

OBITUARY

Sir Frank Heath, G.B.E., K.C.B. 351

one of the Army's formation colleges, he expressed a hope that it would be possible in the post-war period to retain at least one such institution for the benefit of the long-service soldier.

Examinations, much as we dislike them, serve two important purposes. First they are required as a part of the process of assessing the man's all-round ability for purposes of proficiency pay. If, as seems probable, a test of this sort cannot be escaped, it will be devised to do its work in a manner which will at once avoid heavy waste of time and effort and elude the constricting danger of a fixed and immutable syllabus. The second purpose served by the examination is the provision of the 'scrap of paper' which experience proves is highly valued by soldiers at all levels as a passport to well-paid employment when they leave the Army. To satisfy his needs in this respect it is felt that the soldier should be encouraged to take the examinations open to his civilian brothers, for these are more acceptable to civilian employers, who in the past have shown diffidence in accepting the less familiar Army certificates of education.

In addition to the types of possible provision described, there are the institutions which train boys as apprentice tradesmen: these will probably continue along much the same lines as hitherto, though, of course, general education will have to be brought into line with that in units. Band-boys are, and always have been, a special problem, for the numbers of them in units are usually too small for satisfactory arrangements to be made to meet their educational needs. Proposals are, however, being examined with the view of eradicating the weaknesses of the pre-war system so that band-boys may be assured of an educational opportunity worthy of the future that lies before them.

At the end of a period of war few will need convincing that however gallant and efficient the rank and file may be, their efforts will be nullified if they are not backed by an efficient staff corps. Army education as an extensive operation on a global scale will no less need a highly trained and efficient staff corps to plan, stimulate, administer and provide. Between the Wars the Army Educational Corps suffered continuously from a sense of frustration: promotion, slow at all levels, was almost non-existent in the intermediate commissioned ranks; numbers were inadequate to develop the opportunities which all keen men could see; the burden of an examination system kept educational staffs enslaved to the chores of education when they should have been leading the way to its shining corridors. As a result, few were attracted to its service from outside the Army.

Proposals have now been accepted which will ensure a constant flow of new blood from the civilian system and, for those who wish to make a career in Army education, prospects of pay and promotion equivalent to those in other corps and in the education profession generally.

Much praise has been given to the Army for its great educational efforts during and since the War; but if these efforts are to survive and flower in the years of peace, more will be required than mere lip service. If Army education is worth while in war, it is doubly worth while in peace, and if it is worth while it must be staffed and equipped in a manner worthy of its great task. This is not a matter of mere domestic politics for the Army; it is a matter of vital concern for the nation, of which the Army is a living, though in peace often a forgotten and neglected, part.

HENRY FRANK HEATH was born on December 11, 1863. He was the eldest son of Henry Charles Heath, miniature painter to Queen Victoria. He was educated at Westminster School and University College, London, after which he spent a year at the University of Strasbourg. When he came back to England he was appointed professor of English at Bedford College, London, and lecturer in English language and literature at King's College, London. He held these posts until 1895, when he became assistant registrar and librarian of the University of London. He was appointed academic registrar in 1901, holding the post only for two years, when he joined the Government service as Director of Special Enquiries and Reports under the Board of Education (1903-16). He became principal assistant secretary of the Universities Branch of the Board from 1910 until he was appointed secretary to the Department of Scientific and Industrial Research in 1916. He retired from the Department in 1927, and from then until the end of his life gave voluntary service to a number of important institutions. He died on October 5.

These are the bare facts of Heath's long life and of his great services to the State, to science, and to education. Few men, except those who knew him well and worked in intimate co-operation with him, know how great these services were.

Heath first became interested in scientific education and research when he became head of the Universities Branch of the Board of Education, which was formed in 1910. There existed at that time a Treasury Advisory Committee on Universities, of which Heath was a member. This Committee advised on Treasury grants to certain university faculties but not to the universities of Great Britain as a whole. It was converted in 1910 into a general advisory committee on universities, and attached to the Board of Education. Sir William McCormick was appointed chairman, and Heath ceased to be a member, as the recommendations of the Committee came to him to recommend. It was then that he formed that close friendship, and began the long association, with McCormick that was to prove so fruitful.

In the course of his work at the Board of Education, Heath devised simple and effective provisions for giving grants to universities in respect of engineering and medicine. Previously such grants had only been given under the attendance regulations for technical schools. Before long these grants were absorbed in block grants to the universities; and the medical schools, in London and in the provinces, came to be State-aided under the new system. All this work of Heath's, in which he showed the vision and the administrative ability which were so characteristic of him, and which are seldom combined in one man to such a degree, led finally to the evolution of the University Grants Committee, and to the great spread of State aid to the universities of Great Britain without affecting their autonomy.

