Historical vignette

California’s Cushing connection: Harvey Cushing trained California’s first neurosurgeons

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On September 9, 2000, California celebrated its sesquicentennial anniversary of its admission to the United States. One hundred years ago, in September of 1901, Harvey Cushing began his surgical practice in Baltimore, Maryland. The proximity of these dates presents an auspicious moment for a review of the careers of three neurosurgeons trained by Dr. Cushing—Howard Naffziger, Carl Rand, and Edward Towne—who played defining roles in establishing modern neurosurgery in the Golden State. In promulgating Cushing’s surgical principles and philosophy, these physicians achieved a distinguished place in the history of medicine in California.

KEY WORDS • Harvey Cushing • history of neurosurgery

The advance of neurological surgery is greatly impeded by the prevailing impression in regard to its dangers and general futility—an impression due in large measure to the unsuccessful attempts of the untrained and inexpert.9

In September, 1901, the 32-year-old Harvey Cushing began a surgical practice at Johns Hopkins Hospital. After completing his surgical residency under Chief of Surgery William Stewart Halsted, Cushing spent a year abroad studying principles and techniques in the clinics of Victory Horsley, Theodor Kocher, and Charles Sherrington. It was in this milieu that the specialty of neurosurgery would evolve.

The year 1901 marked the beginning of an epoch of change. The Victorian Era ended with the death of Queen Victoria on January 22 of that year, and in September, as Cushing began his surgical practice, an assassin’s bullet took the life of President William McKinley. The Progressive Era began under the leadership of the new president, Theodore Roosevelt, hero of the Spanish–American War. The progressive ideal of organized, systematic research would embody Cushing’s career in neurosurgery.14

In one of his early publications, Cushing described his own experiences as a volunteer surgeon treating patients with typhoid fever on a special hospital train chartered to return Roosevelt’s troops home from the Cuban conflict.11

It was at this same time, at the beginning of the 20th century, that numerous advances in technology propelled the advance of medical science.15 These advances occurred in electricity, with operating room illumination, electrically powered instruments, and wireless communication; in combustion, with the introduction of the internal combustion engine (motorized ambulances replaced horse-drawn conveynaces); and in medical techniques and procedures (x-ray film/radiography).

Proof of Cushing’s genius as a surgical innovator is demonstrated by his having implemented these new technologies. In 1896, while still a medical student, Cushing procured the first Roentgen apparatus at the Massachusetts General Hospital.15 And in his seminal 1905 paper, “The special field of neurological surgery,” Cushing described the essence of the foundation of modern neurological surgery.

To assure a permanent place among the established medical specialties for his “special field,” Cushing trained a cadre of surgeons. These men, in effect, became disciples who spread the gospel of modern neurological surgery. The first, George Heuer, became assistant in neurological surgery at Johns Hopkins Hospital in 1908. The last, Richard Light, became assistant at Boston’s Peter Bent Brigham Hospital in 1932. Also among Cushing’s trainees were three men—Howard Naffziger, Carl Rand, and Edward Towne—who established surgical practices in California and promulgated Cushing’s principles and techniques on the west coast (Figs. 1 and 2). Howard Naffziger was the last of Cushing’s residents trained at Johns Hopkins Hospital (1912). Carl Rand and Edward Towne were two of the first residents trained by Cushing at the new Peter Bent Brigham Hospital (1913–1915). All three played critical roles in developing Cushing’s new neurosurgery.

