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Science News x

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T. MITCHELL PRUDDEN, 1849–1924

DR. T. MITCHELL PRUDDEN was one of the group of advisers of Mr. Rockefeller and his associates consulted on the creation of an institution for the investigation of disease, and he became one of the original members of the scientific board to which was entrusted the conduct of The Rockefeller Institute for Medical Research when founded in 1901. Dr. Prudden was chosen first vice-president of the board and first chairman of its executive committee, offices which he continued to hold until his recent death. Although repeatedly pressed to accept the presidency of the board, he resolutely refused the election. The services rendered to the institute by Dr. Prudden far exceeded in scope and devotion the official positions which he held.

Dr. Prudden's professional life in New York covered more than forty years, and was spent in large measure in forwarding the public welfare. But so self-effacing was he that it was only to his family, intimate friends and a coterie of his professional associates that the nature, variety and extent of his public services became known. The aid he rendered to the departments of health of the city and state of New York is written large in their history; as a student and teacher of cellular pathology and bacteriology—two branches to which modern medicine owes very much of its recent advances—he ranks among the leaders; and many of his pupils now carry on the high standards and wholesome traditions which he helped to establish in the country. After his retirement from the professorship of pathology at Columbia University in 1909, Dr. Prudden continued to exercise his humanitarian impulses and his interest in medical research in connection with the public health council of the state department of health, of which body he was an original member, and with the Rockefeller Institute to which he came daily and participated in many of its activities. To his many other gifts, Dr. Prudden added an exceptional administrative capacity and executive acumen. Hence he served many important enterprises of philanthropic and scientific nature during their formative and stressful periods in a manner which contributed valuably to their ultimate successful issue.

Dr. Prudden possessed a natural habit remarkably straightforward and elevated. It is doubtful whether many persons casually penetrated an exterior superficially somewhat austere. But to the number, by no means small, of persons admitted into the inner circle of his personality, he exhibited a nature peculiarly sympathetic, sensitive and simple and a heart of rare

warmth and richness. His scientific ideals were high, sometimes it seemed almost unapproachably high. And yet he produced work of his own, through his pupils and by stimulation from many others; and no one put a higher value on something real achieved than did Dr. Prudden.

Fortunately, Dr. Prudden has left behind materials suitable for a brief sketch of the outstanding incidents of his life, for the use of which I am indebted to his sister, Miss Lillian E. Prudden.

T. Mitchell Prudden was the fourth son, in a family of four sons and one daughter, of the Reverend George Peter Prudden and Eliza Ann Johnson. The father, a Congregational clergyman, was the direct descendant, seventh generation, of Reverend Peter Prudden, one of the founders of New Haven colony in 1638. It is of some interest to record that the Reverend Peter Prudden later separated from the New Haven colony and established the Milford Church in 1639.

Dr. Prudden was born in the parsonage at Middlebury, Connecticut, on July 7, 1849. He died in New York City on April 10, 1924. His early life was passed in the parsonages at Middlebury, Southbury and Watertown, Connecticut; for a brief period on a farm belonging to the family, and at New Haven, Connecticut; the last 45 years were spent in New York. The early period is made up of the common heritage, varied only by circumstance, of healthy and happy childhood. One point is stressed, namely, that in the household there existed "sympathetic realization of the youngster's point of view, and for the necessity of amusement and initiation into knowledge and familiarity with things worth while." The strenuous period with many vicissitudes came with adolescence; the father's anti-slavery proclivities aroused vehement opposition, which in turn served to accelerate a decline of health already apparent, and this led to his retirement from the pulpit, although for a time preaching was continued in other places. The eldest son, Henry, of strong literary tastes and an eager desire for a college education, "courageously and generously" entered business in New Haven and later prospered. In 1866, when Mitchell was 17, a place was found for him in Henry's establishment, where, besides sweeping and dusting, he was initiated into the vagaries of salesmanship and the intricacies of bookkeeping. The duties proving irksome and the youth perhaps ill adapted, the connection was dissolved and a year or more later, after a period of indefinite happenings, Mitchell embarked upon his first real adventure—an index perhaps of many subsequent ones pursued in Europe and in this country in wooing the new cellular pathology and bacteriology and harnessing them to an outworn and changing medical creed, and in explorations of the Great Western Plateau. This first venture included a cruise in Long Island Sound in a Menhaden fishing schooner, a mutiny among the crew, the landing of the passengers on the rocks at Stratford Light and a walk back to New Haven.

