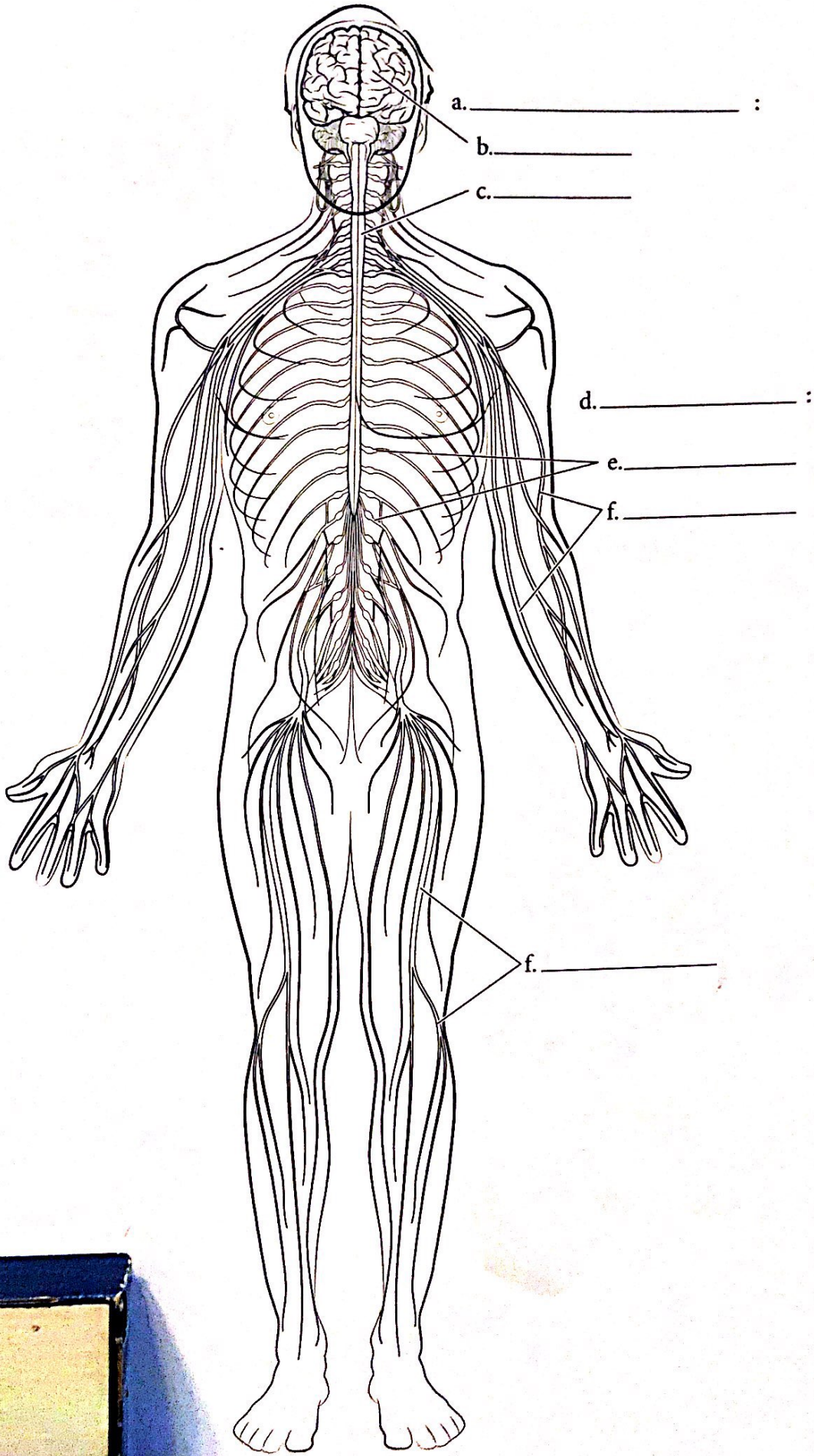
