Nervous system

funiculus

x

lemniscus

x

fasciculus = axons-HETEROGENEOUS structure– starts in the different nuclei and ends in different structures too

x

tractus =axons-HOMOGENEOUS structure – the fibers start and end in the same structures

ipsilateral x kontralateral

rostral = direction to the nose – forward x **dorsal**

substantia alba x substantia grisea

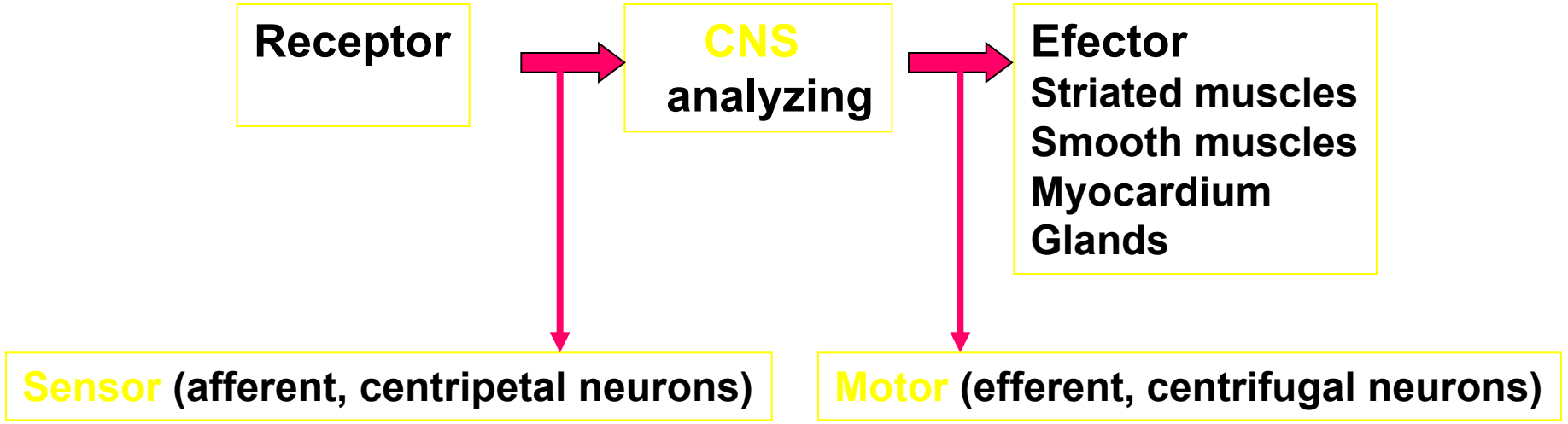
nucleus motorius (originis) x terminationis (senzorius)

3 types of somatosensation – somatosensory fibers:

1. **Protopathic sensation**
2. **Epicritic sensation**
3. **Proprioception**

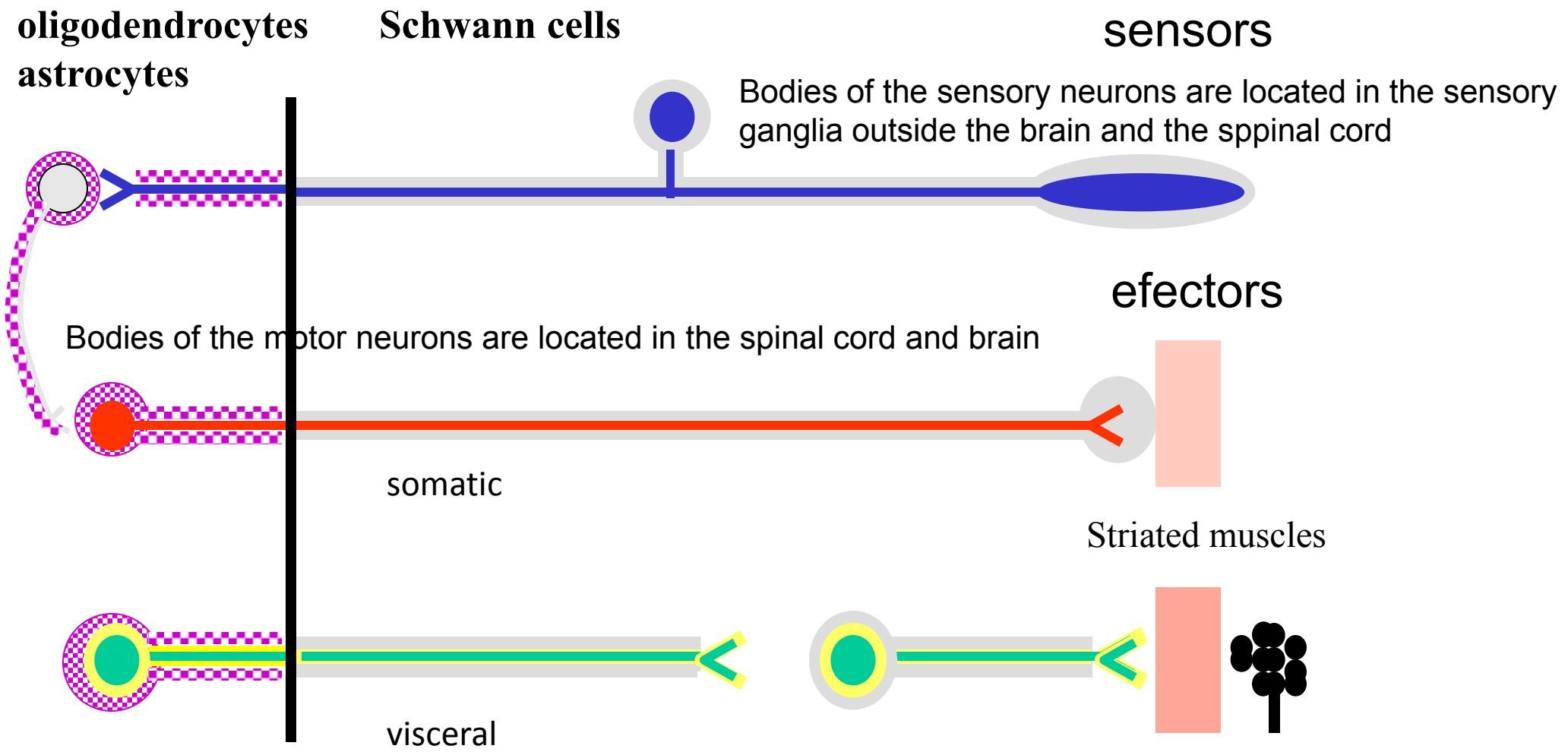
Nervous system

Sensory function – changes in the internal and external environment
Integrative function – analyses, stores and compares informations
Motor function – responds to stimuli by initiating contraction and glandular secretion



DIVISIONS OF THE NERVOUS SYSTEM

CNS PNS



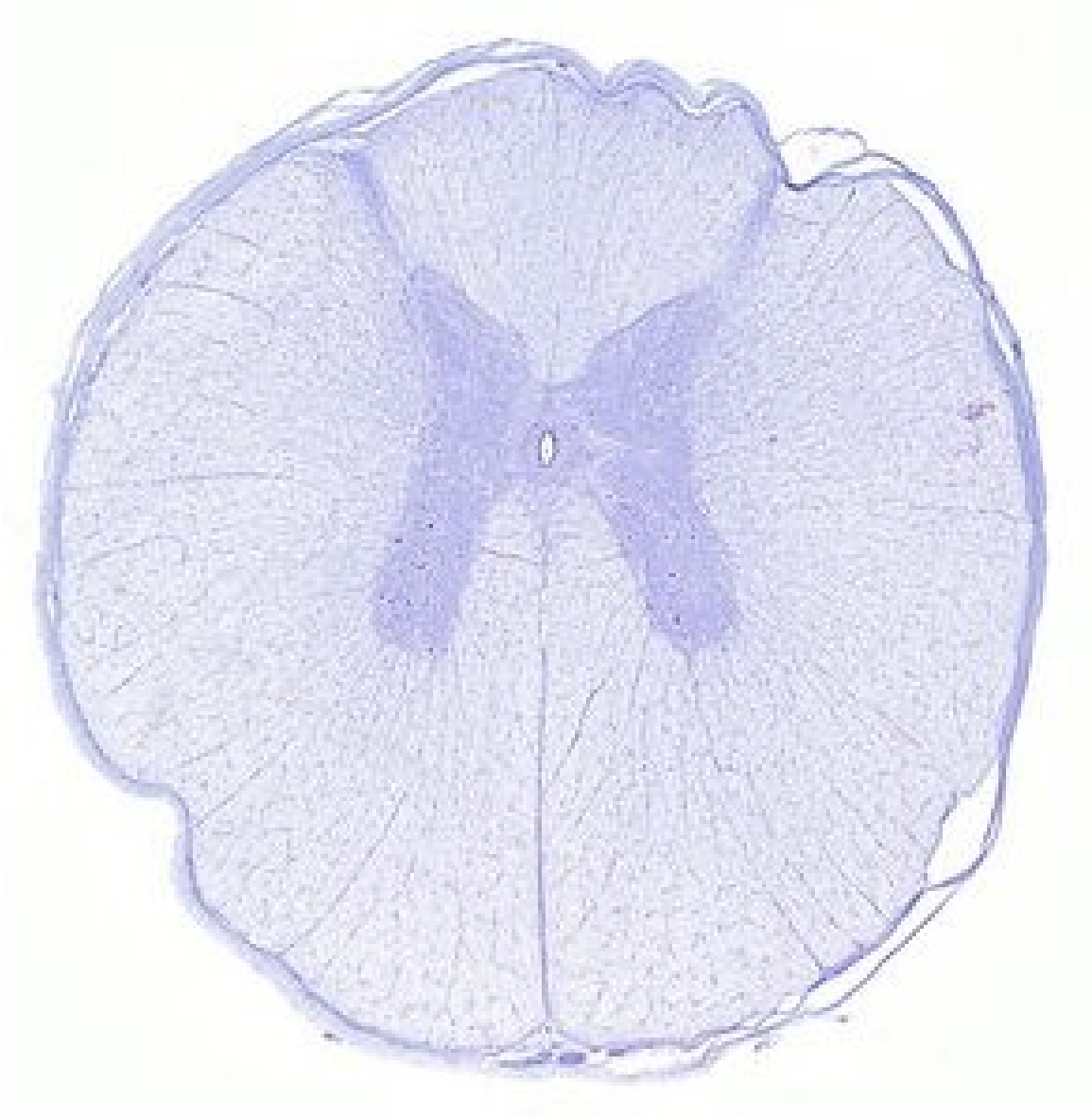
DIVISION OF NERVOUS SYSTEM

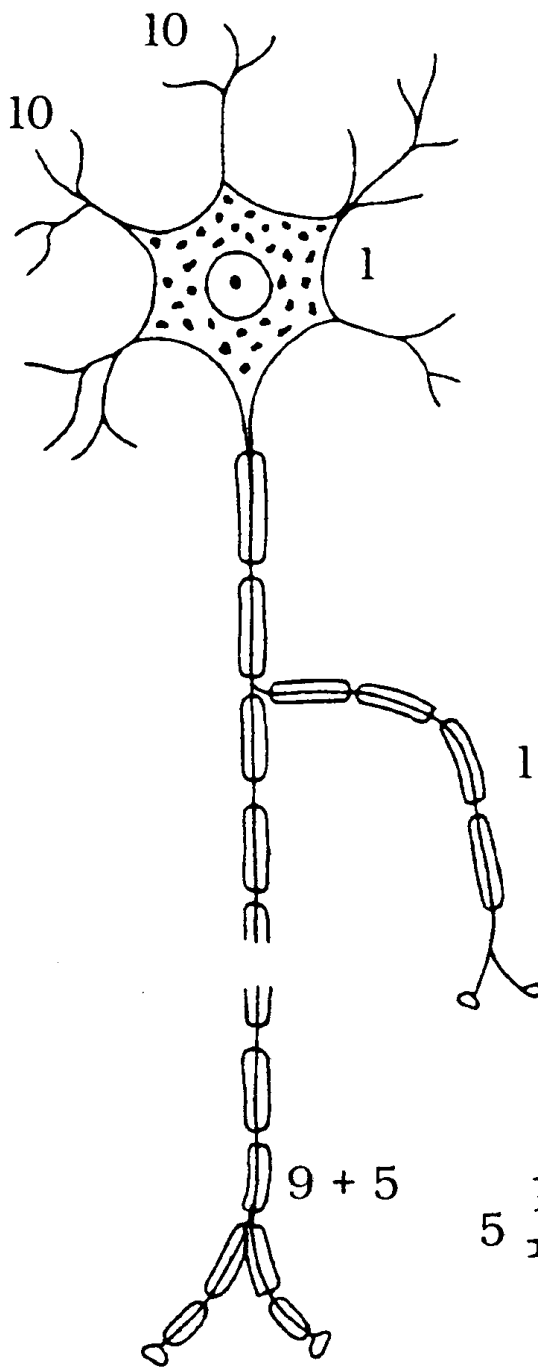
1. Central (CNS)
   – **spinal cord, brain**