In 1866 the start, with the financial backing of Henry, was made towards college and the sciences. A preliminary year was spent at Wilbraham Academy, and the Sheffield Scientific School was entered in 1869 under a Connecticut state fellowship which provided free tuition during the undergraduate years. The first year courses in physics, chemistry, mathematics, German and English were followed and the goal of medicine was decided upon. As there was at that time no combined instruction provided in zoology, botany, organic and physiological chemistry, Prudden and his friend Russell, who already sensed their importance for a medical career, appealed to the faculty with such success that a course called "The biological course in preparation for medicine" was instituted. The class started with the two friends as sole attendants. This proved no disadvantage, as the earnest young men "were invited for special, advanced work in botany into Eaton's herbarium at his house; they were placed in Johnson's private laboratory for physiological chemistry; they worked rather as assistants than as students under the eye . . . of Verrill and Sid. Smith in the old 'Bug Lab' (alias zoological laboratory)." The two concluding years were full of action: the collection of plants and animals; scouring of land and sea about New Haven; studies with Whitney, Lounsbury and Gilman—all combining to arouse a profound and abiding interest in the now aspiring Mitchell. In view of the facile pen which he later wielded, it is interesting to note that Prudden received honorable mention in English composition under Lounsbury.

It was in the last spring vacation of 1872 that Prudden and Russell chartered a yacht and "taking along a few choice spirits, made a week's dredging expedition down the Sound. They dredged off Watch Hill and Newport, went over to Holmes' Hole (Woods Hole), Edgartown, had a glorious adventure, and brought back much plunder, establishing new habitats for several marine invertebrates. . . . This was the first dredging done about Woods Hole and its neighboring waters."

Progress had now come with celerity. During the last term in the Sheffield Scientific School, Prudden was selected to substitute for Professor Mixter in freshman elementary chemistry. "There were weekly lectures with an experimental lecture, a practicum for the whole class once a week, and recitations." Study had also been begun at the Yale Medical School under the old two-year lecture system; and, at the same time, Prudden served as secretary to the faculty of the Scientific School. The M.D. degree was awarded in the autumn of 1875, the spring

months having been spent in New York in the study of pathology under Dr. Francis Delafield. A hospital interne year, divided between medicine and surgery, followed at the New Haven Hospital. As the hospital did not then provide a laboratory for clinical tests, Prudden brought his New York experience to bear by setting up a small one in a basement room. It should now be apparent to one looking backward over Prudden's career that the laboratory instruction at the Sheffield Scientific School served to discontent him with the system of didactic lectures in vogue at the Yale Medical School, and drove him to study pathology under Delafield in New York, which experience in turn determined his going abroad for further training and thus had much to do in shaping his subsequent course.

The lack of opportunity to pursue adequately practical laboratory courses of instruction in the fundamental branches of medical science in the United States led Prudden, immediately after the completion of his interneship, to seek this opportunity abroad. He naturally turned toward Germany and chose Arnold and Heidelberg as his immediate goal. There still exists the letter, dated September 10, 1876, in which Professor Arnold informs Prudden that a place had been reserved for him in his laboratory and that he does not accept fees. He, however, states that a registration fee of about 10 marks is required. During the winter semester, therefore, of 1876–1877 Prudden followed the lectures and laboratory courses under Professor Arnold and his associate, Dr. Thoma. Subsequently he visited other medical centers, including Vienna, and worked in other laboratories, returning to New Haven after a period of two years of study abroad.

