Biology

Nervous system

The nervous system is responsible for communication between different regions of the body, it is divided into:

CNS (central nervous system) = brain + spinal cord

PNS (peripheral nervous system) =nerves running between the CNS & other tissues.

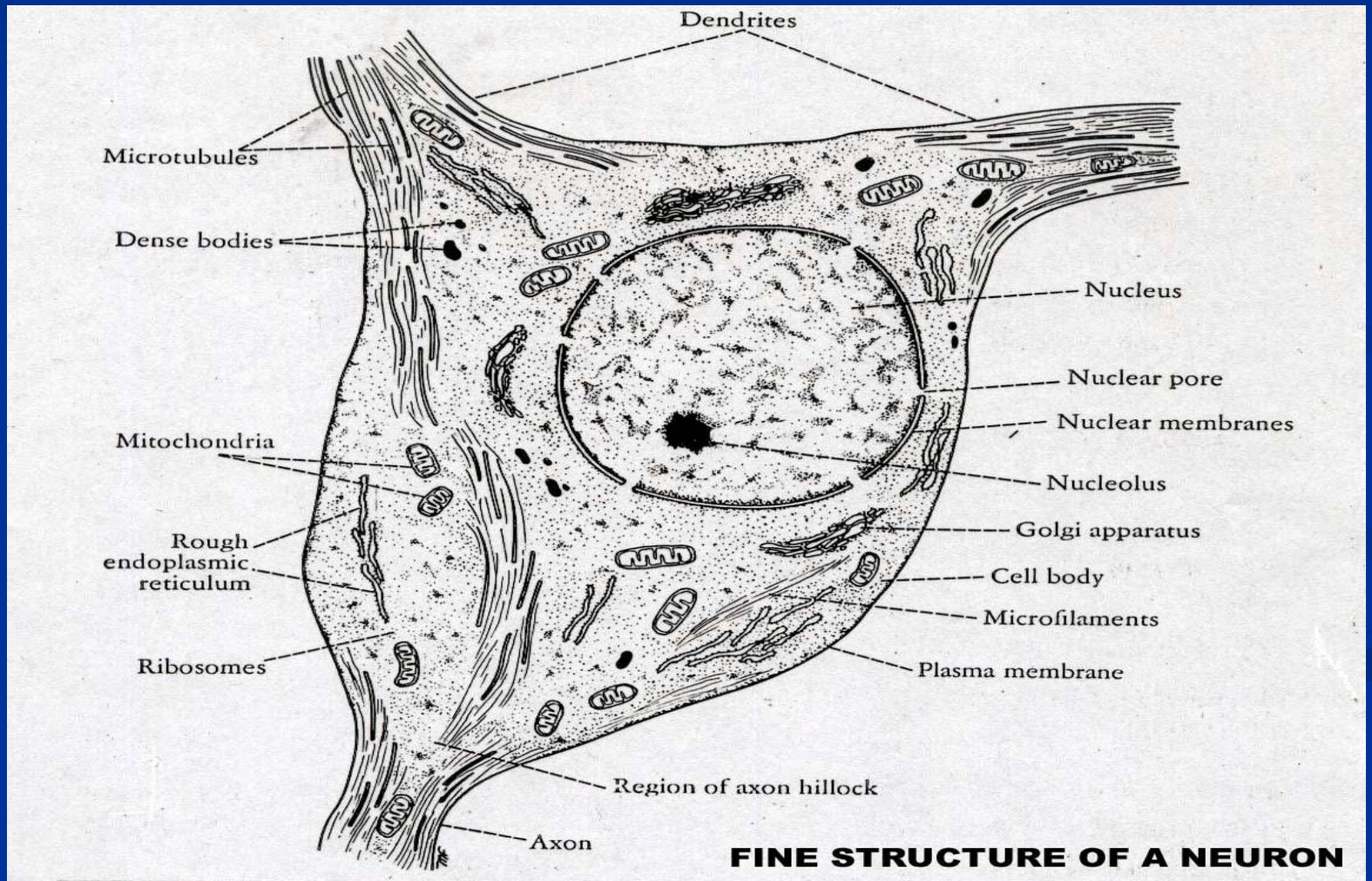
Nervous tissue consists of two major cell types:

neurons and neuroglia.

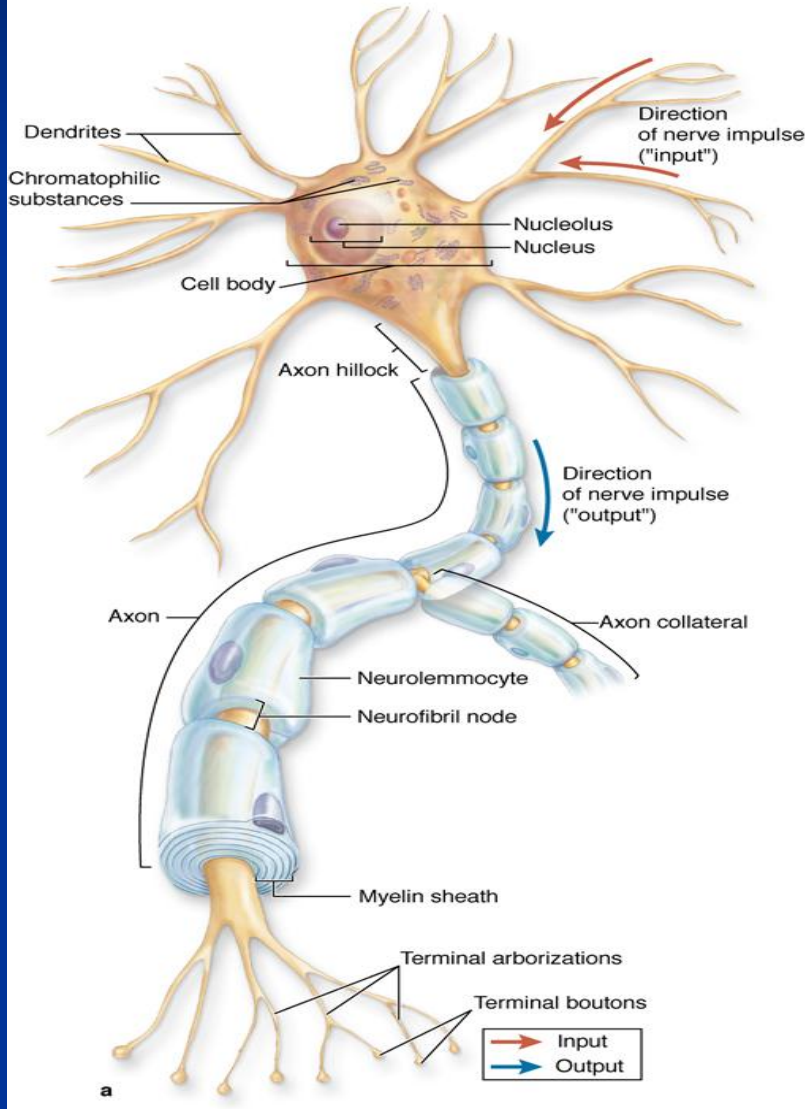
The Neuron:

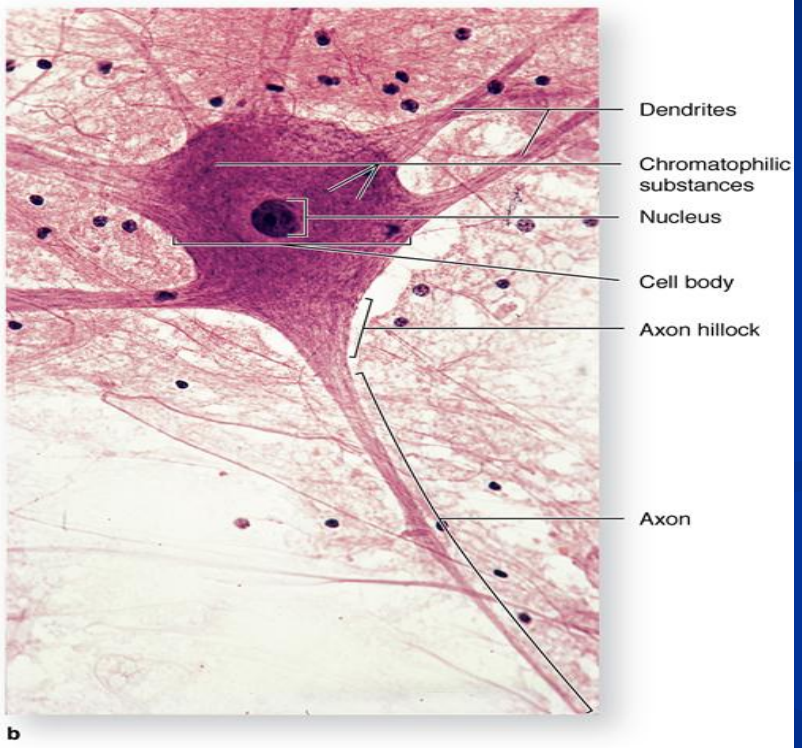
Is the main functional unit of the nervous system , it consists of :

1. Cell body (perikaryon)



2. Axon
3. Dendrites
4. Terminal button





Types of the Neurons:

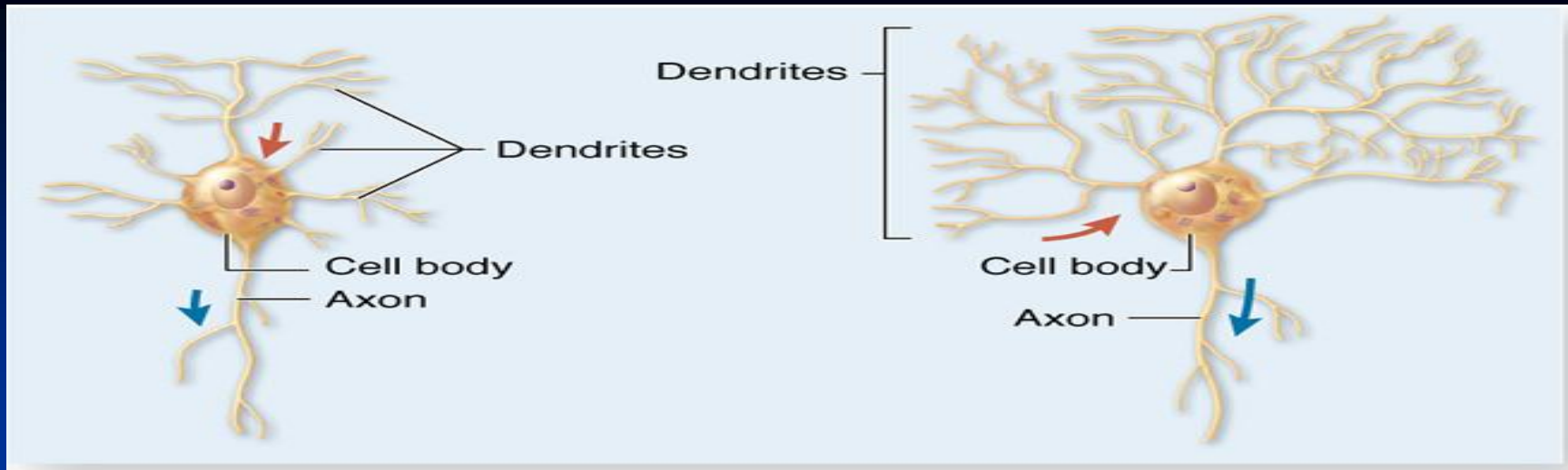
Multipolar (motor) neurons : have large cell body + large axon + many dendritic processes.

Unipolar (pseudounipolar) (sensory) : cell body + one large process divided into 2 branches, one is axon & other is dendrite.

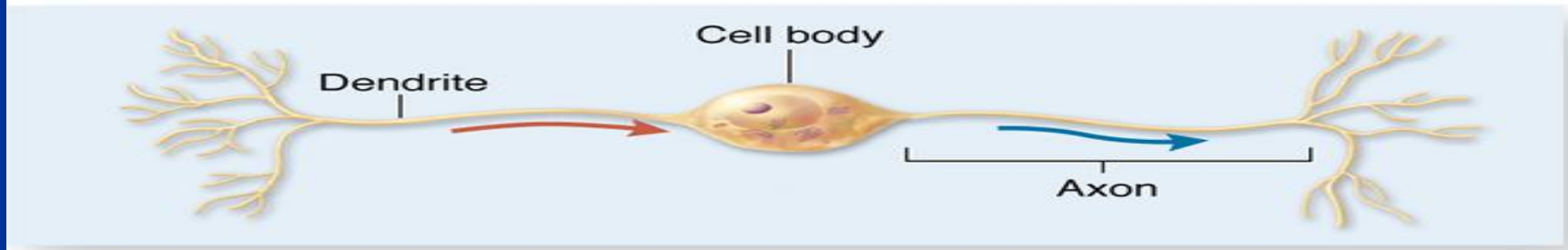
Bipolar : simple cells provide local communications within the CNS having 2 main processes of equal size one axon & other dendrite.

