

In regard to staff, the Committee is not convinced that if the universities started a vigorous recruiting campaign, an adequate supply of science teachers of sufficient calibre would not be forthcoming. It recommends that the universities should make a comprehensive survey of their staff requirements in the light of the expansion proposed, that all university vacancies should be notified as a matter of routine to the Appointments Department of the Ministry of Labour, and that the universities should consider the possibility of taking an increased proportion of their staff direct into the lecturer grade. The Committee is opposed to any attempt to increase the student population by adding substantial additional teaching responsibility to the individual members of a faculty: the average teacher should have more and not less opportunity for his own research than he has had in the past.

In this belief that, once the urgency and importance of the nation's need for more graduates are widely appreciated, and provided the financial misgivings of the universities are removed, the obstacles to their expansion in the immediate future need not prove insuperable, the Committee considers the problems of individual universities and their response to the idea of expansion. Regretting that neither Oxford nor Cambridge has suggested any permanent expansion in its student body, the Committee considers that these two ancient universities should regard it as a duty to make some contribution towards meeting the nation's requirements, possibly by enlarging some of the smaller of the existing colleges and the foundation of one or more new colleges. There is some scope for expansion in the student population of the University of London, although expansion may involve a policy of decentralization. A really substantial expansion of the English civic universities and the University of Wales depends to a considerable extent on these universities being able to compete with Oxford, Cambridge and London for the limited supply of talented students. The present system tends to concentrate the major proportion of State and county scholars into three universities and is fundamentally bad. The improvement of amenities such as halls of residence is one among many ways in which the civic universities can help themselves, but the educational authorities should consider urgently a revision of the scholarship system.

The existing University Colleges of Nottingham, Southampton, Exeter, Hull and Leicester should be able to make a substantial contribution towards filling the remaining gap and should aim at earning full university status at the earliest possible date. There are also several large centres of population in which new university colleges could profitably be established. The Committee thinks that there is still scope for expansion, though on a smaller scale, in the Scottish universities; but it also suggests that early consideration be given to the foundation of at least one new university which would give to the present generation the opportunity of leaving to posterity a monument of its culture. Finally, touching on the quality of science teaching, the Committee emphasizes its dependence on the quality of research and records its opinion that, as an essential part of any balanced expansion in the science faculties, there should be an expansion in research schools for training purposes apart from the needs of the students, and an increase in the financial grants that are made specifically towards research by university staffs.

When all possible measures have been taken to expand the output of graduates, Great Britain will still be seriously short of scientific workers in 1950, and is unlikely to have an adequate supply by 1955. The Committee incidentally records the view that if the intellectual standard of graduates is not to suffer, science students should be allowed, if they wish and if there is room for them, to complete their full course before doing their period of military service; but it also recommends that some system of priorities should be established to secure the best use of our limited supply of men of science. During the reconstruction period, this order of preference should be, first, teaching and fundamental research; secondly, civil science, both Government and industrial; and thirdly, defence science. It is important, however, to maintain an adequate nucleus of able scientific workers working on the problems of defence, and the order of priority set out should be kept under constant review by the Government. As one means of implementing this order of priority, the attractions of an academic career should be improved. Provision of more secretarial assistance and office machinery for university teachers would not only contribute to this end but also would increase materially the efficiency of the universities. Looking at the position after 1955, the Committee does not think that the universities need fear that expansion of their facilities to provide an output of 3,000 graduates in science each year would leave them with excessive staffs and accommodation once the demand for qualified scientific workers has steadied.

No indication of the cost of implementing these proposals is attempted in the report, but the Committee insists that acceptance of the proposals by the Government must not involve any infringement of the independence of the universities. Such independence, in the Committee's view, is not inconsistent with a greater degree of co-ordination between university policy and the needs of the country than has existed in the past. The Government's instrument in any expansion programme should be the University Grants Committee, which should increasingly concern itself with positive university policy in Britain, and it may be desirable for this purpose to revise its terms of reference and strengthen its machinery.

OBITUARIES

Dr. F. Crowther

DR. FRANK CROWTHER, chief plant physiologist in the Department of Agriculture of the Sudan Government, died on April 11, at the early age of forty, after a very brief illness, during his first post-war leave.

He was educated at St. Albans School and entered the Imperial College of Science and Technology in 1923, graduating in botany with honours in 1926. The next two years were devoted to research in plant physiology; his work broke new ground, and established the differential manurial response of varieties of barley, and the inheritance of specific efficiencies in the utilization of individual nutritive elements. During this period Dr. Crowther was closely associated with me, and acquired, at first hand, knowledge of the methods of growth analysis which were at that time being developed. In 1928 Dr. Crowther accompanied me to the Sudan, and was appointed as plant physiologist at the Gezira Research Farm soon after his arrival. Work was begun on the analysis of the

factors determining growth and yield of cotton under irrigation, to the completion of which he devoted with great zeal the whole of his life. The technique of field experimentation in the study of interaction of factors, then a new departure in agronomy, was exploited from the outset, and papers on interaction of nitrogen and water supply, and of the four factors, nitrogen, water, sowing date, and spacing, appeared in 1932 and 1934. Appreciation of the importance of establishing experimentally the optimal combination of all controllable factors was a guiding principle, and with this knowledge adjustment of the cultural method was later introduced into large-scale practice on the Gezira Irrigation Scheme.

