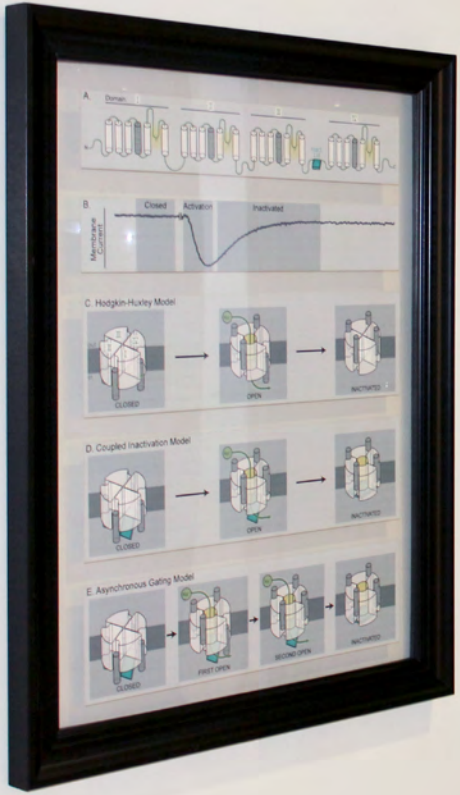

A.
Domain
B.
Closed
Activation
Inactivated
Membrane Current
C. Hodgkin-Huxley Model
CLOSED
OPEN
INACTIVATED
D. Coupled Inactivation Model
CLOSED
OPEN
INACTIVATED
E. Asymchronous Gating Model
CLOSED
FIRST OPEN
SECOND OPEN
INACTIVATED


