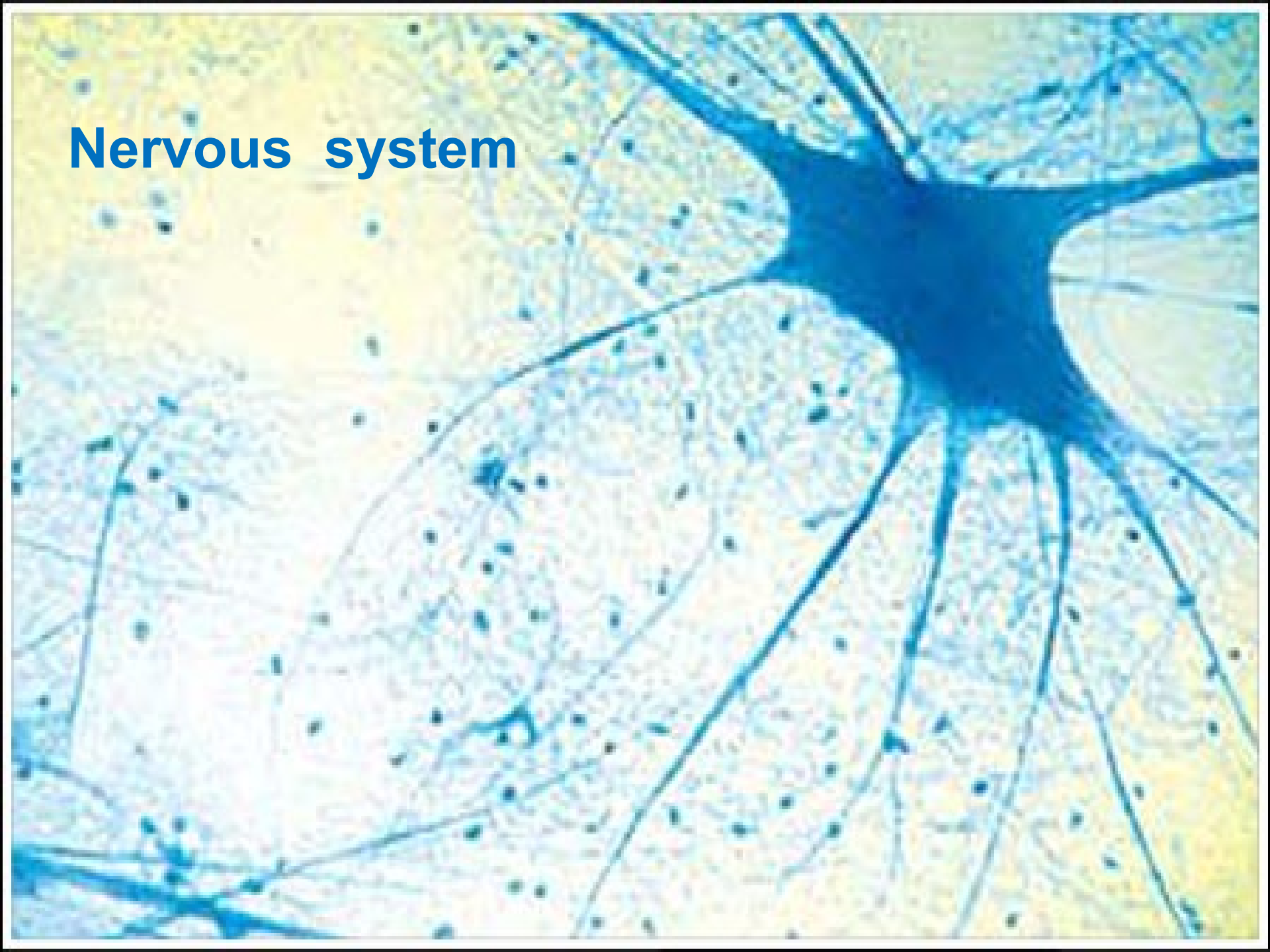


Nervous system



Nervous system

is a complex, sophisticated system that regulates and coordinates body activities

regulates the body's responses to internal and external stimuli

has three main functions, sensory input, integration of data and motor output

is composed of excitable nerve cells

conducts nerve impulses

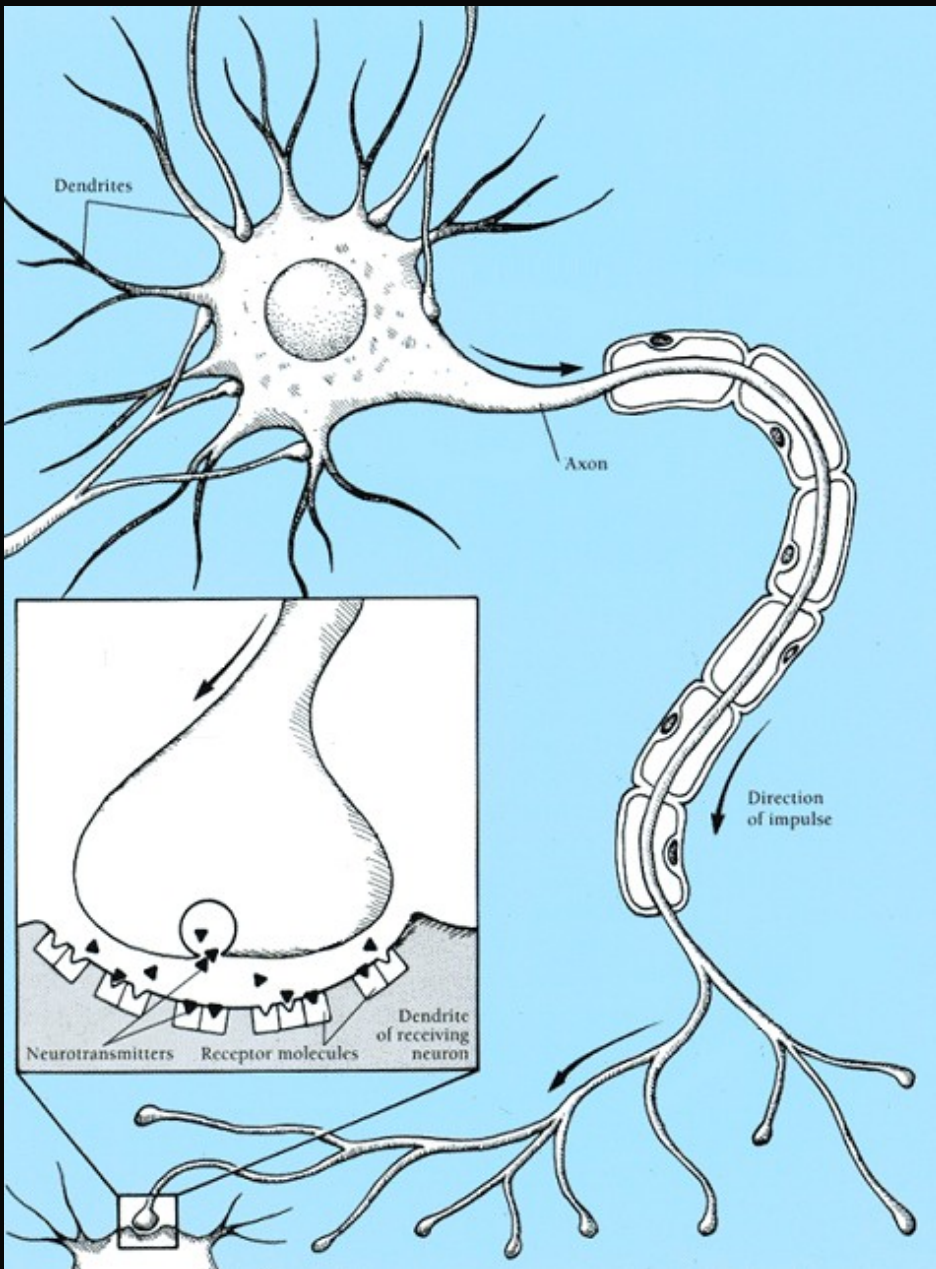
is divided into two categories: the central nervous system- **CNS** and the peripheral nervous system - **PNS**

the basic structural and functional unit - **neuron**

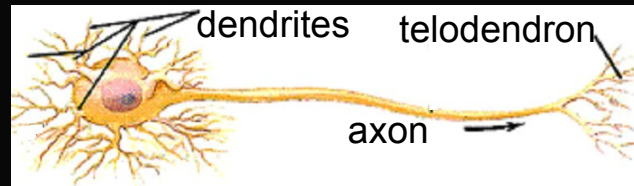
cells providing support and protection for neurons – **glial cells**

Neuron

- receives stimuli
- transforms stimuli to nerve impulses
- conducts nerve impulses
- processes information
- transmits the electro-chemical signal across a synapse



