



# ***Curriculum : Phase 2/Semester2/TOB /Session 11/practical histology***

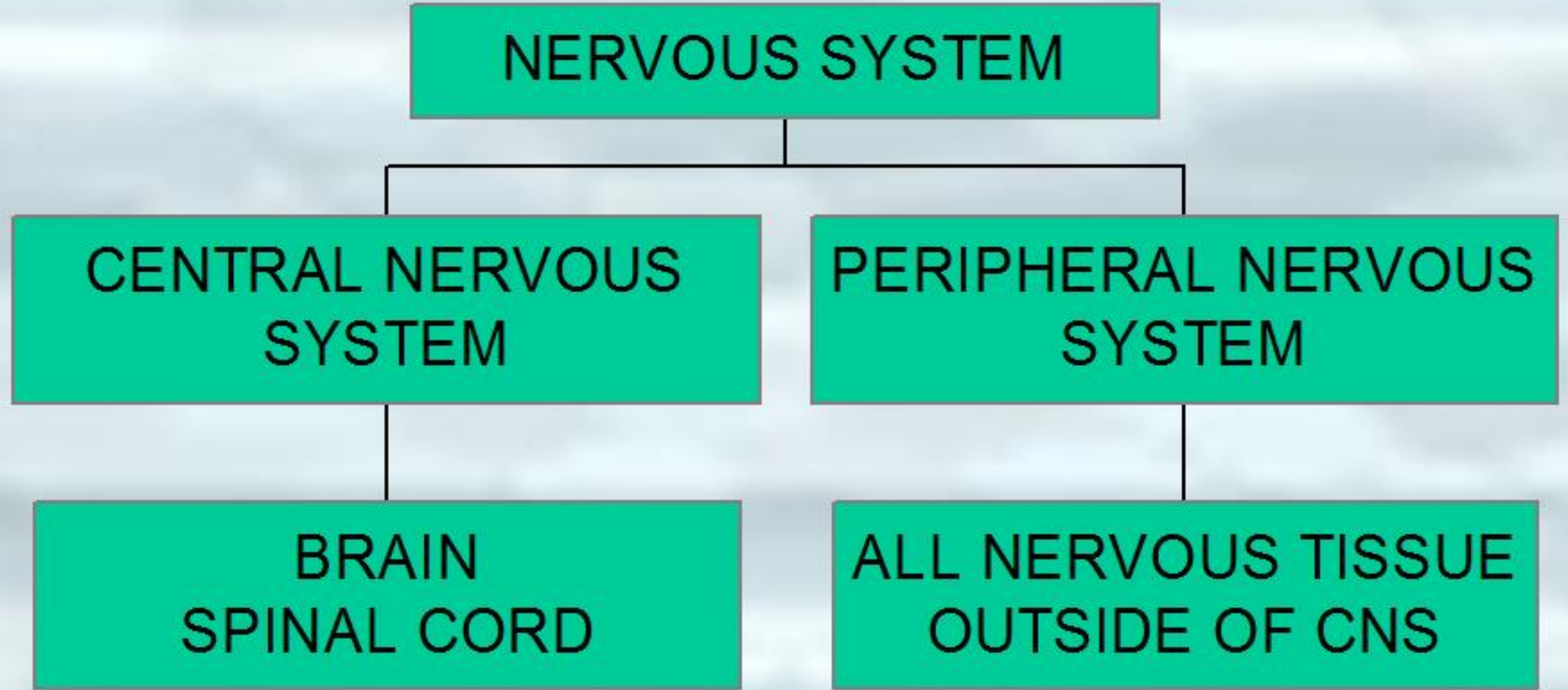
**2017/2018**

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# Sub-divisions of the Nervous System



**Nervous system is divided into two parts:**

### **1- The Central Nervous System (CNS)**

which consists of the **brain** and the **spinal cord** which are composed of neurones (nerve cells) and supporting neuroglial cells.

### **2- The Peripheral Nervous System (PNC)**

which consists of **Peripheral Nerve** and **ganglia**.

## *Nervous tissue consists of two groups of cell types:*

*1-Nerve cells (Neurons)*

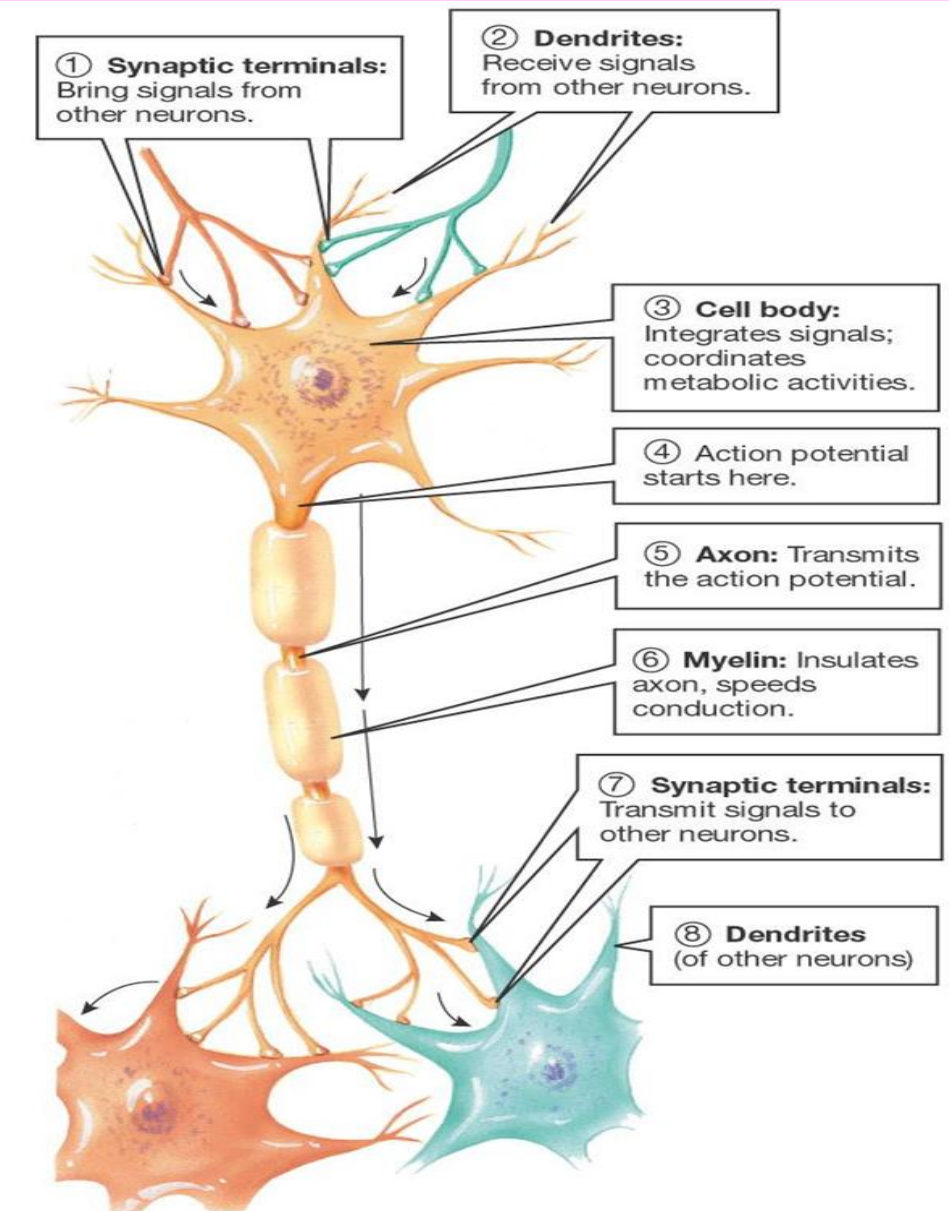
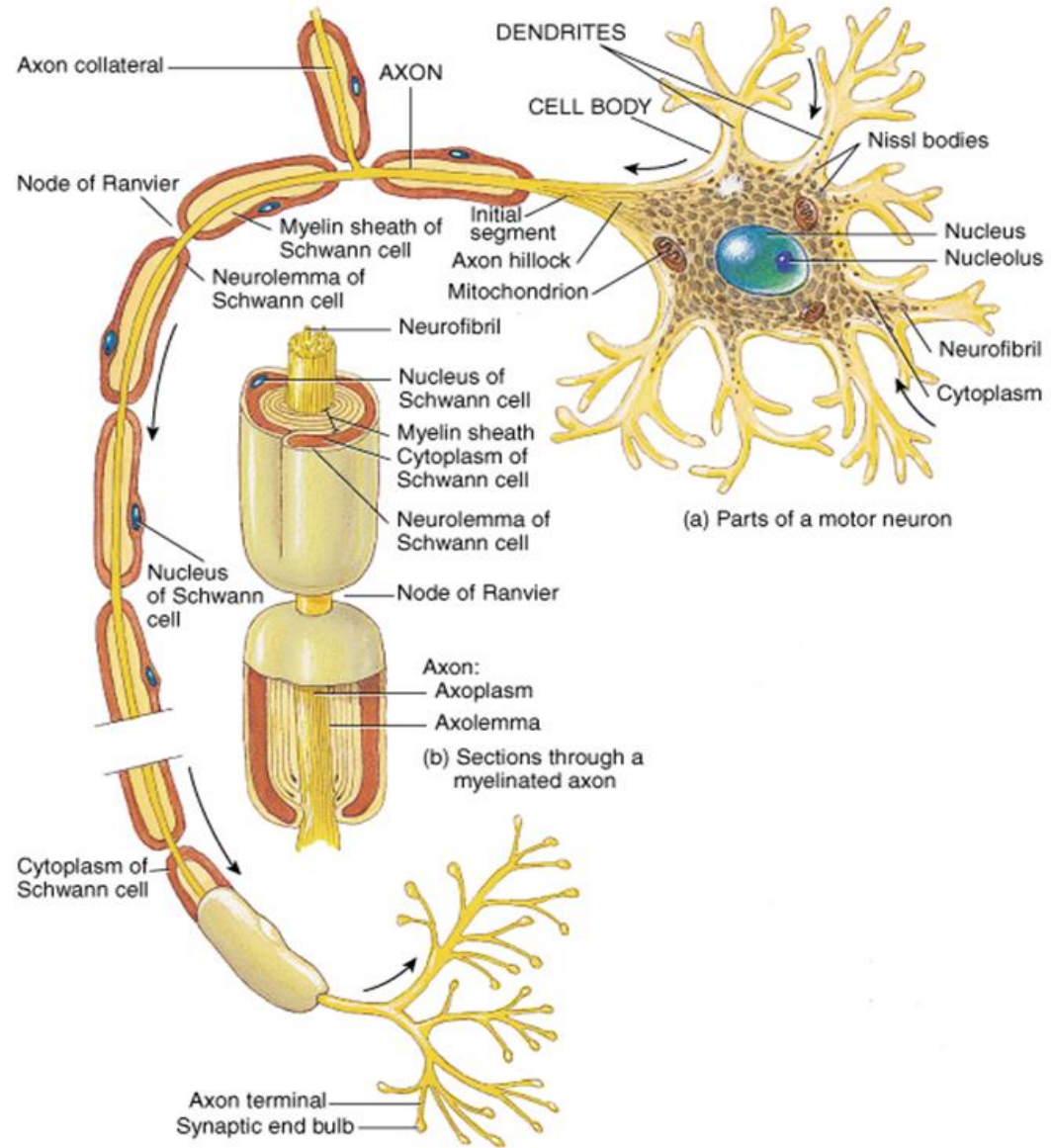
*2-Neuroglia.*

