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FRANK CHARLES MANN

1887—1962

A Biographical Memoir by
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Biographical Memoir

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F. C. Mann

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BY MAURICE B. VISSCHER

THE LIFE HISTORY of Frank C. Mann is in a very real way an epic of the great American drama. He was born in a log cabin on the family farm in Adams County, Indiana, and his attitudes throughout life were those of the frontiersman. His early life instilled in him a love for and curiosity about nature. The realities of Hoosier frontier homestead life shaped the pattern of his social and political views, which were conservative. He was the fourth and youngest son of Joseph E. and Louisa Kiess Mann. He had five sisters, one of whom was younger than he. Frank Mann's paternal grandfather emigrated from Mansfield, England, and his maternal grandparents came from Bavaria following the revolution of 1848.

The "hybrid vigor" of his mixed Scotch, English, and German inheritance may have given him his unusually robust constitution and buoyancy. Mann spoke of himself as "a typical American mongrel." His boyhood life on the farm certainly conditioned him for his lifelong habit of serious, hard work. His early education was in the county grammar grades. He attended the Decatur (Indiana) High School for two years before entering Marion Normal College, from which he obtained the B.S. degree in 1907. His formal connection with the science of physiology began the next year at Indiana University where he was appointed an assistant, then teaching

fellow, and teaching associate in the Department of Physiology between 1908 and 1912. For one year he moved to the Department of Medicine and then spent two years as an instructor in experimental surgery. In the meantime, he earned three degrees at Indiana, the B.A. in 1911, the M.D. in 1913, and the M.A. in 1914.

Frank Mann had had a career in medicine in mind from an early age, and long dreamed of going to the Johns Hopkins Medical School, which was then nearly unique in its offerings. His application for admission to Hopkins was accepted, but Dr. W. J. Moenkhaus, then Professor of Physiology at Indiana, intrigued him into preparing himself for an academic career by asking him to assist in teaching in the Department of Physiology, while continuing his medical studies at Indiana. The Mann family was not affluent, and Frank was undoubtedly influenced in part in his decision by a realization that he could spare his family real financial sacrifice by remaining in the institution where his part-time services as a teacher would be compensated. It turned out that his decision was no handicap to his career; in fact it may have assisted it because his unusual talents were very quickly recognized and he was given opportunities which he might not have had in a larger, more mature center.

Frank Mann's early research interests in surgical shock and in circulatory disorders during anesthesia impressed his mentor, Dr. Willis D. Gatch, who was Professor of Surgery and Dean of the Indiana University College of Medicine. The latter wrote to Dr. Louis B. Wilson, Director of the Mayo Foundation, asking whether the Mayo enterprise had a place for a promising young man. As a result, Frank Mann became director of experimental medicine and pathologic anatomy at the Mayo Clinic. With the integration of the Mayo Foundation into the Graduate School of the University

of Minnesota, he became, in 1915, Assistant Professor of Experimental Surgery and Pathology, giving up the latter half of his titular assignment the following year. His academic advancement was rapid; he was made Associate Professor in 1918 and Professor in 1928. He retained the latter post until his retirement in 1952.

Mann's scientific work was extraordinarily fruitful because he combined a talent for recognizing significant problems with consummate skill in experimental surgical techniques for their study. His most fundamental series of studies was that carried on largely in collaboration with T. B. McGath and Jesse L. Bollman, dealing with the physiology of the liver. In this research, Mann's surgical skill made possible the study of hepatectomized animals which resulted in the writing of new chapters on the physiology of the liver. He established the crucial role of the liver in supplying glucose for the remainder of the body in the fasting state and he demonstrated the role of the liver in urea formation. He was also able to establish the extrahepatic formation of bile pigment.

The bulk of Frank Mann's scientific life was spent on studies of the normal and pathological physiology of the digestive system, including the liver. He made important contributions to the pathogenesis of peptic ulcer, pancreatitis, cholecystitis and other gallbladder diseases, and liver insufficiency, as well as other diseases of the digestive system.

With various collaborators, including especially Hiram E. Essex, he made pioneering studies of the physiological effects of various animal venoms and toxins. He utilized his surgical skill in the employment of extravascularly placed flow meters in the study of organ circulation, including the coronary circulation, in animals which had completely recovered from surgical procedures and could be studied under various normal circumstances in the waking state.

