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GILBERT DALLDORF

1900—1979

A Biographical Memoir by

FRED RAPP

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WASHINGTON D.C.



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March 12, 1900–December 21, 1979

BY FRED RAPP

THE LIFE OF GILBERT DALLDORF spanned the beginnings of modern virology as a descriptive science through the beginnings of studies undertaking the molecular biologic properties of those microbial agents. This included the era of rapid discovery of many viruses as the causative agents of human disease and effective vaccines to prevent the worst of them.

Born and raised in the midwest, Gilbert Dalldorf went east for his medical training and spent most of his professional career in the state of New York. A likeable man, he had high standards and instilled them into his colleagues. The creativity of his mind was perhaps best exemplified by his famous discovery of the Cocksackie viruses for which he used newborn mice as the vehicle for their isolation. In carrying out these experiments, he discovered viruses that often mimic mild or nonparalytic poliomyelitis. His knowledge of pathology and virology enabled him to separate the Cocksackie viruses into types A and B and to carry out the definitive work on the pathology caused by those viruses in experimental systems. That discovery and other research yielded evidence that many viruses interfere with each other in replication. The substance induced by these viruses, now known as interferon, has become prominent in experimen-

tal studies and in studies involving the treatment of a variety of neoplastic and infectious diseases. The effects of his work on the science of virology are still being felt a decade after his death and are likely to continue well into the twenty-first century.

Born in Davenport, Iowa, Gilbert Dalldorf's early life was spent in that state. The 1920s were times for developing independence in a young man without large-scale financial resources, and Dr. Dalldorf became well acquainted with the vagaries of life while surviving that environment. His undergraduate education took place at the State University of Iowa, where he graduated with a Bachelor of Science in 1921. During his college days he lived in Sigma Nu House, taking what he referred to as sometimes "miserable" summer jobs. These included scraping ciminite ceilings or driving about the countryside crimping metal signs to barbwire fences. He became a Fuller brush salesman during some summers, and characteristically, he soon ran a squad of fellows of his own, covering the state of Kansas. He rode the freights all over the state selling brushes in an environment that can only be described as uncomfortably hot, when finding lemonade or fresh water was a major achievement. It was an era in which undergraduate premedical students took chemistry and biology but also were exposed to many of the liberal arts, with large doses of history and literature.

After admission to the University of Iowa Medical School in Iowa City, Dr. Dalldorf became restless and eventually transferred to New York University and Bellevue Hospital Medical School, from which he graduated in 1924 with a medical degree. The architect of his move to New York had been Dr. Henry Prentiss, who convinced him that Bellevue Hospital Medical School was an exciting and stimulating environment.

He was excited about what he saw at New York Univer-

sity. He discovered the New York Public Library and continued a major reading program that had been with him his whole life and accompanied him to his death. During this period he returned to Iowa where he met Frances Barhart, a native of Omaha, who also became a famous physician. Married some years later, their relationship was to endure in full flower until his death in 1979.

Upon graduation from medical school, Dr. Dalldorf took a one-year rotating internship at the Norwegian Hospital in Brooklyn, New York. He then became a Fellow in pathology at the Pathologisches Institut, University of Freiburg, Germany. There, he studied under its famous director, Dr. Ludwig Aschoff. He also studied under Dr. James Ewing, a world-renowned pathologist. Subsequently, Dr. Dalldorf became a diplomate of the American Board of Pathology. He was to receive an honorary Doctor of Science degree from Bowdoin College in Brunswick, Maine, in 1953, and an honorary M.D. degree from the University of Freiburg in 1957. The latter degree, awarded on the occasion of the 500th anniversary of the founding of the university, represented a unique tribute to a special American.

Following his formal training, Dr. Dalldorf accepted the position of assistant pathologist at New York Hospital in 1926 and was promoted to pathologist at that hospital in 1927. From 1926 to 1932, he was an instructor in pathologic anatomy at Cornell Medical College and became the pathologist of Grasslands Hospital in Valhalla, New York, from 1929 to 1943.

