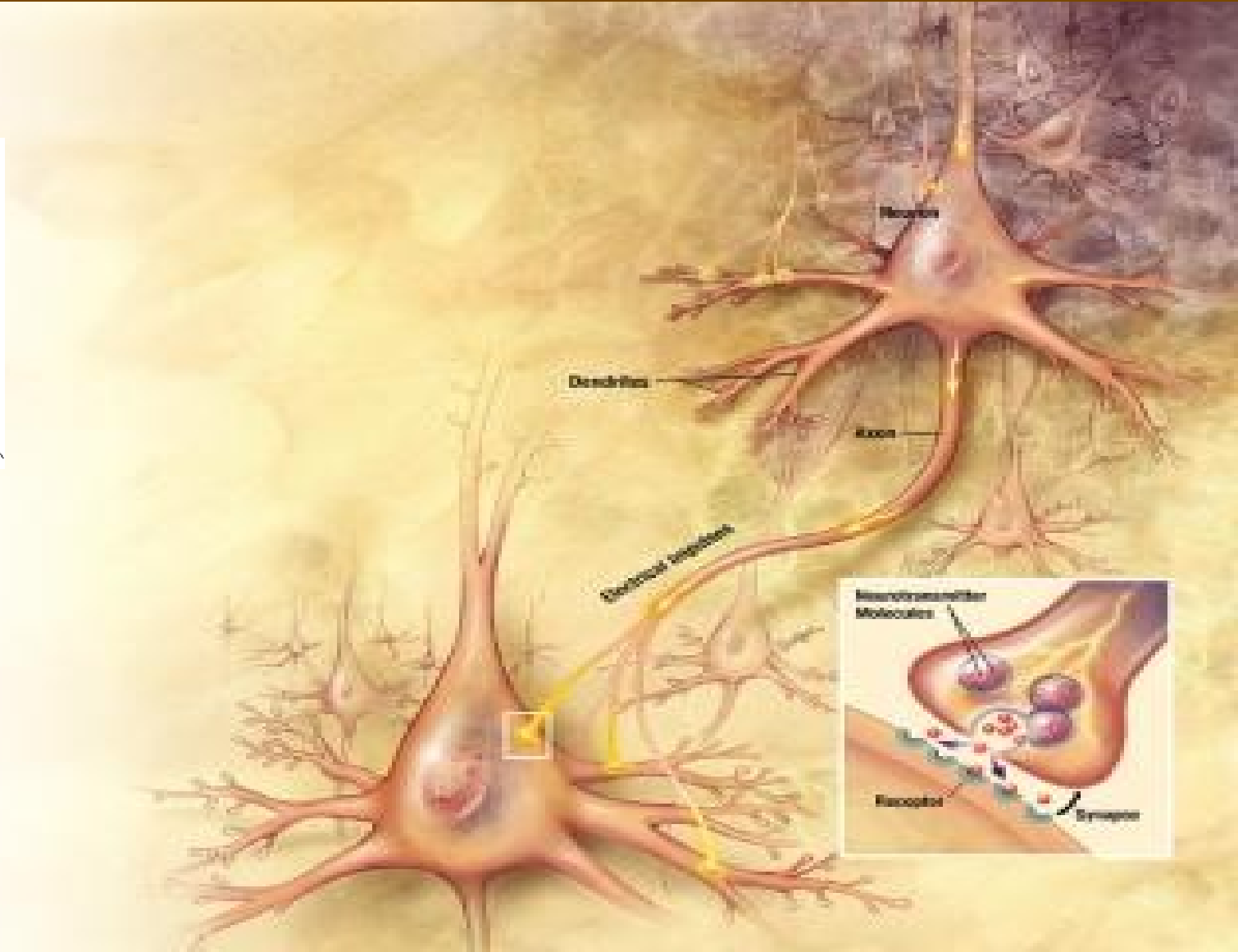
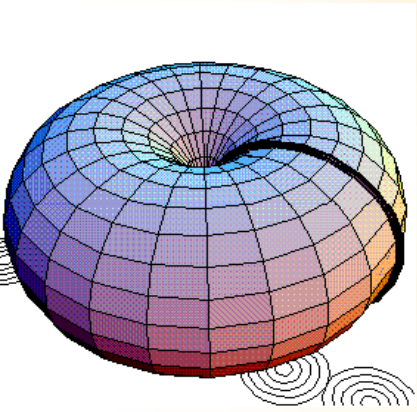


Nervová tkáň



Obecné vlastnosti nervové tkáně a její složky

dráždivost a vodivost

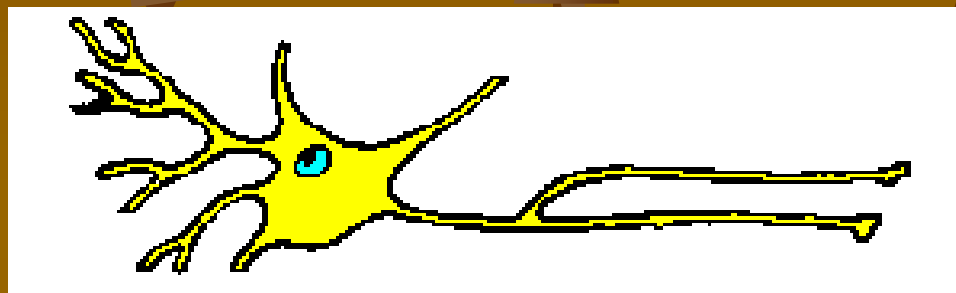
původ: neuroektoderm

funkce: nervová regulace

- přesná analýza změn
- rychlý převod informace do ústředí
- cílená a místně diferencovaná odpověď

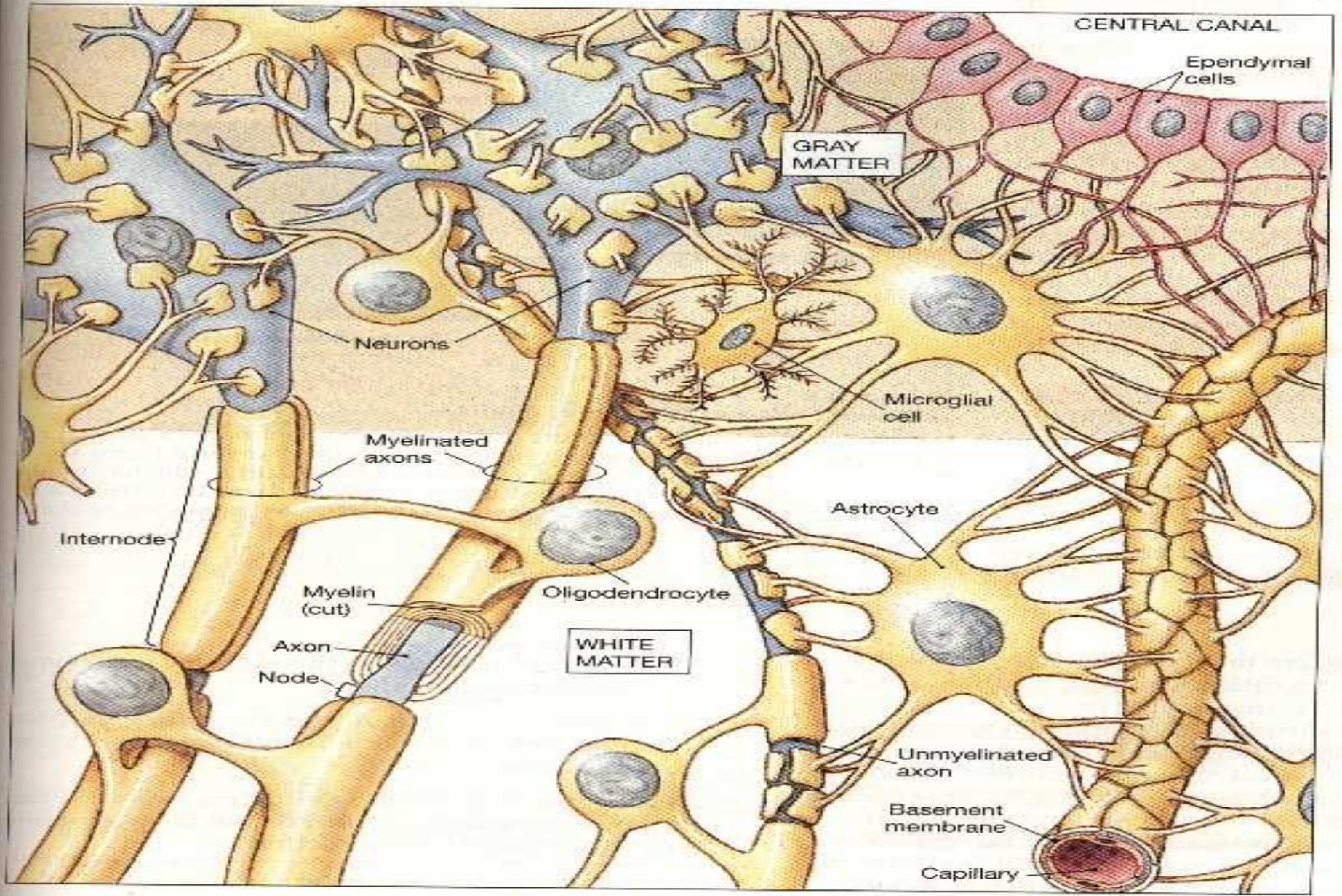
Složení: **neurony a neuroglie** (buňky podpůrné)

PNS + CNS ↗ šedá hmota
↘ bílá hmota



NS – struktura:

Neurony + gliové buňky



Neuron

morfológické části

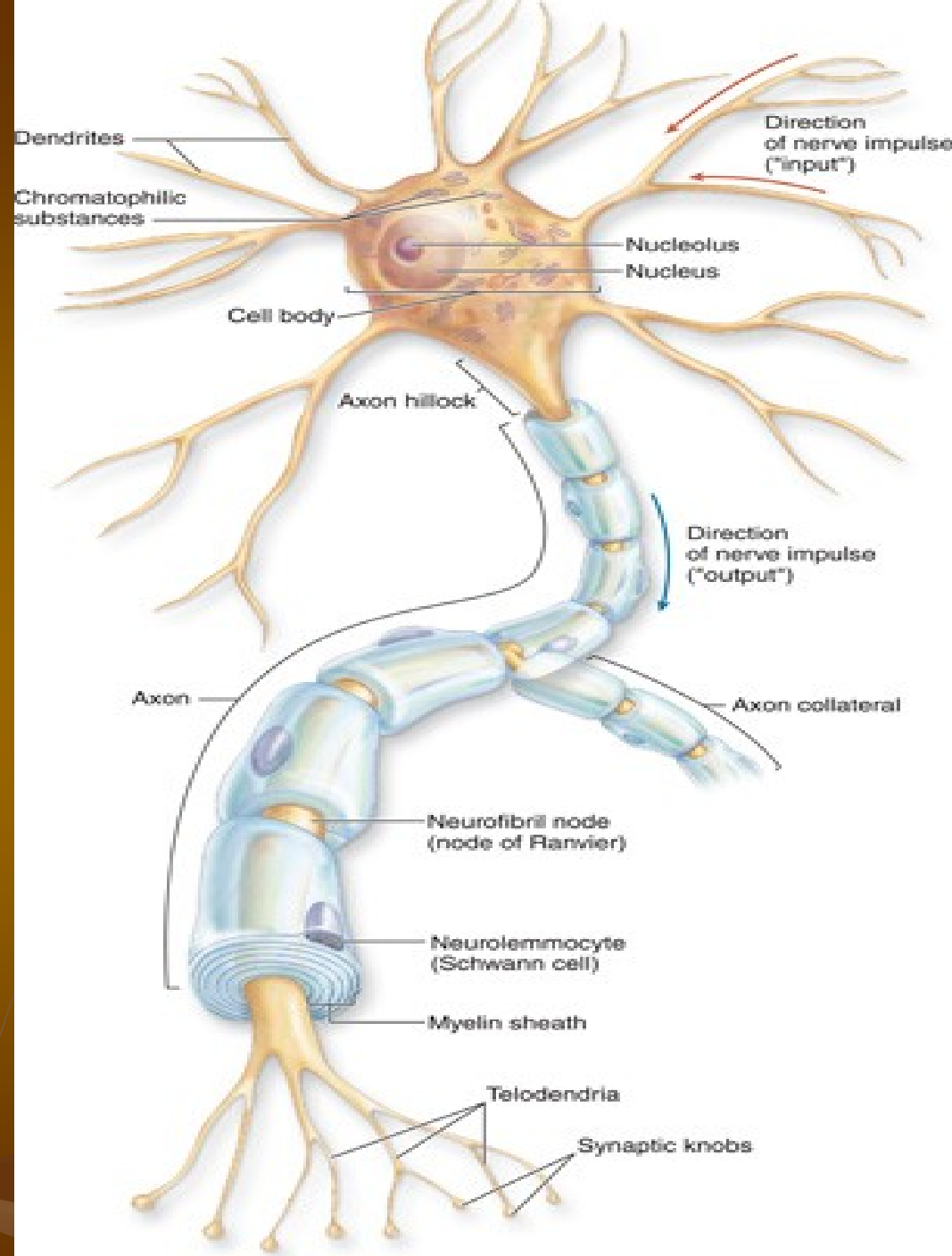
Perikaryon (tělo)

Dendrit(y)

Neurit/Axon (1)