Frank Mann frequently found his stimulus for attacking problems in puzzling clinical findings in humans. His association throughout his life with alert physicians in the Mayo Clinic undoubtedly favored this tendency because he was their consultant in problems of pathological physiology. He himself enjoyed this relationship.

Modesty was one of Frank Mann's prime attributes. In 1950 at a dinner given in his honor at the time of his election to membership in this Academy, he said, among other things:

"In our present world an investigator is but a part, and a part which is all but insignificant, of a vast and progressive movement. I have been fortunate in being at a focal place in such a movement.

"The early investigators could make their own equipment and perform their investigations by themselves, as Franklin did with his kite. It is now rarely possible for an investigator to accomplish his objectives without aid. The prerequisites of an investigator are many, but they consist essentially of an institution and colleagues.

"The institution must possess adequate funds and above all must have a generous policy regarding freedom of action by the scientist. The colleagues must have abilities and training in many scientific areas, and above all, be co-operative. It is no longer possible to contain a scientific investigation within the man-made walls of a single subject, such as anatomy, physiology, and so forth. Advances in medical practice depend upon biologic material which may range all the way from man himself down to organisms that cannot be seen. These advances also depend upon all scientific apparatus and technics designed to study phenomena in our chemical and physical world. As a consequence, in our time a single individual can have but a small part in a discovery which is of aid to the patient."

Frank Mann had numerous pupils, many of whom have become leaders, especially in clinical investigation. He was a successful teacher, not so much as a lecturer as in the seminar and at the laboratory bench. In an address he gave at Indiana University in 1938, on the occasion of the award to him by his alma mater of an honorary doctorate of laws, he gave his own definition of the ideal teacher. He said, in part:

"The ideal teacher, and I use the word in the broad sense, including all who instruct, is one who lives in the memory of his students long after most of the specific things he taught are forgotten. Not every teacher possesses those qualities which make him bigger than his subject, although I believe a higher percentage of teachers fulfill the ideal requirements for their work than any other profession. The most productive relationship of teacher and student is intangible; a rapprochement of the spirit, such as obtains between two old friends who through long association can carry on a soul-satisfying wordless conversation."

Frank Mann believed that the spirit of inquiry is indispensable to a valid educational experience. He said on one occasion:

"I do not believe that higher education can be made a thing apart from investigation without stunting the student's capacity to grow. A serious defect of those educational institutions which cannot afford necessary facilities for research is that their instruction is done so well the student acquires the view that all the facts about each subject have been learned. An individual with such a training frequently becomes so orthodox in his views that he is not receptive to new ideas or advancement in the material, social, or spiritual environments in which he must live. A heritage of a university training should make the recipient a leader in the nation but such leadership must be based upon the clearly recognized fact that

the acquired knowledge of the past but points the direction for future advancement. If the experiences of the last quarter century should have taught anything, particularly in the field of science, it is that much that is accepted as truth is relative and must always be considered in relation with time."

The spirit of the pioneer which his log cabin birth and his farm and forest boyhood instilled in him dominated his philosophy of life. Speaking in 1938 in the Commencement Address at Indiana University, he dealt with the problem of opportunity for the graduates of a university in the "depression" years. His droll humor and cautious optimism come out in his remarks:

"It has been said that the present world economic and social crisis is owing to a lack of territory for pioneering; that pioneering days are over. But pioneering days are not over; they have hardly begun. Only the earth's surface has been covered with a fighting horde of disgruntled human beings too occupied in attempting to obtain their supposed share of the visible surface from each other to explore the numerous opportunities whereby each may obtain a sufficiency of the abundance that exists. When one considers the marvelous development of the supposedly inferior forms of life around him, plants and animals, recognition comes that after all man is a very defective animal whose only claim to leadership in the world of life is the possession of a central nervous system which permits him to make up for his other deficiencies. Pioneering of the future will depend upon the fuller development of this one thing, the brain, in which man excels. The tools of pioneering no longer are the ax, pick, and shovel, but the more delicate ones of materials and thought fashioned in the institutions of learning and research. The pioneers are the graduates of these institutions, a selected group whom you now join, trained to discover new spaces and

outlooks which have never before been seen or even believed to exist."

