

Preface

Santiago Ramón y Cajal and Gretel Ehrlich Remixed . Jo-Anne Green

“How treelike the human, how human the tree.” – Gretel Ehrlich

“(If) we did not fear making excessive comparisons, we would defend our idea by saying that the cerebral cortex is similar to a garden filled with innumerable trees, the pyramidal cells, which can multiply their branches thanks to intelligent cultivation, sending their roots deeper and producing more exquisite flowers and fruits every day.”

– Santiago Ramón y Cajal

“Even the words used to describe the human brain are botanical: limbic referring to the limbic system, where all emotion occurs, is a word whose ancient meaning was “limb of a tree.” Cortex, that deep part of the brain where language and abstract thought happen, means “bark.” I am told of the delicate nature of the tree’s parts: of cambium, the inner layer of cells between phloem and xylem, and how remarkably sensitive it is to any strain on the tree. And the way bark acts as a waterproof covering to the thin layer of living tissue within. A tree’s breathing is slow and slight. The respiratory pores in the bark, called lenticels, must have ample space. As the tree ages, the central heartwood thickens and the girth of the trunk widens to accommodate decay.” – Gretel Ehrlich

“The garden of neurology holds out to the investigator captivating spectacles and incomparable artistic emotions. In it, my aesthetic instincts found full satisfaction at last. Like the entomologist in the pursuit of brightly colored butterflies, my attention hunted, in the flower garden of the grey matter, cells with delicate and elegant forms, the mysterious butterflies of the soul, the beating of whose wings may some day – who knows? – clarify the secret of mental life.”

– Santiago Ramón y Cajal

I have been interested in the visual and functional intersections of trees – root systems, mycelial networks, branching, fractals – and the human brain (dendritic networks/arborization/branching – a multi-step biological process by which neurons form new dendritic trees and branches to create new synapses – and neural networks) for many years.

After Cajal pays homage to **Santiago Ramón y Cajal** (1852–1934), the Spanish neuroscientist and pathologist who specialized in the histology of the central nervous system. Founder of modern neuroscience, winner of the Nobel Prize, **Cajal** showed that the nervous system is made up of independent nerve cells (later termed “neurons”) that connect to each other at small, specialized contact zones (now known as “synapses”), and that a single nerve cell typically possesses three anatomically distinct structures: the Dendritic Arbor, the Cell Body, and the Axon. **Cajal** further posited that neurons function as information processing units, using electrical impulses to communicate within functional networks.

“Thoughts arise as electrical impulses; bits of thought and sensation are neural plasma shuttling from cell to cell, spreading like a net. There’s a rhythmical pattern of firing activity, and wild chemical reactions occur: calcium is released and in turn activates an enzyme called calpain, which scrubs connective tissue between neurons “the rootlike dendrites” cutting into the cytoskeleton and, in this way, exposing receptors. Through these, information is absorbed; memory is etched in, and the dendritic brainscape, a place that looks like the cracks in ice on my lake, changes its shape forever.” – Gretel Ehrlich

Cajal related neurons to plants – their morphology, development and physiology – when he successfully applied the ontogenic method to studying the nervous system. He often gave morphological structures botanical names: “star-cells of the cerebellum” and “claw endings of the granule cells” → “mossy fibers,” “climbing fibers,” “rosacea endings” and “nest endings.” His theory about the plasticity of the nervous system is mirrored in his reflection that “Every man if he so desires becomes sculptor of his own brain.”

Cajal made hundreds of drawings of the microscopic structures and anatomical organization of the brain, and these magnificent studies remain a source of inspiration for many artists and scientists to this day.

Ehrlich, Gretel. “Islands, The Universe, Home,” Penguin Publishing Group, 1992
Santiago Ramón y Cajal Exhibition, National Institutes of Health, <https://t.ly/lld0to>