How does such a man fit into the American scene? He is probably good enough to be considered for a post-doctoral fellowship, but these seldom last for more than a few years. He may get congenial work as a member of a research group working in a university laboratory but financed by one of the big government agencies such as the Atomic Energy Commission, the Office of Naval Research or the National Science Foundation. The difficulty here is that funds are usually allocated annually and Congress can, and often does, impose cuts in the budgets of such agencies. Even apart from this, there is the fundamental difficulty that, before each year's money is handed out, there must have been a contact, somewhere along the line, between someone who understands just what the particular research project is all about and someone who does not but who may have power to reduce or withhold the next grant, or to divert the money to some other project. Much time and effort is obviously spent in trying to be fair about 'evaluating' reports on the work of the past year and also 'projects' for fresh research, which seems to be done mainly on the basis of referees' reports (I was asked to make a few myself); but it all produces a decided sense of insecurity for the people who are doing the work, knowing, as they do, that a grant may easily be cut next year for reasons totally unconnected with the merits of the work or its value to the community. Another possibility is an industrial or government post. Here, the short-term position is more secure; but most employers, quite understandably, expect a research department to perform a considerable amount of 'bread-and-butter work' which may be anything from routine testing to the development of a new plant on the pilot scale or the designing of circuits for a special requirement. Much depends here upon the director of the laboratory and on his ability to act as a buffer between his staff, who want to investigate interesting long-term problems, and his board, who naturally expect some visible return for the expenditure they are asked to approve. The final possibility is the traditional one of an academic post; but this is far from an ideal solution in present conditions. In these days of rapid expansion of demand for engineers, physicists and chemists the young instructor is likely to be faced with a heavy load of elementary teaching, and the fact that he has research ability does not necessarily mean that he has interest in, or aptitude for, pure teaching at an elementary level; nor does the fact that he is an expert at designing and using apparatus necessarily mean that he is capable of keeping a practical class running smoothly. If he has a young family, he is likely to find his stipend barely enough to live on, and he will be forced to take on yet more teaching during the 'summer sessions', or else to do other paid work during the three summer months. (I knew one young professor, in this position, who was selling copies of a famous encyclopædia as a sideline.) A few universities do have research professorships, while others will arrange that a distinguished scholar has a very light teaching load; but, with nearly all his time occupied, how can the young instructor hope to do the work that will gain him the reputation that would win him one of these coveted posts?

Be all this as it may, there can be no doubt that the 'lure of the ivory tower' is still immensely strong, and that one of the dearest wishes of many a bright student is to be asked to return to his university or college as a junior instructor. Anyone who doubts this must explain how it is that even quite small and obscure colleges seem to have little difficulty in filling their vacancies. Very little formal advertising is done, deans usually notifying one another of vacancies by means of circular letters. Contrast this with the fact that industrial firms who are in a position to offer better pay, probably coupled, as we have seen, with more time for research, are resorting more and more to publicity stunts in order to attract applicants. The explanation is probably two-fold. The scholar who has a real vocation for teaching and pride in training future leaders of men is, as he always has been, willing to work for less than his true market value and to face the drudgery of teaching large elementary classes. The scholar whose main ability lies in research feels sure that, in the long run, the universities will always be the real homes of fundamental research, and that, in due course, some of the very real difficulties outlined above will be sorted out. It does seem certain that the financing of research at the universities by outside bodies has come to stay, and that, in time, reasonable means will be evolved for regulating the inflow of money. The phrase 'going industrial' is often applied to a scientist who leaves academic life. It seems to convey not so much a feeling of superiority, but a subtle tinge of sorrow that one more good man has sold part of his soul.

A more disturbing point concerns the number of British physicists and chemists who are tempted, by the higher pay and lower taxation, to settle in the United States on a long-term basis. There is everything to be said for interchanges and visiting posts; but, in present conditions, it is hard to see how a prolonged stay can benefit either country in the long run.

OBITUARIES

Prof. Hermann Weyl, For.Mem.R.S.

Among all the mathematicians who began their working lives in the twentieth century, Hermann Weyl was the one who made major contributions in the greatest number of different fields. He alone could stand comparison with the last great universal mathematicians of the nineteenth century, Hilbert and Poincaré. So long as he was alive, he embodied a living contact between the main lines of advance in pure mathematics and in theoretical physics. Now he is dead, the contact is broken, and our hopes of comprehending the physical universe by a direct use of creative mathematical imagination are for the time being ended.

Weyl was fortunate in the manner of his death. On November 9, 1955, he celebrated his seventieth birthday, in full and robust health of body and mind. At the banquet which was given in his honour in Zurich, he received messages of goodwill and homage from all over the world. Less than a month later, on December 8, he walked out of his house to post a letter, suffered a heart-failure, and died instantly.

