1951-52 [Cmd. 8584] **Committee of Privy Council for Medical Research. Report of the Medical Research Council for the year 1950-1951**

COMMITTEE OF PRIVY COUNCIL
FOR MEDICAL RESEARCH

REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1950-1951

Presented by the Lord President of the Council to Parliament
by Command of Her Majesty
June 1952

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Cmd. 8584

COMMITTEE OF PRIVY COUNCIL FOR MEDICAL RESEARCH

(Ex Officiis)

The Lord President of the Council (*Chairman*)
The Minister of Health (*Vice-Chairman*)
The Secretary of State for Scotland
The Secretary of State for Home Affairs
The Secretary of State for Commonwealth Relations
The Secretary of State for the Colonies
The Secretary of the Medical Research Council (*Secretary*)

MEDICAL RESEARCH COUNCIL

AT DATE OF REPORT

The Right Hon. the EARL OF LIMERICK, K.C.B., D.S.O. (*Chairman*)
Sir GEORGE SCHUSTER, K.C.S.I., K.C.M.G., C.B.E., M.C. (*Treasurer*)
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Sir GEOFFREY JEFFERSON, C.B.E., M.S., F.R.C.S., F.R.C.P., F.R.S.
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Professor F. G. YOUNG, D.Sc., F.R.S.
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Sir JAMES LEARMONTH, K.C.V.O., C.B.E., Ch.M., F.R.C.S.
Sir HAROLD HIMSWORTH, K.C.B., M.D., F.R.C.P. (*Secretary*)
A. LANDSBOROUGH THOMSON, C.B., O.B.E., D.Sc. (*Second Secretary*)

OTHERS SERVING DURING PERIOD COVERED

The late the Right Hon. the VISCOUNT ADDISON, K.G., M.D., F.R.C.S., F.R.C.P. (*Chairman*)
Professor J. H. GADDUM, Sc.D., M.R.C.S., F.R.S.
Sir NEIL HAMILTON FAIRLEY, K.B.E., D.Sc., M.D., F.R.C.P., F.R.S.

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REPORT OF THE

COMMITTEE OF PRIVY COUNCIL FOR MEDICAL RESEARCH

FOR THE YEAR 1950-1951

TO THE QUEEN'S MOST EXCELLENT MAJESTY IN COUNCIL

May it please Your Majesty,

We, the Lords of the Committee for Medical Research of Your Majesty's Privy Council, humbly submit to Your Majesty a report of our proceedings during the year from 1st October, 1950, to 30th September, 1951.

1. During the financial year 1951–2 Parliament provided for the expenditure of the Medical Research Council a grant-in-aid of £1,626,500 on the ordinary account and £276,050 on the non-recurrent account for special apparatus and buildings.

2. The estimates of the Medical Research Council for that financial year are being met by our provisional allocation of funds under the following heads :—

For administration, including expenses of the Council and of the administrative offices and staff ;

For general scientific purposes, including expenses of committees, of liaison abroad and of publications ;

For the expenses of the National Institute for Medical Research, for the salaries of the scientific staff there and the expenses of research work done by them or by other workers temporarily attached ;

For the salaries and expenses of scientific staff working elsewhere, including those in the Research Units maintained by the Council in certain hospitals, universities and other institutions, and those engaged in work in the field of industrial health and in the Colonies ;

For temporary research grants, both for personal remuneration and for expenses, to workers engaged in investigations at universities, hospitals, and other centres in the United Kingdom, for fellowships in clinical research, and for postgraduate studentships for training in research methods ;

For the research programme of the Royal Cancer Hospital, London, and for investigations into human factors in industry, and for other special projects ;

For non-recurrent expenditure on new buildings, especially those at Hammersmith for the Radiotherapeutic Research Unit and the Blood Transfusion Research Unit, and on permanent equipment.

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3. By an Order of 3rd August, 1951, we appointed two new members of the Medical Research Council (after the required consultation with the Medical Research Council and with the President of the Royal Society) as follows :— George Lindor Brown, C.B.E., M.B., M.Sc., F.R.S. (Jodrell Professor of Physiology in the University of London) and Sir James Rögnvald Learmonth, K.C.V.O., C.B.E., Ch.M., F.R.C.S. (Regius Professor of Clinical Surgery and Professor of Surgery in the University of Edinburgh and Surgeon to His late Majesty the King), in place of John Henry Gaddum, M.R.C.S., Sc.D., F.R.S. (Professor of Materia Medica in the University of Edinburgh), retiring in accordance with the provisions of the Charter, and Sir Neil Hamilton Fairley, K.B.E., M.D., D.Sc., F.R.C.P., F.R.S. (late Wellcome Professor of Tropical Medicine in the University of London), retiring on grounds of health.

4. We have received from the Medical Research Council a report, which is submitted herewith, upon the progress of their work during the year ending 30th September, 1951. This is the thirty-seventh Annual Report upon the research work falling now to the duty of the Medical Research Council and formerly to their predecessors, the Medical Research Committee.

5. With effect from 1st April, 1951, the Medical Research Council accepted a new type of responsibility in making a substantial block grant for the research activities of the Royal Cancer Hospital, which it is proposed to entrust in future to an independent Institute of Cancer Research within the University of London. This was made possible by a transfer of funds from the vote for the National Health Service to the Council's grant-in-aid.

6. Scientific liaison with other parts of the Commonwealth, and with the United States of America and other countries, has been actively continued.

7. Close touch has been maintained with the Ministry of Health and the Department of Health for Scotland, and with other departments having administrative problems calling for new research work or for expert advice based on the most recent advances in knowledge. The Colonial Medical Research Committee, appointed jointly by the Colonial Office and the Medical Research Council, has been reconstituted for a further period of three years and has continued to advise on questions of research in tropical medicine. On research questions of common interest, the normal consultation with the Department of Scientific and Industrial Research and the Agricultural Research Council, acting under their respective Committees of the Privy Council, has been continued.

WOOLTON,
Lord President

H. P. HIMSWORTH,
Secretary to the Committee of Privy Council for Medical Research

16th June, 1952

REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1950-1951

TO THE LORDS OF THE COMMITTEE OF PRIVY COUNCIL FOR MEDICAL RESEARCH

May it please Your Lordships,

The Medical Research Council beg leave to submit the following Report upon their proceedings during the period from 1st October, 1950, to 30th September, 1951.

INTRODUCTION

FORM OF THE REPORT

The form of this Report follows the pattern used for the first time in the Council's Report for 1948–50, the account of the work of the separate research establishments being given in summary form only; the single classified list of references to publications has also been retained.

It must be emphasised that the discussion of some aspects of medical research contained in the main part of the Report is selective and is not intended to give a complete picture of the Council's work. An attempt will be made to deal with every important subject of study once every few years. From time to time the Report will also contain an account of some particular trend in the Council's scientific policy; on this occasion it includes a section on the training of research workers.

THE LATE VISCOUNT ADDISON

The Council suffered a severe loss through the death of their Chairman, the Right Hon. Viscount Addison, K.G., M.D., F.R.C.S., F.R.C.P., on 11th December, 1951. He was then in his eighty-third year and until a few weeks from the end had been active in the affairs of the country.

It was highly appropriate, and greatly to his own liking, that Lord Addison held as his final office, in a long and distinguished life of public service, the Chairmanship of the Medical Research Council. It is perhaps to his influence more than to that of anyone else that the Council owe their present constitution and those particular features of their organisation which have aroused the admiration and envy of research bodies in many other parts of the world.

When Dr. Christopher Addison first became a Member of Parliament, he was closely associated with Mr. Lloyd George in framing the measure which became the National Health Insurance Act of 1911 and which provided the basis for the appointment of the original Medical Research Committee, under the aegis of the National Health Insurance Joint Committee. In devising and subsequently implementing this particular provision, Dr. Addison took the special interest to be expected from one with his academic background, and he was himself a member of the Medical Research Committee throughout its existence from 1913 to 1920. In 1919 he was President of the Local Government Board and had the responsibility of piloting through the House of Commons the Bill to establish a Ministry of Health to take over and expand

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the functions of the Local Government Board in matters of health in England and Wales. It had been widely assumed that if such a Ministry were created the Medical Research Committee would be subject to its direction, but to the surprise and in some cases consternation both of his friends and of his political opponents Addison, who was later to become the first Minister of the new Department, thought otherwise. In a memorandum to Parliament he gave his reasons, which as Minister of Reconstruction he had already submitted to the Cabinet in the preceding year. They carried conviction, and the solution he proposed, the present constitution of the Medical Research Council, was accepted. Being convinced that the principles he set forth are as pertinent today as when he laid them down, we reprint the full text of his memorandum as an appendix to this Report.

It was perhaps fortunate that the original Medical Research Committee was to be prevented by circumstances from becoming exclusively involved in the concerns of the Departments with which it had been directly connected. Hardly had the Committee been formed when the first world war broke out and the national emergency made demands upon it of a much wider nature. For four years its main energies were devoted to the investigation of problems arising from the work of the Fighting Services, and by the end of the war medical research was clearly seen to have important contributions to make in many fields other than those which were the concern of the Departments responsible for public health in the several parts of the United Kingdom. It was Addison's intimate association with the work of the Committee throughout this period that convinced him that the Government's organisation for medical research should not be included within a particular Department but should be set up independently and given an existence in its own right.

This independence was not the only one that was needed. For success, a more subtle and more vital freedom had to be secured. Despite his native shrewdness and foresight, it is doubtful if Addison would have grasped this fact but for the experience of his previous training. He was himself a trained research worker ; his paper on the relationships of the abdominal viscera has become a classic, and " Addison's plane " is an anatomical landmark familiar to every medical student. He knew the inevitable sterility of shortsighted, *ad hoc* research programmes, and he knew that the solution of a particular scientific problem often comes unexpectedly from work not obviously relevant. It was evident to him that the new Council must be given full scientific freedom : in his own words, " any body of men engaged upon scientific research in medicine or any other field should be given the widest possible freedom to make their new discoveries ". He defined this freedom as " freedom to pursue scientific inquiries in any direction which may increase scientific knowledge of any kind ", saying with characteristic forthrightness that it would " only be secured by making the connexion between the administrative Departments concerned . . . and the research bodies whose work touches on the same subjects, as elastic as possible and by refraining from putting the scientific bodies in any way under the direct control of Ministers responsible for the administration of health matters ".

The fruit of Addison's wisdom is to be seen in the success of the research organisations under the Privy Council, which reconcile the claims of government and expert knowledge in a characteristically practical compromise that after the lapse of thirty years still seems a most hopeful model for the future.

THE TRAINING OF RESEARCH WORKERS

The progress of scientific research must increasingly depend upon the provision made for training research workers. The main responsibility in this matter falls upon the Universities, with which it has always been a

guiding principle of the Council to maintain the closest association. As long ago as 1921 the late Sir Charles Sherrington in his presidential address to the Royal Society said of the Medical Research Council " . . . one of the strengths of this organisation that has arisen is, in my view, that it interlocks with the educational system of the country. It is an organisation which proceeds on the wise premiss that, in the case of Science, the best way to get the fruit is to cultivate the tree ".

The Council have from the first made a direct contribution to the accomplishment of this task not only by giving grants to support research assistants in university and other departments but also by providing opportunities for training to junior workers in their own research establishments. Recently, however, with the great expansion of medical research in the country, the Council have thought it desirable to increase their facilities for training and to make special provision for certain categories of workers whose needs were not fully met by existing arrangements.

By far the best training for a research worker is to engage in actual investigations under the eye of an expert. It is easy to arrange for a young graduate to do this when he wishes to continue working on the same subject as that in which he graduated. But he may wish to undertake research in a branch of science with which he is unfamiliar, perhaps because it is one of the several biological subjects thought unsuitable for an undergraduate curriculum ; or he may wish to do work requiring knowledge of a wider range of scientific subjects than was included in his undergraduate training. Medically qualified men may need to refresh or extend their knowledge of one of the basic sciences after a period of purely clinical practice ; or they, and other senior workers, may wish to have the opportunity to work in other countries.

There is a need to satisfy such requirements today in connexion with practically every branch of biological or medical research. In planning for the training of research workers it is necessary therefore to have an organisation which is flexible in meeting individual needs and which provides for the senior worker facilities suited to his experience. With these considerations in mind the Council have recently reviewed their arrangements for training research workers. There are now three main schemes for this purpose : postgraduate studentships (to be known in future as postgraduate scholarships), clinical fellowships tenable in this country, and travelling fellowships.

POSTGRADUATE STUDENTSHIPS

These studentships are intended mainly for those who have recently graduated in medicine or science, though arrangements are made also for more senior workers. They are available for students training in any branch of medical science, but graduates in the physical sciences are as a rule required to take as part of the training a course of study in an appropriate biological subject. Studentships are awarded for one year in the first instance, but are renewable up to a maximum of three years, subject to satisfactory progress. The majority of the awards have been held for the maximum period.

Since the start of this scheme in 1944 the Council have awarded 221 studentships, 39 of them to women. Twenty-two of the men and 4 of the women were medically qualified ; most of the others held bachelors' degrees of a good honours standard in the natural sciences, while a few held masters' degrees, or doctorates of philosophy, in science. On the 1st October, 1951, the number of studentships in being was 97.

Over one-half of the total number of students chose to work in subjects allied to chemistry, no less than one-third in biochemistry. The other major preclinical subjects—anatomy, physiology and pharmacology—together with biophysics accounted for only one-quarter of the total awards ; pathology and

bacteriology for less than 10 per cent. ; and clinical research for less than 2 per cent. In themselves these figures give no indication of the relative amounts of training in the different subjects throughout the country as a whole, for this scheme of awards, like any other by a non-academic body, is only supplementary to the opportunities which the universities provide through fellowships, demonstratorships, and similar posts. It can, however, be inferred that there are a number of suitable candidates whose needs would not otherwise be catered for and, apart from the special case of clinical research, their uneven distribution throughout the different disciplines shows the value of something like the present system, under which the universities provide a basic number of posts in each subject, while non-academic bodies such as the Council make supplementary provision under a scheme sufficiently flexible to adjust itself to the needs of the moment.

The value of this scheme of studentships cannot be assessed until there has been time to see what careers their holders ultimately follow. At present only the posts taken immediately after tenure of the studentships are known; of the students who have so far completed their period of training ninety-four (75 per cent.) took up appointments in which they could continue research, either in academic departments or with research organisations.

CLINICAL RESEARCH FELLOWSHIPS

These fellowships, which are intended for more senior workers than those to whom studentships are awarded, were created to satisfy a particular need. Post-graduate studentships were found to be attracting few medical graduates to careers in clinical research, and there seemed little doubt that the failure was due to the nature of the awards rather than to lack of interest in this rapidly developing field of study. It was plain that to be equipped to start training in clinical research a man or woman must not merely have graduated in medicine but must also have held hospital appointments, of the status of senior house officer, which would give him the necessary clinical experience and which would not normally be held until some eight years after beginning medical study, excluding time spent on military service. Suitable candidates would therefore be of considerable seniority, and the awards would need to be adapted to their age and experience and to take into account the fact that workers of similar seniority in the non-clinical branches of medical research would already be eligible for special research awards or for employment as members of the Council's staff.

To meet these requirements the Clinical Research Fellowships were devised. The stipend is that of a registrar in the National Health Service, and arrangements have been made with the Departments of Health to continue superannuation provision during the tenure of the fellowship.

By the time that a candidate is ready to compete for a fellowship he is likely to have lost much of his familiarity with the laboratory techniques which he will need in his research work. The scheme therefore provides not only for training in clinical research but also if necessary for work in the non-clinical subject most relevant to his clinical interest. The success of such a scheme depends largely upon the appropriate placing of Fellows and the Council try to secure for each Fellow the necessary opportunities in university departments or the Council's own research units. An undertaking is required from the academic or hospital department sponsoring a candidate's application that, on the satisfactory completion of his fellowship, he will be given the choice of returning to that department. This condition has occasionally given rise to difficulties but it is essential to ensure that the proved worker shall have re-entry into the clinical field. The first fellowships under this scheme were awarded in 1951.

The Council have five groups of travelling fellowships at their disposal—Rockefeller Fellowships in Medicine, Eli Lilly Research Fellowships in Medicine, Dorothy Temple Cross Fellowships in Tuberculosis, Alexander Pigott Wernher Memorial Trust Fellowships in Ophthalmology and Otology, and French Exchange Scholarships in Medical Science. The first two groups are available to workers in clinical and non-clinical subjects, the second and third in the stated special subjects, the fourth in non-clinical subjects only. All are normally tenable for one year.

The Dorothy Temple Cross Fellowships have been in existence since 1930 and 39 Fellows were appointed in the intervening period (excluding the war years) up to 1950. The Alexander Pigott Wernher Memorial Trust Fellowships, which were introduced in 1949, were at first open not only to those in need of advanced training before entering a career in research but also to candidates wishing to acquaint themselves briefly with established clinical practice in other countries. It has, however, now been decided, in consultation with the Trustees, to limit future awards to the former type of fellowship. Both the Dorothy Temple Cross Fellowships and the Alexander Pigott Wernher Memorial Trust Research Fellowships are provided from benefactions of British origin. The French Exchange Scholarships in Medical Science are made by arrangement with the Centre National de la Recherche Scientifique, each body nominating two workers annually to work in the other's country and being responsible for their maintenance during this period. The first awards under the scheme were made for the academic year 1948–9.

Additional funds for the award of medical travelling fellowships tenable in the United States have recently become available through the generosity of Eli Lilly & Company of Indianopolis, U.S.A., who have placed a special dollar grant for the purpose at the disposal of the Council.

Since 1923, except for the year 1936–7 and during the second world war when the scheme was suspended, the Rockefeller Foundation of New York has entrusted the Council with funds for the award of travelling fellowships to British candidates. These fellowships have proved extremely attractive and each year the Council are faced with the difficult task of selecting from a large and highly qualified field of candidates the small number of Fellows for whom awards are available. The allocation of funds is made in dollars and in order to award the greatest number of fellowships the Council have in recent years provided travelling expenses in sterling from their own resources. The table below gives a summary of the subsequent careers of the holders of Rockefeller Fellowships awarded between 1923 and 1950. It will be seen that 87 per cent. are engaged in research and that nearly 50 per cent. are now holding major academic appointments. Later it may be expected that an even greater proportion will be found among the leaders of medical research in this country. Rarely can there have been such a successful scheme for travelling fellowships or can enlightened generosity have reaped such a rich reward.

ROCKEFELLER MEDICAL FELLOWSHIPS

Summary of subsequent careers of Fellows (1923-1950)

University Chairs	41
University Readers or Lecturers	21
Other whole-time research or teaching appointments	22
Part-time research or teaching appointments	32
Whole time public health work	4
Consultant or general practice	10
No information available	3
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SOME ASPECTS OF MEDICAL RESEARCH

PROTEINS

The amount of attention given in the Council's laboratories to chemical, physical and biological investigations on proteins reflects the enormous importance of these substances to the body's economy, both in health and in disease. The enzymes which control almost all the chemical reactions within the cells of the body or in the digestive tract are proteins ; so are a great proportion of the hormones, such as ACTH and insulin ; so are the toxins produced by micro-organisms and responsible for the damaging effects of infection. Each of these substances must possess specific structural characteristics which decide its special functions and which must be known in detail before its action can be fully understood.

Pure specimens of some proteins can now be obtained by methods such as electrophoresis, which separates the various components of a protein mixture according to the differences of their mobility in an electrical field. These methods of purification are of importance not only to the study of structure but also, for example, in the preparation of the various plasma fractions, such as the fibrin used to reduce blood loss in surgery, which are produced, in this country, by the Council's Blood Products Research Unit at the Lister Institute of Preventive Medicine. They have also led to the detection of abnormal proteins which are formed in the course of certain diseases. For instance, Dr. Linus Pauling of Pasadena has found an abnormal form of haemoglobin, the oxygen-carrying protein of the red blood cells, in patients suffering from hereditary " sickle cell " anaemia, and Dr. M. F. Perutz, of the Council's Unit for Research on the Molecular Structure of Biological Systems, Cambridge, has shown that the great fragility of the sickle cells is due to the low solubility of this abnormal protein when little oxygen is present in the blood. It is of great biological interest that a genetical abnormality should thus express itself in a chemical change of a particular protein. Similarly, Dr. A. S. McFarlane of the National Institute for Medical Research found a progressive increase of an abnormal protein in the blood in a case of essential hyperglobulinaemia, a rare but usually fatal disease.

To acquire information about the size and shape of the molecules of purified proteins a variety of physical methods has been used. The ultracentrifuge has

provided accurate knowledge about molecular weights. The electron microscope is being used at the National Institute, and in the Council's Biophysics Research Unit at King's College, London, to discover the molecular shape of some of the larger proteins or protein-complexes such as viruses. Much less information is as yet available about the internal structure of the molecules. Proteins are built up of varying amounts of about eighteen different amino-acids, the amino-acid composition of each individual protein being constant, but though reliable methods have been developed to measure the relative amount of each amino-acid we still know little about their sequence or their spatial arrangements in the protein molecule.

It is hoped that information about the latter may be obtained from X-ray analysis. Many proteins have approximately spherical molecules and can often be obtained in the form of crystals, whilst others, such as the contractile protein of muscle, have long fibrous molecules. Both types of protein have been examined by X-rays, the fibrous proteins mainly by Professor W. T. Astbury in Leeds, and the globular proteins by Dr. Dorothy Hodgkin in Oxford and by Dr. Perutz and his colleagues in Cambridge. Although the discovery of the exact position of each atom is a goal that will probably be attained only in the distant future, considerable progress has been made in defining the general shapes of certain protein molecules. It has been clearly shown that the amino-acids are arranged in chains of a regular geometrical form, parallel to the main axis of the molecule, and that the chains are arranged in a regular pattern relative to one another. The chains are folded to give a compact molecule, and the nature of the fold has been discussed for some time. Recently, Dr. Pauling and Dr. R. B. Corey of Pasadena have suggested that the chains are in the form of a spiral containing eighteen amino-acids to every five turns, and the crystallographic experiments of Dr. Perutz and his colleagues on haemoglobin have provided strong support for this hypothesis. Thus a promising model of the structure of many proteins has been obtained.

One of the most important developments in biochemistry in recent years has been the introduction and elaboration of chromatographic methods. Protein chemistry in particular has greatly benefited from the invention by Dr. A. J. P. Martin, now at the National Institute, and by Dr. R. L. M. Synge of partition chromatography, which enables amino-acids to be separated from one another and identified. These methods can be applied not only to the recognition and isolation of new amino-acids from various natural sources but also to the investigations of the amino-acid constitution of complete proteins. Dr. Martin and Dr. R. R. Porter have used partition chromatography on ribonuclease, an enzyme present in the pancreas, and Dr. F. Sanger (now on the Council's staff) working in the Biochemistry Department, Cambridge, has by the use of this method together with other analytical techniques succeeded in completely elucidating the sequence of amino-acids in insulin.

On the building up and breaking down of proteins our knowledge has advanced greatly during the last few years, partly because of chromatography but even more because of the introduction into biological research of stable and radioactive isotopes, with which the changes undergone by different substances in the body can be traced in detail. Isotope work has produced a great deal of new evidence about the speed of chemical reactions within the organism. For example, it is now known that the proteins of the blood plasma, the liver, the kidney and the intestinal tract are almost completely renewed every fifteen or twenty days, a fact which makes the relative constancy of composition of these tissues most remarkable. However, Dr. A. Neuberger and his colleagues at the National Institute have recently shown that this rapid turnover does not apply to all body proteins. Collagen, a fibrous protein present in bone, cartilage, and

other connective tissues, and forming approximately a quarter of the total protein of the body, remains practically unchanged once it is formed. Its behaviour is of particular interest in view of the fact that abnormalities in the structure of collagen have been found to occur in rheumatic diseases, and isotope methods promise to be of great value in studying the changes taking place in these conditions.

Isotopes have also been used to study in experimental animals the mechanism by which certain proteins are built up. Proteins taken in food are broken down in the intestinal tract to amino-acids, which the body joins together in a regular manner to form its own individual proteins. The actual mechanism by which this is done is still obscure, but it has already been shown that a radioactive amino-acid enters all its different positions in a protein chain at the same rate; the process of building up the chain from several hundred amino-acids seems therefore to be extremely fast and may even be a simultaneous condensation.

It is becoming evident that the metabolism of some amino-acids is closely connected with the formation or action of certain vitamins. Professor du Vigneaud in New York found that animals needed a supply of labile methyl groups, and did not grow unless their diet included choline or the amino-acid methionine, both of them sources of such groups. However, Dr. H. R. V. Arnstein of the National Institute showed, simultaneously with various workers in the United States, that the rat could to a very limited extent synthesise methyl groups from other components of its diet. It has also been shown that preformed methyl groups can much more readily be dispensed with if the diet contains vitamin B_{12}, the factor whose absence causes pernicious anaemia; there seems therefore to be a connexion between the action of this vitamin on the blood-forming organs and its action on the synthesis of methyl groups. Similarly, a deficiency of vitamin B_6 leads to a disturbance of the metabolism of the amino-acid tryptophan. This disturbance is manifested by the excretion of abnormal substances in the urine, and the identification of these substances has provided a clue to the function of this particular vitamin in amino-acid metabolism. Similar elucidation of the more general relationship between vitamin function and amino-acid metabolism would be of the greatest importance to our knowledge of both these fields.

THE PRESERVATION OF LIVING CELLS AT LOW TEMPERATURES

Among the lower forms of life certain cells, tissues and organisms may survive freezing at very low temperatures, such as can be obtained with "dry ice" (−79° C.) or liquid air (about −192° C.). Thus, successful experiments have been carried out with certain bacteria, moulds, protozoa, minute worms, rotifers and the like. Little work has been done on vertebrates, and the functional survival of normal cells of birds or mammals after exposure to low temperatures has rarely been recorded. Moreover, even with the lower forms, special preliminary treatments or conditions of freezing have often been regarded as necessary, based for the most part on the idea that if a living cell is to survive freezing the formation of ice crystals within the cell must be prevented by partial or complete dehydration, by ultra-rapid freezing or by a combination of these conditions. Successful work has therefore previously been restricted to abnormally resistant cells or to cells capable of withstanding dehydration.

The work described below has removed these limitations and has opened up a substantial new field of biology. It should now be possible to verify the theoretical expectation that if a cell can be frozen to very low temperatures the arrest of biochemical processes will confer a virtual immortality on the cell while it is maintained at these temperatures. The work has important practical

applications in that it will make it possible to store various cells and tissues for clinical use, and important theoretical results in throwing light on the whole structure and functional activity of cells.

Germ Cells

Some ten years ago a study of the effects of physical and chemical agents on the germ cells was begun at the National Institute for Medical Research. In the course of this work interest concentrated on the possibility of preserving spermatozoa at low temperatures, but little progress was made until Dr. A. S. Parkes, Mr. E. J. C. Polge and Dr. A. U. Smith discovered in the early part of 1949 that the use of a diluting fluid containing glycerol enabled fowl spermatozoa to resume full motility when thawed out after long periods at —79° C. The addition of the glycerol greatly reduced the fertilising power of the sperm as tested by artificial insemination, but Mr. Polge found that if the glycerol was removed slowly by dialysis—that is, by diffusion through a porous membrane—spermatozoa frozen to —79° C. for a few hours retained almost normal fertilising power. Large numbers of fertile eggs and normal chicks have since been produced by means of insemination with spermatozoa so frozen. By present methods freezing for longer periods is progressively more destructive of fertilising power, but normal chicks have been produced from spermatozoa frozen for nine months in liquid air at —192° C. During these experiments a pullet was successfully inseminated with spermatozoa from the same frozen batch as that originally used to fertilise the egg from which she developed.

In the course of the early work bull spermatozoa were found to be killed by quick freezing even in glycerol, but Mr. Polge and Dr. Smith later found that slow cooling in glycerol was compatible with the revival of a large percentage of the cells. Trials of the fertilising capacity of frozen bull spermatozoa were then begun. One calf was produced in a small series of experiments at Shinfield, and in a much larger series carried out at Cambridge in the autumn of 1951 Mr. Polge and Mr. L. E. A. Rowson obtained a pregnancy rate of nearly 80 per cent. after insemination with semen stored at —79° C. for periods varying from two hours to eight days. Since then pregnancies have been obtained by the use of semen stored for several months.

Endocrine Tissue

In the course of unsuccessful experiments on freezing mammalian eggs it was noticed that a few of the ovarian cells surrounding the ovum survived the rapid freezing then employed. Later work by Dr. Smith showed that a high proportion of such cells from the rabbit survived slow cooling to —79° C., as demonstrated by subsequent growth in culture ; the addition of glycerol to the media was beneficial but not essential. The observations were extended by Dr. Smith and Dr. Parkes to whole ovarian tissue of the rat, and survival of the frozen and thawed tissue was tested by its ability to form a functional graft in the rat from which it had originally been taken. Many different conditions of freezing were investigated. The best results were obtained with ovarian tissue frozen to —192° C., in media containing 15 per cent. glycerol ; such material regularly formed active grafts which produced normal hormonal changes in the reproductive tract of the recipient. On examination under the microscope these grafts were seen to contain no eggs but to consist of nodules of endocrine tissue.

The longest period for which ovarian tissue has so far been kept frozen is four months. The material, when grafted, gives results identical with those from tissue similarly frozen for a few days, and it is likely that very prolonged storing of ovarian tissue will be possible. Similar experiments are in progress with adrenal cortical tissue and are planned for other endocrine glands; they may eventually lead the way to new forms of treatment of certain diseases.

Red Blood Cells

Dr. Smith also investigated the possibility of similarly preserving red blood cells. These are completely destroyed by freezing and thawing under ordinary conditions, but Dr. Smith found that dilution of human or rabbit blood with equal parts of 30 per cent. glycerol in saline made it possible to recover a high percentage of the red blood cells after freezing to —79° C., even for many weeks. Dr. H. A. Sloviter, a visiting worker at the National Institute from the University of Pennsylvania, developed this work and with modifications of the technique was able to recover 80–90 per cent. of human red cells after freezing. The recovered cells survived and behaved normally *in vitro*. Similarly thawed rabbit cells labelled with radioactive phosphorus appeared to behave equally normally when reintroduced into the circulating blood of a living rabbit.

Dr. Sloviter went on to develop aseptic methods for freezing, thawing and dialysing batches of human blood large enough to permit transfusion with the recovered cells. Dr. P. L. Mollison, of the Council's Blood Transfusion Research Unit, then carried out an investigation on three patients and found that the cells which had been frozen had a normal survival time and presumably therefore a normal functional life when used for transfusion. In this first investigation the red cells were subjected only to short periods of freezing ; in a second investigation cells frozen for three or six months had a somewhat lower recovery rate but behaved normally after transfusion. It appears that a practical method of preserving human red cells for transfusion is in sight, and certainly the long-term preservation of specimens of rare types of blood is now possible.

A number of general questions emerge from the mainly empirical observations reviewed above. In particular, more must be learnt of the nature of the damage caused to cells by exposure to low temperatures and of the way in which this damage is prevented by the use of diluting fluids and special conditions of freezing. Moreover, damage to the cell caused by changes in the medium must be distinguished clearly from primary damage in the cell itself. It was at first thought that glycerol exerted its effect only by preventing, or altering the character of, crystallisation in the medium or in the cell, but it is likely that its effect is much more complex than this and may be related to the changes which it produces in the concentration of salts in the media. In particular, its effects in slowing down the rate of change of salt concentration with freezing may be beneficial to cells sensitive to " osmotic shock ". Another factor to be taken into account is the increase which glycerol causes in the volume of fluid remaining unfrozen during cooling.

To facilitate the study of the effects of glycerol, Mr. J. Smiles, Mr. Polge and Dr. Smith have invented a freezing slide for use on the microscope stage, with the aid of which it is possible to watch under the microscope the freezing of the medium around the cells and to make a cinematograph film of the process. The presence of 15 per cent. glycerol does not prevent the formation of crystals in the medium on relatively slow freezing, but it alters their shape and enlarges the spaces in which cells congregate. It has not yet been possible to make any reliable observation on changes in the cell itself during the freezing process.

A systematic investigation of the problems presented by this work is now in progress. Firstly, the survival of functional activity after freezing is being studied on cells about which a great deal is known, for example yeast cells; and, secondly, physical and chemical methods are being used for the study of the changes occurring during freezing and storage at low temperatures, and during thawing.

STATISTICS IN MEDICAL RESEARCH

In reviewing the development of the scientific method in medical research during the first half of the twentieth century, Sir Henry Dale placed the science of statistics among those activities that have had the greatest influence on thought and practice. " Quietly but irresistibly ", he wrote, " statistical methods and principles have been exercising and establishing their corrective influence, substituting a numerical measure of the evidential significance of data obtained in ward or laboratory, whether from opportunist observations or deliberately planned experiments, for the vague and speculative methods of appraisement which formerly prevailed ". The Council have always attached great importance to the development of this approach to medical research and their Statistical Research Unit, under the direction first of the late Professor Major Greenwood and since 1945 of Professor A. Bradford Hill, has played a large part in demonstrating the use and value of the necessary principles and techniques.

Nowhere in medicine has the application of the statistical method had a more salutary effect than in the testing of new agents for the treatment or prevention of disease. The advantages of a new agent may on occasion be so clear-cut and consistent that no special system of checks and counterchecks is necessary; but more often what is to be looked for is improvement, perhaps slight or gradual, rather than cure, or decreased liability to contract a disease rather than complete and universal protection against it. Effects of this order are very hard to distinguish from those of mere chance, for nearly every disease can, apart from any differences of treatment, vary astonishingly in its course, its severity and its final result. The evidence may be insufficient for the distinction to be made ; different doctors, each treating small numbers of patients, may get widely different results and mistakenly attribute their success or failure to the treatment, so that it perhaps becomes fashionable for a time only to be discarded later as worthless or even harmful.

A juster estimate of a treatment's value can often be made only by means of a controlled trial, but the use of this method must always, of course, be strictly subject to ethical considerations. It must also, on grounds of cost and labour, be usually limited to treatments which give reasonable promise of importance, that is, to those which are applicable either to a serious disease or to large numbers of patients. In a controlled trial in its simplest form the patients are divided into two groups as similar as possible in every important way except that one group is given the new treatment while the other is treated by the approved method in current use. For practical purposes any significant differences between the course of the illness in the two groups may then justifiably be ascribed to the new treatment, and a fair estimate of its value can be formed. Like all statistical results, the estimate can be made only in terms of groups : it is not possible to say " This treatment will be good for that particular individual ", but only " On the average a group of patients treated in this way will do better than those not so treated "—or, on the other hand, that they will not do better. A bare statement such as this is usually, however, not the only outcome. Trials are normally designed to reveal also the particular conditions in which a treatment will be most beneficial, to demonstrate its limitations or dangers, and to show how best it can be brought into general use.

If the results are to carry a high degree of conviction, trials often require more cases of a particular disease than are normally seen by any one doctor, and the observations of a number of doctors in different centres, all working to a common plan, may have to be used. Such a concerted attack is necessary where the possible advantages of the new treatment are quite small and must be proved beyond reasonable doubt, as in the Council's trial of the alleged effects of an antihistaminic compound in aborting the common cold ; the trial

included some 1,500 persons and showed the treatment to be useless for this purpose. It is also necessary when the agent under test is intended to prevent rather than cure disease, since the incidence of many diseases in a population in its usual environment is quite small. Thus the Council's Whooping Cough Immunisation Committee found it necessary for its trials of different whooping cough vaccines to recruit nearly 10,000 children ; since less than one in five were in the next two years in contact with a known case of whooping cough, the incidence of attack was inevitably low, and it was only the large numbers used that enabled the positive value of the best vaccines to be decisively shown (see p.15).

Often, however, a carefully designed inquiry can give an answer with relatively few observations. The Council's trial of the value of streptomycin in the treatment of tuberculosis in young adults used only 50 treated cases and 50 controls and gave a clear result. Similar numbers sufficed to demonstrate the improved effect when PAS (*p*-aminosalicylic acid) was given in conjunction with streptomycin. Dr. C. E. Quin, Dr. R. M. Mason and Dr. J. Knowelden needed only 43 patients to show that the effects of injections of desoxycorticosterone acetate and ascorbic acid in rheumatoid arthritis were not noticeably different from those of injections of common salt solution. The Council's Antibiotics Clinical Trials Committee treated less than 100 patients in each group to compare the effects of aureomycin and chloramphenicol with those of penicillin in the treatment of the ordinary forms of pneumonia (see p.19).

Statistics can also play a useful part in defining the extent or in disentangling the cause of a health hazard. For example, the transfusion of blood or certain blood products to sick persons occasionally results in jaundice. It is important to know how often this occurs and to what extent the frequency varies with the particular blood product used, and the answer can be obtained only by carefully following up large numbers of patients who in the course of illness are given these different products. This procedure may not be simple ; for instance, if the survey is to give trustworthy results, the number of patients lost sight of must be very small and there must be no reason to suppose that they include an undue proportion of cases with, or without, jaundice. To take another example, it is known that german measles in a pregnant woman may sometimes harm the foetus, and it is important to know whether any other disease has a similar effect ; only careful observations on large numbers of women and their babies can provide the answer. In many other conditions it is possible that causative factors may be unearthed by a similar approach. Is an attack of paralytic poliomyelitis frequently preceded by an injury of some kind ? Are particular environmental factors constantly associated with coronary thrombosis or with cancer of different sites of the body ? What is the relation of dietary habits to the incidence of peptic ulcer ? All these problems call for investigations controlled by statistical method.

A third important use of statistics is in assaying the potency of certain drugs and vaccines which cannot be tested by physical or chemical methods alone. It has already been mentioned that to test a single new vaccine on a human population required very large numbers of subjects. To compare one effective vaccine with another by this method might well demand a scale quite outside the bounds of practicability. Instead, methods must be devised to compare their potencies in laboratory animals and, since animals too are variable in their reactions, statistical techniques must again be called in to discount the effect of chance. The development of these methods has, in the words of one of the contributors, Dr. J. O. Irwin, enabled " many of the newer discoveries of medicine to be utilised on a comparable basis throughout the world to the immense advantage of thousands of sufferers ".

Whooping Cough

One of the most important controlled trials carried out under Council auspices during the period under review was that of different vaccines for the prevention or modification of whooping cough. Since 1946 this disease has been responsible each year for more deaths than measles, diphtheria and scarlet fever combined, and in the past ten years over 10,000 deaths have been ascribed to it in England and Wales. Moreover, it is often extremely distressing and disabling; in over half the affected children the cough lasts for more than eight weeks, and in nearly a third for more than ten.

Ever since 1906, when the causative organism was first isolated, attempts have been made to check the disease by the injection of vaccines, but the task has proved peculiarly difficult. In the 1930's several investigations were reported, some of them successful and some negative. In 1939, therefore, the Council appointed a subcommittee of the Preventive Medicine Committee to try to resolve the contradictions. Their first investigation, carried out between 1942 and 1944, showed no advantage for vaccination. However, American and Canadian workers were still claiming good results, and it was in any case obvious that there were numerous differences between different vaccines. It was therefore decided to carry out a large investigation in which two American vaccines should be tested as well as one prepared in this country.

As has been indicated in the previous section, it was necessary to test the vaccines on a large number of children. The investigators worked, in collaboration with the local Medical Officers of Health, in Oxford, Manchester, Leeds, West Ham, Tottenham, Edmonton and Wembley. The different teams all followed a common plan, so that their results could be added together, and nearly 10,000 children under two years old were inoculated. Half were given one or other of the vaccines, the others a fluid which was superficially indistinguishable from the vaccines. To eliminate conscious and unconscious bias on the part of the investigators as well as of the children and their parents, the records were kept centrally and even the doctors administering the injections did not know which fluid was which.

All the inoculated children were visited once a month for two years. At the end of this period the two groups were compared in a number of respects—average age, average number in family, proportion breast-fed and proportion attacked by various infectious diseases during the period—and were found to be indistinguishable, except that the proportion attacked by whooping cough was five times as high in the unvaccinated children as in the vaccinated.

A further result of the trial was to confirm the existence of considerable differences in potency between the three kinds of vaccine used, the best being that prepared by Dr. Pearl Kendrick of the Michigan State Laboratories. Efforts are now being made to find the factors responsible for these differences. Vaccines have been produced by the Michigan method in this country and are being compared in another large-scale trial with those prepared by Dr. Kendrick herself. In this trial, since the general value of vaccination has already been established, no dummy inoculations are being given, but each child is given one or another of the vaccines. So far, 30,000 children in nine centres have been inoculated.

Work is also in progress, in this country and in the United States, to find a method by which the effectiveness of a particular vaccine can be tested in the laboratory instead of in the field. Such methods are, as is explained in the previous section, essential if vaccines are to be available on a large scale. If satisfactory methods can be evolved, protection against this distressing and often dangerous disease may in the near future be made available on the same scale as protection against diphtheria.

Infantile Gastro-Enteritis

The ways in which the body can react to irritants are limited, and it is often impossible for the clinician to decide whether a given association of symptoms is caused by one or another of a series of possible irritants. Nowhere is this limitation more obvious than in the gastro-enteritis of infants. " Gastro-enteritis " is not a single disease ; its two cardinal symptoms of diarrhoea and vomiting can be evoked by several different causes ; and from them alone the clinician can hazard little more than a guess at the true cause of a child's illness. Some cases occur singly, some in outbreaks. Some are mild, some rapidly fatal. Some respond to treatment, some do not. In some outbreaks the disease remains confined to infants, in others it affects adults as well. In some cases the symptoms are only the remote consequences of inflammation in other parts of the body, notably in the ear, nose and throat or the lungs ; in others, and these often the most severe, they appear to be the direct result of infection that remains localised in the gastro-intestinal tract itself.

The bacteriological investigation of this last and most important group has proved extremely puzzling. Numerous micro-organisms of one sort or another have been isolated from the stools of these sick infants, but in general there has been no evidence that any of them play a part in causing the disease. In a small proportion of cases in this country well known and easily recognisable bacteria have been found, such as those causing dysentery or food poisoning ; but it is still true to say that the bacterial cause of the majority remains unknown. Many workers have suspected that a particular type of one or another of the common bacteria of the intestine is responsible, the type being indistinguishable by current bacteriological methods ; or alternatively that the equilibrium between one of these normal parasites and its host may be disturbed by nutritional or other factors so that a normally harmless organism becomes pathogenic.

Evidence suggestive of the first explanation was brought by Dr. E. F. Gale, working during the war in the Biochemical Department at Cambridge. Dr. Gale found that some strains of bowel streptococci produce a substance to which very young rats are highly susceptible, but to which they become resistant as they grow older, owing apparently to the appearance in the intestine of an enzyme capable of breaking down the toxic substance. These laboratory results fitted in so well with the epidemiology of gastro-enteritis that bacteriologists were hopeful of their having at last provided a clue to its aetiology. However, strains of bowel streptococci collected by various public health laboratories from outbreaks of infantile gastro-enteritis were so rarely found to produce the toxin that the labour of pursuing the subject further seemed at that time unjustified.

Another rather similar explanation was suggested by the late Professor W. W. C. Topley. It had been shown that the disease of new-born lambs, known as lamb dysentery, was caused by a special type of *Clostridium welchii*, one of the organisms normally found in human and animal intestines, and it seemed possible that some outbreaks of gastro-enteritis in infants might have a similar cause. However, exhaustive examination of the stools of affected infants failed to reveal the presence of this type of *Cl. welchii* in significant numbers, and another promising explanation had to be abandoned.

The next step came from Dr. J. S. B. Bray, working in the Hillingdon Hospital, Middlesex. Among the normal bacteria of the bowel are various members of the coliform group. Dr. Bray studied forty-four cases of summer diarrhoea in infants, 40 per cent. of whom had died, and from forty-two of them he identified by delicate serological methods a particular type of coliform organism which was found in only four out of a hundred control infants not suffering from gastro-enteritis. He could not, however, decide whether

it was the cause of the disease or merely a secondary invader. Before long, D. C. Giles and Dr. G. Sangster at Aberdeen and Dr. Joan Taylor at Colindale, working in conjunction with Dr. Joyce Wright and Dr. B. W. Powell of the Council's staff at the Hospital for Sick Children, Great Ormond Street, succeeded in showing that in some institutional outbreaks of the disease this so-called " alpha " type was to be found in practically every affected child and was almost uniformly absent from control children and adults who had not been in contact with known cases. Further experience at Aberdeen, at Colindale, and by Dr. K. B. Rogers at Birmingham, has served to strengthen the conclusion that this organism is associated with the disease. In some outbreaks another recognisable type, called " beta ", has been found, and there is reason to believe that the few in which neither has been present may have been caused by another type not yet recognised.

It is still too early to say whether these coliform organisms are the actual cause of this important form of infantile gastro-enteritis in the same way as the typhoid bacillus, for instance, can be said to be the cause of typhoid fever, though the few human volunteer experiments so far recorded are consistent with this explanation. One approach to the problem will be to study the response of infants to treatment with antibiotic drugs. The alpha type at least is very susceptible in the laboratory to chloramphenicol, aureomycin and terramycin, though not to penicillin ; if the administration of suitable antibiotics is followed by the disappearance of the coliform bacilli from the intestine and by improvement in the patients' clinical condition, further evidence will have been provided implicating these organisms. Trials are proceeding in a number of centres and the results are awaited with interest.

Tuberculosis

The Council continue to place great emphasis on research on the prevention and treatment of tuberculosis. The trials of BCG (Bacillus Calmette-Guèrin) and vole bacillus vaccines mentioned in the last Report are making progress ; over forty thousand children of school leaving age have entered the scheme and the follow-up has started and will be carried on until the end of 1955. A national survey of tuberculin sensitivity at various ages has been completed, ninety-five thousand children and young people having been examined in twenty-two representative areas of England and Wales. At school ages the percentage of children with a positive reaction, that is, of children who at some time had had a tuberculous infection, was found to be lowest in the urban areas of Southern England, higher in urban areas of the North, the Midlands and South Wales, and highest in rural areas. The survey has been a necessary preliminary for the assessment of the results of the BCG trials mentioned above.

An important observation has been made by Dr. P. M. D'Arcy Hart and Dr. R. J. W. Rees in the course of experimental work at the National Institute for Medical Research. Certain non-ionic surface-active agents were found to produce a striking antituberculous effect in the mouse and guinea-pig. A series of these compounds was therefore synthesised by Dr. J. W. Cornforth and Mr. J. A. Stock. Unlike previously known antituberculous agents these substances have no action against the bacillus in the test-tube but seem to act on the body itself, by stimulating or accelerating the ordinary defence mechanism. The present compounds are too toxic to be used in treatment but new methods are being developed in the hope of preparing more active and less toxic products.

At the end of February 1952, an announcement in the United States described preliminary clinical results with iso-nicotinic acid hydrazide and its isopropyl derivative, of which the antituberculous properties had been discovered independently by a Swiss and an American firm in 1951. The Council had been

asked by the American company early in February to undertake investigations with the drug, and laboratory experiments were already in progress at the National Institute. A Tuberculosis Chemotherapy Trials Committee was formed, and at its first meeting in March recommended that extensive controlled clinical trials be conducted under the auspices of the Council to compare the effects of iso-nicotinic acid hydrazide with those of streptomycin and para-amino-salicylic acid (PAS). It was essential for the trials to be organised rapidly and in such a way as to provide an answer as soon as possible. The experience of the Council's Tuberculosis Research Unit in clinical chemotherapeutic trials enabled them to respond to these needs, and by the end of April thirty-five hospitals were already co-operating and over two hundred patients had been accepted. Analysis of the results will be made as the trial progresses, so that any striking effect may be reported without delay.

RECENT WORK ON ANTIBIOTICS

Brief reference was made in the Report of the Council for the years 1948–50 to three new antibiotics, chloramphenicol (Chloromycetin), aureomycin and terramycin, which have greatly extended the range of diseases amenable to chemotherapy. The discovery of all these substances, like that of streptomycin, was made in the United States, and was in each case the result of a systematic search on an unprecedented scale. Many of the antibiotics are formed by moulds, of which soil is the most prolific source : hence the practice has been, and still is, to obtain thousands of samples of soil from all parts of the world, and to examine them exhaustively in the hope of finding a new and useful species. These three antibiotics are the product of such work, and were for a time obtainable only from the American firms whose research workers discovered them. Chloramphenicol, which can be synthesised, is now being manufactured in Great Britain, and has been freely available on prescription since the beginning of 1951. Aureomycin and terramycin have been obtainable here only in very limited quantities, but the former is now being manufactured in this country from bulk material imported from the United States. Unfortunately all three of them are at present many times as expensive as penicillin.

In 1943, when penicillin was first being manufactured but when supplies were inadequate for general use, the Council appointed a Penicillin Clinical Trials Committee, which was given the task of directing further studies of treatment with this substance and of allocating supplies to responsible investigators. This arrangement had the effect of making penicillin available as far as possible for patients who were most urgently in need of it and at the same time enabled substantial quantities to be allocated for specific projects, such as the treatment of a particular type of infection or the study of a new method of administration. It was thus that the use and limitations of penicillin came to be more widely understood and that a nucleus was formed of both clinicians and bacteriologists who were accustomed to handling the drug and later passed on their knowledge to others. The advent of streptomycin was met by the appointment of two similar committees to direct the study of the use of this drug, one in tuberculosis and the second in other infections. It was natural to meet the situation created by the discovery of three further antibiotics in the same way, and an Antibiotics Clinical Trials Committee was appointed with similar functions. It includes some members who have served on all these committees since 1943, and is widely representative of leading general and special hospitals throughout the country.

The present situation, although resembling that of eight years ago in one way, differs from it in another. There has been the same scarcity of the drugs concerned, and the same necessity that their use should first be studied under carefully controlled conditions and restricted to patients either urgently in

need of them or suffering from specified infections in which the prospects of this treatment need to be further explored. The difference lies in the fact that in the use of the new drugs American experience is several years ahead of our own. Aureomycin, for instance, was widely distributed in the United States before any of it reached Europe, and has been freely obtainable there since early in 1949. The main properties and possibilities of all three drugs have been reliably ascertained by extensive study in that country. We know that they are specific for all forms of typhus and other infections due to rickettsiae, the small micro-organisms which are intermediate in size between bacteria and viruses ; that they are also effective against undulant fever, and a few of the many infections due to viruses, including one form of pneumonia ; and that chloramphenicol, alone of all antibiotics, has a dependable action in arresting the progress of typhoid fever. They can also be used against many bacterial infections in which penicillin or streptomycin has failed because of the development of bacterial resistance, which is readily developed to streptomycin by all species though to penicillin fortunately by only one common species, the staphylococcus. It is valuable to have a second line of defence against infection not only because the micro-organism may be tolerant of the drug but because the patient may be intolerant of it ; allergic reactions to penicillin in patients sensitised by previous treatment are now common. The new antibiotics have therefore another varied sphere of usefulness embracing on occasion much of the ground covered by previous discoveries.

Clearly the main findings of the American work needed no confirmation, and supplies of chloramphenicol and aureomycin* were early made available through the Ministry of Health for individual patients suffering from diseases, such as typhoid fever and undulant fever, in which their use was unequivocally indicated. The main tasks which the Antibiotics Clinical Trials Committee set itself were two. One was to determine whether more general categories of disease, such as pneumonia, which are apt to vary in nature and severity from one country to another, responded as well to this treatment in Great Britain as they were found to do in the United States. The second was to study systematically the action of these drugs in certain conditions in which their degree of usefulness was still admittedly uncertain. Several carefully planned trials have been initiated by the Committee and are being conducted on agreed lines in a number of hospitals in different parts of the country.

Only one of these studies has as yet been completed, but the results so far obtained are such as to remind us that initial enthusiasm over a new drug needs often to be tempered with caution, and that when carefully controlled studies are substituted for clinical impressions the advantages may appear less striking than were at first believed. Pneumonia was chosen for one such study for the reason already mentioned, and also because it had been asserted that the newer antibiotics were effective in every form of pneumonia and could consequently be used forthwith for any patient presenting signs of this disease. Pneumonia is commonly caused by the pneumococcus, but sometimes by one of four other principal bacteria or by one of two known viruses. Three of these bacteria are usually sensitive to penicillin, the two others to streptomycin, and one, but only one, of the viruses to penicillin. Hitherto, therefore, well directed treatment has required not only a clinical diagnosis, but in addition a bacteriological investigation, which demands expert laboratory aid and involves delay. If a single drug were to be found successful against all forms of the disease, the laboratory would be superfluous and treatment could be administered in the patient's home with much relief to hospital bed space.

In the Committee's study of pneumonia all cases, regardless of their causal nature—which was, however, subsequently ascertained—were allocated to one

* Terramycin has recently been made available on a similar basis.

of three groups, which were treated with chloramphenicol, aureomycin, or "standard" treatment, that is, penicillin with or without sulphonamides. Terramycin was not available when this study was begun but was included at a later date. Standard treatment is so effective in the majority of cases of pneumonia that a significant difference in mortality was not to be expected in any but a very large series; there were, however, slightly fewer deaths and fewer undesirable side effects in patients treated with penicillin than in those treated with either chloramphenicol or aureomycin, though by other criteria there was little to choose between the three groups. All three new antibiotics are superior to penicillin in ease of administration, as they are ordinarily given by mouth, but all three are unfortunately also liable to cause loss of appetite, nausea, and sometimes vomiting and diarrhoea. These effects vary, being severe in only about one patient in three or four, but they amount to a distinct disadvantage. Whether penicillin is as effective given by mouth as by injection is under investigation in Glasgow and will be the subject of a later report.

The other main diseases studied have been whooping cough and infantile gastro-enteritis. The drug of choice for the former is chloramphenicol and it appears to have a definite, though not dramatic, effect if administered at an early stage. It has so far been difficult to reach any certain conclusion about the value of either chloramphenicol or aureomycin in infantile gastro-enteritis, mainly because outbreaks of this disease vary in severity and probably in their causal nature, but trials are proceeding in a number of centres.

Members of the Committee and others working under its aegis have also studied the effects of the three new antibiotics in the treatment of various obscure diseases of the skin, in infections of the eye, bronchiectasis, wound infections, urinary tract infections, peritonitis, meningitis and septicaemia. In each of the last five conditions a variety of bacteria may be concerned, and extensive clinical experience combined with bacteriological study is necessary before final and detailed conclusions can be drawn. There is no doubt that in some of these infections, and in the treatment of various septic conditions caused by bacteria abnormally resistant to penicillin or streptomycin, these new antibiotics will have much value, and the experience now being gained will help to ensure that they are properly used.

Besides the antibiotics which can safely be used as drugs—administered, that is to say, by the mouth or by injection so that they circulate in the blood and reach every part of the body—many are known which cannot be used in this way because they are too toxic, although they exert powerful antimicrobic effects. At present a few are being studied which are on the borderline of toxicity. They can certainly produce dangerous effects, mainly on the kidney, unless the dose is carefully restricted; on the other hand they have an effect on a few bacteria of secondary importance which is unequalled by that of any other known agent. An alternative and safe use for such substances is direct application to the site of infection, when this is accessible. The value of such a use has recently been proved in a fully controlled study carried out by the staff of the Council's Burns Research Unit at the Birmingham Accident Hospital. The antibiotic used was polymyxin E, which was shown to be remarkably effective in eliminating *Ps. pyocyanea* form infected burns. This micro-organism is a common cause of chronic sepsis, the effect of which is to delay healing and to prevent the successful take of skin grafts; it is resistant to other antibiotics and to almost all other known chemotherapeutic agents and antiseptics. The average healing-time of severe burns was reduced by the use of polymyxin by over three weeks, and the general use of this treatment, together with penicillin, can be expected to bring substantial benefit to this type of case.

The great blinding diseases of the past in this country have been general infections, such as smallpox or gonorrhoea, the ocular manifestations of which have dwindled or disappeared as part of the advances in general medicine. Now that the first place has been taken by the diseases peculiar to the eye itself, progress must increasingly depend on our ability to make equally striking advances in ophthalmology. At present in most of such diseases, in cataract or glaucoma for example, we are able to do little more than try to stave off or counteract the worst consequences of a disaster that has already befallen. Everywhere, sooner or later, progress has been barred by our ignorance of the fundamental physiology of the eye, and once again, as so often in medical research, the longest way round seems likely to prove the shortest way home.

Most hampering of all has been our ignorance of the fluid which fills the eye and forms the medium in which its tissues live and function. Until recently considerable doubt and controversy have persisted about how this fluid is formed and circulates and what is the nature of the barrier that separates it from the blood. Much patient biochemical research, assisted of late by the use of radioactive tracer substances, has now left little doubt that the fluid is in fact formed by two distinct processes : one of direct diffusion from the neighbouring blood vessels and one of secretion by specialised cells within the eye itself. While this second factor seems to be largely responsible for maintaining the intraocular pressure at its normal level and for providing the impetus for the circulation of the fluid, changes in pressure seem to depend mainly on variations in the blood flow through the local blood vessels. This latter finding has naturally led to a renewal of interest in the nervous control of the ocular blood vessels and in the reflex relationship between the two eyes, and it has been of great advantage that their reactions to such stimuli as nerve impulses or different drugs can now be watched *in vivo* by rendering the opaque white coat of the eye transparent or alternatively by inserting plastic windows. This work has been supplemented and clarified by parallel anatomical studies, which have revealed for the first time the full complexity of the ocular circulation and its drainage channels by injecting them with plastic material and then dissolving the ocular tissues to leave a complete cast of the circulatory system.

This increased knowledge of the circulation and pressure within the eye has compelled a revision of our picture of the pathological changes in glaucoma, a prolific source of blindness in this country and a main preoccupation of the Council's Ophthalmological Research Unit, of which Sir Stewart Duke-Elder is Director. Glaucoma has generally been held to be due to a rise in the tension of the eye, with consequent damage to the optic nerve, originating in some obstruction that has developed in the drainage of the intraocular fluid. Such a sequence may undoubtedly occur, especially when glaucoma supervenes on some obvious disease of the eye, but it now seems that in its common form the early stages are characterised not by a persistent rise in the ocular tension but by an instability which is itself probably governed by a corresponding instability in the nervous control of the local blood vessels. The practical corollary of this new concept is that the present surgical treatment of the disease—the construction of artificial drainage channels for the escape of the intraocular fluid—must be looked upon as an expedient that leaves the essential cause of the disease untouched. It is necessary when a damaging rise of tension has become established but we can understand now why it may fail to halt progressive deterioration of sight.

Other important practical consequences are already beginning to follow this better understanding of the circulatory system of the eye. Treatment of intraocular infections has up till now been impeded by the difficulty of passing

suitable drugs across the barrier between the blood and the inner eye. Penicillin, for example, which is of the utmost value in treating infections of the outer eye, where local application is possible, cannot penetrate in useful quantities into the inner eye by any route. We now know, however, that the entry of such substances depends primarily on their solubility in fats, and although specially prepared fat-soluble penicillins still fail to pass the barrier (because they become adherent to blood proteins), chloramphenicol, one of the newer antibiotics, has been found to have the necessary qualities for relatively free entry; a wide range of intraocular infections is therefore now accessible to chemotherapy. Other antibiotics are also under investigation and, as mentioned in the previous section, polymyxin has recently been found of great value in treating the severe infections due to *Ps. pyocyanea*, an organism which has hitherto been unusually recalcitrant to drugs.

Work has also been undertaken on the metabolism of other tissues of the eye, notably the lens and cornea. Surprisingly little is known about the physiology of the lens or the reasons for its developing the opacities known as cataract. Yet its study is of great intrinsic importance and might in addition throw much needed light on the other degenerative processes of old age. The metabolism of the cornea, the transparent outer coat of the eye, is under extensive investigation, and attempts are being made in particular to define its chemical composition. During this work the cornea's sources of nutrition have been clarified and previous views on the factors responsible for maintaining its normal transparency have had to be modified. Though much remains to be learnt, these results should help us to improve the surgical repair of corneal opacities and to increase the chances of success when transplanting grafts of healthy corneal tissue. New information has also been gained on the factors controlling the passage of different substances, including drugs, through the cornea into the inner eye. It is of incidental interest that the cornea has been found to breathe oxygen from the atmosphere largely through the activity of the layer of cells on its surface ; it should be possible to use this knowledge to alleviate some of the discomforts and mistiness of vision frequently associated with the wearing of contact lenses.

Much of the Ophthalmological Research Unit's time during the past year has been spent in studying the effects of cortisone. The eye is particularly suited to treatment with this hormone, partly perhaps because it is so frequently affected by allergic inflammations and partly because of the efficacy and safety of locally applied treatment, which is free from most of the disadvantages that may follow when cortisone is given by injection or by mouth. Moreover, the ease with which the eye may be examined makes it exceptionally suitable for this kind of clinical research. Experimental work is in progress on the effect of cortisone on the processes of inflammation and repair and on the degree to which its use delays healing and the formation of scar tissue after injury At the same time a large series of patients with various types of ocular disease has already been treated with cortisone.

