universities, since industry is the controlling factor of modern life. Industry must learn what the universities do and how graduates can be introduced, particularly into small firms. The universities must learn to appreciate the nature and purpose of industry. He pointed out that the cessation of ear-marked grants throws an increased responsibility on the universities, since they must not neglect the needs of industry.

Prof. W. G. Sutton, Witwatersrand, claimed that in the technological field his university has the same aims as Cambridge. He feels that too much respect for research must not be encouraged among students of technology, but that postgraduate courses of instruction are desirable. He ended with a warning to New South Wales that South Africa from bitter experience knows the deficiencies of technological institutions as centres of higher education.

Prof. J. R. Daymond, Natal, in his turn claimed allegiance to the Cambridge aims. The University of Natal encourages students to graduate in science and then to read engineering for two further years. Prof. Daymund, taking more than twice the allowance of time given to other speakers, pleaded eloquently for a broader base to be given to the educational pyramid and for universities to resist the tendency to train in specific skills.

Prof. W. H. Hutt, Cape Town, who stressed the fact that he is not an engineer, expressed entire agreement with the views Prof. Baker expressed in opening the session, and summed up the discussion in the apt phrase, "Let the university teach 'why' and leave life to teach 'how' ".

ACADEMIC MOBILITY IN THE BRITISH COMMONWEALTH

By Sir CHARLES MORRIS
Vice-Chancellor, University of Leeds

AT the recent Congress of Universities of the Commonwealth at Cambridge, at which more than eighty universities and university colleges were represented, there was a lively and most interesting discussion on "Academic Mobility in the Commonwealth". A previous Congress five years ago at Oxford had pressed for vigorous action to be taken to promote interchange of both senior and junior scholars between British countries; and following that Congress the United Kingdom Government made available through the British Council rather more than £30,000, so that a start could be made with the pilot scheme. Under this scheme, provision was made for three categories of scholars: very senior and distinguished people paying short visits on the invitation usually of several universities; professors and other established scholars on leave from their own universities for about a year; and junior scholars able to spend one or two years abroad at the beginning of their professional academic careers. It was clear from the discussion at the Congress that the minds of the universities in other Commonwealth countries have been working along the same lines, and a great deal of progress has been made in many countries.

The British Council scheme clearly covers only a part of the total movement between universities, but its role was recognized to be an extremely valuable one; the Congress showed itself particularly interested in the visits arranged in the first category mentioned above, namely, the short visits of very senior and distinguished people. In the meantime, it was obvious that there are some most desirable developments not covered or certainly not sufficiently covered by any of the arrangements in operation within the Commonwealth—in particular, movement between the universities and university colleges in the Colonial countries and the rest of the Commonwealth, and cross-movement between the 'peripheral' countries of the Commonwealth themselves. On the first point it was announced to the Congress that the United Kingdom Government has now made a fund available to enable similar arrangements to be made with the university institutions of the Colonial countries.

After a lively debate the Congress passed a resolution urging member universities to seek suitable opportunities for approaching their Governments with the request that they should contribute to "a co-operatively administered Commonwealth Interchange Fund". It need not be said that the Congress showed itself well aware of the high desirability of movement between the universities of British countries and of non-British countries, notably the countries of Western Europe and the United States. Tribute was paid especially to the success of the Fulbright scheme.

This was perhaps the most interesting instance of a resolution of the last Congress five years ago being actually brought into force. It was a significant instance. The zeal for promoting movement between universities has greatly increased in the past five years. Many speakers at the Cambridge meeting testified to the great value of interchange of undergraduates and young graduates; and a great deal of thought was given to the well-known problems involved in making it easier for members of the academic staff of a university in one country to move to a permanent appointment in another country. There was no kind of suggestion by anybody that too much importance was being attached to such movement or that the zeal for these developments was getting out of proportion. The only hesitant voices were from those who feared that movement between British and non-British universities might possibly suffer. There is no question that the Congress as a whole was most desirous that this should not be so.

