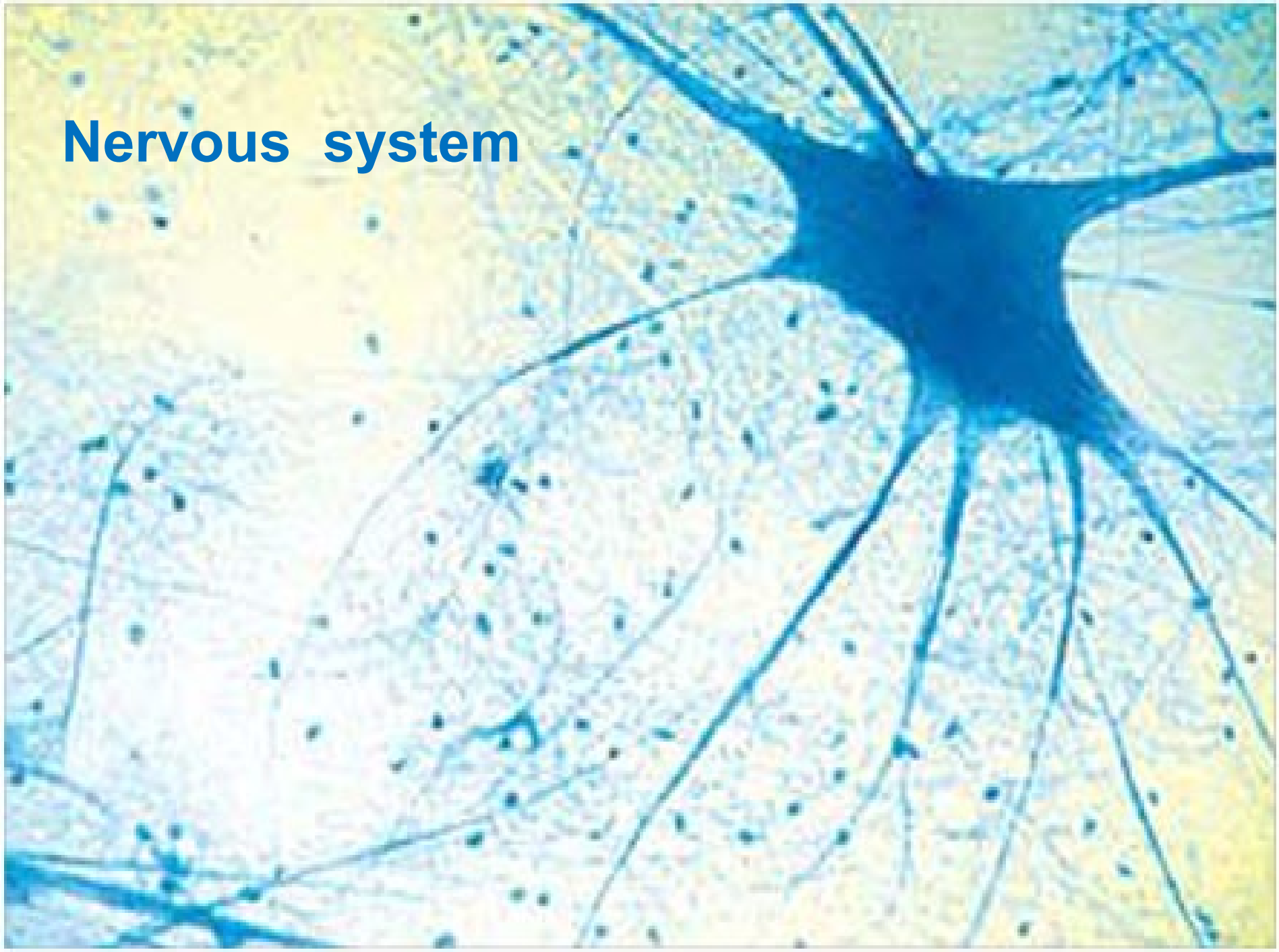
Nervous system



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

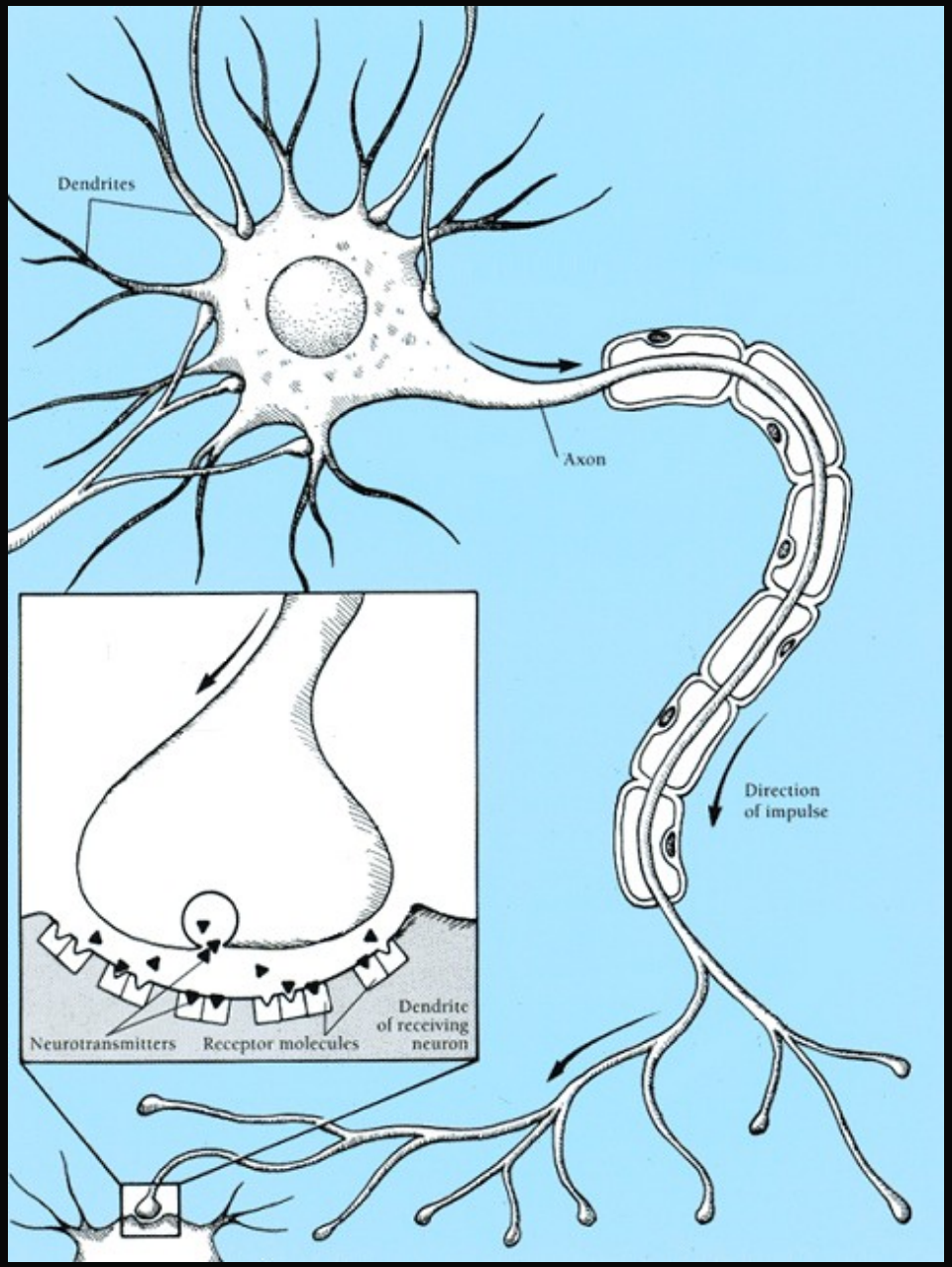
is composed of excitable nerve cells

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

