

Nervous system-2

classification of neurons

acc. To polarity—

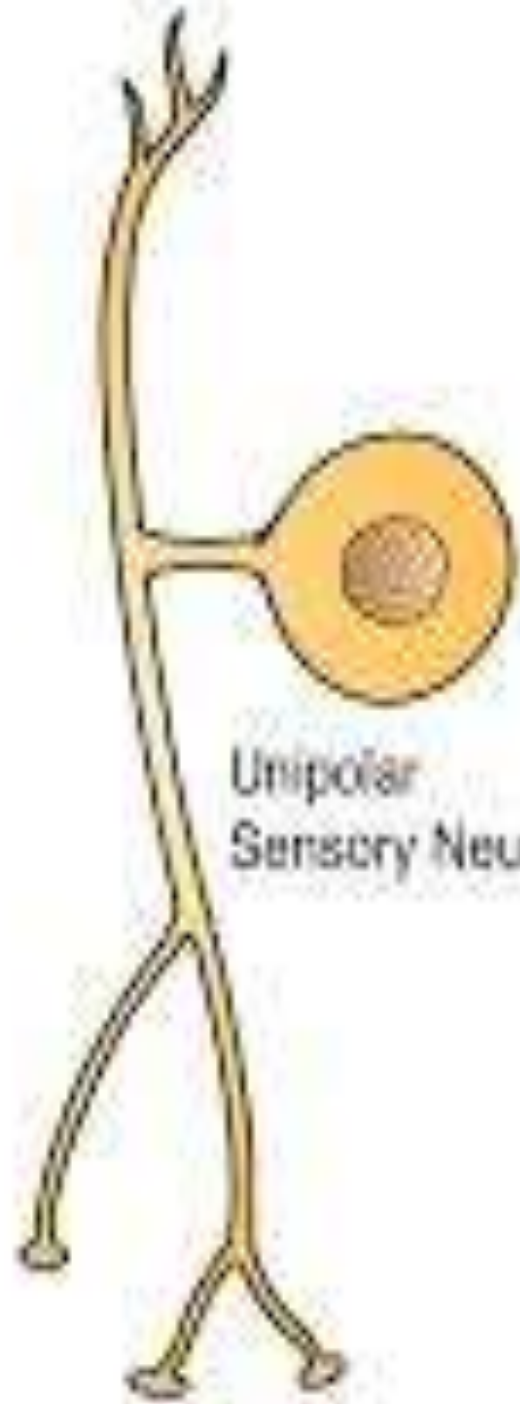
- **Unipolar**—unipolar cell & send out single process, e.g **mesencephalic nucleus** of trigeminal nerve.
- **Bipolar**—spindle shaped, dendrite extend from periphery to cell body , axon passes from cell body into nervous system, e.g **olfactory cells of nasal mucous membrane, bipolar cells of retina, ganglion cells of auditory nerve.**
- **multipolar**—have no of neurites arising from body, long process is axon, while rest are dendrites.e.g most neurons of brain,spinal cord.
- **Pseudounipolar**

- **pseudo unipolar—cell** body of this neuron has a single neurite that divides a short distance from the cell body into two branches, one branch enters CNS other proceed to PNS.
- **e.g neurons of dorsal root ganglion.**

