Letting Knowledge Serve through interdisciplinary neuroscience, art, and a few extra brains!

Noggin @ UCEDD

Northwest Noggin

nwnoggin.org
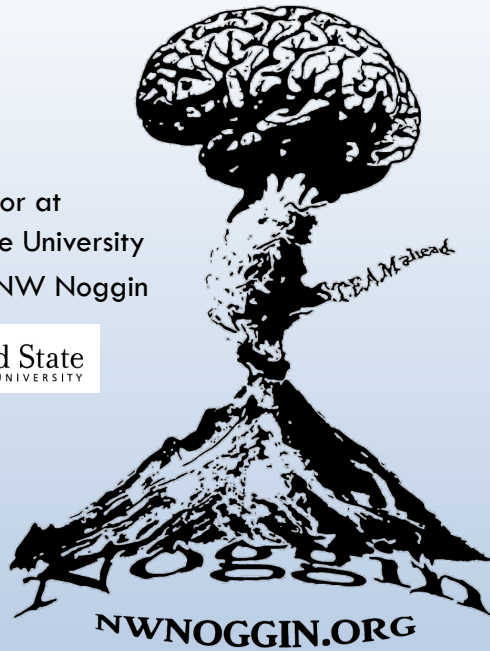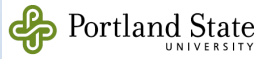
Jeff Leake

Bill Griesar

Jeff Leake

Artist, Instructor at
Portland State University

Co-Founder, NW Noggin

Portland State
UNIVERSITY

Bill Griesar

Senior Instructor at
Portland State University

Adjunct Instructor, OHSU

Co-Founder, NW Noggin

Portland State
UNIVERSITY

OHSU

STEAMahead

Noggin

NWNOGGIN.ORG

Jeff Leake, M.A. currently teaches interdisciplinary art and neuroscience courses in the Psychology and University Studies departments at Portland State University. He is also the president, co-founder and arts coordinator of the nonprofit NW Noggin. A working artist, Jeff has completed prestigious residencies in Shanghai, Nevada and Wyoming (UCross), and spent last month in Latvia. He has traveled the U.S. lecturing and teaching neuroscience through art and was recognized as an innovator by the Obama White House.

Bill Griesar, Ph.D. is Senior Instructor in Psychology/Neuroscience at Portland State University and co-founder and Neuroscience Coordinator of NW Noggin. He has developed and taught arts-integrated neuroscience courses at PSU and OHSU since 2001 and helped create an interdisciplinary neuroscience minor at PSU. Through NW Noggin he's met with more than 50,000 K-12 students over real brains and art. He's been recognized as an innovator by the Obama White House and has won numerous teaching awards.

NWNOGGIN
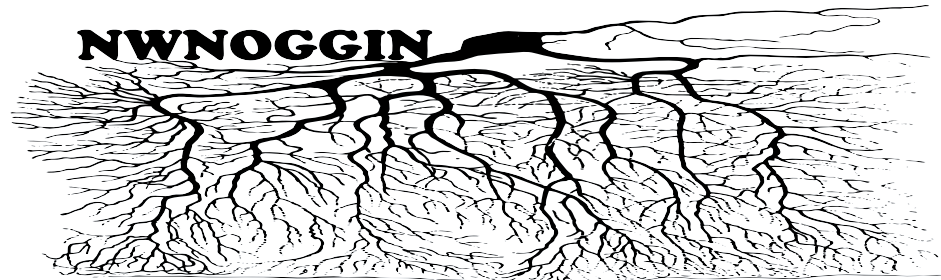
nwnoggin.org

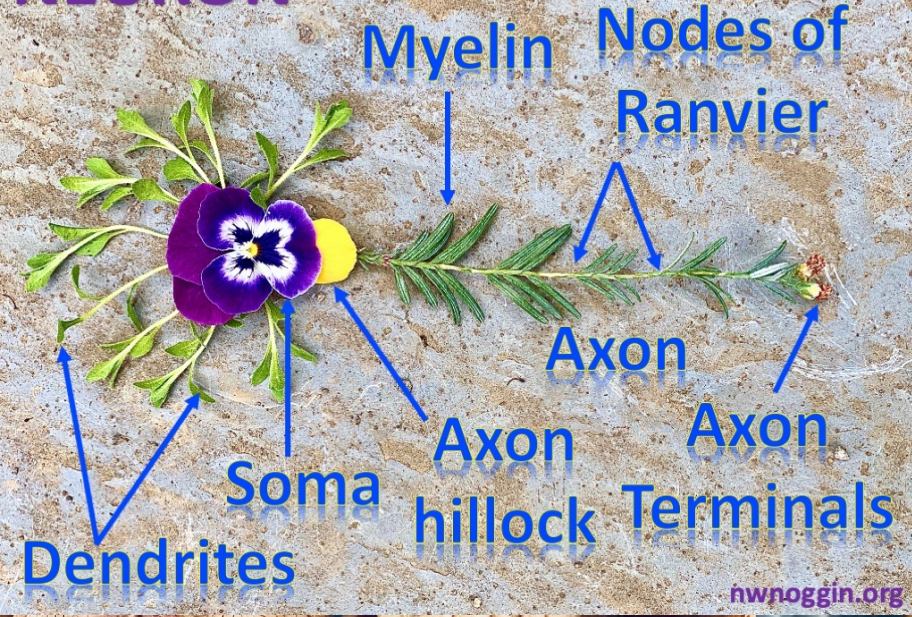Arts integrated neuroscience
outreach for K-12 & community

TEN YEARS!
ALL VOLUNTEER (everyone)
50,000+ community members

Art & Brains!

NEURON

Myelin

Nodes of Ranvier

Dendrites

Soma

Axon hillock

Axon

Axon Terminals

nwnoggin.org

nwnoggin.org

Sleep
Anxiety
Depression
ADHD
Autism
Development
Perception
Drugs
Memory
Language
Racial Bias
...

What you do has relevance GO PLACES

We all pay for research

Greater understanding
More support for research
Increased participation
Less confirmation bias
New directions
FUN!

Connections matter

BUILD NEW CONNECTIONS

- **Academic priority K-12, urban/rural communities, tribal majority schools**
  - Not always well-funded, or valued, often ignored, subjected to standardized testing that primarily benefits others. Complex brain development underway, unacknowledged diversity, racism, bias, police brutality, mental health,...
- **Young graduate researchers, undergraduates (Portland State University, OHSU,...)**
  - *How does my research relate to the world? How can I explain it? Where can I go from here?*
- **Houseless youth (p:ear), incarcerated youth (MacLaren/Coffee Creek Correctional Facilities)**
  - *"It's like people see me as an object, not as a human being"*
- **Artists: Painters, Dancers, Storytellers, Musicians, Poets**
  - *How does my work relate to other fields? How do I connect with new audiences?*
  - *How is my practice influenced and enriched by discoveries about the brain?*
- **Community organizations**
  - *TRIO, Area Health Education Centers (AHECs), American Brain Coalition,...*
- **Area businesses (BioGift, Intel, Fort George, Floyds/Street 14, Hospitals)**
  - *How can we better connect with everyone in our community?*
- **Members of the public**
  - *Why are my taxes spent on research? Art? What are we discovering? Making?*

Oh the places you'll go!

Why art & brains..?

- Motivation, engagement, **empathy**
- Exploration, creativity, INNOVATION
- **Personal relevance of STEAM material**

Build your own mouse line!

