

THE LANCET Neurology

Supplementary appendix

This appendix formed part of the original submission. We post it as supplied by the authors.

Supplement to: Mehta A. Cajal's illustrations inspire reparative acts. *Lancet Neurol* 2021; **20**: 174.

Kindling: Neurology-inspired sculpture

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Campbell with *Incubate*, 2019



Detail of cover artwork, porcelain and stoneware, 2021

The catalyst for my current work was a traumatic personal event that unfolded in 2016 and 2017. My son, Emmett, was born with a rare brain malformation, hemimegalencephaly of the right hemisphere that caused him to experience dangerous, intractable epilepsy. The only solution was a complete hemispherectomy in which the entire affected hemisphere is disconnected from the healthy left side to stop the seizures. My current work is informed by extensive research into brain (mal)functions, structures, seizure, and neuroplasticity in which I immersed myself while trying to understand what was happening to my baby. I became fascinated by brain cells, in particular what happens when they become physically damaged or ravaged by seizure activity. What began as catharsis evolved into a new visual vocabulary within my long-time conceptual focus on environmental degradation. My previous work, pictured below, explored tree forms whose roots, trunks, and limbs drew connections between the human form, nature and society's broken relationship the natural world. Therefore, the transition to neurons, with their branching dendrites, was not a far leap.



Ventricle, 2013, stoneware



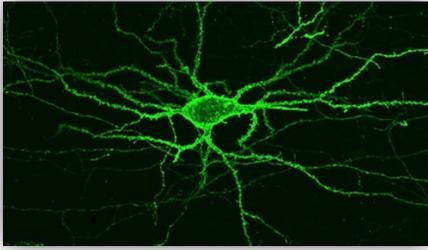
Helix, 2015, stoneware



Escape, 2010, stoneware, steel

Within two years of the surgery, life settled into a new “normal”, no longer ruled by seizures. I felt a strong impulse to pull away from personal trauma as a conceptual focus and return to the urgency of the climate change crisis, the main drive behind my artistic practice. Around this time, I was introduced to the drawings of the pioneering early 20th-century Spanish neuroscientist Santiago Ramón y Cajal. As most *Lancet Neurology* readers are aware, his renderings of brain structures are so comprehensive and illuminating that the 100+-year-old drawings are still used in neurological education today. They represent a beautiful union of art and science that I strive to incorporate in my sculpture.

In the summer of 2019, I had the great fortune of being selected as a “Reach Scotland” Artist-in-Residence at the Edinburgh Sculpture Workshop (ESW). With the support of my home institution, Auburn University, my family and I lived for four months at the facility. This allowed me to be close to Emmett, while immersing myself in my work in a way that I had not been able to do since becoming the mother of a child with special needs. This experience yielded two very important results: a solo exhibition of complete, in-progress, and experimental work that will carry me through years of exploration and membership in the Fusion Group, a club composed of artists and scientists in the Edinburgh area. Through Fusion, I have made valuable contacts in the art scene and the Department of Clinical Neurosciences at the University of Edinburgh, UK. I can still see in my mind’s eye the image of the first living neuron I ever observed at the department. It was one of the most beautiful things I have ever seen.



A light-sensitive protein embedded in neuron membranes emits a fluorescent signal related to the amount of voltage in the cell. The method permits the study of neurons in real time. Reprinted (with minor modification) by permission from Springer Nature Customer Service Centre GmbH: Springer Nature, *Nature Chemical Biology*, A robotic multidimensional directed evolution approach applied to fluorescent voltage reporters, Piatkevich & Jung *et al.*, © 2018.

