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OF

WILLIAM HENRY WELCH

1850–1934

BY

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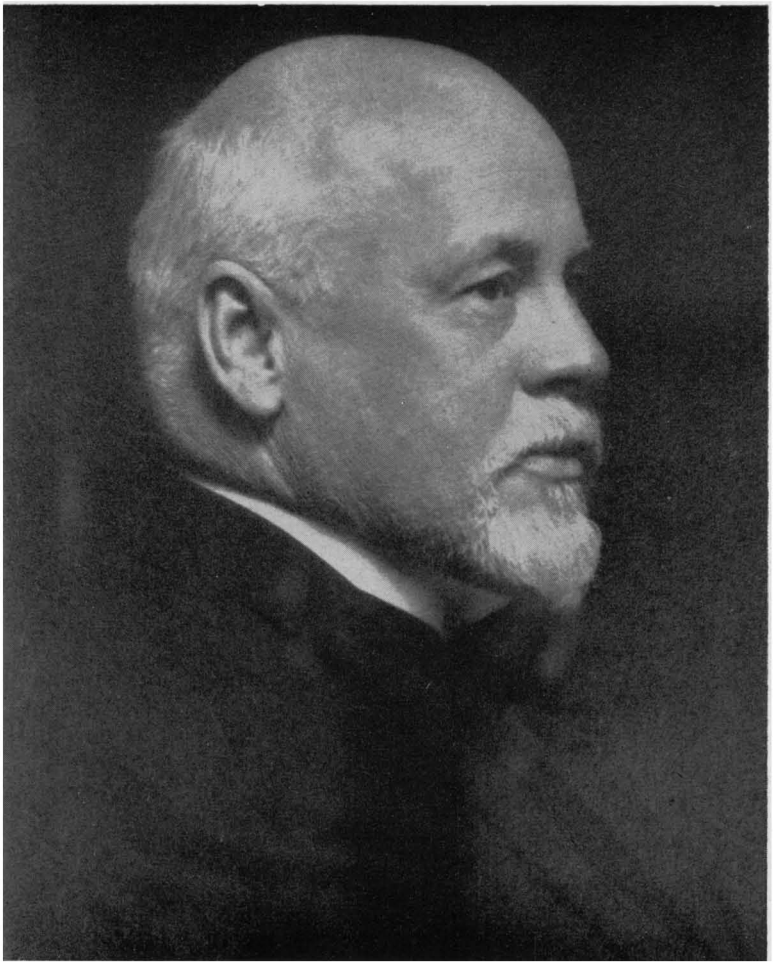

William H. Welch

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William Henry Welch was born April 8, 1850, into a family which for two generations had been country doctors in Connecticut. His grandfather, father, and his father's four brothers were all doctors, and William and four of his cousins were also to become doctors. Under such environmental influences, it was to be expected that William, an only son, would fall at once into his place in the family vocation, first assisting and later succeeding his father in practice in the charming village of Norfolk. But this did not happen, and when circumstances compelled William to study medicine it was only after he had failed in his ambition, on graduating from Yale College in 1870, to become a teacher of the classics. His predilection was for an academic life, not a life of practical affairs, and his chief passion at that time was for Greek. No tutorship being available for him, the young man, perhaps for the only time in his long life, was at loose ends. He taught school, for a year at Norwich, New York, while reflecting on the future before him. At the end of this year he joined his father and reluctantly took up the study of medicine. After a short period, he returned to New Haven, having wisely decided to study chemistry at the Sheffield Scientific School, for during his pupilship no experimental science was taught in the academic course at Yale.

