pronounced with the male than with the female type of hormones. A feminizing effect may also follow the administration of male hormones to males in amphibia. reptiles and mammals or to developing male chicks. To explain these double effects Burns has suggested that the introduced substances either may be changed chemically in the body or may stimulate the secretion of the normal heterotypic hormone. It is well known that the pituitary and other endocrine glands are closely associated physiologically with the sex glands.

Transplantation experiments prove that the primary germ cells of the vertebrates, like those of the invertebrates, are bipotential and that their differentiation into the germ cells characteristic of the one sex or of the other is controlled by the associated tissues. They will become of the male or of the female type depending upon their position within the sex glands; male if situated in the medullary portions and female if in the cortex. Since only one of these two portions is normally retained in each of the functional sex glands of vertebrates with separate sexes, the germ cells remaining are all of the same sexual type. If both portions develop simultaneously hermaphroditism results, but if either one is inhibited for a time and later becomes functional, consecutive sexuality of the one type or of the other, as mentioned for certain invertebrates and fishes, may ensue.

Functional activity, however, is dependent upon agencies additional to those which govern the differentiation of the organs; it requires the mutual interaction of the organs themselves with other secreting and reacting systems, including the nervous system. Only then is physiological sexuality realized and only then do the sexual instincts become operative.

The realization of functional sexuality, therefore, requires the participation of a long series of hereditary reaction systems which are activated one after the other in orderly sequence under the influence of suitable external and internal conditions. The environmental requirements may change during successive stages of development. Each developmental event as it occurs is a response to a preceding action and in turn initiates the one that is to follow. If any one of these reactions fails to occur because of either hereditary or environmental deficiency functional sexuality is not realized. The individual is sterile, and its line of descent comes to an end.

OBITUARY

WILLIAM SNOW MILLER
1858–1939

DR. WILLIAM SNOW MILLER, emeritus professor of anatomy at the University of Wisconsin, died at Madison on December 26, 1939, in his eighty-second year after a brief period of illness and inactivity. Although death came in the fullness of years it appeared especially untimely in one with his mental alertness and scientific activity. In the seventeen years since his retirement from active teaching, Dr. Miller's accomplishment has been such that it might well be the envy of a much younger man. With a daily routine of a morning spent in the laboratory and an afternoon in his well-equipped library, he has furthered the two great interests of his life, the anatomy of the lung and medical history. In the former, his researches of a period of almost a half century were consolidated in his monograph "The Lung," published in 1937. This book had been so eagerly awaited that a first printing of 1,500 copies was exhausted in two weeks. This book he wisely regarded as not the last word on the subject but as a foundation upon which others might build. This work he would leave as his monument.

Dr. Miller's interest in the cultural side of medicine led to the assembling at his home of a library, unusually rich in the classical anatomical works, in medical biography and history and in general medicine. During the past thirty years there has been held in this library a bi-weekly seminar in the history of medicine. This was at first composed of a select group of interested students, and later, after his retirement from active teaching, of colleagues of the medical faculty. Numerous published contributions to the history of medicine have resulted from this seminar. In later years Dr. Miller's own interest has been centered largely in early medical conditions in Wisconsin. Through his efforts a memorial tablet to William Beaumont was set up at Prairie du Chien, where so many of the observations on Alexis St. Martin were made.

It is, however, not only as a skilled, patient and persistent investigator and as cultivator of the historical field that Dr. Miller is to be remembered. He was also a teacher of distinction. In his earlier years at Wisconsin he came into intimate contact with the premedical students with whom he worked. To them he taught histology, neurology, comparative anatomy, topographical anatomy and embryology. Given this extended association with members of small classes, his influence on his students was easily greater than that of any other faculty member. His high ideals, his scientific curiosity and his beautiful, precise laboratory technique were a living example and inspiration to them. That he was a strict taskmaster in requiring of his students similarly honest, clean-cut, independent work did not prevent but rather resulted in a devoted following of young medical men who main-

tained for him an admiration and affection which lasted throughout his life. In the success of these men lay his greatest pride.

