THE HISTORY OF THE SARANAC LABORATORY

1885 - 1958

The beginning of the Saranac Laboratory is best described by its founder, Dr. Edward Livingston Trudeau, in the paper he read before The Laennec, a Society for the Study of Tuberculosis, at the Johns Hopkins Hospital, May 1, 1901:

"I must apologize for talking of my own work . . My experiences may prove an encouragement, perhaps, to those of you who are to locate at distant points, as demonstrating the possibility of doing scientific work in remote regions, far from the centres of learning, and they may prove of interest to a Society such as yours as describing the foundation of the first laboratory in this country devoted to researches in tuberculosis.

"I had from the first many difficulties to contend with: no health, no scientific training, no apparatus, no access to books, and was situated forty-two miles from a railroad, in a primitive forest, where I had gone in search of health.

"My inspiration was Koch's paper on the Etiology of Tuberculosis, of which I read an extract in a medical journal in 1883, and which was translated into English and sent me by a patient*.

"In some of the short visits I was enabled to make to New York, Dr. Prudden** taught me how to stain the bacillus, and the first principles of bacteriology, and I taught myself the rest as best I could. My laboratory was a very small room in my house, in which, during the intense cold of winter, water froze at night in spite of my best efforts, as we had no coal in Saranac Lake in those days, and the wood stove could not be counted upon to burn all night. I had no apparatus but my microscope. With Dr. Koch's paper as a guide I succeeded, however, in growing the tubercle bacillus in a home-made thermostat which had no regulating apparatus and which was heated by a small kerosene lamp only. In order to protect this from the violent changes of temperature, which occurred principally at night, I had enclosed it in a series of wooden boxes, the doors of which could be opened or closed at will, according to the intensity of the cold out of doors. But on very cold nights I was obliged to get up in the night to make a fire on the stove in order to prevent too violent changes of temperature in my little oven.

"With these primitive arrangements, after many failures, I obtained the tubercle bacillus in pure cultures, being, I believe, the second observer in America to do this. With these cultures I repeated all of Koch's inoculation experiments. My guines pigs had to be kept in a hole underground, heated by a kerosene lamp, this being the only spot in Saranac Lake where they could escape freezing at night."

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* Mr. Charles M. Lea of the famous Philadelphia publishing house.

** Dr. T. Mitchell Prudden, who worked in Koch's laboratory and who then taught pathology at the College of Physicians and Surgeons.

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These quarters were so small that Dr. Trudeau soon built a little addition off his office and this was the laboratory in which he worked until his house was destroyed in 1893 by fire originating from the little thermostat.

In his autobiography Dr. Trudeau describes his laboratory in these words: " . . . I can see clearly the room opening from my little office, which was really the beginning of the Saranac Laboratory for the Study of Tuberculosis. One side of this room was occupied by a long, high, stationary shelf-table set against the wall under three little half-windows, with shelves underneath the table for glassware, a dry and a steam sterilizer, an oil stove, etc. A little home-made thermostat, heated by a minute kerosene lamp, without any regulating apparatus, stood on a bracket-shelf next to a sink for washing glassware. This sink was as primitive as the thermostat, as there was no running water in Saranac Lake in those days. At one end on a broad shelf stood a big pail with a dipper and this supplied the water (there was of course no hot water), and the waste from the sink was carried off by a leaden pipe which led to a big pail on the floor, this pail being emptied out of doors when danger of its overflow made this imperatively necessary. At the window was a small table with my microscope on it, some bottles of stains, and slides in boxes. By the side of this stood a shelf of books, on top of which was always Mr. Lea's precious translation of Koch's paper, to which the Saranac Laboratory has owed its existence.

"With this humble outfit I began with much enthusiasm, in my imagination, the conquest of the tubercle bacillus, and if I have never come 'within sight of the castles of my dreams', I at least have made some progress along the road leading to them and started others in the same direction, for I was, as far as I can ascertain, the first in this country to cultivate the tubercle bacillus and confirm Koch's brilliant discovery. From the ashes of the little room has sprung the Saranac Laboratory for the Study of Tuberculosis . . ."

Doctor Trudeau's first publication, An Experimental Research upon the Infectiousness of Non-Bacillary Phthisis, was published in the American Journal of Medical Sciences, October 1885, a record of experiments demonstrating the infectiousness of bacillary sputum and the harmlessness of expectoration free from bacilli taken from a patient supposed to have consumption.

In 1886 Doctor Trudeau studied the influence of extremes of environment on the course of inoculation tuberculosis. Many of the inoculated rabbits allowed to run wild on an island recovered or developed only localized disease, while those placed under the most unhygienic conditions died of tuberculosis in a few months. The results of this research confirmed Doctor Trudeau's faith in the value of the sanatorium and open-air method of treating tuberculosis.

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THE HISTORY OF THE SARANAC LABORATORY

During the same week in which Koch's announcement of the discovery of tuberculin and of his hopes as to its specific curative action on tuberculosis was flashed across the ocean, Dr. Trudeau published in the November 22, 1890 issue of the Medical Record an article describing his attempts at the production of artificial immunity in animals by the injections of sterilized and filtered liquid cultures of the tubercle bacillus (tuberculin), and his failure to obtain any appreciable degree of immunity by this method.

