OBITUARIES

Prof. K. S. Lashley, For.Mem.R.S.

KARL SPENCER LASHLEY was born in West Virginia on June 7, 1890. He died in Paris in August 1958.

Whatever may turn out to be the correct detailed story of nerve conduction and the localization of mental functions in the brain, it is safe to say that Lashley's work will always stand distinguished for the brilliance of his experimental attack, for the originality and sweep of his ideas, and for the incisiveness and clarity of his exposition.

Lashley received his scientific training, about equally in zoology and in psychology, at the Universities of West Virginia, Pittsburgh and Johns Hopkins. He became a professor of psychology first in the University of Minnesota and then at Chicago. In 1937 he was appointed research professor of neurophysiology at Harvard, and five years later he also became director of the Yerkes Laboratories of Primate Biology at Grange Park, Florida. It was in Florida, in his home there, working among his chimpanzees, with his carefully chosen band of students, and often piloting his small sailing boat, mostly alone in coastal waters, that he spent, probably, the happiest years of his life.

Some of Lashley's early work was carried out in conjunction first with H. S. Jennings, and later with the behaviourist, J. B. Watson. But he never, all his life, for long allowed himself to stay tied to anybody else, or to theories other than his own. Perhaps it was their unconventional character, and the fact that they were rebelling against respectable and established opinions of their day, which attracted him in turn to behaviourism, to Pavlovian conditioned reflex theory; and then, by what seemed rather like a complete somersault, to *Gestalt* psychology, and even to some of the more romantic aspects of Freudism. All of these had some influence with him; none of them carried him away.

From 1912, when he published his first paper—on visual discrimination of size and form in the albino rat—to the middle 1920's, he was busy with many and varied experimental investigations in animal behaviour. These moved more and more definitely towards what he called "studies of cerebral function in learning". In 1929 he published his famous book "Brain Mechanisms and Intelligence", and this was very quickly recognized as of outstanding importance. Nearly everybody who writes now of this volume directs attention to Lashley's two principles of brain activity, which he called "Equipotentiality" and "Mass Action". Taken together and in a broad sense, these principles, and particularly the abundant, detailed and original evidence upon which they were based, expressed and demonstrated the view that there could be considerable loss or injury to brain tissues and still the behaviour functions subserved by the areas concerned could be carried on, though sometimes in ways new and different compared with those which had been learned. What particularly marked Lashley's neurophysiological approach was its loyalty, at the same time, to the highest and most exact standards of behaviour experimentation. Plenty of people have shown that it is easy to be scientifically exacting on one side, and little but dogmatic on the other; Lashley accepted and used the same rigour of research on both.

Until he moved to Florida and the chimpanzee colony, most of Lashley's experimental work had been carried out with rats. But with the opportunities which he now had, he began to devote more attention to studies of the neurophysiological foundations of some of the higher and more complex mental functions. In a broad sense, his views about the areal and patterned character of brain activities remained unchanged. He continued to publish a number of splendid papers, and he inspired notable experimental work by his students. But he ran into a period of prolonged ill-health. In the summer of this year he seemed to be better, and he set out upon one more journey to Great Britain and to France. He had been elected a Foreign Member of the Royal Society in 1951. On July 28 he signed the Charter book of the Society, and then continued his planned trip to France. There, in Paris, about a fortnight later, he died.

Lashley, superbly intelligent himself, liked people to be, in his judgment, intelligent. He very quickly made up his mind about this, and anybody who met him, though maybe only for a short time, and was accepted by him as up to the mark, could never forget his brilliant, rather wayward, and most lively habit of mind. Though he was a fine and patient experimenter, he was no laboratory recluse. High among more general interests were music—he was good with a violin—and sailing. Sometimes he said that he would have liked best of all to sail lonely voyages across the widest seas in some small boat. When he came to Europe he always preferred, if he could do so, to travel in a little tramp steamer; he disdained the luxury liner. Life to him was an adventure, a continuing opportunity for original exploration, whether in action or by thought, and if it could be very clear that the responsibility for whatever he found was wholly his own, that was all the better.

F. C. BARTLETT

The Rev. T. N. Burke-Gaffney, S.J.

WITH the death of Thomas Noel Burke-Gaffney on September 14, Australian seismology has suffered an almost irreplaceable loss.

Father Burke-Gaffney became director of the Riverview College Observatory in 1952 when the former director, Father D. J. K. O'Connell, was appointed director of the Vatican Astronomical Observatory. He occupied the post with distinction, and more than maintained the reputation which Riverview has held for fifty years as one of the world's first-class seismological observatories.

He was that rare type of seismologist to whom the records of each earthquake take on the form of a distinct personality. Through this faculty, he developed an insight into the reading of seismic records the like of which we may not see again in Australia. He was devoted to his work, and few outside the ranks of seismologists in Sydney and a small number of his close colleagues know of the extent to which he helped, beyond his strength, young seismologists in many parts of Australia to an understanding of the intricacies of seismic recording.

He played a valued part in Australia's International Geophysical Year work as convener of the

National Subcommittee on Seismology, and was for several years a member of the Council of the Royal Society of New South Wales. In these and related offices he gave of his best.

