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THE SOUTH'S CONTRIBUTION TO SCIENCE[1]

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THE general impression has been that most of the scientists of the United States have come from the northern and eastern sections, with the exception of a few, who have come from the western part of the country. On careful investigation, however, it was discovered that a great number of distinguished men of science have come from the South. There are perhaps two main reasons for such an erroneous impression: (1) the after-effects of the Civil War, and (2) the accumulation of the wealth of the nation in the northern and eastern parts of the country. Since war has a tendency to suppress the normal development of the conquered land, we might have expected that progress of all sorts, especially scientific progress, would have been delayed. And since many recent scientific achievements have come from institutions which have had the necessary capital for materials and equipment, it would be quite logical to think that the lack of wealth in the South would have had a curbing effect on interest in science. But regardless of the Civil War and this centralization of wealth of the nation, there have been many investigators of the South who have merited national and, in some instances, international recognition.

Since this paper is an attempt to give a brief survey of the whole South's contribution to science, of course, only some of the most important efforts can be included. I shall mention not only contributions made by men who were born and wholly educated in the South, but I shall mention also the scientific labors of those who were born and even educated in the North, but who were undoubtedly strongly influenced through teaching or living in the South.

This study naturally begins with the consideration of that well-known, beloved friend of birds, John J. Audubon, of Louisiana (1780–1851). He painted pictures of birds during his leisure hours and, since he was a poor man, he had to make several business

[1] Address of the retiring president of the Alabama Academy of Science, University, Alabama, March 13, 1931.

ventures in order to obtain enough money to continue his ornithological work. At first, he represented the birds suspended as dead game, but later portrayed them in life-like positions. In 1826, he sailed for England and Scotland and during a three-year stay secured enough subscribers to warrant the publication of his work. His pictures of the birds were life size and naturally attracted wide attention. It took about ten years to engrave and print the "Birds of America" and the "Ornithological Biography," the two works which contain Audubon's chief contributions. Audubon was noted for his simplicity, kind-heartedness, love of nature, love of youth and friendliness to humanity. In spite of many hardships, poverty and want, Audubon persevered until success crowned his efforts.

In the field of botany Alabama has given us an investigator, B. M. Duggar, who has been actively engaged in teaching and research for thirty-five years. During this time he has served two Southern universities and is at present located at the University of Wisconsin. He is the author of three works and has reported many articles on research. He has been editor of one journal and is assistant editor of another at present. Another botanist, W. H. Brown, of Richmond, Virginia (professor of botany at the University of the Philippines from 1915 to 1924), should be mentioned. He was plant physiologist of the Bureau of Science, Manila, from 1911 to 1923, and has been the director since 1924. He is the author of four works and numerous botanical publications. Brown has been editor of the *Philippine Journal of* Science since 1924.

Zoology, often associated with botany, is a subject that has not been neglected by Southerners. W. K. Brooks, of Cleveland, Ohio, born 1848 and died 1908, was professor of zoology at Johns Hopkins from 1877 until his death. He spent several summers studying the fauna in North Carolina and in Virginia, and was quite influential in the cultivation and development of the oyster industry. H. H. Newman, of Alabama, was professor of zoology and embryology at the University of Texas from 1908 to 1911, and has been professor of the same subjects at the University of Chicago since the latter date. He served as dean of the colleges of science at the University of Chicago from 1915 to 1922. He is the author of several works and is especially noted for his investigations on twins and twinning. Newman is editor of "The Nature of the World and of Man." Another distinguished zoologist is T. H. Morgan, of Kentucky, who directed the work that has led to the discovery of the mechanism of heredity. He has published numerous papers on various phases of heredity. Yet another famous zoologist is R. E. Coker, of South Carolina, who received all his training in the South, served in various capacities with the U. S. Bureau of Fisheries from 1900 to 1922. He has been professor of zoology at the University of North Carolina since 1922. He is the author of various reports and papers relating to barnacles, turtles, oyster culture and mussels.

