here the modern quantitative approaches and mathematical theories of community composition and species diversity, but what one does find is a paradigm of the sort of study that will ultimately determine the survival or failure of new approaches.

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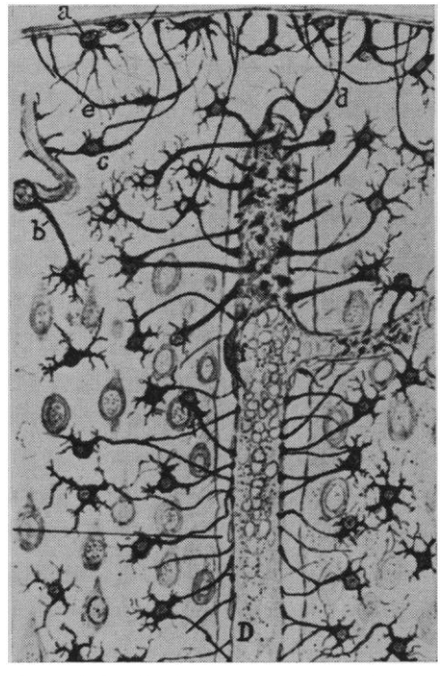
Cajal

Recollections of My Life. SANTIAGO RAMÓN Y CAJAL. Translated from the third Spanish edition (1923) by E. Horne Craigie and Juan Cano. M.I.T. Press, Cambridge, Mass., 1966. 650 pp., illus. $10. Reprinted from *Memoirs of the American Philosophical Society*, vol. 8, 1937.

Santiago Ramón y Cajal, born in 1852, spent his boyhood and youth in a small village in the foothills of the Pyrenees. The ruins of a glorious past contrasted sharply, it seems, with the rapidly changing world beyond the province of Huesca. In the first part of his autobiography Cajal recounts, with candor and the detached and lonely wisdom of an aging man, the escapades of the childhood and youth of a congenital rebel: protest against the single-minded, domineering father, boredom and conflicts with the teachers in school, boyish pranks and punishments, and constant scrapes with bullies, each defeat feeding his will to get the better of adversities. As would any youngster, Cajal identified himself with the literal rather than the metaphoric side of the character of Cervantes' Knight of La Mancha: "I took the figure of Don Quixote seriously and so felt keenly the damaged state in which the valiant knight emerged from nearly all his quarrels and adventures." After a stint as a cobbler's apprentice and another as a barber's assistant, Cajal, at age 16, took up the study of medicine at Saragossa.

The second part of the book is a record of Cajal's discoveries in the histology of the nervous system, of the reverses and grievances of "academic scrapes" for priorities, and of his major battle, and greatest victory, in proving, against a formidable array of authorities (Golgi, Bethe, Marchand, Monckeberg, O. Schultze) who held to the then prevalent theory of the protoplasmic continuity of the neuronal reticulum, that the neuron is a structural and functional unit. This part of the autobiography gives an interesting insight into the intellectual climate that prevailed in the academic world in Europe between the Franco-Prussian War of 1870 and the war of 1914–18, a period in which the political and economic center of gravity, and with it the center of scientific authority and prestige, was shifting from Latin to Germanic Europe. The technological revolution in scientific methods and instrumentation had its beginning in those decades. Cajal was not a technological inventor; he was, however, his own technician, and an unexcelled one. Cajal regarded himself as an artist, and if paternal intransigence and his own insatiable curiosity about nature had not deflected him, he would have become a painter. He defined his own cerebral constitution as "visual," in William James's term. In school he was a poor listener and exulted in visual demonstrations. In his work as a scientific observer, the images which he sought and found in a section of brain tissue under a microscope provided him with an esthetic pleasure. He went after this inchoate "constellation of the unknowns" with the obsession of an artist seeking a perfect image of visual reality. His scientific writings were meticulously yet often laboriously worded; he was most eloquent and explicit in the exquisite drawings with which he illustrated the text. His startling conclusions followed inexorably from what he saw. These conclusions were statements of a new empirical reality which contradicted the accepted notions—that is, theories—of reality. Such is the essence of true discovery.



One of Cajal's drawings, a sectional view of the molecular layer and the area of small pyramidal cells of the cerebrum of a cat. [Reproduced from the third Spanish edition of *Recuerdos de Mi Vida*, Madrid, 1923, by courtesy of the National Library of Medicine]

Cajal's first opportunity to present his discoveries to the scientific world came in 1889, on the occasion of the meeting of the German Anatomical Society in Berlin:

> Among those who showed most interest in my demonstration I should mention His, Schwalbe, Retzius, Waldeyer, and especially Kölliker. . . . these savants, then world celebrities, began their examination [of Cajal's preparations] with more skepticism than curiosity. . . . However, when there had been paraded before their eyes in a procession of irreproachable images of the utmost clearness, the axons of the granules of the cerebellum, the pericellular basket-endings, the mossy and climbing fibres, the bifurcations and ascending and descending branches of the sensory roots, the long and short collaterals of the columns of white matter, the terminations of the retinal fibres in the optic lobes, etc., the supercilious frowns disappeared. Finally the prejudice against the humble Spanish anatomist vanished and warm and sincere congratulations burst forth.

From the pages of this autobiography emerges the figure of a great man who embodied all the strengths and weaknesses of his race—uncompromising dedication and fanatical loyalty to an ideal, frugality and an indomitable courage to endure adversities, and, in the guise of humility, an immense personal pride. Cajal is almost unique as a great scientist, and his life as a scientist reveals the features of the dedicated conquistador, militant saint, and poetic adventurer in the unknown.

Usually aloof and chary of reference to his private life, Cajal allows an intimate and revealing paragraph when recalling a difficult period of his life in 1891, when his child was dying:

> Perchance in such distressing circumstances anguish was the sovereign sharpener of my wits. Continuously awake, exhausted with fatigue and distress, I developed the habit of drowning sorrows during small hours of the night in the light of the microscope, so as to lull my cruel tortures. And one bitterly fateful night, when the shadows were beginning to fall on an innocent being, there suddenly blazed forth on my mind the splendor of a new truth.

Portraits of Cajal as he appeared in later life remind one of the ascetic verticality of the saints and ecclesiastics in El Greco's paintings.

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