Neurosurgery in California: Before Harvey Cushing

The discovery of gold at Sutter’s Mill on January 24, 1848 sparked the California Gold Rush and, along with it, a massive influx into the state of a population in search of gold. This rapid growth culminated in the admission of California as the 31st state of the Union on September 9, 1850.13 Science, art, and the practice of medicine were greatly disadvantaged by the geography of the state, whose Sierra Nevada Mountains extended along its eastern boundary and isolated it from the rest of the Union.50 Its cultural and geographic isolation ended with completion of the transcontinental railroad on June 10, 1869. Construction of the railroad had often been difficult and dangerous work, which resulted in illness and injury. To address this situation the Central Pacific Railroad Hospital was established in Sacramento in 1870. Chief surgeon of the hospital, A. B. Nixon, documented his treatment of head injury in railroad workers in his 1877 article.22
In 1862, San Francisco surgeon Levi Cooper Lane became faculty president of Cooper Medical College (today’s Stanford University School of Medicine). In 1873, Hugh Toland, a surgeon from the Carolinas who originally arrived in California as a gold prospector, completed negotiations with the Regents of the University of California at San Francisco’s Toland Medical School to become the University of California School of Medicine.

Both Lane and Toland wrote surgical texts for California’s medical students with chapters on brain surgery.

Singular events in California medicine in the 19th century provided impetus for the emergence of Harvey Cushing’s “special field” in the early years of the 20th century.

On February 25, 1886, Drs. Hirschfelder and Morse performed the first documented case of resection of a cerebral glioma in San Francisco, only 15 months after Bennett and Goldlee’s historic operation on a cerebral glioma in a patient in London.

In 1895, to commemorate the opening of Cooper Medical College’s new teaching hospital in San Francisco, eminent Scottish surgeon William MacEwen accepted Professor Lane’s invitation to give a series of lectures. MacEwen lectured for 10 days on surgery of the brain and even performed a brain operation for an audience of physicians and medical students.

By 1900, these events and the burgeoning sophistication of California medicine had established a matrix for the dissemination of Cushing’s teachings and the introduction of modern neurological surgery in California. Among Cushing’s emissaries who brought this knowledge to California were his former residents, Naffziger, Rand, and Towne, the first Cushing-trained neurosurgeons in California. Their lives and careers comprise the balance of this report.

Howard Christian Naffziger (1884–1961)

Howard Naffziger was born on May 6, 1884 in Nevada City, California, which owed its existence to the California gold rush. Young Naffziger grew up in a fresh, dynamic, exuberant atmosphere, a region full of dreamers and fortune seekers who worked diligently to succeed in the challenging frontier environment. He received a baccalaureate degree from the University of California, at Berkeley in 1907 and studied medicine at the University of California Hospital in San Francisco, a city then rebuilding from the Great Earthquake and Fire of 1906 to restore its place of prominence on the west coast.

Just as the railroad had helped transform California’s social and financial fabric, it would influence Naffziger’s surgical career because Thomas W. Huntington, Chairman of Surgery at the University of California, had transferred there from the Central Pacific Railroad Hospital in Sacramento. Naffziger was encouraged to pursue additional study in surgery of the nervous system by Dr. Camillus Bush, a fellow native Californian and graduate of Johns Hopkins Medical School who was performing neurosurgery in San Francisco. Naffziger traveled to Baltimore, where he demonstrated to Dr. Cushing that he had the mettle to be assistant surgical resident on Cushing’s service (1912–1913). Securing this position may have been aided by a special kinship between Johns Hopkins Hospital and the University of California, which owned its existence to the California gold rush. Young Naffziger grew up in a fresh, dynamic, exuberant atmosphere, a region full of dreamers and fortune seekers who worked diligently to succeed in the challenging frontier environment. He received a baccalaureate degree from the University of California, at Berkeley in 1907 and studied medicine at the University of California Hospital in San Francisco, a city then rebuilding from the Great Earthquake and Fire of 1906 to restore its place of prominence on the west coast.

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The pinacle shift.

From 1920 to 1940, some 56 publications emanated from the neurosurgery clinics of the University of California. In 1925, in response to a request by the editors of California and Western Medicine that he review the contemporary status of neurological surgery, Naffziger published an article that paid particular homage to Cushing’s contributions. In the same year, Naffziger elucidated the roentgenographic sign of brain edema manifest by the shift of the pineal gland (Fig. 3). Cushing was so impressed with Naffziger’s study of the cerebral subarachnoid system that he asked in a letter of congratulations to be credited with inspiring the original research (H. Cushing to H. Naffziger, 27 August 1925, Cushing Papers).