Largely because of its ready absorption on local application, cortisone is a pre-eminently suitable treatment for diseases of the anterior segment of the eye. Diseases of the posterior segment, for which cortisone must be given by injection or mouth, are in general much less responsive. It has been shown that cortisone is effective in controlling the acute phases of ocular inflammatory disease whether bacterial, allergic or traumatic in origin. So dramatic is its action that in many such cases, where the life history of the disease is short or an infecting organism can be attacked by other means such as antibiotics, the results of treatment are excellent. Typical conditions where this occurs are acute iridocyclitis, sympathetic ophthalmitis and infective keratitis. The effect, however, on chronic infective diseases and on the later consequences

of inflammatory conditions is difficult to assess and is much less marked. Cortisone is similar ineffective in degenerative conditions affecting the eye. Its value in ophthalmic conditions is thus limited, but within its restrictions is great, particularly when it is remembered that the functional effects of acute or even subacute inflammatory changes may be disastrous.

SKIN DISEASE

Skin diseases do not often cause death but they are a source of much social distress and economic loss. For example, each year some 8,000 to 10,000 factory workers are recorded as suffering from " industrial dermatitis " alone, and in the Armed Services the proportion of sickness due to various forms of skin disease ranges from 3 to 10 per cent. in different parts of the world.

We are still ignorant of the underlying basis of many even of the common skin diseases. Before 1939, little attention was paid to the experimental pathology of the skin with the notable exception of the work of the late Sir Thomas Lewis, who was associated with the Medical Research Council from the earliest days. He showed that some of the acute reactions of the skin to injury, irrespective of whether the injury was chemical, thermal or mechanical, were due to the release of a substance analogous to histamine, an advance in knowledge which later led to the introduction of methods of controlling nettle-rash and certain other conditions with a group of substances known as the anti-histamine drugs. It is encouraging that in recent years several groups of workers in this country have begun to initiate fresh lines of research. The ease with which the skin can be observed and the simplicity of removing specimens for laboratory examination suggest that progress should be rapid ; a better realisation of the complexity of the skin's functions and reactions might have dispelled over-easy optimism or been felt as a special challenge to ingenuity.

Knowledge of the chemical processes occurring in the skin was greatly extended as a result of the work of the Oxford School of Biochemistry, during the recent war, on arsenical blistering agents such as " Lewisite ". Sir Rudolph Peters and his colleagues tested these poisons on living skin fragments isolated in small flasks containing nutrient solutions and found that they prevented the skin's normal use of oxygen. Further experiments led them to deduce that an essential group of enzymes, containing sulphur and hydrogen in the form of sulphydryl groups, was being put out of action by combination with the arsenic. The remedy they suggested—neutralisation of the arsenic with alternative substances containing the same sulphydryl groups—proved effective beyond expectation, in that the poison could be rendered harmless even after it had started to redden the skin ; and the substance finally selected, dimercaptopropanol, usually known as British Anti-Lewisite, or BAL, was found equally useful in the treatment of skin disease caused by other forms of arsenic and even by a number of other heavy metals.

One of the secretions of the skin, the sebum which coats the whole body surface, is known to be essential for health. In addition to preventing excessive drying and cracking of the thin horny surface layer, this greasy mixture, it has now been shown, plays an important part in the body's defences against bacterial infection. In the course of studies of industrial skin infections at the Birmingham Accident Hospital, the arms of volunteers were soaked in acetone to extract the sebum, which was found to be present in amounts equivalent to a surface film about one-thousandth of a millimetre thick. Some 40 per cent. of this sebum consisted of free long-chain fatty acids, about half of which contained unsaturated carbon atoms and so were potentially active chemicals. Oleic acid was proved by X-ray crystallography to be a major constituent, and its disinfectant action, and that of sebum itself, on streptococci and other pathogenic micro-organisms were confirmed. Some bacteria are apparently little

affected by sebum but, as these are mostly destroyed by drying, very few harmful organisms can multiply or even survive for long on the healthy, intact skin surface. Even the staphylococcus, which is one of the most resistant organisms, has been shown to survive for only about three days. If the skin is injured, however, and serum exudes, not only does the moisture enable certain organisms to multiply but the disinfectant action of sebum is neutralised.

Grafting skin from a healthy to an injured part of the body is now an essential part of reparative surgery, the donor site healing rapidly if the deeper layers of the surface epithelium are left. So far, lasting skin grafts can only be taken from the injured patient himself. Even skin from a close relative is destroyed after a week or two and so can provide only temporary cover, though destruction seems to be delayed if cortisone or ACTH is administered when the graft is placed in position. Studies on animals have shown that successive grafts of such extraneous origin are destroyed more rapidly than the first, presumably due to the body developing an "immunity". Experiments of great importance to the practical problems of skin grafting have been undertaken by Professor P. B. Medawar and Dr. R. E. Billingham, formerly at the Zoology Department of Birmingham University and now at University College, London, who have found that skin grafts can be stored in the refrigerator and used successfully several weeks later if any injured areas remain unhealed. Even more remarkable is the capacity of such isolated skin to withstand being frozen solid by liquid air, provided this is done gradually.

The obvious differences of texture, colour and hairiness in the skin of different parts of the body are of great importance to the functional and aesthetic result of a grafting operation. For example, skin taken from the pad of an animal's foot remains thick when transplanted, say, to the animal's flank. Of special interest is the fact that, when grafts of white skin are transferred to the black or brown areas of a piebald animal, the edges of the white areas darken in the ensuing months, though the hairs remain white. Special methods, which include splitting the epidermis from the underlying dermal part of the skin, have revealed a system of highly branched cells, which appear to be able to transfer pigment from dark areas to neighbouring skin cells. Similar branched cells are to be found underlying all areas of skin, and experiments are being designed to test the possibility that they may be concerned in the spread from site to site of a variety of diseases.

It has long been known in industry that some substances are liable to "sensitise" the skin; at first, contact causes no trouble, but repeated handling may result in severe inflammation. Substances known to cause sensitisation include not only simple chemicals in use as drugs or in industrial processes, but also the products of living agents such as garden plants, fungi, and bacteria such as the bacillus of tuberculosis. In view of its wide significance, skin sensitisation has been studied under controlled conditions both at the National Institute for Medical Research and in the Department of Experimental Pathology at the University of Birmingham. The essential property of the simple chemical sensitisers appears to be their ability to combine at ordinary temperatures with proteins, presumably in this instance with the proteins of skin. The rash of "contact dermatitis", as these effects are often called, is not controlled by the antihistamine drugs but may be influenced by cortisone or ACTH. The behaviour of skin during sensitisation has been studied in the Council's Industrial Medicine and Burns Research Units by means of a new technique for cultivating isolated skin in the test-tube, which was suggested by Professor Medawar and enables small fragments to retain their normal structure and growth pattern. As a result it is becoming increasingly possible to analyse the different factors which may be concerned in the response of a patient to sensitisation.

Industrial skin disease often leads to long periods of absence from work, though modern methods of treatment, especially those aimed at controlling added bacterial infection, can greatly reduce this loss. The particular forms of skin disease encountered in different industries are being studied by several groups of workers and the Council have recently appointed a Committee on Industrial Epidermophytosis to investigate the incidence of fungal infections of the feet among coalminers. Other industrial rashes affect chiefly the hands and forearms and their prevention has been shown to depend in part upon engineering improvements, in part upon the care exercised by the work-people themselves. Simple tests of the efficiency of different washing agents in removing oil and grease have been made with the help of ultra-violet light, which shows up traces of residual oil. The importance of these measures is increased by the finding that some of the mineral oils in current use are capable of producing cancer and important long-term experiments are being conducted in an attempt to identify the carcinogenic fraction so that eventually it may be removed or destroyed.

THE EXPERIMENTAL STUDY OF HUMAN SKILLED PERFORMANCE

At first sight it may seem strange that a Medical Research Council Unit should be concerned with the experimental investigation of human skill. What has this subject to do with health and disease?

In the first world war the Health of Munition Workers Committee, whose descendant, the Industrial Fatigue Research Board (later the Industrial Health Research Board), became a committee of the Council, investigated the causes and results of fatigue, and found that if a man had to work under conditions to which the human body is not normally adapted his health could be seriously affected. In the second world war the Council again had to pay attention to fatigue, but to fatigue of a different kind. Muscular effort was now much less required, the heavy work being usually performed by machines; but mental effort, accurate and often extremely speedy, was needed to control the machines, and it was this that was now producing fatigue. If the signals for action, and the means provided by the machine for dealing with them, were not designed with regard to normal capacities, the attempt to deal with them day after day set up nervous strain, lowered efficiency and morale, produced unnecessary accidents, and in many cases led to definite and continued ill-health.

It was this situation, now increasingly found in industry as well as in the Services, that induced the Council to study the conditions in which skill can be learnt and exercised by normal workers.

In all skilled operations, whether in work or in play, the first stage is the identification and interpretation by the operator of certain information. The information may come, as for instance in motor-driving, from the world outside, in which case its form, timing, and arrangement can be controlled only to a very slight extent. It may come from the machine itself, from objects moving on a conveyor belt, from gauges, or other "display" devices. Or it may come from the operator's own bodily movements as he manipulates the control mechanism of the machine and notes its response or resistance to the movements of levers and switches. In both these last two cases, which are much more common than the first, the form and timing of the information depend almost entirely on the design of the machine. "Display" signals can be arranged so as to be most easily read and understood by a normal operator, while to a lesser extent "control" mechanisms can be so designed that, besides performing their primary function, they supply the maximum of useful information to their users.

Many problems of display design have been studied by the Council's Applied Psychology Research Unit, of which Sir Frederic Bartlett is Director. One case is that of the machine tool indicator. For many machine tools such as lathes, jig borers and milling machines an indicator is needed which can be easily and accurately read, which is sensitive to changes of the order of 0·001-in. but has a range of several feet, and which requires no counting, mental arithmetic, or successive machine stoppages for resetting. Dial-like indicators, at present the most common, have often been found difficult to read accurately and at speed, especially when the principles of their design vary as widely as they do at present, and to overcome this difficulty workers in the Unit have produced a new numerical scale indicator. Tests with the prototype in a large machine shop showed a reduction of 40 per cent. in machine tool setting time, and 17 out of every 18 " human errors " were eliminated. Further trials demonstrated a large saving in learning and machining time for new operators, and the device is now being commercially developed for manufacture in this country and in Canada. The principles which it embodies are applicable to many problems of machine design outside the machine tool industry.

On the designing of control mechanisms so as to provide useful information, much has been learnt which is now ready for application, but most of the problems can receive radical solution only as a result of much more fundamental research ; we must know how—and how much—information coming to the operator from the complicated and obscure mass of sensations set up by his bodily movements can be used by him to direct his skill. However, the Cambridge Unit has already been able to compare the usefulness of control levers with small movement range and heavy spring loading with that of those with light free moving control. In many practical industrial situations the former type appears to give much more information, and some applications have already been made in Service and industrial operations.

Once the information, or stimulus, has been received, the next stage in a skilled task is to make the appropriate response. This stage too has been investigated by workers of the Unit, particularly in tasks requiring continuous attention and activity. They have been able to show that the ease or difficulty of making the response depends largely on two factors, which they have called " load " and " speed ". Speed is the rate at which decisions have to be made. Load is the complexity of the sources of information, due sometimes to the number of the sources, as when a cotton operative has to tend sixty spindles, at others to their arrangement in space or time, as when a pilot has to change height at the same moment as he is receiving a radio message. Load and speed are independent, in the sense that if either changes beyond definite limits it causes a disproportionate increase in error. But in industrial practice it is very rare for one to increase without the other and their combined effect is demonstrably greater than the sum of their separate effects. Work is in progress to discover what changes in the one can be used to compensate for changes in the other so as to avoid strain ; in the past it has often been assumed that doubling the load can be compensated by halving the speed, but it is already clear that no such simple relation exists.

There is a special case of the relation between stimulus and response that is of outstanding interest. In many industrial skills appropriate actions have to follow signals which succeed one another rapidly on a conveyor belt. The normal operative soon comes to look ahead of his action point and to read signals to which he will not respond for several " moves ". It is this anticipation that produces the smoothness, consistency, and freedom from forced effort, that are characteristic of skill. The Unit has been able to distinguish three main forms of anticipation, each with a characteristic time span. The practical

problem is to match rate of display signals to rate of control movements that will give the anticipation span best suited to the skill in question. There is strong evidence that the best timing rates are significantly different for different broad age groups, and this is obviously a matter of great importance at a time when industry must give greater and greater consideration to the employment of older workers.

Besides these studies of the intrinsic nature of skilled performance, work has also been done on the effect of very fast imposed speeds and of great heat or cold or humidity. The methods which have been established for the study of all of these are similar and some of the work on heat and cold is mentioned in the next section of this Report.

Finally, work is in progress on the transfer of skill from one situation to another. The great natural danger of all human learning is that, unless special precautions are taken, the new skill is so tightly tied to the conditions in which it is acquired that it cannot be adapted to other conditions without delay and waste. In these days of very rapid technological invention and change, this inability of workpeople to adjust themselves easily makes great demands on the industrialist who plans large-scale training schemes. We are, however, beginning to be able to pick out the essential components in an industrial operation so as to reproduce them in a " synthetic " training scheme and omit what is irrelevant. But there is still much to find out about the details of transfer and about the bodily processes which underlie it.

These are only a few of the topics which are under study in the Council's Applied Psychology Research Unit. It is obvious that they are vital to a high level of industrial productivity, but the Council's interest in them is due less to this fact than to their impact on health. When circumstances causing ill-health can, as here, be remedied, they automatically become not only a legitimate but also an obligatory concern of environmental medicine.

CLIMATOLOGICAL MEDICINE

During the second world war great numbers of human beings had to learn to work and fight in climates vastly different from those to which they were accustomed. They were exposed to the intense cold of the arctic, the burning sun of deserts and the humid heat of tropical forests ; they had to face extreme conditions in the upper air or when immersed in cold water. Few of these hardships were novel in human experience, which can draw on reserves of practical wisdom accumulated during centuries of ingenuity and endurance. But the systematic study of the physiological effects of climate was barely a generation old ; it received a big impetus from the needs of the war ; and it has already some useful new knowledge to its credit.

The physiological effects of climate show themselves in two ways : as acute changes when the body is first exposed to an unfamiliar climate and its defences may break down bringing a catastrophe like heat stroke or frostbite ; and later as long term adaptations. Analogous changes are often found in other conditions where the body is exposed to unusual stress, such as high altitudes. A good deal is known about physiological adjustments to heat. Exposure to heat causes an immediate increase of the circulation through the skin, a shift of blood distribution that facilitates cooling. If the hot weather is prolonged a parallel increase takes place in the volume of the blood, with the result that the extra demands of the skin circulation are met without the rest of the body being deprived of its normal volume. Other changes occurring during acclimatisation to heat are an alteration in the rate of sweating and in the composition of the sweat ; these were the main subject of a long and detailed war-time investigation under the auspices of the Council's Royal Naval Personnel

Research Committee. The work, which was carried out in hot rooms specially built by the Admiralty in the National Hospital for Nervous Diseases, London, showed that full acclimatisation to high temperatures and humidity, apparently similar to that naturally acquired by residence in the tropics and including a steady improvement in working capacity, could be artificially developed in less than a fortnight by means of short daily periods in a hot room.

Several groups of workers have now compared the physiological adaptation to heat made by different races without as yet finding any striking differences between them so far as can be judged by the limited tests at present available. The Bantu mine worker, for example, seems to become accustomed to his excessively hot and humid working environment by the same process of acclimatisation as occurs in the white man. And by artificial acclimatisation, the white man can be made to tolerate temperatures and humidities even higher than those in which an African negro normally lives. There is a very widespread belief, however, that after the initial period of acclimatisation the white man gradually begins to deteriorate both mentally and physically, a decline that is epitomised in the phrase " tropical fatigue " and that has led to the custom of his taking frequent long holidays in the temperate zone.

Work that may shed further light on these problems is being carried out at the Tropical Research Unit at Singapore and is about to be restarted in the Council's Applied Psychology Research Unit at Cambridge. Hot room studies at Cambridge during the war, since repeated and checked at Singapore and found to hold equally for natural conditions in the tropics, showed that the influence of heat on a man's efficiency could not be accurately predicted from any known measurements either of comfort or of functional changes in his heat regulating mechanisms, since it depended to some extent on his previous skill at whatever work he was doing ; for example, in the reception of morse code signals, the higher the skill, the hotter the room temperature had to be before accuracy broke down. Work is therefore now being resumed in Cambridge on the effects of heat on a man's ability to take decisions and perform skilled machine operations.

There are interesting contrasts between man's reactions to heat and to cold. A rise of 10° F. in body temperature is usually fatal, but the body's heat regulating mechanism so adjusts the circulatory and other physiological systems that the internal temperature changes only slightly when a man moves from the temperate zones to the tropics. On the other hand physiological acclimatisation to cold has still to be definitely proved in man, who appears to have been by evolution a tropical animal, so that Scholander can go so far as to say that the Eskimo survives only because he has skilfully maintained a tropical environment inside his clothing and dwellings. Yet the body temperature can fall 25° F. or more during exposure to cold without necessarily fatal results.

The action of cold is under intensive study in Canada and the U.S.A., which both possess several centres devoted entirely to this subject. The work in this country has so far been on a smaller scale. Many years ago Sir Thomas Lewis studied the effects of cold on the hands and feet, and showed that exposure of the hands to iced water produces, after an initial intense constriction of the blood vessels, a great increase in the local circulation. Dr. N. H. Mackworth, working at the Council's Applied Psychology Research Unit, has also studied the reaction of the fingers to cold. His subjects sat in a room at 14° F. (−10° C.) for two hours daily and then held their fingers in a current of cold air. The fingers became numb and slowly recovered after removal from the wind. The degree and duration of the numbness were measured, and both were found to decrease with repeated daily exposures. The importance of this experiment, which was a continuation of field work

started under sub-arctic conditions, lies in its having provided the first clear experimental evidence that physiological adjustments to cold do in fact occur in man. One is reminded of the remarkable adaptations in arctic gulls, which can walk with impunity on ice at temperatures of —40° F. (—40° C.) or lower, while a gull that escaped into the open after several months in captivity at a temperature of 68° F. (20° C.) had its feet frozen within two minutes.

Dr. E. M. Glaser, of the Department of Experimental Medicine, Cambridge, has studied the effect of immersion in cold water and has shown that life can be prolonged by vigorous swimming, whereas previously it had been thought that the best way to conserve body heat was to keep as still as possible, clinging to a floating object. In other studies he has shown that there is an immediate shift of blood from the limbs to the lungs on exposure to cold. The significance of this finding is not yet clear but it may bear some relation to the respiratory distress that sometimes occurs when a man is plunged into cold water.

Among the practical achievements of the investigations in this country and elsewhere have been improvements in the ventilation of ships, mines, factories and fighting vehicles, and the development of more suitable shelter and clothing for use in extremes of heat and cold. The light clothing now worn in the tropics by members of the Forces is immensely more comfortable than the uniforms of a generation ago. The solar topee has given place to the bush hat, and the spinal pad, which used to be advocated as a protection to the spinal cord against extreme heat, has been shown to be unnecessary. Similarly, light comfortable clothing, boots, gloves and hoods, have now been designed for virtually every variety of extreme cold.

Since the war the resources for work of this kind have greatly expanded. A Climate and Working Efficiency Research Unit has been established by the Council at Oxford ; a Division of Human Physiology has been formed at the National Institute for Medical Research ; a Tropical Research Unit has been set up jointly by the Council and the Admiralty at Singapore ; and on the advice of the Colonial Medical Research Committee the Colonial Office have established a research laboratory under the direction of Dr. W. S. S. Ladell in Nigeria. The Council's Environmental Hygiene Research Unit under the direction of Dr. T. Bedford, and their Applied Psychology Research Unit and the Department of Experimental Medicine, both at Cambridge, have also co-operated in much of this work.

The simple techniques in use in this country have been adequate up to the present, but there are problems that can only be properly studied where the environment can be controlled. At the Royal Air Force Institute of Aviation Medicine a climatic laboratory has now been completed, in which air movement, air temperature, wall temperature, and humidity are each controlled over a range of from 5° F. to 167° F. (—15° C. to +75° C.). A complementary laboratory has been designed for the National Institute for Medical Research to cover the lower range of temperatures, approximately — 40° F. to 68° F. (— 40° C. to +20° C.). When these two laboratories are complete, this country will possess excellent facilities for reproducing the effects of almost every kind of climate.

MALARIA

Malaria still causes more deaths than any other single disease and is responsible for an untold amount of chronic ill-health and lowered vitality. In many Commonwealth territories, as in great areas of the world at large, the well-being of the inhabitants would perhaps be promoted more effectively by the control of this disease than by any other single measure. During the recent war it was controlled among the Armed Forces to an extent never before considered

feasible, and much thought is now being devoted to the rather different problem of giving a similar degree of protection to civilian populations. The Council are concerned in the necessary research, not only through experimental studies at the National Institute and at their Field Research Station in the Gambia, but through their having recently taken over from the Ministry of Health the administration of the Malaria Reference Laboratory, Horton, as part of the Public Health Laboratory Service.

The most important advances in antimalarial measures have been the use on a large scale of synthetic antimalarial drugs and the introduction of new insecticides for the elimination of the mosquitoes that spread the disease.

Antimalarial Drugs

Work on antimalarial drugs can now proceed on less empirical lines as a result of the discovery of a hitherto unknown stage in the life-cycle of the malaria parasite. After its injection into the body by the mosquito, the parasite circulates in the blood for up to half an hour and then disappears, only re-appearing 7–10 days later at the onset of the clinical attack. Nearly fifty years after the rest of the malaria cycle had been discovered, the whereabouts of the parasite during this latent period were still unknown, but in 1948 workers at the London School of Hygiene and Tropical Medicine, with the collaboration of the Malaria Reference Laboratory in the later stages, showed that the parasite passes part of its life cycle in the liver. In the case of those forms of malaria in which relapses readily occur, it is presumably from this organ that the parasite's renewed attacks are made.

Before the last war the only antimalarial drug in common use was the natural product quinine, which, while effective in suppressing symptoms of the disease, did not prevent relapses. Many countries with interests in the tropics were therefore engaged, in some cases with promising results, in a search for a still more effective drug, and when war came a new impetus was given to this research in the Allied countries by the enemy occupation of Java, from which over 90 per cent. of all quinine supplies came.

One of the most successful of these drugs, originally developed in Germany, was widely used by the Allies during the war under the name of mepacrine. Tests on human volunteers at the Army Medical Research Centre, Cairns, Australia, showed conclusively that routine use of mepacrine will ensure practically complete suppression of all forms of malaria, and this conclusion was proved in years of practical experience in the Armed Services.

Like quinine, mepacrine does not attack the organisms in the liver, and individuals infected with relapsing malarias are liable to further attacks on ceasing to take the drug. Relapse can, however, be guarded against by one of a series of drugs on which much work has been done in the United States, the most recent and most effective being Primaquine (pamaquin). This drug, while unsuitable for use against an actual attack, reaches the nests of parasites in the liver and reduces the chances of relapse. Earlier members of the series were very toxic, but Primaquine is said to be a considerable improvement in this respect.

Another new drug, Paludrine (proguanil) was developed in the later years of the war by Imperial Chemical Industries, Ltd., and experimental trial at Cairns showed it to suppress the symptoms of all forms of malaria and to be particularly valuable for prophylaxis. It was evolved too late in the war to be given large-scale trials in the Armed Forces, but immediately the war ended it was tested on the civilian populations of malarious areas, the Council assisting at first directly and later through the Colonial Medical Research Committee. Paludrine proved to have two important new qualities: it attacked the parasites of most strains of the frequently fatal "malignant

tertian " malaria in the liver, and it prevented the transmission of this infection to mosquitoes and hence to other human beings. It has the further advantages of being very safe and relatively cheap, and is now successfully used throughout the world for preventive treatment ; in acute attacks it is somewhat slow-acting, and is therefore often supplemented by other drugs.

There is a possibility that the phenomenon of resistance, well known in the case of streptomycin, may also occur with Paludrine. It has for some time been known that in laboratory infections the malaria parasite may become resistant to the drug, and already this has been found to occur also in human infection. It is not yet possible to foresee how far the future use of the drug may be affected.

A powerful antimalarial which has now been adopted in the U.S. Army for routine use in the treatment of clinical attacks of malaria is chloroquine, a development of the German Resochin. It does not prevent relapses, but has the advantages of high potency and low toxicity.

The most recent drug to be discovered, Daraprim (pyrimethamine), is a product of the Wellcome Research Laboratories in New York and London, and preliminary trials indicate that it may prove of considerable value, particularly for suppression. It is clear that the ideal antimalarial, which will destroy all species of the parasite in all their stages while being suitable also for routine preventive treatment, has yet to be developed. At the same time the diversity of drugs serves a useful purpose ; different geographical strains of the same species of parasite often react very differently, and where a strain proves intractable to a particular remedy it is a great advantage to have an alternative in reserve.

Insecticides

The older methods of eliminating the mosquitoes that spread malaria were chiefly directed against them in the larval stage and, except in special cases, proved to be impracticably expensive. In recent years insecticides such as DDT (dicophane) and Gammexane (gamma benzene hexachloride) have opened up possibilities of destroying the adult mosquito, since when they are sprayed on the walls of houses they have a lethal action that persists for long periods. Much study has been given to suitable methods of using these new insecticides and to their action on different species of mosquito. In certain island countries, in Cyprus, Sardinia, Mauritius, for example, the complete extermination of mosquitoes has been attempted by this method, which has also been used with conspicuous success for the control of malaria in many other parts of the world, notably in British Guiana, Venezuela, Argentina, Brazil, Italy, India and Ceylon. In all these countries there has been a remarkable fall in mortality and an improvement in the population's health, efficiency and economic state that may well have far-reaching results. It is as yet somewhat difficult to see what the eventual effect may be in non-island areas. A reduction in the incidence of malaria or even a complete arrest of its transmission may be expected while a campaign is in progress, but unless the measures are continued indefinitely the mosquito population may be renewed by infiltration from surrounding untreated areas. If by then the inhabitants have lost the partial immunity that is acquired by continuous re-infection and that enables residents of endemic areas to survive, even though often chronically unhealthy, it is possible that the disease may reappear in an unusually severe form. Obviously such points must be taken into account, and long-term studies are being undertaken. The Council, while not directly at work on the practical problems of clearance, are concerned with the research aspect through the Colonial Medical Research Committee and its Malaria Subcommittee, both of which have taken the place of former committees of the Council.

CHEMICAL AGENTS IN THE CAUSATION OF CANCER

Cancer research has been considerably expanded in recent years and is supported in this country not only by the Council, the British Empire Cancer Campaign, and the Imperial Cancer Research Fund but also independently in hospitals and university departments in many different centres. Some important advances have resulted from developments in atomic physics, which have made it possible to construct new types of apparatus for producing high voltage radiations. The Council have for many years supported research on the treatment of cancer by radiations and their Radiotherapeutic Research Unit, at Hammersmith, under the direction of Dr. Constance Wood, continues to investigate the improved methods of treatment now available. Work on super-voltage therapy is also assisted by the Council in several other centres including the Department of Radiotherapy at Cambridge and the Christie Hospital and Holt Radium Institute at Manchester.

The Council sponsor research on many other aspects of the problems of cancer, as may be seen from previous Reports and from the summaries elsewhere in the present Report of work in progress. They have in the last year increased their direct interest in this field through their assumption of the major financial responsibility for the recently established Institute of Cancer Research of the University of London (p. 36), which incorporates the work of the Chester Beatty Research Institute and of other departments in the Royal Cancer Hospital, London.

As was observed in the Council's last Report, the advance of knowledge in cancer research is dependent upon almost every branch of medical investigation and indeed upon many other branches of science. It would be impossible to give a detailed account of all the relevant research, even one confined to the Council's activities alone. The following review has therefore been limited to the consideration of one aspect of the problem, namely the mechanism of the causation of cancer by chemical means.

It has long been known that certain forms of cancer occur as a result of exposure to occupational hazards. Among those observed in the eighteenth and nineteenth centuries were cancer of the skin in chimney sweeps, " mule-spinners' cancer " in the cotton industry, " paraffin cancer " in the Scottish shale-oil industry, and other similar types due to contamination of the skin by soot, pitch, tar or mineral oils. Fundamental advances in our understanding of the cause of these and other forms of cancer were, however, dependent upon the ability to reproduce the disease under controlled experimental conditions, and have in fact been almost entirely confined to work carried out within the past half century. It is, for example, only thirty-seven years since Japanese workers were the first to induce cancer by chemical means, through the application of coal tar to the skin of rabbits. It is only twenty-three years since the work of Professor W. V. Mayneord and Dr. I. Hieger on fluorescence spectra led to the isolation from two tons of coal-tar pitch of a cancer-producing substance, 3 : 4 benzypyrene, a discovery which led to the production, under Sir Ernest Kennaway, of a long series of carcinogenic compounds by Professor J. W. Cook and his assistants at the Royal Cancer Hospital.

Since then many new and diverse types of chemical carcinogen have been recognised, including for example certain oestrogens, some azo-dyestuffs, urethane and many kinds of aromatic amine. The study of these compounds has provided some information on the relationship between their chemical structure and biological activity but virtually none concerning their mode of action.

This earlier phase of investigation has now been supplemented by another in which increasing attention is being given to the precise biochemical mechanisms

by which such substances may effect the transformation of the normal cells of the body into cancer cells. In the past few years a fresh impetus has been given to this line of research through the discovery of a new class of chemical carcinogens, namely the " nitrogen mustards " and their related compounds. These substances had earlier been shown to possess unusual inhibitory effects upon cell growth and division, in the course of their investigation as potential agents of chemical warfare, and these effects had been made use of in the treatment of certain kinds of tumour in man. In was in fact an endeavour to enhance their therapeutic usefulness which led to the synthesis of new series of these " mustards " and to their chemical and biological study. Although their value in treatment remains limited, the investigation has led to more fundamental and unexpected developments arising from the discovery of their cancer-producing properties.

These compounds are of particular interest chemically because, in contrast to the earlier discovered carcinogens, they are highly reactive and their properties can be studied in the test-tube. It is thus possible to examine their effects on important cellular constituents isolated for the purpose of experiment, and to gain some idea of their possible mode of action on cells in the living body. A great deal of work has been carried out on the chemistry of their action on substances of special biological and genetical importance, such as the nucleic acids, which are essential constituents of every living cell. This work has led to the concept—which still, however, requires much further test—that the carcinogen may interfere with the normal combination of nucleic acid with protein, a combination which is believed to be fundamental to the production of genetic nucleoprotein and hence to the normal maintenance and growth of living tissue.

Biologically, the " nitrogen mustard " group of carcinogens is of great interest, since their action can be studied experimentally on many different tissues, including tumour tissue, bone marrow, corneal epithelium and plant root-tip, while their genetical effects can be observed in micro-organisms or the fruit-fly Drosophila, in which they have been found to produce deficiencies in, or even deletions of, minute portions of the chromosome structure—alterations which are thought to be caused by interference with the process of gene reproduction. For many years the bulk of available evidence has pointed to the likelihood that malignant change represents some such permanent cellular alteration, and it would appear that the evidence for this is increasing. It is possible that chemical carcinogens may act directly on the gene itself, and that tumour production may be due to the elimination of gene or enzyme centres which normally regulate the synthesis of substances essential for cell division.

It is clear that future progress must largely depend upon advances in our knowledge of the mechanism of protein synthesis and of the molecular organisation of the chromosomes, but the work described above promises a fuller understanding of carcinogenesis and may in time point the way to chemical or other means of reversing or controlling the process.

CORTISONE AND ACTH : PROGRESS REPORT

In the last Report a brief account was given of the discovery in the United States that cortisone, a hormone of the adrenal gland, and ACTH (corticotrophin), a pituitary gland hormone, can profoundly affect a series of diseases in which previous methods of treatment had achieved little or no success. The Council's clinical and experimental work on cortisone and ACTH began towards the end of 1949, but its scope was at first severely limited by the extreme scarcity of the two hormones. It was only very gradually during the ensuing months that supplies for research became a little easier and it was not until

a full year later, when the firm of Merck and Co., Inc., Rahway, New Jersey, generously gave 1 kilogramme of cortisone jointly to the Council and the Nuffield Foundation, that it became possible to revise and extend the programme on any considerable scale. A further expansion took place during 1951, when the Ministry of Health began to import both hormones regularly so as to provide small monthly supplies to hospitals; at the same time they arranged to allocate substantial quantities to the Council for research purposes. Stocks at the disposal of the Council have still to be husbanded with great care but the hampering scarcity of the early days has disappeared.

Cortisone and ACTH were originally so eagerly sought after because of the promise they held in the treatment of rheumatoid arthritis and, despite the remarkable variety of conditions for which they have since been tried, study of their effects in this and other chronic rheumatic diseases must still be reckoned of pre-eminent importance. By the time work could be begun in this country, however, a good deal of knowledge had already been gained in the United States, and the Committee appointed jointly by the Council and the Nuffield Foundation to organise investigations on the treatment of chronic rheumatic diseases was able to proceed at once to a series of controlled clinical trials, including studies of the value of the hormones in facilitating treatment by manipulative procedures and in restoring to activity those severely crippled by rheumatoid arthritis.

An undertaking of a different kind was entered into by the Council as a result of an invitation from Dr. C. J. Van Slyke, Director of the National Heart Institute, Bethesda, Maryland, and Dr. T. Duckett Jones, Chairman of the American Council on Rheumatic Fever of the American Heart Association, to join in organising a controlled trial of the value of cortisone and ACTH in treating rheumatic fever and particularly in preventing the damage to the heart which is its most serious outcome and so tragically often the herald of years of crippling ill-health in later childhood and in youth. The trial is being carried out simultaneously and as far as possible on identical lines in the two countries, the work over here being shared between six centres with supplies of cortisone and ACTH specially provided from American sources. It will be some years before the final results can be known.

A wide variety of other clinical conditions is also under investigation. For a number of eye, blood and skin diseases, treatment with cortisone and ACTH had already been reported to be of value before work was started in this country, but little really definite information was available and the first task was to undertake preliminary trials to discover in which conditions more exact work might be fruitful. Results of some of the work on eye diseases are now available and have been mentioned in a previous section of this Report (see p. 22). Other work in progress includes studies of the effect of the hormones in the treatment of industrial lung diseases, disorders of the endocrine glands, general connective tissue diseases and allergic states.

Equally important is the need to learn how the hormones act on the body and how and why they are apparently able to modify the reactions of its tissues to disease. To help to answer such questions is the aim of a large part of the Council's programme in this field, a programme which includes experimental studies of the effects of cortisone and ACTH on the healing of wounds, fractures and burns, on sensitivity and allergic reactions and antibody responses, on tissue and capillary permeability, on skin grafts, on shock, on changes in blood protein levels and saline constituents, and on hormone excretion. Many interesting points have begun to emerge but the work is still in its infancy.

The manufacture of both hormones continues to be difficult and this country is still almost entirely dependent on supplies from the United States. Several commercial firms have, however, become interested in the manufacture

of these substances and the first home-produced samples of ACTH have already been delivered under contract to the Ministry of Health and approved on the basis of provisional specifications laid down by a specially appointed committee of the Council. One obstacle to expanding production has been the scarcity of the animal pituitary glands from which ACTH has to be extracted, but it is hoped that this difficulty may gradually be overcome as a result of recent arrangements by the National Research Development Corporation to encourage their collection and facilitate their distribution. Another serious obstacle is the difficulty of standardising the potency and purity of the finished product, the method in use at present requiring laborious and uncertain tests on a large number of rats. Continuous but so far unsuccessful work in search of less complicated and more reliable methods has been in progress at several different centres.

The raw material for the commercial synthesis of cortisone has so far been deoxycholic acid, obtained from animal, mainly ox, bile, which must always remain inconveniently scarce. Every effort is therefore being made to find some more plentiful alternative of vegetable origin, amongst those first considered being sarmentogenin, which can be extracted from the seeds of a particular strain of *Strophanthus sarmentosus*, a climbing plant growing in certain areas of Africa. The possibilities were recently investigated on the spot by a team sent out by the Council to Nigeria and the Cameroons, but supplies of the seed proved so inaccessible and the best yield of sarmentogenin so small that no immediate contribution can be expected from this source. One of the most promising natural compounds for the purpose of cortisone synthesis is a sapogenin called hecogenin, which occurs in small quantities in Agave species in the Southern United States and Central America. It has now been discovered by a team of Council workers that hecogenin occurs also in sisal waste and in still higher concentration in the juice of the sisal plant. Investigation of this matter by a member of the team in Kenya has shown that hecogenin can be easily and cheaply extracted from the sisal juice, so that material for cortisone synthesis becomes potentially available from this source in a large amount and at low cost.

While the quest for natural products has been in progress, research both in the U.S.A. and in this country has been directed towards the total synthesis of steroids, the group of which cortisone is a member. In 1951, Professor Robert B. Woodward of Harvard University was able to announce the first total synthesis of a steroid, his preparation being a distant relative of cortisone, and Sir Robert Robinson at Oxford, with Dr. J. W. Cornforth at the National Institute for Medical Research, announced the total synthesis of an androgenic steroid hormone. Although this work is as yet purely academic, it holds promise that many valuable therapeutic agents, of which cortisone is only one, will in the future become more readily available.

ADMINISTRATION

ORGANISATION

HEADQUARTERS STAFF

SECRETARY
Sir Harold Himsworth, K.C.B., M.D., F.R.C.P.

SECOND SECRETARY
A. Landsborough Thomson, C.B., O.B.E., D.Sc.

PRINCIPAL MEDICAL OFFICER
F. H. K. Green, C.B.E., M.D., F.R.C.P.

SENIOR MEDICAL OFFICERS
F. J. C. Herrald, M.B., M.R.C.P.E.
R. H. L. Cohen, M.A., M.R.C.S.
Surgeon-Commander J. M. Holford, R.N.
—part-time (*Services Medicine*)

MEDICAL OFFICERS
Joan Faulkner, M.B., D.P.H.
(*Information*)

B. S. Lush, M.D., M.R.C.P.
(*Environmental Medicine*)

ASSISTANT SECRETARY (*Finance*)
D. V. T. Fairrie, B.A., A.C.A.

ADMINISTRATIVE OFFICERS
J. G. Duncan, LL.B. (*Establishments*)
J. D. Whittaker, M.B.E. (*Supplies*)
Sheila Smith, M.A. (*Publications*)
D. J. Cawthron, M.A.
J. C. R. Hudson, B.A.

SENIOR EXECUTIVE OFFICERS
J. H. Dixon (*Accountant*)
R. F. Smart (*Deputy Accountant*)

G. S. Wilson, M.D., F.R.C.P., D.P.H. (*Director, Public Health Laboratory Service*)

Major-General Sir John Taylor, C.I.E., D.S.O., M.D., I.M.S. (ret.) (*Joint Secretary, Colonial Medical Research Committee*)

RESEARCH ESTABLISHMENTS

During the year covered by this Report the new laboratories of the Pneumoconiosis Research Unit (p. 79) at Cardiff were officially opened by the Lord President of the Council. Following upon the retirement of Professor H. Hartridge the Vision Research Unit was reconstituted as a Group for Research on the Physiology of Vision under the direction of Dr. L. C. Thompson (p. 69). The title of the Occupational Psychiatry Research Unit was changed to Unit for Research in Occupational Adaptation (p. 84). During this period also, the Group for Research on the Building Industry, which was under the direction of Professor C. A. Mace, was dissolved (p. 85).

As the close of the year under review, the organisation consisted of the National Institute for Medical Research, thirty-seven Research Units (in some cases with other titles), seven less formally constituted Research Groups, the Antibiotics Research Station and the Laboratory Animals Bureau. There is also the Field Research Station in the Gambia, and there are some individual members of the staff attached to other institutions. Although most of the work was done in the United Kingdom, investigations by members of the staff were also made in Tropical Africa, in Malaya, in the Canadian Arctic, and at sea.

THE INSTITUTE OF CANCER RESEARCH

Midway during the period under review, at the beginning of the financial year 1951–2, the Council assumed responsibility for providing for the research activities of the Royal Cancer Hospital, London. These are centred partly within the hospital itself, but largely in a separate building known as the

Chester Beatty Research Institute. The Royal Cancer Hospital having become part of the National Health Service, the Ministry of Health considered that research activities on this scale should have separate provision ; with the approval of H.M. Treasury, therefore, a sum of £150,000 (as determined for the financial year 1951–2) was transferred from the estimates of the Ministry to those of the Council. In parallel with this step, the earlier association of the Royal Cancer Hospital with the University of London has been preserved by constituting the research departments as an Institute of Cancer Research within the ambit of the British Postgraduate Medical Federation.

This arrangement marks a new departure in the Council's practice. Hitherto they have financed research either by maintaining establishments of their own, with staff employed by themselves, or by making temporary research grants for specific purposes directly to individual workers in independent institutions. They have not, except in a very small way for exceptional reasons, made block grants to institutions as such or subsidised entire programmes of research outside their own staff organisation. Appropriate new procedures are accordingly under consideration which will enable the Council, without unduly restricting the freedom of the new Institute, to fulfil their responsibilities to the Committee of Privy Council and to H.M. Treasury for the programme of work and the expenditure of a substantial sum from public funds.

OVERSEAS LIAISON

Scientists from Commonwealth and foreign countries have continued to visit the headquarters office and to spend varying periods at the National Institute for Medical Research and other Council establishments. Members of the Council's staff have visited research establishments, laboratories and hospitals overseas, taken part in a large number of international congresses, given lectures and undertaken inquiries abroad for government departments.

An increasing number of visits has been made to the United States and Canada, and in many cases American sources have generously provided the expenses involved. Leave of absence for the academic year 1950–1 was granted to Dr. Janet Niven (National Institute for Medical Research) to work in the Department of Bacteriology at the Long Island College of Medicine ; to Dr. J. A. Loraine (Clinical Endocrinology Research Unit) in the Department of Physiology in the Boston University School of Medicine, and to Mr. P. H. R. James (Applied Psychology Research Unit) in the Department of Social Relations at Harvard. Shorter visits were made in connexion with work on the medical aspects of nuclear physics by Dr. L. F. Lamerton (Royal Cancer Hospital), who for three months acted as the Council's liaison officer in this field, and by Dr. Alma Howard, Dr. S. R. Pelc and Mr. J. W. Gallop (all of the Radiotherapeutic Research Unit). Professor A. Bradford Hill (Honorary Director, Statistical Research Unit) and Dr. E. G. L. Bywaters (Canadian Red Cross Memorial Hospital, Taplow), both members of the Council's Rheumatic Fever Panel, visited New York to meet the United States workers in the combined U.S.–U.K. study of the treatment of rheumatic fever with cortisone and ACTH.

Among the meetings on the American continent at which the Council were represented were the International Chemical Conclave, a Conference on Cold Injury and a Conference of the New York Academy of Sciences on Curare and Anti-Curare Agents, all in New York ; the Nucleic Acid Conference at New Hampton and the Laurentian Hormone Conference held near Montreal. Sir Charles Harington (Director, National Institute for Medical Research) was the principal speaker at the opening of the new research laboratories of the Massachusetts General Hospital in Boston, and Dr. R. T. Grant (Director,

Clinical Research Unit) gave a series of lectures in the Department of Medicine, Tulane University, New Orleans.

In January and February, 1951, the Secretary of the Council, in his capacity as Chairman of the Colonial Medical Research Committee jointly appointed by the Colonial Office and the Council, toured the medical research establishments in East and West Africa ; he also visited research centres in the Sudan. In July, at the request of the Colonial Office, Dr. J. M. Barnes (Director, Toxicology Research Unit) visited the Gold Coast in connexion with investigations into swollen-shoot disease in cocoa trees.

Many visits were made to countries in Europe : Dr. J. A. B. Gray (National Institute for Medical Research) spent six months in Professor Bernhard's laboratory in Stockholm ; Dr. Audrey Smith and Dr. K. E. Cooper, both also of the National Institute, respectively visited Paris to see the work of Dr. R. Moricard on the fertilisation of mammalian ova *in vitro*, and Copenhagen to study new techniques developed there in investigating problems of human physiology ; Dr. J. F. Loutit (Director, Radiobiological Research Unit) with Professor J. S. Mitchell (Department of Radiotherapeutics, Cambridge) also visited Copenhagen to see work at the Finsen Institute on the clinical effects of thorium compounds.

The Council were represented at the following congresses in Europe : on Orthopaedic Surgery and Traumatology, on Crystallography and on Psychology, all in Stockholm ; on Psychotechnics in Gothenburg ; on Poultry Science in Paris ; on Blood Transfusion and Industrial Medicine in Lisbon ; on Rheumatology in Barcelona and of Allergists in Zürich. Dr. A. A. Miles (National Institute for Medical Research) attended the opening ceremony of the International Training Centre for Chemical Microbiology in Rome. Other members of the Council's staff lectured : Dr. W. S. Feldberg (National Institute for Medical Research) in the Free University of Berlin ; Dr. E. E. Pochin (Director, Department of Clinical Research) in Brussels, Leyden and Paris ; Dr. F. Hawking (National Institute for Medical Research) at Lisbon and Dr. C. H. Andrewes (National Institute for Medical Research) at Lund, Stockholm, Upsala and Leyden. Dr. C. M. Fletcher and Dr. J. C. Gilson (both of the Pneumoconiosis Research Unit) visited Portugal to assist in a health survey at a mine. Opportunity was generally taken both in the United States and Europe for members of the Council's staff attending congresses to extend their visits to see the progress of cognate research work in neighbouring laboratories.

Dr. F. H. K. Green continued to represent the Council on the Committee on Overseas Scientific Relations appointed by the Advisory Council on Scientific Policy.

SCIENTIFIC COMMITTEES

The Council's committees in two important fields of research—the medical application of nuclear physics and the uses of cortisone, adrenocorticotrophic hormone (ACTH) and related substances—were both reorganised during the period and additional subcommittees and panels appointed to study further aspects of these problems. Jointly with the Nuffield Foundation another committee was set up to supervise clinical research in this country on chronic rheumatic diseases with particular reference to the use of cortisone.

Three committees were appointed in the field of environmental medicine : on methodology in the study of social behaviour ; on diet and energy requirements ; and on social and environmental health. The terms of reference of the latter exclude those problems arising from specific industrial hazards, but not from the working environment as a part of the general social environment.

A clinical endocrinology committee was set up to advise the Council on the promotion of research with special reference to the biochemical and biological

methods used in these studies ; a committee for research on breathing apparatus for protection against dangerous fumes and gases, especially in fire-fighting, was also appointed during the year.

PUBLIC HEALTH LABORATORY SERVICE

The Council, with the assistance of the Public Health Laboratory Service Board which they appointed for the purpose in the preceding period, have continued to administer this Service (pp. 95–103) on behalf of the Ministry of Health, the cost being met from the vote of the latter. The organisation has made further progress towards its planned full development, but only slowly owing to the difficulties of the times. The former associated laboratories at Birmingham and Dorchester, which were administered by local authorities, have been absorbed as constituent units of the Service ; and new or additional accommodation for existing constituent laboratories has been provided as noted later.

Besides carrying out its own functions, the Service co-operates with a number of other bodies, notably the Ministry of Health, the Ministry of Food, the Ministry of Agriculture and Fisheries, the Department of Scientific and Industrial Research, the Central Council for Health Education, and the World Health Organisation. During the past year the Ministry of Agriculture and Fisheries handed over to the Service the responsibility for the bacteriological examination, throughout England and Wales, of fish suspected of suffering from furunculosis. From the staff of the Service, Dr. C. C. B. Gilmour was invited to serve on the Expert Advisory Panel on Cholera of the World Health Organisation ; Dr. Orpwood Price was appointed Consultant Serologist to the Admiralty ; and Dr. G. S. Wilson was made a member of the Committee set up by the International Children's Centre at Paris to plan research into the prevention of whooping cough by vaccination.

FINANCE

EXPENDITURE OF PUBLIC FUNDS

In the financial year ended on 31st March, 1951, the total expenditure of public funds by the Council was £1,438,277 on ordinary account and £288,443 on non-recurrent account.

Most of this expenditure was met from the grants-in-aid made by Parliament for the respective purposes during the year. These were augmented, however, by sundry receipts arising from the Council's activities and by contributions from government departments and other sources for special purposes. These included payments from the Ministry of Health for statistical work and the maintenance of the Blood Group Reference Laboratory ; from the Admiralty for investigations proposed by the Royal Naval Personnel Research Committee ; from the Colonial Development and Welfare Fund for the cost of the Nutrition Field Research Station in the Gambia ; and from the World Health Organisation for work on international biological standards and for that of the World Influenza Centre, both at the National Institute for Medical Research.

The allocation, under main heads of the total expenditure of public funds on ordinary account was as follows (financial year 1950–1) :—

	Per cent.
Administration	4·2
General scientific purposes	1·8
National Institute for Medical Research	22·4
Research units and external staff	56·6
Temporary research grants and training awards	11·9
Research on human factors in industrial productivity ..	3·1
	100·0

(The percentage cost of administration is 3·4 if calculated on the total ordinary and non-recurrent expenditure of public funds, and would be still lower if expenditure from benefactions were included and the figures were combined with those for the Public Health Laboratory Service.)

The Council have given close attention to the observations of the Committee of Public Accounts (Fourth Report, Session 1950–1) on their financial arrangements. Before the war the annual amount of the Parliamentary grant-in-aid providing for the Council's work was fixed on a quinquennial basis, and within this limit the Council were allowed almost complete freedom in allocating the money. More recently the amount has been reviewed from year to year in relation to the Council's programme, and special provision has been included for non-recurrent expenditure on buildings and on major items of new equipment. As the Committee point out, this procedure calls for closer Treasury control of the expenditure. Arrangements have accordingly been worked out with H.M. Treasury whereby the Council seek specific authority before embarking on new major projects or incurring fresh long-term commitments, but otherwise continue to enjoy freedom in making more detailed allocations of funds and the possibility of taking rapid action to meet unexpected requirements arising from new discoveries or from improvements in scientific methods. As part of this procedure, a summary of the Council's proposed allocation of expenditure in the succeeding year is now being printed as an appendix to the Civil Estimates laid annually before Parliament, in explanation of the total figure shown in the Vote itself.

BENEFACTIONS

By the terms of their Charter, the Council are expressly empowered to accept and administer funds of unofficial origin, coming to them by gift or bequest either for the general purposes of their work or for special objects within their field. In performing this function the Council act autonomously. Further valuable augmentations of the Council's resources have thus become available to them during the period under review, and of these they wish here to make grateful acknowledgment. A list is given on page 192.

The income from such sources was in the financial year ended on 31st March 1951, £13,591, plus $25,310 from the Rockefeller Foundation (U.S.A.) and $3,500 from the U.S. Public Health Service : £4,000 was received from the Alexander Pigott Wernher Memorial Trust.

PUBLIC HEALTH LABORATORY SERVICE

Financial provision for the Public Health Laboratory Service in England and Wales is made quite separately, the cost being borne on the Vote of the Ministry of Health. The expenditure in the financial year 1950–1 was £779,648 on ordinary account and £87,634 on non-recurrent account.

The cost of work undertaken for the Ministry of Health in the preparation and supply of blood products for transfusion and other purposes is provided in the same way, the expenditure being £20,172 in the financial year 1950–1.

ACCOMMODATION

RESEARCH UNITS

Work has been started on a new building in the grounds of the Hammersmith Hospital to house a 45-in. Cyclotron and a Linear Accelerator in course of production for the Radiotherapeutic Research Unit. The new building will also provide control rooms and research laboratories required for work with these instruments.

New accommodation is being built for the Blood Transfusion Research Unit at Hammersmith Hospital and for the Blood Products Research Unit at the Lister Institute, Elstree.

Temporary additional accommodation has been obtained in Manchester and Birmingham for the Tuberculosis Research Unit, and in Manchester for the Unit for Research in Occupational Adaptation.

PUBLIC HEALTH LABORATORY SERVICE

New or converted premises have been provided for the already existing Public Health Laboratories at Brighton, Hereford, Northallerton and Reading, and for the new constituent laboratory at Dorchester, already mentioned. Premises have been completed for new laboratories at Bedford, Harrogate and Middlesbrough. Additional accommodation has been secured for the laboratory at Cardiff, and a small extension to the laboratory at Epsom has been completed. New building or conversion work is in progress at Bath, Bournemouth, Colindale, London (County Hall), Northampton and Taunton.

PERSONNEL

OBITUARY

The death is recorded with deep regret of Lieutenant-Colonel R. F. Bridges, a senior member of the staff of the Public Health Laboratory Service, on 29th March, 1951.

Colonel Bridges, as a pathologist in the Royal Army Medical Corps, held important posts in this country and in India. On his retirement from the Army, he joined the Council's staff in 1937 to take charge of their Standards Laboratory for Serological Reagents, then at Oxford. On the removal of that Laboratory to London at the beginning of 1946, he remained in Oxford as Director of the Dysentery Reference Laboratory of the Public Health Laboratory Service. He was still giving part-time supervision to its work at the date of his sudden death.

RETIREMENTS

The names of the members of the Council who retired during the period under review are listed on p. 2.

During the period, the Council lost the services of the following members of their staff on retirement :—

Professor Hamilton Hartridge M.D., M.R.C.P., F.R.S. (Vision Research Unit), and Dr. Helen M. M. Mackay, F.R.C.P. (a part-time member of the Council's external staff working at the Queen Elizabeth Hospital for Children, Hackney Road, London).

In 1947, Professor Hartridge relinquished his chair of physiology in the University of London, held at St. Bartholomew's Hospital, in order to give the whole of his time, for the period remaining until retiring age, to research work. He had to this end been offered a position on the Council's scientific staff as Director of a new Vision Research Unit established by them to meet this opportunity. During the four years he not only continued the personal investigations which had already earned him high distinction, but built up a team which is continuing in the Council's service, under a modified title, on a slightly reduced scale. Professor Hartridge is wellknown for his applications of physics to the study of physiological problems, notably in the field of the special senses. His contributions to the understanding of colour vision have been of particular importance.

Dr. Helen Mackay is a distinguished clinician in the field of pediatrics, and has for long been a physician to the Queen Elizabeth Hospital for Children, Hackney Road, London, as well as holding other appointments. In 1926, she elected to give up private practice in order to be more free to undertake research work, and she was a part-time member of the Council's external staff from then until her retirement from their service. During that period she published many contributions to knowledge in her particular field.

The following among the more senior members of the staff left to take up other work : Dr. D. Herbert, to become Head of the Bacterial Chemistry Division at the Microbiology Research Department of the Ministry of Supply, Porton ; Dr. G. C. Kennedy, to take up a Rockefeller Travelling Fellowship ; Dr. J. M. Rogan, to become Chief Medical Officer of the National Coal Board ; and Dr. T. Sommerville, to become a lecturer in bacteriology at the University of St. Andrews.

HONOURS

During the period covered by the Report the following honour was conferred by His late Majesty on the honorary director of the Council's Statistical Research Unit :

C.B.E. .. .. .. Professor A. Bradford Hill.

Two former members of the Council and a scientist closely associated with their work received honours as follows :

Knight Bachelor .. .. Professor C. A. Lovatt Evans.
C.B.E. .. .. .. Professor M. J. Stewart.
C.B.E. .. .. .. Professor J. S. Mitchell.

Dr. A. Neuberger, a member of the Council's staff, was admitted as a Fellow of the Royal Society.

STAFF : NUMBERS

The number of the staff employed by the Council for their own purposes, at the end of the period covered by the Report, was 1,416. This figure was made up of 434 scientific staff (of which 153 were medically qualified), 524 technical staff, 253 administrative staff (including clerical grades), and 157 full-time and 48 part-time maintenance staff (including tradesmen, drivers and cleaners). Not included in the total of 1,416 were the 60 African staff employed at the Field Research Station in the Gambia.

The Council, as agents of the Ministry of Health in this matter, also employed 923 members of the Public Health Laboratory Service. This figure was made up of 144 scientific staff (of which all but 28 were medically qualified), 467 technical staff, 140 administrative staff and 94 full-time and 78 part-time maintenance staff.

ADVISERS, COMMITTEES AND ASSESSORS

The Council are again greatly indebted to all the independent medical and other scientists—in addition to members of their own staff—who have assisted them with advice, whether individually or as members of special committees. A list of the committees is given on page 175.

The respective Secretaries of the Department of Scientific and Industrial Research and of the Agricultural Research Council, and the respective Chief Medical Officers of the Ministry of Health and of the Department of Health for Scotland, are assessors, *ex officiis*, to the Council. Sir Ben Lockspeiser and Sir William Slater, in this capacity, receive papers on a reciprocal basis, and Sir John Charles and Sir Andrew Davidson have regularly attended meetings.

LIMERICK,
Chairman of the Medical Research Conucil

H. P. HIMSWORTH,
Secretary of the Council,
38, Old Queen Street,
Westminster, London, S.W.1.

15th February, 1952

OUTLINE OF RESEARCH PROGRAMME

The main function of the Medical Research Council is to promote scientific investigations for the acquisition of knowledge likely to be of value for the prevention, diagnosis and treatment of disease, and for the maintenance of normal health and full human efficiency. In addition, the Council undertake particular investigations required by Government Departments for their administrative purposes, and they also advise Departments on questions involving use of the latest knowledge in medical science.

The programme of research work supported or assisted by the Council covers the whole field of preventive and curative medicine. The items which receive particular attention are constantly changing, and in allocating resources the Council have to be guided by considerations both of need and of opportunity. As regards the latter, the governing factors are the supply of workers of first class ability with the special qualifications appropriate to the subject, and the existence of, or possibility of finding, a promising line of attack upon a problem ; a frontal attack on a problem which has already proved intractable is seldom successful, and it is generally more profitable to await the opening up of a new approach as the result of an increase in fundamental knowledge.

The Council promote research work in the following two ways. Firstly, they employ scientific staff of their own : some of the members of this staff work in the Council's own premises, of which the chief is the National Institute for Medical Research ; others are attached (either individually or as Research Units or less formal groups) to external institutions. Secondly, the Council make temporary grants for particular purposes to independent workers in universities, hospitals, and elsewhere : such grants may be for personal remuneration (whole-time or part-time), for scientific or technical assistance, or for special research expenses.

In the following sections of this Report, the summary account of the research work is necessarily given under administrative headings, in accordance with the allocation of expenditure outlined on page 39. While this classification of subject matter gives a picture of the Council's organisation, and of the work of the various parts, it inevitably separates cognate investigations which happen to be promoted under different arrangements. It is therefore supplemented here by a survey of the research programme under main scientific heads, with references to the summary statements which come later. In the following tabulation the names of the establishments of the Council's scientific staff organisation are shown in the right-hand column, where mention is also made of grant-aided researches when these form a substantial part of the work under a particular heading ; in the cases where researches on a subject are directed or co-ordinated by an expert Committee of the Council, the name of the Committee is given in the left-hand column. Any attempt at a classification of researches on these lines cannot be other than arbitrary, and it will be seen that there is some overlapping between the different subject heads.

