

## OBITUARY NOTICES.

### FREDERICK WILLIAM PAVY.

DR PAVY was born at Wroughton in Wiltshire on May 29th, 1829. He received his preliminary education at the Merchant Taylors' School and entered Guy's Hospital in 1847. After five years, he graduated at the University of London, taking the M.B. degree with honours in all subjects and the gold medal in medicine. In the following year he obtained the M.D. degree, and then went to Paris, where he met Claude Bernard, for whom, in after life, he always had the greatest admiration although disagreeing in so pronounced a manner with his teaching. On his return to England he was appointed a lecturer of anatomy at Guy's Hospital in 1854, and lecturer in physiology in 1856, which latter position he held until 1877. In 1859 he became assistant physician at Guy's, and full physician in 1871, when he was also appointed lecturer in medicine at the medical school. On his retirement from active work at Guy's in 1890, he was appointed consulting physician to the Hospital.

Dr Pavy took an active part in the proceedings of the Royal College of Physicians, at which he was sometime examiner, censor and councillor. He was President of the Royal Medical and Chirurgical Society in 1893 and President of the Association for the Advancement of Scientific Research and Chairman of the National Committee of International Medical Congresses until his death on Sept. 19th, 1911. During his career he delivered the Lett-somian Lectures in 1859, the Goulstonian Lectures in 1862, the Croonian Lectures in 1878 and again in 1894, and was Harveian Orator of the Medical Society in 1886. He was elected a Fellow of the Royal Society in 1863.

In 1901 he was awarded the Baly Gold Medal by the Royal College of Physicians for his excellent physiological investigations, and, in celebration of his 80th birthday in 1909, the members of the Physiological Society presented him with a silver bowl in token of their affection for him and admiration of his work. Many other honours were awarded to him not only by his colleagues in this country but by the wider medical fellowship in all parts of the world. He achieved a high reputation for the treatment of diabetes in Europe and America whilst still comparatively young, and his intense vitality enabled

him to maintain a commanding position for more than fifty years as an expert in the department which he had made his own.

Although consulted daily by patients from all parts of the world, Dr Pavy was much more than a physician. When the writer was first brought into contact with him towards the end of his active career, he seemed to be the ideal research worker, bending all his energies to search out the solutions of the problems with which he was so familiar. The mornings were given up to consultations, when he was brought into direct contact with the anomalies which reveal the essentially complex nature of the phenomena which are comprised under the term diabetes; the afternoons were devoted to research work, and the evenings to a consideration of the daily results and to the drawing-up of the programme for the next day's experiments. He seemed to be always picturing in his mind the possible sequences of events in the body. Possessed of a remarkably vivid imagination he could *see* the molecules of starchy food being broken down in the alimentary canal into glucose molecules and could watch these simple molecules passing through the walls of the intestines and making their way to the liver, the muscles or the urine. From the visualised processes, deductions were drawn which he sought to substantiate or refute by the test of experiment. He was exceedingly careful, desiring accuracy in his research work and certainty in the deductions to be drawn from it. For him, the positive result of a single experiment was never sufficient to ground a theory on, and he was always on the look-out for the pitfalls which were a cause of stumbling to so many of his co-workers.

The knowledge obtained through long years of experience of the manifold errors by which workers in his field of research were so liable to be led astray impelled him to give but little consideration to contemporary literature. He sought above all else to express his own views in the clearest possible manner, and the only two books he consulted frequently were a large dictionary of several volumes and Roget's *Thesaurus*. The present writer remembers many lengthy discussions over the relative merits of certain kindred words and their ability to express the exact shade of meaning he desired to convey. His writings are models of careful expression and often took weeks and months to prepare. One result of this devotion to accuracy of expression was that he ascribed the same virtue to his contemporaries and often read into their words meanings which the authors themselves did not wish to convey. More than one of the controversies in which he took part arose in this way.

