. *Ash* 781; *Gilbert* 3420; *Chaffey* 440.

4. MURDANNIA Royle (1840) *nom. conserv.*

Perennials and annuals. Leaves spirally arranged or distichous, blades sessile. Inflorescences thyrses of 2-many cincinni, or reduced to fascicles of 1-flowered cincinni, terminal and axillary; bracteoles persistent or

falling off soon. Flowers pedicellate, regular to slightly bilaterally symmetrical, bisexual and male. Sepals free, subequal. Petals free, equal, not clawed. Stamens 3, opposite the sepals, sometimes one staminodial, filaments bearded or glabrous; staminodes 3, opposite the petals, rarely all lacking, filaments bearded or glabrous, antherodes 3-lobed or hastate. Ovary 3-locular. Capsules 3-locular, 3-valved, locules 1-many-seeded. Seeds uni- or biseriate, hilum punctiform to linear, embryotege lateral to dorsal.

A pantropical and warm temperate genus of about 50 species, with the greatest diversity in tropical Asia.

1. Inflorescences thyriform, terminal; flowers borne in many-flowered cincinni; stamens 2, staminodes 4; locules 2-seeded. 1. *M. simplex* – Inflorescences of apparent fascicles of 1–3 terminal and axillary 1-flowered cincinni; stamens 3, staminodes 0; locules *c* 2–3-seeded.

2. *M. tenuissima*

1. *M. simplex* (Vahl) Brenan (1952);

Commelina simplex Vahl (1805–1806) – types: 'Guinea,' *Isert* s.n. (C syn.); *Thonning* 75 (C 4 sheets). *Aneilema sinicum* Ker-Gawl. (1822).

Perennial herb, mostly 30–70 cm tall; roots uniformly thickened, not tuberous. Shoots densely tufted, unbranched or branched near the base, erect to ascending, rarely decumbent. Leaves spirally arranged or distichous, basal and cauline, widely spaced and strongly reduced distally, the upper most bract-like on the flowering shoot; sheaths up to 2.5 cm long, pilose to nearly glabrous, ciliate at the apex; blades linear to linear-oblong or lanceolate-oblong, (2–)4.5–43 x 0.4–1 cm, glabrous to pilose. Inflorescences usually compound, composed of 2 or more thyrses, each thyrses composed of 1–3 elongate, many-flowered cincinni. Bracteoles elliptic, 3.5–6 mm long, soon falling off. Flowers secund, bisexual and male; pedicels 4.5–8 mm long, erect in fruit, glabrous. Sepals 4.5–6 mm long, glabrous. Petals 4–9 mm long, blue or mauve to lilac. Stamines 4, opposite the sepals, with 3-lobed antherodes; stamens 2, filaments bearded. Capsules ovoid, apiculate, 4–6 x 2.5–3 mm, glabrous, locules 2-seeded. Seeds uniseriate, transversely elliptic to elliptic or ovate, (1.2–)1.5–1.75 x 1.3–1.7 mm, testa brown, alveolate to scrobiculate, sometimes with low warts. Fig. 207.4.

Short grass, *Combretum* – *Terminalia* savanna and *Pterocarpus* – *Anogeissus* woodland; 550–1300 m. WU IL; widespread in tropical Africa, Madagascar and tropical Asia. *Jansen* 6347; *Gilbert & Thulin* 722; *Friis* et al. 2552.

2. *M. tenuissima* (A. Chev.) Brenan (1952);

Baoulia tenuissima A. Chev. (1912) – type: Ivory Coast, *Chevalier* 22318 (P hol.).

Much-branched, grass-like, annual (?) with very slender, weakly erect to ascending shoots 30–80 cm long. Leaf-blade linear-lanceolate, 1.5–6 x 0.2–0.4 cm, apex acuminate, adaxial surface sparsely pilose to glabres-

cent, abaxial glabrous. Inflorescences of apparent fascicles of 1–4 1-flowered cincinni, terminal and in the upper leaf axils; cincinni 1.2–2.7 cm long, without bracts, glabrous. Flowers 6–8 mm wide; pedicels 8–11 mm long. Sepals 3–4 mm long, glabrous. Petals obovate, pale blue. Stamens with filaments bearded; staminodes lacking. Capsules ellipsoid, 3–5 mm long, locules 2–3-seeded. Seeds uniseriate, *c* 1 mm in diameter, ribbed with a radial pattern, testa grey to light brown, with a mealy covering, embryotege semidorsal, hilum elliptic.

Marshy places, growing among grasses and sedges; 1650–1900 m. KF WG; Guinea, Ivory Coast, Ghana, Nigeria, Cameroun, Central African Republic, Zaire, Uganda, Tanzania, Zambia, Angola. *J. De Wilde* 5423; *W. De Wilde* 7650.

5. STANFIELDIELLA Brenan (1960)

Perennial or annual slender herbs or sometimes moderately robust plants. Stems glabrous or sometimes densely pilose. Leaves narrowly-elliptic to elliptic. Inflorescence axillary or terminal, aggregate or branched, branches more or less elongate; flowers pedicellate, borne singly at inflorescence nodes. Sepals 3, free, equal. Petals 3, free, equal, oblong-spathulate or elliptic. Stamens 6, sub-equal. Ovary distinctly demarcated from style; style elongate. Capsule linear-oblong, oblong or ellipsoid, apex obtuse or apiculate, 3-loculed, with 2–10 seeds per locule. Seeds more or less square.

A small genus with about 3 species confined to tropical Africa. Only 1 species recorded from the Flora area.

S. imperforata (C.B. Clarke) Brenan (1960);

Buforessia imperforata C.B. Clarke (1881) – types: Cameroun, *Mann* 1340 (K syn.); Sao Tome & Principe, *Mann* s.n. (K syn.).

Stoloniferous herb; stems creeping and rooting at lower nodes, ascending above to 40 cm long, glabrous; internodes 5–7.5 cm long. Leaf-sheaths 1–1.5 cm long, closed, pubescent along the line of fusion and with some hairs 0.3–0.7 cm long on free end; blade 10–13 x 3–4 cm, narrowly-elliptic, papery, shiny rather dark green and hairy above, pale greyish-green or sometimes purple-tinged and glabrous beneath, base acute to cuneate, apex acuminate, margins entire; pseudo-petiole hardly any. Inflorescences terminal, paniculate cymes, branched at the base, pubescent or nearly glabrous. Rachis sparsely pilose with glandular hairs or glabrous above. Bracts 11–13 x 2–2.5 mm, green, leafy, glabrous. Bracteoles 2–4 x 1–2 mm, glabrous, membranous except for the midrib which is green; pedicels 5–8 mm long, sparsely pilose with glandular hairs or glabrous. Sepals 3, free, 2.5–3.5 x 1.3–1.8 mm, linear-oblong, hyaline white with brown tinge along the 3 parallel veins, pilose with glandular hairs or glabrous. Petals 3, alternating with sepals, 3–4 x 1.2–1.8 mm, elliptic, hyaline white with brownish veins. Stamens with sub-equal filaments 2–2.6 mm long, glabrous; anthers *c* 0.6 mm



Figure 207.4 *MURDANNIA SIMPLEX*: 1 – plant base, with base of flowering shoot $\times 1/2$; 2 – inflorescence $\times 1/2$; 3 – bisexual flower, side view $\times 2$; 4 – bisexual flower, front view showing style curving away from the stamens $\times 3$; 5 – dehiscent capsule $\times 6$; 6 & 7 – seed, dorsal view and ventral view $\times 14$. All from Faden et al. 74/64. Drawn by A.R. Tangerini.

long. Ovary 1–1.4 mm long, pilose along the 3 ridges and at the apex with glandular hairs; style 2.3–2.5 mm long, glabrous; stigma capitate. Capsules c 8 x 2 mm, 3-angled, linear-oblong, shiny-grey, glabrous, 18–24-seeded. Seeds c 1 x 1 mm, square, brown with grey dots.

1. Pedicels and sepals pubescent with glandular hairs. var. *imperforata*
 – Pedicels and sepals glabrous. var. *glabrisepala*

var. *imperforata*

Lowland rain-forest; c 1050 m. KF; also in Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Nigeria, Cameroun, Sao Tome and Principe, Gabon, Congo, Central African Republic, Zaire, Uganda, Tanzania and Angola. *Friis et al.* 3885.

var. *glabrisepala* (De Wild.) Brenan (1960)

Buforesia glabrisepala De Wild. (1931) – types: Zaire [Congo], *Bequaert* 1054 & *Claessens* 497 (BR syn.).

Lowland rain-forest; 1000–1300 m. IL KF; also in Central African Republic, Zaire, Uganda and Tanzania. *Friis et al.* 4099; *Meyer* 8018, 8919A.

6. FLOSCOPA *Lour.* (1790)

Perennial or annual herbs. Stems erect to decumbent. Leaves linear to oblong, lanceolate or elliptic, sheathing at base. Inflorescences terminal and sometimes axillary, lax to dense, leafy compound thyrses, usually glandular pubescent; bracteoles small or absent; pedicels short. Flowers small, bisexual. Sepals 3, free, equal, persistent. Petals 3, free, equal or lower one narrower, purple to blue, pink, yellow or white. Stamens (5–)6, equal or upper 3 slightly different from lower 3; filaments glabrous, upper 3 fused basally. Ovary 2-locular, glabrous, locules 1-ovulate; style filiform. Capsules shortly stipitate, longitudinally compressed, ellipsoid to obovoid, 2-seeded, apex retuse or acute. Seeds ribbed or smooth, seldom provided with warts.

A genus with about 20 species, widespread in the warmer regions of the world; 1 species in the Flora area.

F. glomerata (Willd. ex J.A. Schult. & J.H. Schult.)

Hassk. (1870);

Tradescantia glomerata Willd. ex J.A. Schult. & J.H. Schult. (1830) – type: Madagascar, herb. *Willdenow* 6345 (B microfiche 6345).

Lamprodirhynchus rivularis (A. Rich.) Fenzl (1865) – type: TU/GD, Sanka Berr, 1740–2290 m, *Schimper* 1226 (K US iso.).

Floscopa rivularis (A. Rich.) C.B. Clarke (1881).

Aneilema rivularis A. Rich. (1851) – types: TU, Wajerat [Ouodgerate], *Quartin-Dillon* s.n. (K syn.); ?TU, *Quartin-Dillon & Petit* s.n. (K syn.).

Perennial herb; stems decumbent, branched, 30–120 cm high, pubescent. Leaves with sheaths 0.5–1.5 cm long, pubescent along the line of fusion and at summit; blade linear-lanceolate, 3.5–7.5 x 0.8–1.2 cm, base clasping or

rounded, apex acuminate, surface glabrous or hairy along the midrib beneath. Inflorescences terminal and terminating axillary branches, 1.5–3.5 cm long, densely glandular pubescent, lilac or mauve. Flowers very small, bisexual; pedicel c 2 mm long. Sepals oblong-ovate, 2.5–3 x 1.7–2 mm, mauve or lilac, glandular pilose. Petals 3, unequal, purple or mauve or lilac, 2 upper ovate-elliptic, c 3.3 x 2 mm, lower one narrower, linear, c 3.3 x 0.8–1 mm. Stamens 6, unequal: filaments of the 3 upper stamens shorter, c 4.5 mm long; anthers with a broad connective; the 3 lower stamens longer, c 5 mm long; anthers with a narrow connective. Style 5–6 mm long. Capsules transversely ellipsoid, 2–2.3 x 3–3.3 mm, shiny-grey, 2-seeded. Seeds obovoid, 1.1–1.5 x 1–1.2 mm. Fig. 207.5.

Damp meadows, ditches, boggy grassland and marshy places near streams; 1300–2400 m. TU GD GJ SU WG IL KF SD; throughout tropical Africa and Madagascar. *Gillett* 14631; *Mooney* 6253; *Mesfin T. & Kagnev G/Y* 1790.

7. POLLIA *Thunb.* (1781)

Perennial herbs. Stems creeping and rooting at lower nodes. Leaves sheathing, sheaths closed, glabrous except for some hairs along free edges; blade narrowly-elliptic to lanceolate. Inflorescences terminal, dense or loose. Sepals 3, free, equal. Petals 3, free, equal or sub-equal, white. Stamens 6, all fertile and sub-equal or 3 reduced to staminodes; filaments glabrous. Ovary 3-loculed, with 5–10 ovules per locule. Fruit indehiscent, hard, dry, globose or broadly-elliptic, metallic-blue or grey-purple. Seeds 5–10 in each locule, flattened with variable angular edges.

The genus has a pan-tropical distribution, occurring in both Old and New world tropics, with its main distribution in the Old World.

1. Leaf-blade 9–10 x 3–3.5 cm; inflorescence lax; sepals 3–4 x 1.5–2 mm; stamens 6; fruit 5.5–7 x 3.5–5 mm, ovoid, grey-purple. 1. *P. mannii*

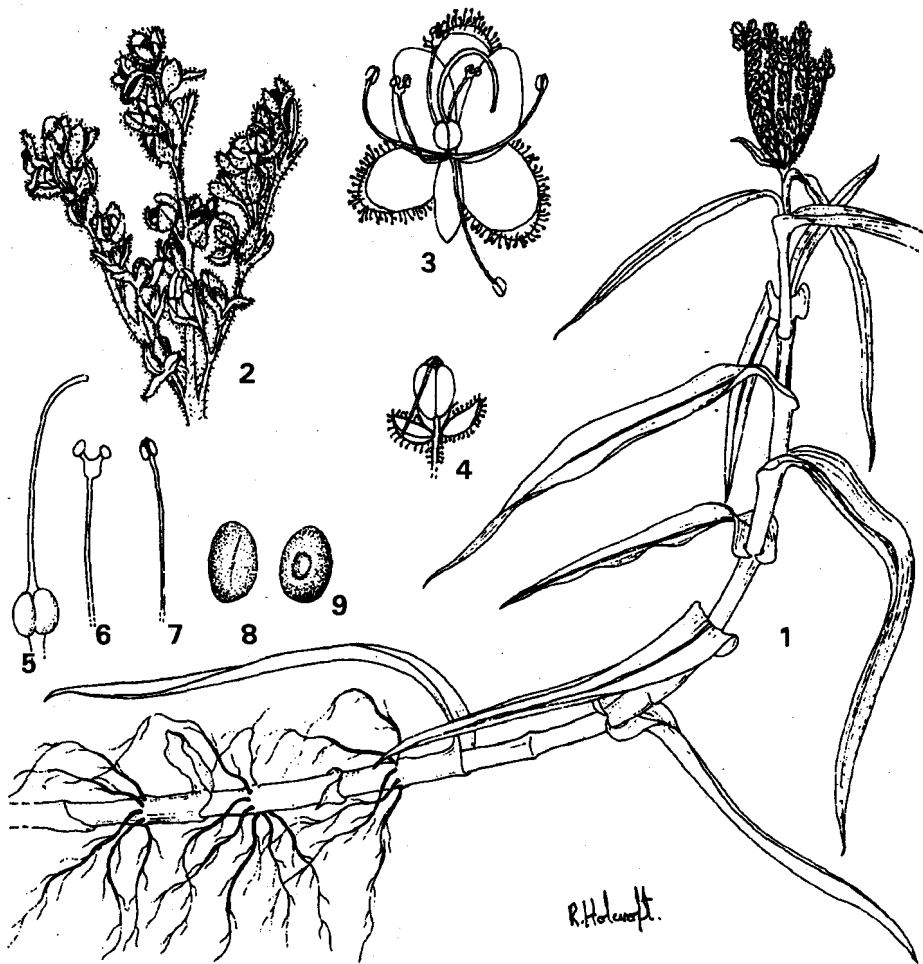
– Leaf-blade 13–24 x 5–7 cm; inflorescence compact; sepals c 8 x 5 mm; stamens 3 with 3 staminodes; fruit 4–5 mm in diameter, metallic blue.

2. *P. condensata*

1. *P. mannii* C.B. Clarke (1881)

– types: St. Thomas Island, 610 m, *Mann* 1098 (K syn.); Angola, *Welwitsch* 6604 (BM syn. in part).

Stoloniferous perennial herb. Flower-bearing stems creeping and rooting at lower nodes, ascending above to 90 cm long, glabrous; internodes 4–9 cm long. Leaf-sheaths closed, glabrous or provided with some hairs at the apex or minutely pubescent; blade 9–10 x 3–3.5 cm, narrowly-elliptic to lanceolate, broadest below the middle, acute to cuneate at the base, acuminate at the apex, margins entire, glabrous, pseudo-petiolate; pseudo-petiole 0.8–2 cm long, glabrous. Inflorescences terminal, lax, paniculate cymes; inflorescence peduncle 1–1.5 cm long. Inflorescence bract c 35 x 8 mm, apex acumi-



R. Holcroft.

Figure 207.5 *FLOSCOPA GLOMERATA*: 1 – flowering branch $\times 3/5$; 2 – part of inflorescence in fruiting stage $\times 2$; 3 – flower $\times 5$; 4 – capsule, style and persistent sepals $\times 3$; 5 – pistil $\times 6$; 6 – staminode $\times 6$; 7 – stamen $\times 6$; 8 – seed, showing hilum $\times 6$; 9 – seed, showing embryotega $\times 6$. All from *Mauve* 5301. Drawn by R. Holcroft. (Reproduced from *Fl. South. Afr.* 4(2): fig. 15, 1985.)

nate. Cincinnus peduncle pubescent with short hooked hairs; pedicel 3–5 mm long, pubescent with short hooked hairs. Cincinnus bract 7–12 \times 2–2.5 mm, linear, the largest subtending the lowest branch, those above getting smaller up the inflorescence axis. Bracteole subtends a pair of flowers, c 3–4 \times 2 mm, oblong-lanceolate. Sepals free, slightly hooded 3–4 \times 1.5–2 mm, broadly-elliptic, pubescent along the middle, margins scarious. Petals free, sub-equal, 4.5–5 \times 2–2.5 mm, elliptic, glabrous. Stamens with unequal filaments, 5–5.5 mm long, glabrous; anthers sub-equal, 0.4–0.7 mm long. Ovary c 1.5 mm long, dark brown; style c 6 mm long, dark brown at base, yellow above; stigma capitate, yellow. Fruit 5.5–6 \times 3.5–5 mm, longer than broad, ovoid, grey-purple, several-seeded. Seeds variable in size, 1.5 \times 1.1–1.5 mm, triangular, square, rectangular or oval.

Wet lowland rainforest; 1000–1200 m. IL KF; also in Cote d'Ivoire, Ghana, Nigeria, Cameroun, Congo, Uganda and Tanzania. *Friis* et al. 4018, 4068; *Meyer* 8918.

2. *P. condensata* C.B. Clarke (1881)

– types: Fernando Po, *Barter* 1518 & 2020; Fer-

nando Po, 500 m, *Mann* 93 (K syn.); Angola, *Welwitsch* 6604 (BM syn., in part).

Stoloniferous herb. Flower-bearing stems erect, up to 150 cm high, unbranched, glabrous; internodes 9–12 cm long. Leaf-sheaths 3.5–5 cm long, slender, closed, glabrous; blade 13–24 \times 5–7 cm, elliptic, base cuneate, margins entire, apex acuminate, pseudo-petiolate; pseudo-petiole 2–4 cm long. Inflorescences terminal, compact paniculate cymes, 1.5–6 cm long including a peduncle of 0.5–0.8 cm long, with bisexual flowers or rarely male flowers within the same inflorescence, glabrous. Bract subtending the head-like inflorescence 17–30 \times 8–9 mm, acuminate at apex; bracteoles c 8 \times 8 mm, ovate to sub-orbicular, broadest at base, margins scarious, apex acuminate, glabrous; pedicel 1–3 mm long, glabrous. Sepals equal, c 8 \times 5 mm, broadly-elliptic, pale green. Petals white, sub-equal, 6–8 \times 3–3.5 mm, 1 elliptic, 2 obovate. Stamens with filaments 8–9 mm long, glabrous; anthers c 1.5 mm long, yellow. Staminodes with filaments 3 mm long; antherodes absent. Ovary 1.1 mm long, brown, glabrous; style 9–10 mm long, brown at base, white above, glabrous; stigma capitate. Capsule 4–5 mm in diameter, globose, 3-loculed

and -valved, 18–24-seeded, metallic-blue, with 6 paler longitudinal lines. Seeds 1.8–2 x 1.2–1.6 mm, variable in shape.

Wet lowland rainforest; 800–1200 m. IL KF; also in Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Nigeria, Cameroun, Gabon, Congo, Central African Republic, Zaire, Sudan, Uganda, Kenya, Tanzania and Angola. Friis et al. 3853; Meyer 8958; Moutt 24.

8. ANEILEMA R.Br. (1810)

Faden, *The Morphology and Taxonomy of Aneilema R. Brown (Commelinaceae)*, *Smithsonian Contributions to Botany*, Number 76: 166 pp. (1991).

Perennials and annuals. Leaves spirally arranged or distichous, blade petiolate or sessile. Inflorescences thyrses, rarely reduced to a single cincinnus, terminal and axillary, rarely all axillary; bracteoles persistent, commonly perfoliate. Flowers pedicellate, bilaterally symmetrical, bisexual and male, rarely only female. Sepals free, usually subequal. Petals free, paired petals clawed, lower (outer) petal usually different in size, shape and colour. Staminodes 3(–2), posterior, antherodes bilobed; stamens 3, anterior, the medial usually differentiated, lateral filaments sometimes bearded, medial glabrous; ovary bi- to trilocular. Capsules usually dehiscent, bi- to trilocular, dorsal locule usually 1-seeded or empty, ventral locules 1–6-seeded. Seeds uniseriate, hilum linear, embryotega lateral.

A pantropical genus of about 64 species, most numerous in Africa; 18 species recorded from the Flora area.

1. Plant mat-forming; leaves with white veins above; inflorescences all axillary, perforating the sheaths, consisting of 1(–2) cincinni.

14. *A. zebrinum*

– Plant various, but not mat-forming; veins not white; inflorescences some or all terminal, rarely some perforating the sheaths, thyrses composed of several to many cincinni. 2

2. Bracteoles usually cup-shaped, rarely not cup-shaped, perfoliate or not, apex not drawn out into an elongate, glandular tip; lateral stamen filaments glabrous or bearded. 3

– Bracteoles not cup-shaped, not perfoliate, apex usually drawn out into an elongate, swollen, glandular tip; lateral stamen filaments densely bearded with purple or blue hairs. 16

3. Flowers yellow to orange; inflorescences lax. 4

– Flowers white to pink, blue or purple; inflorescences lax to dense. 5

4. Leaves spirally arranged; inflorescences, sepals and stamen filaments glabrous; flowers orange-yellow. 1. *A. johnstonii*

– Leaves distichous; inflorescences and sepals puberulous; lateral stamen filaments bearded; flowers yellow. 2. *A. aequinoctiale*

5. Inflorescences lax, mostly 8–23 cm long, with cincinni mainly subverticillate or subopposite; flowers 15–40 mm wide. 6

– Inflorescences lax to dense, mostly 2–10 cm long, with cincinni variously arranged; flowers 6–20 mm wide. 7

6. Bracteoles not perfoliate; capsule glabrous or subglabrous, apex acute; stamen filaments free, bearded basally. 3. *A. gillettii*

– Bracteoles perfoliate; capsule puberulous, apex truncate to emarginate; stamen filaments fused basally, glabrous. 4. *A. hockii*

7. Capsules glabrous, erect; inflorescences dense. 8

– Capsules puberulous, erect or further recurved; inflorescences lax to dense. 9

8. Mature capsules straw-coloured; sepals with red or reddish brown margins; stamen filaments glabrous; medial stamen anther with an enlarged, convex, maroon-spotted connective; plant of dry habitats. 5. *A. rendlei*

– Mature capsules dark brown; sepals entirely green; lateral stamen filaments minutely bearded dorsally; medial stamen anther connective not enlarged, flat, yellow; plant of forests. 15. *A. beniniense*

9. Roots thick or with distal tubers; lower petal reduced, not deeply cup-shaped, usually not the same colour as the paired petals. 10

– Roots, thin, never tuberous, lower petal large, deeply cup-shaped, the same colour as the paired petals. 12

10. Inflorescences composed of (8–)17–40(–50) cincinni; leaves not especially succulent; capsules (5–)6–14 mm long. 11

– Inflorescences composed of 2–11(–13) cincinni; leaves succulent; capsules 2.5–5 mm long. 8. *A. pusillum*

11. Bracteoles not perfoliate; capsules (5–)6–9 mm long, apex usually rounded to truncate; seeds 2–3(–4) per ventral capsule locule, 1.6–2.7 mm long. 6. *A. somaliense*

– Bracteoles perfoliate; capsules (10.5–)12–14 mm long, apex beaked; seeds 2 per ventral capsule locule, 3.4–3.9 mm long. 7. *A. grandibracteolatum*

12. Pedicels glabrous or with a few hairs at apex, mostly erect in fruit; bracteoles cup-shaped, prominently glandular along the margin, glabrous; sepals glabrous. 13

– Pedicels puberulous in the distal half or occasionally only at apex, mostly recurved through 180°; bracteoles various; sepals usually puberulous at least basally. 14

13. Perennial; leaf margins scabrid and ciliate; capsules mostly 2.8–3.6 mm wide. 12. *A. sebitense*

– Annual; leaf margins usually only scabrid, occasionally also sparsely ciliate; capsules mostly 3.3–4.5 mm wide. 13. *A. forskalii*

14. Pedicels puberulous only at apex; outer sepal glabrous; bracteoles symmetrically cup-shaped, with small, inconspicuous marginal glands, glabrous; capsules mostly 3.5–5 x 2–2.5 mm. 11. *A. recurvatum*

– Pedicels usually puberulous in distal half, rarely

only at apex; bracteoles asymmetrically cup-shaped or not cup-shaped, lacking marginal glands, puberulous or rarely subglabrous; capsules mostly 4.5–7.5 mm long x 2.3–5 mm wide.

15

15. Bracteoles not cup-shaped although sometimes shortly perfoliate basally; filaments of lateral stamens crossing when in flower; capsules (2.4–)3.3–5(–5.5) mm wide, dorsal valve deciduous; dorsal and ventral locule seeds strongly dimorphic, differing in shape, size, testa surface and colour; dorsal locule seed hemispherical, humpbacked towards capsule apex, testa smooth.

9. *A. petersii*

- Bracteoles cup-shaped, usually some or all perfoliate; filaments of lateral stamens not crossing; capsules (1.9–)2.3–3(–3.4) mm wide, dorsal valve usually persistent; dorsal and ventral locule seeds scarcely dimorphic, differing only in shape and length; dorsal locule seed dorsiventrally compressed, not humpbacked, testa shallowly pitted.

10. *A. indehiscens*

16. Cincinnus bracts and bracteoles lacking linear, gland-tipped apices; inflorescences lacking long, uniseriate hairs.

16. *A. spekei*

- Cincinnus bracts and bracteoles with linear gland-tipped apices; inflorescences commonly with long, seriate hairs.

17

17. Leaves sessile (except occasionally the lower leaves); capsule locules 1-seeded; annual.

17. *A. hirtum*

- Leaves petiolate; capsule locules 2-seeded; perennial.

18. *A. leiocaula*

1. *A. johnstonii* K. Schum. (1895)

– type: Tanzania, *Volkens* 2146 (B lecto).

Perennial herb; roots with distal tubers. Shoots annual, sparsely branched, erect to ascending, 30–60 cm tall. Leaves spirally arranged, blade sessile to shortly petiolate (lower leaves sometimes), linear-lanceolate to lanceolate-elliptic or ovate-elliptic, 4–13.5 x 1–3.7 cm, puberulous and often with scattered longer hairs. Inflorescences thyrses, terminal, lax, ovoid to ellipsoid, 2.5–11 x 3–7.5 cm, glabrous, with (6–)10–25 cincinni arranged in (1–)2–7 pseudo-whorls; cincinni up to 4 cm long, 12-flowered. Bracteoles cup-shaped, perfoliate. Flowers bisexual and male, 12–18(–25) mm wide; pedicels 4–7 mm long (to 11.5 mm in fruit), glabrous. Sepals 3–5.5 mm long, glabrous. Paired petals *c* 7–9.5 mm long, orange or orange-yellow, medial petal *c* 5–5.5 mm long, greenish orange; filaments free. Staminodes with horseshoe-shaped antherodes; lateral stamen filaments gently sigmoid, glabrous. Capsules elliptic to obovate, bi- or trilobular, 4.5–7 x 3–4.5 mm, glabrous, dorsal locule (0–)1-seeded, ventral locules (1–)2–3(–4)-seeded. Seeds of ventral locule ovate to triangular in outline, 1.9–2.3 x 1.7–1.8 mm; testa beige, smooth to faintly reticulate, white-farinose around the hilum. Fig. 207.6.

Woodland and bushland with *Acacia*, *Commiphora*,

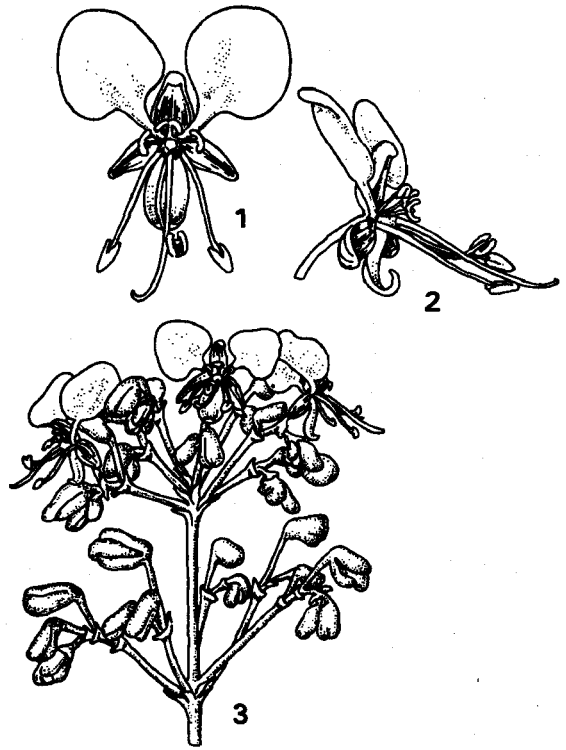


Figure 207.6 *ANEILEMA JOHNSTONII*: 1 – flower, front view x 2; 2 – flower, side view x 2; 3 – inflorescence x 1. All from Pawek 12327. Artist not known. (Reproduced from *Fl. South Afr.* 4(2): fig. 7, 1985.)

and *Combretum*, often on rocky hillsides or granitic outcrops; 1250–1650 m. SD BA. Ethiopia S to Mozambique, Zimbabwe and Botswana. *Friis* et al. 2690; *Gilbert* et al. 7766; *Mesfin T. & Vollesen* 4316.

2. *A. aequinoctiale* (P. Beauv.) G. Don (1830)

– type: Nigeria, *P. de Beauvois* s.n. (G holo.).

Decumbent, scrambling or subscandent perennial herb; roots thin, fibrous. Shoots perennial, sparsely branched, to *c* 1(–2) m tall, often adhering to vegetation by means of hooked hairs on the internodes and leaf-sheaths. Leaves distichous, blade petiolate or sessile, ovate or ovate-elliptic to lanceolate-elliptic, 4.5–15 x (1.5–)2–5 cm, densely pubescent. Inflorescences thyrses, terminal, lax, ovoid or narrowly ovoid to cylindrical, (3–)5–11.5 x 3–5 cm, with 4–11, alternate to subopposite or pseudo-whorled cincinni; cincinni up to 6 cm long and 10-flowered. Bracteoles cup-shaped, not perfoliate. Flowers bisexual (and male?), *c* 18–30 mm wide; pedicels 3.5–5 mm long (to 13 mm in fruit), puberulous. Sepals 5–8 mm long, green, puberulous. Paired petals *c* 15 x 15 mm, yellow, claw puberulous; lower petal oblong-elliptic, *c* 6–8 x 2.5 mm, translucent yellow-white, glabrous. Stamens: filaments free, lateral stamen filaments straight, bearded for most of their length, anthers with orange pollen. Style straight, equalling lateral stamens, *c* 8 mm long, white, stigma purple. Capsules oblong to obovate-elliptic, trilobular, 7.5–10 x 4–5.5 mm, puberulous, apex truncate to slightly emarginate, dorsal locule 1-seeded, ventral locules 3-seeded (occasionally fewer through abortion). Seeds of ventral lo-

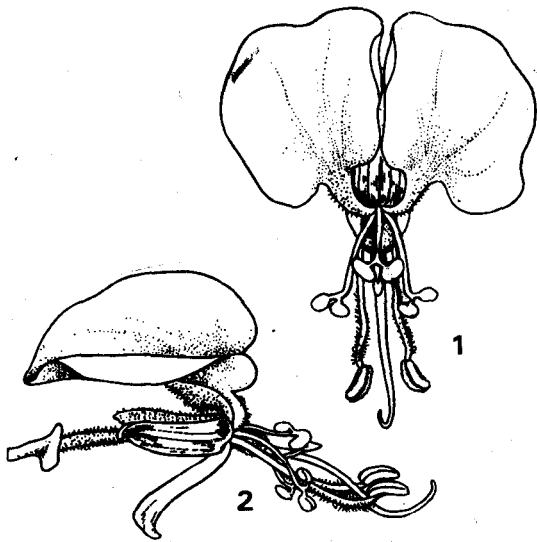


Figure 207.7 *ANEILEMA AEQUINOCTIALE*: 1 – flower, front view x 2; 2 – flower, side view x 2. All from *Faden & Faden* 74/199. (Reproduced from *Fl. South. Afr.* 4(2): fig. 7, 1985.)

cule ovate to trapezoidal or subreniform in outline, 1.9–2.4 x 1.7–2 mm, testa orange-brown, alveolate, with blackish granules mainly around the hilum. Fig. 207.7.

Damp situations in partially disturbed forest with much undergrowth; 1050–1200 m. KF IL; Guinea to Ethiopia S to Angola, Zimbabwe and South Africa (Transvaal, Natal, Cape). *Friis* et al. 1763, 3880.

Previous records of *A. aequinoctiale* from Ethiopia, e.g. *Cufodontis* (1971), have all been based on faulty concepts of this species and/or misidentifications of *A. hockii* or *A. forskalii*. Ethiopian specimens belong to the West African type, i.e. subsp. *aequinoctiale*, which otherwise occurs from S Sudan and Uganda westwards. Plants from Kenya southwards belong to a different, unnamed subspecies.

3. *A. gillettii* Brenan (1961)

– type: Kenya, *Gillett* 14033 (K holo.).

Robust perennial herb; roots tuberous. Shoots annual, unbranched or sparsely branched, erect to ascending, to c 100 cm tall. Leaves spirally arranged, blade sessile, obovate-elliptic to ovate-elliptic, 7–11 x 3–6.4 cm, pilose-puberulous. Inflorescences thyrses, lax, narrowly ovoid to cylindrical, (8–)15–23.5 x 4–7(–9) cm, with (5–)12–26 mainly subverticillate (occasionally opposite or alternate), cincinni; cincinni to 3.5 cm long and 7-flowered. Bracteoles 2–3.5 mm long, cup-shaped. Flowers bisexual and male, 21–26 mm wide; pedicels 5–10 mm long (to 17 mm in fruit), puberulous at the apex. Sepals 6.5–9 mm long, puberulous. Paired petals 12–16 x 9–11 mm, purple to blue or violet, medial petal boat-shaped, 12 x 7–9 mm, concolorous; filaments free, lateral stamen filaments undulate, minutely bearded below the middle; medial stamen anther blackish violet-maroon. Capsules oblong-elliptic, bilocular, 9–11 x

4–5 mm, glabrous or subglabrous, locules (2–)3–4-seeded. Seeds mostly ovate to trapezoidal in outline, 1.7–2.5 x 1.8–2.2 mm; testa yellowish brown to orange-brown, shallowly pitted to nearly smooth, tan-farinose in the depressions and around the hilum.

Acacia woodland, in scrubland with *Sterculia*, *Sesamothamnus* and *Ochna*; 1100–1700 m. SD; N. Kenya. *Westphal & Westphal-Stevens* 2783, 2798; *Friis* et al. 1044.

This species is very distinctive and possibly confused only with *A. hockii*. It differs by its generally larger inflorescences, non-perfoliate bracteoles, different coloured flowers, much larger lower petal that is the same colour as the paired petals, bearded stamen filaments, and pointed capsules. In the range of *A. gillettii*, *A. hockii* lacks tuberous roots.

4. *A. hockii* De Wild. (1913)

– type: Zaire: *Hock* s.n. (BR holo).

A. aequinoctiale Cufod. *Enum.* p.p., non (P. Beauv.) G. Don (1830).

Perennial herb; roots thin, fibrous. Shoots erect to ascending shoots to 60 cm tall, lower portions usually covered by overlapping sheaths. Leaves spirally arranged, blade sessile, linear-lanceolate to lanceolate-elliptic or narrowly elliptic, (4–)9.5–14 x (0.15–)1.5–3.5 cm, puberulous and often with scattered longer hairs. Inflorescences thyrses, terminal, lax, ovoid to cylindrical, 4.5–10 x 2–6 cm, with 4–13, usually mostly subopposite or pseudo-whorled (commonly some alternate), cincinni; cincinni to 3 cm long and 7-flowered. Bracteoles cup-shaped, perfoliate. Flowers female, bisexual and male, (15–)20–40 mm wide. Sepals 5.5–9 mm long, green striped with maroon or bluish purple, puberulous. Paired petals c 12.5–17.5 x 9.5–17 mm, mauve to blue, lavender or bluish purple; medial petal c 7–12 x

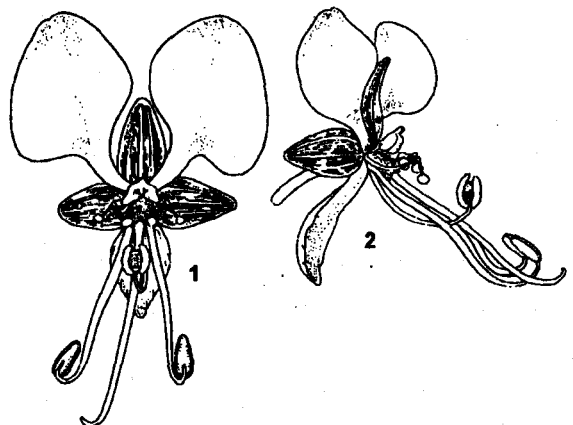


Figure 207.8 *ANEILEMA HOCKII*: 1 – flower, front view x 2; 2 – flower, side view x 2. All from *Faden & Faden* 74/190. (Reproduced from *Fl. South. Afr.* 4(2): fig. 7, 1985.)

2.5–3 mm, pinkish white. Stamen filaments fused basally; lateral stamen filaments undulate, glabrous. Capsules oblong to oblong-elliptic, usually bilocular, 8–10.5 x 3–4.2(–4.9) mm, puberulous, locules 3–5-seeded. Seeds rectangular to ovate or trapezoidal in outline, 1.4–1.9(–2.1) x 1.9–2.1 mm; testa tan, orange-tan or grey-brown, rugose or with irregular raised ridges and bumps, usually with numerous, scattered blackish granules. Fig. 207.8.

Rocky places in or at edge of *Acacia* – *Commiphora* – *Combretum* or *Euclea* – *Euphorbia candelabrum* woodland; c 1250–1800 m. GG SD; Ethiopia S to Swaziland, South Africa (Transvaal), Botswana and Namibia. *Gilbert & Thulin* 266A; *Gilbert & Jefford* 4450; *Cufodontis* 385.

5. *A. rendlei* C.B. Clarke (1901)

– type: SD, Amaro Montains, *Donaldson Smith* s.n. (BM holo.).

Perennial herb; roots fibrous. Shoots erect to ascending, rarely decumbent, mostly 25–100 cm tall, bases swollen, persistent. Leaves spirally arranged, blade petiolate, narrowly lanceolate to lanceolate-elliptic, elliptic or ovate-elliptic, 2.5–11 x 1–3.5 cm, hirsute-puberulous or pilose-puberulous. Inflorescences thyrses, terminal and occasionally axillary, moderately dense, ovoid, (2–)3–5(–5.5) x (1.5–)2–3(–6) cm, with (9–)13–20(–32), alternate to subopposite cincinni; cincinni to 3.5 cm long and 13-flowered. Bracteoles cup-shaped, perfoliate (rarely not). Flowers bisexual and male, 9.5–17 mm wide; pedicels 2.5–4(–5.5) mm long (to 6.5 mm in fruit), glabrous. Sepals 3–4.5 mm long, glabrous. Paired petals 7.5–11 x 4.5–8 mm, lilac; medial petal 4.5–5.5 x 3–3.5 mm, greenish white; filaments free; staminode lobes spotted with maroon; lateral stamen filaments J- or U-shaped, glabrous; anther of medial stamen hemispherical, with a broad, maroon-spotted connective. Capsules oblong to oblong-elliptic, bi- (tri-)locular, (5–)6–10 x (3.1–)3.5–4.2 mm, glabrous, dorsal locule obsolete or 0(–1)-seeded, ventral locules 3–5-seeded. Ventral locule seeds trapezoidal in outline, 1.5–2.3 x 1.5–2 mm; testa greyish-brown to flesh-pink, shallowly pitted, white-farinose in the depressions.

Dense *Acacia* – *Commiphora* bushland, low woodland; 600–1120 m. GG SD; Ethiopia to N Tanzania. *Gilbert & Phillips* 9116, 9118; *Corradi* 2159.

6. *A. somaliense* C.B. Clarke (1901)

– type: HA, Harradigit, Mar. (1885), *James & Thrupp* s.n. (K holo.).

A. smithii C.B. Clarke (1901) – types: SD, Lake Rudolf to Gondokoro, Jara, *Donaldson Smith* s.n. (BM lecto); Lake Rudolf to Gondokoro, Anole, *Donaldson Smith* s.n. (BM syn).

A. tacazezanum sensu Chiovenda, *Missione Biol. Paese Borana* 4: 305 (1939) (pro *Cufodontis* 319, non Hochst. ex A. Rich.).

Perennial herbs, sometimes rhizomatous; roots with distal tubers. Shoots annual, usually erect to ascending,

7.5–40 cm tall, disarticulating at the base and nodes when drying. Leaves spirally arranged; blade sessile, lanceolate-elliptic to elliptic, ovate-elliptic or ovate, mostly 2.5–7.5 x 2–3.5 cm, surfaces grey-green, puberulous, with scattered, longer hairs. Inflorescences thyrses, moderately dense, ovoid to ellipsoid or cylindrical, mostly 3–9.5 x 2–4.5 cm with (8–)17–40(–50) cm; cincinni to 2.5 cm long and 8-flowered. Bracteoles cup-shaped, not perfoliate. Flowers bisexual, male and female, (7.5–)10–12.5 mm wide; pedicels 2.8–4.5(–5.5) mm long (to 7 mm in fruit), usually glabrous. Sepals (2–)2.4–3.5 mm long, puberulous. Paired petals 4.8–9 x 3.2–7 mm, white to very pale lilac or blue; medial petal 2.8–6 x 1.6–4.5 mm, green with whitish margins; filaments free, lateral stamen filaments sigmoid, glabrous. Capsules oblong-elliptic, bi- or trilocular, (5–)6–9 x 3.2–4(–4.8) mm, sparsely puberulous, dorsal locule 1-seeded or empty, ventral locules 2–3(–4)-seeded. Ventral locule seeds trapezoidal, rectangular, triangular or elliptic in outline, 1.6–2.7 x (1.2–)1.3–1.6(–2) mm, testa pinkish brown to greyish tan or tan, interruptedly furrowed in a radiate pattern, farinose in the depressions, and around embryotega and hilum.

Acacia – *Commiphora* bushland and woodland on loamy or sandy soil; 850–1700 m. SD HA; Somalia, Kenya. *Ash* 823; *Friis* et al. 2670; *Thulin* et al. 3539.

7. *A. grandibracteolatum* Faden (1991)

– type: HA, between Walwal and Bulleh (Sirauw), *Glover & Gilliland* 408 (K holo., EA iso.).

Probably perennial; roots unknown but probably tuberous. Flowering shoots to 15 cm tall, disarticulating at base and nodes when dry. Leaves spirally arranged; blade sessile, lanceolate to lanceolate-elliptic, 2.5–7.5 x 1–2.5 cm, puberulous. Inflorescences thyrses, terminal, moderately dense to dense, ovoid to broadly ellipsoid, 2–6 x 2–7 cm, composed of c 20–30, alternate to subopposite cincinni; cincinni to 3.5 cm long and 8-flowered. Bracteoles (2.5–)3–3.5 mm long, cup-shaped, perfoliate or not. Flowers male and probably bisexual; pedicels 2.5–4.2(–5.7) mm long (to 8.5 mm in fruit), glabrous to sparsely puberulous. Sepals c 3.2–3.5 mm long, puberulous. Paired petals c 6–6.5 mm long, 'pale blue.' Capsules stipitate, oblong-elliptic, tapered at both ends, bi- to trilocular, (10.5–)12–14 x 3.5–3.8 mm, stramineous, puberulous, dorsal locule 1-seeded or obsolete, ventral locules 2-seeded. Ventral locule seeds elliptic in outline, 3.4–3.9 x 1.6–1.9 mm, testa orange-brown, with radiately arranged shallow pits and grooves.

Probably bushland; 'open areas on sand' according to the collectors. HA; endemic, known only from the type.

This species is closely related to *A. longicapsa* Faden and *A. obbiadense* Chiov., both from Somalia.

8. *A. pusillum* Chiov. (1916)

– type: Somalia, *Paoli* 1277 (FT holo.).

Perennial herb, rhizomatous or not; roots tuberous. Shoots annual, unbranched or sparsely branched, 5–

15(-18) cm tall. Leaves spirally arranged or distichous, all cauline (or mostly basal), blade moderately to very succulent, linear or linear-oblong to linear-lanceolate, lanceolate-elliptic (or ovate-elliptic), 2-9 x (0.1)0.3-1.1(-2) cm, glabrous to puberulous. Inflorescences thyrses, terminal, moderately lax to moderate dense, ovoid to pyramidal, 1.5-6.5 x (0.7)1-3.5 cm, with (2-)6-10(-13) mostly alternate cincinni; cincinni to 3 cm long and 8-flowered. Bracteoles cup-shaped, perfoliate. Flowers bisexual and male, 6-9 mm wide; pedicels (1.5-)3-5 mm long (to 6 mm in fruit), puberulous. Sepals 2-4 mm long, puberulous. Paired petals 3-5.4 x 2.5-4.5 mm, pale lilac or blue (to pinkish red), medial petal 2.5-4.5 x 1.5-2 mm, greenish tinged with pink or red; filament bases free; lateral stamens with filaments S-shaped, glabrous. Capsules elliptic to oblong-elliptic, trilobular, 2.4-5 x 1.5-2.5 mm, puberulous, dorsal valve deciduous, dorsal locule 0-1-seeded, ventral locules 2-seeded. Ventral locule seeds subdeltate to ovate in outline, 1-1.9 x 0.75-1.3 mm, testa tan or orange-tan, sulcate or smooth with crenate margins, hilum raised within a ventral pit.

Boswellia rivae bushland on summit of gypsum hill; c 400-950 m. SD HA; Somalia, N Kenya. *Gilbert et al.* 7573; *James & Thrupp* s.n.

Our plants probably both belong to subsp. *variabile* Faden, although the leaves of *Gilbert et al.* 7573 are somewhat broad (1.05 cm) for that subspecies. However, they are not mainly basal, a feature of the broad-leaved subsp. *thulinii* Faden from Somalia.

9. *A. petersii* (*Hassk.*) *C.B. Clarke* (1991)

-type: Mozambique, *Peters* s.n. (B holo.).

A. tacazeanum sensu *Chiovenda*, *Missione Biol. Paese Borana* 4: 305 (1939) (pro *Cufodontis* 705, non *Hochst. ex A. Rich.*).

Perennial herb or annual; roots fibrous. Shoots erect or ascending to decumbent, sparsely to densely branched, 20-60(-100) cm tall. Leaves usually spirally arranged, blade petiolate or (the upper) sessile, narrowly lanceolate or lanceolate-elliptic to lanceolate-ovate, ovate-elliptic or ovate, (2.5-)3.5-11(-13.5) x (0.6-)1-3.5(-4.5) cm, pilose-puberulous to puberulous. Inflorescences thyrses, terminal and axillary, moderately lax, ovoid, to 7(-9.5) x 6.5(-9.5) cm, with 1-16(-19), mostly alternate cincinni; cincinni to 4(-7) long and 16(-33)-flowered. Bracteoles ovate to lanceolate, usually not perfoliate. Flowers bisexual and male, (6.5-)11-19 mm wide; pedicels (2.2-)2.5-5(-5.8) mm long (to 7 mm and strongly recurved in fruit), puberulous apically. Sepals 2-5.2 mm long, puberulous. Paired petals 4.5-9.5 x (3.5-)4.5-11 mm, white to lilac or pinkish purple; medial petal broadly cup-shaped, 3.5-7.5 x 3-8 mm, concolorous. Stamen filaments fused basally; lateral stamens crossing, S-shaped, glabrous. Capsules obovate to subquadrate (or obovate-oblong), trilobular, (3.4-)4.5-7.5(-9) x (2.4-)3.3-5(-5.5) mm, puberulous, dorsal valve humpbacked, deciduous, dorsal locule (0-)1-seeded, ventral locules (1-)2-seeded.

Seeds strongly dimorphic; dorsal locule seed hemispherical, smooth; ventral locule seeds ovate to oblong or rectangular in outline, (1.3-)1.5-2.6(-2.9) x 1.6-2.3 (-2.6) mm; testa orange-buff (to buff), shallowly pitted, not farinose or with sparse black granules.

Moist woods; c 1000 m. SD; S Sudan and Ethiopia S to Mozambique. *Cufodontis* 705.

The single Ethiopian collection belongs to subsp. *petersii* (flowers 15-19 mm wide; sepals (3.3-)3.5-5.2 mm long; paired petals lilac to pinkish purple, 7-9.5 mm long), which is a perennial and ranges from Ethiopia to Mozambique. Subsp. *pallidiflorum* Faden, which is annual and ranges from S. Sudan and Kenya to Tanzania, is known from the Kenya side of the border at Dandu and may occur in SD. The record of *A. petersii* from Somalia in Faden (1991) is erroneous.

10. *A. indehiscens* *Faden* subsp. *keniense* *Faden*, in *Faden loc. cit.*: 104 (1991)

-type: Kenya: *Faden & Faden* 77/788 (US holo., EA F K iso.).

Perennial herb; roots fibrous. Vegetative shoots trailing or looping along the ground, or straggling through bushes, to c 3 m long, flowering shoots erect to ascending, to c 60 cm tall. Leaves spirally arranged, blade shortly petiolate, narrowly lanceolate to lanceolate-elliptic, lanceolate-ovate or ovate-elliptic (rarely ovate), puberulous or pilose-puberulous. Inflorescences thyrses, terminal and axillary, lax to moderately dense, ovoid to broadly ovoid, (2-)2.5-5(-8) x (1.5-)2-5(-7) cm with (1-)3-9, mostly alternate cincinni. Bracteoles asymmetrically cup-shaped, usually perfoliate. Flowers bisexual and male, (9-)13-17.5 mm wide; pedicels 3.8-6(-8) mm long (to 10 mm long and strongly recurved in fruit), puberulous. Sepals 2.4-4.3(-4.9) mm long, puberulous. Paired petals 7.3-9.5 x 6-8.5 mm, very pale lilac, blue or mauve; medial petal cup-shaped, 6-8 x 4-6(-7.5) mm, concolorous. Stamen filaments fused basally; lateral stamen filaments parallel, gently S-shaped, glabrous. Capsules obovate-elliptic to obovate-oblong, oblong or oblanceolate, trilobular, dehiscent or indehiscent, (4-)4.5-6(-6.8) x (1.9-)2.3-3(-3.4) mm, puberulous, dorsal valve truncate or terminating in a ridge, usually persistent, dorsal locule usually 1-seeded, ventral locules usually 2-seeded. Seeds weakly dimorphic, ventral locule seeds ovate to trapezoidal in outline, 1.5-2.2(-2.5) x 1.3-1.8 mm, testa usually orange-buff (rarely buff or orange-brown), very shallowly pitted, sparsely white-farinose.

Cleared slopes and *Euphorbia tirucalli* woodland and thicket; 800-1230 m. KF GG; W Kenya. *M.G. & S.B. Gilbert* 4165; *Gilbert & Phillips* 9146.

In its long-trailing or straggling habit, *A. indehiscens* can be confused only with *A. recurvatum*, from which it differs by its less symmetrical, puberulous bracteoles that lack marginal glands; its larger flowers, puberulous upper sepal, parallel stamen filaments, and generally larger capsules. Subsp. *indehiscens* is restricted to SE Kenya and NE Tanzania.

11. *A. recurvatum* Faden (1991)

—type: Uganda, Faden et al. 69/1066 (EA holo.).

Perennial herb; roots fibrous. Vegetative shoots decumbent to subscaudent, flowering shoots ascending, to 30 cm or more. Leaves spirally arranged, blade shortly petiolate, narrowly lanceolate-elliptic or lanceolate to ovate-elliptic, 2.5–7(–8) x 0.5–2.2(–2.9) cm, sparsely puberulous, rarely a few, long, uniseriate hairs also present. Inflorescences thyrses, terminal and axillary, moderately lax, ovoid to broadly ovoid, 2–4.5 x 2–6.5 cm, with (1–)2–7(–9) alternate, subopposite or pseudo-whorled cincinni; cincinni to 4.2 cm long and 15-flowered. Bracteoles symmetrically cup-shaped, perfoliate, with small, marginal glands. Flowers bisexual and male, 10–14 mm wide; pedicels (4.4–)5–8(–9) mm long (to 10 mm and strongly recurved in fruit), puberulous at the apex. Sepals 2.4–3.5(–3.8) mm, upper glabrous. Paired petals 6.5–9(–11) x 4–6.5(–7.5) mm, lilac to pale blue; medial petal slipped-shaped, elliptic, 5–7.5(–8.5) x 3–4(–4.8) mm, concolorous. Stamens filaments fused basally; lateral stamen filaments divergent, S-shaped, glabrous. Capsules oblong-elliptic to obovate-elliptic (or obovate), trilocular, puberulous, dorsal valve usually persistent, dorsal locule (0–)1-seeded, ventral locules (1–)2-seeded. Seeds weakly dimorphic, ventral locule seeds ovate to trapezoidal in outline, 1.4–2.3 x 1.25–1.6 mm; testa brown, shallowly pitted, white-farinose in the depressions. Fig. 207.9.

Glade in *Aningeria* forest and margin of groundwater forest with *Cordia* and *Ficus*; 950–1250 m. IL KF GG; Ethiopia to Uganda, W Kenya and N Tanzania. M.G. & S.B. Gilbert 1617; Gilbert & Thulin 318; Friis et al. 3878.

12. *A. sebitense* Faden (1991)

—type: Kenya, Faden & Faden 77/803 (US holo.).

A. rendlei sensu Clarke (1901) p.p. (pro Donaldson Smith 346).

Perennial herb; roots fibrous. Shoots ascending, to c 1 m tall. Leaves spirally arranged, blade petiolate (except distal leaves), lanceolate-elliptic to lanceolate, ovate-elliptic or ovate, 3–15 x (0.7–)1.5–4 cm, densely puberulous, sometimes with longer hairs intermixed; margins ciliate. Inflorescences thyrses, terminal and axillary, lax to moderately lax, ovoid to broadly ovoid, 4–10 x 3.5–10 cm, with (2–)5–9(–12), mostly alternate cincinni; cincinni to 5 cm long and 13-flowered; bracteoles cup-shaped, perfoliate, with numerous marginal glands. Flowers bisexual and male, 10–20 mm wide; pedicels 6.5–10.5 mm long (to 13 mm and erect in fruit), glabrous. Sepals 3.5–4.5(–6) mm long, glabrous. Paired petals 9–10.5 x 6–10 mm, lilac; medial petal cup-shaped, elliptic to obovate, 7.5–13 x 5.5–8 mm, concolorous or slightly paler. Stamen filaments fused basally; lateral stamen filaments parallel or divergent, S-shaped, glabrous. Capsules obovate to oblong or obovate-elliptic, trilocular, (4–)4.5–7.5 x (2.3–)2.8–3.5(–3.7) mm, puberulous to subglabrous; dorsal valve deciduous, dorsal locule (0–)1-seeded, ventral locules 2–3(–4)-

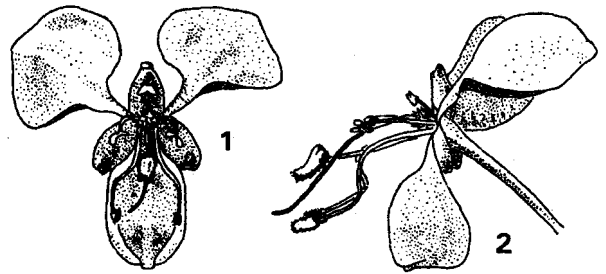


Figure 207.9 *ANEILEMA RECURVATUM*: 1 – flower, front view x 2; 2 – flower, side view x 2. Both from Faden 69/1300. Drawn by Stanley Dolasinski. (Reproduced from *The Morphology and Taxonomy of Aneilema R. Brown (Commelinaceae)*: 107, 1991)

seeded. Seeds moderately dimorphic, ventral locule seeds ovate to trapezoidal in outline, (1.35–)1.5–2(–2.9) x 1.55–1.9(–2) mm, tan or yellowish brown, shallowly reticulate to reticulate-scrobiculate, brownish farinose in the depressions. Fig. 207.10.

Among rocks at edge of *Acacia* – *Commiphora* – *Combretum* woodland; 1120–1350 m. GG SD; W Kenya. Gilbert & Thulin 266; Donaldson Smith 346.

13. *A. forskalii* Kunth (1843)

—types: Yemen, Forsskål in Herb. *Forskali* 33 (C lecto.); Forsskål in Herb. *Forskali* 32 (C iso.); Forsskål in Herb. *Forskali* 31 (C iso.).

Commelina tuberosa Forssk. (1775), non L. (1753).

C. paniculata Vahl (1805–1806), non Hill (1773).

A. tacazeanum Hochst. ex A. Rich. (1850); *Lamprodithyros tacazeanus* (Hochst. ex A. Rich.) Hassk. (1863) – types: TU, banks of the Tacaze, *Quartin-Dillon & Petit* s.n. (P Herb. Richard, lecto., P isolecto.); Tacaze River valley, near Djeladgeranne [‘Dscheladscheranne’, ‘Tchélatchékanné’], *Schimper* 1660 (G K MO P syn.).

L. ehrenbergii Hassk. in Schweinfurth, *Beitr. Fl. Aetiop.*, 210 (1867); *A. ehrenbergii* (Hassk.) C.B. Clarke (1881) – type: EE, Togodele, *Ehrenberg* 413 (B holo., L fragment iso.).

A. tacazeanum Hochst. ex C.B. Clarke (1881) – types: TU, Tacaze (Tekeze) valley, near Djeladgeranne, *Schimper* 1660 p.p. (G P syn.) & 1729 (G K P syn.); Oudgerade, *Petit* s.n. (P syn., not seen).

A. aequinoctiale (P. Beauv.) G. Don & minor C.B. Clarke (1881) – types: TU, Tacaze (Tekeze) valley, near Djeladgeranne, *Schimper* 1660 p.p. (fide Clarke) (P syn.); *Quartin-Dillon (& Petit)* s.n. (P syn.); Yemen, *Botta* s.n. (P syn.).

Annual; roots fibrous. Shoots erect to ascending or shortly decumbent, unbranched or sparsely branched, 20–50(–70) cm tall. Leaves spirally arranged, blade petiolate, mostly lanceolate-elliptic to ovate-elliptic, 2.5–12 x (0.5–)1.3–4.5 cm, puberulous, usually mixed

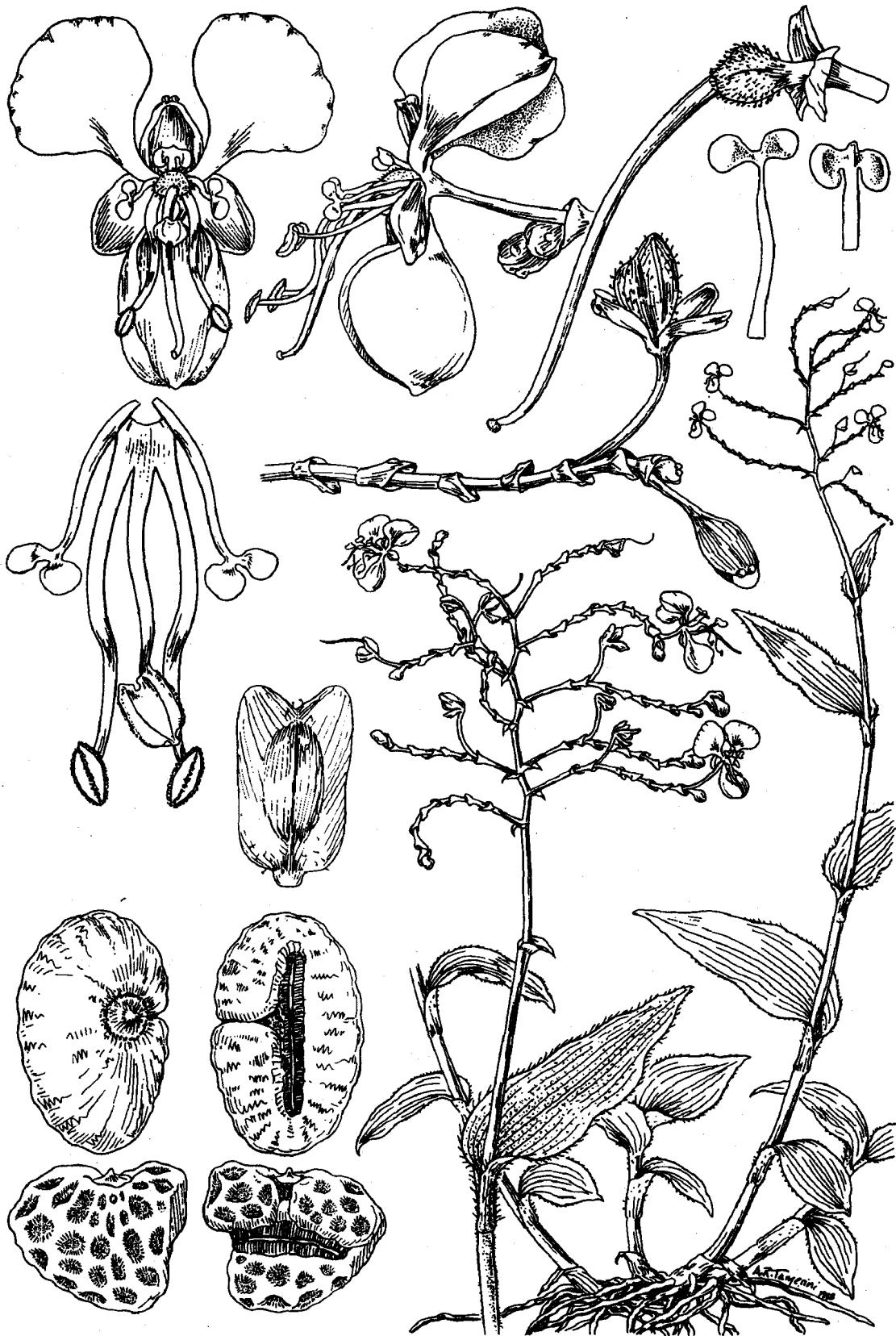


Figure 207.10 *ANEILEMA SEBITENSE*: 1 - whole plant; 2 - inflorescence; 3 - flower, front view; 4 - flower, side view; 5 - lateral staminode; 6 - medial staminode; 7 - androecium, top view, medial staminode omitted, gynoecium removed; 8 - gynoecium, side view; 9 - capsule attached to cincinnus, side view; 10 - dorsal capsule valve, dorsal view; 11 - dorsal locule seed, dorsal view; 12 - dorsal locule seed, ventral view; 13 - ventral locule seed, dorsal view; 14 - ventral locule seed, ventral view. All from *Faden & Faden 77/803*. Drawn by A.R. Tangerini. (Reproduced from *The Morphology and Taxonomy of Aneilema R. Brown (Commelinaceae)*: 111, 1991)

with scattered long hairs, adaxially; margins scabrid to sparse ciliolate, rarely ciliate. Inflorescences thyrses, terminal, lax to moderately lax, ovoid to broadly ovoid, 2.5–6(–12.8) x 2.5–6(–12) cm, with (1–)3–10(–12), mostly alternate to subopposite cincinni; cincinni to 9.5 cm long and 21-flowered. Bracteoles cup-shaped, perfoliate, with small marginal glands. Flowers bisexual and male, 11–18 mm wide; pedicels 4–8(–11.5) mm long (to 12 mm and erect in fruit), glabrous or sparsely puberulous at the apex. Sepals 2.1–4.5 mm long, glabrous. Paired petals white or pale lilac, lavender, mauve or blue; medial petal cup- or slipper-shaped, 5.5–8 mm long, concolorous or paler. Stamen filaments fused basally; lateral stamens filaments parallel to divergent, S-shaped, glabrous. Capsules obovate to obovate-oblong (rarely obovate-elliptic), trilocular, (3.5–)4.5–7.5(–8) x (2.25–)3.3–4.5(–4.9) mm, glabrous or subglabrous, dorsal valve deciduous, dorsal locule (0–)1-seeded, ventral locules (1–)2–3-seeded. Seeds moderately dimorphic; ventral locule seeds ovate to triangular or trapezoidal in outline, (1.5–)1.8–2.6(–3.1) x (1.4–)1.7–2.2(–2.5) mm, testa brown or grey-brown (or buff-orange or orange-brown), shallowly pitted or shallowly pitted-reticulate, sparsely white or brownish farinose in the depressions. Fig. 207.11.

Bushland to forest, usually on slopes, escarpments or in river valleys, in partial to dense shade; 15–1200 (–1800) m. EW EE TU SU BA HA; Sudan (Red Sea Hills), Yemen, Oman. *Gilbert & Thulin* 969; *Ryding* et al. G.1088A; *M.G. & S.B. Gilbert* 2186.

The southernmost collection of this species, *Gilbert* et al. 7912 from Bale Region is unusual in having ciliate leaf margins, thus approaching *A. sebitense*. However, its capsule width and seed dimensions agree with *A. forskalii*, not *A. sebitense*. This specimen was collected at a much higher elevation (1750–1850 m) than any other collection of either species.

14. *A. zebrinum* Chiov. (1951)

– types: GG, banks of the Caschei, *Corradi* 2154 (FT syn.) & 2163 (FT syn.); Caschei, *Corradi* 2155 (FT lecto.).

Ballya zebrina (Chiov.) Brenan (1964).

Mat-forming Perennial herb; roots fibrous. Shoots repent, rooting at the nodes. Leaves distichous, blade moderately succulent, sessile, ovate to ovate-elliptic (or elliptic), 1–3.5(–4) x 0.5–2 cm, puberulous, upper surface with pale veins, sometimes mottled with maroon. Inflorescences axillary, perforating the sheaths, consisting of a single (rarely 2), short cincinnus, often hidden beneath the leaves; cincinnus up to 2 cm long and 4(–6)-flowered. Bracteoles cup-shaped, perfoliate. Flowers usually all bisexual, 7–10 mm wide; pedicels (0.5–)1.5–3.5 mm long (to 5 mm and erect in fruit), puberulous. Sepals 2–3 mm long, puberulous. Paired petals held in a lateral position, 4–5.7 x 3.1–4.5 mm long, pale lilac; medial petal cup-shaped, 3.5–4.7 x 2.7–4 mm, concolorous. Stamen filaments fused basally; lateral stamen filaments parallel, S-shaped, glabrous.

Capsules obovate-elliptic, indehiscent or partially dehiscent, trilocular, 3–4 x 2.1–2.5(–3) mm, puberulous, dorsal valve persistent, dorsal locule (0–)1-seeded, ventral locules (1–)2-seeded. Seeds scarcely dimorphic; ventral locule seeds ovate to ovate-cordate in outline, 1.25–1.6 x (1.1–)1.2–1.5 mm, testa grey or greyish brown, shallowly reticulate, sometimes sparsely tan-farinose around the hilum. Fig. 207.12.

Acacia mellifera – *Commiphora* – *Boscia* bushland with dense ground cover; growing in deep shade; 700–1160 m. GG; Kenya, Tanzania, South Africa (Natal). *Gilbert* et al. 9105.

15. *A. beniniense* (P. Beauv.) Kunth (1843)

– type: Nigeria, *P. de Beauvois* s.n. (G holo.).

Perennial herb; roots fibrous. Shoots much-branched below, ascending, becoming decumbent, 40–120 cm tall. Leaves spirally arranged, blade petiolate (or sessile), lanceolate-elliptic to elliptic, 6–19.5 x 2–5 cm, glabrous to scabrous or pilose. Inflorescences thyrses, terminal and axillary, very dense, ovoid, 2–6.5 cm long and wide; cincinni numerous. Bracteoles cup-shaped, perfoliate. Flowers bisexual and male, 7–13 mm wide; pedicels 3–6 mm long (to 7.5 mm and erect to strongly recurved in fruit), glabrous. Sepals 2.5–4 mm long, glabrous. Paired petals c 6.5–8.5 x 4.5 mm, white or pale lilac to mauve, purple, pink or bluish; medial petal c 3 x 2.5 mm, greenish white; filaments free; medial staminode absent, vestigial or well-developed; lateral stamen filaments divergent or parallel, S-shaped, inconspicuously bearded in the distal half. Capsules oblong-elliptic, (4.5–)5–7 x 2.5–3.5 mm, glabrous; dorsal locule 0–1-seeded; ventral locules (1–)2–3-seeded. Ventral locule seeds broadly ovate to trapezoidal or reniform in outline, 1.3–2.4 x 1.2–1.8 mm, testa pinkish brown, orange-brown or grey, usually reticulate or foveolate-reticulate, occasionally irregularly pitted, often white-farinose in the depressions.

Riverine forest, rainforest, and forest glades; 600–1600 m. IL KF; Senegal to Ethiopia, S to Angola and Zambia. *Friis* et al. 3889; *Gilbert & Friis* 8369; *Friis* et al. 1907.

16. *A. spekei* C.B. Clarke (1901)

– types: Tanzania, *Speke & Grant* 165 (K syn.); *Speke & Grant* s.n. (K syn.); Malawi, *Whyte* s.n. (BM syn., not seen).

Sparsely to densely branched annuals; roots fibrous. Shoots erect or ascending to decumbent, 15–60 cm tall. Leaves spirally arranged, blade sessile (to shortly petiolate), lanceolate-elliptic to ovate, 3–10 x 1–3 cm, hirsute-puberulous. Inflorescences thyrses, terminal and axillary, dense, cylindrical to ovoid, 2–4.5 x 1–2.5 cm; bract of the inflorescence usually medial on the peduncle; axes with fine hook-hairs, lacking long, uniseriate hairs. Bracteoles ovate, lacking a linear, gland-tipped apex. Flowers bisexual and male, 8–11 mm wide; pedicels (2–)4–5.5(–7) mm long, puberulous. Sepals 2.5–4 mm long, green or variously marked or suffused

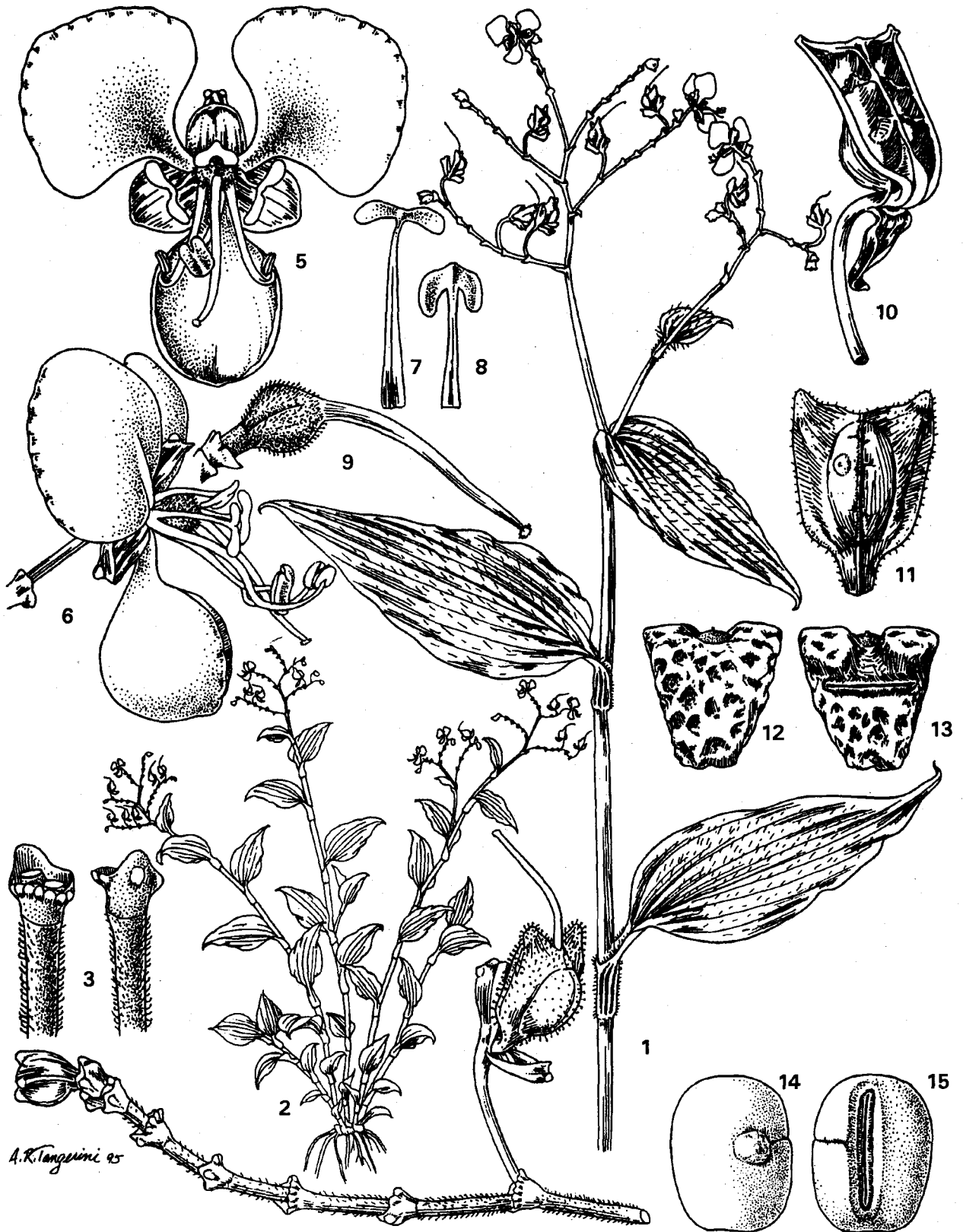


Figure 207.11 *ANEILEMA FORSKALII*: 1 – flowering shoot $\times 2\frac{1}{3}$; 2 – habit $\frac{1}{4}$; 3 – bracteoles $\times 10$; 4 – cincinnus with immature fruit $\times 4$; 5 & 6 – flower, front and side view $\times 4\frac{1}{2}$; 7 & 8 – lateral and medial staminodes $\times 10$; 9 – gynoeceum, side view $\times 10$; 10 – dehiscent capsule with dorsal valve shed $\times 7\frac{1}{2}$; 11 – dorsal capsule valve, dorsal view $\times 8$; 12 & 13 – seed from ventral locule, dorsal and ventral view $\times 15$; 14 & 15 – seed from dorsal locule, dorsal and ventral view $\times 14$. 1, 3–15 from Wood 1997; 2 from Pappi 4511. Drawn by R. Tangerini.

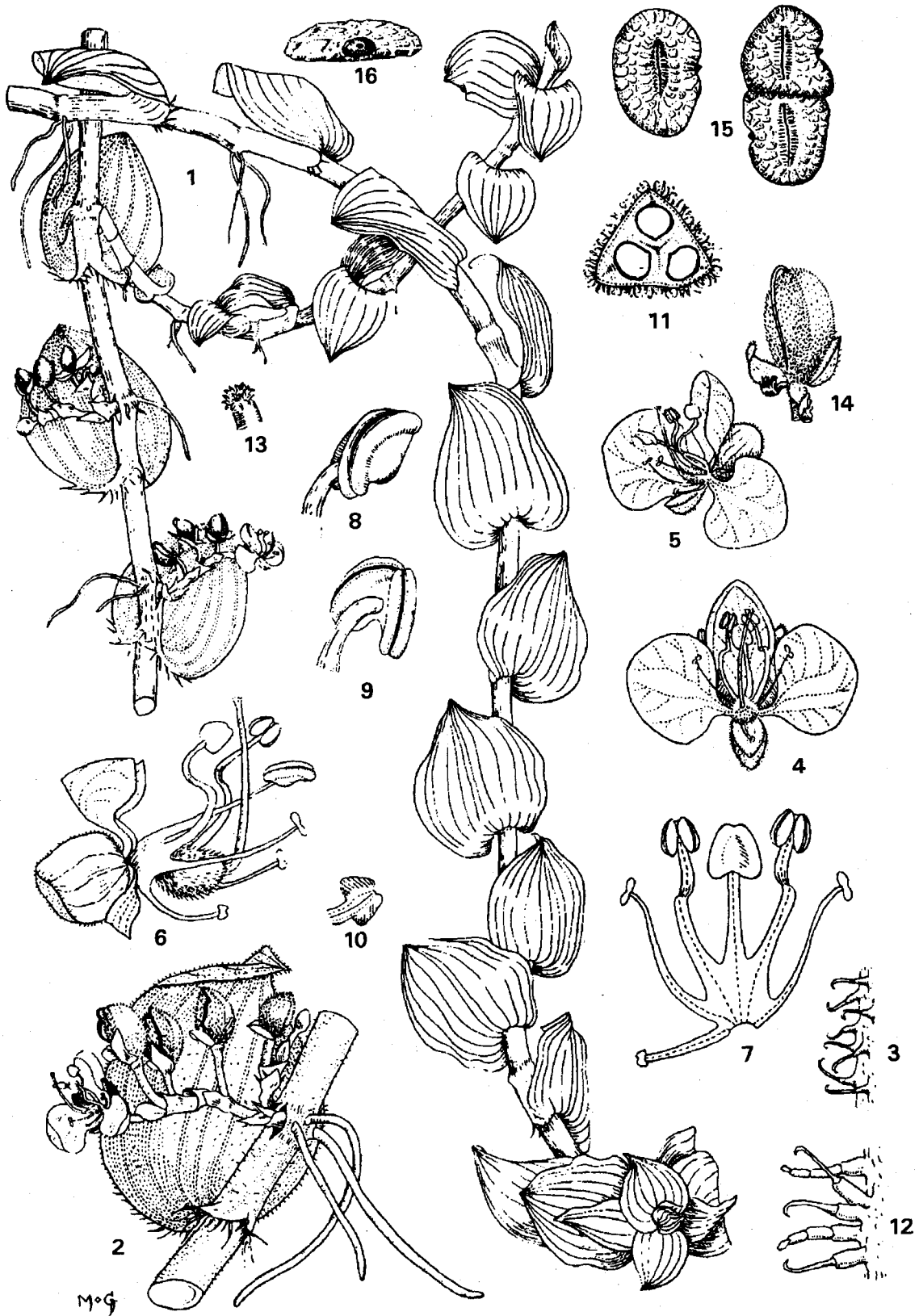


Figure 207.12 *ANEILEMA ZEBRINUM*: 1 - part of flowering plant x 1; 2 - single node of plant, showing adventitious roots and inflorescence perforating the leaf-sheath x 2; 3 - hairs on stem (similar ones on sepals) x 60; 4 & 5 - flower, front and side views x 4; 6 - flower from side with sepals and petals partly removed x 9; 7 - androecium split on one side of staminode and spread out x 9; 8 & 9 - fertile anther, side and back views x 16; 10 - apex of staminode x 20; 11 - ovary, cross-section x 18; 12 - hairs on surface of ovary x 60; 13 - stigma and apical part of style x 24; 14 - fruit, before dehiscence x 4; 15 - seeds from a one-seeded loculus to left, from a two-seeded loculus to right x 9; 16 - seed from embryotegal edge x 9. All from *Bally 12145* (Cultivated). (Reproduced from *Fl. South. Afr.* 4(2): fig. 8, 1985.)

with blue to purple, puberulous. Paired petals 5–9 x 5–7 mm, blue-violet to bluish purple; medial petal 3–4.5 mm long, green, sometimes with reddish margins; filaments free; lateral stamen filaments S-shaped, densely bearded above the middle with bluish-purple hairs. Capsules oblong-elliptic (to subquadrate), bilocular, 3.5–5 x 3–3.5 mm, puberulous; locules (1–)2-seeded. Seeds ovate to trapezoidal or transversely elliptic in outline, 1.4–2.3 x 1.4–1.8 mm, testa beige, rugose-scrobiculate, sparsely whitish or brownish farinose.

Forest glade with short grass over flat rocks; 600 m. IL; S Sudan and Ethiopia, S to Zaire, Zambia and Tanzania. *Gilbert & Friis* 8384.

The previous record of this species from Ethiopia (*Faden*, 1991) was based on a misidentification of *Ash* 2219, which is *A. leiocaule*.

17. *A. hirtum* *A. Rich.* (1850)

– type: TU, Kouaieta, *Quartin-Dillon & Petit* s.n. (P Herb. Richard, lecto., P iso.).

Branched or unbranched annuals; roots fibrous. Shoots erect to ascending, sometimes rooting near the base, to c 40 cm tall. Leaves spirally arranged, blade sessile (to shortly petiolate), ovate-elliptic to ovate or lanceolate elliptic, 2–7.5 x 1–2.5 cm, hirsute-puberulous. Inflorescences thyrses, terminal and axillary, dense, ellipsoid to subspherical, 1–2.5 x 0.7–1.5 cm; bract of the inflorescence basal on the peduncle; axes with numerous, long uniseriate hairs. Bracteoles linear-lanceolate, terminating in a swollen gland. Flowers bisexual and male, 8–10(–12) mm wide; pedicels c 1.5–2.5 mm long, puberulous. Sepals 2.5–4 mm long, maroon in distal half, glabrous to sparsely puberulous. Paired petals 4.5–5.5 x 3.5–4 mm, blue to lavender or blue-violet; medial petal spatulate, 3 x 2 mm, with a large maroon spot; filaments free; lateral stamen filaments parallel, S-shaped, densely bearded above the middle with maroon to purple or blue-purple hairs. Capsules nearly circular (to oblong-elliptic), bilocular, 2.5–3.5(–5) x 3–3.5 mm, puberulous, locules 1(–2)-seeded. Seeds trapezoidal in outline, (1.6–)2–2.3 x 1.4–1.65 mm, testa tan to brown or grey-brown, shallowly pitted to foveolate-reticulate, tan or white farinose in the depressions.

Wooded grassland, slopes and roadside banks, often in moist soil, sometimes in partial shade; 1200–1650 m. TU GD GJ WG; Ethiopia S to Zaire, Zambia, Malawi, and Tanzania. *Gilbert & Thulin* 711; *Mesfin T. & Kagnev K.Y.* 1723; *De Wilde & Gilbert* 280.

The fruiting Ethiopian specimens seen all have nearly circular capsules and 1-seeded locules. Specimens with oblong-elliptic capsules and 2-seeded locules occur in Kenya and elsewhere.

18. *A. leiocaule* *K. Schum.* (1895)

– types: *Kersten* s.n. (B syn., destr.); *Volkens* 1436 (B syn., destr.; BM G K PRE isosyn.).

A. pedunculosum *C.B. Clarke* auct., non *Clarke* (1881).

Sprawling or spreading Perennial herb with decumbent

stems to 50 cm tall; roots fibrous. Leaves spirally arranged, blade mostly petiolate, ovate to ovate-elliptic to lanceolate-ovate, 2.5–7 x 1–2.7 cm, hirsute-puberulous or puberulous. Inflorescences thyrses, terminal and axillary, dense, ovoid, 1–2.5 x 1–2 cm; bract of the inflorescence basal, axes with none to many, long, uniseriate hairs. Bracteoles ovate, terminating in a swollen gland. Flowers bisexual and male, 10–13 mm wide; pedicels 1–2.5(–3) mm long, puberulous. Sepals 2–3.5 mm long, green, glabrous or sparsely puberulous. Paired petals 5–6.5 x 4–4.5 mm, lavender to blue-violet; medial petal 3–4 x 2–2.5 mm, greenish white; filaments free. Stamen filaments divergent, S-shaped, densely bearded above the middle with bluish purple hairs. Capsules bilocular, oblong-elliptic, (4–)4.5–5 x 3–3.5 mm, puberulous, locules (1–)2-seeded. Seeds broadly ovate to trapezoidal in outline, 1.5–2 x 1.4–1.7 mm, testa grey-tan to beige, foveolate-reticulate, sparsely tan-farinose in the depressions.

Forest, open forest, coffee plantations with forest trees, sometimes on roadsides, growing in shade; 1300–1700 m. IL KF; Ethiopia, S to E Zaire and Tanzania (and Zambia?). *Ash* 2219; *Friis* et al. 3962; *de Wilde* 5236.

Uncertain species

A. rendlei sensu *Chiovenda*, *Webbia* 8: 38 (1951) (pro *Corradi* 2159, p.p., non *Clarke*).

A specimen from southern Gamo Gofa (Rive del Ghizo, *Corradi* 2159 (FT), which is a mixture with *A. rendlei*), was treated with doubt under *A. recurvatum* by *Faden*, *loc. cit.*: 110 (1991). It was noted to differ from that species by having densely pubescent leaves and less widely spaced bracteoles, among other characters. Further study shows that it also lacks marginal glands on the bracteoles. The specimen bears some resemblance to *A. indehiscens* subsp. *keniense*, differing chiefly in having much less pubescent bracteoles, sepals and pedicels. Either species might be expected in the area, and something entirely new cannot be ruled out.

9. *COMMELINA* ¹*L.* (1753)

Ogwal, E.N.K., A taxonomic investigation of the genus *Commelina* in Uganda. *Mitt Inst. Allg. Bot. Hamburg, Band 23b*: S. 573–592 (1990).

Perennial or annual herbs with fibrous or tuberous roots. Stems creeping, ascending or erect, branched, sometimes with cleistogamous flower-bearing underground stolons. Leaves distichous or spirally arranged; sheaths mostly closed, usually ciliate at the mouth; blade variable, mostly linear-lanceolate. Inflorescences leaf-opposed and falsely terminal. Flowers borne in stalked or rarely sessile boat-shaped spathe; spathes with entirely free margins although folded or proximal margins partially or completely fused. Cincinni 1 or 2 in each spathe; lower cincinnus borne on a short peduncle, with protruding floral parts or rarely only upper

1. Also spelt *Commehyna* in older publications.

part of pedicel at anthesis, included when fruiting due to recurving pedicels, (1-)2-9(-14)-flowered, all flowers bisexual or a few male. Upper cincinnus 1(-2-3)-flowered, usually male and with or without a pistillode, exerted, included or absent. Sepals 3, free or lower 2 laterally fused. Petals 3, free; lower 1 unclawed or very rarely shortly clawed, reduced; upper 2 clawed, blue, lilac or mauve, yellow, buff or orange. Stamens 3, borne on lower side, lateral ones with slightly longer filaments and smaller anthers than the middle one. Staminodes 3, borne on upper side; filaments reduced; antherodes mostly cross-shaped and yellow, rarely variously deformed and coloured. Ovary 3(-2)-loculed, 2 ventral locules each with 2 or rarely 1 ovule and the 1 dorsal locule with 1 ovule or reduced and sterile or absent or rarely with 2 ovules; style filiform; stigma capitate or rarely bifid. Capsule 3-loculed, loculicidal, all locules dehiscent and smooth, or in some species dorsal locule indehiscent and striate or tuberculate, with capsule wall fused to seed coat, (1-)5(-6)-seeded. Seeds variable in shape and size, ellipsoid, globose or cylindrical-truncate; testa mostly smooth, reticulate or furrowed or rarely reticulate-foveolate; hilum linear; embryotega lateral.

The genus has about 170 species, mainly distributed in the tropics and warmer parts of the subtropics; 19 species are recognized in the Flora area, nearly all of which are widespread, only 2 undescribed species are endemic.

1. Spathes free along proximal margins. 2
- Spathes fused at least at base along proximal margins. 7
2. Annual; spathes subsessile, peduncles less than 8 mm long, sharply recurved. 4. *C. subulata*
- Perennials; spathes pedunculate, peduncles more than 8 mm long, not sharply recurved. 3
3. Petals blue or rarely white. 4
- Petals yellow or dark brownish yellow or dull orange. 6
4. Leaf base clasping the stem; capsules usually 1-seeded.
2. *C. sp.* = *de Wilde & de Wilde-Duyffes* 9332.
- Leaf base rounded to oblique; capsule 3-5-seeded. 5
5. Leaves usually with purple blotches; capsule usually 3-seeded; seeds with testa reticulate-foveolate; roots fusiform; upper petals bright blue; filaments of lateral stamens winged. 6. *C. stephaniniana*
- Leaves entirely green; capsule usually 5-seeded; seed testa reticulate; roots fibrous; upper petals pale blue to white; filaments of lateral stamens not winged. 1. *C. diffusa*
6. Stems geniculate; petals dark brownish yellow or dull orange; anther of middle stamen with sterile yellow lobes at base; capsule with dorsal locule 2-seeded and dehiscent; seeds with testa furrowed. 5. *C. reptans*
- Stems not geniculate; petals yellow; anther of middle stamen without sterile lobes; capsule with dorsal locule 1-seeded and indehiscent; seeds with testa reticulate-foveolate. 3. *C. africana*
7. Spathes with proximal margins partly free. 8
- Spathes with proximal margins wholly fused or nearly so. 13
8. Spathes spreading above the fusion point, leafy; lower sepals laterally fused. 7. *C. foliacea*
- Spathes with 2 halves appressed, not leafy; lower sepals free. 9
9. Auricles present at top of sheath; capsule with dorsal locule readily dehiscent; seed-testa with irregularly raised golden yellow ridges. 12. *C. zambesica*
- Auricles lacking; capsule with dorsal locule indehiscent; seeds tuberculate, furrowed or smooth. 10
10. Capsules square; seeds globose. 9. *C. latifolia*
- Capsules elongate; seeds ellipsoid. 11
11. Seeds with testa smooth, brown blotched with grey, hilum much raised above surface, longer than the seed. 8. *C. kotschyi*
- Seeds with testa tuberculate or furrowed, differently coloured, hilum not much raised above seed surface, shorter than the seed. 12
12. Seeds with testa deeply transversely furrowed, with tubercles of similar size in a row on ridges, farinose granules absent; uppermost leaves on a shoot with obtuse to rounded bases. 11. *C. petersii*
- Seeds with testa shallowly transversely furrowed, with tubercles of varying sizes densely covering the ridges, farinose granules present; at least uppermost leaves on a shoot with cordate to sagittate bases. 10. *C. imberbis*
13. Leaf-sheaths top, pseudo-petiole and base of blade with 3-7 mm long stiff purple to red or white hairs; seed testa furrowed. 18. *C. benghalensis*
- Leaf-sheaths, pseudo-petiole (if present) and base of leaf-blade without stiff hairs or if hairs present less than 4 mm long and never coloured; seed testa smooth or rugose-tuberculate. 14
14. Capsules square, 4-seeded; seed testa rugose tuberculate. 14. *C. eckloniana*
- Capsules elongate, 2-3(-4)-seeded; seed testa smooth. 15
15. Spathes long-pedunculate, with more than 14 mm long peduncle, bulged outward along folded midrib; dorsal locule of capsules dehiscent. 13. *C. schweinfurthii*
- Spathes nearly sessile to 12 mm long, straight along the midrib; dorsal locule of capsules mostly indehiscent. 16
16. Leaf-blade mostly with undulate margins; subterranean flowers or fruits often present; lateral stamens with winged filaments, anther of middle stamen with sterile lobe at base of both theca; capsule mostly 1-seeded. 19. *C. forskoolii*

- Leaf-blade with entire margins; subterranean flowers or fruits absent; lateral stamens without winged filaments; anthers of middle stamen without sterile yellow lobes; capsules mostly 3-seeded. 17
- 17. Spathes strongly falcate and recurved; petals lilac to mauve. 15. *C. albescens*
- Spathes not strongly falcate and recurved; petals blue. 18
- 18. Roots fibrous, thickened; spathes pilose or pubescent; leaf-blade linear-lanceolate. 16. *C. erecta*
- Roots fusiform; spathes glabrous; leaf-blade ovate-lanceolate.
- 17. *C. sp.* = *M.G. & S.B. Gilbert* 1554

1. *C. diffusa* *Burm.f.* (1768)

- type: India, Bengal, *Burman* s.n. (G not seen).

Perennial herb. Stems creeping and rooting at lower nodes, erect above to 15–60 cm; glabrous or pubescent in a row corresponding to the fused edge of the leaf-sheath above the internode; internodes up to 5–10 cm long. Leaf-sheaths 0.6–2.5 cm long, pubescent along fused edges, ciliate with white hairs 1–2.5 mm long made of 5–7 cells; blade 3.5–8 x 1.5–1.7 cm, lanceolate, linear-lanceolate or lanceolate-elliptic, broadest near the base, acute or acuminate at the apex, glabrous. Cymes leaf-opposed, borne in the upper 2–4 nodes. Spathes free, folded along midrib, 14–25(–30) x 13–22 mm, curved at the base, short-acuminate to acute at the apex, glabrous; peduncle 10–28 mm long, glabrous except for the channel which is pubescent. Upper cincinnus mostly dominant, protruding from the spathe; cincinnus peduncles 11–19 mm long, with 1–2 staminate flowers; pedicels 5–6 mm long; lower cincinnus mostly enclosed in the spathe with only portion of floral parts protruding; cincinnus peduncle 5–8 mm long, with 3–6 bisexual flowers; pedicel 2–3 mm long, reflexed after anthesis. Lower sepals *c* 2.5 x 2 mm, ovate, whitish; upper sepal *c* 2.5 x 1.5 mm, oblong, whitish. Lower petal shortly clawed *c* 3 x 2 mm, ovate, pale blue or white. Paired petals with claw *c* 2.5 mm long, blade *c* 4.5 x 4 mm, pale blue or white. Medial stamen with filament *c* 4 mm long, pale yellow; anther *c* 1.5 mm long, pale yellow; lateral stamens with filaments *c* 5 mm long, pale yellow; anthers *c* 1 mm long, pale yellow. Stamnodes with filaments *c* 3.3 mm long, pale yellow; antherodes cross-shaped, yellow. Ovary *c* 1.5 mm long; style *c* 6 mm long; stigma capitate. Capsule elongate, *c* 6 x 3 mm, 3-loculed, 5-seeded, the 2 ventral locules each 2-seeded and dehiscent, the dorsal locule 1-seeded and indehiscent or dehiscing later. Seeds sub-equal, 2–2.7 x 1.4–1.6 mm, elongate, dark brown; testa double reticulate, outer ridges hexagonal; hilum linear, 1.6 mm long, does not reach the ends. Fig. 207.13.

In moist places by streams, in riverine woodland and forest, among grasses and sedges beside paths, and as a weed in cultivated fields; 500–2400 m. GD GJ SU WG IL KF GG SD BA HA; pan-tropical and subtropical

weed occurring in tropical Africa, Madagascar and Mascarene Islands, Canary Islands, North, Central and South tropical America, West Indies, Tropical and subtropical Asia, Pacific Islands and Polynesian Islands. *Ensermu* K. 68; *Mooney* 9229; *Tadesse Ebba* 203.

2. *C. sp.* = *de Wilde & de Wilde-Duyffes* 9332.

?Perennial herb. Stems straggling or climbing up to 200 cm high, glabrous; internodes 4–9 cm long. Leaf-sheaths 2–3.5 cm long, closed, light green with orange markings, pubescent with some straight hairs along the line of fusion or nearly glabrous; blade 9–13 x 1.6–2.3 cm, linear-lanceolate, margins entire, apex long-acuminate, base clasping the stem and sagittate, auricles ciliate on lower margins. Cymes sub-terminal and falsely terminal. Spathes free, folded along midrib, 23–27 x 18–20 mm, longer than broad, bulged outward at base and cordate, acuminate at the apex, glabrous, with dark green veins and long peduncle; peduncle 20–35 mm long, glabrous. Upper cincinnus present, with 3–6 staminate flowers; pedicel 3–4 mm long. Lower cincinnus with 6–9 bisexual flowers; cincinnus peduncles 6–8 mm long, glabrous; pedicels 3–4 mm long. Both cincinni included in the spathe with only floral parts protruding, glabrous. Lower sepals 4–5 x 2.5–3 mm, completely fused along their length laterally, hyaline white; upper sepal 3.5–4 x 2.5–3 mm, boat-shaped, hyaline white. Lower petal nearly clawed, *c* 5 x 4.5 mm, ovate-elliptic to sub-orbicular, broadest about the middle, blue. Paired petals with claw *c* 4 mm long; blade *c* 7 x 9 mm, blue. Medial stamen with filament *c* 7 mm long, blue; anther *c* 2.2 mm long; lateral stamens with filaments *c* 9 mm long, blue; anthers 1.6–2 mm long, blue. Stamnodes with filaments *c* 6 mm long; antherodes ± cross-shaped with 2 small projections added. Ovary *c* 1.3 mm long; style 8–9 mm long, filiform, glabrous; stigma capitate. Capsule *c* 4 x 2.5–3 mm, oblong-ovate, 1-seeded, indehiscent, with shrivelled pericarp.

Montane forest in open places along stream; 1900 m. KF; only known from the single collection cited above.

3. *C. africana* *L.* (1753)

- type: Cultivated plant in Hort. Upsal. *LINN* 65.3 (*LINN* holo.).

C. edulis *A. Rich.* (1851) - type: TU, Wajerat [Ouodgerate], *Quartin-Dillon & Petit* s.n. (P holo., K iso.).

C. cordifolia *A. Rich.* (1851) - type: TU, Adua, *Quartin-Dillon* s.n. (P, not seen).

C. involucrosa *A. Rich.* (1851) - type: TU, Tchelatchékanne, *Quartin-Dillon* s.n. (P, not seen).

C. beccariana *Martelli* (1886) - type: EW, Keren, 1400 m, *Beccarini* 197 (FT holo.).

Perennial herb with tuberous (fusiform) fleshy roots. Stems creeping, creeping-ascending or straggling, green with purplish tinge, glabrous or pubescent with a row of longitudinal hairs; internodes 8–10 cm long. Leaf-sheaths 0.8–3 cm long, light green with purple



Figure 207.13 *COMMELINA DIFFUSA*: 1 - leafy stem with adventitious roots and flowering shoot $\times 4\frac{1}{2}$; 2 - inflorescence $\times 2\frac{1}{2}$; 3 - flower and bud $\times 8$; 4 - floral diagram; 5 - dorsal sepal $\times 10$; 6 - lateral sepal $\times 10$; 7 - lateral petal $\times 10$; 8 & 9 - stamens $\times 10$; 10 - staminode $\times 10$; 11 - pistil $\times 10$; 12 - fruit $\times 2\frac{1}{2}$; 13 - seeds $\times 8$. 1 from Gillett 15348; 2-11 from Gillett 14295a; 12 & 13 from Okeke FHI 18228. (Reproduced with permission from *Fl. South. Afr.* 4(2): fig. 5, 1985.)

tinge, ciliate along the margins; blade 6–11.5 x (0.6–)1.2–2.2 cm, lanceolate, linear-lanceolate, ovate or rarely linear, cuneate, rounded or cordate at the base, acute, obtuse or rarely acuminate at the apex, entire or rarely undulate at the margins, glabrous except for the ciliate margins below half or only at base or pubescent to pilose. Cymes leaf-opposed. Spathes free, folded along midrib, 9–45 x 9–24 mm, glabrous except for the ciliate margins and/or some long hairs along 2 parallel veins on each side of midrib, or pubescent to pilose, margins ciliate at the base or sometimes to the apex, pedunculate; peduncles 8–40 mm long, glabrous or pubescent. Lower cincinnus with bisexual flowers, the flowers rarely protruding from the spathe; cincinnus peduncles 8–12 mm long, (1–)3–5-flowered. Upper cincinnus usually absent, rarely present and then with 1(–3) staminate flower, pedunculate; cincinnus peduncle 10–20 mm long, pubescent; pedicel 2–7 mm long, sparsely pubescent. Lower sepals 2.8–5 x 2–4 mm, obovate, hyaline yellow or white, glabrous; upper sepal 2.6–5 x 1.3–2 mm, boat-shaped, incurved, whitish, glabrous. Lower petal 5–6 x 1.8–2 mm, linear-lanceolate, yellow. Paired petals with claw 3–4 mm long, blade c 4 x 6 mm, broader than long, yellow. Medial stamen with filament 4–6 mm long; anther 1.5–2 mm long; lateral stamens with filaments 4–7 mm long; anthers 1–1.5 mm long. Staminodes with filaments 3–4 mm long; antherodes cross-shaped, yellow. Ovary c 1.1 mm long, pilose with long hairs on one side at the apex; style c 5 mm long; stigma capitate. Capsule 5–6 x 3–4 mm, 3-loculed, 3–5-seeded, the 2 ventral locules each 1(–2)-seeded (by abortion of lower ovules) and dehiscent, the dorsal locule 1-seeded, indehiscent. Seeds variable in size, cylindric-rectangular in outline, 2.2–3 x 1.3–2 mm, dark brown; testa reticulate-foveolate and irregularly provided with farinose granules.

At lower altitudes: overgrazed areas, *Combretum* – *Stereospermum* and *Acacia* woodland, in moist grassy places and riverine forest margin; at higher altitudes generally marshy or moist grassy places, edge of montane forest, open scrub and hilly-rocky slopes; 900–3300 m. EE EW TU GD GJ WG WU SU AR SD KF BA HA; Cote d'Voire, Guinea, Sierra Leone, Ghana, Nigeria, Cameroun, Zaire, Burundi, Sudan, Somalia, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Angola, Swaziland, Lesotho and South Africa (Transvaal, Natal, Orange Free State and Cape) and Saudi Arabia, Yemen and Australia. *Ensermu* K. 93; *Mesfin* T. 7468; *Ryding & Silesh* N. 1697.

Brenan (1964) described 12 varieties of which 6 are supposed to occur in Ethiopia. It was found difficult to maintain these taxa while preparing this account. The author believes that there may be only 2 varieties, but even for these, there are intermediates. One variety is quite variable and is mostly restricted to altitudes below 2000 m, only rarely reaching 2500 m in relatively drier areas, e.g. around Asmara. The other taxon is relatively uniform and represented by *Ensermu* K. & *Melaku* W. 2971a; *Chojnacki* 65; *Mesfin* T. 7468. This taxon occurs

mostly above 2000 m, only occasionally extending down to 1800 m in wetter places, e.g. around Jimma and Lake Tana.

4. *C. subulata* Roth (1821)

– type: India, *Heyne* s.n. (B holo., K iso.).

C. striata Hochst. ex Kunth (1843) – type: TU, prope Adoa, *Schimper* 360 (K iso.).

C. subaurantiaca Hochst. ex Kunth (1843) – type: Sudan, Cordofan, Abu Gerad, *Kotschy* 59 (K iso.).

Annual herb with fibrous to slightly fusiform roots. Stems erect, 3–45 cm high or creeping at base and ascending above, green and usually brown streaked, glabrous or pubescent with a longitudinal row of hairs; internodes 4–14 cm long. Leaf-sheaths mostly open, rarely closed, 0.5–1 cm long, pale green with purplish veins, pubescent or glabrous except for the ciliate free margins; blade 5–16 x 0.4–0.6 cm, subulate, broadest at the base, clasping both the stem and peduncle, glabrous or rarely pubescent. Cymes leaf-opposed and falsely terminal, borne in the upper 4 nodes. Spathes free, folded along midrib, falcate, sharply recurved lying parallel to the internodes below them, 7–16 x 6–14 mm, green, occasionally marked with purple along the 4 parallel veins, ciliate along the base and just above the curved part, otherwise glabrous or rarely pubescent, nearly sessile. Peduncle nearly lacking to 5(–8) mm long. Lower cincinnus with protruding floral parts; cincinnus peduncle 3–4 mm long, with 2–3(–4) bisexual flowers; pedicel 1–1.5 mm long, never protruding from the spathe. Upper cincinnus lacking. Lower sepals c 3 x 2 mm, ovate, pale whitish lilac; upper sepal c 3 x 1.5 mm, oblong. Lower petal ovate, incurved, acute at apex, white with buff sides. Paired petals 3–4.5 mm long, ovate to rounded, buff yellow with slightly darker claws, orange, pink, apricot or blue. Medial stamen with filament purplish, gently S-shaped; anther transversely oblong with yellow connective and orange pollen sacs; lateral stamens with filaments purplish; anthers orange yellow. Staminodes with filaments purplish; antherodes cross-shaped, yellow. Ovary green; style purplish; stigma orange, slightly bifid. Capsule 4–5 x 2.5–3 mm, 3-loculed, 5-seeded, the 2 ventral locules each 2-seeded, the dorsal locule 1-seeded, all dehiscent. Seeds variable in size, those in ventral locules rectangular, those in dorsal locule larger and elongate with rounded ends, 1.2–2.5(–3.1) x 1.1–1.7(–2) mm, furrowed mostly with (3–)4–5 ridges and furrows, the top of the ridges provided with a row of tubercles, and the lower parts of the ridges and the furrows with minute farinose granules, dark brown; hilum 1–1.7 mm long, linear, does not reach the ends. Fig. 207.14.

Wooded grassy slopes among rocks or in rock crevices, moist depressions, also weed of cultivation, usually in wheat, teff and maize fields; (900–)1600–2500 m. EE EW TU GD GJ SU HA AR KF SD BA; Ghana, Togo, Nigeria, Zaire, Burundi, Sudan, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Namibia, Swaz-



Figure 207.14 *COMMELINA SUBULATA*: 1 – shoot $\times 2$; 2 – fruit, lateral view $\times 4$; 3 – seed, ventral and dorsal views $\times 6$. All from Ogwal 72. (Reproduced from Ogwal, *loc. cit.*, fig. 2C.)

iland and South Africa, Yemen and India. *Ensermu K.* 3876; *Mooney* 9157; *Schimper* 360.

5. *C. reptans* *Brenan* (1961)

– type: SD, Mega, 1950 m, *Gillett* 14382 (K holo.).

Perennial herb with tuberous roots, broadest about the middle and tapering towards both ends. Stems mostly creeping and rooting at lower bent nodes, ascending to erect above, glabrous or pubescent with a row of hairs below flowering nodes; internodes 8–12 cm long. Leaf-sheaths 0.8–1.5 cm long, purple or whitish with purple tinge, fimbriate with 2–3 mm long hairs along the margins, pubescent along the line of fusion; blade 4–5 \times 0.4–0.5 cm, lanceolate, linear-lanceolate, linear or fal-

cate, broadest at the base, undulate or entire and ciliate at the margins, otherwise glabrous. Cymes sub-terminal and falsely terminal. Spathes free, folded along midrib, 16–25 \times 18–24 mm, green or sometimes with purple markings along the veins, densely fimbriate along the margins, otherwise glabrous, pedunculate; peduncle 15–47 mm long, pubescent along a channel. Lower cincinnus mostly included within spathe; cincinnus peduncle 5–11 mm long, purplish, with 4–8 bisexual flowers; pedicel 4–7 mm long. Upper cincinnus present, cincinnus peduncle 5–11 mm long, purplish, with a staminate flower; pedicel 10–15 mm long, purplish. Lower sepals 4–5 \times 2 mm, fused laterally at base, hyaline light purple or dirty orange; upper sepal 4–5 \times 3 mm, ovate, dark red to purple or dirty orange. Lower petal shortly clawed, c 5 \times 4 mm, ovate, apiculate at the apex, buff yellow or pinkish orange. Paired petals with claw c 6 mm long, blade 9–11 \times 15–18 mm, broader than long, cordate at the base, rounded at the apex, buff or dark brownish-yellow or dull orange. Medial stamen with filament c 6.5 mm long, pale orange below, pale yellow above; anther 2.5–3 mm long, bright yellow with dark centre, both thecae provided with sterile yellow lobes at base; lateral stamens with filaments 7–9 mm long, pale orange at the base, pale yellow above; anthers 1.6–2.2 mm long, purplish. Staminodes with filaments 5–7.5 mm long, purple; antherodes cross-shaped, orange. Ovary c 2 mm long; style 8–11 mm long, pale orange below, purplish towards the apex or sometimes reduced (abortive) and white; stigma capitate, minutely bifid, cream. Capsule 4.5–5 \times 3 mm, 3-loculed, (5–)6-seeded, the 2 ventral locules (3–)4-seeded, dorsal locule 2-seeded, all locules dehiscent. Seeds 1.7–2 \times 1.3–1.6 mm, furrowed, with 4–5 ridges and 3–4 parallel furrows, ridges and furrows provided with fused farinose granules and sometimes forming false reticulation; hilum linear, 1.3–1.6 mm long, reaching one end. Fig. 207.15.

Seasonally waterlogged meadows, and evergreen woodland in open moist grassy places in shallow soil overlying granite rocks; 1700–2000 m. SD; Uganda, Kenya, Tanzania and Rwanda. *Ensermu K. & Melaku W.* 2895; *Gilbert & Jefford* 4362; *Sebsebe D.* 2565.

6. *C. stephaniniana* *Chiov.* (1916)

– type: Somalia, Boscaglia di Baidoa, 6.XI.1913, *Paoli* 117, El Uala'c, 2.XI.1913, *Paoli* 1087 and El Ure, 1.XI.1913, *Paoli* 1079 (FT syn.).

C. maculata *Chiov.* nom. nud.

Perennial herb with thick rootstock and fusiform fleshy roots. Stems erect with lower branches creeping and rooting at nodes and upper branches spreading or ascending, reddish, pubescent only along a narrow channel or rarely pilose all over; internodes up to 6–12 cm long. Leaf-sheaths 0.8–1.5 cm long, green or green with purple tinge; blade 5–7(–12) \times 1.6–2.6 cm, lanceolate or linear-lanceolate, long-acuminate at the apex, green with brownish-purple blotches in the upper half on both surfaces, glabrous or rarely pilose beneath. Cymes leaf-opposed, falsely terminal. Spathes free, folded



Figure 207.15 *COMMELINA REPTANS*: 1 – shoot x 1/2; 2 – fruit x 5; 3 – open fruit x 5; 4 – seed, ventral and dorsal views x 6. All from Ogwal 49. (Reproduced from Ogwal, *loc. cit.*, fig. 2A.)

along midrib, 22–55 x 22–36 mm, ovate, cordate at the base, acute at the apex, densely ciliate to fimbriate at the margins, usually purple tinged, pedunculate; peduncle 20–45 mm long, glabrous or sparsely pubescent or rarely pilose. Lower cincinnus enclosed in the spathe; cincinnus peduncle 4–7 mm long, bearing 3–7 bisexual flowers; pedicel 3–6 mm long. Upper cincinnus present, mostly protruding from the spathe; cincinnus peduncle 7–15 mm long, with 1(–2) staminate flowers; pedicel 3–6 mm long. Lower 4–5.5 x 3.3–4 mm, suborbicular or obovate, with rounded apex, fused laterally, glabrous or pilose with some long hairs; upper sepal 4–5.5 x 1.6–2.5 mm, oblong-elliptic, hyaline, glabrous or pilose. Lower petal 6–7 x 1.5 mm, linear-oblong, boat-shaped, incurved, very pale blue. Paired petals with claw 5–6 mm long, blade c 9.5 x 14 mm, bright blue. Medial stamen with filament c 9 mm long; lateral stamens with filaments 12–14 mm long, winged from 3 mm of their length to the apex; anthers c 1.3 mm long. Stamines: filaments 5–7 mm long; antherodes cross-shaped, orange yellow. Ovary 2 mm long; style 16 mm long, much longer than the stamens; stigma capitate. Capsule 6–7 x 3–3.5 mm, 3-loculed, the 2 ventral locules each mostly 1-seeded (by abortion of lower ovules), dehiscent, the dorsal locule 1-seeded, indehiscent. Seeds 3–4.2 x 1.5–2 mm, elongate and elliptic or ± rectangular with one sharp edge; testa reticulate-foveolate; hilum 2–3.5 mm long, linear. Fig. 207.16.

Acacia woodland and open riverine vegetation in rocky or stony often flat places; 700–1800 m. SD BA HA; Somalia and Kenya. *Cufodontis* 492; *Ensermu* K. & *Melaku* W. 2592; *Thulin* et al. 3417.

7. *C. foliacea* Chiov. (1939)

– type: SD, Moyale [Mojaale], 1937, *Cufodontis* 698 (FT holo.).

Rhizomatous perennial herb with thick fleshy rhizomes and tuberous (fusiform) yellow roots; the erect or ascending shoots and roots arranged in two rows. Flowering stems erect or ascending, glabrous or rarely pubescent in the upper part; internodes up to 5–12 cm long. Leaf-sheaths closed, 1–3 cm long, pubescent along the line of fusion with unhooked hairs, ciliate at the apex with up to 2 mm long white hairs; blade pseudo-petiolate or sessile and clasping the stem (subsp. *amplexicaulis* Faden), 5–7 x 2–4 cm, lanceolate, ovate or rarely linear-lanceolate, base obtuse to cordate, oblique or clasping the stem (subsp. *amplexicaulis*), entire at the margins, acuminate at the apex, glabrous or rarely sparsely pubescent beneath; pseudo-petiole 0.2–0.7 cm long, glabrous. Cymes leaf-opposed and borne in the upper nodes. Spathe fused for 25 mm at base along proximal margins, folded and with a pouch above the fused base, spreading and leafy above, (30–)40–90 x 17–24 mm, ovate-lanceolate, broadest at the base, long-acuminate at the apex, glabrous or with a few long white hairs outside (beneath), pilose inside the pouch around the cincinni, pedunculate; peduncle 10–30 mm long, sparsely pubescent with unhooked hairs. Lower cincinnus enclosed in the pouch of the spathe and surrounded by dense white hairs, with 3–6 bisexual flowers. Upper cincinnus absent or suppressed and enclosed in the spathe or present and protruding, with 1–3 staminate flowers. Lower sepals 4–4.5 x 2–2.5 mm, obovate, fused laterally, more or less transparent; up-

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Figure 207.16 *COMMELINA STEFANINIANA*: 1 – plant in flower $\times 2\frac{1}{2}$; 2 – spathe and bisexual flower, lateral view $\times 2\frac{1}{2}$; 3 – bisexual flower, partial side view $\times 5$; 4 & 5 – capsule, dorsal and side view $\times 8$; 6 – capsule, dorsal view, dorsal valve removed to show abortive seeds in basal/ventral locule $\times 8$; 7 & 8 – seed from ventral locule, side and dorsal seed $\times 12$. All from Faden & Kuchar 88/232. Drawn by A.R. Tangerini.

per sepal oblong-elliptic, c 3.5 x 1.5 mm, \pm transparent. Lower petal linear, twisted, hyaline green. Paired petals with claw 2.5–3 mm long, blade c 7 x 8–9 mm, dark blue. Medial stamen with filament 3.5–4 mm long; anther c 2.2 mm long, blue and yellow; lateral stamens with filaments 4.5–5 mm long; anthers c 1.3 mm long, blue and yellow. Staminodes with filaments 3–3.5 mm long; antherodes cross-shaped, yellow. Ovary c 1.3 mm long, brown; style c 7 mm long; stigma capitate. Capsule 6–6.5 x 3–4 mm, 3-loculed, the 2 ventral locules each 2-seeded, dehiscent, the dorsal locule smaller and borne in the upper part of the capsule, 1-seeded, indehiscent. Seeds elongate, 3.5–3.7 x 2.2 mm, dark brown, rugose, provided with farinose granules; hilum linear, c 1.8 mm long, does not reach the ends.

1. Leaves pseudo-petiolate. subsp. *foliacea*
 – Leaves clasping the stem. subsp. *amplexicaulis*

subsp. *foliacea*

Montane broadleaved and riverine forest, and *Acacia* – *Commiphora* woodland; 1100–1900 m. IL KF SD BA; Kenya, Uganda and Tanzania. *Ensermu* K. & *Melaku* W. 2897; *Jansen* 5553; *Tewolde* BGE & *Mesfin* T. 2056.

Subsp. *amplexicaulis* Faden has not been recorded from the Flora area. It occurs in Uganda, Kenya, Tanzania, Zambia and Malawi.

8. *C. kotschyi* Hassk. in *Schweinf.* (1867)
 – type: Sudan, *Kotschy* 34 (B K iso.)

Annual or short-lived perennial herb with fibrous roots. Stems erect or ascending to 30 cm, pale green, slightly purplish tinged, glabrous; internodes 8–14 cm long. Leaf-sheaths 0.6–1.5 cm long, mostly open to the extreme base, sparsely pubescent along the lower edge or line of fusion with hooked hairs; blade 6–9 x 1.5–2 cm, ovate-lanceolate, broadest at or near the base and cordate, truncate or rounded or rarely sagittate (never clasping the stem), undulate at the margins, acuminate at the apex, glabrous. Cymes leaf-opposed, subterminal and falsely terminal, 2–3 per branch, pedunculate; peduncles 8–20(–30) mm long, sparsely pubescent along the channel and at the apex with minute hooked hairs. Spathes fused at the base 2–3 mm along proximal margins, 13–19 x 15–24 mm, broader than long, thick, pale green to yellowish at the base with deep green veins, rounded or obtuse at the apex, sparsely pubescent with minute hooked hairs. Lower cincinnus enclosed in the spathe; cincinnus peduncle 6–10 mm long, with 3–4 bisexual flowers; pedicel 2–4 mm long, partly protruding at anthesis from spathe, reflexed and enclosed when fruiting. Upper cincinnus absent or rarely present and enclosed in the spathe, with 1 staminate flower. Lower sepals c 4 x 2.7 mm, ovate, rounded at the apex, hyaline white with broad transparent margins, free, glabrous; upper sepal c 3 x 2 mm, elliptic, strongly hooded at the apex with a hyaline white mauve tip, hyaline greenish white with broad transparent margins. Lower petal c 4.5 x 4 mm, ovate, apex obtuse, bright blue; paired petals

with claw c 3 mm long, blade 5 x 6.5–7 mm, broadly ovate, base truncate to sub-cordate, apex rounded, bright blue. Medial stamen with filament c 4.5 mm long, more or less straight, blue; anther c 1.7 mm long, entirely yellow, deeply bilobed at apex; lateral stamens with filaments c 6.5 mm long, S-shaped, blue; anthers c 1 mm long, white. Staminodes with filaments 2.5–3 mm long, bluish-purple; antherodes very small, more or less cross-shaped, yellow. Ovary c 2 mm long, ellipsoid, blue, glabrous; style c 5 mm long, S-shaped, blue; stigma capitate, blue. Capsule 8 x 5–6 mm, 3-loculed, the 2 ventral locules each 2-seeded, dehiscent, the dorsal locule 1-seeded, indehiscent. Seeds 2.8–3 x 1.8–2 mm, elongate, dark brown with grey patches, smooth but sparsely provided with farinose granules; hilum linear, 3–3.3 mm long, extending beyond the seed surface, raised.

Acacia bushland and woodland, weed of cultivation in irrigated land; 700–1000 m. AF HA; also in Sudan, Kenya and Angola. *Moore* 92, 93; *Parker* E. 113.

9. *C. latifolia* Hochst. ex A. Rich. (1851);
C. sagittifolia Hassk. in *Schweinf.* (1867), nom. illeg. – type: ?TU, *Schimper* 1686 (K iso.).
C. forskaoalii Vahl var. *major* Chiovenda in *Webbia* 8: 34 (1951), nom. inval. – type: SD, Negelle, *Corradi* 2145 (FT holo.).

Perennial herb with fleshy rootstock and fibrous roots. Stems semi-prostrate or straggling to 60 cm, occasionally rooting at the lower nodes, glabrous; internodes 6–13 cm long, green, paler towards the base and tinged purple. Leaf-sheaths 1.5–3 cm long, green or purple-tinged, sparsely pubescent along the line of fusion or nearly glabrous; blade up to 9–17 x 2.2–4.7 cm, lanceolate or ovate-lanceolate, broadest at the base, clasping the stem and sagittate to cordate at the base or lower ones rounded to obtuse, entire at the margins, long-acuminate at the apex, glabrous. Cymes leaf-opposed, subterminal and falsely terminal, 2 per branch. Spathes fused at the base 4–5 mm along proximal margins, 19–32 x 16–28 mm, mostly longer than broad or sometimes as long as broad, acute to obtuse at the apex, pubescent or glabrous, pedunculate; peduncles 10–35 mm long, pubescent with minute hairs. Lower cincinnus enclosed in the spathe; cincinnus peduncle 8–11 mm long, with (3–)5–8 bisexual flowers; pedicel 2.5–4.5 mm long, protruding at anthesis and reflexed when fruiting. Upper cincinnus mostly absent, when present with up to 17 mm long peduncle and 1(–2) staminate flowers. Lower sepals 3.5–4 x 2.5–3 mm, obovate, whitish; upper sepal 3.2–4 x 1.2–1.4 mm, linear-lanceolate, whitish. Lower petal c 4.2 x 2 mm, linear-oblong, whitish; paired petals with claw 5–6 mm long, blade 7–7.5 x 9–11 mm, broader than long, blue. Medial stamen with filament 5.5–6 mm long, twisted; anther 2–2.4 mm long; lateral stamens with filaments 8–10 mm long, twisted or S-shaped; anthers 1.5–1.8 mm long, bluish. Staminodes with filaments 3–5 mm long, yellowish; antherodes cross-shaped, yellow. Ovary 1.4–1.5 mm long,



Figure 207.17 *COMMELINA LATIFOLIA*: 1 – leafy shoot with fruiting spathes and rooting base $\times 1/2$; 2 – fruits removed from spathe $\times 5$; 3 – seed, top and side views $\times 7$. All from *Ogwal 6*. (Reproduced from *Ogwal, loc. cit.*, fig. 3A.)

dark brown; style twisted about the middle, 8–12 mm long, pale greenish yellow below and pale bluish above; stigma capitate. Capsule 5–6 mm long and wide, constricted between seeds, 2-loculed, dehiscent, 4-seeded. Seeds globose, 2–2.5 mm in diameter, black, tuberculate, provided with fused farinose granules; hilum linear, $c 1.5$ mm long. Fig. 207.17.

Rocky slopes, montane and riverine forest and woodland, weed of cultivation in maize; 100–2600 m. EW TU GJ WU SU AR KF SD HA; Cameroun, Sudan, Uganda, Kenya and Tanzania. *De Wilde* 2839; *Paoli* 3416; *Sebald* 2634.

10. *C. imberbis* Ehrenb. ex Hassk. (1867)

– type: EE/EW, Togodele in Shohos, *Ehrenberg* s.n. (B destr.)

?*C. boissleiana* C.B. Clarke (1881).

Perennial herb with fusiform roots. Stems straggling or creeping and rooting at lower nodes, up to 200 cm long, younger parts pubescent, becoming glabrous when old; internodes 8–12 cm long. Leaf-sheaths 2.2–4 cm long, closed, sparsely pubescent all over or nearly glabrous except on the line of fusion, ciliate towards the apex; blade 10–23 \times 1.5–5.3 cm, lanceolate to ovate, broadest at or near the base, cordate, truncate, rounded, sagittate

or obtuse-cuneate (never clasping the stem), margins entire or undulate below half, long-acuminate at the apex, glabrous or rarely sparsely pubescent with minute hairs. Cymes leaf-opposed and falsely terminal. Spathes fused at the base 4–7 mm along proximal margins, 20–36 \times 22–32 mm, mostly longer than broad or very rarely as long as broad, acute to acuminate at the apex, pubescent with short hooked hairs, pedunculate; peduncles 15–35 mm long, pubescent along the channel and at the apex. Lower cincinnus enclosed in the spathe; cincinnus peduncle 8–11 mm long, bearing 3–6 bisexual flowers; pedicel 3–5 mm long, protruding. Upper cincinnus present, mostly dominant, protruding from the spathe; cincinnus peduncle 15–25 mm long, pubescent with fine hairs, bearing 12 staminate flowers; pedicels 2–4 mm long. Lower sepals 4–5.5 \times 2.5–3 mm, ovate-oblong, hyaline with a translucent greenish white central band; upper sepal 2.5–4 \times 2–2.5 mm, ovate-elliptic. Lower petal $c 5.5 \times 3.3$ mm, pale blue; paired petals with claw 5–6 mm long, blade $c 9 \times 10$ –11 mm, pale blue. Medial stamen with filament 7.5–9 mm long, blue, twisted; anther 2.2–3 mm long, yellow and blue; lateral stamens with filament 11–13 mm long, pale blue below, yellow-green towards the apex, twisted and S-shaped, parallel or sometimes overlapping near the apex; anthers $c 2$ mm long, blue. Staminodes with filaments 5–6 mm long, blue, twisted near the apex; antherodes cross-shaped, yellow. Ovary $c 2.5$ mm long, dark; style $c 12$ mm long, twisted near the apex and pale blue, whitish towards the base; stigma capitate. Capsule 7–8 \times 4.6–5 mm, 3-loculed, (3–)5-seeded, the 2 dorsal locules each mostly 2 or rarely 1-seeded (due to abortion of lower ovules), dehiscent, the dorsal locule 1-seeded, indehiscent, striate. Seeds variable in size, 3.2–5.2 \times 1.8–2.5 mm, elongate, furrowed with tuberculate ridges, furrows provided with farinose granules; hilum linear, raised, does not reach the ends. Fig. 207.18.

