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ARNOLD RICE RICH  
*1893—1968*

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*A Biographical Memoir by*  
ELLA H. OPPENHEIMER

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Donald R. Rich,

## ARNOLD RICE RICH

*March 28, 1893—April 17, 1968*

BY ELLA H. OPPENHEIMER

ARNOLD RICE RICH was born in Birmingham, Alabama in 1893 and died in 1968 in Baltimore, Maryland shortly after his seventy-fifth birthday. He was the second of two children in a prosperous Southern family. His father, the owner of a mercantile business, allowed Arnold a free choice in deciding his future. Arnold's older sister, now Mrs. Leonel R. Weil of Montgomery, Alabama, never ceased to show interest in his career.

After elementary school education in Birmingham, Arnold was sent to a military preparatory academy—The Bingham School—in North Carolina. Whereas this military training did little to change Arnold's inherent dislike of regimentation and all forms of physical exercise, it probably was responsible for his erect bearing and slim figure. His trim appearance was pleasing in spite of his perpetual pallor, which mirrored a sedentary life. His most characteristic expression was a quizzical smile, whether in accord or dispute with his companions.

Following his preparatory school education, Arnold entered the University of Virginia. An elastic curriculum permitted a free choice of any number of subjects at one time and Rich, after a short sojourn of only two years, was given his A.B., and one year later his M.A. degree, and was elected, as well, to Phi Beta Kappa. While at college, Rich had considered becoming a min-

ing engineer, but since he detested mathematics, his alternative choice for a career was biology. His Master's research, carried out in the zoology department at the University of Virginia, concerned the reactions of the proboscis of a flatworm (*Planaria albissima* Vejdovsky); this work, completed in Virginia, was published during Rich's third year at medical school.

Rich entered the Johns Hopkins Medical School in the fall of 1915 and received his M.D. in 1919 along with membership in Alpha Omega Alpha. He was associated with Hopkins for the remainder of his life. His specialization in pathology was accidental. In medical school he came under the influence of Dr. William H. Howell and was fascinated by this extraordinary scholar whose interest at that time was coagulation of the blood. Rich was soon immersed in related research projects; his findings on the "Nature of Metathrombin" and the "Changes in the Clotting Power of Oxalated Plasma on Standing" (see bibliography, 1917) were published while he was still a medical student. He did not allow the school curriculum to interfere with his research to any great degree.

One unexpected interruption did occur because of the participation of the United States in World War I. The medical students, in the fall of 1918, were regimented into the Johns Hopkins Unit of the Students Army Training Corps and because of Rich's previous military training, he was made a sergeant. Although the military regime did not hinder his pursuit of knowledge or further any athletic development, the war did change Rich's interest from theory to more practical medical problems; he therefore decided to specialize in experimental surgery. To this end, Dr. William Halsted, the Professor of Surgery, insisted that Rich devote himself to pathology for a year as preparation for a surgical internship. It was thus that Rich came under the influence of Dr. William G. MacCallum, and surgery lost its brilliant prospect to pathology.

Except for a sabbatical year studying with Dr. Hans Eppinger

in Vienna, Rich remained in the Hopkins Pathology Department for his entire career. Flattering invitations from other institutions were always refused. Rich loved working at Johns Hopkins and living in Baltimore. He was appointed Professor of Pathology in 1944, and in 1947 he became the third Baxley Professor of Pathology, Chairman of the Pathology Department, and Pathologist-in-chief of the Johns Hopkins Hospital, adding his distinguished services to those of his predecessors, Drs. William H. Welch and William G. MacCallum. Although Rich became Professor Emeritus in 1958, he retained his interest in pathology until his death in 1968, which followed a long illness beset by cardiovascular complications.

I first met Arnold Rich when I was a medical student. I was fortunate to have had him for my instructor, and he always remained my preceptor, associate, and friend. Few could resist his enthusiastic teaching. His contagious interest in the study of disease changed many of his students into embryonic pathologists. To his students he embodied the ideal teacher whose standard was excellence in all spheres. This he did by example: Rich taught superbly and lectured brilliantly, vividly describing his material in his soft, slightly Southern-tinged tones. His meticulous autopsy dissections, similarly accompanied by flowing lucid analyses, always drew a large audience of students and staff.

Rich's influence was felt throughout the medical school and hospital, and he was consulted by members of all departments. This, in spite of the fact that as a careful and meticulous worker himself he might seem over-critical and discouraging. If Dr. Rich approved your work and encouraged its publication, you were assured of its worthiness; but he was ruthless in red-penciling observations he considered incomplete, equivocal, uncontrolled, or unimportant.

Rich's power of critical evaluation was especially apparent at the weekly Journal Club meetings of the pathology department.

A junior staff member would report and criticize the original contributions in a specific journal, but it was Dr. Rich who always made the pertinent comments on the value of each. To underscore his evaluations, he delighted in arguing *against* his true opinion to develop perspicacity of judgment in his young staff members. Rich's critical ability was further appreciated and utilized as a member of the editorial board of the *Bulletin of the Johns Hopkins Hospital* and as a member of the Hopkins Research Society. His opinions were sought not only by colleagues, but by former associates in advanced positions in other institutions.

