

GREY ART NYU GALLERY

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EXHIBITION PRESENTS GROUNDBREAKING DRAWINGS OF THE HUMAN BRAIN BY THE FATHER OF MODERN NEUROSCIENCE

The Beautiful Brain: The Drawings of Santiago Ramón y Cajal

On view at NYU's Grey Art Gallery
January 9–March 31, 2018



Santiago Ramón y Cajal
Tumor cells of the covering membranes of
the brain, 1890
Ink and pencil on paper, 6 1/4 x 4 9/10 in.
Cajal Institute (CSIC), Madrid

New York University's Grey Art Gallery is pleased to present the first major U.S. exhibition to showcase the extraordinary drawings of Santiago Ramón y Cajal (1852–1934), widely recognized as the father of modern neuroscience. On view from January 9 through March 31, 2018, *The Beautiful Brain: The Drawings of Santiago Ramón y Cajal* comprises some 80 drawings, most on view for the first time outside the scientist's native Spain. Cajal's depictions of the human brain and other tissues—which combine cutting-edge scientific information with consummate draftsmanship—often offer greater clarity than photographs, so much so that they are still in wide use today. Created in the late 19th and early 20th centuries, Cajal's depictions of brain cells, brain regions, and neural circuits figure among the most important illustrations in the history of science.

This landmark show highlights Cajal's artistic accomplishments, which illustrate his 1906 Nobel Prize-winning supposition that the nervous system is composed of discrete yet contiguous cells called neurons. Confirmed through electron microscopy in the 1950s, Cajal's theories form the foundation of neuroscience today. In *The Beautiful Brian*, his intimate drawings—on loan from the Cajal Institute in Madrid—are displayed alongside a selection of contemporary computer-aided images of and video animations about the brain made using advanced optical imaging techniques. Also featured is a selection of historic books, including volumes by Cajal, tracing the history of medical illustrations from the 16th to the 20th centuries.

The Beautiful Brain is organized by the Weisman Art Museum in collaboration with Drs. Eric Newman, Alfonso Araque, and Janet Dubinsky, neuroscientists at the University of Minnesota, along with Dr. Ricardo Martínez Murillo, neuroscientist and curator of the Cajal Legacy at the

Cajal Institute (CSIC) in Spain. Grey Art Gallery director Lynn Gumpert observes, “The peerless combination of artistic skill and stunning precision apparent in Cajal’s drawings make them among the most significant examples of medical artistry. His unique range of skills and interdisciplinary contributions resonate with NYU’s own academic strengths in both neuroscience and the visual arts.”

Exhibition

The Beautiful Brain features some 80 drawings made by Santiago Ramón y Cajal between 1890 and 1934. Some are well known; others have not previously been published beyond his original scientific papers. Over the course of five decades, Cajal produced more than 2,900 neuroanatomical drawings. He preferred to work freehand, rarely resorting to a camera lucida, a device that projects a microscope image onto paper where it can be traced. Cajal often brought together, in a single drawing, observations he had made at different times or had obtained using different methods, thus allowing him to convincingly illustrate a larger concept or hypothesis.



Santiago Ramón y Cajal
Injured Purkinje neurons of the
cerebellum, 1914
Ink and pencil on paper, 5 1/10 x 8 1/8 in.
Cajal Institute (CSIC), Madrid

Today, neuroscientists continue to work at the cellular scale that Cajal explored, but now they are able to generate more comprehensive images via electron microscopy. Through magnetic resonance imaging (MRI), confocal micrography, and fluorescent microphotography, among other methods, noninvasive imaging of the entire, living human brain is now possible. Several dozen colorful images and animations created via contemporary neural imaging techniques are featured in the exhibition. Yet despite widespread use of these newer technologies, Cajal’s handmade drawings are still being used in medical conferences, journals, textbooks, and classrooms—demonstrating the continuing importance of his observations. Although most of his drawings were made more than a century

ago, his contributions continue to support advances in the field. As Dr. Janet M. Dubinsky observes, today our scientific questions and goals remain the same as Cajal’s: to “clarify the secret of mental life.”

It is clear from Cajal’s writings that he understood the persuasive power of images. His illustrations are interpretations rather than exacting facsimiles. Their beauty and clarity helped convince his fellow neuroanatomists of the truth of his conclusions. His drawings are both observations and arguments, not unlike idealized portraits. Employing various techniques, he would, for example, depict certain cell types in darker tones while others he sketched in lightly or indicated with washes. Some cells were enlarged out of proportion to emphasize them. He often combined images taken from different brain slices. In one drawing, he humorously portrayed a damaged Purkinje neuron as a swimming penguin.

Cajal’s background and family history illuminates just how far he traveled in making his pioneering discoveries. His father was the son of farmers and worked hard to become the respected local doctor in the small town of Petilla de Aragón in northeastern Spain. Though Cajal wished fervently to become an artist, he acquiesced to his father’s wishes and enrolled in the medical school in nearby Zaragoza, where he graduated in 1873, at age twenty-one. Cajal soon mastered the field of histology, or the study of tissues, in 1875. By 1887 he was introduced to a new method developed by the Italian scientist Camillo Golgi that enabled nerve cells to be stained in their entirety as black silhouettes against light-yellow backgrounds. Using this

method, Cajal came to radically different conclusions from Golgi's. Ultimately, Cajal was a more original, critical, and insightful thinker than Golgi, with whom he was jointly awarded the 1906 Nobel Prize in Physiology or Medicine.