In 1879 there appeared in Virchow's Archiv the paper, "Beobachtungen am lebenden Knorpel," which embodied the results of the main laboratory study pursued by Prudden under Arnold's and Thoma's direction. The study is perhaps more significant to-day than it was at that time. In brief, it represents the endeavor to trace the effects of injurious agencies on living cells while still under control of normal environmental conditions. The fixed cells of the episternal cartilage of the frog were the objects chosen for observation and experiment. A clever device was arranged by which that quite transparent structure could be viewed for hours directly under the microscope, while still in vascular connection with adjacent parts. The chromatin network of the nucleus was discerned and shown to be a preformed structure; variations in cell forms and content, inducible at will, were seen to appear and disappear according to the influences to which the tissue was subjected; the important fact that dissolved dyes do not color the living, but do stain the dead nuclei, was clearly shown, as was the fact that it is particulate, not dissolved dyes, which are ingested by living cells. Just now when the growth of cells *in vitro* is affording so remarkable an opportunity to unravel the intricacies of cell generation and degeneration, and vital staining is clearing up so many dark and disputed questions of cell origin and fate, this early, spirited investigation of Prudden may be regarded as a pioneer undertaking in observing what actually goes on in living cells as distinguished from the inferences drawn of the processes concerned, from the appearance of dead tissues, fixed in chemicals and stained in section. Prudden sums up his findings in the following important paragraph:

> But it seems to me particularly significant that it is possible to observe under the microscope, on living cartilage tissue, the processes of contraction and the formation of vacuoles; and that it is possible thus to determine whether and under what conditions such changed cells return to the normal state or whether they undergo degeneration and die. The observations made with reference to the behavior of living and of dead cartilage cells in response to dyes also seem to me noteworthy, because we thus learn that only the nuclei of the latter stain homogeneously. We are, therefore, in a position to distinguish whether cells are dead or living, and can thus exclude their participation in regenerative processes.

It was in 1879 also that Prudden abandoned the idea of the practice of medicine and adopted the career of full-time teacher of pathology in New York. This momentous decision was not something made without forethought and perturbation of spirit.

> When Prudden came home from Europe, full of enthusiasm to introduce into the lore and training of medicine the laboratory and special research study and teaching of normal histology, pathology and pathological physiology, as related to medicine, with all of which he had been especially engaged in various places during his two years abroad, he was chagrined to find none of the authorities at the several medical schools whom he consulted and the few leading practitioners of medicine with whom he talked, seemed to care about these things as special subjects of knowledge or training. There were chairs of pathology and the practice of medicine, but no chairs of pathology as a special practical theme, and no one saw any occasion to establish them. . . . Thus it was that after vain efforts to get a place to work at pathology at any of the medical schools, even as a volunteer, Prudden finally came back to New Haven, opened an office and started to practice.

However, beneath this placid surface of complacence in the medical schools, with things as they are, a new movement was beginning to make itself felt. Dr. Welch had recently become established at Bellevue Hospital Medical College in a laboratory adjoining the dead house at Bellevue Hospital and was attracting students to his demonstrations and lectures from all three medical schools in the city. This notable

success led the Alumni Association of the College of Physicians and Surgeons to propose to set up a pathological laboratory, and Dr. Delafield turned to Prudden, to whom was offered the position as assistant.

The letter (Delafield's) was carefully weighed as the turning point in an opening career, and finally the offer was declined. The letter expressed regret that financial and other circumstances did not seem to justify the writer in cutting adrift from his old associates and a modest living as a teacher and practitioner in New Haven. . . .

This letter ready for posting was held over until morning. During the watches of the night, however, the spirit of adventure, or the lead of a strong impulse of devotion to the advancement of science, led to the destruction of the letter and an acceptance of Delafield's offer and the arrangement of a visit to New York.

