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Part II: Basic Sciences --- Chapter 7: Department of Microbiology (pages 203-221)

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A mong the “basic sciences” that provide a foundation for clinical medicine, none was more dependent upon new concepts and discoveries developed over the latter half of the nineteenth century than Bacteriology, or as later designated, Microbiology. Beginning with the low-key theories of “Contagion,” the possible role of “animalcules,” and continuing to firm establishment of the cause of specific diseases by microscopic agents, the subject was introduced at Jefferson by clinical lectures in several departments. Many interesting events and discussions contributed to early teaching of the subject.

Dr. John Kearsley Mitchell, Professor of Medicine, one of the early Jefferson proponents of the infectious nature of disease, presented discourses on enteric fevers, scarlet fever, consumption, measles, the pneumonias, and smallpox without being able at the time to relate these diseases to specific organisms. He wrote about the nature of malaria and “cryptogamous fevers,” ascribing these diseases to minute spores and fungi. In 1849 Dr. Thomas Dent Mütter, Professor of Surgery, presented a discourse on syphilis with quite accurate descriptions of chancre and the secondary stage of the disease. The following quotation from a student’s notes (1849) is indicative of his views: “When gonorrhea and syphilis are produced in a patient
at the same time, the respective virus (organisms) of both (diseases) have been present. One organism cannot produce the other disease.” It would thus appear that Mutter was aware of John Hunter’s ill-fated self-inoculation experiment in which Hunter developed syphilis from a case of gonorrhea in 1776. Jefferson professors also took part in the controversies aroused in 1843 by Oliver Wendell Holmes and in 1847 by Semmelweis, who were promoting cleanliness for prevention of puerperal sepsis and blood poisoning from contaminated wounds.

As specific discoveries confirmed the role of microorganisms in disease, the faculty gradually recognized the need to present the new development in an organized manner. Dr. W. M. L. Coplin began weekly lectures in Bacteriology in 1892 when he was Demonstrator of Pathology, and the subject continued as a part of Pathology until 1909, when the Department of Bacteriology and Hygiene was formed under Professor Randle C. Rosenberger.

Carlos Juan Finlay, M.D. (1833–1915)

Carlos Juan Finlay (Figure 7-1), a Cuban, enrolled at age 20 in Jefferson Medical College. In 1853, Carlos Juan Finlay (Figure 7-1), a Cuban, enrolled at age 20 in Jefferson Medical College. Only three months earlier Philadelphia had suffered its sixth yellow fever epidemic in 60 years. At that time the faculty consisted of Franklin Bache, Robley Dunglison, Robert Huston, Joseph Pancoast, John K. Mitchell, Thomas D. Mutter, and Charles D. Meigs. Pasteur was still working on crystals, Robert Koch was a young boy, and Lister was a young man working in the University...
College Hospital in London. Surgeons prided themselves on dexterity and speed and worked in their street clothing without antisepsis.

Carlos Finlay's preceptor was John Kearsley Mitchell. The young Finlay became very close to both the senior Mitchell and his son, S. Weir Mitchell (Jefferson, 1850). They instilled in Finlay an interest in the use of the microscope and developed in him a questioning, open mind. Dr. Finlay graduated on March 10, 1855, and returned to Cuba to start a general practice. He was a well-rounded citizen, a scholar, and a physician. He wrote manuscripts on many subjects, such as leprosy, beriberi, cholera, and relapsing fever.

Between 1865 and 1881 Finlay wrote ten papers on yellow fever—his observations on the behavior and frequency of mosquitoes relative to the occurrence of yellow fever were basic. During hot weather, yellow fever occurred at low altitudes; cases diminished with higher altitudes and fewer mosquitoes. Many of his experiments were based on the hope that by mosquito inoculation he could produce a mild type of disease that would confer immunity. This line of investigation failed, but he persisted in his observations and became more convinced of the association of the disease and the mosquito.

In 1879 Dr. Finlay was appointed by the Cuban Governor General to cooperate with the United States Commission to Study Yellow Fever. At the International Sanitation Conference in Washington on February 18, 1881, Finlay proposed the three following conditions necessary for the propagation of the fever: (1) the existence of a previous case of yellow fever, (2) the presence of a subject capable of acquiring the disease, and (3) the presence of an agent necessary for its transmission. Six months later he pointed out that the mosquito, *Aedes aegypti* was the necessary agent. The Commission received all of Dr. Finlay's data and finally, in August, 1900, Lazear, working with the Commission, applied infected mosquitoes to nine American soldiers as well as to Commission members themselves. This first experiment failed, but two days later Lazear tried again and inoculated Dr. Carroll with an infected mosquito. Carroll developed yellow fever. A soldier also developed the disease after inoculation, confirming transmission of yellow fever by mosquitoes. Unfortunately, Lazear, the earliest convert of Finlay, became infected by an experimental sting of a mosquito and died of the disease. The theory proposed years before by Dr. Finlay which had been questioned and held up to ridicule for such a long period of time was proven to be correct and would have far-reaching global effects. Confirmation of his theory revealed that Dr. Finlay was a man of vision and originality, one able to accomplish basic experiments with minimal resources and without support of colleagues.

Jefferson Medical College awarded Finlay an honorary degree of Doctor of Science in 1902. His friend, Dr. S. Weir Mitchell, proposed him for membership in the College of Physicians of Philadelphia. Dr. Finlay's memory was honored at Jefferson in September, 1955, by a symposium on yellow fever in commemoration of the one hundredth anniversary of his graduation. As one
remarked on this occasion, "It was a proud time for Jefferson. The institution was greatly honored by its relationship to the poor practitioner who became a prophet." In the fall of 1983 a special memorial lecture was delivered to the second-year students in honor of the 150th anniversary of Finlay's birth.