The majority of Dr Pavy's scientific publications are concerned with the metabolism of the carbohydrates in one or other of its aspects. His views on this subject changed very considerably with the passing years. In his early days he discovered that the glycogenic doctrine promulgated by Claude Bernard, which assigns to the liver a regulating function over the supply of carbohydrate to the tissues, was based on faulty experiments. He showed that the saccharine condition of the liver was due to *post-mortem* changes and was absent in the living animal. Further, according to his careful analyses, arterial blood contained only the same amount of dextrose as venous blood, which seemed to prove that dextrose did not pass from the liver to the tissues as free dextrose. Finally he maintained that the kidney acted as a filter which allowed all the diffusible substances in the blood, such as urea and dextrose, to pass into the urine, retaining only the indiffusible proteins within the blood-vessels. "Hence," he argues (in *Carbohydrate Metabolism and Diabetes*, 1906), "if sugar (dextrose) passed as free sugar into the circulation from the food or from the liver, as is contended for under the glycogenic doctrine, the urine could not fail to afford a revelation of the fact." His antagonism to the glycogenic doctrine was thus maintained to the end of his life, although his later experiments convinced him that the glycogen of the liver, after being broken down by enzyme action into dextrose, is normally transported by the blood to the tissues. He could not admit, however, that this passage was in the form of free dextrose, but thought that the dextrose must be adsorbed by, or otherwise loosely combined with, the proteins of the blood.

Dr Pavy regarded the blood as a food of constant composition for the tissue cells. Assimilation occurred at the seat of absorption in the intestines or in the liver, and the work of building-up protein from dextrose and amino-acids was considered by him to be done by the lymphocytes, whilst the transformation of the excess of dextrose into fat and glycogen took place in the columnar epithelium of the mucous membrane of the intestinal wall, and in the liver. Synthesis of protein by the growth of lymphocytes, like yeast cells, on the products of digestion in the wall of the alimentary canal is a view that appeals to the imagination; but it has not met with much favour from the sober-minded physiologists of the present day. The fat-forming powers of the columnar epithelial cells have also been denied, but the exact location of the transformation, which undoubtedly does occur in the body, is still unknown, and it may be that the future will see the vindication of this as well as of other visions of Dr Pavy.

Perhaps the most startling of his discoveries in the domain of biochemistry was the recognition of the carbohydrate groups in the protein molecule. Dr Pavy's theory of the glucosidic nature of the proteins was received with interest throughout the scientific world, and a multiplicity of gluco-proteins have since been isolated. Later investigations have shown, however, that the carbohydrate linkage is not of a glucosidic nature so that the metabolic value assigned to these groups by Dr Pavy has not been generally accepted although no other explanation of their significance has yet been attempted.

Among his contributions to chemical physiology must also be mentioned the method for the quantitative estimation of reducing sugar by means of Pavy's ammoniated cupric test which affords excellent results after a little practice.

In the treatment of diabetes, Dr Pavy did much to provide a more suitable and palatable dietary for the diabetic, and, indeed, was responsible for the introduction of almond and other protein-rich bread substitutes. Regarding excess of free dextrose in the blood of diabetics as exerting a toxic action on the system, it seemed to him essential to stop its flow through the body and his treatment usually commenced by placing the patient on a carbohydrate-free diet. Afterwards, as assimilative power returned, starchy food was allowed, but only in such quantity as to maintain the urine free from dextrose. He was among the first to grasp the importance of the acetone series of substances eliminated especially in acute stages of the disease, and published several papers concerning them. The albuminuria often associated with diabetes naturally interested him as well as the cyclic or physiological albuminuria which he was the first to recognise.

Although many of his views are unorthodox and may be considered improbable, Dr Pavy's critical spirit and his unflagging enthusiasm for experimental research have exerted a stimulating influence on two generations of physiologists, and he has thus been the means, indirectly as well as directly, of extending the borders of our knowledge of carbohydrate metabolism and diabetes. His memory will be cherished by all who were privileged to be brought into intimate relations with him, and his example will be an inspiration throughout all future days.

Dr Pavy married in 1855 Julia, daughter of Mr William Oliver, by whom he had a daughter, Florence, who married the Rev. Borradaile Savory, son of the famous surgeon, Sir William Savory, and father of the present baronet.

H. W. BYWATERS.