- odstúpový konus (axonový hrbol)
- iniciální segment

Telodendrie



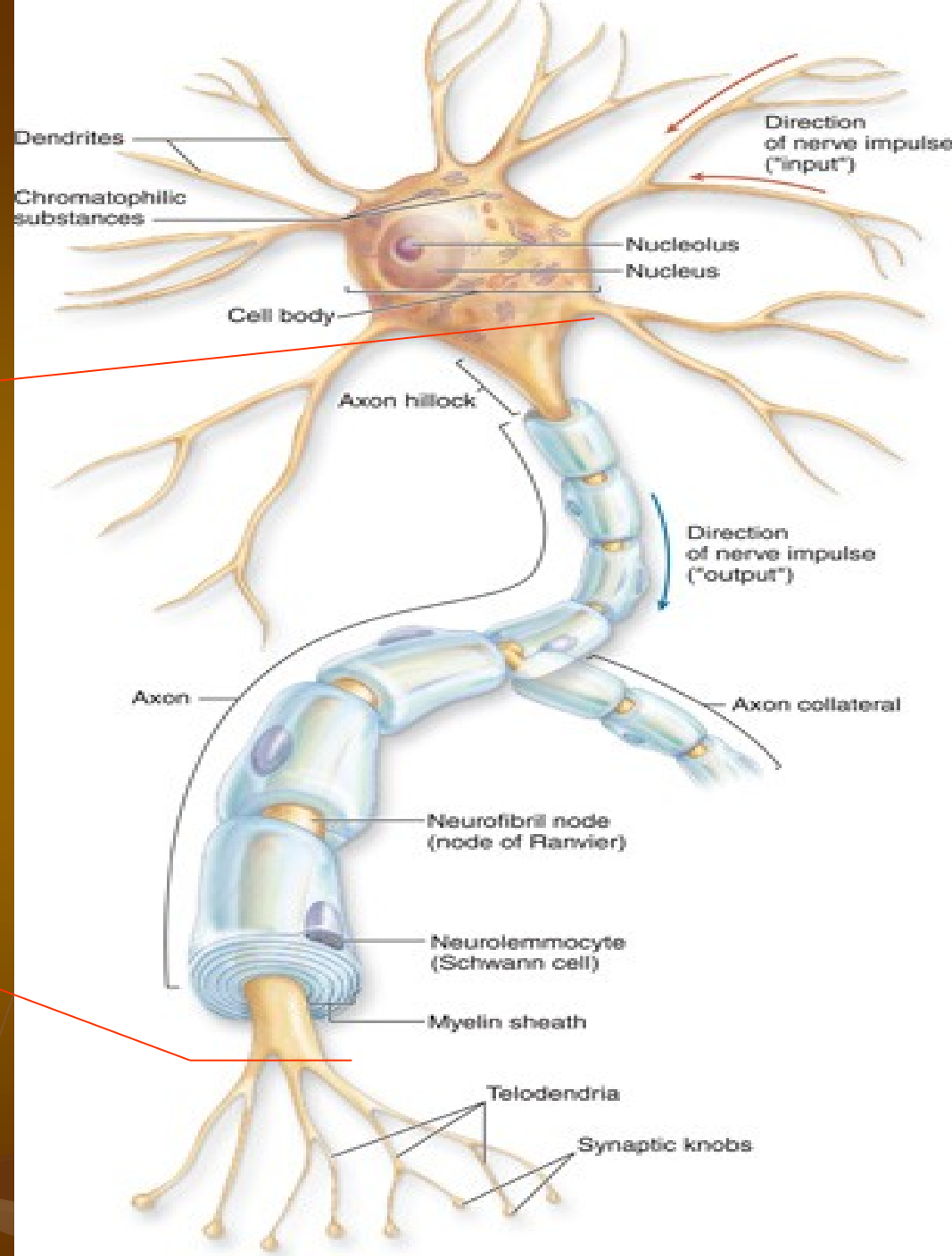
Neuron

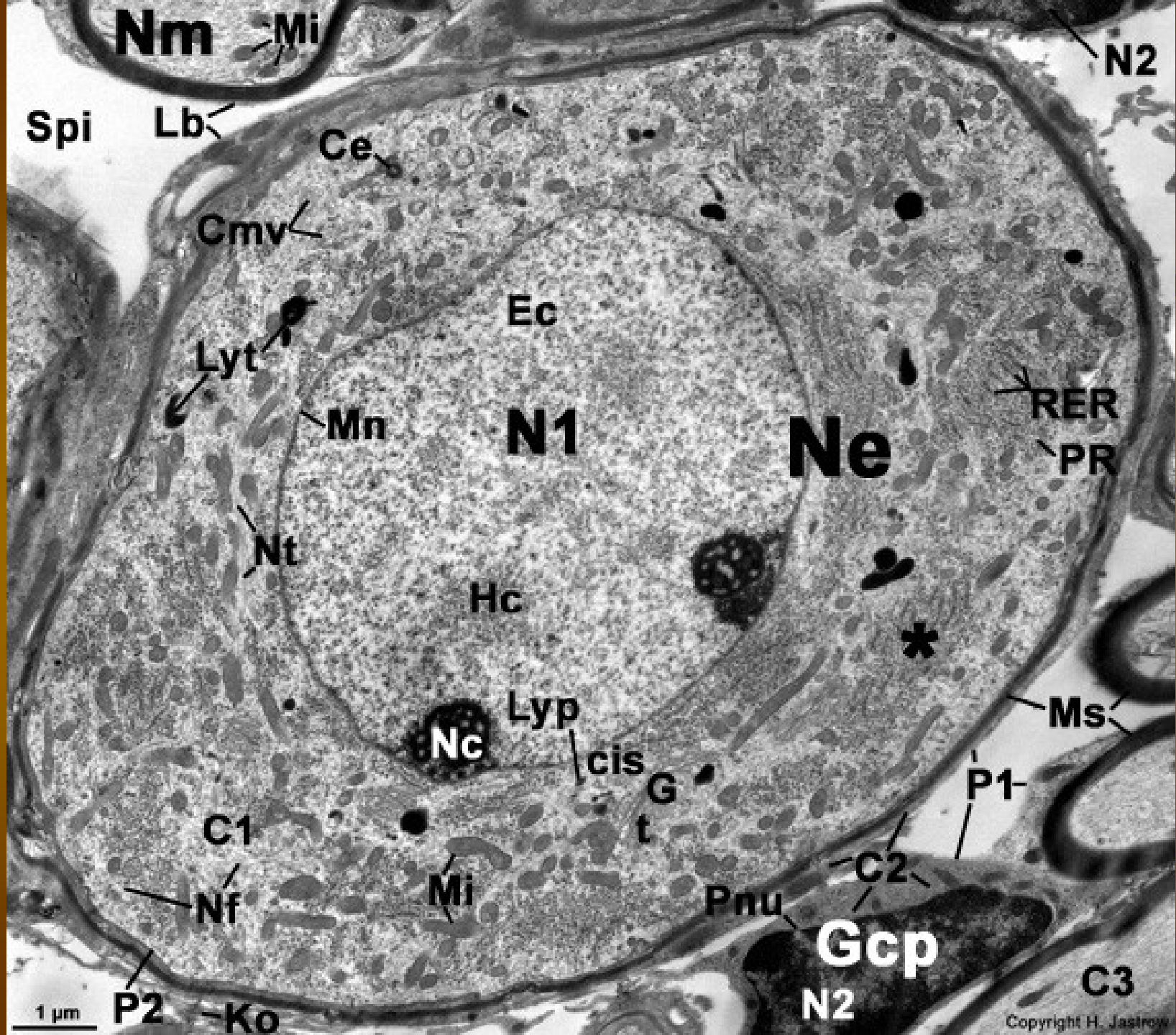
funkční části

Recepční oddíl

Transmisní oddíl

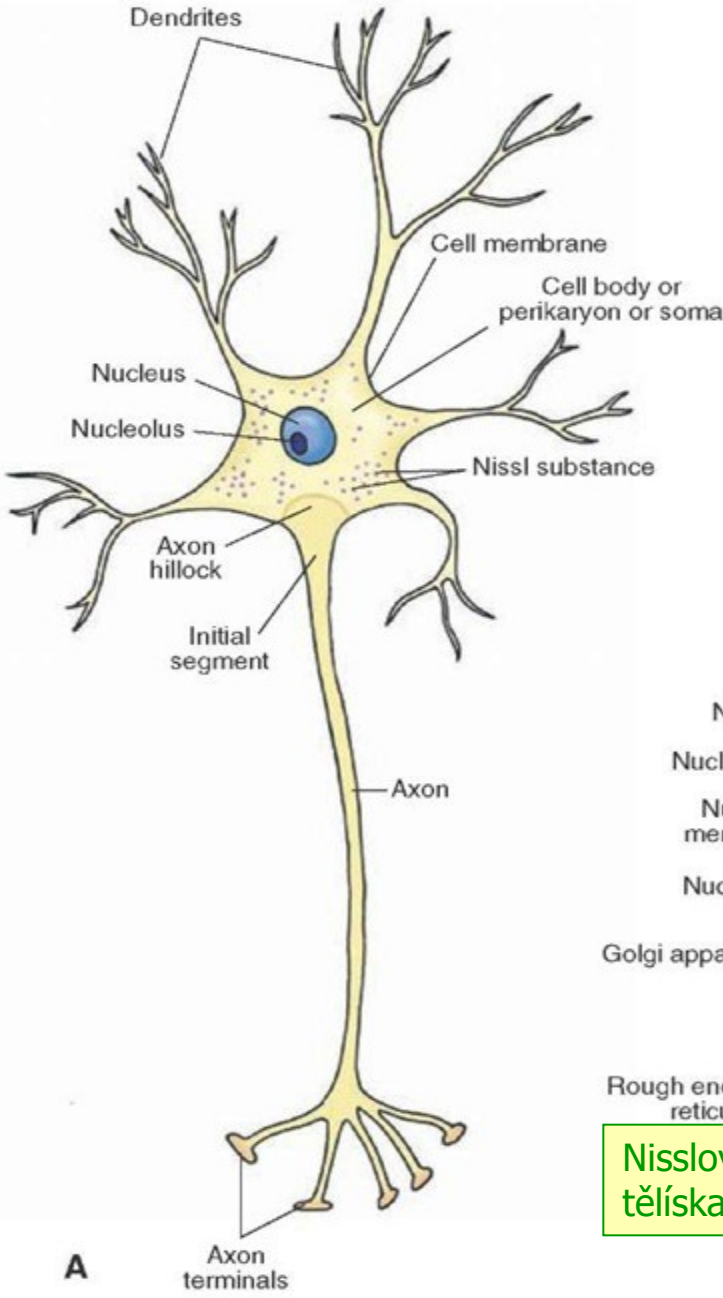
Sekreční oddíl



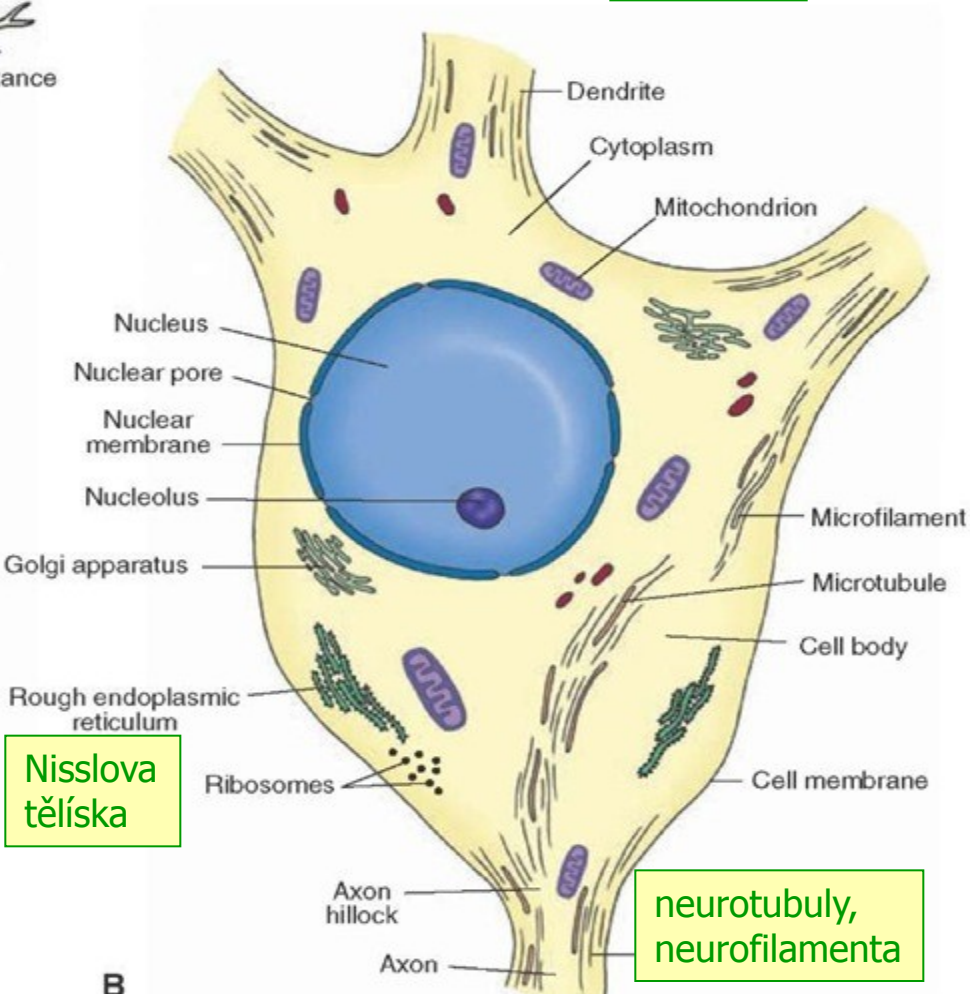


NEURON

4 – 100 μm \varnothing



lipofuscin



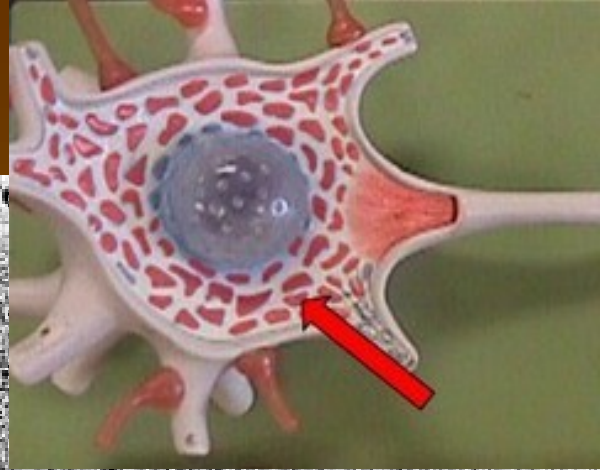
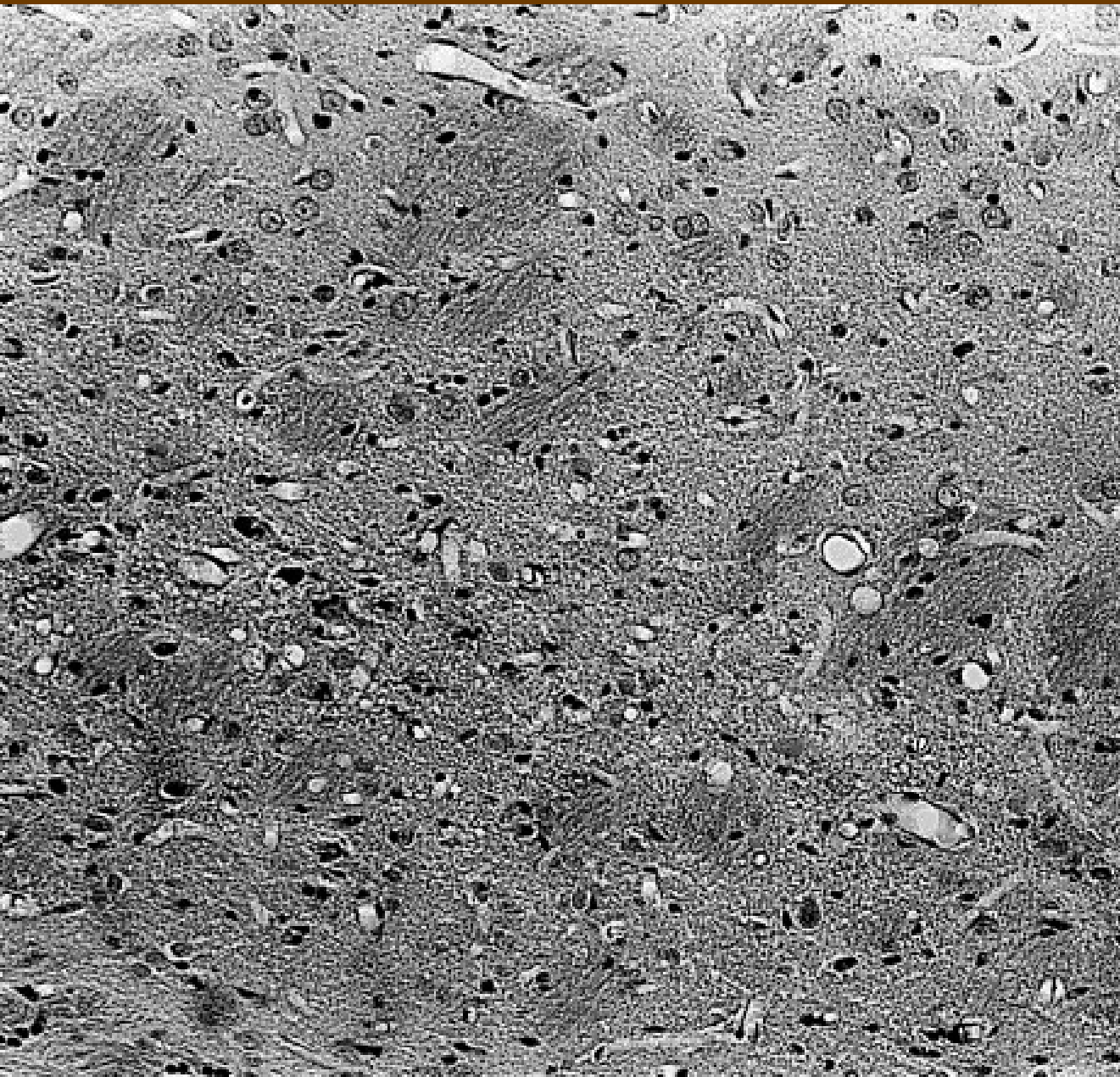
Nisslova tělíska

neurotubuly, neurofilamenta

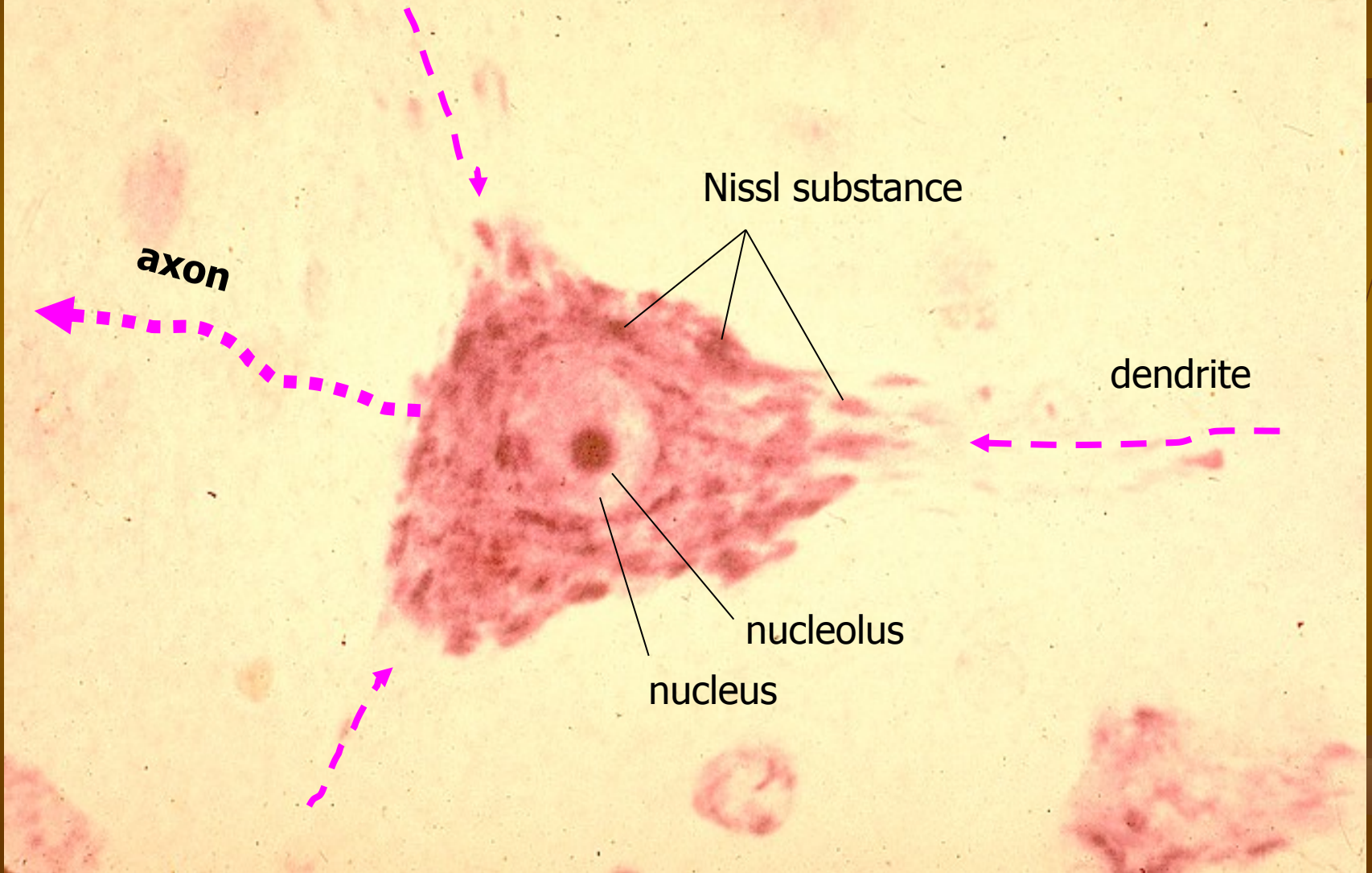
A

B

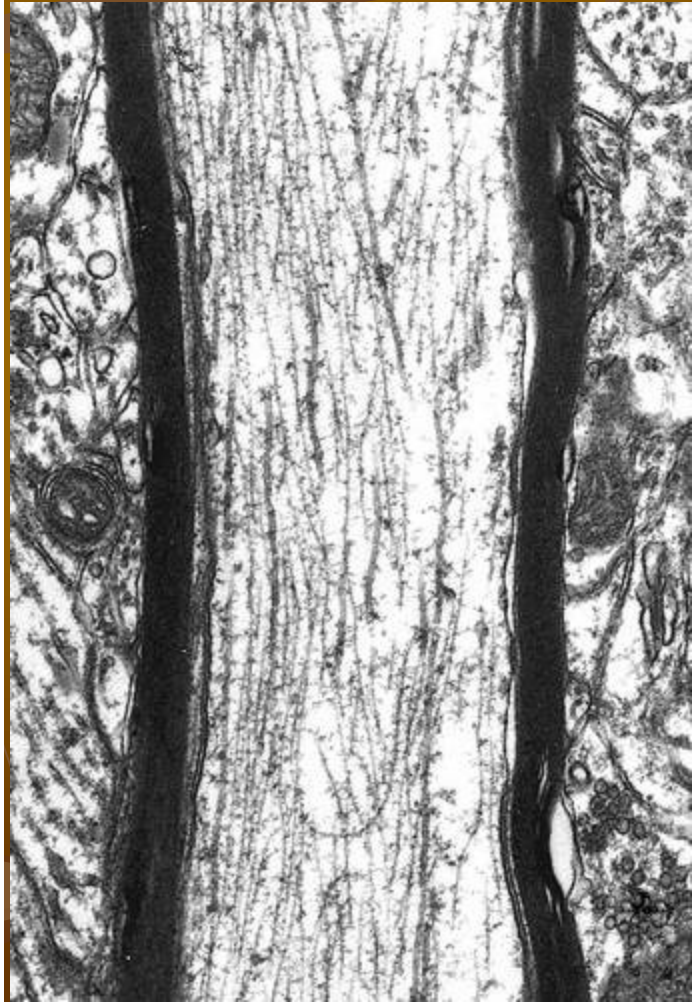
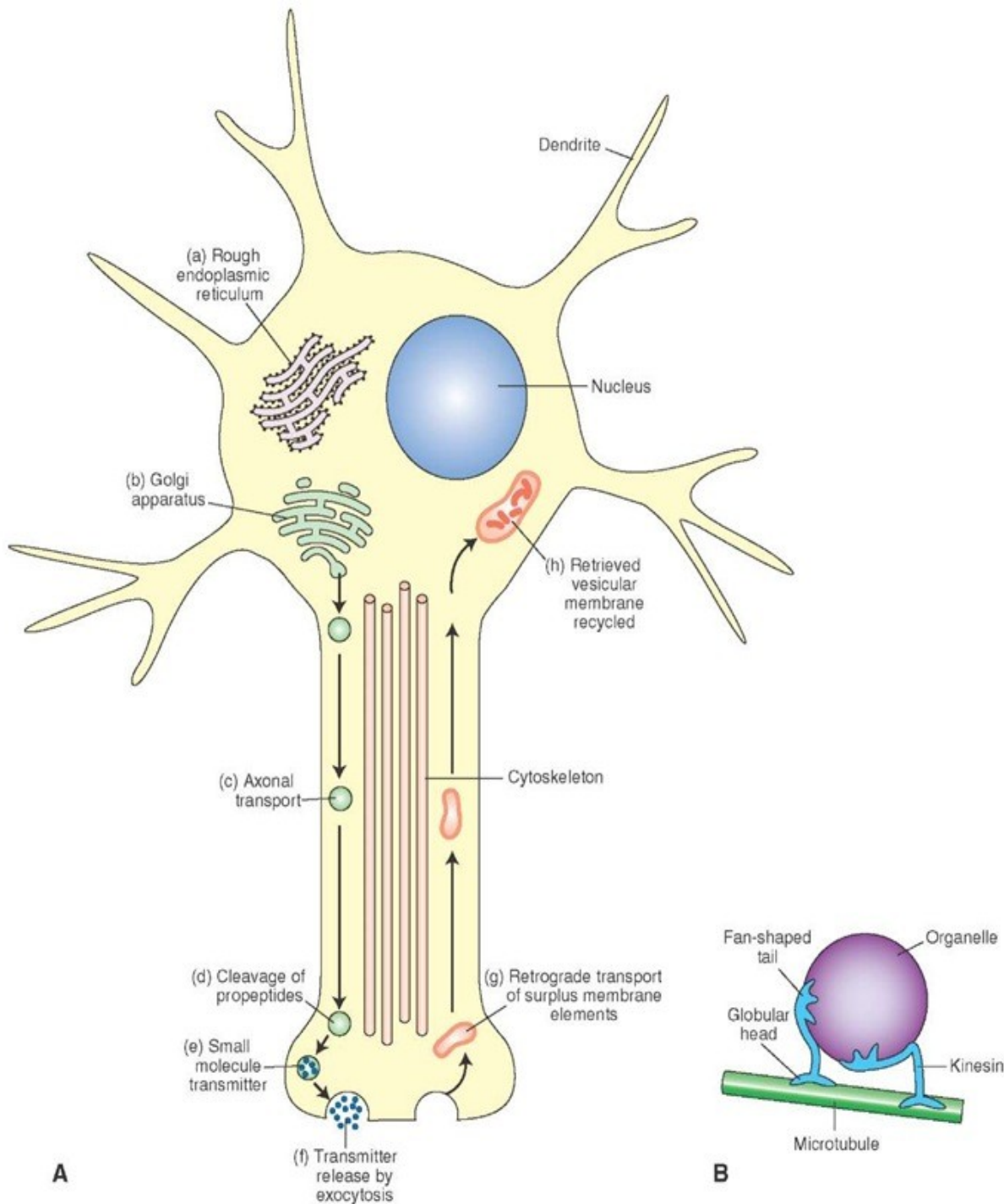
Nisslova tělíska (substance)



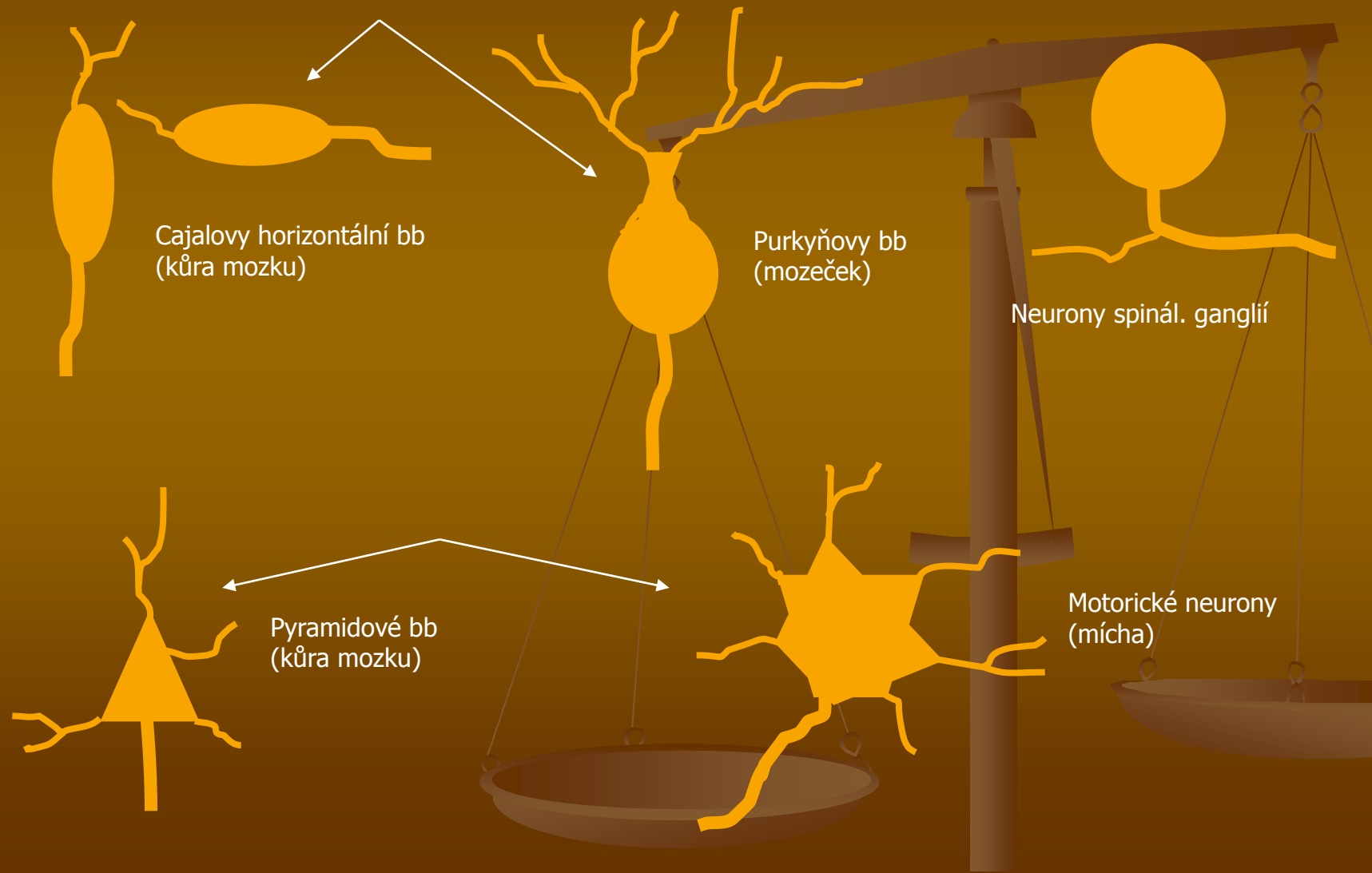
△ perikaryon (pyramidová buňka z cortex cerebri)