Petri Lid
Round Coverslips
Hippocampal Neurons
Glial Cells
Media
Petri Dish

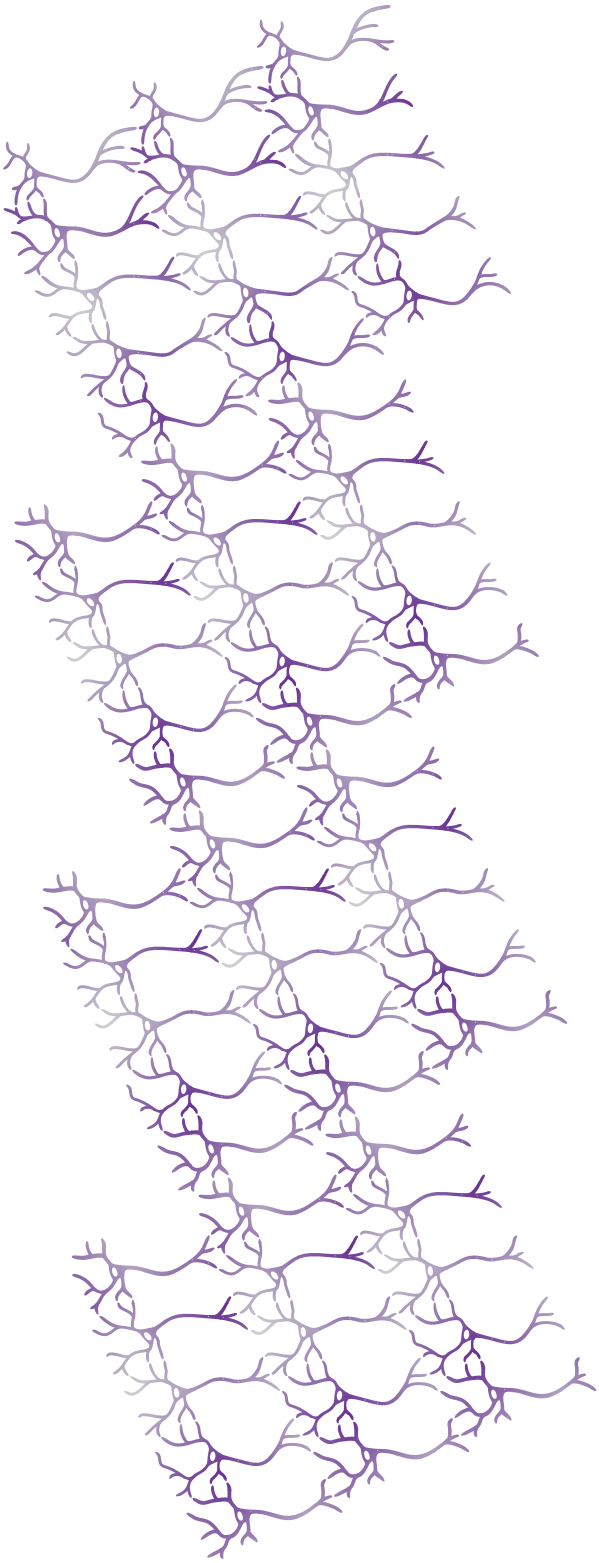

EXIT

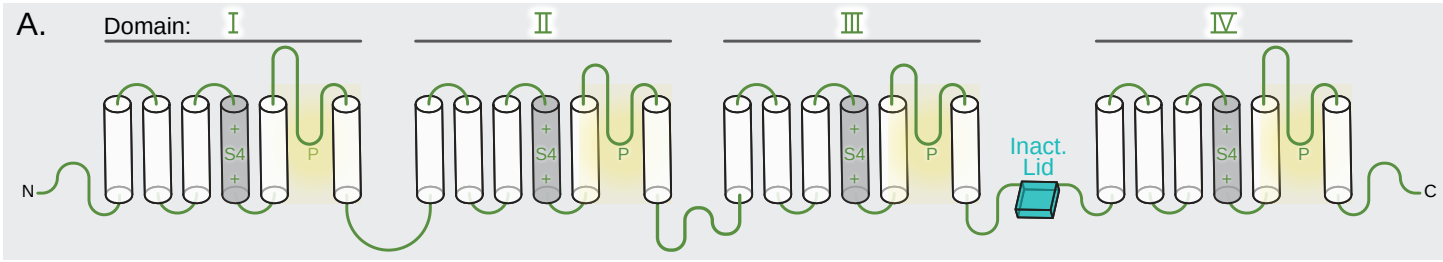
Learning

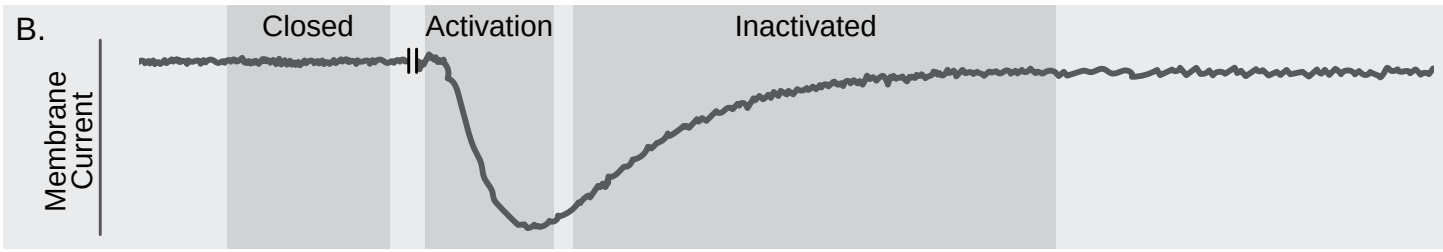
Artist: Kate Baldwin
Software: Adobe Illustrator
Materials: Laser-cut acrylic mirror, chain, and wire.

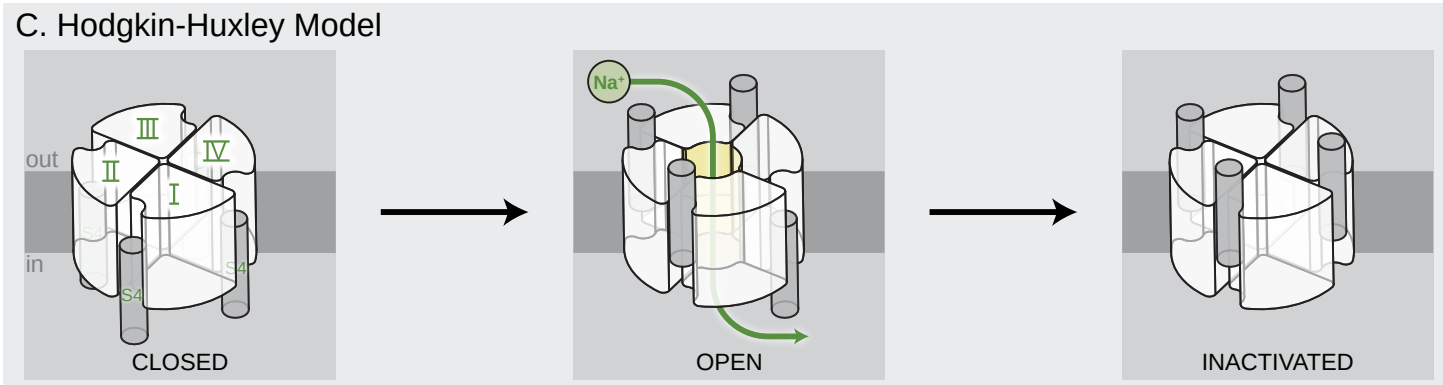
Neurons make new synapses and break old connections when we learn. Memories and knowledge are stored in the pattern of connections. A lifetime of experiences helps define the architecture of our neuronal network.