   Gray matter – bodies of neurons (cortex, nuclei – originis, terminationis)

   White matter – myelinated nerve fibres (tractus, fasciculus, funiculus, lemniscus)

2. Peripheral (PNS)
   – **spinal, cranial and autonomic nerves (sensoric, motor, mixed) plexuses**





NEURON

Body (perikaryon)

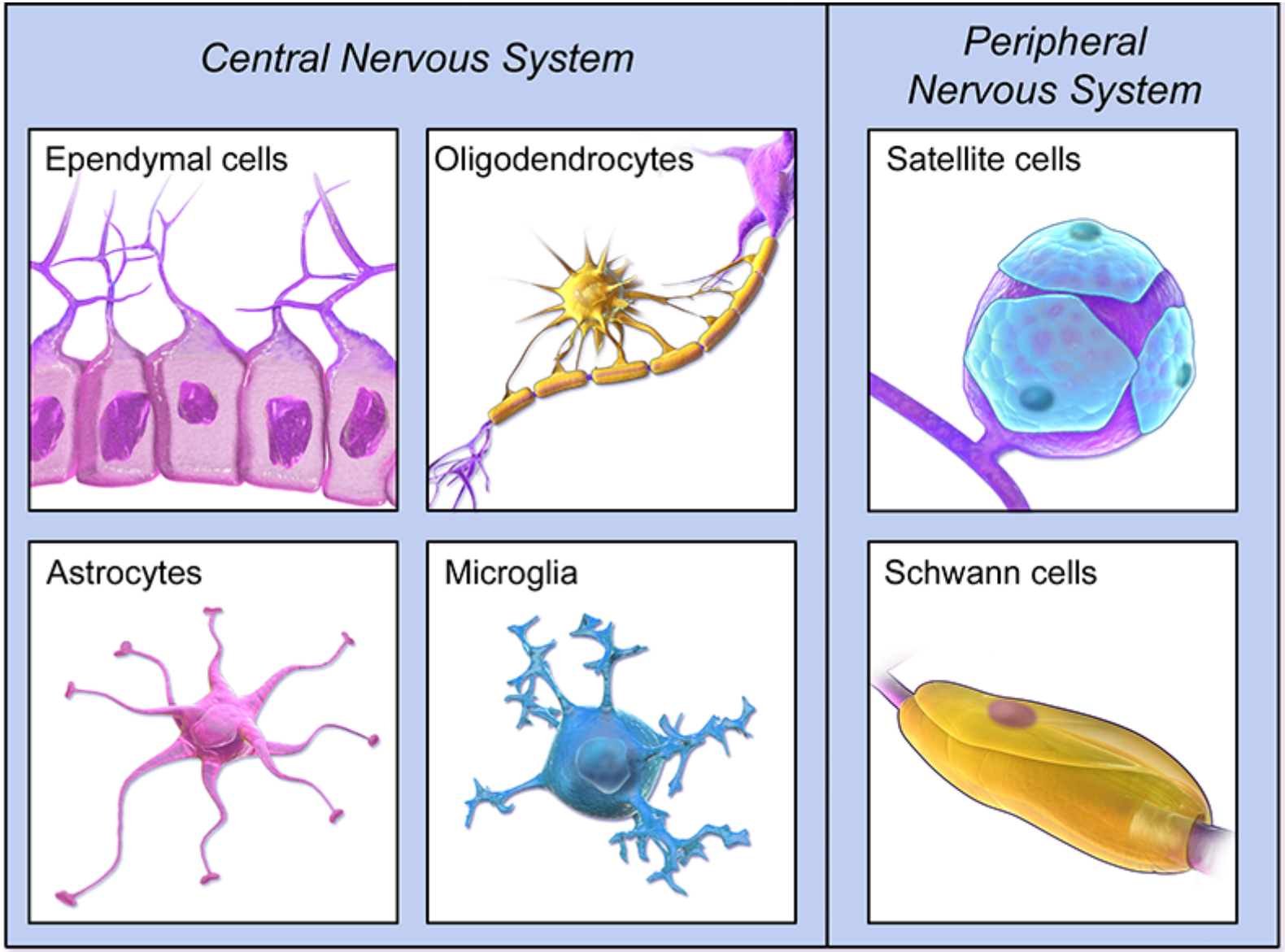
Dendrits (denritic zone)
Neurit (axon)
– inicial segment

Schwann´s covering

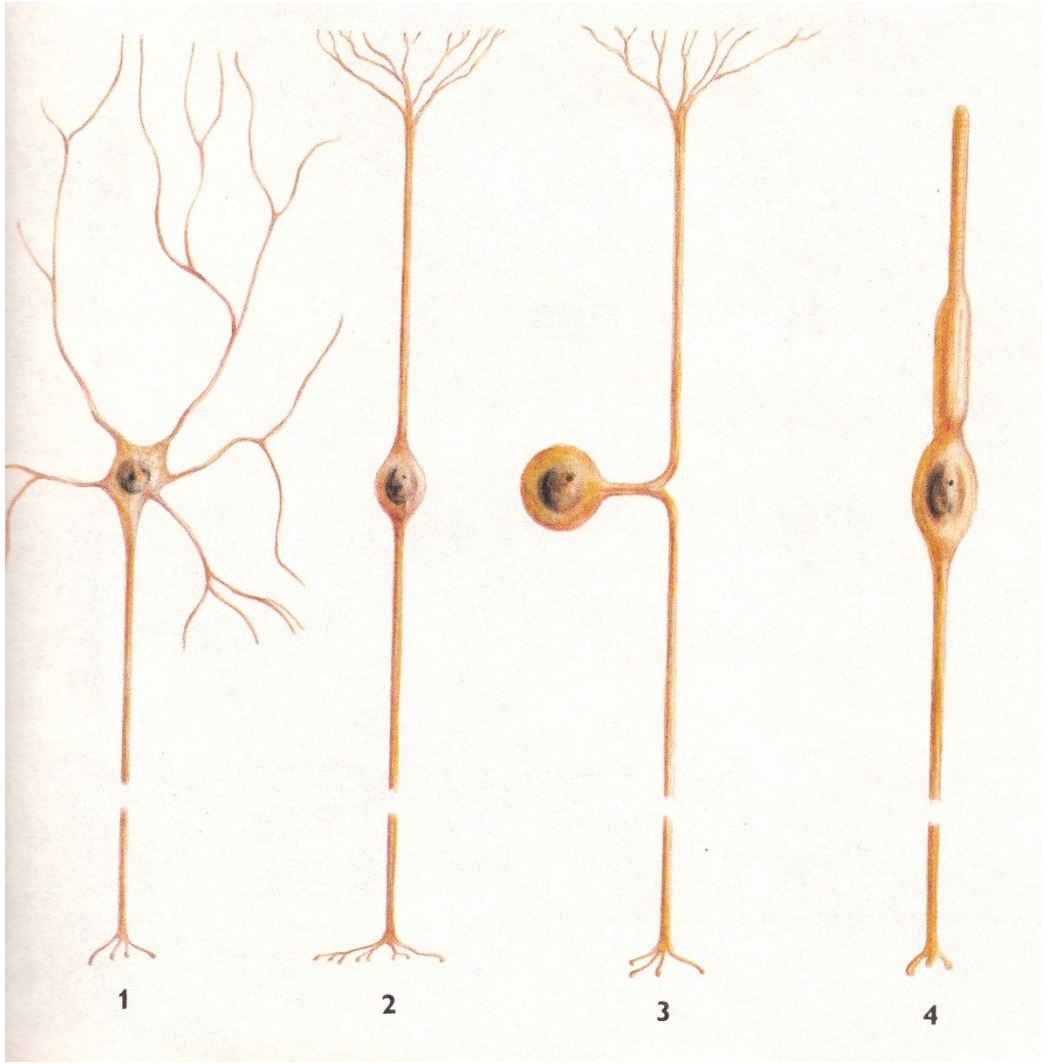
Myelin covering

Schwann cells with fat (PNS)
Oligodendrocytes (CNS)
Ranvier nodes
internodal segments

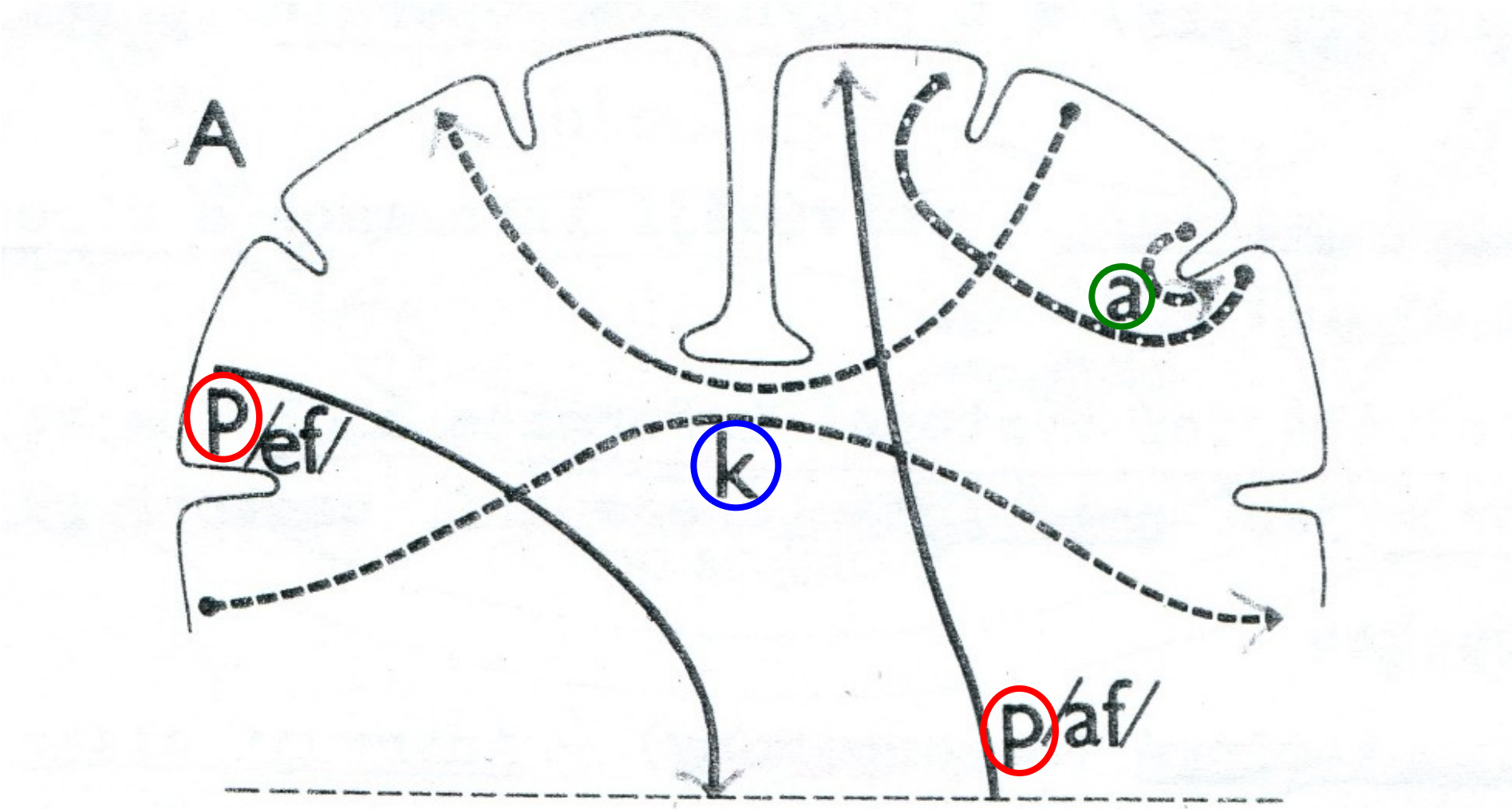
GLIAL CELLS


Central Nervous System
Peripheral Nervous System
Ependymal cells
Oligodendrocytes
Satellite cells
Astrocytes
Microglia
Schwann cells

TYPES OF NEURONS (morfological division)



Neurons- **projection**- ascendent – afferent
- descendent – efferent
Neurons- **komisural**
Neurons- **association**