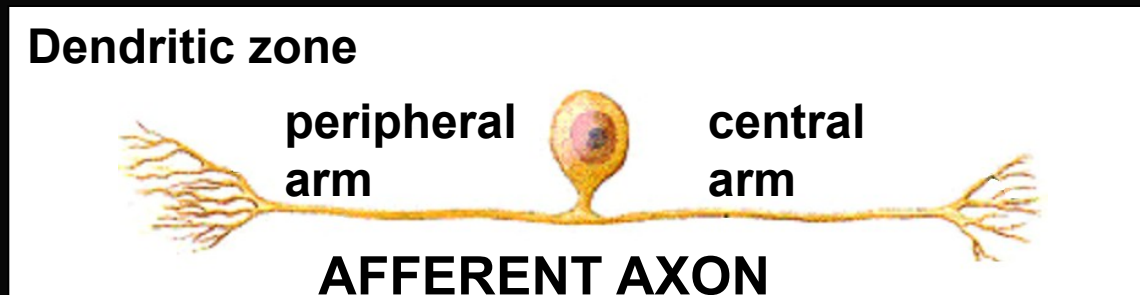
Structural classification



Multipolar neuron

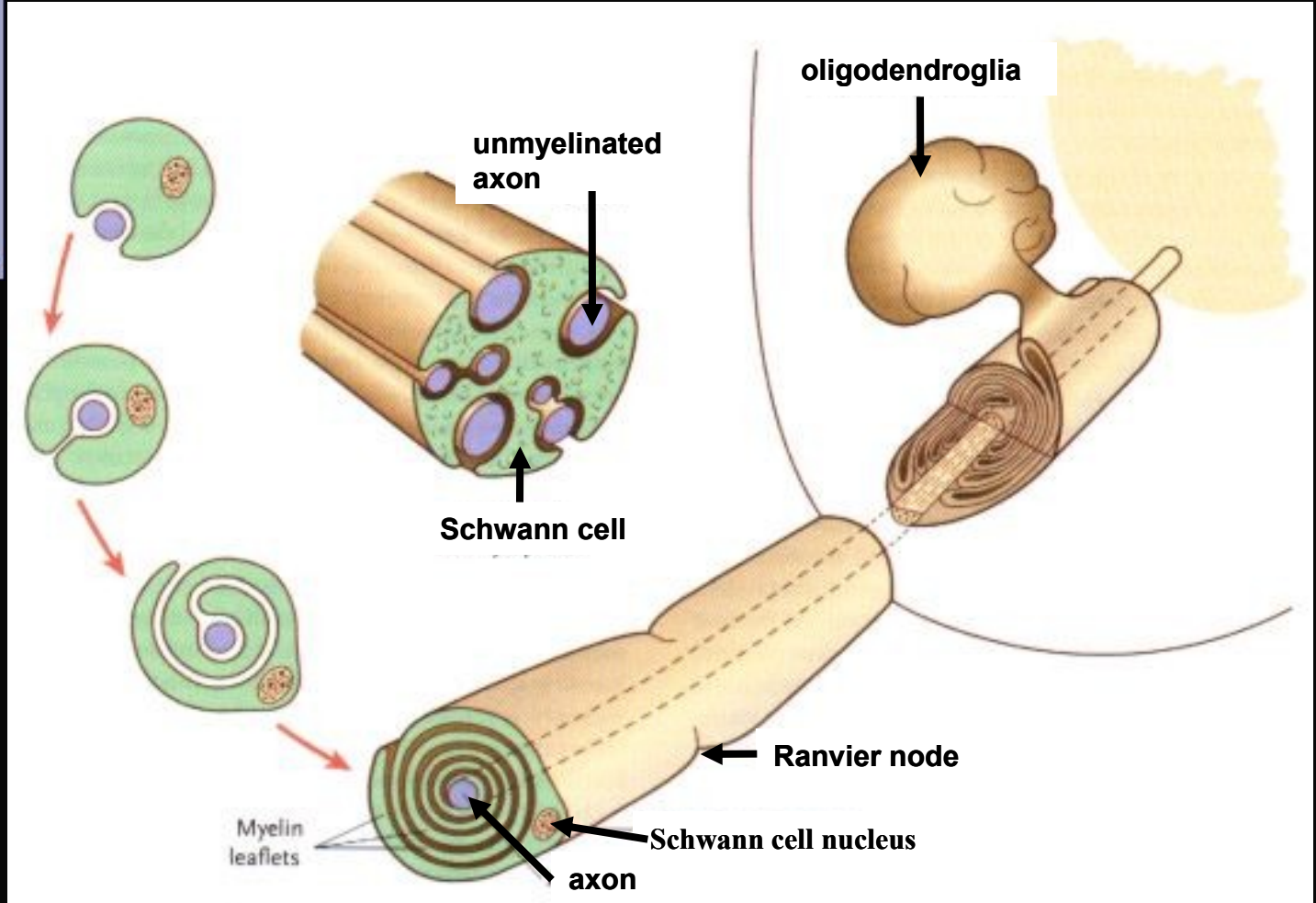
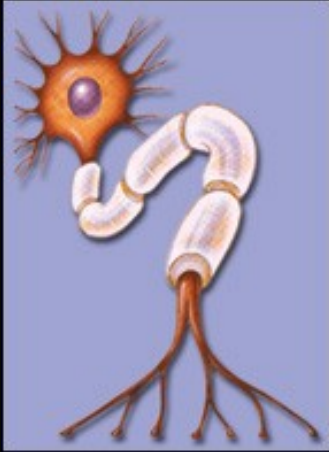


