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JOHN HOLMES DINGLE

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A Biographical Memoir by

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BY WILLIAM S. JORDAN, JR.

JOHN DINGLE'S CONTRIBUTIONS to biomedical science and medical education were fully expressed in each of the components of the classic triad of research, teaching, and service. He pioneered studies of the epidemiology and etiology of acute respiratory infections in military and civilian populations, which set a standard for all such future studies; he created a new department of preventive medicine at Western Reserve University (now Case Western Reserve) and participated in the school's extensive review of medical education and subsequent curriculum revision; and he served with distinction on numerous national advisory groups, most notably as director of the Commission on Acute Respiratory Diseases and then as president of its parent body, the Armed Forces Epidemiological Board. With a remarkable group of like-minded contemporaries, John Dingle extended efforts in all of these areas to promote international cooperation in the study and control of infectious diseases.

John Holmes Dingle was born on November 24, 1908, in Cooperstown, North Dakota, where his father was a Methodist minister. He was the only child of his father's second marriage, joining six much older children borne by his father's first wife. His mother was from Honeoye, New

York, from which her family sent a barrel of apples each year to North Dakota. As Dingle reminisced in later years when reflecting on limited financial resources in his youth, it was his assignment to bring up apples from the barrel in the basement with instructions that rotten apples were to be eaten first. An apple without spots was a luxury delayed. His father died when Dingle was eight years old; when he was thirteen, the family moved to Seattle, Washington, to live with one of his older half-brothers.

Dingle's predoctoral education was obtained at the University of Washington—a certificate in pharmacology and a B.S. (summa cum laude) in 1930 and an M.S. in 1931. He then journeyed east for three days by train to the Johns Hopkins University School of Hygiene and Public Health, which had earlier granted him a scholarship, only to learn that his scholarship had vanished with the Depression. The school did wave tuition, but he had to do a number of odd jobs to pay for room and board, losing sixty pounds in the process. Observing this, bacteriologist Pearl Kendrick—who later pioneered development of the pertussis vaccine—helped by periodically inviting Dingle to lunch. Hopkins awarded him a Sc.D. in immunology in 1933. Subsequently, again largely for financial reasons, he worked as an assistant bacteriologist at the Maryland State Department of Health Laboratory and then joined the staff of Upjohn Company as a bacteriologist for two years before entering Harvard Medical School in 1935. There he was supported by a Cabot fellowship from 1936 until his graduation magna cum laude in 1939.

As a mature student with a strong background in bacteriology and immunology, Dingle naturally established a beneficial association with Hans Zinsser and the stars and soon to be stars of his department: Leroy D. Fothergill, John F. Enders, John H. Mueller, and F. Sargent Cheever.

He formed a productive bond with Fothergill during a series of studies (with C. A. Chandler) on the pathogenesis of *Haemophilus influenzae* infection in mice. During the first week of August 1938, at the beginning of his senior year, an epidemic of eastern equine encephalomyelitis (EEE) occurred in New England, principally in Rhode Island and southern Massachusetts. Coincident with the peak of the epidemic, encephalitis appeared in five children living within five miles of each other in Massachusetts and in the same area as the equine disease. Brain tissue from fatal cases was examined at Harvard by Sidney Farber, pathologist at the Children's Hospital, who joined Fothergill, Dingle, and M. L. Connerley in describing the cases, and by investigators at the Rockefeller Institute. The latter isolated EEE virus; the children died as secondary hosts of a virus that infects horses.

During the same epidemic, pigeon breeders in the area suffered unusual losses in their flocks. Fothergill and Dingle identified a virus from the brain of a dead pigeon as EEE virus, confirming the role of birds in the transmission cycle. Concurrently, Dingle contributed his immunological expertise to studies with Thomas Hale Ham of a rare form of hemolytic anemia, paroxysmal nocturnal hemoglobinuria, and interested Ham in studying the cold hemagglutinins associated with primary atypical pneumonia. Later, when both were at Western Reserve University—Ham at Dingle's urging—they provided advice to the author when he had the opportunity to study two cases of syphilitic cold hemoglobinuria in the same year. By the time of his graduation from medical school, Dingle had contributed to twenty published papers. It is not surprising that he competed successfully for an internship at Children's Hospital.

In 1940 he joined Maxwell Finland's group at the Thorndike Memorial Laboratory, Boston City Hospital, as Francis Weld

Peabody Fellow in medicine and instructor in Zinsser's Department of Bacteriology and Immunology. He participated in early studies of sulfonamides, establishing the efficacy of sulfadiazine in the treatment of meningococcal meningitis, and collaborated with Lewis Thomas on investigations of the bacteriological and immunological aspects of meningococcal infections. This was at a time when the United States was mobilizing for World War II, and meningococcal meningitis was to become a threat to military populations. Dingle's first "field assignment" was to lead a Harvard team to investigate simultaneous outbreaks of diphtheria, scarlet fever, and meningococcal meningitis at Halifax, Nova Scotia, in January 1941.

Another disease of military importance was to shape Dingle's career and occupy his attention for the next quarter century. Primary atypical pneumonia was recognized as an epidemic respiratory disease, perhaps an entity, distinct from then-known viral pneumonia, in the late 1930s. Finland, an investigator particularly interested in pneumonia, had been seeing an increasing number of cases of nonbacterial pneumonia at Boston City Hospital by the time Dingle arrived, and a number of members of the house staff on the two Harvard medical services were being hospitalized with this diagnosis. Similar illnesses were occurring in military personnel in expanding recruit camps. In 1941, having been named a consultant on epidemic diseases to the Secretary of War and a member of the Commission on Influenza under the Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army—the predecessor of the Armed Forces Epidemiological Board—Dingle was asked to join a group of medical scientists to investigate an outbreak of atypical pneumonia at Camp Claiborne, Louisiana. This short-term study led to the recommendation that a separate Commission on Acute Respi-

ratory Diseases be created, its investigators to conduct long-term field and laboratory studies at an Army recruit base. The establishment of this commission at Fort Bragg, North Carolina, and the direction of its studies there for the next four years constitute one of the major achievements of Dingle's career.

By October 1942 he had assembled an outstanding group of investigators, including Theodore J. Abernathy (internist), George F. Badger (biostatistician), Alto E. Feller (virologist), Alexander D. Langmuir (epidemiologist), and Charles H. Rammelkamp (internist). These physicians, augmented by Army medical officers, enlisted personnel, and civilian staff, decided to publish collectively as the Commission on Acute Respiratory Diseases. Dingle promoted this designation to emphasize that theirs was a team effort. His own brilliance coupled with his respect for and encouragement of the talents of others established him as a persuasive leader in a stimulating, congenial, and productive environment.

