

Laboratory Exercise

25

Nervous Tissue and Nerves

Materials Needed

Textbook
Compound light microscope
Prepared microscope slides of the following:
 Spinal cord (smear)
 Dorsal root ganglion (section)
 Neuroglia (astrocytes)
 Peripheral nerve (cross section and longitudinal section)
Neuron model

For Learning Extension:

Prepared microscope slide of Purkinje cells from cerebellum

Nervous tissue, which occurs in the brain, spinal cord, and nerves, contains neurons and neuroglia. The neurons are the basic structural and functional units of the nervous system involved in decision-making processes, detecting stimuli, and conducting messages. The neuroglia perform various supportive and protective functions for neurons.

Purpose of the Exercise

To review the characteristics of nervous tissue and to observe neurons, neuroglia, and various features of the nerves.

LEARNING OUTCOMES

After completing this exercise, you should be able to

- ① Describe and locate the general characteristics of nervous tissue.
- ② Distinguish structural and functional characteristics of neurons and neuroglia.
- ③ Identify and sketch the major structures of a neuron and a nerve.

EXPLORE

Procedure—Nervous Tissue and Nerves

1. Review the sections entitled “General Functions of the Nervous System” and “Classification of Cells of the Nervous System” in chapter 10 of the textbook.
2. As a review activity, label figures 25.1 and 25.2.
3. Complete Parts A and B of Laboratory Report 25.
4. Obtain a prepared microscope slide of a spinal cord smear. Using low-power magnification, search the slide and locate the relatively large, deeply stained cell bodies of motor neurons (multipolar neurons).
5. Observe a single motor neuron, using high-power magnification, and note the following features:

cell body

nucleus
nucleolus
chromatophilic substance (Nissl bodies)
neurofibrils (threadlike structures extending into the nerve fibers)

dendrites

axon (nerve fiber)

Compare the slide to the neuron model and to figure 25.3. You also may note small, darkly stained nuclei of neuroglia around the motor neuron.

6. Sketch and label a motor (efferent) neuron in the space provided in Part C of the laboratory report.
7. Obtain a prepared microscope slide of a dorsal root ganglion. Search the slide and locate a cluster of sensory neuron cell bodies. You also may note bundles of nerve fibers passing among groups of neuron cell bodies (fig. 25.4).
8. Sketch and label a sensory (afferent) neuron cell body in the space provided in Part C of the laboratory report.