N.W. Noggin
@NWNoggin

Building a #rosehipneuron in #pipecleaners 🤗 #nwnoggin 🧠🎨 #sciart #scicomm 🔬
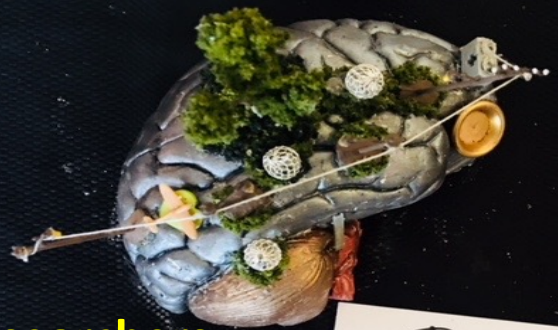nwnoggin.org/2018/08/31/ros...

To see **other** people

p:ear

Researchers
Clinicians
Policy makers
Houseless youth

Bunny:
"we are all connected"

HOMELESSNESS & THE BRAIN

Thurs, Oct 19th
10am – 1pm

p:ear mentor gallery
338 NW 6th Ave

STREET KIDS
ART
NEURO-
SCIENCE

nwnoggin.org   pearmentor.org

Rural Outreach
TO GO PLACES!

Food, housing, baby goats…

Siletz, Amity &
Willamina, OR
Pop: 4,000

Davenport, WA
Pop: 1,700

La Grande, OR
Pop: 13,000

Meservy
Meadows,
OR Pop:
~40

Heppner & Ione, OR
Pop: 1,240

Synapses, Stories and Song!

Tribal majority schools
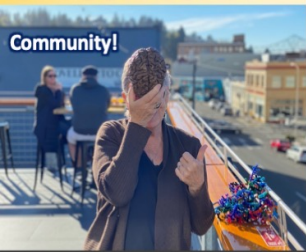
Noggin + TRIO

Oregon Coast Fall, 2021

Noggin + TRIO

NOGGINS ON THE OREGON COAST

Community!

The Stand, Seaside

THE STAND

Art!

nwnoggin.org

NOGGIN.ORG

Rosebriar Mansion, Astoria

Fort George Brewery, Astoria

Clatsop Community College TRIO Program

Astoria Coop

Brains!

Peter Pan Market, Astoria

THANK YOU FOR SUPPORTING ART/NEUROSCIENCE OUTREACH!

Community Connections

October 4 – 7, 2021

Astoria Middle School, Seaside Middle School
West Exchange Preschool, Astoria High School

Jasmin Mabry
Ellie Phelps
Michael Deveney
Greyson Moore
Lidia Echeverria-Garcia
Jeff Leake
Bill Griesar
William Leverette

Noggins on the Coast

N.W. Noggin @NWNoggin

"What causes that feeling of #paralysis as you're falling asleep? Does #daylightsavingstime affect sleep? Why is #sleep important for #brains? What brings on #nightmares?"

#nwnoggin @ #astoriaoregon high school 🤭😴🥺🧠 🎨👉 nwnoggin.org/event/noggins-...

#outreach #allvolunteer ❤️

N.W. Noggin @NWNoggin

"I saw #mycelium in the forest and it looks like #brain cells 🍄! I think my #brain learns through stories" 😍 🧠🎨🍄🤗! Yes ❤️

Some of the deepest insights and questions from #preK today 😃😃

#nwnoggin #oregoncoast 🐋🌊👏👉 nwnoggin.org/event/noggins-...

N.W. Noggin @NWNoggin

"Can you get a #concussion in your #entericnervoussystem or #microbiome? Is the #brain like a computer? What part of the brain is involved w/#rhythm & making your foot tap? Do you ever see a brain that's smooth?"

N.W. Noggin @NWNoggin

"Does #alcoholism run in families? How does smoking cigarettes affect the brain? What about #cannabis? What happens in your #brain if you have #ADHD? #DID? Why are drugs more dangerous for kids?"

GREAT QUESTIONS @ Seaside Middle School 🧠🎨 😃👉 nwnoggin.org/event/noggins-...
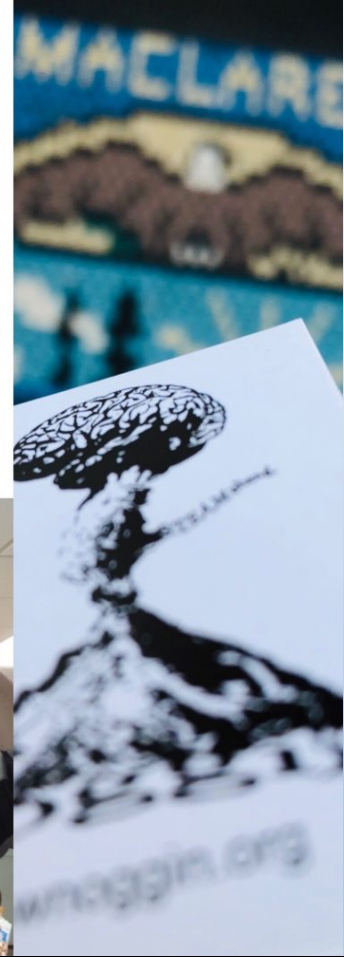
Neuroscience & Law

To listen, learn, empower & make change

Youth get visual, hands-on experience with the brain

NW Noggin, a neuroscience outreach nonprofit, reached out to youth at MacLaren Youth Correctional Facility this week to teach about brain development.

Lindsay Keefer on January 24, 2019

MacLaren Youth Correctional Facility

At SfN conferences

Posters, art of neuroscience *and...*

School visits

Turner Elementary, DC

Public outreach and connection

And also to Capitol Hill

More connections: Congressional office visits
Congressional Neuroscience/STEAM briefing

"Bipartisan" neuron

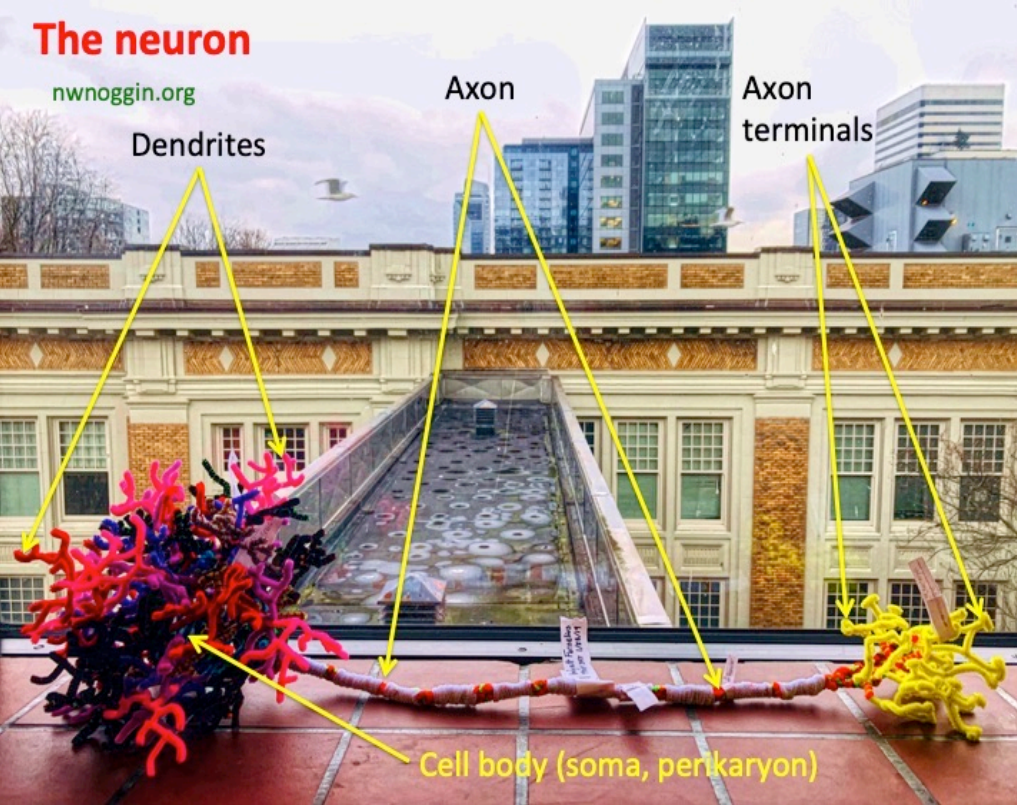Research should inform policy

NOGGINFEST!
& Art
& Music

Music, art, research, brains, all ages, FREE

The neuron
nwnoggin.org

Dendrites

Axon

Axon terminals

Cell body (soma, perikaryon)

MAKE YOUR OWN: Details @ nwnoggin.org

Pipe cleaner brain cells!