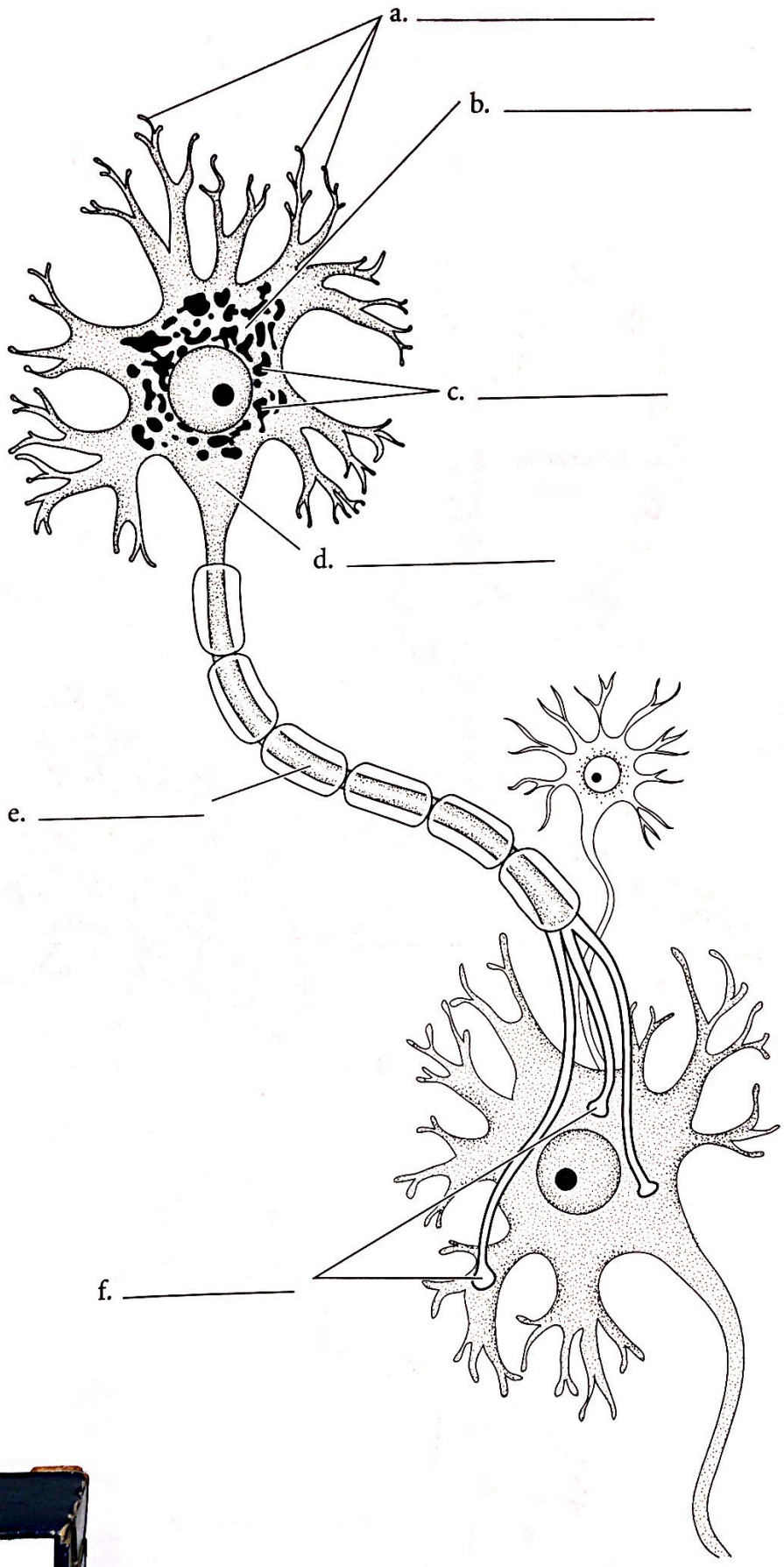
OVERVIEW OF THE NERVOUS SYSTEM