A tribute to Dr. Rich's popularity was the overflowing audience of students and staff that attended his weekly clinical-pathological conferences (CPC), probably the most popular hour in the school curriculum. Dr. William Thayer was his first clinical opponent, then for many years Dr. Louis Hamman, and finally Dr. A. McGehee Harvey. Each of these clinicians added a personal delightful variation to the session. It was Dr. Rich's function to select the cases to be shown, and these were always instructive. In addition, Rich delighted to choose patients who could illustrate a hitherto unrecognized problem or lesion. Many of the CPC cases were subsequently published and frequently served as a basis for research.

It was in his research that Rich made his greatest impact on the field of pathology. He was instrumental in interesting his students and young pathology staff members in his work and utilized their aid in his extensive experimental investigations. His first important contribution elucidated the origin of bilirubin and the bile pigments. This important physiological process had previously been poorly understood and controversial. Rich's studies culminated in his classic review, "Formation of Bile Pigment," for the *Physiological Reviews* (1925). In this he concluded that hemoglobin, derived from destroyed red blood cells, is the sole source of bile pigment; its normal site of origin is in

reticuloendothelial cells alone, especially the Kupffer cells, and the epithelial liver cells have no role in the formation, but only in the excretion of the bile pigment. Additional studies in this field resulted in Rich's delineation of jaundice into two types on the basis of pathogenesis. The first, retention jaundice, results from overproduction of bile pigment in conditions that are associated with a decrease in the excretory power of the liver, such as immaturity, anoxemia, and fever. The second type—regurgitation jaundice—is caused by reflux of bile from the liver canaliculi into the blood stream in the presence of duct obstruction or liver cell necrosis. Published in 1930, this work remains, with only slight modification, the basis for the present concept of jaundice, its clinical diagnosis, and its treatment.

Dr. Rich's next consuming interest was in the field of inflammation and hypersensitivity, especially as related to tuberculous infection. This motivated his investigations for many years. With the assistance of several co-workers, he was able to demonstrate that acquired resistance in the host is independent of the hypersensitive inflammatory reaction, and the latter, injurious to the host, may be eliminated by desensitization without impairment of immunity. These findings were summarized in the *Physiological Reviews* in 1941. Continued research clarified the pathogenesis of the spread of the tubercle bacilli in the body and revolutionized the concept of the disease "tuberculosis" and its myriad manifestations. These monumental studies were published as a deservedly famous book, *The Pathogenesis of Tuberculosis*, in 1944, revised in 1951 and subsequently translated into Spanish and Japanese.

Extensive investigation of the mechanisms of hypersensitivity and immunity led to additional knowledge in pneumococcal infection and syphilis. But of greatest importance was Rich's demonstration that the lesions of periarteritis nodosa, rheumatic carditis and pneumonitis, and some forms of glomerulonephritis

were caused by the anaphylactic type of hypersensitivity. This work was instrumental in stimulating other scholars to investigate the basic mechanisms of the pernicious interactions of antigen and antibody which produce disease in the human body.

During Rich's long career, in addition to basic research, he made numerous important observations in the field of pathological anatomy and histology and clarified the pathogenesis of previously poorly understood conditions. With his colleagues, he demonstrated that portal cirrhosis in rabbits could result from repair following liver cell necrosis caused by a diet deficient in vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, and nicotinic acid. By time-lapse cinemicrography of cells *in vitro*, he first depicted the characteristic locomotion and nature of the "acute splenic tumor" cell. He helped clarify the pathogenesis of acute hemorrhagic pancreatitis by proving that activation of trypsinogen by enterokinase is not a necessary step in the production of this lesion, which may result therefore from liberation of unactivated pancreatic enzymes in the parenchyma following rupture of ductules.

Rich showed the relation of the "tubular" lesions of the adrenal cortex to acute infection, described a peculiar focal interstitial form of nephritis that may occur in acquired syphilis, and first noted the obstructing pulmonary arteriolar lesions that occur in tetralogy of Fallot. His description of idiopathic interstitial fibrosis of the lungs was made in conjunction with the clinical observations of Dr. Louis Hamman, and this condition now bears the name "Rich-Hamman disease."

Dr. Rich was the recipient of many honors. In 1954 he was elected a member of the National Academy of Sciences. Prior to that time he was a consultant to the Chemical Warfare Service, to the Surgeon General of the United States Army, and to the Tuberculosis Control Division of the United States Public Health Service. In 1947, Rich received the certificate of honor of the American Academy of Tuberculosis. In 1951, France gave him its top award, making him a Chevalier of the Legion of Honor. He was a committee member of the National Research



Council from 1947 to 1952. In 1951, Rich became the Chairman of the Scientific Advisory Board of the Armed Forces Institutes of Pathology. He was the U.S. Department of State delegate to the International Congress of Allergy, Zurich, at which time he was granted an honorary M.D. by the University of Zurich and was made a fellow of the International Association of Allergists.