Among the major contributions to the development of knowledge of respiratory diseases in military personnel was the demonstration that at least three then uncultivatable filterable agents were responsible for three clinically and epidemiologically defined illnesses: atypical pneumonia, the common cold, and an influenza-like illness of recruits characterized at Fort Bragg and labeled acute respiratory disease (ARD). This was accomplished by a series of carefully designed studies in volunteers.

Human subjects had to be used because the embryonated egg and animal systems available in this pre tissue culture era yielded little other than influenza viruses. Rammelkamp toured the country recruiting volunteers from among conscientious objectors of several religious groups, and the commission took over a resort hotel in nearby Pinehurst in which to house them. Lacking spe-

cific serologic tests, the investigators could select susceptible volunteers only on the basis of a history of recent illness. They were fortunate in that filtered respiratory secretions induced illnesses that resembled those from which they were taken. Subsequent cross-over challenge experiments confirmed differences in incubation periods of the common cold and ARD agents and demonstrated homologous but not heterologous immunity, indicating that the two agents were immunologically distinct and probably distinct from the agent of atypical pneumonia. It is now known that atypical pneumonia is caused not by a virus but by *Mycoplasma pneumoniae*; ARD is caused by several adenovirus types and can be prevented by a live oral vaccine; most, but not all, colds are caused by any of more than 100 rhinoviruses.

After the war, the military decided that it still needed the advice of the Army Epidemiological Board and the expertise of certain of its commissions. Dingle, who was to continue as director of the Commission of Acute Respiratory Diseases until 1955, conceived the idea of applying its epidemiological and laboratory methods to the study of civilian populations and sought an academic base at which to do so. Yale, with Francis G. Blake in medicine and a Division of Public Health headed by John R. Paul, was considered, but Joseph T. Wearn, dean of Western Reserve University's School of Medicine, persuaded him to come to Cleveland in 1946 to establish a new Department of Preventive Medicine. Dingle's decision was no doubt influenced by the willingness of local practitioners to cooperate by identifying families for pilot studies. He brought three members of the commission—Badger, Feller, and Rammelkamp—with him and recruited Richard G. Hodges, a pediatrician who had conducted studies of pneumococcal vaccine at an Air Force base with Colin M. MacLeod, to join them. This group was later augmented by others,

including Floyd W. Denny, Jr., Harold S. Ginsberg, Sidney Katz, Lois P. McCorkle, Robert Oseasohn, and myself, as Dingle exercised his capacity to raise funds for the support of his department.

With the approval of the Board of Trustees of the Academy of Medicine of Cleveland, whose then-president, Chauncey W. Wyckoff, a pediatrician, encouraged participation by his patients, Dingle's staff eventually recruited eighty-six families, with 443 individuals, resident in middle-class suburbs within easy driving distance of the medical school to participate in what became known as the Cleveland Family Study. This longitudinal study of the occurrence of illness, all illnesses, in families with young children was largely descriptive because, apart from influenza, few respiratory viruses could be identified in those years. Although the bacteria that could be identified—*Haemophilus influenzae,* pneumococci, and streptococci—were comparatively infrequent causes of illness, the occurrence of multiple cases of acute glomerulonephritis in a family infected with the type 12 group A beta hemolytic streptococci was the clue that led Rammelkamp to postulate the existence of nephritogenic types, a postulate supported by studies of other populations. The high incidence of viral respiratory infections in the families, particularly in young children, was documented, and the relative importance of the home and school in their transmission was assessed. Similar data measured the passage of influenza epidemics, most notably Asian influenza in 1957, study of which necessitated reactivation of observation of the population, which had recently been discontinued after ten years of data collection. That this was possible is a tribute to the rapport Dingle had established with the parents and to the responsiveness of a staff devoted to his leadership.

When adenoviruses became available, it was shown that many children are infected by certain types early in life,

often without symptoms. Curiously, the adenovirus types responsible for ARD in military recruits were shown not to be important causes of illness in civilians. Other studies documented the ineffectiveness of an antihistamine for the treatment of colds and provided evidence for the existence of two kinds of nonbacterial gastroenteritis. A final note: all of the data were processed under the guidance of Badger without benefit of computers! A summary of this team effort was published in 1964.[1]

Seldom, if ever, has a medical faculty paid more attention to undergraduate education than during Dingle's tenure. Dean Wearn, himself a product of Harvard Medical School and the Thorndike Memorial Laboratory, had capped his opportunity to recruit eleven new department chairmen in a short period of time with the decision to reexamine the objectives of medical education, the content of the curriculum, and pedagogical processes. Hale Ham was recruited to conduct this "experiment in medical education," and his friend and colleague Dingle became an active participant in the key committees and planning sessions that evolved. On occasion this led to faculty retreats at the dean's home, which became both serious working sessions and pleasant social events. To promote relaxation after a day of intense debate, a self-appointed vocal group composed and presented songs relevant to this collective effort. Such was Dingle's personality and warmth of fellowship that it was only natural this group should gather at his home, with him at the piano, to write its ditties.

The revised curriculum, introduced in 1952, incorporated subject committee teaching, early introduction of students to patients and families, project research, free time, increased emphasis on ambulatory care, and other approaches periodically rediscovered by medical educators. Dingle's department assured the incorporation of empha-

sis on the scientific method and consideration of biostatistics, epidemiology, preventive medicine, and health care, as appropriate, throughout four years by having its staff interact with both basic and clinical scientists. A number of these staff members, with Dingle's blessing, went on to become department chairman at other institutions.

During and after World War II, Dingle was closely associated with a group of scientists with broad knowledge of infectious diseases and a concern for expanded basic and clinical research both at home and abroad. This group included Colin M. MacLeod, Thomas Francis, Jr., Joseph E. Smadel, and Theodore E. Woodward, who, with others, spent many days traveling the world at the request of James A. Shannon, director of the National Institutes of Health, or the White House, or the Department of Defense to select a site for a laboratory for the study of cholera, to negotiate collaborative agreements with the Japanese, or to assess progress at strategic military research laboratories. They, and others like them in other fields, laid the groundwork for an expanded U.S. effort in international health research.

