Occupational Health

A guide to sources of information

Edited by

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Preface

R. S. F. Schilling

Anyone in the field of occupational health, be they physician, nurse, hygienist or safety officer needs to know *how* to practise occupational health and *where* to seek information on a variety of problems which may arise in the working environment. It is relatively easy to acquire from training and experience the basic principles of practice. What is much more difficult is to keep up to date with new techniques and new facts about the host of old and new health hazards which may arise in the workplace. If this is not done an occupational health service will eventually become less effective and incompetent by present day standards.

In our Occupational Health Courses at this School we emphasize the importance to those practising occupational health of knowing how to seek information and being currently aware of new facts. This is why Dr. Suzette Gauvain has provided this invaluable guide to available sources of information. The first edition published in 1968, primarily for the benefit of post-graduate students at this School and members of the Society of Occupational Medicine, was soon out of print. This, the second edition, has been greatly expanded in its scope, and will be invaluable to all practitioners of occupational health wherever they are.

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Introduction

Suzette Gauvain

The aims of this book are to provide information on employment opportunities, training and relevant specialist societies, and to indicate text-books, journals, other publications and sources of information which may be of value to members of an occupational health team. In order to achieve these aims help has been sought from specialist contributors in all branches of occupational health. The purpose is not to provide encyclopaedic information but to assist the reader to know sources where he may gain special additional information for himself through libraries, information services and, when necessary, through personal contact with experts in specialist fields.

Information given is concerned primarily with occupational health in the context of the United Kingdom but an attempt has been made to give additional information helpful to readers in other countries.

The need for such a book became apparent as a result of requests for information from postgraduate physicians seeking training in occupational medicine. The functions of a university department may be defined as teaching and research, but an added service, which is necessary to fulfil both, is to provide a *guide* to available sources of information. Originally such a guide (unpublished) was provided by Professor C. H. Wood who compiled the first sources of information for students in occupational medicine at the London School of Hygiene and Tropical Medicine. Over the years this has been expanded and the first edition of this book was published by the Society of Occupational Medicine in 1968, primarily for the benefit of members of the Society. This book was small and limited in publication to 2,500 copies. Within two years the Guide was out of print and the demand has been such that a second and much expanded edition is now presented.

Occupational health was defined by the joint International Labour Office/World Health Organization (ILO/WHO) Committee in 1953 as the promotion and maintenance of the highest degree of physical mental and social well-being of workers in all occupations and places of employment. In 1959, in Recommendation 112, the International Labour Organisation described occupational health services in places of employment as a service established in or near a place of employment for the purposes of:

(*a*) protecting the workers against any health hazard which may arise out of their work or the conditions in which it is carried on.
(*b*) contributing towards the workers' physical and mental adjustment, in particular the adaption of the work to the workers and their assignment to jobs which they are suited.
(*c*) contributing to the establishment and maintenance of the highest possible degree of physical and mental well-being of the workers.

Many countries have signified acceptance of these concepts.

The official Journal of the Common Market, 31st August 1962 published the recommendation from the Commission to member states regarding occupational health services in places of employment. This stated: "Occupational health must be considered within the context of Article 118 of the Treaty establishing the European Economic Community as being one of the objects of that close collaboration that the E.E.C. Commission has the duty of promoting between member states in the social field, particularly in matters relating to working conditions, protecting against occupational accidents and diseases and industrial hygiene."

The European Parliament, in a Resolution dated 1st July, 1960, dealing with the human and medical aspects of research undertaken in the countries of the Community on safety and health at work, stresses the need for scientific research to be organised on a European scale and expresses "the hope that the six countries in the Community will be able to bring their medical industrial policies into line by means of meetings at a European level of the responsible Ministers in the different countries." It "invites the Executive of the three European Communities to co-operate with a view to ensuring the coordination and encouragement of research on a European basis and also the harmonisation on the same level of legislation and teaching relating to occupational health."

The entry of the United Kingdom into the European Economic Community on January 1st, 1973 leads to the hope that eventually these ideals and this "harmonisation" may be fulfilled. However, as David Goss in the special edition of the Times, Forward into Europe II, January 3rd, 1973, states regarding professional services "the question of free movement of services should have been settled by the end of 1969, when the twelve year transitional period of the Community of the Six ended. Article 59 of the Treaty of Rome stated that restriction on the free supply of services within the Community should be progressively abolished during the transitional period for nationals of member states". In fact little progress has been made and our entry has not coincided with free movement of doctors between the member states.

The requirements for training in the various medical specialties are still under discussion but it is hoped that unanimity of opinion may be achieved particularly with regard to occupational medicine.

In 1972 the Employment Medical Advisory Service Act received the Royal Assent enabling the British Government to set up an Employment Medical Advisory Service (EMAS) to study and give advice on medical problems connected with employment. The Act comes into force on February 1st, 1973. The new service is planned to establish a focus for the development of occupational medicine in Britain, and will be part of the Department of Employment. The service will be available to give advice to employers, trade unions, employees, general practitioners and others with an interest in the subject. The staff of more than one hundred full and part-time doctors will specialise in occupational medicine and will be based in the country's main industrial centres. The staff will also include nurses who will assist in medical examinations and surveys of occupational groups which the EMAS will undertake. The new Service will study and advise on various subjects including the effects of particular jobs on health; the medical precautions to be taken in working with poisonous and hazardous substances; the medical requirements for different kinds of work and the particular problems of the disabled and will have a special responsibility for the health of young people at work.

Although medical surveys and other investigations will be carried out no medical treatment will be provided.

Originally this Service was proposed by the previous Labour Government (before loss of office) as part of far more extensive new legislation.

Lord Robens, Chairman of the Committee of Inquiry into Safety and Health at Work, presented the report of the Committee to the Secretary of State for Employment on the 9th June 1972. The terms of reference were:

"To review the provisions made for the safety and health of persons in the course of their employment (other than transport workers while directly engaged on transport operations and who are covered by other provisions) and to consider whether any changes are needed in:

1. the scope and nature of major relevant enactments, or
2. the nature and extent of voluntary actions concerned with these matters, and to consider whether any further steps are required to safeguard members of the public from hazards, other than general environmental pollution, arising in connection with activities in industrial and commercial premises and construction sites, and to make recommendations."

The Report has had far reaching effects and it is believed that the present Government is likely to act on the recommendations made in paragraph 125: "that the statutory provisions dealing with safety and health at work should be revised and reorganised; that so far as possible they should be unified within the framework of a single comprehensive enactment; and that they should be administered by a new Authority for Safety and Health at Work."

This new awareness of the importance of safety and health in Great Britain is paralleled by developments in the United States of America. Under Public Law 91–596, the 91st Congress S.2193 on December 29th, 1970, made history with an Act "to assure safe and healthful working conditions for men and women; by authorising enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that this Act may be cited as the 'Occupational Safety and Health Act of 1970'."

Occupational health services in private and nationalised industries continue to expand and employ skilled staff. In the succeeding chapters it is hoped that information of value to all of these, as well as those employed in Government services, in the newer occupational health services in universities, hospitals, laboratories and in management will find information of value, and, most importantly, be able to solve their own particular problems.

Without the help of all the major contributors this book could not have been completed in its present form. The guidance given in each chapter is based on the author's own experience and opinion of the needs of occupational health personnel. Chapters relevant to *occupational physicians; occupational hygienists; occupational health nurses; occupational psychologists; ergonomists; biomedical engineers; safety engineers* and *safety officers* are included. Each contributor was asked to consider the following points; *definition and duties; approximate numbers employed in the United Kingdom; employment opportunities; guide to pay scales; training, basic* *qualifications, training courses, qualifications obtainable, costs and sponsoring bodies, syllabus of training; reading lists, text books, journals, additional selected references; specialist societies* and *associations*.

Many contributors make reference to conditions in other countries, especially the United States of America.

The chapters on *The Design of Occupational Health Departments; First Aid; Libraries; Information and Advisory Services; Management; Trade Unions; Air Pollution; Environmental Pollution Problems in the United Kingdom; The Ross Institute of Tropical Hygiene; Occupational Medicine and the Common Market;* follow different patterns of presentation.

World Occupational Health Services have been divided into two major sections: *The World Health Organization* and *The International Labour Office*.

In addition, many individuals from different countries working in occupational health departments of universities, research institutes and industries have provided information on a personal basis. Some information on international agencies, societies and organisations of relevance to occupational health is also included.

Members of the Society of Occupational Medicine and university departments of occupational health, research institutes and many other individuals and organisations have contributed to the information which has been collected, mostly by questionnaire, and all are most gratefully acknowledged.

In conclusion:

The purpose of this book is the provision of *guidance* to readers and may be summarised in diagrammatic form (see pages xv–xvii).

The answers to questions will, we hope, be found in the text. However, if not available from the text itself, guidance on how to obtain the answers through conventional sources, such as text books, journals, libraries and information services is provided. Some members of the Society of Occupational Medicine and others may be approached on a personal basis, but their help should not be sought unless the information cannot be obtained elsewhere. Information on whom to approach will be supplied by the Secretary of the Society of Occupational Medicine at The Royal College of Physicians, 11 St. Andrew's Place, London, N.W.1.

In a book such as this, inevitably and unfortunately information which should be included is omitted and information is included which is out of date or inaccurate. Many people have helped me to overcome these difficult problems. I am particularly grateful to Dr. Stuart Hall and Miss Shiona Archibald for special assistance. To anyone who may be wrongly quoted and to any contributor who has provided information which has been inadvertently left out I offer my profound apologies and greatly regret the delay between compilation and publication.

Finally, I would like to thank Miss Key and Mrs. Cohen for the collection of data and secretarial assistance. Additional secretarial help has been given by Mrs. Collins and Miss MacCarthy. Members of the staff of the TUC Centenary Institute have given invaluable advice; all this help is gratefully acknowledged.

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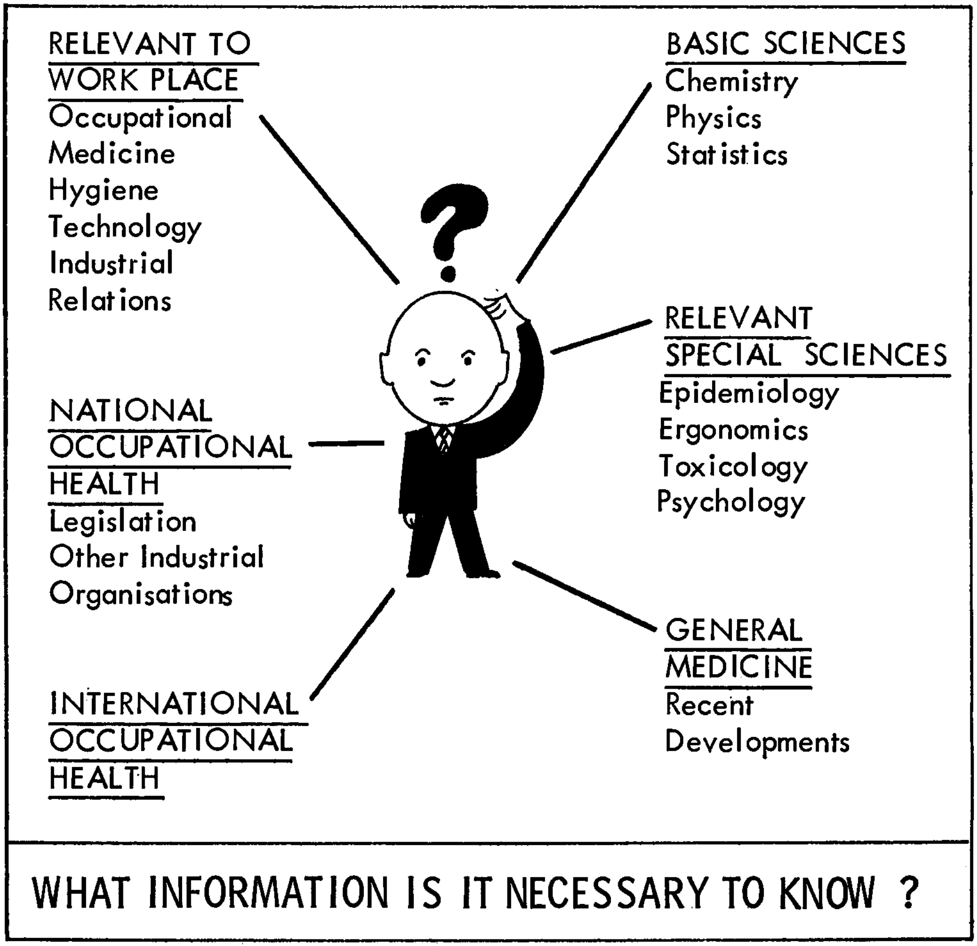
RELEVANT TO
WORK PLACE
Occupational
Medicine
Hygiene
Technology
Industrial
Relations
BASIC SCIENCES
Chemistry
Physics
Statistics
RELEVANT
SPECIAL SCIENCES
Epidemiology
Ergonomics
Toxicology
Psychology
NATIONAL
OCCUPATIONAL
HEALTH
Legislation
Other Industrial
Organisations
GENERAL
MEDICINE
Recent
Developments
INTERNATIONAL
OCCUPATIONAL
HEALTH
WHAT INFORMATION IS IT NECESSARY TO KNOW ?

Diagram 1.

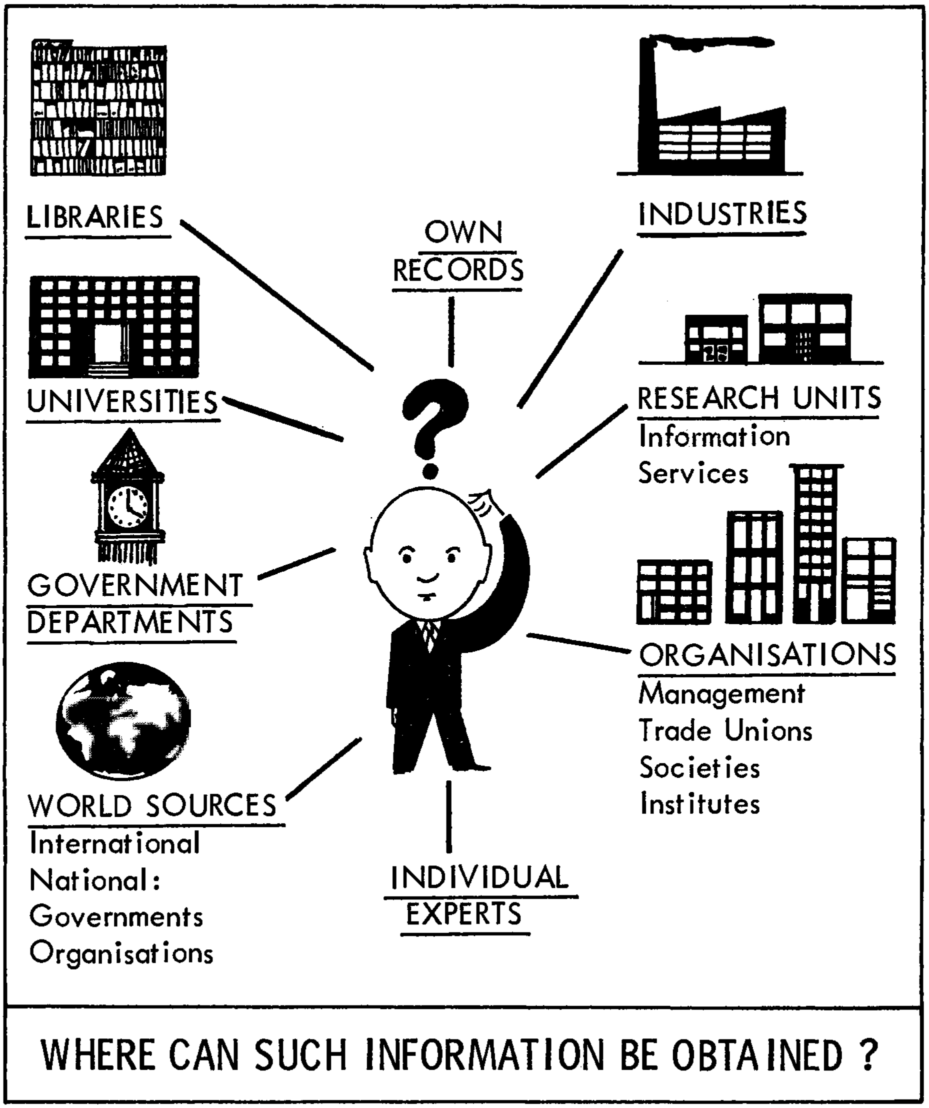
LIBRARIES
OWN RECORDS
INDUSTRIES
UNIVERSITIES
RESEARCH UNITS
Information
Services
GOVERNMENT DEPARTMENTS
ORGANISATIONS
Management
Trade Unions
Societies
Institutes
WORLD SOURCES
International
National:
Governments
Organisations
INDIVIDUAL EXPERTS
WHERE CAN SUCH INFORMATION BE OBTAINED ?

Diagram 2.

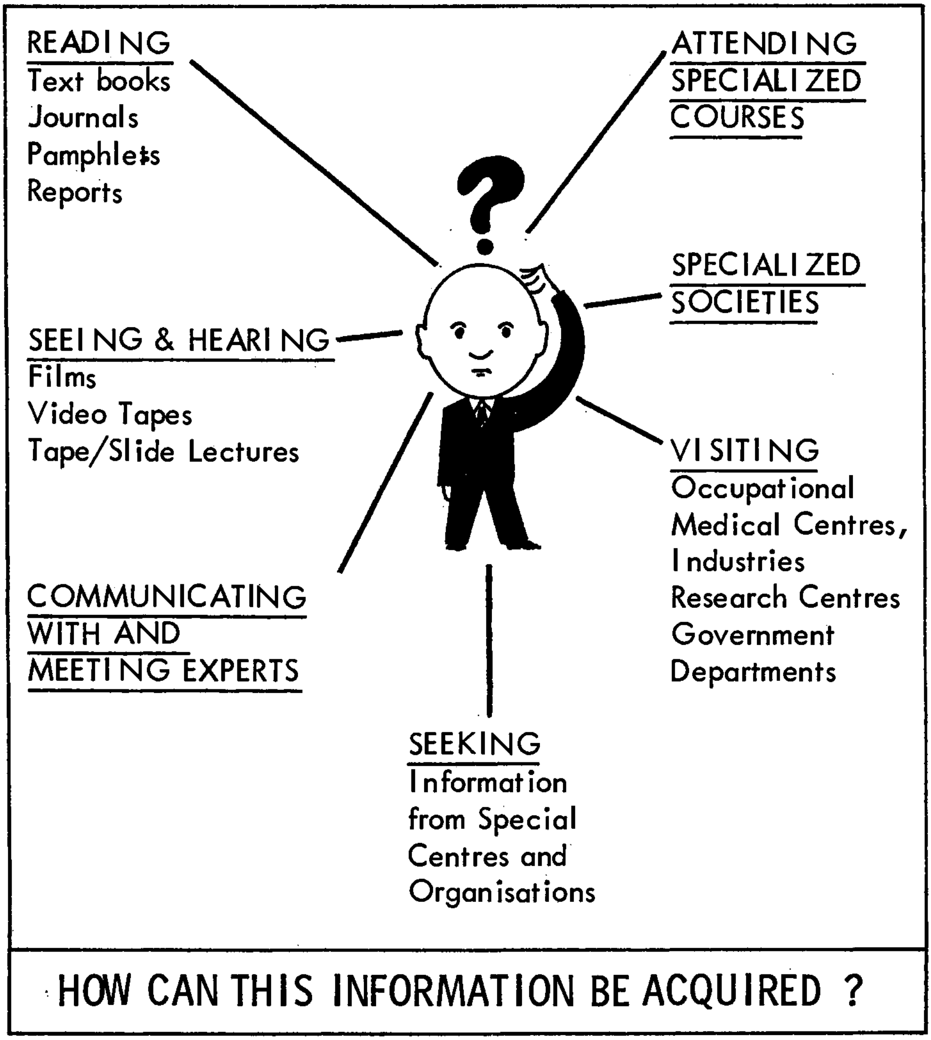
READING
Text books
Journals
Pamphlets
Reports
ATTENDING SPECIALIZED COURSES
SPECIALIZED SOCIETIES
SEEING & HEARING
Films
Video Tapes
Tape/Slide Lectures
VISITING
Occupational Medical Centres,
Industries
Research Centres
Government Departments
COMMUNICATING WITH AND MEETING EXPERTS
SEEKING
Information from Special Centres and Organisations
?
HOW CAN THIS INFORMATION BE ACQUIRED ?

Diagram 3.

Occupational Physicians

Occupational health should aim to protect and improve the health of all classes and kinds of worker (Schilling 1972). The occupational physician and the occupational health nurse are very important members of a team, which should ideally also include occupational hygienists, occupational psychologists, ergonomists, biomedical engineers, safety engineers and safety officers and first aiders.

The occupational physician is concerned primarily with man and the influence of work on his health; the occupational hygienist is concerned primarily with man's environment. Both, in conjunction with the other members of the team, have responsibilities for recognising, measuring and controlling health hazards in the psycho/social environment.

The occupational physician may, in fact, be unsupported by any other members of such a team, particularly if he is working in a small or medium sized industry, or he may have the help of a nurse who may, or may not, be trained in occupational health nursing, and first aiders. In all probability he will only be able to call on occupational hygienists, ergonomists, biomedical engineers and psychologists as advisers when he feels that he has a problem requiring their expertise. He may have no laboratory facilities in his own industry and be dependent on laboratory facilities and advice from Government departments (such as the Department of Employment Medical Advisory Service, and H.M. Factory Inspectorate and/or the National Health Service) or independent advisory and information and laboratory services, therefore it will be necessary for him to receive basic training in all these disciplines, as well as occupational medicine.

Basic qualifications

To practice occupational medicine at present a basic medical qualification is all that is required by law in the United Kingdom. However, many industries and occupational health services in Government departments in the United Kingdom and overseas require or request further postgraduate training.

SUPPORT FOR TRAINING

Overseas Physicians

Full information on scholarships for study in the United Kingdom can be obtained from the U.N.E.S.C.O. handbook "Study Abroad" and a further booklet is "United Kingdom Postgraduate Awards" (50 pence) published by the Association of Commonwealth Universities, 36 Gordon Square, London, W.C.1. An overseas student studying in this country finding himself in financial difficulties as a result of a change in personal circumstances or the political situation in the student's own country should consult the Educational Grants Advisory Service, National Council of Social Service, 26 Bedford Square, London, WC1B 3HN. The British Council's own scholarship scheme is applicable to postgraduate physicians studying occupational medicine for one academic year. The awards are allocated by country and nomination has to be made in the country of origin.

The World Health Organisation has a number of W.H.O. Fellowships which also have to be applied for from the country of origin through the regional W.H.O. office.

In addition to the above, certain governments and industries sponsor their own physicians for academic training in specialized centres abroad.

United Kingdom Physicians

Certain industries will send their own occupational medical staff on courses of training either part or full-time; but in most industries the training time allowed is not longer than three months whole-time, or a longer period part-time. Fellowships are sometimes available in University Departments and these are usually advertised in the medical press.

Government departments may sponsor medical staff for postgraduate training. The Armed Forces Medical Services have schemes of training; principals in general practice may apply through their local executive council for grants from the National Health Service for postgraduate training, which usually cover locum fees in addition to living expenses and the expenses of attending the training course. The Postgraduate Medical Federation, Central Office, 33 Millman Street, London, WC1N 3EJ, organise courses for which fees and expenses can be reclaimed through application on the appropriate forms to the National Health Service.

The Medical Research Council provide a limited number of training grants for which application must be made through the University Department providing the training. In addition to the above there may also be special grants available in the University departments providing the training courses.

Generally speaking sponsorship is more difficult to obtain for United Kingdom physicians.

Post Graduate Training

Over the period, 1959–1968, of 185 students who attended the three months annual occupational health course leading to the Diploma of Industrial Health at the Department (now the TUC Centenary Institute) of Occupational Health at the London School of Hygiene and Tropical Medicine, 103 were from the United Kingdom, 82 from overseas. Sixty-seven per cent of the 185 students were sponsored and 33 per cent were responsible for their own fees.

Selection for Training

Applications to attend courses leading to a postgraduate diploma or higher degree are likely to depend on the ability of the course to enhance future career prospects, but, more importantly, the subject studied should have clearly defined goals. In occupational medicine postgraduate training and a diploma in industrial health are accepted as advantageous to the individual and to the body sponsoring training, but posts and promotion in occupational medicine are uncertain, unlike specialties within the National Health Service which have well established career patterns. Nevertheless, applications have always exceeded vacant places on training courses at the London School of Hygiene and Tropical Medicine. The criteria of selection of students have been established and remain consistent. Selection is based primarily on an expressed intention to practice occupational medicine or to make use of the training in teaching or research in the future. Previous employment in industry, the armed forces medical services and/or some experience in general practice is regarded as an advantage. References are sought and whenever possible students interviewed. Personal interviews are particularly helpful both to the selectors and students for clarification of motivating factors, pre-course study required, and, in the case of overseas students, an assessment of their ability in the English language. Tests of written and spoken English are undertaken in the overseas students' own country by the British Council, but in spite of a satisfactory performance in these tests, their ability in the English language is sometimes inadequate and failure in the examination may occur.

Importance and Value of Postgraduate Training

One hundred and seventy-six physicians attending these courses over the period 1958–1969 sat a Diploma in Industrial Health examination; 148 (84%) were successful. To assess further the value of postgraduate training in occupational medicine at the London School of Hygiene and Tropical Medicine, questionnaires were sent to former students attending annual courses over the same period. Of 181 students who had attended courses whole-time over this period, 138 (76%) returned completed questionnaires. One hundred and twenty-one were practising occupational medicine, 88 full-time and 33 part-time, the majority, 74 in industry. Seventeen were not practising occupational medicine. One hundred and twenty-seven (92% of the 138 respondents) stated the training received had been of advantage in their subsequent career and 93% were able to apply the knowledge gained in the course of their work. The conclusion to be drawn from this study is that the majority of physicians selected for training are practising occupational medicine successfully and valued the course, but no analysis was possible of the careers of non-respondents(43 former students) or of those students who applied and were not selected. (Of the non-respondents three are known to have died, five are known to be working in occupational medicine and eight questionnaires were returned to sender address unknown) (Gauvain 1972).

Training Courses Available in the United Kingdom

Three month whole-time courses leading to a Diploma of Industrial Health are available annually at the T.U.C. Centenary Institute of Occupational Health at the London School of Hygiene and Tropical Medicine (as already stated) and at the Department of Social and Occupational Medicine at the University of Dundee, 9 Dudhope Terrace, Dundee (Appendix 1). Written application should be made respectively to the Registrar, London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street) London, WC1E 7HT and the Postgraduate Medical Education Department of the Faculty of Medicine, University of Dundee, Dundee, Scotland for the appropriate forms. These courses are based on the requirements for the syllabus of training for the D.I.H. of the Society of Apothecaries of London (see Regulations later in this Chapter), and the D.I.H. of the Examining Board in England set by the Royal College of Physicians of London and the Royal College of Surgeons of England who provide the Regulations for obtaining the Diploma of Industrial Health. The information can be obtained from the Secretary at The Examination Hall, 8–11 Queen Square, London, W.C.1. Examinations are held in January and July each year. Candidates must hold qualifications in medicine, surgery and midwifery recognised by The Examining Board in England and must be fully registered in the British Medical Register or fully registered in the country in which the qualification was granted, and they must have been in possession of these qualifications for not less than three years.

Candidates may enter for the Examination on producing evidence of having attended satisfactorily and regularly at an institution recognised by the Examining Board in England a course extending over *either*

(*a*) an academic year of whole-time study or

(*b*) not less than eighteen calendar months of part-time study which in the opinion of the Examining Board be substantially equivalent to the period of whole-time study prescribed or

(*c*) a combination of a period of whole-time study and a period of part-time study which shall together cover a period of not less than fifteen months, and shall in the opinion of the Examining Board be substantially equivalent to the period of whole time study prescribed.

(*d*) Provided that no candidate shall be admitted otherwise than as a whole-time student to any course such as is prescribed unless any part-time employment in which he proposes to engage during the period covered by the course is approved by the authorities of the teaching body by which the course is provided.

(*e*) The conditions of admission to the examination may be modified at the discretion of the Committee of Management in the case of a candidate,

  (i) who has held whole-time appointments as an industrial medical officer for not less than three years or

  (ii) who holds a Diploma in Public Health

  (iii) whose experience during not less than ten years appears to the Committee to be adequate.

(*f*) Candidates must give 28 days notice in writing to the Secretary at the Examination Hall of their intention to present themselves for examination forwarding at the same time the necessary certificates.

(*g*) Applications for admission to the examination must be accompanied by the full amount of the fee payable. For 1972–73 fees are £40.

The Examination is written, clinical and oral.

The Regulations and Syllabus relating to the Diploma in Industrial Health of the Society of Apothecaries of London is obtainable from The Registrar, Apothecaries' Hall, Black Friars Lane, Queen Victoria Street, London, E.C.4.

Regulations for admission to the Examination for the Diploma in Industrial Health are:

(1) Candidates must be registered by the General Medical Council and have possessed a qualification for at least two years to practice medicine, surgery and midwifery in the United Kingdom.

Graduates in medicine, surgery and midwifery of the British Commonwealth, countries of the European Economic Community or Foreign Universities recognised by the Society, but whose degrees are not registrable in this country, may be admitted to the Examination by approval of the Court if they have complied with all other requirements of the Regulations.

(2) Candidates must produce satisfactory evidence that after qualification they have been engaged:

(i) in whole-time practice of Occupational Medicine or medical research in industry for not less than two years; or

(ii) in part-time practice of Occupational Medicine or medical research in industry for not less than four years.

Members of H.M. Services and others whose training and experience are analogous to those detailed above, may be admitted to the Examination subject to their applications being approved by the Society.

(3) Candidates who have satisfactorily completed a recognised course of instruction may, if the Society approves, receive some concession with regard to the requirements of paragraph 2 above; but no candidate will be admitted unless he has completed one year's whole-time or two years' part-time practical experience. The Society will advise candidates which courses are recognised for this purpose. Candidates wishing to avail themselves of this concession must produce evidence from the Dean or other authority that a course has been satisfactorily completed.

(4) The Examination will be written, clinical and oral.

(5) The fee for the Examination is £25. The re-examination fee is £10.

Part-time Training in Occupational Medicine

The Department of Occupational Health, The University of Manchester Clinical Sciences Building, Manchester 13 (Professor W. R. Lee) provides part-time training for physicians in occupational medicine. The course continues over two academic years, but graduate students are admitted annually. During term-time attendance averages a day a week. Information about courses of training is available from the Department of Occupational Health.

In-Service Training in Occupational Health

The National Coal Board provides for those Medical Officers who wish to sit for a D.I.H. examination an in-service preparatory course (Appendix 11).

Short Courses in Occupational Medicine

A regular short course covering one week is run annually by the Department of Occupational Health in Manchester usually in December. Enquiries should be made to the Department. Annual courses of one week's or week-end's duration are run in London at the request of the British Postgraduate Medical Federation. Information can be obtained from the British Postgraduate Medical Federation (address as before).

The Registrar at the London School of Hygiene and Tropical Medicine and the Secretary of the Society of Occupational Medicine at the Royal College of Physicians, 11 St. Andrew's Place, Regents Park, London, N.W.1, will give information concerning short courses organised by them respectively or jointly. These short courses are intended to provide either introductory training for those who plan a career in occupational medicine or to provide continued education for those practising occupational medicine and who wish to become acquainted with recent advances in the subject.

Higher Medical Education

The Joint Committee on Higher Medical Training published its first report in October 1972 and states in the foreword "The Royal Commission on Medical Education considered at length the question of postgraduate education and training. While recommending that all graduates should have three years of general professional training after registration, the Commission recognised that, in the training of the consultant, there would need to be yet a further period of 'vocational' or specialist training. It was envisaged that completion of training might be recognised by the General Medical Council, which might maintain a Register of Specialists on the lines of those recognised in the countries of the European Economic Community. The suggestion of a specialist register has not yet received the approval of the profession.

"The responsibilities of the Joint Committee are to lay down criteria for training in the medical specialties, to approve hospital posts which are suitable for training and to award certificates of accreditation to those who have successfully completed training."

In their general introduction to the training programmes they state—"It is not intended, nor is it possible, to lay down rigid prescription for the training of specialists. Any suggested framework in the following schedules should be interpreted flexibly, allowing for variation in time, for the special needs of individuals and for local circumstances."

The framework of training suggested for Occupational Medicine is as follows:

General Professional Training

Either:

"(*a*) Training for three years as followed for General (Internal) Medicine; or

(*b*) Training for three years during which a recognised examination in occupational medicine would be taken. At least two years would be devoted to a training in occupational medicine by holding appointments in industry, university, Government service or the armed forces, and taking a course of training required for the examination. The remainder of the training period would be spent in appointments in general medicine or in clinical subjects related to occupational medicine such as respiratory medicine, dermatology, psychiatry, industrial rehabilitation and rheumatology, casualty surgery."

Higher Specialist Training

"This period of training should normally be for four years undertaken in approved appointments in universities, hospitals, research units, Government service, armed services and occupational health services. Before admission to the register as a specialist, account would be taken of the programme followed by the trainee, reports from supervisors, publications and academic attainments. During this period of training a trainee who had not taken an M.R.C.P. would be expected to have done original work leading to an M.D. or a Ph.D."

This pattern, if it is adopted, will provide a pattern comparable to that in the United States. This will be discussed later in this chapter.

The Master of Science Degree Course in Occupational Medicine

A first step towards higher medical training in the United Kingdom was taken in 1969 with the introduction of an M.Sc. Degree course in Occupational Medicine at the London School of Hygiene and Tropical Medicine.

The main objectives of the course are:

(1) To know how to organise and run an occupational health service.

(2) To know how to identify, assess and control occupational hazards by observing individuals and groups in relation to their work environment. Because of the special value of observing groups, the teaching of statistics and epidemiological methods are essential.

(3) To understand the special problems that arise out of relations between management and workers, emphasising throughout the impartiality of the occupational physician and the confidentiality of medical information about individual patients.

(4) To know methods of seeking information and the importance of currently being aware of new facts.

The course is designed to provide professional training for doctors in industry, government services or the armed services who require an academic training in occupational medicine or who wish to follow a career in research and teaching. The course replaces the training previously provided at the School by the combined D.P.H. and occupational health courses.

QUALIFICATIONS FOR ADMISSION

The course of study is open to those who are medical practitioners registered in the British Medical Register or fully registered in the country in which the qualification was granted, provided such registration is acceptable to the University. The candidate must have been in possession of these qualifications for not less than three years.

EVIDENCE OF QUALIFICATIONS

Students whose medical qualifications are not registered in this country are required, for University registration purposes, to bring with them to the course their original degree certificates and, if necessary, certified English translations. Photostat copies may be submitted in place of the originals provided they are signed by the Registrar of the University at which the degree was obtained.

SCHOOL FEES

The composition fee, which includes registration fee of £5, tuition, and provision of a locker, is £250. Cheques should be payable to "London School of Hygiene & Tropical Medicine". A deposit of 50p is required on the locker key after arrival.

UNIVERSITY FEES

Registration

A fee of £8 is payable for each registration as an Internal Student of the University. Applications for University registration are submitted to the University through the School authorities after the start of the course.

Examination

The examination entry fee is £25.

LENGTH OF COURSE

The course will normally start on the Monday nearest to 1 October and with the period of examination will last for an academic year.

ADMISSION

Applications for admission should be submitted to the Registrar by **1 February preceding the course concerned.** The number of places is strictly limited. Candidates will be informed as soon as possible whether or not they can be admitted. On acceptance, a student is required to send two passport-size photographs.

Applicants' names cannot be added to the list of those accepted until the School registration fee of £5 is paid. Registration fees are neither returnable nor transferable except in special circumstances to be determined by the Dean.

PROFICIENCY IN ENGLISH

It is essential that applicants from abroad should have a thorough knowledge of the English language.

English Language

Students are accepted for all courses on the basis that they have a command of the English language which is sufficient to enable them to follow both written and verbal matter with ease. In cases of even the slightest doubt about fluency students are advised to come to London at least one week before the commencement of the October courses to attend an Introductory Course held at the School and English language classes held by the British Council and other organisations.

Accommodation

Students who need help in finding suitable lodgings are advised to apply to the Lodgings Officer, University of London Lodgings Bureau, c/o University of London Union, Malet Street, London, WC1E 7HU. (Telephone: 01-636 2818). A personal interview (between 10.30 a.m. and 12 noon, or 2.30 and 4.00 p.m.) is desirable but, if this is not practicable, application may be made by post. Each student's particular requirements will be carefully considered and no fee is charged.

In case of difficulty the Registrar of the School will be pleased to supply a list of hotels in the vicinity of the School to whom students may write for temporary accommodation.

University of London Adviser to Overseas Students

Students from overseas may obtain general information and advice on private matters or personal difficulties from the University of London Adviser to Overseas Students, c/o University of London Union, Malet Street, London, WC1E 7HU. (Tel. 01-580 5035). Office hours: Mondays to Fridays, 9.30 a.m.–5.30 p.m.

"How to Live in Britain"

A copy of the British Council publication "How to Live in Britain" is available free of charge from the Registrar to all students registered for a course at the School and visiting this country for the first time.

Situation of the School

The School is in central London, near a number of railway stations and bus routes.

Student Health

A first-aid room is accommodated on the ground floor of the School for the treatment of minor injuries.

The School is a member of the University of London Central Institutions Student Health Service, where there are full medical and dental facilities and a general practitioner service. Details will be available to each student on registration.

GENERAL ENQUIRIES

The Registrar will be pleased to answer queries concerning any course of study held at the School. All enquiries concerning application for admission, registration, tuition fees, entry to examinations, scholarships and grants should be addressed to her. A memorandum describing further facilities available to students in both the School and the University will be sent to each registered student shortly before the commencement of his or her course.

Regulations and syllabus

Course of Study

A candidate for the degree is required to attend a whole-time course of study approved by the University extending over an academic year.

The course of study must, unless special exemption is obtained, be continuously pursued. Any interruption in a student's attendance, through illness or other exceptional circumstances, must be notified by the authorities of this School at the earliest opportunity to the Academic Registrar.

Curriculum

Systematic and Practical Instruction

1. Occupational Health

(*a*) History and legislation: The history of occupational health; legislation to protect people at work.

(*b*) Aims and functions of services: The aims and functions of occupational health services and their relationship to other health and social services; the design of accommodation and equipment for occupational health services; the planning and functions of medical and other screening examinations; the organisation of casualty medical services for sick and injured; the study of rehabilitation and resettlement and retraining of injured and sick.

(*c*) Occupational disease: The aetiology, diagnosis, prevention and treatment of occupational diseases and accidents, and of diseases associated with industrial development in tropical countries.

(*d*) Work physiology and occupational toxicology: General effects of work on health, ill health and productivity, including: principles of physiology in relation to work and environment; reaction of the body to the environmental conditions including temperature, humidity, barometric pressure and noise; principles of toxicology; mode of entry of toxic substances into, and their action on, the body.

(*e*) Psychology: Factors influencing mental health, human relations and emotional adjustment at work.

(*f*) The physical environment: Measurement and control of chemical, physical and biological hazards of work, including toxic gases, liquids and dusts; ionising and other radiations: noise and vibration; abnormal temperatures and pressures; atmospheric pollution; industrial wastes.

The measurement and provision of safe and comfortable conditions of work; lighting, heating, ventilation and air conditioning.

(*g*) Ergonomics: Design of equipment and machines with particular reference to the physiological, anatomical and psychological aspects of man in his working environment.

(*h*) Vulnerable groups: Vulnerable occupational groups, particularly problems relating to the employment of women, young and elderly persons.

(*i*) Health education: Methods of educating management and workers in the promotion and maintenance of health.

(*j*) Sources of information: Sources of information on occupational health and other relevant topics.

2. Medical Statistics and Epidemiology

Statistical methods; data processing; use of computers; demography and vital statistics; social statistics. Principles and methods of epidemiology; epidemiology of non-communicable—and particularly occupational disease—and communicable disease. Statistical and epidemiological methods used for studying occupational disease in the field; in particular experimental design and sampling techniques.

3. Social and Behavioural Sciences

Social conditions of the community; social effects of illness; social deviation. Behaviour in relation to health and disease. Theory of organisation; systems of government; organisational structure; sociology of the professions; inter-professional relationships; relationships between professions and the public; dynamics of social change; theory and practice of communications; medical ethics. Industrial relations, the functions of management, trades unions, personnel and welfare services.

Health and social service economics and their relation to national investment.

4. Genetics and Growth

Including inherited variation of response to environmental disease factors in man; growth, development and ageing.

5. Practical Instruction

Teaching will include attendance at outpatient clinics, rehabilitation centres and specialist postgraduate institutes, for the study of injury and disease caused or adversely affected by occupation; this will be supplemented by visits to factories, other workplaces, laboratories and research centres.

Students will be required to make a practical study of an occupational health problem in a factory or other workplace; or to participate in a field project with experienced investigators; or to do practical work in a laboratory or hospital. A written report must be submitted before entrance to the examination at the end of the course of study.

EXAMINATION

The examination will consist of three written papers, the report on the practical study, a practical examination in hygiene, physiology and clinical medicine, and an oral examination. A candidate must pass all parts of the examination on one and the same occasion.

The examination will be held once a year, on the first Monday in July.

Training Courses in Other Countries

The United States of America

Occupational medicine was first recognised as a specialty in 1955 by the American Board of Preventive Medicine. After qualification as a physician a further period of training is required; one year of internship followed by two years of graduate study in preventive and occupational medicine in a recognised school. The list of approved residencies in occupational medicine is published annually by the American Medical Association, 535 North Dearborn Street, Chicago, Illinois, 60610, and lists both academic and in-plant residencies. Regulations for in-plant residencies require that this should be one year of supervised experience in occupational medical practice in an approved industrial or medical organisation. The list for 1970–71 was as follows:

APPROVED RESIDENCIES

OCCUPATIONAL MEDICINE (Academic)

The following educational institutions have been approved by the Council on Medical Education and the American Board of Preventive Medicine, through the Residency Review Committee for Preventive Medicine, for TWO years of training in Occupational Medicine. The academic portion of these residencies will be given in the institutions listed. The in-plant training is arranged, and a separate listing of such programs follows the list of institutions giving the academic portion.

Institution or Agency	Physician in Charge	Residencies Offered 1970–1971 1st Year	2nd Year	Total All Years
CALIFORNIA				
Los Angeles				
University of California School of Public Health	F. A. Bryan	4	4	8
MASSACHUSETTS				
Boston				
Harvard University School of Public Health	J. L. Whittenberger	4	4	8
MICHIGAN				
Ann Arbor				
University of Michigan Institute of Industrial Health	H. J. Magnuson	4	4	8

Approved Residencies—OCCUPATIONAL MEDICINE (ACADEMIC)—continued

Institution or Agency	Physician in Charge	Residencies Offered 1970–1971 1st Year	2nd Year	Total All Years
NEW YORK				
Rochester				
University of Rochester School of Medicine and Dentistry	T. S. Ely	—	—	—
OHIO				
Cincinnati				
University of Cincinnati Institute of Environmental Health, Kettering Laboratory	L. B. Tepper	8	8	16
Columbus				
Ohio State University College of Medicine, Department of Preventive Medicine	J. H. Schuiete	3	3	6
OKLAHOMA				
Oklahoma City				
University of Oklahoma Medical Center, Institute of Environmental Health	C. A. Nau	2	2	4
PENNSYLVANIA				
Pittsburgh				
University of Pittsburgh, Graduate School of Public Health	D. Minard	4	4	8

OCCUPATIONAL MEDICINE (In-Plant)

The following plants and agencies have been approved by the Council on Medical Education and the American Board of Preventive Medicine, through the Residency Review Committee for Preventive Medicine, for ONE year of training to cover the requirement for in-plant training as the third year of a residency in Occupational Medicine. For further detailed information concerning a program, it is suggested that the applicant write to the physician in charge of the particular programme concerned.

	Physician In Charge	Residencies Offered 1970–1971 Total All Years
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DISTRICT OF COLUMBIA		
National Aeronautics and Space Administration Division of Occupational Medicine	L. B. Arnoldi	1
UNITED STATES AIR FORCE		
OHIO		
Headquarters, Air Force Logistics Command, Wright-Patterson Air Force Base, Dayton	L. T. Odland	2
UNITED STATES ARMY		
MARYLAND		
U.S. Army Environmental Hygiene Agency, Edgewood Arsenal	I. H. Simmons	2
UNITED STATES ATOMIC ENERGY COMMISSION		
IDAHO		
U.S. Atomic Energy Commission, Idaho Operations Office, Idaho Falls	G. L. Voels	1

Approved Residencies—OCCUPATIONAL MEDICINE (IN-PLANT)—continued

	Physician In Charge	Residencies Offered 1970–1971 Total All Years
UNITED STATES NAVY		
VIRGINIA		
Norfolk Naval Shipyard, Portsmouth	R. S. Stevenson	2
UNITED STATES PUBLIC HEALTH SERVICE		
OHIO		
Cincinnati		
U.S. Public Health Service, Environmental Control Administration, Bureau of Occ. Safety & Health	M. M. Key	1
UNITED STATES TENNESSEE VALLEY AUTHORITY		
TENNESSEE		
Tennessee Valley Authority Division of Health & Safety, Chattisaga	J. Craig	1
NONFEDERAL		
CALIFORNIA		
Fontana		
Kaiser Steel Corporation	H. A. Lewis	1
DELAWARE		
Wilmington		
E. I. duPont de Nemours & Company	C. A. D'Alonzo	0
MASSACHUSETTS		
Cambridge		
Harvard University Health Center, Division of Environmental Health and Safety	B. G. Ferris, Jr.	1
MICHIGAN		
Dearborn		
Ford Motor Company	E. A. Irvin	0
Detroit		
General Motors Corporation	S. D. Steiner	2
NEW YORK		
New York City		
American Telephone & Telegraph Company and Subsidiaries	L. H. Whitney	1
Rochester		
Eastman Kodak Company	W. L. Sutton	2
OHIO		
Cincinnati		
National Lead Company	J. A. Quigley	1
Columbus		
Ohio State University College of Medicine	J. H. Schulte	1
PENNSYLVANIA		
Harrisburg		
Commonwealth of Pennsylvania Department of Health	B. Tanaka	1
Pittsburgh		
Jones & Laughlin Steel Corporation, Pittsburgh Works Division	R. J. Halen, E. A. McGovern	1
WASHINGTON		
Tichland		
Hanford Environmental Health Foundation	P. A. Fuqua	1
Seattle		
Boeing Airplane Company, Aerospace Group	S. M. Williamson	2
WISCONSIN		
Milwaukee		
Allis-Chalmers Manufacturing Company	C. Zenz	2

Finally there has to be a period of not less than three years of practice or teaching or special training in occupational medicine. The examination consists of two days of written papers (multiple choice type questions) concerned with the broad aspects of preventive medicine on the first day and with occupational medicine on the second. An oral examination follows. Three hundred physicians were certified through examination in the first ten years (Goldstein and colleagues 1965).

Continuing Education

The Annual A.M.A. Congress on Occupational Health usually held in September each year for two days and the Industrial Health Conference held each year in April, sponsored by the Industrial Medical Association and the American Association of Industrial Nurses Incorporated attracts many full and part-time physicians working in industry and other branches of occupational medicine. The Council on Medical Education of the American Medical Association compiles lists of courses for physicians (Journal of American Medical Association, 1971, Vol. 217, No. 5, pages 601–688). Information can be sought from Dr. C. H. William Rube, M.D. and Dr. Rutledge W. Howard, M.D., The Department of Continuing Medical Education, American Medical Association, (address as above).

Australia

Dr. G. C. Gordon Smith, Head of the Section and Senior Lecturer in Occupational Health, School of Public Health and Tropical Medicine, University of Sydney, Sydney, N.S.W. 2006 organises three week courses for occupational physicians which have been part of the postgraduate D.P.H. course. In 1974 it is hoped that a postgraduate diploma course lasting an academic year may be instituted.

The Australian and New Zealand Society of Occupational Medicine has only recently been formed as a joint venture.

The Honorary Secretary, from whom information can be obtained, is Dr. K. E. Brown, Olympic Construction Industry, P.O. Box 1, West Footsway, Victoria 3012, Australia.

South Africa

In 1974 it is hoped that the Faculty of Medicine, University of Witwatersrand, Johannesburg may start a new Diploma in Industrial Health part-time course to be organised by Professor Ian Webster, National Research Institute for Occupational Diseases, Joubert Street Ext., Civic Centre, Johannesburg, South Africa.

The Diploma will be open to medical practitioners who hold qualifications registrable in the South African Medical and Dental Council, or who are fully registered in another country provided such registration is acceptable to the University.

Information about the syllabus, length of the course and registration should be obtained from Professor Webster.

For information about the South African Society of Industrial/Occupational Health inquiries should be made to the Hon. Secretary, Dr. Coetzee, 1404 Cape Towers, Cr. Marshall and McLaren Streets, Johannesburg, South Africa.

THE DUTIES OF THE OCCUPATIONAL PHYSICIAN

United Kingdom

These will vary depending on the employing organisation. In university departments these will include teaching and research, and in many cases part-time in the health service of an industrial organisation, or university and in some instances in a hospital.

Armed Forces Medical Services

The Armed Forces Medical Services have special requirements depending on the industrial activity carried on within the service. All will be concerned with the occupational health of fit young men and women, and the middle-aged.

The Institute of Naval Medicine, Alverstoke, Gosport, Hants., PO12 2D1, Tel.: Portsmouth 22351 ext. 41530, has teaching and research facilities in nuclear medicine, radiological protection, submarine, underwater and occupational medicine.

In the Air Force occupational physicians have responsibilities for pilots and flight personnel including maintenance staff. Training is given at the Institute of Aviation Medicine, R.A.F., Farnborough, Hants., Tel.: 0252 24461.

In the Army occupational physicians have a wide range of responsibilities varying from problems of quick transport of personnel to other countries where units may be isolated, to problems of routine work in units, workshops and maintenance depots. Problems of morale will be important in all services. The Director of Army Health is based at the Ministry of Defence, Millbank, London, S.W.1, Tel.: 01-834 9070 ext. 360.

Government Departments

Occupational physicians in government departments, in addition to administrative duties, will be concerned with the special problems of their own departments, ethnic groups and their own countries. The Employment Medical Advisory Service in the Department of Employment in the United Kingdom is concerned with advice on the effects of a particular job in health; medical examinations to protect employees against hazardous substances and the study of medical requirements for different kinds of work, especially in relation to disabled persons. There is a special responsibility for the health of young people at work, and it also carries out medical surveys and other investigations related to work. No medical treatment is given. (Employment Medical Advisory Service Act 1972). Inquiries should be addressed to the Information Officer, E.M.A.S., D.E., Baynards House, Chepstow Place, London W2, Tel.: 01-229 3456.

The Doctor in Industry

The British Medical Association published the policy of the Association, approved by the Representative Body, in 1971 in The Doctor in Industry obtainable from the B.M.A., Tavistock Square, London, WC1 9JP.

The policy advocated in relation to "duties" is reproduced in full as follows:

The Duties of Doctors Holding Appointments in Industry and Some Notes for Their Guidance below:

Duties

24. Many industrial undertakings employ doctors to supervise the health and welfare of the employees and the environmental conditions of their work. The duties which form the basis of their work vary considerably according to the needs of the occupational group but the following may be properly undertaken by them:

(i) Examination of applicants for employment and advice as to their placement.

(ii) Immediate treatment of medical and surgical emergenices occurring at the place of employment.

(iii) Examination and continued observation of persons returning to work after absence due to illness or accident and advice on suitable work.

(iv) Health supervision of disabled persons.

(v) Periodical examination of persons exposed to special hazards in respect of their employment.

(vi) Maintenance of the efficiency of the nursing and first-aid personnel and equipment.

(vii) The study of the work and working environment and their effects on the health of the employees.

(viii) Advice to managements regarding:

- (*a*) The working environment in relation to health.
- (*b*) Occurrence and significance of hazards.
- (*c*) Accident prevention.
- (*d*) Statutory requirements in relation to health.

(ix) Health supervision of all employees with special reference to (*a*) young persons, (*b*) married women and (*c*) elderly persons.

(x) Medical inspection of canteen facilities and medical supervision of the health and hygiene of canteen workers.

(xi) Advice to those committees within the factory which are responsible for the health, safety and welfare of the employees.

(xii) The arranging and carrying out of such educational work in respect of the health and fitness of the employees as may be desirable and practicable.

(xiii) Advice to employees on all health matters relating to their working capacity.

Because of the importance of ethical problems to the physician in industry, the notes for guidance are also reproduced:

Notes and Guidance

25. A doctor in industry needs to exercise constant care in his relationships for while he holds his appointment from the management, his duties concern the health and welfare of the workers, individually and collectively, and in the course of his duties he will constantly be dealing with patients of other doctors.

26. The following notes have been prepared to assist him in avoiding difficulties. Where existing ethical custom fails to cover the circumstances, they will help to govern his professional relationships with medical colleagues in other branches of practice, with those workers under his care and with managements. The notes are

intended for all doctors in industry whether they are working whole-time or in a part-time capacity.

27. The doctor in industry and the general practitioner have a common concern—the health and welfare of the individual workers coming under their care. Less often, this concern may be shared with the hospital doctor, the medical officer of health or some other professional colleague. As in all cases where two or more doctors are so concerned together the greatest possible degree of consultation and co-operation between them is essential at all times subject only to the consent of the individual concerned.

28. As his contribution towards achieving and maintaining this vital relationship with his colleagues, the doctor in an industrial appointment should be guided by the following:

(*a*) Save in emergency, the doctor in industry should undertake treatment which is normally the responsibility of the worker's general practitioner only in co-operation with him. This applies both to treatment personally given and to the use of any special facilities and staff which may exist in his department. When he makes findings which he believes should, in the worker's interest, be made known to the general practitioner, or similarly when details of treatment given should be passed on, he should communicate with the general practitioner.

(*b*) If, for any reason, the doctor in industry believes that the worker should consult his general practitioner, he should urge him to do so.

(*c*) Save in emergency, the doctor in industry should refer a worker direct to hospital only in consultation or by prior understanding with the general practitioner.

(*d*) The Association considers that it is not normally the function of a doctor in industry to verify justification for absence from work on grounds of sickness. If the doctor in industry proposes to examine a worker who is absent for health reasons, he should inform the general practitioner concerned of the time and place of his intended examination.

(*e*) The doctor in industry should not, without the consent of the parties concerned, express an opinion as to liability in accidents at work or industrial diseases except when so required by a competent court or tribunal.

(*f*) Doctors in industry should beware of influencing or of appearing to influence any worker in his choice of general practitioner.

Note: When a letter is sent from the doctor in industry to a worker's general practitioner and no reply is received within a reasonable time, it can be assumed that the general practitioner takes no exception to the contents of the letter.

29. The following points should guide doctors in industry in certain other important aspects of their work:

(*a*) It is the view of the Association that the personal medical records of workers maintained by him for his professional use are his own confidential documents, and that access to them must not be allowed to any other person, save with his consent and that of the worker concerned or by order of a competent court or tribunal. The Association further believes that the doctor in industry is solely responsible for the safe custody of his records which on termination of his appointment he should hand over only to his successor. If there should be no successor, he retains responsibility for the custody of these records.

(*b*) He should not in any circumstances disclose his knowledge of industrial processes acquired in the course of his duties except with the consent of management or by order of a competent court or tribunal.

30. The doctor holding an industrial appointment is advised to establish contact with colleagues similarly engaged and where possible with university departments of

occupational health and government departments concerned with the health of industrial workers.

31. The Medical Research Council at 20 Park Crescent London W1 has a number of special committees dealing with various aspects of industrial health research and inquiries on research problems may be sent to the Secretary at the above address.

32. The London School of Hygiene and Tropical Medicine, and the Universities of Manchester and Newcastle have departments of industrial or occupational health, the Universities of Dundee and the Welsh National School of Medicine have departments of social and occupational medicine. From all these departments advice may be obtained and from time to time they conduct courses of instruction which are normally advertised.

THE FUNCTIONS OF THE INDUSTRIAL MEDICAL OFFICER

The functions of the Industrial Medical Officer were defined in the Report of a Committee of Enquiry on Industrial Health Services (Dale Report) H.M.S.O. 1951 in Section II of the Report:

II. THE POSSIBILITY OF OVERLAPPING

Medical and Nursing Services General

33. In examining the relationship between the industrial and the general health services, we have paid particular attention to the possibility of overlapping, to which our attention was specifically directed by our terms of reference. We have taken overlapping to mean the performance of identical functions by both the industrial and general health services. Overlapping in this sense does not necessarily imply wastage, but the discovery of an instance of overlapping raises the question whether, and if so how far, that overlapping is justified.

A. The Possibility of Overlapping between Employers' Voluntary Services and the National Health Service

Functions of the Industrial Medical Officer

34. In this paragraph we have tried to describe the functions which are performed by Industrial Medical Officers. In regard to these the voluntary and the statutory services can never be entirely separated. Thus an employer may voluntarily seek medical advice in connection with the discharge of his statutory responsibilities (cf sub-para. (i) (*h*) below).

Not all the functions listed below are carried out at every establishment where there is an industrial health service. Some are carried out at one establishment and some at another, though there are certain establishments where all the functions listed are in fact carried out.

(i) *General Advisory Services to Management on*

- (*a*) industrial hygiene, including advice, in collaboration with technical experts, on the design, construction and lay-out of buildings and machines;
- (*b*) the conditions affecting the health of the workers;
- (*c*) the occurrence and risk of dangerous hazards;
- (*d*) medical aspects of safety precautions, including questions as to the effects and avoidance of fatigue;
- (*e*) medical aspects of "employee" services, including canteens and cloakrooms;

(*f*) study of sickness absenteeism and questions of personal and group morale;
(*g*) the causation and prevention of industrial disease, enlisting the help of inside and outside research and technical departments;
(*h*) medical aspects of legislation on health matters which places obligations on the employer.

(ii) *Examination of Individual workers with a view to advising management as to their conditions of employment*

(*a*) pre-placement examinations and the examination of persons returning to work after illness or injury, with a view to determining the work on which the worker is to be employed and his fitness for it;
(*b*) examinations of persons exposed to occupational hazards, other than those for which a statutory examination is required;
(*c*) examination of persons doing work of such a nature that ill health or the development of certain disabilities might endanger the lives of themselves or others.

(iii) *Therapeutic Services*

(*a*) Supervision of Nursing Services;
(*b*) Supervision of First-aid;
(*c*) Primary treatment over and above First-aid;
(*d*) Follow-up treatment, where appropriate, of cases of illness and accident.

(iv) *Certain general health services to workers, namely*

(*a*) diagnostic or periodic general health examinations in addition to those referred to in (ii) above;
(*b*) promotion of the education of workpeople collectively and individually in matters of general and personal hygiene.

35. (i) Under the heading (i) in the preceding paragraph are listed a number of matters with which managements are concerned and on which they may require the advice of doctors. No question of overlapping can arise in connection with these general advisory services to managements, which are not provided under the general health services.

(ii) Similar considerations apply to the functions listed in (ii) of that paragraph. The certification of fitness for particular employment is not one of the free services provided under the National Health Service Service and fitness for particular employment is a matter on which the employer must be in a position to obtain medical advice.

(iii) As regards the functions listed in paragraph 34 (iii) it is clear that no question of overlap arises in connection with (*a*) and (*b*), supervision of nursing and first-aid services. The question does arise, however, in connection with (*c*) and (*d*), which are both concerned with treatment over and above first-aid. The general burden of evidence is that where the doctor or nurse is fully occupied at the factory the overlap in these matters is justified as benefiting productivity. Furthermore, the benefit to the patient in some cases may be considerable and there will be a lessening of the load on the National Health Service.

(iv) The services described in Paragraph 34 (iv) present certain features on which we should like to comment. It is no part of the National Health Service to provide for periodic general health examinations, although it is a function of that Service to provide diagnostic examinations where ill-health is suspected and in respect of the latter there may, therefore, be said to be some overlapping. Within reasonable limits overlap may well be justified in the interests of the efficiency and welfare of the workers. The promotion of the education of workpeople as such, collectively and individually, in matters of general and personal hygiene is not a matter provided for in the National Health Service, though certain measures for the health education of the community are within the powers of local authorities.

Employment Opportunities in the United Kingdom

There are believed to be approximately 600 physicians employed whole-time in industry in the United Kingdom. There are probably 1,800 to 2,000 employed part-time, many of these were also Appointed Factory Doctors under the Factories Act 1961. The Employment Medical Advisory Service has replaced the Medical Inspectorate and the Appointed Factory Doctors and plans to employ 100 to 120 full and part-time doctors as well as nurses in the new service.

Organisations employing Occupational Physicians, Full and Part-time are as follows:

Occupational health services in large industries (nationalised and independent)
Occupational health services for small factories
Factories
Consultants (advisers to industry)
Research Institutes
University Departments
Government Services (including the Armed Forces Medical Services)
Government Departments
University Occupational Health Services
Hospital Occupational Health Services.

Guide to Pay Scales

The British Medical Association sets out recommended salary scales; these are constantly reviewed. The third addendum to The Doctor in Industry, 1971 sets out, as follows, the current whole-time and part-time salary scales recommended by the Association of Industrial Medical Officers, now the Society of Occupational Medicine, for the different grades of whole-time industrial medical officers. These scales which *constitute minimum salaries* are operative from 1st April 1972 in accordance with the Government's acceptance of the recommendation of the Review Body on Doctors' and Dentists' Remuneration (June 1972). The new figures reflect the proposal of the Review Body to increase salaries by 7·5% with larger increases for certain grades (with salaries currently below £3,600). The scales will be reviewed again in the light of the new Report of the Review body due to come into effect on 1st April 1973.

Grades of Industrial Medical Officer

Whole-Time Salaries (1st April 1973) Fourth Addendum to the Doctor in Industry, 1971 and due to be reviewed in the light of the 1974 Report of the Review Body on Doctors' and Dentists' Renumeration.

Assistant Medical Officer

Defined as a doctor who is undertaking training for a career in industrial medicine *and for whom specific time in normal working hours is allocated to training. Tenure* *of the post should normally be for two years with an option of extending to three in order to comply with examination requirements.*

Scales — Assistant Medical Officer

1st year	£3,549
2nd year	£3,849
3rd year (where necessary)	£4,149

Medical Officer

Defined as a doctor in charge of the medical services of a small or medium-sized firm or a constituent unit of a large firm working either single-handed or with an assistant. Applicants to the grade should have held an appointment in the Assistant Medical Officer grade or have postgraduate experience in a branch of medicine likely to be of value to industry.

Scales — Medical Officer.
Initially at least £4,065 per annum, where the appointee is relatively inexperienced, with a commensurately higher salary for a doctor of greater experience in occupational health or other medical employment, rising by annual or biannual increments to at least £6,108 per annum over not more than ten years.

Senior Medical Officer

Defined as a doctor in charge of the medical services of a medium-sized or large firm or in the case of a large organisation of one of its constituent groups. A senior medical officer would usually have one or more medical officers, whole-time or part-time, under his control but industrial medical officers who carry special responsibility by virtue of the problems peculiar to the industries concerned should be included in this grade even when working single-handed. Applicants for appointment on this grade would usually be doctors holding higher qualifications who had distinguished themselves in the medical officer grade or had special experience in the industry concerned, in addition to that required for the medical officer grade. Particular regard should be paid to administrative ability.

Scales — Senior Medical Officer
Initially at least £5,097 per annum rising by annual or biannual increments to at least £7,359 per annum over not more than ten years.

Chief Medical Officer or Director of Medical Services

A doctor responsible for, or in charge of, the medical services of a large undertaking. These medical officers would usually be appointed from those who had distinguished themselves in the senior medical officer grade.

Scales — Chief Medical Officer or Director of Medical Services.
Commencing minimum at least £7,773.

These salary ranges are regarded as suitable for pensionable appointments. Where no pension scheme is in operation, the salary should be adjusted accordingly.

The Medical Officers, Senior Medical Officers, Chief Medical Officers and Directors of Medical Services should be directly responsible to the highest level of management locally or centrally, e.g., a member of the Board.

Part-Time Industrial Medical Officers

Attention is drawn to the Section on Part-time Industrial Medical Officers and Terms of Service for all Industrial Medical Officers on pages 4 and 5 of The Doctor in Industry 1971.

The Part-time Salary Scales (1st April 1973). Fourth Addendum to The Doctor in Industry, 1971 and due to be reviewed in the light of the 1974 Report of the Review Body on Doctors' and Dentists' Remuneration.

In individual cases the value of the medical services given to firms or the seniority or experience of the part-time industrial medical officer will justify higher remuneration than the minimum salary quoted below:

Hours per week	*Minimum* Annual Salary
£	£
0– 1	237
1– 2	420
2– 3	588
3– 4	756
4– 5	921
5– 6	1,101
6– 7	1,263
7– 8	1,392
8– 9	1,515
9–10	1,641
10–11	1,758
11–12	1,875
12–13	1,989
13–14	2,109
14–15	2,238
15–16	2,352
16–18	2,481
18–20	2,589

Consultant in Occupational Health

Also stated (The Doctor in Industry 1971) is that remuneration of a consultant in occupational health or in any other appropriate specialty, called in by a firm to advise as an expert in some particular occupational health problem or problems, should be a matter for private negotiation.

Service Medical Officers

The British Medical Association has advised that "the Armed Forces Pay Review Body recommended the introduction of revised pay scales for doctors and dentists in the Armed Forces effective from 1st April 1973." The recommendation was accepted by the Government and the scales are set out in the following table:

Rank	Annual Salary (£)	Daily Rate (£)
Surgeon Lieutenant/Captain/Flight Lieutenant		
On appointment	4099	11·23
After 2 years in rank	4165	11·41
After 4 years in rank	4249	11·64
Surgeon Lieutenant-Commander/Major/Squadron Leader		
On appointment	4938	13·53
After 1 year in rank	5001	13·70
After 2 years in rank	5070	13·89
After 3 years in rank	5161	14·14
After 4 years in rank	5413	14·83
After 5 years in rank	5504	15·08
After 6 years in rank	5566	15·25
After 7 years in rank	5658	15·50
Surgeon Commander/Lieutenant-Colonel/Wing Commander		
On appointment	6085	16·67
After 2 years in rank	6212	17·02
After 4 years in rank	6340	17·37
After 6 years in rank	6471	17·73
After 8 years in rank	6596	18·07
Surgeon Captain/Colonel/Group Captain		
On appointment	7008	19·20
After 2 years in rank	7092	19·43
After 4 years in rank	7198	19·72
After 6 years in rank	7282	19·95
Colonel/Group Captain after 8 years in rank	7366	20·18
Surgeon Captain with 8 years seniority Brigadier/Air Commodore	7818	21·42

In addition the Government has accepted the Armed Forces Pay Review Body's recommendation on rates of pay for medical and dental cadets, and provisionally registered medical practitioners. These are £1,900 a year (including £950 educational grant) and £2,416 a year respectively, effective from 1st April 1972.

Clinical Academic Salaries

These have also been revised and were set out in the same supplement and are relevant to occupational physicians working in academic departments of occupational health.

The University Grants Committee in a letter to universities has announced that the Government has agreed revised clinical academic salaries, effective from 1st April 1972. Extracts from the letter are published here.

Staff not holding honorary consultant contracts: Lecturers, Senior Lecturers and Readers.

"Minimum £2,337 to maxima ranging from £4,419 to £5,964."

Staff holding consultant contracts: Lecturers, Senior Lecturers and Readers.

"The scale for N.H.S. consultants, viz., £4,836 × £279 to £7,068 × £282 to £7,350."

Professors

"Salaries up to £7,350."

Assimilation

"Scales for non-professional staff not holding honorary consultant contracts should be constructed which, subject to the new minimum and maxima quoted above, give increases over existing scales at the following rates.

"The range of percentage increase indicated against each step in the salary range is to give sufficient flexibility for new university scales to be constructed with rational incremental steps. It is not intended that any particular point between the steps should have a percentage increase adjusted exactly *pro rata*; for example, it is not intended that if £3,750 were a point on an existing university scale the increase should necessarily be precisely 13·5%. The principle on which the percentage increases shown in the table are based is that between £2,067 and £3,588 and between £4,512 and £5,547 on the old scales increases should conform as closely as possible to increases in the relevant hospital scales, and between £3,589 and £4,511 there should be progressively reducing increases from 15% to 7·5%. Staff should be assimilated from their current point on the old scale to the corresponding point on the new scale so constructed.

"Non-professorial staff holding honorary consultant contracts should be assimilated from their point on the old scale to the corresponding point on the new scale.

"Any personal salaries lying beyond £5,547 should be increased by the percentage amount applicable to the nearest point on the consultant scale.

"Where professors are paid on the consultant scale they should be assimilated from their point on the old scale to the corresponding point on the new scale. Where they are paid at non-scale rates these should be increased by amounts equivalent to the increases in the consultant scale.

"Any children's allowances payable in accordance with present practice should be scaled down as necessary to ensure that total remuneration does not exceed £7,350.

"The salaries of holders of part-time posts should be treated in a similar way, with percentage increases corresponding to those applicable to the salaries of their full-time equivalents."

Points within Old Scales between	Percentage Increases	
	From	To
£2,067 and £2,900 ..	13	14
£2,901 and £3,600 ..	14	15
£3,601 and £3,900 ..	14	13
£3,901 and £4,000 ..	13	12
£4,001 and £4,100 ..	12	11
£4,101 and £4,200 ..	11	10
£4,201 and £4,300 ..	10	9
£4,301 and £4,400 ..	9	8
£4,401 and £4,600 ..	8	7·5
over £4,600 ..	7·5	

Career Prospects

The British Medical Association operates a career service for doctors; primarily for those just qualified, choosing and planning a career. For members of the Association the service provides by post or personal interview basic facts about prospects and postgraduate requirements for each specialty, when necessary doctors are referred to further tutors or advisers. The Director of this service is Dr. Alan Gilmour.

The British Medical Association Personal Services Bureau publishes a Summary of Postgraduate Diplomas and Courses in Medicine (1972). Information is available on Aviation Medicine—Diploma Course (page 14); Industrial Health—Diplomas and Courses (pages 14 and 15); Medical Physics and Engineering—Diplomas and

Courses (pages 15 and 16); Dermatology—Diploma and Courses (page 10); other courses—Radiation Safety and Health Physics and Radiological Protections (page 10).

Members of the staff of University Departments of Occupational Health will also give advice on teaching programmes for which they are responsible and on possible career openings in occupational medicine.

Vacant posts are usually advertised in the national medical journals in particular, The Lancet and the British Medical Journal.

SOCIETIES AND ASSOCIATIONS

UNITED KINGDOM

The Society of Occupational Medicine

At a general meeting of the Society held in London on 26th March 1965, the Society of Occupational Medicine adopted a new constitution replacing and rescinding the constitution of the Association of Industrial Medical Officers adopted on 30th October 1959.

Objects—

"The objects of the Society shall be to form a group of medical men and women interested in the practice of occupational medicine in any of its branches for the purposes of:

(*a*) improving the health of people at work;

(*b*) promoting and stimulating research and education in the field of occupational health; and

(*c*) with a view to furthering the above objects:

 (i) co-operating with other interested professional bodies,

 (ii) making representations to medical, governmental and other such bodies as may be concerned with any of the aspects of occupational medicine, and

 (iii) doing all such things as may in the opinion of the Council be conducive to attaining the above objects."

In the new constitution the Council was empowered to appoint Panels of the Society, Research, Advisory, Editorial, Educational, Nursing and "other panels as it sees fit". As a result of the work of these panels the following symposia have been published:

Title	*Publication Dates*
Proceedings of Symposium on Psychological Effects of Noise held at University of Wales, September 1967.	September 1970
Absence from Work Contributing to Sickness held at London School of Hygiene and Tropical Medicine, June 1968.	October 1968
Early Detection of Occupational Hazards held at University of Newcastle upon Tyne, April 1970.	Autumn 1971

Title	*Publication Dates*
Occupational Health for the Undergraduate Medical Student held at the Royal College of Physicians, London, May 1970.	Summer 1972
Assessment of Exposure and Risk held at St. Bartholomew's Hospital, London, November 1972.	to be published

The Education Panel organises annual refresher courses in Clinical Medicine for Industrial Medical Officers. The Editor and Editorial Panel are responsible for publishing the Journal (previously the Transactions) of the Society of Occupational Medicine, which appears quarterly.

Membership	*Approximate Numbers*
Ordinary membership open to registered medical practitioners who are engaged in the practice or teaching of occupational medicine or retired therefrom	900
Overseas Membership	
Those eligible for ordinary membership but who normally reside outside Great Britain, the Channel Islands, the Isle of Man, Northern Ireland and the Republic of Ireland. Overseas membership is also open to medical practitioners resident abroad who hold medical qualifications recognised in the country in which they reside but not necessarily registrable with the General Medical Council, and who are engaged in the practice or teaching of occupational medicine, or who have retired therefrom.	100

Election of Members

Prospective ordinary or overseas members must be proposed and seconded in writing by existing ordinary members. Forms can be obtained from—

The Honorary Secretary,
The Society of Occupational Medicine,
at the Royal College of Physicians,
11 St. Andrew's Place,
Regent's Park,
London, NW1 4LE. (Tel. 01-486 2641).

Subscription

The annual subscription for ordinary members is £8 and for overseas members is £4.

Meetings

The Society holds meetings in the Spring and Autumn in London and an annual meeting in a large provincial centre in Great Britain.

Members may join one of the local Groups of the Society which meet at intervals. Local Groups are centred on Birmingham, Central Southern England, London, Manchester, Merseyside, Northern Ireland, Nottingham, Scotland, South Wales and the West of England, Teesside, Tyneside and Yorkshire.

Library Facilities

The London School of Hygiene and Tropical Medicine library is maintained by the School for the benefit of its own students and staff, and only those members of the School have the right to borrow material from the library within the current rules. However, the School has always recognised the need to make the literature of preventive and tropical medicine available as widely as possible, and the following modifications to the general rule above are applied at the discretion of the Librarian.

1. The School library will lend to, and borrow from, other established libraries where there is a librarian to take responsibility for loans.
2. The School library will admit, *for reference purposes only but not for borrowing,* any student or academic or other bona-fide reader who has need to consult the specialised literature in the library. Admittance may be refused if the books or journals needed are more easily available in another library, e.g., a public library.
3. The Librarian may, under special circumstances, allow borrowing by non-members of the School who can show a special need and whose demands on the library stock will not conflict with those of the students and staff. Such persons will be charged an annual subscription (at present £2·10) and this privilege can be revoked at any time. Requests by members of learned societies associated with the general aims of the School will be favourably considered, e.g., Fellows of the *Royal Society of Tropical Medicine and Hygiene* or members of the *Society of Occupational Medicine.*

Occupational physicians are eligible to join the British Occupational Hygiene Society. Information is available in the chapter on Occupational Hygiene, and also the Ergonomics Research Society. Information is available in the chapter on Ergonomics.

The Royal Society of Medicine

The Royal Society of Medicine, 1 Wimpole Street, London, W1M 8AE, houses meeting halls, the library and club administrative offices and club facilities in the main building and, at Chandos House at 2 Queen Anne Street and at Domus Medica, there are reception and smaller meeting rooms and residential accommodation.

Fellowship of the Society is open to medical practitioners and others who are proposed and seconded and satisfy the Council as to their qualifications and who are elected by ballot.

Fellows may apply for membership of specialised sections of the Society. Of the thirty-three sections, (who hold meetings open to all fellows), many, as well as the section of Occupational Medicine, discuss topics of interest to occupational physicians.

Subscription rates vary depending on a number of factors including geographical location and length of time since medical qualification. Enquiries may be made and information sought, from the Administrative Secretary.

The Journal, the Proceedings of the Royal Society of Medicine, is published monthly and contains reports of the Society and section meetings and is sent to fellows, affiliates and associates of the Society.

Many symposia and articles on occupational health have been published in the proceedings. Of particular interest to members of the Occupational Health team concerned with the care of the health of hospital staff was a meeting held jointly by the section of Occupational Medicine at the Royal Society of Medicine, the Society of Occupational Medicine and the Royal College of Nursing on 28th October 1971. An abridged record of the meeting, Occupational Health Services in Hospitals, was published in the Proceedings of the Royal Society of Medicine 1972 volume 65 pages 447–466.

