methane normally evolved during the anaerobic digestion of sludge; but this drawback is being overcome by the development of methane-producing strains resistant to the inhibitory effect of sulphide. Bacteria concerned in the decay of pyretic fossils, a cause of some perturbation in museums, were also on view.

OBITUARIES

Prof. James B. Sumner

JAMES B. SUMNER, professor of biochemistry at Cornell University, Ithaca, New York, best known as the first to achieve the crystallization of an enzyme, died on August 12 at the age of sixty-seven at Roswell Park, Buffalo, New York. He had been in excellent health up to a few months before his death. He is survived by his wife, three sons, two daughters and seven grandchildren.

The crystallization of urease in 1926 was Prof. Sumner's most important scientific achievement. The history of this work can be read in his own words in "The Story of Urease" (*J. Chem. Education*, **14**, 255; 1937) by anyone who wishes a first-hand, true-to-life account of his prolonged efforts to purify the enzyme and then to defend his idea of its chemical nature against severe and intolerant criticism. His skilful refutation of this criticism required experiments of a highly ingenious and exacting nature.

Prof. Sumner was also well known for his work on the enzyme catalase. Another of his major accomplishments that is, however, not so widely known was the first crystallization of a hæmagglutinin (concanavalin *A*) from jack-bean meal, and the discovery that this protein required the presence of a divalent metal for its action.

Prof. Sumner was an excellent teacher as well as research worker, as the writer can testify from personal experience. He constantly brought his lectures to life by means of a variety of personal anecdotes. He was probably at his best, however, in the less formal teaching of his assistants and graduate students, to whom he communicated his wide knowledge of practical laboratory technique.

In carrying out his own research, Prof. Sumner impressed one as being something of a magician. He would often work furiously without revealing exactly what he expected to discover, and then the rabbit would appear. It should be added, however, that in the case of urease, nine years of persistent work were required before his final objective of isolating the enzyme was attained. His thinking was concrete rather than abstract, and his mind operated by brilliant flashes of intuition rather than by the more laborious process of logical deduction from a given set of premises.

Prof. Sumner was somewhat abrupt in manner, and this was apt to lead people to an attitude of reserve towards him until they found by closer association that his true nature was one of kindness and humanity. He was a very loyal friend. He was free from the intolerable conceit often shown by persons of considerable attainment, although he was justifiably proud of his accomplishments. It is unfortunate that, despite being made a joint recipient of the Nobel Prize in 1946 and being elected to the U.S. National Academy of Sciences, he appeared to retain a certain amount of embitterment from the unjustified criticism to which he had at one time been subjected.

Prof. Sumner lost one arm above the elbow in a hunting accident when he was in preparatory school. This may have been an important factor that spurred him on to success in biochemistry, in the face of discouraging advice. In spite of this handicap, he also became an excellent tennis player, and was fond of outdoor sports such as skiing, sailing and hiking.

Prof. Sumner introduced a new era into biochemistry. He lived to see the fruition of his discoveries and on his deathbed he must have felt the satisfaction, in spite of his great suffering, of knowing that he and his work had already become a recognized and important chapter in the history of biochemistry.

ALEXANDER L. DOUNCE

Mr. Harold Burrows, C.B.E.

HAROLD BURROWS, whose death occurred on September 29, will be greatly missed in the world of medical science. His career was both brilliant and unique. After leaving Marlborough College, he qualified in medicine at St. Bartholomew's Hospital, London, in 1899. He soon distinguished himself as a surgeon and, serving in that capacity in the First World War, was twice mentioned in dispatches. At the conclusion of hostilities he retained his link with the Services by accepting the appointment of consultant surgeon to H.M. Forces with the rank of colonel. In 1919 he was made C.B.E. On resuming his profession after the War he gradually built up one of the largest practices in the west of England, becoming consulting surgeon to both the Welsh Orthopædic and the Gosport War Memorial Hospitals. Harold Burrows received the Jacksonian Prize of the Royal College of Surgeons in 1922 and in the same year was appointed a Hunterian professor. The latter distinction was again conferred upon him in 1933 and 1935.

Shortly after publishing "Pitfalls in Surgery" in 1926, which was an important contribution based largely on his own experiences as a doctor, he became conscious of the strain his large practice had upon his health, and was finally persuaded to abandon clinical work. In 1927 he became a voluntary worker in the research department of the Royal Cancer Hospital, which later became known as the Chester Beatty Research Institute. Burrows was a keen and observant naturalist with a profound biological background, so the transition from medical practice to the life of a laboratory worker was not unduly difficult. In 1930 he was appointed experimental pathologist to the research staff of the Hospital.

Even while engaged in medical practice, Burrows had managed to keep abreast with scientific literature, and his special interest lay in endocrinology and the relationship of hormones to certain forms of cancer. Very naturally this became his special field; but his interests in cancer research covered a very wide range. He published, apart from his several textbooks, more than seventy papers since he gave up practice in 1927. Some of these articles, mainly on experimental carcinogenesis, were published in collaboration with Sir Ernest Kennaway, Sir Charles Dodds and Profs. J. W. Cook, W. V. Mayneord and E. Boyland. Apart from these numerous scientific contributions, his book "Biological Action of the Sex Hormones", published in 1945, was in many ways a classic. With his combined clinical and biological knowledge, few were better qualified than Burrows to write a book on this complex subject.