The arrival of Dr. Edward R. Baldwin from New Haven, Connecticut, marks the beginning of the second epoch in the Laboratory's history. In December 1892 he rang Dr. Trudeau's doorbell and told him that he was a physician, that he had contracted tuberculosis, and that he wanted to go to the Sanatorium, which he entered six weeks later. The day after Dr. Baldwin came to town he visited the Laboratory, at Dr. Trudeau's invitation, and offered to help in any way. Dr. Baldwin became a constant presence in the Laboratory and Dr. Trudeau learned to lean more and more on him and finally turned this branch of work over to Dr. Baldwin entirely. Dr. Trudeau mentioned in his autobiography: "Doctor Baldwin in those days knew even less than I did about the new science of bacteriology, and I gladly taught him all I know, and as gladly does he teach me now the latest advances in a branch of medical science in which he is an expert and an acknowledged authority. Many happy hours did we spend working in the Laboratory together, and now that I cannot work with him anymore he brings to my bedside the latest literature and tells me of the work he and others are doing."

It seems fitting to quote here from an article by Dr. Allen K. Krause, Reflections on Doctor Trudeau, which appeared in the January 1925 issue of the Journal of Outdoor Life, as follows: "For years Baldwin would carry his bundle of the literature over to the doctor's house in the evening and there read to him what was going on in tuberculosis, particularly in Germany, and since the younger man could not handle French, the doctor would tell him what was happening in the land of his own extraction. This pair formed an almost ideal combination for scientific work."

Dr. Baldwin was soon made Director of the Laboratory and this position he held until 1926. With the late Dr. Walter B. James, Dr. Baldwin inaugurated The Edward Livingston Trudeau Foundation in 1916 and was the first director of the Foundation and of the Trudeau School, which positions he held from 1916 to 1938. In 1927 Dr. Baldwin was awarded the Trudeau Medal for outstanding contribution in the field of tuberculosis; in 1936 he received the Kober Medal for outstanding achievements in medicine, and in 1937 Dartmouth conferred upon him the degree of Doctor of Science.

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THE HISTORY OF THE SARANAC LABORATORY

In the winter of 1893 while Dr. Trudeau was ill in New York his house and laboratory burned to the ground. Among the telegrams, letters of condolence and cheer, and offers of help which poured in was one brief but striking note from Dr. William Osler, as follows:

> "Dear Trudeau: I am sorry to hear of your misfortune, but take my word for it, there is nothing like a fire to make a man do the Phoenix trick."

Dr. Osler's prophecy was soon fulfilled. Mr. George C. Cooper of New York, whose family gave to New York the Cooper Institute, a friend and patient of Dr. Trudeau, called on him the day after the fire. He told Dr. Trudeau to begin to plan a good stone and steel laboratory, one that would never burn up. In Mr. Cooper's words: "Plan it just as you want it, complete, and I will be glad to pay for it and give it to you personally."

Mr. Cooper was not satisfied with the mere establishment of the material facilities for investigation, which his gift of the laboratory afforded, but in association with Mr. John Garrett of Baltimore gave a fund sufficient to carry on researches for several years, while a brother of Mr. Garrett, Mr. Horatio Garrett, provided a fund for a library.

While the laboratory was in process of construction a small addition to the stable on Dr. Trudeau's property was built and served as a temporary laboratory in which, for a year, the work, through the generosity of Mrs. Robert Hoe, was carried on.

During the spring and summer of 1894 work steadily progressed on the new laboratory and by fall it was nearly completed. Dr. Trudeau facilitated matters by presenting the land on which it was placed, which was part of his house lot on Church Street. Dr. Trudeau described the new laboratory in these words:

"The building is a most substantial and dignified structure. As nothing but cut stone, glazed brick, slate, steel and cement entered into its composition, it is absolutely fire-proof and it has not been necessary to insure it. The inside is all finished in white, glazed brick, and it looks absolutely indestructible—as if it were built not for time but for eternity! The Phoenix trick will not have to be repeated soon so far as the building is concerned. It is equipped with fine, self-regulating thermostats, gas, electricity, and every modern appliance for facilitating laboratory work.

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THE HISTORY OF THE SARANAC LABORATORY

"No name has been written on the outside of this compact little structure to indicate its uses, but in the inner hall over the door of the main room a small brass inscription has been placed, which reads:

Saranac Laboratory
for the Study of Tuberculosis
Erected A.D., 1894
Presented to
Edward L. Trudeau, M.D.
by
George C. Cooper

"We had no opening ceremonies and never have had any. When everything was ready, Baldwin and I merely began to move the apparatus we already had in use from the little shed near the barn to our beautiful new quarters and to continue the work we were doing. This was the opening of the first laboratory devoted to the study of tuberculosis in this country."

Dr. Lawrason Brown mentioned in an article he wrote about Dr. Trudeau in the May 1931 issue of the Journal of the Outdoor Life that Dr. Trudeau wanted to call the laboratory the Cooper Laboratory, but Mr. Cooper wished to name it after Dr. Trudeau. A compromise was made and it was called the Saranac Laboratory. The Laboratory was incorporated in 1900 as the Saranac Laboratory under the Education Law of New York State.

Finances proved a difficult problem for Dr. Trudeau as the Laboratory had no endowment of any kind; however, with the help from his many friends, among whom were Mr. Horatio Garrett, Mr. John Garrett, Mrs. Robert Hoe, and Miss Julia Cooper, Dr. Trudeau was able to pay for the experimental animals, chemicals and apparatus, and to continue research. Mrs. A. A. Anderson (founder of the Milbank Memorial Fund) gave generous checks at first and then, according to Dr. Trudeau's notes, assumed the entire support of the Laboratory for a number of years.