Making a pipe cleaner neuron...

1. Start with a good amount of (colorful) pipe cleaners, I have 20 here.

2. Create the soma or cell body by linking several pipe cleaner hoops together.

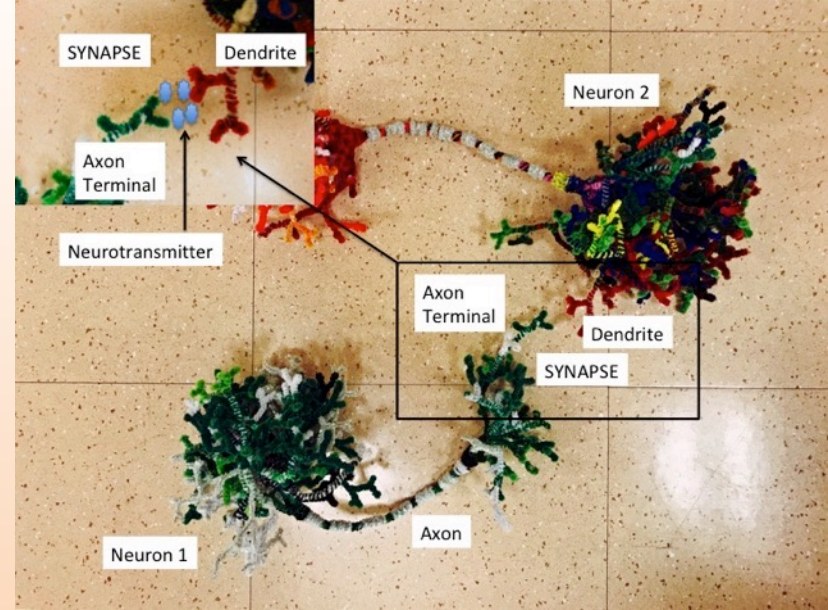3. Attach dendrites to your soma by wrapping them around the soma pipe cleaners.

4. Attach axon terminals to the other end of your axon.

5. Wrap myelin around your axon.

6. Create a nucleus for your soma by wrapping two pipe cleaners around each other. Attach your nucleus inside your soma. You have a neuron!

MAKE CONNECTIONS
MAKE ART

Public Schools

During COVID-19

#showusyourbraincell

Neurons are a type of brain cell

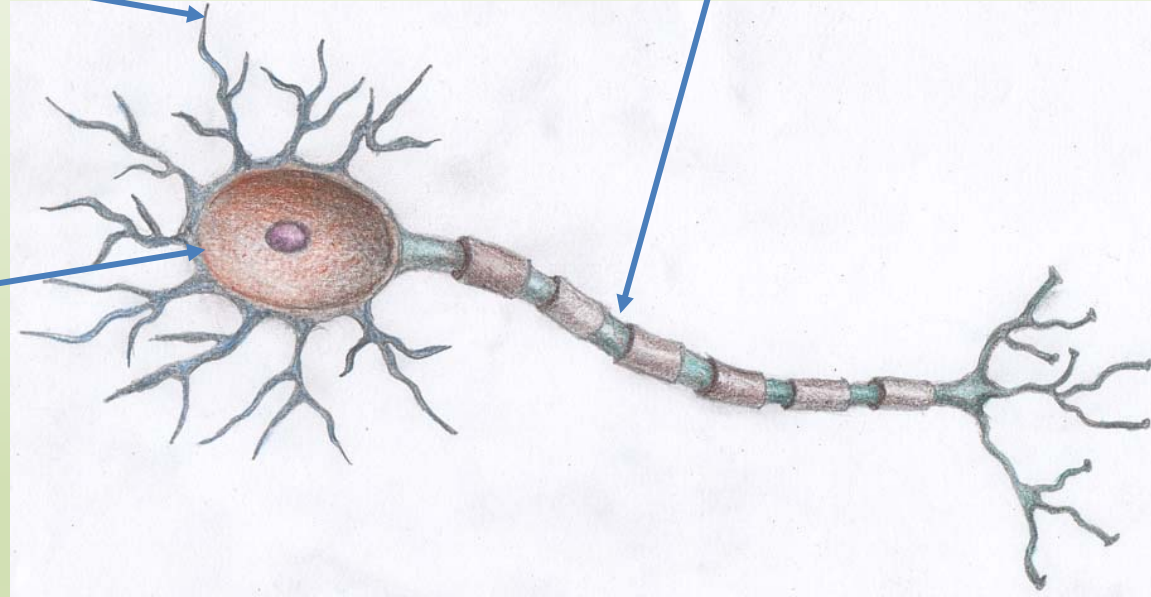The majority of neurons share some basic features

Dendrites
(Receive input from
other neurons at gaps
called synapses)

Axon (Carries electric message)

Cell Body
(or Soma, location of
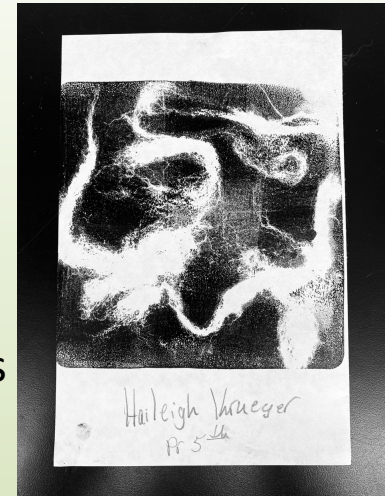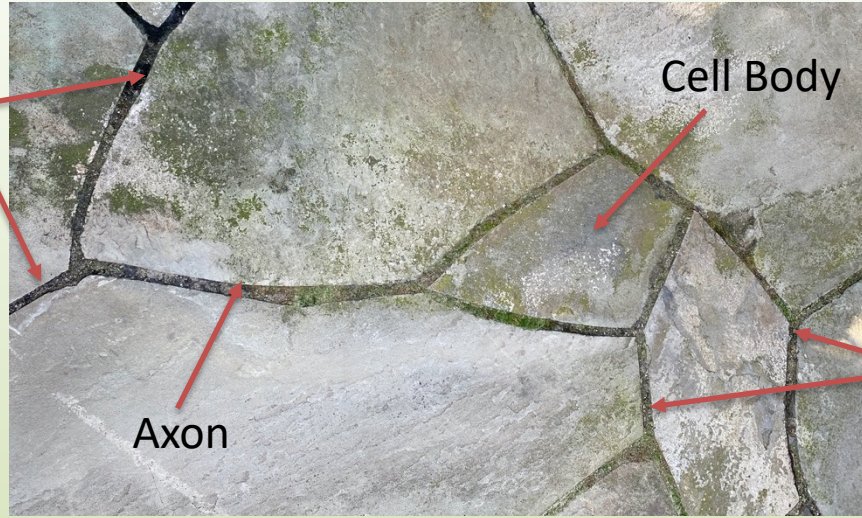nucleus and cell DNA)

Found Object Brain Cells

Take a look around you, what things do you see that share those structures?