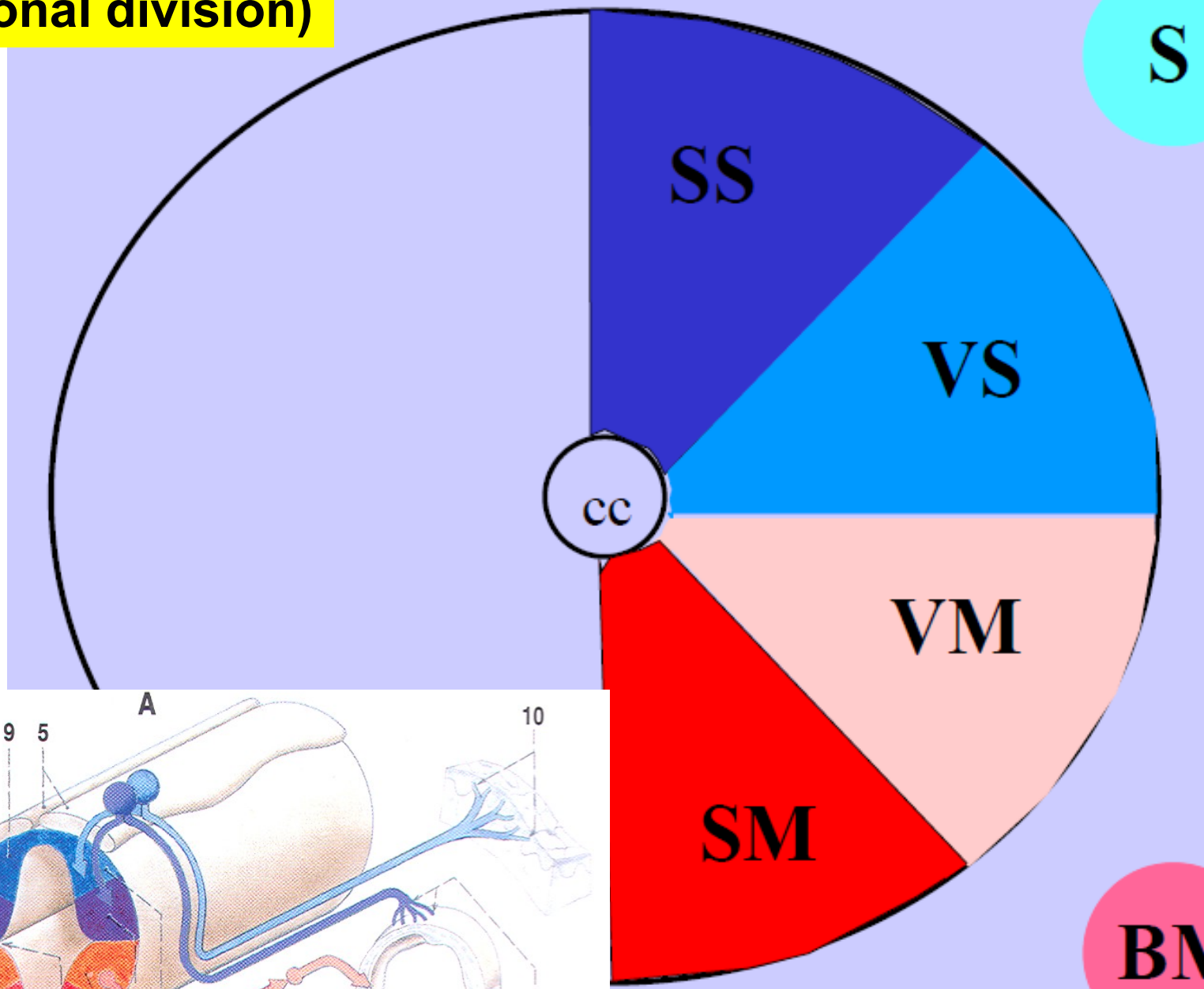


TYPES OF NEURONS (functional division)

1. **SENSORIC** (ascendent, aferent, centripetal)
   - **Somatosensoric** (proprioception, exteroception)
   - **Viscerosensoric** (interoception)

2. **MOTOR**
   - **Somatomotor** (striated muscles)
   - **Visceromotor** sympaticus, parasympaticus – vegetativ, autonomic (smooth muscles, heart, glands)

3. **INTERNEURONS**



FUNCTIONAL TYPES OF AXONS IN PNS

Afferent

- **somatosensoric** — Proprioception, pain, exteroception
- **viscerosensoric** — Mechanoception and pain
- **sensory** — Afferentation of the taste, vestibulocochlear and acoustic info

Efferent

- **somatomotory** → Striated muscles
- **branchiomotor** → Striated muscles
- **visceromotor** → Smooth muscles
- **sympathetic** → myocardium
- **parasympathetic** → glands

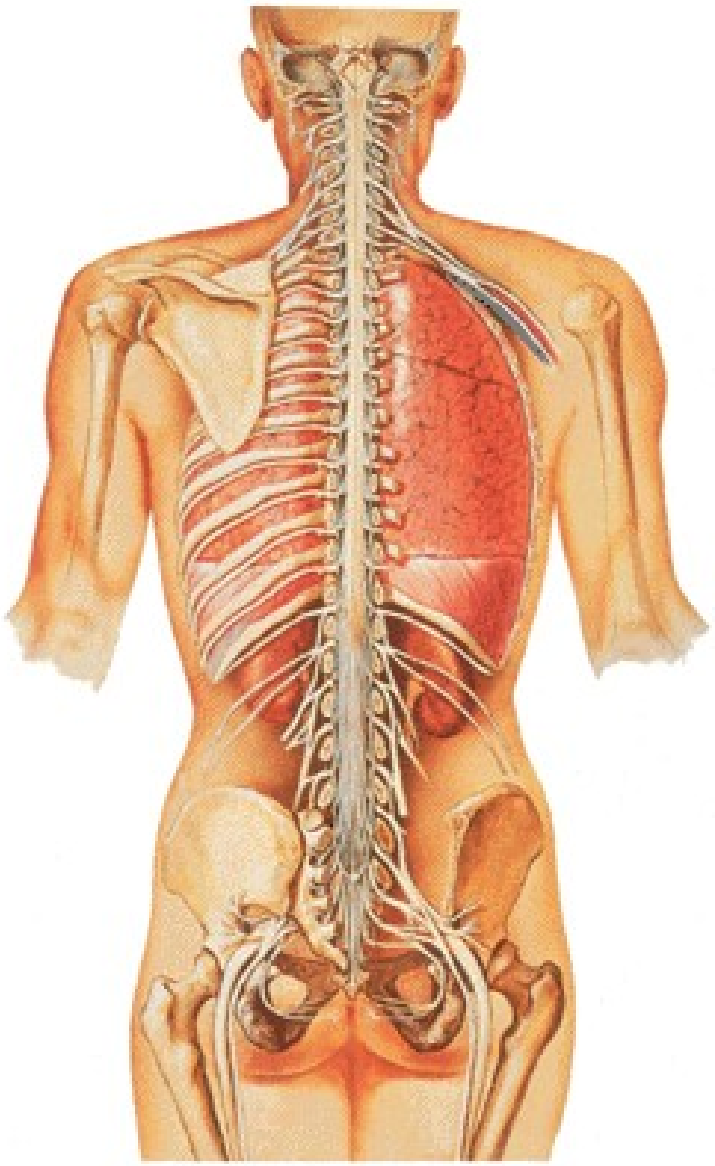
Questions:

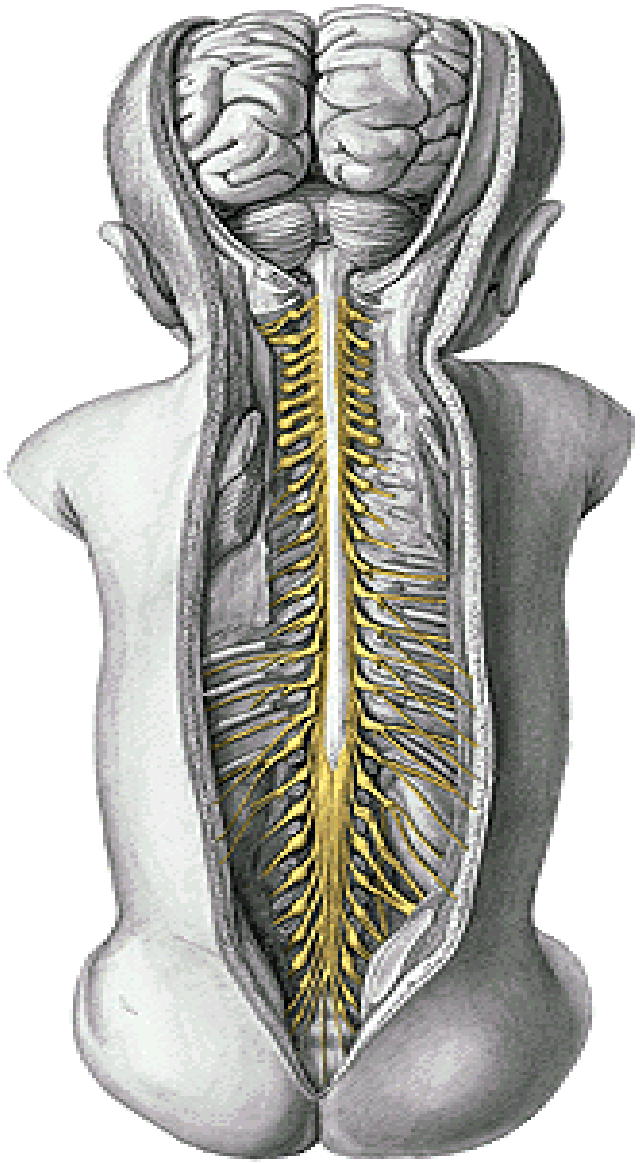
1. Spinal cord (medulla spinalis): borders, gross anatomy and general organization of the grey and white matter
2. Spinal cord (medulla spinalis): grey matter – main nuclei
3. Spinal cord (medulla spinalis): white matter – main ascending and descending pathways and their functions

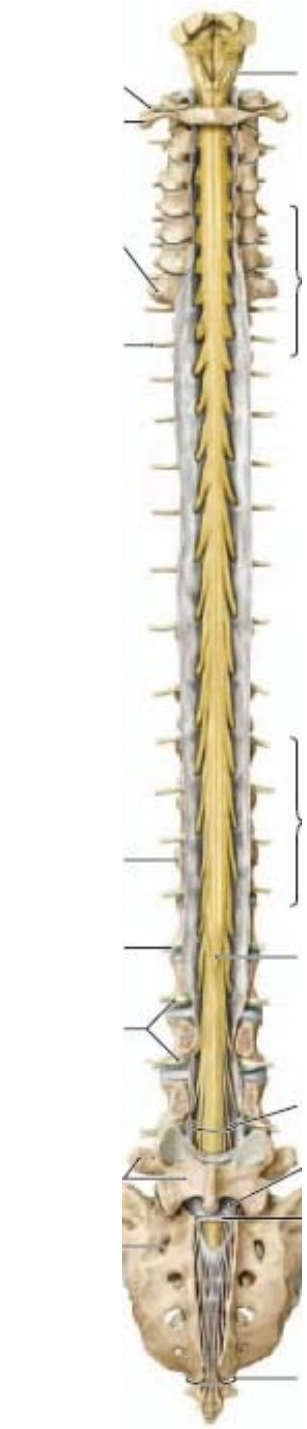
New questions:

60. Protopathic sensibility (non-discriminating responsiveness to thermal, noxious stimuli)
61. Epicritic sensibility (discriminant responsiveness to minute changes in sensations of touch and temperature)
62. Proprioception (from the limbs, trunk, and the head)
63. Pyramidal motor tract (voluntary movements tract)
64. Extrapyramidal motor tracts (involuntary movement tracts, processing motor tracts)

Spinal cord (medulla spinalis)



