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

and Berlin, he joined the staff of the Kaiser-Wilhelm-Institut für medizinische Forschung, working upon the sensory physiology of *Xenopus* and upon the metabolic processes of poikilotherms. In 1934 he was appointed assistant at the joint German-Italian Marine Biological Laboratory at Rovigno d'Istria, and three years later assistant director of the Physiological Department of the Stazione Zoologica at Naples. Here it was that he married an Italian zoologist. During this period he continued his work on the metabolism of poikilotherms, concentrating upon coelenterates and lizards. From this arose an investigation into the island and mainland races of lizards, with biometrical, genetical and hybridization findings.

It was not until after the Second World War, when he spent two years as lecturer in Heidelberg, that Dr. Kramer's life-long interest in birds led him into the field where his name will best be remembered, that of bird orientation, and when, in 1948, he was appointed as a departmental director at the Max-Planck-Institut at Wilhelmshaven he was able

to devote most of his energies to investigating this problem. The decade since this appointment has seen the publication of a remarkable series of papers in which he has established the dependence of birds on the Sun and upon an 'internal chronometer' for their feats of orientation, homing and migration. In 1958 the Max-Planck-Gesellschaft recognized Dr. Kramer's achievements and promise by appointing him to direct an institute of animal behaviour, which was to be built at a site of his choosing. It is still under construction at Walddorf (Tübingen). Less than three weeks before his death, the Gesellschaft made him director of its Radolfzell bird observatory (formerly the well-known Rossitten bird observatory).

Gustav Kramer was an athlete and climber of some note, and it is ironic that he should have met his death while using his climbing ability in his scientific work. He is survived by his widow and by three children. His unfailing charm and hospitality and the inspiration he gave to his students, staff and scientific acquaintances will be remembered with affection.

D. B. CARLISLE

NEWS and VIEWS

Dr. Warren Weaver

ON August 1, Dr. Warren Weaver retired from his present position as vice-president for the natural and medical sciences of the Rockefeller Foundation. He has been appointed vice-president of the Alfred P. Sloan Foundation, and he will continue his activities on the National Science Board, on the National Advisory Cancer Council, on the Council for Library Resources, as vice-chairman of the Health Research Council of the City of New York, and as vice-president and chairman of the Committee on Scientific Policy of the Sloan-Kettering Institute for Cancer Research. For twenty-seven and a half years Dr. Weaver has had, within the Rockefeller Foundation, administrative responsibility for all activities in the natural sciences. When the Rockefeller Foundation became active in agriculture in the early 1940's this field was placed under Dr. Weaver's general charge. Still more recently, in 1955, he was also assigned supervisory responsibility for the Foundation's activities in the medical sciences.

Astronomy at Glasgow :

Prof. W. M. Smart

PROF. W. M. SMART, regius professor of astronomy in the University of Glasgow since 1937, is to retire on September 30. Prior to 1937 Prof. Smart had a background which combined Cambridge mathematics and theoretical astronomy with naval navigation practice and teaching. During this period he was engaged in research in stellar dynamics, particularly with the phenomena of star streaming and stellar motion. His development of a flourishing school of theoretical astronomy in Glasgow was based on this experience. To assist in his teaching work, and to help theoretical astronomy everywhere, he wrote three well-known and widely used astronomical text-books in addition to a number of other books of academic, educational and popular interest. He encouraged his department in studies in stellar

motion and other theoretical problems. It is understood he will move to the London area on retirement.

Prof. P. A. Sweet

DR. P. A. SWEET has been appointed to succeed Prof. Smart. He has, since 1952, been a lecturer in astronomy at University College, London, and also assistant director of the University of London Observatory. The incoming professor is not new to Glasgow, having lectured there during 1947-52. After completing the Mathematical Tripos at Cambridge in 1946, Dr. Sweet commenced theoretical researches in the field of stellar structure and plasma physics. His theory concerning the rate of mixing of the material in stars has had wide consequences in the analysis of stellar structure and evolution. His more recent work has been connected with the influence of magnetic conditions on the control of energy reactions in cosmic material. The applications of his theories to stellar and other problems are still in progress. We may anticipate a development of these and other studies with Dr. Sweet's appointment to the regius professorship in astronomy at Glasgow.

Jacob Bell : Founder of the Pharmaceutical Society of Great Britain

ON June 12, the hundredth anniversary of his death, tribute was paid by the Pharmaceutical Society of Great Britain to its founder, Jacob Bell, when the president, Mr. Gwilym Hughes, unveiled a tablet to Bell's memory in Woodbury Park Cemetery, Tunbridge Wells, where he is buried. By his work for the Society, said Mr. Hughes, Jacob Bell was acting in the public interest as well as in the interests of his calling. When he commenced his labours, pharmacy in Great Britain was ill-defined, unregulated and unorganized, without acknowledged standards of education or practice. It had no authoritative means of expression and lacked official recognition.