Axon Terminals

Cell Body

Dendrites

Axon

Can you construct a neuron out of things that you find?

What things for you represent the function of a neuron? Or the function of specific parts of a neuron? Do those things have personal meaning, or say something about you?
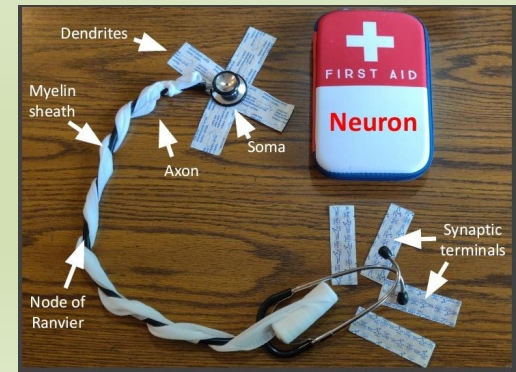
Seaweed Neuron

Dendrites

Cell body (or soma)

From Plage des Chevrets in St-Coulomb in Northern Brittany, France

Axon

Axon Terminals

By Leigh Wilson, Kings College London

#showusyourbraincell

axon
cell body
dendrites
cell membrane
myelin sheath
Schwann cell
axon retmina

Axon
Cell body
Axou terminal
Dendrites

Cell membrane
Dendrites
Nucleus
Cell body
Axon hillock
Axon
Node of Ranvier
Myelin sheath
Schwann cell
Axon terminal

#showusyourbraincell

Neuron

Soma

Dendrites

Axon

Axon terminals

#showusyourbraincell

By James & Mark Rutledge-Gorman
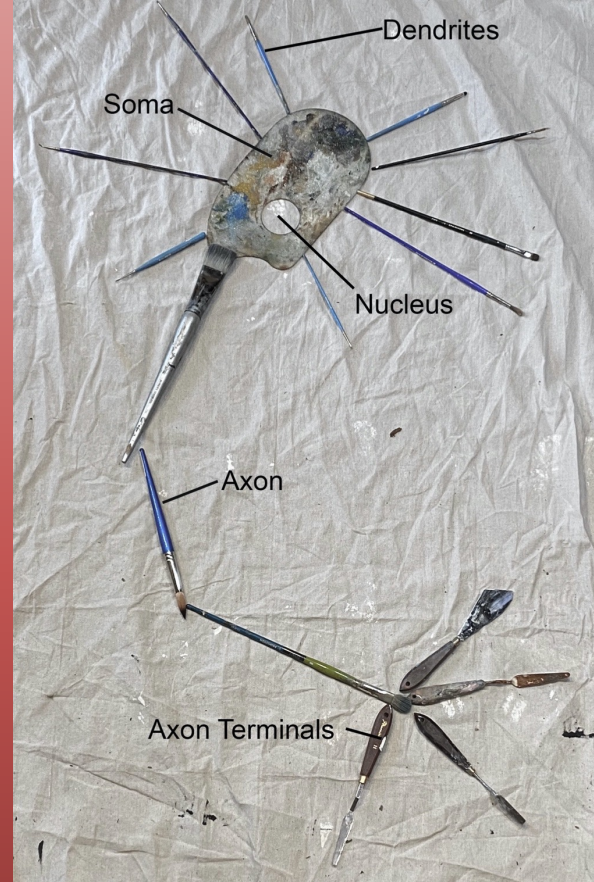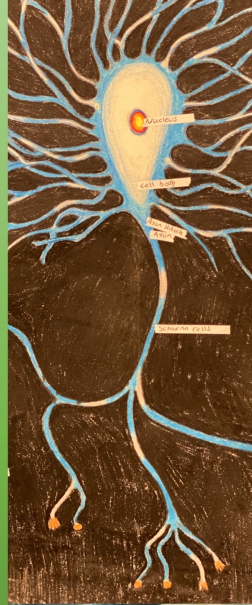
Dendrites

Soma

Nucleus

Axon

Axon Terminals

#showusyourbraincell

Tuna Jig Neuron

Axon terminals
(tuna jigs)

Axon
(rolled up shrimp
netting)

Jigging is a type of fishing
where your boat stays in place,
or slowly drifts, while the line is
jerked up and down to imitate
the swimming of prey

In Oregon, tuna
jigs are primarily
used for trolling,
a style of fishing
where you pull
hooks through
water behind
your boat

Cell Body
(lure for salmon
trolling)

Dendrites
(tuna jigs)

LEARN MORE:
https://seagrant.oregonstate.edu

#showusyourbraincell

By Amanda Gladics,
Oregon Sea Grant, OSU

Serotonin Flow

Astrocyte

Astrocyte

Dendrite

Neuron cell body

Neuron cell body

Serotonin

Astrocyte

Axon

By Sai Kiersarsky

#showusyourbraincell

#showusyourbraincell

Beaded Neuron on Brain-Tanned Leather

By Theresa Smith, Siletz Dee-Ni' Language & Culture Teacher

ANY BRAIN CELLS
Astrocyte
Pyramidal neuron
Photoreceptor
Inner hair cell
Nociceptor
Cerebellar granule cell
Meissner's corpuscle

"Every animal has enough brains to tan its own hide"

Dendrites

Myelin

Axon

Axon Terminals

Cell body (Soma)

#showusyourbraincell
nwnoggin.org

NWNOGGIN

Parallel fiber forms excitatory synapses with much larger Purkinje cells

Soma

Landscape with Cacti (1931) Diego Rivera, Portland Art Museum

Dendritic "claws"

Dendrites receive indirect cortical input via mossy fiber neurons from nuclei in the brainstem (pons)

Cerebellar Granule Cell
The most abundant neuron in our brain

nwnoggin.org

#showusyourbraincell

L-type cone cell

Rod cell

#showusyourbraincell

#showusyourbraincell

Gorgeous hand-crafted photoreceptors by artist Darrin Lane

nwnoggin.org

Neuron from the coat rack

Axon

Soma

Dendrites

Axon Terminals

Fall Neuron

Dendrites

Soma

Axon hillock

Myelin

Axon

Axon collateral

Axon terminals

Synaptic vesicles

Cell membrane

Dendrites

Cell body

Axon hillock

Nucl...

Nod...