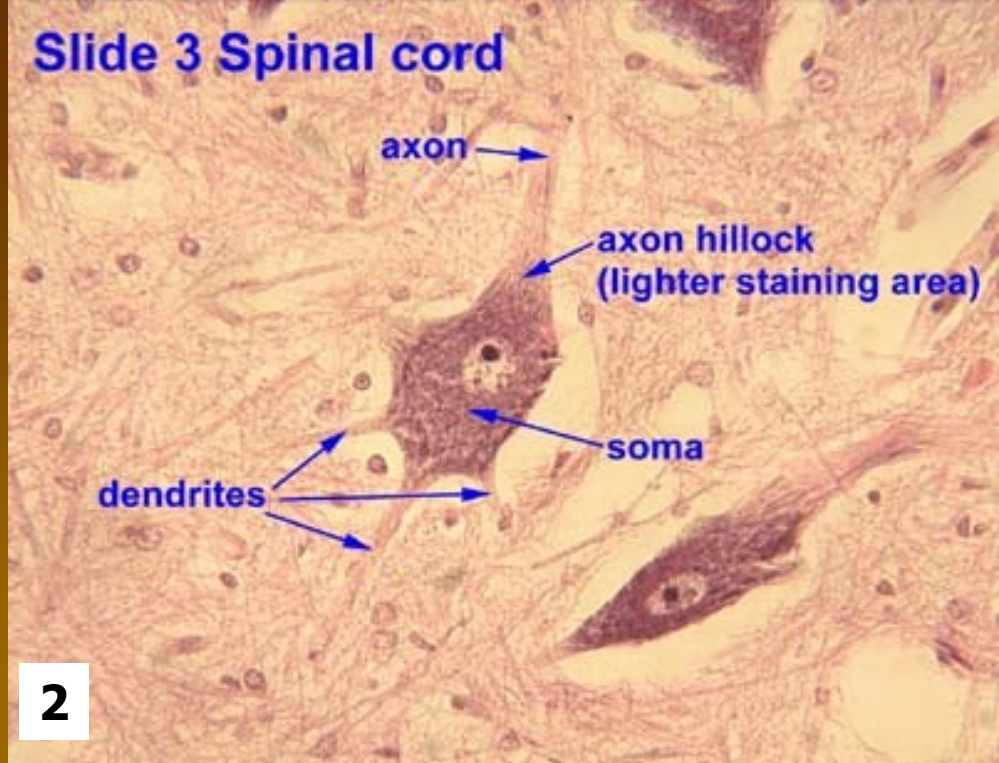
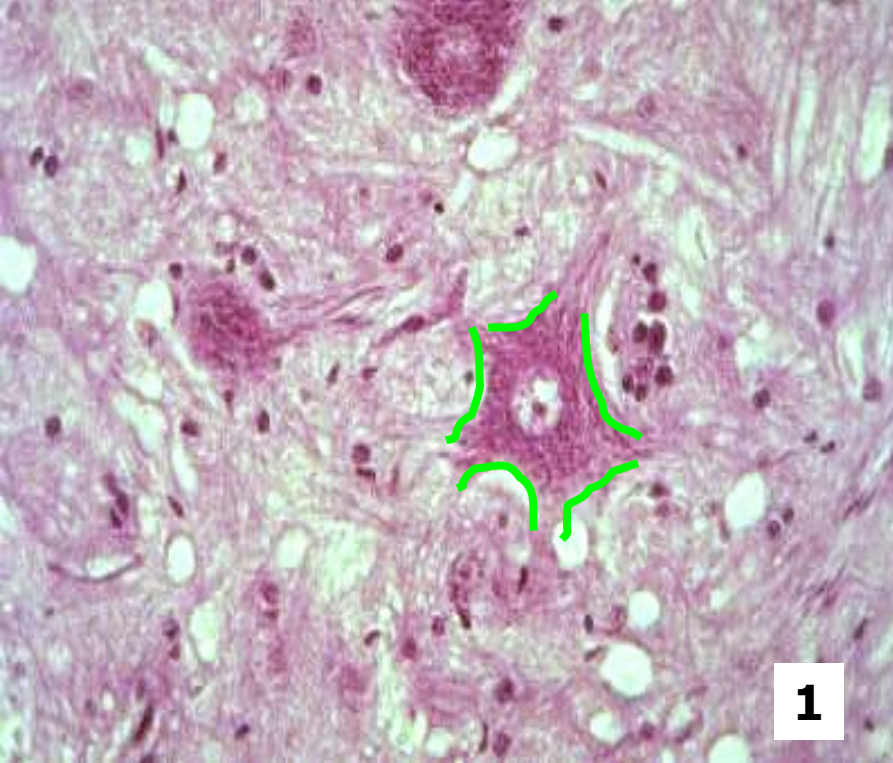


neurotubuly neurofilamenta

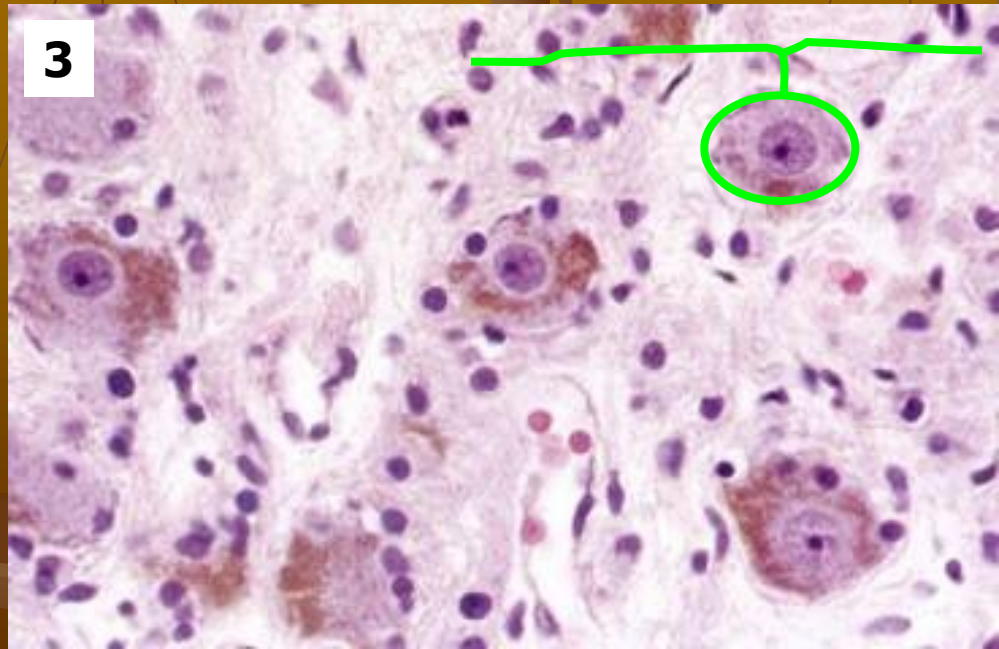


Tvar perikarya





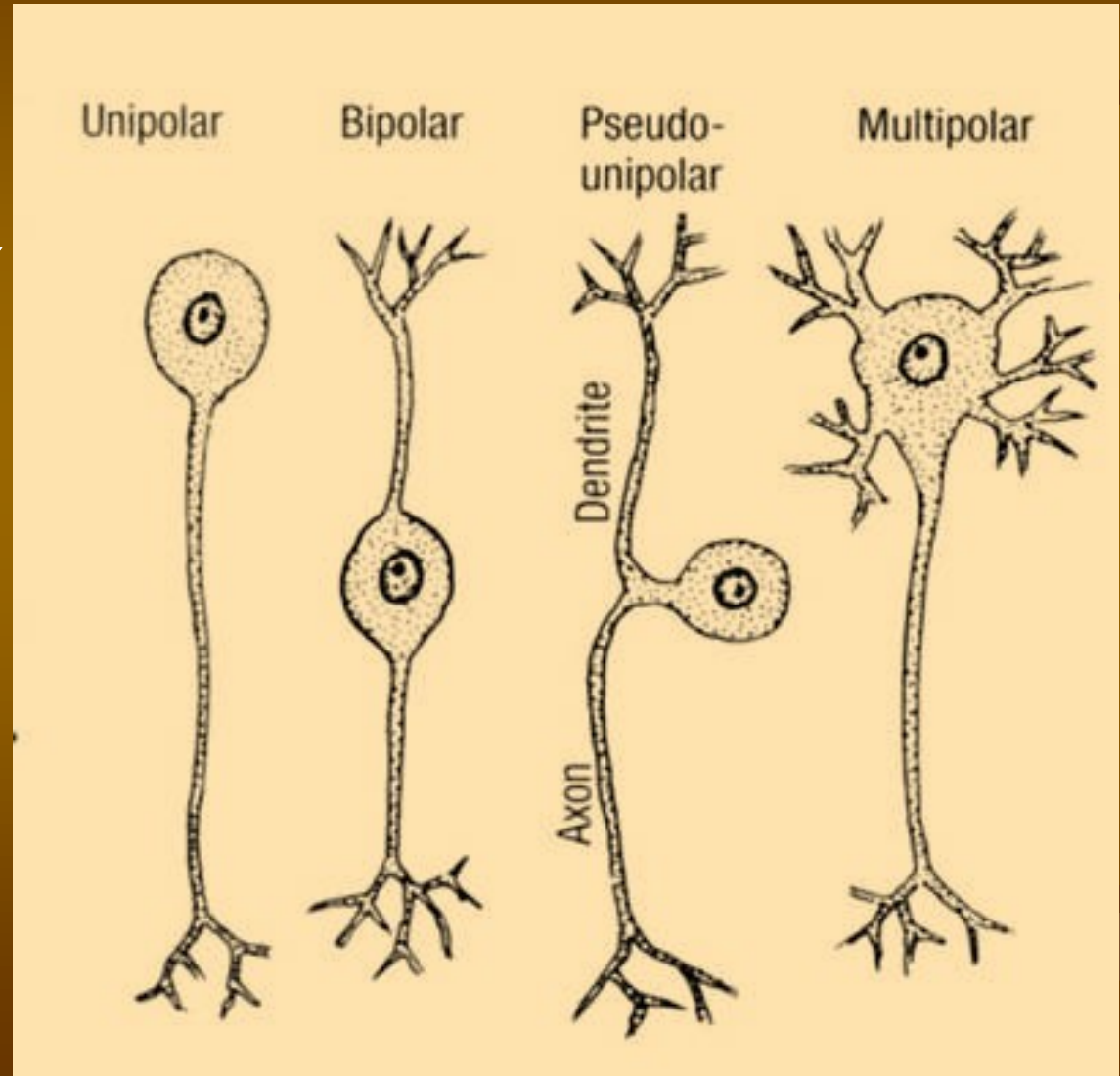
1, 2 – multipolár. neurony: Nisslova tělíska
3 – pseudounipolár. neurony: lipofuscin



Klasifikace neuronů

(dle počtu výběžků)

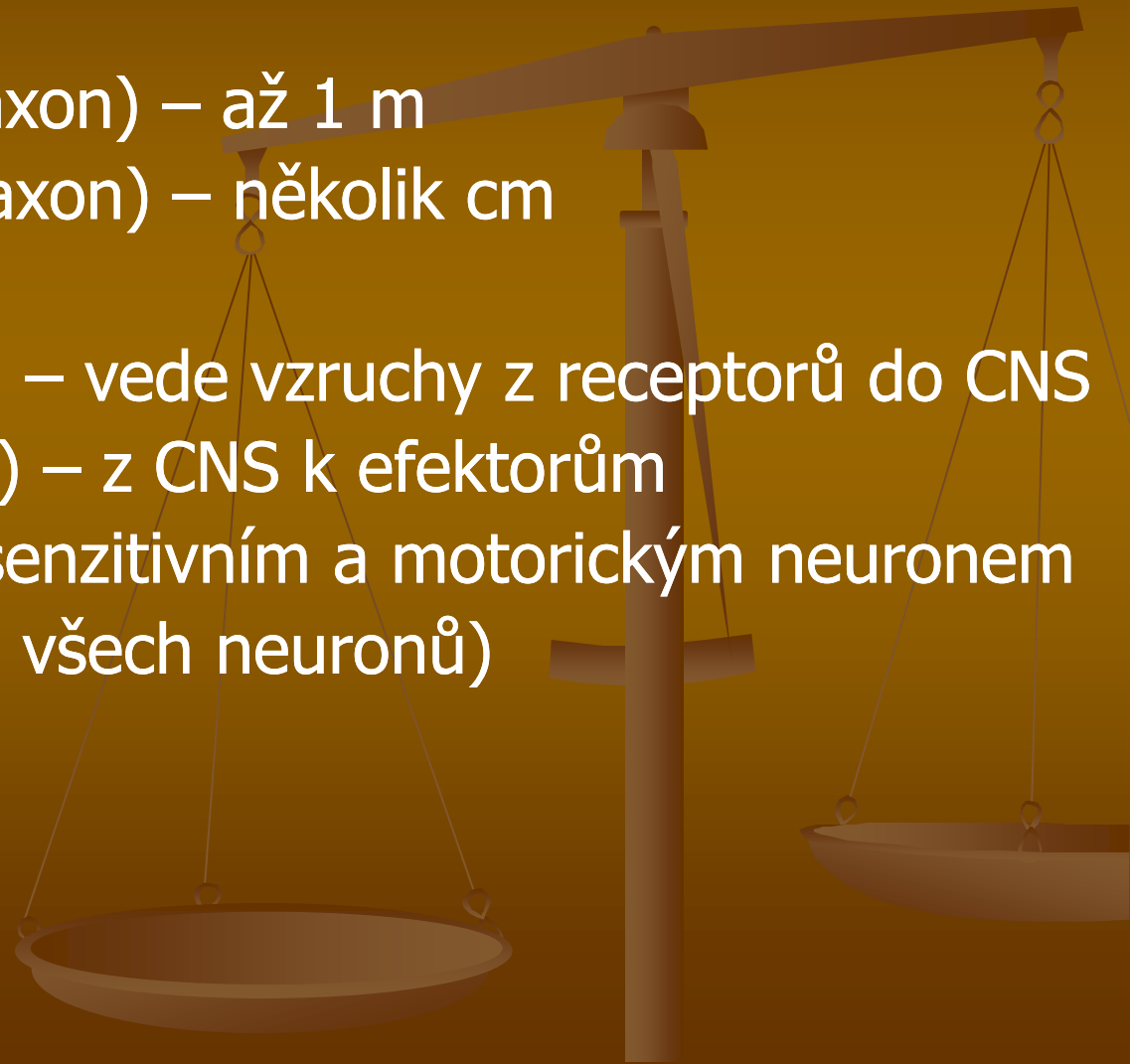
- (unipolární)
- bipolární
- pseudounipolární
- multipolární
- (amakrinní)



Další dělení neuronů

(podle ...)

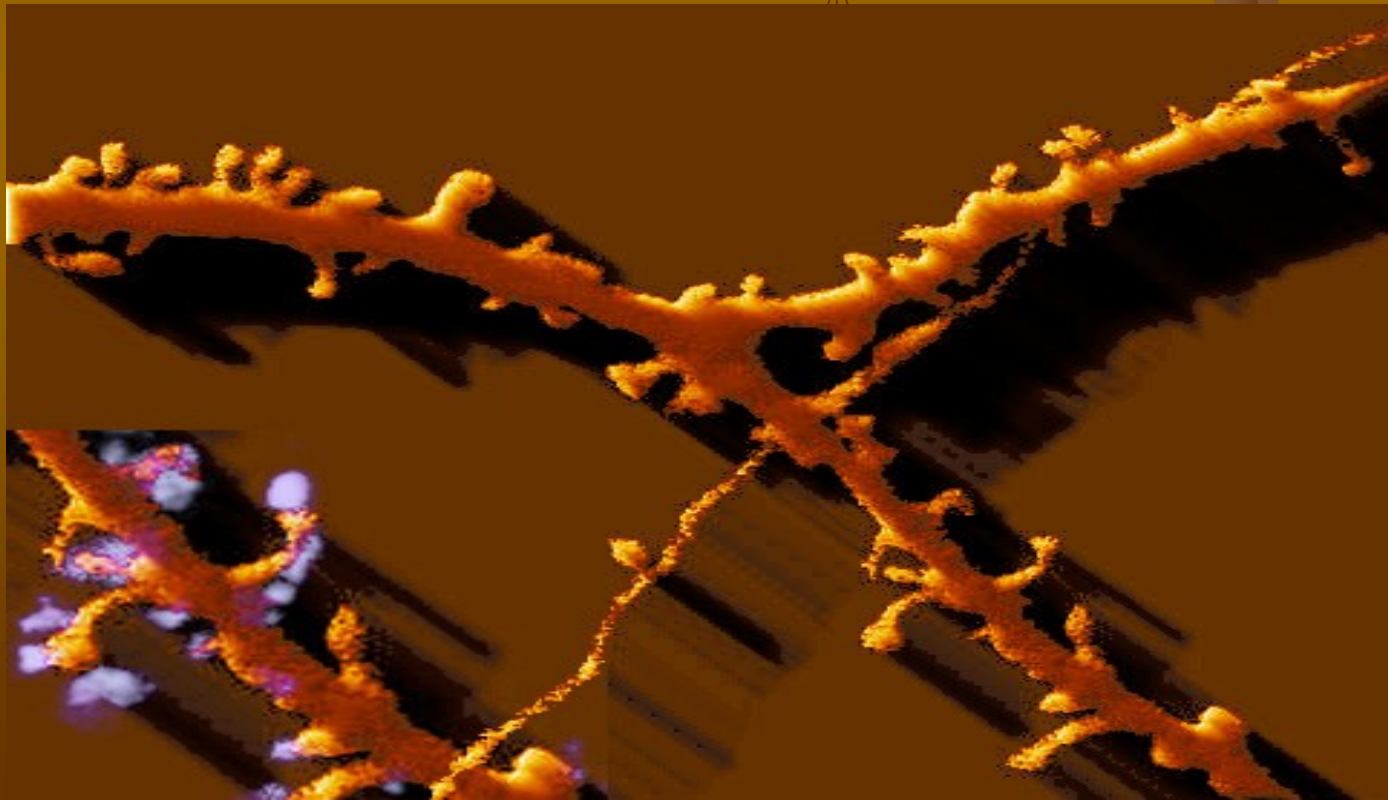
- délky axonu:
 - Golgi typ I (dlouhý axon) – až 1 m
 - Golgi typ II (krátký axon) – několik cm
- funkce:
 - senzitivní (aferentní) – vede vzruchy z receptorů do CNS
 - motorický (eferentní) – z CNS k efektorům
 - interneuron – mezi senzitivním a motorickým neuronem (97 % všech neuronů)



Dendrity

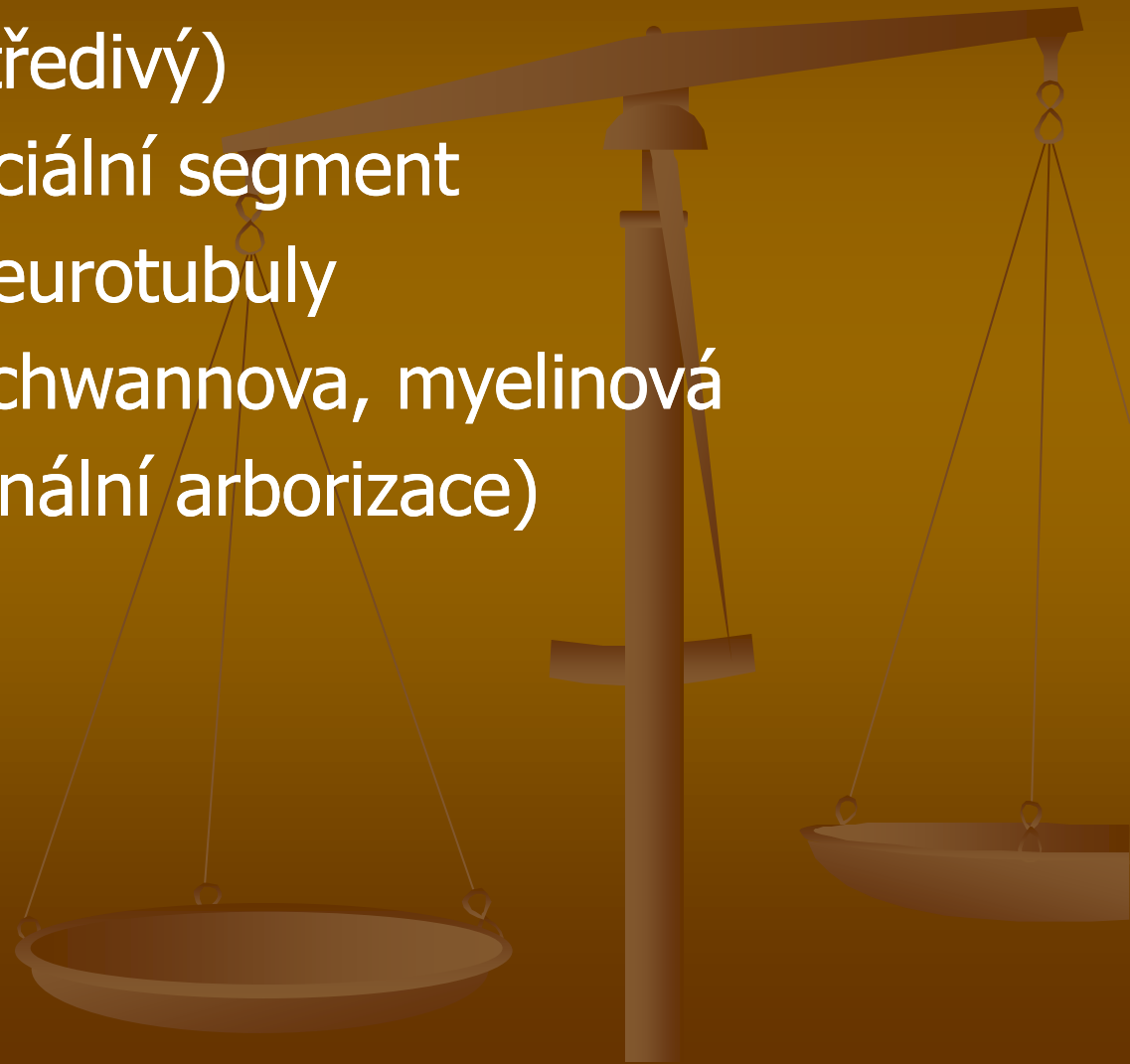
(ř. *dendron*, “strom”)