National and international travel became more and more difficult for Dingle because of the slow progression of an undiagnosed musculoskeletal disease that plagued him from the age of eighteen. Weakness of his left leg, attributed without documentation to poliomyelitis, caused him to limp, and weakness of the left shoulder and arm appeared later. This was not sufficient to disqualify him from being commissioned a major, M.C. AUS in May 1944, with the rank of lieutenant colonel when deactivated in July 1946, nor did he later allow increasing disability to limit his participation in the activities of professional societies and advisory committees during twenty-four years as chairman of the Department of Preventive Medicine. His spirit is sym-

bolized by his determination to spend a year in Geneva as a WHO consultant in 1965–66 despite his need by this time for braces on both legs and a wheelchair for long stretches. By 1969 he was completely dependent on a wheelchair and made arrangements to have himself forklifted on and off airplanes in the days before jetways. Such was the affection felt for him by his colleagues that he never lacked companionship and a helping hand. Despite muscle biopsies and enzyme studies, his illness remained undiagnosed before and after his death from cardiopulmonary failure at the age of sixty-five.

During his years in Cleveland, Dingle enjoyed the blessings of a loving family. He had previously been married to Cornelia Eddy, Ph.D., a fellow bacteriologist, whom he met at Hopkins; they were married in October 1933 and divorced in June 1945, having had no children. At Fort Bragg, Dingle met Doris (Dottie) V. Brown, a native of nearby Fayetteville, while she was working as a secretary for the Commission on Acute Respiratory Diseases. They were married on January 18, 1946, and set up housekeeping in Cleveland Heights the following August. They had two children, Eva Meredith and David Rufus, with whom they delighted to return each summer to a rambling family cottage on the Intracoastal Waterway at Gause's Landing near Shallotte, North Carolina. Even in later years when his disability limited him to the front porch, Dingle looked forward to this family vacation.

At home John and Dottie kept open house for the world. He loved to entertain and she was a marvelous hostess. They were generous with invitations to friends and faculty associates, attracting many to marathon sessions of duplicate bridge. Interest both in the Cleveland Family Study and in the curriculum experiment assured a steady flow of visitors, a high percentage of whom enjoyed the warm fellowship of the Dingle household where dry martinis were a

specialty and tasty food was assured, even with a different visitor or two every night.

Dingle served his community for twelve years as a member of the Cleveland Health Council and as its chairman during 1954–57. He was a member of the advisory boards of the Cleveland Health Department, the Maternal Health Association, and the Cleveland Diabetic Fund. He was an active member of the National Research Council's Subcommittee on Infectious Diseases and its successor, the Subcommittee on Infectious Diseases and Chemotherapy, for ten years, serving as chairman in 1950–53. He was elected to the National Academy of Sciences in 1958.

Dingle was a member of fifteen professional societies and served as president of three of them: American Association of Immunologists, American Epidemiological Society, and Central Society for Clinical Research. His numerous awards included the Legion of Merit and the Outstanding Civilian Service Medal from the Department of the Army, the Albert Lasker Award, the James D. Bruce Memorial Award of the American College of Physicians, and the Bristol Award of the Infectious Diseases Society of America.

Those who were privileged to know and work with John Dingle remember him as a creative medical scientist and teacher, a remarkably effective collaborator, an able administrator, a warm and thoughtful friend and colleague, and, above all, a noble citizen.

I AM INDEBTED TO Mrs. John H. Dingle and to George F. Badger and Theodore E. Woodward for supplementing my personal knowledge of John Dingle's life and career.

NOTE

1. Dingle, J. H., G. F. Badger, and W. S. Jordan, Jr, *Illness in the Home. A Study of 25,000 Illnesses in a Group of Cleveland Families* (Cleveland: Western Reserve University Press, 1964), 398 pp.

SELECTED BIBLIOGRAPHY

1932

With J. Weinzirl. The biology of the tubercle bacillus. II. The asparagin and glycerol metabolism of the tubercle bacillus. *J. Bacteriol.* 23: 281–99.

1933

With H. C. Diehl and J. A. Berry. The practical importance of enzymic inactivation by preliminary scalding of peas intended for frozen pack. *Food Industries* (August), pp. 300–301.

1934

The serological specificity of bacterial carbohydrates, with especial reference to type II pneumococcus and a heterophile strain of *Bacterium lepisepticum. Am. J. Hyg.* 20:148–68.

With C. A. Perry. A bacteriological study of the commercial preparation of crab meat with recommendations and proposed standards. Special Report of the State of Maryland Department of Health, dated February 10, 1934.

1935

With J. F. Norton. Virulence tests for typhoid bacilli and antibody relationships in anti-typhoid sera. *Am. J. Pub. Health* 25:609–17.

With R. K. Meyer and E. L. Gustus. Influence of hormones on agglutinin response to *B. pertussis* in immature rats. *Proc. Soc. Exp. Biol. Med.* 33:71–72.

1936

Growth-inhibitory power of specific antisera as influenced by the carbohydrates of pneumococci and *Bacterium lepisepticum. Am. J. Hyg.* 23:1–9.

With R. K. Meyer and E. L. Gustus. Effect of gonadotropic and oestrogenic hormones on agglutinin response to *B. pertussis* in immature animals. *J. Immunol.* 30:139–47.

With R. K. Meyer and E. L. Gustus. Relationship of precipitin titers to gonadotropic inhibitory action of monkey sera. *Proc. Soc. Exp. Biol. Med.* 33:257–61.

With R. K. Meyer and E. L. Gustus. Effect of gonadotropic and oestrogenic hormones on agglutinin response to *B. pertussis* in immature animals. *J. Immunol.* 30:139–47.

With J. F. Norton and T. H. Shenstone. A ball mill for grinding small quantities of bacteria. *J. Lab. Clin. Med.* 21:1083–84.

1937

With G. H. Bailey and S. Raffel. Anaphylaxis in guinea pigs passively sensitized with antipneumococcus horse serum globulins and shocked with type specific carbohydrates. *Am. J. Hyg.* 25:381–99.

With L. D. Fothergill and C. A. Chandler. The survival of virulent *H. influenzae* in phagocytes. *J. Immunol.* 32:335–39.

With L. D. Fothergill and C. A. Chandler. Studies on *Haemophilus influenzae.* I. Infection of mice with mucin suspensions of the organism. *J. Exp. Med.* 65:721–34.

With H. E. Hoff, L. H. Nahum, and B. W. Carey, Jr. The effect of *Staphylococcus aureus* exotoxin on the rabbit heart. *J. Pharmacol. Exp. Ther.* 61:121–29.

With C. A. Chandler and L. D. Fothergill. Studies on *Haemophilus influenzae.* II. A comparative study of the virulence of smooth, rough, and respiratory strains of *Haemophilus influenzae* as determined by infection of mice with mucin suspensions of the organisms. *J. Exp. Med.* 66:789–99.

