

a history of medicine in pictures

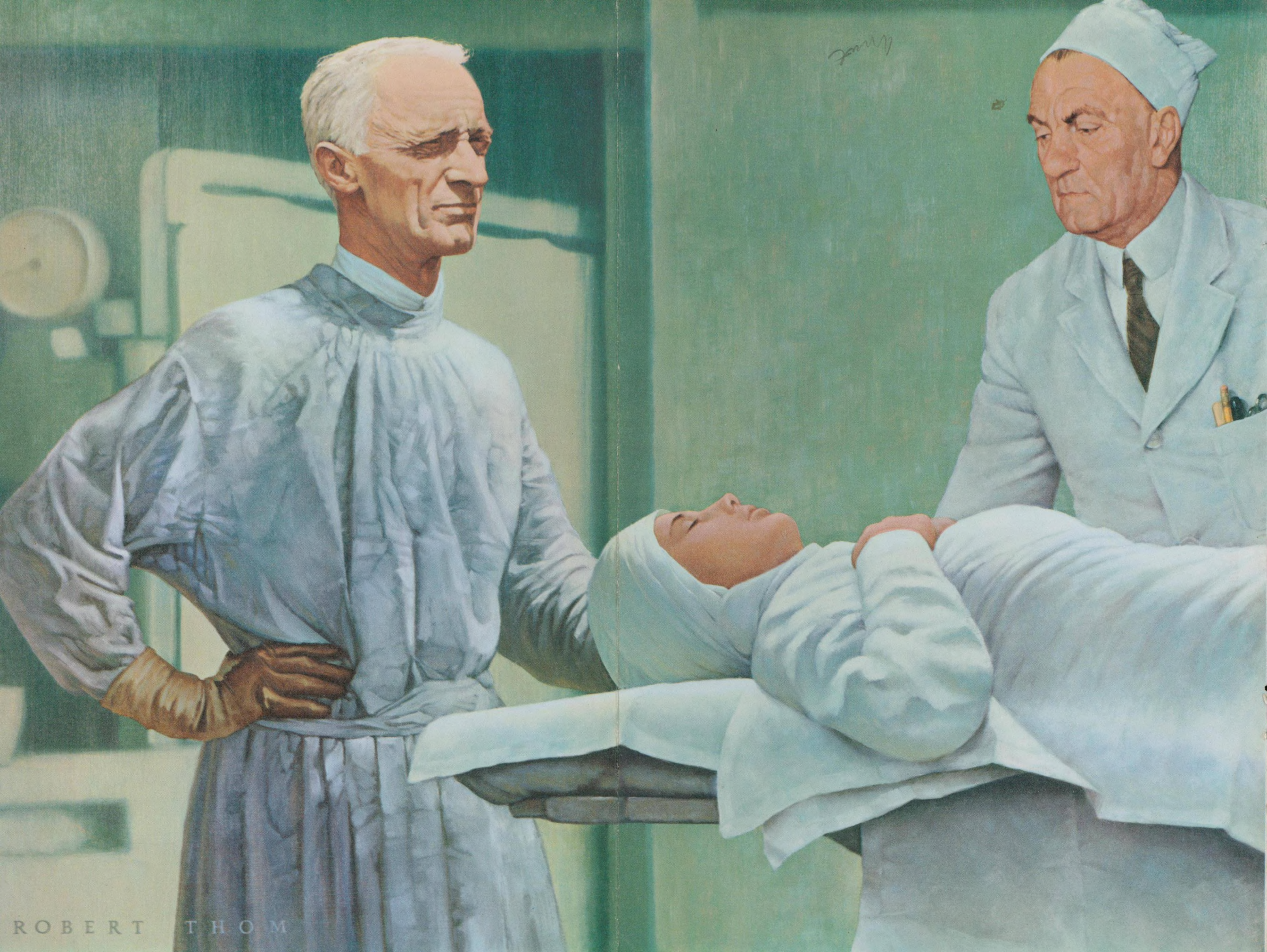
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Harvey Cushing and Neurosurgery