When the War broke out in 1914, it soon became painfully clear how dependent Britain was for vital war material on German industries, and how far we had failed to keep pace with Germany in the application of science to industry. Heath acted with characteristic vigour. By Christmas 1914 he had submitted a memorandum to the president of the

Board of Education, pointing out how the failure of industry to enlist the services of science had caused a great shortage of men trained in scientific research at the universities. This highly important memorandum was referred to a small secret committee under Sir William McCormick. By May 1915 the Government, on the advice of this committee, had decided to establish a permanent organisation for the development of scientific and industrial research, and when the Royal and Chemical Societies approached the Government to ask for the establishment of a National Chemical Advisory Committee, they received the reply that a much wider attack on the whole problem was in its initial stages.

The Department of Scientific and Industrial Research was formed in 1916 on Heath's plan. There can be little doubt that many of his ideas were improved in detail by McCormick's committee; but the whole scheme was primarily due to his imagination and foresight. It was he in particular who foresaw the advantages of placing the new Department, which was destined to have such close relations with other departments of State as well as with the universities and industry, under the Lord President of the Council, who had then no departmental duties. This decision has had the consequence that the Lord President of the Council has become the chief Minister of the Crown responsible to Parliament for advice on the general scientific development of the country. The Medical Research Council, which was the successor of the Medical Research Committee of the National Health Insurance Joint Commission, the appointment of which pre-dated the Department of Scientific and Industrial Research, was placed under the Lord President in 1920. The Agricultural Research Council became responsible to him in 1931.

McCormick was appointed chairman of the Advisory Council of the Department, and Heath was made its permanent secretary. So it came about that the first great venture of the State, in this or in any other country, to exercise a comprehensive influence over the development of research to meet national needs was guided by two professors of English. Needless to say, there was much criticism at the time in the scientific world, criticism that was wholly falsified by events. Speaking as his successor, I record emphatically that I can think of no scientific man at the time who could have done what Heath did in the nursing of this new venture through a most difficult period, and in its final establishment in a secure position. Nor should McCormick's services in this respect ever be forgotten. He supplied qualities that Heath lacked. Heath was apt to be too interested in, and too worried about, details. A talk with McCormick, who cared nothing for details, often resolved Heath's difficulties and refreshed his mind. McCormick's natural geniality, too, and interest in human beings, made much easier the relations between Heath and the great men of science who served on the first Council of the Department. Heath was indeed the driving power, and McCormick was the lubricant.

During the next few years the main structure of the Department was erected. The scheme for the establishment of research associations, which was due to Heath, started in 1917. The Fuel Research Board was established in 1917, the Food Investigation Board in 1918, and the Building Research Board in 1920. Sir George Beilby was the first director of research and chairman of the Fuel Research Board.

He was succeeded later on as chairman by Sir Richard Threlfall. Sir William Hardy was the first director of food investigation. Beilby, Threlfall and Hardy were the three members of the Advisory Council who had most executive responsibility for the research of the Department. Beilby and Threlfall were great industrialists who had also done work of high scientific importance. Hardy, the best scientific worker of the three, had no experience of applied research until he joined the Department. All three had vigorous personalities, strong individualities, and did not suffer fools gladly. But all three got on very happily indeed with Heath, formed close friendships with him, and were always prepared to be guided and influenced by him. It is difficult to think of a better tribute to Heath's own personality and work than this statement.

The general structure of the Department has not changed since those early days. New research boards and stations have been added, but they have been formed on Heath's original plans, which have stood the test of time. Research associations have had a chequered career, and are being exposed at the moment of writing to some severe criticism. Their establishment was a bold experiment, fully justified, and their present value is far greater than some of the critics conceive. Whatever improvements are necessary and desirable in detail, no one would wish to abandon the general scheme. What is more, the basic idea of forming associations to meet the needs of the older and scattered industries is being copied in other countries.

In 1925 Heath was invited by the Government of Australia to advise on the development of scientific and industrial research. After a comprehensive survey he recommended that the existing Commonwealth Institute of Science and Industry should be developed to a Council of Scientific and Industrial Research to serve all Australian national needs in science, industry and agriculture. His recommendations were adopted by the Government and passed into law in June 1926. He then went on a similar mission to New Zealand, where the Government accepted his recommendation to establish a Department of Scientific and Industrial Research. The National Research Council of Canada, which replaced the Honorary Advisory Council for Scientific and Industrial Research, had been established in 1924. In South Africa developments have been slower, and it is only recently that a similar council has replaced the organisation for the encouragement of research that was the responsibility of the Minister of Mines and Industries. All these developments have resulted from Heath's original report to the Government of the United Kingdom in 1915.

Soon after Heath returned from these visits he resigned his secretaryship of the Department. It was not necessary for him to do so; but he felt that his main work had been done, and that the time had come to hand over the chief executive responsibility to a scientific man. All three of Heath's successors have been men of science, and it is highly probable that all future successors will be; but Heath will always have a special place of honour in the history of the Department.

After his retirement in 1927, Heath became for a short time the secretary, and afterwards the honorary director of the Universities Bureau of the British Empire, and threw himself with the same passionate eagerness into its affairs as he had into the larger affairs of State. He was an active governor, from 1931

until his death, of the Imperial College, where his wide knowledge and experience of education and research, and his constructive criticism, were of inestimable value. His many other activities included the chairmanship (1935-39) and the vice-chairmanship since 1939 of the British Standards Institution, and membership of the Royal Commission for the 1851 Exhibition since 1924. Whatever he did was done thoroughly and well; no one ever turned to him in vain for help.

