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OBITUARIES

Sir William Larke, K.B.E.

SIR WILLIAM JAMES LARKE, who died on April 29, three days after his eighty-fourth birthday, deserves honourable remembrance among scientists for his powerful advocacy of scientific research in the service of industry. Born in 1875, educated at Colfe's School, and trained as an engineer with H. F. Joel and Co., Finsbury, and Siemens Brothers at Woolwich, Larke was engineer and manager of the British Thomson-Houston Company's power and mining department from 1899 until 1912, when he became executive engineer. During the First World War he served with the Ministry of Munitions and was appointed director-general of raw materials in 1919.

In 1922 Larke accepted an invitation to become director of the National Federation of Iron and Steel Manufacturers and it was here that he found his first experience of organizing co-operative research for an entire industry. The result was the establishment of the Iron and Steel Industrial Research Council, of which Sir William was the chairman from 1938 until 1945, and ultimately of the British Iron and Steel Research Association, which now carries on the work.

Sir Charles Goodeve, director of the British Iron and Steel Research Association, writes: "B.I.S.R.A. is now the largest of the research associations and it may not be generally appreciated that its predecessor operated on a small scale with a headquarters staff of about fifteen acting as the technical department of the British Iron and Steel Federation. Under the guidance of Larke and the head of the British Iron and Steel Federation Technical Department, the late Mr. E. C. Evans, a substantial and effective research programme was carried out with a very modest budget, and few can have excelled Larke and Evans in their ability to stretch available funds to the utmost. They had no laboratories of their own and much of the programme was carried out by works personnel or in academic institutions under the general direction of committees serviced by the small central staff. But this staff also did practical work themselves, and the goodwill built up by Larke in steel companies and in university laboratories meant that facilities were readily provided. Between 1924 and 1939 studies of the performance of blast furnaces, open hearth furnaces and rolling mills were carried out and several of the fundamental principles governing efficiency were determined. Many of the methods used were basically similar to those which are now known as operational research".

Sir William was sixty when, in 1935, the international symposium on welding organized by the Iron and Steel Institute convinced him of the importance of the new processes for the joining of metals and of the need for an effective programme of fundamental research in this field. He was then a member of the advisory council to the Committee of the Privy Council for Scientific and Industrial Research, and with characteristic energy set himself to reorganize the Institution of Welding Engineers and to secure for it the support of such eminent engineers as the late Sir Alexander Gibb, and from the Department of Scientific and Industrial Research and industry the financial backing necessary for a co-operative research organization in welding. From the Institute of Welding's Welding Research Council, of which Larke was chairman from its formation in 1936, came research results of great value in the war-effort of 1939–46, and out of it the present British Welding Research Association was formed in 1946.

A leader of scientific research rather than a scientist, Larke inspired both affection and respect in those who worked with him, and the impress of his critical and constructive mind remains in many institutions in the field of engineering and metallurgy. He was exceptional in his readiness to welcome new ideas late in life, retaining to the end a lively and informed interest in the institutions to which he had given so much, where a generation now in sight of retirement remembers the kindly wisdom of his advice and the high standards of efficiency and service which he set them as their goal.

GUY PARSLOE

Prof. William Moffitt

ON December 19, 1958, William Moffitt, associate professor of chemistry in Harvard University, died suddenly of a heart attack at the age of thirty-three in Cambridge, Massachusetts. Thus ended a brilliant career which already had a great impact on his chosen field of theoretical chemistry and seemed destined to go on to even higher levels of achievement.

Moffitt was born on November 9, 1925, in Berlin. His father, a British citizen, was in Germany on a government mission. Moffitt's early schooling was by private tutoring, but at the age of eleven he became

a pupil at the Harrow County Boys' School. He proceeded to a first-class honours degree in chemistry at New College, Oxford (1946). Two years of research at Oxford led to a D.Phil. in 1948 and a position with the British Rubber Producers' Research Association at Welwyn, where he enjoyed great freedom to follow his chosen lines of inquiry. In 1953, he went to the United States to become assistant professor of chemistry at Harvard. Only two years later, he was appointed associate professor, one of the youngest to receive this rank.

In 1956, he married Dorothy Silberman of Cambridge, Massachusetts; their daughter Alison was born in July 1958.

Moffitt's papers all deal with the application of quantum mechanics to the problem of the electronic energies of molecules and related optical properties. His earlier publications were prepared at Oxford, where he studied under Prof. C. A. Coulson, with whom he collaborated in a number of applications of molecular orbital theory. A noteworthy product of this collaboration was the introduction of the idea of 'bent bonds'; that is, chemical bonds formed from overlapping atomic orbitals not directed along the line joining the two bonded atoms.