Further honors followed. In 1952, Rich was appointed an honorary committee member to celebrate the 50th Anniversary of the discovery of anaphylaxis in Paris. The University of Toronto honored him in 1956 as the man who during the preceding ten years had contributed most toward practical knowledge in medical arts and science. In this year he also became an honorary fellow of the British Royal Society of Medicine. The Kober Medal of the Association of American Physicians was presented to Rich in 1958. Even in his retirement, Rich continued to receive further honors. He was made an honorary Mickle fellow of the University of Toronto, and the Gardner award was given him at this University for his research on the allergic effects of certain drugs. He was presented the Gordon Wilson Medal by the American Clinical and Climatological Association, the Trudeau Medal by the National Tuberculosis Association, an honorary plaque by the Japanese Society of Tuberculosis, the Seaman award by the Association of Military Surgeons, and an award by the American College of Physicians.

The stupendous numbers of honors and awards received by Rich for his work in medical science might suggest that his interests were confined to this field. Not so! His talents were notable in many diverse directions, and it is difficult to separate his scientific from his personal life.

Rich met his future wife, Helen Jones, in 1915, while still at the University of Virginia, through a mutual interest in music. Miss Jones continued her musical education and career and did not marry Dr. Rich until 1925. Mrs. Rich remains a talented pianist and composer. There are two daughters and five grandchildren. The elder daughter is Adrienne Rich, the famous

poetess who, to date, has received twenty prizes and awards for her published works. Cynthia Rich Glauber, four years younger, writes and also teaches creative writing at Harvard University. Both girls received a unique, unconventional classical education from their parents. The Baltimore census did not discover their existence until Adrienne was nearly eleven and Cynthia seven. At this point, the truant officers of the Baltimore School System insisted they attend conventional school. Their placement in a proper class was not facilitated by their ignorance of mathematics, their fluency in languages—modern and classical—and a remarkable appreciation of history, art, and world conditions.

The Rich hospitality was delightful. Dr. Rich enjoyed entertaining his staff members and held many of the Pathology Journal Club meetings in his attractive home. Once the discussion of current journals was completed, Mrs. Rich, aided by her daughters, would treat our group to delicious homemade cakes and potent punch (a secret recipe) and join in the general conversation. Often an informal musicale would follow with Mrs. Rich at the piano, Dr. Rich playing his violin or viola d'amore, and a junior staff member playing a cello or a wood instrument. These sessions were delightful and lasted well into the night: invariably the pathology staff would arrive late for work the following morning. This passed unnoticed by Rich, who abhorred the early morning and whenever possible arrived for work near noon, but remained in his office or laboratory until any hour at night. He enjoyed detaining an associate with him to discuss, in an informal manner, current problems in the department, music, literature, politics, or ethics. Time would pass heedlessly while families at home awaited a delayed supper. The scope of Dr. Rich's interest was unlimited, and he did not limit the time he devoted to others.

Probably the two main nonscientific concerns of Rich were music and literature. He was a member of the Chamber Music group that included the late "Bard of Baltimore," H. L. Mencken, and he enjoyed as well the rich musical environment

offered by the City of Baltimore. He read voraciously in the classics, English, and foreign literature. His sharp critical ability was evident in his analyses of modern writings. He himself wrote with ease, and although his compositions seemed as uncontrived and fluent as his speech, he admitted that he rewrote every sentence innumerable times before satisfied of its clarity. He did thorough research in any subject that drew his interest; his studies on the "Source of the Nile" were almost as extensive as those of Alan Moorehead. One further quality in his writing must be added: he had a delightful sense of humor. This was always apparent in his original presentations, and was exemplified by an elfin twinkle as he read a treatise such as "In Defense of the Double Bed."

Rich was modest, but his vision was wide and clear. He was a free thinker and in two fields was known as a nonconformist. In an era of specialization in the medical sciences, Rich advocated comprehensive knowledge without splintering of activities. His interest in pathology was universal, enveloping all facets of disease. He did not limit his studies to a specific sex, age, or portion of the body. He was proud to be a "general" pathologist.

Rich's nonconformity was apparent in a second direction. His stimulus to work was love of work; monetary rewards were unimportant to him. He urged this precept on his juniors, but unfortunately lost many a staff member who was unable to survive on the meager salary provided by Rich. Government grants were anathema. He would not consider applying for outside funding which might necessitate modification of his work or its direction. As a result, the pathology department, supported entirely by Johns Hopkins funds, remained small during Rich's tenure. This was in keeping with the Rich precepts of quality and excellence which influenced not only his immediate associates but also spread far afield to other institutions and countries. He was responsible for directing many promising students into the specialty of pathology. Arnold Rice Rich will be remembered by them and by his peers in this field as a great pathologist.

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