Schwann cell

Axon te...
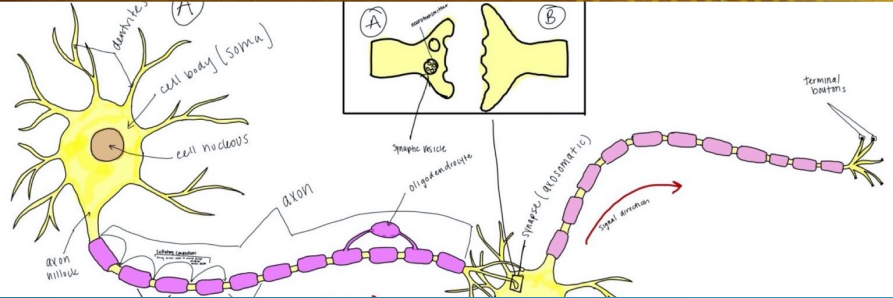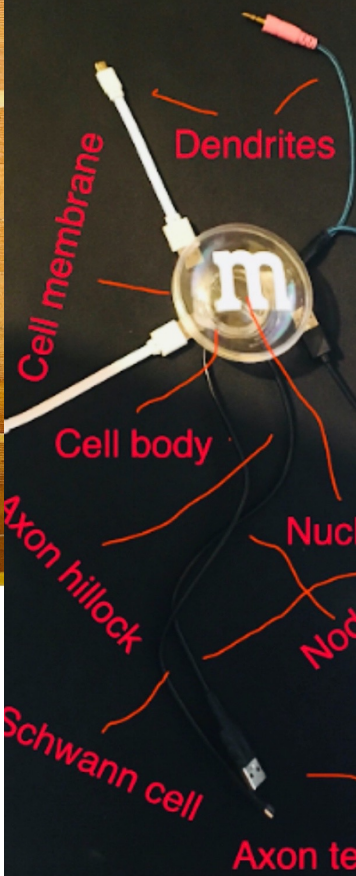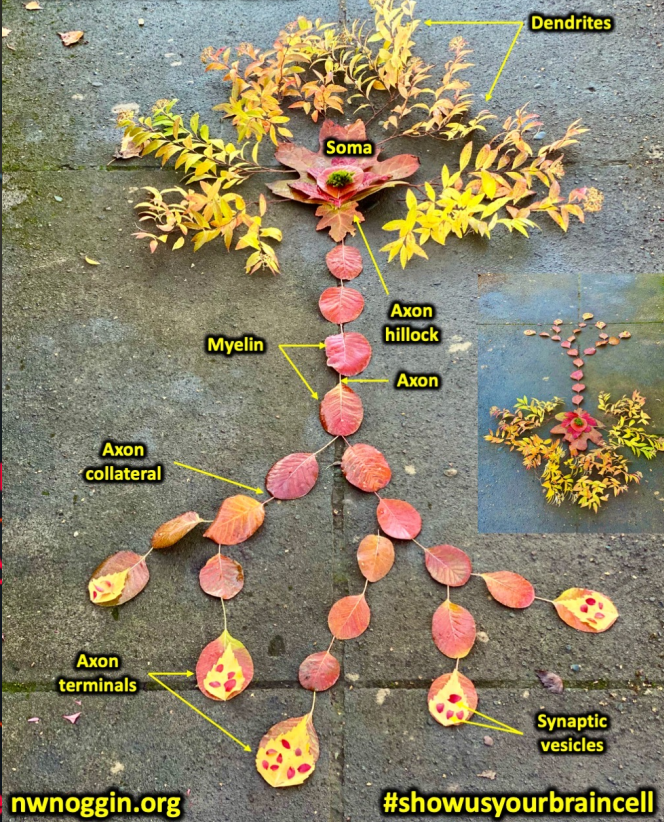
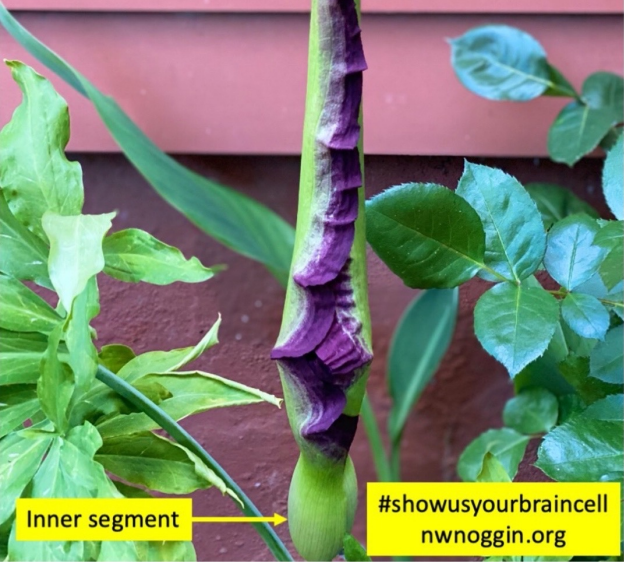nwnoggin.org

#showusyourbraincell

#showusyourbraincell

Dracunculus Vulgaris

Smells like rotting flesh
Pollinated by flies

Or...retinal cone cell?
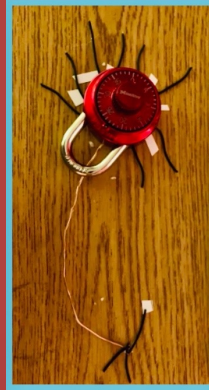
Membranous disks
(sites of photopigment)

Outer segment

Inner segment

#showusyourbraincell
nwnoggin.org

dendrites

axon

axon terminals

cell body
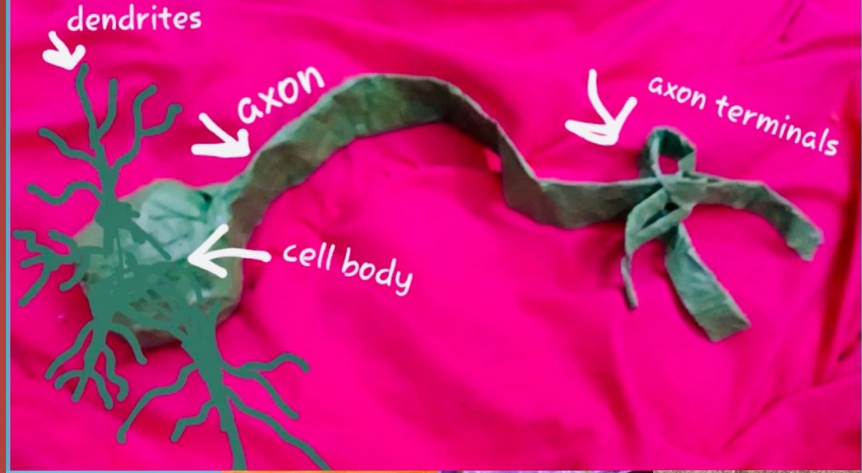
#showusyourbraincell

Taste afferent

Taste afferents are arranged like sections of an in taste buds on your tongue, with tiny microvilli poking out of taste pores for detecting chemicals (tastants) in food.

Microvilli
Site of receptor proteins that bind chemicals you can taste (tastants)

Nucleus

nwnoggin.org

#showusyourbraincell

#showusyourbraincell

Neurotransmitter

Axon

Axon terminals

Nodes of Ranvier

Myelin

Soma (or Cell Body)