THE UNIVERSITY OF LIVERPOOL (1903–53)

By Sir HENRY COHEN
Professor of Medicine, University of Liverpool

IT is a happy circumstance that this year's meeting in Liverpool of the British Association for the Advancement of Science should coincide with the jubilee of the granting of the Charter to the University of Liverpool. For the story of the University's first fifty years is an enviable record both of notable men of science and of man's successful quest for knowledge. A University College had existed for twenty-one years before full university status was attained, and had been served by many impressive scientific figures, including Oliver Lodge who, after occupying the Lyon Jones chair of physics for nineteen years, had resigned to become the first principal of the University of Birmingham.

Thus at its birth the University already enjoyed a high scientific reputation and on its staff were at least two men of science who in their different fields were pre-eminent. The Liverpool School of Tropical Medicine, the oldest in the world, had been founded by the shipowner, Sir Alfred Jones, in 1898, to serve a pressing local need. Ronald Ross was its first lecturer and he had been appointed in 1902 to the Alfred Jones chair of tropical medicine. Two years later was established the diploma of tropical medicine. Ross's contributions to our knowledge of the malarial parasite, its anopheline transmission, and the effective prevention of malaria had led to a Nobel Prize, and he was in its early days the most renowned of the University's professors. His successors' impressive contributions in related fields reflect his stimulating personality—J. W. W. Stephens on malaria and black-water fever, and Warrington Yorke on the chemotherapy of malaria, trypanosomiasis and kala-azar. To-day the School's interest in chemotherapy continues, and the more fundamental processes which underlie the kidney and liver damage in malaria are being studied.

But since 1895, the George Holt professor of physiology had been Charles Scott Sherrington. He had been appointed to the chair when its earlier occupant, Frank Gotch, the eminent electrophysiologist, left Liverpool to succeed Burdon Sanderson at Oxford. Sherrington was to remain in Liverpool for eighteen years before he, too, left for Oxford. It was here that he published, in 1906, the "Integrative Action of the Nervous System", a classic which has been compared with Harvey's "De motu cordis" and Newton's "Principia". Here he laid those stable foundations of neurology which were to lead to the universal verdict that he was "the most profound student of the nervous system the world has yet known". Sherrington attracted many distinguished students to his Liverpool laboratory, including Harvey Cushing and Fröhlich, and many were trained here who later occupied with distinction chairs of physiology in Great Britain and abroad.

It was not only in tropical medicine that Liverpool's natural opportunities were seized. Among the most distinguished of early British oceanographers was William Herdman, who had occupied the Derby chair of natural history since 1881. He was an authority on the ascidians and gave to the School of Zoology a marine bias which profoundly influenced the work of two of his successors in the chair—W. J. Dakin, whose studies on the morphology of various marine animals and on the marine plankton earned him an international reputation, and J. H. Orton, whose life-long interest was the ecology of the sea-shore and who carried out fundamental work on the oyster. Herdman founded the Marine Biological Station in Port Erin, Isle of Man, both for research and for the training of students. More recently, a station has been opened on Lake Bala in North Wales to study the special problems connected with salmon and freshwater fish. Herdman's contribution to the University went beyond his academic gifts and influence. He and his wife endowed two chairs: in 1916 that of geology in memory of their son who was killed in action, with P. G. H. Boswell as the first occupant, and in 1919 that of oceanography, which Herdman himself occupied for a year. His successor was James Johnstone, a distinguished biologist and a profound thinker whose works reveal a man well ahead of his time in the philosophy and methodology of natural science. The character of this chair changed, however, in 1933 when it was accepted by J. Proudman, who had for fourteen years been professor of applied mathematics in the University. In his new chair he was able to continue his notable researches, in conjunction with the Tidal Institute, which have placed his name foremost among those connected with the theory of tides.