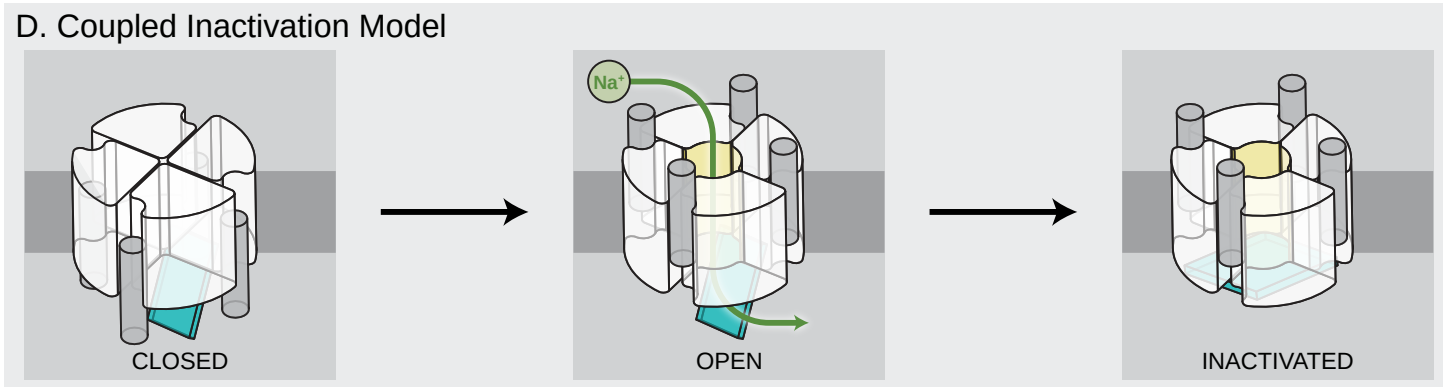
The connections between neurons in this mobile evolve with the changing currents in its environment. You may be able to see a reflection of yourself in this ever changing network.