Bipolar neuron

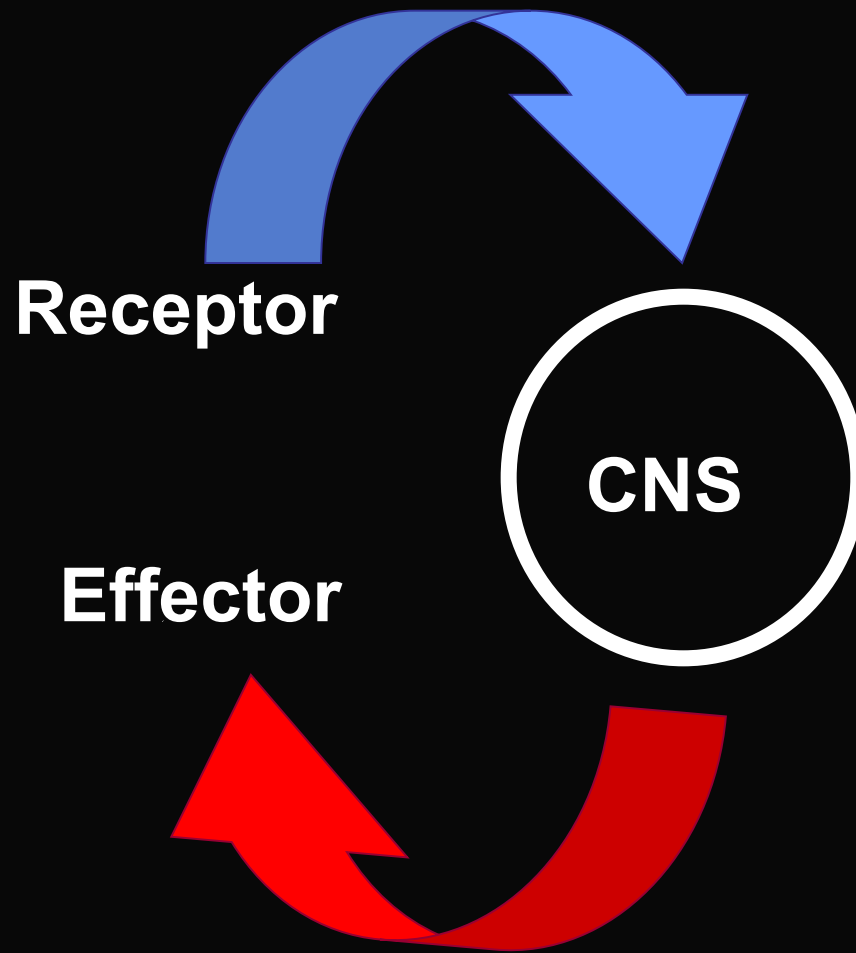


Pseudounipolar neuron

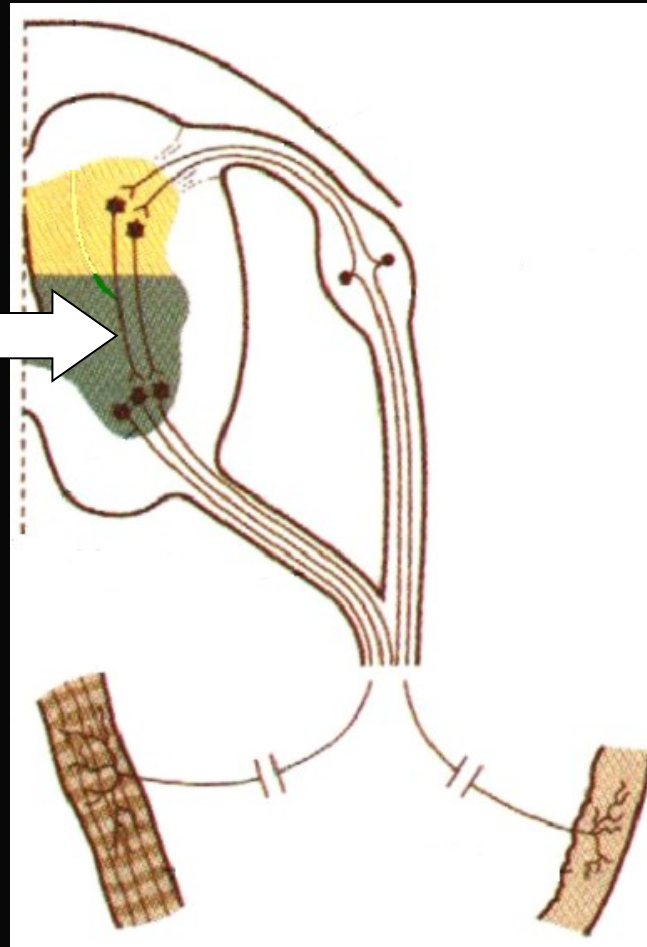
Myelinization



Basic function of NS - **reflex**



Interneuron →

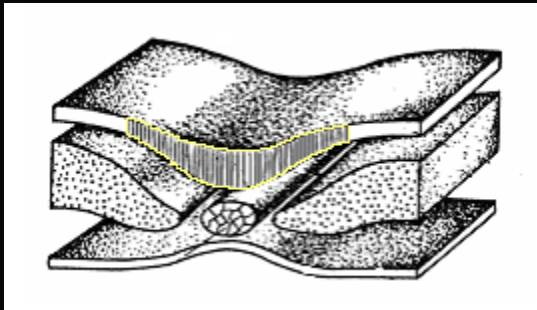


Muscle

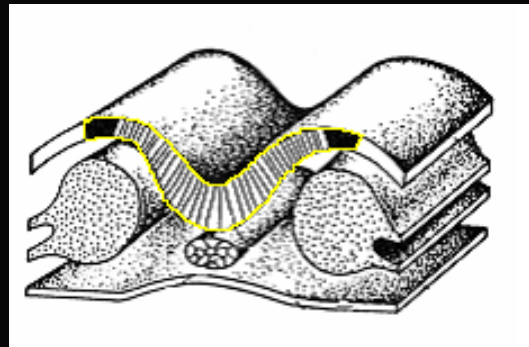
Skin

Development of NS

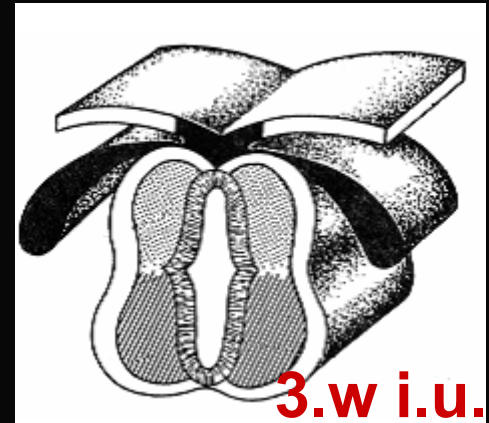
from ectoderm (under influence of the notochord) arises the neural:



plate



groove



tube

+ neural crest

Parts derived from the neural tube

brain

spinal cord

Parts derived from the neural crest

cranial nerve ganglia

dorsal root and autonomic ganglia

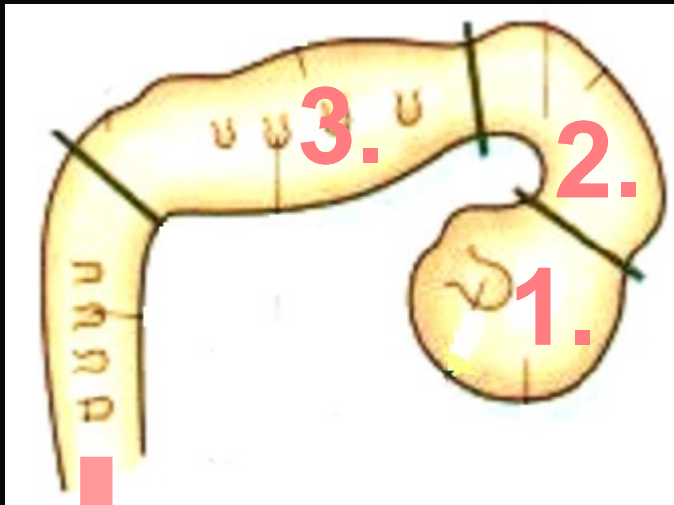
medulla of the suprarenal gland

some bones, cartilage and

connective tissue of the head

pigment cells ...

Cerebral vesicles from the rostral part of the neural tube



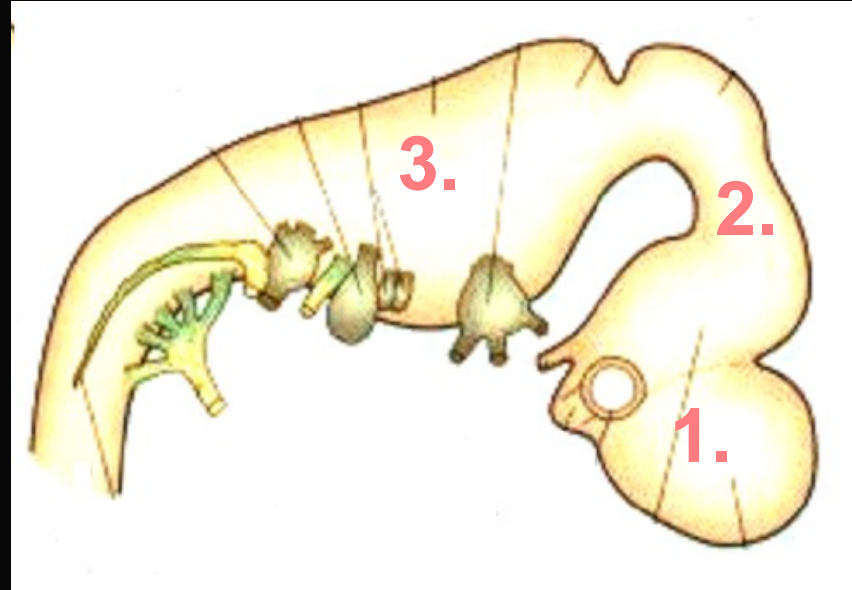
Spinal cord
medulla spinalis

3. rhombencephalon
(hindbrain)

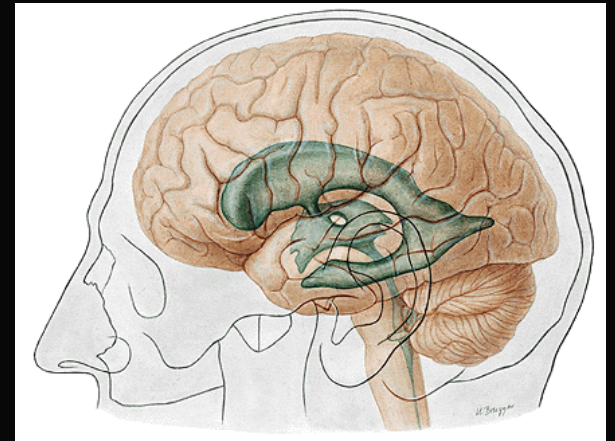
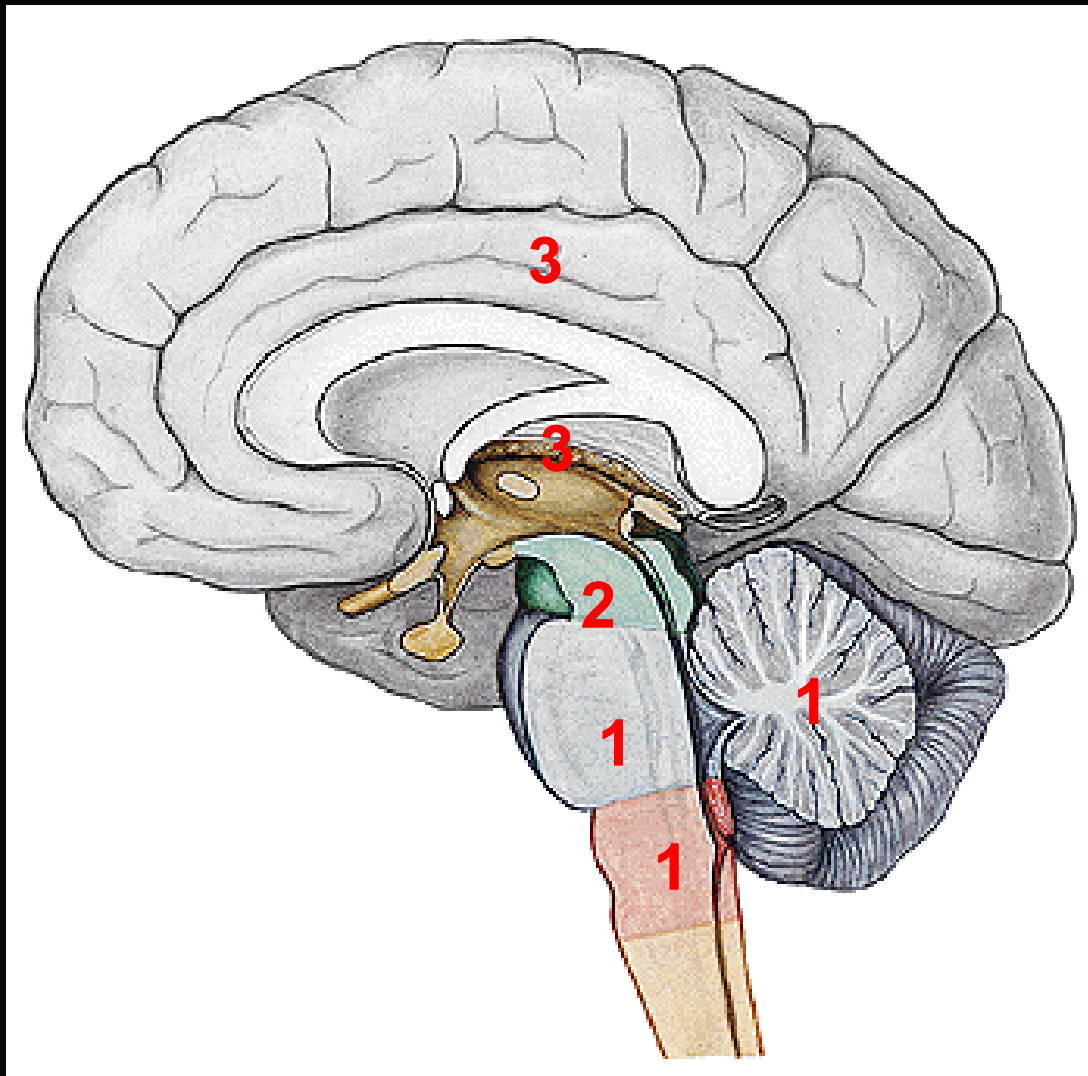
2. mesencephalon
(midbrain)