A challenging fact encountered in the Gezira is the seasonal fluctuation in yield in spite of irrigation and the absence of rain except during the first two months of growth. The elucidation of this problem remained one of the major aims of Crowther's work.

His association with the Sudan was interrupted by a period of three years in Egypt and one year in India, where he applied the same methods of study to cotton and other crops. The work of this period was embodied in eight bulletins of the Royal Agricultural Society and Imperial Chemical Industries, Ltd. Dr. Crowther was therefore in a unique position to study in a comparative way growth and yield of irrigated cotton under very different environments. A detailed analysis of the data for plant development in Egypt and the Sudan appeared as his last publication in 1944.

A characteristic of Dr. Crowther's researches was the persistency with which the work was developed in a logical sequence from theory to field experiment and thence to large-scale practice. The problem presented by the annual fluctuations in yield was attacked in diverse ways. The variation in onset and intensity of rainfall before sowing had been pointed out as a determining factor by Dr. E. M. Crowther in 1926, and under their joint names a full study of this relationship appeared in 1935. This work directed attention to the conditions in the soil during the preceding year of fallow, and eventually resulted in a method of weed control, by which, with the collaboration of the Sudan Plantation Syndicate, spectacular increases in yield on a full commercial scale have been achieved. The most recent development was a study of the root system, which established penetration to the depth of nine feet, and may throw light upon the secular fluctuations in subsoil water and soil nitrate in relation to the later stages of plant development. Exigencies of space forbid discussion of many other aspects of Crowther's work.

Primarily Dr. Crowther was in training and outlook a plant physiologist for whom the study of plant development, in the tradition initiated by Dr. W. L. Balls, held a clue to the analysis and control of plant yield. The successful forecasting of yield only a few days after germination showed the possibilities of utilizing such studies. Crowther developed to the full other and varied capacities. As agronomist, and organiser of field experimentation on a vast scale, Crowther's achievements were outstanding; indeed they may be cited as a supreme example of the fertile union of pure and applied science. He displayed a mastery in the planning of field experiments, and personally trained and led a host of enthusiastic local assistants engaged in carrying them out. Unsparingly he dedicated his energy to the furtherance of tropical agriculture, and the scope and importance of the results obtained stand as a permanent memorial

to his work. Plant physiology, properly applied, has in Crowther's work demonstrably rendered service to practical agriculture. It is fortunate that one of Crowther's last labours was the preparation of a critical résumé of the agricultural investigations in the Sudan, to the development of which he contributed so much. The premature termination of Dr. Crowther's labours, with the promise of great advances yet unrealized, is indeed an irreparable loss to agricultural science; and his untimely death a lamentable personal grief to me.

F. G. GREGORY

Prof. J. Ernest S. Frazer

By the death on April 15 of Prof. J. Ernest S. Frazer, British anatomy has lost an anatomist of great charm and distinction. He had been suffering from ill-health since his retirement in 1940, and his death took place suddenly in London.

Prof. Frazer was born in London in 1870 and was educated at Dulwich College and St. Bartholomew's Hospital. He qualified M.R.C.S., L.R.C.P. in 1891. For several years thereafter he devoted himself to clinical work in various hospitals in London and the Provinces. He obtained his F.R.C.S. in 1898 and his D.Sc. London in 1932. It was not until after a severe illness resulting from an infection at a post-mortem that he decided to adopt anatomy as a career. His first appointment in anatomy was demonstrator in St. George's Hospital in 1900. From there he moved to King's College in 1905. In 1911 he was appointed lecturer and later (in 1914) professor of anatomy in St. Mary's Hospital Medical College. Generations of students at St. Mary's are indebted to him for his stimulating and instructive teaching.

Frazer made a very definite contribution to the subject of embryology. This did not always receive from contemporaries the recognition it rightly deserved. His "Manual of Embryology", first published in 1931 and now in its second edition, afforded him the opportunity of bringing together his original observations and interpretations which had been recorded in numerous papers published in the *Journal of Anatomy*. His text-book "The Anatomy of the Human Skeleton", first published in 1914 and now in its fourth edition, not only gave a detailed and accurate account of the bones of the skeleton but also it 'dressed' the skeleton with ligaments and muscles. He was also editor of Buchanan's *Manual of Anatomy and Manual of Practical Anatomy*.

Prof. Frazer was elected to the Hunterian professorship of the Royal College of Surgeons in 1915-16 and to the Harveian lectureship in 1924.

In 1935 he was elected president of the Anatomical Society of Great Britain and Ireland. Many of us recall with pleasure the courteous way in which he conducted the meetings during his term as president.

W. J. H.

WE regret to announce the following deaths:

Dr. H. G. Earle, director of the Henry Lester Institute of Medical Research and Preventive Medicine, Shanghai, since 1928, on June 5, aged sixty-three.

Mr. Alexander L. Howard, author of "A Manual of Timbers of the World", on June 5, aged eighty-three.

Dr. Howard W. Starkweather, who was in charge of research in the fields of elastomers and fine chemicals at the Jackson Laboratory of E. I. du Pont de Nemours and Co., on May 18, aged fifty-five.