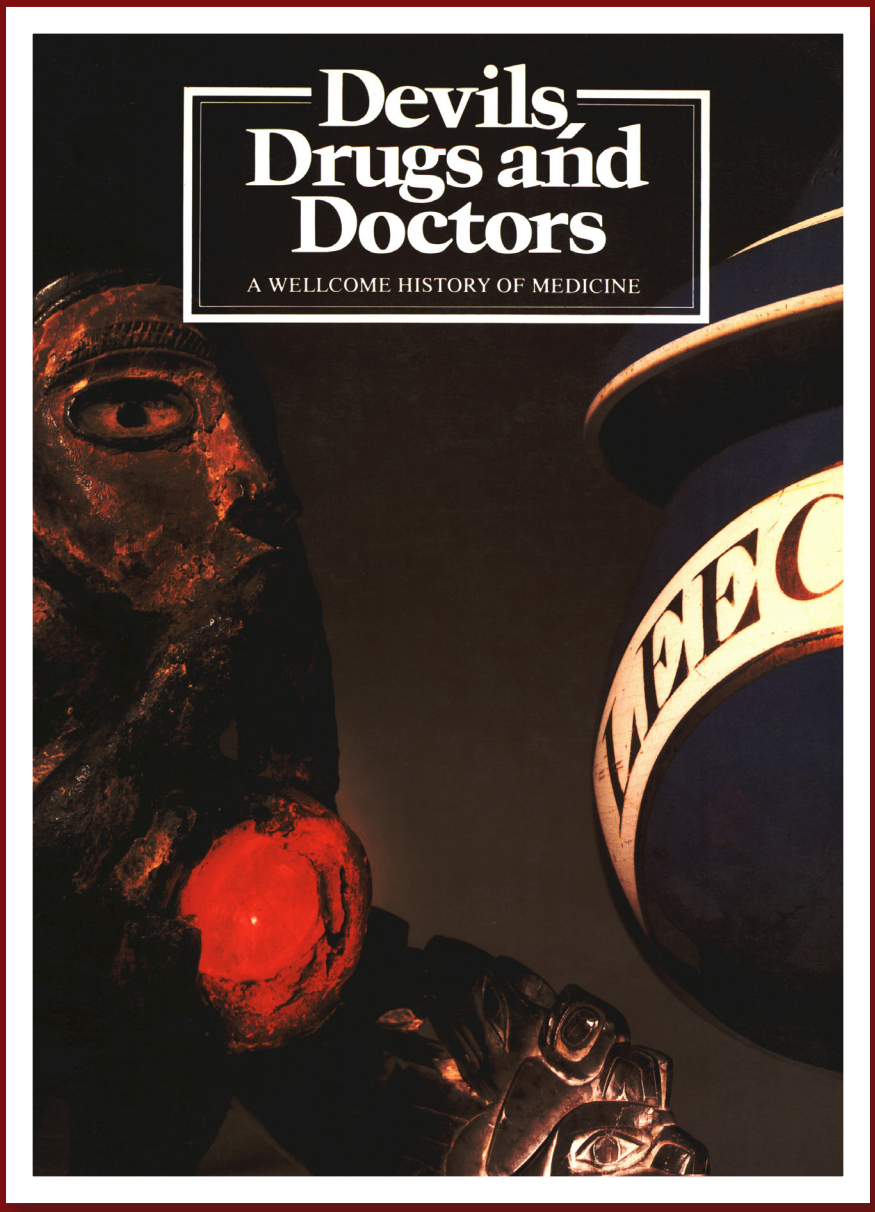
Devils, Drugs, & Doctors: A Wellcome History Of Medicine



Managed By
International Cultural Corporation Of Australia


Devils, Drugs and Doctors

Front cover: Shows an African fetish figure; a carved smoking pipe used by the Haida people of north-west Canada; and an English 19th century leech jar. (The fetish figure bears a mirror, a powerful force in African magic, which it was believed would absorb a sickness from the body.)

Back cover: Replica of an English doctor's sign, 1623. The sign, made in wood, depicts a number of the tasks which the surgeon and physician undertook. Those shown include extracting a tooth, amputating a leg, bleeding, examining the urine, examining the head and breast.

Devils, Drugs and Doctors

A Wellcome History of Medicine

Australia 1986-87

Managed by the International
Cultural Corporation of Australia

Organised by the Museum of Victoria

Contents

5 Acknowledgements
6 Foreword
8 Preface
9 Introduction
10 Christensen Fund
12 Exhibits
19 Henry Wellcome by Brian Bracegirdle
33 Medicine: the Youngest Science by Earle Hackett
34 Medicine in History by Brian Bracegirdle
39 Other Medicines by Jane Bywaters
42 Domestic Medicine by David Wright
44 The Apothecary's Shop by Roger Price
46 Medicine for Travellers by Roger Price
48 Clinical Diagnosis by Ghislaine Skinner
51 Surgery by Ghislaine Skinner
57 Improving on Nature by Jane Bywaters
60 The Wellcome Centenary in Australia

Sponsored by Wellcome Australia

Published by the International Cultural Corporation of Australia Limited 1986.

Devils, Drugs and Doctors.
A Wellcome History of Medicine.

Catalogue Editor: Dr Earle Hackett
Designer: David Sampietro
Typesetter: Acton Graphic Arts
Printer: Gardner Printing Co (Vic) Pty Ltd

National Library of Australia card number:
ISBN 0 642 098 77 8

The Exhibition was managed by the International Cultural Corporation of Australia Limited, Sydney. The organising museum was the Museum of Victoria, 328 Swanston Street, Melbourne, Victoria, 3000, Australia.

Melbourne	Museum of Victoria Robert Edwards, Director 27 March to 13 July, 1986
Hobart	Tasmanian Museum and Art Gallery Don Gregg, Director 31 July to 14 September, 1986
Sydney	The Museum of Applied Arts and Sciences The Hyde Park Barracks Lindsay Sharp, Director 4 October to 30 November, 1986
Brisbane	Queensland Museum Alan Bartholomai, Director 16 December, 1986 to 8 February, 1987
Darwin	Museums and Art Galleries of the Northern Territory Colin Jack-Hinton, Director 25 February to 29 March, 1987
Perth	Museum of Western Australia John Bannister, Director 15 April to 31 May, 1987
Adelaide	The History Trust of South Australia Peter Cahalan, Director 18 June to 2 August, 1987
Canberra	Australian War Memorial James Flemming, Director 20 August to 4 October, 1987

Acknowledgements

Lenders to the Exhibition

The Wellcome Trust

Peter Williams, Director

The Wellcome Museum of The History of Medicine at The Science Museum

Brian Bracegirdle, Keeper
Jane Bywaters, Research Assistant
Roger Price, Assistant Keeper
Ghislaine Skinner, Assistant Keeper
David Wright, Assistant Keeper
David Exton, Photographer
John Lepine, Photographer
Raul Robins, Photographer

We acknowledge the close co-operation and support of Dame Margaret Weston, the former Director, and Dr Neil Cossons, Director, The Science Museum, South Kensington, London.

The Wellcome Institute

Eric Freeman, Librarian and Deputy Director

The Christensen Fund

Rosemary Pratt, Co-ordinating Director – Australia

Organising Museum

Museum of Victoria

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John Chessells, Deputy Director, Public Programmes
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Sponsorship

Wellcome Australia Limited with the assistance of The British Council.

Foreword

Sir Henry Wellcome died in 1936 at the age of 83. His life had been devoted to creating the international pharmaceutical company which he named the Wellcome Foundation Limited. The funds which he derived from this company were used by him to make enormous collections of books and objects about the history of mankind, with special emphasis on medical history. After his death the trustees of his will established the Wellcome Trust, a charity which uses the income derived from the Foundation to carry out the purposes specified in his will. These purposes are to support medical and veterinary research, to look after his historical collections and support research and scholarship in the history of medicine. His library forms the basis for the Wellcome Institute for the History of Medicine in Euston Road, London. His museum is exhibited in the Science Museum in South Kensington.

The Wellcome Trustees are very pleased indeed that the opportunity of the 100th anniversary of the founding of the Australian branch of the Wellcome pharmaceutical company has meant that a major exhibition of objects from Sir Henry Wellcome's collections could be sent to Australia to be shown for 18 months in all parts of the continent. The coincidence of the 100th anniversary of the Australian company and the 50th anniversary of the Wellcome Trust makes this a double event.

The Wellcome Trust supports medical research in Australia in various ways. Now it can also let Australia see some other aspects of Henry Wellcome's legacy.

A pharmaceutical laboratory in 1840.

Even in the more fashionable shops, behind the scenes the drugs were often prepared in the most squalid conditions.

This photograph is of a full-sized reconstruction in the Lower Wellcome Gallery at the Science Museum, London.

Dr. Peter Williams
Director
The Wellcome Trust

Preface

After five years of successful management of gallery-based art exhibitions, the International Cultural Corporation of Australia is pleased to manage this, our first scientific exhibition, and the first of a continuing program of exhibitions conducted with Australian museums. These exhibitions will bring more Australians into contact with the exciting fields of science, technology and the applied arts, and provide a showcase for Australian achievements in these areas.

We are delighted that Wellcome Australia is the pathfinder of this new wave, and has chosen to celebrate its Centenary firstly by providing the content of this remarkable exhibition on medical history – and secondly as the very generous sponsor of the project.

We are greatly indebted to the Wellcome Museum for the History of Medicine at the Science Museum, London, which, in a remarkable gesture of goodwill, has opened the doors of its famous collection to provide the objects for this exhibition. Many Australian institutions have also contributed items to the Exhibition, and we thank them for their important contribution.

The ICCA has been delighted to work in close association with the Museum of Victoria, Organising Museum for this exhibition, and we thank the Director and his staff for their untiring work and co-operation. The Exhibition will travel to museums in every State of Australia and to the Australian Capital Territory, fulfilling another cherished hope of the ICCA – to see more of our exhibitions reaching as many Australians as possible.

James Leslie, AO, MC
Chairman
ICCA

Introduction

The Museum of Victoria is proud to present an exhibition of rare and unusual items from the great collection of Sir Henry Wellcome in association with the International Cultural Corporation of Australia, the Science Museum of London, The Christensen Fund, and Wellcome Australia.

This Exhibition has been brought to Australia to commemorate the centenary of the first operations of the great Wellcome organisation outside of the United Kingdom. It is highly appropriate that it should be featured in Museums throughout this country.

The Wellcome Exhibition combines the past with the future, it brings together unique objects collected by Sir Henry Wellcome which relate to the evolution of modern medicine and couples these with the amazing developments in this field which are taking place in today's modern world. The Exhibition combines the theatrical with the serious and provides Australians with an innovative and exciting experience in an attempt to help them understand more about themselves.

This is the first of a continuing series of major exhibitions being planned especially for Museums. This new initiative by the International Cultural Corporation of Australia is being taken as a response to the growing recognition of the need, and indeed the social imperative, to educate both the young and the not so young, in the importance of gaining insights into scientific, technological and sociological developments which will inevitably influence our way of life and thus our future. It is essential also for Museums to play a lead role in encouraging the care and maintenance of the natural environment to ensure its protection for future generations.

It is our hope that this Exhibition will stimulate a continuing interest in the evolution of medicine and also in the developing role of Museums in Society. If it achieves these objectives it will have succeeded and provided an example for future development.

Robert Edwards
Director
Museum of Victoria

The Christensen Fund

The Christensen Fund is a charitable corporation established in 1957 by Allen D. Christensen, who was President and Director of Utah Construction and Mining Co., for many years.

One of the Fund's principal objectives is to acquire and lend collections of art to museums and galleries throughout the world and to promote their public exhibition.

The Christensen Fund has been active in Australia since 1973, acquiring collections for loan to museums and galleries.

A number of items related to medicine and healing, collected by the Fund, have been loaned to this Exhibition. They originate from Africa, Indonesia and Papua New Guinea, and are held in the custody of the Queensland Art Gallery and the Art Gallery of Western Australia.

The International Cultural Corporation of Australia Ltd, and the Museums where the Exhibition will be shown, gratefully acknowledge the help given by the Christensen Fund and the custodial Galleries.

Figures from the Christensen Collection

Exhibits

Medicine Man's costume
Fibre, cane and canvas, Zambia, late 19th or early 20th century

The medicine man often takes on the persona of a spirit during rituals. To encourage this belief among his community he may wear a costume and often a mask. In this case the costume is woven from coconut fibre decorated with a cane fringed collar.

Medicine Man's staff
Iron, West African, early 20th century

The bells on this staff serve to warn people that the medicine man is approaching. Often he has had to perform purification rituals before undertaking a ceremony. These might be invalidated if the medicine man encounters people considered impure. The bells warn such people to avoid him.

The Healing Gods

In pre-scientific societies it was realised, of course, that battle or accident could cause wounding or illness. There could also be other obvious causes of injury or sickness, such as fire or poisonous plants.

Yet there would also be people who became ill for no apparent reason. In the modern world we know that invisible microbes or chemical changes can be causes, but without such knowledge most earlier communities ascribed such illnesses to angry spirits, offended gods, or the consequences of social or personal transgression. Accordingly, some "treatments" involved religious rituals, spirit appeasements, personal punishments, or bizarre mixtures of such procedures.

Displaying images of tribal spirits or deities before a sick person could be reassuring where it brought together the fundamental beliefs of a tribe, because reassurance is an important part of healing.

Medicine Man's kit
Various, Tanzania, early 20th century

A collection of teeth, bells, flints, animal claws, carved sticks and a lizard skin which were all part of a medicine man's paraphernalia in 1903.

This material was originally acquired by the Universities Mission to Central Africa.

Fetish Figure
Wood, Zaire, 1886

A carved wooden figure used by the Vili, a sub-group of the Bakongo people to exorcise disease-causing spirits. It was collected in 1886 by Captain Wiverth of Belgium.

The figure was held in front of the patient. It was believed that the mirror, a powerful force in African magic, would absorb the sickness from the body.

Shrunken Heads
Ecuador, 19th century

Wellcome collected a considerable amount of ethnographic material. These shrunken human heads were worn as decorative amulets by members of the Jivaro tribe of Ecuador.

Trephined skull (cast) and flint knives

The original skull, from a prehistoric burial ground, shows a partially healed defect. The flint instruments date from 10-20,000 B.C.

Resin replica of a clay model sheep's liver

Wooden pegs marked important features seen in the liver of the sacrificial animal. These were used to divine the course of a human illness in ancient Mesopotamia. Original Babylonian, 2050-1750 B.C.

Sharhal-Qanun, "Commentary on K. al-Qanun"
Arabic, 13th century

Abu "Ali al-Husain b. 'Abd-Allah ibn Sina (980-1037), known in the west as Avicenna and fittingly called "the prince of physicians" although primarily a philosopher and physician, contributed to the advancement of all science known in his time. The most famous of his medical writings is **K. al-Qanun** which is the clear and ordered summation of all medical knowledge of the time. Until comparatively recent times this work formed the basis of medical teaching in both Europe and the east. Many commentaries were written on this work, an exemplar of one of the most distinguished which is exhibited: **Sharh al-Qanun**, "Commentary on **K. Al-Qanun**" by 'Ala al-Din Abu al-Hasan 'Ali b. Abu al-Hazm al-Qurashi ibn ar-Nafis (d. 1288). This Arabic manuscript was copied in the 17th century in excellent **Naskh** and once belonged to Desire Tholozon, physician to the Shah of Persia, nasir al-Din Shah (1829-1896). The opening shown displays the beginning of Book IV which is a commentary on general diseases not specific to particular organs.

Origins and Influences

Modern Western medicine has its beginnings in ancient Egypt, Greece and Rome, with later influential contributions from other parts of the world.

Many of the works of Hippocrates survive, and archaeological digs have found sets of elaborate surgical instruments that were used in ancient Greece and Rome.

After the fall of the Roman Empire the written traditions of medicine were preserved by the Arab cultures.

One of the mistaken theories that influenced Western medicine for more than a thousand years was the "Doctrine of the Four Humors". A "humor" was a body fluid, and disease was thought to be the result of these humors becoming imbalanced, or flowing into inappropriate parts of the body. Two of the four humors were Blood and Phlegm, which were believed respectively to be "hot" and "cold". Therefore hot poultices were used to drive away "phlegm" in "cold" diseases, and intensive bleeding was used to relieve what were thought to be excesses of blood in the "hot" diseases. Such treatments were at best ineffective, and at worst very dangerous.

Singhalese Mask
Wood, Sri Lanka, 19th century.

Traditional Singhalese medical beliefs state that disease is caused by a demon, usually a manifestation of Mahakola-sanni-yakka. To cure the illness, the demon must be enticed out of the sufferer's body. A complicated ritual dance ceremony called the Tovil is performed to exorcise the demon. During this the dancers, wearing masks, are believed to take on the persona of the demons.

Mahakola-sanni-yakka is shown in this mask with his 18 manifestations represented symbolically as heads at each side of the demon. The mask would have been paraded during the ritual.

Samut dam
Black folding book, Thailand, 19th century.

Samut dam or black folding book dating from the 19th century, written in Thai. It contains medicinal recipes and detailed diagrammatic descriptions of boils, rashes, and skin eruptions. The reader is instructed to model the guardian spirit called **Mae su** or "purchase mother" appropriate to each lunar month, to know its name and the names of dangerous boils and their sites on the body. The severity of the boils is measured in dire terms, e.g. Top right "Death after three days", and centre: "Death after one day".

Guanyin
Bronze, Sino-Tibettan, 18th century

Guanyin was the Buddhist goddess of mercy, who in her incarnation as the "Bringer of Sons" was worshipped by many Chinese women who wanted male children. Before the 12th century Guanyin was considered male.

Acupuncture Needles
Metal, China, 19th century.

Different sized needles are used on different parts of the body.

Acupuncture Figure
Bronze, China, 16th-18th centuries.

Acupuncture is probably the best-known aspect of Chinese medicine in the western world. It is an ancient form of treatment to restore balance to the body. It involves inserting very fine needles into the skin at specific known points. This is to alter the flow of "life-energy" believed to flow along defined channels. The points lie along the channels. Each is linked to an organ which is stimulated or calmed by the action of the needles.

The figure shows one channel and its points. It is most unusual to find a figure with one foot raised. Possibly this posture indicates a contracture and the points shown would be used to treat it.

Forceps
Bronze, 200 B.C.-500 A.D.

Cautery
Bronze, 200 B.C.-500 A.D.