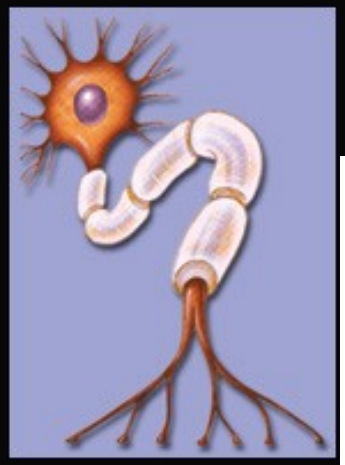
receives stimuli

transforms stimuli to nerve impulses

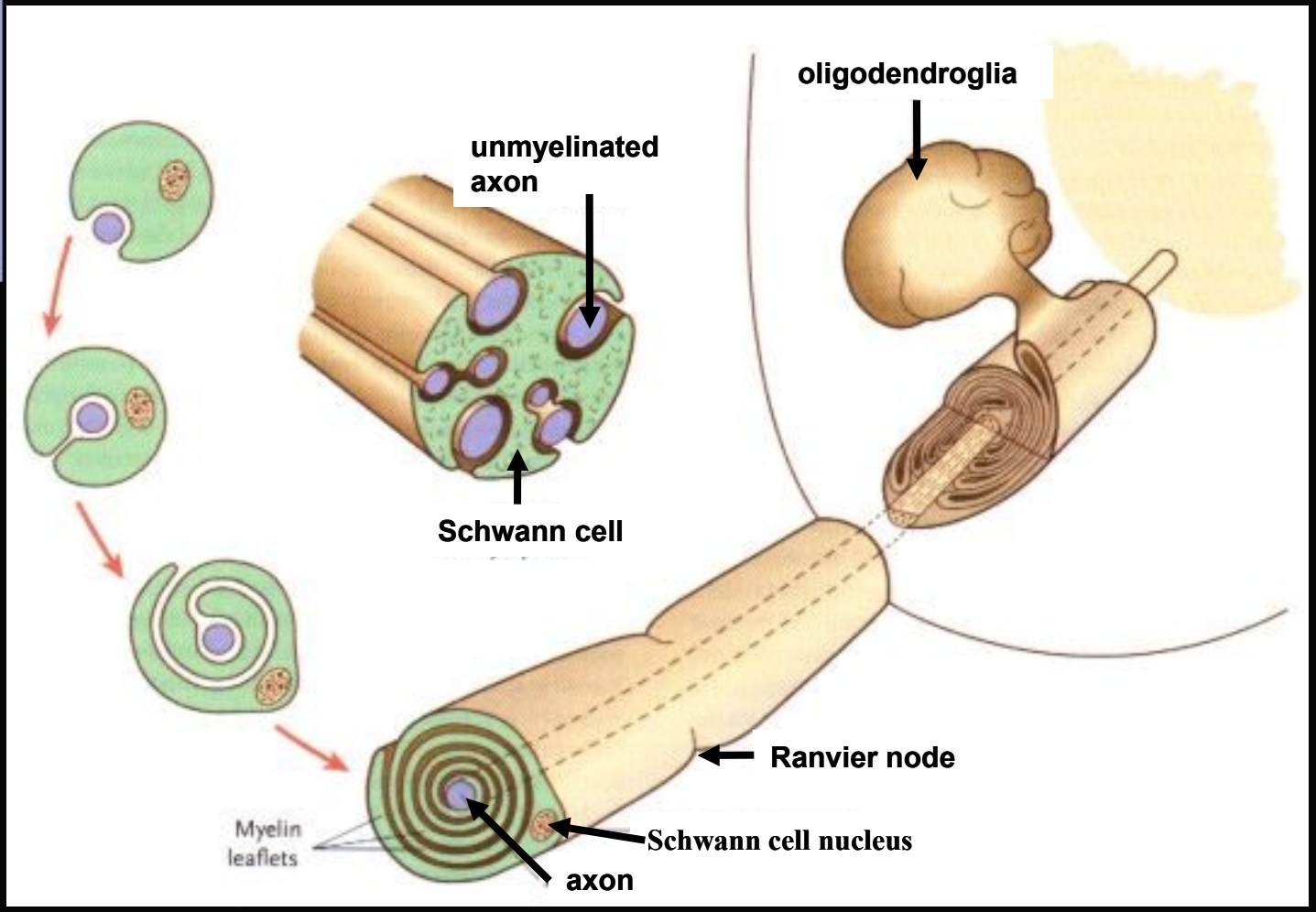
conducts nerve impulses

processes information

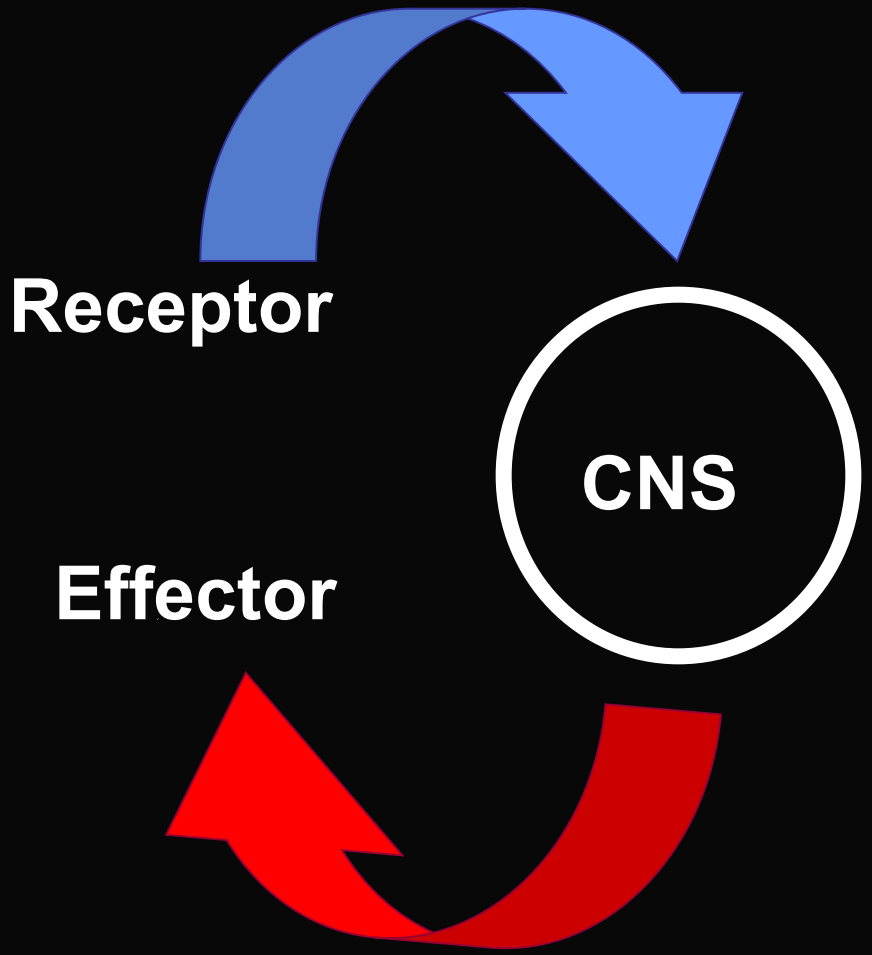
transmits the electro-chemical signal across a synapse