In World War I, Dr. Mann was commissioned as a second lieutenant in the Medical Corps, U.S.A., but was never called to active service because the Army itself preferred that he give courses in surgical technique for medical officers assigned for study at the Mayo Clinic. He also served the war effort of the National Research Council in connection with its shock program. In World War II, he again served the National Research Council in its surgical shock studies in various ways including the preparation of a guide for investigators of this problem. He performed other important services for the Federal Government as a member of the Physiology Study Section for the National Institutes of Health from 1948 to 1952, and as a member of the Gastrointestinal Advisory Committee of the National Advisory Cancer Council from 1941 to 1951.

Frank Mann was very active in the work of the American Physiological Society, of which he became a member in 1916. He was its secretary from 1933 to 1939 and its president in 1936 and 1937. He helped establish the editorial board of the *Annual Review of Physiology* and served a long term as its chairman. He was chairman of the Section on Pathology and Physiology of the American Medical Association in 1944. He was a member of numerous other scientific societies, including the Association of American Physicians, the American Society for Pharmacology and Experimental Therapeutics, the Society for Experimental Biology and Medicine, the American Society for Experimental Pathology, the American Society for Thoracic Surgery, the Western Surgical Association, the American Gastroenterological Association, the Harvey Society, the American Association for the Advancement of Science, the Minnesota Academy of Science, the Society of Sigma Xi, the Alpha Omega Alpha medical honor society, the Royal Flemish

Academy of Medicine of Brussels, and the Argentina Society of Biology. He was also an honorary member of the Indianapolis Medical Society, an associate member of the Minnesota State Medical Association, and an honorary fellow of the American College of Surgeons.

From 1914 until his retirement in 1952, Frank Mann was a major leader in the Mayo educational and research enterprise. He had joined the Mayo Clinic staff at the time that Dr. William J. Mayo was attempting to bring about the establishment of the Mayo Foundation as an integral part of the University of Minnesota, with its complete financial and operating control vested in the regents of that university. After much acrimonious controversy, such arrangements were made, and Dr. Mann played an important part in establishing a program of graduate training with academic validity in the Mayo Foundation. His homespun intolerance of sham and his deep devotion to science set a tone in the Institute for Experimental Medicine, over which he had virtually complete control, that gave the many Mayo Fellows who worked there an experience that was truly academic in its best sense. A visitor to Rochester, Minnesota, in those days could not fail to be amazed, as he emerged from the rolling countryside of cornfields, trees, and pasture, to come upon one of the busiest and most productive laboratories in the world in such a rustic setting. The scientific visitor could also not fail to be impressed, if he spent even a day in the laboratories, with the genuineness of the scholarly approach to the problems under study. It is in no small measure due to Frank Mann that, as a recent study by the Association of American Medical Colleges has shown, former Mayo Foundation Fellows occupy more medical faculty posts than do the graduates of any but a handful of other institutions in the United States. Dr. Mann played a very important part in making the Mayo Foundation

of the University of Minnesota a major center of training for academic medicine.

In the special environment of the Mayo Clinic and the Mayo Foundation, the problems of integration of basic and clinical research were important. Frank Mann was an exponent of close cooperation and mutual respect between the experimental investigator and the clinician. His remarks on this score are interesting and incisive.

"In general, research problems can be placed into one or the other of two categories, depending upon the character of the problem. The problems in the one category have to do with fundamental laws of natural phenomena; those in the other category deal with methods of application of those laws to the use of man. Both types of research are essential if the benefits of research are to be obtained. The results of investigations which frequently are designated as 'academic' and which deal with the first-mentioned types of problems often are considered to be of little value or impractical, and rather often they cannot be applied in practice by the contemporary generation. However, the principles established by such investigations may form the basis for many years of progress by means of applied research.

"Experimental research is the progressing frontier of physiology and other medical sciences. Each experimental investigation is a scouting expedition for the exploration of unknown pathways. Many of these explorations are unproductive. Only a very few trails are discovered which can be made into safe broad highways for the advancement of medical practice. It is a responsibility of both the experimental investigator and the clinician to cooperate in the development of these new and safe highways. This responsibility can be fulfilled on the basis of mutual recognition of each other's worth and integrity."