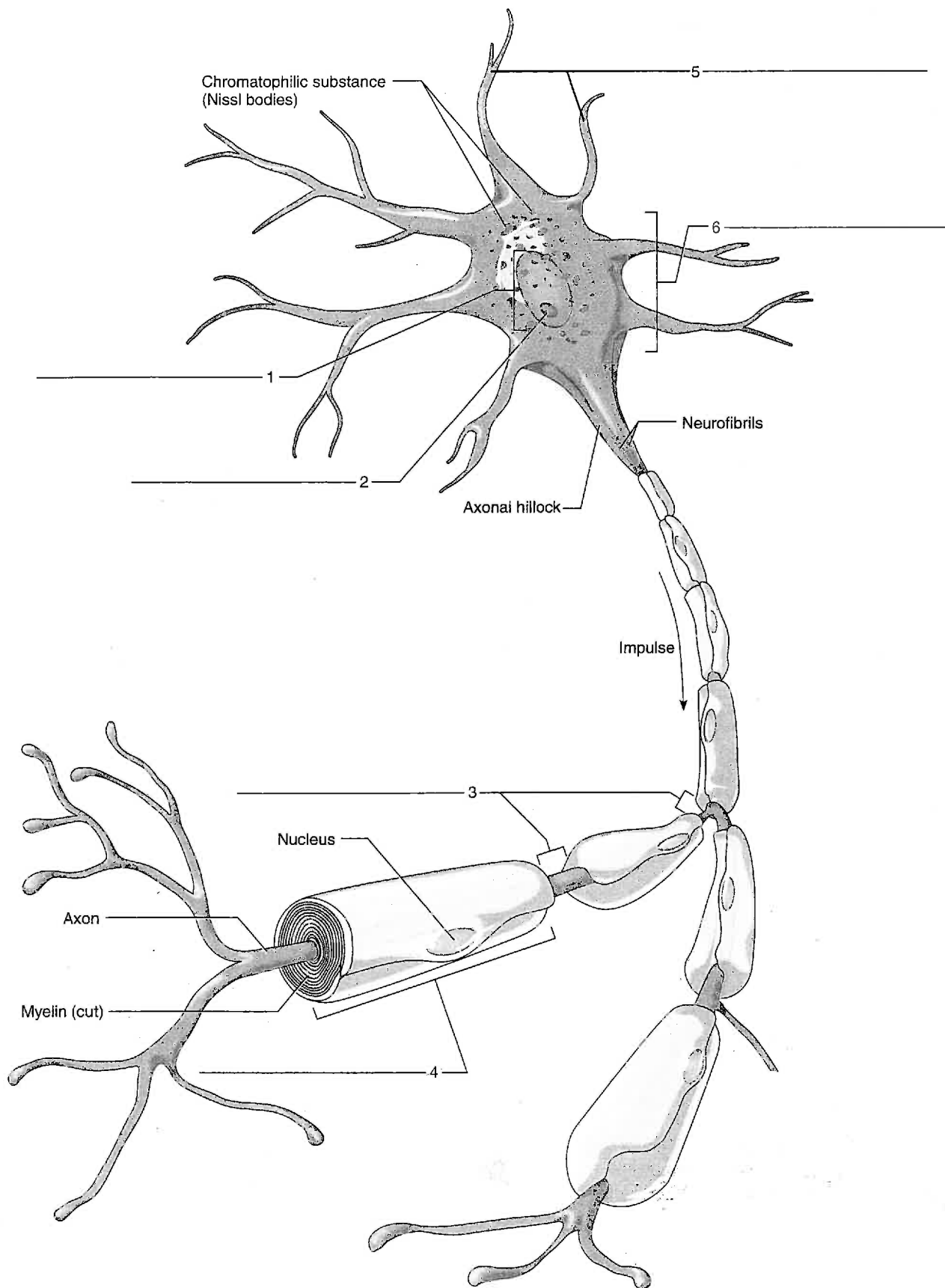


Figure 25.1 Label this diagram of a motor neuron. **A**

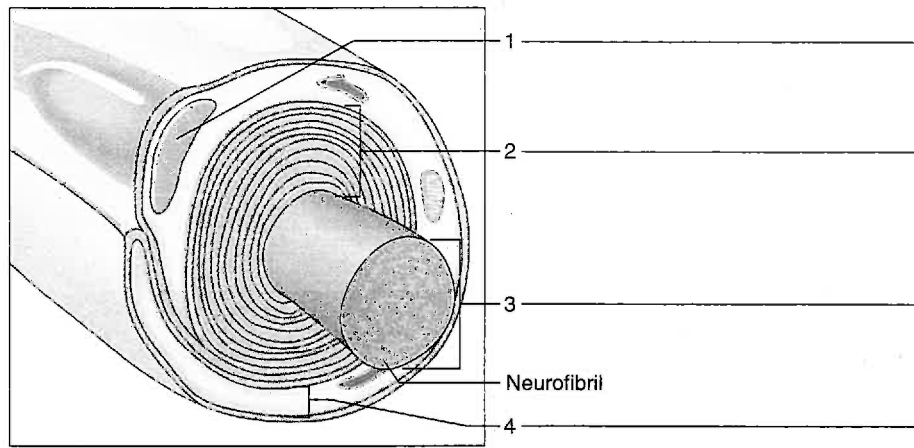


Figure 25.2 Label the features of the myelinated axon (nerve fiber). **A**

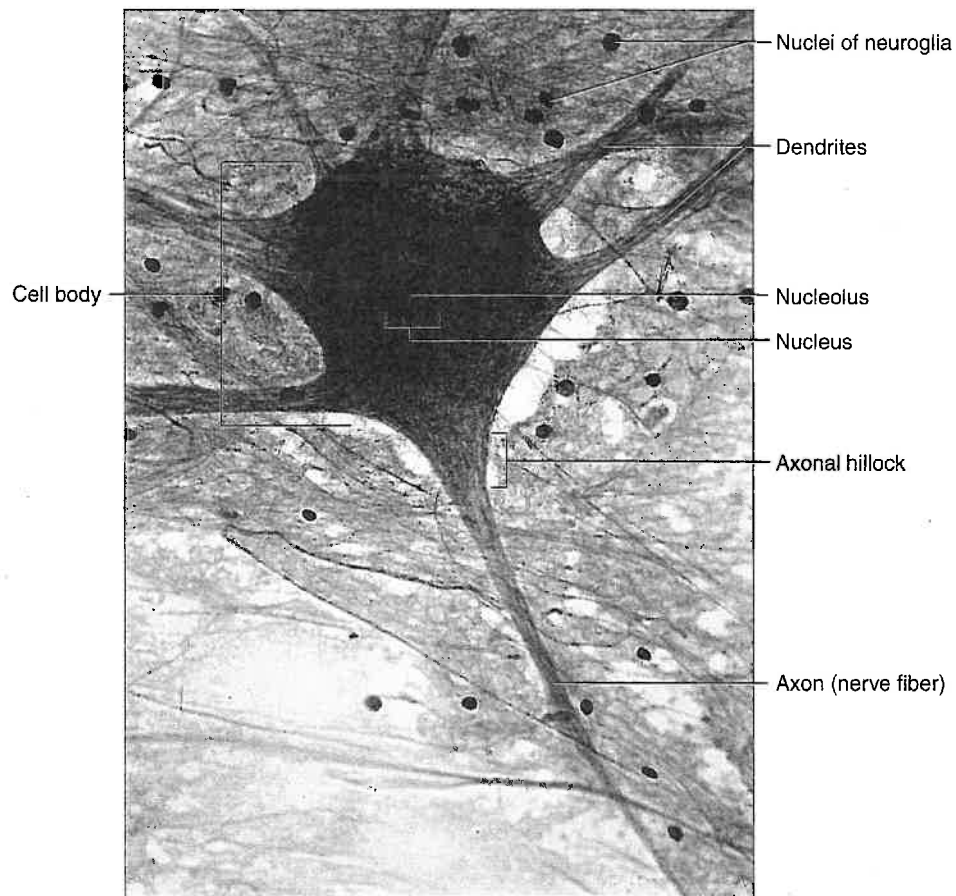


Figure 25.3 Micrograph of a multipolar neuron and neuroglia from