OPERATIONS on the skull provide the oldest evidence of surgical procedures of which there is record. Yet, because of inherent technical difficulties and high mortality risks, surgical conquest of diseases of the brain and nervous system was slow to develop. Not until the twentieth century was there sufficient knowledge of the anatomy and of the functioning of these vital areas to encourage any but the boldest surgeons to invade these tissues; and, with discouraging regularity, their patients were lost. Successful brain surgery and neurosurgery came about only through long study and perfection of exacting, delicate surgical skills. The man who was to lead the way and to place neurosurgery on a sound, scientific footing was Harvey Williams Cushing — an intense, severe man remembered by some of his junior assistants as uncompromising, dictatorial, and indomitable. However, Dr. William H. Welch, “father” of the medical faculty at The Johns Hopkins University, asserted, in 1931, that Dr. Cushing was “undoubtedly the outstanding medical figure in the world.” Dr. Franklin S. Newell observed that Dr. Cushing “was an extremely hard man to work with, whether one was over him or under him... but when he wanted to be he was one of the most charming people in the world...” John F. Fulton, Dr. Cushing’s friend, associate, and biographer, describes him thus: “In all he did, Cushing





Amist

was a perfectionist—on the parallel bars and at tennis, in the experimental laboratory and the operating room where he constantly attempted to extend the horizons of medical science... He had the temperament and the sensitive perception of an artist, but he also had the enduring patience of the scientist... Along with an unyielding devotion to principle there was warmth and gaiety and humor which lightened the way and proved a source of unending delight to his family and his host of friends." Of him, Elizabeth Thomson wrote: "By devoting his life to neurological surgery and its problems he made operations on the brain of little more hazard than those involving the abdomen..." and, "By example he taught that a physician is obligated to consider more than a diseased organ, more even than the whole man—he must view the man in his world."

Surgery as a discipline of medicine had advanced but slowly over the centuries, as knowledge of anatomy and of pathology increased. Speed and dexterity were prime operational skills prior to the introduction of anesthesia by Dr. Morton in 1846; and after that, although operations increased tenfold, there were only limited improvements either in the technique of surgery or in the management of wounds. Dangers and complications of infection inevitably arose. Introduction of antiseptics by Joseph Lister in 1865 paved the way, and adoption a decade later of aseptic techniques for surgery and for care of wounds laid the foundations for tremendous advances in surgery. More and more of the body's organs, such as the intestines, the thyroid, and the ovaries, once considered beyond the range of the scalpel, came under the jurisdiction of the surgeon.

Still another discovery, however, was essential to the development of neurosurgery: the demonstration by Fritsch and Hitzig, in 1870, of the electrical excitability of the cortex of a dog's brain. A whole new field of physiologic investigation was opened as researchers sought to learn which parts of the brain and spinal cord controlled specific organs and body functions. Late in the nineteenth century a number of investigators, many of them British, began exploration of the brain. Sir Charles Sherrington used anthropoid apes for study. Sir William Macewen started removal of brain tumors in 1879, and Sir Victor Horsley followed in 1887. It was Dr. Horsley, a man of great courage, who introduced the curved scalp flap to conserve blood supply, who developed bone wax to control bleeding, and who was first to remove a spinal cord tumor. The work in Spain of Santiago Ramón y Cajal in charting the nervous system also contributed greatly to the development of neurosurgery. It was to this field of brilliant surgical pioneering and development that young Dr. Cushing was introduced as the nineteenth century ended.

Harvey Cushing was born in Cleveland, Ohio, April 8, 1869, the son, grandson, and great-grandson of physicians. His grandfather, Erastus Cushing, had come to the Western Reserve state of Ohio from Massachusetts in 1835. His father, Henry Kirke Cushing, a graduate of the Medical Department of the University of Pennsylvania, practiced in Cleveland most of his life. Dr. Kirke and Betsey Williams Cushing had ten children, seven of whom reached maturity. Of these, Harvey was the youngest. He and his brother, Edward, were destined to carry on the family's medical traditions.

Harvey entered Yale University in 1887, graduating in 1891. That fall, he went to Boston and entered Harvard Medical School. At one point, a death which occurred while he was administering an anesthetic depressed him to the point where he nearly abandoned medical studies. He overcame this shock by developing a system for charting respiration and pulse during operations. Later, he added blood pressure to this record. These were definite contributions to the technique of anesthesia, and to safety for patients undergoing operations. Also, during his final year in medical school, he had opportunity to work with Dr. J. W. Elliot, who had studied with Dr. Horsley in London. Observation of Dr. Elliot's operations for brain tumors undoubtedly stimulated the young student in choice of his life's specialty.

Graduated from Harvard with the degrees of M.D. and A.M., *cum laude*, in June, 1895, Dr. Cushing entered on a year of internship at Massachusetts General Hospital. It was in December of 1895 that Wilhelm Conrad Röntgen discovered x-rays; and Dr.

Cushing was active among those who first tried out the new apparatus at the Boston hospital.