Neurons are of 3 types:

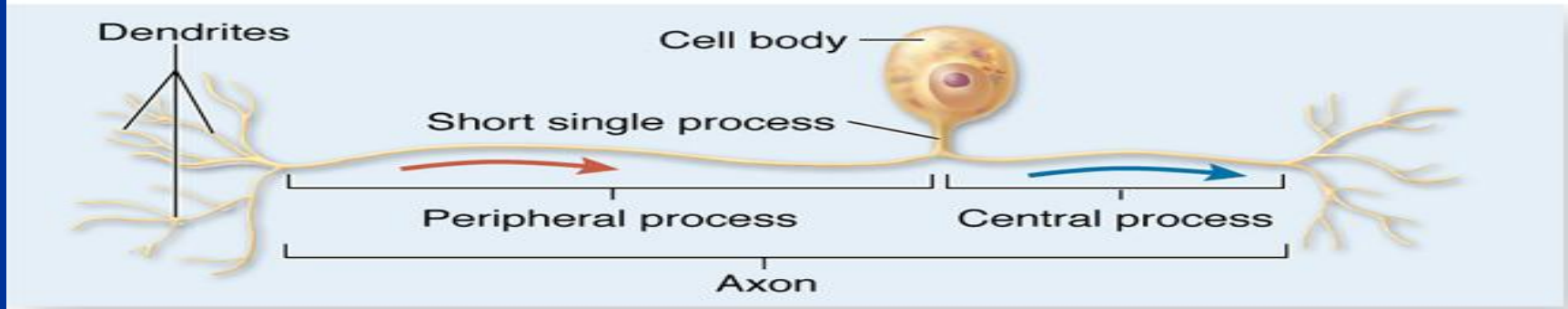
- Sensory (afferent)
- Motor (efferent)
- Interneuron