It was South Carolina that gave us an eminent naturalist, W. Ravenel, who became connected with the U. S. Fish Commission in 1883, and has served in several responsible posts. He has been secretary of the Smithsonian Institution and has served as director of arts and industries in the U. S. National Museum since 1925.

A paper of this kind would not be complete without mentioning Eugene A. Smith (1841–1927), of Autauga County, Alabama, who was the second state geologist of Alabama and served from 1873 until his death. He was trained as a chemist and, in fact, taught chemistry at the University of Mississippi for three years before coming to the University of Alabama in 1871 as professor of geology and mineralogy. Beginning with the year 1874, he taught chemistry also and continued working with three subjects until 1890. He was made professor emeritus in 1913 and thus was able to devote all his time to the geological survey of Alabama. He was responsible for the location of cement and other industrial plants in his state. Smith was an interesting writer, and his bibliography contains over one hundred entries. Another geologist, T. W. Vaughan, of Jonesville, Texas, graduated from Tulane in 1889. He was engaged in geologic and paleontologic researches with the U. S. Geological Survey for twenty-nine years. He was geologist in charge of coastal plain investigations from 1907 to 1923 and has been senior geologist since 1924. Vaughan has been director of the Scripps Institution of the University of California, La Jolla, California, since 1924. He is the author of several works and has published numerous articles on geology, paleontology, oceanography and recent corals.

The field of chemistry seems to have been quite attractive to the youth of the South, as several distinguished investigators have come from this section. Charles Baskerville (1870–1922), of Noxubee County, Mississippi, was one of those inspired individuals. He received his education from four Southern universities and taught at the University of North Carolina for several years. In 1904 he moved to New York; there he became director of the chemical laboratory of the College of the City of New York and held this position until death. His earlier researches were with the rare earths, and he discovered the chemical elements, carolinium and berzelium. Baskerville was a leader in the American Chemical

Society, especially in the New York section. B. B. Ross (1864–1930), of Tuskegee, Alabama, is well known to many of us as an inspiring teacher and chemist. Ross received his first experience as a teacher at Louisiana State University from 1887 to 1893. He served as state chemist and professor of chemistry thirty-seven years. He served Auburn as dean of science for twenty-two years. Ross made numerous contributions on the chemistry of sugars and the analysis of fertilizers. Another eminent chemist, H. C. Jones (1865–1916), of New London, Maryland, received his education in the South and taught physical chemistry at Johns Hopkins from 1895 until his death. Being an untiring investigator, he published many articles, among which were several on absorption spectra of solutions, viscosity of solvents and conductivity of salts and acids. Jones was associate editor of three chemical journals. Ira Remsen (1846–1927), of New York, N. Y., became professor of chemistry at Johns Hopkins in 1876, and was director of the chemistry laboratory for thirty-two years. He later became president of that institution and served in that capacity for one year; he was made president and professor emeritus in 1913. Remsen had the honor of being president of several scientific bodies, among which was the National Academy of Sciences from 1907 to 1913. After receiving his education in the South, W. R. Orndorff (1862–1928), of Baltimore, Maryland, became professor of chemistry at Cornell and taught both organic and physiological chemistry at that institution until his death. Orndorff contributed numerous articles of original research to several of the chemical journals.

There are certain living chemists whom it would be interesting to discuss fully; however, for the purpose of this paper it is sufficient to give only a partial list of their contributions. C. H. Herty, of Georgia, taught chemistry at his state university and at the University of North Carolina. He is known for his original investigations, especially those on the collection of turpentine and pitch from the pine trees; he is noted, too, for his contributions to the paper industry. He was editor of the *Journal of Industrial and Engineering Chemistry* for several years. Herty is a past president of the American Chemical Society. J. F. Norris, of Maryland, was professor of chemistry at Vanderbilt University for a short period and has been professor of chemistry at the Massachusetts Institute of Technology since 1916. He has written text-books and is the author of numerous papers on chemical subjects. Norris also is a past president of the American Chemical Society. H. C. Sherman, of Virginia, has been professor of chemistry at Columbia since 1905. He has contributed largely to the chemistry of food and nutrition. Sherman is a past president of the American Society of Biological Chemists. S. C. Lind, of Tennessee, served as physical chemist of the U. S. Bureau of Mines for several years and then as chief chemist. He has been director of the school of chemistry, University of Minnesota, since 1926. He is assistant editor of two chemical journals. Lind has received the Nichols Medal for his work on chemical activation by alpha particles. C. S. Hudson, of Georgia, is chief chemist of the U. S. Bureau of Standards. Hudson has received the Nichols Medal and the Willard Gibbs Medal for his researches on the structure of sugars. G. W. Carver, of Missouri, who was awarded the Spingarn Medal in 1923, is director of the department of agricultural research, Tuskegee Institute.

