SCIENCE LIVES

Drawing the mind, one neuron at a time

A new biography celebrates the Spaniard who founded modern neuroscience

By **Alex Gomez-Marin**

In his new book, *The Brain in Search of Itself: Santiago Ramón y Cajal and the Story of the Neuron*, author Benjamin Ehrlich walks readers through the life and work of Santiago Ramón y Cajal, the Spaniard whom many consider the founder of modern neuroscience. Structured as a series of brief, captivating chapters, the first major English language biography of Cajal is a delightful read. With rigor and eloquent prose, Ehrlich captures the essence of Cajal's visionary thought and force of character, drawing a composite portrait of the "peasant genius" who became a Nobel laureate.

Born in a small village in the north of Spain in 1852, Cajal had a difficult upbringing. As a child, he was beaten by his father, Justo, at home and by his teachers at school, a terror that he later admitted he would "prefer to bury in the shadows of the unconscious." At the age of 10, he knew he wanted to be a professional artist, but Justo ordered him to become a doctor first. Cajal thus "entered the Castle of Science through the Door of Art."

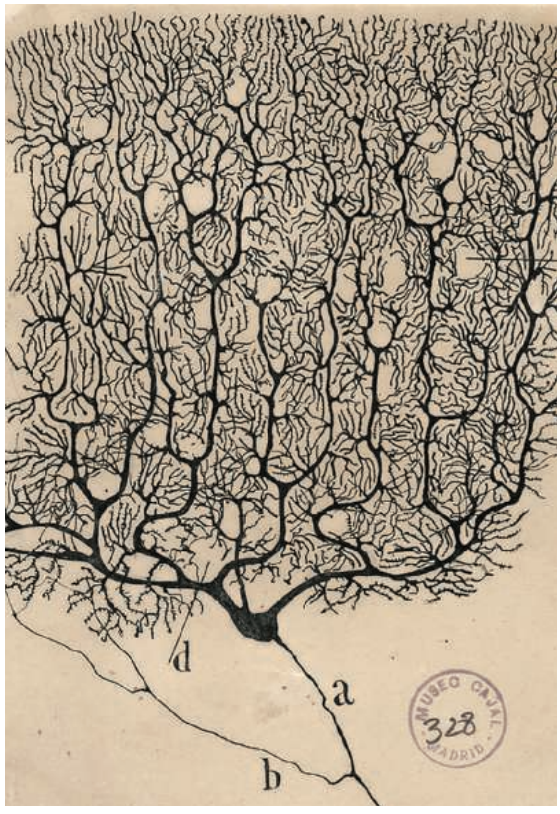
As a university student, Cajal loved writing stories. In one, he arrives on Jupiter, which is inhabited by beings so big that he can inspect their cells directly, foreshadowing his scientific contributions. With his first microscope, he began a systematic exploration of the tissues of the human body. Not content to superficially observe cells, he sought to chart their microscopic anatomy and turned to histology, the art of optical dissection.

In 1879 he married Silveria Fañanás, about whom he noted: "Only the unsurpassable self-abnegation of my wife made my scientific work possible." Together, they had seven children. The Cajals' modest economy covered their rent and food, with the rest spent on the scientist's home laboratory. When he finally won his third "oposición"—a "quintessentially Spanish" tenure examination—they moved from Zaragoza to Valencia.

From Luis Simarro Lacabra, Cajal's colleague and competitor in Madrid, he learned about Camillo Golgi's staining technique that made visible random bits of nervous tissue. Working in solitude and employing his prodigious imagination, he avidly used and improved the method, even as most others abandoned it as too unreliable.

Weary of distractions, Cajal moved to Barcelona at the end of 1887, away from family and friends. In his first 4 years there, he published 43 papers and founded his own journal. Instead of trying to map the impenetrable "full grown forest" of the adult brain, Cajal shifted his studies to the "young wood" of early embryos. Absent the sheaths of myelin that coated mature neurons, young neurons stained better, he found.

In the cerebellum, he found magnificent Purkinje cells, the largest of neurons. Whereas Golgi had drawn them fading away, in Cajal's eyes they "ended freely," and his empirical data compellingly suggested the independence of each neuron. He also inferred that electrical transmission in neurons was directional. To communicate his seminal discoveries, Cajal traveled to Berlin in 1889, where he met the renowned anatomist Albert von Kölliker, who began promoting the Spaniard's work to the world.



Cajal's rendering of a Purkinje neuron found in the human cerebellum captures the beauty and intricacy of this complex cell.

The Brain in Search of Itself: Santiago Ramón y Cajal and the Story of the Neuron
Benjamin Ehrlich
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After Cajal's landmark discoveries in Barcelona, he moved to Madrid in 1892, where prizes and honors poured in and his "Spanish school," which teemed with promising young scientists, started taking off. He published dozens of monographs, including his masterpiece *Texture of the Nervous System of Man and the Vertebrates*, an overwhelming synthesis comprising 2000 pages and close to 1000 illustrations.

In 1906, he received the Nobel Prize in Physiology or Medicine for establishing that the neuron is the basic unit of the nervous system, sharing the award with Golgi. While the Italian provided the key to unlock the secrets of the nervous system, the Spaniard mastered its use. Urged to take part in politics by his liberal colleagues, Cajal mostly demurred, dedicating his scarce free time to establishing Spanish research institutions.

Cajal spent his final days surrounded by his "spiritual grandchildren"—disciples Jorge Francisco Tello and Fernando de Castro, among others—passing away in 1934 at the age of 82. He requested no solemn homage. "And what do praises matter to me?" he wrote once in a notebook. "When they applaud me I will not exist."

Yet it is important to remember figures like Cajal, not only to honor them but also because their stories help us better understand ourselves. With this delightful biography, Ehrlich has done justice to Cajal, just as Cajal did justice to the brain. ■

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