The beginning of Weyl's scientific life cannot be better described than in his own words. "I came to Göttingen as a country lad of eighteen, having chosen that university mainly because the director of my high school happened to be a cousin of Hilbert's and had given me a letter of recommendation to him. In the fullness of my innocence and ignorance I made

bold to take the course Hilbert had announced for that term, on the notion of number and the quadrature of the circle. Most of it went straight over my head. But the doors of a new world swung open for me, and I had not sat long at Hilbert's feet before the resolution formed itself in my young heart that I must by all means read and study whatever this man had written. And after the first year I went home with Hilbert's 'Zahlbericht' under my arm, and during the summer vacation I worked my way through it. These were the happiest months of my life, whose shine, across years burdened with our common share of doubt and failure, still comforts my soul." The words "read and study whatever this man had written" are the key to Weyl's breadth and versatility. Hilbert's method of work was to choose a field of mathematics, study it intensely for a few years, revolutionize it with a basic new idea, then drop it and look for another field. Weyl followed the same method, and was equally successful.

The following is a very incomplete chronological summary of Weyl's activity. Between 1908 and 1917 he worked on problems in classical pure mathematics, in particular the theory of numbers, singular integral equations, and functions of a complex variable. His book "Die Idee der Riemannschen Fläche" created a new branch of mathematics by uniting function-theory and geometry ; the influence of this book led directly to a synoptic view of analysis, geometry and topology which has become a central theme in the mathematics of to-day. During 1917–23 he worked on the logical foundations of mathematics, and simultaneously took an active part in the development of Einstein's relativity theory and its generalizations. He discovered the first 'unified field theory' in which the Maxwell field appears along with the gravitational field as a geometrical property of space–time. This theory he soon rejected as being without empirical foundation ; but it remains at least as plausible as any of the other unified theories which came later. Between 1923 and 1938 he created a general theory of matrix representations of continuous groups, which powerfully assisted the growth of quantum mechanics. He discovered that a large proportion of the regularities of quantum phenomena in atomic physics can be understood most simply by means of group theory. By bringing group theory into quantum mechanics he led the way to our modern style of thinking in physics. To-day the instinctive reaction of every theoretical physicist, confronted with an unexplained regularity in the behaviour of elementary particles, is to postulate an underlying symmetry-group.

After taking his degree at Göttingen, Weyl occupied chairs successively at the Federal Technical College in Zurich (1913–30), at Göttingen (1930–33), and at the Institute for Advanced Study in Princeton (1933–51). He was elected a foreign member of the Royal Society in 1936. He was twice married, and is survived by a widow and two sons.

Characteristic of Weyl was an æsthetic sense which dominated his thinking on all subjects. He once said to me, half joking, "My work always tried to unite the true with the beautiful ; but when I had to choose one or the other, I usually chose the beautiful". This remark sums up his personality perfectly. It shows his profound faith in an ultimate harmony of Nature, in which the laws should inevitably express themselves in a mathematically beautiful form. It shows also his recognition of human frailty, and his humour, which always stopped him short of being pompous. His friends in Princeton will remember him as he was when I last saw him, at the Spring Dance of the Institute for Advanced Study last April : a big jovial man, enjoying himself splendidly, his cheerful face and his light step giving no hint of his sixty-nine years. Freeman J. Dyson

Prof. H. Oertel

Prof. Horst Oertel, who died on January 9 at the age of eighty-two, was formerly Strathcona professor of pathology in McGill University. Since leaving Canada in 1938, he had lived a retired life at his club in London.

Although born in Germany, near Dresden, Oertel received most of his education in the United States and took his medical degree at Yale in 1894. Shortly afterwards, he returned to Germany for postgraduate studies, first at Berlin, where he was much influenced by Virchow and Senator, and later, at Würzburg and Leipzig. His interest in philosophy, which continued throughout his life, was greatly strengthened by his contact with Wundt, whose reputation as an exponent of physiological psychology was then drawing students and research workers from many parts of the world.

Soon after his return to the United States in 1897, Oertel became the director of a department of pathology—later the Russell Sage Institute—that was then being developed in a large municipal hospital under the auspices of the New York University School of Medicine. In 1911, political changes in the city brought this association to an end, though Oertel maintained for some time longer his connexion with the Russell Sage Foundation. Much of his work at this time was upon nephritis, to the study of which he had been stimulated by Senator, and in 1910 he published a series of lectures on Bright's disease. It was this interest, too, that brought him to London in 1913 to work at Guy's Hospital—near Bright's own wards—on experimental nephritis and the embryology of the kidney. This "delightful and profitable departure", to use his own words, brought him into association with Laidlaw, Boycott, Keith and Assheton. In 1914, while still in London, Oertel received an invitation to an associate professorship at McGill University under J. G. Adami. Almost at once, he assumed full direction of the Department, for Adami left Montreal soon afterwards, first for war service and later to become vice-chancellor of the University of Liverpool.

At McGill, Oertel quickly developed an active pathological institute in close association with the Royal Victoria Hospital, and it was here that his most productive work was done. His previous experience in the United States, Germany and England had led him to a critical appraisal of the objectives of medical education at a time when the scope of the curriculum was being widened at an unprecedented rate. His tenure at McGill gave him the opportunity to put some of his views upon teaching into practice. These ideas soon gained a wider audience through the publication in 1921 of his "General Pathology", a book which was followed in 1927 by "Outlines of Pathology" and in 1938 by "Special Pathological Anatomy". All three bear the distinctive marks of Oertel's personality—his absorption with the historical development of pathology and its emergence as an independent biological science. Although addressed to undergraduates, their