The Saranac Laboratory has had a strong educational influence on the many physicians who have come to Saranac Lake for their health and has offered them an opportunity for study. Among these were Drs. P. A. Levene, Lawrason Brown, H. M. Kinghorn, J. Woods Price, Albert H. Allen, J. L. Nichols, Robert A. Patterson, and Willard B. Soper. One of the most noted of the group was Dr. Allen K. Krause who came in 1910 and worked here for ten years. He relieved Dr. Baldwin of much of the routine work and was later appointed associate director of the Laboratory. His work on the problems of immunity and infection are known to all in the tuberculosis world. Dr. Levene was another outstanding scientist and a pioneer worker at the Laboratory. He conducted important studies on the biochemistry of the tubercle bacillus, continuing his investigations at the Rockefeller Foundation.

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Dr. Leonard R. Long, associate professor of pathology at the University of Chicago and later director of Henry Phipps Institute, worked with Dr. Baldwin in the Laboratory from 1917 to 1919. Here he started the chemical investigations on the tubercle bacillus which became an important feature of the research program of the National Tuberculosis Association.

Physicians who were staying in Saranac Lake even temporarily and who were disposed to do a piece of work meeting with the approval of Dr. Baldwin and Dr. Krause had the facilities of the Laboratory placed at their disposal and were assisted in carrying out their work, which they were free to publish under their own names.

The Saranac Laboratory inspired the formation of a medical society in Saranac Lake which continues to meet in the John Black Room. The Laboratory has been the nucleus about which the medical interest of the community centers. Here physicians of the village have brought their problems for solution. The medical library, housed in the John Black Room, has always been open to the physicians and medical patients of the community.

Numerous research studies were conducted during the early years of the Laboratory, as Dr. Trudeau has disclosed:

"How much original work my associates have done was revealed most pleasantly to me on my sixtieth birthday when, after a very pleasant dinner they gave me, they presented me with two most beautiful volumes bound in red morocco, containing seventy papers representing their own studies, which had been published in various medical journals both here and abroad, from 1897 to 1901. These volumes I keep among my treasures and I prize them more and more as the years roll by."

Just before Dr. Trudeau's death on November 15, 1915, the post-graduate course known as the Trudeau School of Tuberculosis, which has its headquarters at the Saranac Laboratory, was founded by the late Samuel Mather. An annual contribution of $5,000 was contributed by Mr. Mather for the first eleven years, and since 1940 the School has received support from the Lillia Babbitt Hyde Foundation.

Dr. Trudeau died before there was any assurance of the permanency for the research and teaching in progress. It was then that the sanatorium trustees decided to establish a memorial endowment fund to maintain these activities. Created by gifts from Dr. Trudeau's friends, this fund was called the Edward L. Trudeau Foundation. The Saranac Laboratory was entrusted to the Foundation, under whose administration it provides diagnostic facilities to the community and carries on experimental research.

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A new era in the activities of the Saranac Laboratory was initiated by Dr. Leroy Upson Gardner, who later became the third director of the Laboratory. Following his graduation in medicine at Yale in 1914, Doctor Gardner entered Boston City Hospital as an intern in pathology under Dr. F. B. Mallory (1914-1917), and at Harvard Medical School he was instructor in pathology during the years 1916-1917. In 1917 he became assistant professor of pathology at Yale. Shortly afterward at Camp Devens, where he was a Lieutenant in the Army Medical Service, he developed tuberculosis and came to Trudeau Sanatorium. In April 1918 Doctor Gardner was well enough to enter the Saranac Laboratory on a fellowship of the Trudeau Foundation and in 1919 he became pathologist of the Saranac Laboratory and of the Trudeau Foundation. He was made Director of the Saranac Laboratory in 1927 and in 1936 he was appointed Director of the Trudeau Clinical and Research Laboratory also. In 1938 he became Director of the Edward L. Trudeau Foundation and of the Trudeau School of Tuberculosis and a Trustee of the Trudeau Sanatorium, which offices he held until his death on October 24, 1946.

It was while Doctor Gardner was director of the Foundation that the Department of Physiology was established, in 1939, and in 1946 he received approval from the Board of Trustees to establish the Department of Biochemistry, which got under way January 1, 1947. The Physiology and Biochemistry Departments, the Trudeau Clinical and Research Laboratory, and the Saranac Laboratory worked together under the Trudeau Foundation. Following the closing of the Sanatorium at the end of 1954, the Department of Physiology was without clinical material and ceased to function, as of July 31, 1955. The Department of Biochemistry moved from Trudeau on June 30, 1955 and operated in conjunction with the Saranac Laboratory until March 1, 1956.

Doctor Gardner's directorship marked a turning point in the history of the Saranac Laboratory and of industrial medicine. Prior to 1918 the work of the Laboratory had been confined almost entirely to tuberculosis. At the time Doctor Gardner joined the Laboratory staff, in 1918, Doctor Baldwin, who was then director, discussed with him the high mortality from tuberculosis among the granite cutters in Barre, Vermont, and the subnormal death rate from this cause in marble cutters at nearby Proctor, Vermont. Doctor Baldwin believed that the dusts which these two groups of stone workers inhaled might be responsible for the obvious differences in their response to tuberculosis. This problem interested Doctor Gardner and a program of experimental research was mapped out. It soon appeared that this was a problem of major proportions with many ramifications and that years instead of months would be required to obtain results. Gradually the facilities of the Laboratory were organized to pursue such a study and soon the major portion of time of the staff members of the Saranac Laboratory was devoted not only to investigations of various problems in tuberculosis, both clinical and others more theoretical in nature, but also to research on mineral dusts and their relationship to pulmonary tuberculosis. Then came years of stringency when the outlook

