for which one should be penalized. However, the disparity between grants and starting salaries is now so great as to be a serious discouragement. Allowing for income tax and certain advantages, the grant paid to research students is equivalent to a salary of about £500 per annum; the usual starting salary in industry for a new graduate is about £800 per annum.

(e) A special disability of universities is the lack of resources for travelling expenses for meetings and conferences. To a scientist active in research attendance at such gatherings is a necessary part of his activity, as is recognized by industrial and Government laboratories.

Urgent action should be taken on the following lines to deal with these problems.

(1) There should be a substantial increase in the direct and assured provision of money for physics research, through whatever agency is responsible for financing the universities, at present the University Grants Committee, with reasonable resources available to heads of departments for use as need arises, without the invariable necessity of long-term forecasting. It is essential to have the resources to exploit initial successes immediately.

(2) More chairs and readerships need to be created in physics departments.

(3) Technical and administrative assistance should be provided on a more adequate scale.

(4) Grants to postgraduate students should be brought more nearly into line with salaries offered to new graduates by industry and the Scientific Civil Service.

(5) Provision should be made for university staffs to attend scientific meetings as easily as people of comparable reputation in industry and Government service can do.

These are the minimum requirements of policy if British physics departments are to continue to give the education that is expected of them. Most of the other problems can be solved within the universities or by collaboration between universities and schools. It should be repeated, however, that the essential problem is the maintenance of a scholarly environment for higher education. The United States report already quoted stresses that "science and the making of scientists go best together" and that "in the absence of special considerations the university is the best place for basic research". These two statements are the foundations of our own beliefs.

Physics in Colleges of Technology

It is the policy of the Government that the recently established colleges of advanced technology shall develop into institutions of university standard. Several of them already have established physics courses for the Diploma in Technology. If they are eventually to acquire the repute enjoyed by some of our best university departments, the factors we have discussed above must be relevant to these colleges also. Research has not in general been a normal activity of the staffs of these colleges and, in contrast to the universities, their problems are those associated with the establishment of research schools. These problems will eventually be solved only by the recruitment of more men of the calibre that the universities wish to recruit and this, of course, will be an aggravation of the difficulties of the universities unless urgent steps are taken to solve them. The colleges have some special problems of their own. Most of them have so far found great difficulty in attracting research students because, unless these students are graduates of the University of London, they cannot work for the Ph.D. and the recently established award of member of the College of Technologists (M.C.T.) does not yet have an equal appeal. Unless a solution is found for this it would seem to be excessively difficult to build up research schools of repute. The colleges also find great difficulty in filling adequately the senior posts demanding real research ability. To some extent this may be influenced by the salary scales, which are far better than university scales for junior posts but which offer fewer senior posts comparable in salary with university readerships, but we are inclined to the view that the determining factor is the general lack of research reputation.

Conclusion

At a time when a great increase of university education is planned, with particular emphasis on science, with new universities created and colleges of advanced technology established, British university physics departments face extreme difficulties in meeting the requirements of the educational facilities at present in existence. Physics is a fundamental science in which Great Britain has been recognized as one of the world's leaders and in which other countries, especially the United States and the U.S.S.R., are investing heavily; the present plight of our physics departments shows itself in difficulty in staff recruitment and in the increasing number of outstanding physicists who find it necessary to go abroad to secure adequate facilities for their work. Unless the present situation is changed, and rapidly, it would seem impossible even to maintain, let alone to expand, university resources in this basic science. The solution, like the problem, lies entirely within the responsibility of Government policy.

[1] H.M.S.O. Cmnd. 1490.
[2] H.M.S.O. Cmnd. 1489.

OBITUARIES

Dr. John Freeman

With the death of Dr. John Freeman on January 18 in his eighty-sixth year, the Wright–Fleming Institute of St. Mary's Hospital has lost a remarkable man, an all-round enthusiast, ideologist and thinker, who became consulting director of clinics for allergic disorders and emeritus director of allergy research at St. Mary's Hospital, London.

Born in Leeds the son of a solicitor, he went to Charterhouse and Oxford, and from there he served in the Boer War as a lance-corporal in the Oxfordshire Light Infantry. He resumed his clinical studies at St. Mary's Hospital, and as a student of bacteriology won a Radcliffe Travelling Fellowship at Oxford and studied at the Pasteur Institute in Paris and also in Berlin and Vienna.

He was a keen rugby player as well as a rifle shot, and I first met him as a young student when going by train in 1905 to Rainham Ranges to be tried out as to fitness for the shooting team. In the compartment was an enthusiastic talkative young man, very

good-looking but careless as to dress, the brim of his straw hat being half broken off. In the opposite corner was a very quiet young unassuming man. I found that the first was John Freeman and the other the late Sir Alexander Fleming; both, of course, were to become colleagues of the great Sir Almroth Wright who founded the Inoculation Department of St. Mary's Hospital, later to be known as the Wright–Fleming Institute.

