

# Victor Vaughan (1851–1929) and the birth of bacteriology in the United States

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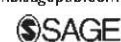
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## Abstract

Victor Vaughan is well known for his numerous accomplishments and services to science, medicine, and public health. This paper discusses one of Dr Vaughan's earliest and most significant accomplishments: founding the Hygienic Laboratory at the University of Michigan in 1887, the first in the United States. The vision, initiative and planning demonstrated by this episode illustrate the characteristics that enabled Vaughan to have such an accomplished and storied career.

## Keywords

Vaughan, Novy, bacteriology, Hygiene laboratory, University of Michigan

Victor Vaughan was born in October 1851 on a farm in Missouri where he spent his early years. In 1874, at the age of 23 Vaughan travelled by rail to the University of Michigan to pursue a master's degree and PhD in Chemistry, which he completed in 1876. In 1876, Vaughan obtained his first faculty position and began teaching physiology at the medical school. He also earned a medical degree from the University of Michigan in 1878. In 1881, Dr Vaughan started teaching a new course called *Sanitary Science*, eventually renamed the *Course on Hygiene*. The germ theory of disease was not yet widely accepted and had some

influential opponents in the sciences and so the more general and neutral term of hygiene was used before today's terms bacteriology and microbiology came into general use. Dr Vaughan's Course on Hygiene was clearly related to microbiology and included

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**Figure 1.** West Physics Building, constructed in 1887, the first home of the Hygienic Laboratory. Source: The University of Michigan: An Encyclopedic Survey; Walter A Donnelly, Wilfred B Shaw, and Ruth W Gjelsness, editors; Ann Arbor: University of Michigan Press, 1958.