It is interesting to note that the first professor of physics at Johns Hopkins, Henry A. Rowland (1848–1901), of Honesdale, Pennsylvania, received his appointment on the same day that Remsen was made professor of chemistry at that institution. Rowland remained in the chair of chemistry for a quarter of a century and became famous because of his work on the mechanical equivalent of heat. G. B. Pegram, of North Carolina, has been professor of physics at Columbia University since 1909. He has been dean of the School of Mines, Engineering, and Chemistry since 1918 at the same institution. Fred Allison, of Virginia, has recently announced the discovery of element 87. Allison has been professor of physics at Alabama Polytechnic Institute for several years.

The science of mathematics is closely associated with physics and Archibald Henderson, of Salisbury, North Carolina, has been connected with his alma mater, his state university, most of the time since 1899, and has been head of the department of mathematics since 1920. And R. D. Carmichael, of Goodwater, Alabama, is one of the representatives of that field who should not be overlooked. He has taught at the University of Indiana and the University of Chicago, and has been professor at the University of Illinois since 1915. Carmichael has been associate editor and editor of two mathematical journals and has been a constant contributor of original articles.

Again, it is Alabama that has given a noted son, W. L. Sibert, who served as engineer in charge of the eastern part of the Isthmian Canal. He built the Gatun Locks and Dam and excavated the channel from Gatun to the Atlantic Ocean. He was chief engineer of the Mobile Docks, which were recently completed. During the World War, Sibert organized the Chemical Warfare Service and became the director. M. S. Sloan, of Mobile, Alabama, received his education at Alabama Polytechnic Institute and has served in various capacities as engineer for several

electrical concerns and is president of the Brooklyn Edison Co., Inc. W. H. Browne, of Baltimore County, Maryland, received his education in the South and did consulting work in electrical engineering for several years. He taught electrical engineering at Nebraska and Illinois and then in 1908 became professor of this subject and physics at North Carolina State College, where he has been head of the department of electrical engineering since 1916. A. S. Langsdorf, of St. Louis, received his training at Washington University. He was called to the chair of electrical engineering at the same school in 1901. He was appointed dean of the school in 1910 and served in that capacity for ten years. Langsdorf has been director of the department of industrial research at Washington University since 1926.

The accomplishments of inventors do not pertain to any one branch of scientific endeavor; yet it is interesting to note that the South had a marked influence on Eli Whitney, the Yankee schoolmaster from Massachusetts. Whitney had never seen a cotton seed until he came to Georgia to tutor some children. When he arrived, the position had been filled. He then accepted the invitation of the widow of General Nathanael Greene to make her place at Mulberry Grove his home while he studied law. Since he had shown his mechanical ability in other matters on previous occasions, Mrs. Greene asked Whitney to help devise some mechanical means of separating the cotton wool from the cotton seed. Whitney built the first cotton gin and later patented it.