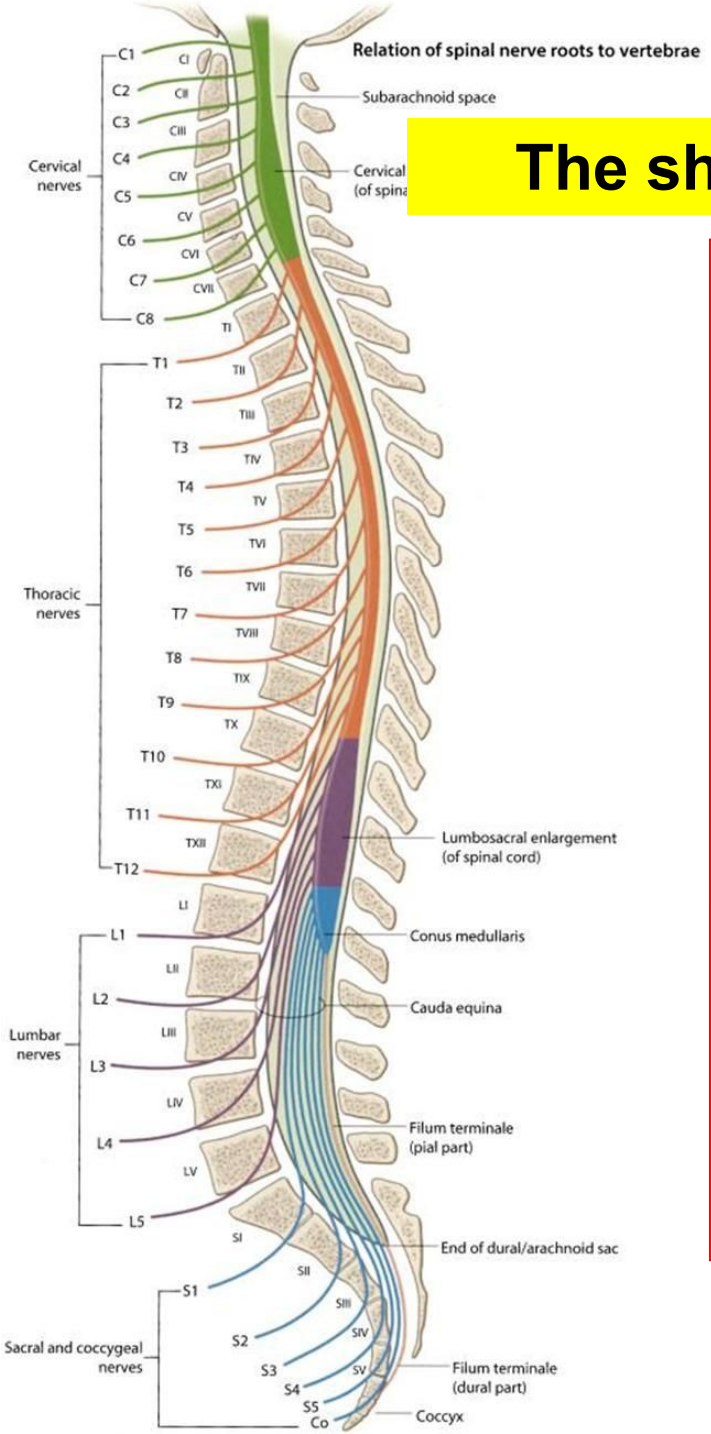


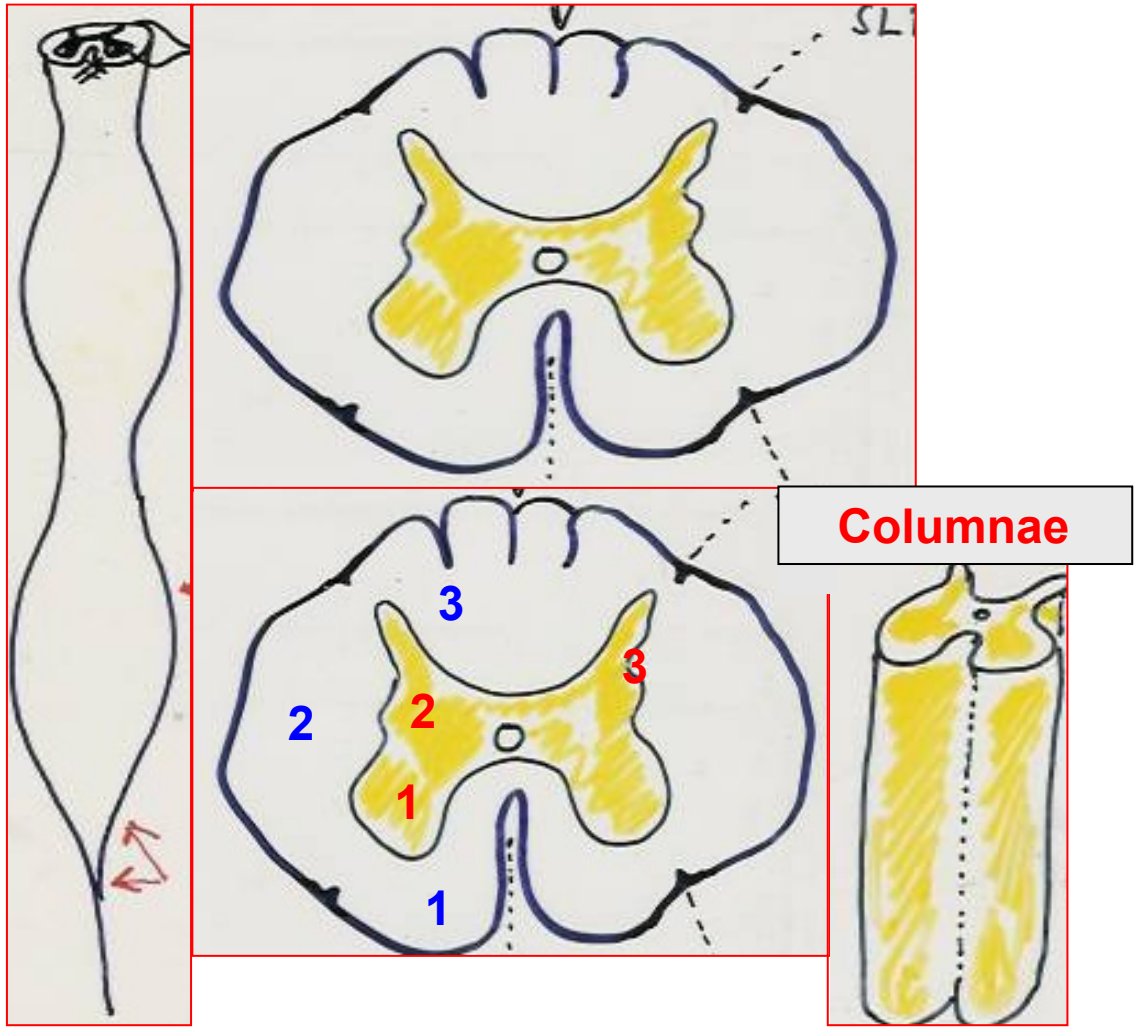


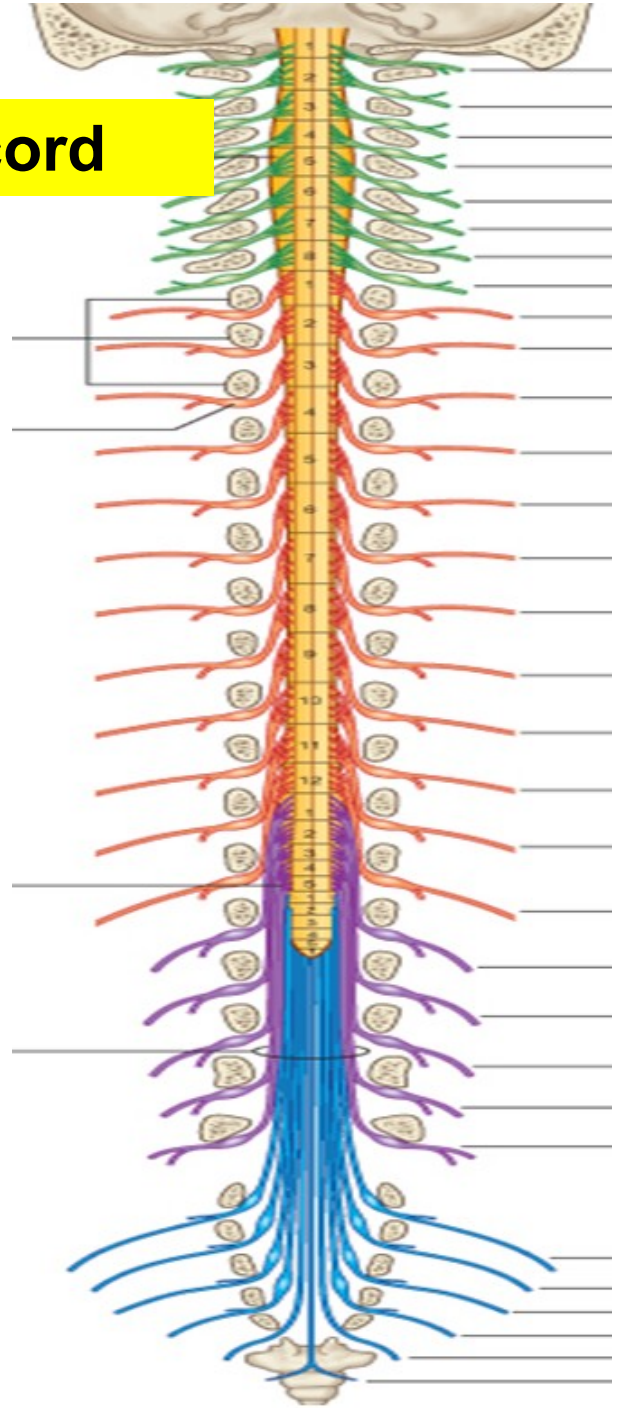

C

Segments

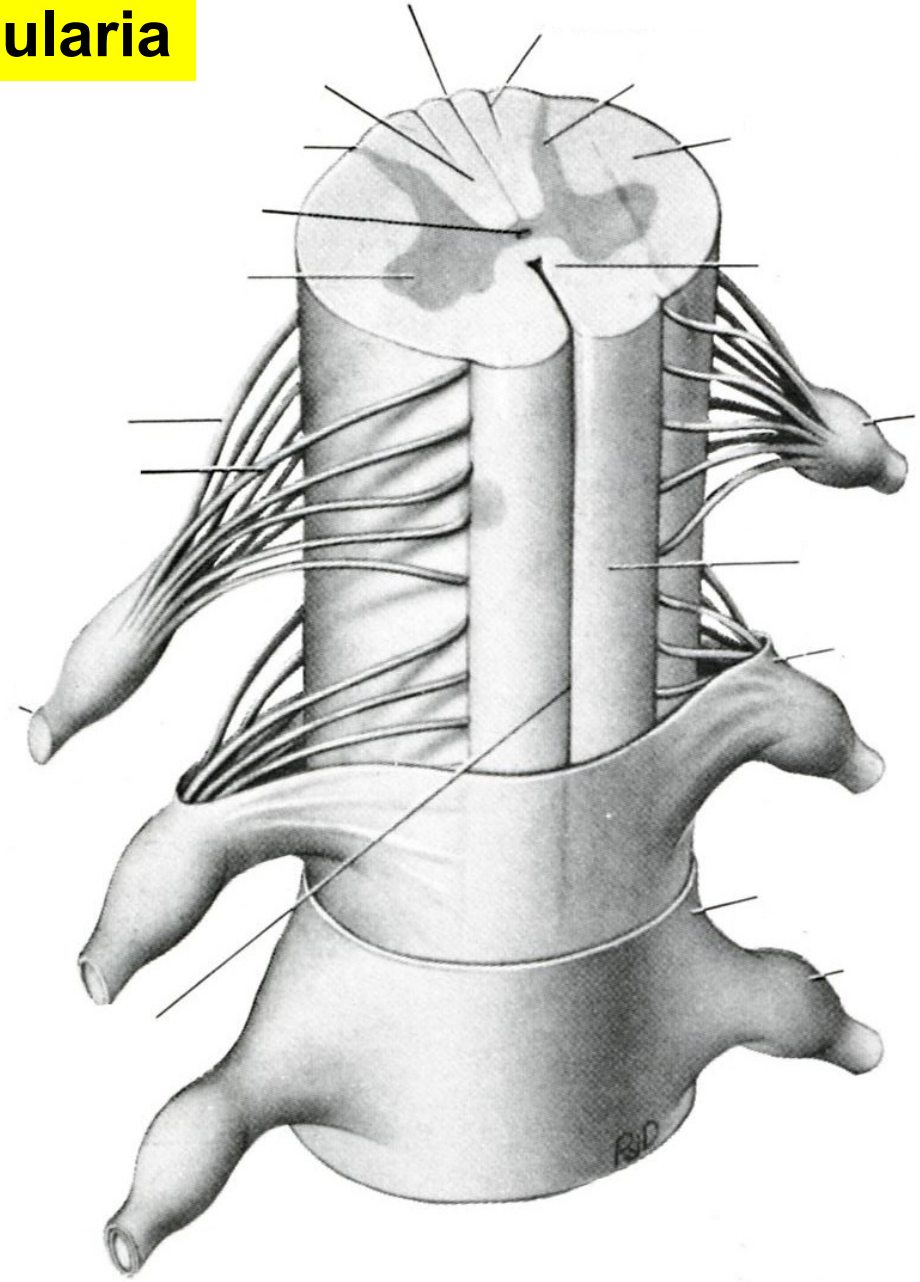
The shape and inner structure of the spinal cord







