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VICTOR CLARENCE VAUGHAN*

PHYSICIAN, educator, biochemist, hygienist, patriot. Born at Mount Airy, Randolph County, Missouri, October 27, 1851; died at his home in Richmond, Virginia, November 21, 1929.

Victor Vaughan first emerged from the obscurity of youth and adolescence at the age of nineteen as professor of Latin at Mount Pleasant College, Huntsville, Missouri. In his earlier years he had been tutored by a man whose first love was Latin and who so drilled this dead language into the young boy that the two of them were able and accustomed to carry on their daily conversations in Latin. It was but natural then, that immediately upon his graduation from Mount Pleasant College, he should devote his energies to that subject in which he was most proficient. But for a man whose subsequent life has proved him to be an indefatigable searcher for the truth in the great unknown realms of science, the teaching of a dead language could scarcely be expected to become his permanent metier.

He discovered the latter quite by accident. In an unused room in Mount Pleasant College which had been closed through the Civil War, Victor Vaughan discovered a number of unopened packing cases which on investigation proved to contain a complete outfit for a chemical laboratory. Obtaining permission to set up the laboratory, and to experiment with the various chemicals, he soon became fascinated with the work and within a short time was teaching chemistry along with his Latin. Throughout the remainder of his life the viewpoint of the chemist dominated his contributions to research.

In 1874 he entered the University of Michigan to pursue his chemical studies, and a year later added the degree of M.S. to that of B.S. obtained in Missouri. In 1876 he received the degree of Doctor of Philosophy, and two years later that of Doctor of Medicine. In 1897 he was made an honorary Doctor of Science by the University of Western Pennsylvania. Four times he received the honor of the degree of Doctor of Laws, the highest honor

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that can be conferred by an institution of higher learning. He received this degree from the University of Michigan in 1900, Central College, Missouri, in 1910, Jefferson Medical College, Philadelphia, in 1915, and from the University of Missouri in 1923. An unusual honor was the conferring on him of the honorary degree of Doctor of Medicine by the University of Illinois in 1894.

Dr. Vaughan's first contribution from the chemical laboratories of the University of Michigan, appearing in 1875, was on the separation of arsenic from other metals. Throughout the succeeding fifty years the study of organic and inorganic poisons held greatest interest for him, and his contributions to the subject have been authoritative. Before long he was recognized as one of the leading toxicologists of the country, and his services were in constant demand in cases of medico-legal dispute.

As early as 1875 Dr. Vaughan became associated with the Medical School of the University of Michigan as instructor in medical chemistry. In 1878 he published his second book, a textbook of physiologic chemistry which went through three editions in as many years. In 1880 he was made assistant professor, and in 1883 professor of physiologic and pathologic chemistry and associate professor of therapeutics and materia media in the Medical School of the University of Michigan.

During these years Dr. Vaughan's research work paralleled quite closely the line of his teaching work. He continued always interested primarily in the chemical causes of disease and the changes in the human body consequent on contact with these causes.

In 1880 he became interested in the contamination of drinking water, and this eventually led him into the field of public health. The inadequate and unsanitary facilities for obtaining drinking water at that time rendered the question of pollution most important. In those days the only method of examination was chemical, and gradually the function of examining water supplies from all over the state of Michigan fell to Dr. Vaughan. He soon saw that this was but a very small portion of the general problem of sanitation and his interest in this field gradually broadened. In 1886 he wrote the Lomb prize essay of the American Public Health Association entitled *Healthy Homes and Foods for the Working Classes*, which went through many editions and was translated into most of the modern languages. In 1883 he was appointed a member of the Michigan State Board of Health, and for the following thirty-six years he served as its president, until 1919 when the board was disbanded and replaced by a commissioner of health.

During his first fifteen years at Ann Arbor, Dr. Vaughan carried on his investigations in the chemical laboratory. However, it gradually became apparent that the old chemical laboratory was inadequate for pursuing problems relating to health and disease. He therefore sought and obtained a grant from the Michigan legislature in 1887 with which to build and equip a hygienic laboratory at the University. At the same time he was made professor of hygiene and physiological chemistry and director of the hygienic laboratory. These positions he retained until his retirement from the university.

At this time the newly developing science of bacteriology was the great advance of the day. Although Pasteur had laid the foundations some years

before, and Robert Koch had demonstrated that the anthrax bacillus is the cause of anthrax, the birth of the science of bacteriology dates from 1882, when Koch developed methods for isolating bacteria. In 1887 when the hygienic laboratory was being built, bacteriology was but five years old and there were no trained bacteriologists in this country. In 1888 Dr. Vaughan therefore spent some time in the laboratory of Dr. Robert Koch in Berlin, gaining an understanding and mastery of this new science. Immediately upon his return this work was introduced into the hygienic laboratory. This was the first laboratory in the United States offering systematic teaching of bacteriology to students and physicians, and the second in the world.

As a consequence of his rapidly developing preeminence in the fields of hygiene and sanitation and toxicology, Dr. Vaughan was offered in the nineties the professorship of hygiene at Bellevue Medical College, New York, together with the position of coroner for the city of New York. These honors, however, he declined, feeling that he could never be happy living in the great city. At about this time he was made Dean of the Department of Medicine and Surgery at the University of Michigan, a position which he held for thirty years, until his retirement in 1921. Under his direction the school grew steadily until it became one of the greatest medical schools in the United States. He gathered around himself a faculty of the best minds in medicine, and as rapidly as another great medical school would take away individual members for its own faculty, he would replace them with other men of equal brilliance.