In the multiple field of the medical sciences, there have been so many great men that the logical order of review becomes a problem at this point. It has long been considered that anatomy should come first, due to seniority, if not to alphabetical place, and we shall accept it as our first topic of the medical sciences. W. E. Horner (1793–1853), of Warrenton, Virginia, served as army surgeon in the War of 1812 and later practiced medicine for a short while in his home town. He became prosector of anatomy in the University of Pennsylvania, and finally accepted the chair of anatomy in the same institution. He discovered the *tensor tarsi muscle* which bears his name, and contributed several original papers on anatomical subjects. Next we shall take up the study of the contributions of John D. Godman (1794–1830), of Annapolis, Maryland. He practiced medicine in his state and in Pennsylvania. Godman taught anatomy in three schools, one of them being the University of Maryland. He became the editor of the *Western Quarterly Reporter of Medical, Surgical, and Natural Sciences,* the first medical journal to be published west of the Alleghenies. Godman also assisted in editing the *Philadelphia Journal of Medical Sciences.* We might add the name of Jeffries Wyman (1814–1874), of Chelmsford, Massachusetts, even though he spent the major portion of his scientific career at Harvard, his alma mater. A few years after graduating he accepted the chair of anatomy and physiology at Hampden-Sidney College, Virginia. Wyman was another prolific writer and wrote over two hundred articles.

There are several living anatomists who should be included in this paper. Charles R. Stockard, of Mississippi, has edited three journals and has personally been a constant contributor. Stockard has been professor of anatomy at Cornell for twenty-two years. Irving Hardesty, of North Carolina, has been professor of anatomy at Tulane for the same length of time. Hardesty has published numerous papers on the nervous system. Ross G. Harrison, of Pennsylvania, taught anatomy at Johns Hopkins for eleven years and has been at Yale for twenty-four years as professor of anatomy and biology. His name is usually connected with the work on the growth of nerve fibers. He has edited the *Journal of Experimental Zoology* since 1903. Warren H. Lewis, of Connecticut, has been professor at Johns Hopkins since 1904. He has been research associate at the Carnegie Institution of Washington since 1919, and has published many articles.

Since surgery is so closely associated with anatomy, it is fitting to discuss it next. Regardless of time or place, the great southern gynecologist, Ephraim McDowell (1771–1830), of Rockbridge County, Virginia, stands second to none among surgeons He was educated in the South except for the part of his medical work which he took in Edinburgh. He practiced medicine in Danville, Kentucky, and in 1809 he successfully performed the operation for extirpation of the ovary, the first on record, and in consequence he acquired European celebrity. He performed this operation thirteen times, and had eight recoveries. His first patient lived for thirty-three years after the operation. To McDowell has been given the credit for putting ovariotomy upon a permanent basis. James Marion Sims (1813–1883), of Lancaster County, South Carolina, settled in Alabama and became interested in operative gynecology. He is noted for his contributions to uterine surgery, both mechanical and operative, his name being associated with the peculiar lateral posture, which he employed during his examinations, Sims' position. He is especially remembered for his success in operating for vesicovaginal fistula. He was the founder of the State Hospital for Women in New York. The work of Sims was continued by his able assistants, Thomas A. Emmet, of Virginia, and Nathan Bozeman, of Alabama.

There are several other gynecologists who have made worthy efforts that deserve mention. John King, of South Carolina, in 1816, operated successfully in a case of abdominal pregnancy and saved the life of both the mother and child. He is the author of the first book on "An Analysis of the Subject of Extra-uterine Foetation, and of the Retroversion of the Gravid Uterus." William Baynham (1749–1814), of Virginia, operated twice for extra-uterine pregnancy and was successful in both instances. Josiah Clark Nott (1804–1873), of Columbia, South Carolina, in 1844 described the condition which was later called coccygodynia. He was one of the first to suggest the "mosquito theory" in reference to the transmission of yellow fever, some fifty years before Reed and his commission assembled in Cuba. We, of Alabama, feel grateful to Nott because he was instrumental in organizing the Medical College of Alabama at Mobile, which was the forerunner of our present School of Medicine. T. G. Thomas, of South Carolina, performed the first vaginal ovariotomy in 1870. Robert Battey, of Georgia, in 1872, was the first to suggest the excision of the uterine appendages for such non-ovarian conditions as neuroses and painful menstruation. F. C. Hammond, of Georgia, has served both as professor of gynecology and as dean of the medical department, Temple University. To McDowell and Sims, however, goes the credit for founding modern operative gynecology. Another surgeon, William Gibson (1788–1868), of Baltimore, Maryland, finished his education at Edinburgh. He was the first to successfully perform the Caesarean operation twice with success to both mother and child on the same patient, the patient living for fifty years after the first operation. His son, Charles Bell Gibson, became professor of surgery in two Southern schools and was made surgeon-general when the state of Virginia seceded.