The library contains 500,000 volumes and receives over 2,300 current periodicals. Books and journals may be borrowed or studied in the reading rooms.

There is a reference service providing short selected lists or a collection of journal articles. Translation of abstracts in European languages can be supplied. Extensive bibliographies may be undertaken, for a fee, by special arrangement.

The International Relations Office provides introductions to colleagues for fellows (from overseas or the United Kingdom), travelling to countries other than their own. There are also reciprocal arrangements with a number of Medical Societies throughout the world.

Reference

Annual Report of the Council 1970–1972, The Royal Society of Medicine Calendar with section programmes of the Royal Society of Medicine 1972–1973.

UNITED STATES OF AMERICA

The Industrial Medical Association

The Industrial Medical Association is a professional organisation for all physicians concerned with the relationships between health and work and the work environment. The By-Laws of the Industrial Medical Association were amended and adopted at the Annual Business Meeting on 19th April 1972. Article II states the *Object:*

> "The object of this Association shall be to foster the study of problems peculiar to the practice of industrial medicine and surgery, and to unite into one organisation members of the medical profession whose interest lies in that field. It shall encourage the development of methods adapted to the conservation and improvement of health among workers, and promote a more general understanding of the purposes and results of the medical care of these workers.

Article III, *Membership.*

Section 1. Membership in this association shall be of six classes (*a*) Fellow, (*b*) Active, (*c*) Associate, (*d*) Honorary, (*e*) Inactive, (*f*) Emeritus."

History

"In 1915, the American Association of Industrial Physicians and Surgeons was organised in Illinois by a small group of doctors who recognised that no existing medical association served the interests of those physicians who were concerned with the health and well-being of the working population. The Association was chartered in Illinois as a not-for-profit corporation on 11th February 1916. The first annual meeting was held 12th June 1916 in Detroit with approximately 125 members in attendance . . . In 1951, the membership voted to change the name to the Industrial Medical Association."

The new By-Laws specify the rank of the officers and Director and their duties; only Fellows are eligible to serve as officers or directors.

The Industrial Medical Association has thirty component societies in the United States, the new By-Laws state "Article XII, Section 1, The Board of Directors shall have the power to take the necessary steps for organising or admitting component societies."

The Association has a headquarters staff supervised by an *Executive Director* to whom all queries should be addressed. The booklet "Industrial Medical Association—Its Objects, Its Activities, Its Services" is available and is the source of the following information:

The official publication is *The Journal of Occupational Medicine* published monthly. *A Membership Directory* is published periodically.

An Employment Referral Service aids doctors seeking posts in occupational medicine and assists employers by listing current positions available in industry, published in a bulletin monthly. *Inquiry Service on Special Problems.* The headquarters office provide information on a variety of subjects and answer specific problems.

Annual Meeting

An annual four-day convention and business meeting of the Industrial Medical Association is held in the Spring each year currently with the annual meeting of the American Association of Industrial Nurses and is known as The American Industrial Health Conference—approximately 2,500 physicians and nurses register annually.

Liason Activities

Close association and interchange of information is maintained with the professional organisations listed below:

Aerospace Medical Association
American Academy of General Practice
American Academy of Occupational Medicine
American Association of Industrial Nurses
American Conference of Governmental Industrial Hygienists
American Industrial Hygiene Association
American Heart Association
American Medical Association
American Public Health Association (Occupational Health Section)
American Standards Association
Industrial Health Foundation
International Association on Occupational Health
Medical Society Executives Association
National Council on Radiation Protection and Measurements
National Safety Council

National Society for Medical Research
Occupational Health Institute
The President's Committee on Employment of the Handicapped

Publications

The list of publications and reprints available in September 1972 are printed below:

ABSENTEEISM

A Medical Program to Assist Management in the Control of Absenteeism—D. C. Bews, M.D.; 8 pp. (1966); **F-13.**

ALCOHOLISM

Long-Term Experience with Rehabilitation of Alcoholic Employees—Fern E. Asma, M.D., Raymond L. Eggert, Robert R. J. Hilker, M.D.; 5 pp. (1971); **J-45.**

The Psychiatrist in an Industrial Alcoholic Clinic—Arnold S. Zentner, M.D.; 4 pp. (1968); **G-2.**

Sickness Absenteeism of Alcoholics—Sidney Pell, Ph.D. and C. A. D'Alonzo, M.D.; 13 pp. (1970); **I-18.**

Also see Cardiology; **G-18.**

AIR QUALITY CRITERIA

Proceedings of the Symposium on Air Quality Criteria,* June 4-5, 1968, New York City; 136 pp. (1968); **X-4**—$3·00.

Atmospheric Contaminants and Standards—Neill K. Weaver, M.D.; 7 pp. (1969); **H-27.**

ASBESTOS

Research on Health Effects of Asbestos—Lewis J. Cralley, Ph.D., et al; 4 pp. (1968); **G-3.**

Evaluation of Asbestos Exposure in the Working Environment—Recommendation of Subcommittee on Asbestosis of the Permanent Commission and International Association on Occupational Health; 3 pp. (1972); **K-27.**

ATOMIC POWER PLANTS

Fact and Fiction about Health and Atomic Power Plants—W. D. Norwood, M.D.; 6 pp. (1971); **J-19.**

Also see Radiation.

AUDIOLOGY

See Noise and Hearing.

AUTOMATION

Automated Diagnostic Screening for Comprehensive Medicine—Keeve Brodman, M.D., Leo S. Goldstein, Ph.D. and Ralph A. Baer, M.D.; 4 pp. (1967); **F-14.**

Electronics and Medicine—L. Murry Shipp, M.D.; 8 pp. (1967); **F-11.**

The Industrial Medical Department Laboratory—Experience with Automation—K. L. Stratton, M.D. and G. H. Collings, Jr., M.D.; 4 pp. (1969); **H-40.**

The Physician and the Computer—Robert Masters, M.D.; 3 pp. (1967); **F-16.**

The Value of the Computer as a Screening Tool for Routine Electrocardiograms—A. S. Verdesca, M.D.; 5 pp. (1972); **K-15.**

AVIATION

Medical Aspects of Business Aviation—A Guide for Physicians in Industry: Joint Committee Report of the Industrial Medical Association and the Aerospace Medical Association; 16 pp. (1964); **D-21.**

Medical Care of Aircrewmen in an Industrial Environment—William E. Evans, III, M.D. and Charles I. Barron, M.D.; 4 pp. (1968); **G-33.**

BERYLLIUM INDUSTRY

See Respiratory Problems: **H-28** and Epidemiology; **H-26.**

BIOCHEMICAL RANGES

Individual Bio-Range Patterns—Edward L. Burns, M.D., Glenn S. Usher, M.D., Thad W. Taylor, M.D., Donald K. Cameron, M.D., Thomas Browning, B.S.; 9 pp. (1971); **J-13.**

BIOTELEMETRY

An Introduction to Biotelemetry—William W. Simmons, L.C.D.R., (M.C.) U.S.N.; 7 pp. (1968); **G-10.**

CANCER

Basal Cell Epithelioma in a Thermal Burn Scar—Irwin Kantor, M.D., Bernard W. Berger, M.D. and Joel M. Wilentz, M.D.; 3 pp. (1970); **I-16.**

Environmental Cancer Hazards—W. C. Hueper, M.D.; 5 pp. (1972); **K-6.**

Epidemiological Considerations of Cancer of the Gallbladder, Bile Ducts and Salivary Glands in the Rubber Industry—Thomas F. Mancuso, M.D. and Michael J. Brennan, M.D.; 9 pp. (1970); **I-34.**

CANCER—continued

Facts and Myths Concerning Aromatic Diamine Curing Agents—W. A. Rye, M.D., P. F. Woolrich, M.S. and R. P. Zanes, M.D.; 5 pp. (1970); **I-19.**

Uranium Mining and Lung Cancer—W. Clark Cooper, M.D.; 7 pp. (1968); **G-5.**

CARBON DISULPHIDE

Carbon Disulphide as a Cause of Suicide—Epidemiological Study of Viscose Rayon Workers—Thomas F. Mancuso, M.D. and Ben Z. Locke, M.P.H.; 12 pp. (1972); **K-28.**

CARDIOLOGY

Antecedents of Myocardial Infarction in Actively Employed Men—Lawrence Hinkie, M.D.; 8 pp. (1971); **J-40.**

Cardiac Employees and Their Immediate Supervisors: Effects of an Industrial Medical Program—George A. Hellmuth, M.D.; 9 pp. (1971); **J-17.**

Cardiopulmonary Evaluation Studies in an Occupational Health Program—Jean Spencer Felton, M.D. and Harriet R. Voss, M.D.; 4 pp. (1972); **K-26.**

Cardiovascular Disease Among Problem Drinkers—C. A. D'Alonzo, M.D. and Sidney Pell, Ph.D.; 7 pp. (1968), **G-18.**

Coronary Heart Disease Among Men in the Bell System—L. Holland Whitney, M.D.; 7 pp. (1968); **G-1.**

Electrocardiograph Coding—Arthur L. Knight, M.D.; 2 pp. (1971); **J-34.**

Heart Cases Under Workmen's Compensation Laws—Leon J. Warshaw, M.D.; 4 pp. (1967); **F-5.**

Lipid Patterns in Adult Males—J. J. Appelbaum, M.D.; 4 pp. (1971); **J-48.**

Preventive Program for Coronary Artery Disease—Seymour H. Rinzler, M.D.; 5 pp. (1968); **G-6.**

Also see Rehabilitation: **F-10;** Exercise: **G-16;** Medicolegal: **K-1;** and Cardiology: **K-15.**

CARDIOVASCULAR STRESS TESTING

Heart-Controlled Ergometry in Cardiovascular Stress Testing—Laurence E. Morehouse, Ph.D.; 8 pp. (1968); **G-31.**

Practical Use of Stress Testing in Industry—Richard W. Call, M.D., Basil Clyman, M.D. and Don R. Kaserman, M.D.; 6 pp. (1968); **G-30.**

Stress Testing, Safety Precautions, and Cardiovascular Health—Tom R. Hornsten, M.D. and Robert A. Bruce, M.D., 9 pp. (1968); **G-29.**

Testing and Developing Cardiovascular Fitness Within the United States Air Force—Kenneth H. Cooper, Lt. Col., U.S.A.F. (M.C.); 4 pp. (1968); **G-28.**

Treadmill Exercise Tests for Capacity and Adaptation in Angina Pectoris—Albert A. Kattus, M.D., Anthony Alvaro, M.D. and Rex N. MacAlpin, M.D.; 9 pp. (1968); **G-27.**

The Use of Posterior Lead in Cardiovascular Stress Testing—Richard W. Call, M.D., et al; 5 pp. (1970); **I-22.**

CAREERS IN OCCUPATIONAL MEDICINE

Careers in Occupational Medicine—Prepared by the Industrial Medical Association's Committee on Occupational Medicine; 12 pp. (1965); **X-2–N/C.**

Industrial Medicine—Is It the Field for You?—George M. Wheatley, M.D., reprinted from Resident Physician; 24 pp. (1963); **X-3–N/C.**

COAL MINE DUST

A Model for Evaluating Coal Mine Dust Standards—Henry N. Doyle, B.S.; 5 pp. (1970); **I-40.**

An International View of Coal Workers' Pneumoconiosis — Robert Murray, M.D.; 4 pp. (1970); **I-55.**

Coal Dust Standards and Measurements—Henry P. Wheeler, Jr.; 4 pp. (1970); **I-51.**

Coal Workers' Pneumoconiosis Disability Benefits—Arthur E. Hess, LL.B.; 6 pp. (1970); **I-53.**

The Health of the Coal Miner—An Expendable Resource?—Irving R. Tabershaw, M.D.; 6 pp. (1970); **I-50.**

Coal Workers' Pneumoconiosis—State of the Knowledge and Research Needs—Douglas H. K. Lee, M.D.; 10 pp. (1971); **J-15.**

Medical Examinations for Coal Miners—Jesse L. Steinfeld, M.D.; 4 pp. (1970); **I-52.**

Problems in the Gravimetric Measurement of Respirable Coal Mine Dust Kenneth M. Morse, M.S.; 10 pp. (1970); **I-43.**

Pulmonary Function in Coal Miners' Pneumoconiosis—Robert E. Hyatt, M.D.; 8 pp. (1971); **J-12.**

COKE OVEN EMISSIONS

Benzo(a)pyrene in the Workplace Atmosphere of Coal and Pitch Coking Plants—Vaclav Masek; 6 pp. (1971); **J-16.**

Control of Coke Oven Emissions—T. E. Dancy; 8 pp. (1971); **J-5.**

Evaluation of Coke Oven Emissions—William M. Smith; 6 pp. (1971); **J-4.**

Improving the Environmental Health of Coke Oven Workers—R. B. O'Connor, M.D.; 3 pp. (1971); **J-6.**

MEDICAL RECORDS—continued

Validating Thresholds Using Industrial Records—Philip E. Enterline, Ph.D.; 4 pp. (1970); **I-7.**

Also see Radiation: **H-5** and **H-8.**

MENTAL HEALTH

Care, Compassion and Confrontation—Correctives in the Occupational Mental Health of the Future—Jean Spencer Felton, M.D.; 13 pp. (1968); **G-17.**

Crises Intervention in Industry—Ari Kiev, M.D.; 6 pp. (1970); **I-15.**

Determinants of Emotional Health—Van Buren O. Hammett, M.D.; 8 pp. (1969); **H-11.**

Early Recognition and Management of Emotional Distress in Executives—Leonard E. Himler, M.D.; 3 pp. (1967); **F-8.**

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A Study of Mortality, Symptoms, and Respiratory Function in Humans Occupationally Exposed to Oil Mist—Thomas S. Ely, M.D., et al; 9 pp. (1970); **I-24.**

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Effects of Bronchitis and Occupation on Pulmonary Ventilation Over an 11 Year Period—Geoffrey L. Brinkman, M.D.; Duane L. Block, M.D. and Charles Cress, Ph.D.; 6 pp. (1972); **K-30.**

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Farmer's Lung, Its Geographic Distribution—Frederick J. Wenzel, B.S., Robert L. Gray, B.S. and Dean A. Emanuel, M.D.; 4 pp. (1970); **I-57.**

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The Breathmobile-Industry Interface: Procedures Developed for Industrial Screening by a Voluntary Health Agency—David P. Discher, M.D. and A. Lloyd Anderson, Ph.D.; 6 pp. (1971); **J-43.**

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Respiratory Disease Associated with Beryllium Refining and Alloy Fabrication—Jan Lieben, M.D. and Robert R. Williams, M.D.; 6 pp. (1969); **H-28.**

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The Painful Shoulder—Charles A. Owen, M.D.; 6 pp. (1969); **H-9.**

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Worker Safety: A Function of the Acceptability of Risk—Ernest Levens; 5 pp. (1961); **J-27.**

Also see Driver Safety: **F-1.**

INTERNATIONAL SOCIETIES

Permanent Commission and International Association on Occupational Health

In 1906 the Permanent Commission and International Association on Occupational Health was founded in Milan, Italy, as an International Scientific Society, with the purpose of fostering "Scientific progress, knowledge and development of occupational health in all its aspects on an international basis. To achieve this purpose the Permanent Commission will:

arrange international congresses on occupational health;
promote special meetings and training courses;
collaborate with international and national bodies and societies having similar aims; and
take such actions in the field of occupational and environmental health as may be considered desirable."

There are five classes of membership, active, associate, honorary, sustaining (such a member, individual organisation, society or industry may make a financial contribution to the Permanent Commission) and affiliate. For information about membership an approach should be made to the delegation secretary in the country in which the inquirer resides. Occupational physicians, hygienists and nurses may all apply for membership if they are able to fulfil the regulations under article 3 of the constitution for active and associate membership.

(*a*) *active members*. An individual shall be admitted to active membership upon fulfilling all the following conditions:

- (i) proposal by three active members in good standing;
- (ii) submission of curriculum vitae (reprints of no more than five scientific papers may be submitted);
- (iii) approval of the proposal by the Membership Committee;
- (iv) election by the Council of the Permanent Commission;

(*b*) *associate members*. An individual shall become an associate member by paying the required fee for the current triennial period. No person may attend any congress, meeting or training course sponsored by the Permanent Commission unless he is an active member, an honorary member or an associate member.

(Constitution of the Permanent Commission and International Association on Occupational Health, 1966, amendments 1969, 1972.)

The supplementary membership list 1972 gives the names of the President, Vice-Presidents, Delegation Secretaries and Sub-committees of the Permanent Commission. (Appendix III.)

The next Conference is planned for 1975 in the United Kingdom, to be held in Brighton. Members who have any suggestions or special requests concerning the programme of the 1975 Congress should contact Dr. Kenneth Duncan, Chief Medical Officer, British Steel Corporation, P.O. Box No. 403, 33 Grosvenor Place, London SW1X 7JG, England, at as early a date as possible.

The International Committee on Occupational Mental Health

Aims

1. To bring together those from many disciplines who are interested and concerned in Occupational Mental Health.
2. (*a*) To collect and disseminate information and advice.
   (*b*) To educate its members and others in the maintenance of mental health particularly in the working environment.
   (*c*) To promote research.
3. To promote close contact with other international, and with national bodies concerned with occupational health, with special emphasis on aspects relating to mental health.

The committee meets formally once each year and has undertaken studies of specific topics including:

(*a*) Epidemiology of Neurosis in Industry.
(*b*) Problems of Immigrant Workers.
(*c*) Stress in Industry; an Exercise in Prevention.

Reports have been published on the two latter subjects and further seminars are planned.

Membership

There are now 120 members of several disciplines from 21 different countries.

Further information about the I.C.O.M.H. is available from the Secretary, Dr. J. D. A. Doeglas, Medical Department, N.V. Philips Gloeilampenfabrieken Eindhoven-Nederland.

Society for Occupational and Environmental Health

On 12th November 1972 the Society for Occupational and Environmental Health was organised in New York City. The new group consists at present of 100 members from universities, government, industry and labour. Dr. I. J. Selikoff is the first president of the new organisation and other officials include Dr. S. S. Epstein, Dr. E. P. Radford, Dr. David Linard, Dr. O. J. Balchum and Dr. Arend Bouhuys.

Interested individuals may address inquiries to Dr. H. Heimann, Environmental Sciences Laboratory, Mount Sinai School of Medicine, 100th Street/5th Avenue, New York 10029.

SOME ASPECTS OF LEGISLATION AFFECTING OCCUPATIONAL HEALTH IN THE UNITED KINGDOM OF GREAT BRITAIN AND THE UNITED STATES OF AMERICA

In all countries of the world, legislation is bedevilled by its historical origins. Laws have been made as a response, often grudging, to the urgent needs of a past age and these laws may not be in any way appropriate to present conditions, but all occupational physicians need to be aware of the legislative requirements for the safety and health of workers in the federation, country or state in which the organisation is situated and to know where to obtain information and advice.

UNITED KINGDOM

The Factories Act 1961 with its supporting orders and regulations covers approximately eight and a half million employees in factories, shipyards, docks and construction sites.

The Offices Shops and Railway Premises Act 1963 covers approximately eight million employees. These two acts are administered by the Department of Employment and enforced by its Factory Inspectorate and partly by Local Authorities.

The Mines and Quarries Act 1954 covers provisions for the health and safety of about 345,000 employees. Enforcement and administration comes under the *Department of Trade and Industry* and *Inspectorates of Mines and Quarries. The Agriculture (Poisonous Substances) Act* 1952 and *The Agriculture (Safety Health and Welfare Provisions) Act* 1956 are concerned with about 340,000 employees in agriculture. Administration and enforcement is the responsibility of safety and field officers in the Ministry of Agriculture, Fisheries and Food and the Department of Agriculture and Fisheries for Scotland.

There are a number of other Acts which provide for special regimes of control over certain specified industrial activities and substances such as explosives and nuclear installations.

Legislation is also in force to deal with emissions and effluents from work places. This legislation spans occupation, safety, general public health and environmental pollution. *The Alkali, etc., Works Regulation Act* 1906 is enforced by the Department of the Environment and their Alkali and Clean Air Inspectorate.

In addition to the complexity of these acts and the numerous departments responsible for their administration, the statutory system has developed in such a way that there is too much law. For example, since 1960, 107 statutory instruments were issued under the Factories Act. A change of attitude and a change of approach to legislation is obviously essential. These were the motivating factors in setting up the Committee on Safety and Health at Work under the Chairmanship of Lord Robens (1972); this report is now being considered by interested parties and the present Government have declared their intention to bring in new amending legislation in the future.

One change has already taken place which was first proposed by the last Labour Government in office. *The Employment Medical Advisory Service Act* 1972 amends the Factories Act 1961 by introducing the new Employment Medical Advisory Service in the Department of Employment scheduled to start operating in February 1973.

The Department of Health and Social Security has the responsibility, under the *National Health Service Act* 1946, to provide free medical attention for all and free medical prescriptions to those who are classified as in special need because of their financial position (old age pensioners) and those whose health requires special attention such as pregnant mothers, young children and the chronically sick.

Under the *National Insurance (Industrial Injuries) Act* 1965, also administered by the Department of Health and Social Security, "a person who is under this Act insured against personal injury caused by accident arising out of, and in the course of his employment shall be insured also against any prescribed disease and against any prescribed personal injury not so caused, being a disease or injury due to the nature of that employment and developed after 4th July 1948." There are forty-seven prescribed occupational diseases (Notes on the Diagnosis of Occupational Diseases (1972)), (Pneumoconiosis and Allied Occupational Chest Diseases (1967)). Injury disablement, death and other subsidiary benefits can be claimed under this Act. "The State of the Public Health (1972)" lists the Injury Benefit (Prescribed Diseases) in Great Britain and analyses annual certified incapacity (new spells). All prescribed diseases accounted for over 20,000 new spells per year over the last four years. The most important contribution to this total is made by dermatitis, about 15,000 new spells being reported each year, next in importance were traumatic inflammation of the tendons of the hand, forearm, etc., and beat knee. Lead poisoning still accounts for about one hundred new spells per year. The relative unimportance, in terms of incapacity, of prescribed diseases due to toxicological substances is noteworthy, and should be compared with claims for sickness benefit, which were, in fact, ten and a half million for new spells of certified incapacity from all causes in males and females. The major contribution is made by diseases of the chest, mental disorders and musculoskeletal ailments, including arthritis and rheumatism.

In addition to the "prescribed diseases" sixteen diseases are "notifiable" under the Factories Act 1961 for the purposes of prevention. H.M. Chief Inspector of Factories in his Annual Report 1971 recorded 123 cases of lead poisoning and a total of all cases of notifiable industrial disease of 324. The two different types of recording lead to discrepancies in published figures.

Major occupational health problems in industry causing absence from work are therefore not generally toxicological, though these are of great importance to the individual. Ill health caused by non-occupational disease, but possibly accentuated by the effects of occupation, is of far greater concern.

Special Legislative Problems

Ionising radiations are a relatively new hazard which have been anticipated by special and effective regulations put out as statutory instruments under *The Factories Act* 1961, *The Ionising Radiations (Sealed Sources) Regulations* 1961 and *The Ionising Radiations (Unsealed Radioactive Substances) Regulations* 1968.

Hazards which are currently under consideration for legislation include:

Noise

Noise may be defined as unwanted sound. This "unwanted sound" is often caused by factory processes, boiler rooms, and aircraft. The noise produced may be detrimental to the health of workers within the factory or to the population living in the noisy environment. A major difficulty in defining legislation for workers within the factory is to distinguish if deafness in a worker is *wholly* attributable to occupational noise. This difficulty has led the Department of Employment to publish a Code of Practice for Reducing the Exposure of Employed Persons to Noise (1972). The Secretary of State for Employment states in his foreword "The general solution to this problem which is a complex one has been hampered more by ignorance than by neglect . . . I regard the publication of the Code as the first important step in the prevention of loss of hearing due to noise at work. It should be considered as a blue print for action." By means of this code of practice, advice is given on the engineering aspect of noise exposure of employed persons; however "it does not include advice to machinery manufacturers, which it is proposed to cover separately, or on the medical management of noise exposed personnel, or on the place of audiometry". Nevertheless, it is a most valuable document and should make a major contribution to the prevention of occupational deafness, which is not yet a "prescribed" disease.

Vibration Syndrome

The Industrial Injuries Advisory Council in accordance with Section 62 of the National Insurance (Industrial Injuries) Act 1965 is at present considering whether disease of bones, joints, muscles, blood-vessels or nerves of the hand, arm or shoulder (including Raynaud's phenomenon) caused by vibrating machines should be prescribed under the Act. An interim report presented to Parliament in 1970 concluded "that further enquiries are necessary on all aspects of the question referred to them".

Problems arising on prescription are:

(*a*) the difficulty of distinguishing between occupational and non-occupational cases;
(*b*) the difficulty of deciding and defining the occupational cover;
(*c*) the problem of diagnosis and assessment;
(*d*) the triviality of disablement in the majority of cases.

The Common Law

In 1971, John Munkman in his book 'Employer's Liability at Common Law' stated:

> "At the present day, therefore the law is favourable to the injured workman. He receives insurance benefits whether he was to blame for his accident or not. In addition he is entitled to damage at common law if the accident was caused by the fault of his employer, of his fellow-workmen, or of third parties and if the workman's own negligence contributed to the accident, the effect is not to defeat his claim but to reduce the damages in proportion to his fault."

In relation to the worker, the employer has a dual duty of care. There is a duty of care imposed by common law, breach of which may give the employee an action in law for the tort of negligence. Lord Wright expressed the common law duty of care as:

> "The obligation is threefold, the provision of a competent staff of men, adequate material and a proper system (of work) and effective supervision." (Wilson and Clyde Coal *v.* English; Law Reports, 1938 Appeal Cases, page 57.)

Later authorities have added a further class: a safe place of work.

In addition to the common law duty of care there is the duty of care imposed on an employer by Act of Parliament. If an employer fails to comply with some duty imposed on him by statute: i.e., fencing dangerous machinery, the employee may bring an action in tort against the employer if as a result of the employer's breach of statutory duty he has suffered the sort of harm which the statute was enacted to prevent.

Generally the employee claims against the employer on the basis of either one or both these torts. It is sometimes possible, although rarely done, for claims to be expressed as a breach of the employer's contract with the employee. For an action to succeed on the basis of either of these torts the employee must prove in support of his claim on a balance of probability:

(1) the employer acted or failed to act in accordance with his duty of care;
(2) the employee thereby suffered damage (generally personal injury);
(3) this damage was not too remote, that is to say that the consequences of the breach of duty could have been reasonably foreseen beforehand.

Discussion

From the above description of the law as it affects the worker, sympathy must be felt with the recommendation made by the Robens Committee (1972) paragraph 125. "That the statutory provisions dealing with safety and health at work should be revised and re-organised; that so far as possible they should be unified within the framework of a single comprehensive enactment; and that they should be administered by a new Authority for Safety and Health at Work." It is envisaged that this new authority would have responsibility, not only for the groups of workers already mentioned, but also for those workers in universities, laboratories and hospitals not at present covered by any of the present Acts.

The law relating to compensation for persons who suffer personal injury in certain specified circumstances is likely to be changed in the foreseeable future when the findings of the Royal Commission on Civil Liability and Compensation for Personal Injury, under the Chairmanship of Lord Pearson, are published.

The terms of reference of the Royal Commission are: "To consider to what extent, in what circumstances and by what means compensation should be payable in respect of death or personal injury:

(*a*) in the course of employment;
(*b*) through the use of a motor-vehicle or other means of transport;
(*c*) through the manufacture, supply or use of goods or services;
(*d*) on premises belonging to or occupied by another; or
(*e*) otherwise through the act or omission of another where compensation under the present law is recoverable only on proof of fault or under the rules of strict liability.

Having regard to the cost and other implications of the arrangements for recovery of compensation, whether by way of compulsory insurance or otherwise."

Annual Reports

The annual reports of the various government departments review up-to-date changes and new legislation. In particular the Annual Report of Her Majesty's

Chief Inspector of Factories, Department of Employment, should be consulted—these and all the sectional lists of publications available from all the Government Departments are published by Her Majesty's Stationery Office.

Department of Employment

Other publications which can be obtained on direct application to the Information Branch, Department of Employment, 12 St. James's Square, London, SW1 4LL. (Tel. 01-930 6200 ext. 516) are:

Background Briefing, Number 1.

Work of the Department, January 1972.

This describes the functions and responsibilities and the information service of the Department of Employment (D.E.) and is designed as a basic introduction to its work. This clear exposition, freely available, is strongly recommended to all occupational physicians and others who require information about the D.E.

The briefing states:

The Industrial Relations Act 1971 is the most comprehensive piece of legislation in British history dealing with the reform of industrial relations.

The D.E. is responsible for bringing it into effect and administering it.

The Act provides a framework of law which reinforces the voluntary system of industrial relations. Among its main provisions are:

the right of an individual to join or not to join a trade union;

protection for employees against unfair dismissal;

the voluntary registration of trade unions and employers' associations which comply with certain basic requirements, principally in relation to their rules, and the restriction of certain rights and privileges to unions and associations which have so registered;

a new system of courts and tribunals (the National Industrial Relations Court and the industrial tribunals) to adjudicate upon matters in dispute which cannot be resolved voluntarily, and a Commission on Industrial Relations (C.I.R.) to carry out investigations and advise the Court.

new powers for the Secretary of State in emergency situations.

For further explanation of the purpose and working of the Act, see *Background Briefing No.* 4, *The Industrial Relations Act* 1971.

There is a description (page 15) of the Youth Employment Service and the Disablement Resettlement Service (page 15 and 16).

The Government Training Centres are described on page 17. All are in Background Briefing number 4.

Background Briefing No. 5.

Services for Disabled Workers—February 1972, defines the legislative provisions under the Disabled Persons (Employment) Acts 1944 and 1958. Other Services and relevant acts are also discussed. Two other important booklets are *Training for the Future* aimed to serve as a basis for public debate and discussion of the issues involved and their implications.

A review of the Industrial Training Board system and training in other countries is included in the text.

People and Jobs—a modern employment service—sets out how the Government intends to modernise the employment service to meet the needs of the Labour market in the 1970's, these plans have emerged from a review of all the manpower services provided by the Department of Employment.

A further recent publication is *Respiratory Disease in Foundrymen* Report of a Survey by T. A. Lloyd Davies, Medical Branch of H.M. Factory Inspectorate, Department of Employment (now the Employment Medical Advisory Service 1973) H.M.S.O. 1971, Dd 501534 K40 5/71, 50p.

The organisation, methods and analysis of the findings of the survey are described. The discussion and conclusions on this major survey, indicate that many factors have to be considered in concluding that work in foundries is associated with pulmonary hazards.

The Technical Data Notes, a series of short papers, each produced with a specific purpose to guide management and employees on methods of use and methods of prevention of ill health (many have a section on health and safety precautions) also contain a list of the relevant statutory provisions. (Technical Data Notes, 1–32. These are free from H.M. Factory Inspectorate, The Department of Employment, Baynards House, Chepstow Place, London, W.2.).

The Chief Medical Adviser, The Employment Medical Advisory Service has provided *Notes for Guidance*. "Compiled with the object of giving Employment Medical Advisers a ready source of information on certain aspects of industrial medicine which they are likely to encounter in the course of their duties."

At present they are in stencilled form but they are available to physicians on application to the Employment Medical Advisory Service at the Department of Employment.

They form an up-to-date text book of toxicology with a bibliography which includes relevant legislation. Information is given on the requirements for medical examinations, the nature of the disease, cause, diagnosis, and pathology, where appropriate.

UNITED STATES OF AMERICA

The Federal Government has made and is making changes in a comparable way to the British Government. The present position is, we believe, best explained by quoting directly from the N.I.O.S.H. Fact Sheet put out by Health Services and Mental Health Administration, U.S. Department of Health, Education and Welfare, The National Institute for Occupational Safety and Health, 5600 Fishers Lane, Rockville, Maryland, 20852.

"The National Institute for Occupational Safety and Health was established within the Department of Health, Education, and Welfare under the provisions of Public Law 91–596—the Occupational Safety and Health Act of 1970. Administratively, N.I.O.S.H. is located within H.E.W.'s Health Services and Mental Health Administration.

"As the Federal agency responsible for formulating new or improved occupational safety and health standards, N.I.O.S.H. not only carries out H.E.W.'s responsibilities under the Occupational Safety and Health Act, but also the health program of the Federal Coal Mine Health and Safety Act of 1969 (P.L. 91–173). N.I.O.S.H. is the principal Federal agency engaged in research, education and training in a national effort to eliminate on-the-job hazards to the health and safety of America's working men and women.

"Under the Occupational Safety and Health Act, N.I.O.S.H. has the responsibility for conducting research designed at producing recommendations for new occupational safety and health standards. These recommendations are transmitted to the Department of Labor which has the responsibility for the final setting, promulgation and enforcement of the standards.

"In the case of the Federal Coal Mine Health and Safety Act, N.I.O.S.H. transmits recommended health standards to the Department of the Interior which has the enforcement responsibilities under that law.

"The Institute's main research laboratories are in Cincinnati, Ohio, where studies center on the effects of exposure to hazardous substances used in the workplace, as well as on the psychological, motivational, and behavioral factors involved in occupational safety and health. Much of the Institute's research focuses on specific health and safety hazards such as asbestos, beryllium, carbon monoxide, lead, mercury, noise pollution, heat stress and others.

"At N.I.O.S.H.'s Appalachian Center for Occupational Safety and Health (A.C.O.S.H.) in Morgantown, West Virginia, research is being conducted on the problem of coal workers pneumoconiosis ('black lung disease') and on other occupational respiratory diseases. Thousands of coal miners have been given X-rays and medical examinations as part of the research effort into the causes and characteristics of 'black lung disease'.

"N.I.O.S.H.'s Western Area Occupational Health Laboratory, based in Salt Lake City, Utah is engaged in health and safety research relative to uranium mining, and in the provision of technical assistance to western states. This laboratory also provides analytical and instrument calibration services to Department of Labour compliance officers in the field.

"Education and training are also major functions of N.I.O.S.H. Under the Occupational Safety and Health Act, N.I.O.S.H. is required to conduct '. . . education programs to provide an adequate supply of qualified personnel to carry out the purposes of this Act . . .' There is, at present, a severe national shortage of occupational safety and health professionals. N.I.O.S.H. has embarked on a training grant program to develop two-year, baccalaureate and graduate programs in colleges and universities across the nation. These programs, coupled with an expanding short course training activity conducted at the Cincinnati laboratories, are helping to produce a balanced number of qualified personnel to deal with the problems of occupational safety and health.

"N.I.O.S.H. also maintains staff in ten Regional Offices throughout the United States. The Regional Offices are focal points for special surveys and evaluations of existing occupational safety and health problems, consultative services to the states, and other activities."

The programmes that are at present the concern of the National Institute for Occupational Safety and Health for compliance with their mandate under the *Occupational Safety and Health Act* (1970) have been described by Baier and Key (1972).

Criteria Documents

Two types of documents are being produced, comprehensive and partial documents. Priorities are:

(1) a population index of workers exposed;
(2) a relative toxicity index, comparing a substance which can produce mild transient effects to a substance which produces permanent disability;
(3) an incidence index, which is a determination of the number of workmen showing effects from exposure to the substance or hazard;
(4) a quantity index, the amount produced annually or the number of sources of physical agents; and
(5) a trend index, which is an estimate of usage.

Criteria for a recommended standard of occupational exposure to beryllium, carbon monoxide, asbestos, noise and hot environments have already been published. In addition to these two types of criteria documents, N.I.O.S.H. is preparing a recommendation for dealing with carcinogenic compounds listed in Appendix A of the Threshold Limit Value list and perhaps other carcinogens. There will probably be recommended methods of control which prohibit manufacture, use, and other activities which involve human exposure without express approval of the enforcement agency.

The other kind of document is one for biologic threshold limits, being prepared with the help of an external Biologic Standards Review Committee.

List of Toxic Substances

The Occupational Safety and Health Act (1970) requires the Secretary of Health, Education and Welfare to publish "within six months of enactment of the Act and thereafter as needed, but at least annually, a list of known toxic substances by generic family or other useful grouping, and the concentrations at which such toxicity is known to occur."

In 1971 N.I.O.S.H. compiled a list of 8,000 substances. Toxic Substances Annual List 1971 available from the U.S. Government Printing Office, Washington D.C. A second edition has been published in 1972.

National Occupational Hazard Survey and Health Evaluations

A research activity of N.I.O.S.H. is to gather data from the National Occupational Hazard Survey and from hazard evaluations, the latter are undertaken on requests from employers or employees.

Human Factors Research

The Occupational Safety and Health Act (1970) requires studies to be undertaken into the motivational aspects of work. A further study is considering "the impact of shift work, time rotation, fixed tasks which require very little physical activity or no thought (boredom), and high stress situations such as those experienced by air traffic control tower operators". Behavioural studies, which will include changes resulting from exposure to chemical neurotoxic agents, are in progress.

Survey of Needed Manpower

The Bureau of Labor Statistics and the Occupational Safety and Health Administration in the Department of Labor are assisting N.I.O.S.H. "in initiating a contract to evaluate the feasibility of developing a National Survey to determine manpower requirements to implement the Act".

Occupational Injury and Disease Reporting in the United States

A Status Report (Trasko 1971) under the above title "brings together information on (1) the status of State Law and regulations requiring the reporting of occupational injuries and diseases to official agencies and (2) the availability of published statistics on number and costs of occupational injuries and diseases. Included also is a brief reference to the 'Proposed National System for Uniform Recording and Reporting of Occupational Injuries and Illnesses' recommended by a special study group, appointed by the American National Standards Institute". The basic purpose of this report is to furnish background information that may be useful in the implementation and administration of the National system for collection and reporting statistics on injuries and illnesses provided for in the Occupational Safety and Health Act of 1970 (PL. 91–596).

This comprehensive report includes in an Appendix "the list of laws and regulations providing for the reporting of occupational injuries and diseases to Workmen's Compensation agencies, State health and Labor authorities". A revealing comment in the report states (page 20)—"Reasons for the failure of systems providing for medical reporting of occupational diseases are numerous and include: shortcomings in the reporting laws and regulations themselves; failure to enforce laws, which would be difficult to do so under any system; difficulties in diagnosing occupational diseases by physicians in general practice and the consequent failure to recognise them; the insidious nature of many diseases, especially those of slow development, the absence of standard methods of classification, and of a uniform definition of conditions that constitute an occupational disease as contrasted with an accidental injury." To combat some of these difficulties, the U.S. Department of Labor, Occupational Safety and Health Administration has published Recording Requirements under the Williams-Steiger Occupational Safety and Health Act of 1970. This states "Beginning 1st July 1971, every employer who is covered under this Act must keep occupational injury and illness records for his employees in the establishment at which his employees usually report to work." Details of the type of recording required are included in the Recording Requirements.

Changes in attitude to Occupational Health and safety in the people of Great Britain and the United States are reflected in proposed and actual legislative changes in both countries.

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OCCUPATIONAL HEALTH—SELECTED TEXT-BOOKS AND OTHER SOURCES

Introduction

Practising occupational physicians, medical practitioners in other disciplines or physicians who have the intention to attend post-graduate courses in Occupational Health may require guidance on sources of information likely to be most helpful to them on a variety of different topics.

Information is included in Chapter 11 on Libraries and their use, and Information and Advisory Services (Chapter 12). The syllabus of the M.Sc. Course in Occupational Medicine (page 9) lists the topics covered in that course. Specific guidance on general and specialised text-books and other reading matter thought to be of value is included. A bibliography, of additional text-books and articles published in specialised journals, has been prepared but, because of the high additional cost, could not be reproduced. Access to this and other specialised information on industrial processes, toxic agents and individual occupational health services provided by members of the Society is available on application in writing to the Secretary, The Society of Occupational Medicine, at the Royal College of Physicians, 11 St. Andrew's Place, London, NW1.

Other methods of learning such as tape-slide lectures, films, video-tapes and programmed texts are being developed and reference will be made to these also.

Organisations such as government departments, research institutes, university departments and industry itself may be able and willing to provide information as well as individuals on specialised topics, but before seeking information from these sources the more conventional methods of obtaining information for example from text-books, journals, libraries and information services should be used. Attention is drawn to the section in Chapter 12 (Information and Advisory Services) on how to seek information and what information is really required on any particular topic. (This advice will, we believe, be quite unnecessary for experienced occupational physicians and many others, but it may be helpful for those who are unfamiliar with occupational health problems). The phrasing of the question and the actual knowledge required should be carefully thought out before information is sought. Whenever possible questions should be sent by post rather than telephoned, unless an instant or very rapid answer is essential. If difficulty is experienced in identifying poisons or information is required for emergency treatment of poisoning the *Poisons Information Services* should be consulted. The addresses and telephone numbers are as follows:

Poison Centres

LONDON (*Director:* Dr. D. R. Goulding), Poisons Reference Service, New Cross Hospital, Avonley Road, London, SE14. Tel. 01-407 7600.

EDINBURGH (*Director:* Dr. H. B. Matthew), Scottish Poisons Information Bureau, The Royal Infirmary, Edinburgh, EH3 9YW. Tel. 031-229 2477.

CARDIFF (*Director:* Dr. J. D. P. Graham), Poisons Information Centre, The Cardiff Royal Infirmary, Cardiff, CF2 1SZ. Tel. 0222 33101.

BELFAST (*Director:* Prof. P. C. Elmes), Poisons Information Centre, Royal Victoria Hospital, Belfast. Tel. 0232 30503.

DUBLIN (*Director:* Dr. J. Woodcock), Poisons Information Centre, Jervis Street Hospital, Dublin 1. Tel. Dublin 45588.

Dr. Roy Goulding analysed the type of inquiries answered by all the services in 1970. The majority concerned drugs (i.e., medicines) and household products. Next in importance, numerically, were plants followed by agricultural and industrial queries and finally a miscellaneous group. The total number of queries dealt with in 1970 was 17,894.

(*National Poisons Information Service—Health Bulletin, Vol. XXIX No.* 3 1971 (*pp.* 170/1).

Text-books which the poisons information services frequently consult are:

Poisonous Plants and Fungi
Pamela North, Blandford Press 1967

Clinical Toxicology and Commercial Products
M. N. Gleason, K. E. Gosselin and H. C. Hodge, The Williams and Wilkins Company, Baltimore, 2nd Edition 1963.

Side Effects of Drugs
L. Meyler, Excerpta Medica Foundation, Volume V. 1966.

HISTORY, GENERAL AND SPECIALISED ASPECTS OF OCCUPATIONAL HEALTH

The change from an agricultural economy to gradual industrialisation in any country throughout the world presages the occurrence of industrial disease and accidents at work.

From these sociological and industrial changes spring the origins of the history of occupational health. Ramazzini is famous as the "father" of Occupational Health. He it was who first formulated the question when taking a history from a patient, "What is your occupation?" His book *De Mortis Artificum Diatriba* was published in 1700 and a translated edition *Diseases of Tradesmen* was compiled by Herman Goodman in 1933.

In addition to these books reference to more recent historical events are described and discussed in "Developments in Occupational Health during the Last Thirty Years" *Three Cantor Lectures by R. S. F. Schilling*, published in the Journal of the Royal Society of Arts Vol. CXI 1963 (pages 933–971). The Wellcome Institute of the History of Medicine published "Occupational Medicine in the 1860s" by W. R. Lee in their book *Medicine and Science in the 1860s* (1969). The 1860s started with New Coal Mines Act and Lee describes the effect of this new legislation. He discusses some of the medical comments on this ten-year period made in the Lancet and British Medical Journal.

Jean Spencer Felton, Julia P. Newman and Donald L. Read describe some of the historic events in Occupational Medicine throughout the ages in *Man, Medicine and Work,* published in 1964 by the U.S. Department of Health, Education & Welfare, Washington D.C., to commemorate the 50th year of the American Division of Occupational Health. Also in 1964, 50 *Years of Occupational Health* was published by the same department. This booklet is lavishly illustrated and concerned exclusively with American history.

Probably the most famous text-book on Occupational Health is *The Diseases of Occupations* by Donald Hunter, published by the English Universities Press Limited. First printed in 1955 the 4th edition was published in 1969 and a new edition is in preparation—The book is described as "a complete clinical survey of all known hazards of occupation including the latest methods of treatment. In itself the book constitutes a textbook of clinical industrial medicine."

In fact it is far more than this. History, legislation, social reforms, changes in attitude and distinguished pioneers in occupational medicine are all described and discussed in what the Royal Society of Medicine states is "a fascinating and connected account". Clinical pictures, X-rays and photographs of work places with examples of hazardous situations illustrate the text-book. Following each chapter there is an extensive bibliography.

A recent publication which compares in magnitude with *The Diseases of Occupations* is:

The Encyclopaedia of Occupational Health and Safety

Volume I A/K, published in 1971; *Volume II L/Z,* published in 1972, by the International Labour Office, Geneva.

Contributions were sought from 700 specialists who prepared 900 articles—Seventy different countries and 10 international organisations are represented.

This text-book therefore, covers an immense variety of topics concerned with international occupational health and toxicology.

The description of how to use the encyclopaedia states "The articles are classified in alphabetical order. When a title consists of several words, the most significant of these is used as a heading. Because of their complexity, some subjects are dealt with in several articles which are usually grouped together. Bibliographical references: each article is usually accompanied by a few bibliographical references, the purpose of which is to supplement the information in the article and sometimes develop individual points. Care has been taken to quote documents published in different countries so as to cater for as wide a circle of readers as possible. On the other hand, no mention is usually made of such sources of general information as text-books or encyclopaedias, and in particular of such standard works of reference as:

Encyclopedie medico-chirurgicale. Pathologie du travail, intoxications, maladies par agents physiques (Fascicules mobiles), Paris.

Lazarev, I. V. (1965)
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Patty, F. A. (1958)
Industrial hygiene and toxicology. Second revised edition, 3 vols. Interscience Publishers, New York.

Schwartz, L.; Tulipan, L.; Birmingham, D. J. (1957)
Occupational diseases of the skin. 3rd edition. Lea and Febiger, Philadelphia.

Hunter, D. (1969)
The Diseases of Occupations 4th edition. The English Universities Press, London."

The reader will appreciate from the above quotation that these are the recognised books of reference that he should consult on the appropriate topics in the English, French and Russian languages.

Text-books which are concerned with the problems of particular industries, but which in fact contain information likely to be of value to all occupational physicians and other members of the occupational health team are:

Medicine in the Mining Industries, edited by John M. Rogan, Chief Medical Officer, National Coal Board and Director, Institute of Occupational Medicine, Edinburgh, published by Heinemann Medical Books Ltd., London 1972.

The preface states that it "is intended for those who are concerned with the health of the miner". The book contains information on dust-borne diseases, radio-activity, skin diseases, extremes of temperature, noise, noxious gases and accidents, absence from work and administration. The list indicates the wide applicability of this book which is up to date and highly recommended.

A book which develops further the different aspects of occupational pulmonary disease is:

Clinical Aspects of Inhaled Particles edited by D. C. Muir who is head of the Physiology Branch, Institute of Occupational Medicine, Edinburgh. Published by William Heinemann, Medical Books Ltd., 1972.

The editor states in the foreword "Most patients suffering from disease of the respiratory tract contracted their illness as a result of inhaling airborne particles of one type or another." Included are chapters on deposition and clearance of inhaled particles, air pollution and tobacco smoke, inhaled microbes, airborne allergens; byssinosis; asbestos; silicosis and coal worker's pneumoconosis; other industrial dusts; and physical properties of therapeutical aerosols.

These two up-to-date books, both from the Institute of Occupational Medicine in Edinburgh, complement each other.

Medical Services in Transport, Published in 1966 by Butterworths, London is edited by the Chief Medical Officer of the British Railways Board, London Transport and the Cunard Line respectively; J. Sharp Grant, L. G. Norman and L. M. Heggie.

The authors state in the preface; "transport in all its forms—whether surface or space—is potentially hazardous to its users and operators unless it is constantly monitored by enlightened and alert occupational doctors and unless there is regular consultation between them and the technologists at the earliest design stage". Since publication there have been changes within the services and in legislation. Nevertheless, this book remains a valuable reference book on this important subject.

"The Boards of Directors of modern industry are composed of engineers, chemists, lawyers and accountants, and of managers who have been trained within industry itself. These are the men who create the environment in which other men and women work. But at no stage in their experience, do they receive much systematic guidance on the relationship of this environment to the health of the work people of whom they are in charge. This book has therefore been written in an attempt to fill this gap in the education of the university scientists and college technologists who will find careers in industry," states the author of this text-book, *Health in Industry a Guide for Engineers, Executives and Doctors* R. C. Browne, Nuffield Professor of Industrial Health, in the University of Newcastle-Upon-Tyne (formerly Kings College, University of Durham) published in 1961 by Edward Arnold (Publishers) Ltd. The text-book is clear and readable, suitable for all members of the Occupational Health team. Unfortunately, as is the case with so many text-books on occupational health, a new edition is badly needed to discard out of date material and incorporate recent information. Nevertheless, it is recommended for its clear exposition of general principles. The gap in up-to-date information for non-medical personnel on wide-ranging environmental issues may well be filled by the new *Encyclopedia of Environmental Science and Engineering* to be published shortly by Gordon and Breach, Science Publishers Incorporated, and edited by Edward N. Zeiler and James R. Pfafflin, which contains a chapter on occupational health.

Industrial Health Technology, by Bryan Harvey (now H.M. Chief Inspector of Factories) and Robert Murrary (now Medical Adviser to the Trade Unions Congress) were both members of the Factory Inspectorate, in 1958, when this book was published by Butterworths, London. G. P. Barnett states in the foreword: "One of the most valuable features of any text-book such as this is to collate and establish certain essential and fundamental principles which can form the basis of precautionary measures in the future, and in the introductory chapter to part II the authors have set out certain important principles and advice as the plan of attack where a health hazard exists, with priorities which should prove most helpful to anyone faced with such a problem as the introduction of a new process or use of a new compound."

A new edition is required, but, I believe, generations of occupational physicians would endorse the view expressed by Mr. Barnett, and I know of no book to take the place of Industrial Health Technology at the present time. It is still strongly recommended, though Chapter 1, in particular, is sadly out-of-date.

The Effects of Abnormal Physical Conditions at Work, edited by C. N. Davis, P. R. Davis and F. H. Tyrer is the report of a joint meeting of the British Occupational Hygiene Society, the Ergonomics Research Society, and the Society of Occupational Medicine held in January 1967. As honorary secretary of the joint organising Committee I was intimately concerned with the planning of this meeting, therefore my views may be prejudiced, but I believe this record of the proceedings, with which I was not concerned, gives valuable information, provided by experts in the field, on extremes of cold, heat and pressure combined with a section on the industrial implications. This book is recommended for all members of the occupational health team.

Modern Trends in Occupational Health, edited by R. S. F. Schilling and published by Butterworth & Co. Ltd. 1960, forms part of the Modern Trends Series of publications. In his introduction Professor Schilling states: "Occupational Health is expanding so rapidly that it is not possible to cover all recent developments in one book. We have therefore, attempted to given an account of the more important general trends, particularly the broadening of the scope of occupational health beyond the boundaries of medicine and of the development of scientific methods for measuring the working environment and its effects on health . . . One aim has been to show that with doctors and nurses, the occupational hygienist and health engineer, the physicist, chemist, psychologist and sociologist are all playing an increasingly important part in protecting people from the hazards of their work." The first chapter by the editor is entitled, the Measurement of Health, the remaining 20 chapters are written by experts on a wide variety of topics. Though this book was published thirteen years ago, I believe that it should rightly still be regarded as an essential reference book.

The Practice of Industrial Medicine edited by Dr. T. A. Lloyd Davies then Professor of Social Medicine and Public Health, University of Malaya, was first published in 1948 by M. K. Lewis & Co. Ltd., London, followed by a second edition in 1957. The preface is of much interest particularly in view of the developments in occupational medicine in the United Kingdom and Dr. Lloyd Davies' present appointment as Chief Employment Medical Adviser in the Department of Employment.

Referring to extracts from the preface to the first edition, which described the need for education in industrial medicine for the doctor and the nurse and the difficulties of their jobs in industry, he stated: "to be fair, I must add the doubts which have assailed me as events have unfolded in post-war years. The industrial medical officer needs a place. Owing to the difficulties of uniformity of standards in different parts of the country he cannot be an officer of the local authority. Moreover he needs to be part of an industrial organisation, and not an interloper foisted on an organisation by authority. So long as he is paid by the employer, dismissible at whim for doing his job, he will be suspected by employees. Solution of these difficulties is needed before industrial medicine can develop freely. Perhaps the best solution may be to adopt the ideas of our Belgian allies and to make medical officers and nurses working in industry responsible to an employer-employee committee; after all, the health of the employee is the charge of industrial medical officers and nurses. It is of secondary importance into what ministerial orbit industrial medicine is gathered so long as the industrial medical officer and nurse have definite and firm support. Maybe this issue, so long debated, is best settled by expediency rather than principle—the important thing is that it should be settled".

The book, despite the fact that it has not been revised since 1957 is strongly recommended because the coverage is comprehensive. The text is easily read and understood, concise and factual and as stated by the publisher "The aim has been to fit the separate requirements for industrial health into a composite whole rather than to study each branch in detail."

The most recent text-book, to be published in February 1973, by the Butterworth Group, London is *Occupational Health Practice* edited by Richard S. F. Schilling. The publishers state: "This book outlines the principles of occupational health practice for physicians, hygienists, nurses and safety officers.

"An introductory chapter gives a brief account of the developments of occupational health in both the Western World and East Europe, contrasting the different forms of service provided by private enterprise and the State. Another chapter deals with the importance of man's work in relation to his health. Others describe routine and special medical examinations, including the screening of the apparently well, the psycho-social factors in the working environment and the mental health of people at work. The problems of occupational safety and the prevention of occupational disease are described in some detail. Techniques used in the study of groups of workers are described in sections on epidemiology, field surveys and the collection and handling of sickness absence data.

"One chapter is devoted to ergonomics, while five on occupational hygiene deal with various factors in the working environment, and include one on protective clothing and equipment. The book concludes with a chapter on education in occupational health for experts in this field and undergraduates in medicine and science.

"The general aim is to offer a broad and up-to-date concept of occupational health practice in different parts of the world. The needs of developing countries are emphasised throughout the book."

TOXICOLOGY

General toxicological information is contained in almost all of the occupational health text-books which have already been discussed, however, there are in addition, a number of other standard texts to which the occupational physician may require to have access.

Industrial Hygiene and Toxicology edited by Frank A. Patty published by Interscience Publishers, 1962, is in three volumes, *Volume I General Principles; Volume II Toxicology; Volume III Industrial Environmental Analysis.*

The preface to the second edition of Volume II stated that "the book was planned as a ready practical reference for persons interested in or responsible for safeguarding the health of others working with the chemical elements and compounds used in industry today". This book fulfills the editor's ambition most admirably. Unfortunately the introduction of new toxic substances make it impossible for any toxicological text-book to remain up-to-date, and for this reason the U.S. Department of Health Education and Welfare Health Services and Mental Health Administration publish annually *The Toxic Substances List* edited by

Herbert E. Christensen—in accordance with Section 20 (*a*) (6) of the Occupational Safety and Health Act 1970, Public Law 91–596. The original list was published on 28th June 1971 and the revised list was published in the 1972 edition. In the introduction the editor states "The purpose of *the List* is to identify 'all known toxic substances' . . . While some 13,000 toxic substance items are listed, there are perhaps double that number which have not yet been included."

The editor requests information on errors, on substances for inclusion, and on any new reference material relating to the elements presented in *the List*. Information should be addressed to him at Room 10–28 N.I.O.S.H. 5600, Fishers Lane, Rockville, Maryland, 20852.

Dangerous Properties of Industrial Materials by N. Irving Sax, 3rd edition, was published in 1968 by Reinhold Book Corporation, New York, Amsterdam, London. The author states in the preface: "The purpose of this work is to provide a single source for quick, up-to-date, concise, hazard-analysis information about more than 12,000 common industrial and laboratory materials." Section 1 entitled Toxicology is by Leonard J. Goldwater and is designed for those "without special training in industrial toxicology who may be called upon to understand and interpret data which are largely medical in nature". This chapter forms a clear introduction to the whole subject, but readers may require more up-to-date information as it is 5 years since publication.

Clinical Toxicology of Commercial Products—Acute Poisoning by Marion N. Gleason, Robert E. Gosselin, Harold C. Hodge and Roger P. Smith, was first published in 1957, the third, the latest edition, was published in 1969 by Williams & Wilkins Co. Baltimore. The authors state: "The purpose of this book is to assist the physician in dealing quickly and effectively with acute chemical poisonings, arising through misuse of commercial products. The book provides, (*a*) a list of trade name products together with their ingredients, (*b*) addresses and telephone numbers of companies for use when descriptions of products are not available, (*c*) sample formulas of many types of products with an estimate of the toxicity of each formula, (*d*) toxicological information including an appraisal of toxicity of individual ingredients, (*e*) recommendations for treatment and supportive care." This is an extremely practical and useful book.

Practical Toxicology of Plastics by René LeFaux, translated by Scripta Technica Ltd. and edited in the English Edition by Peter T. Hopf, published by Iliffe Books Ltd., London 1968.

This book on the toxicology of macromolecular compounds covers three main industrial fields; plastics, elastomers and textiles. Part I concerns the chemistry and toxicology of high polymers; Part II, industrial hygiene, which comprises industrial toxicology, the dermatoses and health and safety. The medical and surgical applications of macromolecular compounds are dealt with in Part III and food toxicology in Part IV. There are also appendices on legislation and other relevant points.

The book cannot be entirely up-to-date in such an expanding field, but contains many basic facts on this important topic.

Other important toxicological textbooks are not commented on here but, likely to be of particular value, are the Industrial Toxic Agent Series of the Elsevier Monographs, and the two additional text books by Ethel Browning.

Harmful Effects of Ionising Radiations, by Ethel Browning (Elsevier Monograph, 1959)

Toxic Aliphatic Fluorine Compounds, by F. L. M. Pattison (Elsevier Monograph, 1959)
Toxicity of Beryllium Compounds, by L. B. Tepper, H. L. Hardy, R. I. Chamberlain (Elsevier Monograph, 1961)
Toxicology and Biochemistry of Aromatic Hydrocarbons, by H. W. Gerarde (Elsevier Monograph, 1960)
Toxicity of Arsenic Compounds, by W. D. Buchanan (Elsevier Monograph, 1962)
Carcinogenic and Chronic Toxic Hazards of Aromatic Amines, by T. S. Scott (Elsevier Monograph, 1962)
Toxicity of Mercury and its Compounds, by P. L. Bidstrup (Elsevier Monograph, 1964)
Vanadium: Toxicology and Biological Significance, by T. G. F. Hudson (Elsevier Monograph, 1964)
The Halogenated Hydrocarbons of Industrial Toxicological Importance, by W. F. von Oettingen (Elsevier Monograph, 1964)
Industrial Toxicology and Dermatology in the Production and Processing of Plastics, by K. E. Malten and R. L. Zielhuis (Elsevier Monograph, 1964)
Toxicity of Industrial Metals, by Ethel Browning (Butterworths, 1961)
Toxicity and Metabolism of Industrial Solvents, by Ethel Browning (Edited by Encyclopaedia of Industrial Medicine, 1965)

OCCUPATIONAL CANCERS—Textbooks

Occupational cancers are unfortunately of increasing importance. There are a number of valuable textbooks:

Chemical Carcinogenisis and Cancers by W. C. Hueper and W. D. Conway both of the Environmental Cancer Section of the National Cancer Institute, Bethesda, Maryland, published by Charles C. Thomas, Springfield, Illinois, U.S.A. 1964. In this book the nature and types of carcinogenic chemicals are described. Information is given on the products, industries, environments and population groups likely to be affected. In addition to other information, chemical and biological screening and bio-assay techniques are described for testing chemicals for carcinogenic properties.

Health Hazards of the Human Environment was published by the World Health Organisation, Geneva, in 1972 and contains contributions from 100 specialists in 15 countries. Part I concerns the community environment; Part II chemical contaminants and physical hazards and Part III surveyance and monitoring. Mutagens and carcinogens are considered in Chapter 13, pages 213–228.

The Biochemistry of Bladder Cancer by Professor Eric Boyland was published by Charles C. Thomas, Springfield, Illinois, U.S.A. in 1963. This book reviews earlier work and describes research in progress at the time of publication. It is in the same American Lecture Series as Hueper and Conway's book discussed above.

Occupational and Environmental Cancers of the Urinary System by W. C. Heuper was published in 1969 by the Yale University Press, New Haven, London. All aspects of the biology, pathology and epidemiology of cancers of the kidney, ureter and bladder are described. The book is intended for industry, governmental agencies, physicians and labour organisations, written with the hope that a cancer control programme may be developed.

The International Agency for Research on Cancer. I.A.R.C. Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Volume 1 Lyons 1972, World Health Organisation, Geneva. Because of the increase in number and quality of chemicals in the environment, international concern was such that the I.A.R.C. Advisory Committee on Environmental Carcinogenesis considered it wise that experts should meet to consider the data, review and evaluate their findings and publish these in monograph form. The book describes how this work was undertaken; lists the members of the working group and their advisers, who met in Geneva in December 1971. This carefully prepared monograph should be of the greatest assistance to workers in this field.

Prevention of Cancer—Pointers from Epidemiology by Dr. (now Sir) Richard Doll, F.R.S. was published by the Nuffield Provincial Hospitals Trust 1967. He was the holder of the Rock Carling Fellowship for that year. This beautifully written instructive book is a pleasure to read and has in addition an excellent bibliography.

Precautions for Laboratory Workers who handle Carcinogenic Aromatic Amines was published by The Chester Beatty Research Institute, The Institute of Cancer Research, Royal Cancer Hospital, London in April 1966. The code recommended is based on a code of practice drawn up by the Harlow Industrial Health Service for the guidance of laboratory staff in factories: The revised code is issued "in the hope that it will provide guidance to laboratory workers in industrial, hospital, teaching and research laboratories and also for those responsible for employing such workers".

The World Health Organisation—Features Article No. 23 December 1972 is on Occupational Cancer. This forms one of the most up-to-date publications on this topic.

GENERAL MEDICINE—Textbooks

Each physician is likely to have personal preferences for one or more of the many medical text-books published. However, to guide post-graduate physicians attending our courses we recommend those which we believe, or our students have told us, are particularly useful in the context of occupational clinical medicine and for examination purposes.

A Short Text-Book of Medicine by J. C. Houston, C. L. Joiner and J. R. Trounce, English University Press (paperback) is recommended both for its excellence and comparatively small size and reasonable price. This book is not designed for future reference but rather for present instruction.

Bedside Diagnosis. Now in its 8th edition, by Charles Seward, published by E. & S. Livingstone Ltd., Edinburgh and London 1969, is particularly helpful to physicians from overseas and others who may be unfamiliar with the training in bedside diagnosis usually given to medical students in the United Kingdom.

Primer of Medicine—(3rd Edn.), 1971 by H. M. Pappworth, Butterworths, London. This short book is designed to assist graduates preparing to sit the final qualifying and post graduate medical clinical examinations. It does not claim to be a text-book of medicine as theoretical knowledge is best obtained from the standard medical texts.

Post-Graduate Medicine by I. G. T. Davies, published by Lloyd-Luke (Medical Books) Ltd., London, (2nd End.), 1972. The author in the preface to the first edition states: "Medical text-books fall into two main groups: those intended for medical students and those which are large, comprehensive and intended mainly for reference purposes. It seemed to me that there was need for a book intended to be read from cover to cover which served the need of those engaged in general medicine and which attempted to bridge the gap between the theoretical knowledge of the final year medical student and the practice of sound, safe and orthodox medicine" . . . "In one compact and convenient volume I have tried to distil the basic requirements of current post-graduate medicine which will be useful, not only to general and specialist physicians but also to final year students, to interested general practitioners, and to those working for surgical, anaesthetic and obstetrical post-graduate degrees." Judging by opinions expressed by post-graduate physicians studying occupational medicine the author has fulfilled his ambition most admirably.

Because of the importance of occupational pulmonary disease, reference should be made to section 13 of the index, but in addition *Lectures in Chest Medicine* by John R. Edge, published by Staples Press, London 1970, gives a clear picture of the range of pulmonary diseases. Dr. Neville Oswald in the foreword states "The ten lectures in this book exemplify the breadth of experience of the contributions . . . complex subjects have been reduced so far as possible to simple terms."

Reference books

Reference books required by occupational physicians in their own medical departments will be selected personally in the light of their own needs, however, the following are recommended:

Price's Text-book of the Practice of Medicine (11th Edn.) edited by Sir Ronald Bodley Scott, Oxford University Press, London (1972).

The Principles and Practice of Medicine (8th Edn.) edited by Sir Stanley Davidson, E. & S. Livingstone, Edinburgh and London.

Cecil Loeb Text-book of Medicine (13th Edn.) edited by P. B. Beeson and W. McDermott (1971).

Harrison's Principles of Internal Medicine (6th Edn.) edited by M. M. Winstrobe, et al. (1970) (2 volumes).

Both these American text-books are standard works and contain extensive and authoritative accounts of general medical topics. They cover similar areas to Price's Textbook of Medicine and the choice of textbook should be largely decided by personal preference.

SELECTED READING LIST

Guideline reading list on selected topics. (Reference should be made to appropriate chapters and the indexes for further reading.)

Abbot, D., *Inorganic Chemistry*. Millard Boon (1971).
Adams, J. C., *Outline of Orthopaedics* (6th Edn.). Livingstone (1967).
Baetjer, A. M., *Women in Industry*. W. B. Saunders Co., Philadelphia and London (1961).
Bennett, T. P. and Frieden, E., *Modern Topics in Biochemistry*. MacMillan Co., New York, Collier MacMillan, London (1968).
Bezzant, R. J., *Basic Organic Chemistry*. McGraw-Hill (1967).

Bradford Hill, Sir A., Principles of Medical Statistics (9th Edn.). *Lancet*, London (1971).

Brown, J. A. C., *The Social Psychology of Industry*. Pelican (1962).

Duke-Elder, Sir S., *System of Ophthalmology*. Volume XIV Injuries. Part 1. Mechanical Injuries; Part 2. Non-Mechanical Injuries; H. Kimpton (1972).

Edholm, O. G., *The Biology of Work*. Weidenfield and Nicholson (1967).

Encyclopaedia of Occupational Health and Safety. Volume I A-K (1971); Volume II L-Z (1972); International Labour Office, Geneva.

Farnsworth, D. L., *College Health Administration*. Appleton Century Crofts, New York (1964).

Fife, I. and Machin, B., *Redgrave's Factories Acts* (22nd Edn.). Butterworths and Shaw & Sons, London (1972).

Gafafer, W. M., *Occupational Diseases—A Guide to Their Recognition*. U.S. Department of Health, Education and Welfare, P.H.S. Publication No. 1097 (1964).

Grant, W. M., *Toxicology of the Eye* (2nd Edn.). Springfield, Illinois (1974).

Green, J. H., *Basic Clinical Physiology*. Oxford Medical Publication, Oxford University Press (1969).

Harvey, B. and Murray, R., *Industrial Health Technology*. Butterworths, London (1958).

Houston, J. C., Joiner, C. G. and Trounce, J. R., *A Short Textbook of Medicine*. English Universities Press, London (1972).

Humphrey, J. H. and White, R. G., *Immunology for Students of Medicine* (3rd Edn.). Blackwell Scientific Publications, Oxford and Edinburgh (1970).

Hunter, D., *The Diseases of Occupations* (4th Edn.). English Universities Press (1969).

MacMahon, B. and Pugh, T. T., *Epidemiology: Principles and Methods* (1st Edn.). Little, Brown & Co., Boston (1970).

Moser, C. A. and Kalton, G., *Survey Methods in Social Investigation* (2nd Edn.). Heinemann Educational Books Ltd., London (1971).

Muir, D. C. F. (Ed.), *Clinical Aspects of Inhaled Particles*. Heinemann Medical Books, London (1972).

Rieche, A., *Outline of Industrial Organic Chemistry*. Butterworths, London (1968).

Rogan, J. M. (Ed.), *Medicine in the Mining Industries*. Heinemann Medical Books, London (1972).

Schilling, R. S. F. (Ed.), *Occupational Health Practice*. Butterworths, London (1973).

Schilling, R. S. F. (Ed.), *Modern Trends in Occupational Medicine*. Butterworths, London (1960).

Schwartz, L., Tulipan, L. and Birmingham, D. J., *Occupational Diseases of the Skin* (3rd Edn.). Lea & Febiger, Philadelphia, H. Kimpton, London (1957).

Singleton, L. J., *Introduction to Ergonomics*. W.H.O., Geneva (1972).

Tredgold, R. F., *Human Relations in Modern Industry*. University Paperbacks Methuen (1965).

Winstrobe, M. M., Thorn, G. W., Adams, R. D., Brunwald, E., Isselbacher, K. J., Petersdorf, R. G., *Harrison's Principles of Internal Medicine* (7th Edn.). Magraw-Hill (1974).

Wolff, H. S., *Biomedical Engineering*. World University Library (1970).

Wright, S., *Applied Physiology* (12th Edn.). Oxford University Press, Oxford (1971).

H.M.S.O. Publications

Annual Report of H.M. Chief Inspector of Factories.
A short guide to The Factories Act 1961.
A short guide to The Offices, Shops and Railway Premises Act 1963.
The National Insurance (Industrial Injuries) Act 1965.
Notes on the Diagnosis of Occupational Diseases 1972.
Pneumoconiosis and Allied Occupational Chest Diseases 1970.
Report of a Committee under the Chairmanship of Sir Brian Windeyer appointed to inquire into Lead Poisonings at the R.T.Z. Smelter at Avonmouth. Cmnd. 5042 (1972).
Report of a Committee under the Chairmanship of Lord Robens appointed to enquire into Safety and Health at Work. Cmnd. 5034 (1972).
Royal Commission on Medical Education. (Todd Report) Cmnd. 3569 (1968).
Report of a Sub-Committee of the Standing Medical Advisory Committee. Scottish Home and Health Department: Medical Rehabilitation—the pattern for the future. (Mair Report) SBN 11 49079355 (1972).
Report of a Sub-Committee of the Standing Medical Advisory Committee of Department of Health and Social Security and Welsh Office. Rehabilitation. (Tunbridge Report). SBN 11 320479 5 (1972).
Code of Practice for Reducing Exposure of Employees to Noise. SBN 11 360887X (1972).
Absenteeism. Manpower Papers No. 4. SBN 11 3605501 (1971).
The Report of the Joint Committee on the Care of the Health of Hospital Staff. (Tunbridge Report) Ministry of Health, Scottish Home and Health Department. SBN 11 320004 8 (1968).

Journals

The Lancet.
The British Medical Journal.
The New England Journal of Medicine.
The Journal of the American Medical Association.
The Medical Journal of Australia.

Specialist Journals

The Journal of Occupational Medicine (Journal of American Industrial Medical Association).
The Journal of the Society of Occupational Medicine (of England) (Formerly the Transactions).
The British Journal of Industrial Medicine.
The Archives of Environmental Health (American).
The American Journal of Industrial Medicine and Surgery.
The Annals of Occupational Hygiene (Journal of the British Occupational Hygiene Society).
The Proceedings of the Royal Society of Medicine (British).
The British Journal of Preventive and Social Medicine
Ergonomics (British).
Occupational Health (Journal for Occupational Health Nurses) (British).
The Journal of the Association of Industrial Health Nurses (U.S.A.).

Abstract Journals

Industrial Hygiene Digest (Abstracts well over 100 journals).
Excerpta Medica.
Bulletin of Hygiene.
Abstracts of World Medicine.

Industrial Safety is published monthly by the United Trade Press Ltd., 42 Gerrard Street, London, W1V 7LP. It regularly carries information on:

1. Safety training courses available throughout Britain.
2. Activities of the Safety Groups of companies throughout the country.
3. Law relating to safety, and relevant litigation.
4. Fire prevention.
5. Research in the field.
6. Recent industrial accidents and lessons to be learned from them.
7. Building and civil engineering hazards.
8. Newly published books on the subject, and relevant British Standards and Statutory Instruments.

The Industrial Safety Yearbook and Buyers Guide (published annually), carries information about all safety products, which are classified alphabetically and include a wide range of topics—for instance gas detectors, marine rescue vessels, emergency lighting, first aid equipment, radiation protection—as well as all types of protective clothing and industrial clothing.

In addition it carries a list of British Standards relating to safety; technical, research, government and trade organisations, and all trade names known to the publisher.

APPENDIX I

University of Dundee
Faculty of Medicine 1972/73
Department of Social and Occupational Medicine,
Dudhope Terrace, Dundee.

GENERAL INFORMATION

1. Introduction

The University provides the following Industrial Health courses which are designed, as far as possible, to meet the needs of candidates wishing to practise either at home or abroad. The courses are held in the Summer Term only, from April to June.

Diploma in Industrial Health (DIH) Course

This course is open to graduates in Medicine and Surgery of two years' standing, or similarly qualified persons, who hold a Diploma in Public Health or equivalent qualification.

Certificate in Industrial Health (CIH) Course

This course is open to graduates in Medicine and Surgery of two years' standing, or similarly qualified persons.
For full particulars regarding entrance see Regulations 1 and 2.

2. Application for Admission

Applications for the Diploma in Industrial Health and for the Certificate in Industrial Health courses should be submitted by 31 January of the year in which admission is desired.

Students whose applications have been accepted will be required to matriculate and may be required, prior to matriculation, to appear before the Director of Studies. If such students without an acceptable excuse have failed by the prescribed date to appear before the Director of Studies if required, or to matriculate, or both, they will incur a penalty of £5. It should be noted that to fulfil matriculation requirements students must also call at the Cash Office about payment of their fees (see below).

3. Fees

The Consolidated Fee for the Diploma in Industrial Health and Certificate in Industrial Health courses is £25 and covers matriculation, tuition, use of laboratories, and examinations. A Composition Fee of £2 for membership of the Students' Association and Sports Union is also payable.

4. Examination Regulations

All candidates must obtain from the Matriculation Office an Examination Schedule to be completed and returned to the office and must produce if required the appropriate class certificates.

The fee for the examination is included in the Consolidated Annual Fee, but candidates who present themselves for re-examination are charged a fee of £3. Any fees due are payable in the Cash Room when schedules are returned to the Matriculation Office.

5. Periods of Examination in 1973

For the periods of examination beginning in June, completed schedules must be returned and fees paid at the Cash Office by the first Friday of the Summer Term and for the period beginning in September by 20 July. Schedules and fees will be received, with a late fee of £5, up to three clear days from the first day of each examination diet, provided that the subjects offered by a late entrant can be taken within the framework of the examination timetables. Thereafter no entries will be received.

Regulations

Diploma in Industrial Health (DIH) and Certificate in Industrial Health (CIH)

1. Before entering the course prescribed in these Regulations for the Diploma or the Certificate in Industrial Health a candidate must be a graduate in Medicine and Surgery of two years' standing having graduated either in this University or in another institution approved by the Senatus Academicus on the advice of the Board of the Faculty of Medicine; provided that a candidate for the Diploma in Industrial Health must possess, in addition to the qualifications mentioned above, a Diploma in Public Health or such other qualification as the Senatus on the advice of the Faculty Board may deem to be the equivalent.

2. An intending candidate for the Diploma or Certificate must first inform the Dean of the Faculty of Medicine of his intention to enrol as a candidate and then complete an application form.

3. A candidate for either the Diploma or the Certificate shall be required to attend in the University and to follow for one academic term the prescribed course of study in the following subjects, that is to say,

(a) A systematic study of:

(i) Promotion and maintenance of the health of factory operatives;
(ii) Occupational hygiene, including industrial toxicology;
(iii) The health and hazards of non-industrial occupational groups;
(iv) Occupational diseases;
(v) Accidents and their prevention;
(vi) Rehabilitation and resettlement in industry;
(vii) International health organisation;
(viii) Dermatology, Otorhinolaryngology, Ophthalmology, Traumatic Surgery, Orthopaedics and Haematology in relation to Occupational Health.

(*b*) A practical study of:

(i) Industrial toxicology, chemical and physical; dust analyses; noise and radiation measurements; measurement of the physical environment—temperature, humidity and air movement.
(ii) Heat stress.

(*c*) Environmental studies, including visits to industrial establishments throughout Scotland.

4. A candidate for either the Diploma or the Certificate shall maintain and, at the end of the course, submit for examination, a Day Book in which shall be written a record of visits made to industrial establishments during the course together with brief and critical observations on these activities.