Baby Carrier
Hide and leather, North America, late 19th or early 20th century.

Nomadic people have to carry all possessions, including children, with them. This baby carrier, made by the Sioux, has been finely decorated with beadwork. The cane hood acts as a sunshade. The model baby may have been added later. The leather carrying strap is attached to the case with leather thongs.

Haida Pipe
Argillite, Canada, 19th or 20th century.

The Haida people live on Queen Charlotte Islands, off the north-west coast of Canada. Argillite carvings were first made in response to the early curio trade of the 1820s and are still made today. Argillite is a soft black shale, which is found at Slatechuck Creek on the islands. The figures represented are totemic.

Henry Wellcome: the man and his legacy

by Brian Bracegirdle

Pur-ba
Bronze, Tibet, 19th century.

A ceremonial dagger which stood at the entrance to the temple and acted as a symbolic barrier to entrance of demons, or evil spirits.

Traditional medicine in Tibet was derived from both Chinese and Indian medical theories. It was heavily influenced by Buddhism, and important physicians were monks. The religious aspect of Tibetan medicine was important.

Henry Wellcome was born in 1853 in the pioneering American midwest, in a small village called Almond in Wisconsin. His family was deeply religious, and this affected him for the rest of his life. When he was eight years old the family travelled in a wagon train with other settlers to Garden City in Minnesota, and the following year, 1862, the American Indian tribes of the area rose up against the settlers and massacred over two thousand of them. Henry played his part in the defence of his township. This also had a permanent effect, as in later years he spent much time and money on the welfare of American Indians.

Garden City was large enough to have a log cabin school, and this gave Wellcome not only a good basic education, but also promoted drive and independence. He helped in the family drug store and then, at the age of seventeen, took a post with a pharmaceutical company in the town of Rochester nearby. Here he met William Mayo, father of two famous sons who later founded, in Rochester, one of the most famous clinics in the world. Henry Wellcome went on to pharmaceutical college in Chicago and then Philadelphia from where he graduated in 1874.

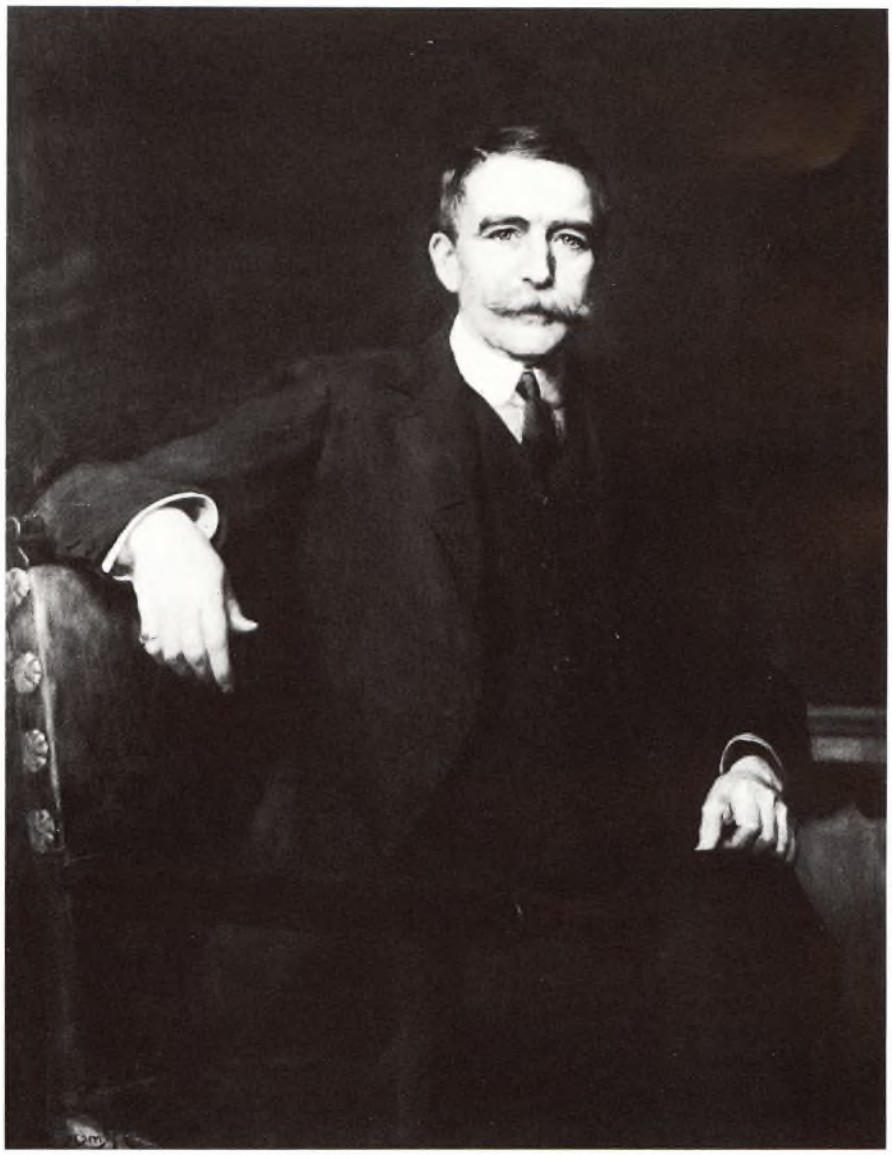
He worked for two drug companies in New York and travelled in Central and South America, taking the opportunity to study cinchona forests while doing so. By 1879 he was well established as a pharmaceutical salesman, specializing in the newly introduced, gelatine coated pills.

A former college friend, Silas Burroughs, had by then established himself in London as agent for the Philadelphia company of Wyeth, and asked Wellcome to join him in a partnership specializing in compressed medicines. In the following year Wellcome went into partnership with Burroughs, establishing Burroughs, Wellcome and Company in September 1880.

The fortunes of the company were built upon a remarkably simple idea – that of making medicines into tablets. Wellcome bought the rights to an 1843 patent by William Brockedon, and with them the metal dies used to punch measured doses of powder into a tablet (this actual equipment is on show in the Wellcome Museum in London). This original method had been much improved upon in America during the 1870s to provide accurate doses of medicines in a form easily swallowed and with what we would now call a long shelf-life. At that time, and for many years later, the work of the pharmacist was to mix together various ingredients to fill individually written prescriptions. The advantages of ready-made tablets were obvious as soon as they were introduced, and they are so commonplace today that most people imagine medicines have always been provided in this way.

Canopic jars
Limestone, Egypt, 1500 B.C.-30 B.C.

During the process of mummification the internal organs were removed and treated separately. They were either returned to the body after preservation or stored in canopic jars, then placed in the tomb with the mummy. The heads on the jars represent the gods: the jackal head is Anubis, the human head is Osiris.



Sir Henry Wellcome.

Silas Burroughs was the partner who provided the stream of ideas, while Henry Wellcome was more practical and in 1883 developed a factory on the Thames at Wandsworth so that the company would no longer have to rely on importing their tablets from America, paying large sums of money in stamp duty to do so. Wellcome devised special machinery which used highly purified, standardized ingredients, and never failed to pay the utmost attention to securing the highest quality. The first Burroughs Wellcome branch was opened in Melbourne, Australia, in 1886.

The name "Tabloid" was devised by Henry Wellcome in 1884, specifically to denote the superior tablets of his company, and in 1903 the courts established that it could properly be used only for Wellcome's own products. Since then, of course, the word has become even better known when applied to newspapers which convey news in what we might call a concentrated form.

Eskimo Snow Goggles
Wood, North America, 19th century.

To protect their eyes from the glare of snow and ice Eskimo hunters wear goggles during the winter months. Both these pairs are of wood, one pair incorporating an eye shade. Leather snow goggles are also found.

The wooden box is decorated with hunting scenes, probably blackened with soot.

Slippers belonging to Queen Victoria
English, c. 1860.

The Wellcome collection includes many objects which are not medical but have important personal associations. These items from Queen Victoria's wardrobe were acquired through the Chalmers family, several of whom were members of the Royal household from 1830 onwards.

Burroughs was much concerned with the welfare of the company's employees. He introduced the eight-hour day, and left part of his estate to be divided between the employees at the time of his death. He enjoyed travelling and promoted the company abroad in a most efficient manner. He died suddenly in 1895 and Henry Wellcome took control of the entire company. He had already opened the first of the firm's research laboratories – devoted to physiology. This was a totally new idea for a pharmaceutical company, especially as Wellcome promoted original research which might have little connection with the company's products; it was unusual also in that Wellcome allowed, and indeed encouraged the staff freely to publish what they discovered. In 1921 the laboratory was moved to Beckenham in Kent, still the home of Wellcome Research in the United Kingdom.

The company thus came to produce very early in its history a range of medicines which were advertised most effectively through the direct intervention of Wellcome himself. The quality of exhibition stands at various World Fairs was of the very highest. One of the most effective ways in which Tabloid medicines were promoted derived from Wellcome's strong personal friendship with the famous explorer H. M. Stanley.

Stanley, on his expeditions across Africa, had been appalled by the quality of medicines supplied to travellers. Tabloid preparations, assembled into a small medicine chest, provided all that was required for any expedition in any climate. They were sent all over the world and were provided also for members of the Royal Family. All of them were eventually returned to the company, and are now some of the most evocative objects to be displayed. Their advertising value was enormous and tied in well with Wellcome's personal interest in tropical medicine.

By the time he became sole owner of the firm he had begun to think of creating a museum, and as the years went by, his concept of the displays developed until he wished to create "A Museum of Man". This would deal not only with health and disease, but also anthropology, archaeology, ethnography and the rest. By the turn of the century wherever he went he devoted much of his personal time to looking in antique shops and markets, and persuading individuals to sell objects in which he was interested.

Although he spent what would be some millions of pounds at today's prices, he came to assemble well over a million objects. He also bought large numbers of books and manuscripts. He was well advised by members of staff he employed to assist him in all these activities. Some complete collections were purchased, prominent among them, those of Hamonic and of Gorga, and collections associated with Lord Lister and Jenner. Vast numbers of small purchases were made in the auction rooms and from individuals, and he came to employ over fifty agents worldwide.

John Bell's pharmacy, London, 19th century

Apothecaries' Shops

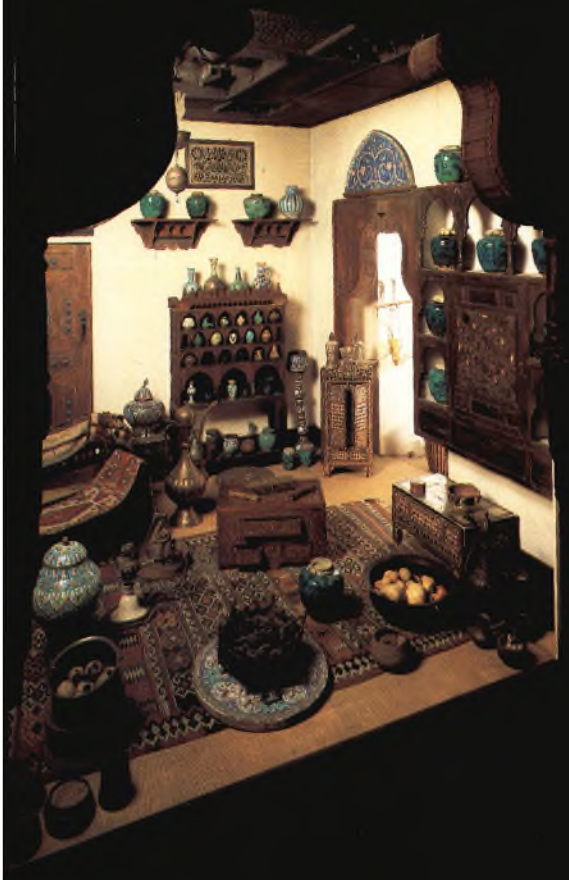
The contents of the apothecary's shop were designed to make a maximum impact by their visual richness. This was a deliberate ploy, both to catch the eye of the passer-by in an attempt to attract custom, and to impress the layman with the apothecary's knowledge of the mysteries of medicine.

'I do remember an apothecary . . .
And in his needy shop a tortoise hung,
An alligator stuff'd, and other skins,
Of ill-shap'd fishes; and about his shelves
A beggarly account of empty boxes,
Green earthen pots, bladders, and musty seeds,
Remnants of packthread, and old cakes of roses,
Were thinly scatter'd to make up a show.'
William Shakespeare (Romeo & Juliet)

Not all apothecaries were as impoverished as the one described by Shakespeare: the more "up-market" businesses were furnished with high-quality materials.

These reconstructed apothecaries' shops may be seen at the Wellcome Institute in London.

English pharmacy, 17th century



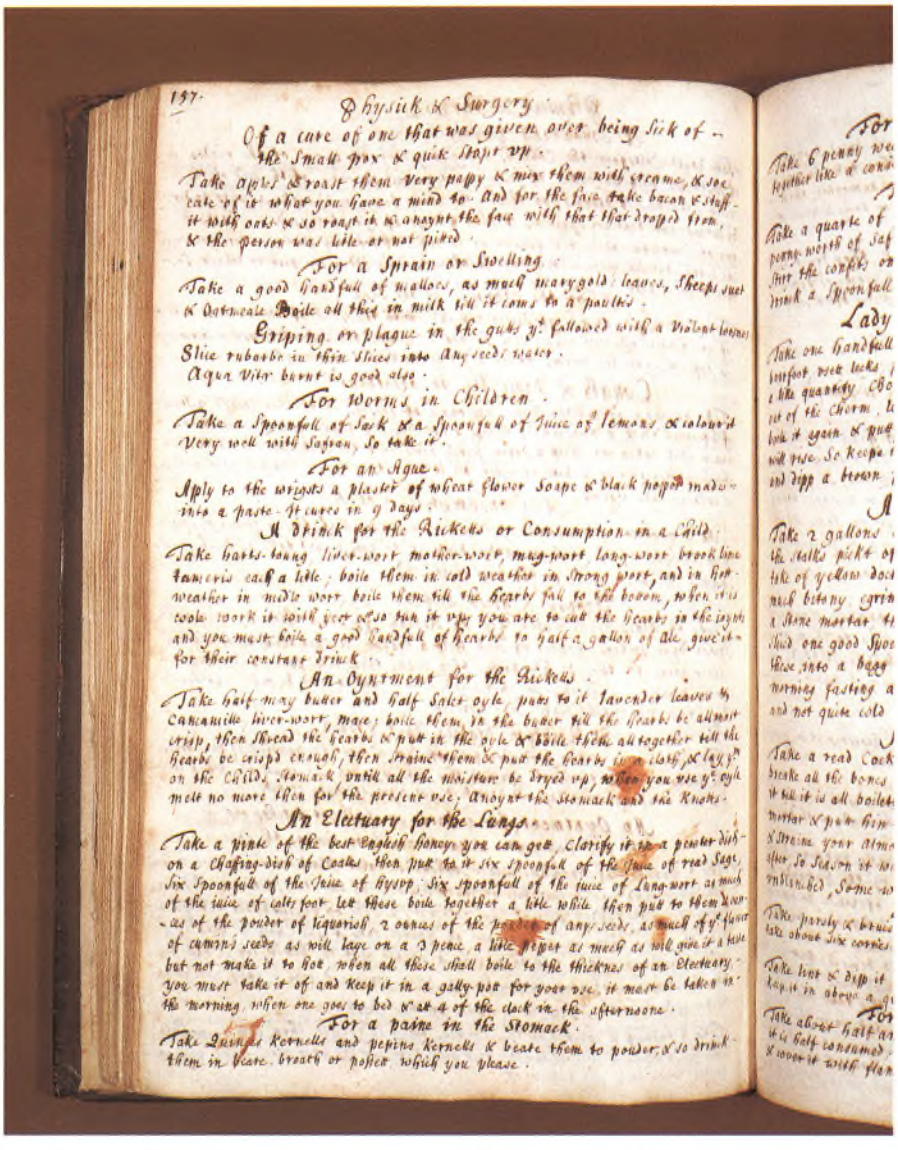
Italian pharmacy, 17th century

Arab pharmacy, 19th century

Spanish pharmacy, 17th century

Mortars
Probably North European, 16th century.

This example was found near Bamwell Priory in Cambridgeshire, and might have been used there before the dissolution of the monasteries.



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Physick & Surgery

Of a cure of one that was given over being sick of the Small pox & quik stopt up.

Take apples & roast them very pappy & mix them with creame, & see eate of it what you have a mind to. And for the fare take bacon & staff it with oats & so roast it & anoynt the face with that that dropped from, & the person was like or not pitted.

For a Sprain or Swelling

Take a good handfull of mallows, as much marygold leaves, Sheeps suet & Oatmeale Boile all this in milk till it come to a poultis.

Griping or plague in the guts yt followed with a Violent loosnes

Slice rubarbe in thin slices into Any seeds water.

Aqua Vitæ burnt is good also.

For worms in Children.

Take a Spoonfull of Sack & a Spoonfull of Juice of lemons & colour'd Very well with Safran, So take it.

For an Ague.

Apply to the wrists a plaster of wheat flower Soape & black pepper made into a paste. It cures in 9 days.

A drink for the Rickets or Consumption in a Child

Take harts-tong liver-wort mother-wort, mug-wort long-wort brook lime tamaris each a little; boile them in cold weather in Strong beer, and in hot weather in mild wort boile them till the hearbs fall to the bottom, when it is cooll work it with yeast & so run it up; you are to cut the hearbs in the ingle and you must boile a good handfull of hearbs to half a gallon of ale, give it for their constant drink.

An Ointment for the Rickets.

Take half may butter and half Sallet oyle, puts to it lavender leaves & Camamille liver-wort, mace; boile them in the butter till the hearbs be almost crisp, then shread the hearbs & put in the oyle & boile them all together till the hearbs be crisp enough, then straine them & put the hearbs in a cloth & lay it on the Childs stomach, untill all the moisture be dryed up, when you use yt oyle melt no more then for the present use, Anoynt the stomach and the Knees.

An Electuary for the Lungs.

Take a pinte of the best English honey you can get, Clarify it in a pewter dish on a Chafing-dish of Coales then put to it six Spoonfull of the Juice of red Sage, Six Spoonfull of the Juice of Hyssop, Six Spoonfull of the Juice of Lung-wort as much of the Juice of coltsfoot let these boile together a little while then put to them Liquorish as of the powder of liquorish, 2 ounces of the powder of any seeds as much of yt flower of cummin seeds as will lye on a 3 pence a little pepper as much as will give it a taste but not make it to hot, when all these shall boile to the thicknes of an Electuary you must take it off and Keep it in a gally-pot for your use, it must be taken in the morning when one goes to bed & at 4 of the clock in the afternoone.