### *Structures of neuron*

*1-dendrite*

*2-The cell body (perikaryon)*

*3-The axon*





# Morphological classification of neurons

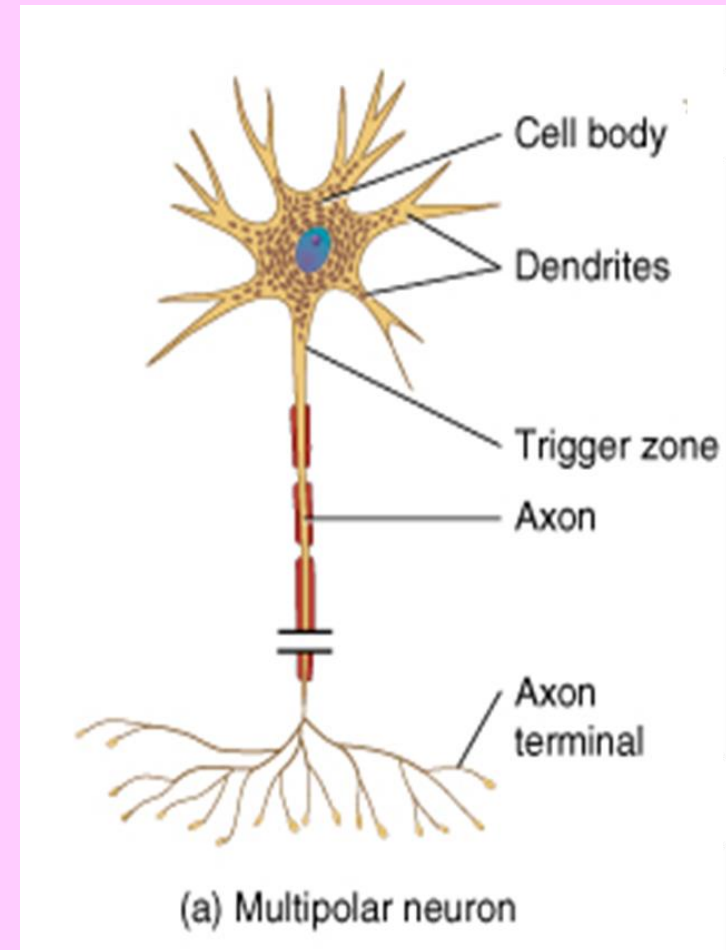
three main types of neurons, according to their number of processes.

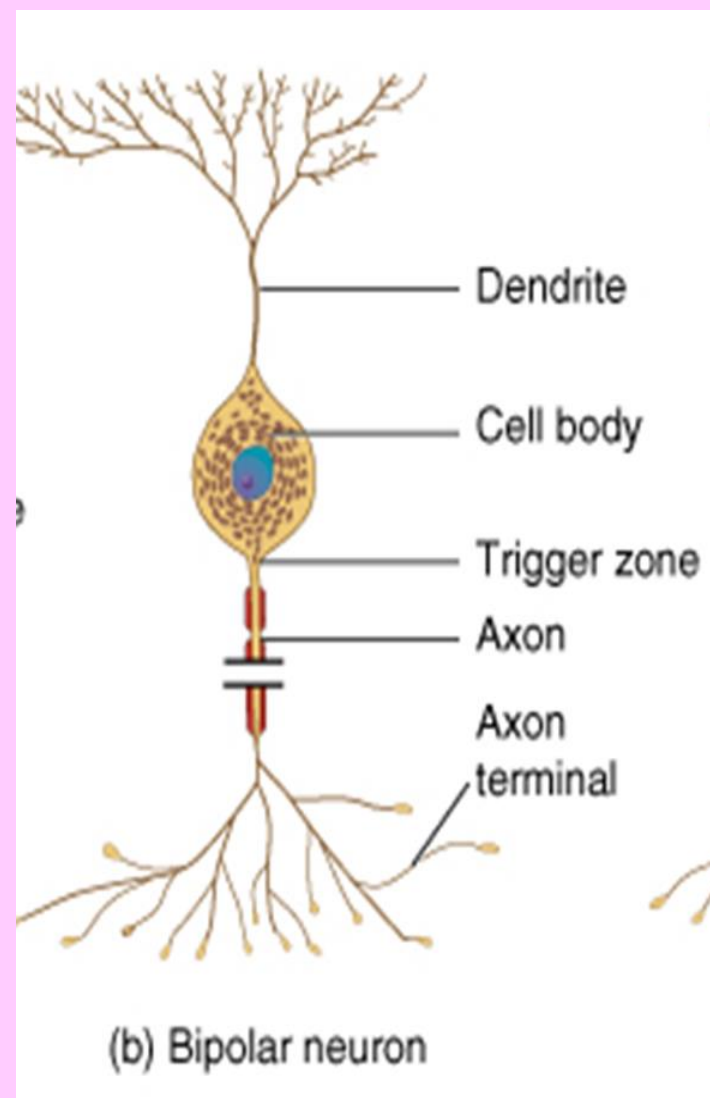
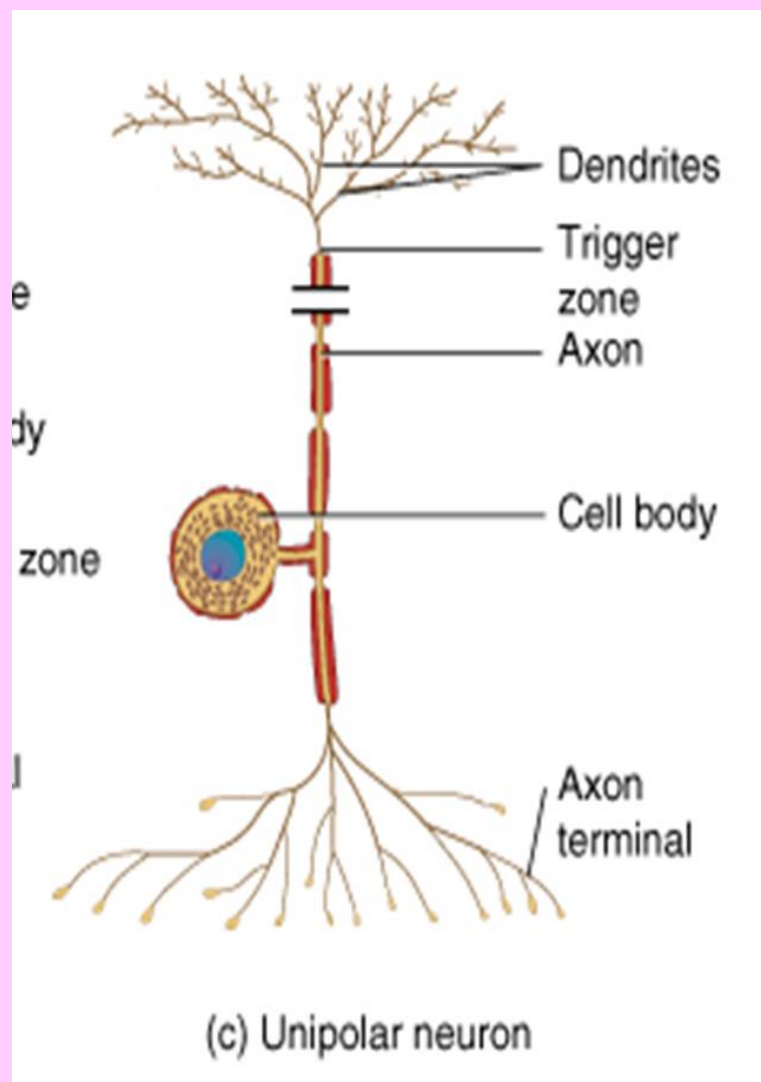
*Based on number of processes found on cell body*