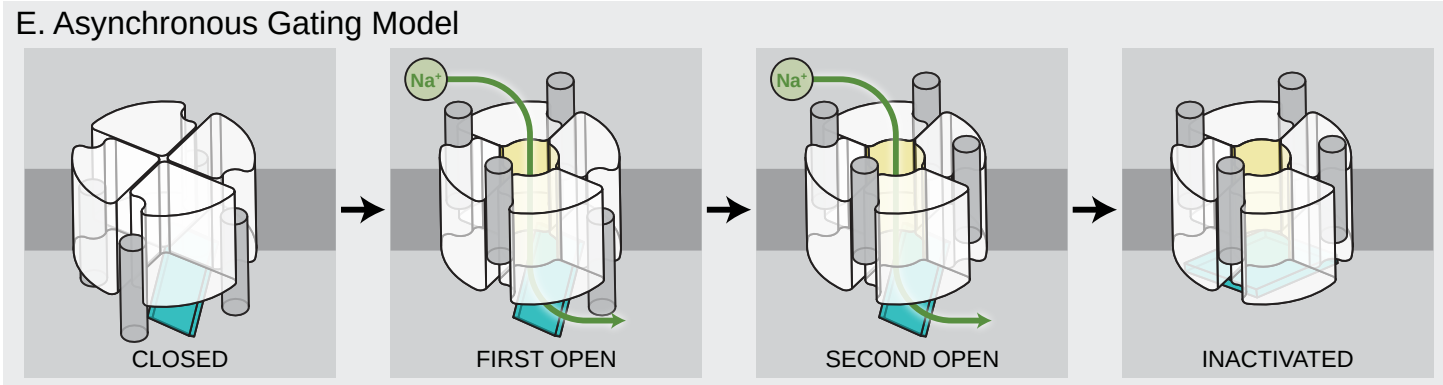



A.
Domain:
I
II
III
IV
S4
P
N
C
Inact.
Lid


B.
Closed
Activation
Inactivated
Membrane
Current


C. Hodgkin-Huxley Model
out
in
CLOSED
OPEN
INACTIVATED


D. Coupled Inactivation Model
CLOSED
OPEN
INACTIVATED

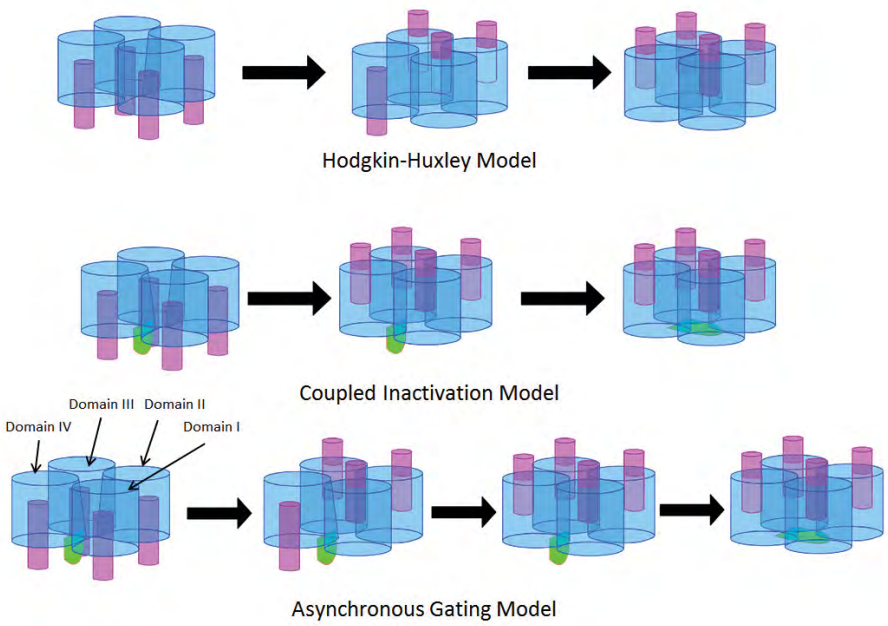

E. Asynchronous Gating Model
CLOSED
FIRST OPEN
SECOND OPEN
INACTIVATED

Models of Sodium Channel Opening

Designer: Kate Baldwin
Researcher: Dr. Baron Chanda, Associate Professor of Neurosicence, University of Wisconsin, Madison
Software: Adobe Illustrator

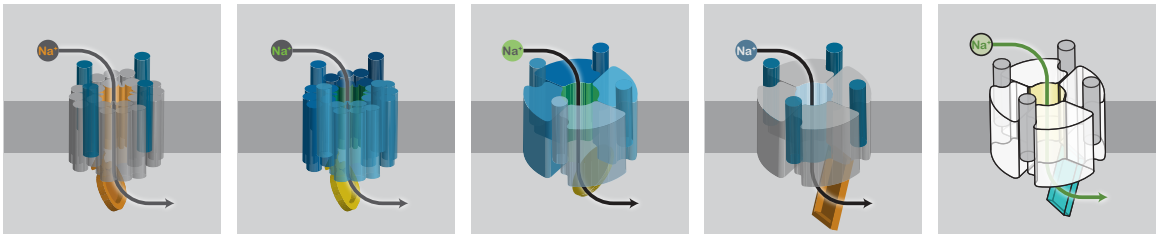
Neurons use sodium ion (Na^+) channels to transmit signals. The Chanda Lab has been conducting experiments to learn exactly how these channels open and close at a structural level. This figure compares several different theoretical models of how that process may proceed.

This figure needed to illustrate subtle differences in 3D movement of a multi-domain channel through time. Although a 3D crystal structures are available for this protein, a cartoon was needed to communicate the differences among these models. As a cartoon, I had the freedom to exaggerate movement in order to highlight the differences between models.



Researcher's Original Power Point Diagram

Dr. Chanda had previously prepared an admirable diagram in Microsoft PowerPoint that helped explain the different models if the viewer was already familiar with the protein structure. For our new figure, I added panel A, which uses matched colors to show what parts of the protein primary sequence are involved in movement in the lower panels.