For a paine in the Stomack.

Take Quinces Kernells and pepins Kernells & beate them to powder, & so drink them in Veare breath or posset which you please.

Pills and Potions

Apothecaries Glass Bottles
English, 19th century.

Labelled **OXYMEL**:
A mixture of vinegar and honey often used in cough mixtures.

Spanish, 18th century.

Labelled **SUCC:CYDONIOR** (Quince Sugar)
Used to make cordial which was thought to cool the blood.

English, 19th century.

Labelled **OL:TEREB:** (Oil of Turpentine)
Used in plasters, particularly for chest disorders and rheumatism, and taken internally as a diuretic, purge and reliever of bronchitis.

English, 19th century.

Labelled **TR:JALAPAE** (Tincture of Jalap)
Used as a purge.

English, 19th century.

Labelled **TR:CONII** (Tincture of Hemlock)
Used in narcotic and sedative preparations.

Most early medicines had unpleasant tastes and did little more than bring about purging or vomiting, when they had any effects at all. Nevertheless, many people relied on them and believed in their curative powers.

They were usually crude preparations of plants, and commonly mixtures of many ingredients. A few did have specific effects on, for example, fever, heart failure and gout.

Apothecaries made elaborate preparations according to the prescriptions of physicians. Travellers and explorers preferred to bring with them a selection of their own medicines for use in emergencies.

Developments in chemical science slowly led to the making of modern, purer drug preparations, in forms that are easier to take.

Shop Sign
French, gilded gesso and wood, c. 1860

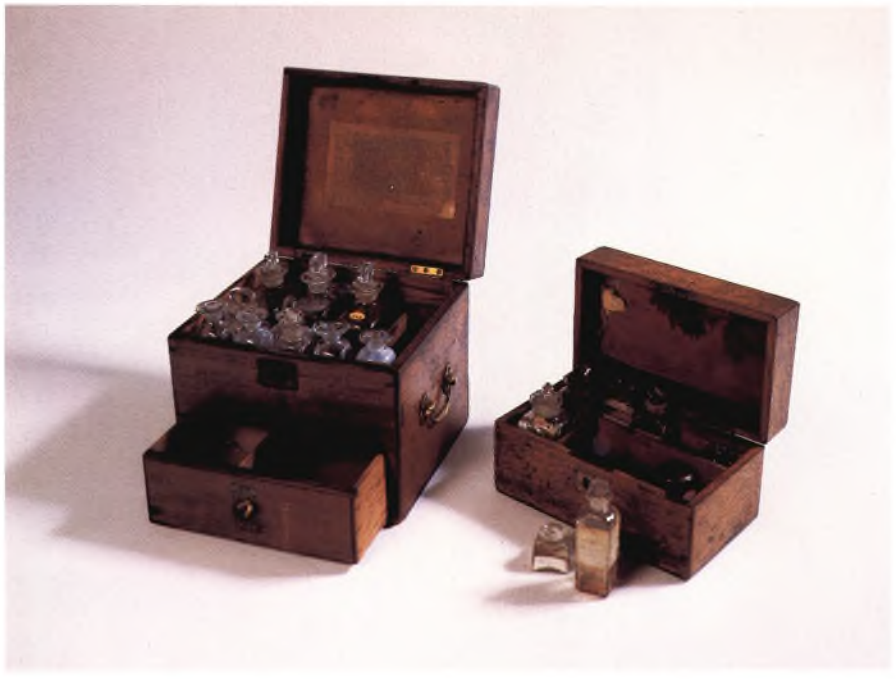
This sign was fixed outside the shop. It uses the caduceus motif of snakes twisted around a winged staff. This was the symbol of Asklepios, the Greek god of medicine. It derives from the wand of Mercury, the divine herald who could use it to put people to sleep.

Health and Healing
Recipe book, medical and culinary, c. 1700.

In country areas of England, doctors were not always readily available. Their place was taken by domestic medicine, learned from advice books, handed down in families, and exhanged between neighbours. Recipe collections were a common resource in the event of illness, and they survive in large numbers from the Middle Ages to the 18th century. The present example is typical in including both medical recipes and culinary ones, "allmonds mumballs", "a lemon's syllebubb", "a foole in snow" and so on. The vocabulary of good eating and ill health are side by side in the book's index, "fistula" next to "fishes to marinate", "gripes" next to "grapes", "king's evil" next to "kidney beans".

Compact Medicine Chest
Italian, wood covered with gold-embossed leather and iron fittings, late 17th or early 18th century.

This compact medicine chest was designed for use when travelling. Its quality suggests that it was made for a person of some wealth.



Medicine Chest
Probably American, mahogany and brass fittings, late 18th century.

This medicine chest has the letters GW engraved on the lid. It is said to have belonged to George Washington, the first President of the United States of America, and was acquired from one of his descendants.

It is not certain that the bottles are original. All of them are empty.

Medicine Chest
English, oak and brass fittings, early 19th century.

This medicine chest is reputed to have belonged to Arthur Wellesley, the first Duke of Wellington. It is said that he had it with him at the Battle of Waterloo in 1815 and was acquired from a relative of the governess to the Wellesley family.

Some of the surviving medicines were supplied by John Bell & Co. of London, and may be a little later than 1815.

Henry Morton Stanley, 1887-9

Stanley achieved lasting fame by discovering the supposedly lost Dr. Livingstone in 1871. Subsequently he made two further journeys to Africa.

In 1887 he led an expedition to relieve the beleagured Emin Pasha in East Africa, which also paved the way in establishing a British colony there. The journey was plagued by starvation, fever and hostile tribes; nearly half his men were lost. Small wonder that few medicines were brought back.

Ernest Shackleton, 1907-9

Shackleton had accompanied Scott on the Antarctic Expedition of 1901-4. In 1907 he led his own team and came within 97 miles of the South Pole.

Captain Scott, 1910-2

Robert Falcon Scott is the most famous of Antarctic explorers, although his last expedition ended in disaster when he and all his companions perished.

This small pack was an auxilliary medical supply, one of several designed to be easily carried on a sledge.

Phrenological bust

Phrenology was a system of making psychological diagnoses, devised by F.J. Gall (1758-1828), which related the contours of the skull to underlying tendencies located in particular areas of the brain. Popular in the first half of the 19th century, it was later discredited and relegated to "fringe" medicine.

Doctor's sign
Replica of English wooden sign, 1623.

This sign depicts a number of the tasks which the surgeon and physican undertook. Those shown include extracting a tooth, amputating a leg, bleeding, examining the urine, examining the head and breast.

Looking and Listening

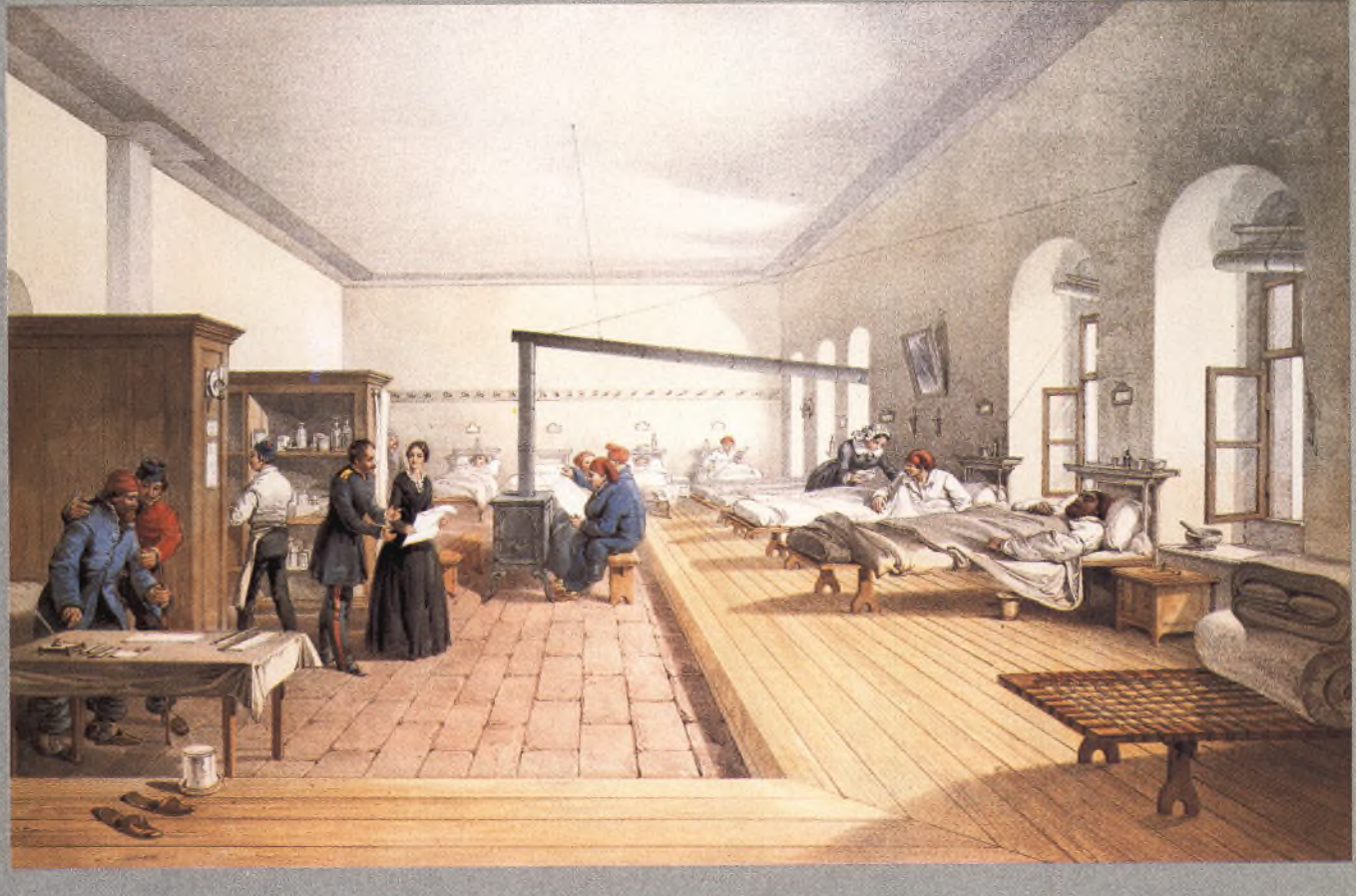
When doctors realised that some diseases caused characteristic changes deep inside the human body, they began to use various ways of diagnosing such changes in the living patient.

The stethoscope, which is used to listen to sounds in the lungs and heart, started off as a roll of parchment which the physician held to his ear with the other end applied to the patient's chest.

Other methods were the thermometer to measure temperature, and many ingenious mirrors and devices for peering into the natural openings of the body.

One of the wards of the hospital at Scutari
Lithography by E. Walker, 1856, after a drawing by William Simpson,
28.3 x 44 cm.

The Crimean War, 1853-1856, in which England and France supported Turkey against the claims of Russia, started at a time when the British army's medical services were in great disarray. Florence Nightingale's work to improve nursing services at the base hospital at Scutari caused a permanent raising of the standards of the nursing profession at home. She is shown at the left of the print of one of the wards at Scutari. Despite her efforts, more men died of disease in the Crimea than were killed in action.



Painful Surgery

After the Renaissance, accurate dissection led to great improvements in our knowledge of human anatomy, and to the discovery of the Circulation of the Blood. It became apparent that more and more disorders of the body could be treated from a mechanical or materialistic point of view.

Treatments could be directed towards freeing blocked passages, and removing dead parts or foreign bodies. All the same, the real success of such methods had to await the development of anaesthetics, the control of infection and of "shock", and an understanding of the microstructure and chemistry of living cells.

Before the discovery of anaesthetics, surgeons had to work with great speed because of the pain their work inflicted on the patient. Rough ligatures had to be placed on spouting arteries, and tourniquets often damaged the limbs that surgery was hoping to save.

Another mistaken doctrine held that the actively healing wound should exude pus, which was therefore held to be a good sign – "laudable pus" it was called. Today we know that the appearance of pus usually means that a wound or abscess is complicated by bacterial infection.

Amputation Saws
French, by Leseur, and German, by Muller, c. 1700.

These are for major limb amputations.

Leech Jar
English (probably Staffordshire), ceramic, 19th century.

Blood-sucking leeches were kept alive in water in special containers. The lid was perforated to let in air, but the holes had to be small to prevent the animals from escaping.

The leech not only anaesthetizes the skin of its victim in order to escape notice, but also contains chemicals in its saliva which increase blood-flow and prevent clotting.

Bullet extractors
16th-17th centuries.

The rod contained in the outer tube was screwed into the bullet, thus enabling it to be withdrawn from the body.

Amputation Set
By Carter, 19th century.

This contains all the instruments required to amputate a limb.

Scarificator
Viennese, by John Jacob Fischer, brass and steel, 18th century.

Scarificator
Italian, brass and steel 1778

Scarificators were used to produce multiple punctures of the skin. A number of small blades are spring-loaded and released by pulling the trigger. They were popular instruments as there was less danger of producing an uncontrollable haemorrhage.

39-31 Figure Group
Dutch(?), ivory and silver, possibly 17th century.

This group is based on a painting by the Dutch master David Teniers and depicts blood-letting.

Obstetric instruments
English, by Arnold and Sons, 19th century.

The case contains instruments to assist dicult deliveries.

Tabloid Splint Outfit
By Burroughs Wellcome, steel and cardboard, Great Britain, late 19th century.

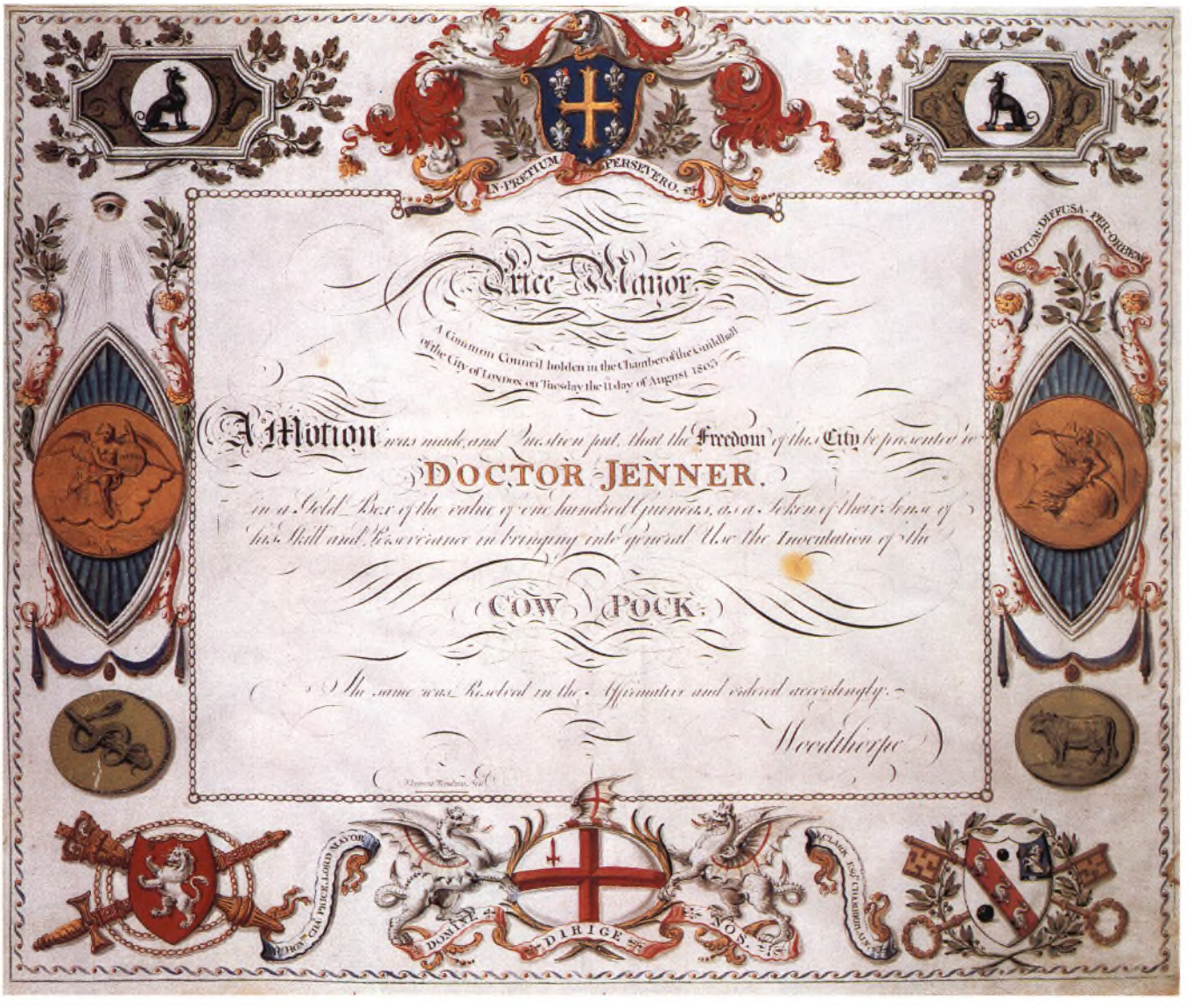
Wellcome's splint outfit contained nine metal splints of various sizes for fractures of the arm, and nine cardboard finger splints. The finger splints, according to the instructions, were to be snapped off "briskly to ensure a clean edge" to the required width – narrow for one finger, wide for two.

Rectal and vaginal specula
English and French makers, 19th century

Surgeons have used such instruments since Roman times to widen natural openings, for medical inspection. Physicians began to do so from about 1800. The gold speculum was made for Empress Eugenie, wife of Napoleon III.

19th century Thermometers

Simple thermometers were invented in the 17th century. Thermometers were not widely used in medicine, however, until after about 1800. Many were designed to be placed on the surface of the body.



Edward Jenner (1749-1823)
Diploma awarding Jenner the freedom of the City of London, 11 August 1803.