In subsequent years, admiration continued between the younger neurosurgeon and his mentor, as reflected in Naffziger’s 1934 letter, in which he requested Cushing’s opinion about the possible contribution of the pituitary gland to the exophthalmos of hyperthyroidism, which Naffziger had been treating surgically by craniotomy with orbital decompression (H. Naffziger to H. Cushing, 6 May 1934, Cushing Papers). An article written by Naffziger and Stern on chronic subdural hematoma presented an updated review of the topic addressed in the classic study by Putnam and Cushing. Just as Cushing had praised his former chief, William Stewart Halsted, in a moving eulogy in Science, Naffziger paid similar respect in the Bulletin of the American College of Surgeons on the occasion of Cushing’s death in 1939. Cushing’s mantle as a leader and teacher was then passed to Naffziger in 1947, who had been elected President of the American College of Surgeons in the 1930s, and who was appointed chair of the first university neurosurgery department west of the Mississippi river.

Naffziger’s capacity for work and scholarship did not diminish with advancing age. His chapter on the nervous system in Textbook of General Surgery presents a lucid description of the clinical neurological examination, which was still of tantamount importance, along with the diagnostic modalities of angiography and ventriculography before the precise imaging afforded by the advent of computerized tomography and magnetic resonance imaging. Just before his retirement, Naffziger published a number of papers with Drs. Boldrey and Adams, both of whom later became chairs of the Department of Neurosurgery at the University of California.

Naffziger retired from neurosurgery in 1951 at 66 years of age. Shortly thereafter California Governor Earl Warren appointed Dr. Naffziger to the Board of Regents of the University of California. During his tenure, the Regents formulated the Master Plan of Education to address the tremendous influx of population to California that occurred after World War II. This thoughtful work for California’s education resulted in the current nine-campus system of the University and the development of medical schools at Davis, San Diego, and Irvine. As he demonstrated over the span of his career, Naffziger had been an excellent choice as Harvey Cushing’s last neurosurgery resident at Johns Hopkins (Fig. 4).

Carl Wheeler Rand (1886–1972)

Carl Wheeler Rand, born in Monson, Massachusetts on

William Osler had left; however, still on the faculty were other giants of American medicine—William Stewart Halsted, William Welch, and Howard Kelly. During his year of training, the young surgeon from California was able to observe intimately the interaction between the Chief and Walter Dandy, his immediate predecessor as resident neurosurgeon. Naffziger’s superior performance at Johns Hopkins earned him an invitation from Dr. Cushing to join him and the staff at Boston’s new Peter Bent Brigham Hospital. Citing his mother’s failing health, Naffziger declined the invitation and returned to California in 1913 to start a general surgery practice in San Francisco (H. Naffziger to H. Cushing, 19 July 1912, H. Cushing Papers, Yale University Library).

Although Naffziger’s early publications dealt with neurosurgical topics, he actually performed little neurosurgery until he departed for World I in France with the University of California’s medical and nursing staff. Together they joined the United States Army as a contingent of the Allied Expeditionary Force. The veracity of Cushing’s principles of cerebral surgery were demonstrated during this conflict by a marked decrease in mortality rates for the treatment of soldiers with head wounds compared with those of prior wars. With the end of hostilities, University of California President Wheeler wrote to the weary Army neurosurgeon requesting that he return from France to resume teaching duties in San Francisco. Naffziger, then a Lieutenant Colonel, replied that his return would be delayed by the 1000 soldiers with head, spine, and nerve injuries who needed treatment before they could return home (H. Naffziger to B. Wheeler, 19 October 1919, Naffziger Collection, University of California at San Francisco Archives). On his return to California, Dr. Naffziger limited his practice exclusively to neurosurgical cases.