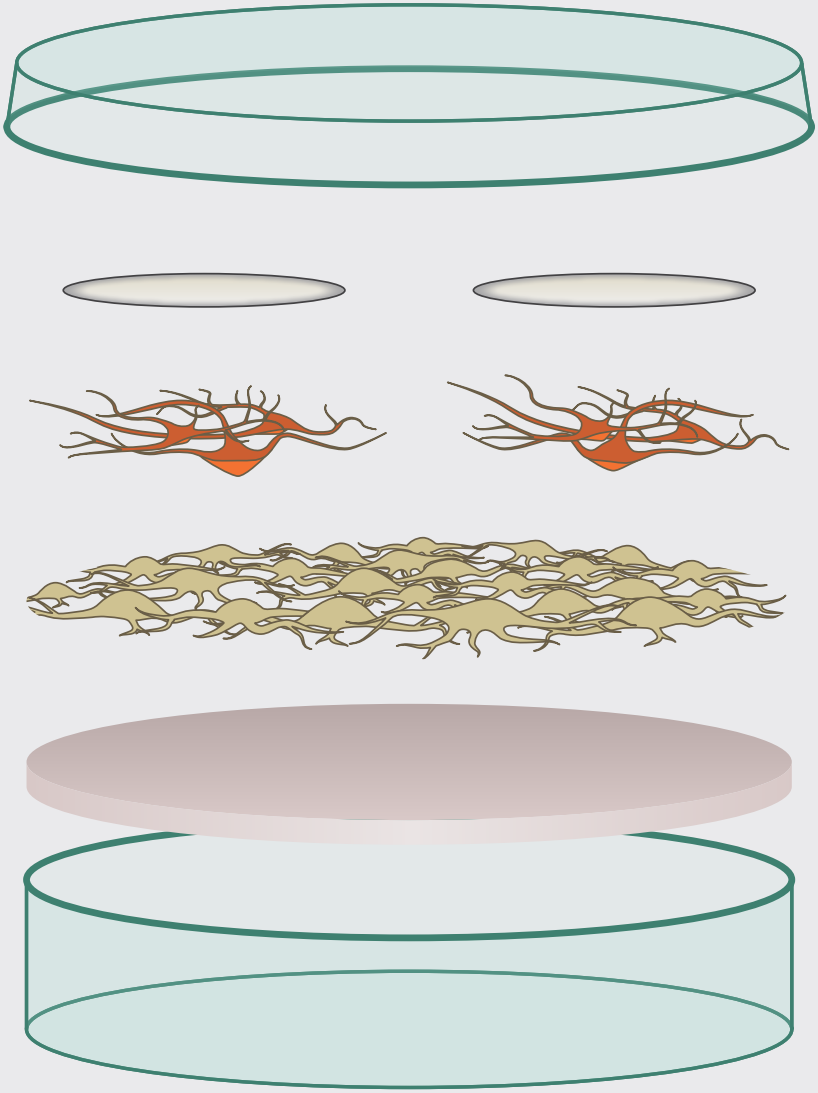
A series of drafts I made in the process of planning the figure

I thought that it was difficult to tell when the central pore was open or closed in the original sketch. I solved this challenge by reducing the color information from the stagnant parts of the diagram. This allowed me to save my colors for the key parts I wanted the viewer to notice. I used yellow to highlight the central pore being open. I used teal for the inactivation lid, which functions independently of the central pore and needs to be distinguished. I used shades of gray for the other parts of the diagram.

Pear Lemon Fizz on Adobe Color

I choose these particular colors based on empirically tested color schemes that thousands of Internet users have nominated for interest and pleasantness on Color.Adobe.com. This figure uses “Pear Lemon Fizz” which is among the top 20 most-liked color schemes of all time.

The cost for a custom figure like this is approximately $200.



Petri Lid

Round Coverslips

Hippocampal Neurons

Glial Cells

Media

Petri Dish

*Cells and Coverslip shown enlarged

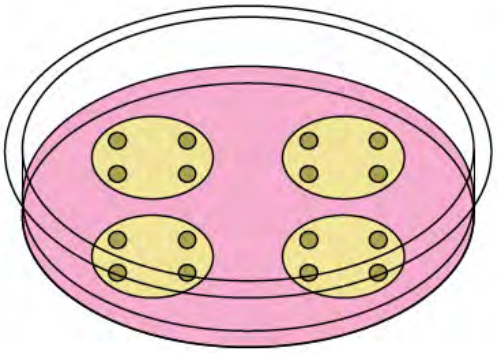
Exploded Neuronal Culturing System

Designer: Kate Baldwin
Researcher: Dr. Janis Lochner, Professor of Chemistry,
Lewis & Clark College, Portland, OR