Dalldorf's innovative spirit was manifested in a number of ways during those years of training. To take up his position in Freiburg, he became an assistant to the ship surgeon on the *S.S. George Washington*, an old-fashioned but elegant coal burner. It had been used by President Woodrow Wilson as a peace ship during World World War I. He then

transferred to a newer vessel, the S.S. *President Roosevelt* (Theodore, not Franklin), where he and one nurse provided for the crew and passengers. A rescue at sea became the subject of a story he published in *Liberty* magazine; the funds received for that story were used to finance his foreign fellowship.

For a lad from Iowa, New York was a heady atmosphere. The theater, trips to East Hampton, backpacking in the Hudson Valley and the Catskills, and visits to Fire Island and Westchester were all part of the itinerary. The Dalldorf's move to Valhalla coincided with the birth of their first child. Their idyllic life was interrupted by tuberculosis (probably contracted in the morgue) and by poliomyelitis contracted by the children. It is intriguing to speculate how much that infection may have played a role in the major discoveries made by Gilbert Dalldorf shortly thereafter.

He became director of the Department of Laboratories and Research in Westchester County in 1943, and in 1945 made the very large jump to become director of the Division of Laboratories and Research of the New York State Department of Health. During the twelve years in Albany, Dr. Dalldorf made perhaps his greatest contributions to medical science.

The New York State Department of Health through its Division of Laboratories and Research was a pioneer in public health. The first director had been Augustus B. Wadsworth, who served from 1914 until Dr. Dalldorf became the second director in 1945. The famous bacteriologist had recruited a fine staff of investigators including Dr. Mary Butler Kirkbride. The senior staff wrote a book entitled *Standard Methods*, first published in 1927, which subsequently became almost a bible for public health laboratories. By the time Dr. Dalldorf arrived in Albany, a very knowledgeable and innovative staff of researchers was on hand and the labora-

tory had become famous for developing methods, reagents, and standards for microbial diagnostic tests and notably for the preparation and production of therapeutic antisera.

Medicine and science were rapidly changing at this time. Serum treatment of bacterial diseases had been supplanted by the use of antibiotics, especially penicillin. Virology was beginning to blossom with the continuing epidemics of poliomyelitis spurring research in that arena. A complete laboratory of virology under Dr. Irving Gordon was established and housed in a barracks-like building separate from the main structure to keep the risk of infectious contamination at a minimum. However, Dr. Dalldorf continued to personally supervise studies with poliomyelitis, which he had initiated earlier in Westchester.

The poliomyelitis studies, performed in collaboration with Grace Sickles, led directly to the premier discovery that was subsequently made by Dalldorf and his various collaborators. His earlier work with monkeys had demonstrated that lymphocytic choriomeningitis virus (a contaminant of a distemper virus preparation) protected monkeys against the crippling effects of inoculation of virus isolated from cases of poliomyelitis. Dalldorf had originally thought that distemper virus was responsible for the observed interference, but quickly published a "correction" when the presence and role of his lymphocytic choriomeningitis virus was discovered in his laboratory. Subsequently, it was observed by many others that one virus has the capability of interfering with the replication of another, an effect sometimes mediated by interferon and at other times by other mechanisms.

Using newborn mice as a vehicle for his studies, Dalldorf decided to attempt the isolation of viruses from fecal specimens from poliomyelitis patients or similar diseases. In carrying out these experiments, he discovered viruses that often mimicked mild or nonparalytic poliomyelitis. The virus

family he discovered was eventually given the name Cocksackie, for a little town on the Hudson River where Dalldorf had obtained the first specimens. These viruses subsequently were found to cause a variety of infections, including epidemic pleurodynia (Bornholm disease), and were subdivided into groups A and B based on their pathology in newborn mice. Isolation of these viruses generated great excitement and represented the first of many viruses isolated from the gastrointestinal tract that were serologically unrelated to poliovirus.