Naffziger’s wartime neurosurgical experience and Cushing’s growing national reputation as a “brain surgeon” had created a niche for neurosurgery as a defined mainstream medical specialty. From 1920 to 1940, some 56 publications emanated from the neurosurgery clinics of the University of California. In 1925, in response to a request by the editors of California and Western Medicine that he review the contemporary status of neurological surgery, Naffziger published an article that paid particular homage to Cushing’s contributions. In the same year, Naffziger elucidated the roentgenographic sign of brain edema manifest by the shift of the pineal gland (Fig. 3). Cushing was so impressed with Naffziger’s study of the cerebral subarachnoid system that he asked in a letter of congratulations to be credited with inspiring the original research (H. Cushing to H. Naffziger, 27 August 1925, Cushing Papers).

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Carl Wheeler Rand, born in Monson, Massachusetts on
April 8, 1886, was an able scholar who exhibited a flair for athletics. Rand’s solid academic performance at Williams College led to a baccalaureate and a Master’s degree in liberal arts and his election to Phi Beta Kappa. His decision to pursue a career in medicine led to his enrollment at the Johns Hopkins Medical School in 1908.48

The future neurosurgeon probably sensed a kindred spirit with his professor of surgery, Harvey Cushing; the two men shared the same birthday. They became acquainted during Rand’s junior year (1910) when Rand took an elective course in canine surgery given by Cushing. When he complained to Cushing about the difficulty of anesthetizing large uncooperative canine “patients,” Cushing replied, “Don’t blame your golf balls.” Impressed by this pithy advice, Rand increased the pace of his studies, for which he was rewarded 2 years later with an internship at Johns Hopkins Hospital. The intern then impressed Cushing with his emergency management of a patient with high intracranial pressure from a suspected brain tumor. As the patient became cyanotic and then suffered respiratory arrest, Rand initiated artificial respiration and called for Cushing to come immediately. When Cushing arrived, the two doctors rushed the patient to the operating room, where Cushing rapidly trephined the patient’s skull and punctured a large cerebellar cyst that immediately restored the patient’s vital signs. Recovery was then complete, and the patient subsequently enjoyed many years of useful life. Recognizing Rand’s cool performance in this trying circumstance, Cushing, the new Mosely Professor of Surgery at Peter Bent Brigham Hospital, offered him a position as a surgical resident.56

In Cushing’s papers, meticulously recorded on microfiche in the Cushing–Whitney Library Archives at the lint of the Los Angeles Neurological Society appeared, with the prolific Dr. Rand as editor. Rand and Cyril Courville, a former resident on the neurosurgery service who went on to become the staff neuropathologist, authored papers for athletics. Rand’s solid academic performance at Williams College led to a baccalaureate and a Master’s degree in liberal arts and his election to Phi Beta Kappa. His decision to pursue a career in medicine led to his enrollment at the Johns Hopkins Medical School in 1908.48

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In Cushing’s papers, meticulously recorded on microfiche in the Cushing–Whitney Library Archives at the Yale Medical School, one finds that surgery resident Rand assisted Cushing in 97 craniotomies and transsphenoidal hypophysectomies over the course of a year. Rand’s work was performed in exhaustive detail, per Cushing’s requirements: six-page single-spaced typewritten histories and physical examinations were the norm; the length of each metacarpal and metatarsal bone for the acromegalic patients recorded in the chart. On May 5, 1914, Rand was allowed to decompress a cystic ependymal tumor with Cushing assisting.