Edge of montane and riverine forest, *Acacia* bushland, woodland and wooded grassland; 700–2200 m. EE EW TU GJ WU SU GG SD BA HA; Nigeria, Burundi, Sudan, Somalia, Uganda, Kenya, Tanzania, Mozambique, Zambia, Zimbabwe, Botswana and South Africa and Yemen. *Ensermu K. & Melaku W.* 2833; *Merga Gutetta* 1091; *Quartin-Dillon & Petit* 13.

11. *C. petersii* Hassk. (1864)

– type: Mozambique, *Peters* s.n. (B holo. destroyed).

C. trachysperma Chiov. (1911) – type: EE, Beni Amer, monte Curcu, 1000 m, *Pappi* 7689 (FT holo.).

Annual or short-lived perennial herb with fibrous or moderately fusiform roots. Stems erect or scrambling to 1 m, glabrous below, pubescent on their upper part with hooked hairs; internodes up to 4–9 cm long. Leaf-sheaths 1–2 cm long, whitish with dark brown veins, pubescent with hooked hairs or nearly glabrous; blade up to 8–9 \times 1.2–1.8 cm, lanceolate-elliptic or linear-lanceolate, broadest below or about the middle, taper-



Figure 207.18 *COMMELINA IMBERBIS*: 1 – leafy shoot with fruiting spathes and rooting base $\times 4/5$; 2 – fruit, bottom and top views $\times 2 1/2$; 3 – seed, bottom and top views $\times 5$. All from *Ogwal* 62. (Reproduced from *Ogwal*, *loc. cit.*, fig. 3B.)

ing towards both ends, long-acuminate at the apex, pubescent beneath with short hooked hairs, glabrous above (lower leaves pseudo-petiolate). Cymes leaf-opposed and falsely terminal, scattered and mostly one per branch. Spathes fused only 3–4 mm at the base along proximal margins, 18–25 \times 19–24 mm, as long as broad, acute at the apex, pubescent with long and short hooked hairs, thus sticky, pedunculate; peduncles 16–30 mm long, mostly hidden in the subtending leaf-sheath, pubescent with hooked hairs. Lower cincinnus present, mostly with 3 bisexual flowers; peduncle 7–9 mm long; pedicel 3–4 mm long, pubescent. Upper cincinnus mostly absent, when present protruding from the spathe, with 1 staminate flower. Lower sepals c 3.5 \times 2 mm, hyaline, tinged with blue; upper sepal c 3.5 \times 1.2 mm, hyaline. Lower petal boat-shaped, incurved. Paired petals with claw 4–5 mm long, blade 7.5–8 \times 12–13 mm, cordate at the base, truncate at the apex, blue. Medial stamen with filament c 6.5 mm long; anther c 2 mm long, yellow; lateral stamens with filaments c 7 mm long, twisted towards the apex, white at base and yellow above; anthers c 1 mm long, yellow. Staminodes with filaments c 5.5 mm long; antherodes cross-shaped, yellow. Ovary c 1.5 mm long, dark brown; style 8 mm

long, yellowish at base, blue at apex; stigma capitate, purple. Capsule c 7 \times 4.5 mm, elongate, 3-loculed, the 2 ventral locules each 2-seeded and dehiscent, the dorsal locule 1-seeded and indehiscent, the seed firmly adhered to the pericarp. Seeds 3.5–4 \times 2–2.5 mm, elongate and slightly curved, deeply furrowed, with 5 ridges and 4 furrows (both ridges and furrows unique to the species), ridges provided with minute tubercles, without farinose granules; hilum slightly curved, 2.2–2.5 mm long.

Acacia – Combretum – Terminalia-woodland; 500–1700 m. EE WG SD; Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana and Angola. *Corradi* 2200; *Ensermu K. & Melaku W.*; *Terracciano & Pappi* 2719.

12. *C. zambesica* C.B. Clarke (1881)

– types: Mozambique, opposite Senna, *Kirk* s.n.; Bank of Shire River, *Kirk* s.n.; Kongoni River, Zambesi Delta, Kougoul, *Kirk* s.n.; Mouth of Kongoni River, Zambesi Delta, *Kirk* s.n. (all K syn.); Malawi, Lake Nyassa, *Simmons* 1876 (K syn.).

Perennial herb with thick fleshy fusiform roots. Stems up to 70 cm high, sparsely pubescent at least in the channels; internodes up to 10–17 cm long. Leaf-sheaths 1–3 cm long, auriculate with more or less clasping small auricles at the apex; auricles, free edges and pseudo-petiole ciliate with white hairs up to 3.5 mm long which may have brownish septa, pubescent with unhooked hairs; blade up to 10–15 \times 1.5–3.5 cm, lanceolate to ovate, broadest below the middle, tapering towards both ends, acuminate at the apex, sparsely pubescent on both surfaces. Cymes sub-terminal and falsely terminal, 1–2 per branch. Spathes fused at base 5–8 mm along the proximal margins, 22–30 \times 22–32 mm, about as long as broad, obtuse at the apex, pubescent with short and medium hooked hairs and pilose with long unhooked white hairs, pedunculate; peduncle 10–30 mm long, pubescent with hooked hairs. Lower cincinnus enclosed in the spathe; peduncle c 10 mm long, with 4–5 bisexual flowers; pedicel c 5 mm long. Upper cincinnus present, protruding from the spathe; cincinnus peduncle 15–23 mm long, pubescent with short hooked hairs, with 1–2(–3) staminate flowers; pedicel c 6 mm long, glabrous. Lower sepals 6–6.5 \times 4 mm, oval, laterally fused, hyaline pale blue or white; upper sepal 4–4.5 \times 1.5–2 mm, elliptic, hyaline white or pale blue. Lower petal narrowly lanceolate, dark blue, folded. Paired petals with claw 4–6 mm long, blade 7–10 \times 11.5–12 mm, cordate at base, rounded to slightly retuse at the apex, dark to light blue. Medial stamen with filament c 8 mm long, blue-purple below c 3 mm of its length and cream above; anther curved, c 3 mm long; lateral stamens with filaments c 12 mm long, bluish-purple below and blue above, S-shaped, incurved at the apex; anthers c 1.4 mm long, blue. Staminodes with filaments c 4.5 mm long, pale blue below and yellow above; antherodes cross-shaped or not, those of two staminodes seem 6-parted, the lower and upper pairs yellow and the middle pair

white, antherode of the third staminode cross-shaped with 2 white and 2 yellow parts. Ovary *c* 2.5 mm long, dark brown; style *c* 13 mm long, cream at extreme base and blue or mauve above, S-shaped; stigma capitate, white. Capsule 3-loculed, (2-)5-seeded, the 2 ventral locules each commonly 1-seeded (by abortion of lower ovules), all locules dehiscent. Seeds nearly globose, 2.5-3 x 2.2-2.6 mm, brown with irregularly raised golden yellow ridges; hilum linear, 1.5-2.5 mm long, lateral, reaching the ends.

Combretum - *Terminalia*- and *Acacia* - *Commiphora* - woodland; 500-1500 m. WG IL SD; Nigeria, Central African Republic, Kenya, Uganda, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Namibia and South Africa (Transvaal). *Ensermu* K. & *Melaku* W. 2840; *Ensermu* K. & *Lemessa Kenei* 3465; *Mesfin* T. 6699.

13. *C. schweinfurthii* C.B. Clarke (1881)

- type: Sudan, Gerriba Ghattas, *Schweinfurth* 2022 & 2023, *Schweinfurth* 1869 (both K syn.).

C. elgonensis Bullock (1932).

Perennial herb with fusiform roots. stems erect, 0.4-1.6 m high, pale green with purplish tinge, pilose or pubescent only in two rows on younger parts; internodes 6-15 cm long. Leaf-sheaths 0.7-3 cm long, pilose or pubescent along the line of fusion only, ciliate with long white hairs along the free margins; blade 7-18 x 0.6-1.4 cm, linear-subulate or linear-lanceolate, pubescent or glabrous, with small auricles at the junction with the sheath clasping the stem, especially those at the upper nodes. Cymes leaf-opposed. Spathe fused nearly all along the proximal margins (6-8 mm), 19-28(-42) x 22-32(-44) mm, broader than long or about as long as broad, midrib bulged outward near the base (this is a unique feature among the Ethiopian species of *Commelina*), pilose or glabrous, nearly always purple tinged along the margins and major veins, short-acuminate at the apex, pedunculate; peduncle 20-60(-120) mm long, pilose at least along the channel. Lower cincinnus with 6-14 bisexual flowers, included with protruding floral parts; cincinnus peduncle 5-8 mm long; pedicel 4-11 mm long. Upper cincinnus present, protruding or rarely included; cincinnus peduncle 6-10 mm long; pedicel 10-20 mm long, mostly longer than the peduncle. Lower sepals *c* 6 x 3.5 mm, ovate-oblong, laterally fused, semi-transparent except for the margins which are hyaline, whitish; upper sepal *c* 6 x 2 mm, curved, elliptic in outline, semi-transparent, whitish. Lower petal mauve or lilac, filiform; paired petals with claw 5-6 mm long, blade *c* 9 x 11 mm, blue. Medial stamen with filament *c* 7 mm long; anther *c* 2.5 mm long, yellow; lateral stamens with filaments *c* 8 mm long; anthers *c* 2 mm long, blue-black. Staminodes with filaments *c* 6 mm long; antherodes cross-shaped, yellow. Ovary *c* 1.8 mm long, dark brown; style *c* 11 mm long; stigma capitate, bluish. Capsule 5-6.5 x 3.5-5 mm, 2-loculed, (2-)3(-4)-seeded. Seeds 1.8-2 x 1.5-1.7 mm, smooth but with very dense fused farinose granules, light brown (due to gran-

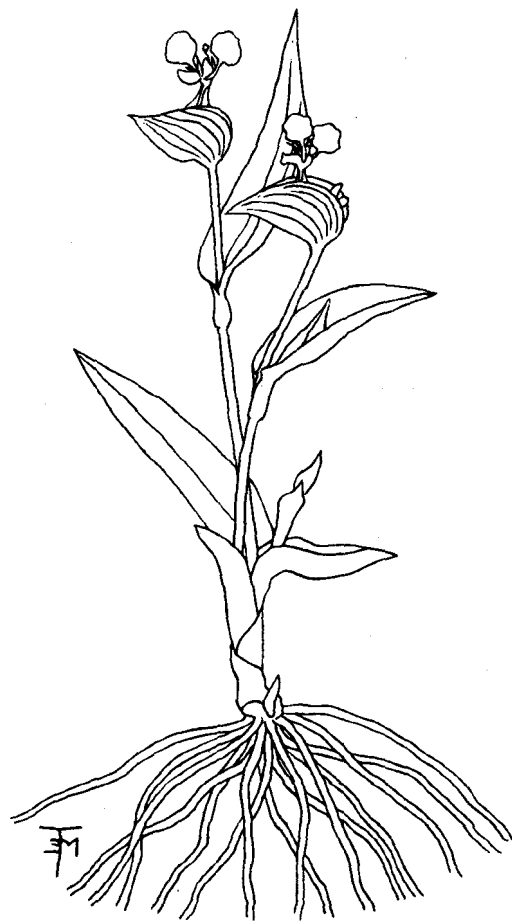


Figure 207.19 *COMMELINA SCHWEINFURTHII*: whole plant in flower x 1/2. Drawn by Mrs E.M. Tweedie. (Reproduced with permission from Agnew, *Upland Kenya Wild Flowers*: 658, 1974)

ules but dark brown when testa exposed); hilum linear, lateral. Fig. 207.19.

Combretum - *Acacia* mixed woodland, (wooded) grassland and weed of cultivation in cotton and other crops; 1200-2000 m. WU SU WG KF SD HA; Guinea, Sierra Leone, Cote d'Ivoire, Ghana, Togo, Nigeria, Cameroun, Burundi, Sudan, Uganda, Kenya and Tanzania. *Ash* 771; *Cufodontis* 750; *Mooney* 7412.

14. *C. eckloniana* Kunth (1843)

- type: South Africa, Cape, *Ecklon* s.n. (K iso.).

Annual or short-lived perennial herb with tuberous (fusiform) roots and sometimes with rootstock. Stems creeping and ascending and rooting at the lower nodes and ascending or erect above, or rarely erect or ascending from the base and 15-60 cm high, pubescent; internodes 5-11 cm long. Leaf-sheaths 1-4.5 cm long, pubescent with hooked hairs, ciliate at the apex with white hairs up to 3 mm long; blade 1-1.5 x 0.1-0.4 mm, linear-lanceolate or lanceolate, gradually tapering towards both ends, long-acuminate at the apex, glabrous above, pubescent beneath with minute hooked hairs, or nearly glabrous. Cymes leaf-opposed and borne on

side-branches, 2–3 per branch. Spathes fused nearly all along their proximal margins (7–8 mm), 23–25 x 21–23 mm, slightly longer than broad, acute at the apex, pubescent with minute hooked hairs and some straight hairs up to 2 mm long (near base and along veins), pedunculate; peduncle 15–25 mm long, usually perpendicular to the stem axis, pubescent with hooked hairs. Lower cincinnus enclosed in the spathe; cincinnus peduncle 9–12 mm long, with 3–5 bisexual flowers; pedicel 5–8 mm long. Upper cincinnus present and protruding from the spathe with 1 staminate flower, pedunculate; cincinnus peduncle 10–16 mm long; pedicel 8–12 mm long. Lower sepals 5–6 x 3–4 mm, ovate-elliptic or oblong, laterally fused, pale blue or mauvish, transparent; upper sepal *c* 5 x 2 mm, elliptic, pale blue. Lower petal blue, *c* 5.5 x 2.5 mm, boat-shaped, incurved at the apex; paired petals with claw 4–5 mm long; blade 7–8 x 8.5–9.5 mm, blue. Medial stamen with filament *c* 7.5 mm long, blue; anther *c* 2 mm long, curved, blue and yellow; lateral stamens with filaments 10–11 mm long, blue; anthers *c* 1 mm long, blue. Stamines with filaments *c* 8.5 mm long, blue; antherodes cross-shaped, yellow. Ovary 1.5–2.4 mm long, dark brown; style *c* 12 mm long, pale blue. Capsule 6–7 x 6 mm, more or less a square, 2-loculed, dehiscent, 4-seeded. Seeds more or less globose, 2–2.2 mm in diameter, rugose-tuberculate, with farinose granules; hilum lateral, curved and much raised above the seed surface.

Woodland along moist creek, wooded grassland and in riverine forest and woodland; 1300–1900 m. GJ WG IL; Uganda, Kenya, Tanzania, Zaire, Rwanda, Burundi, Botswana, Zimbabwe, Zambia, Malawi, Mozambique, South Africa (Transvaal and Cape). *Ensermu* K. & *Melaku* W. 2924, 2948; *Sebald* 2483.

15. *C. albescens* Hassk. (1867)

– type: ?TU, Agau, montes pr. Gageros, *Schimper* 2268 (K iso. destr.).

C. mensensis Schweinf. (1894) – types: EW, Gheleb, *Schweinfurth* 1414 & 1434 (B syn. destroyed); Anseba, *Steudner* 1417 (B syn. destroyed).

Scrambling or semi-erect perennial herb with fibrous roots and fleshy rootstock. Stems several, up to 60 cm high, grey-green and streaked with purple, glabrous; internodes up to 10–15 cm long. Leaf-sheaths 1–3 cm long, nearly always open, grey to hyaline, purple-veined and mostly purple spotted, sparsely pilose, ciliate at the margins with some white hairs 2–3 mm long; blade up to 8–17 x 0.6–1.1 cm, grey-green, subulate or linear-lanceolate, broadest at the base, glabrous or sparsely pubescent beneath. Cymes leaf-opposed, falsely terminal, mostly 2 together, (2–3 cymes in reduced internodes, 2 nodes near each other, thus cymes resembling heads). Spathes fused all along their proximal margins, 16–22 x 18–26 mm, broader than long, acuminate at the apex, folded along midrib, strongly falcate and recurved, very pale green, darker near the margins and on the veins, pubescent with short and long hooked hairs or

nearly glabrous, nearly sessile and covered partly by leaf-sheath. Lower cincinnus 2–4-flowered, included with partially protruding pedicels; cincinnus peduncle 7–10 mm long; pedicel 3–4 mm long. Upper cincinnus absent. Lower sepals 3–3.5 x 2.5–3 mm, orbicular, hyaline, transparent, whitish; upper sepal *c* 2.5 x 1.5 mm, elliptic, hyaline, transparent. Lower petal broader than long, very pale mauve to lilac or white; paired petals with claw 2.5–3 mm long, blade 7–8 x 9–10.5 mm, mauve to lilac or rarely white. Medial stamen with filament *c* 4 mm long, yellow; anther *c* 2 mm long; lateral stamens with filament *c* 4.5 mm long, cream; anthers *c* 2 mm long, blue. Stamines with filament *c* 3.6 mm long; antherodes cross-shaped, yellow. Ovary *c* 1 mm long, dark brown; style 5.5–7 mm long, white; stigma capitate, mauve. Capsule *c* 4 x 4 mm, rhomboid or square, 3-loculed, the 2 ventral locules each 1-seeded and dehiscent, the dorsal locule more or less globose (shorter than the others but bulged), 1-seeded and indehiscent, tuberculate (rough). Seeds 2.8–4 x 2–2.5 mm, smooth but with farinose granules, compressed globose, with low lying soft tissue encircling it only interrupted at embryotega.

Acacia – *Commiphora* – *Terminalia* (mixed) open bushland and woodland, rocky volcanic or limestone slopes, roadside and weed of cultivation; 300–1700 m. EE AF TU SU SD BA HA; Sudan, Djibouti, Somalia, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zimbabwe and Botswana and Saudi Arabia, Oman, Yemen (also on Socotra) and India. *Cufodontis* 239; *Ensermu* K. & *Melaku* W. 2834; *Schimper* 1232.

16. *C. erecta* L. (1753)

– type: N America (US lecto.).

C. corradii Chiov. (1951) – types: SD, El Banno, *Corradi* 2195 (FT holo.); SD, El Banno, *Corradi* 2184, 2194 & 2199 (FT syn.).

Perennial herb with thick fibrous to fusiform roots. Stems erect or ascending and rooting at lower nodes, light green with purple tinge, glabrous except for the uppermost internode which is pubescent; internodes 6–12 cm long. Leaf-sheaths 0.2–3.5 cm long, mostly open, glabrous except for 2–4 mm long hairs along free edge or pubescent with short hooked hairs along the line of fusion; blade 12–19 x 0.9–1.5 cm, linear-lanceolate, broadest below the middle, mostly with auricles at the junction with the sheath, margins entire, long-acuminate at the apex, glabrous except for few hairs 2–4 mm long at very base or sparsely pilose; lower leaves pseudo-petiolate. Cymes sub-terminal and falsely terminal, 1–2 per branch. Spathes fused all along proximal margins, 24–36 x 24–30 mm, longer than broad or rarely about as long as broad, acuminate at the apex, pubescent with short hooked hairs and pilose with unhooked long white hairs, shortly pedunculate; peduncle 7–10 mm long, pubescent with short hooked hairs at least along the channel. Lower cincinnus present, 2–6-flowered; cincinnus peduncle 8–11 mm long; pedicel 3–4 mm long. Upper cincinnus absent or rarely present.

Lower sepals c 4.5 x 3 mm, ovate-elliptic, laterally fused all along their length, hyaline white with translucent middle; upper sepal c 3.5 x 2 mm, boat-shaped, hyaline white. Lower petal c 3 mm long, linear, blue; paired petals with claw c 4 mm long, blade c 11 x 15 mm, bright blue. Medial stamen with filament c 7 mm long, blue; anther c 3 mm long, saddle-shaped; lateral stamens with filaments c 9 mm long, blue; anther c 2 mm long. Staminodes with filaments c 6 mm long; antherodes with 6 parts (2 large + 2 medium + 2 small). Ovary c 1.2 mm long; stigma capitate. Capsule c 3 x 5 mm, broader than long, 3-loculed, the 2 ventral locules each 1-seeded, dehiscent, the dorsal locule 1-seeded, globose, tuberculate or striate and indehiscent, or rarely smooth and dehiscent. Seeds 2.6–3 x 2–2.5 mm, more or less globose, only slightly longer than broad, encircled by a white soft tissue and provided with farinose granules, otherwise testa smooth, brown with grey patches; hilum linear, lateral.

Woodland and thornbush on rocky limestone or granite slopes and valleys; (?600–)1300–1600 m. ?GG SD BA HA; tropical Africa, tropical Asia, West Indies, North, Central and South America. *Chaffey* 442; *de Wilde* 6390; *Tadesse Ebba* 226.

17. *C. sp.* = *M.G. & S.B. Gilbert* 1554 (ETH K)

Perennial herb with uniformly thickened, black fusiform roots. Stems creeping and rooting at nodes, branched with alternate branches borne in the upper nodes, glabrous; internodes up to 10–13 cm long. Leaf-sheaths 1–1.5 cm long, pubescent only along the line of fusion with ascending short hooked hairs and with some unhooked hairs at the mouth and on the small auricles at the junction with the pseudo-petiole; blade 3.5–5 x 1.6–2.5 cm, ovate-lanceolate, cuneate to rounded at the base, broadest below half, margins entire, apex acute, glabrous, shortly pseudo-petiolate; pseudo-petiole c 0.5 cm long. Cymes sub-terminal and falsely terminal. Spathe fused all along the proximal margins (7–8 mm), folded along the midrib, 13–17 x 15–20 mm, broader than long, funnel-shaped, obtuse at apex, pubescent along the line of fusion, shortly pedunculate; peduncle up to 5 mm long, pubescent along the channel with short hooked hairs. Lower cincinnus 3–4-flowered. Upper cincinnus absent. Lower sepals c 4.5 x 2.5 mm, oblong, laterally fused, hyaline white; upper sepals c 3 x 2 mm, boat-shaped, hyaline white. Petals (not seen). capsule 3-loculed, the 2 ventral locules each 1-seeded and dehiscent, the dorsal one globose, tuberculate, indehiscent. Seeds c 3 mm in diameter, globose, dark brown, encircled by thick yellow-orange, ring-like tissue which is thin at embryotega and scattered on surfaces; testa smooth, with farinose granules; hilum more or less linear.

Grassland in riverine scrub and woodland. GG; known only from a single collection.

M.G. & S.B. Gilbert 1554, collected from the Woito river, c 5 km from junction with Sagan, 12.VIII. 1969, appears to be related to *C. melanorrhiza* Faden, which

was described from Kenya in 1994. It differs from the latter by having auricles at the junction between the leaf-sheath and the blade or pseudo-petiole and by having a capsule which has its dorsal locule indehiscent and rough. In *C. melanorrhiza* auricles are lacking and the dorsal locule is readily dehiscent. The seeds of the two taxa are also similar except for a difference in size; those of *M.G. & S.B. Gilbert* 1554 are larger than those of *C. melanorrhiza*.

18. *C. benghalensis* L. (1753)

– type: India, *Herb. Linnaeus* No. 65.16, LINN (LINN lecto.).

C. pyrrohoblepharis Hassk. (1867) – type: TU, Agau, *Schimper* 1591 (BM K iso.).

C. uncata C.B. Clarke (1881) – type: TU, Agau, in montibus prope Gageros, 1220 m, IX.1854, *Schimper* 2269 (BM K iso.).

C. benghalensis L. var. *hirsuta* C.B. Clarke in *DC Monogr.* 3: 160 (1881); *C. benghalensis* L. subsp. *hirsuta* (C.B. Clarke) Morton in *J. Linn. Soc. Bot.* 60: 176 (1967) – type: TU, Gurrarfara, Agau, 910–1220 m, *Schimper* 1499 (K syn.).

C. phaeochaeta Chiov. (1929) – type: BA, Tomomo, *Basile* 261 (TO holo.).

C. cufodontii Chiov. (1939) – type: SD, Yabello [Javello], *Cufodontis* 419 (FT holo.).

An erect or creeping-ascending robust perennial herb with fusiform roots and often with subterranean cleistogamous flowers. Stems up to 0.9–2.5 m long, rooting at the lower nodes, green with purple tinge, pubescent or rarely hirsute or glabrous; internodes up to 10–13 cm long. Leaf-sheaths 0.5–3 cm long with purple veins and purple tinge, ciliate with purple (rarely white) 3–7 mm long bristles along free edges, rarely all over the surface, otherwise glabrous or pubescent with hooked hairs; blade with pseudo-petiole, 9–12 x 2.7–5 cm, ovate or lanceolate, broadest below the middle, entire or rarely undulate at the margins, acute or acuminate at the apex, pubescent or glabrous; pseudo-petiole 0.3–1.5 cm long, provided with a few purple or white bristles 3–7 mm long. Cymes leaf-opposed, falsely terminal. Spathes 14–23 x 18–30 mm, broader than long, completely fused all along their proximal margins, mostly funnel-shaped, sometimes pointed at the lower end and curved downwards, pubescent with short hooked hairs and sparsely pilose with straight hairs or sometimes glabrous, nearly sessile to shortly pedunculate; peduncle up to 6 mm long, pubescent with minute hooked hairs. Lower cincinnus enclosed in the spathe, with 2–3 bisexual flowers; cincinnus peduncle 8–10 mm long; pedicel 4–7 mm long, protruding when flowering and reflexed and enclosed in the spathe when fruiting. Upper cincinnus present, dominant, protruding from the spathe; cincinnus peduncle 15–20 mm long, sparsely pubescent with small hooked hairs, mostly with 1 staminate flower; pedicel 4–9 mm long. Lower sepals 3.5 x 2.5 mm, oblong; upper sepal c 3.5 x 1.5 mm, elliptic. Lower petal blue; paired petals with claw 4–5 mm long, blade 7–8.5 x 9–11 mm, blue. Medial stamen with filament 5–7 mm long, blue; anther c 2 mm long, yellow; lateral stamens

with filaments 5–7 mm long, blue; anthers c 1.4 mm long, blue. Stamines with filaments 4–4.5 mm long, bluish; antherodes cross-shaped, yellow. Ovary c 1.3 mm long, brown; style c 9.5 mm long, blue; stigma capitate, blue. Capsule 4.5–5.5 x 3 mm, 3-loculed, 3–5-seeded, the 2 ventral locules each (1–)2-seeded, readily dehiscent, the dorsal locule always 1-seeded, may dehisce or remain until later, but finally dehiscent. Seeds variable in size, 2–5.5 x 1.5–2.2 mm, more or less reticulate with tuberculate ridges, provided with farinose granules; hilum normally linear, 1–3 mm long, not reaching the ends. Fig. 207.20.

In forest, woodland, stream banks, rocky hillsides, in partial shade under bushes and weed of cultivation in coffee, cotton, groundnut, pepper, teff, etc. fields and in waste grounds and gardens; 400–2500 m. EW EE GJ WU SU WG IL KF GG SD HA; tropical and South Africa, Madagascar and Mascarene Islands, tropical Asia, Indonesia, Polynesia, Pacific Islands and Australia, introduced and naturalized in N, C and S America and Hawaii. *Burger & Amare G.* 349; *Ensermu K. & Melaku W.* 2841; *Pichi-Sermolli* 2005.

19. *C. forskaolii* Vahl (1805)

– type: Arabia, *Forsskal* 31, 32 & 33 (C syn.).

Annual or short-lived perennial herb with fibrous roots and often with subterranean cleistogamous flowers. Stems erect or creeping and rooting at the lower nodes, sparsely to densely pubescent with short hooked hairs or nearly glabrous; internodes up to 4–9 cm long. Leaf-sheaths 0.5–1.3 cm long, sometimes with small auricles at the apex, sparsely pubescent with hooked hairs, ciliate at the margins with white hairs 2–3 mm long towards the apex; blade with pseudo-petiole, 5–7 x 1–1.3 cm, linear-oblong, linear-lanceolate or linear, mostly broadest below half, margins undulate or entire, acute at the apex, pubescent with short hooked hairs and long straight ones. Cymes leaf-opposed, sub-terminal and falsely terminal. Spathes completely fused all along proximal margins, 14–15 x 13–15 mm, mostly longer than broad, sometimes as long as broad, acute at the apex, pubescent with short hooked hairs and pilose at least at the base with long white hairs, mostly purple tinged along the free hyaline margins and rarely all over its surface, pedunculate; peduncle 5–12 mm long, pubescent along the channel with hooked hairs. Lower cincinnus enclosed in the spathe with the petals protruding, with few bisexual flowers. Upper cincinnus present, protruding at least during flowering, with 1 staminate flower; cincinnus peduncle 10–14 mm long; pedicel 4–5 mm long. Lower sepals c 4 x 2.5–3 mm, ovate-oblong or sub-orbicular, fused laterally at base, pale blue; upper sepal c 4 x 1.3 mm, elliptic, pale blue. Lower petal 2.5–3.5 x 1 mm, lanceolate, acute at the apex, pale blue; paired petals with claw 2.5–3.5 mm long; blade 6–8 x 7–10 mm, truncate at the base, emarginate at the apex, blue. Medial stamen with filament c



Figure 207.20 *COMMELINA BENGHALENSIS*: whole plant in flower x 1/2. Drawn by Mrs E.M. Tweedie. (Reproduced with permission from Agnew, *Upland Kenya Wild Flowers*: 659, 1974)

4 mm long; anther c 1.5 mm long, blue, saddle-shaped, both thecae with sterile basal yellow lobe; lateral stamens with filaments 6–7 mm long, blue, winged in their upper parts; anthers pale yellow to pale blue, c 1.2 mm long. Stamines with filaments c 3 mm long; antherodes cross-shaped, yellow. Ovary c 1.1 mm long, brown; style 9–10 mm long, pale blue; stigma capitate. Capsule c 5 x 2.5 mm, boat-shaped, 3-loculed, the 2 ventral locules with all ovules aborted or each 1-seeded or only one of them 1-seeded (by abortion of lower ovule and/or both in a locule), dehiscent; the 1 dorsal locule 1-seeded indehiscent, tuberculate (rough). Seeds from the ventral locules (when present) 2.3–2.5 x 1.4–2.2 mm, ovate, smooth but with farinose granules; hilum linear, lateral.

Woodland, rocky hillsides, river banks, coastal sandy plains, evergreen scrub, and weed of cultivation in cotton, sorghum, chickpea, teff, etc. fields; 0–1700 m. EE GD WU SU AR GG SD HA; Cape Verde, Senegal, Gambia, Mali, Burkina Faso, Togo, Benin, Nigeria, Chad, Cameroun, Egypt, Sudan, Djibouti, Somalia, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe, Botswana, Namibia and Mauritius, Saudi Arabia, Oman, Yemen (also on Socotra), India, Sumatra and Java. *Chaffey* 119; *Mooney* 5333; *Schweinfurth & Riva* 1180.

208. XYRIDACEAE

by K. A. Lye*

Nilsson in *Öfvers. K. Vet.-Akad. Frh.* 1891, 3: 149–158 (1891) and *K. svenska Vet.-Akad. Handl. N.F.* 24 (14): 1–75, tab. 1–6 (1892); Malme in *Bot. Jahrb.* 48: 287–308 (1912), *Arkiv Bot.* 22A, 4: 1–12 (1928) & 24A, 5: 1–10 (1932); Cufodontis, *Enum.*: 1506 (1971); Lewis, *Xyridaceae* in *Fl. Cameroun* 22: 35–51 (1981); Lewis & Obermeyer, *Xyridaceae* in *Fl. South. Afr.* 4(2): 1–7 (1985).

Perennial or annual herbs forming grass-like tufts in damp or wet places; stem and rhizome usually very short. Leaves mostly or all basal, in 2 opposite rows, less often spirally arranged; sheath open; blades entire, narrow with parallel venation or with only one vein, often folded. Flowers bisexual, parts in 3s, slightly bilaterally symmetrical, usually sessile, with strongly differentiated calyx and corolla; each flower subtended by a stiff bract and usually borne in densely-flowered globose or cylindrical heads or spikes on a long leafless stalk. Bracts firm, tough, closely overlapping and spirally arranged. Sepals typically 3, free, unequal in size; the lateral two exterior, boat-shaped, keeled, like brown to grey scales with thin dry edges, looking like glumes; the third interior, thin and membranous, forming a hood over the corolla in bud, but pushed aside and falling off as the corolla develops. Petals 3, united to form a short or long tube, yellow (rarely white or blue), usually thin and ephemeral, with 3 distinct corolla-lobes often narrowed at their base. Stamens typically 3, opposite the petal-lobes, usually alternating with 3-bifid fringed staminodes (in *Xyris*), rarely 6 fertile stamens; filaments short, attached to the corolla-tube; anthers 2-locular, opening by longitudinal slits; pollen grains mostly monosulcate or inaperturate. Carpels 3, united to form a superior 1-locular ovary with few-many ovules on parietal, basal or central placentas; style usually 3-branched. Fruit a loculicidal capsule surrounded by the persistent dry corolla-tube. Seeds small.

A family of 4 genera and more than 200 species of moist open habitats; widely distributed in tropical and subtropical regions; only the genus *Xyris* occurs in Africa.

XYRIS L. (1753 & 1754)

Annual or perennial herbs forming small tussocks. Leaves mostly basal with flat or cylindrical to filiform blades. Inflorescence a head or an ovate or cylindrical spike with few to many flowers crowded on a long stalk. Seeds with longitudinal stripes.

About 200 species, widely distributed in regions with a warm climate, rare in temperate regions; in Africa there are about 25 species, 4 of which occur in the Flora area.

1. Robust perennial with woody base; peduncles 50–90 cm long; bracts and lateral sepals aristate.
 4. *X. rehmannii*
 - Annual or perennials with soft plant base; peduncles less than 50 cm long; bracts and lateral sepals obtuse or acute, not aristate. 2
2. Robust plants with 2–6 mm wide leaf-blades; largest involucre bracts 5–8 mm long. 2. *X. capensis*
 - Robust or slender plants with 1–2 mm wide leaf-blades; largest involucre bracts 3–5 mm long. 3
3. Slender annuals; culms very thin, 0.3–0.5 mm thick; inflorescence often ovoid, pale white or light reddish brown; keel of lateral sepals smooth. 1. *X. straminea*
 - Slender to robust annual or perennial; culms 0.8–1 mm thick; inflorescence often globose, dark reddish brown to almost black; keel of lateral sepals toothed. 3. *X. welwitschii*

1. *X. straminea* Nilsson (1891)

– type: N Nigeria, Barter 764 (S holo.).

Slender annual herb with 1–10 peduncles. Basal leaves 2–6; sheath light brown to pale on the margin, darker on the slightly scabrid midrib; blades 1–10 x 0.1–0.2 cm, flat and soft, linear and gradually narrowed towards the apex, often minutely scabrid on margin, and sometimes transversely wrinkled after shrinkage when drying. Peduncle 3–40 cm x 0.02–0.05 cm, flattened or angular, glabrous or minutely scabrid on the ridges. Inflorescence ovoid (or sometimes obtriangular with the bracts spreading), few-flowered, 4–6 mm long, light brown with or without a purplish tinge. Involucral bracts oval with acute or rounded tips, membranous, translucent, olive brown to red or purplish, with or without a pale margin; the two lowermost 2–4 mm long. Lateral sepals 4–5 mm long, pale, light brown or purplish, transparent, rounded or acute at the apex, the keel rounded, glabrous. Corolla yellow; lobes about 3 mm long. Fig. 208.1.1–7.

Marshy ground or in wet flushes on basalt pavements; 1300–1600 m. SU WG; scattered throughout tropical Africa. *Mogk* 34; *Benedetto* 550; *Gilbert & Thulin* 697.

2. *X. capensis* Thunb. (1794)

– type: S Africa, Cape, Thunberg 1267 (UPS holo.).

Robust annual or perennial with many basal leaves and 1–8 peduncles. Leaf-sheaths rather wide, membranous, light reddish brown to pale; blades 5–50 x 0.2–0.6 cm, flat, glabrous or slightly scabrid on margin. Peduncle

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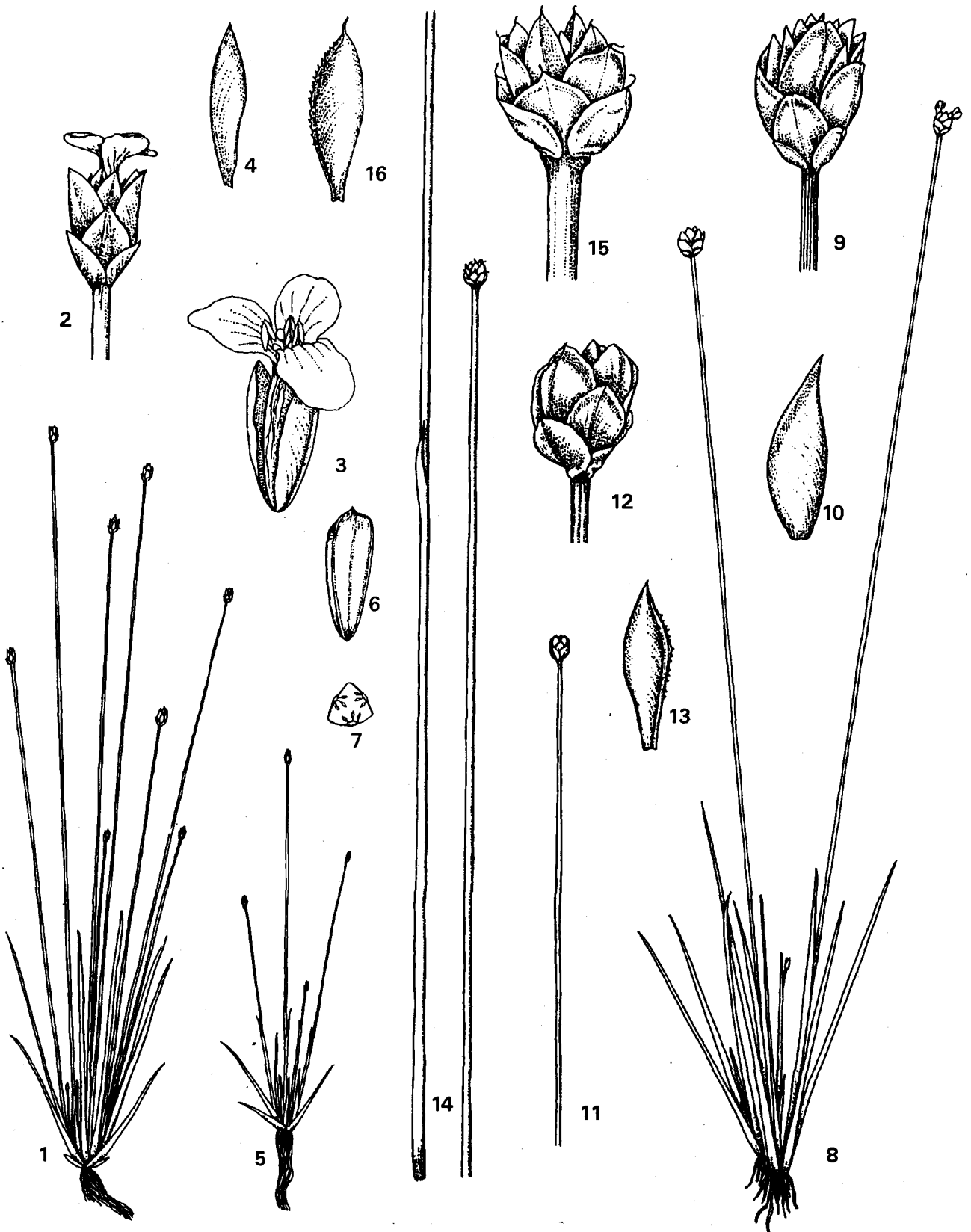


Figure 208.1 *XYRIS STRAMINEA*: 1 - complete plant in flower, normal size $\frac{1}{2}$; 2 - inflorescence with flower $\times 3$; 3 - flower $\times 5$; 4 - lateral sepal $\times 5$; 5 - very small plant in flower $\times \frac{1}{2}$; 6 - capsule $\times 5$; 7 - transverse section of capsule showing position of seeds. *X. CAPENSIS*: 8 - complete plant in flower $\times \frac{1}{2}$; 9 - inflorescence, no open flowers $\times 3$; 10 - lateral sepal $\times 5$. *X. WELWITSCHII*: 11 - upper half of flowering stem $\times \frac{1}{2}$; 12 - inflorescence without open flower $\times 3$; 13 - lateral sepal $\times 5$. *X. REHMANNII*: 14 - flowering stem $\times \frac{1}{2}$; 15 - inflorescence without open flower $\times 3$; 16 - lateral sepal $\times 5$. 1-4 from *Benedetto* 550; 5-7 from *Gilbert & Thulin* 697; 8-10 from *de Wilde* 9527; 11-13 from *Thulin* 1479; 14-16 from *Massa* 149. Drawn by Gerd Mari Lye.

20–100 x 0.1–0.3 cm, rounded to angular, glabrous. Inflorescence globose to hemispherical (ovate only when very young), many-flowered, 5–13 mm in diameter, dark reddish-brown to almost black. Involucral bracts 4–8 mm long, orbicular to broadly oval with rounded tip, thick and leathery, olive-brown to dark reddish-brown. Bracts of flowers mostly with acute tips. Lateral sepals membranous, hyaline, sometimes with a purplish tinge; keels glabrous. Corolla yellow; lobes 3–4 mm long. Capsule oblong-ovoid, 3–4 mm long, obtuse. Seeds ellipsoid, 0.5 mm long. Fig. 208.1.8–10.

Marshy ground or on slopes with oozing water; 1650–2700 m. TU SU AR KF SD BA; widespread in tropical Africa, Madagascar, Asia and Brazil. *Gilbert & Thulin* 902; *de Wilde* 9527; *Friis et al.* 1081.

3. *X. welwitschii* Rendle (1899)

–type: Angola, Huilla, *Welwitsch* 2465 (K iso.).

Slender perennial with somewhat swollen base, or annual. Basal leaves many, sheath leathery, light reddish-brown or yellowish-brown, somewhat glossy, glabrous or minutely ciliate on margin; blades 3–20 x 0.1–0.2 cm, flat or with margin incurved, glabrous or minutely scabrid on margin, and often minutely transversely wrinkled after shrinkage when drying. Peduncle 15–30 x 0.07–0.1 cm, rounded to angular, glabrous. Inflorescence globose (ovoid when young), many-flowered, 5–10 mm in diameter, dark reddish-brown to almost black. Involucral bracts broadly oval to orbicular with rounded apex, strongly concave, thick and leathery, dark reddish-brown to black with a thin pale margin; the lowermost 3.5–4 mm long. Bract of flower similar, with rounded tip. Lateral sepals membranous, light

brown, transparent; keel thicker, dark reddish-brown, minutely serrate below and in its middle part, but glabrous above; apex acute. Corolla yellow; lobes about 3 mm long. Fig. 208.1.11–13.

Marshy ground and moist places in grassland; 2700 m. AR SD; scattered throughout tropical Africa from Guinea to Angola and from Ethiopia to Zambia. *Thulin* 1479; *de Wilde* 6722.

4. *X. rehmannii* Nilsson (1892)

–type: S Africa (Transvaal), Houtbosch, *Rehmann* 5764 (Z holo., K iso.).

Tall perennial forming large tussocks from a short woody rhizome. Leaves to 60 x 0.1–0.4 cm (but not known from Ethiopian plants). Flowering stems 50–90 x 0.1–0.3 cm, lower part rounded, often somewhat compressed below the inflorescence; basal parts enclosed in a 15–25 cm (or more) long leaf-sheath, which is glossy brown at its base and green above and ending in an up to 1 cm long triangular awn. Inflorescence subspherical 7–10 mm in diameter, black. Lower involucral bracts 4–6 mm long, broadly oval, stiff and leathery, shiny dark-brown ending in a very slender and easily broken about 1 mm long awn; fertile bracts similar but wider with a shorter awn and a minutely scabrid patch below its apex. Lateral sepals about 5 mm long, oval with narrow ciliate dark keel ending in a short narrow awn. Fig. 208.1.14–16.

Probably in swampy ground; 1700–1800 m. KF; scattered in tropical Africa from Nigeria to Ethiopia and south to S Africa (Transvaal) and Swaziland. *Massa* 149.

209. ERIOCAULACEAE

by K. A. Lye*

Körnigke in *Linnaea* 27: 561–692 (1856); Ruhland in *Engl. Bot. Jahrb.* 27: 65–85 (1899) and Engler, *Pflanzenreich* IV. 30 (1903); Jacque-Félix in *Bull. Soc. Bot. France* 94: 143–151 (1947); Cufodontis, *Enum.*: 1506–1507 (1971).

Perennial or annual herbs most often growing in seasonally wet places or in shallow water, rarely entirely submerged. Stem very short with many crowded grass-like leaves, but without distinct basal sheaths. Inflorescence a dense whitish, grey or lead-coloured head terminating a short or long leafless stalk from a rosette of leaves or from the axis of stem-leaves, the stalk often emerging from a prominent tubular basal sheath, the head subtended by an involucre of brown to grey bracts; receptacle hairy or glabrous; florets opening from the edge to the middle. Flowers very small, unisexual, regular or irregular, parts usually in 3s, more rarely in 2s, ovary superior, often on a stalk, sometimes subtended by a scarious glabrous or hairy bract; both sexes often intermingled in the same head, or the female flowers marginal; rarely the plants dioecious with unisexual inflorescences. Perianth scarious or membranous, segments usually in 2 distinct series; outer segments (sepals) 3 or 2, most often united in male flowers, free in female; inner segments (petals) 3 or 2, often united or absent in male flowers, free or rarely united in female flowers. Stamens equal in number to, or twice as many as the inner perianth segments, rarely reduced to 1; filaments joined to the corolla-tube or from a united base; anthers small, opening inwards by longitudinal slits. Carpels 2–3, united to form a 2–3-locular superior, often stalked ovary; style with 2–3 branches; ovules solitary in each locule. Fruit a membranous loculicidal capsule with 2–3 seeds. Seeds relatively large; testa often papillose or minutely hairy.

A family of about 13 genera and 1200 species, widely distributed in tropical and subtropical countries, more rare in temperate regions; most abundant in tropical America. Represented in the Flora area by 1 genus and 6 species.

ERIOCAULON L. (1753 & 1754)

Annual or perennial mostly slender glabrous herbs. Stem usually very short with crowded radical leaves, or rarely elongate. Inflorescence a solitary globose to hemispherical (rarely bell-shaped) head on a long (rarely short) leafless stalk; involucre bracts obovate to linear, rarely radiating beyond the head of flowers; receptacle glabrous or hairy. Sepals 2–3, rarely absent; in male flowers free or variously united; in female flowers free, equal or unequal, concave, flattened or filiform, often pilose or ciliate near apex, the keel rounded or winged, sometimes the 2 lateral sepals are boat-shaped and the third much narrower and flattened or filiform. Petals 2–3, rarely absent, glabrous or hairy, often with a gland on the inner surface near the apex; male flowers with petals united into a tube, which is often asymmetric and ending in 3 lobes; female flowers with free petals. Stamens 6, in two alternating series, rarely 4 or 3. Ovary 2–3 locular; style 2–3 branched. Capsule with 2–3 globose locules. Seeds ovoid, covered with a reticulate, hygroscopic epidermis.

About 400 species, widely distributed, but particularly abundant in South America; 6 species in the Flora area.

1. Plant perennial; leaves broad, 10–25 mm wide near its base; inflorescence white; involucre bracts often with white hairs at their tips. 2

- Plant annual; leaves narrow-broad, 1–9 mm wide; inflorescence white or grey; lower involucre bracts mostly glabrous. 3
- 2. Plant dioecious. 1. *E. rosenii*
– Plant monoecious. 2. *E. schimperi*
- 3. Leaves thick and fleshy; outer bracts about 3 x 2.5–3 mm, leathery; lateral petals of female flowers 1.6–1.8 mm long. 6. *E. crassiusculum*
– Leaves thin; outer bracts about 2 x 1–1.5 mm, membranous; lateral petals of female flowers 0.8–1.5 mm long. 4
- 4. Inflorescence 2–3 mm in diameter; receptacle almost glabrous; involucre bracts 2–2.5 mm long; sepals not winged. 3. *E. abyssinicum*
– Mature inflorescence 3.5–6 mm in diameter; receptacle hairy; involucre bracts 1–2 mm long; sepals of female flowers usually winged. 5
- 5. Mature flowering stalks 10–25 x 0.3–0.4 mm; seeds almost smooth. 4. *E. aethiopicum*
– Mature flowering stalks 30–350 x 0.5–2 mm; seeds reticulate. 5. *E. transvaalicum*

1. *E. rosenii* (Pax) Lye (1995);
Mesanthemum rosenii Pax (1909) – type: SU. Aki, *Rosen* s.n. (WRS� holo.).

Tussocky dioecious perennial with hardly any stem. Leaves about 10 in a rosette, 50–120 x 10–20 mm, glabrous, rather thick and leathery with obtuse to rounded tips. Flowering stalks 50–150 x 1–2 mm with prominent longitudinal ridges. Male and female inflorescences hemispherical pure white heads 10–14 mm in

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diameter. Outermost involucre bracts about 4 mm long, ovate-ligulate; in male inflorescence pale grey, somewhat white-hairy; in female inflorescence straw-coloured with small black tips, almost glabrous, inner bracts all densely white hairy. Bracts of both male and female flowers pale or straw-coloured, white-hairy at their tips and margins. Male flower with 3 sepals c 3.5 mm long, tips white-hairy, united at base for less than 1 mm; petals pale with 3 white-hairy lobes; anthers 6, black. Female flowers with 2 lateral sepals, pale grey, free, keeled and boat-shaped, apex white-hairy; petals 3, linear-lanceolate, free, pale with a black subapical dot and white hairy margins (almost to their base); ovary with 3-branched style. Fig. 209.1.5 & 6.

Bog; 2800 m. SU; endemic. Only known from the type.

This species is known only from a rather immature collection. It appears closely related to *E. schimperi*, but is dioecious and has paler and less acute involucre bracts and bracts to the flowers, petals of female flowers white-hairy almost to their base and male flowers with a sepal-tube which is united for less than 1 mm (about 1.5 mm in *E. schimperi*).

2. *E. schimperi* Km. ex Ruhland (1899)

– type: GD, Begemder, swamp at Dschan-Meda, Schimper 1217 (K iso.).

Dwarf to robust tussocky perennial with hardly any stem. Leaves many in a basal rosette, 10–20 x 10 mm in dwarf-specimens, up to 350 x 10–25 mm in taller specimens. Flower stalk usually 50–300 mm long, in lush specimens to 90 cm long, but in dwarf-specimens sometimes shorter or almost lacking, often with prominent longitudinal ridges. Inflorescence a globose to hemispherical white head 7–20 mm in diameter; receptacle glabrous. Involucre bracts 2.5–4 mm long, green, straw-coloured or more commonly black, glabrous or with thick white hairs in their upper parts; apex rounded or acute. Bracts of flowers light brown to black, white hairy at their tips. Sepals of both flowers grey to black, prominently white-hairy at their tips. Male flower with 3 sepals united into a wide 3-lobed tube, 3 petals united into a narrow 3-lobed tube and 6 stamens with black anthers. Female flowers with 3 free, boat-shaped and keeled sepals, 3 linear-lanceolate free petals, and a 3-lobed ovary with 3-branched style. Seed reticulate. Fig. 209.1–4.

Bogs and marshy ground, often near streams or in places with seepage; 2300–4100 m. GD GJ SU AR GG SD BA; also in Kenya, Uganda, Tanzania, Rwanda, Burundi, western Zaire, Zambia and Malawi. Mooney 7223, 7245; Hedberg 4212.

3. *E. abyssinicum* Hochst. (1845)

– type: TU, Shire, Schimper 1944 (B holo., K iso.).

Delicate dwarf annual. Leaves 10–50 x 0.5–2 mm wide, thin, sometimes very few. Flowering stalks usually many per plant, 10–100 x 0.2–0.5 mm; receptacle almost

glabrous. Involucre bracts ovate-lanceolate with acute or acuminate apex, the largest 2–2.5 mm long, pale coloured, glabrous. Bracts of flowers about 2 mm long, lanceolate, pale or grey at the acute apex, glabrous, rarely with a few hairs. Sepals of female flowers glabrous or with a few spine-like hairs on the keel, which is sometimes irregularly dentate. Male flowers pale, glabrous with 3 sepals united into a wide 3-lobed tube, 3 petals united into a narrow 3-lobed tube, and 6 dark stamens. Female flowers with 3 free, boat-shaped, acuminate sepals, pale or grey at their tips, 3 free linear petals ending in a dark gland or slightly split at the tip, and a 3-lobed ovary with 3-branched style. Seeds almost smooth. Fig. 209.1.8 & 9.

Wet soil in swampy grassland or in wet flushes over rocks, often on bare soil; 1300–2400 m. TU SU AR WG; scattered in tropical Africa from Ethiopia west to Nigeria and south to South Africa. Gilbert & Thulin 701, 819, 884.

4. *E. aethiopicum* S. M. Phillips (1996)

– type: AR, 3 km from Asella at Livestock Farm, Thulin 1445 (K holo., BR ETH FT UPS iso.).

Delicate dwarf annual. Leaves 6–12 x 0.3–0.4 mm. Flowering stalks up to 12 per plant, 10–25 x 0.3–0.4 mm; receptacle hairy. Involucre bracts ovate and acute, about 2 mm long; light grey, glabrous. Bract of flowers 1.4–1.6 mm long, ovate to lanceolate with acute apex, greyish-black and somewhat hairy. Male flowers grey with three sepals united into a 3-lobed tube and 6 black anthers. Female flowers with 3 boat-shaped subequal acuminate sepals with a winged keel, 3 free unequal linear petals (the median linear-oblong and about twice as wide as the laterals) and a 3-lobed ovary with 3-branched style. Seeds brownish, almost smooth, but with a few minute T-shaped projections from the cell walls (these are absent in closely related *E. abyssinicum*).

Bare wet soil along small stream; c 2400 m. AR; endemic and only known from the type collection.

5. *E. transvaalicum* N.E.Br. (1897)

– type: S Africa (Transvaal), Rehmann 4787 (K holo.).

E. dembianense Chiov. (1911) – types: GD, Mt. Inceduba near Gonder, Chiovenda 1651 (FT syn., K isosyn.) and Scinta valley above Asoso, Chiovenda 1912 (FT lecto., K isolecto.).

Slender to robust annual. Leaves 10–80 x 1–9 mm, thin or thick. Flowering stalks usually many per plant, 10–350 x 0.4–2 mm. Inflorescence a pale to dark grey globose or hemispherical head 2–6 mm in diameter; receptacle densely hairy. Involucre bracts obovate with rounded or frayed apex, 1–2 x 1–1.5 mm, light brown to lead-coloured, at least the lower most glabrous. Bract of flowers 1–2 mm long, obovate to oblanceolate, somewhat stipitate, glabrous or with few-many white hairs at the apex. Male flowers pale to dark-grey with 3 sepals united into a wide 3-lobed tube, 3 petals united into a

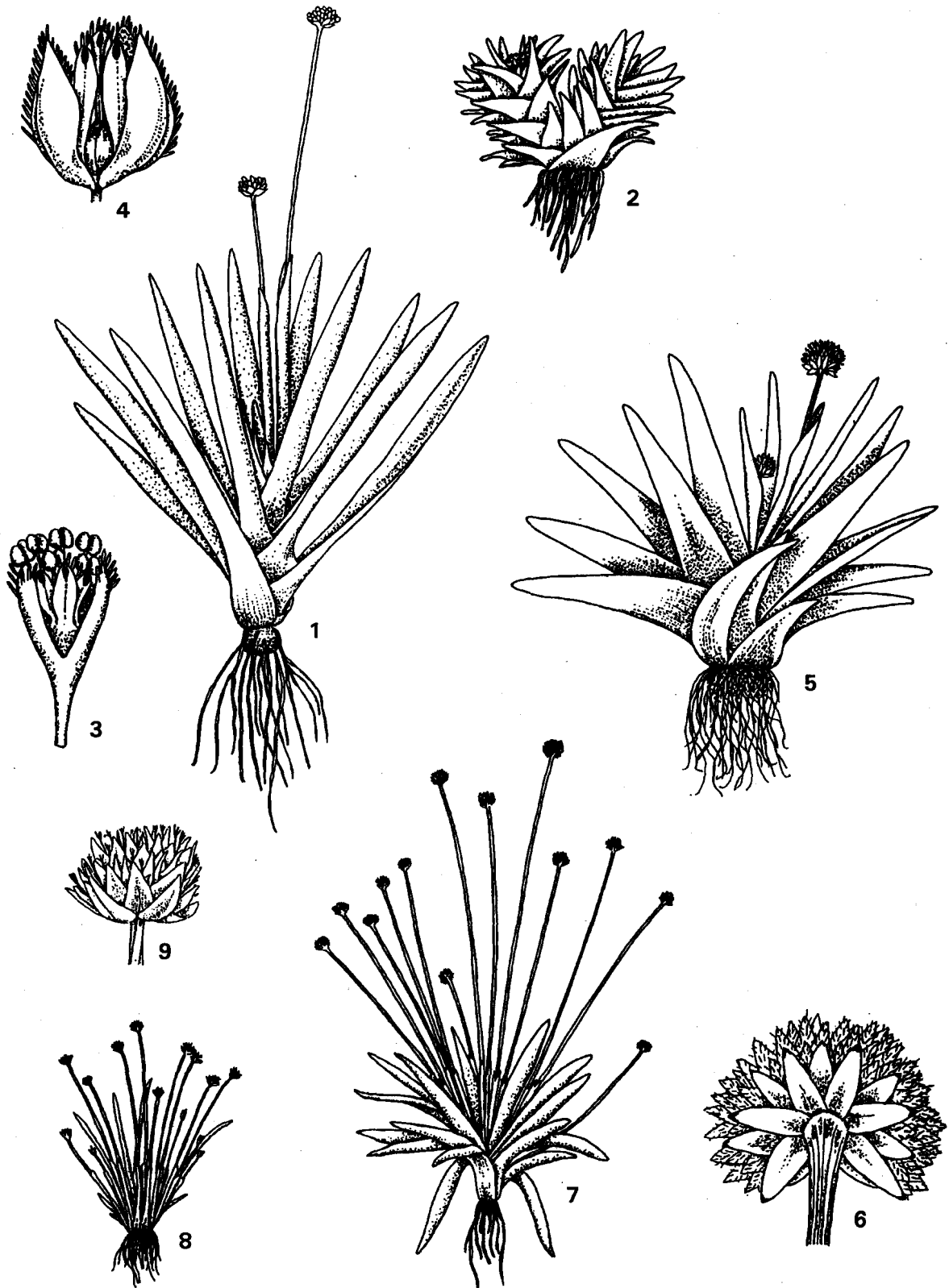


Figure 209.1 *ERIOCAULON SCHIMPERI*: 1 – complete plant with flowering stems x 1/2; 2 – small form from afro-alpine area x 1/2; 3 – individual male flower x 8; 4 – individual female flower x 8. *E. ROSENI*: 5 – complete plant in flower x 1/2; 6 – flower head x 3. *E. TRANSVAALICUM*: 7 – complete flowering plant x 1/2. *E. ABYSSINICUM*: 8 – complete flowering plant x 1/2; 9 – flower head x 5. 1 from Mooney 7223; 2–4 from Mooney 7245; 5 & 6 from Rosen s.n.; 7 from Friis et al. 2076; 8 & 9 from Gilbert & Thulin 819. Drawn by Gerd Mari Lye.

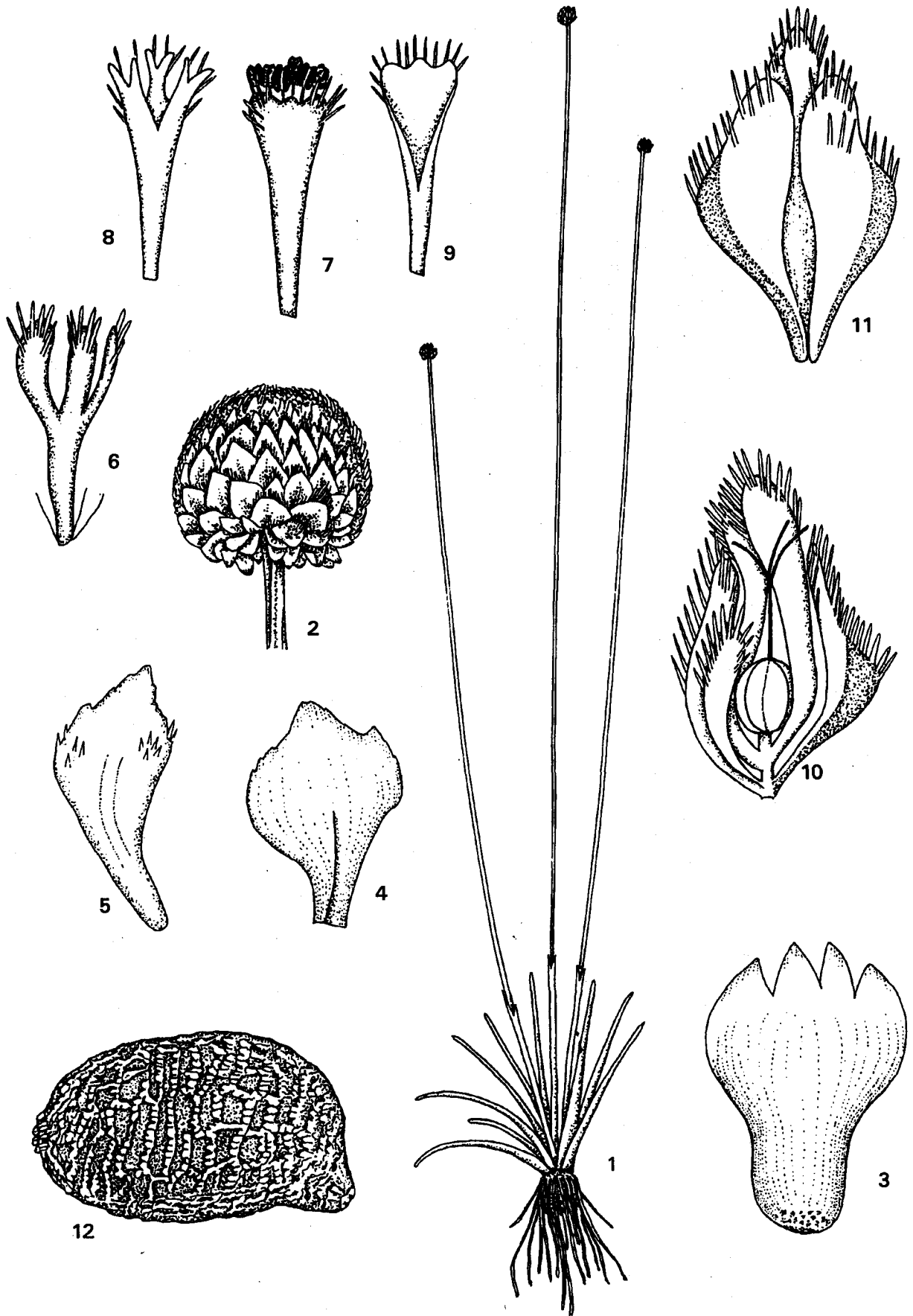


Figure 209.2 *ERIOCAULON CRASSIUSCULUM*: 1 – complete plant in flower $\times 1/2$; 2 – inflorescence $\times 10$; 3 – involucre bract $\times 20$; 4 – bract of male flower seen from inside $\times 20$; 5 – bract of male flower seen from outside $\times 20$; 6 – part of male flower showing 3 sepals forming a tube below; 7–9 perianth of 3 male flowers $\times 20$; 10 & 11 – female flowers seen from inside and outside $\times 20$; 12 – seed $\times 40$. Drawn from the holotype, Friis et al. 2067, by Gerd Mari Lye.

narrow 3-lobed tube, and 6 dark stamens, lobes of sepals and petals glabrous or with slender pale hairs or stiff white hairs at the tips. Female flowers with 3 free boat-shaped sepals with or without winged keels (1 sepal often smaller and not boat-shaped), 3 free oblanceolate petals, and a 3-lobed ovary with 3-branched style; sepals and petals glabrous or with slender pale hairs or stiff white hairs at the tips. Seeds minutely reticulate with rows of minute club-shaped hairs.

1. Plant 30–300 mm tall with thin leaves to 9 mm wide; inflorescence to 6 mm in diameter, dark grey without prominent stiff white hairs; sepals and petals glabrous or with scattered slender pale hairs, very rarely with a few white hairs; lateral sepals of female flower 1.2–1.5 mm long, somewhat winged on the keel.

var. *transvaalicum*

- Plants (in the Flora area) 20–200 mm tall with thin leaves to 5 mm wide; inflorescence 3–4 mm in diameter, grey-white with stiff white hairs; sepals and petals with stiff white hairs at their tips; lateral sepals of female flower 0.8–1.2 mm long, not winged.

var. *hanningtonii*

var. *transvaalicum*

Fig. 209.1.7.

Marshy land in swamps or lake-margins, or in places with oozing water; 1600–2100 m. GD SU KF; eastern Africa from Ethiopia to South Africa. *De Wilde* 6146; *Gilbert & Thulin* 874; *Friis et al.* 2076.

var. *hanningtonii* (*N.E.Br.*) *Meikle* in *Kew Bull.* 22: 142 (1968);

Eriocaulon hanningtonii *N.E.Br.* (1901) – type: Tanzania, Kwa Chiroa, *Hannington* s.n. (K holo.).

Marshy grassland and wet flushes on basalt pavement; 1300 m. WG; scattered in tropical Africa from Mali to eastern Africa. *Gilbert & Thulin* 649, 704.

6. *E. crassiusculum* *Lye* (1996)

– type: KF, Kochi, *Friis et al.* 2067 (K holo., C iso.).

Robust tussocky annual, many basal leaves and few many inflorescences. Leaves 20–80 x 2–6 mm, glabrous, soft and thick; apex obtuse or somewhat hooded. Inflorescence stalk 90–350 x 0.5–1.3 mm, rounded with many obscure longitudinal ridges. Inflorescence a globose to hemispherical greyish-white head 4–8 mm in diameter; receptacle hairy. Largest involucral bracts 2–3 x 2.5–3 mm, leathery, broadly obovate but often frayed or splitting, (emarginate) to about 1/2 way down, light brown to greyish, glabrous. Bracts of flowers 2–2.5 mm long, strongly concave, obovate-oblanceolate with pale cuneate basal part, glabrous or with prominent white hairs at their tips. Male flowers with 3 sepals united to form a basal tube and 3-lobes, and 3 petals similarly united at their base; both sepals and petals with many white hairs at the tip, of the lobes; stamens 6, with blackish anthers. Female flowers with 3, free, pale sepals, densely set with white hairs on their midrib and margin, two lateral boat-shaped, 1.7–2.2 mm long with prominent wings on the keel; petals 2–3, free, pale, 2–2.4 mm long, linear-lanceolate, densely set with white hairs at their tips. Seeds 0.4–0.5 x 0.3 mm, light reddish-brown, reticulate with minute flat lobes from the cell walls and minute irregular papillae. Fig. 209.2.

Open marshy land or slopes with oozing water, but usually on drier ground than *E. transvaalicum*; 1690–1800 m. KF; also in Uganda. *De Wilde* 9260; *Friis et al.* 41; *Mesfin T. & Kagnev* 2525.

210. TYPHACEAE

by K. A. Lye*

Graebner in Engler, *Pflanzenreich* IV. 8 (1900); Brown, *Fl. Trop. Afr.* 8: 133–137 (1901); Gèze in *Etudes bot. agron. sur les Typha* (1912); Anderson, *Fl. South. Afr.* 1: 53–56 (1966); Hepper, *Fl. W. Trop. Afr.* 2nd ed., 3: 129–131 (1968); Cufodontis, *Enum.*: 1195–1197 (1968); Napper, *Typhaceae in Fl. Trop. E. Afr.*: 6 pp. (1971); Thulin, 163. *Typhaceae in Fl. Somalia* 4: 94–95 (1995).

Perennial glabrous monoecious herbs with creeping starchy rhizomes growing in wetlands. Stems erect, unbranched, terminated by dense cylindrical flower-spikes. Leaves alternate, distichous, mostly basal or sub-basal, with a prominent open sheathing base and a broadly linear, parallel-veined, flattened blade. Inflorescence spike-like, very dense-flowered with the upper flowers male and the lower female, sometimes with a gap between the upper male 'spike' and the lower female 'spike'; bract subtending spikes usually falling off early. Male flowers usually subtended by bracteoles or scales; perianth absent or reduced to 3–6 bristles or slender scales; stamens usually 2–5 (rarely 1, 6 or 7) with free or united filaments and linear basifixed anthers. Plants wind-pollinated. Female flowers partly sterile (then called carpodia), with or without a subtending usually club-shaped bracteole; perianth of more or less numerous narrow scales or slender bristles (sometimes thickened at their apices); carpel 1, forming a superior, 1-locular ovary, raised on a gynophore which elongates in fruit to form a slender stalk; ovule solitary. Fruit a minute 1-seeded follicle (eventually dehiscent longitudinally) attached to the persistent stalk with its long hairs and distributed by wind. Seed fusiform with striate testa.

A monogeneric family with less than 10 species (although sometimes regarded as consisting of about 25 species) widely distributed in temperate and warm regions in marshes, shallow water or sandy river-beds: 3 of the 4 species found in Africa occur in the Flora area.

As with many plants from wetlands, *Typha* is more widespread than present herbarium collections suggest.

TYPHAL. (1753)

Robust perennial herbs usually 1–3 m tall, rarely smaller. Lower leaves with short blades; the upper with long linear obtuse or acute blades which are semi-cylindrical to lens-shaped in section, occasionally keeled on lower surface. Female inflorescence usually a single spike below the male spike, rarely with 1–2 additional female spikes remote from each other beneath the first. Flowers with bracteoles and perianth-segments (hairs) of similar length, the styles conspicuously longer. Fruit narrowly ellipsoid.

Distribution as for the family.

Typha has many uses: the starchy rhizomes and abundant pollen can provide food in times of famine, the female flowers are used to fill mattresses and cushions, the leaves are used as thatch as well as being woven into mats and seats for chairs, and the mature inflorescence is a popular ornament in dried-flower arrangements.

1. Male and female part of spike continuous or separated for at most 0.5 cm (only seen when male flowers are shed); male part of spike often shorter than the female. 1. *T. latifolia*
- Male and female part of spike separated for at least 1 cm; male part of spike often longer than the female. 2

2. Leaf-blades with a prominent midrib on lower surface giving an angular cross-section to the blade. 2. *T. elephantina*
- Leaf-blades without a prominent midrib, flat or semilunar in section. 3. *T. domingensis*

1. *T. latifolia* L. (1753)

– type: from 'Sweden.'

Plant robust with a short woody rhizome and few-many scale-covered stolons producing new plants at their tips. Stems 150–350 x 0.3–1.2 cm, rounded, solid. Leaves erect or spreading; sheaths greenish with pallid or light reddish brown membranous margins and sloping, rounded or auriculate shoulders; blade up to 200 x 0.7–1.5 cm, linear, glaucous, flat in upper portions, semilunar near the sheath; the tip obtuse. Inflorescence of 1 (rarely 2) female spike(s) below and 1 male spike above, the spikes continuous or separated for at most 5 mm. Male spike 5–12 x 1.3–2.5 cm; bracteoles linear, light reddish brown, thinner than the filaments; stamens 1–6 (usually 2–3) with their white filaments variously united; anthers 3–4 mm long, linear, the connective ending in a dark globose tip. Female spike usually 10–20 x 2.5–3 cm, dark brown to black when mature; bracteoles absent; carpodia light red-brown; stigma broadly lanceolate, much longer than the hypogynous hairs. Fig. 210.1.9.

Lake-margins, swamps and ditches; 1600–2100 m. GJ SU KF SD HA; Kenya, Uganda, Nigeria and North Africa; common in temperate regions of both the Old

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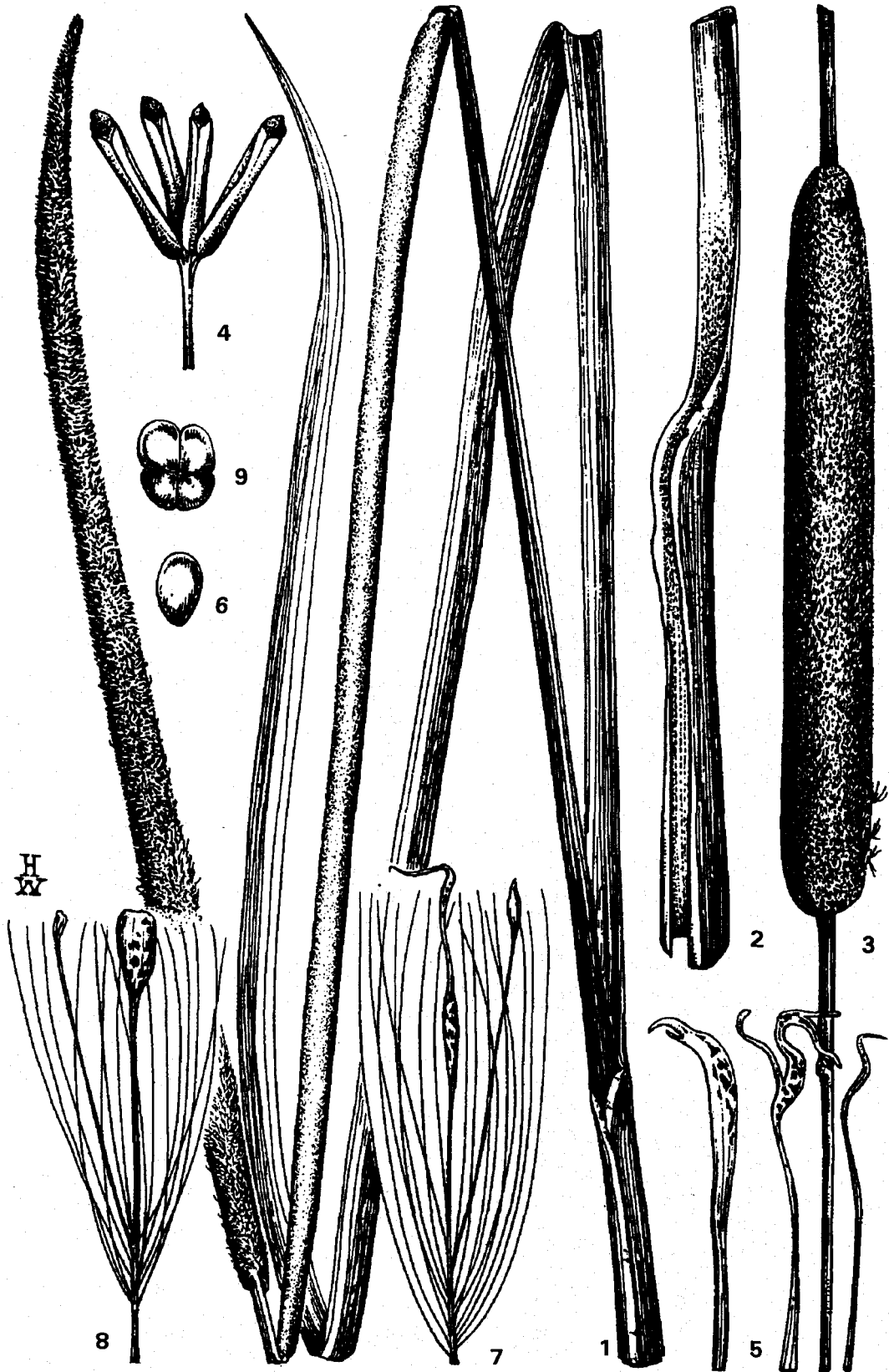


Figure 210.1 *TYPHA DOMINGENSIS*: 1 – part of shoot showing upper mature male and lower immature female spikes $\times \frac{1}{2}$; 2 – leaf-sheath $\times \frac{1}{2}$; 3 – mature female spike $\times 9$; 4 – male floret $\times 9$; 5 – male bracteoles $\times 15$; 6 – pollen $\times 120$; 7 – female floret with ovary and bracteole $\times 9$; 8 – sterile female floret with carpodium and bracteole $\times 9$. *T. LATIFOLIA*: 9 – pollen $\times 120$. 1, 2, 4–8 from Greenway & Kanuri 12567; 3 from Tanner 1135; 9 from Kerfoot 2984. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Typhaceae*: fig. 1.)

and the New World. *Fris* et al. 2080; *Mooney* 5406 & 6719.

2. *T. elephantina* Roxb. (1832)

– type: from 'India.'

A very robust plant with 3–4 m tall rounded stems. Leaf-blades 1–2 cm wide, flat on upper side, with a prominent midrib and slightly keeled on lower side; the prominent midrib disappearing well below the obtuse tip. Inflorescence with the male and female spikes separated for at least 2–5 cm. Male spike mostly 20–30 x 1–2 cm, sometimes longer than the female spike; bracteoles light to medium red brown, linear, but widened and often slightly curved at the tip; anthers 2.5–3.5 mm long, linear; the connective ending in a dark triangular tip. Female spikes 15–45 x 2.5 cm, medium to dark red brown; bracteoles with a pale stalk and a widened elliptic light red brown tip; stigma narrow lanceolate, somewhat longer than the hypogynous hairs.

Red loamy soil near river; 1300 m. HA (Erer River); North Africa and India. *Westphal and Westphal-Stevels* 2372.

3. *T. domingensis* Pers. (1807)

– type: from 'Dominican Republic.'

T. angustata Bory & Chaubard var. *aethiopica* Rohrb. in *Verh. Bot. Ver. Brandenb.* 11: 89 (1870); *T. angustifolia* L. subsp. *angustata* (Bory & Chaubard) Briquet var. *aethiopica* (Rohrb.) Cufod. in *Enum.*: 1196 (1968) – types: GD/TU, Takazze River, *Schimper* 1190 (P lecto.); Ethiopia, sine loc., *Quartin Dillon & Petit* s.n. (P syn.).

T. angustata Bory & Chaubert var. *leptocarpa* Rohrb. in *Verh. Bot. Ver. Brandenb.* 11: 89 (1870); *T. angustifolia* L. subsp. *angustata* (Bory & Chaubard) Briquet var. *leptocarpa* (Rohrb.) Cufod. in *Enum.*:

1196 (1968) – type: TU, near Djeladscherane, *Schimper* 1563 (G K L P iso.).

T. angustifolia L. subsp. *australis* (Schum.) Kronefeld in *Verh. Zool.-Bot. Gesell. Wien* 39: 156 (1889).

T. schimperi Rohrb. (1870); *T. elephantina* Roxb. var. *schimperi* (Rohrb.) Graebner in Engler (ed), *Das Pflanzenreich* IV, 8: 11 (1900) – type: GD, Dscha-Dscha (Jaja) in Agau, *Schimper* 1479 (B holo., lost).

Medium-sized to robust plant with woody base, sometimes forming woody scale-covered stolons to 30 cm long. Stems 1–4 m tall, rounded. Leaves similar to those of *T. latifolia*, but smaller forms sometimes have semi-lunar blades only 3–6 mm wide; these are as thick as they are wide in lower parts. Inflorescence with the upper male spike separated from the lower female by 1–8 cm. Male spike 10–30 x 0.9–1.5 cm, often as long as or longer than the female spike; bracteoles light red brown, usually flattened and forked or lacinate at their tips; stamens with their white filaments united, anthers 2.5–3.5 mm long, linear, the connective ending in a dark globose tip. Female spike usually 15–30 x 1–2.5 cm, dark brown to black when mature; bracteoles filiform with flattened tips which end in a short mucro; carpodia light red brown; stigma linear, only slightly broader than the style. Fig. 210.1.1–8.

Lake-margins, stream-beds and other wet habitats; 500–2200 m. EE EW TU GD WU SU GG HA; widespread in tropical and subtropical regions throughout the world; in temperate regions replaced by the closely related *T. angustifolia* L., which does not have mucronate female bracteoles. *Ash* 2374; *Burger & Amare Getahun* 238; *de Wilde* 5024.

211. JUNCACEAE

by K. A. Lye*

Weimarck in *Svensk Bot. Tidskr.* 40: 141–178 (1946); *Fl. Trop. E. Afr.* (1966); Cufodontis, *Enum.*: 1522–1525 (1971); Lisowski, Malaisse & Symoens, *Fl. d'Afrique Centrale*: 13 pp. (1973); Haines & Lye in *Sedges and Rushes of East Africa*: 31–37 (1983); Lye, 164. *Juncaceae* in *Fl. Somalia* 4: 95–98 (1995).

Annual or perennial usually monoecious herbs, rarely somewhat woody. Stems usually erect, cylindrical, more rarely compressed. Leaves mostly basal, grass-like or cylindrical, rarely without blades, glabrous or hairy. Sheaths open or closed, sometimes with long hairs at the mouth. Inflorescence a terminal panicle or anthela¹, but sometimes appearing lateral when the main inflorescence bract is cylindrical and continues in the direction of the stem; flowers solitary or in small heads. Major inflorescence-bracts leafy, filiform or cylindrical. Bracts of flower and bracteoles often present. Flowers regular, small, usually bisexual, ovary superior. Perianth-segments 6 in two whorls, glumaceous², green, light to dark red brown or more rarely black, white or pale yellow. Stamens 3 or 6, opposite and shorter than the perianth-segments; filaments linear or triangular; anthers basifixed, bilocular, introrse, opening by a slit lengthwise. Carpels 3, united to form a 1- or 3-locular ovary with 3-many ovules; style with 3 branches. Fruit a dry capsule splitting lengthwise, loculicidal. Seeds 3 or many; base sometimes with an outgrowth (elaisome).

A family of 8 genera and about 310 species, widely distributed, but with most species in the temperate zones; 2 genera and 10 species in the Flora area.

Key to genera

1. Leaves and bracts glabrous (but blades sometimes absent); capsule with many seeds. 1. *Juncus*
 – Leaves and bracts with scattered long hairs; capsule with 3 seeds. 2. *Luzula*

1. *JUNCUS* L. (1753 & 1754)

Annual or perennial glabrous herbs, tufted or with longer rhizomes. Stems usually rounded. Leaves grass-like, channelled, cylindrical or flat, but sometimes reduced to the sheaths only; in some species there are transverse septa which are seen when the leaves are pressed flat and dried; sheaths usually open, sometimes with auricles. Inflorescence an open or congested terminal or apparently lateral anthela. Flowers bisexual with 6 free, acute or obtuse, perianth-segments, 3 or 6 stamens and a sessile ovary; bracteoles sometimes present. Capsule 1- or 3-locular, or incompletely 3-septate, usually 1.5–4 mm long. Seeds many, usually 0.2–0.5 mm long, smooth or reticulate.

About 220 species widely distributed in temperate regions, but also reaching the arctic; in the tropics mostly at high altitudes, 8 species in the Flora area.

1. Plant annual with minute root-system. 2
 – Plant perennial with rhizomes or stolons (sometimes floating stems rooting at the nodes). 5
 2. Inflorescence open; flowers solitary or 2–3 together; plants 5–30 cm tall; seeds smooth or striate. 3
 – Inflorescence congested; flowers crowded; plants 1–15 cm tall; seeds pitted. 4. *J. capitatus*
 3. Capsule ovoid to ellipsoid. 1. *J. bufonius*
 – Capsule globose to subglobose. 4

4. Inflorescence occupying less than ½ stem height; auricles on leaves well developed. 3. *J. tenageia*
 – Inflorescence occupying more than ½ stem height; auricles absent from lower leaves. 2. *J. sphaerocarpus*
 5. Inflorescence a lateral corymb of numerous solitary or paired flowers; blades reduced to small lobes. 5. *J. effusus*
 – Inflorescence terminal with crowded flowers often arranged in small heads; blades well-developed. 6
 6. With numerous flat basal leaf-blades not septate; inflorescence dark brown. 8. *J. dregeanus*
 – Leaf-blades cylindrical, septate, 1 or several widely spaced along the stem; inflorescence light to dark brown or greenish. 7
 7. Leaf-blade 1 only, from the middle or upper part of the stem. 7. *J. punctorius*
 – Leaf-blades 3–6, widely spaced along the stem. 6. *J. oxycarpus*

1. *J. bufonius* L. (1753).

Slender tufted annual. Stems 5–30 cm long, simple or branched from the base, often with a few small basal leaf-blades and one blade on the stem. Leaf-blades 1–25 x 0.1–0.2 cm, slightly channelled; sheaths open. Inflorescence a much-branched panicle with 1-sided cymes, and laxly arranged flowers with short pedicels; involucral bracts leafy. Each flower subtended by a 3–4 mm long membranous bract and 2 similar 1.5–2 mm long bracteoles. Perianth-segments 4.5–6 mm long (the outer slightly longer than the inner), lanceolate with long acute apex, pale green when flowering, becoming light brown when fruiting. Capsule shorter than the

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1. anthela: the term for the distinctive cymose inflorescence of the Juncaceae and Cyperaceae.

2. glumaceous: dry, usually somewhat stiff, without bright colours, like the glume of a grass inflorescence.

perianth, obovate with truncate and apiculate apex, shiny, red brown. Seeds about 0.4 mm long, ovate to elliptic. Fig. 211.1.4.

Wet soil in grassland and near streams and paths, 2300–3260 m. EW TU GD GJ SU AR KF BA SD; Kenya, Uganda, South and North Africa, Europe and other temperate regions. *Getachew A.* 1045; *Thulin* 1591; *Gilbert* 1918.

2. *J. sphaerocarpus* Nees (1818)

– type: from 'Europe.'

Slender annual with a small root system and many crowded leafy stems. Stems 5–20 x 0.03–0.08 cm, glabrous, rounded to obtusely angular, with 2–4 leaves. Leaves up to c 15 x 0.05–0.15 cm, flat, gradually tapering to an acute tip. Inflorescence lax, occupying at least 1/2 total height of plant. Flowers borne singly on short or long pedicels. Tepals narrowly oval with a green midrib (sometimes turning brown with age) and a prominent wide translucent margin; outer tepals c 2.5 mm long, acute, usually longer than the capsule. Stamens with linear, yellow anthers, c 0.4 mm long. Capsule 2–2.5 x 2 mm, spherical to triangular (when young), green to brown. Seeds about 0.3 mm long, smooth to inconspicuously striate.

Recorded from the Flora area by Snogerup in *Flora of Turkey* 9: 15 (1958), but no material seen by the author.

3. *J. tenageia* Ehrh. ex L. f. (1781)

– type: from Germany, *Ehrhart* s.n. (G holo.).

Slender tufted annuals or with 1–few stems only. Stems 5–15 x cm, usually with 4–5 leaf-blades up to 6 x 0.05–0.1 cm, much shorter than the stem, flat or channelled. Inflorescence lax, usually 3–5 cm wide and long with one sided cymes, occupying the upper half of the stem only. Flowers sessile or stalked; each flower subtended by a pale bract and 2 pale bracteoles, 1.5 mm long. Perianth segments 2–2.5 mm long, ovate to lanceolate with a green or yellowish-brown midrib and wide, pale, translucent margins; inner obtuse to acute, shorter than the outer which are mucronate. Capsule about as long as the perianth or slightly shorter, trigonous-globose with emarginate rather than apiculate apex, light red brown. Seed 0.3–0.4 mm long, ovate to elliptic, conspicuously striate. Fig. 211.1.5.

In wet ground along river; probably above 1200 m. EW; NW Africa, Europe, Turkey and Cyprus. *Baldrati* 3912.

The Ethiopian plant differs slightly from European specimens in having paler flowers with somewhat more acute perianth-segments and shorter anthers.

4. *J. capitatus* Weig. (1772)

– type: figure 5 in *Obs. Bot.* 28 t.2.

Slender tufted annual. Stems 1–15 x 0.02–0.08 cm. Leaves all basal; blades 1–8 x 0.03–0.08 cm, flat or channelled. Inflorescence usually a single terminal glo-

bose cluster of 2–12 flowers, rarely of a single flower or with an additional head on a 4–8 mm long peduncle; each cluster subtended by 1–3 leafy bracts. Outer perianth-segments 3.5–7 mm long, grey to pale brown with a green or brown midrib ending in a strongly acuminate somewhat recurved tip; inner segments shorter, 2.5–5 mm long, green with a usually dark brown central area; apex acuminate. Capsule 1.7–2.5 mm long, much shorter than the perianth, grey to light brown but dark brown to almost black at the tip. Seed about 0.3 mm long, ovoid, faintly reticulate. Fig. 211.1.6.

Wet soil near streams and along paths; 2400–2850 m. SU AR SD; Kenya, Cameroun, N Africa, Atlantic Islands and Europe. *Thulin* 1441; *Gilbert & Thulin* 1003.

5. *J. effusus* L. (1753)

– type: from Europe (LINN lecto.).

Robust perennial with horizontal much-branched rhizome forming dense tussocks with numerous clustered stems. Stems 60–120 x 0.15–0.5 cm, with prominent white soft pith in the middle. Leaf-blades usually absent or reduced to a 2–5 mm long, needle-like, deciduous limb; sheaths often red brown. Inflorescence apparently lateral (because of the erect stem-like bract), much-branched, diffuse or compact with numerous stalked or sessile flowers; major inflorescence bract 25–50 cm long, stem-like and continuing in the direction of the stem. Perianth-segments 1.7–3 mm long, lanceolate with long acuminate apex, light to dark brown with paler, often green, midrib, the outer longer than the inner. Capsule 2–2.5 mm long, obovate with truncate and shortly apiculate apex, shiny, light to dark red brown. Seeds 0.4–0.5 mm long, ovoid, reticulate. Fig. 211.1.2.

By streams and swampy ground; 2400–3120 m. AR BA; Kenya, Uganda, Tanzania, Rwanda, Burundi, eastern Zaire, S Africa, Madagascar and the Mascareigne Islands, N Africa, Atlantic Islands, widespread in northern temperate regions. *Mooney* 5238, 7274.

6. *J. oxycarpus* E. Meyer ex Kunth (1841)

– type: S Africa, *Bergius* s.n. & *Drège* s.n. (B syn., K isosyn.).

J. quartinianus A. Rich. (1851) – type: TU, Shire, *Quartin-Dillon & Petit* s.n. (P holo., K iso.).

J. oxycarpus Kunth subsp. *sparganioides* Weim. in *Svensk Bot. Tidsskr.* 40: 166 (1946).

Tufted perennial, but sometimes stems decumbent, rooting and branching at the nodes. Stems 10–60 cm long. Leaves 3–5 per stem; blades 5–25 x 0.1–0.3 cm, cylindrical, transversely septate; sheaths green or grey brown, wide. Inflorescence of one terminal sessile globose head of flowers usually subtended by 1–5 stalked heads of flowers, and sometimes with additional stalked heads from the base of some stalked primary heads, sometimes giving a total of 10–20 heads. Each head 8–15 mm in diameter, often consisting of 20 or more flowers. Perianth-segments equal, 3.5–4.5 mm long, acute, green to light brown when young, turning dark



Figure 211.1 *JUNCUS DREGEANUS* subsp. *BACHITII*: 1 - whole plant x 1/2. *J. EFFUSUS*: 2 - culm with inflorescence and involucre x 1/2. *J. PUNCTORIUS*: 3 - upper part of culm with solitary leaf-blade and inflorescence x 1/2. *J. BUFONIUS*: 4 - whole plant x 1/2. *J. TENAGEIA*: 5 - whole plant x 1/2. *J. CAPITATUS*: 6 - whole plant x 1/2. *J. OXYCARPUS*: 7 - whole plant x 1/2. 1 from Gillett 15041; 2 from Mooney 7274; 3 from Wickens 1723; 4 from Thulin 1591; 5 from Baldrati 3912; 6 from Gilbert & Thulin 1003; 7 from Mooney 5058. Drawn by Gerd Mari Lye.

red brown when mature. Capsule 2.5–3.5 mm long, oblong with apiculate apex, rather shiny, usually light brown below and dark red brown to almost black above. Seeds 0.35–0.45 mm long, ovoid, reticulate. Fig. 211.1.7.

Swampy ground, often beside streams, pools or lakes; 2000–3150 m. EW TU SU AR BA SD; Somalia, Kenya, Uganda, Tanzania, Rwanda, Burundi, Zaire and south tropical Africa to the Cape. *Thulin* 1390; *Mooney* 5058, 7270.

7. *J. punctorius* L. f. (1781)

– type: S Africa, Cape Peninsula, *Thunberg* & *Sonnerat* s.n. (LINN 449.15 holo.).

J. schimperi Hochst. ex A. Rich. (1851) – type: TU, near Adua, *W. Schimper* 56 (P holo., K iso.).

Robust perennial with horizontal rhizome with closely set or somewhat spaced stems. Stems 30–80 x 0.1–0.5 cm. Lower 2 leaves with wide green to light brown sheaths without blades, but sometimes ending in a short filiform limb; upper sheath ending in a 5–50 cm long cylindrical blade which is prominently transversely septate. Inflorescence terminal, consisting of few-numerous hemispherical or globose dense heads of flowers; major peduncles to 7 cm long. Smaller heads of flowers sometimes crowded into larger composite heads. Perianth-segments equal, 2–3 mm long, acute, light to dark red brown, often with pallid margins. Capsule about 2.5 mm long, ovoid with apiculate apex, shiny, light to dark red brown. Seeds about 0.3 mm long, ovoid, longitudinally striate. Fig. 211.1.3.

Wet soil along streams and in swamps; 2100–3180 m. EW TU GD SU AR BA; Sudan, Somalia, S Africa, N Africa and SW Asia. *Thulin* 1554; *Mesfin T. & Kagnew* 2550; *Mooney* 7278.

8. *J. dregeanus* Kunth (1841)

– type: S Africa, *Drège* 4387 (B holo. lost).

Tufted perennial with short rhizome. Stems erect, 10–45 x 0.04–0.15 cm. Leaves many, near the base; blades 3–25 x 0.1–0.5 cm, flat or slightly channelled; sheaths green, brown or pale. Inflorescence terminal, consisting of a dense head of flowers usually subtended by 1–4 stalked heads; major inflorescence-bract 1–6 cm long, usually erect and leafy. Heads 5–12 mm in diameter, each with 5–20 flowers; the peduncles up to 3 cm long, but often less than 1 cm. Flowers sessile on up to 1.5 mm long pedicels. Perianth-segments 2.5–3 mm long, acute to acuminate, light to dark blackish-brown, with or without a pale marginal border; the outer segments slightly longer than the inner. Stamens 3 or 6. Capsule subglobose to elliptic, 2–2.5 mm long, light to dark-brown, apiculate. Seeds 0.2–0.5 mm long, ovoid, smooth or obscurely longitudinally ribbed.

subsp. *bachitii* (*Steud.*) *Hedberg* in *Symb. Bot. Upsal.* 15(1): 61, 263 (1957);

Juncus bachitii *Steud.* (1855) – type: TU, Mt. Bachit, *W. Schimper* 114 (P holo., PRE iso.).

Perianth-segments almost entirely black brown except for the pallid marginal border. Stamens 6. Capsule 2.2–2.5 mm long. Seeds 0.4–0.5 mm long. Fig. 211.1.1.

Swampy ground, often near streams and in shallow water; 2500–3300 m. TU GD GJ SU AR KF SD BA HA; also in Sudan, Uganda, Kenya, Tanzania, Rwanda, Zaire, Zambia, Malawi and Zimbabwe. *Mooney* 4832; *Thulin* 1580; *de Wilde & de Wilde-Duyffes* 5996.

Subsp. *dregeanus* occurs in S Africa. It has paler perianth segments, stamen number varying between 3 and 6 and smaller seeds, less than 0.4 mm long.

2. LUZULA DC. (1805), *nom. conserv.*

Perennial or rarely annual herbs. Leaf-blades grass-like, flat, usually numerous in the basal part; margins with long hairs; sheaths always closed. Inflorescence an open or congested panicle; the flowers sometimes set in small heads or spikes. Major inflorescence-bracts leafy. Bract of flower present, hairy on the margin. Bracteoles placed immediately below and clasping the flower. Flowers bisexual. Perianth-segments free, ovate to lanceolate, entire, usually brown, rarely white or pale yellow. Stamens 3 or 6; filaments filiform; anthers oblong or linear. Ovary sessile with filiform style and stigmas. Capsule 1-locular, with 3 seeds only. Seeds globose to ovoid, often with a tail or outgrowth (elaisome).

About 80 species widely distributed in temperate regions, but also reaching the arctic; in the tropics only at high altitudes.

1. Inflorescence lax with solitary pedicellate flowers.

– Inflorescence dense, subspicate. 1. *L. johnstonii*
2. *L. abyssinica*

1. *L. johnstonii* *Buchenau* (1890)

– type: Tanzania, Mt. Kilimanjaro, *Johnston* 28 (K holo.).

Perennial with stolons 2–20 cm long and somewhat distant stems. Stems 15–60 x 0.05–0.2 cm, angular, glabrous. Leaves many near the base, fewer above; blades 5–25 x 0.3–0.9 cm, with scattered long white hairs; sheath glabrous, but with numerous long white hairs at its mouth. Inflorescence an open anthela of subsessile and stalked flowers; involucre bracts leafy, shorter than the mature inflorescence. Major inflorescence-branches 1–5 (rarely to 8) cm long, each carrying one sessile and 1–6 stalked flowers, sometimes with additional stalked flowers above. Perianth-segments 3–4 mm long, lanceolate with sharply pointed apex, dark red brown with paler margins. Anthers 0.7–0.8 mm long. Capsule subglobose, about 2 mm in diameter with a prominent beak, pale to dark red brown. Seeds ovoid, 1.2–1.5 mm long with a distinct tail. Fig. 211.2.

Wet soil in swamps and near streams and paths; 2700–3800 m. AR BA SD; also in Kenya, Uganda, Tanzania, and eastern Zaire. *Mooney* 7164; *Gillett* 14922; *de Wilde-Duyffes* 8085.



Figure 211.2 *LUZULA JOHNSTONII*. Drawn from Haines 4269. (Reproduced with permission from Hains & Lye, *loc. cit.*, fig 35.)

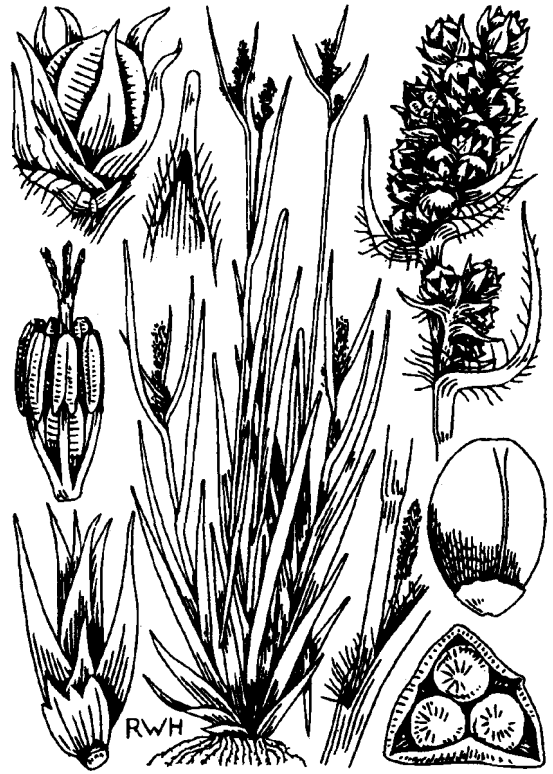


Figure 211.3 *LUZULA ABYSSINICA*. Drawn from Haines s.n. (Reproduced with permission from Hains & Lye, *loc. cit.*, fig 33.)

2. *L. abyssinica* Parl. (1852);

L. spicata (L.) DC. var. *erecta* E. Meyer in *Linnaea* 22: 415 (1849); *L. spicata* (L.) DC. var. *simensis* Hochst. ex Buchenau in *Engl. Bot. Jahrb. Syst.* 12: 128 (1890), nom. illeg.; *L. abyssinica* Parl. var. *simensis* (Hochst. ex Buchenau) Buchenau in *Das Pflanzenreich IV*, 36: 72 (1906), nom. illeg. – type: GD, near Demerki on Mt. Bachit, Semien, 3500 m, W. Schimper 1154 (FI holo., K iso.).

Tufted perennial, rarely with stolons. Stems 15–50 x 0.06–0.3 cm, angular, glabrous. Leaves many, particularly near the base; blade 5–20(–30) x 0.3–1.2 cm, with few-many long white hairs along the margin; sheath almost glabrous, but with numerous long white hairs in

its mouth. Inflorescence a long, dense or interrupted, compound spike-like panicle; subtending major inflorescence-bracts leafy. Bracteoles subtending the flower membranous, pale with strongly hairy margins. Perianth-segments 2–3 mm long, lanceolate and sharply pointed, red brown to almost black, with paler margins; the inner sometimes shorter than the outer. Anthers 1.5–2 mm long. Capsule subglobose, 1.5–2 mm in diameter, shortly apiculate, light to dark red brown. Seeds ovoid, 1–1.4 mm long, only obscurely tailed. Fig. 211.3.

Wet soil in swamp edges and along streams and wet paths; 2700–4100 m. GD GJ SU AR GG; also in Kenya, Uganda, Tanzania, Rwanda and eastern Zaire. Hedberg 4180; Gilbert 505; de Wilde & de Wilde-Duyffes 8074.

212. CYPERACEAE

by K.A. Lye*

Napper, *Cyperaceae* of East Africa – I, *J. E. Afr. Nat. Hist. Soc.* **24**(2): 1–18 (1963); II, *J. E. Afr. Nat. Hist. Soc.* **24**(5): 23–46 (1964); III, *J. E. Afr. Nat. Hist. Soc.* **25**(1): 1–27 (1965); IV, *J. E. Afr. Nat. Hist. Soc.* **26**: 1–17 (1966); V, *J. E. Afr. Nat. Hist. Soc.* **28**: 1–24 (1971); Cufodontis, *Enum.*: 1414–1495 (1970); Haines & Lye, *The Sedges and Rushes of East Africa*: 400 pp. (1983); Lye, *Cyperaceae* in *Fl. Somalia* **4**: 98–147.

Grass-like herbs, (only tree-like in the West African *Microdracoides*), often with short or long rhizomes or with stolons, sometimes with very short internodes forming a tuber or corm. Stems usually solid, triangular, flattened or rounded, more rarely 4- or multi-angular, sometimes septate. Leaves usually in 3 ranks (sometimes in 2 or several ranks), usually with a closed sheath and linear or hair-like blade. Inflorescence very variable, an open or dense anthela, or panicle of spikelets, often surrounded by conspicuous leafy bracts, but sometimes reduced to a solitary spikelet. Flowers usually small and green, brown or black, unisexual or bisexual, arranged in few- to several-flowered spikelets, each subtended by a glume. Perianth of 3–6 hairs, bristles or scales, or absent. Stamens 1–3, rarely 4–6. Ovary solitary, superior, of 2–3 joined carpels, 1-locular; style with 2 or 3 branches, rarely more or unbranched. Fruit a 1-seeded nutlet or achene, sessile or seated on a disc, free, in *Carex* and *Schoenoxiphium* surrounded by a utricle (sac-like structure).

About 90 genera and 4000 species, especially in the tropics and subtropics, but the largest genus *Carex* more common in temperate regions. So far 19 genera and 185 species recorded for the Flora area.

The Cyperaceae are often the dominant plants of wetland areas which can cover extensive areas. Unfortunately, fear of diseases and parasites like ticks have inhibited collection of these plants and they are not well represented in herbarium collections. Traditionally several species are used for temporary floor covering and in making household utensils. The Orthodox Church also uses sedges in ceremonies associated with Easter.

Key to genera

- | | |
|---|--|
| 1. Flowers unisexual, i.e. with either ovary or stamen(s), but not both. 2 | – Style 3-branched. 14. <i>Schoenus</i> |
| – Flowers bisexual, i.e. with both ovary and stamen(s). 5 | 10. Leaf-blades and leaf-sheaths hairy, but sometimes only on leaf-tip and near throat of the leaf-sheaths. 1. <i>Fuirena</i> |
| 2. Ligule a dense band of stiff white hairs. 17. <i>Coleochloa</i> | – Leaf-blades and leaf-sheaths glabrous or scabrid, or leaf-blades lacking. 2. <i>Schoenoplectus</i> |
| – Ligule absent or obscure. 3 | 11. Spikelets often flattened; at least some glumes in 2 ranks. 12 |
| 3. Female flowers enclosed by a utricle (sac-like structure). 4 | – Spikelets usually not flattened; glumes spirally arranged or in five rows. 14 |
| – Female flowers not enclosed by a utricle. 16. <i>Scleria</i> | 12. 2 lower glumes without flowers; only lower glumes in 2 ranks. 5. <i>Abildgaardia</i> |
| 4. Utricle containing nutlet with its style and style-branches only. 19. <i>Carex</i> | – All glumes usually with flowers and in 2 ranks. 13 |
| – Utricle containing a short limb or a protruding male spikelet in addition to its nutlet. 18. <i>Schoenoxiphium</i> | 13. Stems 1–3 cm long, entirely concealed by the basal leaves; inflorescence a dense head of numerous crowded spikelets; glumes 10–12 mm long; plants found only at high altitudes. 9. <i>Ficinia</i> |
| 5. Flowers with perianth hairs, bristles or scales. 6 | – Stems visible; inflorescence dense or open; glumes 0.5–9 mm long. 11. <i>Cyperus</i> |
| – Flowers without a perianth. 11 | 14. Inflorescence a solitary spike or spikelet. 15 |
| 6. Inflorescence a solitary spike or spikelet. 7 | – Inflorescence of 2 to many spikelets at least on some stems. 18 |
| – Inflorescence of 2 to many spikelets. 8 | 15. Leaf-blade reduced to a short triangular limb or absent. 3. <i>Eleocharis</i> |
| 7. Inflorescence with a stem-like bract continuing in the direction of the stem. 2. <i>Schoenoplectus</i> | – Leaf-blades conspicuous. 16 |
| – Inflorescence bracts scale-like. 3. <i>Eleocharis</i> | 16. Inflorescence apparently lateral, inflorescence bract single and looking like an extension of the stem. 12. <i>Lipocarpa</i> |
| 8. Spikelets few-flowered, producing 1–5 nutlets only. 9 | – Inflorescence mostly terminal, inflorescence bracts radiating. 17 |
| – Spikelets many-flowered, producing many nutlets. 10 | |
| 9. Style unbranched or 2-branched. 15. <i>Rhynchospora</i> | |

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Explanation of Terms

Cyperaceae are a natural family with special features which have been given their own terms. Those used in this account are explained here and in accompanying drawings.

anthela: when the inflorescence is at the top of simple culm, see Fig 212.2.

beak: the upper, narrow part of the utricle in *Carex* and *Schoenoxiphium*.

bulb (corm): the swollen base or end of a stem, used for food storage. Fig. 212.1.

corm: see bulb.

culm: the inflorescence-stalk, which may be simple or leafy.

distichous: arranged in 2 rows, either side of the stem or rachis.

involucre: the main bracts at the top of the culm which support an anthela-type inflorescence. Fig. 212.2.

involucral-bract: the bract which is leaf-like or glume-like which supports the inflorescence. Fig. 212.2.

leaf sheath: the basal part of the leaf which wraps around the stem and is usually closed.

ligula: a raised rim at the top of the sheath opposite the blade.

ligule: a rim or line of hairs between the blade and the sheath.

panicle: when the culm has leaves with the branches of the inflorescence produced from the axils. Fig. 212.2

pseudospikelet: a false spikelet made of several 1-flowered spikelets which have been reduced and condensed forming a cone-like structure.

pulvinus: a small swelling on the rachis in *Cyperus* subgenus *Kyllinga*.

rachilla: the axis of a spikelet.

rachis: the axis of a spike.

rhizome: a tough, often woody, underground stem formed from the base of stems which first grow horizontally and then turn erect. Fig. 212.1.

runner (stolon): lateral stems which grow across the surface of the ground. Fig. 212.1.

scale leaves: Basal leaves and those covering stolons and rhizomes below ground which lack blades.

spike: sessile spikelets arranged along a common axis called a rachis.

spikelet: the basic unit of the inflorescence in which each flower is supported by a glume and arranged on a common axis, the rachilla. The main types of spikelets found in this account are shown in Fig. 212.3

stolon: a lateral outgrowth produced below ground which produces several nodes before a bulb, corm or erect shoot is formed. Fig. 212.1

utricle: the bottle-shaped outer covering of female flowers in *Carex* and *Schoenoxiphium*. Fig. 212.3

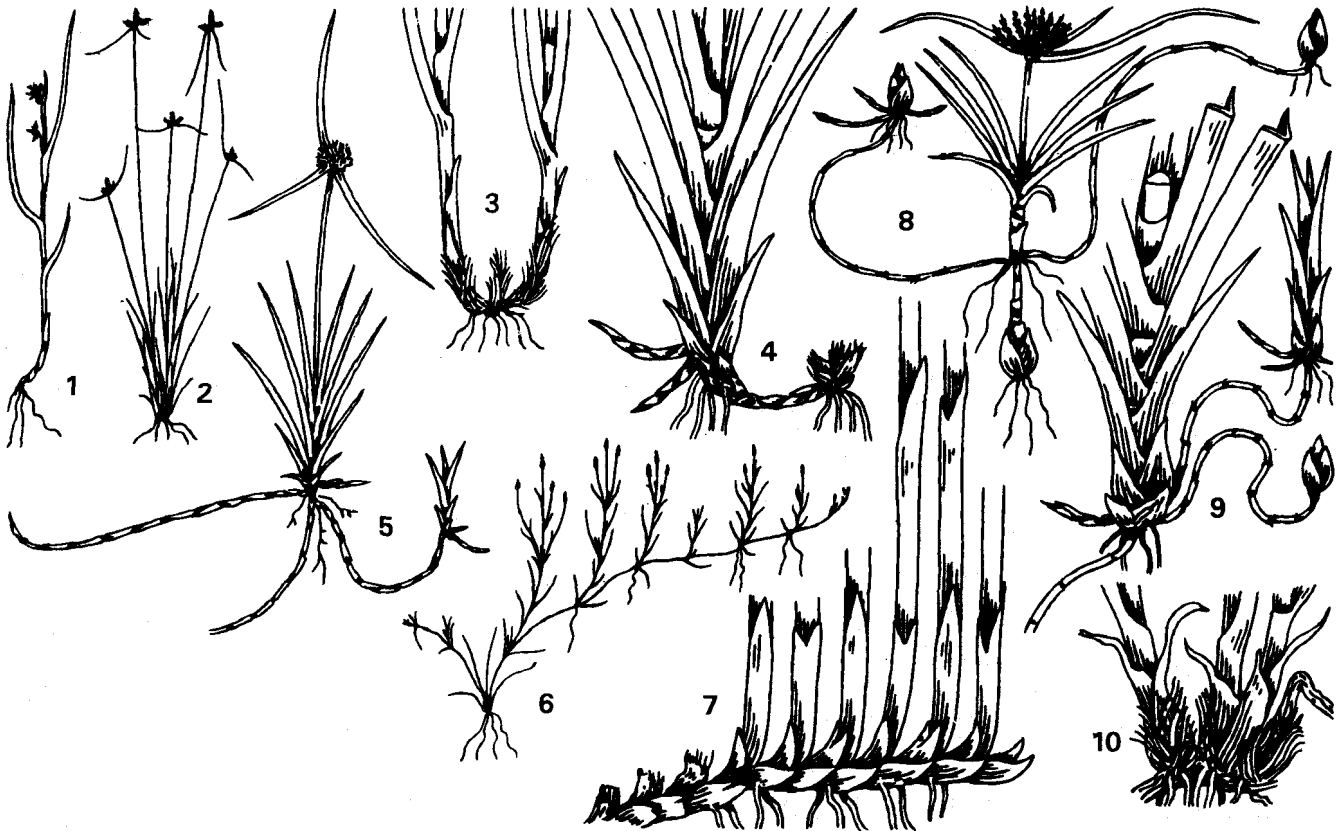


Figure 212.1 Growth forms of CYPERACEAE: 1 & 2 – short-lived annuals (ephemerals) with simple root systems, e.g. *Fuirena leptostachya* (1) and *Lipocarpa nana* (2); 3 – tufted perennial, e.g. *Schoenoxiphium sparteum*; 4 – perennial with thick stolons, e.g. *Carex bequaertii*; 5 – perennial with fine underground stolons, e.g. *Cyperus (Kyllinga) richardii*; 6 – stolons on surface or in water, e.g. *Isolepis fluitans*; 7 – creeping rhizome, e.g. *Cyperus laevigatus*; 8 & 9 – plant growing from bulb, producing stolons, e.g. *Cyperus usitatus* (8) and *C. bulbosus* (9); 10 – bulbs on a short rhizome, e.g. *Fuirena umbellata*. Drawn by R.W. Haines. (Reproduced with permission from Haines & Lye, fig. 2, 1983.)



Figure 212.2 Inflorescence types in *CYPERACEAE*: 1 - anthela of *Fimbristylis* - *Bulbostylis* - *Cyperus* type; 2 - panicle of *Schoenoxiphium* - *Carex* type; 3 - terminal head of *Cyperus* (*Kyllinga*) type; 4 - apparently lateral head of *Schoenoplectus* type. Drawn by R.W. Haines. (Reproduced with permission from Haines & Lye, fig. 10, 1983.)



Figure 212.3 Main spikelet types in *CYPERACEAE* of the Flora area: 1 - laterally flattened with distichous glumes, e.g. *Cyperus*; 2 - glumes arrange spirally, e.g. *Scirpus* and *Rhynchospora*; 3 - lower florets female and upper male, e.g. *Scleria*; 4 - lower female spikelets enclosed in utricles, upper spikelet male, e.g. *Carex*; 5 - lower female part of spikelet enclosed in a utricle, male florets above, e.g. *Schoenoxiphium*. Drawn by R.W. Haines. (Reproduced with permission from Haines & Lye, fig. 11, 1983.)

17. Style-base remaining on the nutlet as a short knob. 6. *Bulbostylis*
 - Style-base not remaining on the nutlet. 7. *Isolepis*
18. Spikelet with 3 or more empty glumes at its base. 14. *Schoenus*
 - Spikelet with only 1-2 (rarely no) empty glumes at its base. 19
19. Inflorescence a panicle; leaves and leaf-sheaths usually hairy. 1. *Fuirena*
 - Inflorescence an open or dense head, often globose. 20
20. Inflorescence appears to be on the side of the stem; bract stem-like and continues in the same direction as the stem. 2. *Schoenoplectus*
 - Inflorescence appears terminal; major inflorescence-bract(s) leafy or filiform, erect or spreading. 21
21. 1-2 scales between the glume and the flower. 22
 - Without such scales. 23
22. Inflorescence often looking daisy-like; 1 stiff white petal-like scale inside each sterile glume at the base of the spikelet. 13. *Ascolepis*
 - Inflorescence grey-white or red-brown, not daisy-like; (1-2) very thin scales inside the glumes. 12. *Lipocarpha*
23. Nutlet with style-base persistent as a distinct knob. 6. *Bulbostylis*
 - Nutlet without persistent style-base. 24
24. Inflorescence with at least some stalked spikelets or spikelet-clusters. 25
 - Inflorescence with all spikelets sessile in one head. 27
25. A tall floating plant. 10. *Oxycaryum*
 - Plants not floating. 26
26. Leaves hair-like or narrow and channelled, often hairy, with long hairs at opening of leaf-sheaths. 6. *Bulbostylis*
 - Leaves flat, often glabrous, without long hairs at opening of leaf-sheath. 4. *Fimbristylis*
27. Inflorescence white. 8. *Kyllingiella*
 - Inflorescence green, brown or black. 28
28. Glume pubescent. 6. *Bulbostylis*
 - Glumes glabrous. 29
29. Glumes ending in an awn at least 0.5 mm long. 30
 - Glumes obtuse or acute, or if mucronate, then awn much shorter. 7. *Isolepis*
30. Awn about as long as the glume. 12. *Lipocarpha*
 - Awn about 1/4 the length of the glume. 8. *Kyllingiella*

1. *FUIRENA* Rottb. (1773)

Napper, Cyperaceae of East Africa - III, *J. E. Afr. Nat. Hist. Soc.* 25(1): 19-21 (1965).

Annuals or perennials, often with a horizontal rhizome. Stems 3- or 5-angled or almost non-angled, hairy or glabrous, with nodes and leaves throughout their length. Leaf-blades usually flat and hairy at least along margins and at apex; sheaths closed; ligule prominent,

tubular. Inflorescence a paniculate corymb consisting of 1-several clusters of spikelets or compound corymbs of spikelets. Lower inflorescence-bracts similar to the upper leaves. Spikelets ovate to elongate, producing numerous bisexual flowers; glumes spirally arranged or (more rarely) 5-ranked making the spikelets angular. Glumes red-brown to grey-black, usually strongly hairy, and with the midrib extending into a straight or recurved mucro or awn. Perianth-segments bristle-like, scale-like, or with a blade on a stalk, 3 or 6, or absent; the two whorls of 3 often different. Stamens 2-3. Style with 3 long hairy stigmas. Nutlets obovate, 3-angled, smooth or irregularly wrinkled, falling off enclosed in scales or bristles when these are present.

About 30 species in all tropical and warm temperate regions, but with most species in Africa and America; 5 species recorded for the Flora area.

1. Annual with fibrous roots, lacking rhizomes or stolons. 2
 - Perennial with short or long horizontal rhizomes or stolons. 4
2. Perianth segments present; plant generally larger with several stems in a tuft. 3
 - Perianth segments absent; plant generally small with few stems. 2. *F. leptostachya*
3. Glumes 1-1.5 mm long; nutlets 0.4-0.6 mm long; 3 perianth segments with a crescent-shaped blade on a prominent stalk. 2. *F. leptostachya*
 - Glumes 2-2.5 mm long; nutlets 0.8-1 mm long; 3 perianth segments with a square blade and 3 raised veins. 3. *F. ciliaris*
4. Stems 5-angled, often with long spongy stolons; perianth segments scale-like. 5. *F. umbellata*
 - Stems 3-angled, tufted or with short not-spongy stolons or rhizomes; perianth segments bristle-like or absent. 5
5. Perianth of 6 bristles; largest leaf-blade 1-4 mm wide. 1. *F. stricta*
 - Perianth absent; largest leaf-blade 4-9 mm wide. 4. *F. pubescens*

1. *F. stricta* Steud. (1855)

- type: from Madagascar, *Boivin* s.n. (P holo.).

Slender perennial with short rhizome. Stems 20-70 cm long, 3-angled, glabrous except below the inflorescence. Leaf-blades 7 x 0.1-0.4 cm, glabrous or sparsely hairy; sheaths usually glabrous except at the throat. Inflorescence of 1-several stalked clusters of spikelets. Spikelets up to 13 mm long when fruiting, only 4-8 mm long when flowering. Glumes 2.1-2.6 mm long, red-brown to black, densely set with short hairs; midrib extending into a stiff, scabrid awn. Perianth of 6 bristles with recurved barbs. Nutlets 1.1-1.7 mm long, light to dark brown, almost smooth.

1. Spikelets angular with glumes arranged in 5 distinct rows. subsp. *stricta*
 - Spikelets not angular, with spirally arranged glumes. subsp. *chlorocarpa*



Figure 212.4 *FUIRENA STRICTA* subsp. *CHLOROCARPA*. Drawn by R. W. Haines from Haines 4115. (Reproduced with permission from Haines & Lye, fig. 38, 1983.)

subsp. *stricta*

Not so far recorded for the Flora area, but it occurs in the lowlands of Sudan near the border with Ethiopia and could be found in future collections.

subsp. *chlorocarpa* (Ridl.) Lye in *Nord. J. Bot.* 3: 241 (1983);

F. chlorocarpa Ridl. (1884) – type: Angola, Welwitsch 7113 (LISU holo.).

Fig. 212.4

Wet grasslands and swamp-edges; 1250–2600 m. GD WU SU AR KF GG BA; Uganda, Kenya, Tanzania, Zambia, Mozambique, Zaire, Angola, South Africa, Madagascar. Mooney 6135; Gilbert & Thulin 894; Mesfin T. & Kagnev G.Y. 2523.

2. *F. leptostachya* Oliv. (1875)

– type: Uganda, Madi, Speke & Grant s.n. (K holo.).

Slender annual. Stems 10–40 cm long, hairy. Largest leaf-blades 5–20 x 0.3–0.5 cm, hairy; sheaths with hairs about 1 mm long. Inflorescence usually with 3 to many spikelets in sessile or stalked clusters from the upper sheaths. Spikelets green or brown, 4–10 mm long. Glumes 1–1.5 mm long, awn 0.5–1.0 mm long, green, grey, grey-black, or somewhat red-brown, hairy. Perianth of 3 outer short slender bristles and 3 inner stalked segments ending in crescent-shaped blades (or absent, see below). Nutlets 0.4–0.6 mm long, pale brown or grey-white, smooth. Fig. 212.5.

In E Africa, seasonally wet ground, often in seepage

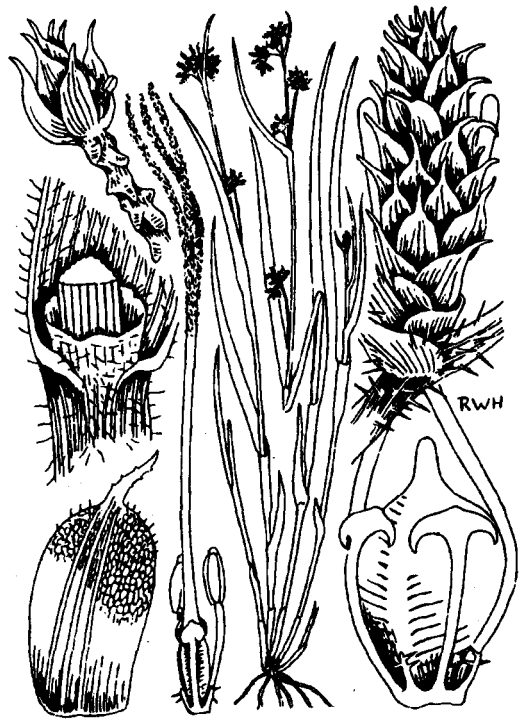


Figure 212.5 *FUIRENA LEPTOSTACHYA*. Drawn by R. W. Haines from Haines 4091. (Reproduced with permission from Haines & Lye, fig. 42, 1983.)

zones on shallow soils; 1800–2000 m. HA; widespread in tropical Africa. Pizni 9, ser. B.

Fuirena leptostachya forma *nudiflora* Lye in *Nord. J. Bot.* 3 (1983) is a form of this species which lacks perianth-segments and is generally small. It has not been found so far in the Flora area, but could occur.

3. *F. ciliaris* (L.) Roxb. (1875);

Scirpus ciliaris L. (1771) – type: from 'India'.

F. glomerata Lam. in *Fl. Trop. Afr.* non Lamark.

Slender to robust annual. Stems 15–70 cm long, hairy. Largest leaf-blades 5–20 cm long, hairy; sheaths hairy or glabrous. Inflorescence usually with 3 to many spikelets in sessile or stalked clusters from the upper sheaths. Spikelets green or pale brown, 5–12 mm long, densely hairy. Glumes 2.0–2.5 mm long, awn c 1.5 mm long, green, grey, grey-black, or somewhat red-brown. Perianth of 3 outer short slender bristles and 3 inner stalked segments ending in square blades with 3 raised veins. Nutlets 0.8–1.0 mm long, brown, smooth. Fig. 212.6.

Moist places in *Combretum* – *Terminalia* woodland; 550–600 m. IL; widespread in the tropics. Friis et al. 7256.

4. *F. pubescens* (Poir.) Kunth (1837);

Carex pubescens Poir. (1789) – type: from 'N Africa'.

F. pachyrrhiza Ridl. (1884).

F. welwitschii Ridl. (1884).

Perennial with long creeping scale-covered rhizome;



Figure 212.6 *FUIRENA CILIARIS*. Drawn by R.W. Haines from Lye 5777. (Reproduced with permission from Haines & Lye, fig. 46, 1983.)



Figure 212.7 *FUIRENA PUBESCENCE*. Drawn by R.W. Haines from Haines 4617. (Reproduced with permission from Haines & Lye, fig. 58, 1983.)

stems at 0.5–1.5 cm intervals, 30–100 x 0.1–0.4 cm, usually glabrous, sometimes hairy below the inflorescence. Largest leaf-blades 10–25 x 0.4–0.9 cm, hairy at least near the tip; the sheaths glabrous or hairy. Inflorescence of several stalked clusters of spikelets from the upper sheaths. Spikelets 5–10(–24) x 3–5 mm. Glumes 2.5–4 mm long, awns 0.8–2.5 mm long, red-brown below, often black-grey or blue-grey above, densely hairy. Perianth absent. Nutlets 1.2–1.7 mm long, white to brown, with irregular longitudinal and horizontal ridges. Fig. 212.7.

Seasonal swamps and grasslands; 1400–2700 m. EW GD TU SU AR SD HA; throughout Africa, South Europe and extending to India. *Schimper* 1296; *Mooney* 4784; *Friis* et al. 2304.

5. *F. umbellata* *Rottb.* (1773)

– type: from Surinam, *Rolander* s.n. (C holo.).