Jenner's introduction of vaccination, announced in his **Inquiry**, published in 1798, made possible a dramatic advance in preventative medicine. Jenner foresaw that smallpox could be eliminated through programmes of vaccination, although only in recent years has the World Health Organisation been able to announce the final disappearance of the disease. The diploma on display, awarded to Jenner in a gold box to the value of one hundred guineas, was a recognition of a major contribution to the health of mankind.

Dentures
Ivory, human teeth and gold, c. 1860.

Gold was used as a mount for teeth for many years, although the delicate work involved in making the plate and the cost of the gold made dentures very expensive.

This set has human teeth at the front of the lower set and ivory for the rest. The owner had one premolar and incisor left and gaps have been left for these.

X-ray tube

W.C. Rontgen (1845-1923) discovered x-rays in 1895. They were soon put to diagnostic use. They dramatically revealed the inner structure of the body. This tube, used to produce x-rays electrically, was designed by Sir Oliver Lodge (1851-1940), circa 1900.

Disease, accident, inheritance or old age can prevent parts of the body from working properly.

Since early times, mankind has attempted to correct these malfunctions with replacements – "prostheses" as the doctors call them.

They include such common items as spectacles, hearing aids and teeth; splints, crutches and corsets; and, during this century, devices which actually fit inside the body – artificial joints and heart valves, for example.

Artificial Heart Valves (used)
Plastic and stellite, Great Britain, 20th century.

Artificial prostheses are made to replace diseased heart valves. To avoid the problems of rejection by the body they are made of special materials which are highly inert. The balls of these are made of Silastic – a plastic with elastic qualities – and the case is of stellite – an alloy of cobalt, chrome, tungsten and carbon.

Artificial valves were first used in 1952. These are Starr Edwards valves developed by an American (Starr) and an Englishman (Edwards), surgeons in the early 1960s. Modern versions are smaller, neater and more smoothly finished.

Artificial Arterial Prosthesis
By United States Catheter and Instrument Corporation Dacron, U.S.A., 20th century.

Diseased arteries can be replaced with artificial materials such as dacron – a synthetic, woven fabric. This has the right properties to encourage the growth of fibrous tissue to line the tube and to make it blood tight. The crinkled pleating allows the tube to bend without developing kinks where dangerous blood clots could form.

Trial Lens Case
By Pillischer, wood and glass, Great Britain, late 19th century.

In order to prescribe the correct lenses for a patient the optician had to test their sight. Trial lenses, each very slightly different to the others, in their special frame, allowed fine adjustments to achieve the best possible sight.

This case contains 173 lenses.

Medicine: the youngest science

by Earle Hackett

Medicine in its current professional form is somewhat beleaguered.

When the scientific spirit of the time pushes doctors towards using more science and rigorous technology in their work, they are immediately criticised for being cold, hard and uncaring. Yet, when they are subjected to academic examinations of their competence, it is commonly their knowledge of science and technology that is tested and not their capacities for love or tender care or experience in human affairs. They are being swirled in mixing bowls of contrary influences.

One can sympathise with them. There is the social paradox that doctors usually seek their fees from those who are sick and therefore least able to earn money to pay. Indeed, it seems to be an aspect of innate human nature that the doctor is called when disaster has already struck, and disregarded when he or she offers preventive advice to those who are still well.

The past history of medicine is that of healers in many cultures doing their jobs according to the beliefs and practices of the nations into which they were born.

The profession of healing, one way or another, is universal. Commonly it can work in only two ways. Either it influences the molecular physiology of the human body in more favourable ways than those by which the unaided body can repair or restore itself alone. Or else it influences the mental activity of the sick person's brain so that that important organ may in its turn accelerate the healing process. This last is increasingly seen to be a molecular possibility. That is, brain activity, too, is something natural and not supernatural. Cartesian dualism may be coming to an end. However, any final disentangling of the physics and chemistry of brain or mind is quite a long way off.

The best of modern Medicine is what is used rationally by physicians and surgeons working in sound accord with the principles of biological science on which all orthodox Medicine is now said to be based. Much modern Medicine is indeed of such a kind.

It works. In fact much Medicine, today, is "working" for the first time in history, in terms of bodily physics and chemistry.

Meanwhile it also uses reassuring treatments which are not based on scientific analysis. It is rather that both doctors and patients here are basing their confidence in a broad belief in a flavour of science, rather than science itself.

Such treatment is a token; essentially a religious appeal to a widespread belief-system in order to make the sick person feel better. Meanwhile the healing power of nature may bring about a cure.

What then is that token "really" worth? Reassurance has obviously great value to a sick person. To be kind, Medicine is the youngest science and is steadily improving its scientific abilities. All the same an unscientific use of science is very reminiscent of those medical procedures we call "primitive" and label with names like shamanism, voodooism, mesmerism, witchcraft, and so on.

In different centuries and different places most people have been rigidly encrusted in the beliefs and practices of their own times. We are surely no different.

The great pharmaceutical companies, of which Wellcome is one, have done immense good for humanity in the past century. But a century is historically a short time.

If there are areas where doctors and patients are still coming to terms with the industry's products, that is no surprise.

Wellcome, as a great drug company, should be congratulated for the unfettered way in which it has facilitated this warts-and-all display of the History of Medicine.

This publication contains explanatory essays written by members of the staff of the Wellcome Institute, London. It is illustrated with photographs of items and displays which are part of the Wellcome Collection.

History cultivates the long view. It is a human way of putting something in its place.

What is the place of Medicine?

This exhibition of its history should help you to place it – and the doctors – where you think they belong.

Dr Hackett, editor of this catalogue, is a distinguished broadcaster on medicine.

Medicine in history

by Brian Bracegirdle

Many things can go wrong with the human body. Accidents occur, and there is a host of viruses, bacteria, fungi, protozoa, worms, insects and others always ready to invade the tissues. Other diseases arise from lack of certain substances in the body or from inherited causes, while still others occur for reasons still unknown. Even before the human species evolved disease was not uncommon, as shown by prehistoric remains. Some mammoth bones exhibit diseased areas and several types of deformity have been found in other species. Disease has a very long history, probably as long as life itself.

Many peoples have left behind no written record of their activities and beliefs, and thus it is difficult to understand what they thought about disease and how they dealt with it. Human skulls in which holes had been scraped during life, are fairly common from some areas of the Stone Age, and some of their owners survived this hazardous operation. We know from the skulls that the operation was carried out, but we do not know why – they may have been letting out devils associated with headaches or epilepsy as we would now say – but they may have had a totally different, non-medical reason for carrying out and undergoing this heroic operation.

Tribal medicine

In more recent times there were still groups of people, tribes, who had no written language. Their beliefs and activities were handed down from one generation to the next only by word of mouth. Such peoples very often had elaborate objects and practices. One important characteristic of tribal medicine is that the witch-doctor deals with the entire person, and possibly the whole family as well, so that the psychological effect is considerable and may be very important in obtaining a result.

Medicine 3000 BC

The earliest written records dealing with medicine come from the ancient civilizations of Egypt and Mesopotamia. Both cultures date from about 3000 BC and we know quite a lot about them from archaeological digs as well as written records. These societies developed in river valleys and had a lot in common.

From ancient Egypt a number of papyri have been preserved, and once the hieroglyphic writing had been uncoded much was learnt from them about many aspects of life. Magic and religion were routine parts of this. Good hygiene practices were followed and amulets were widely used against disease. If one became ill one had offended the gods, and throughout the papyri, rituals are described and prayers to prevent spirits being malevolent are everywhere. Imhotep was the most important god of healing.

In addition to priests and magicians there were well-trained specialist physicians who could read and write, and who had followed a medical course at a temple. Doctors asked questions of the patient and used their hands to take the pulse, palpate tumours, and make a rough estimate of temperature. They described one or two medical conditions and were able to deal with superficial surgical matters, such as putting splints on fractures and draining abscesses. Drugs from all kinds of animal and plant sources were administered as ointments, pills, liquids and suppositories.

We know rather less about the history of Mesopotamia with its rivers, the Tigris and the Euphrates. There are fewer archaeological remains and the written records were pressed into clay tablets which were very fragile. One written record which survived is a large piece of stone carved about 2000 BC by Hammurabi, king of Babylon – it is essentially a legal code which includes references to medicine. Later records include frequent medical references in the Old Testament of the Bible. Like Egypt, the social organisation of this area was based on religion, which permeated all aspects of life. The priests were powerful, and astrology was an important activity because the Babylonians believed that the gods provided omens to tell the people what they would do. Health was regarded as a positive gift, while disease was a punishment for sin. If you were taken ill it was because you had insulted some god so that your guardian spirit no longer protected you and demons had gained possession. (The idea that disease is somehow sinful still exists.) In addition to priests who could define the meaning of omens and drive out devils, there was a well educated class of physicians with a definite scale of fees which

were not paid unless the treatment was successful. Many substances were used as drugs as part of various rites to drive out evil spirits. Substances were inhaled as well as being administered as suppositories and enemas. Underlying the medical practices of these two civilizations were theories of disease which were to be followed in some ways until the 19th century AD.

Greek and Roman medicine

The city states of Greece were well developed by the 6th century BC. The modern Western world still accepts philosophies developed then. Religion was an important part of life although not quite so all-encompassing as in the more ancient civilizations already mentioned. Many written records have come down to us from the ancient Greeks, some of them mainly philosophical, but many others decidedly medical. Many of these latter are often put together as the writings of Hippocrates who flourished in the 4th century BC. Impressive archaeological remains have also been uncovered in large quantities, and from all of these it is clear that the Greeks felt that health had to be pursued as an ideal. Asclepius was the most important Greek god of healing and his cult developed impressive temples which came to be associated with the symbol of a rod with snakes entwined, still seen today. In addition to the priest-healers, there were many physicians who believed that sickness was the result of imbalances between man and the world, and also within the body. Health was thought of as the proper balance between four "humours" – phlegm, blood, black bile and yellow bile. Bedside Medicine became highly developed, and listening to the patient to record a case history was very important, including the entire background of the patient as well as the specific symptoms. The pulse was felt and an estimate made of body temperature. Following all of this, treatment was based upon diet rather than drugs, as the intention was to recreate the proper harmony of the humours. Some surgical work, especially treatment of fractures and dislocations was carried out, as might be expected in a society to which sporting activities were so very important. All of this became slightly modified by the writings of Aristotle. His approach was to insist on an understanding of nature discovered partly by logical thought, mainly by direct investigation. For the first time this meant that anatomy and physiology were investigated by dissection, and it came to be accepted among Aristotle's followers that Medicine had to be based on science. Those who believed in this approach produced many works describing structure and function, and Aristotelian Medicine was to survive as the core of medical thought and practice for almost 2000 years.

The focus of Greek medicine moved to Alexandria from 300 BC where work in dissection continued, and much of the attitude of the Greeks found its way to Rome. There were several different attitudes to medicine and a variety of writings have come down to us, the most important being those of Galen from 2nd century AD. The medical schools of Roman times produced many practitioners, and improvements in surgical practice brought about the development of new kinds of surgical instruments. The Romans provided their cities with excellent drainage systems and water supplies, and controlled the quality of food and disposal of the dead. They built hospitals for the sick, and left behind attitudes which still find a place in the modern world.

Medicine in Islam and the medieval world

Although Rome declined, the medical tradition remained strong in Constantinople and in the Islamic civilisations. Relatively few new discoveries were made but knowledge was compiled and passed on. Bedside observation was still important, and famous practitioners such as Rhazes and Avicenna wrote books which were to influence Medicine for some centuries. Arabic physicians were widely read in the sciences as well as Medicine which continued to be based on the balance of the humours. Many new substances were introduced into Medicine and by the 11th and 12th centuries as European culture revived Christian authors translated the Arabic texts to make available the Greek and Roman heritage once again.

In medieval Europe some Medicine from the monasteries of the previous centuries was added to the inheritance from the Arabs, and famous medical schools such as that of Salerno flourished, while in the 13th century universities were founded in Bologna and Padua in Italy, and in Montpellier and Paris in France. Their students were taught Medicine only from books. Surgery was taught in the same way, but gradually some new approaches and techniques were introduced. Most practitioners had very few treatments at their disposal and diagnosis was almost equally primitive. Epidemics were seen as a scourge sent by the Almighty and many saints were invoked to cure disease. Leprosy and plague affected large parts of the population, but during this period medical scholarship was re-established, hospitals were founded and physicians, surgeons and apothecaries became separate from each other.

Medicine in the Renaissance

Western culture was totally transformed in the 15th and 16th centuries. New thinking in astronomy preceded new thinking in science generally, and the writings of the ancient authors yielded their place as the sole source of knowledge in favour of direct scientific investigation. Renewed interest in dissection was stimulated by the work of Vesalius in the 16th century, and the body came to be described as a mechanism as more and more discoveries were made. Work in physiology sprang from that in anatomy, and William Harvey's announcement of his discovery of the circulation of the blood was undoubtedly a turning point in medical history. The wealthy were treated by physicians, but for most of the population traditional folk medicine was the norm. Surgery improved in status and on the continent surgeons such as Fabricius became famous. The increasing use of gunpowder produced many gunshot wounds, and Paré became the best known 16th century surgeon as a result of improving the treatment of such wounds. Increasing interest in chemistry, stimulated by Paracelsus, brought about the introduction of mineral based drugs as supplements to the traditional herbal remedies. Although plague and leprosy affected fewer people, other diseases such as smallpox and syphilis became epidemic. Remedies remained restricted to purges, enemas and bleeding, but the science of pathology was originated. Drugs were brought back from expeditions to the Orient and the Americas, but astrology and magic remained essential in medical diagnosis and treatment.

Medicine in the 18th century

In Britain and much of Europe the 18th century was an elegant age. The pursuit of wealth encouraged also the pursuit of health. It was fashionable to take the waters at spas all over Europe, and large hospitals were built in many places. One of the major advances of all time in Medicine was achieved by Edward Jenner who introduced vaccination to protect against smallpox, which had been a terrible killer. There were many more medical practitioners relative to the population, and medical institutions such as those at Leiden and Edinburgh rose to great prominence, while some schools of anatomy such as that of the Hunters in London also educated many hundreds of students. Medicine achieved a more scientific basis as a result of a general interest in science. A notable improvement in technique in childbirth arose from the widespread introduction of the use of forceps.

The Hospital of Santa Cruz at Toledo in the 16th century.
A diorama in The Wellcome Historical Medical Museum.

A woodcut showing scarification, a form of blood-letting. Paris, 17th century.

Model of the Anatomical Theatre built in 1594 in the University of Padua.

Ambrose Godfrey's chemical laboratory in Southampton Street, Strand, London. Early 18th century.

Experimental work on respiration in Lavoisier's laboratory in Paris, 1789.
A diorama in The Wellcome Historical Medical Museum.

Colonization of the Americas and Asia by many European countries proceeded apace and totally new diseases played havoc with settlers and with some who returned home. Scurvy, a serious condition for those making long sea voyages, was scientifically treated by Lind in the 1750s and by the end of the century positive health was seen as desirable, in purely social terms, for the first time in almost 2000 years.

The 19th century

There were many advances in scientific understanding of disease in this century, many of them originating in Germany where research was carefully organised. The microscope (perfected in England) was applied widely to the study of neurological and pathological tissues culminating in the work of Virchow. In France the study of physiology produced interesting results from the work of experimenters such as Bernard, and by the end of the century Britain also was providing spectacular results in understanding physiology and, through it, medicine. Instruments to measure all manner of bodily values, from blood pressure, temperature, to breathing sounds and the rest, were developed during the century, but the most important contribution to health and well-being was based on the work of Pasteur in France. He it was who laid the foundations of the germ theory of disease. Lister developed this concept into antiseptic surgery and Koch founded the science of bacteriology in the 1880s. Following the introduction of anaesthesia in the 1840s the surgical scene was totally transformed, allowing the hospitals of the day to become far safer places at the end of the century than they were at the beginning. The hospitals of Paris were important in stimulating bedside investigation of patients and work in the post-mortem room. Good hospitals were founded all over the world, and surgical and medical conditions were treated with greater effect than ever before. Dealing with the insane attracted much attention, and their earlier, unfortunate conditions were dramatically improved by the end of the century.

The most important improvement in the health of the population as a whole came about through prevention rather than cure, with the application of the principles of public health. By the middle of the century reform of the squalid conditions of the British working class had begun through the work of Chadwick. Statistics were collected and analysed and proper water supplies and drainage systems were introduced. Medical matters were increasingly regulated by law, and by the end of the century more powerful medicines were available, produced by a combination of scientific research and a much developed pharmaceutical industry.

The 20th century

The work of Ehrlich, in making the first synthetic substance intended to have a specific medical action, was achieved early in the century and led to the development of the sulphonamides in the 1930s and other chemotherapeutic agents subsequently. These proved to be extraordinarily effective against a wide variety of dangerous germs. Fleming discovered the existence of penicillin in 1928 but it was Florey and his team who recognised its clinical potential and succeeded in making it available, with American help, to treat large numbers of wounded towards the end of the 2nd World War. Since then the development of a wide range of highly potent antibiotics has revolutionised medical treatment. Other exceptionally potent substances have been introduced as a result of an enormous amount of pharmaceutical research throughout the World, and the practitioner nowadays has an almost bewildering choice of medicines intended for highly specific purposes.

Other scientific advances have occurred as a result of determined efforts on so wide a scale that it is impossible to list them. Roentgen's work on X-rays at the end of last century has provided not only a potent diagnostic tool, but also significant therapy for a range of tumours. Other advances in therapy have occurred as a result of understanding that disease can arise as a result of deficiencies and from genetic causes. The socialisation of Medicine in many countries has ensured that even their poorest people receive adequate treatment, and the widespread recognition of the need for proper hygiene and sanitation throughout the World has provided remarkable advances. Astrology and magic have finally lost their important place in feelings about health and disease, although it may be argued that the gentleman in the white coat with his battery of electronic devices is the witch-doctor of the modern World!

New discoveries in pneumatics! An experimental lecture on the powers of air. Coloured etching by James Gillray 1802.

Leech-gatherers. English, 1814.

Other medicines by Jane Bywaters

Evidence from human remains shows that disease was frequently present in prehistoric communities. Only diseases that leave a mark on hard tissues can be recognised – for example arthritis, tooth decay and fractures. It is more difficult to interpret the evidence for therapy in prehistoric times but stone carvings of female figures have been found which may have been involved in fertility rites, suggesting that prehistoric man probably believed in spirits or gods and appealed to them for help. Herbal medicines may have been used. In a cave burial in Iraq dated 60,000 years ago, pollen grains have been found of a plant still used locally as a medicine. Archaeologists believe the cave dwellers might have used it in the same way.