At ESW, the conceptual connection between the neurological imagery and environmentalism began to coalesce. I began making sculptures consisting of delicate structures created by dipping local plants like elderberry, thistle pods and leaves, and wasps' nests into porcelain slip that becomes translucent when fired. These fragile components are encased in black and brown stoneware "cell bodies" for strength and to aid in the insertion of LEDs within the porcelain shell. Each piece was modelled after different types of brain cells (astrocytes, pyramidal neurons, *etc.*). I also incorporate mixed media, such as wire, sand, translucent polymer clay, and graphite on paper. The lights are meant to represent seizure activity in the brain (without being seizure-inducing themselves) and the neurons are modelled after damaged cells in Cajal's drawings, *i.e.*, scar tissue, or ruptured vacuoles in the cells of a drowned man. The damage and irregular brain activity symbolically represent the collective cognitive dissonance required to perpetuate environmental degradation in the face of its effects.



Cluster, Elderberry and Thistle Pod, both porcelain, stoneware & LED, 2019.

Back home in the states, in early pandemic lock-down, I was delighted to learn of the *Cajal Embroidery Project*. I had taken up embroidery as a relaxing hobby while in Edinburgh, and here was an opportunity to expand my skills, and soothe my anxiety, while replicating the work of my main source of inspiration in my sculpture work. I find the act of stitching and mending to be meditative and reparative. This second quality got me thinking about including stitching in my sculptural work. This

current body of work includes experiments with thin wire, conductive thread, and resin, with the goal of finding cohesive ways of incorporating lights within the work. As evidenced by the cover-art of this issue of *The Lancet Neurology*, the conceptual space between my embroidery and my sculpture is getting smaller, perhaps in no small part due to the undeniable impact of seeing Emmett's incision for the first time after his hemispherectomy. We braced ourselves for something horrific...but we were shocked to see the incision, secured by hundreds of stitches that encircled the entire side of his skull, had not a speck of blood or swelling. Instead, it resembled the hem of a fine garment hand-stitched with silk thread. (Credit and endless gratitude to the amazing, world-class surgical team at UCLA Mattel Children's Hospital).

While my work has always addressed the distressing, life-threatening issues of environmental degradation, I try to infuse signs of hope. In the old work, it could take the form of a sapling growing from an abused and dying tree. In the current work, the stitching and the astrocytes represent an *attempt* at reparations and hope for a better future.



Detail, *Bound*, MFA thesis exhibition, 2010. Detail, *Cluster*, Thistle-leaf Astrocyte, 2019.

Emmett lifting his head for the first time ever just days after his hemispherectomy at UCLA, 2017.

Astrocytes and microglia have a special, positive meaning in the work because of their amazing qualities. For the non-neurology reader: they are the most numerous cells in the brain and they protect damaged neurons by creating scar tissue, provide energy to neurons, aid in communication by “cleaning” synaptic exchanges, and even attack viruses. This is why I chose Cajal's beautiful depiction of a single astrocyte for my contribution to the collaborative embroidery project, and why I jumped at the opportunity to create a porcelain piece inspired by my embroidered version, custom-made for this cover. After our traumatic experience with Emmett, I am grateful and in awe of what the billions of astrocytes are doing in his brain every nanosecond.

The following series of images describes how the porcelain piece on the cover was created.



Planning the shape. I designed the piece to complement the embroidered astrocyte, but also stand alone.



Cutting out the dendrites after imprinting. Some porcelains are gray before firing.



Forming complete, time for refinement.



I have added a coat of ivory porcelain. Since adding the textures and vacuoles took 2 days, I had to keep the rest covered, so it would dry evenly and prevent cracks.



The thinned, refined dendrites with some liquid black clay stippled on.



Here the black and brown clay additions are finished. This is what The clay looks like before being fired to approx. 2232 °F / 1222 °C.