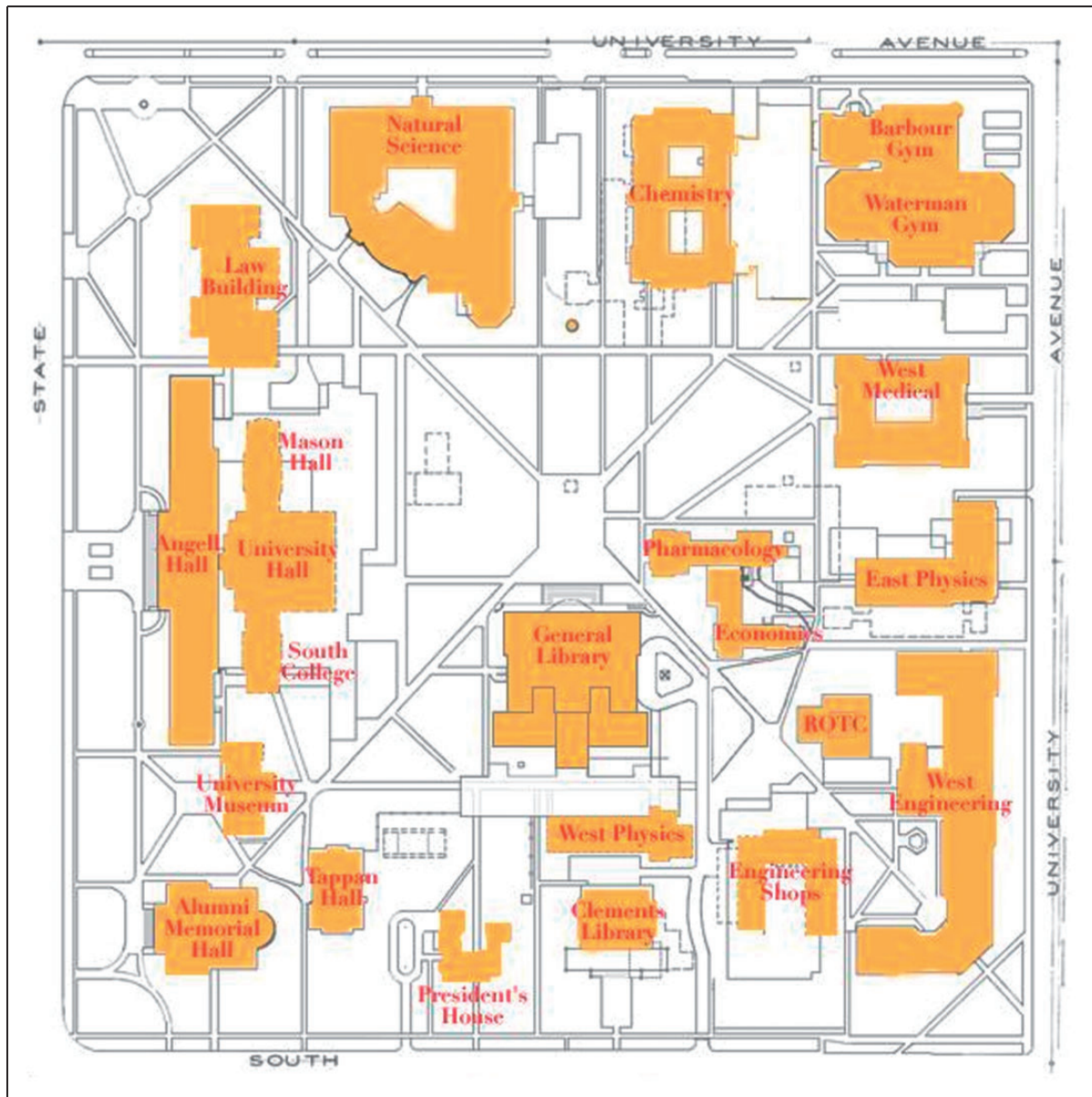


**Figure 2.** West Medical Building, constructed in 1903, second home of the Hygienic Laboratory. This stands today as the Dana Building. Source: University of Michigan Millennium Project. <http://umhistory.dc.umich.edu/history/>

topics of ferments and germs, disease germs, filth diseases, antiseptics and disinfectants and their use, quarantine and vaccination. With the eventual opening of the Hygienic Lab in January of 1889, this course was moved there and renamed *Methods of Hygiene*.

Frederick Novy (1864–1957) also served an instrumental role in the development of the Hygienic Laboratory and the Medical School at the University of Michigan. As a youth, Novy developed an early interest in chemistry and microscopic life. During his

high school years, he would observe specimens collected from swamps around Chicago and is reported to have presented a paper on his findings to a local group. Novy earned the BS degree in chemistry from the University of Michigan in 1886, his doctorate in 1890, and an MD degree in 1891. He undertook several transatlantic journeys to study with the top scientists of the time, including time at the Imperial Laboratory of Hygiene in Berlin in 1888, the Pathological Institute of Prague in 1894, and the