a Multipolar neurons



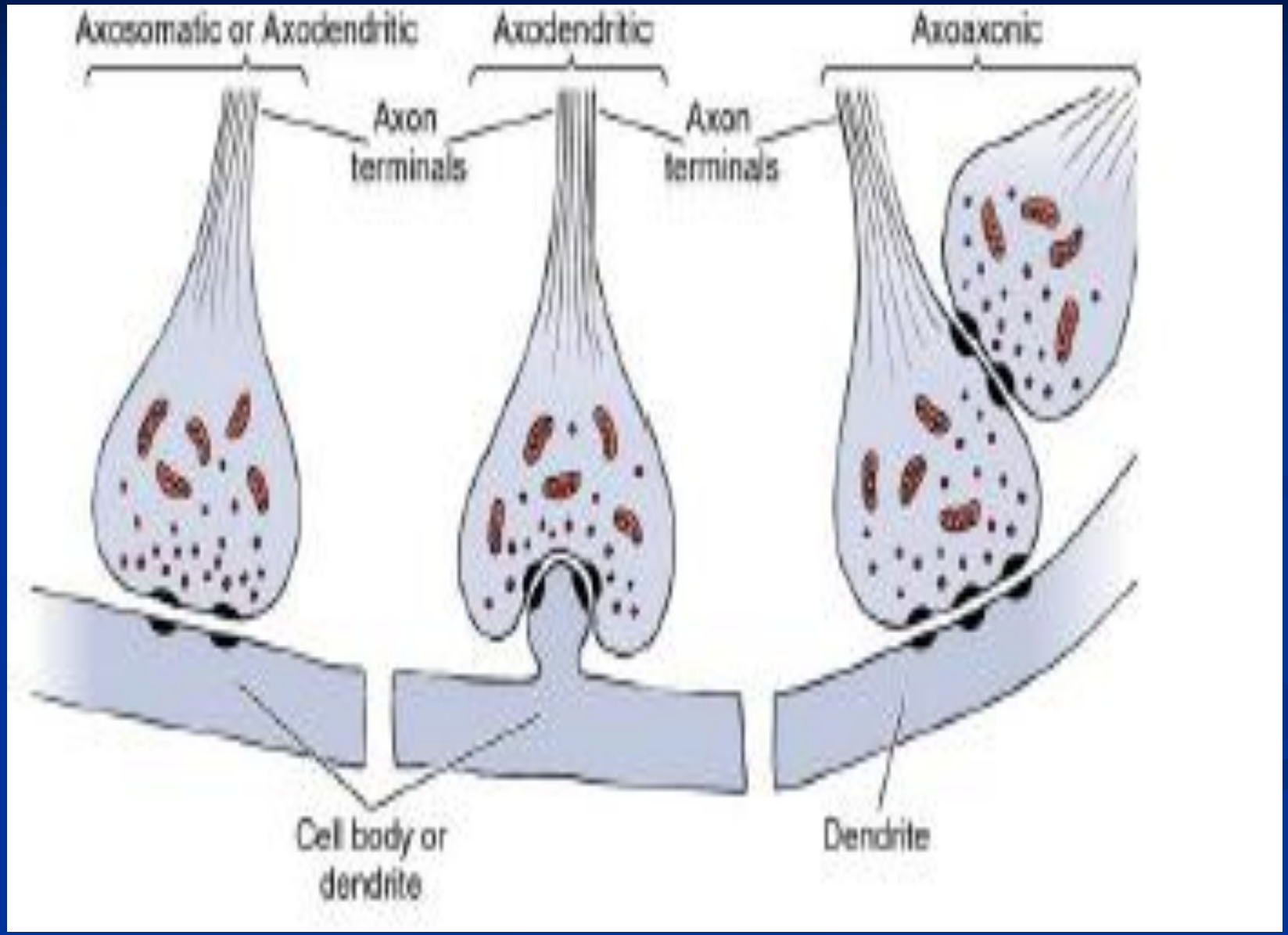
b Bipolar neuron



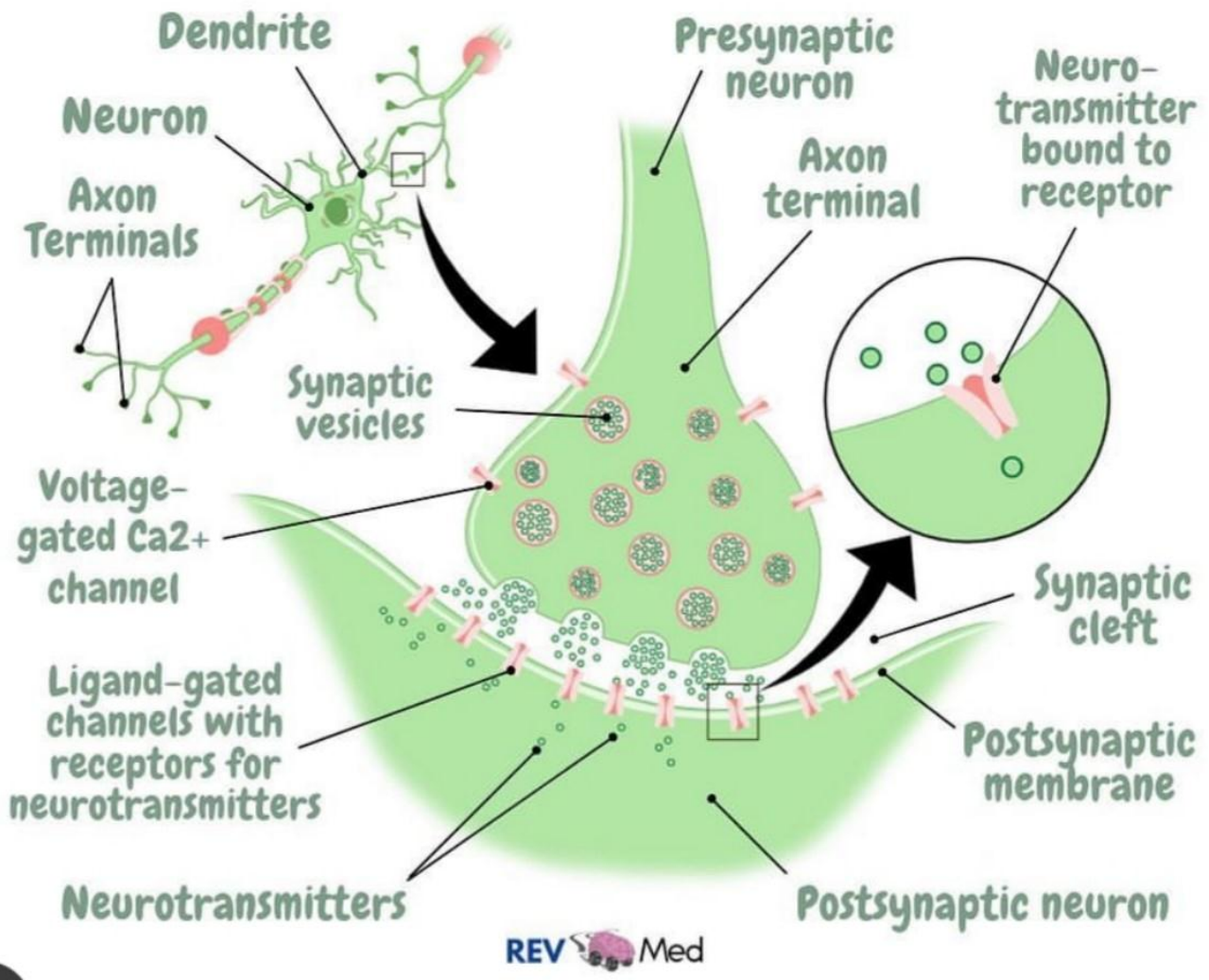
c Unipolar neuron

Input Output

Synapses:


Axosomatic or Axodendritic
Axodendritic
Axoaxonic
Axon terminals
Axon terminals
Cell body or dendrite
Dendrite

The Synapse


Dendrite
Neuron
Axon Terminals
Presynaptic neuron
Axon terminal
Neuro-transmitter bound to receptor
Synaptic vesicles
Voltage-gated Ca2+ channel
Synaptic cleft
Ligand-gated channels with receptors for neurotransmitters
Postsynaptic membrane
Neurotransmitters
Postsynaptic neuron
REV Med

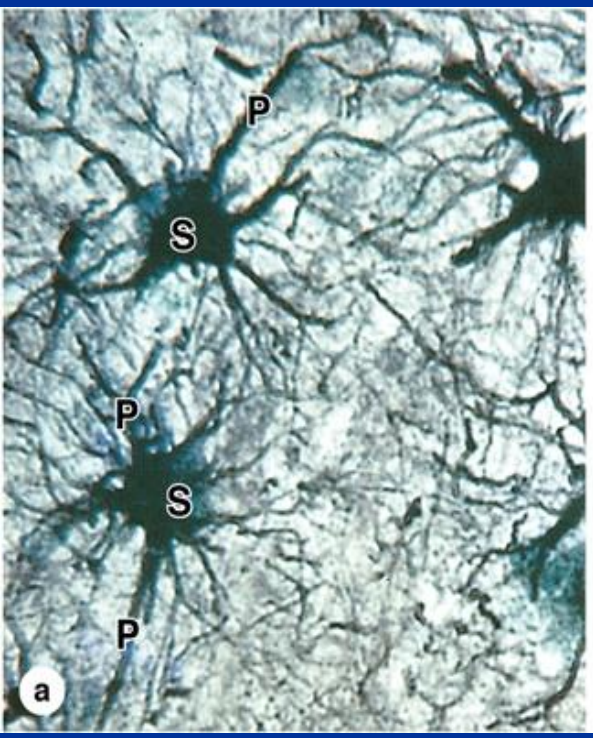
Neuroglia:

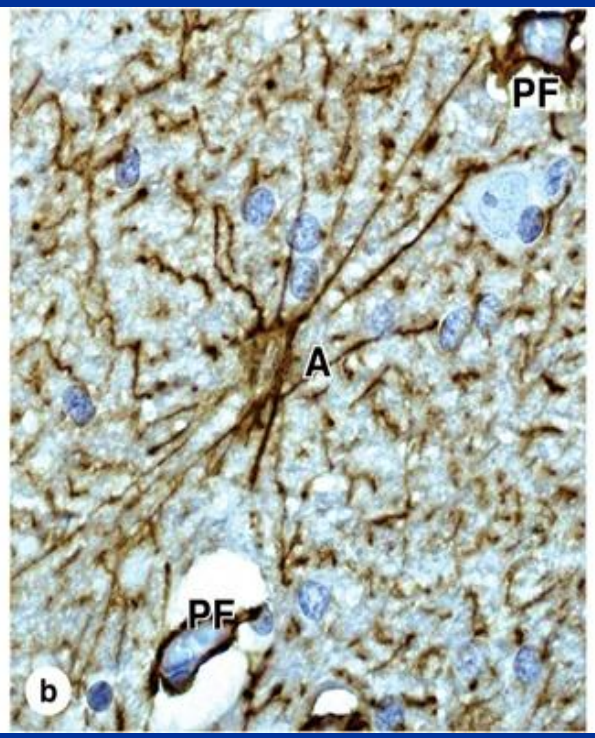
- They outnumber neurons by about 10 to 1 in the brain . More than half the volume of the human nervous system is composed of supporting neuroglial cells.

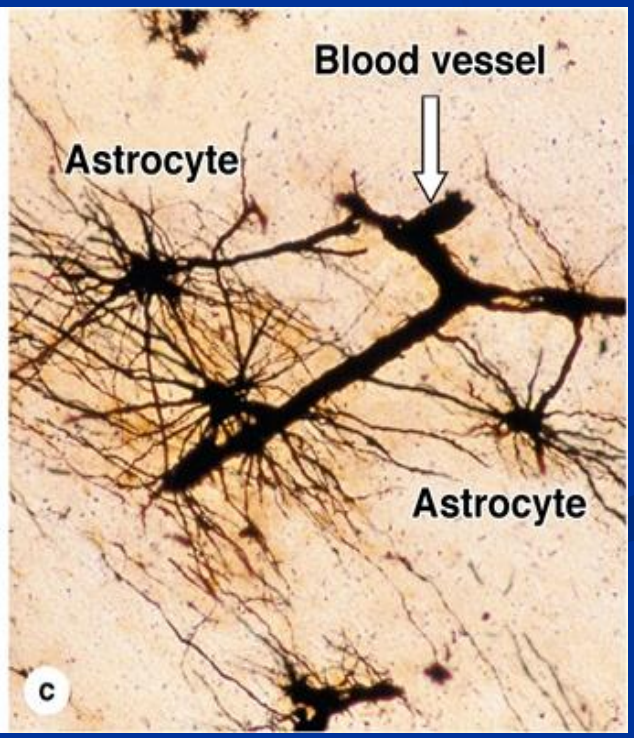
- In the CNS (brain & the spinal cord) there are 4 types of supporting cells:
- **1. Astrocytes:** stellate-shaped cells with fine processes radiating in all directions.
- **a.** Astrocytes provide nutritional support to neurons
- **b.** Astrocytes give structural support to hold neurons in place and also scavenge dead cells after an injury to the brain.