Fila radicularia



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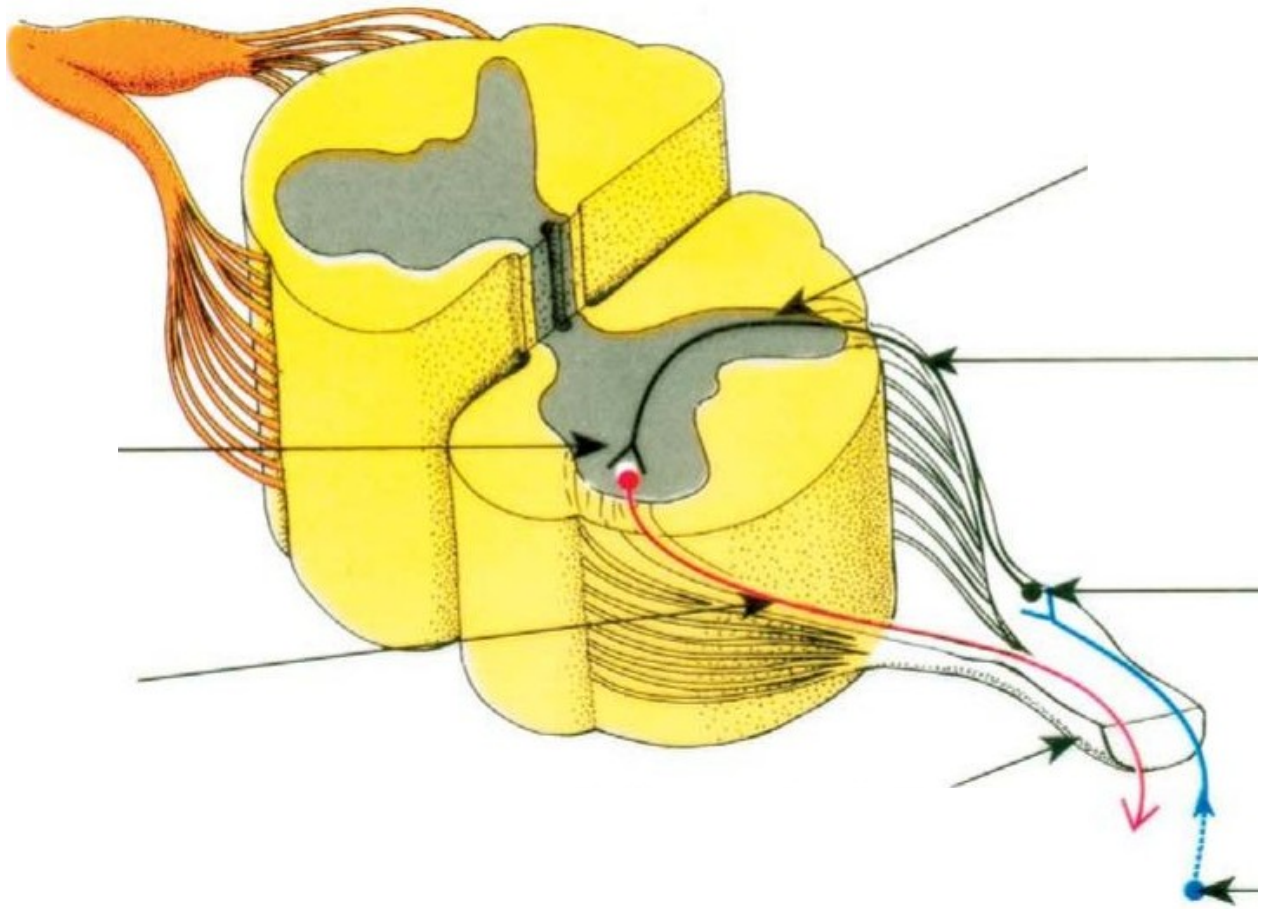
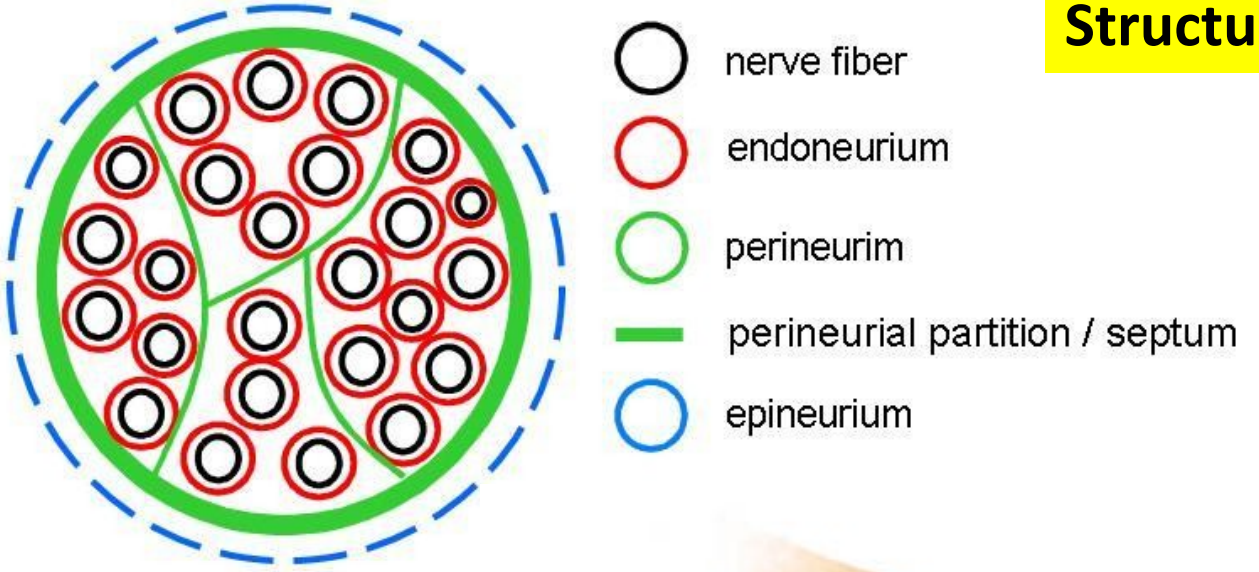
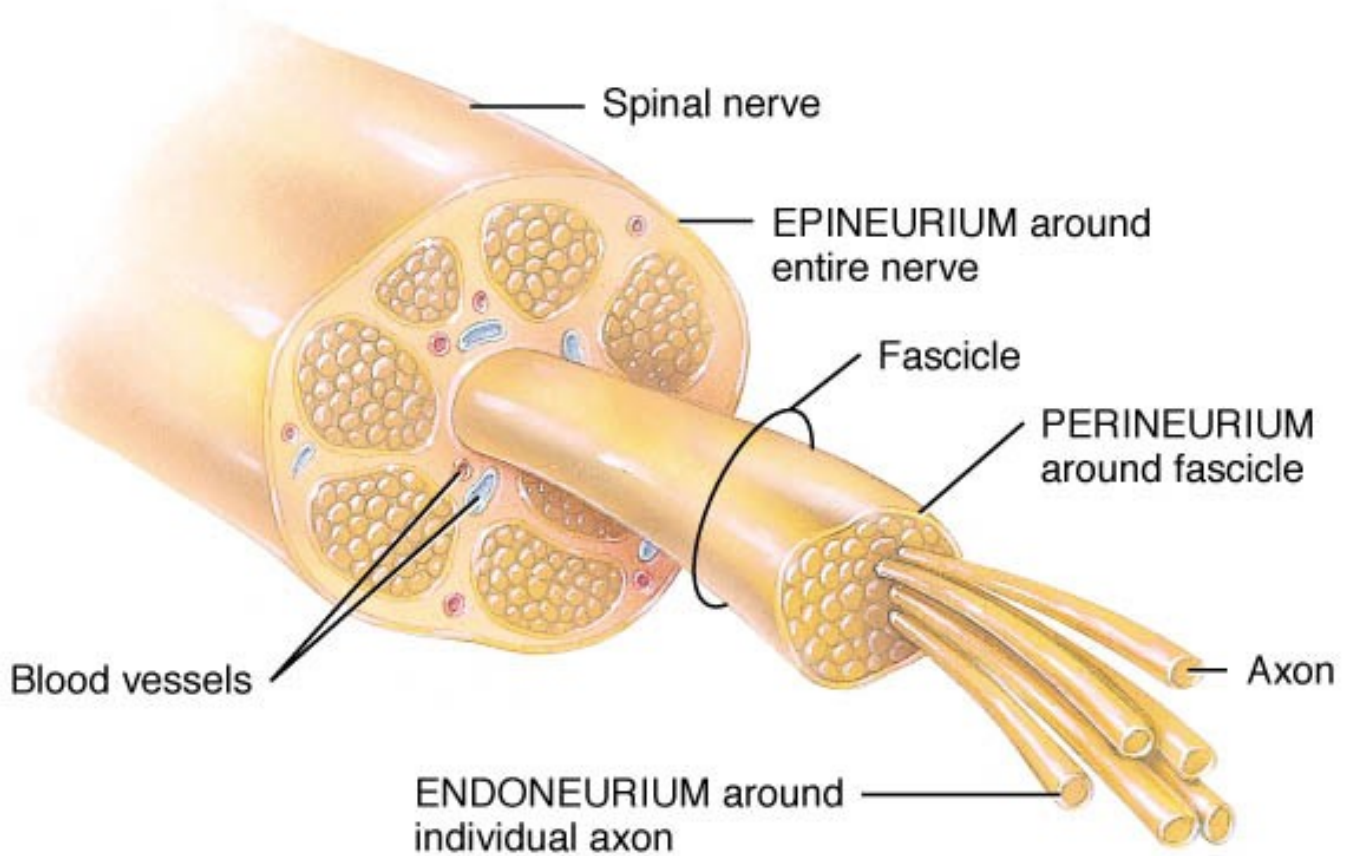
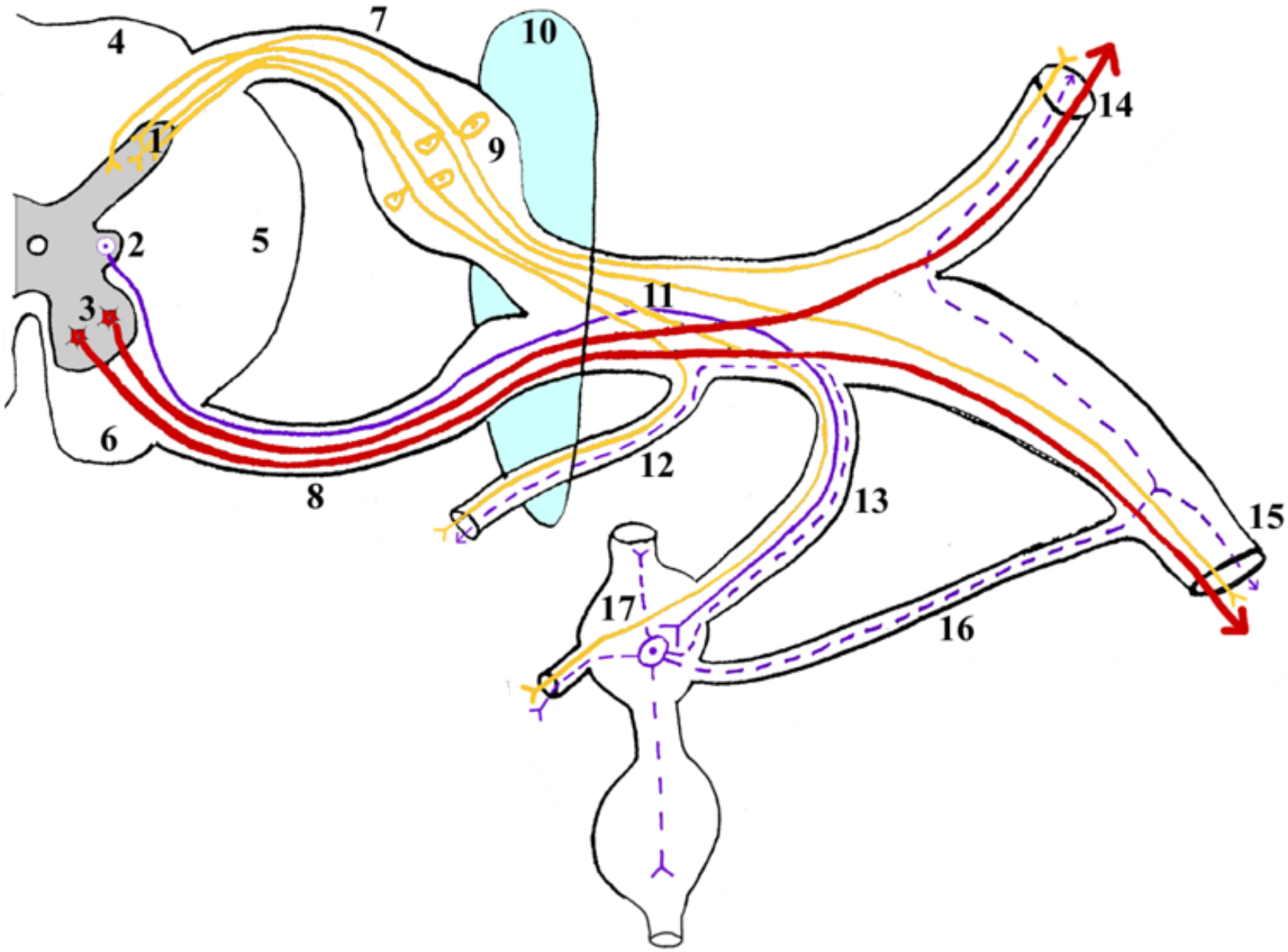