Frank Mann was given recognition for his work in many ways during his lifetime. Already mentioned was the honorary doctorate from the institution he most loved, Indiana University. A lectureship was named in his honor in 1942 at that institution. He also received an honorary doctorate from Georgetown College in 1937. In 1932 he received the William Wood Gerhard gold medal of the Philadelphia Pathological Society. In 1944 he was awarded the gold medal of the American Medical Association. In 1955 he received the Julius Friedenwald medal of the American Gastroenterological Association.

On September 20, 1952, there were dedicatory exercises for the opening of the Frank C. Mann Hall in a new Medical Sciences Building for the Mayo Foundation and the Mayo Clinic. The time was a few days after Mann's sixty-fifth birthday. The occasion was celebrated by a symposium on experimental medicine in which Lester R. Dragstedt, Thomas D. Jones distinguished service professor of surgery in the University of Chicago, Chester M. Jones, clinical professor of medicine in Harvard University, and Owen H. Wangensteen, professor of surgery in the University of Minnesota, participated. Appropriately, Frank Mann's long-time colleague and collaborator with him on his important liver studies, Jesse L. Bollman, presided at the symposium. Through this action, the naming of a major hall for him, Mann joined a very select handful of major contributors to the success of the Mayo Foundation and the Mayo Clinic for whom facilities have been named. In his remarks on that occasion, Bollman explained some of the reasons for Frank Mann's importance to medical science and education when he said:

"My second duty as chairman involves my acting as spokesman for the many associates of Dr. Mann. During his thirty-eight and a half years at the Mayo Clinic, he encouraged,

aided, and abetted approximately 2,000 research studies and has been author of about 400 papers. I do not intend to recount each of those or even very many of them for you. I would like to mention some that I believe to be better known and more outstanding; however, it is a difficult choice. His fields were many and persons with other interests would vary in their choice from what I have selected. His early experiments were on intestinal obstruction; shortly after these and about thirty-five years ago, his experiments on shock were published. Furthermore, these shock studies led to the adrenal glands and to the study of the animal after complete removal of the adrenals. Since gastric ulcers develop in adrenalectomized animals, a long series of studies of peptic ulcer followed. The Mann-Williamson dog has long been a standard for the study of experimentally produced peptic ulcer. Studies then were extended to include transplantation of biliary ducts, pancreatic ducts, complete removal of the stomach, the duodenum, and many other organs.

“Dr. Mann is best known for his studies on physiology and experimental pathology of the liver. These include studies of the secretion of bile, biliary pressures, function of the gallbladder, biliary obstruction, experimental pathology of the liver, and so on. A long series of studies of the changes of animals after complete or partial hepatectomy is well known to all of you. Dr. Mann pointed out that many metabolic changes previously thought to occur only in the liver continued to occur in the animal after the liver was completely removed. Other metabolic processes cease immediately on removal of the liver. One of these I would like to show you. This is a picture of a dog taken on November 1, 1920, an hour and a half after his liver had been completely removed. Five hours later, the animal had developed hypoglycemic coma, then fifteen minutes later the animal was completely relieved by

the administration of glucose. Dr. C. H. Best said that it was these pictures which gave him the clue to the nature of the toxemia his animals were developing after they received injections of pancreatic extracts. A short study following this observation enabled Doctors Banting and Best to develop insulin and test it enough so that it was practical.

"In addition to his heavy research program Dr. Mann found time to serve on practically all of the committees of the Clinic. He also was available for the discussion and help in the problems of his colleagues. Everyone who has come in contact with him has been enriched and aided by his experience.

"My many years of professional association with Dr. Mann have also been enriched by a close bond of friendship between us and our respective families. Dr. and Mrs. Mann have given us help and sympathy in times of stress and have rejoiced with us in any good fortune that came our way."