1. **multipolar** = several dendrites & one axon  
*most common cell type*

2. **bipolar** neurons = one main dendrite & one axon  
*found in retina, inner ear & olfactory*

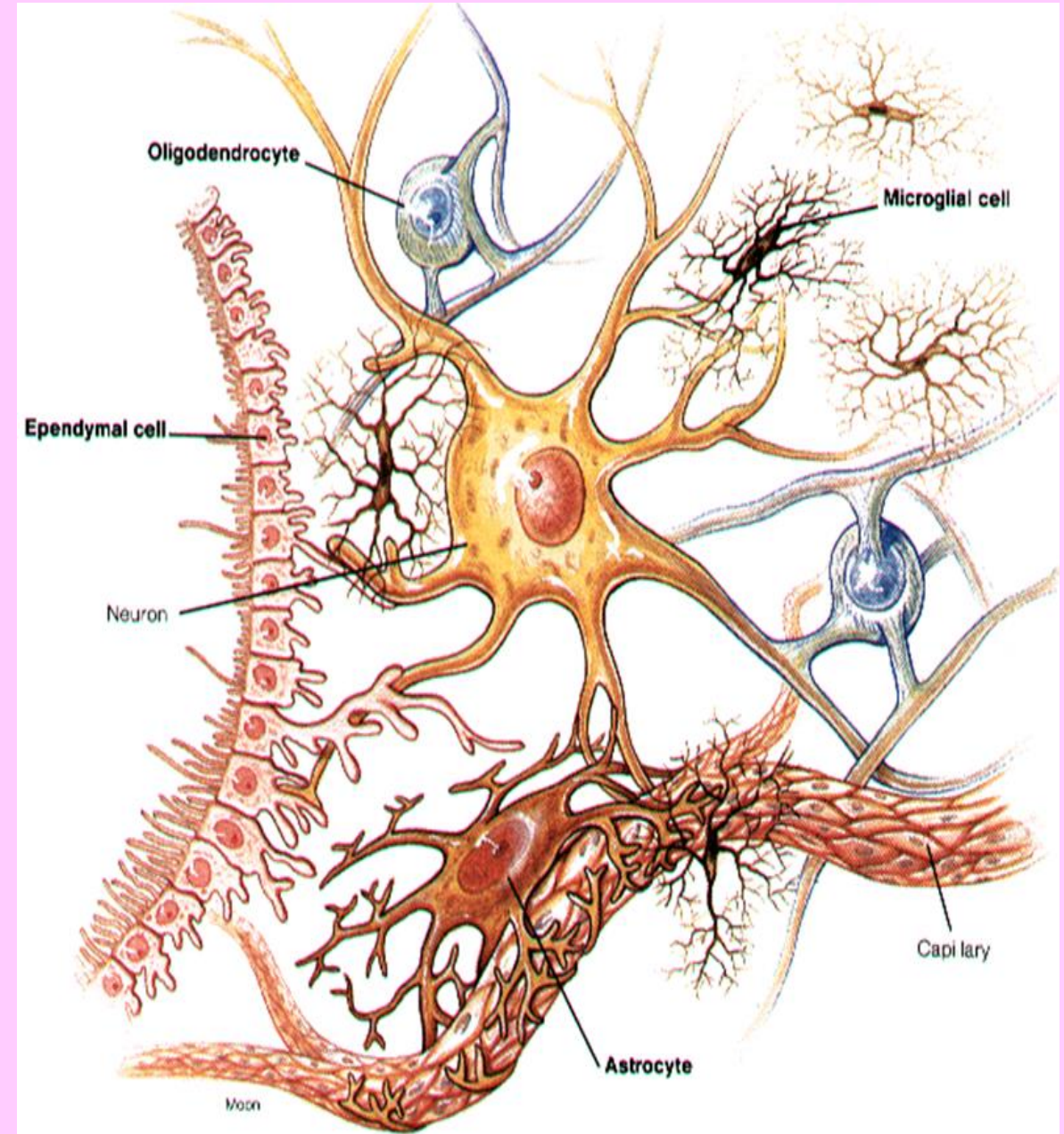
3. **unipolar** neurons = one process  
*only (develops from a bipolar)*  
*are always sensory neurons*





## Neuroglial Cells

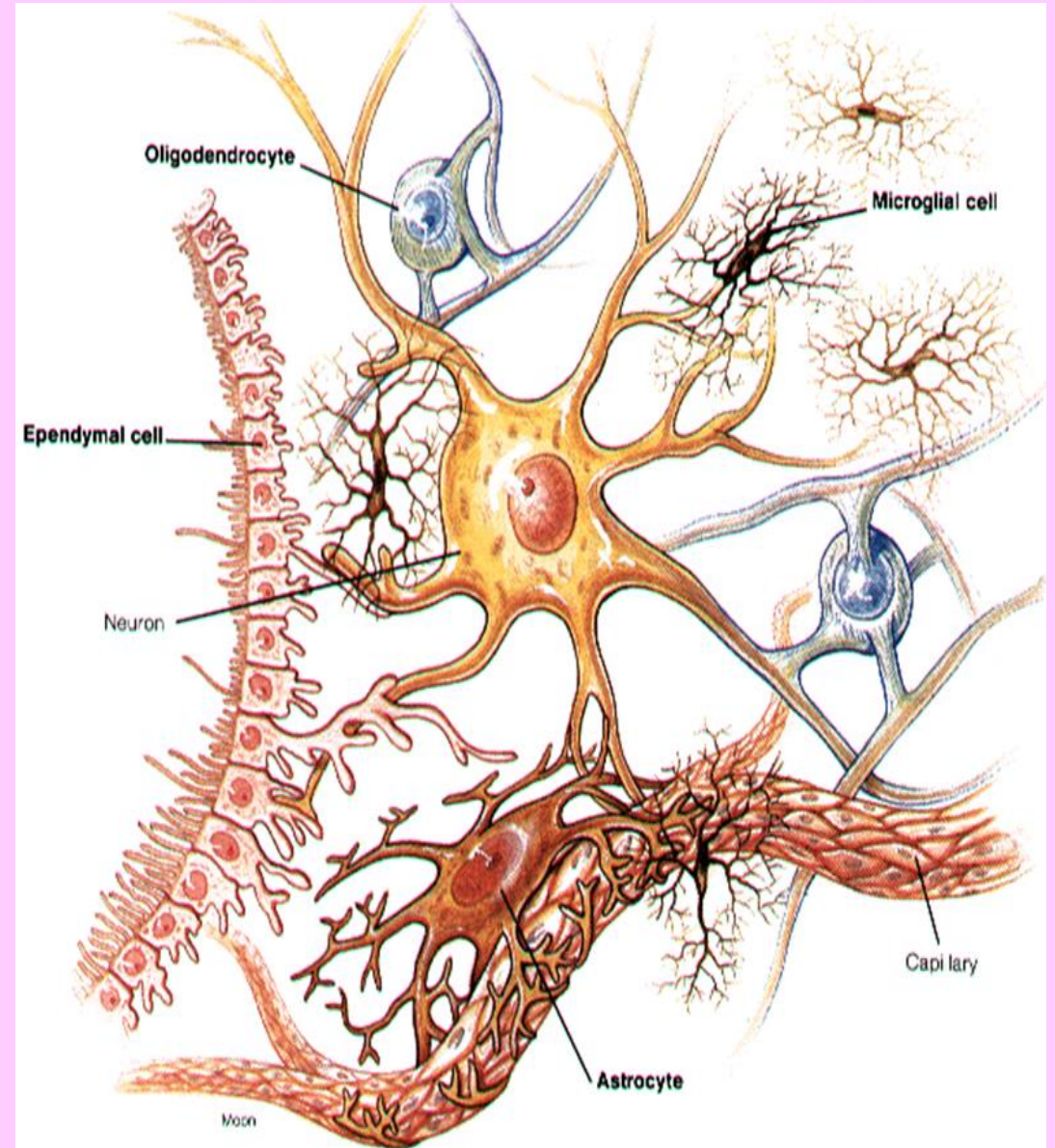
- Half of the volume of the CNS
- Smaller cells than neurons
- 50X more numerous
- Cells can **divide**
  - rapid mitosis in tumor formation (gliomas)
- 4 cell types in **CNS**
  - astrocytes, oligodendrocytes, microglia & ependymal
- 2 cell types in **PNS**
  - schwann and satellite cells