In the early years of this century, expanding interest in the application of the techniques of physics and chemistry to the study of biological phenomena led to the establishment a year before the Charter was granted of the first chair in biochemistry in Britain. Its first occupant was Benjamin Moore, whose contributions to the study of cell membranes was stimulated by his association with F. G. Donnan, but who had wider recognition for his forthright if unorthodox views on the origin of life. He founded, with Whitley, the *Biochemical Journal* which, before it was taken over by the Biochemical Society, was published in Liverpool.

There had been a chair of inorganic chemistry in University College since 1881. Its first holder was J. Campbell Brown, a sound teacher, but whose most fruitful contribution to the advance of chemistry was his bequest to the University for the endowment of a chair of industrial chemistry. This was occupied by T. P. Hilditch for twenty-five years (1926–51), during which time his investigations of neutral fats were so remarkably complete and authoritative that he has earned an unrivalled reputation in this field.

In the year in which the Charter was granted, Sir John Brunner endowed a chair in physical chemistry. This was held by F. G. Donnan for ten years before he left to succeed Sir William Ramsay at University College, London. He impressed his character and interests widely, and the influence of his work on membrane equilibria on Benjamin Moore's researches has earlier been noted. Donnan founded a strong research school. His pupils included A. J. Allmand of Kings, Hugh Taylor of Princeton, and F. A. Freeth of Imperial Chemical Industries. E. C. C. Baly, who had worked with Ramsay, went to Liverpool to succeed Campbell Brown in 1910. He was distinguished in spectroscopy and widely known for his mapping of the emission spectra of rare gases in Ramsay's laboratory. He was a man whose adventurous speculations were criticized adversely because they went beyond the then available techniques; but he stimulated others and has indirectly been responsible for much of our knowledge of photosynthesis and of plastics.

Organic chemistry remained without a chair until 1915, when an endowment enabled Robert Robinson to be appointed the first professor. Here he achieved the synthesis of tropanone and began his monumental work on alkaloids, which was the prelude to an outstandingly brilliant and fruitful contribution to his subject. He was succeeded in 1920 by Ian Heilbron. During his tenure of the chair, which he held until 1933, his major interests were his investigations on provitamin D, on sterols, and on vitamin A, which he was later to follow up with marked success.

In 1935 the University was singularly fortunate in securing James Chadwick to succeed L. R. Wilberforce in the chair of physics. Chadwick, the discoverer of the neutron and a Nobel Laureate, inaugurated work on nuclear physics which was to lead to dramatic developments and provide a notable contribution to our war effort. The present extensive

building developments in nuclear physics stem directly from Chadwick's influence, though he returned to Cambridge in 1948 to become master of Gonville and Caius College.

It would be invidious to mention by name those who still serve the University. Many of them will leave an indelible mark on the history of science and a few will light lamps which will shine as brightly as any which illuminated the first half-century of the University's history. The territory now being covered is extensive. It includes the chemistry of natural products such as insecticides, fish poisons, and antibiotics; the synthesis of anthocyanins and new oxygen-heterocyclic compounds such as the chromonopyrones; studies on vitamin A, detoxication, and carotenoids, and the use of radioactive tracers in biogenesis; contributions to the theory of the solid state, metals and dielectrics; to differential geometry, relativity and cosmology; the phenomena of wakes and the compilation of mathematical tables; nuclear physics; endocrinology; and experimental zoology. Restricted space forbids reference to the related fields—engineering, medical, dental, veterinary and the social sciences—in which this University has made and continues to make a contribution of first-rate importance.

In this brief sketch of the outstanding scientific events in the history of science in the University of Liverpool during the past fifty years, it has been possible to mention only a tithe of the foremost figures and achievements. Also, these jottings have been "written by Time on the memory" of one man. Others may justifiably have painted a picture in different colours, light and perspective. Moreover, the solid contribution of many hundreds of a singularly able and loyal junior staff to the shape and stability of the University has had to remain unrecorded. If there be grave omissions or misplaced emphasis, I will hope with Pliny the Younger that "history however it is written will always please".

