and physical considerations involved, a thrilling example of the practical significance of an academic proposal.

Helmholtz's work on accommodation, color vision, and the sensation of tone is profoundly important not only in neurology but also in psychology. His view, expressed in 1867, that the position of the eyes is not consciously perceived through the mediation of proprioceptor nerve fibers coming from the extraocular muscles, holds true today; his contributions to the nervous reflexes of equilibrium are also significant. It is not pertinent to indicate here Helmholtz's supreme contributions to physics. It was his suggestive influence, for instance, which led his pupil, Heinrich Herz, to demonstrate the existence of electromagnetic waves as predicted by Clerk Maxwell, and thus to make possible the development of modern radiation theory.

Helmholtz's one weakness was lecturing. Max Planck\(^{3}\) relates: "It is obvious that Helmholtz never prepared his lectures properly. He spoke haltingly, and would interrupt his discourse to look for the necessary data in his small notebook; moreover, he repeatedly made mistakes in his calculations at the blackboard, and we had the unmistakable impression that the class bored him at least as much as it did us. Eventually his classes became more and more deserted, and finally they were attended by only three students ..."

In other ways the influence of the Jovian Helmholtz was profound. He was remarkable as a scientist, as a philosopher, and as a personality which was majestically reflected in his splendid appearance. He was fond of mountaineering and travel, but most of all enjoyed his scientific friendships. Max Planck, one of those three students staying to the last, says: "With his well-rounded personality, integrity of convictions and modesty of character, he was the very incarnation of the dignity and probity of science ... supplemented by a true human kindness, which touched my heart deeply. When during a conversation he would look at me with those calm, searching, penetrating, and yet so benign eyes, I would be overwhelmed by a feeling of boundless filial trust and devotion. I would feel that I could confide in him, without reservation, everything I had on my mind, knowing that I would find him a fair and tolerant judge; a single word of approval, let alone praise, from his lips would make me as happy as any worldly triumph."

On the other hand, with shallow or trivial persons Helmholtz was apt to invest himself with "the subtle ether of potential disapprobation," which, as some have testified, made them feel as if they were dealing with the fourth dimension of space (Garrison).

It is not surprising that a biographer, J. G. M'Kendrick, called him one of the greatest geniuses of the nineteenth century.

SAN FRANCISCO, CALIFORNIA

CHAUNCEY D. LEAKE

References


EDUARD HITZIG (1838–1907)

HITZIG, a native of Berlin, came of a distinguished family. His grandfather was a criminologist, writer and poet, and his father was one of Europe's most renowned architects. Hitzig at first embarked on the study of law, then turned to medicine. After some semesters at Würzburg, he completed his studies at Berlin. where, in 1862, he received his doctorate. He then engaged in the practice of medicine in Berlin. Called to Zürich in 1875, he became professor of psychiatry and director of the Burghölzli Asylum. Here, a year later, von Monakow became one of his pupils. Hitzig held this position until 1879, when he was made a member of the faculty of the University of Halle and director of the psychiatric clinic of the Irrenanstalt Nietleben. Later, in 1885, he was appointed director of the newly founded neuropsychiatric clinic of
Hitzig's epochal studies of the electrical excitability of the cerebral cortex were initiated during the 1860s with experienced Gustav Theodor Fritsch (1838–1927) as his collaborator. At that time there were no laboratories available at the Physiological Institute in Berlin for work on warm-blooded animals, and as a consequence Hitzig and Fritsch did their first studies on dogs in Hitzig's home, operating on Frau Hitzig's dressing table. Their joint paper in 1870,\(^1\) of which Fritsch was the senior author, marked the beginning of a new era in the study of brain physiology. According to Percival Bailey, the legend goes that Fritsch discovered in dressing a wound of the brain during the Prussian-Danish war in 1864 that irritation of the brain causes twitching of the opposite side of the body. Earnest\(^2\) states that Weir Mitchell was aware as early as 1860 that one side of the brain innervates the opposite side of the body; this was just before the time that Mitchell took up his study of the war-wounded in Philadelphia. (In this connection it should be mentioned that Roberts Bartholow, of Cincinnati, Ohio, was the first to apply electrodes to the human cortex [1871], using as his subject a servant of his household who had cancer of the scalp. Weak faradization of the cortex produced muscular contractions of the limbs of the opposite side of the body and turning of the head to that side.\(^3\) On publication of this observation, Bartholow was forced to leave Cincinnati.) Fritsch's work with Hitzig was his only important contribution. Fritsch was a man of wealth, a globe-trotter, who spent about ten years in South Africa. Some time after 1870 he was made Ausserordentlicher Professor of physiology at the University of Berlin. He never became Ordinarius.