Trepanation is one of the few signs that surgery was attempted by prehistoric man. During the operation a piece of skull is removed, and skulls have been found from all over the world showing these holes. Sharp flints were probably used to scrape away the bone. It is not clear why this operation was attempted, but sometimes there are signs of other damage to the skull indicating that it was to remove splinters of bone after an accident in battle. It may have been thought that the operation would release invading spirits which might cause madness or severe headaches.

Knowledge of disease in ancient times has been extended greatly by the study of mummies, in particular those found in Egypt. As some soft tissues are preserved during the process of mummification a wide range of diseases which affect these parts can be studied. Traces of insects have been found on mummies and these could have been parasites. Teeth are often found with abscesses, and traces of tuberculosis and bilharzia infection have all been found.

Greece and Rome

Archaeological remains from ancient Greece and Rome illustrate their medical practices, as do their books. The earliest texts, dated to the 5th century BC, form the Hippocratic body of medical work describing man's nature and comparing it with the nature of the universe; this is now accepted as the work of many different authors. It embodies the ideal of a clinical and observational approach to Medicine. It considered Medicine as a craft which it took a life-time to learn. Many case studies are given in the writings. The humoral theory was introduced in the corpus and later refined by the great Greek philosopher Aristotle (384-322 BC).

The greatest Roman contribution to Medicine came from Galen (129-199), a physician who worked in Rome. His work was a derivation and expansion of Aristotle's. He performed animal dissections and studied the human skeleton. He believed that the principle of life was a spirit, drawn into the body with the breath. He believed that restoring a balance of the humours would cure disease.

Despite a logical approach to Medicine, both Greek and Roman cultures retained a strong tradition of magical and religious healing. Greeks believed that Apollo was the arbiter of health and sickness. The legendary physician Aesculapius was considered his son and was worshiped as a God in his own right. Temples were set up where the sick people could stay. There their dreams would be interpreted and the Hippocratic practices of rest and recuperation could be taken. On leaving these temples it was customary for the patient to leave behind a votive offering, usually a representation of the sick part of the body, in gratitude for a cure. Many of these survive.

Treatment was aimed at restoring the balance of the humours and drugs were one of the most important ways of achieving this. The most influential author was Discorides (fl. 50-70 AD) whose one surviving work is his *Materia Medica*. This text describes and discusses the medical uses of 600 plants, 30 animals and 90 minerals including drugs used today such as belladona, calamine and opium. For 1,600 years Dioscorides remained the major reference work on Medicine.

Spirit Healers

Many long-established communities have a different World view from that held by people of the West. Many believe in a "spirit world" which can intervene directly in people's lives. The spirits may be gods, devils, demons, the ghosts of ancestors or the spirit of animals, plants or places. Spirits can act for good or evil, and they may predict the outcome of an event.

The successful completion of any venture, be it a good harvest, victory in battle, easy childbirth or the

curing of an illness, depends on the good-will of the spirits. Conversely their ill-will could cause failure, disease and other misfortunes.

Most traditional communities depend on one individual for direct two-way communication with the spirits – the "medicine man". This person – man or woman – is a powerful, important member of the community. They are not only concerned with healing. They may appeal to the spirits for information leading to a successful hunt, they may ask for a good harvest or the spirit's blessing for any activity which may be carried out. Many "medicine men" are also traditional healers. They may specialise, some carrying out divinations, others being consulted for a particular type of disease. The traditional healer uses both magical and rational therapies, often together.

Religious ceremonies form an important part of the healing process for many communities. Certain African and Red Indian societies believe that during these the healer takes on the persona of a spirit which performs the cure. Often masks and costume are worn to enhance the belief in magical transformation. Rituals involve dance, music and chanting and the "medicine man" may enter a state of trance. The patient plays an active role in the ceremony. The rituals are usually aimed at an exorcism of whichever spirit is believed to have caused the disease. Red Indians believe in the magical removal of an object spirited into the patient's body by a malevolent spirit. During such ceremonies the "medicine man" triumphantly produces an "object" – often a stone – as proof that the disease causing agency has been removed. As part of the ritual the patient may be given a drug.

Chinese Medicine

The theories and practice of traditional Chinese Medicine arose in the 6th century BC and remained the dominant form of Medicine in China for over 2000 years. The aim of Chinese Medicine was to maintain health by preserving a balance in all things. It was considered preferable to prevent rather than cure illness. Chinese Medicine was influenced by the main religions of China – Confucianism which rejected the purely spiritual explanation of phenomena, Taosim which encouraged the study and observation of nature, and Buddhism which believed in compassion for all living things. The practice of traditional Medicine flourished until the Sung dynasty (960-1279). After that it declined and gradually stagnated to a point where high levels of scholarship and knowledge of medical texts were considered greatly superior to practical ability. By the 19th century quacks, pedlars and monks were consulted by most people. Traditional Medicine was revived after the establishment of the Communist State in 1947 and is still widely practised in China. Of the many beliefs of Chinese Medicine two concepts are particularly important – the principles of Yin and Yang and the belief in a life force Chhi.

Yin and Yang are two opposite but complementary forces which rule the World. Yin is dark, mysterious, feminine and evil. Yang is bright, active, masculine and beneficial. Yin and Yang are important in Medicine. A balance of both is needed to maintain health; an excess of Yang tending to cause acute feverish and dry diseases while an excess of Yin causes chronic, cold and moist diseases. The various organs of the body were considered to be Yin or Yang.

In the body Yin and Yang are represented by two circulatory systems, the blood (Yin) and chhi (Yang). Chhi is a force or energy which gives the body life. In the 6th century BC Chinese Medicine there were thought to be 6 types of chhi related to external factors – for example wind and rain. However, by

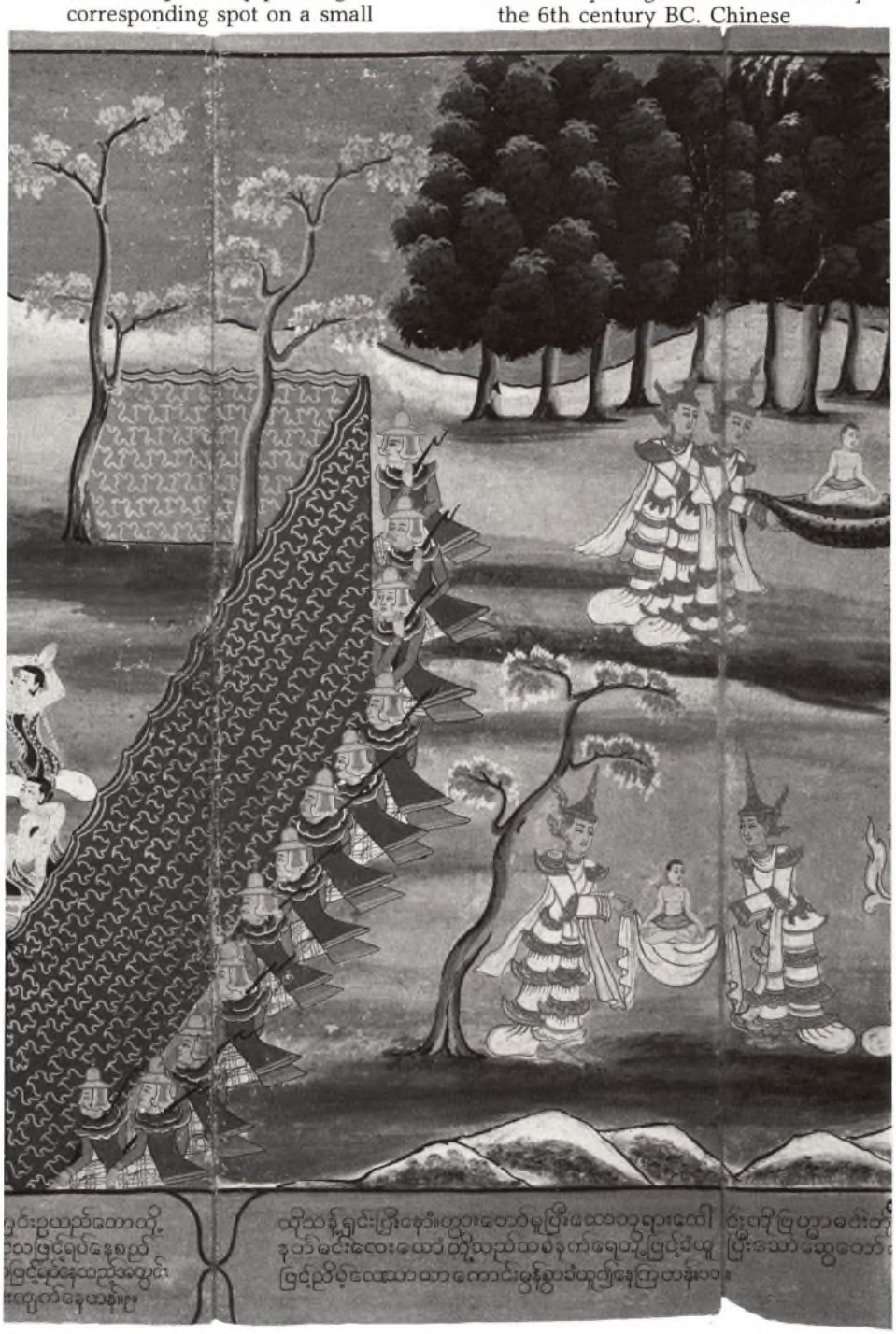
A Burmese folding book. 18th century.

the 1st to 2nd centuries BC it was accepted that disease could be caused by internal forces alone and six internal chhi were added to the six external.

The traditional Chinese physician used many methods to diagnose an illness; these included history-taking, scrutiny of the face and skin, the sound of the voice and taking the pulses. During the Ming (AD 1368-1644) and Chhing (AD 1644-1911) dynasties the physician was expected to diagnose a condition purely by observation. The physical examination of woman was forbidden at that time, so women showed the physician the location of their complaint by pointing to a corresponding spot on a small figurine – the diagnostic doll. Chinese physicians take twelve pulses, each of which they relate to one organ. In the 2nd century BC three fingers were used to take two sets of pulses on each wrist, one deep, one superficial. The pulses were timed by the physician's rate of breathing. A disturbance in the pulse indicates disease in the corresponding organ. Different types of pulse can be identified, each indicating a different type of disease.

Old Chinese treatments

Chinese physicians use many very old treatments. The use of acupuncture, massage, gymnastics and many drugs was established by the 6th century BC. Chinese pharmacy was supposed to have been founded by Shen Nung "the father of Agriculture". Drugs were discussed in the oldest existing Chinese medical text, the Huang Ti Nei Ching, which in its present form dates to the 1st century BC, and is a compilation of earlier, now lost texts. The first pharmacopaeia, listing over 300 drugs, was published in the 1st to 2nd century BC. Many drugs were introduced from India during the Sui (AD 581-618) and Thang (AD 618-906) dynasties. Tea and opium were introduced during the Sung dynasty (AD 960-1279). Chinese surgery was confined mainly to surface operations and dealing with fractures, dislocations and war wounds. However, operations for cataracts, were described in the Thang dynasty and there are references made in the Sung dynasty to the sewing together of ruptured intestines with mulberry bark fibre. Tooth extraction was a frequent operation and the use of toothbrushes and tooth powder recommended.



The treatment known as acupuncture is probably the aspect of Chinese Medicine most familiar to the West. It has been in use in China for 2500 years. Very fine needles are inserted into the body at specific places – acupuncture points – which are linked together into 12 main tracts, or meridians. Chhi is believed to flow along these meridians, each of which is linked to and influenced by an organ of the body. If an organ is diseased the flow of chhi is disturbed. Stimulation of a relevant acupuncture point is thought to return the flow to normal and effect a cure. Certain points are used for certain conditions.

Figurines showing the points and tracts were produced in the Sung dynasty to help physicians learn the positions of points. In 1027 AD life size bronze figures were used to examine students. A parallel form of treatment to acupuncture which uses heat as a stimulant exists. In moxibustion the dried herb *Artemisia vulgaris* (moxa) was used. Small piles of the herb would be placed on acupuncture points, either directly on the body, or through pads, then set alight. Modern Chinese physicians do not use moxa directly on the skin. Often moxa is placed on the end of a needle at an acupuncture point and heat travels down the needle to stimulate the chhi. Although the use of acupuncture and moxibustion declined in later centuries, they were revived after the communist revolution and are now practised widely.

Domestic medicine

by David Wright

Medicine is an old profession. The medical practitioner has always been a specialist, from the tribal witch-doctor to the technologist of present day Western medical practice, but it is easy to overlook the fact that simple Medicine is carried out by the ordinary person in ordinary circumstances. The Wellcome Collection includes many everyday objects which are of medical importance.

The practice of *professional* Medicine has always reflected the "state of the art" of man's comprehension of the working of his body in health and disease. *"Domestic"* medical practice, on the other hand, often bears little relation to contemporary professional medical opinion. Domestic medical objects fall into four categories.

The first can be called the "commonsense" type, the manufacture and application of which requires no specialised medical knowledge and does not rely on any philosophical view of life and health. Nipple shields, feeding cups and spittoons are examples of this type in the Exhibition. Objects of this kind have long been made – feeding cups from the neolithic period have been found – and probably always will be. Their function is clear, and their efficacy is certain: they bring comfort.

The second type can be called "amuletic". This kind has also been made throughout history. These objects rely on an intuitive, rather than a rational, approach to Medicine.

The user does not know why they work, but believes that they do so, often in an unspecified way. Objects of this kind are commonly worn on the person, in the form of bracelets, necklaces and charms (an example in the exhibition is the collection of electrotherapeutic amulets). Others may be appealed to from afar, as in the case of a statue of a medical saint.

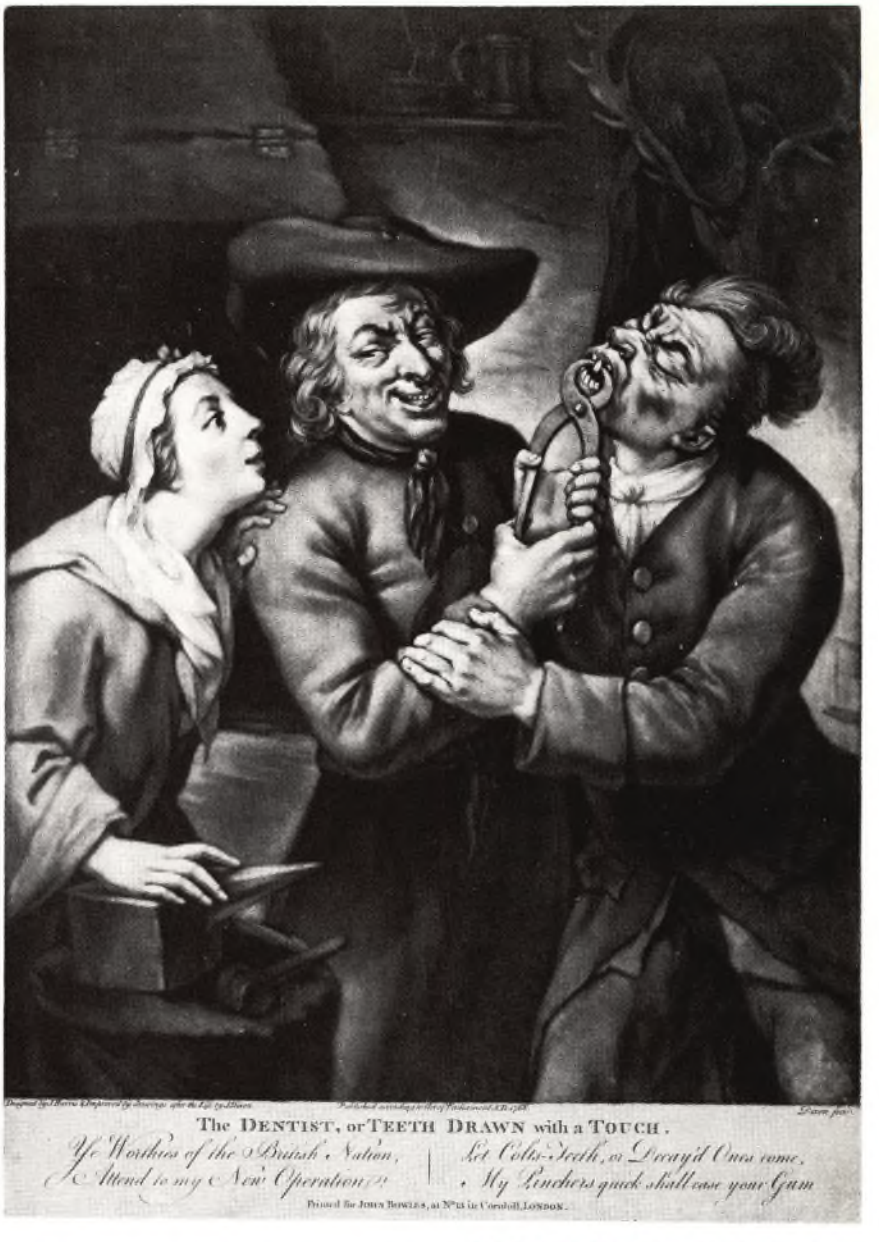
The third type can be called "scientific". As science progresses

A surgeon about to give an enema. 17th century.

these objects often become obsolete, but at the time of their manufacture they reflect contemporary professional opinion. They are objects available to, and used by professional practitioner and layman alike. A good present day example is the clinical thermometer, which is found in both household and hospital. An earlier example in the exhibition is the early, domestic medicine chest. The range of medicines is the same as that which would have been prescribed by a professional medical practitioner of the time.

The fourth type of domestic medical artefact may be called "pseudo-scientific" since it combines elements of the amuletic and scientific types. During the last three centuries, technology has changed man's lifestyle out of all recognition. Science has become respectable, but is not always intelligible to the layman. This state of affairs has resulted in the production of an extraordinary variety of therapeutic devices which have been sold as functioning on "scientific" principles, usually by unscrupulous quacks out to make some easy money. These objects have rarely been accepted at the time by the respectable medical establishment, and have not, on the whole, proved either effective or lasting. Objects of this kind are frequently extensively advertised. They are examples of "science as magic" and should be compared with their magical equivalents in "non-scientific" cultures.