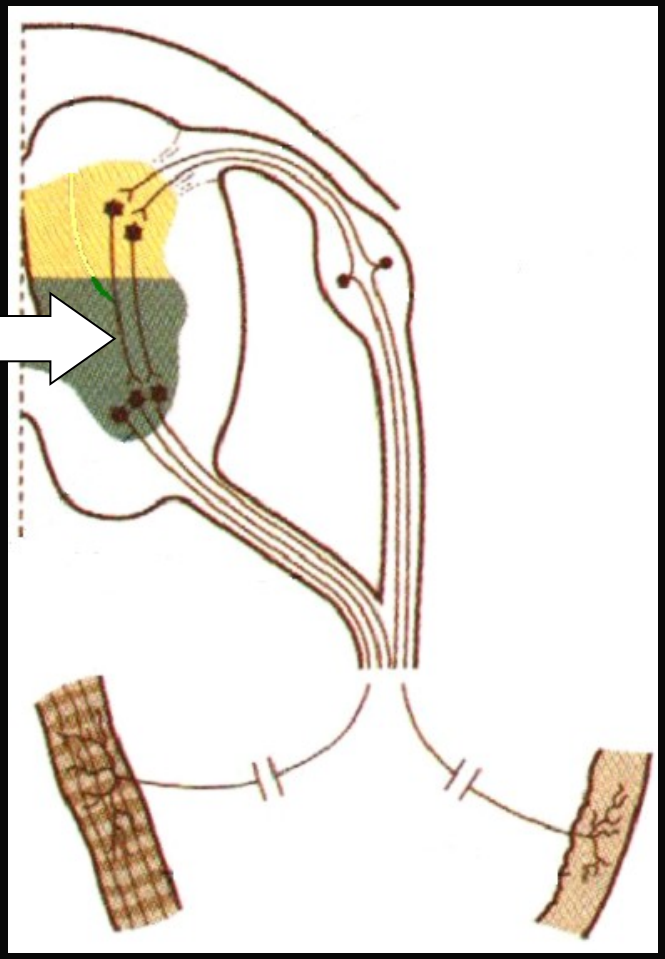
Myelinization



Basic function of NS - reflex



Interneuron

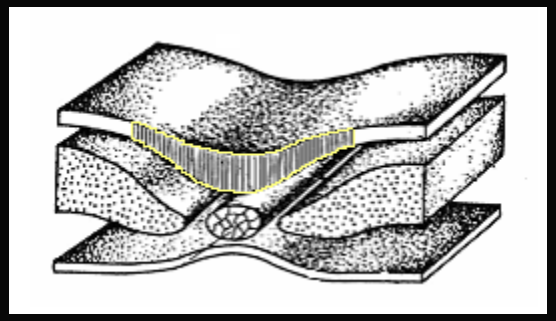


Muscle

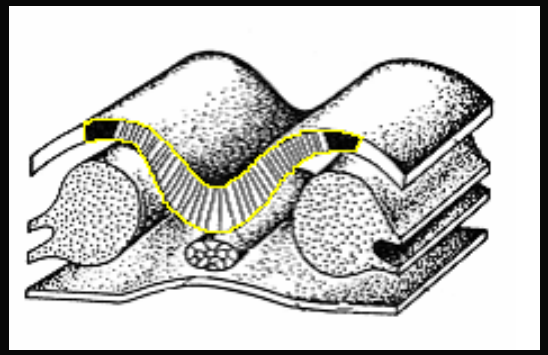
Skin

Development of NS

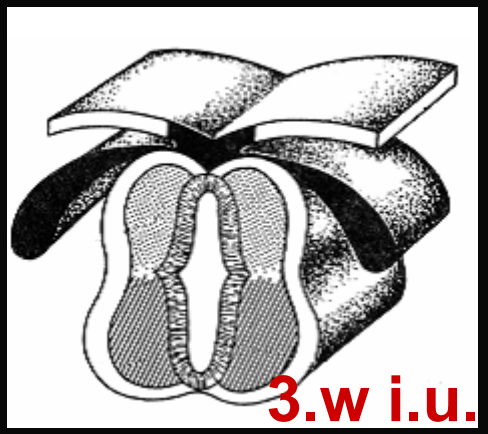
from ectoderm (under influence of the notochord) arises the neural:



plate



groove



tube
+ neural crest

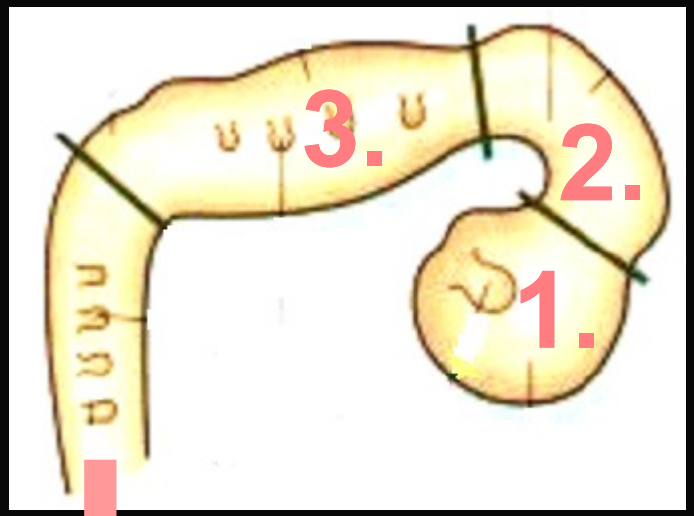
Parts derived from the neural tube

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



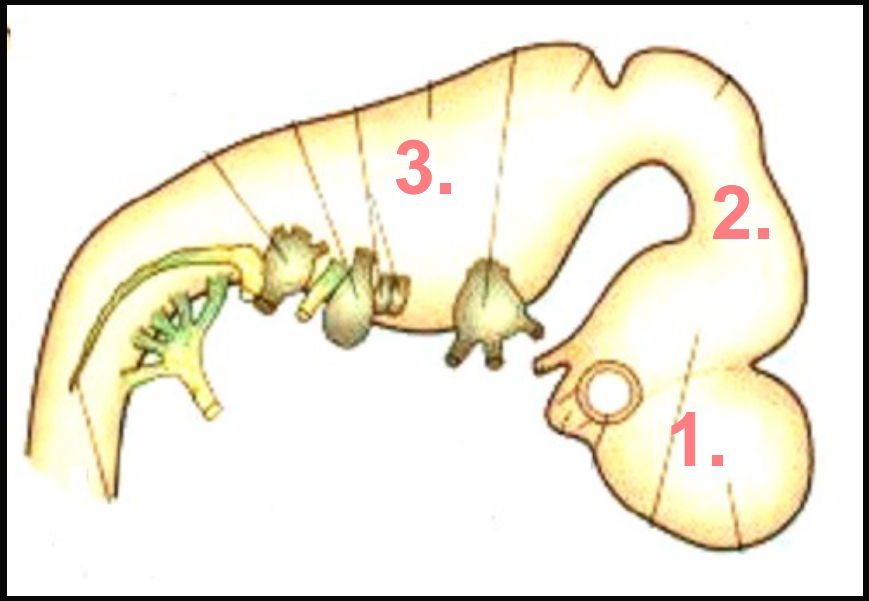
Spinal cord
medulla spinalis

3. rhombencephalon
(hindbrain)