Beginning of a New Science

The groundwork for the new discipline of Bacteriology was laid mainly in Europe. Beginning in 1857, following his pioneering discoveries, Pasteur's sequential experiments finally discredited the long-held ideas of spontaneous generation. Pasteur's further work on fermentation and studies on anthrax and its prevention by immunization established him as a major pioneer. As early as 1867, Joseph Lister developed antiseptic surgery. Soon bacteriology emerged as a science for the study of specific causes of infections and for research and laboratory methods. By 1880 the organism causing typhoid fever was described by Eberth. In 1882 the Pasteur Institute was established. Rabies was transmitted to dogs, and a vaccine against rabies devised. Vibrio cholerae was isolated and described. The tubercle bacillus was described by Koch in 1882. Diphtheria was described by Klebs and Loeffler. It was soon discovered that some diseases were caused by organisms that passed through filters that would hold back bacteria, but these organisms (viruses) could not be seen by light microscopy. By the turn of the century asepsis became a byword, and bacteria could be identified by morphological differences and fermentation reactions.

The great discoveries of the day, tuberculosis and rabies, were received in America with unbelievable skepticism. Instead of provoking experiment and investigation, the response was often controversy, hostility, and ridicule. Several individuals in the Philadelphia area, however, were exceptions. McFarland of the University of Pennsylvania became one of few American students of Pasteur, but he observed that from 1885 to 1889 there was no student teaching of bacteriology. Lawrence F. Flick, who graduated from Jefferson in 1879, readily accepted the germ theory of disease and promoted it in his valuable teachings and in his crusade against tuberculosis. He had been convinced of the infectious nature of tuberculosis by the teaching of Dr. W. H. Webb at Jefferson well before Koch's discovery of the tubercle bacillus. In 1891-1892, a course in bacteriology at the University of Pennsylvania consisted of one lecture weekly for six weeks. At Jefferson, Coplin's weekly lectures were scheduled throughout the year and included hygiene.

Early Teaching At Jefferson

Having introduced the subject of bacteriology at Jefferson, Dr. Coplin included it in the evolving discipline of pathology—in 1895 the College Catalog listed a course entitled "Bacteriology and Clinical Microscopy." Coplin, however, left Jefferson to organize the Department of Histology, Pathology, and Bacteriology at Vanderbilt University in Nashville, Tennessee. In 1896 he returned to Jefferson to become Professor of Pathology and Bacteriology. Coplin held that title until the new Department of Bacteriology and Hygiene was established in 1909, at which time he continued a distinguished career as Professor of Pathology.

In 1897 Bacteriology was taught two days a week for six weeks by Dr. Coplin, assisted by Drs. David Biven and Randle C. Rosenberger. As new discoveries and advances came about, it was necessary to increase the teaching time in the curriculum, and a laboratory course was established. Elementary lectures were given to the first-year students to serve as an introduction to laboratory work in the third year. The latter course continued in the third year until 1917, when it was moved to the first year. An outgrowth of the early instruction in bacteriology was the publication of the first book on Microbiology by an author from Philadelphia, Dr. Michael V. Ball (Jefferson, 1889). Entitled Essentials of Bacteriology, it was published by W.B. Saunders Co., Philadelphia, 1891. During the author's student years, no bacteriology was taught at Jefferson but on one occasion, Jacob M.
DaCosta introduced to the class a young physician, Julius Salinger, who had just returned from Berlin and who made a drawing of a bacillus on the blackboard. After graduation, at which he was awarded the Henry C. Lea Prize, Ball went abroad. Following a stop at the Paris Exhibition of 1889, he went on to visit clinics in London, Paris, Copenhagen, and Berlin. Because he spoke German fluently, he spent most of his time in Berlin, where he pursued a course in bacteriology at the Hygienisches Institut by Robert Koch assisted by Robert Frankel and Emil Behring. This course lasted for four weeks, ten hours daily. He returned to Philadelphia in April, 1890, and became an intern at the German (Lankenau) Hospital. Ball made the acquaintance of W. B. Saunders, a young publisher who was making a specialty of a new type of student publication, *Question Compendia*, in question-and-answer form. The publisher had Ball sign a contract. Following internship, Ball took a position as a ship surgeon. With little work to do and few distractions, his manuscript for the *Essentials of Bacteriology* was completed and published in October, 1891. The question-and-answer form was not used; the text was continuous. The book became popular and went through six editions by 1908.

The teaching program continued to expand at Jefferson at the turn of the century. Gradually Dr. Coplin turned over responsibility for bacteriology to his associates. Immunology was added as new discoveries required. In addition to Dr. Rosenberger, Henry Radasch, George Nofer, and Archibald Graham became assistants while still senior medical students, and they provided instruction to underclassmen. Dr. Radasch joined the staff in Anatomy and for many years headed the teaching in Histology and Embryology. In 1903 Dr. Rosenberger was promoted to Associate in Bacteriology, and in 1904 he became an Assistant Professor. During these early years the practice of hiring student assistants led to the employment of Daniel Lewis, Henry B. Decker, Robert M. Lukens, and Erwin D. Funk, all to become well-known alumni of the College.

Dr. Rosenberger (Figure 7-2) was born in Philadelphia, March 4, 1873. Educated at the old Central High School, he entered Jefferson in 1891 and graduated in 1894. From then until his death Rosenberger's association with Jefferson was uninterrupted. He had several early clinical appointments, but soon his attention was focused on Pathology and especially the new science of Bacteriology.

In 1897 Rosenberger became Assistant Demonstrator of Morbid Anatomy and Bacteriology and, in 1898, Assistant Pathologist to Jefferson Hospital. His career progressed at Jefferson, with advancement in 1904 to Assistant Professor of Bacteriology and ultimately to

![Fig. 7-2. Randle C. Rosenberger, M.D. (1873–1944); First Chairman of Bacteriology and Hygiene (1909–1944).](image)
Professor and Head of the new Department of Bacteriology and Hygiene in 1909. Dr. Rosenberger was active in many areas in relation to developments in his field; these included the Milk Commission and the Pneumonia Commission for the City of Philadelphia. He also carried on investigation in a number of areas and published numerous papers as often as his busy teaching schedule would permit.

The early years of the Department were characterized by efforts to define the scope and limitations of the new discipline. Dr. Rosenberger himself assumed a prodigious teaching schedule in spite of other obligations that continued to demand time. He became a Lecturer and later Professor of Hygiene and Preventive Medicine at Woman's Medical College of Pennsylvania. He was also Pathologist to Philadelphia General Hospital (1903–1919) and served as Bacteriologist to the Henry Phipps Institute from 1904 to 1908.