ANAESTHESIA

Anaesthetics Committee (p. 175) Analgesia in Midwifery Committee (p. 186)	

ANATOMY

Growth and Form Committee (p. 183)	Climate and Working Efficiency Research Unit (p. 81) Grants (pp. 104, 107–8, 111–2, 114–5, 117)

ATOMIC PHYSICS AND RADIOBIOLOGY

Clinical Applications of Nuclear Physics Committee (p. 176) Protection Against Ionising Radiations Committee (p. 177) Tracer Elements Committee (p. 177) Biological (Non-medical) Applications of Nuclear Physics Committee (p. 190)	Department of Clinical Research (p. 59) Radiobiological Research Unit (p. 65) Radiotherapeutic Research Unit (p. 67) External Scientific Staff (p. 91) Grants (pp. 109, 112, 116)

BACTERIOLOGY

U.K. National Committee of the British Commonwealth Collections of Micro-organisms (p. 190)	National Institute for Medical Research (p. 56) National Collection of Type Cultures of Micro-organisms (p. 98) Serum Research Institute (p. 87) Public Health Laboratory Service (pp. 99 *et seq.*) Grants (pp. 104, 106, 109, 116–7)

BACTERIAL CHEMISTRY

Chemical Microbiology Committee (p. 179)	National Institute for Medical Research (p. 56) Chemical Microbiology Research Unit (p. 76) Grants (pp. 104, 110, 116)

BIOCHEMISTRY : the chemical basis of the structure and behaviour of living tissues

	National Institute for Medical Research (p. 54) Department of Experimental Medicine (p. 61) Cell Metabolism Research Unit (p. 75) External Scientific Staff (pp. 89, 93) Grants (pp. 105–112, 114, 116–7)

BIOLOGICAL STANDARDISATION : preparation and maintenance of standards for therapeutic substances of which the activity cannot be determined by direct chemical methods; the definition of standard units of measurement and methods of testing

Anterior Pituitary Hormones Standards Committee (p. 189)	National Institute for Medical Research (p. 58)

BIOPHYSICS : the physical basis of the structure and behaviour of living tissues

Biophysics Committee (p. 179)	National Institute for Medical Research (p. 58) Unit for Research on the Molecular Structure of Biological Systems (p. 74) Biophysics Research Unit (p. 74) Spectrographic Research Unit (p. 75) Grants (p. 105)

BLOOD DISEASES

Cortisone and ACTH Haematology Panel (p. 185)	Blood Transfusion Research Unit (p. 64) Unit for Research on the Molecular Structure of Biological Systems (p. 74) Grants (pp. 115, 117)

BLOOD GROUPS

	Blood Transfusion Research Unit (p. 64) Blood Group Research Unit (p. 64) Blood Group Reference Laboratory (p 65)

BLOOD TRANSFUSION

Blood Transfusion Research Committee (p. 176)	National Institute for Medical Research (p. 57) Blood Transfusion Research Unit (p. 64) Blood Products Research Unit (p. 64) Industrial Medicine and Burns Research Unit (p. 78)

BURNS

	Industrial Medicine and Burns Research Unit (p. 78)

CANCER

Carcinogenic Action of Detergents Committee (p. 188) Carcinogenic Action of Mineral Oils Committee (p. 188) Clinical Applications of Nuclear Physics Committee (p. 176) Tracer Elements Committee (p. 177)	Department of Clinical Research (p. 59) Neurological Research Unit (p. 60) Radiotherapeutic Research Unit (p. 67) Industrial Medicine and Burns Research Unit (p. 78) Statistical Research Unit (p. 86) External Scientific Staff (pp. 89, 90) Grants (pp. 104–5, 110, 112, 118)

CARDIOVASCULAR DISEASES: conditions of the heart and circulation

Cortisone and ACTH Rheumatic Fever Panel (p. 185)	Clinical Research Unit (p. 59) Clinical Chemotherapeutic Research Unit (p. 62) Social Medicine Research Unit (p. 85) Grants (pp. 105, 107, 111, 114)

CHEMOTHERAPY: preparation, preliminary testing in animals, and trial in man of chemical substances for the prevention or treatment of infections

Chemotherapy Committee (p. 180) Tuberculosis Chemotherapy Trials Committee (p. 186) Antibiotics Clinical Trials (Non-tuberculosis) Committee (p. 186)	National Institute for Medical Research (p. 54) Group for Research in Chemotherapy (Molteno Institute) (p. 76) Group for Research in Chemotherapy (University of Manchester) (p. 77) Tuberculosis Research Unit (p. 63) Antibiotics Research Station (p. 88) Serum Research Institute (p. 87) Grants (pp. 113, 116–7)

CHILDREN'S DISEASES

Acute Infections in Infancy Committee (p. 175) Cortisone and ACTH Rheumatic Fever Panel (p. 185)	Blood Transfusion Research Unit (p. 64) Clinical Chemotherapeutic Research Unit (p. 62) Otological Research Unit (p. 68) Human Nutrition Research Unit (p. 71) Public Health Laboratory Service (pp. 99 *et seq.*) External Scientific Staff (pp. 91, 92, 94) Grants (pp. 106, 117–8)

CLIMATOLOGICAL MEDICINE

Royal Naval Personnel Research Committee (p. 182) Climatic Physiology Committee (p. 181) Heating and Ventilation Committee (p. 191)	National Institute for Medical Research (p. 57) Department of Experimental Medicine (p. 61) Environmental Hygiene Research Unit (p. 80) Climate and Working Efficiency Research Unit (p. 81) Royal Naval Tropical Research Unit (p. 82) Applied Psychology Research Unit (p. 83)

DENTAL DISORDERS

Dental Research Committee (p. 179)	Nutrition Building (National Institute for Medical Research (p. 70) Dental Research Unit (p. 73) External Scientific Staff (p. 91) Grants (pp. 104, 109, 111, 117)

ELECTRICAL METHODS FOR THE DIAGNOSIS AND TREATMENT OF DISEASE

Non-ionising Radiations Committee (p. 177)
Electro-medical Research Unit (p. 63)

ENDOCRINOLOGY : conditions of the glands of internal secretion

Clinical Endocrinology Committee (p. 176)
National Institute for Medical Research (pp. 54 and 57)
Department of Clinical Research (p. 59)
Department of Experimental Medicine (p. 61)
Clinical Endocrinology Research Unit (p. 62)
Radiotherapeutic Research Unit (p. 67)
Grants (pp. 107–8, 111)

EPIDEMIC DISEASES : causes of infection, and modes of transmission ; factors influencing epidemic spread

Acute Infections in Infancy Committee (p. 175)
Air Hygiene Committee (p. 181)
Inoculation and Neurological Lesions Committee (p. 187)
Whooping Cough Immunisation Committee (p. 189)
Clinical Trials of Influenza Vaccine Committee (p. 187)
Cross Infections in Hospitals Committee (p. 175)
National Institute for Medical Research (p. 57)
Environmental Hygiene Research Unit (p. 80)
Public Health Laboratory Service (pp. 99 *et seq.*)
Statistical Research Unit (p. 86)
External Scientific Staff (p. 92)
Grants (pp. 108, 116, 118)

GASTRO-INTESTINAL DISORDERS

Department of Clinical Research (p. 59)
Statistical Research Unit (p. 86)
External Scientific Staff (p. 92)
Grants (pp. 110, 114–5)

GENETICS : studies of inherited characteristics

Blood Group Research Unit (p. 64)
Radiobiological Research Unit (p. 65)
Statistical Research Unit (p. 86)
External Scientific Staff (p. 90)
Grants (pp. 105, 113)

IMMUNOLOGY : production of immunity or reduced susceptibility to infection by use of vaccines and sera

Whooping Cough Immunisation Committee (p. 189)
Clinical Trials of Influenza Vaccine Committee (p. 187)
Tuberculosis Vaccines Clinical Trials Committee p. 186)
National Institute for Medical Research (p. 56)
Blood Products Research Unit (p. 64)
Serum Research Institute (p. 87)
Public Health Laboratory Service (pp. 99 *et seq.*)
Grants (pp. 105, 117)

MENTAL DISORDERS

Occupational Adaptation Research Unit (p. 84)
External Scientific Staff (p. 90)
Grants (pp. 107–109, 111)

METABOLIC DISORDERS

Department of Clinical Research (p. 59)
Department of Experimental Medicine (p. 61)

MYCOLOGY : the study of fungi and of the diseases to which they give rise in man

Medical Mycology Committee (p. 184)

Public Health Laboratory Service (p. 100)
External Scientific Staff (p. 104)
Grants (pp. 111, 115)

NEUROLOGY : diseases and injuries of the central and peripheral nervous system

Nerve Injuries Committee (p. 176)
Inoculation and Neurological Lesions Committee (p. 187)

Clinical Research Unit (p. 59)
Neurological Research Unit (p. 60)
Electro-medical Research Unit (p. 63)
Public Health Laboratory Service (p. 100)
Grants (pp. 105, 108, 111, 115–6)

NUTRITION : the nutritional needs of the body under various conditions, and the nutritive value of different foodstuffs

Accessory Food Factors Committee (p. 178)
Food Adulterants Committee (p. 179)
Diet and Energy Committee (p. 179)
Nutritional Aspects of the Extraction Rate of Flour Committee (p. 187)
Food Rationing (Special Diets) Committee (p. 191)

Department of Experimental Medicine (p. 61)
Nutrition Building (National Institute for Medical Research) (p. 70)
Human Nutrition Research Unit (p. 71)
Dunn Nutritional Laboratory (p. 72)
External Scientific Staff (p. 91)
Grants (p. 109)

OBSTETRICS AND GYNAECOLOGY

Analgesia in Midwifery Committee (p. 186)

Clinical Endocrinology Research Unit (p. 62)
Social Medicine Research Unit (p. 85)
Grants (pp. 107, 112, 114)

OCCUPATIONAL HEALTH

Industrial Health Research Board (p. 180)
Occupational Health Committee (p. 181)
Carcinogenic Action of Mineral Oils Committee (p. 188)
Growth and Form Committee (p. 183)
Industrial Epidermophytosis Committee (p. 187)
Industrial Pulmonary Diseases Committee (p. 181)
Air Hygiene Committee (p. 181)
Committee on Breathing Apparatus for Protection against Dangerous Fumes and Gases (p. 188)
Load Carrying Committee (p. 182)
Diet and Energy Committee (p. 179)
Heating and Ventilation Committee (p. 191)
Road Users Committee (p. 191)
Climatic Physiology Committee (p. 181)

Group for Research in Occupational Optics (p. 70)
Department for Research in Industrial Medicine (p. 77)
Industrial Medicine and Burns Research Unit (p. 78)
Pneumoconiosis Research Unit (p. 79)
Environmental Hygiene Research Unit (p. 80)
Climate and Working Efficiency Research Unit (p. 81)
Statistical Research Unit (p. 86)
Toxicology Research Unit (p. 79)
Grants (pp. 106, 111)

OCCUPATIONAL PSYCHOLOGY

Selection of Medical Students Advisory Committee (p. 188)

Psychology Committee (p. 182)

Applied Psychology Research Unit (p. 83)
Group for Research in Industrial Psychology (p. 84)
Occupational Adaptation Research Unit (p. 84)
Group for Research on the Building Industry (p. 85)

OPHTHALMOLOGY AND PHYSIOLOGY OF VISION

Vision Committee (p. 178)
Lighting and Vision Committee (p. 191)
Cortisone and ACTH Ophthalmology Panel (p. 185)

Group for Research on the Physiology of Vision (p. 69)
Ophthalmological Research Unit (p. 69)
Group for Research in Occupational Optics (p. 70)
External Scientific Staff (p. 92)
Grants (pp. 106, 110, 116)

RHEUMATIC CONDITIONS

- Joint Committee on the Treatment of Chronic Rheumatic Diseases with Cortisone and ACTH (with the Nuffield Foundation) (p. 184)
- Cortisone and ACTH : Collagen Diseases and Hypersensitivity Panel (p. 185)

- National Institute for Medical Research (p. 55)
- Clinical Endocrinology Research Unit (p. 62)
- Clinical Chemotherapeutic Research Unit (p. 62)
- Grants (pp. 107, 109, 114)

SERVICE MEDICINE

- Inter-Services Personnel Research Committee (p. 189)
- Royal Naval Personnel Research Committee (p. 182)

- Climate and Working Efficiency Research Unit (p. 81)
- Environmental Hygiene Research Unit (p. 80)
- Royal Naval Tropical Research Unit (p. 82)
- Applied Psychology Research Unit (p. 83)

SKIN DISORDERS

- Cortisone and ACTH Dermatology Panel (p. 185)
- Industrial Epidermophytosis Committee (p. 187)

- Industrial Medicine and Burns Research Unit (p. 78)

SOCIAL MEDICINE

- Resettlement of the Disabled Committee (p. 188)
- Social and Environmental Health Committee (p. 183)

- Pneumoconiosis Research Unit (p. 79)
- Social Medicine Research Unit (p. 85)
- Statistical Research Unit (p. 86)
- External Scientific Staff (pp. 89, 90, 93)

STATISTICS : vital statistics ; advice on the use of statistical methods in other researches

- Statistical Committee (p. 183)

- Statistical Research Unit (p. 86)

SURGERY

- Clinical Research Unit (p. 59)
- Neurological Research Unit (p. 60)
- Grants (pp 107, 112, 116)

TOXICOLOGY : the nature and effects of poisons

- Food Adulterants Committee (p. 179)
- Toxicology Committee (p. 181)
- BAL and Allied Substances Committee (p. 187)
- Fungicide and Insecticide Research and Development Committee (p. 190)

- Department for Research in Industrial Medicine (p. 77)
- Toxicology Research Unit (p. 79)

TROPICAL DISEASES

- Colonial Medical Research Committee (p. 189)
- Indian Medical Research Liaison Committee (p. 190)

- National Institute for Medical Research (p. 55)
- Human Nutrition Research Unit (p. 71)
- Group for Research on Bilharzia Disease (p. 82)
- Public Health Laboratory Service (pp. 99 *et seq.*)
- External Scientific Staff (p. 94)
- Grants (pp. 105, 108–110)

TUBERCULOSIS

- Tuberculosis Chemotherapy Trials Committee (p. 186)
- Tuberculin Sensitivity Survey Committee (p. 188)
- Tuberculosis Vaccines Clinical Trials Committee (p. 186)

- National Institute for Medical Research (p. 55)
- Tuberculosis Research Unit (p. 63)
- Pneumoconiosis Research Unit (p. 79)
- Public Health Laboratory Service (p. 101)
- External Scientific Staff (p. 93)
- Grants (pp. 105, 111, 113, 116–7)

ESTABLISHMENTS, SCIENTIFIC STAFF AND SUMMARIES OF RESEARCH

National Institute for Medical Research

The Ridgeway, Mill Hill, London, N.W.7
(1915)*

Staff: 1st October, 1950–30th September, 1951

(Workers from other laboratories are shown as Attached Workers when the period spent, or to be spent, at the Institute is more than six months; those attending part-time or for less than six months are shown as Visiting Workers.)

BIOCHEMISTRY

Staff

Sir Charles R. Harington, Sc.D., F.R.S. (*Director of the Institute*)
A. Neuberger, M.D., Ph.D., F.R.S.
H. R. V. Arnstein, Ph.D.
R. Bentley, Ph.D.
J. C. Crawhall, B.Sc.
C. E. Dalgliesh, Ph.D.
Miss B. M. A. Davies, M.A., M.Sc.
D. F. Elliott, Ph.D.
N. Fisher, B.Sc.
A. H. Gordon, Ph.D.
P. T. Grant, B.Sc.
G. D. Hunter, Ph.D.
S. Jacobs, Ph.D., F.R.I.C.
A. T. James, Ph.D.
A. J. P. Martin, Ph.D., F.R.S.
Miss I. H. M. Muir, D.Phil.
Mrs. R. V. Pitt-Rivers, Ph.D.
G. J. Popjak, M.D.
J. J. Scott, B.A.

Attached Workers

The late T. H. French, Ph.D., M.R.C.V.S. (*Shinfield; until Feb.*, 1951)
J. Gross, M.D., Ph.D. (*Montreal; Merck Fellow*)
R. D. Harkness, M.B. (*University College, London; from Jan.*, 1951)
T. H. Kennedy, M.Sc. (*Dunedin, New Zealand; from Jan.*, 1951)
W. E. Knox, A.B., M.D. (*U.S. Public Health Service Fellow; from Jan.*, 1951)
Dr. J. C. Perrone (*Brazil, Brit. Council Scholar; until March*, 1951)

Visiting Workers

Dr. G. A. Garton, Bucksburn
Mr. D. B. Lisle, Leeds
Mr. J. S. Mills, London
Dr. H. G. B. Slack, Manchester
Dr. G. H. Smith, Cambridge

CHEMOTHERAPY

(Chemical)

Staff

J. Walker, D.Sc.
R. K. Callow, D.Phil.
P. N. Campbell, Ph.D.
B. H. Chase, Ph.D.
J. W. Cornforth, D.Phil.
Mrs. R. H. Cornforth, D.Phil. (*part-time*)
D. A. A. Kidd, D.Phil.
J. M. Osbond, Ph.D.
P. A. Robins, Ph.D.
P. C. Spensley, D.Phil.
J. A. Stock, B.Sc.
D. A. H. Taylor, D.Phil.
T. S. Work, D.Sc.

Attached Workers

I. E. Bush, B.A. (*M.R.C. Student*)
W. B. Renfrow, Ph.D. (*Ohio; from July*, 1951)
D. H. Simmonds, M.Sc., Ph.D. (*C.S.I.R.O., Australia*)

Visiting Worker

Mr. N. M. Green, London

* The date of establishment of each of the Council's units and groups is recorded in brackets immediately below the address.

CHEMOTHERAPY
(Biological)

Staff

F. Hawking, D.M., D.T.M.
S. Crowther, B.Sc.
Miss K. R. de Bouk, B.Sc.
A. T. Fuller, Ph.D., F.R.I.C.
J. D. Fulton, M.B., Ph.D., D.T.M.
Miss J. M. Horton, Ph.D.
W. E. Ormerod, B.M.
Mrs. S. Searle, B.Sc. (*until July*, 1951)
D. F. Spooner, B.Sc.
Miss J. P. Thurston, B.Sc.
Miss W. A. F. Webber, B.Sc.

Attached Worker

J. A. McFadzean, M.B. (*Colonial Med. Res. Student ; until Aug.*, 1951)

BACTERIAL CHEMISTRY

Staff

M. R. Pollock, M.B.
D. Herbert, Ph.D. (*until Aug.*, 1951)
F. L. Jackson, M.B.
Mrs. E. E. D. Manson, B.Sc.
L. O'Rourke, M.Sc.
C. J. Perret, B.A.
R. R. Porter, Ph.D.

Attached Worker

H. Fraenkel-Conrat, Ph.D., M.D. (*Berkeley, California ; Rockefeller Fellow from Jan. until July*, 1951)

Visiting Worker

Dr. H. Brown, Pennsylvania

PHYSIOLOGY AND PHARMACOLOGY

Staff

W. Feldberg, M.D., F.R.S.
W. W. Douglas, M.D.
J. A. B. Gray, M.B.
W. D. M. Paton, B.M.
W. L. M. Perry, M.D.
M. Schachter, M.Sc., M.D.
Technical Officer, L. W. Collison, M.B.E.

Attached Workers

P. B. C. Matthews, B.A. (*M.R.C. Student ; until Nov.*, 1950)
C. C. Toh, B.Sc. (*Singapore ; Colonial Res. Scholar*)

Visiting Workers

Dr. J. E. De Smedt, Brussels
Dr. G. W. Harris, Cambridge.
Mrs. P. Holton, Cambridge

HUMAN PHYSIOLOGY

Staff

O. G. Edholm, B.Sc., M.B.
K. E. Cooper, M.Sc., M.B.
R. F. Mottram, B.Sc., L.M.S.S.A.
L. G. C. E. Pugh, M.A., B.M.

Attached Worker

H. S. Hatfield, Ph.D. (*London ; from April*, 1951)

EXPERIMENTAI BIOLOGY

Staff

A. S. Parkes, Sc.D., F.R.S.
Miss H. M. Bruce, B.Sc.
G. C. Kennedy, B.Sc., M.B.
E. J. C. Polge, B.Sc.
Miss A. U. Smith, B.Sc., M.B.
S. E. Smith, M.A.
Miss A. Williams, B.Sc.

Attached Workers

P. E. Lake, B.Sc., Dip.Agric.Sc. (*A.R.C. ; from Feb.*, 1951)
H. A. Sloviter, M.D. (*Philadelphia ; Damon Runyon Research Fellow*)
W. K. Whitten, B.Sc., B.V.Sc. (*Australia ; from Jan., until Aug.*, 1951)

BACTERIOLOGY AND VIRUS RESEARCH

Staff

C. H. Andrewes, M.D., F.R.C.P., F.R.S.
T. H. Flewett, M.B. (*until June*, 1951)
A. W. Gledhill, Ph.D., M.R.C.V.S.
A. Isaacs, M.B.
J. E. Lovelock, Ph.D.
Miss J. S. F. Niven, M.D.
Mrs. B. M. Porterfield, B.Sc. (*until Aug.*, 1951)
J. S. Porterfield, M.B.
R. J. W. Rees, B.Sc., M.B.
A. T. Roden, M.D., D.P.H., D.C.H.
T. Sommerville, M.D. (*until April*, 1951)

Attached Workers

A. Bozzo, M.D. (*W.H.O. World Influenza Centre; until Aug.*, 1951)
C. M. Chu, M.B. (*W.H.O. World Influenza Centre; until Nov.*, 1950)
Miss A. Harding, B.Sc. (*Johannesburg; from Feb.*, 1951)
R. R. Wagner, M.D. (*New Haven, Conn.; until July*, 1951)

Visiting Workers

Dr. F. P. Nagler, Ottawa (*World Influenza Centre*)
Dr. D. W. Soman, Bombay (*World Influenza Centre*)

PHYSICAL CHEMISTRY

Staff

The late W. J. Elford, Ph.D., F.R.S.
J. E. Hotchin, M.B.

Visiting Worker

Dr. Antoinette Guélin, Paris

BIOPHYSICS AND OPTICS

Staff

A. S. McFarlane, B.Sc., M.B.
C. E. Challice, Ph.D.
Mrs. A. Dovey, B.Sc.
R. C. Holloway, B.Sc.
D. A. O'Connor, B.Sc.
J. Smiles, A.R.C.S.

Attached Worker

R. F. Mitchell, M.Sc. (*Hall Institute, Melbourne*)

Visiting Workers

Miss M. J. Masson, Bucksburn
Dr. J. F. Dillon, U.S. Department of Agriculture
Dr. R. J. Ludford, London

BIOLOGICAL STANDARDS

Staff

A. A. Miles, M.D., F.R.C.P. (*Deputy Director of the Institute*)
Miss M. G. Davies, B.Sc. (*until March*, 1951)
A. A. C. Dutton, B.M.
J. H. Humphrey, M.D.
R. Jaques, Dr.Med. (*Basle*)
J. W. Lightbown, M.Sc., Dip.Bact.
D. A. Long, M.D.
Mrs. E. M. Miles (*part-time*)
Miss M. V. Mussett, B.Sc.

Visiting Workers

Dr. L. Silvestri, Rome
Dr. G. Weisflog, Berne

DESIGNER AND SUPERVISOR OF APPARATUS

Staff

W. C. Lister, B.Sc., M.I.E.E., A.Inst.P.

LIBRARY

Staff

Miss J. R. Taylor, B.A.
Mrs. R. E. Arnstein, B.A.
Miss M. Harvey, B.A.

ADMINISTRATIVE OFFICER

Major-General G. Brunskill, C.B., M.C.

GENERAL BIOCHEMISTRY

Biosynthesis and Intermediary Metabolism

1. Blood pigment :
   (1) Studies by the tracer technique of haemoglobin formation in the rabbit ; demonstration that formation of haem precedes that of globin
   (2) Metabolic behaviour of the red cell
   (3) Methods of separation and physico-chemical studies of porphyrins
2. Collagen :
   (1) Study of soluble " pro-collagen " as a precursor of collagen
   (2) Demonstration of metabolic inertness of collagen in the adult animal
3. Tryptophan :
   (1) Study of metabolism of hydroxytryptophan and its exclusion as a tryptophan metabolite
   (2) Synthesis of formyl and other acyl kynurenines
   (3) Enzymic splitting of kynurenine
4. Other amino-acids :
   Turnover studies of glycine and valine in the rat, and the demonstration thereby of the high rate of protein synthesis in the lung
5. Choline :
   Role of glycine and serine as precursors of choline methyl groups ; action thereon of vitamin B_{12}
6. Kojic acid :
   Pathway of conversion of glucose into kojic acid by *Aspergillus oryzae*
7. Lipids :
   (1) Demonstration that biosynthesis of milk fatty acids occurs by a process equivalent to reversal of β-oxidation
   (2) Utilisation of glucose for fatty acid synthesis
   (3) Biosynthesis of cholesterol
   (4) Methods of stepwise chemical degradation of fatty acids and cholesterol
8. Proteins :
   (1) Study of peptides as intermediates in protein biosynthesis
   (2) Application of the tracer method to the problem of biosynthesis of milk proteins

Structure of Proteins

1. Methods for specific splitting of peptide linkages involving serine
2. Stepwise breakdown of peptides
3. Amino-acid structure of conalbumin, ovomucoid and avidin

Hormones

1. Physico-chemical and biological studies of the parathyroid hormone
2. Studies of a hitherto unidentified iodine compound occurring in hydrolysates of thyroid gland and in blood plasma, and demonstration that it is probably triiodothyronine
3. Electrophoretic identification of the plasma protein fraction carrying the highest concentration of iodine

Chromatographic Analysis

1. Extension of the range of application of the liquid-gas partition chromatogram
2. Partition chromatography of proteins with special reference to ribonuclease and insulin

CHEMOTHERAPY

1. Tropical diseases :
   (1) Synthesis and biological testing of drugs active against *E. histolytica*, including analogues of emetine
   (2) Further studies of periodicity in filarial infection
   (3) Discovery of antifilarial activity in the phenosafranine group ; therapeutic trial of methylene violet in filariasis
   (4) Studies of nucleic acids of trypanosomes in relation to drug resistance
   (5) Mode of action of trypanocidal drugs
   (6) Discovery of antimalarial activity among aryl diaminopyrimidines (simultaneously with similar and more extensive work in the Wellcome Laboratories)
2. Tuberculosis :
   (1) Discovery of antituberculous effect in mice of a commercial detergent, Triton A20
   (2) Synthesis of chemically similar substances having higher activity and lower toxicity in mice and guinea-pigs infected with tuberculosis
   (3) Biological studies of experimental tuberculous infection
3. Antibiotics :
   (1) Screening of organisms derived from West African soils for new antibiotics
   (2) Experiments on the synthesis of penicillin
   (3) Study of an antagonist, derived from *Ps. pyocyanea*, to streptomycin and dihydrostreptomycin

CORTISONE AND ALLIED SUBJECTS

1. Attempts at synthesis of analogues of cortisone
2. Completion of total synthesis of certain steroids, for example, cholesterol
3. Further experiments towards total steroid synthesis by alternative methods
4. Examination of sarmentogenin as a starting point for cortisone synthesis
5. Discovery that sisal waste contains hecogenin, a potentially useful precursor for synthesis of cortisone, and development of methods for its extraction
6. Chromatographic separation and identification of corticosteroids in blood from the adrenal gland
7. Effect of ACTH on adrenal cortical secretion in different species
8. Anti-allergic effect of cortisone and other compounds
   (1) Biological analysis of the anti-allergic effect of cortisone in the guinea-pig and demonstration of the importance of dietary factors in this reaction
   (2) Study of anti-allergic effects of a principle from liquorice and of other substances of natural and synthetic origin
   (3) Demonstration of anti-allergic effect of sphingomyelin and proof that this is due to the sphingosine moiety
   (4) Synthesis of dihydrosphingosine

BACTERIAL CHEMISTRY

1. Further studies of penicillinase adaptation in *B. cereus*; purification of penicillinase
2. Pyruvate production by *Pr. vulgaris* grown in a medium containing a limiting concentration of nicotinic acid
3. Explanation of effect of metallic ions on bacterial oxaloacetic acid decarboxylase
4. Inhibitory effect of long chain fatty acids on growth of *H. pertussis* ; differential absorption of fatty acids by the organism
5. Studies of silica gels as solid media for bacterial growth
6. Apparatus for continuous culture of bacteria

IMMUNOLOGY AND EXPERIMENTAL PATHOLOGY

1. Explanation of enhancement of local skin infections by diverse agents in terms of shock-induced failure of local capillary circulation
2. Demonstration of the short period required for primary lodgment of an infection
3. Effects of various agents such as histamine, histamine liberators and leukotaxine on capillary permeability in the skin
4. Studies of virulence of haemolytic streptococci, and of local virulence of *Staph. aureus* in the guinea-pig
5. Further investigations of the Arthus and Shwartzmann phenomena, with special reference to the effects of cortisone and ACTH
6. Chemical and physical factors involved in blood clotting

PHYSIOLOGY AND PHARMACOLOGY

1. Histamine and histamine liberators :
   (1) Studies of histamine release in perfused skin preparations
   (2) Examination of the distribution of histamine in the mucosa of the gastro-intestinal tract of the dog
   (3) Isolation and pharmacological study of a smooth muscle-stimulating substance (similar to substance P of von Euler and Gaddum) from the wall of the stomach and intestine of the dog
   (4) Action of histamine liberators and its relation to lymph flow
   (5) Variations in the response of different tissues to the action of histamine liberators ; observation of the lack of action of histamine liberators on gastric secretion
   (6) Histamine-liberating action of arsenical drugs and of bile salts as an explanation of the itching associated with jaundice and toxic reactions to arsenical therapy
2. Study of acute toxic action of tetraethylpyrophosphate (TEPP) and analysis of its neuromuscular blocking action
3. Studies of autonomic ganglionic transmission, with special reference to the action of blocking agents
4. Mechanism of action and adaptation phenomena in sensory receptors

HUMAN PHYSIOLOGY

1. Haemodynamics of the circulation during fainting
2. Study of blood flow through the hand at low temperatures
3. Analysis of the reflex vasodilatation in the hand on heating the face
4. Eosinophil counts in relation to adrenal cortical function and as a quantitative measurement of stress
5. Studies of the thermal conductivity of body tissues

EXPERIMENTAL BIOLOGY

1. Survival of cells and tissues at low temperatures :
   (1) Development of technique for freezing and thawing red blood cells, and for their recovery in a state fit for transfusion
   (2) Demonstration of normal viability after transfusion of human red blood cells which have been kept in the frozen state up to 3 months
   (3) Development of technique for freezing fowl spermatozoa and recovering them with relatively unimpaired fertilising power ; study of application of this method to spermatozoa of other species
   (4) Preservation by freezing of endocrine tissues, and successful autografts of tissues thus treated
2. Tissue culture of endocrine tissues and study of hormone production under these conditions
3. Development of artificial insemination in the fowl as a practicable procedure in routine breeding
4. Studies of the hypothalamus :
   (1) Observation of nephrosclerosis in rats rendered obese by hypothalamic damage
   (2) Observation of failure to mate, which cannot be ascribed to obesity as such, in animals suffering from hypothalamic damage

VIRUS RESEARCH

1. The common cold :
   (1) Field study of the effect of a period of isolation on susceptibility to infection with the common cold
   (2) Investigation of mode of transmission of colds
   (3) Continued search for a laboratory method of propagating the common cold virus ; unsuccessful attempts to confirm claims to have cultivated the virus in developing eggs
   (4) Chemical analysis of the nasal secretions from normal persons and from those with colds
2. Influenza :
   (1) World Influenza Centre : investigation of the viruses responsible for epidemics in 1950–1
   (2) Serological and physico-chemical studies of strains of influenza virus
   (3) Neurotropic variants of influenza virus
3. Mouse hepatitis :

   Discovery of a virus causing hepatitis in mice and having similarities in biological behaviour to human hepatitis virus ; studies of the chemotherapy of this infection

4. General work on viruses :
   (1) Electron microscopical studies of nuclear inclusions in cells infected with fowl plague virus
   (2) Development of methods of study of bacteriophage adsorbed on the " shells " of mechanically disintegrated bacteria
   (3) Isolation of bacteriophages active against *Cl. perfringens*
   (4) Study of the function of calcium and electrolytes in the interaction between red cells, influenza virus and receptor destroying enzyme

BIOPHYSICS AND OPTICS

1. Studies of turnover rates of plasma proteins by physico-chemical methods combined with the use of the tracer technique
2. Electron microscopy of protein molecules
3. Collaboration with workers in other Divisions in researches requiring the use of the electron microscope, the mass spectrometer, radio-active counting apparatus or electrophoretic analysis
4. Collaboration in the optical problems arising in the work on low temperature preservation of cells and tissues and in other biological researches

BIOLOGICAL STANDARDS

(apart from research work recorded under other headings)

1. Replacement of International Standard for Sulpharsphenamine
2. Establishment of the British Standard for *d*-Tubocurarine as the International Standard
3. Organisation of collaborative assays for replacement of the International Standards for Insulin and Penicillin
4. Establishment of British Standard for Dimercaprol
5. Establishment of Provisional Standards for Hyaluronidase and for Dihydrostreptomycin
6. Work on preparation of standards for vitamin B_{12}, scarlet fever antitoxin, terramycin, aureomycin, bacitracin, diagnostic salmonella serum, diphtheria and tetanus toxoids, and thyrotrophic hormone
7. Advisory work for the Ministry of Health (Therapeutic Substances Regulations) and for the British Pharmacopoeia Commission
8. Development of improved methods for assay of antibiotics, of hyaluronidase, of diphtheria toxoid and of tuberculin

DEPARTMENT OF CLINICAL RESEARCH

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL, LONDON, W.C.1

(1919)

*Director**

E. E. Pochin, M.D., F.R.C.P.

Staff

B. D. Corbett, B.A.
D. A. W. Edwards, M.D.
A. J. Honour.
N. B. Myant, B.Sc., D.M.
E. N. Rowlands, B.Sc., M.D., M.R.C.P.

Attached Worker

H. Billion, M.D. (*University of Rostock*)

Summary of Research

1. The thyroid gland :
   (1) The metabolic cycle of iodine in health and in Graves' disease
   (2) The treatment of certain cases of Graves' disease with radio-iodine, and methods of early measurement of dosage
   (3) The treatment of thyroid carcinoma with radio-iodine and the recognition of iodine uptake in such tumours, particularly by "profile" counting over the body surface
   (4) The study of counter shielding for directional counting
2. Obesity :
   (1) The behaviour of fat-storing cells in lipomata, lipomatosis, and lipodystrophy
   (2) Measurement of blood volume, total body water, fat-free mass and fat in obese subjects before and after weight reduction
3. Intestinal functions :
   (1) The role of the motor and acid factors in peptic ulcer pain
   (2) The effect of hexamethonium on duodenal motility and its value for controlling gastric acidity in patients with duodenal ulcers
   (3) A study of the excretion of radio-iodine into the upper alimentary tract and an attempt to identify the cell systems involved
   (4) The use of radioactive colloidal gold for the control of ascitic and pleural effusions in malignant disease

CLINICAL RESEARCH UNIT

GUY'S HOSPITAL, LONDON, S.E.1

(1934)

Director

R. T. Grant, O.B.E., M.D., F.R.C.P., F.R.S.

Staff

H. E. Holling, M.Sc., M.B., M.R.C.P.
B. McArdle, M.D., M.R.C.P., D.C.H.
E. B. G. Reeve, B.M., M.R.C.P.

Attached Worker

D. Verel, M.D. (*Beit Memorial Fellow*)

* Salary of post largely provided by permanent endowment from Rockefeller Foundation

Summary of Research

1. Experimental studies of pulmonary fat-embolism in rabbits
2. The circulatory adjustments following haemorrhage in rabbits
3. The development of an improved method for estimating blood cell volume
4. Observations on blood volume and its relation to physical size
5. Observations on inhibitory respiratory reflexes during abdominal surgery
6. The development of a simple apparatus for the continuous quantitative recording of respiration
7. Cardiac catheterisation in the diagnosis of congenital heart disease
8. The compensatory mechanisms to oxygen lack in congenital cyanotic heart disease
9. The effects of operations for mitral stenosis on the pulmonary circulation and the respiratory efficiency
10. The regulation of blood flow in the peripheral circulation
11. The metabolic disturbance in myotonia atrophica
12. The pyruvate and lactate metabolism in peripheral neuritis
13. The renal excretion of pyruvate and lactate in renal disease and normal health

NEUROLOGICAL RESEARCH UNIT

NATIONAL HOSPITAL FOR NERVOUS DISEASES, QUEEN SQUARE, LONDON, W.C.1

(1933)

Director

E. A. Carmichael, C.B.E., M.B., F.R.C.P.

Staff

J. A. V. Bates, M.B.
Miss M. A. Crosskey, M.A.
G. D. Dawson, M.Sc., M.B.
P. A. Merton, M.B.
P. W. Nathan, M.B,, M.R.C.P.
Mrs. M. C. Smith, B.Sc. M.B.

Summary of Research

1. Cerebral action potentials:
   (1) The elaboration of methods for recording cerebral action potentials
   (2) The design and assembly of apparatus for recording direct from the cerebral cortex during surgical operation
   (3) The detection of focal cerebral abnormalities in epileptics
   (4) The study of infantile hemiplegics and epileptics before and after hemispherectomy

2. Action potentials in peripheral nerves:
   Studies of the " secondary response " in muscle following stimulation of its peripheral nerve

3. Stretch reflex:
   Studies of the reflex nature and sensory mechanism of the " silent period " of muscle action potentials and of the effects of synchronous and asynchronous motor volleys, and the application of the methods to the investigation of myasthenia gravis and the myopathies, including familial periodic paralysis

4. Studies of nerve and spinal cord:
   (1) The examination of muscle biopsies in tabes dorsalis
   (2) The sensory and autonomic functions in inoperable cancer before and after cordotomy, and their correlation with histological changes
   (3) Histological studies of nerve cell degeneration following posterior root section and injury to the Gasserian ganglion
   (4) The autonomic responses before and after leucotomy and in transection of the spinal cord

DEPARTMENT OF EXPERIMENTAL MEDICINE

TENNIS COURT ROAD, CAMBRIDGE

(1945)

Director

Professor R. A. McCance, M.D., Ph.D., F.R.C.P., F.R.S.

Staff

Miss E. M. Widdowson, D.Sc.
Mrs. L. M. Brown, B.Sc. (*until May*, 1951)
R. F. A. Dean, Ph.D., M.R.C.S.*
E. M. Glaser, M.C., M.D.
W. I. M. Holman, Ph.D., F.R.I.C.
Mrs. N. J. B. Naylor, M.D. (*part-time*)
Miss K. Prior, M.S.R.
W. M. B. Strangeways, M.B. (*part-time*)
Miss L. A. Thrussell, S.R.N.

Attached Workers

J. H. Cort, M.D. (*Fellow of the National Foundation for Infantile Paralysis, U.S.A.*)
Miss M. Harrison, M.H.Sc. (*Alice Hamilton International Fellowship, I.F.U.W. until Aug.*, 1951)
G. R. Hervey, M.B.
P. Lous, Cant. med. et chir. (*Copenhagen; until Dec.*, 1950)
J. R. Robinson, M.B., Ph.D.

Summary of Research

1. The composition of the living body and the measurement of its fluid compartments
2. A study of obesity and of basal metabolic rates per unit of cell mass
3. The osmoregulation of living cells
4. The effect of starvation and carbon tetrachloride poisoning on the composition of the liver
5. Diuresis in newborn babies
6. The control of *p*H by the kidney in the newborn
7. The function of the cholinesterase in dogs' colostrum
8. Food and water requirements of castaways in arctic and tropical waters
9. The effects of heat and cold on the distribution of blood within the human body
10. Trials of remedies for seasickness
11. The nutritional value of bread made from flours of different extractions
12. A radiological study of the passage of white and brown bread through the digestive tract
13. A study of kwashiorkor in Uganda

*Working in Uganda.

CLINICAL ENDOCRINOLOGY RESEARCH UNIT

CLINICAL LABORATORY, ROYAL INFIRMARY, EDINBURGH

(1946)

Honorary Directing Committee

Professor J. H. Gaddum, Sc.D., M.R.C.S., F.R.S. (*Chairman*)
Professor D. M. Dunlop, M.D., F.R.C.P.
Professor R. J. Kellar, M.B.E., M.B., F.R.C.S.E., F.R.C.P.E., F.R.C.O.G.
Professor G. F. Marrian, D.Sc., F.R.S.
C. P. Stewart, D.Sc. (*Secretary*)

Staff

J. B. Brown, M.Sc.
J. A. Loraine, M.B., M.R.C.P.
Mrs E. Michie, B.Sc.
N. R. W. Taylor, M.B.

Visiting Worker

Dr. F. W. R. Bahner, Heidelberg

Summary of Research

1. Chorionic gonadotrophin:
   (1) The serum concentration, urinary excretion and renal clearance of chorionic gonadotrophin in normal pregnancy, pregnant diabetics with and without stilboestrol medication, pre-eclamptic toxaemia, essential hypertension, and essential hypertension with superimposed toxaemia
   (2) The chorionic gonadotrophin in multiple pregnancy, hyperemis gravidarum, hydatidiform mole and chorion epithelioma
   (3) The extraction of chorionic gonadotrophin from normal and pathological placentae
2. The development of a new method of assay for pituitary gonadotrophin
3. The problem of ACTH release from pituitary gland and the investigation of methods for its extraction from blood
4. The effect of growth hormone, ACTH and thyrotrophin on fat metabolism in mice and rats, and the development of a micro method for determining acetone and aceto-acetic acid
5. The range of pregnandiol excretion in normal and diabetic pregnancy
6. 17-keto-steroids:
   (1) The urinary excretion of 17-keto-steroids in rheumatoid arthritis treated with ACTH, cortisone or insulin
   (2) Testosterone metabolism in rheumatoid arthritis
7. The development of a method for estimating natural urinary oestrogens

CLINICAL CHEMOTHERAPEUTIC RESEARCH UNIT

UNIVERSITY OF GLASGOW

(1946)

Director

J. Reid, M.D., M.R.C.P. (*part-time*)

Staff

J. B. Cochran, B.Sc., M.B., M.R.C.P.
R. D. Watson, B.Sc.

Summary of Research

1. The clinical and biochemical changes in acute rheumatism during natural remission and remission on treatment with salicylates and other drugs
1. The action of salicylate and γ-resorcylate in rheumatic fever and in various experimental lesions of animals
3. Preparation of new compounds with possible anti-rheumatic action

TUBERCULOSIS RESEARCH UNIT

MEDICAL RESEARCH COUNCIL LABORATORIES, HOLLY HILL, HAMPSTEAD, LONDON, N.W.3

(1948)

Director

P. M. D'Arcy Hart, M.D., F.R.C.P.

Staff

J. R. Bignall, M.D., M.R.C.P. (*part-time ; until Feb.*, 1951)
M. Daniels, M.D., M.R.C.P., D.P.H.
J. P. W. Hughes, M.D., D.P.H
G. G. Lindsay, M.B., D.P.H.
T. M. Pollock, M.B.

Attached Worker

W. Pointon Dick, M.R.C.S. (*until July, 1951*)

Summary of Research

1. Trials of chemotherapy in tuberculosis :
   (1) The therapeutic effect of PAS and streptomycin in pulmonary tuberculosis
   (2) Streptomycin in tuberculous tracheo-bronchitis
   (3) Streptomycin in thoracoplasty operations
2. National tuberculin testing survey
3. Clinical trials of anti-tuberculosis vaccines (BCG and the vole bacillus vaccines)

ELECTRO-MEDICAL RESEARCH UNIT

STOKE MANDEVILLE HOSPITAL, AYLESBURY, BUCKS

(1946)

Director

R. B. Bourdillon, C.B.E., M.C., A.F.C., D.M.

Staff

Miss A. F. Cullis, B.A.
G. Hunter, D.Sc., F.R.S.C.
F. D. Stott, D.Phil.
Miss S. Wolfenden, B.Sc.

Attached Worker (under the direction of Dr. W. Ritchie Russell at Oxford)

A. B. Kinnier Wilson, M.D., M.R.C.P.

Summary of Research

1. Studies on the blood brain barrier and its penetration by the bromide ion and other agents, with especial reference to disseminated sclerosis and tuberculous meningitis (with Sir Hugh Cairns, Dr. Ritchie Russell, and their colleagues)
2. The development of precise methods for estimating bromide in cerebrospinal fluid and in sera
3. The treatment of patients with disseminated sclerosis by methods designed to increase the rate of movement of the cerebrospinal fluid (with Dr. Ritchie Russell)
4. Studies of new types of American, British and Swedish breathing machines and accessory instruments, and of their use in poliomyelitis ; the development of improved types of these machines (with Dr. W. H. Kelleher and the Breathing Machines Group of the Ministry of Health)
5. Electromyography on paraplegic patients (with Dr. L. Guttmann)
6. The development of an improved recording oximeter and clinical tests on the degree of oxygenation of patients

BLOOD TRANSFUSION RESEARCH UNIT

POSTGRADUATE MEDICAL SCHOOL OF LONDON, DUCANE ROAD, LONDON, W.12

(1946)

Director

P. L. Mollison, M.D., M.R.C.P.

Staff

Miss M. Cutbush, B.Sc. Miss H. Crawford, B.Sc.

Visiting Worker

Dr. H. Chaplin, Jr.

Summary of Research

1. Transfusion experiments with red cells previously frozen at −79°C. (in co-operation with National Institute for Medical Research)
2. Testing of a phenothiazine derivative as a blood preservative
3. Controlled trials of the treatment of haemolytic disease of the newborn
4. Mechanism of blood-clotting in newborn infants
5. Relationship between red cell volume, plasma volume and venous haematocrit
6. Rate of red cell destruction in patients receiving ACTH or cortisone
7. Measurement of red cell destruction following transfusions of immune anti-A plasma
8. Demonstration of multiple antibodies in anti-globulin sera

BLOOD PRODUCTS RESEARCH UNIT

LISTER INSTITUTE, CHELSEA BRIDGE ROAD, LONDON, S.W.1

(1945)

Honorary Director

Sir Alan N. Drury, C.B.E., M.D., F.R.C.P., F.R.S.

Staff

Miss Margaret E. Mackay, Ph.D. Miss M. H. Nance, M.Sc.

Associated Workers

E. A. Caspary, B.Sc. L. Vallet, B.A.
R. A. Kekwick, D.Sc.

Summary of Research

1. The preparation of dried human plasma and plasma fractions
2. Preparation of gamma globulin for clinical trials in measles
3. The properties of human fibrinogen
4. The development of an apparatus for irradiating human serum with ultra-violet light
5. The preparation of human albumen
6. Isolation of enzyme-rich plasma fractions
7. Identification of immune bodies in plasma fractions

BLOOD GROUP RESEARCH UNIT

LISTER INSTITUTE, CHELSEA BRIDGE ROAD, LONDON, S.W.1

(1946)

Director

R. R. Race, Ph.D., M.R.C.S., F.R.S.

Staff

Miss R. A. Sanger, Ph.D. Miss J. S. Thompson, B.Sc.

Summary of Research

1. The testing for "new" blood group systems by investigation of the serum of persons known to have been immunised by pregnancy or by transfusion, and of the serum of volunteers who have received intravenous infusions of blood

2. Genetical studies of the nine known blood group systems, particularly of those most recently discovered
3. Use of the blood groups in attempts to map the human chromosomes

BLOOD GROUP REFERENCE LABORATORY

(Administered since April, 1950, by the Council for the Ministry of Health)

LISTER INSTITUTE, CHELSEA BRIDGE ROAD, LONDON, S.W.1

Director

A. E. Mourant, D.M., D.Phil.

Staff

Miss E. W. Ikin, B.Sc.
Miss D. M. Parkin, M.R.C.S.
Miss J. A. E. Walby, B.Sc.

Summary of Activities

1. Selection, preparation and issue of testing sera for all the known blood groups, and of anti-human-globulin serum, to the National Blood Transfusion Service, to the Armed Forces and Colonies, and to other users in Great Britain and abroad
2. Training of pathologists and technicians from British and foreign hospitals and transfusion centres in elementary and advanced blood grouping techniques
3. Examination on behalf of the National Blood Transfusion Service of 1,800 blood donors for the 16 principal blood group antigens, and compilation of a national register for use in special transfusion cases ; similar testing of laboratory and hospital staffs in United Kingdom and overseas ; Rh genotyping of all new recruits to London Red Cross Blood Transfusion Service
4. Research and advice on clinical blood grouping and transfusion problems referred by the Regional Transfusion Centres and hospitals in Great Britain and abroad
5. Anthropological blood group surveys and research into new and unusual blood groups found in the course of these surveys
6. Preliminary stages in the making of National Standard preparations of anti-C, anti-D and anti-E sera

RADIOBIOLOGICAL RESEARCH UNIT

ATOMIC ENERGY RESEARCH ESTABLISHMENT,
HARWELL, DIDCOT, BERKS
(1947)

Director

J. F. Loutit, D.M., M.R.C.P.

Staff

D. E. Andrew, B.A.
D. W. H. Barnes, B.M.
Mrs. O. D. Batt, M.B.
B. G. Chapman, M.Sc.
C. E. Ford, Ph.D.
G. E. Harrison, Ph.D., F.Inst.P.
Mrs. P. H. Herbert, B.A.
Miss E. M. S. Lumsden, B.Sc.
R. H. Mole, B.M., M.R.C.P.
R. J. Munson, Ph.D.
G. J. Neary, Ph.D.
J. St. L. Philpot, M.A.
L. A. Stocken, D.Phil., F.R.I.C. (*honorarium*)
O. A. Trowell, M.D., F.R.S.E.
Mrs. M. E. J. Young, B.Sc. (*until July*, 1951)

Summary of Research

1. Physical studies :
   (1) Measurements of mean energy of fast neutrons
   (2) Measurements of doses of radiation from fast neutrons

(3) Measurement of doses of radiation and depth of penetration of β-rays
(4) Development of techniques for irradiation of laboratory animals by X-rays
(5) Measurement of doses of radiation from the Harwell cyclotron, and related physical problems
(6) Development of an electrometer with remote indication (without a highly insulated link) for use in the presence of intense radiation or in high magnetic fields
(7) Development of γ-ray source using radioactive gold for irradiation of tissue cultures
(8) Further development of interference microscope and spectrophotometer

2. Chemical and analytical studies :
(1) Mechanism of deposition of strontium in bone
(2) Excretion of strontium in urine
(3) Microestimation of calcium
(4) Preparation of clean chemical solutions with special reference to radio-isotopes
(5) Study of enzymes in tissues of animals exposed to supra-lethal and sub-lethal doses of radiation

3. Clinical and physiological effects of radiation :
(1) The effects of chronic exposure to irradiation by fast neutrons on life span, on the incidence of tumours and cataracts, and on the fertility of C.B.A. mice
(2) The effects of single exposures to β-rays at high intensities on mice and rabbits
(3) The effects in rats of irradiation of the whole body on the intestine, on thyroid function and on circulatory change
(4) The effect of whole body irradiation on the response of the rat's intestine to acetylcholine and on its content of cholinesterase (jointly with the Department of Pharmacology, Oxford)
(5) The effects of whole body irradiation on metabolism of rhesus monkeys
(6) Search for drugs and procedures effective against the biological effects of radiation
(7) The immunological responses in irradiated animals
(8) The effects of supra-lethal doses of X- and γ-rays
(9) Long term effects on the leucocyte count in irradiated animals
(10) The effects of radiation on cholinesterases in relation to protein replacement

4. Fundamental biological effects of radiation :
(1) Biological effects of high energy neutrons and protons from the Harwell cyclotron
(2) Irradiation of single cells and parts of cells with a highly collimated beam of α particles
(3) The production of chromosomal aberrations and the inhibition of mitosis in the root-tips and seeds of broad beans by ionising radiations and by chemical agents, and the survival of irradiated cells
(4) The effect of various physical, chemical and biological factors on the radiosensitivity of rat's lymph nodes cultured *in vitro* using X-rays over the range 50–1,000r

5. Miscellaneous developmental work :
   (1) The acute toxicity of thiourea and its derivatives, including the genetics of variations of sensitivity to thiourea in mice
   (2) Development of the use of "cellosolve" as a histological dehydrating and clearing agent
   (3) The examination of synthetic materials for glycogenic activity
   (4) The relation between diet and breeding performance in C.B.A. mice

RADIOTHERAPEUTIC RESEARCH UNIT

HAMMERSMITH HOSPITAL, DUCANE ROAD, LONDON, W.12

(1941)

Director

Miss C. A. P. Wood, M.R.C.P., D.M.R.E. (*part-time*)

Staff

J. D. Abbatt, M.B., D.M.R.T.
J. W. Boag, B.Sc.
Miss S. Carter, B.Sc.
M. Ebert, Dipl. Ingenieur, Dr.rer.nat. chemic.
W. Emery, B.Sc.
P. H. Flanders, B.Sc.
J. W. Gallop, B.Sc., M.I.E.E.
L. H. Gray, Ph.D. (*Deputy Director*)
Mrs. A. Howard, Ph.D.
G. R. Newbery, B.Sc., A.Inst.P.
S. Pelc, D.Phil.
W. B. Powell, B.A.
J. Sharp, B.Sc.
F. S. Stewart, B.Sc., A.M.I.E.E.
N. Veall, B.Sc.
D. D. Vonberg, B.Sc.
P. J. Waterton, B.Sc.
T. Wilson, B.Sc. (*until Jan.*, 1951)

Summary of Research

1. Supervoltage X-ray therapy :
   (1) Collaboration in the design of the 10 million volt linear accelerator
   (2) Planning the clinical use of the 10 million volt linear accelerator
   (3) Collaboration in the design of a new, mobile 4 million volt linear accelerator

2. Clinical trial of treatment of cancer of the lung by medium voltage X-rays

3. Radioactive isotopes :

   Therapeutic applications :
   (1) The investigation and treatment of thyroid carcinoma
   (2) Localisation of functional thyroid tissue by means of a directional counter and I^{131} uptake
   (3) The treatment of thyrotoxicosis by I^{131} and development of a method for assessing I^{131} uptake by the thyroid gland
   (4) The treatment of polycythaemia vera and the reticuloses by radioactive phosphorus

   General medical problems :
   (1) The use of radioactive sodium for studies of the circulation in tubed skin pedicles
   (2) The measurement of red cell volume by P^{32} labelled erythrocytes
   (3) The use of radiosodium for studies of placental circulation

   Physical aspects :
   (1) Development of instruments and techniques for the detection and assay of radio-isotopes by electrical counting and ionisation procedures
   (2) The development of photographic procedures for the precise localisation of radioactive substances within the tissues

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4. The production and measurement of high voltage electron and neutron beams for radiobiological investigations by means of the 2 MeV electrostatic generator
5. Radiobiological research :
   (1) Chemical changes resulting from absorption of ionising radiation in aqueous solutions
   (2) Cytological damage induced by ionising radiation
   (3) The study of the synthesis of desoxyribonucleic acid, and of nucleoprotein in relation to mitosis, and differentiation by means of autoradiographs showing the localisation of P^{32} and S^{35} incorporated into these molecules
   (4) The disturbance in the above synthetic processes induced by X- and neutron radiation, and its relation to cytological damage
   (5) The induction of cataract in rabbit lenses by X- and fast neutron irradiation
   (6) The induction of tumours by mono-energetic electron beams
   (7) Collaboration in a study of the effects of electron radiation on the sterility, taste and other properties of food materials
6. Work on the construction of the 45-in. cyclotron

OTOLOGICAL RESEARCH UNIT

NATIONAL HOSPITAL FOR NERVOUS DISEASES, QUEEN SQUARE, LONDON, W.C.1

(1944)

Director

C. S. Hallpike, M.B., F.R.C.P., F.R.C.S.

Staff

Miss M. R. Dix, M.B., F.R.C.S.

J. D. Hood, Ph.D.

Summary of Research

1. Clinico-pathological investigations of temporal bones and of central cochlear and vestibular nervous pathways in cases of vertigo and deafness
2. The application of constant angular accelerations to the study of human vestibular function, normal and pathological
3. Deafness and speech defects in young children

WERNHER RESEARCH UNIT ON DEAFNESS*

ROYAL NATIONAL THROAT, NOSE AND EAR HOSPITAL, GOLDEN SQUARE, LONDON, W.1

(1949)

Director

T. S. Littler, Ph.D., F.Inst.P.

Staff

R. F. Naunton, M.B.

Mrs. E. F. Shutt, B.Sc. (*part-time*)

Miss P. H. Strange B.Sc.

Miss E. A. M. Whetnall, M.S., F.R.C.S. (*Assistant Director ; until Oct.*, 1950)

Attached Worker

J. J. Knight, B.Sc.

Summary of Research

1. The pathology of congenital deafness, industrial deafness and deafness developing with age
2. The effect of the fenestration operation on hearing, and an investigation of the results over a long period

*Supported by funds made available to the Council by the trustees of the Alexander Pigott Wernher Memorial Trust.

3. The early diagnosis of deafness in young children and the use of hearing aids, lip reading and auditory training in fitting them for normal education
4. Methods of alleviation for patients unsuited by existing forms of hearing aids
5. Improvements in hearing aid equipment
6. The auditory masking effect of noise, and its application to clinical tests of hearing including observations on phenomenon of paracusis

OPHTHALMOLOGICAL RESEARCH UNIT

INSTITUTE OF OPHTHALMOLOGY, JUDD STREET, LONDON, W.C.1

(1948)

Director

Sir Stewart Duke-Elder, K.C.V.O., M.D., D.Sc., F.R.C.S., F.A.C.S. (*part-time*)

Staff

N. Ambache, M.A., M.R.C.S.
H. Davson, D.Sc. (*Assistant Director; until June*, 1951)
M. E. Langham, Ph.D.
D. M. Maurice, Ph.D.
A. M. Woodin, Ph.D.

Attached Workers

D. P. Greaves, M.B., F.R.C.S. (*Grant from the Alexander Pigott Wernher Memorial Trust Fund*)
R. K. McDonald, M.D. (*Alexander Pigott Wernher Travelling Fellowship*)
E. S. Perkins, M.B., F.R.C.S. (*Grant from the Alexander Pigott Wernher Memorial Trust Fund*)
E. J. Ross, M.R.C.S. (*Grant from the Alexander Pigott Wernher Memorial Trust Fund*)
Katharine Tansley, D.Sc. (*M.R.C. Grant*)

Summary of Research

1. The intraocular pressure, its measurement and its nervous control
2. The pharmacology of the autonomic nervous supply to the eye
3. The circulation of the aqueous humour
4. The blood-aqueous barrier
5. The metabolism of the cornea and of the lens
6. Neutron cataract

GROUP FOR RESEARCH IN THE PHYSIOLOGY OF VISION

INSTITUTE OF OPHTHALMOLOGY, JUDD STREET, LONDON, W.C.1

(1951)

Director

L. C. Thomson, M.B., Ph.D.

Staff

H. J. A. Dartnall, Ph.D., F.R.I.C.
R. Gunter, B.A.
Mrs. O. Kennard, M.A., A.Inst.P.
R. A. Weale, M.Sc., A.Inst.P.

Summary of Research

1. A study of the action currents generated in single fibres of the optic nerve of rabbits and the responses of these fibres to point stimulation of the retina
2. The electro-retinography of a strain of red Irish setters showing a type of hereditary blindness and the development of a diagnostic test for this blindness (with Mr. H. B. Parry and Dr. Katharine Tansley)
3. The search for new photosensitive pigments in retinal extracts from bleak and tench

4. The determination of the photosensitivity of visual pigment 467
5. The use of a refractometer for measuring absorption spectra
6. The determination of the character of vision at the periphery of the retina, and measurements of hue discrimination, luminosity and colour-matching
7. The measurement of the absorption of light in the pre-retinal media of animal and human eyes
8. The development of a new method of crystallographic analysis and its use to determine the structure of vitamin A acetate
9. The identification by crystallography of amino acids from natural sources
10. A determination of scotopic and photopic spectral sensitivity curves of the cat by a behavioural method
11. The measurement of the reflectivity of the cat's tapetum (with Dr. W. S. Stiles)

GROUP FOR RESEARCH IN OCCUPATIONAL OPTICS

INSTITUTE OF OPHTHALMOLOGY, JUDD STREET, LONDON, W.C.1

(1949)

Director

H. C. Weston, F.I.E.S.

Summary of Research

1. Laboratory and field studies of factors affecting comfort and efficiency in performing visual tasks
2. Measurement of visual acuity for coloured test-objects at different brightness levels
3. Characteristics of television displays and viewing conditions with reference to " eyestrain " and visual comfort

NUTRITION BUILDING

NATIONAL INSTITUTE FOR MEDICAL RESEARCH, THE RIDGEWAY, MILL HILL, LONDON, N.W.7

(1939)

Director

Sir Edward Mellanby, G.B.E., K.C.B., M.D., F.R.C.P., F.R.S.

Staff

Lady Mellanby, D.Sc. Mrs. Helen Mellanby, M.D., Ph.D.

Summary of Research

1. Nutrition research :
   (1) The interaction of vitamin D and phytate and the effect on the relative amounts of organic and inorganic content of bone
   (2) Studies of the action of physiological substances, including vitamin A, on growth and development of tissues *in vitro*
   (3) The toxicological action of methionine sulphoximine
2. Dental research :
   (1) Structure of organic constituents of dental enamel in man and animals
   (2) Surveys among British children before leaving school at age 15
   (3) Survey among Indian school children
   (4) Continuation of investigation on sugar and dental caries
   (5) Effect of fruit and other acid drinks, natural and artificial, on dental enamel

HUMAN NUTRITION RESEARCH UNIT

MEDICAL RESEARCH COUNCIL LABORATORIES, HOLLY HILL, HAMPSTEAD, LONDON, N.W.3, AND FIELD RESEARCH STATION, FAJARA, BATHURST, GAMBIA, W. AFRICA

(1944)

Director

Professor B. S. Platt, C.M.G., M.B., Ph.D.

Staff

Miss B. M. Balfour, M.R.C.S.
A. Borrow, B.Sc. (*until July*, 1951)
I. G. Campbell, D.Phil.
Miss J. C. Chettle, B.Sc.
Miss H. M. Dewey, M.Sc.
J. Done, Ph.D.
L. Fowden, Ph.D.
R. H. Fox, M.B.
Mrs. M. Goldberg, B.Sc. (*until Nov.*, 1950)
Miss R. Jackson, M.B.
O. Lindan, M.D., Ph.D.
I. A. McGregor, L.R.C.S., L.R.F.P.S., D.T.M. & H.
Miss J. N. Olley, Ph.D. (*until June*, 1951)
P. R. Payne, B.Sc.
J. R. Penney, Ph.D.
J. H. Walters, M.D., M.R.C.P. (*until Dec.*, 1950)
J. C. Waterlow, M.D. (*until Dec.*, 1950)
R. A. Webb, D.Phil. (*until April*, 1951)
D. F. White, B.Sc.

Attached Workers

(At the London School of Hygiene and Tropical Medicine)

Miss W. M. Grant, B.Sc.
D. A. Smith, O.B.E., M.D., D.T.M. & H.

Visiting Workers

O. Bassir, Ph.D.
A. A. Abd El Raheim, M.Sc.
Y. Seddik, M.B., B.Ch., Ph.D. (*until Nov.*, 1950)

The staff of the Unit is engaged in a study of the dietary and other factors responsible for the malnutrition which is widespread amongst peoples in Colonial Territories. There are three main interrelated groups of research activities going on in villages and at the Field Research Station in the Gambia, and at the Unit's Headquarters at Hampstead.