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for financial support from private philanthropies was most gloomy. But this apparent misfortune proved to be a turning point in the program of the Laboratory. Because other sources of income had failed the Saranac Laboratory was forced to make new alliances and, in doing so, was brought into intimate contact with the much needed clinical material for a well-balanced investigation. To take advantage of the situation it was necessary to expand. Important members of the research staff had to be sent into the field to study conditions of dust generation and its effects upon men who work in it. New members had to be secured to investigate the problems that developed. This program of research proved a profitable venture. Now experimental and clinical studies of occupational diseases of the lung, attributed to the working environment, comprised the major effort. In addition to experiments on silicosis, with and without associated tuberculous infection, there were investigations pertaining to asbestos, diatomaceous earth, cement, gypsum, and other industrial dusts. Antedating the publication of experiments by Canadian investigators dealing with the use of aluminum for the prevention of silicosis, the Saranac Laboratory engaged in experimental work on this subject. During the war years a new disease which appeared to be caused by the inhalation of dust containing beryllium was recognized in certain industrial employees. The aid of the Laboratory was sought and Doctor Gardner entered wholeheartedly into the study of this problem. He initiated many clinical and experimental investigations designed to throw light on this puzzling disease. During this period another new disease entity, occurring among workers exposed to the fume arising from bauxite furnaces and known as Shaver's disease, also received his attention. He was busily engaged in this work at the time of his death.

In 1927 a very serious effort was made to obtain additional endowment for the work of the Saranac Laboratory. Mr. Frank Black of The Ohio Brass Company offered the sum of $100,000 contingent upon Doctor Gardner's ability to secure a like amount of money. Through the activity of a finance committee composed of three local physicians, Doctors Klinghorn, Packard, and Price, and that of Doctor Baldwin, the sum of $225,000 was pledged for a permanent endowment in 1928. The Milbank Fund pledged $100,000 and fulfilled the conditions of Mr. Black's gift. In 1931 the membership of the finance committee was increased by the addition of Dr. Lawrason Brown and Dr. Edgar Mayer.

The John Black Memorial Library and Lecture Room, started in 1927, was completed in 1928 and on May 19, 1928 it was dedicated, a brick and stone structure of one story adjoining the main building on the south side of the Saranac Laboratory with a seating capacity of approximately one hundred. This addition was the gift of Mrs. Frank B. Black in memory of her son, John Baxter Black. This library and lecture room houses the scientific library of the Saranac Laboratory. Over the fireplace is a portrait in oil of John Baxter Black painted by Ivan Olinsky, a distinguished artist of New York City. The speakers at the dedication ceremony included Mrs. Black, who made the presentation of the memorial; Dr. James Alexander Miller, President of the Trudeau Sanatorium; Dr. Edward R. Baldwin, Director

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of the Trudeau Foundation; Mr. Lawrence Lovingood, a classmate of John Black at Princeton; Dr. Lawrason Brown, who cared for John Black during the last months of the latter's life, and Dr. Leroy U. Gardner, who accepted the memorial on behalf of the Laboratory. In a letter to Doctor Gardner dated April 18, 1928, Mrs. Black urged: "You should most surely be the one to accept the room. It was given to you particularly." Mrs. Black spoke of the "remarkable spirit that radiates from the remarkable group of men who are the specialists in tuberculosis, the doctors in the village," and of the kindness of those in the community, and that she wanted to share in it. "Then," she added, "from one of John's friends, a worker in this Laboratory who knows its work and its needs and who loves, admires, and reveres its director, came the suggestion for a needed lecture room . . . . It was a chance to do something for these doctors . . . . So it came to be not only a lecture room but a library and a place in which I hope the doctors will be comfortable while they read, and where they can meet together . . . . So, my husband and my sons and I give this room to the Saranac Laboratory and the doctors of Saranac Lake." Dr. Miller spoke eloquently of the medical and research work done in Saranac Lake and in Trudeau, of Doctor Trudeau and the spirit which he had impressed upon the community of workers here, and of the place which the John Black Memorial would have in furthering the important researches here. He said there were two outstanding achievements in Doctor Trudeau's life: first, the Trudeau Sanatorium; second, the scientific research in the disease, first in the little laboratory in his house, destroyed by fire, and then in the Saranac Laboratory, the work of which has been one of the notable achievements in scientific medicine in this country. In 1929 Mrs. Black provided additional funds for the necessary extensions to the heating system, including the installation of a new oil-burning furnace and of additional radiation in the John Black Room.

In 1926 Mr. John D. Rockefeller, Jr., pledged $5,000 annually for three years to the support of a chemist and his work and in March of that year Mr. Donald E. Cummings joined the staff as chemist. In 1931 he was made assistant director in charge of field work, a position he held until his death in December 1942. Under Mr. Cummings' direction and in collaboration with Dr. H. L. Sampson, roentgenologist at Trudeau Sanatorium, a series of studies was undertaken, beginning in 1932, in different industries in which dust was a problem. These inquiries included a physical investigation of the dust or other hazards and an examination of the employees. Studies were carried on in the iron ore district about Lake Superior, in the gypsum and cement industries, in a group of fluorspar mines, and in a large steel mill. These field studies, which led to the establishing of a Field Division of the Saranac Laboratory, proved a productive form of research for they yielded the practical information which was needed to evaluate the experimental results observed in animals. Doctor Gardner has recorded that great credit was due Mr. Cummings for developing the field research activities which produced much needed income for the continuation of the Laboratory's work.