a spinal cord smear (100× micrograph enlarged to 600×).

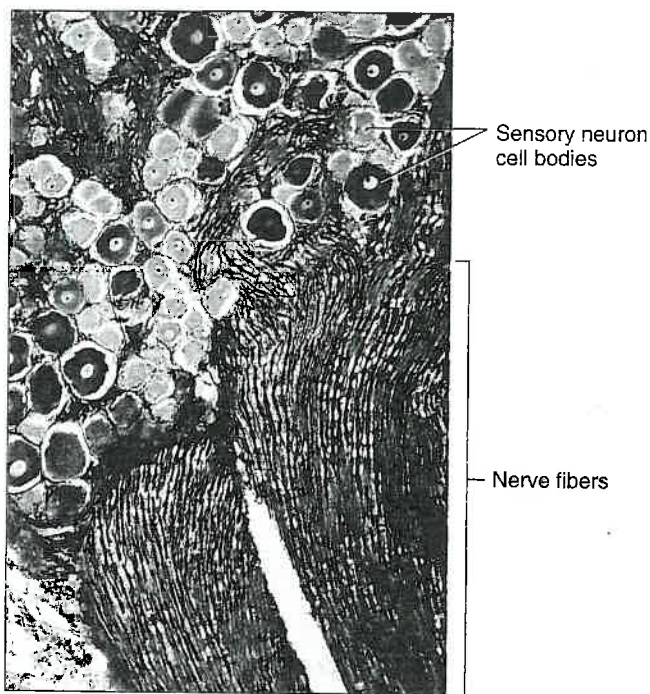


Figure 25.4 Micrograph of a dorsal root ganglion (50 \times micrograph enlarged to 100 \times).

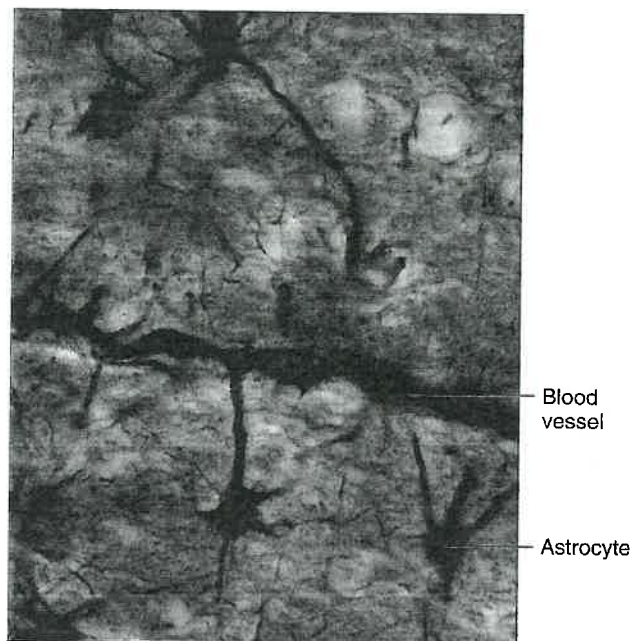


Figure 25.5 Micrograph of astrocytes (250 \times micrograph enlarged to 1,000 \times).