Summary of Research

1. In village areas in the Gambia :
   (1) Medical survey of inhabitants of Genieri and other villages, including studies of endemic disease, mean weight and seasonal weight fluctuations
   (2) Comparison of the effects on a community of control of insect borne disease by the use of insecticides with effects of increased crop production achieved by mechanised agricultural operations
   (3) Time and motion studies of agricultural operations and an estimate of the energy cost of agricultural work, including a comparison between hand and mechanically aided labour
   (4) The study of local factors affecting yield of crops, including groundnuts
2. At the Field Research Station :
   (1) An analysis of the relationship between the effects of zymotic disease, e.g. malaria, and malnutrition
   (2) Protein metabolism, especially in Gambian infants and children
   (3) Liver pathology—including enzymic changes (measured by the Cartesian diver)
   (4) Collection of data on feeding and growth of Gambian infants
   (5) Soil analysis in relation to quantity and quality of crops and the role of major nutrients and trace elements

3. At the Medical Research Council Laboratories, Hampstead :
   (1) Methods of estimating the isotope tritium (radioactive hydrogen) as a tracer element, and its use in protein metabolism
   (2) The development of methods for the separation of amino-acids to study the amino-acid content of foods and tissues
   (3) Liver cytology in normal and pathological states, studied by phase-contrast microscopy and microbiochemical methods
   (4) The behaviour of food, particularly breast milk, in the stomach of the infant rat
   (5) The relation of rat hookworm infection to nutritional state
   (6) The effect of various methods of sophistication on the nutritive value of rice
   (7) The design of a pilot mill for the production of processed tropical cereals with maximum retention of nutritional value

DUNN NUTRITIONAL LABORATORY

MILTON ROAD, CAMBRIDGE

(1926)

Director

L. J. Harris, Sc.D., F.R.I.C.

Staff

M. N. Bland, B.A.
Miss K. M. Clegg, B.Sc.
Miss E. M. Cruickshank, Ph.D.
R. E. Hughes, B.A.
E. H. Kodicek, M.D., Ph.D.
T. Moore, Sc.D. (*Deputy Director*)
I. M. Sharman, Ph.D., F.R.I.C.
R. J. Ward, B.Sc.

Attached Workers

F. D. Aibara, M.Sc. (*Indian Dairy Research Institute, Bangalore ; until Sept.*, 1951)
V. H. Booth, Ph.D. (*member of scientific staff, Agricultural Research Council*)
I. Clark, Ph.D. (*Fulbright Fellow ; until June*, 1951)
S. P. Mistry, Ph.D. (*Indian Institute of Science, Bangalore*)
K. K. Reddi, Ph.D. (*Indian Institute of Science, Bangalore*)
G. S. Wijesinha, Ph.D. (*Medical Research Institute, Colombo ; until Nov.*, 1950)

Summary of Research

1. ACTH and cortisone :
   (1) Influence of ACTH on the requirements for vitamin C and on its metabolism
   (2) The effect of chronic vitamin C deficiency on joints, and the influence of treatment with cortisone acetate
   (3) Histochemical studies of the effect of cortisone on wound healing

2. Vitamin A :
   (1) The storage and distribution of vitamin A in the bodies of male and female animals, and the effects of administering hormones
   (2) The effect of vitamin A on resistance to poisons
   (3) The biological activity of vitamin A carboxylic acid
   (4) Levels of vitamin A in human blood in health and disease
   (5) The influence of plant variety and conditions of growing on the carotene content of carrot leaves
   (6) Stability of carotene in dried green crops
   (7) Vitamin A and carotene in diseased farm animals

3. Vitamin B complex :
   (1) An experimental technique for conditioning rats to distinguish diets deficient in and containing vitamin B_1
   (2) Differences between species in susceptibility to nicotinamide deficiency
   (3) Effect on nicotinamide requirements of variations in the dietary protein and fat, and of exposure to cold and exercise
   (4) The biological and microbiological activity of bound nicotinic acid in maize
   (5) Paper chromatography of nicotinyl compounds, and its application to a study of the metabolites of nicotinic acid and tryptophan in animals
   (6) The fluorimetric estimation of co-enzymes in biological materials
   (7) The paper chromatography of peptides having strepogenin activity
4. Vitamin C :
   (1) Differentiation of vitamin C from other indophenol reducing substances by comparison of rates of reaction
   (2) The antiscorbutic activity of products derived from lucerne
5. Vitamin D :
   (1) Balance experiments on vitamin D and its distribution in the body
   (2) The effect of adrenalectomy on the action of vitamin D
   (3) *In vitro* experiments on the destruction of vitamin D
   (4) Microbiological effects of vitamin D and related substances
   (5) Paper chromatography of sterols related to vitamin D
   (6) The distribution of provitamin D in the rat
6. Vitamin E :
   (1) Vitamin E deficiency in different breeds of rats
   (2) The absorption of vitamin E by normal and diseased subjects
   (3) Vitamin E levels in kwashiorkor and pyomyositis
   (4) The effect of excessive amounts of cod-liver oil in rats deficient in vitamin E
   (5) The influence of vitamin E deficiency on the susceptibility of rats' erythrocytes to haemolysis
7. Miscellaneous :
   (1) The effect of fumigants on the vitamin contents of cereals
   (2) Phosphorus partition and balance as influenced by deficiency of vitamin A or nicotinamide
   (3) The yield of protein in green crops suitable for drying
   (4) The effect of unsaturated fatty acids on bone metabolism
   (5) The biological activity of partially hydrolysed proteins in the rat

DENTAL RESEARCH UNIT

KING'S COLLEGE HOSPITAL, LONDON, S.E.5

(1946)

Director

J. J. D. King, D.Sc., F.D.S.

Staff

Mrs. R. C. Bruce, M.A. S. L. Rowles, B.A.

Summary of Research

1. Biochemistry and bacteriology of dental calculus in ferrets, hamsters and man
2. Calcium and phosphate content of ferrets' saliva under different conditions
3. Non-carious cavitation of the teeth associated with parodontal disease in ferrets, hamsters, rats and man
4. Gingival hyperplasia due to sodium diphenyl hydantoinate in ferrets, hamsters rats and man

UNIT FOR RESEARCH ON THE MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS

CAVENDISH LABORATORY, FREE SCHOOL LANE, CAMBRIDGE

(1946)

Director

M. F. Perutz, Ph.D.

Staff

F. H. C. Crick, B.Sc.

J. C. Kendrew, Ph.D. (*part-time*)

Attached Worker

H. E. Huxley, M.B.E., M.A. (*M.R.C. Student*)

Visiting Workers

A. M. Liquori, Ph.D. (*Rome University; from Jan. until April*, 1951)

I. F. Trotter, M.A. (*Courtauld Research Laboratory, Coventry; from Jan. until Sept.*, 1951)

Summary of Research

1. X-ray analysis of the structure of crystalline proteins, including the haemoglobins of blood and muscle
2. Polypeptide configuration in crystalline and fibrous proteins, and in artificial polypeptides
3. X-ray analysis of the structure of frog sartorius muscle
4. The state of haemoglobin in sickle cell anaemia
5. Use of the Cambridge digital electronic calculating machine for crystal structure calculations

BIOPHYSICS RESEARCH UNIT

KING'S COLLEGE, STRAND, LONDON, W.C.2

(1947)

Honorary Director

Professor J. T. Randall, D.Sc., F.R.S.

Senior Biological Adviser

Miss H. B. Fell, D.Sc., F.R.S.

Staff

J. E. S. Bradley, B.Sc. (*until Sept.*, 1951)
G. L. Brown, Ph.D.
H. G. Davies, B.Sc., A.Inst.P.
Mrs. M. J. Fraser, Ph.D.
Miss E. J. Hanson, Ph.D.
Miss A. V. W. Martin, Ph.D.
P. M. B. Walker, B.A.
M. H. F. Wilkins, Ph.D. (*Assistant Director*)

Attached Worker

F. C. Kelly, M.Sc. (*M.R.C. Student*)

This Unit is largely occupied with the study of cells, especially living cells and materials derived from them, by the methods of electron microscopy, and microspectrometry in the infra-red, visible, and ultra-violet regions of the spectrum.

Summary of Research

1. Physical and biochemical studies of desoxyribose nucleic acid
2. The synthesis of ultra-violet absorbing substances, chiefly desoxyribose-nucleic acid, during mitosis of chick tissue culture cells
3. Fibrogenesis and fine structure in connective tissue and bone
4. Studies of living myofibrils
5. The microstructure of spermatozoa

SPECTROGRAPHIC RESEARCH UNIT

LONDON HOSPITAL, WHITECHAPEL, LONDON, E.1

(1949)

Director

E. R. Holiday, B.M.

Staff

G. H. Beaven, Ph.D.

E. A. Johnson, D.Phil.

Summary of Research

1. The chemical structure of vitamin B_{12}
2. The differentiation of foetal and adult haemoglobins and their occurrence in anaemias
3. Studies of purine metabolism
4. The identification of methylated uric acids in urine
5. Theoretical and technical aspects of absorption spectroscopy

CELL METABOLISM RESEARCH UNIT

DEPARTMENT OF BIOCHEMISTRY, SHEFFIELD UNIVERSITY

(1945)

Director

Professor H. A. Krebs, M.D., F.R.S. (*part-time*)

Staff

W. C. Bartley, B.Sc.
R. E. Davies, Ph.D.
D. E. Hughes, B.Sc.

Attached Workers

J. S. D. Bacon, Ph.D. (*Department of Biochemistry, University of Sheffield*)
F. J. Bealing, B.Sc. (*M.R.C. Student*)
K. Burton, Ph.D. (*Department of Biochemistry, University of Sheffield*)
R. Heyworth, B.Sc (*M.R.C. Student*)
L. E. Hokin, M.D. (*American Cancer Society Fellow*)
Mrs. M. Johnson, M.Sc. (*Department of Biochemistry, University of Sheffield; until Oct.*, 1951)
M. A. G. Kaye, B.Sc., Ph.D. (*Department of Biochemistry, University of Sheffield*)
H. L. Kornberg, B.Sc. (*M.R.C. Student*)
P. M. Nossal, M.Sc. (*Australian National Health and Medical Research Council*)
A. S. Pierpoint, B.Sc. (*Agricultural Research Council*)
R. Whittam, B.Sc. (*Agricultural Research Council*)
T. H. Wilson, M.D. (*American Cancer Society Fellow*)

Summary of Research

1. Metabolic processes :
   (1) The efficiency of oxidative phosphorylation
   (2) The exchange of ions between animal tissues and their environment *in vitro*
   (3) The chemical and electrical properties of isolated frog gastric mucosa
   (4) The inhibition of gastric acid secretion in cats
   (5) Protein synthesis in isolated tissues, especially the synthesis of amylase *in vitro* by surviving slices of pigeon pancreas, and the role of nucleic acid in protein synthesis and protein transport
   (6) Metabolism of dicarboxylic acids in yeasts
2. Enzymes :
   (1) The action of hydrolytic enzymes on carbohydrates
   (2) Synthesis of cozymase from nicotinic acid and of coenzyme A from pantothenic acid
   (3) Measurement of equilibrium constants of various reversible systems
   (4) Enzymes of snake and insect venoms
   (5) Equilibrium measurements of various dehydrogenase systems

3. Techniques :
   (1) Procedures for the determination of malic and fumaric acids
   (2) The development of methods for breaking up bacterial and other microbial cells and for extracting enzymes and other cell constituents

CHEMICAL MICROBIOLOGY RESEARCH UNIT

SCHOOL OF BIOCHEMISTRY, SIR WILLIAM DUNN INSTITUTE, TENNIS COURT ROAD, CAMBRIDGE

(1944)

Director

E. F. Gale, Sc.D.

Staff

R. Davies, Ph.D.
Miss J. M. Moyle, M.A.
B. A. Newton, B.A.
J. Tosic, Ph.D.
Miss M. B. Van Halteren (*until Dec.*, 1950)

Attached Workers

L. C. Bigger, M.S. (*Fulbright Student, Cornell College, Iowa*)
O. J. Chear, B.A. (*M.R.C. Student*)
B. Hurlock, B.A.
V. A. Knivett, B.A. (*M.R.C. Student*)
K. McQuillen, Ph.D. (*University of Cambridge*)
J. L. Peel, Ph.D. (*M.R.C. Student*)
P. J. Samuels, B.A. (*M.R.C. Student*)

Micro-organisms provide admirable material for the study of the synthesis of proteins and their organisation as enzymes within the living cell. The investigations in this Unit are mainly concerned with the biochemistry of these processes in bacteria and yeasts, and with the ways in which such processes can be inhibited by chemotherapeutic agents.

Summary of Research

1. The assimilation and metabolism of amino-acids by bacteria
2. The conditions for synthesis of peptides and proteins by a variety of organisms
3. Electrophoretic studies of the nature of the bacterial surface and its charge
4. Factors controlling the inheritance of enzymic activities and their adaptive capacity in yeasts
5. Points of interference in bacterial anabolic processes by various chemotherapeutic agents
6. The synthesis of esters by yeasts

GROUP FOR RESEARCH IN CHEMOTHERAPY

MOLTENO INSTITUTE, DOWNING STREET, CAMBRIDGE

(1927)

Director

Miss A. Bishop, Sc.D.

Staff

Miss E. W. McConnachie, M.A.

Summary of Research

1. Problems of the development of acquired resistance to drugs in the malarial parasite and other organisms
2. Methods of cultivation of a pathogenic amoeba (*Entamœba invadens*) and the *in vitro* action of emetine upon this organism

GROUP FOR RESEARCH IN CHEMOTHERAPY

DEPARTMENT OF CHEMISTRY, UNIVERSITY OF MANCHESTER

(1946)

Director

The late J. C. E. Simpson, D.Sc.

Staff

C. M. Atkinson, Ph.D.
J. McIntyre, B.Sc. (*until Sept.*, 1951)
J. S. Morley, Ph.D.
A. Taylor, B.Sc.

Attached Workers

C. W. Brown, B.Sc. (*M.R.C. Student*)
J. Sharrock, B.Sc. (*M.R.C. Student*)

Summary of Research

1. The synthesis of compounds of potentially high trypanocidal activity (in collaboration with Dr. E. M. Lourie)
2. The lipid constituents of trichomonas and trypanosomes

DEPARTMENT FOR RESEARCH IN INDUSTRIAL MEDICINE

LONDON HOSPITAL, E.1, AND MEDICAL RESEARCH COUNCIL LABORATORIES, HOLLY HILL, HAMPSTEAD, LONDON, N.W.3

(1943)

Physician-in-Charge

D. Hunter, M.D., F.R.C.P. (*part-time*)

Staff

J. N. Agate, M.D., M.R.C.P. (*absent on National Service from Sept.*, 1949)
Miss P. Lesley Bidstrup, M.B., M.R.C.P.
R. G. Drew, B.Sc.
D. Graham Harvey, M.B.E., Ph.D.
E. King, B.Sc.
D. J. Lawford, B.Sc.
J. A. L. Bonnell, M.B.
Miss H. M. B. Buckell, Ph.D. (*until Oct.*, 1950)

Summary of Research

1. Experimental work on the electrostatic precipitator and electronic dust counter

2. Mercury :
   (1) The incidence of chronic mercury poisoning in men repairing direct current meters
   (2) The effect of mercury on the enzyme systems of the body

3. Dinitro-*ortho*-cresol :
   (1) Absorption and excretion in man and animals
   (2) The significance of the presence of DNOC in the blood
   (3) Correlation of experimental work with results of routine blood DNOC estimations in men engaged in the manufacture and use of DNOC
   (4) Study of one fatal and several acute cases of DNOC poisoning

4. Organophosphorus insecticides :
   (1) Investigation of paralysis following poisoning by these substances
   (2) Identification of metabolites of parathion

5. Beryllium :
   (1) Environmental studies in the manufacture of pure beryllium
   (2) Investigation of patients with signs and symptoms suggestive of chronic beryllosis
   (3) Methods of analysis for beryllium in industrial dusts and biological specimens, including the development of a sensitive fluorometer

6. Carcinoma of the lung in the chromate-producing industry :
   Follow-up study of men investigated in 1949–50
7. Development of a rapid method for the determination of micro-quantities of lead in blood and urine
8. Toxicity tests on manucol ester and other substances

INDUSTRIAL MEDICINE AND BURNS RESEARCH UNIT

BIRMINGHAM ACCIDENT HOSPITAL, BATH ROW, BIRMINGHAM, 15
(1946)

Honorary Director
Professor J. R. Squire, M.D., F.R.C.P.

Staff

M. H. Antia, M.B. (*part-time ; until March*, 1951)
E. A. Brown, M.B. (*until Nov.*, 1950)
J. P. Bull, M.D. (*Assistant Director*)
Miss M. S. Cotterill, M.C.S.P. (*until Feb.*, 1951)
C. N. D. Cruickshank, M.D., D.I.H.
N. W. J. England, B.Sc., M.B.
Miss J. E. Fox, B.Sc.
D. MacG. Jackson, M.B., F.R.C.S. (*part-time*)
P. S. London, F.R.C.S. (*part-time*)
E. J. L. Lowbury, B.M.
C. R. Ricketts, Ph.D.
Mrs. M. E. Ricketts, B.Sc. (*part-time ; until Dec.*, 1950)
W. P. Dallas Ross, M.B. (*until March*, 1951)
S. Sevitt, M.D., F.R.C.P.I., D.P.H. (*part-time*)
Miss E. Topley, M.D.

Summary of Research

1. Industrial medicine :
   (1) Causes and prevention of injuries due to swarf, including eye injuries
   (2) Further development and trial of nylon film dressings for open wounds
   (3) The incidence, causes, prevention and treatment of burns in industry
   (4) The mechanism of skin sensitisation as shown in tissue culture and as affected by cortisone
   (5) Skin cancer in relation to exposure to mineral oil
2. Research on burns :
   (1) Continuation of studies on dextran as a plasma substitute for treatment of burns shock
   (2) Development and clinical trial of dextran sulphate as an anticoagulant for clinical and laboratory use
   (3) Biochemical studies of shock due to burns and of electrolyte requirements in treatment
   (4) Studies of the spread, control, effects and therapy of infection due to streptococci, *Ps. pyocyanea* and staphylococci
   (5) Controlled prophylactic and therapeutic trials of penicillin, polymyxin, aureomycin and terramycin
   (6) Improved dressing materials for preventing the spread of infection in burns
   (7) Studies of the clinical and microscopic appearance of healing in burns as an aid to diagnosis and treatment
   (8) Development of immediate or early grafting of full-thickness burns to give earlier and better healing and the application of these methods to burns of the feet and head
   (9) Studies of pituitary-adrenocortical function and failure in burns

PNEUMOCONIOSIS RESEARCH UNIT

LLANDOUGH HOSPITAL, PENARTH, GLAMORGANSHIRE

(1945)

Director

C. M. Fletcher, M.D., F.R.C.P.

Staff

R. G. H. B. Boddy, Ph.D.
K. J. M. Carruthers, M.B. (*until Aug.*, 1951)
A. L. Cochrane, M.B.E., M.B., D.P.H.
I. Davies, M.D., M.R.C.P., D.P.H. (*part-time*)
J. C. Gilson, O.B.E., M.B., M.R.C.P. (*Assistant Director*)
P. Hugh-Jones, M.D., M.R.C.P.
M. C. S. Kennedy, M.R.C.S.
C. B. McKerrow, M.B., M.R.C.P.
T. G. Morris, Ph.D.
P. D. Oldham, M.A.
A. H. Rinsler, M.R.C.S. (*until March*, 1951)
S. A. Roach, B.Sc.
A. D. Thomas, B.Sc.
G. G. Thomas, Ph.D.
V. Timbrell, Ph.D., A.R.C.S.
O. L. Wade, M.D., M.R.C.P. (*until Feb.*, 1951)
H. H. Watson, B.Sc., F.Inst.P.
A. L. Wells, M.B., D.C.P. (*until June*, 1951)
R. H. L. Wilson, M.B., M.R.C.P. (*until Jan.*, 1951)
B. M. Wright, M.B.

Summary of Research

1. Methods of treatment of pneumoconiosis including the use of antispasmodics, antibiotics and aluminium therapy
2. Methods of achieving consistency in radiological diagnosis of pneumoconiosis, including improvements of radiographic technique
3. Radiological studies of the progression of pneumoconiosis in relation to :
   (1) Dust exposure
   (2) Infection by tuberculosis
4. Investigation of the possibility of control of tuberculous infection in a mining community by means of mass radiography with the isolation and education of sputum positive cases
5. Study by physiological methods of the disturbances of lung function causing breathlessness on exertion in pneumoconiosis and related disorders
6. The effect of exposure of animals to dusts of various compositions, including samples of airborne dusts obtained from mines
7. The design of dust sampling instruments intended to have sampling characteristics similar to that of the human lung
8. Techniques for assessing concentrations and composition of airborne dusts from the working environment of coalminers

TOXICOLOGY RESEARCH UNIT

SERUM RESEARCH INSTITUTE, WOODMANSTERNE ROAD, CARSHALTON, SURREY

(1947)

Director

J. M. Barnes, M.B.

Staff

W. N. Aldridge, Ph.D.
*G. V. R. Born, M.B., D.Phil.
K. K. Cheng, M.B., Ph.D.
A. N. Davison, B.Sc., B.Pharm.
F. A. Denz, M.Sc., M.D.
V. H. Parker, B.Sc.

Summary of Research

1. The toxicity and mode of action of the organophosphorus insecticides :
   (1) The role of cholinesterase at the myoneural junction
   (2) The relation between the chemical and physical properties of inhibitors of cholinesterase and their toxicity

* Working in Oxford

(3) The mechanism by which the tissues can convert organophosphorus compounds into highly active poisons
(4) The possible role of cholinesterase inhibitors in the production of peripheral neuritis as in tri-*ortho*-cresyl phosphate poisoning

2. The effect of dinitrophenol poisoning on the constituents of voluntary muscle in poisoned animals
3. Renal lesions produced by nickel and the effect upon them of administering BAL
4. Factors affecting the regeneration of haematopoietic bone marrow

ENVIRONMENTAL HYGIENE RESEARCH UNIT

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, KEPPEL STREET, LONDON, W.C.1, AND MEDICAL RESEARCH COUNCIL LABORATORIES, HAMPSTEAD, LONDON, N.W.3

(1950)*

Director

T. Bedford, D.Sc.

Staff

F. A. Chrenko
C. N. Davies, D.Sc., F.Inst.P.
J. McK. Ellison, B.A.
O. M. Lidwell, D.Phil.
F. E. E. Smith
G. W. Spicer, M.Sc.
Miss B. E. Tredre, B.Sc.
D. Turner, M.Sc.
W. L. Welman, B.Sc.
Miss C. V. Williamson, B.Sc.
Mrs. A. Wolff, B.Sc. (*until Nov.*, 1950)

Summary of Research

1. Heating and ventilation :
   (1) Effects of heated ceilings on comfort, with reference to temperature, height and extent of heated surface
   (2) Factors contributing to " freshness " in an environment : thresholds of perception of radiant heat and air movement
   (3) Measurement of small changes in skin temperature
   (4) Further development of the ion anemometer
   (5) Air turbulence in ventilated rooms
   (6) Radiant heat exchanges between man and his surroundings : studies with a differential bolometer comparable in size and shape to the human body
   (7) Statistical examination of experimental data on physiological responses to heat
2. Naval hygiene :
   (1) The thermal insulation of gunhouses
   (2) Sickness incidence in H.M. ships in relation to climatic conditions
   (3) Prediction of thermal conditions in ships
3. Air hygiene :
   (1) Evaluation of experimental data on effects of indirect ultra-violet irradiation in schools (with Dr. R. E. O. Williams and others)
   (2) Removal of bacteria-carrying particles from air by centrifugal fans
   (3) Influence of atmospheric humidity on the bactericidal effect of ultra-violet irradiation against β-haemolytic streptococci grown or suspended in various vehicles
   (4) Experiments for committee of Public Health Laboratory Service on test method for formaldehyde disinfection
   (5) Initiation of epidemiological studies of common cold (with Dr. R. E. O. Williams)

* Previously the Group for Research in Industrial Physiology (1938)

4. Industrial dusts :
   (1) The trajectories of dust particles in a jet, and application to dust sampling
   (2) The use of coal-dust stains on filter paper in dust sampling
   (3) Separation of air-borne dust and particles : fundamental considerations and application to cyclone and fibrous filters
   (4) Trajectories of dust particles approaching a wire or rod, and application to theory of fibrous filters
   (5) Optical assessment of air-borne coal dust
   (6) Scattering of light by suspension of quartz particles
   (7) Aspiration of dust into a sampling orifice
   (8) Review of work on alveolar retention of dust, and derivation of acceptance curve for a sampling instrument to measure only " alveolar " dust

CLIMATE AND WORKING EFFICIENCY RESEARCH UNIT

DEPARTMENT OF HUMAN ANATOMY, UNIVERSITY MUSEUM, OXFORD

(1948)

Honorary Director

Professor W. E. Le Gros Clark, D.Sc., F.R.C.S., F.R.S.

Staff

H. D. Darcus, B.M.
K. Hellman, B.Sc.
Mrs. R. E. van Heyningen, M.A. (*until March*, 1951)
R. M. Jones, B.Sc.
Miss A. E. Salter, B.Sc.
A. G. McD. Weddell, M.D., D.Sc. (*with honorarium from M.R.C.*)
J. S. Weiner, Ph.D., M.R.C.S. (*with honorarium from M.R.C.*)
R. Whitney, Ph.D.
H. Wiltshire, B.A.

Visiting Workers

Major J. M. Adam, B.Sc., M.B., R.A.M.C. (*Royal Army Medical College, Millbank*)
A. R. Lind, B.Sc. (*Physiologist to the Royal Naval Tropical Research Unit*)
Surgeon Lieutenant Commander B. Geoghegan, MB., R.N. (*Royal Naval Medical School, Alverstoke*)

Summary of Research

1. The physiology of climatic adaptation :
   (1) The investigation of circulatory changes during acclimatisation to heat, with reference to the development of the strain-gauge method for plethysmography
   (2) The physiology of sweating with reference to neuro-chemical control of the sweat glands
   (3) The limits of tolerance for work at high temperatures and humidity (in co-operation with the Royal Naval Tropical Research Unit, Singapore)
   (4) The effect of " heat stress " on different racial groups with reference to physique and body size (in co-operation with the Physiology Department, University of Malaya, the Royal Naval Tropical Research Unit, Singapore, and Dr. W. S. S. Ladell in West Africa)
   (5) Comparisons of basal metabolic rates and of diurnal temperatures of subjects in temperate climates and in the tropics

2. Working efficiency :
   (1) The measurement of the strength of muscular contraction and the effect on it of repeated exercise
   (2) The measurement of the range of joint movements
   (3) The determination of the degree of proprioceptive sensitivity in passive movement of joints

3. Research on *ad hoc* problems :
   (1) The design of seats and standing supports for the Royal Navy and the Army
   (2) The design of acquisition sights for the Royal Navy
   (3) The design of a crane driver's cab for the British Iron and Steel Research Association
   (4) The design of a telephone switchboard for the Army Operational Research Group
   (5) Nutritional studies of the effects of cold climates
   (6) Anthropometry by photography for operational use

ROYAL NAVAL TROPICAL RESEARCH UNIT

(Jointly with the Admiralty)

MEDICAL FACULTY, UNIVERSITY OF MALAYA, SEPOY LINES, SINGAPORE 3

(1948)

Director

Surgeon Commander F. P. Ellis, O.B.E., M.D., M.R.C.P., R.N.

Staff

Major J. M. Adam, B.Sc., M.B., R.A.M.C. (*until March*, 1951)
Surgeon Lieutenant Commander R. T. John, M.B., R.N.
R. K. Macpherson, M.Sc., M.D.
P. S. B. Newling, B.Sc.
R. D. Pepler, B.A.

Associated Workers

Yap Tien Beng (*Department of Physiology, University of Malaya*)
J. O. Irwin, Sc.D. (*Statistical Research Unit, London School of Hygiene and Tropical Medicine*)
R. M. Jones, B.Sc. (*Dept. of Statistics, Oxford*)
Professor R. G. Scott MacGregor, D.M. (*Dept. of Physiology, University of Malaya*)
You Poh Seng, Ph.D. (*Department of Economics, University of Malaya*)

Summary of Research

1. Physiological reactions of man to warm and hot environments under varying conditions of air temperature, humidity, radiant heat, air movement, clothing and rates of work, and in varying states of acclimatisation
2. The effects of hot climate on human performance and alertness
3. The determination of thermal conditions necessary for comfort
4. Normal and basal physiological values in the tropics

GROUP FOR RESEARCH ON BILHARZIA DISEASE

WINCHES FARM, HATFIELD ROAD, ST. ALBANS

(1947)

Director

J. Newsome, M.B.

Summary of Research

1. The effect of Miracil compounds on bilharzia in animals
2. Effects on baboons of repeated infection with *S. mansoni*
3. Investigation of diet as an aetiological factor in Egyptian splenomegaly

APPLIED PSYCHOLOGY RESEARCH UNIT

PSYCHOLOGICAL LABORATORY, DOWNING PLACE, CAMBRIDGE

(1944)

Honorary Director

Sir Frederic C. Bartlett, C.B.E., D.Sc., F.R.S.

Staff

Miss B. V. C. Batts
Mrs. E. Belbin, B.A. (*until July*, 1951)
R. M. Belbin, B.A.
D. E. Broadbent, M.A.
R. B. Buzzard, B.M.
Miss V. R. Cane, M.A.
A. Carpenter, M.B.
E. G. Chambers, M.A.
R. Conrad, B.A.
E. R. F. W. Crossman, B.A.
G. C. Drew, M.A. (*part-time*)
Miss J. Elliott, B.A.
E. Farmer, M.A.
D. C. Fraser, M.Sc.
C. B. Gibbs
R. L. Gregory, B.A.
A. D. Harris, M.R.C.S.
Mrs. N. Harris, B.Sc.
Miss A. W. Heim, Ph.D.
W. E. Hick, M.D.
R. E. F. Lewis
N. H. Mackworth, M.B., Ph.D. (*Assistant Director*)
M. W. B. O'Loughlin, B.A.
R. D. Pepler, B.A.
E. C. Poulton, M.B.
Mrs. E. C. Roberts, B.A.
W. J. Shaw, B.A., Ll.B.
G. J. Siddall, B.A.
Mrs. V. E. Simmonds
Miss M. A. Vince, B.A.
Miss M. M. Woodhead

Attached Workers

Sick Berth Petty Officer G. Joice, R.N.
Wardmaster A. G. White, R.N.

Summary of Research

1. Problems of bodily and mental skill :
   (1) Anticipation and forethought in human performance
   (2) Speed and load stress in a variety of skilled performances in laboratory and factory
   (3) Display and control in machine operations
   (4) The nature of the peripheral and central nervous processes which select and use perceptual evidence in the interests of skilled action
   (5) The ways in which information can be efficiently used when conveyed to a listener along a number of channels simultaneously
   (6) Principles of synthetic training

2. The effects of abnormal environments :
   (1) The effect on performance of exposure to high degrees of heat and humidity
   (2) Local adaptation to extreme cold
   (3) The effect on performance of prolonged exposure to very loud noise
   (4) Studies of changes in human ability on breathing pure oxygen

3. Mental tests :
   (1) Methods of selection of medical students, including the development of new types of test examination
   (2) The effect of practice on score levels in intelligence tests
   (3) The effect of apparent test difficulty in intelligence scores
   (4) Development of a new series of spatial perception tests

4. Road research problems :
   Driver reactions on the road under experimental conditions

GROUP FOR RESEARCH IN INDUSTRIAL PSYCHOLOGY

2, LOWNDES STREET, LONDON, S.W.1, AND OTHER CENTRES

(1918)

Director

S. Wyatt, D.Sc.

Staff

H. Campbell, M.A.
Miss Norah M. Davis, Ph.D.
R. A. Denerley, B.A.
Mrs. I. C. Grant, M.A.
Miss M. E. Fleminger, Ph.D. (*until Dec.*, 1950)
D. E. R. Hughes
Mrs. Y. H. Kapp
R. Marriott, M.Sc.
Mrs. D. M. Z. Pool
F. G. L. Stock
Mrs. C. Tenen, Ph.D.
J. Walker, M.A.

Summary of Research

1. The nature, effects and relative importance of factors in the industrial situation which tend to promote satisfaction or cause discontent, with special reference to :
   (1) The merits and defects of different systems of payment
   (2) Managerial policies and methods
   (3) Group methods of working

UNIT FOR RESEARCH IN OCCUPATIONAL ADAPTATION*

MAUDSLEY HOSPITAL, DENMARK HILL, LONDON, S.E.5

(1948)

Honorary Director

Professor Aubrey J. Lewis, M.D., F.R.C.P.

Staff

L. E. D. Barber, B.Sc.
J. H. Champness, M.A.
Mrs. F. Eisler, Ph.D.
A. Heron, Ph.D.
F. Loos, Ph.D.
M. Markowe, M.D., D.P.H., D.P.M.
N. O'Connor,, Ph.D.
J. Tizard, Ph.D.
P. H. Venables, B.A.
K. A. Yonge, M.D., C.M. (McGill)

Summary of Research

1. Psychological factors influencing labour turnover and the occupational effectiveness of individuals in two industries—light and medium engineering, and transport
2. Mental deficiency :
   (1) The effect of different types of workshop supervision upon the behaviour and output of high-grade male defectives
   (2) The effect of three types of teaching upon the performance of high-grade defectives in an institution
   (3) Comparison of the occupational performance of high-grade defectives living in an institution with that of youths of the same level of intelligence living in the community
3. Interviewing :
   (1) Grammatical form and tempo of speech as constants for each individual
   (2) The relative significance of these and of the interlocutor in determining the pattern of language during an interview

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* Formerly known as the Occupational Psychiatry Research Unit

GROUP FOR RESEARCH ON THE BUILDING INDUSTRY*

BIRKBECK COLLEGE, LONDON, W.C.1

(1946)

Honorary Director

Professor C. A. Mace, M.A., D.Litt.

Staff

Mrs. E. Bryan-Brown, B.A. (*until Dec.*, 1950)
A. J. Flook, B.A.
Miss P. M. F. Hooper, B.A.
Miss E. D. Howard, B.A.
Miss E. C. Jamieson (Mrs. Roberts), B.A. (*until July*, 1951)
Mrs. E. R. Oppenheimer, B.Sc.
Miss A. Steinhart
Miss W. T. Veness, B.A.
Miss M. M. Woodhead (*until July*, 1951)

Summary of Research

1. Vocational guidance and selection for the building industry
2. Training problems in the building industry ; new methods in technical education
3. Factors contributing to " industrial morale " ; joint consultation procedures; the causes of labour wastage in the building industry

SOCIAL MEDICINE RESEARCH UNIT

CENTRAL MIDDLESEX HOSPITAL, ACTON LANE, LONDON, N.W.10
AND DEPARTMENT OF MIDWIFERY, ABERDEEN UNIVERSITY

(1948)

Director

J. N. Morris, M.A., M.R.C.P., D.P.H., D.C.H.

Staff

E. M. Backett, B.Sc., M.B., M.R.C.P.
Miss E. H. L. Duncan, M.A., B.Sc.
J. C. G. Evans, M.B. (*part-time*)
Miss E. M. Goldberg
J. A. Heady, M.A.
R. Illsley, B.A.
V. B. Kanter, M.A.
D. R. Livingston, M.B. (*part-time ; until March*, 1951)
Miss K. M. Mottram, B.Sc. (*until March*, 1951)
Miss E. M. Scott, M.A.
Miss L. A. E. Shaw, M.A.
A. L. de Silva, M.B. (*part-time ; until March*, 1951)
Miss E. D. B. Thompson, B.A.
P. M. Turquet, M.R.C.S., D.P.M. (*part-time*)
Mrs. B. S. Williamson, B.A. (*until Dec.*, 1950)

Attached Worker

D. H. Allcorn, B.A. (*Halley Stewart Trust research student in Social Anthropology*)

Summary of Research

1. The reproductive performance of primiparous women (jointly with the Department of Midwifery, University of Aberdeen)
2. Biological, social and medical factors affecting stillbirths, infant mortality and mortality in the second year of life (jointly with the General Register Office)
3. Family relations, personality development and duodenal ulcer in young men
4. The prevalence of gastric and duodenal ulcer in Glasgow, Newcastle and North West London
5. The incidence of coronary heart disease in various occupations

* The group was dissolved in September 1951

6. The importance of hypertension and coronary heart disease as causes of death
7. The work of the general practitioner in relation to current trends in medicine, in social services, in family life and in the population
8. The needs for medical and social services of different types of family on a local general practitioner's list
9. The functions of voluntary and statutory social workers in a selected area
10. The health, work and leisure of young men in a selected area

STATISTICAL RESEARCH UNIT

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, LONDON, W.C.1

(1926)

Honorary Director

Professor A. Bradford Hill, C.B.E., D.Sc.

Staff

P. Armitage, Ph.D.
J. T. Boyd, M.B., D.P.H. (*until Sept.*, 1951)
W. R. S. Doll, M.D., M.R.C.P.
J. O. Irwin, Sc.D.
W. J. Martin, D.Sc.
J. Knowelden, M.D., D.P.H. (*part-time*)

Summary of Research

1. The role of activating agents in the production of poliomyelitis
2. The effects upon the infant of virus diseases in the pregnant woman
3. The aetiology of cancer of the lung, stomach, colon and rectum
4. The aetiology of cancer of the cervix of the uterus
5. In association with Dr. Avery Jones at the Central Middlesex Hospital:
   (1) Factors affecting the rate of healing of gastric ulcers
   (2) The inheritance of peptic ulcer
   (3) The prognosis of perforated gastric and duodenal ulcers
   (4) The prognosis of peptic ulcer in the aged
   (5) The risks of gastroscopy
6. The ratio of male to female mortality rates
7. Mortality from poliomyelitis in recent epidemics in Great Britain
8. Statistical problems involved in experiments to determine mutation rates of bacteria

Members of the Unit have also co-operated with many Council and other scientific workers in designing experiments, supervising trials and analysing data. The investigations with which they have been associated include the following:

(1) Field trials of whooping cough vaccines
(2) Field trials of BCG in the prevention of tuberculosis in children leaving school
(3) A survey of tuberculin sensitivity in England and Wales
(4) Therapeutic trials of streptomycin and PAS in respiratory tuberculosis
(5) Therapeutic trials of cortisone, ACTH and related substances in rheumatic fever and in chronic rheumatic diseases
(6) Therapeutic trials of aureomycin and chloramphenicol in pneumonia, whooping cough and gastro-enteritis
(7) Therapeutic trials of alpha-tocopherol in intermittent claudication and in varicose ulcers

(8) The use of ultra-violet irradiation in schools to reduce infection
(9) The carcinogenic action of mineral oils
(10) The ability of man to withstand warm and hot environments
(11) The biological assay of whooping cough vaccines
(12) The Rous virus and the production of tumours
(13) The titration of influenza virus
(14) Allergy in relation to dampness
(15) The incidence of homologous serum jaundice
(16) The difference in blood clotting time between normal persons and those suffering from thrombosis
(17) Trials of transfusion procedures in babies with haemolytic disease
(18) The resettlement of disabled persons in industry
(19) Trials of hormone therapy in pregnant diabetics

SERUM RESEARCH INSTITUTE

WOODMANSTERNE ROAD, CARSHALTON, SURREY

(1947)

Acting Director

L. F. Hewitt, Ph.D., F.R.I.C.

Staff

Miss A. M. Brown, Ph.D.
Miss E. W. Edleston, B.Sc.
Miss M. J. Smith, B.Sc.

Attached Worker

Mrs. B. Hewitt, M.P.S. (*honorary, part-time*)

Summary of Research

1. Diphtheria :
   (1) The evaluation of chemotherapeutic agents and antibiotics in the treatment of diphtheria infections
   (2) The development of drug-resistant strains of *C. diptheriae*
   (3) The serological classification of strains of *C. diptheriae* from this country and abroad
   (4) The evolution and interchangeability of different strains
   (5) Relations between virulence, toxigenicity and diagnostic characteristics of different strains
   (6) The study of bacterial cell structure by phase-contrast microscopy
   (7) Biochemical studies of fermentation reactions, haemolytic activity and toxigenicity
2. Whooping cough :
   (1) Distribution of different vaccines for clinical trial
   (2) Evaluation of antigenicity of vaccines
   (3) Study of relationship of antibacterial and antitoxin immunity
3. Rheumatic fever and haemolytic streptococcal infections :
   The investigation of haemolysins and of antistreptolysin-O sera
4. Intestinal flora of animals :
   Investigation of proteus organisms in infected guinea-pigs
5. Blood serum proteins :
   Studies on the chemical structure of the carbohydrate-amino acid complex in serum proteins

ANTIBIOTICS RESEARCH STATION

4 ELTON ROAD, CLEVEDON, SOMERSET

(1949)

Director

B. K. Kelly, B.A.

Staff

Miss P. F. Boyd, B.Sc.
R. C. Codner, B.Sc.
C. W. Hale, A.R.I.C.
G. A. Miller
Miss N. Smith, B.Sc.

Summary of Research

1. The examination of some Basidiomycetes and Actinomycetes for antibiotic production
2. The production and investigation of clinically promising new antibiotics, including cephalosporin P1, and cephalosporin N
3. The production of the enzymes actase and desoxyribonuclease
4. The mass cultivation of bacteria

LABORATORY ANIMALS BUREAU

MEDICAL RESEARCH COUNCIL LABORATORIES, HOLLY HILL, HAMPSTEAD, LONDON, N.W.3

(1947)

Director

W. Lane-Petter, M.B.

Staff

F. J. Dyer, Ph.D.

Summary of Activities

1. Collection and dissemination of information about the supply, breeding, maintenance and use of laboratory animals
2. Consultation, by personal visits and by correspondence, on the subject of laboratory animals
3. Administration of an accreditation scheme for breeders of guinea pigs, mice and rabbits, and the publication of a bulletin
4. Organisation of the annual congress of animal technicians
5. Investigation of special problems of supply of laboratory animals : in particular, monkeys, guinea pigs and amphibia
6. Further investigation of problems of small animal husbandry
7. Examination of cortigen assays in rats, with a view to comparing their accuracy in different strains

Members of the Council's External Scientific Staff and their Co-workers

BIRMINGHAM

SELLY OAK HOSPITAL

Medical Research Council Staff

Miss P. Middlemas
R. O. Parker (*until Oct.*, 1950)

Attached Workers

A. A. White, M.B., (*with honorarium from the M.R.C.*)
S. A. Roberts (*with honorarium from the M.R.C.*)
P. Wilson

Summary of Research

1. General survey of the disabled persons register
2. Studies of the value of special workshops and job analysis in the resettlement of disabled persons in the engineering industry (under the direction of Dr. Donald Stewart)

CAMBRIDGE

MOLTENO INSTITUTE, CAMBRIDGE UNIVERSITY

Medical Research Council Staff

H. W. Laser, M.D., Ph.D.

Summary of Research

1. Studies of *cis*-vaccenic acid and its possible role in certain diseases in which haemolysis of red blood cells occurs
2. Adaptation of bacteria to fatty acids
3. Experiments in the coupling of fatty acids with certain proteins with a view to obtaining a conjugated antigen
4. The relation between variation in oxygen tension and (*a*) the activity of aerobic dehydrogenases, (*b*) the peroxidatic function of catalase

STRANGEWAYS RESEARCH LABORATORY

Medical Research Council Staff

F. G. Spear, M.D., D.M.R.E.
M. Webb, Ph.D.

Summary of Research

1. Cancer research :
   (1) Collaboration in the histological analysis of radiation effects in tumours of the skin, uterus, oral cavity, lung and breast, as an aid to prognosis ; and the selection of treatment in individual patients
   (2) Collaboration in studies of the effects of high energy radiation on cells cultivated *in vitro*
   (3) A study of the effect of radiation upon the process of differentiation in chick embryos with special reference to the significance of the intensity factor
   (4) Collaboration in studies of the effect of penetrating rays on the intermitotic period of cells cultivated *in vitro*
2. Studies on the mechanism of cell division :
   (1) Chemical analysis of the filamentous cells produced by the growth of Gram-positive bacteria in media deficient in magnesium

(2) (*a*) Observations of the chemical effects *in vitro* of mitotic inhibitors on isolated deoxypentose-nucleases
(*b*) Determination of the ultra-cellular distribution of deoxypentose-nucleases in mammalian cells
(3) Chemical analysis of cells grown *in vitro* before and after the application of mitotic inhibitors
(4) Collaboration in the study of the action of deoxyribonuclease on nucleic acids derived from plant and animal tissue

EDINBURGH

INSTITUTE OF ANIMAL GENETICS, EDINBURGH UNIVERSITY

Medical Research Council Staff

T. C. Carter, O.B.E., Ph.D. (*seconded from the Radiobiological Research Unit, A.E.R.E., Harwell*).
Miss M. F. Lyon, Ph.D.
Miss R. J. S. Phillips, B.Sc. (*seconded from the Radiobiological Research Unit, A.E.R.E., Harwell*).
B. M. Slizynski, Ph.D.

Summary of Research

The main purpose of this group, which works under the direction of Professor C. H. Waddington, F.R.S., is to extend the cytogenetic knowledge of the mouse, leading eventually to the manufacture of tool-stocks for mutation rate studies. Work continues also on the genetic effects of chronic gamma irradiation and on the developmental effects of various mutant genes.

1. Cytogenetics :
   (1) Genetic and cytological studies of X-ray induced translocations
   (2) Linkage studies
2. Chronic gamma radiation experiments :
   (1) Mutation rate of recessive visibles at specified loci
   (2) Induced male sterility
3. Developmental genetics :
   (1) Embryology of postaxial polydactyly and urogenital anomalies
   (2) The causes of ataxia and other abnormalities in *axax* homozygotes
   (3) Embryology of the behavioural defect " zigzag "
   (4) Embryology of hemimelia and horseshoe kidney
   (5) Chemical phenocopies

GLASGOW

CHEMISTRY DEPARTMENT, GLASGOW UNIVERSITY

Medical Research Council Staff

W. Carruthers, Ph.D.

Summary of Research

The identification and isolation of substances responsible for the cancer-producing action of high boiling petroleum fractions (under the direction of Professor J. W. Cook)

DEPARTMENT OF PSYCHOLOGICAL MEDICINE, GLASGOW UNIVERSITY

Medical Research Council Staff

A. C. Tait, M.B., D.P.H., D.P.M. (*until Dec.*, 1950)

Summary of Research

The rehabilitation and resettlement in industry of persons suffering from psychiatric disorders (under the direction of Professor T. Ferguson Rodger)

DIFFRACTION BRANCH, ATOMIC ENERGY RESEARCH ESTABLISHMENT

Medical Research Council Staff
Miss K. Little, D.Phil.

Summary of Research

Examination by X-ray diffraction and electron microscopy of :

(1) Inorganic constituents of teeth and bone

(2) Organic constituents of teeth and other tissues

(This work is carried out under the direction of Dr. J. Thewlis of the staff of the A.E.R.E.).

JAMAICA

UNIVERSITY COLLEGE OF THE WEST INDIES

Medical Research Council Staff.
J. C. Waterlow, M.D. (*part-time*)

Summary of Research

Factors responsible for malnutrition and their relation to liver disease

LONDON

LISTER INSTITUTE OF PREVENTIVE MEDICINE.

Medical Research Council Staff
Miss E. M. M. Hume, M.A.

Summary of Research

The effect of vitamin A on peptic ulceration in humans and rats

(Miss Hume also carries out a substantial amount of editorial work on behalf of the Council)

POSTGRADUATE MEDICAL SCHOOL OF LONDON

Medical Research Council Staff
W. M. Court-Brown, B.Sc., M.B., D.M.R.E.

Summary of Research

Studies of the physiological disturbances produced by ionising radiations

QUEEN ELIZABETH HOSPITAL FOR CHILDREN, HACKNEY.

Medical Research Council Staff
Miss Helen M. M. Mackay, M.D., F.R.C.P. (*part-time ; until May,* 1951)

Summary of Research

1. Collaboration in investigations into serum protein levels in infancy, including the development of a visual turbidometric method for the estimation of gamma globulin and an analysis of the rates of growth of infants receiving milk of different protein content
2. Collaboration in investigations into the factors affecting the incidence of infections during the neonatal period
3. Collaboration in studies on the incidence of morbidity of all types during the neonatal period

ST. ANN'S GENERAL HOSPITAL, TOTTENHAM.

Medical Research Council Staff
Miss J. Wright, D.M.
A. T. Roden, M.D., D.P.H., D.C.H. (*until May*, 1951)

Summary of Research

1. Bacteriological studies of infantile diarrhoea and vomiting, particularly in relation to cross infection in hospital wards
2. Serological investigations of *Bact. coli.* O 111 group and of *Bact. coli* O 55 group strains
3. Chemotherapeutic trials of streptomycin and of aureomycin in the treatment of infantile diarrhoea and vomiting (in collaboration with Dr. M. B. Alexander)
4. Methods of disinfecting infants' bottles and teats (in collaboration with members of the Public Health Laboratory Service)

UNIVERSITY COLLEGE

Medical Research Council Staff
H. Davson, D.Sc.

Summary of Research

1. The distribution of chloride between the aqueous humour and the blood plasma in a wide variety of species
2. Kinetics of the transfer of substances from the blood into the aqueous humour
3. The active transport of sodium and potassium in the erythrocyte

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL.

Medical Research Council Staff
O. Lindan, M.D., Ph.D. (*until June*, 1951)

Summary of Research

Experimental studies on dietetic diseases of the liver

MANCHESTER

DEPARTMENT OF EDUCATION FOR THE DEAF, MANCHESTER UNIVERSITY

Medical Research Council Staff
P. Gaskill, B.A.

Summary of Research

The evaluation of the validity and uses of measuring techniques in three inter-related studies :

(1) The educational guidance of children with defective hearing in schools for the deaf
(2) The clinical diagnosis and educational guidance of problem cases among school children suspected of deafness
(3) The study of children who have suffered from tuberculous meningitis and who have been or are being treated with streptomycin

(This work is carried out under the direction of Professor A. W. G. Ewing)

DIVISION OF INDUSTRIAL BIOCHEMISTRY, FACULTY OF TECHNOLOGY, MANCHESTER UNIVERSITY

Medical Research Council Staff

M. Woodbine, Ph.D., F.R.I.C. (*seconded from Ministry of Food; until May*, 1951)

Miss S. Murray, B.Sc.

Summary of Research

Studies on the synthesis of fats by micro-fungi (under the direction of Dr. T. K. Walker)

NUFFIELD DEPARTMENT OF OCCUPATIONAL HEALTH, MANCHESTER UNIVERSITY

Medical Research Council Staff

S. B. Rampling, B.Sc., M.D., M.R.C.P. (*until June*, 1951)

Summary of Research

1. Survey of the register of disabled persons
2. Studies of the rehabilitation and resettlement of persons suffering from chronic bronchitis (under the direction of Professor R. E. Lane)

OXFORD

INSTITUTE OF SOCIAL MEDICINE

Medical Research Council Staff

Mrs. J. W. Webb, M.B., D.P.H., D.I.H.

Summary of Research

1. Epidemiological studies of pulmonary tuberculosis (with Dr. A. Stewart)
2. Methods of recording sickness absence in industry with special reference to the study of the spread of airborne infections
3. Trends in maternal mortality in England and Wales
4. Studies in occupational morbidity with special reference to the choice of occupation by the physically unfit

SIR WILLIAM DUNN SCHOOL OF PATHOLOGY

Medical Research Council Staff

A. Q. Wells, D.M.

Attached Workers

Mrs. Flora J. Philpot, B.A. (*part-time; until July*, 1951)

J. A. H. Wylie, M.D., D.Phil. (*part-time*)

Summary of Research

1. Trials of the use of the vole bacillus as a means of raising resistance to tuberculosis in man
2. The properties of some chemical fractions of the tubercle bacillus
3. The effects of drying on the viability of mycobacteria
4. The effect of some antibacterial substances on mycobacteria *in vitro* and *in vivo*
5. Problems of sarcoidosis and experimental tuberculosis

SHEFFIELD

DEPARTMENT OF PATHOLOGY, SHEFFIELD UNIVERSITY

Medical Research Council Staff
H. B. Stoner, B.Sc., M.D.
C. J. Threlfall, B.Sc.

Summary of Research

1. Carbohydrate and nucleotide metabolism in nucleotide and other forms of shock
2. The effect of nucleotide and other forms of shock on the distribution of radioactive phosphorus in the body
3. The role of the suprarenal gland in the response to injury and in water metabolism
4. The effect of systemic disease on the suprarenal gland of infants and children (with Drs. H. J. Whiteley and J. L. Emery)
5. The effect of nucleotide and other forms of shock on water metabolism

(This work is carried out under the direction of Professor H. N. Green)

TAPLOW

CANADIAN RED CROSS MEMORIAL HOSPITAL

Medical Research Council Staff
A. St. J. Dixon, M.D., M.R.C.P.

Summary of Research

Participation in the co-operative Anglo-American study of the value of ACTH and cortisone in rheumatic fever (under the direction of Dr. E. G. L. Bywaters)

UGANDA

MULAGO HOSPITAL, KAMPALA

Medical Research Council Staff
Miss M. D. Thompson, M.D., M.R.C.P.

Summary of Research

Studies of malnutrition in East Africa:

(1) Preliminary clinical survey of 100 cases of kwashiorkor

(2) Studies of gastro-intestinal function in selected cases of malnutrition

The Public Health Laboratory Service

(Directed by the Council for the Ministry of Health)

PUBLIC HEALTH LABORATORY SERVICE BOARD

A. Landsborough Thomson, C.B., O.B.E., D.Sc. (*Chairman*)
Professor S. P. Bedson, M.D., D.Sc., F.R.C.P., F.R.S.
C. Metcalfe Brown, M.D., D.P.H.
Sir John A. Charles, M.D., F.R.C.P., D.P.H.
Sir Alan N. Drury, C.B.E., M.D., F.R.C.P., F.R.S.
Sir Percival Hartley, C.B.E., M.C., D.Sc., F.R.S.
A. A. Miles, M.D., F.R.C.P.
W. H. Bradley, D.M., M.R.C.P. (*Observer, Ministry of Health*)

DIRECTOR

G. S. Wilson, M.D., F.R.C.P., D.P.H.
38 Old Queen Street, London, S.W.1

CENTRAL PUBLIC HEALTH LABORATORY

Colindale Avenue, London, N.W.9

Lt.-Col. H. J. Bensted, O.B.E., M.C., R.A.M.C. (retd.) (*Director*)
J. D. Atkinson, F.I.M.L.T.
B. E. Andrews, M.R.C.S., Dip. Bact.
A. Bernstein, M.B.
A. R. Blowers, M.D., Dip. Bact. (*Director at Middlesbrough from Nov.*, 1951)
G. L. Le Bouvier, M.D., Dip. Bact. (*seconded to the London School of Hygiene and Tropical Medicine*)
Mrs. N. Datta, M.D., Dip. Bact. (*seconded to the Lister Institute*)
R. Dowdeswell, M.D.
Mrs. J. M. B. Edwards, M.B. (*part-time*)
Miss M. C. Holmes, Ph.D.
H. D. Holt, M.R.C.S., D.P.H., Dip. Bact.
K. Machacek, M.D. Prague, D.P.H. Prague
Miss M. E. Rowatt, B.Sc. (*seconded to the Lister Institute*)
C. C. Spicer, M.R.C.S., Dip. Bact.
Miss M. E. M. Thomas (Mrs. Livingstone), B.Sc., M.B., D.P.H.
J. C. N. Westwood, M.B., Dip. Bact. (*seconded to University College Hospital, London*)
G. B. Bruce White, M.R.C.S. (*on military service*)
Miss B. H. Whyte, M.A.

REGIONAL LABORATORIES

Cambridge: Public Health Laboratory, Tennis Court Road

R. M. Fry, M.R.C.S. (*Director*)
Miss J. M. Boissard, M.R.C.S.
C. H. Jellard, B.M., Dip. Bact.
E. M. Mackay-Scollay, M.B.
J. McCoy, M.B., D.P.H.
A. M. McFarlan, M.D.
G. H. Tee, M.R.C.S. (*Director at Dorchester from June*, 1951)
P. J. Wormald, M.B.

Cardiff: Public Health Laboratory, Institute of Preventive Medicine, The Parade

Scott Thomson, M.D., M.R.C.P.E., D.P.H. (*Director*)
I. A. Bolz, M.D. (Vienna), D.P.H.
D. G. Davies, M.B., Dip.Bact. (*seconded to Welsh National School of Medicine*)
A. D. Evans, B.Sc., M.B., Dip. Bact.
R. W. S. Harvey, M.B., Dip. Bact.
J. Marks, M.D., Dip. Bact.

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Manchester : Public Health Laboratory, Monsall Hospital
M. T. Parker, M.B., Dip. Bact. (*Director*)
Miss M. O. Adams, M.B., Dip. Bact.
Mrs. H. J. Mair, M.D.
N. S. Mair, M.B., D.C.H., Dip. Bact.
Miss J. M. Watkinson, B.Sc.

Newcastle : Public Health Laboratory, General Hospital, Westgate Road
A. I. Messer, M.B., D.P.H. (*Director*)
W. F. Lewis, B.Sc. (*until March*, 1951)
C. R. Peck, Member of Medical Faculty of Calcutta, Dip. Bact.
H. G. M. Smith, M.B., Ph.D., Dip. Bact.

Oxford : Public Health Laboratory, Walton Street
R. L. Vollum, D.Phil. (*part-time ; Director*)
G. T. Cook, M.D. (*Assistant Director*)
B. R. Frisby, M.B. (*on military service*)
W. H. H. Jebb, M.D., Barrister-at-law
Miss H. K. Linn, B.Sc.
A. M.-M. Payne, M.D., M.R.C.P.
A. H. Tomlinson, B.A.

AREA LABORATORIES

Aberystwyth : Public Health Laboratory, Cardiganshire General Hospital
Miss M. V. N. Sudds, M.B., D.T.M. & H (*Director*)

Bedford: Public Health Laboratory, General Hospital, Kimbolton Road (opened Oct., 1951)
W. F. Lane, M.Sc., M.B., D.P.H. (*Director*)

Birkenhead : Public Health Laboratory, 42 Hamilton Square
J. M. Ritchie, M.B., D.P.H. (*Director*)

Birmingham : Public Health Laboratory, 150 Great Charles Street
B. R. Sandiford, M.D. (*Director*)
Miss P. M. Congdon, M.D., D.P.H., Dip. Bact.

Bradford : Public Health Laboratory, 16–18 Edmund Street
A. J. H. Tomlinson, M.B. (*Director*)
W. J. Ryan, M.B., D.P.H., Dip. Bact.

Brighton : Public Health Laboratory, Royal Sussex County Hospital
J. E. Jameson, M.R.C.S. (*Director*)

Carmarthen : Public Health Laboratory, Penlan Road
W. Kwantes, M.B., Dip. Bact. (*Acting Director*)

Conway : Public Health Laboratory, " Bryn Hyfryd "
A. J. Kingsley Smith, B.M. (*Director*)

Coventry : Public Health Laboratory, Stoney Stanton Road
R. E. Jones, B.Sc., M.R.C.S., D.P.H. (*Director*)
A. J. Beale, M.D.

Dorchester : Public Health Laboratory, Glyde Path Road (opened June, 1951)
G. H. Tee, M.R.C.S. (*Director*)

Epsom : Public Health Laboratory, West Hill House, West Hill
Miss D. M. Stone, M.D., D.P.H. (*Director*)
Mrs. M. Adams, M.D.Amsterdam (*part-time*)

Exeter : Public Health Laboratory, 7 Dix's Field
B. Moore, M.B. (*Director*)

Harrogate : Public Health Laboratory, Department of Pathology, Harrogate and District General Hospital (opened Oct., 1951)
L. A. Little, M.B., Dip. Bact. (*Director*)

Hereford : Public Health Laboratory, County Hospital
D. R. Christie, M.B., Dip. Bact. (*Director*)

Hull : Public Health Laboratory, 184 High Street
C. L. Greening, M.R.C.S. (*Director*)
Miss P. E. T. Forbes, B.Sc., Dip. Bact.

Ipswich : Public Health Laboratory, Borough General Hospital, Woodbridge Road
P. H. Martin, B.M., F.R.C.P., D.T.M. & H. (*Director*)
J. A. Sykes, M.R.C.S., D.P.H., Dip. Bact.

Leicester : Public Health Laboratory, Isolation Hospital, Groby Road
E. H. Gillespie, M.B. (*Director*)
Miss R. C. J. James, M.B., Dip. Bact.