Stout perennial with horizontal woody creeping rhizome; flowering stems densely arranged, basal parts swollen and bulb-like. Stems 60–200 x 0.3–0.6 cm, glabrous, 5-angled. Leaves glabrous, lower reduced to sheaths or with short lobes only, upper 12–30 x 0.8–2.5 cm, flat or folded into distinct longitudinal ridges; margins with spreading translucent hairs. Inflorescence 2 to many compound corymbs on upper 5–40 cm of stem. Spikelets 5–8 mm long, lanceolate, sessile, green, turning dark or rusty brown with age. Glumes 2–2.5 mm long, awn 0.5–0.7 mm long, red-brown with grey-black patches, 3-nerved midrib and awn green or grey; short and long translucent hairs present. Perianth segments 3, scale-like with 3 nerves, apex emarginate or rounded,



Figure 212.8 *FUIRENA UMBELLATA*. Drawn by R.W. Haines from Lye 5029. (Reproduced with permission from Haines & Lye, fig. 55, 1983.)

frequently with a short slender awn. Nutlets white to brown, up to 1 mm long with 0.2 mm long persistent knob-like style-base. Fig. 212.8.

In quaking bog by lake shore; in E Africa also found in wet grassland, swamp, ditches and pools; 1400–1450

m. SU; widespread in all tropical regions, but only one record so far from the Flora area. *Ash* 2370.

2. SCHOENOPLECTUS Palla (1888)

Scirpus L. (1753) p.p. in *Cufodontis, Enum.* (1970–71)

Raynal, *Adansonia sér.* 2, 15: 537–542 & 16: 119–155 (1976).

Small annuals or large tufted perennials. Stems rounded or 3-angled, with or without a node above the base. Leaves mostly basal; blades present or absent; main inflorescence-bract leafy or more commonly stem-like and continuing in the direction of the stem, with or without transverse septa. Inflorescence usually a dense, apparently lateral, cluster of few to many spikelets, more rarely a lax terminal anthela. Spikelets ovate to lanceolate, usually with numerous bisexual flowers subtended by spirally arranged glumes, rarely of 10 or fewer flowers. Glumes ovate or broadly cordate, glabrous or minutely scabrid, but often with longer hairs along margins. Perianth usually of 6 needle-like bristles with or without recurved barbs, or of 4–5 flattened plumose segments (in *S. subulatus* only). Stamens usually 3. Style with 2–3 stigmas. Nutlets obovate to nearly orbicular, 3-angled or lens-shaped, smooth or transversely wrinkled.

About 50 species in all tropical and temperate parts of the world; 10 species recorded for the Flora area.

Annual species often produce cleistogamous flowers more or less hidden in the lower leaf-sheaths. These flowers can have very long styles with stigmas protruding from the opening of the sheaths, and nutlets larger than those produced in aerial spikelets.

1. Plant with 3-angled stems bearing leaf-blades high up the culm; involucre bracts many, green, leaf-like.
 - (Subgen. BOLBOSCHOENUS) 1. *S. maritimus*
 - Plant often entirely without leaf-blades, never with long green leafy involucre bracts.
 - (Subgen. SCHOENOPLECTUS) 2
2. Tall perennial; perianth-segments plumose; inflorescence a lax anthela of many spikelets.
 2. *S. subulatus*
 - Perennial or annual; perianth-segments needle-like or absent; inflorescence a lax anthela, a solitary spikelet, or a dense head of few to many crowded spikelets. 3
3. Inflorescence a dense lateral cluster of few to many sessile spikelets. 7
 - Inflorescence an anthela with at least some spikelet-clusters stalked. 4
4. Annual, stems 0.5–2 mm thick. 9. *S. lateriflorus*
 - Perennial, stems 2 mm thick or more. 5
5. Stems often placed 0.5–5 cm apart on a horizontal rhizome; flowers with prominent bristles longer than the nutlets. 3. *S. lacustris*
 - Stems crowded; flowers without bristles. 6
6. Nutlets strongly transversely ridged; stems with

numerous longitudinal ridges; old sheaths not breaking into fibres. 5. *S. confusus*

- Nutlets smooth, or almost smooth; stems smooth, without longitudinal ridges; old sheaths and scales breaking into fibres. 4. *S. corymbosus*
- 7. Thickest stem more than 2 mm thick; erect inflorescence-bract with distinct transverse ribs. 6. *S. articulatus*
 - Thickest stem 0.5–2 mm thick, with or without transverse ribs. 8
- 8. Glumes 1.4–1.8 mm long. 10. *S. microglumis*
 - Glumes 2–4 mm long. 9
- 9. Glumes 2–2.5 mm long; nutlets wavy on angles. 8. *S. roylei*
 - At least the lower glumes more than 2.5 mm long; nutlets not wavy or wrinkled on angles. 10
- 10. Glumes strongly concave and with a golden tinge; inflorescence bract with distinct transverse ribs. 7. *S. senegalensis*
 - Glumes not or slightly concave and without a golden tinge; inflorescence bract without transverse ribs. 9. *S. lateriflorus*

Subgen. BOLBOSCHOENUS (Palla) Lye (1982).

Perennials with creeping rhizomes. Stems 3-angled with leaves high up the culm. Inflorescence a lax or congested anthela; involucre bracts many, leafy. Flowers with needle-like bristles which are retrorsely scabrid. Style with 2 or 3 stigmas. Nutlets almost smooth.

A group of 3–5 very closely related species, widely distributed in all tropical and temperate regions, but always in saline or alkaline habitats. In some treatments this group of species is put into its own genus, *Bulboschoenus*.

1. *S. maritimus* (L.) Lye (1971);
Scirpus maritimus L. (1753); *Bolboschoenus maritimus* (L.) Palla (1904) – type: from 'Europe'.

Perennial with long hard stolons ending in tubers or stems. Stems 40–120 x 0.2–0.5 cm, sharply 3-angled, pith-filled or hollow. Leaf-blades 25–40 x 0.3–1 cm, flat; sheaths pale green. Inflorescence with clusters of 5–40 spikelets on branches of very unequal lengths (usually 0.5–3 cm long); largest involucre bracts 8–15 cm long, erect or spreading, similar to the leaf-blades. Spikelets 10–50 x 3–5 mm, ovate to elongate and often somewhat curved, golden- to red-brown. Glumes 5–6 mm long, ovate with midrib extended; margins and surface with minute hairs. Perianth-bristles 6. Style with 3 branches. Nutlets 2–2.6 x 1.4–1.8 mm, 3-angled, dark brown when mature. Fig. 212.9 & fig. 212.14.1–3.

Wet saline habitats and seasonally wet saline grassland; 150–1800 m. AF SU SD HA; pantropical as well as in temperate regions. *Boulos* 9749; *Ash* 252; *Parker* E397.



Figure 212.9 *SCHOENOPLECTUS MARITIMUS*. Drawn by R.W.Haines from Procter 3657. (Reproduced with permission from Haines & Lye, fig. 64, 1983.)



Figure 212.10 *SCHOENOPLECTUS SUBULATUS*. Drawn by R.W.Haines from Lock 70/34. (Reproduced with permission from Haines & Lye, fig. 66, 1983.)

Subgen. *SCHOENOPLECTUS*

Annuals or perennials. Stems often without leaf-blades; inflorescence-bract usually erect and stem-like. Inflorescence a lax or congested anthela, often appearing to be placed laterally on the stem. Perianth of needle-like or plumose bristles or absent. Style with 2 or 3 branches. Nutlets smooth or transversely wrinkled. Basal flowers often present in annual species.

About 45 species in all tropical and temperate parts of the world.

2. *S. subulatus* (Vahl) Lye (1971);

Scirpus subulatus Vahl (1805) – type: from ‘Nicabar Islands’.

Scirpus litoralis Schrader (1806).

Scirpus litoralis Schrader var. *pterolepis* (Kunth) C.B. Clarke (1895).

Tall perennial with horizontal stolons. Stems 70–450 x 0.6–1.2 cm below, smooth to 3-angled, pith-filled. Leaf-blades short or up to 70 cm long; sheaths up to 70 x 3.5 cm. Inflorescence a laxanthela with spikelets or groups of spikelets on branches of very unequal length, nearly all spikelets stalked. Major involucre bract 4–6 cm long, erect and stiff, leafy to stem-like. Spikelets 6–15 x 2–5 mm, ovoid to oblong, pale to medium brown. Glumes 3–4 mm long, very broad and rounded at apex, strongly concave, pale with darker brown lines or patches; margins with a prominent pale border and often numerous hairs, especially near apex; midrib distinct, extended into a short hairy or scabrid white apex.

Perianth-segments 4–6, plumose, shorter or longer than the nutlets. Style usually with 2 stigmas. Nutlets 1.5–2(–3) mm long, obovate, lens-shaped, almost smooth, dark brown when mature. Fig. 212.10.

Temporary pools and lake-margins; 50–1650(–2000) m. SU GG HA; tropical and temperate regions of the old world. *Corradi* 1443; *Vatova* 1358; *Ash* 450.

3. *S. lacustris* (L.) Palla (1888);

Scirpus lacustris L. (1753) – type: from ‘Europe’.

Robust perennial with stems placed at 0.5–5 cm intervals on a horizontal rhizome. Stems 50–300 cm long, rounded, pith-filled. Lower leaf-sheaths ending in short lobes, the upper with well-developed but rather short blades. Inflorescence a lax anthela with spikelets or groups of spikelets on stalks of unequal length, rarely a dense pseudo-lateral head. Involucral bract erect, shorter than the inflorescence. Spikelets 5–10 x 4–5 mm, ovoid, red-brown. Glumes 3–4 mm long, broadly ovate, usually somewhat emarginate at apex, ciliate on margins, midrib extended into a short awn. Perianth-bristles 5–6, retrorsely scabrid, usually slightly longer than the nutlets. Style usually with 3 stigmas. Nutlets 2–3 mm long, smooth, grey-brown or grey-black.

Freshwater swamps and lake-shores; 1900–2200 m. EW; S Africa, N Africa, Europe and Asia. *Bellini* s.n.

Only known in the Flora area from this collection made in Seræ.

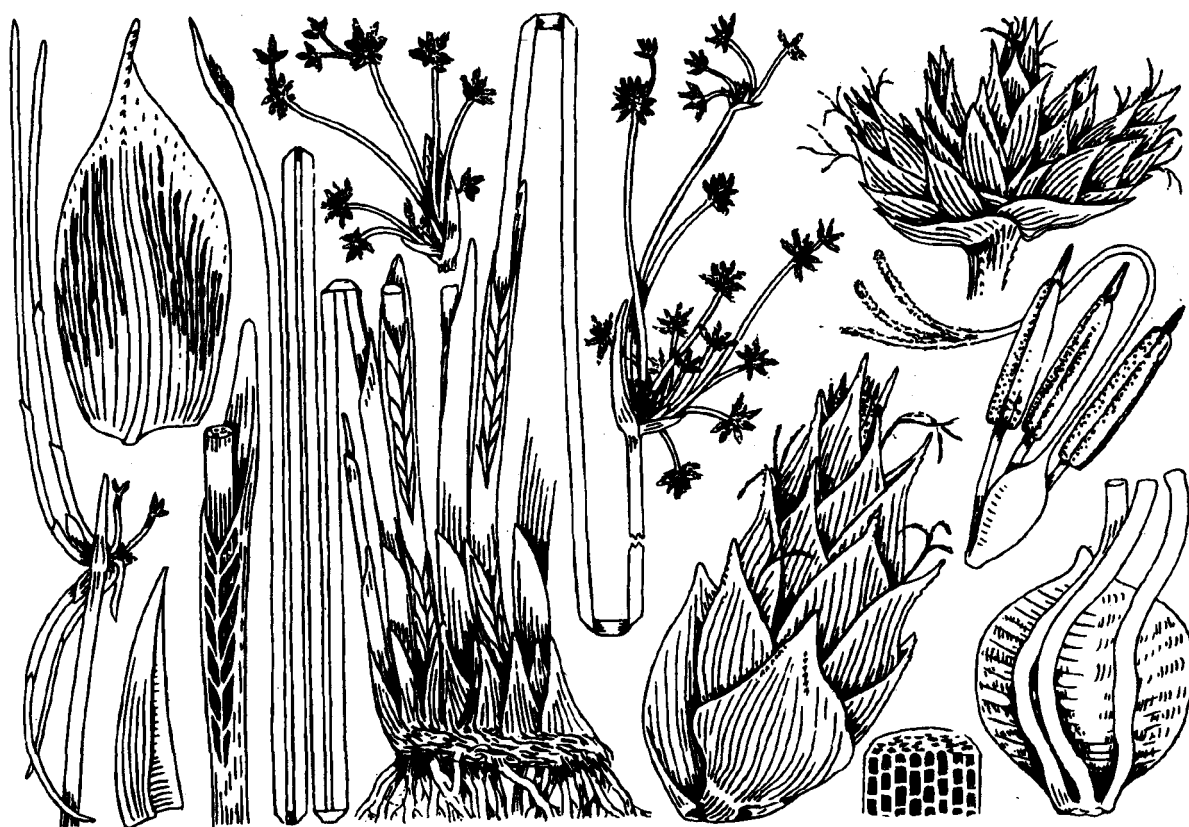


Figure 212.11 *SCHOENOPLECTUS CORYMBOSUS* var. *BRACHYCERAS*. Drawn by R. W. Haines from Haines 4006. (Reproduced with permission from Haines & Lye, fig. 70, 1983.)

4. *S. corymbosus* (Roem. & Schult.) Rayn. (1976);
Isolepis corymbosa Roem. & Schult. (1817) –
 type: from 'India'.
Scirpus inclinatus (Del.) Asch. & Schweinf. ex
 Boiss. (1882).

Robust perennial forming tussocks with short, thick and woody rhizomes. Stems 50–300 x 0.2–0.8 cm, smooth and pith-filled. Leaf-sheaths often splitting to give fine fibres across the split, upper ending in short lobes; blades absent. Inflorescence a lax anthela with clusters of spikelets on very unequal branches; largest branches 2–12 cm long. Major inflorescence bract 1–5 cm long, stem-like and continuing in the direction of the stem or flattened and boat-shaped. Spikelets 3–8 x 1.5–2.5 mm, ovoid, acute, light to dark brown. Glumes 2–4 mm long, ovate, dark red-brown or grey with red-brown lines or patches; margins glabrous or hairy near the apex; midrib scabrid and extending into a short awn. Perianth-segments absent. Style usually with 3 stigmas. Nutlets 1.2–2 mm long, broadly ovate, almost smooth, dark brown or black when mature.

1. Involucral bracts 2–10 cm long, often stem-like;
 glumes light red-brown with a pale margins.
 var. *corymbosus*
 – Involucral bracts 1–2 cm long, often boat-shaped;
 glumes dark red-brown without a pale margins.
 var. *brachyceras*

var. *corymbosus*

Lake margins or pools; 1500–1850 m. GJ SU AR KF

IL; widespread in N and S Africa and W Asia. Bally 3126; Mesfin T. & Kagnev G.Y. 1757.

var. *brachyceras* (A. Rich.) Lye in *Nordic J. Bot.* 3: 242 (1983);

Scirpus brachyceras Hochst. ex A. Rich. (1851) –
 type: TU, near Adua, Schimper I:288 (P holo.).

Fig. 212.11

Generally wet habitats, particularly where there is standing water; swamps, pools, lake-margins, water-logged fields; 1500–3600 m. EW TU GD GJ WU SU AR WG IL KF GG SD BA HA; tropical and S Africa, Madagascar. Mooney 7216; Friis et al. 2001; Gilbert & Getachew A. 2791.

5. *S. confusus* (N.E. Br.) Lye (1971);
Scirpus confusus N.E. Br. (1921) – type: GD (Be-
 gemder) near Amogai, Schimper 253 (K holo.).

Tufted perennial with short thick horizontal creeping rhizome. Stems usually 5–10 together, but sometimes more, 40–80 x 0.1–0.5 cm, with numerous longitudinal ridges, filled with pith, base covered in scales and sheaths, including dead remains from previous seasons. Leaf-blades absent; sheaths pale, lowest much wider than the stem, upper narrower and ending in a lobe 0.2–0.6 cm long. Inflorescence a cluster of spikelets on branches of unequal length, longest 1–3 cm long; main inflorescence-bract looking like an extension of the stem, 3–8 x 0.2–0.3 cm, gradually narrowing to an obtuse apex. Spikelets 5–10 x 2–3 mm, acute, variegated

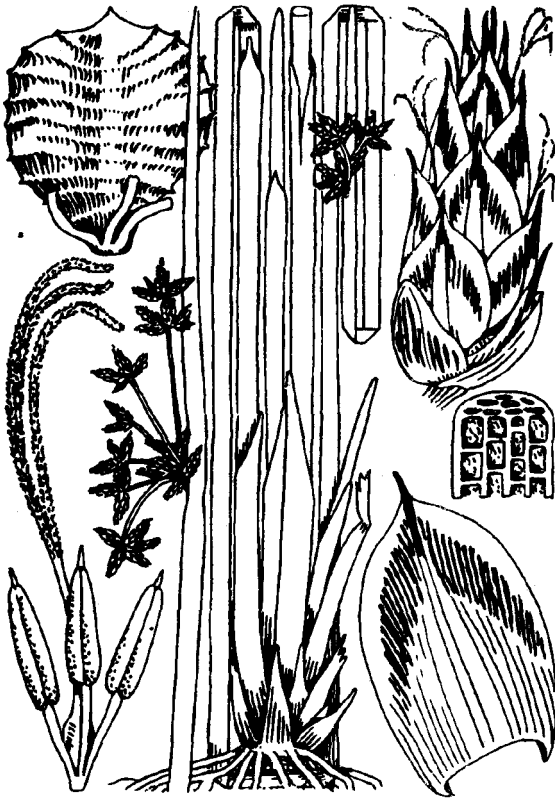


Figure 212.12 *SCHOENOPLECTUS CONFUSUS*. Drawn by R. W. Haines from Haines 4211. (Reproduced with permission from Haines & Lye, fig. 72, 1983.)

grey, brown and black. Glumes 2.5–3.5 mm long, pale but with dark red-brown area on each side of the midrib giving a characteristic inverted V-mark; midrib usually extended into a short awn. Perianth-segments absent. Stamens 3. Nutlets 1.2–1.6 x 1.0–1.3 mm, dark brown to black, shiny, with transverse irregular ridges or frills. Fig. 212.12.

Habitat not noted for the Flora area; in E Africa known from seasonal pools and sometimes in roadside ditches; 1800–2750 m. TU GD SU; E Africa. *Boulos* 9538.

6. *S. articulatus* (L.) Palla (1889);

Scirpus articulatus L. (1753) – type: from India (LINN 71.4 lecto.).

Robust tufted annual with few to many crowded stems. Stems usually 4–30 cm long up to the inflorescence or 12–70 cm long when including the bract, rounded, with distinct transverse ribs above the inflorescence. Leaf-sheaths often much wider than stems; blades absent. Inflorescence of few to many crowded, apparently lateral, spikelets in a dense head. Main inflorescence-bract stem-like, 6–40 cm x 1–8 mm, with conspicuous transverse ribs, much longer than the actual stem which ends at the inflorescence. Spikelets 6–18 x 4–10 mm, ovoid, acute, often variegated grey, pale green and red-brown. Glumes 4–6.5 mm long, oval-triangular, golden to red-brown with a pale green midrib slightly extended into an awn. Perianth absent. Style with 3 stigmas. Nutlets 1.8–2 mm long, somewhat 3-angled, smooth,

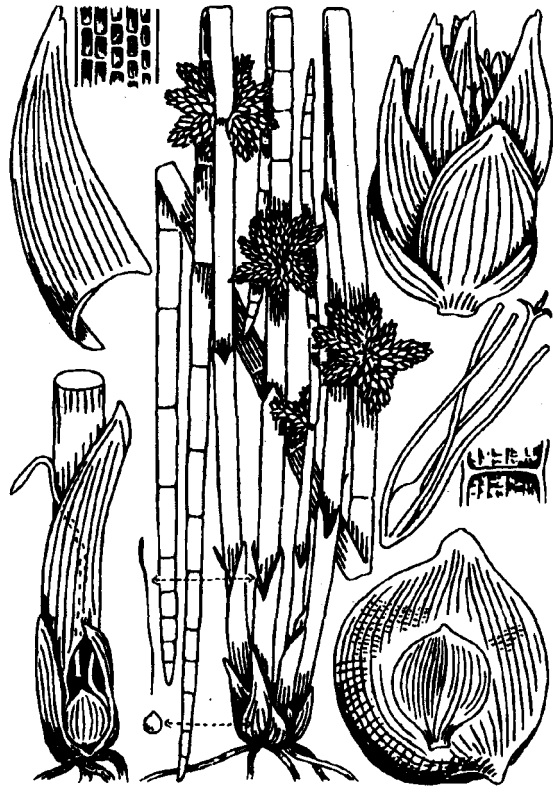


Figure 212.13 *SCHOENOPLECTUS ARTICULATUS*. Drawn by R. W. Haines from Lock 579. (Reproduced with permission from Haines & Lye, fig. 73, 1983.)

almost black when mature. Some flowers are usually found at the stem bases. These produce more globular nutlets 4–5 x 3–4 mm. Fig. 212.13 & fig. 212.14.4.

Seasonally flooded pools in *Combretum* – *Terminalia* woodland; in E Africa also in wallows, and by stream-banks; 600 m. IL; old world tropics. *Friis* et al. 7202.

7. *S. senegalensis* (Hochst. ex Steud.) Rayn. (1976);

Isolepis senegalensis Hochst. ex Steud. (1855) – type: Ethiopia, *Schimper* II:1194 (P holo., K BM iso.).

Scirpus articulatus L. var. *stramineus* Engl. *Abh. Kön. Ak. Wiss. Berlin* 1891 (1892) – type: Ethiopia, *Schimper* 1123 (K iso.).

Scirpus jacobi Fischer. (1931).

Scirpus praelongatus Poir. *sensu* Cufodontis, *Enum.* (1970–71).

Tufted annual with few to many crowded stems. Stems 1–30 cm long below the inflorescence, or total length 6–60 cm when including the bract, 0.3–1.6 mm thick, rounded to somewhat angular, hollow with transverse ribs. Leaf-sheaths pale to light red, without blades. Inflorescence of 1–25 sessile spikelets in an apparently lateral globose cluster. Major inflorescence-bract stem-like or flattened, 5–30 cm long, with some transverse ribs, much longer than the stem. Spikelets 3–9 x 2–4 mm, ovoid, obtuse, golden brown to bronze-coloured. Glumes 2.5–3.2 mm long, broadly ovate, very concave, pale golden below, darker above, often ending in a short



Figure 212.14 *SCHOENOPLECTUS MARITIMUS*: 1 – complete flowering plant $\times \frac{1}{2}$; 2 – spikelet $\times 3$; 3 – flower with 6 setae, 3 flattened stamens and an ovary with 3-branched style. *S. ARTICULATUS*: 4 – complete flowering stem $\times \frac{1}{2}$. *S. SENEGALENSIS*: 5 – complete flowering plant $\frac{1}{2}$; 6 – spikelet $\times 5$. 1–3 from Lobin 6914; 4 from Lobin 6911; 5 & 6 from Lobin 7075. Drawn by Gerd Mari Lye.

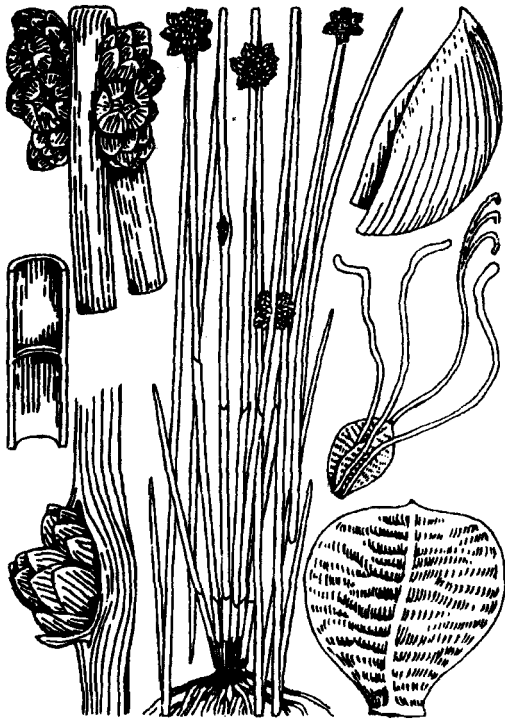


Figure 212.15 *SCHOENOPLECTUS SENEGALENSIS*. Drawn by R. W. Haines from Haines 4207. (Reproduced with permission from Haines & Lye, fig. 74, 1983.)

indistinct awn. Perianth absent. Style with 3 branches. Nutlets 1.2–1.5 mm long, obovate, 3-angled, strongly transversely wrinkled on the 3 sides, dark brown when mature. Flowers which produce nutlets 2–2.5 mm long, sometimes found at the stem-bases. Fig. 212.14.5–6 & fig. 212.15.

Seasonally wet soil in riverine and *Commiphora* woodland, also in swamps, pools, ditches and lake-shores, often on clay-soils; c 1300–2000 m. TU GD WG KF SD; tropical and S Africa, Egypt, India. *Gilbert & Thulin* 641; *W. de Wilde* 7590; *Gilbert* 3411.

8. *S. roylei* (Nees) *Ovcz & Czukav.* (1963);
Scirpus roylei (Nees) *Parker* in *Duthie* (1929) – type: from 'India'.

Tufted annual with few to many crowded stems. Stems 2–8 cm long below the inflorescence, or total length 5–25 cm when including the bract, 0.5–0.9 mm thick, rounded; transverse ribs present but not prominent. Leaf-sheaths pale to light red-brown, without blades. Inflorescence 2–10 sessile spikelets in an apparently lateral globose cluster. Major inflorescence-bract stem-like, 6–17 x 0.07–0.1 cm, somewhat flattened, much longer than the stem. Spikelets 4–6 x 2–3 mm, ovoid, variegated, pale red-brown to straw-coloured or with a golden tinge. Glumes 2–2.5 mm long, ovate and slightly concave, light red-brown. Perianth absent. Stamens only 2. Style with 3 branches. Nutlets 0.8–1.2 mm long, obovate, 3-angled, transversely wavy even on the angles,

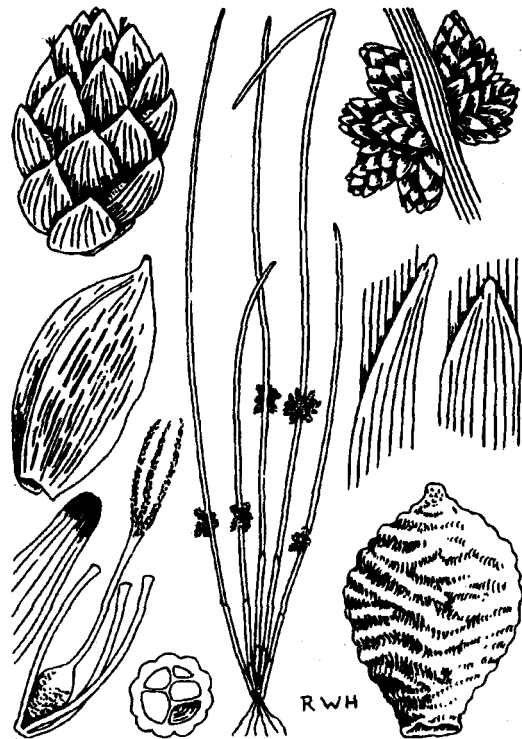


Figure 212.16 *SCHOENOPLECTUS ROYLEI*. Drawn by R. W. Haines from *Chandler* 1359. (Reproduced with permission from Haines & Lye, fig. 76, 1983.)

dark brown to black when mature. Flowers often found within basal leaf-sheaths which produce nutlets 2–2.5 mm long. Fig. 212.16.

On yellow clay soil in cultivated area with *Salvadora persica*; in E Africa also in seasonally wet swamps and grasslands; near sea level to 350 m. EW SD; tropical Africa, India. *Terracciano* 232; *Sebsebe D. & Ensermu K.* 2734.

9. *S. lateriflorus* (Gmel.) *Lye* (1971);
Scirpus lateriflorus Gmel. (1791) – type: from 'Sri Lanka';
Scirpus supinus L. *sensu* *Cufodontis, Enum.* (1971).

Tufted annual with few to many crowded stems. Stems 4–40 cm long to the inflorescence, or 8–60 cm long when including the bract, 0.4–2 mm thick, 3-angled to almost rounded. Leaf-sheaths ending in minute lobes or well developed blades 10–30 cm long. Inflorescence lax with clusters of spikelets on branches of unequal length, or contracted to a pseudo-lateral globose cluster. Major involucre bract 3–12 cm long, stem-like, shorter than the stem. Spikelets 4–10 x 2–2.5 mm, ovoid, acute, variegated grey, green and brown. Glumes 2.5–4 mm long (the lowest largest), oval, red-brown or pale with red-brown lines or patches; margins black, shortly hairy, midrib green, extending into a short awn. Perianth absent. Style with 3 branches. Nutlets 1–1.3 mm long, broadly ovoid, 3-angled, sharply transversely



Figure 212.17 *SCHOENOPLECTUS LATERIFLORUS*. Drawn by R.W. Haines from Haines 4047. (Reproduced with permission from Haines & Lye, fig. 84, 1983.)

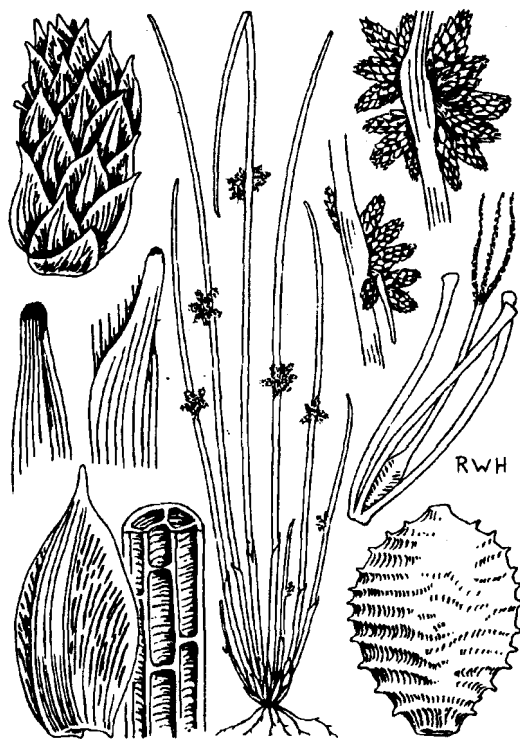


Figure 212.18 *SCHOENOPLECTUS MICROGLUMIS*. Drawn by R.W. Haines from Langdale-Brown 2323. (Reproduced with permission from Haines & Lye, fig. 81, 1983.)

wrinkled, black when mature. Flowers within the leaf-sheaths produce nutlets 2–2.5 mm long. Fig. 212.17.

A weed in a waterlogged field; elsewhere also in seasonally wet soils in swamps or grasslands, or in shallow water in pools or ditches; 2400 m. SU; old world tropics. Pülschen 38.

10. *S. microglumis* Lye (1971)

– type: Uganda, Langdale-Brown 2323 (KAW holo.).

Scirpus tenerrimus Peter (1936).

Small, delicate, glabrous annual with shallow roots. Stems few or many, 1–15 cm long to the inflorescence, 2–20 cm long including the stem-like bract, 0.6–0.8 mm thick, with rounded ridges. Leaf-blade up to 8 x 0.1 cm; sheath pale. Inflorescence of 1–10 sessile or nearly sessile spikelets in a dense head-like cluster. Main inflorescence bract stem-like, 10–100 x 0.6–0.9 mm, usually about as long as the stem. Spikelets 3–5 x 1.5–2 mm, variegated red-brown to straw-coloured, looking somewhat spiny from the acute, spreading glumes. Glumes 1.4–1.8 mm long, ovate, red-brown with pale green midrib and pale margins without hairs, midrib extending into a short awn. Perianth segments absent. Style-branches 3. Nutlets 0.7–1.0 x 0.5–0.7 mm, obovate, bluntly 3-angled, with transverse frills also across the angles, turning from pale brown when young to dark brown or black when ripe. Cleistogamous flowers usually produced within the basal leaf-sheaths; nutlets el-

liptic-ovate, 1.3–1.5 x 0.9–1.0 mm, with transverse wrinkles. Fig. 212.18.

Grassy strip between fields of *Guizotia* and *Eleusine*; in E Africa also in swamps; 1800 m. GJ; scattered in E Africa. Mesfin T. & Kagnev G.Y. 1782.

3. *ELEOCHARIS* R.Br. (1810)

Small to large, annual or perennial, glabrous herbs, apparently without leaves. Stems usually rounded or 3-angled, hollow or pith-filled, sometimes with transverse ribs. Leaf-sheaths usually pale brown or straw-coloured, often purple at the base, tubular, truncate above and ending in a short triangular or lanceolate lobe. Inflorescence a single terminal ovate to lanceolate (rarely almost globose) spikelet. Leafy involucral bracts absent. Lower 1–2 sterile glumes of spikelet sometimes much stiffer than the fertile ones. Fertile glumes spirally arranged and overlapping, usually numerous, pale grey to dark brown. Perianth of 3–9 bristles shorter or longer than the nutlets, or absent. Stamens 1–3. Style with 2–3 style branches. Nutlets with the style base persistent as a small or large appendage, white, brown or black, obovate or urn-shaped; surface smooth, reticulate, pitted or longitudinally grooved with transverse ridges; appendage conical or flattened.

About 180 species in all tropical and temperate parts of the world, but with most species in America; 6 species recorded for the Flora area.

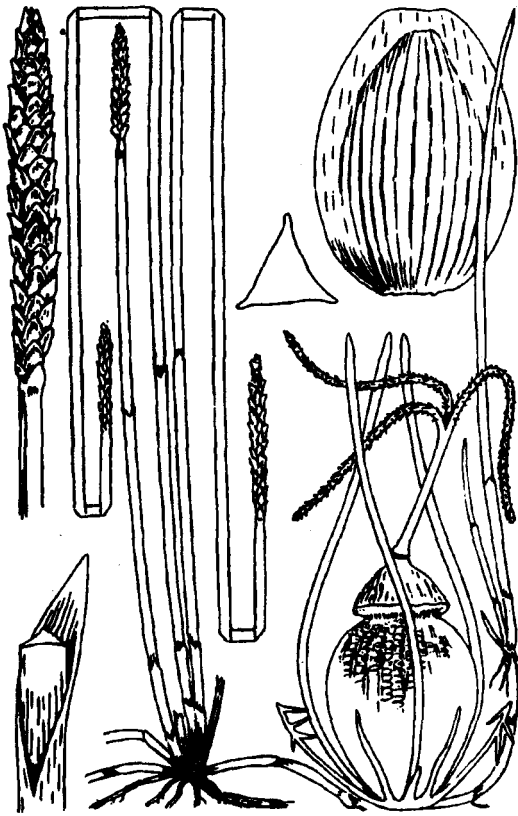


Figure 212.19 *ELEOCHARIS ACUTANGULA*. Drawn by R. W. Haines from Haines 4538. (Reproduced with permission from Haines & Lye, fig. 93, 1983.)

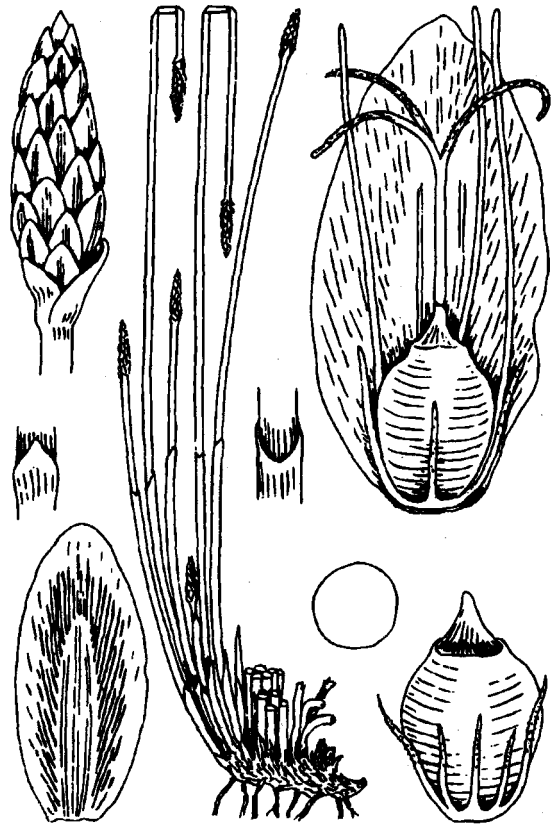


Figure 212.20 *ELEOCHARIS MARGINULATA*. Drawn by R. W. Haines from Haines 4101. (Reproduced with permission from Haines & Lye, fig. 98, 1983.)

1. Perennial with 1–8 mm thick stems; spikelets 8–60 mm long; glumes 3–6 mm long. 2
– Annual with 0.1–0.9 mm thick stems; spikelets 1–6 mm long; glumes 1–2 mm long. 3
 2. Nutlets smooth; rhizome robust; stems without sharp angles. 2. *E. marginulata*
– Nutlets longitudinally grooved and reticulate; plant-base often with stolons; stems sharply 3-angled. 1. *E. acutangula*
 3. Spikelet ovate or globose; glumes 2–3 mm long; stigmas 2; nutlets lens-shaped. 4
– Spikelets ovate; glumes less than 1.5 mm long; stigmas 2 or 3; nutlets 3-angled or lens-shaped. 5
 4. Spikelets ovate-lanceolate with apex acute, 2–2.5 mm wide; appendage on nutlets as long as wide. 4. *E. intricata*
– Spikelets nearly globose with apex rounded, 2.5–3.5 mm wide; appendage on nutlets wider than long. 3. *E. geniculata*
 5. Nutlets flattened, style with 2 stigmas. 6. *E. atropurpurea*
– Nutlets 3-ridged; style with 3 stigmas. 5. *E. setifolia*
1. *E. acutangula* (Roxb.) Schult. (1824);
Scirpus acutangulus Roxb. (1820) – type: from 'India'.
E. fistulosa Schult. var. *robusta* Böck., probably in *Flora*: 563 (1879).

Tall perennial with usually 4–10 stems from a short hardened base sometimes with 5–20 cm long, horizontal, scale-covered stolons producing new plants at their tips. Stems 35–90 x 0.2–0.5 cm, sharply 3-angled. Sheaths much wider than the stem, grey to purple, ending in a short acute lobe. Spikelet 10–60 x 3–5 mm, often with more than 80 flowers. Glumes 4–5 mm long, green or straw-coloured with brown or red-brown parts and narrow transparent marginal borders. Perianth-segments a few short bristles with few or no barbs, or 6–7 long bristles (often strongly barbed). Stamens 3. Style with 3 branches. Nutlets 1.4–2 x 1.2–1.6 mm, brown, longitudinally ridged with transverse bars between the ridges; appendage much larger than the nutlets and with a distinct constriction between the nutlets and the appendage. Fig. 212.19 & 23.4.

Standing water in lakes and pools, marshy areas, swampy grassland; 1550–1900 m. GJ SU AR KF; pan-tropical. *Gilbert & Thulin* 887; *Friis et al.* 38; *Mesfin T. & Kagnev G.Y.* 1764.

2. *E. marginulata* Hochst. ex Steud. (1855)
– type: TU, near Adua, *Schimper* II:915 (P holo., K iso.).
E. striata Hochst ex Steud. (1855) – type: GD, near Enschedcap, *Schimper* II:1331 (P holo., K iso.).
Tussocky perennial with a short horizontal woody rhi-

zome and crowded culms; stolons lacking. Stems 20–60 x 0.15–0.2 cm, almost smooth. Sheaths red-brown, often dark purple below. Spikelet 8–17 mm long, lanceolate, usually with 20–40 flowers, sometimes producing viviparous shoots. Glumes about 4 mm long, red-brown, without a prominent pale border. Perianth-bristles c 6, of various lengths, but shorter than the nutlets. Stamens 3. Style with 3 stigmas. Nutlets 1.4–1.6 (excluding appendage) x 1–1.2 mm, obovate, dull yellow-brown to olive green; surface somewhat rough, but neither ribbed nor reticulate; appendage smaller than in related species. Fig. 212.20 & fig. 212.22.1–3.

Wetter depressions in grassland, in ditches and pools, in mud beside streams and on river flood plains; 1900–2900 m. EW TU GD GJ WU SU KF; Kenya and Tanzania. *W. de Wilde* 7464; *Mooney* 8150; *Mesfin T. & Kagnew G.Y.* 2528.

3. *E. geniculata* (L.) Roem. & Schult. (1817);

Scirpus geniculatus L. (1753) – type: from 'Jamaica'.

E. capitata R.Br. (1810).

E. caribaea (Rottb.) Blake (1918) sensu Napper.

Tufted annual with crowded, often curved, stems. Stems 5–30 x 0.06–0.09 cm, rounded or angular. Sheath grey above, purple below, ending in a short triangular acute lobe with a thin hyaline margin. Spikelet shortly ovate to almost globose, usually 3–4 x 2.5–3.5 mm, usually with 15–30 flowers. Glumes about 2 mm long, grey below, brown above, margins usually somewhat frayed without distinct hyaline borders; apex rounded. Perianth-bristles 5–7, glabrous, longer than the nutlets. Stamens 1–3. Style with 2 stigmas. Nutlets about 0.8 x 0.6 mm, obovate, lens-shaped, black-purple, smooth and shiny; appendage small, pale, forming a low cone. Fig. 212.21 & fig. 212.22.5–7.

In E Africa and Somalia in swamps and shallow water; sea level to 1000 m in Somalia. EE ?HA; pan-tropical, extending to South Africa.

This species occurs quite frequently in N Somalia (Somaliland) and has been collected near the Ethiopian border (*Gillett* 4339). It is likely to occur in the Flora area.

4. *E. intricata* Kük. (1914).

Slender perennial or annual sometimes forming dense stands with many 1 mm thick stolons at the soil surface producing tufts of stems and more scattered stems from the stolons. Stems 3–20 x 0.05–0.12 cm, smooth or angled. Leaf-sheaths grey above, brown or red-brown below, tip triangular, membranous. Spikelets ovate to lanceolate with acute tips, usually 4–5 x 2–2.5 mm, 10–30-flowered. Glumes 2.2–2.5 mm long, broadly ovate, grey to red-brown with thick green midribs ending below rounded apex; margins border irregularly pale. Perianth-bristles 6–7, light red-brown with many recurved barbs, at least 3 bristles longer than nutlets. Style with 2 long branches. Nutlets 0.8–1 long without

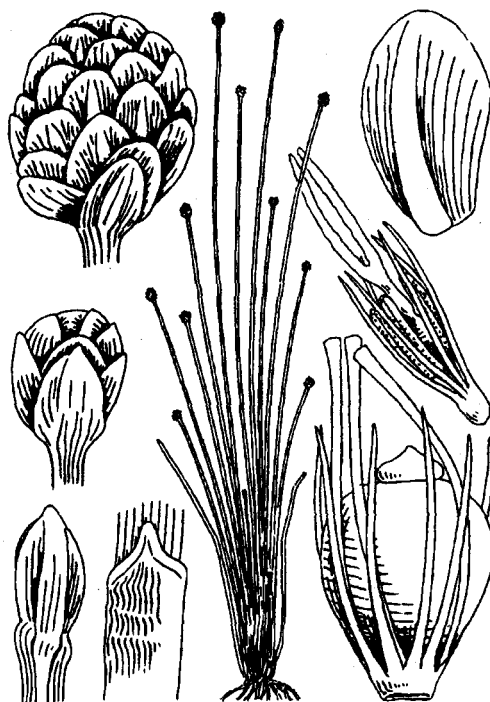


Figure 212.21 *ELEOCHARIS GENICULATA*. Drawn by R.W. Haines from *Chandler* 1481. (Reproduced with permission from Haines & Lye, fig. 101, 1983.)

appendage, dark red-brown and glossy; appendage pale, 0.3 mm long, 3-angled.

In rock crevices where water flows over them; c 1000 m. HA; Somalia and N Africa. *Gilbert* 2327.

5. *E. setifolia* (A. Rich.) Rayn. (1967);

Isolepis setifolia A. Rich. (1851) – type: near Djeladjeranne in Tekeze valley, *Quartin-Dillon* s.n. (P holo.).

E. atropurpurea (Retz.) Kunth sensu Cufodontis, *Enum.* (1971).

Small tufted annual with crowded stems, often with small basal tubers. Stems 4–10(–20) x 0.03–0.04 cm, angular. Leaf-sheaths pale, without any red colour, ending in short triangular lobes. Spikelets 2–5 x 1–2 mm, ovate to obovate, 10–25-flowered. Glumes 1–1.3 mm long, light brown with green keel and prominent pale marginal border, often turning darker with age; apex obtuse or emarginate. Perianth-bristles absent. Stamen solitary. Style with 3 stigmas. Nutlets about 0.5 x 0.3 mm, obovate, strongly 3-ribbed, smooth or minutely tuberculate, yellow-brown; appendage brown, a triangular-cone set in a rim. Fig. 212.22.8 & fig. 212.23.

Habitat not recorded for the Flora area; in E Africa from seasonally wet soils, often on shallow soil over rocks with seepage. TU/GD; Kenya. In the Flora area, known only from the type collected over 150 years ago.

5. *E. atropurpurea* (Retz.) Presl. (1828);

Scirpus atropurpureus Retz. (1789) – type: from India, *König* s.n.

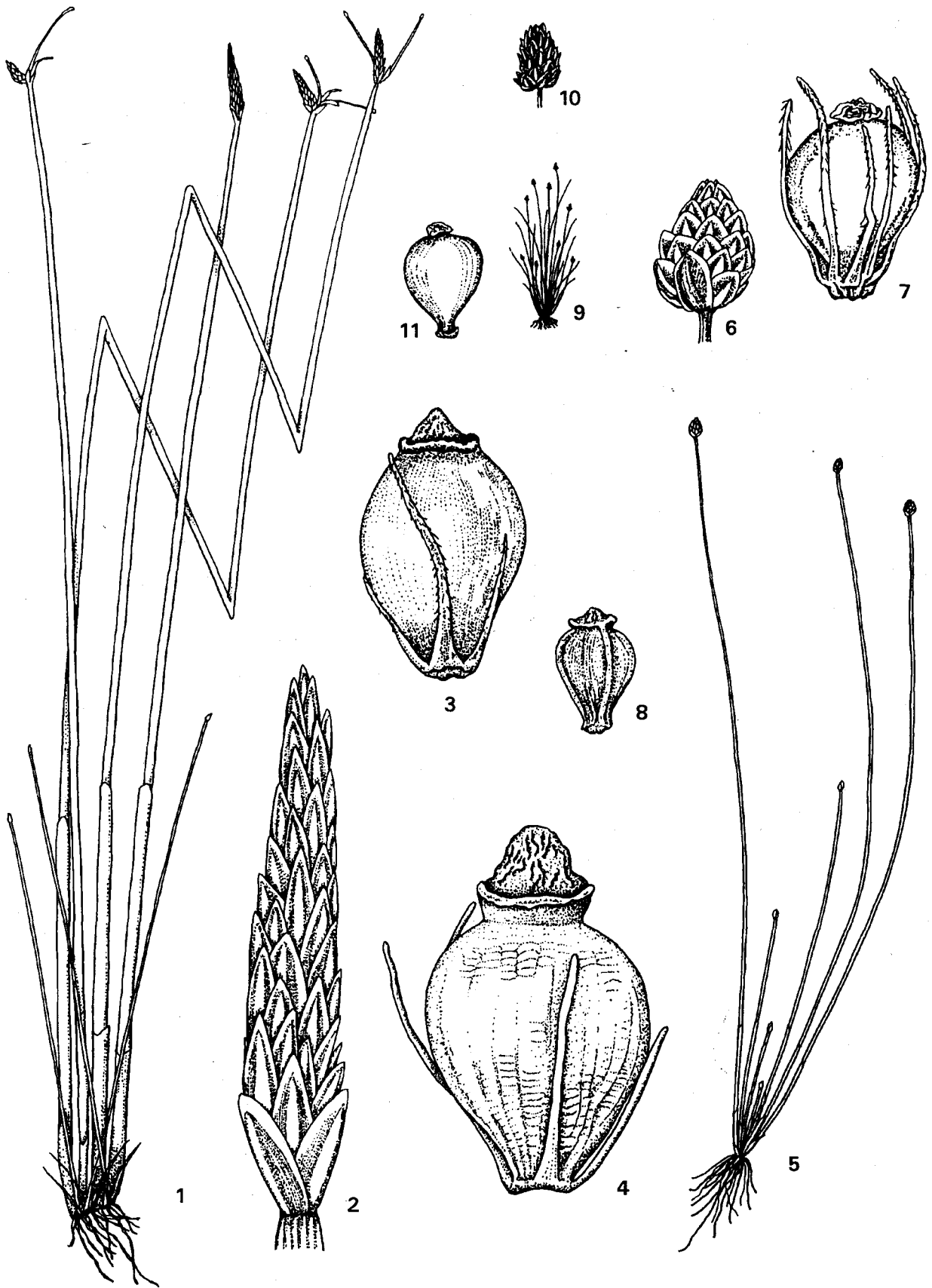


Figure 212.22 *ELEOCHARIS MARGINULATA*: 1 – flowering plant x 1/2; 2 – spikelet x 5; 3 – nutlet with setae x 25. *E. ACUTANGULA*: 4 – nutlet x 25. *E. GENICULATA*: 5 – flowering plant x 1/2; 6 – spikelet x 5; 7 – nutlet x 25. *E. SETIFOLIA*: 8 – nutlet x 25. *E. ATROPURPUREA*: 9 – flowering plant x 1/2; 10 – spikelet x 5; 11 – nutlet x 25. 1–3 from *de Wilde* 7464; 4 from *Lye* 5045; 5–7 from *Thulin & Warfa* 5620; 8 from *Greenway & Kanuri* 14465; 9–11 from *Lobin* 7048. Drawn by Gerd Mari Lye.

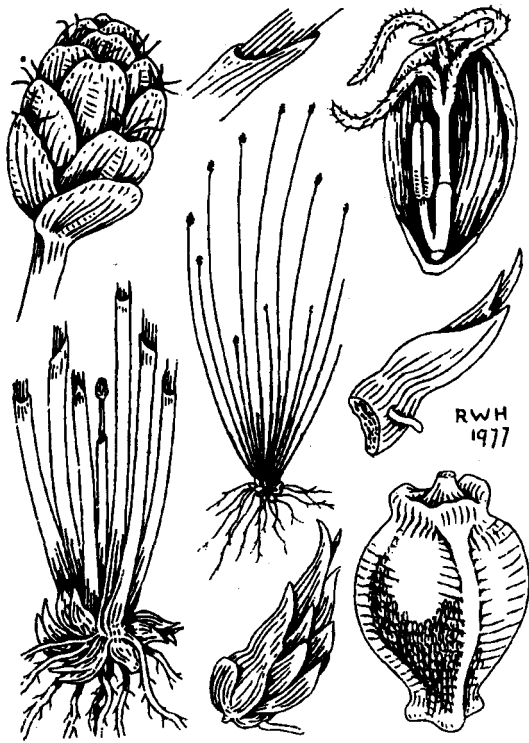


Figure 212.23 *ELEOCHARIS SETIFOLIA*. Drawn by R.W. Haines from Lye 6353. (Reproduced with permission from Haines & Lye, fig. 109, 1983.)

Dwarf tufted annual. Stems 1–12 x 0.02–0.03 cm, 3-angled. Leaf-sheaths usually 2, the lower purple; the upper ending in a short triangular lobe. Spikelets 2–4 x 1–2 mm, ovate, usually 10–20-flowered. Glumes c 1 mm long, pale to dark red-brown with a green midrib ending in or near the obtuse tip, with or without narrow pale margins. Perianth-bristles usually present, 4 or 5, shorter than the nutlets, with recurved spine-like teeth. Stamens 2. Style with 2 stigmas. Nutlets c 0.5 x 0.4 mm, broadly obovate, lens-shaped, smooth and glossy, almost black when mature; appendage grey, minute, flattened. Fig. 212.22.9–11 & fig. 212.24.

Growing with *Fuirena microglumis* in grassland between fields of *Guizotia* and *Eleusine*; in E Africa on wet trampled mud by temporary pools and in seasonally wet grassland and swamps; c 1800 m. GJ; pantropical. *Mesfin* T. & Kagnew G.Y. 1780.

4. FIMBRISTYLIS Vahl (1805)

Annual or perennial herbs forming tussocks or with stems more spaced out from a rhizome or stolon. Stems rounded, angled or flattened, glabrous or scabrid. Leaves mostly basal; sheaths glabrous or with short hairs, without long flexuose white hairs at openings; blades usually well developed, flat, linear, glabrous or short hairy. Inflorescence a lax anthela of 1 sessile spikelet and 1 to many stalked spikelets or groups of sessile and stalked spikelets, more rarely spikelets con-

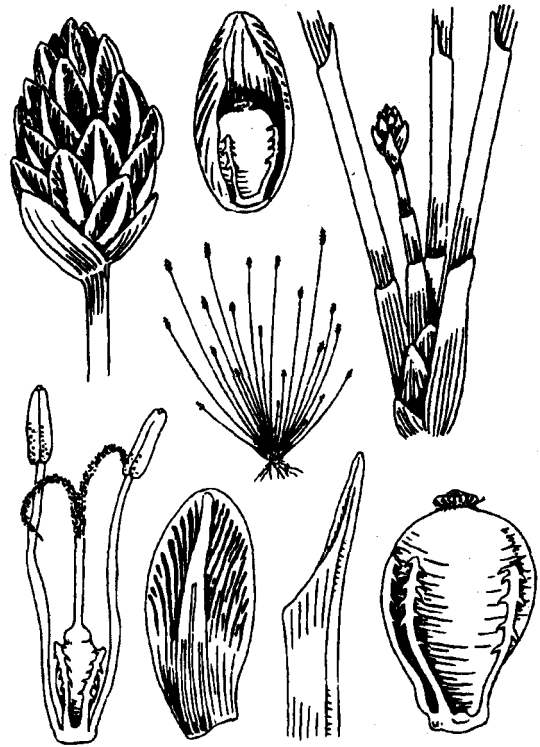


Figure 212.24 *ELEOCHARIS ATROPURPUREA*. Drawn by R.W. Haines from Lock 69/400. (Reproduced with permission from Haines & Lye, fig. 104, 1983.)

gested, or inflorescence a terminal spikelet only. Involucral bracts usually leafy and spreading, shorter or longer than the inflorescence. Spikelets ovate to elongate, with numerous bisexual flowers subtended by spirally arranged glumes. Glumes oval to lanceolate or almost orbicular, glabrous or short-hairy, sometimes with longer hairs on margins; midrib ending below apex or extending in a short or long awn. Perianth absent. Stamens 1–3. Style often strongly flattened and fimbriate, with 2 or 3 stigmas; base widened but falling with the rest of style, very rarely with slender processes descending from the style-base over the nutlets. Nutlets orbicular or obovate to almost cylindrical, 3-angled or lens-shaped, smooth, tuberculate or reticulate with hexagonal or linear surface cells; the cells are never longer than wide when seen from base towards apex.

About 150 species in all tropical and subtropical parts of the world, but especially numerous in Asia and Australia; 8 species recorded for the Flora area.

1. Stems flattened; stigmas 3; nutlets 3-angled. 2
- Stems angled or rounded, at least at the base; stigmas 2; nutlets lens-shaped. 3
2. Most spikelets on individual stalks, sessile spikelets not clustered; stems 0.15–0.3 cm wide.
 1. *F. complanata*
 - Spikelets more crowded with 2 or more on a stalk and 2 or more sessile spikelets together; stems less than 0.15 cm thick. 2. *F. keniaensis*



Figure 212.25 *FIMBRISTYLIS COMPLANATA*. Drawn by R.W. Haines from Haines 4028. (Reproduced with permission from Haines & Lye, fig. 119, 1983.)

3. Upper part of glumes grey with densely set minute hairs. 4. *F. ferruginea*
– Glumes glabrous on upper surface. 4
4. Leaves reduced to sheaths or with very short blades only; nutlets almost smooth. 3. *F. longiculmis*
– Leaf-blades well developed; nutlets with different epidermal cell patterns, not smooth. 5
5. Culms 4–5-angled; nutlets less than 0.6 mm long, epidermal cells forming ridges. 5. *F. miliacea*
– Culms 2–3 angled; nutlets more than 0.6 mm long, epidermal cells forming longitudinal ribs. 6
6. Nutlets 1.2–1.7 mm long, epidermal cells very small forming 13–20 longitudinal ribs on each side. 6. *F. pilosa*
– Nutlets 0.6–1.2 mm long, epidermal cells large, forming 5–10 longitudinal rows on each side. 7
7. Plant forming tussocks, rhizomes absent; spikelets 1.0–1.8 mm wide; nutlets with 5–7 rows of epidermal cells on each side. 7. *F. dichotoma*
8. *F. bisumbellata*
– Plant with short rhizomes; spikelets 2–3 mm wide; nutlets with 8–10 rows of epidermal cells on each side.
1. *F. complanata* (Retz.) Link (1827);
Scirpus complanatus Retz. (1789) – type: from 'India'.

Tufted perennial with short woody rhizome. Stems 30–120 x 0.15–0.3 cm, flat to almost winged, glabrous or scabrid on margins just below the inflorescence. Leaves

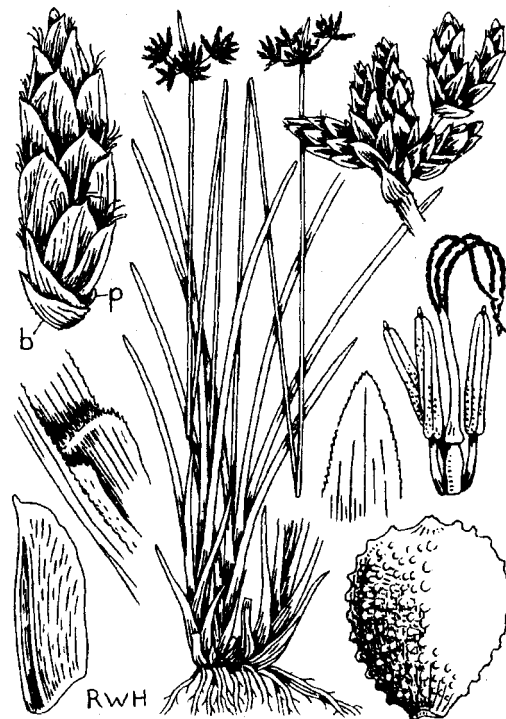


Figure 212.26 *FIMBRISTYLIS KENIAEENSIS*. Drawn by R.W. Haines from Agnew & Musumba 5319. (Reproduced with permission from Haines & Lye, fig. 122, 1983.)

with well-developed blades, 5–35 x 0.5–1 cm, sheaths compressed, glabrous except for margin below; ligule a rim of densely set short hairs. Inflorescence lax with a sessile spikelet surrounded by stalked spikelets and additional groups of sessile and stalked spikelets; major involucre bracts usually shorter than the inflorescence. Spikelets 5–8 x 2 mm, up to 12 mm long when fruiting, ovoid to lanceolate, acute, brown, 5–15-flowered. Glumes 2.5–3 mm long, ovate, brown to dark brown with pale margins; midrib keeled, ending in an acute apex or short awn. Stamens 3. Style with 3 stigmas. Nutlets 0.8–1 mm long, obovate, obscurely 3-angled, with cells in longitudinal rows and with scattered tubercles. Fig. 212.25.

Waterlogged grassland and fields, marshy areas, ditches, swampy lake margins; 1900–2900 m. EW TU GJ SU AR SU/WG SD HA; pantropical. Mooney 8155; Mesfin T. & Sebsebe D. 348; Mooney 7601.

2. *F. keniaeensis* Kük. (1925)

F. complanata (Retz.) Link subsp. *keniaeensis* (Kük.) Lye in *Nordic J. Bot.* 2 (1982) – types: Kenya, Fries & Fries 728 & 1072 (UPS syn.).

Perennial with short woody rhizome forming dense tussocks. Stems 25–50 x 0.07–0.15 cm, conspicuously flattened and densely scabrid at least below the inflorescence. Inflorescence with crowded spikelets, 2 or more on a stalk and 2 or more sessile spikelets together forming groups. Involucral bracts short, often 1–3 cm long, erect or spreading. Spikelets 7–9 x 3 mm, dark



Figure 212.27 *FIMBRISTYLIS LONGICULMIS*. Drawn by R.W. Haines from Lye 5953. (Reproduced with permission from Haines & Lye, fig. 132, 1983.)

brown, 8–12-flowered. Glumes c 3.5 mm long, ovate-elliptic, medium to dark brown, usually lacking pale patches on margins; midrib prominent, apex acute or with a short awn. Style with 3 long branches. Nutlets 0.9–1.0 mm long, obovate, obtusely 3-angled, tuberculate. Fig. 212.26 & fig. 212.31.1–3.

In E Africa found in grassland, often in seasonally damp habitats; 1000–2000 m. TU SU ?GG; Kenya. Senni 444; Chioventa 976, 1929.

The herbarium collections from E Africa named as *F. complanata* and *F. keniaensis* seem to vary with regards to single or clustered sessile spikelets.

3. *F. longiculmis* Steud. (1855)

– type: from Madagascar, Boivin s.n.

Densely tufted perennial with short rhizome. Stems 60–130 cm long, often somewhat compressed at least above. Leaf-sheaths grey or light brown, ending in a lobe or short blade. Inflorescence lax with 1 sessile spikelet subtended by stalked spikelets and often additional groups of sessile and stalked spikelets. Involucral bracts very short. Spikelets 7–15(–20) mm long, ovoid-lanceolate, light to dark brown; 20–30-flowered. Glumes 3.5–4 mm long, ovate, red-brown above, but pale below and along midrib, glabrous; midrib ending in an acute apex or small awn. Stamens 3. Style with 2 stigmas. Nutlets obovate, lens-shaped, almost smooth. Fig. 212.27.

In E Africa found in swamps and wet grassland in saline or alkaline habitats, particularly near the sea-



Figure 212.28 *FIMBRISTYLIS FERRUGINEA* subsp. *SIEBERIANA*. Drawn by R.W. Haines from Haines 4290. (Reproduced with permission from Haines & Lye, fig. 135, 1983.)

shore; 60 m. AF; East tropical Africa, Madagascar. Hemming 1236.

Getachew A. 2679 from a hot spring near Lake Langano (c 1500 m) has also been identified as this species, but this needs confirmation.

4. *F. ferruginea* (L.) Vahl (1805).

Tufted perennial with a short rhizome. Stems 50–100 x 0.1–0.3 cm, somewhat compressed, glabrous or with scattered spine-like or obtuse teeth. Leaf-blades rather short, up to 30 x 0.05–0.15 mm. Inflorescence a lax or congested anthela of sessile and stalked spikelets; involucral bracts shorter or longer than the inflorescence. Spikelets 5–18 x 3–5 mm, oblong-ovoid, acute, 20–40-flowered. Glumes 3–4 mm long, broadly ovate, light to dark red-brown, densely short-hairy in upper half; the midrib slightly extended. Stamens 3. Style with 2 long stigmas. Nutlets 1–1.7 mm long (when including the short gynophore), obovate, lens-shaped, almost smooth.

1. Lower leaf-sheaths shiny brown and leathery; blades less than 10 cm long; spikelets acute; nutlets 1–1.4 mm long. subsp. *ferruginea*
- Lower leaf-sheaths light brown or pale, not leathery or shiny; largest blades over 10 cm long; spikelets obtuse; nutlets 1.3–1.7 mm long. subsp. *sieberiana*

subsp. *ferruginea*;

Scirpus ferrugineus L. (1762) – type: from 'Jamaica'.



Figure 212.29 *FIMBRISTYLIS MILIACEA*. Drawn by R.W. Haines from *Wingfield* 2087. (Reproduced with permission from Haines & Lye, fig. 128, 1983.)



Figure 212.30 *FIMBRISTYLIS PILOSA*. Drawn by R.W. Haines from *Lock* 69/449. (Reproduced with permission from Haines & Lye, fig. 143A, 1983.)

This subspecies occurs in coastal areas of Kenya and Tanzania, but has not been recorded for the Flora area. However, the coastal areas along the Red Sea are very poorly collected and this plant could occur there.

subsp. *sieberiana* (Kunth) Lye in *Nordic J. Bot.* 2 (1982);

F. sieberiana Kunth (1837) – type: Mauritius, *Sieber* 201 (probably AWH holo.).

F. mauritiana Tausch in *Roem. & Schult.* (1824).

Fig. 212.28.

Wet grassland and swamps on saline or alkaline soils; 450–2500 m. EE EW TU GD GJ SU HA; pan-tropical, but rare in Africa. *Mesfin & Kagnev* 1566; *Burger* 2185; *Vollesen* 7332.

5. *F. miliacea* (L.) Vahl (1805);

Scirpus miliacea L. (1759) – type: from 'India'.

F. quinquangularis (Vahl) Kunth (1837).

Tufted annual without rhizomes. Stems 20–60 x 0.1–0.15 cm, acutely 4–5-angled. Leaves as long as the stems or shorter; blades flat with prominent midrib, 0.2–0.3 cm wide; ligule absent. Inflorescence an open panicle up to 10 cm long. Involucral bracts much shorter than the inflorescence, fine, up to 3 cm long. Spikelets 2–5 x 1–1.5 mm, ovate, acute, sometimes with dark wings on the rachis. Glumes 1–2 mm long, brown to golden brown. Stamen 1, sometimes with an additional vestigial stamen. Style with 3 stigmas. Nutlets 0.4–0.6 x 0.4–

0.4 mm, obscurely 3-angled, obovate, epidermal cells forming raised transverse ridges. Fig. 212.29

In small temporary pool in *Combretum*–*Terminalia* woodland; 550–600 m. IL; occasional in E Africa, originally from Asia and Australia. *Friis* et al. 7248.

Friis et al. 7248 most closely matches *M. Niamir* 55 collected from S Kordofan in Sudan. In Lye (1983), *F. miliacea* is treated as 3 subspecies based on nutlet characters. *F. miliacea* subsp. *miliacea* is said to be the least common, but the most widespread subsp. *macroglumis* Lye has larger nutlets than the collection cited.

6. *F. pilosa* Vahl (1805)

– type: from Ghana, *Thonning* s.n. (probably C holo.).

Tall tufted annual or perennial with short rhizomes. Stems 25–60 x 0.04–0.1 cm, angular or somewhat compressed above, densely covered with short hairs, at least above. Leaf-sheaths hairy with well-developed blades 15–20 x 0.5–3 mm, flat, channelled or inrolled, densely hairy at least on margins. Inflorescence lax, of 4–12 spikelets, one sessile and few to many stalked; major involucral bract shorter or longer than inflorescence. Spikelets 5–12 x 3–4 mm, ovoid, 15–30-flowered. Glumes 2.5–3 mm long, strongly concave, red-brown with paler midribs and margins, glabrous or with a few scattered hairs; margins with short hairs; the raised end of the midrib just reaching the apex. Stamens 2 or 3. Style with 2 stigmas. Nutlets 1.2–1.7 mm long, broadly obovate, lens-shaped, brown; epidermal cells very



Figure 212.31 *FIMBRISTYLIS KENIAEENSIS*: 1 – flowering plant x 1/2; 2 – spikelet x 5; 3 – nutlet x 25. *F. DICHOTOMA*: 4 – flowering plant x 1/2; 5 – spikelet x 5; 6 – nutlet x 25. *F. BISUMBELLATA*: 7 – flowering plant x 1/2; 8 – spikelet x 5; 9 – nutlet x 25. 1–3 from Senni 444; 4–6 from Kukkonen 12523; 7–9 from Lobin 6897. Drawn by Gerd Mari Lye.

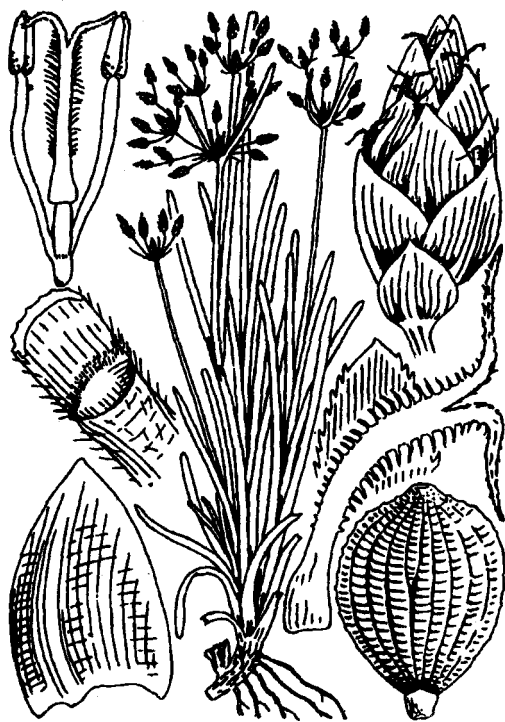


Figure 212.32 *FIMBRISTYLIS DICHOTOMA*. Drawn by R. W. Haines from Haines 4017. (Reproduced with permission from Haines & Lye, fig. 140, 1983.)

small, in 13–20 longitudinal rows on each side. Fig. 212.30.

In E Africa found in seasonally wet grassland or swamps; 1300 m. WG; tropical Africa. *Gilbert & Thulin* 723.

7. *F. dichotoma* (L.) Vahl (1805)

Scirpus dichotomus L. (1753) –type: from 'India'.

Perennial with a short woody rhizome. Stems 10–60 x c 0.1 cm, angular or compressed, glabrous or with scattered hairs above. Leaf-sheaths short-hairy; ligule a dense rim of very short hairs; blades 5–50 x 0.08–0.2 mm, flat or channelled, densely hairy at least on margins. Inflorescence lax, 1 sessile spikelet and few to many stalked spikelets with or without additional groups of sessile and stalked spikelets. Major involucre bract leaf-like, 2–10 cm long. Spikelets 4–12 x 2–3 mm, ovoid to cylindric, acute. Glumes 2.5–3 mm long, red-brown with paler margins and midrib; midrib just reaching the subacute or obtuse apex, or slightly extended. Stamens 2. Style prominently flattened, ciliate, with 2 stigmas. Nutlets 0.8–1.2 mm long, broadly obovate, lens-shaped, grey or brown, with 7–10 longitudinal ribs and rows of cells on either side, without tubercles. Fig. 212.31.4–6 & fig. 212.32.

Common in seasonally or permanently wet grassland, swamps, roadsides ditches and other disturbed habitats; 1000–2750 m. EW TU GD WU GJ SU WG

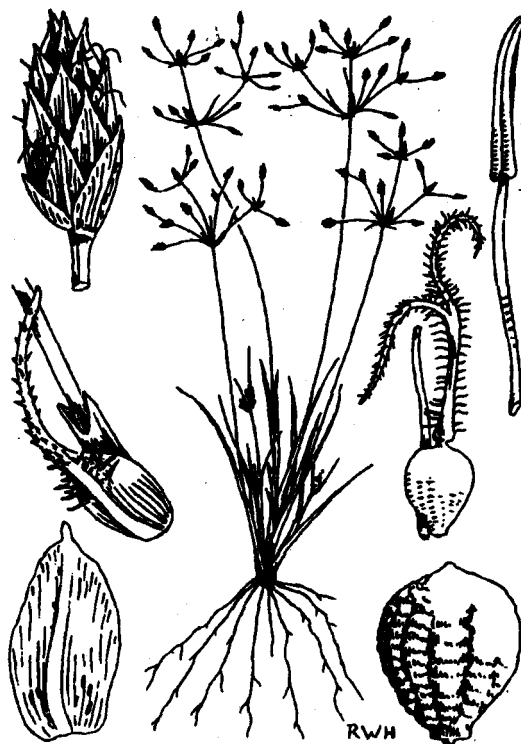


Figure 212.33 *FIMBRISTYLIS BISUMBELLATA*. Drawn by R. W. Haines from *Greenway & Kanuri* 13008. (Reproduced with permission from Haines & Lye, fig. 141, 1983.)

IL KF GG SD HA; pantropical, even in temperate regions. *Mooney* 5923; *Gilbert & Thulin* 758; *Mesfin T. & Kagnev G.Y.* 2262.

8. *F. bisumbellata* (Forssk.) Bub. (1850);

Scirpus bisumbellatus Forssk. (1775) –type: from Egypt, *Forsskål* s.n. (C hol.).

Tufted annual sometimes forming very dense tussocks. Stems usually 8–35 x 0.05–0.1 cm, 3-angled, glabrous. Leaf-sheaths light brown or straw-coloured; ligule a dense rim of short hairs; blades 2–5 x 0.1–0.2 cm, scabrid on margins and major ribs. Inflorescence lax, 1 sessile spikelet and few to many stalked spikelets with or without additional groups of sessile and stalked spikelets; peduncles slender. Major involucre bract leaf-like, shorter or longer than the inflorescence. Spikelets 3–8 x 1.5 mm, angular, acute. Glumes 1.3–1.8 mm long, somewhat concave, brown with green 3-nerved midribs extended in a short awn; margins often shortly ciliate. Stamen 1. Style with 2 stigmas. Nutlets 0.6–0.7 x 0.4–0.5 mm, obovate, lens-shaped, with 5–7 longitudinal rows of cells on each side; tubercles absent. Fig. 212.31.7–9 & fig. 212.33.

Wet temporary pools in woodland, particularly on sandy soils and on river banks; 150–1500 m. EW TU GD GJ HA; old world tropics from West Africa and the Mediterranean to Australia. *Ash* 125, 866; *Sandford* 6; *Mooney* 5855.

5. *ABILDGAARDIA* Vahl (1805)

Perennial herbs of small to medium size. Stems erect or somewhat curved, 3-angled, polyangular or almost terete, glabrous or scabrid. Leaves near the base only; blades well-developed, flat or rarely reduced to sheaths. Inflorescence a head of congested spikelets or reduced to 1 or 2 terminal spikelets. Involucral bracts leafy or glume-like, often shorter than the inflorescence. Spikelets with spirally arranged glumes above and lower glumes in two rows. Glumes glabrous, pale, or red-brown, often with green midrib, oval with obtuse or acute apex. Perianth absent. Stamens 1–3. Style with 2 or 3 stigmas. Nutlets obovate to obconical, obtusely or sharply 3-angled, rarely biconvex, pale, grey, red-brown to almost black; surface smooth or tuberculate, style base swollen but falling off with the style.

About 15 species in all tropical regions, but especially common in Australia.

1. *A. ovata* (Burm. f.) Kral (1971);
Fimbristylis ovata (Burm. f.) Kern (1967); *Carex ovata* Burm. f. (1768) – type: from 'India.'
F. monostachyos (L.) Hassk. (1848).

Densely tufted perennial with very short rhizome. Stems 5–40 x 0.05–0.1 cm, glabrous. Leaves: sheath pale to dark brown; blade flat, 5–25 x 0.05–0.08 cm. Inflorescence of 1, rarely 2 pale green-grey, ovate and somewhat flattened spikelets. Glumes grey or pale green, sometimes with a brown tinge; lower 1–3 about 2–3 mm long (excluding a 3–6 mm long awn), upper larger, but awns successively shorter. Style with 3 stigmas. Nutlets brown. Fig. 212.34.

Grassland and wooded grassland, sometimes waterlogged but not marshy, often in heavily grazed areas; 1050–2400 m. EW SU AR KF SD BA HA; in most tropical regions. *Burger* 3502; *Thulin* 1574; *Sue Edwards* 2157.

6. *BULBOSTYLIS* Kunth (1837)
nom. conserv. ex C.B. Clarke (1893)

Annual or perennial herbs, small to medium in size. Stems erect or somewhat curved, 3 to many-angled or almost rounded, glabrous, scabrid or hairy. Leaves basal only; blades well-developed, flat or filiform, rarely reduced to sheaths, usually with long flexuous hairs at the sheath opening. Inflorescence a laxanthela, head of congested spikelets, or reduced to a single terminal spikelet. Involucral bracts leafy or glume-like, often shorter than the inflorescence. Spikelets with few to many spirally arranged glumes; all scales fertile or lower 1–2 without flowers. Glumes pale, red-brown to almost black, often with a green midrib, oval to orbicular with obtuse to acute apex, midrib sometimes extended into an awn, scabrid or hairy, sometimes glabrous. Perianth absent. Stamens 1–3. Style with 1 or 3 stigmas. Nutlets obovate to obconical, 3-angled, rarely lens-shaped, pale grey, red-brown to almost black; surface variable; swollen style base remaining as a small knob.

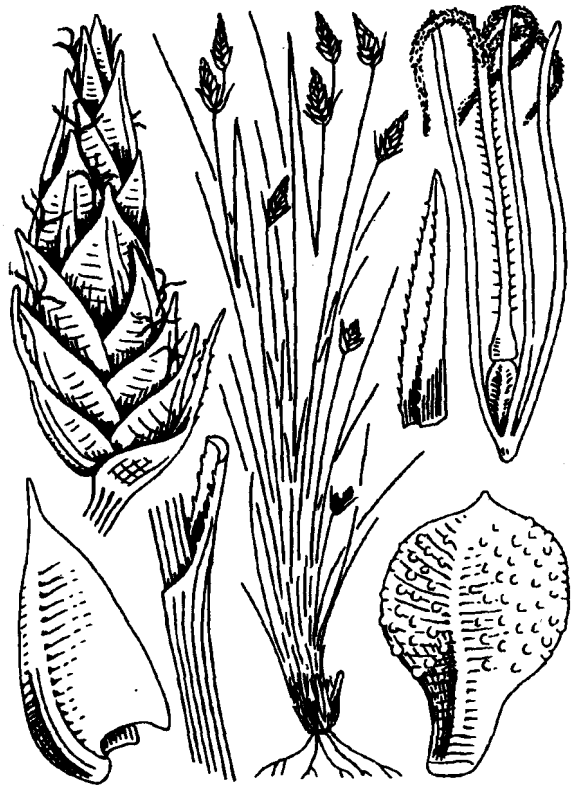


Figure 212.34 *ABILDGAARDIA OVATA*. Drawn by R.W. Haines from *Haines* 4026. (Reproduced with permission from *Haines & Lye*, fig. 158, 1983.)

About 150 species in all tropical regions, especially in tropical Africa where they are found in relatively drier habitats than most other species of Cyperaceae.

1. Inflorescence a solitary spikelet. 2
- Inflorescence of 2 to many spikelets. 4
2. Perennial with stems 40–80 cm long; grows in swamps. 4. *B. clarkeana*
- Annual with stems 0.5–15 cm long; grows in seasonally wet habitats. 3
3. Glumes 2–4 mm long; nutlets almost smooth or reticulate with isodiametric surface cells. 14. *B. striatella*
- Glumes about 1.5 mm long; nutlets transversely wrinkled. 6. *B. sphaerocarpa*
4. Inflorescence a congested head of 3 to many sessile spikelets, rarely with an additional stalked spikelet or spikelet cluster. 5
- Inflorescence a lax anthela (umbel-like), but sometimes consisting of 2–3 spikelets only. 11
5. Nutlets longitudinally striate with many horizontal ribs connecting the longitudinal ribs; plant annual. 15. *B. schimperiana*
- Nutlets not longitudinally striate; plant annual or perennial. 6
6. Annual without remains of previous seasons growth. 7
- Perennial with short rhizome, often with withered remains of the previous season's growth. 9

7. Glumes with a wide base and narrow upper part extended into a long recurved tip and awn.
 16. *B. cruciformis*
 - Glumes ovate, with or without a short awn. 8
8. Glumes 1.5–2 mm long; nutlets smooth or minutely reticulate with isodiametric surface-cells.
 13. *B. barbata*
 - Glumes 2.5–4 mm long; nutlets transversely wrinkled with papillae on the 3 angles.
 7. *B. buchananii*
9. Rhizome ± erect, densely covered with black sheath remnants; midribs of glumes wine red.
 2. *B. schoenoides*
 - Rhizome horizontal, sheath remnants brown; midribs of glumes green, pale brown or the same colour as the glumes. 10
10. Inflorescence dark red-brown; glumes usually 3–4 mm long, without green midrib; in swamps or wet habitats.
 3. *B. setifolia*
 - Inflorescence brown; glumes 4–6 mm long with green midrib; in dry grassland.
 1. *B. boeckeleriana*
11. Largest inflorescence with 2–3 spikelets only. 12
 - Largest inflorescence with 4–many spikelets. 15
12. Perennial growing in swamp or wet habitats; glumes light brown with darker patches and a green mid-rib.
 4. *B. clarkeana*
 - Annual growing in dry or seasonally wet habitats; glumes uniform in colour with or without a different coloured midrib. 13
13. Hairs on leaves and stems short and stiff; spikelets 2–5 x 1.5–3 mm; nutlets tuberculate, persistent style base as a conspicuous yellow knob.
 9. *B. densa*
 - Hairs on leaves and stems, if present, fine, not short and stiff; spikelets 3–15 x 2–4 mm; nutlets wrinkled or reticulate, persistent style base brown or absent. 14
14. Stems 0.5–12 cm long, glabrous or slightly hairy; glumes with midrib extended into an awn; nutlets reticulate with isodiametric surface cells.
 14. *B. striatella*
 - Stems 5–40 cm long, strongly hairy; glumes with or without a short awn; nutlets transversely wrinkled.
 5. *B. hispidula*
15. Nutlets transversely wrinkled (but sometimes papillose on the angles); style-base persistent or deciduous; long hairs at opening of leaf sheath. 16
 - Nutlets minutely papillose, reticulate or almost smooth; style-base usually persistent as a small knob on the mature nutlets; with or without long hairs at opening of leaf-sheath. 17
16. Style base not remaining on the mature nutlets; leaf-sheaths pale, sheaths and blades usually densely hairy.
 5. *B. hispidula*
 - Style-base persistent as a small knob; leaf-sheaths straw-coloured to light brown, scabrid or hairy.
 8. *B. pusilla*
17. Spikelets ovate, 2–5 x 1.5–3 mm; glumes 2–3 mm long; nutlets papillose or tuberculate. 18
 - Spikelets lanceolate, 2–7 x 0.7–2 mm; glumes 1–2 mm long; nutlets reticulate or wrinkled. 19
18. Inflorescence bract glume-like with awn much longer than the spikelets; glumes gapping when nutlets mature, margins ciliate. 12. *B. coleotricha*
 - Inflorescence bract leaf-like and filiform; glumes not gapping when nutlets mature, margins glabrous. 9. *B. densa*
19. Spikelets about 1 mm wide; stamens 1–2; mature nutlets small, 0.5–0.6 mm long.
 10. *B. microlegans*
 - Spikelets 1–3 mm wide; stamens usually 3; nutlets larger, 0.6–1 mm long. 20
20. Glumes with rounded apex, red-brown with conspicuous pale margins; nutlets 0.7–0.8 mm long, smooth or reticulate. 11. *B. abortiva*
 - Glumes mostly acute or mucronate, light to dark brown, margins ciliate, not conspicuously pale; nutlets 0.6–1 mm long. 21
21. Leaf-sheaths straw-coloured to light brown; glumes 1–2 mm long, red-brown, midrib not conspicuous and green. 8. *B. pusilla*
 - Leaf-sheaths pale or green; glumes 2–3 mm long, light brown, midrib conspicuous, usually green. 12. *B. coleotricha*
1. *B. boeckeleriana* (*Schweinf.*) Beetle (1949);
Abildgaardia boeckeleriana (*Schweinf.*) A.A. Beetle (1949); *Scirpus schweinfurthianus* Schweinf. (1894) – types: EW, Mt. Bizen, *Schweinfurth & Riva* 1851 (G lecto.), 1873 (G syn., FT isosyn.); EW, Lalamba near Keren, *Schweinfurth* 837 (G syn., K isosyn.).
- Tufted perennial with woody horizontal rhizome and crowded shoots. Stems 20–70 x 0.05–0.15 cm, angular, glabrous except for minute spine-like hairs below the inflorescence. Leaf-sheaths light brown, glabrous except for long flexuose hairs at their openings; blades 5–15 x 0.05–0.1 cm, flat or channelled, almost glabrous. Inflorescence of 2–12 spikelets, either all sessile forming a head, or with 1–3 additional stalked spikelets or spikelet-clusters. Involucral bracts inconspicuous. Spikelets 6–10 x 2–4 mm, ovoid. Glumes 4–6 mm long, red-brown with a green midrib, minutely short-hairy, ovate with acute apex; margins ciliate. Nutlets 1.4–1.8 mm long, obovate, transversely wrinkled; style base persistent. Fig. 212.35.
- Relatively dry grassland, often on stony hill-slopes; 1600–2700 m. EW SD; East tropical Africa, South Africa. *Cufodontis* 446; *Gilbert & Jefford* 4662.
2. *B. schoenoides* (*Kunth*) C.B. Clarke (1894);
Isolepis schoenoides Kunth (1837) – type: from South Africa, *Drège* s.n. (probably P holo.).
Abildgaardia erratica (*Hook.*) Lye subsp. *schoenoides* (*Kunth*) Lye in *Nord. J. Bot.* 3 (1983).
- Densely tufted perennial, basal parts covered by many old, dark brown or black leaf-sheath remnants. Stems

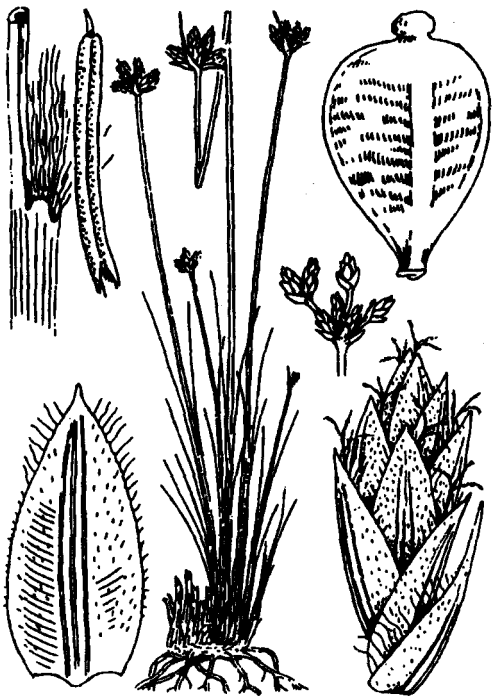


Figure 212.35 *BULBOSTYLIS BOECKELERIANA*. Drawn by R.W. Haines from *Haines* 4081. (Reproduced with permission from Haines & Lye, fig. 167, 1983.)

10–50 x 0.05–0.08 cm. Leaves: sheaths pale brown to wine red when young, persisting and drying black; blade (5–)10–15(–25) x 0.05–0.1 cm, flat or slightly channelled, large square cells on upper surface, lower surface with 3–5 ridges, glabrous except for spiny/scabrid margins. Inflorescence a head of 1–5 obtuse spikelets; bracts shorter than the spikelets. Spikelets 6–10 x 2–3 mm, obtuse. Glumes pubescent, dark brown to black, midrib wine red or pale brown, apex obtuse or emarginate, often frayed, margins with short hairs. Nutlets large, 1.4 x 1 mm, light brown, transversely wrinkled. Fig. 212.36.

Seasonally waterlogged areas, black clay soil; 1800–2000 m. GJ SU SD; Kenya, Tanzania, Uganda. *Stewart* 187; *Gilbert & Jefford* 4306; *Sebald* 2281.

The material seen has previously been named as *B. cinnamomea* (Böck) C.B. Clarke and also *B. collina* Kunth following Napper (1965). It is similar to *B. boeckeleriana* but is larger with very dark glumes and wine-red leaf-sheaths which persist and turn black as described for *B. schoenoides*.

3. *B. setifolia* (A. Rich.) Bodard (1963);

Abildgaardia setifolia (A. Rich.) Lye (1974); *Fimbristylis setifolia* A. Rich. (1851) –type: TU, Uogerat (Quodgerate), *Petit* s.n. (P. holo.).

Bulbostylis atrosanguinea (Böck.) C.B. Clarke (1894); *Scirpus atrosanguineus* Böck. (1885).

Densely tufted perennial forming large tussocks from a much branched rhizome. Stems 10–40 x 0.4–0.7 cm, glabrous or scabrid below the inflorescence. Leaf-sheaths pale brown or slightly red, glabrous, but with

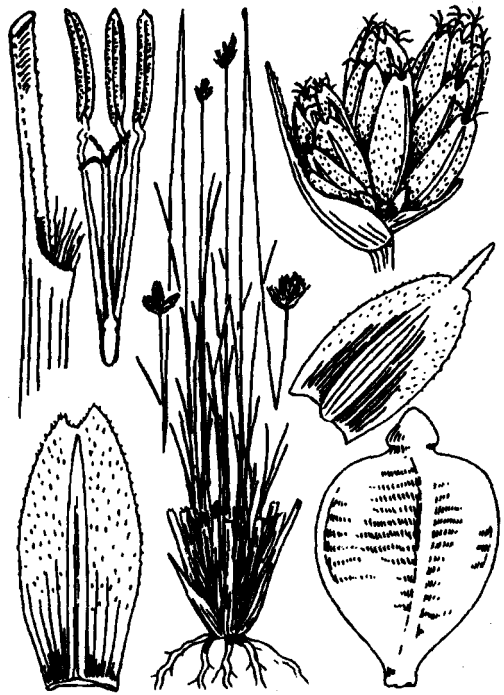


Figure 212.36 *BULBOSTYLIS SCHOENOIDES*. Drawn by R.W. Haines from *Haines* 4266. (Reproduced with permission from Haines & Lye, fig. 172, 1983.)

long hairs the opening; blades 5–12 x c 0.05 cm, flat or channelled, scabrid on margins. Inflorescence of 3–10 sessile spikelets forming an untidy compact head. Involucral bracts small, almost scale-like. Spikelets 5–10

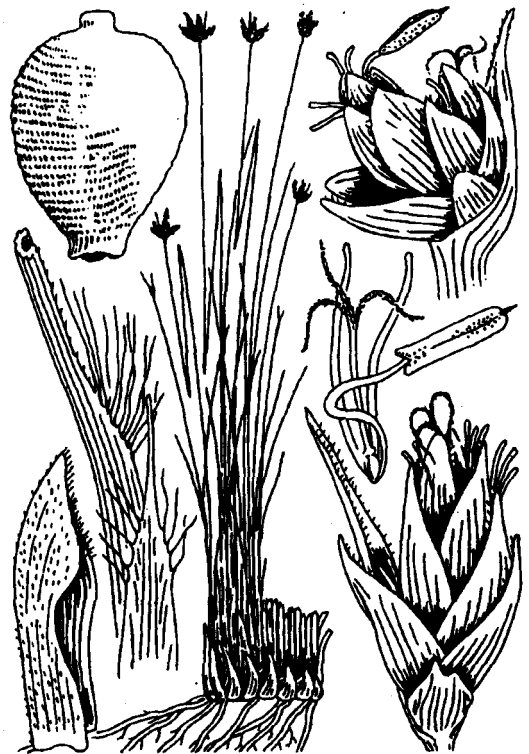


Figure 212.37 *BULBOSTYLIS SETIFOLIA*. Drawn by R.W. Haines from *Haines* 4266. (Reproduced with permission from Haines & Lye, fig. 170, 1983.)



Figure 212.38 *BULBOSTYLIS CLARKEANA*. Drawn by R. W. Haines from Lye 6486. (Reproduced with permission from Haines & Lye, fig. 175, 1983.)

x 3 mm, ovate. Glumes 3–4 mm long (but uppermost glumes sometimes only 2 mm long), light or dark brown to almost black, oval with acute apex, multinerved, glabrous or minutely short hairy. Nutlets 1.3–1.7 mm long, transversely wrinkled, but often not developed or badly attacked by fungi. Fig. 212.37.

Grassy glades in *Juniperus* forest; 2000–3050 m. EW TU GD SU SD; Uganda, Kenya, Tanzania, Malawi, Zambia, Angola. Gillett 14304; Mooney 4831, 8034.

4. *B. clarkeana* Bodard (1961);

Abildgaardia clarkeana (Bodard) Lye (1974) – type: from 'West Africa.'

Slender perennial with a creeping rhizome. Stems clustered, 50–80 x 0.04–0.08 cm, angular, glabrous or scabrid below inflorescence; base covered by red-brown or dark purple leaf-sheaths ending in lobes up to 20 mm long; blades absent. Inflorescence a solitary terminal spikelet or with 1–2 additional spikelets on 1–6 mm long stalks. Spikelets 8–12 x 2–4 mm, ovate-lanceolate. Glumes 3–4.5 mm long, ovate with rounded apex, light brown with darker patches, midrib green, often extended into a short awn, minutely hairy. Style with 3 long stigmas. Nutlets 1–1.3 mm long, obovate, 3-angled with prominent ridges, transversely wrinkled. Fig. 212.38.

Swamps or marshy land, 1900 m. KF; tropical Africa. De Wilde & De Wilde-Duyffes 7646.

5. *B. hispidula* (Vahl) R. Haines (1983);

Scirpus hispidula Vahl (1805); *Fimbristylis hispidula* (Vahl) Kunth (1837); *Abildgaardia*

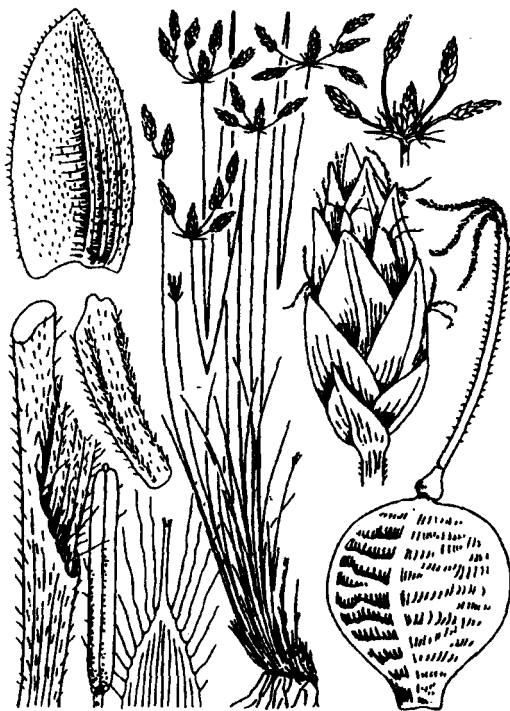


Figure 212.39 *BULBOSTYLIS HISPIDULA* subsp. *HISPIDULA*. Drawn by R. W. Haines from Haines 4038. (Reproduced with permission from Haines & Lye, fig. 181A, 1983.)

hispidula (Vahl) Lye (1974) – type: from West Africa, Thonning 349 (C holo.).

A highly polymorphic species, either annual or (rarely in Ethiopia) perennial with a short woody rhizome. Stems 5–50 x 0.03–0.1 cm thick, angular, hairy or glabrous. Leaf-sheaths pale, densely hairy to almost glabrous with long hairs at the openings; blades usually less than 15 cm long, frequently only 1–2 x 0.02–0.05 cm, flat or channelled, usually densely hairy. Inflorescence a simple or compound laxanthera of one sessile spikelet with 2 to many stalked spikelets or additional groups of sessile and stalked spikelets, rarely all spikelets almost sessile. Involucral bracts usually shorter than the inflorescence. Spikelets 4–15 x 2–4 mm, ovate to elongate. Glumes 2.5–4.5 mm long, light to dark red-brown, or almost black, often with paler midribs and margins, minutely short-hairy both on surface and margins. Nutlets 1–1.3 mm long, pale grey or light brown, obovate, obtusely 3-angled with 5–10 rounded transverse wrinkles on each side, angles smooth or papillate; swollen style-base usually not persistent on the mature nutlets.

1. Plant perennial with short woody rhizome.
 - subsp. *brachyphylla*
 - Plant annual with a slender base. 2
2. Glumes light to medium red-brown; nutlets without papillae on angles. 3
 - Part of glumes black; nutlets with papillae on angles. 4
3. Spikelets 4–10 mm long.
 - subsp. *hispidula*
 - Largest spikelets more than 10 mm long.
 - subsp. *longespicata*

4. Inflorescence lax; nutlets with prominently stalked base. subsp. *pyriformis*
 – Inflorescence lax or dense; nutlets without prominently stalked base. subsp. *oligostachys*

subsp. *hispidula*

Fimbristylis exilis (H.B.K.) Roem & Schult. (1817).

Fig. 212.39.

Open grassland, often in sandy soils or on shallow soils over rocks; 900–1850 m. EW TU TU?/GD? (Tekeze valley) GJ IL GG SD BA HA; pantropical, but most common in Africa. *Pappi* 318/6006; *Gilbert & Getachew A.* 2910; *MG & SB Gilbert* 1319.

subsp. *brachyphylla* (Cherm.) R. Haines in Haines & Lye (1983);

Fimbristylis hispidula (Vahl) Kunth subsp. *brachyphylla* (Cherm.) Napper in *Kew Bull.* 25 (1971); *Abildgaardia hispidula* (Vahl) Lye subsp. *brachyphylla* (Cherm.) Lye in *Nord. J. Bot.* 3: 239 (1983); *Fimbristylis exilis* (H.B.K.) Roem & Schult subsp. *brachyphylla* Cherm. in *Arch. Bot. Caen* 4, Mém 7: 32 (1931) – types: from 'Central African Republic.'

Open grassland, often on sand or soil-covered rocks in heavily grazed areas; c 1400–1500 m. EW; tropical Africa. *Pappi* 2526; *Tellini* 904.

subsp. *longespicata* Lye in *Lidia* 3: 205 (1996)

– type: GG, Murle, *Corradi* 1484 (FT holo.).

Sand in wadis; 500–1400 m. GG; not known elsewhere. *Corradi* 1474; *Pirota* 208/8930.

subsp. *pyriformis* (Lye) R. Haines in Haines & Lye *App.* 3:1 (1983);

Abildgaardia hispidula (Vahl) Lye subsp. *pyriformis* Lye in *Bot. Notiser* 127: 494 (1974) – type: Uganda, *Haines* 4208 (MHU).

Open grassland, often on sand, 700–1500 m. EW GG SD; Uganda, Kenya. *Gilbert et al.* 321; *Gilbert & Jefford* 4454.

subsp. *oligostachys* (A. Rich.) Lye in *Bot. Notiser* 127(4): 496 (1974);

Fimbristylis oligostachys A. Rich. (1851); *Bulbostylis oligostachys* (A. Rich.) Lye (1971); *Abildgaardia hispidula* (Vahl) Lye var. *oligostachys* (Hochst. ex A. Rich.) Lye, in *Bot. Notiser*, 127(4): 496 (1974); *Abildgaardia oligostachys* (A. Rich.) Lye (1983) – type: GD, near Dschomara, *Schimper* 1268 (P holo., K FI-W iso.).

Fig. 212.40.

Seasonally wet soil, especially on shallow soils over rocks; 1600–2700 m. EW TU GD SU AR WG KF HA; Uganda, Kenya, Tanzania. *Mooney* 8165; *Gilbert & Thulin* 712; *Ash* 3101.

6. *B. sphaerocarpa* (Böck.) C.B. Clarke (1894);

Scirpus sphaerocarpus Böck. (1870); *Abildgaardia sphaerocarpa* (Böck.) Lye (1974) –



Figure 212.40 *BULBOSTYLIS HISPIDULA* subsp. *OLIGOSTACHYS*. Drawn by R. W. Haines from *Haines* 4031. (Reproduced with permission from Haines & Lye, fig. 192, 1983.)

type: GD, near Metamma, *Schweinfurth* 2046 (G holo., BM BREM K iso.).

Slender tufted annual. Stems 3–10 cm long; leaf-blades 2–10 cm long, filiform, scabrid. Inflorescence a solitary terminal spikelet, and cleistogamous spikelets within leaf-sheaths at base of stem. Spikelets 3–8 x 1–1.5 mm, ovate-elliptic, 5–10 flowered. Glumes c 1.5 mm long, red-brown with paler midrib, sparsely hairy. Nutlets from terminal spikelet 0.8–0.9 mm long, obovate, pale, transversely wrinkled. Nutlets from stem-base 1.2–1.3 mm long, otherwise similar.

Seasonally damp soil; 1000–2000 m. GD; Tanzania, Angola. *Chioventa* 2146.

7. *B. buchananii* C.B. Clarke (1902);

Abildgaardia buchananii (C.B. Clarke) Lye (1974) – type: Malawi, *Buchanan* 1329.

Densely tufted annual (perhaps short-lived perennial). Stems 5–35 x 0.03–0.06 cm thick, angular, scabrid or glabrous. Leaf-sheaths pale brown with long hairs at openings; blades 2–20 x 0.02–0.06 cm wide, filiform, scabrid on margins. Inflorescence a terminal head of few to many sessile spikelets. Involucral bracts filiform, longer than the inflorescence and often prominent. Spikelets 3–6 x 1–2 mm, lanceolate-elliptic. Glumes 2.5–4 mm long, red-brown and densely short hairy, ovate with acute or mucronate apex. Nutlets 0.8–1.1 mm long, obovate, 3-angled, grey, strongly transversely wrinkled, with large papillae on the angles. Fig. 212.41.

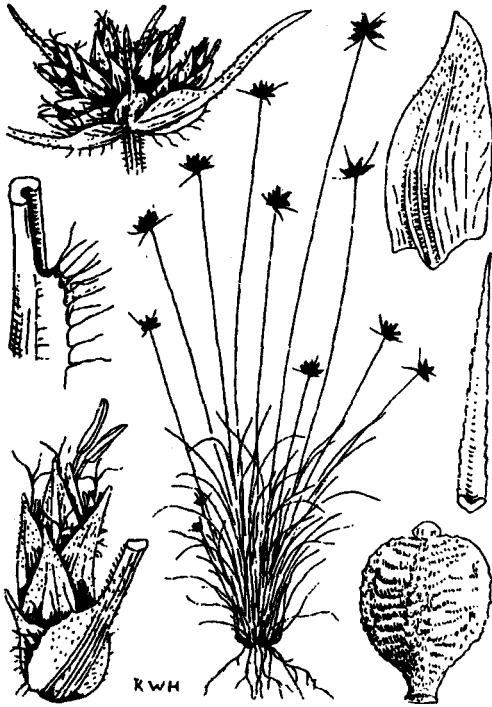


Figure 212.41 *BULBOSTYLIS BUCHANANII*. Drawn by R. W. Haines from Vesey-FitzGerald 6680. (Reproduced with permission from Haines & Lye, fig. 210, 1983.)

Open bushland; 1900 m. GG; east and south tropical Africa. *Gilbert et al.* 425.

8. *B. pusilla* (*Hochst. ex A. Rich.*) *C.B. Clarke* (1894);
Fimbristylis pusilla *Hochst. ex A. Rich.* (1851);
Abildgaardia pusilla (*Hochst. ex A. Rich.*) *Lye*
 (1974) – types: TU, near Guendepa, *Schimper* 796
 (P lecto., FI-W G M isolecto.); near Adua, *Quartin-*
Dillon s.n. (P syn.).

Tufted slender annual with few to many crowded stems. Stems 3–40 x 0.02–0.05 cm thick, 3-angled or angular, glabrous to densely hairy. Leaf-sheaths straw-coloured to light brown, scabrid to hairy, with long hairs at the opening; blades 1–40 x 0.2–0.4 mm, scabrid or hairy. Inflorescence a simple or compound lax anthela with 2–40 spikelets up to 5 cm long; one sessile spikelet with 1–10 stalked spikelets and additional groups of sessile and stalked spikelets. Spikelets 2–5 x 1–2 mm, ovate. Glumes 1–2 mm long, ovate, red-brown, often with paler ciliate margins; surface densely short hairy to almost glabrous. Nutlets 0.6–1 mm long, obovate to obcordate, obscurely 3-angled, grey to brown or olive, prominently transversely wrinkled with one papilla per cell making up the top of the wrinkles.

1. Stems and leaves densely short-hairy, glumes 1.5–2 mm long. subsp. *congolensis*
- Stems and leaves scabrid to glabrous; glumes 1–1.5 mm long. 2
2. Glumes almost glabrous; nutlets 0.9–1 mm long. subsp. *pusilla*

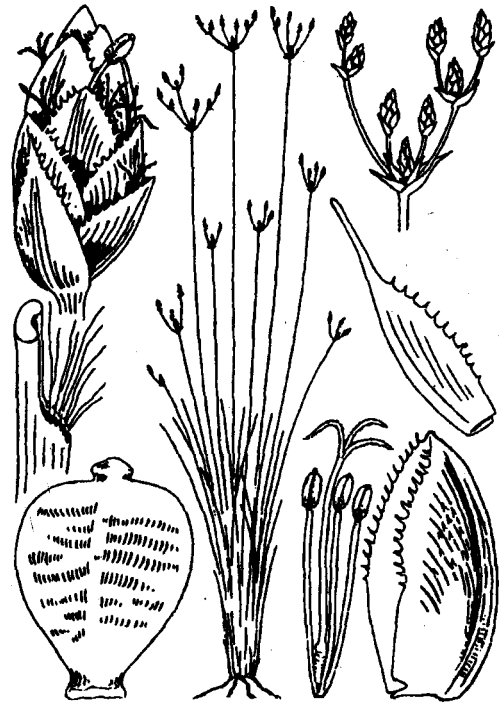


Figure 212.42 *BULBOSTYLIS PUSILLA* subsp. *YALINGENSIS*. Drawn by R. W. Haines from Haines 4295 & Lye 06599 (Reproduced with permission from Haines & Lye, fig. 213B, 1983.).

– Glumes often short-hairy; nutlets 0.6–0.9 mm long. subsp. *yalingensis*

subsp. *pusilla*

Seasonally damp grassland or on shallow soil over rocks with seepage; 1770–2100 m. TU GD SU WG SD; endemic. *Gilbert & Thulin* 759; *Friis et al.* 3305; *Mooney* 5685.

subsp. *yalingensis* (*H. Cherm.*) *R. Haines* in *Haines & Lye* (1983) App. 3:1;

Bulbostylis yalingensis *H. Cherm.* (1931);
Abildgaardia pusilla (*A. Rich.*) *Lye* subsp. *yalingensis* (*H. Cherm.*) *Lye* in *Nordic J. Bot.* 3 (1983) – type: Central African Republic, Yalinga, *Le Testu* 2987 (P holo.).

Fig. 212.43.

Seasonally damp soil; c 1900 m. GD; Central and East tropical Africa. *Pichi-Sermolli* 1981.

subsp. *congolensis* (*De Wild.*) *R. Haines* in *Haines & Lye* (1983) App. 3:1;

Bulbostylis congolensis *De Wilde* (1927);
Abildgaardia congolensis (*De Wild.*) *Lye* in *Nordic J. Bot.* 3 (1983) – types: Zaire, *Lode Achten* s.n., *Claesens* 1681 (BR syn.).

Bulbostylis holotricha *A. Peter* (1936).

Fig. 212.43.

Seasonally damp soil, often on shallow soils over rocks;

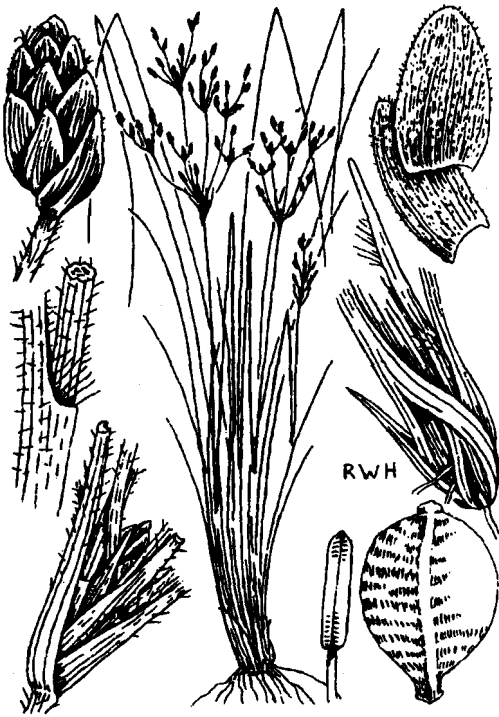


Figure 212.43 *BULBOSTYLIS PUSILLA* subsp. *CONGOLENSIS*. Drawn by R.W. Haines from *Haines* 221. (Reproduced with permission from Haines & Lye, fig. 215, 1983.)

1300–1400 m. WG KF; tropical Africa. *Gilbert & Thulin* 631; *Friis et al.* 2309.

9. *B. densa* (Wall.) *Hand.-Mazz.* (1930);

Scirpus densus Wall. (1820) – type: from 'India'.

Bulbostylis capillaris (L.) Kunth var. *trifida* (Nees) C.B. Clarke (1893).

Tufted annual, 5–30 cm tall, glabrous or with scattered short spine-like hairs on stems and leaves. Stems deeply grooved, 0.02–0.04 cm wide, ridges pale, ± scattered short stiff hairs. Leaf-sheaths with many slender hairs 1–2 mm long; blade grooved, 0.02–0.03 cm wide with short prickle-like hairs along ridges. Inflorescence of 1 sessile spikelet and up to 8 pedicelled spikelets, pedicels shorter or longer than the spikelets. Main inflorescence bracts filiform, 4–7 mm long, longest a bit longer than the sessile spikelet. Spikelets 2–4 x 1.5–3 mm with few glumes which spread open at fruiting. Glumes glabrous or pubescent; 2–3 mm long, dark brown, midrib conspicuous, green or grey, apex obtuse, acute and with a tiny point, margins shortly ciliate. Nutlets large for the glumes, c 1 mm long, forcing the glumes open; young nutlets pale yellow with a distinct yellow knob from the persistent style base, tubercles not clear; mature nutlets grey with distinct tubercles.

1. Nutlets with very clearly seen tubercles; glumes with distinct keel. subsp. *densa*

– Nutlets with somewhat obscure tubercles; glumes rounded on the back. subsp. *afromontana*

subsp. *densa* is found in India and W Africa. It has not been recorded either in the Flora area or in East

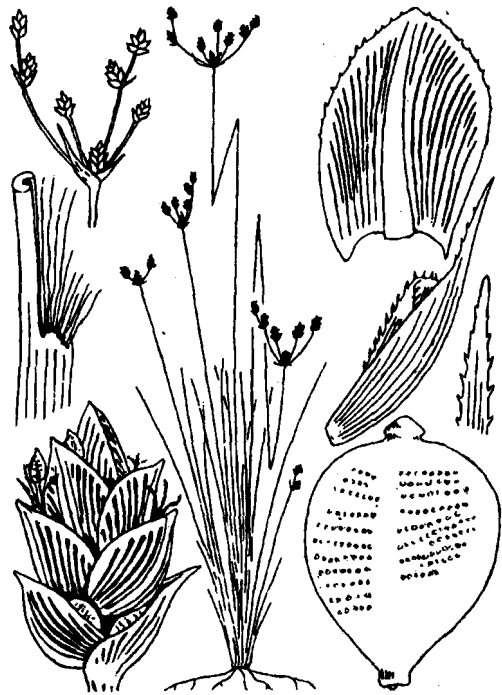


Figure 212.44 *BULBOSTYLIS Densa* subsp. *AFROMONTANA*. Drawn by R.W. Haines from *Haines* 4272. (Reproduced with permission from Haines & Lye, fig. 224, 1983.)

Africa. Subsp. *cameroonensis* (C.B. Clarke) Hooper, which has compact inflorescences and glumes with a distinct awn, is endemic to mountains in Cameroon.

subsp. *afromontana* (Lye) R. Haines in *Haines & Lye* (1983) App. 3: 1;

Abildgaardia densa (Wall.) Lye subsp. *afromontana* Lye in *Nordic J. Bot.* 3 (1983) – type: Uganda, Kigezi, *Lye* 5329 (EA holo., MHU K iso.).

Fig. 212.44.

Ecology from herb labels needed; 1450–3000 m. GD SU AR IL GG SD; widespread in E Africa. *Friis et al.* 1059; *Mooney* 7554; *Gilbert & Getachew A.* 3012.

This species is easily distinguished from *B. pusilla* by the tubercles on mature nutlets which are easily seen with a hand lens.

10. *B. microelegans* (Lye) R. Haines (1982);

Abildgaardia microelegans Lye (1982) – type: Kenya, near Nairobi, *Lye & Katende* 6323 (MHU holo.).

Slender tufted annual. Stems 5–25 x 0.02–0.03 cm, glabrous. Leaf-blades channelled, about 0.02 cm wide, almost glabrous; sheath with some flexuose hairs at its opening. Inflorescence a lax anthela of one sessile and 2–6 stalked spikelets or groups of sessile and stalked spikelets. Spikelets 3–5 x 0.7–1 mm, linear-lanceolate. Glumes glabrous or short-hairy, c 1.5 mm long, ovate, acute or obtuse, dark brown, midrib 3-nerved green. Stamens 2. Nutlets 0.5–0.6 mm long, obovate, 3-angled,

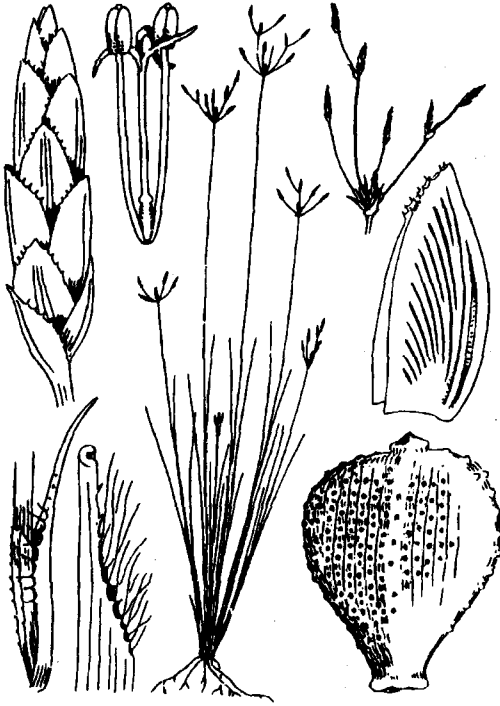


Figure 212.45 *BULBOSTYLIS MICROELEGANS*. Drawn by R. W. Haines from Haines 4294. (Reproduced with permission from Haines & Lye, fig. 217, 1983.)

grey-white with cuticular papillae arranged in longitudinal and horizontal rows, with minute epidermal papillae below the cuticular papillae. Fig. 212.45.

Seasonally damp ground, often on shallow soils over rocks or in disturbed soils in grasslands; c 500–600 m. IL; Uganda, Kenya, Tanzania. *Kukkonen* 12517.

11. *B. abortiva* (Steud.) C.B. Clarke (1894);

Fimbristylis abortiva Steud. (1855); *Abildgaardia abortiva* (Steud.) Lye (1974) – type: Madagascar, *Boivin* 1996.

Scirpus schweinfurthianus Böck. (1870) – type: GD, near Metema, *Schweinfurth* 2039 (B holo., P iso.).

Slender to robust tufted annual. Stems 15–50 x 0.05–0.15 cm, glabrous or scabrid. Leaf-blades to 20 x c 0.05 cm, flat or channelled, scabrid; sheath with prominent long flexuose hairs at its opening. Inflorescence a lax compound anthela of one sessile spikelet with many stalks carrying new groups of sessile and stalked spikelets. Spikelets 3–7 x 1–2 mm wide, ovate, usually 15–40 per inflorescence. Glumes 1–2 mm long, broadly ovate, red-brown with a pale margins and midribs which usually ends before the rounded apex. Nutlets 0.7–0.8 mm long, obovate, grey- or yellow-brown, almost smooth but often with a translucent papillose surface-layer which cracks into square or circular scales; style base persisting as small knob. Fig. 212.46.

Seasonally damp ground, often in sandy soils or on shallow soils over rocks; 800–1600 m. GD IL GG;

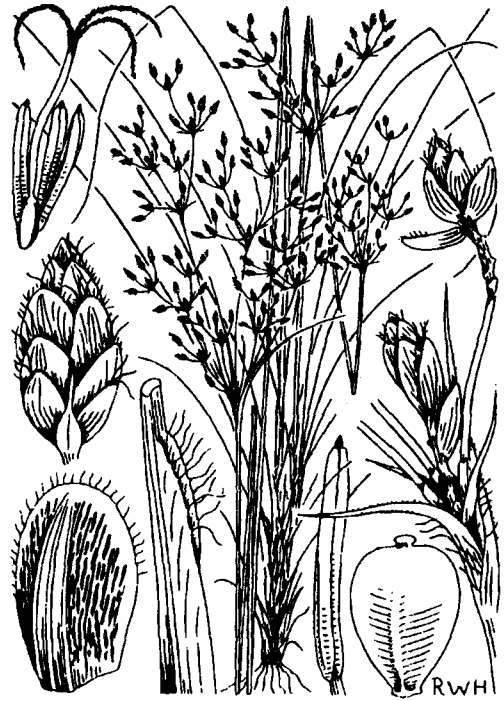


Figure 212.46 *BULBOSTYLIS ABORTIVA*. Drawn by R.W. Haines from Lye 3978. (Reproduced with permission from Haines & Lye, fig. 218, 1983.)

tropical Africa, Madagascar. *Kukkonen* 12491; *Fukui* 1409.

12. *B. coleotricha* (Hochst. ex A. Rich.) C.B. Clarke (1894);

Fimbristylis coleotricha Hochst. ex A. Rich. (1851); *Abildgaardia coleotricha* (Hochst. ex A. Rich.) Lye (1974) – types: TU, Guendepa, *Schimper* 1226 (P lecto., G HEID K UPS isolecto.); *Chiré*, *Quartin Dillon* s.n. (P syn.).

Slender tufted annual, 8–25 cm tall, all parts with long flexuose hairs. Stems deeply grooved, 0.03–0.05 cm wide, with paler, scabrid ridges set with stiff hairs 0.1–0.2 mm long. Leaf-sheaths with many long slender hairs, 3–10 mm long; blade 0.02–0.03 cm wide, deeply grooved with dense stiff hairs on the sides of the ridges. Inflorescence a lax anthela of one sessile spikelet subtended by 2–8 stalked spikelets or groups of spikelets. Inflorescence bracts narrowly lanceolate with very long apices extending beyond the spikelets. Spikelets 2–5 x 1.5–3 mm, glumes prominently spreading when mature, ovoid, usually only 6–10 flowered, but all glumes fertile. Glumes glabrous or short-hairy, 2–3 mm long, ovate, dark brown, midrib conspicuous, pale green, extending into a long or short awn, margins short ciliate. Nutlets 0.8–1 mm long, obovate, 3-angled, grey or yellow-brown, minutely papillose; style base persisting on mature nutlets as a small knob. Fig. 212.47.

Seasonally damp places, often on shallow soils over rocks; 750–1300(–2900) m. EW GD SU WG KF SD;

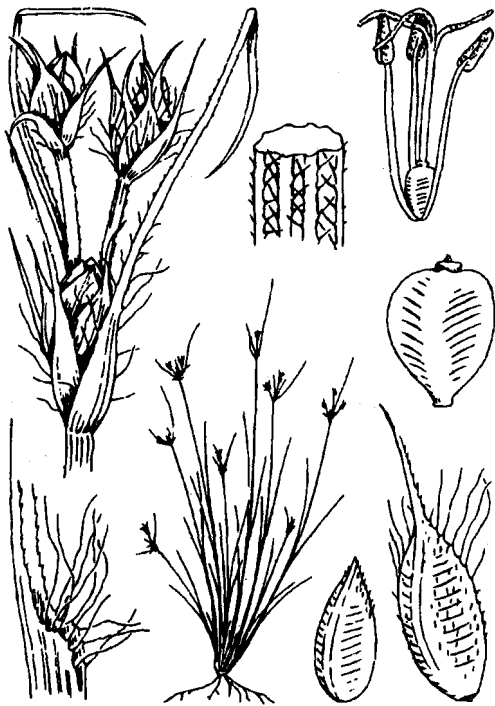


Figure 212.47 *BULBOSTYLIS COLEOTRICHA*. Drawn by R. W. Haines from Haines 4168. (Reproduced with permission from Haines & Lye, fig. 220, 1983.)



Figure 212.48 *BULBOSTYLIS BARBATA*. Drawn by R. W. Haines from Napper & Kanuri 2066. (Reproduced with permission from Haines & Lye, fig. 232, 1983.)

tropical Africa. Kukkonen 12384; Gereau 1393; MG & SB Gilbert 2183.

13. *B. barbata* (Rottb.) C.B. Clarke (1893);

Scirpus barbatus Rottb. (1773) – type: from 'India'.

Abildgaardia wallichiana (Schult.) Lye (1983).
non *Abildgaardia barbata* Beauv. (1807).

Densely tufted annual. Stems 5–25 x 0.02–0.04 cm, angular, glabrous. Leaf-sheaths light brown with long slender hairs at its opening; blades 1–10 x 0.02–0.05 cm, scabrid on margins at least near tip. Inflorescence a solitary terminal head of few-several spikelets, 3–15 mm in diameter. Inflorescence bracts very fine, 5–30 mm long. Spikelets 3–8 x 1–1.5 mm, ovoid-lanceolate. Glumes glabrous or sparsely short-hairy, 1.5–2 mm long, ovate, red-brown with paler margins, midrib scabrid, usually green, slightly extended. Stamen usually 1 only. Nutlets 0.5–0.7 mm long, obovate, 3-angled, light brown, smooth with isodiametric surface-cells; style base persisting on mature nutlets as a small knob. Fig. 212.48.

Sandy soils; 500–1000 m. EW EE TU SD; pantropical. Pappi 1869, 6007; Friis et al. 2877.

14. *B. striatella* C.B. Clarke (1898);

Abildgaardia striatella (C.B. Clarke) Lye (1983) – type: S Africa, Natal, Buchanan 86 (K holo.).

Bulbostylis humilis (Kunth) C.B. Clarke sensu Cufodontis, Enum. (1970–71).

Slender tufted annual or short-lived perennial. Stems 0.5–12 x 0.02–0.04 cm (but sometimes spikelets apparently stemless), glabrous. Leaf-sheaths pale brown; blades 2–6 x 0.03–0.08 cm wide, flat, densely scabrid. Inflorescence a solitary terminal spikelet or 2–3 clustered spikelets on a 1–12 cm long stalk, but often with additional sessile spikelets at the plant base. Stalked spikelets 3–8 x 2–4 mm, often with spreading glume-tips. Glumes glabrous or scabrid, 2–4 mm long, light to dark red-brown, midrib green extended into a short awn. Stamens usually 2. Style-branches 2. Nutlets 1–1.3 mm long, obovate, biconvex, grey to brown with isodiametric surface-cells in longitudinal rows; style-base persisting as a brown knob. Fig. 212.49.

Seasonally damp soil in disturbed grassland or among rocks; 2400–2800 m. EW TU; Kenya, Tanzania, South Africa. Pappi 1058, 862; Baldrati 1846.

15. *B. schimperiana* (Hochst. ex A. Rich.) C.B. Clarke (1894);

Isolepis schimperiana Hochst. ex A. Rich. (1851);
Abildgaardia schimperiana (Hochst. ex A. Rich.) Lye (1974) – type: TU, near Adua, Schimper 299 (P holo., BR BM G K UPS Z iso.).

Slender tufted annual. Stems 10–25 x 0.04–0.1 cm, glabrous, distinctly ridged and compressed below the inflorescence. Leaf-sheaths pale grey, glabrous or with a few long slender hairs, also at the opening; blades 1–8 x 0.05–0.1 cm, flat or channelled, glabrous or scabrid. Inflorescence usually a solitary terminal head of few to



Figure 212.49 *BULBOSTYLIS STRIATELLA*. Drawn by R. W. Haines from *Newbould* 5855. (Reproduced with permission from Haines & Lye, fig. 240, 1983.)

many crowded sessile spikelets, but sometimes with 1–2 additional stalked heads. Main inflorescence bracts leaf-like with an expanded ciliate base. Spikelets short-hairy, 4–7 x 2–2.5 mm, ovoid. Glumes 1.5–2 mm long, ovate, dark brown to almost black, midrib paler, often brown. Style with 2 or 3 stigmas. Nutlets 0.9–1.1 mm long, obovate, 3-angled or biconvex, pale grey or white with cells in longitudinal rows forming longitudinal ribs and grooves; the style-base not persisting on the mature nutlets. Fig. 212.50.

Seasonally wet soil, often near seepage in grassland or on shallow soils over rocks; 1940–2900 m. EW TU GD AR; Uganda, Kenya, Tanzania. *Thulin* 1440, *Gilbert & Getachew* A. 2690.

16. *B. cruciformis* (Lye) R. Haines (1983);

Abildgaardia cruciformis Lye (1982) – type: Kenya, *Stannard & Gilbert* 1112 (EA holo.).

Tufted annual with shallow root system. Stems 4–12 x 0.02–0.04 cm, angular, scabrid below the inflorescence, otherwise glabrous. Leaf-sheaths straw-coloured to light brown, scabrid to hairy with long hairs at the opening; blade 1–3 x 0.02–0.04 cm, scabrid on margins and main ribs. Inflorescence a head, 5–8 mm wide, 3–5 spikelets sessile, often arranged to form a cross. Main inflorescence bracts leafy, 5–20 mm long, spreading or reflexed, at least 1 or 2 longer than a spikelet. Spikelets 3–5 x 2–2.5 mm, somewhat square in outline, mixed green and red-brown. Glumes glabrous or pubescent,

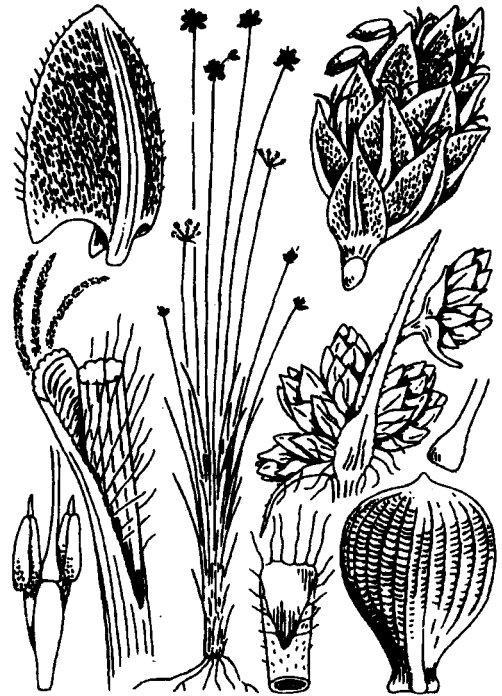


Figure 212.50 *BULBOSTYLIS SCHIMPERIANA*. Drawn by R. W. Haines from *Haines* 4034. (Reproduced with permission from Haines & Lye, fig. 250, 1983.)