Since electricity and magnetism, as invisible forces able to act at a distance, have always been considered mysterious in the popular imagination, electrical and magnetic therapeutic devices have been widely sold during the 19th and 20th centuries. Examples in the exhibition are Overbeck's Rejuvenator of 1926 and the Magnetic Bracelet of 1960. The idea of "chemistry" can invoke ideas or irresistible potions and transmutations, and has also proved an effective magical attraction to sales, as is evidenced by "Dr" Carter Moffat's Ammoniaphone of c. 1880. Mechanical vibration has also enjoyed a mystical vogue in the first two decades of this century. Examples are the "Veedee" massager of c. 1904 and the "Ideal Sight Restorer" of 1905. Some remedies have made fortunes for their manufacturers. "Professor" Thomas Holloway, the manufacturer of a famous "cure-all" ointment in



The dentist, or teeth drawn with a touch.

London during the mid-19th century was, by the 1870s, spending fifty thousand pounds a year on advertising, and his assets were valued at over five million pounds when he died in 1883.

Domestic medical artefacts, therefore, have much to tell us about mankind's attitude to health throughout the ages, and remind us that, in some ways, there has been little change.

Matthew Chancelor's
D R E A M,
Being a True Information, given by him concerning the Discovery of the
Glastonbury Waters,

This is to certify, whom it may concern,

THAT I MATTHW CHANCELOR, of the Parish of *North Wootton*, in the County of *Somerset*, Yeoman, hath been Afflicted with an Asthma or Phthisic, almost 30 Years, and about the middle of *October* last, I had a violent Fit in the Night, and afterwards fell asleep, and dreamed I was at *Glastonbury*, some way above *Chain-Gate*, and I saw in the Horse Track some of the finest Water I ever saw in my Life; I kneeled down on my Knees and drank of it.—I could perceive the splashing of the Horses on both Sides, as soon as I stood up I saw a Person stood by and pointed with his Finger, and said, *If you go to the Shoot and take a clean Glass in your Hand, fasting and drink it seven Sunday Mornings following, I should find a perfect Cure.* I asked him—Why seven Sunday Mornings? He said the World was made in six Day, and in the seventh Day GOD rested from his Labour and blessed it above other Days. —— He likewise said to me, where this Water comes from is out of the Holy Ground where a great many Saints and Martyrs have been buried, he told me some thing concerning Our SAVIOUR's Baptism in the River *Jordan*, but I could not remember it. —— When I waked this was my *DREAM*.—— The Sunday after I went and found it exactly, accordingly, it was a very dry Time and I could not scarce perceive it run in the Shoot, so I dipt in the Glass three Times in the Hole where the Shoot run into, the value of a Draft and drank it, returning GOD thanks, and so continued seven Sundays, and by the Blessing of GOD recovered me of my Disorder, Witness my HAND,

MATTHEW CHANCELOR.

*** The above was verified on the Oath of the said M. CHANCELOR, the 27th, Day of *April*, 1751, before T. WHITE, *Mayor*, and R. BLAKE, *Justice*.

A testimonial to the curative effects of Glastonbury waters. 18th century.

The apothecary's shop by Roger Price

Since ancient times there have been specialists supplying the raw materials for preparing medicines. Earlier, the physician himself would gather the herbs and other substances which he required, but when a rare plant, or one out of season, had to be obtained it came from a herbalist. There was much overlap in the roles of physician and apothecary. In medieval Britain, the profession of apothecary was closely associated with that of grocer and spicer – indeed, they were usually members of the same guild until the Society of Apothecaries of London was founded in 1617, making pharmacy a discipline in its own right. The apothecary kept his drugs in boxes, baskets and plain pottery. The bric-a-brac associated with the trade (stuffed crocodiles and lizards, so-called unicorns' horns and the like) decorated the shop and contributed to the air of mystery. Shakespeare gives a vivid picture of such a place in *Romeo and Juliet*:

"I do remember an apothecary . . .
And in his needy shop
a tortoise hung,
An alligator stuff'd,
and other skins,
Of ill-shap'd fishes;
and about his shelves
A beggarly account
of empty boxes,
Green earthern pots, bladders,
and musty seeds,
Remnants of packthread,
and old cakes of roses,
Were thinly scatter'd
to make up a show."

Not all shops were as run down as Shakespeare describes. Many pharmacies were attached to religious houses (monasteries and hospitals) or the palaces of local dignitaries. In these, the quality of display was of high order, especially in the pottery used for storage preparations. Although to 20th century eyes much early pottery has an impressive appearance when seen in isolation, rows of such vessels in a shop must have seemed rather dull. The sombre colours given by lead glazes made contrasting decoration difficult. However, from Spain and Italy a new style of pottery came into use in Europe during the latter Middle Ages.

Pots and Mortars

It had been discovered in the Middle East that, if oxides of tin are added to the glaze, the finished vessel takes on a matt white appearance which is an ideal ground for applied decoration. Using compounds of various metals painted on, a rich coloured design can be obtained. The most common effect used was blue on white, given by applying oxides of cobalt, but other substances gave different colours – polychrome. Particularly in Italian hands during the Renaissance, this tin-glazed pottery attained a degree of excellence rarely surpassed. In the early period the island of Majorca served as an export base and the style became known as majolica. Later the Italian town Faenza became a major production centre and the term faience was also used. In northern Europe, the later prominence of the Dutch town Delft caused it to be known as delftware. Surviving examples of almost intact pharmacies and contemporary paintings show the prestigious effect of a shop equipped with these vessels.

From about the mid-15th century in Italy, and later elsewhere, labelling the pot with the name of a drug became increasingly common. Until then, the apothecary seems to have relied on labels glued or painted on. Labelling by the potter never became universal, and it often occurred that a cartouche for the drug-name was left blank so that it could be used by the apothecary as required.

In preparing medicines, one of the most important tools was the mortar and pestle. In ancient times these were usually made either of stone (usually basalt or marble) or pottery, although a few were made of wood. During the later Mediaeval period, the rise of the bellmaking industry allowed the manufacture of mortars in bronze – the production methods for both articles being the same. Although other materials continued in use, bronze quickly became the favoured material and remained so until the late 18th century.

In Britain the style tended to be plain, but in much of Europe elaborate mortars were made depicting flowers, animals, classical scenes etc, often with the date of manufacture and the name of the maker or owner. Most mortars were of a size for use at the bench, but occasionally very large ones were made. For these, the pestles were so heavy that they had to be suspended on a chain and balanced by a counterweight. A later development was the special porcelain devised by Josiah Wedgwood about 1780, which in addition to being strong, did not contaminate the drug being ground. This type of mortar quickly replaced the bronze ones and is still sometimes used today.

An etching of a scene in an apothecary's shop by Rowlandson. *circa* 1800.

Carboys

By the 16th century glass vessels were also used for preparing and storing drugs, especially in Italy. A number of contemporary illustrations depict such wares in European pharmacies and many pieces survive. Unfortunately, there are no such early pictures of English pharmacies and few pieces of good quality survive, though many written accounts show that glass drug containers were quite common from the 17th century onwards. The most famous glass object in apothecaries' shops was the carboy filled with coloured water, which became the symbol of the pharmacy. From the end of the 18th century, and more quickly during the 19th, the use of ceramic vessels declined. Pots, usually stoneware or creamware, were reserved mostly for ointments. Nearly everything else was stored in glass jars or bottles. There were several reasons for this. One was the ready availability of cheap glass following the introduction of new industrial processes. Also, glass is far less prone to chemical attack by the substances which it holds, and by using tightly fitting, ground-glass stoppers it is easy to prevent the rapid evaporation of volatile liquids. By the end of the 19th century, the old-fashioned rows of drug jars had been replaced by lines of "shop rounds", as the new standard bottles were known.

The improvements in glassmaking technology also allowed large sheets of plate-glass to be made. This led to a whole new style of shop-front being adopted along with the marked change in the nature of window displays. During the 19th century there was an increasing tendency to make displays "practical" as well as decorative. The carboys and other symbolic vessels were sited less prominently and greater emphasis was placed on a variety of smaller medical items. This new approach was further encouraged by a change in the organisation of the trade. The more modern chemists and druggists firms which manufactured and marketed drugs on a large scale,

Natives of Java stripping and packing cinchona bark, *c.* 1900.

Dr. Nicholas Monardes of Seville writing his book on the medicinal plants of America (1565). A diorama in The Wellcome Historical Medical Museum.

became the usual suppliers to the small shops. The idea of the apothecary who made nearly all his own remedies, became outmoded.

In Australia, it was inevitable that, in the early days, the colony would be largely dependent on Britain for its drug supplies. In this, the Society of Apothecaries of London led the field until the mid-19th century. At first, the pharmacy trade centred on the small hospitals and local doctors. However, when in 1820 John Tawell opened his retail shop, first at Hunter Street and a few months later in Pitt Street, Sydney, the stage was set for a growing independence from the "mother" country.

Having seen the success of the Pharmaceutical Society in Britain, a group of Australian businessmen set up the Pharmaceutical Society of Victoria in 1857, in anticipation of proposed Parliamentary legislation on the sale of drugs and poisons. Unfortunately, the venture failed after only a few years. More successful was the Pharmaceutical Society of New South Wales, founded in 1876 and which grew out of a series of regular luncheon meetings attended by the prominent pharmacists of Sydney.

Medicines for travellers by Roger Price

When planning his journey, the traveller is faced with the problem of what to do should he be taken ill. This is important because in countries with different climates, foods and standards of hygiene, even the most healthy person is susceptible to illness. The situation is familiar enough today, but in previous centuries the problem was far more serious; it could be a matter of life or death. The causes of most diseases were not understood and really effective remedies were scarce, but great reassurance could be had in difficult circumstances if one could use one's "own" medicines in which one had confidence. Skilled medical treatment was usually unavailable, particularly in remote regions. The obvious solution was to take one's own medical supplies. Many remedies involved the use of quite common substances, others were exotic drugs from faraway countries.

Seafaring was an obvious case where most supplies had to be taken, and if the voyage was a long one then scurvy was almost certain to occur. The cause of the ailment was a mystery: doctors did not realise that it was a result of deficiency in vitamin C caused by prolonged reliance on stale foods. Although pickling in vinegar or brine helped to keep things edible, their vitamin content quickly declined. Ordinary seamen were affected more than the officers, who might have supplies of better-quality foods, and were sometimes even able to grow fresh greens in small quantities.

The first successful remedy for scurvy was reported by Jacques Cartier. During his exploration of the St Lawrence River in 1535 he was advised by a local inhabitant on the use of the bark and leaves of a certain tree. The value of citrus fruits was described by another author in 1564 and again recommended by John Woodall in *The surgeon's mate* of 1617.

It was not until 1747 that James Lind conducted a famous experiment on twelve sailors who had bad scurvy, and he clearly demonstrated that orange and lemon juices cured it. His persistence led to their regular use at sea, a notable lead in this being taken by Captain Cook (although he seems to have preferred carrying the whole fruit). British captains and ship owners incurred heavy penalties after 1854 if they did not carry lime juice for regular administration to the crew.

A different kind of disease is malaria, a major hazard facing visitors to tropical countries. It is rife in low-lying and swampy districts, breeding-grounds of the mosquitoes which carry the organism causing the fever. Expeditions from the 15th century onwards exposed sailors to malaria, and there was, at first, no cure. However, the value of the bark of the cinchona tree in treating fevers was probably known to the Incas of Peru, where the tree grew. Their civilization was conquered by the Spaniards in 1527, but how soon the latter became aware of the use of the tree is uncertain. The circumstances under which the bark was introduced to Europe are also unclear. The earliest description by a Spaniard living in Peru was given some time before 1630 and the first mention in the literature of its use in Europe was in a Flemish work of 1643.

The problem of identifying the drug was complicated by inaccurate descriptions, which resulted in cinchona (also known as Jesuit's Bark, Peruvian Bark and later, simple as The Bark) being confused with another drug – Peruvian Balsam. This confusion was made worse by the Spaniards, who forbade visitors to Peru in an attempt to monopolise the South American trade, which meant that at first the bark had to be smuggled out. Because physicians could not be sure which drug was the most useful in treating fevers, the specific role of cinchona in curing malaria was not demonstrated until the early 18th century. The active agent in the bark (quinine) was finally isolated in 1820. This in turn stimulated attempts to synthesize quinine chemically to compensate for the rapidly dwindling stocks of the trees in their native forests.

The foregoing examples are of two effective remedies which came into use from the 17th century onwards. Many other drugs were used and chests were necessary to carry them. Such supplies of drugs and surgical instruments had been transported by the military since ancient times, but the expense involved meant that only the most wealthy civilians could afford them. An outstanding example is a medicine chest made for the Giustiniani family in the 1560s. The Guistinianis were of Genoese origin and ruled the Aegean island of Chios. The chest, which is now part of the Wellcome collection and displayed in London, still contains 126 of its bottles, some with the original contents, and is lavishly decorated.

Such chests (this is about 1 metre wide) were too large for convenient carriage and most people preferred something smaller. The age of the "Grand Tour" encouraged this trend towards compactness, although the manufacturers would still make their product as elaborate as the purchaser required. Even in the most modest examples there were separate compartments for bottles and drawers for dressings, balance weights, tiny mortars, and so on.

The range of drugs contained in chests reflects the state of medical knowledge at the time. Earlier sets had contents resembling the often obscure preparations seen in apothecaries' shops; those from the 18th and early 19th century laid emphasis on the purgatives and emetics which were paramount in contemporary medicine, while examples from the later 19th century demonstrate the more sophisticated chemical approach to pharmacy.

Even so, explorers found that most drug preparations were still too bulky to be transported through thousands of miles of jungle or wasteland, or else they quickly deteriorated in the tropical heat and became useless. The temptation was to equip expeditions with a minimal supply of medicines. Obviously, what was needed were small, compact packages which could be carried easily and safely; a complete medical outfit with medicaments, dressings, and bandages so compressed that an ample supply could be taken and their virtually indefinite efficiency guaranteed. When the great explorer, Henry Morton Stanley, famous for discovering the supposedly lost Dr Livingstone, returned from Africa he met Henry Wellcome and they discussed the problem. In 1884 Wellcome had coined the trade name "Tabloid" to describe his compressed tablets which contained accurately measured quantities of purified drugs. Their ease of administration, even by those not specially trained (because a dosage was clearly printed on the container), and their prolonged life under poor conditions, made them ideally suited to the needs of travellers. The first Tabloid medicine chest was supplied to Stanley in 1887, who took it on his expedition to East Africa. From then on, Wellcome made sure that all important expeditions were equipped with his Tabloid kits, individually tailored to meet the special hazards which might be faced. Thus an expedition to the jungles of South

America would be supplied with different medicines from one going to the polar regions. They soon became standard equipment for all such ventures, but Wellcome requested that if at all possible the remaining supplies should be returned to him when the explorers arrived home. For this reason, many of them survive and they are greatly valued by historians for the insight which they give into medicine of the time. A small selection of the most important kits is displayed in this exhibition.

16th century medicine chest. Made for Vincenzo Giustiniani about 1565. The chest holds 126 bottles and pots, some of them still containing the original 16th century medicaments.

Clinical diagnosis by Ghislaine Skinner

Since earliest times, mankind has tried to ascertain the causes of ill health. However, the conclusions reached have been dependent on the prevailing conception of the external world and our relationship with it.

In pre-literate societies, an adequate diagnosis often involved identifying the means by which the illness was caused. This might have been considered to be witchcraft, spirit possession, or loss of the soul. In ancient Mesopotamian and Egyptian Medicine, diagnosis was by magico-religious means and divination was an important ritual. In Mesopotamia, priests examined the internal organs of sacrificed animals to estimate the nature and future course of a human illness. Clay models of livers, in which particular features were marked by inserting wooden pegs into holes, survive as a record of this practice.

Urine and the Stars

Modern Western medicine, however, traces its origins to the works of the Hippocratic Corpus (500-400 BC). Here the causes of disease are regarded as naturalistic rather than supernatural: the factors in the environment, such as bad air or diet, or imbalance in the constituents of the body. For many centuries, the ancient Greek view that the body contained four humours, or fluids, predominated in Western Medicine. These humours were usually described as blood, phlegm, yellow bile and black bile. Illness was caused by an imbalance in the individual's humours, and diagnosis involved detecting that imbalance by listening to the patient's account of his symptoms, examining his general appearance, and also examining the appearance of his body fluids, particularly the urine. Uroscopy – diagnosis by examining the urine in a special flask, or *matula*, for its colour, clarity, odour and taste – became a highly developed practice in Medieval Medicine. Charts relating the characteristics of the urine to supposed humoral imbalances were compiled.

Renaissance physicians continued with uroscopy and the humoral theory. They combined this with searching for astrological causes of disease. Drawings of "zodiac men" appear in the medical literature of the period. These indicated the astrological influences to which various parts of the body were susceptible. A concern with astrology and mysticism, however, was only one aspect of Renaissance thought. Increasingly, mechanical models, both of the cosmos and of man's body, came to prominence, supplanting the older, organic ones. The best known conception of man as a machine was contained in the *Traité de L'Homme* (1662) of René Descartes (1596-1650).

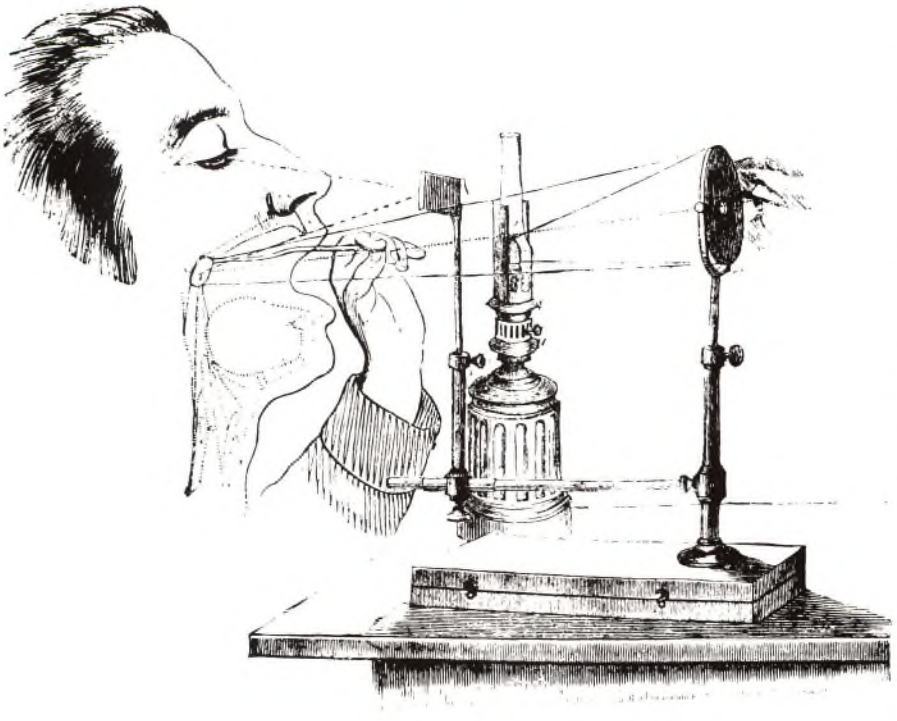
Mediaeval diagnosis by examining the urine in a flask. It was known as uroscopy and was often conducted by the patient sending urine to the physician by messenger.