- **c.** Processes from astrocytes called “end feet” adhere to the blood vessels of the brain.

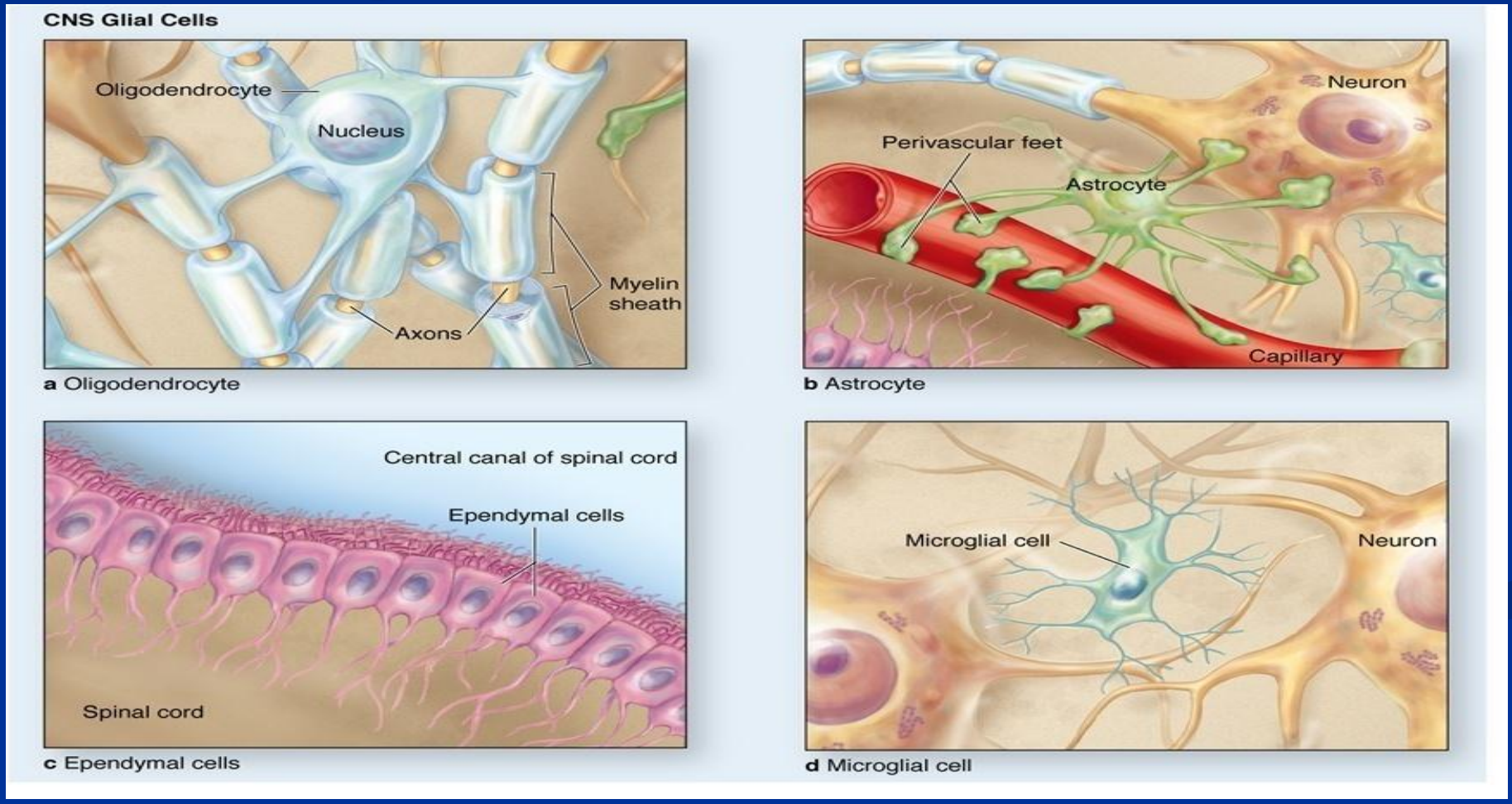
- Astrocytes are of 2 types:
- a. fibrous astrocytes found in the white matter of brain.
- b. protoplasmic astrocyte found in the gray matter of brain.