Frank Mann married Velma J. Daniels on July 21, 1914, after an engagement of six years, during which he completed his medical and graduate school education. They had three children, Frank Daniels, Ruth J., and Joseph Daniel Mann. Both of their sons are medically trained, and both are actively engaged in clinical and experimental pathology. Miss Ruth Mann is a librarian in the Mayo complex. Frank Mann's personal life was a happy one. He enjoyed gardening and cattle-breeding. He won many prizes for his peony blooms and his Holstein-Friesian cattle herd was the envy of professional stockmen. After his retirement, he devoted himself largely to floriculture and animal husbandry. His death was due to a malignancy of the pancreas, which he himself diagnosed, a disease with whose course and outcome he was professionally very familiar, yet he maintained his buoyant optimism to the end. His daughter wrote: "During the time that he was ill,

he helped all those who loved him by his refusal to relinquish hope and by his gallant acceptance of weakness and pain."

The present author knew Frank Mann from 1922 until his death. Although I was never one of his students, I was a student in the University of Minnesota in Minneapolis while he served as a professor in Rochester. He was a member of my examining committee for the Ph.D. degree. I remember the skill with which he conducted his part of my examinations, delving with each question progressively more deeply into a subject. Later, for eighteen years, beginning in 1936, I knew him as a colleague, when he was administratively responsible for physiology in the Mayo Foundation in Rochester and I had similar responsibilities on the Minneapolis campus of the University of Minnesota. He was a most dependable colleague. One could always be certain that he would maintain high standards of integrity and competence. There is no doubt about the fact that the excellence of the research and teaching program which he carried on in the Institute for Experimental Medicine in the Mayo Foundation facilitated the development of the entire scientific medical enterprise in the University of Minnesota. In the history of the development of the medical scientific enterprise in America, and especially in the Middle West, the life and work of Frank Mann will always be important.

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KEY TO ABBREVIATIONS

- Am. Heart J. = American Heart Journal
 Am. J. Digest. Diseases = American Journal of Digestive Diseases
 Am. J. Digest. Diseases Nutr. = American Journal of Digestive Diseases and Nutrition
 Am. J. Med. Sci. = American Journal of the Medical Sciences
 Am. J. Physiol. = American Journal of Physiology
 Am. J. Surg. = American Journal of Surgery
 Am. Rev. Tuberc. = American Review of Tuberculosis
 Anat. Record = Anatomical Record
 Ann. Internal Med. = Annals of Internal Medicine
 Ann. Rev. Physiol. = Annual Review of Physiology
 Ann. Surg. = Annals of Surgery
 Arch. Internal Med. = Archives of Internal Medicine
 Arch. Pathol. = Archives of Pathology
 Arch. Pathol. Lab. Med. = Archives of Pathology and Laboratory Medicine
 Arch. Surg. = Archives of Surgery
 Brit. Med. J. = British Medical Journal
 Ergeb. Physiol. = Ergebnisse der Physiologie
 Folia Haematol. = Folia Haematologica
 Internat. Abstr. Surg. = International Abstracts of Surgery
 J. Am. Med. Assoc. = Journal of the American Medical Association
 J. Am. Vet. Med. Assoc. = Journal of the American Veterinary Medical Association
 J. Biol. Chem. = Journal of Biological Chemistry
 J. Exp. Med. = Journal of Experimental Medicine
 J. Indiana State Med. Assoc. = Journal of the Indiana State Medical Association
 J. Lab. Clin. Med. = Journal of Laboratory and Clinical Medicine
 J. Mt. Sinai Hosp. = Journal of the Mt. Sinai Hospital
 J. Pharmacol. Exp. Therap. = Journal of Pharmacology and Experimental Therapeutics
 J. Thoracic Surg. = Journal of Thoracic Surgery

- J. Urol. = Journal of Urology
Minn. Med. = Minnesota Medicine
Proc. Soc. Exp. Biol. Med. = Proceedings of the Society for Experimental Biology and Medicine
Proc. Staff Meetings Mayo Clin. = Proceedings of the Staff Meetings of the Mayo Clinic
Surg. Clin. North Am. = Surgical Clinics of North America
Surg., Gynecol. Obstet. = Surgery, Gynecology and Obstetrics
Trans. Assoc. Am. Physicians = Transactions of the Association of American Physicians
Western J. Surg., Obstet. Gynecol. = Western Journal of Surgery, Obstetrics and Gynecology
Wisconsin Med. J. = Wisconsin Medical Journal

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