5. (*a*) A candidate for the Diploma in Industrial Health must pass, at a single diet, an examination which shall include

(i) an oral examination
(ii) a written examination
(iii) a practical examination
(iv) a clinical examination
(v) an evaluation of the contents of the Day Book prescribed by these Regulations

and

(*b*) A candidate for the Certificate in Industrial Health must pass, at a single diet, an examination which shall include

(i) an oral examination
(ii) a practical examination
(iii) a clinical examination
(iv) an evaluation of the contents of the Day Book prescribed by these Regulations.

6. The examiners shall be such of the Professors, Readers, Senior Lecturers and Lecturers giving instruction in subjects qualifying for the examinations as the Faculty Board shall from time to time determine, together with such external examiners (not being members of the academic staff of the University) as may be appointed by the University Court.

7. A candidate who has satisfied all the conditions prescribed in the preceding Regulations shall, after payment of the fees required, be entitled to receive the Diploma in Industrial Health or the Certificate in Industrial Health as appropriate.

Syllabus of Courses

The History of Occupational Health

This lecture course deals with the history of the Industrial Revolution, development of safety precautions in mines and factories, Workmen's Compensation, temperature regulations, clothing, measurement of environmental conditions, and visual and auditory problems in industry.

Applied Physiology and Ergonomics

The subjects covered in this course include: visual and auditory problems in industry and machine design. The practical application of the basic principles will be given in the subjects heating, lighting, ergonomics and noise in lecture demonstrations. Instruction will be given on measurement of environmental conditions and heat stress.

Rehabilitation and Resettlement

The course will cover accident-proneness; the medical-social problems of the disabled, including estimation of loss of function and associated problems; the physiology of exercise and fatigue; the study of joint movement and posture.

The scope and function of Resettlement Clinics and Industrial Rehabilitation Units; the Disabled Persons (Employment) Act, 1944; the National Insurance (Industrial Injuries) Act, 1946.

The clinical aspects of rehabilitation will be demonstrated and practical procedures illustrated on injured workers—e.g., the various resistance exercises to remedy joint injuries of the knee, foot, hand, elbow, shoulder and spine, in two clinical sessions.

Practical Application of Statistics

Instruction is given in the methods of socio-medical research including the collection, collation and analysis of data, the use of computing machines, and the more important sources of information.

Radiation Hazards

Instruction (which will include a practical demonstration) on radiation protection and radiation hazards will be given by the Department of Medical Biophysics.

International Health Organisations

There will be two lectures dealing with: the structure of the World Health Organisation; International Labour Office, international travel; epidemiological information services: WHO publications and the scientific documentation service.

APPENDIX II

National Coal Board

Training for Occupational Health

1. So far as is possible new medical officers are given a short residential induction course the object of which is threefold:

(i) a general introduction to the aims and objectives of occupational medicine;
(ii) a slightly more detailed introduction to Mining Medicine;

(iii) a review of the main problems of the mining industry together with an outline of the structure of the N.C.B.

2. For those medical officers who wish to do in-service preparation for the D.I.H. a comprehensive syllabus (attached) is available. Notes for guidance are sent out with each lesson and an examination question set. The course is supervised by one of the headquarters medical staff with a special interest in, and responsibility for, training. Comment on the written answers is returned on tape, affording an opportunity for wide-ranging review of the subject. Each student is seen personally at least every six months to discuss progress. In addition, a number of outside visits are arranged and a reading list and other material provided.

3. In co-operation with the Institute of Occupational Medicine (q.v.) annual post graduate courses are run and the Board's medical officers are nominated to attend at three-yearly intervals.

In addition a record is kept at Headquarters, and updated annually, of all post graduate training so that the progress and professional advancement of each medical officer may be helped.

D.I.H. Part Time Study

Syllabus

SECTION I—HISTORY AND STRUCTURE OF INDUSTRY

Lesson 1—Introduction
2—Modern Trade Unionism—Records
3—Factory Act—Mines and Quarries Act
4—Disabled Persons' Employment Act
5—National Insurance (Industrial Injuries) Act—Offices, Shops and Railway Premises Act
6—The Factory Inspectorate
7—Industrial Relations
8—The Appointed Factory Doctor Service—Employment Medical Advisory Service

SECTION II—TOXICOLOGY AND INDUSTRIAL DISEASE

Lesson 11—Lead
12—Mercury
13—Benzene—Aniline
14—Aliphatic Hydrocarbons
15—Epoxy Resins—Chromium
16—Beryllium—Hard Metal Disease
17—Minor Metals
18—Phosphorus—Manganese
19—Arsenic—Arsenious Hydride
20—Asbestos
21—Carbon Monoxide—Irritant Fumes and Gases
22—M.A.C.s.—T.L.V.s.
23—Pneumoconiosis—Byssinosis
24—Industrial Accidents
25—Compressed Air Illness

26—Farmer's Lung
27—Anthrax
28—Occupational Cancer
29—Pesticides

SECTION III—ENVIRONMENT, PHYSIOLOGY, PSYCHOLOGY

Lesson 31—Thermal Environment
32—Vision—Lighting
33—Hearing
34—Nutrition
35—Industrial Psychology
36—Noise
37—Ventilation and Humidity
38—Occupational Hygiene
39—Radiation

SECTION IV—PRACTICE OF INDUSTRIAL MEDICINE

Lesson 41—B.M.A. Subject of the Year
42—B.M.A. Occupational Health Sub-Committee
43—Notification of Industrial Diseases
44—Substances capable of inhibiting bone marrow—blood changes
45—Occupational Hazards of Certain Jobs
46—Visual Standards
47—Employment of Women and Young Persons
48—Role of Medical Examinations
49—Rehabilitation
50—Group Medical Services

SECTION V—MEDICAL STATISTICS

Lessons 51 to 54

SECTION VI—MISCELLANEOUS

Lesson 61—Report Writing
62—Ergonomics
63—Electric Shock
64—Senior Staff—screening procedures
65—Industrial Organisation: E.E.C., I.L.O., W.H.O.

APPENDIX III

PERMANENT COMMISSION AND INTERNATIONAL ASSOCIATION ON OCCUPATIONAL HEALTH

The Supplementary Membership list 1972

President: Prof. Leo Noro (Finland), c/o National Board of Health, Siltasaarenkatu 18A, Helsinki 53.
Past President: Prof. Sven Forssman (Sweden).
Secretary General and Treasurer: Prof. Enrico Vigliani (Italy), Direttore della Clinica del Lavoro, "Luigi Devoto" dell 'Universita, Vin San Barnaba, 8 20122 Milano.

Vice Presidents: Dr. Adolfo Antoni (Argentina); Miss Margaret Hardy (Canada); Dr. Jean-Jacques Jarry (France); Prof. Mirtscho Lukanov (Bulgaria); Prof. Harold Magnuson (U.S.A.); Prof. Richard Schilling (U.K.); Prof. Fedor Valic (Yugoslavia).

Delegation Secretaries: Dr. Juan Martin Baztarrica, Hipolito Irigoyen 833, Buenos Aires, Argentina; Prof. Jaroslav Teisinger, Director, Dept. of Industrial Hygiene and Occupational Diseases, Institute of Hygiene and Epidemiology, Srobarova, 48, Czechoslovakia; Dr. Aage Grut, H.M. Senior Medical Inspector of Labour—Direktoratet for Arbejdstilsynet, Baunegardsvej 73–75 Stengarden (Hellerup), Denmark; Prof. Marcel Marchand, 12 Rue de Tenremonde, Lille, France; Prof. Ernst Holstein, 117 Berlin-Köpenick 1, Ostendorfstr, 43, E. Germany; Prof. Werner Klosterkötter, Direktor des Institutes für Hygiene und Arbeitsmedizin, Klinikum Essen der Universität 43 Essen, Hufelandstrasse 55 Robert-Koch-Haus, W. Germany; Dr. Robert Murray, Medical Adviser, Trades Union Congress, Congress House, Great Russell Street, London, W.C.1; Prof. Giovanni Mauro, Viale Sarca, 85, 20125, Milano, Italy; Prof. Juko Kubota, Director, Occupational Health, Service Centre, 35–4 Shiba 5-Chome, Minato-ku, Tokyo 108, Japan; Mr. D. van Zuilen, Director, Research Institute for Public Health Engineering T.N.O. Schoemakerstraat 97, Post bus 214, Delft, Netherlands; Dr. Arne Bruusgaard, Direktoratet for Arbeidstilsynet, Postboks 8103, Oslo-Dep., Oslo 1, Norway; Prof. Witold Zahorski, Directeur de l'Institut de Medecine du Travail en Industrie Miniere et Siderurgique, Rue Widlakow 23, Katowice 8, Poland; Dr. Narciso Perales y Herrero, Portal de Belen 4, (Bario del Nino Jesus) Madrid-9, Spain; Miss Sara P. Wagner, Director of Nurses, Standard Oil Company (N.J.) 30 Rockefeller Plaza, New York, N.Y. 10020, U.S.A.

For information about membership an approach should be made to the delegation secretary in the country in which the inquirer resides. Occupational physicians, hygienists and nurses may all apply for membership if they are able to fulfil the regulations under article 3 of the constitution for active and associate membership.

(*a*) *active members*. An individual shall be admitted to active membership upon fulfilling all the following conditions:

- (i) proposal by three active members in good standing;
- (ii) submission of curriculum vitae (reprints of no more than five scientific papers may be submitted);
- (iii) approval of the proposal by The Membership Committee;
- (iv) election by the Council of the Permanent Commission.

(*b*) *associate members*. An individual may become an associate member by paying the required fee for the current triennial period. No person may attend any congress, meeting or training course sponsored by the Permanent Commission unless he is an active member, an honorary member or an associate member.

PERMANENT COMMISSION AND INTERNATIONAL ASSOCIATION ON OCCUPATIONAL HEALTH

Sub-Committees

ABSENTEEISM (Sick Absence Statistics)

Chairman: Dr. O. Paulíno (Brazil), Av. Vicente de Carvalho 42, Ap. 61, P.O. Box 110, Santos (Estado de Sao Paulo).

Secretary: Prof. A. Moniz (Portugal), Av. Guerra Junqueiro 28, 2° E, Lisboa-1.

Members: Prof. D. P. Nogueira (Brazil); Prof. H. J. Molteni (Argentina); Prof. P. Sangro y de Torres (Spain); Prof. P. Taylor (Great Britain).

OCCUPATIONAL HEALTH IN THE PRODUCTION OF ARTIFICIAL FIBRES (CS_2)

Chairman: Prof. J. Teisinger (Czechoslovakia), Department of Industrial Hygiene and Occupational Diseases, Institute of Hygiene and Epidemiology, Srobarova 48, Praha 10.

Secretary: Ing. D. Djuric (Yugoslavia), Institute of Occupational and Radiological Health, Deligradska 29, Beograd.

Members: Dr. G. Bittersohl (East Germany); Prof. S. Goto (Japan); Dr. S. Hernberg (Finland); Dr. J. Lieben (U.S.A.); Dr. J. Logeard (France); Prof. S. Maugeri (Italy); Dr. J. Nofer (Poland); Prof. H. Thiele (East Germany).

ASBESTOSIS

Chairman: Prof. B. Pernis (Italy), Institute of Occupational Health, University of Genoa, Ospedale San Martino, 16132 Genova.

Secretary: Dr. P. Pelnar (Canada), Institute of Occupational and Environmental Health, Suite 412, 5 Place Ville Marie, Montreal 113, P.Q.

Members: Dr. H. Bohlig (West Germany); Dr. P. Cartier (Canada); Dr. J. Champeix (France); Dr. W. Clark Cooper (U.S.A.); Dr. L. J. Cralley (U.S.A.); Dr. R. S. J. Du Toit (South Africa); Dr. J. C. Gilson (Great Britain); Dr. A. Grut (Denmark); Prof. G. Jacobson (U.S.A.); Dr. S. F. McCullagh (Australia); Dr. M. Nosal (Czechoslovakia); Dr. W. J. Smither (Great Britain); Dr. I. Webster (South Africa); Dr. G. Wright (U.S.A.).

OCCUPATIONAL HEALTH IN THE BUILDING INDUSTRIES

Chairman: Prof. G. Jullien (France), 7 bis Avenue Frédéric-Mistral, Marseille VIII.

Secretary: Dr. H. G. Häublein (East Germany), Direktor, Deutsches Zentralinstitut für Arbeitsmedizin, 1134 Berlin-Lichtenberg, Nöldnerstrasse 40–42.

Members: Dr. M. Baselga Monte (Spain); Dr. M. A. El Batawi (Egypt/W.H.O.); Dr. J. M. Halewyck de Heusch (Belgium); Prof. M. Lukanov (Bulgaria); Dr. J. Nofer (Poland); Dr. E. Östlund (Sweden); Prof. L. Parmeggiani (Italy/I.L.O.); Dr. J. P. Poli (France); Prof. M. Hassenein (Egypt); Dr. H. Matsufuji (Japan).

BYSSINOSIS

Chairman: Prof. A. Bouhuys (U.S.A.), Yale University Lung Research Center, School of Medicine, 333 Cedar Street, New Haven, Connecticut 06510.

Secretary: To be appointed.

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Chairman: Prof. R. Truhaut (France), Chaire de Toxicologie, Faculté de Pharmacie de l'Université, 4, Avenue de l'Observatoire, Paris VI.
Members: Dr. Milan Horvath (Czechoslovakia); Prof. F. Kalojanova (Bulgaria); Prof. N. Zurlo (Italy); Dr. H. Stokinger (U.S.A.).
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Chairman: Dr. E. Mindus (Sweden), Sveavägen 9–11, Stockholm.
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Secretary: Dr. F. Kalojanova (Bulgaria), Institute of Hygiene and Industrial Safety, Boul. Petko Napetof 36, Sofia.
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Chairman: Dr. A. Bruusgaard (Norway), Direktoratet for Arbeidstilsynet, Postboks 8103, Oslo-Dep. Oslo 1.
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TOXICOLOGY OF METALS

Chairman: Prof. L. Friberg (Sweden), Department of Environmental Hygiene, Karolinska Institute, S–104 01 Stockholm 60.
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The Epidemiological Approach to Occupational Health Problems

The importance of the epidemiological approach to occupational health problems is stressed in the M.Sc. Course in Occupational Medicine at the London School of Hygiene and Tropical Medicine. The programme of teaching is organised by the Department of Epidemiology and Medical Statistics in the School. Because we believe that members of the Occupational Health team, particularly physicians, may wish to have more detailed information on, and a discussion of, this epidemiological approach, this chapter is included in the text.

Occupational Health is concerned with groups of workers as well as individuals. The physician or hygienist working in the industrial milieu should think in terms of these groups and to do this satisfactorily, he must possess a good grounding in epidemiological method. Statistics are an integral part of this process and he should, therefore, also be conversant with basic concepts of statistical technique.

Epidemiology may be defined as the study of the distribution and determinants of disease frequency in man (MacMahon and Pugh 1970). Although this subject was initially restricted to the investigation of epidemics of infectious disease, the major advances in methodology in the past twenty years have been in the field of non-infective chronic illness such as coronary heart disease, chronic bronchitis and cancer. A few basic epidemiological concepts will be outlined here to demonstrate the need for this knowledge in anyone concerned with groups rather than individuals.

To the initiated, many of these concepts may appear self-evident. The excuse for re-iterating them here is that, in our experience, many postgraduates do not appreciate their importance, and without this appreciation, group-orientated medical research becomes impossible.

Epidemiology can be broadly divided into two branches:

A. Descriptive

Here the main concern is to observe patterns of disease in the community and to describe the changes that vary, say, with age distribution, sex ratio, social class and time.

B. Experimental

In this section, whilst descriptive studies play a background part the main preoccupation is with formulating and testing hypotheses about the causes of disease patterns. These are tested by therapeutic trials, sample surveys, intervention trials, etc.

Rarely, however, is it possible—or morally justifiable—to test these causative theories in ways which might be employed on laboratory animals. Nevertheless, it is frequently possible to design experiments which test, in some degree, these aetiological hypotheses.

(*A*) *Rates*

Firstly the concept of *rates*. Many statistics are quoted as simple numbers, for example 200 workers were killed on building sites in 1971. The risk of dying, however, will depend on the total number of workers exposed. If the overall population was 2,000 there is greater cause for concern than if this total was two million. Quoting this statistic as 20 per 100,000 persons employed per year puts the number who died into perspective and affords an opportunity for comparing it with other working groups. The need to establish a "population at risk" is fundamental to all comparative epidemiological studies.

The concept of rates can be narrowed to more specific entities. For example, the overall death rate for a particular cause may hide important variations between age groups, sex, social class, occupation, etc., so that the use of age or sex-specific rates is often necessary to demonstrate these latent differences.

The crude death rate in 1951 for Middlesbrough was 11·8 deaths per 1,000 persons living, and for Hastings this figure was 18·1. These figures suggest that the quieter, less polluted and warmer environment of Hastings is not having a beneficial effect on the health of its inhabitants compared with colder, dirtier industrial Middlesbrough. However, these figures hide two important factors affecting the differences. The population of Hastings is much older than Middlesbrough and the death rates for each age group are higher in the industrial town. A more valid comparison of the two towns mortality experience would be by age-specific death rates. When this is computed, taking England and Wales as 100, the figures are: Hastings 97%, Middlesbrough 114%.

With these specific rates it is possible to compare the experience of one group with another and various standardisation techniques are available for this purpose. The interested reader is referred to the standard texts for more details of this and other statistical techniques (Bradford Hill 1966).

It is also important to state here that incidence rates and prevalence rates are not synonymous, though they both commonly relate to sickness absence.

An *incidence rate* is either expressed as "spells" or "persons".

$$\text{Incidence rate (spells)} = \frac{\text{Spells beginning in defined period}}{\text{Persons/days at risk}}$$

$$\text{Incidence rate (persons)} = \frac{\text{Persons starting at least one spell in defined period}}{\text{Persons/days at risk}}$$

Prevalence relates not to the *onset* of new illness or spells but to those currently in existence during the period of study. For example:

$$\text{Period prevalence (spells)} = \frac{\text{spells current at any time in defined period}}{\text{Persons/days at risk}}$$

A similar equation exists for period prevalence (persons) whereas point prevalence is concerned with persons sick at a given *instant* divided by the persons at risk.

"Person/years" is a means of overcoming the difficulties involved in assessing a population at risk where the persons involved and time concerned is variable. For example 50 people each exposed to a hazard for 2 years is 100 person/years. The same group exposure would result from 10 years exposure in each of ten individuals.

Incidence rates are more suitable for acute illness with a well defined onset whereas prevalence rates are more applicable for chronic long term illnesses with a poorly defined starting point.

(B) Time, Place, Persons

In the assembling of facts about a given disease, these three categories must always be taken into account. They are fundamental to all epidemiological thinking. A variation in the occurrence of a disease is more likely to be affected by one of these variables than anything else—with the possible exception of the suspected cause of the disease.

Time

A disease which causes a rapid and sudden increase in the numbers of persons affected in a short period of time—a matter of days—followed by a slow falling off is likely to be infective in type. Whereas a slow increase in disease incidence over a number of years, but seeming to start at a fairly well-defined point in time, suggests that the casual factor appeared before the case increase and was present for some years afterwards. If the incidence of the disease falls thereafter either the "pool" of susceptibles has been used up or the concentration of the agent in the environment has levelled off or decreased (other possibilities of course include, better prophylaxis, medical care and treatment). Good examples of the rise and fall in incidence of infective diseases are given weekly in the epidemiology section of the British Medical Journal.

Place

If the disease under study is restricted to particular areas whether they be countries, districts, towns or streets, then the search for the cause may take into consideration, local factors operative in the affected areas but absent elsewhere. A good example is Burkitt's lymphoma in Central Africa (Burkitt & Wright 1966).

Persons

If specific groups of individuals are affected by a disease whereas others appear immune, then both groups must be examined for factors which separate them. This may be occupation, ethnic group, dietary or social habits, etc. Examples here include, nasal cancer among woodworkers (Acheson,Cowdell, Hadfield & Macbeth 1968); cancer of the cervix in non-Jews (*Lancet* 1966); and lung-cancer in cigarette smokers (Doll & Hill 1950).

Combinations of the time, the place and the people may increase substantially the likelihood of a cause producing an effect. The discovery of groups or "clusters" of people affected by a given disease either geographically or temporarily close to each other has enabled a number of associations to be proposed. "Clustering" tends to suggest an infective source and such arguments have been used recently in cluster research on congenital neural tube malformations in Glasgow (Fedrick & Wilson 1971) and Hodgkins disease in Ncw York State (Vianna, Greenwald, Brady, Polan, Dwork & Davies 1972).

One of the earliest examples of this technique was John Snow's pioneer work in Soho, where he discovered that cholera epidemics in mid-nineteenth century London were water-borne (Snow 1855).

(*C*) *Causation and Association*

In epidemiology, the timing, place and type of person affected is an essential prerequisite in assessing a potential risk to health. If the time, the place and the people suggest a causative link with a given agent then this is useful corroborative evidence. Nevertheless the researcher needs to be aware of the pitfalls involved in making the terms "causation" and "association" synonymous. In science in general and medicine in particular it is rarely possible to prove beyond all doubt that X causes Y. The use of epidemiology and statistical significance tests may strengthen the association but proof is often hard to find.

We may say that smoking cigarettes causcs lung canccr and although there is strong evidence in favour of that statement it is difficult to prove it conclusively. It may be that people with lung cancer smoke more cigarettes than others or that cigarette smoking and lung cancer are *independently* related to a third factor which is the real cause—for example, genetic predisposition.

"Cause" and "association" may be related to each other in several ways:

(i) Not statistically associated, i.e., independent.
(ii) Statistically associated.

  (α) Non causally, i.e., secondarily associated
  (β) Causally — indirect
                     — direct

Nevertheless cigarette smoking has been associated with lung cancer and the evidence for a causative link is very strong. Notwithstanding proof is difficult to establish. Association is strengthened by many factors such as a statistical link between the prevalence of lung cancer in smokers compared with non-smokers. Many researchers have demonstrated this using several different methodological approaches. The sites of the cancer seem to be specific and the time factor shows that smoking almost invariably precedes the disease. A dose/response relationship has been demonstrated, animal experiments have confirmed the cancer risk and carcinogenic substances have been isolated from cigarette smoke. In short, all the evidence points to a cause/effect relationship.

The corroborative evidence demonstrated in this example should be sought in all such association studies. Rarely, however, is the link between an agent and its effect as clear cut as in the smoking–lung cancer example.

Types of Epidemiological Method

Much confusion surrounds the terminology here but in essence there are several types of studies.

(1) *Case/Control Studies*

Ideally a comparison between representative samples of people contracting a disease and those who do not. This method is retrospective and the controls are matched as closely as possible with the cases for all parameters except the disease in question and its known associates.

This method is cheap, quick, useful for rare diseases and can be used where expensive or time consuming tests are needed to establish the diagnosis of the disease in question. Its disadvantages are the bias in the selection of cases and controls and the measurement of the disease, as well as difficulties in interpreting the results.

(2) *Prevalence Studies*

These studies define the level of a disease in a population at a given time. Synonymous terms are point prevalence studies and cross-sectional studies.

The advantages are that the investigator can choose his population and methods and can employ uniform diagnostic criteria. It is however fairly expensive, time consuming and not suitable for rare diseases or illnesses of short duration.

(3) *Longitudinal Studies*

These studies follow a defined population for a period of time and the behaviour of physiological and pathological variables are assessed during this period. These studies can be "prospective" or "retrospective" but these terms are confusing and therefore best avoided.

Longitudinal techniques can be used either to observe the incidence of a disease or for case follow up. In addition, controlled trials (intervention trials) which seek to alter a factor or factors in the population or its environment and observe the effect are also longitudinal in type.

This type of epidemiological method is potentially the most accurate so long as the problem of "drop-outs" is assessed accurately. It is unbiased by knowledge of the eventual outcome but of necessity is expensive and time consuming.

SURVEY METHODS

A survey of any disease pattern, occupational group or illness should never be undertaken lightly. It requires the most detailed planning, and statistical advice should be sought from the beginning. It is unlikely that a statistician, however good he may be, will be able to salvage a research project at the very end if he is presented with the results obtained from a badly designed survey. Only the barest outline of the steps involved is possible here. For more details the reader is referred to Moser and Kalton (1971).

It is worth pointing out that postal surveys, although cheap, quick and particularly valuable for investigating rare conditions, suffer from the disadvantages of a potentially high non-response rate and a limited scope for the investigator in the type of questions he asks.

With interview administered questionnaires the procedures for investigation can be more detailed and more accurate but the cost of the study and the time involved is much greater.

Planning a Survey

The order of the items is roughly chronological but will vary, to some extent, depending on the nature and type of the survey to be undertaken.

(i) Define objectives, outline plans and assess practicability of such a survey.
(ii) Define the population to be studied, and decide on method of sampling.
(iii) Outline methods of investigation, i.e., questionnaire, mail or interview administered, plan the data processing and analysis. Decide whether the information is to be processed by hand or through a computer.
(iv) Prepare questionnaire (if needed).
(v) Publicise study among interested people and ask for their help.
(vi) Discuss in detail with sponsors (if any) and with academic directors or department heads.
(vii) Perform a pilot study on limited numbers of the survey population. The purpose of this is to confirm the feasibility of the study, define the costs more accurately and to iron out such items as questionnaire format, interviewer technique, measurement validity, staff training, etc.
(viii) Assess sample size needed for a reasonable chance of a valid result, the staff requirements, costs and time involved.
(ix) Complete the training of the ancillary staff.
(x) Approach the defined population—emphasising the confidentiality of the project, its aims, and the expected benefit to be gained from the results. Where necessary state the organisation sponsoring the study, e.g., Medical Research Council, Department of Health, University, etc.
(xi) Carry out main study, i.e., questionnaire, interviews, measurements.
(xii) "Non responders" need to be followed up. Mail surveys should be followed by at least two reminder letters, the second one enclosing another copy of the questionnaire. Individuals failing to arrive for an interview should be personally followed up. If the "non responders" exceed 10%, a sub sample of these could conceivably be intensively studied if their identity is known, with a simplified protocol to see if they differ significantly from the "responders".
(xiii) Assess the response bias, and check errors in the completed returns. If necessary, re-examine a certain number to assess the validity or reliability of the methods and the results.
(xiv) Process the data and tabulate the results.

Code the answers
Punch the computer cards
Feed cards into computer after programming

(xv) Prepare report and conclusions.
(xvi) Assess the need for further study in this group or a sub-sample and report recommendations and results.

The protocol for the whole study should be clearly outlined before the survey begins, not drawn up at the end for completeness. Serious errors in design, costing and analysis cannot be rectified in the later stages of the survey.

Finally, in this section examples of epidemiological investigations will be cited to illustrate some of the concepts described in this section.

(A) *Nasal cancer*

In 1958 it was noted that the nickel workers at a refining plant in South Wales had a 150 times increased risk of dying of cancer of the nose compared with the general population (Doll 1958). This research was stimulated by information gleaned from accurate records of illness kept at the factory. An analysis of the deaths showed that all the men affected were working at the plant before 1924 and no-one employed after that time seemed to suffer from the same risk. The victims were not employed in processes involving metallic nickel nor the gaseous nickel carbonyl. They were, however, associated with the calcination procedures and the dust from the process probably contained the offending agent. In 1924 precautions were instituted to protect workers from this dust which contained arsenic, and certain processes involving calcination were curtailed. Two workers who underwent operations for lung cancer—this malignancy carried a five times increased risk amongst these employees—were noted to have high arsenic concentrations in their hair, lungs and urine. In this example the demonstration of the risk, the timing of the alteration in the calcination process, combined with environmental and biological monitoring, suggests that arsenic rather than nickel was the carcinogenic agent.

The discovery of this nasal cancer risk was made by the works medical officer. In another example of occupational nasal cancer, the initiator of the research was an ear, nose and throat specialist in Buckinghamshire, England. She noted several cases of an unusual type of cancer of the nose in the High Wycombe area. All those affected were men working in the furniture industry. Subsequent studies detected many more cases and it has been computed that the risk of getting this type of cancer is 1,000 times greater in furniture makers than in the general population (Acheson, Cowdell, Hadfield and MacBeth 1968). Studies of the working conditions in the factories suggests that the risk is associated with dust either from the beechwoods or from resins used in the manufacture of furniture. The polishers, who by way of their craft, have to work in a dust-free atmosphere, have never experienced similar risks from this form of cancer. The hygiene in these furniture factories has improved dramatically in the last thirty years, and it seems unlikely from recent monitoring investigations that the cancer risk still exists. Nevertheless, follow-up studies would be required to prove this.

(B) *Asbestosis*

Since the discovery that asbestos was a potentially dangerous substance that could cause fibrosis and cancer of the lungs, much work has been done to ascertain the degree of risk and the likely aetiological agents. Asbestos manufacturing processes such as cement, pipes and cloth making have been extensively studied in Britain, and insulation workers in the United States have been followed for some years (Selikoff, Churg and Hammond 1965). It appears that there is a differential risk depending on the type of asbestos handled and that smoking enhances the risk of tumours in a multiplicative fashion rather than a summatory one. Mining the ore carries a lesser risk according to Canadian studies (McDonald, Becklake, Fournier-Massey and Rossiter 1972).

Further Reading

(A) *Statistics*

The basic textbook on medical statistics is Bradford Hill's monograph published by the Lancet (8th Edn) (1966). This collection of articles entitled *Principles of Medical Statistics* remains a classic work and should be compulsory reading for anyone considering epidemiological investigations.

More extensive and detailed statistical techniques are to be found in Armitage's book *Statistical Methods in Medical Research* which is based on lectures given by Professor Armitage at the London School of Hygiene and Tropical Medicine.

Both these books contain full bibliographies should the reader require more information on specific topics.

(B) *Epidemiology*

From the many books written in this field, *Epidemiology Principles and Methods* (2nd Edn) (1970) by MacMahon and Pugh and published by Little Brown and Co., Boston, is probably the most concise exposition of modern non-communicable disease epidemiology. This book together with Bradford Hill's Statistics are wise purchases for the budding epidemiologist.

The outline of epidemiological concepts and some applications particularly related to communicable diseases are well described in Taylor and Knowelden's *Principles of Epidemiology* (2nd Edn) published by Churchill, London (1964).

So far as survey techniques are concerned Moser and Kalton's *Survey Methods in Social Investigation* (2nd Edn) Heinemann, London, contains a wealth of information and advice. Admittedly it is concerned primarily with social science research but it is not difficult to adapt the principles outlined to occupational medical practice.

(C) *Seminal papers*

Some are quoted in the text and appear in the references at the end but others recommended include:

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Occupational Hygienists

Introduction

Occupational hygiene may be defined as the measurement, evaluation and control of health risks in working environments. Hygienists have to utilise knowledge from the fields of chemistry and physics, toxicology and applied physiology, and engineering (particularly industrial ventilation). A fully qualified occupational hygienist is usually a science or engineering graduate with wide experience and a higher qualification in the subject. Some hygienists specialise in one particular field, not necessarily restricted to occupational environments, e.g., acoustic engineers, health physicists (dealing mainly with ionising radiations), or aerosol scientists. An occupational hygiene assistant is a technician or trainee, often with a technical rather than an academic qualification.

Occupational physicians, nurses and safety officers may spend part of their time in the identification or routine monitoring of environmental health risks. On problems which require further scientific expertise and time, especially in the design of new facilities, or in engineering control where large capital sums may be involved, the employment of a hygienist or equivalent specialist becomes essential.

In the United Kingdom there are about 150 science graduates who are members of the British Occupational Hygiene Society (B.O.H.S.), and this gives a good estimate of the number of practising hygienists. Some, perhaps about 30, are comprehensive and cover the whole field, whilst the remainder specialise in one or two fields. About 150 occupational physicians are also members of the society. By contrast in the U.S.A. there are about 1,500 graduate hygienists, members of the American Industrial Hygiene Association (A.I.H.A.) and/or the American Conference of Governmental Industrial Hygienists (A.C.G.I.H.). A relatively small proportion however are members of the American Academy of Industrial Hygiene, which issues a roster of professionally qualified hygienists.

Employment Opportunities

Occupational hygienists are employed by most industries with 50,000 or more employees, and by some smaller industries with special risks. In Britain, these include nearly all the nationalised industries, the oil companies, chemical manufacturers and motor companies. A few are employed by industrial research associations, and a very few practise as independent consultants. Within government, increasing numbers are employed in the Industrial Hygiene Laboratories of H.M. Factory Inspectorate (Department of Employment), and in more specialised ways in the Safety in Mines Research Establishment, the Department of the Environment's Warren Springs Laboratory, and in each of the Medical Branches of the armed services. Very few are employed by local government. The Medical Research Council employs a few hygienists in its pneumoconiosis and air pollution research units, and occasionally on its external scientific staff. University teaching departments in Birmingham (University of Aston), Cardiff (National University of Wales), Glasgow (University of Strathclyde), London, Manchester, Newcastle-upon-Tyne and Dundee employ hygienists and most offer a consultant and laboratory service. The National Health Service does not offer full-time career opportunities to hygienists, though on occasion it provides assignments on contract terms.

Guide to pay scales

There are no uniform pay scales for occupational hygienists, who follow the appropriate scientific officer and technician scales in government, comparable with scales in industry, possibly less in universities. A qualified comprehensive hygienist with more than 5 years' experience would probably earn around £2,900; the average salary (1973), is £4,650. Exceptionally, a hygienist with Ph.D. and 20 or more years' comprehensive experience could earn £9,700 p.a. in industry (1973).

Training

Basic qualifications are usually a science or engineering degree, or a comparable technical qualification such as a Higher National Certificate or L.R.I.C. The practising hygienist must be competent in the use and maintenance of complex instrumentation under a great variety of circumstances, and this fact makes technical vocational training as essential as academic study.

Academic degrees

Two *undergraduate* courses largely comprise occupational and environmental hygiene, at Glasgow (University of Strathclyde) and from September, 1974 in London at the Polytechnic of the South Bank. The University of Aston offers an M.Sc. in occupational safety and hygiene; the main emphasis in this course is on safety. *Postgraduate* M.Sc. courses in occupational hygiene, of one year's duration open to I/II class honours graduates, are held at the T.U.C. Centenary Institute, London School of Hygiene and Tropical Medicine (University of London), and from October 1973 at the University of Newcastle-upon-Tyne. During 1958–70 the University of London awarded an academic postgraduate diploma in occupational hygiene (D.O.Hyg.) but this was superseded by the M.Sc. introduced in 1971. Most other universities with occupational hygiene departments offer M.Sc. degrees on thesis only. All offer facilities for Ph.D. students.

Vocational qualifications

The British Examining Board in Occupational Hygiene, a body sponsored by the B.O.H.S., offers a diploma examination (Dip. Occ. Hyg.) for those with at least five years' comprehensive experience, and a certificate for technicians and trainees with at least 3 years' training. The standard of detailed knowledge required in the

Diploma examination is more than that for an M.Sc. It is also comparable in the U.S.A. to the examination of the American Examining Board in Industrial Hygiene sponsored by A.I.H.A. which also qualifies for Membership of the American Academy of Industrial Hygiene.

Sponsoring Bodies

A limited number of industrial enterprises and Industrial Training Boards are prepared to sponsor staff attending academic courses. British students may also be eligible for Science Research Council or Medical Research Council studentships. The Department of Employment and Department of the Environment may from time to time sponsor their own trainees. Overseas students recommended by their own governments may receive support in the form of W.H.O. or I.L.O. Fellowships and, in the case of Commonwealth students, from scholarships given by the U.K. Overseas Development Agency.

Syllabus of Training

The syllabus for the London M.Sc. is reproduced below:

Syllabus

1. Background to Occupational Hygiene

The history and structure of industry; industrial relations; the law; the functions of management, trade unions, government inspectors, personnel and industrial health services; principles of psychology and sociology in relation to work and the environment; sources of information and use of libraries; the presentation of technical reports and scientific papers.

2. Occupational Health Engineering

The measurement and control of chemical, physical and biological hazards of work, including toxic gases, liquids and dusts; ionizing and other radiations; noise and vibration; abnormal temperatures and pressures; atmospheric pollution; industrial wastes; provision of safe and comfortable conditions of work; heating, ventilation, and air conditioning, lighting, machine design; the design and testing of instruments used for environmental measurements.

3. Statistics and Epidemiology

The purpose and methods of epidemiology used in clinical and environmental studies in the field and laboratory, particular attention being paid to experimental design and sampling techniques; the determination of permissible levels of exposure to environmental contaminants; techniques used for the statistical analysis and presentation of data concerned with environmental measurements.

4. Physiology, Occupational Toxicology and Disease

Elementary principles of physiology in relation to work and environment; reaction of the body to environmental conditions including temperature, humidity, barometric pressure and noise; principles of toxicology; mode of entry of toxic substances into, and their action on the body; description of accidents and occupational diseases including the pneumoconioses, poisoning by metals, solvents and gases; dermatitis; effects of ionizing radiations; personal hygiene and nutrition of workpeople.

5. Practical Instruction

Teaching will include practical demonstrations, exercises in environmental measurements in relation to occupational health in the laboratory and in the field, visits to factories and other places and institutions of importance to industrial health, and undertaking a field project in occupational hygiene.

The syllabus for the undergraduate courses at Strathclyde and at the Polytechnic of the South Bank (London) necessarily contain rather more basic science, with an emphasis on engineering in the former and biology in the latter. The syllabus for the British Examining Board's Dip. Occ. Hyg. is similar to that of the London M.Sc., except that it places much less emphasis on epidemiology and the social sciences.

The syllabus for the Diploma of Occupational Hygiene is as follows:—

SYLLABUSES

Part I (two three-hour papers)

(A) Hazards

Chemical, physical and biological hazards of the occupation, including those from gases, dusts and liquids; noise and vibration; heat and cold; ionising and other radiations; abnormal atmospheric pressures. Air pollution and industrial wastes.

The elementary principles of epidemiology, physiology, toxicology and public health. Mode of entry of toxic substances into, and their action on the body; inhalation, ingestion, absorption through the skin. Occupational diseases including their principal signs and symptoms. Human factors.

(B) Standards

Hygiene standards; threshold limit values, maximal acceptable concentrations, approved conditions. Standards for gases, vapours and dusts, noise, ionising radiations, thermal comfort and stress, lighting.

(C) Environmental Measurements

The working principles, calibration, testing and use of instruments. Evaluation of samples. Grab sampling and continuous sampling. Personal instruments. Environmental sampling programmes. Elementary statistics and the design of experiments.

(D) Control

Design and testing of control equipment. General and local exhaust ventilation. Substitution. Shielding. Properties of acoustic materials. Personal protection.

Heating, ventilation and air conditioning. Lighting. Ergonomics.

Assay of biological materials.

Part II (two three-hour papers)

In this Part more searching questions will be set in special fields. Candidates are expected to demonstrate wide knowledge in at least *three* of the following:

(*a*) Physical factors of the environment, lighting, heat and cold, non-ionising radiations, abnormal atmospheric pressures.
(*b*) Chemical hazards.
(*c*) Dust hazards, excluding systemic poisons.
(*d*) Ionising radiations; radioactive materials.
(*e*) Noise.

The fee for the Diploma examination is twenty pounds. A registration fee of two pounds must accompany the application and the balance of eighteen pounds must be paid on notification of acceptance.

The fee for the certificate examination is ten pounds. A registration fee of one pound must accompany the application and the balance of nine pounds must be paid on notification of acceptance.

Cheques should be made payable to "The British Examining Board in Occupational Hygiene" and crossed.

Candidates whose fees have not been paid by seven days preceding the examination will be considered to have withdrawn. If an applicant is not accepted as a candidate, the registration fee will be returned but no registration fee will be returned to any accepted applicant who may subsequently withdraw.

The written examinations will be in two parts.

Candidates seeking a Diploma of professional competence in Occupational Hygiene require a pass with credit in Part I and a pass in Part II.

Candidates seeking a Certificate of operational competence in Occupational Hygiene require a pass in Part I only.

An oral examination may be required, at the discretion of the Examining Board.

No practical examination will be held.

The results will be made known about two months after each examination and each candidate will be advised individually.

The names of candidates to whom certificates and diplomas have been awarded will be listed in the *Register* of the British Examining Board in Occupational Hygiene. A mark of credit will be placed against the names of those candidates who show particular merit in the Part I examinations.

ADDRESS LIST

American Conference of Governmental Industrial Hygienists (A.C.G.I.H.), P.O. Box 1937, Cincinnati, Ohio 45201.
American Industrial Hygiene Association (A.I.H.A.), 25711 Southfield Road, Southfield, Michigan 48075.
British Examining Board in Occupational Hygiene, Secretary: Dr. Derek Turner, Ph.D., Occupational Health Unit, B.P. Research Centre, Sunbury-on-Thames, Middlesex.
British Occupational Hygiene Society, Secretary: Mr. J. T. Sanderson, Esso Research Centre, Abingdon, Berks.
Department of Employment, H.M. Factory Inspectorate, Baynards House, Chepstow Place, London, W.2.
Department of Employment, Industrial Hygiene Division, W.2.
Department of the Environment, Central Unit on Environmental Pollution, 2 Marsham Street, London, SW1P 3EB.
Department of the Environment, Warren Springs Laboratory, Gunnels Wood Road, Stevenage, Herts.
Department of Trade and Industry, Safety in Mines Research Establishment, Red Hill, Off Broad Lane, Sheffield S3 7HQ.
Medical Research Council, 20 Park Crescent, London W.1.
Science Research Council, State House, High Holborn, London W.1.

UNITED STATES: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (N.I.O.S.H.)

Public Information, 5600 Fishers Lane, Rockville, Maryland 20852
Hazard Evaluations and Technical Services, Division of Technical Services, Post Office Building, Room 506, Cincinnati, Ohio 45202.
Technical Information, Technical Information Services Branch, Post Office Building, Room 503, Cincinnati, Ohio 45202.
Health and Safety Research, Post Office Building, Room 543, Cincinnati, Ohio 45202.
Training, 1014 Broadway, Cincinnati, Ohio 45202.
Equipment Testing and Certification, 1014 Broadway, Cincinnati, Ohio 45202.
Standards Development, 5600 Fishers Lanc, Rockville, Maryland 20852.
Occupational Safety, 5600 Fishers Lane, Rockville, Maryland 20852.
Industry-wide Studies, Division of Field Studies and Clinical Investigations, Post Office Building, Room 523, Cincinnati, Ohio 45202.
Employee Health Programs, Division of Occupational Health Programs, 5600 Fishers Lane, Rockville, Maryland 20852.
Labor Liaison, 5600 Fishers Lane, Rockville, Maryland 20852.
Manpower Development, 5600 Fishers Lane, Rockville, Maryland 20852.
Regional Activities, 5600 Fishers Lane, Rockville, Maryland 20852.
Grants, Post Office Building, Room 501, Cincinnati, Ohio 45202.
Coal Mine Health, Alford, 944 Chestnut Ridge Road, Morgantown, West Virginia 26505.
Occupational Safety and Health Statistics, 5600 Fishers Lane, Rockville, Maryland 20852.
Legislative Liaison, 5600 Fishers Lane, Rockville, Maryland 20852.

UNIVERSITIES AND POLYTECHNICS

Birmingham: Safety and Hygiene Group, University of Aston in Birmingham, Gosta Green, Birmingham, B4 7ET.
Cardiff: Department of Social and Occupational Medicine, Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN.
Dundee: Department of Social and Occupational Medicine, University of Dundee, 9 Dudhope Terrace, Dundee, DD3 6HG.
London: T.U.C. Centenary Institute, London School of Hygiene and Tropical Medicine, Kepple Street, London, WC1E 7HT; Borough Polytechnic of the South Bank, Borough Road, London, S.E.1.
Manchester: Nuffield Department of Industrial Health, Clinical Sciences Building, York Place, Manchester 13.
Newcastle upon Tyne: Department of Industrial Health, 20 Claremont Place, Newcastle upon Tyne, NE2 4AA.
Strathclyde: Environmental Engineering Unit, Department of Mining, University of Strathclyde, Glasgow, S4.

READING LIST

The following list forms the basis for reading to M.Sc. standard; in addition some texts for epidemiology, statistics and toxicology are as recommended in the M.Sc. Occupational Medicine list (see Page 81 and 82).

General

Cralley, L. V., Cralley, L. J., and Clayton, G. D. (1969) (Eds.) *Industrial Hygiene Highlights.* Industrial Hygiene Foundation of America Inc., Pittsburgh.
Harrison, D. (Ed.) (1972) *Specification.* (Annual) Volumes 1 and 2. Architectural Press, London.
I.L.O. (1972) *Encyclopaedia of Occupational Heath and Safety.* 2 Vols., I.L.O., Geneva.
Patty, F. (Ed.), *Industrial Hygiene and Toxicology* (1958), Volume I—General Principles (1968), Volume II—Toxicology N.Y., Interscience.
Powell, C. H., and Hosey, A. D. (Eds.) *The Industrial Environment—Its Evaluation and Control.* U.S. Department of Health, Education and Welfare.

Official Publications

OFFICIAL PUBLICATIONS OF AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS

The following publication is available from:

Committee on Industrial Ventilation
P.O. Box 453,
Lansing, Michigan 48902

Industrial Ventilation—A Manual of Recommended Practice 12th Edn.—1972 (300 pp)
Industrial Ventilation is a practical reference for the design and construction of exhaust systems used by designers and contractors in all types of industry. Eleven sections, from Section I, "Principles of Airflow", to Section XI, "Air Cleaning Devices", discuss basic ventilation principles and provide useful information. 200 illustrations.

Publications listed below are available from:

Secretary-Treasurer
ACGIH,
P.O. Box 1937,
Cincinnati, Ohio 45201

Air Pollution Control Process Flow Sheets—1961 (40 pp)
This publication contains flow diagrams, process descriptions, and control methods for asphalt paving plant, cement plant, ferrous foundry operations, iron and steel making, rendering, plants, coffee roasting, alfafa dehydrating and milling asbestos ore.

Air Pollution Reference Library—1969 (10 pp)
This is a compilation of references on air pollution and includes lists of books, handbooks, journals, and periodicals, and other references.

Air Sampling Instruments Manual, 4th Edn.—1971
The manual describes Uses, Principles, Physical and Performance Data, Operating and Maintenance Instructions, and Commercial Sources, for air sampling instruments. A comprehensive technical discussion of the principles of air sampling and the use of instruments for the evaluation of airborne contaminants is included.

Analytical Methods Manual
A loose-leaf Manual of chemical procedures and techniques for analysis of airborne contaminants which can be performed without expensive specialised equipment. The methods have been developed and verified in a number of co-operating laboratories. Nineteen methods have been published to date, one additional method will be sent to purchasers when it is completed.

Guide to Uniform Industrial Hygiene Codes or Regulations—Revised 1965 (9 pp)
Supplement #1—Dry Cleaning Operations, 1951 (Revised 1968) (5 pp)
Supplement #5—Coin-Operated Dry Cleaning Establishments, 1963 (4 pp)
Supplement #6—Clean Rooms, 1964 (6 pp)
Supplement #7—Laser installation, 1967 (30 pp)

Threshold Limit Values of Airborne Contaminants and Physical Agents, 1972 (94 pp)
A listing of the adopted Threshold Limit Values for toxic dusts, fumes, gases, vapours and mists. The Values, which are under continuous review, are accepted and utilised throughout the world for the control of airborne concentration of hazardous materials. Pocket sized for easy reference.

Documentation of the Threshold Limit Values (For Substances in Workroom Air) completely reviewed and updated (1971)
Basis of TLV's for over 475 substances, including 1970 Tentative Values. Every industrial hygienist needs this reference which contains revised discussions, limitations and cautions for better understanding of Threshold Limit Values.

Transactions of Annual Meetings
The official report of the annual meetings of the Conference. The Transactions contain the papers presented at the formal sessions of the meetings and the proceedings of the business session.

Guidelines for Noise Exposure Control —1967 (10 pp)
This multilith guide was prepared by an inter-society committee of organisations. It contains condensed pertinent data from various literary sources as a guide. Two figures are included on guides to preventing impairment of hearing.

Committee on Respirators
P.O. Box 453
Lansing, Michigan 48902

Respiratory Protective Devices Manual, 1963 (182 pp)
This manual is prepared by the joint A.I.H.A.-A.C.G.I.H. Committee on Respirators. It consists of thirteen chapters covering such topics as absorption of gases and vapours, specific types of respirators approved for various hazards, as well as physiological factors involved in respiratory protection programmes. Respiratory protection of workers is a problem common to many industrial operations, and management and scientific personnel should be well informed about suitable protective devices for every type of hazardous exposure.

Airborne Contaminants—Measurement and Control

H.M. Factory Inspectorate (annual), Technical Data Note No. 2. *Threshold Limit Values of Airborne Contaminants.* Dept. of Employment, London.
H.M. Factory Inspectorate (occasional), *Methods for the Detection of Toxic Substances in Air.* Series 1–20, H.M.S.O., London.
International Labour Office (1970), Permissible Levels of Toxic Substances in Air in Working Environment. *Occupational Health and Safety Series No.* 20, Geneva.
Levine, B. S. (1960–63), *U.S.S.R. Literature on Air Pollution and Related Occupational Diseases* (8 vols.). U.S. Department of Commerce, Washington.
Lund, H. F. (Ed.) (1970), *Industrial Pollution Control Handbook.* McGraw-Hill, New York.
McCrone, W. C., Draftz, R. G., and Delly, J. G. (1967), *The Particle Atlas.* Science Publications, Ann Arbor.
Ryazanov, V. A. (1952–62), *Limits of Allowable Concentrations of Atmospheric Pollutants.* Books 1–5, U.S. Department of Commerce, Washington.
Silverman, L., Billings, C. E., and First, M. W. (1971), *Particle Size Analysis in Industrial Hygiene.* Academic Press, London and New York.
Stern, A. C. (Ed.) (1971), *Air Pollution* (3 vols.). Academic Press, London and New York.
Strauss, W. (Ed.) (1971), *Air Pollution Control.* Interscience, New York and London.

Analytical Chemistry

Fishbern, L. (1972), *Chromatography of Environmental Hazards.* Elsevier, London.
Kolthoff, M., Elving, P. J., and Stross, F. H. (Eds. 1971), Treatise on Analytical Chemistry. Part III. Analytical Chemistry in Industry. Vol. 2. *Industrial Toxicology and Environmental Pollution.* Wiley-Interscience, New York.

Ionising Radiations

Cember, H. (1969), *Introduction to Health Physics.* Pergamon Press, London.
I.C.R.P. Publication 7 (1966), *Principles of Environmental Monitoring Related to the Handling of Radioactive Material.* Pergamon Press, London.
I.C.R.P. Publication 9 (1966), *Radiation Protection—Recommendations of the I.C.R.P.* Pergamon Press, London.
I.C.R.P. Publication 12 (1969), *General Principles of Monitoring for Radiation Protection of Workers.* Pergamon Press, London.
I.C.R.P. Publication 15 (1970), *Protection against Ionizing Radiation from External Sources.* Pergamon Press, London.

International Commission on Radiological Protection Publications (I.C.R.P.):
International Commission on Radiological Units (1972), *Radiation Protection Instrumentation and Its Applications*. I.C.R.U. Report No. 20, I.C.R.U. Publications, Washington.
Kiefer, H., and Maushart, R. (1972), *Radiation Protection Measurement*. Pergamon Press, London.

Law

Allsop, P. (Ed.) (1962), *Encyclopaedia of Factories, Shops and Offices, Law and Practice*. Sweet and Maxwell, London.

Lighting

Electronic Engineering Association (1966), *Guide to the Safe Use of Lasers*. London.
Hopkinson, R. G. (1963), *Architectural Physics: Lighting*. H.M.S.O., London. (1969) *Lighting and Seeing*. Heinemann, London.
Hopkinson, R. G., and Collins, J. B. (1970), *The Ergonomics of Lighting*. McDonald, Technical and Scientific, London.
Hopkinson, R. G., and Kay, J. D. (1969), *The Lighting of Buildings*. Faber, London.
Illuminating Engineering Society (1968), Technical Report No. 10. *The Evaluation of Discomfort Glare*. London. (1973) *I.E.S. Code for Interior Lighting*. London.
Lowson, J. C. (1965), *Artificial Lighting in Factory and Office*. C.I.S. Information Sheet 11. I.L.O., Geneva.
Ministry of Aviation (1965), *Laser Safety, Code of Practice*. H.M.S.O., London.
Weston, J. C. (1962), *Sight, Light and Work*. Lewis, London.

Noise

British Occupational Hygiene Society (1971), "Hygiene Standards for Wide Band Noise." *Ann. occup. Hyg.*, **14**, 57.
Burns, W. (1968), *Noise and Man*. John Murray, London.
Burns, W., and Robinson, D. W. (1970), *Hearing and Noise in Industry*. H.M.S.O., London.
Department of Employment (1972), *Code of Practice for Reducing the Exposure to Noise of Employed Persons*. H.M.S.O., London.
Duerden, C. (1970), *Noise Abatement*. Butterworths, London.
Harris, C. M. (Ed.) (1957), *Handbook of Noise Control*. McGraw-Hill, New York.

Protective Clothing and Equipment

Ford, J. E. (Ed.) (1966), *Fibre Data Summaries*. Shirley Institute, Manchester.
Freeman, M. T. (1962), *Protective Clothing and Devices*. United Trade Press, London.
Industrial Safety Equipment and Clothing Catalogue. United Trade Press, London.
Renbourn, E. T. (1972), *Materials and Clothing in Health and Disease*. Lewis, London.

Thermal Environment

Bedford, T. (1946), *Environmental Warmth and its Measurement*. Medical Research Council War Memo. No. 17. H.M.S.O., London.
Fanger, P. O. (1970), *Thermal Comfort*. Danish Technical Press, Copenhagen.
Keatinge, W. R. (1969), *Survival in Cold Water*. Blackwell, Oxford and Edinburgh.
Kerslake, D. McK. (1972), *The Stress of Hot Environments*. Cambridge University Press.
Leithead, C. S. and Lind, A. R. (1964), *Heat Stress and Heat Disorders*. Cassell, London.
World Health Organization (1969), *Health Factors Involved in Working Under Conditions of Heat Stress*. Technical Report Series. No. 412. W.H.O., Geneva.

Ventilation

Alden, J. L., and Kane, J. M. (1970), *Design of Industrial Exhaust Systems*. Industrial Press Inc., New York.
American Society of Heating, Refrigerating and Air-conditioning Engineers (1968), *Handbook of Fundamentals*. New York.
Carrier, W. H., Cherne, R. E., Grant, W. A., and Roberts, W. H. (1959), *Modern Air Conditioning, Heating, and Ventilating*. Pitman, New York.
Hemeon, W. C. L. (1963), *Plant and Process Ventilation*. Industrial Press Inc., New York.
The Institute of Heating and Ventilating Engineers (1970), *I.H.V.E.* (*Book C*). London.

Journals

*Annals of Occupational Hygiene**, Publ. Pergamon Press, Oxford (for the British Occupational Hygiene Society), quarterly.
*American Industrial Hygiene Association Journal**, Publ. by the Association, 25 New Street, Worcester, Mass. 01605, bi-monthly.

The following, though not exclusively devoted to occupational hygiene, are amongst the remaining most frequently cited journals in occupational hygiene literature (Hall, Jamieson, Taylor 1971):

Archives of Environmental Health
Analytical Chemist
Journal of the Acoustic Society of America
Health Physics
Journal of the Air Pollution Control Association
British Journal of Industrial Medicine
Annals of Occupational Hygiene
Toxicology and Applied Pharmocology
Industrial Engineering Chemistry
Journal of the American Medical Association
Journal of Occupational Medicine
Annals of the New York Academy of Sciences
Journal of Applied Physiology
Atmospheric Environment

Abstract Journals

The following are devoted wholly to occupational health and safety:

Environmental Health, monthly. Publishers: Excerpta Medica, 364 Herengracht, Amsterdam, Netherlands.
Excerpta Medica, section 35 (occupational health and industrial medicine), monthly.
Industrial Hygiene Digest, monthly. Publishers: Industrial Health Foundation Inc., 5231 Centre Avenue, Pittsburg, PA 15232.
Occupational Health and Safety Abstracts. Publishers: C.I.S. International Labour Office, Geneva. (Also available as card abstracts.)

The following are devoted in part to various aspects of Occupational Hygiene:

Abstracts on Hygiene
Analytical Abstracts
Biological Abstracts
Chemical Abstracts
Ergonomics Abstracts
Fire Research Abstracts and Reviews
Fluoride Abstracts
The Kettering Abstracts on Lead
Noise and Vibration

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* Subscription as a member of the Association or Society is generally cheaper than subscription to the publication alone.

Nuclear Science Abstracts
Plastics Abstracts
Referativnyi Zhurnal
Safety in Mines Research Abstracts
Toxicity Bibliography
Tropical Diseases Bulletin

SOCIETIES AND ASSOCIATIONS

American Conference of Governmental Industrial Hygienists (A.C.G.I.H.):
Open to government or university staff as full members; other industrial hygienists as associate members. Members get a quarterly newsletter, a copy of the annual list of Threshold Limit Values, a copy of the Proceedings of the annual conference and other publications at a reduced price.

American Industrial Hygiene Association:
Jointly with A.C.G.I.H. organises an annual conference, usually held in May each year; also publishes a bi-monthly *Journal.*

British Occupational Hygiene Society:
Organises two scientific meetings each year; publishes spring and autumn with International Conferences organised every 5 years.

Annals of Occupational Hygiene; represents views of hygienists in a number of organisations; Industrial Membership is available to firms interested in the subject.

(Normally these organisations require applicants to be sponsored by two existing members.)

In addition, hygienists with specialist qualifications may belong to appropriate societies or institutions, e.g.:

British Acoustical Society, 1 Birdcage Walk, London, S.W.1. Illuminating Engineering Society, York House, Westminster Bridge Road, London, S.W.1.
Institute of Petroleum, 61 New Cavendish Street, London, W.1.
Institution of Heating and Ventilating Engineers, 49 Cadogan Square, London, S.W.1.
Royal Institute of Chemistry, 30 Russell Square, London, W.C.1.

For more detailed information see: *Trade Associations and Professional Bodies of the United Kingdom.* Compiled by Patricia Millard, 5th Edn, Pergamon Press, Oxford.

LABORATORIES

Occupational hygiene laboratories and services may be comprehensive or selective (limited). Sometimes occupational hygiene work is undertaken by general industrial or clinico-pathological laboratories. However, the advantages of special laboratories are: reliability, correct priority, quick investigation, adequate sampling, availability of qualified staff, expertise and experience. Sanderson (1971) has given a useful comprehensive account of laboratory functions and work, which may be summarised as follows:

PROCESSES (functions)
—Advice and information
—Field investigations
—Design of control measures
—Monitoring: environmental and biological (blood Pb., etc.)
—Testing toxicity of industrial materials (incl. effluents)
—Routine "screening" tests* (vision, audiometry, lung function)
—Work physiology*

* if not undertaken by a Medical Department

PREMISES
—Location and access (transport of equipment)
—Room separation and space
—Stores

PLANT (equipment)
—Field equipment (lighting, thermal noise, ventilations, atmospheric sampling)
—Chemical laboratory (balances, fume cupboards, spectrophotometers, gas chromatographs, misc. apparatus, facilities for calibration)
—Microscopy (dust; haematology)
—Access to special equipment (X-ray diffraction; electron microscopy/diffraction; mass spectroscopy)
—Library (see Hall *et. al.* 1971); records of investigations; laboratory method book(s)

PERSONNEL
—Director or supervisor; qualifications*, interests and experience
—Technologists (ditto)
—Technician(s)
—Services (gas, compressed air, h. & c. water, drainage, general and exhaust ventilation)
—Safety (protective, first aid)
—"Good housekeeping"
—Assistant(s)
—Secretary
—Links with other personnel (medical, engineering, managerial, etc.)

* consider: subject of first degree/basic qualification; specialist (e.g. ventilation); research (Ph.D.); comprehensive (Dip. Occ. Hyg.)

In the United States there is a system of accreditation of laboratories (A.I.H.A. 1970) and quality control for analytical work. It is likely that a similar system will be adopted in Britain shortly.

References

American Industrial Hygiene Association (1970), *Amer. Ind. Hyg. Assoc. J.*, **31** (3), 335–338. Guidelines for the accreditation of industrial hygiene analytical laboratories.
Hall, S. A., Jamieson, V., Taylor, P. J. (1971), *Ann. Occ. Hyg.*, **14**, Information sources in occupational hygiene.
Hiscocks, E. S. (1958), *Laboratory Administration*. Macmillan, London.
Sanderson, J. T. (1971), *Industrial Hygiene Laboratories*. In: Encyclopaedia of Occupational Health and Safety, International Labour Office, Geneva.
Steere, N. V. (1967), *Handbook of Laboratory Safety*. The Chemical Rubber Co., Cleveland.

Occupational Health Nursing

The modern concept of occupational health nursing has developed from two major sources, that of nursing and that of occupational health. Nursing in a W.H.O. Report of 1966 (1) was defined as activity in:

1. Maintenance of health programmes.
2. Protection of groups at increased risk.
3. Early detection of illness and absence.
4. Clinical treatment.
5. Rehabilitation.

It is these activities developed in order to achieve the aims of occupational health as outlined in I.L.O. Recommendation 112 1959 (2) which constitute occupational health nursing.

The duties of the occupational health nurses are under constant review by the Occupational Health Section of the Royal College of Nursing* and are outlined in their publications (3). The duties of the occupational nurse are also described in the I.L.O. publication "The occupational health nurse" (4) and in the report of the Permanent Commission and International Association on Occupational Health entitled *The Nurse's Contribution to the Health of the Worker* (5). It is not known accurately how many nurses are engaged in Occupational Health work in the United Kingdom. A report of the Department of Employment in 1966 estimated that there were some 7,430 nurses employed in factories, but this enquiry did not take cognisance of nurses working in shops, offices, universities, airports, hospitals and other establishments not subject to the Factories Act. There was some doubt also whether the people so described were in fact nurses as defined under the Nurses Act. A State Registered Nurse (S.R.N.) is a nurse who has completed a theoretical and practical course of general nurse training in a recognised training school and whose name has been entered on the General part of the Register of the General Nursing Council for England and Wales or the Northern Ireland Nurses and Midwives Council. The equivalent in Scotland is Registered General Nurse (R.G.N.). A State Enrolled Nurse (S.E.N.) is a nurse who has completed a theoretical and practical course of enrolled nurse training in a recognised training school and whose name has been entered in the General Part of the Roll of Nurses of the General Nursing Council for England and Wales, the General Nursing Council for Scotland, or the Northern Ireland Nurses and Midwives Council. It is the policy of the R.C.N. that all nurses in Occupational Health Nursing should receive special preparation for the work, and R.C.N. is continually trying to encourage appropriate

* Hereinafter called "R.C.N.".

education bodies or centres to promote suitable courses. The Occupational Health Nursing Certificate is awarded by the Royal College of Nursing to State Registered Nurses who have completed an approved course (theoretical and practical) in an "approved centre" and who have passed the R.C.N. examination in Occupational Health Nursing. A Letter of Attendance is awarded by the R.C.N. to nurses who have completed a short practical course at an "approved centre". A current list of "approved centres" is available from the Royal College of Nursing (Institute of Advanced Nursing Education).

COURSES IN OCCUPATIONAL HEALTH NURSING

An applicant to take the short practical course in Occupational Health Nursing at an approved centre must be a trained nurse within the context of the Nurses Act. An applicant to the advanced Occupational Health Nursing Course in preparation for the R.C.N. Certificate must be a State Registered Nurse who can show evidence of sound general education (usually a General Certificate in Education in five subjects).

The full syllabus of the course is available from the R.C.N., Institute of Advanced Nursing Education, or from an approved centre (Appendix I).

Areas of study in the syllabus include:

(i) The objectives of an occupational health service; the functions of an occupational health service; the duties and position of the nurse; the legal position of the nurse. The role and function of the nurse in relation to health supervision of people at work particularly of those who are especially vulnerable, young people, women, the disabled, those who are exposed to occupational hazards and those about to retire from work.

(ii) The treatment of accident and illness at work.

(iii) The essentials of record keeping and the use of records; personal records, sickness absence, case histories; hazard manuals, environmental records.

(iv) The work of the nurse in the prevention of disease and the early detection of illness.

(v) The work of the nurse in contributing to the safe control of the working environment and to the prevention of accidents.

(vi) The nurse's function as a health educator and counsellor.

(vii) The occupational health nurse as an administrator.

The subject matter of the course is therefore divided into nursing, physiology, psychology, toxicology, ergonomics, occupational hygiene, social administration and industrial system.

A full time course in Occupational Health Nursing covers 2 academic terms. Day release courses (one day a week over five academic terms) are available for nurses employed in occupational health nursing. Grants are available for these courses: most commonly through the schemes of the Department of Employment. Candidates from countries other than the United Kingdom should apply to the World Health Organisation for a grant. Nurses who have achieved the Occupational Health Nursing Certificate may proceed to further study and sit the examination for the Diploma in Nursing of the University of London, offering Occupational Health Nursing as the speciality (Appendix V). Details of courses in preparation for the Diploma examination are available from the Director (Room 14) Department of Extra Mural Studies, University of London, 7 Ridgmount Street, London, WC1E 7AD. Nurses proceeding to teaching or management posts in Occupational Health Nursing should apply to the R.C.N. for details of appropriate advanced courses.

EMPLOYMENT OPPORTUNITIES

One of the many attractions of occupational health nursing is that there is so much variety in the work, both in the environment in which it is practised and in the size of the enterprise. The occupational health nurse may be found at work in banks, in coalmines, in mass production works or tiny industries who are served by a group Occupational Health Service. The occupational health nurse should be at work in hospitals and universities caring for the health of the staff (6), (7).

The occupational health nurse may be employed as a member of a large team of occupational health nurses, who are employed by a large national or international corporation; or she may find herself as the chief nursing officer of such a team. The nurse may be found with a civil engineering or film project in an isolated location, or may be the only person concerned with health and safety matters in a factory employing some 500 people. The hours of work will vary enormously, day work, night work, shift work, part-time work.

The R.C.N. has published a booklet *Occupational Health Nursing Structure* (8) in which may be found full details concerning job opportunities.

Salaries and Conditions of Service

The Industrial Relations Department of the R.C.N. publish a leaflet of recommended pay scales for Occupational Health Nurses (Appendix II). Both employers and nurses should study these recommendations before advertising or applying for jobs. The Nurse Officer, Occupational Health Section of the R.C.N. is available to offer help and advice in connection with any matter concerning Occupational Health Nursing including salaries and conditions of service.

References

1. W.H.O. Report of Expert Committee on Nursing, 5th Report, Geneva 1966.
2. I.L.O. Recommendation 112, Geneva 1959.
3. R.C.N. Occupational Health Nursing, R.C.N. 1968.
4. I.L.O. The Occupational Health Nurse, Geneva 1969.
5. Permanent Commission and International Association on Occupational Health, Nursing Sub-committee, The Nurse's Contribution to the Health of the Worker.* (Available in English, French, Spanish.) The Commission 1969.
6. The implementation of a Hospital Occupational Health Service, R.C.N. 1968.
7. University Health Nursing Structure, R.C.N. 1972.
8. R.C.N. *Occupational Health Nursing Structure*, R.C.N. 1968.

Books

There are notoriously few books available about Occupational Health Nursing itself and those which are available are in need of revision due to recent rapid changes in techniques and legislation.

* R.C.N. and Permanent Commission publications are available from "The Royal College of Nursing", 1a Henrietta Place, Cavendish Square, London, W1M 0AB, England.

Essential books are:

H. Bridger, E. Miller, J. O'Dwyer, *Doctor and Sister in Industry*, Macmillan (Journals) (1964).
M. L. Brown (1956), *Occupational Health Nursing*, Springer, N.Y.
I. H. Charley (1958), *The Birth of Industrial Nursing*, Baillere Tindall & Cassell.
J. F. Copplestone, J. Turton, and J. Sutherland (1967), *Preventive Aspects of Occupational Health Nursing*, Edward Arnold.
P. Pemberton (1965), *Essentials of Occupational Health Nursing*, Arlington.
M. M. West (1962), *Handbook for Occupational Health Nurses,* Arnold.

Library of Nursing

The Royal College of Nursing headquarters building also houses the Library of Nursing which is a unique professional library providing an expert service to the nursing profession. Its facilities are available to R.C.N. members and others who need its specialist resources. In addition to nursing and medical literature, the Library covers such subjects as public health, industry, psychology and sociology. Books, with the exception of reference books, may be borrowed by members and there is a postal loan service. Books outside the range of the Library's own stock can be obtained by special request. The Library receives over 200 current periodicals, both British and overseas, and although these may not normally be borrowed, photocopies of articles can be provided at a cost of 5p per page. New books and articles are listed in "Nursing Bibliography": a monthly list of current publications on nursing and allied subjects, available from the Library, price £3·20 for twelve issues.

OCCUPATIONAL HEALTH NURSING IN THE UNITED STATES OF AMERICA

American Association of Industrial Nurses, Inc. (A.A.I.N.). Executive Director: Miss Dorothy M. Saller, A.A.I.N., 79 Madison Avenue, New York, New York 10016, U.S.A.

The American Association of Industrial Nurses, Inc., founded in 1942, is the professional organisation of nurses engaged in the specialty field of occupational health nursing. The A.A.I.N. has defined the objectives of occupational health nursing (Appendix III). A.A.I.N. is composed of over 100 local, state and regional constituent associations. Its membership is comprised of more than 6,000 registered professional nurses who are engaged full time in conserving, protecting and restoring the health and safety of employed workers throughout the nation. A.A.I.N. constantly strives to improve the services and standards of occupational health nursing through:

Professional Exchange—Formal and informal professional exchange is carried on in the meetings and programmes of the constituent associations. A.A.I.N.'s annual meeting is held in conjunction with that of the Industrial Medical Association. The combination of these two national meetings is known as the American Industrial Health Conference.

Legislation—Through A.A.I.N. occupational health nurses are represented in public policy discussions that may affect the day-to-day practice of occupational health nursing. Legislative actions are studied and influenced as the need arises.

Publications—*Occupational Health Nursing*, the official journal of A.A.I.N., is published monthly and contains technical articles, nursing features, policy statements and other pertinent professional news. A.A.I.N. also issues special manuals, brochures and guides for promoting nursing excellence. Both public and professional news media are provided with timely releases concerning occupational health nursing and the activities of A.A.I.N. (Appendix IV).

Professional Standards—A.A.I.N. is the recognised source in matters of professional standards in occupational health nursing. It provides guidance in ethical practice, privileged communications and legal responsibilities.

Education—A.A.I.N. promotes formal training programmes through development of education lectures, symposia, institutes, conferences and workshops. It is a leader in working towards the integration of concepts of occupational health nursing at the undergraduate and graduate levels in schools of nursing.

Nurse-Physician-Management Relations—At national, state and local levels, A.A.I.N. promotes the formation of medical, management and nurse educator advisory councils composed of outstanding executives, physicians and nurse educators.

Economic Security—A.A.I.N. believes that increased professional competency is the basis for economic opportunity and security, and that the collective bargaining method is not applicable to the nurse in industry. One of A.A.I.N.'s many goals is directed towards promoting the occupational health nurse as an impartial professional worker (A.A.I.N. Fact Sheet).

RELEVANT PUBLICATIONS

The Occupational Health Content in Baccalaureate Nursing Education by M. J. Keller and W. T. May (1970), published by the U.S. Department of Health, Education and Welfare, Public Health Service, Environmental Health Service, Environmental Control Administration, Bureau of Occupational Safety and Health, and the Training Institute, Office of Training and Manpower Development, Cincinnati, Ohio.

The Industrial Health Foundation, Inc., 5231 Centre Avenue, Pittsburgh, Pennsylvania 15232, in its Nursing Series Bulletin No. 3-71 describes *The Extended Role of the Nurse in Occupational Mental Health Programmes.*

The U.S. Department of Health, Education and Welfare has provided a guide for voluntary and official health agencies on the provision of part-time health nursing services in its publication *Community Health Nursing for Working People*, P.H.S. (Public Health Service) publication number 1296, revised 1970. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

APPENDIX I

THE ROYAL COLLEGE OF NURSING AND NATIONAL COUNCIL OF NURSES OF THE UNITED KINGDOM

Centres Preparing for the Occupational Health Nursing Certificate

England

The Royal College of Nursing and National Council of Nurses of the United Kingdom, 1a, Henrietta Place, Cavendish Square, London W1M 0AB	Full time Course (six months), commencing each September Day Release Course (18 months: 1 day per week), commencing each September Write to the Director
Birmingham Accident Hospital, Bath Row, Edgbaston, Birmingham 15	Day Release Course (hospital staff also eligible) Write to Miss J. Turton, Tutor to the Occupational Health Nursing Course
Mabel Fletcher College, Sandown Road, Liverpool L15 4JB	Day Release Course Write to the Principal
Manchester Polytechnic, Department of Social Studies, Bracken House, Charles Street, Manchester M1 7DF	Day Release Course Write to Mrs. J. V. Homewood, Lecturer
Department of Catering, Domestic Science & Pre-Nursing, College of Technology, Howard Street, Rotherham, Yorkshire	Day Release Course Write to Miss G. M. Ward, Head of Department

Scotland

Department of Social & Occupational Medicine, University of Dundee, 9 Dudhope Terrace, Dundee DD3 6HG	Full time Course (six months), commencing January each year Write to Mrs. Radwanski, Occupational Health Nursing

Wales

Newport and Monmouthshire College of Technology, Allt-y-Yn Avenue, Newport, Mon NPT 5XA	Day Release Course Write to the Principal

Candidates for day-release courses must be currently employed in occupational health nursing.

APPENDIX II

THE ROYAL COLLEGE OF NURSING AND NATIONAL COUNCIL OF NURSES OF THE UNITED KINGDOM

April 1972

Salary Scales for Occupational Health Nurses

The Royal College of Nursing has revised the salary scales for Occupational Health Nurses following the recent increases agreed for nurses in the National Health Service and operative from April 1st, 1972. This should be regarded as an interim award pending the complete revaluation which is at present being negotiated.

The relevant salary scales should be considered in conjunction with the structure and details of this are in a booklet entitled "Occupational Health Nursing Structure" which is obtainable from the R.C.N., price 20p.

Revised Salary Structure

Chief Nursing Officer	£3,066 × £126 × 8 = £4,074
Principal Nursing Officer	£1,992 × £ 90 × 8 = £2,712
Senior Nursing Officer	£1,695 × £ 78 × 5 = £2,085
Nursing Officer	£1,404 × £ 78 × 7 = £1,950
Assistant Nursing Officer	£1,212 × £ 66 × 6 = £1,608
	+£84 after 3 years on maximum.

£51 for the O.H.N.C. to be added to the above salary scales

Senior Nurse (S.E.N.)	£1,131 × £ 51 × 4 = £1,335
	+£81 after 3 years on maximum.
Nurse (S.E.N.)	£1,002 × £ 48 × 3 = £1,146
	+£81 after 3 years on maximum.

These salary scales have some relation to the scales negotiated by the Nurses and Midwives Whitley Council for nurses in the National Health Service but other factors are taken into account when determining the final sum. These include:

1. necessary post registration experience;
2. duties and responsibilities of occupational health nursing;
3. less favourable conditions of service compared to National Health Service (e.g., annual leave, study leave);
4. less favourable superannuation provisions than National Health Service where benefits are continuous from one employing authority to another and pension is based on salary in last three years of service.

These scales should be regarded as minimal. The maximum should be increased in each grade according to the responsibilities of the post.

In the case of a new appointment, or in placing a nurse on these scales, incremental credit should be given for previous experience in occupational health and/or other relevant branches of nursing.

Allowances

Where other members of staff receive shift allowance, *London Weighting Allowances, bonuses and other concessions, these should be paid to the nursing staff. Where it is not the policy of the firm to pay such allowances to staff, it is recommended that special duty payments, at the following ratio, should be made:

(*a*) night duty, time and one quarter per hour;
(*b*) Saturday from 12 noon and Sunday duty, time and one quarter per hour.

Part-time staff should be paid pro-rata to these salaries and allowances.

Indoor uniform should be provided by the employer or an allowance of £30 per annum given in lieu. Cost of laundering and/or dry cleaning of uniforms should be paid for by the employer.

APPENDIX III

AMERICAN ASSOCIATION OF INDUSTRIAL NURSES, INC.