After leaving Oxford, Moffitt continued to publish applications of current methods but was struck with their inadequate quantitative accuracy. He was thereby led to make perhaps his best-known contribution, that of the method of 'atoms in molecules'. He reasoned that one of the causes of the poor results then being obtained in calculations of chemical binding energies was that these rather small energies came out as the difference of two huge energies—the total electronic energies of the molecule and of its separated atoms. Consequently, he worked out a procedure by which the interaction between the atoms was treated as a perturbation and its effects separated from the internal energies of the atoms themselves. The latter were obtained from accurate spectroscopic data on free atoms.

At Harvard, he continued his interest in the theoretical elucidation of the ultra-violet spectra of large conjugated molecules. One contribution was a refinement of the free-electron perimeter model, particularly elegant because of the simplicity of its starting point and the number of experimental observations which it correlates. It has been stated that his work in the spectra of aromatic molecules is comparable in this field "to the importance of the complete theory of the Zeeman effect in interpreting atomic spectra".

In addition to his earlier interests, Moffitt characteristically took full advantage of his new scientific environment. Thus, part of the reason for his entry into the field of optical activity was provided by his interest in the research going on in the Harvard Laboratories concerning helical macromolecules and sterols. A major effort was begun which continued to the time of his death and which, though unfinished, helped to provide structural chemistry with a new tool. Moffitt's theoretical analysis of the problem of the optical activity of helical polypeptides, metal co-ordination compounds, and large ketones guided him to an appreciation of the importance of the circular dichroism and the properties of the absorption bands which are responsible for the optical activity. He demonstrated that such bands could be characterized by parameters, extractable from the rotatory dispersion data, which are sensitive to the nature of the asymmetrical environment of the chromophoric group involved in the transition. It is this structural sensitivity which promises to be so useful to the organic chemist.

This work was a fitting and logical application of the knowledge, skills and experience which Moffitt had acquired earlier. He was thoroughly conversant with the techniques of the theoretical physicist, accomplished in the application of advanced mathematical methods, and at the same time learned in a remarkably wide range of chemistry.

Another area in which he was continuing was the interaction of electronic and nuclear motions, especially in the John-Teller effect. This has to do with the instability of nuclear configurations which would lead to degenerate electronic energy-levels.

Few men had as great an impact at so early an age. The reasons are clear. Few have been endowed with such a sparkling, quick and keen intelligence, with such a capacity for spending long hours in the thorough study of fundamental subjects, with such high standards; and finally, but by no means least, with such a warm, outgoing, and appealing personality. Moffitt had tremendous innate assets and he used them fully and efficiently. His intellectual powers were not only applied to the solution of problems but perhaps even more to their wise selection. He avoided areas where only formal solutions were attainable, with no contact with experience.

Moffitt's quickness of mind was obvious to all, as was his interest and devotion to science. Perhaps not so obvious was the effort he expended, both in self-improvement and in the execution of his ideas. His scientific papers were prepared with great care. Each one went through draft after draft until he had finally hand-written a version that met his exacting standards. The use of refined and proper language was for him a necessity, obviously based on his enjoyment and wide knowledge of English literature. His lectures, both in courses and on special occasions, were prepared with the same care as his manuscripts. They were well-organized, clear, elegantly phrased and beautifully delivered.

Moffitt was much more than a scientist of outstanding distinction; he was a cultivated man in the broadest sense, an enthusiastic athlete, and a human being of rare warmth, friendliness and consideration. His death not only deprives science of a great mind but also takes away for ever from his numerous friends and associates a great spirit.

E. BRIGHT WILSON, JUN.

Dr. Gustav J. Kramer

ON April 19, Dr. Gustav Kramer, *Abteilungsleiter* at the Max-Planck-Institut für Verhaltensphysiologie and *Leiter* at the Vogelwarte Radolfzell of the Max-Planck-Gesellschaft zur Förderung der Wissenschaften, fell to his death while endeavouring to collect wild fledgling pigeons during a scientific expedition to Calabria in southern Italy. With his death in his fiftieth year there must be a halt to very promising researches upon the homing, migration and orientation of birds and other animals and upon a multiplicity of allied problems. But such has been the inspiration which he has offered to his students and assistants that we may hope that his ideas will for many years yet continue fertilizing this field of study.

Gustav Kramer was born in Mannheim on March 11, 1910, and came of a wine-growing family. After studying at the Universities of Freiburg, Königsberg