Axon hillock

Dendrites

#showusyourbraincell

nwnoggin.org

#showusyourbraincell

Neuron (left image)
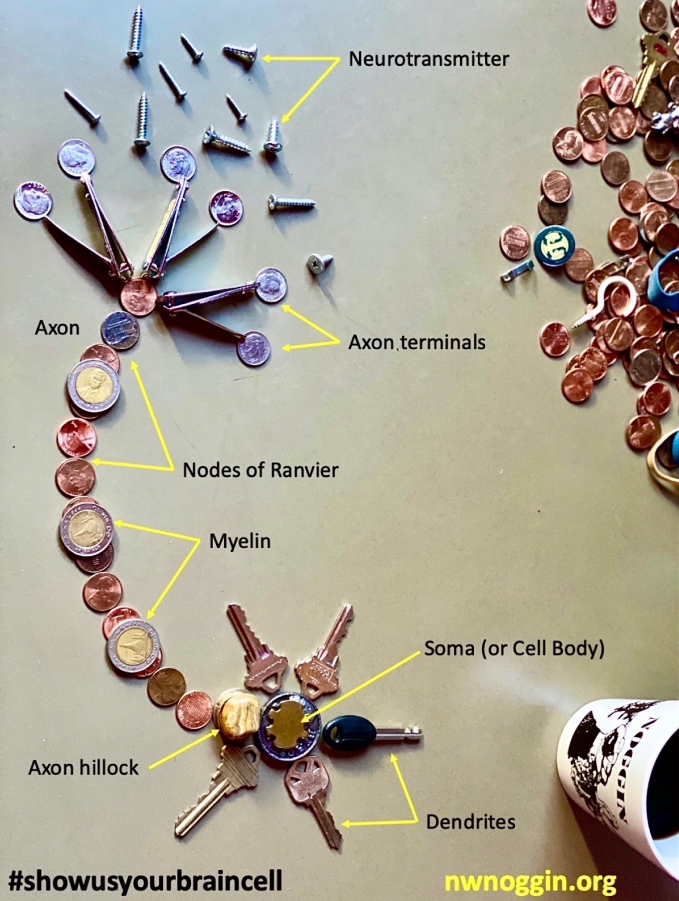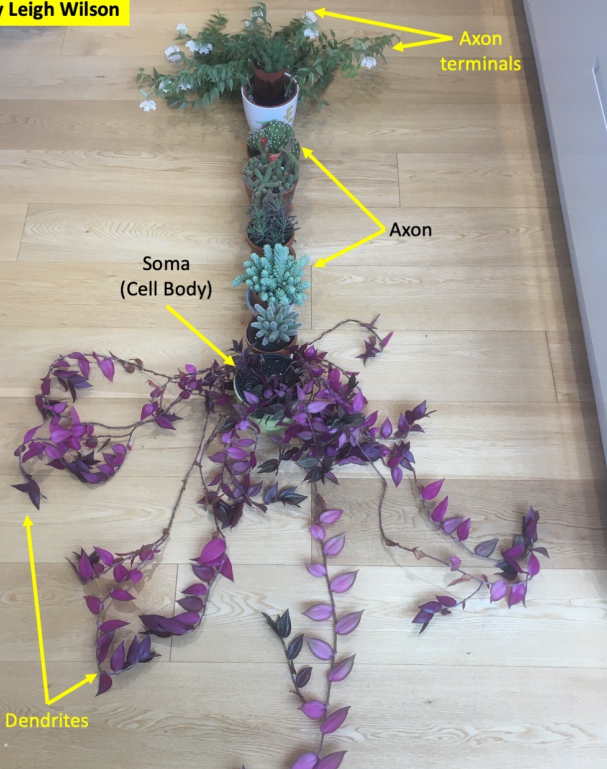
By Leigh Wilson

Axon terminals

Axon

Soma (Cell Body)

Dendrites

#showusyourbraincell

Neuron (center image)
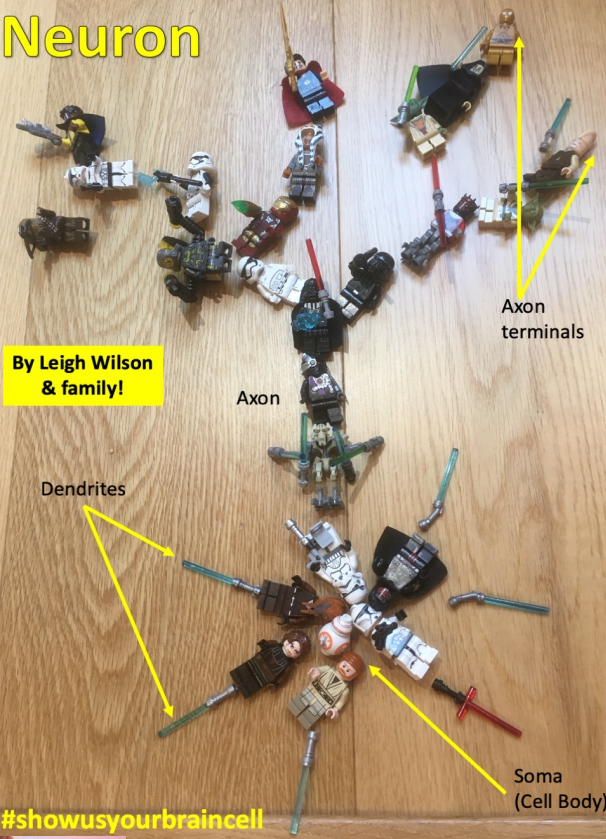
By Leigh Wilson & family!

Axon terminals

Axon

Dendrites

Soma (Cell Body)

#showusyourbraincell

Neuron (right image)
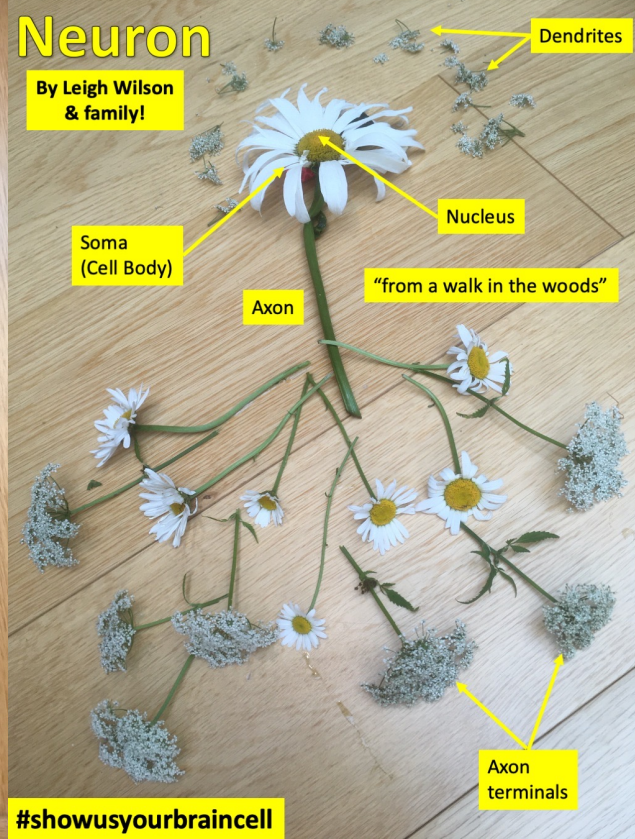
By Leigh Wilson & family!

Dendrites

Nucleus

Soma (Cell Body)

"from a walk in the woods"

Axon

Axon terminals

#showusyourbraincell
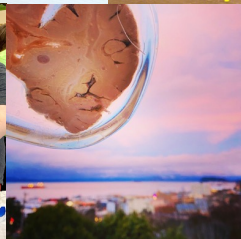
#showusyourbraincell

Tear Gas Neuron

Axon Terminals

Portland Police collaborated with white nationalist gangs & used chemical weapons of war on citizens

Axon

Chemicals in tear gas cause and worsen respiratory ailments

Portland Police, county sheriffs, Oregon state troopers, federal DHS officers & armed members of regional hate groups **attacked Portlanders & press** with tear gas & impact munitions *for more than *5* months in 2020*.

Soma

Dendrites

These dendrites are clips from CS gas canisters deployed by the Portland Police, **under Police Commissioner & Mayor Ted Wheeler**, against people protesting ongoing racism and police violence against BIPOC Americans.

Portland, OR 2020

Portland Police Bureau officers used force *"more than 6,000 times"* during *"crowd-control events"* from 5/ 29 – 11/15
-U.S. Department of Justice

#showusyourbraincell

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#showusyourbraincell

NEOCORTEX

Neocortex

Axonal inputs & outputs

Coronal slice Human brain

From straw bales in Union County, Oregon

Surface of neocortex

Layer I
Layer II
Layer III
Layer IV
Layer V
Layer VI

II
III

V
VI

Cortical minicolumn

A basic, repeated structural & functional unit of the neocortex.

