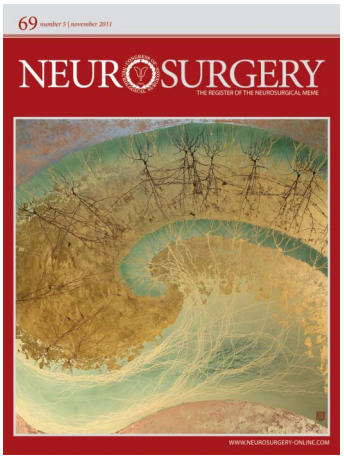
Greg Dunn (1979 -) *Hippocampus II* (c. 2010)

". . . Look at things as if for the very first time. That is, admire them afresh, disregarding what we remember from books, stilted description, and conventional wisdom. We must free our minds of prejudice and fading images, and make a definite point to see and judge for ourselves, as if the object had been created for the gratification and delight of our intellect alone. In short, we must re-create, insofar as possible, the state of mind of the fortunate scholar who discovered the fact under consideration, or who first stated the problem–a blend of surprise, emotion, and lively curiosity." – Santiago Ramón y Cajal, Advice for a Young Investigator (1916)[1]



While neuroanatomist Santiago Ramón y Cajal's (1852-1934) groundbreaking contributions to neuroscience included definitive evidence for neuron theory and the discovery of the synapse, he is also well-known for an altogether different skill: drawing. In 1887, Cajal discovered Camillo Golgi's (1843-1926) technique of using silver nitrate to stain neurons, a technique that produced remarkably clear images of neurons against a yellow background. Himself an aspiring artist as a youth, Cajal buried himself in his work and created hundreds of hand-drawn reproductions of everything from cerebellar Purkinje cells to the structure of the retina, creating a body of work now instantly recognizable and integral to the history of neuroscience. Yet many of these drawings, if removed from their scientific context, could rival anything by Juan Miro (1893-1983)—snaking dendrites and bulbous nuclei are suspended in vast swaths of negative space, many seeming to form eyes, trees, and other abstract and emotionally-charged objects. Beyond their scientific applications, his drawings are deeply affecting: rarely seen science as presented through the skill of an artist's hand and an inspired human mind.

Though he had artistic leanings, Cajal created these drawings out of necessity, since in the absence of microphotography these small works of art were the only practical method he had for disseminating his findings. But these reproductions were prone to the unsteady errors of the human hand and the fallibility of the mind, and subsequently as the 20th century progressed, photography became the preferred method for recording microscopic data. But something was lost as a result of these advancements: while we are now able to precisely depict images of the microscopic world for appreciation and study, the emotional weight and fresh context that could result from the human interpretation of these newly discovered landscapes has been absent. This perhaps explains why in the lobby of the Society for Neuroscience's Washington D.C. office it is not photographs of neurons hanging from its walls, but the paintings of Greg Dunn.

In his desire to convey his fascination with the aesthetics of neurobiology, Dunn has eschewed photography or anatomic illustration and has instead turned to the Rimpa school of the Muromachi and Edo periods of Japanese art. This movement flourished sporadically through the 17th through 19th centuries and was borne by artists looking for inspiration in the simple forms of the natural landscape. The Rimpa artists emphasized sparseness in their natural subjects: meandering branches, a twisting tree, and other images of spare natural beauty are often placed (in an echo of Golgi's neurons on a yellow background) against a floating landscape of gold leaf. Dunn's depictions of Purkinjes, pyrimidals, and glia stand easily within this context, their own twisting layers and delicate forms creating a ghostly natural landscape rarely seen outside of neuroscience laboratories. By placing neurons in a familiar period of art history renowned for its celebration of nature and simplicity, Dunn is asking us to look at neurons as objects of everyday beauty, just as worthy of awe as the plum trees or autumn grasses of the Rimpa school. His interpretation allows us to view the neurobiological landscape with the eyes of Cajal's "fortunate scholar," that is: "with a blend of surprise, emotion, and lively curiosity."

"When it comes to neuroscientists viewing my neuroscience themed artwork, I would like them to see their subject of study in a completely different context then they are used to," Dunn states. "The daily monotonous scientific labors can sometimes erode the sense of wonder that arose the first time a scientist saw the beautiful neural landscapes of the brain, and I hope to refresh that feeling by representing neurons in a purely artistic context."

Dunn is a 6th year PhD candidate in Neuroscience at the University of Pennsylvania, and his approach to art mirrors his scientific background. He uses pipettes to deliver precise amounts of pigment to the canvas, creates wet lab-style workflow protocols so that he can accurately reproduce techniques later, makes digital mock-ups of a project before putting his brush to canvas, and uses his knowledge of chemistry to precisely manipulate the variety of materials he utilizes in his work. Further, Dunn's knowledge of the visual system deeply informs his creative process. For example, our brains must assemble data arriving from the retina into form and contrast information as quickly as possible as an essential matter of survival. Sparsely processed information is sent to structures such as the amygdala and basal ganglia to determine whether the shapes in the visual field require an appropriate fight or flight response. This unconscious judgment is largely completed prior to the remainder of the visual data being

assembled into a completed, conscious percept in the visual cortex. These characteristics of the brain drive Dunn to create initial silhouettes of each painting—the part of his paintings on which he labors the most carefully—so that he can encourage a visceral response from the viewer.

But while his approach to his art is influenced by a knowledge of neuroscience and the scientific method, his approach to life is influenced by the artists and culture he looks to for artistic inspiration. Among his greatest influences is Sakai Hōitsu (1761-1829), a Buddhist monk and a painter of the Rimpa school whose drive for a simple life in a natural setting led him to spend the last 21 years of his life in seclusion. Hōitsu's seclusion was largely spent studying the work of Ogata Kōrin (1658-1716), one of the originators of the Rimpa school a century before, and Hōitsu's studies led to a revival of the school in the early half of the 19th century. Dunn's life bears aspects to that of Hōitsu's: an aspiring Zen master, Dunn meditates for an hour and a half per day, credits his spiritual pursuits for much of his creative energy, and studies intently those artists he seeks to draw from. And like Hōitsu, he is seeking to revive and push the boundaries of the Rimpa school.

"Asian art is simple and emotional," said Dunn. "It distills the necessary aspects of an object and caricatures it into the work without wasted strokes. There is nothing unnecessary in the great works of the masters, and this is what I try to emulate."

Greg Dunn's struggle to emulate and expand upon the work of artists from centuries before his time adds human emotion, conflict, and context to the abstract forms and tendrils of the neurobiological landscape. Like Cajal's drawings, Dunn's interpretations ask us to appreciate not only our knowledge of the form and function of these objects, but also invite us to share in a sense of intangible awe at this rarely-represented scale of life.

"Whereas nature on a macroscopic scale is often represented in the arts, the microscopic world remains a relatively unexplored territory when it comes to artistic representation," Dunn states. "Through the fusion of my neuroscientific and artistic interests I hope to reveal my vision of that world, and to convey to the viewer that the immense beauty of the universe pervades all magnitudes of scale."

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REFERENCE

1. Levinson MH. How science should be done: insights from Santiago Ramon Y Cajal. *ETC.: A Review of General Semantics*. FindArticles.com. Available at: http://findarticles.com/p/articles/mi_hb6405/is_1_68/ai_n57620515/. Accessed August 7, 2011.

Purkinje Neurons (2008)

Ink on xuan with digital manipulation.

Retina (2010)

Enamel on composition gold leaf. University of California, San Diego neuroscience department.

Glomerulus (2008)

Ink on xuan with digital manipulation. Commission for the Schoppa lab, University of Colorado.