

Theobald Smith, 1859-1934: A Fiftieth Anniversary Tribute

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Theobald Smith, often judged to be the leading pioneer microbiologist in North America, died on 10 December 1934. Thirty-five years before, he helped to found the Society of American Bacteriologists. His presidential address to that Society's fifth annual meeting in Philadelphia (1903) was published recently in *ASM News* (47:231-235, 1981).

The Plan

Smith disliked biographical products. In 1876, the valedictorian from Albany High School noted, "All subjects tending toward biography become monotonous and tiresome." To his son, Smith asserted—indicating a bound set of reprints—that all the essentials of himself were in those volumes. Although he had nothing to hide, what right had anyone to pry into his private affairs? Early in his career, he confided: "I have a mania of always putting a bushel basket over any light that might accidentally come from my unsuffed candle" (10). Theobald Smith disavowed hypocrisy by remaining ultramodest, but he also consigned many great achievements to the shadows of history. He should view leniently this flash of limelight.

Successful scientific research may derive from heredity and home environment; religious, public school, and higher education; supervisors, colleagues, and professional friends; fruitful projects selected under the necessities of time and place; and suppression of other urges. Several of these factors have been suggested as contributing to his accomplishments (2, 4, 5). However, Theobald Smith was actually a researcher *sui generis*. To overcome the discouragements of the 11-year period (1884-1894) when he worked at the Bureau of Animal Industry (BAI), his dedication to research needed to be self-generated and singularly deeply rooted.

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The Foundations

His parents, Philip Schmitt, a journeyman tailor, and Theresia Kexel, a hard-working housekeeper, came from the Rhineland in Germany. They were married in 1854 and escaped political unrest through an 8-week voyage to the New World, settling in Albany, N.Y., where each had a sister. A friendly neighbor, Jacob Theobald, was the infant's godfather. The compilers of the city directory were unwilling to differentiate the various European cognates of "Smith" and reduced Schmitt to the common anglicized spelling. Theobald Smith thus got his name. He remained fluent in the German language, but at college he discarded his mother's Roman Catholicism.

In 1867, Philip Schmitt and family paid a short exploratory visit to Germany. On returning, he mortgaged a brick house near the docks on the Hudson River. With customers in the workshop and roomers above, the parents invested in a grand piano. Theobald acquired skills as handyman, gardener, and musician. He gave piano lessons, substituted for church organists, kept the books for a merchant, and studied for a New York State scholarship to the young university at Ithaca, N.Y. Apart from music ("How beautiful is Schubert—how exquisitely melodious!"), he relaxed by boating and fishing on the Hudson and by taking berry-picking hikes with schoolmates. In 1877, he won free tuition to Cornell University.

That institution, short of buildings and other facilities, still launched academic experiments under the eccentric patronage of Ezra Cornell and its innovative, often-absent president, Andrew D. White (1). For 2 years, as Theobald shone in courses chosen for a broad education, diverse instructors advised him to specialize in their particular subjects. A nearly fatal boating accident forced him to consider professional training: "I overcame my dislike for death and blood and disease and made up my mind that I was made for a physician." S. H. Gage, his microscopy instructor, and Burt Wilder,

a physician-biologist, recommended Cornell's premedical and veterinary science courses, followed by a summer apprenticeship to an Albany physician. In 1881 Smith led his class and was graduated with honors and a Ph.B. Entering Albany Medical College that fall, he passed the examinations for his M.D. within 2 years, again leading the class.

Theobald Smith was unready for practice and lacked funds for extra training. After a temporary job in the Biology Department of Johns Hopkins-University under Henry N. Martin, he was hired by Wilder and Gage to articulate animal skeletons and prepare histological slides. They advised him to accept a new laboratory assistantship in the Veterinary Division of the U.S. Department of Agriculture in Washington, D.C., with an annual salary of \$1,200, which commenced on 1 December 1883. The recently appointed chief of the division (after June 1884, it became BAI) was Daniel E. Salmon, who was graduated in veterinary science from Cornell in 1872.

The Edifice

From 1884 to 1933, Theobald Smith published 305 items, usually as sole author, an overall average of six per annum. The same output prevailed for about two decades (1896-1915) while he was professor of comparative pathology at Harvard and a pathologist with the Massachusetts Board of Health. In the preceding 11 years in Washington, D.C., the annual publication rate averaged nine items, but that was halved while he was director of the Animal Pathology Division of the Rockefeller Institute for Medical Research at Princeton. To maintain this record, it was necessary for him to have at least two concurrent research projects.

