

## Thomas Milton Rivers 1888-1962

Thomas Milton Rivers died in New York 12 May 1962 at the age of 73 years.

Dr. Rivers was born on 3 September 1888 in Jonesboro, Georgia, and received his secondary school education at the Middle Georgia Military Academy in that city. At the age of 16, he entered Emory College, graduating with a Bachelor of Arts degree in 1909. Although he did not originally plan to study medicine, an interest in the natural sciences was aroused while he was at Emory and he decided to study at the Johns Hopkins School of Medicine. His education there was interrupted at the end of his sophomore year when a routine physical examination revealed that he was afflicted with progressive central muscular atrophy of the Aran-Duchenne type. Given but a short time to live, he was advised to drop out of school. Although he followed the advice of the school authorities and left, he did not abandon his interest in medicine. Instead he obtained a position as a laboratory assistant in the San Tomas Hospital in Panama. Stories that he has told of his 2 years there indicate that his medical activities and responsibilities far exceeded those of most sophomore medical students. His experience in Panama was obviously a rich one and served to whet his appetite to return to Hopkins for more training. The condition for which he had been advised to drop out of school had, after 2 years in Panama, seemingly miraculously disappeared and he returned to Hopkins, graduating with the medical class of 1915.

While attending medical school, Rivers had decided upon a career in pediatrics. He took an internship in Janeway's department at the Hopkins Hospital, and the following year was appointed an assistant resident in pediatrics under Dr. John Howland at the Harriet Lane Home in Baltimore. Young Rivers proved to have a fine aptitude for clinical pediatrics and would probably have been destined for a distinguished career in this field had not World War I intervened.

Rivers had gone into the Army Medical Corps and had been assigned to duty with a medical commission (The Army Pneumonia Board) that the Surgeon General had established to study the

pneumonias complicating measles and influenza. He had been placed on the Board because of his aptitude in the clinical aspects of the infectious diseases under study. However, during the course of the investigations he was closely associated with such distinguished investigators as Blake, Cole, and Opie, and it seems very likely that this exposure to experimental medical science influenced his decision to abandon clinical pediatrics in favor of the laboratory. After the war, Rivers received an appointment at the Hospital of the Rockefeller Institute, and Dr. Rufus Cole, Director of the Hospital, was agreeable to his initiating an intensive study of virus diseases. Throughout the 33 years that Rivers was actively associated with the Rockefeller Institute, virus diseases remained his main scientific interest.

In 1922, when Rivers went to the Rockefeller Institute to begin his studies of virus diseases, virology was not the robust and burgeoning science that it is today. Few investigators devoted full time to it and theories even as to the nature of viruses were about as numerous as the individuals propounding them. Thus, Rivers as a young and untried investigator entered a field of science that was also young and largely unprobed. He lived to see it become a mature and important science. The period spanned by Rivers' scientific career may truly be thought of as the "golden age of virology."

An analysis of Dr. Rivers' impact and role in contributing to the great development of virology and the tremendous increase in our knowledge concerning viruses and the diseases they cause is difficult to make because his influences were so numerous and so diverse and often quite subtle. However, if anyone can be said to have individually influenced the development of virology through its golden age of the past 30 years more than another, it is Rivers. It was he who most of us looked upon as the natural leader of our science.

Rivers' scientific contributions to our knowledge of viruses and virus diseases were numerous and significant; and, most importantly, many of them were made at a time when modern virology was still quite young, and they served to



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direct the thinking and work of other virologists in profitable directions. Strangely enough, and illustrative of the pitfalls into which the early virologists might fall, Rivers' first discovery resulted from the recognition of a mistake that he almost made. In 1923, with Tillett, Rivers described the transmission of a virus, seemingly from varicella patients, to rabbits, only to find later that the suspected varicella virus was indeed one naturally latent in rabbits—Virus III—which had been activated to infectivity by serial passage in this host. The discovery of this first silently latent virus was the forerunner of many others that have subsequently been brought to light to plague the work and thinking of virologists. The recognition by Rivers and Tillett of Virus III for what it really was seems simple today in the present advanced state of medical science, but back in the early 1920s it represented one of the astute observations of virology.