John A. Roddy, M.D. (Jefferson, 1907), joined the Department as a Demonstrator in 1911 and was promoted to Associate in Bacteriology in 1915. He also became Demonstrator and Chief Assistant in the Department of Clinical Medicine at Jefferson Hospital as well as Professor of Hygiene and Bacteriology at the Philadelphia College of Pharmacy. His dual appointment continued until 1920. In 1917, Dr. Roddy published his book, Medical Bacteriology, a text for beginners and a laboratory guide for medical practitioners and pharmacists. Dr. Robert M. Lukens (Jefferson, 1911), who was an Assistant in the Department in 1911 and a former student of Dr. Rosenberger, did the illustrations. The book was published by P. Blakiston & Sons, Philadelphia.

The transfer of the laboratory course from the third to the first year in 1917 increased the need for intense student supervision, and by 1923 the course increased to 162 hours. Dr. Henry B. Decker (Jefferson, 1920), was appointed Instructor in Bacteriology in 1923 and assumed an intimate role in the laboratory course as well as sharing some of the lectures. In 1925 the Department name was changed to Preventive Medicine and Bacteriology, a title that would remain until the 1940s.

Having become established as one of the three first-year basic sciences at Jefferson, sharing those of Anatomy and Biochemistry, the Department maintained its teaching prominence in the early 1930s, its hours for laboratory increasing to 180, plus 32 hours of lecture. In addition, a third-year course was presented in preventive medicine, public health, industrial, and occupational medicine. The course covered sewage disposal, water purification, and the consideration of water and milk as vehicles for infectious diseases. Demography and vital statistics were stressed. All students presented a thesis dealing with preventive medicine in industry as a part of the third-year course.

Dr. Decker resigned in 1933 to limit himself to Dermatology, progressing to Professor and Chairman of that Department in 1936. He was succeeded by William A. Kreidler, Ph.D., who was promptly caught up in the very demanding teaching program that had become established. Dr. Kreidler was appointed Assistant Professor of Bacteriology and Immunology in 1932, and his hard work combined with his soft-spoken but authoritative manner resulted in his advancement to Associate Professor in 1936. Dr. David Meranze joined the staff in 1934 as Assistant Demonstrator, and in 1940, Dr. George Silver (Jefferson, 1938) became the first Eli Lilly Fellow. He was also appointed Assistant Demonstrator.

■ Period of Transition (1941–1944)

The year 1941 brought major changes. Dean Henry K. Mohler died suddenly, and Dr. Rosenberger was immediately appointed Acting Dean, his long experience providing stability for the Medical School until the arrival of the new Dean, Dr. William Harvey Perkins (Jefferson, 1917) from Tulane University. Dr. Perkins, having had pioneering experience in Preventive Medicine, Public Health, and Tropical Medicine, was also appointed Professor and Chairman of a new Department of Preventive Medicine, thus removing this responsibility from Dr. Rosenberger's Department. The third-year teaching program was taken over by Dr. Perkins.
Rosenberger. In his honor the Alumni Association established the Rosenberger Memorial Fellowship in March, 1944.

but the teaching hours were increased, and the Department was renamed the Department of Bacteriology and Immunology. In 1944, a separate lecture and laboratory course in Parasitology was introduced, with the appointment of Dr. William G. Sawitz as Associate Professor. George P. Blundel, Ph.D. joined the staff as an Associate in Bacteriology and Immunology in 1942.

Wartime brought the accelerated teaching program, with its increased hours and stresses on the staff. The death of Dr. Rosenberger on February 21, 1944, marked a major change in the Department he had organized and nurtured. His professorial tenure was one of the longest in the history of Jefferson. His career had evolved with little formal training and still he was able to grow with his field, remaining abreast of developments while maintaining high standards of teaching and also conducting research. Along with his other accomplishments, Dr. Rosenberger designed several practical pieces of laboratory apparatus including a brass Petri dish holder for quick sterilization in an open flame and an exhibition test-tube stand to display the various bacterial fermentation reactions.

In spite of his dedication to Jefferson and his teaching duties, Dr. Rosenberger had a rewarding and relaxing home life. He lived for many years at Rahns, Pennsylvania, just a short distance from Collegeville, the site of Ursinus College. His funeral service was conducted by the Reverend Wharton A. Kline, Dean of Ursinus. Having been athletic in early life (baseball and tennis), Dr. Rosenberger changed to the less strenuous sports of quoits and croquet. He was fond of gardening, and for years his favorite local transportation was his horse and buggy. He was also musically talented and played a much-prized Stradivarius violin. Rosenberger’s good humor and ready wit were greatly appreciated by the students. His standards were high and he did not tolerate lack of application graciously. The Class of 1928 presented his portrait to the College, and another portrait of him was painted by Dr. Robert M. Lukens (Jefferson, 1911) and later given by Mrs.

William A. Kreidler, Ph.D.; Acting Chairman (1944–1946)

Upon Dr. Rosenberger’s death, Dr. Kreidler (Figure 7-3) was appointed Acting Chairman. He received his B.S. and M.S. from Lehigh University and proceeded to the University of Pennsylvania, where he was awarded his Ph.D. in Bacteriology and Immunology in 1926. He joined the teaching staff there, advancing to Assistant Professor before his appointment as Assistant Professor at Jefferson in 1932. As a senior member of the Department, Dr. Kreidler carried on the intensive teaching program effectively with the assistance of Dr. Grant Favorite, an Associate, and Dr. George Warren (to return in 1966 as Professor), an Instructor. Dr. Sawitz was also present as Assistant Professor to teach Parasitology.