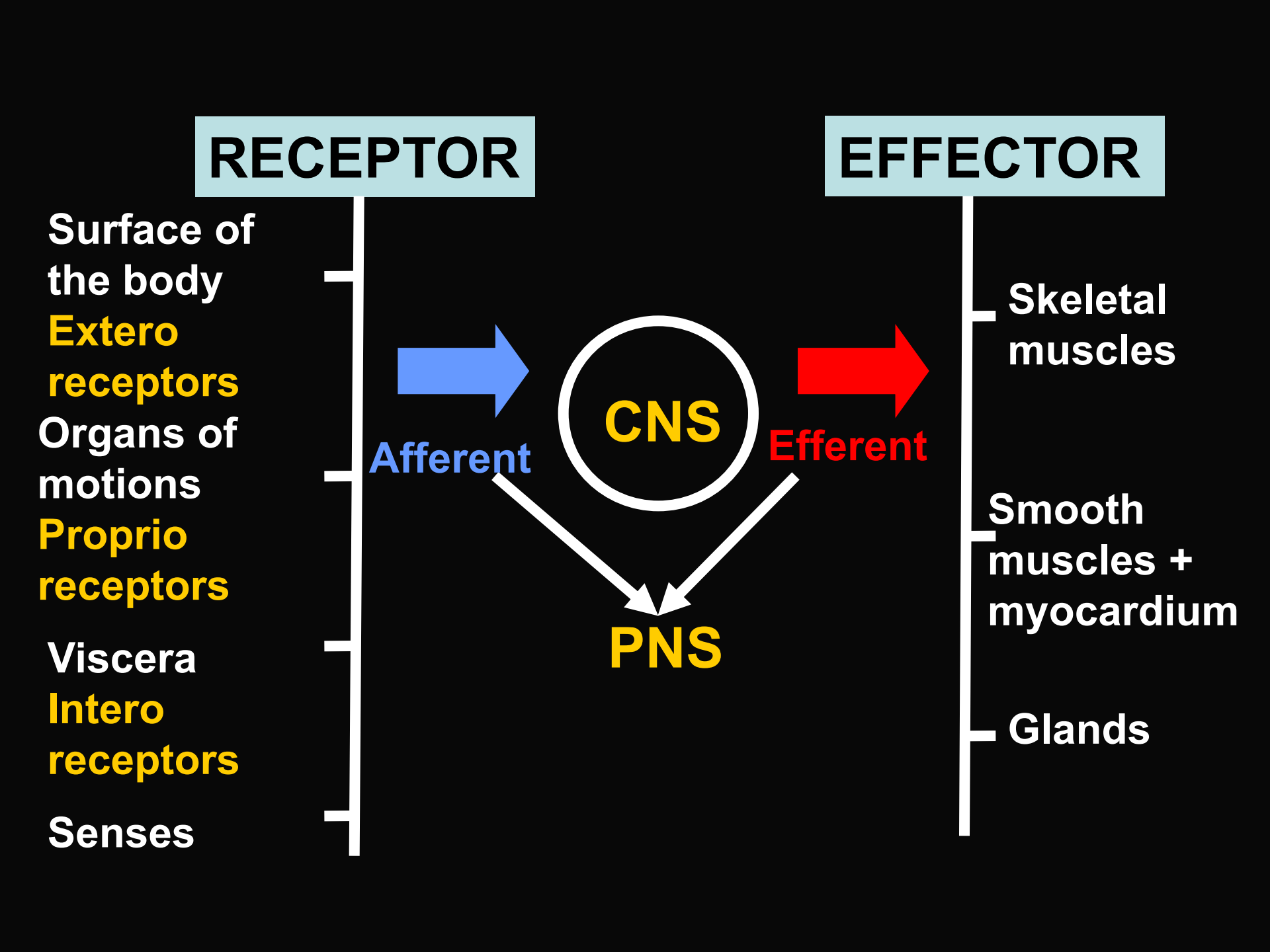
2. mesencephalon
(midbrain)

1. prosencephalon
(forebrain)

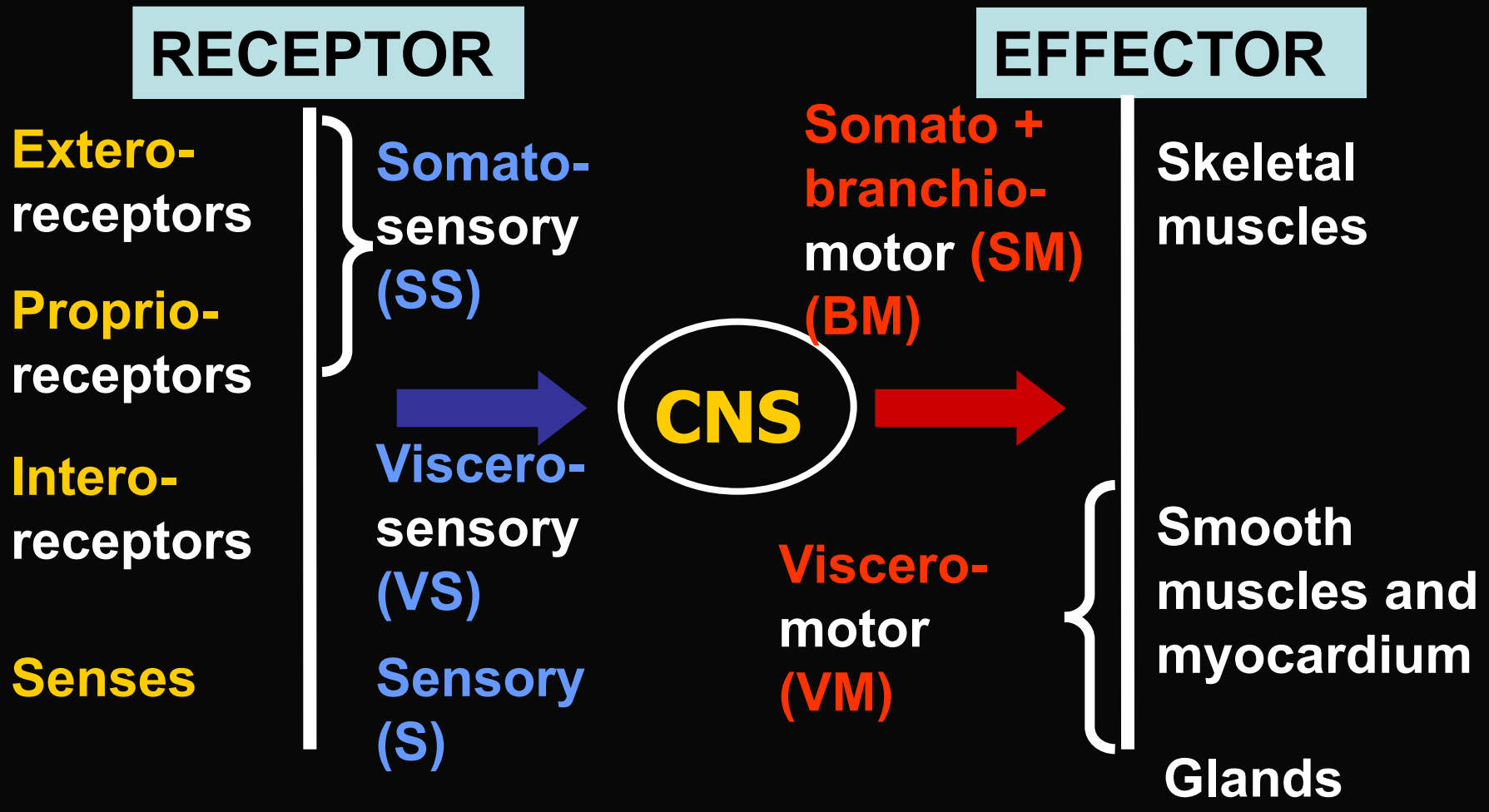
Secondary vesicles



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


RECEPTOR
Surface of the body
Extero receptors
Organs of motions
Proprio receptors
Viscera
Intero receptors
Senses
Afferent
CNS
Efferent
PNS
EFFECTOR
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

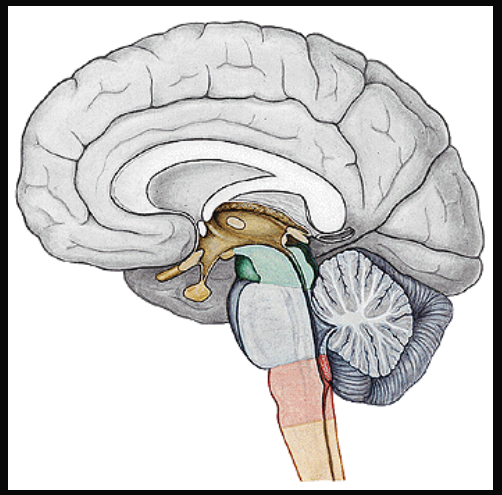
pass through the intervertebral foramina