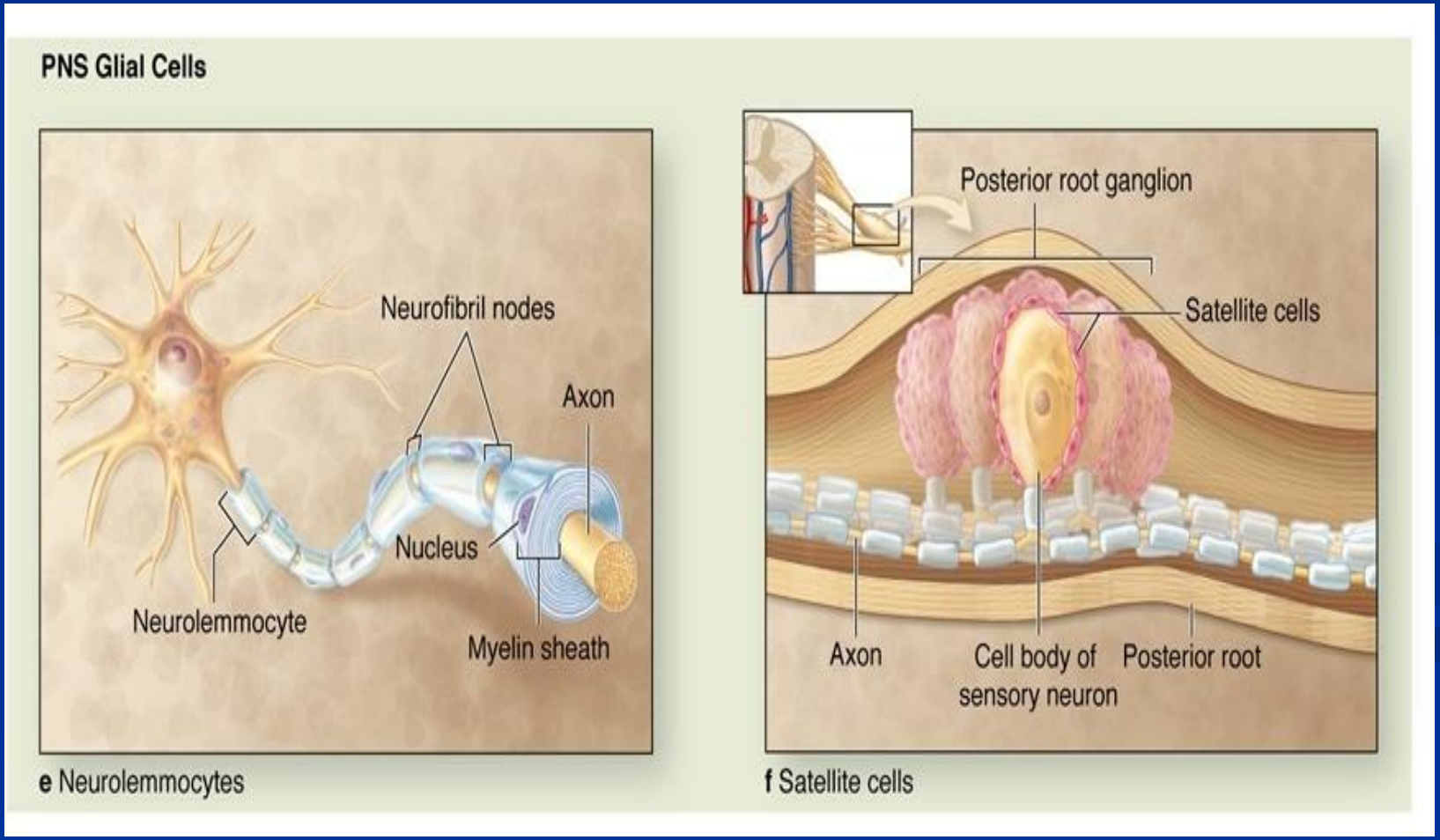




- 2. Oligodendrocytes:
- 3. Ependymal cells:
- 4. Microglia cells:

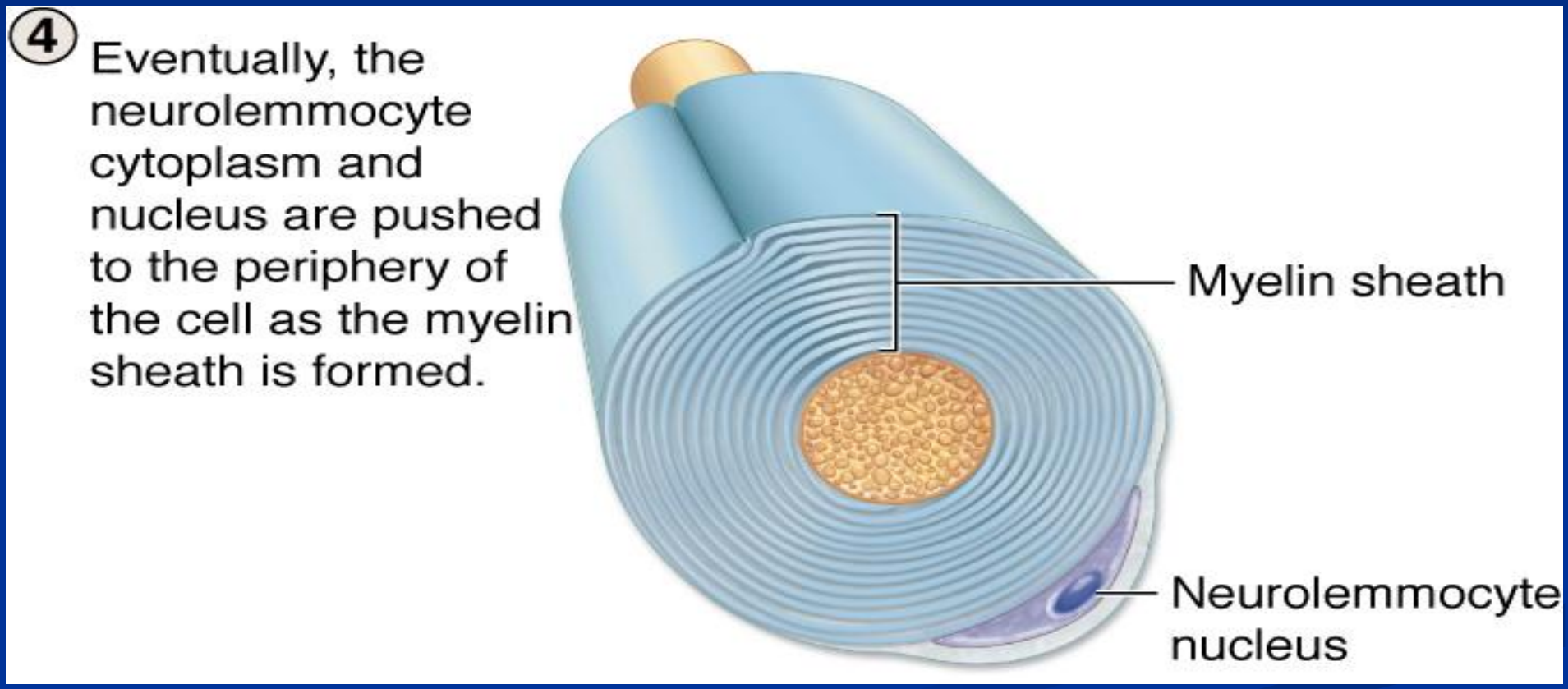


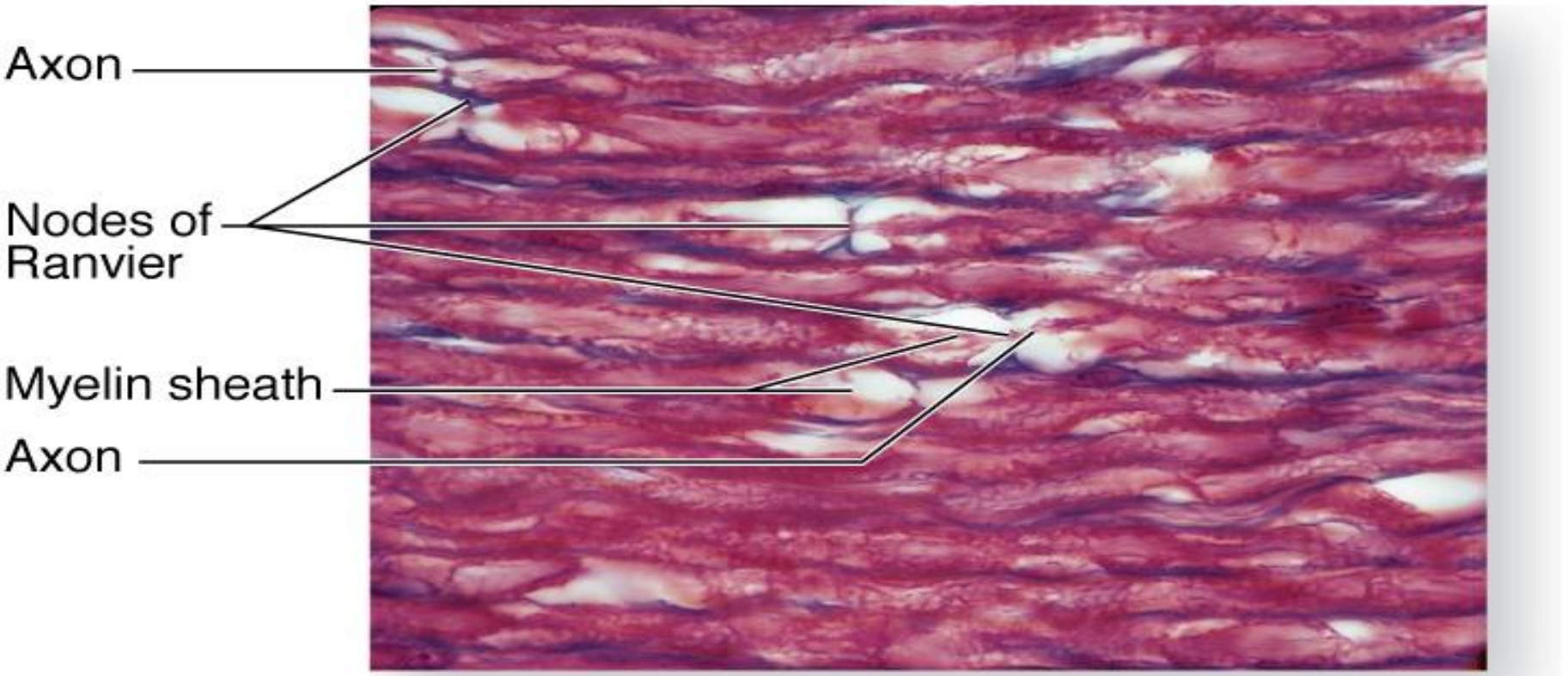
- In PNS:
- 5. Schwann cell (neurolemmocytes):
- 6. Stellite cells of ganglia:



