



*Ross G. Harrison*  
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**ROSS GRANVILLE HARRISON**

**1870-1959**

It is most fitting that this number of *The Yale Journal of Biology and Medicine* should be dedicated to the memory of Ross Granville Harrison. His best known contribution to the field of medical research is the tissue culture method which is now being so importantly applied to the study of disease. This, however, represents but one aspect of his thought and interest in medical problems both at Yale and elsewhere.

Born in Germantown, Pennsylvania, January 13, 1870, he had his early schooling there. Later he attended the public schools in Baltimore and then Marston's University School before matriculating at The Johns Hopkins where he completed his undergraduate work, securing the A.B. degree in 1889. His graduate work at The Hopkins was with Professor W. K. Brooks, a teacher and scholar who left a lasting effect upon Harrison's life. Harrison's respect for Brooks was shown in the care with which he prepared his nerve outgrowth article for the Brooks Memorial Volume of the *Journal of Experimental Zoology*. He was granted his Ph.D. in 1894. During this graduate period Harrison had spent 1892-93 abroad working at Bonn with Professor Moritz Nussbaum. While studying there he met Ida Lange whom he married in 1896. He returned to Bonn and received his M.D. in 1899. As an instructor in the new Johns Hopkins Medical School he carried out his teaching along with the medical study on which his Bonn M.D. was partially based.

His associations with The Hopkins were always closely maintained. He started his teaching with Franklin P. Mall as the head of anatomy and he adopted Mall's method of teaching. He was intimately acquainted with the great, known as the Big Four of the new Medical School, Osler, Welsh, Halsted, and Kelly. In the Department of Anatomy he was associated with Warren Lewis, Florence Sabin, and Lewellys F. Barker in addition to Mall.<sup>1</sup>

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<sup>1</sup> Gertrude Stein was diverted in her quest for medical knowledge by this group; at that time she was working with Florence Sabin on wax reconstruction of the brain and brain stem of the newborn.

Harrison after a year as lecturer at Bryn Mawr returned to The Hopkins to teach histology and embryology from 1896-1907 and was Associate Professor of Anatomy from 1899-1907 when he came to Yale as Bronson Professor of Comparative Anatomy. In his early years of teaching at Yale, Lewis Weed, later Dean of The Hopkins Medical School, and Stanhope Bayne-Jones, later Dean of the Yale School of Medicine, were his students as undergraduates.

Harrison's official relation with the Medical School during his first days at Yale is not immediately apparent. Probably the duties of building the Osborn occupied all of his spare time for he was conscientious about inspecting the construction of the building each day. His contacts in the Medical School, however, were numerous. George Blumer and Joseph Flint were Hopkins acquaintances and H. B. Ferris and Yandell Henderson both were friends. As given in the minutes of the Board of Permanent Officers, Harrison was sitting on the Board on October 20, 1914. At that time the pre-clinical work was given in the York Street building. A committee of the Medical Faculty was set up to consider moving anatomy to the Osborn, thus releasing sorely needed space for physiology and pharmacology.

By this time two of Harrison's Ph.D. students were instructing in the Department of Anatomy: Davenport Hooker, later Professor of Anatomy at the University of Pittsburgh, and H. Saxton Burr, now E. K. Hunt Professor of Anatomy Emeritus. S. R. Detwiler (former Professor of Anatomy at College of Physicians and Surgeons) and L. S. Stone, Bronson Professor of Comparative Anatomy, also have served the School. Harrison always felt that his students should know morphology and that taking human anatomy was the best way to acquire it. It served well for many anatomy departments throughout the country. The contributors to this memorial issue are a part of the Osborn Zoological Laboratory supply of anatomists trained under the Harrison regime.

Anatomy was not moved to Osborn; it was easier for the anatomists to go to the York Street Medical School where 'Pop' Ferris gave his wonderful lectures, broadly comparative in their scope and content. The medical students went to the Osborn for their embryology with Harrison and Reynald Spaeth.

Dr. Harrison had a large share of medical committee work and served at one time or another on 16 of these Committees. He was usually on every committee dealing with appointments, among these Milton C. Winternitz's to the chair in pathology and later to the Deanship. He remained a member of the Board of the Childs Fund after his retirement and was also a Trustee of the Rockefeller Institute.

His relationship to medicine was maintained on a national scale. He was in constant touch with Abraham Flexner during the crusade to better medical training and education and to a lesser degree with Simon Flexner, then director of the Rockefeller Institute, with whom he had become acquainted at The Hopkins. Both Flexners, and many others during his lifetime, greatly appreciated his ability to think things through to a logical end.

After retiring from Yale, he was Chairman of the National Research Council from 1938 to 1946. During this period the function of that body changed from peripheral adviser to government agencies on issues in which information was requested to an operating agency which sought to make the agencies aware of what scientists could do for government agencies' problems. Since science was doing most unusual things in connection with World War II, the entire focus of the importance of scientists as a group was intensified to a large extent through the efforts of Dr. Harrison and Dr. Jewett, then president of the National Academy of Sciences. This pair of minds cooperated in some of our major national policy decisions.