The use of suckling mice was not Dalldorf's idea, but was brought to his attention in a paper written by Danish scientists Orskov and Andersen in 1947, who were using such mice to study a mouse virus (Theiler virus). The discovery of the Cocksackie viruses stimulated many virologists to use this system and ultimately resulted in the isolation of a large number of other enteric and nonenteric viruses, including mouse leukemia viruses and other oncogenic agents.

Dalldorf introduced many innovative programs in the Division of Laboratories and Research. In addition to continuing the excellent library started by Wadsworth, he fostered an intellectual atmosphere in the division that resembled that of many top research universities. Thus, when Elizabeth Hazen and Rachel Brown isolated the first successful antifungal antibiotic, first known as fungicidin, then nystatin (for New York State), and finally, Mycostatin, he quickly sought sources to develop it for clinical use. Working in collaboration with Squibb and Sons and Research Corporation, that aim was accomplished and the Brown-Hazen application for a patent was granted. By their stipulation, their royalties were to be used entirely to support scientific research. The system established by Dalldorf continues to serve as a model for university and industrial col-

laboration in the biomedical field; this was the first of its kind and for many years was the predecessor of other agreements now in place in many universities.

Dr. Dalldorf was not one to sit still very long. In 1958 he became the director for Medical and Scientific Research of the National Foundation (March of Dimes), and a member of the Sloan-Kettering Institute for Cancer Research in Rye, New York; he held the latter position until 1967 when he retired and became an emeritus member of the Sloan-Kettering Institute. During his tenure in these various research positions he maintained his university affiliation, first as professor of pathology and bacteriology at the Albany Medical College, then as visiting professor of virology at the University of Buffalo, New York; visiting lecturer in microbiology at the Harvard School of Public Health; and professor of pathology of the Sloan-Kettering Division at Cornell University Medical College. He served on many national and international committees, was a member of Alpha Omega Alpha (Delta chapter), and a member of most of the pertinent scientific societies of his era.

His major awards included the Harold J. Fisher Memorial Award to a Civil Service Leader in 1951; the Scientific Achievement Award of New York University Alumni Association in 1955; the Albert Lasker Award for Medical Research from the American Public Health Association in 1959; the Medical Achievement Award of the Golden Slipper Square Club in Philadelphia, 1961; and the medal of the New York Academy of Medicine in 1964. He was elected a member of the National Academy of Sciences in 1955.

Dr. Dalldorf finished his active research in Africa, examining Burkitt lymphomas of African children and studying the various virologic, serologic, and epidemiologic aspects of that disease. It is, perhaps, significant that his last research publication appeared in *Proceedings of the National*

Academy of Sciences in 1973, entitled "Malignant Lymphomas of African Children."

Gilbert Dalldorf was a self-made man who took opportunities as he saw them and learned from knowledgeable individuals with whom he came into contact. Although he looked forbidding to young investigators, he was generally friendly, inspiring confidence in his colleagues and friends. He was avid about everything he touched, from his science to his hobbies. He flew his own airplane and enjoyed fishing in his later years.

His motorsailor, the *Wanigan* and later *Wanigan II*, took him along the eastern coast from Maine to Florida; he loved the Chesapeake Bay and the eastern shore of Maryland, where he rediscovered the old city of Oxford, which he made his retirement home. He was fond of people of good nature and friendliness. He lived life to the fullest.

He was survived by his wife, son (also a pathologist), daughter, and a number of grandchildren (two of whom are physicians). To those who knew him, even eleven years after his death, he remains a formidable figure who affected in a positive manner all who crossed his path.

I AM INDEBTED to a large number of people for making available their recollections and information concerning Dr. Dalldorf. These especially include Drs. Dorothy Horstmann and Frederick Dalldorf. They also include the late Mr. Hugo Gentilcore, who served for many years in the Division of Laboratories and Research in the administrative offices, and who reminded me that the librarian during that time, Anna M. Sexton, had written a very good chronicle of the Division of Laboratories and Research for the period of 1914–64. Ms. Sexton supplied valuable personal insight into the character and achievements of Dr. Dalldorf and was kind enough to carefully edit the final version of this biography. All these sources provided a wealth of information when it was most needed.

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