CNS

I. Brain

medulla oblongata
pons
mesencephalon

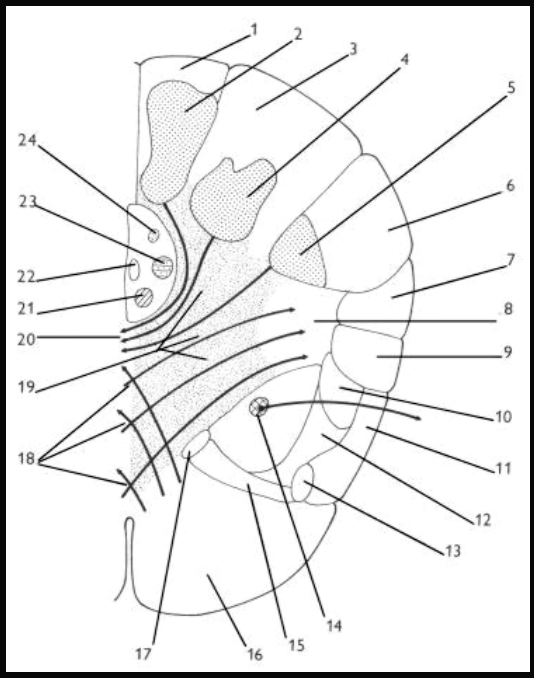
cerebellum
diencephalon
telencephalon

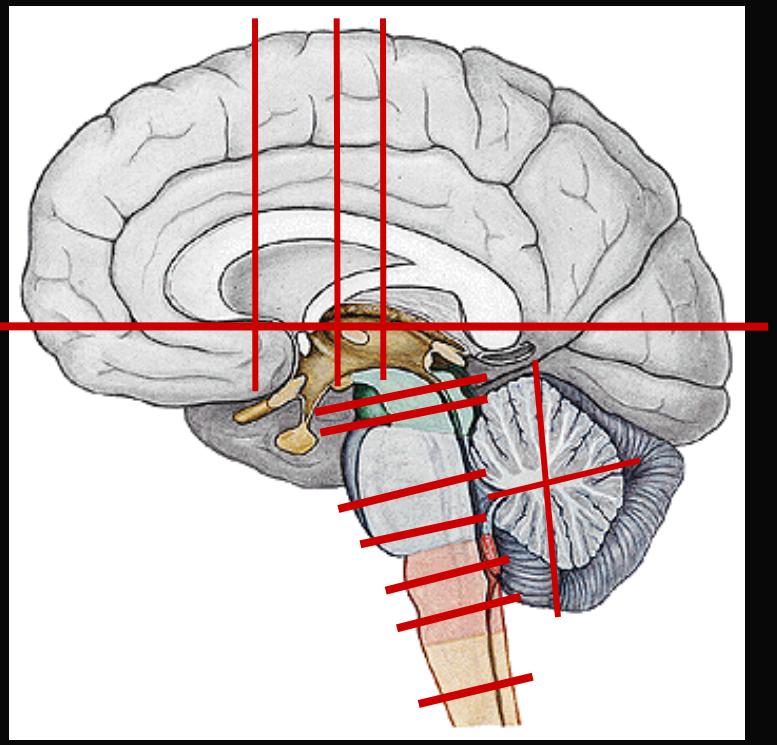


II. Spinal cord

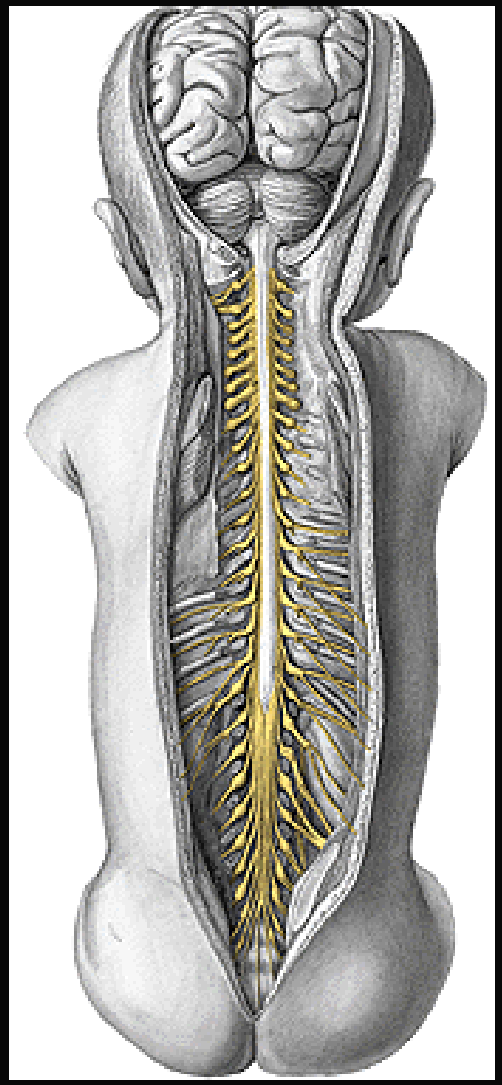
Structure of the CNS

Gray matter - nuclei
White matter – nerve tracts:
- tractus
- fasciculus (lemniscus)



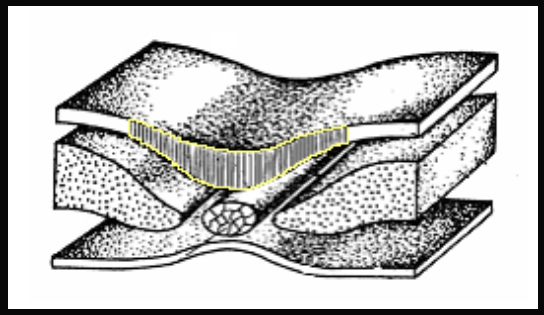


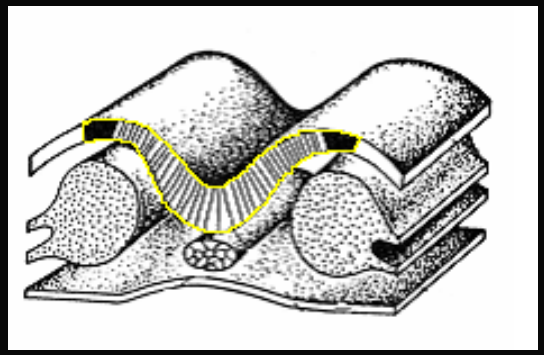
Spinal cord

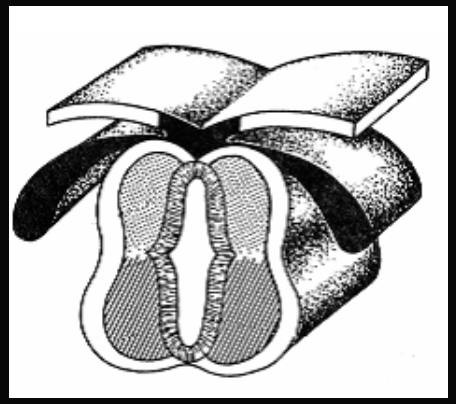


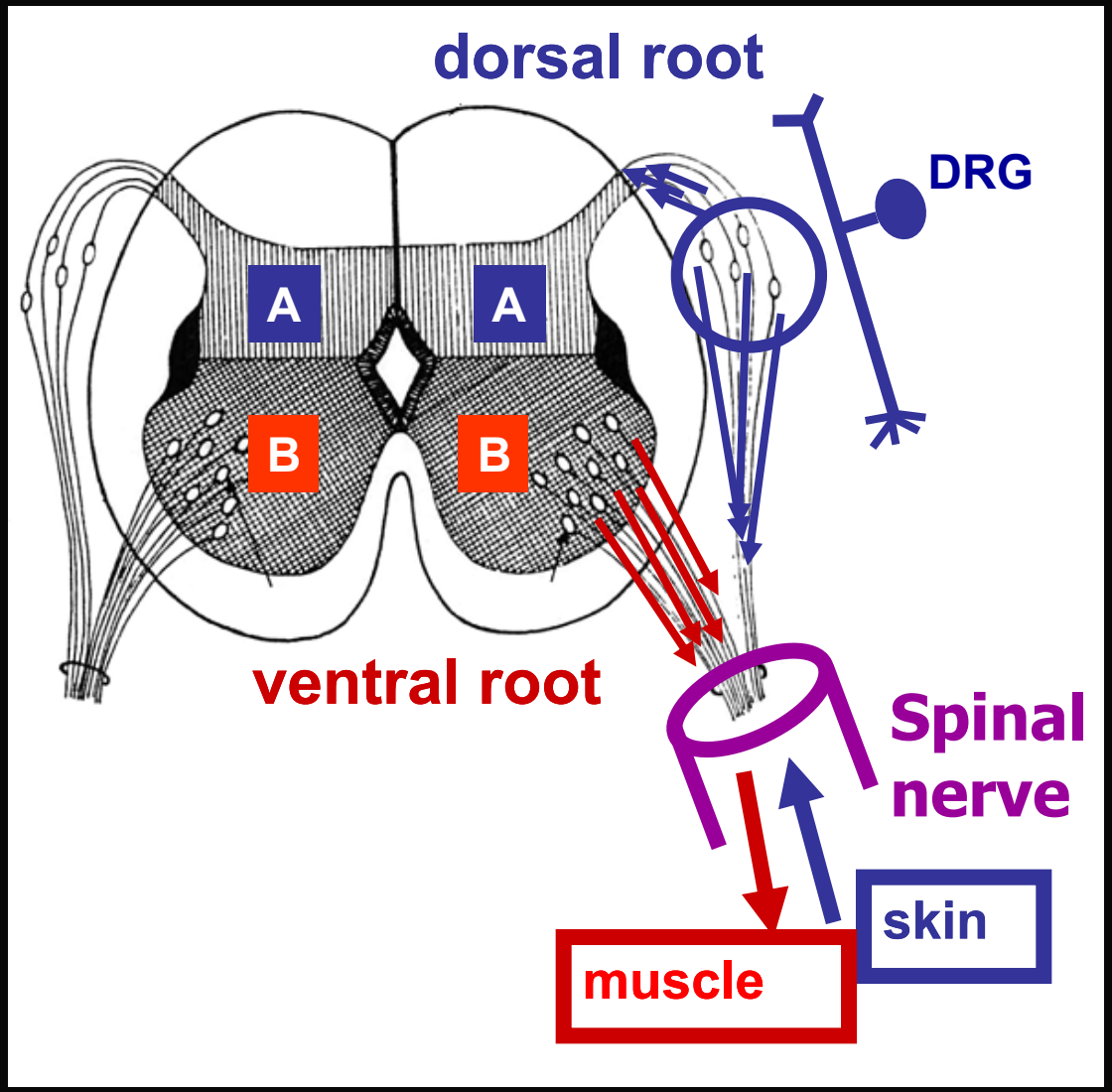
transmission of neural signals between the brain and the rest of the body