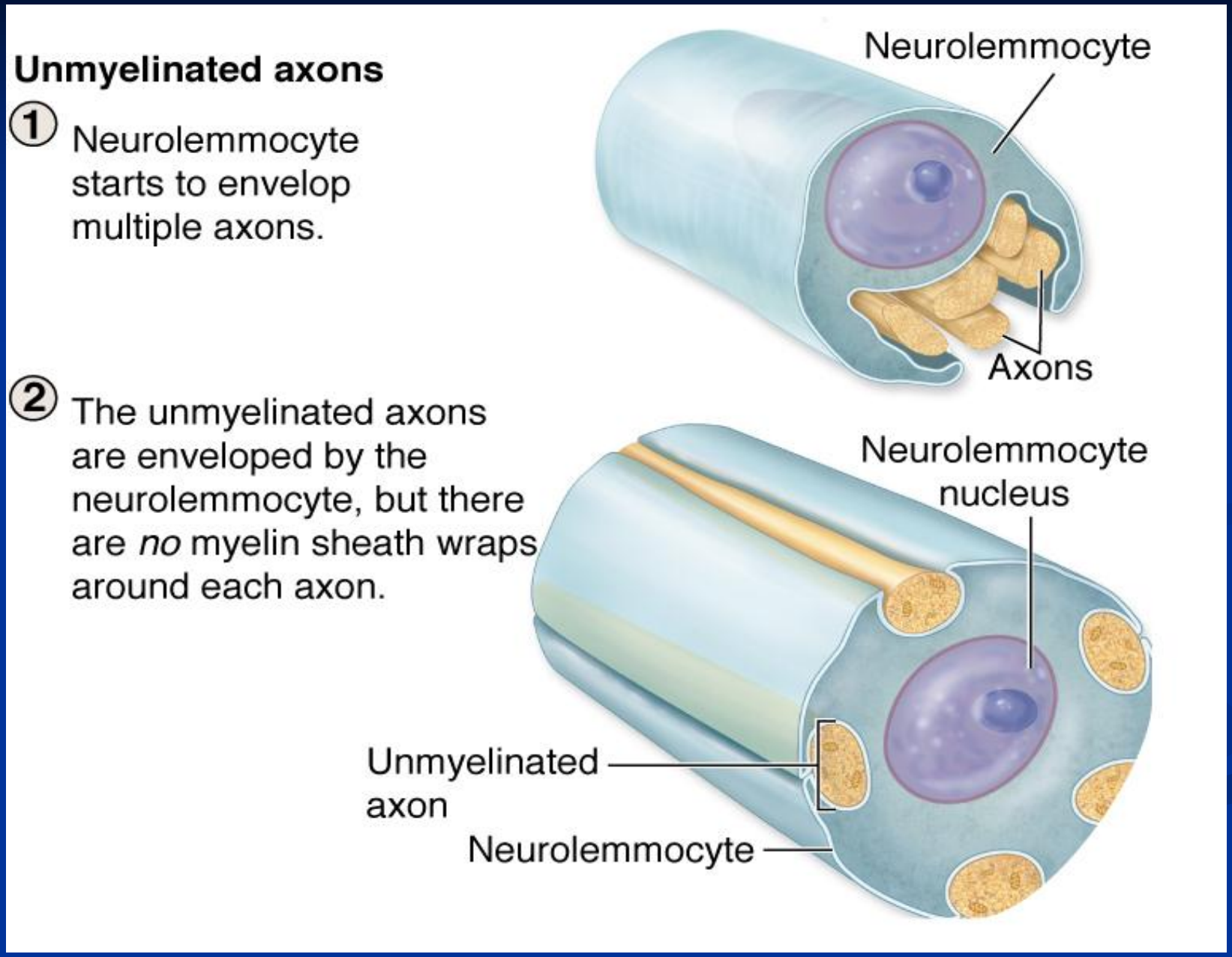
- **The peripheral nervous system**
- The main components of the peripheral nervous system are the nerves, ganglia and nerve endings.
- **Nerves:-** are bundles of nerve fibers surrounded by a series of connective tissue sheaths.
- **Nerve fibers:-**