2.5–3.2 mm long with a wide base abruptly narrowed into a long recurved apex, midrib green, extended into a long, usually recurved awn, margins long ciliate. Stamens 3. Style with 3 branches. Nutlets 0.6–0.7 x 0.4–0.5 mm, obovate, grey or white, persistent style base brown; surface covered in pearl-like glossy tubercles. Fig. 212.51.

Acacia – *Commiphora* bushland; 850 m. SD; otherwise only known between Thika and Garissa in Kenya. *Friis* et al. 2878.

Smeds 1 and *Smeds* 1109, probably both collected in Bale (BA), are both perennial tussocky plants which look superficially similar to *B. cruciformis*. However, both lack mature nutlets and have other different characters.

Smeds 1 grows as leafy tussocks, 7–19 cm tall, leaves thick, channelled, to 2 mm wide and 2/3 length of stems; inflorescence bracts leafy, twice as long as the head of spikelets; inflorescence a head of several sessile spikelets, dark brown; lower glume/spikelet bract with a long awn; stamens 3; style base bulbous.

Smeds 1109 has stems 7–14 cm tall, arising from a short rhizome; stems ridged, somewhat flattened; leaves 2–3 mm wide, often broken/grazed off, largest longer than stem and overtopping inflorescence; inflorescence bract leaf-like with a wide base and apiculate apex; inflorescence a head of sessile red-brown spikelets; spike-bracts awned, scarious; glumes c 4 mm long; stamens 3, filaments flattened with a knee at midpoint; style base narrow, stigmas 3 (4).

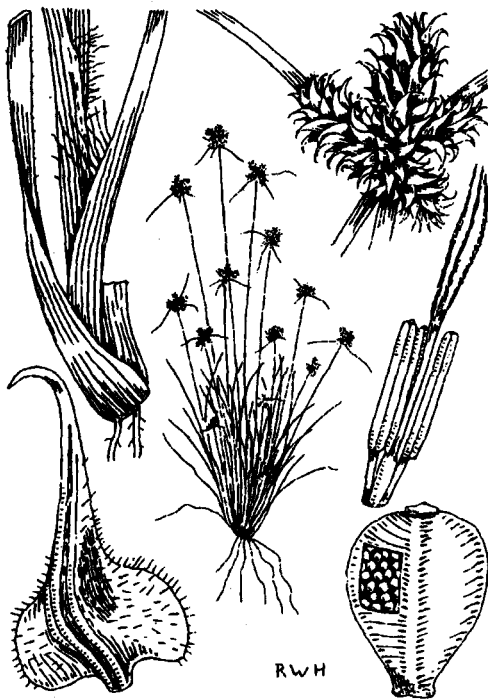


Figure 212.51 *BULBOSTYLIS CRUCIFORMIS*. Drawn by R.W. Haines from *Stannard & Gilbert* 1112. (Reproduced with permission from Haines & Lye, fig. 244, 1983.)

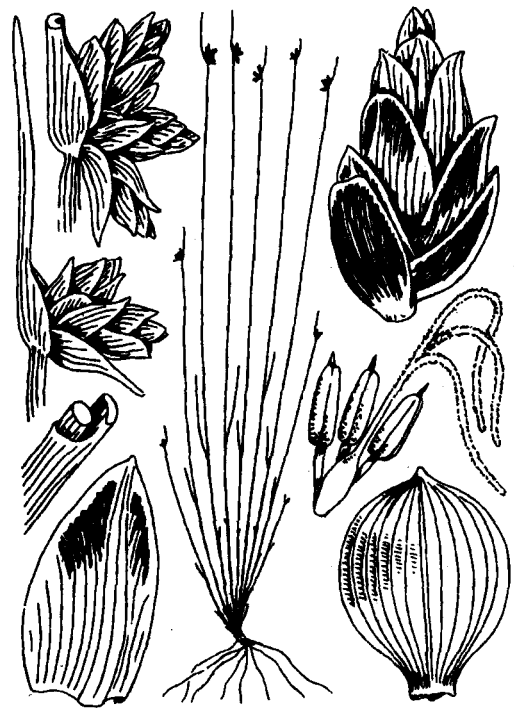


Figure 212.52 *ISOLEPIS SETACEA*. Drawn by R.W. Haines from *Haines* 4582. (Reproduced with permission from Haines & Lye, fig. 258, 1983.)

7. ISOLEPIS R. Br. (1810)

Plants generally small, slender annuals or perennials with short or long rhizomes or stolons. Stems erect, or prostrate and branched. Leaves usually with well-developed blades, reduced to sheaths in some species. Inflorescence a terminal, sessile or stalked spikelet, or a terminal or apparently lateral head of few to many spikelets, or spikelets produced laterally in the leaf-axils. Spikelets ovate to elongate, rounded or somewhat compressed with few to many spirally arranged glumes, green to dark red-brown or almost black. Glumes ovate to broadly ovate to obovate. Styles 2 or 3. Stamens 1-3. Nutlets 3-angled or biconvex, elliptic to obovate, smooth, papillate or longitudinally ribbed with transverse bars between the ribs.

About 40 species, widely distributed in wet habitats in tropical (only at high altitude) and temperate regions, especially in South Africa and Australia.

1. Plant with numerous leaf-blades (always more than 5 per stem); stems usually prostrate and branched; inflorescence a solitary spikelet.
 4. *I. fluitans*
- Plant without leaf-blades, or with 1-3 slender blades per stem; stems always erect; inflorescence of 2 to many spikelets or spikelet solitary.
2. Plant small to medium-sized; stems 1-60 cm long; nutlets prominently longitudinally striate.
 3. Plant minute; stems up to 1 cm long, nutlets smooth or papillose.
 3. *I. omissa*

3. Plant with short rhizomes, often perennial; leaf-blades reduced to lobes 1-3 mm long.
 2. *I. costata*
- Plant without short rhizomes; leaf-blades present, over 3 mm long.
 1. *I. setacea*

1. *I. setacea* (L.) R.Br. (1810);

Scirpus setaceus L. (1753) - type: from 'Europe'.

Tufted annual, culms 1-30 x 0.02-0.05 cm, glabrous. Leaf-sheaths pale above, often purple below; blades 1-6 cm long. Inflorescence of 1-3 sessile, apparently lateral spikelets; major bract of inflorescence often erect and continued in the direction of the stem. Spikelets 2-5 mm long, ovate, 8-12 flowered, never viviparous. Glumes 1.5-2.5 mm long; upper grey with green midrib, lower usually dark red-brown to almost black (at least in patches). Style with 3 stigmas. Nutlets 0.8-1.2 mm long, obovate, grey to dark brown; surface with many longitudinal ribs. Fig. 212.52.

Wet soil in swamps, along paths, streams and rivers, also a weed on wet soil; 2300-4100 m. EW TU GD GJ SU AR SD BA HA; temperate regions throughout the world, in the tropics only at high altitudes. *Hedberg* 4154; *Thulin* 1590; *Gilbert* 3170.

2. *I. costata* A. Rich. (1851);

Scirpus costatus (A. Rich.) Böck. (1870) - types: Ethiopia, Ouodgerate, *Petit* s.n. & without location, *Schimper* II:1153 (P syn.).

I. setacea (L.) R.Br. var. *abyssinica* Böck., in

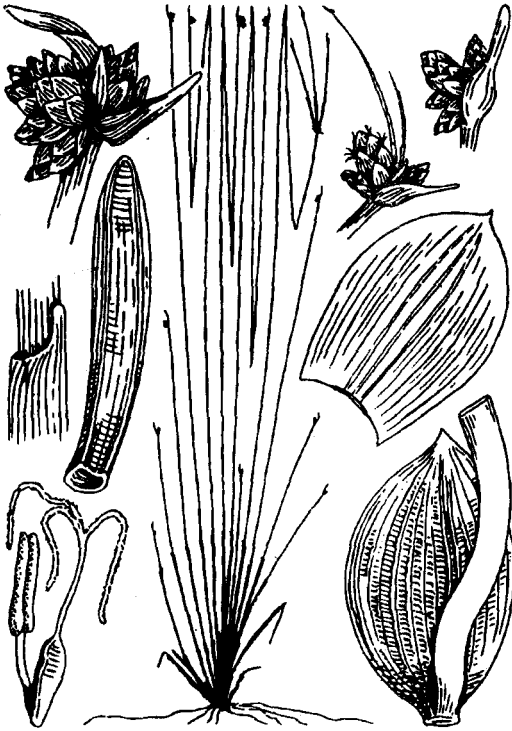


Figure 212.53 *ISOLEPIS COSTATA*. Drawn by R. W. Haines from Haines 4176. (Reproduced with permission from Haines & Lye, fig. 261, 1983.)

Flora: 419 (1858) –type: Ethiopia, without location, *Schimper* ?76a (B holo. destroyed?).

Slender tufted perennial with very short rhizome. Stems 5–60 x 0.03–0.1 cm, glabrous. Leaf-sheaths pale above, purple below, ending in a short, erect, obtuse lobe, 1–3 mm long. Inflorescence of 2–12 sessile, apparently lateral spikelets, major bract of the inflorescence often erect. Spikelets 2–5 mm long, ovate, frequently viviparous. Glumes 1.3–2.2 mm long, red-brown to almost black, but sometimes, especially at the top, grey. Style with 3 stigmas. Nutlets 0.8–1.3 mm long, oval-elliptic; surface with many longitudinal ribs. Fig. 212.53.

Marshy areas and wet soil in swamps or near streams and tracks; 2200–3650 m. TU GD GJ SU SD KF BA HA; Uganda, Kenya, Tanzania, Malawi, South Africa, Madagascar. *De Wilde & Gilbert* 144; *Friis et al.* 1266; *Sue Edwards et al.* 3593.

3. *I. omissa* Rayn. (1977)

–type: GD, Boakle near Dedschenn (Dejen) in Semien, *Schimper* 1354 (P holo.).

Minute plant, glabrous, forming dwarf tussocks. Stems 3–10 x 0.2–0.3 mm, angular with prominent longitudinal ridges, glabrous, usually 3–15 per plant. Leaf-sheaths pale; blades 4–20 x 0.5 mm, flat to channelled, apex rather obtuse. Inflorescence a solitary terminal spikelet on a straight or somewhat curved stem. Spikelets 2–4 x 1–2 mm, ovoid-elliptic, 6–10 flowered, all scales fertile. Glumes very unequal in length; lowest

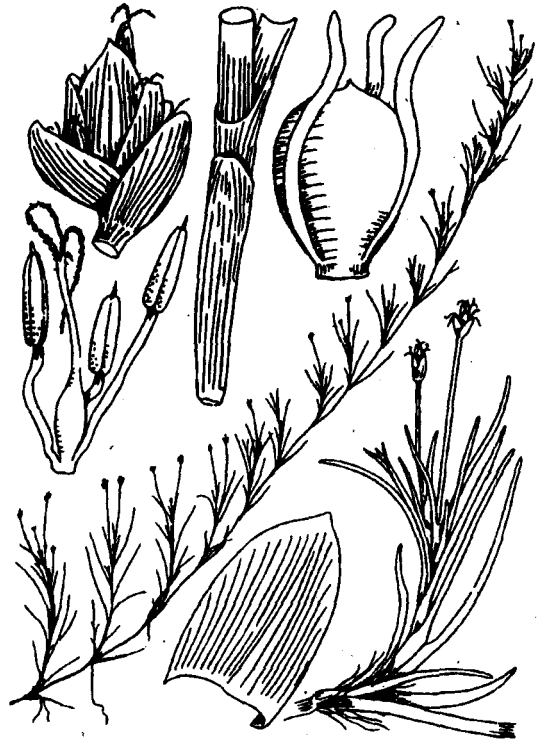


Figure 212.54 *ISOLEPIS FLUITANS* var. *FLUITANS*. Drawn by R. W. Haines from Haines 4584. (Reproduced with permission from Haines & Lye, fig. 267, 1983.)

up to 4 mm long including the extended green leafy midrib; other glumes 1–2 mm long, oval, pale with green midrib usually ending at the apex. Stamens 2. Style with 3 long stigmas. Nutlets 0.8–0.9 x 0.5–0.6 mm, elliptic-oblong, obscurely 3-angled, dark red-brown, almost smooth. Fig. 212.57.4–6.

Afro-montane grassland; 3300–3900 m. TU GD; not known elsewhere. *Hedberg & Getachew A.* 5399.

4. *I. fluitans* (L.) R.Br. (1810).

Low-growing, carpet-forming perennial with creeping or floating, much-branched stems, often rooting at the nodes. Stems 5–50 x 0.03–0.09 cm, rounded to flattened, often with shorter fertile or sterile shoots at 1–2 cm intervals. Leaf-sheaths prominent, pale; blades flat, 1–4 x 0.02–0.09 cm. Inflorescence solitary spikelets on stalks 1–15 cm long. Spikelets 2.5–4.2 x 1–2.5 mm, pale to dark red-brown with green midrib. Stamens 2 or 3. Style with 2 (rarely 3) stigmas. Nutlets 1–1.8 mm long, obovate with short conical apex; surface smooth with isodiametric surface cells, grey to dark brown.

1. Spikelets green to light red-brown; spikelet-stalks 1–9 cm long; spikelets 5–10 flowered. 2
- Spikelets dark red-brown with prominent green midrib; spikelet-stalks often more than 10 cm long; spikelets 10–20 flowered. var. *nervosa*
2. Stalks of spikelets flattened; spikelets 8–10 flowered; glumes mostly pale with green midrib; nutlets 1.5–1.8 mm long. var. *major*



Figure 212.55 *ISOLEPIS FLUITANS* var. *MAJOR*. Drawn by R.W. Haines from Pursglove 2196. (Reproduced with permission from Haines & Lye, fig. 269, 1983.)

– Stalks of spikelets angular or rounded, but not flattened; spikelets 5–8 flowered; glumes pale or light red-brown; nutlets 1–1.3 mm long.

var. *fluitans*

var. *fluitans*

Scirpus fluitans L. (1753) – type: from ‘Europe’.

Fig. 212.54.

Wet bogs or swampy grassland, sometimes submerged; 2500–2900 m. EW SU SD; temperate regions throughout the world. *De Wilde* 8429; *Ash* 2598; *Friis* et al. 1087.

var. *major* Lye in *Bot. Notiser* 127 (1974)

– type: Uganda, Lye 5276 (MHU holo.).

Fig. 212.55.

Wet sloping, grassy, ground; 2500–3750 m. GD GJ AR BA; Uganda, Kenya, Tanzania. *Hedberg* 5717; *Thulin* 1607; *Evans* 5717.

var. *nervosa* (Hochst. ex A. Rich.) Lye in *Lidia* 3(4): 132 (1994);

Isolepis nervosa Hochst. ex A. Rich. (1851); *Scirpus nervosus* (Hochst. ex A. Rich.) Böck. (1870) – type: GD, Entchedkab, *Schimper* 551 (P holo.).

Scirpus ramosus Böck. (1874) – type: GD, ‘Jan Meda’, *Schimper* III:1103 (probably P holo. or syn.).

Fig. 212.57.1–3.

Edges of pools and seasonally waterlogged habitats; 2300–3000 m. GD SU AR SD BA; not known elsewhere. *Ash* 2098; *Friis* et al. 3803; *E.F. Gilbert* 464.

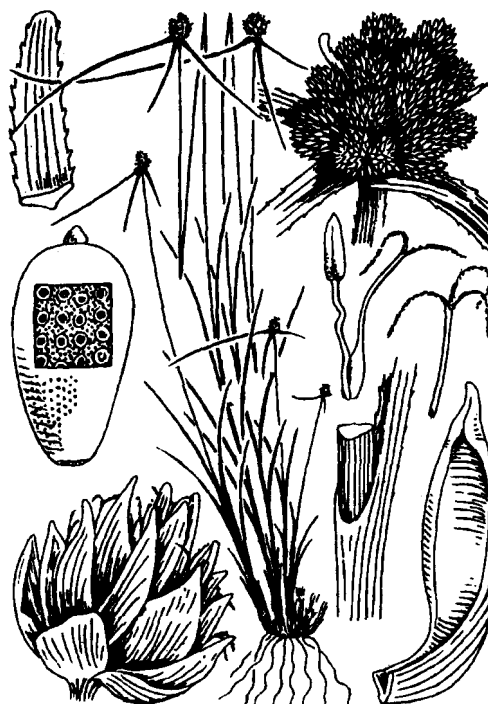


Figure 212.56 *KYLLINGIELLA MICROCEPHALA*. Drawn by R.W. Haines from Haines 4218. (Reproduced with permission from Haines & Lye, fig. 277, 1983.)

8. *KYLLINGIELLA* R. Haines & Lye (1978)

Slender tufted perennials. Stems 3–40 cm long, 3-angled at least above, glabrous; base sometimes slightly swollen. Leaf-blades well developed. Inflorescence a compact white or green terminal head of several-many crowded spikes or spikelets; involucre bracts long and leafy, spreading. Each spike may consist of several-many crowded spikelets. Spikelets with few-numerous spirally arranged glumes; each of these glumes subtends a flower. Perianth absent. Stamen 1. Style with 2 or 3 stigmas. Nutlets obovate to elliptic, minutely papillose.

4 species in tropical Africa; 2 in the Flora area with 1 extending to India.

1. Inflorescence white; scales not rough.

1. *K. microcephala*

– Inflorescence green, scales rough. 2. *K. polyphylla*

1. *K. microcephala* (Steud.) R. Haines & Lye (1978);

Kyllingia microcephala Steud. (1842); *Scirpus microcephalus* (Steud.) Dandy in Andrews (1956) – type: WU, near Gor Amba, *Schimper* 650 (P holo., K UPS iso.).

Scirpus kyllingioides (A. Rich.) Böck. (1870); *Isolepis kyllingioides* A. Rich. (1851).

Densely tufted, leafy perennial. Stems 5–40 x 0.03–0.5 mm, base somewhat swollen, densely covered by coarse dark, often thread-like fibres formed by splitting of lower leaf-sheaths. Leaf-blades 3–15 x 0.1–0.2 cm, flat or rolled-inwards, scabrid on margins and midribs. Inflorescence-head 3–8 mm in diameter, dull white, drying grey or very pale red-brown, consisting of many

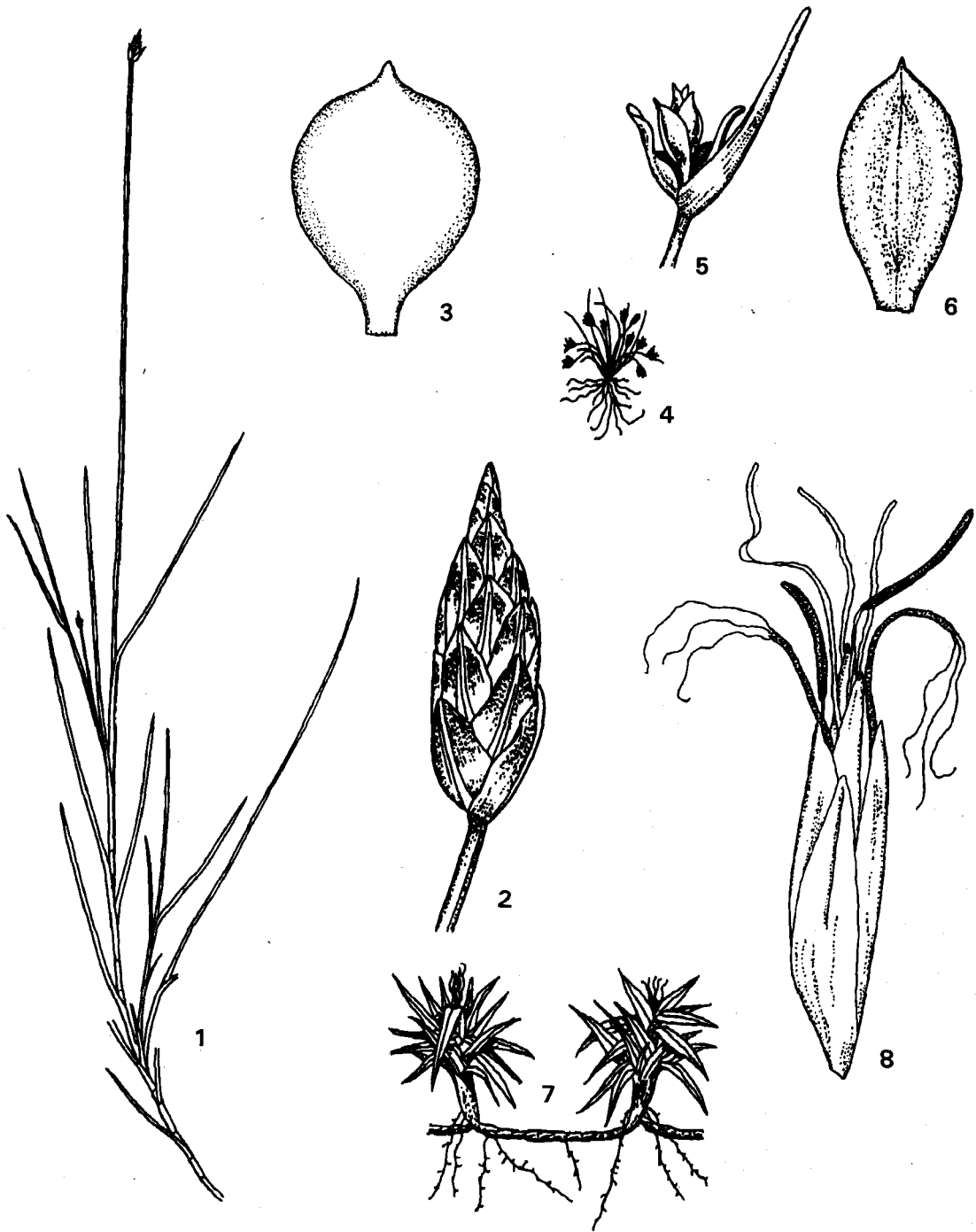


Figure 212.57 *ISOLEPIS FLUITANS* var. *NERVOSA*: 1 - flowering plant x 1/2; 2 - spikelet x 5; 3 - nutlet x 25. *I. OMISSA*: 4 - flowering plant x 1; 5 - spikelet x 5; 6 - nutlet x 25. *FICINIA CLANDESTINA*: 7 - flowering plant x 1/2; 8 - spikelet x 5. 1-3 from de Wilde 8384; 4-6 from Hedberg & Getachew A. 5399; 7 & 8 from Thulin et al. 3680. Drawn by Gerd Mari Lye.

crowded rounded spikes. Each spike of many closely packed 1-flowered spikelets consisting of a scale and one flower only. Scales 1.2–1.5 mm long, white, lanceolate, boat-shaped with hooded apex and incurved margins. Style with 2 or 3 stigmas. Nutlets 0.5–0.7 mm long, elongate, dark grey to black when mature; the style-base persisting as a small dark knob. Fig. 212.56.

Sandy soil, often in soil pockets and in shallow soil over rocks where there is seepage; 1500–2450 m. EW TU GD WU; tropical Africa, India. *Friis* et al. 5411; *Gilbert & Getachew* A. 2923, 2743.

2. *K. polyphylla* (A. Rich.) Lye (1983);

Isolepis polyphylla A. Rich. (1851); *Scirpus polyphyllus* (A. Rich.) Schweinf. & Asch. (1867); *Scirpus steudneri* Böck. (1879) – type: TU, Shire (Chiré), *Quartin-Dillon* s.n. (P holo.).

Slender leafy perennial with 1 or 2 stems from a swollen base. Stems 3–15 cm long, base covered by fibrous remains of old leaf-sheaths. Leaf-blades well developed, often longer than the inflorescence, usually 2–3 per stem. Inflorescence a head, 6–10 mm in diameter, pale green with numerous closely packed spikelets, subtended by 3–5 long leafy bracts. Spikelets distinct, scaly, 15–25-flowered. Glumes 2–2.5 mm long (including 0.5 mm long recurved awn-like tip), 3-nerved. Style with 3 stigmas. Nutlets 0.5–0.6 mm long, obovate, obtusely 3-angled. Fig. 212.58.

Bare patches in *Commiphora* bushland, thin soil on granite outcrops, seasonally wet grassland; 900–1500 m. EE/EW TU GD; Kenya, Tanzania. *Schimper* 849; *Friis* et al. 2724; *Gilbert & Getachew* A. 2741.

9. *FICINIA* Schrad. (1832)

including *Chamaexiphium* Hochst. (1844)

Perennial herbs with erect horizontal scale-covered stolons or rhizomes, sometimes tufted annuals. Stems slender, glabrous, leaves crowded at the base. Leaves narrow to filiform. Inflorescence a dense head of 1-many crowded spikelets, each subtended by a leafy bract. Spikelets with numerous scales, each associated with a single flower. Perianth absent. Stamens mostly 3. Style with 3 stigmas. Nutlet 3-sided, smooth or with obscure transverse lines; gynophore up to 1/3 length of nutlet.

Genus with less than 60 species, most of which are confined to S Africa; 2 species in the Flora area.

1. Inflorescence on a clearly visible stem.

1. *F. ecklonea*

– Inflorescence almost hidden in the basal leaf-sheaths.

2. *F. clandestinus*

1. *F. ecklonea* (Steud.) Nees (1834);

Scirpus eckloneus Steud. (1829) – type: S Africa, Cape Peninsula, *Ecklon* 869 (K holo.).

Tufted perennial with woody rhizome. Stems 30–75 cm



Figure 212.58 *KYLLINGIELLA POLYPHYLLA*. Drawn by R.W.Haines from *Faden* 71/374. (Reproduced with permission from Haines & Lye, fig. 280, 1983.)

long, rather slender, glabrous. Leaves up to 40 x 0.1–0.2 cm, flat or channelled, densely scabrid particularly along margins. Inflorescence an irregularly-shaped head, 12–15 mm wide, with 15–40 crowded spikelets. Involucral bracts 3, largest leafy, 1–4 cm long. Spikelets 3–9 mm long, green variegated red-brown when young, becoming brown when mature. Glumes 4–5 mm long, ovate, obtuse or acute, midrib slightly extended, red-brown. Style with 3 style-branches. Nutlets obovate, with transverse lines, grey to dull black.

Montane grassland and moorland, often in the *Erica* zone; 2200–3000 m. BA; also E and S Africa. *Kukkonen* 12647.

2. *F. clandestina* (Steud.) Böck. (1871);

Chamaexiphium clandestinum (Steud.) Hochst. (1844); *Cyperus clandestinus* Steud. (1842) – type: GD, Semien, *Schimper* II:980 (B holo., K UPS iso.).

Perennial herb with stolons 10 x 0.15–0.3 cm, covered with old scales often splitting up into fibres. Stems 1–3 cm long, entirely concealed by the crowded leaves. Lower leaf-sheaths form leathery brown scales; upper leaf-sheaths leathery, green; blades green, successively longer, to 4 x 0.2–0.4 cm; margins membranous, pale or brown, prominently scabrid on margins and midribs, at least above. Involucral bracts many, 1.5–2 cm long. Spikelets 10–14 x 1–2 mm, narrowly lanceolate with



Figure 212.59 *OXYCARYUM CUBENSIS*. Drawn by R. W. Haines from *Haines* 4113. (Reproduced with permission from Haines & Lye, fig. 282, 1983.)

strongly extended stigmas and anthers. Glumes 10–12 x 1–1.5 mm, narrow, lanceolate, pale to light red-brown with green extended midrib. Stamens linear, 3–4 mm long. Style, basal part c 10 mm long, pale brown; stigmas 6–7 mm long, medium red-brown. Nutlets not known. Fig. 212.57.7 & 8.

Afro-alpine grassy slopes; 3000–3400 m. GD BA; not known elsewhere. *Thulin* et al. 3680; *Smeds* 1108/B.

The generic position of this species has not been established because mature nutlets have not been seen. It is possible that it is a very specialised member of *Cyperus*.

10. *OXYCARYUM* Nees (1842)

Robust floating perennial with scaly stolons and long hanging roots. Basal leaves many, crowded, lower sheaths inflated; ligule a low rim with densely set hairs on margin. Inflorescence 3–10 heads in an uneven umbel, stalks of very variable length. Involucral bracts long and leafy, spreading. Spikelets with spirally arranged glumes. Glumes very stiff with glabrous or scabrid keels. Stamens 3. Style with 2 long stigmas. Nutlets

elongate with cuneate base, ending in a long beak, floating.

Monotypic.

O. cubensis (Poepp. & Kunth) Lye (1971);

Scirpus cubensis Poepp. & Kunth (1837) – type: Cuba, *Poeppig* s.n.

Robust perennial with long scaly stolons, usually floating; roots usually long and hanging. Stems 45–70 x 0.3–0.5 cm, sharply 3-angled, smooth. Leaf-blades 40–90 x 0.4–1 cm, scabrid on margins and midrib; lower leaf-sheaths inflated. Inflorescence heads on 1–35 mm long stalks, 5–15 mm in diameter, with numerous closely packed spikelets. Inflorescence bracts up to 60 cm long, leaf-like. Spikelets 3.5–6 x 2.5–3.5 mm. Glumes c 3.5 mm long, very stiff, red-brown, sometimes with a pale green midrib; margins with long hairs. Style branches 2. Nutlets 1.9–2.3 x 0.6–0.8 mm, smooth, yellow to brown; beak up to 0.7 mm long. Fig. 212.59.

Floating in lakes or open water in swamps; 550–600 m. IL; tropical Africa and America. *Ash* 3513; *Friis* et al. 7301.

11. *CYPERUS* L. (1753 & 1754)

Including *Alinula*, *Anosporum*, *Courtoisina* (*Courtoisia*), *Kyllinga*, *Mariscus*, *Marisculus*, *Pycneus* and *Sorostachys*.

Perennial or (more rarely) annual herbs, tufted or with creeping rhizomes or stolons, sometimes producing tubers or bulbs. Culms erect, or more rarely pendulous (mainly in viviparous plants), 3-angled, or (more rarely) subterete or 6 angular, usually leafy only at the base, rarely halfway up, but some species are lacking basal leaves altogether; the culm-base sometimes swollen and succulent. Leaves 3-ranked, linear and grass-like, the lower ones often scale-like, covering the base of the stem and the rhizome, rarely all reduced to their sheaths. Inflorescence terminal, often a subumbel-like open anthela or congested into a dense head (capitate), usually consisting of numerous spikelets set in distinct spikes or in digitate clusters. Inflorescence usually subtended by bracts similar to the leaves; the base of each branch (ray) enclosed in a tubular, two-keeled prophyll. Spikelets more or less compressed, linear or ovate, with up to 50 flowers; axis (rachilla) often winged by the decurrent base of the glumes, persistent or falling off quickly (then spikelets falling off as a whole). Glumes distichous, white, grey, green, brown, red-brown or black, often variegated, with 1–5 more or less distinct nerves on each side of the midrib; midrib often green and of another colour than the other parts of the glume, sometimes excurrent in a straight or recurved mucro. Flowers bisexual. Hypogenous bristles or scales absent. Stamens 3, 2 or 1; the connective often produced into an apical appendage. Style 3-fid or 2-fid, rarely almost undivided. Nutlet sessile, 3-angled or lenticular, usually obovoid or ellipsoid; the surface often tuberculate or papillose.

A large genus of about 650 species, of which 110 have been found in the Flora area. The type-species is *Cyperus esculentus* L.

It is quite possible that further species in this large genus will be found as the flora becomes better known; for example, *C. dichromus* C.B. Clarke presently only known from the Boran area of N Kenya could also grow in the Boran area of Ethiopia.

Key to subgenera

1. Spikelets never in distinct spikes, but in congested heads or in few to many digitate clusters. 2
 - Spikelets in distinct spikes, in congested heads or in digitate clusters. 5
2. Floating plants; nutlet 3–4 mm long including a persistent long and narrow style-base with corky basal tissue. Subgen. *Anosporum* (sp. 11)
 - Plants terrestrial; nutlet 0.4–2 mm long without corky basal tissue. 3
3. Inflorescence a congested white head.
 - Subgen. *Sorostachys* (sp. 12)
 - Inflorescence congested or lax; spikelets straw-coloured to dark red brown. 4

4. Plants strongly aromatic; nutlet lanceolate, more than four times as long as wide.

Subgen. *Courtoisina* (sp. 13)

- Plants less aromatic; nutlet usually obovate or elliptic, less than three times as long as wide.

Subgen. *Pycnostachys* (spp. 1–10)

5. Style with 2 stigmas; nutlet lens-shaped. 6
 - Style with 3 stigmas; nutlet 3-angled. 8

6. Rachilla of spikelets deciduous; the inflorescence a spherical to cylindrical head of numerous crowded spikelets. Subgen. *Kyllinga* (spp. 73–91)
 - Rachilla of spikelets persistent; the inflorescence usually of few-many digitate clusters of spikelets or consisting of 1-few spikelets only. 7

7. Nutlet laterally compressed.

Subgen. *Pycneus* (spp. 92–108)

- Nutlet dorsally compressed.

Subgen. *Cyperus* (spp. 14–72)

8. Inflorescence a yellow head up to 8 mm in diameter, the glume utricle-shaped as in *Ascolepis*.

Subgen. *Marisculus* (sp. 110)

- Inflorescence black, brown, green or white, lax or head-like; if glume utricle-shaped then inflorescence a white head. 9

9. Annual; inflorescence of 2–6 sessile spikes; glumes 1.7–2 mm long, dark red brown; the base of the nutlet enclosed in a cup-like white scale.

Subgen. *Alinula* (sp. 109)

- Annuals or perennials; inflorescence of sessile or stalked spikes or spikelets; glumes short or long, often black, brown or white; the base of the nutlet not enclosed in a cup-like scale.

Subgen. *Cyperus* (Spp. 14–72)

It is with considerably doubt the author has accepted the subgenera *Kyllinga* and *Pycneus*, since these are clearly not monophyletic groups having developed from different ancestors. However, they are practical groups to deal with, and are accepted as genera by many other botanists.

Key to species

1. Inflorescence of one or more spikes of spikelets having a distinct rachis (axis of the spike); at least some of the spikes stalked, but sometimes the peduncles are only 2–5 mm long. 2
 - Inflorescence a solitary usually dense head (very rarely 1–4 additional heads), or inflorescence more open but then spikelets arranged in clusters (digitate) and not in distinct spikes. 52

Species with one or more spikes having a distinct rachis (axis)

2. Plant without leaf-blades, perennial. 3
 - Plant with the largest green leaf-blades more than 3 cm long, or if shorter then annual. 5
3. Culm terete with transverse rings (articulated).
 - 23. *C. articulatus*
 - Culm 3-angled without transverse rings. 4
4. Culms 2–5 m long; involucre bracts light brown.
 - 14. *C. papyrus*

- Culms 1-3 m long; involucre bracts green. 15. *C. penzanosus*
- 5. Style with 2 branches; nutlet flattened. 6
- Style with 3 branches; nutlet 3-angled. 8
- 6. Plants annual with a minute root-system. 7
- Plants perennial with woody rhizome. 20. *C. alopecuroides*
- 7. Spikelets 3-4 mm wide; glumes with midrib shortly excurrent. 106. *C. divulsus*
- Spikelets 1.5-2.5 mm wide; glumes obovate and obtuse without excurrent midrib. 102. *C. macrostachyos*
- 8. Plants annual with a minute root-system; glumes 1.3-1.7 mm long. 9
- Plants perennial with stolons, rhizome or slightly woody or hardened stem-bases. 11
- 9. Glumes 2.5-3.2 mm long with midrib ending below the rounded apex. 52. *C. pustulatus*
- Glumes 1.3-1.7 mm long with midrib excurrent into a short or long mucro. 10
- 10. Glumes elliptic with the midrib excurrent into a long mucro. 55. *C. squarrosus*
- Glumes obovate to rounded with the midrib excurrent into a very short mucro. 36. *C. iria*
- 11. Inflorescence a single spike without leafy involucre bract. 32. *C. bulbosus*
- Inflorescence of few-many spikes in a simple or compound anthela, or if reduced to a single spike then at least some spikes with leafy involucre bract. 2
- 12. Basal sheaths semi-succulent producing swollen bulbous bases; spikelets fall off entire when mature. 13
- Basal sheaths not succulent; spikelets fall off entire when mature or with rachilla persistent after the lower glumes are shed. 17
- 13. Culm 5-10 mm thick; glumes 4-5 mm long, greyish white to pale brown. 46. *C. tomaiophyllus*
- Culm 1-5 mm thick; glumes 2.5-4 mm long, light to dark-red brown. 14
- 14. Spikelets 0.7-2 mm wide. 15
- Spikelets 2-4 mm wide. 66. *C. amauropus*
- 15. With 1-2 mm thick stolons. 49. *C. schweinfurthii*
- Without slender stolons. 16
- 16. Leaf-blades 1-3 mm wide; spikelets 7-10 mm long. 47. *C. impubes*
- Leaf-blades 3-5 mm wide; spikelets 2.5-4 mm long. 48. *C. rohlfsii*
- 17. Plants with slender stolons, sometimes ending in bulbs or tubers. 18
- Plants without stolons; plant base swollen or hardened or culms coming from woody rhizomes. 33
- 18. With bulbs. 19
- Without bulbs, but tubers often present. 22
- 19. Bulbs underground; culms distant from the bulb; spikelets 3-4 mm wide. 34. *C. usitatus*
- Bulbs often at ground-level; culms arising directly out of the bulbs. 20
- 20. Bulbs 3-10 mm thick. 21
- Bulbs 0.6-0.8 mm thick. 35. *C. microbolbos*
- 21. Spikelets dark red brown, 1.5-2 mm wide. 32. *C. bulbosus*
- Spikelets golden-yellow, 1.5-3 mm wide. 33. *C. grandibulbosus*
- 22. Spikelets falling off entire when mature. 23
- Spikelets remaining attached to the rachis whilst the lower mature glumes and nutlets are shed. 24
- 23. Spikelets 1-2 mm wide, 4-12-flowered. 45. *C. boreohemisphaericus*
- Spikelets 0.7-1 mm wide, 1-flowered. 49. *C. schweinfurthii*
- 24. Glumes dark red brown to black with a paler, often green, midrib, 2.5-3 mm long. 25
- Glumes light to medium red brown, but sometimes with almost black patches, 0.7-5 mm long. 27
- 25. Inflorescence contracted; largest rays 0.5-4 cm long. 25. *C. rigidifolius*
- Inflorescence more open; largest rays often 4-22 cm long. 26
- 26. Spikes in brush-like clusters, spikelets 5-12-flowered with rather distant glumes. 38. *C. aterrimus*
- Spikelets not in brush-like clusters; spikelets 10-25-flowered with closely set glumes. 26. *C. kilimandscharicus*
- 27. Stolons stout (rhizome-like), not ending in tubers; culm base not much swollen. 29. *C. longus*
- Stolons slender, frequently ending in small tubers, or culm-base swollen. 28
- 28. Leaf-blades 10-25 mm wide. 22. *C. latifolius*
- Leaf-blades less than 10 mm wide. 29
- 29. Rachilla (axis) of spikelet distinctly winged. 30
- Rachilla (axis) of spikelet not or hardly winged. 21. *C. procerus*
- 30. Spikelets yellowish brown or rusty (brown); glumes 2.2-2.6 mm long, with raised nerves almost to the margin. 31. *C. esculentus*
- Spikelets red brown to dark purple; glumes 2-4.5 mm long, with a wide marginal border without nerves. 31
- 31. Culm with 2 well developed leaf-blades only. 39. *C. bifolius*
- Culm with 3-many well developed leaf-blades. 32
- 32. Glumes 2-3 mm long with a wide uncoloured margin. 30. *C. maculatus*
- Glumes 2.7-4 mm long with a narrow uncoloured margin or such margin absent. 28. *C. rotundus*
- 33. Spikelets falling off entire when mature. 34
- Spikelets remaining attached to the rachis whilst the lower mature glumes and nutlets are shed. 40
- 34. Spikelets 0.5-1 mm wide, 1-many-flowered. 35
- Spikelets 1-2 mm wide, 2-many-flowered. 37
- 35. Spikelets producing many nutlets. 42. *C. longibracteatus*
- Spikelets producing 1-3 nutlets. 36

36. Glumes 1.5–2 mm long; spikelets 2–3 mm long, golden. 44. *C. subumbellatus*
 – Glumes 2–3.5 mm long; spikelets 2.5–6 mm long, green or greenish yellow. 43. *C. cyperoides*
37. Spikelets white, cream or very pale brown; glumes 4–5 mm long. 46. *C. tomaiophyllus*
 – Spikelets red brown or green; glumes 1.7–4 mm long. 38
38. Spikelets more than 1 mm wide only with glumes spreading; glumes 2–3 mm long. 42. *C. longibracteatus*
 – Spikelets 1–1.5 mm wide even when the glumes are not spreading; glumes 2.5–4 mm long. 39
39. Leaf-blades 1–3 mm wide; spikelets 7–10 mm long. 47. *C. impubes*
 – Leaf-blades 3–5 mm wide; spikelets 2.5–4 mm long. 48. *C. rohlfsii*
40. Spikes long, cylindrical (at least twice as long as wide), often crowded; spikelets not exceeding 12 mm (when flowering). 46
 – Spikes shorter (less than twice as long as wide), with fewer spikelets; largest spikelets often 15–40 mm long. 41
41. Largest leaf-blades 60–200 cm long and 10–30 mm wide. 22. *C. latifolius*
 – Largest leaf-blades less than 50 cm long and 1.5–10 mm wide. 42
42. Largest leaf-blades less than 10(–15) cm long and 2–4 mm wide. 24. *C. schimperianus*
 – Largest leaf-blades 15–50 cm long and 1.5–10 mm wide. 43
43. Spikelets olive or grey-green with a blue tinge. 27. *C. maranguensis*
 – Spikelets red brown to straw-coloured. 44
44. Spikelets less than 1 mm wide; glumes 1.7–2.6 mm long. 41. *C. distans*
 – Spikelets 1–1.5 mm wide; glumes 2–3 mm long. 45
45. Stem-base not prominently swollen. 29. *C. longus*
 – Stem-base prominently swollen. 30. *C. maculatus*
46. Glumes with a rounded midrib and inrolled margin. 20. *C. alopecuroides*
 – Glumes with a distinct green keel; margin not inrolled. 47
47. Spikelets terete or angular. 16. *C. digitatus*
 – Spikelets more or less strongly compressed. 48
48. Spikelets almost erect when mature; rachilla not winged; glumes 2–2.3 mm long. 49
 – Spikelets spreading; rachilla winged; glumes 0.9–2.4 mm long. 50
49. Glumes yellowish brown with red brown margins, the tip truncate. 40. *C. pratensis*
 – Glumes red brown with pale margin, the tip with prominently excurrent midrib. 37. *C. nutans*
50. Spikes 3–8 mm wide; glumes 0.9–1.2 mm long. 19. *C. imbricatus*
 – Spikes 6–25 mm wide; glumes 1.2–2.4 mm long. 51
51. Spikes 6–15 mm wide with 30–120 crowded spikelets; glumes 1.2–1.8 mm long. 18. *C. dives*
 – Spikes 15–25 mm wide often with only 15–30 rather distant spikelets; glumes 1.8–2.4 mm long. 17. *C. exaltatus*
52. Inflorescence rather open with spikelets in digitate clusters. 53
 – Inflorescence congested into a solitary (usually dense and occasionally cylindrical) head, very rarely with 1–4 additional sessile or stalked heads. 96
- Spikelets in digitate clusters**
53. Without basal leaf-blades, but inflorescence bracts often leafy. 54
 – With leaf-blades in lower part of stem. 55
54. Involucral bracts leafy, numerous and far overtopping the inflorescence. 1. *C. alternifolius*
 – Involucral bracts scale-like or leafy, but only 5–30 mm long. 23. *C. articulatus*
55. Style with 2 stigmas; achene flattened or rounded (in section). 56
 – Style with 3 stigmas; achene 3-angled (in section). 75
56. Inflorescence a spike with 2–5 spikelets each subtended by a leafy involucral bract. 106. *C. divulsus*
 – Inflorescences a lax or dense anthela of 2-many sessile spikelets or with sessile as well as stalked groups of spikelets. 57
57. Glumes with a prominent furrow or sunken patch on each side of the midrib. 58
 – Glumes without such furrow or sunken patch. 60
58. Stems perennial, at least in part decumbent or floating with leaves along a large part of its length; glumes 2.4–3 mm long. 59
 – Stems erect, either annual or with very slender stolons; glumes 1.5–2.2 mm long. 94. *C. sanguinolentus*
59. Spikelets 2–3 mm wide; glumes with 3-nerved midrib. 92. *C. mundtii*
 – Spikelets about 4 mm wide; midrib of glumes with 8 dark red brown nerves. 93. *C. atronervatus*
60. Nutlets horizontally wrinkled; surface cells elongate. 61
 – Nutlets papillose or almost smooth; surface cells almost isodiametric. 62
61. Glumes 3–4 mm long. 108. *C. macranthus*
 – Glumes 1.5–3 mm long. 107. *C. flavescens*
62. Perennials with stolons or short or long woody rhizome, often with remnants of previous season's growth. 63
 – Annuals with usually slender root-system. 70
63. Glumes 2–5 mm long; largest glume more than 2.2 mm long. 64
 – Glumes 1.4–2.2 mm long. 69
64. Plant tussocky without stolons. 65
 – Plant with stolons. 68
65. Spikelets 2–8 mm wide; largest glumes 3–5 mm long. 66

- Spikelets 1–2 mm wide; glumes 2–2.7 mm long. 99. *C. aethiops*
66. Spikelets dark brown to black. 97. *C. nigricans*
– Spikelets yellow to light brown or olive. 67
67. Inflorescence a globose head of sessile spikelets; glumes 2–2.7 mm long. 100. *C. lanceolatus*
– Inflorescence usually compound with sessile as well as stalked spikelets-clusters; glumes 2.8–4 mm long. 98. *C. unioloides*
68. Inflorescence a simple head-like anthela of sessile spikelets. 100. *C. lanceolatus*
– Inflorescence compound with one sessile and 1–8 stalked spikelet-clusters. 96. *C. nitidus*
69. Glumes dark brown to black with green midrib. 95. *C. elegantulus*
– Glumes golden brown or light red brown. 101. *C. polystachyos*
70. Glumes with a conspicuous wide pale margin; plants robust. 102. *C. macrostachyos*
– Glumes without such margin; plants robust or delicate. 71
71. Spikelets 3–4 mm wide; glumes 2.8–3.3 mm long. 105. *C. pauper*
– Spikelets 1–2.5 mm wide; glumes 0.7–2.2 mm long. 72
72. Inflorescence with one erect bract making the head-like anthela appear lateral. 104. *C. capillifolius*
– Inflorescence-bracts spreading or reflexed. 73
73. Glumes 1–1.2 mm long, conspicuously mucronate. 103. *C. pumilus*
– Glumes 1.4–2.2 mm long, not conspicuously mucronate. 74
74. Glumes dark brown to black with green midrib. 95. *C. elegantulus*
– Glumes golden brown or light red brown. 101. *C. polystachyos*
75. Plants annual with a minute root system. 76
– Plants perennial with woody rhizome or slender or tough stolons, or stem base swollen. 84
76. Glumes large (2.5–5 mm long). 77
– Glumes small (0.5–2.5 mm long). 78
77. Spikelets 3–5 mm wide, persistent; glumes 3.5–5 mm long. 51. *C. compressus*
– Spikelets 1–2.5 mm wide, falling off entire when mature; glumes 2.5–3 mm long. 13. *C. assimilis*
78. Glumes 0.5–0.8 mm long with keeled midrib. 5. *C. difformis*
– Glumes 0.8–2 mm long with rounded or keeled midrib. 79
79. Glumes truncate or emarginate with 3-nerved midrib ending in a short or long recurved mucro; nutlet 0.5–0.8 mm long. 80
– Glumes oblong to ovate, obtuse with the midrib ending in apex; achene 0.3–0.6 mm long. 82
80. Glumes 1.5–2.5 mm long with long recurved mucros. 81
– Glumes 1.3–1.6 mm long with short straight mucros. 53. *C. castaneus*
81. Spikelets 1.5–2 mm wide; nutlet 0.7–0.8 mm long. 54. *C. cuspidatus*
– Spikelets 2.5–4 mm wide; nutlet 1.6–1.8 mm long. 6. *C. reduncus*
82. Glumes straight; connective of the anthers setulose. 9. *C. haspan*
– Glumes straight or spreading; connective of the anthers smooth. 83
83. Leaf-blades 2–10 mm wide; spikelets 1–1.5 mm wide, glumes 1–1.4 mm long. 7. *C. foliaceus*
– Leaf-blades about 1 mm wide; spikelets less than 1 mm wide; glumes 0.7–0.9 mm long. 8. *C. tenuispica*
84. Glumes black with a green midrib, 2.5–3 mm long. 25. *C. rigidifolius*
– Glumes not as above, 0.5–5 mm long. 85
85. Plant with stolons. 86
– Plant without stolons. 88
86. Glumes 3–4 mm long; nutlet 1.6–1.8 mm long; culm-base succulent. 66. *C. amauropus*
– Glumes 0.6–1.3 mm long; nutlet 0.6–1.1 mm long; culm base not succulent. 87
87. Glumes 0.6–0.8 mm long. 5. *C. difformis*
– Glumes 1.1–1.3 mm long. 4. *C. dichroostachyus*
88. Culm base with semisucculent basal sheaths producing oval to cylindrical swollen bases. 89
– Culm base not succulent, but sometimes swollen. 90
89. Leaf-blades filiform; the largest 0.5–1.5 mm wide. 64. *C. cunduduensis*
– Leaf-blades flat; the largest 2–4 mm wide. 62. *C. rubicundus*
90. Glumes 1.3–1.7 mm long; leaf-blades rather thin. 91
– Glumes 2–5 mm long; leaf-blades thick or thin. 92
91. Rhizome weak. 9. *C. haspan*
– Rhizome prominent, 3–5 mm thick. 10. *C. denudatus*
92. Glumes with rounded apex; midrib not excurrent. 2. *C. dereilema*
– Glumes with acute apex and excurrent midrib. 93
93. Glumes 2.2–2.5 mm long; spikelets often proliferating. 3. *C. fischerianus*
– Glumes 2.5–4 mm long; spikelets not proliferating. 94
94. Stem-bases swollen, almost globose; nutlet 1.7–1.8 mm long. 30. *C. maculatus* subsp. *ogadensis*
– Stem-bases not prominently swollen; nutlet 1.2–1.5 mm long. 95
95. Roots densely covered by tomentum. 58. *C. conglomeratus*
– Roots without tomentum. 59. *C. jeminicus*
- Spikelets in (dense) heads**
96. Inflorescence yellow. 110. *C. microaureus*
– Inflorescence white, red brown or brown. 97
97. Single head (group) spikelets. 98
– One sessile head of spikelets subtended by 1–4 stalked heads. 109. *C. lipocarpoides*

98. Leaf-blades absent or very short; involucre bracts 1-2, often shorter than the inflorescence. **99**
 - Leaf-blades well developed; involucre bracts 2-many, the largest much longer than the inflorescence. **100**
99. Plant floating; glumes 4-5 mm long. **11. C. pectinatus**
 - Plant not floating; glumes 2-3.5 mm long. **50. C. laevigatus**
100. Style with 2 long stigmas; nutlet flattened. **124**
 - Style with 3 long stigmas or stigma unbranched or shortly 2-branched; achene 3-angled to rounded. **101**
101. Plants annual with a minute root-system. **102**
 - Plants perennial with rhizome, stolons or a swollen stem-base. **107**
102. Glumes minute, 0.6-0.8 mm long. **5. C. difformis**
 - Glumes 1.3-5 mm long. **103**
103. Glumes 1.3-2 mm long ending in long recurved mucros. **104**
 - Glumes 2.5-5 mm long with or without mucros. **105**
104. Spikelets 2-3 mm wide; glumes 1.4-1.7 mm long. **55. C. squarrosus**
 - Spikelets 1.7-2 mm wide; glumes 1.6-2 mm long. **54. C. cuspidatus**
105. Glumes about 2.5 mm long; nutlet 0.5-0.7 mm long. **63. C. kaessneri**
 - Glumes 2.5-5 mm long; nutlet 0.9-1.7 mm long. **106**
106. Stem base succulent; spikelets 4-15 mm long; glumes 2.5-4 mm long; achene 0.9-1.1 mm long. **62. C. rubicundus**
 - Culm base not succulent; spikelets 10-50 mm long; glumes 3.5-5 mm long; achene 1.5-1.7 mm long. **51. C. compressus**
107. Inflorescence light to dark red brown, or at least with larger dark coloured patches. **108**
 - Inflorescence white, but may dry to a pale pinkish brown, with or without a few red brown spots. **115**
108. Glumes small, i.e. 1.3-2 mm long. **109**
 - Glumes large, i.e. 2.3-6 mm long. **110**
109. Inflorescence of 15-30 crowded spikelets; glumes 1.3-1.5 mm long, medium red brown. **57. C. meeboldii**
 - Inflorescence of 3-6 sessile spikelets; glumes 1.6-2 mm long, almost black. **61. C. holostigma**
110. Stem base succulent with fleshy leaf-sheaths forming an ovate or cylindrical pseudobulb. **111**
 - Stem base not succulent, but the rhizome is sometimes thickened at the stem-base. **114**
111. Leaf-blades flat; the largest 2-4 mm wide. **112**
 - Leaf-blades filiform or canaliculate; the largest 0.3-1.5 mm wide. **64. C. cunduduensis**
112. Spikelets 4-6 mm wide, not disarticulating before the glumes and achenes are shed; achenes 0.9-1.1 mm long. **62. C. rubicundus**
 - Spikelets 1.5-4 mm wide, disarticulating as one unit with the glumes and achenes persistent; achenes 1.6-1.8 mm long. **113**
113. Spikelets 5-17 mm long and 2-4 mm wide. **66. C. amauropus**
 - Spikelets 4-5 mm long and 1.5-2 mm wide. **65. C. cruentus**
114. Roots densely covered by tomentum; spikelets compressed to subterete. **58. C. conglomeratus**
 - Roots without tomentum; spikelets strongly compressed. **59. C. jeminicus**
115. Plants with long stolons. **70. C. diurensis**
 - Plants without stolons. **116**
116. Stem and upper surface of leaf-blades densely short-hairy. **67. C. albopilosus**
 - Stem and leaf-blades glabrous or minutely scabrid. **117**
117. Spikelets 4-25 mm long with 8-30 flowers; the rachilla persistent after at least some of the lower glumes and nutlets have fallen. **118**
 - Spikelets 2-8 mm long with 1-8 flowers, falling off entire when mature. **121**
118. Glumes small; i.e. 1.3-1.6 mm long. **119**
 - Glumes 2-6 mm long. **120**
119. Leafy involucre bracts 5-8, longer than the culm. **56. C. pygmaeus**
 - Leafy involucre bracts 2-3, much shorter than the culm. **12. C. pulchellus**
120. Glumes 2.5-4 mm long; achene obscurely 3-angled, minutely papillose. **58. C. conglomeratus**
 - Glumes 4-6 mm long; achene 3-angled with concave adaxial side, smooth. **60. C. niveus**
121. Leaf-blades 1-3 mm wide. **122**
 - Leaf-blades 4-8 mm wide. **71. C. dubius**
122. Glumes 2-3 mm long. **69. C. plateilema**
 - Glumes 3-5 mm long. **123**
123. Spikelets 3-6-flowered; glume not sheathing and not tightly enveloping the nutlet. **68. C. submacropus**
 - Spikelets 1-flowered; glume sheathing at base, tightly enveloping the mature nutlet. **72. C. mollipes**
124. Inflorescence dark purple to almost black. **125**
 - Inflorescence white, yellow, golden, green or light brown. **127**
125. Plant tussocky, never with stolons. **81. C. chlorotropis**
 - Plant with scattered culms from an elongate rhizome or with stolons. **126**
126. Culm regularly spaced along a horizontal scale-covered rhizome; inflorescence a solitary globose spike. **83. C. brevifolius**
 - Culms from the ends of slender stolons; inflorescence usually of several clustered (rarely stalked) spikes, the central one cylindrical. **80. C. bracheilema**
127. Inflorescence white, greenish white or very pale red brown. **128**
 - Inflorescence golden or green. **139**
128. Stolons (long and slender scale-covered subter-

- ranian stems) present, only 0.5–1 mm thick; spikelets 2–4-flowered. 73. *C. richardii*
- Stolons absent, but rhizome sometimes horizontal; spikelets 1-many-flowered. 129
129. Keel of glumes winged; wings toothed or hairy. 130
- Keel of glumes not winged; but sometimes scabrid or hairy. 131
130. Spikelets 4–6.5 mm long. 88. *C. alatus*
- Spikelets 2.5–3 mm long. 89. *C. controversus*
131. Keel of glumes with long cilia; glumes to 1.8 mm long. 79. *C. welwitschii*
- Keel of glumes glabrous or with short spine-like teeth. 132
132. Spikelets about 1 mm long; unbranched part of style very short; glumes only 0.8 mm long. 77. *C. microstylis*
- Spikelets at least 1.5 mm long; unbranched part of style long or short; glumes at least 1.5 mm long. 133
133. Glumes not prominently keeled; midrib distinct near apex only. 76. *C. brunneofibrosus*
- Glumes keeled with midrib distinct at base also. 134
134. Glumes up to 2.5 mm long; spikelets 1-flowered. 135
- Largest glumes 2.6–5 mm long; spikelets 2–5-flowered. 137
135. Plant-base not prominently woody, often annual; glumes with scabrid midrib; nutlet about 1 mm long. 87. *C. densicaespitosus*
- Plant-base somewhat woody, perennial; glumes glabrous; nutlet about 1.5 mm long. 136
136. Central spike cylindrical; inflorescence (when mature) with a blue tinge. 86b. *C. sesquiflorus*
- Central spike oval; inflorescence white to greyish white or faintly red brown. 78. *C. triceps*
137. Plant base covered by fibrous remains of old leaf-sheaths. 138
- Plant base lacking such fibres. 86. *C. sesquiflorus*
138. Leaf-blades 3–5 mm wide; glumes 2.5–4 mm long. 75. *C. comosipes*
- Largest leaf-blades often 5–8 mm wide; glumes 4.5–7 mm long. 74. *C. eximius*
139. Annual or perennial; midrib of glumes prominently keeled; the keel toothed or ciliate. 140
- Perennial; glumes not prominently keeled; the midrib glabrous or with short teeth. 141
140. Annual; spikelet 1-flowered; teeth of keel of glumes without cilia. 90. *C. metzii*
- Perennial; spikelet 2-flowered; teeth of keel of glumes with cilia. 91. *C. aureoalatus*
141. With horizontal rhizome; culms crowded or distant; spikelets 1–2-flowered. 142
- Tufted without elongate rhizome; culm base swollen and covered by the fibrous remains of old leaf sheaths; spikelets 2–3-flowered. 82. *C. costatus*

142. Culms widely spaced on the rhizome; involucre bracts longer than the leaves; spike 8–15 mm long. 85. *C. pinguis*
- Culms crowded or widely spaced; involucre bracts shorter than the longest leaf-blades; spike mostly less than 8 mm long. 143
143. Culms distant on 1–2 mm thick rhizomes; culm-base not swollen. 83. *C. brevifolius*
- Culms crowded on 2–4 mm thick rhizomes; culm-base swollen. 84. *C. erectus*

Subgen. **PYCNOSTACHYS***C.B. Clarke* (1893)

Perennial, or more rarely annual, plants of swamps and forest, usually in areas of high rainfall. Basal leaves many, few or absent. Culms usually 20–80 cm long, ending in an open (or more rarely somewhat congested) inflorescence with digitate clusters of spikelets and usually large leafy involucre bracts. Spikelets many-flowered, 2–15 mm long, only slightly compressed; axis persistent (i.e. spikelets not falling off as a whole). Glumes 0.5–3.5 mm long, obtuse, acute or the midrib excurrent in a straight or recurved mucro. Stamens 3, 2 or 1; connective often produced into an apical appendage. Style falling off quickly, 3-fid. Nutlet sessile, 3-angled, 0.4–1.5 mm long; surface usually tuberculate or minutely papillose.

A medium-sized subgenus of about 100 species, mostly occurring in the tropics and subtropics. In Ethiopia 10 species. The type species is *Cyperus diffusus* Vahl.

1. *C. alternifolius* L. (1771)

– type: from 'Madagascar'.

subsp. *flabelliformis* (Rottb.) Kük. in *Pflanzenr.* IV, 20(101) (1936);*C. flabelliformis* Rottb. (1773) – type: Arabia, *Forskål* s.n. (Rottböll 1773 Tab. XII, 2).*C. flagellatus* Hochst. (1841) – type: TU, near Adua, *Schimper* 55 (P holo., HAL iso.).

Robust perennial with a 2–10 mm thick creeping woody rhizome and several culms usually placed in a straight row. Culms 25–150 x 15–70 cm (but only 1.2 cm across the leaf-sheaths), rounded with longitudinal ridges, minutely scabrid; the basal part covered with leaf-sheaths and shorter black scales. Leaf-blades absent or the uppermost sheath with a 1–8 cm long somewhat leafy limb (the function of the leaves has been taken over by the leafy involucre bracts). Inflorescence a compound anthela 5–25 cm in diameter, subtended by numerous (15–25) leafy involucre bracts; bracts 10–35 x 0.3–2 cm, scabrid on margin and major ribs, spirally arranged along a 1–5 cm long axis; largest peduncle 3–13 cm long; each spikelet-cluster digitate consisting of 3–20 spikelets, if more than 10 then the cluster is almost capitate. Spikelets 2–10 x 1–2.5 mm, light to medium brown, lanceolate, much compressed, 15–30-flowered. Glumes 1–2 mm long, straw-coloured or golden to red brown with 3-keeled midrib excurrent in a short mucro



Figure 212.60 *CYPERUS ALTERNIFOLIUS* subsp. *FLABELLIFORMIS*. Drawn by R.W. Haines from *Haines* 4012. (Reproduced with permission from Haines & Lye, fig. 283, 1983.)

or acute tip. Nutlet 0.8–0.9 x 0.4–0.5 mm, 3-angled, lanceolate to oblong, yellow as young, turning brown when mature, minutely papillose. Fig. 212.60.

In swamps, wet grasslands, and stream-banks, also cultivated as a garden plant; 700–2400 m. EW TU SU GG SD HA; widespread in tropical Africa and south-west Asia. *Mooney* 5582; *Burger* 1136; *Ash* 2309.

Differs from subsp. *alternifolius* in having shorter nutlets (equalling $\frac{1}{3}$ of the bract as compared to $\frac{2}{3}$ in subsp. *alternifolius*) and often shorter spikelets, the glumes tend to be shorter and often have a distinct white hyaline margin.

2. *C. dereilema* Steud. (1842)

– type: Ethiopia, Mt. Silke, *Schimper* 659 (P holo., HAL K iso.).

Robust tussocky perennial with a thick woody rhizome. Culms 60–150 x 0.4–1 cm, 3-angled. Leaves 60–120 x 1–2.5(–3) cm, flat, scabrid on margins and ribs; leaf-sheaths not prominent, only seen at the very base of the culm. Inflorescence a large anthela 10–30 cm in diameter; major peduncles 4–15 cm long carrying a secondary inflorescence of numerous stalked and sessile spikelet-clusters. Involucral bracts 5–15, leafy, erect or spreading; the largest 20–60 x 0.8–1.8 cm. Spikelets 4–10 x 1.5–2.5 mm, solitary or more commonly in groups of 2–5 (rarely more). Glumes 2–2.8 mm long, glabrous, red brown with a rounded apex, midrib not or slightly



Figure 212.61 *CYPERUS DEREILEMA*. Drawn by R.W. Haines from *Haines* 4731. (Reproduced with permission from Haines & Lye, fig. 285, 1983.)

excurrent. Nutlet 0.9–1 x 0.5–0.6 mm, 3-angled, red brown, almost smooth. Fig. 212.61.

In Upland forests, often near streams; 1700–3000 m. GD GJ SU IL KF GG SD; widespread in East Africa. *Scott* 152; *Gillett* 15013; *Ash* 2719.

3. *C. fischerianus* A. Rich. (1851)

– type: TU, Mt. Scholoda, 3 km W of Adua, *Schimper* 348 (P lecto., HAL K UPS isolecto.).

Robust perennial with short woody rhizomes forming dense tussocks. Culms 60–100 x 0.2–0.8 cm, 3-angled, almost glabrous. Leaves 40–90 x 0.8–2 cm, flat, scabrid on margin and major ribs; leaf-sheaths rather thick, dark purple and glossy below. Inflorescence a 6–15 x 6–15 cm anthela, or even larger when proliferating branches are produced. Involucral bracts leafy, erect or spreading, the largest 15–60 x 0.5–1.5 cm. Anthela a 'pseudoumbel' with one sessile and 5–15 stalked secondary 'pseudoumbels' on 0.5–12 cm long peduncles; the tubular prophylls at the base of major peduncles purple. Spikelets 5–10 x 1.5–3 mm, linear-lanceolate, rusty brown, solitary or a few together, 10–20-flowered. Glumes 2.2–2.5 mm long, ovate-lanceolate, rusty red brown with a usually shortly excurrent midrib. Nutlets 1–1.2 mm long and 0.5–0.6 mm wide, obovate-elliptic, red brown, minutely papillose. Fig. 212.62.

At forest-edges, and in open places in upland forest, also in woodland on rocky outcrops; 1700–2600 m. EW



Figure 212.62 *CYPERUS FISCHERIANUS*. Drawn by R.W. Haines from *Haines* 4036. (Reproduced with permission from Haines & Lye, fig. 286, 1983.)

TU GD GJ SU AR WG IL KF SD BA HA; widespread at higher altitudes in central and east tropical Africa. *Mooney* 7587; *Friis* et al. 333, 1580.

4. *C. dichroöstachyus* A. Rich. (1851)

– type: TU, Mt. Scholoda 3 km W of Adua, *Schimper* 391 (P lecto., HAL K isolecto.).

C. andschoa A. Rich. (1851) – types: TU, Chiré, Maie Goua Goua, *Quartin-Dillon* s.n. (P lecto.) & TU, Mt. Scholoda, *Schimper* 273 (P syn.).

Fairly robust stoloniferous perennial. Stolons 3–12 x 0.1–0.3 cm, red-brown to almost black, naked or with persistent 10–25 mm long brown to black scales. Culms 25–70 x 0.2–0.8 cm, 3-angled, glabrous. Largest leaf-blades 20–40 x 0.4–1 cm, flat, scabrid on margin and midrib at least above; sheaths light to dark brown; the basal without leaf-blades. Inflorescence a small to large open (rarely congested) anthela 2–25 cm wide, and with 3–4 large leafy bracts. Largest involucre bract 12–50 x 0.3–1.4 cm, spreading, usually much longer than the inflorescence. Largest inflorescence-branches 0.5–8 cm long; secondary branches 0.1–3.5 cm long. Anthela with one sessile and many pedunculate secondary inflorescences consisting of one sessile and 5–20 pedunculate digitately arranged spikelet-clusters or tertiary inflorescences. Spikelets 2–4.5 x 0.7–2 mm, straw-coloured to dark brown, 10–15-flowered. Glumes 1.1–1.3 mm long, obovate to ovate, grey or light to dark chestnut brown (or almost black) with pale 3-nerved midrib ending in a very short erect or recurved mucro. Stamens 2. Style 3-branched. Nutlet c 1 x 0.3–0.5 mm, lanceolate



Figure 212.63 *CYPERUS DICHROÖSTACHYUS*. Drawn by R.W. Haines from *Haines* 4699. (Reproduced with permission from Haines & Lye, fig. 308a, 1983.)

to elliptic with a short apiculus, grey-brown, minutely wrinkled or irregularly papillose. Fig. 212.63.

In wet habitats near streams and pools in forest, or near cultivations, also in swamps; 1170–3200 m. EW TU GD GJ WU SU AR WG IL KF SD BA HA; widespread in tropical Africa and Madagascar. *Mooney* 8863; *Burger* 1794; *Friis* et al. 1538.

5. *C. difformis* L. (1756)

– type: from 'India' (LINN 70.10 lecto.).

Slender to medium-sized annual. Culms 6–80 x 0.07–0.3 cm, 3-angled, glabrous. Largest leaf-blades 5–25 x 0.2–0.6 cm, flat, smooth or scabrid on margin and midrib; sheaths green to red brown, rather wide, the basal without leaf-blades. Inflorescence a solitary congested anthela or with many subumbellately arranged heads giving an anthela 1–8 cm wide, and with 2–3 leafy bracts. Largest involucre bract 3–25 x 0.1–0.6 cm, erect or spreading, much overtopping the inflorescence. Each head is 5–12 mm in diameter and consists of 10–60 spikelets in digitate clusters. Spikelets 2–6 x 0.8–1.2 mm, pale yellow-grey to dark-brown, 6–30-flowered. Glumes 0.6–0.8 mm long, obovate, yellow to dark red-brown with a wide green midrib ending in a short mucro. Nutlet 0.6–0.8 x 0.3–0.4 mm, 3-angled, obovate-elliptic, yellow brown, minutely papillose. Fig. 212.64.

In seasonally wet grassland and temporary swamps and pools; 600–2000 m. WG IL KF; common pantropical species, also in South Europe. *Ash* 3619; *Friis* et al. 7200, 7253.



Figure 212.64 *CYPERUS DIFFORMIS*. Drawn by R. W. Haines from *Haines 4222*. (Reproduced with permission from Haines & Lye, fig. 310, 1983.)



Figure 212.65 *CYPERUS REDUNCUS*. Drawn by R. W. Haines from *Haines 4257*. (Reproduced with permission from Haines & Lye, fig. 297, 1983.)

6. *C. reduncus* Böck. (1868)

—type: TU, Gapdia, *Schimper* s.n. (B holo.).

Medium-sized annual with solitary or a few crowded stems. Culms 12–35 x 0.1–0.25 cm, 3-angled, scabrid. Leaf-blades 10–25 cm long, flat with prominent longitudinal ribs, scabrid on margin and midrib, at least as young; sheaths green to light brown. Inflorescence an open anthela 3–12 cm wide, and with 4–6 leafy bracts. Largest involucre bract 10–30 x 0.2–0.5 cm, erect or spreading, much overtopping the inflorescence. Largest inflorescence-branches 2–10 cm long. Anthela with 4–12 main branches, each with one digitate cluster of spikelets and with or without additional spikelet-clusters on 0.2–2.5 cm long secondary peduncles, more rarely with tertiary peduncles and spikelet-clusters. Spikelets 2–10 x 2.5–4 mm, light brown with spreading curved glumes, 5–25-flowered. Glumes 1.5–2.5 mm long, strongly curved, red brown to green yellow with wide uncoloured margin; midrib 3-nerved, excurrent in a curved mucro. Stamens 3. Style 3-branched. Nutlet 1.6–1.8 x 0.35–0.45 mm, 3-angled, linear-oblong, light red-brown, minutely papillose. Fig. 212.65.

In seasonally wet grasslands, temporary pools and swamps; 790–1600 m. TU WG IL SD; widespread, but uncommon in tropical Africa. *de Wilde* 8860; *Friis* et al. 7250.

7. *C. foliaceus* C.B. Clarke (1908)

—type: Togo in West Africa, *Wamecke* 388 (K holo.).

Slender to fairly robust annual with a minute root system. Culms 3–35 x 0.1–0.3 cm, 3-angled, green, glabrous. Leaf-blades present, the largest 3–25 x 0.2–0.6(–1) cm; leaf-sheaths green, glabrous, often with distinct transverse bars. Inflorescence an open anthela 3–20 cm in diameter. Major involucre bract leafy, 6–25 x 0.2–0.8 cm, longer than the inflorescence. Largest inflorescence-branches 2–12 cm long, carrying one sessile and several stalked groups of digitately arranged spikelets. Spikelets 3–8 x 1–1.5 mm (or to 2 mm with glumes spreading), linear-lanceolate, green or light brown. Glumes 1–1.4 mm long, truncate, green to red-brown with translucent margin; midrib excurrent in a short mucro or ending in the slightly recurved apex. Nutlet 0.4–0.5 x 0.3–0.4 mm, obovate to almost spherical, as mature shiny grey white with isodiametric tuberculate surface-cells, as immature with small surface cells in longitudinal rows. Fig. 212.66.

In temporary swamps; 800 m. KF; rare in East Africa. *Ash* 3644.

8. *C. tenuispica* Steud. (1855)

—type: 'India', *Hohenacker* 1607 (P holo.).

Slender annual with a minute root-system. Stems often solitary, 5–15 x 0.05–0.1 cm, 3-angled, glabrous. Leaves 2–4, the sheaths pale or light red-brown; blades 2–10 x c 0.1 cm, flat and flaccid. Inflorescence a slender lax anthela 2–5 cm in diameter, with one sessile spikelet or a small group of sessile spikelets subtended by 2–6 stalked digitate groups of spikelets. Involucre bracts



Figure 212.66 *CYPERUS FOLIACEUS*. Drawn by R. W. Haines from *Katende* 622. (Reproduced with permission from Haines & Lye, fig. 315, 1983.)

1-3, erect or spreading; the largest 3-6 cm long and usually overtopping the inflorescence. Primary rays usually 1-5 cm long, glabrous. Spikelets 4-6 x < 1 mm, linear with acute apex; rachilla slightly winged, soon visible between the glumes. Glumes 0.7-0.9 mm long, oval-elliptic, pale to light red-brown without lateral nerves, but with a green midrib ending immediately below the obtuse or emarginate apex; when mature the glumes are often spread at a 90° angle. Style about 0.8 mm long with 3 long branches. Nutlet 0.3-0.4 x 0.25-0.35 mm, obtusely 3-angled to almost spherical, but with a prominent basal stalk, white or pale grey, minutely tuberculate. Fig. 212.67.

In grassland near cultivated fields; 1800 m. GJ; widespread in warm regions of Africa, Asia and Australia. *Mesfin T. & Kagnev* 1781.

9. *C. haspan* L. (1753)

- type: Sri Lanka, Herb. *Hermann* 37, v. 2, f. 43 (BM-SL lecto.).

Annual or perennial herb without or with a very short rhizome. Stems usually crowded, 5-40 x 0.08-0.25 cm, 3-angled, green, glabrous. Leaf-blades present at least on some shoots, up to 20 x 0.1-0.4 cm; leaf-sheaths light to dark red-brown, glabrous, often with undulate margin and mouth. Inflorescence an open anthela 2-15 cm in diameter. Major involucral bract leafy, 1.5-7 cm long, usually shorter than the inflorescence. Largest inflorescence-branches 1-7 cm long, carrying one sessile and one subumbel-like group of digitately arranged spikelets. Spikelets 3-12 x 1-1.5 mm, linear-lanceolate,

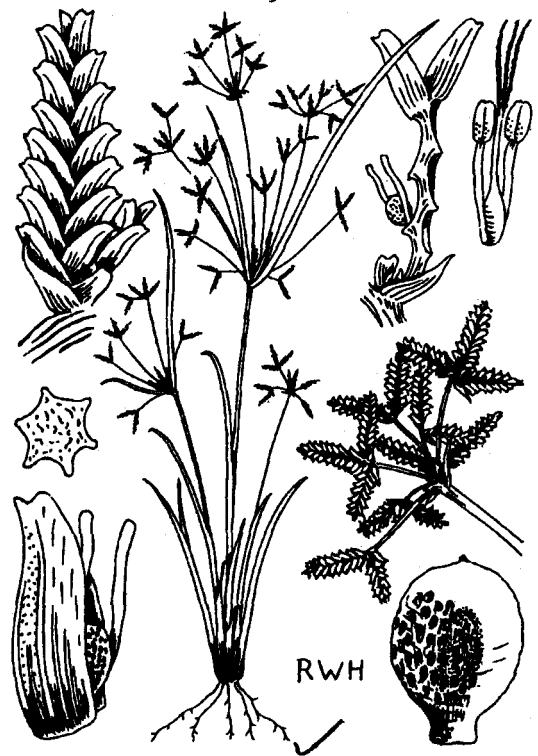


Figure 212.67 *CYPERUS TENUISPICA*. Drawn by R. W. Haines from *Haines* 4143. (Reproduced with permission from Haines & Lye, fig. 314, 1983.)

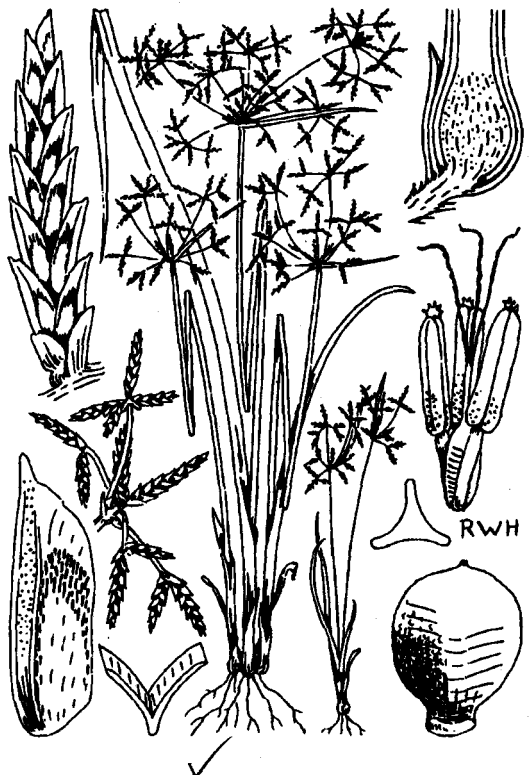


Figure 212.68 *CYPERUS HASPAN*. Drawn by R. W. Haines from *Haines* 4223. (Reproduced with permission from Haines & Lye, fig. 317, 1983.)

light red-brown. Glumes 1.3–1.6 mm long, red-brown with a paler midrib which is excurrent in a short straight mucro. Stamens 3 with setose anthers. Nutlet 0.5–0.6 x 0.3–0.4 mm, obovate or subspherical, white when young, grey-brown and irregularly tuberculate when mature. Fig. 212.68.

In swamps, wet grassland and on river-banks; 1690–2000 m. KF; widespread in the tropics of the Old World. *de Wilde et al.* 6888; *Friis et al.* 44, 2049.

This species sometimes given as *C. halpan*.

10. *C. denudatus* L. f. (1781)

– type from 'India'.

C. phaeorhizus K. Schum. (1895).

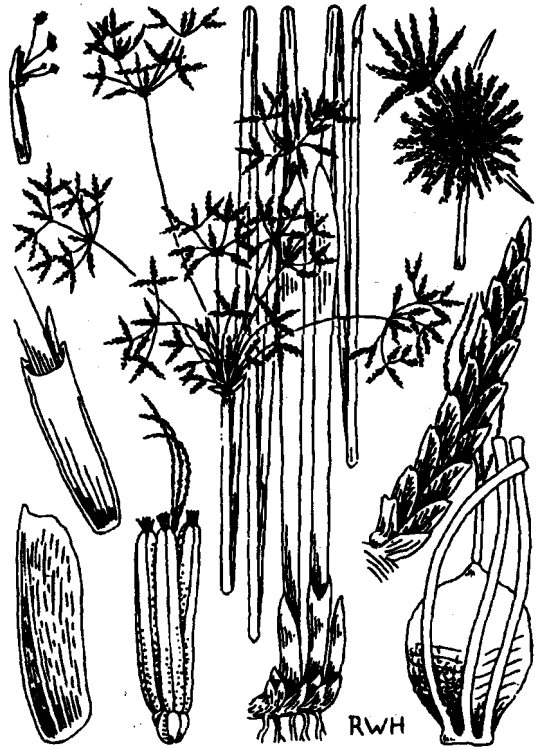
Tufted perennial with a 3–5 mm thick creeping scale-covered rhizome and crowded stems, more rarely with stems spaced along the rhizome. Culms 30–90 x 0.05–0.5 cm (but often wider across the rather lax sheaths), 3-angled, green, glabrous. Leaf-blades absent or up to 1 cm long, usually red-brown (rarely green); leaf-sheath light to dark red-brown, usually ending in a 3-angled red-brown tip. Inflorescence an open or congested anthela, 2–15 x 2–12 cm. Major involucre bract leafy, 0.5–3 cm long and usually shorter than the inflorescence. Largest inflorescence-branches 1–8 cm long, carrying a subumbel-like cluster of digitately arranged spikelets. Sessile spikelet-clusters usually consisting of 2–5 spikelets. Spikelets 3–10 x 0.8–1.5 mm, linear-lanceolate, light to dark red-brown; each consisting of 5–20 flowers. Glumes 1.3–1.7 mm long, ovate, light to dark red-brown, with or without paler margin and green midrib; apex with slightly excurrent midrib. Nutlet 0.5–0.7 x 0.3–0.4 mm, ovate to obovate, white and muricate when young or depauperate, brown and tuberculate when mature. Fig. 212.69.

In swamps, swamp-edges, along ditches, and in other wet habitats; 1070–2100 m. GJ SU AR WG KF SD BA; widespread in tropical Africa. *Mooney* 7596; *Gilbert et al.* 1940, 4364.

Subgen. ANOSPORUM (Nees) C. B. Clarke (1893)

Perennial floating plants with or without stolons and scattered or crowded culms. Culms 15–120 x 0.05–0.5 cm, rounded angular to sharply 3-angled or winged, smooth, erect or curving. Leaves rather rigid, 2–4 mm wide, flat except at the base, or leaf-blades absent. Inflorescence a congested anthela of few-numerous crowded sessile spikelets. Spikelets 4–20 x 2–7 mm, 10–40-flowered. Glumes 3–5.5 mm long, ovate, very densely imbricate. Stamens 3. Style continuous with the ovary, undivided, obscurely 3-lobed or more deeply 2–3 branched, persistent. Nutlet 2–5 x (including the persistent style-base and the corky basal tissue) 0.7–2 mm, smooth; darker seed surrounded by yellow corky tissue, thus nutlet long-floating.

A small subgenus of 3 species; 1 occurs in the Flora area. The type-species is the Asian *Cyperus cephalotes* Vahl.



?Figure 212.69 *CYPERUS DENUDATUS*. Drawn by R. W. Haines from *Haines* 4669. (Reproduced with permission from *Haines & Lye*, fig. 319, 1983.)

11. *C. pectinatus* Vahl (1805)

– type: Guinea, West Africa, *Isert* s.n. (*C. holo.*)

Tufted leafless perennial with few to numerous crowded culms from a short rhizome, sometimes stoloniferous; roots numerous, light-brown to red-brown, sometimes spongy. Culms 30–120 x 0.06–0.2 cm, rounded-angular, glabrous, the base covered with grey black to purple leaf sheaths; as young the culm is erect but as mature it often curves outwards and eventually plants the inflorescence on the ground; each inflorescence gives rise to a new tussock. Leaf-blades absent, but the leaf-sheaths often end in a short 3-angled limb. Inflorescence a solitary red-brown head of 3–20 sessile spikelets, 1–4 cm in diameter. Involucral bracts 1–2, culm-like, and usually shorter than the inflorescence. Spikelets 5–20 x 2–6 mm, lanceolate, light to dark red-brown, flattened, 15–40-flowered; spikelets are produced continually and their size is therefore very variable within the same head. Glumes 4–5 mm long (but the lowest in each spikelet only 2–4 mm), ovate, boat-shaped, red-brown with usually green, 3-nerved, very strongly scabrid keel; apex obtuse to acute. Nutlet 3.5–4 x 1–1.2 mm, lanceolate in outline, somewhat flattened; apex long, acuminate; surface smooth; darker seed surrounded by yellow corky tissue, thus nutlet long-floating. Fig. 212 70.

In wet swamps, lake-edges and along streams and rivers, sometimes floating; 600–1700 m. WG IL KF GG; widespread in tropical Africa and Madagascar. *Vatova* 1507; *Friis et al.* 2063, 7298.



Figure 212.70 *CYPERUS PECTINATUS*. Drawn by R.W. Haines from *Haines* 4653. (Reproduced with permission from Haines & Lye, fig. 328, 1983.)

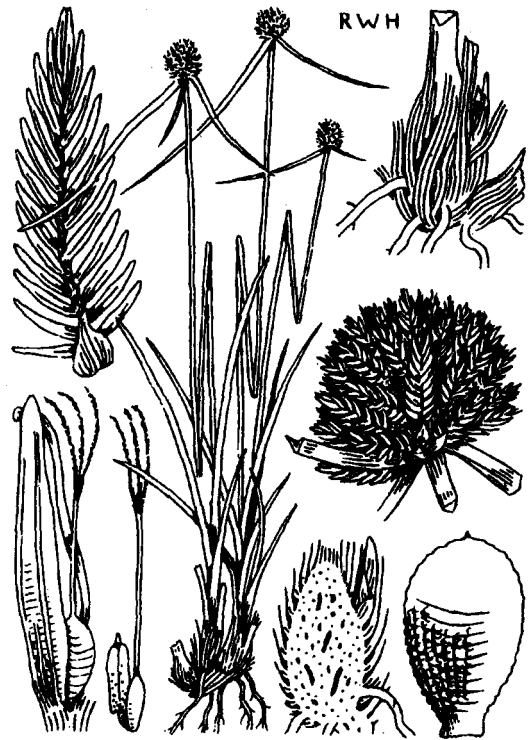


Figure 212.71 *CYPERUS PULCHELLUS*. Drawn by R.W. Haines from *Haines* 4231. (Reproduced with permission from Haines & Lye, fig. 330, 1983.)

Subgen. **SOROSTACHYS** (*Steud.*) Lye (1983)

Perennial terrestrial plants growing in small tussocks in (seasonally) damp places. Inflorescence a single congested white or pale cinnamon-coloured terminal head consisting of 15–60 crowded spikelets, 7–15 mm in diameter. Involucral bracts foliaceous, 2–4, spreading or reflexed. Spikelets 2–8 x 1–2.5 mm (depending on how much the glumes are spreading), 8–10-flowered, compressed. Rachilla slender, not winged. Glumes distichous, membranous, elliptic to oblong, 1–1.8 mm long, grey-white, with a cinnamon tinge or purple lines, faintly 3-nerved; midrib indistinct. Stamen 1, rarely 2 in some flowers. Style continuous with the ovary, not incrassate at the base, falling off quickly, with 3 long branches. Nutlet sessile, 3-angled, obovoid to oblong, shortly apiculate, grey to brown or black, minutely papillose, 0.5–1.2 x 0.2–0.4 mm.

A small subgenus of 7 species, of which only 2 occur in Africa. The type-species is *Cyperus pulchellus* R.Br.

12. *C. pulchellus* R.Br. (1810)

—type: Australia, *Brown* 5917 (K holo., L iso.).

Slender perennial with swollen stem-bases covered by fibrous remains of old sheaths, often with many crowded stem-bases giving a rhizome-like structure. Culms 6–40 x 0.04–0.1 cm, glabrous or slightly scabrid, 3-angled, covered by red-brown to black sheaths. Leaf-blades 2–15 x 0.05–0.2 cm, flat or v-shaped, scabrid on margin and midrib; sheaths green to light red-brown, basal sheaths darker. Inflorescence a congested anthela

with sessile spikelets only. Major involucral bract leafy, 2–10 x 0.1–0.15 cm, reflexed or spreading. Anthela 0.7–1.5 cm in diameter, consisting of 15–60 crowded spikelets. Spikelets 4–8 x 1–2.5 mm (depending on how much the glumes are spreading), grey white with a light pink brown (cinnamon) tinge, 10–20-flowered. Glumes 1.3–1.5 mm long, lanceolate, grey white with a cinnamon tinge; midrib indistinct; margin often incurved. Nutlet 0.6–0.8 x 0.2–0.3 mm, obovate, flattened 3-angled, grey to pale-brown, minutely papillose. Fig. 212.71.

In seasonally wet habitats; 1400–1500 m. SD; widely distributed in the Old World tropics. *Friis* et al. 3310.

Subgen. **COURTOISINA** (*Nees*) Lye (1992)

Annual plants with a strong odour. Basal leaves many. Culms 10–80 cm long, 3-angled and ending in an open inflorescence with long leafy involucral bracts. Spikelets 3–6 mm long, 1–8-flowered, falling off entire when mature. Glumes with winged midrib and mucronate apex. Achene 1.8–3 mm long, linear-lanceolate to linear-oblong; surface minutely papillose.

A small subgenus of 2 species only widely distributed in Africa and India, also extending its range to Burma and Indo-China; 1 species in the Flora area.

13. *C. assimilis* Steud. (1842);

Mariscus assimilis (Steud.) Podlech (1960).

Courtoisia assimilis (Steud.) C. B. Clarke (1895)

– types: TU, *Gapdia*, *Schimper* 1208 (P syn., not found) & 1252 (P lecto., HAL K UPS isolecto.).

C. assimilis Steud. var. *depressa* Steud. (1842) – type: TU, near Adua, *Schimper* 1074 (P holo., K P UPS iso.).

Slender to robust aromatic annual. Stems 1–50 x 0.07–0.3 cm, 3-angled, almost smooth. Leaf-blades 5–40 x 0.2–0.5 cm, flat, yellow-green, scabrid on margin and midrib at least near the apex. Inflorescence a relatively lax anthela 2–12 x 1.5–10 cm, consisting of 1–few sessile and 2–10 stalked digitately arranged spikelet-clusters on 0.5–8 cm long stalks, very rarely all branches contracted. Spikelets 3–6 x 1–2.5 mm, elliptic, strongly flattened, yellow-brown to brown, 3–8-flowered, falling off entire when mature. Glumes 2.5–3 mm long, yellow-brown to brown with a green midrib excurrent into a straight or slightly recurved mucro. Style with 3 stigmas. Nutlet 1.8–2 x 0.3–0.4 mm, linear-oblong with persistent filiform style-base, red-brown, minutely papillose. Fig. 212.72.

Seasonally wet habitats, often besides temporary pools, streams with fluctuating water-level, ditches and newly excavated hollows; 1200–2500 m. EW TU GD GJ SU AR WG KF SD HA; tropical Africa. *de Wilde & de Wilde-Duyffes* 7588; *Friis et al.* 1124; *Gilbert* 3418.



Figure 212.72 *CYPERUS ASSIMILIS*. Drawn by R.W. Haines from *Haines* 4736. (Reproduced with permission from Haines & Lye, fig. 332, 1983.)

Subgen. *CYPERUS* (1754)

Perennial or (more rarely) annual herbs, tufted or with creeping rhizomes or stolons, sometimes producing tubers or bulbs. Culms 2–500 cm long, erect, or more rarely pendulous (in viviparous plants), 3-angled, or (more rarely) subterete or 6-angular, usually leafy only at the base, rarely halfway up, but some species are lacking basal leaves altogether. Leaves 3-ranked, linear and grass-like, the lower ones often scale-like, covering the base of the stem and the rhizome, rarely all reduced to their sheaths. Inflorescence a terminal subumbel-like open anthela often consisting of numerous spikelets in distinct spikes, more rarely congested into a lax head (capitate) or spikelets in digitate clusters. Inflorescence subtended by involucrel bracts similar to the leaves, the base of each branch (ray) enclosed in a tubular, two-keeled prophyll. Spikelets 2–70 x 0.5–3.5 mm, more or less compressed, rarely terete, linear or ovate, 1–50-flowered; axis (rachilla) often winged by the decurrent base of glumes, persistent or deciduous (then spikelets falling off as a whole). Glumes distichous, 0.9–5 mm long, white, grey, green, brown, red-brown or black, often variegated, with 1–5 more or less distinct nerves on each side of the midrib; midrib often green and of another colour than other parts of the glume, sometimes excurrent into a short straight or recurved mucro. Stamens 3, 2 or 1; the connective often produced into an apical appendage. Style 3-fid or very rarely 2-fid. Nutlet sessile, 3-angled (rarely lens-shaped), 0.5–2.8 mm long, usually obovoid or ellipsoid; surface often tuberculate or papillose.

A large subgenus of about 300 species of which 60

are found in the Flora area. The type-species is *Cyperus esculentus* L.

14. *C. papyrus* L. (1753)

– type: south Italy, Syria or Egypt (LINN lecto).

Large, robust perennial with a stout creeping rhizome. Rhizome 3–6 cm thick, central part of white air-tissue surrounded by a light brown harder outer cylinder; on the outside densely covered by black scales, 5–10 x 5–10 cm. Culm 200–500 x 0.2–4 cm (0.2–1.5 cm thick immediately below the inflorescence), 3-angled with rounded angles, green. Leaf-blades absent; sheath black or red-brown, innermost almost woody, 30–45 x 0.2–0.5 cm below, the lowest much shorter. Inflorescence a compound umbel-like anthela 30–60 x 30–80 cm. Major involucrel bracts 5–10 x 1–3 cm, light brown, never green. Major peduncles 200–360 per culm, 5–40 x 0.1–0.15 cm. Each inflorescence-branch with a simple umbel of 2–5 spikes; major secondary bracts filiform, 4–12 x 0.05–0.15 cm, green. Spikes 15–30 x 8–12 mm, with 12–40 spreading spikelets; spikes sessile or on up to 2 cm long peduncles. Spikelets 3–5 x 0.7–1 mm, cylindrical to slightly compressed. Glumes 2–2.5 mm long, ovate, light-brown (rarely dark brown) to golden with green midrib ending below the obtuse apex. Style with 3 long branches. Nutlet 0.9–1.1 x 0.4–0.5 mm, ovate, 3-angled, grey with almost smooth surface. Fig. 212.73.

In wet swamps and lake-edges; 1600–2500 m. SU GJ SD; widespread in tropical and subtropical Africa and

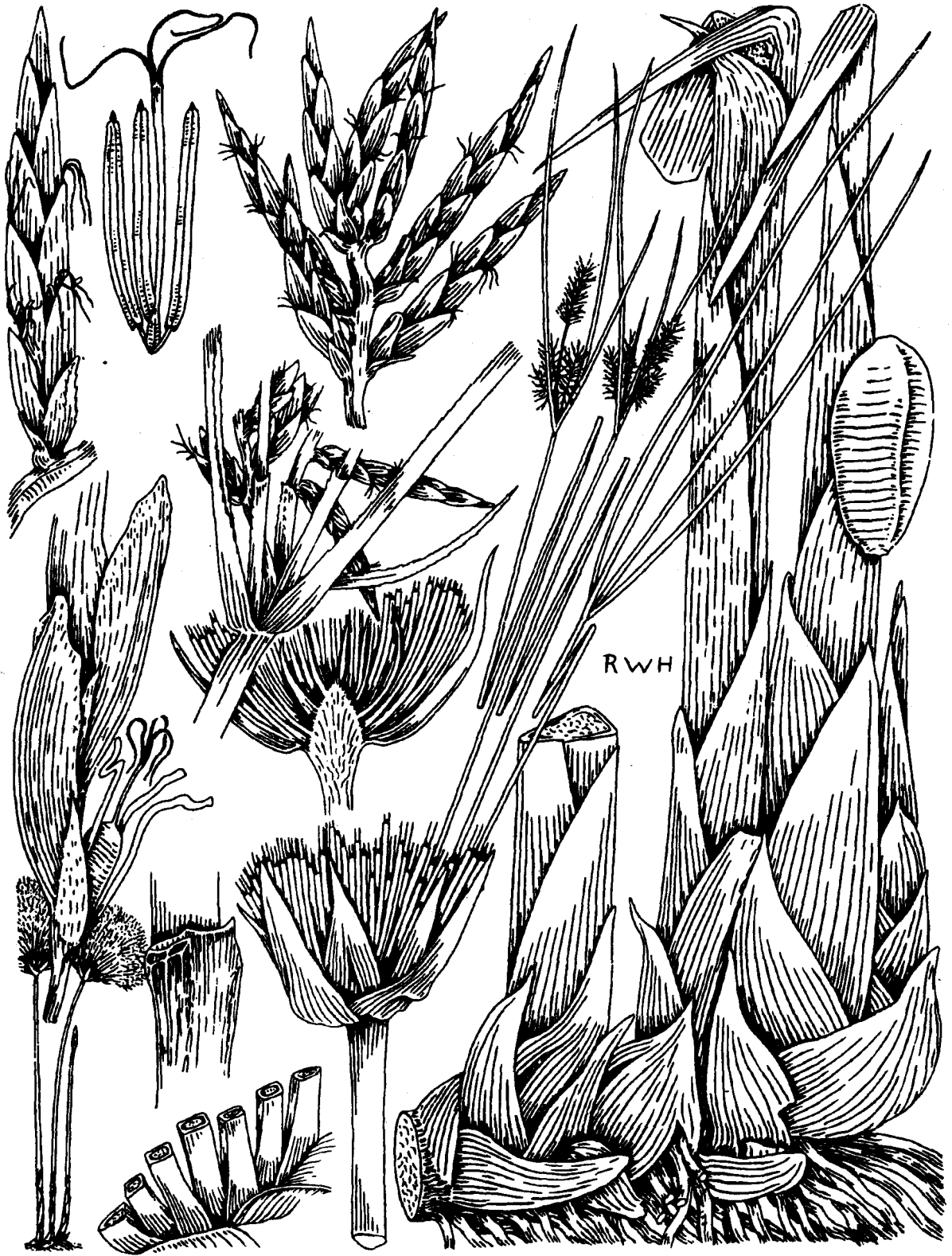


Figure 212.73 *CYPERUS PAPIRUS*. Drawn by R. W. Haines from *Lye* 6741. (Reproduced with permission from Haines & Lye, fig. 336, 1983.)



Figure 212.74 *CYPERUS PENZOANUS*. Drawn by R. W. Haines from Thompson 23A. (Reproduced with permission from Haines & Lye, fig. 338, 1983.)

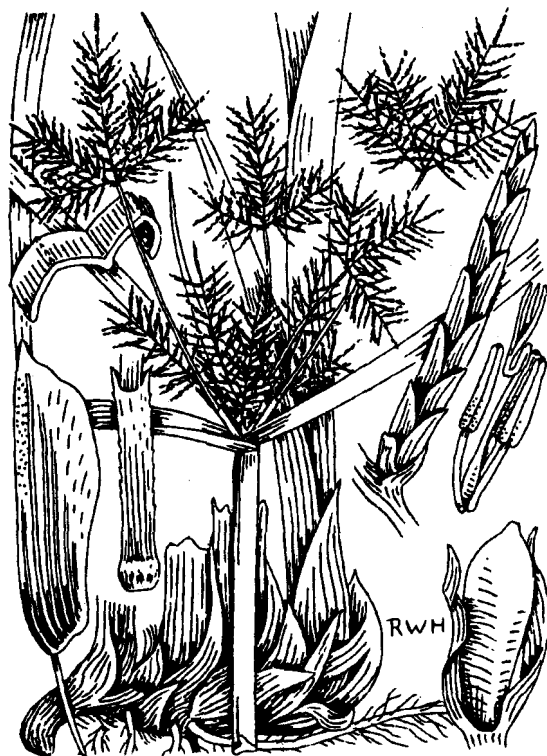


Figure 212.75 *CYPERUS DIGITATUS* subsp. *AURICOMUS*. Drawn by R. W. Haines from Haines 4712. (Reproduced with permission from Haines & Lye, fig. 340, 1983.)

the Middle East, probably introduced to India and southern Europe. *Pichi-Sermolli* 1956; *Meyer* 8650.

15. *C. penzoanus* Pic.-Serm. (1951)

– type: GJ, border of Lake Tana near Scimbit (Bahar-Dar), 1820 m, *R. Pichi-Sermolli* 1986 (FT holo.).

C. morandinii Pic.-Serm. (1951) – type: GJ, border of Blue Nile at Bahar-Dar ferry-crossing, 1820 m, *R. Pichi-Sermolli* 1982 (FT holo.).

Robust perennial with a woody rhizome. Stems 150–300 x 0.5–2 cm, 3-angled, glabrous. Basal leaves with green to purple leathery to membranous sheath endings in acute, 3-angled lobes, but without blades. Inflorescence a lax anthela 20–40 cm long consisting of numerous short or long (to 30 cm) peduncles each carrying a spike or a group of sessile or stalked spikes. Major involucre bracts many, with prominent green blades, the largest 20–25 x 1–1.5 cm. Spikes with 10–50 spreading spikelets. Spikelets 5–12 x 0.7–1.5 mm, linear, only slightly flattened, 6–20-flowered. Glumes 1.5–2.5 mm long, medium red-brown, without prominent marginal nerves and with a pale or green midrib usually ending in the obtuse or slightly acute apex. Style with 3 long stigmas. Nutlet 3-angled, immature. Fig. 212.74.

In water at lake-shore or very wet swamps; 1820–1850 m. GJ; also rare in East Africa. *Pichi-Sermolli* 1985; *Sebald* 143, 2552.

16. *C. digitatus* Roxb.

– type: from 'India'.

subsp. *auricomus* (Spreng.) Kük. in *Bot. Not.*: 35 (1934)

– type: from 'Egypt'.

C. auricomus Spreng. (1825); *Cyperus aureorufus* Böck. (1874) var. *auricomus* (Böck) Chiov. *Malpighia* 34: 49 (1937) – type: GD, Begemder, streams near Silen Uha (Amora Gettel), 1950 m, *Schimper* 1403 (K iso.).

Robust perennial with a 8–12 mm thick woody creeping scale-covered rhizome; the scales red brown but breaking up into black fibres. Culms 50–160 x 0.2–1 cm, sharply 3-angled to almost winged, scabrid to almost smooth. Basal leaves few; the largest 20–50 x 0.6–1.2 cm, flat, scabrid at least on margins and midrib; leaf sheaths brown to purple. Inflorescence a 4–20 x 3–15 cm anthela consisting of one sessile and 2–6 stalked groups of spikes, rarely the inflorescence congested with all groups of spikes sessile or very shortly stalked; the largest rays 0.5–20 cm long. Primary involucre bracts leafy, 12–60 x 0.4–1.2 cm, erect or spreading. Spikes 10–50 x 8–20 mm, with 15–60 spreading spikelets. Spikelets 4–10 x 0.8–1 mm, linear, terete or angular, red-brown to golden colour, 10–20-flowered. Glumes 2–2.4 mm long, ovate-elliptic, red brown to golden with a slightly excurrent green midrib. Style with 3 branches. Nutlet 1–1.4 x 0.3–0.4 mm, narrow elliptic, 3-angled, dark grey, minutely papillose. Fig. 212.75.



Figure 212.76 *CYPERUS EXALTATUS*. Drawn by R. W. Haines from Haines 4175. (Reproduced with permission from Haines & Lye, fig. 342, 1983.)

In swamps or near water, often in seasonally wet habitats; 1500–3300 m. GD WU SU IL KF SD BA HA; widespread in tropical Africa, subsp. *digitatus* in Asia and Australia. Mooney 8180; Burger 397, 3511.

This subsp. differs from subsp. *digitatus* in its fewer-flowered (10–20 against 6–40) spikelets.

17. *C. exaltatus* Retz. (1789)

– type: India, König s.n. (LD holo.).

Large robust perennial with crowded culms on a short about 1 cm thick woody rhizome, scales of the rhizome breaking up into fibrous remains. Culms 40–150 x 0.3–1 cm, 3-angled, smooth; base slightly swollen. Basal leaves many, up to 80 x 0.8–2 cm, flat, scabrid at least on margins and major ribs; leaf-sheaths green to purple. Inflorescence 10–30 x 10–40 cm, open anthela consisting of 4–6 subsessile and stalked spikes and 5–15 stalked group of spikes on 5–20 cm long inflorescence-branches (rays). Primary involucre bracts leafy, the largest 30–60 x 0.8–2 cm, erect or spreading. Spikes 20–50 x 15–25 mm when mature, with 15–60 spreading rather distant spikelets. Spikelets 6–15 x 1.5 mm, linear but sometimes slightly curved, flattened, brown, 12–30-flowered. Glumes 1.8–2.4 mm long, ovate-elliptic, red-brown to golden with 2–3 nerves on each side of the excurrent green midrib. Style with 3 branches. Nutlet 0.8–1 x 0.5–0.6 mm, 3-angled, elliptic, grey, almost smooth. Fig. 212.76.

In swamps or river beds; 600 m. HA; widespread in



Figure 212.77 *CYPERUS DIVES*. Drawn by R. W. Haines from Haines 4714. (Reproduced with permission from Haines & Lye, fig. 345, 1983.)

tropical and subtropical parts of the Old World. Parker E 472.

18. *C. dives* Del. (1813)

– type: from 'Egypt'.

C. immensus C.B. Clarke (1883).

C. exaltatus Retz. var. *dives* (Del.) C.B. Clarke in *J. Linn. Soc.* 21: 187 (1884).

Robust perennial with a few culms from a short woody rhizome; roots often red. Culms 50–150 x 0.5–1.5 cm, 3-angled, smooth, the basal part covered by rather thick leaf-sheaths. Basal leaves many, up to 80 x 1.5–3.5 cm, flat, scabrid at least on margin and major ribs; leaf sheaths purple at least below. Inflorescence 10–30 x 15–30 cm, open anthela consisting of a few sessile or shortly stalked spikes and 5–15 clusters of spikes on 2–20 cm long inflorescence-branches (rays). Primary involucre bracts leafy, the largest 20–80 x 1.5–2.5 cm, erect or spreading. Spikes 10–30 x 6–15 mm, with 30–120 spreading and very crowded spikelets. Spikelets 3–5 (rarely to 10) x 1–1.5 mm wide, linear-lanceolate, flattened, brown or golden, 6–20-flowered. Glumes 1.2–1.8 mm long, ovate, golden with darker red brown margin and an excurrent green midrib; lateral nerves indistinct. Style with 3 branches. Nutlet 0.6–0.8 x 0.4–0.5 mm, 3-angled, elliptic, grey and almost smooth. Fig. 212.77.

In swamps, on river-banks or in open water; 1350–2100 m. EW TU GJ KF GG SD HA; widespread in tropical Africa and Asia. Mooney 8867; Burger 802, 1380.



Figure 212.78 *CYPERUS IMBRICATUS*. Drawn by R.W. Haines from Haines 4228. (Reproduced with permission from Haines & Lye, fig. 347, 1983.)



Figure 212.79 *CYPERUS ALOPECUROIDES*. Drawn by R.W. Haines from Björnstad 1018. (Reproduced with permission from Haines & Lye, fig. 348, 1983.)

19. *C. imbricatus* Retz. (1789)

– type: India, König s.n. (LD holo.).

C. radiatus Vahl (1806).

Fairly robust perennial with a short woody rhizome. Culm 30–120 x 0.1–0.5 cm, 3-angled, almost glabrous. Leaves few, the largest 10–40 x 0.3–0.8 cm, flat, scabrid at least on margin and midrib; leaf-sheaths light-brown and purple. Inflorescence 6–15 x 8–15 cm, anthela consisting of a few sessile spikes and 3–8 groups of spikes on 1–12 cm long peduncles, each group containing 2–12 densely clustered spikes. Primary involucre leafy, the largest 25–50 x 0.5–0.8 cm, scabrid on margin and midrib, erect or spreading. Spikes (5–)20–35 x 3–8 mm with 30–80 (or in exceptionally small spikes only 10–20) spreading spikelets. Spikelets 2–5 x 0.8–1.5 mm, ovate-lanceolate, light-brown to golden, 10–16-flowered. Glumes 0.9–1.2 mm long, ovate, light brown or golden with or without purple streaks, the midrib green and excurrent in a short mucro. Style with 3 branches. Nutlet 0.5–0.6 x 0.4 mm, elliptic, 3-angled, red-brown with smooth or irregularly pitted surface. Fig. 212.78.

In swamps and on river-banks, especially in sandy habitats; 500–1250 m. SU IL SD/GG; widespread in tropical regions of all continents. *Ash* 925; *Riva* 675; *Friis* et al. 2474.

20. *C. alopecuroides* Rottb. (1773);

Juncellus alopecuroides (Rottb.) C.B. Clarke – type: Yemen, *Forsskål* s.n. (C holo.).

Fairly robust tussocky perennial with 50–150 cm long

3-angled culms. Basal leaves crowded, 5–15 mm wide, strongly scabrid on margin; the sheath red-brown to black. Inflorescence an umbel-like anthela 10–30 x 10–30 cm, consisting of one sessile and few-many stalked clusters of spikes; the largest peduncles with tertiary clusters of spikes. Spikes 10–40 x 4–12 mm, consisting of numerous crowded spikelets. Spikelets 2.5–8 x 1.5–2.5 mm, lanceolate, pale to golden (or more rarely red) brown, 10–15-flowered. Glumes 1–1.7 mm long, ovate; back rounded, excurrent in a short mucro; margin in the lower half inrolled to enclose the nutlet. Style with 2 long stigmas. Nutlet 0.7–0.9 x 0.5–0.6 mm, usually flattened, smooth or minutely reticulate. Fig. 212.79.

In swamps and river beds; 180–2100 m. EE EW WU SU KF GG SD HA; widespread in the tropics of the Old World, probably introduced into America. *Sandford* 8; *Burger* 1935; *Ash* 2385.

21. *C. procerus* Rottb. (1773)

– type: Egypt, *Forsskål* s.n. (C holo.).

Fairly robust perennial with up to 15 cm long stolons covered by distantly spaced black scales. Culms 50–90 x 0.2–0.5 cm (but wider across the leaf-sheaths), 3-angled. Leaves many in the lower part; the largest 20–60 x 0.3–1 cm. Inflorescence a lax or somewhat congested anthela, 5–20 x 5–15 cm, consisting of 2–4 leafy bracts and 3–6 stalked spikes with or without stalked or sessile secondary spikes from the base of the primary spikes. Spikes 20–40 x 20–50 mm, with 5–20 spreading spikelets. Spikelets 5–30 x 1.5–3.5 mm (depending on

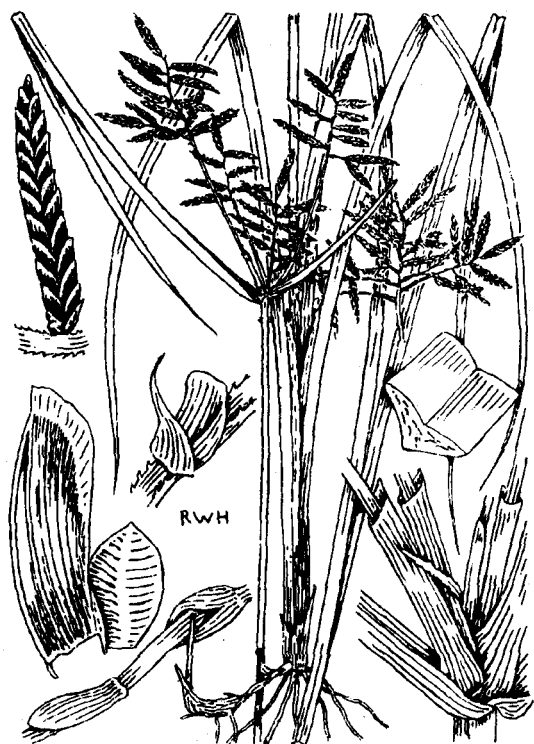


Figure 212.80 *CYPERUS PROCERUS*. Drawn by R. W. Haines from Gillespie 347. (Reproduced with permission from Haines & Lye, fig. 352, 1983.)



Figure 212.81 *CYPERUS LATIFOLIUS*. Drawn by R. W. Haines from Haines 4060. (Reproduced with permission from Haines & Lye, fig. 351, 1983.)

whether the glumes are spreading or not), linear. Glumes 2.5–3 mm long, ovate, light to dark red-brown with colourless margin and a rounded apex. Nutlet 1.2–1.6 x 0.7–0.9 mm, obovate, 3-angled, brown. Fig. 212.80.

In seasonally wet grassland and swamps; 1400 m. KF; widespread in tropical Asia, rare in Africa. *Jansen* 5686.

This collection is not typical and it is with some doubt identified as this species.

22. *C. latifolius* Poir. (1806)

– type: Madagascar, *Petit-Thouars* s.n. (P holo.).

Robust perennial with hardened base producing 1–3 mm thick stolons covered with black scales. Culms 40–160 x 0.3–0.8 cm, sharply 3-angled, usually slightly scabrid below the inflorescence; basal part covered by leaf-sheaths. Leaves 40–200 x 0.8–3 cm, flat or v-shaped, glabrous or with scabrid margin and midrib; sheaths green to red-brown, slightly fleshy below, lowest leafless sheaths almost black. Inflorescence a large open anthela 7–35 x 6–40 cm, consisting of 5–10 major branches each with a (usually) 3-angled group of spikes. Major involucre bracts leafy; the largest 15–90 x 0.6–2 cm, usually spreading. Major peduncles 1–35 cm long, somewhat flattened. Spikes 10–40 cm long and wide, each with 5–20 spreading, rather distantly placed spikelets; rachis minutely hairy. Spikelets 5–20 x 1–2 mm (rarely to 3 mm wide with glumes spreading), linear, light to dark red brown, 5–30-flowered. Glumes

1.8–2.5 mm long, oblong-elliptic, straw-coloured (as young) to light or dark red-brown with a green midrib and a distinct colourless marginal border; apex rounded. Style with 3 style-branches. Nutlet 0.8–1 x 0.5–0.7 mm, obovate, 3-angled, light brown as young, turning dark brown or grey when mature; surface minutely papillose. Fig. 212.81.

In wet swampy ground; 1100–2450 m. GJ SU WG KF HA; widespread in tropical Africa and Madagascar. *Ash* 3103; *Burger* 3643; *Siegenthaler* 1565.

23. *C. articulatus* L. (1753)

– type: Jamaica (LINN lecto.).

Robust leafless perennial with solitary culms from the end of stolons. Stolons to 10 cm or more long (but frequently with culms at 1–3 cm intervals) and 2–8 mm thick, often woody, clothed with black or purple scales. Culms 80–160 x 0.3–1.2 cm below, but only 1–3 mm thick below the inflorescence, rounded, pith-filled with transverse rings at 5–50 mm intervals (these rings show best when dry owing to shrinkage of the pith); lower part of the culm covered with 3–5 leaf-sheaths; very base of the culm swollen and woody. Inflorescence a compound terminal lax anthela, 4–15 cm in diameter with 1–3 sessile spikelet-clusters and 2–10 pedunculate clusters or umbels of new sessile and stalked clusters; largest peduncles 1–12 cm long; inflorescence-bracts scale-like, 5–15 mm long. Spikelets 5–55 x 1–2 mm, linear, somewhat flattened, light to dark red-brown, 20–50-flowered. Glumes 3–4 mm long, ovate, red-

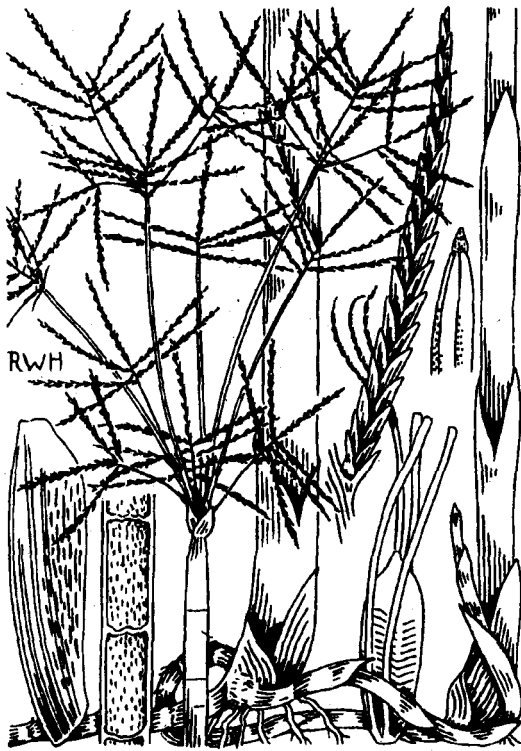


Figure 212.82 *CYPERUS ARTICULATUS*. Drawn by R.W. Haines from *Haines* 4654. (Reproduced with permission from Haines & Lye, fig. 353, 1983.)

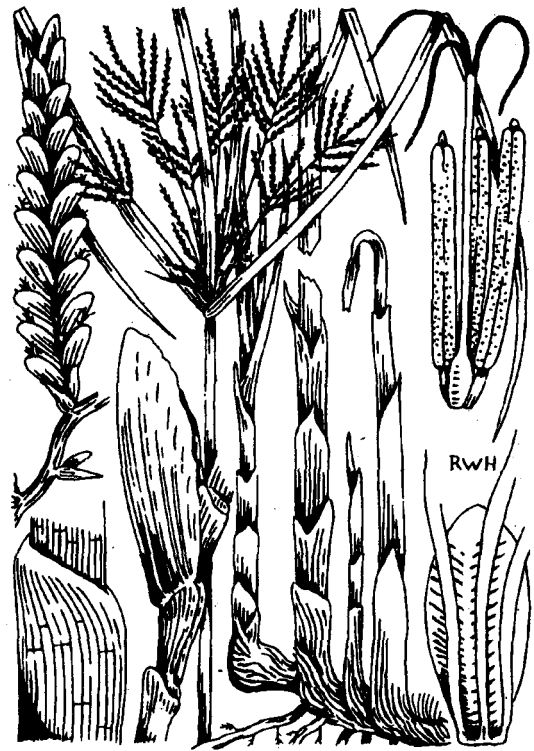


Figure 212.83 *CYPERUS SCHIMPERIANUS*. Drawn by R.W. Haines from *Schimper* 569. (Reproduced with permission from Haines & Lye, fig. 355, 1983.)

brown (or straw-coloured when very young) with paler midrib; apex obtuse. Style with 3 long style-branches. Nutlet 1.4–1.7 x 0.4–0.5 mm, narrow elliptic, 3-angled, shortly apiculate, grey-yellow as young, red-brown to dark olive-brown when mature; surface smooth. Fig. 212.82.

In stagnant water, often near pools; 300–1950 m. EW WU GG SD HA; widespread in tropical regions of both hemispheres. *Mooney* 7884; *Gilbert et al.* 334; *Getachew A. & de Wit* 1491.

24. *C. schimperianus* Steud. (1855)

– type: TU, near Adua, *Schimper* 57 (P holo., K iso.).

C. truncatus A. Rich. (1851); non *C. truncatus* Turcz. (1838); *C. amblyleptos* Steud. (1855) – type: TU, Chiré, *Quartin-Dillon* s.n. (P holo.).

Robust perennial with a 5–10 mm thick woody rhizome covered by brown to black scales. Culms 50–90 x 0.1–0.5 cm, 3-angled, but almost terete below the inflorescence. Leaf-blades usually 5–15 x 0.2–0.4 cm; sheaths grey to red-brown, rather wide, only the upper ones carrying blades. Inflorescence a lax anthela 6–12 x 4–12 cm, consisting of one sessile and 5–10 stalked spikes or groups of spikes. Inflorescence-bracts leafy, erect or spreading; the largest 15–40 x 0.3–0.7 cm. Spikes 10–30 x 12–25 mm, consisting of 3–12 spikelets only; rachis 3–15 mm long. Spikelets 5–25 x 1.5–2.5 mm, linear, red-brown. Glumes 2.2–2.7 mm long, ovate-lanceolate,

light to dark red-brown, rounded at the apex. Nutlet 1.3–1.5 x 0.5–0.6 mm, elliptic, brown. Fig. 212.83.

On river-banks and in seasonal swamps; 1000–2600 m. EW TU GD GJ SU HA IL; uncommon in east, west and north Africa. *de Wilde et al.* 9706; *Sebald* 744; *Friis et al.* 1159.

25. *C. rigidifolius* Steud. (1842)

– type: GD, Endchadcap, *Schimper* 991 (P holo., HAL K P UPS iso.).

C. adoensis Hochst. ex A. Rich. (1851) – type: TU, near Adua, *Schimper* 186 (P holo., HAL K P iso.).

C. atrosanguineus Hochst. ex Steud. (1855); *C. longus* var. *adoensis* Böck. in *Linnaea* 36: 281 (1870) – type: Argentor, *Schimper* s.n. (P holo.).

Slender to fairly robust perennial with a woody base and curving horizontal stolons up to 15 x 0.15–0.3 cm. Culms 15–50 x 0.07–0.2 cm, 3-angled, glabrous or slightly scabrid below the inflorescence. Largest leaf-blades 7–15 x 0.15–0.5 cm, flat and rather stiff, scabrid on margin and midrib; leaf-sheaths green to light brown. Inflorescence a 1.5–6 x 1–5 cm anthela consisting of one congested group of spikelets with or without 1–5 stalked spikes. Inflorescence-bracts leafy, erect or spreading; the largest 2–15 x 0.2–0.4 cm. Spikes 8–20 x 5–13 mm, consisting of 5–10 crowded erect spikelets; main peduncles up to 4 cm long. Spikelets 5–15 x 1.5–2.5 mm, lanceolate, somewhat compressed, almost black with 6–20 flowers. Glumes 2.5–3 mm long, ovate,



Figure 212.84 *CYPERUS RIGIDIFOLIUS*. Drawn by R.W. Haines from *Haines* 4055. (Reproduced with permission from Haines & Lye, fig. 359, 1983.)

dark red-brown to black with a green midrib ending below the rounded apex. Stamens 3. Style with 3 branches. Nutlet 1.3–1.5 x 0.7–0.9 mm, obovate, 3-angled, grey-brown with minute isodiametric surface-cells. Fig. 212.84.

In grassland, near roads and other disturbed habitats; 1600–3100 m. EW TU GD GJ WU SU AR WG KF GG SD BA HA; widespread in temperate parts of Africa. *Mooney* 5796; *Burger* 757; *Gilbert* 1191.

26. *C. kilimandscharicus* Kük. (1925)

– type: Tanzania, *Endlich* 122 (B holo.).

Slender to fairly robust perennial producing long slender stolons about 1 mm thick. Culms 15–50 x 0.07–0.2 cm, 3-angled especially above, almost glabrous; base swollen and almost corm like. Largest leaf-blades 10–25 x 0.1–0.35 cm, flat or folded, scabrid on major ribs; leaf sheaths green to light-brown. Inflorescence a 1–5 x 1–5 cm anthela of one sessile (or almost sessile) spike or spike-like cluster and 1–5 stalked spikes or spike-like clusters or all spikes almost sessile; peduncles to 5 cm long. Involucral bracts leafy, erect or spreading; the largest 2–15 x 0.1–0.3 cm. Spikes 1–3 cm long and wide, with 3–10 rather distant, spreading spikelets. Spikelets 7–15 x 1–3 mm, linear-lanceolate with spreading glumes, 10–25-flowered. Glumes 2.5–3.5 mm long, ovate, dark red-brown to almost black with a prominent green (usually) slightly excurrent midrib and 1–2 prominent lateral nerves on each side of the midrib. Style with 3 branches. Nutlet 1.1–1.3 x 0.5–0.6 mm,



Figure 212.85 *CYPERUS KILIMANDSCHARICUS*. Drawn by R.W. Haines from *Lye* 6301. (Reproduced with permission from Haines & Lye, fig. 358, 1983.)

obovate, 3-angled, grey; surface reticulate with transversely wrinkled pattern. Fig. 212.85.

In seasonally wet grassland or open forest; 2000–3300 m. SU HA; rare in East Africa. *Mooney* 7027; *Burger* 1903; *Sue Edwards* 2161.

Since the specimens from the Flora area are without mature achenes the identifications are provisional.

27. *C. maranguensis* K. Schum. (1895)

– type: Tanzania, Marangu, Mt. Kilimanjaro, *Volkens* 649 (B holo.).

Fairly robust perennial (or sometimes appearing as annual) with a slightly swollen stem-base from a short woody nodular rhizome. Culms 40–100 x 0.1–0.5 cm (but thicker across the leaf-sheaths), 3-angled, glabrous. Largest leaf-blades 15–50 x 0.4–1 cm, flat, scabrid at least on margin and major ribs; leaf-sheaths green to light-brown. Inflorescence a 5–25 x 5–25 cm anthela consisting of one sessile and 3–10 pedunculate spikes with or without 1–5 sessile or shortly stalked secondary spikes from the base of the major spikes; major rays up to 20 cm long. Inflorescence bracts leafy, erect or spreading; the largest 10–40 x 0.5–1.2 cm. Spikes 20–40 x 20–50 mm with 5–20 spreading spikelets. Spikelets 8–22 x 1.5–2.5 mm, linear and olive with 8–18 flowers. Glumes 2.3–2.8 mm long, ovate, blue-grey with indistinct midrib. Stamens 3. Style branches 3. Nutlet 1.5–1.7 x 0.7–0.8 mm, obovate, 3-angled, brown; surface minutely papillose. Fig. 212.86.

A weed of cultivations, by roadsides, more rarely in

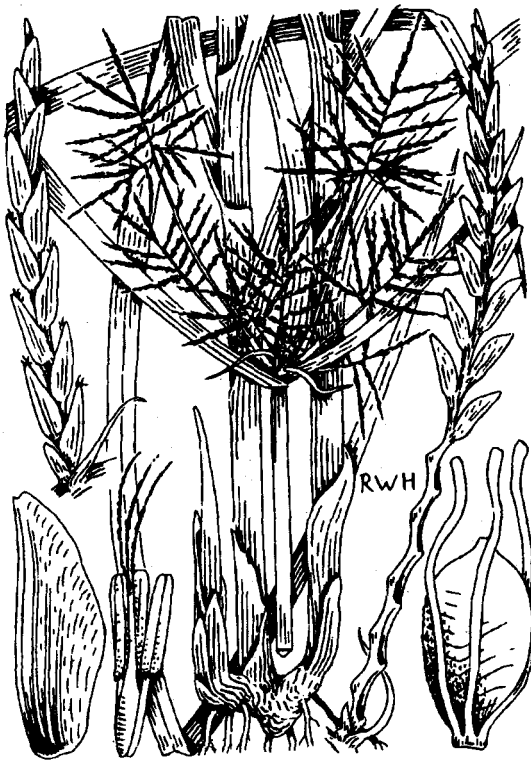


Figure 212.86 *CYPERUS MARANGUENSIS*. Drawn by R. W. Haines from Haines 4023. (Reproduced with permission from Haines & Lye, fig. 382, 1983.)