After a year in Boston, Rand completed his surgical training in Chicago at Mercy Hospital in the clinic of surgeon John B. Murphy. Rand then decided to move to southern California to join the surgical practice of a former colleague from Johns Hopkins. He started a neurosurgery service at the Los Angeles County Hospital, where a letter of reference from Dr. Cushing to H. G. Brainerd, University of Southern California Professor of Neurology, paved the way for his appointment (C. Rand to H. Cushing, 11 December 1915, Cushing Papers). Brainerd, editor of Southern California Practitioner, a medical journal, was a leading neurologist in southern California who, in 1896, had reported the case of a brain tumor he had localized for resection by his surgical associate, Elliot Alden.3

War in Europe soon interrupted Rand’s California neurosurgical practice. Then Colonel Harvey Cushing, Neurosurgical Consultant to the Allied Expeditionary Force in France, arranged for Rand to be part of “Surgical Team No. 578,” which saw action in the 1918 Argonne offensive. This team performed surgery in 64 patients with head wounds. The team operated without benefit of antibiotics, blood transfusion, and electrocautery, and with only rudimentary x-ray facilities: the operative mortality rate was 18.7%. Again, the validity of Cushing’s surgical principles were confirmed in the brutal laboratory of battlefield surgery.41 After the war, Rand returned to Los Angeles, where he practiced for a period of 39 years as Chief of Neurosurgery at the Los Angeles County–University of Southern California School of Medicine.

Southern California’s growth after World War I was intimately associated with the automobile. By 1924, the heaviest traveled intersection in the United States was the corner of Adams and Figueroa Streets in Los Angeles, where 69,797 cars passed daily.52 Publications from the Neurosurgery Service at Los Angeles County Hospital during this time dealt with treating head injuries attendant to a massive volume of motor vehicle accidents. Other papers affirmed and embellished on Cushing’s pioneering work; among them was a 1929 paper on the management of stab wounds to the spinal cord, which recalled Cushing’s classic 1898 paper on hematomyelia and the early use of roentgenography. The 1925 work by Putman and Cushing on chronic subdural hematoma became the foundation for the seven cases reported by Rand in 1927.53 Rand demonstrated his expertise in a great number of head injuries referred to the Los Angeles County Hospital and in the chapter he wrote on head injuries in A Textbook of Surgery. That same year, a new journal entitled Bulletin of the Los Angeles Neurological Society appeared, with the prolific Dr. Rand as editor. Rand and Cyril Courville, a former resident on the neurosurgery service who went on to become the staff neuropathologist, authored papers...
over the years on the topic of neuropathology. In the 1940 volume of the *Bulletin*, Rand’s* moving essay, “Doctor Cushing as I knew him,” detailed his memories of his former Chief. Courville’s subsequent article in the same volume recalled Cushing and Eisenhardt’s last publication together (1938), in which they discussed the first successful removal of an intracranial tumor, an olfactory groove meningioma (1885), which was performed by Italian surgeon Durante.5

In 1943, war raged in Europe and the Pacific, and based on his own experience Rand recounted in his *Bulletin* the status of neurosurgery in World War I. He hoped his portrayal of the great strides in medical science and surgery from the dark days of 1918 would inspire a new generation of neurosurgeons who were treating casualties on the many battlefields around the world.41 In that same year, *The Neurosurgical Patient: His Problems of Diagnosis and Care*, a lucid compendium relating the treatment of disorders of neurosurgical interest, was dedicated to Harvey Cushing (Fig. 5). This text now conveys to the modern neurosurgeon an interesting perspective on neurosurgery at the midpoint of the 20th Century.

In 1954, the Congress of Neurological Surgeons recognized Dr. Rand’s distinguished career by inviting him to be the honored guest at its annual meeting in Los Angeles. Cushing would have been proud that the topic of Rand’s address was pituitary tumors, including more than 100 patients in whom Rand performed surgery.40 Two years later, at Rand’s 70th birthday party, Howard Naffziger made a speech noting a charming aspect of his old colleague’s personality: a keen sense of humor. Naffziger recalled Rand’s commencement address, delivered on Flag Day, when the aspiring neurosurgeon stated, “This is a banner day in American history” (H. Naffziger to C. Rand, 4 April 1956, Naffziger Papers).