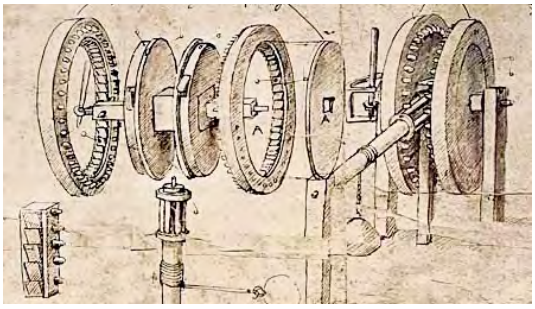
Super-resolution Imaging of Neuronal Dense-core Vesicles
BA Scalettar, D Shaver, S Kaech, JE Lochner
J Vis Exp. 2014; (89): 51394. PMCID: PMC4211406

Software: Adobe Illustrator

The Lochner Lab was invited to submit a methods-based research article describing their hippocampal neuron culturing techniques. The diagram that they previously had been using to illustrate the basic stacked layers of their system was confusing to viewers.



Researcher's original digram



Leonardo da Vinci's exploded view of a gear assembly, from Codex Atlanticus

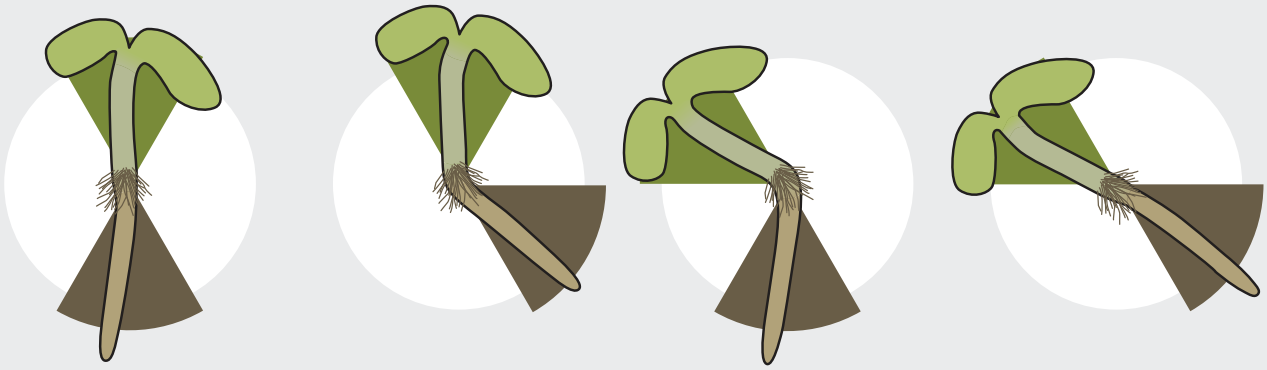
The culturing technique used many thin layers, so it was impossible to clearly show them all in a real-size diagram. I had recently seen an exhibit of Leonardo da Vinci's drawings, and the challenges of this figure reminded me of da Vinci's exploded gears drawing.