1. prosencephalon
(forebrain)

Secondary vesicles



- | | | |
|----|-----------------------|-------------------|
| 3. | myelencephalon | medulla oblongata |
| | metencephalon | pons, cerebellum |
| 2. | mesencephalon | midbrain |
| 1. | diencephalon | diencephalon |
| | telencephalon | telencephalon |

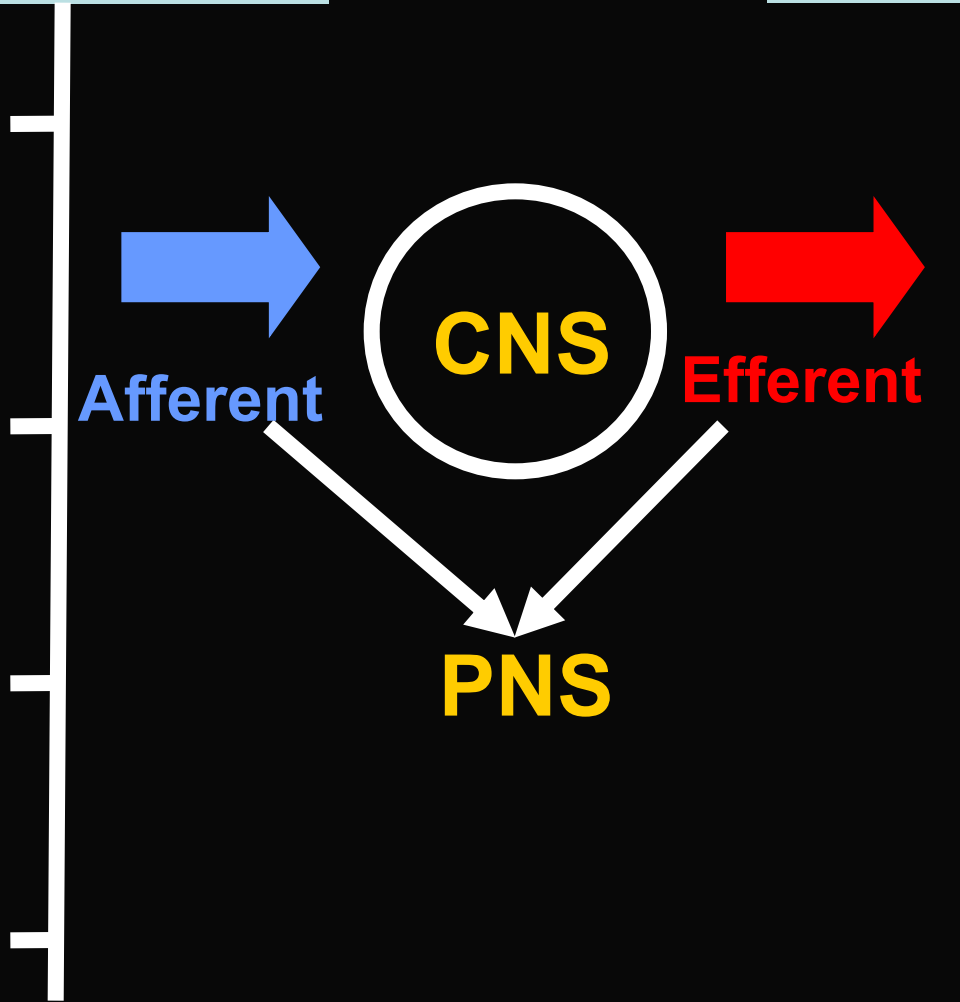


ventricles

RECEPTOR

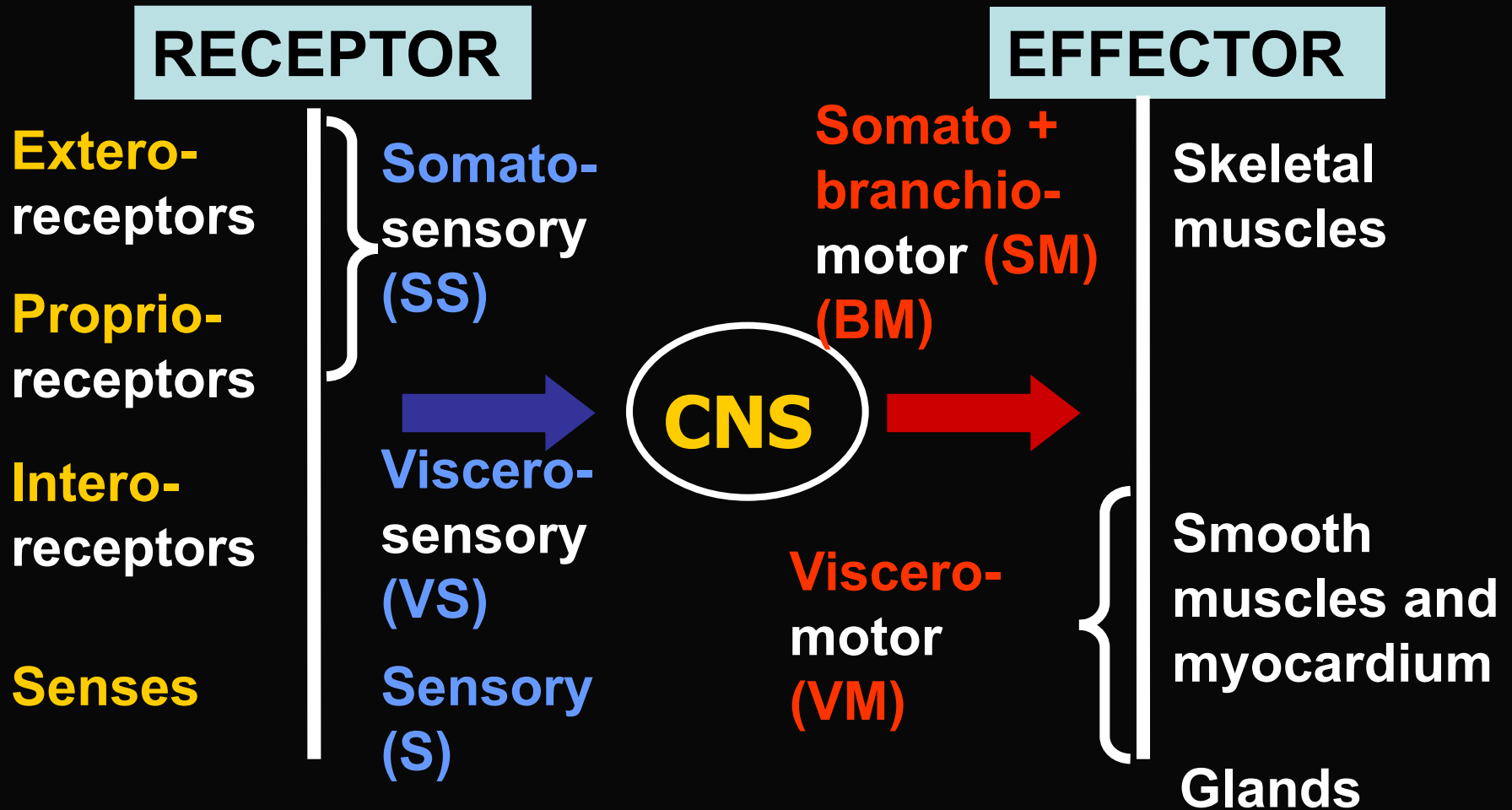
EFFECTOR

- Surface of the body
Extero receptors
- Organs of motions
Proprio receptors
- Viscera
Intero receptors
- Senses