The information obtained from the field and experimental investigations has been given to all who could use it. By correspondence, by interview, by lectures, by publications, and through the medium of the symposia, the Laboratory has attempted to place what is known of dust diseases in the hands of

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those dealing with their practical aspects. The contributions of the Saranac Laboratory concerning silicosis have been of fundamental importance and have added greatly to a better understanding of this serious industrial disease. As a result of his work Doctor Gardner became widely recognized both here and abroad as an authority on dust diseases and was in demand as consultant by many industries as well as by governmental agencies. The National Tuberculosis Association awarded him the Trudeau Medal in 1935 in recognition of his work on disease due to dust and the American Association of Industrial Physicians and Surgeons gave him the Knudsen Award for outstanding achievement in industrial medicine in 1940. He also received in that year an honorary degree of Master of Science from Yale. Doctor Gardner was selected in 1930 as one of two delegates from the United States Government to the International Conference on Silicosis, held in South Africa under the auspices of the International Labor Office of the League of Nations, at which he was elected secretary of the medical division. At this meeting he presented a general report of the Saranac Laboratory experimental work which demonstrated for the first time that silicosis can be reproduced experimentally, thereby furnishing a means for the solution of many perplexing problems. Doctor Gardner also represented the United States Government at the International Labor Conference on Pneumonokoniosis in London in 1932 and again in Geneva in 1938. He served for several years as special consultant to the U. S. Public Health Service.

Doctor Gardner arranged and conducted five symposia at the Saranac Laboratory: the first three, held in 1934, 1936, and 1937, were devoted entirely to the subject of silicosis; the fourth was held in 1939 and the program was varied by presentations of the experience in a wide variety of dusty industries with and without silica hazards. Eminent authorities in the various fields volunteered their services to lead the discussions. The participants at these symposia included industrial physicians and executives, engineers, insurance officials and state compensation commissioners. Mr. B. E. Kuechle, Vice President and Claims Manager of the Employers Mutuals of Wausau, undertook the publication of the proceedings of these four symposia and his company defrayed all expenses, turning over the proceeds from the sale of these publications, approximately $6500, to the Saranac Laboratory as a contribution to research in industrial disease. The fifth symposium was conducted in June 1941. The subject was Tuberculosis in Industry and silicosis was considered only incidentally among the many other environmental factors of the working place that have been alleged as causes of tuberculosis. The proceedings of this session were published by the National Tuberculosis Association.

The development of a museum of pathological specimens, started in 1928, was an important adjunct to the teaching program. The curator, Mr. J. V. Luttrell, arranged an extensive tuberculosis collection representing most of the forms of this disease. In 1929 the staff of the Saranac Laboratory was augmented by the employment of a bacteriologist, Dr. G. R. Dowd, and in 1930 Mr. Douglas S. McCrum joined the staff to develop a department of photography. Mr. McCrum made a very valuable contribution to the teaching facilities by providing illustrations for lectures and publications and also by making a series of wax models of silicotic nodules from the lungs of experimental animals and from the lungs of human beings. These models demon-

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strate the similarity between the animal lesions and those in man. Another group of models made by Mr. McCrum graphically illustrates how silicotic nodules compress the lymphatic vessels - the drainage system of the lung - thus interfering with their function. Still another group demonstrates how tuberculous infection penetrates into the interior of a pre-established silicotic nodule.

Among the contributions to income in 1929 were pledges by the Commonwealth Fund and by the Metropolitan Life Insurance Company, each having pledged a sum of $5,000 annually for a period of five years for the special purpose of studying the bacteriological phases of silicosis. The Commonwealth Fund's contribution was obtained through the efforts of the chairman of the finance committee, Doctor Kinghorn, who also raised the sum of $1,150 from various sources for running expenses. Additions to plant equipment in 1930, such as a new incubator room, photographic room, and a room for the preparation of tuberculin were made possible through the generosity and efforts of Doctor Kinghorn. A new camera and other equipment for the photographic room were also secured through his efforts.

In the spring of 1931 two pledges of $10,000 were not renewed and the finance committee and the director were unsuccessful in their efforts to find funds to replace this loss. Because of financial stringency it became necessary to suspend temporarily the work in the field of bacteriology but some staff members chose to remain without salary until certain portions of the work could be finished. In July 1931 a meeting of the physicians practicing in Saranac Lake was called and the financial problem placed before them. They unanimously agreed the work of the Laboratory should continue and they accepted the responsibility of securing funds for its support. To accomplish this purpose an organization called the Saranac Lake Academy of Medicine was formed, the principal objective of which was to obtain funds for the support of the Saranac Laboratory. Doctor Baldwin was elected president and at the initial meeting about $3,000 in the form of membership dues was raised. For several years, during the period 1931 to 1938, Academy members made an annual contribution to the Laboratory, over the years totaling approximately $10,000, but later, when the Laboratory received some income from its field activities, the members discontinued their annual gifts and the Academy ceased to function. Most of the receipts from the Saranac Lake Academy of Medicine were devoted to carrying on the diagnostic department for the benefit of the community. It may be of interest here to mention that during the years 1922 to 1942, for which the figures are readily available, the number of diagnostic examinations ranged from 3,541 to 6,814 a year and the number of autopsies from 9 to 74 a year. The diagnostic department served the patients, physicians, hospitals, and sanatoria not only in Saranac Lake but also in Lake Placid, Loon Lake, and Saranac Inn. Contributions from the Trudeau Foundation and the Saranac Lake Academy of Medicine, supplemented by fees from individuals and grants from Northwood Sanatorium and Saranac Lake General Hospital for diagnostic services, made it possible to maintain a staff for this work. At the request of Dr. Edgar Mayer the

