History of Neurology: Charles-Édouard Brown-Séquard - The Original International Neurologist

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A live recording of this lecture can be viewed here: RRNMF - Charles-Édouard Brown-Séquard

This History of Neurology article is about Charles-Édouard Brown-Séquard, who I consider the first original international neurologist. I'll explain why I think that as I go through his story.

Brown-Séquard was born in the Mauritius Islands off the coast of Africa (Figure 1). Interestingly, his father, Brown, was an American sea captain who died at sea before Brown-Séquard was born. His mother, Charlotte Séquard, was French, although she herself was born in Port Louis in the Mauritius Islands. He grew up very poor and was also poorly educated early in life. In 1838, his mother took him to Paris, where he began to receive some formal education.

At first, he wanted to be a poet and wrote a great deal of poetry. Eventually, he decided that poetry was not for him and he burned all of his manuscripts. He then enrolled in medical school and changed his name to the French form by which we now know him, Charles-Édouard Brown-Séquard. In 1846, he graduated from the Faculty of Medicine in Paris. His medical thesis focused on experimental research on the physiology of the spinal cord, which marked the beginning of his lifelong study of this subject.[1]

Just a few years later, he published his classic experiments in which he sectioned the spinal cord and demonstrated that pain and temperature pathways were crossed, while the corticospinal tracts remained ipsilateral.[2] This work produced what became known as Brown-Séquard syndrome. These experiments made him famous and led to his success throughout his career.[3-7]

Around this time, his mother died, and he had very little income. He continued performing spinal cord experiments in animals and seeing patients, but he was very depressed and experienced many psychosomatic symptoms even at that time. I will return to this later. This period marked the beginning of his transatlantic life, as he moved back and forth between Europe and America in various clinical and academic positions (Figure 2).

In 1852, he moved to the United States. At that point, he did not speak English, but he learned it and began seeing

Figure 1

Charles-Édouard Brown-Séquard MD
1817-1894

- B - Port Louis, Mauritius
- American father, French mother, born British
- Edward Brown sea captain, lost at sea before Édouard's birth
- Charlotte Séquard, born Port Louis (French)
- Grew up poor, poorly educated
- 1838; 1st Paris visit with his mother
  - Wanted to be a poet! Burned his manuscripts but enrolled at Faculty Medicine of Paris
- Changes name to Édouard Brown-Séquard
- 1846; Graduated/Thesis: Researches and Experiments on the Physiology of Spinal Cord
- 1850; Demonstrated crossed sensory paths when cut cord in animals - Brown-Séquard Syndrome
- Mother died 1848, very poor; just did research and saw patients
  - Depressed/psychosomatic symptoms

Figure 2

Éduoard Brown-Séquard MD – America and England

- 1852 – Moved to American and learned English
    - Saw patients, delivered babies, co-wrote Obstetrics book
        - Letters of introduction by Broca and others
    - Lectured and experimental demonstrations in NY, Boston, Philadelphia
- 1853 – Married Ellen Fletcher (American), returned to Paris/Mauritius
- 1854 – Professor of Physiology at New Medical College of Virginia in Richmond
    - Bored and disillusioned
- 1855 – Returned to Paris, visited London/Cambridge
- 1856 – Son born,back to USA to see family and lecture – Boston, NY, Baltimore, Charleston,
- 1857 – Returned NY to lecture
- 1858 – London lectures, Royal Society
- 1859 – Edinburgh, Glasgow, London, Dublin
- 1860 – Queen Square, National Hospital for Nervous Diseases – Brown-Séquard one of 2 founding physicians
    - Friends with Darwin, Huxley, Jackson
- 1860 – Published: *Course Lectures on the Physiology and Pathology of the Central Nervous System*

patients. He engaged in a wide range of medical practice, including delivering babies, and he co-wrote an obstetrics book while in America. He carried letters of introduction from famous French neurologists such as Broca, and his spinal cord experiments had already established his reputation. As a result, he was invited to lecture and perform experimental demonstrations in New York, Boston, and Philadelphia.

He married an American woman and later returned to Paris and the Mauritius Islands for a period of time. In 1854, he returned to the United States and accepted his first academic position as a professor of physiology at a new medical college in Richmond, Virginia. Even today, the medical school in Richmond still refers to Brown-Séquard as one of its original neurology faculty members. However, after only a year he became bored and disillusioned in Virginia and returned to Paris in 1855.

During this period, he visited London and Cambridge for the first time. Shortly afterward, he had a son. Because his wife was American, they returned to the United States to visit her family and introduce the baby. While there, he delivered a series of lectures in Boston, New York, Baltimore, and Charleston and then published a book based on the lectures.[5] In 1858, he was invited to give a series of lectures at the Royal College of Surgeons in England. While in England, he also lectured in Edinburgh, Glasgow, and Dublin.