This momentous decision, not only for Prudden himself, but, as it proved, for the future welfare of pathology in the United States, was communicated promptly, it would appear, to Professor Arnold, since in a letter from him dated November 15, 1878, I glean the following:

Your letter pleased me greatly because I am convinced that the position you have assumed will assure you a future. From my knowledge of you, I am, I believe, justified in saying that you will not now easily be diverted from the goal of a scientific career. There is no doubt in my mind that your institute will be a success. The fact that it is small and has only moderate means at its disposal is not important. Some time ago, our German pathological institutes, with the exception of a few, were very bad; now they are being replaced by good ones. But I know from personal experience it is possible to work in even a small institute.

All that Professor Arnold prophesied came true, even to the lean years and the apathy on the part of the older practitioners and teachers in the medical school. But when the College of Physicians and Surgeons was built on West Fifty-ninth Street, opposite the Roosevelt Hospital and adjoining the Vanderbilt Clinic, its chief glory consisted of the splendid group of laboratories, long unequalled, housing the significant department of pathology and bacteriology presided over by Dr. Prudden.

But in 1878–1879, when these beginnings were being laboriously and painfully made, there existed in English no text-book which fairly represented the subject of pathological anatomy as conceived and taught in Europe, especially in Germany. Prudden conceived the notion, even before he returned from his European trip, of translating the brief but excellent work of Perls, and with this end in view, he carried on a correspondence with the author, whose consent he obtained, and then with American publishers, who declined to undertake the printing. From his letter to Professor Perls, ending the series, I abstract the following:

I have been delayed in writing to you, as I promised before leaving Germany, on account of the tardiness of several publishers in answering my communications.

I regret to inform you that none of our best publishers in New York or Philadelphia are willing to undertake the publication of the work at present. The times are bad and the pathological works which have been translated have not been financially successful, and hence they are unwilling to assume this responsibility now.

I regret extremely that it can not be added to our English works at once. I think it possible that it may be done after a time, but at present it seems impossible.

But the large gap which Prudden tried unsuccessfully to fill at the outset of his career with the translation of Perl's pathology he was destined to fill later with a more ambitious and significant work of his own with Delafield. The first edition of Delafield and Prudden's text-book appeared in 1885. As an index of the change in sentiment regarding pathology which had taken place in half a dozen years in America and the standing it came to have may be cited the fact that a second edition was called for within the year. Twelve editions have now been published, each more complete and comprehensive than its predecessor. There is not a modern student or practitioner of medicine who has not fed on its authoritative contents. Dr. Delafield dropped out of the work as part author after the seventh edition. From the tenth edition on, Dr. Francis C. Wood, a pupil of Prudden's, has cooperated in preparing the new volumes. The work as a whole is a tribute to Prudden's grasp of the principles and the practical details of general and special pathology and bacteriology; and among its distinguishing characteristics are charm of style and precision of language, which only felicity and mastery of English diction could achieve.

The great wave of interest in bacteriology, set in motion by the remarkable work of Pasteur and of Koch, and which broke over the world with the announcement of the discovery of the microbes of tuberculosis, cholera, typhoid fever and of the means of preventing rabies, led to a quick response from Prudden who sensed the part the new science would come to play in pathology and in preventive medicine. Early in 1885, therefore, he planned to return to Germany to study, if possible, under the master Koch himself. That he at once enlisted the good offices of his old teacher in this ambition is shown by a letter under date of March 29, enclosing a note from Koch himself, written by Professor Arnold. Koch's note states that "at the moment it is not possible to accede to the request of Dr. Prudden, as the few available places at the Gesundheitsamt have already been assigned for some time ahead." He adds that "a hy-

gienic laboratory will be opened within the next few months, and I expect to give a bacteriological course there. I would suggest informing Dr. Prudden of this opportunity." Arnold's covering letter to this significant enclosure suggests that a preliminary course be taken with Heuppe in Wiesbaden or Frobenius in Munich. He adds, "I was delighted with your letter, because I gather from it that everything is going well with you, and because you give me the hope of seeing you soon." That Prudden's desire to study under Koch was finally achieved is shown by a paper, written in 1885, in which he describes the method of teaching carried out by him.

