

Frederick William Pavy

David Adlersberg, M.D.,* *New York*

Frederick William Pavy was born on May 29, 1829, at Wroughton, Wiltshire, England. He received the M.B. degree of London University, with honors in physiology and medicine in 1852, and the M.D. degree in 1853. After serving as house surgeon and house physician at Guy's Hospital, he continued his studies in Paris in the laboratory of Claude Bernard already famous for his researches in physiology. Claude Bernard awakened Pavy's interest in experimental physiology, especially in carbohydrate metabolism, which persisted to the end of his life. His first communication to the Royal Society in 1855 was entitled: "An Experimental Inquiry into the Nature of the Metamorphosis of Saccharine Matter as a Normal Process of the Animal Economy." His later papers were concerned with lesions of the central nervous system producing diabetes. Another study from the early research period was entitled: "Experimental Inquiry into the Alleged Sugar-Forming Function of the Liver." As his systematic experimental research went on, Pavy came to disagree with Bernard's views of the glycolytic theory of diabetes.

His classical book, *Researches on the Nature and Treatment of Diabetes*, written almost one hundred years ago (1862, republished 1869), presents a summary of his experimental work and of his theories of diabetes. He proved that during life the blood of the right heart does not contain more sugar than that in other parts of the circulation. He thus eliminated the basis of the theory, prevalent at that time, that the lungs are responsible for the combustion of sugar. He maintained that the metabolic error of diabetes is caused by "mal-assimilation of sugar." According to this theory, failure to incorporate sugar into the large molecules of protein results in diabetes, in accumulation of free glucose in the circulation and by necessity in its excretion in the urine. In extensive and meticulous studies Pavy was able to demonstrate small quantities of sugar in the urine of normal persons, in his opinion a most significant finding. He described extensively the laborious studies devoted to the carbohydrate fraction in serum proteins.

To the clinician his book on diabetes is of particular interest because of a very careful analysis of the symptomatology of human diabetes. Polyuria and polydipsia

* Associate Attending Physician for Metabolic Diseases, Mount Sinai Hospital; Assistant Clinical Professor, College of Physicians and Surgeons, Columbia University, New York City.

and their relation to the concentration of glucose in the urine and to the specific gravity are extensively discussed. Such details as white spots left on articles of clothing "where drops of urine had fallen," the type of thirst that cannot be quenched, however much fluid is taken, "a peculiar sensation, not exactly hunger, referred to the stomach, which the diabetic is generally well acquainted with," the changes of mouth and tongue, the sweet taste, changes of the skin and "a peculiar odour eliminated from the body of the diabetic," are discussed. In his experience the "odour of the diabetic resembles the smell of ripe apples more than anything else." It may be safely assumed that many of Pavy's patients exhaled acetone in their breath. Questions of diet interested him greatly. He stressed the necessity of eliminating carbohydrates from the diet because of his concept that in diabetes these foods are not assimilated properly. He used gluten and almond bread as substitutes and introduced codeine as a substitute for opium in the treatment of diabetes. The book includes many recipes for carbohydrate-free dishes and a careful discussion of various menus. His book on diabetes remained for many years the standard book in the field.

In 1874 Pavy published his second important monograph entitled: *Treatise on Food and Dietetics* (second edition 1875). Without presenting too much original research the book gives a good account of the knowledge of nutrition approximately ninety years ago and has a sound physiological basis. There is an interesting discussion of foods eaten by the inhabitants of various regions including the arctic, by Indian tribes, the natives of Australia, China, Japan, Egypt, and Abyssinia. A chapter on practical dietetics includes an elaborate discussion on proper quality and quantity of food, on culinary preparation of food, on diets for thinness and stoutness, for gout and diabetes. An appendix presents the dietaries used in the various hospitals of England; it affords an excellent illustration of the customs and habits of that time. Pavy's treatise on food and dietetics became a second standard book for many years and makes interesting reading today.

Pavy's interest was not confined to the subject of carbohydrate metabolism and diabetes. His name is associated with the recognition of postural albuminuria and with the immunity of the gastric mucosa to auto-digestion. As a pupil of Claude Bernard he realized that understanding of the normal processes in the body

is a necessary prerequisite for the study of disease. He was methodical, punctual, precise and "never in a hurry." He performed his duties in a large hospital and medical school, Guy's Hospital in London, and had an extensive private practice especially among the sufferers from the disease to the study of which he devoted most of his life. Even in his old age he spent much time doing research in diabetes. In 1905 he presented a paper, "The Pathogeny of Diabetes," before the International Congress of Internal Medicine. His final paper was published in 1911 and its title was: "Some Recently Elicited Facts Relating to Carbohydrate Metabo-

lism and Glycosuria." He died in London on Sept. 19, 1911, in his eighty-third year.

Pavy was one of the prominent physicians of the second half of the past century. He was a worthy successor of Prout and Bence Jones and a contemporary of Garrod and Thudichum. His leading role in medicine may be characterized as that of a clinician-chemist who built the foundations and advanced the study of metabolism mainly by applying new experimental technics and advances in physiology to research in clinical medicine. He was the founder of the modern study of diabetes.

Robert Russell Bensley, 1867-1956

Arnold Lazarow, M.D., Ph.D., Minneapolis*

Not "who is right, but what is right" characterized the life of Dr. R. R. Bensley. The effect of this philosophy upon the lives and attitudes of his students and their students constitutes a truly effective memorial. Dr. Bensley had the wisdom and patience to refrain from engaging in polemics, allowing time to prove his theses; he had the longevity to see many of his important discoveries first ignored, later accepted, and finally acclaimed.

Dr. Bensley was born of an English-Canadian father and Irish mother on a farm near Hamilton, Ontario, on Nov. 13, 1867. His vigorous boyhood included farming in summer and logging in winter. He attended country schools and the Collegiate Institute in Hamilton. At the age of sixteen he left for Toronto to enter the University College where he participated in college life with zest. He registered for all the courses in chemistry, languages, arts and sciences that were given. Obviously some of the classes were rarely or never attended, but he passed the courses by examination.

In his third year of college, while pursuing a favorite hobby, hunting, he suffered a severe gunshot wound of the leg. He applied a tourniquet himself, thus preventing bleeding to death from a severed artery. A noted surgeon of the day was summoned and he amputated the shattered leg below the knee. The operation was performed on the dining room table of the

farm house. Following the surgery gangrene set in, and another amputation high in the thigh had to be performed. Following this there developed thrombophlebitis, septicemia and bacterial endocarditis. The surgeon left a pound of opium with the family with directions to keep the patient comfortable and left the young man to die in peace. However, the patient regained consciousness and with it a determination to live. In about two weeks he recognized his dependence on the narcotic and suspected that it might be the cause of many of his symptoms; therefore, he refused to take any more. By sheer will power he survived about four days of torture after which his recovery was progressive and complete.

His convalescence took about a year. During this time he did a prodigious amount of reading. His father bought him a microscope and a few inexpensive accessories. He learned how to make dyes out of bark and fruit and to stain preparations with them. His preparations were mounted with balsam collected from the blisters of a Canada balsam tree growing in the front yard. This year's activity set the pattern and direction for much of his life's work.

In the fall of 1888 he returned to University College and was graduated with honors in 1889. He won the Governor-General's medal in both arts and sciences and a prize in both chemistry and languages. His interest in and facility for language was maintained throughout his life. His aptitude for chemistry enabled him to become an expert in the chemistry of dyes and it

* Professor and Head of the Department of Anatomy, University of Minnesota, Minneapolis, Minnesota.