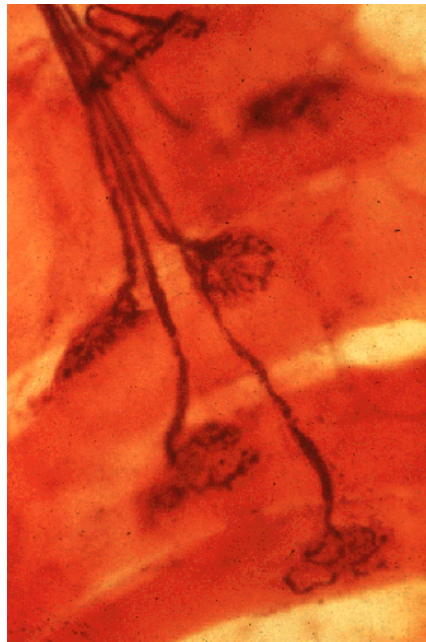


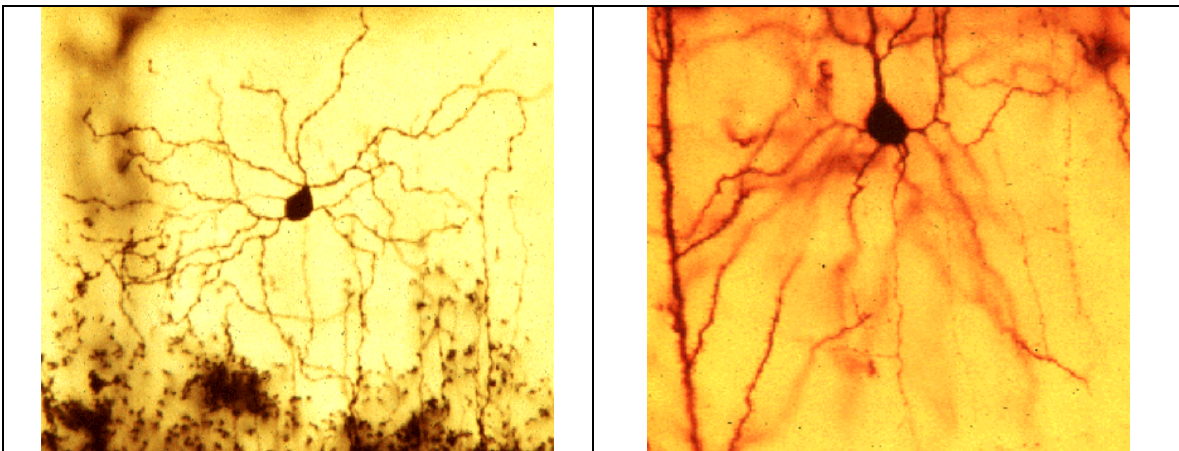
Neuron Microscopy

Introductory Background

As you learned in lecture, neurons are everywhere in the nervous system. Motor neurons (efferent neurons) run FROM the central nervous system to effectors, e.g., glands, muscles (the neuromuscular junction is illustrated, below):



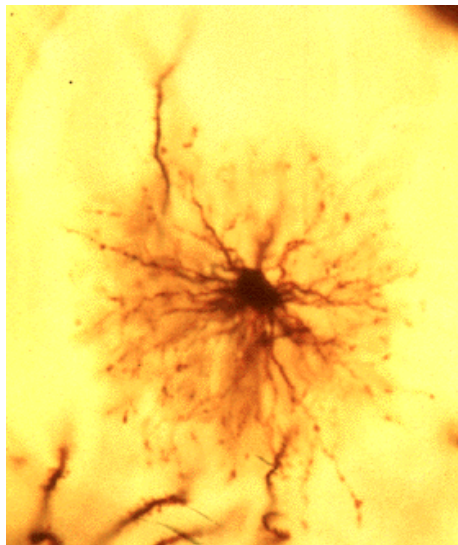
The collection of “bulbs”, above, are the terminals of the axons that interface with the muscle membrane. Motor neurons also run from higher to lower central nervous system centers. Motor neurons are generally multipolar, i.e., have multiple dendrites and one axon (remember that most neurons in the CNS are of the multi-polar type). Shown below are some examples of multi-polar neurons:



Do you see the axon for each neuron, above?

That motor neurons are multipolar need not come as a surprise. The function of the motor neuron is to unite regulatory/response messages between the brain and sensory receptors/cells (input) in order that a single message (output) may be sent to effect a response. The manner in which the motor neuron combines these signals demands that the motor neuron be multi-polar, i.e., it must be able to receive numerous input signals to be able to send a single output signal to its target. Additionally, the motor neurons with the largest cell bodies are the neurons that have the largest and longest neurons. In some instances, axons have been known to be as long as a meter or more, depending on the effector innervated by the motor neuron. [ASIDE: Axons carry messages Away from the nerve cell body while dendrites bring messages to the nerve cell body.]

Below is an astrocyte – not as a motor neuron (remember that astrocytes make up the blood-brain barrier), rather as another demonstration of a multi-polar neuron:



Experimental

Obtain the microscope slide of motor neurons. Examine it under 10X and 40X magnification on your microscope. Draw what you observe in the space provided, below:

10X view	40X view

Questions

- 1) Draw, in the space, below, and label a motor neuron.
- 2) Can you easily determine, under a microscope, which structure[s] is [are] the axon? The dendrite[s]? Why or why not?
- 3) If you could see the termination of the axon at the muscle spindle (like above), could you work your way backwards to determine which structure is the axon and which structures are the dendrites? Why or why not?

4) If you smashed your hand with a hammer, which kind of neuron would cause you directly to remove your hand from that place?

5) If you stubbed your toe on your coffee table, which kinds of neuron would cause you to directly say, "Gee! I wish I hadn't done that?!"

References

- 1) Carman: Doc Carman's Necessities of Human Anatomy and Physiology, Volume II. (WC Brown: Dubuque) ©1996.
- 2) Kelly, Wood and Enders: Bailey's Textbook of Microscopic Anatomy, 18th Edition. (Williams and Wilkins: Baltimore) ©1984.