- Skeletal muscles
- Smooth muscles + myocardium
- Glands

Functional types of axons



PNS

Cranial nerves III. - XII. (I.- XII.)

pass through the skull base

Spinal nerves - 31 pairs

**pass through the intervertebral
foramina**

CNS

I. Brain

medulla oblongata

pons

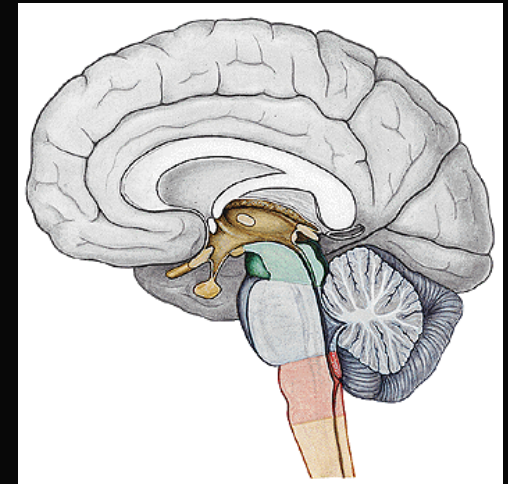
mesencephalon

cerebellum

diencephalon

telencephalon

II. Spinal cord



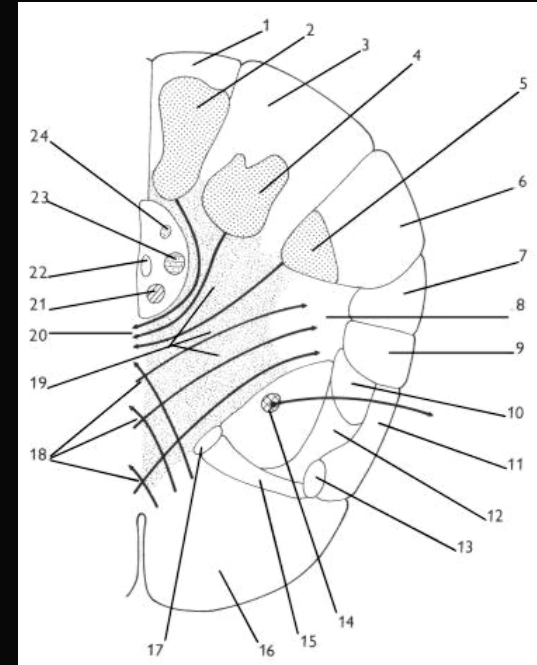
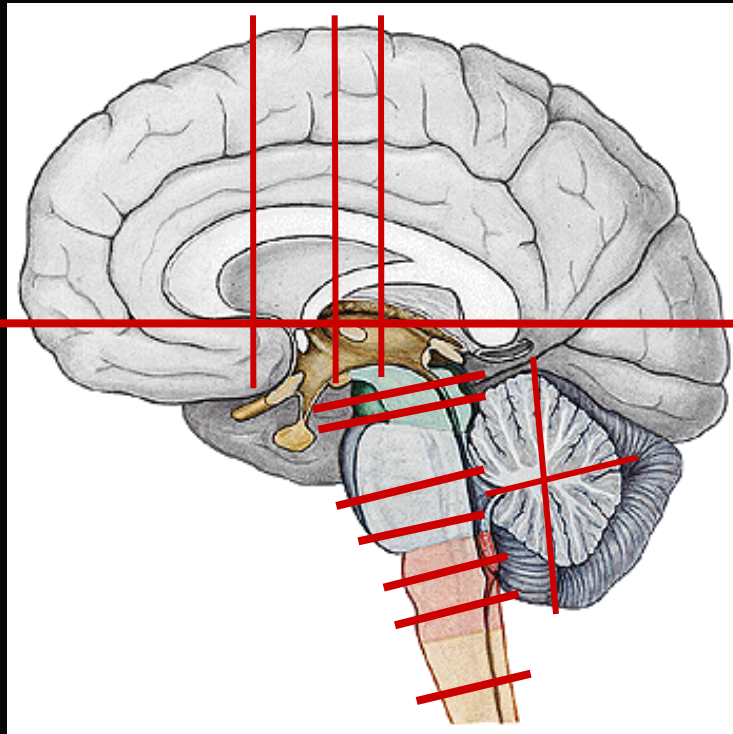
Structure of the CNS

Gray matter - **nuclei**

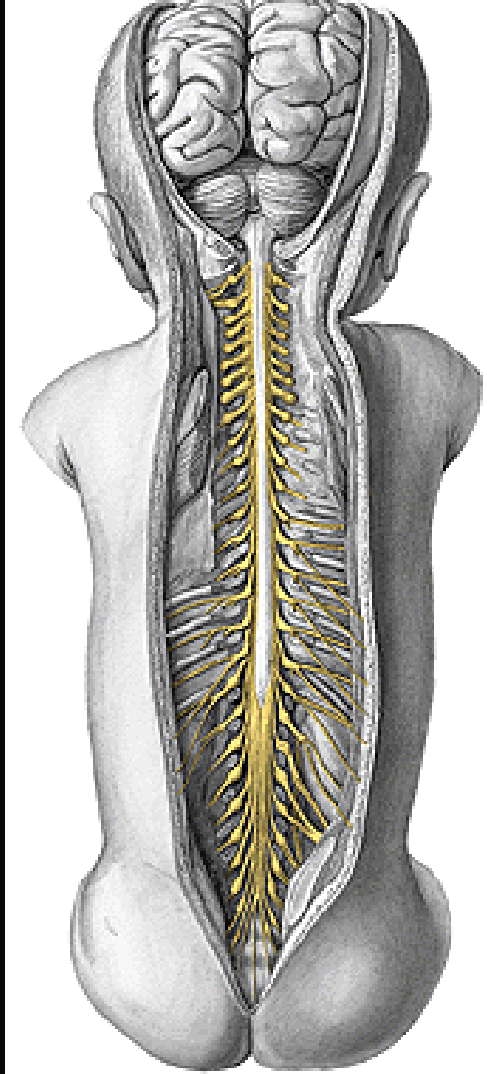
White matter – **nerve tracts:**

- tractus

- fasciculus (lemniscus)