William's forbears had studied medicine in the local medical schools—the peripatetic school at Pittsfield, Massachusetts, or the Yale Medical Institution, as the Yale school was then called —or they had become doctors merely through acting as apprentices to local practitioners. William alone of the family up to his time had had a liberal education preliminary to the study of medicine. In the autumn of 1872 he entered the College of Physicians and Surgeons, a leading school, in New York and graduated in the spring of 1875. The poverty of the medical

* Based on *William Henry Welch and the Heroic Age of American Medicine*, by Simon Flexner and James Thomas Flexner, New York, Viking Press, 1941.

curriculum can hardly be conceived by the medical student of today. The instruction was, with the exception of dissection in anatomy, almost wholly by didactic lectures. The courses were not graded, and the lectures were repeated in successive years. The possession of the doctor's degree carried with it the privilege to practice; state boards of examiners had not yet been instituted. Welch won an interneship in Bellevue Hospital which he completed in the spring of 1876, and there came under the influence of Francis Delafield, pathologist to the Hospital. Pathology exercised a strong attraction on him, so that the ardent young man was led to imagine a professional career for himself in that subject despite the fact that nowhere in America did there exist a chair of pathology from which a living could be extracted or a laboratory in which the subject could either be learned or taught. Nevertheless the fascination of such a career had taken firm hold of his mind and the vision was strengthened just then by the announcement of the opening of the Johns Hopkins University to take place in the autumn of 1876 in which was to be included a medical school with laboratories not only to train competent practitioners but also to further science.

Under the influence of this idea Welch sailed for Europe early in 1876, his destination being Strasbourg, where a strong new German university had been set up following the Franco-Prussian war of 1870. He spent a summer semester in the study of histology under Waldeyer, pathology under von Recklinghausen, and physiological chemistry under Hoppe-Seyler; and in order not to be impractical, Welch listened to von Leyden's lectures in medicine. His next move was to Leipzig, to the pathological laboratory of Ernst Wagner and especially the celebrated physiological laboratory of Carl Ludwig. Then Welch spent a semester at Breslau under the experimental pathologist Julius Cohnheim, with whom he carried out a piece of successful research on oedema of the lungs.

The early months of 1878 saw Welch again in New York. He sought immediately an opportunity to teach and work in pathology. Failing in his object at the College of Physicians and Surgeons, he turned next to Bellevue Hospital Medical

College, which gave him three small rooms and spent twenty-five dollars for tables and chairs. Half a dozen microscopes were obtained somehow and as many volunteer students put to work. The course was instantly successful. Very soon students from all three medical schools in the city joined the classes, and within half a year the College of Physicians and Surgeons felt obliged to offer a similar course. They tried to attract Welch, but he remained loyal to Bellevue and recommended T. Mitchell Prudden of New Haven, also a German student of pathology.

This, in brief, is the story of the founding of the first laboratory of pathology in America. The money returns were small. Welch turned to other employment to support himself: he made autopsies for physicians, examined and reported on specimens removed by surgeons, conducted quiz classes for hospital internships, wrote for medical books, and engaged in private practice.

Welch's six years in New York brought him reputation for knowledge and skill, but no success in attaining his main object, which was to develop pathology along German lines. Then one day Dr. John S. Billings, whom Welch had met in Leipzig in 1877, the author of the Surgeon General's Catalogue, just then engaged in building the Johns Hopkins Hospital, walked into Welch's primitive laboratory, heard him lecture and watched him demonstrate, and talked to him about his future plans, inquiring what he would do if provided with adequate laboratory facilities. This was on March 1, 1884; on March 9 Billings was back in New York; on March 10 Welch was in Baltimore for a conference with President Gilman, who offered him the professorship of pathology at the Johns Hopkins University. Despite strong pressure made on Welch to remain in New York, he accepted the offer on March 31. His almost impossible dream of 1876 had come true.

In the middle seventies of the last century, when Welch studied in Germany, Robert Koch had not yet brought bacteriology into medical practice, and when he startled the world by the announcement of the cultivation of the tubercle bacillus in 1882 and the isolation of the cholera bacillus in 1883, Welch

was obliged to stand on the side-lines, as his small laboratory afforded no opportunity for the pursuit of bacteriology. His first move, therefore, after the Baltimore appointment, was to return to Germany for a year's study of bacteriology, first under a pupil of Koch's at Munich, then under Flügge at Göttingen, pupil of both von Pettenkofer and Koch, and finally under Koch himself.

The autumn of 1885 found Welch in Baltimore entering on his new duties. By good fortune he was given working space in Newell Martin's biological laboratory. The laboratory was actively engaged in teaching and research, and Welch found himself in the heart of a university and in a company of scholars. Welch was no scientific recluse, but a cultivated, companionable man, and he quickly established himself in the university circle. His happiness in the change from the arid years in New York is apparent in his letters.