Anesthesia was introduced in cases of surgery by Crawford W. Long (1815–1878), of Danielsville, Georgia, who noted the anesthetic effects of ether and used it quite extensively in surgery during 1842 and 1843. He was not aggressive and ambitious and did not publish his results. Documentary evidence, however, has been found which clearly proves that Long was the originator of anesthesia in surgery.

Samuel D. Gross (1805–1884), of Easton, Pennsylvania, was professor of surgery at Louisville for sixteen years before going to Jefferson Medical College in 1856. He invented new instruments and introduced deep stitches in wounds of the abdominal wall. He was an interesting writer, and we are especially indebted to him for his biographies of some of the leading medical men. Gross wrote also a system of surgery in two volumes.

John A. Wyeth (1845–1922), of Missionary Station, Alabama, received his medical training at the University of Louisville. He organized and founded the first postgraduate medical school in the United States, the New York Polyclinic Medical School and Hospital. Wyeth was the first professor of surgery and president of the faculty.

Due to the breadth of the field that I have undertaken to cover, I can only list briefly the names and accomplishments of a few more of the Southern surgeons who have originated some particular method or technique. Charles McCreary, of Kentucky, was the first to excise the clavicle in an operation performed in 1813. Milton Anthony, of Georgia, excised the fifth and sixth ribs with a portion of gangrenous lung in 1821. Paul F. Eve, of Georgia, removed a large fibrous polyp from the base of the cranium in 1836. John M. Carnochan, of Georgia, removed the ulna with preservation of the arm function in 1853. J. T. Hodgen, of Kentucky, devised instruments and suspension splints for fracture of the femur and forearm that are still in use.

Another branch of medical science, pharmacology, has attracted a few men. Arthur S. Loevenhart (1878–1928), of Lexington, Kentucky, served as professor of that subject at two universities and as chief pharmacologist of the research division, Chemical Warfare Service, American University, in 1918. Loevenhart served as associate editor of the official organ of his field. Physiology is one of the sciences that is so closely associated with pharmacology that some schools include both subjects in one department. An investigator who has been professor of both subjects is W. D. Cutter, of New York. Cutter taught at the University of Georgia for several years. He has served as dean of the New York Post-Graduate School and is now dean of the School of Medicine of the University of Southern California. Henry Sewall, of Virginia, taught physiology for twenty-six years and is professor emeritus of the University of Colorado. Sewall has recently been awarded the Kober Medal for research work in tuberculosis. W. H. Howell, of Maryland, who has been on the faculties of three universities and been dean of the medical faculty of Johns Hopkins, is at present director of the School of Hygiene of the same university. Howell is a recognized leader in the field and was so honored at the Thirteenth International Physiological Congress in 1929. Isaac H. Manning, of North Carolina, has been professor of physiology at the University of North Carolina since 1901 and dean since 1905.

There is another branch of the sciences that has long been associated with physiology, but which has been given recognition as an individual subject only in comparatively recent years. I have reference to

biochemistry or physiological chemistry. I shall begin with Victor C. Vaughan (1851–1930), of Mt. Airy, Missouri. He taught chemistry in the department of medicine, University of Michigan, for thirty years and served as dean for an equal period. Vaughan is known for his work on poisonous alkaloids, ptomaines and cellular toxins. Walter Jones, of Maryland, was professor of physiological chemistry at Johns Hopkins from 1895 to 1927, at which time he was made professor emeritus. Jones has been an untiring investigator in nuclear chemistry. William J. Gies, of Maryland, taught at Yale and Columbia and was made professor emeritus of Columbia in 1929 after thirty-one years' service. He was secretary of the faculty of the College of Physicians and Surgeons from 1905 to 1921. He was the founder and editor of the *Proceedings of the Society for Experimental Biology and Medicine.* Gies has been assistant editor and editor of four other journals, and has contributed numerous original articles. P. A. Shaffer, of West Virginia, has been professor of biochemistry at Washington University since 1910 and was dean of the faculty of medicine from 1915 to 1919. J. F. McClendon, of Alabama, has been associated with the department of physiological chemistry at the University of Minnesota since 1914, and has been professor since 1920.