Kenneth Goodner, Ph.D.; Second Chairman (1946–1967)

Following a prolonged process of searching for a new Department Head, Kenneth Goodner, Ph.D. (Figure 7-4), was appointed Professor and Chairman of the Department of Bacteriology and Immunology in 1946, largely through the initiative of Dean Perkins. Dr. Goodner was born in 1902 in McCune, Kansas, and educated at the local schools. He received his A.B. and M.A. at the University of Kansas and proceeded to Harvard, where he studied under the eminent Hans Zinsser. Following receipt of his Ph.D. in 1929, Goodner continued as an Instructor in Bacteriology at the Harvard School of Public Health in 1930 but was then appointed to the Rockefeller Institute for Medical Research. He was one of the group of young men in Dr. Rufus Cole’s program involved in the investigation of immunity to pneumococci. This ultimately led to the development of a type-specific antipneumococcal rabbit serum that was more effective and produced fewer allergic reactions in the treatment of lobar pneumonia than the previously used multivalent horse serum. Numerous publications in collaboration with his associates, Drs. Frank Horsfall, Colin MacCleod, Rene Dubos, and A. H. Harris, resulted. The rabbit serum’s period of usefulness was limited because it was soon rendered obsolete by the discovery of antimicrobial agents, beginning with the sulfa drugs in the late 1930s and soon followed by penicillin. In 1940 Dr. Goodner became a member of the staff of the Rockefeller Foundation and began his participation in the investigation of infectious diseases throughout the world, research that included further work with pneumococci and, during World War II, studies on vaccines against yellow fever. His associations with investigators from Rockefeller and government agencies formed the basis for his later studies on cholera and plague.

Dr. Goodner came to Jefferson as an internationally recognized scientist and a capable administrator. When Dean Perkins asked him about signing a contract, Goodner’s reply was “a contract is unnecessary when two gentlemen shake hands.”

The first challenge was to attract faculty, but it was also necessary to develop research programs and to revamp the courses of instruction. The latter had already begun when Dean Perkins recruited Dr. William G. Sawitz as Assistant Professor of Parasitology in 1943 and asked him to develop a new course. Dr. Sawitz came to Jefferson from Tulane University School of Medicine, having worked with Dr. Perkins there.
after he came to the United States from Germany in 1936 as a political refugee. Sawitz was trained in clinical medicine and tropical medicine in Rostock and Munich and was highly regarded for his skill in parasitology. He had quickly developed a course of lectures and laboratory exercises in the Bacteriology Department but his formal appointment was confirmed after the arrival of Dr. Goodner. Again at the behest of Dean Perkins, Sawitz received an appointment by Dr. Reimann in the Department of Medicine in addition to his basic status as Assistant Professor of Bacteriology and Immunology. He became a very effective laboratory instructor and investigator whose methods and skills ideally meshed with Dr. Goodner’s plans for the Department. In 1949 Dr. Sawitz was promoted to Associate Professor and in 1955 to full Professor. In 1950 his book, Medical Parasitology, described as “the most successful condensation of the field of parasitology applicable to clinical medicine,” was published by the Blakiston Company. Dr. Sawitz died in 1957.

Dr. Goodner’s first new appointment was Dr. Carl F. Clancy (Ph.D., Yale University, 1942) as an Associate in 1947. Dr. Clancy was active as a bacteriologist at the Pennsylvania Hospital, so his teaching was part-time. His basic role was laboratory teaching, where he was known to students as a kind, fatherly person whose knowledge of clinical bacteriology was of practical value. Following his advancement to full-time Associate Professor in 1963, Clancy also increased teaching time and initiated a research program on the action of staphylococcal toxins. He retired in 1975.

Innovations during the early Goodner years related to teaching changes, introduction of the principles of scientific research, and the development of graduate education (Figure 7-5). The laboratory course for medical students was...
changed from the first year to the second year in 1947. Dr. Goodner took his teaching obligations seriously; as a result he formed close relationships with the medical students and became their strong advocate in areas not limited to those of his discipline. Living close to the campus, he also established local relationships that enhanced his image as an academician.

- Research and Graduate Programs

The research program was built upon Dr. Goodner's previous activities in the international field of infectious diseases. Early involvement with studies on plague in Madagascar were followed by membership on the Cholera Committee of the National Institutes of Health. Members of this group and their associates included Drs. Joseph Smadel, Theodore Woodward, Thomas Francis, John H. Dingle, and J. Edsall. Field work was carried on in the Philippines, India, Pakistan, and Thailand. In addition, the discipline stimulated members and provided excellent material for teaching and research within the Department. In 1968 the South-East Asia Cholera Research Laboratory was established in Dacca, Pakistan (later Bangladesh), providing a regional facility for Committee activities. Dr. Goodner was a long-time consultant, continuing field trips throughout his lifetime.

The activities involving study of cholera formed an important part of the new School of Graduate Studies organized in 1949 at Jefferson through the driving efforts of Drs. Peter Herbut, Andrew Ramsay and Goodner. Along with the other basic sciences, Dr. Goodner's department was ready with programs leading toward the Ph.D. degree. The first students to enter the Ph.D. program in Bacteriology were Keith Jensen and Russell Miller, who joined the staff as Assistants in 1949 and went on to receive their degrees. The graduate program as well as the death of Dr. Kreidler in 1949 required further faculty recruitment that during the next few years proved exceptionally successful.

Dr. Goodner’s first full-time faculty expansion appointee was Assistant Professor Morton Klein, Ph.D., in 1948, whose interest in virology and general bacteriology proved valuable. Klein resigned in 1950. To replace him, Dr. Goodner proposed the appointment of the first full-time woman Professor at Jefferson. Lolita Parnell, Ph.D., an experienced teacher with service in the United States Navy, was appointed Assistant Professor of Bacteriology and Immunology in 1950. Although her tenure lasted only three years, the administrative policy changes that permitted her appointment were then in place, clearing the way for the appointment of women in all departments of the Jefferson faculty.

The Department faculty was further strengthened in 1950–1951 by recruitment of three young doctoral graduates from the University of Pennsylvania. Bernard Koff (Ph.D., 1950) who was trained by Drs. A. Sevag and Stuart Mudd, was appointed Instructor in 1950 and furthered his studies on growth factors of bacteria. An effective teacher and scientist, he was promoted to Assistant Professor in 1953, but two years later became Professor and Chairman of Microbiology at Rutgers University, New Brunswick, New Jersey.

Henry Stempen, was appointed in 1950 as Instructor. His areas of investigation included the biology of *Proteus vulgaris*, fungi, and slime molds, and he introduced mycology into the departmental curriculum. Although shy and artistic, he was a well-qualified teacher and exacting in his work. Stempen advanced to Assistant Professor in 1955 and Associate Professor in 1957, but resigned in 1962 to join the Department of Biology at Rutgers University in Camden, New Jersey, where he remained until his retirement in 1988.