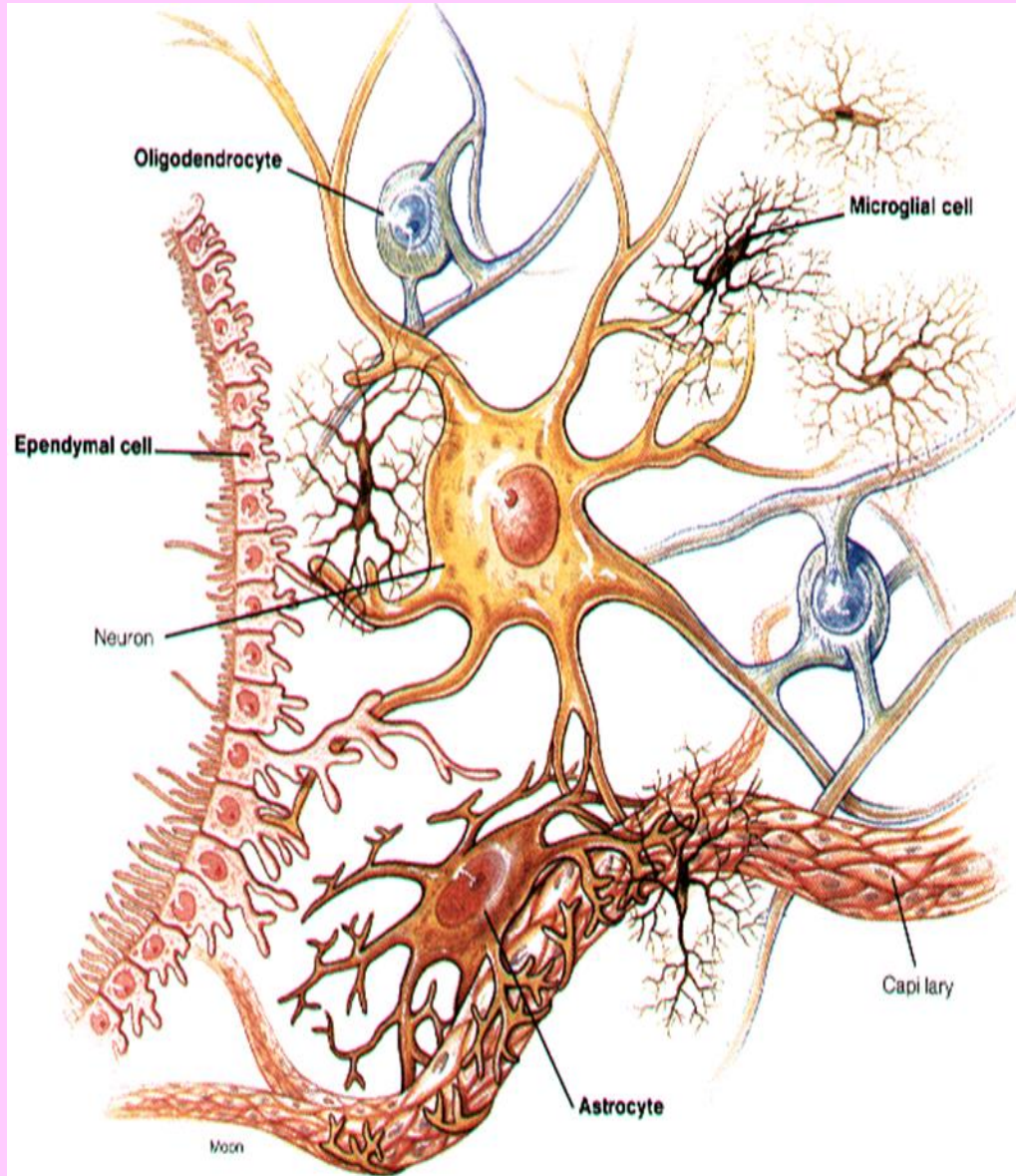
# Astrocytes

- Star-shaped cells
- Form **blood-brain barrier** by covering blood capillaries
- **Metabolize neurotransmitters**
- Regulate **K<sup>+</sup>** balance
- Provide **structural support**



# Oligodendrocytes

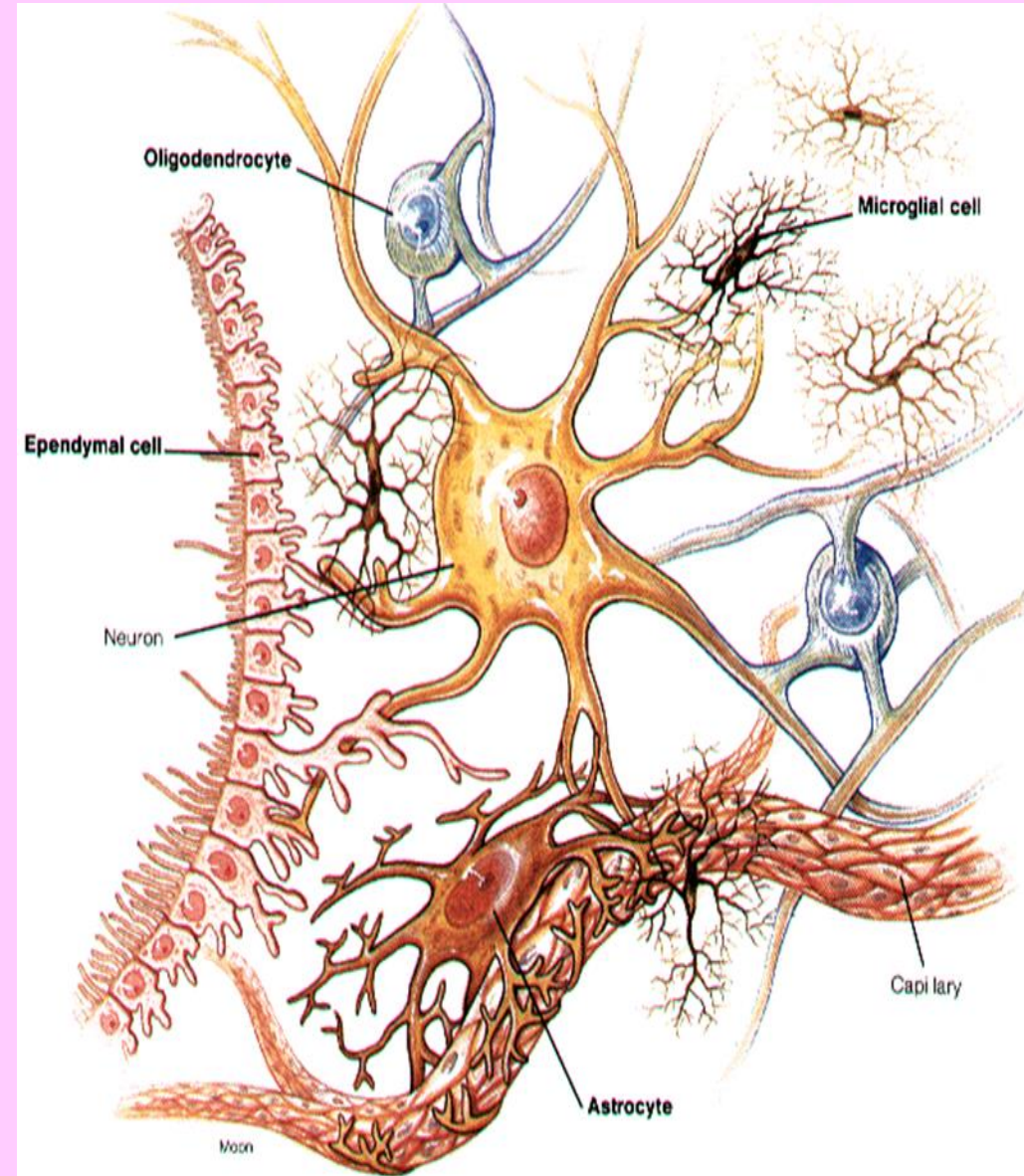
- Most common glial cell type
- Each forms myelin sheath around more than one axons in CNS
- Analogous to Schwann cells of PNS