1938

With L. D. Fothergill and C. A. Chandler. Studies on *Haemophilus influenzae.* III. The failure of complement of some animal species, notably the guinea pig, to activate the bactericidal function of sera of certain other species. *J. Immunol.* 34:357–91.

With M. F. Shaffer. A study of antigens and antibodies by the monolayer film technique of Langmuir. *Proc. Soc. Exp. Biol. Med.* 38:528–30.

With L. D. Fothergill, S. Farber, and M. L. Connerley. Human encephalitis caused by the virus of the eastern variety of equine encephalomyelitis. *N. Engl. J. Med.* 219:411.

With L. D. Fothergill. A fatal disease of pigeons caused by the virus of the eastern variety of equine encephalomyelitis. *Science* 88:549–50.

1939

With C. A. Chandler and L. D. Fothergill. The pattern of dissociation in *Hemophilus influenzae. J. Bacteriol.* 37:415–27.

With L. D. Fothergill. The isolation and properties of the specific polysaccharide of type B *Hemophilus influenzae. J. Immunol.* 37:53–63.

With T. H. Ham. Studies on destruction of red blood cells. II. Chronic hemolytic anemia with paroxysmal nocturnal hemoglobinuria: Certain immunological aspects of the hemolytic mechanism with special reference to serum complement. *J. Clin. Invest.* 18:657–72.

1940

With S. Farber, A. Hill, and M. L. Connerley. Encephalitis in infants and children, caused by the virus of the eastern variety of equine encephalitis. *JAMA* 114:1725–31.

1941

With L. R. Seidman. Specific polysaccharide as cutaneous test for evaluation of serum therapy in influenza bacillus meningitis. *Proc. Soc. Exp. Biol. Med.* 46:34–36.

With E. Strauss and M. Finland. Use of para-aminobenzoic acid to inhibit sulfonamide action in bactericidal tests. *Proc. Soc. Exp. Biol. Med.* 46:131–33.

With C. C. Little et al. Infectious diseases of mice. In *The Biology of the Laboratory Mouse.* Pp. 380–474. Philadelphia: The Blakiston Co.

The Harvard field trip to Halifax, Nova Scotia. *Harvard Med. Alumni Bull.* 15:57–59.

With L. Thomas and A. R. Morton. Treatment of meningococcic meningitis and meningococcemia with sulfadiazine. *JAMA* 116: 2666–68.

An epidemiological field trip to Halifax. *Bull. N. Engl. Med. Center* 3:186–87.

What is a virus? *The Commonwealth (Mass.)* 28:73–75.

Encephalitis and the horse. An editorial. *N. Engl. J. Med.* 225:666–67.

With E. Strauss and M. Finland. Studies on the mechanism of sulfonamide bacteriostasis, inhibition and resistance. Experiments with *E. coli* in a synthetic medium. *J. Immunol.* 42:313–29.

With E. Strauss and M. Finland. Studies on the mechanism of sulfonamide bacteriostasis, inhibition and resistance. Experiments with *Staphylococcus aureus. J. Immunol.* 42:331–42.

With H. E. Pearson, E. C. Eppinger, and J. F. Enders. A study of influenza in Boston during the winter of 1940–1941. *N. Engl. J. Med.* 225:763–70.

With M. Finland. Treatment of meningitis. *N. Engl. J. Med.*, 225:825–32.

The encephalitides of virus etiology. *N. Engl. J. Med.* 225:1014–22.

1942

With M. Finland. Diagnosis, treatment and prevention of meningococcic meningitis, with a resume of the practical aspects of treatment of other acute bacterial meningitides. *War Med.* 2:1–58.

With M. Finland. Virus pneumonias. I. Pneumonias associated with known non-bacterial agents; influenza, psittacosis and Q fever. II. Primary atypical pneumonias of unknown etiology. *N. Engl. J. Med.* 227:342–50, 378–85.

With L. Thomas. Protection of mice against meningococcal infection by sulfadiazine, and inhibition of protection by para-aminobenzoic acid. *Proc. Soc. Exp. Biol. Med.* 51:76–78.

1943

With T. J. Abernethy, G. F. Badger, G. J. Buddingh, A. E. Feller, A. D. Langmuir, J. M. Ruegsegger, and W. B. Wood, Jr. Primary atypical pneumonia, etiology unknown. *War Med.* 3:223–48.

With L. Thomas. Investigations of meningococcal infection. I. Bacteriological aspects. *J. Clin. Invest.* 22:353–59.

With L. Thomas and H. W. Smith. Investigations of meningococcal infection. II. Immunological aspects. *J. Clin. Invest.* 22:361–73.

With L. Thomas. Investigations of meningococcal infection. III. The bactericidal action of normal and immune sera for the meningococcus. *J. Clin. Invest.* 22:375–85.

With A. R. Taylor, D. G. Sharp, D. Beard, J. W. Beard, and A. E. Feller. Isolation and characterization of influenza A virus (PR8 strain). *J. Immunol.* 47:261–82.

With D. G. Sharp, A. R. Taylor, I. W. McLean, Jr., D. Beard, J. W. Beard, and A. E. Feller. Isolation and characterization of influenza virus B (Lee strain). *Science* 98:307–8.

With A. R. Taylor, D. G. Sharp, I. W. McLean, Jr., D. Beard, J. W. Beard, and A. E. Feller. Purification and character of the swine influenza virus. *Science* 98:587–89.

1944

With H. W. Smith, L. Thomas, and M. Finland. Meningococcic infections, report of 43 cases of meningococcic meningitis and 8 cases of meningococcemia. *Ann. Int. Med.* 20:12–32.

With D. G. Sharp, A. R. Taylor, I. W. McLean, Jr., D. Beard, J. W. Beard, and A. E. Feller. Isolation and characterization of influenza virus B (Lee strain). *J. Immunol.* 48:129–53.

With the Commission on Acute Respiratory Diseases. Epidemiology of atypical pneumonia and acute respiratory disease at Fort Bragg, North Carolina. *Am. J. Pub. Health* 34:335–46.

With the Commission on Acute Respiratory Diseases. Primary atypical pneumonia. *Am. J. Pub. Health* 34:347–57.

With T. J. Abernethy, G. F. Badger, G. H. Buddingh, A. E. Feller, A. D. Langmuir, J. M. Ruegsegger, and W. B. Wood, Jr. Primary atypical pneumonia, etiology unknown. I, II, and III. *Am. J. Hyg.* 39:67–128 (Jan.), 197–268 (Mar.), 269–336 (May).

With I. W. McLean, Jr., D. Beard, A. R. Taylor, D. G. Sharp, J. W. Beard, and A. E. Feller. Influence of temperature of incubation on the increase of influenzal virus B (Lee strain) in the chorioallantoic fluid of chick embryos. *J. Immunol.* 48:305–16.