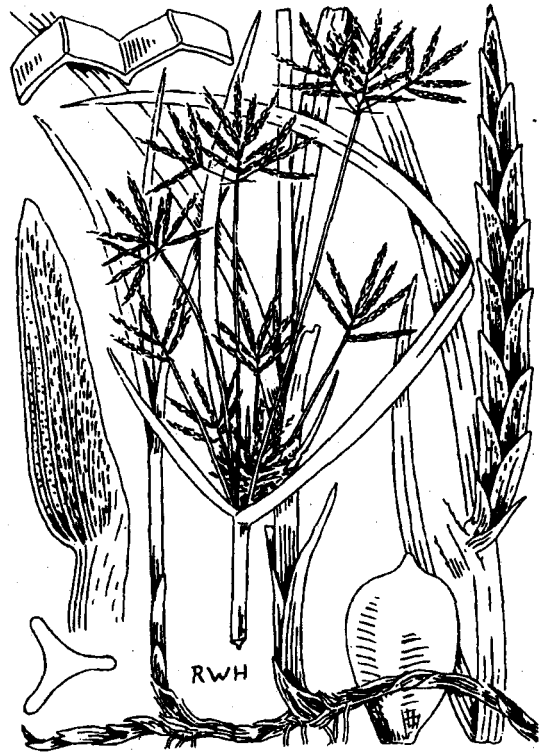


Figure 212.87 *CYPERUS ROTUNDUS*. Drawn by R. W. Haines from Haines 4062. (Reproduced with permission from Haines & Lye, fig. 362, 1983.)

grassland and open forest; 1500–2000 m. SD; widely distributed in East Africa. *Corradi* 1595.

This species is known from Ethiopia merely from a poorly collected specimen (inflorescence only) from Mega.

28. *C. rotundus* L. (1753)

– type: India, Herb. Hermann 36, v. 1, fol. 3 (BM-SL lecto.).

Medium-sized perennial with a somewhat swollen (sometimes tuber-like) stem-base arising from slender to fairly robust stolons with rather remote scales. Culms 25–80 x 0.1–0.4 cm, glabrous, 3-angled with many crowded leaves in the basal part. Largest leaf-blades 15–30 x 0.4–0.8 cm, flat or enrolled, scabrid at least on margin and major ribs; leaf-sheaths green to brown. Inflorescence a 3–15 x 2–12 cm anthela consisting of one sessile and 1–8 stalked spikes on 0.5–12 cm long peduncles with or without secondary spikes from the base of primary spikes. Inflorescence-bracts 1–7, leafy, erect or spreading, the largest 3–20 x 0.2–0.9 cm. Spikes 0.1–0.5 x 15–70 mm with 4–15 erect or spreading spikelets. Spikelets 6–70 x 1–2.5 mm, linear-lanceolate, light to dark red-brown with 8–35 flowers. Glumes 2.7–4.3 mm long, ovate, almost colourless or light to dark red-brown with or without a narrow colourless margin and 1–2 nerves on each side of the midrib; midrib green, glabrous or scabrid ending in or below the obtuse apex. Nutlet 1.5–1.7 x 0.8–1 mm, obovate, 3-angled, grey, minutely papillose. Fig. 212.87.

In seasonally wet grassland, swamps and by margins of springs and streams, also as a weed in cultivated land; near sea level to 2500 m. EW EE TU GD GJ WU SU IL KF GG SD HA; widespread pantropical plant, but also in temperate regions. *Mooney* 8149; *Burger* 497; *Getachew A. & Gilbert* 704.

Very variable species with many colour-forms and different glume sizes. Three subspecies have been distinguished, but most collections are too young to be referable to any of them.

subsp. *rotundus* has 3.3–4.3 mm long glumes which are light to dark red-brown.

subsp. *tuberosus* (Rottb.) Kük. in *Engl. Pflanzenr.* IV. 20 (101): 113 (1935) has 3.7–4 mm long light-brown to colourless glumes.

subsp. *merkeri* (C.B. Clarke) Kük. in *Engl. Pflanzenr.* IV. 20 (101): 115 (1935); *C. rotundus* L. var. *spadiceus* Böck. (1870) has 2.7–3.2 mm long dark red-brown to almost black glumes.

29. *C. longus* L. (1753)

– type: from 'southern Europe'.

C. fenzelianus Steud. var. *badiiformis* Chiov. in *Ann. Bot. Roma* 13: 376 (1915); *C. longus* L. var. *paleus* Böck. f. *badiiformis* (Chiov.) Kük. in *Das Pflanzenreich* IV. 20 (101): 101 (1936) – type: El Ualac, Paoli 1095 (FT hol.).

Fairly robust perennial with rather thick horizontal, often curved, scale-covered 3–10 mm thick rhizome and



Figure 212.88 *CYPERUS LONGUS*. Drawn from by R.W. Haines Lock & Haines 69/439. (Reproduced with permission from Haines & Lye, fig. 369, 1983.)

only slightly swollen stem bases. Culms 40–90 x 0.1–0.4 cm, glabrous, 3-angled above, terete below. Leaf-blades few, withering early, the largest 15–30 x 0.3–0.5 cm; leaf-sheaths light brown to dark red-brown. Inflorescence a 5–13 x 2–10 cm anthela consisting of one sessile and 4–8 stalked spikes on 0.5–10 cm long peduncles, with or without secondary spikes from the base of the primary spikes. Inflorescence-bracts 3–7, leafy, erect or spreading, scabrid on margin and midrib; the largest 6–12 x 0.2–0.5 cm. Spike 10–30 x 10–50 mm with 3–12 spreading spikelets. Spikelets 10–25 x 1–2 mm, linear-lanceolate, red-brown with 8–20 flowers. Glumes 2–3 mm long, ovate, light to dark red-brown with a narrow uncoloured margin and a green midrib ending below the obtuse tip; nerves very slender. Style 3-branched. Nutlet 1.3–1.5 x 0.5–0.6 mm, elliptic, 3-angled, brown; surface almost smooth. Fig. 212.88.

In periodically wet depressions in grassland or bushland; 400–2700 m. GJ SU GG HA; widespread in Africa, southern Europe and western Asia. *Burger* 955; *Gilbert* 36; *Carr* 666; *Parker* E614.

Most plants from Ethiopia are intermediate between *C. longus* and *C. rotundus*. Only plants with 2–2.5 mm long pale glumes and a thick rhizome not emitting stolons can be safely ascribed to *C. longus*.

30. *C. maculatus* Böck. (1864)

– type: Mossambique, W.C.H. Peters s.n. (B holo.).

Slender to robust perennial with up to 15 cm long



Figure 212.89 *CYPERUS MACULATUS*. Drawn by R.W. Haines from Haines 4063. (Reproduced with permission from Haines & Lye, fig. 367, 1983.)

stolons, but when growing in narrow rock-cracks the stolons are reduced and the basal parts of the plant consist of many densely crowded swollen woody stem-bases. Culms 10–70 x 0.1–0.3 cm, 3-angled to subterete, glabrous. Largest leaf-blades 4–40 x 0.15–0.5 cm, flat, somewhat blue-green, scabrid on margin and midrib; leaf-sheaths green to light red-brown. Inflorescence a 1–12 x 1–10 cm anthela consisting of one sessile and 1–6 stalked spikes, but usually with 1–5 secondary sessile or stalked spikes from the base of the primary spikes, but sometimes plants have 5–15 spikelets per inflorescence only. Inflorescence-bracts 2–4, leafy, erect or spreading; the largest 1–30 x 0.1–0.5 cm. Spikes 10–50 x 10–30 mm, with 3–10 erect or spreading spikelets; rachis only 2–10 mm long. Spikelets 8–40 x 1–1.5 mm, linear-lanceolate with acute tip, straight or curved, variegated green and dark red-brown, 10–50-flowered. Glumes 2.2–3 mm long, ovate-elliptic, closely overlapping, red-brown with a wide uncoloured marginal border and green midrib ending in the apex, lateral nerves absent. Style with 3 branches. Nutlet 1–1.2 x 0.5–0.6 mm, obovate, 3-angled, brown.

1. Glumes 2.2 mm long; nutlet 1–1.2 mm long.

subsp. *maculatus*

– Glumes 3–3.5 mm long; nutlet 1.7–1.8 mm long.

subsp. *ogadensis*

subsp. *maculatus*

Fig. 212.89.

In sandy habitats near pools and rivers; 500–1800 m. GJ

IL SD HA; widespread in tropical Africa. *Mooney* 7291; *Burger* 2884; *Ash* 165.

subsp. *ogadensis* *Lye* (1996)

– type: HA, (given as Brit. Somaliland), second Bulleh at Sirauw, 1944, *Glover & Gilliland* 424 (K holo.).

Probably in temporary damp site in dry bushland; 400–500 m. HA; endemic. *Glover & Gilliland* 424.

31. *C. esculentus* *L.* (1753)

– type: Bauhin, *Theatr. Bot.* t. 222 (1658).

Fairly robust stoloniferous perennial. Stolons to about 15 x 0.05–0.15 cm, covered with brown to black scales and ending in a black tuber 3–8 mm in diameter. Culms 15–70 x 0.1–0.5 cm, 3-angled, glabrous, with 3-many crowded leaves near the base. Largest leaf-blade 10–30 x 0.3–0.9 cm, flat, scabrid on margin and major ribs; leaf-sheaths green to red-brown, rarely black. Inflorescence a 3–20 x 3–15 cm anthela consisting of one sessile and 3–10 stalked spikes on 0.5–15 cm long peduncles, often with 1–5 secondary (usually stalked) spikes from the base of some primary spikes. Primary inflorescence-bracts 3–9, leafy, erect or spreading; the largest 3–20 x 0.2–0.9 cm. Spikes 10–30 mm long and wide, with 4–12 spreading spikelets. Spikelets 5–20 x 1.5–2 mm, linear lanceolate with obtuse tip, brown or rust-coloured, 6–22-flowered. Glumes 2.2–2.6 mm long, ovate-elliptic, red-brown with colourless marginal border and 3–4 distinct nerves on each side of the midrib; midrib ending in the obtuse apex or slightly excurrent. Style with 3 style-branches. Nutlet 1.3–1.5 x 0.6–0.7 mm, elliptic, 3-angled, grey and shiny; surface with minute isodiametric cells. Fig. 212.90.

A weed of gardens and cultivations, also in seasonally wet grassland and swamps; 900–2200 m. EW TU GD GJ SU WG GG SD; pantropical and subtropical. *Burger* 496; *Ash* 1989; *Getachew A. & Gilbert* 784.

This species has edible tubers mostly cultivated in northern parts of the country.

32. *C. bulbosus* *Vahl* (1805)

– type: Senegal, *Jussieu* s.n. (C lecto., P iso.).

Hemichlaena bulbosa Hochst. ex A. Rich. (1851); *Cyperus blysmoides* Hochst. ex C.B. Clarke (1902); *C. bulbosus* Vahl var. *spicatus* Böck. in *Linnaea* 36: 301 (1870) – types: GD, Enderder, *Schimper* 580 (P lecto., K P isolecto.); TU, near Adua, *Quartin-Dillon* s.n. (P K syn.).

Cyperus bulbosus Vahl var. *longibracteatus* Terracc. in *Bull. Soc. Bot. Ital.*: 426 (1892) – type: HA, Gera-Amaden, *Baudi & Candeo* s.n. (FT holo.).

Perennial with a basal bulb covered by brown to black scales and with very slender stolons ending in new 3–7 mm thick bulbs from which the culms emerge. Culms 8–50 cm long, 3-angled. Leaves many, 5–25 x 0.2–0.6 cm. Inflorescence a lax anthela 3–12 x 5–12 cm, consisting of 4–6 leafy bracts, one sessile spike and 3–6 stalked spikes or reduced to one single spike, i.e. var. *spicatus* Böck. Spikes 15–40 mm long and wide, consisting of



Figure 212.90 *CYPERUS ESCULENTUS*. Drawn by R.W. Haines from *Lock & Haines* 69/447. (Reproduced with permission from Haines & Lye, fig. 372, 1983.)

5–20 spreading spikelets. Spikelets 5–25 x 1.5–3 mm, linear-lanceolate, dark red-brown to yellow-green, 5–10-flowered. Glumes 3–4 mm long, ovate-lanceolate, dark red-brown to almost black, with a paler slightly excurrent green midrib (even in the uppermost glumes the mucro is about 0.2 mm long only) and prominent lateral nerves. Nutlet about 0.8 x 0.5 mm, 3-angled, papillose. Fig. 212.91.

In seasonally wet grassland or on open sand; near sea level to 2500 m. EE EW TU GD GJ SU SD HA; widespread in fairly dry regions in Africa, Asia and Australia. *Mooney* 7985; *Sebald* 2346; *Gilbert & Getachew A.* 2658.

33. *C. grandibulbosus* *C. B. Clarke* (1902);

C. bulbosus Vahl var. *grandibulbosus* (C.B. Clarke) Chiov. in *Fl. Somalia* II: 435 (1932) – type: Taita Hills, Kenya, *Scott Elliot* 6284 (K holo.).

C. bulbosus Vahl var. *flavus* Chiov. in *Webbia* 8: 46 (1951), nom. nud. – types: Sagan-Omo, Mt. Banno (Tertale), *Corradi* 1574 (FT lecto.), 1570, 1572, 1565 (all FT syn.).

C. giolii Chiov. (1915) var. *latifolius* Chiov. in *Reale Accad. Italia* 1939-XVII: 288 (1939) – type: SD, Borana Neghelli, *Cufodontis* 232 (FT holo.).

Fairly robust perennial with long slender stolons and a 7–10 mm thick bulb. Culms 10–60 x 0.1–0.3 cm, 3-angled, growing directly from the bulb. Leaves many from the base; the largest 15–30 x 0.2–0.5 cm; leaf-sheaths rather wide and fleshy, brown. Inflorescence a congested anthela of few-many crowded spikes, 2–4 cm in



Figure 212.91 *CYPERUS BULBOSUS*. Drawn by R. W. Haines from Schimper 1250. (Reproduced with permission from Haines & Lye, fig. 379, 1983.)



Figure 212.92 *CYPERUS GRANDIBULBOSUS*. Drawn by R. W. Haines from Gillett 12981. (Reproduced with permission from Haines & Lye, fig. 378, 1983.)

diameter, more rarely with 1–4 additional stalked spikes. Inflorescence-bracts 4–8, leafy, spreading or reflexed; the largest 8–20 cm long. Spikelets 5–20 x 1.5–3 mm, lanceolate, golden yellow to yellow-brown, 8–15-flowered. Glumes 3.8–5 mm long, ovate-lanceolate, yellow-brown to medium red-brown with a green excurrent midrib (in the uppermost glumes the mucro is at least 0.5 mm long and recurved) and 3–5 prominent lateral nerves on each side of the midrib. Fig. 212.92.

In seasonally wet habitats, probably, 1000–1500 m. SU KF SD; also in Somalia and East Africa. *Corradi* 1570, 1572.

34. *C. usitatus* Burch. (1822)

–type: from ‘South Africa’.

Fairly slender perennial carrying bulbs from slender stolons. Stolons 0.5–10 x 0.02–0.06 cm (but wider when including the scales), with scattered or closely set 3–5 mm long thin red-brown scales, sometimes splitting up into fibres. Bulbs 6–10 mm in diameter, with a few thin scales outside, thick almost black scales in the middle and thinner red-brown scales inside. Culms 10–30 x 0.5–1.2 cm, 3-angled, glabrous. Leaf-blade 5–20 x 0.2–0.6 cm, flat, rather thick and semi-fleshy, shrivelling when dry, scabrid on margin at least above; sheaths grey to light brown. Inflorescence a congested dark brown to almost black (rarely pale) anthela of many crowded spikelets, or rarely a more open anthela of short spikes with crowded spikelets. Largest inflorescence-bract 2–6 x 0.08–0.3 cm, scabrid on margin. Anthela 1–6 cm in

diameter, consisting of 3–40 spikelets in crowded digitate clusters or short spikes. Spikelets 5–15 x 1–3 mm (depending on whether the glumes are spreading or not), linear, dark red-brown to almost black. Glumes 3–4.2 mm long, ovate-lanceolate, dark red-brown with a narrow pale marginal border, glossy, 5–9 nerved; midrib light brown. Stamens 3. Style with 3 branches. Nutlet 1.4–1.6 x 0.7–0.8 mm, elliptic-oblong, 3-angled, apiculate, grey to dark brown, with minute tubercles in longitudinal rows. Fig. 212.93.

In seasonally wet habitats; 1700–1800 m. GJ SD; widespread in tropical and south Africa. *Sebald* 2653; *Gilbert & Jefford* 4409.

35. *C. microbolbos* C. B. Clarke (1902)

–type: Sudan, *Bent* s.n. (K holotype).

Slender glabrous herb with 5–9 x 0.06–0.08 cm stems from minute bulbs; lower half of the stem buried in the sand. Scales of bulb 3–5, about 5–6 mm long, shiny, medium red-brown, broadly oval with short acuminate tip. Leaves 4–5, lower 2–3, reduced to bladeless light red-brown sheaths; upper 2 with 8–15 x 0.08–0.15 cm blades which are folded when dry; sheaths all of the same length, almost entirely buried in the sand. Inflorescence a 10–12 x 5–10 mm spike with 8–13 spreading red-brown spikelets, the 2–3 lowermost subtended by up to 10 cm long erect or spreading leafy bracts. Spikelets oval-elliptic, 3–8 x 1–1.5 mm, compressed, medium red-brown, 5–8-flowered. Glumes 2–2.5 mm long, red-brown with green midrib; lateral nerves

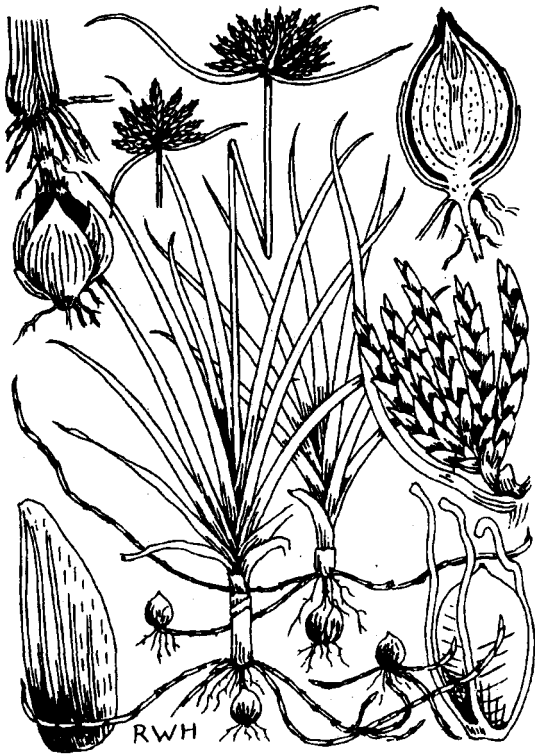


Figure 212.93 *CYPERUS USITATUS*. Drawn by R. W. Haines from Haines 4242. (Reproduced with permission from Haines & Lye, fig. 376, 1983.)

prominent. Style 1.5 mm long, divided into 3, c 1 mm long style-branches. Nutlet c 1 mm long, obovate-3-angled, grey to black, minutely papillose.

Coastal sand, forming a flush; probably near sea-level. EE; also in the Sudan. Gilliland 4080.

36. *C. iria* L. (1753)

– type: India, Osbeck s.n. (S lecto., LINN 70.16 isolecto.).

Tussocky annual or perennial with numerous short roots. Culms 8–60 x 0.06–0.3 cm, 3-angled, glabrous, green. Largest leaf-blades 4–25 x 0.1–0.5 cm, flat, scabrid on margin and major ribs; leaf-sheaths green to red-brown. Inflorescence an open anthela 1.5–20 x 1–20 cm, with groups of spikes sessile or on 0.5–15 cm long major peduncles (rays). Inflorescence-bracts leafy, the largest 5–30 x 0.1–0.6 cm. Spikes sessile or almost so, rather irregular in shape and length. Spikelets 2–10 x 1.5–2 mm, 5–20-flowered, golden to yellow-green. Glumes 1.3–1.6 mm long, obovate or rounded, golden brown with colourless margin and a green slightly excurrent midrib. Style 3-branched. Nutlet 1.2–1.4 x 0.6–0.7 mm, obovate, 3-angled with a short apiculus, dark brown to nearly black as mature; surface almost smooth. Fig. 212.94.

In seasonally wet habitats, such as temporary pools and swamps; 800–1600 m. EE EW GG; a widespread pantropical and subtropical species. Pappi 6240, 7606; Ash 3622.



Figure 212.94 *CYPERUS IRIA*. Drawn by R. W. Haines from Haines 4206. (Reproduced with permission from Haines & Lye, fig. 391, 1983.)

37. *C. nutans* Vahl (1805)

– type: from 'India'.

var. *eleusinoides* (Kunth) Haines in Bot. Bihar Orissa 5: 898 (1924);

C. eleusinoides Kunth (1837) – type: India, Wallich 3346b (K holo.).

C. xanthopus Steud. (1842) – type: Eritrea, Modat, Augar Valley, Schimper 1021 (P lecto., K P isolecto.) – type: Ethiopia, near Demerki, Schimper 1155 (P HAL syn.).

Fairly robust perennial with a thick, sometimes nodular, creeping rhizome and numerous crowded roots. Culms 40–120 x 0.15–0.6 cm (but much thicker across the leaf-sheaths), 3-angled, glabrous, green. Largest leaf-blade 20–50 x 0.4–1 cm, scabrid on margin and midrib at least near the apex, as dry somewhat enrolled; leaf-sheaths green, yellow or red-brown, rather wide. Inflorescence an umbel-like anthela, 6–14 x 3–12 cm, consisting of clustered groups of spikes on up to 12 cm long major peduncles (rays). Involucral-bracts leafy; the largest 10–40 x 0.4–0.8 cm. Spikes 10–30 x 4–10 mm, almost sessile with numerous crowded erect or slightly spreading spikelets. Spikelets 4–8 x 1.5–2.5 mm, grey-brown with 4–12 flowers. Glumes 2–2.3 mm long (including an up to 0.5 mm long mucro), strongly concave, red-brown with pale margins, prominent lateral nerves and a strongly excurrent midrib. Style 3-branched. Nutlet 1.2–1.4 x 0.5–0.6 mm, obovate-oblong, 3-angled, dark brown; surface minutely papillose. Fig. 212.95.



Figure 212.95 *CYPERUS NUTANS* var. *ELEUSINOIDES*. Drawn by R. W. Haines from Haines 4702. (Reproduced with permission from Haines & Lye, fig. 394, 1983.)

In or near seasonal swamps, pools or streams; c 800–2300 m. EW GD SU KF HA; widespread in tropical Africa and Asia. *Corradi* 1479; *Burger & Getahun* 239; *Getachew A. & Gilbert* 1041.

Deviates from subsp. *nutans* in having a greater number of flower in the spikelets (10–40 against 4–12 in subsp. *nutans*) and nutlet often curved (against obovate-oblong).

38. *C. aterrimus* Steud. (1855)

– type: Ethiopia, Debra Eski, *Schimper* s.n. (P holo.) & 233 (P iso.).

??*C. atroviridis* C.B. Clarke (1902).

Fairly robust perennial with a short woody base emitting 2–10 x c 0.2 cm scale-covered stolons; scales of stolons 1.5–3 cm long, dark grey. Culms solitary from ends of stolons, 40–90 x 0.2–0.5 cm, 3-angled, glabrous, green; lower part covered by leaf-sheaths. Largest leaf-blade 30–70 x 0.4–0.8 cm, flat, scabrid on margin and major ribs at least near the tip; leaf-sheaths green to light red-brown. Inflorescence a large anthela 6–12 x 5–10 cm consisting of 2-many clustered spikes on 0.5–8 cm long major peduncles (rays). Involucral bracts leafy; the largest 15–40 x 0.4–0.7 cm. Spikes 20–40 x 10–20 mm, erect or spreading, almost sessile, often appearing brush-like with 10–25 spikelets. Spikelets 8–12 x 2–3 mm, linear-lanceolate, black with 10–15 rather distant flowers. Glumes 2–3 mm long (often with 2 mm long glumes at the top of the spikelet and 3 mm long at the base), lanceolate, dark red-brown with a usually slightly



Figure 212.96 *CYPERUS ATERRIMUS*. Drawn by R. W. Haines from Haines 4313. (Reproduced with permission from Haines & Lye, fig. 395, 1983.)

excurrent green midrib. Style with 3 long branches. Nutlet 1.6–1.8 x 0.5–0.6 mm, elliptic-lanceolate, 3-angled, brown; surface almost smooth, as mature falling enclosed by the glume. Fig. 212.96.

In damp places in upland forest areas, often near streams or bogs; 1350–3350 m. GD GJ SU SD BA; widespread in African mountains. *Friis* et al. 1260; *Ash* 2604; *Hedberg & Getachew A.* 5493.

39. *C. bifolius* Lye (1996)

– type: IL, Buna Bedele Awraja, c 6 km E of Chora town, Kumbabe, *Mesfin T. & Kagnew, G. Y.* 2446 (UPS holo., ETH iso.).

Tall stoloniferous perennial, c 10 x 0.1–0.2 cm curving stolons. Scales of stolon 2.5–3 mm long, membranous, light red-brown to dark grey. Stem solitary from the end of a stolon, 80–90 x 0.2–0.4 cm, 3-angled, glabrous. Leaves from near the basal 30 cm only, often only 2 per culm or at least only 2 producing blades; sheaths light red-brown to grey, membranous, glabrous; blade 40–60 x 0.3–0.8 cm, flat, but strongly twisted when dry, scabrid at least on midrib and margins. Inflorescence a 10–15 x 7–10 cm lax anthela consisting of many sessile and subsessile groups of spikes on 1–9 cm long peduncles, but with a few spikes sessile. Involucral bracts leafy, the largest 30–40 x 0.4–0.6 cm, similar to the leaf-blades. Prophylls at base of peduncles 0.8–2.5 cm long, red-brown, bifid and ending in two prominent awns. Spikes 20–50 x 5–10 mm, erect, appearing brush-like. Spikelets 6–12 x 1–2 mm, linear-lanceolate, light red brown with

5–15 rather distant flowers. Glumes 2–2.5 mm long, oval-elliptic, glabrous, light to medium red-brown with paler margin and 3–5 nerved midrib ending in apex or excurrent into a short awn. Style with 3 stigmas. Nutlet 1.2–1.4 x 0.4–0.5 mm, elliptic, 3-angled, grey, smooth with isodiametric surface cells, falling tightly enclosed by its glumes.

Swampy area in grassland; 1890 m. IL; only known from the type collection.

40. *C. pratensis* Böck. (1874);

Mariscus pratensis (Böck.) Cufod. (1970) –types: GD, near Debra Ari, 2550 m, *Schimper* 1326 (P lecto., K isolecto.) & near Gaffat, 2550 m, *Schimper* 1330 (B K syn.).

Slender perennial with abbreviated monifiliform rhizome with stem-base corm-like. Stem 15–40 x 0.05–0.2 cm, 3-angled, glabrous. Leaf-blade 5–30 x 0.2–0.5 cm, flat, scabrid at least on midrib and margin near the tip. Inflorescence of several sessile irregular spikes with or without 1–3 additional stalked spikes on up to 3 cm long peduncles. Spikes 10–18 x 8 mm, with numerous crowded 4–6-flowered spikelets. Glumes 2–2.2 mm long, obovate-rectangular with truncate tip, yellow-brown to golden with a wide red-brown margin and a narrow pale marginal border, with 3–5 prominent nerves on each side of the midrib. Nutlet about 1.5 x 1 mm, elliptic, 3-angled, grey.

Probably in seasonally wet habitats; 1500–2600 m. GD SU; endemic. *Chiovenda* 1891; *Bartolozzi* s.n.; *Sandford* H-20.

41. *C. distans* L.f. (1781)

– type: India (LINN 70.42 lecto).

Mariscus rubrotinctus Cherm. (1919).

Tufted perennial with a short thick rhizome and culm usually set in a row or solitary. Culms 20–60 x 0.15–0.5 cm, 3-angled, glabrous, basal part covered with leaf-sheaths. Leaves 5–30 x 0.2–0.8 cm, flat, scabrid on margin and midrib; leaf-sheaths grey to dark purple (or black on old culms), rather lax. Inflorescence a compound umbel-like anthela, 3–25 x 5–25 cm; major branches 5–15, 1–18 cm long; secondary and tertiary branches short or spikes sessile. Spikes 20–40 x 10–40 mm, spikelets rather loosely set and often spreading at an angle of 90. Spikelets 7–20 x 0.5–1 mm (or 1–2 mm wide with glumes spreading), linear or zigzag when glumes spreading; rachilla with a wide transparent wing on two sides; the spikelet sometimes breaking at its base with the glumes and nutlets persistent on its rachis, 10–20-flowered. Glumes 1.7–2.6 mm long, oblong-elliptic, straw-coloured, light to dark red-brown with a 3–5 nerved often green or paler keel; apex obtuse with a red-brown or transparent margin into which the keel does not reach; glumes placed rather distant, falling off with the nutlet or persistent until the whole spikelet falls as one unit. Nutlet 1.4–1.7 x 0.4–0.5 mm, narrow

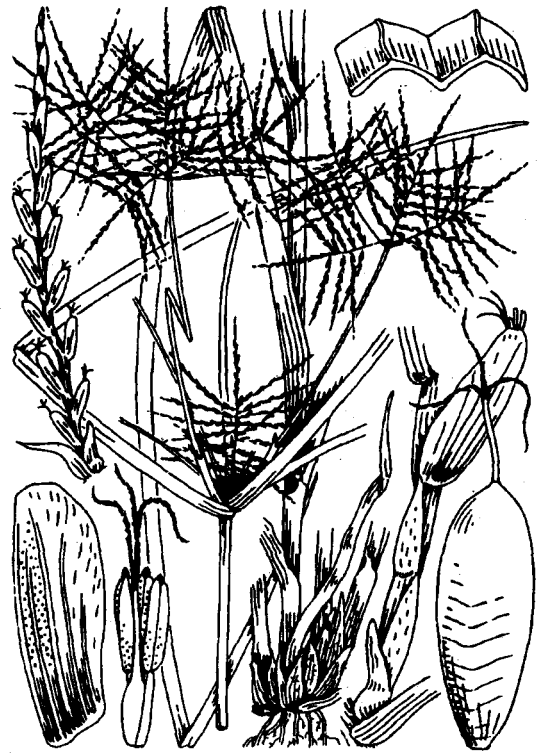


Figure 212.97 *CYPERUS DISTANS*. Drawn by R. W. Haines from Haines 4022. (Reproduced with permission from Haines & Lye, fig. 398, 1983.)

elliptic with short apiculus, yellow and almost smooth when young, grey with a metallic shine and minute papillae in longitudinal rows when mature. Fig. 212.97.

At edges of pools and ditches, also in dry forest, on roadside banks and in cultivations; from below sea level (Afrera plain) to about 2100 m; AF GD GJ SU IL KF GG SD; widespread in most tropical and subtropical regions. *Mooney* 5583; *Parker* E 444; *Friis* et al. 6848.

42. *C. longibracteatus* (Cherm.) Kük. (1929);

Mariscus longibracteatus Cherm. (1919) – types: from 'Madagascar'.

C. distans L.f. subsp. *longibracteatus* (Cherm.) Lye in *Nord. J. Bot.* 3: 231 (1983).

Tufted perennial with a short woody rhizome and few to many crowded culms. Culms 30–80 x 0.2–0.5 cm, 3-angled, glabrous. Leaves 10–30 x 0.2–0.8 cm, flat, scabrid on margin and midrib; leaf-sheaths green to purple, rather lax. Inflorescence a compound umbel-like anthela 10–25 cm wide and long; major branches 8–15, 2–18 cm long; secondary and tertiary branches short or spikes sessile. Largest involucre bracts spreading, usually more than 25 cm long. Spikes 2–4 cm long and wide with somewhat distantly placed spikelets. Spikelets 10–20 x 0.5–1 mm or 1–2 mm wide with glumes spreading, linear or zigzag when glumes spreading; rachilla with a wide transparent wing on two sides;



Figure 212.98 *CYPERUS LONGIBRACTEATUS*. Drawn by R.W. Haines from Haines 4010. (Reproduced with permission from Haines & Lye, fig. 399, 1983.)

spikelet usually breaking at its base with the glumes and nutlets persistent on its rachis, 6–15-flowered. Glumes 2–3 mm long, oblong-elliptic, green to dark red-brown with a 3–5 nerved often green or paler keel; apex obtuse with a light brown or transparent margin into which the keel does not reach; glumes placed rather distant, persistent until the whole spikelet falls as one unit. Nutlet 1.4–1.7 x 0.4–0.5 mm, narrow elliptic with short apiculus, grey with a metallic shine and minutely papillate when mature. Fig. 212.98.

In upland forest and margins of woodland and streams; 1300–3300 m. GJ WG SU IL KF SD; widespread in tropical Africa and Madagascar. Parker E124; Ash 2224; Friis et al. 1624.

A very variable species which sometimes grades into *C. distans*.

Var. *longibracteatus* has green spikelets and very long involucre bracts.

Var. *rubrotinctus* (Cherm.) Kük. in Engl. *Das Pflanzenreich* IV. 20 (101): 413 (1936) has shorter involucre bracts and red-brown spikelets.

Var. *niger* (C.B. Clarke) Lye in *Lidia* 3: 131 (1994) has very dark brown to almost black spikelets.

43. *C. cyperoides* (L.) Kuntze (1898);

Scirpus cyperoides L. (1771) – type: India, König s.n. (C holo.).

Mariscus polyphyllus Steud. (1842) – type: GD, Enderder, Schimper 1124 (P holo., HAL K P iso.).



Figure 212.99 *CYPERUS CYPEROIDES*. Drawn by R.W. Haines from Haines 4762. (Reproduced with permission from Haines & Lye, fig. 408, 1983.)

Fairly robust perennial with a swollen stem-base and usually a short woody rhizome. Culms 20–80 x 0.07–0.5 cm, 3-angled, glabrous, with leaves from the lowest 5–20 cm. Largest leaves 10–25 x 0.3–0.9 cm, flat, scabrid on margin and midrib at least near the tip; leaf sheaths green to pale brown above, dark purple below; basal scales often splitting up into fibres. Major inflorescence-bracts 5–15, leafy, erect or spreading; the largest 6–30 x 0.3–1.2 cm, flat, scabrid on margin and ribs. Inflorescence a 4–25 cm wide, umbel-like anthera of 6–18 spikes on 0.5–12 cm long peduncles and one or a few sessile spikes, sometimes with 1–6 additional spikes at the base of some major spikes. Spikes 10–30 x 5–12 mm, with numerous (25–150) spreading or more rarely recurved spikelets. Spikelets 2.5–6 x 0.6–0.8 mm, oval, 1–3-flowered, green yellow and often with a brown tinge, falling off entire when mature, often perfecting 1 nutlet only. Glumes 2–3.5 mm long, grey or somewhat golden, with 4–6 nerves on each side of the green midrib. Stamens 3. Style 3-branched. Nutlet 1.5–1.9 x 0.6–0.8 mm, elliptic, 3-angled, red-brown, minutely papillose. Fig. 212.99.

A weed of cultivated land, along paths in forest, more rarely in grassland and savanna; 700–2400 m. EE EW GD GJ SU WG HA AR KF GG SD; widely distributed in the tropics and subtropics of Africa, Asia and Australia; probably introduced to America. Mooney 5882; Ash 1973, 1988; Gilbert et al. 3098.

A very variable species particularly as regards ro-

bustness and number of flowers per spikelet. subsp. *macrocarpus* (Kunth) Lye in *Nordic J. Bot.* 3: 231 (1983) has a more irregular anthela with wider spikes and larger spikelets usually perfecting 2–3 nutlets.

44. *C. subumbellatus* Kük. (1936);

Kyllinga umbellata Rottb. nom. illeg. (1773).

Cyperus cyperoides (L.) Kuntze subsp. *flavus* Lye in *Nordic J. Bot.* 3: 231 (1983); *Mariscus cylindrostachyus* Steud. (1855) – type: Gabon, Jardin s.n. (P holo.).

Medium-sized perennial with as short horizontal rhizome and slightly swollen stem-bases, but plants growing in cultivated ground may appear as annuals. Culm 25–70 x 0.08–0.3 cm, 3-angled, glabrous, with leaves from its lowest 4–12 cm only. Largest leaves 10–30 x 0.2–0.6 cm, flat, scabrid on margin and midrib; leaf-sheath green or pale purple above, dark purple near the base. Major inflorescence-bracts 6–13, leafy, erect or spreading; the largest 8–25 x 0.2–0.7 cm. Inflorescence a 4–10 cm wide umbel-like anthela of 7–14 spikes; the largest peduncle 1–5 cm long. Spikes 5–18 x 4–6 mm with numerous (30–180) spreading spikelets. Spikelets 2–3 x 0.7–0.9 mm, ovate to elongate, 1–2-flowered, yellow green but turning brown when ripe, falling off entire when mature. Glumes 1.5–2 mm long, elliptic, grey to pale red-brown and with a golden tinge at least when fresh, and with 4 nerves on each side of the green midrib which ends in apex; glumes embrace the nutlet closely. Style 3-branched. Nutlet 1.5–1.8 x 0.7–0.8 mm, elliptic, 3-angled, red-brown, minutely papillose. fig. 212.100.

A weed of cultivated ground, in seasonally burnt grassland or in open parts of forests; 500–1300 m. EE EW WG IL; widespread in tropical and subtropical parts of Africa and Madagascar. *Ash* 528, 3099A; *Jansen* 6336.

45. *C. boreohemisphericus* Lye (1993)

– type: KF, Mt. Karkarha, 16 km SSE of Mezan Tefari, *Ash* 3401 (K holo., US iso.).

Perennial producing up to 20 x 0.1–0.3 cm scale-covered slender stolons. Stems solitary or a few together, 5–70 x 0.15–0.35 cm, 3-angled, glabrous. Leaves 10 or more per stem; leaf-blades 10–30 x 0.3–0.8 cm, flat, densely scabrid at least on margin and midrib near the tip. Inflorescence a lax or somewhat congested anthela 2–7 x 2–8 cm; involucre bracts many, leaf-like, the largest 8–25 cm long. Spikes sessile or with up to 3 cm long peduncles, with about 10–20 spreading spikelets. Spikelets 5–12 x 1–2 mm, linear, only slightly flattened, 4–12-flowered, falling off entire when mature. Glumes 3–4 mm long, lanceolate with obtuse tip, pale or straw-coloured to pale red brown with 3–5 prominent nerves on each side of the green midrib; red brown gland-dots sometimes present on glumes and rachis. Anthers about 2.5 mm long, linear. Style with 3 long stigmas. Nutlet about 1.4 x 0.7 mm elliptic, 3-angled, brown, smooth.



Figure 212.100 *CYPERUS SUBUMBELLATUS*. Drawn by R.W. Haines from *Haines* 4761. (Reproduced with permission from Haines & Lye, fig. 412, 1983.)

Grassy places in montane forest, also near cultivations; 1700–2300 m. SU WG KF; not known elsewhere. *Mooney* 6249; *de Wilde et al.* 10435; *Gilbert* 240.

46. *C. tomaiophyllus* K. Schum. (1895)

– type: Tanzania, Mt. Kilimanjaro, Rua stream, 1900–2300 m, *H. Meyer* 272 (B lecto.).

Large perennial with a branching up to 2 cm thick scale covered woody rhizome. Culms 40–140 x 0.5–1 cm thick, 3-angled, glabrous; base covered with brown scales and old leaf-bases split by the new culms arising in their axes. Leaves shorter than the culm, 6–15 mm wide, flat or v-shaped, scabrid on margin and midrib. Inflorescence a 6–15 cm wide anthela consisting of 6–12 major spikes on 0.5–4 cm (rarely to 15 cm) long peduncles, with or without 1–3 smaller spikes at the base of the major spikes. Involucral bracts 6–12, leafy, erect or spreading; the largest 20–40 x 1–2 cm. Spikes 15–45 x 10–20 mm, with numerous spikelets, often crowded. Spikelets 6–10 x 1–2 mm, linear-oblong, 3–6-flowered, falling from the persistent bracts and prophylls. Glumes 4–5 mm long, oblong-lanceolate, pale brown with colourless margins and 5–7 slender nerves on each side of the midrib. Nutlet 2.2–2.4 x 0.6–0.7 mm, oblong, 3-angled, brown. Fig. 212.101.

In bogs and other wet areas; 1300–1800 m. KF; scattered in African mountains. *Mooney* 9212.

47. *C. impubes* Steud. (1855)

– type: Ethiopia, *Schimper* s.n. (P holo.).



Figure 212.101 *CYPERUS TOMAIOPHYLLUS*. Drawn by R.W. Haines from Haines 4153. (Reproduced with permission from Haines & Lye, fig. 414, 1983.)



Figure 212.102 *CYPERUS IMPUBES*. Drawn by R.W. Haines from Haines 4116. (Reproduced with permission from Haines & Lye, fig. 419, 1983.)

Mariscus procerus A. Rich. (1851) – type: TU, Assai, *Quartin-Dillon* s.n. (P holo.).

Robust perennial with a thick horizontal rhizome with clustered or distant culms. Culms 20–90 x 0.1–0.3 cm, 3-angled. Leaves 10–40 x 0.2–0.8 cm, scabrid, at least on margins and midrib. Involucral bracts 4–8, erect or spreading, the largest 10–30 cm long. Inflorescence of one sessile and 3–6 stalked spikes on 0.5–8 cm long peduncles, rarely with 1–2 secondary spikes at the base of the main spike. Spikes 10–40 x 8–15 mm, with numerous spreading spikelets; rachilla winged. Spikelets 7–10 x 1–1.3 mm, linear-lanceolate, falling off entire when mature, 4–6-flowered, but usually perfecting 3 nutlets only. Glumes 3–4 mm long, oblong, red-brown with prominent lateral nerves and a paler midrib. Nutlets oblong, 3-angled. Fig. 212.102.

Forest-margins or near streams; 1000–2900 m. EW TU KF SD; rare in East Africa. *Pappi* 26; *Getachew* A. & *Gilbert* 776; *Gilbert & Jefford* 4414.

48. *C. rohlfsii* Böck. (1882);

C. impubes Steud. var. *rohlfsii* (Böck.) Kük. (1936) – type: GD, Djebel Gerara, *G. Rohlf*s & *A. Stecker* 47 (B holo.).

Tall robust perennial of similar habit as *C. impubes*, but slightly larger. Culms usually solitary or a few together from thick stolons. Culms 50–100 x 0.3–0.5 cm, 3-angled, glabrous. Leaves from the lower 30 cm only; blades to 50 x 0.8 cm, scabrid along the margin; sheaths

light to dark red-brown, the lower rather stiff and thick. Involucral bracts 4–8, leafy, erect or spreading; the largest 20–70 x 0.2–0.5 cm. Inflorescence of one almost sessile and 5–12 stalked spikes on 0.5–5 cm long peduncles. Spikes 10–70 x 5–8 mm, with numerous spikelets. Rachis nodular, glabrous. Spikelets 2.5–4 x 0.8–1.2 mm, linear-lanceolate, falling off entire when mature, 2–3-flowered, but perfecting 1–2 nutlets only. Glumes 2.5–3.5 mm long, light red-brown. Fig. 212.103.

In bushland; 2000–2700 m. EW GD; rare in Kenya and Tanzania. *Schweinfurth* & *Riva* 1476.

Due to the very immature type of *C. rohlfsii*, it must be considered a doubtful species. It is perhaps conspecific with *C. impubes*.

49. *C. schweinfurthii* (Chiov.) Kük. (1936);

Mariscus schweinfurthii Chiov. (1903) – type: Eritrea, Assaorta, Masciabo, *Pappi* 3234 (FT holo.).

Fairly tall stoloniferous perennial with a slightly swollen stem-base. Stolons to 15 x 0.1–0.2 cm, covered by brown to grey scales. Culms 30–50 x 0.15–0.4 cm, 3-angled, glabrous. Leaves 10–40 x 0.3–0.7 cm, flat, scabrid on margin; leaf-sheaths grey white to brown, somewhat fleshy below. Involucral bracts 5–8, leafy, erect or spreading; the largest 8–20 x 0.3–0.5 cm. Inflorescence of one sessile and 4–8 stalked spikes on 0.5–8 cm long peduncles. Spikes 10–35 x 8–10 mm, with many spreading spikelets. Spikelets 3–6 x 0.7–1 mm, linear-lanceolate, 1-flowered, falling off entire when mature. Glumes 2.5–3 mm long, oblong with obtuse apex, light to dark

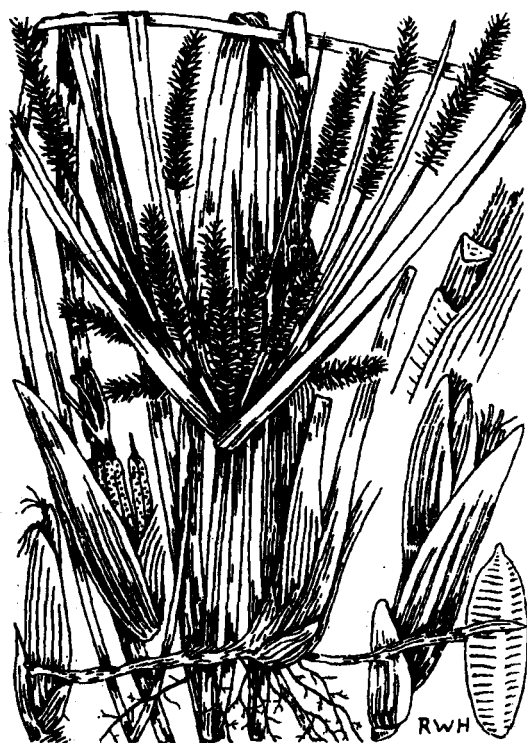


Figure 212.103 *CYPERUS ROHLFSII*. Drawn by R. W. Haines from Polhill & Paulo 946. (Reproduced with permission from Haines & Lye, fig. 431, 1983.)

red-brown with a paler margin, glabrous, the green midrib ending in apex.

In bushland or grassland; 800–1200 m. EE EW; not known elsewhere. *Fiori* 852; *Baldrati* 822.

50. *C. laevigatus* L. (1771)

– type: South Africa, *König* s.n. (C holo.).

Juncellus laevigatus (L.) C.B. Clarke (1893).

C. teretifolius A. Rich. (1851) – type: SU, Choho, *Quartin-Dillon* s.n. (P holo.).

Tufted perennial with crowded culms or culms solitary on a long creeping rhizome. Rhizome 1–5 mm thick, light brown to purple-black. Culms usually 3–60 x 0.05–0.2 cm (rarely to 150 x 0.2–0.6 cm), rounded to 3-angled or angular, glabrous; basal part covered with short scales and rather loose leaf-sheaths and the culm therefore wider across the sheaths. Leaves to 4 x 0.05–0.2 cm, usually enrolled and almost culm-like, scabrid on margin but appears glabrous because of the enrolled margin, sometimes leaf-blade absent; leaf-sheaths light to dark purple-brown, all or the lowest only without leaf-blades. Inflorescence of a solitary spikelet or more commonly a lax to crowded head of 2–30 spikelets (rarely to 80 spikelets), 0.5–3.5 cm in diameter; major involucre bract 1–3 cm long, scabrid on margin, slightly flattened but culm-like and continuing in the direction of the culm, the inflorescence therefore apparently lateral. Spikelets 5–20 x 1.5–3 mm, straight or curved, linear to lanceolate, somewhat flattened, pale yellow-grey (straw-coloured) rarely variegated dark brown,

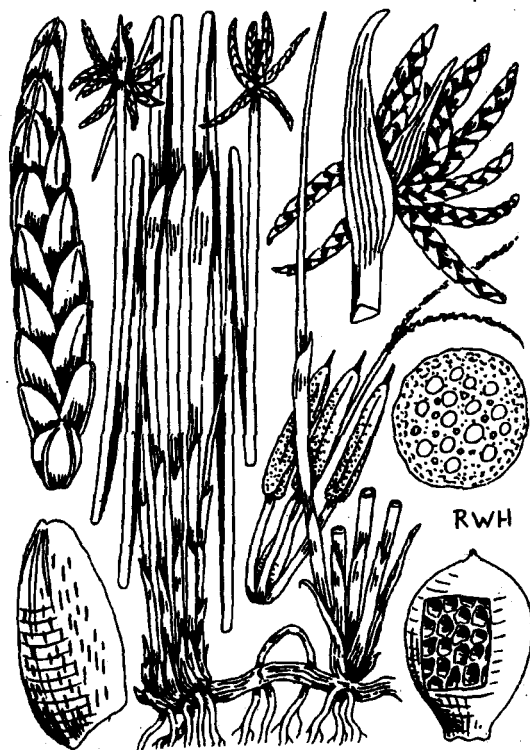


Figure 212.104 *CYPERUS LAEVIGATUS*. Drawn by R. W. Haines from Haines 4021. (Reproduced with permission from Haines & Lye, fig. 539, 1983.)

15–30-flowered. Forms with few more than 10 mm long often curved spikelets are sometimes named var. *distachyos* (All.) Coss. & Durieu. Glumes 2–3.5 mm long, very closely overlapping, broadly elliptic, rounded on the back, which is without keel except near the tip, pale yellow with red-brown dots; apex acute, shortly mucronate or frayed. Style with 2 long branches. Nutlet 1.5–1.7 x 0.8–1 mm, obovate with short apiculus, flat on one side, rounded on the other, grey to brown; surface smooth but with distinct rather large isodiametric surface-cells. Fig. 212.104.

Forming a very dense sward on saline shores and in seepage zones, also near hot springs; sea level to 2800 m. EE EW GD SU AR KF GG SD HA; widespread in saline habitats in all tropical and hot regions, particularly in regions with a low rainfall. *Mooney* 6637; *Burger* 2187; *Gilbert* 2341.

51. *C. compressus* L. (1753)

– type: America (LINN lecto).

Small to fairly robust annual with a single or a few culms. Roots brown to red. Culms 10–60 x 0.07–0.5 cm, 3-angled, almost glabrous. Leaves 3–30 x 0.15–0.6 cm, flat, scabrid on margins and ribs; leaf-sheaths grey to red-brown. Inflorescence in small specimens a solitary head of 3–6 spikelets, but more frequently a compound anthela 1–15 x 0.5–2.5 cm, consisting of one sessile group of spikelets and 1–10 stalked groups on 0.5–1.2 cm long peduncles. Involucre bracts leafy, erect or spreading, the largest 2–25 cm long. Spikelets 10–50 x



Figure 212.105 *CYPERUS COMPRESSUS*. Drawn by R.W. Haines from Haines 4180. (Reproduced with permission from Haines & Lye, fig. 542, 1983.)

3–5 mm, linear-lanceolate, flattened, green-grey to red-brown, 10–60-flowered. Glumes 3.5–5 mm long, ovate-elliptic, grey to brown with or without yellow patches; the midrib green and shortly excurrent. Style with 3 branches. Nutlet 1.5–1.7 x 1.1–1.3 mm, obovate, red-brown and almost smooth. Fig. 212.105.

In seasonally wet habitats. Locality given as 'Hortaciao'; widespread in all tropical and subtropical regions. UAZ 3.

52. *C. pustulatus* Vahl (1805)

– type: Guinea in West Africa, Thonning s.n. (C holo.).

Slender to robust annual with solitary or clustered stems. Culms 15–60 x 0.03–0.4 cm, 3-angled or compressed, glabrous, green. Largest leaf-blades 7–50 x 0.05–0.5 cm, flat or canaliculate, scabrid on margin and midrib at least near the apex; leaf-sheaths grey to red-brown. Inflorescence a solitary spikelet (in the smallest specimens) or a group of 2–many clustered sessile spikelets with or without 1–6 stalked spikelet-clusters or short spikes, rarely with 1–3 secondary stalked or subsessile spikelet-clusters from the base of pedunculate spikelets-clusters. Involucral bracts leafy; the largest 6–40 x 0.05–0.5 cm, erect or spreading. The entire inflorescence 0.5–22 x 0.5–13 cm. Spikelets 5–10 (but elongating to 12–20 mm when fruiting) x 2–4 mm, linear-lanceolate and only slightly compressed, green grey to brown with 10–25 flowers. Glumes 2.5–3.2 mm long, ovate, light brown but often with dark red-brown



Figure 212.106 *CYPERUS PUSTULATUS*. Drawn by R.W. Haines from Lye 5367. (Reproduced with permission from Haines & Lye, fig. 540, 1983.)

patches; lateral nerves prominent and the midrib ending below the rounded apex. Style with 2 (rarely 3) branches. Nutlet 1.7–2 x 1.2–1.4 mm, obovate to rounded, dorso-ventrally compressed or more rarely 3-angled, dark brown as mature; surface with numerous small isodiametric cells and sometimes minutely papillose. Fig. 212.106.

Edge of temporary pools and in wet flushes in grassland; 1200–1300 m. WG; widespread in tropical Africa. Ash 3092; Gilbert & Thulin 678.

53. *C. castaneus* Willd. (1797)

– type: from 'tropical Australia'.

subsp. *amabilis* (Vahl) Lye (ined.);

C. amabilis Vahl (1805) – type: Ghana, Thonning s.n. (C holo.).

Slender to fairly robust annual with solitary or crowded culms. Culms 5–25 x 0.03–0.13 cm, 3-angled, glabrous. Leaf-blades 2–10 x 0.05–0.25 cm, flat or enrolled, scabrid on margin; sheaths red brown to purple, rather short. Inflorescence an open anthela 2–8 cm in diameter. Major involucral bract leafy, 1–10 x 0.05–0.25 cm, usually shorter than the inflorescence. Largest inflorescence-branches 1–7 cm long, carrying one sessile and 1–9 stalked groups of digitately arranged spikelets, occasionally some stalked spikelet-clusters carry a secondary stalked spikelet-cluster; the tubular prophyll at the base of each peduncle green or light brown. Spikelets 3–17 x 1–1.5 mm (or to 3.5 mm wide with glumes



Figure 212.107 *CYPERUS CASTANEUS* subsp. *AMABILIS*. Drawn by R. W. Haines from Haines 4148. (Reproduced with permission from Haines & Lye, fig. 544, 1983.)

spreading at right angles), linear, red-brown to golden. Glumes 1.3–1.5 mm long, ovate, 3-nerved, orange to red-brown with a green midrib which is usually very shortly excurrent in a slightly recurved micro. Stamen 1. Nutlet 0.5–0.6 x 0.3–0.4 mm, obovate, 3-angled, brown, minutely papillose. Fig. 212.107.

In seasonally wet habitats, often on sandy soil near roads; 500–1400 m. EE EW SU IL; widespread in tropical and subtropical parts of Africa, Asia and America. Parker E-458; Ash 525; Gilbert 2182.

Subsp. *amabilis* differs from subsp. *castaneus* in having on the average longer stems (5–25 cm against rarely above 10 cm in subsp. *castaneus*), longer spikelets (the range being 3–17 mm against 8–12 mm), and its major involucre bracts usually shorter than the inflorescence, not longer, and its glumes are 3-nerved against 1-nerved in subsp. *castaneus*.

54. *C. cuspidatus* H.B.K. (1815)

– type: Venezuela, Humboldt & Boupland s.n.

Slender annual with a minute root system. Culms 3–14 x 0.02–0.05 cm, 3-angled, glabrous. Leaf-blades flat or enrolled, slightly scabrid near the apex, 1–8 x 0.02–0.08 cm; sheaths red-brown to purple. Inflorescence a single spikelet-cluster of 4–20 (rarely 1–3) spikelets, or of one sessile and 1–3 stalked spikelet-clusters. Major involucre bracts 2–8 cm long, leafy to filiform. Major inflorescence-branches (when present) 0.5–2 cm long. Anthela 2.5–4 cm in diameter when consisting of several spikelet-clusters; each spikelet-cluster 1–2 cm

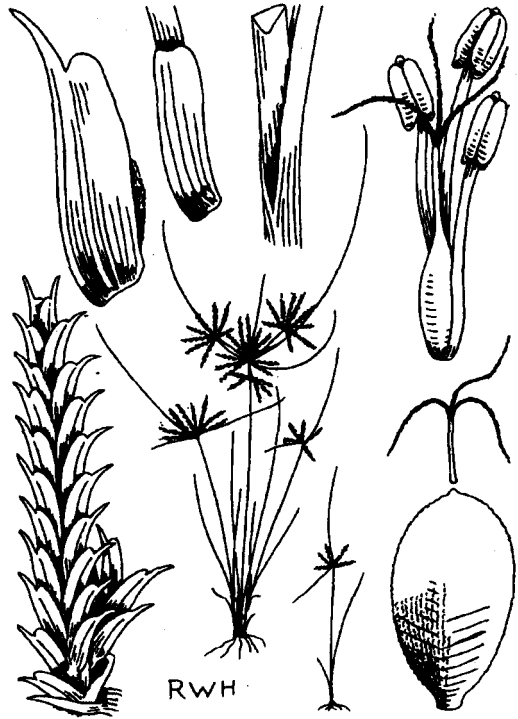


Figure 212.108 *CYPERUS CUSPIDATUS*. Drawn by R. W. Haines from Lye 5388. (Reproduced with permission from Haines & Lye, fig. 508, 1983.)

across. Spikelets 4–10 x 1.7–2 mm, linear, squarrose, red-brown, 8–25-flowered. Glumes 1.6–2 mm long (including the 0.5–0.6 mm long excurrent recurved midrib), strongly 3-nerved, truncate, red-brown with green midrib. Stamens 1–3. Nutlet 0.6–0.8 x 0.3–0.4 mm, obovate, strongly 3-angled, red-brown with dark grey angles, densely papillose. Fig. 212.108.

In shallow seasonally wet soil often near pools on rock outcrops; 1500–2500 m. GD SU; widespread pantropical species. Chiovenda 1731; Sandford s.n.

55. *C. squarrosus* L. (1756)

– type: India (LINN lecto).

Fairly slender annual with solitary or crowded culms and a minute root-system. Culms 3–20 x 0.1–0.3 cm, 3-angled, almost glabrous, not swollen at the base. Leaves 2–10 x 0.1–0.4 cm, flat, slightly scabrid or glabrous; sheaths green to purple, rather wide. Inflorescence a 1–5 x 1–4 cm anthela consisting of 1–2 sessile spikes and 1–7 stalked spikes on 0.5–4 cm long peduncles, rarely reduced to a solitary spike. Spikes 5–15 x 5–12 mm, consisting of numerous crowded spikelets. Spikelets 3–7 x 2–3 mm, linear, yellow-green to red-brown, flattened, squarrose with recurved glume-apices, 6–15-flowered. Glumes 1.4–1.7 mm long, elliptic, yellow to red-brown with a green strongly excurrent midrib and 3–4 nerves on each side of the midrib. Stamen 1. Style with 3 long branches. Nutlet 0.6–0.7 x 0.2–0.3 mm, narrow oblong, 3-angled, dark grey, minutely papillose, disarticulating at its base but held by



Figure 212.109 *CYPERUS SQUARROSUS*. Drawn by R.W. Haines from Haines 4734. (Reproduced with permission from Haines & Lye, fig. 511, 1983.)

the persistent glume so that it falls with the spikelet. Fig. 212.109.

In seasonally wet soil, often on silt near pools, rivers, streams and road ditches; 100–2100 m. EE EW TU GD SU SD; widespread pantropical species. *Pappi* 8781; *Cufodontis* 727; *Gilbert et al.* 2181.

56. *C. pygmaeus* Rottb. (1793);

C. michelianus (L.) Link subsp. *pygmaeus* (Rottb.) Asch. & Graebn. (1904) – type: India, König s.n. (C holo.).

Tussocky annual with crowded stems. Culms 1–15 x 0.05–0.15 cm (but wider across the sheaths), 3-angled, glabrous. Leaf-blades 1–6 x 0.1–0.2 cm, flat, but as dry often folded and twisted, scabrid on margin and midrib at least near the apex; sheaths red to purple. Inflorescence a congested anthela of irregular outline and surrounded by 4–6(–8) long leafy spreading bracts. Major involucre bract 3–12 x 0.15–0.25 cm. Anthela 0.5–1.2 cm in diameter, consisting of several crowded hardly discernable spikes; each spike with many crowded spikelets. Spikelets 2.5–4 x 1–1.5 mm, green, oblong-lanceolate, 8–15-flowered. Glumes 1.3–1.6 mm long, ovate-lanceolate, 3–7 nerved, colourless below, light red-brown with a thick green midrib above. Stamens 1–2. Style 2-branched. Nutlet 1–1.2 x 0.3–0.4 mm, oblong, lenticular with one flat and one rounded side, yellow to apricot, minutely papillose. Fig. 212.110.

In seasonally wet habitats, often in sandy places near

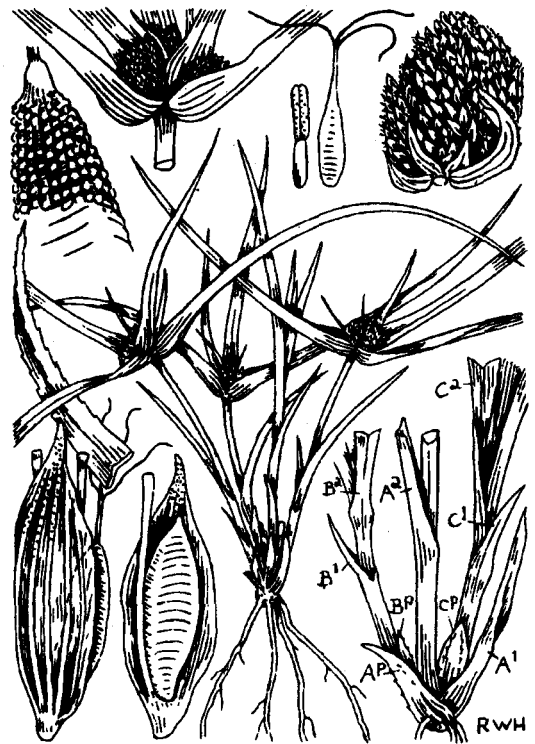


Figure 212.110 *CYPERUS PYGMAEUS*. Drawn by R.W. Haines from Lye 5788. (Reproduced with permission from Haines & Lye, fig. 532, 1983.)

pools or watercourses; 500–1000 m. GG HA; widespread in the tropics and subtropics of the Old World. *Suckert* 23; *Corradi* 1610; *Ash* 3727.

57. *C. meeboldii* Kük. (1922)

– type: India, *Meebold* 11257 (B holo., not found).

C. sphaeranthelus Chiov. (1939) – type: SD, Borana, c 8 km east of Mojale, *Cufodontis* 721 (FT holo.).

Rather slender perennial with swollen stem-base covered by fibrous remains of old sheaths; root-system much reduced. Culms 4–20 x 0.04–0.1 cm, 3-angled, glabrous or slightly scabrid, swollen at the base. Leaf-blades 3–12 x 0.05–0.2 cm, flat or enrolled, slightly scabrid on margin; sheaths grey to light brown, the oldest disintegrating into black fibres. Inflorescence a congested anthela with numerous sessile spikelets. Major involucre bract leafy, 4–10 x 0.1–0.4 cm, much longer than the inflorescence. Anthela 0.7–2 cm in diameter, consisting of 15–60 crowded spikelets. Spikelets 4–10 x 1–2 mm (or to 2.5 mm wide with glumes spreading), light to dark-brown, linear, 15–30-flowered. Glumes 1.3–1.5 x 0.5 mm, ovate, red-brown with 3-nerved midrib which ends in the slightly recurved apex. Stamen usually 1. Style unbranched or with 3-style-branches. Nutlet 0.5–0.6 x 0.3–0.4 mm, pear-shaped, 3-angled, grey, minutely papillose. Fig. 212.111.

In seasonally wet habitats in open grassland, or near



Figure 212.111 *CYPERUS MEEBOLDII*. Drawn by R.W. Haines from Haines 4221. (Reproduced with permission from Haines & Lye, fig. 528, 1983.)



Figure 212.112 *CYPERUS CONGLOMERATUS*. Drawn by R.W. Haines from Schweinfurth s.n. (Reproduced with permission from Haines & Lye, fig. 536, 1983.)

temporary pools and swamps; c 500–1600 m. EE SD BA; rare also in East Africa and in India. Pappi 3870.

58. *C. conglomeratus* Rottb. (1772)

– type: Arabia, *Forsskål* s.n. (C lecto.).

Slender, large tussocky perennial with a short woody rhizome and numerous, c 0.5 mm thick wiry roots; roots often covered by a thick grey tomentum, 2 mm thick. Culms 1–40 (rarely to 120) x c 0.1–0.4 cm, 3-angled to almost terete, glabrous. Leaves many from the basal 3–15 cm only; sheaths rather thin, white or grey to red-brown, the lower sometimes splitting up into red-brown fibres; blades 5–25 x 0.1–0.3 cm, often rather thick, weakly or strongly curving, sometimes folded as dry. Inflorescence a terminal head of 3–50 crowded spikelets usually 3–5 cm in diameter, but often subtended by 1–8 new heads or groups of spikelets on 1–6 cm long peduncles. Involucral bracts 1–5, leafy, erect or spreading, the largest 1–25 cm long, usually overlapping the inflorescence. Spikelets 5–30 x 2–4 mm, lanceolate, strongly compressed or subterete, grey white or variegated grey and red brown, 10–50-flowered. Glumes 2.5–4 mm long, oval, grey white to brown or red brown, many-nerved, but the nerves sometimes indistinct; the midrib often green and excurrent into a short straight awn. Nutlet about 1.5 x 0.8–1 mm, obovate, obscurely 3-angled with the adaxial side concave, black, minutely papillose. Fig. 212.112.

In sandy soils, more rarely on rocks, clay-soils and

gravel, often in somewhat saline habitats; near sea level to 700 m. EE GG HA; widespread in dry and hot parts of Africa and western Asia. *Gilbert* 56; *Mooney* 8953; *Hemming* 1154.

A very variable species of which the extremes are indeed very different, but intermediate forms are known. The typical *C. conglomeratus* has almost terete culm, subterete 8–20-flowered spikelets and pale glumes.

59. *C. jeminicus* Rottb. (1772);

C. conglomeratus Rottb. subsp. *jeminicus* (Rottb.) Lye (1994) – type: Jemen in Arabia, *Forsskål* s.n. (C hol.).

Slender perennial forming small tussocks not connected by rhizomes; roots slender and without tomentum. Stems 5–20 x 0.05–0.2 cm, 3-angled, glabrous. Leaves basal with prominent pallid sheaths; blades 2–10 cm long and about 1 mm wide, often thick and sometimes curving, channelled or folded as dry. Inflorescence a sessile terminal cluster of 5–20 crowded spikelets with or without additional stalked groups of spikelets. Involucral bracts erect or spreading, leaf-like, to about 10 cm long. Spikelets 5–15 x 2–3 mm, linear-lanceolate, strongly compressed, brown or red-brown, 10–25-flowered. Glumes 2.5–3 mm long, oval, red brown, many-nerved; the midrib green and excurrent into a short mucro. Nutlet 1.2–1.5 mm long, obovate, obscurely 3-angled, brown, minutely papillose.

In sand dunes or sandy soils; near sea-level to 500 m. EE; North Africa and SW Asia. *Tellini* 242; *Ash* 709.

It is very doubtful if this is a good species, and it should probably be included in *C. conglomeratus*, from which it differs in its more flattened red-brown spikelets and the slender roots without tomentum.

60. *C. niveus* Retz. (1791)
– type: from 'East Indies'.

var. *leucocephalus* (Kunth) Fosberg in *Kew Bull.* 31: 835 (1977);

C. sphaerocephalus Vahl var. *leucocephalus* Kunth in *Enum. Plant.* II: 45 (1837) – type: from 'South Africa'.

C. obtusiflorus Vahl (1806).

Perennial with crowded culms often growing in a straight line; culm-bases swollen and fused into a horizontal rhizome; roots slender. Culms 10–50 x 0.07–0.25 cm, 3-angled to rounded, glabrous; base covered by hard leaf-sheaths not breaking into fibres. Leaves 5–35 x 0.05–0.5 cm, scabrid on margin and midrib at least near the tip; leaf-sheaths hard, light to dark brown. Inflorescence a solitary usually globose head of 5–50 spikelets, 1–4 cm in diameter, white as young, pale red-brown when mature; involucre bracts leafy, the largest 1–16 cm long. Spikelets 5–17 x 3–7 mm, lanceolate, compressed, 8–25-flowered. Glumes 4–6 mm long, elliptic-lanceolate, white with a pink-brown tinge and 6–8 conspicuous striations on each side of the rather obscure midrib; apex obtuse. Nutlet 1.3–2 x 1–1.3 mm, obovate in outline, 3-angled, brown to black, smooth, shortly apiculate. Fig. 212.113.

In grassland or open bushland or woodland, often on rock slopes; 1000–2600 m. EW TU SU AR WG GG SD BA HA; widespread throughout tropical and subtropical Africa and western Asia. *Mooney* 9126; *Gilbert* et al. 2373; *Thulin* et al. 3432.

var. *tisserantii* (Cherm.) Lye in *Nordic J. Bot.* 3: 231 (1983);

C. margaritaceus Vahl var. *tisserantii* (Cherm.) Kük. in *Das Pflanzenreich* IV. 20 (101): 285 (1936); *Cyperus tisserantii* Cherm. (1931) – type: Central African Republic, Ippy, *Tisserant* 1878 (P holo.).

Differs from var. *leucocephalus* in having narrower leaf-blades and involucre bracts, 8–15-flowered spikelets; glumes 3.5–4.5 mm long; nutlet 1.3–1.4 mm long.

In grassland and savanna, very resistant to burning; 1100–1300 m. WG IL HA; widespread in tropical Africa. *Burger* 653; *de Wilde* et al. 10721; *Friis* et al. 2403.

The African material of this species deviates from the Asian one in having usually four involucre bracts instead of two, the bracts being also conspicuously longer. Represented in the Flora area by 2 insufficiently known varieties, which may only be ecological forms developed after fire.

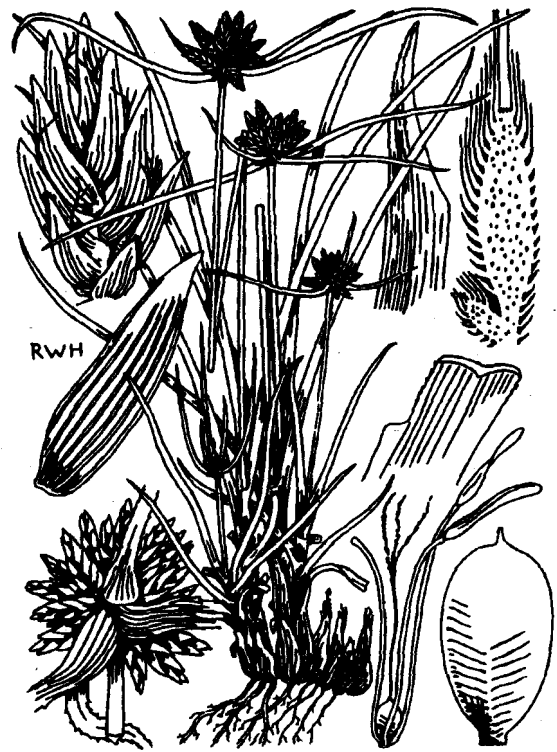


Figure 212.113 *CYPERUS NIVEUS* var. *LEUCOCEPHALUS*. Drawn by R.W. Haines from *Haines* 4068. (Reproduced with permission from Haines & Lye, fig. 517, 1983.)

61. *C. holostigma* C.B. Clarke ex Schweinf. (1894)
– type: EW, Eritrea, Kohaito plateau, 2600–2700 m, *Schweinfurth* 120 (G holo., K iso.).

Dwarf tufted perennial with a short erect woody rhizome. Stems 4–10 x 0.03–0.05 cm, 3-angled, glabrous. Leaf-blades to 5 x 0.05–0.08 cm, flat, but often enrolled when dry, scabrid on margin and midrib. Inflorescence of 3–6 sessile spikelets subtended by 1–3 spreading or recurved leafy bracts to 2.5 cm long. Spikelets 5–12 x 1–2 mm, black, 15–30-flowered. Glumes 1.6–2 mm long, oval, dark red-brown with a prominent pallid marginal border; midrib of the same colour as the glume, ending below the obtuse tip; marginal nerves several, prominent. Style 4–5 mm long, unbranched.

Shallow soils, often flat limestone outcrops with shallow pockets of soil; 1750–2700 m. EW TU BA; not known elsewhere. *Gilbert & Getachew* A. 2692; *Gilbert* et al. 7925.

62. *C. rubicundus* Vahl (1805)
– type: from 'Puerto Rico'.
C. teneriffae Poiret (1806).

Tussocky annual with a small root-system, or forms with much swollen base perhaps perennial. Culms 2–20 x 0.05–0.15 cm, 3-angled, slightly scabrid below the inflorescence, sometimes woody at the very base. Leaf-blades 2–8 x 0.05–0.04 cm, flat, scabrid on margin and midrib; sheaths light to grey or purple, up to 10 mm wide, and frequently not enclosing the base all around. Inflorescence a congested anthela with sessile spikelets



Figure 212.114 *CYPERUS RUBICUNDUS*. Drawn by R.W. Haines from Haines 4675 & 4040. (Reproduced with permission from Haines & Lye, fig. 521, 1983.)

only. Major involucre bract leafy, 1–5 x 0.05–0.25 cm, usually longer than the inflorescence. Anthela 0.7–2.5 cm in diameter, consisting of 3–25 large and sometimes much crowded spikelets. Spikelets 4–15 x 4–6 mm, light to dark red-brown, linear-lanceolate and prominently compressed, squarrose, 12–40-flowered. Glumes 2.5–4 mm long (frequently of rather different length in each spikelet), ovate, red-brown to chestnut with 5–8 very narrow paler nerves on each side of the midrib; midrib prominent at apex only, and here paler and excurrent into a short recurved scabrid mucro. Stamens 3. Style unbranched, but often twisted at the apex or with 2–3 short or long style-branches. Nutlet 0.9–1.1 x 0.6–0.75 mm, obovate, sharply 3-angled, grey, minutely papillose. Fig. 212.114.

In seasonally damp habitats, often on sand or on shallow soil over rocks and near temporary pools; 200–2500 m. EE EW TU WU SU SD BA HA; widespread in tropical Africa (including Macaronesia), South Africa, Madagascar and India. *Burger* 856; *Gilbert et al.* 1451; *Thulin et al.* 3770.

63. *C. kaessneri* C.B. Clarke (1906)

– type: Kenya, Kibwezi, *Kaessner* 716 (K holo.).

Small tussocky annual with a minute root-system and 3–6 culms. Culms to 18 x 0.05–0.15 cm, 3-angled, glabrous. Leaves few, shorter than the culm; sheaths red-brown with numerous nerves; blades to about 6 x 0.1–0.2 cm, flat or folded, minutely scabrid along margin. Inflorescence a terminal congested cluster (head)

2–4 cm in diameter, consisting of 10–30 crowded spikelets; involucre bracts leaf-like, to 5 cm long. Spikelets 10–25 x 4–5 mm, compressed, squarrose with 50–60 crowded flowers; rachilla red. Glumes about 2.5 mm long including the 0.5 mm long recurved mucro, red-brown, oval-3-angled with an obtuse to emarginate apex; lateral nerves slender, 3–4 on each side of the green excurrent midrib. Nutlet 0.5–0.7 mm long, oval-3-angled with flat sides, grey, almost smooth.

In seasonally damp habitats; probably 1000–1500 m. EW HA; also in Kenya and Tanzania. *Pappi* 99; *IE-CAMA* I-49.

This species should perhaps be considered as a subspecies or variety of *C. rubicundus*.

64. *C. cunduduensis* Chiov. (1940)

– type: HA, Gara Cundudu, 2800 m, *M. Gortani & Jaboli* I.18 (FT holo.).

Densely tussocky perennial with crowded swollen stem bases to 10 mm thick covered by conspicuous pale leaf-sheaths. Stems 3–10 x 0.03–0.05 cm, 3-angled, smooth. Leaves from the basal 2–3 cm only, usually 5–8 per stem; blades 0.3–0.5 x 0.05–0.15 cm, with a very conspicuous white marginal border reaching the tip of the blade. Inflorescence a terminal cluster 15–25 mm in diameter and consisting of 4–10 sessile spikelets; 2–4 leafy involucre bracts spreading or recurved, usually 1–3 cm long only. Spikelets 5–18 x 2–4 mm, linear, occasionally somewhat curved, 10–20-flowered. Glumes 3–4 mm long, pale to dark red brown, with 5–8 narrow pale nerves on each side of the prominent green midrib which is excurrent into a short straight or recurved mucro 0.2–0.3 mm long. Stamens 3. Style unbranched or short 2–3 branched at the tip only. Nutlet c 1.5 x 1.2 mm, broadly obovate, 3-angled, grey, glossy with minute tubercles.

Open woodland or scrubland in limestone areas; 1200–2800 m. BA HA; elsewhere only in Somalia. *Burger* 2849; *Gilbert* 1403, 7926.

65. *C. cruentus* Roth. (1773)

– type: Egypt, *Forsskål* s.n. (C).

Mariscus schimperi Hochst. ex A. Rich. (1851); *Cyperus variegatus* Böck. (1870); *C. neo-schimperi* Kük. (1936) – types: EE, Tigre, Mt. Scholoda, *Quartin-Dillon & Petit* s.n. (P lecto.), *Schimper* 173 (P syn.); Simen, Mt. Schoata, *Schimper* 578 & 1363 (P syn.).

C. neo-schimperi Kük. var. *viridis* Kük.; *Mariscus viridis* Schweinf. (1867), nom. illeg. – type: GJ, Agow region, above Mawerr, 1050 m, *Schimper* 2292 (K isolecto.).

Tussocky perennial with few-many clustered oblong stem bases (cylindrical pseudobulb) on an obscure rhizome. Stems 20–50 x 0.1–0.3 cm, 3-angled, glabrous. Leaves with 5–30 x 0.1–0.4 cm flat blades; sheaths pallid above, brown below; because of the many withered loose leaf sheaths at the lower part of the plant, stem base appears to be swollen and 6–8 mm thick. Inflores-

cence a dense 3-angled to hemispherical contracted anthela 1–2 cm in diameter. Involucral bracts 4–7, leafy, spreading or reflexed, the largest 10–30 cm long. Spikes obscure, c 10 x 7–9 mm, consisting of 10–25 crowded spikelets. Spikelets 4–8 x 1.5–2 mm, oval, only slightly compressed, 3–6-flowered. Glumes 2.5–4 mm long, pallid but light to medium red-brown at least in patches, with 5–8 prominent nerves on each side of the narrow green midrib which ends in the acute apex or is slightly excurrent. Style with 3 long branches. Nutlet 1.6–1.8 x 0.7–1 mm, obovate to elliptic, dark red-brown to black, sharply 3-angled, minutely papillose.

Probably in bushland or open woodland; 750–1600 m. EE EW TU SU HA WL AR; also Somalia, North Africa and Arabia. *Ash* 3597; *Gilbert & Getachew A.* 2946; *Mooney* 8042.

66. *C. amauropus* Steud. (1855)

– type: Mt. Schoata, 1838, *Schimper* 1391 (P holo., K iso.).

C. leptophyllus Hochst. ex Böck. (1870).

Mariscus amauropus (Steud.) Cufod. (1970).

Fairly robust succulent perennial with a short rhizome, and sometimes with 1–5 cm long stolons. Culms 15–60 x 0.05–0.2 cm (but often thicker near the base when fresh), 3-angled, glabrous. Leaves up to 25 x 0.1–0.4 cm, flat, scabrid at least on margin; leaf-sheaths numerous at the base and producing a cylindrical pseudobulb, pallid or pale brown, but sometimes partly purple. Inflorescence a 1–8 cm wide anthela consisting of several usually stalked short spikes, but spikes may appear like digitate spikelet-clusters when consisting of 3–5 spikelets only. Involucral bracts 2–5, leafy, erect or spreading, the largest 3–15 x 0.1–0.3 cm. Anthela of 3–6 (rarely 1–2) spikes on 0.2–4 cm long peduncles. Spikes 10–20 x 10–30 mm, with 5–10 spreading or reflexed spikelets. Spikelets 5–17 x 2–4 mm, linear-lanceolate, 8–18-flowered. Glumes 3–4 mm long, ovate-oblong, pale or dark red-brown with 4–8 slender ribs on each side of the green or red brown midrib, which is usually ending in the apex. Nutlet 1.6–1.8 x 0.5–0.7 mm, 3-angled, oblong-elliptic, brown and densely papillose. Fig. 212.115.

In grassland or dry bushland, often in bare soil; 900–2700 m. EE EW TU GD WU SU GG SD BA; widespread in tropical east and Northeast Africa and Arabia. *Thulin* et al. 3734.

67. *C. albopilosus* (C.B. Clarke) Kük. (1934);

Mariscus albopilosus C.B. Clarke (1902) – type: Malawi, *White* s.n. (K holo.).

Medium-sized perennial with a horizontal somewhat moniliform rhizome. Culms 15–50 x 0.07–0.15 cm, 3-angled, minutely but densely hairy. Leaves usually 3–4 per culm; sheaths straw-coloured to red-brown; blades 1–13 x 0.3–0.5 cm, flat, rather stiff and spreading, densely hairy on upper surface. Inflorescence a dense globose white head with numerous crowded spikelets, 6–12 mm in diameter. Involucral bracts 2–3, leafy,



Figure 212.115 *CYPERUS AMAUROPUS*. Drawn by R.W. Haines from *Haines* 4199. (Reproduced with permission from *Haines & Lye*, fig. 428, 1983.)

spreading or reflexed; the largest 1.5–6 x 0.2–0.4 cm. Spikelets 3–4 x 1–1.5 mm, ovate, 3–4-flowered. Glumes 2–2.5 mm long, ovate, pure white or somewhat brown with narrow green midrib ending in apex. Fig. 212.116.

In grassland or open woodland; 800 m. IL; also in Kenya, Tanzania, Zambia, Malawi and Zimbabwe.

68. *C. submacropus* Kük. (1936);

Mariscus macropus (Böck.) C.B. Clarke (1902); *Cyperus macropus* Böck. (1879) – type: Sudan, *Djur*, *Seriba Ghattas*, *G. Schweinfurth* 1917 (P iso.).

Small to fairly robust tussocky perennial with a few crowded and swollen conspicuous stem-bases. Culms 10–50 x 0.05–0.15 cm, 3-angled, glabrous; usually with strongly bulbous base covered with brown leaf-sheaths which break up into numerous tough fibres. Leaves 5–30 x 0.1–0.3 cm, flat, scabrid on margin and midrib; young leaf-sheaths often transparent, pale-covered. Inflorescence a solitary white head of globose or irregular outline, 1–1.5 cm in diameter. Involucral bracts leafy, 2–4, the largest 2–12 x 0.1–0.3 cm, usually not conspicuously dilated at the base. Spikelets 5–8 x 1–2 mm, lanceolate, 3–6-flowered, but often perfecting 2–3 nutlets only. Glumes 3–4 mm long, concave, white but sometimes with a pink-brown tinge as dry; nerves rather conspicuous, 4–6 on each side of the obscure midrib. Nutlets 1.4–1.7 x 0.8–1.2 mm, narrow to broadly obovate, 3-angled, dark brown to black, minutely papillose.



Figure 212.116 *CYPERUS ALBOVILOSUS*. Drawn by R.W. Haines from Robinson 4215. (Reproduced with permission from Haines & Lye, fig. 439, 1983.)



Figure 212.117 *CYPERUS PLATEILEMA*. Drawn by R.W. Haines from Haines 4087. (Reproduced with permission from Haines & Lye, fig. 435, 1983.)

In dry or seasonally wet grassland and savanna, also on shallow soil over rocks; 500–2100 m. IL SD HA; widespread in tropical Africa. Ash 3514; Friis et al. 2433; Gilbert & Jefford 4271.

69. *C. plateilema* (Steud.) Kük. (1936);

Mariscus plateilema Steud. (1842) – type: Simen, Schoata, Schimper 588 (P holo., HAL K P iso.).

Cyperus bulbocaulis (A. Rich.) Böck. (1870); *Mariscus bulbocaulis* A. Rich. (1851); *Mariscus bulbosus* Steud. (1855) – type: Simen, Enderder, Schimper 579 (P lecto.).

C. bulbocaulis (A. Rich.) Böck. var. *atrosanguineus* (A. Rich.) Kük. (1936); *Mariscus atrosanguineus* A. Rich. (1851); *Mariscus hochstetteri* Walpers (1853) – type: Simen, Enschedap, Schimper 575 (P holo., HAL P iso.).

Cyperus circumclusus (C.B. Clarke) Kük. (1936); *Mariscus circumclusus* C.B. Clarke (1902) – type: Begemder, Sanka Berr, Schimper 1300 (K holo.).

Fairly robust perennial with a slightly swollen stem-base covered by rather thin grey or brown leaf-sheaths which only rarely split into fibres. Culms 5–40 x 0.05–0.15 cm, 3-angled, glabrous. Leaves few-many, 5–30 x 0.1–0.3 cm, rather thick, scabrid at least on margin and midrib; upper leaf-sheaths thin and membranous, lower and dead ones darker and somewhat thicker. Inflorescence a solitary variegated pale/dark red-brown head of hemispherical or irregular outline, 8–15 mm in diameter. Involucral bracts 3–4, spreading or reflexed; the largest 3–15 x 0.1–0.3 cm. Spikelets 3–5 x 1–1.5 mm,

lanceolate, 2–5-flowered, but usually perfecting 1–2 nutlets only; the spikelets fall entire. Glumes 2–3 mm long, lanceolate with rounded apex, pale grey with a large (rarely small) dark red brown or black central area (sometimes almost the entire glume is dark coloured); lateral nerves 3–5 on either side of the slender midrib. Stamens 2–3. Nutlets 1.4–1.6 x 0.6 mm, 3-angled, brown and minutely papillose. Fig. 212.117.

In alpine grassland, and rocky parts of woodland; 1800–3100 m. EW GJ SU BA; widespread in East African mountains. Ash 3009; Gilbert & Getachew A. 2592; Thulin & Hunde 3919.

70. *C. diurensis* Böck. (1879);

Mariscus diurensis (Böck.) C.B. Clarke (1895) – type: Sudan, Djur, grosse Seriba Ghattas, G. Schweinfurth ser. III, no. 198 (B holo.).

Tall perennial with a slightly swollen stem-base sometimes covered by fibrous remains of old leaf-sheaths and emitting 1–10 cm long slender stolons. Culms 20–60 x 0.07–0.25 cm, 3-angled, glabrous. Leaves 20–40 x 0.2–0.4 cm, scabrid on margin and midrib. Involucral bracts 2–6, leafy, spreading or reflexed, scabrid on margin and midrib; the largest 5–15 cm (rarely to 30 cm) long. Inflorescence a solitary white globose head 12–20 mm in diameter, consisting of numerous crowded spikelets. Spikelets 5–15 x 2–2.5 mm, ovate-lanceolate, falling off entire when mature, 6–10-flowered and usually perfecting at least 5 nutlets. Glumes 4.5–5 mm long, white with a red-brown tinge especially near the frayed



Figure 212.118 *CYPERUS DIURENSIS*. Drawn by R.W. Haines from Taylor 1886 & Thomas 1973. (Reproduced with permission from Haines & Lye, fig. 454, 1983.)



Figure 212.119 *CYPERUS DUBIUS* subsp. *MACROCEPHALUS*. Drawn by R.W. Haines from Haines 4088. (Reproduced with permission from Haines & Lye, fig. 451, 1983.)

rather obtuse apex; lateral nerves distinct; the midrib not prominent. Nutlet about 2 x 0.6 mm, elliptic, 3-angled. Fig. 212.118.

In scrub savanna; 1300–1650 m. SD HA; also in the Sudan, Uganda, Kenya and Tanzania. *Bos & Jansen* 10035; *Burger* 2713; *Friis* et al. 2621.

71. *C. dubius* Rottb. (1773)
– type: from 'India'.

subsp. *macrocephalus* (C.B. Clarke) Lye in *Nordic J. Bot.* 3: 231 (1983);

Mariscus coloratus Nees var. *macrocephala* C.B. Clarke in *Fl. Trop. Afr.* 8: 381 (1902); *Mariscus dubius* (Rottb.) Hutch. var. *macrocephalus* (C.B. Clarke) Chiov. in *Reale Accad. Italia* 1939–17: 294 (1939) – type: Sudan/Zaire, Niamniam, *Schweinfurth* 3790 (K lecto.).

Robust tussocky perennial with usually a few culms together. Culms 10–60 x 0.15–0.3 cm, 3-angled, glabrous; base elongate and bulbous. Leaves few-many, 10–30 x (usually shorter than the culm) 0.4–0.8 cm, flat, scabrid at least on margin and midrib; leaf-sheaths usually red-brown, but the upper sometimes grey and membranous. Inflorescence a solitary white or green-white head of hemispherical or irregular outline, 13–20 mm in diameter and composed of 3–6 congested sessile spikes. Involucral bracts 3–5, usually spreading or recurved; the largest 10–15 x 0.25–0.6 cm. Spikelets 4–7 x 1.5–2.5 mm, lanceolate, 4–6-flowered and often perfecting 3–4 nutlets, usually densely clustered on a

winged rachilla; spikelets fall entire. Glumes 3–5 mm long, concave, grey white or green with colourless margin and 6–8 slender nerves on each side of the midrib. Nutlets 1.6–1.7 (including a 0.1–0.2 mm long apiculus) x 0.8–0.9 mm, obovate, 3-angled, brown and strongly papillose. Fig. 212.119.

In shallow seasonally wet soil on rock-outcrops (often near rock-pools) or in grassland; 900–1850 m. EW TU WU SU GG SD HA; widespread in tropical Africa and Asia. *Schweinfurth* 463; *M.G. & S.B. Gilbert* 1638; *Gilbert & Jefford* 4633.

Distinguished from subsp. *dubius* by its larger inflorescences (13–20 mm in diameter against 5–15 mm in subsp. *dubius*) and wider leaves (4–8 mm against 1–3.5 mm).

72. *C. mollipes* (C.B. Clarke) K. Schum. (1895);

Rhynchospora bulbocaulis Böck. (1879) – type: Sudan, Djur, Majob, *G. Schweinfurth* 1547 (B holo.).

Mariscus mollipes C.B. Clarke (1895).

Mariscus paoli Chiov. (1915) – type: Benadir, Piana di Bicia, *Paoli* 206 (FT holo.).

Small to fairly robust tussocky perennial with many culms and crowded swollen culm-bases. Culms 15–40 x 0.1–0.25 cm, 3-angled, glabrous; strongly swollen stem-base is covered with brown leaf-sheaths which sometimes break up into brown or black fibres. Leaves 10–25 x 0.15–0.3 cm, flat, scabrid at least on margin and midrib; young leaf-sheaths pale brown and sometimes transparent. Inflorescence a white (but usually some-

what brown as dry) head of hemispherical or irregular outline, 1–1.8 cm in diameter. Involucral bracts leafy, 3–5, the largest 3–10 x 0.1–0.5 cm, sometimes conspicuously dilated at the base, spreading or reflexed. Spikelets 4–6 x 0.8–1.5 mm, lanceolate, 1-flowered. Glumes 3.5–5 mm long, concave, white but usually pink brown when dry (except young inflorescences which often remain white), with up to 8 indistinct nerves on each side of the obscure midrib; base conspicuously sheathing. Nutlets 2–2.7 x 0.5–0.7 mm, often curved, slightly 3-angled to cylindrical with a conspicuous apiculus, dark brown to black, minutely papillose, as mature completely enveloped and enclosed by the glume.

In grassland or savanna; 1000–1700 m. GG SD; widespread in eastern Africa and from India to Burma. *Gilbert & Jefford* 4558; *Corradi* 1548.

Subgen. **KYLLINGA** (*Rottb.*) *Suringar* (1889);
Kyllinga Rottb. (1773) as genus.

Small to medium sized annual or perennial herbs of usually in tussocks or short rhizomes. Leaves flat, often channelled or incurved, usually glabrous except for short prickles on the margins and lower side of midrib. Inflorescence-bracts usually 3–5 and leafy. Inflorescence a single ovate or hemispherical spike, or a complex head of one central larger spike and 1–several usually smaller lateral spikes, all spikes sessile in the axils of the inflorescence-bracts. Spikelets ovoid, 1–6-flowered, with 2 small sterile basal glumes. Glumes often ovate, usually grey-white, bright yellow, golden, yellow or green, sometimes dark purple to almost black, with 2–6 ribs or nerves on each side of the midrib. Stamens usually 3. Style with 2 style-branches; style-base not bulbous. Fruit an oblong or ellipsoid nutlet, compressed laterally, usually dark brown-black or black when mature, glabrous or minutely tuberculate.

A subgenus of about 50 species; a few species are widely distributed in the tropics and warm temperate regions of both hemispheres, but most species are found in Africa only. 19 species in the Flora area.

1. Inflorescence dark purple to almost black. 2
– Inflorescence white, yellow, golden, green or light brown. 4
2. Plant tussocky, never with stolons. 3
81. *C. chlorotropis*
– Plant with scattered culms from an elongate rhizome or with stolons. 3
3. Culm regularly spaced along a horizontal scale-covered rhizome; inflorescence a solitary globose spike. 83. *C. brevifolius*
– Culms from the ends of slender stolons; inflorescence usually of several clustered (rarely stalked) spikes, the central one cylindrical. 80. *C. brachellema*
4. Inflorescence white, green white or very pale red brown. 5
– Inflorescence golden or green. 16

5. Stolons (long and slender scale-covered subterranean stems) present, only 0.5–1 mm thick; spikelets 2–4-flowered. 73. *C. richardii*
– Stolons absent, but rhizome sometimes horizontal; spikelets 1-many-flowered. 6
6. Keel of glumes winged; wings toothed or hairy. 7
– Keel of glumes not winged; but sometimes scabrid or hairy. 8
7. Spikelets 4–6.5 mm long. 88. *C. alatus*
– Spikelets 2.5–3 mm long. 89. *C. controversus*
8. Keel of glumes with long cilia; glumes to 1.8 mm long. 79. *C. welwitschii*
– Keel of glumes glabrous or with short spine-like teeth. 9
9. Spikelets about 1 mm long; unbranched part of style very short; glumes only 0.8 mm long. 77. *C. microstylis*
– Spikelets at least 1.5 mm long; unbranched part of style long or short; glumes at least 1.5 mm long. 10
10. Glumes not prominently keeled; midrib distinct near apex only. 76. *C. brunneofibrosus*
– Glumes keeled with midrib distinct at base also. 11
11. Glumes up to 2.5 mm long; spikelets 1-flowered. 12
– Largest glumes 2.6–5 mm long; spikelets 2–5-flowered. 14
12. Plant-base not prominently woody, often annual; glumes with scabrid midrib; nutlet about 1 mm long. 87. *C. densicaespitosus*
– Plant-base somewhat woody, perennial; glumes glabrous; nutlet about 1.5 mm long. 13
13. Central spike cylindrical; inflorescence (when mature) with a blue tinge. 86b. *C. sesquiflorus*
– Central spike oval; inflorescence white to grey white or faintly red brown. 78. *C. triceps*
14. Plant base covered by fibrous remains of old leaf-sheaths. 15
– Plant base lacking such fibres. 86. *C. sesquiflorus*
15. Leaf-blades 3–5 mm wide; glumes 2.5–4 mm long. 75. *C. comosipes*
– Largest leaf-blades often 5–8 mm wide; glumes 4.5–7 mm long. 74. *C. eximius*
16. Annual or perennial; midrib of glumes prominently keeled; the keel toothed or ciliate. 17
– Perennial; glumes not prominently keeled; the midrib glabrous or with short teeth. 18
17. Annual; spikelet 1-flowered; teeth of keel of glumes with cut cilia. 90. *C. metzii*
– Perennial; spikelet 2-flowered; teeth of keel of glumes with cilia. 91. *C. aureoalatus*
18. With horizontal rhizome; culms crowded or distant; spikelets 1–2-flowered. 19
– Tufted without elongate rhizome; culm base swollen and covered by the fibrous remains of old leaf sheaths; spikelets 2–3-flowered. 82. *C. costatus*
19. Culms widely spaced on the rhizome; involucrel



Figure 212.120 *CYPERUS RICHARDII*. Drawn by R.W. Haines from Haines 4056. (Reproduced with permission from Haines & Lye, fig. 457, 1983.)



Figure 212.121 *CYPERUS EXIMIUS*. Drawn by R.W. Haines from Agnew, Hanid & Kimiaruk 9237. (Reproduced with permission from Haines & Lye, fig. 491, 1983.)

- bracts longer than the leaves; spike 8–15 mm long. 85. *C. pinguis*
 – Culms crowded or widely spaced; involucre bracts shorter than the longest leaf-blades; spike mostly less than 8 mm long. 20
 20. Culms distant on 1–2 mm thick rhizomes; culm-base not swollen. 83. *C. brevifolius*
 – Culms crowded on 2–4 mm thick rhizomes; culm-base swollen. 84. *C. erectus*

73. *C. richardii* Steud. (1855);

Kyllinga macrocephala A. Rich. (1851) – type: TU, Djeladjekanne near Tacazze Valley, *Quartin-Dillon* s.n. (P holo.).

Perennial producing long slender pale stolons only 0.5–1 mm thick (easily lost if not plant carefully uprooted). Stems 5–25 x 0.07–0.15 cm, 3-angled, glabrous; base swollen. Leaf-blades 5–25 x 0.2–0.5 cm, flat or incurved, densely scabrid on margins and midrib. Inflorescence a dense head of several crowded white spikes. Involucral bracts usually 3–5, the largest 2–8 cm long, reflexed or spreading. Spikelets 2.5–3.5 mm long, 3–5-flowered. Largest glumes 2.5–3 mm long, white with green midrib; keel unwinged, smooth. Style with 2 stigmas. Nutlet flattened. Fig. 212.120.

Open grassland, roadsides, lawns and disturbed ground also as a weed; 1600–2900 m. EW GD GJ SU KF SD BA; throughout tropical Africa except the driest regions. *M.G. & S.B. Gilbert* 1163 & 1324; *Jansen* 2133.

74. *C. eximius* (C.B. Clarke) Mattf. & Kük. (1936);

Kyllinga eximia C.B. Clarke (1901) – type: HA, Harradigit marsh in Ogaden, *James & Thrupp* s.n. (K holo.).

Tussocky perennial with base covered by the fibrous remains of old leaf-sheaths. Stems 20–40 x 0.15–0.2 cm, 3-angled, glabrous; the base slightly swollen. Leaf-blades 10–20 x 0.3–0.8 cm, scabrid at least on margin and midrib. Inflorescence a single white globose head 15–20 mm in diameter. Spikelets 5–8 mm long, 3–5-flowered, but sometimes only two basal flowers produce nutlets. Glumes 4.5–7 mm long, white or with a slight brown tinge; keel unwinged, scabrid. Style with 2 stigmas. Nutlet flattened. Fig. 212.121.

Opened grassland or marshland only seasonally wet; 750–1000 m. HA; also in Somalia and Kenya. *Ellis* 210.

75. *C. comosipes* Mattf. & Kük. (1936);

Kyllinga leucocephala Böck. (1875) – type: Tanzania, Uyanzi distinct, *Speke & Grant* s.n. (K holo.).

Tussocky perennial with the base covered by fibrous remains of old leaf-sheaths. Stems 10–50 x 0.05–0.15 cm, 3-angled, scabrid at least above. Leaf-blades 10–20 x 0.3–0.5 cm, strongly scabrid on margin. Inflorescence a globose to irregular white head 10–15 mm in diameter. Involucral bracts 2–4, the largest 3–15 cm long, reflexed or spreading. Spikelets 4–6 mm long, 2–4-flowered. Glumes 3–4 mm long, white; keel unwinged, glabrous. Style with 2 stigmas. Nutlet flattened.

Open places in bushland; 700–1600 m. ?EW SD

HA; also in Somalia, East Africa and southern Africa.
Ellis 128.

76. *C. brunneofibrosus* Lye (1996)

—type: Somalia, Bakool region, 17 km E of Wajid (Uegit) on road to Oddur, *Gillett & Hemming* 24356 (K holo.).

Densely tussocky perennial with a short woody rhizome, culm bases densely covered by numerous old leaf-sheaths splitting up into dense 'socks' of brown fibres. Roots many, grey, up to 0.5 mm in diameter. Culms 5–15 x 0.05–0.08 cm, angular to terete, glabrous. Leaves many (5–8) from within the fibrous 'socks', and usually one cauline from the lower part of the culm; cauline sheath light red-brown, membranous; blades to c 10 x 0.1–0.2 cm, flat, dense short-hairs on margin and midrib; lower surface with a slightly keeled midrib; upper with a slightly sunken central part and several more or less distinct lateral nerves. Inflorescence a terminal hemispheric head 5–10 mm in diameter consisting of numerous crowded sessile spikes. Involucral bracts 2–4, to 5 x 0.2 cm, spreading or reflexed, leaf-like and densely short-hairy on margin and midrib. Spikelets 3–4 x 1–2 mm, oval, brown (at least as dry), 1–3-flowered. Glumes 3–4 mm long, oval, as dry cinnamon-tinged but perhaps white when fresh; the midrib distinct near the apex only, slightly excurrent into a very short (0.1–0.2 mm long) straight or recurved mucro of the same colour as the glume or slightly paler; lateral nerves very indistinct. Stamens usually 3, with 1.2–1.4 mm long linear anthers. Style with a 1.5 mm long unbranched part and divided into 2 stigmas at apex. Nutlet about 1 x 0.5 mm, elliptic, lenticular, red-brown, minutely papillose.

On shallow soil over limestone rocks and in sand or loam in bushland; 150–2500 m. HA; Somalia. *Gilbert & Jefford* 4597; *Ellis* 128.

Similar to *C. comosipes*, but *C. brunneofibrosus* differing in its smaller, usually 1–2-flowered spikelets and glumes drying cinnamon, without distinct lateral nerves; culm less 3-angled and glabrous. Perhaps it related to *C. brunneoalbus* Lye from northern Kenya which has more spherical-oblong inflorescence (in *C. brunneofibrosus* hemispherical) with many more crowded and smaller spikelets and glumes and lacks the prominently fibrous base of *C. brunneofibrosus*.

77. *C. microstylis* (C.B. Clarke) Mattf. & Kük. (1936);
Kyllinga microstyla C.B. Clarke (1895) — type:
Somalia, *Lort Phillips* s.n. (K holo.).

Slender tufted perennial. Stems 5–15 x <0.05 cm, 3-angled, scabrid below the inflorescence; base slightly swollen. Leaf-blades 3–8 x c 0.15 cm, scabrid on margin and midrib recurved. Inflorescence of 1 central and 2 lateral spikes, mostly 3-spicate white head with the central spike c 3 x 2.5 mm. Involucral bracts usually 3, the largest 2–6 cm long, erect or spreading. Spikelets about 1 mm long, 1-flowered. Glumes 0.8–1.2 mm long,



Figure 212.122 *CYPERUS MICROSTYLIS*. Drawn by R.W. Haines from *Greenway* 12804. (Reproduced with permission from Haines & Lye, fig. 463, 1983.)

white; keel unwinged without teeth. Style short with 2 long stigmas. Nutlet obovate, flattened. Fig. 212.122.

Sandy plain with scattered *Acacia tortilis* and *Balanites*; 300–1670 m. EE SU; also in Somalia and Kenya. *Hemming* 1121.

78. *C. triceps* Endl. (1842);

Kyllinga triceps Rottb. (1773), nom. illeg. — type:
India, *König* s.n. (C holo.).

Kyllinga tenuifolia Steud. (1855).

Tufted perennial with swollen culm-bases only occasionally covered by fibrous remains of leaf-sheaths. Stems 5–30 x 0.05–0.1 cm, obtusely angular, glabrous. Leaf-blades 5–15 x 0.15–0.3 cm, scabrid on margin and midrib. Inflorescence a light green or grey white (often drying light red-brown) head of 2 or more sessile spikes; central spike more prominent. Involucral bracts 3–5, spreading or reflexed. Spikelets 2–2.5 mm long, 1-flowered. Glumes 1.5–2.2 mm long, pallid with brown dots; keel unwinged, glabrous. Style with 2 stigmas. Nutlet elliptic, flattened. Fig. 212.123.

Seasonally wet ground; 1000–2700 m. GD SU; widespread in tropical regions of the Old World. *Schimper* 1310; *Schweinfurth* 2051.

79. *C. welwitschii* (Ridl.) Lye (1983);

Kyllinga welwitschii Ridl. (1884) — type: Angola,
Welwitsch 6779 (LISU holo., BM iso.).

Tufted perennial with base of stems swollen and densely covered by old leaf-sheaths, oldest fibrous and thread-



Figure 212.123 *CYPERUS TRICEPS*. Drawn by R.W. Haines from Haines 4210. (Reproduced with permission from Haines & Lye, fig. 466, 1983.)

like. Culms 5–25 x 0.04–0.07 cm, 3-angled, ridged, glabrous; base very thickly covered with old torn leaf-sheaths. Leaves 5–10 x 0.05–0.2 cm broad, flat, canaliculate or incurved, with short prickles on margin and midrib. Inflorescence an irregular head, but often 3-angled in outline, 5–8 x 5–9 mm, consisting of several (often 3) grey-white spikes. Central spike ovate to cylindrical, 3.5–4 mm wide. Spikelets 1.5–2 mm long, very asymmetric, 1-flowered. Glumes 1–1.8 mm long, white or pale yellow with or without golden-brown midrib; with 1–2 nerves on each side of the slightly or not winged but strongly ciliate midrib (cilia 0.1–0.4 mm long); apex with midrib slightly excurrent or midrib ending in apex. Nutlet about 1 mm long elliptic. Fig. 212.124.

On moist sandy soil near rivers or in shrubland; 500–1850 m; EE EW TU WU SD; tropical Africa. Pappi 7135; Friis et al. 2902; de Wilde 4597.

80. *C. bracheilema* (Steud.) Mattf. & Kük. (1936);

Kyllinga bracheilema Steud. (1842) – type: Simen, near Enschedcap, Schimper II: 1371 (P holo., K iso.).

C. teneristolon Mattf. & Kük. (1936); *Kyllinga pulchella* Kunth (1837) – type: South Africa, J. F. Drege 7384 (B holo.).

Kyllinga atrosanguinea Steud. (1842) – type: GD, near Dubomara, Schimper II: 1269 (P holo., B K iso.).

Perennial with a short rhizome and long slender stolons only about 1 mm thick. Culms 5–50 x 0.05–0.1 cm,

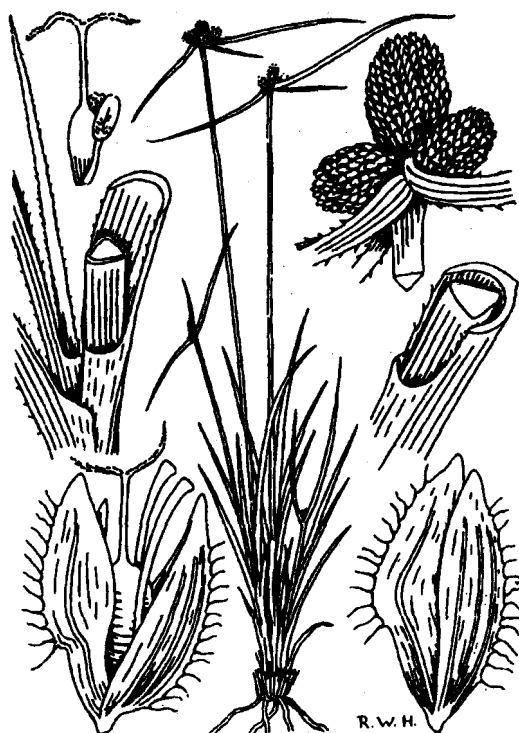


Figure 212.124 *CYPERUS WELWITSCHII*. Drawn by R.W. Haines from Padwa 104. (Reproduced with permission from Haines & Lye, fig. 467, 1983.)

3-angled, glabrous. Leaves 5–30 x 0.1–0.3 cm, scabrid on margin, but often prominently incurved when dry. Inflorescence a dark purple to almost black head of several crowded spikes, rarely with a single spike. Involucral bracts 3–5, usually reflexed; the largest 3–15 cm long. Spikelets 3–4 mm long, 2–3-flowered, all bisexual. Glumes 2.5–3 mm long, dark purple with 3–4 prominent nerves on each side of the midrib; midrib green or more rarely purple, glabrous or with a few prickles, excurrent into a distinct sometimes recurved mucro. Fig. 212.125.

In grassland or in wet soil over rocks; 1500–2730 m. EW TU GD SU AR BA; widespread but scattered in eastern and southern Africa. Pappi 2301; Gilbert & Getachew A. 2832, 2933; Gilbert & Thulin 949.

81. *C. chlorotropis* (Steud.) Mattf. & Kük. (1936);

Kyllinga chlorotropis Steud. (1842) – type: SD, Shoata, Schimper II: 1377 (P holo., HAL K iso.).

Small tufted perennial with the stem-bases usually covered by the fibrous remains of old leaf-sheaths, bulbous base. Stolons absent. Stems 3–20 x 0.04–0.08 cm, 3-angled, glabrous. Leaves 1–5 x 0.1–0.4 cm, scabrid on margins, often shorter than the culms. Inflorescence a dark purple head of one terminal cylindrical spike and 1–4 lateral spikes. Involucral bracts 3–4, usually reflexed, similar to the leaves, longest as long as leaves. Spikelets 1.5–3 mm long, 1–3-flowered. Glumes 1–2 mm long, dark red-brown or brown-black, with conspicuous green glabrous (rarely with a few spine-like teeth) midrib excurrent in a distinct point and with 3–4



Figure 212.125 *CYPERUS BRACHEILEMA*. Drawn by R.W. Haines from *Haines* 4122. (Reproduced with permission from Haines & Lye, fig. 470, 1983.)

prominent lateral nerves on each side of the midrib. Nutlet about 0.8 x 0.5 mm, elliptic, brown, minutely papillose. Fig. 212.126.

In grassland or on shallow soil over rocks; 2200–3000 m. EW TU GD GJ SU; also in East Africa. *Senni* 1713; *Mooney* 7935; *Gilbert & Getachew* A. 2639.

82. *C. costatus* *Mattf. & Kük.* ;

Kyllinga nervosa *Steud.* (1842) – type: TU, Wadi Schoata, *Schimper* II: 1375 (P holo., HAL K UPS iso.).

C. oblongus (C.B. Clarke) *Kük.* (1936) subsp. *nervosus* (*Steud.*) *Lye* in *Sedges & Rushes of E. Afr.* (1983).

Densely tufted perennial with a short rhizome. Culms 10–50 x 0.07–0.1 cm, deeply ridged, glabrous; base somewhat bulbous and covered by old blackened leaf-bases, sometimes split into fibres. Leaves fine, 10–25 x 0.1–0.25 cm, flat or incurved; margin and sometimes surface with short and occasionally also long hairs; leaf-sheaths pale above, red-brown below and splitting into black fibres. Inflorescence a single oblong, green-yellow spike (with age becoming black-brown) of numerous 2–3-flowered sessile spikelets, sometimes small lateral spike at the base. Involucral bracts 3–4, leafy, the largest 4–9 cm long, usually bent downwards. Spikes 8–15 x 5–7 mm. Spikelets 3–4 mm long, 2–3-flowered. Glumes 2.5–3.5(–4) mm long including an up to 0.8 mm long subulate apex (in the lowest glume), golden yellow but darker above, often with dark violet dots; midrib

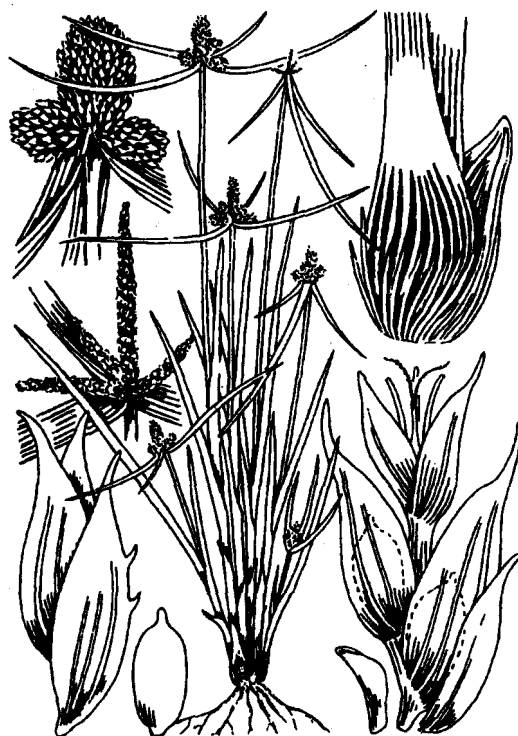


Figure 212.126 *CYPERUS CHLOROTROPIS*. Drawn by R.W. Haines from *Haines* 4261. (Reproduced with permission from Haines & Lye, fig. 471, 1983.)

often green above, rarely with 1–3 spine-like hairs, usually excurrent; lateral nerves very distinct, 2–4 on either side of the midrib. Ripe nutlet c 1.2 x 0.6 mm, strongly flattened, violet-black with minute tubercles in longitudinal rows.

subsp. *costatus*

Fig. 212.127.

In wallows and seasonally waterlogged grassland; 1000–2700 m. EW TU GD GJ SU SD; widespread in tropical Africa. *Negri* 636; *Gilbert & Getachew* A. 2688; *Gilbert & Jefford* 4307.

subsp. *sidamoensis* (*Mtoto.*) *Lye* in *Lidia* 3: 132 (1994);

Kyllinga nervosa *Steud.* subsp. *sidamoensis* *Mtoto.* in *SINET: Eth. J. Sci.* 13: 37 (1990) – type: SD, 13 km S of Aghere Mariam (new road), *Gilbert & Jefford* 4305 (K holo., C iso.).

Differs from subsp. *costatus* in its robust habit, taller culm and wider leaf-blades and somewhat larger, more golden inflorescence with much longer spikelets and glumes.

In seasonally wet ground, black soil; 1950 m. SD; endemic. Only known from the type.

83. *C. brevifolius* (*Rottb.*) *Hasskn.* (1844)

subsp. *intricatus* (*Cherm.*) *Lye* in *Sedges & Rushes of E. Afr.* (1983);

C. erectus (*Schum.*) *Mattf. & Kük.* var. *intricatus*

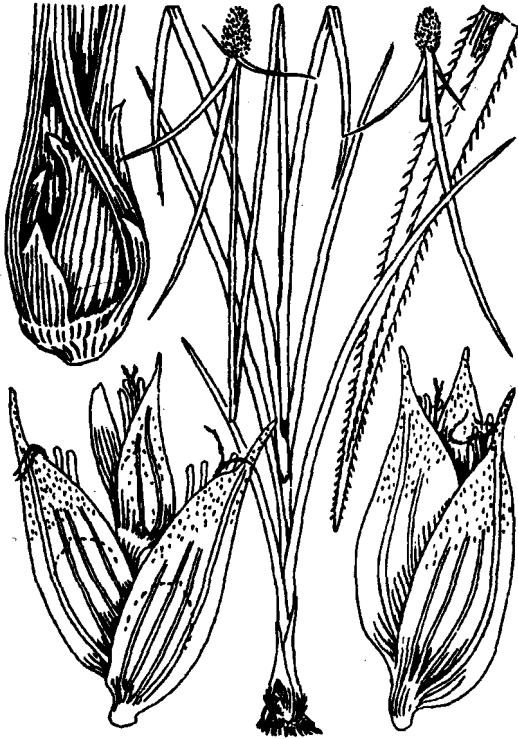


Figure 212.127 *CYPERUS COSTATUS*. Drawn by R. W. Haines from *Loock* 377. (Reproduced with permission from Haines & Lye, fig. 437, 1983.)

(Cherm.) Kük. in *Das Pflanzenreich* IV. 20 (101): 590 (1936); *Kyllinga intricata* Cherm. (1919) – type: from ‘Madagascar’.

Kyllinga aurata Nees sensu Napper (1971).

Slender perennial with a creeping rhizome and culms usually spaced regularly in succession along its length, sometimes with culms somewhat crowded. Rhizome up to 15 x 0.1–0.2 cm, covered with brown scales. Culms 5–40(–70) (smaller) x 0.03–0.12 cm, glabrous, 3-angled and ridged; base not swollen, but enclosed in brown bladeless sheaths, culms sometimes curving from the rhizome. Leaf-blades flat or canaliculate, usually 2–3 per culm, the largest to 3–10 (rarely to 20) x 0.1–0.2 cm; margins and midrib densely set with short spine-like teeth especially above. Inflorescence a globose or hemispherical head 4–8 mm in diameter, usually of 1 spike, but sometimes with short lateral spikes in addition to the central. Involucral bracts 1–4, but usually 3 with one erect and two spreading giving a cross-like appearance, rarely (mainly in robust forms) all spreading or reflexed, the largest usually 1–5 cm long. Spikes usually with numerous spikelets, but in depauperate plants sometimes with 5–10 spikelets only. Spikelets 2–3.5 mm long, usually 1-flowered, rarely 2-flowered. Glumes 2–3.5 mm long, usually unequal with apex acuminate and sometimes reflexed, usually golden brown with a green midrib and 2–3 nerves on each side of the glabrous midrib; old glumes often darkened to dirty brown or bronze, the bronze persistent in the dried plant. Nutlet about 1.2 x 0.8 mm, elliptic to obovate, black with minute papillae. Fig. 212.128.

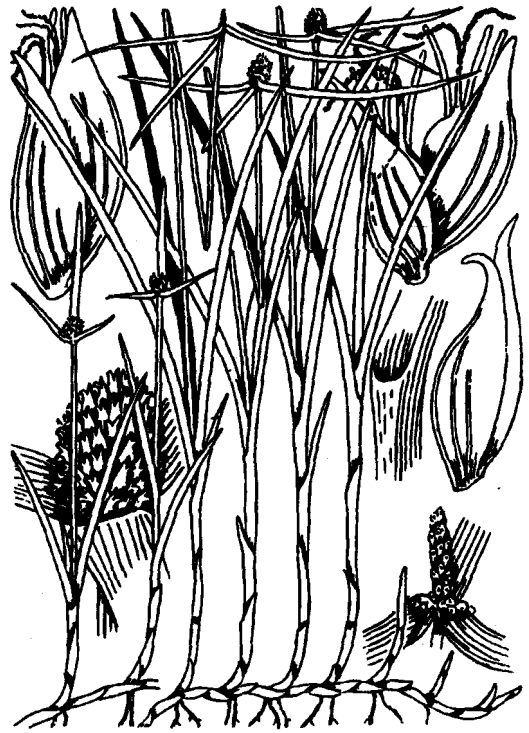


Figure 212.128 *CYPERUS BREVIFOLIUS* subsp. *INTRICATUS* Drawn by R. W. Haines from *Haines* 4522 & 4049. (Reproduced with permission from Haines & Lye, fig. 475, 1983.)

In grassland or open woodland; 1300–2700 m. WG SU IL KF SD HA; widespread in tropical Africa and Madagascar. *Friis* et al. 33; *Mooney* 5933; *E.F. Gilbert* 419.

Differs from subsp. *brevifolius* by its frequently cross-like arrangement of the involucral bracts and its golden yellow inflorescence (green or straw-coloured in subsp. *brevifolius*).

84. *C. erectus* (*Schum.*) *Mattf. & Kük.* (1936);

Kyllinga erecta *Schum.* in *Schum. & Thonning* (1827) – type: Guinea, West Africa, *Thonnings.n.* (C holo.).

Perennial with a creeping rhizome and culms densely set in a usually single row, the swollen basal parts of the culms persistent on the old dead rhizome. Rhizome 4–10 cm long, and 3–4 mm wide, covered by scales and the densely set stems. Culms 12–40(–50) x 0.08–0.17 cm, sharply 3-angled, ridged, glabrous, base enclosed in several brown bladeless sheaths. Leaf-blades flat, canaliculate or enrolled, usually 4–6 per culm, the largest to 5–20 x 0.2–0.4 cm; margin and midrib densely set with short spine-like teeth especially above. Inflorescence a solitary ovate or hemispherical spike. Involucral bracts 3–4, leafy, usually spreading or reflexed, the largest 5–15 x 0.2–0.35 cm. Spikelets 2.5–3 mm long, 1–2-flowered. Glumes 2–3.5 mm long, very unequal, golden yellow with green midrib and 3–5 nerves on each side of the glabrous unwinged midrib; apex acuminate or with midrib excurrent and recurved. Nutlet about 1.2 x



Figure 212.129 *CYPERUS ERECTUS*. Drawn by R.W. Haines from Haines 4281. (Reproduced with permission from Haines & Lye, fig. 478, 1983.)



Figure 212.130 *CYPERUS PINGUIS*. Drawn by R.W. Haines from Haines 4053. (Reproduced with permission from Haines & Lye, fig. 481, 1983.)

0.6 mm, elliptic (but mature nutlet not seen). Fig. 212.129.

In grassland; 12500–2500 m. GD SU KF IL; widespread in tropical Africa, but more common in West Africa. *Sebald* 2623; *Gilbert* 3494.

85. *C. pinguis* (C.B. Clarke) Mattf. & Kük. (1936);
Kyllinga pinguis C.B. Clarke (1906) – type:
 Uganda, Entebbe, *E. Brown* 26 (K holo.).
Kyllinga elatior Kunth (1837), non *C. elatior*
 Böck.

Perennial with a usually long creeping rhizome and culms regularly spaced along its length, rarely with shorter rhizome and closely set culms. Rhizome up to 25 cm long (excluding the scales), covered with brown or purple membranous sheaths. Culms 10–60 x 0.15–0.25 cm, 3-angled with usually distinctly winged angles; ridges distinct or obscure; culms usually at first spaced along the rhizome, but later with accessory culms arising from their bases. Each culm with 2–4 leaf-blades, usually 2–10 x 0.35–0.5 cm. Inflorescence usually a solitary ovate spike, more rarely with a few poorly developed lateral spikes. Involucral bracts 5–6, leafy, the largest 5–20 x 0.3–0.6 cm. Central spike 8–15 x 4–8 mm, yellow-green. Spikelets 2.5–3.5 mm long, 1–2-flowered, when 2-flowered the upper one male or bisexual. Glumes 2.5–3 mm long, yellow white or golden yellow with a green midrib with 2–3 nerves on each side of the midrib and usually 3–4 spines on the keel of the midrib;

apex long-acuminate. Nutlet 1–1.3 x 0.6–0.7 mm, elliptic, black with minute tubercles. Fig. 212.130.

Forest-edges, stream-sides, and damp hollows in grazed and cultivated areas, also in roadside-ditches and other disturbed habitats; 1200–2300 m. GJ SU WG IL KF GG SD BA; widespread in tropical east and south Africa, but only in regions with high rainfall. *Mooney* 7208; *Ash* 3099; *Friis* et al. 1668.

86. *C. sesquiflorus* (Torr.) Mattf. & Kük. (1936)
 – type: from 'Florida, North America'.

1. Inflorescence with a single ovate spike.
 - subsp. *sesquiflorus*
 - Inflorescence of one or more cylindrical or ovoid-cylindrical spikes. 2
 2. Spikelets 2-flowered; glumes 3–4 mm long.
 - subsp. *appendiculatus*
 - Spikelets 1-flowered; glumes 1.5–2.2(–2.5) mm long.
 - subsp. *cylindricus*
- subsp. *sesquiflorus* is not found in the Flora area.

subsp. *appendiculatus* (K. Schum.) Lye (1983);
Kyllinga appendiculata K. Schum. (1898) – type:
 Cameroon, *Preuss* 923 (B holo.).
Kyllinga odorata Vahl var. *major* (C.B. Clarke)
 Chiov.
 in *Fl. Somalia* 2: 432 (1932) – type: Tanzania,
Johnston 75.

Tufted perennial with mostly crowded culms from a usually short, but sometimes up to 8 cm long creeping



Figure 212.131 *CYPERUS SESQUIFLORUS* subsp. *APPENDICULATUS*. Drawn by R. W. Haines from Haines 4172. (Reproduced with permission from Haines & Lye, fig. 485a, 1983.)

rhizome with or without bulbous bases of old culms present. Culms 3–80 x 0.05–0.3 cm, 3-angled, ridged, glabrous; base usually swollen and covered by hardened scales which split, but do very rarely form fibres. Leaves flat or enrolled and with spine-like hairs on margin and midrib; the largest leaves 3–40 x 0.15–0.5 cm; lower leaf-sheaths blade-less or with very short leaf-blades. Inflorescence either a single or compound head (7–15 x 5–17 mm) of a larger ovoid to ovoid-cylindrical central spike and usually much smaller lateral spikes. Involucral bracts 2–6, leafy, usually spreading or reflexed, the largest 3–15 cm long. Spikes white but fading pale brown. Spikelets 1.8–4.5 mm long, 2-flowered but very rarely producing 2 nutlets. Glumes 3–4 mm long, white with red dots and frequently with a green midrib, with 2–5 nerves on each side of the midrib; keel of midrib glabrous; apex usually acuminate with an excurrent midrib. Nutlet usually 1.2–1.5(–1.9) x 0.7–0.9 mm, obovate to elliptic, black and minutely tuberculate. Fig. 212.131.

