

levels. This is necessary for the proper design of shielding which will protect those working near the machine and also allow access to the various beams of radiation from targets. A detailed experimental programme is being prepared, and it is hoped that this synchrotron, which provides π -mesons of energies up to at least 700 MeV., will add significantly to existing information on the nuclear interactions of high-energy particles. It is clear that the accumulation of events of interest in nuclear emulsions and cloud chambers is likely to be rapid.

¹ *Rev. Sci. Instr.* (the September 1953 issue is devoted to a description of the Brookhaven cosmotron).

² Oliphant, M. L., Gooden, J. S., and Hide, G. S., *Proc. Phys. Soc.*, **59**, 666 (1947).

³ *Nature*, **169**, 476 (1952).

⁴ Hibbard, L. U., *Nucleonics*, **7**, No. 4, 30 (1950); see also *The Engineer*, **195**, 271 and 305 (1953).

OBITUARIES

Prof. A. F. Holleman

ARNOLD FREDERIK HOLLEMAN died on August 11, and so passed the doyen of Dutch chemists and one who held a special place in the hearts of his countrymen, not only for what he had done for the cause of science, and of organic chemistry in particular, in Holland, but also as one of the band of famous scientists who succeeded in bringing the universities of Holland into the very forefront of scientific progress.

During his long life of almost ninety-four years, Holleman formed a connecting link between the earlier period of organic chemistry and modern developments. He was born at Oisterwijk in North Brabant on August 28, 1859, and received his early chemical education from Dr. Lamers, a pupil of Kekulé. He proceeded in 1879 to Leyden, where he studied under the two famous teachers, Franchimont and van Bemmelen, and also had instruction from van Romburgh, Bakhuis Roozeboom and Lobry de Bruyn. Then followed a period under Bunsen at Heidelberg and one in von Baeyer's laboratory at Munich, where he was contemporary with Bamberger, Claisen, Nef and Friedlander. In 1887 he returned to Holland to work with van't Hoff at Amsterdam, where he also met Eijkman. Here he started his

career as a teacher; he became professor at Groningen in 1893, and a little later he succeeded Lobry de Bruyn at Amsterdam, where he remained until he retired in 1924 at the age of sixty-five.

The effect of Holleman's lifelong friendship with van't Hoff and his contacts with Eijkman and Bakhuis Roozeboom is to be seen in the direction his researches took at Groningen and Amsterdam. As a student of the Leyden school, he was interested in the chemistry of substitution in aromatic compounds, and his thesis for his doctorate (1887) dealt with "Researches on the so-called β -Nitro-cymene"; his fame, however, rests on the application of exact physico-chemical methods to the quantitative study of the problem. His researches enabled him in 1910 to publish his famous book "Die Einführung von Substituenten in den Benzolkern", truly the basis on which the English school later built the electronic theory. He was still stressing the importance of the quantitative aspect of the subject in probably the last of his papers, published in 1947.

After his retirement, Holleman lived in Bloemendaal, but still devoted himself to science, as secretary to the Hollandsche Maatschappij der Wetenschappen, Haarlem, and on various committees of the Dutch Chemical Society, which obtained its Royal title a few days before his death, and in which he was particularly interested.

No notice would be complete without reference to Holleman's fame as a teacher. Anyone who studied organic chemistry at a Dutch university could 'feel' it, and it was also a reason for the success of his text-book, which passed through sixteen editions between 1896 and 1951 (he supervised the whole of the manuscript of a recent English translation) and was translated into many languages. S. COFFEY

WE regret to announce the following deaths:

Mr. R. H. Burne, F.R.S., sometime physiological curator of the Hunterian Museum, Royal College of Surgeons, on October 9, aged eighty-five.

Mr. James Fairgrieve, formerly reader in education with special reference to geography in the Institute of Education, University of London, on October 8, aged eighty-three.

NEWS and VIEWS

Aerodynamics at the National Physical Laboratory: Mr. A. Fage, C.B.E., F.R.S.

MR. A. FAGE, who retired from the post of superintendent of the Aerodynamics Division of the National Physical Laboratory last summer, is one of the pioneers of aeronautical research. He went to the Laboratory in 1912, after an education at the Portsmouth Dockyard Schools and the Royal College of Science, London, and joined the small group of workers who were beginning to establish an aeronautical section at the Laboratory under the guidance of the then Dr. Stanton and Mr. Bairstow. His early work ranged over the whole field of aerodynamics as it then existed; but he made a special study of the characteristics of airscrews and laid the foundations of airscrew theory. He wrote two books at this time, on airscrews and on the aeroplane, as a guide to designers. About 1920, Mr. Fage began to study the problems of the boundary layer and of turbulent air-flow which have been his main work and have brought

him international fame and the fellowship of the Royal Society (1942). He was the first to measure, by the use of Stanton's surface Pitot tube, the distribution of skin friction along the chord of an aerofoil, and to show in detail the nature of the transition from laminar to turbulent flow. His work on the effects of surface imperfections on skin friction did much to emphasize the great importance of smooth and accurately shaped surfaces for the attainment of the lowest possible drag.

Mr. Fage was a brilliant experimentalist but had a sufficient knowledge of the underlying theory to enable him to interpret lucidly the results of his experiments. Many of his experimental researches show an almost uncanny skill, and also a great degree of patience, in attacking new and difficult problems. Incidentally, he made some of the first experiments on laminar flow aerofoils. He was appointed superintendent of the Aerodynamics Division at Teddington in 1946 and since then has devoted much of his time