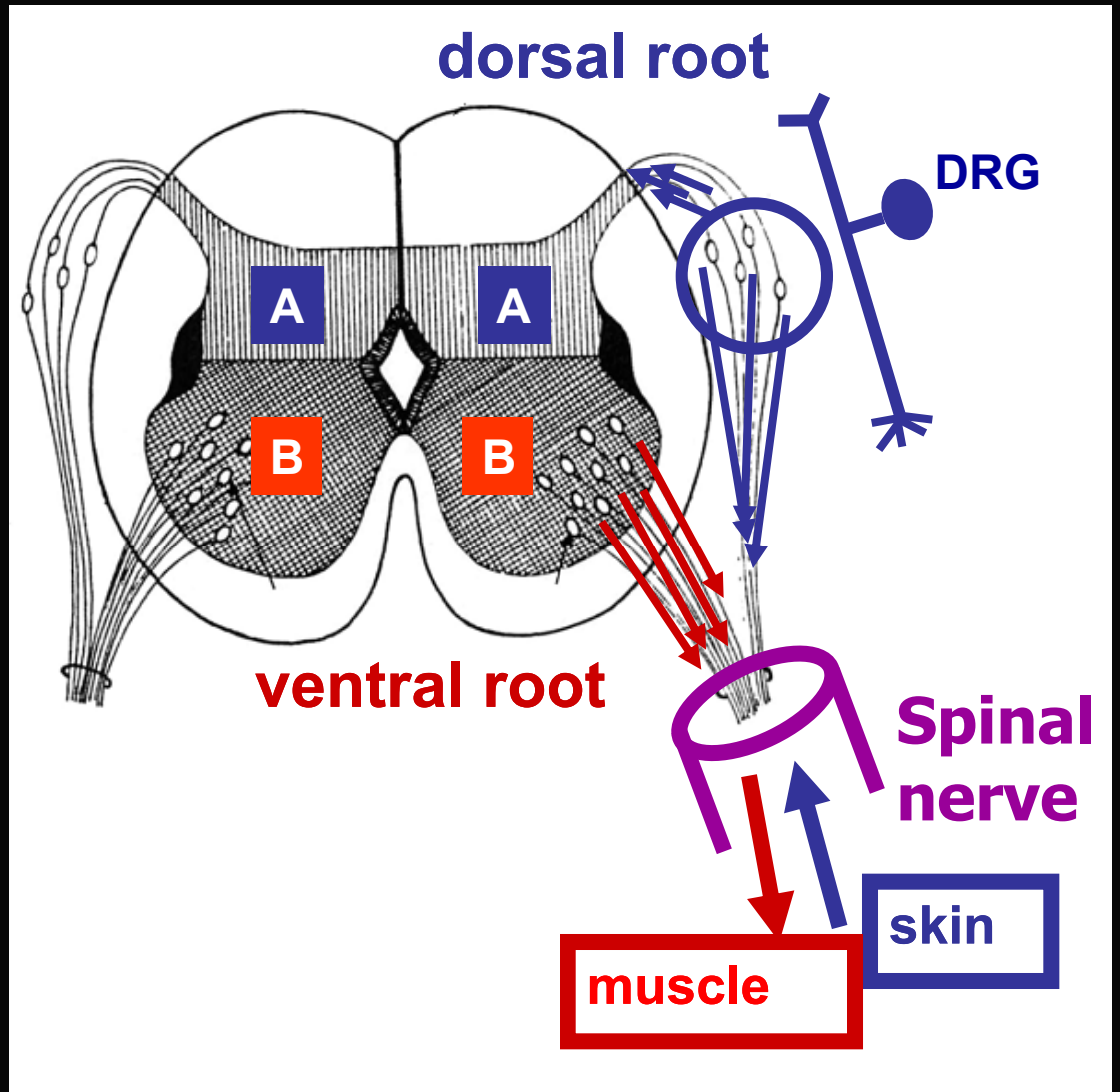
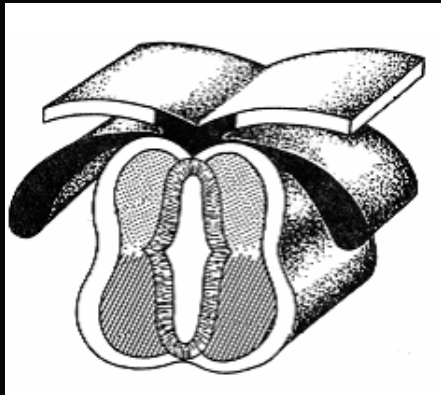
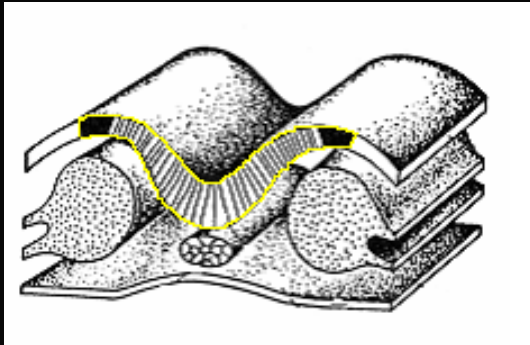
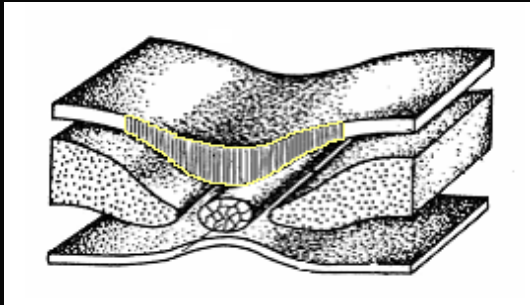


Spinal cord



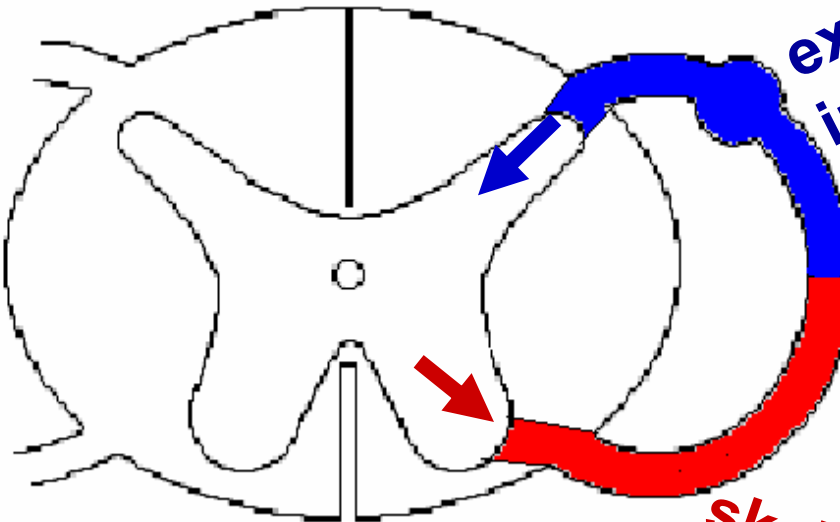
transmission of neural signals between the brain and the rest of the body

contains neural circuits that can independently control numerous reflexes and central pattern generators