From the time of his tutelage under Robert Koch, Dr. Vaughan's first interest in the research laboratory remained always the mechanism by which bacteria cause disease and the manner in which the living body combats bacterial infection. This was but a logical step from the study of the chemical causation of disease, and throughout the remainder of his work his viewpoint, even in the field of bacteriology, was that of a chemist. This is in evidence even in the last essay which he wrote, *A Chemical Concept of the Origin and Development of Life*, in 1927. Dr. Vaughan has with entire justice been called one of the founders in this country of the modern science of biochemistry, or the chemistry of life.

His contributions to medical literature are too numerous to detail, being represented by about two hundred and fifty short articles and seventeen books, some of which have gone through several editions. Among the outstanding contributions emanating from his laboratory may be mentioned *The Michigan Method of Water Analysis*; the discovery of tyrotoxon or cheese poisoning; the demonstration that a variety of bacteria may be responsible for the summer diarrheas of infancy; the discovery that nuclein, a constituent of normal blood, possesses germicidal properties; and chemical researches into the nature of bacteria and their reaction with living tissues which culminated in Vaughan's theory of infection and immunity, a theory which today still colors most of our understanding of these processes.

In 1898 Dr. Vaughan joined the Thirty-Third Michigan Volunteer Infantry as major and surgeon and served through the Spanish-American War as division surgeon. He was the first surgeon to come under the fire of the Spanish batteries at the Battle of Santiago. While in Cuba he contracted

yellow fever, and after a prolonged convalescence, he was invalided home to Washington. Here he, Major Walter Reed, and Major Edward Shakespeare were appointed as a commission to study typhoid fever among the Spanish War troops. This committee made revolutionary observations on the nature and manner of the spread of typhoid. Reed and Shakespeare having died, it fell upon Major Vaughan to complete the work and write the report. This he did in a massive two-volume contribution which stands today as one of the most authoritative works on the epidemiology of typhoid and kindred diseases.

From the time of the Spanish-American War until his retirement, Dr. Vaughan remained in close contact with the army and the United States Public Health Service, serving on the advisory board of the Surgeon-General of the United States Public Health Service, and on the advisory board of the Hygienic Laboratory at Washington.

In September, 1916, many months before the entrance of the United States into the World War, the National Research Council was organized as a committee from the National Academy of Science, to serve the president of the United States in an advisory capacity in preparation for war. Dr. Vaughan, who was one of the organizers of this committee, served with it throughout the war, and following its reorganization after peace, became the first chairman of the medical division of the National Research Council. This position, requiring full time, necessitated Dr. Vaughan severing his connection with the medical school of the University of Michigan and moving to Washington. Throughout the World War he served as colonel in charge of the Division of Communicable Diseases in the Surgeon-General's office, and on the executive committee of the general medical board of the Council of National Defense. By virtue of his position in the army, he was able to apply his wide knowledge of hygiene, sanitation, and epidemiology in the organization and supervision of the army training camps throughout the United States. Following the close of hostilities, he wrote a two-volume treatise on *Epidemiology and Public Health*, into which he has incorporated his own vast experience together with the experience of others.

As an editor he founded the *Physician and Surgeon*, in 1888, the JOURNAL OF LABORATORY AND CLINICAL MEDICINE, in 1915, and in 1923 served as the first editor of *Hygeia*, a popular journal published by the American Medical Association.

Dr. Vaughan served as president of the American Medical Association in 1914-15, and for many years remained a member of its Council on Medical Education. From 1919 to 1923 he was chairman of its Council on Health and Public Instruction. He was a member of the Association of American Physicians, being its president in 1908-9. He was president of the American Tuberculosis Association in 1919. He was also a member of the National Academy of Sciences, the American Philosophical Society, the French Society of Hygiene, the Hungarian Society of Hygiene, and other learned societies.

He served for several years on the board of directors of the International Health Board, which has done more than any other one organization to stamp out hookworm, malaria, and yellow fever from the Americas.

Following the Spanish-American War he received a citation for gallantry under fire, and following the World War he received the Distinguished Service Medal for his work in epidemiology, and was made a Knight of the Legion of Honor by the French government.

In 1928 he received the Kober Medal of the Association of American Physicians for outstanding contributions to his profession.

No biographic review of Dr. Vaughan's rich and varied life would be complete without some mention of his first twenty years as a physician, during which he devoted half of his time to the practice of medicine. It was what he saw and heard at the sick bed that filled him with a compassion and sympathy which lasted throughout his life, which won for him devoted friends and admirers throughout the world, and which spurred him on throughout his life in his battle against filth, poverty, and ignorance, against typhoid fever and tuberculosis, and against the germs of disease. Unlike many of the present-day research workers, he had seen on both sides of the curtain, he was able to work not only as a laboratory investigator interested in an abstract problem but also with the zeal of one who had witnessed human suffering and who hoped to do his bit toward ameliorating it. Fortunately, he has left in *A Doctor's Memories* a delightful narrative of his unique experiences and of his contacts with the great minds of his time, both in Europe and America.

In 1927, upon his return from the Orient where he had attended at Tokio a meeting of the Pan-Pacific Congress as a representative of the government of the United States, the National Research Council, and the American Medical Association, he suffered a mild apoplectic seizure from which he recovered, but which terminated his participation in active work.

—Warren T. Vaughan.