Lights in the great darkness

The 1971 Harvey Cushing oration

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In this address one of the most distinguished and thoughtful living neurosurgeons recalls and pays tribute to select individuals who each in their time and way have lighted a path for neurosurgical progress. If, in fact, the neurosurgical darkness is now less profound than at the beginning of the author's career, the change is due in large part to the unique illumination which his own work has shed upon the physiological approach to neurosurgery.

THIS national association of neurosurgeons was first enrolled forty years ago as a band of pupils of Harvey Cushing and under the title of the Harvey Cushing Society. Dr. Louise Eisenhardt, an excellent neuropathologist and a friend of Cushing and all his early pupils, gave the first Cushing Oration in 1965.* In this, the seventh Cushing Oration, your president has chosen to honor a neurosurgeon for the first time in this series.

I shall therefore begin with a backward glance at neurology. That is where neurosurgery and psychiatry began. It is where they will surely find their places in the end—in a transformed and broadly-based neurology. I shall speak sometimes of physicians and surgeons I have known, making it personal but with no thought of giving you a complete review such as that made by Earl Walker recently. He edited A History of Neurological Surgery. The chapters were written by him and his Johns Hopkins neurosurgeons. It is an excellent contribution to our background, beginning, as it does, at the very beginning with prehistoric trepanation and following with descriptions of techniques and a series of biographies.

Seen from the point of view of science, the mind and the brain of man still constitute, I dare say, the greatest and the most important of all unexplored fields of knowledge. Many approaches must be made to this great darkness. Our specialty is only one.

Looking back, one can see the lights come on, one by one. What Cushing and you and I and the other workers and dreamers have begun is important. We have learned to cross the body-to-brain frontier, with safety for the patient, bringing him relief and sometimes cure. The door has opened wide, and yet I suspect that the past is no more than a prelude to understanding.

In old time, men who concerned themselves with the brain considered its functions to be a mysterious action-of-the-

* The subsequent orations were delivered as follows: the second in 1966 by Philip Handler on "Science and Society"; the third in 1967 by William Stewart on "Responsibility of Excellence"; the fourth in 1968 by Buckminster Fuller on "Man's Function in the Universe"; the fifth in 1969 by John Millis on "The Paradox of Medical Practice and Medical Education"; the sixth in 1970 by Edwin Crosby on "The Changing Role of the Institution in Modern Health Care."
whole, something akin to the spirits that were thought to move within the body, carrying messages of speech and action. That was before it was known that electric potentials travel by insulated pathways along the nerves. This was the thinking of Galen seventeen centuries ago. Strange to say, it seems to have lingered on in the minds of some, today. They hesitate to believe that there are semiseparable mechanisms within the centrencephalic system that correspond with all transactions of the mind.

The year 1971 is the first year in the second century after the discovery by Fritsch and Hitzig that electricity could activate brain mechanisms. Imagine the amazement when those two young neurophysiologists applied a gentle electric current to the motor convolution of a dog's brain and the sleeping dog moved a paw on the opposite side of the body as though it were a voluntary movement.

In their German laboratory, they understood then, in 1870, that there was action in circumscribed mechanisms of the brain, willed action or seelische Functionen. It had to do with the mind. The mind could activate a brain mechanism or, as these physiologists expressed it in wonder, the spirit could enter and leave the body in a certain area. Let us not quibble about their terminology. Their experiment opened a wonderful century of adventure and advance. Physiologists, like Sherrington and Pavlov, brought to light the integrative action of the nervous system in which the inborn reflexes and the conditioned reflexes played their automatic roles. Hughlings Jackson in London was emboldened to interpret epileptic fits in terms of physiological mechanisms. And other clinicians, such as Jean-Martin Charcot of Paris, read the meaning of isolated destructive lesions of the brain, and localized speech function, motor function, and sensory conduction.

The second century of neurological advance lies before us in 1971. The opportunity for advance in the knowledge of mechanisms in the brain stem and cerebral hemispheres and the mind seems to wait and beckon to explorers of the future. This is the new frontier. No one is better equipped to carry out these explorations than the neurosurgeon. But he must approach his work with a prepared mind of his own, ready to plan, to observe, to hypothecate, and, some day, to conclude.

In 1886, there was a beginning that was important for neurosurgery. Victor Horsley, a young physiologically-minded surgeon, was appointed to the staff of what was then called The National Hospital for the Paralyzed and Epileptic, Queen Square. He applied the dawning knowledge of structure and localization of function to surgical treatment. He had the help, in doing this, of a brilliant company of neurologists gathered in the Queen Square Hospital—Hughlings Jackson, William Gowers, David Ferrier, to name only the early leaders. Horsley carried out ten operations in that first year and spent his extra time continuing his experiments on epilepsy in the Brown Institution.

He acted as a surgeon also at the University College Hospital of London. It was there, in the laboratory of that institution, that he and Clarke built the first stereotaxic apparatus and described controlled exploration of the monkey brain. It was there the young American, Ernest Sachs, came to work with him. Horsley had also been Professor-Superintendent at the Brown Institution, an endowed hospital for the care and the cure of animals. Remarkable as it may seem today, this establishment was combined with an institute for pathology and physiology, and it is interesting to note, in passing, that in 1896 Horsley surrendered this post to young Charles Sherrington.

Horsley carried out the first operation for spinal cord tumor and worked out the procedure of laminectomy. He localized brain lesions successfully, and operated on brain tumors. But his results were disappointing when the work was reviewed. Antiseptic surgery had been introduced by Joseph Lister only during the preceding decade, and the crudities of this technique in his hands, when he had to cross the meningeal barrier between body and central nervous system, defeated his hope of regularly safe and successful operative procedures. Aseptic surgical refinements were being developed in other clinics, especially in Germany, but Horsley continued to employ the crude methods that seemed to serve the purpose well enough in the physiological laboratory.