Bipolar
Interneuron



Unipolar
Sensory Neuron

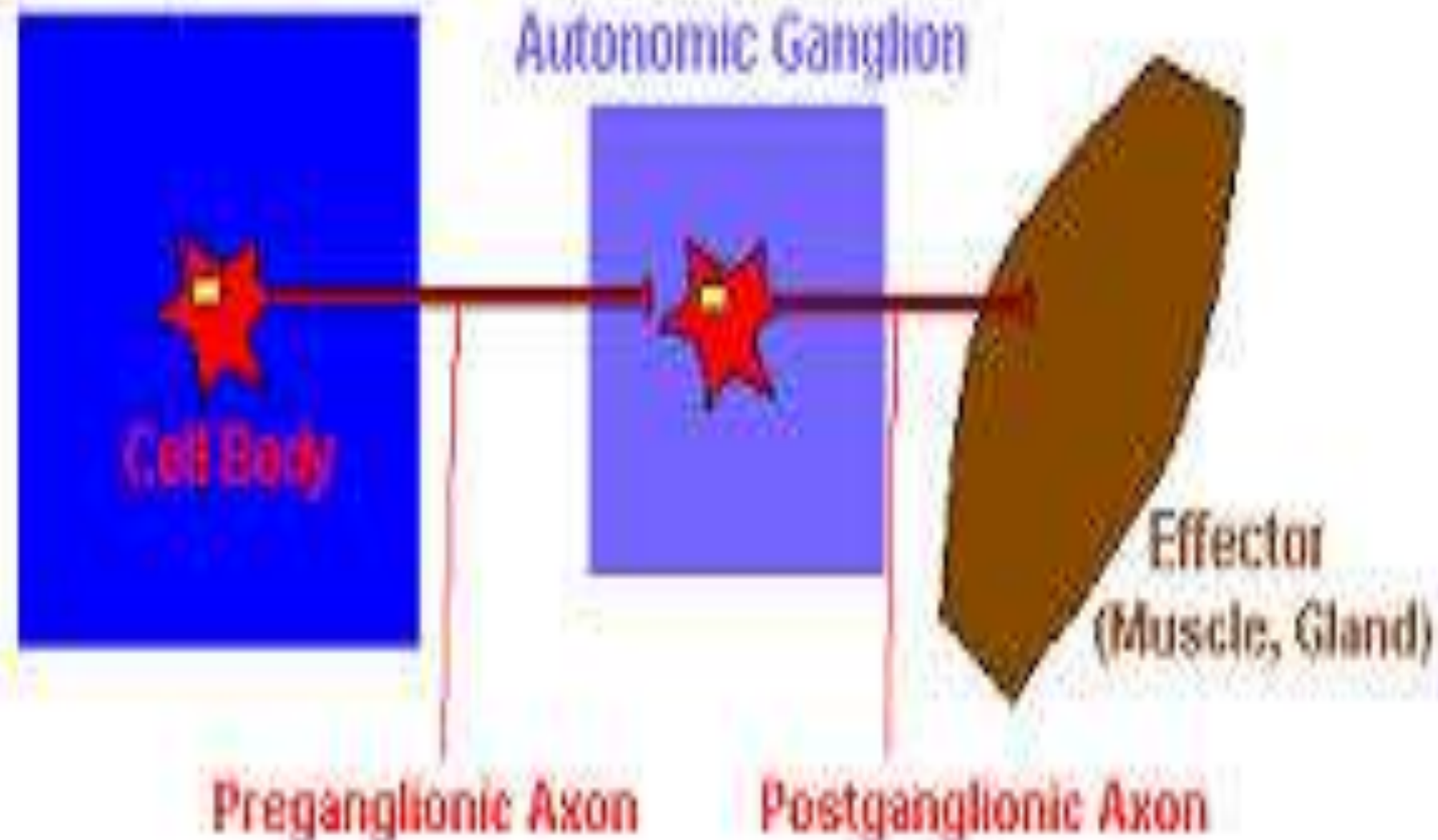


Multipolar
Motor Neuron



- Acc. To function—
- **Sensory**-bipolar or pseudounipolar neurons, bodies of all sensory neurons lie outside CNS, except mesencephalic nucleus of trigeminal nerve.
- **motor**- multipolar, located in CNS ,except postganglionic neurons of ANS.
- Are of two types—**UMN**-confined to cortex of brain, **LMN**—confined to spinal cord and brainstem.
- **Internuncial / connector neurons-**

Central Nervous System (Brain, Spinal Cord)