The body must react to the external environment and the internal environment and communicate information between regions of the body. This job is primarily the task of the nervous system. Proper response to the external environment is critical for thermal regulation, response to threats, taking advantage of opportunities such as food availability, and response to a host of other stimuli. Response to the internal environment is important for sensing muscle tension, digestive processes, maintenance of blood pressure, and other functions. Communication is important for coordination of activities such as walking, digestion, and maintenance of blood pressure. The nervous system also integrates information from the environment, relates past information to the present, and interprets new experiences. The **brain** and the **spinal cord** make up the **central nervous system (CNS)**. The nerves of the body make up the **peripheral nervous system (PNS)**. The peripheral nervous system is divided into the **somatic nervous system**, which consists of **spinal nerves** and **peripheral nerves** that innervate the outer regions of the body, and the **autonomic nervous system (ANS)**. Label the parts of the nervous system and color them in.



NEURON

The nerve cell or **neuron** is the functional cell in the nervous system. Most electrical conduction in the body is due to the transmission of impulses by the neuron. The neuron consists of branched structures called **dendrites**. The main portion of the nerve cell is called the **soma** or **nerve cell body**, and the elongated part of the neuron is the **axon**. Two neurons are connected by gaps called **synapses**. The nerve cell body is the metabolic center of the cell consisting of a nucleus, an endoplasmic reticulum called the **Nissl bodies**, and a region where the axon attaches called the **axon hillock**. Color in the parts of the neuron and label the parts.