Lincoln : Public Health Laboratory, St. Anne's Road
J. M. Croll, M.B., D.P.H. (*Director*)

London (Camberwell) : Public Health Laboratory, 134 Denmark Hill, S.E.5
G. W. J. Bousfield, M.D. (*part-time; Director*)

London (Hither Green) : Public Health Laboratory, Park Hospital, S.E.13
J. E. McCartney, M.D., D.Sc. (*part-time; Director*)

Luton : Public Health Laboratory, Town Hall
J. H. C. Walker, M.B., D.P.H. (*Director*)

Middlesbrough : Public Health Laboratory, General Hospital, Ayresome Green Lane (opened Nov., 1951)
A. R. Blowers, M.D., Dip. Bact. (*Director*)

Newcastle : Public Health Laboratory, Government Buildings, Ponteland Road
R. Norton, M.B., D.P.H. (*Director*)
Miss E. C. Armstrong, M.D., Dip.Bact.
Mrs. B. Donaldson, M.R.C.S. (*until April*, 1951)

Newport (Mon.) : Public Health Laboratory, County Hall
R. D. Gray, M.D., D.P.H. (*Director*)

Northallerton : Public Health Laboratory, The Friarage Hospital
D. J. H. Payne, M.B. (*Director*)

Northampton : Public Health Laboratory, General Hospital
L. Hoyle, M.B. (*Director*)

Norwich : Public Health Laboratory, Isolation Hospital, Bowthorpe Road
Miss L. M. Dowsett, M.D. (*Director*)

Nottingham : Public Health Laboratory, 63 Goldsmith Street
G. B. Ludlam, M.B., D.T.M. & H., D.L.O. (*Director*)

Peterborough : Public Health Laboratory, Peterborough and District Memorial Hospital
C. C. B. Gilmour, O.B.E., M.B. (*Director*)

Poole : Public Health Laboratory, Municipal Buildings
G. J. G. King, M.B., Dip. Bact. (*Director*)

Portsmouth : Public Health Laboratory, "G" Block, Infectious Diseases Hospital
K. E. A. Hughes, M.B.E., M.R.C.S. (*Director*)
D. A. Skan, M.B.E., M.B., D.T.M., D.T.H.

Reading : Public Health Laboratory, The Battle Hospital
N. Wood, B.Sc., M.D. (*Director*)

Sheffield : Public Health Laboratory, City General Hospital
L. G. Cook, M.B., D.P.H. (*part-time; Acting Director*)
Miss M. Pownall, M.B., D.P.H., Dip. Bact.

Shrewsbury : Public Health Laboratory, Royal Salop Infirmary
A. C. Jones, M.B. (*Director*)

Southampton : Public Health Laboratory, The Health Centre, King's Park Road
Miss R. I. Hutchinson, M.D., D.P.H., D.T.M. (*Director*)

Southend : Public Health Laboratory, Westcliff Hospital, Balmoral Road
R. Pilsworth, M.D., Dip. Bact. (*Director*)

Stafford : Public Health Laboratory, Martin Street
R. N. Phease, M.B. (*Director*)

Sunderland : Public Health Laboratory, Royal Infirmary
P. B. Crone, M.D., Dip. Bact. (*Director*)

Taunton : Public Health Laboratory, County Hall
J. A. Boycott, D.M. (*Director*)

Truro : Public Health Laboratory, Royal Cornwall Infirmary
F. D. M. Hocking, B.Sc., M.B. (*Acting Director*)

Wakefield : Public Health Laboratory, County Medical Offices, Wood Street
W. F. Lane, M.B., M.Sc., D.P.H. (*Director; until June*, 1951)
Brig. H. T. Findlay, M.B., D.P.H., R.A.M.C. (retd.) (*Director*)
L. A. Little, M.B., Dip.Bact. (*until July*, 1951)
H. Fennell, B.Sc.

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Watford : Public Health Laboratory, Peace Memorial Hospital

Mrs. B. H. E. Cadness-Graves, M.Sc., M.B. (*half-time; Director*)

Mrs. C. B. Subramanian, B.Sc., Dip. Bact.

Winchester : Public Health Laboratory, Royal Hants County Hospital

R. D. Mackenzie, M.B., F.R.C.P.E., Dip. Bact. (*Director*)

Worcester : Public Health Laboratory, Royal Infirmary

R. J. Henderson, M.B. (*Director*)

REFERENCE LABORATORIES

Central Enteric Reference Laboratory and Bureau (Colindale)

A. Felix, D.Sc., F.R.S. (*Director*)
E. S. Anderson, M.B., Dip. Bact.
Miss B. R. Callow, M.A.

Dysentery Reference Laboratory (Oxford)

Mrs. K. Patricia Carpenter, M.B., Dip. Bact. (*Acting Director*)

Malaria Reference Laboratory (Horton Hospital, Epsom)

Sir Gordon Covell, C.I.E., M.D., D.P.H., D.T.M. & H. (*Director*)
P. G. Shute, M.B.E. (*Assistant Director*)

Mycological Reference Laboratory (London School of Hygiene and Tropical Medicine)

Mrs. J. I. J. Walker, Ph.D. (*Acting Director*)
Mrs. G. M. Colombo, B.Sc.

Salmonella Reference Laboratory (Colindale)

Mrs. J. Taylor, B.Sc., M.B., D.P.H. (*Director*)
Miss S. H. Douglas, M.Sc.
Miss R. E. Hilton, B.Sc.

Streptococcus and Staphylococcus Reference Laboratories (Colindale)

R. E. O. Williams, B.Sc., M.D. (*Director*)
Miss S. J. McLean, M.Sc.
Miss S. I. McVie, B.Sc. (*until Sept.*, 1951)
Miss J. E. Rippon, B.Sc., Dip. Bact.

Venereal Diseases Reference Laboratory (St. Peter's Hospital, Whitechapel, London, E.1)

I. N. Orpwood Price, M.R.C.S., D.P.H. (*part-time; Director*)
A. E. Wilkinson, M.R.C.S. (*part-time*)

Virus Reference Laboratory (Colindale)

F. O. MacCallum, B.Sc., M.D. (*Director*)
A. P. Goffe, M.B., Dip. Bact.
A. D. Macrae, M.D., Dip. Bact.
B. P. Marmion, M.D.

SPECIAL LABORATORIES

Air Hygiene Unit (Colindale)

R. E. O. Williams, B.Sc., M.D. (*Director*)
Miss A. P. Hirch, B.Sc.
T. Nash, M.A., B.Sc., A.R.I.C.

Epidemiological Research Unit (Headquarters Office)

W. C. Cockburn, M.B., D.P.H. (*Director*)
J. C. McDonald, M.D., D.P.H., D.I.H. (*at Colindale*)
Miss J. Beveridge, B.Sc. (*at Colindale*)
Miss E. J. Simpson, B.Comm.

Epidemiological Research Unit (Cirencester)

R. E. Hope-Simpson, M.B. (*part-time; Director*)

Food Hygiene Unit (Colindale)

Miss B. C. Hobbs, Ph.D., Dip. Bact. (*Director*)
Mrs. M. B. M. Furbank, B.Sc.

National Collection of Type Cultures (Colindale)

S. T. Cowan, M.D., Dip.Bact. (*Director*)
Mrs. P. H. Clarke, B.A.
Miss M. G. Jennens, B.Sc.
Miss H. E. Ross, B.Sc.
Miss C. Shaw, M.Sc., Dip. Bact.
Miss J. M. Stitt, B.Sc.

Standards Laboratory for Serological Reagents (Colindale)

Lt.-Col. H. J. Bensted, O.B.E., M.C., R.A.M.C. (retd.) (*Director*)
Mrs. C. M. P. Bradstreet, M.B.
Miss M. W. Hully, B.Sc.

JUNIOR BACTERIOLOGISTS IN TRAINING (UNALLOCATED)

Miss E. C. Armstrong, M.D., Dip.Bact. (*until Oct.*, 1951)
Mrs. S. R. Cavanagh, M.B.
P. Chadwick, M.B.
L. A. Hatch, M.B.
Miss M. K. Herring, M.B., D.P.H.
J. G. Howard, M.B.
Miss B. Hull (Mrs. Ivey), M.B.
Miss J. J. Mackintosh, M.B.
P. G. Mann, M.B.
J. Nagington, M.B., Dip.Bact. (*from Aug.*, 1951, *on military service*)
Miss P. M. Poole, M.B.
L. Robertson, B.M.
J. A. Rycroft, M.A., M.B.
K. R. Wallace, M.B.

Summary of Research

INFECTIOUS DISEASES

1. Diphtheria :
   (1) The testing of new prophylactics
   (2) The immunisability of very young infants
2. Dysentery :
   (1) Investigation of potential new members of the *Shigella* genus
   (2) The epidemiology and bacteriology of Sonne dysentery
   (3) Production of fermentative variants by *Sh. sonnei* and other " late fermenting " organisms
3. Enteric fever :
   (1) Vi-phage typing schemes of *Salm.paratyphi B* and *Salm.typhi-murium*
   (2) " Natural " and adapted Vi bacteriophages
   (3) A new method of standardising the serological diagnosis of the enteric fevers (for the World Health Organisation)
   (4) The immunising potency of alcoholised typhoid vaccine after storage for ten years
   (5) Virulence of *Salm. typhi* for mice and for man
   (6) A study of beach pollution in west-country resorts
   (7) The use of calcium alginate swabs for the cultivation of enteric organisms from sewage
4. Food poisoning :
   (1) Continued investigation of the incidence and causes of outbreaks in England and Wales
   (2) The identification of new types of salmonella organisms
   (3) The relationship of salmonellae in reptiles to human disease (in collaboration with Dr. James Mackey, Dar-es-Salaam)
   (4) The epidemiology of salmonella infection, with particular reference to duck eggs, meat in the slaughterhouse, and cold-blooded animals
   (5) Investigation of the distribution and mode of spread of *Salm. typhi-murium* infection (in collaboration with Brigadier J. S. K. Boyd)
   (6) A survey, by the sewage-swab method, of salmonella infection in a west-country fishing village
   (7) Serological typing of strains of *Cl. welchii* associated with outbreaks of food poisoning
   (8) Selective and enrichment media for the isolation of salmonella organisms
5. Influenza :
   (1) The structure and intracellular growth of the influenza virus
   (2) The serological diagnosis of epidemic influenza

6. Malaria :
   (1) Studies on naturally induced quartan malaria in non-immune subjects
   (2) Studies on the morphology of *Plasmodium malariae* both in man and in the mosquito, and on the clinical course of the disease
   (3) Observations on *P.berghei* in rodents, and on *P.gallinaceum* and *P.relictum* in birds

7. Measles :
   (1) The efficacy of gamma globulin and adult measles serum in the prevention and attenuation of measles
   (2) Investigation of homologous serum hepatitis in children inoculated with gamma globulin and adult measles serum
   (3) Investigation into the possible loss of potency of gamma globulin with storage in the liquid state

8. Mycological infections :
   (1) The natural history of dermatophytes
   (2) Survey of the dermatophytes and dermatophytoses of Nigeria (in collaboration with Dr. G. H. V. Clarke, Nigerian Medical Service)
   (3) The use of gaseous methods for the sterilisation of Army footwear contaminated with ringworm fungi (in collaboration with the Pest Infestation Laboratory, Slough)

9. Neonatal diarrhoea :
   The bacteriology of strains of *Bact. coli* and paracolon organisms associated with outbreaks of neonatal diarrhoea

10. Virus pneumonia :
   Investigation of pneumonia of presumed virus origin (in collaboration with the Council's Antibiotics Clinical Trials Committee)

11. Poliomyelitis :
   (1) Joint clinical and epidemiological investigation into the role of "activating agents" such as trauma, inoculations, illnesses, operations and physical activity in the aetiology of poliomyelitis
   (2) Investigation of cases occurring after recent prophylactic inoculation or tonsillectomy
   (3) The analysis of records of all prophylactic inoculations given in local health authority clinics in all County Boroughs and in Municipal Boroughs with a population of more than 100,000 (in collaboration with the medical officers of health)
   (4) The relative value of sewer swabs and liquid sewage in detecting the presence of the poliomyelitis virus
   (5) The use of the sewer swab in the study of the prevalence of poliomyelitis virus during epidemic and non-epidemic periods

12. Q fever :
   Further investigations into the epidemiology of Q fever

13. Respiratory infection :
   (1) Pharyngeal inclusion bodies in the new-born
   (2) The presence of salmonella, shigella and coli-aerogenes organisms in normal and inflamed throats

14. Smallpox :
    (1) The effect of certain disinfectants, cleansing agents and laundering processes on the virus of smallpox
    (2) The use of the air sampler in the study of the dust-borne spread of smallpox
15. Staphylococcal infection :
    (1) Analysis of the results of bacteriophage typing
    (2) Examination of the serology of staphylococcal phages and of the apparent change in the serological reactions of the phage
    (3) The nasal carriage rate and penicillin sensitivity of *Staph. aureus* in mothers and their infants
    (4) The role of staphylococcal infection in Beat disorders of miners
    (5) Standardisation of staphylococcal α-antitoxin
16. Streptococcal infection :
    (1) Epidemiological investigation of the incidence and spread of streptococcal sore throats in different parts of the country. The relation of nose and throat carriers to contamination of bed clothes and personal clothing
    (2) Analysis of the antigenic structure of *Str.pyogenes*, Types 2 and 28
    (3) The development of an indirect bactericidal test for demonstrating protective antibodies against streptococci in human and rabbit sera
    (4) Investigation of methods of preparing Group D streptococcal grouping sera, and the reasons for difficulty in extracting the antigen
    (5) The distribution of different serological types of streptococci in S. Wales
    (6) Aerobic and anaerobic cultivation of β-haemolytic streptococci from throat swabs
    (7) Investigation of toxic effects of different fractions of haemolytic streptococci
    (8) Investigation of the characteristics of about 90 strains of haemolytic streptococci of Group B from human sources
17. Tuberculosis :
    (1) The comparison of different concentration methods in the cultivation of tubercle bacilli from pathological material
    (2) A comparison of Corper and Cohn's medium with Loewenstein's medium using varying amounts of glycerine for the cultivation of tubercle bacilli in sputum
    (3) Comparison of the merits of five different media in the cultivation of tubercle bacilli of bovine origin
    (4) The value of papain as a homogenising agent in the preparation of sputum for the examination of tubercle bacilli
    (5) The nature of tuberculin hypersensitivity
    (6) The bacteriostatic effect of tissue fluids on tubercle bacilli
    (7) The effect of hyperthermia and streptomycin on experimental tuberculosis
    (8) Treatment of tuberculous infections with tuberculin and streptomycin
18. Tuberculous meningitis :
    The laboratory diagnosis of tuberculous meningitis
19. Venereal disease :
    (1) An improved method of performing the Wassermann Reaction : " The Whitechapel Wassermann Reaction "

(2) Investigation of Kahn's Universal Reaction and its application to the problem of non-syphilitic serum reactions

(3) The effect on specimens of whole blood of travel, time and temperature (on behalf of the World Health Organisation)

(4) Parallel testing of 140 sera received from Lisbon, Baghdad and Albany (N.Y.) in order to compare the sensitivity and specificity of the tests employed (on behalf of the World Health Organisation)

(5) Parallel testing of freeze-dried sera to ascertain the stability of the reagin content (on behalf of the World Health Organisation)

20. Whooping cough :

(1) A comparison of the immunising potency of different vaccines by means of (*a*) the mouse test and (*b*) field trials on over 10,000 children

(2) Controlled field and laboratory trials of British vaccines made according to an American formula, and of Cohen's liquid medium vaccine

(3) Preliminary investigation of a combined diphtheria-pertussis prophylactic which does not contain alum (in collaboration with the medical officers of health of Bolton County Borough and Ealing Municipal Borough)

(4) A comparison of Lacey, Atkinson, and Bordet-Gengou media for the isolation of *H.pertussis* from cases

(5) Metabolism of *H.pertussis*

21. Winter vomiting disease :

Epidemiological, bacteriological and virological studies of the disease

SANITARY BACTERIOLOGY

1. Air hygiene :

(1) Survey of substances that may be useful aerial bactericides

(2) Tests of neutralising agents for formaldehyde

2. Food hygiene :

Further investigations of factors responsible for bacterial growth in synthetic cream

3. Milk :

Investigation of the Ring test for brucella organisms in milk

4. Ice-cream :

The irregular behaviour in the 44°C. MacConkey test of some strains of " faecal coli " in ice-cream

5. Water :

(1) The effect of storage at different temperatures on the coliform count of water samples

(2) The possible bactericidal effect of thiosulphate used as a neutralising agent to chlorine in water

MISCELLANEOUS

1. The use of quinone compounds as selective inhibitors in culture media
2. The accuracy of the disc technique for the estimation of the antibiotic sensitivity of organisms
3. The use of penicillin as an aid to primary isolation

4. The relationship, if any, of dye-sensitivity to cell amino-acids
5. Syringe-transmission of *Staph.aureus* in prophylactic inoculations
6. Investigation of the physical separation of organisms for diagnostic purposes
7. The presence of anthrax bacilli on imported hides, and the effect of disinfectants in their treatment
8. The effect of cortisone and ACTH on antibody production
9. The development of new biochemical methods in bacteriology
10. Investigation of the type of flagella on *Pfeifferella whitmori* (*Loefflerella pseudomallei*)
11. The relation of the Coxsackie group of viruses to epidemic myalgia or pleurodynia, and non-paralytic poliomyelitis or aseptic meningitis
12. Investigation of a method of counting total bacteria in bacterial suspensions
13. The antigenicity of mitochondria (in collaboration with Dr. Margery MacFarlane at the Lister Institute)
14. Study of the increase of serum proteins in rheumatoid arthritis
15. The sterilisation of rubber gloves
16. Tetrathionase adaptation : suspected change-over from fermentative to oxidative attack on substrate during adaptation
17. Studies on environmental contamination with intestinal organisms
18. Electronic red cell counter
19. Standardisation of the serological diagnosis of the typhus group of fevers (for the World Health Organisation)

RESEARCH WORK AIDED BY GRANTS

During the period covered by this Report the Council have continued to make research grants to individual workers in aid of an extensive programme of clinical and laboratory investigations. A list of these grants, arranged according to the geographical location of the institutions in which they are held, is given below.

ABERDEEN

UNIVERSITY OF ABERDEEN

Bacteriology Department

Mrs. D. Oxford—assistance by Dr. J. W. Porteous, and expenses : studies of actinomycosis in man and cattle

Physiology Department

Dr. H. W. Kosterlitz—assistance by Miss R. M. Campbell, and expenses : effects of nutritional, hormonal and other factors on the structure of the liver

Surgery Department

Professor W. C. Wilson—assistance by Dr. Isabel E. James : biological actions of blood and tissue polypeptides

BIRMINGHAM

QUEEN ELIZABETH HOSPITAL

Mr. W. Stirk Adams—expenses : radiation treatment in deafness

UNIVERSITY OF BIRMINGHAM

Anatomy Department

Professor S. Zuckerman—expenses : factors controlling the early development of germinal epithelium

Dr. E. M. B. Clements and others—personal and expenses : anthropometric studies (under the general direction of Professor Zuckerman)

Bacteriology Department

Dr. K. A. Bisset—assistance by Mr. E. O. Morris, and expenses: bacteriology of dental caries

Chemistry Department

Professor M. Stacey—assistance by Mrs. S. H. Henry and Miss M. Hilton, and expenses: studies in microbiological chemistry

Dr. G. A. Gilbert—assistance by Mr. R. W. Baldwin: physico-chemical and immunological studies of the tubercle bacillus (in collaboration with Dr. C. N. Iland—*see* p. 105)

Pathology Department

Professor J. R. Squire—assistance by Dr. Isobel Hinde and Dr. J. Hardwicke : allergic reactions and related problems

Pathology Department (Cancer Research Laboratory)

Dr. D. L. Woodhouse—expenses : for work on behalf of the Committee on the Carcinogenic Action of Mineral Oils

Pharmacology Department

Professor A. C. Frazer—expenses :
Dr. J. M. French—personal :
Dr. W. F. R. Pover—personal :
Dr. P. E. Sagrott—personal :
Dr. F. W. J. Teale—personal :
} studies of fat metabolism and absorption

Physiology Department

Dr. Margit Beznák—personal and expenses : mechanism of cardiac hypertrophy, with particular reference to the role of hormones

Social Medicine Department

Dr. B. MacMahon—personal : studies of human congenital malformations

Zoology Department

Professor P. B. Medawar—assistance by Miss J. Marchant and expenses : immunological behaviour of leucocytes

BRISTOL

UNIVERSITY OF BRISTOL

Anatomy Department

Professor J. M. Yoffey—assistance by Mr. K. W. Keohane, and expenses : use of the reflecting microscope in the study of steroid compounds (with Dr. C. R. Burch)

Dr. E. J. Field—expenses : mechanism of virus invasion of the central nervous system

Chemistry Department

Dr. D. D. Eley—assistance by Dr. A. Couper, and expenses : physical chemistry of enzyme catalysis

Physiology Department

Dr. J. Grayson—expenses : reflex mechanisms underlying circulatory changes in the colon

Dr. H. Sosnowick—expenses : kidney function in relation to urea excretion

Preventive Medicine Department

Dr. C. N. Iland—expenses : immunochemistry of *M. tuberculosis* antigens

Zoology Department

Professor J. E. Harris—assistance by Mr. D. T. King, and expenses : biological applications of autoradiography

CAMBRIDGE

STRANGEWAYS RESEARCH LABORATORY

Dr. Honor B. Fell and colleagues—expenses : studies of cell and tissue growth

UNIVERSITY OF CAMBRIDGE

Chemical Laboratory

Dr. F. G. Mann—assistance by Mrs. Joan A. Reid, and expenses : synthesis of new compounds for test as therapeutic agents in schistosomiasis and amoebiasis

Colloid Science Department

Professor F. J. W. Roughton—assistance by Mr. R. L. J. Lyster : gas absorption properties of haemoglobin

Dunn Nutritional Laboratory

Dr. I. Clark—personal : physiological action of vitamins

Mr. S. P. Mistry—personal : effects of " strepogenin " in promoting the growth of bacteria

Pathology Department

Dr. Dorothy H. Heard—personal : haemolytic disease of the newborn and related blood group problems

Pharmacology Department

Dr. F. Howarth—expenses : radioactive tracer studies of cerebral blood flow

Physiological Laboratory

Dr. J. Beattie—expenses : the effect of hypothalamic lesions on adrenal cortical function

Dr. G. W. Harris—expenses : the effect of electrical stimulation of the hypothalamus on the secretion of anterior pituitary thyrotrophic hormone

Dr. S. M. Hilton—personal and expenses : local peripheral vascular reactions during muscular work (under the supervision of Dr. J. Beattie)

Dr. Pamela M. Holton—personal and expenses : chemical transmitter responsible for antidromic vasodilation

Dr. B. H. C. Matthews—expenses : electrophysiology of the central nervous system

Dr. W. A. H. Rushton—expenses : electrophysiology of the retina

Sir William Dunn School of Biochemistry

Professor F. G. Young—expenses : influence of pituitary hormones on metabolism

Dr. June D. Cross—personal : studies of carbohydrate metabolism (under the supervision of Dr. Dorothy Needham)

Dr. M. Dixon—assistance by Miss B. A. Askonas : problems of enzyme chemistry

Dr. Cecilia Lutwak-Mann—personal and expenses : cell metabolism, with special reference to the blood forming tissues and the reproductive system

Dr. Dorothy Needham—personal and expenses : the effect of adrenal cortical steroids on carbohydrate metabolism

Dr. R. H. Smith—personal : physico-chemical studies of pituitary hormones (under the direction of Professor F. G. Young)

Zoology Department

Lord Rothschild—expenses : problems of fertilization and the physiology of spermatozoa

CARDIFF

WELSH NATIONAL SCHOOL OF MEDICINE

Pathology and Bacteriology Department

Professor J. Gough—expenses : pathology of pneumoconiosis

Pharmacology Department

Dr. J. D. P. Graham—expenses : pharmacology of potential anti-histaminic compounds (in association with Dr. N. B. Chapman, University College, Southampton, p. 118)

WHITCHURCH HOSPITAL

Neuropsychiatric Research Centre

Dr. D. Richter—assistance by Mr. G. B. Ansell and Mr. L. W. Tyrrell, and expenses : brain chemistry

DUNDEE

UNIVERSITY COLLEGE

Biochemistry Department

Dr. R. P. Cook—(1) assistance by Mr. D. C. Edwards, and expenses : cholesterol metabolism ; (2) assistance by Mr. R. M. Mackenzie : protein formation in *Penicillium notatum*

Physiology and Biochemistry Department

Professor G. H. Bell—expenses : physical properties of bone in relation to fluorosis

Mr. B. L. Andrew—assistance by Mrs. J. Oliver : innervation of the larynx

EDINBURGH

UNIVERSITY OF EDINBURGH

Biochemistry Department

Professor G. F. Marrian—assistance by Dr. J. Y. F. Paterson and Miss E. S. Sutherland, and expenses : metabolism of steroid hormones

Clinical Laboratory (Royal Infimary)

Dr. C. P. Stewart—assistance by Miss S. M. Mitchell and Miss R. Renwick, and expenses : studies of renal function and related problems

Department of Medicine (Royal Infirmary and Northern General Hospital)

Dr. J. J. R. Duthie—assistance by Mrs. A. Crossland, and expenses : clinical and metabolic studies of rheumatic disease

Institute of Animal Genetics

Professor C. H. Waddington—expenses : cytogenetic effects of low intensity radiation

Pharmacological Laboratory

Dr. Regine Kapeller-Adler—expenses : histadine and histamine metabolism in pregnancy

Dr. Marthe L. Vogt—expenses : factors controlling the release of hormones from the adrenal cortex

Physiology Department

Professor D. Whitteridge—expenses : the connections of the inferior olive in relation to the function of the cerebellum

Dr. A. D. Dewar—expenses : the physiology of pregnancy

Dr. Mary Pickford—expenses : renal clearance in patients with pituitary disorders

Public Health and Social Medicine Department

Dr. R. Passmore—expenses : metabolic efficiency during muscular work

Surgery Department

Professor Sir James Learmonth—(1) assistance by Dr. E. J. Delorme, Dr. I. D. E. Storey and Mr. D. C. Simpson, and expenses : problems of experimental surgery ; (2) assistance by Dr. G. I. C. Ingram : problems of blood clotting in thrombo-angiitis obliterans and related conditions

ESSEX

RUNWELL HOSPITAL

Dr. S. L. Last—expenses : problems of electro-encephalography

Dr. H. Weil-Malherbe—assistance by Dr. J. Stern, and expenses : the hexokinase reaction in relation to hormonal changes in normal and psychotic subjects

GLASGOW

UNIVERSITY OF GLASGOW

Anatomy Department

Professor G. M. Wyburn—expenses : tissue grafts and homo-transplants

Bacteriology Department (Western Infirmary)

Professor C. H. Browning—assistance by Miss A. A. N. Keppie, and expenses : chemotherapeutic action of new trypanocidal compounds

Biochemistry Department

Professor J. N. Davidson—expenses : the chemical composition of the cell nucleus

Dr. H. N. Munro—expenses : protein metabolism

Chemistry Department

Professor J. M. Robertson—assistance by Miss C. M. Thompson : X-ray crystallographic studies of new compounds with possible cortisone-like action (in association with the Clinical Chemotherapeutic Research Unit, p. 62)

Dr. P. A. Ongley—personal : preparation of new compounds for trial in the Clinical Chemotherapeutic Research Unit (under the supervision of Professor J. W. Cook)

Infectious Diseases Department (Knightswood Hospital)

Dr. T. Anderson—assistance by Dr. N. R. Grist (subsequently seconded to the Virus Reference Laboratory, Central Public Health Laboratory, Colindale), Dr. Joan B. Landsman and Miss J. B. Fernie, and expenses : the mode of spread of respiratory diseases

Materia Medica and Therapeutics Department

Dr. A. Slessor—expenses : water retention in adreno-cortical insufficiency

Pathological Biochemistry Department

Dr. J. C. Eaton—expenses : hormone assay in diabetic pregnancy

Physiology Department

Dr. H. S. D. Garven—assistance by Miss I. Chapman : histology of the peripheral sympathetic nervous system

Social Medicine Department

Dr. I. M. Richardson—personal : studies of work and working capacity in old age

KENT

BUCKSTON BROWN RESEARCH FARM, DOWNE

Mr W. J. Dempster—expenses : experimental studies on the transplanted kidney

UNIVERSITY OF LEEDS

Bacteriology Department

Professor J. W. McLeod—expenses : studies of bacterial metabolism and related problems

Dr. J. Gordon—expenses : the reaction of bacteria to unusual metabolic environments

Biochemistry Department

Professor F. C. Happold—(1) assistance by Mr. R. L. Noble, and expenses : carbohydrate metabolism in manic-depressive psychosis ; (2) expenses : problems of microbiological chemistry

Clinical Pathology Department

Dr. D. H. Collins—expenses : the effect of cortisone and related substances in experimental arthritis

Medical Physics Department

Professor F. W. Spiers—assistance by Mr. P. J. R. Burch, and expenses : measurement of the normal radioactivity of the human body

Pharmacology Department

Professor W. A. Bain—expenses : histamine and histamine antagonists

Mr. J. G. Dare—expenses : bacterial pyrogens

Mr. P. Hey—expenses : structure-action relationships in choline derivatives

Physiology Department

Professor A. Hemingway—expenses : the effects of training on cardiac output and body metabolism

LIVERPOOL

UNIVERSITY OF LIVERPOOL

Bacteriology Department

Professor A. W. Downie—expenses : for work on behalf of the Streptomycin Clinical Trials (Tuberculosis) and Antibiotics Trials Committees

Biochemistry Department

Professor R. A. Morton—expenses : vitamin A and related topics

Dental Surgery School

Professor H. H. Stones—expenses : the influence of dietary sugar on the incidence of dental caries in infants and children

Dr. R. L. Hartles—assistance by Miss Norma MacDonald : the metabolism of saliva and the oral flora in relation to dental caries

Physiology Department

Professor R. A. Gregory—expenses : the physiology of the alimentary tract

School of Tropical Medicine

Professor R. M. Gordon—(1) assistance by Mr. W. L. Nicholas : the biology of *Culicoides sp.*, and their association with the spread of disease ; (2) expenses : schistosomiasis and filariasis

Professor B. G. Maegraith—assistance by Dr. E. S. Jones, and expenses : pathogenesis of hepatic lesions in malaria

LONDON

BARCLAY PERKINS RESEARCH DEPARTMENT

Miss R. J. Macaulay—personal : fat production by yeasts (under the supervision of Mr. H. J. Bunker)

BEDFORD COLLEGE FOR WOMEN

Chemistry Department

Professor E. E. Turner—assistance by Mr. R. F. Bird : synthesis of phenosafranine compounds in relation to the chemotherapy of filariasis

Physiology Department

Professor Margaret M. Murray—expenses : fluorosis and endemic goitre

Dr. D. F. Cheesman—assistance by Mrs. V. Rivlin, and expenses : application of the monomolecular film technique to the study of the mechanism of carcinogenesis and growth-inhibition

BIRBECK COLLEGE

Chemistry Department

Dr. R. E. Bowman—assistance by Mr. D. E. Ames and Miss B. W. Boughton : problems of microbiological chemistry

BROMPTON HOSPITAL

Dr. J. W. Clegg—expenses : for work on behalf of the Streptomycin Clinical Trials (Tuberculosis) and Antibiotics Trials Committees

CENTRAL MIDDLESEX HOSPITAL

Gastroenterology Department

Dr. F. Avery Jones—assistance by Dr. B. Hirschowitz and Miss K. Jones, and expenses : studies of peptic ulceration

CHELSEA POLYTECHNIC

Physics Department

Dr. Mary P. Lord—expenses : minute eye movements

GUY'S HOSPITAL MEDICAL SCHOOL

Chemical Pathology Department

Professor R. H. S. Thompson—assistance by Miss M. G. Ord, and expenses : nature of cholinesterase activity

Pharmacology Department

Professor J. M. Robson—expenses : pharmacology of sex hormones

IMPERIAL COLLEGE OF SCIENCE

Organic Chemistry Department

Dr. L. N. Owen—expenses : chemistry of thiol compounds

Physics Department

Dr. W. D. Wright—expenses : colour vision and related problems

INSTITUTE OF OPHTHALMOLOGY

Sir Stewart Duke-Elder—assistance and expenses (from a special fund provided by the Alexander Pigott Wernher Memorial Trustees) : problems of glaucoma and myopia

Dr. Katherine Tansley—personal : retinitis pigmentosa, retinal electrophysiology, and neutron cataract

KING'S COLLEGE HOSPITAL

Chemical Pathology Department

Professor C. H. Gray—(1) assistance by Miss P. E. Brockman, and expenses : bile pigment metabolism ; (2) expenses : hormone excretion in diabetic pregnancy

LISTER INSTITUTE OF PREVENTIVE MEDICINE

Biochemistry Department

Dr. P. Ellinger—expenses : problems of nicotinamide metabolism

Dr. W. T. J. Morgan—assistance by Dr. Winifred M. Watkins : biochemistry of human blood group substances

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

Biochemistry Department

Professor H. Raistrick—assistance by Dr. G. J. Lawson : chemistry of micro-organisms, with particular reference to the metabolic products of fungi

MAUDSLEY HOSPITAL

Mrs. M. Meyer—personal and expenses : histology of the olfactory tracts (with Professor W. E. Le Gros Clark at Oxford) ; effects of leucotomy

MIDDLESEX HOSPITAL MEDICAL SCHOOL

Courtauld Institute of Biochemistry

Professor E. C. Dodds—expenses : synthetic oestrogens

Dr. P. Pincus—personal : mechanism of dental caries

POSTGRADUATE MEDICAL SCHOOL OF LONDON

Department of Medicine

Professor J. McMichael—expenses : cardiovascular and respiratory disorders

Dr. C. L. Cope—assistance by Miss S. McCrae : adrenal function in conditions of physical stress

Dr. L. Cudkowicz—personal : vascular anatomy of the lungs, with particular reference to the changes in disease

Dr. Russell Fraser—expenses : iodine metabolism

Pathology Department

Professor E. J. King—assistance by Mrs. J. C. Dale, and expenses : studies of pneumoconiosis

Dr. D. A. Mitchison—expenses : for work on behalf of the Streptomycin Clinical Trials (Tuberculosis) and Antibiotics Trials Committees

Dr. G. I. M. Ross—expenses : microbiological assay of vitamin B_{12} in body fluids

Surgery Department

Mr S. F. Taylor—expenses : studies of thyroid function with radioactive iodine

PUBLIC HEALTH DEPARTMENT, ST. PANCRAS

Dr. D. H. Geffen—expenses : factors influencing the activation of paralysis in poliomyelitis (in association with Dr. J. H. Paterson at the National Hospital for Nervous Diseases, Queen Square, London)

QUEEN ELIZABETH HOSPITAL FOR CHILDREN, HACKNEY

Dr. B. Levin—expenses : serum protein levels in normal and premature infants (in collaboration with Dr. Helen Mackay)

ROYAL CANCER HOSPITAL

Chester Beatty Research Institute

Professor A. Haddow—expenses : for work on behalf of the Committee on Carcinogenic Action of Mineral Oils

Physics Department

Professor W. V. Mayneord and colleagues—assistance and expenses : application of nuclear physics to medical problems

ROYAL COLLEGE OF SURGEONS

Dr. S. Engel—personal and expenses : the comparative anatomy of the lung

ROYAL FREE HOSPITAL SCHOOL OF MEDICINE

Dr. A. Lawson—assistance by Mr. H. V. Morley, and expenses : anti-thyroid action of thiol compounds

ROYAL NATIONAL ORTHOPAEDIC HOSPITAL

Dr. J. T. Scales—expenses : the use of plastic materials as wound dressings, and in orthopaedic surgery

ROYAL NORTHERN HOSPITAL

Mr. Anthony Green—assistance by Mr. B. Spicer: improved techniques in X-ray therapy

ST. BARTHOLOMEW'S HOSPITAL

Pathology Department

Sir Ernest Kennaway—assistance by Mr. R. E. Waller and Mr. K. B. Dawson, and expenses : atmospheric pollution in relation to cancer of the lung

Dr. H. Lehmann—assistance by Miss Elsie Datlow, and expenses : problems of haemorrhage

ST. BARTHOLOMEW'S HOSPITAL MEDICAL COLLEGE

Biochemistry and Chemistry Department

Professor A. Wormall—assistance by Miss N. Salaman, Miss D. E. Richards, and expenses : the use of radioactive isotopes in immunological investigations ; studies of trypanocidal drugs

Physics Department

Professor J. Rotblat—expenses : the use of nuclear research emulsions in the study of living tissues

Physiology Department

Dr. D. A. McDonald—expenses : high-speed cinematographic recording of the arterial blood velocity

ST. MARK'S HOSPITAL

Mr. H. R. Thompson—expenses : follow-up studies of rectal cancer

ST. MARY'S HOSPITAL MEDICAL SCHOOL

Anatomy Department

Dr. J. J. Pritchard—expenses : mechanism of bone formation

Biochemistry Department

Professor R. T. Williams—expenses : metabolism of benzene derivatives

Physiology Department

Professor A. St. G. Huggett—assistance by Mr. D. Nixon and Miss D. P. Alexander, and expenses : physiology of the foetus and placenta

Wright-Fleming Institute of Microbiology

Professor R. Cruickshank—assistance by Miss B. T. Wicks : laboratory diagnosis of tuberculosis, with particular reference to the virulence factor

ST. PETER'S AND ST. PAUL'S HOSPITALS

Mr. H. G. Hanley—expenses : action potentials of the intact human ureter in relation to pain, spasm and atonia

ST. THOMAS'S HOSPITAL

Sherrington School of Physiology

Professor H. Barcroft—expenses : studies of the peripheral circulation

SCHOOL OF PHARMACY

Professor G. A. H. Buttle—expenses : problems of chemotherapy ; pharmacological studies of substances simulating the action of cortisone (on behalf of the Council's Clinical Chemotherapeutic Research Unit, p. 62)

Professor G. A. H. Buttle and the late Dr. G. M. Findlay—expenses : experimental studies of poliomyelitis

Professor W. H. Linnell—expenses : synthesis of analogues of the adrenal cortical hormones

Dr. K. R. Adam—expenses : biological properties of newly synthesised dithiols

UNIVERSITY COLLEGE

Biometry, Eugenics and Genetics Department

Dr. H. Grüneberg—assistance by Miss G. M. Truslove, and expenses : the pathology of inherited disease in animals

Biophysics Research Unit

Dr. E. J. Harris—assistance by Dr. P. Caldwell : tracer studies of equilibrium transfer phenomena between cells and their environment

Botany Department

Dr. G. E. Fogg—assistance by Miss D. M. Collyer : fat production by algae

Galton Laboratory

Professor L. S. Penrose—assistance by Dr. Sylvia D. Lawler : the serological typing of families with inherited abnormalities and diseases

Pharmacological Laboratory

Dr. A Wilson—expenses : studies of liver disease ; neuromuscular blocking properties of thymus extracts

Pharmocology and Psychology Departments

Miss H. Steinberg—personal and expenses : the effect of drugs on quantitatively measurable performance in man (under the supervision of Professor R. Russell and Professor F. R. Winton)

Physiology Department

Professor G. L. Brown—assistance by Miss B. R. Bigland : neuromuscular physiology

Dr. B. Katz—assistance by Dr. P. Fatt : the mechanism of neuromuscular transmission

Dr. H. E. Lewis—expenses : the effect of pulmonary oedema on electrical conductivity of the lungs

Dr. A. Schweitzer and Dr. M. de Burgh Daly—assistance by Mr. P. G. Wright, and expenses : respiratory reflexes

UNIVERSITY COLLEGE HOSPITAL

Clinical Pathology Department

Professor M. Maizels—expenses : red cell metabolism

Maternity Department

Dr. G. B. Stanford—expenses : photogrammetric studies of changes in form in pregnancy

Obstretric Hospital

Dr. Mavis Gunther—personal and expenses : problems of lactation

Dr. Helen Payling Wright—expenses : radioactive tracer studies of venous flow time

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL

Bacteriology Department

Professor Wilson Smith—expenses: the influenza group of viruses and studies of bacterial metabolism

Biochemistry Department

Dr. C. E. Dent—assistance by Mrs. J. M. Searle : chromatographic isolation and identification of amino-acids in human body fluids

Chemical Pathology

Miss R. E. H. Nicholas—personal : chromatographic analysis of porphyrins (under the direction of Professor C. Rimington)

Medical Unit

Professor M. L. Rosenheim—assistance by Dr. M. Harington : pharmacology and clinical effects of methonium compounds

Dr. R. J. Calvert—personal : studies of liver disease (under the direction of Dr. Andrew Wilson)

Morbid Anatomy Department

Professor G. R. Cameron—expenses : effect of cortisone and allied substances on tissue repair

Surgical Unit

Dr. B. G. B. Lucas—expenses : experimental studies on the effect of anoxia on the brain (in collaboration with Dr. Dorothy H. Strangeways, Department of Physiology, Queen's University, Belfast)

WEST LONDON HOSPITAL (AND OTHER CENTRES)

Dr. W. S. C. Copeman, Professor E. C. Dodds, Dr. P. M. F. Bishop, Dr. A. S. Paterson and Dr. O. Savage—expenses : the treatment of rheumatoid arthritis with cortisone and related compounds

MANCHESTER

UNIVERSITY OF MANCHESTER

Anatomy Department

Professor G. A. G. Mitchell and colleagues—expenses : the autonomic nervous system and other anatomical studies

Cardiology Department (Royal Infirmary)

Professor C. Bramwell—expenses : problems of cardiology

Department of Education of the Deaf

Professor A. W. G. Ewing—assistance by Miss J. D. Hewitt, and expenses : problems of deafness in children, with special reference to methods of educational treatment. (A grant in aid of this work, including assistance by Miss D. M. Gutteridge and expenses, was also made from a special fund provided by the Alexander Pigott Wernher Memorial Trustees)

Haematology Department (Royal Infirmary)

Dr. J. F. Wilkinson—expenses : macrocytic anaemia and other blood disorders

Neuro-Surgery Department (Royal Infirmary)

Mrs S. M. Bennett—personal : studies of personality and intelligence in patients with brain tumours before and after operation (under the supervision of Professor Sir Geoffrey Jefferson)

Physiology Department

Dr. J. N. Mills—expenses : the physiology of respiration

NEWCASTLE-UPON-TYNE

ROYAL VICTORIA INFIRMARY

Dr. C. C. Ungley—expenses : megaloblastic anaemias

UNIVERSITY OF DURHAM (KING'S COLLEGE)

Botany Department

Dr. J. W. Hughes—personal and expenses : nutritional requirements of the pathogenic fungi, *M. audouini* and *M. canis*

Chemistry Department

Dr. J. Weiss—assistance by Dr. Max Keller, and expenses : radiation chemistry of steroids

Industrial Health Department

Professor R. C. Browne—assistance by Miss N. E. Graham . a psychological study of a problem of display

Physiology Department

Dr. B. Schofield—expenses : studies of gastric secretion, with particular reference to the role of the vagus

Surgery Department

Professor F. H. Bentley—expenses : the pattern of blood vessels in the stomach in normal and diseased conditions

NOTTINGHAM

UNIVERSITY OF NOTTINGHAM

Geology Department

Professor W. D. Evans—assistance by Mr. E. Williams, and expenses : the application of petrological techniques to problems of pneumoconiosis

UNIVERSITY OF OXFORD

Biochemistry Department

Sir Rudolph Peters—expenses : (1) physico-chemical studies of proteins with the ultra-centrifuge ; (2) studies of the vitamin B complex

Dr. A. G. Ogston—assistance by Dr. Jean Stanier : the physical properties of synovial fluid

Dr. V. P. Whittaker—personal, assistance by Mr. E. H. Thompson, and expenses : studies of cholinesterase

Dr. D. D. Woods—assistance by Mr. J. H. Marshall, and expenses : peptide requirements of micro-organisms

Botany Department (Mycology Laboratory)

Dr. W. H. Wilkins—assistance by Miss S. M. Johnson and Miss R. Vaughan, and expenses : the production of antibiotic substances by fungi

Clarendon Laboratory and Radcliffe Infirmary

Dr. K. A. G. Mendelssohn—expenses : the application of physical methods to medical treatment

Institute of Social Medicine

Dr. Alice M. Stewart—assistance and expenses : studies of tuberculosis in industry

Laboratory of Human Nutrition

Dr. J. R. Marshall—personal and expenses : the role of trace elements in health and disease (under the supervision of Dr. H. M. Sinclair)

Nuffield Institute for Medical Research

Mr. J. R. Vane—personal and expenses : factors affecting gastric secretion ; refractory mechanism of the isolated auricle (under the supervision of Dr. G. S. Dawes)

Dr. J. G. Widdicombe—personal : respiratory and cardiovascular reflexes (under the supervision of Dr. G. S. Dawes)

Nuffield Laboratory of Ophthalmology

Dr. J. W. Waters—expenses : chemical and enzymic changes in the lens after experimental neutron irradiation (under the supervision of Mrs. A. Pirie)

Pharmacology Department

Dr. H. R. Ing—assistance by Mr. D. P. H. Tudor Williams : the mechanism of drug action in relation to chemical structure

Dr. E. M. Lourie—personal : problems of chemotherapy and pharmacology

Dr. Janet Vaughan—assistance by Miss B. Kidman and Miss B. Rayner, and expenses : metabolism of radioactive strontium

Radcliffe Infirmary

Dr. W. Ritchie Russell—(1) assistance by Dr. A. B. Kinnier Wilson : clinical studies of poliomyelitis, with particular reference to the use of mechanical respirators ; (2) expenses : follow-up studies of head injuries (at the Head Injuries Bureau, Military Hospital, Oxford)

Clinical Biochemistry Department

Mr. E. J. Butler—personal and expenses : the role of trace elements in chronic disease of the nervous system (under the supervision of Dr. J. R. P. O'Brien)

Nuffield Department of Clinical Medicine

Professor L. J. Witts—expenses : experimental macrocytic anaemia

Dr. L. P. R. Fourman—expenses : metabolism of potassium

Nuffield Department of Surgery

Sir Hugh Cairns—assistance by Dr. Margaret Taylor : the use of tuberculin combined with streptomycin in the treatment of tuberculous meningitis and other forms of tuberculosis (in collaboration with Dr. Honor Smith)

Pathology Department

Dr. R. G. Macfarlane—expenses : problems of blood coagulation

Sir William Dunn School of Pathology

Sir Howard Florey—assistance by Dr. H. S. Burton, Miss E. M. Barnes and Mr. G. G. F. Newton, and expenses : the isolation and properties of antibiotics produced by bacteria and fungi

Mrs. K. Crawford—personal and expenses : antibacterial substances occurring in natural sources

Dr. D. Kay—personal : the phage-bacterium relationship (under the supervision of Sir Paul Fildes)

Mrs. F. J. Philpot—personal and expenses : immuno-chemistry of the tubercle bacillus

Dr. K. B. Roberts—personal : the mechanism of antibody production (under the direction of Sir Howard Florey)

PORTSMOUTH

CENTRAL LABORATORY

Dr. E. M. Darmady—assistance by Mrs. D. Richardson Jones and Miss P. Loud, and expenses : pathology of acute renal failure

READING

UNIVERSITY OF READING

Psychology Department

Professor R. C. Oldfield—expenses : the recording of fluctuations in sensory thresholds and other psycho-physical variables

SHEFFIELD

ASH HOUSE HOSPITAL AND CHILDREN'S HOSPITAL

Dr. J. L. Emery and Dr. S. Doxiadis—expenses : the epidemiology and control of streptococcal infection in rheumatic children

UNIVERSITY OF SHEFFIELD

Anatomy Department

Professor F. Davies—expenses : the conducting system of the vertebrate heart

Dental School

Mr. J. J. Hodson—expenses : pathology of human caries

Pathology Department

Professor H. N. Green—(1) assistance by Miss M. J. Martin, and expenses : studies of nucleotide metabolism (with Dr. H. B. Stoner, p. 94) ; (2) expenses : the influence of dietary sugar supplements on dental caries (for the Dental Research Committee)

Pharmacology Department

Dr. D. R. Wood—expenses : studies of gastric secretion, with particular reference to the actions of urogastrone and antihistamine substances

Department of Medicine

Professor C. H. Stuart-Harris—assistance by Miss Z. C. Franks, and expenses : respiratory infections

SOUTHAMPTON

UNIVERSITY COLLEGE

Chemistry Department

Dr. N. B. Chapman—assistance by Mr. J. W. James, and expenses: synthesis of potential antihistaminic compounds

SURREY

KINGSTON HOSPITAL LABORATORY

Dr. J. C. Lees—expenses : the relation between toxic action and tumour inhibition of drugs

TAPLOW

CANADIAN RED CROSS MEMORIAL HOSPITAL

Dr. E. G. L. Bywaters and Dr. L. E. Glynn—assistance by Miss W. M. Stanier, and expenses : clinical and experimental studies of adrenocorticotrophic hormone and related compounds in rheumatic fever

YORKSHIRE

AYSGARTH

Dr. W. Pickles—expenses : for the maintenance of epidemiological records

RESEARCH FELLOWSHIPS AND STUDENTSHIPS

Fellowships

ROCKEFELLER TRAVELLING FELLOWSHIPS IN MEDICINE

The Council are indebted to the Rockefeller Foundation of New York for a further generous allocation of funds for the award of medical travelling fellowships. These fellowships are intended for graduates resident in this country who have had some training in research work in clinical medicine or surgery or in some other branch of medical science, and who are likely to profit by a period of work at a centre in the United States, or elsewhere abroad, before taking up positions for higher teaching or research in the United Kingdom.

The following appointments were made by the Council for the academic year 1950–1 :—

Dr. R. I. S. Bayliss (Department of Medicine, Postgraduate Medical School of London)—for work on the urinary excretion of steroids, under Professor Robert F. Loeb in the Department of Medicine, Columbia University, New York.

Dr. R. V. Coxon (Department of Biochemistry, Oxford University)—for work on metabolic disorders, under Dr. Fuller Albright at the Massachusetts General Hospital, Boston, and under Dr. D. D. van Slyke at Brookhaven National Laboratory, Long Island.

Dr. J. E. French (Department of Pathology, Radcliffe Infirmary, Oxford)—for work on the use and applications of histochemical and cytochemical methods in morphological pathology, under Dr. George Gomori in the Department of Medicine, University of Chicago.

Mr. J. A. Key (Department of Surgery, University of Durham)—for work mainly on the vascular disturbance in peptic ulceration, under Professor R. M. Janes in the Medical School and General Hospital, Toronto.

Dr. R. A. Shooter (Department of Pathology, St. Bartholomew's Hospital, London)—for work at the Johns Hopkins Hospital, Baltimore, (a) in the Department of Pathology under the supervision of Dr. Arnold R. Rich ; and (b) on the mineral requirements of mammalian cells in tissue culture, with Dr. G. O. Gey in the Division of Cellular Physiology, Department of Surgery.

Dr. E. A. Wright (Department of Pathology, Guy's Hospital Medical School, London)—for work mainly on problems of experimental pathology, under Dr. Otto Krayer in the Department of Pharmacology, Harvard Medical School, Boston.

DOROTHY TEMPLE CROSS RESEARCH TRAVELLING FELLOWSHIPS IN TUBERCULOSIS

These fellowships, which were established under a generous endowment by the late Mrs. Odo Cross, are open to suitably qualified British graduates who intend ultimately to devote themselves to the advancement by teaching or research of the curative or preventive treatment of tuberculosis in any of its forms.

The following award was made for the academic year 1950–1 :—

Mr. A. M. Macarthur (Thoracic Unit, Postgraduate Medical School of London)—for work mainly on the place of resection in the treatment of pulmonary tuberculosis, under Dr. John Alexander in the Department of Surgery, University Hospital, Ann Arbor, Michigan.

KATHLEEN SCHLESINGER RESEARCH FELLOWSHIP

This fellowship, which was endowed by the late Mr. Eugen M. Schlesinger and Mrs. Schlesinger in memory of their daughter, is intended for research on cysts of the brain and allied degenerative conditions. Towards the end of the period under review Dr. Helen T. Morgan was appointed to the Fellowship for work on the pathology of post-partum necrosis of the anterior pituitary gland, under the supervision of Professor H. L. Sheehan in the Department of Pathology, University of Liverpool.

MAPOTHER BEQUEST RESEARCH FELLOWSHIP

This Fellowship is provided from a benefaction by the late Dr. and Mrs. Edward Mapother for research in psychiatry. The first holder of the fellowship, Dr. O. E. Pratt, who was appointed in 1950, has continued his work on the histochemistry of the nervous system under the direction of Professor A. Meyer and Dr. H. McIlwain at the Institute of Psychiatry, Maudsley Hospital, London.

ALEXANDER PIGOTT WERNHER MEMORIAL TRUST : TRAVELLING AWARDS IN OPHTHALMOLOGY AND OTOLOGY

These awards are provided from a special fund placed at the disposal of the Council by the trustees of the late Lady Ludlow under the terms of a bequest in memory of her son, to be used " towards the prevention and cure of blindness and deafness in the United Kingdom and the British Empire, and in particular research in connection therewith by financing medical men and students within the Empire to study methods and practices in all countries of the world ". Reference is made elsewhere in this report (pp. 68–9, 110 and 115) to the provision made by the trustees for research in ophthalmology and otology at centres in this country under the Council's auspices.

The following awards were made under this scheme for the academic year 1950–1 :—

Travelling Fellowship in Ophthalmology

Dr. R. K. MacDonald (University of Toronto, Canada)—for work on glaucoma and iritis under Sir Stewart Duke-Elder at the Institute of Ophthalmology, London.

Travelling Grants in Ophthalmology.

Dr. V. K. Chitnis (Grant Medical College, Bombay)—to study methods for the prevention and cure of blindness at centres in the United Kingdom.

Mr. F. J. Damato (Royal Malta University)—to study methods of keratoplasty at centres in France.

Travelling Grants in Otology.

Dr. R. A. Cooper (Sir Jamsetjee Jeejeebhoy Hospital, Bombay)—to study fenestration operation techniques under Mr. T. Cawthorne at King's College Hospital, London, and at other centres in the United Kingdom.

Mr. M. S. Harrison (Lincoln, Grimsby, Boston and Scunthorpe Hospitals)—to study recent advances in otological work at centres in Europe.

Dr. J. D. Hood (Otological Research Unit, National Hospital, London)—to study physiological acoustics at otological centres in Switzerland and Germany.

Mr. G. H. Livingstone (United Oxford Hospitals)—to study recent advances in the investigation and treatment of ear, nose and throat diseases at centres in the U.S.A.

Provision is made for these awards under an arrangement with the Centre National de la Recherche Scientifique for the interchange of French and British research workers in medical science (excluding clinical medicine). The scheme allows for the exchange of two workers from each country annually. The following appointments were made for the academic year 1950–1 :—

(*a*) French Scholar nominated by the C.N.R.S.

M. Jean Lecocq (L'Ecole Polytechnique, Paris)—for work on the synthesis of nucleotides under Professor A. R. Todd in the University Chemical Laboratory, Cambridge

(*b*) British Scholars nominated by the Council.

Dr. D. G. F. Harriman (Royal Victoria Hospital, and Department of Pathology, Queen's University, Belfast)—for work on the pathological anatomy of epilepsy, under the direction of Professor I. Bertrand at the Salpêtrière Hospital, Paris.

Dr. S. D. Wainwright (National Institute for Medical Research, London)—for work on bacterial adaptive enzymes, under Dr. A. Lwoff at the Pasteur Institute, Paris.

Postgraduate Studentships*

These awards are intended for recent medical and scientific graduates of special promise who desire to prepare themselves for a career in some branch of medical research. Forty-one new appointments were made in respect of the academic year 1950–1, and the total number of awards in being at the end of the period was ninety-five.

*To be known in future as Postgraduate Scholarships.

LIST OF PUBLICATIONS BY MEMBERS OF THE COUNCIL'S STAFF

THE NATIONAL INSTITUTE FOR MEDICAL RESEARCH

C. H. ANDREWES—

The common cold. *J.R. Inst. publ. Hlth*, 1951, **14**, 199.

Viruses and Linnaeus. *Acta path. microbiol. scand.*, 1951, **28**, 211.

Influenza virus and the beginnings of its study in the laboratory. *Medical Press*, 1951, **225**, 437.

The common cold. *Sci. Amer.*, 1951, **184**, 39.

Epidemiology of influenza in the light of the 1951 outbreak. *Proc. R. Soc. Med.*, 1951, **44**, 803.

C. H. ANDREWES, J. E. LOVELOCK and T. SOMMERVILLE—

An experiment on the transmission of colds. *Lancet*, 1951, **i**, 25.

C. H. ANDREWES and J. S. F. NIVEN—

Chemotherapeutic experiments with grey lung virus. *Brit. J. exp. Path.*, 1950, **31**, 767.

A virus from cotton-rats : its relation to grey lung virus. *Ibid.*, 1950, **31**. 773.

E. F. ANNISON, A. T. JAMES and W. T. J. MORGAN—

The separation and identification of small amounts of mixed amino sugars. *Biochem. J.*, 1951, **48**, 477.

H. R. V. ARNSTEIN—

The biosynthesis of choline methyl groups by the rat. *Biochem. J.*, 1951, **48**, 27.

Some aspects of the metabolisn of D- and L-serine by the rat: *Ibid.*, 1951. **49**, 439.

H. R. V. ARNSTEIN and R. BENTLEY—

Kojic acid biosynthesis from l-C^{14}-glucose. [Letter]. *Nature, Lond.*, 1950, **166**, 948.

Synthesis of 1 : 3-dihydroxy (2-^{14}C) acetone. *J. chem. Soc.*, 1951, p. 2385.

H. R. V. ARNSTEIN and A. NEUBERGER—

The effect of vitamin B^{12} on the conversion of glycine to choline. *Biochem. J.*, 1951, **48, ii.**

E. M. BAVIN, R. J. W. REES, J. M. ROBSON, M. SEILER, D. E. SEYMOUR and D. SUDDABY—

The tuberculostatic activity of some thiosemicarbazones. *J. Pharm. Pharmacol.*, 1950, **2**, 764.

G. BELYAVIN—

Cultural and serological phases of *Proteus vulgaris*. *J. gen. Microbiol.*, 1951, **5**, 197.

G. BELYAVIN, E. M. MILES and A. A. MILES—

The serology of fifty strains of *Proteus vulgaris*. *J. gen. Microbiol.*, 1951, 5, 178.

P. M. F. BISHOP, N. A. RICHARDS and W. L. M. PERRY—

Stilboestrol sulphate, oestrone and equilin. Further observations on the potency and clinical assessment of oestrogens. *Lancet*, 1951, **i**, 818.

B. D. BURNS—

Some properties of isolated cerebral cortex in the unanaesthetized cat. *J. Physiol.*, 1951, **112**, 156.

B. D. BURNS and W. D. M. PATON—

Depolarization of the motor end-plate by decamethonium and acetylcholine. *J. Physiol.*, 1951, **115**, 41.

B. D. BURNS, W. D. M. PATON and M. VIANNA DIAS—
Action of decamethonium iodide (C 10) on the demarcation potential of cat's muscle. *Arch. Sci. Physiol.*, 1949, III, 609.

I. E. BUSH—
Paper chromatographic study of the secretion of the adrenal cortex in various mammalian species. *J. Physiol.*, 1951, **115**, 12P.

R. K. CALLOW, J. W. CORNFORTH and P. C. SPENSLEY—
A source of hecogenin. [Letter]. *Chem. & Industr.*, 1951, p. 699.

R. K. CALLOW, R. D. MEIKLE and D. A. H. TAYLOR—
The source of sarmentogenin. [Letter]. *Chem. & Industr.*, 1951, p. 336.

P. N. CAMPBELL—
Chromatographic fractionation of the water-soluble constituents of liver. *Biochem. J.*, 1951, **48**, xix.

P. N. CAMPBELL, D. H. SIMMONDS and T. S. WORK—
The occurrence of glycerylphosphorylethanolamine in extracts of liver and yeast. *Biochem. J.*, 1951, **49**, xvi.

P. N. CAMPBELL and T. S. WORK—
Incorporation of blood amino-acids into milk proteins in the rabbit. *Biochem. J.*, 1951, **49**, xlvi.

P. N. CAMPBELL, T. S. WORK and E. MELLANBY—
The isolation of a toxic substance from agenized wheat flour. *Biochem. J.*, 1951, **48**, 106.

H. M. E. CARDWELL, J. W. CORNFORTH, S. R. DUFF, H. HOLTERMANN and R. ROBINSON—
Total synthesis of androgenic hormones. *Chem. & Industr.*, 1951, p. 389.

C. M. CHU, C. H. ANDREWES and A. W. GLEDHILL—
Influenza in 1948–1949. *Bull. World Hlth Org.*, 1950, **3**, 187.

J. W. CORNFORTH, R. H. CORNFORTH, C. E. DALGLIESH and A. NEUBERGER—
DL-β-3-oxindolylalanine (DL-hydroxytryptophan). 1. Synthesis. *Biochem. J.*, 1951, **48**, 591.

J. W. CORNFORTH, C. E. DALGLIESH and A. NEUBERGER—
β-3-oxindolylalanine (hydroxytryptophan). 2. Spectroscopic and chromatographic properties. *Biochem. J.*, 1951, **48**, 598.