In damp shady woodland margins, along forest-roads, and in other habitats in upland forests (including bamboo) where light intensities are high; c 750–2750 m. GD GJ SU AR IL KF GG SD BA HA; widespread in tropical Africa. Mooney 7080; Ash 3017; E. F. Gilbert 375.

subsp. *cylindricus* (Nees) Koyama in *Bot. Mag. (Tokyo)* 83: 187 (1970);

Kyllinga cylindrica Nees (1834); *Kyllinga odorata*



Figure 212.132 *CYPERUS SESQUIFLORUS* subsp. *CYLINDRICUS*. Drawn by R. W. Haines from Haines 4520. (Reproduced with permission from Haines & Lye, fig. 484, 1983.)

Vahl var. *cylindrica* (Nees) Merrill (1907) – type: Nepal, Wallich 3442 (B lecto.).

Kyllinga viridula Hochst. ex A. Rich. (1851) – type: TU, near Djeladjeranne, Schimper III: 1641 (P holo., HAL K UPS iso.).

Fig. 212.132.

In open grassland, especially in disturbed ground, heavily grazed by animals or cut or burnt by man; 1750–2150 m. TU GJ WU KF SD; widespread in tropical Africa and Asia. *Agrarian* s.n.; Gilbert & Thulin 692.

87. *C. densicaesпитosus* Mattf. & Kük. (1936);

Kyllinga pumila Michx. (1803) – type: from 'North America'.

Annual, usually rather densely tufted with slender root-system and a pale green head-like inflorescence. Culm 10–45 x 0.07–0.12 cm, 3-angled, ridged, glabrous; lowest part covered by a prophyll and a variable number of dark purple bladeless sheaths. Leaves flat or enrolled; margin and midrib with short spine-like hairs; the largest leaves 7–20 x 0.2–0.32 cm, frequently as long as or overtopping the inflorescence. Inflorescence an irregular pale green to grey head, 5–8 x 5–10 mm, consisting of 1 larger central spike and several smaller lateral spikes. Involucral bracts 3–5, leafy, erect or spreading, the largest 4–13 cm long. Spikes ovoid, with spikelets on a narrow receptacle; middle spike 5–8 x 4–5 mm. Spikelets usually 2–2.5 mm long, 1-flowered. Glumes 1.5–2.5 mm long, pale brown to transparent, with a

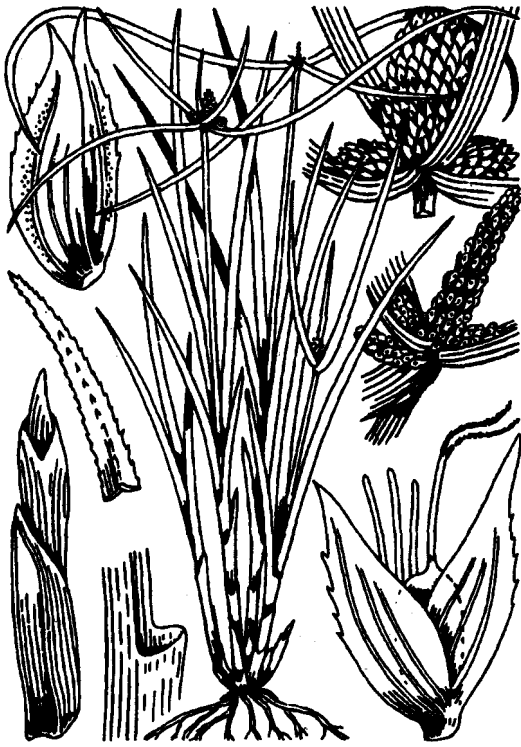


Figure 212.133 *CYPERUS DENSICAESPITOSUS*. Drawn by R.W. Haines from *Haines* 4042. (Reproduced with permission from Haines & Lye, fig. 488, 1983.)



Figure 212.134 *CYPERUS ALATUS* subsp. *ALBUS*. Drawn by R.W. Haines from *Haines* 4215. (Reproduced with permission from Haines & Lye, fig. 500, 1983.)

distinct green midrib (sometimes with numerous dark purple dots) and 2–4 nerves on each side of the midrib; keel of midrib more or less winged and set with a few transparent spine-like teeth; apex acuminate or midrib shortly excurrent. Nutlet about 1 mm long, elliptic. Fig. 212.133.

In grassland or seasonally wet ground; 1000–1500 m. TU WG GG; pantropical. *Chiovenda* 677; *Fukui* 1457; *Gilbert & Thulin* 668.

88. *C. alatus* (Nees) F. Muell. (1874)
– type: from 'South Africa'.

subsp. *albus* (Nees) Lye in *Lidia* 3(5): 172 (1995);
Kyllinga alba Nees (1835) – type: South Africa, Komgha district, Zwarte Keyrivier, *Ecklon* s.n. (B holo., K iso.).

C. cristatus (Kunth) Mattf. & Kük. (1936).

Robust, densely tufted perennial with a short rhizome producing usually numerous stems and leaves. Culms 10–70 x 0.4–1.7 mm, sharply 3-angled and deeply or obscurely ridged, glabrous (or with a few very short spine-like hairs); base of the culm swollen and bulb-like and densely covered by old darkened leaf-sheaths often split into black fibres. Leaves 5–40 x 0.2–0.7 cm, flat or incurved; margin and midrib with short spine-like hairs especially above. Inflorescence a single globose or shortly ovate white head fading to pale dirty brown, 6–14 x 6–15 mm. Involucral bracts 2–5, leafy, up to 15 cm long (but in smaller plants sometimes only 1 cm long), usually bent downwards. Spikelets 4–6.5 mm

long, 1–2-flowered. Outer glumes equal, 3.5–6.5 mm long, white but often brown-spotted, with 2–3 mostly rather weak nerves on each side of the excurrent, strongly winged midrib; the wings coarsely toothed; each tooth with a wide base and 1–2 narrow ciliate spines. Nutlet 1.6–1.8 x 0.7–0.8 mm, black, minutely papillose. Fig. 212.134.

In grassland or bushland, often in seasonally wet sand; 850–2250 m; EW TU SU SD; widespread in tropical and south Africa. *Corradi* 1467; *Friis* et al. 2623.

Differs from subsp. *alatus* in its broader leaves (1–7 mm against 1–3 mm in subsp. *alatus*), longer spikelets (4–6.5 mm against 3.5–4 mm) and longer nutlets (1.6–1.8 mm against c 1 mm).

89. *C. controversus* (Steud.) Mattf. & Kük. (1936);
Kyllinga controversa Steud. (1855) – type: GD, Enderder, *Schimper* II: 581 (P holo., K iso.).

Tussocky perennial with a very short rhizome and many culms. Culms 5–40 x 0.04–0.15 cm, 3-angled, glabrous; base of the culm swollen. Leaves 5–30 x 0.2–0.4 cm, flat or incurved, scabrid on margins and midrib especially above; sheaths brown to purple. Inflorescence single, globose to shortly ovate, white or grey-brown head, 0.5–1.2 x 0.5–1 cm, consist of numerous crowded spikelets. Involucral bracts 2–4, leaf-like, spreading or reflexed. Spikelets 2.5–3 mm long, oval-lanceolate with an oblique base, 1-flowered. Glumes 2.5–3 mm long, of the same length (but the uppermost with a somewhat wider wing); light rust-brown with 2–3 lateral nerves,

prominently winged with long cilia on the somewhat toothed keel. Nutlet 1.2–1.4 x 0.7–0.8 mm, elliptic, black, minutely papillose.

In grassland and bushland; 800–2200 m. EE EW TU GD WU SU SD HA; scattered in east and south tropical Africa. *Gilbert et al.* 2604, 2888, 4410.

This species should probably be considered a subspecies of *Cyperus alatus*.

90. *C. metzii* (Steud.) Mattf. & Kük. (1936);

Kyllinga metzii Hochst. ex Steud. (1855) – type: India, *Hohenacker* 199 (P holo.).

Kyllinga squamulata Vahl (1805).

Kyllinga dentata Steud. (1855) – type: TU, near Djeladjeranne, *Schimper III*: 1457 (P holo., K iso.).

Leafy annual growing in small tussocks; root-system very slender. Culms 2–30 x 0.05–0.08 cm, deeply ridged, glabrous, green and sometimes with minute dark dots; base with a tubular prophyll and 1–several bladeless pink grey translucent sheaths with dark longitudinal veins. Leaves 2–25 x 0.05–0.2 cm (and consequently far overtopping the inflorescence), densely scabrid on margins and midrib at least above, green and sometimes with numerous minute dark dots; as dry V-shaped or flat, much deformed; leaf-sheath translucent with dark longitudinal veins, tubular below; ligule absent. Inflorescence a dense and ragged brown head of numerous sessile 1-flowered spikelets. Major involucre bracts 3, of about equal size, leafy with very conspicuous transparent wings at their bases. Spikelets 2.5–4 mm long, consisting of 1 flower and 2 glumes, supported by an elongated flexible peduncle with 2 minute bracts. Glumes 2–2.5 mm long, brown but green on the upper part of the keel; keel winged and with very coarse teeth, each tooth with a flat 3-angled base and a narrow apex bent sharply upwards. Nutlet strongly flattened, about as wide as long, minutely papillose. Fig. 212.135.

A weed of disturbed sandy ground; 450–1800 m. EE EW TU GD IL; widespread in tropical Africa and Asia. *Fiori* 831; *Gilbert & Getachew A.* 2874; *Parker E* 459.

91. *C. aureoalatus* Lye (1995)

– type: Uganda, Karamoja, Moroto town, *R. W. Haines* 4215 (NLH holo., K MHU iso.).

Densely tufted perennial with base surrounded by strong fibres from old leaf-bases. Culms 15–40 x c 0.1 cm, deeply ridged, glabrous or with a few scattered hairs below the inflorescence. Leaves 10–25 x 0.1–0.3 cm, flat or incurved, sometimes with minute dark dots; margin and midrib with short spine-like teeth especially above. Inflorescence single, 10–20 x 6–10 mm, golden brown spike, numerous sessile 2-flowered spikelets. Involucral bracts 3–4, leafy, up to 12 cm long. Spikelets 3.5–4 mm long, with 2 bisexual flowers or the upper male. Glumes golden brown, but the long-acuminate midrib is frequently green above; keel conspicuously winged with coarse teeth each bearing 1–2 cilia. Nutlet about 1 x 0.6 mm, style including its 2 style-branches 2 mm long.

In *Acacia* – *Commiphora* scrub on coarse gravelly

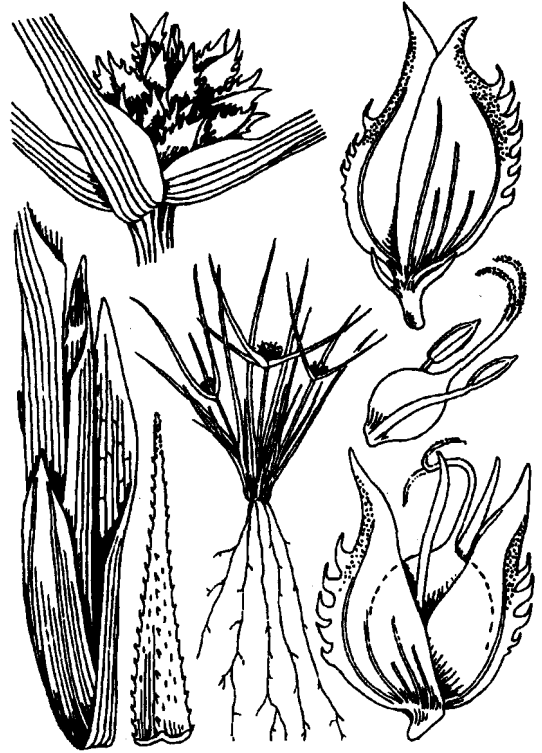


Figure 212.135 *CYPERUS METZII*. Drawn by R.W. Haines from *Haines* 4205. (Reproduced with permission from Haines & Lye, fig. 503, 1983.)

soil; 850 m. SD; scattered in Somalia and East Africa. *Friis et al.* 2957.

Subgen. **PYCREUS** (*P. Beauv.*)

C.B. Clarke (1884);

Pycreus *P. Beauv.* (1807) as genus.

Small to medium-sized annual or perennial tussocky herbs with short rhizomes or stolons in many perennials. Leaves to 60 x 0.1–0.8 cm, usually flat and scabrid on margin at least near the tip; leaf-sheaths glabrous. Inflorescence appearing head-like with few-many sessile or subsessile spikelets, or consisting of one sessile and appearing 'subumbellate' with few-many pedunculate spikelet-clusters or groups of spikelets-clusters. Spikelets, linear, ovate, yellow to dark-brown or almost black, rarely grey-white, laterally compressed; glumes distichous. Glumes usually ovate or obovate, often concave, of various colours. Stamens 2 or 3. Ovary usually with 2 (rarely 3) style-branches, or very rarely 3 in certain species. Nutlet obovate, ovate, cylindrical or almost spherical, yellow, grey, brown to almost black, often minutely papillose or transversely wrinkled to muricate.

A subgenus of about 80 species widely distributed in the tropics and warm temperate regions of both hemispheres, but particularly well represented in Africa; 17 species in the Flora area.

1. Inflorescence a spike with 2–5 spikelets each subtended by a leafy involucre bract.

106. *C. divulsus*
 - Inflorescences a lax or dense anthela of 2-many sessile spikelets or with sessile as well as stalked groups of spikelets. 2
2. Glumes with a prominent furrow or sunken patch on each side of the midrib. 3
 - Glumes without such furrow or sunken patch. 5
3. Stems perennial, at least in part decumbent or floating with leaves along a large part of its length; glumes 2.4–3 mm long. 4
 - Stems erect, either annual or with very slender stolons; glumes 1.5–2.2 mm long. 94. *C. sanguinolentus*
4. Spikelets 2–3 mm wide; glumes with 3-nerved midrib. 92. *C. mundtii*
 - Spikelets about 4 mm wide; midrib of glumes with 8 dark red brown nerves. 93. *C. atronervatus*
5. Nutlets horizontally wrinkled; surface cells elongate. 6
 - Nutlets papillose or almost smooth; surface cells almost isodiametric. 7
6. Glumes 2.5–3 mm long. 107. *C. subintermedius*
 - Glumes 1.6–2.3 mm long. 106. *C. flavescens*
7. Perennials with stolons or short or long woody rhizome, often with remnants of previous season's growth. 8
 - Annuals with usually slender root-system. 15
8. Glumes 2–5 mm long; largest glume more than 2.2 mm long. 9
 - Glumes 1.4–2.2 mm long. 14
9. Plant tussocky without stolons. 10
 - Plant with stolons. 13
10. Spikelets 2–8 mm wide; largest glumes 3–5 mm long. 11
 - Spikelets 1–2 mm wide; glumes 2–2.5 mm long. 99. *C. nuerensis*
11. Spikelets dark brown to black. 97. *C. nigricans*
 - Spikelets yellow to light brown or olive. 12
12. Inflorescence a globose head of sessile spikelets; glumes 2.0–2.7 mm long. 100. *C. lanceolatus*
 - Inflorescence usually compound with sessile as well as stalked spikelets-clusters; glumes 2.8–4 mm long. 98. *C. unioloides*
13. Inflorescence a simple head-like anthela of sessile spikelets. 100. *C. lanceolatus*
 - Inflorescence compound with one sessile and 1–8 stalked spikelet-clusters. 96. *C. nitidus*
14. Glumes dark brown to black with green midrib. 95. *C. elegantulus*
 - Glumes golden brown or light red brown. 101. *C. polystachyos*
15. Glumes with a conspicuous wide pallid margin; plants robust. 102. *C. macrostachyos*
 - Glumes without such margin; plants robust or delicate. 16
16. Spikelets 3–4 mm wide; glumes 2.8–3.3 mm long. 105. *C. pauper*
 - Spikelets 1–2.5 mm wide; glumes 0.7–2.2 mm long. 17
17. Inflorescence with one erect bract making the head-like anthela appear lateral. 104. *C. capillifolius*
 - Inflorescence-bracts spreading or reflexed. 18
18. Glumes 1.0–1.2 mm long, conspicuously mucronate. 103. *C. pumilus*
 - Glumes 1.4–2.2 mm long, not conspicuously mucronate. 19
19. Glumes dark brown to black with green midrib. 95. *C. niger*
 - Glumes golden brown or light red brown. 101. *C. polystachyos*
92. *C. mundtii* (Nees) Kunth (1837);
Pycreus mundtii Nees (1836) – type: South Africa, Zwelendama W George, J. L. Mundt s.n. (B holo.).
C. mundtii Nees var. *distichophyllus* (Steud.) C.B. Clarke in *J. Linn. Soc.* XXI: 64 (1884).
C. eragrostis Vahl sensu A. Rich. (1851), non Lam. (1791) nec Vahl (1805).
C. distichophyllus Steud. (1842) – type: TU, near Adua, *Schimper II*: 745 (P holo., B HAL iso., K iso.).
- Perennial with stolons, 10–200 cm long, rooting at the nodes. Stems usually one from each node of the stolon, with many widely spaced leaves and ending in a 10–30 x 0.05–0.25 cm leafless stem carrying an inflorescence. Leaf-blades 2–20 x 0.1–0.6 cm, flat or incurved, scabrid on midrib and margins at least near the tip; blades separated from their sheaths by an auricled region where the blade eventually breaks off. Inflorescence a compound umbel of 1–few subsessile and many stalked subdigitate clusters of spikelets, more rarely all spikelet-clusters subsessile. Spikelets 4–13 x 2–3 mm, lanceolate, flattened, light to dark-brown. Glumes 2.4–2.7 mm long, oval with rounded apex and many slender lateral nerves; groove on either side of the green midrib distinct. Nutlet 0.8–1.2 x 0.5–0.6 mm, obovate with short apiculus, biconvex, light to dark brown, smooth or minutely papillose. Fig. 212.136.
- Wet swamps or floating on stagnant or slowly moving water at edges of lakes and pools; 1000–2200 m. EW TU SU SD HA; throughout Africa, Madagascar, the Mediterranean, rare in tropical America. *De Wilde & de Wilde-Duyffes* 6055, 10347; *Gilbert & Getachew A.* 2793.
93. *C. atronervatus* Böck. (1874);
Pycreus atronervatus (Böck.) C.B. Clarke (1894) – type: GD, Gaffat, *Schimper* 1287 (B holo., K iso.).
C. atronervatus Böck. var. *minor* Böck. (1874) – type: GD, Gerra, *Schimper* 1244 (B holo., K iso.).
- Robust perennial or rarely slender annual (only subsp. *angustifolius*) with 5–50 x 0.05–0.3 cm 3-angled stems from filiform or robust stolons rooting at their nodes, often with the stems floating at water surface, but roots anchored in mud. Leaf-blades to 30 x 0.5 cm, flat. Inflorescence a dense cluster of spikelets 1–2.5 cm in diameter, rarely consisting of 1–4 spikelets only.



Figure 212.136 *CYPERUS MUNDTII*. Drawn by R.W. Haines from Haines 4071. (Reproduced with permission from Haines & Lye, fig. 548, 1983.)

Spikelets 5–16 x 2–5 mm, linear-lanceolate, flattened, grey-black. Glumes 2–6 mm long, green or pallid and without a prominent midrib, but with many prominent black longitudinal lines; apex obtuse; margin often with a wide black border. Nutlet 1.3–1.8 x 0.9–1.2 mm, obovate, strongly flattened, black, smooth or punctate.

1. Plants perennial with 1–3 mm thick stems; largest blades 2–5 mm wide; anthela of 5–10 spikelets; largest glumes 3–6 mm long, often with a wide black margin. subsp. *atronervatus*

– Plant annual with 0.5–1 mm thick stems; blades 0.3–1 mm wide; anthela of 1–4 spikelets; glumes 2–3 mm long, without a wide black margin. subsp. *angustifolius*

Fig. 212.47.1 & 2.

subsp. *atronervatus*

Wet swamps and lake-margins, often semi-floating; 1800–2850 m. EW GD GJ SU; not known elsewhere. *Gilbert & Getachew* A. 3039; *Ash* 2055, 2717.

subsp. *angustifolius* Lye (1995)

– type: SU, 14 km N of Entoto pass out of Addis Ababa, Soluta, *Ash* 2097 (K holo.).

Flooded water meadows; 2500 m. SU; not known elsewhere. *Ash* 2097.

94. *C. sanguinolentus* Vahl (1805);

Pycnus sanguinolentus (Vahl) Nees (1834) – type: from 'India'.

Pycnus sanguinolentus (Vahl) Nees forma *flac-*

cidus (Böck.) Cufod. in *Enum.*: 1446 (1970); *C. eragrostis* var. *flaccidus* Böck. in *Linnaea* 35: 446 (1868) – type: GD, Delhi-Dikeno, 1200 m, *Schimper* 317 (B holo., not found).

Pycnus sanguinolentus (Vahl) Nees forma *neurotropis* (Steud.) Cufod. in *Enum.*: 1446 (1970); *Cyperus neurotropis* Steud. (1842) – type: TU, Gambia, *Schimper* 765 (P holo., HAL K UPS iso.).

Slender annual or perennial producing slender stolons. Stems 10–40 x 0.08–0.15 mm, 3-angled, glabrous. Leaf-blades 10–25 x 0.05–0.4 cm, flat and soft, glabrous or scabrid on midrib and margins near the tip. Inflorescence a dense cluster of spikelets 1–3 cm in diameter, or with additional stalked clusters of spikelets. Spikelets 4–15 x 1.5–3 mm, linear-lanceolate, brown to black. Glumes 1.3–2.2 mm long, oval, dark purple to almost black with a large paler groove on each side of the green midrib. Nutlet 0.9–1.2 x 0.6–0.8 mm, obovate with cuneate base and short apiculus, biconvex, dark grey to black; surface cells isodiametric, minutely papillose, but young nutlets may appear obscurely wrinkled to muricate.

Wet soil along streams or in seasonally wet grassland; 1500–2200 m. EW TU GD SU KF; tropical Africa, Asia and Australia. *Schweinfurth* 1050; *Pappi* 2283; *Fiori* 833.

95. *C. elegantulus* Steud. (1842);

Pycnus elegantulus (Steud.) C.B. Clarke (1894); *Cyperus niger* Ruiz & Pav. subsp. *elegantulus* (Steud.) Lye in *Sedges & Rushes Appendix* 3: 2 (1983) – type: GD, near Demerki in Simien, *Schimper* 574 (P holo., HAL K UPS iso.).

C. atronitens Hochst. ex A. Rich. (1851) – types: TU, near Adua, *Schimper* s.n. or 312 (P lecto., HAL K UPS isolecto.); Assao, *Quartin-Dillon* s.n. (P syn.); Quodgerate, *A. Petit* s.n. (P syn.).

Pycnus niger (Ruiz & Pavon) Cufod. (1970), non *Cyperus niger* Ruiz & Pavon (1798) – type: Peru, *H. Ruiz Lopez & J. J. A. Pavon* s.n. (MA holo.).

Slightly tufted perennial with slender stolons, but may appear annual when stolons are lost or lacking. Stems 10–80 x 0.1–0.3 cm, 3-angled, glabrous. Leaf-blades 5–30 x 0.1–0.5 cm, flat, scabrid on midrib and margins near the tip; the lower leaves reduced to bladeless sheaths. Inflorescence a single compact head of sessile or subsessile clusters of spikelets, but often with one-several additional stalked clusters of spikelets. Spikelets 2–5 x 1.2–2 mm, oval-lanceolate, usually closely packed and often curved, usually 6–10-flowered. Glumes 1.4–1.6 mm long, very dark brown to black, but green on midrib; apex acute or obtuse. Nutlet 0.9–1.2 x 0.5–0.6 mm, obovate, biconvex, brown to grey, minutely papillose. Fig. 212.137.

Wet grassland, swamp-margins and near streams; 1500–3600 m. EW TU GD GJ SU AR WG KF GG SD BA; mountain-regions in tropical Africa and America. *De Wilde & De Wilde-Duyffes* 6297, 8389; *Friis* et al. 1188 & 1275.



Figure 212.137 *CYPERUS ELEGANTULUS*. Drawn by R.W. Haines from Haines 4247. (Reproduced with permission from Haines & Lye, fig. 551, 1983.)



Figure 212.138 *CYPERUS NITIDUS*. Drawn by R.W. Haines from Haines 4070. (Reproduced with permission from Haines & Lye, fig. 553, 1983.)

Cyperus niger from South American mountains is very similar, but differs in having about 2 mm long glumes.

96. *C. nitidus* Lam. (1791);

Pycurus nitidus (Lam.) Rayn. (1969) – type: sine loc., sine lect (P-LA holo.).

C. lanceus Thunb. (1794).

Coarse perennial with up to 40 x 0.3–0.8 cm scale-covered stolons. Stems 15–60 x 0.1–0.3 cm, 3-angled, glabrous. Leaf-blades many, basal or sub-basal, 15–60 x 0.2–0.8 cm, rather stiff and tough, scabrid on midrib and margins; leaf-bases with cross-veins joining the longitudinal veins. Inflorescence a compound umbel-like anthela with 1-few sessile and few-many stalked subdigitate clusters of spikelets, more rarely all clusters sessile. Spikelets 8–25 x 3–4 mm, lanceolate, light or more commonly dark red-brown. Glumes 3.2–3.8 mm long, ovate with obtuse apex, light to dark red brown with 3–5 nerved usually green midrib. Nutlet 0.9–1.1 x 0.6–0.7 mm, obovate with a short apiculus, biconvex, red-brown to black, minutely papillose, but may appear slightly wrinkled particularly when young. Fig. 212.138.

Wet swamps and grasslands with oozing water, also margins of open water; 1400–1500 m. GJ SU KF; east and southeast tropical Africa, South Africa and Madagascar. Ash 2369; Friis et al. 2056.

97. *C. nigricans* Steud. (1842);

Pycurus nigricans (Steud.) C.B. Clarke (1894) –

type: GD, Endschetcab in Semien, Schimper 1373 (P holo., HAL K UPS iso.).

Pycurus nigricans (Steud.) C.B. Clarke var. *fir-mior* (Kük.) Cherm. (1935) – type: SD, north-east part, Ellenbeck 1861 (P holo.).

Robust perennial forming dense tussocks. Stems 30–100 x 0.07–0.25 cm, 3-angled to rounded, minutely scabrid especially on the angles. Leaves from near the base only; blades to 60 (or more) x 0.07–0.4 cm, flat or folded, rather stiff and wiry, scabrid on margins near the tip. Inflorescence a compact black head-like anthela 1–4 cm in diameter, consisting of many crowded sessile spikelets. Spikelets 5–20 x 3–8 mm, lanceolate, sometimes replaced by viviparous shoots. Glumes 3–5 mm long, dark red-brown to black with paler 3–5 nerved keel; apex acute. Nutlet 1.3–1.5 x 0.7–0.8 mm, obovate, biconvex, grey to red-brown, smooth or minutely papillose. Fig. 212.139.

Marshy ground in upland areas; 2500–3000 m. GD SU AR SD BA; Uganda, Kenya, Tanzania, Malawi and Madagascar. Ash 1961; Mooney 7209; Thulin, Hunde & Mesfin T. 3664.

98. *C. unioloides* R. Br. (1810);

Pycurus unioloides (R. Br.) Urban (1900) – type: from 'Australia'.

Tufted perennial with short woody rhizome. Stems 30–100 x 0.07–0.3 cm, sharply 3-angled, glabrous. Leaf-blades 10–60 x 0.2–0.6 cm, flat, scabrid on margin and



Figure 212.139 *CYPERUS NIGRICANS*. Drawn by R.W. Haines from Haines 4342. (Reproduced with permission from Haines & Lye, fig. 554, 1983.)

midrib at least near the tip. Inflorescence a lax anthela of one sessile and 1–7 stalked spikelet-clusters, rarely with one sessile head of spikelets only. Spikelets 8–16 (–25 when fruiting) \times 3–4.5 mm, lanceolate, yellow-brown to light red-brown. Glumes 3–4 mm long, yellow-brown with or without green midrib; apex acute or midrib slightly excurrent. Nutlet 0.8–1 \times 0.7–0.8 mm, broadly obovate with distinct apiculus, biconvex, grey, dark red-brown or black, smooth to minutely papillose or slightly wrinkled.

Seasonally wet grassland or swamps; 1800–1900 m. GJ WG KF IL; pantropical. *Mesfin T. & Kagnew 1776; de Wilde & de Wilde-Duyffes 7651 & 8839.*

99. *C. aethiops* Ridl. (1884);

Pycnus aethiops (Ridl.) C.B. Clarke (1895) – type: Angola, *Welwitsch 7025* (LISU holo., BM iso.).

Robust perennial with slightly swollen base, occasionally producing stolons. Stems 30–80 \times 0.1–0.4 cm (but to 1 cm or more thick across the leaf-sheaths), 3-angled, glabrous. Leaf-blades 10–40 \times 0.5–0.9 cm, flat and rather stiff, strongly scabrid at least on margins and midrib near the tip. Inflorescence usually large, with 1–few sessile or subsessile ‘spikes’ and 2–8 stalked ‘spikes’. ‘Spikes’ globose to elongate with very numerous crowded spreading groups of spikelets. Spikelets 6–15 \times 1–2 mm, linear, brown to black. Glumes 2–2.7 mm long, dark brown with green midrib and narrow. Nutlets 0.8–1 \times 0.3–0.4 mm, cylindrical, smooth or minutely papillose. Fig. 212.140.



Figure 212.140 *CYPERUS AETHIOPS*. Drawn by R.W. Haines from Gilbert & Thulin 890. (Reproduced with permission from Haines & Lye, fig. 562, 1983.)

Swampy grassland; 1650–1830 m. SU KF; Sudan, Uganda and Kenya. *Gilbert & Thulin 890; Mooney 9161.*

100. *C. lanceolatus* Poirlet (1806);

Pycnus lanceolatus (Poir.) C.B. Clarke (1895) – type: Madagascar, *Petit-Thouars* s.n. (P holo.).

Pycnus humboldtianus (Röm. & Schult.) Cufod. (1970).

Tufted perennial with a short rhizome or with distant stems from a long creeping stolon. Stems 15–50 \times 0.07–0.15 cm, 3-angled, glabrous. Leaf-blades 1–30 \times 0.1–0.25 cm, flat, scabrid on margin and midrib at least near the tip. Inflorescence a globose head of usually many tightly packed spikelets, 1–4 cm in diameter. Spikelets 7–25 \times 2–3.5 mm, linear-lanceolate, light yellow-brown. Glumes 2–2.8 mm long (but lowermost glumes smaller), oval, golden but often with red brown patches and a green midrib; apex obtuse. Nutlet 0.8–1 \times 0.6–0.7 mm, obovate with short apiculus, biconvex, grey, red brown or black, reticulate (as young only) and minutely papillose. Fig. 212.141.

Wet grassland and marshes; 900–2100 m. GD SU KF; tropical parts of Africa and America, including Madagascar. *De Wilde & De Wilde-Duyffes 7648; Mooney 7595.*

101. *C. polystachyos* Rottb. (1773);

Pycnus polystachyos (Rottb.) Pal. Beauv. (1807) – type: India, *König* s.n. (C holo.).

Tufted perennial with short woody rhizome, rarely with



Figure 212.141 *CYPERUS LANCEOLATUS*. Drawn by R.W. Haines from *Haines* 4645. (Reproduced with permission from Haines & Lye, fig. 563, 1983.)



Figure 212.142 *CYPERUS POLYSTACHYOS* subsp. *POLYSTACHYOS*. Drawn by R.W. Haines from *Haines* 4642. (Reproduced with permission from Haines & Lye, fig. 571, 1983.)

slender stolons; young plants may look as annuals. Stems 20–80 x 0.1–0.3 cm, but depauperate specimens sometimes only 8–20 x 0.05–0.1 cm, 3-angled, glabrous. Leaf-blades 5–40 cm long and 1–5 mm wide, flat or channelled, scabrid on margins and midrib at least near the tip. Inflorescence a congested head-like anthela of numerous crowded spikelet-clusters, or more lax with few-many stalked brush-like groups of spikelet-clusters, or inflorescence with laxly arranged spikelets. Spikelets 4–15 mm long and 0.8–2.2 mm wide, linear-lanceolate, yellowbrown to brown. Glumes 1.5–2.2 mm long, oval, light brown, yellow brown, golden or light red brown; the midrib sometimes green, ending in the acute apex or slightly excurrent. Nutlet 0.8–1.2 mm long and 0.3–0.6 mm wide, oblong to cylindrical, pale when young, grey when mature, minutely papillose.

1. Inflorescence with laxly arranged spikelets; nutlet 1.0–1.2 mm long. subsp. *laxiflorus*
 – Inflorescence with crowded spikelets, usually brush-like; nutlet 0.8–1 mm long. subsp. *polystachyos*

subsp. *polystachyos*

Fig. 212.142.

Wet grassland and swamp-margins; c 1200–1400 m. EW; widely distributed in all warm parts of the world. *Fiori* 834.

subsp. *laxiflorus* (Benth.) Lye in *Sedges & Rushes E. Afr., Appendix 3*: 2 (1983);

C. polystachyos Rottb. var. *laxiflorus* Benth. in *Flora Austral.* 7: 261 (1878) – type: North Australia, *F. Mueller* s.n. (BM holo.).

Pycurus ferrugineus (Poirlet) C.B. Clarke sensu Cufod. *Enum.* (1970).

Fig. 212.143.

Seasonally wet grassland and swamps; 2000–2400 m. EW; pantropical. *Pappi* 2298.

102. *C. macrostachyos* Lam. (1791);

Pycurus macrostachyos (Lam.) Rayn. (1969) – type: Africa, *Anon.* s.n. (P-LA holo.).

C. retusus Steud. (1842) – type: TU, near Gafta, *Schimper II*: 1199 (P holo., HAL K iso.).

Robust, erect annual with solitary stem or tufted. Stems 30–100 x 0.1–0.6 cm, but to 1 cm thick across the sheaths, 3-angled, glabrous. Leaf-blades 10–60 x 0.2–1 cm, flat, rather thick and soft below, scabrid on margin and midrib near the tip. Inflorescence a compound anthela of large sessile and stalked spikes; major branches to 15 cm long. Spikelets 7–20 x 1.5–2.5 mm, linear-lanceolate. Glumes 2.5–4 mm long, obovate, golden, light brown or red-brown with a very prominent wide pallid marginal border. Nutlet 1.7–2 x 0.8–1.2 mm, obovate to elliptic, grey, brown or black, minutely papillose; apex shortly papillose. Fig. 212.144.



Figure 212.143 *CYPERUS POLYSTACHYOS* subsp. *LAXIFLORUS*. Drawn by R.W. Haines from *Haines* 4008. (Reproduced with permission from Haines & Lye, fig. 573, 1983.)



Figure 212.144 *CYPERUS MACROSTACHYOS*. Drawn by R.W. Haines from *Haines* 4649. (Reproduced with permission from Haines & Lye, fig. 596, 1983.)

Swamps and marshes; 550–2000 m. TU GD GJ WG IL; pantropical. *Mesfin T. & Kagnev* 1756; *Getachew A. & Gilbert* 955.

This plant is used to make AGLIGIL and INJERA baskets. The stem is stripped into thin sheets, dried, soaked and used for basketry.

103. *C. pumilus* L. (1756);

Pycurus pumilus (L.) Nees (1834) – type: India, Anon. s.n. (LINN holo.).

Pycurus pumilus (L.) Nees subsp. *patens* (Vahl) Podlech in *Mitt. Bot. Staatssamml. München* 3: 523. (1960); *Pycurus patens* Vahl (1805) – type: Guinea in West Africa, *Thonning* s.n. (C holo.).

Dwarf tufted annual. Stems 1–16 x 0.03–0.08 cm, 3-angled, glabrous. Largest leaf-blades 2–8 x 0.1–0.15 cm, scabrid on margin and midrib near the tip. Inflorescence of one sessile and 1–6 stalked spikelet-clusters, 1–10 cm wide; each cluster with 3–20 rather laxly arranged spikelets. Spikelets 2–12 x 1–2.5 mm, linear, grey to red-brown, divergent. Glumes 1–1.3 mm long, ovate, grey or red-brown with a green 3–5 nerved keel, conspicuously mucronate; glumes imbricate when young, but later spreading so as to expose the nutlet. Nutlet 0.5–0.6 x 0.3–0.4 mm, obovate, dark grey, minutely papillose.

Seasonally wet grassland, often on shallow soils over rocks, near pools and in disturbed habitats; 800–1800 m. EW TU GJ WG KF IL SD; pantropical. *Gilbert & Thulin* 681; *Mesfin T. & Kagnev* 1781, 2377.

104. *C. capillifolius* A. Rich. (1851);

Pycurus capillifolius (A. Rich.) C.B. Clarke (1895) – type: TU, Chiré, near Kouaieta village, *Quartin-Dillon* s.n. (P holo.).

Slender tufted annual. Stems 5–30 x 0.03–0.1 cm, 3-angled, glabrous. Leaf-blades only 1–2 per stem, 5–25 x 0.05–0.1 cm, canaliculate to almost filiform, scabrid on margin and midrib near the tip. Inflorescence a globose cluster of sessile spikelets 1–3 cm in diameter, few-many crowded spikelets. Major involucre bract stem-like, 1–15 cm long and continuing in the direction of the stem; inflorescence therefore appearing lateral. Spikelets 5–16 x 1.5–2 mm, linear-lanceolate, light yellow-brown to dark brown. Glumes 1.3–1.7 mm long, ovate, golden to light brown with green or straw-coloured 3-nerved keel and often a pallid marginal border, or dark brown with paler midrib; apex rounded to emarginate. Nutlet 0.7–1 x 0.5–0.6 mm, 3-angled, biconvex, but thicker over the shoulders, red-brown or grey, minutely papillose. Fig. 212.145.

Seasonally wet grassland, often near rock-pools or on wet flushes on flat rocks; 1300–2000 m. TU WG; tropical Africa, Madagascar, Brazil. *Gilbert & Thulin* 660, 680 & 817.

105. *C. pauper* Hochst. ex A. Rich. (1851);

Pycurus pauper (Hochst. ex A. Rich.) C.B. Clarke (1895) – type: TU, Walcha in Sana province, *Schimper III*: 1602 (P holo., H HAL K UPS iso.).

Slender annual. Stem 5–40 x 0.03–0.06 cm, angular to

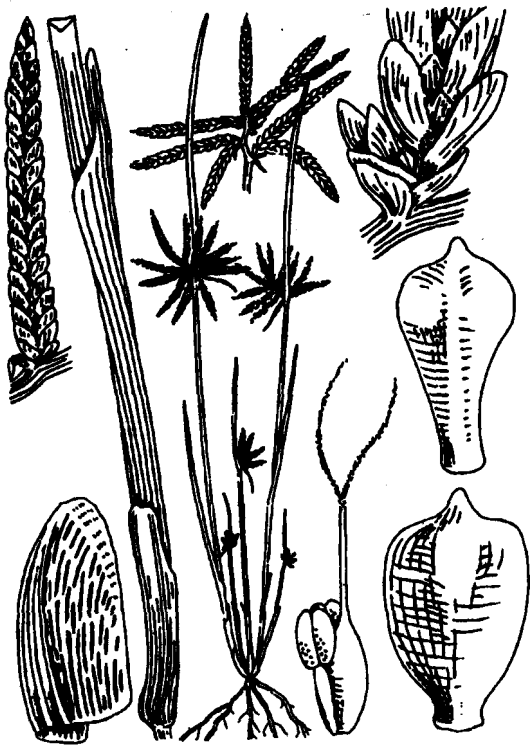


Figure 212.145 *CYPERUS CAPILLIFOLIUS*. Drawn by R.W. Haines from *Makerere College* K 315. (Reproduced with permission from Haines & Lye, fig. 594b, 1983.)

almost terete, glabrous. Leaf-blades 1–30 x 0.05–0.15 cm, flat, but folded or incurved when dry, scabrid on margin at least near tip. Inflorescence a solitary spikelet or a cluster of 1–5 spikelets, apparently placed laterally since the major involucreal bract is stem-like and continuous in the direction of the stem. Spikelets 5–15 x 2.5–4 mm, ovate, golden with dark patches. Glumes 2.3–3.3 mm long, ovate, golden, grey or light red-brown with a green midrib ending below the acute apex and with a prominent dark purple to almost black marginal border near the tip. Nutlets 1.2–1.7 x 0.8–1.4 mm, broadly obovate to almost orbicular, black, transversely wrinkled. Fig. 212.146 & fig. 212.147.3 & 4.

Swampy grassland and bare wet soil, often along streams or on shallow soils over rocks; 1350–2900 m. EW TU GD SU AR WG IL KFGG SD; also in Nigeria, Cameroun, the Central African Republic and Tanzania. *Thulin* 1443; *Gilbert & Thulin* 901.

C. pauper and *C. divulsus* look very similar and occur together giving rise to mixed collections (*Ash* 2225, *Robertson* in *Mooney* 7548).

106. *C. divulsus* Ridl. (1884);

Pycurus divulsus (Ridl.) C.B. Clarke (1894) – type: Madagascar, Betsileo, *Hildebrandt* 4080 (BM hol.).

Slender to fairly robust tufted annual. Stems 5–25 x 0.05–0.2 cm, obtusely 3-angled, glabrous. Leaf-blades 3–15 x 0.05–0.2 cm, flat, scabrid on margin and midrib at least near the tip. Inflorescence a spike of 2–5



Figure 212.146 *CYPERUS PAUPER*. Drawn by R.W. Haines from *Robinson* 4337. (Reproduced with permission from Haines & Lye, fig. 589, 1983.)

spikelets, each subtended by a leafy involucreal bract; largest bract 4–15 cm long. Spikelets 6–15 x 3–4 mm, somewhat compressed, distant or rather crowded. Glumes 2.5–3.5 mm long, yellow-brown to brown with a narrow pallid margin and a green 3–5 nerved slightly excurrent midrib, glabrous. Nutlet 1.5–1.7 x 1–1.2 mm, ovoid, dark red-brown to black, almost smooth or minutely wrinkled with isodiametric surface-cells. Fig. 212.147.5 & 6.

Seasonally wet grassland; 1350–1680 m. WG IL KF; Sierra Leone, Nigeria, Cameroun, Zambia and Madagascar. *Gilbert & Thulin* 796; *Ash* 2225C; *Kukkonen* 12524.

107. *C. flavescens* L. (1753).

Annual with slender root-system or occasionally producing slender stolons (mainly when covered by soil or sand). Stems 5–50 x 0.03–0.25 cm, 3-angled to subterete, glabrous. Leaf-blades 5–30 x 0.1–0.35 cm, flat and rather soft, scabrid on margins and midrib at least near the tip. Inflorescence a dense globose cluster of sessile spikelets or more commonly with one central head and 1–6 additional stalked heads of clustered spikelets. Spikelets 5–18 x 1.2–3.5 mm, linear-lanceolate, pale yellow-brown or with a red-brown tinge. Glumes 1.5–3 mm long, ovate, yellow to red-brown with or without a pallid marginal border and a green midrib. Nutlet 0.7–1 x 0.5–0.8 mm, obovate with a short apiculus, biconvex, transversely wrinkled to almost smooth; surface cells elongate.

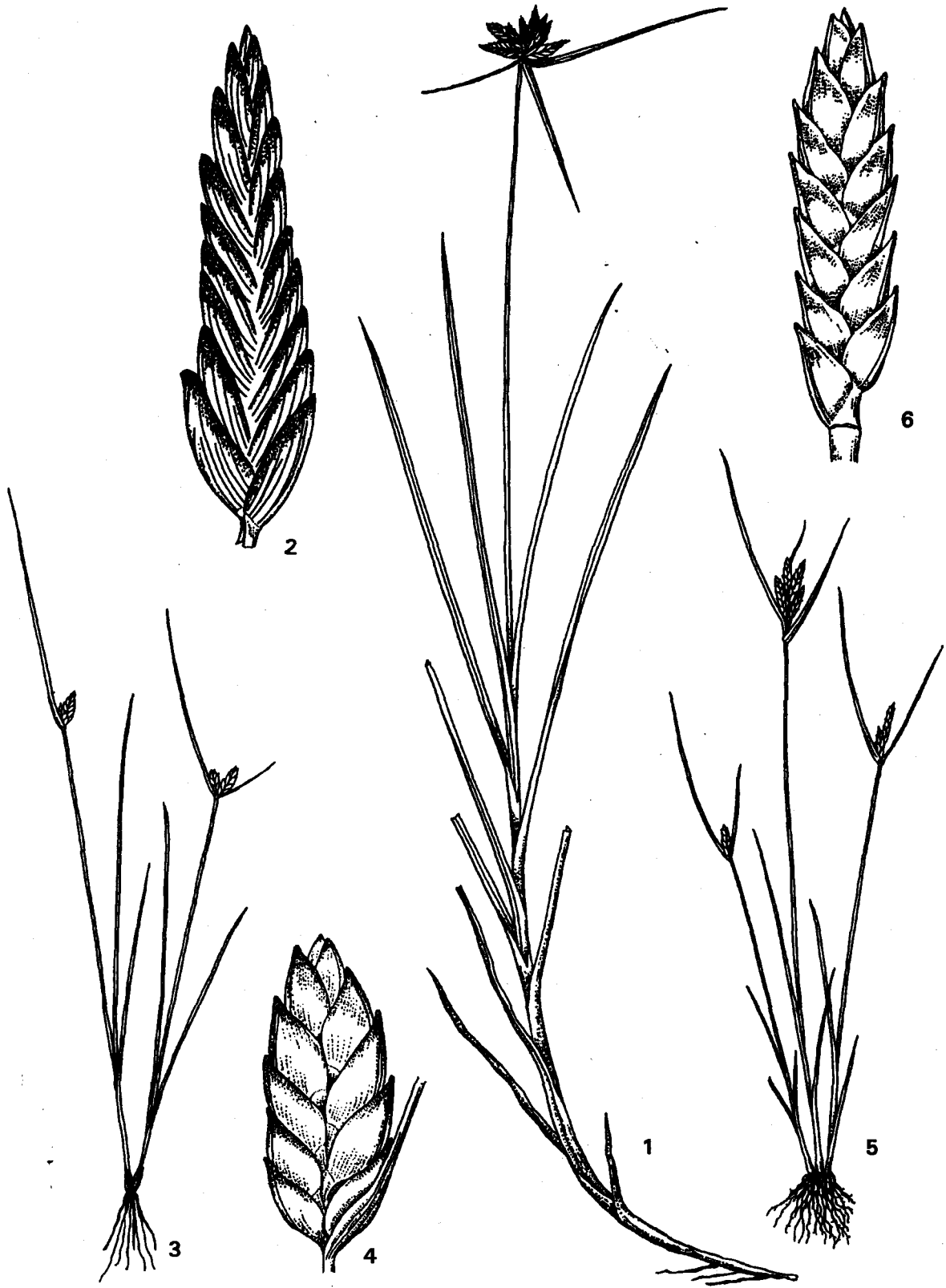


Figure 212.147 *CYPERUS ATRONERVATUS*: 1 - whole plant x 1/2; 2 - spikelet x 5. *CYPERUS PAUPER*: 3 - whole plant x 1/2; 4 - spikelet x 5. *CYPERUS DIVULSUS*: 5 - whole plant x 1/2; 6 - spikelet x 5. 1 & 2 from *Kukkonen* 12432; 3 & 4 from *Schimper* 1602; 5 & 6 from *Kukkonen* 12524. Drawn by Gerd Mari Lye.



Figure 212.148 *CYPERUS FLAVESCENS*. Drawn by R.W. Haines from Haines 4224. (Reproduced with permission from Haines & Lye, fig. 576, 1983.)

1. Largest glumes 1.5–2.3 mm long. subsp. *flavescens*
 – Largest glumes 2.5–3 mm long. subsp. *intermedius*
 subsp. *flavescens*.

Pycrus flavescens (L.) Rchb. (1830) – type: from 'Europe'.

Cyperus abyssinicus Hochst. ex Steud. (1855);
Pycrus flavescens (L.) Rchb. var. *abyssinicus*
 (Hochst. ex Steud.) Rendle in *Catal. Afr. Pl. Welw.* 2:
 106 (1899) – type: TU, near Adua, *Schimper I*:122 (P
 holo.).

Fig. 212.148.

Seasonally wet grassland, swamp-edges, waterlogged soil in marshes and in ditches; 1500–2500 m. EW TU GD GJ SU WG IL KF IL SD HA; pantropical and extending to temperate regions. *Ash* 2097 B; *de Wilde* 8433; *Aweke* 1240.

subsp. *intermedius* (Steud.) Lye in *Lidia* 3: 132 (1994);
Cyperus intermedius Steud. (1842); *Pycrus intermedius* (Steud.) C.B. Clarke (1901) – type: GD, near Dschomara, *Schimper II*:1267 (P holo., K iso.).

Probably seasonally wet ground. GD; also in south-east tropical Africa. Only known from the type.

108. *C. macranthus* Böck. (1868);

Pycrus macranthus (Böck.) C.B. Clarke (1895)
 – type: South Africa, Port Natal, *Drege* 4394 (B
 holo., B iso.).

Stoloniferous perennial growing in small tussocks each



Figure 212.149 *CYPERUS MACRANTHUS*. Drawn by R.W. Haines from Haines 4086 & 4632. (Reproduced with permission from Haines & Lye, fig. 574, 1983.)

emitting 1–few slender stolons. Stems 20–60 x 0.05–0.15 cm, slender and wiry, glabrous, at first single, later a few stems together. Largest leaves 10–40 x 0.05–0.35 cm, flat or enrolled, scabrid on margin especially near the tip. Inflorescence a solitary head-like anthela with 5–15 crowded sessile or subsessile spikelets, rarely more lax. Spikelets 5–25 x 3–5 mm, linear-lanceolate, dark brown to black. Glumes 3–4 mm long, often becoming successively smaller above, ovate, brown to dark red-brown without or with a narrow pallid marginal border. Nutlet 0.7–1 x 0.5–0.8 mm, obovate to almost spherical, light to dark red brown, prominently transversely wrinkled. Fig. 212.149.

Savanna, grassland or marshy land; 1250–2000 m. KF SD; widespread in tropical Africa south to the Cape Province. *De Wilde* 5348; *de Wilde & de Wilde-Duyffes* 7616; *Siegenthaler* C32.

Subgen. *ALINULA* (Rayn.) Lye (1983);
Alinula Rayn. (1977) as genus

slender annuals with a usually congested brown inflorescence of sessile spikes. Spikes ovate with numerous crowded 1-flowered spikelets containing a short scale-like bract, a prophyll, a long glume and a bisexual flower; the 'hypogynium' is a cup-like scale with irregular lobes. Stamens 2. Style with 3 branches.

A subgenus of 2 species with only, scattered distri-

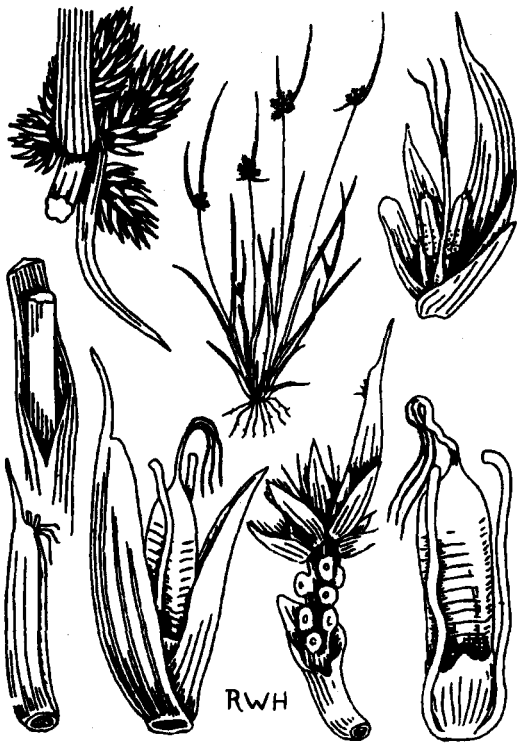


Figure 212.150 *CYPERUS LIPOCARPHOIDES*. Drawn by R.W. Haines from *Haines* 4607. (Reproduced with permission from Haines & Lye, fig. 504, 1983.)

tribution in East and Southeast tropical Africa. 1 species in the Flora area.

109. *C. lipocarphoides* (Kük.) Lye (1983);

Ficinia lipocarphoides Kük. (1936 & 1937).

Alinula lipocarphoides (Kük.) Rayn. (1977) – type: Tanzania, Mangati, A. Peter 43922b (B holo.).

Slender annual. Stems 2–15 x 0.03–0.06 cm, 3-angled, glabrous. Leaf-blades usually shorter than the stem, flat, almost glabrous; sheaths purple at least below. Inflorescence a congested anthela up to 1 cm in diameter, consisting of 2–6 sessile spikes subtended by leafy bracts far overtopping the anthela. Spikes ovate with numerous crowded 1-flowered spikelets. Glumes 1.7–2 mm long, dark red brown with 3–4 distinct nerves on each side of the strongly excurrent green midrib. Nutlet 1.1–1.2 x 0.4 mm, elongate, 3-angled, brown, almost smooth; the base enclosed in a white cup-like scale. Fig. 212.150.

Bare wet soil along small stream; c 2400 m. AR SD; Uganda, Kenya, Tanzania, Zambia. *De Wilde* 8393; *Thulin* 1442.

Subgen. **MARISCULUS** (Goetgh.) Lye (1994);
Marisculus Goetgh. (1977) as genus

Annual leafy herbs. Inflorescence a terminal yellow head of sessile spikes; major involucre bracts leafy; each spike with numerous one-flowered spikelets on a thickened axis. Spikelet with a narrowly 3-angled bract, a minute adaxial scale (prophyll?), a utricle-shaped glume (squamella), 1–2 stamens and an ovary with a 3-branched style. The utricle-shaped glume is not thickened at the top, the nerves are visible to the top, and the margins are adaxially connate with only a small slit near the apex.

A monotypic subgenus, which elsewhere occurs in Tanzania, Zambia and Malawi only.

110. *C. microaureus* Lye (1994);

Marisculus peteri (Kük.) Goetgh. (1977); *Ascolepis peteri* Kük. (1936), non *Cyperus peteri* Kük. (1936) – type: Tanzania, Ngulu, Peter 34934 (B holo.).

Alinula peteri (Kük.) Goetgh., Vorster (1988).

Dwarf annual with a minute root-system. Culms slender, 5–15 x 0.04–0.06 cm; culm-base not bulbously thickened, covered by a few pale grey to pink leaf-bases. Leaves shorter than the culm, up to 1 mm wide. Inflorescence a yellow-green head up to 8 mm in diameter, consisting of 3–8 small spikes up to 4 mm long. Involucral bracts 2–3, reflexed, to 2.5 cm long. Spikelets densely crowded and spirally arranged on the axis of the spikes. Bract 1–1.3 mm long, narrowly 3-angled, hyaline but with a prominent golden midrib. Glume or squamella 1.6–1.9 mm long, narrowly oval and apiculate; abaxial side prominently 5-nerved, yellow; adaxial side weakly 2–4 nerved. Stamens 1–2, lateral. Style 3-branched. Nutlet about 1 mm long, orange-brown, minutely papillose; surface-cells isodiametric. Fig. 212.151.

In wet rocky outcrops in grassland; 2500 m. SU; also in Kenya, Tanzania, Malawi and Zambia. *Sandford* s.n.

Poorly known species

C. poecilus C.B. Clarke (1902)

– type: Somalia, Mandire, *Keller* 58 (K holo.).

This species is given as occurring in Eritrea (Monte Faghena 2200 m, *C. Troll* 4179 & 4183), but as the author has not been able to find these collections (perhaps lost at B) the species has been excluded. It should, however, be looked for on this mountain.

114. *C. fissus* Steud. (1842)

– type: Ethiopia, Simen, near Gessgessa, *Schimper* 992 (P holo.).

Due to the very immature type-material of this species the author has not been able to refer it to any other species with certainty. It should be considered a doubtful species until better material turns up.



Figure 212.151 *CYPERUS MICROAUREUS*. Drawn by R.W. Haines from Greenway 13353. (Reproduced with permission from Haines & Lye, fig. 642, 1983.)

12. *LIPOCARPHA* R. Br. (1818), *nom. conserv.*
including *Rikliella* Rayn. (1973)

Goetghebeur & Van den Borre, *Wageningen Agric. Univ. Pap.* 89(1): 1–87 (1989).

Small annuals or tufted perennials. Stems 3-angled, terete or somewhat flattened, glabrous. Inflorescence a terminal head of few to many sessile cone-like spikes, or one apparently lateral spike, rarely a cluster of a few lateral spikes. Involucral bracts several, spreading or reflexed, or (for plants with apparently lateral inflorescence) erect and stem-like. Spikes with numerous closely set and spirally arranged bracts; each bract subtending a flower enclosed in 2 delicate hypogynous scales (these are bract and prophyll in a 1-flowered spikelet), or rarely one or both scales aborted (in *L. isolepis*). Flowers usually bisexual. Stamens 1–3. Style with 2 or 3 short or long stigmas. Nutlets papillose, falling enclosed in the hyaline scales.

About 20 species in the tropical and subtropical regions of both hemispheres; 13 species in Africa of which 5 occur in the Flora area.

1. Annual, nutlets not surrounded by 1–2 very thin membranous scales. 5. *L. rehmannii*
- Annual or perennial, nutlets surrounded by 1–2 very thin, membranous scales. 2
2. Spikes (appear like spikelets) solitary on each stem, apparently lateral. 4. *L. hemisphaerica*
- Spikes few to many in a terminal head or cluster. 3
3. Inflorescence green-grey or white. 1. *L. chinensis*

- Inflorescence brown, red brown or black. 4
- 4. Scales of spikes with an awn at least $\frac{1}{3}$ the length of the scale; annual. 3. *L. nana*
- Scales of spikes without such long awns; annual or perennial. 2. *L. constricta*

1. *L. chinensis* (Osb.) Kern (1958);

Scirpus chinensis Osb. – type: from 'East Asia'.

L. argentea (Vahl) R. Br. in Tuckey (1818).

Perennial with a much reduced rhizome. Stems 15–80 x 0.1–0.15 cm, 3-angled. Leaf-blades 10–40 x 0.1–0.6 cm, flat or enrolled, scabrid at least on margins and midribs; sheaths green, brown, or purple. Inflorescence a grey irregular head usually 1–2 cm in diameter. Involucral bracts 2–3, spreading, leafy. Spikes 4–12, rounded conical with obtuse apex. Scales of spikes 2–2.5 mm long, spatulate, dull grey white with small red brown dots and a rounded slightly green keel. Stamens 1–2. Style with 3 stigmas. Fig. 212.152

Swampy grassland and seasonally wet swamps; c 1400–2100 m. GD SU WG KF SD; widespread in tropical Africa, and from India to China and Australia. Gilbert & Thulin 891; Schimper 1301.

2. *L. constricta* Goetgh. (1989)

– type: Burundi, Reekmans 3801 (BR holo., WAG iso.).

Slender perennial. Stems 20–60 x 0.07–0.1 cm, somewhat 3-angled. Leaf-blades up to 20 x 0.1–0.3 cm, glabrous; sheaths dark purple or green with dark purple dots or lines. Inflorescence a congested head of 2–5 crowded red brown spikes 5–10 mm in diameter. Involucral bracts 2, spreading or reflexed, leafy. Spikes 3–6 x 2.5–3 mm, ovate, obtuse; rachis 0.7–1 mm thick; scales c 1.5–2 mm long, very concave, broadly obovate with the upper $\frac{1}{3}$ bent so as to form a roof over the nutlets, pale, but densely set with red brown lines so as to appear dark; midrib green, ending at apex or slightly extended in a short triangular tip. Stamens 1–2. Style with 3 branches. Nutlets 1–1.2 mm long; broadly obovate, 3-angled, with a conspicuous basal constriction.

Swampy ground; c 1500 m. BA; Burundi. Mooney 7213, 8392.

3. *L. nana* (A. Rich.) Cherm. (1924);

Fuirena nana A. Rich. (1851) – type: TU, Kouayeta, Quartin-Dillon s.n. (P holo.).

L. pulcherrima Ridl. (1884).

Slender annual. Stems 2–25(–40) x 0.02–0.05 cm, somewhat flattened. Leaf-blades 2–8 cm long; the sheaths often tinged with violet-red, especially below. Inflorescence of 3 (sometimes 1, 2 or 4) dark spikes. Involucral bracts 1–3, leafy. Spikes 2–8 x 2.5–5 mm, ovate, with minute rough scales. Scales of spike about 1.5 mm long, pale brown to almost black, squarish but abruptly narrowed into a long reflexed awn. Stamens 1–2. Style with 3 stigmas. Nutlets 0.6–0.9 mm long, obovate. Fig. 212.153



Figure 212.152 *LIPOCARPHA CHINENSIS*. Drawn by R. W. Haines from Haines 4044. (Reproduced with permission from Haines & Lye, fig. 613, 1983.)

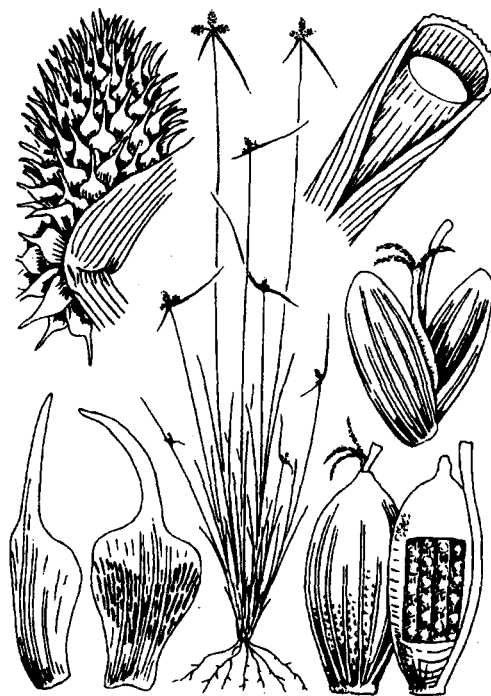


Figure 212.153 *LIPOCARPHA NANA*. Drawn by R. W. Haines from Haines 4035. (Reproduced with permission from Haines & Lye, fig. 618, 1983.)

Seasonally wet ground, often in seepage-zones on shallow soils over rocks; 1400–2000 m. TU WG IL SD; throughout tropical Africa from Guinea and Nigeria to Namibia and Transvaal, Madagascar. Mooney 7553; Gilbert & Thulin 771.

4. *L. hemisphaericus* (Roth) Goetgh. (1989);

Scirpus hemisphaericus Roth (1821) – type: India, Heyne s.n. (B ?holo. ?destr.).

L. isolepis (Nees) R. Haines (1971); *Scirpus isolepis* (Nees) Böck. (1870).

Slender dwarf annual. Stems 3–18 x 0.02–0.03 mm, rounded or angular. Leaf-blades 1–4 cm long; the sheaths usually stained purple. Inflorescence a single lateral cone-like spike with a single bract seemingly continuing the stem above the inflorescence. Spike 1–6 x 1–2 mm, ovate to obtuse; scales c 0.8 mm long; squarish, but much wider above than below, dark red brown above, pale brown to grey below; midrib very prominent, pale green and ending in a short mucro. The 2 delicate scales enclosing the flower are sometimes lacking. Stamen 1. Style very short with 2 stigmas. Nutlets 0.7–0.8 mm long, obovate.

Shallow seasonally wet soil over rocks; 700–1000 m. GD GG; tropical Africa, S Africa, India, SE Asia. Schweinfurth 2047; Friis et al. 6907; Gereau 1298.

5. *L. rehmannii* (Ridl.) Goetgh. (1989);

Rikliella rehmannii (Ridl.) Rayn. (1973); *Scirpus*

rehmannii Ridl. (1884) – type: Angola, Welwitsch 1678 (BM holo.).

Scirpus squarrosus L. sensu Cufodontis, *Enum.* (1970–71), non sensu L.

Delicate, sometimes minute, annual with red brown roots. Stems 2–30 x 0.03–0.06 cm. Largest leaf-blades 1–6 x 0.07–0.15 cm, flat, scabrid on margins and midribs at least above; sheaths dark purple. Inflorescence of 3–12 crowded spikes, 5–13 mm in diameter, or, in very small specimens, only 1–2 spikes. Involucral bracts 2–9, spreading or reflexed, leaf-like. Spikes 3–8 x 2–4 mm, variegated dark red brown and green, looking 'spiny' from the long awns on the scales; scales spreading or reflexed, 2–3 mm long including the 1–2 mm long awn, red brown with green awn. Stamens 1–2. Style with 3 long branches. Nutlets 0.5–0.7 mm long, obovate, obscurely 3-angled, with 8–15 rows of tubercles on each side. Fig. 212.154.

Seasonally wet ground; 700–800 m. GD; Kenya, Tanzania, Zimbabwe, Malawi, Mozambique, Angola, Namibia, Natal and Madagascar. Schweinfurth 3003.

13. *ASCOLEPIS* Steud. (1855), *nom. conserv.*

Goetghebeur, *Adansonia*, ser. 2, 19: 269–305 (1980).

Slender annuals or more robust, mostly densely tussocky, perennials. Stems 3-angled to terete. Leaves flat, but often inrolled. Inflorescence a dense white, grey brown, yellow or dark head of 1 to several spikes or



Figure 212.154 *LIPOCARPHA REHMANNI*. Drawn by R.W. Haines from Lye 6360. (Reproduced with permission from Haines & Lye, fig. 623b, 1983.)

cones each with very numerous 1-flowered crowded spikelets. Involucral bracts 2 to many, leaf-like, spreading or reflexed. Each spikelet consists of a small spikelet-bract, a hypogynous scale (squamella) and a flower. The squamella is often conspicuous and petal-like, sometimes enclosing the nutlet and falling with it, sometimes separate. Stamens 1–3. Ovary with 2–3-fid style. Nutlets 0.6–2.5 mm long, minutely papillose to almost smooth.

About 20 species, almost entirely confined to Africa south of the Sahara. One species in South America and 2 extend to Indo-China.

1. Squamellae obovate with a central 'pocket' enclosing the flower; style 2-branched.
 3. *A. capensis*
 - Squamellae narrow with margins somewhat incurved below, without a 'pocket' and not entirely enclosing the flower; style 2- or 3-branched. 2
 2. Mature inflorescence 4–9 mm in diameter, squamellae 2–3 mm long with acute apex, the outer not longer than the inner.
 2. *A. eriocauloides*
 - Mature inflorescence 10–20 mm in diameter; squamellae 4–8 mm long with obtuse apex, the outer often longer than the inner. 1. *A. protea*
1. *A. protea* Welw. (1869).

Tussocky perennial with a somewhat swollen base often covered by the fibrous remains of old leaf-sheaths.

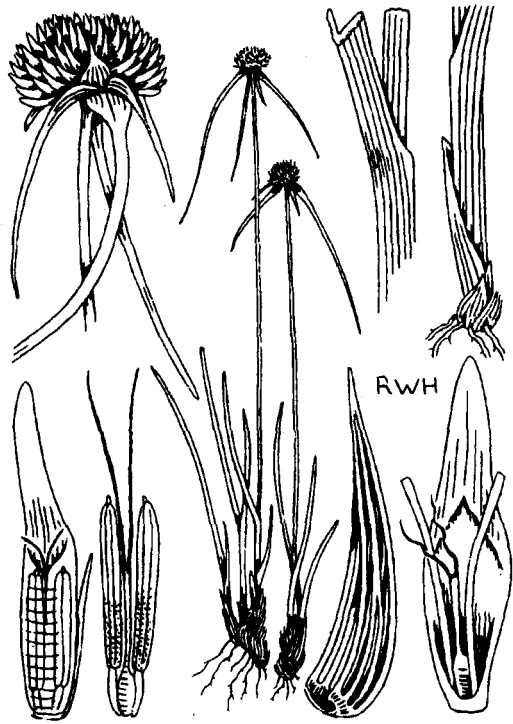


Figure 212.155 *ASCOLEPIS PROTEA* subsp. *BELLIDIFLORA*. Drawn by R.W. Haines from Richards 7389. (Reproduced with permission from Haines & Lye, fig. 628, 1983.)

Leaf-blades relatively short. Inflorescence a 5–9 mm wide hemispherical to subglobose white head. Squamellae 3–4 mm long, all of about the same length; apex rather thick, obtuse; the basal part only partly enclosing the flower.

subsp. *bellidiflora* (Welw.) Lye in *Nordic J. Bot.* 2 (1983);

A. protea Welw. var. *bellidiflora* Welw. (1869); *A. bellidiflora* (Welw.) Cherm. (1931) – types: Angola, Welwitsch 1668 & 1672.

Stems 10–40 cm long. Inflorescence 10–20 mm in diameter. Bracts of spikelet about 1/2 the length of the squamellae. Ligulate squamellae 4–8 mm long, the outer usually longer than the inner. Nutlets 0.8–0.9 mm long, narrow obovate, densely papillose. Fig. 212.155.

Seasonally wet swamps or grasslands; 1200–1800 m. TU; tropical Africa west to Nigeria and south to Angola and Zimbabwe. *Quartin-Dillon & Petit* s.n.

Haines and Lye (1983) recognise 6 subspecies, most of which, including subsp. *protea*, occur from southern Tanzania through central Africa to Angola.

2. *A. eriocauloides* (Steud.) Steud. (1855); *Kyllingia eriocauloides* Steud. (1842) – type: TU, Gafta, Schimper 1195 (P holo., K syn.).

Slender perennial, perhaps sometimes annual, with a small bulbous base surrounded by old fibrous remains of leaf-sheaths. Stems few, 6–25 x 0.03–0.05 cm. Leaf-



Figure 212.156 *ASCOLEPIS ERIOCAULOIDES*. Drawn by R.W. Haines from *de Wilde* 7487. (Reproduced with permission from Haines & Lye, fig. 635, 1983.)

blades 1–3 per stem, to 10 cm long. Inflorescence a hemispherical grey white head 4–9 mm in diameter. Involucral bracts 3–4, spreading or reflexed, leafy. Squamellae 2–3 mm long, white, upper part rather thick and acute, margins of lower part partly enclosing the flower and nutlet. Stamens 1. Style with 2–3 stigmas. Nutlets narrowly obovate. Fig. 212.156.

Seasonally wet grassland or seepage zones on shallow soils over rocks; 1300–2500 m. TU WG KF; not known elsewhere. *Schimper* 106; *W. de Wilde* 7487; *Gilbert & Thulin* 693.

3. *A. capensis* (*Kunth*) *Ridl.* (1884);

Platylepis capensis Kunth – type: S Africa, *Drège* s.n.

Dense tussocky perennial with short woody rhizome and many leafy stems. Stems 30–80 x 0.03–0.1 cm, slightly compressed with weak longitudinal ridges. Leaves usually 10–30(–70) x 0.1–0.3 cm, rolled inwards when dry, glabrous. Inflorescence a rounded hemispherical pure white (when fresh and young) head. Involucral bracts 1–3, leaf-like, spreading or reflexed. Squamellae 3–4 mm long, white with rust-brown lines below, flat with the flower in a central hollow 'pocket'. Style 2-branched. Nutlets 2–2.5 mm long, oblanceolate, dark violet black, nearly smooth. Fig. 212.157.

Seasonally wet grasslands, swamps and marshes; 1500–1800 m. SU KF SD BA; Africa west to Sierra

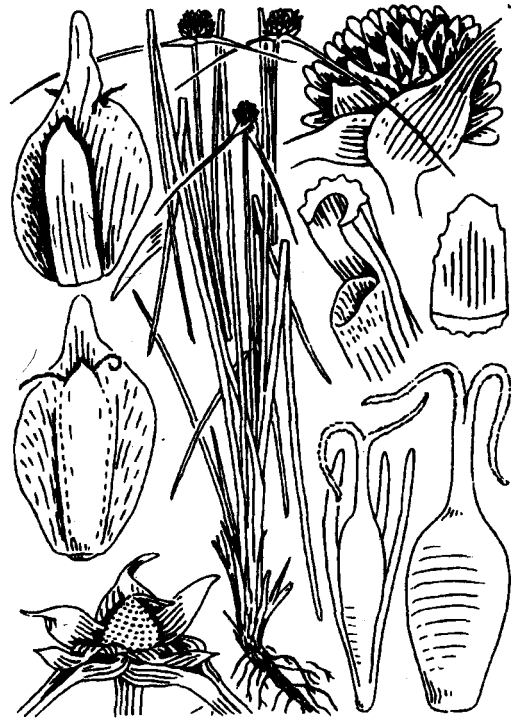


Figure 212.157 *ASCOLEPIS CAPENSIS*. Drawn by R.W. Haines from *Haines* 4092. (Reproduced with permission from Haines & Lye, fig. 641, 1983.)

Leone and south to South Africa. *Mooney* 6127; *Gilbert & Thulin* 895; *Mesfin T & Kagnev* GY. 2520.

14. *SCHOENUS* L. (1753)

Kükenthal, Feddes Repert. 44: 1–32, 65–101, 161–195 (1938).

Perennial herbs usually forming dense tussocks. Stems usually smooth and ending in a dense bracteate cluster of spikelets. Leaves all basal. Spikelets with subdistichous glumes, lowermost sterile. Flowers usually hermaphrodite; perianth of 1–6 small bristles or absent. Stamens 1–6, usually 3. Style with 3 stigmas, rarely 2. Nutlets small, usually 3-angled, without a persistent style-base.

About 75 species, mainly in Australia and New Zealand; only 1 species in Africa.

S. nigricans L. (1753).

Dense tussocky plant with few to many culms and numerous leafy shoots. Stems 15–70 x 0.05–0.2 cm, with many rounded longitudinal ridges, glabrous. Leaves from the basal 12 cm only; basal sheaths chestnut-brown to red brown, often glossy; blades 10–40 x 0.04–0.1 cm, flat or somewhat channeled, hard and wiry, minutely scabrid at least on margins near tip. Inflorescence a head, 5–20 x 10–15 mm, with 5–20 crowded spikelets. Involucral bracts glume-like, largest with glume-like base and 0.5–5 cm long green leafy awn.

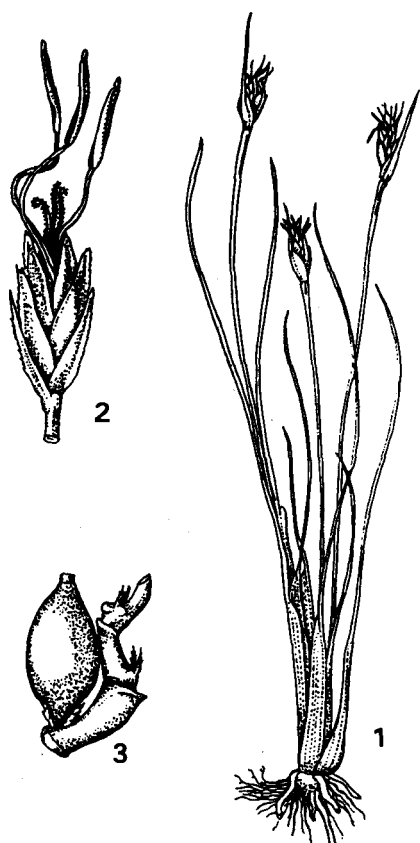


Figure 212.158 *SCHOENUS NIGRICANS*: 1 -- whole plant x 1/2; 2 -- spikelet x 3; 3 -- nutlet with rachilla x 10. Redrawn from *Flora of Iraq* by Gerd Mari Lye.

Spikelets 5–15 x 2–4 mm, somewhat flattened with distichous glumes, usually 2–3-flowered; lower glumes much shorter than upper ones, largest glumes 7–8 mm long, red brown to almost black, minutely scabrid on midrib, otherwise glabrous. Perianth-bristles very small or absent. Stamens 3. Style with 3 long, strongly hairy stigmas. Nutlets about 1.5 mm long, obtusely 3-angled, white, shiny. Fig. 212.158.

Seasonally wet habitats; 2700–2900 m. EW; Somalia, South Africa, North Africa, Europe, Middle East, America. *Pappi* 1297, 1335.

15. RHYNCHOSPORA Vahl (1806), *nom. conserv.*

Kükenthal, *Bot. Jahrb.* 74: 375–509 (1949); 75: 90–195 (1950), 273–314 (1951), 451–497 (1952).

Perennial or annual herbs with rounded or 3-angled, leafy stems. Inflorescence usually a panicle, frequently with inflorescence-branches ending in corymbs. Spikelets stalked or sessile, with spirally arranged glumes, lowest 2–5 glumes sterile. Glumes light to dark red brown, rarely white. Perianth usually of 6 bristles with minute teeth directed towards the apex, or bristles absent, rarely with up to 13 bristles. Stamens 2–3. Style unbranched, slightly divided at the tip only, or with 2 long branches. Nutlets obovate, oblanceolate, urn-shaped or almost square with the swollen style-base persisting on the mature nutlets as a short-conical or long-conical cap, or as an overhanging spongy crown.

About 200 species, widely distributed, but particularly widespread in Tropical America. In tropical Africa 11 species.

1. Plant robust, 60–250 cm tall; leaves 1–2 cm wide.

1. *R. corymbosa*

– Plant slender, 5–50 cm tall; leaves 0.05–0.3 cm wide.

2. *R. subquadrata*

1. *R. corymbosa* (L.) Britt. (1892);

Scirpus corymbosus L. (1760).

R. aurea Vahl (1806).

Coarse tufted perennial with woody rhizome. Stems 60–250 cm long, up to 1 cm wide at the base to 0.25–0.35 cm wide above, 3-angled with nodes and leaf-blades throughout its length. Leaves numerous and densely crowded below, largest blades 50–100 x 1–2 cm, usually very tough and densely set with spine-like teeth on margins. Inflorescence: 1 terminal and several lateral corymbs; major branches to 10 cm long. Spikelets 6–10 x 1.5–2.5 mm, narrowly lanceolate, brown, grouped into stalked clusters, usually 2–3-flowered, the upper flower often male. Largest glumes 6–9 mm long, glabrous with narrowly midrib. Bisexual flowers with 6 perianth-bristles. Stamens 3. Style unbranched or slightly divided at the tip. Nutlets c 4 x 1–2 mm, oblanceolate, brown, coarsely nodular or wrinkled, persistent style-base a long cone, about as long as the nutlets. Fig. 212.159.

Swamps and lake-shores; c 1250 m. WG; widespread in all tropical and warm temperate regions. *Smeds* 1102.

2. *R. subquadrata* Cherm. (1922);

R. gracillima Thw. subsp. *subquadrata* (Cherm.)

Rayn. in *Adansonia*, ser. 2, 7 (1967) – type: from ‘Madagascar’.

Slender leafy annual, possibly perennial, with short rhizome and many crowded stems. Stems (including area of inflorescence) 5–40 x c 1 cm, rounded or angular; leaves at base reduced to scales. Leaf-blades 5–25 x 0.05–0.1 cm, flat or rolled inwards, upper surface with large rectangular surface cells, at least near the sheath; margins densely set with spine-like teeth, at least near apex; sheath thin and translucent on one side; ligule sometimes a distinct ridge. Inflorescence of flowering branches along most of stem, those near apex maturing first. Inflorescence bracts leafy, up to 20 cm long. Each inflorescence branch 2–8 cm long with 1–5 pedunculate spikelets, the terminal spikelet overtopped by side branches. Peduncles very slender, 1–20 x 0.1–0.2 mm, bract filiform, pale, 2–6 mm long. Spikelets 4–7 x 0.7–1.5 mm, acute, pale brown; lower 2–3 glumes sterile, 1.5–2.5 mm long, those above fertile, 3–3.5 mm long; rachilla zigzag. Glumes pale brown, midrib shortly extended or ending at apex. Perianth segments absent. Stamens 2. Style with 2 long branches. Nutlets 1.3–1.6 x 1–1.3 mm, including 0.1–0.2 mm flat conical top, white, almost square, transversely wavy; pedicel persistent, 2–3 mm long, red brown.

Wet grassland with swampy area; c 1800 m. SD;



Figure 212.159 *RHYNCHOSPORA CORYMBOSA*. Drawn by R. W. Haines from Haines 4263. (Reproduced with permission from Haines & Lye, fig. 643, 1983.)

Tanzania, Uganda, widespread in W and C Africa, and also in southern Africa. *Mesfin T. et al.* 3648.

16. SCLERIA Bergius (1765)

Robinson, *Kew Bull.* 18: 487–551 (1966).

Annual or perennial herbs. Stems 3-angled, often scabrid, with leaf nodes. Leaf-blades linear to narrowly oblong, glabrous or hairy, frequently strongly scabrid on margins and ribs; sheaths closed, occasionally 3-winged, sometimes separated from the blade by a ligule, the 2–3 lower sheaths usually without a blade. Inflorescence paniculate with 1 terminal and usually 1 to many lateral panicles from the upper leaf-sheaths, or reduced to dense clusters of sessile spikelets, often these clusters arranged in spikes. Involucral bracts leafy or glume-like. Spikelets with flowers of one or both sexes; lower 2–4 scales empty. Bisexual spikelets with one basal female flower and one or a few male flowers above. Female spikelets like bisexual spikelets but upper male portion reduced to 1 or 2 empty scales or absent. Male spikelets like bisexual spikelets but without basal female flower and often with more male flowers. Flowers unisexual, solitary in the axils of spirally or distichously arranged glumes. Glumes green, brown or red brown, glabrous or with stiff spreading black, red or pale hairs, sometimes hairy on midrib only. Male flowers of 1–3 stamens. Female flowers with an ovary and 3-branched style. Nutlets ovoid to depressed subglobose, sometimes obscurely 3-angled, white, grey, violet or black;

surface smooth, reticulate, tuberculate or pitted, glabrous or hairy, borne on a stalk (cupula). Cupula often 3-angled, dilated into a simple or 3-lobed disc, more rarely cup-like or almost absent.

About 200 species in all tropical and subtropical regions except the Mediterranean and the Orient, particularly abundant in Africa and America.

1. Inflorescence terminal only; spikelet-clusters usually in spikes; bracts not leafy. 2
 - Inflorescence terminal and lateral; spikelets not in spikes; bracts leafy. 8
2. Perennial with well-developed rhizomes. 3
 - Annual with minute root-system. 5
3. Spikelet clusters reflexed. 1. *S. distans*
 - Spikelet clusters erect or spreading. 4
4. Stems strongly bulbous at the base; inflorescence rarely branched. 2. *S. bulbifera*
 - Stems not bulbous at the base; inflorescences branched. 3. *S. woodii*
5. Spikelet clusters reflexed; glumes hairy. 4. *S. melanotricha*
 - Spikelet clusters erect or spreading; glumes glabrous or hairy. 6
6. Plant densely hairy; female glumes hairy all over. 5. *S. hispidior*
 - Plant sparsely hairy; female glumes glabrous or hairy on the midrib only. 7
7. Nutlets with a depressed 3-angled globose tuberculate or irregularly reticulate upper part, sharply set off from the cuneate base. 7. *S. pergracilis*
 - Nutlets obovate, regularly reticulate, the base not very sharply set off from the upper part. 8. *S. hispidula*
8. Nutlets surrounded by a basal 'cup' with ciliate margin; robust perennial, 1–2 m tall. 14. *S. racemosa*
 - Nutlets with 3 basal lobes or cupula scarcely developed; annual or perennial. 9
9. Nutlets depressed subglobose, wider than long, smooth. 9. *S. schimperiana*
 - Nutlets ovate or obovate, longer than wide, smooth or covered with pits. 10
10. Stems with minute recurved hooks on the angles; robust perennial. 12. *S. lagoënsis*
 - Stems without recurved hooks, scabrid or glabrous on the angles; perennial or annual. 11
11. Nutlets 3.7–4.2 mm long, smooth, white but usually blue-black at the apex; robust perennial. 13. *S. melanomphala*
 - Nutlets 2–3.5 mm long, smooth or covered in pits; annual or slender perennial. 12
12. Nutlets smooth; all spikelets bisexual. 8. *S. lithosperma*
 - Nutlets usually somewhat pitted; at least some spikelets entirely male. 13
13. Lateral panicles 2 or more arising from at least one of the nodes; nutlets 2–2.8 mm long with poorly developed basal lobes. 11. *S. clathrata*

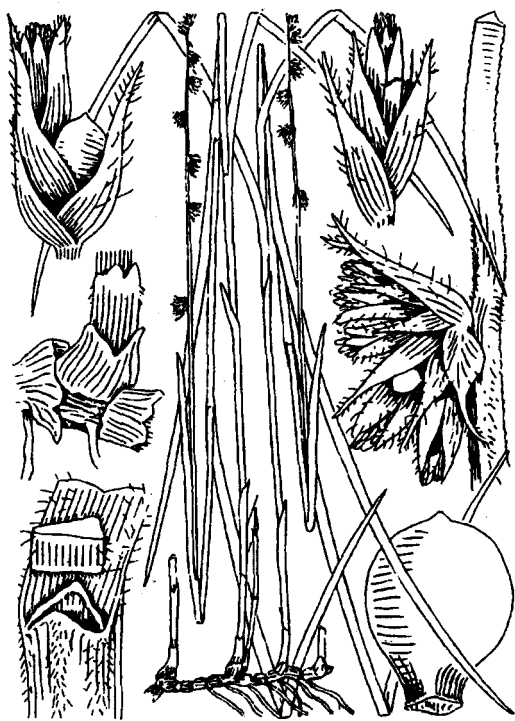


Figure 212.160 *SCLERIA DISTANS*. Drawn by R.W. Haines from *Haines* 4004. (Reproduced with permission from Haines & Lye, fig. 674, 1983.)

- Lateral panicles solitary from the leaf-sheaths; nutlets 2.7–3.5 mm long with 3 distinct basal lobes. 10. *S. foliosa*

1. *S. distans* Poir. (1806)

- type: from Puerto Rico, *Ledru* 110 p.p. (P holo.).

S. nutans Willd. ex Kunth (1837).

S. hirtella Sw. sensu Cufod. (1971).

Slender perennial with creeping horizontal rhizome and many stems at 0.2–2 cm intervals. Rhizome to c 10 x 0.2–0.4 cm, red brown. Stems 20–50(–90) x 0.05–0.15 cm, hairy or almost glabrous. Leaf-blades mainly from middle part of stems, up to 18 x 0.1–0.3 cm, hairy; sheaths green or brown, hairy. Inflorescence a lax 'spike' 5–10 cm long with 4–9 sessile, drooping, spikelet-clusters. Spikelets bisexual. Glumes 3–6 mm long, red brown to black; midrib and awn densely set with spreading red brown hairs. Nutlets 1.4–1.5 mm long, obovate, smooth or with indistinct tubercles or wrinkles, white, rarely with a pale violet tinge. Fig. 212.160.

In black humus soils in marshes or low-lying sites in grassland; 1600–2400 m. KF SD; tropical Africa, Madagascar and America. *E.F. Gilbert* 342; *MG & SB Gilbert* 1337; *Friis* et al. 378.

2. *S. bulbifera* Hochst. ex A. Rich. (1851)

- types: TU, near Dochli (Tecli), *Schimper* 1557

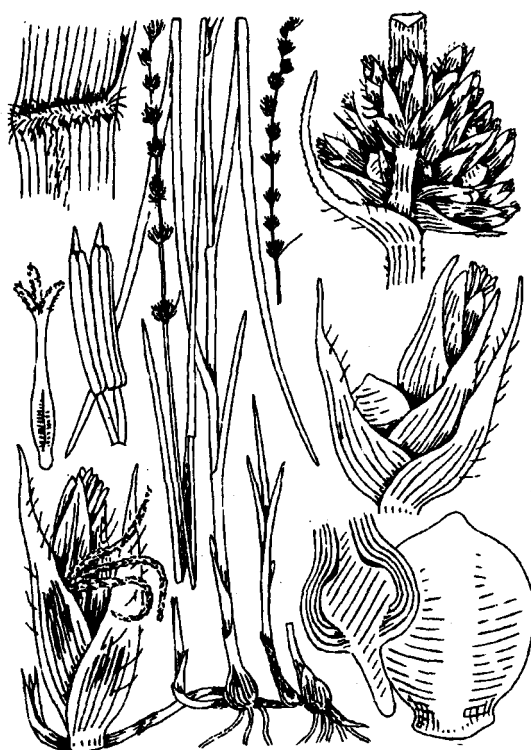


Figure 212.161 *SCLERIA BULBIFERA*. Drawn by R.W. Haines from *Haines* 4619. (Reproduced with permission from Haines & Lye, fig. 677, 1983.)

(P lecto., UPS isolecto.); Mt. Sellauda, *Schimper* 327 (P syn.); Chiré *Quartin-Dillon* s.n. (P syn.).

S. atrosanguinea Hochst. ex Steud. (1855) -type: TU, Mt. Scholoda (Sellauda), *Schimper* 327 (P holo., UPS iso.).

Perennial with somewhat spaced-out stems from 1–5 cm long stolons, or stems more crowded on a horizontal rhizome. Stems 30–70 x 0.07–0.15 cm (to 0.35 cm across the sheaths), glabrous; base prominently swollen, bulb-like, 0.4–1 cm in diameter. Leaf-blades 15–30 x 0.2–0.5 cm, glabrous or slightly hairy; lower sheaths red-brown. Inflorescence a lax 'spike' 5–20 cm long with 6–20 sessile erect spikelet-clusters. Spikelets bisexual. Glumes 3–4 mm long, red brown, midrib usually green, glabrous or with short white hairs. Nutlets 1.6–2 mm long, obovate, white or grey, smooth, or obscurely reticulate or tuberculate. Fig. 212.161.

Grassland, often with shrubs, or in open woodland, usually on loamy soils; 1200–2400 m. TU GD SU AR WG HA; tropical and S Africa; Madagascar. *Ash* 2003; *W. De Wilde* 7191; *Thulin* 1457.

3. *S. woodii* C.B. Clarke (1898)

- type: S Africa, *Wood* 3994 (K holo.).

Slender perennial with a short or long slender horizontal rhizome. Stems 20–60(–85) x 0.05–0.15 cm (to 0.25 mm across the sheaths), glabrous or slightly scabrid below inflorescence; base not swollen. Leaf-blades to 30 x 0.1–0.25 cm, flat, hairy or glabrous; lower sheaths red, usually glabrous. Inflorescence a lax 'panicle' 5–14

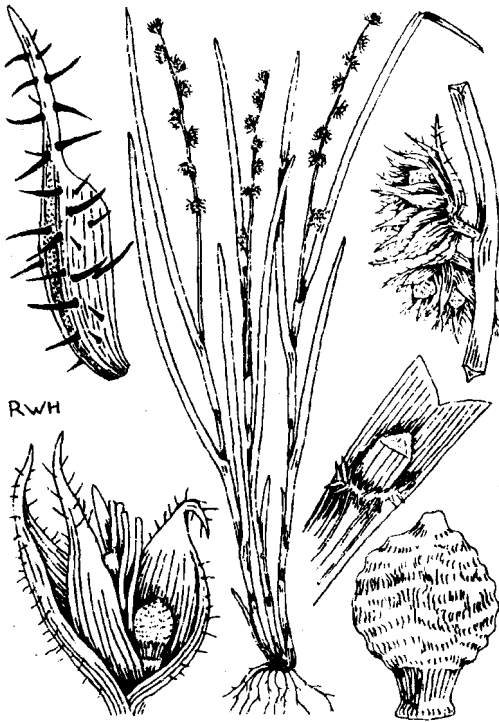


Figure 212.162 *SCLERIA MELANOTRICHA*. Drawn by R.W. Haines from Kahurananga et al. 2759. (Reproduced with permission from Haines & Lye, fig. 696, 1983.)

x 2–7 cm, usually branched once only. Spikelets 4–5 mm long. Glumes 3–5 mm long, straw-coloured with red brown streaks or patches or almost entirely dark red brown except for the paler midrib, glabrous. Nutlets 1.6–2 mm long, obovate with a fairly prominent 3-angled base, white or grey, smooth, tuberculate or with irregular transverse ridges.

Seasonally damp grassland, often in open woodland; 1900–2600 m. WG SU AR GG SD; tropical and South Africa. *Gilbert & Thulin* 614; *W. De Wilde* 6808; *Gilbert & Jefford* 4302.

4. *S. melanotricha* Hochst. ex A. Rich. (1851)
– types: TU, near Guendepa (Gafta), *Schimper* 830 (P lecto.); Chiré, *Quartin-Dillon* s.n. (P syn.).

Slender annual. Stems 10–50 x 0.05–0.15 cm (to 0.3 cm across the sheaths), hairy. Leaf-blades to 30 x 0.1–0.3 cm, flat, strongly hairy; lower sheaths brown, upper green, strongly hairy. Inflorescence a lax spike 3–20 cm long with 5–15 sessile reflexed spikelet-clusters (sometimes reduced to solitary spikelets). Spikelets 5–9 mm long, bisexual. Glumes 4–7 mm long, ending in a prominent awn, green to red brown, densely hairy with transparent, brown or black spreading hairs. Nutlets 1.2–1.5 mm long, yellow-brown to grey, with subglobose transversely wrinkled to ribbed upper part sharply set off from the 3-angled basal part. Fig. 212.162.

Seasonally damp grassland or shallow soil over rocks, often in seepage zones; 1300–2000 m. TU WG; tropical Africa. *Gilbert & Thulin* 657, 797.

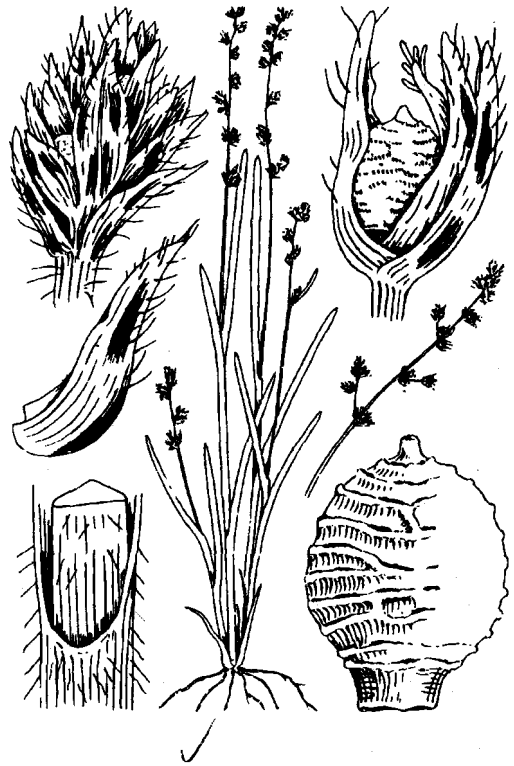


Figure 212.163 *SCLERIA HISPIDIOR*. Drawn by R.W. Haines from Wood 448. (Reproduced with permission from Haines & Lye, fig. 698, 1983.)

5. *S. hispidior* (C.B. Clarke) Nelmes (1955);
S. hispidula Hochst. ex A. Rich. var. *hispidior*
C.B. Clarke in *Fl. Trop. Afr.* (1902) – type: GD, Debra Ari, *Schimper* 1278 (K holo.).

Slender annual. Stems 2–25 x 0.05–0.1 cm (to 0.2 cm across the sheaths), hairy. Leaf-blades 4–15 x 0.17–0.35 mm, flat, densely hairy; lower sheaths brown, or all sheaths green, strongly hairy. Inflorescence a lax 'spike' or narrow 'panicle' 3–10 x 1–6 cm, with 2–8 sessile or shortly stalked spikelet clusters, more rarely a few 1–4 cm long spreading or reflexed lateral branches each with 2–4 sessile spikelet-clusters. Spikelets 3–6 mm long, bisexual. Glumes 3–5 mm long, light red brown to almost black, midrib often green, densely set with long spreading black (more rarely pale) hairs. Nutlets 1.2–1.5 mm long, obovate with a short 3-angled base, white (when young) to dark grey with black dots on ridges, strongly transversely wrinkled or irregularly ribbed. Fig. 212.163.

Seasonally damp grassland or on wet flushes on shallow soils over rocks; 1850–2600 m. TU/GD GD SU AR WG IL; Uganda. *Thulin* 1634; *Gilbert & Thulin* 861, 927.

6. *S. hispidula* Hochst. ex A. Rich. (1851)
– type: TU, Guendepa (Gafta), *Schimper* 1277
(P holo., UPS iso.).

Slender annual. Stems 5–30(–60) x 0.05–0.08 cm (to 0.2 cm across the sheaths), glabrous. Leaf-blades to 20 x 0.1–0.3 cm, flat, glabrous or sparsely hairy, scabrid on

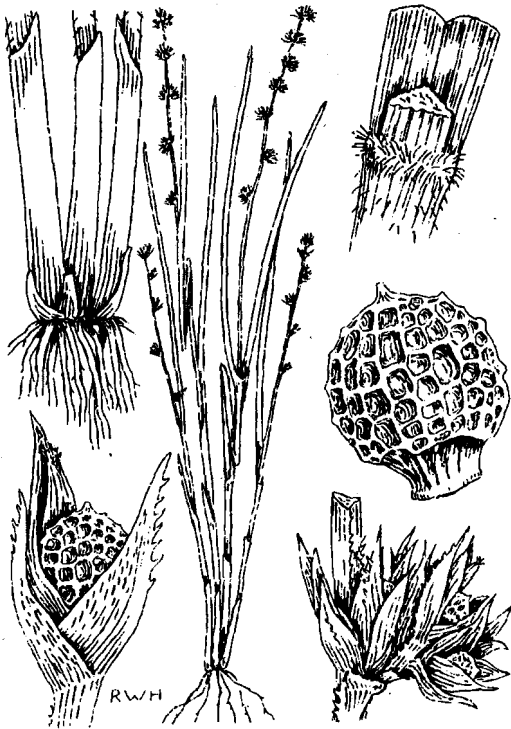


Figure 212.164 *SCLERIA HISPIDULA*. Drawn by R.W. Haines from Polhill & Paulo 2224. (Reproduced with permission from Haines & Lye, fig. 700, 1983.)

margins at least near the tip; lower sheaths brown or red brown, upper green, glabrous or hairy. Inflorescence a lax 'spike' 2–10 cm long with 2–10 sessile spikelet-clusters, rarely with 1–2 short lateral branches. Spikelets 3–4 mm long, bisexual. Female glumes 3–4 mm long, medium to dark red brown with green strongly scabrid midrib, otherwise glabrous. Nutlets 1.2–1.6 mm long, obovate with short 3-angled base not prominently set off from the upper part of the nutlets, grey white, regularly ribbed. Fig. 212.164.

Seasonally damp grassland, often on black cotton soil and in open woodland; 1350–2600 m. TU GD GJ SU; Tanzania and Zambia. *Gilbert & Thulin* 601, 986; *J. De Wilde & Gilbert* 290.

7. *S. pergracilis* (Nees) Kunth (1873)

– type: India, *Wallich* 3406 (K holo.).

Tall slender annual. Stems 15–40(–60) x 0.05–0.1 cm, glabrous. Leaf-blades to 40 x 0.1–0.2 cm, flat, scabrid on margins and midrib near the tip, otherwise glabrous; lower sheaths brown, upper green, glabrous. Inflorescence a lax 'spike' 3–12 cm long with 5–20 sessile erect spikelet-clusters, rarely with 1–2 short branches below. Spikelets 4–5 mm long, bisexual. Glumes 3–4 mm long, medium to dark red brown with green scabrid midrib, otherwise glabrous. Nutlets 1.3–1.8 mm long, white to black with a depressed subglobose ribbed or wrinkled upper part prominently set off from the 3-angled base. Fig. 212.165.

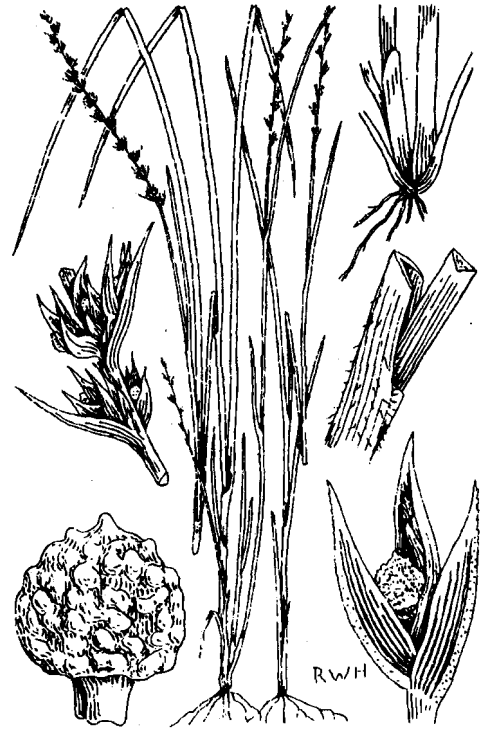


Figure 212.165 *SCLERIA PERGRACILIS*. Drawn by R.W. Haines from *Milne-Redhead & Taylor* 9933. (Reproduced with permission from Haines & Lye, fig. 705, 1983.)

Wet flushes on basalt pavement; c 1300 m. WG; tropical Africa, Natal, India, Sri Lanka and New Guinea. *Gilbert & Thulin* 656.

It is somewhat doubtful if *Gilbert & Thulin* 656 should be referred to *S. pergracilis*, since it differs in having strongly hairy glumes. It has, however, been identified as such by the late J. Raynal.

8. *S. lithosperma* (L.) Sw. (1788);

Scirpus lithospermus L. (1753) – type: from 'India'.

Slender perennial with short rhizome and relatively few stems. Stems 30–90 x 0.1–0.25 cm, minutely scabrid. Leaf-blades to c 30 x 0.2–0.5 cm, flat, scabrid on margins and midrib at least near the tip, more rarely hairy; lower sheaths brown, upper green, minutely short-hairy to glabrous. Inflorescence with 1 terminal and 2–3 lateral panicles, the latter rising singly at the nodes in the axis of leafy bracts. Spikelets 4–5 mm long, all bisexual. Glumes 3–5 mm long, light to medium brown, but midrib sometimes green, minutely scabrid at least on midrib and margins, otherwise glabrous. Nutlets 2.5–3 mm long, obovate with 3 depressions near the base, white, smooth; basal lobes absent. Fig. 212.166.

Gallery forest, in shade; c 1500 m. WG; pantropical. *W. De Wilde* 8937.

9. *S. schimperiana* Böck. (1874)

– type: GD, Sanka-Berr, *Schimper* 1235 (B holo.).

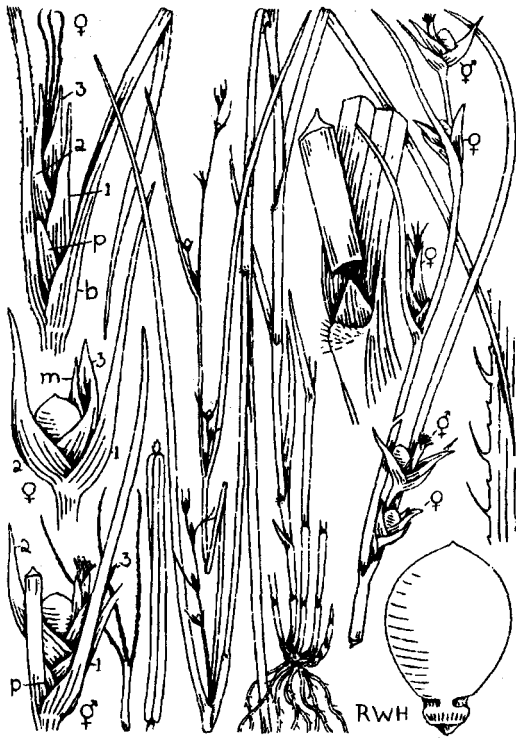


Figure 212.166 *SCLERIA LITHOSPERMA*. Drawn by R.W. Haines from Magogo & Glover 449. (Reproduced with permission from Haines & Lye, fig. 709, 1983.)

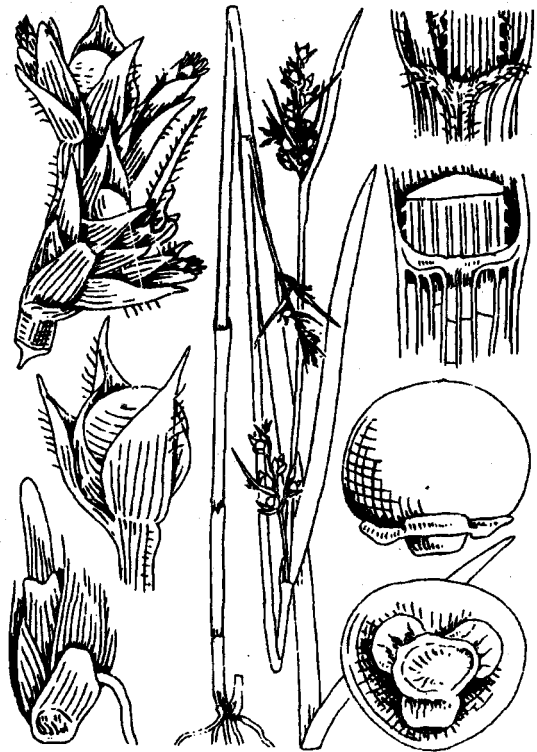


Figure 212.167 *SCLERIA SCHIMPERIANA*. Drawn by R.W. Haines from Pursglove 1362. (Reproduced with permission from Haines & Lye, fig. 710, 1983.)

S. hypoxis Schweinf. ex Böck. (1874); *S. schimperiana* Böck. var. *hypoxis* (Böck.) C.B. Clarke (1902) – type: GD, Metema, Schweinfurth 2054 (B holo.).

Robust annual. Stems 35–70 x 0.1–0.3 cm, glabrous or hairy towards the apex; angles scabrid. Leaf-blades to 40 x 0.2–0.7 cm, flat, scabrid or short-hairy on margins and major ribs; sheaths glabrous to short-hairy. Inflorescence of 1 terminal and 1–2 lateral panicles, each 2–5 cm long, widely spaced along the culm; peduncles to 8 cm long, usually short-hairy, erect or somewhat pendulous, always solitary from the leaf-sheaths. Male spikelets 4–5 mm long, with dark red brown glumes. Female spikelets 6–8 mm long, with 4–6 mm long light to dark red brown glumes, glabrous except for the short-hairy green midrib. Nutlets 2.5–3 mm long, compressed globose, white or pale grey, smooth and glabrous; cupula with 3 short white rounded lobes. Fig. 212.167.

Depressions in grasslands, swamps and open woodland near rivers and water falls; 750–1800 m. GD GJ SU KF; Uganda, Tanzania, Zaire, Zambia and Zimbabwe. Gilbert & Thulin 896; J. De Wilde & Gilbert 289; Mooney 6091.

10. *S. foliosa* Hochst. ex A. Rich. (1851) – types: TU, Guendepa (Gafta), Schimper 1232 (P lecto.); Chiré, Quartin-Dillon s.n. (P syn.).

Robust annual. Stems 25–60(–90) x 0.1–0.4 cm, glabrous or minutely scabrid. Largest leaf-blades 6–40

x 0.2–0.6 cm, flat, scabrid on margins and major ribs; sheaths glabrous or short-hairy. Inflorescence composed of 1 terminal and 1–3 well-spaced lateral panicles, always single at the nodes of the upper leaves; panicles 1–6 cm long. Male spikelets 4–5 mm long. Female spikelets 5–8 mm long. Glumes straw-coloured to dark red brown, midrib often green, glabrous except for midrib which is often scabrid and extended. Nutlets 2.7–3.5 mm long, ovoid, glabrous, white or grey (rarely almost black), coarsely and irregularly pitted. Fig. 212.168.

Wet flushes or depressions in grassland; 600–2000 m. TU GJ WG IL; tropical Africa, Transvaal, Madagascar and India. Gilbert & Thulin 667; Mesfin T. & Kagnev G.Y. 1802.

Pritchard 24 was collected from the Abay river where it crosses into the Sudan and it is not clear which side of the border the collection was made.

11. *S. clathrata* Hochst. ex A. Rich. (1851) – type: TU, Walcha, Schimper 1603 (P holo., BM iso.).

S. clathrata Hochst. ex A. Rich. var. *scandens* Fiori in Agr. Col. 35: 62 (1941) – type: KF, Jimma, Fiori s.n. (FT holo.).

Slender annual. Stems 5–60 x 0.07–0.25 cm, glabrous or minutely scabrid or short-hairy above. Leaf-blades 3–40 x 0.2–0.6 cm, flat, scabrid to short-hairy at least on margins and major ribs near the somewhat hooded



Figure 212.168 *SCLERIA FOLIOSA*. Drawn by R.W. Haines from Haines 4624. (Reproduced with permission from Haines & Lye, fig. 711, 1983.)

leaf-tip; lower sheaths pale or brown, upper green, glabrous or minutely scabrid. Inflorescence of 1 terminal and several lateral panicles, usually 2–3 at each node; peduncles slender, often pendulous, very unequal in length. Male spikelets 4–6 mm long. Female spikelets 8–10 mm long. Glumes pale to red brown with a prominent green, usually extended midrib, glabrous. Nutlets 2–3 mm long, ovoid-ellipsoid, white to dark grey or almost black, glabrous, minutely pitted or ribbed; cupula 0.7–1 mm long, 3-angled, yellow-brown, with 3 very indistinct rounded lobes.

Seasonally moist areas in grassland; 1650–2400 m. TU GJ SU AR KF; Kenya, Tanzania, Zambia and Mozambique. *Thulin* 1395; *Gilbert & Thulin* 865; *Friis* et al. 176.

12. *S. lagoënsis* Böck. (1869)
– type: from 'Brazil'.

Scleria lagoënsis Böck. subsp. *canaliculata-triquetra* (Böck.) Lye in *Nordic J. Bot.* 3 (1983) – type: Sudan, *Schweinfurth* 2474 (K holo.).

Tufted perennial with crowded culms from a short knotted woody rhizome. Stems 50–120 x 0.2–0.3 cm (but much thicker across the sheaths), with minute recurved hooks on angles. Largest leaf-blades 20–50 x 0.7–1 cm, flat, scabrid on margins and major ribs; lower sheaths purple, scabrid at least on the wings. Inflorescence of 1 terminal and 3–6 widely spaced lateral panicles 3–8 cm long; peduncles to 6 cm long, usually erect and 1–2 from each leaf-sheath. Male spikelets 5–6 mm long;

glumes straw-coloured. Female spikelets 6–7 mm long; glumes straw-coloured, but often with red brown spots or patches and a green midrib. Nutlets 2.7–3.5 mm long, ovoid, white, smooth or faintly pitted, (densely hairy at least at the base, but not seen in material from the Flora area); hypogynium yellow-brown with 3 very rudimentary lobes.

In moist grassland and woodland; 1500–1900 m. SU KF GG; tropical Africa, South Africa, Madagascar and South America. *W. De Wilde* 7852; *Gilbert & Thulin* 612; *Gereau* 1401.

13. *S. melanomphala* Kunth (1837)
– type: S Africa, *Drège* s.n.

Robust tussocky perennial with short woody rhizome. Stems 60–180 x 0.2–0.6 cm (up to 1 cm across the sheaths), scabrid on the angles. Leaf-blades 20–60 x 0.7–1.8 cm, flat or revolute, glabrous or short-hairy, scabrid on margins and ribs; lower sheaths red, strongly scabrid. Inflorescence of 1 terminal and 5–9 lateral, often pendulous, panicles; individual panicles 2–10 cm long, lanceolate in outline; peduncles to 25 cm long, often 2–4 at the lowest nodes. Male spikelets 10–13 mm long. Female spikelets 10–12 mm long. Glumes straw-coloured with usually dark red brown, hairy margins and green scabrid midrib. Nutlets 3.7–4.2 mm long, ovoid, smooth, glabrous, white and glossy, but usually blue-black at the apex; cupula white or pale yellow, irregular in shape and without distinct lobes. Fig. 212. 169.

In marshes and swampy grasslands; 1650 m. SU; tropical Africa, S Africa, Madagascar and South America. *Gilbert & Thulin* 892.

14. *S. racemosa* Poirét (1806)
– type: Madagascar, *Du Petit-Thouars* s.n.

Robust perennial with creeping branched woody rhizome. Stems 100–200(–300) x 0.3–0.8 cm, glabrous or scabrid. Leaf-blades to 60 x 1–3 cm, plicate, scabrid on margins and ridges; sheaths with sharp wings densely set with scabrid teeth cutting the fingers like a razor-blade. Inflorescence of 1 terminal and 3–6 lateral panicles; individual panicles elliptic or lanceolate in outline. Male spikelets 5–6 mm long. Female spikelets 7–9 mm long; the whole spikelet falling with the first fruit. Glumes straw-coloured or light brown with red brown dots and strokes, minutely hairy especially on margins. Nutlets 4–5 mm long (excluding style and cupula), ovoid, smooth, glabrous, white with a brown tinge; style-base usually persistent as a dark red brown cylindrical or conical appendage; cupula cup-like, 3–4 mm long, yellow-brown above and dark red brown below, smooth or wrinkled, corky in texture, enclosing lower part of nutlets, margin with numerous white, yellow or red brown hairs.

Swampy forest and near streams, always in permanently damp ground and usually in partial shade; 1150–1650 m. SU WG IL KF; tropical Africa and



Figure 212.169 *SCLERIA MELANOMPHALA*. Drawn by R.W. Haines from Haines 4005. (Reproduced with permission from Haines & Lye, fig. 741, 1983.)

Madagascar. *Gilbert & Thulin* 679; *Friis et al.* 3946; *M.G. & C.I. Gilbert* 4235.

17. *COLEOCHLOA* Gilly (1943)

Nelmes, *Kew Bull.*: 373–381 (1953).

Densely tussocky perennials adapted to dry habitats on shallow soils. Stems glabrous or hairy. Leaves grass-like with open sheaths, hairy ligule and leathery deciduous blades. Inflorescence usually a lax panicle with many clusters (spikes or heads) of spikelets. Spikelets male or bisexual, composed of 4–5 distichous glumes, of which the lowest 2 are empty, the 2–3 upper either subtend male flowers only or 1–2 female and 1–2 male flowers. Stamens 1–3. Ovary with a prominent beak and 3 long stigmas, base surrounded by a ring of erect hairs. Nutlets covered in a loose coat looking similar to the utricle of *Carex*.

About 8 species widely distributed but scattered in tropical Africa, southern Africa and Madagascar.

C. abyssinica (Hochst. ex A. Rich.) Gilly (1943);

Eriospora abyssinica Hochst. ex A. Rich. (1851);

Trilepis abyssinica (Hochst. ex A. Rich.) Böck. (1875) – type: TU, Mt. Semaiaata, *Schimper* 233 (P holo., BM FT K iso.).

Coleochloa abyssinica (Hochst. ex A. Rich.)

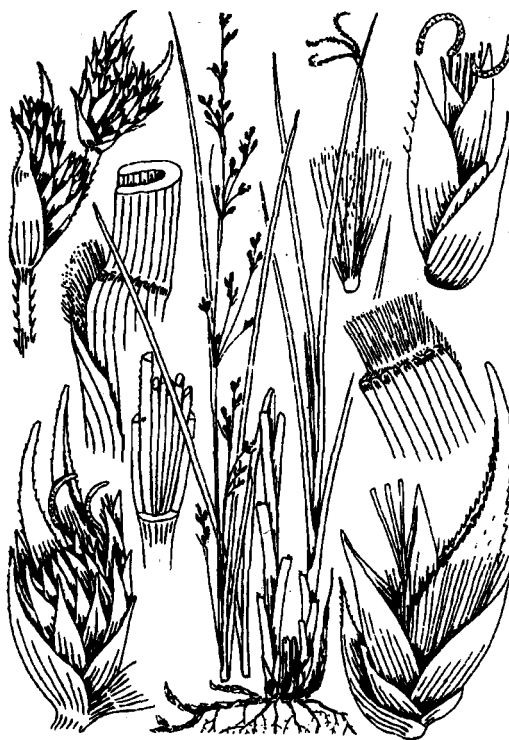


Figure 212.170 *COLEOCHLOA ABYSSINICA*. Drawn by R.W. Haines from Haines 4232. (Reproduced with permission from Haines & Lye, fig. 752, 1983.)

Gilly var. *castanea* (C.B. Clarke) Pic.-Serm. (1950); *Eriospora abyssinica* Hochst. ex A. Rich. var. *castanea* C.B. Clarke (1902) – type: TU, River Tačcazi, *Quartin-Dillon & Petit* s.n. (K holo., P iso.).

Robust plant with branching, scaly stolons. Stems 40–80 x 0.1–0.4 cm, lower part covered by old leaf-sheaths. Leaf-blades to 30 x 0.2–0.7 cm, folded; ligule a dense band of stiff white hairs, 1–2 mm long. Panicle diffuse with 2–6 branches arising together from the upper leaf-sheaths. Spikes 5–8 x c 3 mm broad, of numerous densely clustered spikelets. Glumes pale or dark brown or red brown, glossy, glabrous, but often minutely scabrid at least on midrib; midrib excurrent into a short awn. Ripe fruit *Carex*-like, with a long stiff curving beak. Fig. 212.170.

In rock crevices, shallow soils over rocks, and upland grasslands, or often epiphytic on trees in upland rain forest; 1700–3000 m. EW TU GD GJ WG IL BA; also in Uganda, Tanzania and Angola. *Gilbert & Thulin* 786; *Friis et al.* 7163; *Mooney* 8769.

A species of *Coleochloa* in similar habitats in the Sudan, Imatong mountains, has been named *C. schweinfurthiana* (Böck.) Nelmes. This differs from *C. abyssinica* in having no hairs on the midribs of the leaves and paler spikes. Otherwise the two species look very similar.

18. *SCHOENOXIPHIMUM* Nees (1832)

Kükenthal, *Das Pflanzenreich* IV. 20 (1909).

Slender tufted perennials with short rhizomes. Stems 3-angled to almost rounded, leafy. Leaves with prominent closed sheaths, and a small rim-like ligule at the junction of the sheath and the blade. Inflorescence a slender panicle with unisexual flowers; branches formed all along the culm. Male flowers in small male spikes, occasionally produced from the axis of a female prophyll (utricle). Male flowers with 3 stamens. Female flowers solitary at the base of a male sterile or fertile axis, and partly or entirely concealed inside a prophyll (utricle) which is most often closed except for a narrow beak. The female flower consists of an ovary with a 3-branched style only. Nutlets 3-angled, enclosed in utricles.

About 15 species, mainly in South Africa, but with 4 species reaching East Africa.

1. Utricles (including beak) 4–6 mm long.

1. *S. lehmannii*

– Utricles (including beak) 2–3 mm long.

2. *S. sparteum*

1. *S. lehmannii* (Nees) Steud. (1855)

Uncinia lehmannii Nees (1836) – type: South Africa, Drège s.n. (K iso.).

Slender perennial, base of stems slightly swollen, covered by fibrous remains of old leaf sheaths; roots rather stiff. Stems 30–80 x 0.05–0.15 cm with a leaf and inflorescence at each node. Leaf-blades 15–40 x 0.2–0.5 cm; sheaths 1–2 cm long, light green to red. Inflorescence with 1–2 short branches at each node; branches few-flowered, some male flowers at each branch tip with 2–5 female flowers below. Lower female glumes c 6 mm long including 2–3 mm long awn, upper 4–5 mm long. Male glumes smaller. Utricles 4–6 mm long including 1.5–2 mm long beaks, 3-angled with very distinct longitudinal ridges, brown with a green stripe on at least two faces. Each utricle includes a nutlet and a flattened green axis with scabrous margin, more rarely the axis develops a perfect male spikelet. Nutlets c 3 mm long. Fig. 212.171.

In open forest or grassland; 1500–2000 m. SD BA; also in Kenya, Uganda and southwards to South Africa. Gillett 14241; Friis et al. 3458.

2. *S. sparteum* (Wahlenb.) Kük. (1909)

Carex sparteum Wahlenb (1803) – type: S Africa, Thunberg s.n. (UPS holo.).

S. sparteum (Wahlenb.) Kük. var. *shimperianum* (Böck.) Kük. (1909); *Carex schimperiana* Böck. (1876) – type: GD, Debra-Tabor in Reb Valley, Schimper 1318 (B holo., BM P iso.).

Tufted leafy perennial with erect, slender stems and bases covered in fibrous remains of leaf-sheaths. Stems 25–80 x 0.07–0.15 cm, obtusely 3-angled. Leaf-blades to 40 x 0.1–0.4 cm; sheaths 1–4 cm long, green or white, often purple-dotted near the mouth. Inflorescence with usually 2 main branches of different lengths at each

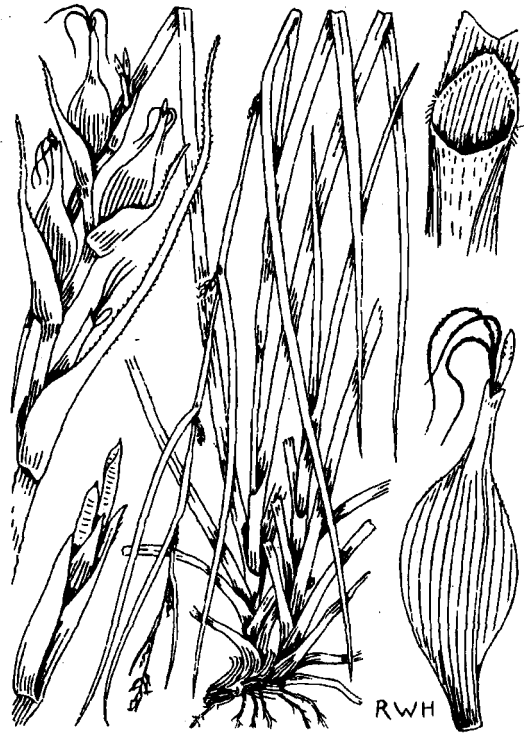


Figure 212.171 *SCHOENOXIPHIMUM LEHMANNII*. Drawn by R.W. Haines from Wilson 1153B. (Reproduced with permission from Haines & Lye, fig. 758, 1983.)

node; flowers relatively crowded, a few male flowers at each branch tip, the female flowers below. Lower female glumes 6–7 mm long including 3–4 mm long awns; upper 2–3 mm long. Male glumes smaller and narrower than the female. Utricles 2.5–3 mm long including 0.5–0.8 mm long beaks, obtusely 3-angled with 3 distinct flat sides, brown with very distinct ridges and usually a green central stripe on 2 of 3 sides. Each utricle includes a nutlet and a flattened axis of a much reduced male spikelet. Nutlets about 2 mm long. Fig. 212.172.

In woodland at forest-edges and in grassland; 1500–2700 m. GD GJ AR IL SD BA; also in Uganda and Kenya and south to South Africa. Thulin 1429; Gilbert et al. 581; Thulin & Hunde 3952.

19. *CAREX* L. (1754)

Kükenthal, *Das Pflanzenreich* IV. 20 (1909).

Perennial herbs with short or long creeping rhizomes, often forming compact and dense tussocks. Stems 3-angled, rarely rounded (not in Ethiopian species). Leaves with prominent, closed, glabrous or hairy sheaths, and a small rim-like ligule at the junction of the sheath and the blade; blades usually well developed, rarely reduced to short triangular lobes (e.g. the East African species *C. nunsoroensis*), glabrous or hairy. Inflorescence either a single unisexual or bisexual spike or a variously composed panicle of spikes. Individual spikes either unisexual or with male flowers below and female above or vice versa, more rarely with male flowers at both



Figure 212.172 *SCHOENOXIPHIMUM SPARTEUM*. Drawn by R.W. Haines from Haines 4204. (Reproduced with permission from Haines & Lye, fig. 759, 1983.)

ends. Flowers unisexual, in few- or many-flowered spikes and subtended by a glume. Perianth segments absent. Male flower with 3 stamens. Female flower an ovary with 2 or 3 style-branches, ovary enclosed in a bottle-shaped utricle so only the stigmas project. (The rachilla on which the female flower is usually seated is absent in all Ethiopian species.) Utricle with or without a short or long beak, glabrous or short-hairy, often with 2-3 prominent longitudinal ridges; surface smooth, micro- or macro-papillose. Nutlets 3-angled or biconvex, entirely enclosed in their utricles.

About 1500 species throughout most of the world, but rare at low altitudes in the tropics. Most numerous in cold and temperate parts of the northern hemisphere.