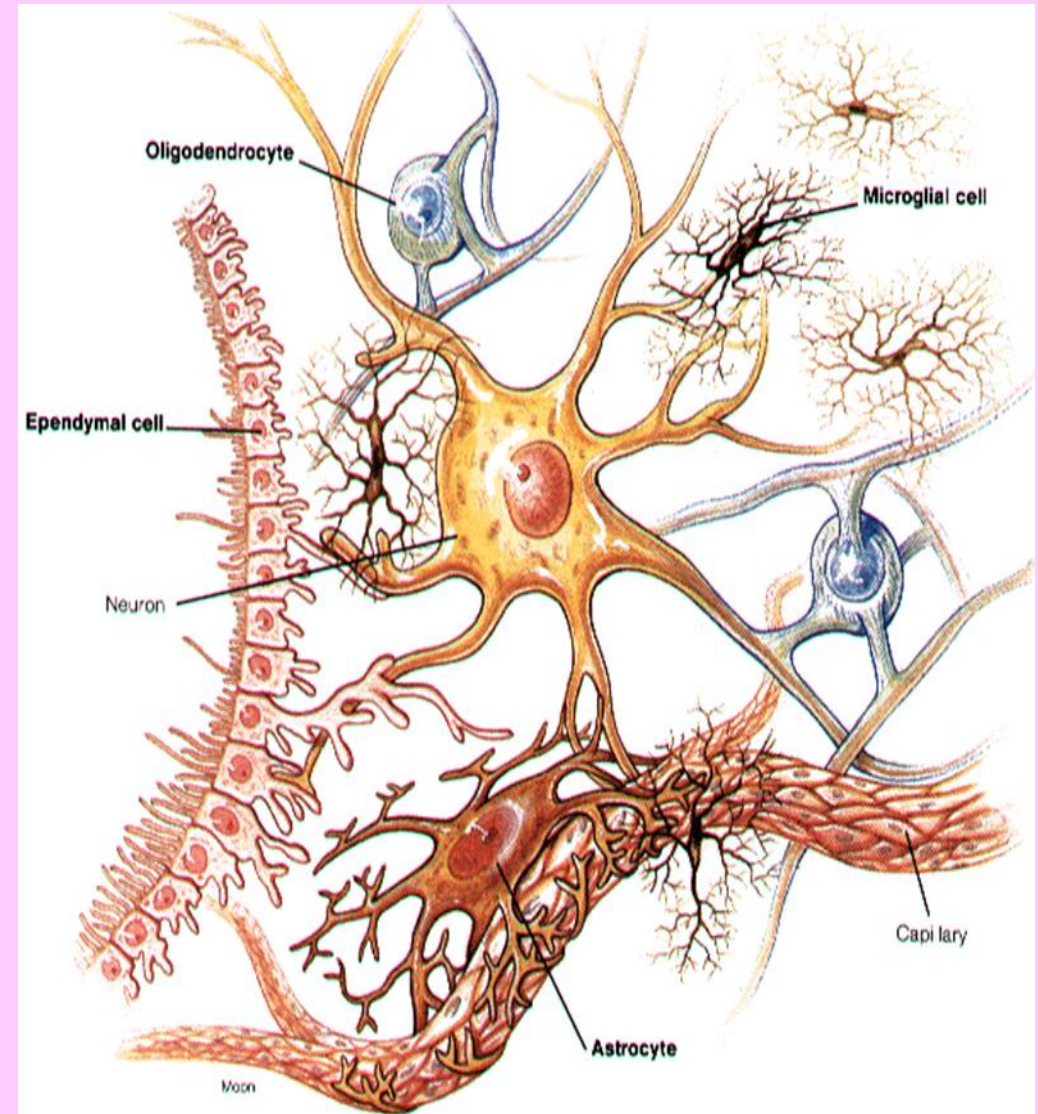
# Microglia

- Small cells found near blood vessels
- **Phagocytic role** -- clear away dead cells
- Derived from cells that also gave rise to macrophages & monocytes



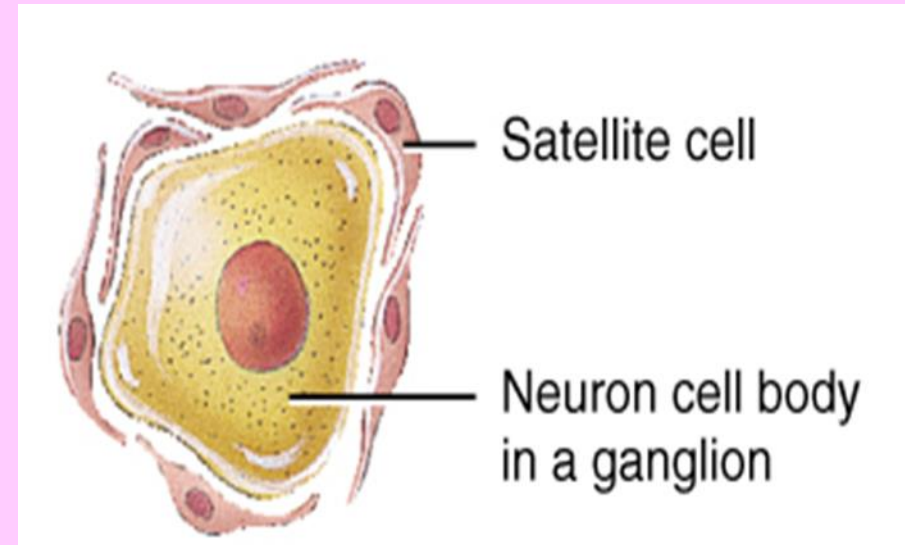
# Ependymal cells

- Form epithelial membrane lining cerebral cavities & central canal
- Produce cerebrospinal fluid (CSF)



# Neuroglial Cells (PNS): Satellite Cells

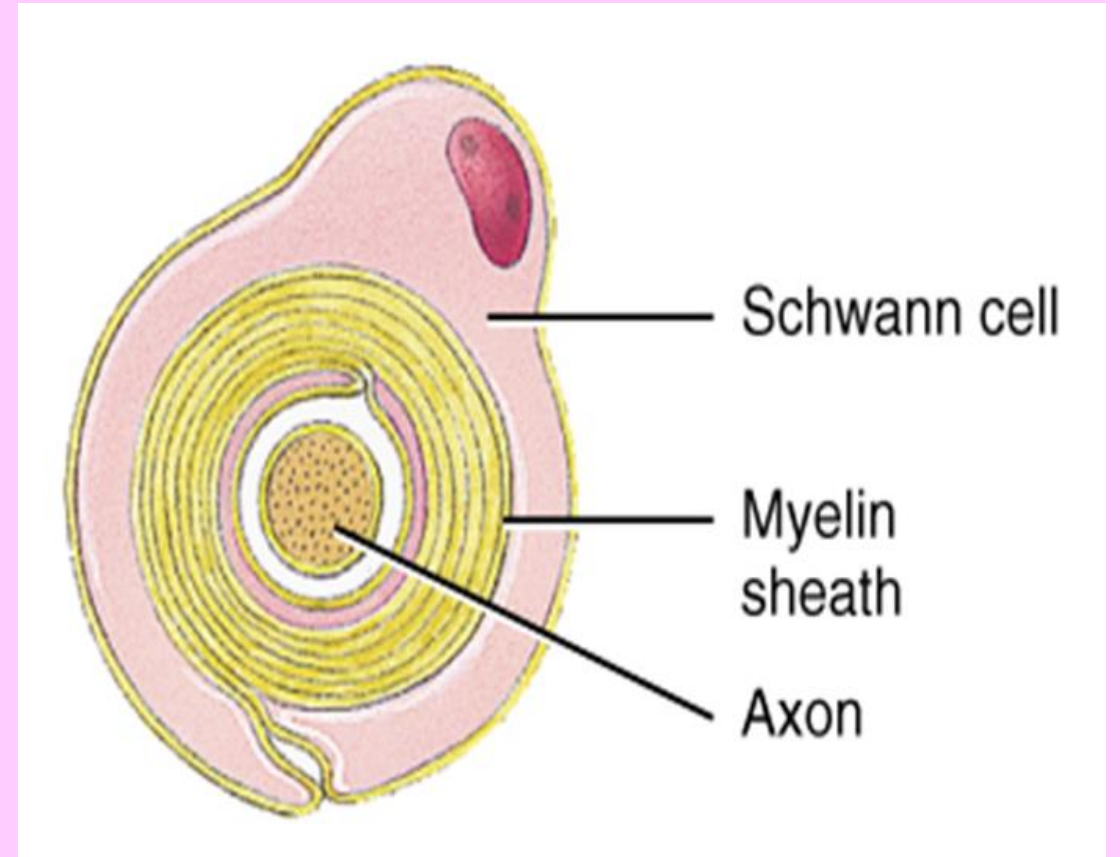
- Flat cells surrounding neuronal cell bodies in peripheral ganglia
- Support neurons in the PNS ganglia