- krátké, větvené výběžky cytoplazmy,
- centripetální (dostředivé)
- **dendritické trny** (součást synapsí)



Axon (neurit)

- dlouhý, hladký, jen oj. kolaterály
- centrifugální (odstředivý)
- axonový hrbol, iniciální segment
- neurofilamenta, neurotubuly
- obaly (pochvy): Schwannova, myelinová
- telodendrie (terminální arborizace)



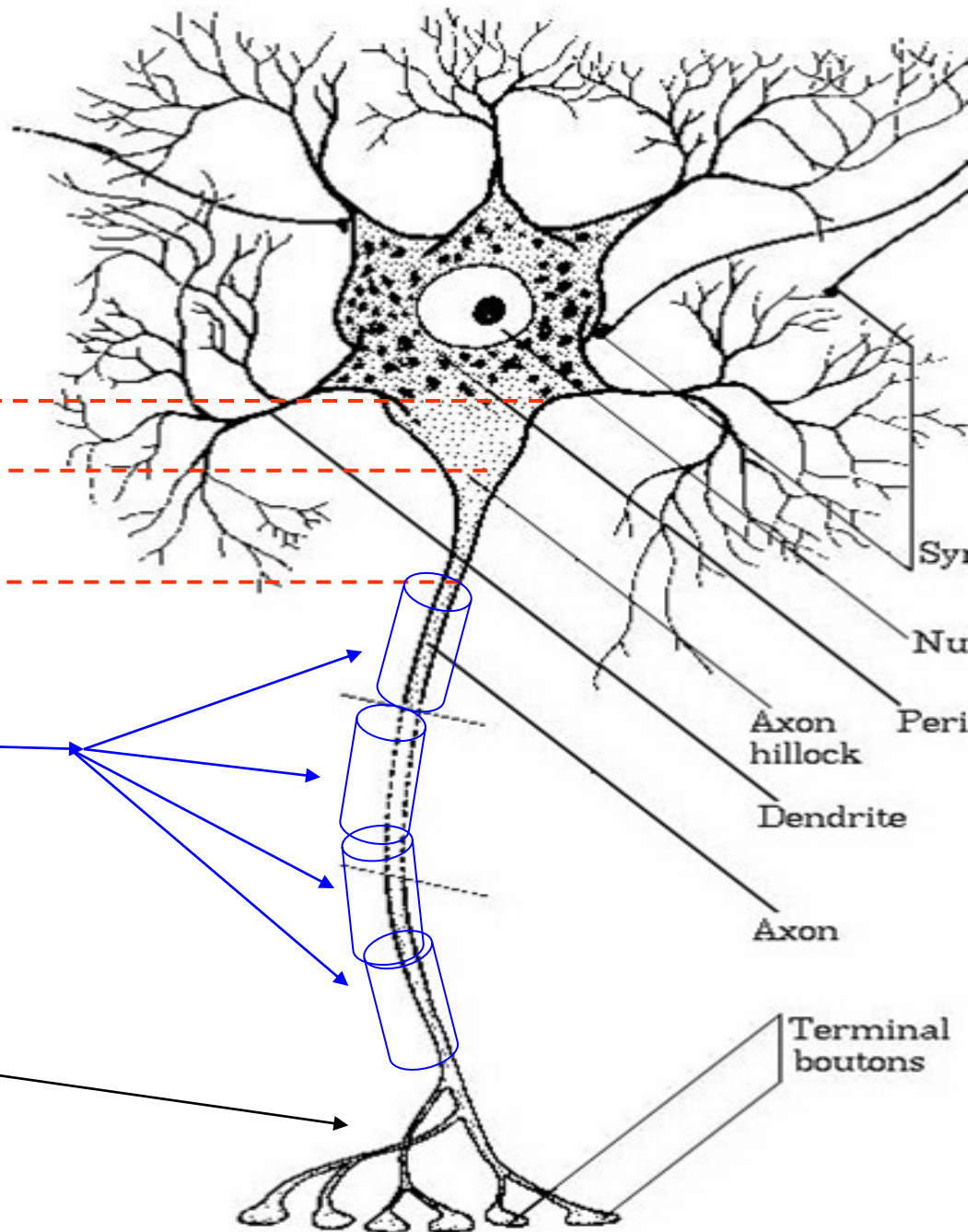
STAVBA AXONU

Axonový hrbol

Iniciální segment

Schwannovy bb

Axonterminály (telodendrion)



obaly axonů (neuritů)

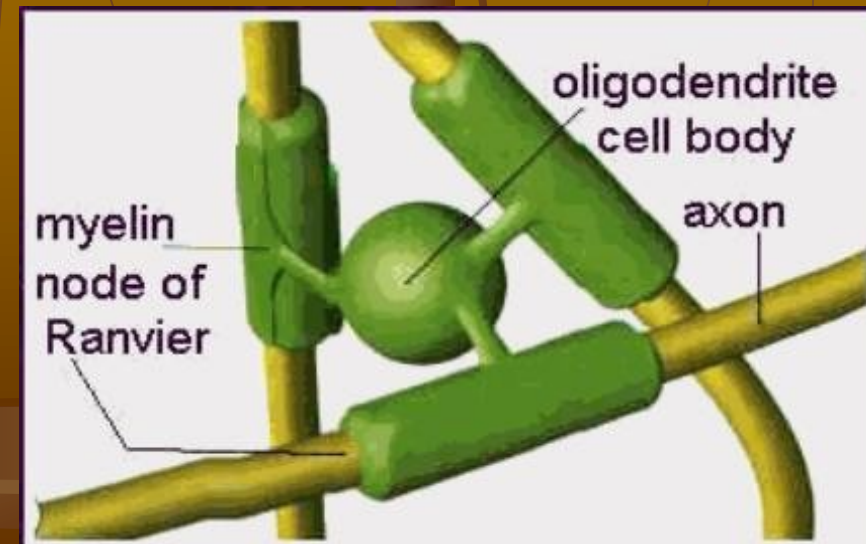
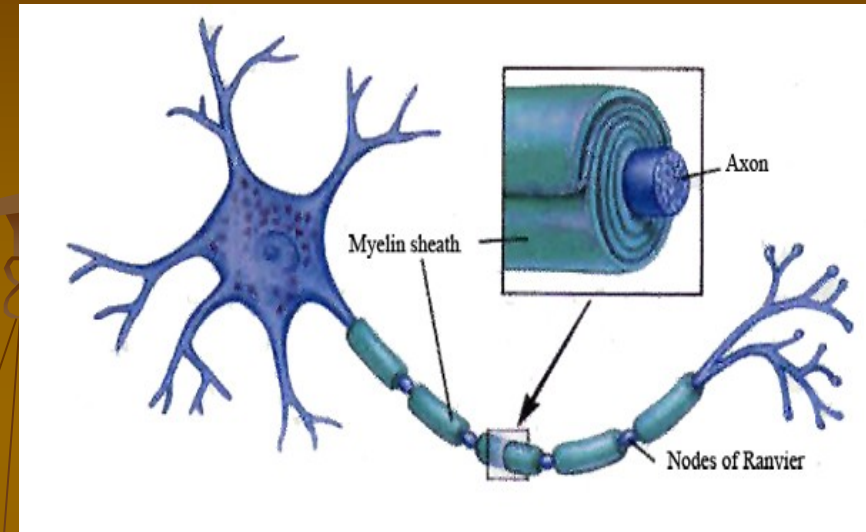
Schwannovy b. (v PNS)



Myelin

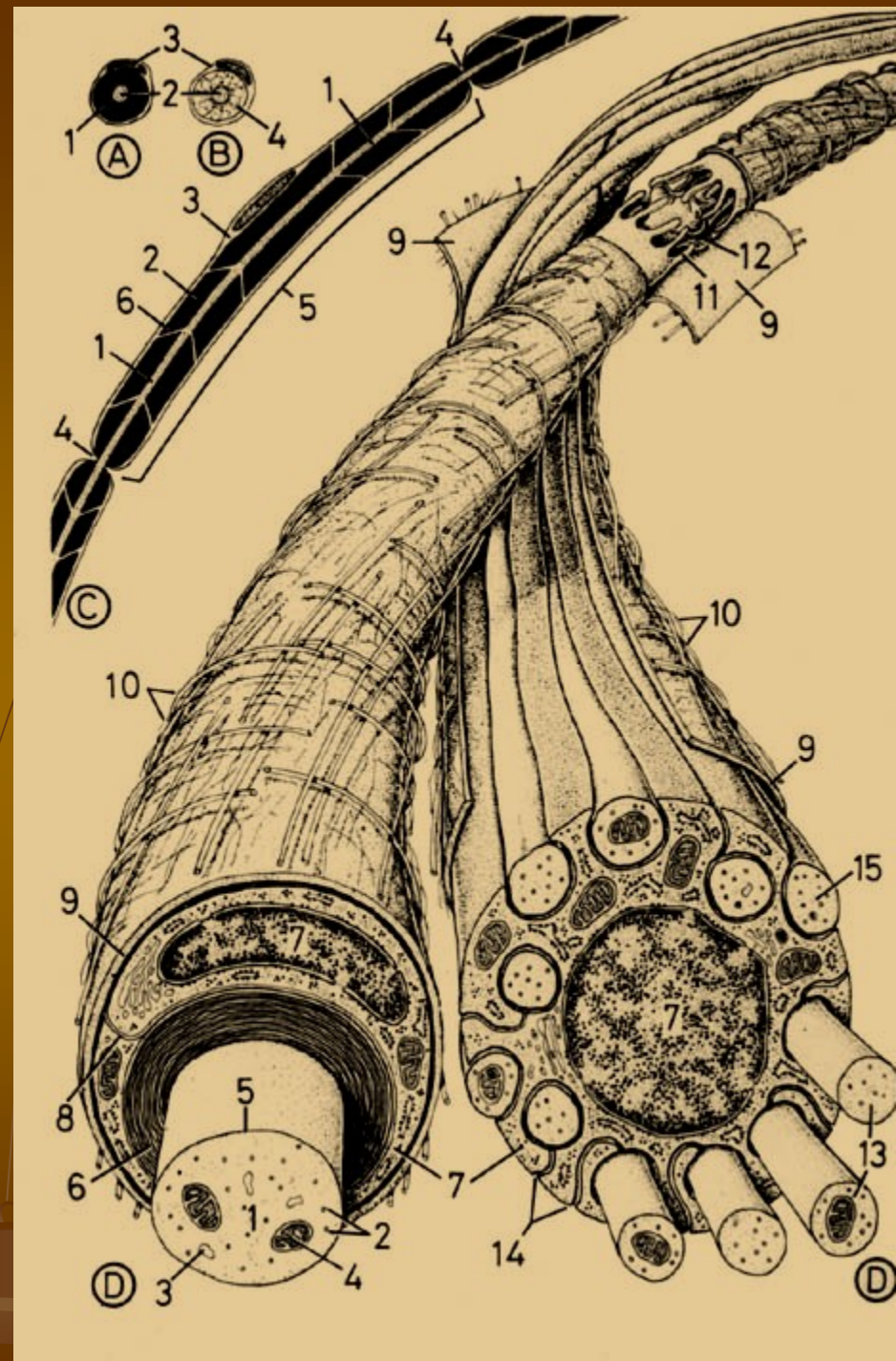
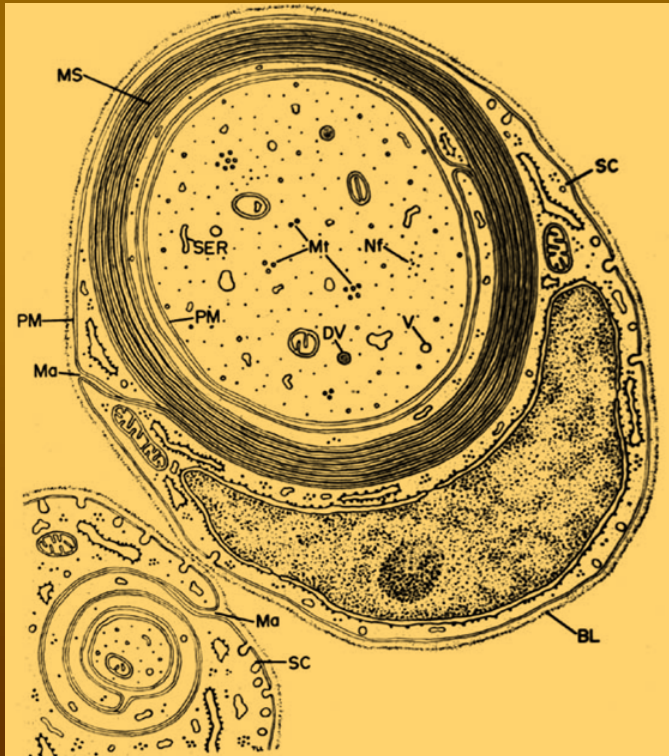


Oligodendrocyty (v CNS)



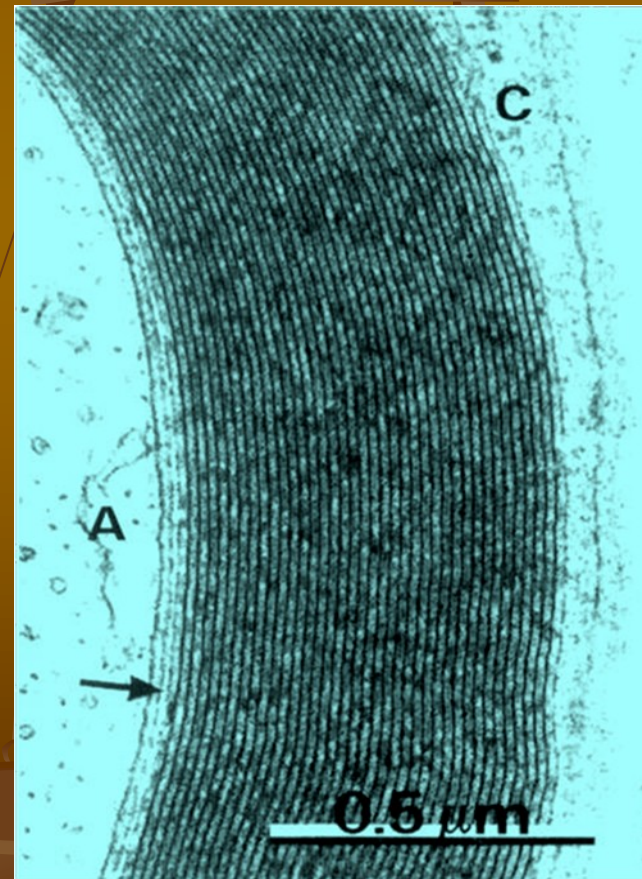
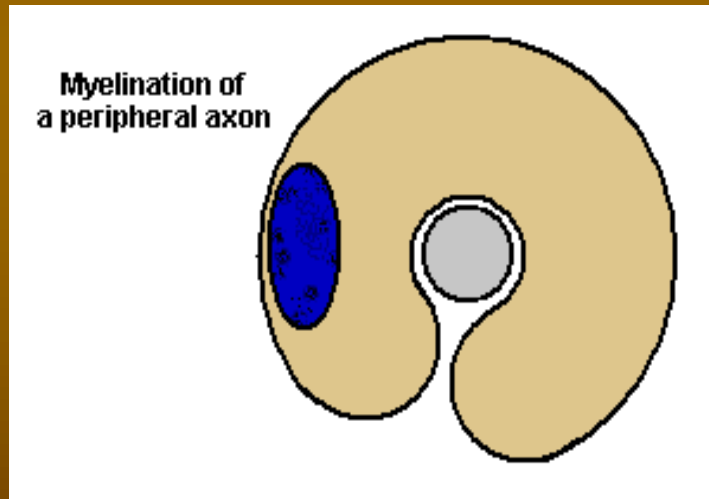
obaly

- myelinová pochva
- Schwannova pochva (v PNS)
- oligodendrocyty (v CNS)

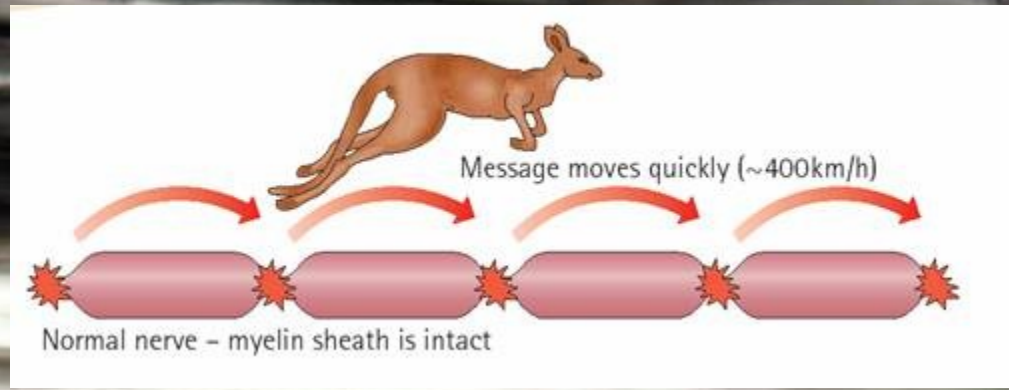


Myelinová pochva

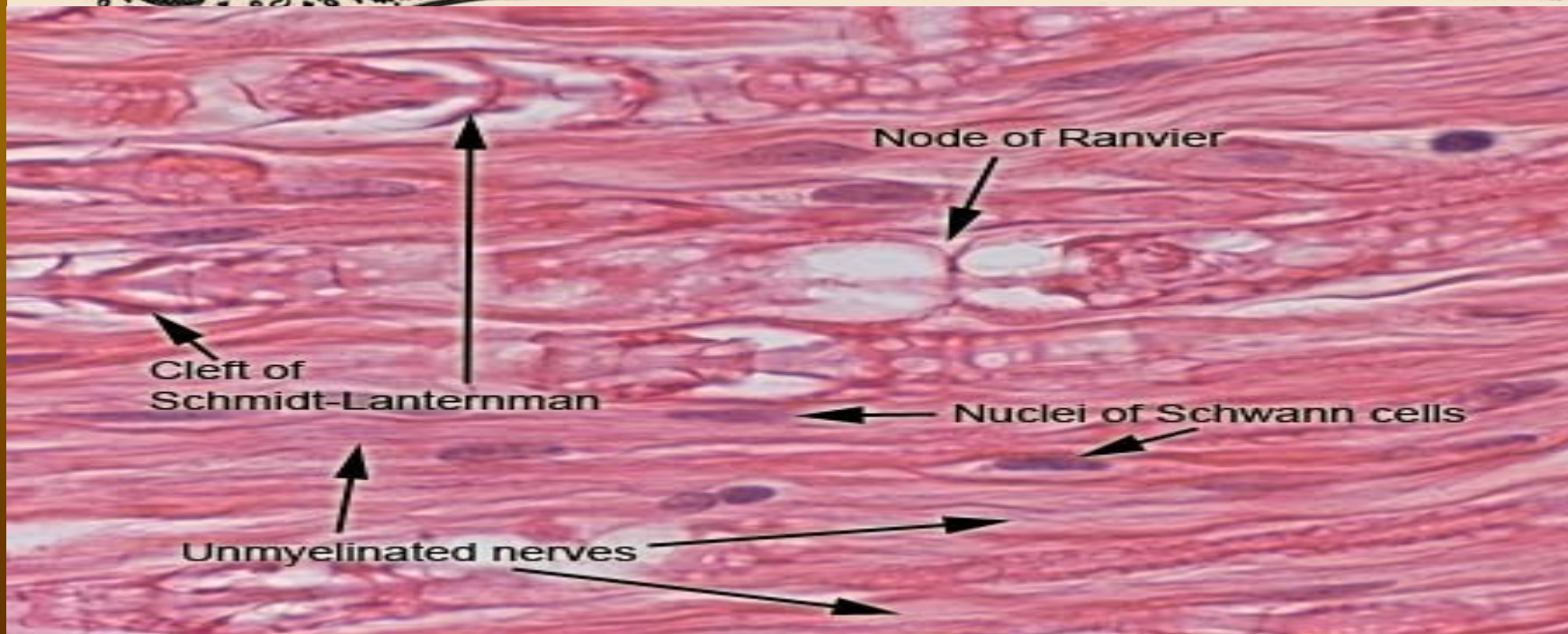
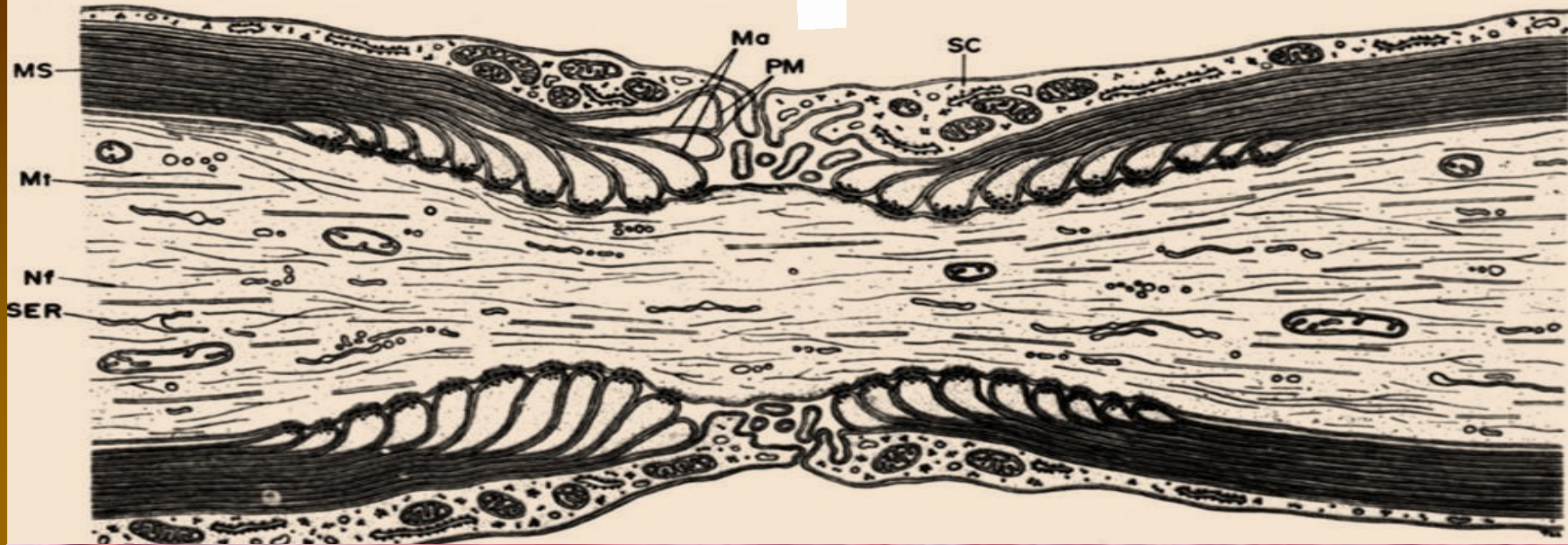
- 1 - 20 μm \leftrightarrow
- 70 % H_2O , lipidy, proteiny
- koncentricky uspořádané lamely lipoproteinů
- Ranvierovy zářezy; internodia (Ranvier. segmenty, 0,6–2,0 mm \leftrightarrow)