Dorsal root

*extero + proprio +
intero-receptors*

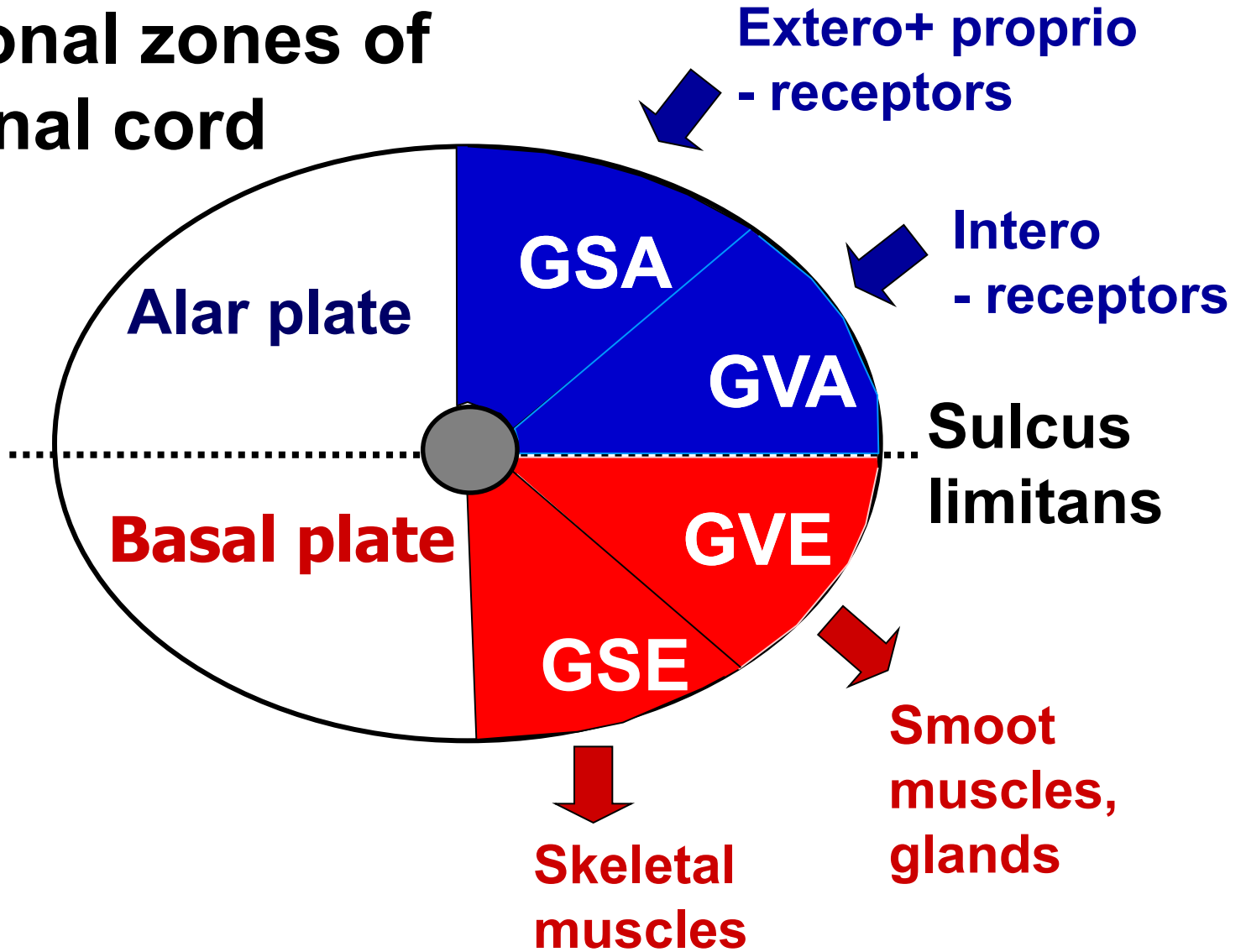


**Spinal
nerve**

Ventral root

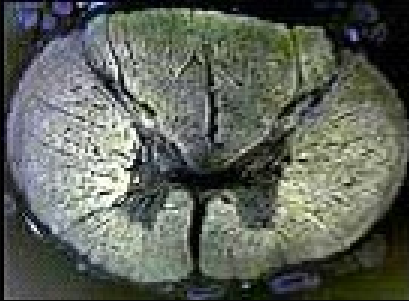
*skeletal + smooth
muscles + glands*

Functional zones of the spinal cord

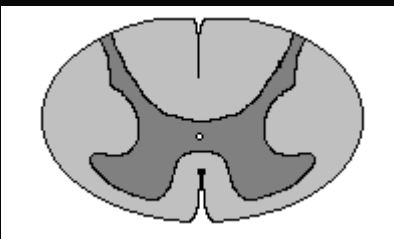




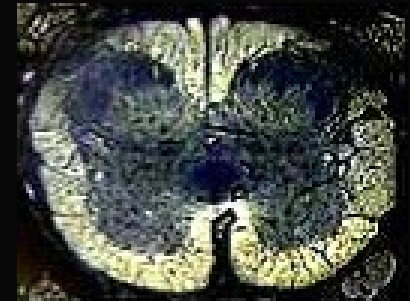
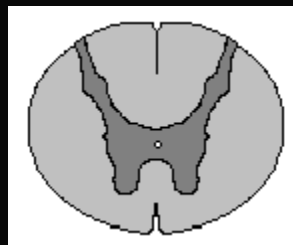
Dorsal horn
Ventral horn



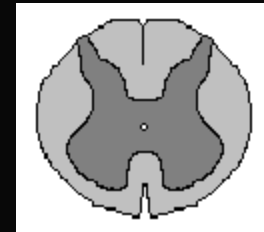
p. cervicalis



p. thoracica



p. sacralis



Gray matter

DORSAL HORN – afferent neurons

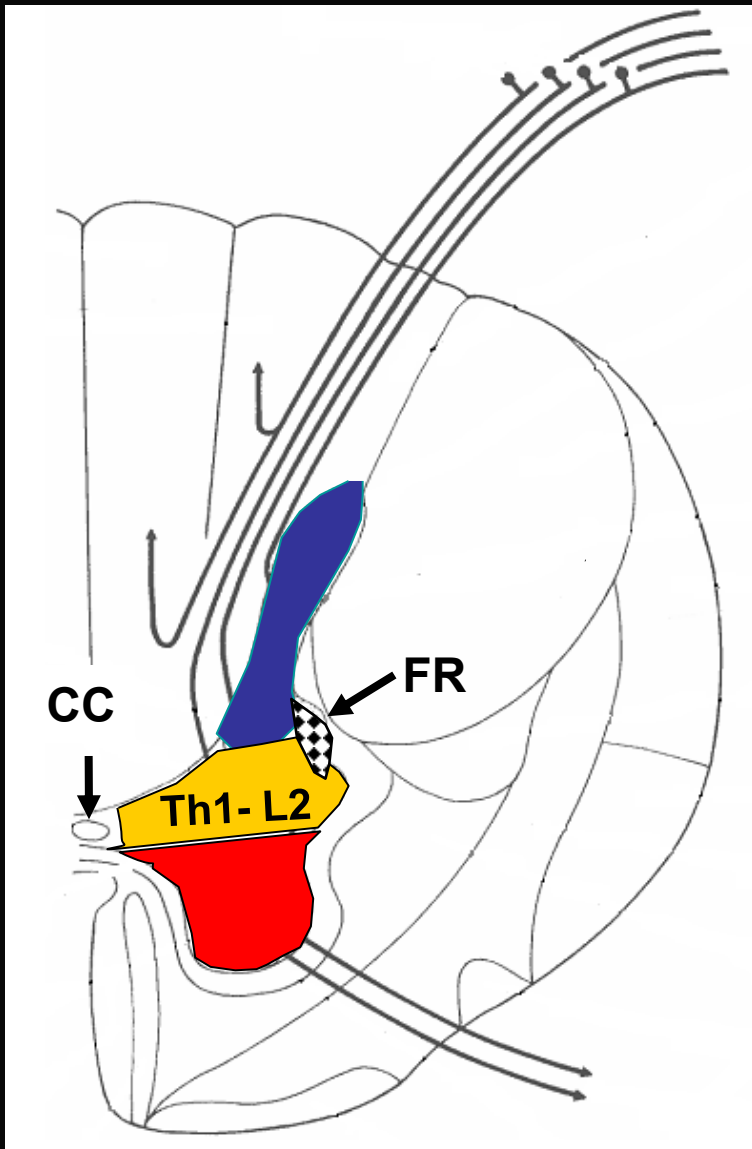
SUBST. INTERMEDIA (lateral horn)
motoneurons of the ANS

VENTRAL HORN - motoneurons
ncll. originis

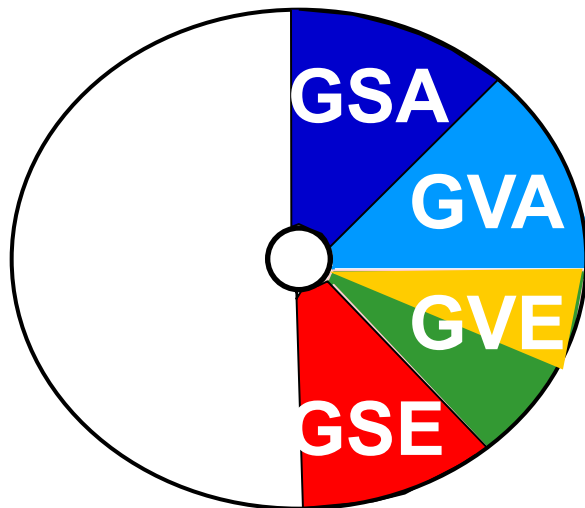
White matter

Funiculus post.
(fasc. gracilis et cuneatus)