With A. R. Taylor, D. G. Sharp, I. W. McLean, Jr., D. Beard, J. W. Beard, and A. E. Feller. Purification and character of the swine-influenza virus. *J. Immunol.* 48:361–79.

With the Commission on Acute Respiratory Diseases. Endemic exudative pharyngitis and tonsillitis. Etiology and clinical characteristics. *JAMA* 125:1163–69.

With the Commission on Acute Respiratory Diseases. Cold hemagglutinins in primary atypical pneumonia and other respiratory infections. *Am. J. Med. Sci.* 208:742–50.

1945

With the Commission on Acute Respiratory Diseases in collaboration with M. H. Kaplan. *Science* 101:120–22.

With the Commission on Acute Respiratory Diseases. Transmission of primary atypical pneumonia to human volunteers. *JAMA* 127:146–49.

With the Commission on Acute Respiratory Diseases in collaboration with G. J. Dammin and T. H. Weller. Attempts to transmit primary atypical pneumonia and other respiratory tract infections to the mongoose. *J. Immunol.* 50:107–14.

With the Commission on Acute Respiratory Diseases. Atypical pneumonia. *Am. J. Med. Sci.* 209:55–58.

With the Commission on Acute Respiratory Diseases. An experimental attempt to transmit primary atypical pneumonia in human volunteers. *J. Clin. Invest.* 24:175–88.

With the Commission on Acute Respiratory Diseases. The present

status of the etiology of primary atypical pneumonia. *Bull. N.Y. Acad. Med.* 21:235–62.

With the Commission on Acute Respiratory Diseases. Role of β-hemolytic streptococci in common respiratory disease. *Am. J. Pub. Health* 35:675–82.

With J. W. Beard et al. Ultracentrifugal, chemical and electron microscopic identification of the influenza virus. *South. Med. J.* 37:313–20.

With the Commmission on Acute Respiratory Diseases. A study of a food-borne epidemic of tonsillitis and pharyngitis due to β-hemolytic streptococcus, Type 5. *Bull. Johns Hopkins Hosp.* 77:143–210.

With the Commission on Acute Respiratory Diseases and the New York State Department of Health. The relation between epidemics of acute bacterial pneumonia and influenza. *Science* 102:561–63.

With the Commmission on Acute Respiratory Diseases. The relation between pneumonia and influenza. *Bull. U.S. Army Med. Dep.* 4:492–94.

With the Commmission on Acute Respiratory Diseases. Present status of the etiology of primary atypical pneumonia. *Bull. U.S. Army Med. Dep.* 4:494–96.

With the Commmission on Acute Respiratory Diseases. Selective method for isolation of hemolytic streptococci from throat swabs. *Bull. U.S. Army Med. Dep.* 4:496.

With the Commmission on Acute Respiratory Diseases. Epidemic of septic sore throat. *Bull. U.S. Army Med. Dep.* 4:497–98.

With the Commission on Acute Respiratory Diseases. Diagnosis of β-hemolytic streptococcal pharyngitis and tonsillitis. *Bull. U.S. Army Med. Dep.* 4:499–500.

With the Commission on Acute Respiratory Diseases. Value of anterior-oblique roentgenograms in diagnosis of primary atypical pneumonia. *Bull. U.S. Army Med. Dep.* 4:641–42.

1946

With the Commission on Acute Respiratory Diseases. Laboratory aids in diagnosis of primary atypical pneumonia. *Bull. U.S. Army Med. Dep.* 5:10–12.

With the Commission on Acute Respiratory Diseases. Effect of the environment on respiratory diseases in the army. *Bull. U.S. Army Med. Dep.* 5:123–26.

With the Commission on Acute Respiratory Diseases. Outbreaks of

a rickettsial disease related to Q fever. *Bull. U.S. Army Med. Dep.* 5:245–46.

With the Commission on Acute Respiratory Diseases. The periodicity of influenza. *Am. J. Hyg.* 43:29–37.

With the Commission on Acute Respiratory Diseases and Commission on Airborne Infections. A study of the effect of oiled floors and bedding on the incidence of respiratory disease in new recruits. *Am. J. Hyg.* 43:120–44.

With the Commission on Acute Respiratory Diseases. The effect of double-bunking in barracks on the incidence of respiratory disease. *Am. J. Hyg.* 43:65–81.

Primary atypical pneumonia. In *The Doctors Talk It Over* radio broadcast, sponsored by Lederle Laboratories. (Jan. 15.)

With the Commission on Acute Respiratory Diseases. Association of pneumonia with erythema multiforme exudativum. *Arch. Int. Med.* 78:687–710.

With M. H. Kaplan in collaboration with the Commission on Acute Respiratory Diseases. Studies of streptococcal fibrinolysis. III. A quantitative method for the estimation of serum antifibrinolysin. *J. Clin. Invest.* 25:347–51.

With the Commission on Acute Respiratory Diseases. Studies of streptococcal fibrinolysis. IV. Clinical application of a quantitative antifibrinolysin test. *J. Clin. Invest.* 25:352–59.

With the Commission on Acute Respiratory Diseases. Hemagglutination by amniotic fluid from normal embryonated hen's eggs. *Proc. Soc. Exp. Biol. Med.* 62:118–23.

With the Commission on Acute Respiratory Diseases. Acute respiratory disease among new recruits. *Am. J. Pub. Health* 36:439–50.

With the Commission on Acute Respiratory Diseases. Q fever: a foreword. Introduction to a series of papers dealing with Q fever. *Am. J. Hyg.* 44:1–5.

With the Commission on Acute Respiratory Diseases. Epidemics of Q fever among troops returning from Italy in the spring of 1945. II. Epidemiological studies. *Am. J. Hyg.* 44:88–102.

With the Commission on Acute Respiratory Diseases. Epidemics of Q fever among troops returning from Italy in the spring of 1945. III. Etiological studies. *Am. J. Hyg.* 44:103–9.

With the Commission on Acute Respiratory Diseases. Identification and characteristic of the Balkan grippe strain of *Rickettsia burneti*. *Am. J. Hyg.* 44:110–57.

With the Commission on Acute Respiratory Diseases. A laboratory outbreak of Q fever caused by the Balkan grippe strain of *Rickettsia burneti*. *Am. J. Hyg.* 44:123–57.

With the Commission on Acute Respiratory Diseases. The transmission of primary atypical pneumonia to human volunteers. I. Experimental methods; II. Results of inoculation; III. Clinical features; IV. Laboratory studies. *Bull. Johns Hopkins Hosp.* 79:97–167.