In 1860, he was named one of the founding neurologists at the National Hospital for Nervous Diseases at Queen Square in London. This was a significant appointment. His College of Surgeons lectures were later published in a book titled Course of Lectures on the Physiology and Pathology of the Nervous System (Figures 3 and 4).[6]

Figure 3

Course Lectures on the Physiology and Pathology of the Central Nervous System (1860) delivered at the Royal Society, London

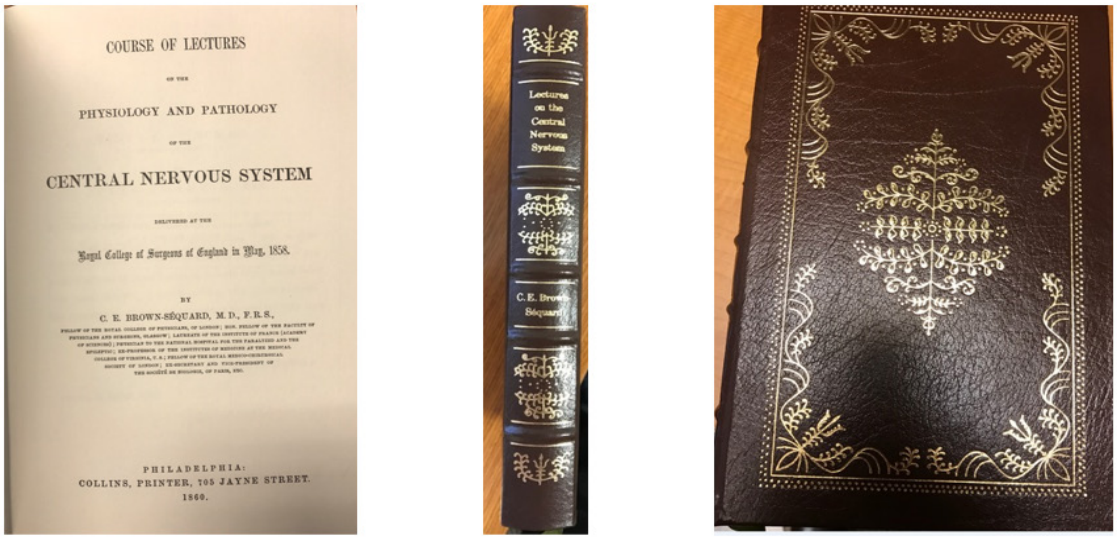


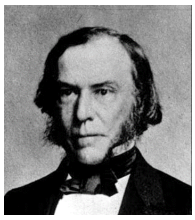
Figure 4

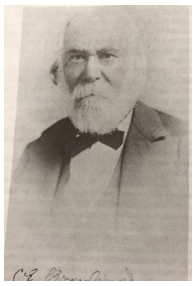
Course Lectures on the Physiology and Pathology of the Central Nervous System (1860)

Figure 5

Éduoard Brown-Séquard, MD – Back to America and France

- 1864 – Harvard; Professor Physiology and Pathology of the Nervous System; wife dies
  - Resigns 3 times, meets Weir Mitchell
- 1867 – Returned to Paris – with Charcot
- 1871 – to NY due to Franco-Prussian War
  - Remarried (woman 30 yrs younger) Maria
- 1873 – Boston, lectured with Agassiz, OW Holmes, Putnam in audience
  - Clinical practice in NYC
  - With Edward Sequin (Columbia) started Archives of Scientific and Practical Medicine
- 1874 – 2nd wife dies, post partum
- 1876 – returned to Paris
- 1877 – 3rd marriage; lectured Cambridge, NYC
- 1878 – Claude Bernard dies and Edward Brown-Séquard assumes Professor and Chair of Medicine College de France (Magendie old chair) and his lab
  - Close to L. Pasteur, Gustave Eiffel
- 1894 – 3rd Wife Dies, Emma
  - Edward Brown-Séquard dies several months later, age 77
- 577 publications
  - First in 1846 – Doctoral Thesis; 6 in 1894





The book became well known in the medical and neurological communities and firmly established his international reputation. The volume also included beautiful illustrations.