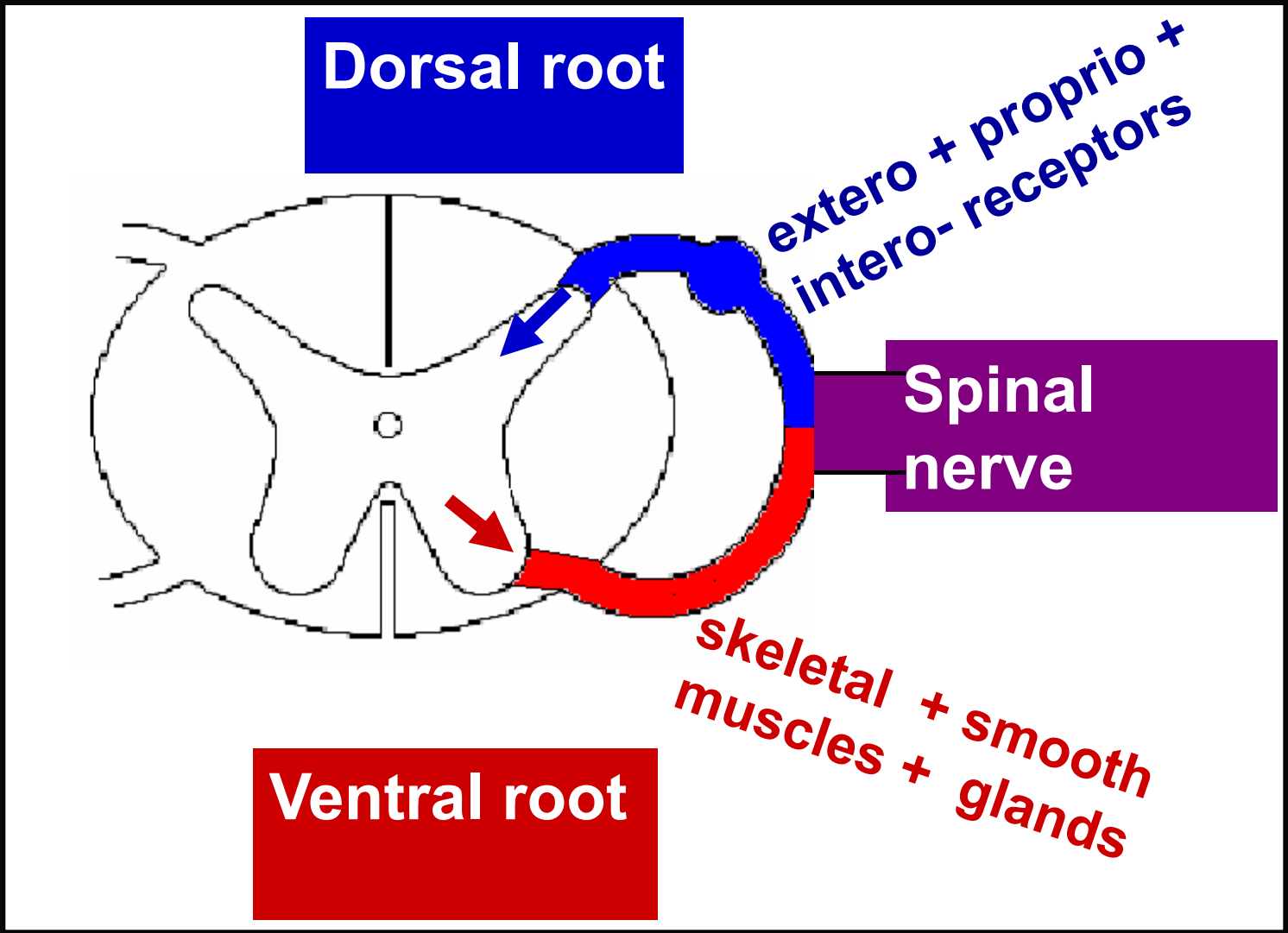
contains neural circuits that can independently control numerous reflexes and central pattern generators