In the fall of 1896, Dr. Cushing went to Baltimore, Maryland, to become a surgical resident under Dr. William S. Halsted, director of surgical service at The Johns Hopkins Hospital. Dr. Halsted was then the most outstanding American surgeon, and the newly opened Johns Hopkins Medical School and Hospital were teeming with activity. Dr. Cushing's drive and ability fitted in well at The Hopkins, but his personality contributed to difficulties. Neither he nor Halsted readily understood one another during this period, although in later life they achieved a mutual respect. During his initial period of four years at The Hopkins, Dr. Cushing laid the foundations for close friendships with Dr. William Osler and Dr. Welch. His native artistic ability received stimulus from friendship with Max Broedel, The Hopkins' great medical artist. Dr. Cushing also began to make a name for himself for his studies of the gall bladder, his surgical work in repairing intestines perforated during typhoid, and his splenectomies. It was at The Hopkins, too, that he did his first gasserian ganglion resection to relieve the intolerable pain of trigeminal neuralgia.

In June, 1900, Dr. Cushing sailed for Europe. Having made up his mind that neurosurgery was to be his field (despite the fact that it hardly existed as a specialty), he sought out Dr. Horsley in London. He also visited the Hunterian Museum, and many hospitals in London and in Paris. In Berne, Switzerland, he found a pleasant and profitable association with the surgeon, Theodor Kocher, and the physiologist, Hugo Kronecker. In their laboratories he carried on experiments concerning the relation of blood pressure to pulse and to intracranial pressure. Later, he visited Italy, then spent a month in Liverpool with Dr. Sherrington, where he assisted in craniotomies on anthropoids.

Returning to The Hopkins in 1901, Dr. Cushing endeavored to launch his career in neurosurgery. Despite scarcity of suitable neurological patients, and appalling mortality rates following operations, Dr. Cushing struggled on toward his objective.

One of Dr. Cushing's contributions to The Hopkins was establishment of the Hunterian Laboratory, in 1905. Named for John Hunter, famous London anatomist, the laboratory became a center for teaching and research in surgery.

In June, 1902, Dr. Cushing married the sweetheart of his youth, Katharine Crowell, and they settled in a house next door to the Oslers, who were to become lifelong friends. The Cushings were to have five children, for whom the doctor

had great love, but little time; he drove himself and his associates without mercy. The fact that so many of his patients were doomed added much to his load of care.

From his father, Harvey Cushing had learned to find relaxation in collecting books. This hobby received a great impetus during his friendship with Dr. Osler.

Early in his work on brain surgery, Dr. Cushing found that improvement of existing techniques was imperative. He owed his successes to painstaking attention to detail and constant striving for improvement. Particularly difficult was the problem of control of bleeding. In 1904, Dr. Cushing developed a cranial tourniquet that proved very helpful. In 1908, he began to study and to operate on the pituitary gland, which is deeply buried in the skull and closely associated with the brain and with bodily functions. In 1912, he published a book, *The Pituitary Body and Its Disorders*, which documented fifty operations. This gland and tumors affecting it were to hold his attention for the rest of his life; and a specific pituitary disease, first described by him in 1932, has been called Cushing's syndrome.

Dr. Cushing's style of research has been described as intuitive. Once he had settled upon an idea, the objective of his investigations was to prove the correctness of his theory. Many times he was successful, research proving his ideas to be sound. At other times, he had difficulty in abandoning an idea, despite proof of its error.

During his stay at The Hopkins, which lasted until 1912, Dr. Cushing had many invitations to take professorships and other posts at leading medical schools and hospitals; but he had one objective in mind: Harvard. Finally, when plans were under way for construction of Peter Bent Brigham Hospital in Boston, Dr. Cushing was offered the post of chief of surgery at the hospital, and one of the professorships in surgery at his alma mater, Harvard Medical School. These he accepted. Among the rules for the new teaching service, in the passage of which Dr. Cushing had a part, was that of compulsory retirement at age 63—a ruling he was later to regret.

World War I interrupted Dr. Cushing's work in Boston. From 1915 to 1919, he served in France, first with the British, and later with the American Expeditionary Force. Very lively excerpts from his wartime diaries were published many years later, in 1935. During the war, the vascular disease in his legs, which was to plague him the rest of his life, manifested itself.