With the Commission on Acute Respiratory Diseases. Association of acute pulmonary lesions with infections of the throat. *Ann. Int. Med.* 25:473–87.

With M. H. Kaplan and the Commission on Acute Respiratory Diseases. Immunological similarity of streptococcal antifibrinolysins. *Proc. Soc. Exp. Biol. Med.* 63:50–53.

1947

With the Commission on Acute Respiratory Diseases. The role of the Lancefield groups of β-hemolytic streptococci in respiratory infections. *N. Engl. J. Med.* 236:157–66.

With the Commission on Acute Respiratory Diseases. Exudative tonsillitis and pharyngitis of unknown cause. *JAMA* 133:588–93.

Meningococcal infections. *Cecil's Textbook of Medicine*, 7th ed., pp. 194–205. Philadelphia: W. B. Saunders Co.

Atypical pneumonia. *Advances in Pediatrics*, vol. 2, pp. 194–237. New York: Interscience Publisher.

With the Commission on Acute Respiratory Diseases. Studies on strepococcal fibrinolysis. V. The *in vitro* production of fibrinolysin by various groups and types of β-hemolytic streptococci; relationship to antifibrinolysin production. *J. Exp. Med.* 85:441–57.

With the Commission on Acute Respiratory Diseases. Experimental transmission of minor respiratory illness to human volunteers by filter-passing agents. I. Demonstration of two types of illness characterized by long and short incubation periods and different clinical features. *J. Clin. Invest.* 26:957–73.

With the Commission on Acute Respiratory Diseases. Experimental transmission of minor respiratory illness to human volunteers by filter-passing agents. II. Immunity on reinoculation with agents from two types of minor respiratory illness and from primary atypical pneumonia. *J. Clin. Invest.* 26:974–82.

With the Commission on Acute Respiratory Diseases. Studies on the causation of an unusual pulmonary diseases at Camp Gruber, Okla. *Arch. Int. Med.* 80:203–4.

A study of infectious diseases in families. *Bull. Acad. Med.* (Cleveland) 32:8–9.

With C. H. Rammelkamp, Jr. Acute respiratory disease. *Med. Clin. North America* (Philadelphia):1369–74.

Medical progress: Influenza. *N. Engl. J. Med.* 237:845–52.

Experimental studies of the "common cold" in human volunteers. *Trans. Stud. Coll. Physicians Philadelphia* 15:113–23.

With the Commission on Acute Respiratory Diseases. Clinical patterns of undifferentiated and other acute respiratory diseases in army recruits. *Medicine* 26:441–64.

With the Commission on Acute Respiratory Diseases. Bacteriological findings in undifferentiated and other acute respiratory diseases. *Medicine* 26:465–84.

1948

Common virus infections of the respiratory tract. Diagnosis and etiology. *JAMA* 138:1084–88.

With the Commission on Acute Respiratory Diseases. Endemic influenza. *Am. J. Hyg.* 47:290–96.

With the Commission on Acute Respiratory Diseases. Influenza B: Study of a localized outbreak preceding the 1945 epidemic. *Am. J. Hyg.* 47:297–303.

Progress report on a study of infectious diseases in families. *Bull. Acad. Med.* (Cleveland) 33:9.

With the Commission on Acute Respiratory Diseases in collaboration with W. A. Mickle and T. J. Oliver. Problems in determining the bacterial flora of the pharynx. *Proc. Soc. Exp. Biol. Med.* 69:45–52.

With the Commission on Acute Respiratory Diseases. Studies of the 1943 epidemic of influenza A. I-VIII. *Am. J. Hyg.* 48:253–349.

Infectious encephalitis and other forms of encephalitis. In *The Child in Health and Disease* by C. G. Grulee and R. C. Eley, pp. 319–25. Baltimore: Williams and Wilkins Co.

Outbreaks of Q fever during World War II. In *Rickettsial Diseases of Man,* pp. 47–50. Washington D.C.: American Association for Advancement of Science.

With C. H. Rammelkamp. Pathogenic streptococci. *Annu. Rev. Microbiol.* 2:279–304.

1949

Acute respiratory infections: Contributions made during World War II. Cincinnati J. Med. 30:117–30.

With R. F. Williams and J. P. Craig. The diagnosis and management of atypical or virus pneumonia. *Ann. Int. Med.* 30:1134–42.

With the Commission on Acute Respiratory Diseases. The single throat culture as an index of the bacterial flora of the respiratory tract. *Am. J. Hyg.* 50:168–74.

With the Commission on Acute Respiratory Diseases in collaboration with Norman Plummer. A comparison of the bacterial flora of the pharynx and nasopharynx. *Am. J. Hyg.* 50:331–36.

With C. H. Rammelkamp, Jr., G. F. Badger, A. E. Feller, and R. G. Hodges. A quantitative method for measuring staphylococcal anticoagulase. *Proc. Soc. Exp. Biol. Med.* 72:210–13.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of respiratory infections in families. *Trans. Assoc. Am. Physicians* 62:99.

1950

With W. S. Jordan, Jr., and G. F. Badger. Immunological studies of pneumococcal pneumonia in patients treated with penicillin. *J. Clin. Invest.* 29:161–68.

With C. H. Rammelkamp, Jr., and M. M. Hezebicks. Specific coagulases of *Staphylococcus aureus*. *J. Exp. Med.* 91:295–307.

With C. H. Rammelkamp, Jr., G. F. Badger, A. E. Feller,and R. G. Hodges. Antigenicity of cell-free staphylococcal coagulase. *J. Infect. Dis.* 86:159–63.

With A. E. Feller, G. F. Gadger, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. The failure of antihistaminic drugs to prevent or cure the common cold and undifferentiated respiratory diseases. *N. Engl. J. Med.* 24:737–44.

Epidemiology of mental disorder. II. Evaluation of this material. Pp. 65–70. New York: Milbank Memorial Fund.

1951

Meningococcal infections. In *Cecil's Textbook of Medicine*, pp. 177–86. Philadelphia: W. B. Saunders Co.

With W. S. Jordan, Jr., R. W. Albright, and F. H. McCain. Clinical variations in primary atypical pneumonia. *Am. J. Med.* 10:3–20.

With W. S. Jordan, Jr., and L. Pillemer. The mechanism of hemoly-

sis in paroxysmal cold hemoglobinuria. I. The role of complement and its components in the Donath-Landsteiner reaction. *J. Clin. Invest.* 30:11–21.

With W. S. Jordan, Jr., and L. Pillemer. The mechanism of hemolysis in paroxysmal cold hemoglobinuria. II. Observations on the behavior and nature of the antibody. *J. Clin. Invest.* 30:22–30.