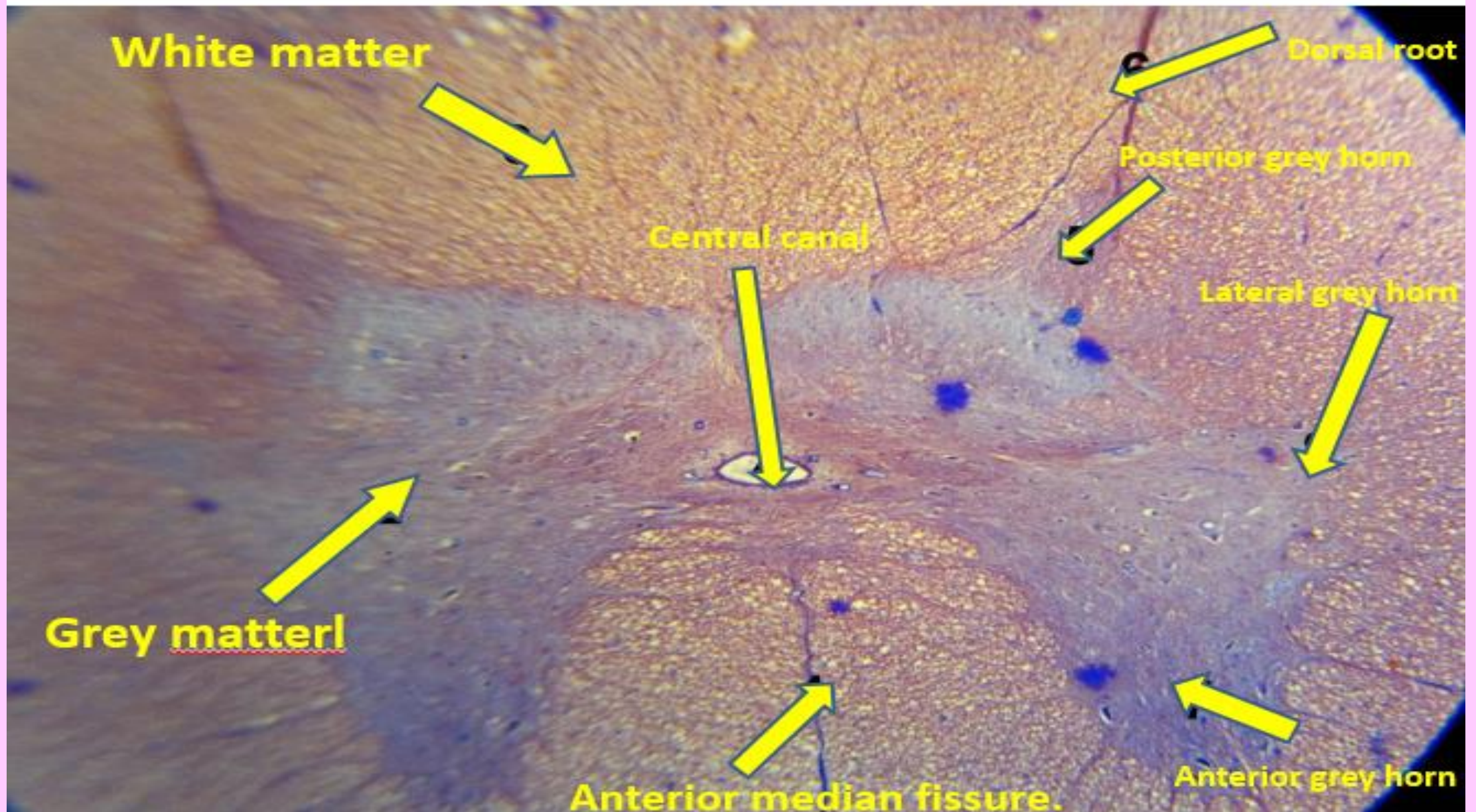


# Neuroglial Cells (PNS): Schwann Cell

- Cells encircling PNS axons
- Each cell produces part of the myelin sheath surrounding an axon in the PNS



# SPINAL CORD



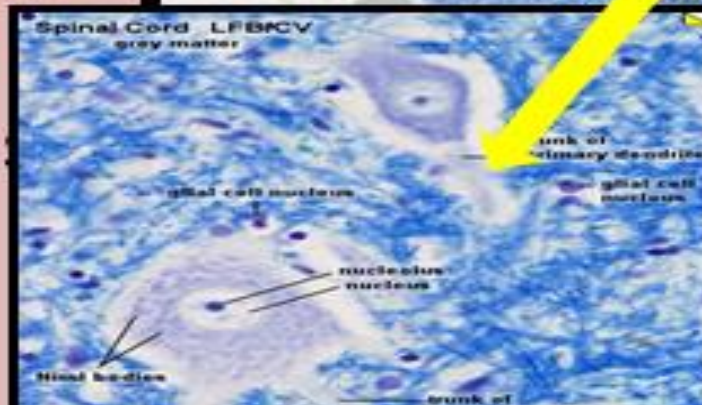
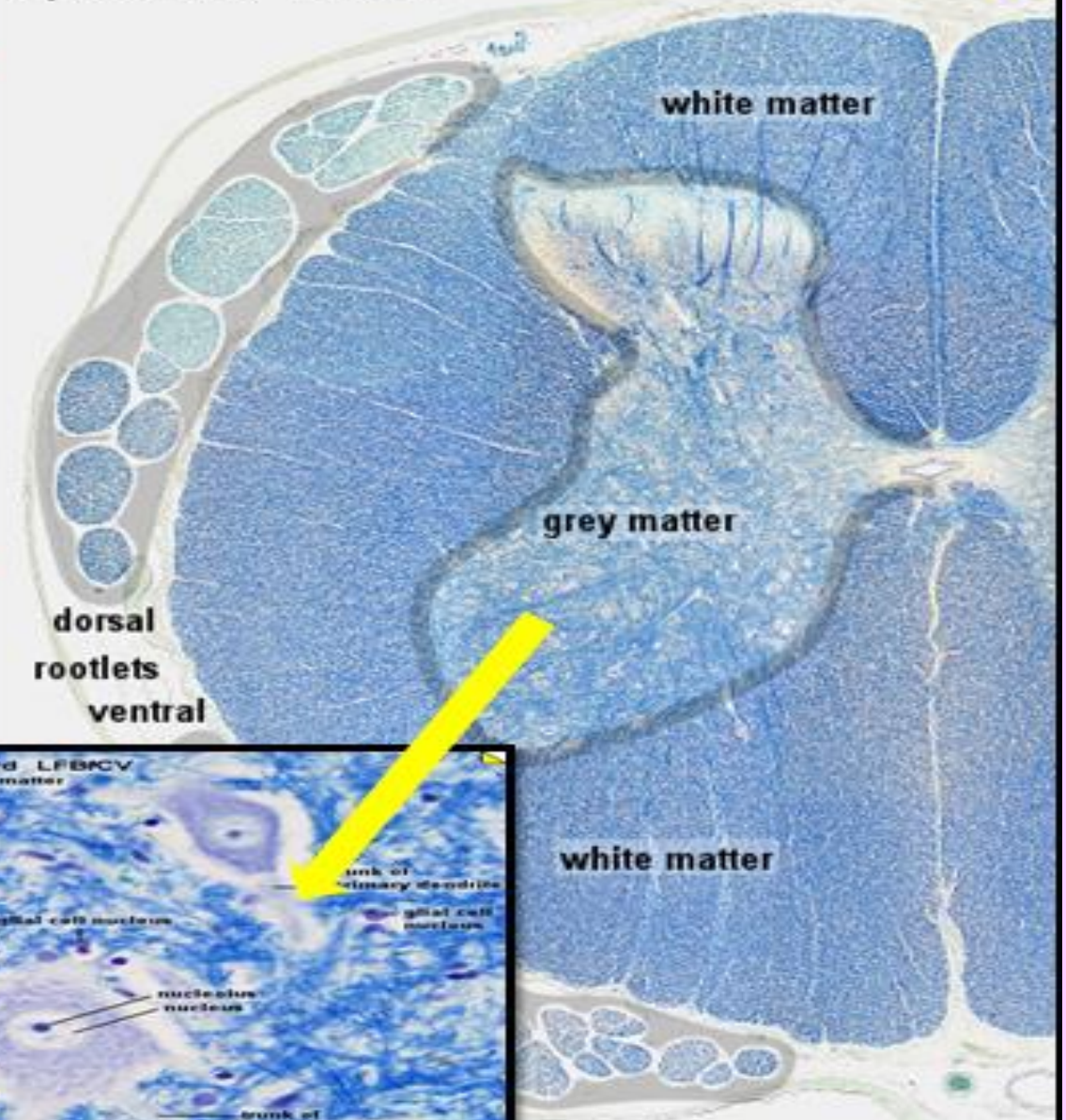


# SPINAL CORD

**1- grey matter** butterfly-shaped has dorsal (D) and ventral (V) horns containing large cell bodies. The ventral cell bodies belong to spinal motor neurons.