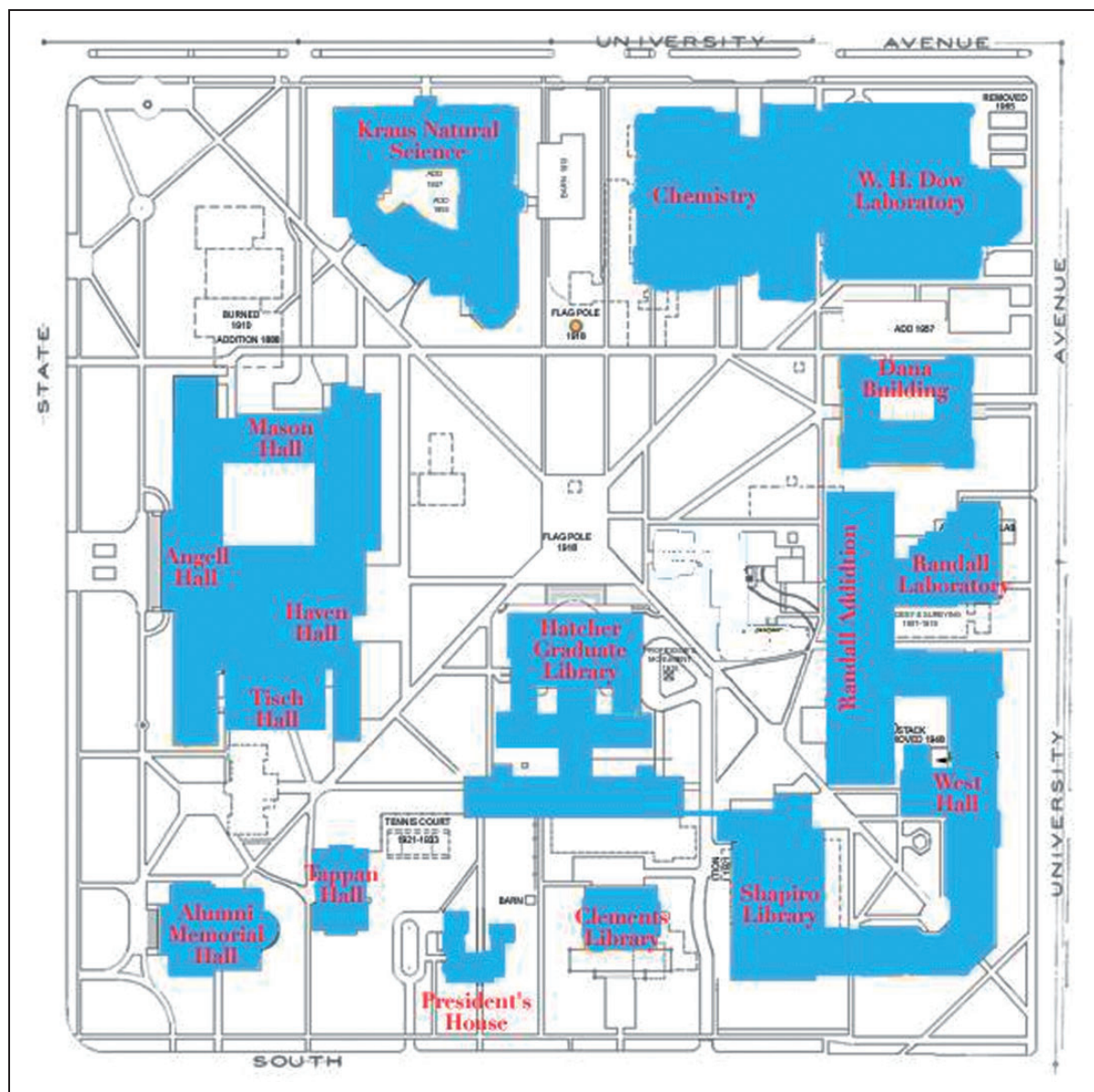


**Figure 3.** University of Michigan Central Campus, 1925. The map shows the West Physics Building, original home of the Hygienic Laboratory and the West Medical Building, the second home of the Hygienic Laboratory. Source: University of Michigan Millennium Project. <http://umhistory.dc.umich.edu/history/>

Pasteur Institute in Paris in 1897. In addition to his contributions as a prolific researcher and inventor, Dr Novy headed the Department of Bacteriology at the University of Michigan from 1902 until 1935, and was Dean of the Medical School from 1933 to 1935.

During his early years teaching at the Medical School, Dr Vaughan used to enjoy discussing the germ theory of disease with his colleagues in the School of Medicine. Although bacteria had been seen using the microscope almost two centuries earlier, the idea that they could cause disease was controversial and not widely accepted by scientists or physicians. A series

of discoveries after 1850 had begun to lend support to the germ theory of disease; these included the development of pasteurizing beer and wine to prevent spoilage by bacteria by Dr Louis Pasteur (1822–1895) and the antiseptic technique to prevent infections following surgery by Dr Joseph Lister (1827–1912). Dr Vaughan developed a conviction regarding the germ theory of disease and in January 1884 he made his first request to have the regents consider the establishment of a State Laboratory of Hygiene. Although Dr Vaughan's first request was denied, the timing of the request was notable since in 1884 Dr Robert Koch (1843–1910) of



**Figure 4.** University of Michigan Central Campus, 2000. The map shows the present day Dana Building (former West Medical Building). The West Physics building burned down in 1966. Source: University of Michigan Millennium Project. <http://umhistory.dc.umich.edu/history/>

Berlin published his groundbreaking and now widely accepted *Koch's Postulates* dealing with the germ theory of disease. The fact that Dr Vaughan made his request for the construction of a hygienic laboratory in January 1884, months before he could have learned of Koch's postulates, speaks volumes about his scientific foresight and level of conviction about the germ theory of disease.

As the months passed, the implications of Koch's postulates on the theory of disease spread through academic circles worldwide. Undeterred by his first unsuccessful request for the construction of a Hygienic Laboratory and substantiated by the results of Koch's

work, in 1886 Dr Vaughan again repeated his request to the regents for the construction of a Hygienic Laboratory. The regents were convinced of the quality and potential of Dr Vaughan's proposal and approved his request for a Hygienic Laboratory. In 1887, the Board of Regents at the University of Michigan requested \$75,000 (about \$1.8 million today) from the Michigan State Legislature for the construction of various labs: hygienic, physics, pathology, histology, and physiology. This request was accompanied by a campaign lobbying the Michigan Legislature to fund the proposed project. The lobbying efforts were not limited to University affiliates but included appeals from other

citizens and professionals including farmers and pharmacists. A brochure promoting the establishment of this laboratory of hygiene stated 'the objects of such a laboratory would be to investigate the causes of disease...to study the conditions of the soil affecting health, and to ascertain the best methods of disposing of garbage and all kinds of waste'. There were no hygienic labs within the United States to look to for comparison and the effectiveness of Koch's Imperial Laboratory of Hygiene in Berlin was cited instead. Possessing the breadth of vision to seek knowledge and comparison past national borders was a trait that allowed Dr Vaughan to keep ahead of the times.

On 24 June 1887, the Michigan State Legislature allocated \$35,000 to the University of Michigan towards building the proposed labs; the University constructed the Hygienic Lab and the Physics Lab in the same building, the West Physics Building. The University of Michigan's Hygienic Laboratory predated the Hygienic Laboratory of the National Institutes of Health (NIH) by several months. The precursor of the NIH was founded in 1887 by the Marine Hospital Service, and in August of 1887 the creation of the Hygienic Laboratory of the NIH was authorized, two months after the University of Michigan. This makes the Hygienic Lab at the University of Michigan the first in the United States. As Dr Frederick Novy, who worked under Dr Vaughan and went on to become the Head of the Department of Bacteriology and then Dean of the Medical School said, 'this new lab...became the lab for teaching Bacteriology, perhaps the first lab devoted to that subject in this century'.