> Thus the course in the study of bacteria, of one month's duration, in Koch's laboratory was brought to an end, and the writer can not refrain from remarking that the calm, judicial mind of Dr. Koch—the master worker in his field—his marvelous skill and patience as an experimenter, his wide range of knowledge and his modest, unassuming presentation of his views are all calculated to inspire confidence in the results of his own work, to stimulate his students to personal exertion in this field and to lend certainty to the already widespread hope that ere long through the resources of science we shall be able to cope successfully with those most terrible and fatal enemies of the human race—the acute infectious diseases.

Prudden became, therefore, the instrumentality through which the new bacteriology was brought to New York; research was begun and courses of instruction in the subject were at once offered to students; and the tenets of the new science were made practically potent through the influence which Prudden exerted upon the officials of the city department of health and by a well-considered newspaper campaign carried out anonymously over a period of years. It is no accident, therefore, that the department of health of New York presented itself as well advanced in applying to public health measures the teachings of the new hygiene.

The large range of Dr. Prudden's intellectual activities can be gleaned most easily from the list of his published papers and books which, from 1879 to 1914, cover about 100 major titles. The greater number of the papers and books relate naturally to his special field of inquiry, namely, pathology and bacteriology, in the widest sense. The articles and books on American ethnology form a thing apart and show how readily Prudden might have led in archeology, as he did in pathology. His pen was a facile instrument which he could turn at will to the description of detailed and abstruse phenomena or the revealing of fascinating and romantic happenings in the life of the bacteria, the conquest of disease, the past of American aborigines, or indeed any theme which engaged his interest and his thought. His delightful booklets, "The Story of the Bacteria" and "Dust and Disease," were more than messengers of light to the medical profession; they were written in such simple and delightful style that they were read with the absorption of romance by many lay persons, and contributed a large share to that popularization of authentic knowledge upon which the modern practice of sanitation has come to be built. But, as with every scientific man, the most enduring productions are the results of his own efforts to extend the bounds of knowledge; and in that endeavor, Dr. Prudden himself labored through many years and inspired the labors of many others. There stand to his credit and that of his pupils many conspicuous pieces of finished work.

The adventurous and pioneer Prudden did not fail after arduous days to bring back his ship laden with a rich freight of humanitarianism and science. Let this be his monument.

SIMON FLEXNER

THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH

VASECTOMY AND REJUVENESCENCE

THE skepticism manifested by many biologists concerning the results of vas deferens ligation or vasectomy in producing rejuvenating effects seems abundantly justified from both old and new researches. The Steinach operation has commanded considerable interest because of its rejuvenescence claims, *i.e.*, by the remarkable character of these reported effects of restoring youthful vigor. The explanation usually offered is to the effect that there is produced degeneration of the spermatogenic cells with attendant hypertrophy of interstitial tissue. The latter supposedly causes the rejuvenescence. The primary atrophy of the spermatogenic cells is said to be followed by a subsequent regeneration which relieves the animal of the temporary sterility produced by the ligation.

A review of the literature on vasectomy which has been accumulated since the early eighteen hundreds is especially interesting. Hunter,[1] Cooper,[2] Gosselin[3] and Curling[4] were among the earliest of those interested in pathological change in the testes, epididymis and vas deferens. Part of their interest lay purely in the field of pathological findings together with a

[1] Hunter, "Hunter's Works," Ed. by Palmer, Phila., 1841.

[2] Cooper, "Observations on the Structures and Diseases of the Testis." London, 1845.

[3] Gosselin, Arch. gen. de Med., 1847, S. 4, Vol. XIV, p. 408; "Nouvelles Études sur l'obliteration des voies spermatiques et sur la stérilité consecutive à 'l'épididymite bilaterale." Arch. gen. de Med., S. 5, Vol. II, p. 256.

[4] Curling, "On the Diseases of the Testis," Phila. 1866.