79 Madison Ave., New York, New York 10016

Objectives of an Occupational Health Nursing Service

The occupational health nursing service should be administered by registered professional nurses and staffed by licensed nurses working under the directives of a licensed medical practitioner. Industries and companies vary widely—so do the policies governing the degree and scope of professional nursing service to be provided and the administrative methods thereof. Varying conditions may limit or modify the practical goal of achievement, but objectives are the same for all nursing services.

The major objective of any occupational health nursing service is to provide an adequate programme for employees which will help them maintain the highest potential level of health and efficiency.

Contributory objectives are:

- To adapt the nursing programme to serve the health needs of the company with respect to its character, size and location.
- To give competent nursing care and treatment.
- To have and maintain adequate space, equipment and supplies.
- To obtain medical direction where none exists.
- To have and use an adequate record system.
- To promote health education among the employees.
- To maintain good working relations with all departments of the company.
- To maintain co-operative relations with local physicians and health and other community agencies.
- To maintain good relations with the general public.
- To upgrade the quality of the nursing service through continual personal and professional growth.
- To evaluate the health programme and nursing service periodically and revise it to meet changing needs.

These objectives were issued in December 1955 *and revised as of January* 1971.

* In the National Health Service London Weighting Allowance was increased in May 1968 to £90.

APPENDIX IV

A.A.I.N. PRICE LIST OF AVAILABLE MATERIAL

Item	Price	Quantity	Amount
Brochure: "The Occupational Health Nurse—her role in America's Health"	·25		
Objectives of an Occupational Health Nursing Service	·10		
Principles of Management-Nurse Relationship in Industry and Commerce	·10		
Principles of Nurse-Physician Relationships in Industry	·10		
Statement of Principle Concerning the Practical Nurse in Industry	·10		
Industry's Nurses and Collective Bargaining	·10		
Professional Liability Information	·10		
A.A.I.N.'s Decision Still Stands	·10		
Recommended Job Responsibilities (Consultant, Administrator of Nursing Services, Charge Nurse, Supervisor 10¢ each.) Complete set	·50		
A Guide for the Industrial Nurse to Plan a Student Programme	·40		
Guide to Interviewing and Counselling for the Nurse in Industry	·60		
Principles of Privileged Comminications	·40		
Standards and Criteria for Evaluating an Occupational Nursing Service	·50		
Guide for On-The-Job Orientation of the Occupational Health Nurse	1·00		
Guide for Establishing a Small Plant Nursing Service	1·50		
Guide for a Record System	1·50		

TOTAL $ ———

Complete packet will be sold for $7·00 plus $1·00 for postage and handling—Total $8·00

A Guide for Evaluation of an Occupational Health Nursing Service	1·50
A Guide for the Preparation of a Manual of Policies and Procedures for the Occupational Health Service	5·00

Please enclose cheque with order
payable to: American Association of
Industrial Nurses, Inc.
79 Madison Avenue
New York, N.Y. 10016

NAME ____________________
ADDRESS ____________________
____
____________________ (Zip Code)

April 1971)

APPENDIX V

[*July* 1972]

UNIVERSITY OF LONDON

DIPLOMA IN NURSING

REVISED SYLLABUS

(11) OCCUPATIONAL HEALTH NURSING

The examination will comprise one paper of three hours, the submission of case studies, and an oral examination.

Each candidate will be required to present, certified by the competent authority*, three case studies of workers for whose nursing care or health supervision the candidate has been directly responsible in a commercial or industrial establishment, during a period of twelve months within the two years preceding the date of the examination at which the studies are submitted. Each study should be presented in the following form:

(*a*) Short title.
(*b*) Reasons for selection of the case presented.
(*c*) Details of the case.
(*d*) Discussion of the case.

Sections (*c*) and (*d*) should illustrate aspects of the work of the occupational health nurse, such as the following:

(1) The value of medical assessment.
(2) The value of measures taken for the promotion of the health of workers with particular reference to such special groups as young persons, women, the physically or mentally handicapped, those engaged in unpleasant, unsatisfactory or dangerous work.
(3) The value of medical and nursing surveillance at work.
(4) The contribution of the occupational health nurse to measures of environmental control.

Syllabus

The Occupational Health Service

(i) Types of service for large, medium and small organisations.
(ii) The design of individual health units.
(iii) Equipment. Minimum and optimum requirements for efficiency. Buying and storage of supplies. Care of dangerous drugs.
(iv) Staffing. Number and type of staff required. Recruitment, selection and training. Staff meetings. Committee meetings.

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* The nurse who does not work under the supervision of a medical officer or a senior supervisory sister should submit a certificate to that effect, signed by her employing authority.

Functions

(i) The role and function of the occupational health nurse. Ethics.

(ii) Health supervision of special groups—young persons—women—disabled (physically and mentally handicapped) people—pre-retirement groups—those exposed to dangerous processes.

(iii) Health education—principles, methods and opportunities. Sources of information.

(iv) Treatment of minor injuries and ailments—organisation for and first aid treatment of major accidents and medical emergencies. Disaster programmes. Ancillary services. Rehabilitation.

(v) Control of occupational health hazards. The aetiology, prevention and treatment of prescribed industrial diseases.

(vi) Promotion of mental health knowledge of the cause, prevention and treatment of psychological disturbances.

(vii) Methods of compiling, storing and interpreting records. Preparation of reports.

(viii) Advising on nutritional requirements of workers.

R. B. BUZZARD

Occupational Psychologists

Occupational psychology, once known as industrial psychology, is concerned with all matters affecting people's adjustment to their work and their efficiency and satisfaction in it. Its boundaries overlap those of other sources of information treated in this guide. It leans on a wide range of underlying scientific disciplines from anatomy and physiology at one end, psychology at the centre and sociology and anthropology at the other end; it calls on engineering and is concerned with some of the problems of occupational medicine.

It has been an expanding field of research, teaching and advice in the United Kingdom for over fifty years. Its origin in this country lies in the investigations of the Government's Health of Munition Workers Committee of 1915 to 1918, continued between the two world wars by those of the Medical Research Council's Industrial Fatigue Research Board, later renamed its Industrial Health Research Board, and of the National Institute of Industrial Psychology. The contribution of other organisations and university departments has steadily increased.

The overlap with ergonomics (qv) is particularly large; many of the subjects of interest to ergonomists were being studied by occupational psychologists before the second world war so that ergonomics may be seen as a speciality which had grown too big to be contained within occupational psychology alone.

Occupational psychologists are concerned on the one hand with people's capabilities, perceptions, attitudes, feelings and observable behaviour at work and, on the other, with the ways in which the physical, psychological and social aspects of work affect people. The Occupational Psychology Division of the British Psychological Society considers that its members should have knowledge of the following:

Occupational guidance and counselling—including job study, knowledge of occupational and training facilities and the use of tests of ability and aptitude; *personnel selection*—with special reference to testing and allocation procedures; *performance appraisal*—including the design and use of appraisal systems and procedures; *training*—identifying training needs, formulating training policy, choosing and evaluating training methods; "*men/machine systems*" *and environment*—for example, the design of tasks, methods, equipment and working conditions; *organisational structure*—including communication, motivation and styles of management; *occupational welfare and safety*—counselling, prevention of accidents, stress, sickness; *attitudes to work and leisure; industrial relations*—for example, rewards, incentives, consultation, negotiation.

What they do

The occupational psychologist may be engaged in research, teaching or in advisory work in any or all of the areas listed above. Much of the teaching is direct to industry in the form of training courses or seminars for employees and managers.

Where they work

Occupational psychologists work in many kinds of organisation and under a variety of job titles: in the personnel or training departments of industrial companies; in the Civil Service or the Armed Forces; for the Government's Industrial Training Boards, Youth Employment Service or adult Occupational Guidance or Rehabilitation Units; on University Appointment Boards; in industrial consultancies; in research organisations or at universities and colleges, conducting field or laboratory research and teaching.

Numbers

Since there is no register of occupational psychologists and since many are only partially engaged in work of the kind, no exact estimate can be given of the number working in the United Kingdom. Membership of the Occupational Psychology Section or Division of the British Psychological Society suggests that some four hundred would be a fair approximation of the number engaged in occupational psychology to any significant extent, although the overlap with ergonomics, noted earlier, means that many people classify their work under both heads. A census in 1969 suggests that about the same number are employed in academic work as in consultancy, with a smaller but increasing number being in Government employment.

Pay scales

Salaries in universities, technical colleges and Government service are in line with the standard scales. Industrial and other appointments are paid at competitive rates.

Qualifications and training

Employment as an occupational (or industrial) psychologist normally requires a degree in psychology. Most, but not all, degrees in psychology qualify the holder for membership of the British Psychological Society, whose different grades are becoming recognised as a professional qualification. Membership of the Society's Occupational Psychology Section or Division is desirable. The Division specifies more advanced criteria for membership. (Information can be obtained from: The British Psychological Society, 18–19 Albemarle Street, London, W1X 4DN.)

Occupational psychology can be read for a B.Sc. first degree at The University of Wales Institute of Science and Technology or for a B.Tech. at Brunel University.

Postgraduate qualifications in occupational psychology (some on a part time basis) are offered at the Universities of Aston in Birmingham, Belfast (Queen's University), Liverpool, London (Birkbeck College), Loughborough, The University of Wales Institute of Science and Technology and Hull (diploma course only).

Many universities and polytechnics offer occupational psychology as an option or include it as part of the curriculum for other subjects such as sociology and business studies.

The range and variety of university courses is too large to be specified in this chapter. The list below shows some sources of information about content of the different courses and about entrance requirements.

British Qualifications, 1972 Ed. Kogan Page. Paperback. Price £2·95. Information on, for example, courses, syllabuses, different types of grants and scholarships, professional status.

U.C.C.A. Handbook. Universities Central Council on Admissions, P.O. Box 28, Cheltenham, Glos., GL50 1HY. Published annually, price 20p. Information on application to universities.

A Compendium of University Entrance Requirements for First Degree Courses. Association of Commonwealth Universities, 36 Gordon Square, London, W.C.1. Published annually, price 75p.

Which University? Cornmarket Press, published annually, price £3·50.

Degree Course Guide (*Psychology*), 1971 Ed. Published by The Careers Research and Advisory Centre, Bateman Street, Cambridge. Price 37½p. Information on the content of courses at different universities.

Psychology and Psychologists, published 1970 by The British Psychological Society, 18–19 Albemarle Street, London, W1X 4DN. Price 10p (post free).

A Compendium of Advanced Courses in Technical Colleges. Published annually for the Regional Advisory Councils in England and Wales by Regional Advisory Council for Technological Education, London and Home Counties, Tavistock House South, Tavistock Square, London, WC1H 8LR. Price 70p.

Graduate Studies (*Volume 4, Social Sciences*), 1970–71. Cornmarket Press. Price £3. Information on all higher degrees, diplomas and certificates.

Psychology: An Outline for the Intending Student. J. Cohen (Ed.), 1968. Routledge and Kegan Paul. Six chapters, by professors and lecturers, on psychology as a science, its physiological, experimental and developmental aspects, language, communication and social behaviour. These references may be consulted in libraries.

Postgraduate Training Courses in Psychology, 1972. The British Psychological Society, 18–19 Albemarle Street, London, W1X 4DN.

Comprehensive information on subjects such as career choice (at school level), education, training and employment is given in publications of The Careers Research and Advisory Centre (C.R.A.C.), Bateman Street, Cambridge.

Suggested reading

Blum, M. L. and Naylor, J. C. (1968), *Industrial Psychology: its theoretical and social foundations*. New York: Harper & Row.

Brown, J. A. C. (1954), *The Social Psychology of Industry: human relations in a factory*. Harmondsworth, Middlesex: Penguin Books.

Myers, C. S. (Ed.) (1956), *Industrial Psychology*. London: O.U.P.

Pym, Denis (Ed.) (1968), *Industrial Society: social sciences in management*. Harmondsworth, Middlesex: Penguin Books.

Schein, E. H. (1965), *Organisational Psychology*. Englewood Cliffs, N.J.: Prentice-Hall. (2nd Edn) 1972.
Tiffin, J. and McCormick, E. J. (1966), *Industrial Psychology* (3rd Edn). London: Allen & Unwin.
Vroom, V. H. and Deci, E. L. (Eds.) (1970), *Management and Motivation*, Harmondsworth, Middlesex: Penguin Books.
Warr, P. B. (Ed.) (1971), *Psychology at Work*. Harmondsworth, Middlesex: Penguin Books.

Journals

Applied Ergonomics
British Journal of Guidance and Counselling
British Journal of Industrial Medicine
British Journal of Industrial Relations
Ergonomics
Human Relations
Industrial and Commercial Training
Industrial Society
Industrial Training International
Journal of Applied Psychology
Journal of Counselling Psychology
Journal of Management Studies
Management Today
Occupational Psychology
Personnel Management
Programmed Learning and Educational Technology
Vocational Aspects of Education

Societies and Associations

The British Psychological Society, with its Occupational Psychology Section and Division, has already been mentioned as the main Society to which occupational psychologists are likely to belong, while people may join the National Institute of Industrial Psychology without having academic qualifications. Other Societies to which occupational psychologists may be attracted include The Ergonomics Research Society, The Industrial Society, The Society of Occupational Medicine, The Operational Research Society and the Institute of Personnel Management.

Ergonomists

Definition

When the Ergonomics Research Society in the late 1960's prepared a brief statement about ergonomics in general and the Society in particular it defined ergonomics as follows:

"Ergonomics is the scientific study of the inter-relations between people and their occupations. It deals with the equipment they use, the environment they work in and the working system as a whole. It draws on the disciplines of anatomy, physiology, psychology and engineering for its methods and data. The name was coined from the Greek and emphasizes the Ergonomist's concentration on the scientific study of human effort in its many aspects. Other terms used to describe the same, or similar, activities are Human Engineering and Human Factors; these terms are more popular in the U.S.A."

Another slightly different definition is that of the International Labour Office and was published in the International Labour Review 1961.

"Ergonomics is the application of human biological sciences in conjunction with the engineering sciences to achieve the optimum mutual adjustment of man and his work, the benefits being measured in terms of human efficiency and well being."

Whichever definition we prefer it can be said that there are four principal topics with which ergonomics is primarily concerned. Each of these topics may to some extent be the concern of other individuals who are involved in any occupational health and efficiency programme.

The principal topics are:

A. *Environmental Conditions*—traditionally these are heating, lighting, noise, humidity and ventilation but more recently we have to include vibration and some ergonomists would also specify the micro-environment occurring within a protective clothing system as part of this general heading of environment.

B. *Physical and Psychological Characteristics of the Human Being*—this heading includes anthropometric data on body size and body strength; the general field of biomechanics and psychological characteristics such as perceiving, learning, attending, information load and decision making.

C. *Man-Machine Relations*—such as displays and controls including the presentation of information, the design and arrangement of controls, the organisation of work space and the implications of automation.

D. *Special Aspects of Work*—such as stress, fatigue and pacing, errors, accidents and safety, work performance and system effectiveness.

As with any new discipline, practitioners appear and organisations grow up before any formal training has been agreed or recognised. Before the word "Ergonomics" had been brought into use, or the Ergonomics Research Society had been formed (in 1949) a group of specialists from psychology, physiology, anatomy, engineering and other scientific backgrounds were working on wartime problems of the man/machine interface. In this case the "man" was the soldier, sailor or airman and the "machine" was a tank, gun or aircraft. The problems were such that the value of a combined approach became more and more apparent and discussions took place between the various scientists. These pioneers may be regarded as the first ergonomists though their forerunners could be identified at least 35 years earlier during World War I. But no fully professionally qualified ergonomist could be truly identified until after the establishment of the Department of Ergonomics and Cybernetics at the then Loughborough College of Technology in 1960.

In considering the extent of ergonomics and its present application the most readily available information is through the membership of the Ergonomics Research Society.

The following information is based on an analysis of the 1972 membership list:

Ergonomics Research Society

Total membership for 1972 including Honorary Members and Associate Members	430
Student Members	60

Of this total membership, those whose residence was overseas consist of:

U.S.A.	74
France	10
Holland	9
Australia	8
Sweden	8
Canada	7
India	7
Other	29
Total	152

The total number of ergonomists working in the U.K.—excluding students—is approximately 280. In addition certain organisations are affiliated to the Society and these include:

Industrial organisations	15
Research institutions	12
University or college depts.	12

Of the members of the E.R.S. who live in the U.K. about 50% work in universities, technical colleges or colleges of art;

About 24% work in industry, including industrial research.
About 12% work in the armed forces (e.g., Ministry of Defence).
About 10% work in other research (e.g., Medical Research Council).
About 2% work in consultancy.

There is necessarily some overlap of classification since most university teachers are engaged in research, much of which is for industry, and many of those classified under "other research" may also engage in contract research on industrial problems. Hence the probability is that a great deal more of the time of members is spent in some form of industrial research than would appear from the analysis of jobs of members. Even so the analysis of jobs makes it clear that at present the main outlet for qualified ergonomists is in teaching establishments. The actual number of ergonomists may be higher than the figures suggest; as some may be able to enjoy most of the advantages of the Society through a research unit or department without actually joining the Society.

In industry the public sector has employed ergonomists more extensively than the private sector. In particular the British Steel Corporation, British Railways, the Central Electricity Generating Board, British European Airways and the National Coal Board have all employed ergonomists for a number of years and other Government departments sponsor research work.

In the private sector the glass industry (Pilkington) and motor manufacturers (B.L.M.C. and Ford) have ergonomic departments and EMI Electronics Limited have an ergonomics laboratory which acts as a consultant. Other major employers such as London Transport and the Post Office, have made use of ergonomics without necessarily employing full time ergonomists within the organisation.

A small number of other individual firms may either employ an ergonomist or make use of university staff or private consultants.

Research organisations with one or more ergonomists on the staff include:

Corporate Engineering Laboratories, British Steel Corporation.
The Furniture Industry Research Association.
The Building Research Station.
The Transport Road Research Laboratories.
Safety in Mines Research Association.
Royal Aircraft Establishment.
Institute of Aviation Medicine.
Army Personnel Research Establishment.
National Institute of Agricultural Engineering.
Institute of Consumer Ergonomics Ltd.

It is not always easy to know exactly what is taking place at any particular moment in time but there certainly are some other research organisations, industries or firms actively employing ergonomists.

Guide to Pay Scales

There appears to be no reliable information available. It must be presumed that since the major employers of ergonomists are academic institutions and the Government the pay scales of the universities and the Civil Service are the dominating factor.

Training

There is no single route to professional training in ergonomics but there are two major avenues:

1. *Undergraduate Training*

The Department of Ergonomics and Cybernetics, University of Technology, Loughborough, Leicestershire (Professor B. Shackel) offers a three year undergraduate course which, depending on the option taken in the third year, leads to a degree of Bachelor of Science in either Ergonomics or Human Biology.

A number of other universities offer courses which include some ergonomics. The best known of these are:

University of Aston in Birmingham—the combined honours course of the University includes an option in ergonomics. The Department of Applied Psychology (Professor W. T. Singleton) also provides a psychology specialism within a four year course leading to a B.Sc. in Behavioural Science; Ergonomics is one of the options within this course.

University of Birmingham—the B.Sc. in Engineering Production (Professor E. N. Corlett) includes courses in ergonomics in the second and final years.

University of Wales Institute of Science and Technology—the Department of Applied Psychology (Professors K. F. H. Murrell and D. Wallis) offers a three year course leading to a B.Sc. or a four year course leading to a B.Sc.(Tech.). In each of these courses ergonomics forms one of the final year options. Ergonomics is also an option in a Diploma in Psychology.

With the rapidly changing interests in many other universities, more and more undergraduate courses (e.g., in psychology and human biology) introduce students to ergonomics, or to those aspects of the subject most appropriate to the main course.

2. *Postgraduate Courses* (M.Sc.)

University of Technology, Loughborough (Professor B. Shackel)—a one year M.Sc. course in Ergonomics. Some students can take a special option in environmental ergonomics designed to appeal particularly to architects and to environmental engineers concerned with the design of the services in buildings.

University of Aston (Professor W. T. Singleton)—M.Sc. course in Applied Psychology. Ergonomics is one of the five major subjects studied.

University of Birmingham (Professor E. N. Corlett)—A one year M.Sc. course in Ergonomics in the Department of Engineering Production.

University of London (Dr. H. G. Maule)—an intercollegiate M.Sc. course in Ergonomics. One year full time or two years part time.

Cranfield Institute of Technology (Mr. T. B. Leamon)—School of Production Studies has a one or two year M.Sc. course in Industrial Engineering with an Industrial Ergonomics specialisation.

Many technical colleges include brief introductions to Ergonomics as a part of the teaching in other courses.

Cost

It is impossible to generalise about the costs of the various degree courses and information should be obtained directly from the appropriate college or university.

Grants and Sponsoring Bodies

Students attending undergraduate courses are financed in precisely the same way as for any other undergraduate course.

Awards for postgraduate studies are constantly under revision and up to date information should be obtained from each college or university. According to the precise classification of a course studentship awards may be available from the Medical Research Council, the Science Research Council or the Social Science Research Council. It is possible that other research councils would make an award for an appropriate student attending a particular course. Some students, both full time and part time, have been sponsored by their employers. In effect this means study leave on full pay. Each university or college may have additional funds, or arrangements with other bodies that are prepared to sponsor suitable candidates.

Syllabus of Training

It would be impossible to include anything approaching a full record of the different syllabi of the various courses. The (author)/(editor) has therefore made the arbitrary decision of reproducing the syllabus of one of the more recent full time M.Sc. courses. This was drawn up after long discussions between those responsible for the particular course and those concerned with ergonomics in other universities and elsewhere. Up to date information about any particular syllabus should be obtained from the appropriate department.

Reading List

There is a rapidly growing volume of text books and individuals must make their own choice. Almost any list would include the following books:

Murrell, K. F. H. Ergonomics, Chapman & Hall, 1969.
Dreyfus, H. The Measure of Man, Whitney Library of Design, 1967.
McCormick, E. J. Human Factors Engineering, McGraw-Hill, 1970.
Edholm, O. G. The Biology of Work, Wiedenfeld & Nicholson, 1967.
Gagne, R. M. Psychological Principles in System Development, Holt, Reinhart & Winston, 1962.

In the last few years new paperback editions are providing relatively cheap and very useful volumes on specialist topics and the H.M.S.O. has published a valuable series of booklets under the general heading "Problems of Progress in Industry."

Journals

Ergonomics—the official publication of the Ergonomics Research Society, Nederlandse Vereniging Voor Ergonomie and the International Ergonomics Association. This is published by Taylor & Francis Limited, 10–14 Macklin Street, London, WC2B 5NF and there are six bimonthly numbers per volume per annum. Approximately 750 pages per volume. Annual subscription £14.

Applied Ergonomics—published by I.P.C. Science and Technology Publications, 32 High Street, Guildford, Surrey, in co-operation with the E.R.S. There are four numbers per volume per annum. Approximately 250 pages per volume. Annual subscription £10.

Ergonomics Abstracts—published by Taylor & Francis Limited. There are four numbers per volume per annum. Approximately 500 pages per volume. Annual subscription £16.

Societies and Associations

Many countries throughout the world have professional or scientific societies concerned with ergonomics. The following extract from the general information issued by the *Ergonomics Research Society* indicates the original purpose of the Society;

"At the end of the 1939–45 war, groups of experts, drawn mainly from psychology, anatomy and physiology, emerged as members of multi-disciplinary teams who had contributed to the solving of ergonomic problems. The value of their combined approach became more generally recognised and their ideas, techniques and specialised knowledge began to be applied to a wider range of industrial and domestic design and work problems. In particular the efforts of these scientists became more concentrated on promotion of greater health, safety and comfort in working environments as well as on improvements in working procedures. By 1949 the people involved in these activities had created a formal society under the title of the Ergonomics Research Society to act as a communicating body to focus their interests."

The Society has now expanded both in size and range of interest. There is now more attention being paid to applying this knowledge to practical situations, and to designing working environments and equipment right from the start with the operator or user in mind. Members are either trained and qualified in Ergonomics itself or in one of the basic disciplines such as anatomy, physiology, psychology or engineering, which underlie the subject. Associate membership is available for people not qualified or active in the field but who are interested in the subject. The Society holds its own scientific and special meetings several times a year as well as a three day annual conference. It also co-operates with other societies to hold joint meetings in areas of common interest.

The officers of the Society change from time to time. In 1974 the Hon. Secretary is Mr. T. B. Leamon, Cranfield Institute of Technology, Cranfield, Bedfordshire, and the Hon. Treasurer is Mr. H. M. Cooke, Department of Ergonomics and Cybernetics, University of Technology, Loughborough, Leicestershire, LE11 3TU.

The International Ergonomics Association was founded in 1959, its aim being to bring together persons and organisations interested in scientific problems of experimental psychology, anatomy and physiology applied to human work. In 1972 the General Secretary was Professor A. Wisner, Professor of Work Physiology and Ergonomics, Conservatoire National des Arts et Metiers, 41 rue Gay-Lussac, Paris 5, France. Membership is generally through the affiliation of national societies though there are facilities for individuals to join the Association.

The I.E.A. holds an international congress every three years.

There are now societies in Australia and New Zealand, Canada, Holland, Germany, Italy and Japan catering for workers in ergonomics in those countries; there are also a French-speaking Society, a Nordic and an Indian Society. In the United States of America there are several societies having similar interests to those of the Ergonomics Research Society. Foremost among these are the Human

Factors Society, which has its own Journal, the Engineering Psychology Society (a Division of the American Psychological Association) and the Professional Group on Man-Machine Systems of the Institute of Electrical and Electronic Engineers.

APPENDIX 1

M.SC. DEGREE IN ERGONOMICS

Syllabus

The general content of the syllabus can be grouped under the following headings:

1. *Introductory Course* (16 hours)

Forerunners of Ergonomics; social and psychological implications of industralisation; development of industrial psychology; origins and growth of Ergonomics in the U.K.; some aspects of management.

2. *Experimental Psychology* (35 hours)

Man as an information channel; audition, vision and proprioception; perception of pattern, depth, movement, colour and time; signal detection theory and information theory; vigilance and discrimination; processing discrete and continuous signals—human operator in man-machine systems; motor control systems; memory processes; modifying factors—noise, heat and other stresses; ageing; individual differences.

3. *Human Anatomy and Biomechanics* (40 hours)

Biophysical properties of human tissues; structure and function of joints and skeletal muscle; components of the body—their masses, inertias and spatial (anthropometric) characters; design of equipment; space requirements; posture, movement, load carrying—their normal limits; instrumentation.

4. *Human Physiology* (35 hours)

Concepts of homeostasis, adaptation and self-regulation; grades and measurement of work and work capacity; limits of response to work, environmental extremes, optimal conditions; circadian rhythms, sleep, sleeplessness; fatigue, stress and physiological concomitants; functioning of the central nervous system and special senses.

5. *Instrumentation* (15 hours)

Fundamental principles of measurement. Transducers for physiological and environmental variables. Recording systems. Compatability between different components of an instrumentation system. Literature and technological information services.

6. *Operational Studies* (35 hours)

Fitting the man to the job through occupational guidance, personnel selection, training and development. Fitting the job to the man through methods design, equipment design, the design and negotiation of working conditions and rewards. The place of the FMJ-FJM framework in the avoidance of error and discomfort.

7. *Statistics* (50 hours)

Frequency distributions, means, medians, ranges and standard deviations; probability and the binomial, poisson and normal distributions; sampling: significance tests and confidence limits; differences between means and proportions; contingency tables and x^2 tests; regression and correlation; distribution free methods; t tests; straight-line data; planning of experiments; analysis of variance.

8. *Systems Analysis* (35 hours)

System and operator dynamics; configuration and stability of negative feedback systems; open and closed looped systems; stabilisation methods; control systems; use of signal flow methods; linear system identification; introduction to non-linear control; properties of non-linear oscillations; information theory; evaluation of systems; identification of human factors; critical path analysis; computer use.

9. *Case Studies* (50 hours)

The case study is a practical account of a situation which illustrates theoretical concepts of ergonomics. In most case studies the teacher is able to report in relation to the particular problem (*a*) the circumstances that lead to the recognition of a problem, (*b*) the early stages of investigation including exploration and definition of the problem, (*c*) full investigation including, where appropriate, the experimental design and (*d*) solution and follow up including evaluation.

10. *Seminars* (16 hours)

These include reports by the students on practical work or special reading allocated to them as well as seminars presented by visiting speakers.

11. *Project Work* (250 hours)

Each student is required to undertake a practical project under the general supervision of his tutor.

EXAMINATION

The examination will consist of four written papers of three hours each taken in the month of June of the last year of the course. A written report of the project work will be submitted in September of the same year.

ADMISSION TO THE COURSE

To qualify for acceptance to the course a candidate must normally hold a first or second class honours degree in a subject relevant to Ergonomics. This will usually be in Psychology. Physiology or Engineering but other subjects such as biological and medical sciences, other applied sciences or a wide-based degree of some universities may be regarded as satisfactory. There is also provision in the regulations for admission of students whose "general education, scholarship and training can be regarded as suitable preparation". Such cases are considered on their individual merits.

Students in their final year of undergraduate work will be considered for admission to the course, subject to successful completion of their first degree.

Part Time Students

It is possible for some students to follow the course on a part time basis, generally whilst in employment and on a day-release arrangement. There is no fixed pattern of attendance for part-time students. Each student will be required to discuss his own timetable with the Director of Studies. Some students may be able to attend for a block of three months at a time, i.e. the whole of one term's work in one calendar year, with the remaining part of the course spread over two years. It is more usual for students to attend for two or more days per week for two years. Every effort will be made to meet the particular requirements of each student.

Arrangements for Lectures and Practical Work

Most of the lectures and practical work take place between 10.00 and 17.00 from Mondays to Fridays. Some courses start at 9.30 and part of the course in Operational Studies takes place from 18.30 to 20.00 on one day per week. There are normally no classes or visits on Saturdays.

Dates and Length of Course

The course commences in the last week of September. A candidate for the degree is required to attend a full-time course of study extending over one calendar year, or a part time course extending over not less than two calendar years. The formal teaching programme is completed early in June and before the written examinations. Work on the practical project is likely to continue after the June examinations and a written report of the project must be presented in the month of September. For part time students the course normally continues until the end of September two years after commencing the course. However, a part time student whose project report is satisfactorily completed in the first year will be deemed to have completed the course at the completion of his written examinations.

Financing of Students

The course has been recognised for advanced studentships by the Science Research Council and is included in the Medical Research Council's approved list of post-graduate courses. Students who are accepted for the course will be informed of the procedure for obtaining an award. At least one professional organisation and one research organisation may consider well qualified students for some financial aid.

Appendix 11

Addresses

Professor B. Shackel, Department of Ergonomics and Cybernetics, University of Technology, Loughborough, Leicestershire, LE11 3TU.

Professor W. T. Singleton, Department of Applied Psychology, University of Aston in Birmingham, College House, Gosta Green, Birmingham, B4 7ET.

Professor E. N. Corlett, Department of Engineering Production, University of Birmingham, Edgbaston, Birmingham, B15 2TT.

Professor K. F. H. Murrell, Department of Applied Psychology, University of Wales Institute of Science and Technology, Llwyn-y-Grant Road, Penylan, Cardiff, CF3 7UX.

Dr. H. G. Maule, Director of Studies in Ergonomics, Department of Mechanical Engineering, University College London, Torrington Place, London, WC1E 7JE.

Mr. Tom B. Leamon, Ergonomics Research Laboratory, Cranfield Institute of Technology, Cranfield, Bedfordshire.

Professor N. S. Kirk, Institute of Consumer Ergonomics Limited, University of Technology, Loughborough, Leicestershire, LE11 3TU.

Bio-Medical Engineering

In spite of the fact that biomedical engineering is a fashionable subject at the moment, there are very few posts which actually carry this description. A large proportion of the people who could be described as such have selected themselves for jobs in this field and may have qualified originally in medicine, physics, engineering, physiology or anatomy. If one had to write a job definition for an encyclopaedia it would run something like "the application of engineering principles and engineering thought to the solution of problems in clinical practice and medical research".

One could distinguish five types of bioengineers. The first, working usually in an academic department, would concern himself with the explanation of biological phenomena in engineering terms. Work of this type might range from the modelling of biological processes on a computer to an investigation of the hydrodynamic factors which allow a heart valve to be so highly efficient. The second type of bioengineer might work in close association with a medical or biological research worker and be responsible for the development of measuring or manipulative techniques required for the research project. The third type, really not very different from the second, would be concerned with the development of instrumentation of all kinds, though perhaps in looser association with the final user. A fourth type, sometimes called a biomechanical engineer, would concern himself with the development of a whole range of orthopaedic devices. This would include implantable plates and fixtures to join broken bones, artificial joints, external prostheses such as artificial limbs, and splints both for acute cases and for the relief of chronic disabilities or malformation. Another type may be added in the forseeable future, perhaps at a slightly lower academic level. He would operate as part of a care team in hospital situations where a high level of technology was being employed such as, for instance, in an Intensive Therapy Unit, and would be expected to be competent in the operation of complex instruments and the interpretation of their results.

Looking even further ahead a need will become apparent for bioengineers to work in conjunction with the community health and social services on the design, prescription and installation of technological aids for the elderly or disabled, where these are to be used within the home.

Numbers working in the U.K.

It is very difficult to make an estimate of the total number of posts in the U.K. which do at least have some bio-medical engineering component as part of their duties. This difficulty arises because by far the greatest number of likely candidates are working in the National Health Service but are described as medical physicists and medical physics technicians. A further difficulty arises in as far as the latter are not necessarily graduates and may have other qualifications such as H.N.C. and H.N.D. The term "medical physicist" in the past has tended to be associated largely with the use of ionising radiations. However, more recently an increasing number of medical physicists and medical physics technicians have been employed on work which is largely indistinguishable from that covered by the definition of biomedical engineering. In Table I, figures are given which give some indication of the number of jobs which are thought to exist at present, broken down under employers. The figures in column A include the totals for all physicists and medical physics technicians, whilst column B contains amended figures in which an attempt has been made to estimate the proportion of medical physicists, physicists in the Medical Research Council and medical physics technicians not employed largely on radiation work. The total appears to be around 1,000. There is likely to be an appreciable growth rate in the medical physics technician category because of the increasing use of complex electronic equipment in hospitals.

Table I

	A	B
Medical physicists in N.H.S.	425	142
Medical physics technicians in N.H.S.	750	375
D.H.S.S. + S.H.H.D. + B.R.A.D.U.	230	230
Physicists, M.R.C.	50	17
Others, M.R.C.	77	77
Ministry of Defence	30	30
University departments	70	70
Medical schools, Industry (unknown but estimated)	150	150
Total	1,782	1,091

Organisations employing biomedical engineers

The National Health Service in the forseeable future is likely to be the largest employer, particularly as the recommendations of the Zuckerman Committee (H.M.S.O., Report of the Committee on Hospital Scientific and Technical Services, 1968) are now in the process of being implemented. These recommendations amount to the setting up of a scientific and technical service in the N.H.S. which to some extent will unite all non-medical professions. Bioengineers will have a place in this organisation though many of the jobs will be at a level which would be described as technician under the present nomenclature. In parallel, the Engineering Inter-Board Study Group, Number 8, has issued a report on the *Maintenance of Electronic and Biomedical Equipment in Hospitals* which seeks to establish a maintenance and advisory service for this type of equipment as part of the hospital engineering hierachy. The report (known as EY1.0) has performed a valuable service in quantifying the likely employment possibilities under this heading, and if it were fully implemented could eventually yield approximately another 1,000 jobs, comparatively few of which exist at present.

The Department of Health and Social Security and the Scottish Department of Home and Health, at present employ about 230 people with biomedical engineering duties. These are in the main concerned with the work of the Scientific and Technical Branch of the Supplies Division, and with the Biomechanical Research and Development Unit at Queen Mary's Hospital, Roehampton (development of limb prostheses). It seems likely that with the creation of the Chief Scientific Adviser's Department, a number of new posts will become available concerned with the evaluation of equipment, the drawing up of equipment specifications and the setting up and administration of the Zuckerman organisation.

The Medical Research Council maintains an Engineering Division at the National Institute for Medical Research, a Bioengineering Division at the Clinical Research Centre and in addition employs a number of engineers and physicists in some of its other research units.

The Ministry of Defence has a relatively small number of posts within its research establishments, such as the Institute of Aviation Medicine, the Army Personnel Research Establishment, and the Royal Navy Physiological Laboratories.

Even though there are five universities, one medical school and one polytechnic which offer undergraduate or postgraduate courses in bioengineering, they usually rely heavily on the staff of other departments, and therefore offer relatively little employment opportunities. The exception is the University of Strathclyde which has a large academic staff engaged on teaching and research.

It has been very difficult to obtain figures for medical schools and industry, because there are no published reports of any kind. The number employed in industry at the moment is almost certainly very small, reflecting at least in part, the small size of the industry itself.

Guides to pay scales April 1972

Within the Health Services employment would be under:

(*a*) Medical Physicists scales:

Graduates—no previous experience.
1st and 2nd class honours degrees £1,566–£1,980 plus London Weighting.
Other degrees £1,278–£1,980 plus L.W.
Post experience £1,842–£4,599 plus L.W.

(*b*) Medical Physics Technician scale:

5 grades £1,209–£2,889.

(*c*) Hospital Engineers scales:

Group Engineers £2,190–£4,173.
Deputy Group Engineers £2,031–£2,922.
Hospital Engineers £1,884–£2,388.
Assistant Engineers £1,500–£1,944.

In the Medical Research Council, posts of scientific staff status (a good first degree and/or postgraduate qualification) are graded on university scales, see below:

Grade II £1,668–£3,192.
Grade I £3,351–£4,299.
Senior Grade £4,143–£5,247.
Special Appointments £5,367–£7,392.

Others are on Technical Officer or Senior/Chief Technician scales:

Junior Technical Officer £1,077–£1,944.
Technical Officer £2,019–£2,889.
Senior Technical Officer £2,889–£3,783.
Senior Technician £1,947–£2,664.
Chief Technician £2,439–£2,961.
Senior Chief Technician £2,883–£3,693.

Much the same would probably be true of medical school appointments. Pay in industry, depending on qualifications and experience, would be in the £1,500–£3,000 bracket.

Training

Until recently the academic training which was obtainable in the U.K. was limited to postgraduate courses. These were run at the following institutions:

Chelsea College of Science and Technology—Biophysics section of the Basic Medical Sciences Group. Entry requirements: good honours degree or approved equivalent qualification in science, engineering, biological science, medicine or dentistry. Course takes two years full-time, or three years part-time.

Imperial College, London—Engineering in Medicine Laboratory, Department of Electrical Engineering. Entry usually restricted to medically qualified candidates and possible life scientists both with some postgraduate experience. Twelve months' course leading to D.I.C. (Diploma of Membership of Imperial College).

University of Strathclyde, Glasgow—Bio-Engineering Unit. Entry qualifications: minimum lower 2nd honours degree in engineering, an appropriate physical science or applied mathematics. Course duration one calendar year. In exceptional cases a longer course may be prescribed dependent on initial qualifications.

University of Surrey, Guildford—Course in biomechanics taught by the Department of Mechanical Engineering in collaboration with the Department of Biological Sciences of the university, King's College Hospital and the Institute of Aviation Medicine. Entry qualifications as for Chelsea, separate initial streams for graduates in physical sciences and life sciences. One year course.

St. Bartholomew's Hospital Medical College—Sub-Department of Medical Electronics, Department of Physics. Entry requirements: degree in physics or electrical engineering with ancillary physics or equivalent. Course in medical electronics, though syllabus does cover the appropriate physiology and anatomy. Duration, one calendar year for full-time students or two academic years for part-time students.

North-Staffordshire Polytechnic, Stoke on Trent—Bio-Medical Engineering Unit, Faculty of Engineering. Entry requirement: degree in mechanical or electrical engineering, applied physics or materials science. Equivalent professional qualification and experience may be admitted at discretion of Examinations Committee. Lecture programme divided into two stages: First stage will cover basic human biology together with some additional mathematical techniques, psychology and the organisation of health care. Second stage integrated study of specific biological systems and additional scientific topics. Duration, 18 months' full-time, leading to award of C.N.A.A., M.Sc. degree.

University of Salford—Department of Electrical Engineering. B.Sc. in Bio-Medical Electronics. Three years' full-time. Entrance requirements: 2 "A" levels in Mathematics, Physical Science, Chemical Science, Biological Science. If no Mathematics offered at "A" level a good pass at "O" level, plus additional work is required. Students with O.N.C. or O.N.D. are also accepted.

To cater for a new type of technician in the hospital service, known as a physiological measurement technician (see the fifth classification of bioengineer), *Ewell Technical College, Surrey,* is running a special H.N.C. course to provide career training for a corps of versatile and skilled technicians capable of dealing with the range of technological supportive and measuring equipment now being used in hospitals.

For the postgraduate courses leading to an M.Sc. or comparable qualification, grants may be available from the S.R.C. or M.R.C. Some special arrangements are possible at Imperial College where the students may already be holding middle-range or senior appointments, and may require support at a more generous level. For those courses which can be taken part-time, it is not unusual for the employer to sponsor the student.

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I.E.E.E. Transactions on Biomedical Engineering. I.E.E.E. Inc. New York.

Journal of Biomechanics. Pergamon Press Ltd, Oxford.

Journal of the Association for the Advancement of Medical Instrumentation. Editorial Office: Baylor College of Medicine, 1200 Moursund Avenue, Houston, Texas 77025.

Physics in Medicine and Biology. Taylor and Francis Ltd, London.

Societies or Associations

In the U.K. the Biological Engineering Society (Secretary: K. Copeland, Biophysics Department, University College London, Gower Street, W.C.1.) functions as the national learned society to which biomedical engineers and others with kindred interests can belong. The B.E.S. is affiliated to the International Federation for Medical and Biological Engineering, which has been organising bi-annual international conferences (Secretary: J. Kuiper, Medische-Fysische Instituut T.N.O., Da Costakade 45, Utrecht, Holland).

Hospital Physicists, and recently workers in closely allied posts, can belong to the Hospital Physicists Association (Secretary: Dr. B. J. Perry, 47 Belgrave Square, London, S.W.1.). Medical Physics Technicians have their own body called the Hospital Physics Technician Association (Secretary: L. D. Kitchen, Medical Physics Department, King's College Hospital, Denmark Hill, London, S.E.5.).

Health and Safety Inspectors, Safety Advisers and Safety Engineers

The concern about safety—whether at work or at home or in transport—is not a new phenomenon, but the last ten years have seen an increase in the level of concern. The point has now been reached where there is a noticeable demand for specialists in safety. Developments in this work are taking place simultaneously in a number of areas, in particular the work of health and safety inspectors, safety advisers and safety engineers.

Health and safety inspectors' work is to seek out dangers in existing plants and processes, and to assess whether the steps taken in order to combat the dangers meet legal and other standards for safety.

Approximately 1,000 people are employed in health and safety inspection work in government safety inspectorates—of which the largest is H.M. Factory Inspectorate. Local Authorities also employ people on health and safety inspection work—though not often in a full-time capacity.

Several insurance companies employ safety inspectors often doing very specialised work. The numbers employed are much smaller in comparison with the government inspectorates but they are generally increasing.

For a century and more, health and safety inspection has been seen as one of the most important ways—if not the most important way—of progressively improving standards in safety. To judge from the Robens Report (1972), the future holds even more emphasis on safety inspection.

Safety advisers (safety officers) are employed at various levels in most industries. In a senior role, they advise on the strategy for safety in all matters affecting the company or organisation. The scope of their work depends on the size and nature of the industry. Sometimes the work covers security, product safety, fire prevention, disaster contingency planning, as well as occupational safety and occasionally it may include occupational hygiene.

Occupational Safety

Occupational safety has a broad scope including the advising of management on aspects of the design of plant, processes and equipment; the specification of safe systems of work; attention to legal requirements; committee work and joint consultation on safety matters; safety training for management and workers; investigation of accidents and the collection of data on accidents; and generally the advancement of all aspects of accident prevention.

Senior posts are not numerous but there seems to be a growing need for people capable of work at this level. No up-to-date figures are available but it is possible that 4,000 or more people are employed in less senior posts on full-time or part-time advisory duties in industry and commerce.

Safety engineering encompasses a number of well-established specialisations in engineering:

(*a*) *Safety technology*; one example is the highly specialised inspection of pressure vessels done by certain insurance companies.

(*b*) *Safety and reliability engineering*; this involves making predictions about failure in plant and machinery and has been developed to a considerable degree of specialisation by the U.K.A.E.A. Safety and Reliability Directorate.

(*c*) *Safety design engineering*; there is a growing body of engineering knowledge with specific applications in safety. Examples are the design of primary safety into motor cars; the design of fail-safe mechanisms; and tamper-proof mechanisms in guarding.

Training

The Factory Inspectorate has always recruited from a wide range of backgrounds. In the Mines and Quarries Inspectorate, on the other hand, mining engineers are preponderant—though electrical, civil, and mechanical engineers are also recruited. The other inspectorates are smaller and recruit people with appropriate experience and qualifications.

In general, training in safety inspection work has always been done by the inspectorates themselves. (Overseas inspectorates have also benefitted from the training done by the British Factory Inspectorate). However, in recent years factory inspectors have attended specialist courses in universities; for example in the late 1960's inspectors received special training in noise at the Institute of Sound and Vibration Research at the University of Southampton. More recently as an experiment ten inspectors joined the MSc course in Occupational Safety and Hygiene at the University of Aston in Birmingham. The future pattern of training for inspectors will need to evolve in order to meet the increasing responsibiity of the work.

Safety inspectors employed by insurance companies are experienced engineers, often with professional standing. A number are recruited from the Factory Inspectorate. It seems likely that there will be a call for broad training as well as increasing specialisation for safety inspectors in insurance—particularly for those without experience in one of the government inspectorates.

Safety advisers and safety officers come from very diverse backgrounds. A number of senior safety advisers have worked as safety inspectors; others have been managers or company engineers. Relatively few have worked their way up from junior posts in safety. Hence the call for specialist training has been late in developing in comparison with other professional and semi-professional groups.

In the 1930's the Royal Society for the Prevention of Accidents started several Industrial Accident Prevention Groups. These have always had an important educational role. But by 1943 it was apparent to the Midlands Group that full-time safety officers needed an institution with a professional standing. From this developed the Institution of Industrial Safety Officers.

In the late 1960's the Institution produced a booklet on the training of safety officers and this was followed by another booklet setting out the syllabus in greater detail. These two booklets have set the pattern for the immediate future (See Appendix I).

Courses following the Institution of Industrial Safety Officers' (I.I.S.O.) syllabus are designed to last eight weeks (Appendix II). At the time of writing the only regularly advertised course of a general nature is that run by the Royal Society for the Prevention of Accidents. Courses have also been run by the British Safety Council and certain technical colleges.

No-one has made a complete survey of all safety training in the U.K. and coordination is patchy. The Robens Report devoted a chapter to training and summarised the present situation:

"Most people are agreed that safety training is of vital importance. There is no unanimity about what in practice should follow from this proposition. Our experience has been that discussions about training for safety and health at work . . . too often tend to remain at an abstract and generalised level. An example of this is the debate which has gone on for some time about whether safety training should be thought of as an integral part of job training generally, or whether it should take the form of specialised training taught separately. Put in these general terms, the debate is a sterile one. Safety training must be concerned with a variety of specific needs and circumstances, and in this context the concept of "integrated" safety training and specialised safety training are by no means mutually exclusive."

A complete survey of facilities for safety training is not practical. Instead I have chosen to highlight certain educational courses. There are probably some omissions and I hope that tutors of educational courses which I have not mentioned will inform me of the extent and nature of any omissions.

Independent and Industrial Safety Organisations

The Industrial Safety Training Centre of the Royal Society for the Prevention of Accidents runs a number of short courses each year. These include the Licentiate course, and the course to the IISO syllabus. Other courses are largely of a technical nature and are intended for special groups in industry such as power press operators. For further details write to The Manager, Industrial Safety Training Centre, 22 Summer Road, Acocks Green, Brmingham, B27 7UT.

The British Safety Council, which pioneered Loss Control courses in the U.K., has now introduced a course leading to the Diploma in Safety Management. The British Safety Council also organises a number of other courses on specialist and general topics. Enquiries to Mr. J. Tye, Director General, British Safety Council, National Safety Centre, 62, Chancellors Road, London, W.6. Tel. 01-741 1231.

Polytechnics, Technical Colleges and Universities

The following is a brief list of courses which were available in the U.K. at the time of writing.

1. Basic Course for Safety Officers in Construction
   School of Management and Business Studies,
   Brooklands Technical College,
   Weybridge,
   Surrey.

Although it is intended to comply with the syllabus of training recommended by the Institution of Industrial Safety Officers, the whole emphasis is towards construction. Five weeks of instruction are given whereas the I.I.S.O. programme requires 4 weeks. The remainder of the course time is taken up in project work in the same way as in the Ro.S.P.A. eight week Safety Officers course (Appendix III).

2. Safety Officers Day Release Course,
School of Management and Business Studies,
Brooklands Technical College,
Weybridge,
Surrey.

This is intended to help Safety Officers to prepare for the I.I.S.O. examination but it does not purport to cover the entire I.I.S.O. syllabus (Appendix IV).

3. Industrial Safety and Fire Prevention Course, (Appendix V).
Department of Building Technology and Administration,
Glasgow College of Building and Printing,
66 North Hanover Street,
Glasgow, G1 2BP.

4. A variety of courses offered as options in Higher National Diploma and post graduate syllabi (Appendix VI).

Department of Management and Business Studies,
Middlesex Polytechnic,
The Burroughs,
Hendon,
London, NW4 4BT.

5. Post graduate courses in Industrial Safety leading to M.Phil. or Ph.D., (Appendix VII).

Department of Chemical Engineering and Chemical Technology,
Imperial College,
Prince Consort Road,
London, S.W.7.

6a. M.Sc. Course in Occupational Safety and Hygiene (Appendix VIII).

6b. Post-graduate Diploma in Safety and Hygiene for government health and safety inspectors (Appendix IX).

Safety and Hygiene Group,
University of Aston in Birmingham,
Gosta Green,
Birmingham, B4 7ET.

7. Short courses on various aspects of safety are held in the "Advances in Chemistry" series, recent titles include: Environmental Hazards in the Chemical Industry (gaseous explosions, respirable dust and toxic solvent hazards), Safety in the Chemical Industry: Flammability Protection, Explosion Hazards in the Chemistry Industry.

Enquiries to Professor P. G. Ashmore, Chemistry Department, Institute of Science and Technology, University of Manchester, Manchester.

Literature

The number of books and publications relevant to safety is great, but no comprehensive list is available at present. However, the following list of journals gives some impression of the field and supply up-to-date information:

Accident Analysis and Prevention, Pergamon, Oxford.
California Safety News, Department of Industrial Safety, California.
College and University Safety Newsletter, National Safety Council, Higher Education Section, School and College Department, Chicago.
Environmental Control and Safety Management, A. M. Best & Co., Morristown, New Jersey.
Fire, Journal of the British Fire Services, Tunbridge Wells, Kent, Unisaf Publications.
Fire International, Journal of the World's Fire Protection Services, Tunbridge Wells, Kent, Unisaf Publications Ltd.
Fire News, National Fire Protection Association, Boston, Mass.
Fire Notes, H.M.S.O., London.
F.P.A. Journal, Fire Protection Association, London.
Fire Protection Review, Benn Bros., London.
Fire Research Notes, Department of Environment and Fire Officers Committee, Fire Research Station, Borehamwood, Herts.
Fire Technology, National Fire Protection Association, Society of Fire Protection Engineers, Chicago.
Hazard Prevention, System Safety Society, Los Angeles, Calif.
Industrial Safety, United Trade Press, London.
Institution of Fire Engineers Quarterly, The Institute of Fire Engineers, Leicester.
JOFRO Quarterly, Department of Environment and Fire Officers Committee, Joint Fire Research Organisation, Borehamwood, Herts.
Journal of the British Fire Services Association, B.F.S.A., Leicester.
Journal of the American Society of Safety Engineers, A.S.S.E., Park Ridge, Illinois.
Journal of Safety Research, National Safety Council, Chicago.
Laboratory Safety Newsletter, National Safety Council, Campus Safety Association, Campus Publishers, Ann Arbor, Michigan.
National Safety News, National Safety Council, Chicago.
Nuclear Safety, Division of Technical Information, U.S.A.E.C., Government Printing Office, Washington.
Occupational Hazards, Industrial Publishing Co., Ohio.
Occupational Safety and Health, Ro.S.P.A., London.
Occupational Safety Bulletin, Ro.S.P.A., London.
Protection, Alan Osborne and Associates, for the Institute of Industrial Safety Officers, London.
Quarterly Safety Summary, Chemical Industries Association, London.
Safety, British Steel Corporation, London.
Safety (U.S.), Greater New York Safety Council.
Safety (U.S.), National Commission on Safety Education Association, Washington.
Safety and Rescue, British Safety Council, London.
Safety Digest, National Occupational Safety Association, Pretoria, South Africa.
Safety Education, Ro.S.P.A., London.
Safety in Industry (Australia), Victorian Chamber of Manufacturers, Melbourne.
Safety in Industry (South Africa), National Occupational Safety Association, Pretoria.
Safety Journal, Editors: M. W. Young and J. R. Young, Box 19, Anderson, South Carolina, U.S.A.
Safety Maintenance, A. M. Best & Co., New Jersey, U.S.A.
Safety Review, Government Printing Office, Washington.
Safety Series (pamphlets), International Atomic Energy Agency, Vienna.

Safety Standards, Government Printing Office, Washington.
Security and Protection, Trade News Ltd., London.

Abstracting and Indexing Services in Safety and Related Fields

Fire Research Abstracts and Reviews, National Academy of Sciences, Committee on Fire Research, National Research Council, Washington.
Occupational Safety and Health Abstracts, Centre Internationale d'Information de Securite et d'Hygiene de Travail (C.I.S.) Geneva.
Today's Safety Guides Abstracts, U.S. Department of Labor, Bureau of Labor Standards, Office of Occupational Safety, Washington, D.C. 20210.

Review Bibliographies

A Review of the Industrial Accident Research Literature, by Hale A. R. and Hale M., Second Robens Committee Research Paper, London, H.M.S.O., 1972.
Industrial Accident Research: A Bibliography, by Jean Surry, University of Toronto, Department of Industrial Engineering, 1969.

APPENDIX I

The Institute of Industrial Safety Officers

222 Uppingham Road, Leicester.

Grades of Membership (under review at the present time; see Appendix X for further details).

Non-Corporate

The Institution is composed of non-Corporate, Corporate and Honorary members. The grades are:

Student. A person who is 17 years of age, and under 31, who has satisfied Council he intends to study for the Institution's examination with a view to qualifying for Graduate Membership, and who is otherwise suitable. Council will expect Students to sit the Institution's examination within five years.

Associate. A person who is not otherwise qualified to be elected to any grade of membership, but who, in the opinion of Council, has some specialised knowledge of occupational accident prevention, and who is otherwise suitable. Candidates for Graduate Membership are usually admitted as Associates until they pass the Institution's examination, or complete three years as safety officers.

Corporate Grades

Graduate. A person who has reached the age of 25 years, has passed the Institution's examination, and has satisfied Council that he has been employed for at least three years mainly on occupational accident prevention. This period may be reduced to two years if the person has completed an approved accident prevention course, and holds certain educational qualifications.

Member. To qualify for full membership the applicant must have reached the age of 30 years, and have passed the Institution's examination. He must satisfy Council that he has held a responsible post mainly concerned with occupational accident prevention for a period of at least five years. In most cases he will have been a Graduate of the Institution, but in exceptional cases a Corporate member of another approved professional Institution, or the holder of an approved degree, may be admitted by Council to the grade of member without previous service as a Graduate.

Fellow. Is a member who is, or has been, engaged in industry, and in the opinion of Council has distinguished himself in the practice of occupational accident prevention, and has obtained such qualifications as Council may prescribe. Fellows must have reached the age of 35 years.

Honorary Fellows and Members. These grades are elected by Council from persons whom Council considers worthy of particular honour.

Certificates. A certificate is issued to each of the corporate grades. Associates are issued with a membership card.

Career Opportunities

The safety officer in industry advises management, at the appropriate level, on all matters affecting accident prevention at his place of work. His role ideally begins at the design stages of plant and factory or site layout, and continues through the construction and erection stage, installation and commissioning of the equipment, and its subsequent operation. He may also be concerned with the safety of the product from the point of view of the user.

The following is a summary of the duties generally undertaken by the safety officer:

1. Advising line management in order to assist it to fulfil its responsibility for safety. This includes:
   (a) advising on safety aspects in the design and use of plant and equipment before and in the course of commissioning;
   (b) carrying out periodic inspections to identify unsafe plant, unsafe working conditions and unsafe practices, to report upon the results of such inspections and to make recommendations for remedying any defects found;
   (c) advising on problems concerning occupational hygiene.

2. (a) Advising on the drawing up and implementing of safe systems of work, and on the provision and use of appropriate protective equipment;
   (b) advising on legal requirements affecting safety.

3. Participating in joint consultation affecting safety, and in the work of safety committees.

4. Promoting a safety education programme to assist in developing safety consciousness at all levels in the organisation and specifically to train supervisors to develop and maintain safe working conditions.

5. Working in collaboration with the training department, where this exists, to secure regular safety training of employees.

6. Providing information about accident prevention techniques and preparing, or having prepared, visual aid material, including posters, slides, film strips, etc. for safety training purposes.

7. Providing for the investigation of causes of an injury and of the circumstances leading to an accident, the compilation of the necessary reports, and tendering of advice to prevent recurrences.

8. Recording of accident statistics and presenting information in appropriate form for the use of management and others, in measuring safety performance.

9. Maintaining liaison with other departments, including medical and training departments; with official bodies such as Government inspectorates, local authorities and fire authorities; and with outside bodies, such as Ro.S.P.A., B.S.C. and Fire Protection Association.

10. Keeping up to date with modern processes and techniques with special reference to safety.

If a young person wishes to make a career in industrial accident prevention, he should first seek to acquire a general education of a sufficiently high standard to enable him to understand the technical aspects of the industry concerned. This should be followed by technical training to at least an acceptable O.N.C. level and preferably to H.N.C., H.N.D. or degree level. Much depends on the particular industry which the candidate wishes to serve, or is at the time serving, and will necessarily influence the type of course he follows.

Specialised safety officer training may be obtained through industry-sponsored off-the-job courses, by on-the-job courses within the industry selected, or by day-release courses conducted by educational establishments (Appendix IX).

Thus, there may be a choice available between full-time courses, courses of the sandwich type and part time day-release courses.

The professional body representing safety officers is the Institution of Industrial Safety Officers, which is composed of both corporate and non-corporate members. Details concerning the Institution and its activities are given in an Information Leaflet which can be obtained free of charge from the Secretary, 222 Uppingham Road, Leicester. The trainee safety officer is strongly recommended to undergo training of such a kind as will later fit him to apply for corporate membership.

The examination for this level of membership of the Institution is at present held annually and candidates wishing to prepare themselves for this examination are referred to the training recommendations contained in the Institution's booklet entitled "The Training of Safety Officers", also obtainable from the Secretary at the address given above. (Price 30p post free in United Kingdom.) The training recommendations relate principally to a basic residential 8-week course, but alternative methods of training may be available which aim to cover the same ground. Past examination papers may be obtained from the Institution.

INSTITUTE OF INDUSTRIAL SAFETY OFFICERS

23 Queen Square, London, WC1N 3AZ.

SYLLABUS FOR SAFETY OFFICERS' TRAINING

GENERAL **Philosophy of Industrial Accident**	Brief History of Industrial legislation. Factories Act 1961—highlighting sections of special importance to safety officers—Case Law. Offices, Shops and Railway Premises Act 1963.
Prevention **Industrial Legislation**	Petroleum (Consolidation) Act 1928, etc. Statute and Common Law. More detailed consideration of safety sections of Factories Act 1961, and Regulations. "Fire" sections; fire precautions; fire alarms, etc.
Critical Examination	Case studies—developing techniques for obtaining facts of a situation, drawing conclusions and presenting recommendations.
Accident Prevention Methods	Plant layout and design for safety; Machine guarding; non-machinery accidents.
Report writing	Instruction in writing clear and informative reports about given situations; Practical exercise.
Effective speaking	Instruction in effective methods of communicating.
Statistical Methods	Appreciation of statistical methods; need for "control"; derivation of control mechanisms for given situations.

Science of behaviour	Theories of motivation. Techniques of persuasion.
Problem solving and decision making.	Instruction in identifying training needs; designing methods of training for specific needs.
Safety Training	Techniques of instruction.
Interpretation of drawings	Practical exercises in pinpointing hazards.
Personal Protective Equipment. Sources of Information	Keeping up-to-date with modern developments and techniques. Information retrieval.
TECHNICAL SUBJECTS For example:	Access and Safety of work places; Electricity; Chemistry and Toxicity; Fire and Explosion; Pressure Vessels; Lifting Equipment; Systems of Work; Compressed Gases; Radiological Hazards; Noise and Environment; Machine Guarding; Internal Transport.

APPENDIX II

ROYAL SOCIETY FOR THE PREVENTION OF ACCIDENTS

INDUSTRIAL SAFETY OFFICERS' TRAINING COURSE (Residential)

An eight-week course designed to give firms basically trained and equipped Safety Officers who can give expert advice to management and men. This course is fully approved by the Engineering Industry Training Board for grant purposes, and it is also accepted by the Institution of Industrial Safety Officers as a qualification which lowers the period of experience by one year for Corporate Membership of the Institution.

SYLLABUS

PHILOSOPHY OF INDUSTRIAL ACCIDENT PREVENTION
INDUSTRIAL LEGISLATION · CRITICAL EXAMINATION
ACCIDENT PREVENTION METHODS · REPORT WRITING
EFFECTIVE SPEAKING · STATISTICAL METHODS
SCIENCE OF BEHAVIOUR
PROBLEM SOLVING AND DECISION MAKING
TECHNIQUES OF SAFETY TRAINING
PERSONAL PROTECTIVE EQUIPMENT
SOURCES OF INFORMATION

TECHNICAL SUBJECTS:
ACCESS AND SAFETY AT WORK PLACES
ELECTRICITY, CHEMISTRY AND TOXICITY
FIRE AND EXPLOSION · PRESSURE VESSELS
LIFTING EQUIPMENT · SYSTEMS OF WORK
COMPRESSED GASES · RADIOLOGICAL HAZARDS
NOISE AND ENVIRONMENT · MACHINE GUARDING
INTERNAL TRANSPORT

APPENDIX III

BROOKLANDS SCHOOL OF MANAGEMENT AND BUSINESS STUDIES

SYLLABUS FOR BASIC COURSE
SAFETY OFFICERS IN CONSTRUCTION

(*a*) THE CONSTRUCTION INDUSTRY
The Construction Industry, its size and structure.
Organisations of employers and trade unions.
Relationship between main contractors, sub-contractors and labour only sub-contractors.
The Industry's accident problem.

(*b*) THE LAW AND SAFETY
Historical development.
Statutory requirements.
Factories Act 1961
Offices, Shops and Railway and Premises Act 1963
Construction regulations.
Miscellaneous appropriate regulations.
Duties of employer and employee.
Legal terminology.
Common Law—brief outline of origins and development.
Safe systems of work.
Interpretation and application of the law by Courts.
Head Office and Site documentation.

(*c*) DUTIES OF THE SAFETY OFFICER
His status, aims and objectives.
His relationship with other departments—personnel, training, insurance, design.
Relationship with outside bodies—Factory Inspectors, Local Authorities, Fire Authorities.
Setting up an effective company or group safety organisation.
Different types of safety organisation.
Group Safety Officer's relationship with member companies.
Involving Management.
Management Policy, with responsibilities at each level.

(*d*) ELEMENTS OF MANAGEMENT
Planning.
Setting objectives.
Decision making.

(*e*) PRINCIPLES OF ACCIDENT PREVENTION
Accident causation.
The faults of management, supervision and operatives.
Costing accidents, procedure and methods.
Methods of achieving safe conditions.
Principles by elimination, substitution, enclosure, personal protection, training.
Planning for safety as part of contract planning and estimating.
Designing for safety.
Reading drawings and identifying hazards.
Feedback of information.
Appreciation of ergonomics.

(*f*) ACCIDENT ANALYSIS
Recording accidents.
Preparation of statistics.
Analysing statistics.
Accident frequency rates.
Mean durations.
Use of statistics in measuring safety performance.

(*g*) ACCIDENT INVESTIGATION
Principles of investigation.
Objectives of investigation.
Procedures for major and minor accidents.
Collecting facts.
Chain of events.

True cause as opposed to apparent cause of accident.
Interviewing witnesses.
Timing of investigation—possible distortion of facts.
Written evidence.
Use of photographs and sketches.

(*h*) SITE INSPECTION
Organising and planning the periodic site inspection.
The role of management.
The role of the "inspector".
Hazard spotting.
Recording results.
Reporting to management.
Follow-up procedures.
Feed-back.

(*i*) HUMAN BEHAVIOUR
Motivating agencies.
Individual behaviour.
Effects of grouping on individual behaviour.
Environmental effects.
Physical effects—tiredness.
Techniques of persuasion.
Men management.
Human relations.

(*j*) MACHINERY AND PLANT
Accidents connected with moving parts of machinery.
Appreciation of principles of guarding.
Importance of regular maintenance.
Machines normally associated with construction sites—wood-working machines, *batching plants*, *concrete mixers*, bar bending/cutting machines, *cartridge guns*, etc.
Earth moving machinery.
Pressure vessels—air receivers—air compressors—examination, cleaning and maintenance.

(*k*) NON-MECHANICAL PLANT
Use and maintenance of trench and roof props.
System formwork.

(*l*) TRANSPORT
Transport to and from sites.
Hazards connected with site transport.
Competent drivers.
Dumpers.
Tipping lorries.
Safety in road and motorway construction.

(*m*) SITE TIDINESS
Site organisation, responsibilities and control.
Relation of site tidiness to accident occurrence.
(Appreciation of job planning.)
Site access.
Materials stacking.
Fire precautions and fire fighting.
Materials handling—Kinetic handling.

(*n*) ELECTRICITY
Appreciation of electrical hazards.
Principles of electrical safety.
Elementary circuit theory, fuse protection, earthing.
Power tools.
Low voltage systems.
Underground cables and overhead lines.
Lighting systems for sites.

(*o*) EXCAVATIONS
Elementary soil mechanics.
Introduction to timbering.

Methods of timbering.
Precautions while timbering.
Removal of timbering.

(*p*) DEMOLITION
Appreciation of safe methods of work and principles of demolition.
Competent supervision.
Prevention of accidental collapse.
Use of shoring.
Disposal of debris.
Overloading floors.
Protection of public.

(*q*) ACCESS AND PLACE OF WORK
Scaffold materials and basic rules.
Hazards connected with use of ladders.
Faults in ladders.
Maintenance and inspection.
Types of scaffold—putlog, independent, cantilevered, birdcage, slung and suspended.
Frame scaffolds.
Overloading.
Elementary calculation of permitted loading.
Work on pitched and flat roofs.
Fragile materials.
Openings in walls and floors.
Use of safety belts and nets.
Special scaffolds for particular applications.

(*r*) CRANES AND OTHER LIFTING MACHINES
Appreciation of hazards and accident prevention methods connected with use of different types of crane and excavator.
Importance of regular maintenance and inspection.
Competence of driver.
Access to cranes.
Special precautions connected with rail mounted cranes.
Importance of correct signalling.
Erection of hoists, passenger and goods and protection of hoistways.
Importance of regular maintenance and inspection.

(*s*) LIFTING TACKLE
Slings, single and multi-leg.
Charts of safe working loads.
Properties of ropes, fibre, synthetic fibre and wire.
Methods of jointing or splicing ropes.
Different types of chain, wrought-iron, mild steel and high tensile.
Safety Hooks and eyebolts.
Appreciation of hazards connected with the use of chains, ropes and other lifting tackle.
Common causes of failure—corrosion, overloading, fatigue, lack of maintenance.
Importance of regular maintenance and inspection.
Necessity for system of identification and recording results of inspections.
Site and depot storage of lifting tackle.
Correct slinging methods.

(*t*) HEALTH AND WELFARE
Hazards to health on site.
Dust, gas, fumes, dangerous substances.
Protective clothing.
Health problems associated with the employment of youths.
Medical examinations.
First Aid.
Washing facilities, Toilets, Stretchers and Ambulances, Arrangements with Doctors and hospitals.
Site first aid.

(*u*) COMMUNICATIONS
Effective methods of communicating.
Securing the right reaction.

Avoidance of jargon.
Suppression of annoying personal traits.
Public speaking.
Method and preparation of reports.
Methods of obtaining clarity and simplicity in reports and all communications.
Safety committees and conferences.
Chairmanship.

(*v*) TRAINING IN ACCIDENT PREVENTION
Assessing the needs of the company.
The training needs of management, supervision, technicians, and operatives.
Problem of the new entrant.
Appreciation of job and skills analysis.
Introduction to programme planning.
Preparation of syllabus.
Evaluation of training.

(*w*) TECHNIQUES OF INSTRUCTION
The learning process.
Instruction and demonstration techniques.
The Lecture.
The Lesson.
Group discussion.
Syndicate work.
Lesson preparation.
Visual aids.

(*x*) METRICATION
Metrication programme.
Problems to be faced.

(*y*) SAFETY ORGANISATIONS
I.I.S.O.
Ro.S.P.A.
B.S.C.

(*z*) VISITS AND REPORTS
(*aa*) PROJECT
Discussion of reports of project period.

(*bb*) INTRODUCTION, BRIEFS, REVIEWS AND INFORMAL DISCUSSIONS

APPENDIX IV

BROOKLANDS SCHOOL OF MANAGEMENT AND BUSINESS STUDIES

SAFETY OFFICERS DAY RELEASE COURSE

SUBJECT

DAY 1

Development of Factory Law.
Factories Act 1961.
Supporting Legislation to Factories Act 1961.
Offices, Shops and Railway Premises Act 1963 and supporting legislation.

DAY 2

Petroleum Act 1928 and supporting legislation.
Explosives Acts 1875 and 1923 and supporting legislation.
Highly Flammable Liquids, etc., Regulations 1972.
Mines and Quarries Act 1954 and supporting legislation.
Mines and Quarries Act continued.
Radioactive Substances Act 1960.
Ionising Radioactive (Unsealed Radioactive Substances) Regulations 1968. Ionising Radiations (Sealed Sources) Regulations 1969.

DAY 3

Powers of H.M. Factory Inspectorate Prosecution Procedure.
Agriculture (Safety, Health and Welfare Provisions) Act 1956 and supporting legislation.
Fire Precautions Act 1971.
Common Law.

DAY 4

Toxicity, MAC, TLV, Testing for toxic atmospheres. Ergonomics.
Industrial Noise: pressure levels, frequency, audiometry, protection, attenuation, law relating to nuisance and injury.

DAY 5

Dust control, exhaust ventilation. Detection. Personal protection.
Industrial disease, pneumoconiosis, dermatitis.
Entry into confined spaces and dangerous atmospheres. Explosion reliefs and suppression, flame proof equipment.

DAY 6

Human behaviour, motivation, effects of environment.
Principles of accident prevention, accident prevention policy, damage control, total loss control.

DAY 7

Accident statistics, presentation sampling, deviation, correlation.
Cost of accidents.
Work in compressed air—The Work in Compressed Air Special Regulations 1958.
Pressure vessels, steam and air receivers, boilers, compressed gas cylinders, safety in testing.

DAY 8

Principles of guarding, types of guard. Power Presses Regulations 1965.
Safety in welding and flame cutting.
Crane lifting appliance and lifting trackle (gear) safety.
Clearance and Permit to work systems.

DAY 9

Training for Accident Prevention.
Techniques of Instruction and Communications.
Fire: nature of fire, fire prevention, control, alarms, flammable substances, storage, static electricity.

DAY 10

Electrical Safety: elementary circuit theory, earthing and earth leakage protection, wiring faults, portable electrical equipment, low voltage supplies, danger of overhead lines, electric shock.
Electricity Regulations 1908 and 1944.
Personal protection and equipment.

APPENDIX V

GLASGOW COLLEGE OF BUILDING AND PRINTING

66 North Hanover Street, Glasgow, G1 2BP.
Department of Building Technology and Administration.
Enquiries to J. Hewitt, L.I.O.B., M.I.I.S.O., Course Tutor.

INDUSTRIAL SAFETY AND FIRE PREVENTION COURSE

Objectives

This course has been designed:

to give a systematic approach to industrial safety, accident prevention and fire prevention;
to create the desire to improve safety records, as a means of improving departmental efficiency;
to improve understanding of the various roles that Management, Unions and workers play in communicating safety "awareness" throughout an organisation; and
to increase awareness of Statutory and Common Law responsibilities.

Entry Standards

This course will be particularly suitable for anyone who earnestly desires to improve his knowledge of the broad basic principles of Accident Prevention, the Factories Act and Allied Legislation.

Course Content

Basic Principles of Accident Prevention.

Fire Protection—Prevention—Fire Fighting Detection, Automatic systems, Legislation on fire.
Factories Act 1961 and Allied Legislation.
Inspection of Plant and Premises.
Principles of Guarding.
Statutory Examinations.
Dust and Fumes in Factory Atmospheres.
Noise in Industry.
Permit to Work and Lock out Procedures.
Appreciation of Common Law and Statutory Law.
Accident Investigation.

APPENDIX VI

MIDDLESEX POLYTECHNIC

The Burroughs, Hendon, London, NW4 4BT.
Department of Management and Business Studies.
Enquiries to Dr. R. W. L. Howells.
Courses Offered:

(1) **Institute of Personnel Management: Postgraduate Diploma: Optional Subject: Occupational Safety:**

Approximately four hours of teaching per week over three terms are given in this subject.

(2) Higher National Diploma in Business Studies Third Year Optional Subject: Safety and Health at Work:

This subject is not offered at the moment at the College, but was drafted here at the request of the D.E.S. It is likely that it will be offered at this and other Polytechnics in the future.

(3) Occupational Safety in other Business and Management Courses at Middlesex:

A review of existing Management and Business Studies courses is now under way, with a new inclusion of some safety content following the lines of the Robens Report, para. 392.

PERSONNEL MANAGEMENT

Full-time Course

OCCUPATIONAL SAFETY

AIMS

The aim of the course is to offer an introduction to the basic disciplines involved in the occupational safety field, with the object of equipping the student to take a part in the management of this increasingly important aspect of employment services.

The main emphasis will be placed upon those aspects of the problem which are closely related to the personnel management function and in particular upon:

(a) the behavioural and environmental aspects of hazard identification and elimination;
(b) the quantification of the occurrence of hazards, mishaps and accidents and their elimination;
(c) the legal constraints upon safety activity.

Attention will also be paid to the principal scientific and technical aspects of accident and health hazards, and their elimination. While the course aims to provide a basic understanding of the occupational safety function for the student seeking a career in the mainstream of personnel management, it will also provide a basis for those wishing to specialise in occupational safety, in conjunction with an appropriate technical qualification.

TIME ALLOCATION 132 hours.

SYLLABUS

Psychological Aspects of Safety and Accident Causation

The psychological factors inherent in accident prevention, relating both to the working environment and the individual.

1. PERSONALITY FACTORS AND "ACCIDENT PRONENESS". Accidents and tests of verbal intelligence, mechanical aptitude and reaction time.

Accidents and measures of extraversion. Reactive inhibition and vigilance problems. Can the concept of "accident proneness" be justified?

2. RISKS INHERENT IN WORK. The skill of the worker. Environmentally controlled and pre-programmed modes. Design failure in information and central equipment.

3. WORKING-SOCIAL ENVIRONMENT. Accidents as a means of withdrawal. Accidents in relation to illumination factors, temperature and humidity, noise, age, working hours, monotony, pace, fatigue. The role of the supervisor.

4. ACCIDENT DEFINITION. What is an accident? The collection of data. Problems in the application of statistical analysis.

5. THE OCCUPATIONAL PSYCHOLOGIST AND SAFETY IMPROVEMENT.

(*a*) *Selection.* Age; skill; physical capacities.
(*b*) *Training.* Skilled performance and safety. Safety propaganda. Problems in changing attitudes.
(*c*) *Ergonomics.* Reducing stress and fatigue. Man-machine systems.
(*d*) *Working conditions.* Illumination, temperature and humidity, noise, hours, pace.