The third of this trio of University of Pennsylvania Ph.D. graduates, Robert J. Mandle (Figure 7-6), was appointed Instructor in 1951. He was a graduate of Lebanon Valley College (B.S., 1942), served in the Navy until 1945, then went to work as a technician for Drs. Wendell Stanley and Armand Braun in their laboratory at Rockefeller Institute’s Princeton, New Jersey, Division. Mandle credits these investigators for instilling in him “the philosophy of experimentation, the philosophy of science.” An exceptional biologist, his investigations included the microbiology and epidemiology of staphylococci, studies carried out with the collaboration of the Division of Infectious Diseases. He also participated in the
investigation of organisms of the gut with Drs. Goodner and Freter of his department and Dr. Franz Goldstein of the Division of Gastroenterology. Dr. Mandle became expert in mycology, succeeding to responsibility for that subject upon the resignation of Dr. Stempen. Virology, bacterial physiology, and the genetics of bacterial disease were also included in his comprehensive biological skills.

Dr. Mandle progressed up the academic ladder, reaching the rank of Professor in 1965 and serving as Interim Chairman of the Department in 1967–1968. In 1979 he received the Christian R. and Mary Lindback Award for Distinguished Teaching and in 1983 the additional honor of the presentation of his portrait to Jefferson by the senior class of medical students. In 1977–1979 Mandle also was President of the Eastern Branch of the American Society for Microbiology. In 1980, he received a Fulbright–Hays Award for International Exchange of Scholars, under which he served at the Catholic University School of Medical Technology in Quito, Ecuador, for six months. After a distinguished career, Mandle retired in 1986.

Expansion continued in the 1950s. Dr. Goodner’s leadership in organization was established within the Department as well as in collaborative enterprises with other Jefferson departments. Such relationships led to the appointment in 1951 of Dr. W. Paul Havens of the Department of Medicine as Associate Professor of Bacteriology and Immunology. Dr. Havens was a leader in the weekly infectious disease conferences, which became important teaching exercises in linking applied microbiology with clinical medicine. He was a pioneer in the study of viral hepatitis and served as a member of various

Fig. 7-6. Robert J. Mandle, Ph.D., Professor of Microbiology and Interim Chairman (1967–1968).
commissions including the Armed Forces Epidemiology Board and Consultant to the Surgeon General and to the Veterans Administration. Havens worked closely with Dr. Goodner and shared the lectures in the Microbiology course, his research laboratory being located within the Department. In 1956 he was advanced to Professor of Microbiology, and the following year to Professor of Medicine.

The Middle Period of the Goodner Chairmanship

The year 1957 was eventful: Dr. Sawitz's death in March called for new approaches to the teaching of parasitology; and the first ten years of the Goodner period, even though they represented major achievements in departmental organization, outstanding instruction of medical students, and the successful development of the Graduate School program, still demanded other new emphases. The appointment of Harry L. Smith, Jr., (Figure 7-7) as Instructor in 1957 was among the first and most durable of the faculty appointments from the Graduate School. Smith (B.S., Temple University, 1952) came directly to Jefferson, where he received his M.S. in 1954 and his Ph.D. in 1957. He became intensely involved in the investigations initiated by Dr. Goodner into *Vibrio* organisms and the epidemiology of cholera. Observations on the "sticky" surface of the vibrios led him to the study of gelatin degradation by various bacterial gelatinases. Promoted to Assistant Professor in 1959 and to Associate Professor in 1964 (when he received a career development award), Dr. Smith went on to major accomplishments in international health. Field trips were carried out in the study of cholera epidemics in Thailand, the Philippines, and Pakistan. When Dr. Goodner retired, Dr. Smith took over his training and research grants. A *Vibrio* Reference Laboratory was established at Jefferson in 1969 with grant support from the United States/Japan Cooperative Scientific Program of the National Institutes of Health, and Smith’s collection of *Vibrio* strains and serotypes was used for reference by investigators throughout the world. Grant support for this program ended in 1980, but the Laboratory has continued to function. Dr. Smith’s teaching accomplishments were equally notable—he was advanced to Professor of Microbiology in 1973, for some years he was responsible for the teaching of parasitology, and he later became interested in computerized aids in teaching, especially in relation to diagnosis of infectious diseases, enabling students to manage computer-simulated cases. Dr. Smith was honored in 1988 by the senior class with the presentation of his portrait to the University.

The year 1957 was also marked by the appointment of Drs. Frank F. Katz and Rolf...
Freter as Assistant Professors. Dr. Katz (M.S., Tulane University, 1953; Ph.D., University of Pennsylvania, 1966) had experience in teaching parasitology and took over the duties of the late Dr. Sawitz. His research centered on nematodes, especially Strongyloides species, and the effects of radiation on their stages of development, studies supported by the United States Public Health Service. Katz resigned in 1962 to join the faculty at Seton Hall School of Medicine, and his teaching duties were assumed by Dr. Smith, who had also been a student of Dr. Sawitz.

Dr. Rolf Freter (Ph.D., Goethe University, Frankfurt, Germany, 1951) also came as Assistant Professor. From Loyola University, Chicago, Freter had pursued research in cholera and Shigella, especially characterizing the immune responses of these organisms. He was an able teacher, and his participation in the cholera programs included field work during cholera epidemics. Promoted to Associate Professor in 1960 Freter resigned in 1965 to become Professor of Microbiology at the University of Michigan.

The Department of Microbiology

Having gone through several changes of name and orientation from its inception in 1909, the designation of the Department was finally changed to Microbiology in 1959, reflecting the accretion of knowledge and the concepts of molecular biology that were then being introduced. The subject of virology was receiving increasing attention at this time, and in 1960 Dr. Paul B. Johnson (Ph.D., University of Chicago, 1957) was recruited from his former position as Chief of the Division of Virology of the United States Medical Research Unit (NAMRU-2) in Taiwan. Having published numerous papers, Dr. Johnson was co-discoverer of the “Simian Foamy Agent,” and he continued his viral studies at Jefferson with a National Institutes of Health grant. Johnson left Jefferson in 1964 for a Research Professorship at the University of Louisville, Kentucky.