Freeman graduated B.Ch. in 1905, and D.M. in 1907, and married in the same year Violet Hadden, of Murtle, Aberdeenshire. There were three sons and a daughter. Salaries of hospital workers in those days were very small or non-existent, and therefore private practice from Sir Almroth Wright downwards was encouraged. J. F. acquired a large house in Devonshire Place and soon had a big practice there as well as running a large clinic in the Inoculation Department at St. Mary's. Certain colleagues, including Sir Alexander Fleming, Leonard Colebrook, Parry Morgan, Prof. Pannett and myself, among others, were privileged to consult from that address, and this was a happy house, for the hospitality and geniality shown to all colleagues by J. F. and his wife were excellent.

In 1908 Freeman joined Leonard Noon in the study of hay fever. It was known by Dunbar's researches that extract of pollen could produce the disease in a hay-fever subject, and would cause reactions if injected into the skin. Dunbar thought this was due to toxin and tried to get a passive immunity by injecting anti-sera from immunized horses. Freeman and Noon produced an active immunity by making a series of pollen injections of graduated strength. Noon died all too soon of tuberculosis in 1911, leaving Freeman to develop and carry on his work, particularly in a large clinic at St. Mary's, where Freeman devoted a great deal of time as well as practising in private.

Early in the First World War, Freeman, as a colonel in the Russian Army, went to Galicia to collect material for the preparation of large quantities of cholera vaccine, and after that joined Wright and his workers in the laboratories at the Casino in Boulogne.

After this War he became clinical bacteriologist to the Hospital and also lecturer in bacteriology.

In the Second World War he organized a practical service in blood transfusions, and spent a great deal of energy, not to mention money, in running it in a most efficient manner.

But his life work was undoubtedly the study of hay fever and allergic disorders, and as a result forty years of experience and observation were published by him in 1950 in his erudite and at times amusing book called *Hay-Fever, a Key to the Allergic Disorders*, dedicated to "L. N. This account of my Stewardship".

A. B. PORTEOUS

Prof. H. Deuel

WITH the untimely death of Hans Deuel at the age of forty-six in Berne, Switzerland, agricultural chemistry lost one of its most versatile and active personalities. H. Deuel was born in Leipzig in 1916, where he attended the König-Albert-Gymnasium. He later moved to Zürich and studied agriculture at the Swiss Federal Institute of Technology, where he remained for the rest of his life. He graduated in agricultural chemistry with a Ph.D. degree and became full professor and head of the Department of Agricultural Chemistry in 1949. In this position he succeeded his former teacher, Prof. H. Pallmann, who was elected president of the Swiss Federal Institute of Technology.

H. Deuel was primarily interested in the chemistry and properties of polysaccharides. He tried to relate specific properties (for example, gelation, complex formation) with structural features of these compounds. His investigations on plant gums and above all pectic substances are well known among specialists throughout the world. Through his many publications he contributed to all aspects of pectin chemistry and became one of the foremost experts on pectic substances.

In 1954 he published his work on the use of cross-linked neutral polysaccharides for the separation of high-molecular-weight from low-molecular-weight compounds. This method has been rediscovered and developed by Swedish workers and named 'gel filtration'; it is now in general use in many laboratories.

Another field of active interest of H. Deuel was soil science, where he made many valuable contributions to the chemistry of soil constituents. His investigations on ion exchange properties of natural and synthetic ion exchangers are well known and led him to a study on the ion exchange properties of plant roots. H. Deuel also prepared new organic derivatives of clays and silica gel. His observations on the degradation of clays and silica gel by *o*-diphenols shed new light on possible reactions involved in organic weathering. In recent years he has also been actively engaged in an investigation of carbohydrates in soils and on the chemistry of humic substances.

H. Deuel's life was fully devoted to his scientific interests which he pursued with enthusiasm and vigour. His knowledge of the literature was truly outstanding, and he always gave freely of his vast store of knowledge. To his co-workers and students he was an inspiring and ever-helpful teacher. H. Deuel liked vivid discussions; his mind was very critical but paired with a good sense of humour. He was not only a very capable and respected scientist but also a man of high moral standing and humanistic education. He will always be warmly remembered by all who knew him.

H. Deuel is survived by his widow and two sons.

H. NEUKOM

Mr. F. C. Cooke

FRANK CYRIL COOKE, editor of *World Crops*, died on January 11 at the age of sixty-three. His training as a chemist specializing in soap-making and the manufacture of alkaline products fitted him for his first appointment with Unilever. In 1929 he accepted an Empire Marketing Board appointment in Malaya as assistant chemist for Copra Investigations. Later, he joined the Malayan Department of Agriculture as chemist, coconut products. An assiduous investigator, he rapidly became conversant with all aspects of the subject and devoted his attention particularly to the improvement of copra production on small holdings. Eventually he devised a simple type of drying kiln—which has achieved world-wide recognition—capable of producing high-grade copra.

In 1946, Frank Cooke became canning research officer, Malaya, in which capacity he investigated the canning of pineapples and other products. This work contributed materially to the rehabilitation of the