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Adirondack Fund for Tuberculosis appropriated annually, beginning in 1931, the sum of $1,000 to the diagnostic department in return for clinical laboratory examinations on patients at Northwoods Sanatorium. The examinations were made by Mr. Morris Dworski, for many years bacteriologist of the Saranac Laboratory and later Director of the Laboratory at Will Rogers Memorial Hospital. This annual appropriation was continued for many years. The diagnostic department received also, from 1939 to 1950, an annual grant of $1,000 from the Saranac Lake General Hospital. Following the establishment of a diagnostic laboratory at the Saranac Lake General Hospital, in June 1950, the greater number of examinations have been handled there but the facilities of the Saranac Laboratory are still used to some extent. Another contribution received in 1931, one solicited by Mr. George L. Starks, was a three-year annual pledge of $2,500 from the Chemical Foundation.

Doctor Gardner mentioned in his annual report of 1932 that the Saranac Laboratory was then in a surprisingly favorable position with brighter prospects for the future, that due to a nation-wide interest in pneumoconiosis and tuberculosis - the subjects on which the Laboratory had been working for the preceding fifteen years - "our experience now commands attention. We find ourselves one of the few groups competent to supply much sought for information." In the early spring of 1932 the Laboratory staff entertained a group of fifteen prominent investigators in the field of industrial disease. Some of the experimental data at the Laboratory served as the basis for a two-day discussion on the subject of the estimation of atmospheric dust concentrations with particular attention to the function of particle size.

At this time, owing to the fact that suits for many millions were pending in various courts throughout the country, pneumoconiosis was becoming a most unpleasant by-word with many business executives. By correspondence and by personal interview Doctor Gardner was being consulted by representatives of state industrial compensation boards, of insurance companies, and of industries such as mining, quarrying, sandblasting, foundries, and manufacturers and users of artificial abrasives. They were given all information available but invitations to Doctor Gardner to appear in court as an expert witness were refused. Adoption of this policy seemed the only way to preserve the reputation of the Saranac Laboratory as a source of impartial scientific knowledge. In a few cases where it was felt that the Laboratory possessed special knowledge of an industrial condition, members of the staff consented to testify as to the general nature of the hazard but refused to give evidence as to the condition of particular individuals.

In 1932 a new animal house, which provided facilities for carrying on dust inhalation experiments, was completed at a cost of $4,414. Owing to insufficient funds it could not be used for dust exposures at once but two rooms were equipped for breeding experimental animals. However,

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within a year the dust house was operating at full capacity with five dust inhalation experiments in progress. Mr. Ernest W. Smoot of Washington, D.C., gave a sum of $2,500 toward the construction of this building, gifts of $1,000 each were received from Dr. Hugh Kinghorn and Mr. Frank J. Tone, and a gift of $200 was received from Mr. Harold Hochschild. By this time the accommodations of the Laboratory were again inadequate to carry on the work in progress and additional space for the proposed increase in the staff became imperative. The logical place for expansion was above the John Black Room, which had been erected with this possibility in mind. In 1935, therefore, a second story, which provided six additional rooms, was added to the John Black wing. The addition, which cost $16,000, was made possible by gifts of $10,000 from Mr. and Mrs. Frank B. Black, $1,000 from Dr. Frederick Wilson and Mr. Thomas A. Wilson of Reading, Pa., $1,000 from Mr. Andrew Fletcher, vice-president of the St. Joseph Lead Company, and $250 from Mr. Henry U. Harris of New York. In 1938 one of the rooms was equipped as a petrographic laboratory when the Air Hygiene Foundation contributed $10,000 for the establishment of a department of petrography. The Air Hygiene Foundation and its successor, the Industrial Hygiene Foundation of America, gave generous support to the work of the Saranac Laboratory for about fifteen years and during that period made additional grants that totaled nearly $50,000. In 1941 the Saranac Lake Medical Society gave $185 toward the cost of a fluorescent lighting system in the John Black Room and Mr. and Mrs. Woodward Clark and Mr. Stephen Phillips made contributions for fluorescent lights throughout all the workrooms and offices.

In 1933 Doctor Gardner and Mr. Cummings took part in a conference on pneumoconiosis arranged by a group of industries in Wisconsin, after which the group made an immediate contribution of $500 to the Saranac Laboratory with assurance that more help would be forthcoming. A year later a group of mutual insurance companies through the American Mutual Alliance pledged their support to a three-year silicosis research program and a group of stock insurance companies through the National Bureau of Casualty and Surety Underwriters made a similar three-year pledge. In 1933 an iron mining company in the Lake Superior district contracted with the Laboratory to carry out field and laboratory studies for a period of three years and the entire group of companies operating iron mines in the northern part of Michigan decided to employ the Laboratory's services at $30,000 annually to survey all their mines. At about this time engineering and industrial hygiene surveys were initiated in the steel, cement, and gypsum industries and were subsequently carried on for a number of years. The field activity of the Saranac Laboratory has continued to play an important role in developing better health control for the working man, particularly in the Lake Superior district and in mining industries in New York State.