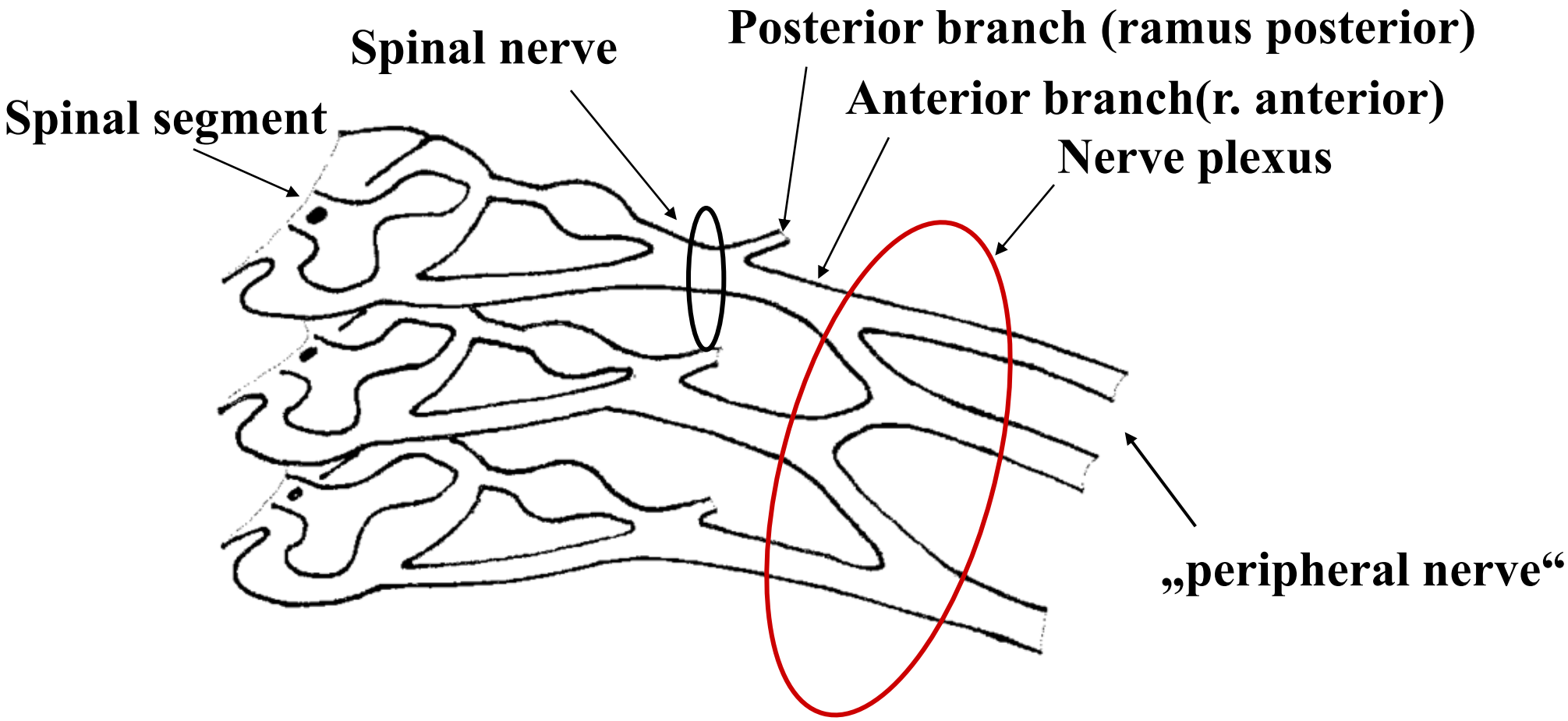
Structure of the spinal nerve





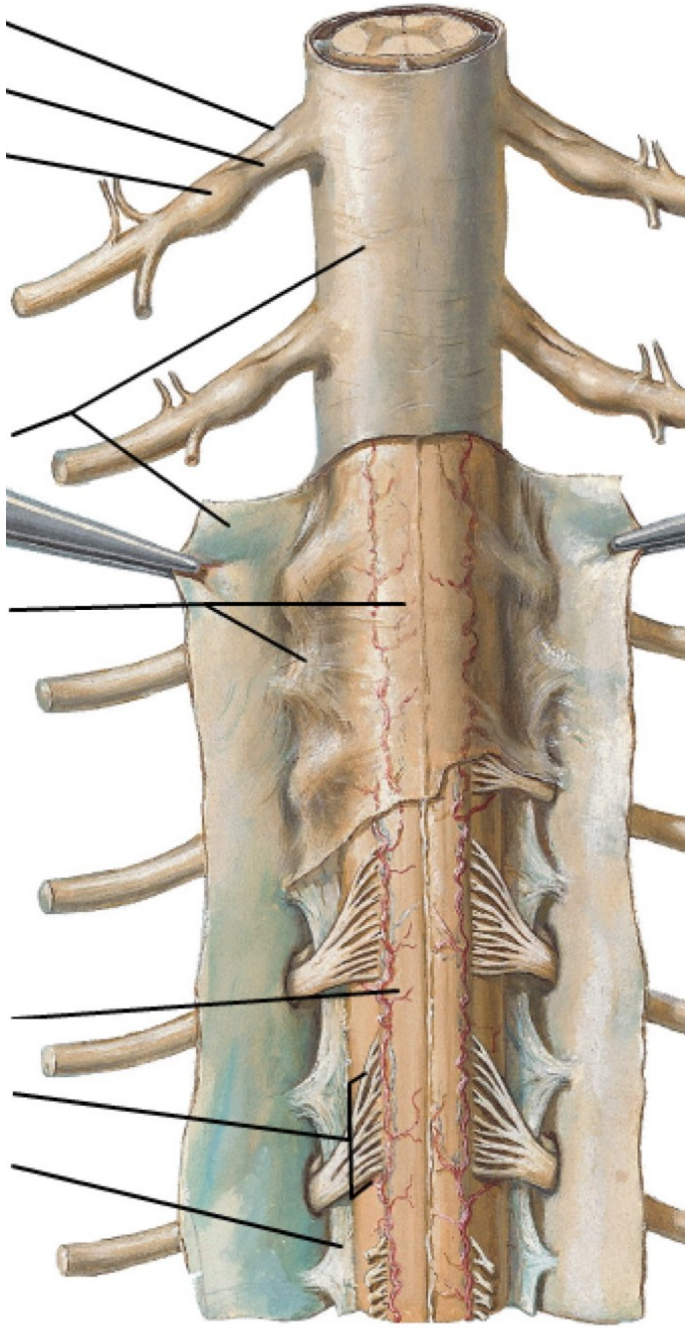
The scheme of the spinal nerve

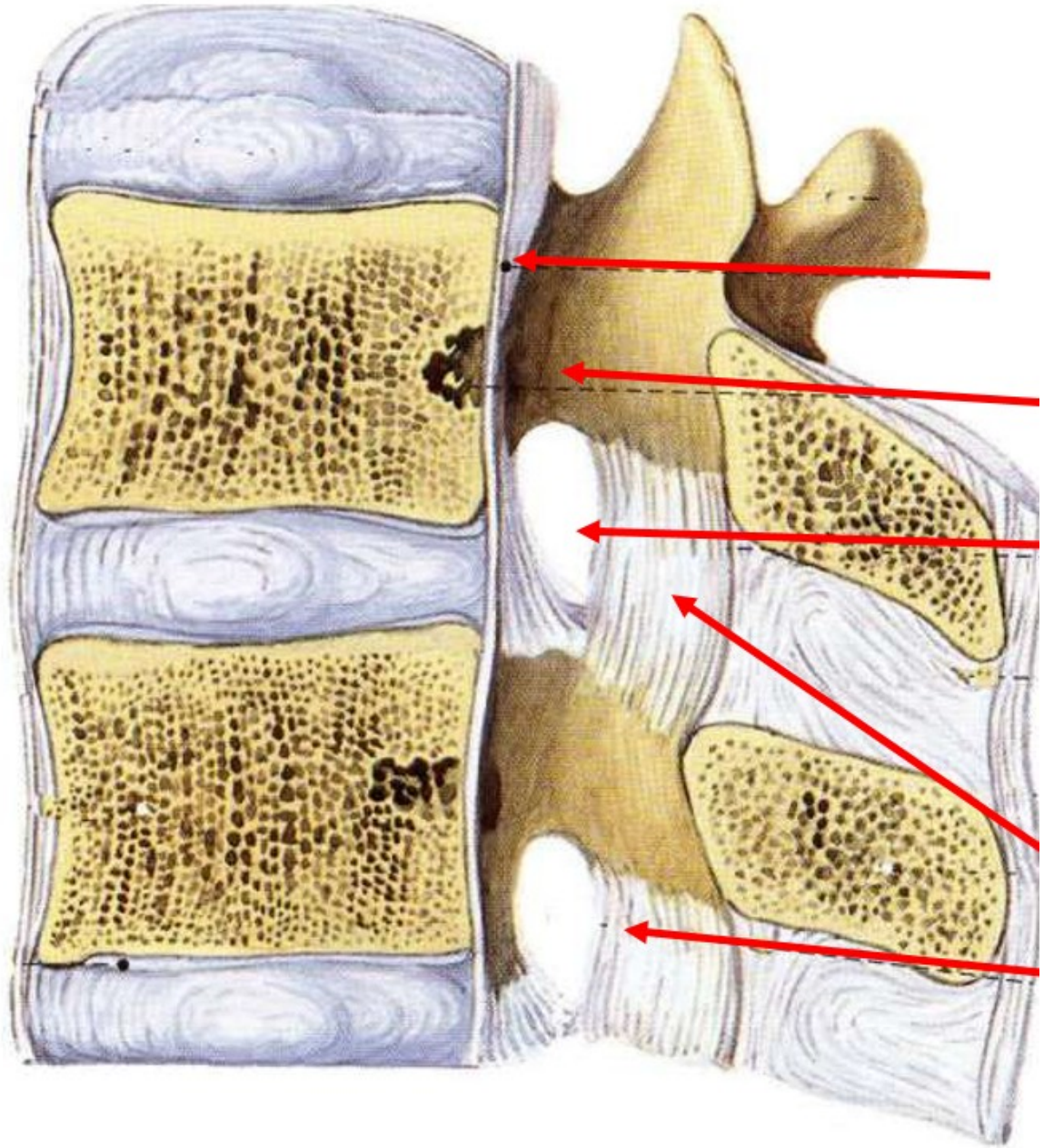




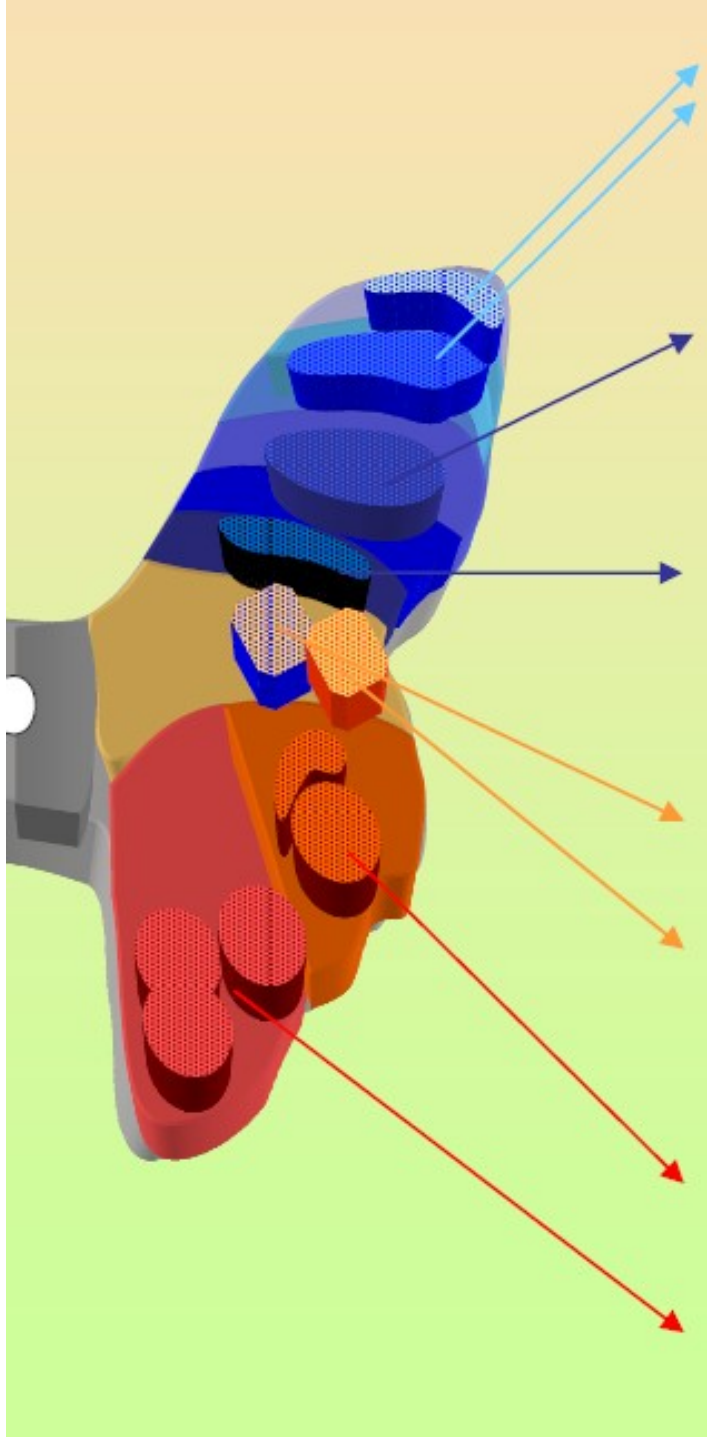
The nervous plexuses are formed only by ventral branches of the spinal nerves