In the six years that Welch spent in New York, he failed to bring a single piece of pathological research to a conclusion; in the next six or seven years ending with 1892-93 he brought to a successful end researches on Bright's disease of the kidneys, structure of white thrombi, hæmorrhagic infarction, pathology of fever, causation of hog cholera, pneumococcus and acute lobar pneumonia, bacteriology of diphtheria, and most important of all on the bacillus which bears his name—Clostridium or Bacillus welchii. This gas-producing bacillus which Welch discovered to be the cause of the presence of gas in the blood vessels and organs after death not attributable to post-mortem decomposition and erroneously mistaken for air, was to play a large rôle in pathology under a chapter to which Welch later gave the name of "pneumatopathology."

"The Pathological," as Welch's laboratory was called and in which he was to spend the first thirty years of his Baltimore period, was hastily completed on the Johns Hopkins Hospital grounds and occupied by him in 1886. It was a laboratory modelled after the German pattern only it was more inclusive than such laboratories were in Germany. Welch was to combine the pathological anatomy of Virchow with the experimental pathology of Cohnheim and the bacteriology of Koch probably

for the first time in the laboratory of one man. The opening of the Hospital was three years off and that of the Medical School seven years off. Hence courses were offered in pathology and bacteriology to graduates in medicine and facilities for research provided to more advanced students. The Pathological became a busy workshop and continued to be a center of teaching and research throughout Welch's professorship, which he resigned in 1916.

Almost from the beginning, however, Welch was drawn to the public platform in order first to expound the modern bacteriology and pathology, and then to promote the higher, or university, medical education. Welch had peculiar gifts which made him a graceful and persuasive speaker. He became, indeed, as the years passed, the teacher-at-large of scientific medicine throughout the nation. With the organization of the Hopkins Medical School, in which he took the leading part, he was still further diverted from strict laboratory duties, and with the founding of the many educational philanthropies and various welfare organizations for medical and social betterment during the twentieth century, he was called upon more and more for aid and guidance. All these extra-mural activities, many in the city of Baltimore, encroached on Welch's laboratory time; his personal influence there continued, but the main teaching and all the research were carried on by his associates and pupils.

Undoubtedly, Welch's greatest work was the upbuilding of the Hopkins Medical School, which exerted a strong influence in this country and even on medical education in Europe. The part which Welch played in developing the medical school extended over more than forty years. The first unit of the school to come into existence was the Johns Hopkins Hospital, which opened in 1889. At the outset a radical departure was made in the appointment of the major clinical staff, who became at the same time professors in the university. Hitherto medical schools in America were staffed from the local practitioners. The Hopkins called Osler in medicine, Halsted in surgery, and Kelly in gynecology, all from a distance. This was President Gilman's policy put into effect by Welch.

The four years between the opening of the hospital and the

launching of the medical school were anxious and strenuous ones. The school had already been too long delayed. It seems extraordinary, now that medicine has become so favored by philanthropy, that this long delay should have depended on the comparatively small endowment of $500,000. But it was not until medicine in America had entered on its course of modern scientific development that endowments became progressively more frequent and large. And in bringing about this fundamental change of direction Welch exerted a strong influence. The donors of the needed endowment at the Hopkins were a national group of women interested primarily in the higher education of women. In 1891 Welch had drawn up a plan of instruction in which he included, for admission to a medical school, preliminary training in biology, chemistry, and physics, and a reading knowledge of French and German. This standard was not to be adopted at once, but to be attained gradually. The women's committee seized on the plan and demanded its immediate execution, adding to it the possession of a college degree by the entrants and the admission of women on the same terms with men. All these conditions were reluctantly granted. Welch was made dean of the new school, the next step being the setting up of laboratories of anatomy, physiology, pharmacology and physiological chemistry staffed by trained teachers and investigators. The school got under way in 1893, and its classes grew in number with surprising rapidity. The country had proved more ready than had been foreseen to take so great a step forward in medical education.