Ranvierovy zářezy Internodium - saltatorní vedení (skokem)

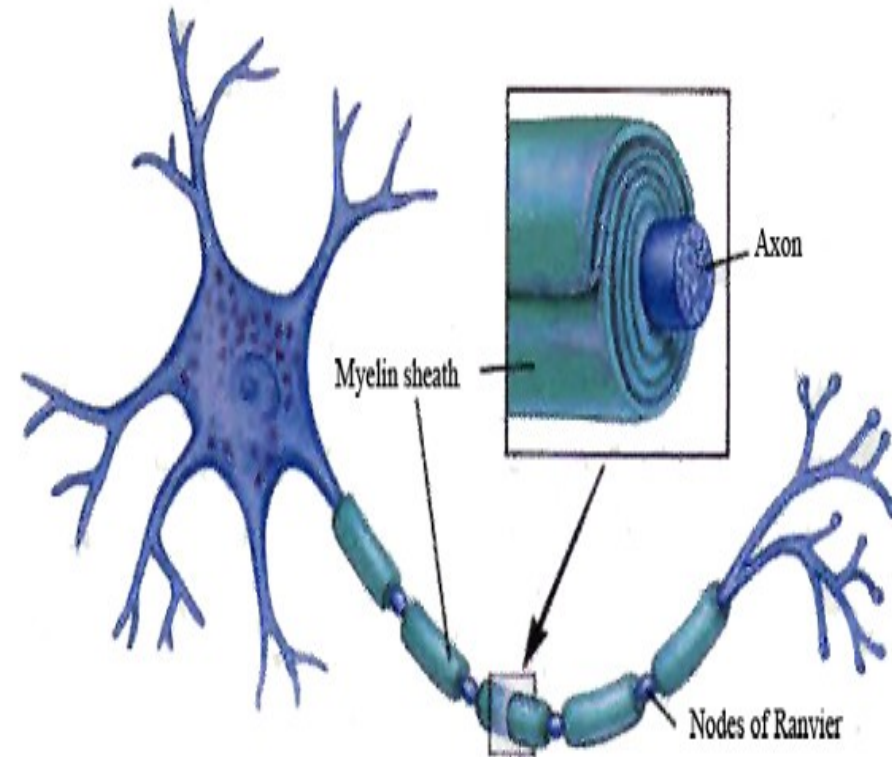


20 μ m

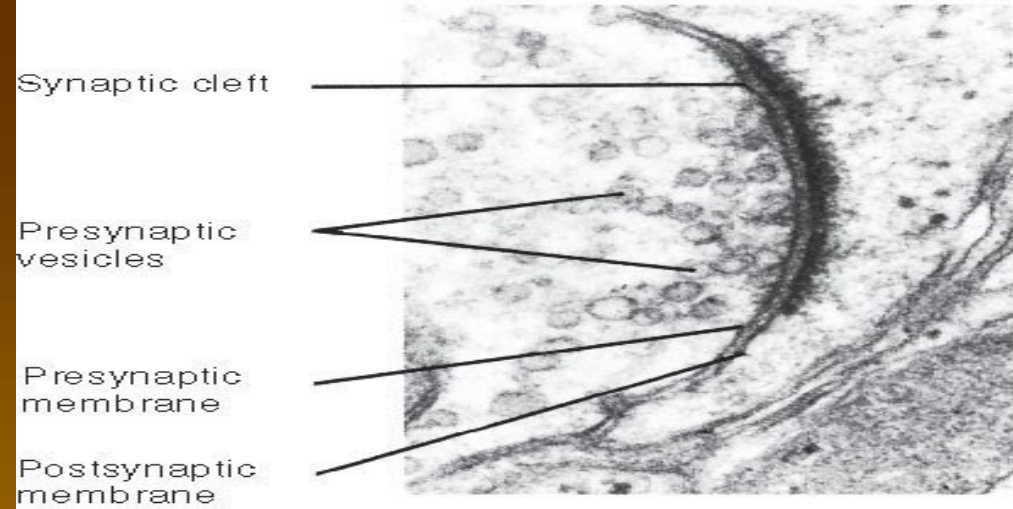


Neurilema = Schwannovy bb.

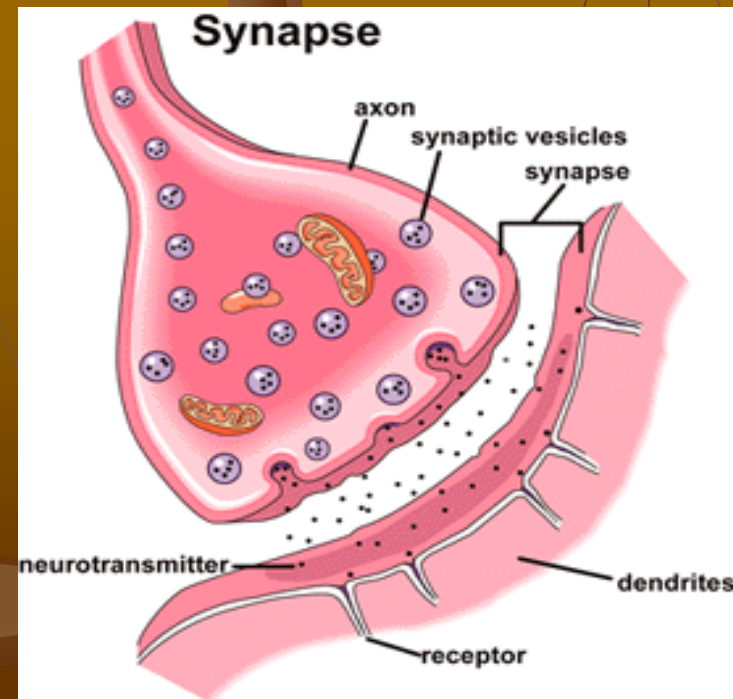
- vlákna bez myelin. pochvy – (jen Schwannovy bb. kolem axonu)
- myelinizovaná vlákna – každé internodium má „svoji“ Schwannovu b.



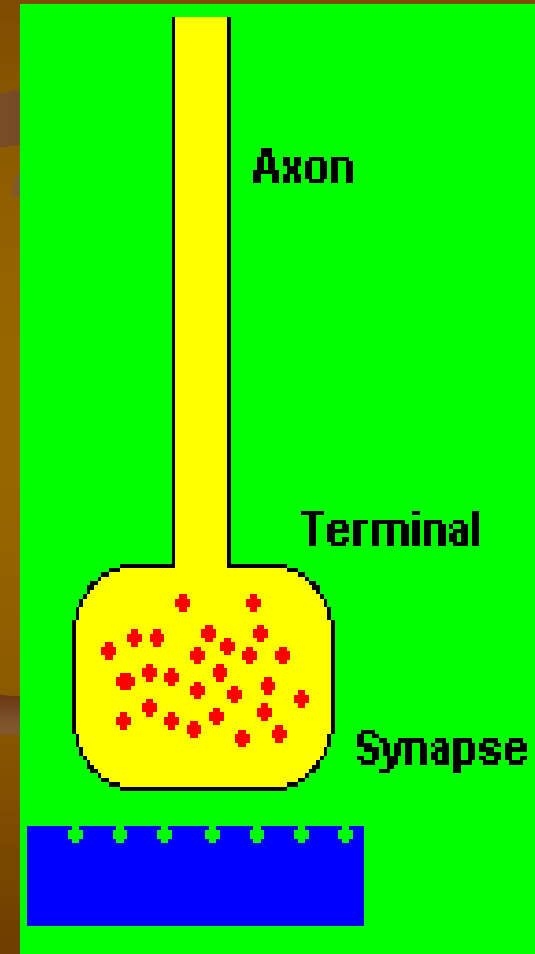
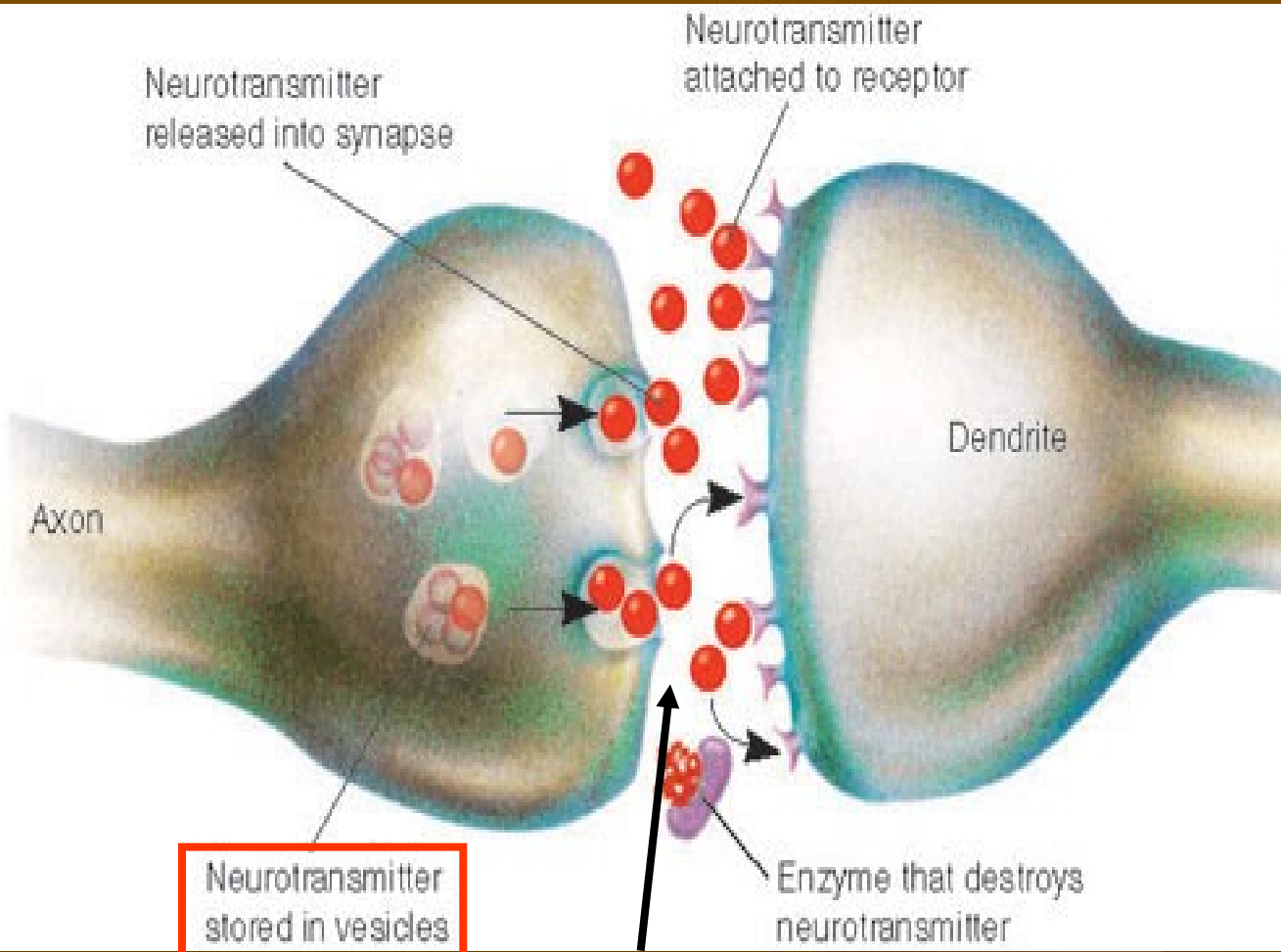
Synapse



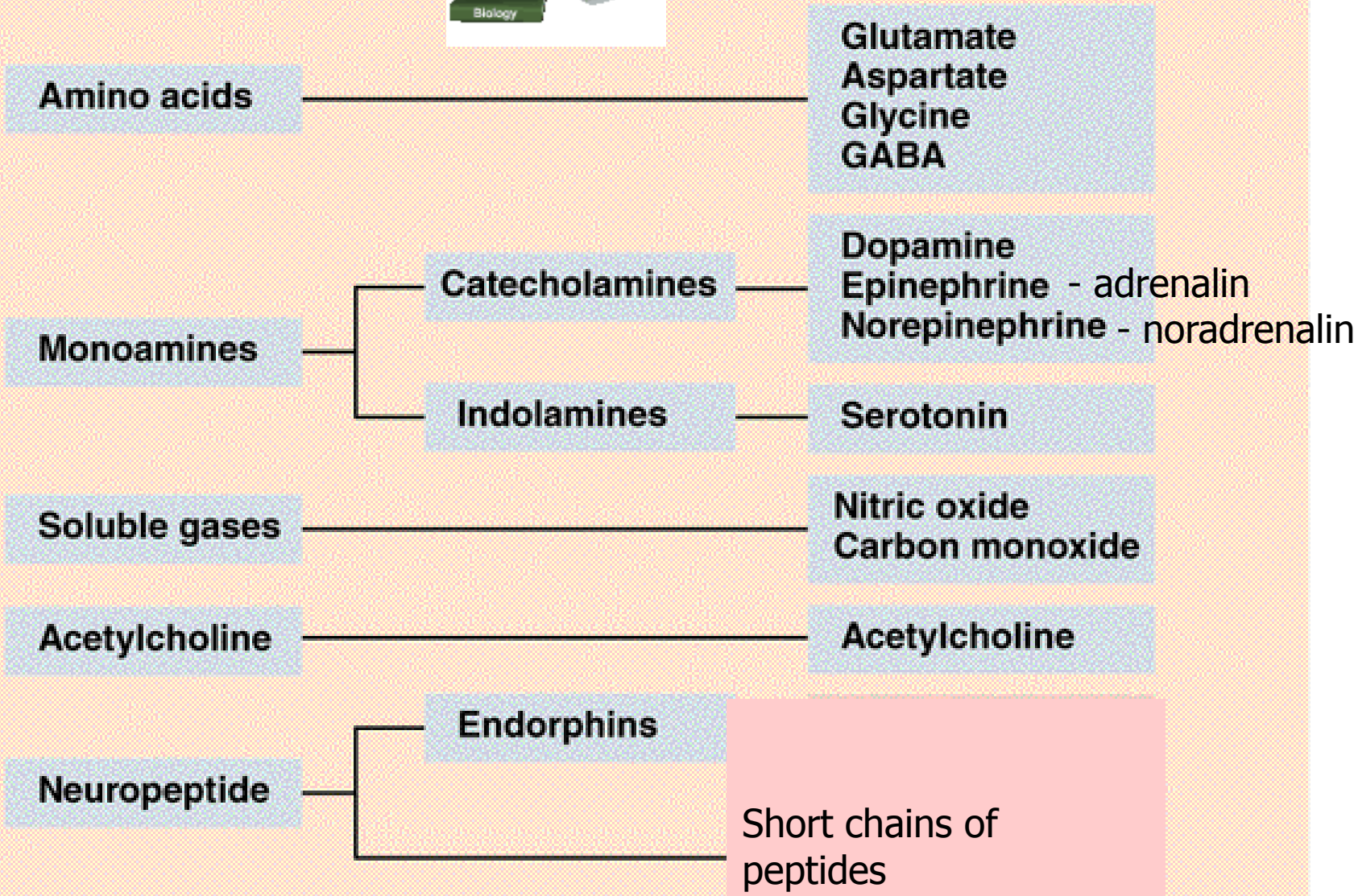
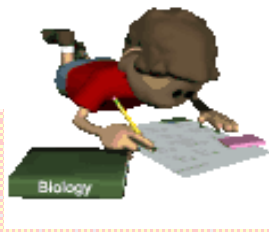
- pro převod vzruchu mezi 2 neurony nebo neuronem a efektorovou b.,
- chemická nebo elektrická synapse,
- úseky synapse:
 - 1) presynaptické zakončení
 - 2) synaptická štěrbiná
 - 3) postsynaptická membrána



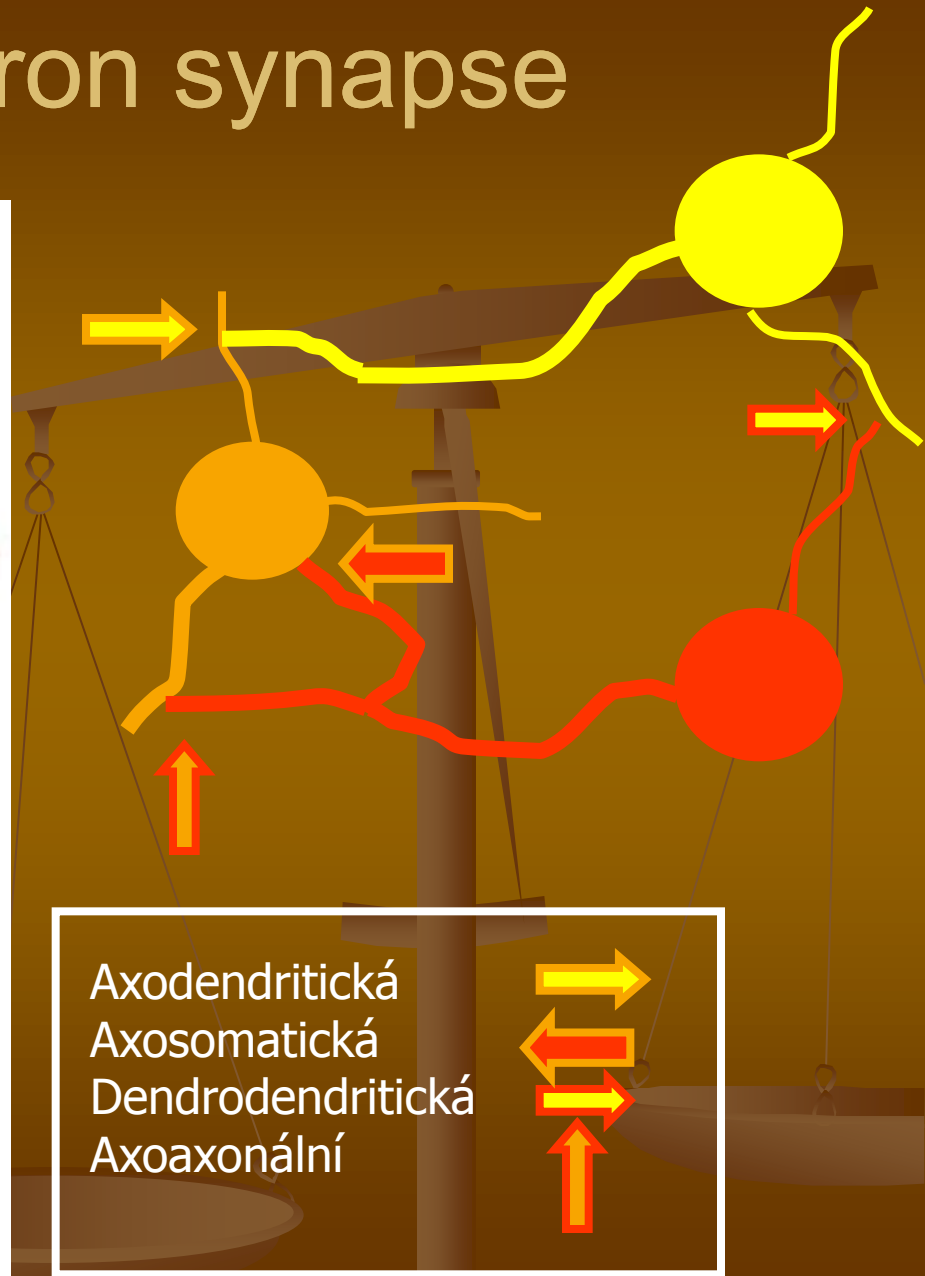
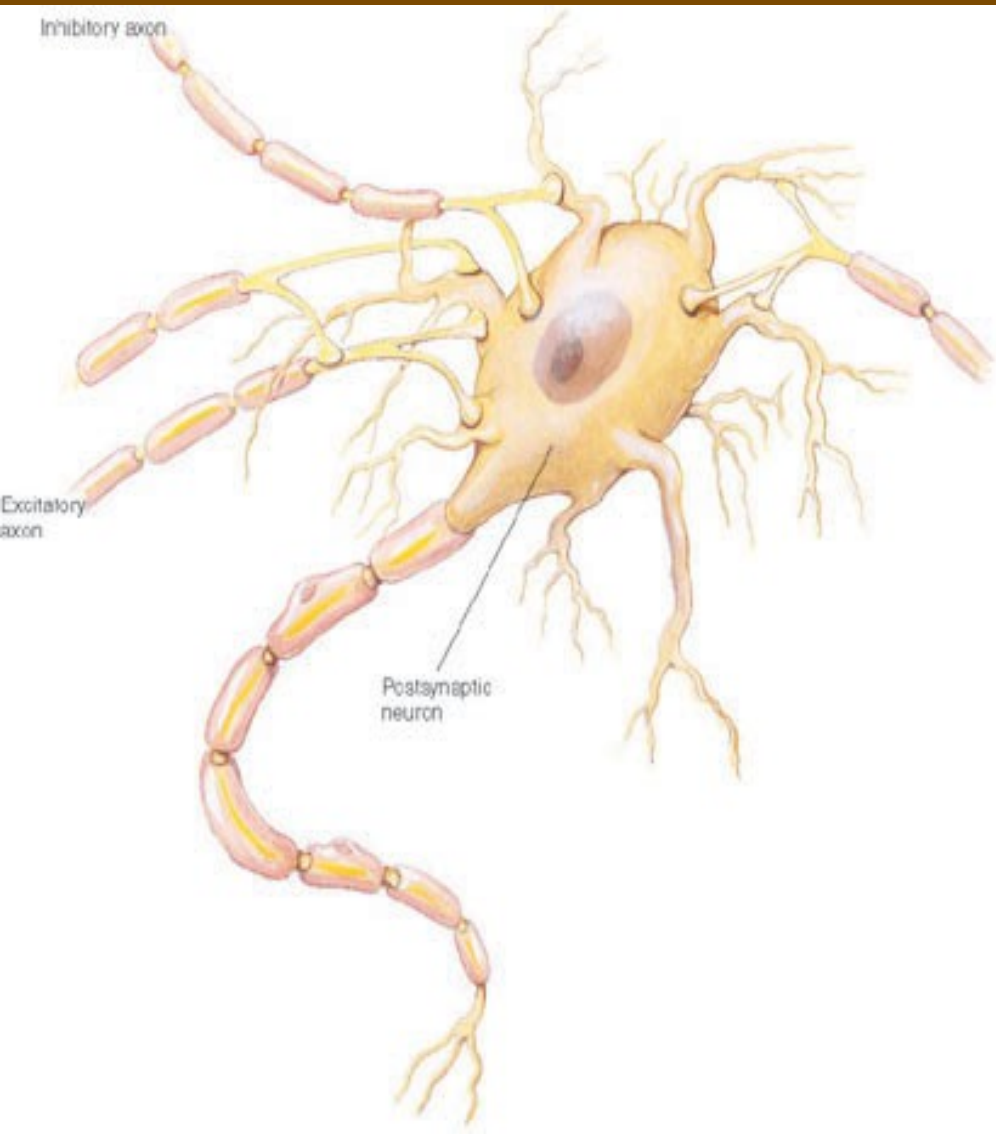
Funkce synapse