J. W. CORNFORTH and D. F. ELLIOTT—
Mechanism of the Dakin and West reaction. *Science*, 1950, **112**, 534.

J. W. CORNFORTH, P. D'A. HART, R. J. W. REES and J. A. STOCK—
Antituberculous effect of certain surface-active polyoxyethylene ethers in mice. *Nature, Lond.*, 1951, **168**, 150.

C. W. COULING—
A method of construction using bosshead clamps. *J. sci. Instrum.*, 1951, **28**, 252.

A. T. COWIE, W. G. DUNCOMBE, S. J. FOLLEY, T. H. FRENCH, R. F. GLASCOCK, L. MASSART, G. J. PEETERS and G. POPJÁK—
Synthesis of milk fat from acetic acid ($CH_3{}^{14}COOH$) by the perfused isolated bovine udder. *Biochem. J.*, 1951, **49**, 610.

J. C. CRAWHALL and D. F. ELLIOTT—
A note on the racemization of serine. *Biochem. J.*, 1951, **48**, 237.
New syntheses of cystine. *J. chem. Soc.*, 1951, p. 2071.

C. E. DALGLIESH—
Permanganate as a spraying reagent for amino-acids on paper chromatograms. [Letter]. *Nature, Lond.*, 1950, **166**, 1076.

C. E. DALGLIESH, W. E. KNOX and A. NEUBERGER—
Intermediary metabolism of tryptophan. *Nature, Lond.*, 1951, **168**, 20.

W. W. DOUGLAS, W. FELDBERG, W. D. M. PATON and M. SCHACHTER—
Distribution of histamine and substance '*P*' in the wall of the digestive tract of the dog. *J. Physiol.*, 1951, **114**, 14P.

W. W. DOUGLAS and P. B. C. MATTHEWS—
Respiratory failure produced by tetraethylpyrophosphate in the cat and the antagonistic action of atropine or hyoscine. *J. Physiol.*, 1951, **114**, 31P.

O. G. EDHOLM, S. HOWARTH and E. P. SHARPEY-SCHAFER—with a note on pulse pressure changes by A. C. DORNHORST.
Resting blood flow and blood pressure in limbs with arterial obstruction. *Clin. Sci.*, 1951, **10**, 361.

W. FELDBERG—
Synthesis of acetylcholine (choline acetylase). *Methods in Medical Research*, 1950, **3**, 95.

W. FELDBERG—
On the origin and function of the acetylcholine in the intestinal wall. Contribution to : A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 285.
The physiology of neuromuscular transmission and neuromuscular block. *Brit. med. J.*, 1951, **i**, 967.
Inhibitors of autonomic ganglia on the isolated guinea-pig's ileum preparation. *J. Physiol.*, 1951, **112**, 19P.
Effects of ganglion-blocking substances on the small intestine. *Ibid.*, 1951, **113**, 483.

W. FELDBERG and A. A. MILES—
Distribution of histamine in the guinea-pig's skin in relation to the action of intravenous injections of histamine liberator. *J. Physiol.*, 1951, **114**, 34P.

W. FELDBERG and W. D. M. PATON—
Release of histamine from skin and muscle in the cat by opium alkaloids and other histamine liberators. *J. Physiol.*, 1951, **114**, 490.

N. FISHER, C. HARINGTON and D. A. LONG—
Action of sphingosine and its derivatives on tuberculin sensitivity in guinea-pigs. *Lancet*, 1951, **ii**, 522.

T. H. FLEWETT and C. E. CHALLICE—
The intracellular growth of fowl-plague virus. A phase-contrast and electron microscopical study of infected tissue cultures. *J. gen. Microbiol.*, 1951, **5**, 279.

T. H. FRENCH, G. D. HUNTER, A. J. P. MARTIN and G. POPJÁK—
Mode of formation of milk fatty acids studied with the aid of $CH_3{}^{14}COONa$. *Biochem. J.*, 1951, **48**, vi.

T. H. FRENCH and G. POPJÁK—
A comparison between glucose and acetate as precursors of milk fat in the rabbit. *Biochem. J.*, 1951, **49**, iii.

J. D. FULTON, L. P. JOYNER and I. N. O. PRICE—
Studies on protozoa. Part IV—A complement-fixation test for amoebiasis. *J. trop. Med. Hyg.*, 1951, **54**, 27.

J. D. FULTON and J. S. F. NIVEN—
Studies on protozoa. Part III.—Visceral leishmaniasis in the cotton rat (*Sigmodon hispidus*). *Trans R. Soc. trop. Med. Hyg.*, 1951, **44**, 717.

M. GOFFART and W. L. M. PERRY—
The action of adrenaline on the rate of loss of potassium ions from unfatigued striated muscle. *J. Physiol.*, 1951, **112**, 95.

C. H. GRAY, I. H. M. MUIR and A. NEUBERGER—
Studies in congenital porphyria. 3. The incorporation of ^{15}N into the haem and glycine of haemoglobin. *Biochem. J.*, 1950, **47**, 542.

J. A. B. GRAY and J. L. MALCOLM—
The excitation of touch receptors in frog's skin. *J. Physiol.*, 1951, **115**, 1.

J. A. B. GRAY and P. B. C. MATTHEWS—
Response of Pacinian corpuscles in the cat's toe. *J. Physiol.*, 1951, **112**, 44P.
Response of Pacinian corpuscles in the cat's toe. *Ibid.*, 1951, **113**, 475.
A comparison of the adaptation of the Pacinian corpuscle with the accommodation of its axon. *Ibid.*, 1951, **114**, 454.

C. HARINGTON—
The National Institute for Medical Research. *Brit. med. Bull.*, 1950, **7**, 81.
Foreword. In: *Ciba Foundation conference on isotopes in biochemistry.* London (J. & A. Churchill Ltd.), 1951, pp. v-vi.
The role of the basic sciences in medical research. (The Shattuck Lecture.) *New Engl. J. Med.*, 1951, **244**, 777.

F. HAWKING—
The toxic effects of chemotherapeutic agents. *Practitioner*, 1951, **166**, 382.

F. HAWKING and J. P. THURSTON—
The persistence of metacyclic trypanosomes in the blood. *J. trop. Med. Hyg.*, 1951, **54**, 185.
A strain of monkey malaria (*Plasmodium cynomolgi*) made resistant to proguanil (paludrine). *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 695.

D. HERBERT—
Oxalacetic decarboxylase and carbon dioxide assimilation in bacteria. *Symposia Soc. exp. Biol.*, 1951, **5**, 52.
Oxidising enzymes. *Rep. Progr. Chem.*, 1951, **47**, 335.
Hydrodynamic aspects of bacterial locomotion. *J. gen. Microbiol.*, 1951, **5**, xx.

P. HOLTON and W. L. M. PERRY—
Antidromic vasodilatation in the rabbit's ear. *J. Physiol.*, 1951, **112**, 18P.
On the transmitter responsible for antidromic vasodilatation in the rabbit's ear. *Ibid.*, 1951, **114**, 240.

J. E. HOTCHIN—
A particulate impurity found in solutions of radioactive phosphorus. [Letter.] *Nature, Lond.*, 1951, **168**, 200.

J. H. HUMPHREY—
The effect of cortisone upon some experimental hypersensitivity reactions. *Brit. J. exp. Path.*, 1951, **32**, 274.

G. D. HUNTER and G. POPJÁK—
A new method for the chemical degradation of *n*-fatty acids. *Biochem. J.*, 1951, **48**, v.

A. ISAACS—
The 1951 influenza viruses. *Proc. R. Soc. Med.*, 1951, **44**, 801.

S. JACOBS—
A study of the determination of uranium by measurement of fluorescence. Chemical Research Laboratory, Teddington, 1950. (CRL–AE–54). Declassified Feb. 28, 1951. *Nuclear Sci. Abstr.*, 1951, **5**, 125.

A. T. JAMES, A. J. P. MARTIN and S. S. RANDALL—
Automatic fraction collectors and a conductivity recorder. *Biochem. J.*, 1951, **49**, 293.

O. KANTOROWICZ—
Bomb-tube for conducting small-scale reactions under medium pressures. *J. Soc. chem. Ind., Lond.*, 1950, **69**, Suppl. 2, S76.
Shaking apparatus for the aeration of bacterial cultures. *J. gen. Microbiol.*, 1951, **5**, 276.
An antibiotic assay tray. *Ibid.*, 1951, **5**, 357.
Bottle-shaking mechanism. *J. sci. Instrum.*, 1951, **28**, 61.

O. KANTOROWICZ and C. W. COULING—
Lifting mechanism. *Instrum. Practice*, 1951, **5**, 155.

G. C. KENNEDY—
The hypothalamic control of food intake in rats. *Proc. roy. Soc.*, B, 1950, **137**, 535.

D. A. LONG, A. A. MILES and W. L. M. PERRY—
Action of ascorbic acid on tuberculin-sensitivity in guineapigs and its modification by dietary and hormonal factors. *Lancet*, 1951, **i**, 1085.
Influence of thyroxine on the desensitising action of A.C.T.H. and of cortisone in B.C.G.-infected guineapigs. *Ibid.*, 1951, **i**, 1392.

J. E. LOVELOCK—
Fluorescence quenching by colloid anions and cations. *J. chem. Soc.*, 1951, p. 115.

J. E. LOVELOCK and B. M. BURCH—
Blood clotting: the inhibition by anions and the function of calcium. *Biochem. J.*, 1951, **48**, xxxiv.

J. E. LOVELOCK and J. S. PORTERFIELD—
Blood coagulation: its prolongation in vessels with negatively charged surfaces. [Letter.] *Nature, Lond.*, 1951, **167**, 39.

J. A. MCFADZEAN—
Morphological changes in *Plasmodium cynomolgi* following proguanil, sulphadiazine and mepacrine therapy. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 707.

A. S. MCFARLANE—
Chairman's opening remarks. In: *Ciba Foundation conference on isotopes in biochemistry*. London (J. & A. Churchill Ltd.), 1951, pp. 1–3.

J. R. MARSHALL and J. WALKER—
An experimental study of some potentially tautomeric 2- and 4(6)-substituted pyrimidines. *J. chem. Soc.*, 1951, p. 1004.

A. J. P. MARTIN and R. R. PORTER—
The chromatographic fractionation of ribonuclease. *Biochem. J.*, 1951, **49**, 215.

A. A. MILES—
International standards for anti-A and anti-B blood-grouping sera. *Bull. World Hlth Org.*, 1950, **3**, 301.
Biological standards and the measurement of therapeutic actiivty. *Brit. med. Bull.*, 1951, **7**, 283.
The mouse pathogenicity and toxicity of *Proteus vulgaris*. *J. gen. Microbiol.*, 1951, **5**, 307.
Increased permeability of skin capillaries produced by histamine in guinea-pigs. *J. Physiol.*, 1951, **114**, 35P.

E. M. MILES and A. A. MILES—
The identity of *Proteus hydrophilus* Bergey *et al.* and *Proteus melanovogenes* Miles & Halnan, and their relation to the genus *Aeromonas* Kluyver and van Niel. *J. gen. Microbiol.*, 1951, **5**, 298.

I. H. M. MUIR, A. NEUBERGER and J. C. PERRONE—
Biosynthesis of globin in the rat. *Biochem. J.*, 1951, **49**, lv.

I. H. M. MUIR, J. C. PERRONE and G. POPJAK—
Studies on the metabolism of the circulating erythrocyte in the rabbit. *Biochem. J.*, 1951, **48**, iv.

A. NEUBERGER—
Studies on mammalian red cells. In: *Ciba Foundation conference on isotopes in biochemistry*. London (J. & A. Churchill Ltd.), 1951, pp. 68–85.

A. NEUBERGER and J. S. F. NIVEN—
Haemoglobin formation in rabbits. *J. Physiol.*, 1951, **112**, 292.

A. NEUBERGER, J. C. PERRONE and H. G. B. SLACK—
The relative metabolic inertia of tendon collagen in the rat. *Biochem. J.*, 1951, **49**, 199.

J. S. F. NIVEN—
The histology of "grey lung virus" lesions in mice and cotton-rats. *Brit. J. exp. Path.*, 1950, **31**, 759.

W. E. ORMEROD—
The mode of action of antrycide. *Brit. J. Pharmacol*, 1951, **6**, 325.
A study of basophilic inclusion bodies produced by chemotherapeutic agents in trypanosomes. *Ibid.*, 1951, **6**, 334.

A. S. PARKES—
Storage of mammalian spermatozoa at low temperatures. *Proc. Soc. Study of Fertility*, 1951, No. 2, p. 12.

A. S. PARKES and A. U. SMITH—
Effect of low temperatures on ovarian tissue. *J. Endocrinol.*, 1951, **7**, xxxix.

W. D. M. PATON—
Compound 48/80 : a potent histamine liberator. *Brit. J. Pharmacol.*, 1951, **6**, 499.
The paralysis of autonomic ganglia, with special reference to the therapeutic effects of ganglion-blocking drugs. *Brit. med. J.*, 1951, **i**, 773.

W. D. M. PATON and W. L. M. PERRY—
The analysis of electrical records from a sympathetic ganglion in the cat. *Biometrics*, 1951, **7**, 123.
The pharmacology of the toxiferines. *Brit. J. Pharmacol.*, 1951, **6**, 299.
Depolarization and transmission block in the cat's superior cervical ganglion. *J. Physiol.*, 1951, **112**, 48P.
The relationship between depolarization and the action potential complex of the cat's superior cervical ganglion. *Ibid.*, 1951, **114**, 47P.

W. D. M. PATON and M. SCHACHTER—
The influence of an antihistamine drug on the release of histamine in the unanaesthetized dog. *Brit. J. Pharmacol.*, 1951, **6**, 509.
Effect of an antihistamine on histamine release in unanaesthetized dogs. *J. Physiol.*, 1951, **114**, 32P.

W. D. M. PATON and J. WALKER—
Methonium compounds in hypertension. [Letter]. *Lancet*, 1951, **i**, 473.

W. D. M. PATON and E. J. ZAIMIS—
Paralysis of autonomic ganglia by methonium salts. *Brit. J. Pharmacol.*, 1951, **6**, 155.
The action of D-tubocurarine and of decamethonium on respiratory and other muscles in the cat. *J. Physiol.*, 1951, **112**, 311.

J. C. PERRONE—
Separation of amino-acids as dinitrophenyl derivatives. *Nature, Lond.*, 1951, **167**, 513.

C. POLGE—
Artificial insemination in fowl. *Proc. Soc. Study of Fertility*, 1951, No. 2, p. 16.
Functional survival of fowl spermatozoa after freezing at –79° C. [Letter]. *Nature, Lond.*, 1951, **167**, 949.

M. R. POLLOCK—
Penicillinase adaptation in *B. cereus :* adaptive enzyme formation in the absence of free substrate. *Brit. J. exp. Path.*, 1950, **31**, 739.

G. POPJÁK—
Mode of formation of fatty acids from acetate and glucose as studied in the mammary gland. In : *Ciba Foundation conference on isotopes in biochemistry.* London (J. & A. Churchill Ltd.), 1951, pp. 258–284.

(52058) E 2

G. POPJÁK, T. H. FRENCH and S. J. FOLLEY—
Utilization of acetate for milk-fat synthesis in the lactating goat. *Biochem. J.*, 1951, **48**, 411.

G. POPJÁK, T. H. FRENCH, G. D. HUNTER and A. J. P. MARTIN—
Mode of formation of milk fatty acids from acetate in the goat. *Biochem. J.*, 1951, **48**, 612.

R. R. PORTER—
The use of 1 : 2 : 4-fluorodinitrobenzene in studies of protein structure. *Methods in Medical Research*, 1950, **3**, 256.

R. J. W. REES and J. M. ROBSON—
Enhancement of the action of streptomycin. *Science*, 1950, **112**, 790.
The activity of thiosemicarbazones alone and in combination with other drugs in experimental corneal tuberculosis. *Brit. J. Pharmacol.*, 1951, **6**, 83.

H. A. SLOVITER—
Recovery of human red blood-cells after freezing. *Lancet*, 1951, **i**, 823.
In-vivo survival of rabbit's red cells recovered after freezing. *Ibid.*, 1951, **i**, 1350.
Review of present research on the treatment of shock. XIII C. Preservation of erythrocytes by freezing. In : National Research Council, Division of Medical Sciences and Army Medical Service Graduate School. *Symposium on Shock*, Washington, 7-9 May, 1951, pp. 1–12.

A. U. SMITH—
Prevention of haemolysis during freezing and thawing of red blood-cells. *Lancet*, 1950, **ii**, 910.
Fertilization *in vitro* of the mammalian egg. *Biochem. Soc. Sym.*, 1951, **7**, 3.

J. P. THURSTON—
Morphological changes in *Plasmodium berghei* following proguanil, sulphadiazine and mepacrine therapy. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 703.
Action of proguanil on *P. berghei*. Inhibition by *p*-aminobenzoic acid. *Lancet*, 1950, **ii**, 438.

C. C. TOH—
Experiments on the barium contraction of the guinea-pig's ileum. *J. Physiol.*, 1951, **114**, 33P.

DEPARTMENT OF CLINICAL RESEARCH, UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL

D. A. W. EDWARDS—
The behaviour of subcutaneous fat in lipodystrophy and lipomatosis. Contribution to : Discussion on experimental approaches to obesity. *Proc. R. Soc. Med.*, 1951, **44**, 904.
Differences in the distribution of subcutaneous fat with sex and maturity. *Clin. Sci.*, 1951, **10**, 305.
Observations on the behaviour of subcutaneous fat in lipodystrophy. *Ibid.*, 1951, **10**, 317.

CLINICAL RESEARCH UNIT, GUY'S HOSPITAL

J. H. BENSON, E. B. REEVE and G. W. TAYLOR—
A simple apparatus for the continuous quantitative recording of the respiration during anaesthesia. *Guy's Hosp. Rep.*, 1951, **100**, 129.

R. T. GRANT—
Etiology and mechanisms of shock. II. Diagnosis and evaluation. In: National Research Council, Division of Medical Sciences and Army Medical Service Graduate School. *Symposium on Shock*, Washington, 7–9 May, 1951, pp. 1–11.
Summary paper. XXXI. Mechanisms of shock. In : National Research Council, Division of Medical Sciences and Army Medical Service Graduate School. *Symposium on Shock*, Washington, 7–9 May, 1951, pp. 1–6.

H. E. HOLLING—
Travel sickness. *Nursing Mirror*, 1950, **92**, 75.
The pulmonary circulation. *Guy's Hosp. Gaz.*, 1951, **65**, 271.
Travel sickness. *Pharm. J.*, 1951, **112**, 139.

C. L. JOINER, B. MCARDLE and R. H. S. THOMPSON—
Blood pyruvate estimations in the diagnosis and treatment of polyneuritis. *Brain*, 1950, **73**, 431.

B. MCARDLE—
Myopathy due to a defect in muscle glycogen breakdown. *Clin. Sci.*, 1951, **10**, 13.

E. B. REEVE, E. M. NANSON and F. F. RUNDLE—
Observations on inhibitory respiratory reflexes during abdominal surgery. *Clin. Sci.*, 1951, **10**, 65.

D. VEREL—
Postural hypotension : the localization of the lesion. *Brit. Heart J.*, 1951, 13, 61.

NEUROLOGICAL RESEARCH UNIT

J. A. V. BATES—
Electrical activity of the cortex accompanying movement. *J. Physiol.*, 1951, **113**, 240.
Significance of information theory to neurophysiology. In : *Rep. Proc. Symposium on information theory*, London, September, 1950. (Ministry of Supply 51/1766), pp. 137–142.

J. A. V. BATES and W. MCKISSOCK—
Anomalous result of excision of excitable motor cortex in man. *J. Physiol.*, 1951, **115**, 51P.

E. A. BERING, JR.—
Confirmation of the Rosenow antibody-antigen skin reaction in idiopathic epilepsy. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 205.

W. BLACKWOOD, W. H. MOSBERG, Jr. and P. K. ROBINSON—
Brain tumour with normal air encephalography and arteriography ; report of an unusual case. *J. Neurosurg.*, 1951, **8**, 322.

G. D. DAWSON—
A summation technique for detecting small signals in a large irregular background. *J. Physiol.*, 1951, **115**, 2P.

A. ELITHORN, M. F. PIERCY and M. A. CROSSKEY—
Local sign in autonomic responses. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 209.

P. A. MERTON—
The silent period in a muscle of the human hand. *J. Physiol.*, 1951. **114**, 183.
Contractions of muscle produced by synchronous and asynchronous motor volleys. *Ibid.*, 1951, **112**, 6P.

P. K. ROBINSON, W. H. MOSBERG, Jr., and R. C. LOWE—
Observations on diaphragmatic movement in some neurological disorders. *J. Neurol. Neurosurg. Psychiat.*, 1950, **13**, 296.

M. C. SMITH—
The use of Marchi staining in the later stages of human tract degeneration. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 222.

DEPARTMENT OF EXPERIMENTAL MEDICINE, CAMBRIDGE

M. ABRAHAMS and E. M. WIDDOWSON—
Modern dietary treatment. 3rd ed. London (Bailliere, Tindall & Cox), 1951

L. M. BROWN and M. F. HARRISON—
Effect of a single injection of carbon tetrachloride upon the activity of the pseudo-cholinesterase in the liver and serum of male and female rats. *Nature, Lond.*, 1951, **168**, 83.

R. F. A. DEAN—
The nutritional adequacy of a vegetable substitute for milk. *Brit. J. Nutrit.*, 1951, **5**, 269.

R. F. A. DEAN and W. I. M. HOLMAN—
Excretion and intake of B vitamins in newborn infants. *Arch. Dis. Childh.*, 1950, **25**, 292.

E. B. FERGUSON—
A study of the regulation of the rate of urinary ammonia excretion in the rat. *J. Physiol.*, 1951, **112**, 420.

E. M. GLASER—
Immersion and survival in cold water. *Nature, Lond.*, 1950, **166**, 1068.

E. M. GLASER and G. R. HERVEY—
Swimming in very cold water. *J. Physiol.*, 1951, **115**, 14P.

E. M. GLASER and R. V. H. JONES—
Initiation of shivering by cooled blood returning from the lower limbs. *J. Physiol.*, 1951, **114**, 277.

M. F. HARRISON—
The effect of temperature on the interference of potassium in the determination of sodium. *Biochem. J.*, 1951, **48**, 283.
Relation between polyploidy and the amounts of deoxynucleic acid per nucleus in the liver and kidney of adult rats. *Nature, Lond.*, 1951, **168**, 248.

M. F. HARRISON and L. M. BROWN—
The effect of starvation on the pseudo-cholinesterase activity of the liver and serum of rats. *Biochem. J.*, 1951, **48**, 151.

W. I. M. HOLMAN and P. LOUS—
A study of the renal clearance and distribution in body fluids of *N*-methyl-2-pyridone-5-carboxylamide, using an improved method of determination. *J. Physiol.*, 1951, **114**, 255.

P. E. H. JONES—
The absorption of glucose and xylose by adult and newborn rats. *J. Physiol.*, 1951, **113**, 276.

R. A. MCCANCE—
The practice of experimental medicine. President's address. *Proc. R. Soc. Med.*, 1951, **44**, 189.

R. A. MCCANCE and M. OTLEY—
Course of the blood urea in newborn rats, pigs and kittens. *J. Physiol.*, 1951, **113**, 18.

R. A. MCCANCE and J. R. ROBINSON—
The effect of dehydration by hypertonic saline on the water content of a number of organs in the rat. *Biochem. J.*, 1950, **47**, xxv.

R. A. MCCANCE and E. M. WIDDOWSON—
Composition and function of colostrum and "regression" milk. *Nature Lond.*, 1951, **167**, 722.
Composition of the body. *Brit. med. Bull.*, 1951, **7**, 297.
Famine. *Post Grad. med. J.*, 1951, **27**, 268.
The metabolism of iron during suckling. *J. Physiol.*, 1951, **112**, 450.
A method of breaking down the body weights of living persons into terms of extracellular fluid, cell mass and fat, and some applications of it to physiology and medicine. *Proc. roy. Soc.*, B, 1951, **138**, 115.

J. R. ROBINSON—
Osmoregulation in surviving slices from the kidneys of adult rats. *Proc roy. Soc.*, B, 1950, **137**, 378.
Effect of 2, 4-dinitrophenol on osmoregulation in isolated kidney slices. *Nature, Lond.*, 1950, **166**, 989.

C. M. SPRAY—
A study of some aspects of reproduction by means of chemical analysis. *Brit. J. Nutrit.*, 1950, **4**, 354.

C. M. SPRAY and E. M. WIDDOWSON—
The effect of growth and development on the composition of mammals. *Brit. J. Nutrit.*, 1951, **4**, 332.

E. M. WIDDOWSON—
Chemical composition of newly born mammals. *Nature, Lond.*, 1950, **166**, 626.
Mental contentment and physical growth. *Lancet*, 1951, **i**, 1316.

E. M. WIDDOWSON, R. A. MCCANCE and C. M. SPRAY—
The chemical composition of the human body. *Clin. Sci.*, 1951, **10**, 113.

E. M. WIDDOWSON and C. M. SPRAY—
Chemical development *in utero*. *Arch. Dis. Childh.*, 1951, **26**, 205.

CLINICAL CHEMOTHERAPEUTIC RESEARCH UNIT

J. B. COCHRAN—
The anaemia of rheumatic fever. *Brit. med. J.*, 1951, **ii**, 637.

J. B. COCHRAN, R. D. WATSON and J. REID—
Mild Cushing's syndrome due to aspirin. *Brit. med. J.*, 1950, **ii**, 1411.

J. REID, R. D. WATSON, J. B. COCHRAN and D. H. SPROULL—
Sodium γ-resorcylate in rheumatic fever. *Brit. med. J.*, 1951, **ii**, 321.

ELECTRO-MEDICAL RESEARCH UNIT

G. R. GIRDLESTONE (the late) and R. B. BOURDILLON, with an appendix by A. M. MCFARLAN—
Infection of "clean" surgical wounds by the surgeon and from the air. The work and ventilation of an operating-theatre. *Lancet*, 1951, **i**, 597.

BLOOD TRANSFUSION RESEARCH UNIT

M. CUTBUSH and P. L. MOLLISON—
The *Duffy* blood group system. *Heredity*, 1950, **4**, 383.

P. L. MOLLISON—
Blood transfusion in clinical medicine. Oxford (Blackwell Scientific Publications), 1951.

P. L. MOLLISON and M. CUTBUSH—
A method of measuring the severity of a series of cases of hemolytic disease of the newborn. *Blood*, 1951, **6**, 777.

N. VEALL and P. L. MOLLISON—
The rate of red-cell exchange in replacement transfusions. *Lancet*, 1950, **ii**, 792.

BLOOD PRODUCTS RESEARCH UNIT

J. W. LYTTLETON and L. VALLET—
Coagulability of irradiated plasma. *Lancet*, 1951, **i**, 1102.

BLOOD GROUP RESEARCH UNIT

R. R. RACE—
Genetic analysis of racial traits (III). The eight blood group systems and their inheritance. *Cold Spr. Harb. Sym. quant. Biol.*, 1951, **15**, 207.

R. R. RACE, H. A. HOLT and J. S. THOMPSON—
The inheritance and distribution of the *Duffy* blood groups. *Heredity*, 1951, **5**, 103.

R. R. RACE and R. SANGER—
The *Rh* Antigen C^u. *Heredity*, 1951, **5**, 285.

R. R. RACE, R. SANGER, F. H. ALLEN, Jr., L. K. DIAMOND and B. NIEDZIELA—
Inheritance of the human blood group antigen *Jk*^{a}. *Nature, Lond.*, 1951, **168,** 207.

R. R. RACE, R. SANGER and J. G. SELWYN—
A possible deletion in a human Rh chromosome : a serological and genetical study. *Brit. J. exp. Path.*, 1951, **32,** 124.

R. K. WALLER and R. R. RACE—
Six blood-group antibodies in the serum of a transfused patient. *Brit. med. J.*, 1951, **i,** 225.

BLOOD GROUP REFERENCE LABORATORY

H. I. COOMBS, E. W. IKIN, A. E. MOURANT and G. PLAUT—
Agglutinin anti-S in human serum. *Brit. med. J.*, 1951, **i,** 109.

J. A. DONEGANI, K. A. IBRAHIM, E. W. IKIN and A. E. MOURANT—
The blood groups of the people of Egypt. *Heredity*, 1950, **4,** 377.

E. W. IKIN and A. E. MOURANT—
A rare blood group antigen occurring in Negroes. *Brit. med. J.*, 1951, **i,** 456.

A. E. MOURANT—
The use of blood groups in anthropology. *J. R. Anthrop. Inst.*, 1947, **77,** 139.
The blood groups of the peoples of the Mediterranean region. *Cold Spr. Harb. Sym. quant. Biol.*, 1950, **15,** 221.

RADIOBIOLOGICAL RESEARCH UNIT

C. T. ANDERSON, H. BLASCHKO, J. H. BURN and R. H. MOLE—
The pressor amines in the adrenal medulla after irradiation. *Brit. J. Pharmacol.*, 1951, **6,** 342.

G. E. HARRISON and W. H. A. RAYMOND—
Preparation of clean chemical solutions with special reference to radioactive phosphorus solutions for clinical use. *Brit. med. J.*, 1951, **ii,** 930.

E. R. HOLIDAY, J. ST. L. PHILPOT and L. A. STOCKEN—
Sodium ethanemonothiophosphonate. A weak antidote to mustard gas. *Biochem. J.*, 1950, **47,** 637.

J. F. LOUTIT—
Treatment of the radiation syndrome. *Brit. med. Bull.*, 1950, **7,** 64.

J. F. LOUTIT and W. D'A. MAYCOCK—
The treatment of radiation casualties. *Practitioner*, 1950, **165,** 607.

R. H. MOLE—
The action of radiation on the tissues. *Practitioner*, 1950, **165,** 580.
The detection of radiation over-exposure. In : *Recent advances in clinical pathology.* 2nd ed. London (J. & A. Churchill Ltd.), 1951, pp. 372–386.
Protection from whole body-irradiation by chemical means. *J. chim. phys.*, 1951, **48,** 258.

R. J. MUNSON—
A note on the paper by F. W. Spiers (Brit. Journ. Rad., 1949, **xxii,** 521) entitled " The influence of energy absorption and electron range on dosage in irradiated bone ". [Letter.]. *Brit. J. Radiol., N.S.*, 1950, **23,** 505.

G. J. NEARY—
A simplified account of atomic radiation physics. *Practitioner*, 1951, **165,** 575.

RADIOTHERAPEUTIC RESEARCH UNIT

J. N. BARRON, N. VEALL and D. G. ARNOTT—
The measurement of the local clearance of radioactive sodium in tubed skin pedicles. *Brit. J. Plast. Surg.*, 1951, **4,** 16.

J. W. BOAG—
Ionization measurements at very high intensities. I. Pulsed radiation beams. *Brit. J. Radiol., N.S.*, 1950, **23**, 601.
On the interpretation of the dose-frequency curve in radiogenetics. *Genetics*, 1951, **36**, 281.
Presentation of results in the treatment of cancer. II. Presentation of clinical results. *Brit. J. Radiol., N.S.*, 1951, **24**, 299.

J. W. BOAG, F. D. PILLING and T. WILSON—
Ionization chambers for electron dosimetry *Brit. J. Radiol., N.S.*, 1951, **24**, 341.

W. J. DEMPSTER, B. LENNOX and J. W. BOAG—
Prolongation of survival of skin homo-transplants in the rabbit by irradiation of the host. *Brit. J. exp. Path.*, 1950, **31**, 670.

E. W. EMERY—
Radioactive decay of I^{131}. *Phys. Rev.*, 1951, **83**, 679.

L. H. GRAY—
Non-medical aspects of medical radiology. Presidential address. *Brit. J. Radiol., N.S.*, 1950, **23**, 627.

L. H. GRAY and M. E. SCHOLES—
The effect of ionizing radiations on the broad bean root. Part VIII. Growth rate studies and histological analyses. *Brit. J. Radiol., N.S.*, 1951, **24**, 82, 176, 228, 285, 348.

A. HOWARD—
Report of "Symposium on mode of action of ionizing radiations". *Nucleonics*, 1950, **7**, 26.

A. HOWARD and S. R. PELC—
P^{32} autoradiographs of mouse testis. Preliminary observations of the timing of spermatogenic stages. *Brit. J. Radiol., N.S.*, 1950, **23**, 634.
Nuclear incorporation of P^{32} as demonstrated by autoradiographs. *Exp. Cell Res.*, 1951, **2**, 178.
Synthesis of nucleoprotein in bean root cells. *Nature, Lond.*, 1951, **167**, 599.
Synthesis of deoxyribose nucleic acid and nuclear incorporation of ^{35}S as shown by autoradiography. In: *Ciba Foundation conference on isotopes in biochemistry*. London (J. & A. Churchill Ltd.), 1951, pp. 138–151.

P. HOWARD-FLANDERS and G. R. NEWBERY—
The gantry type of mounting for high voltage X-ray therapy equipment. *Brit. J. Radiol., N.S.*, 1950, **23**, 355.

S. R. PELC—
Radiation dose in tracer experiments involving autoradiography. In: *Ciba Foundation conference on isotopes in biochemistry*. London (J. & A. Churchill Ltd.), 1951, pp. 122–137.

G. ROSE and E. W. EMERY—
Effects of solution composition in a G-M counter for liquid samples. *Nucleonics*, 1951, **9**, 5.

S. RUSS, L. H. CLARK and S. R. PELC—
Physics in medical radiology. 2nd ed. London (Chapman & Hall Ltd.), 1950.

S. TAYLOR and F. S. STEWART—
Distribution of radio-iodine in human thyroid gland. *Lancet*, 1951, **ii**, 232.

OTOLOGICAL RESEARCH UNIT

M. R. DIX and C. S. HALLPIKE—
Lesions of the cerebral hemispheres and their effects upon optokinetic and caloric nystagmus. *J. Physiol.*, 1951, **114**, 55P.

C. S. HALLPIKE, M. S. HARRISON and E. SLATER—
Abnormalities of the caloric test results in certain varieties of mental disorder. *Acta otolaryng., Stockh.*, 1951, **39**, 151.

C. S. HALLPIKE and J. D. HOOD—
Some recent work on auditory adaptation and its relationship to the loudness recruitment phenomenon. *J. acoust. Soc. Amer.*, 1951, **23**, 270.

J. D. HOOD—
Auditory adaptation and its relationship to clinical tests of auditory function. *Proc. R. Soc. Med.*, 1950, **43**, 1129.
The significance of the ' on-effect ' in the perception of loudness. *J. Physiol.*, 1951, **112**, 37P.

J. D. HOOD, with a preface by C. S. HALLPIKE—
Studies in auditory fatigue and adaptation. *Acta otolaryng., Stockh.*, 1950, Suppl. 92, pp. 1–57.

OPHTHALMOLOGICAL RESEARCH UNIT

N. AMBACHE—
Contribution to : A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 315.
A further survey of the action of *Clostridium botulinum* toxin upon different types of autonomic nerve fibre. *J. Physiol.*, 1951, **113**, 1.
Unmasking, after cholinergic paralysis by botulinum toxin, of a reversed action of nicotine on the mammalian intestine, revealing the probable presence of local inhibitory ganglion cells in the enteric plexuses. *Brit. J. Pharmacol.*,1951, **6**, 51.

N. AMBACHE and J. EDWARDS—
Reversal of nicotine action on the intestine by atropine. *Brit. J. Pharmacol.*, 1951, **6**, 311.

N. AMBACHE and M. ROCHA e SILVA—
Analysis of certain interactions of nicotine with bradykinin and histamine. *Brit. J. Pharmacol.*, 1951, **6**, 68.

D. P. GREAVES and E. S. PERKINS—
Aqueous veins in rabbits. *Brit. J. Ophthal.*, 1951, **35**, 119.
Buphthalmos in the rabbit. *Ibid.*, 1951, **35**, 232.

M. LANGHAM—
Secretion and rate of flow of aqueous humour in the cat. *Brit. J. Ophthal.*, 1951, **35**, 409.
Secretion and rate of flow of the aqueous humour in the cat. *J. Physiol.*, 1951, **114**, 13P.

D. M. MAURICE—
An aplanation tonometer of new principle. *Brit. J. Ophthal.*, 1951, **35**, 178.
The permeability to sodium ions of the living rabbit's cornea. *J. Physiol.*, 1951, **112**, 367.

D. M. MAURICE and A. A. GIARDINI—
A simple optical apparatus for measuring the corneal thickness, and the average thickness of the human cornea. *Brit. J. Ophthal.*, 1951, **35**, 169.

E. J. ROSS—
The transfer of non-electrolytes across the blood-aqueous barrier. *J. Physiol.*, 1951, **112**, 229.

K. TANSLEY—
The physiological basis of electroretinography. *Britannica Acta*, 1951, 2, 583. (Proc. int. Congr. Ophthal., London, 1950).

GROUP FOR RESEARCH ON THE PHYSIOLOGY OF VISION

F. D. COLLINS, R. A. MORTON, H. HARTRIDGE and H. J. A. DARTNALL—
Retinal receptors. *Nature, Lond.*, 1951, **167**, 673.

R. GUNTER—
Sensitivity of the cat's eye to infra-red radiations. *Nature, Lond.*, 1951, **167**, 1062.
The absolute threshold for vision in the cat. *J. Physiol.*, 1951, **114**, 8.

R. GUNTER—
Visual size constancy in the cat. *Brit. J. Psychol., Gen. Sect.*, 1951, **42**, 288.
Binocular fusion of colours. *Ibid.*, 1951, **42**, 363.

L. C. THOMSON—
The spectral sensitivity of the central fovea. *J. Physiol*, 1951, **112**, 114.
Spike-potentials from the optic nerve of the rabbit. *Ibid.*, 1951, **113**, 22P.

L. C. THOMSON and P. W. TREZONA—
The variations of hue discrimination with change of luminance level. *J. Physiol.*, 1951, **114**, 98.

R. A. WEALE—
Foveal huediscrimination in the presence of a white surround. *Nature, Lond.*, 1950, **166**, 872.
A new micro-electrode for electro-pyhsiological work. *Ibid.*, 1951, **167**, 529.
Hue-discrimination in para-central parts of the human retina measured at different luminance levels. *J. Physiol.*, 1951, **113**, 115.

GROUP FOR RESEARCH IN OCCUPATIONAL OPTICS

H. C. WESTON—
Illumination levels for building interiors. *Proc. Building Res. Congr.*, Div. 3, London, 1951, p. 139.
Lighting for industrial efficiency and safety. *Proc. Nat. industr. Safety Conf., 26-27 May, 1951.* London (The Royal Society for the Prevention of Accidents) 1951, pp. 70–81.
Visual tasks in schools. *Light and Lighting*, 1951, **44**, 64.

NUTRITION BUILDING

National Institute for Medical Research

P. N. CAMPBELL, T. S. WORK and E. MELLANBY—
The isolation of a toxic substance from agenized wheat flour. *Biochem. J.*, 1951, **48**, 106.

H. B. FELL and E. MELLANBY—
The effect of vitamin A on skeletal tissue cultivated *in vitro*. *J. Physiol.*, 1951, **115**, 4P.

E. MELLANBY—
The chemical manipulation of food. *Brit. med. J.*, 1951, **ii**, 863.

M. MELLANBY and H. MELLANBY, with the assistance of J. JOYNER and M. KELLEY—
A further study of the teeth of 5-year-old children in residential homes and day schools. *Brit. med. J.*, 1951, **i**, 51.

HUMAN NUTRITION RESEARCH UNIT

O. BASSIR—
The importance in nutrition of the amounts of phosphorus in poor dietaries. *University of London, Ph. D. Thesis*, 1951.

A. BORROW and J. R. PENNEY—
Further observations on biological reactions by the Cartesian diver technique—with special reference to mammalian tissues. *Exp. Cell Res.*, 1951, **2**, 188.

J. DONE—
A new metabolite (an amino-acid amide) in the groundnut plant, Arachis Hypogaea. *University of London, Ph. D. Thesis*, 1951.

J. DONE and L. FOWDEN—
A third amino-acid amide in peanut plants (Arachis hypogaea). *Biochem. J.* 1951, **49**, xx.

M. W. GRANT—
Vitamin A and carotene. *Nature, Lond.*, 1949, **164**, 212.

B. S. PLATT—
Vitamin deficiencies. In : *Medical treatment : principles and their application.* Edited by G. Evans. London (Butterworth & Co.), 1951, pp. 1343–1348.

D. A. SMITH—
East African nutrition school. *Corona*, 1949, **1**, 17.

DUNN NUTRITIONAL LABORATORY

V. H. BOOTH—

Recent advances in estimation of vitamins A. *Research*, 1950, **3**, 497.

Chromogenesis in stored carrots. *J. Sci. Food Agric.*, 1951, **2**, 353.

Distribution of carotenoids in different parts of the carrot. *Ibid.*, 1951, **2**, 350.

G. H. BOURNE and L. J. HARRIS—

Histological changes in rats on nicotinic acid-deficient diets. *Brit. J. Nutrit.*, 1950, **4**, xvi.

J. R. G. BRADFIELD and E. KODICEK—

Abnormal mucopolysaccharide and " precollagen " in vitamin C-deficient skin wounds. *Biochem. J.*, 1951, **49**, xvii.

E. EDEN and T. MOORE—

Vitamin A in the kidney of the rat. *Biochem. J.*, 1951, **49**, 77.

L. J. HARRIS—

Errors in printing of structural formulae of organic compounds. *Chem. & Industr.*, 1950, **30**, 821.

Vitamins : a digest of current knowledge. London (J. & A. Churchill, Ltd.), 1951.

Festival symposium on nutrition and the B vitamins. Pellagra. *Brit med. J.*, 1951, **ii**, 50.

Some British pioneers in vitamin research. *Med. Press*, 1951, **225**, 478.

L. J. HARRIS and E. KODICEK—

Quantitative studies and dose-response curves in nicotinamide deficiency in rats. *Brit. J. Nutrit.*, 1950, **4**, xiii.

L. J. HARRIS, L. W. MAPSON, E. KODICEK, T. MOORE and V. H. BOOTH—

Chemical methods for the estimation of vitamins. *Proc. XIth int. Congr. pure and appl. chem., London*, 1947, 1951, **3**, pp. 503–510. (Translation of above) *Ann. Nutrit.*, 1949, **3**, 25.

E. KODICEK—

The biological activity for the rat of the bound form of nicotinic acid present in maize. *Biochem. J.*, 1951, **48**, viii.

E. KODICEK and K. K. REDDI—

Paper chromatography of nicotinic acid derivatives. *Nature, Lond.*, 1951, **168**, 475.

S. P. MISTRY and E. KODICEK—

The assay of " strepogenin " activity of purified proteins with *Lactobacillus casei*. *Biochem. J.*, 1951, **49**, xviii.

T. MOORE and I. M. SHARMAN—

Vitamin A in the kidneys of male and female rats. *Biochem. J.*, 1950, **47**, xliii.

Vitamin A levels in health and disease. *Brit. J. Nutrit.*, 1951, **5**, 119.

T. MOORE, I. M. SHARMAN and R. J. WARD—

The distribution of vitamin A in male and female rats at different levels of dosing. *Biochem. J.*, 1951, **49**, xxxix.

The effect of sex hormones on the distribution of vitamin A in castrated male rats. *Ibid.*, 1951, **49**, xiii.

T. MOORE and R. J. WARD—

Spectroscopic observations on the reproductive organs of the male rat. Contribution to the discussion following : Hormonal and nutritional factors in the metabolism of the male accessory organs of reproduction by C. Lutwak-Mann. *Biochem. Soc. Sym.*, 1951, **7**, 33.

DENTAL RESEARCH UNIT

J. D. KING—

Some recent experimental investigations. *Brit dent. J.*, 1951, **91**, 86.

J. D. KING and W. J. MARTIN—

Dental disease in parts of Trinidad and British Guiana (March–April, 1948). *Brit. dent. J.*, 1951, **90**, 35 and 63.

UNIT FOR RESEARCH ON THE MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS

L. BRAGG, J. C. KENDREW and M. F. PERUTZ—
Polypeptide chain configurations in crystalline proteins. *Proc. roy. Soc.*, A, 1950, **203**, 321.

I. M. DAWSON and M. F. PERUTZ—
Summarized proceedings of a meeting on "The investigation of biological systems by the electron microscope and by X-ray analysis"—Buxton, 1949. *Brit. J. appl. Phys.*, 1950, **1**, 57.

H. E. HUXLEY and M. F. PERUTZ—
New X-ray evidence on the configuration of polypeptide chains. *Nature, Lond.*, 1951, **167**, 1053.

A. M. LIQUORI—
Presence of foetal haemoglobin in Cooley's anaemia. *Nature, Lond.*, 1951, **167**, 950.

M. F. PERUTZ, M. JOPE and R. BARER—
Observations of proteins in polarized ultra-violet light. *Faraday Soc. Discussion*, 1950, **9**, 423.

M. F. PERUTZ, A. M. LIQUORI and F. EIRICH—
X-ray and solubility studies of the haemoglobin of sickle-cell anaemia patients. *Nature, Lond.*, 1951, **167**, 929.

M. F. PERUTZ and J. M. MITCHISON—
State of haemoglobin in sickle-cell anaemia. *Nature, Lond.*, 1950, **166**, 677.

BIOPHYSICS RESEARCH UNIT

H. G. DAVIES—
Discussion following: Infra-red microspectrometry with a 0·8 N.A. reflecting microscope, by R. D. B. Fraser. *Faraday Soc. Discussion*, 1950, **9**, 397.
Ultra-violet microspectrography of living tissue culture cells. Part I. Radiation measurements. *Ibid*, 1950, **9**, 442.

P. FATT and B. KATZ—
Membrane potentials at the motor end-plate. *J. Physiol.*, 1950, **111**, 46P.
Spontaneous local activity at the nerve-muscle junction. *Ibid.*, 1951, **114**, 16P.

M. J. FRASER and R. D. B. FRASER—
Physical studies of nucleic acid. Evidence on the structure of deoxyribonucleic acid from measurements with polarized infra-red radiation. *Nature, Lond.*, 1951, **167**, 761.

R. D. B. FRASER—
Infra-red microspectrometry with a 0·8 N.A. reflecting microscope. *Faraday Soc. Discussion*, 1950, **9**, 378.

K. P. NORRIS, W. E. SEEDS and M. H. F. WILKINS—
Reflecting microscopes with spherical mirrors. *J. opt. Soc. Amer.*, 1951, **41**, 111.

K. P. NORRIS and M. H. F. WILKINS—
A reflecting microscope of 1.3 numerical aperture. *Faraday Soc. Discussion*, 1950, **9**, 360.

W. C. PRICE, R. D. B. FRASER, T. S. ROBINSON and H. C. LONGUET-HIGGINS—
The infra-red absorption spectra of boron-nitrogen compounds. *Faraday Soc. Discussion*, 1950, **9**, 131.

J. T. RANDALL—
Microscopical apparatus—instrument design and technique. Introductory paper. Optical methods in cytology. *Faraday Soc. Discussion*, 1950, **9**, 353.
An experiment in biophysics. *Proc. roy. Soc.*, A, 1951, **208**, 1.

J. T. RANDALL and H. B. FELL—
Tissue culture and biophysical research. *Lancet*, 1951, **i**, 839.

W. E. SEEDS and M. H. F. WILKINS—
Ultra-violet microspectrographic studies of nucleoproteins and crystals of biological interest. *Faraday Soc. Discussion*, 1950, **9**, 417.

S. G. TOMLIN and H. G. CALLAN—
Preliminary account of an electron microscope study of chromosomes from newt oocytes. *Quart. J. micr. Sci.*, 1951, **92**, 221.

P. M. B. WALKER and H. G. DAVIES—
Ultra-violet microspectrography of living tissue culture cells. Part II. Microspectrographic studies of living cells and ultraviolet-irradiated chick fibroblasts. *Faraday Soc. Discussion*, 1950, **9**, 461.

M. H. F. WILKINS—
Some aspects of microspectrography. *Faraday Soc. Discussion*, 1950, **9**, 363.

M. H. F. WILKINS, R. G. GOSLING and W. E. SEEDS—
Physical studies of nucleic acid. Nucleic acid: an extensible molecule? *Nature, Lond.*, 1951, **167**, 759.

SPECTROGRAPHIC RESEARCH UNIT

G. H. BEAVEN, H. HOCH and E. R. HOLIDAY—
The haemoglobins of the human foetus and infant. Electrophoretic and spectroscopic differentiation of adult and foetal types. *Biochem. J.*, 1951, **49**, 374.

G. H. BEAVEN, E. R. HOLIDAY, E. A. JOHNSON, B. ELLIS and V. PETROW—
The mode of linkage of component α in vitamin B_{12}. [Letter] *J. Pharm. Pharmacol.*, 1950, **2**, 733.
The chemistry of anti-pernicious anaemia factors. Part VI. The mode of combination of *component* α in vitamin B_{12}. *Ibid.*, 1950, **2**, 944.

G. H. BEAVEN, E. R. HOLIDAY and E. M. JOPE—
The ultra-violet absorption spectra of the aromatic amino acids in proteins and related compounds. *Faraday Soc. Discussion*, 1950, **9**, 406.

G. COOLEY, B. ELLIS, V. PETROW, G. H. BEAVEN, E. R. HOLIDAY and E. A. JOHNSON—
The chemistry of anti-pernicious anaemia factors. Part VII. Some transformations of vitamin B_{12b}. *J. Pharm. Pharmacol.*, 1951, **3**, 271.

B. ELLIS, V. PETROW, G. H. BEAVEN, E. R. HOLIDAY and E. A. JOHNSON—
Conversion of vitamin B_{12b} into vitamin B_{12}. [Letter] *J. Pharm. Pharmacol.*, 1950, **2**, 735.

E. R. HOLIDAY and W. WILD—
An image converter to extend the useful range of photo-multipliers to longer wavelengths. *J. sci. Instrum.*, 1951, **28**, 282.

CELL METABOLISM RESEARCH UNIT

J. S. D. BACON and J. EDELMAN—
The action of invertase preparations. [Letter] *Arch. Biochem.*, 1950, **28**, 467.
The carbohydrates of the Jerusalem artichoke and other compositae. *Biochem. J.*, 1951, **48**, 114.

N. M. BRADFORD, E. E. CRANE and R. E. DAVIES—
Observations on some physiological variations in frogs and toads, with special reference to the gastric mucosa. *Proc. zool. Soc. Lond.*, 1950, **120**, 471.

W. S. BULLOUGH and M. JOHNSON—
Epidermal mitotic activity and oxygen tension. *Nature, Lond.*, 1951, **167**, 488.

E. E. CRANE and R. E. DAVIES—
Chemical and electrical energy relations for the stomach. *Biochem. J.*, 1951, **49**, 169.

R. E. DAVIES—
The mechanism of acid secretion by the stomach. *Gastroenterologia*, 1950/51, **76**, 78.
The mechanism of hydrochloric acid production by the stomach. *Biol. Rev.*, 1951, **26**, 87.

J. EDELMAN and J. S. D. BACON—
The action of a hydrolytic enzyme system from *Helianthus tuberosus L.* on carbohydrates present in the tubers. *Biochem. J.*, 1951, **49**, 446.
Transfructosidation in extracts of the tubers of *Helianthus tuberosus L.* *Ibid.*, 1951, **49**, 529.

L. E. HOKIN—
Amino-acid requirements of amylase synthesis by pigeon pancreas slices. *Biochem. J.*, 1951, **48**, xl.
The synthesis and secretion of amylase by pigeon pancreas *in vitro*. *Ibid.* 1951, **48**, 320.

D. E. HUGHES—
A press for disrupting bacteria and other micro-organisms. *Brit. J. exp. Path.*, 1951, **32**, 97.

D. E. HUGHES, E. SALVIN and D. R. WOOD—
Decarboxylation of histidine as a source of error in extracting histamine from tissues. *J. Physiol.*, 1951, **113**, 218.

D. E. HUGHES and D. H. WILLIAMSON—
Removal of acid by trioctylamine from samples for microbiological assay. *Biochem. J.*, 1951, **48**, 487.

H. A. KREBS—
Chemical composition of blood plasma and serum. *Ann. Rev. Biochem.* 1950, **19**, 409.
Oxidation of amino acids. In: *The enzymes: chemistry and mechanism of action*, **2**, pt. 1. Ed. by J. B. Sumner and K. Myrbäck. New York (Academic Press Inc.) 1951, pp. 499–535.
The use of "CO_2 buffers" in manometric measurements of cell metabolism. *Biochem. J.*, 1951, **48**, 349.
Carbon dioxide fixation in animal tissues. *Symposia Soc. exp. Biol.*, 1951, **5**, 1.
Improved manometric fluid. *Biochem. J.*, 1951, **48**, 240.

H. A. KREBS, P. BOULANGER and R. OSTEUX—
A propos du dosage de l'acide *L*-glutamique par la décarboxylase bactérienne. *Bull. Soc. Chim. biol., Paris*, 1950, **32**, 851.

H. A. KREBS, L. V. EGGLESTON and C. TERNER—
In vitro measurements of the turnover rate of potassium in brain and retina. *Biochem. J.*, 1951, **48**, 530.

P. M. NOSSAL—
The decarboxylation of L-malic acid by *Lactobacillus arabinosus*. *Biochem. J.*, 1951, **48**, xvii.
Enzymic method for the estimation of L-malic and fumaric acids. *Ibid.* 1951, **48**, xviii.
The decarboxylation of Malic acid by *Lactobacillus arabinosus*. *Ibid*, 1951, **49**, 407.

E. ROWATT—
The metabolism of pyruvate by *Lactobacillus plantarum*. *Biochem. J.*, 1951, **49**, 453.

CHEMICAL MICROBIOLOGY RESEARCH UNIT

R. DAVIES, E. A. FALKINER, J. F. WILKINSON and J. L. PEEL—
Ester formation by yeasts. 1. Ethyl acetate formation by *Hansenula* species. *Biochem. J.*, 1951, **49**, 58.

E. F. GALE—
The assimilation of amino-acids by bacteria. 10. Action of inhibitors on the accumulation of free glutamic acid in *Staphylococcus aureus* and *Streptococcus faecalis*. *Biochem. J.*, 1951, **48**, 286.
The assimilation of amino-acids by bacteria. 11. The relationship between accumulation of free glutamic acid and the formation of combined glutamic acid in *Staphylococcus aureus*. *Ibid.*, 1951, **48**, 290.

E. F. GALE and T. F. PAINE—
The assimilation of amino-acids by bacteria. 12. The action of inhibitors and antibiotics on the accumulation of free glutamic acid and the formation of combined glutamate in *Staphylococcus aureus*. *Biochem. J.*, 1951, **48**, 298.

B. HURLOCK and J. TOSIC—
An organism able to metabolize 3-methylglucose and 3-methylfructose. *J. gen. Microbiol.*, 1951, **5**, 587.

K. MCQUILLEN—
The bacterial surface. III. Effect of penicillin on the electrophoretic mobility of *Staphylococcus auréus*. *Biochim. Biophys. Acta*, 1951, **6**, 534.
The bacterial surface. IV. Effect of streptomycin on the electrophoretic mobility of *Escherichia coli* and *Staphylococcus aureus*. *Ibid*, 1951, **7**, 54.

P. MITCHELL and J. MOYLE—
Relationships between cell growth, surface properties and nucleic acid production in normal and penicillin-treated *Micrococcus pyogenes*. *J. gen. Microbiol.*, 1951, **5**, 421.

T. F. PAINE, Jr.,—
The similarity in action of bacitracin and penicillin on the staphylococcus. *J. Bact.*, 1951, **61**, 259.

J. L. PEEL—
Ester formation by yeasts. 2. Formation of ethyl acetate by washed suspensions of *Hansenula anomala*. *Biochem. J.*, 1951, **49**, 62.

C. J. SHEPHERD—
The enzymes of carbohydrate metabolism in *Neurospora*. 1. Succinic dehydrogenase. *Biochem. J.*, 1951, **48**, 483.

GROUP FOR RESEARCH IN CHEMOTHERAPY, CAMBRIDGE

A. BISHOP and E. W. MCCONNACHIE—
The inhibition by *p*-aminobenzoic acid of the development of paludrine-resistance as produced by sulphonamides in *Plasmodium gallinaceum*. *Parasitology*, 1951, **41**, 105

E. W. MCCONNACHIE—
Latent infections in avian malaria in relation to the production of drug-resistance. *Parasitology*, 1951, **41**, 110.

DEPARTMENT FOR RESEARCH IN INDUSTRIAL MEDICINE, LONDON HOSPITAL

P. L. BIDSTRUP—
The health hazards of dinitro-*ortho*-cresol. *Proc. IInd int. Congr. Crop Protection*, London, 20–31 July, 1949. pp. 23–25.
Cancer of the lung in nickel, arsenic and chromate workers. *Arch. belges med. sociale hyg.*, 1950, **8**, 500.

P. L. BIDSTRUP and D. J. H. PAYNE—
Poisoning by dinitro-*ortho*-cresol. Report of eight fatal cases occurring in Great Britain. *Brit. med. J.*, 1951, **ii**, 16.

M. BUCKELL—
The rapid estimation of mercury in the atmosphere of workrooms. *Brit. J. industr. Med.*, 1951, **8**, 181.

D. G. HARVEY, P. L. BIDSTRUP and J. A. L. BONNELL—
Poisoning by dinitro-*ortho*-cresol. Some observations on the effects of dinitro-*ortho*-cresol administered by mouth to human volunteers. *Brit. med. J.*, 1951, **ii**, 13.

D. HUNTER—
Berylliosis. *Arch. belges med. sociale hyg.*, 1950, **8**, 433.
Toxicology of some metals and their compounds used in industry. *Brit. med. Bull.*, 1950, **7**, 5.

INDUSTRIAL MEDICINE AND BURNS RESEARCH UNIT

J. P. BULL—
Industrial injuries. *Brit. med. Bull.*, 1950, **7**, 69.
The treatment of flash burns. *Practitioner*, 1950, **165**, 615.
The history and principles of clinical therapeutic trials. *University of Cambridge, M.D. Thesis*, 1951.

M. S. COTTERILL—
Methods of measuring the swelling of limbs. *Physiotherapy*, 1951, **37**, 49.

C. N. D. CRUICKSHANK—
Sensitivity to tuberculin. *Nature, Lond.*, 1951, **168**, 206.

J. HARDWICKE, C. R. RICKETTS and J. R. SQUIRE—
Effect of dextran of various molecular sizes on erythrocyte sedimentation rate. Letter. *Nature, Lond.*, 1950, **166**, 988.

J. S. HORN and S. SEVITT—
Ischaemic necrosis and regeneration of the tibialis anterior muscle after rupture of the popliteal artery. *J. Bone Jt Surg.*, 1951, **33B**, 348.

D. MACG. JACKSON—
Suppurative thrombophlebitis treated with aureomycin. *Brit. med. J.*, 1951, **i**, 72.

D. MACG. JACKSON, E. J. L. LOWBURY and E. TOPLEY—
Pseudomonas pyocyanea in burns. Its rôle as a pathogen, and the value of local polymyxin therapy. *Lancet*, 1951, **ii**, 137.

E. J. L. LOWBURY—
Contamination of cetrimide and other fluids with *Pseudomonas pyocyanea*. *Brit. J. industr. Med.*, 1951, **8**, 22.
Improved culture methods for the detection of *Ps. pyocyanea*. *J. clin. Path.*, 1951, **4**, 66.

C. R. RICKETTS—
Chemistry of dextran and its derivatives. *Proc. R. Soc. Med.*, 1951, **44**, 558.

C. R. RICKETTS, J. R. SQUIRE and E. TOPLEY, with the technical assistance of H. A. LILLY—
Human skin lipids with particular reference to the self-sterilising power of the skin. *Clin. Sci.*, 1951, **10**, 89.

S. SEVITT—
Eosinophil and other leucocyte changes in burned patients. With special reference to adrenocortical activity. *Brit. med. J.*, 1951, **i**, 976.

J. R. SQUIRE—
The Medical Research Council Burns Unit, Birmingham Accident Hospital. *Queen's Medical Magazine*, 1950, **43**, 107.
Medical field surveys in industry and the Services in relation to laboratory research. In : Medical Research Council. *The application of scientific methods to industrial and Service medicine ; proceedings of a conference held from March 29th to March 31st, 1950.* London (H.M.S.O.), 1951, pp. 21–23.
The use of nylon film in surgical dressings. In : *Plastics progress. Papers and discussions at the British plastics convention, 1951.* Edited by P. Morgan. London, (Iliffe & Sons Ltd.), 1951, pp. 267–271.
Background to biological studies with dextran. *Proc. R. Soc. Med.*, 1951, **44**, 557.
Skin disinfection. *Practitioner*, 1951, **166**, 502.