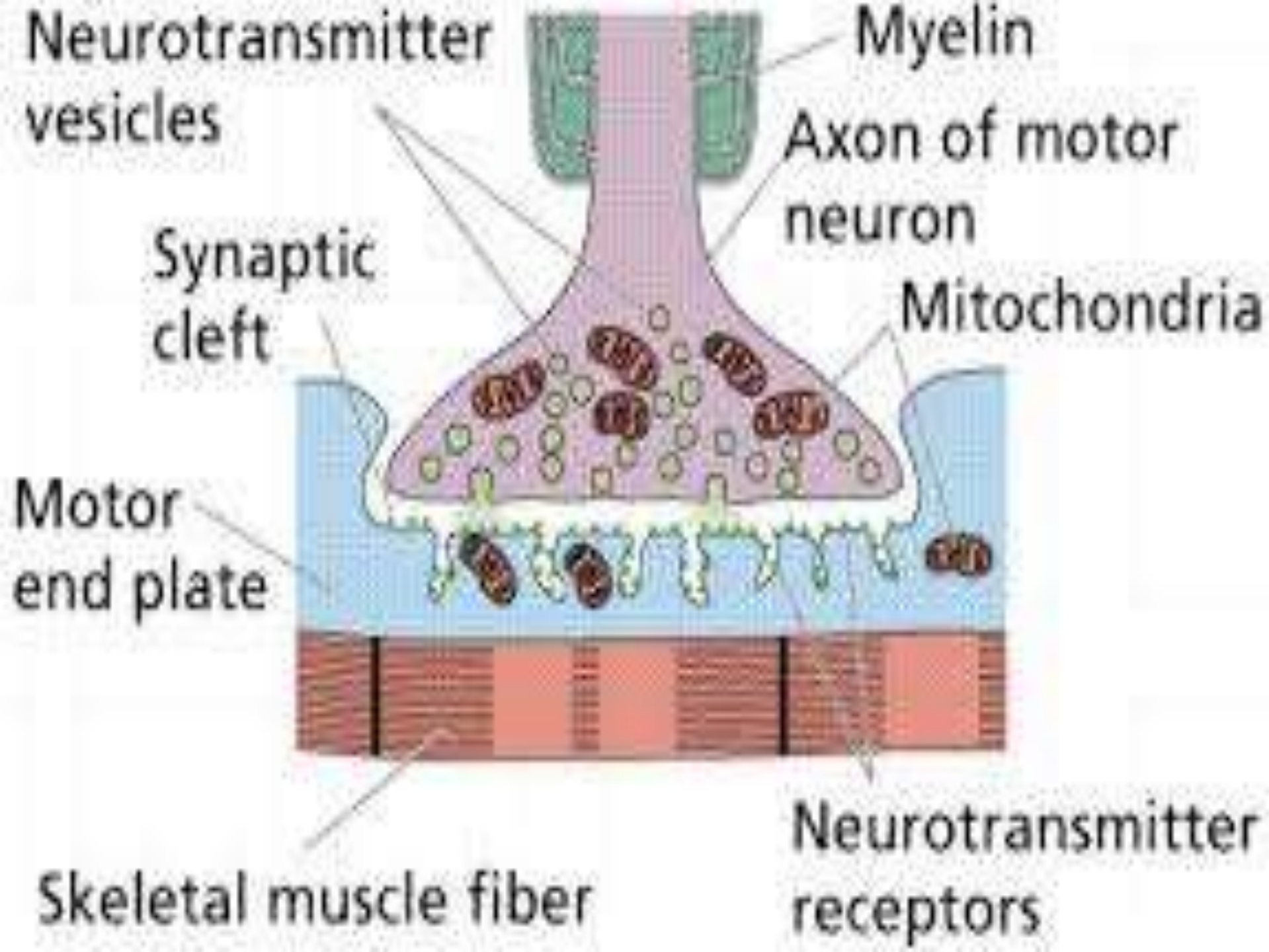


- In autonomic nerves—
- Arranged in two sets-
- Preganglionic neurons—which lie within the CNS, as **craniosacral** outflow for **parasympathetic** nerves,
- **Thoraco lumbar** outflow for **sympathetic** nerves.
- postganglionic neurons- situated outside the CNS.