Primary atypical pneumonia. In *Modern Practice in Infectious Fevers,* pp. 626–45. London: Butterworth & Co.

1952

With W. S. Jordan, Jr., R. L. Prouty, and R. W. Heinle. The mechanism of hemolysis in paroxysmal cold hemoglobinuria. III. Erythrophagocytosis and leukopenia. *Blood* 7:387–403.

With C. H. Rammelkamp, Jr., and R. S. Weaver. Significance of the epidemiological differences between acute nephritis and acute rheumatic fever. *Trans. Assoc. Am. Physicians* 65:168–75.

1953

With C. H. Rammelkamp, Jr., and L. W. Wannamaker. Epidemiology of streptococcal infections and their non-suppurative complications. *Lancet* 1:736–38.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of illness in a group of Cleveland families. I. Plan of study and certain general observations. *Am. J. Hyg.* 58:16–30.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of illness in a group of Cleveland families. II. Incidence of the common respiratory diseases. *Am. J. Hyg.* 58:31–40.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of illness in a group of Cleveland families. III. Introduction of respiratory infections into families. *Am. J. Hyg.* 58:41–46.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of illness in a group of Cleveland families. IV. The spread of respiratory infections within the home. *Am. J. Hyg.* 58:174–78.

With G. F. Badger, A. E. Feller, R. G. Hodges, W. S. Jordan, Jr., and C. H. Rammelkamp, Jr. A study of illness in a group of Cleveland families. V. Introductions and secondary attack rates as indices of

exposure to common respiratory diseases in the community. *Am. J. Hyg.* 58:179–82.

1954

The clinical pattern of streptococcal infection in man. In *Streptococcal Infections*, pp. 120–29. New York: Columbia University Press.

With S. Katz. Antihistamines and the common cold. *Am. J. Nursing* 54:179–80.

With S. Katz, G. F. Badger, W. S. Jordan, Jr., and H. B. Rosenbaum. A study of illness in group of Cleveland families. VI. A controlled study of reactions to oxytetracycline hydrochloride (Terramycin$^{R)}$. *N. Engl. J. Med.* 251:508–13.

With W. S. Jordan, Jr. Acute upper respiratory infections: A discussion of their management and a review of progress in the common cold field. *GP* 49–56.

With H. S. Ginsberg, G. F. Badger, W. S. Jordan, Jr., and S. Katz. Evidence for the specific etiology of "Acute Respiratory Disease (ARD)." *N. Engl. J. Med.* 251:466–71.

Plans and policies for future development of Western Reserve University School of Medicine and University Hospitals of Cleveland. Report of the Committee on Plans and Development, John Dingle, Chairman.

1955

Respiratory diseases caused by viruses. *Military Medicine* 116:252–58.

Meningococcal infections. In *Cecil's Textbook of Medicine*, 9th ed., pp. 189–98. Philadelphia: W. B. Saunders Co.

With L. P. McCorkle, R. G. Hodges, G. F. Badger, and W. S. Jordan, Jr. A study of illness in a group of Cleveland families. VIII. Relation of tonsillectomy to incidence of common respiratory diseases in children. *N. Engl. J. Med.* 252:1066–69.

With H. S. Ginsberg, G. F. Badger, W. S. Jordan, Jr., and S. Katz. Etiologic relationship of the RI-67 agent to "Acute Respiratory Disease (ARD)." *J. Clin. Invest.* 6:820–31.

With H. S. Ginsberg, E. Gold, W. S. Jordan, Jr., S. Katz, and G. F. Badger. Relation of the new respiratory agents to acute respiratory disease. *Am. J. Pub. Health* 45:915–22.

Respiratory disease research. *U.S. Armed Forces Med. J.* 6:1249–64.

The prevention of respiratory infections within families. *Ann. Int. Med.* 43:518–25.

With H. S. Ginsberg, E. Gold, W. S. Jordan, Jr., S. Katz, and G. F. Badger. Relationship of certain characteristics of the new respiratory viruses to the clinical and epidemiological behavior of nonbacterial pharyngitis. *Tr. Assn. Am. Phys.* 68:73–77.

1956

With P. D. Hoeprich and G. T. Kent. Rickettsialpox. Report of a serologically proved case in Cleveland. *N. Engl. J. Med.* 254:25–27.

With R. H. Seibert, R. F. Williams, W. S. Jordan, Jr., and H. S. Ginsberg. Epidemiological studies of psittacosis in Cleveland. *Am. J. Hyg.* 63:28–37.

With A. E. Feller. Noninfluenzal viral infections of the respiratory tract. *N. Engl. J. Med.* 254:465–71.

With W. S. Jordan, Jr., D. A. Stevens, and S. Katz. A study of illness in a group of Cleveland families. IX. Recognition of family epidemics of poliomyelitis and pleurodynia during a search for respiratory-disease viruses. *N. Engl.. J. Med.* 254:687–91.

R. H. Seibert and W. S. Jordan, Jr. Clinical variations in the diagnosis of psittacosis. *N. Engl. J. Med.* 254:925–30.

Studies of respiratory and other illnesses in Cleveland (Ohio) families. *Proc. R. Soc. Med.* 49:259–60.

With J. F. Enders, J. A. Bell, T. Francis, Jr., M. R. Hilleman, R. J. Huebner, and A. M.-M. Payne. "Adenoviruses": Group name proposed for new respiratory-tract viruses. *Science* 124:119–20.

With A. E. Feller, M. L. Furcolow, H. W. Larsh, and A. D. Langmuir. Outbreak of unusual form of pneumonia at Camp Gruber, Oklahoma, in 1944. Follow-up studies implicating Histoplasma capsulatum as etiologic agent. *Am. J. Med.* 21:184–92.

With A. E. Feller and A. D. Langmuir. *An Outbreak of an Unusual Form of Pneumonia at Camp Gruber, Oklahoma. Review of the Outbreak and Certain Followup Studies.* Proceedings of the Conference on Histoplasmosis, Public Health Monograph no. 39.

With W. S. Jordan, Jr., G. F. Badger, C. Curtiss, H. S. Ginsberg, and E. Gold. A study of illness in a group of Cleveland families. X. The occurrence of adenovirus infections. *Am. J. Hyg.* 64:336–48.

With R. G. Hodges, L. P. McCorkle, G. F. Badger, C. Curtiss, and W. S. Jordan, Jr. A study of illness in a group of Cleveland families. XI. The occurrence of gastrointestinal symptoms. *Am. J. Hyg.* 64: 349–56.