J. R. SQUIRE, C. N. D. CRUICKSHANK and E. TOPLEY—
Occupational skin disease. *Brit. med. Bull.*, 1950, **7**, 28.

M. STACEY and C. R. RICKETTS—
Bacterial dextrans. *Fortschr. Chem. Org. Naturstoffe*, 1951, **8**, 28.

E. TOPLEY, E. J. L. LOWBURY and L. HURST—
Bacteriological control of aureomycin therapy. *Lancet*, 1951, **i**, 87.

PNEUMOCONIOSIS RESEARCH UNIT

A. L. COCHRANE, P. J. CHAPMAN and P. D. OLDHAM—
Observers' errors in taking medical histories. *Lancet*, 1951, **i**, 1007.

A. L. COCHRANE, I. DAVIES and C. M. FLETCHER—
"Entente radiologique". A step towards international agreement on the classification of radiographs in pneumoconiosis. *Brit. J. industr. Med.*, 1951, **8**, 244.

A. L. COCHRANE, C. M. FLETCHER, J. C. GILSON and P. HUGH-JONES—
The rôle of periodic examination in the prevention of coalworkers' pneumoconiosis. *Brit. J. industr. Med.*, 1951, **8**, 53.

C. M. FLETCHER and P. D. OLDHAM—
The use of standard films in the radiological diagnosis of coalworkers' pneumoconiosis. *Brit. J. industr. Med.*, 1951, **8**, 138.

K. J. MANN—
A radiological study of the relationship between tuberculosis and pneumoconiosis in coal miners. *Thorax*, 1951, **6**, 43.

O. L. WADE and J. C. GILSON—
The effect of posture on diaphragmatic movement and vital capacity in normal subjects with a note on spirometry as an aid in determining radiological chest volumes. *Thorax*, 1951, **6**, 103.

TOXICOLOGY RESEARCH UNIT

W. N. ALDRIDGE—
The conversion of cyanogen chloride to cyanide in the presence of blood proteins and sulphydryl compounds. *Biochem. J.*, 1951, **48**, 271.

W. N. ALDRIDGE, J. M. BARNES and F. A. DENZ—
Biochemical changes in acute beryllium poisoning. *Brit. J. exp. Path.*, 1950, **31**, 473.

J. M. BARNES—
Health hazards from insecticides. *Brit. med. Bull.*, 1950, **7**, 23.

J. M. BARNES and F. A. DENZ—
The effect of 2–3 dimercapto-propanol (BAL) on experimental nickel carbonyl poisoning. *Brit. J. industr. Med.*, 1951, **8**, 117.

J. M. BARNES, F. A. DENZ and H. A. SISSONS—
Beryllium bone sarcomata in rabbits. *Brit. J. Cancer*, 1950, **4**, 212.

F. A. DENZ—
Myoneural junctions and toxic agents. *J. Path. Bact.*, 1951, **63**, 235.
Poisoning by *p*-nitrophenyl diethyl thiophosphate (E. 605) : a contribution to the study of anticholinesterase compounds. *Ibid.*, 1951, **63**, 81.

ENVIRONMENTAL HYGIENE RESEARCH UNIT

T. BEDFORD—
Toplina i ventilacija radne okoline i njihov utjecaj na industrijskog radnika. *Arhiv hig. rada*, 1950, **1**, 316.
Cycle du chauffage 8–10 mai 1951. État de la recherche en chauffage et ventilation dans quelques pays étrangers. Les recherches en Grande-Bretagne. *Ann. Inst. tech. Batiment Trav. publics*, 1951, No. 222 *Équipement technique*, No. 17, p. 3.
Fuel economy III—Heating and ventilation in relation to human needs. *Research*, 1951, **4**, 497.
Equivalent temperature : what it is and how it is measured. *Heat. Pip. Air condit.*, 1951, p. 87.

T. BEDFORD and M. FISHENDEN—
Comparisons of convective and radiant methods of heating. (Research item M.34). *British Shipbuilding Research Association*, Report 56, 1950.

C. N. DAVIES—
Filter paper for dust control in coal mines. *Paper Mkr., Lond.*, 1951, **121**, 356.

C. N. DAVIES and M. AYLWARD—
The trajectories of heavy, solid particles in a two-dimensional jet of ideal fluid impinging normally upon a plate. *Proc. phys. Soc.*, B, 1951, **64**, 889.

O. M. LIDWELL—
The bacterial filtration efficiency of an electrostatic air cleaner. *J. Instn. Heat. Vent. Engrs.*, 1951, **19**, 139.

CLIMATE AND WORKING EFFICIENCY RESEARCH UNIT

H. D. DARCUS—
Anatomical factors in machine design. In: Medical Research Council. *The application of scientific methods to industrial and Service medicine; proceedings of a conference held from March 29th to March 31st*, 1950. London (H.M.S.O.), 1951, pp. 72–76.

Some aspects of road user research. [Address]. R. Soc. for the prevention of accidents. Road Safety Organisers' Course. Bournemouth, May 1951. p. 7.

The maximum torques developed in pronation and supination of the right hand. *J. Anat., Lond.*, 1951, **85**, 55.

Muscular movement. Development of isometric contraction. *Advanc. Sci.*, 1951, **8**, 54.

D. K. C. MACDONALD and C. H. WYNDHAM—
Heat transfer in man. *J. appl. Physiol.*, 1950, **3**, 342.

R. E. VAN HEYNINGEN—
Sweat gland activity. *University of Oxford, Ph. D. Thesis*, 1951.

R. VAN HEYNINGEN and J. S. WEINER—
Comparison of arm and general body sweat. *J. Physiol.*, 1951, **112**, 13P.

J. S. WEINER—
Observations on the working ability of Bantu mineworkers with reference to acclimatization to hot humid conditions. *Proc. 4th Empire Mining and Metallurgical Congr.*, 1951, **1**, 339.

Physiological studies of the effects of heat. In: Medical Research Council. *The application of scientific methods to industrial and Service medicine; proceedings of a conference held from March 29th to March 31st*, 1950. London (H.M.S.O.), 1951, pp. 63–71.

GROUP FOR RESEARCH ON BILHARZIA DISEASE

J. NEWSOME—
Recent investigations into the treatment of schistosomiasis by miracil D in Egypt. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 611.

APPLIED PSYCHOLOGY RESEARCH UNIT

V. R. CANE and V. HORN—
The timing of responses to spatial perception questions. *Quart. J. exp. Psychol.*, 1951, **3**, 133.

A. CARPENTER—
A case of absolute pitch. *Quart. J. exp. Psychol.*, 1951, **3**, 92.

E. G. CHAMBERS—
Psychology and the industrial worker. (Cambridge University Press), 1951.

R. CONRAD—
Speed and load stress in a sensori-motor skill. *Brit. J. industr. Med.*, 1951, **8**, 1.

Study of skill by motion and time study and by psychological experiment. *Research*, 1951, **4**, 353.

C. B. GIBBS—
Transfer of training and skill assumptions in tracking tasks. *Quart. J. exp. Psychol.*, 1951, **3**, 99.

C. B. GIBBS and J. C. BAKER—
Free-moving and fixed control levers in a manual tracking task. *Proc. Conf. Automatic Control,* 1951, **3,** 99.

N. HARRIS—
A note on the paired comparisons method of rating. *Quart. J. exp. Psychol.,* 1951, **3,** 146.

A. W. HEIM and V. R. CANE—
The effects of repeated testing. III : further experiments and general conclusions. *Quart. J. exp. Psychol.,* 1950, **2,** 182.

W. E. HICK—
Information theory in psychology. In : *Rep. Proc. Symposium on information theory,* London, September, 1950. (Ministry of Supply, 51/1766). pp. 130–133.
A simple stimulus generator. *Quart. J. exp. Psychol.,* 1951, **3,** 94.
Man as an element in a control system. *Research,* 1951, **4,** 112.

M. J. H. MITCHELL and M. A. VINCE—
The direction of movement of machine controls. *Quart. J. exp. Psychol.,* 1951, **3,** 24.

GROUP FOR RESEARCH IN INDUSTRIAL PSYCHOLOGY

R. MARRIOTT—
Socio-psychological factors in productivity. *Occup. Psychol.,* 1951, **25,** 15.
Three examples of joint consultation in industry. *Psychology at Work,* 1951, **4,** 13.

J. WALKER and R. MARRIOTT—
A study of some attitudes to factory work. *Occup. Psychol.,* 1951, **25,** 181.

UNIT FOR RESEARCH IN OCCUPATIONAL ADAPTATION

A. LEWIS—
Social aspects of psychiatry. Parts I and II. *Edinb. med. J.,* 1951, **58,** 214.

N. O'CONNOR—
Neuroticism and emotional instability in high-grade male defectives. *J. Neurol. Neurosurg. Psychiat.,* 1951, **14,** 226.

N. O'CONNOR and J. TIZARD—
Predicting the occupational adequacy of certified mental defectives. *Occup. Psychol.,* 1951, **25,** 205.

J. TIZARD, N. O'CONNOR and J. M. CRAWFORD—
The abilities of adolescent and adult high-grade male defectives. *J. ment. Sci.,* 1950, **96,** 889.

GROUP FOR RESEARCH ON THE BUILDING INDUSTRY

A. J. FLOOK—
New methods in the training of foremen. *Vocational Aspect,* 1951, **3,** 59.

T. VENESS—
The human problems of building industry : Joint consultation on building sites. *Occup. Psychol.,* 1951, **25,** 131.
Psychological research in the building industry. *Psychology at Work,* 1951, **4,** 23.

SOCIAL MEDICINE RESEARCH UNIT

J. N. MORRIS—
Industrial health : what is it we are trying to do? *J. R. san. Inst.,* 1951, **71,** 621.
Recent history of coronary desease. *Lancet,* 1951, **i,** 1 and 69.
Social conditions and juvenile rheumatism. [Letter.] *Brit. med. J.,* 1951, **ii,** 548.

A. M. THOMSON—
Human foetal growth. *Brit. J. Nutrit.,* 1951, **5,** 158.

STATISTICAL RESEARCH UNIT

P. ARMITAGE and I. ALLEN—
Methods of estimating the LD50 in quantal response data. *J. Hyg., Camb.*, 1950, **48**, 298.

M. E. DAFF, R. DOLL and E. L. KENNAWAY—
Cancer of the lung in relation to tobacco. *Brit. J. Cancer*, 1951, **5**, 1.

R. DOLL—
Occupational factors in peptic ulcer. In: Medical Research Council. *The application of scientific methods to industrial and Service medicine; proceedings of a conference held from March 29th to March 31st*, 1950. London (H.M.S.O.), 1951, pp. 16–20.

F. FULTON and P. ARMITAGE—
Surviving tissue suspensions for influenza virus titration. *J. Hyg., Camb.*, 1951, **49**, 247.

A. B. HILL—
The clinical trial. *Brit. med. Bull.*, 1951, **7**, 278.
The doctor's day and pay. Some sampling inquiries into the pre-war status. The inaugural address of the President delivered to the Royal Statistical Society on November 22nd 1950. *J. R. statis. Soc.*, A, 1951, **114**, 1.
General principles of field surveys. In: Medical Research Council. *The application of scientific methods to industrial and Service medicine; proceedings of a conference held from March 29th to March 31st*, 1950. London (H.M.S.O.), 1951, pp. 7–13.

J. O. IRWIN—
Statistical method in the field of biological assay. *J. Pharm. Pharmacol.*, 1950, **2**, 737.
Note on the relation between LD50 and average time to death in 25 strains of *H. pertussis*. *J. gen. Microbiol.*, 1951, **5**, 266.

F. A. JONES, R. DOLL, C. FLETCHER and H. W. RODGERS—
The risks of gastroscopy, a survey of 49,000 examinations. *Lancet*, 1951, **i**, 647.

W. J. MARTIN—
A comparison of the trends of male and female mortality. *J. R. statist. Soc.*, A, 1951, **114**, 287.

D. L. PUGH and E. R. JONES, with approval of statistical evidence by W. J. MARTIN—
The domiciliary use of paramisan sodium in the treatment of pulmonary tuberculosis. *Tubercle, Lond.*, 1951, **32**, 50.

SERUM RESEARCH INSTITUTE

L. F. HEWITT—
Cell structure of *Corynebacterium diphtheriae*. *J. gen. Microbiol.*, 1951, **5**, 287.
Effect of cultural conditions on bacterial cytology. *Ibid.*, 1951, **5**, 293.

LABORATORY ANIMALS BUREAU

F. J. DYER—
Biological standardisation in review and preview. *Pharm. J.*, 1951, **166**, 233 and 252.

W. LANE-PETTER—
Mouse ear tattooing forceps. *J. anim. Technicians Ass.*, 1951, **2**, 15.

EXTERNAL SCIENTIFIC STAFF

S. M. BENNETT—
A group test of hearing for six-year-old children. *Brit. J. educ. Psychol.*, 1951, **21**, 45.

T. C. CARTER—
The position of fidget in linkage group V of the house mouse. *J. Genet.*, 1951, **50**, 264.
Wavy-coated mice: phenotypic interactions and linkage tests between rex and (*a*) waved-1, (*b*) waved-2. *Ibid.*, 1951, **50**, 268.
The genetics of luxate mice. I. Morphological abnormalities of heterozygotes and homozygotes. *Ibid.*, 1951, **50**, 277.
The genetics of luxate mice. II. Linkage and independence. *Ibid.*, 1951, **50**, 300.

T. C. CARTER and D. S. FALCONER—
Stocks for detecting linkage in the mouse, and the theory of their design. *J. Genet.*, 1951, **50**, 307.

T. C. CARTER and H. GRÜNEBERG—
Linkage between fidget and agouti in the house mouse. *Heredity*, 1950, **4**, 373.

T. C. CARTER and R. S. PHILLIPS—
Ichthyosis, a new recessive mutant in the house mouse. *J. Hered.*, 1950, **41**, 297.

H. DAVSON—
Textbook of general physiology. Ed. by H. Davson. London (J. & A. Churchill, Ltd.), 1951.

H. N. GREEN, H. B. STONER, H. J. WHITELEY and D. EGLIN—
A case of traumatic uraemia. *Brit. J. Surg.*, 1951, **39**, 80.

W. JACOBSON and M. WEBB—
The two types of nucleic acid during mitosis. *J. Physiol.*, 1951, **112**, 2P.

H. LASER—
The effect of *cis*-vaccenic acid on respiration and growth of *B. subtilis*. *Biochem. J.*, 1951, **48**, 164.
The haemolytic substance present in animal tissues. *Science*, 1951, **113**, 2943.

M. F. LYON—
Hereditary absence of otoliths in the house mouse. *J. Physiol.*, 1951, **114**, 410.

N. P. MARKHAM, A. Q. WELLS, N. G. HEATLEY and H. W. FLOREY—
The effect on experimental tuberculosis of the intravenous injection of micrococcin. *Brit. J. exp. Path.*, 1951, **32**, 353.

L. A. MOUNTER—
The specificity of cobra-venom cholinesterase. *Biochem. J.*, 1951, **50**, 122.

F. G. SPEAR—
Some recent advances in radiation biology. *Med. Pr.*, 1951, **225**, 621.

F. G. SPEAR and K. GRIFFITHS—
The Radium Commission; a short history of its origin and work, 1929–48. London (H.M.S.O.), 1951.

H. B. STONER and H. N. GREEN—
Studies on the role of the adrenal cortex in adenosine triphosphate shock. *Brit. J. exp. Path.*, 1950, **31**, 603.
Bodily reactions to trauma. Further studies on the effect of ischaemia on the clotting factor of muscle. *Ibid.*, 1951, **32**, 183.

C. J. THRELFALL, H. B. STONER and H. N. GREEN—
Kidney citrate levels in nucleotide shock. *Nature, Lond.*, 1951, **168**, 297.

M. WEBB—
The influence of magnesium on cell division. 4. The specificity of magnesium. *J. gen. Microbiol.*, 1951, **5**, 480.
The influence of magnesium on cell division. 5. The effect of magnesium on the growth of bacteria in chemically-defined media of varying complexity. *Ibid.*, 1951, **5**, 485.
The influence of magnesium on cell division. 6. The action of certain hydrolytic enzymes on the filamentous and chain forms of gram-positive rod-shaped organisms. *Ibid.*, 1951, **5**, 496.

A. Q. WELLS—
Tuberculosis. In: *British Surgical Practice.* Edited by E. R. Carling and J. P. Ross. London (Butterworth & Co.), 1951, **8**, pp. 311–331.

J. WRIGHT—
Bacterial flora and bacterial counts of infants' bottle feeds. *Brit. med. J.*, 1951, **ii**, 138.

PUBLIC HEALTH LABORATORY SERVICE

S. P. BEDSON, A. W. DOWNIE, F. O. MACCALLUM and C. H. STUART-HARRIS—
Virus and rickettsial diseases. London (Edward Arnold & Co.), 1950.

H. J. BENSTED—
Standardization of serological reagents. *Brit. med. Bull.*, 1951, **7**, 178.

G. BOUSFIELD—
Paralysis following immunizing injections: measures calculated to diminish the risk. *Lancet*, 1951, **i**, 1028.

J. A. BOYCOTT—
The work of an area public health laboratory. *Brit. med. Bull.*, 1951, **7**, 207.

R. F. BRIDGES—
The Dysentery Reference Laboratory. *Brit. med. Bull.*, 1951, **7**, 200.

W. C. COCKBURN—
Whooping-cough immunization. *Practitioner*, 1951, **167**, 232.

W. C. COCKBURN and J. A. HARRINGTON—
Field trials of prophylactic agents. *Brit. med. Bull.*, 1951, **7**, 181.

W. C. COCKBURN, J. A. HARRINGTON, R. A. ZEITLIN, D. MORRIS and F. E. CAMPS—
Homologous serum hepatitis and measles prophylaxis: a report to the Medical Research Council. *Brit. med. J.*, 1951, **ii**, 6.

W. C. COCKBURN, J. E. JAMESON and J. FENTON—
An explosive outbreak of paratyphoid B fever due to Vi-phage Type "Taunton". *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 43.

G. T. COOK, B. R. FRISBY and W. H. H. JEBB—
The routine use of selective and enrichment media for the isolation of salmonellae. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 89.

G. T. COOK, R. KNOX and A. H. TOMLINSON—
Production of fermentative variants by *Shigella sonnei* and other "late fermenting" organisms. *Brit. J. exp. Path.*, 1951, **32**, 203.

G. T. COOK and A. M.-M. PAYNE—
Epidemiological control of infectious diseases. *Brit. med. Bull.*, 1951, **7**, 185.

G. COVELL—
Prophylactic and therapeutic treatment of malaria. In: *British encyclopaedia of medical practice*, Suppl. 107. London (Butterworth and Company Ltd.) 1951, pp. 6–9.

G. COVELL and W. D. NICOL—
Clinical, chemotherapeutic and immunological studies on induced malaria. *Brit. med. Bull.*, 1951, **8**, 51.

S. T. COWAN—
National Collection of Type Cultures. *Brit. med. Bull.*, 1951, **7**, 189.
United Kingdom culture collections. *J. gen. Microbiol.*, 1951, **5**, 605.

P. B. CRONE—
Multiplication of certain salmonella species in autoclaved buffered tap water. *J. Path. Bact.*, 1951, **63**, 167.

S. H. DOUGLAS and J. TAYLOR—
Salmonella wien. Mon. Bull. Minist. Hlth., Lond., 1951, **10**, 198.

S. H. DOUGLAS, J. TAYLOR, E. GREENWOOD and S. IBBOTSON—
Human infection due to a new *Salmonella—Salm. salford. Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 75.

D. G. ff. EDWARD and V. D. ALLISON—
Diphtheria in the immunized, with observations on a diphtheria-like disease associated with non-toxigenic strains of *Corynebacterium diphtheriae. J. Hyg., Camb.*, 1951, **49**, 205.

A. FELIX—
Laboratory control of the enteric fevers. *Brit. med. Bull.*, 1951, **7**, 153.
The preparation, testing and standardization of typhoid vaccine. *J. Hyg., Camb.*, 1951, **49**, 268.

A. FELIX and E. S. ANDERSON—
Bacteriophages carried by the *Vi*-phage types of *Salmonella typhi*. *Nature, Lond.* 1951, **167**, 603.
The immunizing potency of alcohol-killed and alcohol-preserved typhoid vaccine after storage for ten years. *J. Hyg., Camb.*, 1951, **49**, 288.
Bacteriophage, virulence and agglutination tests with a strain of *Salmonella typhi* of low virulence. *Ibid.*, 1951, **49**, 349.

A. FELIX and B. R. CALLOW—
Paratyphoid-B Vi-phage typing. *Lancet*, 1951, **ii**, 10.

A. FELIX and R. M. PITT—
The pathogenic and immunogenic activities of *Salmonella typhi* in relation to its antigenic constituents. *J. Hyg., Camb.*, 1951, **49**, 92.

R. M. FRY and R. I. N. GREAVES—
The survival of bacteria during and after drying. *J. Hyg., Camb.*, 1951, **49**, 220.

P. HARTLEY, W. J. TULLOCH, M. ANDERSON, W. A. DAVIDSON, J. GRANT, W. M. JAMIESON, C. NEUBAUER, R. NORTON and G. H. ROBERTSON—
A study of diphtheria in two areas of Great Britain: a summary of Medical Research Council Special Report No. 272. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 143.

M. S. HARVEY, G. B. FORBES and B. P. MARMION—
An outbreak of Q fever in East Kent. *Lancet*, 1951, **ii**, 1152.

A. HIRCH—
Bacterial contamination of the air in boot and shoe factories. *Brit. J. industr. Med.*, 1951, **8**, 8.

B. C. HOBBS—
Food-poisoning and food hygiene. *Brit. med. Bull.*, 1951, **7**, 167.

W. H. H. JEBB, S. H. DOUGLAS and J. TAYLOR—
A new Salmonella type, *Salmonella oxford*, isolated from a guinea-pig. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 200.

A. C. JONES—
A hospital outbreak of typhoid fever. Bacteriological and serological investigations. *J. Hyg., Camb.*, 1951, **49**. 335.

R. E. JONES—
Notes on some aspects of the investigation of food poisoning. *Med. Pr.*, 1951, **226**, 55.

N. C. LENDON and R. D. MACKENZIE—
Tracing a typhoid carrier by sewage examination. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 23.

F. O. MACCALLUM—
Diagnosis of virus diseases. *Brit. med. Bull.*, 1951, **7**, 174.
Advances in the treatment of virus diseases. *Practitioner*, 1951, **167**, 397.

F. O. MACCALLUM, D. MCALPINE, W. H. KELLEHER and A. H. GALE—
B.M.A./R.S.M. Festival symposium on poliomyelitis. *Brit. med. J.*, 1951, **i**, 1510.

J. MCCOY, R. D. GRAY and E. H. GILLESPIE—
Sanitary bacteriology. *Brit. med. Bull.*, 1951, **7**, 193.

A. D. MACRAE—
Psittacosis: some recent developments. *J. R. sanit. Inst.*, 1951, **71**, 121.

J. MARKS—
The standardization of staphylococcal *a*-antitoxin, with special reference to anomalous haemolysins including *δ*-lysin. *J. Hyg., Camb.*, 1951, **49**, 52.

J. MARKS and A. C. T. VAUGHAN—
Staphylococcal *δ*-haemolysin. *J. Path. Bact.*, 1950, **62**, 597.

B. P. MARMION—
"Q" Fever. *J. R. sanit. Inst.*, 1951, **71**, 97.

B. P. MARMION, F. O. MACCALLUM, A. ROWLANDS and C. C. THIEL—
The effect of pasteurization on milk containing *Rickettsia burneti*. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 119.

M. MARYON, P. LEE and P. G. SHUTE—
Experimental hybridization of *Anopheles maculipennis* var. *atroparvus* Meigen and *Anopheles quadrimaculatus* Say. *Proc. R. ent. Soc. Lond.*, (A) 1951, **26**, 109.

M. T. PARKER—
Human sources of food infection. *J. industr. Nurses*, 1951, **3**, 104.
The control of respiratory infections in child communities. *J. R. sanit. Inst.*, 1951, **71**, 166.

I. N. O. PRICE—
Complement-fixation technique. III. The Wassermann reaction. *Brit. J. ven. Dis.*, 1950, **26**, 172.
Serological control of venereal diseases. *Brit. med. Bull.*, 1951, **7**, 204.

REPORT—
The bacteriological control of drinking water. Memorandum No. 3 of the P.H.L.S. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 18.
The prevention of whooping-cough by vaccination, a Medical Research Council Investigation. *Brit. med. J.*, 1951. **i**, 1463.

R. W. RIDDELL—
Survey of fungus diseases in Britain. *Brit. med. Bull.*, 1951 **7**, 197.

H. E. SHORTT, N. H. FAIRLEY, G. COVELL, P. G. SHUTE and P. C. C. GARNHAM—
The pre-erythrocytic stage of *Plasmodium falciparum*. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 405.

P. G. SHUTE—
Culex molestus. Contribution to : Symposia on the Culex pipiens complex. *Trans. R. ent. Soc.*, 1951, **102**, 380.
Mosquito infection in artificially induced malaria. *Brit. med. Bull.*, 1951, **8**, 56.
Twenty-five years of malariatherapy. *Discovery*, 1951, March.

P. G. SHUTE and M. MARYON—
A study of gametocytes in a West African strain of *Plasmodium falciparum*. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 421.

W. SMITH and J. C. N. WESTWOOD—
Influenza virus haemagglutination. The mechanism of the Francis phenomenon. *Brit. J. exp. Path.*, 1950, **31**, 725.

P. G. STOCK and P. G. SHUTE—
Mosquito nuisances in London. *Mon. Bull. Minist. Hlth, Lond.*, 1951, **10**, 38.

J. TAYLOR—
The Salmonella Reference Laboratory. *Brit. med. Bull.*, 1951, **7**, 163.

J. TAYLOR, A. MACDONALD and C. W. SIVELL—
A new type of *Salmonella* isolated from porcine mesenteric lymph nodes—*Salm. norwich*. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 76.

J. H. WILDMAN, C. GRANT NICOL and G. H. TEE—
An outbreak due to *Salmonella wien*. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 190.

R. E. O. WILLIAMS—
The approach to the study of air-borne infections. *Brit. med. Bull.*, 1951, **7**, 171.

G. S. WILSON—
The Public Health Laboratory Service. *Brit. med. Bull.*, 1951, **7**, 147.
Epidemiological investigation and research : the relationship between the district Medical Officer of Health and the Public Health Laboratory Service. *Mon. Bull. Minist. Hlth., Lond.*, 1951, **10**, 217.

LIST OF PUBLICATIONS BY GRANTHOLDERS AND OTHERS

ABERDEEN

ROWETT RESEARCH INSTITUTE

R. J. PENNINGTON—

A heat-labile vitamin B_{12} complex in faeces. *Biochem. J.*, 1951, **48**, xviii.

UNIVERSITY OF ABERDEEN

R. M. CAMPBELL, I. R. INNES and H. W. KOSTERLITZ—

Excess of ribonucleic acid in the liver during pregnancy. *J. Endocrinol.*, 1951, **7**, xxxiv.

E. J. DENTON and M. H. PIRENNE—

Retinal oxygen supply and macular pigmentation. *Nature, Lond.*, 1950, **165**, 304.

H. W. KOSTERLITZ—

Changes in the constituents of the liver cell in early choline and protein deficiencies. In: *Liver Disease: A Ciba Foundation Symposium.* London (J. & A. Churchill), 1951, p. 32–42.

M. H. PIRENNE—

Descartes and the body-mind problem in physiology. *Brit. J. Phil. Sci.*, 1950, **1**, 43.

Limits of the visible spectrum. *Research*, 1951, **4**, 508.

M. H. PIRENNE and E. J. DENTON—

Quanta and visual thresholds. *J. opt. Soc. Amer.*, 1951, **41**, 426.

M. F. A. WOODRUFF and B. FORMAN—

Effects of antilymphocytic serum on suspensions of lymphocytes *in vitro*. *Nature, Lond.*, 1951, **168**, 35.

M. F. A. WOODRUFF, B. FORMAN and K. B. FRASER—

The effect of antilymphocytic serum on circulating antibody levels. *J. Immunol.*, 1951, **67**, 57.

BELFAST

QUEEN'S UNIVERSITY

J. E. MORISON—

The taking and projection of stereoscopic photographs in colour of small objects. *J. Path. Bact.*, 1951, **63**, 429.

BIRMINGHAM

BIRMINGHAM AND MIDLAND EYE HOSPITAL

D. A. CAMPBELL, R. HARRISON and J. VERTIGEN—

Binocular vision in light adaptation and dark adaptation in normal subjects and coal-miners. *Brit. J. Ophthal.*, 1951, **35**, 484.

UNIVERSITY OF BIRMINGHAM

G. M. ARDRAN, J. M. FRENCH and E. H. MUCKLOW—

Relationship of the nature of the opaque medium to small intestine radiographic pattern. *Brit. J. Radiol., N.S.*, 1950, **23**, 697.

R. ASTLEY and J. M. FRENCH—

The small intestine pattern in normal children and in coeliac disease. Its relationship to the nature of the opaque medium. *Brit. J. Radiol., N.S.*, 1951, **24**, 321.

M. BEZNÁK—

The effect of the pituitary and growth hormone on the ability of the heart to hypertrophy. *J. Physiol.*, 1951, **113**, 38P.

W. C. BROWN—
Some effects of anti-coagulants and protamine on the transport of lipid in the body. *University of Birmingham Ph. D. Thesis*, 1951.

E. CHARLES—
Statistical utilization of maternity and child welfare records. *Brit. J. soc. Med.*, 1951, **5**, 41.

J. W. DANIEL, A. C. FRAZER, J. M. FRENCH and H. G. SAMMONS—
The absorption of paraffin. *J. Physiol.*, 1951, **114**, 26P.

A. C. FRAZER—
Steatorrhoea. In: *Modern trends in paediatrics*. Ed. by L. Parsons. London (Butterworth & Co. Publishers Ltd.), 1951, pp. 528–546.
Synthetic chemicals and the food industry. *J. Sci. Food Agric.*, 1951, **2**, 1.
Les vitamines et l'absorption des graisses. *Bull. Soc. Chim. biol., Paris*, 1951, **33**, 968.
Le système d'absorption des graisses. *Ibid.*, 1951, **33**, 961.

J. M. FRENCH—
Further studies in the radiology of the small intestine. *Gastroenterologia*, 1950–51, **76**, 343.
Radiographic studies of the small intestine. *University of Birmingham M.D. Thesis*, 1951.

S. H. GREEN and S. ZUCKERMAN—
The number of oocytes in the mature rhesus monkey (*Macaca mulatta*). *J. Endocrinol.*, 1951, **7**, 194.

A. S. JONES, P. W. MUGGLETON and M. STACEY—
The gram complex in *Clostridium welchii*. *Nature, Lond.*, 1950, **166**, 650.

M. A. G. KAYE and M. STACEY—
Chemistry of tissues. 4. Migration studies on hyaluronic acid. *Biochem. J.*, 1951, **48**, 249.

C. R. LOWE and R. L. FERGUSON—
Age incidence of dysmenorrhoea. *Brit. J. soc. Med.*, 1951, **5**, 193.

C. R. LOWE and T. MCKEOWN—
A note on secular changes in the human sex ratio at birth. *Brit. J. soc. Med.*, 1951, **5**, 91.

T. MCKEOWN and C. R. LOWE—
The sex ratio of stillbirths related to cause and duration of gestation. An investigation of 7,066 stillbirths. *Human Biology*, 1951, **23**, 41.

T. MCKEOWN, B. MACMAHON and R. G. RECORD—
Size of tumour in infantile pyloric stenosis related to age at operation. *Lancet*, 1951, **ii**, 556.

B. MACMAHON, R. G. RECORD and T. MCKEOWN—
Congenital pyloric stenosis. An investigation of 578 cases. *Brit. J. soc. Med.*, 1951, **5**, 185.

A. M. MANDL and S. ZUCKERMAN—
The relation of age to numbers of oocytes. *J. Endocrinol.*, 1951, **7**, 190.
Changes in ovarian structure following the injection of carbolic acid into the ovarian bursa. *Ibid.*, 1951, **7**, 227.
The effect of destruction of the germinal epithelium on the numbers of oocytes. *Ibid.*, 1951, **7**, 103.
Numbers of normal and atretic oocytes in unilaterally spayed rats. *Ibid.*, 1951, **7**, 112.

F. W. J. TEALE—
X-ray diffraction studies in nerve structure. *University of Birmingham Ph.D. Thesis*, 1950.

BRISTOL

UNIVERSITY OF BRISTOL

J. H. BIRNIE and J. GRAYSON—
The effect of anaesthesia on temperature and liver blood flow in rats. *J. Physiol.*, 1951, **114**, 30P.

W. CHESTER and J. GRAYSON—
Physical basis of internal calorimetry. *Nature, Lond.*, 1951, **168**, 521.

S. E. DICKER and M. GINSBURG—
Some observations on the antidiuretic activity of rat serum. *Brit. J. Pharmacol.*, 1950, **5**, 497.

S. E. DICKER and H. HELLER—
The mechanism of water diuresis in adult and newborn guinea-pigs. *J. Physiol.*, 1951, **112**, 149.

E. J. FIELD, J. GRAYSON and A. F. ROGERS—
Observations on the blood flow in the spinal cord of the rabbit. *J. Physiol.*, 1951, **114**, 56.

J. GRAYSON—
Observations on blood flow in human intestine. *Brit. med. J.*, 1950, **ii**, 1465.
Cold and warmth vasoconstrictor responses in the skin of man. *Brit. Heart J.*, 1951, **13**, 167.
Intestinal blood-flow changes in normal human subjects. *J. Physiol.*, 1951, **112**, 43P.
The measurement of intestinal blood flow in man. *Ibid.*, 1951, **114**, 419.
A method of determining blood flow by internal calorimetry. *Ibid.*, 1951, **114**, 29P.

J. GRAYSON and H. J. C. SWAN—
Intestinal blood-flow changes in man during fainting. *J. Physiol.*, 1951, **112**, 44P.

D. T. KING, J. E. HARRIS and S. TKACZYK—
Liquid-emulsion methods in electron track radiography. *Nature, Lond.*, 1951, **167**, 273.

CAMBRIDGE

STRANGEWAYS RESEARCH LABORATORY

C. B. ALLSOPP and H. B. FELL—
The effects of fluoroacetate on beating embryo chick heart in tissue culture. *Exp. Cell Res.*, 1950, **1**, 590.

E. M. BRIEGER, H. B. FELL and B. R. SMITH—
A comparative study of the reaction *in vivo* and *in vitro* of rabbit tissues to infection with bovine tubercle bacilli. Part II. Observations on cultures of spleen and lymph glands from infected rabbits. *J. Hyg., Camb.*, 1951, **49**, 189.

E. M. BRIEGER, J. A. R. MILES, V. E. COSSLETT and R. W. HORNE—
Nature and infectivity of granular forms of the bovine tubercle bacillus. *Nature, Lond.*, 1951, **168**, 96.

C. P. CHERRY—
The process of cytolysis in mouse liver *in vitro*. *Brit. J. exp. Path.*, 1950, **31**, 680.

F. H. C. CRICK—
The physical properties of cytoplasm. A study by means of the magnetic particle method. Part II. Theoretical treatment. *Exp. Cell Res.*, 1950, **1**, 505.

H. B. FELL—
Histogenesis in tissue culture. In: *Cytology and cell physiology*. Ed. 2. Edited by G. H. Bourne. Oxford (University Press), 1951, pp. 419–443.
Methods for study of organized growth *in vitro*. *Methods in Medical Research*, 1951, **4**, 233.

H. B. FELL and E. M. BRIEGER—
A comparative study of the reaction *in vivo* and *in vitro* of rabbit tissues to infection with bovine tubercle bacilli. Part I. Observations on rabbit spleen infected *in vitro*. *J. Hyg., Camb.*, 1951, **49**, 181.

L. M. GILBERT, W. G. OVEREND and M. WEBB—
The inhibition of pancreas deoxyribonuclease. *Exp. Cell Res.*, 1951, **2**, 349.

A. GLÜCKSMANN—
Cell deaths in normal vertebrate ontogeny. *Biol. Rev.*, 1951, **26**, 59.
The histogenesis of radiation-induced and of benzpyrene-induced epidermal tumours in the mouse. *J. Path. Bact.*, 1951, **63**, 176.
Local factors in the histogenesis of hypertrophic scars. *Brit. J. Plast. Surg.*, 1951, **4**, 88.
Prognosis based on biopsies. *Trans. XIIth Brit. Congr. Obstet. Gynaec.*, London, 6–8 July, 1949, p. 234.

M. H. HARDY—
The development of pelage hairs and vibrissae from skin in tissue culture. *Ann. N.Y. Acad. Sci.*, 1951, **53**, 546.

A. F. W. HUGHES—
The effect of inhibitory substances on cell division. A study on living cells in tissue cultures. *Quart. J. micr. Sci.*, 1950, **91**, 251.

R. D. PASSEY, L. DMOCHOWSKI, I. LASNITZKI and A. MILLARD—
Cultivation in vitro of frozen and dessicated mouse tumour tissues. *Brit. med. J.*, 1950, **ii**, 1134.

UNIVERSITY OF CAMBRIDGE

B. A. ASKONAS—
The use of organic solvents at low temperature for the separation of enzymes. Application to aqueous rabbit muscle extract. *Biochem. J.*, 1951, **48**, 42.
Effect of thyroxine on creatinephosphokinase activity. *Nature, Lond.*, 1951, **167**, 933.

K. BAILEY, F. R. BETTELHEIM, L. LORAND and W. R. MIDDLEBROOK—
Action of thrombin in the clotting of fibrinogen. *Nature, Lond.*, 1951, **167**, 233.

P. M. COTES and F. G. YOUNG—
Attempts to detect growth hormone in samples of blood and urine obtained during pregnancy or lactation. *Biochem. J.*, 1951, **49**, lix.

W. H. ELLIOTT—
Studies on the enzymic synthesis of glutamine. *Biochem. J.*, 1951, **49**, 106.

W. FELDBERG, G. W. HARRIS and R. C. Y. LIN—
Observations on the presence of cholinergic and non-cholinergic neurones in the central nervous system. *J. Physiol.*, 1951, **112**, 400.

P. HOLTON—
High concentration of *nor*adrenaline in calves' suprarenals. *Nature, Lond.*, 1951, **167**, 858.

F. HOWARTH—
Radioactive isotopes and their application to a problem in anaesthesia. *Brit. J. Anaesth.*, 1950, **22**, 4.

H. KAY and E. C. POULTON—
Anticipation in memorizing. *Brit. J. Psychol.*, 1951, **42**, 34.

J. KEILIN—
Turacin and the supposed catalytic activity of copper-porphyrins. *Biochem. J.*, 1951, **49**, 544.

C. LUTWAK-MANN—
Hormonal and nutritional factors in the metabolism of the male accessory organs of reproduction. *Biochem. Soc. Sym.*, 1951, **7**, 24.
Effect of vitamin B deficiency on nucleic acid phosphorous content of rat bone marrow. *Biochem, J.*, 1951, **48**, xxv.
Some aspects of phosphorous metabolism in bone marrow. *Ibid.*, 1951, **49**, 300.

C. LUTWAK-MANN and T. MANN—
Effect of malnutrition on the secretory function of male accessory glands of reproduction. *Biochem. J.*, 1951, **48**, xxvi.

A. LYELL and J. A. R. MILES—
The myrmecia. A study of inclusion bodies in warts. *Brit. med. J.*, 1951, **i**, 912.

T. MANN and C. LUTWAK-MANN—
Fructose formation and seminal phosphatase. *Biochem. J.*, 1951, **48**, xvi.
Secretory function of male accessory organs of reproduction in mammals. *Physiol. Rev.*, 1951, **31**, 27.

J. A. R. MILES—
Observations on the course of infection with certain natural bacterial pathogens of the rat in rats on protein-deficient diets. *Brit. J. exp. Path.*, 1951, **32**, 285.
Effects of low protein diet on the multiplication and disappearance of louping ill virus in the rat. *Ibid.*, 1951, **32**, 295.

L. S. MYNORS, D. H. HEARD and R. R. A. COOMBS—
An experimental study of haemolytic disease of the newborn due to isoimmunization of pregnancy. II. Report of an attempt to produce anti-red cell isoantibodies in guinea-pigs, together with a note on the blood picture of one-day-old guinea-pigs. *J. Hyg., Camb.*, 1950, **48**, 458.

D. M. NEEDHAM—
Discussion following : *Uterine contractility and cervical dilatation* by S. R. M. Reynolds. *Proc. R. Soc. Med.*, 1951, **44**, 702.

D. M. NEEDHAM, L. SIMINOVITCH and S. M. RAPKINE—
On the mechanism of the inhibition of glycolysis by glyceraldehyde. *Biochem. J.*, 1951, **49**, 113.

W. PAUL and F. J. W. ROUGHTON—
The equilibrium between oxygen and sheep haemoglobin at very low percentage saturations. *J. Physiol.*, 1951, **113**, 23.

S. V. PERRY—
The adenosinetriphosphatase activity of myofibrils isolated from skeletal muscle. *Biochem. J.*, 1951, **48**, 257.

E. REID—
Assay of diabetogenic pituitary preparations. *J. Endocrinol.*, 1951, **7**, 120.
Some studies with diabetogenic pituitary preparations. *Ibid.*, 1951, **7**, xxxvi.

J. F. RYLEY—
Studies on the metabolism of the protozoa. 1. Metabolism of the parasitic flagellate, *Trypanosoma lewisi*. *Biochem. J.*, 1951, **49**, 577.

R. H. SMITH and H. G. WILLIAMS-ASHMAN—
The influence of thyroxine on the enzymic activity of rat tissues. *Biochim. Biophys. Acta*, 1951, **7**, 295.

F. G. YOUNG—
Diabète hypophysaire. *Mémoires de Journées Médicales Toulousaines, 6 Congrès*, 1950, 187.
The endocrine approach to the problem of diabetes. [The Banting memorial lecture.] *Proc. Amer. diabetic Ass.*, 1950, **10**, 11.
Growth hormone and experimental diabetes. *J. clin. Endocrinol.*, 1951, **11**, 531.

CARDIFF

WHITCHURCH HOSPITAL

D. RICHTER and R. P. HULLIN—
Isolated nuclei from cells of the cerebral cortex. Preparation and enzyme content. *Biochem. J.*, 1951, **48**, 406.

L. W. TYRRELL and D. RICHTER—
The lipids of cell nuclei isolated from human brain cortex. *Biochem. J.* 1951, **49**, li.

UNIVERSITY OF ST. ANDREWS

B. L. ANDREW and J. OLIVER—
The epiglottal taste buds of the rat. *J. Physiol.*, 1951, **114**, 48P.

R. P. COOK and D. C. EDWARDS—
Cholesterol metabolism in man. *Biochem. J.*, 1951, **49**, xli.

R. P. COOK and R. O. THOMSON—
The absorption of fat and of cholesterol in the rat, guinea-pig and rabbit. *Quart. J. exp. Physiol.*, 1951, **36**, 61.
Cholesterol metabolism. 3. Cholesterol metabolism in the guinea-pig and rabbit. *Biochem. J.*, 1951, **49**, 72.

D. C. EDWARDS and R. P. COOK—
The component fatty acids of the faecal lipids of normal and cholesterol-fed rats. *Biochem. J.*, 1951, **48**, ix.
Human faecal lipids. *Ibid.*, 1951, **49**, xli.

R. O. THOMSON—
The faecal volatile acids of normal and of cholesterol-fed rats. *Biochem. J.*, 1951, **48**, x.

EDINBURGH

UNIVERSITY OF EDINBURGH

K. R. ADAM—
The effects of dithiols on the distribution of mercury in rabbits. *Brit. J. Pharmacol.*, 1951, **6**, 483.

B. BILLING, J. B. DONALD, C. P. STEWART and A. W. WILKINSON—
Protein hydrolysate. Part I. Physiological effects and utilisation. *Edinb. med. J.*, 1951, **58**, 52.
Protein hydrolysate. Part II. Therapeutic applications. *Ibid.*, 1951, **58**, 64.

R. I. COX and G. F. MARRIAN—
The hydrolysis of the chloroform-insoluble conjugated adrenocortical steroids in human urine. *Biochem. J.*, 1951, **48**, xxxiii.

L. S. P. DAVIDSON, J. J. R. DUTHIE, R. H. GIRDWOOD and R. J. G. SINCLAIR—
Clinical trials of A.C.T.H. in haemolytic anaemia. *Brit. med. J.*, 1951, **i**, 657.

E. J. DELORME—
Arterial perfusion of the liver in shock. An experimental study. *Lancet*, 1951, **i**, 259.

A. D. DEWAR—
Possible role of progesterone in the water retention of pregnancy in the mouse. *J. Physiol.*, 1951, **112**, 53P.

A. D. DEWAR and W. H. NEWTON—
The nature of the weight loss following parturition and " pseudo-parturition " in the mouse. *J. Physiol.*, 1950, **111**, 36P.

G. J. DUTTON and I. D. E. STOREY—
Glucuronide synthesis in liver homogenates. *Biochem. J.*, 1951, **48**, xxix.

J. K. GRANT and G. F. MARRIAN—
Studies on the metabolism of progesterone and related steroids *in vitro*. 1. The metabolism of pregnane-3α : 20α-diol by liver preparations. *Biochem. J.*, 1950, **47**, 497.

G. O. HORNE and R. H. MOLE—
Comparative physiological observations on prickly heat, mammillaria and anhidrotic heat exhaustion. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **45**, 79.
Mammillaria. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **44**, 465.

R. KAPELLER-ADLER—
A new volumetric method for the determination of histaminase activity in biological fluids. *Biochem. J.*, 1951, **48**, 99.

T. I. KYLE and G. F. MARRIAN—
*allo*Pregnane-3α : 20α-diol in the urine of pregnant women. *Biochem. J.*, 1951, **49**, 80.
The metabolic reduction of progesterone to *allo*Pregnane-3α : 20α-diol in human subjects. *Ibid.*, 1951, **49**, 162.

G. F. MARRIAN—
The methods of assay and clinical significance of pregnanediol in the urine. *Trans. XIIth Brit. Congr. Obstet. Gynaec.*, London, 6–8 July, 1949, p. 110.
Hormonal disturbances associated with rheumatoid arthritis and related conditions. *Practitioner*, 1951, **166**, 43.

J. Y. F. PATERSON and G. F. MARRIAN—
Some observations on the chloroform-soluble conjugated adrenocortical steroids in human urine. *Biochem. J.*, 1951, **48**, xxxiii.

M. PICKFORD and M. VOGT—
The effect of adrenaline on secretion of cortical hormone in the hypophysectomized dog. *J. Physiol.*, 1951, **112**, 133.

M. ROBERTS and H. M. ADAM—
New methods for the quantitative estimation of free and conjugated histamine in body fluids. *Brit. J. Pharmacol.*, 1950, **5**, 526.

H. N. ROBSON and J. J. R. DUTHIE—
Capillary resistance and adrenocortical activity. *Brit. med. J.*, 1950, **ii**, 971.

R. J. G. SINCLAIR and J. J. R. DUTHIE—
Intravenous iron in treatment of hypochromic anaemia associated with rheumatoid arthiritis. *Brit. med. J.*, 1950, **ii**, 1257.

M. VOGT—
Cortical secretion of the isolated perfused adrenal. *J. Physiol.*, 1951, **113**, 129.
The role of hypoglycaemia and of adrenaline in the response of the adrenal cortex to insulin. *Ibid.*, 1951, **114**, 222.
The effect of emotion and of β-tetrahydronaphthylamine on the adrenal cortex of the rat. *Ibid.*, 1951, **114**, 465.

A. W. WILKINSON, B. H. BILLING, G. NAGY and C. P. STEWART—
Excretion of chloride and sodium after surgical operations. *Lancet*, 1949, **i**, 640.
Excretion of potassium after partial gastrectomy. *Ibid*, 1950, **ii**, 135.
Nitrogen metabolism after surgical operations: use of a protein hydrolysate after partial gasterctomy. *Ibid*, 1950, **i**, 533.
Changes in blood chemistry after surgical operations. *Ibid.*, 1951, **i**, 315.

GLASGOW

UNIVERSITY OF GLASGOW

T. ANDERSON, M. A. FOULIS, N. R. GRIST and J. B. LANDSMAN—
Clinical and laboratory observations in a smallpox outbreak. *Lancet*, 1951, **i**, 1248.

J. W. COOK and J. S. MOFFATT—
Syntheses of some derivatives of 2-phenyl-1-azapyrene. *J. chem. Soc.*, 1951, p. 2487.

J. N. DAVIDSON—
The use of radiophosphorus in the study of the nucleic acids. In : *Ciba Foundation conference on isotopes in biochemistry.* London (J. & A. Churchill Ltd.), 1951, pp. 175–183.

J. N. DAVIDSON, S. C. FRAZER and W. C. HUTCHISON—
Phosphorus compounds in the cell. 1. Protein-bound phosphorus fractions studied with the aid of radioactive phosphorus. *Biochem. J.*, 1951, **49**, 311.

J. N. DAVIDSON and I. LESLIE—
Nucleic acids in relation to tissue growth : *a review*. *Cancer Res.*, 1950, **10**, 587.
The changing cell number and composition of chick heart explants growing *in vitro*. *Exp. Cell Res.*, 1951, **2**, 366.

J. N. DAVIDSON, W. M. MCINDOE and R. M. S. SMELLIE—
The uptake of ^{32}P by ribonucleotides in liver-cell fractions. *Biochem. J.*, 1951, **49**, xxxvi.

N. R. GRIST—
Egg culture in the diagnosis of some dermotropic virus diseases. *Glasg. med. J.*, 1951, **32**, 207.
Influenza 1951. (Discussion). *Proc. R. Soc. Med.*, 1951, **44**, 798.

J. B. LANDSMAN, N. R. GRIST, R. BLACK, D. MCFARLANE, W. BLAIR and T. ANDERSON—
" Sore throat " in general practice. *Brit. med. J.*, 1951, **i**, 326.

I. LESLIE and J. N. DAVIDSON—
The chemical composition of the chick embryonic cell. *Biochim. Biophys. Acta*, 1951, **7**, 413.
The effect of insulin on cellular composition and growth of chick-heart explants. *Biochem. J.*, 1951, **49**, xli.

J. S. MOFFATT—
3 : 6-Diamidinodibenzofuran. *J. chem. Soc.*, 1951, p. 625.

A. SLESSOR—
Studies concerning the mechanism of water retention in Addison's disease and in hypopituitarism. *J. clin. Endocrinol.*, 1951, **11**, 700.

LEEDS

UNIVERSITY OF LEEDS

E. C. ALLIBONE, J. D. PICKUP and K. ZINNEMANN—
Haemophilus influenzae meningitis treated with streptomycin. Difficulties in diagnosis. *Lancet*, 1951, **i**, 610.

S. DAGLEY, E. A. DAWES and G. A. MORRISON—
Inhibition of growth of *Aerobacter aerogenes* : the mode of action of phenols, alcohols, acetone and ethyl acetate. *J. Bact.*, 1950, **60**, 369.
The effect of aeration on the growth of *Aerobacter aerogenes* and *Escherichia coli* with reference to the Pasteur Mechanism. *Ibid.*, 1951, **61**, 433.
The kinetics of pyruvate production by *Aerobacter aerogenes*. *J. gen. Microbiol.*, 1951, **5**, 508.

S. DAGLEY, G. A. MORRISON and E. A. DAWES—
The " Dicarboxylic acid cycle " in bacterial metabolism. [Letter]. *Arch. Biochem.*, 1951, **32**, 231.

B. DAWSON, E. H. FARNWORTH, J. W. MCLEOD and D. E. NICHOLSON—
Observations on the value of the Bordet-Gengou medium for the cultivation of *Haemophilus pertussis*. *J. gen. Microbiol.*, 1951, **5**, 408.

D. E. DOLBY and F. C. HAPPOLD—
Antitryptophanase. *Biochem. J.*, 1951, **4**, v.

W. GOLDIE and D. H. COLLINS—
Experimental erysipelothrix arthritis in rabbits. *J. Path. Bact.*, 1951, **63**, 551.

J. GORDON, R. A. HALL and L. H. STICKLAND—
The kinetics of the lysis of *Bacterium coli* by glycine. *J. Hyg., Camb.*, 1951, **49**, 169.
Observations on resistance of *Bacterium coli* to glycine. *J. Path. Bact.*, 1951, **63**, 285.

A. HEMINGWAY—
Infra-red gas analysis for cardiac output determinations. *J. Physiol.*, 1951, **112**, 54P.

K. I. JOHNSTONE, J. E. CROFTS and D. G. EVANS—
Single cell culture of *Cl. welchii* type A morphologically changed by penicillin. *Brit. J. exp. Path.*, 1950, **31**, 562.

C. J. LA TOUCHE—
An unsealed hanging-drop technique for the investigation of microsporum in hair. *Brit. J. Derm.*, 1951, **63**, 8.

LIVERPOOL

UNIVERSITY OF LIVERPOOL

J. ALEXANDER and T. W. GOODWIN—
A demonstration of the conversion of carotene into vitamin A in conscious rats. *Brit. J. Nutrit.*, 1950, **4**, 421.

H. R. CAMA and R. A. MORTON—
Changes occurring in the proteins as a result of processing groundnuts under selected industrial conditions. 2. Nutritional changes. *Brit. J. Nutrit.*, 1951, **4**, 297.

R. J. GARNER—
Availability of the magnesium of grass to the ruminant. *Nature, Lond.*, 1950, **166**, 614.
Aspiration biopsy of the liver in cattle. *Vet. Rec.*, 1950, **62**, 729.

G. A. GARTON, T. W. GOODWIN and W. LIJINSKY—
Studies in carotenogenesis. 1. General conditions governing β-carotene synthesis by the fungus *Phycomyces blakesleeanus* Burgeff. *Biochem. J.*, 1951, **48**, 154.

T. W. GOODWIN—
Carotenoids and reproduction. *Biol. Rev.*, 1950, **25**, 391.
Carotenoid distribution in the gonads of the limpets *Patella vulgata* and *Patella depressa*. *Biochem. J.*, 1950, **47**, 249.
Biochemistry of locusts. 4. Insectorubin metabolism in the desert locust (*Schistocerca gregaria* Forsk.) and the African migratory locust (*Locusta migratoria migratorioides* R. and F.) *Ibid.*, 1950, **47**, 554.
Carotenoids in fish. *Biochem. Soc. Sym.*, 1951, **6**, 63.
Carotenoid metabolism during development of lobster eggs. *Nature, Lond.*, 1951, **167**, 559.
Vitamin A-active substances. *Brit. J. Nutrit.*, 1951, **5**, 94.
Biochemistry of locusts. 7. A note on the effect of breeding temperature on the carotenoid content of locusts (the African migratory locust *Locusta migratoria migratorioides* R. & F. and the desert locust, *Schistocerca gregaria* Forsk.). *Biochem. J.*, 1951, **49**, 86.

T. W. GOODWIN and S. SRISUKH—
Biochemistry of locusts. 3. Insectorubin : the redox pigment present in the integument and eyes of the desert locust (*Schistocerca gregaria* Forsk.), the African migratory locust (*Locusta migratoria migratorioides* R. and F.) and other insects. *Biochem. J.*, 1950, **47**, 549.
A study of the pigments of the sea-urchins, *Echinus esculentus* L. and *Paracentrotus lividus* Lamarck. *Ibid.*, 1950, **47**, 69.
Biochemistry of locusts. 5. The green pigment of the haemolymph and integument of solitary locusts (*Locusta migratoria migratorioides*, R. & F., and *Schistocerca gregaria* Forsk.) *Ibid.*, 1951, **48**, 199.
Biochemistry of locusts. 6. The occurrence of a flavin in the eggs and of a pterin in the eyes of the African migratory locust (*Locusta migratoria migratorioides* R. & F.) and the desert locust (*Schistocerca gregaria* Forsk.) *Ibid.* 1951, **49**, 84.
Carotenoids in the heart urchin, *Echinocardium cordatum*. *Nature, Lond.*, 1951, **167**, 358.

T. W. GOODWIN and M. M. TAHA—
The carotenoids of the gonads of the limpets *Patella vulgata* and *Patella depressa*. *Biochem. J.*, 1950, **47**, 244.
A study of the carotenoids echinenone and myxoxanthin with special reference to their probable identity. *Ibid.*, 1951, **48**, 513.

T. W. GOODWIN and A. A. WILSON—
Studies in vitamin A. 15. The variations in the serum β-carotene and vitamin A levels of cows near parturition. *Biochem. J.*, 1951, **49**, 499.

E. S. JONES—
Pathological processes in malaria. Progress report. II. Studies on malarial blood. *Trans. R. Soc. trop. Med. Hyg.*, 1951, **45**, 19.

H. K. KING—
Penicillin in the aquarium. *Nature, Lond.*, 1950, **166**, 1036.

R. A. MORTON—
Vitamins A and vision. *Brit. J. Nutrit.*, 1951, **5**, 100.

H. H. STONES, F. E. LAWTON, E. R. BRANSBY and H. O. HARTLEY—
1. Dental caries and length of institutional residence. 2. Relationship between dental caries and calculus. 3. Dental caries and the pH of saliva. *Brit. dent. J.*, 1950, **89**, 199.
Time of eruption of permanent teeth and time of shedding of deciduous teeth. *Brit. dent. J.*, 1951, **90**, 1.

LONDON

BEDFORD COLLEGE FOR WOMEN

M. M. MURRAY—
Industrial fluorosis. *Brit. med. Bull.*, 1950, **7**, 87.

M. M. MURRAY and E. E. POCHIN—
Thyroid uptake of iodine from ingested iodate in man. *J. Physiol.*, 1951, **114**, 6P.

BIRKBECK COLLEGE

D. E. AMES and R. E. BOWMAN—
Synthetic long-chain aliphatic compounds. Part III. A critical examination of two methods of synthesis of olefinic acids. *J. chem. Soc.*, 1951, p. 1079.
Synthetic long-chain aliphatic compounds. Part IV. Some methyl-substituted oleic acids. *Ibid.*, 1951, p. 1087.
Synthetic long-chain aliphatic compounds. Part VI. Some anomalous reductions of 9-Keto-10-methoxyoctadecanoic acid. *Ibid.*, 1951, p. 2752.

CHELSEA POLYTECHNIC

M. P. LORD—
Nystagmus following an emotional disturbance. *Nature, Lond.*, 1950 **166**, 1036.
Binocular eye movements at high convergence. *Proc. phys. Soc. Lond.*, B, 1951, **64**, 171.
Measurement of binocular eye movements of subjects in the sitting position. *Brit. J. Ophthal.*, 1951, **35**, 21.

GUY'S HOSPITAL MEDICAL SCHOOL

C. B. ALLSOPP and J. WILSON—
Effects of X rays on aqueous solutions of indole. *J. chim. phys.*, 1951, **48**, 195.

K. DIDCOCK, J. M. ROBSON and A. A. SHARAF—
Prolongation of action of chorionic gonadotrophin. *Brit. J. Pharmacol.*, 1951, **6**, 445.

J. A. NISSIM and J. M. ROBSON—
The conversion of pregnenolone to a more active progestational substance by incubation with corpus luteum, adrenal or placenta. *J. Physiol.*, 1951, **114**, 12P.

M. G. ORD and R. H. S. THOMPSON—
The preparation of soluble cholinesterases from mammalian heart and brain. *Biochem. J.*, 1951, **49**, 191.

J. M. ROBSON—
Local action of steroids on secondary sex organs of male rats. *J. Physiol.*, 1951, **113**, 537.

J. M. ROBSON and A. A. SHARAF—
The action of sodium oestrone sulphate on the uterus of the mouse *in vitro*. *J. Endocrinol.*, 1951, **7**, 221.
Antagonism of vaginal actions of oestrogen by progesterone and other steroids. *Ibid*, 1951, **7**, 177.
The hormonal effects of pregnatrienone. *J. Pharm. Pharmacol.*, 1951, **3**, 338.
Interruption of pregnancy with ACTH and cortisone. *J. Physiol.*, 1951, **114**, 11P.

R. H. S. THOMPSON—
Cholinesterase activity and the innervation of peripheral tissues. Contribution to : A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 311.

IMPERIAL COLLEGE OF SCIENCE

L. W. C. MILES and L. N. OWEN—
Dithiols. Part VIII. Polymethoxy-dithiols. *J. chem. Soc.*, 1950, p. 2934.
Dithiols. Part IX. Syntheses with the *iso*Propylidene and Benzylidene Derivatives of 2 : 3-Dimercaptopropanol. *Ibid.*, 1950, p. 2938.
Dithiols. Part X. A Thio-analogue of BAL-Intrav. *Ibid.*, 1950, p. 2943.

W. D. WRIGHT—
Modern problems of colorimetry. *Proc. phys. Soc., Lond.*, B, 1951, **64**, 537.
The role of convergence in stereoscopic vision. *Ibid*, 1951, **64**, 289.

KING'S COLLEGE HOSPITAL

C. H. GRAY—
On the nature of naturally occurring porphyrin precursors. *Biochem. J.*, 1951, **48**, liv.

LISTER INSTITUTE OF PREVENTIVE MEDICINE

P. HARTLEY—
The effect of peptic digestion on the properties of diphtheria antitoxin. *Proc. roy. Soc.*, B, 1951, **138**, 499.

W. T. J. MORGAN and W. M. WATKINS—
The inactivation of the blood group receptors on the human erythrocyte surface by the periodate ion. *Brit. J. exp. Path.*, 1951, **32**, 34.