The Quantification of Hazards

The statistician's and the accountant's view of the factors involved in occupational safety, including human injury and disease, damage to equipment, loss of production, lost time, potential causes of harm, and their elimination.

A. The statistical identification of hazard.

Statistics of mishaps and accidents, including a critical analysis of the current official statistics available in the U.K. A comparison of U.K. statistics with those of the U.S. Department of Labor. The use of accident statistics within the company, both statutory and non-statutory. An indication of the methods and scope of the mathematical theory of accidents.

B. The costing of hazards and their elimination:

1. Costing.
Introduction—cost centres and codes. Costing systems.
Materials—purchase, storage and issue. Bases for pricing.
Labour—methods of remuneration.
Overheads—allocation and absorption.
2. Depreciation—theory and methods.
3. Budgetary control. Co-ordinated decision-making within the firm.
4. Marginal costing as a decision-making device.
5. Capital project evaluation—methods of investment appraisal including the effect of tax on such decisions.
6. Sources of finance. Long and short term—including "plough back".
7. Lease or buy decisions.

The Legal Constraints in Occupational Safety

The law relating to the prevention of accidents and health hazards, and the compensation of those injured, with particular reference to the current occupational safety codes and legal standards of practice.

1. *Historical Introduction to Law of Occupational Safety.*

(*a*) *The problems created by the Industrial Revolution:*
Dangerous trades and unrestricted employment.

(*b*) *Legal remedies available:*
The common law: contract, tort and crime. Statutes of the Realm. Public opinion, judges, juries and legislators.

(*c*) *Contract:*
Freedom of contract.
Absence of criminal sanctions.
Unequal bargaining power and oppressive conditions of employment.
Volenti non fit injuria.
Truck.
The necessity for statutory intervention.

(*d*) *Tort:*
Development of vicarious liability. Employer's personal duties. Some powerful defences.

(*e*) *The criminal law:*
Important role of Coroners' inquests. Sunderland Society 1812.
Reluctance of juries to convict. Acts of omission and commission.

(*f*) *Statutes of the Realm:*
The precedent established. Health and Morals of Apprentices Act 1802.
Mines and Collieries Act 1842.
Progress through influence of public opinion: inspectors and their reports.
Accident investigation and statistics.
Disasters and inquiries. Royal Commissions. Court proceedings.

(*g*) *Problems of enforcement:*
Traditional court attitudes. Growth of strict liability.
Vicarious criminal responsibility.

(*h*) *The development of industrial safety legislation in the 20th century:*
The Gresford Disaster 1935. The Royal Commission on Mines Safety, 1938.
The Mines and Quarries Act 1954.

(*i*) *The Gowers Report and the completion of legislative protection:*
Agriculture (Safety, Health and Welfare) Act 1956.
Railways (Prevention of Accidents) Act 1900.
Offices, Shops and Railway Premises Act 1963.
Mines and Quarries Act 1954.
Factories Act 1961.

2. *Common Law Standards of Occupational Safety*

(*a*) *Basic duty of care at common law:* rule in *Wilsons & Clyde Coal Co. v. English.*

(*b*) Common law standards in accident compensation, and statutory standards in accident prevention, contrasted.

Fault liability and social responsibility as expressed in the civil and criminal law.

(*c*) Development of concept of "negligence" in employer's liability and comparable relationships.
Standard required of the "reasonably well-informed member of the occupation, profession or trade".
The courts the final arbitrator of the standard.
Actual and constructive knowledge.

(*d*) "Personal" and "vicarious" liability: servants, agents and contractors.
Employers Liability (Defective Equipment) Act 1969.

(*e*) Safe systems of working, and problems of discipline.

(*f*) A positive safety policy at common law.

3. *Statutory Safety Codes*

(*a*) *Principles of the Factories Act* 1961, *and Regulations:*
Safety, health and welfare requirements. Application of the Code. Persons protected. Enforcement.

(*b*) The Mines and Quarries Act.

(*c*) Offices, Shops and Railway Premises Act.

(*d*) Minor safety legislation.

Technical and Scientific Aspects

The practical aspects of hazard identification and elimination in selected scientific and technical areas. These will be drawn from the following mechanical, electrical, chemical and scientific topics, and will include some practical exercises in accident investigation and reporting.

A. *Scientific*

A discussion of basic toxicological hazards likely to be met with in industry and agriculture. Emphasis will be given to modern methods of controlling the toxic environment.

Personal protection against toxic gases, particulates, dusts and mists. The hazards arising from the use of high pressure equipment of all kinds in industry.

Radiological hazards.

B. *Mechanical*

Fire and explosion; pressure vessels; lifting equipment; machine guarding; internal transport; noise and the environment; compressed gases; pressure vessels; systems of work.

C. *Electrical*

Analysis of accidents in relation to voltage; shock and burns; electrical installations; earthing; portable apparatus; fire hazards; maintenance; safety in electrical testing.

APPENDIX VII

IMPERIAL COLLEGE

Prince Consort Road, London, S.W.7.
Department of Chemical Engineering and Chemical Technology.
Enquiries to Dr. D. H. Napier.

M.PHIL. AND PH.D. SYLLABUS

Industrial Safety

A full-time course, commencing in October and extending over twelve months, consisting of lectures, tutorials and research.

The course is mainly concerned with the scientific principles and engineering aspects underlying both hazards in industry and methods employed to produce safe conditions. Consideration is also given to those more general aspects of industrial operations that bear on safety and can be used to influence the state of the working environment.

There are about 160 lecture hours in the course and participants may be required to take such of the short combustion courses as are relevant.

Each student undertakes a research project which may usually be continued for a further two or more years, leading to the award of a M.Phil. or Ph.D. degree in accordance with the regulations of the University of London.

(The courses marked † are short courses and may be taken separately from the full-time course.)

General aspects of industrial safety

About 15 lectures.

Legal considerations; relevant principles of insurance; economics; accident statistics; hazard analysis; ergonomics; psychology; safety services, equipment and information; organisation for safety; reliability engineering.

Ignition of gases†

8 half-day sessions in 1 week of the autumn term.

Spontaneous ignition of gases; composition ranges of ignitability; ignition by local thermal sources; ignition by electrical discharges; practical applications to the ignition hazard.

Gas explosions†

6 half-day sessions.

Ranges of flammability; decomposition explosions; development and spread of explosions; control of spread and effect; explosimetry and gas freeing of plant.

Fire hazard of materials

6 lectures.

Ignition and burning of liquids; spontaneous combustion, ignition and burning of solid and particulate materials.

Fire hazard of buildings and their control†

7 half-day sessions in 1 week of the spring term.

Principles of combustion; development and spread of fire in and between buildings; detection of fires; fire extinguishment; burning of elements of structure.

Toxic hazards†

8 half-day sessions.

Review of hazards; classification of toxic materials according to site of primary contact and physiological response; asphyxiation; quantitative toxicology; methods of confinement; cleaning of contaminated air streams; sampling, detection and estimation of poisons.

Corrosion and protection

10 lectures.

Relevant electrochemistry and survey of electrochemical systems; commonly occurring forms of corrosion and systems of protection; influence of corrosion on failure mechanisms; cathodic and anodic protection.

Electrical and environmental hazards

8 lectures.

Electric shock and protective devices; noise and vibration; hazards of operations involving low and high temperatures and pressures.

Dust and mist explosions†

8 half-day sessions.

Ignition and flammability of dusts and mists; combustion of single particles and collections of particles; control of dust explosions; dust explosion testing.

Atmospheric pollution and environmental studies

About 10 lectures.

Air and water pollution; measurements of pollution and their analysis; odour.

Static electricity and explosion hazards†

4 half-day sessions.

Practical systems; electrical double layers; measurement of static electrification. Charge generation (i) by moving liquids (ii) at solid surfaces, and (iii) in particulate systems.

Hazards of large scale operations†

7 half-day sessions.

Combustion of bulk quantities of solids and liquids; dispersion of gases in the environment; hazards in large-scale chemical plant; hazards in large buildings and stores.

Aspects of design relating to fire and explosion in the chemical industry†

Summer school lasting 9 days.

Broad consideration of fire and explosion in the chemcial industry set against a background of fundamental considerations, in relation to: electrical equipment for general use and for use in flammable atmospheres; fire detection; extinguishants; storage of materials; suppression and relief behaviour of materials; protection of structures; fire preplanning.

Combustion of gases†

13 lectures in one week at the beginning of the session.

Radiological protection

10 lectures in the autumn term.

Disposal and transport of radioactive materials

3 lectures in the autumn term.

APPENDIX VIII

UNIVERSITY OF ASTON IN BIRMINGHAM

Gosta Green, Birmingham, B4 7ET.
Safety and Hygiene Group.
Enquiries to Course Tutor.

M.SC. COURSE IN OCCUPATIONAL SAFETY AND HYGIENE

The Safety and Hygiene Group

The Safety and Hygiene Group has been set up at the University of Aston in Birmingham to take a leading part in the development of Safety and Hygiene as an academic discipline.

The Group's members at present represent building science, chemistry, engineering, information science, medicine, physics, and psychology. There is access to all the other disciplines represented in the University. Through its visiting staff, advisers and external and internal examiners the Group is in touch with key interests in the safety world such as H.M. Factory Inspectorate and other government bodies, research establishments, insurance companies as well as the safety profession in industry.

The Group's research interests are expanding rapidly—at present these include accident statistics, acoustics, economics of safety, personal protection, safety inspection, and subjective risk and objective hazard.

The Group's teaching, apart from the M.Sc. in Occupational Safety and Hygiene, includes specialist short courses and lectures for industry and lectures to various Departments within the University of Aston in Birmingham, and other universities.

The Group works closely with industry in teaching, research and consultancy. This ensures that the Group as well as industry is kept abreast of developing knowledge in practical and theoretical fields. Contacts have been established with a number of companies, large and small.

Safety and Hygiene as an academic discipline

Until recently, safety has not been an academic subject for study in its own right. Rather, safety has been looked upon as a benefit which comes automatically from, say, good engineering. Hence academic knowledge of safety is scattered through engineering, and the physical, biological and social sciences.

There is increasing awareness that safety, i.e., absence of danger, should be a fundamental and not just an incidental consideration in technology. Hence there is a call for knowledge specifically about safety and hygiene—which requires that the two should be researched and studied as a unified academic discipline.

Lord Robens referring to the establishment of the Chair in Safety and Hygiene at Aston said, "This new development should help to encourage at academic level a more integrated approach to the multi-disciplinary study of occupational safety and health, as well as providing facilities for advanced study by 'working practitioners' such as inspectors and safety officers."

The unifying concept for safety and hygiene is danger. This is met across the spectrum of technology and human behaviour. There is danger wherever failure of machines, materials or structures carries the possibility of harm (injury, disease or damage) to people or things; and wherever human actions can lead to such harm.

M.Sc. in Occupational Safety and Hygiene

The Course leading to the degree of Master of Science of the University is intended for people at present concerned with any aspects of occupational safety and hygiene, or about to enter the general field. The Course will also be of value to people who do not intend to devote the whole of their careers to safety and hygiene, but for whom the control of danger will be a continuing responsibility.

Minimum requirements are:

(*a*) the B.Sc. Degree of the University; or
(*b*) another approved degree; or
(*c*) a qualification accepted by the Senate as equivalent to (*a*).

Students will normally be expected to have some practical experience of work in industry.

Aims of the Course

The Course aims to equip the student for a responsible position in the expanding field of safety and hygiene, in which he will have to advise management on a wide range of complex technical and human problems. He will have the knowledge to predict and assess the hazards to health and safety present in a wide range of situations, and to suggest, from his own knowledge, or in conjunction with experts in other disciplines, ways of combating the hazards.

This knowledge will come from the study of the whole field of safety and hygiene as an integrated academic discipline. The Course aims to provide a sound theoretical background, insight into the application of theory to prevention, and practical knowledge of the measurement of hazards and research into their causes.

Outline of the Course

Duration and pattern

The Course will last four terms, extending over twelve months. Candidates will normally take these terms in the course of one year, but eventually it is hoped that provision could be made for candidates who cannot leave their work for twelve months to take the Course on a part-time basis over a period not exceeding four years.

The Course will consist of three terms of lectures, practical work, tutorials, and private study with written examinations at the end of the third term. During these terms the students will make preparations for the project, to be undertaken in the fourth term, which will be the subject of their dissertation. The project gives the student the opportunity to apply his knowledge to a particular problem. Problems are chosen for which no immediate solutions exist. They can be selected from a wide area to suit the interests of the students, but all of them will have some practical implications.

Syllabus

1. Human Safety and Hygiene

This section deals with the effects of the physical working environment on human functioning, and with occupational disease.

- (i) The normal working and structure of the human body systems.
- (ii) The effect on body systems of adverse environments: excessive noise, heat, radiation, toxic agents, dust, etc.
- (iii) The measurements of the environmental factors.
- (iv) Control and personal protection.

2. Safety Engineering

This section deals with danger arising from machinery, materials and processes and the control of the danger.

- (i) Machinery and structural reliability:
  Basic strength of materials, failure mechanisms, life prediction and reliability assessment, reliability statistics, non destructive testing, inspection for safety, stability of scaffolding and excavations.

(ii) Machinery safety:
Danger identification, machinery guarding, kinematics of safety mechanisms, ergonomic design of equipment.

(iii) Factory safety:
Design of production systems, systems theory, factory layout, safe access and escape.

(iv) Engineering environmental control:
Ventilation engineering, noise control, electrical safety, fire and explosion control, chemical process control.

3. Human behaviour and safety

This section deals with danger due to the limitations of human performance, and the role of the human factor in accident causation.

(i) Normal human behaviour:
Perception, memory, decision making, skills, attitudes, motivation, behaviour in groups, measurement of behaviour and abilities.

(ii) Human behaviour and accidents:
Risk taking, human factors in accident research, theories of accident causation, stress and performance under adverse conditions.

(iii) Control of behaviour:
Selection, learning and training, propaganda, motivation and sanctions.

4. Measurement, Management and Control

This section deals with the establishment of the degree and cause of danger, and the organisational and institutional methods for its control.

(i) Measurement of danger:
Accident measures, morbidity and mortality data, epidemiology, descriptive and inferential statistics, accident costing, safety inspections and audits.

(ii) Company organisation:
Organisational structures; management theory; safety and health in the company; the role of the safety adviser, company medical services, safety committees, loss control.

(iii) Legal control:
Statute and common law, safety legislation in this country and in other countries, the role of government inspectorates.

All enquiries and requests for application forms should go to:

M.Sc. Course Tutor,
Safety and Hygiene Group,
University of Aston,
Gosta Green,
Birmingham B4 7ET

APPENDIX IX

UNIVERSITY OF ASTON IN BIRMINGHAM

Diploma in Safety and Hygiene

Aims of the Course

To prepare people for work with government safety and health inspectorates.

Background to Starting the Course

Experience with the M.Sc. in Occupational Safety and Hygiene shows that there is a need for additional courses with the same syllabus, but with a vocational orientation. A Diploma is an appropriate award for vocational courses.

Entrance Qualifications

The minimum requirement is a good Higher National Diploma or qualification accepted by Senate as the equivalent. Candidates will normally be employed as government safety and health inspectors.

Outline of the Course

Duration and Pattern: the course will run for two terms. There will be two courses each academic year; one will start early October the other will start in early January.

The courses will overlap during the period January to March. During the overlap period the courses will not normally be combined except when visiting speakers cover topics of general interest.

Structure: The course is structured within four main subject groups.

1. *Human Safety*

This part concentrates on the effects of adverse environments on the human body. The section also covers the measurement of the environment and the extent to which personal protection can be relied upon to combat the adverse environment. The subject areas covered are:

(*a*) The normal working of human bodily systems, anatomy and physiology: Structure function and occupational disorders of the respiratory system; cardio-vascular system; blood forming organs; central nervous system; musculo-skeletal system; digestive and excretory system.

(*b*) The effects of adverse environments: Fundamental mechanisms of tissue and biochemical injury by energies, toxins and certain microbiological agents. Specific effects of: heat, humidity; noise; vibration; infra-red, ultra-violet and laser radiations; X-ray and radioactive ionising radiations; toxic agents; carcinogens; fibrogenic dusts; toxic metals; solvents; sensitisers; other categories of toxic chemicals.

(*c*) Measurement of adverse environments, occupational hygiene: Dose-response relations; critical appraisal of the assumptions underlying "safe levels"; exposure sampling techniques; selected topics in physics and chemistry relevant to the detection and measurement of adverse environments; limitations of the equipment used for monitoring environments; practical training in the use of monitoring equipment.

(*d*) Personal protection:
Theoretical and practical limits to the use of protective clothing; estimation of the proportion of wearers not protected; laboratory testing of personal protection; ergonomic considerations in the selection of protective equipment.

2. *Safety Engineering*

This part is concerned with failures of materials, machines, processes and structures which cause immediate danger of accidents, or the release of harmful agents. The aim of the section is to enable people to foresee danger both at the planning stage of projects and in existing situations, to quantify the danger and to understand the principles involved in reducing or eliminating the danger. The subject areas covered are:

(*a*) Machinery and structural reliability:
Basic stress and deformation analysis; failure mechanisms; creep, corrosion, fatique, brittle fracture, ductile fracture; component and structural safe-life predictions, reliability statistics; non-destructive testing methods; elements in the design and inspection of pressure vessels and lifting equipment; failure case studies; relevant legislation, regulations and codes of practice.
Electrical safety: fail-safe circuit design, intrinsic safety, flame proofing.

(*b*) Machinery safety:
Application of objective/subjective risk criteria to machinery danger; mechanical danger analysis; methods of safe-guarding machinery: fixed, interlocked, automatic, trip and distance guards, safety systems; kinematics of safety mechanisms; fail-safety, considerations of operator abuse and misuse, maintenance; ergonomic and systems design; relevant legislation, regulations and codes of practice.

(*c*) Engineering environmental control:
Ventilation engineering: dust control; extraction systems, fume control.
Noise control: mechanical vibrations; noise radiation, air and structure-borne pathways; noise absorption, damping, insulation, isolation, noise control at source; design of enclosures and close shields.
Control of fire and explosion dangers:
Aspects of chemical process control:

(*d*) Elements of construction safety:
Scaffolding; excavations; falsework; lifting; tunnelling; compressed air; demolition; temporary structures.

3. *Human Behaviour*

This part concentrates on the ways in which people take in, store, process and act on information. The aim of the section is to give a coherent account of inherent limitations of these functions and the ways in which human performance is affected by environmental, personal and social factors. The subject areas covered are:

(*a*) Normal human behaviour:
Functions and limitations of visual and auditory perception; attention;

learning; decision making; attitude formation; human skills; fundamentals of personality.

(*b*) Behaviour and errors:
Effects of fatigue, stress and environmental conditions on performance; risk taking; human error; work physiology; theories of accident causation (including proneness) correlation and epidemiological studies; ergonomic and psychoanalytic explanations.

(*c*) Control of behaviour:
Selection; propaganda and attitude change; ergonomics, interface and workspace design.

4. *Management and Legal Control*

This part concentrates on the organisational and legislative methods available for combating and controlling danger. The section also covers the mathematical tools available for the description and analysis of danger.

(*a*) Group behaviour:
Management organisation; management objectives; problem solving and the use of system analysis; securing efforts, formulating purpose; satisfaction and motivation; committees; project management; formal and informal status; attitude change; group theory; leadership; organisational change; personnel and selection; training; industrial relations.
Legal structure; civil and criminal law; sources of English and Scottish law; organisation and function of the courts; the Factories Acts; employers' common law duties towards employees; employers' statutory duties—safety, health and welfare; National Insurance (industrial injuries) scheme; the law relating to safety at work in other countries; the proposals for future safety and health legislation.

(*b*) Company safety and health organisation:
Accident data collection and analysis—uses of statistics; statistical inference; non-parametric tests; freouency and probability distributions; binomial and normal distributions; sampling distributions; hypothesis testing about population means; sources of "official" data on safety and health; mortality and morbidity statistics; the uses for statistical data.
Safety committees; loss control and accident costing; role, function, and powers of government inspectorates; local authorities; employers' federations; trade unions; voluntary safety bodies; insurance companies; methods of influencing management; report writing.

Assessment of Students

At the end of the second term there will be four three-hour written papers followed by an oral examination at the discretion of the board of examiners. A student shall satisfy the examiners that he has reached a satisfactory standard in all of the examinations.

A student who fails to reach a satisfactory standard in one paper may be given leave by the board of examiners to sit a further examination paper at the next normal examination or earlier at the discretion of the Board of Examiners.

A student who fails to reach a satisfactory standard in the written examination and is not allowed a further paper may be given leave by the examiners to resit the whole examination at the next sitting, with or without further attendance.

All enquiries should go to
Diploma Course Tutor,
Safety and Hygiene Group,
University of Aston in Birmingham,
Gorta Green,
Birmingham B4 7ET

APPENDIX X

THE INSTITUTION OF INDUSTRIAL SAFETY OFFICERS EXAMINING AND MEMBERSHIP STRUCTURE

Conditions for Entry 1974

	Affiliate	Student	Associate Member	Member	Fellow
Minimum Age:	25 years	Any age	25 years	30 years	35 years
EXPERIENCE	Special Connection with Occupational Safety and Health	No specific requirements but a declared Intention to follow a career in Occupational Safety and Health	Mainly employed in Occupational Safety and Health for at least 5 years	Must have been an Associate Member if entry is by Member's examination *or* Mainly employed in Occupational Safety and Health for at least 2 years if entry is by an approved qualification	Member for not less than 5 years

	Affiliate	Student	Associate Member	Member	Fellow
Minimum Age:	25 years	Any age	25 years	30 years	35 years
ENTRY REQUIREMENTS	Not eligible for any other grade	Pass in an acceptable CGLI Craft Course *or* 5 GCE's or 5 Grade 1 CSE's *or* Ordinary National Certificate *or* Membership of a professional Institution by an examination graded by the Burnham Committee in category B or higher *or* Such other standards as may be accepted by Council	Pass in the Institution's examination for Associate Member *or* An Educational qualification approved by Council and awarded by Colleges, Polytechnics. Employers Associations, ITB's, National Safety Organisations etc. *or* H.N.C., H.N.D., DIP.TECH., University Degree in approved subjects *or* Corporate Membership of a professiona Institution approved by Council *or* Pass in the Factory Inspectors' qualifying examination *or* Such other standards as may be accepted by Council	Pass in the Institution's examination for Member *or* An approved qualification in Occupational Safety and Health equivalent to a University Degree	Election by Council

K. P. WHITEHEAD

The Design of an Occupational Health Department

The siting of a new medical department in any factory is largely governed by the space available. The ideal is to have a choice of site and given this it is not too difficult to achieve good results by careful thought and planning.

If possible, and especially in the larger factory, it is desirable for the medical department to be situated centrally as this will reduce to a minimum the time lost from the place of work by employees attending for treatment.

Much of the day to day work of the medical department is carried out in close collaboration with safety and personnel departments, e.g., the investigation of accidents and the interviewing of new employees, and it is therefore preferable that these departments should be in close proximity.

Care must be taken to site the medical department in a safe environment and away from hazardous plants where there is a potential danger of explosion or escape of harmful gases.

A detached building is the ideal and it is generally considered that at least certain essential parts of the department, for instance the casualty reception area, should be at ground floor level. Where a large comprehensive medical department is being planned, especially where the area of building land is limited, it is often advantageous and indeed entirely satisfactory to house the ancillary services—dental, ophthalmic and chiropody departments on a second floor.

It is sometimes found necessary to adapt a part of the business premises for use as a health department, and although this is seldom as satisfactory as a building designed and erected for the specific purpose, there are in this country many examples of first class industrial health units which have been planned on this basis. It is essential to have an outside wall with the maximum of light and ventilation and particular attention should be paid to ease of access which must allow for the convenient movement of stretchers and ambulance, and where practicable ramps should replace steps.

The external appearance of the department should be attractive yet simple in design. Maintenance is expensive and woodwork requiring painting should be kept to a minimum. Metal window frames in an industrial area, and especially in a chemical works, rapidly corrode and should be avoided. Attention to such detail at the planning stage will substantially reduce maintenance costs.

Accommodation will depend upon various factors, including the size and type of factory, the numbers employed, the volume of work to be expected, the hazards involved and the attitude of the company as to the sort of facilities which it wishes to provide for its employees.

As circumstances change, as they so often do, it may be necessary to enlarge the medical department and this possibility should always be borne in mind when carrying out the original planning.

As a guide, suitable accommodation for a medical department in a moderate sized factory—say 500 to 1,000 employees—would comprise a treatment room, a recovery room, a consulting room, a nurses' duty room cum office, a waiting room and separate male and female toilet facilities.

In larger factories where, very often, many thousands of personnel are employed some firms provide additional facilities, such as a physiotherapy department, an x-ray plant and dental, ophthalmic and chiropody departments.

Such facilities make possible an immediate diagnosis and where appropriate provide early and continued treatment on site and are responsible for a considerable saving of lost time from work by obviating the need to send employees sometimes long distances to busy hospital departments.

In factories in which there is a risk of exposure to various toxic materials and where it is necessary to carry out periodical biochemical monitoring of employees consideration should be given to the provision of a clinical laboratory.

In the interior design of a medical department the following points are worthy of note:

(1) Modern architects in this country usually favour large windows as they enhance the general appearance of a building and give a maximum of natural lighting. They also have their disadvantages. During the summer months, rooms facing south become unbearably hot and it is usually necessary to provide blinds to protect against the sun. In winter, rooms tend to be very cold and care must be taken to make sure that the heating arrangements are adequate.

Double glazing is essential if the environment is noisy.

(2) Wall decorations are largely a matter of taste. Some prefer a white egg-shell finish throughout with perhaps a little bit of wallpaper relief in selected areas such as the consulting room. Others however would favour the use of soft pastel shades.

(3) Floors should be hard wearing and non-slip.

(4) The temperature in the medical store should be maintained at about 60°F. High temperatures will result in the deterioration of some items of stock, such as elastoplast.

(5) All corners should be rounded off and all service pipes enclosed so as to discourage the collecting of dust.

(6) The treatment room should be reasonably spacious and contain the essential equipment, such as a dressing trolley, an eye examination chair, steriliser and wash basin. Ample cupboard space should be provided.

All working surfaces should be smooth, flat and easily cleaned. Stainless steel sinks are to be preferred. Enamel chips.

(7) Cupboards used for the storage of linen and uniforms should preferably be heated.

(8) In the recovery room thought should be given to the privacy of patients and beds should either be contained in cubicles or provided with curtains.

(9) In a busy medical department the layout of the accommodation must be such as to facilitate the smooth and continuous flow of patients into the doctor's consulting room and to this end it is essential—

(a) that adjacent to the consulting room there should be a pre-examination room where a nurse can record the patient's personal particulars, height and weight, visual acuity and the result of urine testing.

(b) that changing cubicles should be provided.

It has been common practice in the past to site such cubicles so that they communicate directly with both the consulting room and the pre-examination room. This is undesirable as it is difficult to soundproof these cubicles and conversation in the consulting room can be overheard by patients awaiting examination.

(10) Adequate fire precautions must not be forgotten.

For further information reference should be made to Vol. 1 of *Industrial Medicine and Hygiene*, edited by E. R. A. Merewether and published by Butterworth & Co (Publishers) Limited, London (1954).

Chapters 4 and 5, as well as dealing with the design of medical departments list the equipment which is required and consider the question of staffing and the duties of doctors and nurses employed in industry.

For more practical advice, an approach should be made to the medical officer in charge of established health services in the nationalised and private industries.

First Aid

What first-aid is

First-aid is the process of carrying out the *essential* emergency treatment of an injury or illness in order to *benefit* the casualty.

Several points in this definition require amplification. The treatment must be essential to benefit the casualty. Treating trivialities in the face of serious injuries will merely delay arrival at hospital. What can or could be done and what is essential and must be done to benefit the casualty are often different.

First-aid implies second aid. So, when first-aid has been carried out the casualty must be passed on for further treatment in hospital or by a doctor.

Two kinds of first-aid can be distinguished:

self-help—what the casualty can do for himself, and
first help—what other people can do for the casualty.

Self-help is often forgotten or ignored in teaching first-aid.

What first-aid is not

The definitive treatment of minor injuries is often mistakenly described as first-aid. Definitive treatment implies *discrimination* in the selection of injuries to be treated. In definitive treatment the casualty is not passed on for further treatment—there is no second-aid. So, this kind of treatment is not first-aid.

Selection of injuries which can safely be treated by the relatively unskilled is not easy. Puncture and stab wounds, injuries near joints, wounds near vital organs or structures, and small seemingly unimportant injuries in the head and neck areas all require careful assessment. Discrimination must be used in deciding whether they should be treated by first-aid or definitively. The main point to be made is that the level of skill and experience required to carry out first-aid is quite different from that required to discriminate. First-aid, because it implies that the casualty will be referred for treatment by a more skilled person, is easier and safer to carry out and places less responsibility on the individual supplying immediate treatment.

Legal requirements for first-aid in industry

Although the law requires that virtually all places of employment must have a first-aid box, only some are obliged to have persons trained in first-aid. Thus, whilst offices, shops and railway premises, whatever their size, are only required to have first-aid boxes, all factories employing over 50 persons must have a person who is trained in first-aid "always readily available during working hours" (Factories Act 1961, section 60). For each 150 additional employees, there must be another box and a trained first-aider. These are the only general regulations covering treatment in factories, although the Act allows for exemption to be granted by the Inspector of Factories if an "ambulance room" exists in the factory and arrangements are made for the immediate treatment there of all injuries in the factory.

A minimum standard of training for such first-aiders is also laid down, requiring a certificate of competence less than three years old issued by a recognised body such as the British Red Cross, St. John, St. Andrew, or more recently by the Harlow and Central Middlesex Occupational Health Services. Although many first-aiders with such certificates can be of the greatest value in an emergency, it would be misleading to suggest that all are as competent as this. There is a great deal of difference on the one hand between being able to apply triangular bandages on an examination "subject" and giving the correct answers in an oral test and on the other, being able to cope with a seriously injured colleague. Practically all first-aiders in industry have full-time jobs in the factory and only some of them have any vocation for first-aid.

How should first-aid be organised in industry?

Ideally, everyone should be able to do life saving first-aid—that is, they should know what to do for someone who is not breathing, who is bleeding, or who is unconscious. These emergencies can occur with extreme rapidity and can result in unnecessary loss of life. The best first-aider in the circumstances is usually the nearest person provided that he knows what to do. In some countries, Norway for example, first-aid, safety and accident prevention are taught in all schools. The benefits to the nation and to the individual are obvious. In Britain a start has been made in Southampton where all school children now have the benefit of this instruction.

Training of one kind or another in industry can have safety and first-aid tagged on. The linkage is important—part of doing a job well is to do it safely. Safety and first-aid are important subjects to be seen together: one deals with what to do to avoid personal injury and the other with what to do when a person has been injured.

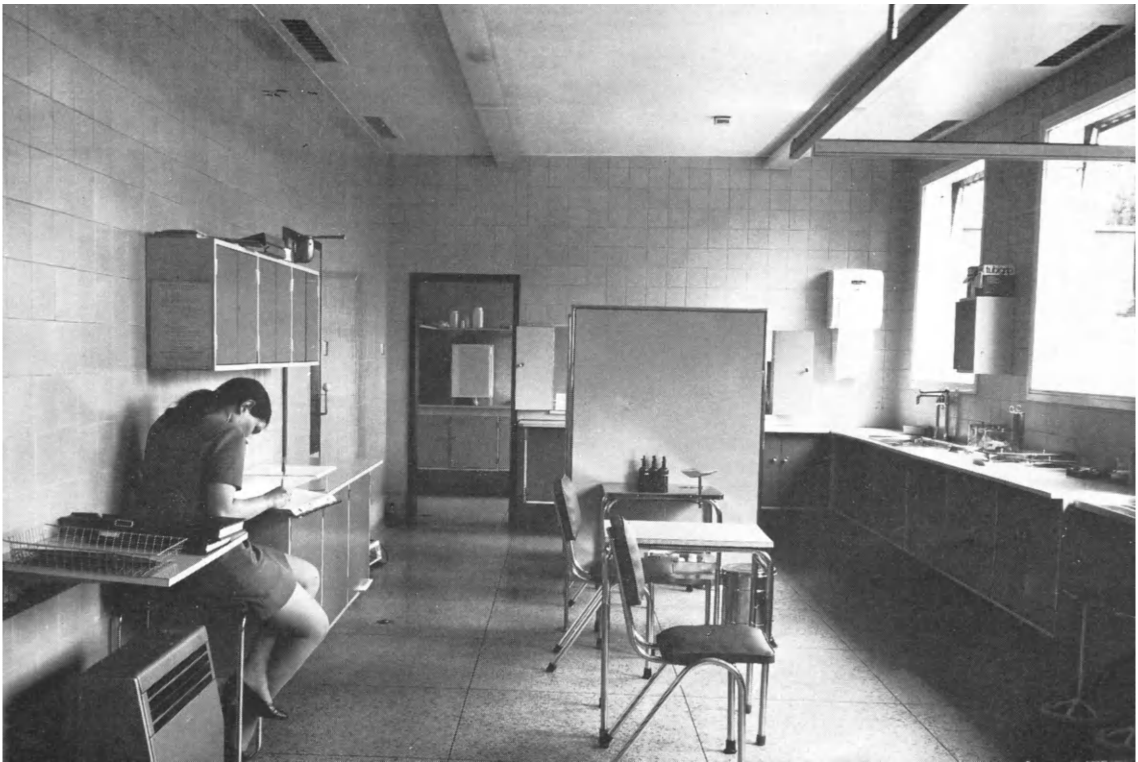
Teach life saving first-aid to everyone

Life saving first-aid is what to do for someone who is *not breathing*, who is *bleeding*, or who is *unconscious*. Everyone should be taught the simple procedures of life saving first-aid. This may seem a large undertaking but should require no more than an hour of everyone's time each year. Much of the refusal to comprehend first-aid instructions lies in the extreme difficulties of language, jargon, unnecessary detail and redundant material which are foisted on the unsuspecting public by those who should know better. Knowledge of the intricacies of the chambers of the heart and how to recognise arterial or venous blood are quite unnecessary in order to stop bleeding. Bleeding is stopped by pressing where the blood comes from and by lifting up the part in order to utilise the effect of gravity in stopping the flow. The correct treatment of an unconscious person is to place the person in the unconscious position. This is the commonest of the life saving first-aid procedures

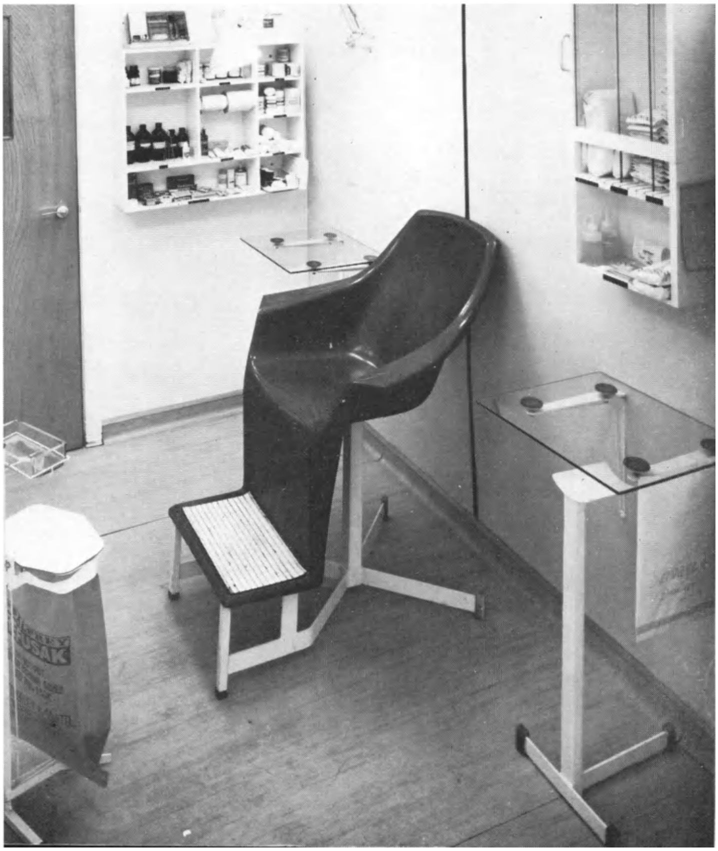
Slough Central Clinic: designed to serve 4,000 patients

SLOUGH INDUSTRIAL HEALTH SERVICE

Slough Central Clinic: interior layout



Slough Central Clinic: waiting room

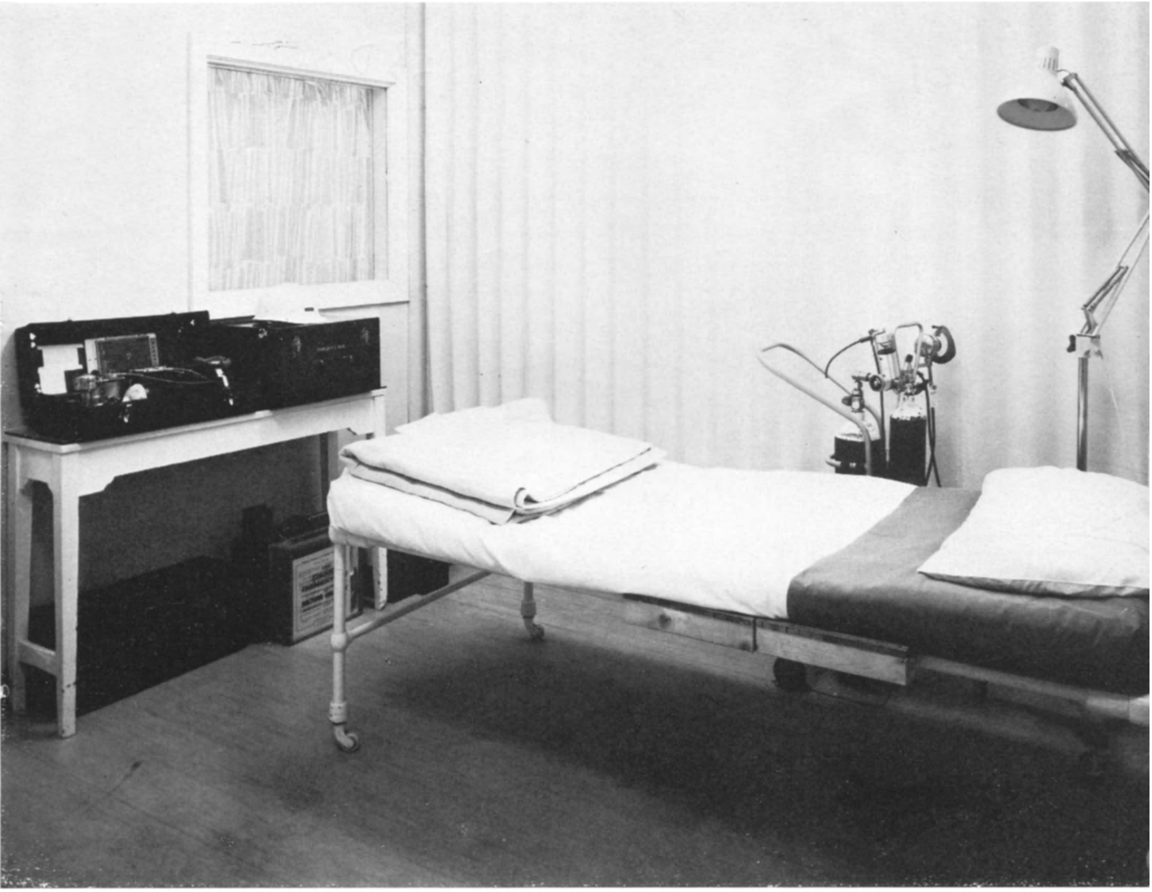


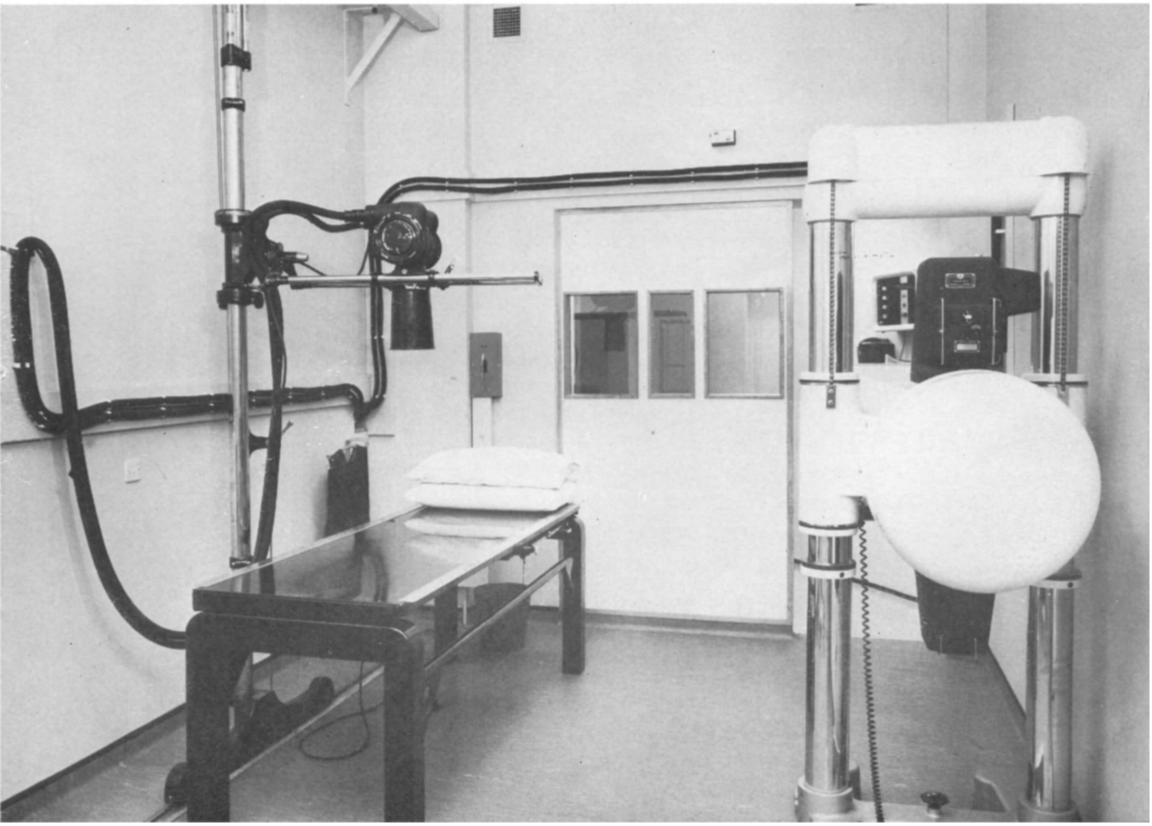
PILKINGTON'S MEDICAL CENTRE AT ST HELENS

Left: Dressing cubicle, ergonomic chair and arrangements for dressing

Above right: Resuscitation room

Lower right: X-ray room

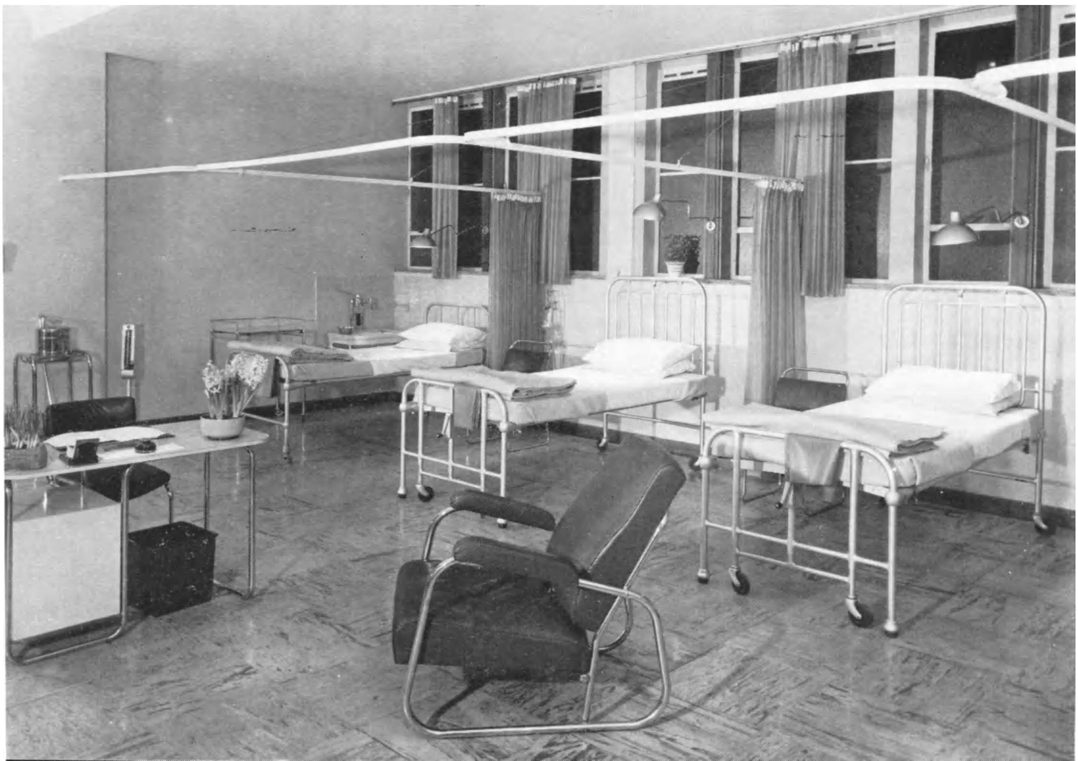




ICI'S MEDICAL CENTRE
AT WILTON

The interior of one of the treatment cubicles

Medical laboratory



required and therefore the one which has the greatest life saving potential. The use of the unconscious position can be demonstrated to a class and practised in a space of five minutes. The essential concepts of blowing air into the lungs of someone who is not breathing can be illustrated using a balloon—and the detail of getting the head well back to prevent blockage of the air passages can be shown by pinching the neck of the balloon or by using a model of the air passages.

Life saving first-aid can therefore be taught as *what to do*, swiftly and without irrelevancies, in a short space of time if only the instructor has enough discipline to confine his instructions to the matter in hand and enough skill as a teacher to interest his audience.

Life saving first-aid is far too important a matter to leave to the trained first-aider. He may not be there in time. Everyone should have the benefit of this knowledge.

How many first-aiders where?

Within any organisation the role, disposition, number and availability of first-aiders will depend on local conditions. In general, if treatment services including first-aid can be centralised, fewer people of higher levels of attainment can carry out work for greater numbers of people from better premises and with a greater degree of expertise. Dispersion, whether geographical or numerical, produces dilution of skill at every level and therefore work of poorer quality. This is an important principle. Those who organise first-aid in industry should therefore aim to have everyone trained to carry out life saving first-aid. Thereafter, as few "casual" first-aiders as possible should be used. If numbers are sufficient and if the factory is geographically compact, a nurse can be employed who will have a much higher level of skill than say six casual first-aiders. The nurse can work from suitable premises and can discriminate and carry out all definitive treatment because the only real emergencies, that is life saving first-aid, must be dealt with on the spot. Other less urgent matters can then be treated by the skilled nurse and not by the casual first-aider. The relative nearness of hospital casualty departments can also influence what is treated locally. Similarly, isolation creates a need for more local treatment.

Instructors in first-aid

Good teachers of any subject must obviously have an adequate knowledge of that subject. Many potential first-aid teachers fulfil this requirement. But good teachers must also know how to teach, how to keep their classes interested and how to impart enthusiasm for the subject to those who are to be taught. Some of this can be learned, but a part also depends on qualities like personality which cannot be taught and must be accepted. Anyone who has to select teachers should be specially concerned with the personality and other qualities of the candidate. The technical knowledge can easily be acquired by anyone who has the necessary intelligence and wants to teach. But the personal qualities must be there from the start.

The first-aid organisations run instructors' courses for those who have suitable basic qualifications. Local ambulance training schools operate courses which may be suitable in part, and technical colleges often organise evening classes in first-aid at normal and advanced levels.

Holding a medical or nursing qualification does not automatically mean that these doctors or nurses are good instructors—like everyone else, they have to learn how to teach. But from the doctor or nurse, enthusiastic do-it-yourself teaching will usually produce an excellent response in any class. Anecdotes are a valuable way of reinforcing instruction provided that they are relevant and not used just for the laugh or the story.

Selecting people for training in first-aid

Potential first-aiders should if possible be selected from those of stable personality who express themselves as willing to be instructed by supervision and management. Those selected should have no job to do in any emergency which is more important than the job of first-aid—otherwise they may not be available to do first-aid. If possible some incentive should be offered—money being the usual one, but other attractions could no doubt be devised.

Basic training for first-aiders

The importance of determining whether people to be trained will be expected to do first-aid only or will also be required to carry out the definitive treatment of minor injuries and the sorting out and treating of minor illnesses is essential. Additional training will obviously be required for those who will be expected to discriminate between the seriousness of injuries and illnesses. Pure first-aid training can be divided into two parts:

theoretical instruction, which can be given in large groups;
practical instruction, which must be given in small groups.

The average duration of a basic course in first-aid is about 12 hours: 5 hours of lectures, 5 hours of practical work, with 2 hours for questions and revision at the end. Detailed schedules are given in most first-aid books.

Additional time must be allowed if it is necessary to train people to deal with special hazards.

Refresher courses in first-aid

Knowledge changes with time and new concepts and methods evolve. There is a need to stay ahead, or at least abreast, of what is new—so refresher training is essential if fossilisation is to be avoided. The aims of any refresher training should be both to update and to stimulate. Without enthusiasm little will be accomplished on a long term basis.

Examining in first-aid and first-aid certificates

To be an examiner presupposes an adequate knowledge of the subject in both theory and practice. It also involves having clear perception about priorities—marks should be given for saying or doing the right things and for ignoring trivialities in the face of life threatening conditions. What can or could be done is not the same as what must or should be done. Principles are more important than a slavish following of what any particular manual of first-aid says. Examiners are usually provided with a suitable schedule of questions by the society for which they are examining. A balance should always be struck between practical or oral work—both are required. It is often a good idea to examine in pairs, one person supervising the practical work and the other carrying out the oral examination.

Certificates in first-aid are awarded by:

St. John Ambulance Association, 1 Grosvenor Crescent, London, S.W.1. Tel. 01-235 5231.

British Red Cross, 9 Grosvenor Crescent, London, S.W.1. Tel. 01-235 5454.

St. Andrew's Ambulance Society, 1 Woodland Terrace, Glasgow, C.3.

Harlow Industrial Health Service, Edinburgh Way, Harlow, Essex. Tel. Harlow 22377.

Selected book list

The list of books given below in this chapter is neither exhaustive nor complete. It is not the intention to burden the reader with such a list. The wiser course is probably to pick out valuable texts and useful visual aids rather than to present an avalanche of unselected material from which the reader has to try to make a choice. Perusal of the books recommended will lead the interested reader, should he so wish, into wider fields.

Principles for First-aid for the Injured (1968), H. Proctor and P.S. London, Butterworths, London.

An excellent book, the result of much experience. Should be read by all who instruct in first-aid.

Teaching First-aid (1970), (Ed.) Stanley Miles and Peter J. Roylance.

Written for the Medical Commission on Accident Prevention to provide an authoritative text in this field.

New Essential First-aid (1972), A. Ward Gardner and Peter J. Roylance. Pan, London.

Probably the clearest first-aid text for use by teenagers and adults. Free of frills and jargon.

First Aid (1973), The authorised manual of the St. John Ambulance, St. Andrew's Ambulance Society and the British Red Cross Society (addresses above). Contains much redundant material. Maintains a sound but traditional approach to the subject.

New Advanced First-aid (1969), A. Ward Gardner and Peter J. Roylance. Butterworths, London.

For those including doctors, nurses and first-aiders who wish to increase their range and depth of knowledge.

Hazards in the Chemical Laboratory (1971), (Ed.) G. D. Muir. The Royal Institute of Chemistry, London.

A useful text which contains sections on first-aid, both in general terms and related to specific chemical hazards.

Training aids

A number of aids are available from the St. John Ambulance, British Red Cross Society and St. Andrew's Ambulance Society (addresses given above). The Ambu Mannikin is a useful training aid for artificial respiration and for heart compression. It is available from

Ambu International (U.K.) Ltd., Brinksway Trading Estate, Brinksway, Stockport, Cheshire.

Audio-visual aids

Useful audio-visual aids, including films, film strips, slides, tape-lectures and audio-visual material linking safety and first-aid are available from
Camera Talks Limited, 31 North Row, London, W1R 2EN.

The Medical Recording Service, Kitts Croft, Writtle, Chelmsford, Essex, has a number of audio-visual presentations available on first-aid and related subjects.

Posters

A useful poster for exhibition in workplaces *Instant First-Aid*, and a leaflet to go with it, *Pocket First-Aid* are supplied by The Lyndhurst Printing Company, Hardley Trading Estate, Southampton. (Tel. Hythe 6334).

An excellent poster on chemical laboratory first-aid is produced by and available from British Drug Houses Limited, West Quay Road, Poole, Dorset.

Posters are also available from the societies (addresses above).

HEALTH ADVICE FOR TRAVELLERS IN REMOTE PLACES

Health for travellers

Many people are faced with the prospect of journeys to remote parts of the world and may be unsure what immunisations and health precautions are necessary.

The World Health Organisation publishes a list of immunisations which are mandatory for entry to each country. This list is updated and amended regularly and is worth having if advice has to be given to travellers. Copies of this list are usually available in departments concerned with community, airport and port health.

For the individual traveller, a number of useful books are available which are listed below.

Medicine in remote places and at sea

A number of useful texts exist to deal with the problems of medicine in remote places and at sea. Perusal of the titles listed will enable the reader to select suitably.

Selected book list

Vaccination Certificate Requirements for International Travel (1974), World Health Organisation, Geneva.

A useful reference book which must be kept up-to-date.

A Travellers' Guide to Health (1966), J. M. Adam. Hodder and Stoughton, London.

The Preservation of Personal Health in Warm Climates 1971, Ross Institute of Tropical Hygiene, London.

Both books can be recommended to anyone who travels and who is not likely to be going to excessively remote places where a very large measure of self reliance is necessary. (See Exploration Medicine below.)

Staying Alive in the Arctic, American Petroleum Institute, Washington, D.C. A useful handbook for anyone going to very cold places.

Exploration Medicine, O. G. Edholm and A. L. Bacharach (Eds.). Wright, Bristol.

For those who will be in very remote places and who will of necessity have to rely almost exclusively on self-help for any medical problem.

International Guide for Ships (1967), World Health Organisation, Geneva.

The Ship's Medicine Chest and First-Aid at Sea, U.S. Government Printing Office, Washington, D.C.

The Ship Captains Medical Guide (1957), H.M.S.O., London.

The above three books are all suitable for medicine at sea. In each case the recommended treatments presuppose a certain amount of drugs and equipment being available on the vessel.

Medicine for Mountaineering, J. A. Wilkerson. The Mountaineers: Seattle, Washington.

The Physiology of Human Survival (1965), O. G. Edholm and A. L. Bacharach (Eds.). Academic Press, London and New York.

Libraries

The Use of Libraries

In the following chapter, every effort has been made to avoid duplication of information included in other chapters; but the reader must remember that librarians will use the best means possible to provide information needed—including personal contacts or other sources described elsewhere.

Currently, about 700 books and pamphlets are published each week in the United Kingdom and still more in the U.S.A., and it is estimated that approximately 6,000 biomedical periodicals containing worthwhile articles are currently being published throughout the world. A very rough estimate from the use of these figures would suggest that each week 600 or more articles and monographs are published which may be of medical, toxicological or environmental interest to workers in occupational health. A library is not only a repository for such information; but it should also act as a guide to the most efficient means of discovery of the relevant published papers. But it is also true that a librarian can only provide an answer, or direct his client to the answer, to the request for information which is put to him—or her. In other words, the request for help should be framed clearly and concisely; and the reader needs to spend a little time in self-examination as to what it is he needs.

Sources of information currently available can be classified loosely as "global" and "specific". The global system is one which surveys a defined segment of knowledge—say medicine or chemistry—and attempts to digest all published literature in its chosen field. After the digestion process, some form of communication to workers in the field of knowledge concerned is necessary, perhaps abstracts or an index or computer printout. On the other hand, a specific source is one which first of all decides upon the parameters or subject needs of a particular group, say industrial medical officers or dermatologists, and then selects from the whole body of published information those books or articles about which information needs to be given to its audience. More important examples of both types will be described below; but it should be remembered that bibliographies of all kinds are becoming increasingly important as the volume of scientific literature expands. More and more works of this nature are being published, either in the form of serials or as monographs; and a visit to a well-stocked library can be rewarding in time saved by the discovery of an appropriate bibliographical tool.

Libraries and Library Facilities

There is an increasing awareness of the value of a good library service as part of the overall strategy of planning and management. The rapid development of library services in hospitals and postgraduate medical institutes in the U.K. over the last decade is an example from the public sector; and the excellent information and library services provided in large industrial organisations are another, contrasting, example.

However, in Britain there is not a comprehensive national system of libraries *per se*. We have instead a wide range of libraries set up to serve particular interests; but it is generally true that all libraries cooperate extensively with each other so far as the interests of the parent institution or body of members will allow. A list of all possible sources of bibliographical information would enlarge this section too greatly; and it could also be misleading. Consultation of the *A.S.L.I.B. Directory* (Vol. 1, *Information Sources in Science, Technology and Commerce*. Vol. 2 . . . *Medicine, the Social Sciences and the Humanities*) . . . London: Aslib, 1969–70, or the *Directory of Medical libraries in the British Isles* . . . (3rd Edn.), London: Library Assoc., 1969 is advised as indication of which libraries have collections most likely to meet the subject needs of the reader.

Nationally, there will be set up, from April 1973, the British Library. This, formed from existing independent national libraries, will be the focus and the catalyst for co-operation and inter-lending between libraries; and it will operate in three divisions. Firstly the lending services will be based at Boston Spa, Yorkshire; and they will be formed out of the existing National Lending Library for Science and Technology and the National Central Library. The lending services expect to be able to lend all worthwhile current periodicals and all worthwhile current English language books. Older material for lending has been collected in the past, but not so systematically. Location of such material which is not available within the British Library's lending division will continue and will be expanded with the further development of national union catalogues of libraries willing to lend. For loans, access to the British Library is normally only available through another library.

Secondly, the reference services of the British Library will be formed out of the British Museum Library and the National Reference Library for Science and Invention. The two will come together on a site in Bloomsbury and the services will be available either personally or through a library. The third division will be concerned with cataloguing.

The national lending services are of continually increasing importance to any library, that is to say, to any community of practitioners or research workers. The lending services are, for current material, fast and wide-ranging in their subject and geographical coverage.

From the national services, one is led naturally to consider the "global" information services. Generally speaking, these are now computer-based in operation; and the computer tapes are available for machine searching for information. In Britain, the means of access to these banks of information is generally national, through the activities of the components of the British Library; but large industrial firms like Shell or I.C.I. are buying the tapes to use in their own information services. The National Lending Library for Science and Technology is acquiring, from the National Library of Medicine in Washington, the computer tapes which are used to publish *Index Medicus*—an index to the contents of about 3,500 biomedical periodicals, and which also form the basis of MEDLARS (MEDICAL LITERATURE ANALYSIS & RETRIEVAL SYSTEM). The depth of indexing on the computer tapes is greater than in the published *Index Medicus*; and requests for information about published articles can be addressed in terms of relationships between different topics.

Requests and resultant bibliographies have to be paid for; but a considerable amount of time and money can be saved by the method. *Index Medicus*, it should be said, also includes in its monthly issues and in the annual cumulation a *Bibliography of Medical Reviews* which is a useful guide to articles which survey the current state of knowledge of specific subjects such as "Dietary calcium and lead toxicity."

Similarly, the computer tapes used in publication of the fortnightly issues and indexes of *Chemical Abstracts* and *Biological Abstracts* are available; and they are being used, on an experimental basis at present, at the universities of Nottingham and Reading respectively. Either from the published issues or from the tapes information can be found on topics such as "Effects of pesticides in warm-blooded animals."

The last "global" service which ought to be included here is the card service issued by the International Occupational Safety and Health Centre (I.L.O.) (also printed out monthly as *Occupational Safety and Health Abstracts*). The cards give full references and abstracts for a wide range of literature on environmental health and hygiene, toxicology and related subjects; and a classification scheme is used so that they can be arranged in a continuously up-dated information source.

Specialist services

Because of the fluidity of scientific publishing today, largely due to high costs and the uncertainty of government support for some services, any detailed survey of specialist abstracting and indexing services would soon be out of date. It is important, however, to use a library or the advice of a librarian to discover the most appropriate bibliographical source of information for answering a particular need. As the total volume of scientific literature grows, so also more specialised tools are developed to sift out the appropriate literature for specialist groups.

The work of I.L.O. has already been mentioned above. In addition, *Excerpta Medica* is the generic name for a series of nearly 40 abstract periodicals, each of which is devoted to a particular biomedical topic and is available on separate subscription. Examples of these are; *section* 35, *Occupational Health and Industrial Medicine* and *section* 17, *Public Health, Social Medicine and Hygiene* as well as others on *Cancer*, *Haematology* and the like. Also, the Excerpta Medica Foundation has recently, in co-operation with the Netherlands Ministry of Public Health and Pollution Control, started a new abstract series entitled *Environmental Health and Pollution Control*. As with the "global" services described above, all the abstracts of *Excerpta Medica* are published and indexed with the aid of a computer; and a subscription service is available whereby one can arrange to receive all abstracts relevant to a particular topic, whatever the section to which the abstract is assigned.

Earlier papers in the field of occupational health can be found through the now defunct I.L.O. series *Bibliography of Industrial Hygiene*, 1923–41, *Bibliography of Industrial Medicine*, 1948–50, and *Occupational Safety and Health*, 1951–59.

Likewise, the *Journal of Industrial Hygiene and Toxicology*, 1919–49 carried an abstract section in each issue which had coverage, with informative abstracts, of the important literature of the period.

Currently, three bibliographies in this subject field are of value. *Abstracts on Hygiene* (formerly *Bulletin of Hygiene*) has for many years included a section on occupational hygiene; but it abstracts only papers which show an advance in knowledge or a good review of the subject. From this, all relevant papers have been collected in *Pneumoconiosis Abstracts*, 3 volumes for the year 1926 to 1955 inclusive. The *Industrial Hygiene Digest*, 1953– has a fairly wide, though not comprehensive, coverage of papers relating to the causation and prevention of industrial disease. *Toxicology Bibliography* is another valuable publication of the National Library of Medicine, Washington; and it is a by-product of the *Index Medicus* service. The range of this periodical includes all types of poisonous substances, including industrial.

Other specialised abstract journals which are of great value for information work are: *Ergonomics Abstracts*, 1969– ; *Kettering Abstracts . . . on . . . Lead*, 1965– , published by the Kettering laboratory; and *Fluoride Abstracts*. Non-periodical bibliographies of particular topics can be found through any good library catalogue; and noteworthy examples are those on carbon monoxide, on fluorine compounds, and on sulphur dioxide.

Library catalogues of large collections which can be used bibliographically are often published and available for use in other libraries. Examples which are of particular value for their records of the literature of occupational health are the catalogues of the National Library of Medicine, Washington, and of the London School of Hygiene and Tropical Medicine: and the *Subject Index to International Labour Documentation*, 1957–64 and 1965–69, is an analysis of contents of periodicals received in the I.L.O. library which has, of course, a very wide subject range.

Special libraries

Below are given addresses and telephone numbers of libraries having large and wide-ranging collections in the field of occupational health. It should be borne in mind that most of the organisations which are listed in other parts of this work also have libraries; and most—but not all—are willing to give access to literature which they hold and which is not easily available elsewhere. For example, the British Medical Association and the Royal Society of Medicine libraries have a major responsibility to their members and fellows; and access to these libraries by others should be requested in advance, preferably by letter, with a statement of the information needed. On the other hand, the national or university libraries will generally admit any bona-fide enquirer; but here also a previous letter may be helpful.

The two directories mentioned at the beginning of this chapter—and others available in public library reference collections—give details of accessibility. Finally, the existence of many fine public libraries is too often forgotten. Amongst others, those at Sheffield and Manchester are valuable to those working in industry.

American Embassy, Grosvenor Square, London, W.1. Telephone: 01-499 9000. (Will trace American publications and information.)

British Medical Association, B.M.A. House, Tavistock Square, London, W.C.1. Telephone: 01-387 4499.

British Museum, Bloomsbury, London, W.C.1. Telephone: 01-636 1555.

British Student Health Library, Sir Alan Rook Library, St. Bartholomew's Hospital, W. Smithfield, London, E.C.1. Telephone: 01-606 7777.

London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London, W.C.1. Telephone: 01-636 8636.

National Lending Library for Science and Technology, (i) Walton, Boston Spa, Yorks. Telephone: 0937-84 2031.

National Reference Library of Science and Invention, Bayswater Division, 10 Porchester Gardens, London, W.2. Telephone 01-727 3022; Holborn Division, 25 Southampton Buildings, Chancery Lane, London, W.C.2. Telephone: 01-405 8721.

The Royal College of General Practitioners, Medical Recording Service and Sound Library, (Drs. John and Valerie Graves), Kitts Croft, Writtle, Chelmsford, Essex. Telephone: 0245 421475.

Royal Society of Health, 90 Buckingham Palace Road, London, S.W.1. Telephone: 01-730 8942.

The Royal Society of Medicine, 1 Wimpole Street, London, W.1. Telephone: 01-580 2070.

(i) The Medlars Service (based on the Index Medicus) can be obtained from this Library through a librarian and will provide a comprehensive list of references on specified subjects.

Aslib Directory Volume 1, Information Services in Science, Technology and Commerce. Ed. Brian Wilson, Aslib, London 1970.

Aslib Directory Volume 2, Information Services in Medicine, the Social Sciences and Humanities. Ed. Brian J. Wilson. Aslib, London 1970.

Guide to Government Department and other Libraries and Information Bureaux, Ministry of Defence, London. 20th. Edition, 1971. H.M.S.O.

Information and Advisory Services

The field of occupational health embraces such a wide body of knowledge and so many differing areas of practice that it is virtually impossible for any single person to acquire a mastery of the whole. Most people eventually encounter a problem beyond their own resources, those of the group within which they work, or both. In these circumstances the usual informal professional channels may often suffice to provide the extra information and advice needed to solve the question. Increasingly the complexity of problems makes the informal approach less adequate. A deeper, more detailed appraisal is required, calling for unfamiliar knowledge and skills. As a result of the growth in the frequency of such situations a number of Information and Advisory Services (I.A.S.) have developed designed in their separate ways to meet this need.

Such Services are usually multi-disciplinary. They are designed to synthesise information and experience from the medical, physical and biological sciences and some of the subsequent numerous technologies which have developed. Despite superficial appearances very few of these services provide identical facilities. The almost infinite variety of contemporary occupational health problems, together with the explosive growth rate of knowledge has forced some degree of limitation and specialisation. This chapter is in part designed as a guide to the choice of service in the hope that delay and frustration can thereby be reduced.

Information services can only meet the enquirers' needs adequately if the problem is expressed and described in a sufficiently adequate manner to allow the full utilisation of the facilities of the I.A.S. he has chosen. To borrow a phrase from computer technology: "Garbage in; Garbage out."

Anyone seeking optimum help from an I.A.S. must not only choose the appropriate source of advice but must formulate his request in a way which will allow that service to operate to the best of its ability. Failure here is the commonest cause of an enquirer's disappointment, although to him it may appear as an inability of the service to respond in an adequate and appropriate manner.

FUNCTIONS OF AN INFORMATION AND ADVISORY SERVICE (I.A.S.)

Information Function

The provision of factual information on literature references is the most straightforward activity of any service. The assembly of bibliographies or a search of a defined area of the world literature for contributions on a specified subject are examples of this elemental level of information activities. Such work is probably best carried out by libraries and specialised commercial organisations (see Chapter

11). An extension of this is the continuous updating and reporting of knowledge for those whose needs require it. The slow, but steady, introduction of electronic methods into data storage and handling means that information seeking and assemblage is becoming faster, simpler, more accurate and more economic. What was once the tool of the leisurely paced research worker is becoming available to the more heavily committed practitioner.

This development could have several significant practical future consequences. In the past much valuable practical experience has been lost to a wider audience through a failure to report unusual events particularly in the fields of human toxicology and occupational disease. Often a potential author has felt inhibited by the daunting task of "manually" searching a vast literature before beginning to contribute. Modern information services are successfully reducing this barrier and it is predictable that there will be in the future an increasing number of original reports of observed field experiences. These will be particularly welcome concerning human toxicology, the treatment of human poisoning, occupational disease and occupational health practice.

Such is the nature of occupational health that much of the information on many subjects is more tentative and suggestive rather than finite and conclusive. A reflection on the occupational contribution to the aetiology of a common clinical condition such as low-back pain will reveal the need felt by many enquirers for an *interpretation* of the significance of the information they are seeking. In this example no worthwhile interpretation can be given at present. But narrower questions on more limited subjects, in specific local circumstances, and, perhaps related to one or more individual happenings can command a more worthwhile response. This *interpretive* function of an I.A.S. is probably the most relevant to many people. It overlaps considerably with the advisory function of the service and will be further discussed later.

Between these extremes of role of information services lies, for some, a most useful activity. A bald presentation of a list of literature references required for personal study is for many people but a limited advance in their search for further knowledge. Unless the enquirer has time to spare and/or ready access to an adequate library and/or skilled assistance he may be little further forward. What is required in this situation is a skilled and authoritative *abstract* of the relevant literature. That is a digest of information after it has been identified and separated from the much larger and amorphous mass. A part of this abstraction process will of course have already taken place during the initial selection of titles and authors appropriate to the enquiry, but this will have given no indication of the content of these items other than can be deduced from the authors' title. These titles may or may not accurately convey the informational content and relevance of the article. Despite the inherent uncertainty of accurate communication by title precis, the content of any particular article may contain subsidiary items of information which, though of relative unimportance to the author, may be of high significance in the context of a specific enquiry. Only an informed reading of the full original text will reveal its relevance to any particular circumstance. Most information services, limited as they are, must undertake this abstraction work. To some degree both directly themselves and indirectly by the use of specialised primary abstracting services, these services concentrate on far more limited areas of knowledge, allowing the primary abstractors to develop a familiarity with their chosen fields and ensure the accuracy, completeness, authority and balance of the condensed reports which they produce.

These primary abstracting services usually publish regular journals, and many are generally available to subscribers (see Chapter 3). Others have a circulation limited only to members of their parent organisations (see Chapter 3). A few abstracting services of this latter type also accept subscriptions for their informational activities outside general membership of the particular organisation. The enquirer should realise that subscription abstracting services of this type cannot for the most part be used on an *ad hoc* basis for individual queries. At least an annual subscription is required and this demands that the user makes a prior decision about their continuing utility to his field of interest. If only occasional use is required of these abstracting publications it is better for the occasional user to consult a library which subscribes to them or to commission a specific information search from one of the information services. In any event, for some people, the presentation of a list of references accompanied by an acceptable abstract of the publications is adequate. This allows the recipient to exercise a degree of choice based upon a manageable amount of information without undergoing the tedium of a personal perusal of the original sources. The inherent dangers of this process are obvious. The interpretation by the recipient of the original request may be faulty, this initial error may be compounded by a faulty choice of authors and titles, and these confusions may be added to by the misinterpretations and idiosyncratic selectivity inherent in the abstraction process itself.

Finally, the enquirer must decide himself whether or not the importance of the matter, which only he can adequately assess, demands his personal involvement at every step or whether he can with confidence delegate part or parts of the process of information search, retrieval and abstraction to others. Should he decide upon delegation for whatever reason the most important step he must now take is the formulation of the enquiry.

The advisory functions of the services will be dealt with later.

Formulation of enquiries

Disappointment with the assistance offered by advisory and information services is to a large extent the result of a primary and disastrous communications failure between the two parties. To allegorise, the enquirer asks for a description of an elephant but communicates to the recipient his need for an understanding of the morphology of a giraffe and this is duly supplied. Unfortunately a further retrospective and more careful analysis of the problem by both parties reveals that unknown beast bears a close resemblance to the known features of a rhinoceros. The limitless jungles of occupational health have and will continue to offer wilder opportunities of miscommunication than this. Nevertheless the errors begin with:

(*a*) a failure to analyse the essential components of the problem; and
(*b*) to describe, and where possible to quantify these.

Haste may be of the essence on such occasions but is all too often the generator of ultimate confusion.

A systematic and, if need be, leisurely analysis of the constituent factors ***must*** proceed hand in hand with a utilisation of the enquirer's own domestic sources of assistance. Obviously a need to seek assistance beyond one's own personal resources results from a search of these which fails to provide a satisfactory solution.

The Analysis of the Problem

Before an assessment is made of the adequacy of domestic information resources the nature and composition of the problem itself must be considered. There are several ways of going about this each depending on the aim of the exercise. In this instance the aim is to define areas of ignorance about which information is sought. The procedure is to dissect the problem according to its areas of knowledge and ignorance and so to define where help is needed.

It is presumed that a fair degree of personal interrogation and local investigation has revealed at least the factual outline of the situation. It is more than likely that an intellectual analysis as here proposed will raise *ab initio* further questions which can be readily answered by more enquiries on the ground. At any rate at some point the constituent components must be separated and identified. For present purposes it is probably enough to clarify into which *functional* areas of knowledge the problem breaks down. The scheme used throughout this publication is useful:

1. Occupational disease and epidemiology.
2. Toxicology.
3. Occupational hygiene and environmental control.
4. Safety and safety engineering.
5. Ergonomics and occupational psychology.
6. Nursing and first aid.

Most problems contain components from one or more of these areas. An arbitrary weighting must be given to each according to its relative importance to the whole. Set out in writing the weighted analysis can then be used for the next phase of the formulation of the problem. It must be kept in mind that this approach is solely related to making a decision as to whether or not sufficient information and advice is available locally to allow the problem to be solved domestically.

The next step is to assess the range and adequacy of these domestic resources.

Analysis of Domestic Resources

This can follow the following interrogatory sequence:

1. Has this or a similar situation been met before?
2. What is recalled of them?
3. Are there any relevant accounts, in whatever form, available to supplement personal memories? If so, where are they? Are they accessible? Are they accurate and reliable? In essence, what value are they as evidence?
4. If nothing relevant can be recalled from personal experience and from records, is there anyone from whatever discipline, within reasonable access who may have appropriate experience or knowledge of this or similar problems?
5. If this is so, ask for information from them.
6. In conjunction with this line of enquiry begin a search of those formal written sources of information which come easily to hand such as standard textbooks and relevant professional journals. Ask others from other disciplines who may have a contribution to make to do the same.
7. Should none of this produce much progress assemble a small *ad hoc* group of colleagues who, because of their personal knowledge and experience can assist in an analysis of the problem.

8. Assess their individual and joint contributions for relevance and authority. Ask for their personal analysis of the constituent components of the problem.
9. Assemble as much of this domestic information as is relevant and note the sources of information available to colleagues together with an estimate of their relevance and worth.
10. This search and analysis of domestically available sources of information should then allow an estimate to be made as to whether or not outside assistance is necessary.

This formalised scheme of analysis is of course usually what happens in practice although experienced people will take some of the steps intuitively and without any conscious acknowledgement of the process. At any rate it is vital that some such preliminary analysis be made before outside assistance is requested.

Where to ask for information

It has been noted above that most information services restrict their fields of service because of the general enormity and complexity of the subject and that the correct initial choice of service can avoid many secondary difficulties. Nevertheless an analysis of a problem may reveal that no single service would appear to offer the range of knowledge needed to solve the presenting problem. A decision must then be made whether to ask one or more services to contribute to appropriate sections of the analysis simultaneously or in succession. The first approach is speedier but more expensive whilst the second is slower and usually cheaper. In some instances, depending upon the depth and quality of the domestic analysis that has been possible it can be more advantageous to approach one of the more general advisory services in the first instance. In effect, if this course is adopted, it means that the service is being asked to participate in the domestic analysis of problem and to assist in its clarification.

No matter which course is chosen the initial communication with any service is crucial to the success of the outcome. There are many reasons why miscommunications at this point result in eventual failure.

