



**Summary:** In this activity, you'll visit the NeuroMorpho.Org website, choose 10 neurons, watch 3D renderings, and record data about those neurons.

The **NeuroMorpho.Org** website (sponsored by the National Institutes of Health) features over 6600 digitally reconstructed neurons from 13 different species - including the recently added elephant and spiny lobster. Visitors may view and interact with single neurons in 3D, get additional information about cell types, brain regions, and experiments conducted, as well as download these files for free. These are not photomicrographs or images of neurons. Rather they are digital drawings or tracings of neuronal axons and dendrites.

### Part I - Exploration

In a web browser, visit this web page: <http://www.neuromorpho.org> You may browse through the files or conduct a search using options from the orange menu bar just above the neuron images and text on the home page. Try each of these ways to access the neuron data:

1. Click on BROWSE ALL FILES. There are 4 ways in which the files are organized: by animal species, by brain region, by cell types, and by lab name.
2. Click on SEARCH BY in the same menu. You may search by Metadata, Morphometry, or Keywords. In Keyword search you type into a text box and press Enter or Return. Click Show Summary to see your results or click on one of the buttons above that to sort your data by species, brain region, or cell type.

The screenshot shows the NeuroMorpho.Org website interface. At the top, there is a logo of a brain with a neuron and the text "NeuroMorpho.Org". Below the logo, it says "Version 5.2 - Released: 06/01/2011 - Content: 6614 cells". A black bar displays "Total number of downloads: 1875234" and "Total site hits since August 1, 2006: 46373". An orange navigation bar contains "HOME", "BROWSE ALL FILES", "SEARCH BY", "LITERATURE COVERAGE", and "HELP". A dropdown menu under "BROWSE ALL FILES" lists "By animal species", "By brain region", "By cell types", and "By lab name". A pie chart shows the distribution of neuron reconstructions by species. A mouse cursor is hovering over the "Mouse" slice.

Species	Count
Human	2,147
Mouse	1,370
Rat	2,098
Monkey	360
Drosophila	252
Cockat	127
Elephant	78
Salamander	64
Cat	84
Others	27

BROWSE by animal species to see a colorful pie chart that shows the species and the number of neuron reconstructions for each in the collection.

Click on an area of the pie chart and hover over items in the resulting list to see an image of the neuron in a pop-up window.

**Colors are used to identify the parts of the neuron:**

white	soma
gray	axon
green	basal dendrite
magenta	apical dendrite

## Part II - Data Collection and Recording

When you find a neuron that you are interested in, click on the link and you'll get all the data associated with that neuron as well as the option to see the 3D animation.

Make a sketch of the neuron and record important information about it on the Neuron Data Table on page 4. Do this for 5-10 neurons you select. You may not want to keep all the data the website provides. If data were not reported for criteria on the chart, write **NA** in that section of the data table.

## Part III - Follow-up Questions

1. How are all your neurons alike? How are they different?
2. Are all neurons the same size? Justify your answer with data.
3. Generalize about what makes the kind of neurons you chose special.
4. What features do all neurons have?
5. How can you recognize a drawing from a real neuron?
6. What structure(s) is/are missing from these tracings?
7. What else do you want to know about these neurons?
8. Why would scientists divide dendrites into basal ('at the base of the neuron') and apical ('at the top of the neuron')?

9. Why would scientists want to count the number of stems, branches or bifurcations that a neuron has?

The NeuroMorpho.Org site has many more features than those included in this activity. Visit their FAQs (under HELP on the main menu or at [www.neuromorpho.org/neuroMorpho/myfaq.jsp](http://www.neuromorpho.org/neuroMorpho/myfaq.jsp)) for answers and to learn more about this terrific resource.

**NeuroMorpho.org Search  
Neuron Data Table**

Name: \_\_\_\_\_

Neuron Selection # \_\_\_\_\_

<b>NeuroMorpho ID#</b>		<b>Neuron Name</b>	
<b>Species/ Strain</b>			
<b>Brain Region: Primary</b>		<b>Cell Class: Primary</b>	
<b>Magnification</b>		<b>Observations/Drawing/Notes</b>	
<b># of Stems</b>			
<b># of Bifurcations</b>			
<b># of Branches</b>			
<b>Overall Width</b>			
<b>Overall Height</b>			
<b>Overall Depth</b>			

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