He continued traveling extensively (Figure 5). After his time in London, he returned to the United States and became a professor of physiology and pathology of the nervous system at Harvard, the first chair of its kind in the United States. During this period, his first wife died. He attempted to resign from Harvard three times but was persuaded to stay. He became friends with Weir Mitchell but eventually returned to Paris, where he interacted with Charcot, who was then in charge of the Salpêtrière. Brown-Séquard was appointed chair of comparative and experimental pathology at the Museum of Natural History. This was a controversial appointment. There was opposition by a number of prominent scientists, possibly including Claude Bernard, who expressed concerns about the rigor of Brown-Séquard's scientific method.[7] This distinguished academic chair had previously been held by Claude Bernard, a scientific pioneer who wrote a classic book about the experimental method in 1865.[8] Interestingly, Brown-Séquard had previously confirmed and elaborated on Bernard's groundbreaking studies on the sympathetic control of the vasomotor mechanism. Claude Bernard had shown that destruction of the cervical sympathetic ganglion caused dilation of blood vessels, which produced erythema and increased temperature on that side of the face and especially the ear. Brown-Séquard subsequently demonstrated electrical stimulation of the cervical sympathetic ganglia caused vasoconstriction, blanching, and decreased temperature of the rabbit's ear.[9] He also spent a great deal of effort studying epilepsy, searching for both the cause of epilepsy and potential treatments, and he was among the first to suggest the use of bromides for seizures.[10,11] By the 1860s, he was a recognized authority on all disorders of the nervous system.

Because of fears surrounding the Franco-Prussian War, which France ultimately lost, he left Paris and returned to New York. He remarried, this time to a woman named Maria, who was thirty years younger than him. He resumed lecturing in Boston, met prominent figures such as Oliver Wendell Holmes and Charles Pickering Putnam, and began practicing medicine in New York City. He founded a new journal, Archives of Scientific and Practical Medicine, one of many journals he established throughout his life.

In 1874, his second wife died postpartum. He returned to Paris, married again, and once more traveled to the United States to lecture in New York City. Before that, he lectured in Cambridge, England. In 1878, he was invited back to Paris following the death of Claude Bernard. Brown-Séquard assumed Bernard's position as professor and chair of medicine at the Collège de France, a highly prestigious role. While in France, he became friends with Louis Pasteur and Gustave Eiffel.

In 1894, his third wife died, meaning he outlived all three of his wives. Shortly thereafter, he himself died at the age of seventy-seven. He was extraordinarily prolific, producing a total of 577 publications. His first publication was his 1846 doctoral thesis on spinal cord experiments,[1] and in the year of his death, he published six papers.

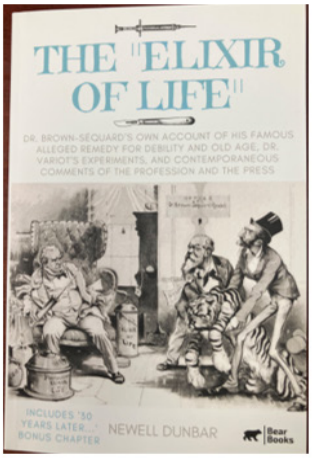
Figure 6

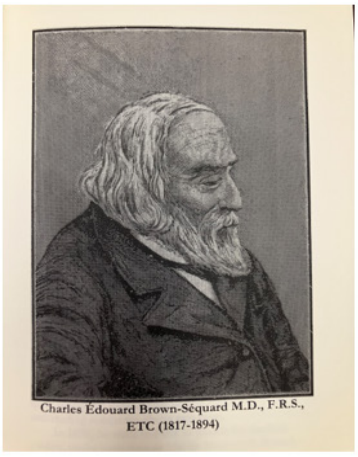
Éduoard Brown-Séquard, MD & Endocrinology

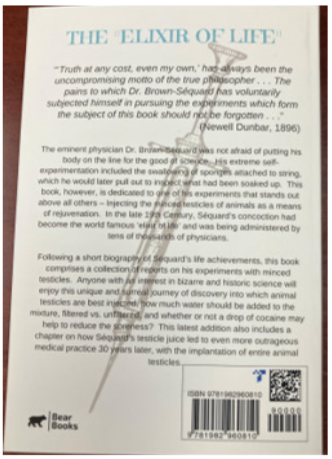
- 1855 – Addison reported disease of the adrenal glands caused anemia, weakness, bronzing of skin and other changes
- 1856 – Brown-Séquard reported excision of both adrenal glands in cats, dogs guinea pigs, rabbits and mice led to death within 24 hours
- Many initially disputed Addison and Brown-Séquard
  - Their experiments and observations initiated modern endocrinology
- Age 72 - Brown-Séquard noticed decline of strength, concentration, fatigue, increase of insomnia, worsening constipation
  - Created solution of testicular blood, seminal fluid and testicular extract from healthy dogs and guinea pigs and injected in himself 10 X over 3 weeks.
  - Reported his observation to Société de Biologie
  - Noticed increased mental concentration, physical endurance, stream of urine, bowel habits and increased power in his forearm by 5-6 kgs
- Very controversial but many including W Hammond confirmed findings
- Brown-Séquard used adrenal extracts for Addison's Disease and others used thyroid extracts for myxedema
  - Generally no benefit until fat solvents used in 1930, but Brown-Séquard started the field of hormone replacement