1. The wrong source of advice is chosen at the outset.
2. The question posed is too general for any one service to answer adequately from its own resources. This often results from a failure to analyse and define closely the components of the problem before seeking help.
3. The initial statement of the problem omits vital information either in the cause of brevity or because its relevance has been misappreciated. Sometimes it is assumed that such information is already available to the service and its inclusion smacks of condescension. This particularly applies to the omission of data about local environmental conditions and individual clinical findings.
4. Misapprehension as to the true nature of the problem can mean that the wrong question has been asked altogether. This seems to occur frequently where the original analysis has failed to give adequate weight to the contributory knowledge from disciplines other than that of the enquirer. For example, a request from a hygienist or a safety engineer provides incomplete clinical data and a clinically orientated nurse or doctor supplies inadequate details about chemicals involved in a suspected occupational disease.
5. Socio-behavioural factors are frequently underestimated in importance. Complaints about headaches which are attributed to inadequate lighting can

for example be a manifestation of broader cause of industrial unrest such as wage rates.

6. From time to time most information services receive requests whose simplicity contrasts with the skills and resources known to be available to the enquirer from his own resources. A common reason for this is usually that the immediate pressure of other work opportunities make it apparently quicker and less troublesome for him to enlist temporary supplemental help from outside. This may be so; but it more often happens that the ready accessibility to the total information available to him on the spot outweighs the disadvantages of temporary delay. Are mote information service can never be an adequate substitute, all other things being equal, for local knowledge and skills.

In summary an adequate analysis of the problem from all aspects should reveal the areas of deficiency of information. They can also be described in the context of a detailed account of the problem. The initial enquiry should be long rather than short, include information from all contributory disciplines and should state clearly the points on which information is required.

Despite the thoroughness with which this preparation is carried out there will be many occasions on which the service chosen will need to ask for extra information. This is predictable as alternative pathways of enquiry will open up as the enquiry unfolds. It may be impossible for it to be taken beyond a certain point without complementary field and laboratory studies being undertaken before any worthwhile conclusion is reached. At this point the information function passes from this role to that of an Advisory Service which offers solutions, as opposed to information.

Advisory Function

Information provided by a service can vary, as already stated, from a straightforward factual list of references to an abstracting service and can include an interpretation and critical commentary of the value and relevance of the information provided. Many enquirers require something more than this depending upon their particular circumstances vis-à-vis the problem. Information as such is of little value unless it is *applied* to the control or solution of a problem. It is the *application* of the information which often requires an information service to extend its role and become an *advisory* service as well. Some services refuse to undertake this extension of their work arguing that it is beyond their scope. Others on the other hand insist that it is impossible for them to give an adequate service unless they are allowed, as an integral part of the whole process, to include proposals for solution or control of the problem presented to them. Most Occupational Hygiene Laboratory Services are in this category.

As with the choice of information services it becomes vital for the initial enquiry to be directed to the appropriate Advisory Service. The primary analysis of the problem and of domestic resources available to deal with it should show outside advice as well as information will be required to resolve it.

This approach is obviously a counsel of perfection as the full complexity of a problem may only reveal itself as exploration proceeds. The enquirer himself should always remain in overall control of the general direction of the investigation he is following and be prepared to change to other and more appropriate sources of information and advice if necessary as the investigation proceeds.

Advice, as an extension of the information giving interpretation process, is available at varying levels of complexity. At the simplest level the advice can be merely a development of the written or verbal extension of the information summary of the literature but applied to the particular circumstances of the problem. This approach often suffices for people who feel that they are probably, and rightly, capable of finding a solution from their own resources. For reasons of completeness, authoritiveness, confidence and so on, they do require a second opinion from an outside source to cement a decision which has virtually already been taken. On the other hand, the most complex level of advice arises where lengthy, detailed and complicated studies are involved, needing inter-related field and laboratory works. These can use epidemiological techniques and require clinical measurements of large populations such things as lung function and blood chemistry. It is these studies that can take on many of the aspects of original research work and as such may become more appropriate for consideration by Universities. The need for this sophisticated type of study usually becomes manifest in the early period of information—seeking, as major gaps in existing knowledge reveal themselves at this time. These deficiencies are usually so striking that it is soon obvious that one or more research studies will be needed before adequate practical advice can be given.

In practice most requests for advice lie between these two extremes. The very nature of the requests for advice shifts the emphasis of the enquiry away from the non-specific, generalised provision of information to the specific, localised application of that information to a defined set of particular circumstances. The advisory service which is consulted may require more local information of the initial enquirer and frequently this can only be obtained by one or more field visits and/or appropriate investigations. Interrogation of, and discussions with, people directly concerned with the detection and management of the problem are nearly always needed, above and beyond the original written communications. To ask for advice on the analysis and control of suspect working conditions, or the occurrence of suspected occupational disease, will almost always require field as well as laboratory investigations. It also frequently requires the co-operation of individual work people who will require clinical examination and study. This type of combined medical-scientific investigation is almost solely available from the established Occupational Hygiene Laboratory Services (see Chapter 3, pp. 87, 88). Other services will provide a more limited range of advice, usually without field and/or laboratory investigation.

It is unfortunately true as a general feature of human behaviour that advice, though genuinely sought and sincerely given, is sometimes not acted upon. The professional giver of advice has learned to become unabashed by this experience; the same can not be said for the intermittent recipient.

The commonest criticisms of the disappointed enquirer is that:

(i) The advice is inappropriate to the circumstances;
(ii) it is impractical in the light of local constraints (of which the commonest is financial);
(iii) it is too theoretical for practical application, etc.

All these criticisms and more can be correct. Nevertheless at the time of making them the disappointed enquirer must look at his own conducts of affairs if only to learn not to repeat his mistakes in the future.

(*a*) Was the right question asked of the right organisation in the right form?
(*b*) Was the preliminary analysis sufficiently penetrating and wide enough to include all its components?
(*c*) Were the subsequent requests for further information adequately met and the essential field work fully supported?
(*d*) Had sufficient preparatory work been done locally with management, unions and other professionals to ensure that the advice when received would be given rational and intelligent appraisal?

In this difficult field of Occupational Health with its many disciplines, its vast areas of unexplored ignorance allied with the capricious inexplicability of human behaviour there will arise situations where no effective solution to a problem is possible at all. The philosophical person will at this stage withdraw from the scene and choose a more opportune moment to return to it. Frequently and unexplainably the worst often solve themselves whilst we are away!

The Costs

The section below on the types of information and advisory services gives an indication of their areas of interest, the range of services they provide, and an estimate of the charges they make.

Some services are only accessible to subscribing members to the service itself or to its parent body. A more usual formula is for subscribing members to pay a reduced fee for service dependent upon the underlying method of charging adopted by the service. These information services usually have a flat rate fee, with a reduction for annual subscribers; some amend this by a formulae of various types which allow them to charge more should the information retrieval and abstraction prove particularly lengthy. Most services charge a higher flat rate or use different formulae if prolonged enquiries have to be made. Field visits are usually charged for on a per diem expenses plus fee basis although for extensive field studies carried out over several days or weeks, most Advisory Services will negotiate an overall contract fee. As the majority of these bodies are registered, and non-profit making, charities no extortionate fees will be charged.

The Occupational Hygiene Laboratory Services, whose investigations usually involve a mixture of field work and complementary laboratory studies tend to quote a fixed daily rate for their services together with an estimate of the total length of the study, i.e., the total cost. These estimates are usually given after a preliminary visit to the site by a senior member of the staff of the service to assess the scale of the problem. This preparatory visit is rarely charged for. No obligation to accept the resulting estimates and proposals is implied.

At the time of writing the costs of the services of the Employment Medical Advisory Service (E.M.A.S.) are uncertain. The field visit by its Medical Advisers will be free as will some of the laboratory work. Exactly how the service will work and charge for its services in practice is uncertain.

Routine monitoring of established hazardous environments is, and will increasingly become more widespread. Not only do processes and their environment need continuous and/or periodic monitoring by combined field and laboratory procedures but there are circumstances which require regular biological measurements to be made on employees, for example, on the levels of substances in blood and urine. Both these types of regular surveillance are carried out on a contract basis by all Occupational Hygiene Laboratory Services (upon enquiry).

In summary, the costs of any query or investigation can be estimated in advance with fair accuracy once the problem has been analysed and a service or services chosen, they will then submit an estimate of their charges for the work required.

Universities will only rarely consider queries for answer, or problems for investigation, unless they are shown to contain an element which can contribute, in an original way, to their research and/or teaching interests. Run-of-the-mill enquiries are rarely accepted. If they are accepted because of their inherent worth it is unlikely that anything other than out of pocket expenses will be charged.

Trade Unions affiliated to the Trades Union Congress can submit queries through their own Union machinery to the Medical Advisor of the T.U.C. The more complex enquiries are referred to the T.U.C. Centenary Institute of Occupational Health which is an academic university department which accepts, without the academic restrictions mentioned above, most enquiries related to occupational health from all sources as well as from unions. For trade unions no fee-for-service is charged. The T.U.C. pays an annual sum to the Institute as a global payment for all enquiries from trade union sources. Costs of expensive field work are not covered by this agreement.

When it comes to the choice of one or more particular information service to approach for advice, the analytical scheme outlined above could avoid many disappointments if adhered to with care. Briefly again, this requires the enquirer to analyse closely the content of his problem to define the primary subject area of interest and any secondary areas. The chapter headings of this book will serve adequately as a checklist for both the primary and secondary analyses. These are:

1. General interests.
2. Occupational Health Services.
3. Occupational Medicine and Disease.
4. Occupational Hygiene and Environmental Control.
5. Ergonomics.
6. Occupational Psychology.
7. Biomedical Engineering.
8. Safety and Safety Engineering.
9. First Aid and First Aid Training.

Having established the main subject content of the problem the enquirer must then proceed to choose one or more information service to satisfy his needs. It should be noted that many of these services will undertake work in related fields other than those of their defined primary interests. For example, safety organisations will offer limited practical advice on toxicology. Most services will consult other services with differing interests from their own, without extra expense, should areas of the problem be beyond their own competence. Having said this, it is important for the enquirer to remember that there are different levels of activity undertaken by different information services. These can be classified as:

1. *Information solely,* i.e., sometimes with abstraction service but without a review and/or interpretation.
2. As above but with a commentary, etc., and/or some comment if requested on the applicability of this to local circumstances.
3. As above without restriction.

4. *Information and Advisory Services.* Limited by field of interest, by facilities available by geography.
5. Abstracting services and journals.

Many of the services available for consultation have been mentioned throughout thc chapters of this book, see pages 45, 50, 52, 87, 88, 200, 227, 239 . . . As the functions of these services can alter from time to time it is not possible to maintain an up-to-date list of the range and type of services they offer. Suffice it to say that the enquirer at the time his problem arises should ask the service of choice to state the range of help that can be given for his particular problem. Should the service of first choice fail to provide an answer of the depth required, it will almost inevitably be able to provide advice on where next to seek assistance.

Useful addresses

GOVERNMENT DEPARTMENTS

HER MAJESTY'S STATIONERY OFFICE PUBLICATIONS including those of the European Community obtainable from:

ENGLAND
Birmingham B1 2HE: 258 Broad Street
Bristol BS1 3DE: 50 Fairfax Street
London: 49 High Holborn, WC1V 6HB (callers only); P.O. Box 569, SE1 9NH (trade and London area mail orders)
Manchester M60 8AS: Brazennose Street

SCOTLAND
Edinburgh EH2 3AR: 13a Castle Street

WALES
Cardiff CF1 1JW: 109 St. Mary Street

NORTHERN IRELAND
Belfast BT1 4JY: 80 Chichester Street
Publications may also be obtained through booksellers. Sectional Catalogues of Government Publications are listed against each Government Department.

CENTRAL OFFICE OF INFORMATION (Sectional List 53)
Central Office of Information (COI)
Hercules House
Hercules Road
London SW1
Telephone: 01-928 2345

CIVIL SERVICE DEPARTMENT (Sectional List 44)
Medical Advisory Service
Tilbury House
Petty France
London SW1
Telephone: 01-834 6644

COMMONWEALTH OFFICE
Curtis Green Building
Victoria Embankment
London SW1
Telephone: 01-839 7010

DEPARTMENT OF EDUCATION AND SCIENCE (Sectional List 2)
National Lending Library for Science and Technology
Boston Spa
Wetherby
Yorkshire L223 7BQ
Telephone: Boston Spa (0937) 843434

DEPARTMENT OF EMPLOYMENT (Sectional Lists 21 and 18 for Official Forms for Use in Premises under Factories Acts)

(*a*) St. James's Square
London SW1
Telephone: 01-930 6200

(*b*) Employment Medical Advisory Service
Baynards House
Westbourne Grove
London W2 4TF
Telephone: 01-229 3456

(*c*) The Industrial Health and Safety Centre
97 Horseferry Road
London SW1
Telephone: 01-828 9255

DEPARTMENT OF ENVIRONMENT (Sectional Lists 5 and 22)

(*a*) D.O.E. Headquarters Library (The former Ministry of Housing and Local Government and Ministry of Transport Libraries)
2 Marsham Street
London SW1P 3EB
Telephone: 01-212 4847

(*b*) P.S.A. Library (The former Ministry of Public Building and Works Library)
Lambeth Bridge House
London SE1
Telephone: 01-735 7611 (ext. 1541)

DEPARTMENT OF HEALTH AND SOCIAL SECURITY (Sectional List 11)

(*a*) Alexander Fleming House (Health)
Elephant and Castle
London SE1
Telephone: 01-407 5522

DEPARTMENT OF HEALTH AND SOCIAL SECURITY—continued

(*b*) 10 John Adam Street (Social Security)
London WC1
Telephone: 01-930 9066

DEPARTMENT OF INDUSTRY (Sectional List 3)
Publications Department
Abell House
John Islip Street
London SW1
Telephone: 01-834 4422

DEPARTMENT OF TRADE (Sectional List 3)

(*a*) Medical Department (Aviation Division)
Shell-Mex House
London WC2
Telephone: 01-836 1207

(*b*) Medical Department (Marine Division)
Sunley House
90 High Holborn
London WC1V 6OE
Telephone: 01-405 6911

HOME OFFICE (Sectional List 26)

(*a*) Whitehall
London SW1
Telephone: 01-930 8100

(*b*) Home Office Central Research Establishment
Aldermaston
Telephone: 07356 4111

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD (Sectional Lists 1 and 23)
Whitehall Place
London SW1
Telephone: 01-839 7711

MINISTRY OF DEFENCE (Procurement Executive)
Civilian Medical Services
Empress State Building
Earls Court
London SW3
Telephone: 01-385 1244 (ext. 2963)

MINISTRY OF OVERSEAS DEVELOPMENT (Sectional List 69)
Eland House
Stag Place
London SW1
Telephone: 01-834 2377

OFFICE OF POPULATION CENSUSES AND SURVEYS (Sectional List 56)
Chief Medical Statistician
Somerst House
Strand
London WC2R 1LR
Telephone: 01-242 0262

NORTHERN IRELAND—MINISTRY OF HEALTH AND SOCIAL SERVICES
Dundonald House
Upper Newtownards Road
Belfast BT4 3SF
Telephone: 0232 650111

SCOTTISH HOME AND HEALTH DEPARTMENT (Sectional List 66)

(*a*) St. Andrew's House
Regent Road
Edinburgh 1
Telephone: 031-556 8501

(*b*) London Office:
Dover House
Whitehall
London SW1
Telephone: 01-930 6151

WELSH OFFICE OF HEALTH
Cathays Park
Cardiff
Glamorgan
Telephone: 0222 28066

PUBLIC BOARDS

BRITISH AIRWAYS
Medical Department
Speedbird House
Heathrow Airport
Hounslow
Middlesex
Telephone: 01-759 5511

BRITISH RAILWAYS BOARD
Medical Department
222 Marylebone Road
London NW1
Telephone: 01-262 3232

THE BRITISH GAS CORPORATION
Medical Department
59 Bryanston Street
London W1
Telephone: 01-723 7030

LONDON TRANSPORT BOARD
Medical Department
Griffith House
280 Marylebone Road
London NW1
Telephone: 01-262 3444

METRICATION BOARD
(Information Division)
22 Kingsway
London WC2B 6LE
Telephone: 01-242 6828

NATIONAL COAL BOARD
Medical Department
Hobart House
Grosvenor Place
London SW1
Telephone: 01-235 2020

POST OFFICE
Medical Department
23 Howland Street
London W1
Telephone: 01-631 2345

ORGANISATIONS

(a) *Associations (including Federations and Fellowships)*

British Dental Association
63–64 Wimpole Street
London W1
Telephone: 01-935 0875

British Diabetic Association
3 Alfred Place
London W1
Telephone: 01-636 7355

British Medical Association
Tavistock Square
London WC1
Telephone: 01-387 4499
Occupational Health Committee
British Medical Association
Telephone: 01-387 4499

Commonwealth Medical Advisory Bureau and the International Advisory Bureau
(For Medical Practitioners from the Commonwealth and other countries, visiting the United Kingdom)
Objects:

1. To provide information on accommodation, postgraduate education, matters of general interest.
2. To welcome overseas visitors, to provide social functions and to keep a list of overseas visitors visiting the United Kingdom.

B.M.A. House
Tavistock Square
London WC1
Telephone: 01-387 4499

British Postgraduate Medical Federation
14 Millman Mews
Millman Street
London WC1
Telephone: 01-405 2716

Medical Women's Federation
Tavistock House North
Tavistock Square
London WC1
Telephone: 01-387 7765

Fellowship of Postgraduate Medicine
9 Great James Street
London WC1
Telephone: 01-242 6900

National Association for Mental Health
39 Queen Anne Street
London W1
Telephone: 01-935 1272

British Epilepsy Association
3 Alfred Place
London WC1
Telephone: 01-580 2704

(b) *Colleges*

The Royal College of Nursing
Henrietta Place
London W1
Telephone: 01-580 2646

The Royal College of General Practitioners
14 Princes Gate
Hyde Park
London SW7
Telephone: 01-584 6262

The Royal College of Obstetricians and Gynaecologists
Sussex Place
Regent's Park
London NW1
Telephone: 01-262 5425

The Royal College of Physicians
St. Andrew's Place
London NW1
Telephone: 01-935 1174

The Royal College of Surgeons
Lincoln's Inn Fields
London WC2
Telephone: 01-405 3474

(c) *Communities*

Commission of the European Communities
Directorate General for Information
200 Rue de la Loi
Brussels 1040
Telephone: Brussels 35-00-40

(d) *Councils*

British Council
Medical Department
65 Davies Street
London W1
Telephone: 01-499 8011

British Council for Rehabilitation
Tavistock House South
Tavistock Square
London WC1
Telephone: 01-387 4037

British Safety Council
62 Chancellors Road
London W6
Telephone: 01-741 1231

Health Education Council
Middlesex House
Ealing Road
Wembley
Middlesex
Telephone: 01-998 2731

Arthritis and Rheumatism Council
8 Charing Cross Road
London WC2
Telephone: 01-240 0871

Confederation of British Industry
21 Tothill Street
London SW1
Telephone: 01-930 6711

ORGANISATIONS (*Councils*)—continued

General Medical Council
44 Hallam Street
London W1
Telephone: 01-580 2727

General Nursing Council for England and Wales
23 Portland Place
London W1
Telephone: 01-580 8334

Medical Research Council (Sectional List 12)
20 Park Crescent
London W1
Telephone: 01-636 5422

Sports Council
26 Park Crescent
London W1
Telephone: 01-580 6822

(e) *Faculties*

Faculty of Community Medicine of the Royal Colleges of Physicians of the United Kingdom

Royal College of Physicians
11 St. Andrew's Place
London NW1 4LE
Telephone: 01-935 1174

(f) *Group Health Services for Small Factories*

Central Middlesex Industrial Health Service
Central Middlesex Hospital
Park Royal
London NW10
Telephone: 01-965 5733

Dundee and District Occupational Health Service
5 Airlie Terrace
Dundee
Telephone: 0382 25978

Harlow Industrial Health Service
Industrial Centre
Edinburgh Way
Harlow
Essex
Telephone: 0279-6 22377

The Newcastle upon Tyne Industrial Health Service

The Nuffield Department of Industrial Health
The University
20 Claremont Place
Newcastle upon Tyne
Telephone: 0632 28511

The Slough Industrial Health Service
Central Clinic
Farnham Road
Slough
Buckinghamshire
Telephone: 75 22238

The West Midlands Industrial Health Service Ltd.
82 High Street
West Bromwich
Staffordshire
Telephone: 021-937 3189

(g) *Institutes*

Institute of Directors Health Service
Provident House
Essex Street
London WC2
Telephone: 01-353 9541

Institute of Dermatology
St. John's Hospital for Diseases of the Skin
Lisle Street
London WC2
Telephone: 01-437 8383

Cardio Thoracic Institute
Beaumont Street Branch
2 Beaumont Street
London W1N 1RB
Telephone: 01-486 3043

Cardio Thoracic Institute
Fulham Road Branch
Brompton Hospital
Fulham Road
London SW3
Telephone: 01-352 8144

Institute of Neurology
The National Hospital for Nervous Diseases
Queen Square
London WC1
Telephone: 01-387 3611

Ross Institute of Tropical Medicine
London School of Hygiene and Tropical Medicine
Keppel Street (Gower Street)
London WC1
Telephone: 01-636 8636

British Institute of Management
Management House
Parker Street
London WC2
Telephone: 01-405 3456

Institute of Personnel Management
5 Winsley Street
London W1
Telephone: 01-580 3271

National Institute of Industrial Psychology
14 Welbeck Street
London W1
Telephone: 01-935 1144

National Institute for Medical Research
The Ridgeway
Mill Hill
London NW7
Telephone: 01-959 3666

Institute of Orthopaedics
234 Great Portland Street
London W1
Telephone: 01-387 5070

ORGANISATIONS (*Institutes*)—continued

The Royal Institute of Public Health and Hygiene
28 Portland Place
London W1
Telephone: 01-580 2731

Tavistock Institute of Human Relations
120 Belsize Lane
London NW3
Telephone: 01-435 7111

Institute of Welding
54 Princes Gate
London SW7
Telephone: 01-584 8556

(h) *Offices*

Office of Health Economics
162 Regent Street
London SW1
Telephone: 01-734 0757

(i) *Organisations*

Organisation for Economic Co-operation and Development (O.E.C.D.) Publications
O.E.C.D.
2 Rue André Pascal
Paris XVI
France

(j) *Societies*

British Occupational Hygiene Society
Esso Petroleum Co. Limited
Esso Research Centre
Abingdon
Berkshire
Telephone: Abingdon 1600 (ext. 541)

Ergonomics Research Society
Construction Industrial Training Board
Radnor House
London Road
London SW16
Telephone: 01-794 5060

Industrial Society
48 Bryanston Square
London W1
Telephone: 01-262 2401

Medical Protection Society
50 Hallam Street
London W1
Telephone: 01-580 9241

Royal Society for the Prevention of Accidents (Ro.S.P.A.)
52 Grosvenor Gardens
London SW1
Telephone: 01-730 2246

Royal Society of Health
90 Buckingham Palace Road
London SW1
Telephone: 01-730 8942

Royal Society of Medicine
1 Wimpole Street
London W1
Telephone: 01-580 2070

Society of Apothecaries of London
Apothecaries Hall
Blackfriars Lane
London EC4
Telephone: 01-236 1189

Society of Medical Officers of Health
Tavistock House South
Tavistock Square
London WC1
Telephone: 01-387 3923

Society of Occupational Medicine
At the Royal College of Physicians
Telephone: 01-486 2641

Society for Radiological Protection
Nuclear Health and Safety Department
National Radiological Protection Board
Harwell
Didcot
Berkshire
Telephone: 023 583600 (ext. 59)

(k) *Unions*

Medical Defence Union Limited
Tavistock House South
Tavistock Square
London WC1
Telephone: 01-387 4244

Trades Union Congress
Great Russell Street
London WC1
Telephone: 01-636 4030

RESEARCH UNITS AND SERVICES

(a) *Provinces*

BIRMINGHAM
Industrial Injuries and Burns Research Unit (M.R.C.)
Birmingham Accident Hospital
Bath Row
Birmingham B15 1NA
Telephone: 021-643 7041

CAMBRIDGE
Applied Psychology Research Unit
15 Chaucer Road
Cambridge
Telephone: 0223 55294

CARDIFF
Epidemiological Research Unit (South Wales)
4 Richmond Road
Cardiff
Telephone: 0222 20376

CARSHALTON BEECHES
The Toxicology Research Unit (M.R.C.)
Woodmansterne Lane
Carshalton Beeches
Surrey
Telephone: 01-643 4466

RESEARCH UNITS AND SERVICES
(*Provinces*)—continued

EDINBURGH
Unit for Research on the Epidemiology of Psychiatric Illness (M.R.C.)
University of Edinburgh
Edinburgh
Telephone: 031-607 7489

LEEDS
Environmental Radiation Research Unit
Department of Medical Physics
University of Leeds
Leeds
Telephone: 0532 31751

LIVERPOOL
Unit for Research on the Occupational Aspects of Ageing (M.R.C.)
Abercromby Square
University of Liverpool
Liverpool 7
Telephone: 051-709 5351

OXFORD
Population Genetics Research Unit (M.R.C.)
Old Road
Headington
Oxford
Telephone: 0092 62834

PENARTH
The Pneumoconiosis Research Unit (M.R.C.)
Llandough Hospital
Penarth
Glamorgan
Telephone: 0222 708761

STEVENAGE
Air Pollution Research Unit (M.R.C.)
Warren Spring Laboratory
Gunnells Wood Road
Stevenage
Herts
Telephone: 0438 3388

SUTTON
Radiological Protection Society (jointly with Ministry of Health)
Clifton Avenue
Belmont
Sutton
Surrey
Telephone: 01-643 5441

(b) *London*

Air Pollution Research Unit (M.R.C.)
St. Bartholomew's Medical College
Charterhouse Square
London EC1
Telephone: 01-253 1537

Blood Group Research Unit (M.R.C.)
Lister Institute of Preventive Medicine
Chelsea Bridge Road
London SW1
Telephone: 01-730 4042

Central Public Health Laboratory
Colindale Avenue
London NW9
Telephone: 01-205 7041

Central Public Health Laboratory Service
24 Park Crescent
London W1
Telephone: 01-636 2223

Department of Clinical Research
University College Hospital
Medical School
London WC1
Telephone: 01-387 5861

Department of Research and Development
Old Admiralty Building
Whitehall
London SW1
Telephone: 01-930 9000

Environmental Physiology Research Unit (M.R.C.)
London School of Hygiene and Tropical Medicine
Keppel Street (Gower Street)
London WC1
Telephone: 01-636 8636

National Institute for Medical Research
The Ridgeway
Mill Hill
London NW7
Telephone: 01-959 3666

Occupational Health Unit (M.R.C.)
Central Middlesex Hospital
Park Royal
London NW10
Telephone: 01-965 5733

Social Psychiatry Research Unit (M.R.C.)
Institute of Psychiatry
Maudsley Hospital
Denmark Hill
London SE5
Telephone: 01-703 5411

Statistical Research Unit (M.R.C.)
University College Hospital
115 Gower Street
London WC1
Telephone: 01-383 7651

Unit for the Study of Environmental Factors in Mental and Physical Illness (M.R.C.)
London School of Economics
Houghton Street
Aldwych
London WC2
Telephone: 01-405 7686

Social Medicine Research Unit (M.R.C.)
London School of Hygiene and Tropical Medicine
Keppel Street (Gower Street)
London WC1
Telephone: 01-636 8636

RESEARCH UNITS AND SERVICES
(*London*)—continued

Vision Research Unit (M.R.C.)
Institute of Ophthalmology
Judd Street
London WC1
Telephone: 01-387 9621

(c) *Trade Research Organisations*

BIRMINGHAM
Rubber Manufacturers Employers Association
Health Unit
Scala House
Holloway Circus
Birmingham
Telephone: 021-643 9269

CARSHALTON
British Industrial Biological Research Association
Woodmansterne Road
Carshalton
Surrey
Telephone: 01-643 4411

KETTERING
Shoe & Allied Trades Research Association
Satra House
Rockingham Road
Kettering
Northants
Telephone: 0536 3151

LONDON
British Iron and Steel Research Association
140 Battersea Park Road
London SW11
Telephone: 01-622 5511

Central Electricity Generating Board
Research and Development Department
Grindall House
25 Newgate Street
London EC1
Telephone: 01-248 1202

ROCHDALE
Asbestos Research Council
c/o Turner Bros
Box No. 40
Rochdale
Lancashire
Telephone: 0706 47422

SITTINGBOURNE
Tunstall Laboratory
Shell Research Limited
Woodstock
Sittingbourne
Kent
Telephone: 0795 4444

MACCLESFIELD
Imperial Chemical Industries Limited
Industrial Hygiene Research Laboratories
Alderley Park
Nr Macclesfield
Telephone: 0996 6 2711

CAMBRIDGE
Fison's Pest Control Limited
Harston
Cambridge
Telephone: Harston 312

UK ORGANISATIONS WITH WORLD WIDE INTERESTS

Imperial Chemical Industries Ltd.
Imperial Chemical House
Millbank
London SW1
Telephone: 01-834 4444

British Petroleum Co. Limited
BP House
Ropemaker Street
London EC2
Telephone: 01-920 8000

Esso Petroleum Co.
Esso House
Victoria Street
London SW1
Telephone: 01-834 6677

Kuwait Oil Co. Limited
Burgan House
105 Wigmore Street
London W1
Telephone: 01-486 6611

Shell Group of Companies
Shell Centre
London SE1
Telephone: 01-934 1234

Tate & Lyle Limited
21 Mincing Lane
London EC3
Telephone: 01-626 6525

Unilever Limited
Unilever House
Blackfriars
London EC4
Telephone: 01-353 7474

Management

Although the need to "manage" must be as old as the first attempts of human beings to organise themselves and their resources we still have difficulty accurately defining just what management is, or more accurately, where management as such takes over from the other processes in an organised system.

Possibly one of the best, and certainly one of the shortest definitions of management is that of Col. L. Urwick, a founder of Urwick Orr & Partners, Management Consultants. He describes management simply as "getting things done through people". This definition stresses the importance of human resource management. There are, of course, other management responsibilities; for money, materials, plants, etc., but central to any true management task is the business of organising, motivating and controlling human resources.

This definition does not fit all of the jobs which have "manager" in their title but this does not necessarily detract from its accuracy. The words "manager" and "management" are thrown about very freely these days and the terms themselves can be very misleading. Just as there are people called managers who do not manage, there are equally large numbers of people, such as headmasters, abbots, army officers, etc., who are not called managers but are almost exclusively employed as such in Urwick's definition of the word. Some of these people may even resent the inference, which is certainly not implicit in their job titles, but they are managers none the less.

Some of the confusion about what management is, and what managers do, springs from a failure to see the difference between "management" and "business". Largely because most managers, or at least more managers with the word manager in their job title, are to be found in business than elsewhere the assumption that the two go together has become widely accepted. Nothing could be further from the truth. Certainly one could not hope to run a business without managers, but there is ample scope for managers outside the confines of business and the basic principles and techniques of management apply throughout a wide range of human activity.

However in this brief survey we are primarily concerned with management in industry, commerce and public administration. This is where the major developments in management science and techniques have taken place and where management principles are given their widest application.

A SHORT HISTORY OF MANAGEMENT PRACTICE

There is nothing static about management. Massive changes have taken place in the last sixty years producing what could well be described as a revolution in management practice. These changes have been a direct result of the growing complexity of industry and commerce, the effects of technological innovation and the pressures of social and political change. At the beginning of the century management was a much easier, intuitive business than it is today. Companies had much simpler organisation structures and there were fewer people at management level. Today companies are generally much larger, much more complex and employ many more managers and management specialists.

As a result of these new pressures upon managers the nature of their work has changed, demanding new skills and new knowledge. The intuitive, often autocratic style of management which characterised the nineteenth century has no place in industry and commerce today.

Managers today are more professional, more specialised and better trained.

Two changes have affected management practice more than any of the others. These are the changes in organisation structure and the shift from the predominantly seller's market of pre-war years to the almost exclusively buyer's market which now exists.

The gradual move to a buyer's market for a wide range of industrial products and services over the last forty years is largely responsible for the growth in importance of marketing as a management function. Effective and efficient marketing is now fundamental to the success of almost every sector of industry and commerce. No longer is it sufficient to manufacture something and then wait for the buyer to come along. Markets must first be painstakingly researched, products manufactured to precise market requirements and the finished goods distributed to customers following a complex process of advertising and sales promotion.

As for the structure of organisations the principal change this century is that of ever increasing size. The massive multi-industry companies which now dominate business throughout the developed countries are the latest stage in the process of collectivisation which began with the industrial revolution. This does not apply solely to manufacturing industries. The Civil Service, Local Government and the service industries have also grown and are now experiencing the same management problems and challenges facing manufacturing industry.

Increased size demands more orderly administration, more levels of authority and firmer control if consistency and efficiency are to be maintained. As a result organisations have become more complex. Increased complexity has in turn encouraged the growth of bureaucracy by creating specialised jobs, precisely defined levels of management authority and a demand for systems and procedures. The effects of increased bureaucracy are also noticeable on the shop floor where there is emphasis on the division of labour, work study techniques and productivity incentives.

These changes have affected management philosophy as well as management practice. At the beginning of the twentieth century large scale mass production manufacturing began in earnest. With this change in the technology and structure of industry came the first real attempts to establish some kind of management philosophy. Henri Fayol* and Frederick Taylor,† working separately in America and France, developed an approach to organisation planning and control which became known as the "Scientific Management" movement. The philosophy

* *General and Industrial Management* Henri Fayol, Pitman, London, 1949. (First published in France 1916).

† *The Principles of Scientific Management* Frederick Wimslow Taylor, Harper & Row Ltd, New York, 1911.

of both these researchers was essentially mechanistic. Fayol concentrated on methods of structuring and administering organisations and Taylor developed techniques, based on the division of labour, which later became the basis of a whole range of Work Study and Industrial Engineering practices.

The application of these techniques was successful in that for the next thirty years there was considerable growth in productivity and efficiency. However, this was also a period of high unemployment and social unrest which led people to question this rational, but often de-humanised approach to administration and control. The upheavals of the Second World War, and the increased prosperity which followed it, revealed further weaknesses and limitations in these systems and there was growing concern about the sociological implications.

This concern led to the second major change in management philosophy this century—the shift to a management style based on an understanding of human relations and applied social science, or what the Americans have termed the "behavioural sciences". Central to this new management philosophy is a concern for employee motivation. The "scientific management" school relied exclusively on financial incentives to motivate their workforces. The division of labour and payment by results were thought to be the only ways to establish and maintain high levels of productivity.

Ironically the birth of the social science approach to management can be traced to an experiment concerned solely with the physical working conditions in a factory. Between the years 1924 and 1932 a number of studies were carried out at one of the Western Electric Company's factories in the town of Hawthorne, near Chicago. Designed to bring under control all the known factors affecting work performance, the experiment began with a study of lighting.

The performance of a group of production workers was measured during a series of improvements in the lighting conditions of their workshop. Not surprisingly the experimenters noted an improvement in output. To prove conclusively the relationship between lighting conditions and production rate, the quality of the lighting was then steadily reduced. Instead of the expected fall in output the experimenters found that production continued to increase. Indeed the increased output was maintained after the lighting conditions had been reduced well below the original level at the beginning of the experiment.

The only possible explanation for this phenomenon was the fact that an experiment was being conducted—this indicating concern for the workers and for their working conditions. It was this concern that was the motivator, not the modifications to the work environment.

This phenomenon has come to be known as the Hawthorne Effect. Whilst having little or no bearing on organisation management at the time, it did generate academic interest and stimulate research which has since proved invaluable.

Abraham Maslow* was responsible for some of the earliest work on motivation theory and laid the foundations for much of the management practice based on applied behavioural science. He argued that motivation came from within an individual as he seeks to achieve some specific goal. He suggested that man's basic needs can be set out in a simple hierachy.

Need for self-actualisation (self-fulfilment)
Need for esteem

* *Motivation and Personality* A. Maslow, Harper & Row, New York, 1954.

Need for belongingness and love
Safety needs
Physiological needs

Maslow's argument is that an individual experiences these needs in ascending order. The next need only becoming a source of motivation when the previous need has been satisfied. In Western society we can claim to have dealt adequately with the basic physiological and safety needs but most industrial jobs offer little to satisfy the need for esteem, belongingness and self-fulfilment.

Frederick Herzberg* took this theory a stage further during an extensive research programme into job-attitudes, initially of a group of American accountants and engineers, but later with many other very different groups from all over the world. His method was to ask people to describe work situations in which they found unusual satisfaction and also those in which they found unusual dissatisfaction. He found a distinct pattern of factors emerged; some satisfying and some dissatisfying. The "satisfiers" related to the content of the work whilst the "dissatisfiers" related more to the conditions of the work, the latter group corresponding closely to the lower sets of needs in Maslow's hierachy.

The satisfiers or motivators were:

Achievement
Recognition
The work itself
Responsibility
Advancement
Growth

and the dissatisfiers (Herzberg called them hygiene factors) were

Company policy and administration
Supervision
Working conditions
Interpersonal relations
Salary
Status
Job security
Personal life

Herzberg regards the dissatisfiers as deficit needs in that their importance is felt only when they are absent. A man will take good working conditions for granted but they will not give him any particular job satisfaction. On the other hand bad working conditions are invariably a source of dissatisfaction.

Whilst progressive companies may satisfy all the dissatisfier needs, few actively pursue the task of helping their employees towards self-fulfilment by satisfying their motivational needs. Slavish followers of the Scientific Management school continue to put their effort into the "dissatisfier" areas by improving working conditions and applying more and more elaborate financial incentive schemes—this effort rarely being rewarded with improved performance. Greater success has come to those organisations who have applied Herzberg's ideas and tried to increase the challenging content of a job so that a man can grow in skill, responsibility and a feeling of accomplishment. This approach to human resource management, called

* *Work and the Nature of Man* F. Herzberg, World Publishing Co., New York, 1966.

"Job Enrichment" by Herzberg, has growing support from managers, particularly in the manufacturing industry.

The behavioural scientist who has made the greatest impact on management style in the last twenty years or so, is the late Douglas McGregor.*

In his influential book *The Human Side of Enterprise* he suggests that there are two sets of beliefs about the nature of Man and his attitude to work. The first is that people are inherently lazy and must therefore be threatened or bribed into improved performance. The second is that people work best when they are involved and committed and that improved performance is achieved by providing opportunity for this in the work environment.

McGregor has elaborated these two theoretical views into what he calls Theory X and Theory Y.

Theory X is the conventional, traditional way of viewing people in an organisation. Essentially:

the average human being has an inherent dislike of work and will avoid it if he can;

because of man's dislike of work he must be coerced, controlled, directed or threatened with punishment to get him to make any effort towards the achievement of organisational objectives;

the average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition and wants security above all else.

Theory Y is a theoretical structure built on behavioural research. Essentially:

the expenditure of physical and mental effort in work is as natural as play and rest;

external control and the threat of punishment are not the only means of getting men to work towards the organisation's objectives. Men will exercise self-discretion and self-control towards achieving objectives to which they are committed;

commitment to objectives is a function of the rewards associated with their achievement;

average human beings learn under proper conditions, not only to accept, but to seek responsibility;

most people are capable of a relatively high degree of imagination, ingenuity and creativity in solving organisational problems;

under the conditions of contemporary life, the average person's intellectual potentialities are being only partially utilised.

McGregor did not suggest that either theory was right or wrong or that there were not other alternatives. What he did do, however, was to force us to re-examine the basic assumptions about motivation and human nature.

ORGANISATION STRUCTURE

The structure of any organisation is designed to meet the needs of top management to measure and control the various activities which make up the total organisation. Specialisation and the normal divisions of work dictate much of this structure and

* "The Human Side of Enterprise", D. McGregor, McGraw-Hill, New York, 1960.

in particular the division into the main management functions of production, finance, sales/marketing and personnel.

The structure of an organisation is usually shown by means of an organisation chart. The basic top level structure of most manufacturing companies looking something like this:

Managing Director

Production Director	Finance Director	Sales/Marketing Director	Personnel Director

Organisation charts can be deceptive in that they suggest a state of tidiness and order which is not always present in reality. They also represent only the formal structure of an organisation and not the often more important informal structure. Taking as an example the simple structure shown above, one might find in reality that the finance director was regarded as a senior director, even though the chart suggests all four are equal and report directly to the managing director. If this were so the informal reporting procedure may follow more closely the dotted lines in the diagram below rather than the "official" unbroken lines.

Managing Director

Finance Director

Production Director	Sales/Marketing Director	Personnel Director

The next layer of the organisation chart becomes more complex by the addition of new specialisms and the sub-division of the main functions. How the main functions are sub-divided, and what new specialist departments are added, will depend on the nature of the business. A company concerned with technological innovation would probably regard research and development so highly as to rate it alongside the main management functions. A company in a traditional industry, with little likelihood of product change, would put research and development into a minor sub-division of the production function. Companies in the consumer goods business may sub-divide the sales/marketing function into specialist sales, advertising, market research and customer relations departments. Conversely a company whose product was facing little competition, or was so highly specialised that normal marketing practices did not apply, would have a very small marketing function, or none at all, and rate sales as a minor activity.

Organisations are sometimes structured according to their products and the geographical location of their manufacturing and marketing units. Also companies with more than one product may structure their organisation so that their production function is divided into separate units for each product. Similarly companies marketing and distributing their product in several areas may well sub-divide their marketing function into regional departments.

Such sub-divisions appear on the organisations chart thus:

Managing Director

Production Director	Finance Director	Sales/Marketing Director	Personnel Director

Works Manager	Works Manager	Works Manager	N. Region Sales Manager	Mid. Region Sales Manager	S. Region Sales Manager
Product A	Product B	Product C			

The sub-division of the management functions create jobs which are usually classified as either "staff" or "line". Line activities are those directly concerned with achieving the organisation's main objectives. They are, in other words, operational functions. Staff functions are those specialised activities which provide advice and service to the line functions. For instance, selling is a line function in that it is part of the total operation of producing goods and distributing them to the market. Market research, however, is a staff function in that it provides information and advice which helps the people operating the line activities within the sales/marketing function.

A function is not always in the same classification within different companies. An activity considered staff in one company may be line in another. The final designation depends on the organisation's main activities and objectives. A company concerned with new products and technological innovation might well regard research and development as a line function. Another company with a stable product would see research and development as a strictly staff function.

The identification of functions as staff and line is more than an academic exercise. Precise designation is essential if the communications and control systems of the organisation are to be effective. This is vital when designing a new organisation structure, if the problems of relations between departments and functions are to be kept to a minimum.

MANAGEMENT WITHIN THE FUNCTIONAL AREAS

Some of the sub-divisions of the main functional areas are mentioned above but there are many more that result from the application of new management techniques and methods. The following summary lists many of these important specialist activities under each of the four main functions. The summary is written in a way that may make it useful as a brief, but by no means complete, glossary of management activities.

1. MARKETING/SALES

The inability of a company to increase sales is more likely to limit its growth and success than the inability to increase production. The Marketing/Sales function is therefore essential to the prosperity of most industrial and commercial organisations.

There is often some confusion between the terms marketing and sales. Marketing can be thought of as the orientation of the company to meet the needs of the consumer. This gives the marketing specialist the opportunity to influence the product range, design, quality and price as well as to supervise the task of presenting the product to the market. The sales management are usually concerned only with the supervision of the sales force. Some of the specialist activities within the Marketing/Sales function are as follows:

Market Research is the use of surveys, statistical analysis and a variety of other methods in an attempt to identify as accurately as possible the market for a given product. The market researchers also try to assess the type, quality, price and design of the product most likely to appeal to an existing or potential market.

Technical Sales is a function which has developed as the inevitable result of the increasing number of highly technical products now being manufactured. The normal salesman is frequently unable to cope with the technical problems of selling his product and requires the assistance of technically qualified specialists to deal with customer specifications and enquiries. The technical sales department also deals with any customer complaints that involve technical features in the design and specification of the product.

Sales Promotion is the name given to a collection of activities intended to motivate and increase sales. Advertising, although still the main activity in this area, is by no means the only one. Such things as offers, gifts, competitions, credit arrangements, etc., have added enormously to the range of methods available to the sales promoter, particularly in the consumer goods field. New media like television, radio and trade exhibitions have added to the scope of the advertising specialist and also added to the complexity of his work. It is mainly because of the growing complexity of advertising and the use of advanced technical processes, that most large companies hand over part, or all of the sales promotion work to outside agencies and consultants.

Export Marketing is now a specialist area in its own right. This results from the growth and importance of export business and also the need to market more skilfully and efficiently in overseas markets for which many more countries are now competing.

2. PRODUCTION

The production function is concerned with all aspects of the practical business of producing goods for sale. As well as controlling and planning the production processes, the production manager is normally responsible for purchasing raw materials, tools and equipment; designing and developing the product; and maintaining the manufacturing plant and equipment.

The production function has obviously been more affected by technological change than the other main functions. First mass production methods and later automation and mechanisation have revolutionised the way most industrial products are produced. These new processes and systems require the application of many new skills and techniques by production managers and their specialist support staff.

Some of the specialist activities within the production function are listed below:

Research and Development, along with product design, are normally the responsibility of separate functions in medium and large organisations. These functions reporting to top management at the same level as the production director. In smaller companies, or those where up-to-date technology and product design are not key issues, research, development and product design would be controlled by the production management.

Quality Control, always an important requirement, is even more so today with the introduction of increasingly complex products into more discerning and competitive markets. The development of sophisticated test procedures and the application of statistical methods have turned the work once done by sharp eyed inspectors into a specialised technology.

Value Engineering involves the application of a range of techniques aimed at producing a better product at lower cost by making a detailed examination of all aspects of the product, its manufacture and subsequent use. There have been some dramatic cost reductions and product improvements by the application of this process, especially in the engineering industries.

3. FINANCE

The main responsibility of the financial controller is to maintain the company's accounts in a way that meets the requirements of the law and also provides sufficient information and data for top management to control efficiently the business and plan for future developments. This involves the provision of advice on investment and the raising of capital, preparing and controlling budgets and drawing-up the key control documents such as "balance sheets" and "profit and loss accounts".

Some of the methods and techniques used to accomplish these tasks are listed below:

Management Accounting is a system of analysing and presenting financial information to line managers in a way that will help them control their activities more efficiently and profitably. Management Accounting is now widely recognised as a specialised accounting skill involving such techniques as costing, budgetary control and the preparation and presentation of financial data. An important new technique for simplifying complex financial information is by means of "financial ratios".

Financial Ratios are comparisons between figures appearing in a company's balance sheet and other financial documents. Ratios are prepared showing the relationship between such things as Profit and Total Assets, Sales and Stock, Profit and Sales, and many other indicators of profitability and liquidity. By giving managers a clear indication of the strengths and weakness of their business, or individual parts of it, these ratios lead to more effective control and greatly assist with the difficult task of forward planning.

Financial ratios also help managers to compare the performance of their company with that of similar companies in the same industry. Whilst companies have always been able to compare the published balance sheets of other companies, a comparison of certain key ratios is a much simpler and more efficient process. A central agency now exists to which a large number of companies submit in confidence more detailed financial information than one normally finds in published balance sheets. This information is used to prepare a range of ratios which can be circulated to appropriate subscriber companies, providing them with valuable data about the relative financial states of other similar companies, without revealing confidential details.

Accounting Techniques which simplify the presentation of accounting information have been developed, or at least more widely applied, in recent years. These techniques are of great assistance to non-accountant, line managers involved in the application of the management accounting procedures described above. They include "Discounted Cash Flow" (an aid to project planning which simplifies the task of calculating the likely return on a project whilst taking into account the changing value of money over a period of time), and "Break-Even-Charts" (graphical representations of the relationship between fixed costs, variable costs and sales as an aid to costing projects).

These, and many other accounting procedures, are the subject of an excellent book *Essential Accounting for Managers*, by A. P. Robson.*

4. PERSONNEL

A brief definition of the personnel function's objectives would be "to obtain the best possible staff and to look after them in a way that allowed them to do their best for the organisation and for themselves".

The Institute of Personnel Management has published its own rather more detailed definition:

"Personnel Management is a responsibility of all those who manage people as well as being a description of the work of those who are employed as specialists. It is that part of management which is concerned with people at work and with their relationships within an enterprise. It applies not only to industry and commerce but to all fields of employment.

"Personnel Management aims to achieve both efficiency and justice, neither of which can be pursued successfully without the other. It seeks to bring together and develop into an effective organisation the men and women who make up an enterprise enabling each to make his own best contribution to its success both as an individual and as a member of a working group. It seeks to provide fair terms and conditions of employment and satisfying work for those employed."

Below is a summary of the main personnel functions with a list of the activities and responsibilities in each one.

Recruitment

Liaison with sources of staff and employment agencies.
Preparation of job descriptions, employee specifications and employee advertisements.
Selection interviewing and aptitude testing.
Manpower planning and recruitment policy making.

* Published by Cassell, London, 1966.

Conditions of Employment

Preparation and application of the organisation's conditions of employment.
Ensuring the organisation's compliance with employment legislation.
Dismissal procedure.
Maintenance of records.

Health, Safety and Welfare

Dealing with individual staff's personal and domestic problems.
Catering and canteen arrangements.
Recreation amenities.
Ensuring the organisation's compliance with the Factories Act and other legislation.
Accident prevention.
Occupational health.

Salaries and Wages

Design and implementation of the organisation's salary and wages policy.
Performance appraisal and job evaluation.
Supervision of incentive schemes and merit bonuses.

Industrial Relations

Implementation of the organisation's employee relations policy.
Advising top management on Industrial Relations matters.
Negotiations with Trade Unions.
Organisation and supervision of Staff Consultative Committees, Works Councils, etc.
Maintenance of the communication systems between management and employees.
Implementation of industrial relations legislation.
Supervision of grievance procedure and liaison with shop stewards.

Training

Supervision of the organisation's training programmes.
Liaison with Industry Training Boards, Government Training Centres, etc., and compliance with Industrial Training Act requirements.
Selection of external training courses.
Induction training.
Apprentice and trainee training.
Management development.

The above list covers most of the responsibilities of a personnel department in a large progressive company. In smaller companies many of the activities listed would not apply.

In this publication it is not possible to examine all aspects of the personnel function in detail but the following activities have been selected for further discussion.

Recruitment is fast becoming a more exacting and sophisticated business. The wide variety of industrial jobs and the many specialist skills resulting from technological advances are one of the recruiter's major problems. He cannot know enough about all of them to assess each applicant's suitability and must rely more and more on written job descriptions, employee specifications, etc. The use of aptitude tests and other selection devices is now very common, and properly administered they are of great help in the selection and placement of new employees at all levels. There is, however, much skill and care needed in the use of aptitude tests, and in particular those involving some assessment of personality, and the more enlightened organisations employ specialist staff or consultants for this work.

There is also a higher price to be paid for "getting it wrong" these days. Government regulations and trade union restrictions, designed to remove the evils of "hire and fire" approach, prevent the less competent recruiter sacking the misfits and trying again. One has to live with one's mistakes.

Training, always a key personnel responsibility, has increased in importance in the last ten years. The increased skill and knowledge requirement of workers engaged in modern industrial and commercial enterprises is the main reason for this growth of interest in training. New techniques are making the skills of some workers redundant and thus create the need for retraining schemes. The displacement of trades, like riveting by welding processes, and the replacement of steam locomotives with diesel engines demand massive re-training programmes.

The Government interest in the need to develop effective training facilities is reflected in the 1964 Industrial Training Act and the establishment of many new Government Training Centres throughout the country.

The demand for more effective training is by no means restricted to the shop floor. Management and professional workers accept the need for more initial training and follow-up courses throughout their entire business career to develop skill in applying new methods and systems. A more detailed summary of Management Education and Training is given at the end of this chapter.

Industrial Relations is the process of securing co-operation between management and workers to the mutual advantage of both parties. Unfortunately the publicity given to strikes and disputes gives a very false picture of the average personnel managers' involvement in industrial relations. Only a minority of industrial relations problems develop into strikes or serious disputes. Most are dealt with by patient and skilled negotiations between management and representatives of the workers concerned. Efficient personnel management and the proper use of the negotiation machinery being the most effective means of minimising strife.

There are many barriers to good relations which a personnel manager can attack in a positive way; as opposed to his negative involvement in strife. Perhaps the commonest of those barriers is the lack of good communications. Improving communications is a key personnel department activity. It involves the personnel manager in the organisation's joint consultative machinery—Works Councils, Staff Consultative Committees, etc.—and also the provision of works newspapers, notice boards and information bulletins.

Many of the decisions affecting industrial relations practice are made nationally by trade unions, employers organisations and Government departments. Where appropriate the personnel manager would represent his organisation in any such negotiations and be responsible for informing top-management of the implications of any national or local changes in industrial relations policy.

In short, the maintenance of good industrial relations is a detailed, positive activity which involves the personnel manager in the delicate, but vital, task of avoiding misunderstanding between the very different individuals, groups and national bodies concerned with the social aspects of work.

Safety at work is nearly always the responsibility of the personnel function whose job it is to co-ordinate the efforts of safety workers and supervisors. Growing concern for industrial safety has led to tighter legislation and the establishment of various national bodies who advise companies on safety matters.

There are two main ways of making work safer—by educating and training workers in the safe procedures and methods they should use and by re-designing the plant, equipment and systems in a way that reduces accident risk. Both approaches are essential. The personnel manager is well placed to implement the first one as he normally controls the organisation's training policy. In order to achieve safer working conditions he must work closely with engineering and production specialists. The technical nature of this latter requirement has led to the development of specialised safety departments in some companies, these departments being staffed by people with the necessary technical as well as personnel skills.

Occupational Health responsibility for most organisations is mainly a matter of complying with the occupational health regulations so familiar to readers of this book. With few exceptions it is the personnel department's responsibility to deal with all aspects of health and safety and, in those companies that employ full time medical staff, such people report to top-management through the personnel function.

Because the practicalities of occupational health administration are dealt with elsewhere in this book it might be more useful at this stage to explore management's attitudes to the subject rather than its involvement.

It would be nice to think that all organisations were interested in the health and welfare of their employees solely for altruistic reasons. Indeed many firms are extremely concerned about the welfare of their staff and go well beyond the minimum requirements of the occupational health regulations simply out of human interest. There are, however, two distinct pressures which help motivate the less enlightened. These are the pressures of public opinion and the economic realities of absenteeism and poor morale.

With increasing public interest in environmental pollution has come a greater realisation of the health hazards of modern technology. There is also better general understanding of mental ailments, the effects of stress and the causes of psychosomatic illness. This concern, by a better informed public, not only motivates organisations who are slow to improve their occupational health services, it also helps convince employees of the importance of complying with the health requirements adopted by more progressive organisations.

The tangible gains in time and money which come with the prevention of accidents and industrial illnesses are obvious to most organisations. The benefits to be gained from the early diagnosis of a wider range of illnesses, and their speedier treatment, is now becoming equally obvious. As a result there is growing interest in the advantages of medical screening and the provision of more comprehensive health services. Ever increasing labour costs serve to highlight the financial return on any such investment in industrial health which reduces sickness absence.

These factors, combined with the benefits to morale and employee relations, generate a very real interest in occupational health and welfare generally. Let us hope that this new climate of opinion is fully exploited.

4. MANAGEMENT SERVICES

So far we have examined the specialist activities which take place within the main management functions. There are more general activities which apply to more than one functional area. These include such things as "Operational Research" (the application of mathematical methods to the solutions of management problems), "Organisation and Methods" (an advisory service to managers designed to help them increase efficiency by improving the organisation of their staff and equipment and by developing more efficient systems and procedures) and "Work Study" (this is a generic term for a range of techniques, in particular "method study" and "work measurement", which, by examining the application of human effort, lead to the development of better working methods and more economic use of manpower).

Although not a management services activity as such, there is one management technique which is now widely applied across all the management functions and in all kinds of organisations—"Management by Objectives" (MBO).

Management by Objectives is not really a management technique. It is an enlightened approach to the management responsibility of controlling and planning subordinate's activities. As the name implies, the setting and agreeing of objectives is central to the MBO style of management. It is a dynamic system which hinges on a realistic co-operation between managers and their subordinates.

The MBO approach can be briefly summarised as follows:

1. Agreeing with each subordinate the "key results" and "performance standards" he must achieve to meet his unit objectives and hence the organisation's objectives.
2. Agreeing with each subordinate a "job improvement plan" which makes a measurable and realistic contribution to the organisation's plans for better performance.
3. Devising an organisation structure which gives the subordinate maximum freedom to achieve the agreed objectives and ensures that he receives all the management control information he needs to effectively monitor his own progress.
4. Reviewing performance against objectives at agreed intervals and discussing progress and improvements with each subordinate.
5. Using performance appraisals to assess also each man's potential for advancement and promotion.
6. Developing training plans for each subordinate which help overcome weaknesses and build up his strengths.

John Humble* whose books are essential reading for anyone interested in MBO, sums it up most succinctly as:

"Agree with me the results I'm to achieve"
"Give me an opportunity to perform"
"Let me know how I'm getting on"
"Give me guidance and training"
"Reward and promote me on my contribution"

SUMMARY

In this short survey only the briefest descriptions have been given of the main functions of organisational management. Many important activities have been left out and some of the sketchy descriptions do little justice to the complexity and importance of the practices they describe. Those readers who would like to learn more will find the reading list at the end of this chapter helpful. There also follows a list of professional bodies and other organisations with an interest in management and some sources of management education and training in the United Kingdom.

A. PROFESSIONAL MANAGEMENT ORGANISATIONS

1. The British Institute of Management, Management House, Parker Street, London, WC2B 5PT. Tel. 01-405 3456.

Founded in 1947, the British Institute of Management is the largest Institute of its kind in the world. Its object is to promote the highest standards of management in both the public and private sectors of the economy.

Its services consist broadly of providing education and information on the many aspects of management and include:

Conferences, Courses and Seminars
Surveys and Publications

The Institute carries out a number of surveys each year on subjects which are of importance to management. It also publishes Checklists, Information Sheets, as well as Guidelines specially designed to help smaller businesses.

BIM Regular Publications

The Institute's official monthly journal is *Management Today*. BIM also publishes a quarterly journal, *Management Abstracts* as well as two other quarterly publications, *Quarterly Review of Services for Collective Subscribers* and a *Bulletin for Individual Members*.

* "Improving Business Results" J. W. Humble, McGraw-Hill, London & New York, 1968.
"Management by Objectives in Action" J. W. Humble, McGraw-Hill, London & New York, 1970.

Library

As well as a large number of books and periodicals on all aspects of management, the library also contains a unique collection of unpublished material including company manuals supplied by member organisations.

Information Services

A team of Information Officers deal with general enquiries and two specialist units handle enquiries on management education and management consulting services. These units are respectively the "Management Education Information Unit" and the "Management Consulting Services Information Bureau."

2. The Industrial Society, Robert Hyde House, 48 Bryanston Square, London, W1H 8AH. Tel. 01-262 2401.

The Industrial Society's stated aim is to promote the industry and commerce of the United Kingdom, in particular by improving management and industrial relations. Its services include:

Advisory Services

This includes surveys and reviews of employment conditions.

Information Services

Dealing with legal and general enquiries.

Conferences, Courses and Seminars

3. The Institute of Personnel Management, Gillow House, 5 Winsley Street, Oxford Circus, London, W.1. Tel. 01-580 3271.

The Institute of Personnel Management is the professional body of men and women employed in personnel management jobs. Its general aims are to encourage and assist the development of personnel management by spreading knowledge and information about its practices, promoting research and organising courses. It has a library, an information service and a publications department.

4. The Institute of Marketing, Moor Hall, Cookham, Berkshire, SL6 9QH. Tel. Bourne End 24922.
5. Institution of Works Managers, 45 Cardiff Road, Luton, Bedfordshire, LU1 1RQ. Tel. 0582 37071.
6. Institute of Cost and Management Accountants, 63 Portland Place, London, W.1. Tel. 01-580 6542.
7. Institution of Production Engineers, 146 Cromwell Road, London, SW7 4EF. Tel. 01-370 6981.
8. Institute of Works Study Practitioners, Staff College, Loughborough University of Technology, Loughborough, Leics. Tel. Loughborough 66671.
9. Institute of Supervisory Management, 22 Bore Street, Lichfield, Staffordshire. Tel. Lichfield 51346.
10. Society for Long Range Planning, 131 Terminal House, Grosvenor Gardens, London, S.W.1. Tel. 01-730 4774.

11. The National Computing Centre Ltd., Audrey House, Ely Place, London, E.C.1. Tel. 01-242 1044.
12. The Consultative Council of Professional Management Organisations (CCPMO), c/o Institute of Secretaries and Administrators, 16 Park Crescent, London, W.1. Tel. 01-580 4741.
    CCPMO is an informal group of professional management organisations. They meet at regular intervals to discuss matters of mutual interest and ex-exchange information on management topics. The following organisations are members of CCPMO:

    British Institute of Management.
    Chartered Institute of Secretaries and Administrators.
    Institute of Cost and Management Accountants.
    Institute of Management Consultants.
    Institute of Marketing.
    Institute of Administration Management.
    Institute of Personnel Management.
    Institution of Personnel Management.
    Institution of Production Engineers.
    Institute of Purchasing and Supply.
    Institution of Works Managers.

B. SOURCES OF MANAGEMENT EDUCATION

Management education and training in the United Kingdom can be roughly divided into two sectors.

(*a*) Post-graduate education—courses leading to a second degree normally taken at the beginning of a manager's business career; and
(*b*) Post-experience education—courses of various lengths attended by experienced managers at appropriate times throughout their working lives.

Post-graduate courses, and recently a number of undergraduate programmes in management and business studies, are offered by the Business Schools and many universities and polytechnics. The same establishments offer post-experience courses but in addition such courses are organised by technical colleges, professional management organisations and a number of independent management colleges.

The qualifications offered at post-graduate level are usually either M.A. or M.Sc. degrees in business studies although one or two colleges offer American type M.B.A. (Master of Business Administration) degrees. There are also a number of universities and business schools that have programmes leading to masters degrees in specialist management subjects such as Operational Research, Industrial Relations, Finance, etc.

The post-graduate and undergraduate courses in the polytechnics lead to C.N.A.A. (Council for National Academic Awards) degrees. In addition many polytechnics arrange post-graduate courses leading to the award of the Diploma in Management Studies.

Post-experience courses are usually non-qualification courses or else lead only to college diplomas as opposed to recognised degrees or national diplomas.

Institutions providing Management Education and Training

The following list includes only a few of the major centres. For a more comprehensive list, and details of the courses offered, consult the various educational directories (such as those published by the Cornmarket Press) or contact the Management Education Information Unit at the British Institute of Management.

Post-Graduate Programmes

London Graduate School of Business Studies, Sussex Place, Regents Park, London, NW1 4SA. Tel. 01–262 5050.
Manchester Business School, Booth Street West, Manchester, M15 6PB. Tel. 061–273 8228.
Scottish Business School, Stock Exchange House, 69 St George's Place, Glasgow, G2 1EU. Tel. 041-221 3142.
Bath University of Technology, School of Management, Rockwell, Kings Weston Road, Bristol, BS11 0UY. Tel. Avonmouth 2682.
Durham University Business School, 36 Old Elvet, Durham. Tel. Durham 4466.
Loughborough University of Technology, Loughborough, Leics. Tel. Loughborough 63171.
Bradford University Management Centre, Emm Lane, Bradford 9. Tel. Bradford 42299.
University of Warwick, School of Industrial and Business Studies, Coventry, Warwickshire. Tel. Coventry 24011.
Brunel University, Kingston Lane, Uxbridge, Middlesex. Tel. Uxbridge 37188.
The City University, Graduate Business Centre, Gresham College, Basinghall Street, London, EC2V 5AH. Tel. 01-606 2043.
University of Aston in Birmingham, Department of Industrial Administration, Maple House, 158 Corporation Street, Birmingham, B4 6TE. Tel. 021-359 3611.
Polytechnic of Central London, School of Management Studies, 35 Marylebone Road, London, NW11. Tel. 01-486 5811.
Thames Polytechnic, School of Management, Riverside House, Beresford Street, Woolwich, London, SE18 6BU. Tel. 01-854 2030.
Anglian Regional Management Centre, Danbury Park, Danbury, Essex. Tel. Danbury 2141.

Post-Experience Programmes

(all the above institutions also arrange post-experience programmes)
Ashridge Management College, Berkhamsted, Herts. Tel. Little Gaddesden 3491.
The Administrative Staff College, Greenlands, Henley-on-Thames, Oxon, RG6 3AU. Tel. Henley 4444.
Sundridge Park Management Centre, Bromley, Kent, BR1 3JW. Tel. 01-460 9821.
Urwick Orr Management Centre, Baylis House, Stoke Poges Lane, Slough, Bucks. Tel. Slough 22267.

Organisations concerned with Management Education

The following organisations are involved directly with some aspect of management education and training. (The professional management organisations listed above also have considerable involvement in management education, but as part of their general interest in management.)

The British Association for Commercial and Industrial Education (B.A.C.I.E.)
16 Park Crescent, London, W1N 4AP. Tel. 01-636 5351.

This Association arranges conferences, courses and seminars aimed at improving the standards of education and training that takes place within industrial and commercial organisations. They also publish occasional reports and a regular bulletin.

The Council of Industry for Management Education (C.I.M.E.)

Management House, Parker Street, London, WC2B 5PT. Tel. 01-405 3456.

The Council of Industry for Management Education was formed in 1967, its sponsoring bodies being the Confederation of British Industry, the British Institute of Management, and the Foundation for Management Education. It acts as a focal point of authority for industry in the field of management education.

The Foundation for Management Education (F.M.E.)

Management House, Parker Street, London, WC2B 5PT. Tel. 01-405 3456.

The Foundation for Management Education was established in 1960 with the object of promoting management education in the United Kingdom at university level. In 1964 the Foundation was given the task of deploying the funds contributed by industry and commerce for management education following an appeal by C.I.M.E.

The Business Graduates Association (B.G.A.)

2 Albert Gate, London, S.W.1. Tel. 01-235 1562/2895.

This is an association of business graduates from a number of selected universities and business schools in the United Kingdom and overseas. Although primarily concerned with matters of interest to its members, the Association is a considerable source of general information on post-graduate management education.

The Association of Teachers of Management (A.T.M.)

Department of Business and Social Studies, University of Wales, Institute of Science and Technology, 3rd Floor, Arlbee House, Greyfriars Road, Cardiff, CF1 3AL. Tel. Cardiff 42522.

Concerned primarily with the improvement of teaching standards in management education, the Association arranges conferences and seminars on a wide range of management education topics. Through a system of specialist interest groups it has also carried out some research of interest to both academic and company based training specialists.

READING LIST

Management Principles and Practice

Argenti, John, *Management Techniques: a Practical Guide*. Allen & Unwin, London, 1969.

Denyer, J. C., *Student's Guide to the Principles of Management*. The Zeus Press, London, 1968.

Drucker, Peter F., *Managing for Results*. Pan Books Ltd., London, 1967.

Drucker, Peter F., *The Practice of Management*. Pan Books Ltd., by arrangement with William Heinemann Ltd., London, 1968.

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Stewart, Rosemary, *Managers and their Jobs.* Macmillan, London, 1967.

Specialist Management Subjects

Buffa, Elwood S., *Modern Production Management* (3rd Edn.), Wiley, New York, London, 1969.
Clay, M. J. and Walley, B. H., *Performance and Profitability; a Manual of Productivity and Cost Reduction Techniques for Industry and Commerce.* Longman & Green, 1965.
Crichton, Anne, *Personnel Management in Context.* B. T. Batsford Ltd., London, 1968.
Deverell, Cyril Spencer, *Personnel Manager: Human Relations in Industry.* Gee & Co. (Publishers) Ltd., London, 1968.
McGregor, D., *The Human Side of Enterprise.* McGraw-Hill, New York, 1960.
McIver, Colin, *Marketing* (3rd Edn,) revised and edited by Gordon C. Wilson. Business Publications Limited on behalf of The Institute of Practitioners in Advertising, London, 1968.
Humble, J. W., *Improving Business Results.* McGraw-Hill, London and New York, 1968.
Humble, J. W., *Management by Objectives in Action.* McGraw-Hill, London and New York, 1970.
Pigors, Paul John William *and others* (ed.). *Management of Human Resources by Paul Pigors,* Charles A. Myers and E. T. Malm (2nd Edn.). McGraw-Hill, New York, 1969.
Pigors, Paul and Myers, Charles A., *Personnel Administration: A Point of View and a Method.* (6th edn.). McGraw-Hill, New York, 1969.
Robson, A. P., *Essential Accounting for Managers.* Cassell, London, 1966.
Willsmore, A. W., *Accounting for Management Control.* Pitman, London, 1971.

Trade Unions

Organisation

As from February 1974, 103 unions will be affiliated to the Trades Union Congress with a total of nine and three quarter million members. These include craft unions, industrial unions, general unions and white collar unions. Although this group of unions represents only some 40% of the wage and salary earners in the country their capacity to speak with one voice through the TUC makes them a powerful influence consulted by the Government—of whatever colour—on a wide range of social and economic issues.

Each union is autonomous and is vertically organised from an elected executive down to local branches. According to the size of the union, it employs a series of full time national, regional, district and local officers but much of the day by day work is done voluntarily by branch officers and shop stewards. There are considerable variations in local and national organisations. Each union guards its autonomy jealously though it may have horizontal arrangements with other unions in the local area via trades councils, with other unions in the same industry via federations with other unions at national level within the TUC and at the international level with its counterparts continentally or globally through the International Labour Organisation, the International Confederation of Free Trade Unions or the many international industrial union organisations.

The TUC is governed by a General Council of 36 members selected according to numbers and occupational groupings and including two women. The various committees of the General Council are serviced by a secretariat headed by the General Secretary who is at present Mr. Lionel Murray. Occupational safety and health comes within the area of concern of the Social Insurance and Industrial Welfare Committee which meets monthly to consider a wide range of topics. The medical adviser is loosely attached to the Social Insurance Department though his work covers the area of other committees and departments. In addition he provides a service to affiliated unions with the help of the TUC Centenary Institute of Occupational Health.

The Report of the Trades Union Congress is published annually and this gives an account of its work throughout the year.

Functions

The function of a union is to obtain the best possible conditions for its members in respect of pay, holidays and working conditions. In the area of occupational safety and health this is achieved at the TUC level by discussions and correspondence with ministers and government officials and by agreements with the Confederation of British Industry. Within particular industries there are National Joint Industrial Councils and other bipartite bodies on which trade unions play their full part in achieving higher safety and health standards while at the local level trade unions are involved in works safety committees and especially, in the coal industry, as workers safety representatives. Arrangements vary widely from one industry to another. Where no other formal safety and health arrangements are made the local shop steward undertakes the safety work on behalf of the union.

Only two unions have full time safety officers, the National Union of Mineworkers (Mr. K. Saunders) and the Amalgamated Union of Engineering Workers (Mr. J. Hamilton).

Trade unions are very much concerned with compensation for industrial injuries and disease. The TUC is responsible for negotiating with the Department of Health and Social Security the prescription of occupational diseases. Industrial unions through their legal departments fight their members' cases in DHSS tribunals and at Common Law.

Relationship to Occupational Health Services

It is only in rare instances, such as some of the group services that trade unions play their full part. Normally the occupational health service is provided by management and the trade unions meet the doctor and nurse at meetings of the health and safety committee. There tends to be some suspicion of occupational health services among trade unionists but this only rarely applies to the nationalised industries and does not as a rule apply to "our own doctor or nurse".

There is at present great scope for effective trade union involvement in occupational health services. In many cases there is useful prior consultation but in even more this essential prerequisite of good industrial relations is absent.

Relationship to Management

There is no point in concealing the essential conflict between management and workers. This is evident enough in the area of pay and conditions negotiations but it also spills over into safety and health. It has been pointed out by Cronin that good industrial relations, mutual understanding of the problems of the other side, is at the bottom of good safety and health performance. In some cases, all too few, safe and healthy conditions of work are a part of the written contract between workers and employers and the nature of equipment and practices are spelt out in detail. In too many cases, however, no formal or informal understanding exists and both management and workers are guilty of unsafe short cuts to production.

Training Courses in Safety and Health

The TUC at its training college in TUC headquarters conducts safety and health courses at roughly two monthly intervals. Most of these are for one week. Summer schools are held at York University and Ruskin College, Oxford, which include courses on safety and health. Weekend schools are held frequently throughout the country. Many of these are organised by the TUC Education Department while individual unions make arrangements for weekend schools and other safety and health training courses at their own further education centres.

TUC References

Starting from 1968
TUC Annual Report 1968, Section D, 193–222.
TUC Annual Report 1969, Section E, 247–281.
TUC Annual Report 1970, Section E, 249–282.
TUC Annual Report 1971, Section E, 106–138.
Sections D & E under Social Insurance and Industrial welfare.
All these Reports are published by Authority of the Congress and the General Council, Congress House, Great Russell Street, London, W.C.1.
The History of the TUC 1868–1968 A Pictorial Survey of a Social Revolution. Published by the General Council of the Trades Union Congress, Congress House, Great Russell Street, London, W.C.1.

Environmental Pollution Problems in the United Kingdom—a Review of Present Legislation, and Voluntary Attempts at Control and Conservation

POLLUTION: AIR

A Department of Trade and Industry report in 1972 reveals that *the daily average smoke concentrations in urban areas of Britain decreased by about* 60% *between* 1961 *and* 1971, and sulphur dioxide concentrations fell by 30%. If progress continues at this rate it is hoped that *industrial cities should be largely smokefree by the late* 1970's.

A major London pollution disaster, the smog of 1952, gave impetus to the passing of the Clean Air Act of 1956. This was later reinforced by a further Act in 1968. The Clean Air Acts gave priority to the reduction of smoke, and the London Boroughs have completed over 80% of the programme to make Greater London a smokeless city by 1980. The yearly average concentration of smoke in London is less than one-fifth of the pre-1956 level. *As a result, there has been no smog for the last ten years, and the clarity of the air in winter has improved dramatically: sunshine during the winter has increased by* 50%. Several hundred varieties of plants which formerly could not survive in the smoky air of Central London now thrive in parks and gardens, and the number of species of bird life has doubled.[1]

SMOKE from Domestic Premises

Under the Clean Air Act 1968 local authorities can make "smoke control orders" which prohibit the emission of smoke from chimneys in a particular area. Over 5 million premises are now covered by orders.

From Industrial Processes

Over 60 processes producing particularly noxious or offensive emissions that are technically difficult to reduce have been brought under the control of the Alkali Inspectorate. These include processes in the chemical, metal manufacturing, ceramic and allied industries, production and processing of ammonia, cement and brick works and the generation of electricity by thermal means. Most other dangerous industrial materials and processes are controlled by the Factories Act of 1961 and its subsequent additional regulations such as the asbestos regulations of 1969 which came into operation in May 1970.[2]

From Other Industrial Processes

Industrial processes not within the scope of the Alkali Act are subject to the control of local authorities under the Clean Air Act. The emission of dark smoke from any trade or industrial premises or from the chimney of any building is, in general, prohibited, and new furnaces must be capable of smokeless operations. The height of the chimney serving a new furnace has to be approved by the local authority, and approved grit and dust arrestment plant must be installed. Regulations were made in 1971 prescribing specific limits to the grit and dust which may be emitted from furnaces.

From Motor Vehicles

Exhausts of heavy goods vehicles are tested annually, and officials of the Department of the Environment carry out roadside spot-checks. Proposals were announced recently to introduce new regulations governing the design of diesel engines.

In 1972 the Government announced a programme to halve the level of lead in petrol over the next four years. The reduction will be from 0·84 gramme a litre—the present maximum—to 0·64 by the end of the year; to 0·55 by the end of 1973; and to 0·45 by the end of 1975.

The Public Interest Research Centre has suggested a Good Petrol Guide for the motorist and that every car should display a notice indicating the grade of petrol it should use. Many run on unnecessarily high grades of petrol and generally the higher the grade the higher the lead content.

Recent evidence suggests that significant accumulation of lead occurs not so much in streets which are washed by rain, but in houses close to busy streets. *More than 15,000 school children are expected to take part in a national survey of air pollution.* They will record the amounts and types of lichen found on trees and walls near their homes. Lichens are sensitive to air pollution, particularly sulphur dioxide, and act as indicators of local conditions. The survey is organised by the Advisory Centre for Education, a charity based in Cambridge. The results will be monitored by the Monks Wood Experimental Station of the Nature Conservancy.