In September 1939 Mr. Cummings, who had so successfully directed the field division of the Saranac Laboratory for seven years, accepted an appointment as Associate Professor of Medicine in the University of Colorado. This new arrangement, however, allowed him to spend one-third of his time in the Laboratory Field Division. It then became necessary to employ an assistant engineer to help Mr. Cummings maintain the contracts in the field. Later,

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with America at war, the Laboratory felt the loss of important staff members to the war effort. Inspection of defense, ordnance and other plants meant more traveling for the Director but brought problems to the Laboratory for study. Confidential investigations of war materials were made under grants from the National Research Council. Late in December 1942 the Laboratory suffered an irreparable loss when the Field Director, Mr. Cummings, was killed in an airplane crash. He was responsible for the Laboratory's largest field activity - the control of health in the iron mines of the Lake Superior District - and was available to the Laboratory for consultation elsewhere.

In 1945 Doctor Gardner, again faced with the problem of being overcrowded in the Laboratory and needing more space and a larger research staff to take care of new projects, approached friends in various industrial organizations concerning the necessary expansion. He asked for contributions and set as a goal $100,000, which would build and equip the necessary addition. His inquiry received immediate and enthusiastic response. Up to the time of his unexpected death, in October 1946, Doctor Gardner had received contributions of $58,550. Later his successor, Dr. Arthur J. Vorwald, increased the sum to more than $150,000. During his last years Doctor Gardner was also engaged in the development of a medical center in Saranac Lake. To this, too, he gave beyond his strength.

Following Doctor Gardner's death Doctor Baldwin stated: "His loss to the scientific world is such as to challenge all in similar research to follow his example." And in the Saranac Lake paper appeared the following tribute:

> ". . . for Doctor Gardner, like Doctor Trudeau, brought unusual gifts to the work of fighting the good fight to free humanity from needless pain and waste and loss. Each was a pioneer, a sufferer, a victor. Each was a great man among men, a great spirit in the battle for a better race."

Dr. Arthur J. Vorwald was chosen as the Laboratory's fourth Director. Doctor Vorwald first joined the staff of the Saranac Laboratory as assistant pathologist under Doctor Gardner on October 1, 1934. Doctor Vorwald had received his training at the University of Chicago and he came to the Laboratory after a year of post-graduate work at Cambridge. He entered service with the Navy in 1942 as Lieutenant Commander (MC) and when he resigned from the Navy in 1947 he held the rank of Captain (MC) USNR, Director of the Medical Sciences Division, Office of Naval Research. He re-joined the staff of the Saranac Laboratory as Director on July 1, 1947, and in 1948 he was made Director of the Trudeau Foundation, which positions he held until July 1, 1953. Doctor Vorwald put the Laboratory on a sound financial basis and under his direction much of the experimental work for the various industries and governmental agencies which was initiated by Doctor Gardner was completed, certain studies were expanded, and new research investigations were undertaken. Grants

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for the support of various studies were obtained by Doctor Vorwald from a number of agencies, particularly the United States Atomic Energy Commission, the Office of Naval Research, the American Cancer Society, the Damon Runyon Fund, the National Tuberculosis Association, the Army Chemical Corps, and the United States Veterans Administration, and several studies were carried on under industrial contracts.

Before his death Doctor Gardner had made plans for another symposium, the sixth, which would consider all aspects of the beryllium problem and of bauxite fumes as they relate to industrial health and which would also review the latest developments in the corporate and social responsibilities for pneumoconiosis. Mr. Manfred Bowditch, formerly director of the Division of Occupational Hygiene, Department of Labor and Industries, Commonwealth of Massachusetts, who joined the staff of the Laboratory at Doctor Gardner's invitation on January 1, 1946 as Field Director, proceeded with the details of planning. In September 1947 the Sixth Saranac Symposium on Beryllium, Bauxite Fumes, and Compensation was conducted in Saranac Lake under the direction of Doctor Vorwald. As in the five previous symposia, contributors to the program were drawn from among the leaders in various fields and the fifty-six contributors represented engineering, clinical industrial medicine, industrial hygiene engineering, clinical and experimental pathology, and finally, management, labor, insurance, and industrial compensation. The audience of some two hundred individuals, most of whom contributed to the lively discussions of the formal papers, made this the largest and possibly the most controversial of all symposia held at the Saranac Laboratory. The proceedings of this meeting were published as a book largely through the generosity of the beryllium industries, which contributed to the cost of the publication.

The Seventh Saranac Symposium on Pneumoconiosis, Pulmonary Cancer, and Compensation was held in the fall of 1952. Because of the large enrollment, the meetings were held at the Odd Fellows Hall. Due to a number of difficulties, the proceedings of this conference were not issued as a single publication but a number of the papers were published individually in various journals.

Under Doctor Vorwald's direction the research and industrial activities of the Saranac Laboratory continued to expand. In addition to investigations with silica dusts, particularly submicron amorphous varieties and diatomaceous earth, the experimental studies dealt with beryllium compounds, with pulmonary cancer, and with attenuated forms of the tubercle bacillus, such as BCG. The field division was quite active and had an important part in the engineering and medical control of dust hazards in the iron mines of Wisconsin, Michigan, Minnesota, and New York.

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THE HISTORY OF THE SARANAC LABORATORY

At the Ninth International Congress on Industrial Medicine, held in London in 1949, Doctor Vorwald read a paper on Diatomaceous Earth Pneumoconiosis and the next year, at the Third International Congress of Experts on Pneumoconiosis, he presented a paper on Problems in Pneumoconiology. This Third International Congress was held in Sydney, Australia in February-March, 1950 and Doctor Vorwald attended it by invitation as one of five experts representing the participating countries.