**2-White matter** contains numerous afferent and efferent fibres as well as glial cells.

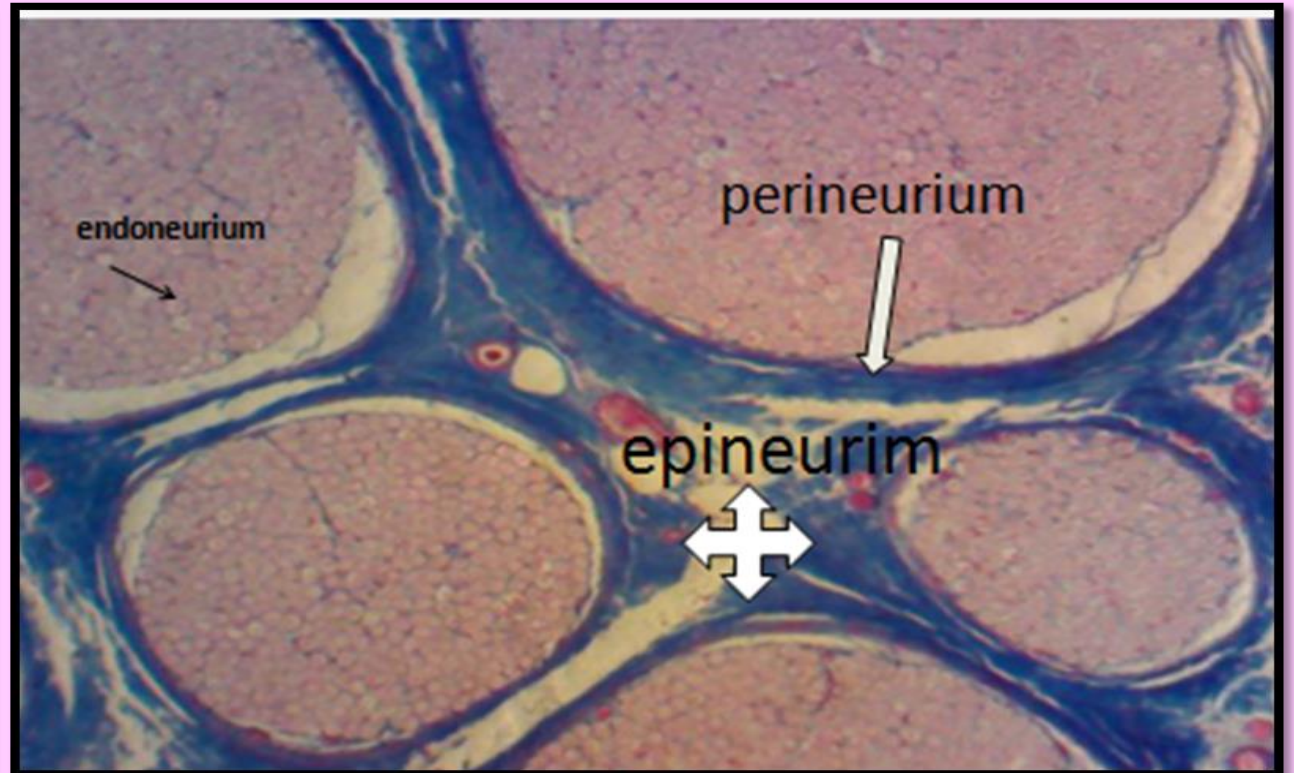
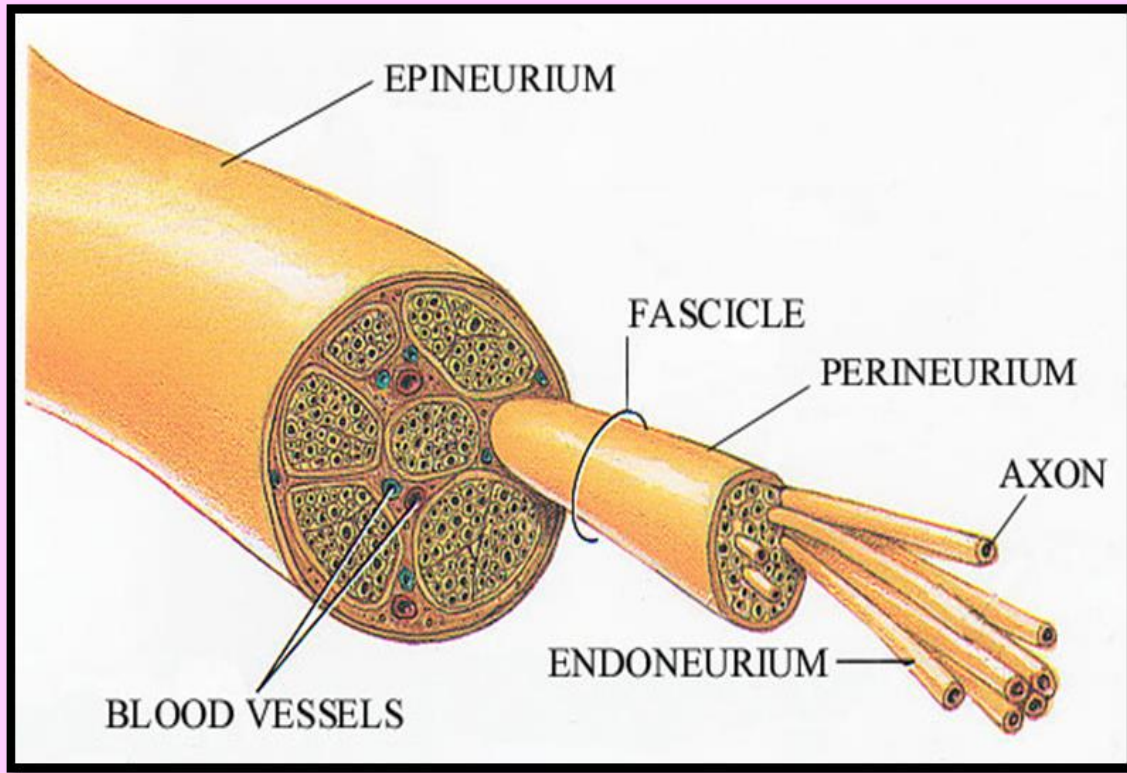
Spinal Cord LFB/CV



## ***Peripheral Nervous System (PNC)***

comprises all nervous tissue outside the brain and spinal cord.





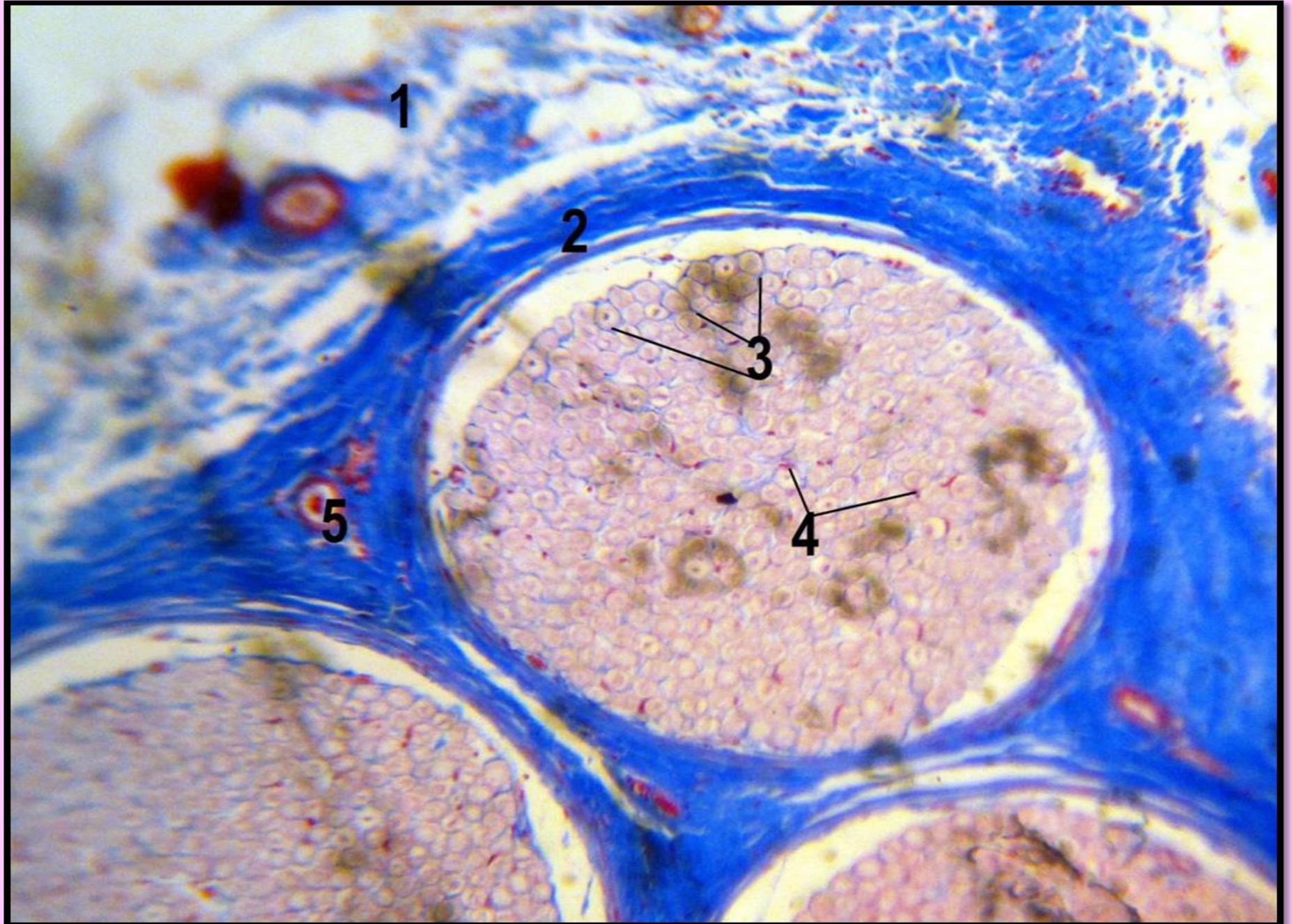
**Peripheral Nerve** are composed of bundles of nerve fibers called (**fasciculi**) in each **fascicle** are internally supported by delicate areolar tissue called **endoneurium**. Each fascicle is covered by delicate connective tissue arranged in layers called the **perineurium**.