Following reports of abnormal levels of lead found in the blood of some children living near smelting factories the DOE is making a survey of lead pollution in dust and soil samples found around these factories.

National Society for Clean Air

The Society is a voluntary body which helped to instigate the Clean Air Acts of 1956 and 1968 and also the setting up of smokeless zones. They are now carrying out research on the measurement of exhaust from cars.

POLLUTION: WATER

The River Pollution Survey, published in 1971, showed a "noteworthy improvement" in the condition of the 4,500 rivers surveyed in England and Wales, compared with their condition in 1958. But it pointed out that intensive efforts would be required to eliminate the remaining stretches of bad pollution. The Government is giving high priority to public capital expenditure on sewerage and sewage treatment—£1,300 million has been earmarked for this during the next five years: a 50% increase over the £830 million spent during the five years to 1970. A further £500 million will be spent on water supply services.

The Thames

The tidal reaches of the River Thames provide a clear example of the progress made in eliminating pollution. From Roman times, the tidal Thames has been used as a depository for rubbish although the general condition of the river was "reasonable" until the early 19th century. The general introduction of the water-closet in 1810, followed by legislation in 1848 making house drainage obligatory, turned the river into an open sewer. The condition of the river became so offensive that in the 1850's, sessions of Parliament were interrupted and lime-soaked sheets were hung at the windows to reduce the stench. Cholera epidemics (more than 14,000 people died in the outbreak in 1849) led to the setting up, in 1855, of the Metropolitan Board of Works to maintain main sewers and to construct new works to prevent sewage entering the Thames in the London area.

Intercepting sewers were later built to carry sewage beyond the city's limits. The present position is that the wastes of approximately 11 million people enter a 20-mile stretch of the tidal Thames and more sewage effluents are added downstream.

The mechanics of the Thames estuary are such that a slug of polluting matter can travel downstream for 10 miles on the ebbtide, only to return $9\frac{1}{2}$ miles on the floodtide: it is possible for polluting matter to remain in the estuary for between six weeks and three months.

Since 1909, the Port of London Authority has been monitoring major polluting discharges in the tidal Thames. The Authority's jurisdiction extends from Teddington to 50 miles below London Bridge—about 92 miles. Since it owns nearly all the bed and foreshore of the river between Teddington and Southend the Authority can therefore impose licence conditions on the use to which this land is put, which tends to reduce pollution risks. (By-laws prohibit the depositing of solid materials in the river.)

The Port of London Authority is unique in being the only port authority in the country with full pollution control powers. It set up the Thames Survey Committee, under the auspices of the Water Pollution Research Board, in 1949. The PLA has adopted a system for co-ordinating the efforts of local authorities and industrialists, in its fight to reduce the pollution level. It arranges the disposal of sewage from ships in the London docks and operates a scheme for minimising the effects of oil spilt in its area of jurisdiction and for removing the oil.

It reported *a reduction in pollution of* 17% *during the period* 1953–62 *and a further* 23% *by the end of* 1969. Proof of this improvement is to be found in the steadily increasing numbers of fish found in the river, and wild birds found along its banks. (*This year's catch by* 48 *anglers from six Thames beaches between Battersea and Tower Bridge totalled* 352 *fish, the previous best being* 161 *in* 1970. Sea-trout, roach, bream, perch and stickleback are among the fish that have been seen in the river).

Coast, Rivers

The first report of the Royal Commission on Environmental Pollution, in 1971, stated that the Commission's first priority was to "enquire into and report on the problems of pollution of tidal waters, estuaries and the seas around our coast".

There are 1,400 separate river authorities, water undertakings and sewerage authorities in England and Wales but it is proposed to replace these with 10 new regional authorities. The Water Re-organisation Bill is intended to clean up dirty rivers and improve estuaries and coastline. There are also to be stronger safeguards against accidental pollution of ground and surface water, and the Government intends to bring all discharge of trade effluents to sewers under full control.[3]

POLLUTION: OIL

Summer, 1972: All *coastal* authorities have prepared emergency organisations to deal with oil pollution. Every coastal local authority has oil pollution officers who can quickly contact the Department of the Environment in the case of pollution emergencies. Liaison has been established between the government departments, armed forces, the police and the oil industry. DOE are prepared to meet 50% of admissible expenditure of preparations, stockpiling equipment and clearance work.

A new code of practice is being formulated for dealing with inland oil spills—leaks from pipelines and storage tanks or from damaged oil tanker vehicles. Each river authority will be responsible, and emergency exercises will take place at least once a year.

POLLUTION: NOISE

Although Britain was the first country to legislate against traffic noise, it is only recently that noise has been recognised as a major environmental pollutant which can cause mental and physical stress and loss of hearing. *The number of vehicle miles travelled has doubled in the past* 10 *years, and aircraft movements at Heathrow have risen from* 1,000 *in* 1950 *to* 250,000 *in* 1971. It is estimated that traffic noise alone will increase in Britain at the rate of 1 decibel per year.

Noise from Vehicles

Vehicles have long been required to be fitted with efficient silencers which must not be altered to increase the noise emitted. From April 1970, new vehicles have also had to meet quantitive noise limits at the manufacturing stage and in use. There are proposals to make these limits stricter for new cars and motorcycles after 1973, and lorries manufactured after 1974.[4]

Noise from Aircraft

Regulations made in 1970 require future types of subsonic jet aircraft to conform to noise maxima of about half the levels from aircraft now in service, weight for weight. This is in accordance with an international agreement and possible further measures are being studied internationally. Noise abatement procedures are in use at major U.K. airports to reduce disturbance due to aircraft noise by such measures as minimum noise routeing and power cutback for departing aircraft; from 1972 night take offs from Heathrow by jets were prohibited during the summer.

Sound-proofing grants are given for seriously affected dwellings near Heathrow, and similar schemes are to be introduced at Gatwick, Manchester and Luton. The Civil Aviation Act 1971 gives the Government power to designate any U.K. aerodrome for the purposes of controlling noise or requiring the payment of sound-proofing grants. The decision to site the third London airport on the coast in preference to three inland sites was taken on environmental grounds including the minimisation of noise disturbance.

Noise from Industry

Manufacturers of equipment for the construction industry are working to produce quieter road drills and air compressors, involving a pile-driving technique which relies on near-silent hydraulic pressure. By 1980 the Transport and Road Research Laboratory plans to have developed a heavy goods vehicle with a maximum noise level below today's cars. Two electric buses powered by lead acid traction batteries are being used in Leeds, but their top speed is only 25 m.p.h.

British Leyland are experimenting with a gas turbine lorry and Lansing Bagnall's noiseless trucks are in the prototype stage. Rolls Royce are optimistic that within the next decade aircraft engines will be 20 dB quieter than present aircraft. The Rolls Royce powered Lockheed TriStar, visiting Luton Airport in August, 1972, produced noise levels 12 decibels below One Eleven aircraft operating on the same day at Luton.

The Noise Advisory Council

The Council is an advisory body chaired by the Secretary of State for the Environment. Since its foundation in 1970, working groups have studied specific problems and produced two reports. The Council have also recommended the use of the L_{10} Index for measuring and predicting nuisance from traffic noise and have suggested that existing residential development should not deliberately be subjected to more than 70 dB (A) on the L_{10} scale unless some form of remedial or compensatory action is taken by the responsible authority.

The Noise Abatement Society

This independent pressure group's purpose is to eliminate all excessive noise. It provides information on the effects of noise on health and efficiency, and on the legal rights of people disturbed by noise. Their efforts have resulted in many noise control laws, by-laws and regulations being passed in this country. The Society protested against the threat that 40-ton lorries compared with the present maximum of 32 tons, may be permitted on the road when Britain entered the Common Market, and have urged the Government to issue regulations to restrict all such vehicles to motorways, transferring loads on to small vans for deliveries in urban areas.

CONSERVATION AND PRESERVATION

CONSERVATION OF THE COUNTRYSIDE

The Nature Conservancy

For 21 years the Nature Conservancy has played a leading part in ecological research in Britain. It forms part of the National Environmental Research Council, an official body responsible to the Department of Education and Science.

The Conservancy was closely involved in the preparation work which led to the passing of the Countryside Act 1968, and to the setting up of the Countryside Commissions for England and Wales and for Scotland.

The Conservancy advise many bodies about the ecology of plants and animals on their land, especially when it is used as open space for recreation.

Voluntary conservation trusts cover every county in England, Scotland and Wales and have their own nature reserves.

By September 1971, 129 *Nature Reserves had been established totalling* 267,988 *acres.*

Countryside Commission

The Countryside Commission is a statutory body set up by the Countryside Act of 1968. It is responsible for keeping under review matters relating to the conservation and enhancement of landscape beauty and amenity in England and Wales. (Scotland has a separate Countryside Commission set up under its Countryside Act 1967).

An important part of the Commission's responsibilities is the selection and designation of national parks and "areas of outstanding natural beauty" in England and Wales. The Commission also draws up proposals for long distance routes providing continuous public rights of way through the countryside. It makes grants to national parks and to local authorities, finances information services, and research and development. The total annual expenditure represented about 2p per head of population in 1972.

National Parks

At present there are ten national parks—seven in England and three in Wales—with a total area of 5,258 sq. miles or nearly one-tenth of the whole area of England and Wales.

Designated at various dates between 1951 and 1957, the parks are, in order of creation:

National Park	*sq. miles*
Peak District	542
Lake District	866
Snowdonia	845
Dartmoor	365
Pembrokeshire Coast	225
North York Moors	553

National Park	*sq. miles*
Yorkshire Dales	680
Exmoor	265
Northumberland	398
Brecon Beacons	519

In the past year the countryside's first motorless zone has been established in the Peak National Park's Goyt Valley.

In August, 1972, the Countryside Commission proposed a new National Park covering 467 square miles of mid-Wales—mainly in walking and pony-trekking country. If this is confirmed, it will be the 11th National Park in England and Wales since the first was established in 1957.

Areas of Outstanding Natural Beauty

Twenty-seven areas of outstanding natural beauty have been selected at various dates between 1956 and 1970, totalling 4,464 sq. miles ($7\frac{3}{4}$% of the total area of England and Wales). Individually these areas tend to be smaller and possibly less spectacular than national parks. The smallest area is Dedham Vale (22 sq. miles), the countryside immortalised by John Constable; the Cotswold Hills the largest area (582 sq. miles).

The Commission recommends grants of 75% on approved expenditure for the setting up, equipping and management of country parks by local authorities. About 25 acres of land, or land and water, is regarded as the smallest space for a country park and these parks make it easier for townspeople to spend their leisure in the open without travelling far and adding to traffic congestion, without crowding into places that depend for their appeal on remoteness and solitude, and without risking damage to agricultural and other rural interests.

Long Distance Footpaths

The Commission draws up proposals for establishing continuous rights of way along which the public may make long journeys on foot or on horseback or bicycle where the route is a bridleway. Four such long distance paths, open to the public for the entire length are: Pennine Way, (250 miles from Derbyshire to Scotland); Cleveland Way, Yorkshire (93 miles); Pembrokeshire Coast Path (167 miles); Offa's Dyke Path (168 miles along the Welsh border); and the recently (summer 1972) opened South Downs Way (80 miles). Six more bridlepaths have been approved. The North Downs Way in Kent and Surrey, and five sections of the South-West Peninsula Coast Path from North Cornwall to Dorset.

Countryside Commission for Scotland

The report for 1971 reveals that resources have been largely devoted to the basic task of developing countryside policies; territorial studies of areas such as Glen Coe and Torridon; proposals for a West Highland Way long-distance footpath route; outlining methods for the classification of landscape resources; studies of the recreational potential of such things as disused railway lines.

Scotland possesses a country park at Cumbernauld; Clyde Coast Park, Renfrewshire, run by the county council—30,000 acres; the West Lothian Park—24 sq. miles of the Bathgate Hills. Gairloch Park, Wester Ross.

National Forest Parks are:

Glenmore, Speyside	12,500 acres
Argyll	58,000
Glen Troll	110,000
Glen More	12,500
Loch Ard	37,000

The Forestry Commission

The body responsible for growing trees and also for providing recreation and for conserving the beauty, flora and fauna of Britain's countryside is the Forestry Commission.

It was established by Act of Parliament in 1919 and now manages 2,950,000 acres of land—one third in England, one half in Scotland and one sixth in Wales. There are 380 forests and at least one lies in every rural county.

The Commission's primary object is to provide wood for industry. Thus growing tree crops comes first, but this is subject to the limitations imposed by the Commission's declared intention to conserve and control wildlife, to safeguard and enhance the beauty of the landscape and to meet requirements for access and other recreational facilities.

In certain forests very large areas have been preserved such as the 7,000 acres of woods in the New Forest in Hampshire; 2,000 acres of old Caledonian pine forest in Glen Affric, and in the Glen More Forest Park, both in Inverness-shire, Scotland.

Each year the Forestry Commission plants 70 million trees, mainly pines, spruces, larches and firs. They are also involved in the reclamation of coastal sand dunes; principally at Culbin Forest on the Moray Firth (6,000 acres); the Newborough Forest on Anglesey (2,000 acres) and Pembrey Forest in S. Wales (1,000 acres). Also for the afforestation of spoil heaps, and the planting of old industrial workings in the valleys of S. Wales and in the Northern Coal Fields—some sites gradually acquiring characteristics of normal woodland.

The Commission's forests contain several Forest Nature Reserves (which have the same status as National Nature Reserves) and Sites of Special Scientific Interest. In all 20,000 acres of Commission land are under management for conservation purposes.

There is close co-operation with the Council for Nature and many Natural History Societies and individuals concerned with conservation. Commission forests provide facilities for research on wildlife and conservation—school parties visit FC forests in increasing numbers and many School Forest Plots are maintained by rural schools.

There are now over 100 Forest Trails: more are being created every year and Forest Centres—full of information about the natural history of the forest—have been opened. Observation towers for watching and photographing wildlife have proved immensely popular.

Nine major camping and caravan sites, and many smaller ones, are provided in the forests for holidaymakers.

Council for the Protection of Rural England

The Council was set up in 1926 and the constituent bodies include: Ancient Monuments Society; Civic Trust; County Councils Association; Girl Guides Association; National Farmers Union; Royal Institute of British Architects; Town and Country Planning Association.

It concerns itself with roads; local government reform; town and country planning; water and sewage; trees and hedges; litter and refuse; "Best-kept Village" competitions; mineral and derelict land; defence lands; national parks; preservation of buildings; oil pollution of the seas; population policy. The Council is also represented at public enquiries into routeing of motorways, e.g., M3 Winchester bypass; M6 link road.

CPRE followed with close attention the progress of legislation on the 1971 Civil Aviation Act; Dangerous Litter Act; Highways Act; Mineral Workings Act; Town and Country Planning Act; Field Monument Bill; Mineral Explorations Bill; Road Traffic (Foreign Vehicles) Bill.

Conservation Society

The Society is a pressure group, founded in 1966, with a membership of 8,000. It aims to promote a stabilised population and an economy that does not destroy the environment. It implements its aims by education, research, publicity and direct action. Public meetings are held to influence public opinion, reports are sent (unsolicited) to government departments, with memoranda and recommendations. The Society was instrumental in bringing to the public's attention the dumping of cyanide in the Midlands.

Friends of the Earth

This is one of the most effective pressure groups in Britain. In less than two years they have precipitated action on issues ranging from wildlife protection, combating pollution, non-returnable glass bottles, plastic packaging, to exposing the risks to national parks and designated areas from mining developments.

Keep Britain Tidy Group

The Group—an independent registered charity—is recognised by the government as the body responsible for educating public opinion in Britain about the need to prevent the dropping of litter on the streets and in the countryside. Financed by the government, local authorities, voluntary societies, firms and private individuals, the group's activities include campaigns to support the efforts of local authorities, schools, amenity and youth groups to make people more aware of the problem of litter and to suggest methods of preventing its occurrence.

The Litter Act 1958 made it an offence to leave litter on land to which the public has free access and the Dangerous Litter Act 1971 makes improved provision (including increased penalties and fines) for the abatement of litter in this country.

INLAND WATERWAYS

The 1968 Transport Act gave the British Waterways Board a specific duty to promote the recreational use of waterways. *The Board controls* 2,000 *miles of canals and navigable rivers,* 1,500 *miles of which are open to pleasure craft.* It provides uniform standards of maintenance and also provides touring facilities, such as casual moorings.

The Board's 1971 *recreational survey revealed that on one day, more than* 18,380 *boats were out on the Board's canals, rivers and reservoirs in England, Scotland and Wales,* with 46,000 people enjoying some form of waterside activity ranging from angling and walking to just sitting and enjoying the scenery.

The number of craft licensed or registered in 1971 amounted to 13,948, compared with 12,607 in 1970: the Board estimates an annual increase of about 10% in the numbers of people using the waterways for pleasure.

During 1971, the Board set in train the first moves towards barge-carrying ships for through traffic between major inland centres of Britain and the mainland of Europe (the Board operates 23 inland freight terminals, three docks and, in conjunction with private industry, a deep water wharf on the River Trent). 240 miles of "remainder" or derelict waterways have been developed; a further 120 miles were developed for amenity use (fishing, walking); 60 miles were retained for water supply with some amenity use. The Board also carried out planned environmental improvement schemes, providing individual waterways with colour schemes complementary to their immediate surroundings and reflecting additional local materials, style and character.

CONSERVATION OF HISTORIC BUILDINGS

Buildings and areas of particular interest because of their history or architecture receive special protection under the planning legislation from both central and local government. Their protection is also the concern of many voluntary amenity societies. As a guide to local planning authorities, the Secretary of State for the Environment and the Secretaries of State for Scotland and Wales are required by the Town and Country Planning Act 1971 and the Town and Country Planning (Scotland) Act 1969 to compile statutory lists of individual buildings of special architectural or historic interest to give them special legal protection. *By January* 1972, *some* 137,000 *buildings in* England were on statutory lists, including about 2,000 pubs and inns.

All buildings built before 1700 which survive in anything like their original condition are listed. Most buildings of 1700 to 1840 are listed. Between 1840 and 1914 only buildings of definite quality and character. A start is now being made on listing selected buildings of 1814 to 1939.

Inclusion in the statutory lists does not necessarily ensure that a building will be preserved intact but demolition is not allowed unless the case for it has been fully examined, and any alterations must preserve its character as far as possible. Owners of listed buildings can, in many cases, obtain grants or loans to help them meet maintenance costs: *since* 1953, 1,662 *buildings in England have received grants totalling about £7·6 million.*

In Portsoy in north-east Scotland a number of buildings, including seven near the old harbour, have been restored and converted by the local authority as part of their regular housing programme.

New College, now part of Edinburgh University, situated at the top of the Royal Mile, occupied half of a group of tenements, known as Mylne's Court. It had been condemned in 1960 and consequently became derelict. The University has restored and converted Mylne's Court to provide accommodation for 180 students.

Churches

Britain has about 10,000 medieval churches. The upkeep of the old churches is often beyond the means of the parish today. The Historic Churches Preservation Trust, an independent body set up in 1952, distributes grants and has so far helped about 2,500 churches. Many churches launch public appeals to preserve the building, one of the most spectacular being for York Minster, which raised £2 million in about three years.

NATIONAL TRUST

The Trust is first and foremost a preservation society. Its functions are the preservation of great houses; restoration of gardens; continuing role as landowner and forester; maintaining hedgerows and hedgerow trees, planting traditional hardwoods, ensuring the careful design and siting of new agricultural buildings. In Wales and the Lake District, the Trust has a constant struggle to modernise and conserve the small hill farms without which these areas would lose much of their character.

Their activities extend from the protection of Iron Age Barrows to the archaeology of the Industrial Revolution; from the preservation of rare flora to the maintenance of suitable breeding grounds for wildlife.

The Trust have special powers, safeguarded by Acts of Parliament, available to no other conservation bodies in this country, to accept and protect their inalienable properties which can neither be sold nor mortgaged.

On important conservation issues which do not directly affect Trust property, the Trust leaves these to be dealt with by those organisations that have been set up primarily as expressions of public concern or to act as pressure groups such as the C.P.R.E., the Georgian Group, the Victorian Society.

It is assisted by the Historic Buildings Councils and the Countryside Commission. The H.B.C. help with repairs and restoration of buildings and the Countryside Commission contributes towards the cost of wardening many of the most visited open country properties.

According to the 1971 annual report more than 3 million people paid to visit Trust properties during the year.

Enterprise Neptune

This campaign was launched in 1965 to save Britain's coastline. A target of £2 million was set—more than £1·8 million has so far been reached. The campaign has brought under the Trust's protection 143 miles of unspoilt coastline; a further 36 miles are currently under active negotiation. When these negotiations have been completed, Neptune will have brought 179 miles of coast under the Trust's protection. Before the campaign was launched, the Trust already protected 175 miles of coast so the total length now protected or being negotiated is 354 miles.

This amounts to over one-third of Britain's unspoilt coastline, and over one-ninth of the total.

CIVIC TRUST

The Civic Trust is an independent body, founded in 1957. It has initiated hundreds of schemes to brighten and tidy up drab streets, promote new techniques for moving semi-mature trees as part of a wider campaign to plant more trees, and stimulate voluntary action to remove eyesores which mar towns and countryside. Most of its income is from industry and commerce, and it makes awards annually for good development of all kinds. By conference, projects and reports, it focuses attention on major issues in town planning and architecture. Its close association with the drafting of the Civic Amenities Act 1967 resulted in a major step towards the protection of the character of towns against thoughtless redevelopment.

The Trust's first act was to launch a campaign to improve dowdy streets. Pilot schemes at Norwich and Stoke-on-Trent and also a similar scheme at Windsor demonstrated what could be achieved with general co-operation at relatively little cost. The Trust has also initiated action to prevent the desecration of the countryside. It organised a series of camps and beauty spots, dismantled the unsightly remnants of war-time defences and removed eyesores of all sorts.

In London the Trust has encouraged with advice and facilities the four amenity societies which in 1967 published and made over to the G.L.C.'s new Canals Consultative Committee a detailed research study and policy proposal aimed at arresting decay and transforming the future of London's canals.

Civic Trust Awards

Awards and commendations have been made for such projects as the restoration of an 18th century Norfolk rectory (Saxlingham Nethergate); new shopping centres (Andover); old shopping centres upgraded and converted to pedestrian use (Old Harlow) and a floating public house extension (Braunston, Northamptonshire).

Scottish Civic Trust

The Scottish Civic Trust has analysed the fabric state of 4,000 properties in Edinburgh's 18th century New Town. This information has been stored in a computer. As a result an independent organisation has been set up, with local and central official funds, to run a 20 year rehabilitation programme.

Addresses

Dept. of the Environment, Marsham Street, London, S.W.1.
Noise Abatement Society, 6 Old Bond Street, London, W.1.
Nature Conservancy, 19 Belgrave Square, S.W.1.
The Countryside Commission, 1 Cambridge Gate, London, N.W.1.
The Forestry Commission, 25 Savile Row, London, W.1.
The Council for the Protection of Rural England, 4 Hobart Place, London, S.W.1.
The Conservation Society, 34 Bridge Street, Walton-on-Thames, Surrey.

Friends of the Earth, 9 Poland Street, W.1.; 8 King Street, London, W.C.2.
Keep Britain Tidy Group, 86 Strand, London, W.C.2.
National Trust, 42 Queen Annes Gate, London, S.W.1.
The Civic Trust, 18 Carlton House Terrace, London, S.W.1.
National Society for Clean Air, 134 North Street, Brighton.
The Port of London Authority, Thames House, Gallions Entrance, London, E.16.
Inland Waterways Association, 114 Regent's Park Road, London, N.W.1.
The Historic Churches Preservation Trust, Fulham Palace, London, S.W.6.
Natural Environmental Research Council, Alhambra House, Charing Cross Road, W.C.2.

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P. J. LAWTHER

Air Pollution

The air over towns has been polluted for many centuries by products of combustion, complete and incomplete, of fuels. To the coal smoke, which was the predominant pollutant in former times, industry and the motor vehicle have added many more substances of proven or potential toxicity. The modern mixture is extremely complex and the need to determine its chemical and physical nature and the variations in quantity and quality has posed formidable problems in sampling and analytical techniques. Until the revival of interest in air pollution, made urgent by the recognition of the steep rise in the number of deaths when pollution accumulated in high concentrations during temperature inversions, measurements of deposited matter, smoke, and sulphur dioxide were the only data available for medical research on the effects of air pollution on man. These data were all too scanty and much effort has been applied to the development of new and accurate methods of sampling, analysis and scrutiny of pollutants which can be inhaled. Daily measurements of smoke and sulphur dioxide, indicators of inadequate combustion and of the sulphurous impurities in fuel, are still of great value, especially in epidemiological investigations, and the extension of the areas over which these measurements have been made, by means of the institution of a National Survey (Warren Spring Laboratory) has been of inestimable value.

The use of the electron microscope has lead to a much greater knowledge of the structure and composition of the myriads of particles present in town air and in the pioneer work in this field liaison between the M.R.C. and the Safety in Mines Research Establishment was fruitful. Knowledge of the nature of particulate and gaseous pollutants has been essential to the proper study of their clinical effects.

Polluted air can kill the old and ill, can make established disease worse and can cause disease. The most urgent problem posed by air pollution was to identify the pollutants which were responsible for causing deaths and exacerbations of disease during the so-called "smogs". Although few would claim that pollution acted by means of one mechanism there was little doubt that clinical signs of increase in resistance to air flow in the respiratory tract commonly accompanied exposure to foul air and there is no doubt that this could lead to fatal derangement of ventilation in the lungs of patients with serious disease. Whilst analytical techniques were being applied and yielded more precise information about the nature and distribution of gases and particles in the highly polluted air, suspect pollutants, singly and in various mixtures, were inhaled by normal volunteers in the laboratory; alterations in lung function following inhalation of pollutants in realistic concentrations were sought. It is a measure of the complexity of the problem that after many years work, here and abroad, in which many thousands of careful experiments have been done, that the guilty pollutant or mixture of pollutants have not been identified with certainty. An obvious handicap to the experiments is the inability, on ethical grounds, to administer suspect pollutants to the type of patient known to suffer in times of high pollution, but it is possible that the development of finer techniques for assessment of changes in lung function might lead to the detection of significant alterations in normal subjects. These may be justly extrapolated to explain the impairment of function in damaged lungs or hearts. Scrutiny of the wave forms of quiet respiratory flow patterns by the use of modern computer techniques may prove to be a much more sensitive method of appraisal of ventilatory function than the methods hitherto tried.

In addition to the experimental method in which changes are sought following inhalation of prepared mixtures, the long term study of variations in lung function, symptoms, morbidity and mortality as pollution varies in quantity and quality offers great hope. Already there is considerable evidence that as pollution, especially by coal smoke, has fallen in the years which followed the passing of the Clean Air Act (1956), the relationship between concentration of pollutants and variations in health has become steadily less until now it is barely demonstrable. It is hoped that refinement in techniques may yet enable us, by the study of variations of function with pollution, to identify the active pollutant.

The study of the part played by air pollution in the development of chronic bronchitis has been of high priority. This disease, so common and so crippling, has a long history and the suspicion that pollution plays a very important part even in its early development was greatly strengthened by the demonstration that, among 5,000 children, the prevalence of lower respiratory tract infection even in the first year of life, marched with the degree of pollution of their birthplace. These children, all born in one week in 1946 are being followed up into adult life to see if the results to their respiratory systems suffered early in life have had lasting effects. An extension of this work is the current investigation of respiratory symptoms and assessment of lung function in 18 year old people who were born in London before and after the severe pollution episode in 1952. The use of such cohorts promises to yield valuable results.

In simple chronic bronchitis an excessive amount of mucus is produced the clearance of which necessitates repeated coughing. Later in the progress of the disease the respiratory tract becomes infected and irreversible destruction of tissue follows. The development of this unwelcome infection may be influenced by air pollution by means of physical or chemical changes produced in the lining of the air passages or by alteration of the metabolism of invading bacteria; during studies on these problems it has been shown that the growth of *Haemophilus influenzae*, an organism commonly found in the sputum of patients with infective bronchitis, is modified by coal smoke. The relevance of the finding to the aetiology of chronic bronchitis may be limited but the approach is of interest.

Motor vehicle exhausts have been studied with great energy in Britain and in America but often for different reasons. In places with static air, strong sunlight and many motor cars, (Los Angeles was the city where the trouble was first noted), pollutants react in a complex manner to form a haze which irritates the eyes and causes severe plant damage. Whilst this "photochemical" pollutant may be formed transiently in this country work on motor vehicles here has been applied mainly to assess possible hazards of the unpleasant and unnecessary smoke often emitted by diesel engines and to the possible effects of carbon monoxide, lead and other compounds produced from petrol driven vehicles.

Diesel smoke was at one time thought by some to be the cause of the dramatic rise in lung cancer since some carcinogenic compounds had been found in some samples. Extensive survey work in garages, tunnels and streets has produced reassuring results; carcinogenic compounds in diesel soot are present in amounts which are minute when compared to coal smoke; there is no evidence to date that workers in diesel garages have the higher experience of lung cancer which one would note if they were carcinogenic to man. The negative findings in this work are not regarded with complacency; mortality and morbidity statistics in occupations in which men are exposed to high concentrations of exhaust fumes, from both petrol and diesel engines, are being scrutinised lest some delayed effect be manifest.

Carbon monoxide when inhaled interferes with transport of oxygen by the blood and when present in high enough concentrations can impair consciousness and performance. It pollutes the air in traffic laden streets and many measurements have been made of the concentrations commonly found in busy streets. More valuable has been the application of a simple micro method to determine the levels found in blood. Large numbers of measurements have shown that the levels of saturation of the blood in those exposed to much traffic are well below those found in most smokers. Possible effects of comparatively low concentrations of carbon monoxide on perception and the performance of fine tasks (which may be relevant to driving efficiency) have been and are being studied using techniques for assessment which have been developed and recommended by the Applied Psychology Research Unit. The results of experiments, many of which are still being done, are so far reassuring.

Interest in pollution by lead, especially that produced by petrol engines from the combustion of the anti-detonant alkyl lead compounds, has intensified and work similar to that done on carbon monoxide is in progress.

For reasons which were good at the time they were advanced, air pollution was once thought to be a major cause of lung cancer. Much work has been done on the distribution of such carcinogenic compounds as the polycyclic aromatic hydrocarbons commonly found in coal smoke, and on the spatial and temporal distribution of lung cancer as a result of which it has been clearly demonstrated that air pollution, as we have known it, must play but a minor role when compared with the effect of tobacco smoking.

There is wisdom, when studying any of the effects suspect and proven, of air pollution, in remembering that tobacco smoke is the most intense and dangerous form of pollution in which we are commonly exposed. All too often the study of the effects of smoking is regarded as a "separate subject".

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Occupational Health and the Common Market

At present there are nine countries in membership of the European Economic Community, including Great Britain. Details of occupational medicine in these countries are given below.

Belgium

By a law of 1965 occupational health services are obligatory in Belgium. Firms who employ less than 2,500 must either have a physician of their own or participate in a group scheme. Where more than 2,500 are employed more than one physician must be engaged.

The physician is paid by his employer and is not concerned with sickness absence. Duties are mainly preventive and environmental. The objectives of the occupational health services are set out in Article 104 of the Royal Decree by which they were established.

Two years post-graduate training is compulsory.

There are two societies for occupational physicians, one each for the French and Flemish communities.

All enquiries should be addressed to Dr. M. J. Lefèvre, Docteur en Médicine, Service de Médicine du Travail, Solvay & Cie, Societé Anonyme, 33 Rue du Prince Albert, Bruxelles 5, Belgium.

Denmark

There is no separate organisation for doctors working in the occupational health field. All enquiries should be addressed to the Medical Association, Kristiansgede 12, 2100 Køhnhavn, Danemark.

France

Although occupational health services have been provided by law since the end of World War II they have tended to be clinical in orientation for the very cogent historical reason that, at the end of the war, illness and injury had taken such a toll that French industry was in a parlous situation. Inevitably there has, then, been a bias towards the rehabilitation of the disabled, and towards routine medical examination of diverse kinds.

There is no national occupational medical society, instead occupational physicians are organised into fourteen regional societies each of which in turn acts as host to the biennial Journées Nationales de la Medicine de Travail. Total membership of the societies is estimated at about 5,000.

New legislation is anticipated shortly.

All enquiries should be addressed to: Dr. J. J. Gillon, 44 Rue Notre Dame des Champs, Paris VI^{e}, France.

Holland

By law any company employing more than 750 workers is obliged to provide an occupational health service and the physicians, so employed, are paid by their companies.

The Dutch Society of Occupational Medicine was founded in 1946 and has about 500 members (for a total working population estimated at 3·7 million). Of these:

300 are licensed full-time occupational health physicians;
120 are full-time occupational health physicians but not yet licensed;
80 are part-time occupational health physicians and others interested in occupational health.

The Society is associated with its parent society, the Dutch Society of Social Medicine and is organised in five regional groups. It is represented on the statutory Board which licenses occupational physicians.

All enquiries should be addressed to Dr. H. Zuidema, Ringlaan 19 Son (nb), Eindhoven, Holland.

Ireland

There is no legal requirement to provide occupational health services or statutory requirements for training of occupational physicians.

There is an Association of Industrial Medical Officers of Ireland.

All enquiries should be addressed to Dr. L. McElearney, Guinness, St. James's Gate, Dublin 8, Eire.

Italy

All enquiries should be addressed to Professor E. C. Vigliani, Clinica del Lavoro, Via San Barnaba 8, 20122 Milan, Italy.

Luxembourg

There is no separate organisation for occupational medicine in the Grand Duchy where only some 24 physicians are engaged in Occupational Health.

West Germany

As yet there are no statutory requirements for occupational health services although it is shortly to be a legal requirement that companies employing more than 700 must have an occupational health service.

At present there are over 1,800 occupational physicians of whom 600 are full-time and 1,200 part-time for a work force of 27·3 million. There is a Federal requirement for prior training in occupational health and registration and examination will shortly become compulsory.

All enquiries should be addressed to Priv.-Doz. Dr.med. A. M. Thiess, Leitender Werksarzt, Badische Anilin—Soda Fabrik AG, 6700, Ludwigshafen, West Germany.

In addition a "Charter of Industrial Medicine" in the E.E.C. was proposed by the Permanent Committee of Doctors in 1969.

After stating the principles involved in the practice and organisation of occupational medicine in the Community it goes on to list thirteen tasks including pre-employment and subsequent medical examinations, rehabilitation and re-training, first aid treatment of accidents and illness, occupational hygiene, health education, statistical evaluation and research. The conditions considered necessary for the occupational physician to carry out his work are listed and finally the basic criteria for training in occupational health are set out.

Names and addresses of individual officers in the societies mentioned have not been given as these change, sometimes, annually. If further information is required it should be sought either in the country concerned or through:

The Honorary Secretary,
The Society of Occupational Medicine,
at the Royal College of Physicians,
11 St. Andrew's Place,
Regent's Park,
London, NW1 4LE.

The Work of the World Health Organisation in Occupational Health

Introduction

There are four important points to consider with regard to the world situation in occupational health.

1. The conditions of health of the working population in different parts of the world.
2. The state of occupational health manpower development.
3. The organisational set up in different countries and
4. Some outstanding research needs.

There are well recognised gains that have been achieved over many years in developing preventive occupational health practice and research and by technological advancement in controlling hazardous chemical and physical exposures in the work environment. Many of the classical disabling diseases of occupations are now considered past history in certain countries.

In industrialised countries, where old problems are disappearing, several new problems are appearing; and occupational health practice has to adapt itself to deal with the new problems. Modern trends in the practice of occupational health emphasise the need to control diseases of complex aetiology where work stresses and other environmental and individual human factors play a role of varying magnitude.

In the countries undergoing industrialisation, the picture is different. Occupational poisoning, respiratory diseases due to dusts, harmful effects of physical and chemical factors, psychological adaptation to mechanisation, physical effort and manual labour and other problems still prevail. These are aggravated by communicable and nutritional diseases which are not yet controlled in many countries. In some surveys undertaken, lead poisoning was described among workers affected by parasitic diseases and nutritional anaemia. Silicoses was found to be as high as 20% in certain occupations in Africa, Asia and Latin America, where pulmonary tuberculosis still occurs. A large number of workers in small enterprises and home industries suffer from pulmonary disability at a young age because their exposure to mineral, vegetable and organic dusts starts from childhood. New industries are being built in a hurry to increase industrial production with little attention to industrial zoning, hygiene measures and safe layout. There are, in addition, the so called new problems that are now of concern to occupational health specialists in industrialised countries as the socio-economic barriers between nations are gradually fading away.

Community health problems affect all workers in developed and developing countries. In developing countries the prevalence of certain communicable diseases is sometimes higher in industrial workers than in the general population, probably due to direct contact in the work premises and additional work strains. On the other hand, industrialised countries have to pay special attention to chronic non-communicable diseases, cardiovascular disorders and to mental and psychological conditions.

Occupational health manpower is in short supply practically everywhere. In some industrialised countries the ratio of trained personnel to those practising in industry and other workplaces may not exceed 5%. In many developing countries persons trained in occupational health are rare, and many of those trained in this field may not be used effectively because of the absence of organised national services. Some of the training, furthermore, is not geared to conditions in developing countries. Occupational health manpower planning at a national level in different parts of the world, even in some of the most industrialised countries, does not exist. In the absence of such planning it is difficult to meet the existing needs of health personnel who provide services to the working population, or the increasing demands of industrial expansion. The result is the emphasis given by many industrial physicians to curative care alone, rather than preventive industrial medicine. Services in many parts of the world are weak or absent.

Only a few countries have succeeded in planning a well-co-ordinated and efficient national programme in occupational health. The inadequacy of occupational health services in many developing and industrialised countries is related, not only to insufficient training and educational facilities, but also to the inheritance of organisational patterns dating back to early industrial development. National occupational health services in a number of countries concentrate on factory inspection. However, occupational health acts are often improperly adapted to local conditions in the developing countries. The enforcing machinery in these countries often lacks strength and manpower and cannot deal with all the health problems of workers. Workers in small industries comprise the majority of working populations in most countries and are left largely without services either at plant level or national level. There is a need to achieve reasonable organisational services for small industries, mines and agricultural enterprises.

Occupational health services in most countries are usually carried out by many governmental and private bodies with unnecessary overlap and lack of co-ordination. The fragmentation of services weakens and minimises their effectiveness, in addition to the wasted effort and cost involved. Team work in occupational health is discussed more frequently than practiced.

The need for further investigation and research into occupational health problems is obvious. The practice of preventive medicine as a whole should benefit from occupational medical experience and should achieve another successful evolution which might match the successes reached in controlling many communicable diseases.

The need for built-in systematic evaluation programmes is great. One of the difficulties encountered, in communicating the message of the need for occupational health services to decision makers and planners, is probably due to the partial failure to demonstrate in concrete figures the obvious returns in terms of economic benefit resulting from the establishment of occupational health services.

World Health Organisation

The Occupational Health Programme of the World Health Organisation started in 1948. It will only be possible to give a brief account of the programme objectives and activities particularly in recent years. One of the major advantages the Occupational Health Programme of W.H.O. has is the fact that it works within an extensive structure of specialised health disciplines such as environmental health, control of communicable and parasitic diseases, nutrition, control of cardiovascular diseases, mental health and cancer control. In dealing with workers' health it is, therefore, quite feasible to deal with the total health problems of the working population. The programme of W.H.O. has broadened its scope in recent years and there are hopeful indications that by 1975 W.H.O. will have a wider and more effective international occupational health programme.

One of the major developments that occurred in 1971 and 1972 is the adoption, by the World Health Assembly of two important resolutions dealing with the development of occupational health programmes. The World Health Assembly in May 1972 in its Resolution WHA 25.63 noted the inadequacy of occupational health services in many parts of the world and called upon member states to study the health problems of the working populations in industry, agriculture, mining and other trades. There is a need to develop occupational health and provide an adequate infrastructure especially in developing countries to deal with increasing demands and to strengthen co-ordination at national and international levels.

The Resolution also requested the Director-General of W.H.O. to continue to provide technical assistance to member states in all new activities in occupational health, to develop guidelines for preventive practice and organisational patterns and to promote research in the different fields of occupational health.

The work of W.H.O. may be summarised under different headings:

(*a*) Direct assistance to governments in establishing and promoting occupational health services and institutes;
(*b*) Assistance to the development of research in vital areas of occupational health in developing and developed countries and international co-ordination of research work;
(*c*) The development of occupational health manpower by training and education at all levels;
(*d*) The development of guidelines and criteria for the practice of occupational health, environmental control, early diagnosis of health impairment and application of ergonomics.

Assistance in promoting occupational health is given to governments, on a short or long term basis. W.H.O. provided developmental assistance in 1971–1972 to more than 30 countries with their occupational health services and has established contractual agreements for research in 22 countries. In Africa assistance was provided to Togo, Sierra Leone, Guinea, Ivory Coast, Liberia, Mali, Botswana and the Sudan.

Assistance was also provided to Iran and Iraq to develop their university and educational programmes in occupational health at postgraduate level.

In South East Asia assistance was provided to the Governments of Sri Lanka, Burma and Thailand, and to the National Institute of Occupational Health in Ahmedabad. In Indonesia, W.H.O. assisted in the development of the National

Institute of Occupational Health and three occupational health centres with I.L.O. participation.

The Government of Singapore received assistance in the field of industrial hygiene in 1972, which aimed particularly at the control of silicosis which occurs in the large numbers of quarries and crushing plants. Assistance to occupational health programmes for small scale industries is also being provided to Singapore. Korea and the Philippines, by organising national surveys and seminars with I.L.O. participation.

The Government of Poland requested assistance under the U.N.D.P. and W.H.O. has completed a project document aimed at the establishment of an Institute of Industrial Toxicology, starting in January 1973, for four years at the National Occupational Health Centre in Lodz. In Bulgaria, several courses on occupational toxicology and ergonomics were organised within the framework of a W.H.O./U.N.D.F. assisted project for the Institute of Labour Hygiene and Occupational Diseases in Sofia.

The Regional Office for the Americas assisted the Government of Bolivia. The Institute of Occupational Health and Pollution Control in Santiago, Chile, is one of the outstanding examples of the profound long term technical co-operation projects that started several years ago and is, at present, providing national and regional services. Industrial health activities were also developed with W.H.O. assistance in Argentina, Cuba, Guatemala, Peru, Mexico and Uruguay.

In dealing with the problems of seafarers, two W.H.O. Pilot Health Centres are being established in Gdynia (Poland) and Auckland (New Zealand).

The types of assistance range from the provision of expertise on a short term basis to wide ranging co-operation with several consultants for longer periods, "followships", and equipment for research and training.

Collaborative Research

Collaborative research in occupational health has been expanded in recent years and has encompassed contractual agreements for undertaking research with W.H.O. assistance in Bolivia, Brazil, Bulgaria, Egypt, Indonesia, Jamaica, Japan, Mexico, Nigeria, Republic of Korea, Singapore, Sudan, Sweden, Thailand and Turkey. In 1972 plans are under way for collaboration in research with Australia, Chile, Finland, Poland, Yugoslavia and the U.S.S.R. Among the different research activities carried out in collaboration with W.H.O. are research in the problems of small-scale industries; effects of exposure to organic and other vegetable dusts; epidemiological studies of intoxication in industry; monitoring of exposure to industrial toxic agents; combined effects of exposure to multiple stress; exposure and adaptation to extreme climatic conditions and to high altitude; and health conditions in different occupational sectors, such as seafarers, and agricultural workers. Other research proposed includes studies on criteria for early diagnosis of health impairment, and the health problems of vulnerable groups. The W.H.O. programme in environmental and occupational cancer, particularly the work of W.H.O. I.A.R.C., is dynamic and includes systematic study of environmental carcinogenesis.

To facilitate the exchange of experience between industrialised and developing countries and to co-ordinate research programmes in several institutions in a manner that may yield better results and save effort, time and expense, W.H.O.

is in the process of designating more than twenty Collaborating Institutions in occupational health with specific tasks to pursue which will ensure continuity and maintained vitality. Both developing and industrialised countries will benefit from this system which, in effect, provides for continuous counselling and eliminates needless research trials.

Training Courses

In developing occupational health manpower, the W.H.O. programme includes fellowships; national training courses and regional and interregional training seminars and courses. Emphasis is given to the need to utilise trained personnel in developing countries and to the simultaneous development of national services. Assistance in the establishment of the Department of Occupational Health in Alexandria, Egypt, is an outstanding example of a long term project developed with effectiveness in that country. In 1971–72 and 1972–73 long term courses in industrial hygiene offered for nine months to candidates from 12 developing countries in the Middle East, and Asia, have been organised with W.H.O. assistance, at the School of Public Health in Zagreb, Yugoslavia. In 1970 an inter-regional seminar on training and education in occupational health for developing countries was organised for Latin American and African countries in Santiago, Chile. This was followed by a similar one in 1971 for Asian and West Pacific countries in Djakarta, Indonesia.

In June 1972 the First European Conference on Occupational Health Education took place in Milan, Italy, under W.H.O. auspices, and with the joint participation of I.L.O.

Specialised Programmes

Other programmes of interest are, the programme of organisational patterns of occupational health services under way in the European countries; the W.H.O. programme in surveying methods used in establishing biologically safe limit of toxic substances in different countries; studies of cardiovascular diseases in chemical industries in Germany and France, and the meeting on occupational mental health which took place in October–November 1972 in W.H.O., Geneva. A programme aiming at international co-operation in establishing maximum permissible concentration of toxic substances in work places started in 1971. One of the recent developments in this programme is a W.H.O. meeting on this subject that took place in the U.S.S.R. in December 1972.

Co-operation with I.L.O.

W.H.O. has always maintained close co-operation with I.L.O. the oldest U.N. specialised agency with a keen interest in occupational health.

I.L.O. and W.H.O. have been associated in many occupational health activities, and close co-operation has been maintained since the establishment of W.H.O.'s Occupational Health Programme in 1948.

In connection with the United Nations' Conference on Human Environment of 1972, W.H.O. pointed out the importance of the working environment. Experience in occupational health provides the best background information in environmental health, and air pollution control. In this connection, and as environmental matters have become fashionable in recent years, work in the occupational health field contributes substantially to total environmental improvement and becomes better able to provide valuable experience to further environmental health science.

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Professor F. Valic, Assistant Director of the School and Associate Dean of the Medical Faculty, Andrija Stampar School of Public Health, Rockefellerova 4, Zagreb, Yugoslavia.

SOME RELEVANT WORLD HEALTH ORGANISATION PUBLICATIONS

International Medical Guide for Ships, (1967).

Noise: An Occupational Hazard and Public Nuisance. Alan Bell. Public Health Papers, No. 30, (1966).

Expert Committee on Medical Rehabilitation. First Report (Geneva 1958). Technical Report Series, No. 158.

Expert Committee on Medical Rehabilitation. Second Report (Geneva 1968). Technical Report Series, No. 419.

Joint I.L.O./W.H.O. Committee on Occupational Health. Second Report (Geneva 1952). Technical Report Series, No. 66.

Joint I.L.O./W.H.O. Committee on Occupational Health. Third Report (Geneva 1957). Technical Report Series, No. 135.

Occupational Health Problems in Agriculture. Fourth Report of the Joint I.L.O./W.H.O. Committee on Occupational Health (Geneva 1962). Technical Report Series, No. 246.

Joint I.L.O./W.H.O. Committee on Occupational Health. Fifth Report (Geneva 1966). Technical Report Series, No. 354.

Permissible Levels of Occupational Exposure to Airborne Toxic Substances. Sixth Report of the Joint I.L.O./W.H.O. Committee on Occupational Health (Geneva 1968). Technical Report Series, No. 415.

Joint I.L.O./W.H.O. Committee on the Hygiene of Seafarers. Report on the First Session (Geneva 1949). Technical Report Series, No. 20.

Joint I.L.O./W.H.O. Committee on the Hygiene of Seafarers. Second Report (Geneva 1954). Technical Report Series, No. 92.

Joint I.L.O./W.H.O. Committee on the Hygiene of Seafarers. Third Report (Geneva 1961). Technical Report Series, No. 224.

Health Factors Involved in Working Under Conditions of Heat Stress. Report of a W.H.O. Scientific Group (Geneva 1967). Technical Report Series, No. 412.

Optimum Physical Performance Capacity in Adults. Report of a W.H.O. Scientific Group (Geneva 1968). Technical Report Series, No. 436.

Amputees and Protheses. Report of a Conference on Prothetics (Copenhagen 1954). Technical Report Series, No. 100.

Environmental and Health Monitoring in Occupational Health, Report of W.H.O. Expert Committee (Geneva 1973) W.H.O. Technical Report Series, No. 535.

International Labour Office

The Peace Conference established the International Labour Organisation in 1919.
The I.L.O. has three activities; *Standard-setting, Research* and *Technical Assistance.*

STANDARD-SETTING

In the earliest years the Organisation concentrated almost exclusively in occupational safety and health matters, on the setting of international standards for the protection of workers' health following exhaustive analysis of the law and practice of its member States.

One hundred and thirty-six Conventions and 144 Recommendations were adopted between 1919 and 1968; 54 Conventions and 54 Recommendations are directly or indirectly concerned with occupational safety and health.

White Lead

Lead poisoning was *the* occupational hazard in every country and headed the list in industrial pathology.

Forty-nine countries have ratified the White Lead (Painting) Convention, 1921.

Occupational Diseases Giving Entitlement to Compensation

In 1925 the Conference adopted the Workmen's Compensation (Occupational Diseases) Convention (No. 18), establishing an initial schedule of three diseases (lead poisoning, mercury poisoning and anthrax). In 1933 the Convention had been ratified by 52 countries.

In 1934 the Conference undertook partial revision of Convention No. 18 and adopted a list of 10 occupational diseases by adding silicosis, poisoning by phosphorus, arsenic, benzene or its homologues and halogen derivatives of hydrocarbons of the aliphatic series, pathological manifestations due to ionising draiations and primary epitheliomatous cancer of the skin.

In 1964 the International Labour Conference adopted the Employment Injury Benefits Convention (No. 121) which contained in an annex a new schedule of occupational diseases; added were diseases caused by beryllium, chrome, manganese and carbon bisulphide, to the 1934 schedule.

The Guarding of Machinery

The guarding of the dangerous parts of machinery is the most effective way of preventing accidents, built-in safety devices are generally superior to devices subsequently adopted by the user, while at the same time being less expensive.

Difficult to regulate on a national basis, the guarding of machinery faced virtually insurmountable obstacles when world trade in machinery was considered as a whole. The I.L.O. has therefore taken nearly 30 years to secure the adoption of international standards covering not only the sale and hire, but also the manufacture and use of machines without appropriate protective devices.

Eventually, after many years work and a number of conferences, the Guarding of Machinery Convention (No. 119) and Recommendation (No. 118) were adopted in 1963. The Convention has been ratified by 28 countries.

Industrial Medical Services

Industrial medicine, as now understood by the I.L.O. developed during the First World War as a result of the expansion of industry to meet the demand for munitions.

Albert Thomas, then Minister of Munitions, who became the first Director of the International Labour Office, was instrumental in setting up a medical inspectorate of munitions factories in 1915. This was the forerunner of modern industrial medical services.

In 1953 the Conference adopted The Protection of Workers' Health Recommendation, and a resolution was passed calling on member states to promote training of qualified industrial physicians and to study the organisation of industrial medical services.

In 1959 the Conference finally adopted (by 240 votes with none against and 2 abstentions), the Occupational Health Services Recommendation (No. 112), which defines an occupational health service, the methods by which it may be established, the organisation and functions and lays down standards regarding operation, staffing and equipment. The principle that the industrial physicians must be completely independent—both technically and morally—of employers and workers, is stated. Benefits to employees must also be free of charge.

RESEARCH: INFORMATION AND SERVICES

Research has been undertaken to study special problems; to provide the I.L.O. Conference, Committees and Meetings of experts with a sound basis for discussion; and to furnish reliable information on facts and trends.

Information in the form of textbooks (Encyclopaedias), codes of practice, guides, manuals, conventions and recommendations and reports, bulletins, reviews, minutes and non-periodic publications, are available and continuously brought up-to-date.

Advisory bodies prepare monographs and model codes of regulations provide technical help and advice on instruments drafted by the Labour office.

In 1959 *The International Occupational Safety and Health Information Centre* (C.I.S.), was set up. This includes a network of 33 National Centres. The task of the National Centres is:

(1) To compile and scrutinise information in their countries and send abstracts of each document to Geneva accompanied by a copy of the original publication.
(2) To form a link between the C.I.S. and subscribers in their own countries.
(3) To take an active part in planning and development of C.I.S. activities, particularly on the occasion of annual meetings.

The C.I.S. publishes Occupational Safety and Health Abstracts; Information Sheets; Bibliographies and Abstract Cards, and supplies these to direct subscribers. Nearly 1,500 periodicals are sifted to produce this information.

Conferences, Symposia, Committees, Tripartite Meetings and Courses

International Conferences and Symposia have been organised in conjunction with the World Health Organisation, the International Atomic Energy Agency and W.H.O., and by I.L.O. independently. Three Courses on radiation protection in industry were held (Oxford and Harwell 1958: Saclay 1960 and Copenhagen 1965).

Since 1961 I.L.O. organises training courses on occupational health and safety, some of which jointly with W.H.O. The following subject matters have been dealt with: occupational health, dust prevention in industry, safety and health in agriculture, prevention of air pollution in the working environment.

An International Directory of Occupational Safety and Health Services and Institutions was published in 1958 as well as in 1969.

The Catalogue of Occupational Safety and Health Films is now at its 6th Edition.

A Directory of Courses in Occupational Safety and Health (1970) gives information on courses of training available throughout the world.

There are 10 tripartite committees who place the agenda of their meetings connected with occupational safety and health, in the industries with which they are concerned, before the I.L.O.; these include petroleum, coal mines, iron and steel, inland transport, chemical industries, textiles, building, civil engineering and public works; salaried employees and professional workers and plantations.

The classification and labelling of dangerous chemical products was undertaken following a resolution of the Chemical Industries Committee in 1950. Danger Symbols adopted by I.L.O. were incorporated in a number of international and national labelling schemes and reproduced by the International Organisation for Standardisation (I.S.O.) in 1965.

TECHNICAL ASSISTANCE

Forms of International Action

The I.L.O. since its foundation has provided technical assistance in the form of information and advice to member countries. Managers, trade union leaders, civil servants and specialists have been given opportunities to attend relevant meetings.

In 1949 The United Nations Economic and Social Council passed a resolution recommending an expanded programme of technical assistance. A special fund was set-up. Between 1950 and 1970 missions totalling 1,054 months were carried out by 121 experts and 163 fellowships averaging six months in length were granted. Fifty countries have been involved and 30 projects are in hand. The aim was to send experts to advise on modernisation of laws and regulations, the training of doctors, engineers and chemists and developing special inspectorates. Assistance has been given in the equipping of laboratories and research centres.

Regional Labour Institutes

A pioneer scheme in India, The Central Institute in Bombay, led to the establishment of regional institutes in West (Calcutta), South (Madras) and North (Kanpur) India. The Government of India supplied land, buildings, furniture and local staff, the special I.L.O. Fund provided international experts and equipment. The Government of India met most of the costs; the success has been such that similar institutes are proposed in other industrial areas. India has adopted the modern approach that an industrial enterprise is a unit of production for social ends.

This pilot experiment has taught the I.L.O. many lessons which it considers invaluable in planning similar projects in Turkey and the United Arab Republic assigned to it under the United Nations Development Programme.

Role of the International Labour Office

The role of the I.L.O. is:

(1) to take advantage of willing collaboration wherever this may be found and to provide a platform for men of good will whatever their provenance;
(2) to encourage more active participation in its work by employers' and workers' organisations, as well as by specialised bodies;
(3) continue to ensure that an effective place is found for safety and health in all appropriate programmes;
(4) explore the vast possibilities offered by collective bargaining;
(5) to encourage in every way the education of workers and particularly of trade union officials with regard to safety—the interest in this should be at least as active as in compensation for industrial accidents and occupational diseases.

This article was extracted from: Fifty years of international collaboration in occupational safety and health. M. Robert and L. Parmeggiani, *International Labour Review,* **99** (1) (1969).

Recent work and present trends at the I.L.O. are given in an article published in *The Encyclopaedia on Occupational Health and Safety* (I.L.O., Geneva 1971), entitled *International Labour Organisation* (Vol. 1, pp. 732–736).

Recent work includes the International Classification of Pneumoconiosis, and a standard set of x-ray film available from the I.L.O., the 4th International Conference on Pneumoconiosis (1971 Bucharest), Convention No. 136 and Recommendation No. 144 on protection against hazards of poisoning arising from benzene, the I.L.O. Encyclopaedia on Occupational Safety and Health, and the World Congress on Prevention of Occupational Risks. All these are described in the Safety and Health Newsletters; No. 1 autumn 1968, No. 2 summer 1969, No. 3 July 1970, No. 4 January 1972, available from the I.L.O. Geneva.

OCCUPATIONAL SAFETY AND HEALTH SERIES

1. Occupational Health Problems in Agriculture.
2. Medical Inspection of Labour.
3. Adaptation of Work to Man and Occupational Health Problems in Countries Undergoing Industrial Development.
4. Man at Work, Studies on the application of physiology to working conditions in a sub-tropical country by E. H. Christensen.
5. Maximum Permissible Weight to be Carried by one Worker.
6. Respiratory Function Tests in Pneumoconiosis.
7. Organisation of Occupational Health Services in Developing Countries.
8. Course on Dust Prevention in Industry.
9. Dust Sampling in Mines.
10. Kinetic Methods of Manual Handling in Industry by S. Himbury.
11. Course on Radiation Protection in Industry.
12. Benzene: Uses, Toxic Effects, Substitutes.
13. Official Services for Occupational Safety and Health.
14. Ergonomics in Machine Design.
15. Safety Training for Underground Mineworkers.
16. International Directory of Occupational Safety and Health Services and Institutions.
17. International Catalogue of Occupational Safety and Health Films.
18. Electrical Safety: Portable Tools and Mobile Appliances.
19. International Directory of Occupational Safety and Health Courses.
20. Permissible Levels of Toxic Substances in the Working Environment,
21. Ergonomics and Physical Environmental Factors.
22. (Rev.) I.L.O.-U/C International Classification of Radiographs of Pneumoconioses 1971.
23. The Occupational Health Nurse.
24. 4th International Report on the Prevention and Suppression of Dust in Mining, Tunnelling and Quarrying.
25. International Occupational Safety and Health Congress (Geneva, 30 June–4 July 1969).
26. Les jeunes au travail: problèmes de santé (not yet published in English).
27. Safety and Health in Shipbuilding and Ship Repairing.

These publications may be obtained free of charge from: International Labour Office, Occupational Safety and Health Branch, CH 1211 Geneva 22.

Publications on Occupational Safety and Health

Model Codes

Model Code of Safety Regulations for Industrial Establishments for the Guidance of Governments and Industry (1962).

Model Code of Safety Regulations for Underground Work in Coal Mines for the Guidance of Governments and the Coal-Mining Industry (1950).

Codes of Practice

Prevention of Accidents Due to Fires Underground in Coal Mines (1959).
Prevention of Accidents Due to Electricity Underground in Coal Mines (1959).
Safety and Health in Dock Work (1958).
Safety and Health in Agricultural Work (1965).

Guides and Manuals

Guide for Labour Inspectors (1966).
Accident Prevention (1967).
Manual of Industrial Radiation Protection:

- Part I. Convention and Recommendation (1963).
- Part II. Model Code of Safety Regulations (Ionising Radiations) (1965).
- Part III. General Guide on Protection against Ionising Radiations (1963).
- Part IV. Guide on Protection against Ionising Radiations in Industrial Radiography and Fluoroscopy (1964).
- Part V. Guide on Protection against Ionising Radiations in the Application of Luminous Compounds (1964).
- Part VI. Radiation Protection in the Mining and Milling of Radioactive Ores (code of practice) (1968).

Published jointly with the International Atomic Energy Agency in Vienna.
Guide to the Prevention and Suppression of Dust in Mining, Tunnelling and Quarrying (1964).
Guide to Safety and Health in Forestry Work (1968).
The Role of Medical Inspection of Labour (1968).

M. J. COLBOURNE

Tropical Public Health and the Ross Institute of Tropical Hygiene

(London School of Hygiene and Tropical Medicine)

The Ross Institute was founded in 1926 with the primary objective of promoting the prevention of disease in tropical countries. Its first supporters—and still important supporters—were those directing and developing industry outside Britain. They were quick to realise the benefits both to themselves and to their employees of a healthy labour force. They also recognised the advantages of being ahead of government health departments in the provision of curative and preventive services for their staff.

In the last fifty years there have been immense political, scientific and economic changes which have affected the provision of health services to industrial concerns all over the world, and these changes have clearly affected the type of assistance that can be given by Institutes and Departments of Tropical Hygiene in such organisations as the London School of Hygiene and Tropical Medicine.

At first the problems of industry in the tropics—and especially rural industry such as tea and rubber plantations—were the fundamental problems of public health; the diseases of insanitation, the major vector-borne diseases, and also the provision of the simplest curative services.

The doctor responsible for the health of the labour force had to solve these major problems in advance of the general health services of the country and before considering the specific problems of the particular industry.

Malaria, for example, caused ill-health in many parts of the tropics. The greater resources of industries often enabled them to carry out effective control in advance of country-wide programmes. In some countries these programmes have been so successful that they have absorbed the local industrial control schemes; in others the industry must still maintain its own control.

Similarly, the advantages of family planning were often more obvious and measures were easier to implement in the concentration of labour associated with agricultural industry.

In many areas the doctor responsible for industrial health must still be trained in the control of disease, especially rural tropical disease, before he turns to specialisation in occupational health. He must obtain both these skills without losing his interest in the techniques and provision of medical care.

The changes mentioned above have been accompanied by changes in the way that the Ross Institute has provided advice to industries in tropical countries. At first, advice on specific points was provided from London. It was soon found that more direct assistance relevant to the local problems was required and branches of the Institute were set up in India, Ceylon and East Africa. These branches played a very useful role in finding practical solutions to local health problems. They were financed by local industries and run by local committees.

The branches gradually became more and more independent. For example, the Ceylon branch has become the Health Service of the Planters' Association of Ceylon, with its Director, Dr. L. V. R. Fernando, remaining an honorary Assistant Director of the Ross Institute. The advisory service in East Africa has been taken over by the local universities.

The reduction in direct advice from London has meant that the Ross Institute and Department of Tropical Hygiene have become more and more closely associated, and have tended to lose their separate identities.

The emphasis has shifted from advisory services to teaching. Since 1963 the department has run a course for the Diploma in Tropical Public Health (Appendix I), as well as being responsible for the Tropical Hygiene component of the Diploma in Tropical Medicine and Hygiene.

The D.T.P.H. course is specially designed to meet the needs of medical practitioners who intend to make a career in public health administration, or in preventive medicine in the tropics. Such a general training is very relevant to the problems of occupational health in the tropics where, as has been indicated above, many of the most disabling conditions are those that can be prevented by general public health measures. Experience in London suggests that it is better for the doctor from overseas who intends to specialise in occupational health to obtain general training in public health on a course such as the D.T.P.H. before taking the M.Sc. in Occupational Medicine or the D.I.H. examination.

The qualification is in many respects the equivalent of the Diploma in Public Health, and is accepted by many governments all over the world as a specialist qualification entitling the holder to varying degrees of advancement in the public service.

Further up-to-date details about the course and the examination are to be found in the syllabus of courses of the London School of Hygiene and Tropical Medicine.

It may be asked why such training should be given in London. Surely it is more suitable for the solution to the health problems of a geographical area to be taught and demonstrated in that area? This is undoubtedly true, and in several tropical parts of the world such training centres have been established. However, the demand for such training for public health staff from many parts of the world remains. When it dies away the Ross Institute and the Department of Tropical Hygiene will once again have to adjust its methods to the requirements of the day.

There have also been changes in the form in which the Ross Institute has provided advisory services. Soon after the second world war it was decided to issue a series of small pamphlets on the prevention of diseases which were of particular importance in the industries that made most use of the Ross advisory services, especially the tea and rubber industries.

They were aimed at the man, often not medically qualified, who was responsible for the health of labour forces.

Since then the picture has changed; the estate health services have become more organised, local governments have introduced statutory requirements for social services, and local men and women with secondary education have been trained as medical auxiliaries.

Some of the bulletins produced more recently have been written specially for the needs of some of the various groups of auxiliaries, both those with a general polyvalent training and also those with more specialised but limited responsibilities.

The result is a series of pamphlets written specially for tropical industry but produced over a period of years and with different readers in mind. For this reason a short summary of the contents of each bulletin is given below to enable the reader to decide which bulletin might be suitable for his particular need.

Some of them are directly useful for particular groups as indicated in the summaries, but all of them should prove useful as source material for preparing teaching material for the subjects they cover. None of the subjects could be considered strictly occupational health, but all of them deal with general public health problems which have proved to be of the greatest importance in causing ill-health amongst workers and their dependants in agricultural industries in tropical countries.

In 1970 an opportunity was taken to review the types of assistance that could be provided by the London School of Hygiene and Tropical Medicine in this field, and a symposium was held on the Health Problems of Industrial Progress in Developing Countries. It was attended by senior health workers from fifteen developing countries. The subjects covered were Industrial Health Problems in Developing Countries, Ecology and Environment, Prevention of Communicable Disease, Medical Manpower for Occupational Health in the Tropics, and a Review of the Opportunities for Co-operative Work (training courses and interchange of staff, information and advisory services, and research, applied and operational).

The proceedings were published in the Journal of Tropical Medicine and Hygiene in the November and December 1970 issues (pages 264–379). A reprint of these proceedings may be obtained from the Publications Secretary of the Ross Institute (price £1).

Thus the main fields of assistance are teaching and advisory services. Details of the course for the Diploma in Tropical Public Health and the contents of the Ross Institute Bulletins are given below.

In the United States the Industrial Council for Tropical Health has run a series of conferences on Industry and Tropical Health, sponsored by the Harvard School of Public Health. The eighth conference is to be held at Boston (Harvard) in April 1973.

An example of overseas basic training in Public Health is the Diploma in Public Health course given at the University of Singapore, Singapore, which provides a comprehensive programme of lectures, field visits and project work especially suited to the needs of doctors in developing countries. The course lasts one academic year of nine months, from July to March. It has been in existence since 1953.

The Singapore D.P.H. is undergoing a change of name to Master of Science (Public Health) commencing from July 1973. The teaching of Occupational Health for the Public Health Course is as follows:

1. In the first six months (core course), there are 15½ hours of lectures and two factory visits.
2. In the last three months, students may elect to make a deeper study of Occupational Health. A large part of the third term will then be related to the subject including lectures, seminars, factory visits and practicals.
3. An entire paper in Occupational Health will be given to students taking this elective. For the others there will be questions in Occupational Health.

Qualifications for entry: The qualifications for entry into the M.Sc. (Public Health) Course are exactly the same as for the D.P.H. Course. Cost: 900 ($ Singapore).

Employment opportunities: Most of the students taking the Public Health Course have been Public Health Officers in Government services in this part of the world. Some are coming from the army and some are private practitioners. The three months' elective course in Occupational Health is not meant to give specialised training in that subject but only a deeper knowledge which may be useful for those looking after the health of communities in industrial areas, the army, rubber estates, etc.

The University of Singapore is also planning a nine month course in Occupational Medicine leading to the Master of Science (Occupational Medicine) to start in July 1973. The student intake will be about ten and the course will be supported by SEAMEC (South East Asian Ministries of Education Council). (Further details may be obtained from: Professor Wai-On Phoon, The Department of Social Medicine and Public Health, University of Singapore, Outram Hill, Singapore 3) (Appendix II).

The Ross Institute Bulletins

A brief description is given here of the individual bulletins so that readers may be able to identify which bulletin, if any, might be suitable for their particular need.

No. 1. Insecticides

This bulletin was written originally by Dr. G. Davidson in 1949. The present edition was revised in 1964, and reprinted with corrections in 1971 by the original author. It contains 39 pages with two line diagrams. The first part describes the insecticides in common use, their formulations, the techniques for using them, the organisation of residual spraying and precautions to be taken by those using insecticides. The second part describes the methods to be taken to control specific insect pests. There are twenty references.

The bulletin is produced as a handbook for those whose responsibilities include the control of insect pests. It forms useful source material for those teaching the subject to auxiliary health personnel. It is unlikely to be directly useful to those who have not completed secondary education.

No. 2. Antimalarial Drugs

This bulletin was first written in 1949. The latest revision was made in 1972 by Professor L. J. Bruce-Chwatt. It contains 40 pages including three diagrams and eleven references.

This is the most detailed of the bulletins, and is an up-to-date review of the present situation in this field. This is a complicated subject, changing from day-to-day, and the bulletin should prove a useful guide for doctors who require a summary presentation.

It describes in detail the individual antimalarial drugs. There are chapters on individual and collective protection from malaria by drugs, and on the treatment of malaria. The final chapters are on drug resistance and the toxic effects of anti-malarial drugs. There are eleven references.

It should prove useful as a source of information for training all grades of medical personnel. It is probably of direct value only to graduate auxiliaries.

No. 4. Tropical Ulcer

This bulletin was originally produced in 1950. The latest edition was rewritten in 1970 by Dr. B. A. Southgate. The subject reflects the long continued interest of the Ross Institute in disabling conditions affecting workers, especially in agricultural industry in the tropics.

The bulletin contains 12 pages with one photograph and two line drawings. It contains a description of the ulcer, predisposing causes, differential diagnosis, prevention and treatment. One reference to operative procedure is given.

This bulletin is particularly valuable for those responsible for labour forces in the field, and especially for the doctor and his dresser, as prompt action can prevent the development of the large incapacitating ulcers. It has, therefore, a more clinical basis than the other bulletins and therefore may be of more direct value to many auxiliaries.

No. 5. The Housefly and Its Control

This bulletin was originally produced in 1950. The latest edition was produced in 1970 by Professor J. R. Busvine.

It consists of 25 pages, with five photographs and six line drawings. It contains an introduction on the life of the housefly, chapters on control of breeding by sanitation, destruction of flies and the protection of food against flies. There are notes on flies resembling the housefly, and precautions to be taken against the toxic effects of insecticide.

This bulletin is essentially a practical manual for all those who have the responsibility of controlling houseflies. It contains useful source material for the teacher; it is unlikely to be understood by those without secondary education.

No. 6. Schistosomiasis

This bulletin was originally produced in 1951. The latest revision was made by Dr. B. A. Southgate in 1970. It consists of 34 pages with 14 maps, photographs, line drawings and graphs. Eight references are given for further reading.

It contains a general description of the disease including geographical distribution, life cycle of the schistosomes, intermediate hosts and clinical manifestation in man. The chapter on control of schistosomiasis includes the preliminary survey, the prevention of exposure to cercariae, the control of snails, the prevention of contamination of water and the treatment of human cases. There are three appendices, on calculation of the dose of molluscicides, tests for measuring molluscicides in water and methods of applying molluscicides.

The control of schistosomiasis is a difficult subject that has frustrated even the most skilled and experienced. This bulletin should be useful for the sanitarian who is instructed to carry out snail control in limited areas. It will also be useful to the doctor who requires to teach the problems of schistosomiasis to medical and health staff, or to the general public. It is unlikely to be useful to anyone who has not completed a secondary education.

No. 7. Malaria and Its Control

The first edition in this series was written in 1946 by Professor G. Macdonald. It was the successor of a pre-war pamphlet written in 1933 by Dr. Cuthbert Christie. The present edition was written in 1969 (reprinted in 1970) by Professor Bruce-Chwatt and Dr. G. Davidson.

This bulletin contains 55 pages and eight line diagrams. The first part of the bulletin deals with the epidemiology of malaria and a description of malaria and its vector in various parts of the world. The second part deals with malaria control with special references to the residual insecticides, but includes sections on other methods of control, national policies and the policy of malaria control in industrial undertakings. There are appendices on the malaria parasite and on mosquitoes.

This bulletin provides a summary of malariology which should be of great value to all grades of health workers not specialising in this subject. It should serve as a source of information for training courses for all grades of medical personnel. It is probably too advanced for those who have not completed secondary education.

No. 8. Rural Sanitation in the Tropics

This bulletin was first written in 1952 and revised in 1968, and reprinted in 1972. It is largely based on the work of Dr. O. J. S. Macdonald.

It consists of 47 pages with 26 line drawings and five photographs. Seven references are given.

The bulletin describes the type of latrines and disposal systems that can be used for small scale sanitation in the tropics. Sections deal with five types of family privies, three types of small-scale public latrines, and three types of effluent disposal. There are also chapters on the maintenance of latrines and waste stabilisation ponds. The feature of this bulletin is the number of professionally produced diagrams of latrines which give enough information for their construction where required.

This bulletin is essentially a handbook for the practical man with building experience who may need to construct small-scale sewage systems. It should also be useful source material for demonstrating the techniques of rural sanitation in tropical countries.

No. 9. The Inflammatory Diseases of the Bowel

This bulletin was originally written in 1955 by Dr. Ford Tredre. The latest edition was revised in 1970. It consists of 22 pages with 5 diagrams. It describes the diarrhoeal diseases in general and deals specifically with cholera, the enteric fevers and the dysenteries. The final section deals with the transmission and control of these diseases. Water supplies and latrine systems are not dealt with in detail; readers are referred to the relevant Ross Institute Bulletins (Nos. 8 and 10).

This bulletin is intended for those responsible for the health of communities particularly exposed to these common and disabling conditions in tropical countries. Neither the treatment nor the methods of prevention are dealt with in sufficient detail for the nurse or the sanitarian. It should prove useful source material for a general introduction to the subject, or for health education of the public. It should be directly useful for those with secondary education.

No. 10. Small Water Supplies

This bulletin was first produced in 1955 by Dr. Ford Tredre with the title "Water". The last revision was in 1971 by Mr. Graham Don.

It consists of 61 pages and contains 27 figures.

It contains chapters on water requirements, selection of sources, sanitary collection of water, purification of water under rural conditions, purification on a domestic or individual scale, and seven appendices on practical details required for small-scale water supplies.

This bulletin is both a simple booklet on water supplies and also provides some practical details, in diagrams, for those who have to construct small-scale water supplies.

Its first function makes it suitable as source material for teaching the importance of pure water in health; the second makes it a useful practical handbook for those responsible for providing water on a small scale. To understand it would require secondary education; to construct the facilities recommended demands some building experience.

No. 11. Anaemia in the Tropics

This bulletin was originally produced in 1957 by Dr. Ford Tredre. Anaemia amongst tea-garden workers was recognised as an important and intractable health problem. The most recent edition was produced in 1972 by Dr. G. R. Wadsworth and consists of 22 pages, a photograph and seven references. It contains an introduction, a section on blood formation and causes of anaemia, theoretical considerations and the treatment and prevention of anaemia in the community.

The latest edition was written with the object of making it a useful reference pamphlet for senior medical auxiliaries. In fact several doctors and one professor of tropical hygiene have said how useful they found it. (It contains definitions of P.C.V. and M.C.H.C.).

It should be particularly appropriate for doctors or senior auxiliary personnel who teach junior staff or require factual information for health education. It is probably too advanced for anyone who has not completed a secondary education.

No. 12. Protein Calorie Malnutrition in Children

This bulletin was written in 1969 by Dr. H. J. C. Burgess and his wife, and was revised by them in 1970.

It consists of 30 pages, 4 photographs, 10 line drawings and 8 diagrams and tables. There are two references.

It consists of four chapters; description and diagnosis of P.C.M., causes, prevention and treatment. There are 10 appendices which consist largely of details of recommended diets.

This bulletin is written very clearly and in simple English. Considerable use is made of paragraph arrangement, bold print and simplified line diagrams to emphasise important points. In line with modern paediatric practice, treatment and prevention are dealt with together. There is more emphasis on treatment in this bulletin than in most of the others.

It should prove of direct value to nurses both in the ward and in the field. The tables and appendices contain much valuable information for the doctor who has to teach the treatment and prevention of protein calorie malnutrition to his staff.