IV

Gray matter

Output to other cortical areas

Axonal inputs to cortex (from thalamus, other areas of cortex) Most synapses made in Layer IV

Output to subcortical structures (thalamus, basal ganglia, etc)

White matter axons entering and leaving cortex

nwnoggin.org

#showusyourbraincell

You can find neurons everywhere!

#showusyourbraincell

Dendrites!
Receive input from other neurons at gaps called synapses

Axon
Carries electric message (action potential!)

Axon terminal
Release of neurotransmitter

Axon hillock
Initiation site for electric message

Cell body (or soma)
Important for cell upkeep; Location of nucleus, and DNA

nwnoggin.org
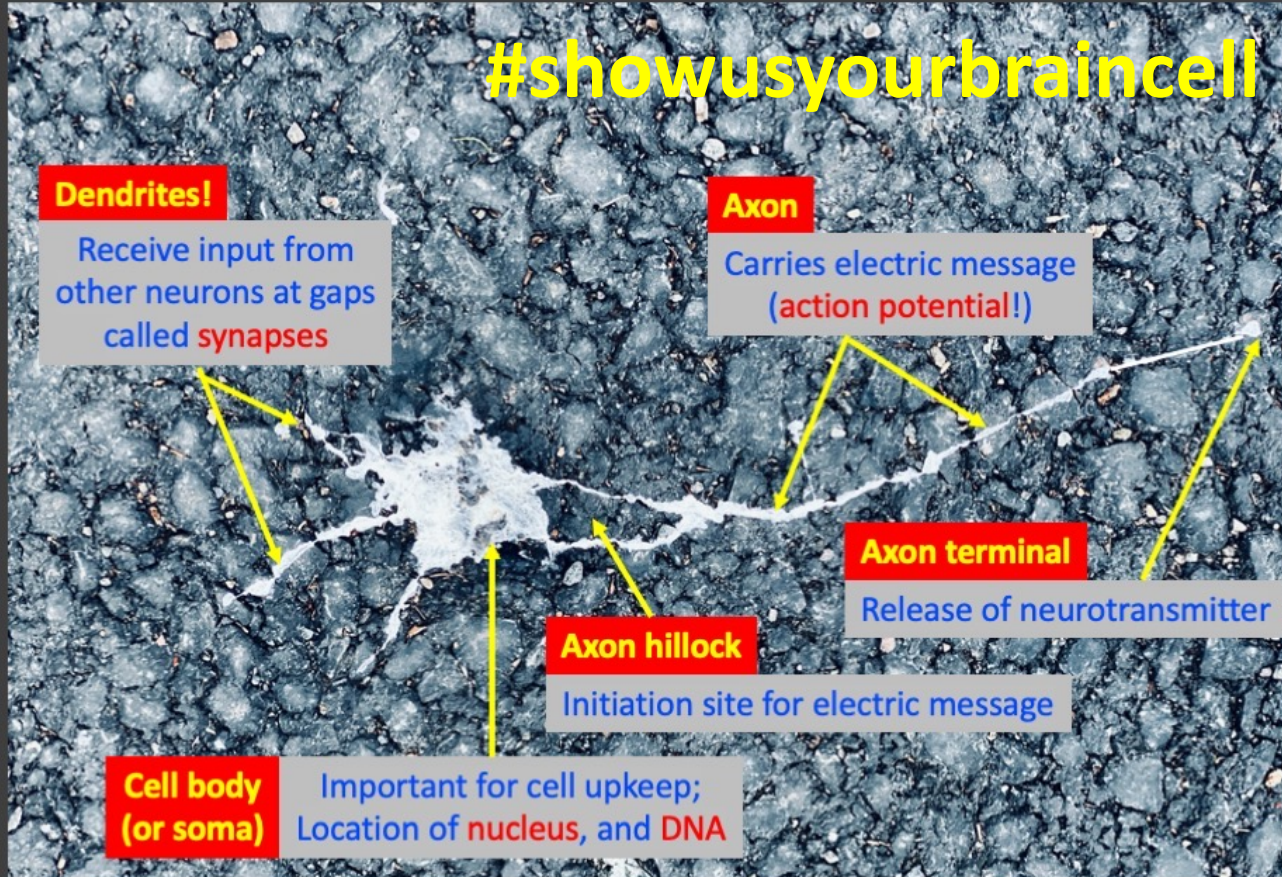
Everywhere!

Leah Hutchinson, Portland State University

Cell body

Nucleus
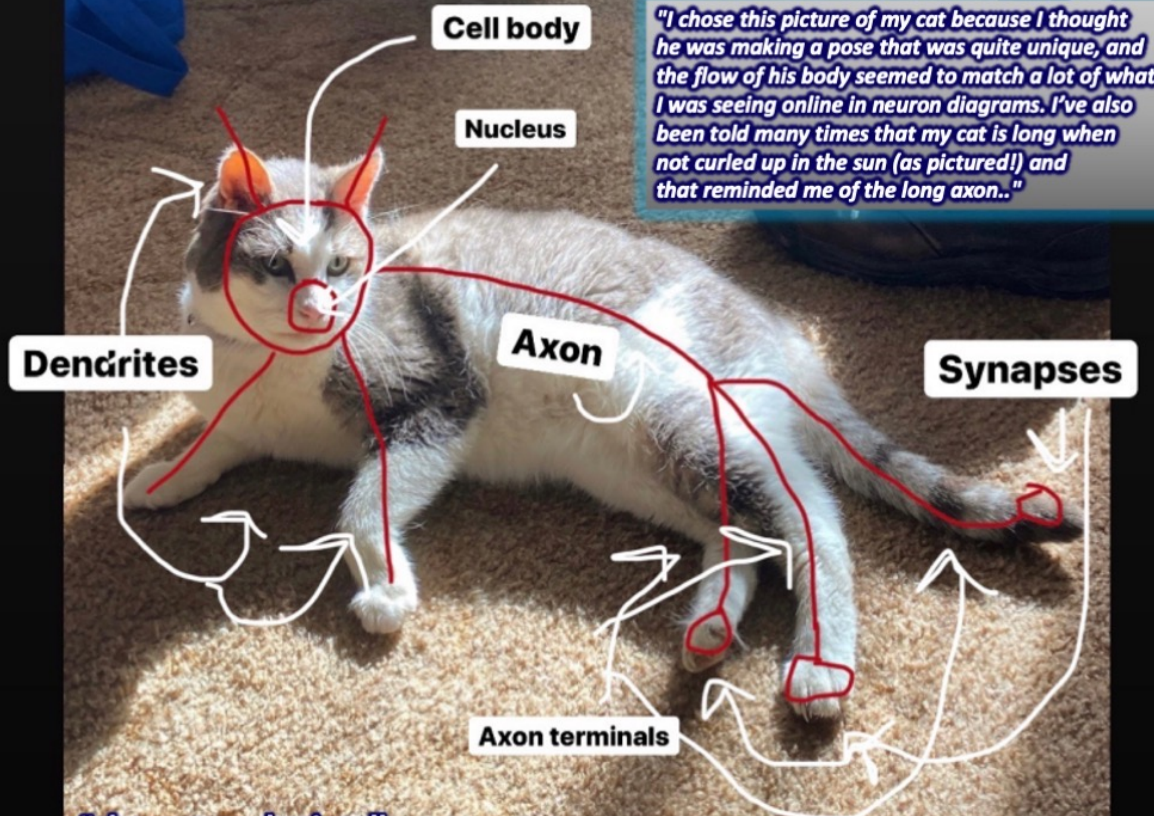
"I chose this picture of my cat because I thought he was making a pose that was quite unique, and the flow of his body seemed to match a lot of what I was seeing online in neuron diagrams. I've also been told many times that my cat is long when not curled up in the sun (as pictured!) and that reminded me of the long axon.."