There are several pathologists of the South who have not only influenced the medical sciences by their own personal investigations but have also been influential because most of them have been directors of scientific institutions. Simon Flexner, of Kentucky, has taught at two universities and has been director of the Rockefeller Institute for Medical Research since 1903. Flexner's researches include work on venoms and various bacterial and pathological subjects. W. H. Manwaring, of Virginia, received his early training at the University of Chicago and then became connected with Indiana University and later with the Rockefeller Institute. Manwaring has been professor of bacteriology and experimental pathology at Stanford University since 1913. David Marine, of Maryland, who has been teaching at Columbia University, recently received the gold medal of the New York Academy of Medicine for his researches into the structure, function and diseases of the thyroid gland. Eugene L. Opie, of Virginia, served as professor and dean of Washington University, School of Medicine, and has been director of the department of pathology at the University of Pennsylvania for eight years. Newton Evans, of Missouri, taught pathology at the University of Tennessee and at the College of Medical Evangelists. Evans is dean at the latter institution. Milton C. Winternitz, of Maryland, was professor of pathology at Johns Hopkins and at Yale and has been dean of the School of Medicine at Yale for eleven years. Wade H. Brown, of Georgia, taught at two Southern universities before becoming connected with the Rockefeller Institute for Medical Research. William A. Evans, of Alabama, was professor at the University of Illinois for several years and is now professor of sanitary science at Northwestern University Medical School.

The men interested in medicine, clinical medicine and preventive medicine have been rather numerous, and it was a difficult task to select the individuals whom I shall discuss but briefly. Nathaniel Chapman (1780–1853), of Virginia, was professor of clinical medicine at the University of Pennsylvania for several years. He founded and edited the *Philadelphia Journal of the Medical and Physical Sciences,* later the *American Journal of the Medical Sciences.* Chapman was the first president of the American Medical Association. The cultivation of all three species of malaria was performed by C. C. Bass, of Mississippi, who has received several gold medals for his researches. Bass has served as professor of experimental medicine, director of the laboratory of clinical medicine and dean at the College of Medicine, Tulane. Manfred Call, of Virginia, a former dean at the Medical College of Virginia, is professor of medicine at the same school. James C. Flippin, of Virginia, another teacher of clinical medicine, served the University of Virginia as professor and is dean of the department of medicine. John N. Simpson, of West Virginia, organized the School of Medicine, West Virginia University, and became professor of medicine and dean. Robert Wilson, of South Carolina, has been associated with the medical college of his state since graduating in 1892. Wilson has been professor of medicine for twenty-seven years and dean for twenty-three years. Ross V. Patterson, of Louisiana, has been professor of medicine and dean of Jefferson Medical College for fifteen years. James S. McLester, of Alabama, was formerly professor of medicine at the Birmingham Medical College and has had the same title at the University of Alabama for twelve years. George C. Robinson, of Maryland, has been professor of medicine and dean of Washington University, Vanderbilt University and Cornell University. M. P. Ravenel, of South Carolina, has been professor of medicine at the University of Missouri and the director of the Public Health Laboratory since 1924. Alan M. Chesney, of Maryland, is another individual who has risen from the ranks in his alma mater. Chesney has been dean of Johns Hopkins since 1929. W. S. Leathers, of Virginia, was dean of the Medical School, University of Mississippi, for

twenty years and has been professor of preventive medicine, Vanderbilt University, since 1924.