With L. P. McCorkle, G. F. Badger, C. Curtiss, R. G. Hodges, and W. S. Jordan, Jr. A study of illness in a group of Cleveland families. XII. The association of respiratory and gastrointestinal symptoms; an estimation of the magnitude and time relations of the association. *Am. J. Hyg.* 64:357–67.

With L.P. McCorkle, G. F. Badger, C. Curtiss, R. G. Hodges, and W. S. Jordan, Jr. A study of illness in a group of Cleveland families. XIII. Clinical description of acute nonbacterial gastroenteritis. *Am. J. Hyg.* 64:368–75.

With G. F. Badger, L. P. McCorkle, C. Curtiss, R. G. Hodges, and W. S. Jordan, Jr. A study of illness in a group of Cleveland families. XIV. The association of respiratory and gastrointestinal symptoms; an estimation of the specific symptomatology. *Am. J. Hyg.* 64:376–82.

1957

With H. S. Ginsberg. Viruskrankheiten des respirationstraktes (Respiratory viral diseases). *Klin. Wochen.* 35:153–56.

With S. Katz, W. S. Jordan, Jr., and G. F. Badger. Studies of complement-fixing and neutralizing antibodies against certain adenoviruses. *J. Immunol.* 78:118–21.

With W. S. Jordan, Jr. Infectious diseases (control of infection: biological and chemical means of prophylaxis). *Annu. Rev. Med.* 8:19–46.

1958

With T. G. Bidder, G. F. Badger, D. D. Bond, T. H. Ham, N. L. Hoerr, and J. W. Patterson. An approach to evaluation of medical education at Western Reserve University. *J. Med. Educ.* 33:113–17.

With F. W. Denny, Jr. Current status of therapy in upper respiratory infections. *JAMA* 166:1595–1602.

With W. S. Jordan, Jr., and G. F. Badger. A study of illness in a group of Cleveland families. XV. Acquisition of type-specific adenovirus antibodies in the first five years of life—Implications for the use of adenovirus vaccine. *N. Engl. J. Med.* 258:1041–44.

The curious case of the common cold. *J. Immunol.* 81:91–97.

With W. S. Jordan, Jr., and G. F. Badger. A study of illness in a group of Cleveland families. XVI. The epidemiology of influenza, 1948–1953. *Am. J. Hyg.* 68:169–89.

With W. S. Jordan, Jr., F. W. Denny, Jr., G. F. Badger, C. Curtiss, R.

Oseasohm, and D. A. Stevens. A study of illness in a group of Cleveland families. XVII. The occurrence of Asian influenza. *Am. J. Hyg.* 68:190–212.

1959

With W. S. Jordan, Jr. Primary atypical pneumonia. In *Viral and Rickettsial Infections of Man,* eds. T. M. Rivers and F. L. Horsfall, pp. 600–11. Philadelphia: J. B. Lippincott Company.

With H. S. Ginsberg. The adenovirus group. In *Viral and Rickettsial Infections of Man,* eds. T. M. Rivers and F. L. Horsfall, pp. 613–29. Philadelphia: J. B. Lippincott Company.

With M. Kaji, R. Oseasohn, and W. S. Jordan, Jr. Isolation of Asian virus from extrapulmonary tissues in fatal human influenza. *Proc. Soc. Exp. Biol. Med.* 100:272–75.

An epidemiological study of illness in families. Harvey Lectures Series (1957–58) no. 53, pp. 1–24. New York: Academic Press.

Meningococcal infections. In *Cecil & Loeb Textbook of Medicine,* 10th ed., pp. 170–78. Philadelphia: W. B. Saunders Co.

1960

With W. E. S. James and G. F. Badger. A study of illness in a group of Cleveland families. XIX. The epidemiology of the acquisition of group A streptococci and of associated illnesses. *N. Engl. J. Med.* 262:687–94.

The present status of the problem of the minor respiratory diseases. *Am. J. Pub. Health* 50:289–94.

The etiology of atypical or viral pneumonias. *Med. Sci.* 8:363–81.

1961

Q fever. In *Preventive Medicine in World War II,* vol. 5, pp. 404–10. Washington: U.S. Government Printing Office.

Certain clinical and climatological characteristics of the common cold. *Trans. Am. Clin. Climatol. Assoc.* 72:18–23.

The whip with the silver handle. *J. Lab. Clin. Med.* 57:3–6.

With W. A. Clyde, Jr., and F. W. Denny, Jr. Fluorescent-stainable antibodies to the Eaton agent in human primary atypical pneumonia transmission studies. *J. Clin. Invest.* 40:1638–47.

1963

Meningococcal disease, ed. R. L. Cecil et al., *A Textbook of Medicine,* 11th ed., pp. 200–208. Philadelphia: W. B. Saunders Co.

1964

With O. Paul, W. H. Sebrell, Jr., W. H. Strain, A. Wolman, and J. R. Wilson. Water composition and cardiovascular health. *Illinois Med. J.*

With E. F. Wheelock. Observations on the repeated administration of viruses to a patient with acute leukemia: A preliminary report. *N. Engl. J. Med.* 271:645–51.

With G. F. Badger and W. S. Jordan, Jr. *Illness in the Home: A Study of 25,000 Illnesses in a Group of Cleveland Families.* Cleveland: Western Reserve University Press. 398 pp.

Current progress in virus diseases: Discussion. *Bacteriol. Rev.* 28:439.

1965

With K. H. Svec. The occurrence of rheumatoid factor in association with antibody response to influenza A2 (Asian) virus. *Arthritis Rheum.* 8:524–29.

With W. S. Jordan. Mycoplasma pneumonia infections. In *Bacterial and Mycotic Infections of Man,* 4th ed. Pp. 810–24. Eds. R. J. Dubos and J. G. Hirsch. Philadelphia: J. B. Lippincott Co.

With H. S. Ginsberg. The adenovirus group. In *Viral and Rickettsial Infections of Man,* 4th ed. Pp. 860–90. Eds. Igor Tamm and F. L. Horsfall, Jr. Philadelphia: J. B. Lippincott Co.

1966

The common cold and common cold-like illnesses. *Med. Times* 94:186–95. Reprinted in *Resident Physician* 12:62–78.

With K. S. Warren. A study of illness in a group of Cleveland families. XXII. Antibodies to *Toxoplasma gondii* in 40 families observed for ten years. *N. Engl. J. Med.* 274:993–97.

1967

Meningococcal disease. In *Cecil-Loeb Textbook of Medicine,* 12th ed. Eds. P. B. Beeson and W. McDermott. Philadelphia: W. B. Saunders Co.