His published work includes seven papers on seismology, the last of which appeared in the *Australian Journal of Physics* shortly after his death. The papers were concerned with the seismicity of Australia, the problem of detecting *S* waves in the Earth's inner core, special phases from New Zealand earthquakes, and seismic aspects of nuclear explosions. The last work has attracted world-wide attention.

Father Burke-Gaffney was born in Dublin on December 26, 1893, and entered the Jesuit order in 1913. He took up residence in Australia in 1928 as senior science master at St. Ignatius's College, Riverview, Sydney, and in 1946 became assistant director of the College Observatory. He lived austerely, and was one of Australia's most unassuming scientists and a man of quiet, gentle dignity. Few outside his College friends and his seismological colleagues got to know him well; but those of us who did, knew him as a charming liberal-minded man graced with a delightful humour and who dedicated himself to his work.

K. E. Bullen

NEWS and VIEWS

Nobel Prize for Medicine and Physiology : Prof. J. Lederberg ; Prof. G. W. Beadle and Dr. E. L. Tatum

The recent award of the Nobel Prize for Medicine and Physiology for 1958 to Prof. Joshua Lederberg, and jointly to Prof. G. W. Beadle and Dr. E. L. Tatum, is a signal acknowledgment of the great advances which have been made in knowledge of the genetics of micro-organisms in recent years, and of the importance of this knowledge to an understanding of living processes in general.

The main contribution of Beadle, the geneticist, in collaboration with Tatum, the chemist, was to show first, in 1941, that mutations induced by irradiation in the mould *Neurospora crassa* resulted in inability to synthesize specific chemical nutrients which the organism needed for growth. Genetic crosses between the mutant and parental strains invariably showed that each mutant strain, having a single specific requirement, differed from the parental strain by alteration of only a single gene. Thus single genes appeared to control single biochemical reactions and, by inference, the formation of single enzymes. This first successful attempt to relate genetic and biochemical function experimentally gave birth to the stimulating 'one gene, one enzyme' hypothesis and initiated the expanding field of biochemical genetics. In further studies Beadle and Tatum traced the synthetic defects of some of their mutant strains to inability to perform various specific intermediate steps in the chain of processes leading to formation of such required end-products as amino-acids or vitamins of the B group. By wedding experiments with such mutants to inspired guess-work concerning presumptive precursors in biosynthesis they, and many subsequent workers, have built up a formidable mass of knowledge about intermediary metabolism.

Tatum (1944–46) extended these *Neurospora* studies to bacteria. As a result, a considerable stock of nutritionally defective mutant strains of *Escherichia coli* were developed. Lederberg, who was working with Tatum at this time, conceived the idea that these mutants might be used to provide a definitive test of the occurrence of sexuality in bacteria. The experiments were immediately successful and were first reported jointly by Lederberg and Tatum in 1946 in *Nature*. Subsequent studies by Lederberg proved the existence of a linear linkage between many of the genes of *Escherichia coli*, thus showing, for the first time, that bacteria are fundamentally similar to other types of cell in their genetic and biochemical constitution. These studies, which then appeared to S. E. Luria "to be among the most fundamental advances in the whole history of bacterial science", served as the starting point for many far-reaching discoveries in the field of bacterial genetics which Lederberg has ever since continued to fertilize with new ideas and techniques. In 1952, he and Dr. N. D. Zinder showed that certain bacterial viruses (bacteriophages) could act as vectors of small fragments of bacterial chromosome from one cell to another so that recombinant types arose : development of this discovery, especially by Dr. M. Demerec and his colleagues, has provided important new concepts about the fine structure and function of the gene. In 1953, Lederberg and his wife, Dr. Esther M. Lederberg, simultaneously with Dr. E. Wollman of the Pasteur Institute, Paris, first proved that the genetic material of a bacterial virus of low virulence might attach itself to a specific site on the bacterial chromosome and thereafter be propagated indefinitely among the progeny of the host cell as though it were part of its normal hereditary constitution. Lederberg and his wife also developed a simple but elegant technique, known as 'replica plating', which, in addition to its wide applicability as a laboratory tool, was used by them to demonstrate directly, for the first time, that bacterial mutations, such as resistance to certain antibiotics or viruses, arose spontaneously and not in response to environmental stimuli.

Royal Society : Medal Awards

The following awards of medals have been made by the President and the Council of the Royal Society : *Copley Medal* to Prof. J. E. Littlewood, lately Rouse Ball professor of mathematics in the University of Cambridge, for his distinguished contributions to many branches of analysis, including Tauberian theory, the Riemann zeta function, and non-linear differential equations ; *Rumford Medal* to Sir Thomas Merton, formerly professor of spectroscopy in the University of Oxford, for his distinguished researches in spectroscopy and optics ; *Davy Medal* to Prof. R. G. W. Norrish, professor of physical chemistry in the University of Cambridge, for his distinguished work in chemical kinetics, especially in photochemistry ; *Darwin Medal* to Sir Gavin de Beer, director of the British Museum (Natural History), for his distinguished contributions to evolutionary biology ; *Sylvester Medal* to Prof. M. H. A. Newman, Fielden professor of mathematics in the University of Manchester, for his distinguished contributions to combinatory topology, Boolean algebras and mathematical logic ; *Hughes Medal* to