- acc to length of axon & dendrites—
- **Golgi type 1**—have long axon with short and numerous dendrites, e.g. pyramidal cells of cerebral cortex, purkinjee cells of cerebellar cortex.
- **golgi type 2**—have short axon, with numerous & short dendrites e.g. neurons in cerebellar cortex.

Synapse

- specialized junctions b/w two or more adjacent neurons.
- Essential components are—
- Presynaptic membrane-formed by knob like end of an axon,
- synaptic cleft—space separating axon terminal & cell with which it is synapsing,
- postsynaptic membrane.-membrane opposed to presynaptic terminal.



classification of synapses

- **axoaxonic-axon** of presynaptic synapses with axon of postsynaptic neuron. least common
- **Axosomatic**-involve contact b/w axon terminals & cell body of postsynaptic neuron. (less common)
- **axodendritic** the presynaptic axon makes contact with post synaptic stem dendrites or dendritic spines. (most common)

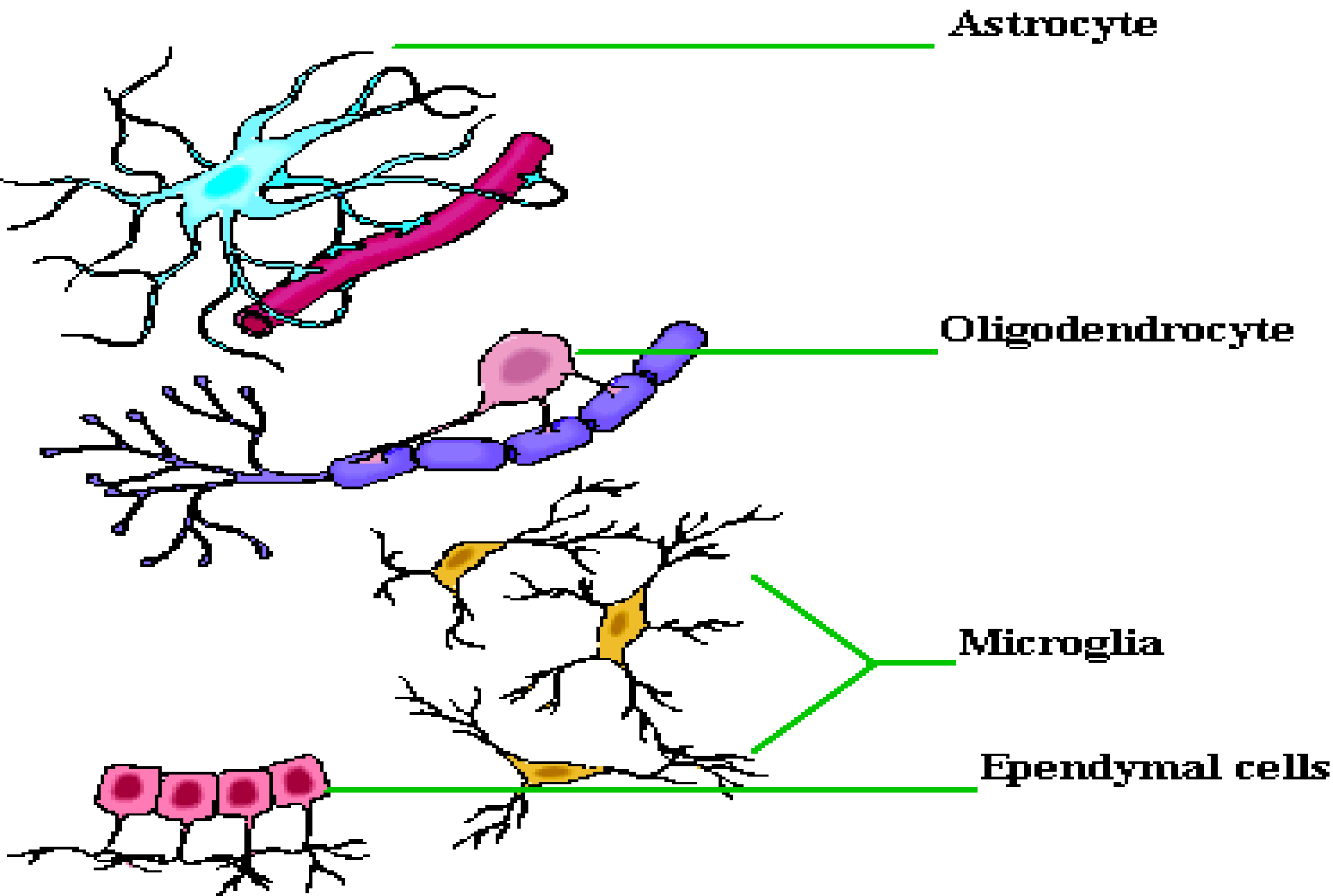
neuroglia

- Supporting cells of CNS.
- they are nonexcitable, undergo mitotic division.
- Brain tumours are mostly neuroglial, meningeal, vascular.

classified into---

- macroglia(develop from neuroectoderm) — astrocytes, oligodendrocytes , ependymal cells
- microglia.(develop from mesoderm)

Neuroglial Cells of the CNS



- **Astrocytes---**
- have small cell bodies , with branching processes that extends in all directions.
- two types—fibrous & protoplasmic
- **fibrous** ---found in white matter, each process is long , slender & smooth, cell bodies & processes contain many filaments which course through cytoplasm.

- Protoplasmic astrocytes—
- found in grey matter, their process ramify among the nerve cell bodies.
- processes are shorter thicker and more branched
- cytoplasm of these cells contain fewer filaments.

- Function—
- form **supporting framework** for the nerve cells bodies.