Harrison was appointed to the Science Committee of the National Resources Planning Board, one of the most progressive of the Government agencies. Headed by Mr. Delano with Dr. Elliot as Executive Secretary, it was a real working body with first-rate minds operating at high levels. The part of their planning which was to have tremendous significance had to do with the budgeting of manpower for the military. This led to an allocation program which the military were loath to accept, for it recognized that scientists could serve their country in modern warfare crises better when not in uniform and not subject to petty military restriction. The idea of the necessity for civilian national universal service instead of universal military service was at least partially accepted in Washington during this period. Without its acceptance even though reluctant, the Manhattan Project could not have been completed. In a large measure this was due to the forces, political and otherwise, that were advanced by the National Resources Planning Board. It remained a Policy Board throughout its existence and was politically smothered only after it had rendered a remarkable national service. Its Science Committee functions were taken over by the Office of Research and Development, the Manhattan Project, and the National Research Council. All these became operating agencies and, while there was not always the bilateral give and take between these groups that there should have been, Dr. Harrison and Dr. Jewett managed to coordinate both the information and the advances of the first two and to supplement them wherever possible.

At this time the lifeline of science was nearly broken by the college presidents' acceptance of an unwise call for universal sacrifice at the college

level. The Science Committee and the National Research Council working through Selective Service and the War Manpower Commission did much to avert the damage which would have resulted from the interruption of the training of scientists. In this, the cooperation of General Hershey, the head of Selective Service, was outstanding for he not only understood the problem, but with typical Hoosier craftiness invented the mechanisms by which scientists could continue their training, thereby maintaining a manpower reservoir which was so valuable during the last World War.

Dr. Lewis Weed was then Chairman of the Medical Division of the National Research Council. General Stanhope Bayne-Jones was in control of the Surgeon General's Office of Research. Through these men Harrison was in constant touch with the national picture of medical care not only for the armed forces but also for civilian needs. The production of penicillin in large quantities in this country was arranged through channels which had their origin with Harrison. Robert Coghill accomplished this with scientists from Dr. Howard Florey's laboratory working at the Peoria Laboratories where was produced a supply increasing in quantity during the entire war period. It was likewise due to Harrison's influence that Dr. Keefer was appointed to ration this antibiotic to take care of critical areas, both military and civilian. The supply, while limited, was utilized as completely as possible. Harrison also assisted the office of Medical Procurement by supporting their contention that medical personnel, which was in short supply, be utilized in the regions of greatest need where they could serve to greatest advantage.

Wherever Harrison touched medicine, whether through advice, teaching, training anatomists, or administration of war problems directly related to medicine, his contact made for professional betterment. It is, however, through his research that he made his greatest contribution to medicine, for the method which he evolved for the solution of the problem of nerve outgrowth was and is proving of the greatest value. The demonstration of the nerve origin changed the whole line of thought in neurology. The physiological integrity of the neurone rests upon the embryological facts which he demonstrated. The method itself is being used successfully in the present period in many fields. A Nobel prize was awarded for a modified application of his method, the growing of monkey kidney cells in quantity in tissue culture, which made the Salk vaccine possible on a commercial scale.

His later work is just as remarkable although it is not yet being applied to medical problems. This is the result of the same sort of critical planning; it led to the discovery of the rules which govern asymmetry. To those of us who have had the privilege of studying with him he passed the knowledge of the way the organism must be approached if questions are to receive definite

answers. It has sharpened the focus of our thought and has made us think of structure and function at molecular levels. His paper with Astbury shows that this approach to the asymmetry problem was very much in his thinking and, while the condition of preparation of his material did not present critical X-ray diffraction patterns, it was a step toward the current manner of investigation and showed that this is a possible method of attacking changes in molecular structure.

Dr. Harrison was a modest man, and the many honors which came to him in recognition of his work were received with such reticence that they were unpublicized. When he received his first Sc.D. from the University of Cincinnati in 1920 he said on opening the notification that this was his first realization of the aging process. This award was to be followed by many more: Dr. Phil. Nat., Freiburg; Sc.D., Michigan; Sc.D., Dublin; M.D., Budapest; Sc.D., Harvard; Sc.D., Yale; Sc.D., Columbia; LL.D., Hopkins; Sc.D., Chicago; and Dr. Rer. Nat., Tübingen.

He served as the only American president of the Anatomische-Gesellschaft and presided at the Königsburg meeting in 1937. In this country he was president of the Anatomists (1912-14), Naturalists (1913), Zoologists (1924), and Growth Society (1946-47). He was Chairman of the National Research Council (1938-46). His touch with science abroad was constantly maintained through his society memberships. These included the Royal Netherlands Academy of Sciences, the Norwegian Academy of Sciences, Accademia Nazionale dei Lincei, Royal Physiographic Society of Sweden, The Royal Society London, Royal Societies of Sciences, Uppsala and Stockholm, and the Zoological Society of London. He was a foreign associate of the Académie de Médecine Paris and correspondent of the Académie des Sciences, Institut de France. Among his honorary memberships is that of the Connecticut State Medical Society.

Three medals were presented to him: the Archduke Rainer Medal of the Imperial Royal Botanische-Zoologische Gesellschaft, Vienna; the John Scott Medal and Premium of the City of Philadelphia; and the John J. Carty Medal of the National Academy of Sciences, U.S.A. Two other major honors must be recorded. He was the first American zoologist to be voted the Nobel Prize. It was never awarded since The Caroline Institute ruled that no awards be made in Physiology and Medicine during World War I (1914-18) and since the vote was in 1917, the award was never made.<sup>9</sup> In 1956, however, Dr. Harrison was awarded the Antonio Feltrinelli International Prize by the oldest of the academies, the Accademie Nazionale dei

<sup>9</sup> See *Nobel, the man and his prizes*, page 245, for the account of this action. Univ. of Oklahoma Press, 1951.

Lincei. This came after he was incapacitated by injuries sustained in an accidental fall from which he unfortunately never fully recovered.

He died on the last day of September 1959. It is seldom that one man can attain such true greatness. Every major effort was constructive and conspicuously successful. His contribution to biological thought is equivalent to that of Einstein or Planck in other branches of science.