1. Inflorescence a single terminal spike. 2
- Inflorescence of several to many spikes. 3
2. Spike with 4-10 female flowers; glumes 2-5 mm long; utricles 6-7 mm long. 2. *C. peregrina*
- Spike with numerous female flowers; glumes 6-10 mm long; utricles 3.5-4 mm long. 1. *C. monostachya*
3. Inflorescence dense, to 2 cm wide; spikes sessile; clado-prophylls (prophylls at base of branches) absent; style with 2 stigmas. 4
- Inflorescence open (but individual spikes or clusters of spikes often dense), more than 2 cm wide; at least some spikes stalked; clado-prophylls present; style with (2-)3 stigmas. 6

4. Leaves grey green, leathery; beak of utricle up to 1 mm long. 5. *C. divisa*
- Leaves green, not leathery; beak of utricle over 1 mm long. 5
5. Plant forming dense tussocks, roots red; leaf-blades 0.1-0.3 cm wide. 4. *C. erythrorrhiza*
- Plant with creeping rhizome, forming less dense tussocks, roots not red; leaf-blades 0.2-1.2 cm wide. 3. *C. conferta*
6. Flowers markedly separated from each other in a cluster; styles with 2 branches; nutlets flattened. 10. *C. brunnea*
- Flowers generally close together; styles with 3 branches; nutlets 3-angled. 7
7. Inflorescence a much-branched panicle with numerous sessile or shortly stalked bisexual spikes; clado-prophylls utricle-like. 8
- Inflorescence with 1-2 simple branches carrying unisexual or bisexual spikes from each leaf-sheath, more rarely with 1-2 lateral sessile spikes from the base of the major spike; clado-prophylls sheath-like. 12
8. Utricles 8-12 mm long. 11. *C. johnstonii*
- Utricles 3-6 mm long. 9
9. Largest glume 5-8 mm long, utricles 5-6 mm long. 9. *C. steudneri*
- Glumes 3-5 mm long; utricles 3-4.5 mm long. 10
10. Glumes red brown, 2-4 mm long. 6. *C. spicato-paniculata*
- Glumes green or red brown, 4-5 mm long. 11
11. Utricles 4-6 mm long with beak 1.5-2.2 mm long. 8. *C. chlorosaccus*
- Utricles 3-4 mm long with about 1 mm long beak. 7. *C. echinochloe*
12. Utricles 8-12 mm long, lanceolate. 11. *C. johnstonii*
- Utricles 3-6 mm long, ovate with short or long beak. 13
13. Spikes shortly stalked, crowded. 18. *C. cognata*
- Most spikes distant, often with long peduncles. 14
14. Inflorescence light straw-colour; glumes papery to transparent; leaves narrow, not plicate. 19. *C. negrii*
- Inflorescence darker; glumes not transparent; leaves often some with plicate folding. 15
15. Utricles 3-4.5 mm long, beak short (0.2-0.8 mm long). 16
- Utricles 4-6 mm long; beak long (1-1.8 mm long). 18
16. Lower spikes 1-2 cm long, light brown. 17. *C. distans*
- Lower spikes 3-20 cm long, often dark brown. 17
17. Glumes 4-9 mm long, longer than the utricles. 12. *C. bequaertii*
- Glumes 3-4 mm long, not longer than the utricles. 13. *C. acutiformis*
18. Spikes 8-10 mm wide, usually 2 from each node. 14. *C. thomasii*
- Spikes 4-7 mm wide, 1 or 2 from each node. 19



Figure 212.173 *CAREX MONOSTACHYA*. Drawn by R.W. Haines from Haines 4000. (Reproduced with permission from Haines & Lye, fig. 762, 1983.)



Figure 212.174 *CAREX PEREGRINA*. Drawn by R.W. Haines from Thulin & Tidigs 112. (Reproduced with permission from Haines & Lye, fig. 766, 1983.)

19. Female glumes pale or dark brown, only 1 spike from each node. 16. *C. petitiiana*
 – Female glumes black; 1 or 2 spikes from each node. 15. *C. simensis*

1. *C. monostachya* A. Rich. (1851);

Uncinia digyna Hochst. ex Steud. (1855) – type: GD, Mt. Silke (Selki) in Semien, *Schimper II*:687 (P holo., K UPS iso.).

Dense tussocky perennial with both sterile and fertile stems. Fertile stems often only 10–20 cm long when flowering, later 30–80 x 0.05–0.15 cm, sharply 3-angled, scabrid on angles. Leaf-blades 10–30 x 0.15–0.4 cm, scabrid on margins; sheaths brown. Inflorescence a solitary terminal spike 10–40 x 2–8 mm, bisexual with female flowers below and male above. Glumes 6–9 mm long, lanceolate, light or dark brown with paler midrib and marginal border. Style with 2 stigmas. Utricles hidden by glumes, 3.5–4 (including beak) x 1.2–1.5 mm, obovate, biconvex. Fig. 212.173.

Alpine bogs and other wet habitats, often near streams; 3750–4200 m. GD SU AR BA; Kenya and north Tanzania. *Hedberg* 4185; *Hedberg & Getachew Aweke* 5444; *de Wilde* 9057.

2. *C. peregrina* Link (1827)

– type: Spain, Madeira, *Wormskiold* s.n.

Slender tufted perennial. Stems 8–35 x 0.4–0.7 cm, 3-angled, almost smooth; basal sheaths brown. Leaf-blades 1–20 x 0.05–0.15 cm, flat or incurved, scabrid on

margins. Inflorescence a solitary terminal spike 20–30 x 2–4 mm, bisexual with 4–10 female flowers below and a few male flowers above. Glumes 2–5 mm long, getting smaller towards top of spike, oblong, pale with green midribs and yellow-brown margins; tip rounded, frayed or with minute hairs. Style branches 2. Utricles 6–7 mm long, including narrow beaks, 2–2.5 mm long, lanceolate with 2 prominent longitudinal ribs, green when young, turning brown or olive when mature. Fig. 212.174.

Wet swampy grassland along stream, 3300 m. BA; Kenya, Tanzania and Madagascar. *Thulin et al.* 3700.

3. *C. conferta* Hochst. ex A. Rich. (1851)

– type: GD, Entchedkab in Semien, *Schimper II*:576 (P holo., K UPS iso.).

C. koestlinii Hochst. ex Steud. (1855) – type: GD, Mt. Bachit in Semien, *Schimper II*:1244 (P holo., K UPS iso.).

Tufted perennial with short or long creeping rhizome. Stems 15–60 x 0.1–0.3 cm, 3-angled, scabrid on angles. Leaf-blades 5–40(–70) x 0.2–0.8(–1.2) cm, flat, scabrid at least on margins. Inflorescence a narrow dense panicle 20–120 x 10–30 cm, lower branches with many spikelets; upper branches with solitary spikelets. Spikes 5–10 x 3–10 mm, ovate, bisexual with female flowers below and male above, rarely unisexual with female flowers only. Glumes 3–4 mm long, acute, light brown to brown with pale midrib, also often pale near midrib and margins. Style with 2 stigmas. Utricles 3.5–4.2 mm



Figure 212.175 *CAREX CONFERTA*. Drawn by R.W. Haines from *Purseglove* 2971. (Reproduced with permission from Haines & Lye, fig. 767, 1983.)



Figure 212.176 *CAREX ERYTHORRHIZA*. Drawn by R.W. Haines from *Hamsen* KN 20. (Reproduced with permission from Haines & Lye, fig. 770, 1983.)

long including a 1–2 mm long scabrid beak, light yellow-brown to dark brown (at least on beak); convex side with 6–9 longitudinal ribs, flattened side with 3–6 ribs. Fig. 212.175.

Montane swamps, cloud forest and scrub, and wet areas near streams; 2500–4000 m. GD GJ SU AR BA HA; Uganda, Kenya, Tanzania, Rwanda and eastern Zaire. *Thulin* 1632; *MG & SB Gilbert* 1815; *Mooney* 7151.

4. *C. erythrorrhiza* Böck. (1875)

– type: GD, Mt. Guna, *Schimper* 1556 (B holo., K iso.).

C. koestlinii Hochst. ex Steud. var. *minor* Boott (1860) – type: between Demerki and Debreski in Semien, *Schimper* 170/A, 170/B (B syn., K isosyn.).

Robust perennial forming thick tussocks, sometimes with a ‘trunk’ to 1 m tall and 30–40 cm in diameter. Roots covered by red filamentous layer. Stems 30–50 x 0.07–0.1 cm, 3-angled, scabrid. Leaf-blades 10–60 x 0.1–0.3 cm, flat or incurved, scabrid on margins. Inflorescence a narrow dense panicle 40–70 x 6–15 mm. Spikelets to c 12 x 5–8 mm, bisexual with female flowers below and male above. Glumes 3–4 mm long, acute, light to dark brown. Utricles 3–4 mm long including beak 1–1.5 mm long, often smooth, light to dark brown, usually with 3–5 longitudinal ribs on convex side. Fig. 212. 176 & fig 212.185.7.

Montane swamps, among rocks near and in streams; 2300–4050 m. GD GJ SU AR BA; Uganda, Kenya and eastern Zaire. *Hedberg* 4238; *Thulin* 1608; *Friis et al.* 1157.

5. *C. divisa* Huds. (1762)

– type: England, *Newton* s.n. & *Sherard* s.n. (OXF not seen).

C. chaetophylla Steud. (1855).

Perennial, stems single or small clusters from a woody, horizontal rhizome up to 0.6 cm thick, covered in brown or black fibrous scales. Stems erect or bending, (5–)10–70 cm tall, 3-angled, scabrid below inflorescence. Leaves: outer basal sheaths wide, margins scarious, light brown; blades shorter than stems, flat or folded, grey green, apex blunt-pointed, scabrid. Inflorescence simple, oblong to ovoid, ± dense, (10–)15–35(–60) mm long; lowest inflorescence bract similar to glume, as long as the lowest spike, or leaf-like and as long as or longer than the inflorescence. Spikes 3–8, sessile, overlapping, female flowers below, male flowers above. Female spikes; glumes up to 4.5 mm long, lanceolate-elliptic, acute to aristate, pale to dark brown, margins often wide and scarious. Utricles yellow to dark brown, dull or shiny, 3–4.2 mm long including beak up to 1 mm long; several conspicuous veins on back, with or without wings on beak and upper part of utricle.

Saline lake; c 2000 m. EW; N Africa, Mediterra-



Figure 212.177 *CAREX SPICATO-PANICULATA*. Drawn by R.W. Haines from *Haines* 7025. (Reproduced with permission from Haines & Lye, fig. 771, 1983.)



Figure 212.178 *CAREX ECHINOCHLOË*. Drawn by R.W. Haines from *Haines* 4155. (Reproduced with permission from Haines & Lye, fig. 772, 1983.)

nean, W & S central Europe, S Russia, SW Asia to Tien Shan in China, introduced into N America, S Africa and N Zealand. *Pappi* 5082.

This species is very variable in vegetative appearance and also utricle characters.

6. *C. spicato-paniculata* Böck. ex C.B. Clarke (1898)
 – type: S Africa, Transvaal, *Rehmann* 5627 (K holo.).

Tufted perennial with short rhizome. Stems 60–100 x 0.1–0.4 cm, 3-angled, glabrous. Leaf-blades 20–50 x 0.5–1.2 mm, flat or somewhat plicate, scabrid on margins and major ribs. Inflorescence of 1 terminal and 1–2 lateral panicles of spikes from each of the upper leaf-sheaths; each panicle up to c 8 x 3–5 cm. Spikes 5–10 x 4–5 mm, bisexual with female flowers below and male flowers above or unisexual with female flowers only; prophyll at base swollen and glume-like. Glumes red brown, 3.5–4 mm long including scabrid awn, 1–1.5 mm long. Style with 3 stigmas. Utricles 3.5–4 mm long including beak c 1.5 mm long, green to red brown, scabrid or minutely hairy, often somewhat curved. Fig. 212.177 & fig. 212.185.9.

Shady floor of montane and gallery forest; 1800–3000 m. SU AR KF SD; Tanzania, southeast tropical Africa and South Africa. *Mooney* 5099; *Friis* et al. 330; *de Wilde* 8536.

This species looks very similar to *C. chlorosaccus*; the species are differentiated on size with *C. chlorosac-*

cus being larger in floral characters than *C. spicato-paniculata*. In Kew most sheets of *C. spicato-paniculata* have been placed with *C. chlorosaccus*. Both taxa have been collected from Menagesha Forest (SU) where the relationship between the 2 taxa could be studied.

7. *C. echinochloë* Kunze (1841)
 – type: TU, Mt. Scholoda (Sellauda) near Adua, *Schimper* 26 (B holo., UPS iso.).

Tufted perennial with short or long creeping rhizome. Stems 50–100 x 0.1–0.4 cm, 3-angled, scabrid to minutely short-hairy. Leaf-blades 20–80(–120) x 0.5–1.4 cm, flat, glabrous or with short adpressed hairs on ribs. Inflorescence a slender strongly branched panicle of spikes, 20–50 cm long, often with one long and one short branch at each node. Spikes 5–10 x c 5 mm, bisexual, female flowers below and male above, with a swollen utricle-like prophyll at its base. Glumes 4–5 mm long including scabrid awn 1–2 mm long. Style with 3 stigmas. Utricles 3–4 mm long including scabrid beak 1 mm long, green with 3–7 prominent longitudinal ribs on each side, often somewhat curved. Fig. 212.178 & fig. 212.185.11 & 12.

Open forest or wooded grassland; 2000–2300 m. TU GD GJ WG KF GG SD; Cameroun, Zaire, Rwanda, Sudan, Uganda, Kenya and Tanzania. *Gilbert* et al. 496; *Mooney* 8679.

8. *C. chlorosaccus* C.B. Clarke (1899)
 – type: Fernando Po, *G. Mann* 653 (K holo.).



Figure 212.179 *CAREX CHLOROSACCUS*. Drawn by R.W. Haines from Haines 4200. (Reproduced with permission from Haines & Lye, fig. 773, 1983.)

Tufted perennial with short or long woody rhizome. Stems 60–120 x 0.1–0.4 cm, obtusely 3-angled, glabrous. Leaf-blades 10–60(–90) x 0.5–0.9 cm, flat or plicate, scabrid on margins and nerves. Inflorescence a slender much-branched panicle, 8–50 cm long, often with one short and one long branch at the lower nodes. Spikes 6–20 x 3–5 mm, bisexual, 5–10 female flowers below and a few male flowers above, a swollen utricle-like prophyll at its base. Glumes 4–5 mm long including awn 1.5–2 mm long, light brown to grey. Style with 3 stigmas. Utricles 4–5.5 mm long including beak 1.5–2.2 mm long, glabrous or slightly scabrid, green with several distinct ribs on each side, often somewhat curved. Fig. 212.179 & fig. 212.185.10.

Moist forest, in shade, also along paths and roads; 2000–2800 m. SU KF SD BA HA; Fernando Po, eastern Zaire, Rwanda, the Sudan, Uganda, Kenya and Tanzania. Mooney 6196, 6338; Burger 2264.

See note under *C. spicato-paniculata* for the similarities in these two species.

9. *C. steudneri* Böck. (1876)

– type: GD, Ghaba in Semien, Steudner 931 (B lecto.); GD, Mt. Guna, Schimper 1559 (B syn., K iso.).

Robust tufted perennial with a short rhizome. Stems 40–70 x 0.1–0.2 cm, obtusely 3-angled, glabrous. Leaf-blades 5–30 x 0.3–1.2 cm, flat, strongly scabrid on margins and midrib. Inflorescence of several narrow, dense, often pendulous, brown panicles, 1–2 from each of the



Figure 212.180 *CAREX STEUDNERI*. Drawn by R.W. Haines from de Wilde 9502. (Reproduced with permission from Haines & Lye, fig. 776, 1983.)

uppermost sheaths. Spikes 6–15 x 1–2 mm, lanceolate, bisexual, a few female flowers below and males above. Glumes 3–6 mm long (upper always 5–6 mm), medium red brown with paler midrib ending at apex or shortly extended. Style with 3 stigmas. Utricle 5–6 mm long including beak 2 mm long, light to medium red brown, ridges sometimes green, densely scabrid at least on beak and major ribs. Fig. 212.180.

On well-drained slopes in grassland, ericaceous scrub or among rocks; 2000–3800 m. GD GJ SU SD BA HA; Sudan, Kenya, Tanzania. Burger 1898, 2942; Mooney 8532; Hedberg 5686.

10. *C. brunnea* Thunb. (1784)

subsp. *occidentalis* Lye (ined.)

– type: Somalia, Karin Xaggarood, Thulin et al. 8982 (UPS holo., K iso.).

Slender tussocky perennial with compact woody rhizome giving rise to many crowded stems. Stems 30–60 x 0.1–0.15 cm, 3-angled, scabrid to subglabrous on angles. Leaves many; lower sheaths dark red brown, nerves almost black, sometimes splitting into fibers; blades up to 40 x 0.3–0.4 cm, flat, margins and ribs scabrid, particularly towards apex. Inflorescence of 1–3 slender, stalked or sessile spikes from each upper 5–8 sheaths. Inflorescence bracts leafy, mostly much longer than spikes. Spikes 10–30 x 3 mm, at base 5–15 female flowers, above 2–6 male flowers, male part of spike much shorter than female. Glumes 3–4 mm long, ovate-lanceolate, light red brown with pale midrib of



Figure 212.181 *CAREX JOHNSTONII*. Drawn by R.W. Haines from Haines 4161. (Reproduced with permission from Haines & Lye, fig. 777, 1983.)

1–3 nerves, somewhat scabrid, apex acute; male and female glumes similar but male and upper female glumes not scabrid. Style with 3 slender stigmas, c 3 mm long. Utricle oval, lens-shaped, c 3.5 x 1.2–1.3 mm including cuneate base 0.5–0.8 mm long and beak c 1 mm long; densely covered with short hairs except at base; nerves many, prominent on both sides. Fig. 212.185.1–4.

Podocarpus forest, in shade; c 1800 m. SD; Somalia. Mooney 5641.

Other subspecies and varieties of *C. brunnea* are found in Yemen, Madagascar, Mauritius and from India to Japan.

11. *C. johnstonii* Böck. (1886)

– type: Tanzania, Mt. Kilimanjaro, Johnston s.n. (K holo.).

Tufted perennial with short rhizome. Stems 40–80 x 0.1–0.3 cm, 3-angled, glabrous. Leaf-blades 10–60 x 0.4–1 cm, flat or plicate, scabrid on margins and nerves. Inflorescence a slender panicle with 1–3 branches from each node. Major spikes 10–70 x c 5 mm, bisexual, 5–15 laxly set female flowers below and few male flowers above; lower spikes on a 5–20 cm long slender stalk, upper ones shortly stalked or sessile. Style with 3 stigmas. Glumes 6–10 mm long, light brown with green scabrid midrib, acuminate. Utricles 8–12 mm long including slightly scabrid beak, 2–4 mm long, green to red brown with distinct nerves on both sides, often densely scabrid below the beak. Fig. 212. 181.



Figure 212.182 *CAREX BEQUAERTII*. Drawn by R.W. Haines from Haines 4275. (Reproduced with permission from Haines & Lye, fig. 778, 1983.)

Juniperus forests, also in *Arundinaria* and *Erica* – *Hagenia* forests, usually in shade; 2000–2800 m. SU KF IL SD; Rwanda, eastern Zaire, Uganda, Kenya, Tanzania and Malawi. Mooney 6341; W. De Wilde 8541; Friis et al. 1225.

12. *C. bequaertii* De Wild. (1927)

– type: Zaire, Mt. Ruwenzori, Bequaert 4677 (BR holo.).

Robust perennial with short curved stolons 2–5 x c 1 cm, covered by hard shiny scales. Stems 60–120 x 0.2–0.6 cm, 3-angled, glabrous. Leaf-blades 30–70 x 1–2 cm, flat or slightly plicate, almost glabrous. Inflorescence of 6–9 very long and usually drooping spikes, only one from each node; at least the lower spikes widely spaced. Spikes 4–16 x c 0.7 cm (largest spike always more than 8 cm long), bisexual, a few male flowers scattered among numerous female flowers; stalks up to 15 cm long, slender. Glumes 4–8 mm long, lanceolate, brown with paler midrib, acute. Style with 3 stigmas. Utricle 3–3.5 mm long, green to brown with red dots, obovate with a short glabrous beak. Fig. 212.182.

Moist ground by streams and rivers; 2500–3500 m. GD SU SD BA HA; eastern Zaire, Rwanda, Uganda, Kenya, Tanzania. Burger 1692, 1891; MG & SB Gilbert 1796.

13. *C. acutiformis* Ehrb. (1789)

– type: from 'Europe'.

Perennial with thick scaly stolons. Stems 90–120 x 0.15–

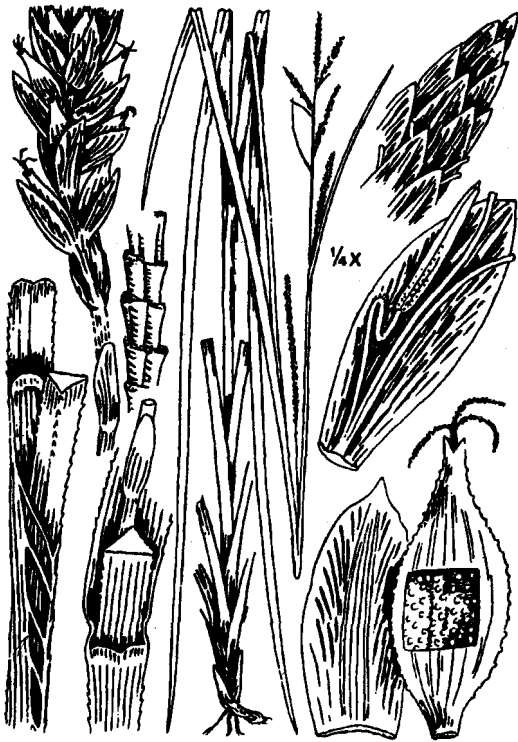


Figure 212.183 *CAREX ACUTIFORMIS*. Drawn by R.W. Haines from *Hamilton* 155. (Reproduced with permission from Haines & Lye, fig. 780, 1983.)

0.3 cm, 3-angled, scabrid at least on angles. Leaf-blades 30–80 x 0.6–0.8 cm, plicate, scabrid on margins. Inflorescence of 5–8 erect or drooping spikes arising singly from leaf-sheaths; lower spikes entirely female, upper 2–3 spikes male with a few female flowers at their base, sometimes one spike in the middle which is half male and half female. Spikes 15–100 x 4–5 mm, upper sessile or subsessile, lower with 50–200 mm long stalks. Glumes 3–4 mm long, dark brown with light brown margins and midrib, acute; 2–3 lowest glumes 6–7 mm long with a 2 mm long awn. Style with 3 stigmas. Utricles 3–4 mm long with beak 0.5 mm long, brown with dark raised dots (papillae) and distinct nerves. Fig. 212.183.

Swamps and marshy ground; 2100–3000 m. EW GD SU HA; Uganda, Tanzania, South Africa, North Africa, Europe, Asia and North America. *Gillett* 5380; *De Wilde & Gilbert* 57; *Gilbert & Tewolde* 3287.

14. *C. thomasi* *Nelmes* (1938)

– type: Sudan, *Thomas* 1794 (K holo.).

Robust tufted perennial. Stems 100–150 x 0.1–0.5 cm, 3-angled. Leaf-blades 30–50 x 0.4–1.2 cm, flat or plicate, scabrid. Inflorescence of 8–11 drooping spikes, usually 2 from each node. Spikes 40–80 x 8–12 mm, the uppermost with male flowers in lower half, other spikes often entirely female. Glumes 5–7 mm long, ovate-lanceolate, red brown with paler usually excurrent scabrid midrib. Style with 3 stigmas. Utricle 5–6 mm long in-

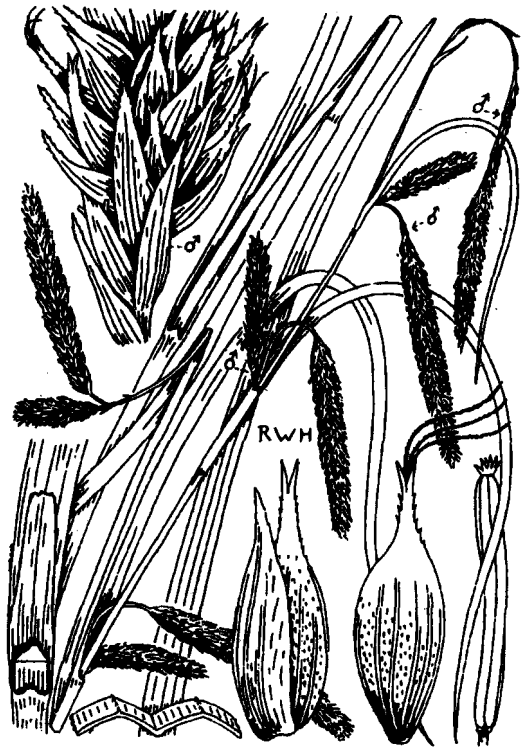


Figure 212.184 *CAREX THOMASII*. Drawn by R.W. Haines from *Thomas* 1794. (Reproduced with permission from Haines & Lye, fig. 785, 1983.)

cluding scabrid beak, c 1.5 mm long, brown with distinct nerves. Fig. 212.184.

Open forest or evergreen bushland; 2350–2600 m. KF IL; the Sudan. *Friis* et al. 1640, 7050.

15. *C. simensis* *Hochst. ex A. Rich.* (1851)

– type: GD, Mt. Buahit in Semien, *Schimper* II:1180 (P holo., K syn.).

C. fischeri *K. Schum. in Engl.* (1895).

Tussocky perennial with short woody rhizome. Stems 15–40(–60) x 0.1–0.3 cm, bluntly 3-angled, glabrous. Leaf-blades 3–40 x 0.3–1.2 cm, leathery, plicate and deeply keeled, scabrid on margins especially near the tip. Inflorescence of 3–9 erect or slightly drooping spikes, 1 or 2 from each node; upper spikes sessile or subsessile, the lower with usually 1–4(–10) cm long stalks. Spikes 1–7 x 0.4–0.6 cm, upper 1–2 male, lower mostly female but some with a few male flowers at the base. Glumes 5–8 mm long, dark red brown to black with pale, often green extended scabrid midrib. Style with 3 stigmas. Utricles 5–6 mm long, green with brown dots; beak glabrous. Fig. 212.186.

Moist ground in grassland or near streams, also ericaceous scrub, moist forest and vertical rock face; (2600–)3000–4100 m. GD GJ SU AR GG SD BA HA; Uganda, Kenya. *Hedberg* 4181, 5659; *Hedberg & Mesfin* T. 7047.

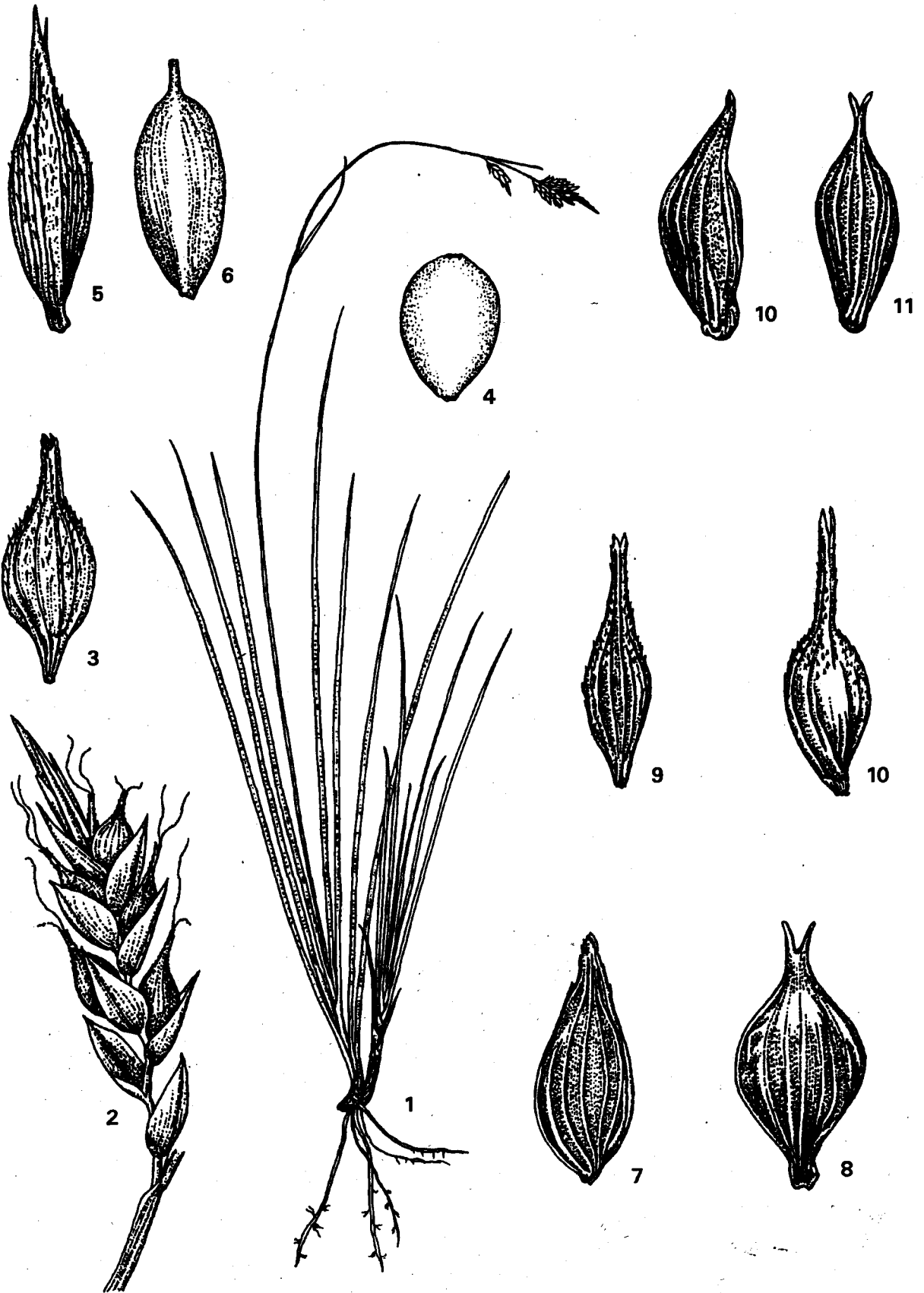


Figure 212.185 *CAREX BRUNNEA* subsp. *OCCIDENTALIS*: 1 - whole plant x 1/2; 2 - spike x 5; 3 - utricle with rachilla x 10; 4 - nutlet x 10. *C. NEGRII*: 5 - utricle x 10; 6 - nutlet x 10. *C. ERYTHORRHIZA*: 7 - utricle x 10. *C. COGNATA*: 8 - utricle x 10. *C. SPICATO-PANICULATA*: 9 - utricle x 10. *C. CHOLROSACCUS*: 10 - utricle x 10. *C. ECHINOCHLOË*: 11 & 12 - utricle from two sides x 10. 1-4 from Thulin et al. 8982; 5 & 6 from Coll. Agric. G 33; 7 from de Wilde 8977; 8 from Chiovenda 960; 9 from de Wilde 7623; 10 from Kukkonen 12396; 11 & 12 from Riva 1438. Drawn by Gerd Mari Lye Partly for *Fl. Somalia*.



Figure 212.186 *CAREX SIMENSIS*. Drawn by R.W. Haines from Hedberg 1043. (Reproduced with permission from Haines & Lye, fig. 790, 1983.)



Figure 212.187 *CAREX PETTIANA*. Drawn by R.W. Haines from Haines 4274b. (Reproduced with permission from Haines & Lye, fig. 789, 1983.)

16. *C. pettitiana* A. Rich. (1851)

— type: TU, Quodgerate, *Quartin-Dillon & Petit* s.n. (P holo., K syn.).

C. cuprea (Kük.) Nelmes (1938).

Perennial with short or relatively long creeping rhizomes. Stems 40–90 x 0.1–0.3 cm, 3-angled with rounded edges, glabrous. Leaf-blades 10–60 x 0.3–1.0 cm, plicate or not, scabrid at least on margins. Inflorescence of 4–8 erect or drooping spikes, only 1 from each node. Spikes 20–70 x 4–7 mm; terminal spike entirely male or up to half female above the male flowers, lateral spikes progressively more female, often with only 1 or a few male flowers at the base; lowest sometimes female only. Female glumes 3–6 mm long, often shorter than utricles, apiculate, light to medium red brown with green or pale midribs. Male glumes often longer, narrower and paler than the female. Utricles 4–6 mm long including beak 1–1.5 mm long, glabrous or scabrid, green or brown, usually dark spotted at maturity. Fig. 212.187.

Moist ground, often on banks or as clumps in streams; 2150–3100 m. TU GD GJ AR SD HA; tropical and south Africa. *Thulin* 1466; *De Wilde* 6829; *Burger* 1877.

17. *C. distans* L. (1759)

— type: from 'Europe'.

Tufted slender perennial with short rhizome. Stems 15–60(–100) cm long, bluntly 3-angled, smooth or scabrid below the inflorescence. Leaf-blades 10–40 x

0.2–0.6 cm, flat or keeled, scabrid on margins and midrib. Inflorescence of 3–6 erect, unisexual spikes, uppermost male, others female. Male spike 15–40 x 2–4 mm; glumes 3–4 mm long, light brown to purple-brown. Female spikes 10–30 x 5–8 mm, spaced out (at least when fruiting); uppermost sessile or subsessile; lowermost with stalks 1–4 cm long; glumes 2.5–3.5 mm long, ovate-oblong, pale brown or pale red brown with green excurrent midrib and hyaline margins. Style with 3 stigmas. Utricles 3.5–5 mm long, beak 0.7–1.5 mm long, usually scabrid, pale green or green-brown, rarely dark brown, prominently nerved.

Saline marsh; 2100–2300 m. EW; north Africa, Europe, Middle East. *Pappi* 4968–69.

18. *C. cognata* Kunth (1837)

— type: South Africa, *Mundt* s.n. (B holo.).

Tufted perennial with short scaly stolons. Stems 30–100 x 0.1–0.4 cm, sharply 3-angled, glabrous. Leaf-blades 10–80 x 0.3–0.7 cm, plicate, scabrid on margins at least near tip. Inflorescence of 4–6 erect, crowded, sessile or subsessile spikes, rarely a single stalked spike below the main group of spikes. Terminal spike male, usually 20–30 x 2–4 mm. Lateral spikes female with a conspicuous crown of empty scales at the tip. Glumes 3–5 mm long, golden brown, dark brown or red brown, acuminate, densely scabrid on margins and midrib, sometimes shortly hairy on margins and nerves. Style with 3 stigmas. Utricles 3–4.5 mm long, including beak almost 1 mm long, golden brown or red brown with many nerves.

1. Glumes yellow or green; utricles 3.5–4 mm long, golden brown. var. *cognata*
 – Glumes red brown; utricles 4.5 mm long, red brown at apex. var. *abyssinica*

var. *abyssinica* (Chiov.) Lye in *Nordic J. Bot.* 3 (1983);
Carex abyssinica Chiov. (1911) – type: GD, Debarek in Semien, *Chiovenda* 960 (FT holo.).

Fig. 212.185.8.

Swamps or marshes; c 3000. GD; endemic. Only known from the type.

var. *cognata* occurs in South Africa and south tropical Africa north to southern Tanzania.

19. *C. negrii* Chiov. (1912)

– type: SD, Gala Arussi near Soddo hill, *Negri* 742 (FT holo., K iso.).

Tall perennial, rhizome horizontal with stems at c 1 cm intervals. Stems (10–)40–90 x 0.1–0.2 cm, 3-angled, scabrid on angles, most of stem covered by leaf-sheaths. Leaves many; lower sheaths brown, upper green, mostly glabrous; blades 10–30 x 0.2–0.3 cm, flat or rolled inwards, very scabrid at least near apex. Inflorescence of 1–2 stalked or sessile spikes from each of uppermost sheaths. Inflorescence bracts leafy and mostly longer than spikes. Spikes 10–25 x 3–4 mm, 2–10 female flowers at base, 10–25 male flowers above, male part of spike always longer than female part. Male and female glumes similar, c 4 mm long, ovate, glabrous, yellow-brown or light red brown with prominent pale border

near margins, midrib green, 1–3-nerved, apex acute. Style with 3 long stigmas. Utricles obovate, 3-angled, 3.5–4.0 x c 1.5 mm, beak 1–1.5 mm long, green to light red brown with fairly prominent nerves on all sides, usually densely covered with short hairs at least in upper half. Fig. 212.185.5 & 6.

In *Juniperus* – *Podocarpus* forest, in open glades or meadows; 1750–2700 m. SD HA; Somalia. *Gillett* 5421; *De Wilde* 4993; *IECAMA* G33.

Carex sp. = *Mulvany* 120

Plant 50 cm tall (lacking basal parts). Stems tough, fibrous, leafy. Leaf-sheaths bluntly 3-angled, closed, smooth; blades flat or folded, perhaps plicate, 3 main veins, very scabrid towards tip. Inflorescence axillary, very dense, ± pyramidal in outline, 45–55 x c 20 cm, spikes numerous, variegated red brown and green. Inflorescence bracts reduced to truncate scales, awn c 2 mm long. Spikes all similar, up to 10 female flowers at base, male above. Female glumes 4–5 mm long, red brown, midrib as a scabrid keel, apex acute. Stigmas 3, long. Utricles curved, longer than glumes, brown, sharply 3-angled, scabrid, particularly on ribs and beak, beak bright green, 1–2 mm long.

Permanent grassland only cut every 2 years, never grazed or cultivated, soil highly leached; c 3000 m. GJ; only known from this collection.

Most closely related to *C. steudneri*.

213. FLAGELLARIACEAE

by Sue Edwards*

Burger, *Families of Flowering Plants in Ethiopia*: 132 (1967); Napper, *Flagellariaceae in Fl. Trop. E. Afr.*: 4 pp. (1971); Thulin, 166. *Flagellariaceae in Fl. Somalia* 4: 147-148 (1995).

Climber or shrubs. Leaves alternate, base forming a sheath with a flat or folded blade and apex extended into a fine straight point or coiled tendril. Inflorescence a terminal panicle. Flowers regular; perianth of 6 tepals in 2 whorls, all petal-like or dry and papery. Stamens 6, opposite the perianth lobes. Ovary superior, globose, 3-locular; style with 3 linear stigmas. Fruit a 1-3-seeded drupe. Seeds spherical.

A very small family with 3 genera in Asia, Australia and Africa; only 1 genus and 2 species in E Africa.

Represented in E Africa and Somalia by the widespread and striking *Flagellaria guineensis* Schum. (1827) and the rare *F. indica* L. *F. guineensis* is a climber up to 5(-10) m high; leaf sheathes with marked rounded auricles or shoulders; blade with a short petiole-like connection with the sheath. Flowers white or cream in terminal panicles, 8-12 cm long. Fruits bright red. Fig. 213.1.

This plant is found mostly along forest edges and in thickets in areas near the coast up to 400 m. It is recorded from Somalia, Kenya and Tanzania, and might turn up in the Flora area.

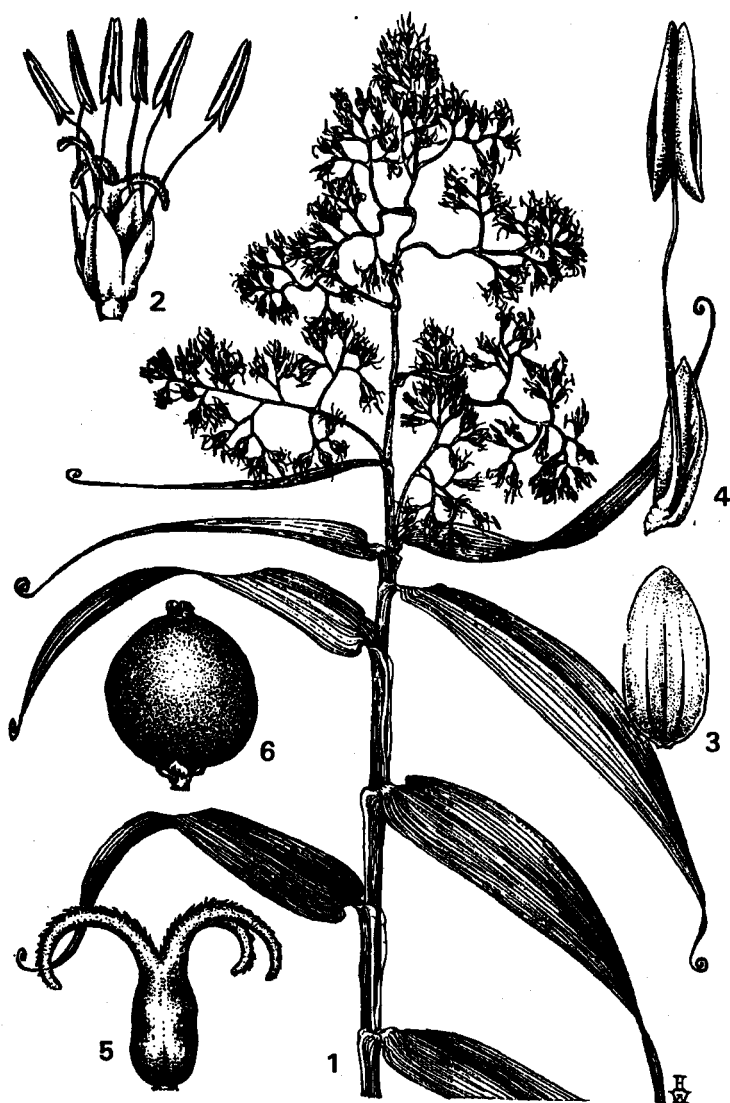


Figure 213.1

FLAGELLARIA GUINEENSIS: 1 - part of leafy shoot showing leaf sheaths and inflorescence x 2½; 2 - flower x 5; 3 - tepal x 10; 4 - stamens with the attached tepal x 10; 5 - pistil x 10; 6 - fruit x 4. 1 from Tanner 3736; 2-6 from Faulkner 1609. Drawn by Heather Wood. (Reproduced with permission from *Fl. Trop. E. Afr. Flagellariaceae*: fig. 1)

215. ARECACEAE (PALMAE)

Sue Edwards* & Tewolde Berhan G. Egziabher**

Cufodontis, *Enum.*: 1495–1500; Dransfield, *Palmae in Fl. Trop. E. Afr.*: 56 pp. (1986); Uhl & Dransfield, *Genera Palmarum* (1987); Thulin, 168. *Areaceae (Palmae) in Fl. Somalia* 4: 270–274 (1995).

Palms, usually trees with simple unbranched or dichotomously branched stems growing solitary or in clumps, more rarely as trunkless shrubs or climbers. Plants bisexual, polysexual, monoecious or dioecious, some flowering only once and then dying. Trunks with a special woody structure (see note below), slender to very thick, upper part often covered with old leaf-bases or even dead leaves, lower down usually with conspicuous spirally-arranged leaf-scars, base with adventitious or stilt roots. Leaves large to very large, spirally arranged to form a dense crown; base sheathing (sometimes forming a columnar pseudostem at the top of the crown of leaves), sometimes armed with spines or prickles; petiole usually present, often channelled or ridged, with or without lateral spines or teeth; blade costapalmate, palmate, pinnate or bipinnate (except in seedlings), rarely simple with pinnate venation, some climbing palms with an elongated barbed extension; leaflets folded, either induplicate or reduplicate. Inflorescence axillary, usually single, sometimes clustered, with a large basal prophyll, often much branched with many bracts, flowering bracts with flowers solitary or in pairs, triads or several-flowered clusters. Flowers generally small, bisexual, unisexual or sterile male, sessile or stalked. Calyx and corolla sometimes similar, usually different, parts free or fused. Stamens 3 to many, free or united; staminodes often present in female flowers. Pistil of 1–3 carpels, free or united, usually 1 ovule in each carpel, rarely 2–10 ovules; stigmas erect or recurved. Fruit usually developed from only 1 carpel, usually 1-seeded, rarely 2–10-seeded; sometimes quite small for the size of the plant, but usually large to very large; usually with 3 distinct layers: epicarp forming a fibrous or dry outer covering, mesocarp a fleshy or fibrous, sometimes very bulky, middle layer, and endocarp either well developed as a membranous to woody inner layer, or absent. Seed often closely associated with the endocarp, or free.

Worldwide with 200 genera and around 2700 species, mostly found in the moist tropics and subtropics, but some groups well adapted for more arid areas where there is ground water; 5 genera and 9 species recorded for the Flora area. This includes 4 cultivated and/or ornamental species.

These plants are very difficult to collect and are usually poorly represented in herbarium collections. Habitat and distributions in the following account are based on written, photo and observations not documented by specimens, as well as herbarium collections.

It is highly possible that there are more ornamental species than recorded here because of the lack of means to identify them and the difficulties in collecting these very large plants. Dransfield (1986) lists over 60 species as cultivated in E Africa.

The wood of palm trunks consists of vascular bundles surrounded by ground tissue and fibres. It is not formed by secondary growth from a cambium. During the early growth of the stem, it widens without the internodes elongating until it has reached the diameter of the mature plant, hence the almost uniform width of palm trunks. Slight secondary thickening may occur throughout the ground tissue to give swellings, as in the trunk of *Borassus*.

Explanation of special terms

- cincinnus**: an cymose inflorescence where the flowers are produced in a row which is curled on itself with the oldest at the outside/base and the youngest tucked into the centre.
- costa**: an extension of the petiole to form a short rachis which is attached to the folded segments of palmate leaves.
- costapalmate**: a palmate leaf where the petiole extends into the blade and divides it into two, often unequal, halves.
- crownshaft**: an apparent extension of the stem above the crown of leaves, formed from the sheaths of developing leaves.
- hapaxanthic**: where a plant grows for several years and then flowers and dies, as in *Ensete ventricosum* and *Agave*.

hastula: a small 'skirt' of tissue found where the petiole or costa meets the leaf-blade. It can be on either the upper or lower surface, or both.

induplicate: leaf segments which are V-shaped in cross-section. These are formed by the splitting of the leaf-blade.

pleoanthic: where a plant can flower and continue growing to flower again, and again, until it dies of old age or other causes.

plicate: folded into up and down ridges, like a closed fan.

prophyll: the first bract of the inflorescence, which usually holds the developing inflorescence.

rachilla: the ultimate flower-bearing branch of an inflorescence.

rachis: the axis of a pinnate leaf, as compared to costa in a costapalmate leaf.

reduplicate: leaf-segments with are A-shaped in cross-sections.

triad: groups of 3 flowers in which the central one is female and the two lateral ones male.

ventricose: where the upper part of the trunk develops a swelling or 'belly' in mature palms.

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Key to genera

1. Leaves pinnate. 2
 - Leaves palmate or costapalmate. 3
2. Petiole with spines; fruit ovate to oblong, fleshy, enclosing a hard, deeply grooved seed. 2. *Phoenix*
 - Petiole without spines; fruit obovoid, very large with massive fibrous mesocarp and woody endocarp. 5. *Cocos*
3. At least upper part of trunk covered with a tidy 'skirt' of old leaves; leaf-bases not split; very tall solitary palms without ventricose trunks. 1. *Washingtonia*
 - Upper part with some dead leaves forming an untidy 'skirt' or with persistent leaf-bases only; leaf-bases split; medium sized to small palms, often growing in clumps or groves, sometimes with ventricose stems. 4
4. Trunk unbranched; leaf usually stiff with a costa less than 10 cm long, transverse veinlets conspicuous; teeth on edge of petiole flattened, not spine-like; male and female inflorescences different; fruits sessile. 3. *Borassus*
 - Trunk often branching dichotomously below and/or above ground level; leaf often somewhat flexible with a costa over 10 cm long, transverse veinlets obscure; teeth on petiole margin forming regular, sharp-pointed spines; male and female inflorescences similar; fruits stalked. 4. *Hyphaene*

1. *WASHINGTONIA* H. Wendl. (1879)

Single-stemmed palm tree, often very tall. Trunk erect, partly to completely covered with old dry leaves which may be removed from cultivated trees. Leaves costapalmate; sheath margins fibrous; petiole margins with strong curved teeth; leaf-blade divided irregularly into linear, single-folded, segments, tips divided and hanging down at maturity. Inflorescence from among the leaves, branched, as long as or longer than the leaves; prophyll tubular, 2-keeled; rachis bracts tubular at the base, splitting longitudinally to become flattened and sword-like, very leathery. Flowers solitary; calyx chaffy, persistent in fruit; corolla tubular with narrow ovate reflexed lobes; stamens 6, borne at the mouth of the corolla tube; pistil cone-shaped with a wider top. Fruit small, ellipsoid to globose, black; epicarp smooth, thin; mesocarp thin, fleshy; endocarp thin, brittle. Seed ellipsoid, somewhat compressed.

2 closely related species from southern N America (California, Arizona and Mexico); 1 cultivated in the Flora area.

1. Leaves grey-green, petioles green with spines spaced out on the margins; trunk grey with conspicuous vertical fissures, leaf-scars not conspicuous. W. *filifera*
 - Leaves bright green, petioles red-brown with numerous closely spaced spines on the margins;

trunk brown with leaf-scars in conspicuous rings. W. *robusta*

W. robusta H. Wendl. is recorded as cultivated in E Africa (Dransfield, 1986). Despite its name, it is not as robust a plant as *W. filifera*. The main features of *W. robusta* are: a wider base but more slender trunk; inflorescence up to 3 m long, generally shorter than the leaves; flowers pink; fruits spherical.

W. filifera (Linden ex André) H. Wendl. (1879);
Pritchardia filifera Linden ex André (1877).

Palm tree growing 15 m or more tall. Base of trunk up to 80 cm in diameter, surface smooth with old leaf-scars as smooth lateral ridges broken by vertical fissures, often covered, at least in the upper part, by dead leaves which hang down to form a 'skirt'. Crown up to 5 x 3 m, of numerous circular grey-green leaves. Leaves: petiole 50-100 x 2.5-6 cm, very strong and rigid, margin with hooked teeth; blade 90-150 cm from top of costa to end of leaf-segments, split almost to the middle into 40-60 induplicate segments, margins with many long fine fibres, apex of older leaves hanging. Inflorescence from between lower leaves, 3-4 m long, much-branched; flowers small, creamy white. Fruits small ovate black berries up to 6 x 4.5 mm; seed 12 mm long.

Cultivated in public and private gardens; 2000-2400 m. EW (Asmara) SU (Addis Ababa) and probably in other larger towns; native to S California, W Arizona and Mexico where it grows in rocky areas where there is water seepage or ground water. *Sue Edwards* 5342.

2. *PHOENIX* L. (1753)

Burrow, S., A monograph of *Phoenix* L. (Palmae: Coryphoideae). Ph.D. thesis, Kew (1996).

Palms growing in clusters or as solitary trunks, sometimes creeping, without erect stems. Plants dioecious. Trunk usually covered with spirally-arranged leaf-bases, later smooth to fibrous at the base with rows of adventitious roots. Leaves pinnate; sheaths splitting and persistent, breaking up into a fibrous mass; petiole channelled, flattened or ridged; leaflets very many, spine-tipped, induplicate, lower modified as spines, midrib often with scales. Inflorescence from among the leaves, at first enclosed in a 2-keeled prophyll; bracts on peduncles absent; rachillas in spirals or partial spirals, each with a small bract; flowers arranged spirally, 1 per bract, bracts inconspicuous. Male flowers: calyx cup-shaped, lobes 3, triangular; corolla base tubular, lobes 3, longer than the calyx; stamens (3-)(6-)(9), borne on the petals; pistillode absent or highly reduced. Female flowers globular: calyx cup-shaped, lobes 3, short, triangular; corolla of 3 free petals; staminodes 6, very small; carpels 3, free, with short recurved stigmas; usually only 1 carpel develops into a fruit. Fruit: epicarp thin, smooth, sometimes waxy, mesocarp fleshy; endocarp a thin skin. Seed 1, with a deep longitudinal groove.

17 species occurring naturally in the tropics and

subtropics, *P. dactylifera* is widely cultivated for its fruits and some others are cultivated as ornamentals; 3 species recorded for the Flora area, only 1 of which is indigenous.

1. Crown with 20 or fewer leaves; trunk up to 25 cm in diameter; fruits ovate, 1.3–2.0 x 0.9–1.5 cm.
 1. *P. reclinata*
 - Crown often massive with over 20 leaves; trunk over 25 cm in diameter; fruits oblong, 2–7 x 1–3 cm, flesh usually soft and sweet. 2
 2. Tree solitary; trunk massive, 50 cm or more in diameter; fruits 2 x 1 cm; a cultivated ornamental.
 3. *P. canariensis*
 - Tree in clusters or man-made groves; trunk robust but not massive, 30–40(–50) cm in diameter; fruits 3–7 x 2–3 cm; tree grown for its edible fruits. 2
 - 2. *P. dactylifera*

1. *P. reclinata* Jacq. (1801)

– type: t. 24 in *Fragm. Bot.*

P. abyssinica Drude (1895) – type: ?TU, *Stuedner* 1541 (probably B holotype, ?destr.).

Palm tree 3–15 m tall, growing either in clumps or as solitary trees. Trunks leaning or erect, 10–25 cm in diameter, covered with persistent split leaf-sheaths; sometimes surrounded by small plants developed from suckers. Crown fairly open, with 20 or fewer leaves, but sometimes more crowded; in wild plants dead leaves remain for sometime hanging down over the trunk, usually removed from cultivated plants. Leaves up to 300 cm long, bright green, often shiny, curved over; petiole up to 50 x 2.5 cm, below spines up to 15 cm long, spines up to 6 cm long, in clusters on the margins; leaflets often 200 or more, in groups of 2–4 together towards the base, single and sub-opposite towards the apex, stiff, spine-tipped when young, breaking up at the apex and along the main vein when older. Inflorescences: prophyll 20–50 x 7–10 cm, often remaining on the tree and splitting into 2 halves; orange at anthesis, fading dull grey-brown, covered with woolly grey-brown indumentum when young. Male inflorescence: peduncle generally shorter than spathe, flattened and ridged; rachillas up to 70, arranged in partial spirals, up to 15 cm long. Male flowers creamy-white, turning brown, with a musty smell; calyx c 1 mm long; petals 6–7 mm long, acute, tip slightly toothed and reflexed at anthesis; stamens 6, shorter than petals, pale brown. Female inflorescence continues to grow after flowering to form a large hanging infructescence: rachillas up to 60, 15–40 cm long, each with up to 50 olive-green flowers, single or in small clusters. Female flowers globose, c 2 mm in diameter; calyx c 1.5 mm long; petals round, 2 x 2 mm, closely overlapping; carpels 3, stigmas reflexed, just emerging from tightly overlapped petals. Fruit generally from 1 carpel, all 3 rarely developed; calyx and petals dry and persisting, calyx up to 2 mm, petals up to 5 x 8 mm; fruit 1.3–2.0 x 0.9–1.5 cm, yellow, orange or dull red; epicarp smooth; mesocarp fleshy or dry. Seed 1–1.5 x 0.6–0.9 cm, deeply grooved along one side. Fig. 215.1 & 2.

Open forest beside streams and rivers, particularly in steep-sided valleys and ravines, sometimes forming groves; also in woodland and wooded grassland where ground is available, widely grown as an ornamental in public and private gardens; (500–)1200–2400 m. EW GD GJ SU SU/WG KF WG IL GG SD HA and probably in all floristic areas; throughout tropical Africa south of the Sahara to S Africa. Friis et al. 2214; M.G. & S.B. Gilbert 1977; *Burger* 525/2616.

When Drude (1895 in *Eng. Jarb.* 21: 117) named *P. abyssinica*, he differentiated it from *P. reclinata* on the calyx being more than half the length of the corolla, the seed being enclosed in a hard endocarp and also being somewhat pointed and larger than that of *P. reclinata*. Examination of material in K and ETH has confirmed the conclusion of Dransfield (1986) and Friis (1992 in *Kew Bull. Add. Ser.* 15: 267–268) that these two taxa cannot be distinguished on characters of the fruit and flower. However, many of the montane plants and those grown in gardens in the Flora area are more robust than as described in Dransfield (1986). These plants generally have erect single trunks, either solitary or in groves, and a fuller crown with longer leaves than found in more typical *P. reclinata*. The fruit may also be larger, but a comprehensive field study is required to see how these characters correlate.

The most conspicuous use of the montane form of this species in the Flora area is as an ornamental in both public and private gardens. The leaves are also cut and used whole on Palm Sunday in the Orthodox Church and as decorations for weddings; between Palm Sunday and Easter children use the young soft leaflets to make finger rings. The fruits are often rather dry and are more eaten by birds and monkeys than by people. The leaves and other parts may be used for making mats, but this is not noted on any of the collections. Weaver birds strip the leaves of this plant in making their nests.

2. *P. dactylifera* L. (1753)

– type: Kaempfer 'Palma hortensis mas et foemina', *Amoen. Exot.*, t. 1, 2: 668, 686, (1712).

Large palm growing solitary or in small clumps or man-managed groves, up to 8 m tall in E Africa (elsewhere over 20 m). Plants dioecious. Trunk robust, 30–40(–50) cm in diameter, first covered with old leaf-bases and then brown prominent leaf-scars. Crown of 20 or more leaves, sometimes fewer. Leaves grey-green, stiff, up to 3 m long, only bending slightly when older, but persisting and hanging down when dead; petiole 50–100 cm long, below spines up to 20 cm long, spines up to 15 cm long; leaflets fairly spaced out, c 80 on each side of the rachis, generally pointing forwards. Male inflorescence: peduncle up to 60 cm long; prophyll c 45 x 10 cm, covered in a brown fur-like indumentum when young; rachillas very many, up to 30 cm long; flowers in scattered groups or solitary. Male flowers cream coloured, somewhat asymmetrical, bud apex obtuse; calyx 2 mm long; petals up to 8 x 3 mm; pistillode very small. Female inflorescence similar to the male, but after flowering continuing to grow into a large fruit-bearing structure.



Figure 215.1 *PHOENIXRECLINATA*: whole plant. Drawn by Sarah Howard from photograph of Sue Edwards from Finchaa (WG).

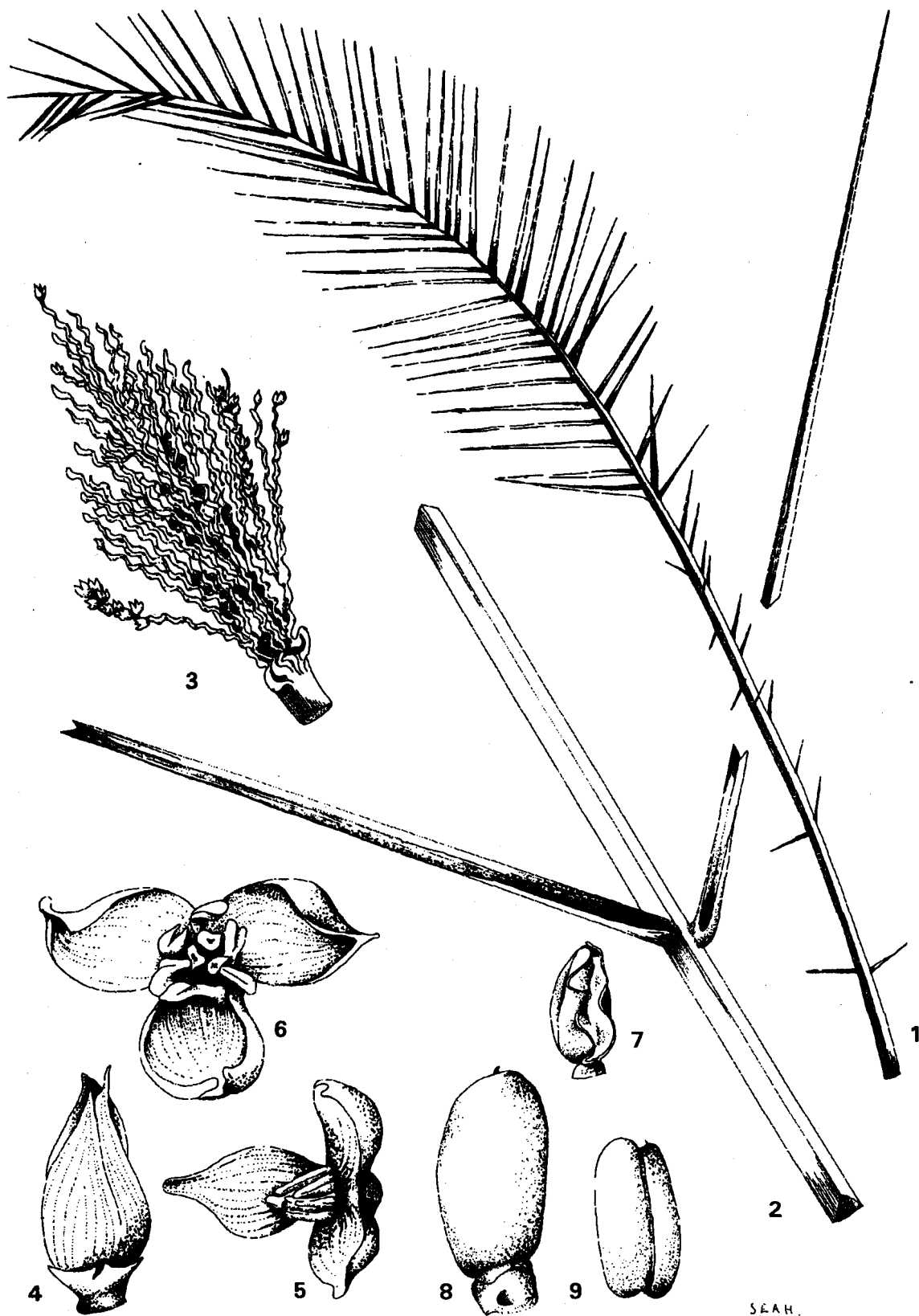


Figure 215.2 *PHOENIX RECLINATA*: 1 - leaf $\times 1/10$; 2 - pair of leaflets and rachis $\times 1$; 3 - part of male inflorescence $\times 1/4$; 4 - closed flower $\times 5$; 5 - male flower showing unopened stamens $\times 5$; 6 - male flower opened to show dehiscent stamens and vestigial carpels $\times 5$; 7 - stamen $\times 10$; 8 - fruit $\times 1\frac{1}{2}$; 9 - seed $\times 1\frac{1}{2}$. Drawn by Sarah Howard.

Female flowers globose, *c* 5 mm in diameter; calyx *c* 2 mm long; petals circular, *c* 4 x 4 mm; carpels *c* 2.5 mm long, only the stigmas exposed at anthesis. Fruit very variable in size and texture; 3–7 x 2–3 cm, yellow, orange-brown, dark brown, almost black, mesocarp very thick fleshy and sweet, or thin sweet and dry. Seed also variable, *c* 2.4 x 0.6–0.8 cm with a conspicuous longitudinal furrow. Fig. 215.1 & 2.

Observed from records from small towns and villages; probably sea-level to *c* 1350 m. Written records and observations from EE EW AF GG HA; widely cultivated in semi-arid and desert habitats throughout the tropics. *Ryding & Sileshi N.* 1712; *Sue Edwards* 5384.

This is the date palm of commerce which has been in cultivation, or otherwise used by man, for more than 8000 years. The main areas of production are the tropical belt between 15N and 30N in Arabia, Africa, California and Arizona. In Ethiopia both dry sweet fruits on the stalk and the packed fleshysweet fruits are found on sale. Most of these are probably imported from Arabia.

3. *P. canariensis* Chabaud (1882)

– type: Chabaud, *La Provence Agricole et Horticole Illustrée* 19: 293–297, fig. 66–68 (K lecto.).

Large ornamental palm growing solitary, up to 10 m tall in the Flora area (up to 20 m elsewhere). Plants dioecious. Trunk very stout, up to 120 cm in diameter at base without the leaf bases, upper part covered with old leaf-bases, leaf-scars diamond-shaped, forming rings, base of trunk wider with many adventitious roots forming a fibrous covering. Crown dense, with usually around 50 leaves (in the Flora area, up to 200 elsewhere). Leaves dark green, 5–6 m long, arching, old ones quickly removed from ornamental plants; petiole 1–1.2 m long; leaflets closely spaced, up to 200 on each side of the rachis. Male inflorescence erect: peduncle 50–70 cm long; prophyll up to 40 cm long, with 2 long splits, yellow-green when young and covered with red-brown fluffy hairs, becoming brown and leathery with age. Male flowers; calyx cup-shaped, 1.5–2 mm high; petals 6 x 3 mm, apex rounded with minute teeth. Female inflorescence similar to the male, first erect and then bending over, peduncle 160–200 cm; rachillas up to 60 cm long with flowers mostly found in the upper parts. Female flowers yellow-white, with a faint smell; calyx cup-like, *c* 2.5 mm high; petals 3 x 4 mm. Fruit 1.5–2 x 1.2 cm, golden yellow when ripe, mesocarp fleshy and sweet. Seed 1.5 x 1 cm with a conspicuous longitudinal furrow and rounded ends.

Cultivated as a street tree in many of the larger towns and cities; 1000–2400 m. Observations from EW (Asmara) GJ (Bahir Dar) SU (Addis Ababa) KF (Jimma); endemic to the Canary Islands but now cultivated as a street tree in warmer temperate and tropical towns. *Ryding* 1939; *Sue Edwards* 5385.

This is the largest street palm in Addis Ababa, Asmara, Bahir Dar and Jimma. As street trees they seem

to live for about 40–50 years and do not reach the height seen from photos of this species in the Canary Islands.

These palms attracts many birds, particularly Pink-breasted Pigeon, to nest in it and small plants to grow on the trunks. The leaves are used in the same way a *P. reclinata*. The fruits are sweet and much-liked by children.

3. BORASSUS L. (1753)

Robust palms with solitary trunks, but sometimes found in groups. Plants dioecious. Trunk robust, usually conspicuously ventricose above the middle in older trees. Leaves very large, palmate or costapalmate, often staying on long after dying, but finally falling to leave a smooth trunk; sheath short, splitting longitudinally; petiole deeply channelled above, ending in a well-developed hastula on the upper side, margins with flattened usually irregularly-shaped teeth; lamina circular to fan-shaped, divided to halfway into induplicate segments, apex shortly bifid, transverse veins conspicuous, short, numerous. Inflorescence produced among the leaves; male and female very different. Male inflorescence: peduncle with a prophyll and several bracts, each rachilla from the axis of a rachis-bract, covered in spirally-arranged, overlapping bracts, united to the rachilla to form pits, each enclosing a cluster of 3 or more flowers. Male flowers emerge one at a time from the pits; sepals 3, united into a tube with long or short lobes; corolla with a long stalk-like base and 3 short lobes; stamens 6; pistillode very small. Female inflorescence unbranched, or branched only once, covered in large overlapping and united bracts. Female flowers large, each with 2 lateral, cup-like, leathery bracteoles; sepals 3, separate but overlapping; petals 3, similar to the sepals; staminodes 6, forming a cup-like ring with or without small sterile anthers; pistil of 3 carpels, ovary globose, stigmas 3, very short or reduced to a knob; nectary conspicuous. Fruits large, rounded, partly within the persistent perianth parts, with 1–3 seeds; epicarp smooth; mesocarp thick and fibrous, often sweet-smelling; endocarp forms hard covering to the seed. Each seed enclosed in a separate endocarp forming a pyrene.

Probably around 3 species in the Old World tropics including N Australia; 1 species in the Flora area.

B. aethiopum Mart. (1838)

– type: Ghana, *Thonning* 258 (location not known).

Large palm tree up to 20–30 m tall, growing singly or in groups. Trunk widened at the base and ventricose above midway up the stem, covered with old leaf-bases below the leaves, lower part with annular leaf-scars on a greysurface. Crown fairly dense with *c* 40 leaves; base *c* 90 cm long, split down the middle; petiole up to 325 cm long, 3 cm thick, 15 cm wide at the base, narrowing to 7.5 cm towards the top, margins with flat, shiny, dark-brown to black, often irregularly shaped flattened teeth, up to 2 cm long; costa *c* 10 cm long; blade *c* 180

cm from top of costa to apex; more or less circular in outline, segments 60–80 or more, stiff, longitudinal veins numerous, transverse veins distinct, scattered minute pale brown scales present; apex divided for up to 15 cm, tips of older segments breaking up and hanging. Male inflorescence up to 150 cm long with 3–6 partial inflorescences; peduncle *c* 50 cm long and 3 cm wide at the base; bracts tubular, up to 45 x 7 cm, leathery, finely ridged, split for *c* 17 cm, upper bracts subtending branches ending in (1–)3 rachillas; rachillas up to 35 x 3 cm, brown-green, densely covered in *c* 8 spirals of overlapping bracts which surround pits, free part of bract 1 x 0.5 cm; each flower cluster a cincinnus of about 9 flowers which emerge one at a time from the pit. Male flowers: bracteoles 2 to each flower, small, *c* 3 x 1 mm; calyx up to 7 mm long, tubular with 3 long or short lobes; corolla-stalk up to 7.5 x 1 mm, lobes 3, somewhat hooded, *c* 2 mm long; stamens 6, filaments very short. Female inflorescence usually unbranched, sometimes with 1 or 2 branches, up to 150 cm long, with 2–3 large empty bracts up to 50 x 7 cm at the base; flowering part *c* 5 cm across, bracts 3 x 12 cm, joined together to form pits. Female flowers: solitary, each with 2 bracteoles, 2 x 3 cm; sepals 3, overlapping, *c* 1.5 x 2 cm; petals 3, overlapping, 1 x 1.5 cm; staminodes joined to form a ring with 6 teeth; ovary *c* 1 cm in diameter, with 3 stigmatic areas at the top. Fruit dull orange-brown and somewhat shiny when ripe; calyx and corolla persisting and enlarging; sepals 6 x 10 cm; petals 7–8 x 12 cm, margin toothed; fruit shape depends on number of seeds developed, and their arrangement in the infructescence, often broadly ovoid, usually flat-topped, up to 12 x 14 cm; mesocarp thick, yellow, many fibres embedded in soft flesh, sweet smelling when ripe; pyrenes 1–3, 3-angled, up to 10 x 10.5 cm. Fig. 215.3 & 4.

Forming stands at the edge of semi-deciduous lowland forest, in depressions in *Terminalia* woodland and along streams, also left as isolated trees in fields; 400–950 m (to 1200 m in E Africa). GJ IL, also SD according to Cufodontis (see below); widespread but patchy in the moister areas of tropical Africa. Friis et al. 7270, 7767; *Mengistu Woube* 22.

The fruits of this species are eaten in the Benshangul-Gumuz Region; the leaves are used for making mats.

The record for SD cited by Cufodontis is based on two photos in the account of the Italian Sagan–Omo expedition (Chiovenda, *Webbia* 8: 42–43, 1952) which Corradi annotated. Corradi comments that the plants in the photos had a different habit from *Hypphaene* being *c* 15–20 m tall with unbranched stems and fan-shaped leaves. He thus concluded that they belonged to *Borassus*, and Beentje (*Kenya Trees, Shrubs and Lianas*, 1994) records *Borassus* from NE Kenya near the border with Ethiopia and Somalia. However, the plants in the photograph lack the ventricose stems typical of *B. aethiopicum* and have arching leaves indicating a well developed costa which is more typical of *Hypphaene*. More field work and herbarium collections are needed

to determine which species of palm occur in southern Ethiopia.

4. *HYPHAENE* Gaertn. (1788)

Beccari, *Agric. Col.* 2: 137–183 (1908); *Palme della tribù Borassese*, Firenze (1924); Fiori, *Boschi e Piante Legnose dell'Eritrea*, *Bib. Agraria Coloniale* 7: 54–55, 96–100 (1912).

Palms varying from shrubs with prostrate stems or without stems to medium-sized to large trees usually with dichotomously divided trunks (unbranched and ventricose in *H. petersiana*), this sometimes underground to give a cluster of stems of the same size. Plants dioecious. Trunk erect or slanting, usually divided at least once, upper part covered with old leaf-bases, lower smooth with circular ridges from the leaf-scars. Crown sparse to dense, leaves often arching over, dead leaves remain on the plant to make an untidy skirt unless the area is burnt. Leaves costapalmate, costa usually well developed, sometimes asymmetrical, all parts can have waxy scales and/or fluffy hairs; base with a triangular split; petiole usually long, semi-circular in cross-section, margins horny with few to many strong, sharp-pointed, erect to curved spines; hastula on lower side usually well-developed, asymmetrical, often partly hidden by fluffy hairs and scales, particularly in young leaves; blade divided for about 2/3 length of the blade into induplicate segments, fibres between segments usually conspicuous, surface usually waxy, with pale or dark dot-shaped scales, longitudinal and transverse veinlets inconspicuous. Male and female inflorescences mostly similar, male often more branched and slender than female; main axis with basal, tubular, empty, 2-keeled prophyll and 1–2 tubular bracts, these and rachilla-bracts often with a sparse to dense covering of fluffy hairs; basal part of main axis often flattened; rachis longer than peduncle; branches much flattened with 1–13 palmately-arranged rachillas each with a small triangular bract at the base; rachilla covered with closely packed, spirally arranged bracts joined together at their base to form floral pits, pits often with fluffy hairs. Male flowers: 3 per pit, arranged as a cincinnus, usually surrounded by hairs, one flower opening at a time; calyx base tubular, lobes 3, hooded; corolla with a basal stalk and 3 overlapping lobes, reflexed at anthesis; stamens 6, on the base of the corolla lobes, filaments short; pistillode very small. Female flowers much larger than the male, 1 in each pit; pedicel densely hairy; sepals and petals similar, each 3, free, rounded; staminodal ring with 6 teeth each with a minute empty anther; ovary globose, 3-locular, usually only 1 locule with an ovule, stigmas sessile. Fruit variable in size and shape, generally brown, often fragrant when mature; pedicel enlarged, sepals and petals persistent but not enlarging very much; epicarp smooth, sometimes pitted, often wrinkled after drying; mesocarp with many transverse fibres and dry to soft edible flesh; endocarp hard, stony.

A genus with *c* 40 species most found in moist to dry



Figure 215.3 *BORASSUS AETHIOPUM*: upper part of female fruiting tree. Drawn by Sarah Howard.

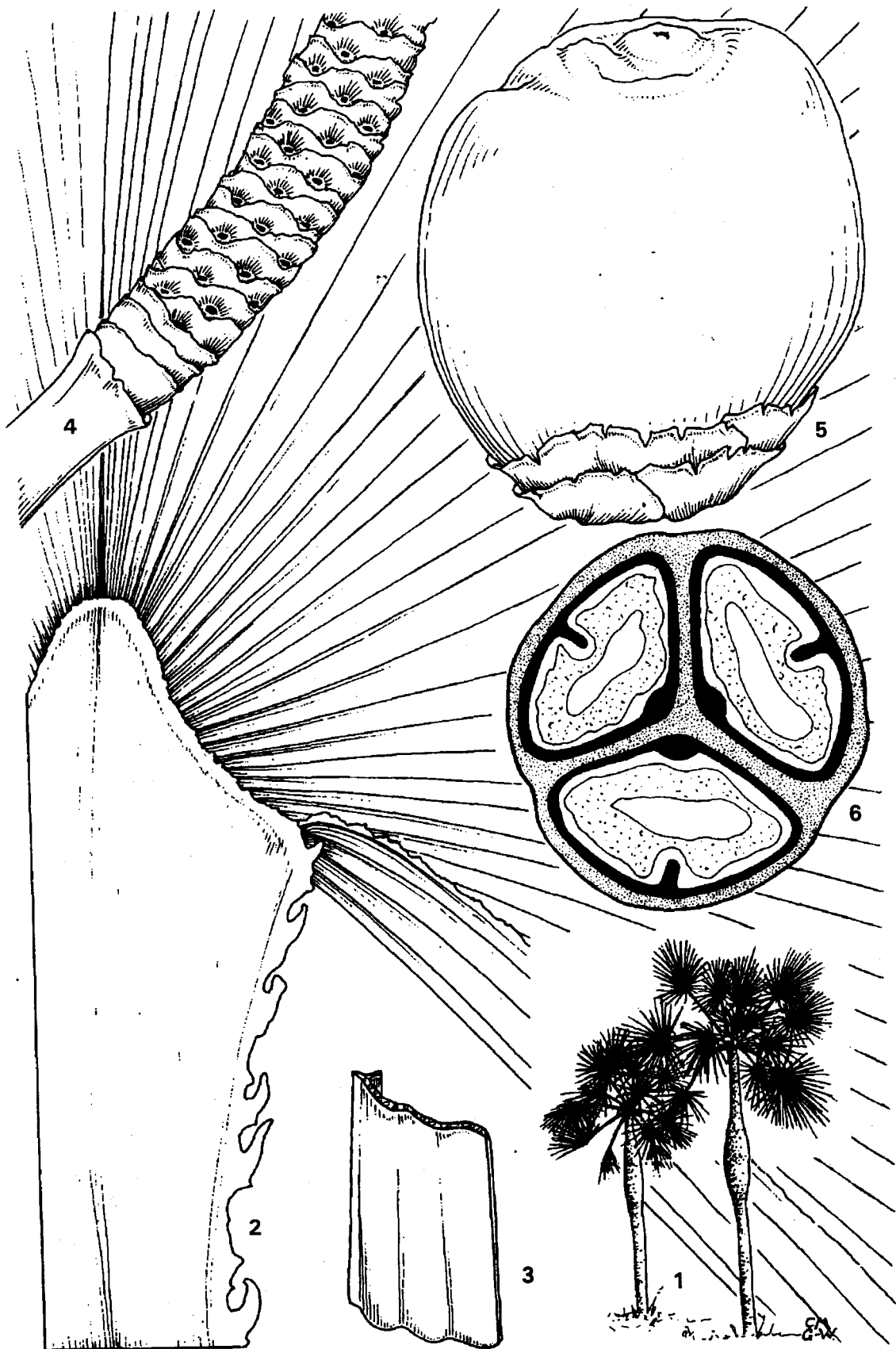


Figure 215.4 *BORASSUS AETHIOPUM*: 1 - full grown trees; 2 - base of leaf showing hastula and upper part of petiole with irregular, flattened spines $\times 2\frac{1}{2}$; 3 - part of segment from leaf $\times 2$; 4 - part of male inflorescence $\times 2\frac{1}{2}$; 5 - mature fruit $\times 1\frac{1}{2}$; 6 - transverse section of fruit $\times 1\frac{1}{2}$. 1 from a photograph, Pawek 13220; 2 & 3 from Dransfield 4811; 4 from Bronn 1904; 5 from Dransfield 4818; 6 from B.D. Burt 1659. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr. Palmae*: fig. 2)

parts of tropical and subtropical Africa, a few species extending to Arabia, 1 on the west coast of India; 2 species recorded with certainty from the Flora area.

1. Shrub with prostrate, flattened stems. *H. reptans* 2
– Trees with erect or ascending stems.

2: Inflorescence bracts glabrous, or with a few fluffy scales on the margins; most teeth on petiole margins not developed into curved spines; fruit irregularly shaped with 2 or more 'bumps'.

1. *H. thebaica*

– Inflorescence bracts covered or with patches of fluffy scales; most teeth on petiole very large and developed into curved spines; fruit with a smooth outline, generally obovate, without irregular 'bumps'. 3

3. Tall trees, usually much-branched or clumped with erect trunks; fluffy scales pale brown; ripe fruit scented, skin pitted. 2. *H. compressa*

– Small trees, usually only once-branched with leaning trunks; fluffy scales dark brown; ripe fruit with hardly any scent, skin smooth. *H. coriacea*

H. reptans Becc. (1908) is a prostrate shrub with flattened stems *c* 30 wide and crown at ground; leaves up to 1 m long, waxy blue-green; petiole margins with small to large, brown or black, straight or curved spines up to 1 cm long, segments rigid, somewhat curved, with long fibres between, apex divided and pointed.

This species is found in wadis and around springs in otherwise desert habitats of Somalia, Arabia and Kenya. There is no report of this species from the Flora area, but it could be found in the Afar or Ogaden.

H. coriacea Gaertn. is a shrub or small tree usually with leaning stems which cluster at the base; fruits usually less than 6 cm with a narrow base and widened top.

This is basically a coastal area palm occurring between sea level and 300 m along the coast in E Africa and southern Somalia. There is no report of this species from the Flora area, but it might be found along the Red Sea coast in EE as this area is very poorly known botanically.

Considering the long tradition of trading with the Indian sub-continent, it is quite possible that *H. dichotoma* (White) Furtado (syn. *H. indica* Becc.) could have been deliberately planted along the Red Sea Coast. The relationship of this species to the wider concept of *H. thebaica* used in this account needs further study.

1. *H. thebaica* (L.) Mart. (1838);

Corypha thebaica L. (1753) – type: probably from Egypt, Thebes, Pocock s.n. (not seen).

H. nodularia Becc. (1908) – type: EW, Agordat, by the Barca river, Senni 612 (FI holo. not seen).

H. dankaliensis Becc. (1906) – type: EE, Assab, Beccari a. 1870 (FI holo. not seen, K syn.).

H. dankaliensis Becc. var. *subcompressa* Becc. in *Agric. Colon* 2: 160 (1908) – type: ?EE, probably from Assab, probably Beccari (Pisa, holo. not seen).

Palm tree with dichotomous branching often found in

almost pure stands, growing (6–)8–20 m tall. Trunk solitary, 30–40 cm in diameter, erect or somewhat slanting, soon dividing into 2 branches which may divide again to give 8 crowns, rarely more; most of trunk covered in leaf-bases which break-up into fibres near the base, unless removed by fire or other means. Crown of 10 or more blue-green, fan-shaped leaves with stiff petioles and generally curved blades, after dying remaining on the trunk to form an untidy 'skirt', but often burnt or cut off. Leaves up to 150 cm long; base sheathing, split; petiole up to up to 60 cm long, margins brown or black with somewhat widely spaced, sharply pointed spines, up to 1 cm long, some curved; most straight; hastula up to 1.5 cm long, but often shorter, and sometimes none; costa up to 3.5(–8) cm long with *c* 10 segments on each side; blade leathery, 55–90 cm long, divided for about ¾ length with a single fibre between each segment; segment-tips divided, outer half with brown or pale scales, fluffy brown scales usually not found. Male inflorescence: prophyll tubular at the base opening out to a lanceolate blade, up to 25 cm long, glabrous; partial inflorescences 25–30 x 1 cm; rachillas 12–18 x 0.7–1.1 cm, base woody and persistent or more fragile; bracts 0.7–0.8 x 0.3 cm, united to form a pit with a small opening, glabrous and often strongly striate. Male flowers in cincinni of 3, with green minute foliaceous bracts: sepals acute; petals obovate, hooded and overlapping. Female inflorescence similar to male, up to 80 cm long, rachillas usually solitary, rarely 2 together, 12–25 x 1.2–1.8 cm; pits densely filled with hairs. Female flowers solitary: pedicel very short and wide; sepals triangular, acute, leathery; petals round, scarious, a little smaller than the sepals; staminodes 6; ovary globose, 3-locular but only 1 locule fertile. Fruit yellowish-brown to orange- or red- or dark red-brown, sessile or with a very short and wide pedicel, 4.5–9 x 4.5–7(–8) cm, highly variable in detail of shape and size, ovate to globose to obovate in outline, usually with some irregular bumps around the base, possibly formed from the aborted locules, and/or shoulders towards the top, the whole fruit usually having an irregular shape; epicarp relatively smooth, dull or shiny, with medium to fine dots and/or reticulations; mesocarp dry, crumbly, sugary or not, with a faint spicy smell or without a smell, 0.4–0.8 cm thick, with numerous radially oriented fibres; endocarp bony, 0.3–0.8 cm thick. Seed with a shape to that of the fruit, ovate to conical or globose to obovate, 3–4 x 2.5–4 cm. Fig. 215.5 & 6.

In the north-west and west of the Flora area, mainly in river valleys and around oasis, often in damp places in *Terminalia* woodland and on flood plains along rivers, in the Rift Valley and Afar often at hot springs, also in depressions along the Red Sea coast and on islands in the Red Sea; from 100 m below sea level in Dallol, Afar, to 1000 m. EE EW AFGD GJIL; Somalia, ?Arabia, Egypt to Sudan and across Sub-Saharan to W Africa. *Mesfin* T. 6122; *Burger* 3708; *Friis* et al. 7800.

When Beccari (1924) studied *Hyphaene*, he considered true *H. thebaica* to be restricted to the Nile valley,



Figure 215.5 *HYPHAENE THEBAICA*: 1 – mature tree; 2 – basal part of leaf showing costa and recurved spines $\times 1/2$; 3 – part of male inflorescence $\times 1/4$; 4 – longitudinal section of female bud $\times 5$; 5–7 – various aspects of a fruit $\times 2/3$. 1 from a live plant in the Tihama Plain, S Arabia (slide taken by Sarah Howard); 2–7 from specimens at the Kew Herbarium. Drawn by Sarah Howard.

particularly Egypt to Nubia in Sudan. The material from the Flora area was placed in two species, *H. nodularia* from the valleys of the Barca and Gash river systems in the west, and *H. dankaliensis* from the Red Sea coast and inland into the Afar to below sea in the Dallol depression 'Piano del Salle'.

Beccari (1924) made extensive notes on *H. nodularia* including the comment that it was difficult to find a precise character to differentiate it from *H. thebaica*. In the description, it is the size of the trees and fruit that are used as diagnostic characters, this includes the globose to ovoid globose fruits with 2 large 'bumps' at the base and wider endocarp in *H. nodularia*. However, *H. nodularia* fits well within a wider definition of *H. thebaica* than that of Beccari and has been reduced to synonymy here. This wider concept is confirmed by the range of variation in the fruits of Friis et al. 7796A & B, and 8003 collected from river valleys from western Ethiopia (GJ IL).

Beccari considered *H. dankaliensis* very distinct from both *H. thebaica* and *H. nodularia*. *H. dankaliensis* could be as tall as *H. nodularia*, but it had larger leaves, up to 1.5 m from the top of the costa to the tip of the central segments, the male rachillas were longer and more delicate with a progressive reduction in the number of rachillas per node from the base to the top of the partial inflorescence. The most striking feature was that the fruits were markedly smaller than in the other two species, but were otherwise highly variable in shape. The fruits were also noted as being very sugary and scented – features not noted for *H. nodularia*, but characteristic of *H. compressa*. Despite all the differentiating features noted by Beccari, and the fact that the authors have only seen a few populations of that taxon in nature, it seems more appropriate to treat *H. dankaliensis* as a synonym of *H. thebaica*; 3 fruits (syntypes of *H. dankaliensis*) collected by Beccari and given to Kew in 1907, and the photos in Beccari (1924) confirm this view. However, more information on the vegetative characters of this taxon is needed before definite conclusions about the taxonomic position of the populations in the Afar depression and along the Red Sea Coast are reached. The taxon *H. dankaliensis* var. *subcompressa*, which has fruits compressed on 2 sides and is triangular in cross-section, is included here but the fruit characters could possibly indicate that this name might be a synonym of *H. compressa*.

The Italians took considerable interest in *H. thebaica* of the northwestern valleys (*H. nodularia*) for industrial development as there were extensive natural populations in the early 1900s (see map in Beccari, 1924). Between 1907 and 1920 over 400 thousand quintals (4 million kg) of the fruits were exported from Eritrea to make buttons from the endocarp which provided vegetable ivory. The Italians imposed a ban on the cutting down of this tree. Beccari noted that all parts of the tree were used by local people: the trunk for construction and fuel, the terminal bud eaten, and the whole of the crown from young plants was taken so the leaves could be woven into bags, baskets, rope and string, and other household items, and there were many other uses for older leaves. The modern uses of *H.*

thebaica are as recorded above by Beccari, with the addition of the extraction of juice from inflorescences just before flowering to make palm wine. The fruits of the palm in Mitsiwa are collected and sold for eating in Asmara. After eating, the fibrous covering is removed to give the obovate seed which children mount on a nail and play with as a top. Reports from other parts of the Flora area also indicate that the fruits are eaten.

2. *H. compressa* H. Wendl. (1978)

– type: Tanzania: Kilwa, Zimmermann Iab (FI neo. not seen).

Large palm tree with dichotomous branching growing to 20 m tall. Trunk solitary and erect, c 40 cm in diameter at base narrowing to c 30 cm below first branching and narrowing at each further branching to c 20 cm below the crowns; usually branching 4–5 times to give 12–16 crowns, sometimes branching six times to give up to 64 crowns; in E Africa also found as clumps of 2–4 curving trunks of about the same height, sometimes also with clusters of young shoots around the base, these probably seedlings; upper part covered with old leaf-bases, lower grey-brown with diamond-shaped leaf-scars. Crown of c 15 large, green, fan-shaped leaves, after dying remaining on the trunk to form an untidy 'skirt', but often burnt or cut off. Leaves: base sheathing with a triangular split up to 50 cm long in the centre; petiole up to 125 x 3.5 cm, semicircular in cross section, pale yellow, margins and ventral line black with large, curved, sharply pointed spines, up to 2 x 0.6 cm mostly pointing towards the blade; hastula black, usually asymmetrical and irregular in shape, with a ragged line of hairs on the edge; costa well developed and sometimes twisted, c 30 segments on each side folded like a fan; blade up to 80 cm long, spreading, c 125 cm wide, divided for about 2/3 length, tips further divided to 1/3; segments stiff, up to 4 cm wide near the base, gradually narrowed to 2-pointed tips, waxy blue-green with somewhat yellow ribs, fibres between segments dark green, surface covered with black scales, fluffy brown scales present on ribs of young leaves. Male inflorescence up to 150 cm long, arching, base 5 x 3 cm; larger bracts c 25 cm long, covered in pale brown fluffy hairs and dark scales; partial inflorescences up to 10, each with 1–3 (–5) rachillas held horizontally together; rachillas c 25 x 1 cm, bracts with exposed area c 0.4 cm wide and 0.1 cm high, green-brown; pit hairs dull pale brown. Male flowers: pedicel c 1 mm long; sepals 1.5 x 0.5 mm; petals ovate, c 2 mm long, pale green; mature stamens bright yellow. Female inflorescence similar to male except that rachillas are usually solitary, sometimes 2, rarely 3 together, up to 25 x 1.5 cm; pit c 1 cm wide and 0.8 cm high at anthesis, densely filled with light brown hairs. Female flowers: pedicel c 5 mm long, lengthening to over 10 mm in fruit, c 6 mm wide including densely packed hairs; sepals and petals similar, 5 x 7 mm, bluntly triangular, bright green; ovary c 5 mm wide; stigma producing nectar. Young fruits dull dark to light brown with green to cream sunken spots; mature fruits rich dark orange to red-brown, rarely pale golden-brown,

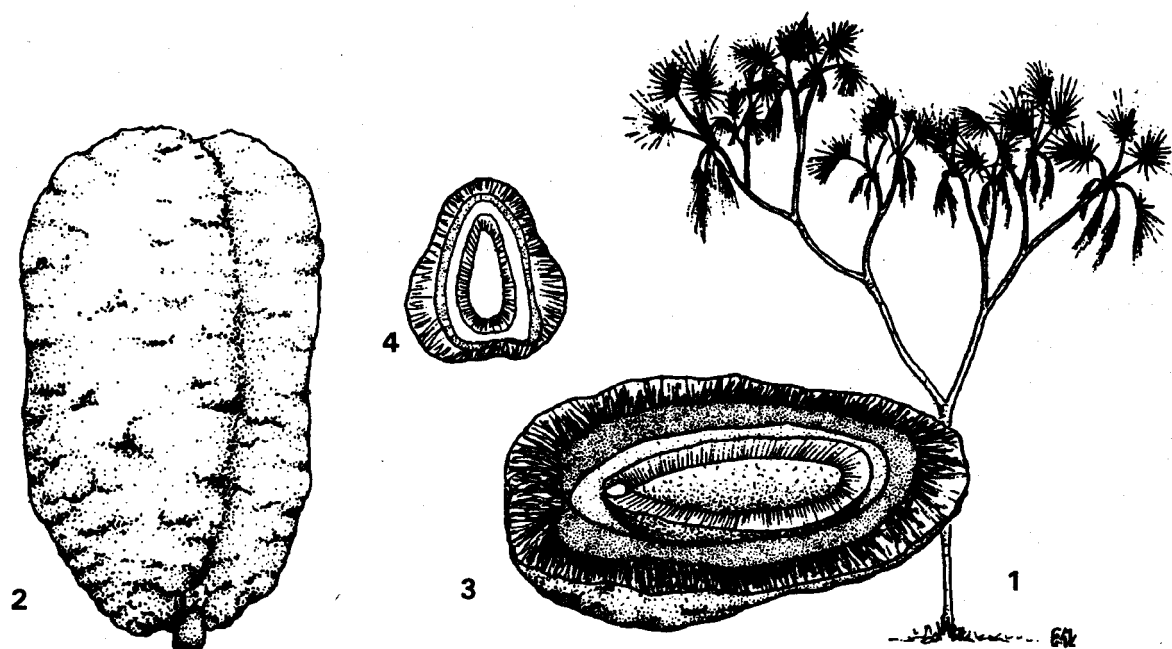


Figure 215.6 *HYPHAENE COMPRESSA*: 1 – mature tree; 2 – fruit $\times 2\frac{1}{3}$; 3 – fruit in longitudinal section $\times 2\frac{1}{3}$; 4 – fruit in transverse section $\times \frac{1}{2}$. 1 from a photograph taken in Tanzania; 2–4 from Dransfield 4830. Drawn by Christine Grey-Wilson. (Reproduced with permission from *Fl. Trop. E. Afr. Palmae*: fig. 3)

variable in size and shape, (6–)7–10(–12) \times (4–)5–8(–9) cm, oblong, obovoid, sometimes much deformed, mostly with 2 flatter sides; epicarp tough, shiny, covered with sunken spots; mesocarp usually with a fairly strong, pleasant smell (some say like ginger), fleshy, up to 1 cm thick; endocarp 4–8 mm thick around the middle, to 10 mm thick around the terminal pore.

In flat savanna near Sagan and Omo river; 500–550 m (0–1400 m in E Africa). GG ?SD (see below); Somalia, S through Kenya and Tanzania to Mozambique. Gereau et al. 1408.

Gereau et al. 1408, from GG, is the only specimen of this species seen from the Flora area. Corradi (see Chiovenda, *Webbia* 8: 42–43, 1953) made a collection of fruits of a species of *Hyphaene* (Corradi 1614, FT, not seen) at the well of Gondaraba, also in GG, and recorded the follow general observations about specimens of *Hyphaene* made during his journey: 'The dum palm was seen in pure stands along the Dawa Parma. From Malca Dide to Bogol Majo few plants were seen along the wadis [these localities are in SD]. From Bogol Majo to Mega none were seen. Along Sagan we did not see palms, but local people said that there were palms higher up the river ... Near the well of Gondaraba, in a destroyed village, we found fruits of *Hyphaene nodularia*. ... We did not see dum palms along the Omo river.'

According to Dransfield (1986) and Beentje (*Kenya Trees, Shrubs and Lianas*, 1994), *H. compressa* grows in the Lake Turkana area in N Kenya, while *H. thebaica* is unknown from Kenya. This supports our identification of Gereau et al. 1408, which has a very robust leaf and fruits with two flattened sides, as *H. compressa*. Corradi's fruits from Gondaraba probably also belong to this species. More information on the plants along the

Dawa Parma and between Malca Dide and Bogol Majo is needed to decide whether the 'dums' seen by Corradi in SD belong to *H. compressa* or *H. thebaica* as the common name 'dum' or 'doum' is used for both species.

Imperfectly known taxa

H. dankaliensis var. *haycockensis* Becc. in Beccari, *Palme della tribù Borassese*: 29 (1924).

–type: S end of Red Sea, Hanish Island, Courbon s.n. (FI Candolle, not seen).

The specimen consists of a male inflorescence and fruits which were taken from a very small palm shrub 4–5 cm tall (according to a note of Courbon). Beccari used the fragile nature of the male rachillas and the basic features of the fruit to make it a variety of *H. dankaliensis*, somewhat similar to the population found at Obok. However, in his notes he expressed the opinion that, as the Hanish Island was nearer to Arabia than Africa, this plant may be related to other Arabian species of *Hyphaene* rather than the African *H. dankaliensis*.

5. *COCOS* L. (1753)

Palm tree with solitary trunk, usually found in groves. Plants monoecious. Trunk erect or leaning, covered in leaf-scars. Leaves pinnate; sheath fibrous, with a triangular extension opposite the petiole; leaflets with a single A-shaped fold, apex bifid and asymmetrical. Inflorescence produced among the leaves, bisexual, only branched once; prophyll tubular, 2-keeled, becoming fibrous; rachillas spreading, with 1 to few 3-flowered clusters at base, and solitary or 2-flowered groups at the ends. Male flowers asymmetrical, sessile; sepals 3, triangular; petals much longer than sepals, leathery, thick;

somewhat boat-shaped; stamens 6; pistillode small. Female flowers much larger than male; sepals 3, overlapping; petals 3, overlapping; staminodes as a ring; carpels 3, broadly ovoid, stigmas 3, very short. Fruit very large, ellipsoid to broadly ovoid, variously coloured when ripe; perianth persisting and enlarging; epicarp smooth, mesocarp a thick mass of fibres; endocarp woody with 3 pores in the base. Seed 1, very large with endosperm forming an internal layer and a central fluid-filled cavity.

Only 1 species, wild origin unknown, now cultivated throughout the tropical lowlands.

C. nucifera L. (1753)

— type: Rheede, *Hort. Ind. Malab.* 1 t. 1–4: 1–8 (1678–1703).

Short to tall palms, some varieties fruiting when 2 m tall, other growing to 30 m or more. Trunk sometimes swollen at the base, otherwise about 40 cm in diameter, bark grey with leaf-scars forming rings. Leaves up to 5 m long; petiole up to 2 m long, channelled above; leaflets up to 1 m long, fairly bright green above, paler below; midrib pale green or golden yellow. Inflores-

cence up to 150 cm long, with a persistent prophyll; peduncle bract conspicuous, somewhat persistent, narrow, with longitudinal ridges; rachillas *c* 30, spreading, cream-coloured. Male flowers somewhat asymmetrical; sepals 3, acute, 2 x 3.5 mm; petals 3, rather flat, acute, somewhat fleshy, 13 x 4 mm; stamens 6, apically bifid. Female flowers large, up to 3 cm in diameter; sepals 3, rounded *c* 1.5 mm wide; petals 3, rounded, *c* 2.5 mm wide; ovary rounded, 2.5 mm in diameter. Fruit usually only 1, developed on a rachilla, very large, extremely variable in shape and size; sepals and petals persisting and enlarging to 5 x 7 cm; epicarp a thin crust over the massive fibrous mesocarp; endocarp hard and woody, up to 5 mm thick. Seed filling the endocarp cavity; endosperm forming the 'flesh' inside the endocarp.

Cultivated experimentally by the Italians at Filfil in Eritrea; *c* 1000 m. EE/EW; cultivated and 'wild' throughout the tropics. No herbarium material seen from the Flora area.

This is the coconut of commerce, one of the most important tropical crops. Most parts of the Flora area are either too dry or too high and cool for this crop.

GLOSSARY OF BOTANICAL TERMS

- abaxial** - the side or part facing away from the stem; the lower surface of a leaf (= dorsal); compare with adaxial.
- abortion** - the failure of a part to develop fully; suppression of a part usually present.
- acarodomatium** (pl. *acarodomatia*) - small cavity or cavities, possibly occupied by mites, found on the underside of the leaf in the axils of the main veins; see also domatium.
- acaulescent** - without an easily seen stem.
- acrescent** - increasing in size with age; as sepals enlarge around a developing fruit.
- accumbent** - leaning against another part, as cotyledons may do against the radicle in the seed when the seedling is once folded.
- achene** - a small dry fruit, not opening when ripe, with only one seed; for example the fruits of *Urtica* and *Rumex*.
- achlamydeous** - without a perianth (sepals and petals lacking); as found in the *Euphorbia*.
- acicular** - needle-like; very narrow, stiff and pointed.
- acropetal** - development proceeding from the base to the apex with the youngest parts at the top and the older parts below, as in a raceme; movement of materials upwards to the apex.
- actinomorphic** - used for flowers which are radially symmetrical (at least in the perianth) and can, therefore, be divided along two or more longitudinal sections into halves which are mirror images of each other; the term applies mainly to the perianth; used as synonymous with radially symmetrical or regular; compare with zygomorphic, amorphous and irregular.
- aculeate** - armed with prickles, but not with spines as the stems in many members of Malvaceae.
- aculeolate** - armed with small prickles.
- acumen** - a tapering point.
- acuminate** - with a tip that becomes gradually narrower to a slender point.
- acute** - with a tip that comes to a sharp point with straight-sided edges that form an angle of less than 45°.
- adaxial** - the side or part facing the main stem; the upper surface of a leaf (= ventral); compare with abaxial.
- adnate** - when an organ or part is united to a different organ or part; for example the androecium (stamens) with the style in Asclepiadaceae and Orchidaceae.
- adpressed** - parts pressed closely to the axis; see also appressed.
- adventitious** - in an unusual or abnormal place or coming from a distant place (buds that arise elsewhere than in the leaf-axils or at stem-tips, i.e. on roots; roots that arise elsewhere than from the radicle or other roots, i.e. from a stem or leaf).
- aerenchyma** - a plant tissue composed of unthickened, often irregularly shaped cells surrounding large air spaces; found in many plants associated with aquatic habitats.
- aerial** - of stems which arise from horizontal rhizomes; of roots which arise from stems and which have special functions such as the aerial roots of orchids which absorb water, and the aerial roots of climbers which attach the plant to its substrate.
- aestivation** - the way in which the flower parts are folded or arranged in bud, before opening.
- afro-alpine** - a distinct vegetation zone found above 3000 m on African mountains.
- agamous** - without gametes; reproduction without either production of and/or normally functioning gametes; (normally functioning pollen and ovules are not produced but fruits and seeds may be formed).
- aggregate fruit** - fruit formed from several separate pistils from the same flower, often together with the receptacle, e.g. *Rubus*, the strawberry, *Fragaria*; can also be used for fruits formed from an inflorescence as in figs, *Ficus*.
- albumen** - a name used for endosperm or perisperm in a seed; storage tissue which is not part of the embryo.
- alternate** - used for leaves that are attached, one at each node, at different levels along the stem; used for stamens borne between the sepals or petals.
- alveolate** - pitted
- amorphous** - lacking shape or form; can be used for flowers lacking any symmetry (compare with actinomorphic and zygomorphic).
- amphi-** - a prefix meaning 'both'.
- amphitropous** (of ovules) - attached near its middle, half inverted.
- amplexicaul** - clasping the stem.
- anatropous** (of ovules) - bent over through 180° to lie alongside and fused with its stalk (funicle).
- ancipitousatous** - two-edged.
- androclinium** - the bed of the anther, an excavation at the top of the column on which the pollinia rests.
- androdioecious** - used for a species which has 2 sexual forms, plants with only male flowers and plants with bisexual flowers.
- androecium** - the male structures of a flower, stamens and accessories.
- androgynophore** - an elongated part of the receptacle carrying both androecium and gynoecium between the perianth and stamens in a bisexual flower.
- andromonoecious** - used for a plant having male and bisexual flowers on the same plant; no purely female flowers are formed.
- androphore** - an elongated part of the receptacle above the perianth which bears only the stamens as in Malvaceae.
- anemophilous** - pollinated by wind; anemophily - wind pollination.
- angiosperms** - a major group of plants and the dominant land plants; seed plants with the seeds usually enclosed in an ovary.
- annual** - a plant which completes its life cycle in one growing season and then dies: where there are two or more growing seasons in a year, an annual species can have two or more generations in a year.
- annular** - arranged in a circle or in a ring; the shape of a ring.
- ant galls** - swollen hollow structures, usually on the stems or leaves of plants, which are inhabited by ants.

- antepetalous** - inserted opposite or at the petals (mostly about stamens).
- anterior** - away from the axis (= abaxial); often used for the petal(s) found on the front of a flower.
- anteseptalous** - inserted opposite or at the sepals (mostly about stamens).
- anthela** - a panicle where the lateral axes exceed the main axis.
- anther** - the part of the stamen producing the pollen, usually divided into pollen-sacs or pouches called thecae.
- antherode** - a non-functional anther
- anthesis** - the time when the pollen is shed and the stigma is receptive to pollen; from the opening of the flower bud to the setting of the seed.
- anthocyanins** - water-soluble pigments giving pink, red, purple, violet or bluish colours to flowers or vegetative parts of plants.
- antipetalous** - used for stamens or staminodes which occur opposite the petals, not alternating with them.
- antisepalous** - used for stamens or staminodes which occur opposite the sepals, not alternating with them.
- apetalous** - without petals or corolla.
- apex (pl. apices)** - the tip or end-point of a structure.
- apical** - concerning or near the apex.
- apical placentation** - where the ovules are attached to the top of the ovary.
- apiculate** - ending abruptly in a short sharp point.
- apiculum** - a sharp and short, but not stiff point, in which a leaf may end.
- apiculus (pl. apiculi)** - a small pointed structure (example, a small terminal extension between 2 leaflets in *Balanites*).
- apocarpous** - with the carpels free from one another.
- apomixis (apomictic)** - in seed plants, the production of seeds without normal sexual fertilization.
- appendage** - a part added or attached to another, usually larger, structure.
- appressed** - lying close or pressed flat against a surface or axis, see also adpressed.
- aquatic** - living in water.
- arcuate** - curved or bent like a bow, usually used to describe a particular leaf shape.
- areolate** - surface of a leaf or seed divided into distinct spaces; with areoles.
- areole (areola)** - a space marked out on a surface or raised or adpressed; used to describe the raised area on the surface of certain seeds; also used to denote the area where spines and glochids arise on the stems of Cactaceae; the open area (cell) formed by anastomosing veins.
- aril** - an outer covering or appendage, often fleshy and/or brightly coloured, that encloses the seed or part of the seed and develops from the stalk of the seed.
- aristate** - with a long, very narrow, bristle-like point.
- armed** - provided with a means of defence such as spines.
- articulate** - with joints or nodes or places where a part will naturally break off.
- ascending** - a plant where the shoots start lying on the ground and then turn to grow mainly upright; usually used for herbs.
- asepalous** - without sepals.
- asexual** - without sex; without the production or fusion of gametes.
- asymmetric** - without any symmetry.
- attenuate** - tapering gradually to a slender point.
- auricle** - an ear-like lobe or appendage.
- auriculate** - ear-like outgrowth.
- autotrophic** - producing food by itself, neither parasitic nor saprophytic, the normal situation in green plants.
- awl-shaped** - used for a leaf which is narrow, flat, stiff and sharp-pointed (= subulate), such as in *Agave* and *Arucaria*.
- awn** - a fine, very narrow, bristle-structure usually at the tip of a leaf or bract; see also aristate.
- axial** - an adjective for any part which arises from the angle between a leaf and its subtending axis.
- axil** - the upper angle made between a leaf attachment and a stem.
- axile** - attached to the central axis.
- axillary** - in or arising from an axil.
- axis** - the central line of any symmetrical or nearly symmetrical body; in plants the main stem or branch on which other organs are arranged.
- baccate** - like a berry with fleshy and pulpy tissue.
- barbed** - with stiff short spines or bristles that point backward away from the apex of the organ.
- barbellate** - shortly barbed.
- basal** - found at or near the base of a structure.
- basifixed** - used for the attachment of the filament to the base of the anther.
- basipetal** - development of parts towards the base, the older parts are found above.
- beaded** - a structure which looks like a string of beads, synonymous with torulose.
- bearded** - with tufts of hairs or awns.
- berry** - a fleshy or juicy fruit with a soft outer portion and the seeds immersed in the fleshy or pulpy tissue, the seeds are not surrounded by a woody or stony endocarp, for example tomato. Compare drupe.
- betalains** - red and yellow alkaloid pigments found in plants of the Caryophyllales.
- bi-** - a prefix meaning 'two' or 'twice'.
- biennial** - living for two growing seasons; usually producing only vegetative growth in the first season, and flowering and fruiting in the second.
- bifid** - divided into two parts near the top.
- bifoliate** - having two leaves.
- bifoliate** - having two leaflets.
- bifurcate** - with two branches or divisions at the end; Y-shaped.
- bilabiate** - with two lips, a corolla with an upper and lower lip, for example, the flowers of many Lamiaceae (Labiatae).
- bilateral** - when a structure has only one plane of symmetry, if cut along this plane the two halves are mirror images of each other; usually used for flowers (synonymous with zygomorphic).
- bilocular** - with two locules or chambers; usually used for ovaries and sometimes for stamens.
- binate** - occurring in pairs.

- binomial** - the scientific species-name composed of two words; the first is the generic name, the second the specific epithet.
- bipinnate** - twice pinnate, when the first divisions of a leaf are themselves pinnate.
- bipinnatifid** - twice pinnatifid.
- biseriate** - having two series or two whorls (as having both calyx and corolla).
- bisexual** - having both sexes and producing both male and female gametes. Bisexual flowers have both functional stamens and pistils.
- bisymmetric** - having two planes of symmetry, see also bilateral symmetry.
- blade** - the flat broad part of a leaf or petal; synonymous with lamina.
- bloom** - the flower or process of flowering (as in the flowers blooming); also used for a whitish waxy powder covering a surface.
- bole** - the unbranched stem or trunk of a tree.
- bostryx** - a cymose inflorescence with successive branches on one side only; normally coiled like a spring.
- bract** - a small leaf-like structure usually associated with a flower and/or inflorescence and found at the base of the pedicel or peduncle.
- bracteate** - having bracts.
- bracteole** - a small bract on the pedicel, or close under the flower, between the bract and the flower.
- branch** - a portion of a stem system which is attached to the main stem; often used for a stem from a woody plant.
- branchlet** - the smallest part of a branch; the growth of the current or the last growing season (a twig).
- brevistylous** - meaning 'short-styled'; used for flowers which have short styles where there are also flowers in the same species/population which have long styles - a condition described as heterostylous.
- bristle** - a stiff hair.
- bud** - an undeveloped shoot that may give rise to a branch or a flower.
- bud scales** - modified leaves or stipules which cover and protect an undeveloped shoot and drop off as soon as the shoot starts growing.
- budding** - the production of buds: in horticulture used for the grafting of a bud of one kind onto a rootstock of another compatible kind of plant, for example the budding of sweet orange onto the rootstock of sour orange; a type of asexual reproduction in which a small protuberance develops and is separated from the parent cell, typical of yeasts.
- bulb** - a short underground stem with a crown of usually fleshy overlapping scale-like leaves, for example an onion.
- bulbil** - a small bulb produced from the base of a larger bulb; or a very small bulb produced in the leaf axils or on leaves of some plants and providing a means of asexual reproduction.
- bullate** - used for leaves with a surface that is prominently raised between the veins.
- buttress** - supporting structure at the bottom of a stem or root.
- caducous** - falling off soon or quickly.
- caespitose** - forming broad tufts or mats.
- calcicole** - a plant which can grow in soil with a high calcium carbonate (lime) content.
- calcifuge** - a plant which cannot tolerate soil with a high lime content.
- calcine** - growth from a callus or receptacle.
- callose** - hard or tick, and sometimes rough.
- callus (pl. calli)** - fleshy outgrowth found on the lip.
- calyculate** - having bracts round the calyx, or an involucre resembling an outer calyx as in many flowers of *Malvaceae*.
- calyculus** - a ring of bracts or the involucre below the calyx as in many flowers of *Malvaceae*.
- calyptra** - a cap-like or lid-like covering of certain fruits or flowers that comes off in one piece, for example, the perianth forms a calyptra which comes off when a *Eucalyptus* flower opens; see also operculum; the cap covering a moss capsule.
- calyx** - the outer whorl or envelope of most flowers, made up of the free or united sepals.
- calyx-tube** - the tube formed by the united sepals, also used for the receptacle-tube and hypanthium (see these terms).
- cambium** - a secondary meristem; vascular cambium produces secondary xylem and phloem, the cork cambium produces cork (phellogen) and secondary cortex.
- campanulate** - bell-shaped, with a broad tube and a wide opening.
- campylotropous (of ovules)** - bent over through 90° so that the stalk (funicle) appears to be attached to the side of the ovule.
- canal** - air spaces running longitudinally in a stem or root.
- canaliculate** - having a groove running lengthways.
- canescent** - covered with a grey pubescence or greyish colour.
- cantharophilous** - pollinated by beetles; cantharophily - beetle pollination.
- cap** - a lid-like covering (= calyptra or operculum).
- capitate** - like the head of a pin (as in the thickened stigma of some flowers) or a compact cluster of flowers forming a head.
- capitulum** - a dense head-like inflorescence of usually sessile flowers.
- capsule** - a dry fruit produced by an ovary composed of 2 or more united carpels and opening by slits or pores or breaking into pieces that are open and shed seeds when ripe.
- carina** - synonymous with keel, a long projecting ridge at the back or on the bottom of a structure: sometimes used for the 2 anterior petals of the papilionaceous flower (*Leguminosae* subfamily *Papilionoideae*) which are partly fused along their lower margins; also used for the lower (abaxial or anterior) petal in many *Polygalaceae*.
- carinate** - a synonym for keeled, with a projecting longitudinal ridge.
- carnivorous plants** - plants which catch small animals and digest them to obtain nitrogen. Often found in very wet habitats.
- carotenoids** - a group of yellow pigments occurring in chloroplasts, chromoplasts and elsewhere in plant cell.
- carpel** - the basic unit of the gynoecium or pistil consisting of an ovary or part of an ovary with an associated style and stigma; generally considered to have developed from a leaf-like structure, often used in a theoretical sense. A

- simple pistil, such as a legume, has only 1 style and stigma and 1 locule; a compound pistil is made up of 2 or more carpels joined together.
- carpodium** (pl. *carpodia*) - abortive, non-functional carpels, as in *Typha*.
- carphore** - a raised part of the receptacle bearing the carpels and sometimes also the stamens.
- cartilaginous** - hardened and tough, but capable of being bent.
- cauruncle** - an outgrowth on the surface of a seed near the hilum as in many Euphorbiaceae.
- cataphyll** - a simplified form of a leaf, e.g. a scale leaf; usually used for reduced leaves other than bracts.
- catkin** - a spike-like inflorescence with many bracteate and closely crowded unisexual flowers that is often pendulous and may resemble a cat's tail.
- caudate** - abruptly ending in a long and very narrow tip like a tail.
- caudex** - a trunk or stock.
- caudicle** - elastic base of a pollinium which connects it to the viscidium, produced within the anther and of texture similar to the pollinia; see different structure under stipe.
- caulescent** - with a clearly visible stem above the ground.
- cauliflorous** - producing flowers directly from the older stems.
- cauliflory** - having flowers produced directly from older, usually woody, stems, for example *Haleria lucida*.
- cauline** - borne on or arising from the stem.
- cell** - in descriptions of flower-parts the word cell is often used as a synonym for chamber, locule, or theca; a 4-celled ovary is a 4-locular ovary. This use must not be confused with the wider use of the word cell as the structural unit of living things.
- central placentation** - see free central placentation.
- centrifugal** - developing from the centre out, the older parts at the centre.
- centripetal** - developing from the outside towards the centre, the older parts on the outside.
- cernuous** - slightly drooping.
- cespitose** - forming mats or broad tufts or cushions (an alternate American spelling of caespitose).
- chaff** - a small dry thin bract or scale.
- chamaephyte** - a plant in which the perennating buds occur within 20-30 cm of the soil surface, i.e. dwarf shrubs. Many Afro-alpine plants are chamaephytes, for example *Sida schimperiana*.
- chartaceous** - with paper- or parchment like texture; thin and opaque.
- chlorophyll** - the green pigment that absorbs light energy to form energy rich compounds in the process of photosynthesis.
- choripetalous** - having entirely free or separate petals; synonymous with polypetalous.
- ciliate** - with a fringe of hairs along the edge, or with regularly arranged hairs.
- ciliolate** - fringed with very short fine hairs, finer than ciliate.
- cilium** (pl. *cilia*) - unicellular hairs found on leaf margins and other structures; also used for motile organelles; usually numerous, almost identical to a short flagellum.
- cincinnus** - a type of cyme which curls up on itself, the same as a helicoid cyme.
- cinereous** - a dark grey or ash-colour.
- circumcissile** - opening as if cut circularly and the upper part coming off like a cap or lid.
- cirrhiferous** - having tendrils.
- cirrhose** - having tendrils or with a long narrow coiling tip that acts as a tendril.
- cladode** - a leaf-like structure formed by a modified stem.
- cladophyll** - a synonym of cladode.
- clasp** - used for leaf-bases that partly or completely enclose the stem.
- clavate** - club-shaped, thickened at the end.
- claw** - the very narrow base of some petals; clawed petals have a long, narrow base and broad terminal lobe (as in Geraniaceae, some Caryophyllaceae and Caesalpinioideae).
- cleistogamous** - flowers that fertilize themselves before they open, or which do not open at all even after fertilization; they are usually small and near the ground (as in *Commelina* and *Oxalis*).
- climbing** - used to describe plants that use other plants or objects as a means of support but have their roots in the ground.
- clinandrium** - that part of the column in orchids on which the anther is resting.
- clone** - a population of plants all having the same genetic makeup, usually produced by vegetative reproduction or pseudosexual reproduction in which seeds are produced without sexual fertilization taking place - see apomixis.
- coccus** - a separate part of a lobed fruit, usually 1-seeded, as in some Rhamnaceae and Euphorbiaceae.
- cochleate** - shape of a human ear or coiled as in a snail shell.
- coherent** - parts in close contact but not united.
- colliculous (colliculose)** - a surface covered in round swellings, as the stem of *Ceiba pentandra*.
- colporate** - in pollen grains with both furrows (colpae) and pores.
- colpus** - a furrow forming a thin area in the exine of a pollen grain through which the pollen tube usually emerges.
- column** - the solid central structure in orchid flowers formed by the union of style and stamens; the stalk or tube formed by the united stamens, as in Malvaceae.
- coma** - a tuft of hairs on the end of some seeds.
- comal** - found at the tip or apex.
- commisure** - the faces (or seam, where the two faces are cohering) of two cohering carpels or mericarps (the plane along which the fruit separates) in the Malvaceae and Apiaceae (Umbelliferae).
- comose** - with a tuft of hairs.
- complanate** - arranged in the same plane.
- compound** - composed of two or more similar parts; the opposite of simple.
- compound fruit** - when the fruit of separate flowers becomes united; for example, *Dorstenia*.
- compound leaf** - when the leaf has two or more leaflets or blades.
- compound pistil** - a pistil made up of 2 or more carpels.

- compressed** - flattened or pressed together, either from side to side (laterally compressed) or from front to back (dorsally compressed).
- concolorous** - where the upper and lower surface of a leaf are more or less the same colour; compare with discolorous.
- concreescent** - grown together, coalesced.
- conduplicate** - folded together lengthways.
- confluent** - merging or blending together.
- connate** - when parts of the same kind are united.
- connective** - the tissue that unites the pollen sacs in an anther; it may form an extension of the filament.
- connivent** - coming close together or converging, but not united, often closer together above than below.
- constricted** - narrowed; with a narrow point.
- contorted** - twisted (for example, the floral parts in bud); synonymous with convolute.
- convolute** - used to describe sepals or petals in bud, when one edge is always above the adjacent part and the opposite edge is always below an adjacent part.
- copious** - abundant.
- coplanar** - in the same plane.
- coradial** - on the same radius.
- coralloid** - a multibranching structure with all parts close to each other.
- cordate** - when the base of the leaf is deeply notched; heart shaped.
- cordiform** - 'heart-shaped', an ovate leaf with a pointed tip and a heart-shaped base.
- coriaceous** - with a thick and firm texture, similar to leather.
- cork** - the outer tissue covering woody stems, formed by the activity of the cork cambium and consisting of dead cells with suberised walls which are impervious to water.
- corn** - a short thick underground stem, which grows vertically, for example, in many Iridaceae.
- corolla** - the inner whorl or inner envelope of sterile appendages in the flower, made up of the free or united petals which are usually colourful.
- corona** - a whorl of appendages between the petals and the stamens, and sometimes united to form a ring or cylinder, usually borne on the petals or corolla-tube, found in some Cucurbitaceae or Amaryllidaceae.
- cortex** - the tissue in stems and roots found between the vascular cylinder and the epidermis or cork cambium.
- corymb** - a panicle-like inflorescence in which the branches or flower-stalks start from different places on the stem but all the flowers are borne at about the same level.
- corymbose** - corymb-like.
- costa** - a rib, or the midvein of a simple leaf.
- costapalmate** - a palmate leaf where the petiole extends into the blade and divides it into two, often unequal, halves.
- costate** - having a rib or ribs that are usually projecting above the surface of the structure and parallel with its long axis.
- cotyledon** - the seed leaf, usually the first leaf or leaves produced by the germinating seed; the cotyledons are usually different from the following leaves, and sometimes the cotyledons do not leave the seed.
- crenate** - the margin notched with rounded or broad and blunt teeth or projections.
- crenulate** - margin with small blunt teeth or projections.
- crisp (crisped)** - having the margin excessively and irregularly divided and twisted; also about twisted hairs.
- crispate** - with a curled edge.
- crownschaft** - an apparent extension of the stem above the crown of leaves, formed from the sheaths of developing leaves.
- crustaceous** - hard, thin and brittle.
- cryptophyte** - a plant in which the perennating buds are below the soil surface.
- cucullate** - hooded or hood-shaped (a hood is a covering for a person's head).
- culm** - the stem of a grass or sedge
- cuticula (cuticle)** - the layer of cutin on top of the epidermis.
- cultivar** - a variety of plant that has been developed under cultivation and selection by man.
- cuneate** - wedge-shaped or triangular, as when the base of a leaf-blade tapers gradually from being widest at the top and narrowest at the petiole.
- cuneiform** - shaped like a wedge or inverted triangle, and attached at the narrowest point.
- cupule** - a cup-shaped structure surrounding, but not enclosing, another structure.
- cusp** - a sharp point, as on teeth.
- cuspidate** - with the tip abruptly narrowed to a point (can be considered intermediate between apiculate and caudate).
- cuticle** - the non-cellular waxy coating of the epidermis of all higher plants.
- cutin** - the waxy material forming the major part of cuticle.
- cyathium** - a flower-like inflorescence characteristic of the genus *Euphorbia*; it is made up of naked, unisexual flowers that are grouped together within fused, perianth-like bracts.
- cyclic** - arranged in cycles or whorls; the opposite of spiralled.
- cymbiform** - shaped like a boat.
- cyme** - an inflorescence in which the central axis is terminated by a flower which opens first, this flower is subtended by two opposite branches each of which ends in a flower, these open next and are likewise subtended by two opposite branches; this branching-pattern may continue.
- cymose** - cyme-like.
- cymose branching** - where the terminal bud becomes a flower or aborts and growth is taken over by one or more lateral buds.
- cymule** - a diminutive cyme or portion of one.
- deca-** - a prefix meaning 'ten'.
- deciduous** - falling off at the end of the growing season; the opposite of evergreen.
- declinate** - bent or curved downward or forward; also used for stamens in sympetalous flowers, such as those of Lamiaceae, which are inserted on the ventral (abaxial) side of the corolla tube and then usually bend up.
- decumbent** - lying on the ground but with the ends growing upwards.
- decurrent** - when the leaf-edges continue down the sides of the petiole and stem.

- decussate** - when each pair of opposite leaves is inserted on the stem at right angles (90°) or perpendicular to pairs of leaves both above and below.
- deflexed** - bent abruptly downward or outward; the opposite of inflexed, and often used as synonymous with reflexed.
- dehiscence (dehiscent)** - the method or process of opening, as in anthers and fruits.
- deliquescent** - to melt away or to break up into many small parts, as in petals that soften and liquefy (Commelinaceae), or as in the trunks of many trees which 'break up' into many branches above (many *Acacia* spp.); the opposite of excurrent.
- deltoid** - shaped like an equal-sided triangle.
- dentate** - with a toothed margin, the teeth pointing outwards, not forward; compare serrate.
- denticulate** - with very small teeth perpendicular to the margin.
- dentiform** - toothed.
- depauperate** - diminutive; looking starved and underdeveloped.
- depressed** - pressed down or flattened from above.
- derived** - originating from an earlier form or group.
- determinate** - having a definite end-point, as in an inflorescence in which the main axis ends in a flower and cannot continue to grow; the opposite of indeterminate.
- dextrorse** - clockwise, towards the right.
- di-** - a prefix meaning 'two', 'away from' or 'unlike'.
- diandrous** - having two stamens.
- diaspore** - a plant part that breaks away from the parent to develop into a new individual.
- dichasium (pl. dichasia)** - a cymose inflorescence in which the main axis and branches end in flowers that are subtended by two opposite branches (see cyme); an inflorescence which consists of dichasia.
- dichlamydeous** - having two coats or envelopes, as flowers with both calyx (sepals) and corolla (petals).
- dichotomous** - dividing regularly into two parts; as in a dichotomous key where the contrasting choices are always two.
- diclinous** - having the male and female reproductive organs on separate parts of the same plant.
- dicotyledonae** - one of the major subdivisions within the angiosperms, characterized by having two cotyledons within the seed; also called dicotyledons or dicots.
- didymous** - in pairs, two closely united structures, or 2-lobed.
- didynamous** - in two pairs of unequal length; as four stamens with two long and two short ones; common in *Commiphora* (Bursaceae) and *Lamiaceae* (Labiatae).
- diffuse** - of branching that is open or loosely spreading.
- digitate** - where the parts are attached to the same point, as in a palmately compound leaf.
- dimorphic** - having two forms, as in juvenile and adult foliage in *Eucalyptus* and some introduced species of *Acacia* with true bipinnate leaves on seedlings and phyllodes on older plants.
- dioecious (dioecious)** - plants with unisexual flowers in which the male and female flowers are not found on the same plant, as if the plants are either male or female, but not both.
- diplostemonous** - having the stamens in two whorls (and usually twice as many as the petals) with the outer whorl alternating with the petals and the inner whorl opposite the petals; the opposite of obdiplostemonous.
- disc (disk)** - an enlargement of the receptacle beneath or around the pistil or within the corolla or stamens, usually in the form of a ring or cushion, or of separate gland-like parts; the term disc is also used for the broad receptacle on which the flowers are borne in the capitate or head-like inflorescence of the Asteraceae (Compositae).
- disk** - see disc.
- dissected** - divided into many slender parts.
- disseminule** - a plant part that breaks away from the parent to develop into a new individual; synonymous with diaspore.
- distal** - the part or end furthest away from the base or point of attachment; the opposite of proximal.
- distichous** - arranged in two opposing rows along the opposite sides of the stem; neither decussate nor spiral.
- distinct** - free and separate from other parts.
- diurnal** - active during the day, as in flowers that open during the day and close during the night; the opposite of nocturnal.
- divaricate** - spreading apart widely and in different directions.
- divergent** - spreading apart but not as widely as in divaricate.
- divided** - separated almost to the base.
- domatium (pl. domatia)** - small tufts of hair; a cavity of pocket formed by a plant which is usually inhabited by insects, particularly ants, or mites; see also acarodomatium.
- dormant** - a structure or organ which is not active.
- dormant bud** - an inactive bud. Plants produce many more buds than can develop at any one time. If something happens to remove the active shoots from a plant, dormant buds are stimulated to start growing and this is how a tree will sprout from the trunk when all the branches are removed, for example *Eucalyptus*.
- dorsal** - the back or side away from the stem or central axis, the abaxial side; the opposite of ventral and adaxial. (Note that in Lawrence's *An Introduction to Plant Taxonomy*, 1955, the dorsal side is called adaxial; the use of the terms abaxial and adaxial are incorrect in that book).
- dorsifixed** - attached to the back or dorsal side.
- dorsiventral** - having distinct upper and lower sides.
- double-serrate** - a margin with large serrations bearing smaller serrations.
- downy** - with fine soft hairs.
- drooping** - inclining downwards; see also cernuous.
- drupaceous** - like a drupe but not with the morphology of a true drupe.
- drupe** - a fruit with a fleshy exterior and with the seed or seeds enclosed in a hard covering formed by the inner part (the endocarp) of the ovary wall, which forms a hard 'stone' around the seed.
- drupelet** - a small drupe; in the genus *Rubus* (Rosaceae) each flower produces an aggregation of many drupelets.