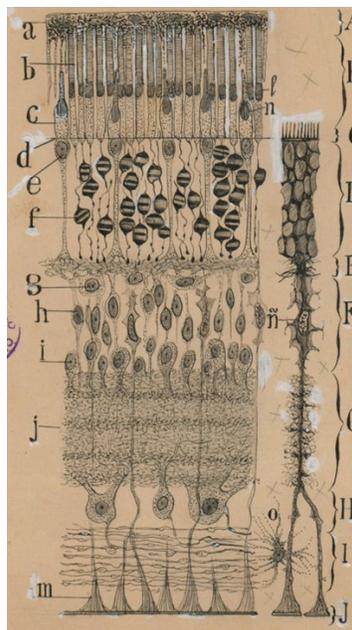
The yet-to-be-titled glia made for this issue. Porcelain and stoneware, 2021.

I have designated 2021 as the beginning of a 3 phase, approximately 4-year project. I am currently seeking funding opportunities at my home institution, with more ambitious goals down the line, to support this plan.

Phase 1 (2021-22) focuses on research and technical skills development (microcomputer programming, soldering) to create custom, programmable light circuits within my work. I want to create light patterns that mimic Emmett's chaotic EEGs from 2017 (*if* I can do so without putting any people with epilepsy at risk). The outcome will be an international 3-person exhibition titled *Current* that focuses on climate change at The White Space, Edinburgh, July 30 – Aug 5, 2021. I am the primary organiser of this exhibition and it will include a gallery talk and interactive/collaborative activities with visitors.