Funiculus ant. } **F. anterolateralis**
Funiculus lat. }



Functional zones in the spinal cord

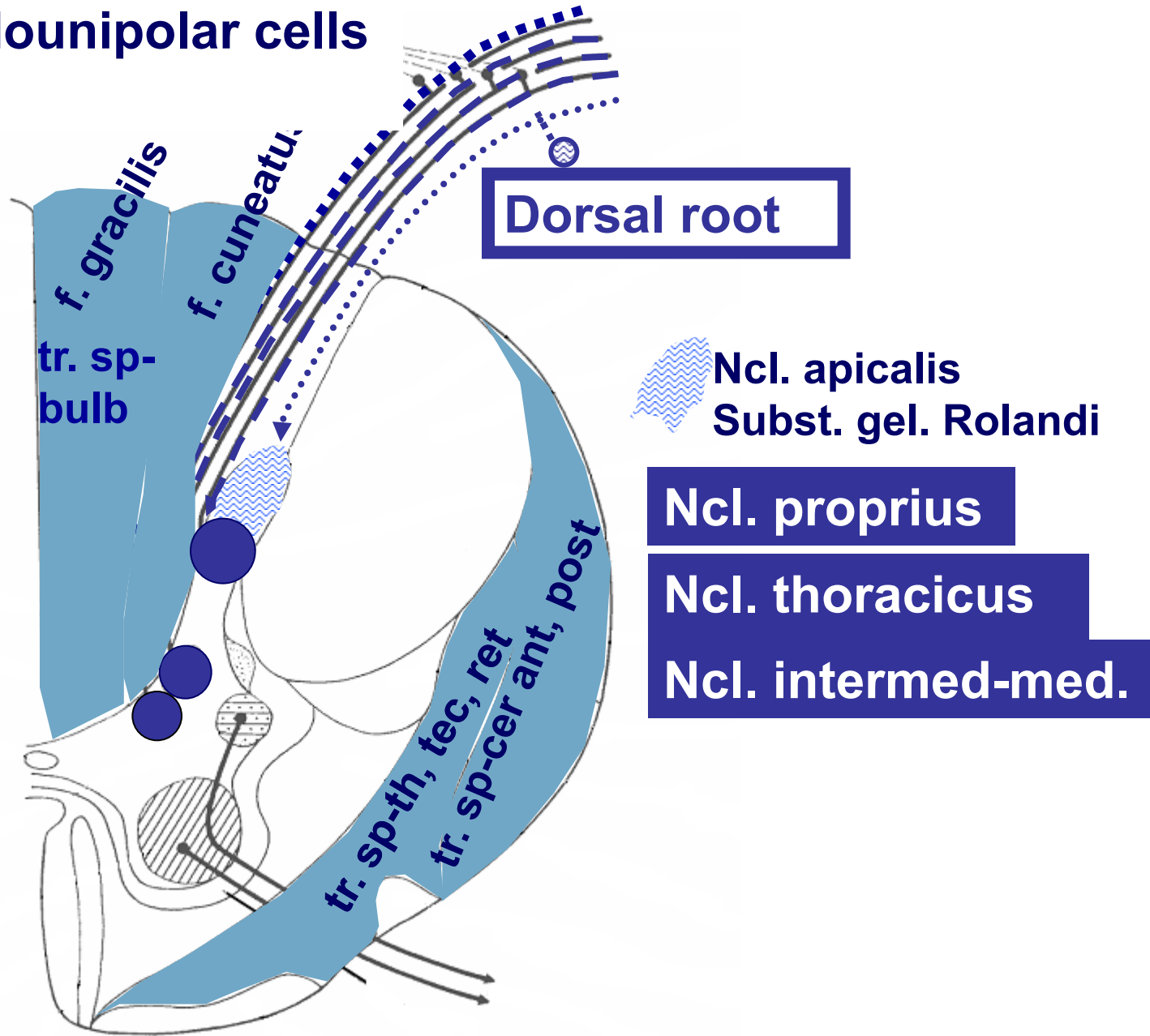


GVE zone

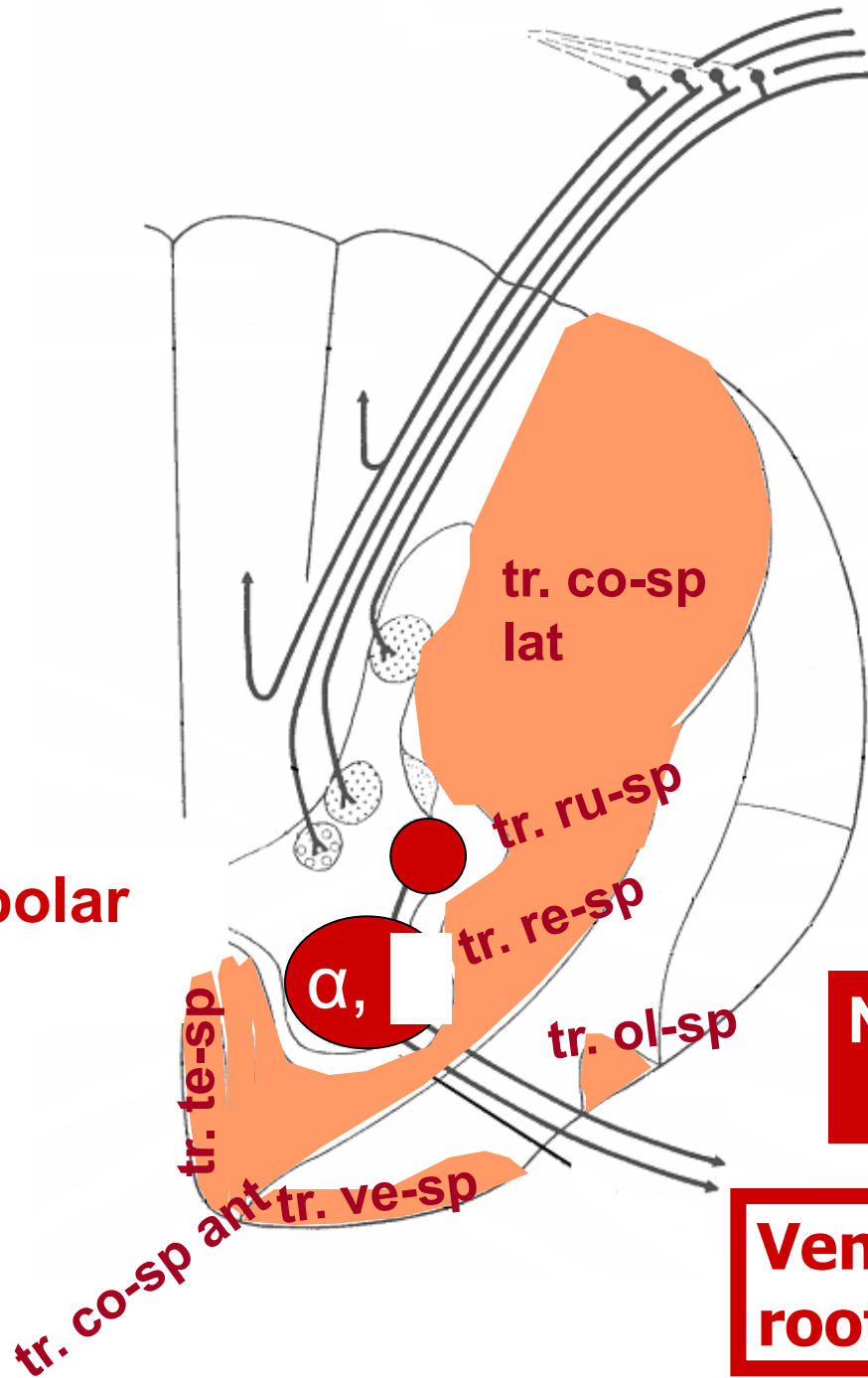
T1 - L2 - preganglionic
sympathetic neurons

below L2 - preganglionic
parasympathetic neurons

Pseudounipolar cells



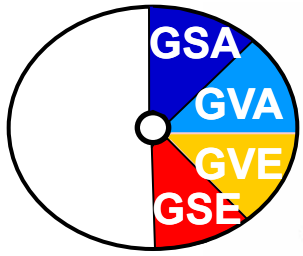
Multipolar cells



Ncl. intermedio-lat.

Ncll. motorii

Ventral root



dorsal root

**ncl apicalis
subst gel Rolandi**

ncl proprius

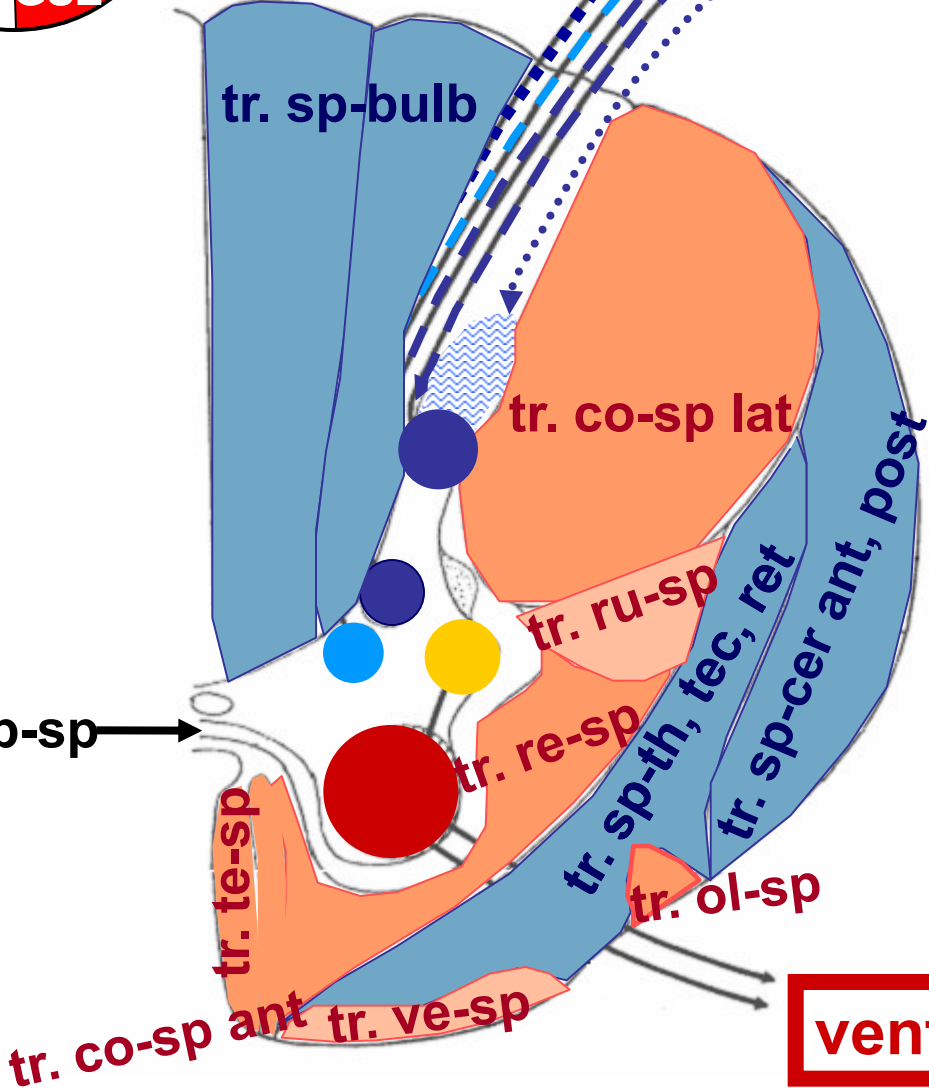
ncl thoracicus

ncl intermed-med

ncl intermedio-lat

ncll motorii

tr. sp-sp



ventral root