In retirement, Carl Rand continued his flair for the liberal arts by writing poetry, composing music, and publishing a biography of Joseph Widney, founder of the University of Southern California School of Medicine.38 He outlived Howard Naffziger and died in 1972 at 86 years of age (Fig. 6). His son Robert, a practicing neurosurgeon in Los Angeles, continues in his father’s footsteps.

**Edward Bancroft Towne (1883–1957)**

Like Carl Rand, Edward Towne was a native of New England, born in West Newton, Massachusetts on August 16, 1883. He spent part of his youth in California, where he attended high school in Belmont. He then returned to the east, graduating from Harvard University in 1906 and from Harvard Medical School in 1913. Towne performed his internship at Peter Bent Brigham Hospital, where he followed Rand as assistant resident in surgery working for Dr. Cushing. A review of the Cushing Archives at the Yale Medical Library reveals that Towne assisted Cushing in 24 brain tumor operations and that he “scrubbed in” on a number of cases with his future California colleague, Carl Rand.

After an outbreak of epidemic poliomyelitis in Boston, Cushing, ever the pioneer of novel therapies for surgical and medical diseases (a 1908 article described a possible use of hexamethylenamin in cerebrospinal meningitis7), arranged for Edward Towne to work in the laboratory of Professor of Bacteriology E. C. Rosenow at the Mayo Clinic in Rochester, Minnesota. He hoped Towne could help Rosenow elucidate Cushing’s theory that polio was related to streptococcal infection. Rosenow and Towne’s articles in *Journal of the American Medical Association* and *Journal of Infectious Disease* on a streptococcal variant causing polio appeared quaint and obviously erroneous in the light of contemporary virology. They reflect the frustrating research in the early search for the cause of and therapy for this terrible disease.46,47
Towne moved to England in 1915, hoping to secure further training in the clinic of famous British neurologist Henry Head; however, because of his training with Cushing, he was immediately offered a commission in the British Army Medical Corps to perform neurosurgery. Towne then spent a hectic 4 years performing neurosurgery in a myriad of battle casualties, first with the British Army Medical Corps and then with the United States Army in France. Towne was so busy that Cushing, who arrived with the Harvard Unit in France, could never catch up with his former pupil. The influence of Towne’s British colleagues, who operated with more pragmatism and less halstedian technique, became obvious in Towne and Goethals’ 1920 paper.63

After the war, in 1919, Towne returned to California to start a neurosurgical practice at Stanford University Hospital in San Francisco. One of his new associates at Stanford was Philip K. Gilman, who had been Cushing’s first (1905) surgical assistant in the Hunterian Laboratory at Johns Hopkins Medical School. Howard Naffziger and Carl Rand were also establishing their neurosurgical practices in San Francisco and Los Angeles, respectively.

In the decade between 1920 and 1930, Towne produced numerous publications on ventriculography (first described by Cushing’s former resident, Walter Dandy),62 radiation therapy for pituitary tumors,61 fracture–dislocation of the carpal bones (measuring the carpal bone lengths of the acromegaly patients learned during his year with Cushing),58 laminectomy for spinal cord tumors after application of local anesthetic (a daunting experience for these patients),60 and midline incision for exposure of the cerebellum (that contrasted with Cushing’s crossbow incision).57 These papers generated frequent correspondence from Cushing, including a plan to incorporate Towne’s 1926 case report on a parasagittal meningioma in a future Cushing monograph on meningiomas (H. Cushing to E. Towne, 23 March 1926, Cushing Papers).

In 1926, Fritz Reichert, a Johns Hopkins graduate who worked for Walter Dandy, was appointed Chair of Stanford Neurosurgery. Rather than work with the irascible Reichert, Towne left Stanford and began private practice in San Francisco.1 That same year there appeared a report56 on the radiographic projection for demonstration of erosion of the petrous bone caused by acoustic tumors, still referred to today as the Towne projection (Fig. 7). The following year, in collaboration with pediatrician Harold Faber, Towne25 published a paper on early craniectomy for oxycephaly in which they paid homage to Levi Cooper Lane, founder of the Stanford Medical School who had pioneered the operation and reported it in 1892.25