9. Obtain a prepared microscope slide of neuroglia. Search the slide and locate some darkly stained astrocytes with numerous long, slender processes (fig. 25.5).
10. Sketch several neuroglia in the space provided in Part C of the laboratory report.
11. Obtain a prepared microscope slide of a nerve. Locate the cross section of the nerve and note the many round nerve fibers inside. Also note the dense layer of connective tissue (perineurium) that encircles a fascicle of nerve fibers and holds them together in a bundle. The individual nerve fibers are surrounded by a layer of more delicate connective tissue (endoneurium) (fig. 25.6).
12. Using high-power magnification, observe a single nerve fiber and note the following features:

central axon

myelin sheath around the axon of Schwann cell
(most of the myelin may have been dissolved and lost during the slide preparation)

neurilemma of Schwann cell

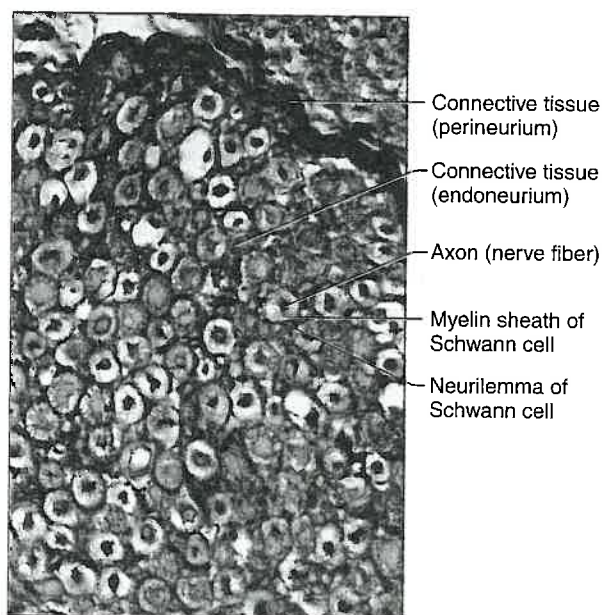


Figure 25.6 Cross section of a bundle of neurons within a nerve (400 \times).

13. Sketch and label a nerve fiber with Schwann cell (cross section) in the space provided in Part D of the laboratory report.
14. Locate the longitudinal section of the nerve on the slide (fig. 25.7). Note the following:

central axons

myelin sheath of Schwann cells

neurilemma of Schwann cells

nodes of Ranvier

15. Sketch and label a nerve fiber with Schwann cell (longitudinal section) in the space provided in Part D of the laboratory report.

Learning Extension

Obtain a prepared microscope slide of Purkinje cells. To locate these neurons, search the slide for large, flask-shaped cell bodies. Each cell body has one or two large, thick dendrites that give rise to branching networks of fibers. These cells are found in a particular region of the brain (cerebellar cortex).

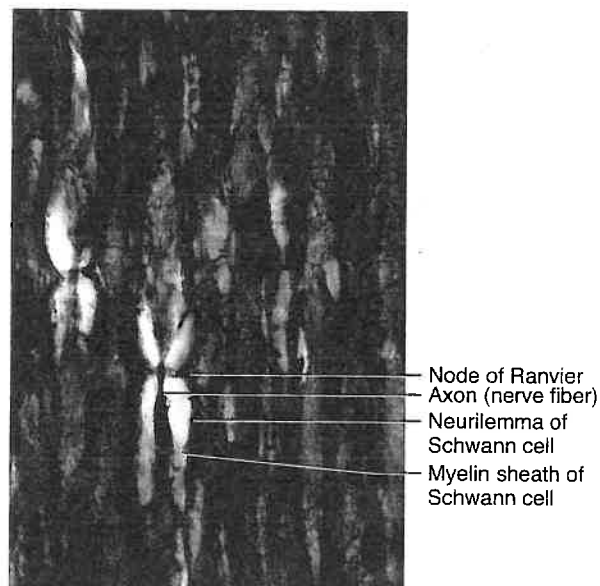


Figure 25.7 Longitudinal section of a nerve (250× micrograph enlarged to 2,000×).

Notes