While the larger classes and the restriction of his teaching to the subjects of histology and neurology, after the establishment of the medical school, lessened his contact with students, it hardly diminished his influence, for he remained always a living ideal and the noblest ornament of the medical school.

Dr. Miller was born at Stirling, Mass., on March 29, 1858, the son of the Reverend William and Harriet Emily (Snow) Miller. With the foundation of his education laid in this cultured home, he attended Williston Academy at East Hampton, Mass. Afterward following a preceptorship under Dr. C. H. Hubbard at Essex, Conn., he entered Yale Medical School, from which he was graduated M.D. in 1879. Following graduation, he studied under Dr. Francis Delafield at the College of Physicians and Surgeons in New York for several months and then returned as laboratory instructor under Dr. Benjamin Silliman, Jr., at Yale. An infection, received at a post-mortem examination, led to a long illness. Upon recovery he deserted the laboratory for medical practice, which he carried on first at Clinton and later at Southbury, Conn.

His great tribulation, slowly developing deafness, drove him from medical practice back to the laboratory in 1889, when he became pathologist to the City and Memorial Hospitals in Worcester, Mass. A year later he became a fellow at Clark University, where he came under the influence of Dr. F. P. Mall and began his study of the lung. With the disruption and dispersion of the scientific faculty in 1892, Dr. Miller accepted an appointment as instructor in zoology at the University of Wisconsin. There he spent the rest of his academic life, with the exception of three years, one of which was spent in Leipzig and two at Johns Hopkins. He became emeritus professor of anatomy in 1924.

The honorary degree of doctor of science was conferred upon Dr. Miller by the University of Cincinnati in 1924 and by the University of Wisconsin in 1926.

Other honors came to him. He was honorary member of the National Tuberculosis Association and in 1934 the association honored him with its Trudeau medal. He was an honorary member of both the Connecticut and Wisconsin Medical Societies. He was a Harvey Society lecturer in 1924. He was a fellow of the American Association for the Advancement of Science; the American Medical Association; the American Association of Anatomists (vice-president, 1909); American Association of the History of Medicine; Medical History Society of Chicago; Milwaukee Academy of Medicine; Wisconsin Academy; Deutsche Gesellschaft für Geschichte der Medicin und der Naturwissenschaften; Société Internationale d'Histoire de la Medicine; Union International contra la Tuberculose.

Dr. Miller was twice married. His first wife, Carrie M. Bradley Miller, of Clinton, Conn., died in 1901. In 1912 he married Miss Alice Burdick, of Madison, who survives him.

C. H. BUNTING

RECENT DEATHS

DR. ARTHUR WHIPPLE SMITH, since 1920 professor of mathematics at Colgate University, died on February 11 at the age of sixty-three years.

REV. FRANCIS J. WENNINGER, professor of zoology and dean of the College of Science of the University of Notre Dame, died suddenly on February 12. He was in his fifty-second year.

DR. RALPH DANIEL REED, chief geologist of the Texas Company, Los Angeles, past president of the American Association of Petroleum Geologists, died on January 19 at the age of fifty-one years.

COLONEL R. E. CROMPTON, of London, pioneer electric lighting engineer, twice president of the Institute of Electrical Engineers, died on February 15 at the age of ninety-four years.

SCIENTIFIC EVENTS

A MINERAL MAP OF CANADA

THE diversity of mineral wealth of Canada and the wide-spread distribution of the mineral resources of the country are shown in a new mineral map of the Dominion issued recently by the Department of Mines and Resources, Ottawa. The map, which is on a scale of 100 miles to the inch, measuring 18 inches by 35 inches, shows the active sources of supply of the metals and minerals being produced in Canada, together with the known, but as yet non-productive sources of supply. On it are shown also the locations of lode gold and placer gold areas; of all lead, zinc, copper, nickel, precious metals, iron and steel and other metallurgical plants; and of cement plants, petroleum refineries and fertilizer plants. Shown in colors are the geological provinces of the Dominion, the largest and most important of which, from the viewpoint of mineral production, is the Canadian Shield, which covers an area of approximately 2,000,000 square miles.

Compared with a similar map issued several years ago, the new map brings to light much evidence of the rapid headway that has since been made in Canadian mining. One instance is the appearance of many new