The Body as Machine

Once the body was thought of as a machine, then aspects of its function could be measured. Two measurements, now very familiar in Western Medicine, were first attempted in the 16th and 17th Centuries respectively. These were the counting of the pulse with reference to an external standard, and the measurement of body temperature. The Italian physician, Sanctorius (1561-1636), described a simple pendulum whose length was altered until its swing coincided with the pulse interval. Galileo (1564-1642) invented the first form of thermometer early in the 17th century, utilizing the expansion of air in a closed vessel, and again it was Sanctorius who put this to medical use, measuring the temperature of the mouth and hands.

A mechanical model of body function also underlay early hydrostatic investigations into the flow and pressure of the blood. The English clergyman and experimenter, Stephen Hales (1677-1761) estimated the blood pressure of a horse by inserting a brass pipe directly into an artery, measuring the height which the blood attained in the pipe.

Looking into the larynx. Mid-19th century.



None of these methods, however, was immediately incorporated into bedside medicine. Far more importance continued to be placed on the patient's own account of his or her symptoms.

During the 17th and 18th centuries, the influence of the humoral theory of disease began to weaken as some physicians began to conceive of diseases as entities, with symptoms sufficiently uniform and consistent to be classified, rather as botanists classified plants. The English physician, Thomas Sydenham (1624-1689) described well-defined clinical entities, such as gout, and the identification of such a condition came to constitute a diagnosis. This was still made, however, on the basis of symptoms – the patient's account of the illness – rather than signs the physician might detect by examination of the patient's body. Sydenham, and other physicians, carried on extensive postal consultations, in which diagnosis was made, and treatment advised, entirely in an exchange of letters between patient and doctor.

Localisation of Disease

At the same time, as attempts were being made to classify diseases, some physicians, especially the Italian, Giovanni Battista Morgagni (1682-1771), tried to correlate clinical entities with underlying anatomical changes observed at post mortem dissections.

Clearly none of those approaches required the use of diagnostic instruments, but they were to lead to profound changes in the way doctors thought about disease, and such instruments would, from about 1800 onwards, play an increasingly central part in medical practice. Eventually, the objective evidence of disease which they detected was often considered more important than the patient's own account. The Paris school of Medicine, newly reorganized after the French Revolution, was the focus for these new ideas during the early 19th century.

Combining the "natural historical" and post mortem approaches led to a search for objective evidence of disease in the *living* body. This could not be opened up and dissected, as was done at autopsy, so other physical methods of "visualising" disease in the living person, whether directly or by listening to or feeling the body, were adopted. The

The ear, nose and throat specialist. Late 19th century.

Early X-ray photography of a leg in 1896. The picture that was produced was called a skiagram.

stethoscope was invented in Paris in 1816 by R.T.H. Laennec (1781-1826) originally so that he could more easily listen to the heart of a plump, young woman. His first version was a roll of paper. Later he used wooden cylinders. Percussion of the body by tapping with the fingers was advocated by others, the changing note obtained providing information about underlying structures.

Later in the century, ways of directly visualising areas of the body previously thought inaccessible, were devised. Surgeons, as opposed to physicians, had used simple specula for looking into body orifices since Roman times. Now physicians designed more complex instruments to look into areas such as the throat (the human vocal cords were first seen in a living person in 1855), and the back of the eye. Herman Helmholtz devised his ophthalmoscope to view the retina in 1851, but early efforts to see deep inside the body were thwarted by inadequate light sources. Phillip Bozzini's (1773-1809) very early attempt (1804) to visualize the bladder used a candle in a box at one end of a tube, the other being passed into the bladder. Later cystoscopes used brighter, but hotter, light sources. Max Nitze (1848-1906) passed a shielded, incandescent, platinum wire into the bladder. This had to be cooled by constant irrigation with water, necessitating very bulky apparatus. T. A. Edison's (1847-1931) carbon filament lamp, miniaturised, made examination of the bladder, stomach and other organs a practical proposition from the 1880s.

New Technologies

One of the most striking methods of visualizing the inside of the living body originated from W. C. Roentgen's (1845-1923) discovery of X-rays in 1895. The bones and other organs could be plainly seen by means of the rays, which were put to clinical use within months of their discovery. The results of X-ray examination could be permanently recorded on photographic plates, and discussed, compared and re-examined by more than one physician.

Other methods of examination provided numerical or graphical data which could be treated in a similar way. Physicians thus began to record and quantify the body's functions. These activities became the subject matter of the new experimental discipline of physiology, created by French and German workers during the 19th century. Instruments devised in the laboratory were adapted for use at the bedside. The sphygmograph (for recording a pulse trace), the sphygmomanometer (for measuring blood pressure), and the electrocardiograph (for recording the electrical activity of the heart) are examples of these new types of diagnostic instrument.

Other new disciplines, many based on laboratory science, contributed to methods by which the body was then judged to be normal or otherwise. The chemical composition of body fluids such as blood or urine, and the cellular composition of the blood were measured as indications of body function. The microscope became an important diagnostic tool, as first the cellular structure of tissues and their alterations in disease and then the new science of bacteriology based on the germ theory of infection, gained ground.

Recent methods of diagnosis in medicine are essentially extensions of those which were developed in the 19th century. Very sophisticated technologies are now available to doctors. The inner structures of the body can be visualized with great clarity by techniques such as C.A.T. (computerized axial tomography) scanning and nuclear magnetic resonance imaging. Computers are an integral part of many of the new imaging methods.

A different approach stems from the science of immunology, which has provided extremely sensitive tests using the body's own antibodies in the diagnosis of disease.

The applications of technology to diagnosis have proved so successful that most doctor-patient encounters in the developed world now make use of them.

Surgery by Ghislaine Skinner

Some forms of surgical practice are very ancient. Trephination (cutting a hole in the skull) is the best-known example. The oldest scientific treatise, the Edwin Smith Papyrus (Egyptian, c 1700 BC) concerns surgical matters and lists indications for operation, but no account is given of the actual procedures. This is consistent with other craft practices in which technical details were not disclosed to outsiders.

It is from ancient Greece that modern Western Medicine traces its origins. Surgical methods, such as the manipulation of fractures and dislocations, and the treatment of wounds and fistulae are described in the Hippocratic Corpus (5th-4th century BC). Knowledge of Greek and Roman surgery passed during the Dark Ages in Europe to Islamic practitioners, who added new instruments and new procedures. Albucasis (d. 1013), one of the most notable Arab surgeons, is credited with introducing the syringe, the tonsil guillotine, the use of animal gut for sutures, and the true (i.e. cross-blade) scissors.

Ambroise Paré (1517-90) operating on a soldier wounded in battle.
A diorama in The Wellcome Historical Medical Museum.

It is likely that Arabic, together with Medieval Christian, influences resulted in the separation of medical from surgical practice which persisted until the 19th century. Physicians were university trained men of letters who, in general, disdained the use of instruments.

The Barber Surgeons

Surgeons practised a craft learned by apprenticeship and were of lower social status. Increasingly, during the Renaissance, separate guild companies were formed in Europe by physicians and by surgeons. In England, the surgeons' lowly status was indicated by their association with the barbers. The Barber Surgeons Company was formed in 1540, essentially to alleviate demarcation disputes which had arisen over what work should be undertaken by whom. Barbers had long performed minor surgery. They agreed to restrict this to tooth pulling, if the surgeons would refrain from cutting hair and shaving beards.

The Royal College of Surgeons

Warfare has always provided considerable stimulus and experience in the development of new surgical techniques. From the 14th century onwards the use of firearms and gunpowder caused battle injuries on a new scale and brought unprecedented experiences for military surgeons. Some, like the Frenchman, Ambroise Paré (1510-1590) made significant contributions to the body of surgical knowledge then current. Running out of "oyle of elders scalding hot" at the siege of Turin, he advocated instead a blander approach, a dressing of "the yolke of an egge, oyle of Roses and Turpentine" after limb amputations; and he attempted to ligature, rather than cauterize, blood vessels. The invention of artificial limbs, and of instruments for bullet extraction, is also attributed to him. Most important of all, he wrote in French rather than Latin, thus allowing widespread dissemination of his techniques amongst uneducated practising surgeons.

Nevertheless surgeons continued to learn most of their techniques by being apprenticed to masters and not from written works. In theory the guild system strictly controlled their training and licensing. In practice, however, it seems likely that there was great variation in skills among those who bled, cupped or purged patients, bound wounds and fractures, attempted to remove teeth or kidney stones, or more rarely, amputate damaged limbs or trephine a patient's skull after head injury. Unlicensed practitioners, some skilled, some dishonest, must have treated many patients, especially in country areas. Occasionally such "specialists" acquired fame and fortune through the success of their operations. Eye couching for cataracts (a very old procedure whereby the cloudy lens was pushed downwards with a needle away from the pupil) was very often performed by unlicensed practitioners and some had good results. Other operators were charlatans, who left many patients disfigured or blinded.

Then, for several reasons, the lowly status of surgery began to rise during the 18th century. Men such as John Hunter (1728-1793) adopted a more scientific approach. Hunter attempted to conserve tissue wherever possible and experimented on surgical problems, such as the treatment of aneurysms in animals. New hospitals were built and some, like the Edinburgh Royal Infirmary (1729), had express provision for a medical school. The French medical schools were reorganised in 1794 with the aim of reuniting medical and surgical practice. Specialist firms of instrument makers came into being to supply finely worked surgical tools, where previously these had been provided by the blacksmiths and cutlers who catered for other tradesmen. In England, the surgeons' official association with the barbers came to an end in 1745. The Company of Surgeons was reconstituted by a charter of George III to become the Royal College of Surgeons of London in 1800.

The everyday practice of surgery, however, still comprised only operations of urgent necessity. The absence of anaesthesia, and the high incidence of post-operative infection, deterred both surgeon and patient fron unnecessary intervention. The three major operations performed with any regularity were still limb amputation, trephining of the skull and the removal of impacted urinary stones. These last had become so prevalent in England by 1827 that, were they all to be removed, it was said there would be enough to "macadamize one side of Lincolns Inn Fields" (the home of the College of Surgeons). Urinary stones could be operated upon because they were relatively accessible by means of instruments passed into the bladder, or by cutting into the urinary tract where it ran close to the surface of the body. Surgery of other easily accessible regions of the body, such as the face, the breast, or superficial tumours had also been attempted, but operating within the body cavities – the chest or abdomen – was rarely undertaken until the 19th century. The reasons for this seem to be that the ancient humoral theory of disease, whereby illness was ascribed to an imbalance in the four principal body fluids of the individual, remained the basis for therapy. Within this theory, surgery had little place. It was not until the causes of disease were believed to be localized in particular organs that it was logical to attempt to eradicate these causes surgically. Xavier Bichat's (1771-1802) conception of the body as composed of different tissues, and Giovanni Morgagni's (1682-1771) monumental work, the *Seats and Causes of Disease*, which related disease symptoms to underlying disorders found at autopsy, contributed to the decline of the older, humoral theories, as did the growing belief that diseases were classifiable entities, each with consistent and uniform symptom patterns.

Amputation below the knee. Paris, 18th century.

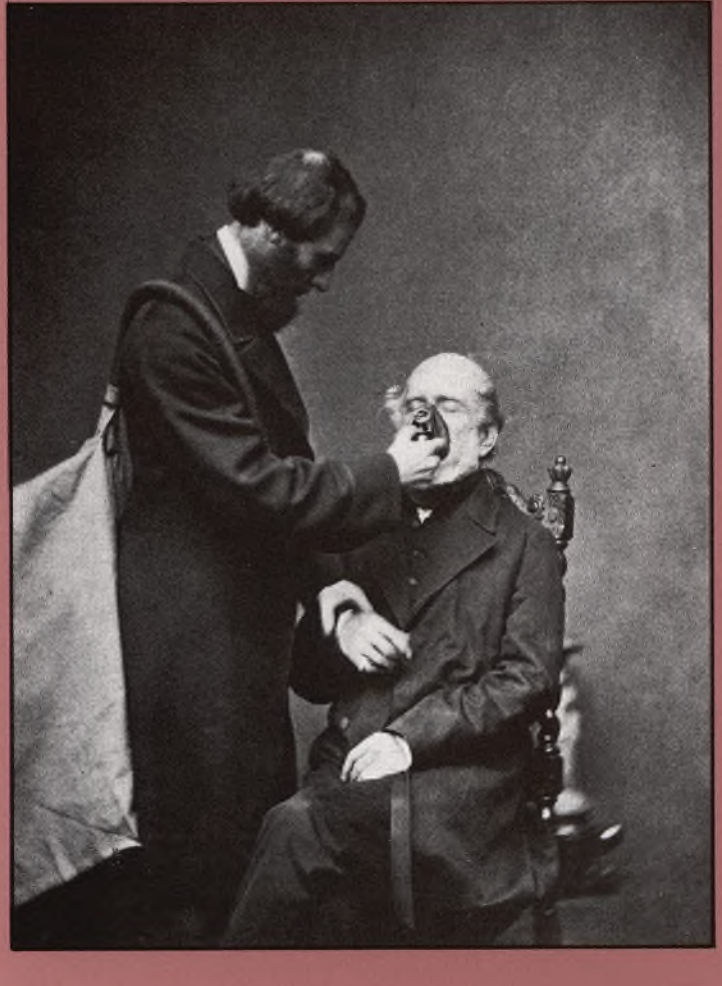
Cutting for the stone. Early 18th century.

Anaesthesia

Despite such new theoretical concepts of disease, in which surgical treatment could be expected to play a greater role, there remained, until the late 19th century, immense practical difficulties for surgeons. Because of pain, operations had to be carried out in the shortest possible time. When the famous London surgeon, Robert Liston (1794-1847) amputated a limb, it was said that "the gleam of his knife was followed so instantaneously by the sound of sawing as to make the two actions appear almost simultaneous". It was held that any competent surgeon should be able to perform an amputation in from thirty seconds to three minutes. Many had themselves timed by their assistants. Such heroics, whilst presumably minimizing the patient's suffering, left no time for developing delicate technique, or suturing any but the largest blood vessels. The introduction of anaesthesia from America in 1846-7 changed all this. Initially, it seems, surgical mortality rose, since more operations were attempted, and post-operative haemorrhage and sepsis claimed many lives. A patient on the hospital operating table was still, in 1869, exposed to "more chances of death than the English soldier on the field of Waterloo" according to Sir James Young Simpson (1811-1870).

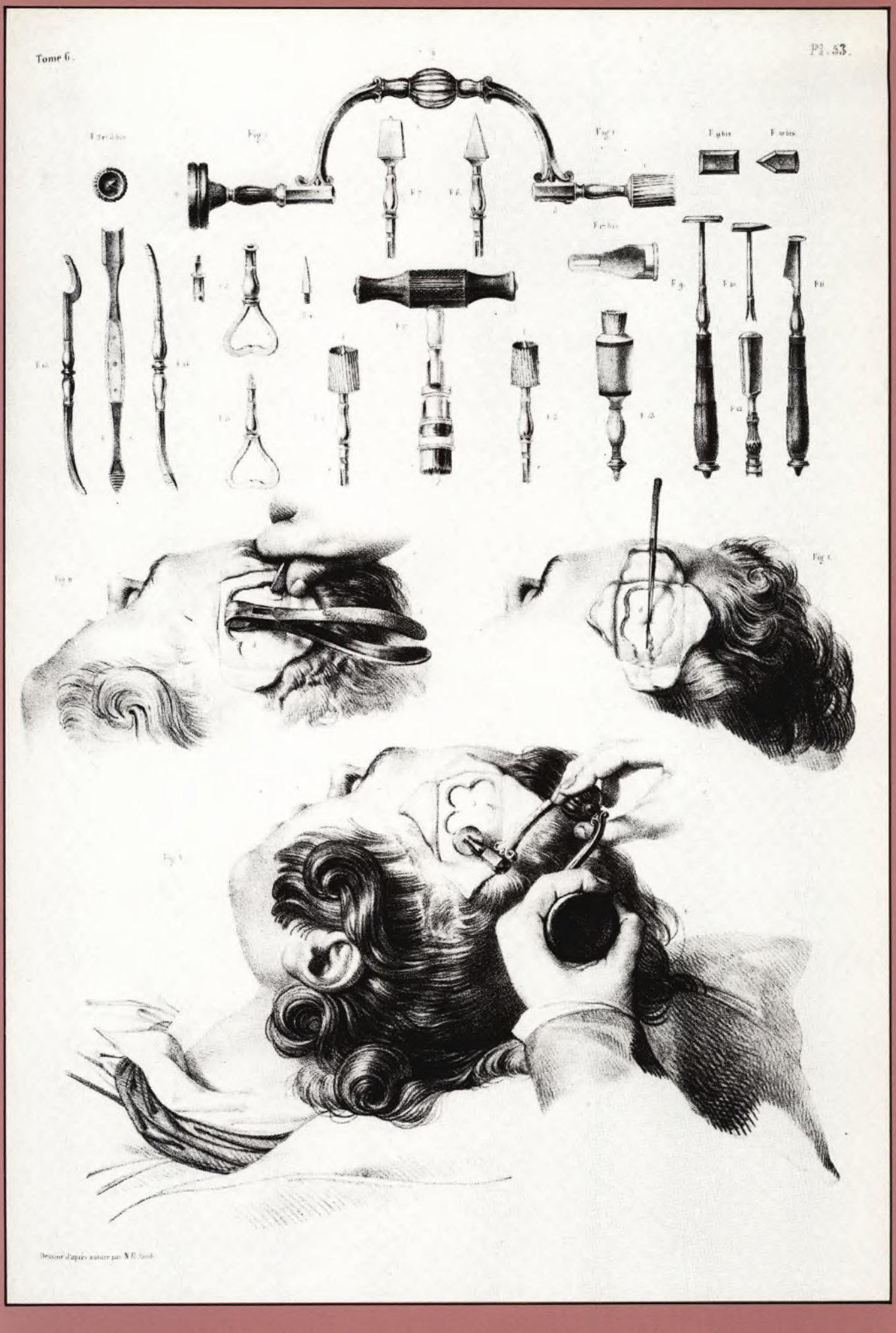
Infection of surgical wounds was another frequent complication. The work of Joseph Lister (1827-1912), who advocated antiseptic methods, based on the germ theory of Louis Pasteur (1822-1895), was slow to be accepted. Acceptance did come, however, during the 1880s. The changes this produced in surgical practices are reflected in instrument design. All-steel instruments, which could be sterilized, replaced those with carved ivory and ebony handles kept in velvet lined boxes. Soon, aseptic techniques, designed to eradicate potentially infective organisms, involved not only instruments and wound sites but the operating theatre, the surgeon and the nurses who, increasingly, assisted at operations. The use of rubber gloves had been adopted by almost all surgeons by 1920, and the sterilization of drapes, operators' clothing and face masks soon followed.