Heath's publications include chapters on English language and literature to the time of Elizabeth in "Social England". He was co-editor with A. W. Pollard and others of the *Globe Chaucer*, and editor

of the *Modern Language Quarterly* from 1897 until 1903. Many of his best writings were published anonymously in official documents, such as the annual reports of the Department of Scientific and Industrial Research; but fortunately he found time, before his death, to complete a book on "Industrial Research and Development" in collaboration with A. L. Hetherington, a close friend and colleague for many years.

Sir Frank married twice. His first wife, Antonia Johanna Eckenstein, died in 1893, only a year after their marriage. In 1898 he married Frances Elaine Sayer, who died in 1939. Two sons of the second marriage survive him.

H. TIZARD

NEWS and VIEWS

Royal Society

Annual Meeting

THE anniversary meeting of the Royal Society was held, as customary, on November 30, and the president, Sir Robert Robinson, delivered his presidential address, a main part of which is printed on p. 815 of this issue, and also presented the medals for 1946 (see p. 841). In addition, he made some brief comments on the relationship of scientific men to world affairs. He welcomed Sir Henry Dale's plea last year for the general release of scientific knowledge. Speaking of the danger to scientific ideals and integrity in the conception of 'total war', he pointed out that men of science are faced with a dilemma—a conflict between their ideals of service to humanity and their duty as citizens of a democratic community—which can only be resolved by the establishment of real friendship and concord among the nations of the world. Speaking for himself, he said that all men of science should strive for the promotion of international peace and the outlawry of all methods of warfare which by their nature involve 'total war'. The existence of the universal brotherhood of scientific workers shows that this hope is not impractical idealism. Nevertheless, in this connexion there can be no clear-cut distinction between peace and war, and a nation's defences must be prepared at all times against attack. Sir Robert continued, "it is inconsistent to praise our scientists for their outstanding contributions to the war effort and at the same time to suggest that they offend against our ethical code if they serve the country in a similar fashion during an uneasy peace. It is useless to attempt to disguise the fact that such service implies some sacrifice of freedom. During the War the scientific effort was nation-wide and control extended to many university departments. Nevertheless, the universities have preserved intact their precious liberty of action, and I see no signs of any attempt to curtail it. Surely this suggests a feasible line of demarcation in that extra-mural contracts, placed by Service departments with the universities, need not, and should not, contain any clauses restricting free publication of the results. Although it has sometimes been irksome, the refusal of many universities to accept theses that cannot be published is a step in the right direction."

Officers and Council

THE following is a list of those elected as officers and Council of the Royal Society at the anniversary

meeting: *President*, Sir Robert Robinson; *Treasurer*, Sir Thomas Merton; *Secretaries*, Sir Alfred Egerton and Sir Edward Salisbury; *Foreign Secretary*, Prof. E. D. Adrian; *Other Members of Council*, Dr. C. H. Andrewes, Prof. W. T. Astbury, Prof. W. Brown, Dr. E. C. Bullard, Prof. A. C. Chibnall, Prof. C. A. Lovatt Evans, Dr. N. H. Fairley, Prof. R. A. Fisher, Prof. S. Goldstein, Prof. E. L. Hirst, Prof. H. W. Melville, Prof. M. H. A. Newman, Prof. M. L. E. Oliphant, Dr. C. F. A. Pantin, Prof. H. H. Read, Sir Reginald Stradling. In his anniversary address, Sir Robert Robinson announced the resignation of Mr. John D. Griffith Davies, assistant secretary of the Society; Mr. Griffith Davies has been appointed a member of the Library Committee and will be chairman of a sub-committee preparing for the celebration of the tercentenary of the Society.

Nobel Prize for Physics:

Prof. P. W. Bridgman

PROF. P. W. BRIDGMAN, to whom the Nobel Prize for Physics for 1946 has been awarded, is celebrated for his comprehensive researches into the properties of matter at very high pressures, which began in 1906 and have continued with unabated vigour to the present day. By the ingenious applications of principles in themselves simple and by the informed utilization of new steels, he extended the range of pressures at which systematic measurements could be made from 3,000 atmospheres, the limit reached by Amagat, to 12,000 atmospheres. Up to this pressure he measured, for example, compressibilities, viscosities, electrical conductivities, thermal E.M.F.'s and transition points of a large number of elements and compounds, with results of the highest interest. This work, which necessarily involved the working out of new methods of measuring pressure, is described in his book "The Physics of High Pressure", which appeared in 1931 and has become the classic of the subject.

Since then, Bridgman has again extended the range of pressures. By constructing the vessels of the steel known as 'carboly' and by special methods of construction, including, for the highest pressures, the immersion of the pressure vessel in a fluid which is itself maintained at 30,000 atmospheres, he has pushed the limit up to 100,000 atmospheres. A number of systematic measurements of polymorphic transitions and of compressibilities have been made up to 50,000 atmospheres. It is an extraordinary