The quality of his publications was unsurpassed. He considered it better not to publish than to do so prematurely. A year before his death he informed Gage that he was preparing the Vanuxem lectures for publication. They had been "delivered last spring. My first and last attempt at 'popularizing science'" (23). In book form, *Parasitism and Disease* embodied elements of his unpublished Lowell (1908) and Herter (1916) lectures and expounded long-held beliefs. To consider disease a biological aberration to be "interpreted in terms of natural law . . . no longer in the hands of professional mystics" (24) echoed an earlier formulation: "Disease is no longer the mysterious, personified entity of the past. It has been brought within the domain of laws which govern all life upon the earth" (13). In 47 years, illustrations had multiplied; the conviction persisted. Another contention—that the symptomatology of an invasive disease reflected the degree of disequilibrium in a host-parasite relationship—also derived from his Washington days, when mild cases and the carrier state proved to be missing links in the pathogenetic riddle of Texas fever.

The Washington years were exceedingly difficult. On arrival, Smith was ignorant of bacteriology, although Salmon was convinced that the new science was essential for the control of animal infections. Salmon's

brief exposure, as an undergraduate in France, to Pasteurian techniques and attitudes, supplemented by experience with homemade apparatus and bacterial contaminants, supposedly qualified him as trainer. He imported a microscope and basic apparatus from Germany, provided a few journals, and established an experiment station just beyond the city limits. The laboratory, primitively quartered under the roof of the Department of Agriculture Building, was very cold in winter, and gelatin medium sometimes melted in the summer. The pupil soon outgrew the teacher and taught himself Koch's methods; however, Smith was hobbled by routine work and Salmon's prolonged absences. He complained to Gage, "My daily labor has so absorbed my entire attention that I often feel like a pack horse destined to carry the same bundle over the same road for ever" (11). Two Cornellians, Fred Kilborne and Cooper Curtice, appointed in 1885 and 1886, respectively, helped to reduce the load. They also kept Salmon informed about laboratory affairs.

Smith protested Salmon's assumption of senior authorship of research reports to which he contributed nothing. The final usurpation of this kind occurred at the IXth International Medical Congress (Washington, D.C., 1887). In a pioneer immunological experiment, pigeons withstood the lethal effect of the "hog cholera bacillus" after receiving inoculations of the heat-killed bacillus. Smith performed the experiment, wrote and delivered the report, and even discovered the lethal organism, yet the authors were recorded in the *Congress Transactions* as Salmon and Smith, and the bacillus was later officially designated *Salmonella cholerae suis*.

Smith's *chef d'oeuvre* was a 300-page monograph, *Investigations into . . . Texas or Southern Cattle Fever*, BAI Bulletin no. 1 (1893). This account of laboratory and field experiments, written entirely by himself, implicating a parasite, such as those which cause malaria, that is conveyed through the bite of an infected cattle tick, established his reputation for scrupulous logic, detailed observation, abundant verification, and unrelenting industry. He amply acknowledged the assistance of F. L. Kilborne, manager of the experimental farm, and others, yet the printed copies revealed Kilborne's name as coauthor on the title page. Salmon's vengeful act possibly cost Smith a Nobel Prize. This bulletin was recognized eventually as a biology classic, but long after Smith had left Washington (6), and even a generation after his death (8), some orthodox parasitologists and veterinarians, resenting successful invasions of their bailiwicks, disparaged his achievements. The monograph is now rare, although 10,000 copies were distributed. New information on its genesis and aftermath became available in 1969 (3).

Theobald Smith recognized the multiple applications of microbiology but was far keener on its contribution to sanitation, public health, and preventive medicine than to veterinary medicine and agriculture. From 1886 to 1895, he gave an annual course in bacteriology at the National Medical College, and in 1887 he began research in his spare time on water sanitation. Bacteri-

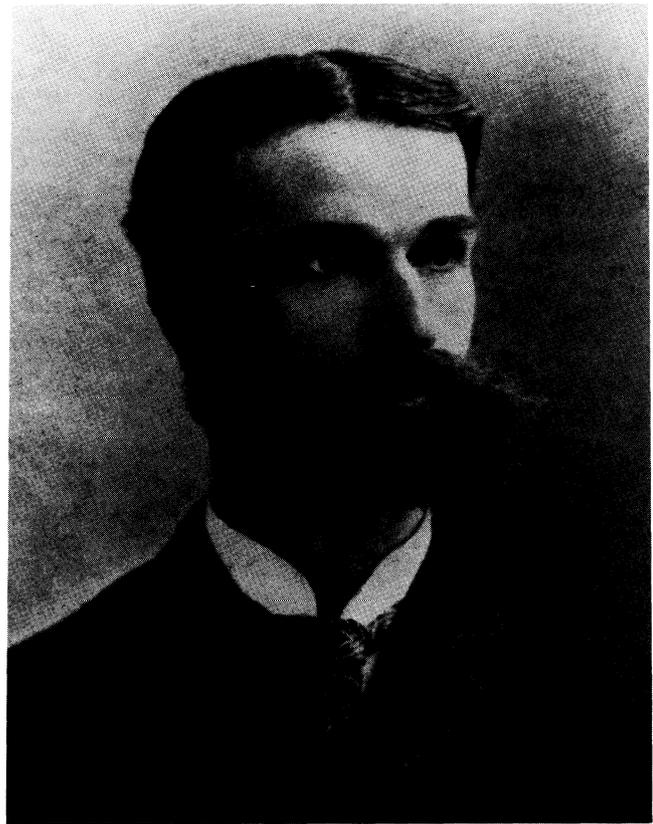
al counts of samples from the Potomac River from a laboratory tap culminated 5 years later in surveys of the Hudson River and tributaries, with the coliform count (verified by his "fermentation tube" method) indicating the degree of fecal pollution (17).