Figure 7

The "Elixir of Life"; Brown-Séquard's own account of his famous alleged remedy for debility and old age, Dr. Variot's experiments, and contemporaneous comments of the profession and the press




Charles Édouard Brown-Séquard M.D., F.R.S., ETC (1817-1894)



Beyond neurology, Brown-Séquard had many innovative ideas. He was among the first endocrinologists (Figure 6). After Addison described what is now called Addison's disease, Brown-Séquard conducted animal experiments in 1856 to confirm these findings by removing adrenal glands from cats, dogs, guinea pigs, rabbits, and mice, which resulted in death.[12,13] Although the findings of both Addison and Brown-Séquard were initially disputed, they were both ultimately proven correct.

At age seventy-two, Brown-Séquard, who had long experienced psychosomatic symptoms, complained of declining strength, poor concentration, fatigue, insomnia, and worsening constipation. While this may have reflected normal aging, he devised a solution made from testicular blood, seminal fluid, and extracts from the testicles of healthy dogs and guinea pigs. He injected himself ten times over three weeks and believed that his condition improved. He reported these findings to a French scientific society and even measured his strength and stamina in what would now be considered an open-label, single-subject experiment (Figure 7).[14]

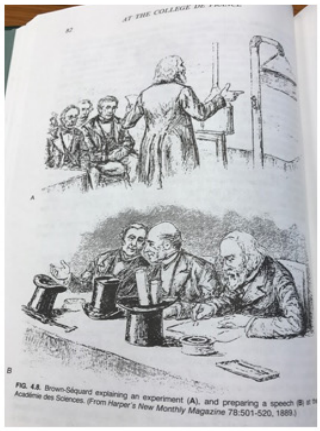
Although controversial, his ideas attracted attention. In the United States, Dr. William Hammond, surgeon general of the US Army during the civil war, close friend of Dr. Weir Mitchell, and author of the first textbook of neurology published in the United States, believed Brown-Séquard might be on the right track.[15] His extracts were eventually commercialized and sold publicly. Brown-Séquard also used adrenal extracts to treat Addison's disease and thyroid extracts to treat myxedema. These treatments failed, but this was due to limitations in known chemistry at that time. Later, when the field of chemistry improved and better compounds could be extracted and modified appropriately and administered to patients with success, Brown-Séquard's hypotheses were proven correct.

Brown-Séquard was truly an extraordinary individual. Throughout his career, he remained a dedicated teacher. He was even caricatured in French literature, where his life-extension extracts were mocked. Today, a bust of Brown-Séquard still exists in Port Louis in the Mauritius Islands (Figure 8).

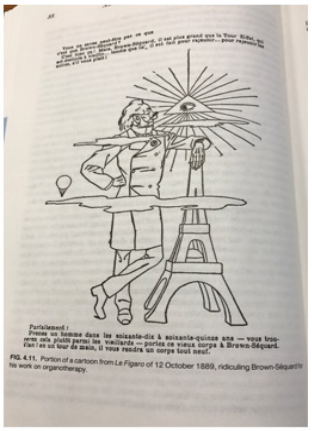
A biography of Brown-Séquard was published in 1946 by J. M. D. Olmstead.[16] More recently, two excellent books have been written about Brown-Séquard by Professor Michael J. Aminoff, University of California-San Francisco (Figure 9).[17,18] The first was published in 1992 and the second in 2011.

Figure 8

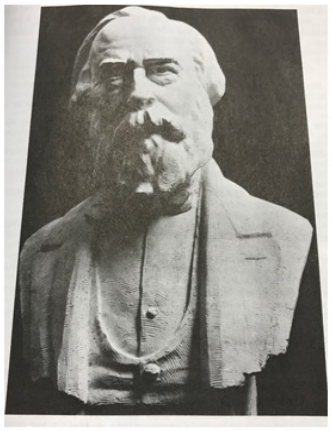
Éduoard Brown-Séquard, MD



Teaching



"Elixir of Life"



Bust in Port Louis, Mauritius

Figure 9

Biographies of Charles Éduoard Brown-Séquard in English

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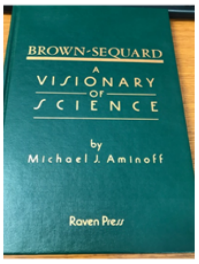

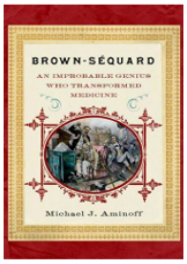

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