Source of Supply

The bulletins may be obtained from: The Publications Secretary, Ross Institute, London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London, WC1E 7HT. Tel. 01-636 8636 ext. 213.
and the prices are as follows:

No. 1	Insecticides	25p
No. 2	Antimalarial Drugs	35p
No. 3	Out of print	
No. 4	Tropical Ulcer	10p
No. 5	The Housefly and Its Control	20p
No. 6	Schistosomiasis	15p
No. 7	Malaria and Its Control	35p
No. 8	Rural Sanitation in the Tropics	12p
No. 9	The Inflammatory Diseases of the Bowel	12p
No. 10	Small Water Supplies	55p
No. 11	Anaemia in the Tropics	25p
No. 12	Protein Calorie Malnutrition in Children	24p

APPENDIX I

COURSE FOR THE DIPLOMA IN TROPICAL PUBLIC HEALTH

(Organised by the Department of Tropical Hygiene, London School of Hygiene and Tropical Medicine).

The general content of the syllabus can be grouped into five sections covering tropical hygiene, medical statistics and epidemiology, health services organisation, presentation of a dissertation and visits to agencies with a public health interest.

A. Tropical Hygiene

This section is concerned with the prevention and control of disease in the tropics and includes a wide range of subjects.

(*a*) *Epidemiology and control of communicable diseases*
The epidemiology and control of certain important diseases occurring in the tropics are studied separately and as illustrations of the general case. These include malaria, arthropod-borne viruses, schistosomiasis, filariasis, the treponematoses, plague, trypansosomiasis, leprosy, intestinal infections and tuberculosis.

(*b*) *Microbiology*
The course of lectures, demonstrations and practical classes, gives instruction in the bacteriological methods used in the diagnosis, treatment and prevention of disease, and in the simple bacteriological examination of water and foodstuffs.

(*c*) *Parasitology and entomology*

This is an intensive course dealing with the causation, diagnosis, dissemination, and vectors of parasitic infections of man and animals and their control through the use of insecticides, drugs and other techniques.

(*d*) *Applied physiology and nutrition of interest to public health in the tropics*

Climatic conditions and their relation to health and fitness in the tropics; nutritional requirements and deficiencies in tropical areas.

(*e*) *Maternal and child health*

The course examines the social, environmental and nutritional factors related to health of mothers and children in the tropics. It also reviews possible remedies and the development of specialised services.

(*f*) *Environmental health*

Theory and practice of sanitation and provision of water supplies in relation to urban and rural areas and industrial project sites; housing in tropical areas; urbanisation and problems of industrial development.

(*g*) *International Health*

International health regulations and surveillance of communicable diseases; Organisation and aims of the United Nations Agencies.

B. Medical Statistics and Epidemiology

This section aims at providing an understanding of the general principles of scientific method, the statistical treatment of the problems of preventive medicine, and the design and practical conduct of epidemiological enquiries. Also included is an outline of the development of vital statistical systems, covering the taking of censuses and the registration of births and deaths, and an introduction to population dynamics.

C. Health Services Organisation and Management

This section is concerned with the planning, management and evaluation of health services and includes a study of the following:

(*a*) Socio-economic and cultural backgrounds of communities and their relationship to health.
(*b*) Development of health services involving static and mobile services; hospitals and health centres; mass campaign projects; special programmes, e.g., family planning.
(*c*) Principles in the practice of public health administration, involving administrative structure, legislation, finance, techniques of management, including systems analysis, organisation and method, network analysis, communication science, operations research.
(*d*) National health planning methods.
(*e*) Evaluation of services, including medical records systems and health practice research.
(*f*) Principles and practice of health education.

D. Dissertation

Each student is required to present a dissertation dealing with an individual enquiry into a subject connected with public health in the tropics. The title of the subject selected must be approved by the Professor of Tropical Hygiene.

E. Visits

Visits are arranged to (*a*) industrial research laboratories related to medical and public health fields; (*b*) agencies with public health responsibilities such as water and sewage works; (*c*) local authorities concerned with town development and (*d*) other units involved in public health problems.

Requirements for attending the course are as follows:

A. QUALIFICATION FOR ADMISSION

The course for the diploma is open to registered medical practitioners and to persons who hold a medical qualification which, although not registered in the United Kingdom, is approved by the University. All candidates must possess such experience as will enable them to profit from the course.

B. LENGTH OF COURSE

The course will normally start on the Monday nearest to 1st October and, with the period of examination, will last for an academic year.

C. ADMISSION

Applications for admission should be submitted to the Registrar by 1st March preceding the course concerned. Candidates will be informed of the results of their applications by the end of March.

D. PROFICIENCY IN ENGLISH

It is essential that applicants from abroad should have a thorough knowledge of the English language.

An examination for the diploma is held by the University of London in June and October. It is only open to those who have attended a course of study in the subject

RECOMMENDED READING LIST FOR THE D.T.P.H. COURSE

The following three books are recommended for students to read before attending the course:

Bryant, J. (1969), *Health and the Developing World.* Cornell University Press, Ithaca and London.

Davey, T. H. and Lightbody, W. P. H. (1965), *The Control of Diseases in the Tropics* (3rd Edn). London, H. K. Lewis.

King, M. (1966), *Medical Care in Developing Countries.* Oxford University Press.

The following journals are recommended to members of the course:

The Tropical Disease Bulletin, Abstracts on Hygiene, W.H.O. Bulletin, W.H.O. Chronicle and *Tropical Doctor.*

Other journals are recommended according to the special interests of individual members of the course.

APPENDIX II

University of Singapore

Course leading to the Mastership of Science in Occupational Medicine: M.Sc. (Occupational Medicine)

Details of Syllabus

Requirements for admission to course

1. A medical qualification registrable in Singapore or its equivalent (acceptable to Senate).
2. Two years' experience after qualification as a medical practitioner, of which at least one year should be spent in either occupational health or public health or in experience relevant to either or both.
3. The possession of a recognised Diploma of Public Health may exempt the holder from attendance at the sessions in the first term.

Duration of Course

One academic year.

Curriculum

I *General preventive medicine*

Public health—including:
- Communicable and parasitic disease control.
- Sanitation.
- Public health administration.

Epidemiology—including epidemiology of non-communicable—and especially occupational—disease.

Nutrition.

Biostatistics—including—Research methodology Evaluation techniques.

Social sciences and group dynamics, including social conditions of the community; social effects of illness; social deviation. Behaviour in relation to health and disease; medical ethics in industry; the functions of management, trade unions, personnel and welfare services.

Health education—including methods of educating management and workers in the promotion and maintenance of health.

Family planning.

II *Occupational Health*

History of occupational health.
Work Physiology—including physical factors of the work environment; general effects of work on health, ill-health and productivity, including the principles of physiology in relation to work and environment; reaction of the body to the environmental conditions, including temperature, humidity, barometric pressure and noise.
Industrial Psychology—including factors influencing mental health, human relations and emotional adjustment to work.
Organisation of Occupational Health Services.
Industrial Legislation including Workers' Compensation.
Occupational Hygiene.
Safety.
Pollution control.
Ergonomics—including the design of equipment and machines with particular reference to the physiological, anatomical and psychological aspects of man in his working environment.

III *Occupational Medicine*

Accident prevention.
Industrial and Agricultural Toxicology—including principles of toxicology; mode of entry of toxic substances into, and their actions on, the body.
Occupational disease—including the aetiology, diagnosis, prevention and treatment of occupational diseases.
Disability evalutation.
Rehabilitation.
Emergency surgery (as applied to occupational hazards).
Refresher course in General Medicine.
Vulnerable groups, including problems relating to the employment of women, the young and the elderly.

IV *Practical instruction*

Teaching will include:

(*a*) Sessions at outpatient clinics, specialist medical units, the Industrial Health Unit and other units related to the study of injury and disease caused or adversely affected by occupation.
(*b*) Visits to factories, other workplaces, laboratories and research centres.
(*c*) Field studies of practical health problems in factories and other work sites.
(*d*) Practical work in a laboratory.

Examination

The examination at the end of the course will consist of four papers, an examination in clinical medicine with emphasis on occupational medicine, a laboratory examination and an oral examination.

The candidate will also be required to present a dissertation on an occupational health subject.

Employment opportunities

It is expected that many of the candidates will be advising Governments on Occupational Medicine. There will also be some sent by private industries and others who may be seeking employment in the private sector after the course. Within the next few years there should be good employment opportunities for practitioners in Occupational Medicine in both Government, and University and private sectors.

Chapter 21

Universities and Research Institutes

University	*Staff*
Dept. of Social Medicine, University Medical Buildings, Foresterhill, Aberdeen. Tel. Aberdeen 23423 (Ext. 2495)	Prof. R. D. Weir, M.D., D.P.H. Dr. John Mann Dr. Dorothy Moir
Safety and Hygiene Group, University of Aston in Birmingham, Gosta Green, Birmingham, B4 7ET. Tel. 021-359 3511	Prof. Gordon Atherley, M.D., M.F.C.M., D.I.H. Dr. Richard T. Booth Mr. Andrew R. Hale
Dept. of Social and Preventive Medicine, Queen's University of Belfast, Institute of Clinical Science, Grosvenor Road, Belfast, BT12 6BJ. Tel. Belfast 40503 (Ext. 330)	Prof. J. Pemberton, M.D., F.R.C.P. Prof. J. Froggart Dr. R. Blaney Dr. J. H. Elwood Dr. J. A. Smiley Dr. J. McKinney Dr. J. McA. Taggart
Department of Social Medicine, University of Birmingham, Medical School, Edgbaston, Birmingham, 15. Tel. 021-472 1301	Prof. T. McKeown, Ph.D., M.D., F.R.C.P. Dr. J. A. H. Waterhouse Dr. P. L. Pelmear
Department of Public Health, University of Bristol, Canynge Hall, Whiteladies Road, Bristol, BS8 2PR. Tel. Bristol 38262	Prof. R. C. Wofinden, M.D., M.R.C.P., D.P.H. Dr. T. G. F. Hudson Dr. E. P. Hamblett
Division of Social Medicine, Chester Beatty Research Institute, 237 Fulham Road, London, SW3 6JB Tel. 01-352 8133	Prof. R. A. M. Case, M.D., P.H.D., F.I.Biol., F.S.S. Mrs. A. Armstrong, B.A., Dip. Soc. Anthr. Miss G. Arscott Miss C. Coghill, F.S.S. Miss Joan Davies, M.A., Dip. P.S.A. Mr. L. S. Levy, M.Sc. Miss E. Lister Dr. D. Manson, Ph.D. Miss S. Somerville, B.Sc., Dip. S.A. Dr. G. Warwick, Ph.D., D.Sc.

Teaching Activities	*Research and Other Services and Interests*
Occupational Health for medical undergraduates. Diploma in Public Health. Extramural, School of Navigation and Fishing Industry.	Advisory service to local industry.
M.Sc. in Occupational Safety and Hygiene; and courses of up to six months.	Noise and occupational deafness. Accident data studies. Loss control safety factors in engineering. Advisory service in acoustics, engineering and accident studies. Information service.
Medical under- and postgraduates. Public Health Service staff, nurses and social workers, etc.	Communicable and non-communicable diseases of all age groups. Byssinosis in flax workers in N. Ireland. Absence attributed to sickness in industry. Coronary heart disease. List of publications.
Medical Students. Undergraduate lectures/Seminars/Industrial visits.	Occupational cancers. Noise induced hearing loss. Vibration white finger. Chrome workers. Statistical Analyses, Cancer Registry, Birmingham Hospital Region. List of publications.
Undergraduate and postgraduate medical students in Occupational Medicine. D.P.H. Course for postgraduates. Postgraduate lectures in Occupational Health.	Member of staff in charge of Bristol Corporation Occupational Health Service. List of publications.
Lectures in other people's courses on Occupational Health, Safety in Laboratories, etc., in relation to carcinogenesis.	Environmental cancers. Advice about possible carcinogenicity of chemicals. List of publications.

University	*Staff*
Department of Social and Occupational Medicine, University of Dundee, 9 Dudhope Terrace, Dundee. Tel. 0382 23051	Prof. Alex Mair, M.D., F.R.C.P. (Ed.), D.P.H., D.I.H. Dr. W. Taylor, B.Sc., Ph.D., M.D., F.R.C.P. (Ed.). Dr. M. K. B. Molyneux, B.Sc., M.Sc., Ph.D. Mr. J. Pearson, B.Sc., M.Sc. Mrs. D. Radwanski, S.R.N., S.C.M., O.H.N.C. Dr. P. B. James, M.B., Ch.B., D.I.H. Mrs. C. Murray, B.Sc. Mr. D. Hutcheson, B.Sc. (Hon.) App. Chem., G.R.I.C. Mr. T. D. Guthrie, Cert. Occ. Hyg.
Department of Social Medicine, University of Edinburgh, Usher Institute, Warrender Park Road, Edinburgh, EH9 1DW. Tel. 031-229 6207	Prof. S. L. Morrison, M.B., Ch.B., F.R.C.P.E., D.P.H. D. Cameron, M.B., Ch.B., D.P.H. W. Lutz, B.Sc., M.Sc. H. B. L. Russell, M.R.C.S., L.R.C.P., D.P.H., D.T.M. & H. S. A. Sklaroff, B.Sc. J. L. Gilloran, M.B., Ch.B., D.P.H. T. L. Pilkington, L.R.C.P., M.R.C.S., D.P.M.
Department of Epidemiology and Preventive Medicine, University of Glasgow, Ruchill Hospital, Glasgow, G20 9NB. Tel. 041-946 6491	Dr. Andrew P. Curran
Department of Public Health, University of Liverpool, Health Department, Hatton Garden, Liverpool, L3 2AW. Tel. 051-227 3911	Prof. A. B. Semple, C.B.E., V.R.D., M.D., D.P.H. Dr. T. L. Hobday
Department of Community Medicine, Guy's Hospital Medical School, London, S.E.1. Tel. 01-407 7600 (Ext. 543)	J. A. D. Anderson, M.D., M.R.C.G.P., D.P.H. P. A. Draper, M.B., B.Ch. E. R. Dalton, B.Sc. R. Haswell, B.Sc., R.G.N. H. Leigh G. Grenholm S. Israel
University of London, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT. Tel. 01-636 8636	C. E. Gordon Smith (Dean) A. W. Woodruff, M.D., Ph.D., F.R.C.P., F.R.C.P.E., D.T.M. & H. D. S. Bertram, D.Sc., Ph.D., F.I.Biol. J. R. Busvine, D.Sc., Ph.D., F.I.Biol. J. C. Waterlow, C.M.G., M.D., Sc.D., F.R.C.P. G. S. Nelson, M.D., D.Sc., M.R.C.P., D.A.P. & E., D.T.M. & H. W. H. R. Lumsden, D.Sc., M.B., Ch.B., D.T.M., D.T.H., F.R.S.E., F.I.Biol., F.R.C.P.E. D. D. Reid, M.D., D.Sc., F.R.C.P. P. Armitage, Ph.D. W. Brass, M.A. G. A. Rose, D.M., F.R.C.P. G. Edsall, M.D. J. N. Morris, C.B.E., D.Sc., F.R.C.P., D.P.H. R. F. L. Logan, M.D., F.R.C.P., D.I.H. J. K. Wing, M.D., Ph.D., D.P.M. L. J. Bruce-Chwatt, O.B.E., M.D., M.P.H., D.T.M. & H. R. S. F. Schilling, M.D., D.Sc., F.R.C.P., D.P.H., D.I.H. J. S. Weiner, D.Sc., M.A., Ph.D., M.R.C.S., L.R.C.P., F.I.Biol.

Teaching Activities	*Research and Other Services and Interests*
Diploma/Certificate in Industrial Health; Occupational Health Nursing Certificate (R.C.N.); Refresher courses; Public Health Engineering.	Noise and occupational deafness. Vibration and Raynaud's Phenomenon. Rehabilitation following myocardial infarction. Low back pain in nurses. Scottish Occupational Health Laboratory Service Ltd. Consultant and environmental service to industry.
Social medicine to undergraduates in the Edinburgh Medical School and in the Faculty of Social Sciences of the University of Edinburgh; postgraduates seeking Diploma in Social Medicine and supervision of candidates for intermediate and higher degrees.	Factors governing the occurrence of selected diseases. Preventive medicine. Health services. Consultant services in social medicine, epidemiology and the use of statistics in medical care problems; electronic computing. Medical care studies. List of publications.
Undergraduate teaching in occupational health. Postgraduate (D.P.H.)	Medical care, occupational health, rehabilitation, environmental health.
D.P.H. General public health.	Public health, particularly infectious disease and medical administration. List of publications.
Medical undergraduates and postgraduates, nurses, health visitors, sister tutors	Epidemiology, rheumatism and back pain in industry, operational research, health care and planning health services. O.R. for hospital. Consultancies for W.H.O. and U.S. Government on Health Care, Research and Planning. List of publications.
Clinical tropical medicine: Entomology. Human nutrition. Medical helminthology. Medical protozoology. Medical statistics and epidemiology. Microbiology: Public health. Ross Institute of Tropical Health. TUC Centenary Institute of Occupationa Health. Environmental Physiology research unit.	Report on the work of the School published annually.

University	*Staff*
Department of Social and Preventive Medicine, Middlesex Hospital, Medical School, London, W.1. Tel. 01-636 8333 (Ext. 573)	Dr. G. Kazantzis, M.B., Ph.D., F.R.C.S., M.R.C.P., M.F.C.M. Miss Anthea Jack
London Hospital Medical College, 36 Newark Street, London, E1 2AD. Tel. 01-247 1863	Dr. T. Arie, B.M., B.Ch., D.P.M.
Department of Medicine, Royal Postgraduate Medical School, Ducane Road, London, W.12. Tel. 01-743 2030	Dr. C. Fletcher, C.B.E., M.D., F.R.C.P. Dr. N. B. Pride Dr. S. Freedman
Institute of Dermatology, University of London, Lisle Street, London, WC2H 7BJ. Tel. 01-437 8383	Prof. C. D. Calnan, M.B., F.R.C.P. W. C. Noble, M.Sc.(Lond.), Ph.D.(Lond.), M.I.Biol., M.C. Path. D. A. Somerville, B.Sc.(Edin), B.Sc.Hons. (Otago.), Ph.D.(Otago.). I. A. Magnus, M.D., F.R.C.P. R. S. Wells, M.D., F.R.C.P.E., M.R.C.P., D.C.H. Dr. G. C. Wells Dr. E. Wilson Jones Dr. M. M. Black H. E. Amos Dr. E. Cronin Dr. Y. M. Clayton, B.Sc., Ph.D. Miss G. Midgley, B.Sc. D. C. N. Young, Ph.D. I. A. Magnus, M.D., F.R.C.P. G. M. Levene Dr. M. F. Spittle, M.Sc., F.F.R., D.M.R.T. Dr. T. E. Burlin, B.Sc., Ph.D.
Department of Epidemiology, St. Mary's Hospital Medical School, London, W.2. Tel. 01-723 1252	Prof. G. A. Rose, D.M., F.R.C.P. Dr. David Christie
Department of Clinical Epidemiology and Social Medicine, St. Thomas's Hospital Medical School, London, S.E.1. Tel. 01-928 9292 (Ext. 2010)	Prof. W. W. Holland, B.Sc., M.D., F.R.C.P. Dr. D. C. Morrell Dr. H. G. Gage Dr. D. McPherson Dr. W. S. Marson Dr. L. Zander Dr. C. Watkins Dr. C. du V. Florey Dr. Jean Weddell Dr. M. Clarke Dr. M. W. Adler Dr. M. Harriet Trevelyan Dr. Judith Cook Dr. Beulah Bewley Dr. Margaret Anderson Mr. H. S. Kasap Mr. T. Halil Mr. R. Corkhill Mr. A. Swan Mr. D. Altman Miss Shirley Beresford Dr. Miriam Morris Mrs. Jane Waller Miss Isobel Day Miss Carol King Mrs. Karen Dunnell Mrs. Susan Thorne

Teaching Activities	*Research and Other Services and Interests*
Occupational preventive and social medicine. Occupational medicine to postgraduate M.Sc. students.	Occupational toxicology, clinical occupational medicine, occupational pulmonary disorders. Evaluation of cases of illness believed to be related to occupation. Biochemical tests and full respiratory functional assessment. Investigation and treatment of patients, List of publications.
Postgraduate medical students.	Chronic airways obstruction and asthma, with particular reference to smoking. Lung function testing. List of publications.
Postgraduate medical students.	Skin testing of patients with eczema and dermatitis. Patch testing. Allergic contact dermatitis. Purity, concentration and diluents of contact allergens. Occupational dermatitis. Allergencity of new products. Contact dermatitis. Contact dermatitis due to textiles, footwear nickel, fluxes, plastics, gold, enzyme detergents and perfume and essential oils.
Medical students.	Heart disease prevention in industry. Epidemiological studies. Publications.
Medical care course, epidemiology, ward rounds, general practice. Postgraduate course on organisation and planning of medical services. Intra-departmental teaching.	Medical care usage. Smoking in schoolchildren. Nutrition amongst schoolchildren. Environmental and personal factors in respiratory disease in schoolchildren. Medical care in general practice. Community care in very severely disabled patients. List of publications.

University	*Staff*
Department of Ergonomics and Cybernetics, Loughborough University of Technology, Loughborough, Leics. Tel. Loughborough 63171	Prof. W. F. Floyd Prof. B. Shackel Prof. N. S. Kirk Dr. E. Edwards Dr. E. J. Hamely
Nuffield Department of Occupational Health, Victoria University of Manchester, Clinical Sciences Building, York Place, Manchester, M13 0JJ. Tel. 061-273 4441	Prof. W. R. Lee, M.D., M.R.C.P., D.I.H. M. L. H. Flindt, M.B., B.S., D.I.H. J. K. Howard, M.B., Ch.B., B.D. F. F. Cinkotai, B.Sc., Ph.D. E. Moss, B.Sc. D. M. Hiett, M.Sc. J. R. Scott, B.Sc. D. W. Franklin, B.Sc.
M.R.C. Air Pollution Unit, St. Bartholomew's Hospital Medical College, Charterhouse Square, London, EC1M 6BQ. Tel. 01-253 1537	Dr. P. J. Lawther, M.B., D.Sc., F.R.C.P.
Medical Research Council, Pneumoconiosis Unit, Llandough Hospital, Penarth, Glamorgan, CF6 1XW. Tel. Penarth 708761	Dr. John Cary Gilson 5 full-time male 1 part-time female doctor 1 full-time female S.R.N. O.H.N.C. Employed population: 50 male, 44 female
Medical Research Council Toxicology Unit, M.R.C. Laboratories, Woodmansterne Road, Carshalton, Surrey. Tel. 01-643 8000	Dr. J. M. Barnes Dr. W. N. A. Aldridge Dr. H. B. Stoner Dr. L. Magos Dr. W. H. Butler Dr. F. de Matteis
Nuffield Department of Industrial Health, University of Newcastle upon Tyne, 21 Claremont Place, Newcastle upon Tyne, NE2 4AA. Tel.: Newcastle 28511	Prof. R. C. Browne, D.M., F.R.C.P. R. I. McCallum, M.D., D.Sc., F.R.C.P. G. L. Leathart, M.D., F.R.C.P. J. Steel, B.Sc., Ph.D., Dip. Occ. Hyg.
Department of Social Medicine, University of Oxford, 8 Keble Road, Oxford, OX1 3QN. Tel. Oxford 57243	Dr. Alice Stewart, M.D., F.R.C.P. Mr. G. J. Draper Mr. G. W. Kneale Dr. J. F. Bithell Mr. P. D. Gorbach Dr. E. L. Lennox
Department of Community Medicine, University of Southampton, Southampton, SO9 5NH. Tel. Southampton 59122	Prof. E. D. Acheson, D.M., F.R.C.P. Dr. J. A. Forbes Dr. W. E. Waters Dr. C. Metcalfe Dr. M. J. Gardner Dr. D. Skelton
Department of Social and Occupational Medicine, Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN. Tel. Cardiff 755944	Prof. C. R. Lowe Dr. J. R. Glover Dr. R. L. Kell Mr. A. Samuel Dr. J. Graham Jones

Teaching Activities	*Research and Other Services and Interests*
B.Sc. (Hons.) in Ergonomics and Human Biology. M.Sc. in Ergonomics, Human Biology and Ergonomics for Architecture and Building Services.	Vibration. Vision and lighting. Human sciences and advanced technology. Institute for Consumer Ergonomics. List of publications.
Occupational health, medicine, nursing, social administration. Postgraduates and undergraduates. Syllabus of courses available.	Electric shock, deposition of aerosols in the lung, occupational cancer. Outpatient clinic, consultancy in occupational medicine. List of publications.
Undergraduate medical students.	List of publications.
	Occupational lung disease. List of publications.
	Mechanisms of toxicity of compounds known as or suspected to be hazards. Contract with W.H.O. on pesticides.
Undergraduate medical students and mechanical engineering and chemistry honours students. Postgraduate courses in industrial health for G.P.s and industrial nurses.	Antimony pneumoconiosis, decompression sickness, asbestosis, toxic components of welding fumes, thermal decomposition products of surface coatings, natural history of bladder cancer, sports injuries, influence of belt design on performance. Blood and urine testing, analysing and testing of substances, materials and environmental conditions. List of publications.
Clinical students, Radcliffe Infirmary.	Epidemiology of cancer, normal growth and development, occupational hazards. List of publications.
Medical students.	Absence from work due to sickness. List of publications.
Medical undergraduates and postgraduates, nurses (O.H.N.C.), and revision courses for G.P.s and I.M.O.s.	Back pain, noise induced hearing loss, selenium, tellurium, lead, occupational bronchitis. Welsh Occupational and Environmental Health Laboratory, and Occupational Hygiene Service available to industry in Wales, the West Midlands and South West England. List of publications.

Chapter 22

Additional Information from Other Countries

Information included in this section is highly selective. Completed questionnaires returned by members of the Society of Occupational Medicine based overseas are the main source. Other information has been submitted at the direct request of the editor either following visits overseas or as a result of contacts made at international meetings. Unfortunately, many of those invited were not able to submit information, but the editor wishes to express her gratitude to all those who have helped her with this section.

Further and more comprehensive information on occupational medicine throughout the world is to be found in Chapter 17– Occupational Health and the Common Market (pages 225–227; Chapter 18– The Work of the World Health Organisation in Occupational Health (pages 228–236); Chapter 20– Tropical Public Health and the Ross Institute of Tropical Hygiene (London School of Hygiene and Tropical Medicine).

The editor is well aware that even so there are many gaps in the information provided. Nevertheless, it is hoped either from these chapters or from sources mentioned in other sections of the book that the reader may be guided to the answers he needs to his queries.

AUSTRALIA

The Federal Government of Australia has an occupational health section in the state of New South Wales at the University of Sydney.

Each state has its own Occupational/Health Department/Division/Section and the addresses of the Chief Medical Officers are shown on the map overleaf. Each state is independent of the others, and functions autonomously. Neither of the two Territories have their own occupational health sections.

The National Health and Medical Research Council of Australia has an Occupational Health (Standing) Committee.

NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL OF AUSTRALIA OCCUPATIONAL HEALTH (STANDING) COMMITTEE

Terms of Reference:

To inquire into and advise the Council through the Public Health Advisory Committee on all matters relating to industrial hygiene and occupational health.

Members

1. Dr. Gordon C. Smith, Chairman, Principal Medical Officer and Senior Lecturer, Occupational Health Section, School of Public Health and Tropical Medicine, University of Sydney, N.S.W. 2006.
2. Dr. N. M. Mitchell (Secretary and Convenor), P.O. Box 100, Woden, A.C.T. 2606, Canberra. Tel. Canberra 81 8411.
3. Dr. A. Bell, Director, Department of Occupational Health, Department of Public Health, Joseph Street, Lidcombe, N.S.W. 2141.

NEW SOUTH WALES

Division of Occupational Health and Pollution Control, Joseph Street, Lidcombe, 2141, N.S.W.

Director: Dr. Alan Bell

Research interests vary according to the types of problems encountered. For the past few years the Division has been involved in:

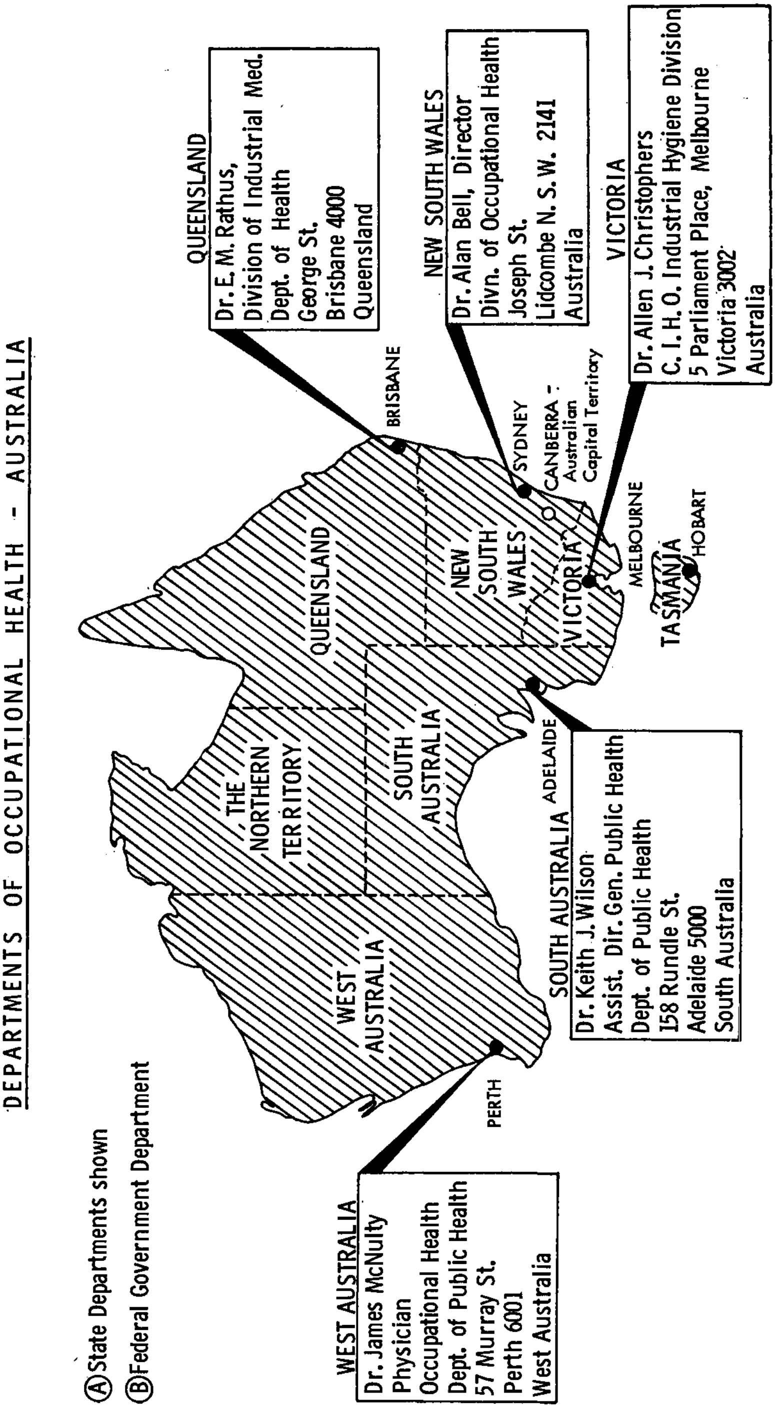
1. Occupational hazards associated with the use of enzymes in the manufacture of detergents.
2. The fumigation of shipping containers.
3. Cotton tests in spinning mills and the incidence of byssinosis.
4. Control tests (dust) in excavation sites.
5. Asbestosis in industry.
6. Causes of tenosynovitis.
7. Evaluation of the design and the effectiveness of personal protective equipment.
8. Hazards from aerial spraying.
9. Medical hazards associated with the exposure to acrylamide.
10. Carbon monoxide exposures in automatic car washing plants.
11. The health of pot room workers in an aluminium smelter.

The Division of Occupational Health and Pollution Control is part of the New South Wales Department of Health. Its responsibilities are to safeguard the health of people at work and to assess and control certain sources of environmental pollution. The services of the Division are available, free of charge, to any Government Department, factory manager, company officer, Trade Union official, medical practitioner or consultant.

The Division has 5 professional branches:

1. *Medical Branch.*
2. *Industrial Hygiene Branch.*
3. *Radiation Branch.*
4. *Air Pollution Control Branch.*
5. *Water Pollution Control Branch.*

For further information: Report of the Director General of Public Health in 1969—No. 220—Apply Director, Dr. Alan Bell, Division of Occupational Health and Pollution Control, Joseph Street, Lidcombe, 2141, New South Wales.


DEPARTMENTS OF OCCUPATIONAL HEALTH - AUSTRALIA
Ⓐ State Departments shown
Ⓑ Federal Government Department
WEST AUSTRALIA
Dr. James McNulty
Physician
Occupational Health
Dept. of Public Health
57 Murray St.
Perth 6001
West Australia
PERTH
WEST AUSTRALIA
THE NORTHERN TERRITORY
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
TASMANIA
HOBART
MELBOURNE
ADELAIDE
CANBERRA - Australian Capital Territory
SYDNEY
BRISBANE
SOUTH AUSTRALIA
Dr. Keith J. Wilson
Assist. Dir. Gen. Public Health
Dept. of Public Health
158 Rundle St.
Adelaide 5000
South Australia
QUEENSLAND
Dr. E. M. Rathus,
Division of Industrial Med.
Dept. of Health
George St.
Brisbane 4000
Queensland
NEW SOUTH WALES
Dr. Alan Bell, Director
Divn. of Occupational Health
Joseph St.
Lidcombe N. S. W. 2141
Australia
VICTORIA
Dr. Allen J. Christophers
C. I. H. O. Industrial Hygiene Division
5 Parliament Place, Melbourne
Victoria 3002
Australia

University of New South Wales, Department of Medicine
Prince Henry Hospital, Little Bay, New South Wales, Australia, 2036.
Associate Professor of Thoracic Medicine: Bryan Gandevia.

Functions: Teaching of undergraduate and post-graduate students in respiratory medicine and especially in occupational respiratory syndromes.

Research interests: include epidemiology of chronic respiratory disease, epidemiology, clinical and functional aspects of occupational respiratory disorders; physiology of respiration with special reference to lung mechanics; respiratory allergy especially in its occupational aspects.

Services provided: Routine clinical and laboratory service in respiratory medicine to a teaching hospital; similar consultant service outside the hospital in respiratory disease; consultant and investigative service to industry in occupational groups as well as individuals; comprehensive mobile respiratory laboratory service; on site epidemiological investigations.

Department of Supply

Jensen House, 339 Swanston Street, Melbourne 3000.
Senior Medical Officer, Munitions Medical Service: Sidney Preston.

The Department of Supply with about 22,000 employees is one of the largest Commonwealth departments. Together with the Departments of Defence, of the Navy, of the Army, and of the Air, Supply is a member of the Defence Group.

The Department's main function is to support Australia's Navy, Army and Air Force in defence production, research and development, purchasing, transport and storage. The Department is also the Commonwealth Disposals Authority and is responsible for the Australian Antarctic programme.

Medical and Nursing Staff

(i) *Establishments*

Senior Medical Officer	1
C.M.O's (full time)	4
C.M.O.'s (part-time)	3
Nursing Sisters (full time)	15

(ii) *Antarctic Division*

C.M.O. Class 2 (full time)	1
C.M.O.'s (full time)	6

Dust Diseases Board

82 Elizabeth Street, Sydney, New South Wales
Medical Officer, Dr. Robert Barnes—Compensation Authority.

Medical Staff

Doctors (full time)	1
Doctors (part-time)	1
Radiographer-technician	1

Research Interests: Byssinosis, Asbestosis.

VICTORIA

Industrial Hygiene Division, State Health Department, 5 Parliament Place, Victoria.

Chief Industrial Hygiene Officer, Dr. Allen J. Christophers.

Teaching: To University of Melbourne; Monash University; National Safety Council; Industry.

Research interests: Asbestos; Mercury; Lead.

The Division now consists of 4 medical officers, 6 scientific officers, 3 inspectors, 2 technicians, clerical staff.

The Health Department Regulations administered include those dealing with harmful gases, lead poisoning, confined spaces, benzene, radiation, organophosphate pesticides. Many other occupational health problems such as noise, ergonomics, solvents, pneumoconiosis, heavy metal poisonings are investigated by the divisional staff. Hazardous cargoes are inspected. In the course of these activities, members of the Division, in their own laboratories carry out tests such as blood and urine estimations of Pb, Hg, As; blood cholinesterase. Assessment of hazards concerned with vanadium, carbon tetrachloride, benzene, carbon monoxide, pesticides, radioactivity, and many others are made.

A comprehensive service is provided and used by members of other government departments, and legal professions, management, union representatives, and workmen. In addition this service is available to *any* enquirer who wishes to obtain information on occupational hygiene problems.

CANADA

Dr. C. A. R. Dennis, Director and Chief Occupational Medical Officer, Occupational Health and Safety Division, Department of Labour, 3211 Albert Street, Regina, Saskatchewan. Tel. (306) 523-0661.

Number of medical staff employed:

2 doctors, full time (male).
3 hygienists, full time (male).
1 S.R.N./O.H.N.C., full time (male).
14 Occupational Health Officers, full time (male).

Research interests: A research staff of 10 are carrying out epidemiological and field studies on the effects of farm hazards. Of particular interest might be the methods and results of the analysis of physician services in Saskatchewan since 1962.

Dr. John Markham, Associate Professor (Occupational Health), Department of Social and Preventive Medicine, University of Saskatchewan, Health Sciences Building, Saskatoon, Saskatchewan. Tel. (306) 343-2423.

Part time teaching/service arrangement.

Main manufacturing processes: Potash mining and ore refining.

Main materials handled: Potassium chloride, sodium chloride, high-boiling oils, "tallow amine".

Research interests: Effects of high boiling oil present in potash mill dust.

Student health. Main area of interest is the creation of a social system which will enable occupational health to become part of a comprehensive health service.

Dr. C. R. May, Director, Industrial Health, Government of Alberta, 10530–100 Avenue, Edmonton, T5J 0A8, Alberta. Tel. (403) 429-2711.

Number of clerical staff employed:

1 full time doctor (male).
3 full time hygienists (male).
1 full time S.R.N./O.H.N.C. (female).
3 full time radiation health officers.
1 health physicist.

Dr. May also included a list of publications from his department and stated that booklets on Lead, Industrial Noise, Asbestos and Aerosols had been published.

Dr. May enclosed "Occupational Safety and Health—A Bibliography, 1971", obtainable from:

Accident Prevention and Compensation Branch, Department of Labour, Ottawa, Ontario, K1A 0J3, Canada.

The catalogues of Information Canada Bookshops are obtainable from 171 Slater Street, Ottawa. An example of their publications is:

"The Report of the Royal Commission on the status of women in Canada", Chairman, Mr. John Bird. Catalogue No. Z1-1967-1 (1970).

The Commission made 167 recommendations to His Excellency the Governor General of Canada; amongst these was that a Federal Status of Women Council directly responsible to Parliament should be appointed (recommendation 166) to advise, undertake research, consult and propose legislation to improve the status of women.

Dr. John Leonard Weeks, Director Health and Safety Division, Atomic Energy of Canada Limited, Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, Canada. Tel. (204) 753-2311.

Number of medical staff employed:

3 full time doctors (male).
3 full time hygienists (male).
6 full time and 10 part time S.R.N./O.H.N.C. (female).
4 full time and 2 part time S.E.N. (female).

Employed population:

700 Male 200 Female

Main manufacturing processes: Nuclear research and development.

Main materials handled: Engineering materials.

Research interests: Industrial toxicology, ecology, medical biophysics, meteorology.

Dr. Weeks attached a list of publications. Three of the most recent are cited below:

Weeks, J. L., and Lentle, B. C. Health considerations in the use of organic reactor coolants. *J. Occ. Med.*, **12** (7), 246–252, 1970.

Weeks, J. L. An organic cooled reactor and its environment. *Arch. Envir. Health*, **23**, 123, 1971.

Weeks, J. L. Diagnostic radiation and the protection of the patient. *Ind. Med. & Surg.*, **40**, 24, 1971.

Dr. William S. Whitehead, Medical Officer, Workmen's Compensation Board of British Columbia, 5255 Heather Street, Vancouver, B.C., Canada.

Number of medical staff employed:

	Full time		Part time	
	Male	*Female*	*Male*	*Female*
Doctors	20	3	2	
Hygienists	4			
S.R.N./O.H.N.C.		1	1	

Population employed:

400 Male 425 Female.

Function: Deal with compensation for industrial injury or disease.

Dr. Whitehead quotes papers and lectures given on workmen's compensation applicable to workmen in British Columbia.

OCCUPATIONAL HEALTH . . . CANADA

John H. Smith, M.D., D.P.H., D.I.H., Director, Division of Occupational Health, Department of Health Services and Hospital Insurance, P.O. Box 4020, Postal Station "D", Vancouver 9, B.C.

C. A. R. Dennis, M.B., Ch.B., D.P.H., D.I.H., Director, Occupational Health Branch, Province of Saskatchewan, Department of Public Health, 3211 Albert Street, Regina, Saskatchewan.

E. Mastromatteo, M.D., Director, Environmental Health Services Branch, Ontario Department of Health, One St. Clair Avenue West, Toronto 7, Ontario.

A. J. de Villiers, D.Sc., M.R.C.S., D.I.H., Acting Chief, Occupational Health Division, Department of National Health and Welfare, Environmental Health Centre, Ottawa 3, Ontario.

T. H. Patterson, M.D., Chief, Occupational Health Division, Department of National Health and Welfare, Environmental Health Centre, Tunney's Pasture, Ottawa 3, Ontario.

V. L. Matthews, M.D., D.P.H., Professor and Head, Department of Social and Preventive Medicine, University of Saskatchewan, Saskatoon, Saskatchewan.

C. R. May, Director, Division of Industrial Health Services, Department of Health and Social Development, Edmonton, Alberta, who kindly provided this list.

EAST GERMANY

German Central Institute for Industrial Medicine

Director: O.M.R. Dr. H. G. Häublein, 1134, Berlin-Lichtenberg, Nöldnerstr. 40/42. Tel. 55 81 01.

Functions

Tasks and organisation of the industrial medical service.

Principal areas of research at institutions of industrial medicine and methods of management and planning of industrial medical research.

Graduate and post-graduate industrial medical training at universities and technical colleges in the G.D.R.

Industrial hygiene standards of the G.D.R.

FINLAND

National Board of Health

Director-General: Prof. Leo Noro, M.D., Siltasaarenkatu 18, 00530 Helsinki 53.

This is the governmental department providing all the customary facilities. It also publishes a series of research papers, *Health Service Research of the National Board of Health of Finland.*

The Occupational Health Foundation—The Institute of Occupational Health

The Occupational Health Foundation administers the Institute of Occupational Health, and its board consists of ten government representatives, one representative of the city of Helsinki, one representative of the Accident Prevention Society and six representatives of labour market organisations.

The Institute operates a training programme in occupational health. The courses generally last less than two weeks and both basic training courses and more specialised courses are given, as shown below:

I. OCCUPATIONAL HEALTH (GENERAL)
Occupational Health Days.

II. INDUSTRIAL MEDICINE
Basic Courses in Industrial Hygiene for Industrial Nurses.
Basic Course in Industrial Health Care.
Industrial Physicians Days for Specific Industries.

III. INDUSTRIAL SAFETY AND HYGIENE
Courses for Safety Engineers.
Seminar for Safety Engineers.
Courses in Industrial Hygiene (for engineers).
Air Impurities.
Measurement and Evaluation of Occupational Health Hazards.

IV. ERGONOMICS
Courses in Applied Ergonomics, "Man-Work-Technology".
Basic Courses in Ergonomics.
Seminars in Ergonomics.

V. REHABILITATION
Course in Evaluation of Working Capacity and Rehabilitation.
Basic Course in Rehabilitation.
Course in Rehabilitation for Nurses and Physiotherapists.
Course in Rehabilitation for Technical Personnel Working in Workshops.

VI. PERSONNEL SELECTION
Course for Personnel Managers.

Further information may be obtained from: F. Blanz, D.Sc., Director of Training and Education, Haartmaninkatu 1, 00290 Helsinki 29.

The Institute of Occupational Health also carries out an extensive research programme and publishes an *annual report* of its activities and publications, as well as a scientific journal *Work-Environment-Health*, which is issued three times a year in English. Further information may be obtained from: Research Office, Institute of Occupational Health, Haartmaninkatu 1, 00290 Helsinki 29.

The original director of the Institute was Professor Leo Noro, M.D. He has been succeeded by Dr. M. J. Karvonen, M.D., Ph.D.

The teaching interests of the Institute have already been referred to, research interests include amongst many others, byssinosis, lead, vibration, asbestos, diphenyl, carbon bisulphide and coronary artery disease, the consumption of fish containing mercury.

A booklet, *Current Research Projects* 1973, can be obtained from the Institute of Occupational Health, Helsinki. Many contributions to scientific literature are written in the English language. A selection from the list of research projects published in 1972 include:

Hernberg, S. and Nikkanen, J. Effect of lead on delta-aminolaevulic acid dehydratase. *Pracov. Lek.*, 24 (1972), 77–83.

Hernberg, S., Tola, S., Nikkanen, J. and Valkonen, S. Erythrocyte delta-aminolaevulic acid dehydratase test and significance for assessing different intensities of lead exposure. *Work-Environment-Health*, 9 (1972), 46–52.

Tola, S., Hernberg, S., Asp, S. and Nikkanen, J. Parameters indicative of absorption and biological effect in new lead exposure. *B. J. Ind. Med.*

Hakkinen, I., Siltanen, E., Hernberg, S., Seppalainen, A-M. and Karli, P. Diphenyl poisoning in fruit paper production—a new health hazard. *Arch. Environ. Hlth.*

Kumlin, T., Wiikeri, M. and Sumari, P. Radiological changes in the carpal and metacarpal bones and phalanges caused by chain saw vibration. *B. J. Ind. Med.*, 29.

Sumari, P., Partanen, T., Hietala, S. and Heinonen, O. Blood and hair mercury content in fish consumers. A preliminary report. *Work-Environment-Health*, 9:2 (1972), 61–65.

Finnish Association of Industrial Medicine

Chairman: Dr. Olli Elo, Enso-Gutzeit Oy, Tainionkoski, Finland.

This Association is a subdivision of the Finnish Medical Association, and its purposes are to develop health and medical care in industry, business and transport; to work for raising the standard of occupational hygiene and to promote the occupational development of its members.

The *Proceedings* of the Association are published in Finnish.

Other Finnish organisations connected with occupational health are:

Association of Occupational Health Nurses

Chairman: Mrs. Helena Karvinen, Vesijohtoliike Huber Cy, Koydenpunojankatu 4, 00180 Helsinki 18.

Center for Industrial Safety

Director: Kalevi Ilmonen, Lonnrotinkatu 11, 00120 Helsinki 12.

Occupational Safety Association

Managing Director: Juho Turunen, 1SO Roobertinkatu 20, 00120 Helsinki 12.

University of Jyvaskyla

Prof. Jeddi Hasan, Jyvaskylan yliopisto, 40100 Jyvaskyla.
(Researching into health and physical activity in the metal industry.)

HOLLAND

Philips Eindhoven

The annual report published by Philips Health Centre, Eindhoven, 1971, stated that a re-appraisal of the medical service had been undertaken with a redefining of broad objectives. The medical service is now concerned with evaluating its policy; Dr. H. H. W. Hogerzeil and Dr. A. Th. Groot Wesseldijk sum up their report by stating that great importance was placed on the organisational structure, preventive medicine, data processing and environmental hygiene.

The medical service outside the Netherlands, through the Philips International Committee on Occupational Medicine, has been concerned to formulate a new code of practice in two parts, the first intended for management and the second for the physician.

Dr. W. J. Netelenbos in co-operation with Dr. Vervoorn of the Royal Institute of the Tropics, Amsterdam has written a booklet, "Good and bad health overseas" ("Wel en wee overzee").

Previously Dr. W. J. Netelenbos had written, "Industrial Medicine", published by the Philips Health Centre, Eindhoven in 1963 in which he describes the purpose of industrial medicine and the organisation of an industrial medical service.

Royal Dutch Shell

Dr. J. H. Becking, of Shell Nederland Raffinaderin en Chemie N.V., P.O. Box 7000, Rotterdam, a member of the Society of Occupational Medicine in London, returned the questionnaire sent to members of the society and provided the following information:

Dr. J. H. Becking, Chief Medical Officer, Shell Nederland Raffinaderij en Chemie N.V., P.O. Box 7000, Rotterdam. Tel. 010 313140.

Number of medical staff employed:

	Full time		*Part time*	
	Male	*Female*	*Male*	*Female*
Doctors	3			
Hygienists	2			
S.R.N./O.H.N.C.	13	1		
S.E.N.		1		
Lab. staff	1	4		
Employed population:	6,141 male		242 female	

Main manufacturing processes: Crude oil products, plastics, rubbers, chlorinated hydrocarbons, organophosphates, ethylene oxide derivatives, detergents, solvents.

Main materials handled: Crude oil, chlorine, hydrocarbons, phenols, amines, alcohols, carbon acids.

Research interests: Chlorinated hydrocarbons, organophosphates, oxitols, noise, prevention of ischaemic heart disease, statistical analysis of; *a.* sickness absenteeism, *b.* periodical examination.

He also gave details of a film, "Fatal Decibels" produced in 1971 by the Shell Netherlands Refinery, dubbed in English. The film lasts 20 minutes, is a 16mm production in sound and colour, and can be obtained from the Shell Centre, London and direct from Dr. Becking. The film is suitable for all concerned with occupational health and safety.

Other members of the medical staff include Dr. K. W. Jager, who published "Aldrin, Dieldrin, Endrin and Telodrin" (1970), and Dr. G. D. Bos and Dr. C. F. Ottevanger who have articles in press.

University of Amsterdam

Professor Dr. R. L. Zielhius, Director, University of Amsterdam, 1st Constantijn Huygensstraat 20, Amsterdam. Tel. 020-181313 (Ext. 23).

Senior Staff: L. H. Wesseling, M.D.; H. J. Docter, M.D.; J. H. Ettema, M.D., Ph.D.; A. de Bruin, chem.; A. J. Poulus, M.D.

Functions of organisation:

Teaching: Medical students, postgraduate occupational physicians, occupational health nurses and safety personnel.

Research interests: Toxicology, work physiology, ergonomics, environmental health.

Services provided: No statutory services, only through scientific investigation and ad hoc consultation.

In the 1971 annual report of the Coronel Laboratory, University of Amsterdam Jan Swammerdam Institute, 1st Constantijn Huygensstraat 20, Amsterdam, the task of the laboratory is defined as teaching (education of) undergraduates and post-graduates and research. The fields of interest are social medicine, occupational, sport and environmental health problems. The report contains details of the research undertaken and lists publications. Though the majority are written in Dutch all have summaries in English. However, amongst the articles published in English the following are listed:

Bruin, A. De. Certain biological effects of lead upon the animal organism. *Arch. Environm. Hlth.*, **23**, 249–264 (1971).

Bruin, A. De and Zielhuis, R. L. Toxicological appraisal of lead as public health hazard. *T. Soc. Geneesk.*, **49**, 855–859 (1971).

Ettema, J. H. and Zielhuis, R. L. Physiological parameters of mental load. *Ergonomics*, **14**, 137–144 (1971).

Zielhuis, R. L. Permissible limits for inorganic lead in industry. *Proc. 16th Internat. Cong. Occ. Hlth.*, Tokyo, 1969, p. 510–512. Tokyo, 1971.

Zielhuis, R. L. Threshold limit values and total work load. *J. Occ. Med.*, **13**, 30–34 (1971).
Zielhuis, R. L. Interrelationship of biochemical responses to the absorption of inorganic lead. *Arch. Environm. Hlth.*, **23**, 299–311 (1971).

Professor Zielhuis also provided the following names and addresses from which it may be possible to obtain additional information:

Dr. J. P. Kuiper, Chief Medical Adviser, Labour Inspectorate, Balen van Andelplein 2, Voorburg.

Dr. H. Zuidema, Secretary Dutch Association of Occupational Health, Rijnlann 19, Son.

IRAN

Dr. A. A. Doorandish, Chief, Industrial Medical Services, National Iranian Oil Company, Main Industrial Medical Centre, Abadan Refinery, Abadan, S. Iran. Tel. 5180.

Number of medical staff employed:

4 full time doctors (male)

Employed population:

9,914 male, 514 female.

Main manufacturing processes: Refining and the manufacture of tin drums.

Main materials handled: Chemicals, engineering components, asbestos, glass fibre.

Research interests: Asbestos, contact cancers of the skin, and noise.

Dr. Doorandish has published papers on occupational health topics.

Dr. A. M. Lighvani, Associate Professor, Head of Health Dept., Medical Faculty, University of Tabriz, Iran. Tel. 22517.

Senior staff: Dr. Naderi (Associate Professor), Dr. Bahadori (Associate Professor), Dr. Meyabi (Associate Professor).

Functions of Organisation: Teaching medical students, courses are also given to pharmacy, agriculture and science students.

Research into industrial accidents in Tabriz.

Dr. Lighvani has published a textbook on occupational health in Persian.

ISRAEL

Dr. Leo Djerassi, Director, Medical Services, Kypath Holim Medical Insurance, Haifa, Shderoth Rotshild 35–37. Tel. (04) 539211.

Number of medical staff employed:

	Full time		*Part time*	
	Male	*Female*	*Male*	*Female*
Doctors	7	1	2	
S.R.N./O.H.N.C.	1	3		1

Employed population: About 95,000.

Main manufacturing processes: Petrochemical, chemical, textile, building, food, metallurgy, asbestcement industries and agriculture.

Research interests: Occupational skin diseases, lead hazard, asbestos hazard. Ergonomics and medical job assessment. Work is mostly in medium and small sized plants.

A number of papers (some with English summaries) on Dr. Djerassi's research interests have been published.

INDIA

Dr. Harwant Singh, Assistant Director (Medical), Central Labour Institute, Eastern Extension Highway, Sion, Bombay 22. Tel. 474351.

Number of medical staff employed:

3 full time doctors (male).
4 full time hygienists (male).

Research interests: Studies and surveys on occupational health problems throughout the country.

Also conducts refresher courses in occupational health for medical officers.

Dr. Singh included a list of publications from the Directorate General, Factory Advice Service and Labour Institutes, Ministry of Labour, Employment and Rehabilitation, Bombay and a booklet describing the work of the Central Labour Institute.

SOUTH AFRICA

Professor I. Webster of the National Research Institute for Occupational Diseases and Dr. J. C. Whitcombe of the Anglo-American Corporation of South Africa Ltd., arranged a programme for me on a visit to South Africa in August 1972. The information included is based on visits and reports. To them and to all those who were kind enough to provide information I would like to express my deep gratitude.

National Research Institute for Occupational Diseases

P.O. Box 4788, Johannesburg. Tel. 724-0331.
Director: Professor Ian Webster.
Senior staff:

Head of Department of Biochemistry, Dr. T. A. Kilroe-Smith.
Head of Department of Bacteriology and Immunology, Dr. I. Prinsloo.
Head of Department of Pathology, Dr. B. Goldstein.
Head of Department of Electron Microscopy, Professor I. Webster.
Head of Department of Industrial Hygiene, Mr. R. E. G. Rendall.
Head of Department of Experimental Physiology, Dr. A. van As.
Head of Department of Industrial Medicine, Dr. G. K. Sluis-Cremer.
Head of Department of Applied Physiology, Dr. B. van Lingen.
Head of Department of Radiology, Dr. A. Solomon.

FUNCTIONS of Organisation:

Teaching: Medical students.
Research interests: Occupational diseases in mining and non-mining.
Services provided: Electron microscopy, chemical, dust technology, pathology, library.

Number of medical staff employed:

	Full time		*Part time*	
	Male	*Female*	*Male*	*Female*
Doctors	11	2	5	
Hygienists	3		3	
S.R.N./O.H.N.C.		2		2
S.E.N.	20	2		

Employed population:

European male	36	European female	51
Non-European male	27	Non-European female	4

The Institute consists of departments of Administration, Biochemistry, Photography, Library; *Basic Sciences:* Bacteriology, and Immunology, Pathology, Electron Microscopy, Industrial Hygiene, Experimental Physiology; *Clinical Sciences:* Industrial Medicine, Applied Physiology and Radiology. A department of Epidemiology and Statistics is planned.

Before the unit was expanded to form the National Institute for Occupational Diseases it was concerned with occupational pulmonary disease and was known as the Pneumoconiosis Research Unit. The 1970 Report describes the work of the unit (S.A. Pneumoconiosis Review No. **6,** 1–32. Johannesburg 1970). The list of recent publications includes the following:

Papers published:

Goldstein, B. and Webster, I. Mixed dust fibrosis in mineworkers. In "International symposium on inhaled particles," (3rd Edn). London, 1970. (Ed.) W. H. Walton, Old Woking, Unwin, 1971.

Marasas, L. W. Chemical analysis of guinea-pig and rabbit alveolar macrophages, after exposure to quartz dust. *Med. Lavoro,* **62,** 1971, 177.

Rendall, R. E. G. and Van Sittert, G. C. H. The determination of the sice distribution of mine dusts using the coulter counter. In "International symposium on inhaled particles," (3rd Edn). London, 1970. (Ed.) W. H. Walton, Old Woking, Unwin, 1971.

Skikne, M. I., Talbot, J. H. and Rendall, R. E. G. Eletron diffraction patterns of U.I.C.C. asbestos samples. *Environ. Res.,* **4,** 1971, 141–145.

Skikne, M. I., Talbot, J. H. and Webster, I. Periodometric studies of inclusion structures found in alveolar macrophages. *Proceedings.* Southern African Electron Microscopy Society, Pretoria, 1971, 9–10.

Skikne, M. I. and Webster, I. Electron microscopical techniques in pneumoconiosis research. *S. Afr. J. Med. Lab. Tech.,* **17,** 1971, 7–9.

Solomon, A., Goldstein, B., Webster, I. and Sluis-Cremer, G. K. Massive fibrosis in asbestosis. *Environ. Res.,* **4,** 1971, 430–439.

Wolfsdorf, J. and Stevens, D. J. The vitalograph—a study of its role in pulmonary function testing in childhood. *S. Afr. Med. J.,* **45,** 1971, 851.

Webster, I. Problems associated with the pathogenesis and complications following on asbestos exposure. *Proc. Int. Congress on Occup. Health,* (16th Edn). Tokyo, 1969, 211–215.

Basson, J. K. and Webster, I. Lung cancer and exposure to radon daughters in South African gold/uranium mines. Pelindaba, Atomic Energy Board, 1971.

The Human Sciences Laboratory, Chamber of Mines, P.O. Box 809, Johannesburg.

The Director is Professor C. H. Wyndham, M.B., M.R.C.P. There are two chiefs of divisions (applied physiology and applied psychology), 27 scientists, 8 technicians and 5 administrative and clerical staff.

The laboratory is mainly concerned with research into methods of *acclimatisation* of mineworkers. A great number of different problems have formed the subject of research into the best method of acclimatising men by the Chamber of Mines Procedures. The importance of reducing heat stroke and the assessment of heat stress of work in hot atmospheres, work physiology, the effects of heat on work performance, work performance and motivation are some of the main topics which have been and are being tackled.

Numerous reports and articles have been published. Quoted here are papers on "A survey of the casual factors in heat stroke and of their prevention in the gold mining industry," which was published by Dr. C. H. Wyndham in the Journal of South African Institute of Mining and Metallurgy, and a joint paper, pp. 125–154 (Nov. 1965); by Wyndham, C. H., Watson, Marion and Sluis-Cremer, G. K. "The relationship between weight and height of South African male of European descent between 20 and 60 years." S. Afr. Med. J., **44**, 406–409 (1970).

Anglo-American Corporation of South Africa Ltd., 44 Main Street, Johannesburg. (P.O. Box 61587, Marshall Town, Transvaal.)

Dr. J. L. C. Whitcombe is the medical consultant. His report for 1971 provides information on the number of African mine workers employed, the number of medical and nursing staff employed by the Corporation and at the Ernest Oppenheimer Hospital, Welkom, Orange Free State. Records are kept of mortality and morbidity amongst corporation employees. A detailed analysis of the figures is included.

Twenty-seven hospitals care for the 166,000 African employees of the mines. The Ernest Oppenheimer Hospital, already referred to, is the largest industrial hospital in the southern hemisphere. The scope of the work and the design of the hospital is described in an illustrated booklet.

Many contributions to the literature have been made by members of the staff, notably, "An outbreak of smallpox in a semi-closed community" by J. G. D. Laing, B.Sc., M.B., Ch.B., D.I.H. A paper on this topic was presented at the 43rd South African Medical Congress, Cape Town in 1966 and it is published as an illustrated book by the hospital.

The Director of the hospital is Dr. I. Potgieter, M.B., B.Ch., D.I.H.

The South African Society of Occupational Health has already been mentioned in chapter 1, but the address of the honorary secretary is also included here: Dr. A. M. Coetzee, 1404 Cape Towers, CR. Marshall and McLaren Streets, Johannesburg, South Africa.

SUDAN

Dr. Yolisif Osman, Chief, Occupational Health Division, Ministry of Health, P.O. Box 303, Khartoum, Sudan. Tel. 80628.

Number of medical staff employed:

5 doctors, full time (male).
3 hygienists, full time (male).

Main manufacturing processes: Textile mills, woodworks, general engineering, printing.

Main materials handled: Cotton dust, wood dust, lead.

Research interests: Occupational health in developing countries. Problems of vegetable dusts.

Dr. Osman enclosed a report of five years experience with the Occupational Health Division in the Sudan. He described the geographical features, industries and health hazards.

The functions and duties of the Division include education and training in safety and health; organisation of occupational health services and first-aid treatment in places of employment; representation on joint committees and research. Publications listed included an article on sprains and strains in *The Encyclopaedia of Occupational Health and Safety*, published by I.L.O., 1972.

SWEDEN

In 1972, the booklet *Occupational Health in Sweden* written by the Director, Dr. Sven Forsmann, of the National Institute of Occupational Health in Stockholm, was published, and can be obtained from: Hamngalan 27, P.O. Box 7072, S-10382, Stockholm 7, Sweden.

The Swedish Institute which was founded in 1945, and is a government foundation whose task it is to promote cultural exchange with other countries.

A brief summary is included with Professor Forsmann's permission.

Parallel to the industrial and economic growth of the last 25–50 years, Sweden has gradually developed its public and occupational health services.

At national level, both in Sweden and elsewhere, there are four main aspects of occupational health. Legislation on workers' protection guarantees a minimum standard of safety and health at the work place and this legislation is supervised by a government authority. Everyday problems on the factory floor must however be controlled or supervised by some organisation within the factory concerned with safety and occupational health, i.e., occupational health services. Problems of general importance must, however, be dealt with by regional or national institutes carrying out research or investigations upon request from authorities, organisations, factories, hospitals or doctors. There is also a need for training specialists in safety, occupational health, ergonomics, as well as training and teaching in this field to managers, engineers, foremen and workers.

Swedish occupational health is based on activities in four fields:

1. Statutory minimum standards for health and safety at work (laid down in legislation), under a Workers' Protection Act, supervised by the National Board of Occupational Safety and the Labour Inspectorate.
   The combination of legislation and voluntary activities in cooperation between employers' and workers' organisations is typical of Sweden.
2. Everyday problems on the factory floor are solved by occupational health services which in Sweden are voluntary but based on an agreement between employers' and workers' organisations.
   Occupational health services consist of a medical and a technical part showing the close cooperation between safety engineers, ergonomists, industrial physicians and nurses.

In order to solve the health problems of small industries, health centres on a regional basis have been widely developed. Occupational health services are now also being gradually organised for non-industrial sectors such as stevedores, forestry and agriculture.

3. Research is covered mainly by the National Institute of Occupational Health, organised in 1966, and by regional hospital units for occupational diseases, as well as, to some extent, by other organisations and university institutes. Research is directed towards practical problems of Swedish industry and other employment sectors. The Institute is also concerned with the practical applications of results from research.
4. Teaching and training. Undergraduate training of medical or engineering students is so far only developed on a small scale as far as occupational health is concerned. Most training in occupational health is provided by the National Institute of Occupational Health at postgraduate level. Industrial physicians, industrial nurses and safety engineers are being trained and the training courses have already been introduced or will be developed to cover one academic year. A higher training course in ergonomics for construction engineers and designers has been introduced and has met with great interest. Training for safety workers has been arranged by the Joint Industrial Safety Council, organised jointly by the employers and unions. Courses for safety workers and union officials have been organised by the Swedish Confederation of Trade Unions. Refresher courses have been organised by the Swedish Employers' Confederation for industrial physicians, nurses and safety engineers.

Dr. Lennant Sundell, Head of the Department of Occupational Medicine, Regional Hospital, 701 85 Örebro, Sweden, has provided the following information:

Senior Staff:

Medical: Lennart Sundell, M.D. (Head); Olav Axelson, M.D.

Technical: Bertil Ekander, M.Sc. (Head of Techn. section); Pontus Götell; Magnus Rehn.

Functions of Organisation:

Teaching: Immigrant physicians. Short courses/conferences about certain problems for plant physicians, safety engineers and industrial nurses.

Research Interests: Metals (Pb, Zn, Cd) Solvents and plastics (especially styrene, isocyanates), Explosives (nitroglycol and nitroglycerin), Epidemiological work on radon and herbicide exposure.

Services provided: 1. Out-patients (occupational diseases and health controls). 2. Measurements and evaluation of occupational risk-factors (service to the industry).

Any other details: The principal tasks of the department are to serve patients and the industry including education. Research work is secondary and mainly concerned with practical problems of measuring and evaluating risk factors.

Department of Occupational Medicine, Regional Hospital, 701 85 Orebro, Sweden. Summary of Annual Report, 1971.

(*a*) Care of (predominantly out-) patients.
(*b*) Health controls to groups of persons exposed to occupational risk factors.
(*c*) To undertake special health controls according to regulations (e.g., lead, mercury, benzol, etc.).

(*d*) Serving the industry, etc., with technical and hygienic investigations of the working environment.
(*e*) Research work.
(*f*) Information to representatives for the authorities, different institutions and corporations.

The activity is as a rule confined to the district of Örebro.

a: *Silicosis.*
Regular conferences between specialists in radiology, pneumonology, physiology and occupational medicine for diagnosis and evaluation of disability.

d: *Halothan.*
Halothan—measurements in operating theatres to evaluate the exposure of the anaesthetists.

e: *Radon.*
Epidemiological work, lung cancer in (non-uranium) miners.
Heat.
Some work is done on heat exposure to evaluate the accuracy of thermal indices in the Swedish climate.

e: *Styrene.*
Relations between styrene in ambient air and metabolites (mandelic acid and phenylglyoxylic acid) in urine have been studied.
Nitroglycol.
The absorption through skin is much more important than by inhalation.

f: *Trade-union conferences.*
Regular conferences are held between the factory inspection and the trade unions and the staff of the department.

References

Göthe, C-J, B. Fristedt, L. Sundell, B. Kolmodin, H. Ehrner-Samuel and K. Göthe; Carbon Monoxide Hazard in City Traffic, *Arch. Environ. Health,* Vol. 19, Sept. 1969, p. 310–314.
Axelson, O. & M. Rehn; Lung Cancer in Miners, *The Lancet,* ii, 1971, p. 706–707.
Götell, P; A Method to Estimate the Total Exposure of Nitroglycol (E.G.D.N.) and Nitro-Nitroglycerin (G.T.N.) in Dynamite Workers. *Abstracts of the International Conference of the Permanent Commission and International Association of Occupational Health,* Slanchev Briag (Bulgaria) Sept. 1971, 20–24.
Axelson, O. & M. Rehn; Lung Cancer Among Populations Having Lung Irradiation, *The Lancet,* i, 1972, p. 46–47.
Götell, P, O. Axelson and B. Lindelöf; Field Studies on Human Styrene Exposure In the Press (*Work-Environment-Health* 1972).

UNITED STATES OF AMERICA

Dr. J. S. Felton, Director, Occupational Health Service, County of Los Angeles, 222 North Grand Avenue, Los Angeles, California 90012. Tel. (213) 625-3611.
Number of medical staff employed:

	Full time		*Part time*	
	Male	*Female*	*Male*	*Female*
Doctors	5		17	2
Hygienists	2	1		
S.R.N./O.H.N.C.	12			

Employed population: 75,079.

Public services concerned: County Government, including hospital operation; crafts; freight operation; law enforcement; fire suppression; parks maintenance; beach and pool lifeguarding; public welfare; tax collection; operation of museums; medical, archeologic, zoologic and research; building maintenance; courts operation; flood control, etc.

Research interests: Occupational mental health, employment of the handicapped, consumer education, rehabilitation, health status of hard core unemployed.

Dr. Felton included a list of over 300 publications. Four of the most recent ones are included here:

Felton, J. S. Occupational health—Government program for County employees. *J. Amer. Med. Assoc.*, **217**, 55–60, 1971.

Felton, J. S. Alice Hamilton, M.D.—A century of devotion to humanity. *J. Occ. Med.*, **14**, 106–110, 1972.

Felton, J. S. Advocacy for the health of society: The true purpose of the preplacement physical examination. *Southern Medical Journal,* **65**, 193–199, 1972.

Felton, J. S. Heavy metal poisoning: Mercury and lead. *Annals of International Medicine,* **76**, 779–792, 1972.

Dr. Norman Williams, Professor of Community Health and Preventive Medicine and Professor of Occupational Medicine, Thomas Jefferson Medical College of Thomas Jefferson University, 1025 Walnut Street, Philadelphia, Pennsylvania 19107. Tel. (215) 829-6928.

Research interests: Carbon monoxide, paint dust, polymer fume fever. Health services for small plants.

Of Professor William's numerous publications the following papers are listed:

Williams, N. and Smith, F. K. Polymer fume fever—an elusive diagnosis. *J. Amer. Med. Assoc.*, **219**, 1587, 1972.

Williams, N. and Riegert, A. L. Epidemic alopecia areata. An outbreak in an industrial population. *J. Occ. Med.*, **13**, 535, 1971.

Williams, N. Hazards of mining uranium, some rarer ores and the use of vibrating tools. In: *Medicine in the Mining Industries* (Ed.) J. Rogan, William Heinemann Medical Books, London, 1972.

ZAMBIA

The Anglo-American Corporation (Central Africa) Ltd.

Reports of the Group Medical Adviser, Dr. W. E. F. L. Glatthaar, Mutondu House, P.O. Box 172, Kitwe, of the medical services of Nctanga Consolidated Copper Mines Ltd., for 1970 and 1971 quote lists of published papers by members of the staff and these include:

"Calculations for changes in sickle cell trait rates" by M. Splaine, E. B. Hayer and G. P. T. Barclay, *American Journal of Human Genetics* (in press).

"Population dynamics of the S-gene", M. Splaine and G. P. T. Barclay, *Medical Journal of Zambia* (1970), **4**, 247.

Dr. Glatthaar reports that the Animal Haemaglobin Research Unit of the Anglo-American Corporation (Central Africa) Ltd., was established in September 1968 to survey the distribution of the sickle cell gene and haemoglobinopathies in Zambia and to study sickle cell anaemia in that country. Dr. G. P. T. Barclay is the Director of the Unit.

Addresses in Africa

Dr. A. O. Soyemi, Occupational Health Unit, Federal Ministry of Health, Yakubugowon Street, Lagos, Nigeria.

Dr. L. K. Derban, Senior Lecturer, Department of Preventive and Social Medicine Ghana Medical School, Accra, Ghana.

Dr. Abaglo, Ministry of Health, Lome, Togo.

Dr. A. O. Ogun, W.H.O. Public Health Adviser, c/o W.H.O. Representative, P.O. Box 316, Monrovia, Liberia.

The Deputy Director of Health Services, Ministry of Health, Seirra Leone.

Dr. Eboko Ebelle, Ministry of Health, Yaounde, Cameroons.

Dr. D. Byahunga, Senior Specialist, Occupational Health, Ministry of Labour, Kampala, Uganda.

Professor John Bennett, Head of Department of Preventive and Social Medicine, Dar-es-Salaam University, Dar-es-Salaam, Tanzania.

The Permanent Secretary, Ministry of Health, Woodgate House, Lusaka, Zambia.

The Chief Medical Officer, Ministry of Health, Blantyre, Malawi.

The Chief Medical Officers of the Ministries of Health of Swaziland, Botswana and Lesotho.

Appendix

FILMS AND AUDIO VISUAL AIDS
AND TEACHING INFORMATION

This brief section includes references to the:

1. British Industrial and Scientific Film Association.
2. Central Office of Information.
3. Medical Recording Service Foundation.
4. British Medical Association, Department of Audio Visual Communication.
5. Camera Talks Ltd.
6. Association for the Study of Medical Education.

Many members of the Society of Occupational Medicine recommended films suitable for a variety of different audiences: Medical, nursing, safety officers, first-aiders, etc., this list has proved too long for inclusion in the text. If, however, there is sufficient demand for such information, it may be possible to publish the information in some other form.

1. British Industrial and Scientific Film Association

Medical Films available in Great Britain is a new publication which gives details of 2,143 films on medical, nursing and allied subjects which are available in this country from numerous sources. This is a completely new edition of the Guide to Medical Films published in 1966.

The intention of this publication is to help teachers of medicine and allied subjects like dentistry and pharmacy by giving details of titles, technical aspects and contents of all films available.

Both the British Life Assurance Trust for Health Education and the British Medical Association have provided sufficient funds to keep the price of the catalogue below cost level and at about half the price of the previous edition.

The bibliographical details have been the responsibility of the staff of the British National Film Catalogue and the medical aspects and classification of films were supervised by the Medical Committee of the British Industrial and Scientific Film Association.

Effective liaison between the two has been carried out by Dr. Michael Essex-Lopresti, now Deputy Secretary of the Council of Postgraduate Medical Education.

Copies of *Medical Films available in Great Britain* can be obtained from B.I.S.F.A., 193–197 Regent Street, London, W.1. Price 95p (postage 10p).

2. Central Office of Information

The Central Office of Information is a Government department acting as the central Government agency for the preparation and supply of publicity material asked for by other Government departments.

The COI Central Film Library, Government Building, Bromyard Avenue, Acton, London, W3 7JB. Tel. 01-743 5555, lends (normally on hire) a large variety of documentary and short films on many subjects, both general and specialised. Subjects include: Education, farming, foreign countries, government and citizenship, health, industry, safety, the Royal Family, science and technology, ships and the sea, town planning and many others. There is also a large section dealing with the United States.

3. Medical Recording Service Foundation

The Medical Recording Service Foundation, an educational activity of the Royal College of General Practitioners has available on loan or sale tape-slides on a number of aspects relevant to first aid and occupational health. Each recording is available on standard reel-to-reel tape or standard compact cassette, no synchronising equipment is needed, only a simple domestic tape recorder and a slide projector.

There are also a number of Teaching Slide Sets. These are collections of slides illustrating various aspects of a particular subject for use as illustrations by a teacher. They are not filmstrips.

In production during 1973 are a series of tapes on various aspects of rehabilitation and slides showing working conditions of men in industry.

For full details of all these write to: Medical Recording Service Foundation, Kitts Croft, Writtle, Chelmsford CM1 3EH, or telephone Chelmsford (0245) 421475.

4. The British Medical Association, Department of Audio Visual Communication, B.M.A. House, Tavistock Square, London, W.C.1.

Information on all forms of teaching aids concerned with medical education produced in the Department or elsewhere can be obtained from the Director, Mr. C. E. Engel.

5. Camera Talks Ltd., Audio Visual Aids, 31 North Row, London, W.1.

Audio Visual Package Deal consisting of a Mini Filmstrip and Slide Projector with filmstrip adaptor, slide adaptor, cassette tape replay unit, six filmstrips and six cassetted tapes (of your own choice) and printed commentaries for the filmstrips. All these are packed into a carrying case. Available to professional organisations on a sale or return basis. Subjects include first aid and safety in industry.

6. The Association for the Study of Medical Education (A.S.M.E.)

Information on membership, meetings and publications can be obtained from Miss Jill Rogers, A.S.M.E., 150B Perth Road, Dundee, Scotland.

The journal, The British Journal of Medical Education, is published quarterly by the British Medical Association, Tavistock Square, London, W.C.1.

Acknowledgements

My grateful thanks to: Anne Caisley for producing the drawings on pages xv, xvi, xvii and 266.

Lloyd-Luke Ltd., for permission to quote from the Preface of *Postgraduate Medicine* by I. J. T. Davies.

Butterworths for permission to quote from *Employer's Liability at Common Law* by J. Munkman.

Edward Arnold Ltd., to quote from *Health in Industry* by R. C. Browne.

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