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Santiago Ramón y Cajal is one of the scientific giants of the twentieth century. By all accounts he was the founder of neuroscience. But these two phrases fall short of understanding not only his impact on science but also his unique talents.<sup>1</sup>

Ramón y Cajal (that is his full surname) was born on May 1, 1852, in a very small town called Petilla de Aragón, in northeastern Spain. He was the son of the local surgeon. As a teenager, he rebelled against any form of authority including his father's wishes of becoming either a shoemaker or a barber while his real interest was in becoming an artist for which he showed early signs of talent. Hoping to interest his son in a medical career, Ramón y Cajal's father took him to graveyards to find human remains for anatomical study during the summer of 1868. Sketching bones was a turning point for him and, subsequently, he did pursue studies in medicine at the University of Zaragoza while also showing a great deal of interest in gymnastics and philosophy. After graduating as a medical doctor in 1873, he was drafted as a medical officer and sent to the war in Cuba during 1874 and 1875, in which the Spanish crown was fighting the rebels. There he contracted malaria and later tuberculosis.

Soon after he returned from Cuba, Ramón y Cajal got his first academic position as "auxiliary professor" of anatomy at the University of Zaragoza. In 1877, he received his doctorate in medicine in Madrid. He married Silveria Fañanás García in 1879, an uneducated young woman, who stood at his side for the rest of their lives (she died in 1930). They had four daughters and three sons (two of whom died in their childhood). He was awarded professorship positions at the universities of Valencia (1883), Barcelona (1887) and Madrid (1892). He was

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1. Aldemaro Romero, Jr., "Ramón y Cajal: Génesis y Evolución de Un Científico," *Algo* 274 (1975): 8-12.

also the director of the Zaragoza Museum (1879), director of the *Instituto Nacional de Higiene*—(*National Institute of Hygiene*, 1899), and founder of the *Laboratorio de Investigaciones Biológicas* (*Laboratory of Biological Investigations*, 1922), later renamed in his honor as the *Instituto Cajal* (Cajal Institute).

In 1877, he purchased with his own funds an old-fashioned microscope thus beginning his research career. Initially, he was interested in inflammation and on the structure of muscle fibers. In 1885, during his tenure as Professor at the University of Valencia, the provincial government of Zaragoza, in recognition of his labor during a cholera epidemic, awarded him a modern Zeiss microscope.

Yet, it was not until 1887—at 35 years of age—that he started what was going to be his great contributions to science. That year he learned about the method of cell staining developed by the Italian Camillo Golgi. This method greatly enhanced the ability to study nerve cells and Ramón y Cajal himself modified the Golgi method in order to improve its capabilities. He presented the results of his new observations at the 1889 Congress of the German Anatomical Society, which were greatly appreciated by his fellow scientists.

Based on his observations, he concluded that unlike the prevalent belief that the nervous system was made up a network of continuous elements, it was actually made of basic units represented by individual cellular elements (later named “neurons”). This conclusion is the modern basic principle of the organization of the nervous system.

He also proposed “the law of dynamic polarization,” stating that the nerve cells are polarized, receiving information on their cell bodies and dendrites, and conducting information to distant locations through axons, which turned out to be a basic principle of the functioning of neural connections. Ramón y Cajal and Golgi shared the Nobel Prize in 1906 for their studies on the nervous system. Other contributions from his more than one hundred scientific papers and many books are just too many to summarize for this book review.

Ramón y Cajal (who died in Madrid on October 17, 1934) was also an accomplished photographer and his medical illustrations are legendary even today. Hundreds of his drawings illustrating the delicate arborizations of brain cells are still in use for educational and training purposes today. Even by current standards, they are considered among the most remarkable illustrations in the history of science and that is what this book, *The Beautiful Brain: The Drawings of Santiago Ramón y Cajal*, is all about.

The book contains several very well written chapters by distinguished academics about Ramón y Cajal’s life and work. In addition to many of his

photographs (a number of which are self-portraits), the book reproduces 75 of his drawings, all of them accompanied by an explanation by the contributors to the book which are very helpful for understanding their significance. Further, the book also contains a few modern photographs of the nervous system that help to contextualize Ramón y Cajal's accuracy of observations as well as his vision that allowed him see things that others were unable to observe.

If there is a book that presents science greatly benefitted by art and insight, this is it.