OBITUARIES

Sir Leonard Bairstow, C.B.E., F.R.S.

THE death of Sir Leonard Bairstow on September 8 deprives us of one of the few remaining pioneers of aviation: a man whose meticulous analytical and experimental study of aerodynamics helped to secure the foundations of that subject at a time when the theory of flight was barely more than an expression of the physical courage of those who practised it.

Sir Leonard was born in Halifax, Yorkshire, on June 25, 1880, and, after obtaining a diploma in mechanics at the Royal College of Science, London, he joined the staff of the National Physical Laboratory. His work there encompassed most of the then current problems of aerodynamics: balloons, airships, seaplanes, propellers, the design of wing sections, wind tunnels, and aeroplane performance as well as its structure. Among his collaborators were such men as Arthur Fage, Sir Melvill Jones and Ernest Relf, who themselves were later to become, and still remain, outstanding figures in the field of aviation. His scientific papers written during that period, many of them published before the First World War, and describing experiments made in wind tunnels, could well serve as models of thoroughness and clarity to the modern student of aerodynamics; the assumptions—and there were necessarily many of them at that time—were boldly displayed and the purely experimental details described so carefully, yet with astonishing succinctness, that one could reproduce without difficulty his apparatus and techniques to-day. But perhaps his most important contribution was made on the mathematical side and concerned the analysis of the stability of aeroplanes. By 1913 he had helped to consolidate the theory of stability and, continuing the work of Bryan, to cast it broadly into the form in which it now exists: a subject which continued to preoccupy him for many years.

Elected to a fellowship of the Royal Society in 1917, Bairstow was awarded the C.B.E. in the same year.

He left the National Physical Laboratory in 1919 to become professor of aerodynamics in the newly formed Department of Aeronautics at the Imperial College of Science and Technology, London, but not before he had played a major part in detaching the Aerodynamics Division from the Engineering Division and giving it a separate identity. In fact, he is regarded as the first superintendent of the Aerodynamics Division as we know it to-day. In 1923, succeeding Sir Richard Glazebrook, he became Zaharoff professor of aviation and head of the Aeronautics Department, a chair which he occupied until his retirement in 1945. Once again Sir Leonard was to take an important part in guiding the destiny of aeronautics in Great Britain, for during his tenure of the chair the study of aerodynamics evolved from a largely empirical assembly of facts—"the subject of aerodynamics is almost wholly based on experiment" Sir Leonard said in 1919—to an orderly and self-consistent science in its own right, and attracted students in increasing numbers. Many of the present-day authorities on aeronautical matters in industry, in Government service and in universities had at one time studied under him.

While Zaharoff professor at Imperial College, he was deeply involved in the work of the Aeronautical Research Council, of which he was a member, with a few short interruptions, for some thirty-five years. He was vice-chairman of the Council during 1940–45 and its chairman during 1949–52. He was also vice-president of the Royal Aeronautical Society from 1930 until 1934. He received a knighthood in 1952.

Many of Sir Leonard's achievements are so firmly embedded in the foundations of aeronautical development as to be easily taken for granted or even overlooked by future generations of workers in the subject; more durable evidence of his distinction is provided by his book, *Applied Aerodynamics*. Published in 1919, it was the first comprehensive text-book on the subject and remained so for many years. Indeed, the second edition was reprinted as late as 1944, a remarkable tribute to a work that was fashioned while the subject was still in its infancy. In the preface to the first edition, Bairstow wrote: "The main outlines of the theory of flight are simple, but the stage of application now reached necessitates careful examination of secondary features". Since these words first appeared, their truth may for a time have been in doubt when the outlines of the theory became blurred by the complex interaction between the motion of a high-speed aeroplane and the forces exerted on it by the compressible medium through which it travelled. But now, when flight is taken to include the penetration of outer space by means of rockets, Bairstow's view of the problem regains its force and takes on the quality of prophecy, for so simple are the outlines of the theory of rocket flight that they are accessible to every schoolboy; it is the 'secondary features' that occupy the minds of aerodynamicists and account for a solid proportion of their present researches.

Sir Leonard married in 1907 Eleanor Mary Hamer, who died in 1926, and by whom he had a son and a daughter. In 1930 he married Florence Katharine, elder daughter of D. J. Stephens, of Llandaff.

P. R. OWEN

Prof. Hans Kopfermann

HANS KOPFERMANN, who died on January 26, will be missed by many friends and colleagues throughout the world-wide scientific community. His tall boyish figure belied his age: he would have been sixty-eight in April and was to retire this summer from the post of director of the First Physical Institute of the University of Heidelberg.

Among the present generation of physicists he is best known for his spectroscopic researches on isotope shift and nuclear hyperfine structure and as the author of a comprehensive monograph on nuclear moments. This represents but one facet of a full life's work which for nearly four decades has moved remarkably close to the crest of the advancing wave of physics.

Born in 1895 in Breckenheim near Wiesbaden, he went to the University of Göttingen in the early 'twenties, the golden years of intense experimental and theoretical activity marking the final phase of the largely heuristic quantum theory of classical particles. He worked for his doctorate under the creative guidance of James Franck. His thesis on sensitized fluorescence of lead and bismuth vapour was published in 1924, a year before Heisenberg, as a very young *Privatdozent* in Göttingen, burst into physics with his new ideas of a quantum mechanics, in which the Kramers dispersion theory played such a decisive part.

Thus it was Kopfermann's good fortune—or Frank's wise direction—that his first post-doctoral appointment led him to the Kaiser Wilhelm Institut in Berlin–Dahlem to contribute as assistant of Ladenburg to a long series of investigations on the anomalous dispersion of excited atoms which provided many experimental tests of the predictions of quantum mechanics and culminated in 1928 in the first experimental evidence for negative dispersion. In careful experiments on the dispersion around several neon lines for varying conditions of electric excitation of the gas discharge he established the existence of the effect of stimulated emission corresponding to