- druse** - globose, spikd crystals of calcium oxalate, formed around a centre of organic material, and found in the cortex, pith, and phloem.
- duct** - a tube or canal through the tissue of the plant; as an oil duct or a lactiferous duct in Euphorbiaceae.
- dwarf-shoot** - a small lateral stem with short internodes, often bearing leaves and/or reproductive structures; characteristic of *Phyllanthus* in Euphorbiaceae.
- e- or ex-** - a prefix indicating the lack or absence of something (see examples below).
- ebracteate** - without bracts.
- eccentric** - situated to one side.
- echinate** - covered with short spines or prickles.
- efoliate** - without leaves.
- elaiosome** - an outgrowth from a seed containing oil or fat and which is often attractive to ants and aids in the dispersal of the seed.
- ellipsoid** - an elliptical three-dimensional structure or body.
- elliptic** - having the shape of an ellipse, broadest at the middle; a rounded two dimensional figure that is symmetrical but has a long and a short axis, as an elliptic leaf.
- emarginate** - with a notch at the apex, without a tip or entire margin at the end; as a leaf with an emarginate apex.
- embryotega** - a callus-like swelling on the seed coat through which the embryo can germinate.
- enation** - an outgrowth on the surface, often only one cell thick.
- endemic** - native and often used in the sense of being confined to a particular geographic region; not native to other areas.
- endocarp** - the innermost layer of the ovary wall in a fruit which may be hard or leathery as in a drupe or pyrene, or fleshy as in Cucurbitaceae.
- endogenous** - developing or originating from the inside; typical of development of a root.
- endosperm** - the food material formed by the female gametophyte that initially surrounds the embryo and is often also found in the seed.
- ensiform** - sword-shaped.
- entire** - with an even and continuous margin without lobes, teeth, etc.
- envelopes** - the floral envelopes enclosing the stamens and ovary, the sepals and petals.
- ephemeral** - short-living, as flowers that open and wilt within the same day; a plant with a very short life cycle which is completed in a few weeks, typical of many weeds.
- epi-** - a prefix meaning on, upon or attached to the organ indicated by the term; as epipetalous = upon the petal.
- epicalyx** - a whorl of bracts borne on the pedicel of the flower immediately below the sepals and similar to the sepals or calyx, for example, always found in *Hibiscus*.
- epichile** - terminal portion of a complex labellum.
- epidermis** - the primary (first) outer layer of cells of all plant organs.
- epigynous** - borne upon or above the inferior ovary (not perigynous); the perianth or stamens may be epigynous but this term is not used for the ovary itself.
- epipetalous** - borne on the petals or corolla.
- epiphyte** - a plant which grows on other plants for support but is not a parasite and does not have its roots in the ground (compare 'climbing', 'liana', and 'parasite').
- equitant** - a condition when a plant member is folded inwards longitudinally, and covers the edges of another member which is similarly folded as in many Iridaceae.
- erect** - a plant which is quite upright, growing straight upwards.
- ericoid** - with an appearance similar to that of *Erica arborea*; a plant with many branches held erect and close together and covered with adpressed scale-like leaves.
- erose** - with a jagged margin that is too irregular to be called dentate or serrate.
- estipulate** - without stipules.
- eu-** - a prefix meaning well, good, true, typical.
- evanescent** - lasting only a short time.
- even-pinnate** - a pinnate leaf with an even number (2, 4, 6, 8, etc.) of leaflets; lacking a single terminal leaflet; the same as paripinnate and the opposite of imparipinnate or odd-pinnate.
- evergreen** - retaining green leaves through the dormant or dry season, as in most true rain forest trees.
- ex-** - a prefix indicating the lack or absence of something; also used to indicate the outer portion of a structure or the outside.
- excrecence** - an unnatural looking outgrowth on the stem of a tree.
- excurrent** - going out beyond the margin of an organ (as a vein going beyond the margin of a leaf).
- exfoliate** - to peel off in thin flakes or plates, as the bark in many species of *Eucalyptus*.
- exine** - the outer layer of the wall of a pollen grain.
- exocarp** - the outer layer of the fruit, the outer part of the pericarp, the soft fleshy part of a drupe.
- exogenous** - developing or coming from the outside.
- exserted** - projecting outside or beyond the edge, as stamens projecting beyond the corolla-tube; the opposite of included.
- exstipulate** - without stipules.
- extant** - living; as opposed to extinct.
- extra-axillary** - arising beyond or outside the leaf-axil.
- extra-floral** - arising outside the flower.
- extrorse** - facing the outside; of an anther which opens away from the central axil of the flower.
- extrose (of anthers)** - opening away from the axis of growth towards the corolla.
- eye** - used to describe the bud in a tuber, as in the potato.
- facultative** - having the ability to live under more than one specific set of conditions, as a plant that can be either parasitic or non-parasitic.
- falcate** - curved like a scythe or sickle.
- family** - a unit of classification above the level of genus and subfamily; the main unit used for writing and arranging this Flora. A family name always ends in *aceae*.
- farinose** - covered with a usually whitish meal-like powder.
- fascicle** - a close cluster of structures arising from about the same point but lacking a distinctive arrangement of parts.
- fasciclude** - a cluster or condensation of sterile stamens (staminodes).
- fasciculate** - borne in fascicles.

- faucal** - concerning the throat, as the throat or opening of a corolla-tube; faucal appendages are appendages arising from the upper part of the corolla-tube or perianth-tube.
- female flower** - producing the larger stationary gametes and the seeds; used as synonymous with pistillate.
- fenestrate** - pierced with holes.
- ferruginous** - rust-coloured, brownish red.
- fertile** - having the ability to produce gametes or seeds; fertile anthers produce pollen; fertile pistils produce ovules and, if pollinated, seeds; the opposite of sterile.
- fetid (foetid)** - with a bad or disagreeable odour, as in flowers that attract flies.
- few** - in botany used for parts that can be counted and are usually between two and five, occasionally between two and ten; the opposite, many is usually more than 10, or a larger, indefinite number.
- filament** - a thread or thread-like structure; the slender stalk that supports the anther.
- filamentous** - made up of many thread-like structures.
- filiform** - slender and thread-like.
- fimbriate** - with a fringe or series of slender structures along the margin.
- fistulose** - hollow, like a pipe, and herbaceous.
- flabellate** - fan-shaped or broadly wedge-shaped.
- flaccid** - soft or weak, limp, wilted; the opposite of firm or stiff.
- flexuose (flexuous)** - having a wavy form, bent alternatively in opposite directions.
- floccose** - covered with soft wool-like hairs that often rub off.
- flower** - the reproductive organs in the angiosperms.
- foliaceous** - like a leaf.
- follicle** - a fruit developed from a single carpel (a simple pistil), dry and breaking open along one line, usually opening along the inner (adaxial or ventral) suture to which the seeds are attached.
- foveolate** - marked with small pits or depressions on the surface.
- free** - not united with or adherent to any other structure.
- free basal placentation** - a type of placentation where the ovules are attached to a central column arising from the base of the locule within the ovary, but not reaching the top.
- free central placentation** - a type of placentation where the ovules are attached to a central column in the centre of the single locule, the column extends from the base of the locule to the apex; compare with the above.
- free venation** - the veins do not unite to form a network; compare with net venation (reticulate venation).
- fruit** - a true fruit is the product of a ripened ovary and its adnate parts; the seed containing structure.
- frutescent** - having the characteristics of a small shrub.
- fruticose** - having the characteristics of a shrub, being woody.
- fugaceous** - falling off early, deteriorating rapidly.
- fulvous** - tawny or dark yellow or yellowish-brown in colour.
- funicle** - the stalk of the ovule which attaches it to the placenta.
- funnel form** - funnel-shaped, gradually widening, as the corolla in many Convolvulaceae.
- furcate** - forked or divided into branches.
- furrowed** - with channels or grooves parallel with the long-axis.
- fuscous** - grey-brown or dark greyish-brown.
- fusiform** - spindle-shaped, thick in the middle and narrowing at both ends.
- fusion** - when two or more organs grow together.
- galea** - a helmet or helmet-like structure, as in the upper part of some corollas.
- galeate** - with a helmet-like form or hooded.
- gamopetalous** - when the petals are united partly or completely.
- gamophyllous** - when the perianth parts are united partly or completely.
- gamosepalous** - when the sepals are united partly or completely.
- geniculate** - bent like a knee.
- geophilous** - occurring on or from the ground.
- geophyte** - a plant which perennates by subterranean buds.
- geotropism** - a growth movement in a plant in response to gravity, for example the pods of groundnuts.
- gibbous** - with a pouch or inflated on one side.
- glabrate** - nearly without hairs; glabrous.
- glabrescent** - becoming glabrous; nearly hairless.
- glabrous** - without hairs, a surface devoid of hairs.
- gland** - a structure that secretes, usually found on the surface or within the surface of an organ (leaf, flower, etc.), often borne on a short stalk (as a glandular hair); also used for a fleshy gland-like body or structure.
- glandular** - bearing or containing glands.
- glanduliferous** - bearing glands.
- glaucouscent** - slightly bluish-green, or covered with a thin layer of wax.
- glaucous** - covered with a very thin, often waxy, whitish substance; pale bluish-green in colour.
- globose** - a spherical structure.
- glochid** - a very small spine or bristle barbed at the tip.
- glochidiate** - with glochids, with barbed bristles or hooked hairs, as found on *Opuntia* (Cactaceae).
- glomerate** - in a compact cluster or group of clusters.
- glomerule** - a small and compact cluster.
- glossy** - smooth and shiny.
- glumaceous** - thin, brown and papery in texture.
- glume** - a small chaffy bract; in particular, a sterile bract at the base of a grass spikelet.
- glutinous (glutinose)** - covered with a sticky or glue-like substance.
- gregarious** - growing in colonies containing many individual plants.
- gynandrous** - with the stamens united with and borne on the pistil.
- gynobasic** - arising from a deep depression in the centre of the ovary, between the ovary lobes, or from the lower part of a single pistil; as the gynobasic style of Lamiaceae (Labiatae) and Geraniaceae.
- gynodioecious** - used for a species with 2 sex forms; plants with only female flowers and others with only bisexual flowers.
- gynoecium** - the female part of the flower.

- gynomonoecious** - used for a species which has both female and bisexual flowers on the same plant, no male flowers are present.
- gynophore** - a stalk bearing the pistil.
- habit** - the overall appearance of a plant.
- habitat** - the environment or plant-community in which the plant occurs.
- half-inferior ovary** - an ovary that is in part united with and in part free from the calyx and corolla.
- halophyte** - a plant growing in and tolerating high concentrations of salt in the soil or in the air.
- hapaxanthic** - used for herbs which only flower once and then die; see also monocarpic.
- hardy** - a plant which can survive adverse conditions such as a cold or dry season.
- hastate** - when the base of a leaf has two more or less triangular lobes that diverge away from the midvein.
- hastula** - a small 'skirt' of tissue found where the petiole or costa meets the leaf-blade. It can be on either the upper or lower surface, or both.
- haustorium** - the modified root (in Angiosperms) or mycelium (in fungi) with which a parasite enters the tissue of the host; the plural of haustorium is haustoria.
- head** - an inflorescence of closely packed flowers that is more or less round or disc-shaped.
- helicoid cyme** - a type of cyme in which the flowers are developed along only one side and which normally curls at the tip; the same as cincinnus.
- hemi-** - a prefix meaning 'half' or 'partly'.
- hemicryptophyte** - a plant whose perennating buds occur at or very close to the soil surface.
- herb** - a plant with no persisting stem above ground; if a stem is formed it lives for only one growing season or one year, without forming woody parts.
- herbaceous** - like a herb; with a stem that dies back to the ground each year.
- hermaphrodite** - with stamens and pistil in the same flower; the same as bisexual.
- hetero-** - a prefix meaning 'of two or more kinds'.
- heteroblastic** - to express the fact that the adult form of a plant is very unlike the young.
- heterogamous** - when an inflorescence bears more than one kind of flower, e.g. bisexual and male, as in many Asteraceae (Compositae) or male and female as in *Begonia* (Begoniaceae).
- heterophyllous** - having more than one leaf form.
- heterostyly** - when the styles and stamens vary in relation to each other by length or position within the flowers of the same plant or plants of the same species.
- hexa-** - a prefix meaning six.
- hilum** - a scar left on the seed where it was attached to the funicle or placenta; the place where this scar is formed.
- hirsute** - with rather coarse stiff hairs.
- hirsutulous** - with slightly stiff hairs or a few stiff hairs.
- hispid** - with a covering of stiff erect hairs.
- hispidulous** - with a covering of small stiff erect hairs.
- homogamous** - when all the flowers of an inflorescence are of the same kind.
- homologous** - of the same origin; as bracts being homologous with leaves.
- honey guide** - markings, usually on the corolla, which show a visiting bird or insect where to find nectar in a plant.
- hood** - formed from dorsal sepal and petals in an orchid flower.
- host** - the organism from which a parasite obtains its food.
- husk** - an outer, usually loose, covering of a fruit.
- hyaline** - very thin and almost transparent.
- hybrid** - produced by crossing two different species, subspecies or varieties of plants.
- hydrophyte** - a plant that grows in very wet places and requires a large amount of water for its growth.
- hygroscopic** - responds to changes in atmospheric humidity by absorbing and/or losing water.
- hypanthium** - the often cup-like part of the flower between the sepal-lobes and the base of the ovary, produced by the union of the base of the sepals, petals, and filaments; often used interchangeably with calyx-tube or floral-tube as in Cucurbitaceae.
- hypo-** - a prefix meaning 'beneath' or 'less than'.
- hypochile** - basal portion of the complex labellum, often throat-shaped.
- hypocotyl** - the part of a seedling axis between the radical and the cotyledon(s).
- hypocrateriform** - salver-shaped; with a narrow tube opening suddenly into a wide cup-shaped mouth.
- hypogynous** - attached below the level of the gynoecium or ovary, as sepals, petals, or stamens attached near the base of the ovary or below the base of the superior ovary.
- hysteranthous (hysterantherous)** - developing leaves after flowering.
- imbricate** - overlapping like the tiles of a roof; in a flower-bud when the petals or the sepals overlap with usually two petals (or sepals) with both edges outside the other petals (or sepals), one with one edge outside, the other within, and one with both edges covered.
- immersed** - completely submerged or surrounded.
- imparipinnate** - odd-pinnate with 1, 3, 5, etc. leaflets; pinnate with a single leaflet at the end of the rachis.
- imperfect flower** - a flower lacking either male or female parts; a unisexual flower.
- inaperturate (of pollen grains)** - without any pores or furrows.
- incised** - with the margin deeply cut.
- included** - not projecting beyond the rim, as stamens not projecting beyond the rim of the corolla tube; the opposite of exerted.
- incompatibility** - the inability of gametes to fuse and form a zygote, or pollen to germinate on a stigma.
- incomplete flower** - a flower lacking one of the perianth whorls.
- incrassate** - made thick.
- incumbent** - leaning or resting on another structure.
- incurved** - curving inward or bent inward.
- indefinite** - numerous or many, as an indefinite number of stamens; in botany usually more than 10 or 20.
- indehiscent** - remaining closed and not opening when ripe or mature.
- indeterminate inflorescence** - one that can continue growing along the main axis and is not terminated by a flower, for example a raceme.
- indigenous** - native to a region, not introduced.

- indumentum** - any covering on a surface but usually restricted to a covering of hair-like structures.
- induplicate** - with the edges bent inwards but not overlapping; the outer surface may then be connivent with other parts.
- inferior ovary** - an ovary that is below the attachment of the sepals, petals, stamens, and, if present, calyx-tube or hypanthium. Compare with a superior ovary and note that the sepal-lobes and stamens may be borne above the ovary in a superior ovary if a calyx-tube, receptacle-tube, or hypanthium is present.
- inflexed** - bent inward, turned abruptly inward, as in the stamens of many species in Urticaceae.
- inflorescence** - the flowering portion of a plant; also used for the arrangement of flowers on the flowering axis.
- infra-** - a prefix meaning 'below'.
- infructescence** - the fruiting portion of a plant; also used for a collection of fruits attached to a common axis.
- infundibuliform** - funnel- or cone-shaped.
- inserted** - borne or growing out from.
- integument** - the membrane(s), enclosing the central nutritive tissue of the ovule, finally forming the testa.
- inter-** - a prefix meaning 'between'; compare with intra-.
- internode** - the part of the stem between two adjacent nodes.
- interpetiolar** - between the petioles, as an interpetiolar stipule that extends from the base of one petiole across the stem to the base of the petiole of the opposite leaf, as in most species of the Rubiaceae.
- intra-** - a prefix meaning 'within'; compare with inter-.
- intravaginal** - placed inside the basal sheathing part of petiole in many cotyledons.
- introduced plant** - a plant that has been brought in from another region and is not native to the region under discussion.
- introrse** - turned inward towards the central axis of an organ; of anthers that open towards the centre of the flower; the opposite of extrorse.
- intruding** - to thrust inward or extend inward, as a placenta that extends into the locule.
- involucrel** - a whorl of bracteoles.
- involucral bract** - a bract forming part of an involucre; see also phyllary.
- involucre** - a number of bracts that surround the base of an umbel or the base of a flower-head.
- involute** - with the edges rolled inwards, the lower surface outwards.
- irregular flowers** - usually used to denote bilaterally symmetrical flowers (flowers that can be divided into two equal halves along only one plane), in this sense it is synonymous with zygomorphic; sometimes used to denote that the flower is asymmetrical or without a plane of symmetry; compare with regular/actinomorphic.
- iso-** - prefix meaning 'equal' or 'like'.
- isomerous** - with the same numbers, as in flowers with the same number of sepals, petals, and stamens.
- isomorphic** - of similar form.
- jointed** - with joints or nodes or articulations where parts separate.
- jointed stem** - one that can be broken easily at the nodes, such as in Viscaceae.
- jugate** - joined or united together, as the leaflets of a compound leaf.
- juvenile** - the youthful or early stages of growth.
- keel** - a projecting ridge running the length of the organ on the outer or under surface; like the keel or bottom of a boat (= carinate).
- keel-petal** - the loosely united lower or abaxial petals of the pea flowers and related plants (= carina).
- keeled** - with a longitudinal ridge running along the under surface of a flat or convex structure.
- key** - in plant identification a text with a series of alternate choices; making the correct choice leads, eventually, to the name of the family, genus and species of the plant which is being keyed.
- labellum** - a lip-like petal; the usually lower or abaxial petal of the flowers of the Orchidaceae.
- lacerate** - with the margin deeply or irregularly cut.
- lacinate** - with the margin cut into many slender lobes or segments.
- lactiferous** - containing milk-like substances; see laticiferous, as in many species of the Euphorbiaceae.
- lacuna** (pl. **lacunae**) - an air chamber, open space, or gap.
- lacustrine** - growing in or associated with lakes or ponds.
- laevigate** - smooth, as if polished.
- lamella** (pl. **lamellae**) - a flat plate; a thin partition or septum.
- lamina** - the flat and thin broad part of a leaf, a sepal, or a petal.
- laminated** - broad, flat, and thin like the blade of a leaf.
- lanate** - covered with long soft white wool-like hairs; woolly.
- lanceolate** - with the shape of the end of a lance or spear, tapering to both ends from a broader middle, as in a lanceolate leaf; usually used to indicate a shape which is widest below the middle, but occasionally also at the middle.
- lateral** - on the side or along the margin.
- latex** - a liquid substance that is often white and sometimes contains rubber, or is fragrant, found in special, often much elongated, cells or ducts called laticifers.
- laticiferous** - having latex or latex-like fluid.
- latrorse** - (of anther dehiscence), with the locule openings located on the sides of the anther.
- lax** - loose and not crowded together, distant.
- leaf** - an organ originating from and attached to a stem, usually with a short stalk attached to a flat blade, the most usual site for photosynthesis.
- leaflet** - a leaf-like part, or one of the individual blades, of a compound leaf.
- lenticel** - a channel filled with loosely packed cork cells allowing the diffusion of gases into and out of stems and sometimes also roots; seen as small areas on the young bark often with a colour different from the surrounding bark.
- lenticular** - lens-shaped, with two convex sides.
- lepidote** - with broad and flat hairs or scales.
- liana** (**liane**) - a woody climbing plant.
- ligneous** - woody.
- lignotuber** - a swollen mass of woody tissue formed at the base of a trunk, e.g. *Eucalyptus*.

- ligulate** - with the shape of a tongue or strap; flowers of the Compositae that have a strap-shaped corolla.
- ligule** - a projection from the top of the leaf sheath present in the Poaceae, Araceae, and a few other families.
- limb** - the upper, usually broad, part of a sepal or petal.
- linear** - long and narrow with parallel edges.
- lineolate** - marked with fine lines.
- lip** - the large lobes of a 2-lipped corolla, or the large, usually abaxial, petal of the Orchidaceae.
- lithophyte** - growing on rocks.
- littoral** - found on the shore of a lake, sea, or ocean.
- lobate** - divided into lobes.
- lobe** - a rounded area along the margin bounded by two indentations or sinuses.
- lobulate** - having small lobes.
- lobule** - a small lobe.
- locular** - divided into chambers or compartments; i.e. 3-locular means having three chambers.
- locule (loculus)** - a chamber or compartment, mostly of an ovary or fruit.
- loculicidal** - opening into the locule.
- loment** - a fruit formed by a simple pistil in which each seed is part of a separate segment that breaks apart from the adjacent segment at maturity.
- long shoot** - shoot with long internodes and relatively rapid annual growth as compared with dwarf or short shoots as in *Phyllanthus*.
- longistylous** - applied to flowers which have long styles where there are also flowers in the same population/species which have short styles; one of the conditions in heterostyly.
- lyrate** - with pinnate lobes in which the terminal lobe or lobes are the largest.
- lysigenous** - a space formed by the breakdown of a cell or cells; as compared with schizogenous.
- macro-** - a prefix meaning 'large'; see also mega-
- male (male flower)** - producing small or mobile gametes or pollen; often used in place of staminate.
- mammillate** - with small, nipple-like projections.
- mangrove formation** - a grove of usually small trees with intertwining roots often with pneumatophores, that grow on mud flats within the tidal zone along tropical sea shores.
- many** - as used in the description of flowering plants usually more than 15.
- marcescent** - wilting or withering but not falling off.
- marginal placentation** - with the ovules placed along the margin of the carpels.
- marine** - of the sea or ocean, able to live in salt water.
- maroon**
- mega-** - a prefix meaning 'large'.
- membranous (membranaceous)** - of a thin texture and translucent.
- mentum** - specialized part of orchid flowers composed of column foot and the lateral sepal bases, often sulcate.
- mericarp** - a part of a dry fruit which splits off and is spread individually, as in many species of Malvaceae.
- meristem** - a tissue of cells that can divide and produce new structures as well as producing cells capable of further division; an embryonic tissue present in all growing parts in plants.
- merous** - a suffix that denotes part or number.
- mesocarp** - the middle layer when three layers are present in the wall (or pericarp) of a fruit, often fleshy.
- mesochile** - middle part of lip in orchids.
- mesophyll** - the parenchymatous tissue in leaves lying between the upper and lower epidermis.
- mesophyte** - a plant that requires an average amount of moisture to grow; compare with hydrophyte and xerophyte.
- mesostylous** - a flower with intermediate style length; used for species/populations where flowers are heterostylous with 3 different style lengths.
- micro-** - a prefix meaning 'small' or 'very small'.
- midrib** - the principal or central vein or rib of a leaf or other organ.
- monadelphous** - with the filaments of the stamens united to form a single group or bundle, as in the Malvaceae.
- moniliform** - like a string of beads; see also torulose.
- mono-** - a prefix meaning 'one'.
- monocarpic** - dying after the production of flowers and fruit, synonymous with hapaxanthic such as *Ensete*.
- monochasium** - a one-sided cyme; i.e. where only one branch develops from under each successive terminal flower.
- monochlamydeous** - with a perianth of only one whorl, having only one coat or envelope.
- monoclinous** - having separate male and female flowers on the same plant.
- monocotyledonae** - one of the two major subdivisions of the angiosperms, characterized by the presence of one embryonic leaf (cotyledon) within the seed; also called monocotyledons or monocots or Liliopsida; see also dicotyledonae.
- monoecious** - when the male and female flowers are borne on the same plant; the flowers are unisexual but the plant is bisexual.
- monogeneric** - when a family consists of only one genus, for example Bixaceae (Vol. 2, part 1).
- monophyletic** - evolving from a single ancestral stock.
- monopodial branching** - where the main axis remains dominant so that all secondary shoots are clearly lateral.
- monotypic** - a family or genus with a single species, as the Barbeyaceae, with the single genus *Barbeya*, and the single species *B. oleoides*.
- morphology** - the study of the form and related anatomy of living organisms.
- mucilaginous** - sticky when wet, slimy.
- muco** - a short sharp point formed by the continuation of the midrib.
- mucronate** - with the broad tip suddenly narrowed to a short stiff point which is a continuation of the midrib.
- multilocellate** - with many small compartments or chambers.
- multiple fruit** - a fruit formed by the union of the female parts of several to many different flowers, as in *Morus* (Moraceae); compare with aggregate fruit.
- multiseriate** - in many rows.
- muricate** - with a rough surface covered with short hard projections or tubercles (such projection is called murica).
- muticous** - blunt and without a point.

- myrmecophily** - the association between certain plants and ants.
- naked bud** - a bud without a covering of bud scales.
- naked flower** - a flower without a perianth, an achlamydeous flower.
- napiform** - underground stem shaped like a carrot or beetroot.
- naturalized** - introduced from a foreign area and now established and growing successfully in the new area.
- navicular** - shaped like a boat.
- nectar** - a sugary liquid produced by flowers or other plant parts, the liquid on which insects and birds that visit the flower feed.
- nectariferous** - producing nectar.
- nectary** - a glandular structure which secretes a sugary liquid, the nectar; either associated with a flower (floral nectary) or elsewhere on the plant, as in Passifloraceae (extrafloral nectary).
- needle** - a slender, pointed structure, used to describe certain types of leaf.
- nerve** - in plants the word nerve is often used in place of vein or vascular bundle; sometimes used only for the more conspicuous vein or ribs of a leaf, a sepal, or a petal.
- nervose** - with prominent nerves, ribs, or veins.
- net-veined** - when the smaller veins are interconnected to form a net-like (reticulate) pattern.
- net-venation** - closed venation in which the veins branch and join.
- neutral flower** - a flower without sexual parts, without functioning stamens or pistils.
- nocturnal** - active at night, as in flowers that open at night; the opposite of diurnal.
- node** - the place on a stem where a leaf or bud is formed; a thickened area on a stem-like organ where other parts are attached or where the organ will later break in two.
- nodule** - a small node or thickening; especially used in roots with thickened swellings in which nitrogen-fixing bacteria live.
- nude flower** - a flower without a perianth, naked or achlamydeous.
- numerous** - used for parts of a flower which are 15 or more in number; see also indefinite.
- nut** - a fruit with a hard outer covering that does not split open when ripe, mostly comparatively large and with one or two seeds; see also nutlet and achene.
- nutlet** - a small nut.
- ob-** - a prefix meaning 'opposite', 'inverse', or 'against'.
- obcordate** - with a broad 2-lobed apex and a narrowed base, as the leaflets in species of *Oxalis*.
- obdiplostemonous** - having two whorls of stamens (usually twice as many as the petals) with the outer stamens opposite the petals.
- oblanceolate** - with the shape of the end of a lance or spear but with the narrow end towards the base; the inverse of lanceolate.
- oblate** - broadly elliptic with the long dimension perpendicular to the axis of the organ.
- obligate** - no choice; generally used for organisms which can only exist as parasites.
- oblique** - a leaf-base in which the two sides are unequal, as in *Begonia*.
- oblong** - a plane shape longer than broad with nearly parallel sides, almost rectangular in outline but with rounded ends and with the length two or three times the width.
- obovate** - a plane shape with an egg-shaped outline but with the broadest part near the apex and the narrow side near the base.
- obovoid** - egg-shaped but with the broadest part near the apex and the narrow part near the base; the solid or 3-dimensional form of obovate.
- obpyriform** - shape like a water pot, with a narrow apex (away from the point of attachment).
- obtuse** - with a blunt or rounded end or the margins of the tip forming an angle of more than 50°; compare acute.
- ocrea (ochrea)** - a stipular growth that sheaths the stem near the leaf-base, as in Polygonaceae.
- octa-** - a prefix meaning 'eight'.
- odd-pinnate** - a pinnate leaf with an odd number (3, 5, 7, etc.) of leaflets, with a single terminal leaflet; the same as imparipinnate; compare with even-pinnate and paripinnate.
- oligo-** - a prefix meaning 'few'.
- opaque** - something that does not allow light to pass through, a surface that is dull and not lustrous or shiny.
- operculate** - opening by a lid or cover; covered with a cap.
- operculum** - a lid, cap or covering that comes off as a single unit.
- opposite** - a term used for two leaves or two branches that arise from the same node on the opposite sides of the stem; a term also used for organs that arise opposite each other or when one arises at the base of another, as stamens opposite a petal or sepal.
- orbicular** - a flat structure with an almost circular outline.
- orifice** - opening of hollow shape.
- organism** - any individual living thing.
- ortho-** - a prefix meaning 'straight', 'upright', or 'true' or 'correct'.
- orthotropous** - ovules borne on a straight stalk.
- ostiole** - an opening or pore.
- oval** - broadly elliptic or having an egg-shaped outline, usually widest at the middle.
- ovary** - that part of the pistil which contains the ovules within one or more locules and which will produce the fruit if pollination (and fertilization) takes place; all angiosperms have ovaries.
- ovate** - a flat structure which is egg-shaped in outline with the broadest part near the base and the narrow part near the apex; the opposite of obovate; compare elliptic and oblong.
- ovoid** - egg-shaped with the broadest part near the base and the narrow part near the apex; the solid or 3-dimensional form of ovate.
- ovule** - an organ which contains the embryo sac and the egg cell within the locule of the ovary (in angiosperms) or borne on fertile scales (in gymnosperms); after fertilization develops into a seed.
- pallid** - light-coloured
- palmate** - with three or more parts attached to a single point and radiating outward, as the fingers of an open hand

- radiating outwards from the palm of the hand; as in palmate venation, or in palmately compound leaves.
- palmatifid** - with palmately arranged lobes, the leaf being divided more than halfway to the single point from which the nerves radiate.
- palmatilobed** - with palmately arranged lobes, the leaf being divided halfway or less to the single point from which the nerves radiate; compare with palmatifid.
- palmatipartite** - palmately divided almost to the centre or midrib.
- palmatisect** - palmately divided to the centre or midrib.
- pandurate** - a rounded plane figure with a slender portion near the centre and with two broad ends one of which is broader than the other; the shape of a body of a violin.
- panicle** - an inflorescence with an indeterminate axis (that continues to grow and does not end in a flower) and many side branches each of which bears two or more flowers. This term is often used for a branched inflorescence which is difficult to classify into any of the other more precise types such as raceme, cyme, etc.
- paniculate** - arranged in panicle.
- papilionaceous** - flowers that resemble the flower type of the subfamily Papilionoideae of the Fabaceae (Leguminosae).
- papilla** (pl. papillae) - a minute blunt hair.
- papillate** - covered with many minute rounded gland-like structures or papillae; compare with muriccate.
- papillose** - a minute blunt hair.
- papula** (papule) - a large papilla or nipple-like projection.
- parallel venation** - generally used for veins that are parallel with each other and with the margin of the leaf; sometimes used for secondary veins that are parallel with each other but not with the midrib or the margin, as in *Musa* and *Ensete*.
- parasite** - a plant (or animal) that lives upon another plant (or animal) and takes nourishment from it; compare epiphyte.
- parietal placentation** - when the ovules are attached to the inner surface of the peripheral or outside wall of the ovary, or the outer wall of the locule.
- paripinnate** - a pinnate leaf with an even number (2, 4, 6, 8, etc.) of leaflets and without a single leaflet at the end; the same as even-pinnate; compare with imparipinnate, odd-pinnate.
- parted** - divided almost to the base or to the midvein.
- parthenogenesis** - the development of a female gamete into a new individual without fertilization.
- partite** - the same as parted; also used as a suffix showing the number of parts in a structure, for example tripartite (3 parts).
- patent** - spreading or open.
- peat** - a deposit of incompletely decomposed plant material with little or no soil, dark brown or black with a high carbon content; in Europe, mostly made up of the moss *Sphagnum*.
- pectinate** - divided to form many parallel parts like the teeth of a comb.
- pedate** - used for leaves which are palmately divided, with each division two-cleft, as in some Passifloraceae.
- pedicel** - the stalk of a single flower within an inflorescence or group of flowers (also used for the stalk of a solitary flower).
- peduncle** - the stalk that bears an inflorescence consisting of two or more flowers; the flowers may themselves each have a stalk (the pedicel) or be without a stalk.
- pellucid** - clear and translucent, bright when viewed against the light.
- peltate** - with the stalk attached near the centre of a more or less rounded shape and not at the edge, as in a peltate leaf.
- pendent** - hanging
- pendulous** - hanging down or drooping.
- penicillate** - with a tuft of hairs, often shaped into a point like a pencil.
- penninerved** - with pinnate nervation.
- penta-** - a prefix meaning 'five'.
- pentamerous** - with five parts, or with sets of five parts, sometimes with multiples of five (5, 10, 15, etc.).
- pepo** - a fleshy fruit with hard outer rind and without septa or separate chambers within, as in the Cucurbitaceae.
- perennating** - surviving from one growing season to the next; a structure or organ which enables a plant to survive a non-growing season.
- perennial** - living for three or more growing seasons.
- perfect flower** - a bisexual flower with stamens and pistil functional.
- perfoliate** - when the leaf-base grows around the stem and the stem appears to have grown through the leaf.
- peri** - a prefix meaning 'around'.
- perianth** - the outer sterile whorls or envelopes of a flower, made up of identical perianth segments, or by two different kinds of perianth segments; sepals (calyx) or petals (corolla).
- pericarp** - the wall of the ripened ovary or fruit (between the locules and the outer surface); it may be of one or as many as three layers (see exocarp, mesocarp, and endocarp).
- perigynous** - arising from a cup-like or tubular structure around the ovary, surrounding the ovary but not at its base nor united to it.
- periphery** - along the margin or on the outer wall.
- persistent** - remaining attached to the plant and not falling off.
- perulate** - with a covering of protective scales, as in many buds.
- petal** - a flat and usually broad part of the inner whorl of sterile appendages in the flower that together are called the corolla, different from the outer whorl (sepals) and often brightly coloured.
- petaloid** - like a petal in colour and form; used for bracts (as in *Bougainvillea*), sepals and stamens.
- petiole** - the stalk of a leaf on which the blade is borne.
- petiolule** - the stalk of a leaflet.
- phanerophyte** - a plant with the perennating organs borne high above ground level.
- phenotype** - the visible, or chemical, or biologically detectable, manifestation of the genotype produced as a consequence of growth and development.
- phloem** - the part of the vascular system made up of living cells that function primarily in the conduction of food, the inner bark.

- photosynthesis** - the process through which green plants make sugar from carbon dioxide and water using sunlight energy captured by the green pigment chlorophyll.
- phototaxis** - the movement of a whole organism in response to light.
- phototropism** - a change in growth direction in response to light.
- phyllary** - a bract-like part of the involucre which subtends the flower-heads in the Compositae and some other families.
- phylloclade** - a flattened photosynthetic stem.
- phyllode** - a flattened leaf-stalk (petiole) or leaf-rachis with the form and function of a leaf, as in some of the species of *Acacia* introduced from Australia; compare with cladode.
- phyllotaxy** - the arrangement of leaves on the stem.
- phylogeny** - the evolutionary history of an organism or group of organisms.
- pilose** - with a loose covering of soft long simple hairs.
- pinna** - the primary division of a pinnate leaf which can be a leaflet in simple pinnate leaves, or can be divided again into pinnules in a bipinnate leaf.
- pinnate** - when a compound leaf has its leaflets borne along an extension (the rachis) of the leaf-stalk (petiole) or when the leaflets are borne on divisions or branches of the rachis; leaves can be bipinnate, tripinnate, etc.; compare palmate.
- pinnatifid** - with the margin divided more than halfway to the midvein or centre and forming pinnate lobes.
- pinnatilobed** - with the margin divided to about half the distance to the midvein or centre and forming pinnate lobes.
- pinnatipartite** - with the leaf divided almost to the midvein or centre and forming pinnate lobes.
- pinnatisect** - with the leaf divided to the midvein or centre and forming pinnate lobes.
- pinnule** - the second or third branching of a compound pinnate leaf; the branches or divisions that arise from the primary rachis of a pinnate leaf; compare pinna.
- pistil** - the individual female structure that contains the ovule and will produce the seeds. It is made up of one or several carpels and is usually divided into the following parts: ovary, style, and stigma. A flower may have one pistil or many pistils.
- pistillate** - often used for flowers with female parts but no male parts and, therefore, unisexual; a female flower.
- pistillode** - a reduced non-functioning pistil that does not produce seeds; often present in functionally male flowers.
- pith** - the soft spongy tissue found in the centre of many stems.
- placenta** - the part of the ovary on which the ovules are attached.
- placentation** - the arrangement of the ovules in the ovary.
- pleomorphism** - having more than one form or shape.
- pleoanthic** - where a plant can flower and continue growing to flower again, and again, until it dies of old age or other causes.
- plicate** - folded, with the edges folded together like a fan.
- plumose** - with tufted or feather-like hairs or feather-like bristles.
- pneumatophores** - air passages; more often used for the vertical wooden projections from the roots of some trees growing in very wet situations, as in swamps or mangrove formations. These woody projections rise above the water level and are believed to function in bringing air to the roots.
- pod** - a dry fruit that opens when ripe; often used as synonymous with legume.
- pollen** - the powder-like grains produced in the anthers that will produce the male gametes necessary in fertilization. The pollen will germinate on the stigmatic surface of the style (in angiosperms) or in the micropyle (in gymnosperms) and produces the pollen tube. The pollen tube grows into the ovule and releases the male gametes where they can reach and fuse with the female gametes; the pollen-grain is homologous with a microspore.
- pollen-grain** - see pollen.
- pollen-sac** - the chamber in which the pollen is produced after meiosis has taken place; the theca (pl. *thecae*) of the anther.
- pollinarium** (pl. *polinaria*) - pollen-bearing structure or structure formed by tissue outside anther locules which carry pollinia.
- pollination** - the act of taking pollen from the anther and bringing it to the receptive stigmatic part of a style or to an ovule; this can be carried out by different agents.
- pollinium** (pl. *pollinia*) - pollen grains held together to form a dispersal unit, derived from anther locules.
- poly-** - a prefix meaning 'many-' or 'much-'.
- polyadelphous** (*polyadelphus*) - with three or more groups of united stamens.
- polyandrous** - with many (more than 15) stamens.
- polycarpic** - bearing fruit many times, as opposed to monocarpic.
- polygamodioecious** - dioecious but with some bisexual flowers or with some flowers of the opposite sex.
- polygamomonoeocious** - monoecious but with a few bisexual flowers.
- polygamous** - when a plant or different plants of the same species have both bisexual and unisexual flowers.
- polygynous** - with many pistils.
- polymorphous** - with several or many forms, variable.
- polypetalous** - with petals that are separate and free from each other.
- polyphyletic** - evolved from more than one ancestral group.
- polysepalous** - with sepals that are separate and free from each other.
- pome** - a fleshy fruit with a soft outer covering and seeds borne within stiff central partitions, as in the fruits of *Malus* (apple) and *Casimoroa* (Rutaceae).
- pore** - a small, usually round opening, as in anthers opening by pores in the Ericaceae.
- porrect** - directed forwards.
- portuberance** - bulging, swelling.
- posterior** - towards the axis, on or nearest the axis (adaxial or ventral); the opposite of anterior.
- precocious** - developing early; used for flowers that develop before the leaves.
- precocious** - developing early; used for flowers that develop before the leaves.
- prickle** - a small sharp outgrowth from the bark or surface.

- pro parte (proparte)** - often abbreviated p.p., meaning 'in part only'.
- procumbent** - lying along the ground.
- procumbent** - with stems that lie on the ground.
- proliferous** - with adventitious buds on the leaves or in the flowers that are capable of producing new plants.
- prophyll (prophyllum)** - a much reduced leaf or bract.
- prostrate** - lying flat on the ground.
- protandrous** - when the anthers discharge pollen before the stigma (in the same flower) is receptive; sometimes spelt proterandrous.
- proteranthus** - leaves produced before the flowers.
- proto-** - a prefix meaning 'first' or 'original'.
- protogynous (proterogynous)** - when the stigma is receptive before the anthers (in the same flower) have discharged their pollen.
- protologue** - original description of new species or other taxonomic unit (in Latin).
- proximal (proximate)** - nearer to the place of attachment; the opposite of distal.
- pruinose** - covered with a whitish wax or very fine powder.
- pseudo-** - prefix meaning 'false'.
- pseudowhorl** - where leaves arise so close together around the stem that they appear to be in a ring.
- puberulous (puberulent)** - covered with very short fine hairs or slightly hairy.
- pubescent** - with a covering of soft hairs.
- pulverulent** - covered with a powder; see also pruinose and glaucous.
- pulvinus (pulvinate)** - an enlargement or swelling, shaped like a cushion or pad, round and flattened, usually found at the base of the leaf or petiole.
- punctate** - marked with dots or glands or very small depressions 1 mm or less in diameter.
- punctiform** - covered in small dots or depressions 1 mm or less in diameter.
- pungent** - ending in a sharp stiff point; with a strong smell or taste.
- pustule (pustulate)** - many small elevations like pimples or blisters.
- pyrene** - a nutlet or kernel; the 'stone' of a drupe or similar fruit.
- pyriform (piriform)** - shaped like a pear (*Pyrus*); a solid shape with a broad apex (away from the point of attachment) narrowing to a wide neck at or below the middle; see also obpyriform.
- pyrophytic** - a plant able to tolerate fire or needing fire to stimulate flowering.
- pyxis** - a capsular fruit in which the top comes off as a lid.
- quadr- or quadri-** - a prefix meaning 'four'.
- raceme** - an indeterminate inflorescence in which the flowers are borne along a single axis with the uppermost the youngest, each flower with a stalk of about the same length; compare with cyme.
- racemose (racemous)** - arranged like a raceme.
- rachilla (rhachilla)** - a small axis or rachis; the axis of pinnules in compound pinnate leaves. The central axis of the spikelet in the Poaceae (Gramineae) and Cyperaceae.
- rachis (rhachis)** - the axis of a compound leaf or frond; the axis of an inflorescence.
- radial symmetry** - symmetrical about a central axis; when the structure is divided longitudinally along any axis, the two halves are mirror images of each other.
- radiate (radiating)** - spreading outward from a point.
- radical leaves** - leaves that arise so close to the base of the stem that they appear to come from the top of the root.
- random branching** - branches which arise without any relationship to subtending leaves.
- rank** - a vertical row; when 2-ranked leaves are in two vertical rows; a general term to denote a level in the taxonomic hierarchy (variety, subspecies, species, genus, family, etc.).
- raphe** - the part of the stalk of the ovule (funicle) that is united or coherent to the outer wall of the ovule and forms a ridge on the surface of the seeds.
- raphides** - needle-shaped crystals found within cells of plants.
- receptacle** - the axis or the central body of the flower on which the flower parts (sepals, petals, stamens, and pistil) are borne.
- reclinate** - bent down onto another part.
- recurved** - curved backwards.
- reduced** - not properly developed or undeveloped.
- reduplicate** - leaf-segments with are A-shaped in cross-sections.
- reflexed** - bent downwards or backwards; bent abruptly backwards towards the base.
- regular** - (of flowers) radially symmetrical or actinomorphic, a flower that can be divided into two equal halves by two or more vertical sections (some authors consider regular synonymous with symmetrical and include both bilateral and radial symmetry); compare with irregular, asymmetric, and zygomorphic.
- reniform** - kidney-shaped, as the seed of many Fabaceae (Leguminosae), and some leaves.
- repand** - with an uneven or wavy margin, not as uneven as sinuate; compare with undulate.
- repent** - stems that creep along the ground and root at the nodes.
- replum** - a septum within the ovary formed by the placenta; as in the Brassicaceae (Cruciferae) where the replum forms a frame to which the seeds are attached when the two outer valves fall away.
- resin (resinous)** - a solid or semisolid substance produced by plants from special canals or ducts found within the plant, not soluble in water and often sticky and aromatic.
- resupinate** - inverted or twisted through 180° so the flower is upside down.
- reticulate** - with many interconnections as in a net; applied to a surface being marked by a network of fine lines or ridges.
- reticulate venation** - see net-venation.
- retorse** - bent abruptly backwards or downwards.
- retuse** - with a rounded tip that has a small notch at the centre.
- revolute** - with the margin or tip rolled or bent backwards towards the centre.
- rhachis** - synonymous with rachis.
- rhpidium (pl. rhipidia)** - a cymose inflorescence with branches alternating from one side of the vertical axis to the other; normally flattened in one plane and fan-shaped.

- rhizome** - a root-like stem on or beneath the ground with roots growing downwards and leaves and shoots upwards; differing from a true root in the presence of buds, leaves, or scales; especially robust rhizomes are often called rootstocks.
- rhomboidal** - shape having sides of equal length, but not square.
- rib** - a primary vein or prominently raised vein or nerve.
- riparian** - growing in or at the edge of rivers and streams.
- root** - the underground portion of the plant that never produces leaves and thus lacks nodes and internodes; with a special anatomy.
- root cap** - a cap of tissue over the root apex.
- root hair** - a hair-like outgrowth of an epidermal cell which absorbs water and minerals, found on young actively growing roots.
- rootstock** - a short, vertical, underground stem, bearing roots.
- rosette** - a cluster of parts in a circular form; often used for leaves produced at ground level.
- rostellar** - provided with or like a rostellum.
- rostellum** - small beak-like projection formed from the upper edge of the stigma, mainly used about structure in orchid flower.
- rostrate** - with a beak or beak-like projection.
- rostrum** - beak or beak-like projection.
- rosulate** - when the leaves are in a circle or in a rosette.
- rotate** - wheel-shaped; a corolla with a very short tube and spreading lobes.
- rotund** - with a shape between orbicular and broadly elliptic.
- rudimentary** - incompletely developed.
- rufous** - rusty or brownish red.
- rugose** - with wrinkles or grooves on the surface.
- rugulose** - delicately wrinkled.
- runcinate** - a margin in which the lobes or teeth point backwards towards the base.
- runner** - a slender stem running along the ground and rooting at the nodes, see also stolon.
- rupturing** - breaking open irregularly.
- saccate** - bag-shaped or sack-shaped, pouched.
- sack (sac)** - a pouch or bag-like structure.
- sagittate** - arrow shaped; the base has two acute lobes that point backwards to the base of the petiole.
- samara** - a one-seeded nut-like fruit with a wing.
- saponins** - a toxic, soap-like group of compounds which is present in many plants.
- saprophyte** - a plant that obtains its nourishment from dead organic matter and usually does not possess chlorophyll.
- sarcocarp** - a fleshy covering to a fruit.
- sarmentose** - with long slender stolons or whip-like branches.
- scabrid (scabrous)** - rough to touch, usually caused by the presence of very short stiff hairs which point backwards to the line of growth.
- scale** - any small flat and thin structure like a flattened hair or very small leaf, often triangular in shape.
- scale leaf** - small, usually adpressed as in *Erica* (Ericaceae) or much reduced as in *Tamarix* (Tamaricaceae).
- scandent** - a general term for climbing.
- scape** - a flower stalk (a pedicel or, more often, a peduncle) without leaves that arises from the ground, as in *Crinum* (Amaryllidaceae).
- scapose** - having a flower stalk with out leaves that arises from the ground.
- scarious (scariose)** - thin and dry, not green.
- schizocarp** - a dry fruit breaking up into one-seeded nut-like parts (each part called a mericarp), as in many genera in the Malvaceae and in Apiaceae (Umbelliferae).
- sclerophyllous** - having a hard and stiff leaves
- scorpioid** - a cymose inflorescence curved to one side and coiled like the tail on a scorpion; see also helicoid cyme.
- scrambler** - a plant which usually climbs with the help of hooks, thorns or tendrils so that it spreads out over or through its support.
- scrobiculate** - having the surface dotted all over with small, rounded depressions
- scrub** - more or less dense vegetation of small shrubs (up to about 3 m high).
- sectile** - divided into small segments, usually applied to the pollen mass in the anther/pollinium.
- secund** - one-sided; as when branches, leaves or flowers are all attached along one side of an axis.
- seed** - the ripened ovule containing the embryo with or without additional storage tissue.
- seedling** - the young plant which develops from a germinated seed.
- segment** - a division or part of an organ.
- semi-parasite** - a plant which can parasitize another plant but is also capable of growing by itself at least for part of its life-cycle.
- sensu** - Latin meaning 'in the sense of'.
- sepal** - a flat part of the outer whorl of sterile appendages that protects the flower in bud, often green or dull in colour; the sepals together are called the calyx.
- sepaloid** - a structure which is similar to a sepal.
- septa** - partitions; plural of septum.
- septate** - divided by one or more partitions or septa.
- septicidal** - opening at or along the partition (or septum) or opening along the placenta; not opening into the locule.
- septum** - a partition or cross-wall.
- seriate** - arranged in a row.
- sericeous** - with silk-like hairs that are soft and straight.
- serrate (serrulate)** - with teeth like that of a saw, the teeth more or less regular and pointing forwards; compare with dentate.
- sessile** - without a stalk, meaning 'seated'
- seta** - a bristle or stiff hair.
- setaceous (setiform)** - like a bristle.
- setose** - with a covering of bristles, similar to hispid.
- sheath (sheathing)** - a tubular structure that encloses an organ or part, as in the lower tubular part of a grass leaf which encloses the stem.
- shoot** - a stem axis together with its leaves.
- short shoot** - with very short internodes, growth usually slow and often bearing leaves and/or reproductive structures.
- showy** - brightly coloured or conspicuous.
- shrub** - a woody plant with perennial woody stems, there are usually two or more stems coming from near the ground or sometimes one slender stem; a term which is not very

- precise but differs from the term tree in not possessing a trunk or bole between the ground and the branches.
- shrublet** - a small shrub; see also suffrutescent.
- silicule (silicula)** - the short fruit found in some Brassicaceae (Cruciferae), not more than two or three times as long as broad; see also silique.
- siliqua (siliqua)** - the long slender fruit of some Brassicaceae (Cruciferae), more than two times as long as broad; divided into two compartments by a thin partition on which the seeds are borne and from which the two outer valves separate.
- simple fruit** - derived from a single carpel or syncarpous ovary.
- simple leaf** - with only a single blade, the opposite of a compound leaf.
- sinuate (sinuose)** - when the margin is uneven or wavy by turning inwards or outwards but not deeply enough to be lobed.
- sinus** - a rounded depression between two projecting lobes or teeth; the space between two lobes.
- siphon (siphonaceous)** - a tube (tubular).
- solitary** - one alone and without companions or similar structures; as a solitary flower in the axil of a leaf.
- spadix** - a spike of flowers with a fleshy axis, enclosed in a spathe.
- spathaceous** - like a spathe.
- spathe** - a large bract enclosing a spadix (as in Araceae), or enclosing a cymose inflorescence (as in Commelinaceae).
- spathulate (spatulate)** - a flat shape with the outline of a spoon or spatula, broadly rounded above and long and narrow below.
- species** - the basic unit in a taxonomic classification denoting a group of organisms that appear more similar to each other than to any other group and are usually assumed to be able to interbreed and produce fully fertile progeny.
- speckled** - spotted as from falling drops.
- spikelet** - the small bracteate of many of the Poaceae and Cyperaceae.
- spike (spicate)** - an indeterminate inflorescence with the flowers sessile (without stalks or pedicels) on a simple unbranched or undivided axis or rachis.
- spine** - a hard sharp-pointed structure, often long and narrow.
- spinescent** - ending in a spine or in a very sharp hard point, or provided with spine-like teeth.
- spinose** - having spines.
- spinulose** - having small spines.
- spongy** - light in weight, porous, and compressible.
- spur** - cylindrical or sack-like outgrowth from the perianth, usually containing nectar.
- squamellate (squamulose)** - covered with small scales, but larger than those described as lepidote.
- squamose** - covered with scales.
- stalk** - the stem or narrow portion beneath and supporting any organ.
- stamen** - the pollen producing organ of higher plants, usually made up of a narrow stalk (the filament) and an anther in which the pollen is produced.
- staminate** - (of flowers) with stamens but without pistil; male flower.
- staminode** - a non-functional stamen, often highly modified or reduced.
- staminodium** - a non-functional stamen without anther or with anther that does not produce pollen; synonymous with staminode.
- stelidium (pl. stelidia)** - teeth-like structures on the column in orchid flowers.
- stellate** - star-shaped, as in stellate hairs that have several arms or branches radiating outward from a central point.
- stem** - the main axis of a plant or a branch of the main axis that (at first) produces leaves at the nodes.
- sterile** - not producing sex cells or gametes; a sterile flower does not produce either pollen or functional ovaries.
- stigma** - the portion of the pistil (usually at the top of the style) which is receptive to pollen, usually with a sticky or minutely papillate surface on which the pollen germinates and grows into the tissue of the style.
- stigose** - with short stiff hairs that lie close to the surface; see also strigose.
- stipe (stipitate)** - a small stalk connecting a pollinium to a viscidium.
- stipel** - a stipule-like structure subtending a leaflet in some compound leaves.
- stipules** - scale-like or bract-like appendages, usually found in pairs, at the base of the petiole; many leaves have three parts: the blade, the petiole, and two stipules.
- stolon** - a branch which grows over the ground (a runner) which produces adventitious roots, mainly at the nodes.
- stoma (pl. stomata)** - a minute pore in the epidermis, usually found on leaves; these pores are important in the exchange of gases and loss of water.
- stomatate (stomate)** - having or provided with stomata.
- stone cells** - heavily lignified, more or less isodiametric cells.
- stramineous** - straw-coloured
- striate** - marked with fine longitudinal parallel lines.
- striate** - marked with longitudinal parallel ridges, grooves, lines, or streaks.
- strict** - standing upright, straight and narrow.
- strigose** - with short stiff hairs that lie close to the surface.
- strophiole** - an outgrowth near the micropyle and hilum of the seed.
- sturdy** - strong or solid.
- style (stylar)** - the narrow portion found in most pistils above the ovary upon which the stigma is borne.
- stylodium (pl. stylodia)** - style-like structure, non functional style.
- sub-** - a prefix meaning 'slightly', 'somewhat', 'almost', or 'below'.
- submerged (submersed)** - below the water level.
- subrhombic** - nearly rhombic.
- subshrub** - a plant with a perennial, woody base to the stems, but with upper part of the stems herbaceous.
- subspecies** - a unit of classification below the rank of species above the rank of variety, often used for geographical variants of a species.
- substrate** - foundation, the underlying surface providing a point of attachment or anchorage.
- subtend** - to extend under, or be opposite to, another structure.
- subula** - a delicate, sharp-pointed prolongation of an organ.

- subulate** - flat and narrow, tapering from the base to a sharp tip.
- subumbellate** - somewhat umbellate.
- succulent** - fleshy and juicy, thick and soft within.
- suffrutescent** - like a small shrub, with a woody base near the ground that produces leafy and flowering shoots each growing season, usually less than 1 m tall.
- suffruticose** - shrubby or like a small shrub, with a woody stem that is somewhat larger than in the case of suffrutescent, usually less than 1 m tall.
- suffuse** - spread out on the substratum.
- sulcus (sulcate)** - a longitudinal furrow.
- super-** or **supra-** - prefixes meaning 'above'.
- superior ovary** - an ovary that is borne above the attachment of the sepals, the petals, the stamens, or, if present, receptacle-tube or hypanthium; the opposite of inferior ovary; compare with hypogynous, perigynous, and epigynous.
- suture** - the line along which two parts have been united or the line along which a structure splits open.
- sym-** or **syn-** - prefixes meaning 'together'.
- symbiosis** - an association between two different types of organisms in which there is some type of mutual benefit; also referred to as reciprocal parasitism.
- sympetalous (synpetalous)** - with the petals at least partly united.
- sympodial** - with apparent main stem consisting of a series of usually short axillary branches.
- synandrium** - when the anthers of a flower or anthers from several flowers are united or coherent.
- syncarpous** - composed of two or more united carpels, as in a syncarpous pistil; the opposite of apocarpous.
- syngenesious** - with united anthers or cohering anthers, typical of many Cucurbitaceae.
- synoptic key** - a key which gives a summary of the taxonomic relationships in a group. Such a key often uses cryptic characters and is difficult to use for identification, whereas an artificial key for identification should use easily found characters.
- synsepalous** - with the sepals at least partly united.
- tangential** - perpendicular to a radius.
- taproot** - a persistent primary root, often swollen with food reserve and/or going deep into the soil.
- taxon** - the general term for any unit of classification such as variety, subspecies, species, genus, family, order, class, etc.
- tendril** - a slender, usually coiling, part of a leaf or stem that helps support a stem.
- tepala** - used for the parts of the perianth where the sepals and petals cannot be readily distinguished as in *Gladiolus* (Iridaceae).
- terete** - round or circular in cross section.
- terminal** - found at the end; near or at the apex.
- ternate** - arranged in a whorl or cluster of three.
- terrestrial** - growing on or in the ground or on rocks but not on other plants (epiphytic) or in water (aquatic).
- tessellated** - marked with a fine pattern, like a mosaic of small tiles; usually used for leaves and seeds.
- testa** - the outer coat of a seed.
- tetra** - a prefix meaning 'four'.
- tetradynamous** - of six stamens when four are long and two are short; characteristic of the Brassicaceae (Cruciferae).
- tetramerous** - with four parts or parts in multiples of four.
- tetrandrous** - with four stamens.
- thalamus** - the receptacle or torus of a flower.
- theca (pl. thecae)** - the pollen-sac or locule of an anther, one of the anther-lobes.
- therophyte** - an annual plant, the perennating organs being seeds.
- thorn** - a sharp-pointed branch, sometimes used as synonymous with spine.
- throat** - the spreading upper portion of the area at the top of the perianth-tube where the lobes become free from each other.
- thyrs** - a panicle with ultimate branches that are cymose.
- tomentellous (tomentulose)** - with very short woolly hairs.
- tomentose** - covered with soft, more or less appressed, hairs that are not straight; woolly.
- torulose** - an uneven cylinder with contractions and swellings at intervals to give the appearance of a row of beads; see also moniliform.
- torus** - the central axis or receptacle of a flower.
- tracheid** - a non-living element of xylem formed from a single cell.
- transverse** - across or at right angles to the long axis.
- trapezoid** - four-angled shape; the two sides of which are parallel, the other two diverge.
- tree** - a woody plant with a single main stem (a trunk or a bole) and a distinct upper crown; compare with shrub.
- tri** - a prefix meaning 'three'.
- triad** - groups of 3 flowers in which the central one is female and the two lateral ones male.
- trichome** - a hair or bristle, usually small.
- trifarious** - arranged in three rows.
- trifoliolate** - with three leaves; compare with trifoliate.
- trifoliolate** - of a compound leaf with three leaflets as in *Trifolium* Fabaceae (Leguminosae) subfamily Papilionoideae.
- trimerous** - with three parts; with parts in multiples of three.
- triquetrous** - with three sharp angles.
- tristichous** - in three rows.
- truncate** - with the base or apex at right angles to the midvein as if cut across at the bottom or top.
- trunk** - the large single woody stem of trees, the main stem or bole.
- tube (in flowers)** - the cylindrical part of the perianth, usually made up of the united sepals and/or petals.
- tuber** - a thickened portion of a stem, usually underground, that is capable of producing new branches.
- tubercle** - a swelling, knob or thickened protuberance on a surface, sometimes found at the base of a hair.
- tuberculate** - having tubercles.
- tumid** - swollen or inflated.
- tunic** - a thin coat or covering; as in the covering of an onion.
- tunicate** - having a coat or covering.
- turbinate (turbiform)** - cone-shaped but with the broad portion up and the pointed portion down.
- turgid** - filled out or swollen, usually with water, but not with air and not distended in shape.

- turion** - a short, scaly branch produced from a rhizome.
- turions** - a scaly sucker or shoot arising from underground.
- twig** - a young woody stem or branch, the last season's growth.
- twining** - climbing by winding the stem around the support.
- umbel (umbellate)** - an inflorescence in which the pedicels of the flowers all arise from one point and the flowers are borne at one level; the umbels themselves may be arranged in an umbel called a compound umbel, as in the Apiaceae (Umbelliferae).
- umbo** - a small cone-like projection from a surface.
- uncinate** - with a hook at the end, as an uncinate hair.
- undershrub** - a perennial plant with lower woody parts, but herbaceous upper parts that die back after each growing season; also refers to a plant growing in the lower shrub layer in a multistoried forest.
- understory** - a layer of shrubs, small trees and saplings growing under the main canopy of a forest.
- undulate** - with a wavy margin.
- unguiculate** - shaped like the hoof of an animal; with a wide rounded terminal lobe narrowed at the base, as in a 'clawed' petal.
- uni-** - a prefix meaning 'one' or 'single'.
- unifoliate** - a leaf with a single leaflet where the leaf-stalk of the leaflet can be differentiated from the main leaf stalk.
- unilocular** - with one locule or chamber.
- uniseriate** - arranged in a single row, or layer.
- unisexual** - producing either male or female gametes, but not both; having either functional stamens or functional ovaries (ovules) but not both; the opposite of bisexual.
- urceolate** - shaped like a water pot or urn; with a rounded base and short broad tube that is narrowed above and slightly expanded at the very top.
- urn-shaped** - having a shape of a rounded vase, swollen in the base.
- utricle** - a small one-seeded fruit with a loose thin outer covering, as in *Carex* (Cyperaceae) and many genera of Chenopodiaceae; also used for the small traps of *Utricularia* (Lentibulariaceae).
- utriculosus** - a bladder-like appearance
- vaginate** - with a sheath or enclosed in a sheath.
- valvate** - opening by regular lines to leave valves between; of petals or sepals that are joined edge to edge and do not overlap in bud.
- valve** - formed when an organ opens along regular lines, as when a capsular fruit splits open; also a flap-like lid.
- variety** - a unit of classification below the level of a species; varieties are separated on the basis of form and colour, but the varieties are usually not geographically separated and individuals of different varieties can freely interbreed.
- vascular** - referring to the xylem and phloem; vascular plants are those with xylem and phloem which transport water and nutrients.
- vascular bundle** - a strand or unit of phloem and xylem, with or without a surrounding sheath, which carries water and nutrients.
- vascular tissue** - a collective term for phloem and xylem together.
- vein** - a small strand of vascular tissue; usually in leaves or floral parts.
- velamen** - covering of the areal roots which can absorb moisture from the atmosphere.
- velutinous** - with a covering of velvet-like hairs, dense and straight.
- venation** - the arrangement of the veins or vascular bundles.
- ventral** - the inner face or the surface towards the axis, adaxial; compare with dorsal or abaxial.
- ventricose** - swollen or bulging on one side (but not as much as gibbous).
- vernation** - the arrangement of leaves in bud or of the parts (sepals and petals or tepals) in a flower-bud.
- verrucate**
- verrucose** - having a surface with raised projections or warts.
- verruculose** - much covered with warts.
- versatile** - turning freely on its support or stalk; as versatile anthers.
- verticil** - a whorl or an arrangement of similar parts in a circle at the same level; also used as synonymous with verticillaster.
- verticillaster** - an inflorescence which has opposite cymes forming whorls of flowers at the nodes along an elongated axis; typical of most species in Lamiaceae (Labiatae) such as *Ocimum* and *Malva* in Malvaceae.
- verticillate** - having parts arranged in whorls.
- vestigial** - undeveloped or poorly developed, or a trace or mark left by a structure no longer developed but present in ancestral or reduced form.
- vesture (vestiture)** - a covering on a surface, as hairs or scales; see also indumentum.
- villous (villose)** - with a covering of long soft, often crooked hairs.
- vinous** - of the color of red wine.
- virgate** - long, slender, and straight; as a virgate stem.
- viscid** - sticky or glue-like.
- viscidia** (pl. **viscidia**) - sticky pad at the base of a caudicle or stipe.
- viscous** - very sticky or glue-like; glutinous.
- viviparous** - when the seeds germinate to form seedlings on the parent plant; often seen in *Agave sisalana*.
- whorl** - when there are three or more leaves or flowers at a single node or at the same level; see also verticil.
- wing** - any flat or thin extension on an organ; as in a winged fruit; the two lateral petals in pea-like flowers in Fabaceae (Leguminosae) subfamily Papilionoideae; the two lateral sepals in Polygalaceae.
- wood** - the xylem of plants with secondary vascular growth; the main tissues in the stems of trees and shrubs.
- xanthophyll** - a class of yellow, carotenoid pigments associated with chlorophyll in the chloroplasts.
- xeromorph** - a plant possessing features often found in xerophytes, but not necessarily confined to growing in dry places.
- xerophyte** - a plant that is able to live under very dry conditions and having structural adaptations for this.
- xylem** - the principal cells of the wood; important in water movement.

zygomorphic - flowers having bilateral symmetry so that the corolla can be divided equally only along one plane, used as synonymous with irregular; compare with actinomorphic and amorphous.

zygote - a fertilized egg formed by the union of a male and female gamete.

This glossary is adapted from Volume 2 Part 2 (1995), with the addition of specialized monocotyledon plant terms from different sources.

Comments on this glossary should be sent to:
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VERNACULAR NAMES FOR VOLUME 6

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Introduction

In the compilation and arrangement of the vernacular names for Volume 6, the same procedure has been used as was applied in Volumes 2, part 2 and 7. The languages are divided between two main groups. The first group comprises languages mainly from the north and central parts of the country where Ge'ez (Ethiopic) letters have been and are still in use. The second group consists of languages mainly spoken in the southern and central parts of the country where for some languages Latin (Roman) letters have already been in use for some time, while the others plan to use Latin script in the near future. Both Ge'ez and Latin scripts have been used in writing the vernacular names of the first group of languages while only Latin has been used for the names of the second group.

Names in Ge'ez script

There is some variation among languages in the way that the Ge'ez script is normally used to represent sounds. An effort has been made to avoid the possible use of a Ge'ez letter (FIDEL) in more than one way. This has been found desirable for ease of reading the names in the various languages without having to keep being constrained by the identity of the language. To make this possible, the following conventions and simplifications have been adopted throughout.

Consistency of the first form of a FIDEL: The first forms of the FIDELS ሀ, ሐ, ኀ, አ, ዐ are usually read as if they were the fourth forms, ሃ, ሐ, ኃ, አ, ዓ, and not in a consonant-vowel combination consistent with the other FIDELS ለ, መ, ደ, ባ, ከ, etc. as contrasted with ላ, ግ, ዳ, ባ, ከ, etc. There has been a recent tendency to disregard this old convention and to treat the five FIDELS ሀ, ሐ, ኀ, አ, ዐ as if they were like the rest. This convention has been adopted here throughout. The FIDEL ሀ (he) is thus read the way ኸ is normally read in Amharinya, and ኂ is often forced to double in being read in Tigrinya, and the FIDEL አ now replaces አ in Amharinya and the second use of ኂ in Tigrinya. This frees the FIDEL ኸ to be used exclusively as it is used in Tigrinya.

Avoidance of redundancy: In some of the Semitic languages of Ethiopia (Amharinya and Guragenya), the typical Semitic guttural sounds (ሐ, ኸ, ዐ) and one palatal sound (ኸ) have been dropped. In Ge'ez, it is believed that the FIDEL ኀ was what is now written in Tigrinya and the other Semitic languages, which

retain the guttural sounds, as ኸ. It is also believed that the Ge'ez ሀ was what has now come to be written as ኸ. For the sake of the cross-language consistency, the presumed old Ge'ez sounds of these FIDELS have been adopted here with ሀ being replaced by ኸ, and ኀ by ኸ. The FIDEL ሀ has thus been totally dropped, though ኀ has been retained as standing for the sound that is redundantly used for in Amharinya, i.e. as ሀ, but only in the diphthong form ኃ. Of the two identical sounding FIDELS, አ and ዐ, the second has been used.

Long and short vowels: In many of the Ethiopian languages, there are long and short vowels. It has not been possible to represent FIDELS to be read with long vowels as distinct from those read with short vowels.

Stress: In the Ge'ez script, no effort has been made to distinguish stressed from non-stressed FIDELS, though the usual doubling of consonants has been adopted to represent this in the Roman script. In ignoring to show stress in the Ge'ez script, the prevalent convention has been followed though this is not to be taken to mean that we belittle the useful convention of making stressed FIDELS through placing points over them. We have not adopted this useful system because we could not consistently apply it to all FIDELS.

Correspondence between the Ge'ez FIDELS and the Roman script: A number of sounds found in Ethiopian languages are often represented by combinations of Roman letters when this is done with a European readership in mind, for example she (ኸ), che or tche (ኸ or ጠ). Some transliteration letters are often used for more than one Ethiopian sound, particularly a (አ, ዓ), ha (ሃ, ሐ, ኸ), ka (ከ, ኃ, ኄ). To avoid ambiguities, the equivalents given below have strictly been followed.

Vowels: The sixth forms of the Ge'ez glottal stops, አ and ዐ, are represented by ' and ' respectively. The sixth forms of all other FIDELS are each represented by the consonant or the group of consonants in the case of sh (ኸ) standing for the sound without a vowel following it. The other forms are each represented by the appropriate consonant followed by -e for the first, -u for the second, -i for the third, -a for the fourth, -ie for the fifth, and -o for the seventh forms. The two glottal stops አ and ዐ, when varying their forms, are represented by the former with the vowels unmodified, and the latter with the vowels modified. The following four examples will illustrate this:

Form	1st	2nd	3rd	4th	5th	6th	7th
Ge'ez	ለ	ሉ	ሊ	ላ	ሌ	ል	ሎ
Roman	le	lu	li	la	lie	l	lo
Ge'ez	ሀ	ሁ	ሂ	ሃ	ሄ	ህ	ሆ
Roman	he	hu	hi	ha	hie	h	ho
Ge'ez	አ	አ	አ	አ	አ	አ	አ
Roman	e	u	i	a	'ie	'	o
Ge'ez	ዐ	ዑ	ዒ	ዓ	ዔ	ዖ	ዘ
Roman	é	ú	î	â	'ie	'	ó

The representation in roman script of all the simple FIDELS in their sixth form is given as follows:

ለ-', ዐ-', ስ-ቦ, ሹ-ሮ, ሰ-ሩ, ደ-ደ, ፍ-ፍ, ገ-ገ, ሀ-ከ, ሐ-ከ, ጅ-ጅ, ገ-ገ, ሞ-ጠ, ገ-ገ, ሹ-ሹ, ጥ-ጥ, ስ-ጐ, ሹ-ጐ, ሹ-ጐ, ር-ጥ, ስ-ጥ, ዕ-ጅ, ሹ-ጥ, ጥ-ጥ, ሞ-ጥ, ደ-ጥ, ስ-ጥ, ሹ-ጥ, ስ-ጥ.

The representation of the diphthong FIDELS in their fourth forms is given as follows:

ሀ-ቦ, ሹ-ሮ, ሰ-ሩ, ደ-ደ, ፍ-ፍ, ገ-ገ, ሀ-ከ, ሐ-ከ, ጅ-ጅ, ገ-ገ, ሞ-ጠ, ገ-ገ, ሹ-ሹ, ጥ-ጥ, ስ-ጐ, ሹ-ጐ, ሹ-ጐ, ር-ጥ, ስ-ጥ, ዕ-ጅ, ሹ-ጥ, ጥ-ጥ, ሞ-ጥ, ደ-ጥ, ስ-ጥ, ሹ-ጥ, ስ-ጥ.

The languages featuring in this list of vernacular names

English is the only widely spoken international language included — all the other languages are found as first languages within Ethiopia.

Owing to the weakness of the data collected on vernacular names, not all languages spoken in Ethiopia have been included. Some languages are found only a few times. This is not to be taken to mean that these languages do not have many vernacular names; it means that only a few plant names in these languages have been collected.

Our data base is weak even in the three most widely spoken major languages: Amharinya, Orominya and Tigrinya. The user of this Flora will find that there are many more vernacular names in use in the various languages than have been included here. However, attempts have been made to include as much vernacular names as possible from the available literature and field trip.

However, we appeal to all of you to help us strengthen our data base by sending us vernacular names of identified plants and, whenever possible, sending us specimens of the plants as well. The languages for which names occur are as follows with the abbreviated form as found in the lists followed by the full name for that language.

Group one - Languages which use Ge'ez FIDELS

Agew - Agewinya
Amh. - Amharinya
Ge'ez - Ge'ez
Gur. - Guraginya
Saho - Sahonya
Tigre - Tigre
Tya. - Tigrinya

Group two - Languages which use Roman script

Afar - Afarinya
Anu. - Anuwakinya
Arb. - Arborenya
Eng. - English
Gim. - Gimranya
Gof. - Gofanya
Had. - Hadiyinya
Kef. - Kefinya
Kem. - Kembatinya
Kon. - Konsonya
Me. - Me'eninya
Mes. - Mesengonya
Nuw. - Nuwer
Or. - Orominya
Sh. - Shanklinya
Sha. - Shakonya
Sid. - Sidamonya
Som. - Somalinya
Wel. - Welaytinya

ARRANGED ALPHABETICALLY BY SCIENTIFIC NAMES

(with page number(s) to the main text)

- Aerangis brachycarpa* (298): 200. Orchidaceae - star orchid (Eng.); ተቀፅላ teqešla (Amh.)
- Aerangis luteoalba* var *rhodosticta* (294): 200. Orchidaceae: - dhumugaa (Or.); riigaa osolee (Or.); ተቀፅላ teqešla (Amh.); wochakan (Mes.)
- Aerangis* spp. (294): 200. Orchidaceae - deegelloo (Or.)
- Aframomum corrorima* (325): 204. Zingiberaceae - ኮረራማ korerima (Amh., Gur. & Tya.); koroorimaa (Or.); ofio (Kef.); oghioo (Or.); orsha (Gim.); otiyo (Kef.)
- Aframomum zambesiaceum* (325): 204. Zingiberaceae - sheti ofjo (Kef.)
- Agave americana* (83): 188. Agavaceae - American aloe, American century plant, century plant (Eng.); ጊቃ ጥልያን iqa tlyan, ጅዕራ j'ra (Tya.); maguey (Eng.); ቃጫ qaça (Amh.)
- Agave sisalana* (85): 188. Agavaceae - alhee (Or.); ጊቃ ጥልያን iqa tlyan (Tya.); kachiya (Wel.); ቃጫ qaça (Amh.); qacaa (Or.); sisal, sisal hemp (Eng.); yaa (Afar)
- Albuca abyssinica* (145): 194. Hyacinthaceae - gel adais (Som.); ሽጉርቲ ዝብኢ shgurti zbi (Tya.); ure tuku (Som.)
- Alisma plantago-lanceolata* (14): 174. Alismataceae - water plantain (Eng.)
- Allium alibile* (154): 195. Alliaceae - የእግዚአብሔር ሽንኩርት ye'gziabhier shnkurt (Amh.)
- Allium cepa* (150): 195. Alliaceae - asa besel (Afar); besel midar (Nuw.); ብሻ ሺንኩርት bsha shinkurt (Gur.); bulb onion (Eng.); faranja tumwa (Wel.); keshertuna (Had.); ቀይ ሽንኩርት qey shnkurt (Amh.); ቀይሕ ሽጉርቲ qeyh shgurti (Tya.); qullubbii diimaa (Or.); shallot (Eng.); sunkuta (Kem.); sweet onion (Eng.); tukisho (Kef.); tumwa (Wel.)
- Allium porrum* (156): 195. Alliaceae - ባሮ ሺንኩርት baro shinkurt (Gur.); ባሮ ሽንኩርት baro shnkurt (Amh.); faranja tumwa, godare tumwa (Wel.); leek (Eng.); የፈረንጅ ሺንኩርት yeferenj shinkurt (Gur.); የፈረንጅ ሽንኩርት yeferenj shnkurt (Amh.)
- Allium sativum* (154): 195. Alliaceae - clown's treacle, garlic (Eng.); ነጩ ሺንኩርት neçe shinkurt (Gur.); ነጭ ሽንኩርት neç shnkurt (Amh.); qullubbii adii (Or.); ገዕዳ ሽጉርቲ ša'da shgurti (Tya.)
- Aloe ankoberensis* (128): 192. Aloaceae - መራራ merarie (Amh.)
- Aloe calidophila* (130): 192. Aloaceae - argeesaa sodu (Or.); genenoo (Had.); godole uta (Wel.); argeesaa, heejersaa, heejersaa (Or.)
- Aloe camperi* (130): 192. Aloaceae - genenoo (Had.); ሳንዳ ዕረ sanda 're (Tya.)
- Aloe debrana* (126): 192. Aloaceae - argeesaa, heejersaa (Or.); መራራ merarie (Amh.)
- Aloe megalacantha* (131): 192. Aloaceae - argeesaa (Or.); argessa (Wel.); heejersaa (Or.)
- Aloe percrassa* (126): 192. Aloaceae - ዕረ ሓርማዝ 're harmaz, አረት arret (Tigre); daar (Som.); iret matiso, ዛብር zaber (Tigre)
- Aloe pirottiae* (124): 192. Aloaceae - daar (Som.); uolaganti (Sh.)
- Aloe pulcherrima* (128): 192. Aloaceae - ምሽት ኤገዳ ፋጋ msht 'iegedel fuga (Gur.); ሴት እሬት set 'ret (Amh.)
- Aloe retrospiciens* (124): 192. Aloaceae - daar burug (Som.)
- Aloe rivae* (128): 192. Aloaceae - argeesaa (Or.)
- Aloe* spp. (117): 192. Aloaceae - ዕረ 're (Saho & Tya.); ኤገዳ ፋጋ 'iegedel fuga (Gur.); እሬት 'riet (Amh.); ጻረይ äray (Tya.); argeesaa (Or.); daar, gabar (Som.); godole uta (Wel.); ማተሶ matiso, እብር ober (Tigre); ዛብር zabur (Tigre)
- Aloe trichosantha* (119): 192. Aloaceae - argeesaa (Or.); daar lebi, daar merodi, daar (Som.); genenoo (Had.); godole uta (Wel.); reetii (Or.); ወንድ እሬት wend 'riet (Amh.)
- Aloe yavellana* (133): 192. Aloaceae - argeesaa, heejersaa (Or.)
- Amorphophallus abyssinicus* (42): 181. Araceae - bagana (Kon.); chido (Kef.); ሓምባጉይጣ hambaguyta (Tya.); ziizee (Or.)
- Ananas comosus* (315): 202B. Bromeliaceae - አናናስ ananas (Amh. & Tya.); ananasii (Or.); pineapple (Eng.)
- Angraecum infundibulare* (288): 200. Orchidaceae - goshgar (Gim.)
- Anthericum angustifolium* (90): 190. Anthericaceae - ወተት አሽር wetet ash (Agew)
- Anthericum corymbosum* (91): 190. Anthericaceae - baharor (Som.)
- Anthericum jamesii* (91): 190. Anthericaceae - gamagdia (Som.)

- Aponogeton abyssinicus* (12): 173.
Aponogetonaceae - mucu (Som.); ሙጎ ፈረስ
mugo feres (Tya.)
- Arisaema enneaphyllum* (46): 181. Araceae -
abuuxayeeh, amook (Or.); አሞጭ amoc
(Amh.) አምባጉይጣ hambaguyta (Tya.); jack-
in-the-pulpit (Eng.); kolthiioo, niitii bofaa
(Or.); የረኞች ጥላ yereñoc ðla (Amh.)
- Arisaema mooneyanym* (47): 181. Araceae -
abuuxayeeh (Or.)
- Arisaema schimperianum* (46): 181. Araceae -
አሞጭ amoc (Amh.)
- Arisaema* spp. (44): 181. Araceae - bude (Sid.);
jack-in-the-pulpit (Eng.); kolchoma (Sid.)
- Asparagus aethiopicus* (70): 186A. Asparagaceae
- sariitii (Or.); የሰይጣን ቀስት yeseytan qest
(Amh.)
- Asparagus africanus* (68): 186A. Asparagaceae -
አድ ዶንጉል ad dongul (Tigre); ዓይኒ ድሙ-
äini dmu (Tya.); ante (Arb.); argheg (Som.);
አታት atat (Tigre); bakar (Som.); hiddii saaree
(Or.); mulu (Sh.); ቃስታ አንሰቲ qasta ansti
(Tya.); ቀስታንቻ qestanca (Amh.); ቃስታነሰቶ
qastanesto (Tigre); sariitii (Or.); ሰራቲ seriti,
የሴት ቀስት yesiet qest (Amh.)
- Asparagus asparagoides* (73): 186A.
Asparagaceae - smilax of florists (Eng.)
- Asparagus falcatus* (70): 186A. Asparagaceae -
argheg (Som.); mulu (Sh.); sickle thorn (Eng.)
- Asparagus flagellaris* (70): 186A. Asparagaceae -
sariitii (Or.); ሰራቲ seriti (Amh.); shorach
(Me.)
- Asparagus leptocladodius* (71): 186A.
Asparagaceae - argheg (Som.)
- Asparagus officinalis* (73): 186A. Asparagaceae -
garden asparagus (Eng.); sariitii (Or.); ሰራቲ
seriti (Amh.); wild asparagus (Eng.)
- Asparagus racemosus* (71): 186A. Asparagaceae -
argheg (Som.); አታት atat (Tya.); ergeg,
minicangulo (Som.); ቃስታ አንሰቲ qasta ansti
(Tya.); ቀስታንቻ qestanca (Amh.); sariitii
(Or.); ሰራቲ seriti, ወንድ ሰራቲ wend seriti,
የሴት ቀስት yesiet qest (Amh.)
- Asparagus setaceus* (68): 186A. Asparagaceae -
sariitii (Or.); ሰራቲ seriti (Amh.)
- Borassus aethiopum* (518): 215. Arecaceae -
African fan palm, ago beam, borassus palm,
deleb palm, fan palm, palmirah palm (Eng.);
udua (Anu.); ዘምባባ zenbaba (Amh.)
- Bulbine abyssinica* (111): 191. Asphodelaceae -
gel adais (Som.)
- Burnatia enneandra* (16): 174. Alismataceae -
balbiot, bar (Som.)
- Canna indica* (333): 205. Cannaceae - atzera,
Indian shot, purple arrowroot, queensland
arrowroot, wild canna (Eng.); ሴት አኩሪ siet
akuri (Amh.)
- Carex acutiformis* (507): 212. Cyperaceae - lesser
pond sedge (Eng.)
- Carex distans* (510): 212. Cyperaceae - distant
sedge (Eng.)
- Carex divisa* (504): 212. Cyperaceae - salt
meadow sedge (Eng.)
- Chlorophytum comosum* (102): 190.
Anthericaceae - chauwo (Kef.); dharm (Gim.,
Kef. & Sh.)
- Chlorophytum gallabatense* (99): 190.
Anthericaceae - hidana teweita (Kon.)
- Chlorophytum longifolium* (94): 190.
Anthericaceae - daai (Som.)
- Chlorophytum tetraphyllum* (94): 190.
Anthericaceae - ኡላንጋ ulanga (Tya.); የአረኛ
ቆሎ ye'reña qolo, የዝንጀሮ ቆሎ yeznjero
qolo (Amh.)
- Chlorophytum tuberosum* (97): 190.
Anthericaceae - አሸንዳ ዲፍ ashenda if (Tya.)
- Cocos nucifera* (526): 215. Arecaceae - coconut
palm, porcupine wood (Eng.)
- Coleochloa abyssinica* (500): 212. Cyperaceae -
ዝህ ህበይ geza hbey (Tya.)
- Colocasia esculenta* (38): 181. Araceae - boneya
(Kef.); cocoyam, eddoe, dasheen, elephant's ear
(Eng.); garaboo, godaaree (Or.); godare (Kef.);
ጎደራ goderie (Amh.); kall chomaa (Or.); upela
(Anu.); kido (Kef.); scratch coco, taro (Eng.)
- Commelina africana* (362): 207. Commelinaceae -
ገሊፍ gelif (Tya.); ላሉንጫ lalunça (Gur.);
መዕቆሪ me'qori, የዕዳ መስቂል ša'da mesqil
(Tya.); የወፍ እንቁር yewef 'nqur (Amh.)
- Commelina albescens* (372): 207. Commelinaceae
- bar (Som.); ganania (Sh.)
- Commelina benghalensis* (373): 207.
Commelinaceae - bar (Som.); dalisha (Wel.);
diliishaa (Or.); ganania (Sh.); ገሊፍ gelif
(Tya.); hoolaa gabbis, laalunxyee (Or.);
መስቂል mesqil (Tigre); qaayyoo (Or.);
wandering Jew (Eng.); የወፍ እንቁር yewef
'nqur, የውሃ እንቁር yewha 'nqur (Amh.)
- Commelina diffusa* (362): 207. Commelinaceae -
Laluumincii, qarxobii (Or.)
- Commelina erecta* (372): 207. Commelinaceae -
bar (Som.)

- Commelina forskolaiae* (374): 207. Commelinaceae - bar (Som.); hoolaa gabbis (Or.); ወድጋሊት wedgalit (Tigre)
- Commelina imberbis* (369): 207. Commelinaceae - ገሊፍ gelif (Tya.); hoolaa gabbis, qayyoo (Or.)
- Commelina kotschyii* (368): 207. Commelinaceae - hoolaa gabis (Or.)
- Commelina latifolia* (368): 207. Commelinaceae - ganaia (Sh.); qaayyoo (Or.); የወፍ እንቁር yewef 'nqur, የውሃ እንቁር yewha 'nqur (Amh.)
- Commelina* spp. (360): 207. Commelinaceae - gorooriisaa (Or.); የውሃ እንቁር yewha 'nqur (Amh.)
- Commelina subulata* (364): 207. Commelinaceae - ደቂቅ መስቀል deqiḳ mesqil, ገሊፍ gelif (Tya.); fugnaan handaqoo (Or.)
- Costus afer* (330): 204B. Costaceae - kiichuu (Or.)
- Crinum abyssinicum* (161): 196. Amaryllidaceae - የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Crinum ornatum* (160): 196. Amaryllidaceae - አምበታ ambeta (Tya.); crinum lily (Eng.); የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Crinum* spp. (158): 196. Amaryllidaceae - የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Curcuma domestica* (329): 204. Zingiberaceae - ዕርዲ 'rdi (Tya.); እርድ 'rd (Amh.); እርድ erd (Gur.); hirrdii (Or.); tumeric (Eng.)
- Cyanotis barbata* (341): 207. Commelinaceae - ብርቆ brqo (Tya.)
- Cyperus alopecuroides* (445): 212. Cyperaceae - fiyail (Afar); ሐራዳ ስላሪ (Tya.)
- Cyperus alternifolius* (434): 212. Cyperaceae - cuntzula (Sh.); ዶቋላ doquale (Tya.); matha kuntun (Som.)
- Cyperus articulatus* (446): 212. Cyperaceae - colafo, garbab (Som.); gomit (Arb.)
- Cyperus assimilis* (440): 212. Cyperaceae - ጋሳ ግይ gasa may (Tya.)
- Cyperus aterrimus* (454): 212. Cyperaceae - እንግጫ 'ngça (Amh.); quunnii (Or.)
- Cyperus bulbosus* (451): 212. Cyperaceae - እንግጫ 'ngça (Tya.); gheo osso (Som.); ኩዕንቲ ku'nti (Tya.); ኩንቲ Kunti (Agew & Amh.); ቃይን qayn (Tigre)
- Cyperus conglomeratus* (463): 212. Cyperaceae - atile, darif (Som.); sibsibu (Afar)
- Cyperus dichroostachyus* (436): 212. Cyperaceae - አሩንጋ ሰቲ arunga seti (Tya.); caafee (Or.); ግራምጣ gramጣ (Agew); ሐዝሐዝ አንጭዋ ስኒሄ ançwa, ሞንጎል mongol, ሰቲ ሩብ seti ruba (Tya.)
- Cyperus digitatus* (443): 212. Cyperaceae - ashuufee (Or.)
- Cyperus dives* (444): 212. Cyperaceae - ሐራዳ ስላሪ (Tya.)
- Cyperus dubius* (468): 212. Cyperaceae - duruco (Sh.); go onyer (Som.)
- Cyperus elegantulus* (480): 212. Cyperaceae - ደንጋሮ dengaro, ርሲሲ ምራኽ r'si mraḳ, ሰቲ seti (Tya.)
- Cyperus esculentus* (451): 212. Cyperaceae - earth almond (Eng.); go ondo (Som.); quunnii (Or.); rush nut, tiger nut (Eng.)
- Cyperus exaltatus* (444): 212. Cyperaceae - brillau, uarme (Arb.)
- Cyperus fischeranus* (435): 212. Cyperaceae - እንግጫ 'ngça (Amh.); daaggo, dhalladuu (Or.); ግራምጣ gramጣ (Agew & Amh.); ሐዝሐዝ አንጭዋ ስኒሄ ançwa, ሐዝሐዝ ስኒሄ (Tya.); ሰቲ seti (Tya.)
- Cyperus grandibulbosus* (451): 212. Cyperaceae - lungighergheret (Som.)
- Cyperus imbricatus* (445): 212. Cyperaceae - sciuceri (Sh.)
- Cyperus laevigatus* (459): 212. Cyperaceae - da, tugugoga (Som.)
- Cyperus longus* (449): 212. Cyperaceae - እንግጫ 'ngça (Amh.); ብትኮ btko (Tya.); cundu (Som.); English galingale (Eng.); ፊላ ሳር fila sar (Amh.); sweet galingale (Eng.); ያህያ ግጫ yahya gça (Amh.)
- Cyperus niveus* (464): 212. Cyperaceae - go onyer (Som.)
- Cyperus papyrus* (441): 212. Cyperaceae - ደንገል dengel (Amh.); alaaduu (Or.); paper-reed, papyrus (Eng.)
- Cyperus procerus* (445): 212. Cyperaceae - gomor (Som.)
- Cyperus pygmaeus* (462): 212. Cyperaceae - coatto (Som.)
- Cyperus rigidifolius* (447): 212. Cyperaceae - እንግጫ 'ngça (Amh.); ብትኮ btko, መተርአስ አንጭዋ meteras ançwa (Tya.); quunnii (Or.)
- Cyperus rotundus* (449): 212. Cyperaceae - እንግጫ 'ngça (Amh.); brown nutsedge (Eng.); ብትኮ btko (Tya.); coco grass (Eng.); ምጭቋ ጠቋጋ mçqua (Tya.); nutgrass, nutsedge, purple nutsedge (Eng.); ሱድ sud, ዋዳሚ wadami (Tigre); water grass (Eng.)

- Cyperus rubicundus* (464): 212. Cyperaceae - go onyer, gudei (Som.); ካይት kayt (Tigre); ramass (Som.)
- Cyperus schimperianus* (447): 212. Cyperaceae - ምጭቋ mçqua, ሰቲ seti (Tya.)
- Cyperus* spp. (429): 212. Cyperaceae - ቁጤማ qietema (Amh.)
- Dioscorea abyssinica* (61): 183. Dioscoreaceae - boye (Sid.); kach bhoi (Sh.); maze (Wel.); ገዕዳ ሻ'a da (Tya.); የጫካ ቦይና yeçaka boyna (Amh.)
- Dioscorea alata* (60): 183. Dioscoreaceae - water yam (Eng.)
- Dioscorea bulbifera* (59): 183. Dioscoreaceae - aerial yam, air potato (Eng.); kooteharree (Or.); potato yam (Eng.); ገዕዳ ሻ'a da (Tya.)
- Dioscorea cayenensis* (60): 183. Dioscoreaceae - Guinea yam (Eng.)
- Dioscorea quartiniana* (56): 183. Dioscoreaceae - buck yam (Eng.); kuba shaan (Or.); ገዕዳ ሻ'a da (Tya.); የማርያም እንጨት yemaryam 'nçet (Amh.)
- Dioscorea schimperiana* (60): 183. Dioscoreaceae - ankoruumbaa (Or.)
- Dioscorea* spp. (55): 183. Dioscoreaceae - kach bhoi (Gim.); yam (Eng.)
- Dipcadi viride* (139): 194. Hyacinthaceae - katzi (Sh.)
- Dracaena afromontana* (76): 187. Dracaenaceae - alghee (Or.); emo, gebdo (Kef.); rukeesaa (Or.); shuda (Kef.); woondoo (Or.)
- Dracaena ellenbeckiana* (77): 187. Dracaenaceae - biilee, butu (Or.); kedong dracaena (Eng.); meti (Or.)
- Dracaena ombet* subsp. *ombet* (78): 187. Dracaenaceae - አሮብ arob (Tigre); አሳራ-asara (Tya.)
- Dracaena steudneri* (79): 187. Dracaenaceae - እፀ ለጠስ 'še paṭos (Amh.); aferfeetuu (Or.); areg, çewyie (Amh.); eebi (Mes.); laankusoo, miirkoo (Sha.); ሞጣ moṭa (Amh.); serte (Sha.); serxee (Or.); steudner's dracaena (Eng.); ታብቶስ tabatos (Amh.); udo (Kef.); waarqee (Or.); yudo (Kef.)
- Drimia altissima* (144): 194. Hyacinthaceae - የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Eleocharis* spp. (403): 212. Cyperaceae - ቁጤማ qietema (Amh.)
- Ensete ventricosum* (317): 203A. Musaceae - እንሰት 'nset (Amh.); አሰት eset (Gur.); Ethiopian banana, false banana, fibre banana (Eng.); ጉና ጉና guna guna (Amh., Tigre & Tya.); ኮባ koba (Amh.); koicho (Kef.); muz (Som.); ቆሮ qoço (Amh.); ቆሮ ሰይጣን qoço seyṭan (Amh.); udo (Sha.); waarqee (Or.); ወርቃ werqa (Amh.); wild banana (Eng.); ምርቂት worqiet (Gur.)
- Eulophia petersii* (278): 200. Orchidaceae - aschkul, degwen (Som.)
- Eulophia* spp. (275): 200. Orchidaceae - የላም ጡት yelam tut (Amh.)
- Eulophia streptopetala* (278): 200. Orchidaceae - የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Fimbristylis complanata* (408): 212. Cyperaceae - ምጭቋ mçqua (Tya.); ቁጤማ qietema (Amh.); quunnii (Or.)
- Fimbristylis dichotoma* (412): 212. Cyperaceae - cengi (Som.)
- Fimbristylis ferruginea* (409): 212. Cyperaceae - ghundo, go onyer (Som.)
- Floscopa glomerata* (348): 212. Cyperaceae - የውሃ እንቁር yewha 'nçur (Amh.)
- Gladiolus abyssinicus* (179): 197. Iridaceae - እንዘረዘይ 'nzerezey (Amh.); ብርኮ brqo (Tigre & Tya.); wild gladiolus (Eng.)
- Gladiolus candidus* (183): 197. Iridaceae - ምላስ ጎልጎል mlas golgul (Amh.)
- Gladiolus dalenii* (176): 197. Iridaceae - እንዘረዘይ 'nzerezey (Amh. & Tya.); gladiolus (Eng.); schescheru (Kef.); የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Gloriosa baudii* (185): 198. Colchicaceae - gheloac, tamajor (Som.)
- Gloriosa superba* (184): 198. Colchicaceae - ዕምባባ 'mbaba (Tya.); ambioco (Som.); aramaadawaa (Or.); አትፊር atfir (Tigre); banari, bavari (Som.); climbing lily (Eng.); dog (Kef.); flame lily, glory lily (Eng.); magiabe (Som.); seekoruu (Or.); ዕላል እኖይ ማርያም šlal 'noy maryam (Tya.); የማርያም ጥዋ yemaryam ṭwa (Amh.); የዝንጆር አገዳ yeznjero ageda (Amh.)
- Habenaria* spp. (206): 200. Orchidaceae - እፀ ይሃዩ 'še yhayu (Ge'ez)
- Holothrix* spp. (198): 200. Orchidaceae - የቦሬ ጨው yeberie çew (Amh.)
- Hyphaene thebaica* (522): 215. Arecaceae - ግንጋ änga (Saho); ግርኮኮይ ärkokobay (Tya.); dum palm (Eng.)
- Isolepis fluitans* (424): 212. Cyperaceae - floating mud-rush (Eng.)
- Isolepis setacea* (423): 212. Cyperaceae - bristle scripus (Eng.)

- Jodrellia fistulosa* (112): 191. Asphodelaceae - rir (Som.)
- Juncus bufonius* (386): 211. Juncaceae - toad rush (Eng.)
- Juncus capitatus* (387): 211. Juncaceae - capitate rush (Eng.)
- Juncus effusus* (387): 211. Juncaceae - hard rush (Eng.); ቁጤማ qietema (Amh.)
- Juncus punctorius* (389): 211. Juncaceae - bar (Som.); ምጭቋ ሩብ mçqua ruba, ሰቲ: seti (Tya.)
- Kniphofia foliosa* (107): 191. Asphodelaceae - አበልቢላ abelbila (Amh.); አምባላ አርሚ ambala armi (Tya.); አመልሚላ amelmiela, አሽንዳ ashenda (Amh. & Tya.); red-hot poker (Eng.); sheemexiimex (Or.); ሸመጥመጦ shemetmetje (Amh.); shushubbee, siisiyee (Or.); torch lily (Eng.); የዝንጅሮ አገዳ yeznjero ageda (Amh.)
- Kniphofia isoetifolia* (110): 191. Asphodelaceae - galadwessa (Sid.); hurguufoo (Or.); waleebo (Or.); የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Kniphofia pumila* (107): 191. Asphodelaceae - አበልቢላ abelbila (Amh.); አሽንዳ ashenda (Tya.)
- Lagarosiphon* spp. (5): 172. Hydrocharitaceae - qorrichaa fardaa (Or.)
- Lagarosiphon steudneri* (6): 172. Hydrocharitaceae - qorrichaa fardaa, siimuu fardaa (Or.)
- Ledebouria cordifolia* (141): 194. Hyacinthaceae - ballabioto, gel adais (Som.)
- Ledebouria* spp. (140): 194. Hyacinthaceae - የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Lemna gibba* (52): 182. Lemnaceae - gibbous duckweed (Eng.); ሰበባ sebeba (Tya.)
- Lemna minor* (52): 182. Lemnaceae - lesser duckweed (Eng.)
- Lemna trisulca* (52): 182. Lemnaceae - ivy duckweed (Eng.)
- Luzula abyssinica* (390): 211. Juncaceae - spiked wood-rush (Eng.)
- Maranthochloa leucantha* (335): 206. Marantaceae - ketti (Mes.); kullala (Gim.); zunzu (Sh.)
- Merendera schimperiana* (187): 198. Colchicaceae - ኮሙሊ አባጉሜ komuli abagumie (Tya.)
- Moraea schimperii* (168): 197. Iridaceae - wild iris (Eng.)
- Musa x paradisiaca* (321): 203A. Musaceae - banana (Eng.); muuzii (Or.); ሙዝ muz (Amh. & Tya.); plantain, banana (Eng.); ባኖኖ banana (Tya.); moozi (Sha.)
- Najas marina* (30): 180. najadaceae - greater najad (Eng.)
- Pancreatium tenuifolium* (162): 196. Amaryllidaceae - ኣመሲ ኣዳ ከamsi adu (Tigre)
- Phoenix canariensis* (518): 215. Arecaceae - canary palm (Eng.)
- Phoenix dactylifera* (515): 215. Arecaceae - date palm (Eng.); ተምሪ temri (Tya.); የተምር ዛፍ yetemr zaf (Amh.)
- Phoenix reclinata* (515): 215. Arecaceae - አውሽዕና awsh'na (Tya.); badaye (Sha.); bode (Mes.); ሆሳእና hosa'na (Amh.); meexii (Or.); tuoh (Anu.); wild date palm (Eng.); yebo (Kef.); ዘንባባ zenbaba (Amh. & Gur.)
- Pistia stratiotes* (49): 215. Arecaceae - mechaaraa (Or.)
- Polystachya bennettiana* (262): 200. Orchidaceae - መዕቆሪ ማይ me'qori may (Tya.); orchid (Eng.); ተቀፅላ teqešla (Amh.)
- Polystachya* spp. (260): 200. Orchidaceae - deegelloo (Or.)
- Potamogeton crispus* (20): 176. Potamogetonaceae - curled pondweed (Eng.)
- Potamogeton lucens* (20): 176. Potamogetonaceae - shining pondweed (Eng.)
- Potamogeton pectinatus* (19): 176. Potamogetonaceae - fennel-like pondweed (Eng.)
- Potamogeton perfoliatus* (20): 176. Potamogetonaceae - perfoliate pondweed (Eng.)
- Potamogeton pusillus* (20): 176. Potamogetonaceae - ሰበባ ማይ sebeba may, ሰጊ segi (Tya.); small pondweed (Eng.)
- Potamogeton thunbergii* (23): 176. Potamogetonaceae - loddon pondweed (Eng.)
- Rhynchospora corymbosa* (493): 212. Cyperaceae - bulrush (Eng.); ቁጤማ qietema (Amh.); kitimo (Kef.)
- Romulea fischeri* (171): 197. Iridaceae - warren crocus (Eng.)
- Ruppia maritimus* (24): 177. Ruppiceae - beaked tassel pondweed (Eng.)
- Ruscus aculeatus* (74): 186B. Ruscaceae - butcher's broom (Eng.)
- Sansevieria ehrenbergii* (80): 187. Dracaenaceae - aleko, algat (Gof. & Arb.); alghee (Or.); arcanti (Gof. & Sh.); ኣያ aya (Saho); bowstring hemp, ehrenberg's wild sisal (Eng.); ኣርዳባ ስhardaba (Tigre); hig (Som.); ጊቃ iqa (Tya.); thahar

- (Som.); wild sisal (Eng.); ወንዶ ቃጫ wendie qaça (Amh.)
- Sansevieria forskoliana* (82): 187. Dracaenaceae - alghée (Or.); አያ aya (Saho); አይና ባሃ ayna baha (Tigre); ቢሰካ biseka (Agew); bowstring hemp (Eng.); ጭረት çret (Amh.); dig wein (Som.); Ethiopian bowstring hemp (Eng.); ኣርዳባ ስዳባ (Tigre); hig (Som.); ጊቃ iqa (Tya.); mother-in-law's-tongue (Eng.); oropte (Arb.); ቃጫ qaça, ወንዶ ቃጫ wendie qaça (Amh.); wild sisal (Eng.)
- Sansevieria* spp. (79): 187. Dracaenaceae - ጭረት çret (Amh.)
- Sauromatum venosum* (44): 181. Araceae - ኣሞጭ amoç (Amh.); ኣምባጉይጣ ስምባጉይጣ hambaguyta, ኣማሰራው ስምሰራው hamaseraw (Tigre)
- Scadoxus multiflorus* (158): 196. Amaryllidaceae - ዕምባባ ኣንባባ 'mbaba anbesa (Tigre & Tya.); abrassa (Or.); blood lily (Eng.); ደም ኣስተፊት demastefit, ኣንዛር ኣባባ enzar abeba (Amh.); fireball lily (Eng.); gel adais (Som.); lumeh (Mes.); qullubii jallidessaa (Or.); ria dararis (Som.); ሽጉርቲ ዝብኢ shgurti zbi (Tya.); የጅብ ኣገዳ yejb ageda, የጅብ ሽንኩርት yejb shnkurt (Amh.)
- Schoenoplectus corymbosus* var. *brachyceras* (399): 212. Cyperaceae - caafee (Or.)
- Schoenoplectus corymbosus* (399): 212. Cyperaceae - caafee (Or.); ግራምጣ gramta; (Kef.); ቁጤማ qietema (Amh.); kitimo (Kef.); ስቲ seti (Tya.)
- Schoenoplectus lacustris* (398): 212. Cyperaceae - club-rush, common bulbrush (Eng.)
- Schoenoplectus maritimus* (397): 212. Cyperaceae - sea club-rush (Eng.)
- Schoenus nigricans* (492): 212. Cyperaceae - black bog-rush (Eng.)
- Scleria hispidior* (496): 212. Cyperaceae - margaa gogorii (Or.)
- Scleria racemosa* (499): 212. Cyperaceae - salmalii (Or.)
- Scleria schimperana* (497): 212. Cyperaceae - caafee (Or.)
- Smilax aspera* (65): 185. Smilacaceae - ኣሽክላ ashkla (Amh.)
- Smilax* spp. (65): 185. Smilacaceae - ኣሽክላ ashkla, ጎይ ተእዚ goy te'zi (Amh.)
- Strelitzia reginae* (322): 203B. Strelitziaceae - arum lily, birds tongue flower, calla lily, crane flower, pig lily, strelitzia, the bird of paradise flower (Eng.)
- Stylochaeton* spp. (36): 181. Araceae - ኣሞጭ amoç (Amh.)
- Tacca leontopetaloides* (63): 184. Taccaceae - ኣቦኣታ aboata (Tya.); tahiti arrowroot (Eng.)
- Typha domingensis* (385): 210. Typhaceae - alal medu, alala, allala nudi (Som.); ኣረንቋ arenqua (Amh.); cat's tail (Eng.); combat (Arb.); daar (Som.); narrow-leaved reedmace (Eng.)
- Typha latifolia* (383): 210. Typhaceae - ኣረንቋ arenqua (Amh.); bulrush, cat's tail, reedmace (Eng.)
- Typha* spp. (383): 210. Typhaceae - ፊላ fila (Amh.)
- Washingtonia filifera* (515): Arecaceae - priest's palm (Eng.)
- Xerophyta schnizleinia* (311): 210. Velloziaceae - elbarar, tignagne (Som.)
- Zannichellia palustris* (25): 178. Zannichelliaceae - horned pondweed (Eng.)
- Zantedeschia aethiopica* (38): 181. Araceae - arum lily, calla lily, lily of the Nile (Eng.); ምላስ ጎልጉል mlas golgul, የሙሽራ ኣባባ yemushra abeba, የጥሩምባ ኣባባ yetrumba abeba (Amh.)
- Zingiber officinale* (329): 204. Zingiberaceae - ginger (Eng.); ጅንጅብል jnjbl (Gur.); zinjibilaa (Or.); ዝንጅብል znjbl (Amh. & Tya.)

ETHIOPIC NAMES ARRANGED ALPHABETICALLY
(in Ge'ez and Latin script)

- ዕምባባ** 'mbaba (Tya.) - *Gloriosa superba* (184)
198. Colchicaceae
- ዕምባባ ኣንበሳ** 'mbaba anbesa (Tigre & Tya.) -
Scadoxus multiflorus (158) 196.
Amaryllidaceae
- ዕርዲ** 'rdi (Tya.) - *Curcuma domestica* (329)
204A. Zingiberaceae
- ዕረ** 're (Saho & Tya.) - *Aloe* spp. (117) 192.
Aloaceae
- ዕረ ኣርማዝ** 're harmaz (Tya.) - *Aloe percrassa*
(126) 192. Aloaceae
- ኤገደል ፋጋ** 'iegedel fuga (Gur.) - *Aloe* spp.
(117) 192. Aloaceae
- እንግጫ** 'ngça (Amh.) - *Cyperus aterrimus* (454),
Cyperus fischeranus (435), *Cyperus longus*
(449), *Cyperus rigidifolius* (447), *Cyperus*
rotundus (449) 212. Cyperaceae
- እንግጫ** 'ngça (Tya.) - *Cyperus bulbosus* (451)
212. Cyperaceae
- እንሰት** 'nset (Amh.) - *Ensete ventricosum* (317)
203A. Musaceae
- እንዘረዘይ** 'nzerezey (Amh.) - *Gladiolus*
abyssinicus (179), *Gladiolus dalenii* (176)
197. Iridaceae
- እንዘረዘይ** 'nzerezey (Tya.) - *Gladiolus dalenii*
(176) 197. Iridaceae
- እርድ** 'rd (Amh.) - *Curcuma domestica* (329)
204A. Zingiberaceae
- እራት** 'riet (Amh.) - *Aloe* spp. (117) 192.
Aloaceae
- እዕ ይሃዩ** 'še yhayu (Ge'ez) - *Habenaria* spp.
(206) 200. Orchidaceae
- እዕ ጳጳስ** 'še paṣos (Amh.) - *Dracaena steudneri*
(79) 187. Dracaenaceae
- አበልቢላ** abelbila (Amh.) - *Kniphofia foliosa*
(107), *Kniphofia pumila* (107) 191.
Asphodelaceae
- አቦአታ** aboata (Tya.) - *Tacca leontopetaloides*
(63) 184. Taccaceae
- አድ ዶንጉል** ad dongul (Tigre) - *Asparagus*
africanus (68) 186A. Asparagaceae
- ዓይኒ ድሙ** äini dmu (Tya.) - *Asparagus*
africanus (68) 186A. Asparagaceae
- አምባላ አርሚ** ambala armi (Tya.) - *Kniphofia*
foliosa (107) 191. Asphodelaceae
- አምበታ** ambeta (Tya.) - *Crinum ornatum* (160)
196. Amaryllidaceae
- አመልሚላ** amelmiela (Amh.) - *Kniphofia foliosa*
(107) 191. Asphodelaceae
- አሞጭ** amoč (Amh.) - *Arisaema enneaphyllum*
(46), *Arisaema schimperianum* (46),
Sauromatum venosum (44), *Stylochaeton* spp.
(36) 181. Araceae
- አናናስ** ananas (Amh & Tya.) - *Ananas comosus*
(315) 202B. Bromeliaceae
- ዓንጋ** änga (Saho) - *Hypphaene thebaica* (522)
215. Arecaceae
- ዓረይ** äray (Tya.) - *Aloe* spp. (117) 192. Aloaceae
- አረግ** areg (Amh.) - *Dracaena steudneri* (79) 187
Dracaenaceae
- አረንቋ** arenqua (Amh.) - *Typha domingensis*
(385), *Typha latifolia* (383) 210. Typhaceae
- ዓርኮባይ** ärkokobay (Tya.) - *Hypphaene thebaica*
(522) 215. Arecaceae
- አሮብ** arob (Tigre) - *Dracaena ombet* subsp.
ombet (78) 187. Dracaenaceae
- አረት** arret (Tigre) - *Aloe percrassa* (126) 192.
Aloaceae
- አሩንጋ ሰቲ** arunga seti (Tya.) - *Cyperus*
dichroostachyus (436) 212. Cyperaceae
- አሸንዳ** ashenda (Amh. Tya.) - *Kniphofia foliosa*
(107), *Kniphofia pumila* (107) 191.
Asphodelaceae
- አሸንዳ ዒፍ** ashenda if (Tya.) - *Chlorophytum*
tuberosum (97) 190. Anthericaceae
- አሽክላ** ashkla (Amh.) - *Smilax aspera* (65),
Smilax spp. (65) 185. Smilacaceae
- አሳራ** asara (Tya.) - *Dracaena ombet* subsp.
ombet (78) 187. Dracaenaceae
- አትፊር** atfir (Tigre) - *Gloriosa superba* (184)
198. Colchicaceae
- አታት** atat (Tigre) - *Asparagus africanus* (68)
186A. Asparagaceae
- አታት** atat (Tya.) - *Asparagus racemosus* (71)
186A. Asparagaceae
- አውሽዕና** awsh'na (Tya.) - *Phoenix reclinata*
(515) 215. Arecaceae
- አያ** aya (Saho) - *Sansevieria ehrenbergii* (80),
Sansevieria forskaoliana (82) 187.
Dracaenaceae
- አይና ባሃ** ayna baha (Tigre) - *Sansevieria*
forskaoliana (82) 187. Dracaenaceae
- ባናና** banana (Tya.) - *Musa x paradisiaca* (321)
Musaceae
- ባሮ ሺንኩርት** baro shinkurt (Gur.) - *Allium*
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- ባሮ ሽንኩርት** baro shnkurt (Amh.) - *Allium*
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- ቢሰካ** biseka (Agew) - *Sansevieria forskaoliana* (82) 187. Dracaenaceae
- ብርኮ** brqo (Tigre & Tya.) - *Gladiolus abyssinicus* (179) 197. Iridaceae, *Cyanotis barbata* (341) 207. Commelinaceae
- ብርኮ** brqo (Tya.) - *Gladiolus abyssinicus* (179) 197. Iridaceae
- ብሻ ሺንኩርት** bsha shinkurt (Gur.) - *Allium cepa* (150) 195. Alliaceae
- ብትኮ** btko (Tya.) - *Cyperus longus* (449), *Cyperus rigidifolius* (447), *Cyperus rotundus* (449) 212. Cyperaceae
- ጨዋዬ** çewyie (Amh.) - *Dracaena steudneri* (79) 187. Dracaenaceae
- ጭረት** çret (Amh.) - *Sansevieria forskaoliana* (82), *Sansevieria* spp (79). 187. Dracaenaceae
- ደምአስተፊት** demastefit (Amh.) - *Scadoxus multiflorus* (158) 196. Amaryllidaceae
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- ደንገል** dengel (Amh.) - *Cyperus papyrus* (441) 212. Cyperaceae
- ደቂቕ መስቂል** deqiḻ mesqil (Tya.) - *Commelina subulata* (364) 207. Commelinaceae
- ደቋለ** doquale (Tya.) - *Cyperus alternifolius* (434) 212. Cyperaceae
- አንዛር አበባ** enzar abeba (Amh.) - *Scadoxus multiflorus* (158) 196. Amaryllidaceae, **አርድ** erd (Gur.) - *Curcuma domestica* (329) 204. Zingiberaceae
- አሰት** eset (Gur.) - *Ensete ventricosum* (317) 203A. Musaceae
- ፊላ** fila (Amh.) - *Typha* spp. (383) 210. Typhaceae
- ፊላ ሳር** fila sar (Amh.) - *Cyperus longus* (449) 212. Cyperaceae
- ጋሳ ማይ** gasa may (Tya.) - *Cyperus assimilis* (440) 212. Cyperaceae
- ገሊፍ** gelif (Tya.) - *Commelina africana* (362), *Commelina benghalensis* (373), *Commelina imberbis* (369), *Commelina subulata* (364) 207. Commelinaceae
- ገዛ ህበይ** geza hbey (Tya.) - *Coleochloa abyssinica* (500) 212. Cyperaceae
- ገደሬ** goderie (Amh.) - *Colocasia esculenta* (38) 181. Araceae
- ገይ ተእዚ** goy te'zi (Amh.) - *Smilax* spp. (65) 185. Smilacaceae
- ግራምግ** gramጿ (Agew) - *Cyperus dichroostachyus* (436), *Cyperus fischeranus* (435) 212. Cyperaceae
- ግራምግ** gramጿ (Amh.) - *Cyperus fischeranus* (435), *Schoenoplectus corymbosus* (399) 212. Cyperaceae
- ጉና ጉና** guna guna (Amh., Tigre & Tya.) - *Ensete ventricosum* (317) 203A. Musaceae
- አምባጉይግ** hambaguyጿ (Tya.) - *Amorphophallus abyssinicus* (42), *Arisaema enneaphyllum* (46), *Sauromatum venosum* (44) 181. Araceae
- አራዳ** ስገሳ (Tya.) - *Cyperus alopecuroides* (445), *Cyperus dives* (444) 212. Cyperaceae
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- ሐዝሐዝ አንጭዋ** ስኒኒኒ ላንዋ (Tya.) - *Cyperus dichroostachyus* (436), *Cyperus fischeranus* (435) 212. Cyperaceae
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- ሆሳእና** hosa'na (Amh.) - *Phoenix reclinata* (515) 215. Arecaceae
- ዒቃ** ስቃ (Tya.) - *Sansevieria ehrenbergii* (80), *Sansevieria forskaoliana* (82) 187. Dracaenaceae
- ዒቃ ጥልያን** ስቃ ስላን (Tya.) - *Agave americana* (83), *Agave sisalana* (85) 188. Agavaceae
- አረት ማቲሶ** iret matiso (Tigre) - *Aloe percrassa* (126) 192. Aloaceae
- ጅዕራ** j'ra (Tya.) - *Agave americana* (83) 188. Agavaceae
- ጅንጅብል** jnjbl (Gur.) - *Zingiber officinale* (329) 204A. Zingiberaceae
- ካይት** kayt (Tigre) - *Cyperus rubicundus* (464) 212. Cyperaceae
- ኮባ** koba (Amh.) - *Ensete ventricosum* (317) 203A. Musaceae
- ኮሙሊ አባጉሜ** komuli abagumie (Tya.) - *Merendera schimperiana* (187) 198. Colchicaceae
- ኮረሪማ** korerima (Amh., Gur. & Tya.) - *Aframomum corrorima* (325) 204A. Zingiberaceae
- ኩዕንቲ** ku'nti (Tya.) - *Cyperus bulbosus* (451) 212. Cyperaceae
- ኩንቲ** Kunti (Agew & Amh.) - *Cyperus bulbosus* (451) 212. Cyperaceae
- ላሉንጫ** lalunጿ (Gur.) - *Commelina africana* (362) 207. Commelinaceae

ማቲሶ matiso (Tigre) - *Aloe* spp. (117) 192.
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ሰጊ ማሻታ (Tya.) - *Potamogeton pusillus* (20) 176.
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ሰቲ ሩባ ማሻታ (Tya.) - *Cyperus*
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ሱድ ማሻታ (Tigre) - *Cyperus rotundus* (449) 212.
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- ታብቶስ tabatos (Amh.) - *Dracaena steudneri* (79)
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- ተምሪ temri (Tya.) - *Phoenix dactylifera* (515)
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- ተቀፅላ teqešla (Amh.) - *Aerangis brachycarpa* (298), *Aerangis luteoalba* var *rhodosticta* (294), *Polystachya bennettiana* (262) 200.
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- ኡላንጋ ulanga (Tya.) - *Chlorophytum tetraphyllum* (94) 190. Anthericaceae
- ዋዳሚ wadami Tigre - *Cyperus rotundus* (449)
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- ወድጋሊት wedgalit (Tigre) - *Commelina forskolaiei* (374) 207. Commelinaceae
- ወንድ እሬት wend 'riet (Amh.) - *Aloe trichosantha* (119) 192. Aloaceae
- ወንዴ ቃጫ wendie qaça (Amh.) - *Sansevieria enrenbergii* (80), *Sansevieria forskaoiana* (82) 187. Dracaenaceae
- ወንድ ሰሪቲ wend seriti (Amh.) - *Asparagus racemosus* (71) 186A. Asparagaceae
- ወርቃ werqa (Amh.) - *Ensete ventricosum* (317)
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- ወተት አሽር wetet ashir (Agew) - *Anthericum angustifolium* (90) 190. Anthericaceae
- ዎርቄት worqiet (Gur.) - *Ensete ventricosum* (317) 203A. Musaceae
- ያሀያ ግጫ yahya gça (Amh.) - *Cyperus longus* (449) 212. Cyperaceae
- የእግዚአብሔር ሽንኩርት ye'gziabhier shnkurt (Amh.) - *Allium alibile* (154) 195. Alliaceae
- የእረኛ ቆሎ ye'reña qolo (Amh.) - *Chlorophytum tetraphyllum* (94) 190. Anthericaceae
- የበሬ ጨው yeberie çew (Amh.) - *Holothrix* spp. (198) 200. Orchidaceae
- የጫካ በይና yeçaka boyna (Amh.) - *Dioscorea abyssinica* (61) 183. Dioscoreaceae
- የፈረንጅ ሽንኩርት yeferenj shnkurt (Gur.) - *Allium porrum* (156) 195. Alliaceae
- የፈረንጅ ሽንኩርት yeferenj shnkurt (Amh.) - *Allium porrum* (156) 195. Alliaceae
- የጅብ አገዳ yejb ageda (Amh.) - *Scadoxus multiflorus* (158) 196. Amaryllidaceae
- የጅብ ሽንኩርት yejb shnkurt (Amh.) - *Crinum abyssinicum* (161), *Crinum ornatum* (160), *Crinum* spp. (158) 196. Amaryllidaceae,
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- የላም ጡት yelam tut (Amh.) - *Eulophia* spp. (275) 200. Orchidaceae
- የግርያም እንጨት yemaryam 'nçet (Amh.) - *Dioscorea quartiniana* (56) 183.
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- የግርያም ጥዋ yemaryam ṭwa (Amh.) - *Gloriosa superba* (184) 198. Colchicaceae
- የሙሽራ አበባ yemushra abeba (Amh.) - *Zantedeschia aethiopica* (38) 181. Araceae
- የረኞች ጥላ yerefioc ṭla (Amh.) - *Arisaema enneaphyllum* (46) 181. Araceae
- የሰይጣን ቀስት yeseytan qest (Amh.) - *Asparagus aethiopicus* (70) 186A. Asparagaceae
- የሴት ቀስት yesiet qest (Amh.) - *Asparagus africanus* (68), *Asparagus racemosus* (71) 186A. Asparagaceae
- የጥሩምባ አበባ yetumba abeba (Amh.) - *Zantedeschia aethiopica* (38) 181. Araceae
- የተምር ዛፍ yetemr zaf (Amh.) - *Phoenix dactylifera* (515) 215. Arecaceae
- የወፍ እንቁር yewef 'nqur (Amh.) - *Commelina africana* (362), *Commelina benghalensis* (373), *Commelina latifolia* (368), *Floscopa glomerata* (348) 207. Commelinaceae
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- የዝንጀሮ አገዳ yeznjero ageda (Amh.) - *Gloriosa superba* (184) 198. Colchicaceae, *Kniphofia foliosa* (107) 191. Asphodelaceae
- የዝንጀሮ ቆሎ yeznjero qolo (Amh.) - *Chlorophytum tetraphyllum* (94) 190.
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- ዛበር zaber (Tigre) - *Aloe percrassa* (126) 192.
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- ዛቡር zabur (Tigre) - *Aloe* spp. (117) 192.
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- ዘንባባ zenbaba (Amh. & Gur.) - *Borassus aethiopum* (518), *Phoenix reclinata* (515) 215.
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- ዝንጅብል zjibl (Amh. & Tya.) - *Zingiber officinale* (329) 204A. Zingiberaceae

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- abrassa (Or.) - *Scadoxus multiflorus* (158) 196.
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- abuuxayeeh (Or.) - *Arisaema enneaphyllum* (46),
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- aerial yam (Eng.) - *Dioscorea bulbifera* (59) 183.
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- aferfeetuu (Or.) - *Dracaena steudneri* (79) 187.
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- African fan palm (Eng.) - *Borassus aethiopum*
(518) 215. Arecaceae
- ago beam (Eng.) - *Borassus aethiopum* (518) 215.
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- air potato (Eng.) - *Dioscorea bulbifera* (59) 183.
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- alaaduu (Or.) - *Cyperus fischeranus* (435),
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- alal medu (Som.) - *Typha domingensis* (385) 210.
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- alala (Som.) - *Typha domingensis* (385) 210.
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- aleko (Gof.) - *Sansevieria ehrenbergii* (80) 187.
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- algat (Arb. & Gof.) - *Sansevieria ehrenbergii* (80)
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- alghée (Or.) - *Agave sisalana* (85) 188.
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forskaoliana (82) 187. Dracaenaceae
- allala nudi (Som.) - *Typha domingensis* (385) 210.
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- ambioco (Som.) - *Gloriosa superba* (184) 198.
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- American aloe (Eng.) - *Agave americana* (83)
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- American century plant (Eng.) - *Agave americana*
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- amook (Or.) - *Arisaema enneaphyllum* (46) 181.
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- anaanasii (Or.) - *Ananas comosus* (315) 202B.
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- ankoruumbaa (Or.) - *Dioscorea schimperiana*
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- ante (Arb.) - *Asparagus africanus* (68) 186A.
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- aramaadawaa (Or.) - *Gloriosa superba* (184) 198.
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- argeesaa (Or.) - *Aloe calidophylla* (130), *Aloe*
debrana (126), *Aloe megalacantha* (131), *Aloe*
rivae (128), *Aloe* spp. (117), *Aloe trichosantha*
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- argeesaa sodu (Or.) - *Aloe calidophila* (130) 192.
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- argessa (Wel.) - *Aloe megalacantha* (131) 192.
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- argheg (Som.) - *Asparagus africanus* (68),
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- arum lily (Eng.) - *Zantedeschia aethiopica* (38)
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- asa besel (Afar) - *Allium cepa* (150) 195.
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