Working subsequently without the aid of Fritsch, Hitzig defined the limits of the motor area in the cerebral cortex of dog and monkey, and using this discovery as a starting point, he\(^4\) disproved the holistic theory of the equivalence of all parts of the cerebrum proposed in 1842 by Marie Jean Pierre Flourens (1794–1867)\(^5\) and adopted by Goltz. He also struck a blow at Munk's view\(^6\) that the property of intelligence is discretely distributed through the cortex in aggregates (rather than uniformly as contended in the holistic theory of intelligence), a view supported by Monakow\(^7\) and Kleist\(^8\) on the basis of brain injuries in man. "I believe," wrote Hitzig\(^9\) (p. 261), "that Munk is correct in his view that intelli-

---


\(^{2}\) Earnest, Samuel, 1900, The History of Medicine, p. 67.


\(^{6}\) Munk, Rudolf, 1900, "Über die Lokalisation der Nervenleistungen," Archiv für Psychiatrie.

\(^{7}\) Monakow, Eduard, 1900, "Uber die Lokalisation der Nervenleistungen," Archiv für Psychiatrie.

\(^{8}\) Kleist, Rudolf, 1900, "Über die Lokalisation der Nervenleistungen," Archiv für Psychiatrie.

---

Portrait, courtesy of Dr. Maurice Genty, Académie de Médecine, Paris, France.
gence—or better, the store of ideas—is a property of all parts of the
cortex, or rather of all parts of the brain, but I contend that abstract
thought must require particular organs, and these I find in
the frontal lobe” (translation by Halstead, 1947).

As a pioneer in experimental investigation, much of Hitzig’s
work was carried out under conditions which would have discour-
aged less ardent investigators. He had even to battle with the Min-
istry of Finance for oil paint to brighten the walls of his labora-
tory. In all of his investigative work and his teaching he constantly
emphasized the importance of exact data obtained under con-
trolled conditions; he held no brief for philosophic speculations.
His comprehensive grasp of the problems involved in the physi-
ology of the brain and his capacity to evaluate the data at hand are
particularly evident in his Hughlings Jackson Lecture on the
motor cortex and in his Welt und Gehirn (Berlin, Hirschwald,
1905).

His contributions to medical education, particularly in the
fields of neurology and psychiatry, were also noteworthy. Through
his influence, psychiatrists became increasingly aware that the
brain is the instrument of the mind and that the treatment of
mental patients must be placed on a more scientific basis. He also
brought to public attention the need for more adequate provi-
sions for the care of mental patients.

Hitzig was a stern man—sharp, abrupt, disagreeable. It was hard
to win from him either affection or dislike, but toward those
whom he disliked he could be most caustic. He was a lover of po-
lemics, and took great relish in his long controversy with Munk on
localization of function in the brain of the dog. To him, contro-
versy was necessary if science was to progress. When Forel arrived
at Burghölzli in March, 1879, to succeed Hitzig, he found the insti-
tution in a topsy-turvy state, with an atmosphere of confusion and
agitation reigning. Hitzig, with the soul of a jurist, actually re-
eviled in his lawsuit against the economist Schnurrenberger, but
nonetheless was burning to be off. He left Zürich with the air of a
martyr, thanks to his “incorrigible conceit and vanity complicated
by Prussianism.”

Near the end of his life, Hitzig became almost blind, and thus

was forced to put his sword in its scabbard. He often said that he
did so with the greatest reluctance.

ALBERT KUNTZ

References

1Arch. Anat. Physiol., 1. Pz., 1850, p. 500–532. 2S. Weir Mitchell,
novelist and physician. Philadelphia, U. of Pa., 1930. 3Amer. J.
Abhandlungen physiologischer und pathologischer Inhalts. Berlin,
Hirschwald, 1874. 5Recherches expériementales sur les propriétés et
les fonctions du système nerveux. Paris, Baillière, 1842. 6Über die
Funktionen der Grosshirrinde; gesammelte Mittheilungen mit Anmer-
kungen. Berlin, Hirschwald, 1890. 7Gehirnpathologie. Wien,
Hölder, 1905. 8Die Lokalisation im Grosshirn und der Abbau der
Funktion durch kortikale Herde. Wiesbaden, Bergmann, 1914.
12Hughlings Jackson and die motorischen Rindenzentren im Lichte
physiologischer Forschung. Berlin, Hirschwald, 1901.

References to Biography and Works: 1) Kirchoff (ed.), Deutsche Irren-
and intelligence. A quantitative study of the frontal lobes. Chicago
Neuchatel, Bacroinière, 1941. 4) Neurosurgical classics. New York,


LUIGI LUCIANI (1840–1919)

Luciani, a pioneer in cerebellar physiology, was born in
Ascoli Piceno, Italy. At the age of twenty he graduated from
the Gymnasium, where his intelligence and industry had
greatly impressed his Jesuit teachers. Italy was then undergoing
political upheaval, and the young man—a nephew of the great pa-