Wood-engraving, 1887. Operation on Kaiser Friedrich III. Left to right: Sir Morell Mackenzie, Krause, F.G. von Bramann, Mark Hovell, Krause. Source unrecorded.



Administering an anaesthetic mixture of chloroform and air. 19th century.

How to open the skull, 19th century style.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Hospital surgery

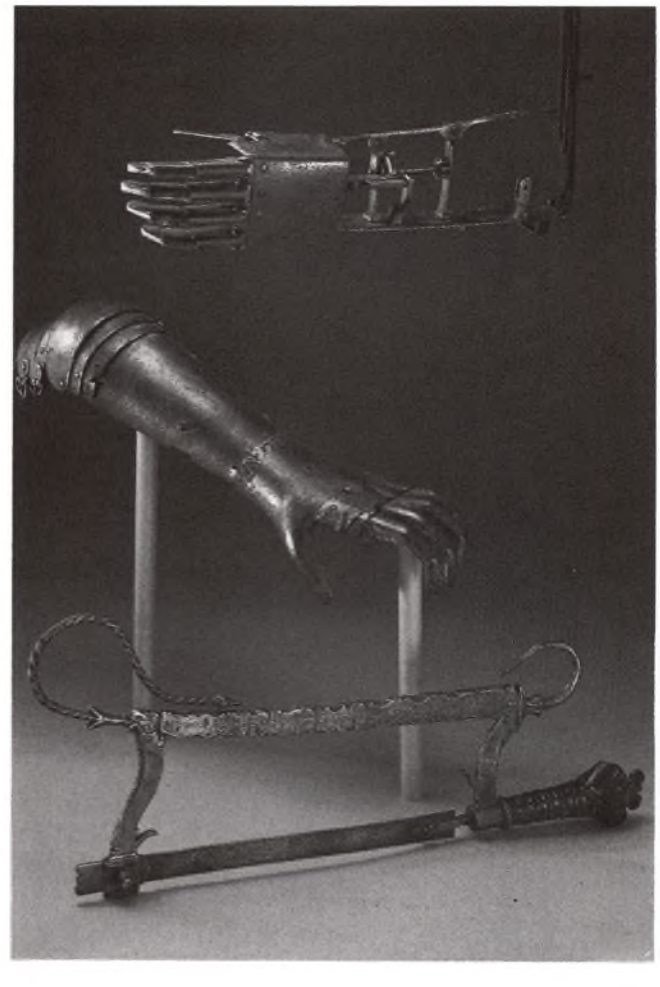
The subsequent development of surgery turned it into a hospital-based discipline. Whereas, prior to the 20th century, the wealthy had preferred to be operated on in their own homes, thus avoiding some of the indignities of the public hospital and the risks of post-operative infection, the more complex surgical techniques which gradually developed could be performed only with the facilities provided by a hospital. Such services as sterile instruments and clothing, equipment for anaesthesia or artificial ventilation, powerful light sources and electrical cautery machines were beyond the means of individual surgeons who, until the turn of the 19th century, had often carried all they needed for major operations in one or two mahogany boxes.

Freed from the necessity of operating at maximum speed on a struggling patient, and able to reduce the risk of post-operative infection, surgeons ventured, during the 1880s, into areas such as the chest cavity, which had previously been considered inaccessible. By 1900 it was acceptable to operate not only for life threatening emergencies but electively, with careful advance preparation, on organs such as the gall-bladder, thyroid, brain, appendix and lung. Following the experiences of two World Wars, extensive reconstructive, or "plastic" surgical techniques were developed. Reconstructive techniques have also been applied with considerable success to congenital abnormalities. Several of these conditions, some life-threatening, can be corrected within hours of birth.

Surgical practice is now closely integrated with other medical specialities and with laboratory science. The research work of Karl Landsteiner (1868-1943) on blood groups enabled blood transfusion to be used to counteract surgical shock which was largely caused by loss of blood. The discovery of antibiotics, again in the laboratory, allowed much more effective control of post-operative infection after the Second World War. Laboratory research has played an increasingly important role, too, in developing techniques for intra-cardiac surgery using circulatory bypass machines, and for the transplantation of organs such as kidneys and hearts. Surgeons and other workers continue to devise new methods and to investigate new technologies in the laboratory. "Knifeless" surgery using laser beams, the surgical treatment of disorders of the foetus while it is still in the mother's womb, and the successful reattachment of severed limbs using microsurgical techniques are some recent products of modern, research-based, surgery in developed countries.

The Marquis of Anglesey leg.

16th Century articifical limbs and amputation saw. Such 'spare parts' were only for the wealthy, and were made by armourers.



Improving on nature

by Jane Bywaters

Disease, accident, genetics and old age can prevent parts of the body working properly. Since the earliest times man has attempted to correct these malfunctions with artificial replacements – prostheses. They include such common items as spectacles and hearing aids, artificial limbs and, during this century, devices which actually fit inside the body – artificial hip joints and heart valves for example.

Splints, crutches and corsets

The earliest forms of external artificial aids were simple items such as splints and crutches to help fractures heal and crippled people to walk. The earliest splints were used during the Fifth Dynasty in ancient Egypt (2730-2625 BC). They were of wood bark and were found associated with a forearm fracture. Crutches were used from the Middle Ages onwards.

The 19th century saw the development of orthopaedics – the medical specialty concerned with skeletal deformities. During the early years of the century most deformities were caused by diseases such as polio, rickets and tuberculosis. Following the general improvements in public health in the 19th century, the emphasis changed to the management of accident and war injuries and, in the 20th century, the problems of old age. Splints, braces and traction, often used together, were widely used to immobilise injured parts. Plaster of Paris bandages were first used in 1852, and by 1877 a plaster of Paris jacket, with traction, had been used for the treatment of spinal deformity. Traction has been used from the Renaissance period but only became widely practised during the 19th century. It was used both for the treatment of fractures, and for the correction of spinal deformities. The main problem with traction frames was the difficulty in attaching the apparatus securely to the body, but in 1909 a method of traction was suggested using metal spikes driven through the bone as attachments. This was not widely adopted until the 1920s as many practitioners feared that infection would inevitably result.

In the 20th century internal devices became accepted for immobilising fractures. These consisted of plates and screws which spanned the fracture holding the two pieces of bone together. Although rigid asepsis was practised, many of the early attempts failed due to reactions between the metal plates and the body. The introduction of inert materials in the 1930s helped overcome this, and today internal plates are used widely.

Artificial limbs

Wooden legs are described in the writings of Herodotus (5th century BC), and Pliny mentions an artificial hand, while Paré (1510-1590) described in detail an artificial hand as well as an artificial arm which could flex at the elbow and a leg which bent at the knee. However, the greatest improvements in artificial limbs came during the 19th century. In 1815 a naturalistic artificial leg with jointed knee and ankle was made for the Marquis of Anglesey, and became the standard. Artificial arms were also improved during the early 19th century. Special harnesses were introduced which allowed the amputee to flex an artificial arm at the elbow using his shoulder muscles.

At the beginning of the 20th century movements of the wrist joint were incorporated, enabling the wearer to eat or drink, especially important for patients who had had a double amputation. Modern artificial limbs may be powered using compressed air, with movement and control close to those found in a natural limb.

Rehabilitation became accepted as important in the 19th century. Hydrotherapy was used to speed up the recovery; in Florence, in the 1830s for example, hot and cold baths, pressure showers and flowing water were all offered. Casualties in the First and Second World Wars brought great demand for artificial limbs. In 1915 a now famous hospital was set up at Roehampton in England specifically to deal with this problem. By the end of the First World War about 25,000 patients had been treated. Roehampton now deals with civilians as well as servicemen. Rehabilitation is very important, and training facilities are excellent.

Spectacles

One of the first references to the use of lenses to improve vision was made by Roger Bacon in the 13th century, and later that century reference is made to the use of eye-glasses to improve sight. The first paintings showing spectacles with double lenses are from the mid-14th century. These were for long-sighted people.

By 1465 a spectacle makers guild had been formed in France. Spectacles remained an expensive luxury until production was stimulated by the introduction of printing. The medical profession seems to have been wary of the new invention. Occasional reference is made to them but most physicians preferred potions and incantations and many recipes exist from this time for the supposed cure of visual defects. Early in the 16th century spectacles were introduced for short-sighted people. Oval lenses became available and could be tinted for protection against the sun. Other developments in the 16th century included leather straps fastened around the back of the head, or loops or cord hooked round the ears or weighted behind.

In the 17th century spring nosepieces were introduced but the first spectacles with an effective method of attaching them to the face appeared in the early 18th century. These were the Temple spectacles which has hinged side pieces which ended in large rings pressed against the side of the head. During the 18th century the prevailing fashions played an important role in the style of spectacles. The first crude bifocals appeared in the 18th century. Benjamin Franklin improvised a pair in the 1780s by combining two existing pairs of glasses; he cut the lenses of each in half and used halves from different glasses in the same frames. The 19th century saw further changes in lenses and frames, again often dictated by fashion. Lorgnettes were popular in the early years of the century, and monocles were introduced.

Rimless spectacles appeared in the 1820s and became popular, while pince-nez were used from the 1840s. Bifocal lenses made in one piece were described in 1836 and many improvements in their quality followed. Contact lenses, first suggested in the mid-19th century were used in the late 1880s and 1890s but were not successful until after further development in the 20th century.

Until the early 19th century the customer chose his own glasses; although opticians' shops existed, many people bought their glasses from travelling salesmen. This began to change in the mid 19th century with the introduction of new instruments such as the ophthalmoscope and sets of trial lenses which allowed the accurate assessment of visual faults. Scientific work of the time elucidated many of the problems of vision, and led to the establishment of a scientific basis for the prescribing of spectacles.

Hearing aids

The oldest hearing aid was invented when a hand was cupped behind the ear, and although this was still being recommended in 1863, mechanical aids had been introduced by the 18th century.

The first hearing aids were ear trumpets. These were simply metal funnels which collected the sound and channeled it down to the ear. They were never particularly efficient and were subject to distortion, although they were popular and frequently used. Those employed by fashionable members of society could be of silver or gold, often finely engraved. The speaking tube was more successful. It did not distort the voice and could transmit sound over some distance, although it could only be used to talk to one other person. The tubes could be made of a number of substances, but vulcanised India rubber was popular in the mid-19th century.

In 1900 the electrical hearing aid was produced. During the first half of the 20th century many hearing aids were produced using carbon microphones, amplifiers and receivers powered by batteries, some of them quite large. The microphone and amplifier section might be placed on a table or the floor to pick up the sound, while early receivers could be worn on a headband or held up to the ear. The introduction of thermionic valves and small electronic components allowed great reductions in size and running costs. Modern receivers have small ear pieces which fit into the ear, made to measure for each patient who can comfortably wear the ear piece for long periods. Other hearing aids have been produced fitted into the frame of a pair of spectacles (introduced in 1954) or worn behind the ear (introduced in 1956). The smallest aids, produced in 1957, can now fit entirely into the ear.

Dentures

In ancient times false teeth were made from cut down animal teeth, elephant ivory or loose human teeth. Specimens have been found (from the 4th century BC) where false teeth were bridged to existing teeth with metal wires usually of gold. In later centuries ivory became the most commonly used material for false teeth whilst gold, which could be worked to achieve a fit, was the only substance available for making a plate. However, as fitting had to be done by measurement only, the results were seldom satisfactory.

Until the 18th century dentures were an expensive luxury. The time, skill and cost of materials involved in producing gold and ivory teeth meant that only the rich could afford them. The introduction of plaster moulds in the mid-18th century, for taking accurate casts of the mouth, meant that producing a well fitting plate was easier and quicker. Porcelain teeth, as one-piece dentures, also appeared in the 18th century, and had many advantages over ivory. They were more resistant to decay, and also it was easier to mould and then bake porcelain than to carve ivory. Individual porcelain teeth appeared in 1808 and became reasonably cheap, but their mounting on a suitable plate was still difficult. Although the fit was now much improved the only satisfactory material remained gold.

In 1844 Charles Goodyear patented the process of vulcanisation of rubber. This gave dentists a cheap, malleable substance – vulcanite. Using a plaster cast of the mouth, a plate could be made of rubber both quickly and easily. The new vulcanite plates, combined with porcelain teeth, made dentures available to millions of people. During the 20th century great improvements were made in methods of taking casts, using first compounds mixed with plaster and later gel-based materials. Teeth made from acrylic resin were introduced and, from the 1940s acrylic was also used to produce the plate.

Internal aids

There were many problems to be overcome during the development of internal replacements. The biggest problem was that of rejection of the implant by the body. Early internal aids, often made of ivory or stainless steel were rejected very quickly. During the 1930s new alloys causing less rejection were introduced; these were rapidly used for implants with much success. The development of plastics, and, more recently, carbon fibres, has produced new materials for replacing tendons, heart valves and blood vessels.

The first attempt to replace the hip joint was made in 1890 by Theodore Gluck, using an ivory prosthesis. This was rejected by the body and the experiment failed. Stainless steel was tried in the 1930s but again failed due to rejection. The first successful material used for an internal implant was vitallium, a cobalt-chromium alloy which in 1938 was used to replace the acetabular cup, the cup of the pelvis. Acrylic femoral head replacements were tried unsuccessfully in 1946. Replacement perspex femoral heads were used in 1949 by Gosset in Paris and in the same year, polythene was also successful. Today many bones and joints may be replaced. Titanium is used for bones, and high molecular weight polythene replaces joints.

Artificial heart valves were introduced in 1952 to replace diseased heart valves. It is difficult to find an artificial material which can survive for very long, and artificial valves must be inert to prevent rejection, while being capable of being attached firmly to the body. Modern artificial valves are a great improvement on diseased or damaged natural valves and have extended the lives of many people.

Diseased arteries can now be replaced. Artificial artery is made from woven, synthetic fibres. The fabrics produced are inert, strong and flexible enough to respond to the changing pressures of blood passing through them. They have an open weave which encourages the growth of blood vessel wall tissue, and concertina type pleats are woven into the tube to allow it to bend easily without kinking.

The beating of the heart is controlled by electrical impulses. Should the firing mechanism fail, the heart will beat irregularly or not at all. A heart pacemaker can replace the biological trigger; the earliest were fitted in the 1950s, and worn externally, connected to the heart via wires through the skin. They were abandoned in favour of internal pacemakers.

Modern electronics has allowed the production of compact devices to deliver the necessary stimuli while being small enough to fit inside the body, usually near the armpit. The electrical impulse is carried from the pacemaker to the heart via a wire which is threaded through the large veins into the heart cavity. Long lasting batteries, essential to the efficient running of pacemakers, are now available.

A great deal of scientific research is now being undertaken around the world to produce new artificial replacements. These include artificial hearts, carbon fibres to replace tendons, artificial lenses for the eye, and cochlear implants to help the deaf (a field to which Australian workers have contributed very significantly).

One Hundred Years of Wellcome in Australia 1886-1986

In 1986 the Wellcome organisation reached its first century in Australia.

In 1886 the London-based pharmaceutical company Burroughs, Wellcome decided to open its first overseas branch and established an office in Australia.

A century later, Wellcome Australia continues to have a significant role in medicine in Australia and in the activities of the unique Wellcome Foundation Limited of London. The Foundation is the parent company of an international group of pharmaceutical and chemical companies.

The Foundation is unique in that under the terms of the will of Sir Henry Wellcome, all the shares in the Company were bequeathed to The Wellcome Trust, a registered charity. The Trust distributes the profits it receives to support research in medicine and allied sciences throughout the world.

Support for Australian medical research from The Wellcome Trust now totals over $3 million in over 200 individual grants.

Burroughs, Wellcome & Company was originally founded by two enterprising young American pharmacists, Silas Burroughs and Henry Wellcome, who had gone to England to represent American pharmaceutical companies.

There they decided to go into partnership, establishing Burroughs, Wellcome & Company in London in 1880. The medicines they produced soon achieved a reputation for purity and consistency quite exceptional for their time, and the new firm flourished.

In 1882, Silas Burroughs embarked on an epic sales journey around the world. In Australia, he travelled across the continent for a year promoting the company's products.

On leaving Australia, Burroughs first appointed a representative and then in 1886, a branch of the Company was opened in Melbourne. In 1902, the Company began manufacturing in Australia.

The most famous group of products developed by Burroughs Wellcome was the "Tabloid" range, compressed products of a precise dosage and efficacy. In Australia the "Tabloid" brand occupied the main part of the Company's activity for more than fifty years.

In its world-wide structure the Wellcome Foundation now employs over 18,000 people in more than fifty countries.

In Australia, Wellcome has offices in all States and distributes more than three hundred products throughout the Commonwealth including such household names as CODRAL, ACTIFED and SUDAFED. The Wellcome range also includes prescription medicines and diagnostic reagents, as well as products for the protection of crops and public health. In celebrating its century of service to the Australian community the Wellcome Company reaffirms its continuing commitment to product development and support for research in Australia.

Anatomical Teaching, Paris, 18th century.

Originally published by The International Cultural Corporation Of Australia (1986)
Original ISBN-10: 0-64209-877-8