About the end of the nineteenth century modern medical education was advancing rapidly and the output of scientific work had become considerable. The first scientific medical periodical—the *Journal of Experimental Medicine*—was issued in 1896 with Welch as editor. At the end of the century the Rockefeller Institute for Medical Research was founded with Welch as president of its Board of Scientific Directors. But progress in the clinical branches of medicine had lagged behind that in the laboratory branches. Welch now turned to the task of making the two branches more nearly equal. To this undertaking he devoted many of his energies for the first dozen years

of the new century, the result being the institution at the Hopkins in 1913-14 of university chairs, sometimes called full- or whole-time professorships, in the main clinical subjects.

Hygiene and public health had remained backward in the medical curriculum. Welch had become deeply impressed with their importance in Munich in 1884 while studying bacteriology there. He had spent a short time working in von Pettenkofer's hygienic institute. His efforts to develop hygiene on an adequate basis in the pathological laboratory had failed for lack of funds. But he had not ceased propagandizing for the subject. Then in 1916 the Rockefeller Foundation, in the furtherance of its public health work under the guidance of the International Health Board, founded the School of Hygiene and Public Health at the Johns Hopkins University with Welch as its first director.

Welch's last years were spent in the organization of the Institute of the History of Medicine in connection with the University's medical library bearing his name. The addition of medical history to the medical curriculum was also the realization of an early idea of Welch's. Speaking at Yale College in 1888, he had said that "nothing is more liberalizing and conducive to medical culture than to follow the evolution of medical knowledge." In 1927-28 he spent eighteen months in Europe buying books for the library and institute. The institute itself was formally opened in October, 1929. Welch remained its director until 1931, when he retired from active university duties. He had a broad conception of the study of the history of medicine which, he said, "requires information on all conditions of civilization of the particular period under consideration," and added that its real significance cannot be grasped "without knowing the state of contemporary knowledge of all important departments of science and philosophy."

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Welch was elected to the National Academy of Sciences in 1895, was a member of the Council from 1902 to 1911, was elected president in succession to Ira Remsen for a six-year term in 1913. He resigned the presidency in 1917. It was in

Welch's presidency that the National Research Council was organized during the great war, and Welch served as member of the executive board of the Council from 1918 to 1933. On the entry of the United States into the war Welch became attached to the Surgeon General's office, advising on medical personnel, acting as liaison man between the laboratory men and the army, making inspection trips to the camps and advising on laboratory organization and epidemiological problems. After the war Welch journeyed to Cannes, France, and took a leading part in the founding of the League of Red Cross Societies which maintained a Bureau of Health in Geneva in connection with the League of Nations.

In 1906 Welch was made a trustee of the Carnegie Institution of Washington, and two years later chairman of the Executive Committee of the Institution.

Dr. Welch died on April 30, 1934, at the age of eighty-four.

HONORARY SOCIETY MEMBERSHIPS

Académie de Médecine, Paris
Académie Royale de Médecine de Belgique
American Academy of Arts and Sciences
Berliner medizinische Gesellschaft
British Association for the Advancement of Science
British Medical Association
College of Physicians of Philadelphia
Comité International d'Histoire des Sciences
Deutsche medizinische Gesellschaft in New York
Deutsche Zentralkomitee zur Erforschung und Bekämpfung der Krebskrankheit
Gesellschaft der Aerzte in Wien
Harveian Society of London
Hufelandische Gesellschaft, Berlin
International Anti-Tuberculosis Association
International Society for Microbiology
Istituto Storico Italiano dell'Arte Sanitaria
Kaiserlich Deutsche Akademia d. Naturforscher zu Halle ("Academia Leopoldina")
Pathological Society of Great Britain and Ireland
Pathological Society of London
Physiological Society (British)
Reale Accademia Medica di Roma
Royal College of Physicians, Edinburgh
Royal Medical and Chirurgical Society, London
Royal Sanitary Institute, London
Royal Society of Medicine, London
Schlesische Gesellschaft für Vaterländische Cultur
Società Medica Chirurgica di Bologna
Société Royale des Sciences Médicales et Naturelles de Bruxelles
Society of Medical Officers of Health, England
Wiener Gesellschaft für Mikrobiologie