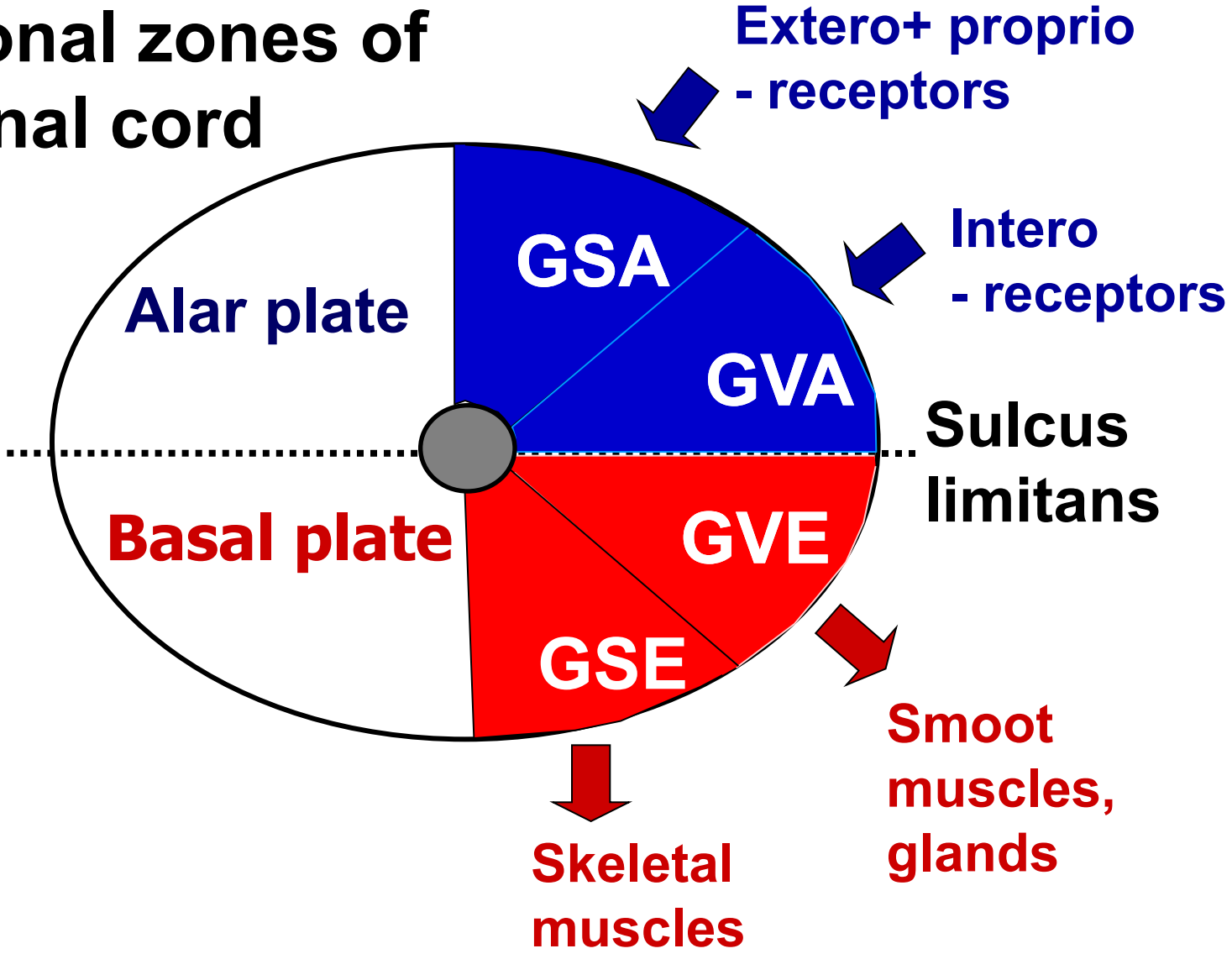





dorsal root
DRG
A
A
B
B
ventral root
Spinal nerve
skin
muscle

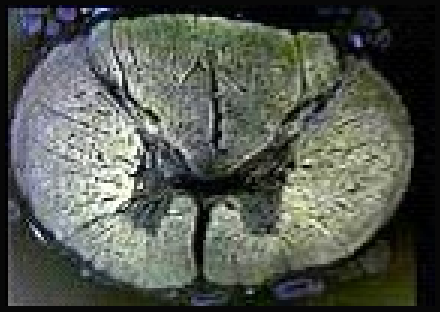

Dorsal root
extero + proprio +
intero- receptors
Spinal
nerve
skeletal + smooth
muscles + glands
Ventral root

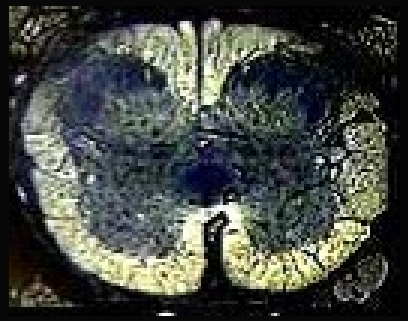
Functional zones of the spinal cord



Dorsal horn

Ventral horn

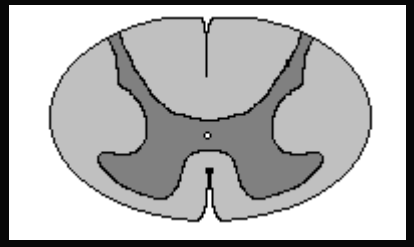


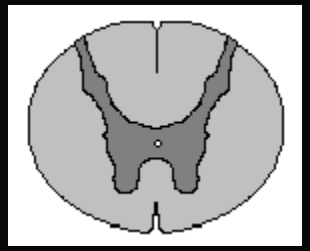


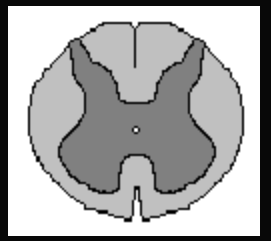
p. cervicalis

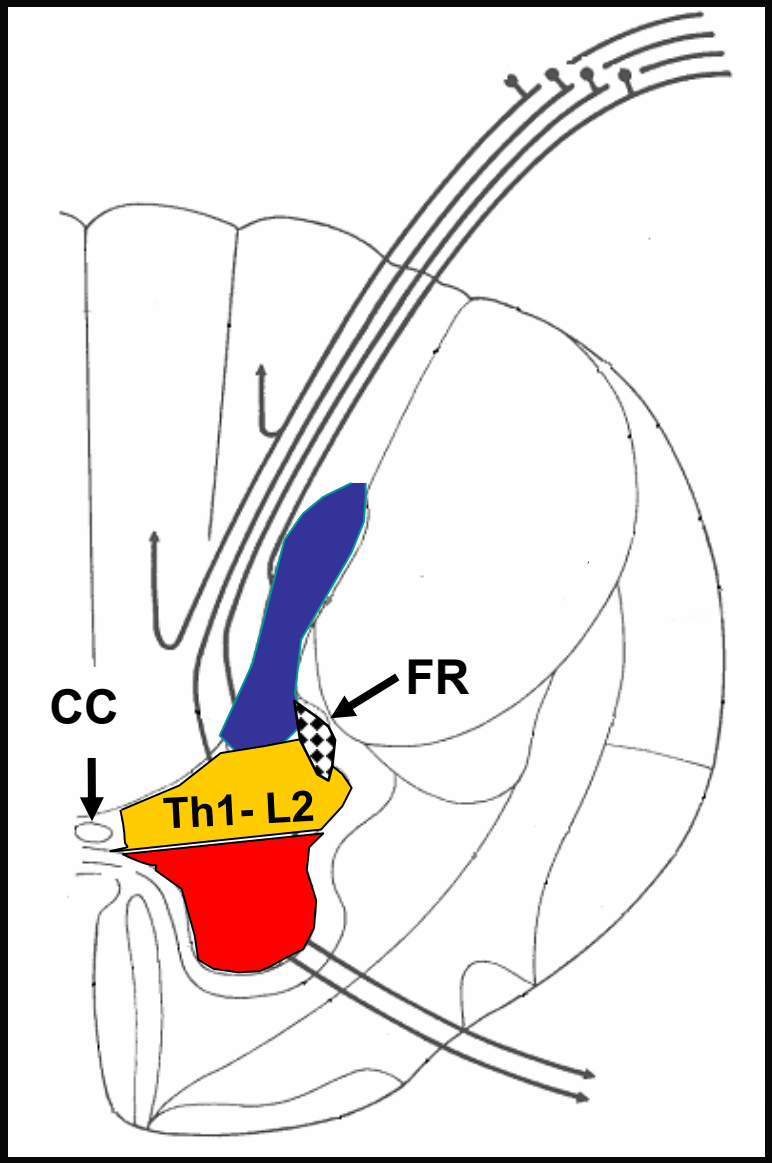
p. thoracica

p. sacralis









Gray matter

DORSAL HORN – afferent neurons

SUBST. INTERMEDIA (lateral horn)
motoneurons of the ANS

VENTRAL HORN - motoneurons
ncll. originis

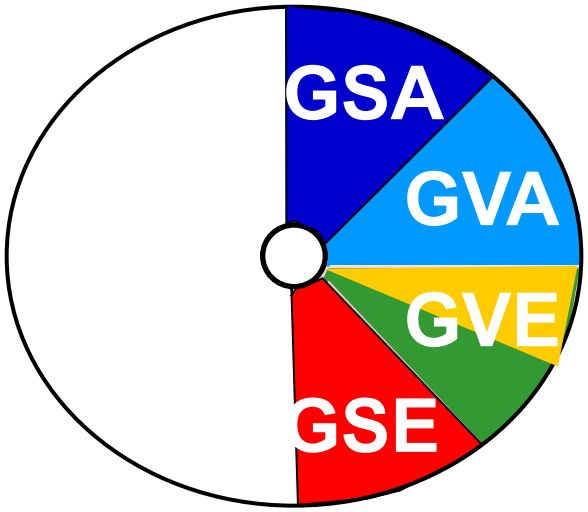
White matter

Funiculus post.
(fasc. gracilis et cuneatus)

Funiculus ant. } **F. anterolateralis**

Funiculus lat.