Of more than passing interest has been the career of Dr. Eileen Randall (B.S., Ohio State University, 1948), who entered the Graduate School program at Jefferson in 1951. She received her M.S. in 1953 while engaged as a clinical microbiologist at Jefferson Hospital, and she advanced to Director of the Clinical Microbiology Laboratory in 1955. Randall was awarded her Ph.D. in 1960. In 1963 she received a dual Medical School teaching appointment as Assistant Professor of Pathology as well as of Microbiology. Her service at Jefferson was notable for the excellence of her work in diagnostic microbiology, teaching and training of medical residents, and teaching undergraduate and graduate students, as well as for the cordial relations between her laboratory and the clinicians who required her skilled services. She continued her research as well and gained a national reputation for new laboratory techniques, including the rapid detection of bacteremia by radiometric methods. Dr. Randall was promoted to Associate Professor of Microbiology in 1969 but resigned in 1973 to become Director of Clinical Laboratories at Evanston, Illinois, Hospital and Associate Professor of Pathology at Northwestern University. In 1984 she received the Thomas Jefferson University College of Graduate Studies Alumni Achievement Award.

In 1965 Dr. Goodner appointed Dr. George Royal as Assistant Professor, the first black to hold a full-time professorial position at Jefferson. Although he was well received, he remained only one year before accepting a higher post at Howard University. The same year, Dr. George Warren returned to the faculty as Professor of Microbiology. After his brief stint at Jefferson in the 1940s he proceeded to Wyeth Laboratories as Senior Research Bacteriologist and soon as Head of the Wyeth Department of Microbiology, a position he held until his retirement. Warren’s association at Jefferson was a voluntary one, and he participated in teaching and departmental affairs on this basis. Dr. Warren was an expert in the field of antimicrobial agents and was responsible for early investigations of hyaluronidase, which led to a very successful product marketed by his company. Following his retirement from Wyeth, Warren continued his teaching activities on a daily basis until being made Honorary Professor in 1987. Even then he continued his departmental connection while working on his book on antibiotics.

Dr. Goodner retired June 30, 1967, with a long
record of successes to his credit. In addition to his work in international health and infectious disease studies, his inauguration of the Ph.D. program proved a major forward step. The new Graduate School coupled with the worldwide studies of infectious diseases attracted many students from the Far East to whom Dr. Goodner was especially committed in the conviction that their training would be important in the development of their countries. Ph.D. graduates have also achieved important posts throughout the United States. The master’s degree program likewise was successful in promoting the interests of the Graduate School and the useful employment of its graduates.

Dr. Goodner’s sudden death on August 30, 1967 occurred only two months after his retirement. His total career contributions to microbiology, to the cause of international health, and to the teaching of a generation of medical and graduate students were summarized at a memorial service conducted at Jefferson on September 20, 1967. On that occasion he was eulogized by Dr. Theodore E. Woodward, Professor of Medicine at the University of Maryland School of Medicine and a lifetime friend and colleague. Dr. Woodward expressed appreciation for Dr. Goodner’s accomplishments in the global campaign against infectious diseases, saying: “His ideas sparked enthusiasm in others; his mind and efforts were selflessly shared in the training and development of young scientists who now make their mark. Never one to shun work, he pressed his tired but willing body over the globe, to Africa for study of yellow fever, to Madagascar and problems of plague, and during the last decade to the Asian subcontinent and the Pacific Far East for cholera.”

Dr. Robert Mandel in a more intimate memoir prepared for the Executive Faculty also described Dr. Goodner in these words:

“He quickly became ‘Ken’ to his peers and ‘K.G.’ to his students. His was a truly noble spirit; he was a rare teacher, investigator, and student advisor and confidant. He was a sentimentalist by tradition, yet one on whom sentimentality was wasted. One did not have a neutral feeling about him. He was at times a charmer, an irritant, a prodding conscience or an outspoken critic. Jefferson, its halls and occupants, was his life for 21 years. He was proud of his heritage and his contemporaries as they sought together to build upon the glories of the past.”

Russell W. Schaedler, M.D.; Third Chairman of Microbiology (1968–), First Plimpton-Pugh Professor (1985–)

Russell W. Schaedler, M.D. (Figure 7-8) (Jefferson, 1933, Alpha Omega Alpha) was appointed the new Chairman January 1, 1968. He was born in Hatfield, Pennsylvania, on December 17, 1927, and received his B.S. at Ursinus College in 1949. Completing his Jefferson internship in 1954, he received an appointment to the Rockefeller Institute for Medical Research and to its associated Hospital. He advanced through residency to Associate Physician to the Hospital of Rockefeller Institute in 1961 and to Physician to that Hospital in 1962. Schaedler was intimately associated with the great microbiologist, Dr. Rene J. Dubos. His early investigations centered upon the effects of bed rest in tuberculosis and upon the etiology of sarcoidosis but later focused on nutrition, infection, and host–parasite interactions.
relationships. He became well known in the field of gastrointestinal microecology. His bibliography relative to his studies during this period provides evidence of the wide range of Schaedler's work. He developed a medium that bears his name and has been widely used for two decades for the isolation and identification of anaerobes. His work delineating the microbial flora of the mouse led to the "Schaedler Cocktail," a group of indigenous organisms of the mouse used to associate germ-free animals; these animals with a defined flora are then used to establish breeding colonies of pathogen-free animals in barrier rooms. The technique is now being used by almost all commercial breeders in the United States. Dr. Schaedler's clinical background together with his research accomplishments provided exceptional credentials for his appointment.

The Department upon Schaedler's arrival had a solid base, but personnel losses in recent years had placed a burden on the teaching staff remaining. Faculty recruitment required teaching skills as well as research plans and funding. The Department was well equipped with its own media-preparation rooms, areas for sterilizing media and equipment, and areas for decontamination of glassware and spent media. There were well-kept animal quarters, an electron microscopy suite, darkrooms for photography, a walk-in incubator room, cold rooms, and freezers. All of these facilities were enhanced by the move in May, 1969, of the Department to the newly erected Jefferson Alumni Hall, one of the best designed basic science buildings in the country.