The scope and quality of Theobald Smith's work were noted approvingly in many quarters outside the BAI. After several years at BAI, he wrote to Gage: "I have so many irons in the fire at the laboratory . . . such a busy, pushing, expanding field microbiology has become" (14). However, the atmosphere worsened, and Smith's litany of complaints did not subside. People began to wonder why he remained if the personal incompatibilities and poor working conditions were so frustrating. Presumably, he doubted whether other positions would fully absorb his interest and tax his capacity. V. A. Moore, his faithful assistant and short-term successor, considered him "the most wonderful man I ever met. The amount of work he can accomplish is phenomenal" (7). Finally the situation became intolerable, and Smith accepted the combined position offered by H. P. Walcott, physician-chairman of the Massachusetts State Board of Health, and President C. W. Eliot of Harvard University.

Just before leaving Washington in 1895, Smith observed distinctions between human and bovine types of tubercle bacilli. During a visit to Europe in 1896, he described these differences to Koch, who reported similar findings (without giving due credit) at the 1901 Tuberculosis Congress in London. On this and subsequent occasions, Koch stressed the negligible pathogenicity of bovine cultures for humans. His initial claim of unicity among tubercle bacilli, regardless of source, was quietly jettisoned, whereas Smith's priority was unmentioned until the 1908 International Congress on Tuberculosis in Washington, D.C. Near the end of his career Smith stated: "I have always taken up the problems that lay spread out before me in the new environment . . . My interest in a problem usually lagged when certain results could be clearly formulated or practically applied" (22). This accounted for his research on cattle fever and swine diseases in Washington, on diphtheria antitoxin and malaria in Massachusetts, and on brucellosis at Princeton, as well as for a half century of unlagging interest in tuberculosis.

The Style

Smith's researches were not all mission oriented. Many phenomena of then purely speculative interest were also described. For example, notes on bacterial variability (1886 [12] and 1890 [15]) were followed in 1899 by an expanded paper on variation at the Society of American Bacteriologists' first annual meeting in New Haven, Conn. (19). Smith narrowed the gap between theoretical issues and practical ends and illustrated the importance of biochemistry to bacteriology by recording improved growth of glanders bacilli in slightly acidic nutrient media (16). He could not explain the attenuated virulence and modified physiology of the cultures in a mixture of hog cholera bacillus and



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Proteus vulgaris (18). Hypotheses and theories were viewed with Newtonian skepticism. "In general," he contended, "a fact is worth more than theories . . . The theory stimulates, but the fact builds. The former in due time is replaced by one better, but the fact remains and becomes fertile" (22). His laboratory research reports were usually replete with facts.

In Boston, where Smith sometimes philosophized on general topics such as "Medical Research" (20), he could be epigrammatic and often prophetic. Occasionally, as in his address "Scholarship in Medicine" (21), he vied with Welch and Osler in eloquence. Welch, a long-time friend and admirer, asserted at the dedication of the new Harvard Medical School that creative minds with research talent counted "more than stately edifices . . . Search for them far and wide . . . and when found cherish them as a possession beyond all price" (25). Theobald Smith surely was his prototype.

In Washington there was less incentive for Smith to exchange laboratory for library or rostrum. His romantic impulses, under tight rein for the first 2 years, finally focused on Lilian Egleston, daughter of a literary Unitarian clergyman and a mother who disapproved of Theobald. After a rather troubled courtship, they married in 1888. Lilian was intelligent, good-looking, and articulate. Her strong parental ties and the fragile economies of all concerned led to their sharing households for several years—an abrasive, tension-building situation in which his mother-in-law's

bitter silences intermingled with the old man's amiable inanities and Lilian's meditations.

In 1893, the Smiths moved into their own home on the outskirts of Washington with two small daughters. They enjoyed the quiet-life by themselves. Their son Philip (still alert today at 89) was born soon after they settled in Boston. Lilian shared Theobald's love of music and botany and tried hard (without much encouragement) to follow his scientific work. She survived him by 6 years. Canisters containing their ashes were buried among the roots of a white pine whose growth from a sapling had been watched from their summer home on the shore of Silver Lake, N.H. In 1966, both canisters were retrieved and reinterred under a white Vermont marble headstone in Chocorua Cemetery.

Service to mankind may have been part of the call that summoned Theobald Smith to endure with patience and courage the dross and politics and disappointments of Washington. But some factor more zestful, resplendent, and primordial than altruism drove and pacified him. Perhaps its simplest expression was a declaration in his diary, made after his sophomore year at Cornell: "Nature is my life and joy" (9).

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