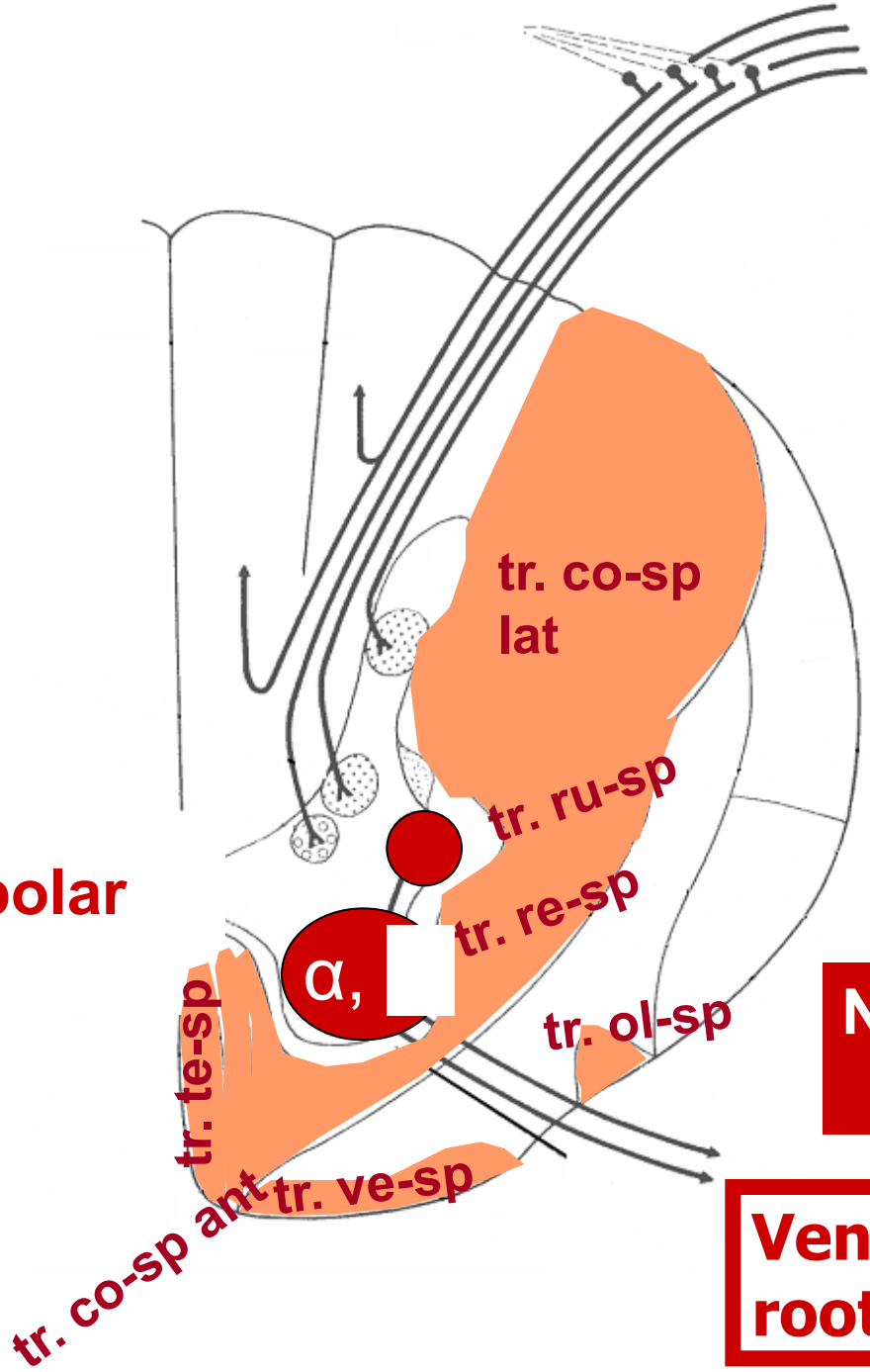
Functional zones in the spinal cord



GVE zone

T1 - L2 - preganglionic sympathetic neurons

below L2 - preganglionic parasympathetic neurons

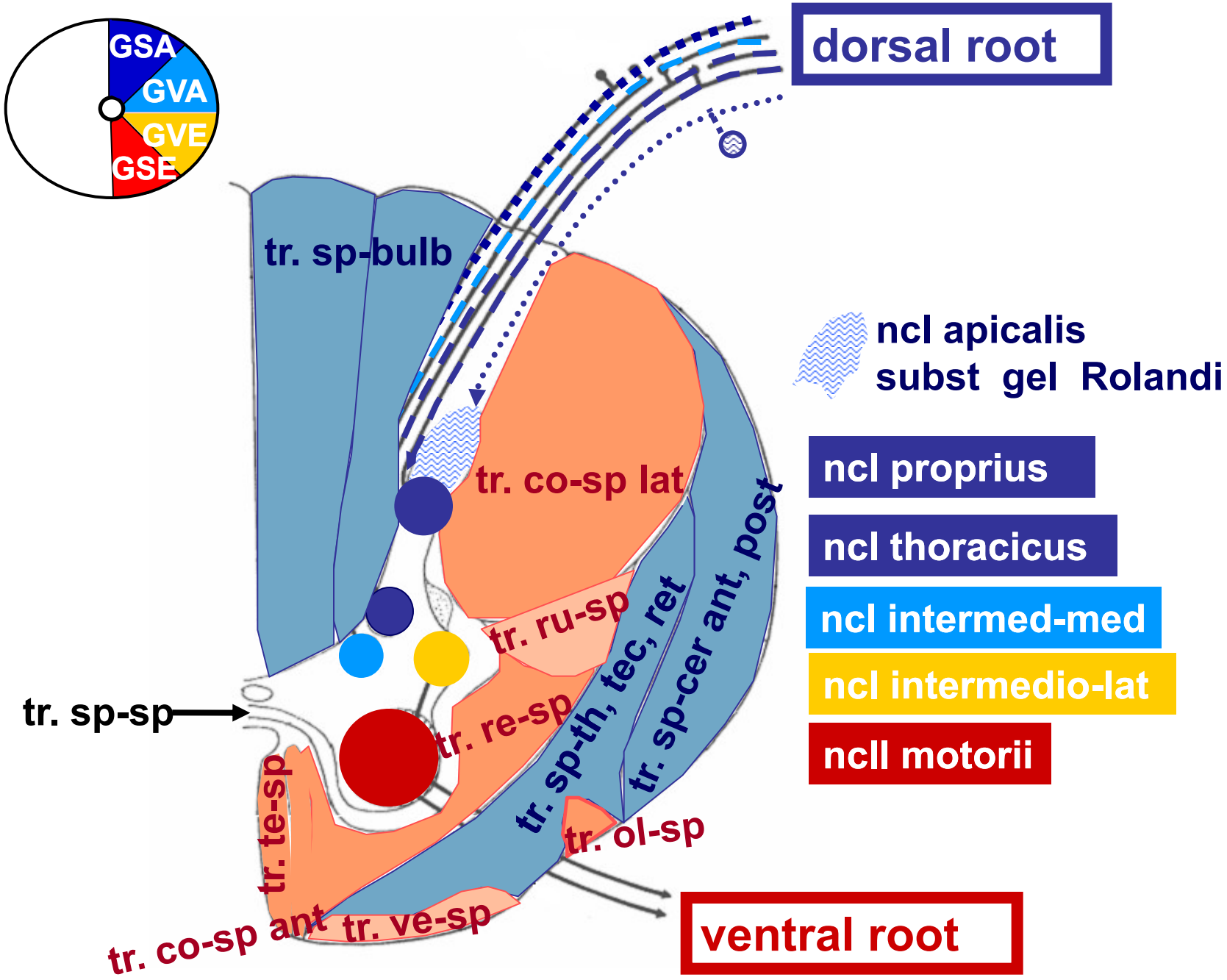


Multipolar cells

Ncl. intermedio-lat.

Ncll. motorii

Ventral root


GSA
GVA
GVE
GSE
dorsal root
tr. sp-bulb
ncl apicalis
subst gel Rolandi
tr. co-sp lat
ncl proprius
ncl thoracicus
ncl intermed-med
ncl intermedio-lat
ncll motorii
tr. ru-sp
tr. sp-cer ant, post
tr. sp-th, tec, ret
tr. sp-sp
tr. re-sp
tr. te-sp
tr. ol-sp
tr. co-sp ant
tr. ve-sp
ventral root