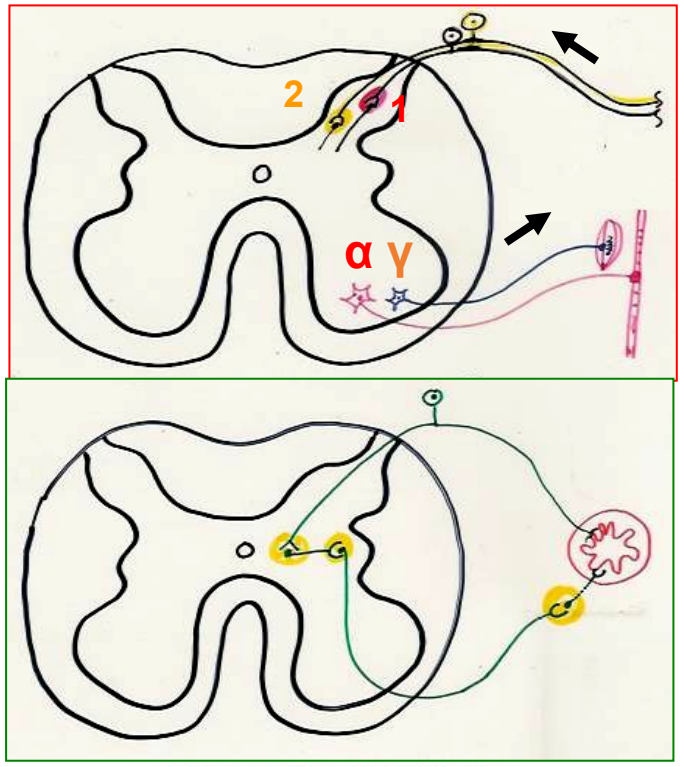
Layers of the vertebral canal



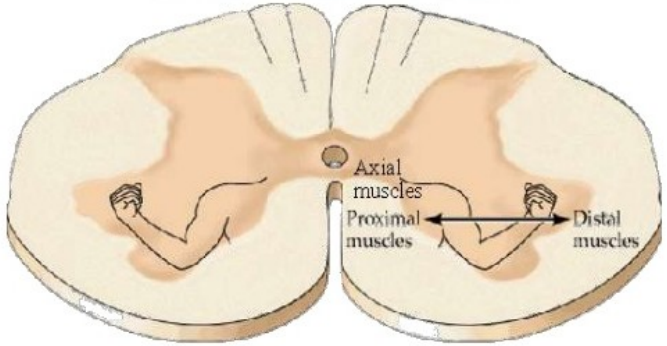


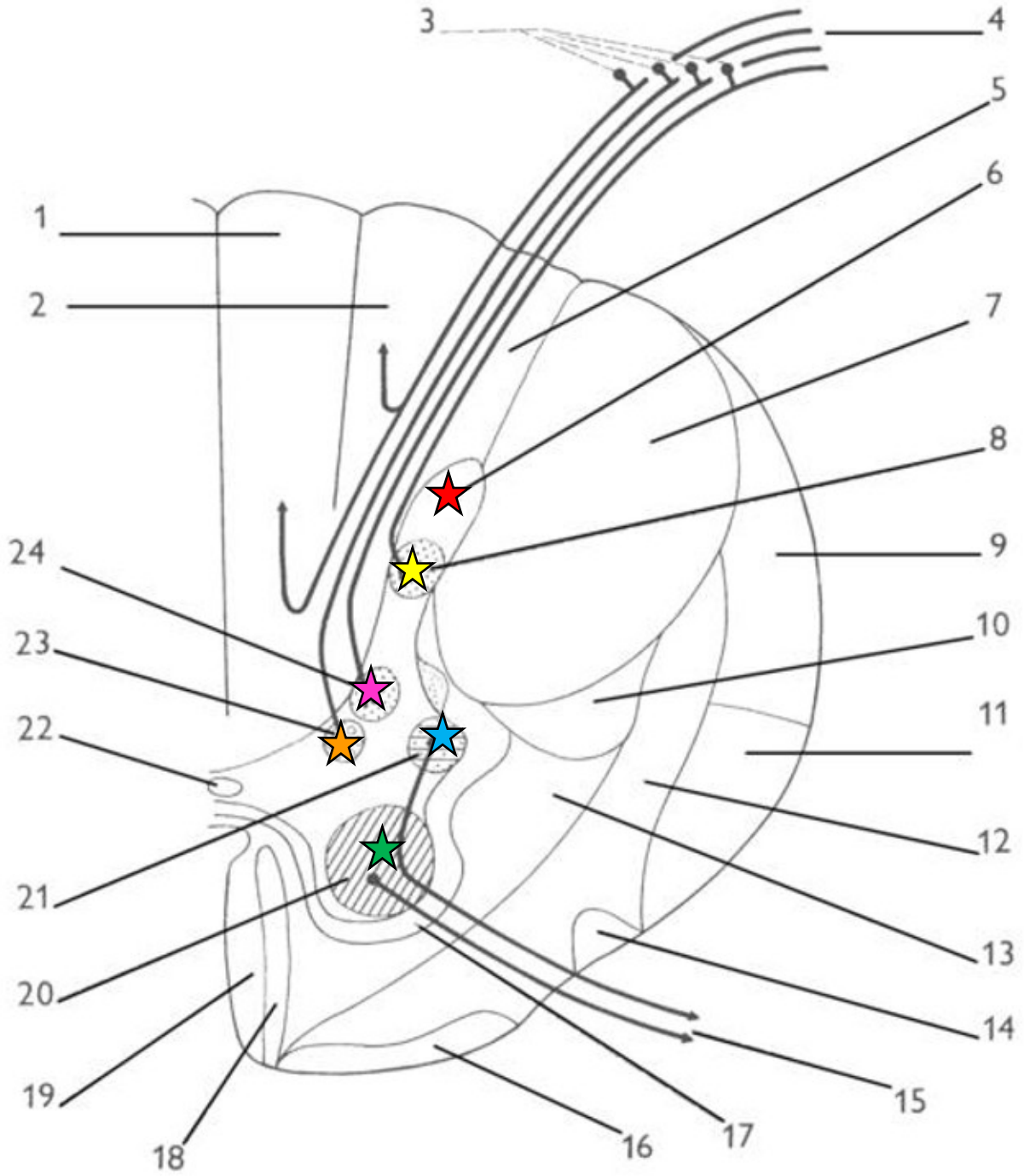
The grey matter of the spinal cord





Somatotopic Organization
Ventral Horn Motor Neurons

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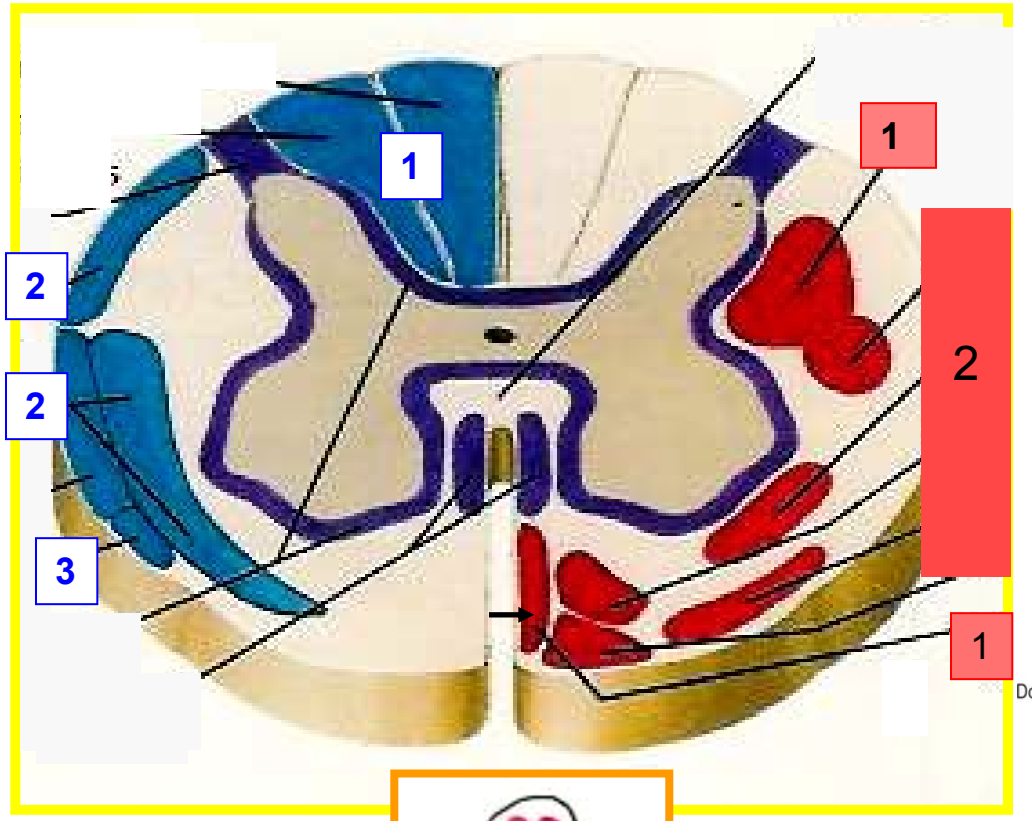
THE WHITE MATTER OF THE SPINAL CORD
TRACTUS NERVOSI

CENTRIPETAL - ASCENDENT SENZORY TRACTS

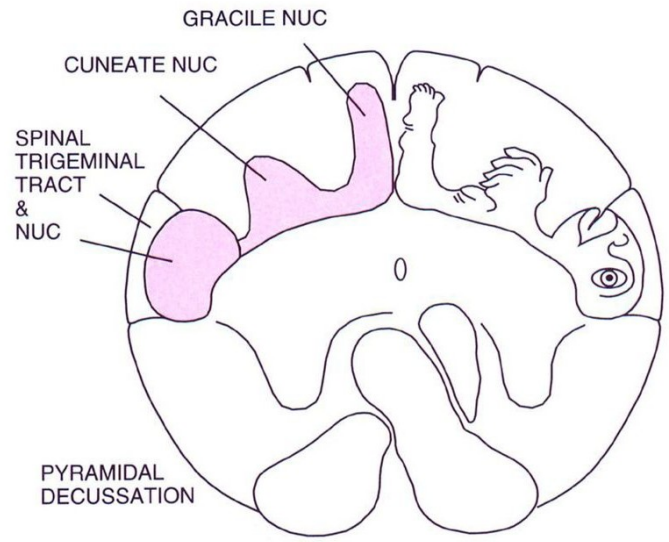
1. **Spino-bulbo-thamo-cortical tracts:** for epikritic sensation and conscious proprioception
2. **Tractus spinocerebellaris anterior et posterior**: propriception to the cerebellum
3. **Tractus spinothalamicus anterior et lateralis**: for unconscious protopathic sensation , heat and pain