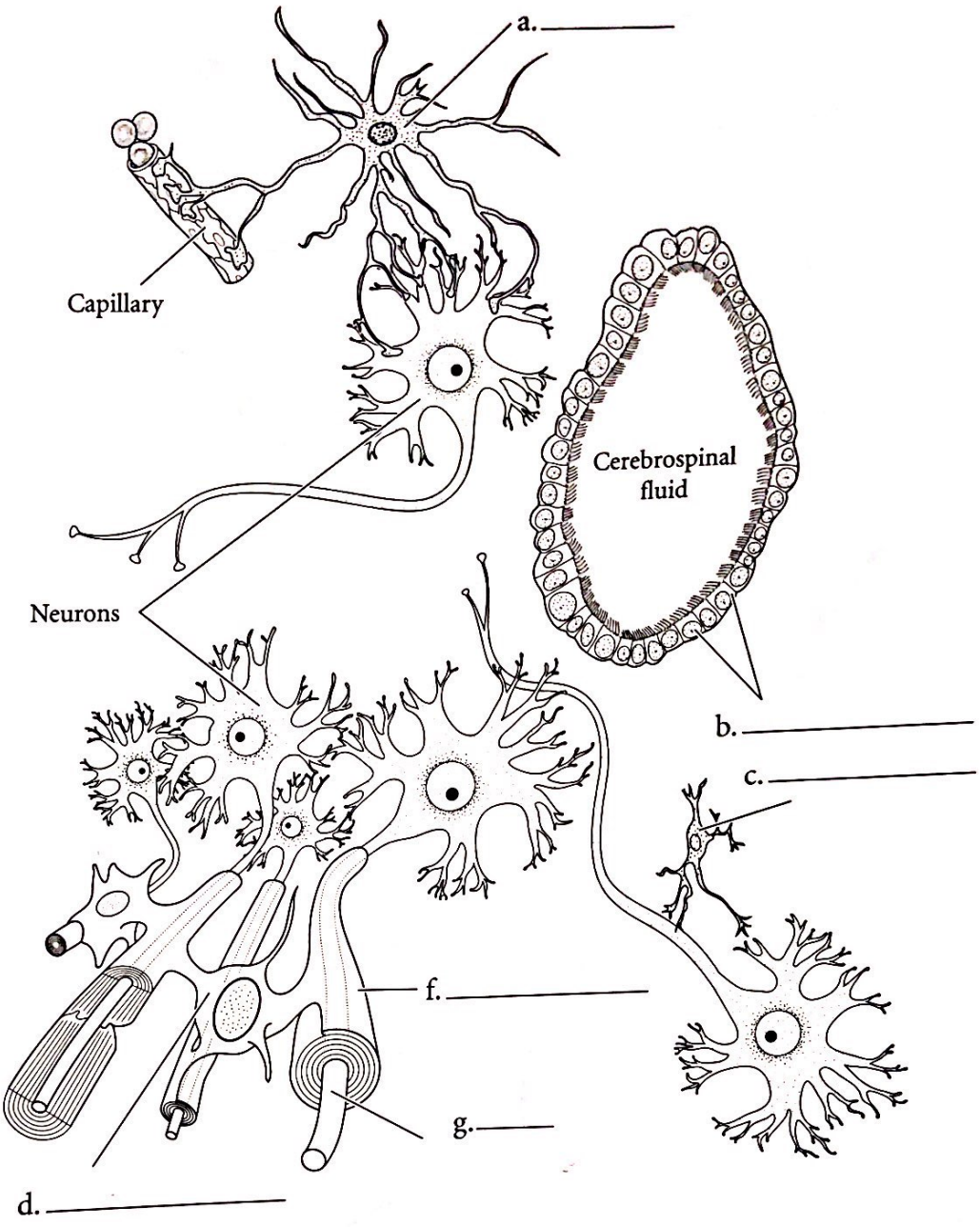


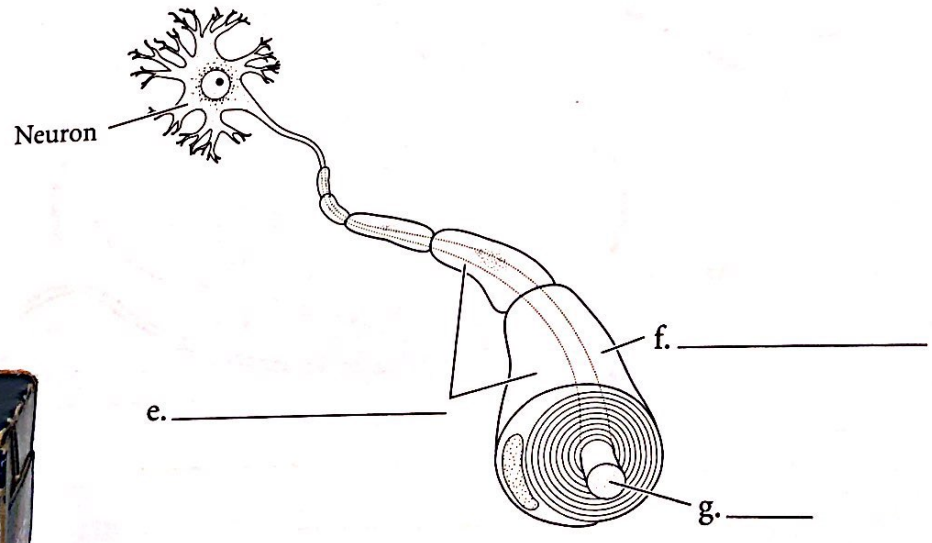
NEUROGLIA

Neuroglia or **glial cells** have many specialized functions in the nervous system. The **neurolemmocyte** or **Schwann cell** is found in the peripheral nervous system. These cells make up the **myelin sheath** that wraps around **axons.**

The other neuroglia are located in the central nervous system. **Astrocytes** are glial cells that, along with the brain capillaries, form the blood-brain barrier. They also have a role in transferring nutrients from the capillaries to the deeper regions of the brain. Another glial cell that functions as a barrier is the **ependymal** cell. These cells are located between the CNS and cavities filled with cerebrospinal fluid. **Microglia** are also found in the CNS, and their function is one of protection. Microglia respond to invasions of the nervous system and destroy microbes.

Oligodendrocytes are neuroglia that produce myelination in the CNS. Myelinated nerve fibers comprise white matter. Myelinated fibers conduct impulses faster than unmyelinated fibers. White matter is mostly associated with transmission of neural impulses from one area to another. Color each glial cell a different color and write the name of each cell in the space provided.





NEURON SHAPES/ SYNAPSE

Neurons come in a few basic shapes. The most common neuron in the CNS is the **multipolar neuron**. It consists of many dendrites and a single axon. **Bipolar neurons** are not very common. They are found in the eye, in the nose, and in the ear and consist of a singular dendrite and an axon. **Pseudounipolar neurons** (unipolar neurons) make up the sensory nerves of the body. They consist of a cluster of dendrites at one end, a long axon leading to the nerve cell body, and another axon leaving the nerve cell body at the same area.

Neurons connect to each other by synapses. The neuron first carrying the information is called the **presynaptic neuron**. This neuron has **synaptic vesicles** that release **neurotransmitters**. The **synaptic cleft** is the space between the neurons, and the **postsynaptic neuron** is the receiving neuron. Label the various neurons and their parts as well as the synapse between the neurons.