Dendrites

Axon

Synapses

Axon terminals

#showusyourbraincell

Ready for the Hersenolympiade!

SATURDAY, 2/12
2:15pm CET/5:15am Pacific!

"Brain"   "Olympics"

Hagelslag
AXON
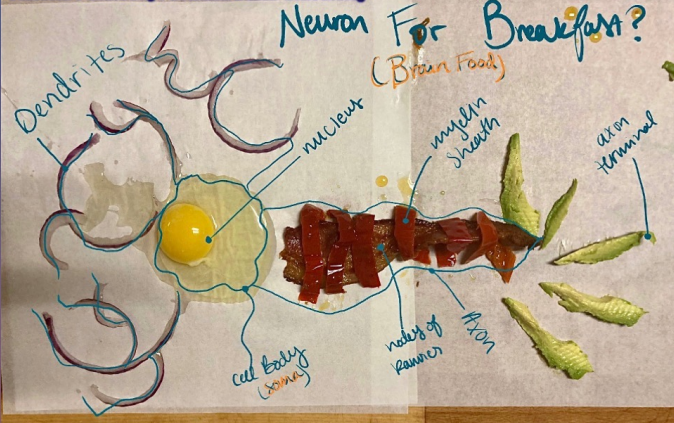TERMINALS

Stroopwafel
SOMA

Drop
AXON

Hagelslag
DENDRITES

Northwest Noggin will discuss (and exhibit!) real brains, art and the intersection between the two. Join us to make your own found object brain cells and discover how the arts and neuroscience offer compelling insights into who we are.

DUTCH NEURON
By Austin Howard

#showusyourbraincell

nwnoggin.org

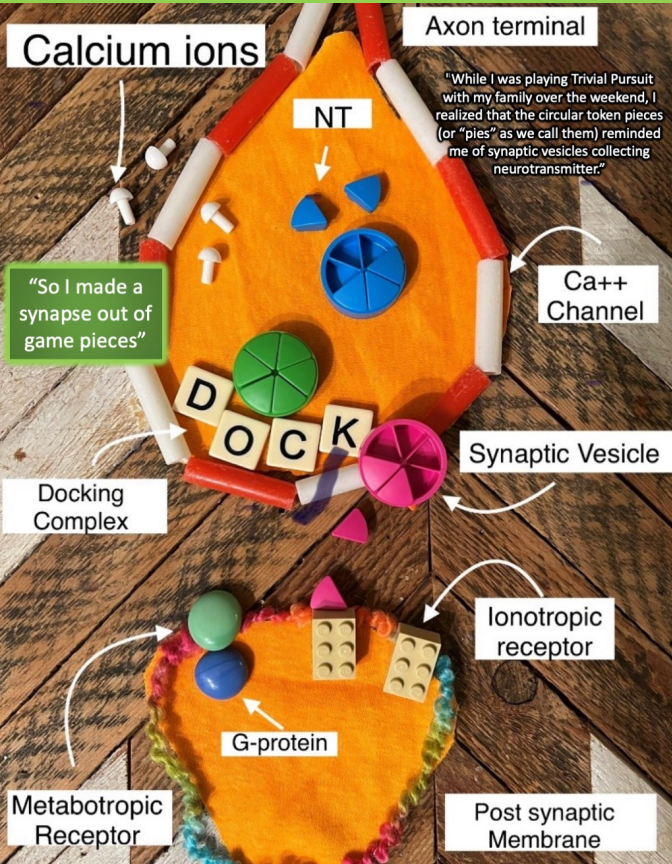Victoria Peterson, Portland State University

Neuron For Breakfast?
(Brain Food)

Dendrites

nucleus

myelin sheath

axon terminal

cell body (soma)

nodes of ranvier

axon

""I've always kind of thought the Soma of a neuron looked like a cracked open egg, which I spend a LOT of time looking at because I work at a cafe where we make a lot of egg sandwiches..."
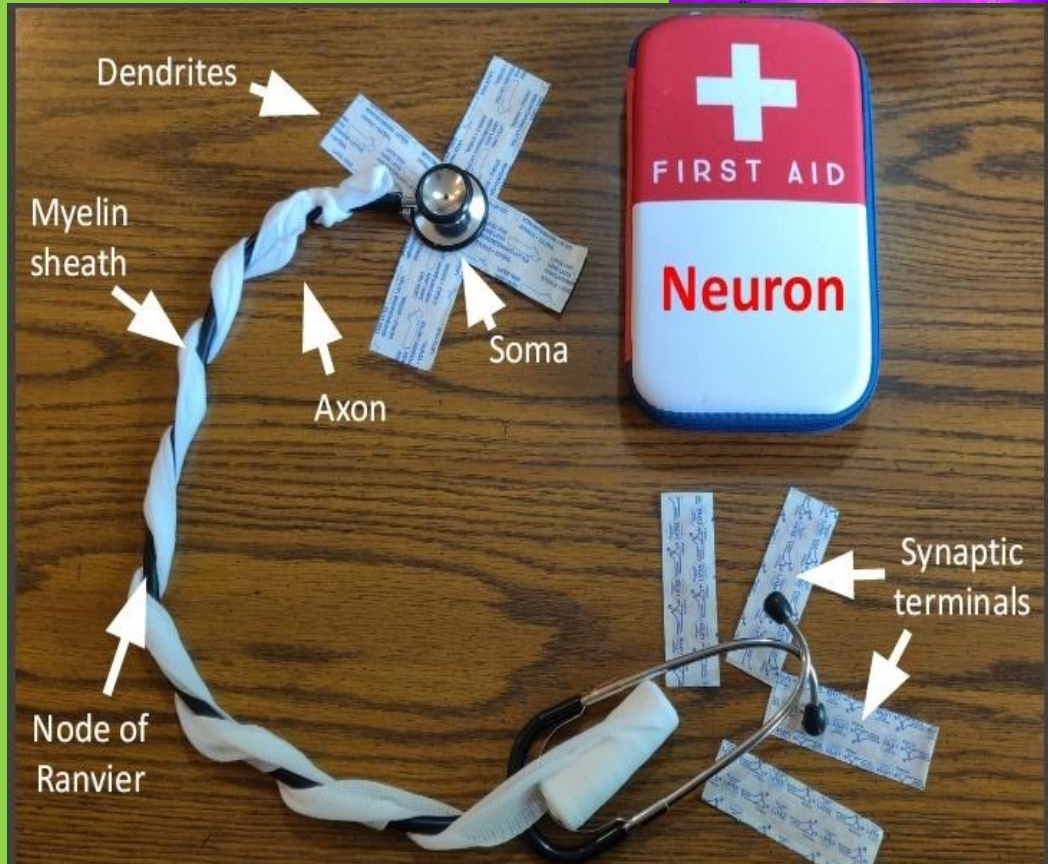
#showusyourbraincell

Make your own – AND SHARE!

Calcium ions

Axon terminal

"While I was playing Trivial Pursuit with my family over the weekend, I realized that the circular token pieces (or "pies" as we call them) reminded me of synaptic vesicles collecting neurotransmitter."

NT

"So I made a synapse out of game pieces"

Ca++ Channel

D O C K

Docking Complex

Synaptic Vesicle

Ionotropic receptor

G-protein

Metabotropic Receptor

Post synaptic Membrane

#showusyourbraincell   Cris Keirsey @ Portland State University

#showusyourbraincell

Dendrites

Myelin sheath

Axon

Soma

FIRST AID

Neuron

Node of Ranvier

Synaptic terminals