LONG ASHTON RESEARCH STATION

JUBILEE CELEBRATIONS*

LONG ASHTON, the second oldest agricultural research station in Britain, began in 1903 as a private foundation—the National Fruit and Cider Institute. The Institute evolved from the pioneer experiments in cider-making carried on at Butleigh Court, Somerset, by Mr. Robert Neville Grenville. His enthusiasm stimulated the Bath and West and Southern Counties Society, in collaboration with the County Councils of Devon, Gloucester, Hereford, Somerset and Monmouth, to establish at Long Ashton an Institute for research and instruction in cider-making and fruit-growing. Thanks mainly to Mr. A. E. Brooke-Hunt, superintending inspector of the Board of Agriculture, the Institute, from its inception, was aided by a small government grant.

The Institute continued independently, under the management of governors nominated by the contributing bodies, until 1912, when it became formally associated with the University of Bristol as one of the research institutes set up at that time by the Board of Agriculture and the Development Commissioners. Under this scheme, the subjects of research at Long Ashton were widened to include all aspects of fruit culture and the control of pests and diseases of fruit crops, and the enlarged Institute was given the name of the Long Ashton Research Station. Its administration became the responsibility of the Agricultural Committee of the University, on which the National Fruit and Cider Institute was given agreed representation. This Committee now includes representatives of the following bodies: Council and Senate of the University, the Governors of the National Fruit and Cider Institute, the Ministry of Agriculture, the contributing counties, and the national associations concerned with the manufacture of cider and fruit juices. Since 1931 the Station has been one of the national research institutes the work of which is co-ordinated by the Agricultural Research Council. The Station's income is now largely derived from grants made to the University by the Ministry of Agriculture and the Agricultural Research Council. The scientific staff at Long Ashton numbers thirty-eight, with forty assistant-scientific and office staff; the Station property covers more than 250 acres.

Research at Long Ashton on cider-making and cider orcharding, started in 1903, has received world-wide recognition and maintains its prominence in the Station's programme. The extension of this work since 1931 to include non-alcoholic fruit juices and syrups has provided the basis for a flourishing new British industry. In fruit culture, the work in growth-regulating substances has been specially noteworthy. Fruit-breeding investigations have produced pear, plum and black-currant varieties of high merit. In pest and disease control the special attention given to spray methods and machinery has made Long Ashton a centre for consultation on spraying problems arising both at home and overseas.

The Station has maintained research and advisory work in willow-growing since 1922 and in domestic food preservation since 1930. The work of this Section has recently been extended to include the preservation of meat and poultry, in addition to that of fruit and vegetables.

The plant-nutrition work at Long Ashton enjoys a world-wide reputation. The discovery in 1924 that a major cause of fruit-tree failures was potash deficiency revolutionized fruit production in England. Since 1939 studies of the nutrition of farm and market-garden crops have been included in this work, and, arising from these, the visual symptoms of mineral deficiencies and excesses on a wide range of crop plants have been defined and published in a colour atlas. In 1952 the group of research workers engaged in these investigations was constituted a special Agricultural Research Council Unit for the study of problems of plant nutrition, with particular reference to the micronutrient elements.

The celebrations of the Station's Jubilee, which were jointly planned by the University of Bristol and the National Fruit and Cider Institute, took place during July 22–23. On July 22, the Jubilee Lecture, entitled "Agricultural Research, 1953", at which the vice-chancellor of the University, Sir Philip Morris, presided, was given in the reception room of the University by Lord Rothschild, chairman of the Agricultural Research Council. In a survey of problems of the organization of agricultural research in Britain, Lord Rothschild pleaded for closer contact between the agricultural research institutes and the industries they serve. Without prejudice to the

* See also p. 264 of this issue.