It was a critical review of the subject and dealt mainly with the physiological activities of the sex hormones and the reactions of normal tissues to them. A second edition was published by the Cambridge University Press in 1949.

After his retirement from the Chester Beatty Research Institute in 1945, he collaborated with E. S. Horning and published "Œstrogens and Neoplasia" in 1952. This book dealt exclusively with the part played by the sex hormones in both the induction and prevention of certain forms of endocrine cancer, and included much of Burrows's own fundamental work. When Lacassagne in 1932 published his fundamental discovery that œstrogens were implicated in the cause of mammary cancer, Burrows was already working on the same problem and was therefore one of the first to confirm Lacassagne's results. Continuing his researches along these lines, he was the first to discover the relationship of œstrogens to the induction of scrotal hernia in rodents, and also to find that œstrogens are not only carcinogenic but also carcinostatic, since they are capable, under certain conditions, of restraining the growth of some forms of hormonal neoplasms.

Burrows was particularly interested in the endocrine factors involved in the causation of tumours of the reproductive organs, and shortly before he died at the age of eighty he had already completed the manuscript for a book on this important subject. His last contribution was published in 1954 in the *Journal of Obstetrics and Gynæcology*.

Harold Burrows's many researches over a wide field of cancer, especially those on the study of disorders of the endocrine glands and their relation to the induction of neoplasia, form a very important contribution to our present-day knowledge of this subject. Many have lost a good colleague; but all can take consolation in the fact that his work has helped to enrich the annals of science.

E. S. Horning

NEWS and VIEWS

The Negative Proton

The University of California and the U.S. Atomic Energy Commission have jointly announced the detection of the negative proton, or 'anti-proton' (cf. *The Times*, October 20). Protons which had been accelerated to an energy of 6,200 MeV. in the bevatron, the proton synchrotron of the University of California Radiation Laboratory at Berkeley, were allowed to collide with a copper target. Negatively-charged particles coming out in a forward direction from this collision were selected and separated in momentum by a focusing and analysing magnet system to provide a beam of negative particles of known momentum. After a time of flight of about one-tenth of a microsecond, this beam may be expected to consist mainly of negative pi- and mu-mesons, with some negative K-mesons (mass about 965 electron masses) and possibly negative protons. These particles were then distinguished both by measurement of their time of flight from the target (since particles of different mass have different velocities for given momentum) and by means of a device measuring the velocity of each particle passing through by the angle of its Čerenkov radiation. In this way the presence of negative particles with protonic mass (within about ten per cent) and distinct from the known K-particles and hyperons was established. Their rate of production for the momentum and direction of this experiment was about one negative proton for every 50,000 negative pi-mesons with the same momentum and direction.

No clear evidence of the existence of the negative proton had previously been available. A very direct interpretation could be given for several isolated cosmic-ray events which have been reported by invoking the negative proton, but these interpretations were not unambiguous. On the other hand, theoretical physicists have always had great difficulty in constructing any relativistic theory of the neutron and proton which did not require the existence of their 'anti-particles', the anti-neutron and the negative proton. The theories which have been proposed suggested that these anti-particles could be created together with a proton or a neutron, a nucleonic pair-creation process, when sufficient energy was available to form the rest mass of the nucleon–antinucleon pair in accord with the Einstein relationship between rest mass and energy. The negative proton would be stable in vacuum, but it was expected to react rapidly on collision with normal nuclear matter, a negative proton and a normal nucleon undergoing mutual annihilation and becoming transformed into lighter mesonic particles. It seems most probable that this annihilation process would generally lead to two or three fast pi-mesons, although there are also other possibilities. It has not been established experimentally yet which are the annihilation processes of importance.

The discovery of the antiproton has removed a major uncertainty in theories of the structure of the basic nuclear particles. It may thus be compared with the discovery in 1932 of the antiparticle to the electron, the positively-charged electron known as the positron, in accordance with the prediction of Dirac's theory of the electron. The importance of the present discovery lies in showing that symmetry between particle and anti-particle, already known to hold for the electron and positron and for the positive and negative pi-mesons, is characteristic also of the heavy nuclear particles, and may therefore be expected to be a general and deep feature of any account of the elementary particles of Nature.

Industrial Fund for the Advancement of Scientific Education in Schools

Some companies which are concerned in the chemical, electrical and mechanical engineering fields of industry, viewing with growing disquiet the shortage of scientists, mathematicians and technologists, have decided to take steps to assist the teaching of pure and applied science and mathematics in secondary schools. The names of the companies are: Associated Electrical Industries, Ltd.; British Insulated Callenders Cables Co., Ltd.; British Petroleum Co., Ltd.; British Portland Cement Manufacturers, Ltd., Group; Courtaulds, Ltd.; The Distillers Co., Ltd.; English Electric Co., Ltd.; Esso Petroleum Co., Ltd.; General Electric Co., Ltd.; Arthur Guinness, Son and Co., Ltd.; Imperial Chemical Industries, Ltd.; Imperial Tobacco (Great