HONORARY DEGREES, DECORATIONS, AND MEDALS

1894: LL.D., Western Reserve University
M.D., University of Pennsylvania
1896: LL.D., Yale University
1900: LL.D., Harvard University
1903: LL.D., University of Toronto
1904: LL.D., Columbia University
1907: LL.D., Jefferson Medical College
1910: LL.D., Princeton University
1911: Order of the Royal Crown, second class (Germany)

1915: LL.D., Washington University
Order of the Rising Sun, third class (Japan)
1916: LL.D., University of Chicago
1919: Gold medal awarded by the National Institute of Social Sciences in recognition of valuable services during the World War. Distinguished Service Medal and citation, United States Army.
1920: Order of the Cross of Mercy (Kingdom of Serbs, Croats, and Slovenes)
1922: Gold medal of the University of Vienna
1923: M.D., University of Strasbourg
Sc.D., University of Cambridge
Legion of Honor—officer
1925: W. W. Gerhard gold medal awarded by the Pathological Society of Philadelphia
1926: Order of St. Olav, commander of the second class (Norway)
Diploma of the Distinguished Service Medal, United States Army
1927: Kober gold medal, with diploma, from Association of American Physicians
1929: D.Sc., Western Reserve University
1930: LL.D., University of Southern California
Gold medal of the American Medical Association
Litt.D., University of Pennsylvania
LL.D., University of the State of New York
1931: Harben gold medal awarded for public health service by the Royal Institute of Public Health
1932: D.Sc., University of Maryland
D.Sc., New York University

BIBLIOGRAPHY OF WILLIAM HENRY WELCH

Key to Abbreviations

Albany Med. Ann.—Albany Medical Annals
Am. J. Med. Sc.—American Journal of Medical Science
Am. Med.—American Medicine
Am. Naturalist—American Naturalist
Am. Pub. Health Assn. Rep.—American Public Health Association Report
Arch. f. path. Anat. u. Physiol. u.f. klin. Med.—Archiv für pathologische anatomie und physiologie und klinische medizin
Boston Med. & Surg. J.—Boston Medical and Surgical Journal
Brit. Med. J.—British Medical Journal
Bull. Am. Acad. Med.—Bulletin, American Academy of Medicine
Bull. Harv. Med. Sch. Assn.—Bulletin, Harvard Medical School Association
Bull. Med. & Chir. Fac. Maryland—Bulletin, Medical and Chirurgical Faculty of the State of Maryland

Centralbl. f. d. med. Wissensch.—Zentralblatt für die medizinischen wissenschaften
Johns Hopkins Hosp. Bull.—Johns Hopkins Hospital Bulletin
Johns Hopkins Univ. Cir.—Johns Hopkins University Circular
J. Alumni Assn. Coll. Phys. & Surg.—Journal, Alumni Association, College of Physicians and Surgeons, New York City
J. Am. Med. Assn.—Journal, American Medical Association
J. Exp. Med.—Journal of Experimental Medicine
J. Physiol.—Journal of Physiology
Maryland Med. J.—Maryland Medical Journal
Med. News—Medical News
Nat. Assn. Study & Prev. Tuberc. Tr.—National Association for the Study and Prevention of Tuberculosis, Transactions
New Eng. & Yale Rev.—New Englander and Yale Review
Papers & Addresses—Papers and Addresses by William Henry Welch, edited by Walter C. Burket, 3 vols., Baltimore, 1920.
Pop. Health Mag.—Popular Health Magazine
Proc. Nat. Confer. Char.—Proceedings, National Conference of Charities and Correction
Proc. Path. Soc. Phila.—Proceedings, Pathological Society of Philadelphia
Southern Med. J.—Southern Medical Journal
Tr. Am. Surg. Assn.—Transactions, American Surgical Association
Tr. Assn. Am. Physn.—Transactions, Association of American Physicians
Tr. Cong. Am. Physn. & Surg.—Transactions, Congress of American Physicians and Surgeons
Tr. Med. & Chir. Fac. Maryland—Transactions, Medical and Chirurgical Faculty of the State of Maryland
Tr. Path. Soc. Phila.—Transactions, Pathological Society of Philadelphia
William Pepper Lab. Clin. Med. (Proc.)—William Pepper Laboratory of Clinical Medicine (Proceedings)
Yale Med. J.—Yale Medical Journal

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