A unique faculty appointment was made in 1969 when Dr. Jussi J. Saukkonen (Figure 7-9) joined as Associate Professor of Microbiology, advancing in 1972 to full Professor. Dr. Saukkonen, born in Helsinki, Finland (B.S., Helsinki University, 1951), had a research fellowship at the University of Heidelberg (1954–1956) and was awarded his M.D. from Helsinki University in 1955. After a postdoctoral fellowship at Columbia University College of Physicians and Surgeons (1955–1959), Saukkonen returned to Finland to become Head of the Biochemistry Laboratory of the Central Public Health Laboratory and, from 1966 to 1969, Director of Biochemistry. During a sabbatical leave served at Rockefeller University in 1966–1967, he made the acquaintance of Dr. Schaedler and in 1969 became the first academic appointee of the new Chairman at Jefferson.

Dr. Saukkonen's qualifications were ideal. In addition to training as a physician, he was a biochemist and microbiologist especially skilled in microbial genetics. His research centered on molecular biology and DNA replication. These multiple assets were to prove valuable in developing a clinically oriented curriculum in microbiology. In addition to teaching medical students, Dr. Saukkonen became a force in the Graduate School program where his students profited by his teaching and research skills, receiving excellent postdoctoral positions and making major scientific contributions. He was also active in academic government, a member of

![Fig. 7-9. Jussi J. Saukkonen, M.D., Professor of Microbiology, Dean of the College of Graduate Studies, and Senior Associate Dean of Scientific and Faculty Affairs of the Medical College.](image)
various committees, and editor or associate editor of several journals. In 1976–1977, Saukkonen took a leave of absence to serve as Director of the Central Public Health Laboratories, the Finnish equivalent of the United States National Institutes of Health.

Dr. Saukkonen’s involvement extended beyond the Department. In 1981, he was made Dean of the College of Graduate Studies of Thomas Jefferson University and in 1983 he was appointed Dean of Scientific Faculty Affairs in the Medical College.

The Department proceeded to seek funding for its many projects, often relative to those initiated by or programmed by new faculty members. Dr. Schaedler, in cooperation with Dr. Abraham Benenson, epidemiologist in the Department of Preventive Medicine, Dr. Dhodanand Kowlessar of the Division of Gastroenterology, and Drs. Smith and Mandle, received a large grant from the United States Navy for the study of diarrheal diseases. This project was an outgrowth of studies by Drs. Mandle and Goldstein using clinical material and following through from Dr. Schaedler’s investigations on the gastrointestinal flora of animals. These funds provided new equipment for research and supported graduate students in the Department.

The Clinical Masters Program was a further cooperative project of the Department and the School of Graduate Studies. Dr. Eileen Randall, in her role as Chief of the Microbiological Laboratories, with the support of Dr. Mandle brought to the attention of the Chairman the need for advanced training of medical technologists, a need also recognized by the American Academy of Microbiologists, by which agency the criteria for designation as “Specialist in Medical Laboratory Microbiology” were developed. The program was designed to emphasize laboratory management skills but included emphasis on molecular virology, immunology, biochemistry of microorganisms, and advanced diagnostic microbiology. A minimum of three years of work in a clinical microbiology laboratory (later reduced to two years) was a prerequisite. The students rotated through a number of laboratories with full-time exposure to different managerial techniques and the means of solving problems of personnel, budget, and tactics in laboratory supervision. After careful planning, the program was launched in 1972 with 15 students enrolled that year. It proved successful from the start, and its continuation was assured when Drs. Schaedler and Mandle obtained training grant support. Over 100 graduates completed the program and filled many supervisory positions in hospitals in Philadelphia and the Eastern Seaboard. Other graduates went on to the Ph.D. program, and some to the M.D. Ultimately professional opportunities for these graduates became limited and the course was discontinued except for part-time students.

In 1969, Dr. Junius Clark (Ph.D., University of Texas, 1967) joined the Department to develop the study and teaching of cellular immunology. Trained in electron microscopy as well, he became an excellent teacher for medical students and also organized a graduate course in immunology. Funded by a Merck Faculty Development Award in 1970, Clark served well in introducing modern immunology to the Department.

Another area urgently in need of development was that of virology. Although Assistant Professor Ihor Zajac had been recruited for this subject by Dr. Goodner in 1965, it needed vigorous promotion. This was provided by the appointment in 1971 of Dr. E. Frederick Wheelock (M.D., Columbia University, 1955; Ph.D., Rockefeller University, 1961) as Professor of Microbiology. His research at Rockefeller had centered on cellular responses to multiplication of the cytovirus using Newcastle Disease Virus. Having been appointed Assistant Professor of Preventive Medicine at Western Reserve School of Medicine in 1961, Wheelock received a career development award, and his research programs were well funded. He continued these studies at Jefferson with major contributions in the fields of interferons, viral interference, and Friend leukemia virus. Not regarded as a dynamic teacher but able to entice good graduate students for his research, the teaching in virology was bolstered by the appointment of Dr. Stephen Toy (Ph.D., University of Florida, 1966) who came to Jefferson with Dr. Wheelock from Western Reserve. His viral studies included the same areas as those of Dr. Wheelock, but he was also skilled in the field of molecular biology and carried the major portion of the teaching of virology to medical
students. His brief tenure ended, however, in 1974, at which time his duties were taken over by Dr. Preston Marx (Ph.D., Louisiana State University, 1969), who was appointed Assistant Professor. Dr. Marx was well trained in molecular virology and the biochemistry of viral infections, and he was an able teacher. Drs. Wheelock and Marx resigned in 1981.

Another area of microbiology that required promotion was that of microbial pathogenesis. To accomplish this goal, Dr. Schaedler in 1975 appointed Dr. Charles Panos (Ph.D., University of Pittsburgh, 1952) as full Professor. Dr. Panos had broad experience in research and teaching at the University of Illinois and at the Einstein Medical Center in Philadelphia, where he became expert in the investigation of mycoplasma and L-forms. A biochemist and bacterial physiologist, Panos had a research career development award and continuing National Institutes of Health grant support through the years. He attracted individuals from all over the United States, Europe, and the Far East to work with him. Panos also participated in teaching medical students and graduate students as well as serving on the student Admission Committee and other committees of the University. His recent work has focused on the role of lipoteichoic acid of streptococci in the pathogenesis of disease.