After years of discussion and advocacy, the idea of the Hygienic Laboratory was on the way to becoming a reality. Construction had begun and the lab was scheduled to host its first students in the Winter of 1889. The period of time during the lab's construction would have been perfect for Dr Vaughan to enjoy a quiet summer in Ann Arbor. On the contrary, when Dr Novy suggested using vacation time for a trip to Europe in order to obtain the most up-to-date information in the field of bacteriology, Vaughan, while Dean of the Medical School, readily agreed. In the summer of 1888, while construction of the Hygienic Laboratory was in process, Dr Vaughan and Dr Novy set sail to Europe. From Dr Vaughan's memoirs, 'in 1888 Doctor Novy and I, with the prospect of opening our laboratory of hygiene that fall, hastened to Berlin to take the course in bacteriology in Koch's laboratory'.<sup>1</sup> The two doctors were undeterred by the weeks of travel time required and the months away from their homes and institution. To them, this was a hardship worth enduring for the benefit of their country, institution, and personal education. They were instructed in the study of

hygiene through lectures given by Dr Robert Koch and in laboratory techniques by Professor Carl Frankel. Drs Vaughan and Novy also obtained a full set of Koch's laboratory equipment while in Europe in order to equip the new Hygienic Laboratory back at the University of Michigan.

If studying at the hands of Dr Koch was not impressive enough, Dr Novy went on to Paris to study with Dr Louis Pasteur. Again, from Dr Vaughan's memoirs

Doctor Novy and I took our departure from Berlin; he, always pursuing knowledge with more zest than I, to the Pasteur Institute in Paris... Later I joined Novy in Paris and...I was presented to the man who, in my opinion, was the greatest product of the nineteenth century, Louis Pasteur.<sup>1</sup>

The Hygienic Laboratory at the University of Michigan, therefore, was not only inspired by the work of Koch and Pasteur but from its beginning was also informed by firsthand knowledge of their techniques.

From this storied beginning, the Hygienic Lab at the University of Michigan functioned as the official state laboratory of the state of Michigan until 1907 when another state laboratory was built in the state capital. In 1911, the Board of Regents at the University of Michigan approved the establishment of a curriculum for master's and doctoral degrees in public health; in 1916 (the year the first School of Public Health in the United States was opening at Johns Hopkins), the University of Michigan granted its first doctorate degree in public health. The Department of Hygiene filled the role of public health research and advocacy until 1941 when the School of Public Health was chartered. Instruction and research in the Hygienic Laboratory, in addition to Dr Vaughan's encouragement of faculty and students to conduct research, heralded an atmosphere of scientific inquiry and more than a century of leadership in medicine to the University of Michigan.

The Hygienic Laboratory quickly outgrew its space in the West Physics Building and in 1903 was moved to the newly constructed West Medical Building. The West Physics Building, the original home of the Hygienic Laboratory, burned down in 1966 during demolition, while the West Medical Building still stands today as the Dana Building. The Hygienic Laboratory gave rise to the Department of Bacteriology in 1902 and then in 1963 it was renamed the Department of Microbiology. As the field of immunology was emerging, in 1979 the department's name was changed to the Department of Microbiology and Immunology. Drs Vaughan and Novy set an early standard of academic contribution;

between them they produced more than 400 papers, reports and books on a wide spectrum of topics. Writings on toxins, disease-causing organisms, policy recommendations, historical topics, and procedural guides provide just a snapshot of their production. From its origins more than 100 years ago until the present day, the department has earned a reputation of innovation and excellence.

From 1891 until 1921, Dr Vaughan served as Dean of the Medical School at the University of Michigan; his focus on recruiting research-oriented faculty fostered a tradition of academic medicine that exists to this day. Vaughan served in the Spanish-American War of 1898 as well as World War I, and attained the rank of colonel. From 1914 to 1915 Dr Vaughan served as President of the American Medical Association. He began serving on the Michigan State Board of Health in 1883 and advanced to serve as Chairman of the

Michigan State Board of Health for many years thereafter. Dr Vaughan was also an avid public health and preventative medicine advocate, travelling to communities around Michigan and addressing churches, medical societies and government policy meetings. He hosted conferences at the University where health commissioners were invited from around the state to present their public health problems. Dr Vaughan's legacy was one of immeasurable contribution and constant work toward the betterment of our society. Reflecting on his accomplishments and character can provide us with an impetus to dedicate our efforts and goals similarly.

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### Author biographies

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