During the Great Depression, Towne reported on the treatment of spinal cord injury after dislocation of the cervical vertebrae. In 1933, the prognosis for spinal cord injury was grim. Surgical intervention was not believed to be of value, and the treatment entailed 3 months of immobilization of the neck and upper body in a plaster cast. Three of 12 patients treated in this manner died, although half of the patients with predominantly nerve root injuries made full recoveries.59

Although Towne’s career did not shine as brightly as those of his more illustrious colleagues, Howard Naffziger and Carl Rand, his abilities as a leader and contributor to the development of neurosurgery were recognized by his election to the presidency of the Northern California Neuropsychiatric Society. He was also a founding member of the Society of Neurological Surgeons.13 He retired from neurosurgical practice in 1949 and died in 1957 at 73 years of age (Fig. 8).35

Discussion

Bring me men to match my mountains . . . .14

Since Harvey Cushing began his practice in Baltimore a century ago, advances in neurological surgery have been spectacular. A vast literature has developed that documents Cushing’s role in the initiation of this specialty as we know it today.16,20,26,55 Probably his most important legacy lies in the people whom he trained to carry on the principles and techniques that he pioneered through his determination and tremendous capacity for innovation.

Those surgeons trained by Cushing who eventually settled in California—Howard Naffziger, Carl Rand, and Edward Towne—were doubly fortunate. Not only had they learned the new specialty from their Chief, but they were able to witness first hand, in the cauldron of the Great War, the successful application of Halsted’s surgical principles with Cushing’s embellishments (Table 1). The careers of these men were guaranteed in 1919 when Cushing, who had just returned from France, addressed the American College of Surgeons on brain tumors, after which the chairman, Dr. William J. Mayo, rose and
announced, “Gentlemen, we have this day witnessed the birth of a new specialty—neurological surgery.”

In California the spirit of progressivism was fostered in the early 20th century by Stanford University President David Starr Jordan and University of California Professor Joseph LeConte. Both men were physicians who had established an intellectual milieu in the state that welcomed Cushing’s ambitious dedicated “special field” for the relief of human suffering. The breadth of the new specialty touched all of the neurosciences. Never again would the 1886 experience, in which the first resection (in United States history) of a glioma was performed by a general surgeon who was guided by an observing neurologist, be repeated.

The notion of expanding neurosurgical knowledge through training outside of the operating theater prompted Cushing to assign Edward Towne to work in Prof. Rosenow’s laboratory at the Mayo Clinic in 1915, in an effort to determine whether there were neurosurgical aspects involved in the treatment of poliomyelitis. Cushing’s theme of ecumenism among the neurological disciplines found expression in his other former residents. Professor Naffziger, for example, facilitated the appointment of Robert Aird as first Chairman of the new Department of Neurology at the University of California in 1947. Cyril Courville, a former neurosurgery resident, took the position of neuropathologist at the Los Angeles County Hospital in conjunction with his former chief, Carl Rand.

Similarly, Naffziger amplified Cushing’s talent in adapting new technologies for neurosurgical advancement, manifest in his early utilization of the roentgen apparatus for neurodiagnosis, when he described the pineal shift to document brain edema. Towne’s report on roentgenographic projection of the skull, which demonstrated acoustic tumors, continues to be a standard view for evaluating the calvarial bone.

Harvey Cushing, scion of the 19th century, launched neurosurgery on its modern course in the 20th century. It would be interesting to conjecture how Cushing, his California “offspring,” and others might respond to the challenges of the 21st century posed by managed care, the Internet, neurosurgery for the victims of terrorism and mass destruction, and neurosurgery in those patients with acquired immune deficiency virus. Every generation must deal with its own issues, which present unique problems that demand novel solutions. It cannot hurt to study the past, to review the dedication, intellectual excellence, and humility of our forebears in neurosurgery to create a modern progressivism that will guide the special field of neurosurgery in the present and into the future.

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