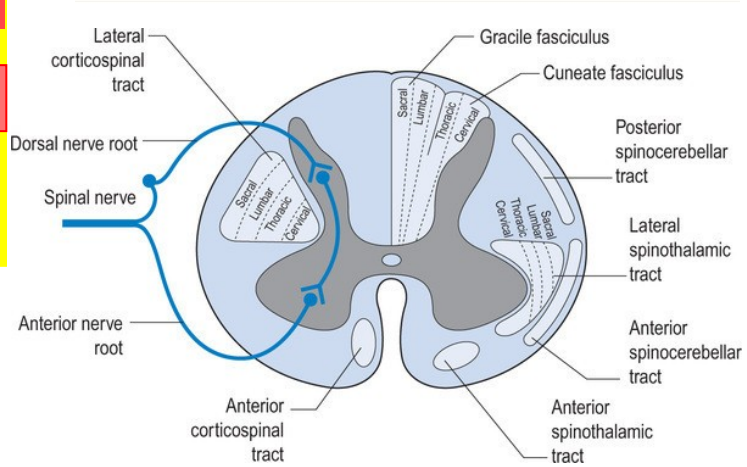
CENTRIFUGAL - DESCENDENT MOTOR TRACTS

1. **Pyramid tracts= tractus corticospinalis anterior et lateralis**: tracts of conscious movements
2. **Extrapyramid tracts**
   tr. rubrospinalis, tr. reticulospinalis, tr. tectospinalis, tr. vestibulospinalis
   tracts of unconscious movements



SOMATOTOPY IN THE SPINAL CORD





SENSORIC TRACTS

- **Tractus spino-bulbo-thalamo-corticalis** – for epikritic sensation(discriminatory sensation), vibrations and proprioceptions from muscles, tendons, joints

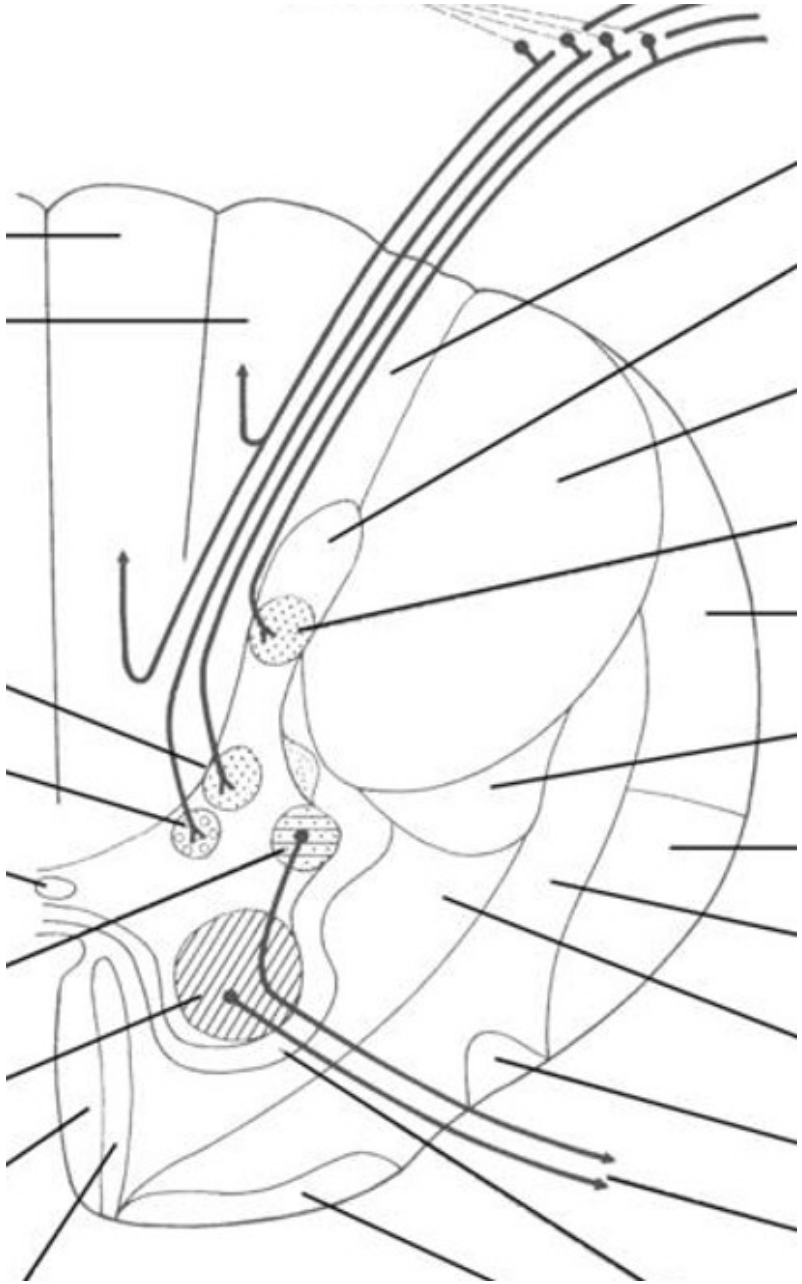
Epikritic sensation

- **Tractus spino-thalamicus (lat. a ant.), spino-reticularis a spino-tectalis** – for perception of temperature and pain and rough touch sensation

Protopathic sensation

- **Spinocerebellar tracts** – for proprioception and touch sensation to the cerebellum

proprioception



MOTOR TRACTS

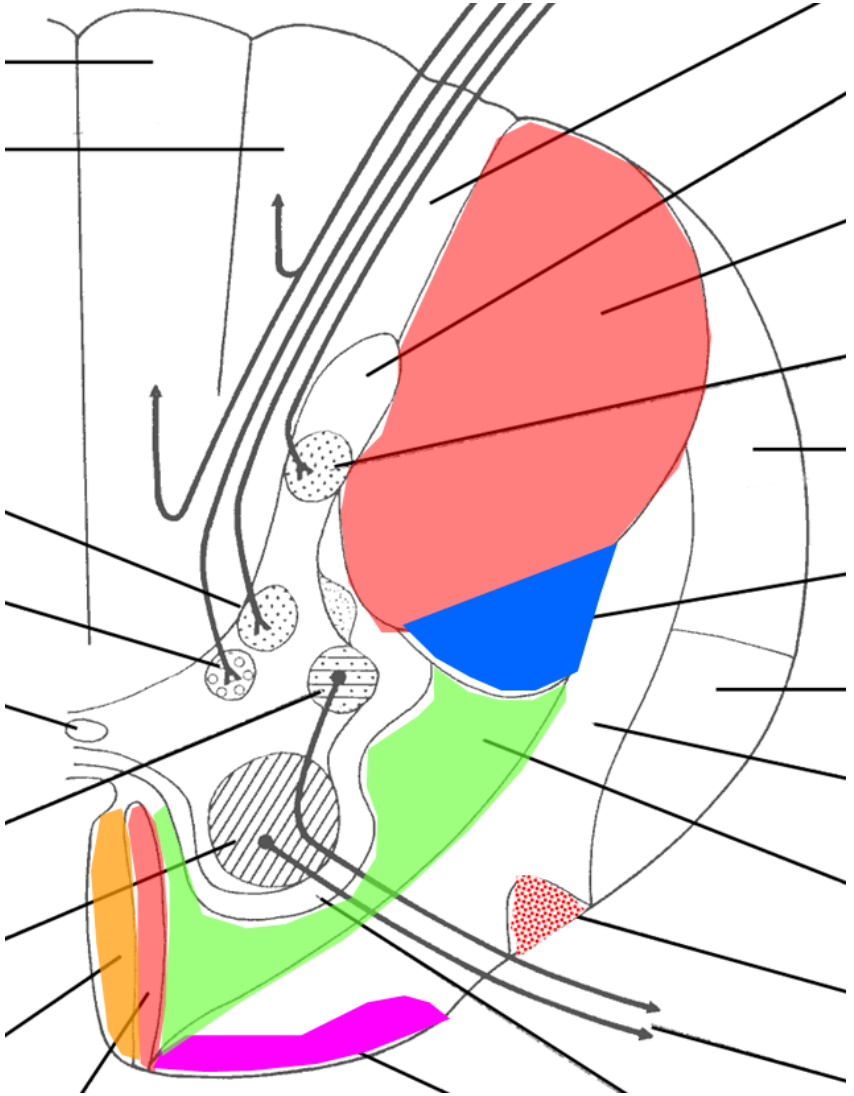
funiculus anterolateralis

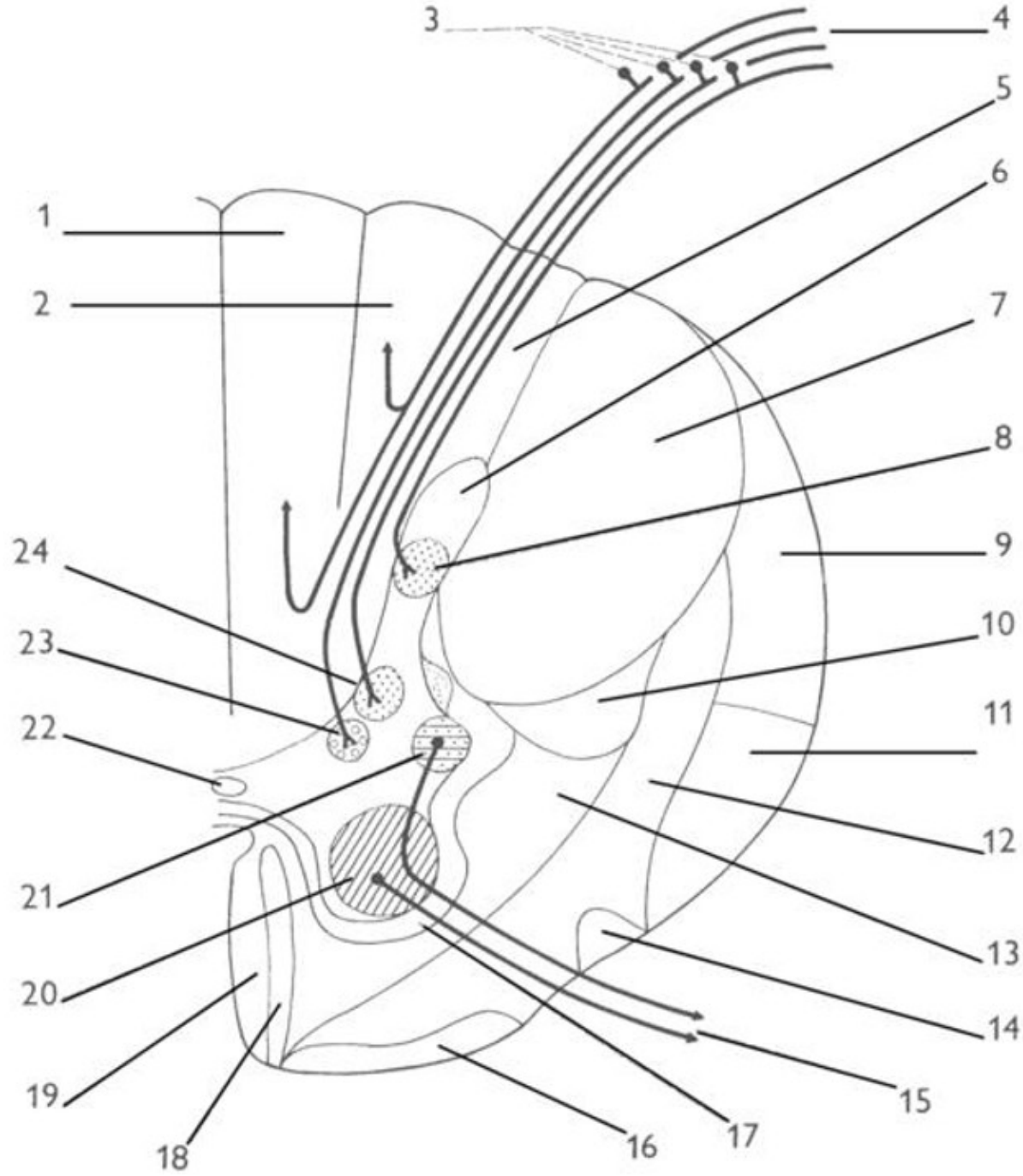
PYRAMID TRACTS

- direct- phylogenetically young
- **Tr.corticospinalis-** lateralis, anterior- cross
- voluntary, conscious movements of the striated muscles

EXTRAPYRAMID TRACTS

- undirect- phylogenetically old
- Starts on the nuclei of RF, brainstem, vestibular nuclei
- **Tr. Rubrospinalis** (flexors)
- **Tr. tectospinalis** (visual stimuli)
- **Tr. Reticulospinalis**
- **Tr. Vestibulospinalis** (extensors)
- Maintenance of the muscle tension, equilibrium, automatic movements – dance, walk…

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