After the war, Dr. Cushing resumed teaching and neurosurgery, pioneering in the field of brain

the picture Surgery on highly sensitive tissues of the brain was seldom attempted, even after anesthesia and asepsis became standard operating room procedures. Not until the early 1900's was the tremendous risk to life reduced by research and by delicate surgical techniques, many of them developed and taught by Ohio-born Dr. Harvey W. Cushing, at Johns Hopkins, at Harvard, and at Yale. Dr. Cushing removed 2,000 brain tumors; developed a "school" of students from many lands who put up with his pungent personality in order to learn his methods. Adolph Watzka, surgical orderly, for many years was his constant operating room companion.

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surgery. His careful study of patients, before operation as well as after, and development of extremely delicate techniques, resulted in greater successes, bolder operations, and reduction of danger of mortality. He was responsible for development of many new procedures, instruments, and safety measures that saved patients' lives and returned an increasing proportion of them to useful pursuits. During the last fifteen years of his service in Boston, he attracted men from all over the world who came to observe or for periods of service in his clinic. He also established the Harvard Experimental Surgical Laboratory, an institution similar to the Hunterian Laboratory at The Hopkins. An important step forward was Dr. Cushing's introduction of electrosurgery to neurological operations in 1926. In that same year, too, Dr. Cushing received the Pulitzer prize for his two-volume work: *The Life of Sir William Osler*. A high light of the Cushings' family life was the marriage of their daughter, Betsey, to James Roosevelt, in 1930. This was to bring Dr. Cushing and Governor Franklin D. Roosevelt into close communication; and during Roosevelt's early years of the Presidency, Dr. Cushing served on a number of important governmental advisory committees.

In 1931, Dr. Cushing operated for the two thousandth time for a verified brain tumor—an unprecedented record of accomplishment. In 1932, with Percival Bailey, he reported on this series of two thousand tumors in a book: *Intracranial Tumors*. That year, too, he published *The Pituitary Body and Hypothalamus*. His great classic, *Meningiomas*, written jointly with Dr. Louise Eisenhardt, was published in 1938.

During the course of his career, Dr. Cushing had made many trips abroad and had developed friendships with most of the world's leading neurologists. He had given lectures on many important occasions, had received many honors and honorary memberships in medical organizations of other nations, and had received a score or more of honorary doctorate degrees from great universities.

The rule covering compulsory retirement, which Dr. Cushing had helped formulate, caught up with him in 1932—a situation to which he adjusted with some difficulty. His successor was Dr. Elliott Cutler, a former pupil. The fact that he was not invited to continue to serve as a sort of senior consultant hurt Dr. Cushing deeply.

The following year, 1933, upon the urging of a number of friends, and particularly, of Dr. John F. Fulton, then Professor of Physiology, Dr. Cushing accepted appointment as Sterling Professor of Neurology at Yale University. Dr. Louise Eisenhardt, who had started with Dr. Cushing as a secretary and later studied medicine, joined him

at New Haven, bringing from Boston Dr. Cushing's collection of specimens of brain tumors. Together, they established a unique institution: the Brain Tumor Registry.

Over the years, Dr. Cushing's interest in books on medical history, particularly the works of Vesalius, had increased. He had pursued book collecting enthusiastically, along with his friends, Dr. Arnold Klebs, of Nyon, Switzerland, and Dr. Fulton. He joined with them in an agreement that their collections should be combined and be presented to the Medical School at Yale. Dr. Cushing set about to put his own books and papers in order, and to influence Yale to provide suitable housing for the contemplated medical history library.

In December, 1937, Dr. Cushing again retired and became Emeritus Professor, but continued to busy himself with his library project. Though his vascular difficulties prevented him from travel, honors continued to come to him. On April 8, 1939, the Harvey Cushing Society paid tribute to him on his seventieth birthday at a meeting in New Haven. Friends from many countries attended. In June, 1939, he received an honor which he deemed most significant: he became the first surgeon, and the sixth person in 250 years, to have been elected to honorary fellowship in the Royal College of Physicians of London. A month later, he was gratified to learn that Yale University had appropriated \$600,000 for a medical library, one wing of which was to be devoted to medical history.

Death came to Dr. Cushing, October 7, 1939, following a heart attack. In his will, he bequeathed his library to Yale, naming Dr. Fulton his "literary executor." He also bequeathed funds for cataloging and putting his collection into shape for easy reference. In 1946, Dr. Fulton published an extensive biography of Dr. Cushing.

Final rites for Dr. Cushing were held in New Haven, October 9, after which his earthly journey ended where it began—his ashes were taken back to Cleveland and placed beside those of his mother, father, and the sister and brothers who had preceded him.

But Dr. Cushing's neurosurgical work was not at an end. A truly great teacher, he turned it over to his pupils, and their pupils, who carry it forward in clinics and operating rooms the world over.

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