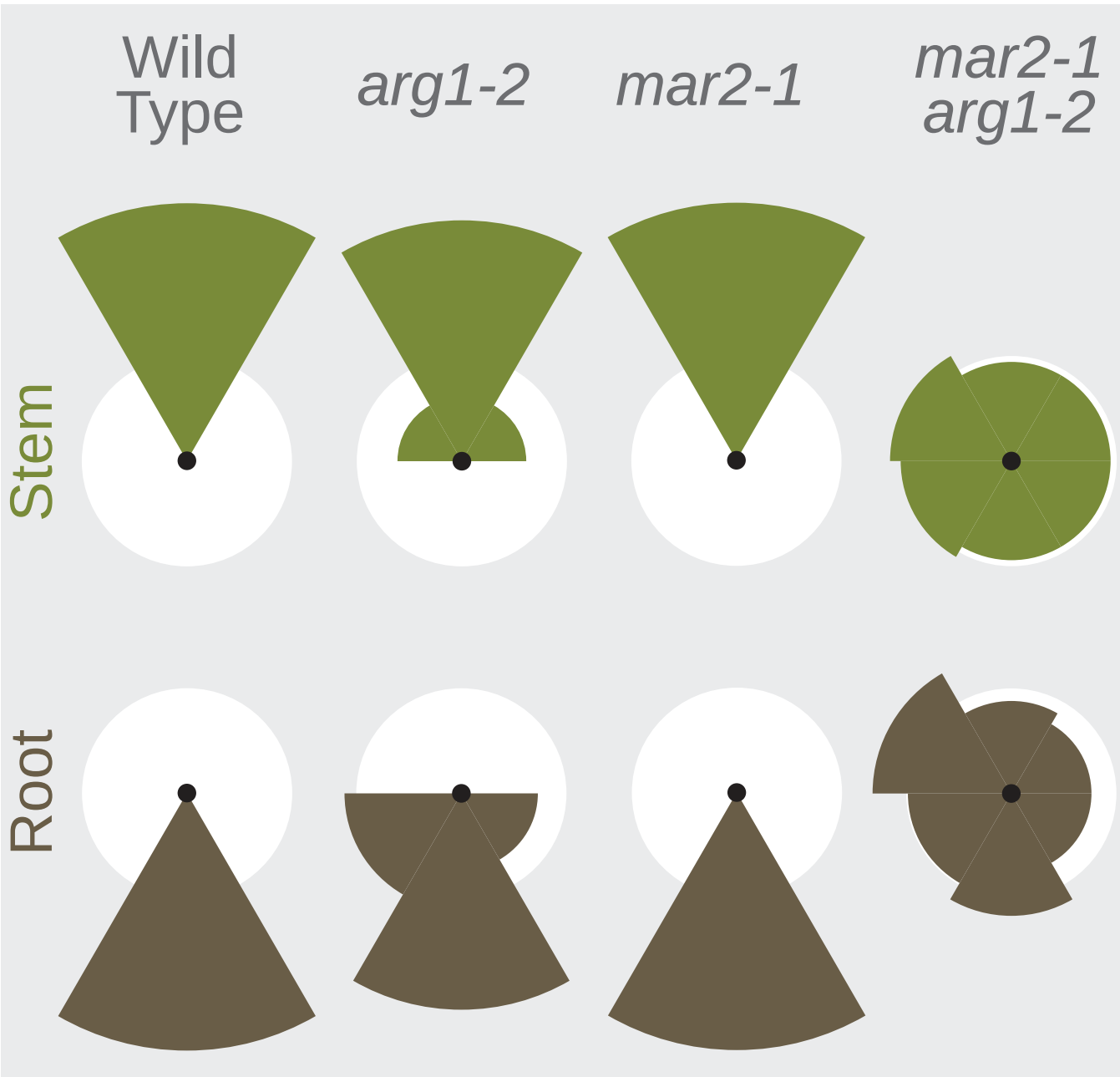
When I added artificial space between the layers of cells, they became easier to see and label.

I helped differentiate each layer with colors chosen from one of the all-time most highly ranked color themes on Color.Adobe.com.

Afternoon Chai on Adobe Color

Directional Seedling Growth Histograms





Seedling Directional Growth Graph

Designer: Kate Baldwin
Researcher: Dr. Patrick Masson, Professor of Genetics,
University of Wisconsin, Madison

A role for the TOC complex in Arabidopsis root gravitropism.
JP Stanga, K Boonsirichai, JC Sedbrook, MS Otegui, PH Masson.
Plant Physiol. 2009 Apr;149(4):1896-905. doi: 10.1104/pp.109.135301.

Software: Adobe Illustrator

Plants sense gravity and the stems of seedlings generally grow up and the roots grow down. The Masson Lab wanted to present data showing that a new Arabidopsis double mutant failed to grow with the normal orientation relative to gravity. Because the new double mutant plants grew at completely random angles, it was non-descriptive to average the angle of growth (non-normal distribution). A regular histogram was also not ideal because zero degrees is the same as 360 degrees.

Inspired by the seasonal mortality graphs of Florence Nightingale, we developed a new type of graph for this data where the area of the wedge represents the portion of seedlings that grew in that direction. Based on the raw data, I used simple geometry to calculate what area each triangle wedge should have and prepared the images in Adobe Illustrator. Because each histogram 'bin' directly corresponds to the angles included in that bin, few labels are needed and it's intuitive to the viewer.

I choose green and brown for the stem and root data to instinctively match those with the colors of the plants.