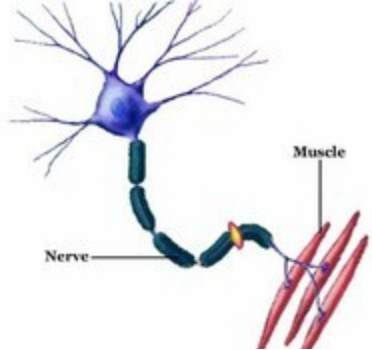
► Classes of Neurotransmitters



neuron – neuron synapse

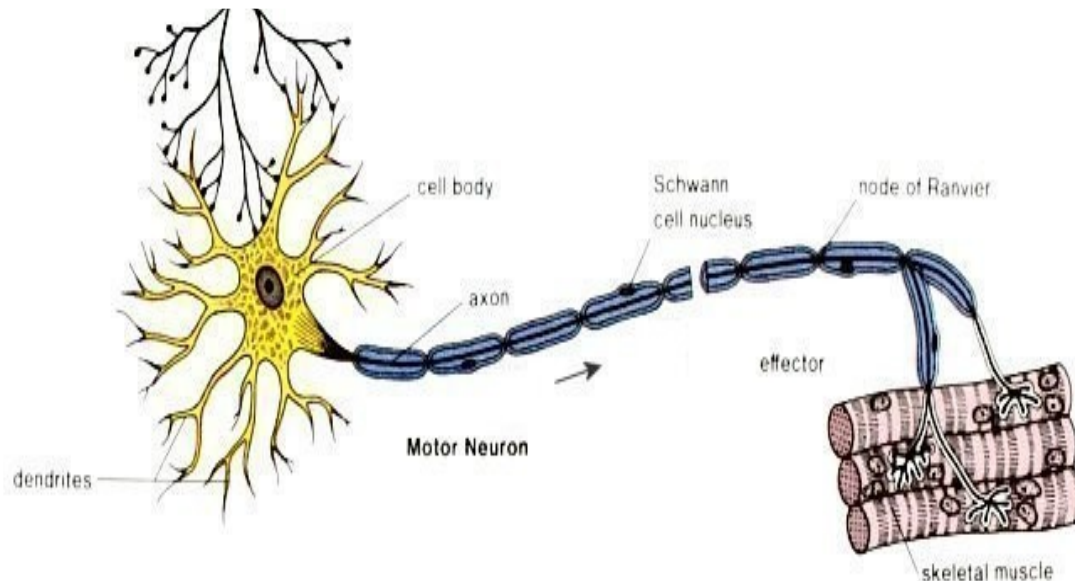
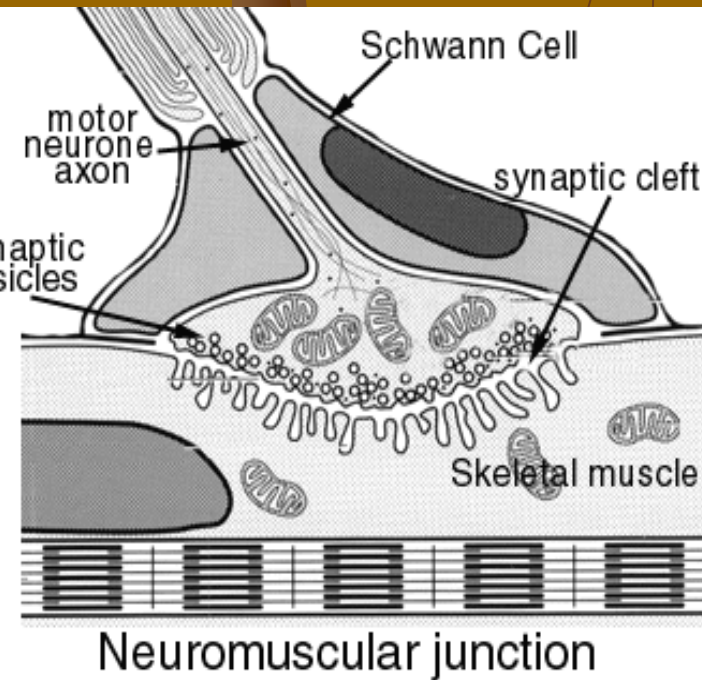


Periferní synapse neuron – efektor



Efektorové buňky:

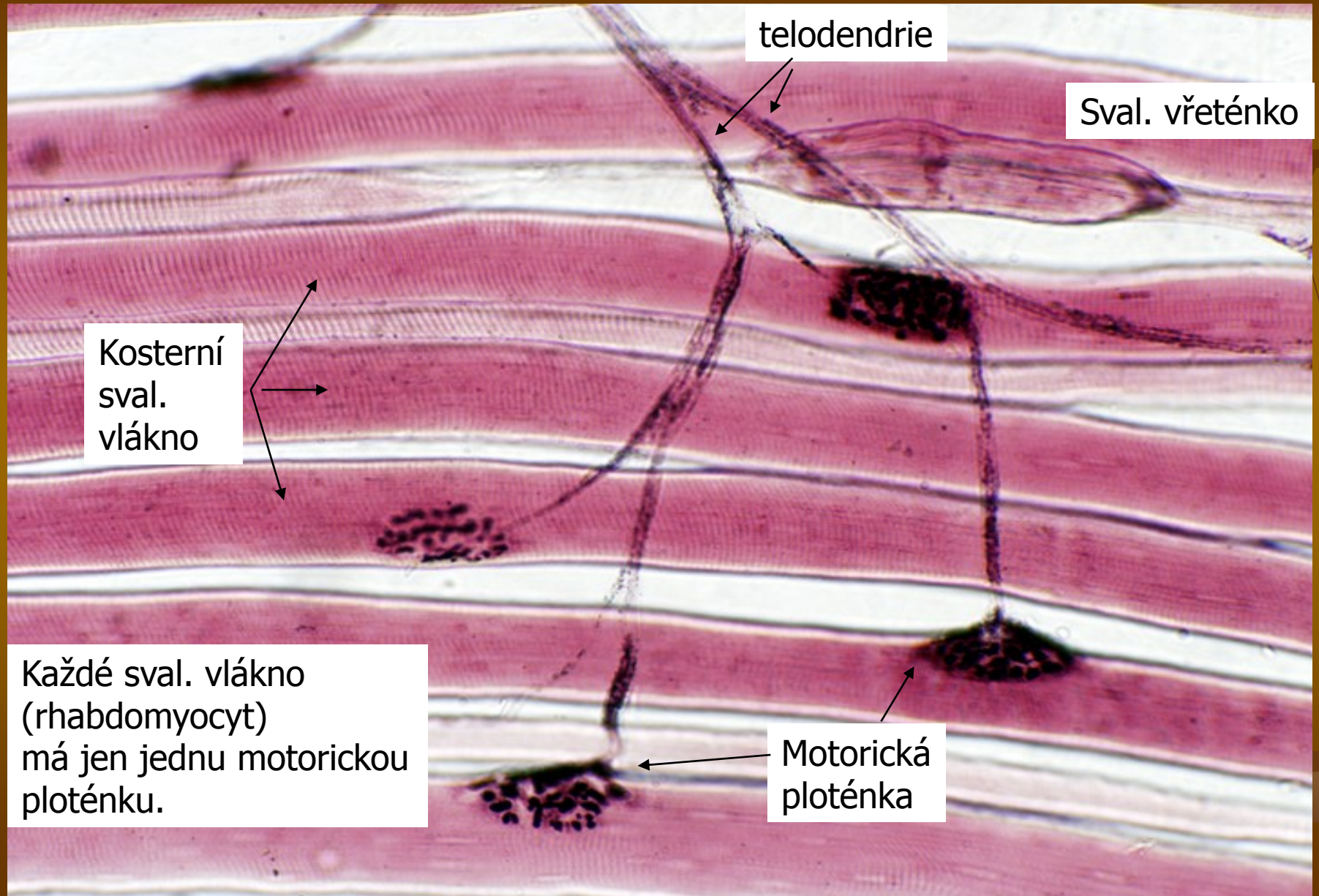
žlázové, svalové (hladká, kosterní, srdeční)
jejich plazmalema představuje postsynaptickou membránu





Motorické ploténky v motorické jednotce

Tato svalová vlákna s kontrahují současně



Neuroglie

Centrální glie

- astrocyty fibrilární/astrocyty plazmatické
hematoencefalická bariéra
- oligodendrocyty – **myelin**
- mikroglie – **fagocytóza (neuronofagie)**
- ependymocyty – **výstelka komory + produkce likvoru**

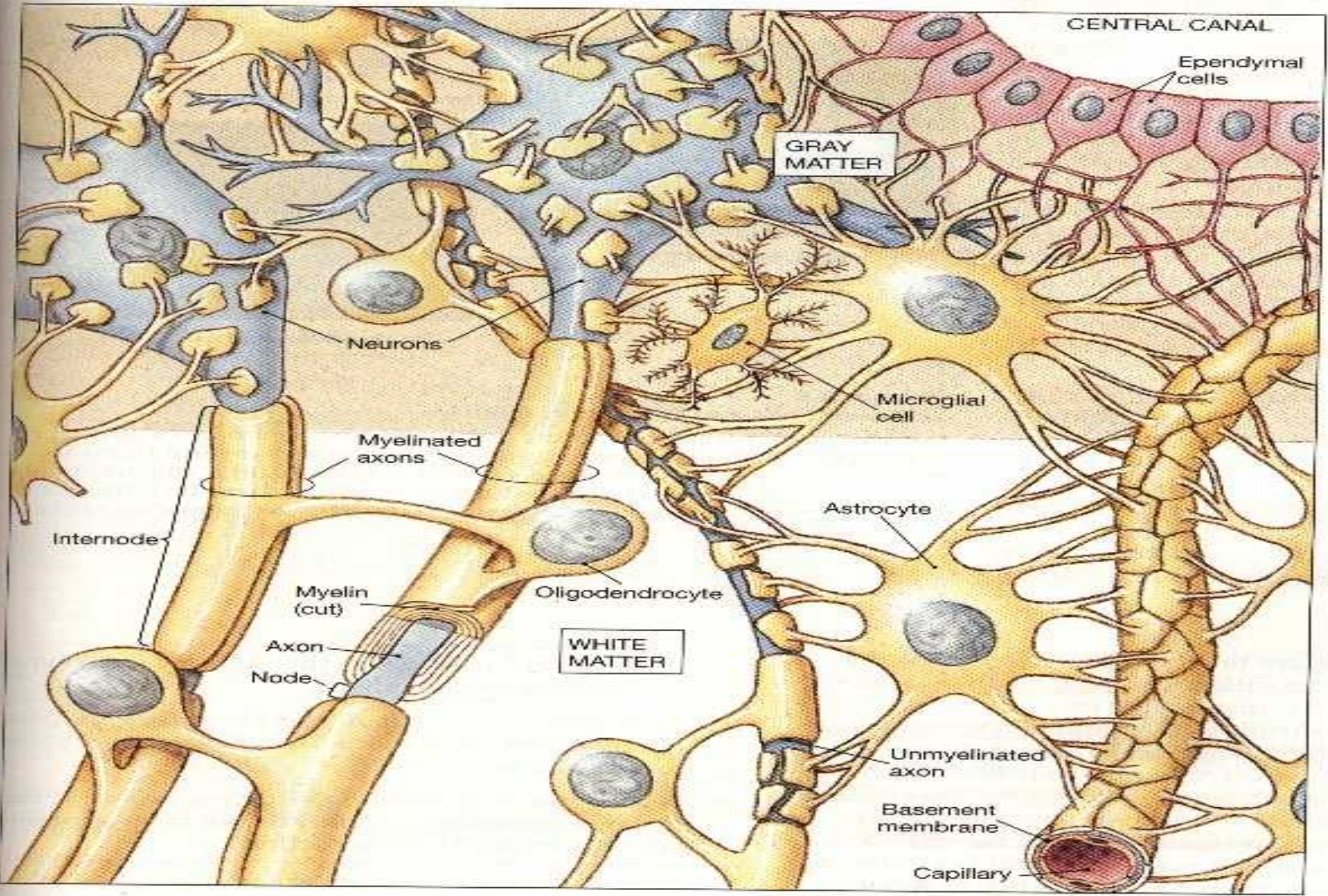
Periferní glie

- Schwannovy buňky (lemnocyty) – **myelin neurilemma**
- satelitové (plášťové) buňky – **izolace perikaryí v gangliích**

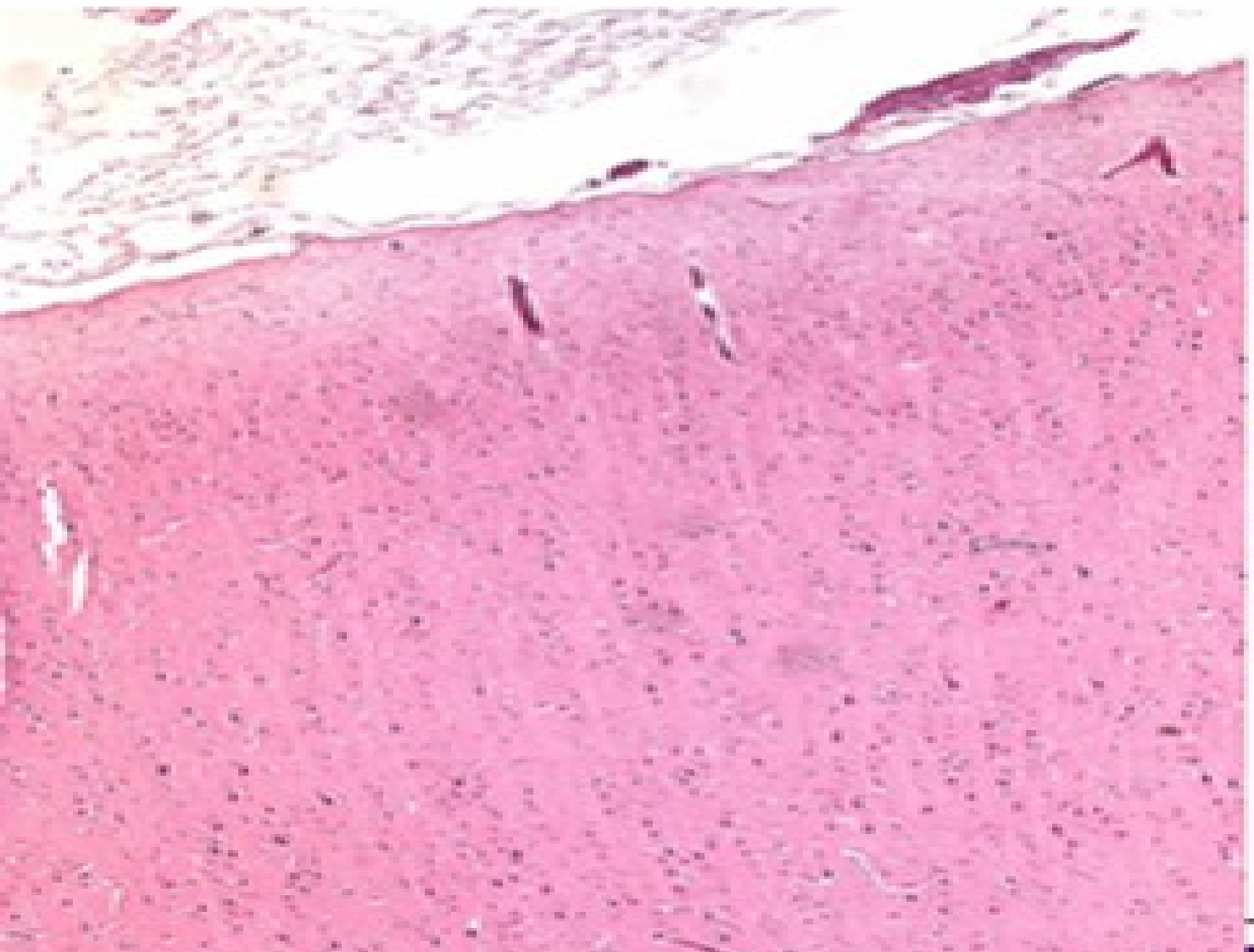


NS – struktura:

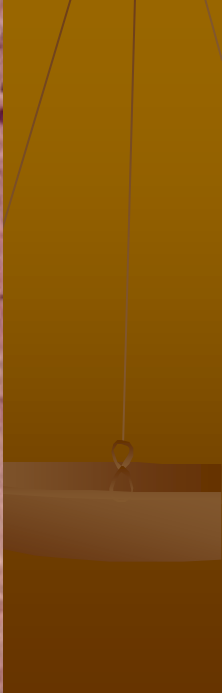
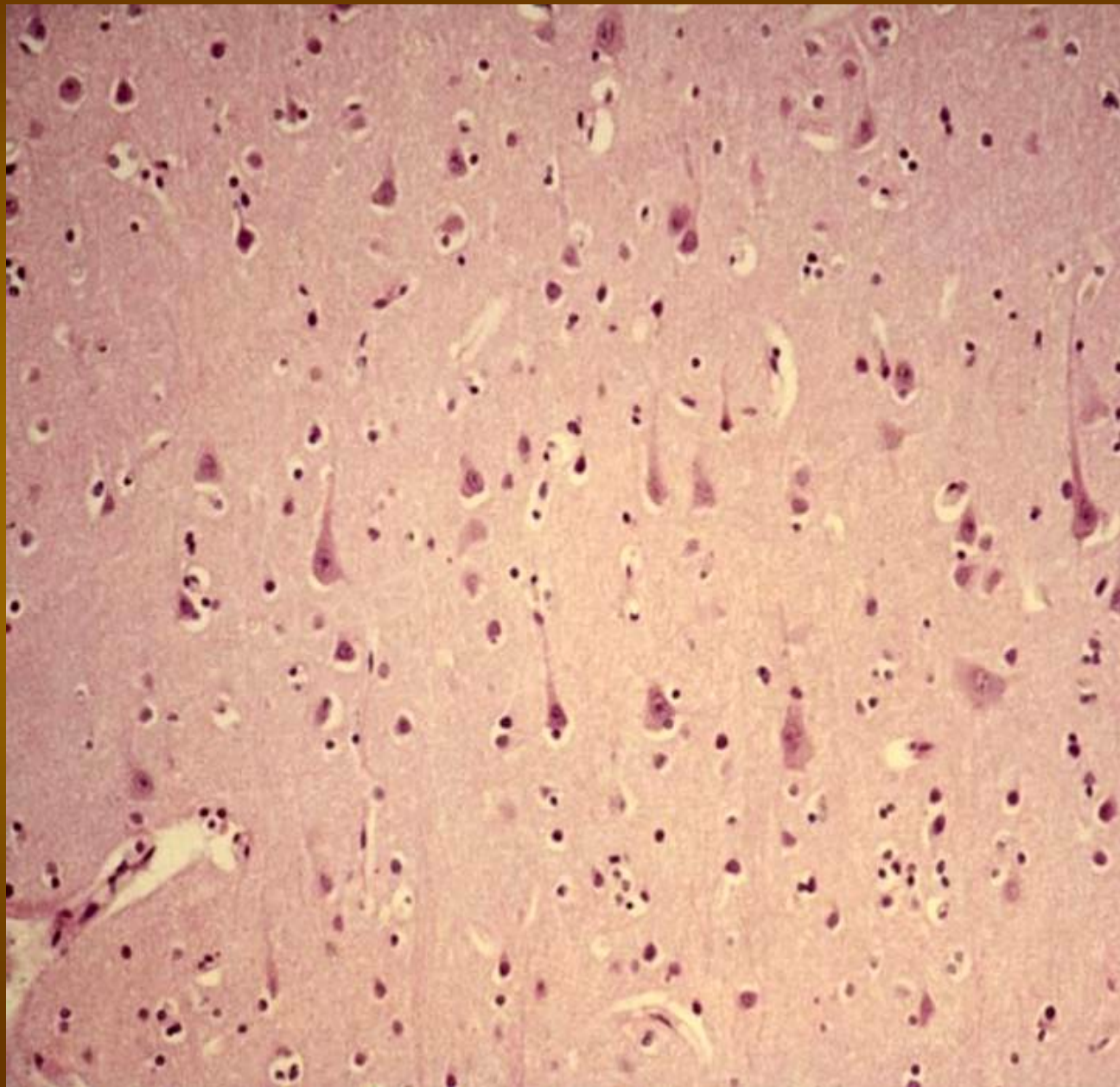
Neurony + gliové buňky