Phase 2 (2022-23) involves learning to use portable EEG equipment worn by viewers to enable their brain waves to control the light patterns within the sculptures. I intend to apply for the 2023-24 *Fulbright-Scotland Visiting Professorship at the University of Edinburgh, College of Arts, Humanities and Social Sciences* program to further develop interdisciplinary connections and aid in the progress of this project.

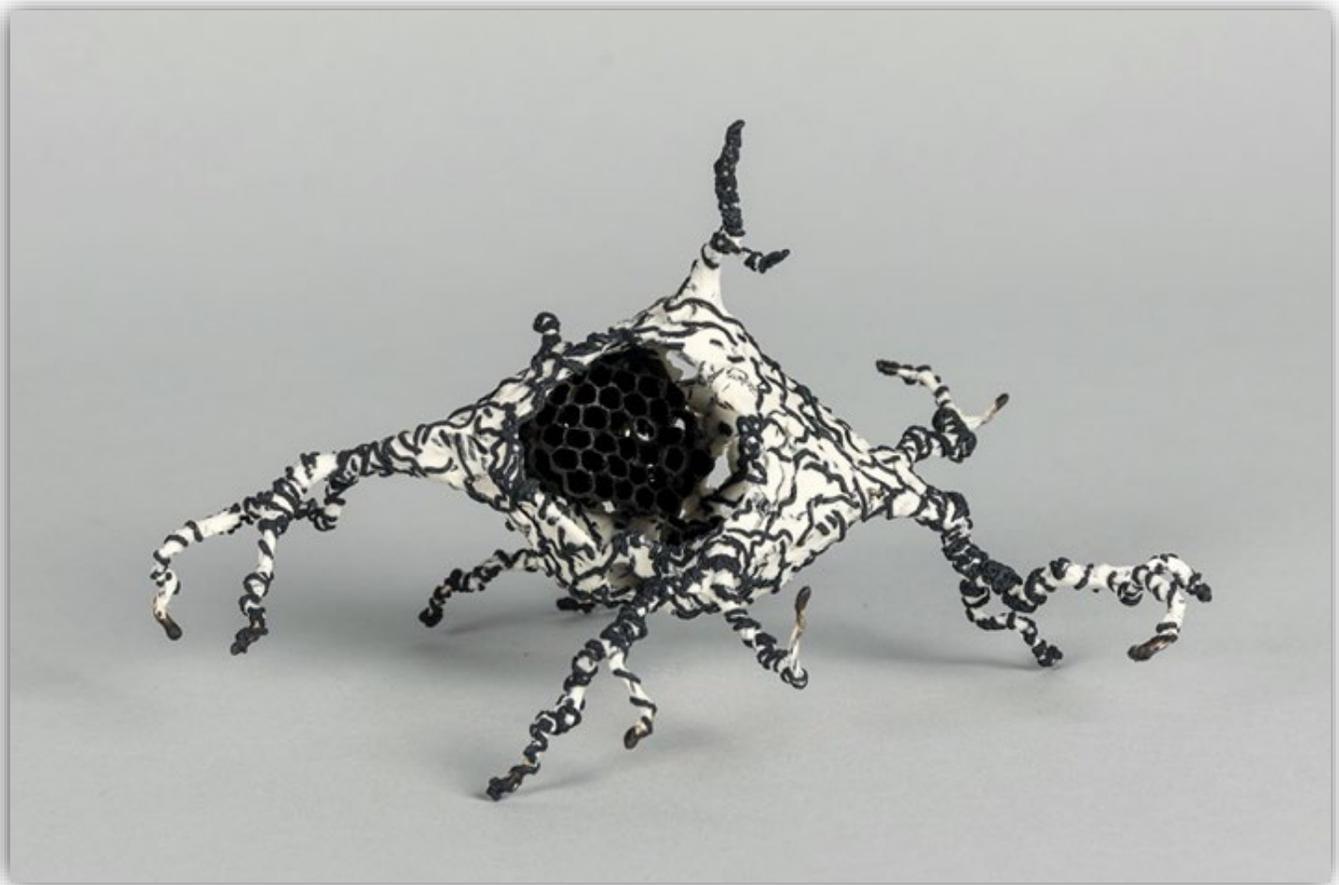
Phase 3 (2023-25) includes plans to mount solo exhibitions and conduct lectures in the USA and Edinburgh with my completed creative research and participate in the Fulbright Program, if accepted. As part of this solo show, I would like to create a large, suspended, tapestry-like installation inspired by Cajal's cross-section of the retinal cells. This piece would be viewed in the round, and include all of the aforementioned elements, including the EEG-controlled light circuits.