I shall mention only a few representatives in some of the other medical sciences. Frank Vinsonhaler, of Missouri, has been professor of ophthalmology at the University of Arkansas since 1893 and is at present dean of the medical school. James M. H. Rowland, of Maryland, has been professor of obstetrics at the University of Maryland and dean of the Medical School since 1915. Henry A. Christian, of Virginia, has been professor of the theory and practice of physic for more than twenty years at Harvard. He served as dean of the same school for four years. In addition, Christian has been physician-in-chief to Peter Bent Brigham Hospital for twenty years. W. McKim Marriott, of Maryland, began his training as a biochemist at Washington University, but changed to pediatrics when called to Johns Hopkins. He later returned to Washington University as professor of pediatrics, and has been dean for several years. W. H. Frost, of Virginia, formerly with the Hygienic Laboratory at Washington, D. C., has been connected with the United States Public Health Service since 1913.

There have been some men, born in other places than the South, who have taught in the South and who should be listed in a paper of this nature. Certainly this report should contain the name of Sir William Osler (1849–1919), of Tecumseh, Ontario, who taught at Johns Hopkins from 1889 to 1905. Osler is noted also for his writings and is particularly remembered for certain of his biographical essays, one of which is "The Alabama Student," a portrayal of the character of Dr. John Y. Bassett, of Huntsville, Alabama. William H. Welch, of Connecticut, was professor of pathology at Bellevue Hospital Medical College from 1879 to 1884 and for the next thirty-two years at Johns Hopkins. Welch was dean of the medical faculty from 1893 to 1898, and was director of the School of Hygiene and Public Health from 1916 to 1926. Since 1926 Welch has been professor of the history of medicine at Johns Hopkins. William S. Thayer, of Massachusetts, was professor of clinical medicine at Johns Hopkins for several years and is professor emeritus of the same institution. Thayer has been a thorough investigator, and he made the first clinical notation of the third sound of the heart in 1908.

In order to show you further that the South has played a great part in furnishing directors for scientific groups, I shall make use of some statistics concerning the present deans of the medical sciences. The recent standard references list sixty-three of the seventy-five deans, and twenty-nine of these were influenced by the South to the following extent: Three were born in the North and received the doctor's degree in the South; six were born in the North and received the doctor's degree in the South and taught in the South before becoming deans; nine were born in the South and educated in the South, except for the work for the doctor's degree; eleven were born in the South and wholly educated in the South.

I know of no more fitting close for this paper than to summarize the works of the Southerners who played the principal part in the suppression of yellow fever. Virginia gave us the leader of this series of great scientific achievements, Walter Reed (1851–1902), who received his medical training in his state university. He was promoted to full surgeon with the rank of major in 1893 and became professor of bacteriology in the newly organized Army Medical School. Reed went to Cuba in 1900 as president of a commission to study yellow fever. The theory had been advanced by Josiah Clark Nott in 1848 that a mosquito was the agent for the transmission of the disease, but there was no scientific evidence in support of it. Reed determined to study the effect of the bite of the mosquito. Two of the commission and several enlisted men volunteered to submit to this experiment. Dr. Jesse W. Lazear (1866–1900), of Baltimore, who had offered himself as one of the first volunteers, succumbed to the fever, and his death was the only fatality during the experiments. Another one of the commission, James Carroll, suffered a very severe attack of the fever, but recovered.

The prevention of the disease was left to the chief sanitary officer in Havana, Major William Crawford Gorgas (1854–1920), of Mobile, Alabama. In less than seven months, Havana was free from the stegomyia mosquito, which had infested it for one hundred and fifty years. Gorgas was appointed the chief sanitary officer of the Panama Canal in 1904, and a member of the Isthmian Canal Commission in 1907. Due to his sanitary measures, it was possible to complete the canal, a project which France had failed to accomplish because of the ravages of yellow fever and other tropical diseases. Gorgas was made surgeon-general in 1915 and continued his sanitary work until his death. He was the recipient of several medals and his work was recognized by kings and governments throughout the world.

The above investigators, whom I have briefly mentioned, can be only an indication as to the type of scientist the South has produced or influenced. And this paper is but a short discussion of Southern men of science whose lives and works have become familiar to the writer through personal communication and through reading.