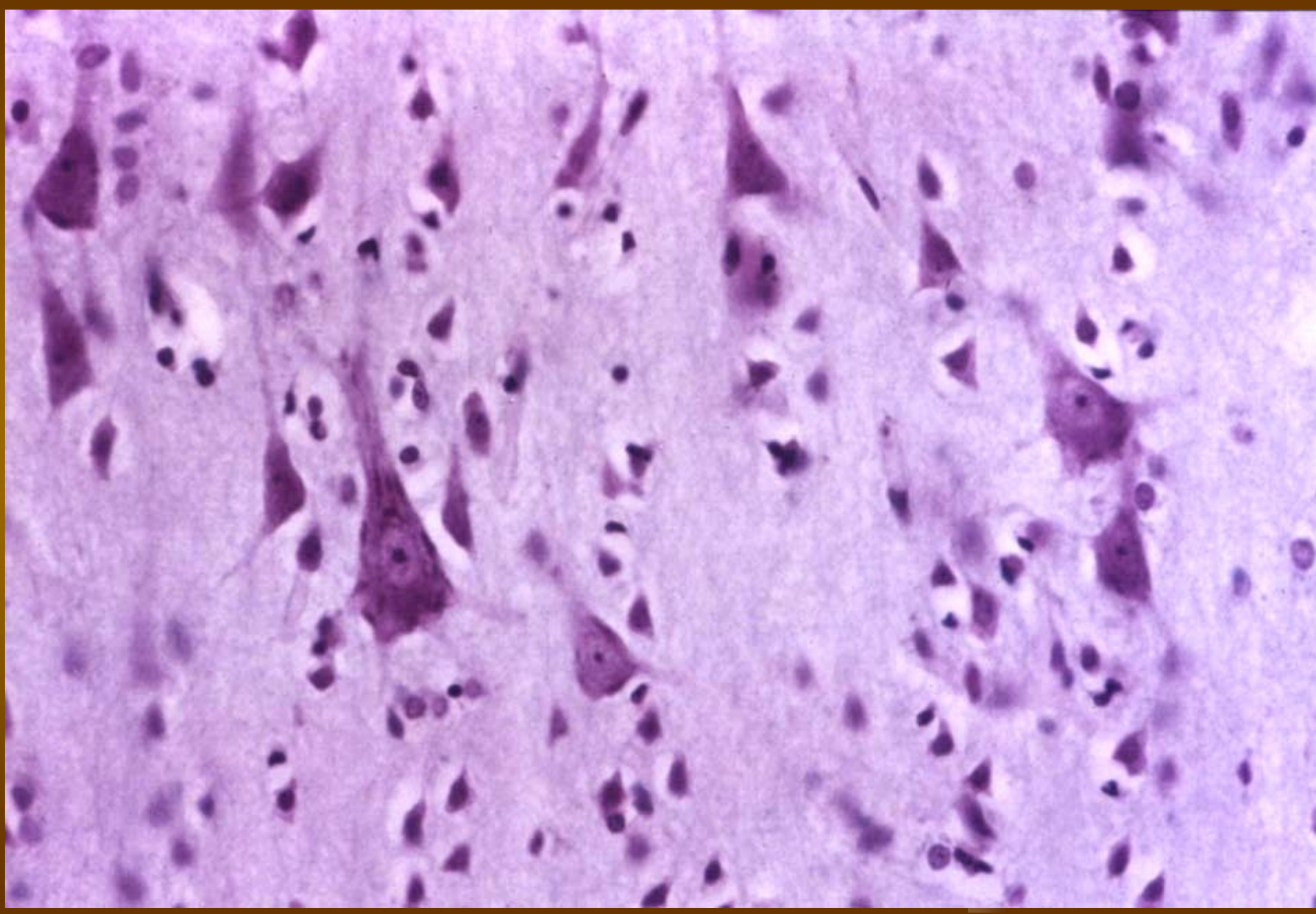
Cortex cerebri



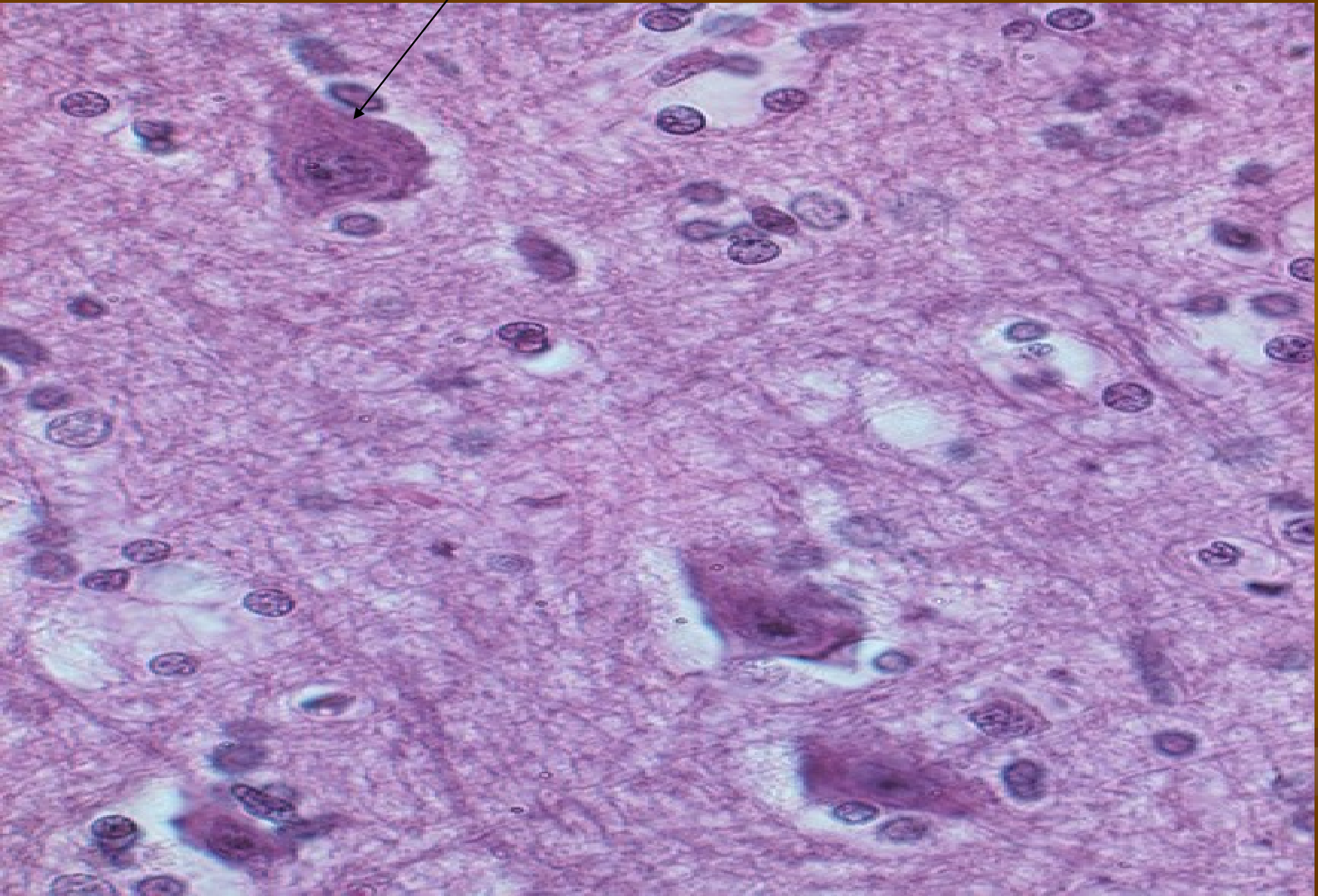
Cortex cerebri (HE) – lamina pyramidalis



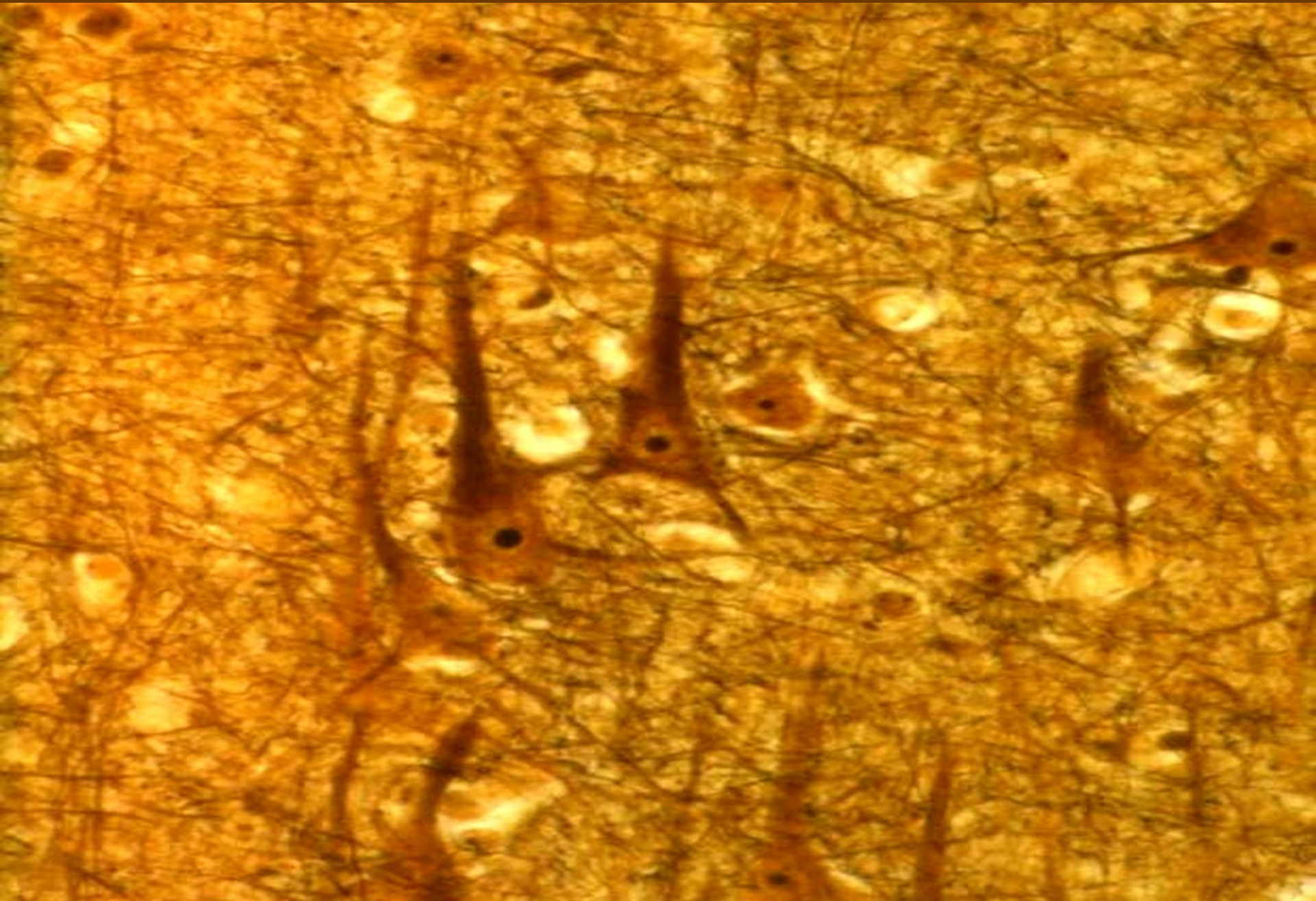
Cortex cerebri (HE) – velké pyramidové buňky = multipolární neurony



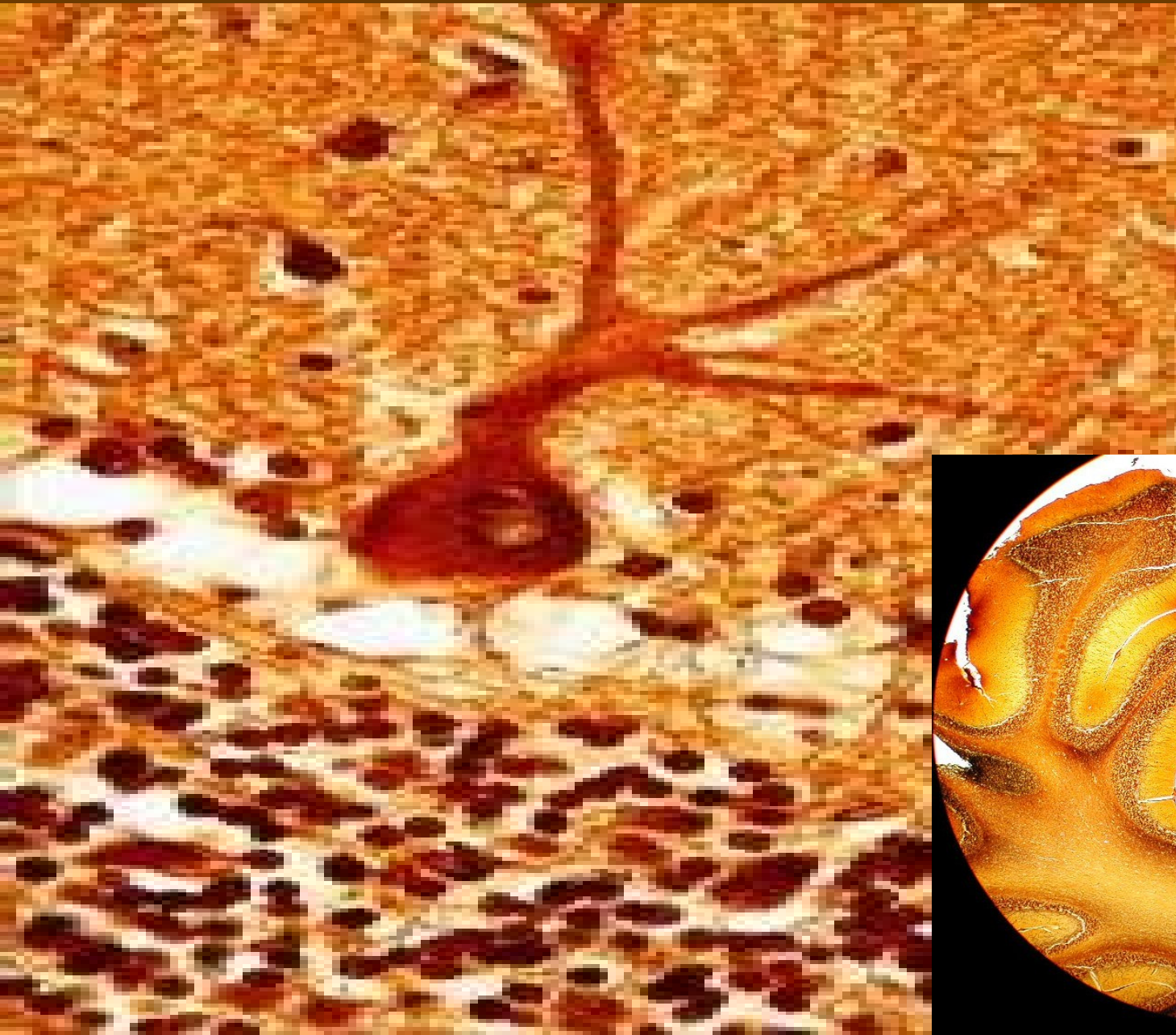
Cortex cerebri (HE) – pyramidové buňky



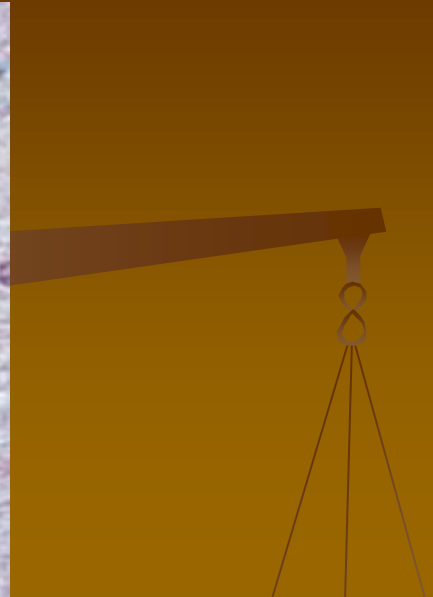
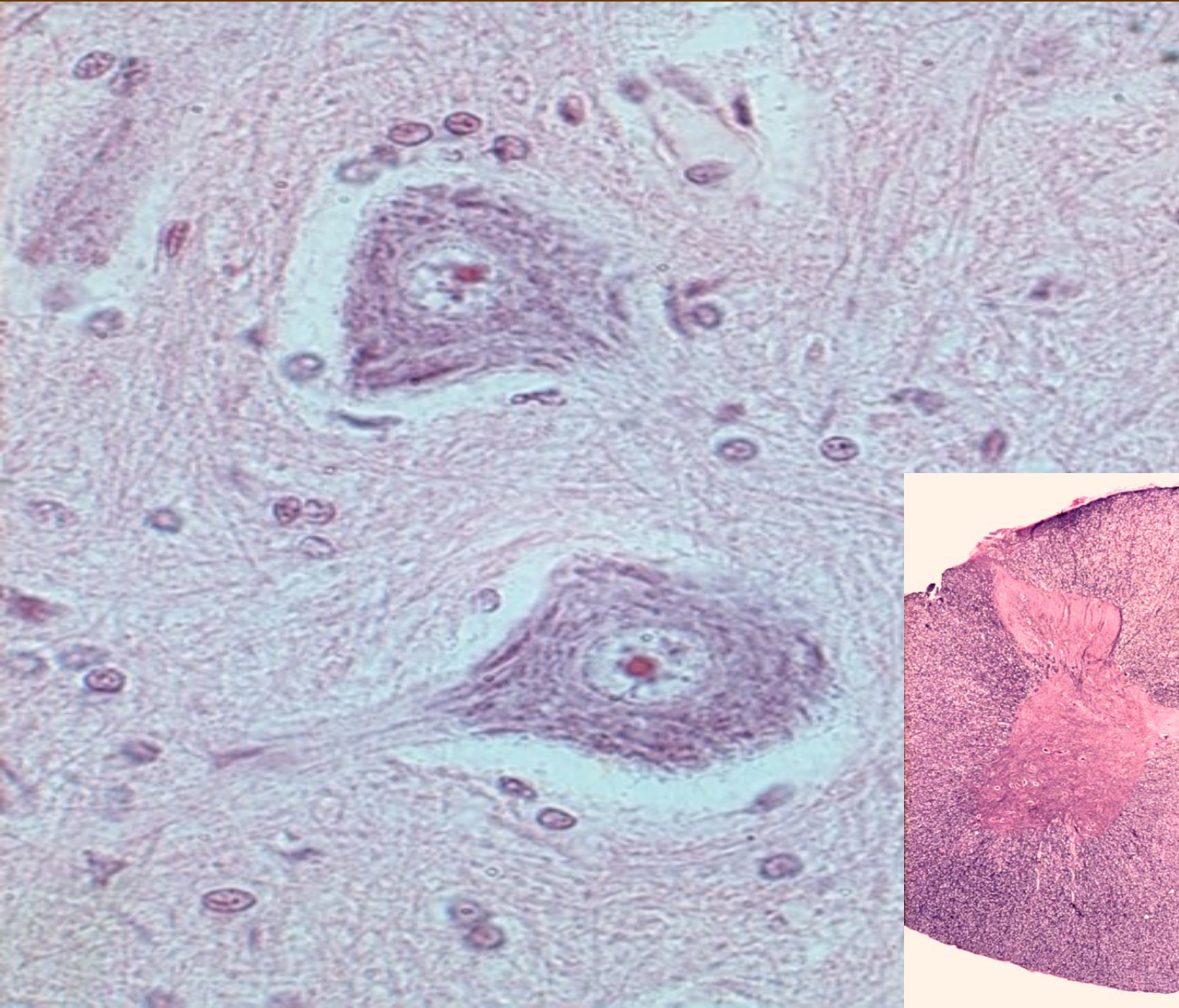
Cortex cerebri (impregnace) – pyramidové buňky