Cajal provided the conceptual framework for thinking about the cellular wiring diagram of the brain and nervous system that is still employed today. He deduced the direction of information flow in neurons by examining their structure and knowing their inputs and outputs. Among his most important contributions to understanding of the brain are the arrows he inserted in his drawings, which indicate the direction of information flow within neurons and neuronal circuits. Cajal was also fascinated by the changes the brain undergoes as it matures, and he studied and documented it at many stages of development, examining, for example, the effects of injuries. In addition to the brain, Cajal examined and illustrated the labyrinth of the inner ear, the olfactory bulb (the brain structure that receives signals from the nose), and the retina across many species, including humans, other mammals, birds, fish, and insects.

An accomplished painter, Cajal made lyrical renditions of forests of neuronal pathways that have been likened to the organic forms found in Surrealist drawings. After seeing Cajal's work in Madrid in the mid-1920s, Luis Buñuel, Salvador Dalí, and Federico García Lorca brought it to the attention of their fellow Surrealists. Nonetheless, Cajal did not view himself as a modernist and, like Albert Einstein, adopted a conservative view of the arts in his time, excoriating critics who praised artists who rejected the "slavish copy of the natural." Yet for Cajal, nature communicated immense feelings and ideas, a conviction that is borne out in his drawings.

As a draftsman, Cajal made seminal contributions to the history of medical illustration. A dozen historic illustrated books—ranging from Vesalius to *Gray's Anatomy* to several of Cajal's own publications—will accompany his drawings and the contemporary images of the brain for which he paved the way. These volumes will offer a striking array of the best of art employed in the service of scientific inquiry, from the Renaissance to the early 20th century. Also on view will be a Carl Zeiss laboratory microscope, c. 1879, which is similar to the one Cajal used to make his revolutionary discoveries.

Contemporary neuroscience visualizations and animations, shown adjacent to Cajal's drawings, range from reconstructed MRI acquisitions to various micrographs (photographs taken through a microscope). The imagery, created by scientists from various institutions, including NYU, shows the evolution of Cajal's early hypotheses to modern-day science, and demonstrates new techniques for depicting the brain that were not available to Cajal.

In addition to making crucial scientific breakthroughs and demonstrating consummate draftsmanship, Cajal was an accomplished self-taught photographer and wrote the first book on techniques of color photography to be published in Spain. He remains a major literary figure in his native country, with an acclaimed autobiography, an entertaining book of aphorisms, and a collection of science-fiction short stories completed before his death in 1934. His *Advice for a Young Investigator* (1897)—which counsels budding scientists on everything from best personality traits to contending with social factors—is still in print today, and professors are still including it in their required reading lists.

Exhibition Catalogue

The Beautiful Brain will be accompanied by a richly illustrated 10 x 11-inch catalogue, available in hardcover and as an Ebook. Contributors include Larry W. Swanson, author of *Brain Architecture* (2012), past President of the Society for Neuroscience, and neuroscientist at the

University of Southern California; Eric A. Newman, Alfonso Araque, and Janet M. Dubinsky, distinguished neuroscientists at the University of Minnesota; Lyndel King, Director and Chief Curator of the Frederick R. Weisman Art Museum, Minneapolis; and Eric Himmel, Editor-in-Chief at Abrams Books, New York. Published by Abrams, the catalogue contains full-color reproductions of all 80 drawings, a commentary on each of them, and essays on Cajal's life and scientific contributions, his artistic roots and achievements, and contemporary neuroscience imaging techniques.

The Beautiful Brain: The Drawings of Santiago Ramón y Cajal
By Larry Swanson, Eric Newman, Alfonso Araque, and Janet Dubinsky
10 x 11 in. 208 pages. 90 color illustrations. Hardcover. Ebook.

Sponsorship

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About the Grey Art Gallery

The Grey Art Gallery is New York University's fine arts museum, located on historic Washington Square Park in New York City's Greenwich Village. It offers the NYU community and the general public a dynamic roster of engaging and thought-provoking exhibitions, all of them enriched by public programs. With its emphasis on experimentation and interpretation, and its focus on studying art in its historical, cultural, and social contexts, the Grey serves as a museum-laboratory for the exploration of art's environments.

Exhibitions organized by the Grey have encompassed all the visual arts: painting, sculpture, drawing and printmaking, photography, architecture and decorative arts, video, film, and performance. In addition to producing its own exhibitions, which often travel to other venues in the United States and abroad, the Gallery hosts traveling shows that might otherwise not be seen in New York and produces scholarly publications that are distributed worldwide.

General Information

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Hours

Tuesday, Thursday, Friday: 11 am–6 pm
OPEN LATE Wednesday: 11 am–8 pm
Saturday: 11 am–5 pm
Sunday, Monday, and major holidays: Closed

Admission Suggested donation: \$5; NYU students, faculty, and staff: free of charge