After studying Virus III rather intensively, noting especially its tendency to go along as a passenger with tumor transplants, Rivers broadened his interests to include vaccinia, herpes, and myxoma viruses. He did pioneering work in the then very young science of virus cultivation and developed a cultured strain of vaccinia virus that for a time was employed for Jennerian prophylaxis in man. He worked extensively on psittacosis, contributing much to our better understanding of the host range, epidemiology, and pathogenesis of this disease. He did important work with louping-ill and with Rift Valley fever, and pioneered in studies of the virus of lymphocytic choriomeningitis as a human pathogen. He did intensive studies elucidating the nature and mechanism of production of allergic encephalomyelitis. Much of what we know about vaccinia virus stems directly from the studies of the antigenic and chemical composition of vaccinal elementary bodies carried out by Rivers and those working with him at the time. His work with infectious myxoma of rabbits elucidated the pathogenesis of this disease and contributed to our knowledge of the nature of the causative virus. Dr. Rivers contributed over 100 scientific papers to the virus literature. However, great as his scientific contributions to the field were, I doubt that they alone would have assured him the position of leadership in virology that he was accorded, and one has to

look beyond his scientific contributions to account fully for his pre-eminence in his field.

During his career, Rivers published 68 summarizing or review articles on viruses or individual virus diseases. He did more than any other single person, in my opinion, in interpreting and critically reviewing contemporary work in virology. He had a tremendous wealth of information gained from his own work and from extensive reading of the works of others, and it was this thorough knowledge of the field and his ability and willingness to write extensively and authoritatively on it that, taken together with his own scientific stature, made Rivers the leader that he was.

In addition, there were other characteristics of Dr. Rivers, known best to those of us who were closest to him, which made us respect and look up to him. He had a lively curiosity concerning newer developments so that he was never too busy to receive a colleague in his laboratory. He delighted in hearing about discoveries or near discoveries before they reached the publication stage, and he was most adept in picking to pieces ideas that had been fuzzily thought out. However, one never left his laboratory after a discussion without the feeling of having profited from conversation with him. Such discussions were usually as good as thorough searches of the literature because his knowledge of virology was tremendous and his memory concerning what he had read, and most especially where he had read it, was phenomenal.

Although Dr. Rivers was by nature a friendly person, he had the capacity of being irascible and pugnacious. He was a difficult and formidable person to oppose and could be stubbornly inflexible in maintaining a position. His discussions at scientific meetings of findings with which he disagreed could be on occasion so stinging that the audience, even though realizing the correctness of Rivers' position, often had their personal sympathies entirely with Rivers' opponent. Many of those of us who have known Dr. Rivers best have felt the sting that he could so picturesquely deliver in an argument. Few of us have had the nerve openly to side with his opposition in one of these "knock-down-and-drag-out" discussions. It is my feeling that Dr. Rivers believed that verbal chastisement of the sort that he occasionally delivered was good for the younger virologists among us.

Dr. Rivers had an active career at the Rockefeller Institute, extending up to his retirement in 1955. He was made Director of the Hospital in 1937 and became Director of the Institute in 1953. After retirement in 1955, he joined the National Foundation, first as Medical Director from 1956 to 1958, and later as Vice-President for Medical Affairs from 1958 until the time of his death. He served as a Member of the Board of Health of the City of New York from 1940 to 1957. During World War II, he organized and commanded Naval Medical Research Unit #2 in the Pacific. He retired from the Navy with the rank of Rear Admiral. Dr. Rivers held honorary degrees from Emory College, the University of Rochester, and the University of Chicago. He was a long-time member of the Society of American Bacteriologists and served as its President in 1936. His other memberships included the National Academy of Science, Association of American

Physicians, American Philosophical Society, Harvey Society, American Society of Experimental Pathology, Society of American Immunologists (President 1934), American Association of Pathologists and Bacteriologists, American Pediatric Society, American Society of Clinical Investigation (President 1932), and the American Association for the Advancement of Science.

I doubt that virology will very soon have another such leader as we had in Tom Rivers. While there are several heirs-apparent to his position of recognized eminence, the delicate problem of unanimous selection of one as uniformly acceptable will be long in being made. Medical science, and virology in particular, have lost a great leader, and those of us who knew Tom well as a scientist, adviser, and friend will miss him greatly.

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