- There are 2 types of nerve fibers:
- **Myelinated nerve fibers:**

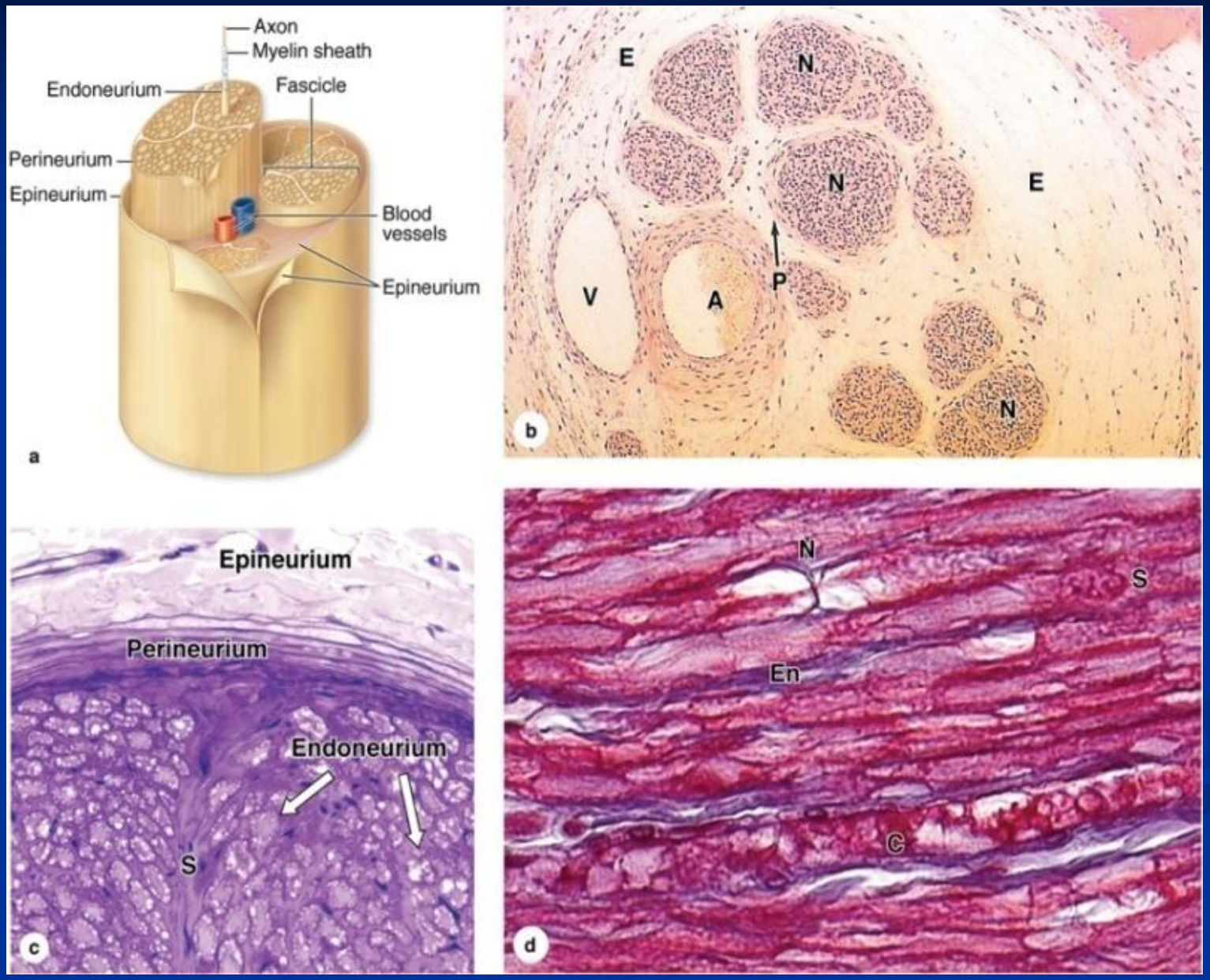



Axon
Nodes of Ranvier
Myelin sheath
Axon

- **unmyelinated nerve fibers:**



- **Peripheral nerves:**

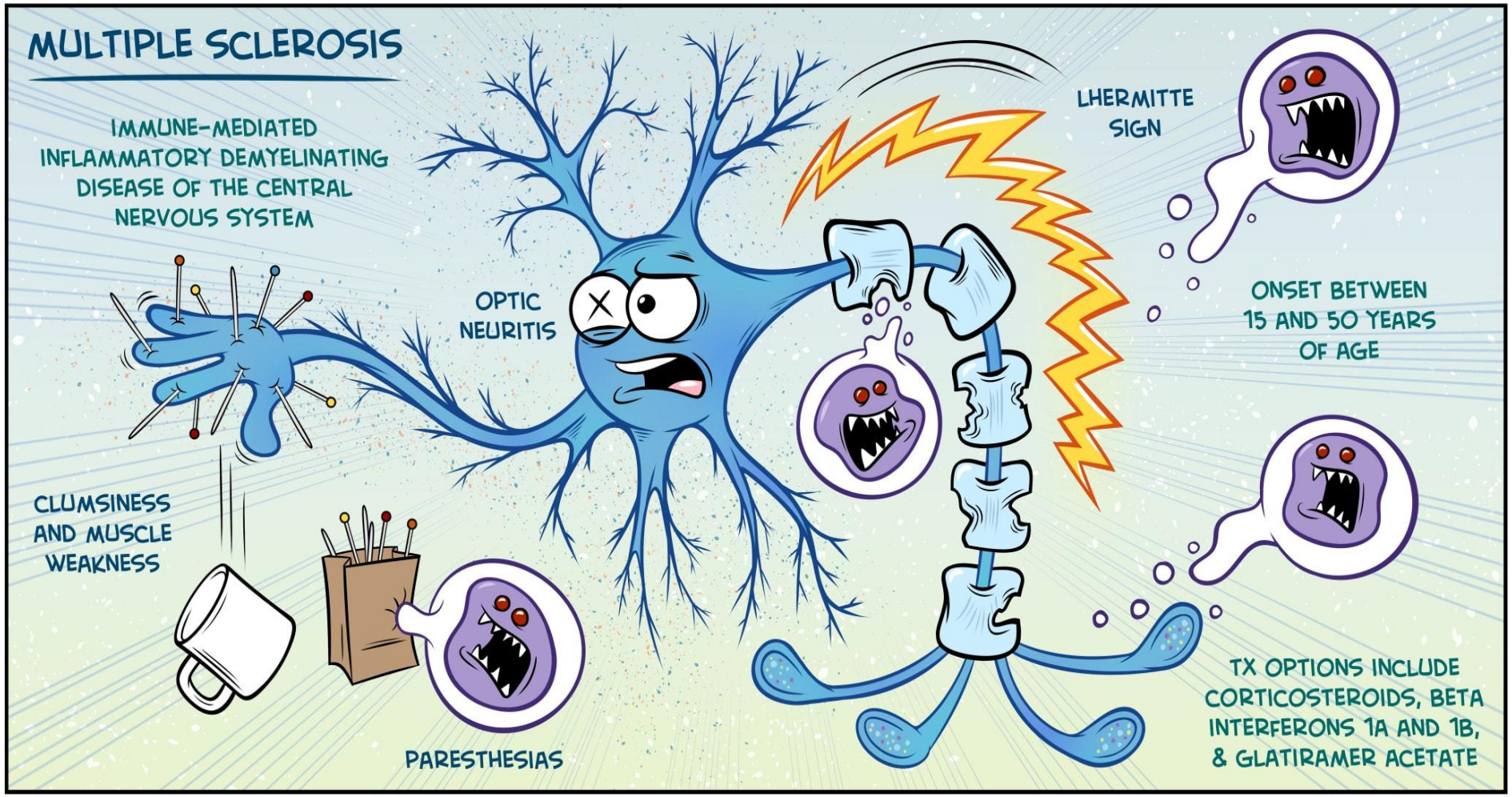


Clinical notes:

1. Demyelinating Diseases

2. Guillian-Barre syndrome (GBS)

3. Multiple sclerosis (MS)



4. Injured fibers in peripheral nerves

Thank you