MIDDLESEX HOSPITAL MEDICAL SCHOOL

P. PINCUS—
Enzymes in dentine and pulp : effect of fluoride. *Brit. dent. J.*, 1951, **90**, 201.
A new method of examination of molar tooth grooves for the presence of dental caries. *J. Physiol.*, 1951, **113**, 13P.

POSTGRADUATE MEDICAL SCHOOL OF LONDON

R. I. S. BAYLISS, M. J. ETHERIDGE and A. L. HYMAN—
Pulmonary hypertension in mitral stenosis. *Lancet*, 1950, **ii**, 889.

R. I. S. BAYLISS, M. J. ETHERIDGE, A. L. HYMAN, H. G. KELLY, J. MCMICHAEL and E. A. S. REID—
The effect of digoxin on the right ventricular pressure in hypertensive and ischaemic heart failure. *Brit. Heart J.*, 1950, **12**, 317.

W. A. BRISCOE, M. R. BECKLAKE and T. F. ROSE—
Intrapulmonary mixing of helium in normal and emphysematous subjects *Clin. Sci.*, 1951, **10**, 37.

C. L. COPE, X. BOYSEN and S. MCCRAE—
Some observations on endogenous cortisone excretion in man. *Brit. med. J.* 1951, **ii**, 762.

J. N. DAVIDSON, I. LESLIE and J. C. WHITE—
Quantitative studies on the content of nucleic acids in normal and leukaemic cells, from blood and bone marrow. *J. Path. Bact.*, 1951, **63**, 471.

W. J. DEMPSTER and B. LENNOX—
An experimental approach to the homotransplant problems in plastic surgery : the use of multiple donors. *Brit. J. Plastic Surg.*, 1951, **4**, 81.

W. J. DEMPSTER and F. WATSON—
Urine from autotransplanted kidneys in dogs. *J. Physiol.*, 1951, **113**, 2P.

R. DONALDSON, R. B. SISSON, E. J. KING, I. D. P. WOOTTON and R. G. MACFARLANE—
Determination of haemoglobin. VII. Standardised optical data for absolute estimations. *Lancet*, 1951, **i**, 874.

J. F. GOODWIN and S. KAPLAN—
2-benzyl-4, 5-imidazoline hydrochloride ("priscol") in the treatment of peripheral vascular disease. *Brit. med. J.*, 1951, **i**, 1102.

J. F. GOODWIN and A. G. MACGREGOR—
Anticoagulant therapy with heparin in Pitkin's menstruum. *Lancet*, 1950, **ii**, 667.

E. J. KING, R. J. BARTHOLOMEW, M. GEISER, S. VENTURA, I. D. P. WOOTTON, R. G. MACFARLANE, R. DONALDSON and R. B. SISSON—
Determination of haemoglobin. VIII. Accuracy of methods applied to abnormal bloods. *Lancet*, 1951, **i**, 1044.

H. KOPELMAN—
The circulation time as a clinical test. *Brit. Heart J.*, 1951, **13**, 301.

H. KOPELMAN and G. de J. LEE—
The intrathoracic blood volume in mitral stenosis and left ventricular failure. *Clin. Sci.*, 1951, **10**, 383.

J. MCMICHAEL—
Pharmacology of the failing human heart. Oxford (Blackwell Scientific Publications), 1950.

J. MCMICHAEL and J. P. D. MOUNSEY—
A complication following coronary sinus and cardiac vein catheterization in man. *Brit. Heart J.*, 1951, **13**, 397.

D. A. MITCHISON—
The segregation of streptomycin-resistant variants of *Mycobacterium tuberculosis* into groups with characteristic levels of resistance. *J. gen. Microbiol.*, 1951, **5**, 596.

J. P. D. MOUNSEY—
Prodromal symptoms in myocardial infarction. *Brit. Heart J.*, 1951, **13**, 215.

S. C. RAY, E. J. KING and C. V. HARRISON—
The action of variable amounts of quartz on the lungs of rats. *Brit. J. industr. Med.*, 1951, **8**, 62.
The action of small amounts of quartz and larger amounts of coal and graphite on the lungs of rats. *Ibid.*, 1951, **8**, 68.
The action of anthracite and bituminous coal dusts mixed with quartz on the lungs of rats. *Ibid.*, 1951, **8**, 74.

ROYAL CANCER HOSPITAL

E. H. BELCHER—
Abnormal efficiencies in the scintillation-counting of gamma-rays. *Nature, Lond.*, 1950, **166**, 742.
Measurement of gamma-ray energies with the scintillation counter. *Ibid.*, 1950, **166**, 826.
Scintillations produced in liquids by high-energy radiation: $\alpha\alpha'$ dinaphthyl as a scintillating medium. *Ibid.*, 1951, **167**, 314.

E. H. BELCHER and H. D. EVANS—
A directional scintillation counter for clinical measurements. *J. sci. Instrum.*, 1951, **28**, 71.
The localisation of cerebral tumours with radioactive derivatives of fluorescein. Physical limitations. *Brit. J. Radiol., N.S.*, 1951, **24**, 272.

F. DEVIK, L. A. ELSON, P. C. KOLLER and L. F. LAMERTON—
The influence of diet on the Walker rat carcinoma 256, and its response to X-radiation—cytological and histological investigations. *Brit. J. Cancer*, 1950, **4**, 298.

B. E. KEANE and G. SPIEGLER—
Stray radiation from diagnostic x-ray beams. *Brit. J. Radiol., N.S.*, 1951, **24**, 198.

L. F. LAMERTON—
Radiotherapeutic physics. VI. Some aspects of the problem of dosage estimation in X-ray treatment. *Brit. J. Radiol., N.S.*, 1951, **24**, 385.

W. V. MAYNEORD—
Modern radiation hazards in clinical practice. *Brit. J. Radiol., N.S.*, 1951, **24**, 6.
Some applications of nuclear physics in medicine. *Rep. Progr. Phys.*, 1951, **14**, 366.

W. K. SINCLAIR—
Comparison of Geiger-counter and ion-chamber methods of measuring gamma radiation. *Nucleonics*, 1950, **7**, 21.

W. K. SINCLAIR and A. F. HOLLOWAY—
Half-lives of some radioactive isotopes. *Nature, Lond.*, 1951, **167**, 365.

W. K. SINCLAIR and S. P. NEWBERY—
A direct reading meter for the measurement of highly active samples of gamma-emitting radioisotopes. *J. sci. Instrum.*, 1951, **28**, 234.

G. SPIEGLER—
A new method of use of the photographic film as quality indicator and dose meter for X- and gamma rays. *Photogr. J.*, 1950, **90B**, 166.

W. R. STANTON and W. K. SINCLAIR—
Effect of high concentration of phosphorus-32 on growth of the potato. *Nature, Lond.*, 1951, **167**, 234.

B. M. WHEATLEY—
Radiotherapeutic physics. VII. An instrument for dosage estimation with fields of any size and shape. *Brit. J. Radiol., N.S.*, 1951, **24**, 388.

ROYAL FREE HOSPITAL SCHOOL OF MEDICINE

R. E. M. BOWDEN—
A comparative study of the rate of atrophy of skeletal muscle following anterior ramisection and acute anterior poliomyelitis in the rhesus monkey. With a note on the weight of the sartorius muscle in the normal animal. *Johns Hopk. Hosp. Bull.*, 1951, **89**, 153.

H. HEATH, A. LAWSON and C. RIMINGTON—
2-mercaptoglyoxalines. Part I. The synthesis of ergothioneine. *J. chem. Soc.*, 1951, p. 2215.
2-mercaptoglyoxalines. Part II. Application of the Mannich reaction. Protection of the thiol group. *Ibid.*, 1951, p. 2217.
2-mercaptoglyoxalines. Part III. Synthesis of 2-mercapto-4(5)-methylhistidine and 4-methylergothioneine. *Ibid.*, 1951, p. 2220.
2-mercaptoglyoxalines. Part IV. Bromination with N-bromosuccinimide. The Reimer-Tiemann reaction. *Ibid*, 1951, p. 2223.

A. LAWSON, H. V. MORLEY and L. I. WOOLF—
The determination of ergothioneine. The non-occurrence of ergothioneine in urine. *Biochem. J.*, 1950, **47**, 513.
Specificity and mechanism of the Hunter reaction for ergothioneine. *Nature, Lond.*, 1951, **167**, 82.

A. LAWSON, C. RIMINGTON and C. E. SEARLE—
Antithyroid activity of 2-carbethoxythio-1-methylglyoxaline. *Lancet*, 1951, ii, 619.

C. E. SEARLE and A. LAWSON—
Some effects of administering antithyroxine compounds on thyroid function in rats. *J. Endocrinol.*, 1951, **7**, xxxvii.

C. E. SEARLE, A. LAWSON and H. V. MORLEY—
Antithyroid substances. 2. Some mercaptoglyoxalines, mercaptothiazoles and thiohydantoins. *Biochem. J.*, 1951, **49**, 125.

ST. BARTHOLOMEW'S HOSPITAL

D. BAK and H. LEHMANN—
Change in the appearance of normoblasts in the bone marrow of rabbits subjected to severe haemorrhage. *J. Physiol.*, 1951, **114**, 38P.

J. E. CATES and R. V. CHRISTIE—
Subacute bacterial endocarditis. A review of 442 patients treated in 14 centres appointed by the Penicillin Trials Committee of the Medical Research Council. *Quart. J. Med.*, N.S., 1951, **20**, 93.

H. LEHMANN—
Estimation of alkali reserve. A method for routine hospital use with small amounts of plasma. *Lancet*, 1951, **i**, 718.

ST. BARTHOLOMEW'S HOSPITAL MEDICAL COLLEGE

T. E. BANKS, G. E. FRANCIS, W. MULLIGAN and A. WORMALL—
The use of radioactive isotopes in immunological investigations. 5. Quantitative aspects of the antibody-antigen reaction. *Biochem. J.*, 1951, **48**, 180.
The use of radioactive isotopes in immunological investigations. 6. Some observations on precipitin inhibition tests and on antibody valence. *Ibid.*, 1951, 48, 371.

T. E. BANKS, R. L. F. TUPPER and A WORMALL—
The fate of some intravenously injected zinc compounds. 1. The determination of ^{65}Zn in tissues. 2. The fate of injected zinc carbonate and phosphate and a zinc dithizone complex. *Biochem. J.*, 1950, **47**, 466.

V. C. E. BURNOP, D. E. RICHARDS, W. M. WATKINS and A. WORMALL—
Combination of nitrogen-15-labelled nitrogen mustard with proteins. *Nature, Lond.*, 1951, **168**, 251.

G. E. FRANCIS, W. MULLIGAN and A. WORMALL—
Labelling of proteins with iodine-131, sulphur-35 and phosphorus-32. *Nature, Lond.*, 1951, **167**, 748.
Quantitative studies on the precipitin reaction using antigens and antibodies labelled with radioactive isotopes. *Biochem. J.*, 1951, **48**, xxxvi.

R. TUPPER, R. W. E. WATTS and A. WORMALL—
Studies on red and white blood cells labelled with ^{65}Zn. *Biochem. J.*, 1951, 48, xxxvii.

F. R. WILDE—
The perivascular neural pattern of the femoral region. *Brit. J. Surg.*, 1951, 39, 97.

A. WORMALL—
Theoretical aspects of isotopes in relation to medicine. *Brit. med. J.*, 1951, ii, 757.

ST. MARY'S HOSPITAL MEDICAL SCHOOL

K. W. CROSS and T. E. OPPE—
A comparison between adults, full term and premature infants in their respiratory response to oxygen. *J. Physiol.*, 1951, **115**, 17P.

K. W. CROSS and P. W. ROBERTS—
Asphyxia neonatorum treated by electrical stimulation of the phrenic nerve. *Brit. med. J.*, 1951, **i**, 1043.

K. W. Cross and P. Warner—
The effect of inhalation of high and low oxygen concentrations on the respiration of the newborn infant. *J. Physiol.*, 1951, **114**, 283.

J. F. D. Frazer—
Factors associated with fœtal death in the rat. *J. Physiol.*, 1951, **114**, 10P.

J. F. D. Frazer and F. X. Wohlzogen—
The estimation of chorionic gonadotrophin, using the male British toad *bufo bufo*. *J. Physiol.*, 1951, **113**, 322.

F. Himmelweit, G. M. Findlay and E. M. Howard—
The size of coxsackie viruses as estimated by filtration through gradocol membranes. *Brit. J. exp. Path.*, 1950, **31**, 809.

A. St. G. Huggett—
Factors concerned with placental permeability. *Abstr. commun. 5th int. anat. Congr.*, Oxford, 1950, p. 93.

A. St. G. Huggett, F. L. Warren and N. V. Warren—
The origin of the blood fructose of the fœtal sheep. *J. Physiol.*, 1951, **113**, 258.

A. St. G. Huggett and W. F. Widdas—
The relationship between mammalian fœtal weight and conception age. *J. Physiol.*, 1951, **114**, 306.

I. A. Kamil, J. N. Smith and R. T. Williams—
The metabolism of aliphatic alcohols. Glucuronide formation. *Biochem. J.*, 1951, **49**, xxxviii.

D. McK. Kerslake—
Abolition of nervous reflex vasodilatation by sympathectomy of the heated limb. *J. Physiol.*, 1951, **113**, 7P.

D. V. Parke and R. T. Williams—
Studies in detoxication. 37. Metabolism of benzene. Examination of the glucuronide fraction of rabbit urine after administration of benzene. Isolation of phenylglucuronide. *Biochem. J.*, 1951, **48**, 621.
Studies in detoxication. 38. The metabolism of benzene. (*a*) The determination of phenylmercapturic acid in urine. (*b*) Mercapturic acid excretion by rabbits receiving benzene. *Ibid.*, 1951, **48**, 624.
Metabolism of benzene. Excretion of phenylsulphuric acid after administration of phenylmercapturic acid and phenylcysteine. *Ibid.*, 1951, **48**, xxvii.
The metabolism of benzene. The nature and amount of the muconic acid in benzene urine. *Ibid.*, 1951, **49**, lii.

D. Robinson, J. N. Smith and R. T. Williams—
The metabolism of nitrobenzene and mononitrophenols in rabbits. *Biochem. J.*, 1951, **48**, xxvii.

D. Robinson, B. Spencer and R. T. Williams—
Spectrophotometric determination of phenolsulphatase. (Arylsulphatase). *Biochem. J.*, 1951, **48**, xxviii.

B. Spencer and R. T. Williams—
Studies in detoxication. 35. Spectrophotometric determination of β-glucuronidase using *p*-chlorophenylglucuronide as substrate. *Biochem. J.*, 1951, **48**, 537.

W. F. Widdas—
Changing osmotic properties of fœtal sheep erythrocytes and their comparison with those of maternal sheep erythrocytes. *J. Physiol.*, 1951, **113**, 399.

ST. THOMAS'S HOSPITAL

H. Barcroft—
On the results of sympathectomy of the human limbs. *Univ. Western Ontario med. J.*, 1951, **21**, 118.

H. BARCROFT, H. KONZETT and H. J. C. SWAN—
Observations on the action of the hydrogenated alkaloids of the ergotoxine group on the circulation in man. *J. Physiol.*, 1951, **112**, 273.

R. S. DUFF and H. J. C. SWAN—
Further observations on the effect of adrenaline on the blood flow through human skeletal muscle. *J. Physiol.*, 1951, **114**, 41.

H. J. C. SWAN—
Observations on a central dilator action of adrenaline in man. *J. Physiol.*, 1951, **112**, 426.

A. J. WALKER, R. B. LYNN and H. BARCROFT—
On the circulatory changes in the hand and foot after sympathectomy. *St Thom. Rep., Second Ser.*, 1950, **6**, 18.

SCHOOL OF PHARMACY

Y. C. HSU and G. A. H. BUTTLE—
The enhancement of the effect of oral penicillin in laboratory animals by the use of oil containing aluminium resinate. *Brit. J. Pharmacol.*, 1951, **6**, 89.

W. H. LINNELL, D. W. MATHIESON and G. WILLIAMS—
Synthetic analogues of the adrenal cortical hormones. *Nature, Lond.*, 1951, **167**, 237.

W. H. LINNELL and J. B. STENLAKE—
4 : 4′-Diamino-2 : 2′-dihydroxydiphenyl sulphone. [Letter.] *J. Pharm. Pharmacol.*, 1950, **2**, 736.

E. J. ZAIMIS—
The action of decamethonium on normal and denervated mammalian muscle. *J. Physiol.*, 1951, **112**, 176.

SPRINGFIELD HOSPITAL, TOOTING

M. HAMILTON—
The personality of dyspeptics with special reference to gastric and duodenal ulcer. *Brit. J. med. Psychol.*, 1950, **23**, 182.

UNIVERSITY COLLEGE

M. ATTFIELD—
Inherited macrocytic anaemias in the house mouse. III. Red blood cell diameters. *J. Genet.*, 1951, **50**, 250.

N. A. BARNICOT, H. HARRIS and H. KALMUS—
Taste thresholds of further eighteen compounds and their correlation with P.T.C. thresholds. *Ann. Eugen., Camb.*, 1951, **16**, 119.

R. E. BILLINGHAM, P. L. KROHN and P. B. MEDAWAR—
Effect of cortisone on survival of skin homografts in rabbits. *Brit. med. J.*, 1951, **i**, 1157.

G. L. BROWN—
Excitatory and inhibitory effects of the chemical mediators. Contribution to : A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 303.

M. de B. DALY and L. E. MOUNT—
The origin, course and nature of bronchomotor fibres in the cervical sympathetic nerve of the cat. *J. Physiol.*, 1951, **113**, 43.

M. de B. DALY and A. SCHWEITZER—
Sino-aortic reflexes affecting the bronchi. *J. Physiol.*, 1950, **112**, 35P.
Effects of sino-aortic nerve stimulation on the bronchi. *Acta physiol. scand.*, 1951, **22**, 66.
Reflex bronchomotor responses to stimulation of receptors in the regions of the carotid sinus and arch of the aorta in the dog and cat. *J. Physiol.*, 1951, **113**, 442.
Observations on the reflex control of bronchomotor tone. *Ibid.*, 1951, **114**, 49P.

S. P. DATTA and H. HARRIS—
A convenient apparatus for paper chromatography. Results of a survey of the urinary amino-acid patterns of some animals. *J. Physiol.*, 1951, **114**, 39P.
Dietary origin of urinary methyl-histidine. *Nature, Lond.*, 1951, **168**, 296.

H. GRÜNEBERG—
Skeletal polymorphism in the mouse. In : *Moderne biologie.* (Festschrift für Hans Nachtsham.) Berlin (F. W. Peters) 1950, pp. 43–54.
The genetics of a tooth defect in the mouse. *Proc. roy. Soc.*, B, 1951, **138**, 437.

H. HARRIS—
The familial distribution of diabetes mellitus : a study of the relatives of 1241 diabetic propositi. *Ann. Eugen., Camb.*, 1950, **15**, 95.
Contribution to : A discussion on prognosis in diabetes. *Proc. R. Soc. Med.*, 1951, **44**, 913.

H. HARRIS and J. JOSEPH—
Variation in extension of the metacarpo-phalangeal and interphalangeal joints of the thumb. *J. Bone Jt Surg.*, 1949, **31B**, 547.

H. HARRIS and N. MCARTHUR—
Changes in sex incidence of diabetes mellitus (1912–1947). *Ann. Eugen., Camb.*, 1951, **16**, 109.

H. HARRIS and C. A. B. SMITH—
The sib-sib age of onset correlation among individuals suffering from a hereditary syndrome produced by more than one gene. *Ann. Eugen., Camb.*, 1949, **14**, 309.

M. F. LOCKETT—
The effect of denervation on the responses of the cat's nictitating membrane to sympathomimetic amines. *Brit. J. Pharmacol.*, 1950, **5**, 485.
The effect of pentobarbitone anaesthesia on the resting level of the systolic blood pressure and on the responses of the systolic blood pressure, in atropinized bitches, to sympathomimetic amines. *J. Physiol.*, 1951, **112**, 243.
The effect of pentobarbitone anaesthesia on the heart rate, and on the responses of the heart rate to sympathomimetic amines in atropinized bitches. *Ibid.*, 1951, **112**, 262.

M. B. THORN—
Studies on the enzymic oxidation of succinic acid containing deuterium in the methylene groups. *Biochem. J.*, 1951, **49**, 602.

A. WILSON, G. A. MAW and H. GEOGHEGAN—
Cholinesterase activity of blood and muscle in myasthenia gravis. *Quart. J. Med., N.S.*, 1951, **20**, 13.
Cholinesterase inhibition and signs and symptoms in myasthenia gravis. *Ibid*, 1951, **20**, 21.

UNIVERSITY COLLEGE HOSPITAL

H. H. F. BARNS, O. LINDAN, M. E. MORGANS, E. REID and G. I. M. SWYER—
Foetal mortality in pregnant rats treated with anterior-pituitary extracts and in alloxan-diabetic rats. *Lancet*, 1950, **ii**, 841.

R. BLOWERS, E. M. CLARKSON and M. MAIZELS—
Flicker phenomenon in human erythrocytes. *J. Physiol.*, 1951, **113**, 228.

H. R. CRUMPLER, C. E. DENT, H. HARRIS and R. G. WESTALL—
β-amino*iso*butyric acid (α-methyl-β-alanine) : a new amino-acid obtained from human urine. *Nature, Lond.*, 1951, **167**, 307.

E. J. HARRIS and M. MAIZELS—
The permeability of human erythrocytes to sodium. *J. Physiol.*, 1951, **113**, 506.

M. MAIZELS—
Factors in the active transport of cations. *J. Physiol.*, 1951, **112**, 59.

H. P. WRIGHT, S. B. OSBORN and D. G. EDMONDS—
Effect of postoperative bed rest and early ambulation on the rate of venous blood-flow. *Lancet*, 1951, **i**, 22.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL

A. D. BANGHAM—
The effect of cortisone on wound healing. *Brit. J. exp. Path.*, 1951, **32**, 77.

G. BELYAVIN, J. C. N. WESTWOOD, N. W. PLEASE and W. SMITH—
Influenza haemagglutination. An evaluation of the photoelectric titration method. *J. gen. Microbiol.*, 1951, **5**, 546.

S. P. DATTA, C. E. DENT and H. HARRIS—
An apparatus for the simultaneous production of many two-dimensional paper chromatograms. *Science*, 1950, **112**, 621.

C. E. DENT and H. HARRIS—
The genetics of " cystinuria ". *Ann. Eugen., Camb.*, 1951, **16**, 60.

J. H. HALE—
Studies on staphylococcus mutation : a naturally occurring " G " gonidal variant and its carbon dioxide requirements. *Brit. J. exp. Path.*, 1951, **32**, 307.

G. HUNTER—
On ergothioneine in blood and diazo-reacting substances in maize. *Biochem. J.*, 1951, **48**, 265.

J. D. JUDAH—
The action of 2 : 4-dinitrophenol on oxidative phosphorylation. *Biochem. J.*, 1951, **49**, 271.

J. D. JUDAH and H. G. WILLIAMS-ASHMAN—
The inhibition of oxidative phosphorylation. *Biochem. J.*, 1951, **48**, 33.

R. E. H. NICHOLAS—
Chromatographic methods for the separation and identification of porphyrins. *Biochem. J.*, 1951, **48**, 309.

R. E. H. NICHOLAS and C. RIMINGTON—
Paper chromatography of porphyrins : some hitherto unrecognized porphyrins and further notes on the methods. *Biochem. J.*, 1951, **48**, 306.
Isolation of unequivocal uroporphyrin. III. A further study of turacin. *Ibid.*, 1951, **49**, xxxii.

J. M. SEARLE and R. G. WESTALL—
The occurrence of free methylhistidine in urine. *Biochem. J.*, 1951, **48**, 1.

W. SMITH and J. C. N. WESTWOOD—
Influenza virus haemagglutination. The mechanism of the Francis phenomenon. *Brit. J. exp. Path.*, 1950, **31**, 725.

UNIVERSITY COLLEGE AND WELLCOME RESEARCH INSTITUTE

A. ALBERT, D. J. BROWN and G. CHEESEMAN—
Pteridine studies. Part I. Pteridine, and 2- and 4-amino and 2- and 4-hydroxy-pteridines. *J. chem. Soc.*, 1951, p. 474.

D. J. BROWN—
Improved syntheses in the pyrimidine series. I. The use of pyrimidine-thiols. *J. Soc. chem. Ind., Lond.*, 1950, **69**, 353.

WEST LONDON HOSPITAL

W. S. C. COPEMAN and L. G. C. E. PUGH—
Dehydration treatment of rheumatic fever. *Lancet*, 1950, **ii**, 675.

W. S. C. COPEMAN, O. SAVAGE, P. M. F. BISHOP, E. C. DODDS, B. GOTTLIEB, J. H. H. GLYNN, A. A. HENLY and A. E. KELLIE—
A study of cortisone and other steroids in rheumatoid arthritis. *Brit. med. J.*, 1950, **ii**, 849.

MANCHESTER

UNIVERSITY OF MANCHESTER

F. S. A. DORAN—

Aetiology of chronic gastric ulcer; observations on the blood-supply of the human gastric mucosa with a note on the arteriovenous shunt. *Lancet*, 1951, **i**, 199.

C. GARDIKAS and J. F. WILKINSON—

Trial of β-naphthyl-di-2-chloroethylamine in leukaemia, Hodgkin's disease and allied disorders. *Lancet*, 1951, **i**, 137.

J. N. MILLS—

Diurnal rhythm in urine flow. *J. Physiol.*, 1951, **113**, 528.

G. A. G. MITCHELL—

The renal nerves. *Brit. J. Urol.*, 1950, **22**, 269.

The intrinsic renal nerves. *Acta Anat.*, 1951, **13**, 1.

Microradiography in biology. *Brit. J. Radiol., N.S.*, 1951, **24**, 110.

S. C. PAPASTAMATIS and J. F. WILKINSON—

Paper chromatography of proteins. *Nature, Lond.*, 1951, **167**, 724.

D. C. RACKER and J. L. BRAITHWAITE—

The blood supply to the lower end of the ureter and its relation to Wertheim's hysterectomy. *J. Obstet. Gynaec.*, 1951, **58**, 609.

R. WARWICK—

A study of retrograde degeneration in the oculomotor nucleus of the rhesus monkey, with a note on a method of recording its distribution. *Brain*, 1950, **73**, 532.

J. F. WILKINSON and C. GARDIKAS—

Treatment of acute leukaemia with aminopterin. *Lancet*, 1951, **i**, 325.

J. L. WILKINSON—

The anatomy of an oblique proximal septum of the pulp space. *Brit. J. Surg.*, 1951, **38**, 454.

A. F. WILLIAMS—

The nerve supply of the laryngeal muscles. *J. Laryng.*, 1951, **65**, 343.

NEWCASTLE-ON-TYNE

ROYAL VICTORIA INFIRMARY

R. B. THOMPSON and C. C. UNGLEY—

Megaloblastic anaemia of pregnancy and the puerperium. A review of forty-five cases with special reference to their response to treatment. *Quart. J. Med., N.S.*, 1951, **20**, 187.

C. C. UNGLEY—

Absorption of vitamin B_{12} in pernicious anaemia. I. Oral administration without a source of intrinsic factor. *Brit. med. J.*, 1950, **ii**, 905.

Absorption of vitamin B_{12} in pernicious anaemia. II. Oral administration with normal gastric juice. *Ibid.*, 1950, **ii**, 908.

Absorption of vitamin B_{12} in pernicious anaemia. IV. Administration into buccal cavity, into washed segment of intestine, or after partial sterilization of bowel. *Ibid.*, 1950, **ii**, 915.

Application of the quantitative method of assessing neurological status to trials of vitamins B_{12} and $B_{12}c$ in subacute combined degeneration of the cord (film and graphs). *J. Physiol.*, 1951, **112**, 35P.

Special aspects of shock. XXVII. Treatment of shock due to immersion and exposure. In: National Research Council, Division of Medical Sciences and Army Medical Service Graduate School. *Symposium on Shock*, Washington, 7–9 May, 1951, pp. 1–5.

Vitamin B_{12}. Part 2. A review of the clinical aspects. *Nutr. Abstr. Rev.*, 1951–52, **21**, 1.

C. C. UNGLEY, with statistics by H. CAMPBELL—
Effect of vitamin $B_{12}c$ in pernicious anaemia and subacute combined degeneration of the cord. *Brit. med. J.*, 1951, **i**, 152.

C. C. UNGLEY with the assistance of G. A. CHILDS—
Absorption of vitamin B_{12} in pernicious anaemia. III. Failure of fresh milk or concentrated whey to function as Castle's intrinsic factor or to potentiate the action of orally administered vitamin B_{12}. *Brit. med. J.*, 1950, **ii**, 911.

UNIVERSITY OF DURHAM (KING'S COLLEGE)

P. A. BURSTALL and B. SCHOFIELD—
An inhibitory component in the gastric response to insulin hypoglycaemia in Heidenhain pouches in dogs. *J. Physiol.*, 1951, **115**, 19P.

N. E. GRAHAM, I. G. BAXTER and R. C. BROWNE—
Manual tracking in response to the display of horizontal, vertical and circular scales. *Brit. J. Psychol.*, 1951, **42**, 155.

M. KELLER and J. WEISS—
Chemical actions of ionising radiations in solution. Part VI. Radiation chemistry of sterols. The action of X-rays on cholesterol and 3β-hydroxypregn-5-en-20-one. *J. chem. Soc.*, 1950, p. 2709.
Chemical actions of ionising radiations in solution. Part VII. Radiation chemistry of sterols. The action of X-rays on cholic acid in aqueous solution. *Ibid.*, 1951, p. 25.
Chemical actions of ionising radiations in solution. Part IX. Radiation chemistry of sterols. The action of X-rays on (+)-oestrone-b in aqueous solution. *Ibid.*, 1951, p. 1247.

B. SCHOFIELD—
Gastric secretion in response to insulin hypoglycaemia in Heidenhain pouches. *J. Physiol.*, 1950, **111**, 57P.

B. SCHOFIELD and F. WATSON—
Equipment for continuous collection of gastric juice in pouch dogs. *Ibid.*, 1950, **111**, 42P.
A micro-titration attachment for the Stadie electrode system. *J. Physiol.*, 1950, **111**, 59P.

J. WEISS and M. KELLER—
Chemical action of ionizing radiations on steroid compounds. *Experientia*, 1950, **6**, 379.

OXFORD

UNIVERSITY OF OXFORD

J. BADENOCH and G. M. WATSON—
Urobilinogen excretion in the faeces of rats with intestinal culs-de-sac. *J. Path. Bact.*, 1951, **63**, 523.

J. BANISTER and V. P. WHITTAKER—
Pharmacological activity of the carbon analogue of acetylcholine. *Nature, Lond.*, 1951, **167**, 605.

R. BIGGS and M. J. ALLINGTON—
The sampling error in haemoglobin determination. *J. clin. Path.*, 1951, **4**, 211.

R. B. BLACKET and A. L. SELLERS—
The effect of removing the constriction of the renal artery in acute and chronic hypertension in the rabbit. *Clin. Sci.*, 1951, **10**, 177.

H. BLASCHKO—
Remarks on chemical specificity. Contribution to: A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 307.

H. BLASCHKO, F. N. FASTIER and I. WAJDA—
The inhibition of histaminase by amidines. *Biochem. J.*, 1951, **49**, 250.

J. H. BURN, H. LANGEMANN and R. H. O. PARKER—
Noradrenaline in whale suprarenal medulla. *J. Physiol.*, 1951, **113**, 123.

M. CAIRNS and A. STEWART—
Pulmonary tuberculosis mortality in the printing and shoemaking trades. Historical survey, 1881–1931. *Brit, J. soc. Med.*, 1951, **5**, 73.

S. T. E. CALLENDER and G. H. SPRAY—
Preparation of haemopoietically active extracts from faeces. *Lancet*, 1951, **i**, 1391.

C. W. CARTER and P. J. R. PHIZACKERLEY—
The influence of pyridoxine on fat metabolism in the rat. *Biochem. J.*, 1951, **49**, 227.

R. CECIL AND A. G. OGSTON—
Determination of sedimentation and diffusion constants of horse-radish peroxidase : addendum to : *Purification of horse-radish peroxidase and comparison of its properties with those of catalase and methaemoglobin,* by D. Keilin and E. F. Hartree. *Biochem. J.*, 1951, **49**, 105.
A simple double-prism refractometer. *J. sci. Instrum.*, 1951, **28**, 253.

R. P. COOK, N. POLGAR and R. O. THOMSON—
Cholesterol metabolism. 2. Cholesterol metabolism in the rat. *Biochem. J.*, 1950, **47**, 600.

G. S. DAWES and J. R. VANE—
Repetitive discharges from the isolated atria. *J. Physiol.*, 1951, **112**, 28P.

M. B. ELVIN and R. C. OLDFIELD—
Disabilities and progress in a dysphasic university student. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 118.

J. FESSLER and A. G. OGSTON—
Studies of the sedimentation, diffusion and viscosity of some sarcosine polymers in aqueous solution. *Trans. Faraday Soc.*, 1951, **47**, 667.

S. R. GLOYNE—
Pneumoconiosis. A histological survey of necropsy material in 1205 cases. *Lancet*, 1951, **i**, 810.

M. de G. GRIBBLE and R. A. PETERS—
The influence of thyroidectomy on post-burn N loss in rats. *Quart. J. exp. Physiol,*, 1951, **36**, 119.

J. L. GUIMARAES and E. M. LOURIE—
The inhibition of some pharmacological actions of pentamidine by suramin. *Brit. J. Pharmacol.*, 1951, **6**, 514.

B. KIDMAN, M. TUTT and J. VAUGHAN—
Excretion of yttrium–91 in rabbits. *Nature, Lond.*, 1951, **167**, 858.
The retention of radioactive strontium and yttrium (Sr^{89}, Sr^{90} and Y^{90}) in pregnant and lactating rabbits and their off-spring. *J. Path. Bact.*, 1951, **63**, 253.

W. LEWIN and H. CAIRNS—
Fractures of the sphenoidal sinus with cerebrospinal rhinorrhoea. *Brit. med. J.*, 1951, **i**, 1.

N. P. MARKHAM and H. W. FLOREY—
The effect on experimental tuberculosis of the intravenous injection of insoluble substances : experiments with carbon. *Brit. J. exp. Path.*, 1951, **32**, 25.

N. P. MARKHAM, N. G. HEATLEY, A. G. SANDERS and H. W. FLOREY—
The behaviour *in vivo* of particulate micrococcin. *Brit. J. exp. Path.*, 1951, **32**, 136.

J. MARSHALL—
Sensory disturbances in cortical wounds, with special reference to pain. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 187.

C. MERSKEY—
The laboratory diagnosis of haemophilia. *J. clin. Path.*, 1950, **3**, 301.
Haemophilia associated with normal coagulation time. *Brit. med. J.*, 1951, **i**, 906.

C. MERSKEY and R. G. MACFARLANE—
The female carrier of haemophilia. A clinical and laboratory study. *Lancet*, 1951, **i**, 487.

G. G. F. NEWTON and E. P. ABRAHAM—
Ayfivin and bacitracin : resolution of crude products into similar series of peptides. *Biochem. J.*, 1950, **47**, 257.

G. G. F. NEWTON, E. P. ABRAHAM, H. W. FLOREY, N. SMITH and J. ROSS—
Some observations on the biological properties of bacitracins A, B, and C. *Brit. J. Pharmacol.*, 1951, **6**, 417.

R. A. PETERS—
Contribution to : A discussion on the action of local hormones. *Proc. roy. Soc.*, B, 1950, **137**, 297.

A. C. RITCHIE, N. SMITH and H. W. FLOREY—
Some biological properties of cephalosporin P_1. *Brit. J. Pharmacol.*, 1951, **6**, 430.

I. M. ROLLO and J. WILLIAMSON—
Acquired resistance to ' Melarsen,' tryparsamide and amidines in pathogenic trypanosomes after treatment with ' Melarsen ' alone. *Nature, Lond.*, 1951, **167**, 147.

W. R. RUSSELL—
Disability caused by brain wounds. *J. Neurol. Neurosurg. Psychiat.*, 1951, **14**, 35.
Parietal lobe syndromes. *Proc. R. Soc. Med.*, 1951, **44**, 341.

G. H. SLOANE-STANLEY—
Amino-acid decarboxylases of rat liver. *Biochem. J.*, 1949, **45**, 556.
The use of tyrosine apodecarboxylase of *Streptococcus faecalis* R for the estimation of codecarboxylase. *Ibid.*, 1949, **44**, 567.

G. H. SPRAY, P. FOURMAN and L. J. WITTS—
The excretion of small doses of folic acid. *Brit. med. J.*, 1951, **ii**, 202.

A. STEWART and J. P. W. HUGHES—
Mass radiography findings in the Northamptonshire boot and shoe industry, 1945–6. *Brit. med. J.*, 1951, **i**, 899.

J. E. THOMPSON and J. R. VANE—
Effect of venous occlusion on peripheral arterial blood-flow. *Lancet*, 1951, **i**, 380.

G. M. WATSON and L. J. WITTS—
Absence of Bartonella infection in rats with intestinal culs-de-sac and macrocytic anaemia. *J. Path. Bact.*, 1951, **63**, 526.

J. WEBB and A. STEWART, with a statistical appendix by I. SUTHERLAND—
Spread of tuberculosis from house to house. *Brit. J. soc. Med.*, 1951, **5**, 13.

V. P. WHITTAKER—
Idrolisi della succinilcolina da colinesterasi : utilizzazione simultanea della cromatografia su carta e della tecnica di Warburg. *Experientia*, 1951, **7**, 217.
Specificity, mode of action and distribution of cholinesterases. *Physiol. Rev.*, 1951, **31**, 312.

V. P. WHITTAKER and S. WIJESUNDERA—
The separation of esters of choline by paper chromatography. *Biochem. J.*, 1951, **49**, xlv.

H. M. WHYTE—
The effect of aspirin and morphine on heat pain. *Clin. Sci.*, 1951, **10**, 333.
Thermocouples as skin thermometers. *Ibid.*, 1951, **10**, 325.

W. H. WILKINS and B. M. PARTRIDGE—
Investigation into the production of bacteriostatic substances by fungi. Preliminary examination of the tenth 100 species, all Basidiomycetes, and review of first 500 Basidiomycetes. *Brit. J. exp. Path.*, 1950, **31**, 754.

W. H. WILKINS and J. R. REES—
Production of antibacterial metabolism solutions by fungi. *Nature, Lond.*, 1950, **166**, 949.

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J. C. APPLEBY, F. HIMMELWEIT and C. H. STUART-HARRIS—
Immunisation with influenza virus A vaccines. Comparison of intradermal and subcutaneous routes. *Lancet*, 1951, **i**, 1384.

J. C. APPLEBY and C. H. STUART-HARRIS—
The use of filtrates of *Vibrio cholerae* in the classification of influenza virus strains. *Brit. J. exp. Path.*, 1950, **31**, 797.

F. DAVIES, E. T. B. FRANCIS and T. S. KING—
Electrocardiogram of the crocodilian heart. *Nature, Lond.*, 1951, **167**, 146.
Ventricular nerve cells in mammals. *Ibid.*, 1951, **167**, 113.

H. N. GREEN and F. N. GHADIALLY—
Relation of shock, carbohydrate utilization, and cortisone to mitotic activity in the epidermis of the adult male mouse. *Brit. med. J.*, 1951, **i**, 496.

K. N. OJHA and D. R. WOOD—
Gastric secretion in spayed female cats and the effect of stilboestrol. *J. Physiol.*, 1951, **114**, 8P.

C. H. STUART-HARRIS—
Atypical pneumonia. *Brit. med. J.*, 1950, **ii**, 1457.
Discussion on short-term fevers of obscure origin. *Proc. R. Soc. Med.*, 1950, **43**, 589.
Aetiology of pneumonia. (Discussion on pneumonia.) *Ibid*, 1951, **44**, 514.

D. R. WOOD—
The inhibitory effect of urogastrone at different rates of gastric secretion. *J. Physiol.*, 1951, **114**, 8P.

SOUTHAMPTON

UNIVERSITY COLLEGE—

N. B. CHAPMAN, J. W. JAMES, J. D. P. GRAHAM and G. P. LEWIS—
Structure and pharmacological activity among 2-haloethylamine derivatives with a naphthylmethyl group : variation of the halogen. *Chem. & Industr.*, 1951, p. 633.

TAPLOW

CANADIAN RED CROSS MEMORIAL HOSPITAL—

R. CONSDEN and W. M. STANIER—
Metabolism of gentisic acid. *Biochem. J.*, 1951, **48**, xiv.
Ultra-violet absorption of reduced phosphomolybdate. *Nature, Lond.*, 1951, **168**, 298.

PUBLICATIONS BY HOLDERS OF STUDENTSHIPS

J. R. BIGNALL, J. W. CROFTON and J. A. B. THOMAS—
Effect of streptomycin on vestibular function. *Brit. med. J.*, 1951, **i**, 554.

M. BLUNDELL and J. ROTBLAT—
Use of liquid nuclear research emulsion in track autoradiography. *Nature, Lond.*, 1951, **167**, 645.

M. DAVISON and Q. H. GIBSON—
The metabolism of acetate in pigeon breast muscle. *Biochem. J.*, 1951, **47**, 1.

N. M. GREEN and E. WORK—
Pancreatic trypsin inhibitor. *Biochem. J.*, 1951, **49**, xxxvii.

J. HARDWICKE—
Use of Dextran to study erythrocyte sedimentation. *Proc. R. Soc. Med.*, 1951, **44**, 559.

C. M. HARRISON—
Inheritance of resistance to DDT in the housefly, *Musca domestica L. Nature, Lond.*, 1951, **167**, 855.

D. E. HUTCHEON and R. H. O. PARKER—
The effect of methionine and of thiouracil on the methylation of *nor*adrenaline in the body. *Brit. J. Pharmacol.*, 1950, **5**, 604.

J. P. JOHNSTON, A. G. OGSTON and J. E. STANIER—
A modification of the Elson and Morgan method for the estimation of glucosamine. *Analyst*, 1951, **76**, 88.

F. E. KING, B. S. JACKSON and D. A. A. KIDD—
Synthesis from Phthalimido-acids. Part II. Further reactions of Phthalylglutamic anhydride. *J. chem. Soc.*, 1951, p. 243.

E. V. ROWSELL—
Transamination to pyruvate and some other α-keto-acids. *Nature, Lond.*, 1951, **168**, 104.

D. G. WALKER and F. L. WARREN—
Filter-paper chromatography of phosphate esters. *Biochem. J.*, 1951, **49**, xxi.

M. J. WHITTINGTON—
The incidence of *Trichomonas vaginalis* in a sample of the general population. With some observations on its relation to the use of chemical contraceptives. *J. Obstet. Gynaec.*, 1951, **58**, 399.
The occurrence of *Trichomonas vaginalis* in semen. *Ibid.*, 1951, **58**, 615.

PUBLICATIONS BY HOLDERS OF FELLOWSHIPS

P. CALAZEL, R. GERARD, R. DALEY, A. DRAPER, J. FOSTER and R. J. BING—
Physiological studies in congenital heart disease. XI. A comparison of the right and left auricular, capillary and pulmonary artery pressures in nine patients with auricular septal defect. *Johns Hopk. Hosp. Bull.*, 1951, **88**, 20.

R. DALEY, J. D. WADE, F. MARAIST AND R. J. BING—
Pulmonary hypertension in dogs induced by injection of lycopodium spores into the pulmonary artery, with special reference to the absence of vasomotor reflex. *Amer. J. Physiol.*, 1951, **164**, 380.

C. E. LUMSDEN and C. M. POMERAT—
Normal oligodendrocytes in tissue culture. *Exp. Cell Res.*, 1951, **2**, 103.

F. MARAIST, R. DALEY, A. DRAPER, Jr., R. HEIMBECKER, F. DAMMANN, Jr., R. KEIFFER, Jr., J. T. KING, C. FERENCZ and R. J. BING—
Physiological studies in congenital heart disease. X. The physiological findings in thirty-four patients with isolated pulmonary valvular stenosis. *Johns Hopk. Hosp. Bull.*, 1951, **88**, 1.

COMMITTEE REPORTS

STREPTOMYCIN IN TUBERCULOSIS TRIALS COMMITTEE—
Streptomycin treatment of tuberculous lesions of the trachea and bronchi. *Lancet*, 1951, **i**, 253.

SUBCOMMITTEE OF THE MEDICAL RESEARCH COUNCIL STREPTOMYCIN IN TUBERCULOSIS TRIALS COMMITTEE—
Prophylactic streptomycin in thoracoplasty operations. *Thorax*, 1951, **6**, 17.

JOINT SUBCOMMITTEE of the MEDICAL RESEARCH COUNCIL STREPTOMYCIN IN TUBERCULOSIS TRIALS COMMITTEE and the BRITISH TUBERCULOSIS ASSOCIATION RESEARCH COMMITTEE—

Treatment of pulmonary tuberculosis with streptomycin and para-amino-salicylic acid. *Brit. med. J.*, 1950, ii, 1073.

MEDICAL RESEARCH COUNCIL WHOOPING-COUGH IMMUNIZATION COMMITTEE and others, with the advice of the MEDICAL RESEARCH COUNCIL STATISTICAL RESEARCH UNIT—

The prevention of whooping-cough by vaccination. *Brit. med. J.*, 1951, i, 1464.

PUBLICATIONS OF THE MEDICAL RESEARCH COUNCIL

REPORT TO PARLIAMENT

Report of the Medical Research Council for the Years 1948–1950. (1951.) Cmd. 8387.

SPECIAL REPORT SERIES

No. 273. Infective Hepatitis. Studies in East Anglia during the Period 1943–47. By F. O. MacCallum, A. M. McFarlan, J. A. R. Miles, M. R. Pollock and C. Wilson. (1951.)

No. 274. Deficiency Diseases in Japanese Prison Camps. By Dean A. Smith and Michael F. A. Woodruff, with an Introduction by J. Bennet. (1951.)

No. 275. Studies of Undernutrition, Wuppertal 1946–9. By members of the Department of Experimental Medicine, Cambridge, and Associated Workers. (1951.)

No. 276. Occupational Factors in the Aetiology of Gastric and Duodenal Ulcers, with an Estimate of their Incidence in the General Population. By Richard Doll and F. Avery Jones, with the assistance of M. M. Buckatzsch. (1951.)

No. 277. Observations on the General Effects of Injury in Man, with special reference to Wound Shock. By R. T. Grant and E. B. Reeve. (1951.)

WHITE MEMORANDA

No. 21. List of Species Maintained in the National Collection of Type Cultures (Third Edition). (1951).

No. 25. The Social Consequences of Pneumoconiosis among Coalminers in South Wales. By P. Hugh-Jones and C. M. Fletcher. (1951.)

CONFERENCE REPORT

The Application of Scientific Methods to Industrial and Service Medicine. (Proceedings of a Conference held from March 29th to March 31st, 1950.) (1951.)

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during the period covered by the present Report,
1st October, 1950–30th September, 1951

GRANTS

U.S.A. Public Health Service ..	$5,000	Travelling expenses to U.S.A. in connection with joint Anglo-American research on rheumatic diseases (*see* pp. 34 and 37).
Rockefeller Foundation, New York	$25,000	Travelling fellowships in medicine awarded by the Council (*see* p. 119).
Alexander Pigott Wernher Memorial Trust.	$20,000	For research on blindness and deafness (*see* p. 120).

BEQUESTS

The late Dr. P. H. Abercrombie ..	£100	For general purposes.
The late Miss A. A. Brereton ..	£100	For research into causes of rheumatism or rheumatoid arthritis.
The late Miss M. L. E. Crowdy ..	£100	For research on cancer.
The late E. V. Tomalin	£500	For research on cancer.

DONATIONS

Amounts under £50—Hope Bowdler Church, Church Stretton (further donation); Partington Women's Institute, Cheshire (further donation for research on infantile paralysis); Mrs. A. J. Dods, Tunbridge Wells (further donation for research on rheumatism); Mr. J. Couch, Norwich (further donation in memory of his son, Robert, for research on infantile paralysis); Miss D. D. Martin, Falmouth (research on infantile paralysis); The Kenneth Ellis Singers, Cornwall (research on infantile paralysis); Miss R. Abbott, London (further donation); Mr. F. R. James, London (further donation for research on tetanus).

APPENDIX

MEMORANDUM BY DR. CHRISTOPHER ADDISON ON THE FUTURE ORGANISATION OF MEDICAL RESEARCH (1918)

The following memorandum, which in its original form had an appendix by Sir Walter Fletcher, was prepared by Dr. Addison, as Minister of Reconstruction, in March 1918. A year later, as President of the Local Government Board, he embodied it in a White Paper (Cmd. 69) presented to Parliament during the passage of the Ministry of Health Bill, of which clause 3 (1), proviso (i), made provision for the responsibilities of the Medical Research Committee to be transferred to a Committee of the Privy Council, under which the Medical Research Council was subsequently established.

THE NATURE OF THE PROBLEM

1. I am not sure whether it is sufficiently clear that the proposals in regard to the Medical Research Committee which are under discussion form a part only, though a very important part, of the general re-organisation of Government research work to which I am confident that we must look forward.

2. These proposals must be considered in relation to the present and future organisation of other kinds of research (including medical research) bodies ; and all schemes of re-organisation have one feature in common, which I am afraid may not have been sufficiently emphasised.

3. I refer to the fact that the present proposals do not mean that we are being asked to advise whether all medical research should be carried out through a body in close relation to the Ministry of Health, or whether no medical research should be carried out by such a body. This is not the question. The question is how much medical research can best be carried out by a medical staff in close relation to the administrative side of the Ministry, and how much can best be carried out by a body whose work will be less immediately directed towards the current administration of health matters.

4. This fact is of great importance, because it follows from it that, whether or not the Medical Research Committee continued to be attached to the Ministry of Health, at least as closely as it is now attached to the National Health Insurance Joint Committee, it would not be the case that all medical research carried out on behalf of the Government would be carried out through the Committee. The reasons for this are both practical and scientific, and the remainder of this Memorandum deals with them in that order.

PRACTICAL REASONS FOR RE-ORGANISATION

5. The re-organisation of medical research work is a problem which extends beyond the Medical Research Committee itself. The Local Government Board, the Board of Control, the Ministry of Munitions, the Colonial Office, and the Departments concerned with national defence, are all at the present moment spending money on medical research, some of them using the Medical Research Committee as an agent for placing particular pieces of research in the best hands, and some of them acting independently. It has never been proposed that the Medical Research Committee, or any similar body which succeeds it, should prevent all other Departments from doing anything in the nature of medical research, and the question therefore is whether the valuable influence of the Medical Research Committee in preventing over-lapping inquiries and using the best scientific men can be maintained most effectively if it is organised on lines similar to those at present laid down, or under some different arrangement.

6. In order that a considered judgment on this question may be formed it is necessary to give some account of the relations which have existed, since the Medical Research Committee was first created, between the Committee and the Minister responsible for Health Insurance. The position is that the Medical Research Fund Regulations lay upon the Medical Research Committee the duty of framing schemes for research. Those schemes are submitted for approval, not to the Joint Committee as a whole, but to the Chairman of the Joint Committee, as the responsible Minister, in person. As soon as the Minister's approval has been given to a scheme, the Committee are left free to carry it into operation, and the Secretary to the Committee is responsible for seeing that the approved expenditure is not exceeded, and that expenditure is made, within the estimate, upon the proper heads of the scheme.

Although, therefore, the operations of the Medical Research Committee are under the control of the Minister responsible for Health Insurance, so that he would defend the proceedings of the Committee if they were criticised in Parliament, it will be seen that in practice the Minister relies upon the Medical Research Committee to select the objects under which they will spend their income, and to frame schemes for the efficient and economical performance of their work. The Minister has, of course, always received a full explanation of their schemes from the Committee before giving his approval, but he has never sought to control their work, or to suggest to them that they should take one line rather than another, as all Ministers rightly do in the administrative work of their Departments.

7. There is, therefore, an important distinction to be drawn between this research work and all other work within the sphere of the Department, whatever its name ; and the judgment of the eminent scientists who are members of the Medical Research Committee as to the value of this undertaking is perfectly clear. In their First Annual Report (1914–15, Cd. 8101, p. 48) the Committee say that they " venture to acknowledge their indebtedness to the three successive Chairmen of the National Health Insurance Joint Committee under whom they have worked, for having allowed them the most complete freedom, within their constitution, to bring flexible and rapid assistance to the national need on occasions of emergency, with the least possible delay in the motion of constitutional machinery ".

8. It may be asked, however, why, if the relations of the Medical Research Committee with the present Department are so satisfactory, they cannot be left as they are under the Bill establishing the Ministry of Health. The answers to this question are of two quite different kinds. There are, in the first place, some serious difficulties arising out of the present constitution of the Medical Research Committee, which will, in any case, have to be met as soon as the central administration of Health Insurance is altered, as it must be, by the establishment of a Ministry of Health. It is proposed to establish a Ministry for England and Wales only, with some consequential adjustments as regards Health Insurance in Scotland and Ireland. But the Medical Research Fund has from the first been deliberately made a single fund for the United Kingdom. It was necessary to take this course in order to make the best use of the comparatively small amount of money available, and the experience of the Committee has shown that for effective work the committee must be in close touch with the best scientific activities in all parts of the whole Kingdom ; in any given piece of research it may be necessary, or highly advantageous, to bring into association with work being done at one university or other centre the investigations by some other worker far remote, and belonging, perhaps, not only to another nation, but even to a different kind of scientific subject.

9. In the second place, the independence of the Committee has rested not only upon the particular constitution which was framed for them when they

were appointed, but also upon the fact that the Insurance Departments in the six years of their existence have been so much absorbed in putting the Acts into operation and in improving their administration that they have had very little time to devote to health problems in the more scientific sense. It might appear at first sight that when a Ministry of Health is set up, and a more advanced health policy is adopted, as we hope it will be as soon as the Ministry is established, the arguments for keeping the Medical Research Committee closely linked with the new Ministry would be strengthened ; but I think that on closer examination the arguments to the contrary are stronger.

10. A progressive Ministry of Health must necessarily become deeply committed from time to time to particular systems of health administration. The Minister of Health at any moment may be appointed by the Government on the ground that he is something of a scientist or takes a special interest in health matters. One does not wish to attach too much importance to the possibility that a particular Minister may hold strong personal views on particular questions of medical science or of its applications in practice ; but, even apart from special difficulties of this kind, which cannot be left out of account, a keen and energetic Minister will quite properly do his best to maintain the administrative policy which he finds existing in his Department, or imposes upon his Department during his term of office. He would, therefore, be constantly tempted to endeavour in various ways to secure that the conclusions reached by organised work under any scientific body, such as the Medical Research Committee, which was substantially under his control, should not suggest that his administrative policy might require alteration. The more active the administration of his Department the greater this danger becomes. It is essential that such a situation should not be allowed to arise, for it is the first object of scientific research of all kinds to make new discoveries, and these discoveries are bound to correct the conclusions based upon the knowledge which was previously available, and, therefore, in the long run to make it right to alter administrative policy.

11. Accordingly, any body of men engaged upon scientific research in medicine or any other field should be given the widest possible freedom to make their new discoveries, and to make them available for the use of the administrative departments. This can only be secured by making the connection between the administrative Departments concerned, for example, with medicine and public health, and the research bodies whose work touches on the same subjects, as elastic as possible, and by refraining from putting the scientific bodies in any way under the direct control of Ministers responsible for the administration of health matters.

12. Further, it must be remembered that, even apart from direct interference by the Minister of Health, the Medical Research Committee, if it were specially attached to his Department, would tend to be too much absorbed in making researches into those problems which appeared at the moment to be of the most pressing practical importance. These problems must, of course, be effectively dealt with in the interests of the good administration of the Ministry of Health. It is for this reason that the Ministry must always conduct some researches through its own staff. The Department must also be in the closest touch with any body, such as the Medical Research Committee, which can give assistance in solving such practical problems. But, while it is essential that the administrative Departments should let the scientific body know what are the practical problems of the day calling urgently for inquiry, the scientific body should not be limited to dealing with the practical aspects of those problems. It has already been found in many cases that an inquiry started with a purely practical purpose has led scientific men into new inquiries, resulting in fresh discoveries which have been valuable for purposes quite distinct from the

solution of the original problem. It has been found equally that the solution of a particular problem has often come quite unexpectedly from scientific work in some other direction, that would have been thought at first sight to be wholly remote from it.

13. This freedom to pursue scientific inquiries in any direction which may increase scientific knowledge of any kind is implied in the words of the Act of 1911 which refer to medical research. At the outset of the Medical Research Committee's work it was clearly understood that they should not be limited to inquiring into problems arising out of the current administration of the National Insurance Acts, but that they could inquire into any subject which was covered by the words " Medical Research ". In fact, as is well known, the main energies of the Committee have been devoted, ever since the outbreak of war, to the investigation of practical problems arising in the course of the work of the Admiralty, the War Office, and the Air Force. It is not suggested that those problems, or the other problems which the Committee had begun to investigate before the war, have no bearing upon the health of insured persons in particular, but the subjects for investigation have always been selected by the Committee on account of their general medical and scientific importance, and not because the Insurance Department thought that these subjects should have the first claim upon the time and funds of the Committee.

14. A further important argument against associating the Committee with a single strong administrative Department is that this course would undermine the confidence at present felt in the Committee by the large number of Departments which have from time to time made demands upon the Committee's services. If the Committee is to continue to be of the fullest service to all Departments which want advanced scientific research in medical subjects to be undertaken on their behalf, it must continue to work in friendly relations with the medical and other officers of all such Departments, and to have free access to the Departmental papers, which may often be of a confidential character.

15. But it is certain that if the Committee were known to be working in specially close relation with a progressive Ministry of Health, and also to be substantially under the control of the Minister, all other Departments would begin to object to using the Committee and giving it full information, and would do their best to conduct the whole of the medical research which they required through their own officers. This would prevent any single body, such as the Medical Research Committee, from having under their view the whole of the medical research which was being done on behalf of the Government, and would make impossible the proper distribution of the work between the separate Departments and the medical research body which should be the common helper of all Departments.

This consideration bears very closely upon those reasons for re-organising the Medical Research Committee which are of a scientific rather than a practical character.

SCIENTIFIC REASONS FOR RE-ORGANISATION

16. The progress of scientific knowledge is making it more and more clear that inquiries begun in one branch of science may always lead to discoveries which have an important bearing upon problems in quite different branches of science. In order to show the practical importance of this point, I am very glad to be able to circulate as an Appendix a note* by Sir W. M. Fletcher, K.B.E., M.D., F.R.S., Secretary to the Medical Research Committee, of instances in which results of this kind have actually been attained in

* This note has been omitted from the present reprint.

consequence of inquiries originally undertaken by the Medical Research Committee.

17. The value of these results is obvious, and if we are to make sure of turning similar results to full account in future, we must take steps to bring into the closest possible association all the branches of scientific research which are under the control of the Government.

THE PROPOSED SCHEME OF RE-ORGANISATION

18. The best method of dealing with the position of the Medical Research Committee, in view of the considerations both practical and scientific which have been outlined above, has been very fully discussed, with special regard to the position which will arise on the establishment of a Ministry of Health. It appears to me, in the light of these considerations, bearing in mind the desirability of organising each branch of Government research so as to enable all the branches ultimately to be brought close together, that the best course in regard to the Medical Research Committee is to follow the precedent already set up in the establishment of the Advisory Council for Scientific and Industrial Research. The Medical Research Committee would, if this course be followed, be brought into an analogous relation to a Committee of the Privy Council under the Lord President, who would be the Minister responsible to Parliament for the expenditure of the moneys involved. If the Lord President remains in the future a member of the House of Lords, one of the Ministerial members of the Privy Council Committee could be made answerable for medical research matters in the House of Commons.

19. The advantages of this course are chiefly the following :—

(*a*) Complete concentration is secured of the activities proper to a central medical research body acting for the United Kingdom as a whole.

(*b*) A wider concentration and exchange of knowledge is at the same time secured, for the Privy Council is the only Department which has an Imperial range. This has immediate importance, for corresponding research bodies have already been set up by the Canadian, South African and Australian Governments, and with all these the work of the Medical Research Committee should be brought into touch.

(*c*) Working in relation to the Privy Council, the Medical Research Committee would be freed from any undue pressure brought by the immediate interests of any particular administrative Department, and would be in a position to serve all alike. Plainly, its activities must be linked most closely at many points with those of the proposed Ministry of Health, and special arrangements will need to be made for this purpose on the establishment of the Ministry.

(*d*) Direct advantage may be expected from the close association, in work done side by side, of those two research bodies, and there would be no difficulty in assimilating other branches of Government research (e.g., Agricultural and Veterinary Research) into such an organisation.

Already at many points the Advisory Council for Scientific and Industrial Research and the Medical Research Committee have common interests. A typical example—to give only one—is the scientific development of synthetic dyes, which, in addition to their commercial value in industry, provide stains needed in a great variety of scientific methods and yield antiseptics of great medical importance.

C. ADDISON.

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