During this period, Dr. Donald Lee Jungkind (M.S., University of Houston, 1968; Ph.D., University of Texas, Galveston Branch, 1972) succeeded Dr. Eileen Randall as Director of the Clinical Microbiology Laboratory as well as holding joint appointments in Pathology and Microbiology, first as Assistant Professor and, since 1987, as Associate Professor. Jungkind's activities in Microbiology have included participation in training and supervising the research projects for clinical masters and students, collaboration with various members of the Department in their research, and participation in the teaching programs. His own research has pursued rapid methods for the identification and susceptibility testing of bacteria, the laboratory diagnosis of sexually-transmitted diseases, and more recently, blood culture techniques by non-radiometric methods.

The departure of Dr. Junius Clark in 1977 prompted the appointment of Dr. Catherine E. Calkins (Ph.D., Purdue University, 1972) as Assistant Professor to maintain the Departmental program in immunology. Dr. Calkins received postdoctoral training at Yale University with Dr. Byron Waksman and was then a Research Associate at Sloan-Kettering Institute in cellular immunobiology. She proceeded with her research on cellular regulation of the immune response, for which she received extramural support. Calkins proved to be an excellent teacher, was promoted to Associate Professor in 1982, and was named Assistant to the Chairman in 1988. She has attracted excellent graduate students who have achieved firm footholds in the world of science.

To complement Dr. Calkins' program in immunology, Dr. Thomas T. MacDonald (Ph.D., University of Glasgow, 1976) was appointed Assistant Professor in 1978. His research focused on the immunology of the gastrointestinal tract especially relative to mucosal cell surfaces and cellular interactions of Peyer's patches. Aggressive and self-assured, MacDonald worked well with other Department members and stimulated the students with his enthusiasm as a lecturer. He made significant contributions with his studies in the priming and regulation of antibody-producing cells. He resigned in 1984, ultimately returning to Great Britain to pursue his investigations.

### Further Staff Development

During the early 1980s, the explosion of biological knowledge of the previous two decades required further expansion of the Department Staff for the extensive teaching and research programs. The course in Medical Microbiology served in excess of 200 medical students annually, including laboratory experience. Each laboratory group of 16 to 20 students had a faculty member or graduate student assigned. Much staff effort was also devoted to the Graduate Teaching Program and the multiple research projects. An important appointment in 1980 was helpful in promoting the area of immunology and renewing investigative parasitology: Dr. Joyce E. Jones (Ph.D., University of Florida, 1977), joined the staff as Assistant Professor. Jones had entered the Peace Corps...
upon her graduation from Florida State University in 1969 and was assigned to Malawi, where in addition to teaching biology, hygiene, and agriculture, she assisted in various surveys of parasitic infestations in the villages. In the Ph.D. program she studied altered immune response to trichinella and followed up as a postdoctoral fellow at the Immunology Branch of the National Cancer Institute, thus developing skills in the immunology of parasitic diseases. At Jefferson she was well received by students and colleagues while beginning her studies on altered responses during trypanosome infestation. She received a new investigator award, which was regularly renewed and funded. Her interest in general microbiology plus her special teaching skills were recognized by receipt of the Christian R. and Mary Lindback Award. Although promoted to Associate Professor in 1986, Dr. Jones resigned the same year to accept a position as grants administrator at the National Institutes of Health.

Another staff person of note during this period was Dr. Thomas J. Wade, a Ph.D. graduate of Jefferson, who returned as Assistant Professor with the special task of acting as coordinator for medical microbiology for Allied Health Science programs. He also worked with Dr. Mandl using a gas chromatograph to characterize nonfermenting gram-negative bacteria. Wade resigned in 1985.

With the departure of Drs. Wheelock, Marx, MacDonald, and Jones, the Department was reorganized in the early 1980s along three separate but interrelated groups: immunology, molecular genetics, and virology, with pathogenesis of infectious disease at the molecular level. A new biological-containment laboratory was constructed through funds provided by the Mary Smith Charity. This suite housed the latest equipment for researching hazardous biologicals, especially genetic recombinants. Dr. Robert Grafstrom (Ph.D., Hershey Medical Center of Pennsylvania State University, 1975) was appointed Assistant Professor in 1985 to head the DNA laboratory and develop the area of molecular genetics. His research respecting the mechanism in DNA repair was funded by the National Science Foundation, and he quickly achieved recognition as an able Department member with stimulating ideas.

Dr. Grafstrom, Dr. Richard Peluso (Ph.D., Rockefeller University), and Dr. Timothy Black (Ph.D., Roswell Memorial Institute of University of Buffalo School of Medicine, 1979) constituted a trio referred to as the “microbiology mob,” all having been appointed about the same time. All became funded investigators, enthusiastic and hard-working. Dr. Peluso, a virologist, was early engaged with replication of the RNA genome of the vesicular stomatitis virus, and Dr. Black was studying Marek’s Disease Virus genes and their gene products, as well as the molecular details of the killing of cells by the Herpes virus and how some cell types resist.

Dr. Robert Korngold (Ph.D., University of Pennsylvania, 1979), was appointed Associate Professor in 1987 as a youthful authority on graft versus host-disease problems, with experience at the Wistar Institute. Dr. David Abraham (Ph.D., University of Pennsylvania, 1983) was recruited in 1983 as an immunoparasitologist.

The teaching staff of the Department reached its full complement in the late 1980s. There were eight Professors, including two Adjunct Professors; seven Associate Professors (two Adjunct), six Assistant Professors, and three Instructors. Sophisticated research was being carried on at all levels in the field of microbiology. In addition to extramural funding for Departmental projects, an Endowed Professorship in Microbiology was established by Dr. V. Watson Pugh (Jefferson, 1953) and Mrs. Frances Plimpton-Pugh in 1985 as a family memorial. Dr. Schaedler, the Chairman, was the first incumbent of this Chair.

Microbiology has surmounted many milestones in the advancement of medicine for the prevention and cure of disease. Jefferson’s past contributions have been noteworthy, but there are plans for greatly expanded research in various aspects of molecular medicine—these include erecting a Research Building with the most modern facilities at the northeast corner of Tenth and Locust Streets, an endeavor integrated in a multidisciplinary approach involving other Departments.

References