- serve as **phagocytes** by taking up degenerating synaptic action terminals,
- Following death of neurons due to disease , they proliferate and fill the spaces previously occupied by neurons , a process called **regeneration gliosis**.

oligodendrocytes

- have smaller cell bodies and few dendritic processes,
- The filaments are absent in the cytoplasm,
- they are found in rows, along nerve fibers or surrounding nerve cell bodies.
- Responsible for **formation of myelin sheath** of nerve fibers **in CNS**.
- they surround nerve cell bodies (satellite oligodendrocytes) & form capsular cells of peripheral sensory ganglion.

Ependymal cells

- these cells **line the cavities of the** brain & spinal cord,
- cuboidal or columnar in shape with cilia and microvilli.
- main function is **circulation of CSF with in ventricular system.**

Microglial cells

- develop from mesoderm,
- smallest cells scattered throughout CNS
- their function is phagocytosis of damaged nervous tissue.

Nervous System (NS)

Peripheral NS

Central NS

Autonomic NS

Somatic NS

Brain

Spinal Cord

Sympathetic NS

Parasympathetic NS

Forebrain

Midbrain

Hindbrain

Telencephalon

Diencephalon

Mesencephalon

Metencephalon

Myelencephalon

Cerebral Cortex
Basal Ganglia
Hippocampus
Amygdala

Thalamus
Hypothalamus

Tectum
Cerebellum

Pons
Cerebellum

Medulla

MCQ

nissl granules are absent in—

- 1) dendrites
- 2) axon hillock
- 3) cell body
- 4) nucleus

bipolar neurons are present in –

- 1) dorsal root ganglion
- 2) retina
- 3) sympathetic ganglion
- 4) spinal cord

glial type 2 neurons are present in—

- 1) cerebellar cortex
- 2) cerebral cortex
- 3) pons
- 4) midbrain

myelination in CNS is done by—

- 1) oligodendrocytes
- 2) microglia
- 3) schwann cells
- 4) astrocytes

derived from mesoderm—

- 1) astrocytes
- 2) oligodendrocytes
- 3) microglia
- 4) ependymal cells.