Harvey Cushing: 
Author, investigator, neurologist, neurosurgeon

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I am pleased and honored to have been given the opportunity to speak to you on the theme of Harvey Cushing's accomplishments in the fields of surgery and neurology and the far broader sphere of literature and human relations. Following his death on October 7, 1939, the Editorial in the New England Journal of Medicine stated, "Imbued with great vitality and enormous energy he became the foremost surgeon of his day, a master-teacher, a profound and prolific investigator and the most accomplished medical writer in our country."

I shall discuss seriatim the justification for these encomiums.

The tremendous esteem he had achieved outside of this country was intimated by his election to Honorary Fellowship in Britain's Royal College of Physicians. This rare distinction had, according to the Secretary of the Royal College, come to only five other individuals in the course of 2½ centuries: two purely political figures, two basic scientists, and one internist. It was the capstone, 6 months before his death, of an incessant series of recognitions, which included 105 honorary fellowships, memberships, prizes, lectureships, and decorations from the world's medical, scientific, and more general learned societies and national governments. In addition, he received 24 honorary degrees from the world's universities, 14 of them outside of this continent. A particularly apt award was that from St. Bartholomew's Hospital, London, in 1922 of "Honorary Perpetual Student" (pp. 3-7). Professors Denny-Brown, Manuelidis, and I have the congenial task of telling you how he earned these accolades.

"The Foremost Surgeon of His Day"

I think his peculiarly distinctive contribution was to be the first physician to concentrate his total clinical effort on the surgery of the nervous system and to achieve such success thereat as directly to induce many other capable persons to enter the same field. He began to focus his efforts on the brain and pituitary gland at a time when so little was known about their diseases that the grossest errors were made in their treatment. One example will suffice. He saw in December, 1901, a 14-year-old girl complaining of headaches and loss of vision. She was undersized, obese, and sexually immature, incidental observations whose relation to an intracranial tumor was not then known. His operative decompression of the brain, first on one side and then on the other, relieved the headache, but the vision worsened. Thinking the patient might have a cerebellar tumor he exposed this region and the patient died 6 weeks later. The autopsy revealed a huge cyst in the pituitary region called by Hopkins' famous pathologist, Popsy Welch, a "teratoma." Today it is more precisely classified as a craniopharyngioma (pp. 137-138). Countless such humbling experiences did not deter this man from a relentless determination to try to solve all the relevant problems. Cushing soon learned that at about the same time Fröhlich in Vienna had in a similar case suspected a pituitary tumor, and had persuaded a Viennese surgeon to operate. The cystic tumor was drained, and although the operation was too late to save vision the patient survived. Cushing perceived from such accounts that vast increases in knowledge were required in the pathology of intracranial processes, in the symptoms they produced, and in the entire technique of pre-, intra- and postoperative management. Dr. Manuelidis will discuss the steps Cushing took in regard to pathology. I will try to summarize his general surgical, neurological, and neurosurgical achievements. Although these came at a rapid clip, the pace of improvement in surgical mortality was painfully slow.

Thoracic surgery in the 1930's and cardiac surgery in the 1950's were, by virtue of the broad range of knowledge of the relatively simple structures afflicted and the perfected ancillary techniques, comparatively ripe plums ready to be picked by several thoughtful courageous surgeons around the world at about the same time. In the first decade of this century this was true on no count with respect to neurosurgery. Sir Victor Horsley preceded Cushing in a serious effort to establish neurosurgery as a specialty. However, Cushing was the first man in the world who, laboring full-time, morning, afternoon, evening, and night, to try to solve surgically the multitudinous diseases
afflicting the brain, achieved methods that continue to be emulated.