Cajal's rendering of retinal cells.

In closing, my *artist's statement*:

Our society has created an artificial construct that enables us to see ourselves as separate from nature. This allows us to enact our “right” to control and abuse resources to which we feel entitled. Botanical and human vascular and respiratory systems, like neurons and their synapses, move impulses and sustenance through our bodies. The “information super-highway” that exists amongst tree roots in the form of mycelium fungal networks informs my work as well. These forms serve as metaphors for, and symbols, of society’s dysfunctional relationship with nature. The neuronal forms in my work are malformed, damaged, and deteriorating. Their connections are weakened by abnormal impulses; a dissonance caused by a detachment from their origins. This work explores the danger of ambivalence in the face of environmental crises.



Incubate, porcelain, stoneware slip dipped & fired wasp's nest, high temperature & steel wire, 2019.

To learn more about my current work, process, and previous bodies of work please visit:

- My website:
www.anniebcampbell.com
- Facebook:
www.facebook.com/ceramicannie
- Instagram:
@ceramicannie
- Podcast Interview about my journey as an artist, academic & mum to a special needs child:
<https://mothersprojectpodcast.com/2019/06/27/i-contain-multitudes-annie-campbell/>

Important resources:

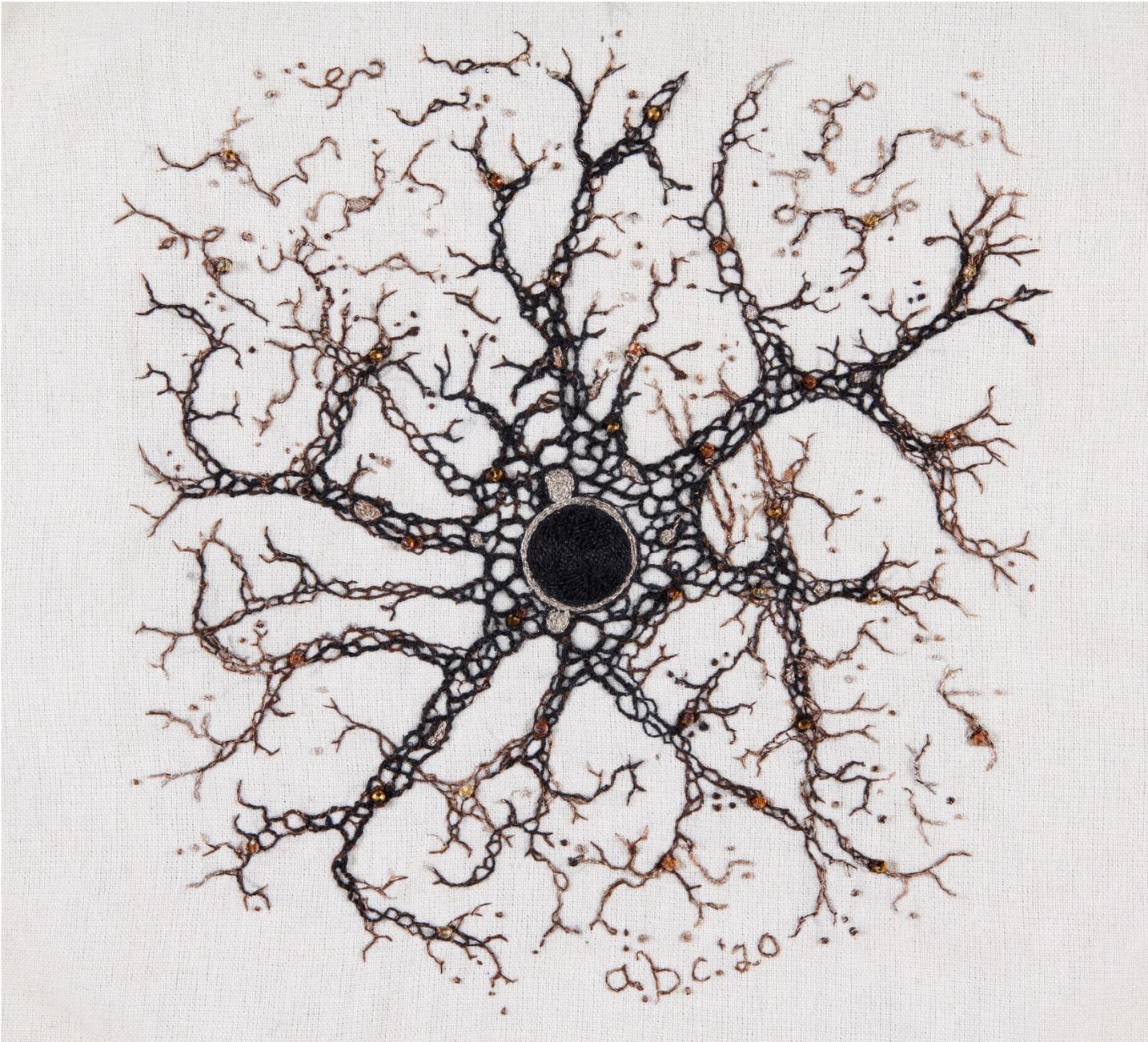
- The Brain Recovery Project:
<https://www.brainrecoveryproject.org/>
- Infantile Spasms Program at UCLA:
<https://www.uclahealth.org/mattel/pediatric-neurology/infantile-spasms-program>
- Infantile Spasms Community Discussion Group:
<https://www.facebook.com/groups/infantilespasmscommunity>
- The Hemispherectomy Foundation:
<http://hemifoundation.homestead.com/>
- The Hemispherectomy Foundation Facebook Group:
<https://www.facebook.com/groups/29122689930>
- The Hemimegalencephaly Family Support Group:
<https://www.facebook.com/groups/HMEFSN>

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Annie B. Campbell's contribution to the Cajal Embroidery Project.