Several fasciculi are held together by dense connective tissue (also containing blood vessels, lymphatics and fat cells) called **epineurium**



# Peripheral Nerve

- 1- Epineurium.**
- 2- Perineurium.**
- 3- Endoneurium.**
- 4- Nuclei of schwann.**
- 5- Blood vessel.**





**Peripheral Nerve H&E**

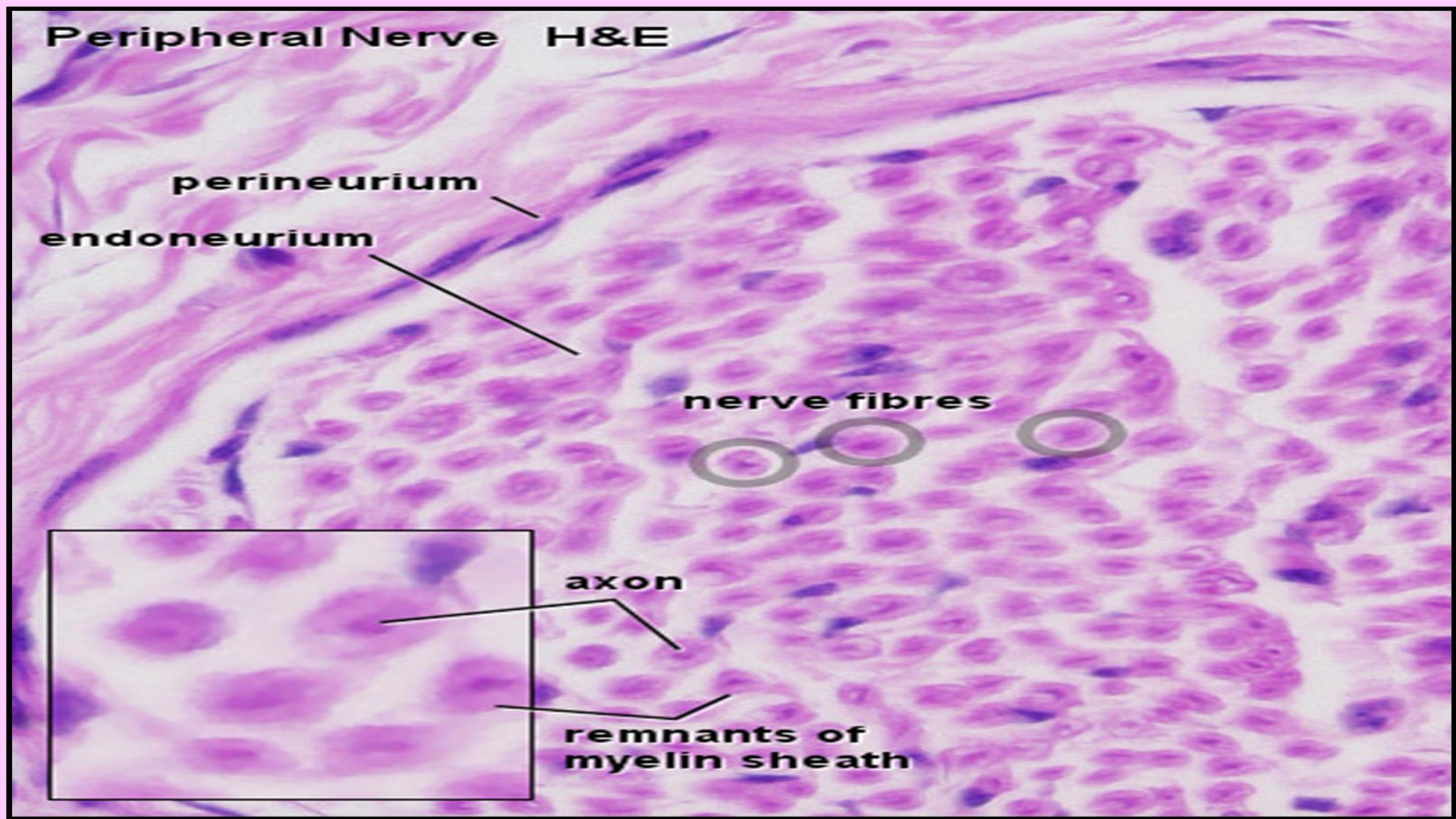
**perineurium**

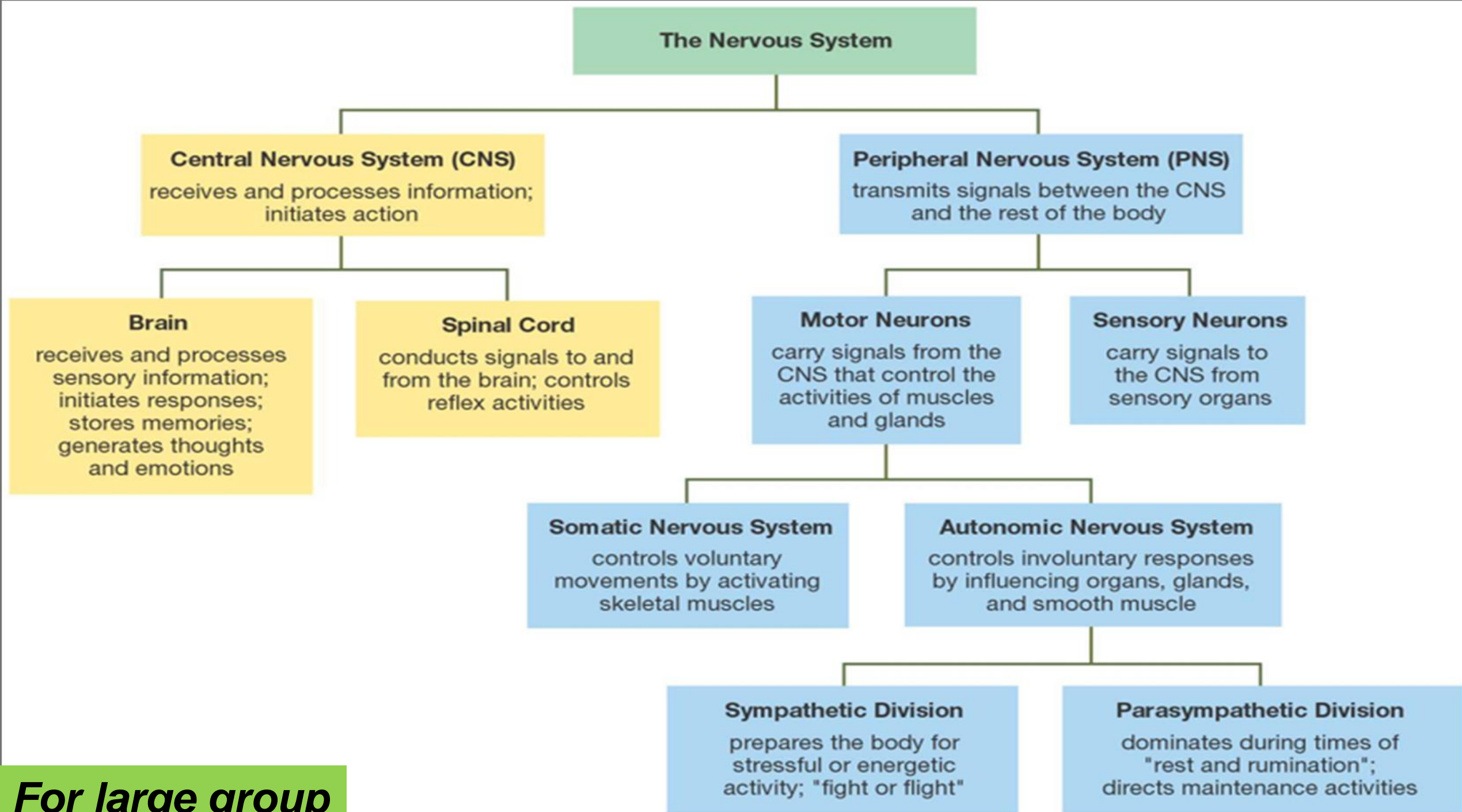
**endoneurium**

**nerve fibres**

**axon**

**remnants of  
myelin sheath**





*For large group*