Among the many papers from the Saranac Laboratory during the years 1947 to 1953 was one entitled Experimental Studies of Asbestosis by Vorwald, Durkan, and Pratt, which appeared in the A.M.A. Archives of Industrial Hygiene and Occupational Medicine, January 1951. For this contribution the authors were given the citation for excellence in medical authorship - Merit in Authorship Award - by the Industrial Medical Association at its Annual Meeting at Atlantic City, April 25, 1951.

Doctor Vorwald resigned as Director of the Saranac Laboratory and of the Trudeau Foundation on July 1, 1953 and in 1954 he joined the staff of Wayne University, Detroit, as Chairman of the Department of Industrial Medicine and Hygiene.

The fifth director of the Saranac Laboratory was Dr. G. W. H. Schepers, who assumed charge in April 1954. Doctor Schepers came to the Laboratory from Johannesburg, Union of South Africa, where he was Chairman of the Pulmonary Disability Committee of the Miner's Phthisis Bureau and a member of the Silicosis Medical Bureau.

The McIntyre-Saranac Conference on Occupational Chest Disease, a joint effort of the McIntyre Research Foundation and the Saranac Laboratory, was held in Saranac Lake in February 1955. Because of the large enrollment the sessions were conducted at the Town Hall. The proceedings of this conference were published by the American Medical Association Press at the expense of the two sponsoring organizations.

The program of experimental work was continued by Doctor Schepers and a large number of scientific papers dealing with studies carried on at the Laboratory were published. At this time monkeys were used as an additional species in some of the experimental investigations. In 1955 Doctor Schepers was made Director of the Trudeau Foundation and for that year he was also Director of the Trudeau School of Tuberculosis. Doctor Schepers resigned from the Saranac Laboratory and joined the staff of the University of Michigan on July 1, 1957, and Mr. Thomas M. Durkan, a member of the Laboratory staff since 1933, Chief Chemist and Associate Director of the Laboratory, then became Acting Director.

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THE HISTORY OF THE SARANAC LABORATORY

In January 1957 the Silicosis Control Unit, with Dr. Leonard J. Bristol, radiologist of the Trudeau Foundation, in charge, was set up as a subdivision of the Saranac Laboratory to include the field activities dealing with dust. Through this Unit contractual arrangements have been made with mining companies in the Lake Superior district and New York State and with other companies to interpret industrial films and conduct mine surveys.

Following a decision of the Executive Committee there was a drastic reduction in the Saranac Laboratory staff in July 1958 and most of the research activities were temporarily discontinued. At the Annual Board Meeting in November 1958 the Trustees approved an experimental program, to be conducted under the direction of Dr. George W. Wright, a member of the Board and Head of the Department of Medical Research at St. Luke's Hospital at Cleveland, which would deal with the problem of emphysema and which would utilize the dust rooms and chambers of the Saranac Laboratory. This program was started January 1, 1959 and is now being carried on.

There have been approximately 399 scientific papers prepared by members of the staff of the Saranac Laboratory. Reprints of the papers have been bound in seven volumes under the heading "Saranac Laboratory Studies," as follows:

Volume	I.	1885 to 1910
	II.	1911 to 1916
	III.	1917 to 1930
	IV.	1931 to 1936
	V.	1937 to 1942
	VI.	1943 to 1953
	VII.	1954 to 1958

The Annual Report of the Director of the Saranac Laboratory was his vehicle to indicate the nature of the work of the Laboratory and to speculate upon its significance. The purpose was not to draw final conclusions but rather was to inform the sponsors and others of the investigations being carried on and the progress of those studies. Prior to 1931 the Annual Report of the Saranac Laboratory and the papers by members of the Laboratory staff were included in the Annual Medical Report of the Trudeau Sanatorium and The Studies of the Edward L. Trudeau Foundation. In 1931, to avoid existing confusion between the Research and Clinical Laboratory of the Trudeau Sanatorium and the Saranac Laboratory, the Annual Report of the Saranac Laboratory was published under separate cover from the report of the Sanatorium. Doctor Gardner explained: "While the Saranac Laboratory cooperates with the Sanatorium in every possible way and serves as the headquarters for the Trudeau School of Tuberculosis, it provides diagnostic facilities to the physicians practicing in the village and carries on independent researches in the field of tuberculosis and associated conditions." Due to the pressure of duties of the Director, there were no Annual Reports of the Saranac Laboratory

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published from 1943 until 1948, but a resume of the work of the Saranac Laboratory for 1943-1944 was given in the Report of the Director of the Trudeau Foundation which appeared in the 1943-1944 Annual Report of the Trudeau Sanatorium. In 1948 a joint Annual Report of the Trudeau Sanatorium and of the Trudeau Foundation, including the work of the Saranac Laboratory, was issued in one brochure. A similar joint report was issued for the years 1949-1950 and for 1951.

Due to the many references to Doctor Gardner's papers, his 110 publications have been collected and bound in three volumes. Included also are his reports of the Saranac Laboratory for the period 1921 to 1942, and of the Trudeau Foundation for the period 1939 to 1944. These three volumes have been bound under the heading "Publications of Leroy U. Gardner, M.D.," as follows:

Volume	I.	1917 to 1931
	II.	1932 to 1939
	III.	1940 to 1946

Although many of the papers are out of print and reprints are no longer on hand, a complete list of the publications of the Saranac Laboratory has been compiled, which is suitable for reference purposes, and copies are available for distribution.

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