The precision of all aspects of his care from the time the patient entered the hospital until he was discharged has become the indispensable foundation upon which the rest of us have tried to build. It was not, however, until the final year of Cushing's 11 years on the faculty at the Johns Hopkins Hospital and Medical School that an assistant resident surgeon working with Cushing went into neurosurgery himself; that man was Walter Dandy, the year was 1911-1912. During the first years, the high mortality rates after intracranial operations were publicized by a reporter on the Baltimore Sun, who inserted notices about people who had come long distances for operation and then a few days later recorded their death without comment. This reporter's actions elicited a protest from the Hopkins' authorities, but the grim facts, well known in the medical world, were perhaps the reason why Cushing had only 39 patients with intracranial tumors verified at operation or even at autopsy in the 6 years 1902 through 1907. Many others came to operation but died without verification of tumor. Cushing's chief, the Professor of Surgery Halsted, tried to discourage him from concentrating on neurosurgery, fearing he would starve on his $350 annual stipend from Hopkins in 1902. Halsted is rumored to have commented that he did not know whether to say "Poor Cushing's patients" or "Cushing's poor patients."

Laboratory scientists have the option and are indeed well advised to select as their field of effort one in which current knowledge and techniques offer the best chance to make a major leap forward. Thus, although Sir Charles Sherrington as early as 1901 published extensive observations on the physiology of the cerebral cortex in higher apes, he concentrated his main attention on the spinal cord and nerves. His monumental work in 1906, The Integrative Action of the Nervous System, was based largely on studies of these simpler systems. The prerequisite knowledge was not yet adequate for intensive analysis of the physiology of the cerebral hemispheres in animals. It was even less adequate for the poorly controllable studies of intracranial diseases in man. But the patients afflicted in the brain, the most complicated of the human systems, provided a stimulus of undeniable urgency. Of all those who picked up the gauntlet thrown down by these fearsome diseases, Cushing was for a decade the only one who refused to drop the surgical attack and turn for respite to some less demanding task. He not only insisted that it was appropriate for him, he had the effrontery to contend that other surgeons should tackle the area. Asked in 1906 by W. W. Keen of Philadelphia to write an 80-page section on surgery of the head for the five-volume work on surgery edited by Keen, Cushing produced an extensively illustrated manuscript of about 800 typed pages. It was condensed into a monograph of 259 pages and 154 illustrations. Its appearance in 1908 in Keen's Volume 3 led to the recognition of neurological surgery as a clearcut field of surgical endeavor. This systematic treatise on the technique of neurological surgery was widely quoted and reprinted by the United States Surgeon-General for use in World War I. The year of its appearance marked the first time an assistant resident surgeon at Hopkins, George J. Heuer, was assigned to work with Cushing.

His service was the most demanding in the hospital. To begin with, there was the protracted detailed history to be obtained from both patients and relatives. In addition to the time-consuming neurological and general physical examination, there were the special examinations such as those of the visual fields. A lengthy preparation for operation was followed by a meticulous procedure which was almost interminable even by Halsted's standards. A distinguished general surgeon, watching Cushing at work in the Brigham amphitheater one day, asked him, "Harvey, do these tumors ever recur on you during the operation?" For all of Cushing's career, only 1 or 2 units of blood of about 500 cc each was likely to be at hand for transfusions, and hemostatic electrocoagulation did not become available in neurosurgery until Cushing introduced it in 1927. Hence operative hemorrhage was an ever-present specter. Cushing stopped every vestige of hemorrhage after each step in the operation before he proceeded to the next. Perhaps it was his insistence on a totally dry and unobscured field which was one of the keys to the minimal unwanted damage and remarkably superb results he began to attain. Indeed, it may be that the current improvement in mortality and morbidity with the operating microscope is due partly to our return to Cushing's insistence on zero oozing into the field. Under the microscope a trickle of blood looks like a torrent.

The primitive state of our data gathering in the first years of the century is illuminated by the fact that it was Cushing who brought the Riva-Rocci instrument for measuring blood pressure to this country in 1901. The Committee on Surgical Research of the Harvard Medical School sent a letter to the School's surgeons on February 1, 1903, commenting, "The representations by Dr. Cushing of the importance of blood pressure observations in surgical diagnosis and treatment have produced a widespread interest in these methods on investigation of surgical problems." As a consequence of proposals in this letter, 37 surgeons at the Massachusetts General, Boston City, and Boston Children's Hospitals permitted the use of their wards for a study of the matter. Thirteen months later the Committee's 41-page multiple-case report concluded, "The adoption of blood pressure observations in surgical patients does not at present appear to be necessary as a routine measure." The enunciation of this medical judicial gem from the precincts of Boston has, as we all know, been followed by the routine measure-