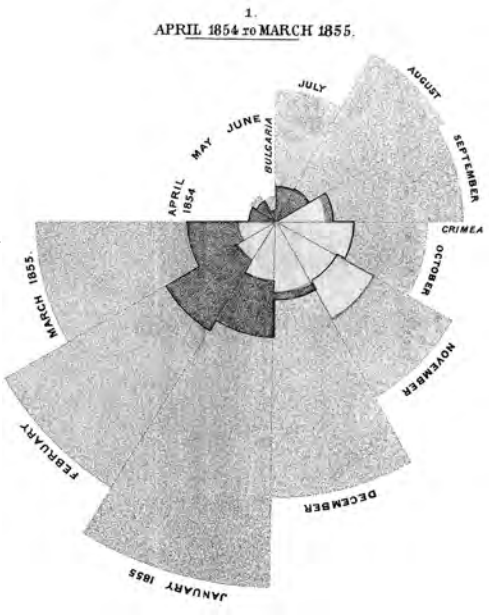
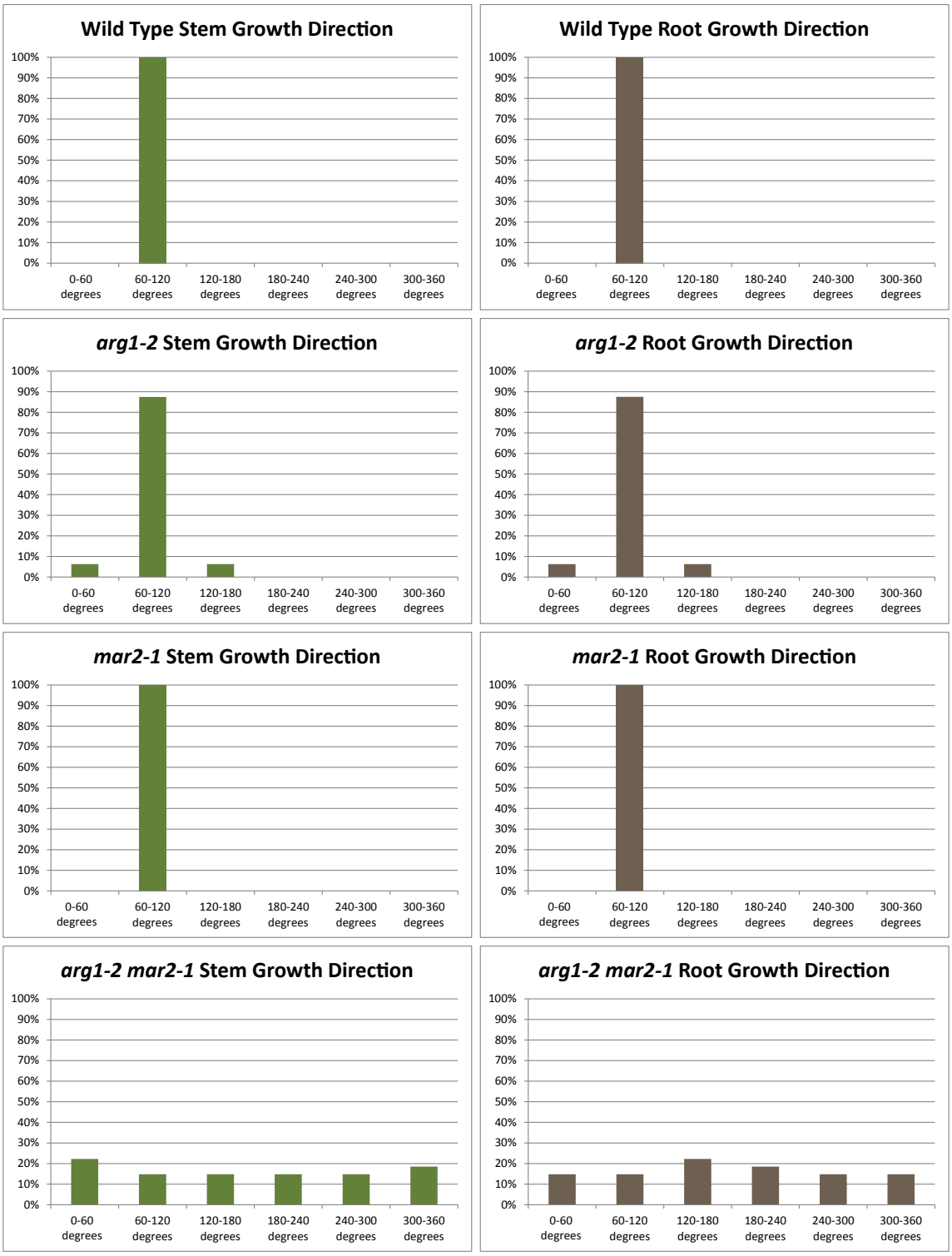


Diagram of the causes of mortality in the army by Florence Nightingale.



The eight regular histograms required to illustrate this data.