Cerebellum (impregnace) – Purkyňovy buňky = bipolární neurony

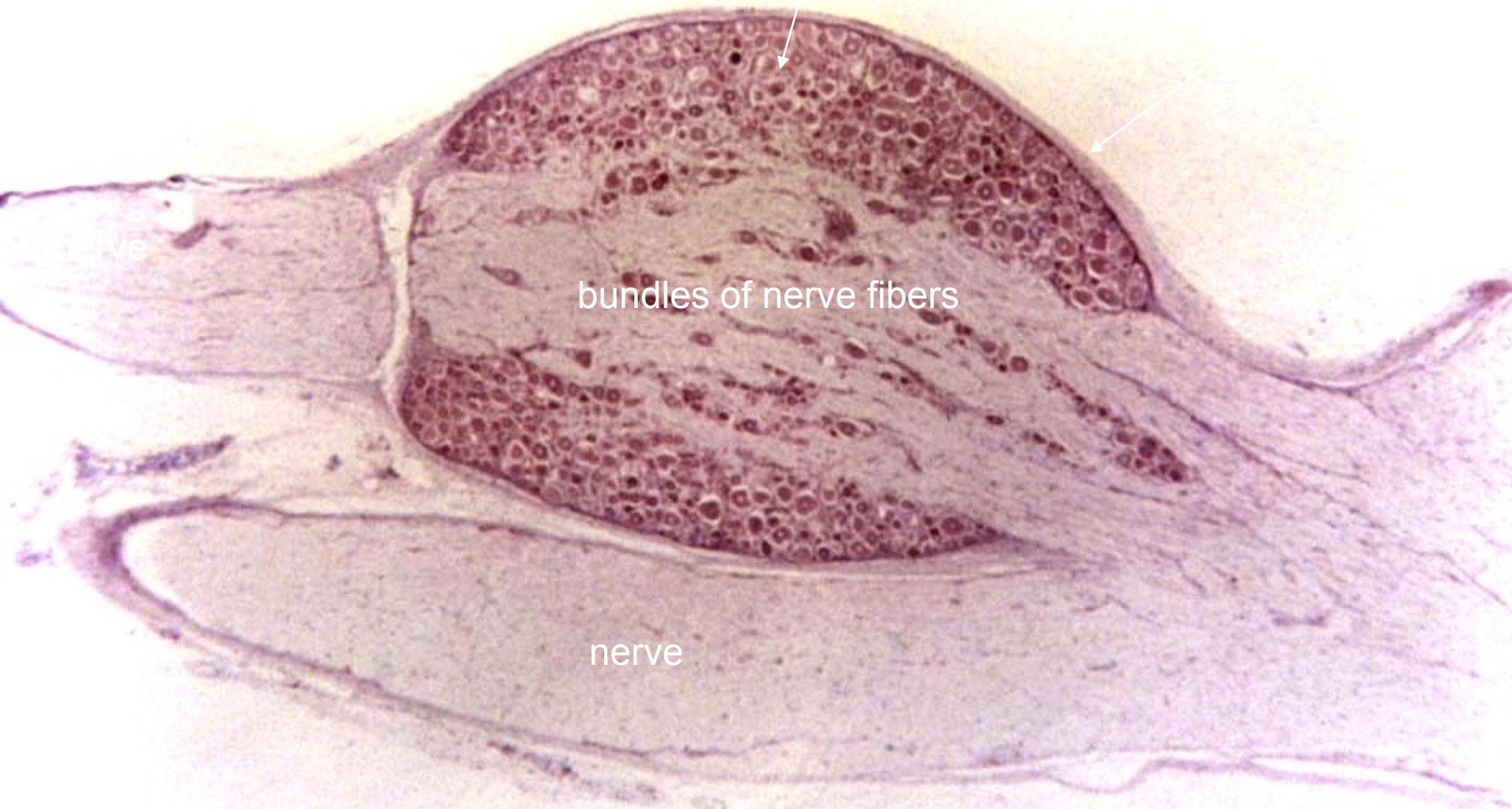


Medulla spinalis (HE) – somatomotorické neuron = multipolární



Spinalní ganglion (HE)

pseudounipolární neurony

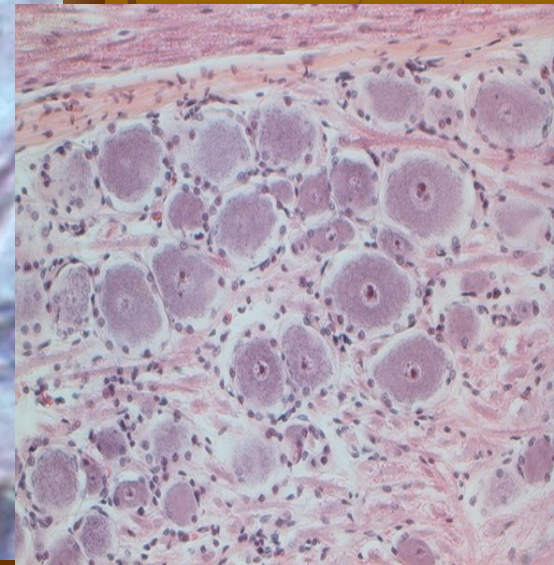
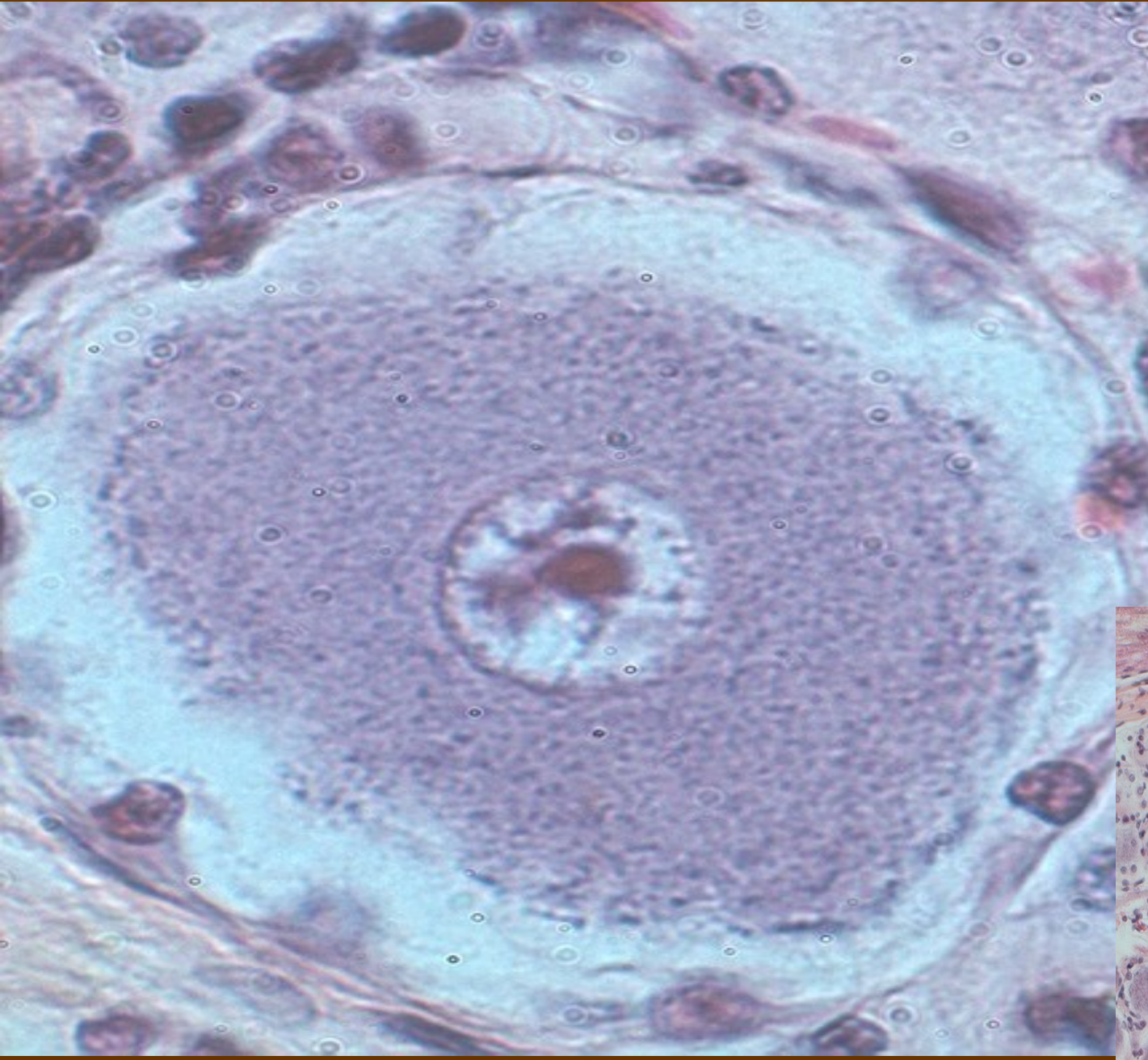


nerve

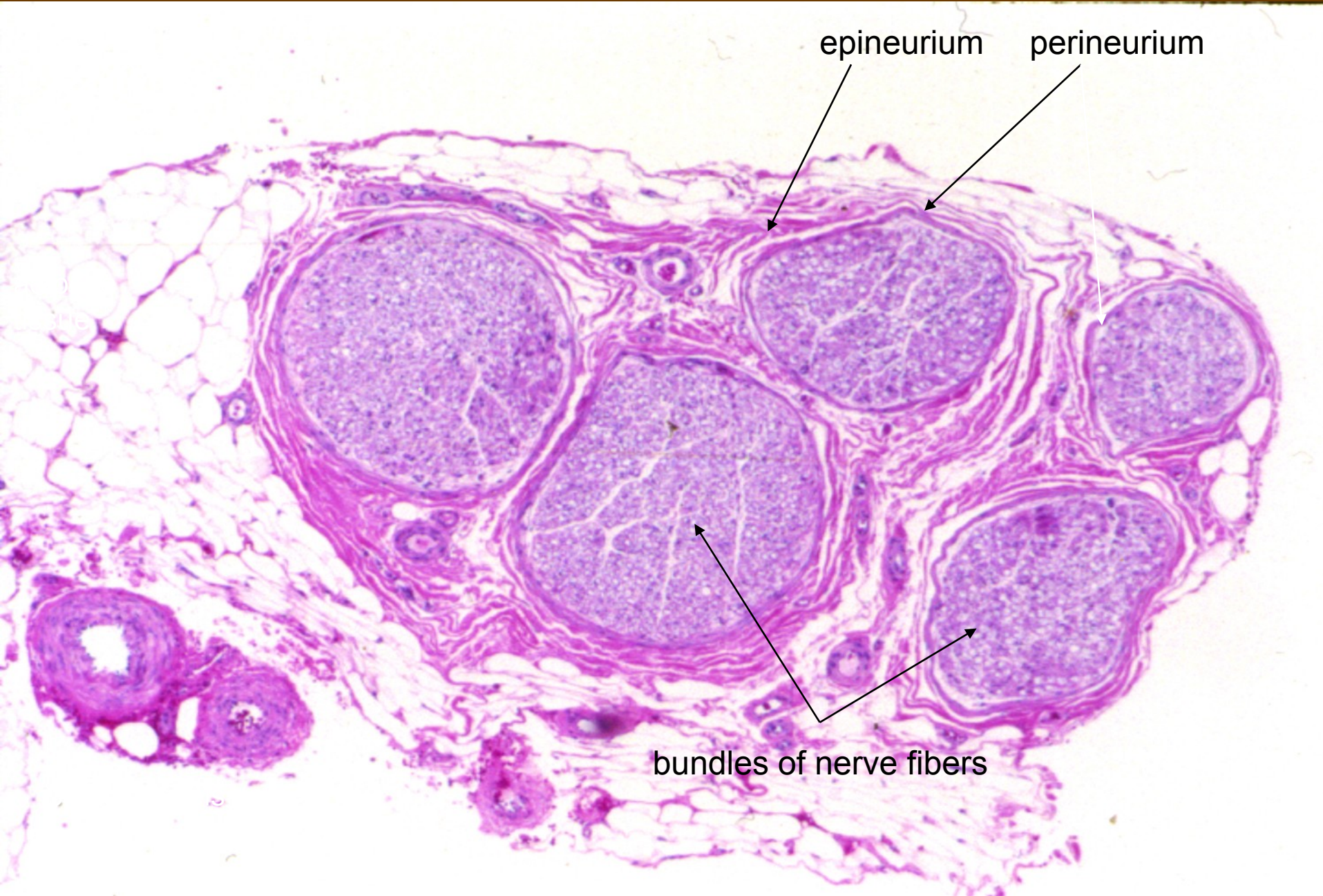
bundles of nerve fibers

nerve

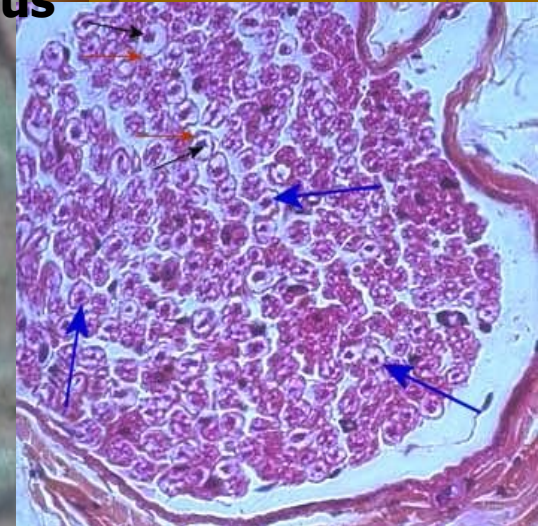
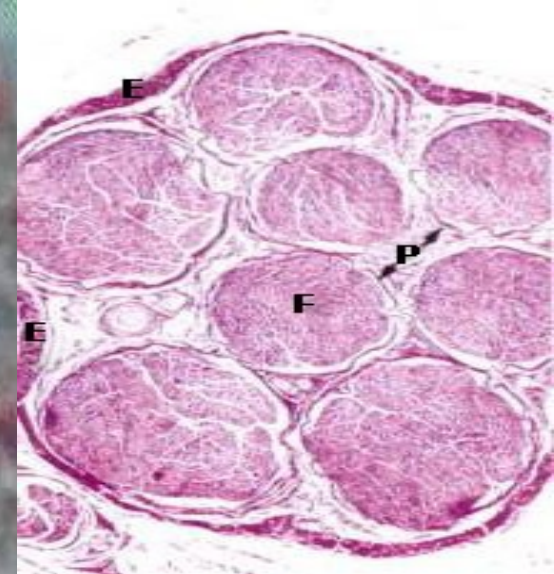
Gangliové buňky = pseudounipolární neurony + satelitní bb



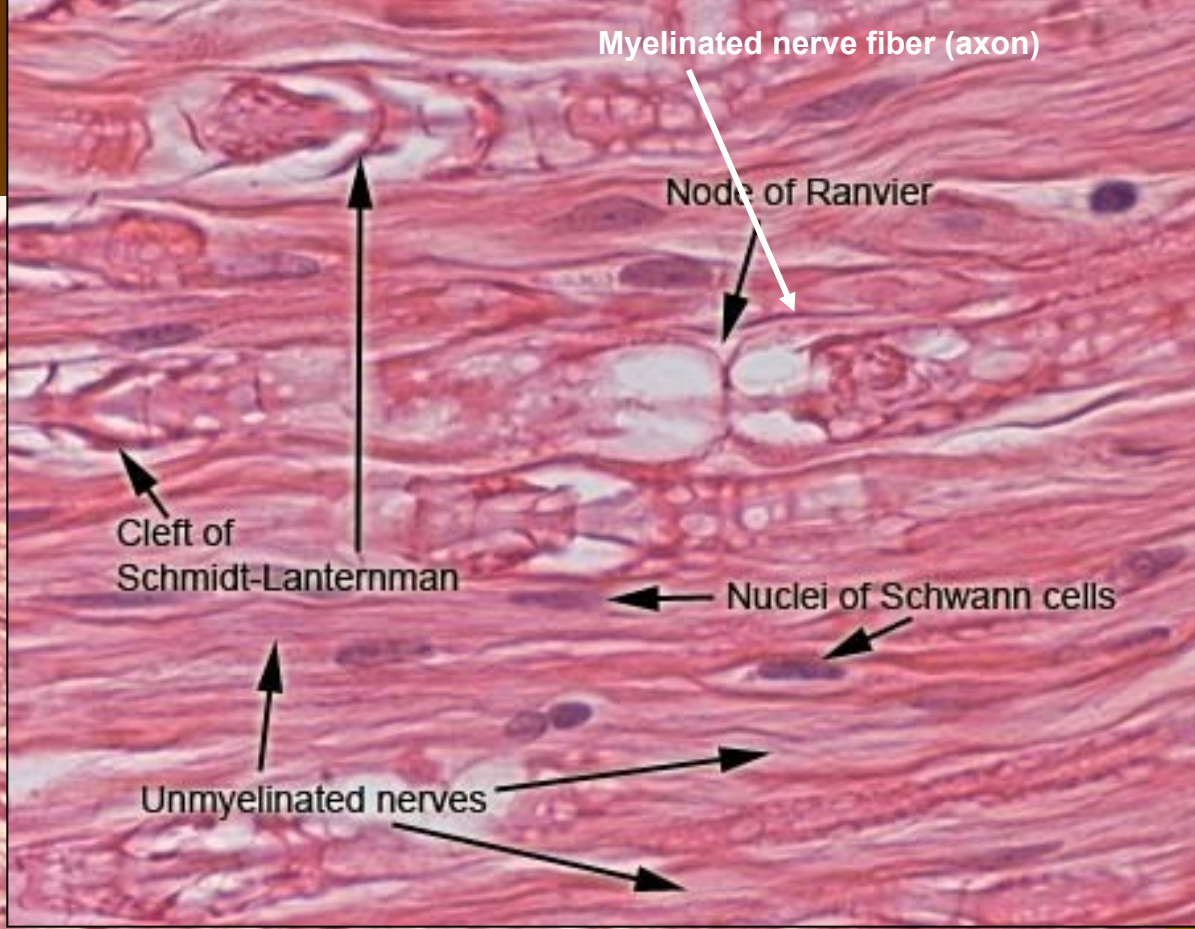
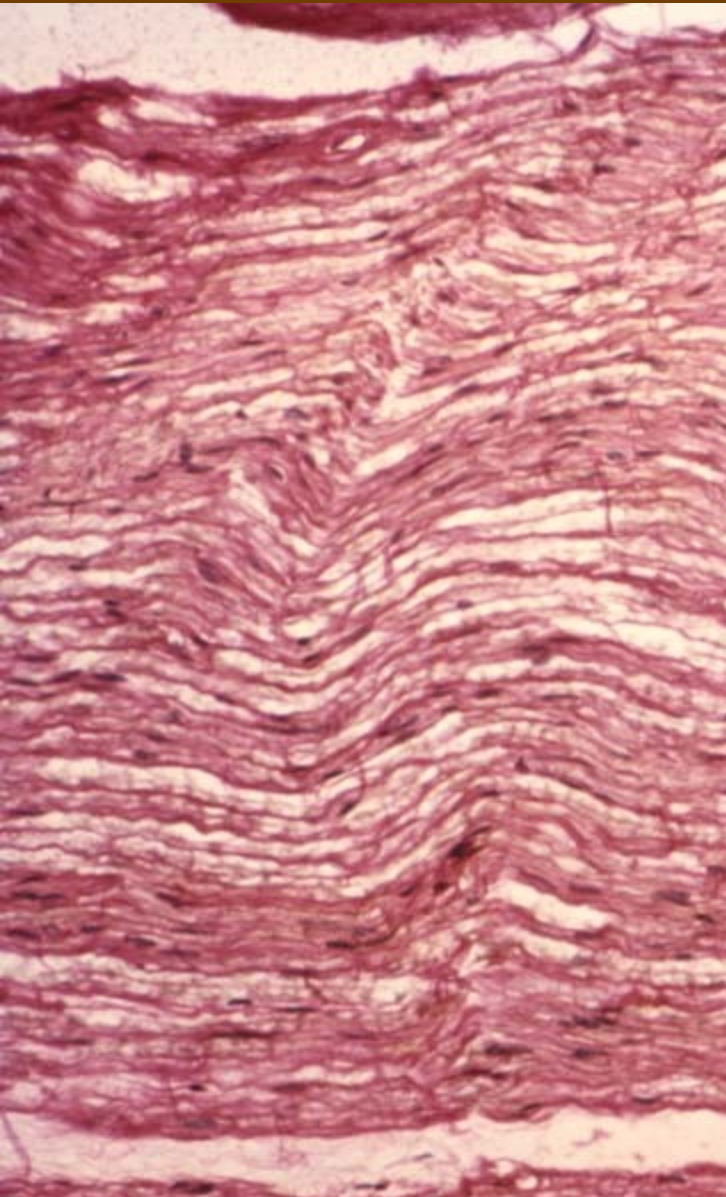
Periferní nerv (HE) – příčně



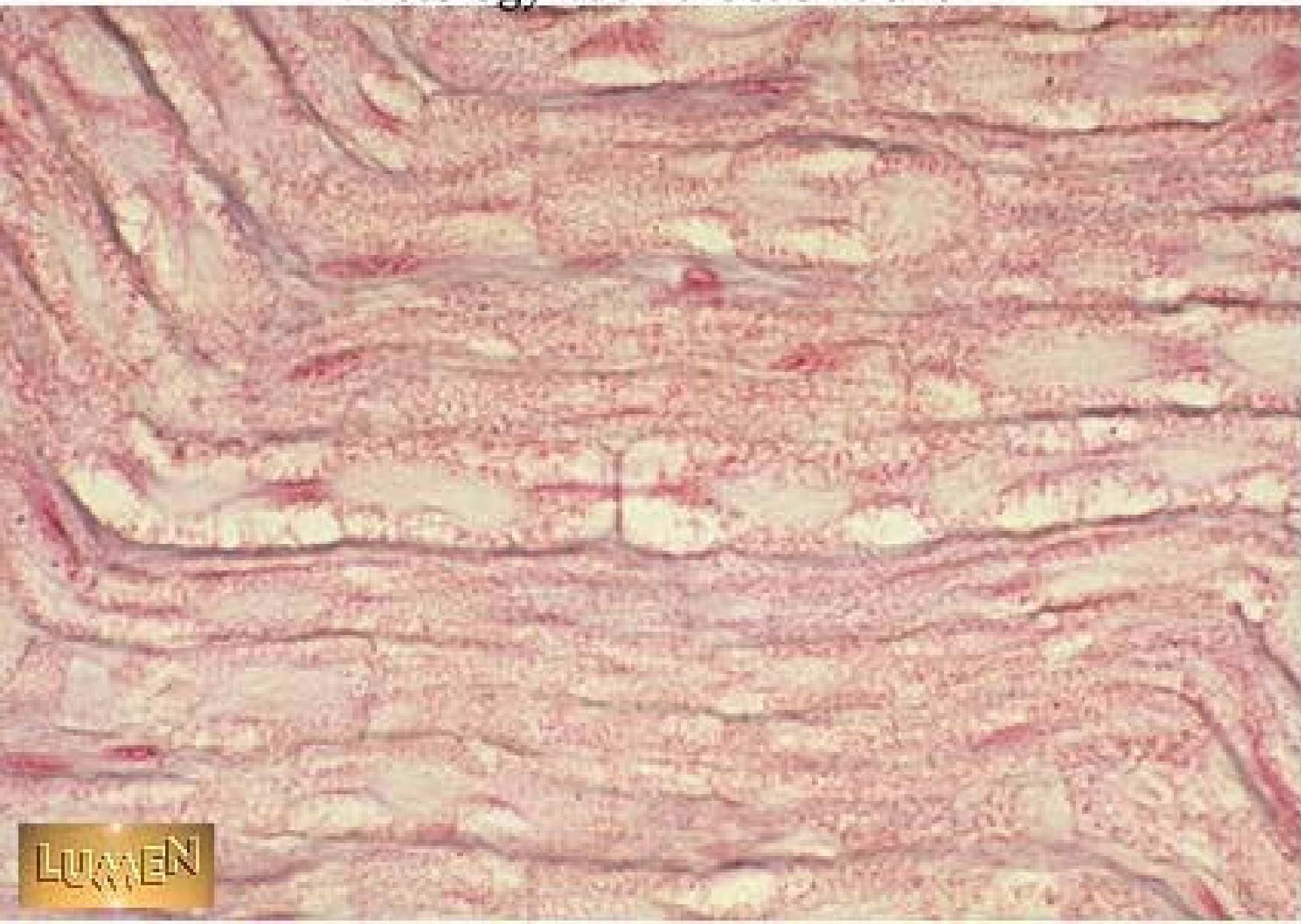
Periferní nerv (HE)



Periferní nerv (HE) podélně



Histology Lab Part 6: Slide 15





© Shaikera



CENTRAL GLIA

Oligodendrocyte

Myelinated axon

Myelin sheath (cut)

Microglia

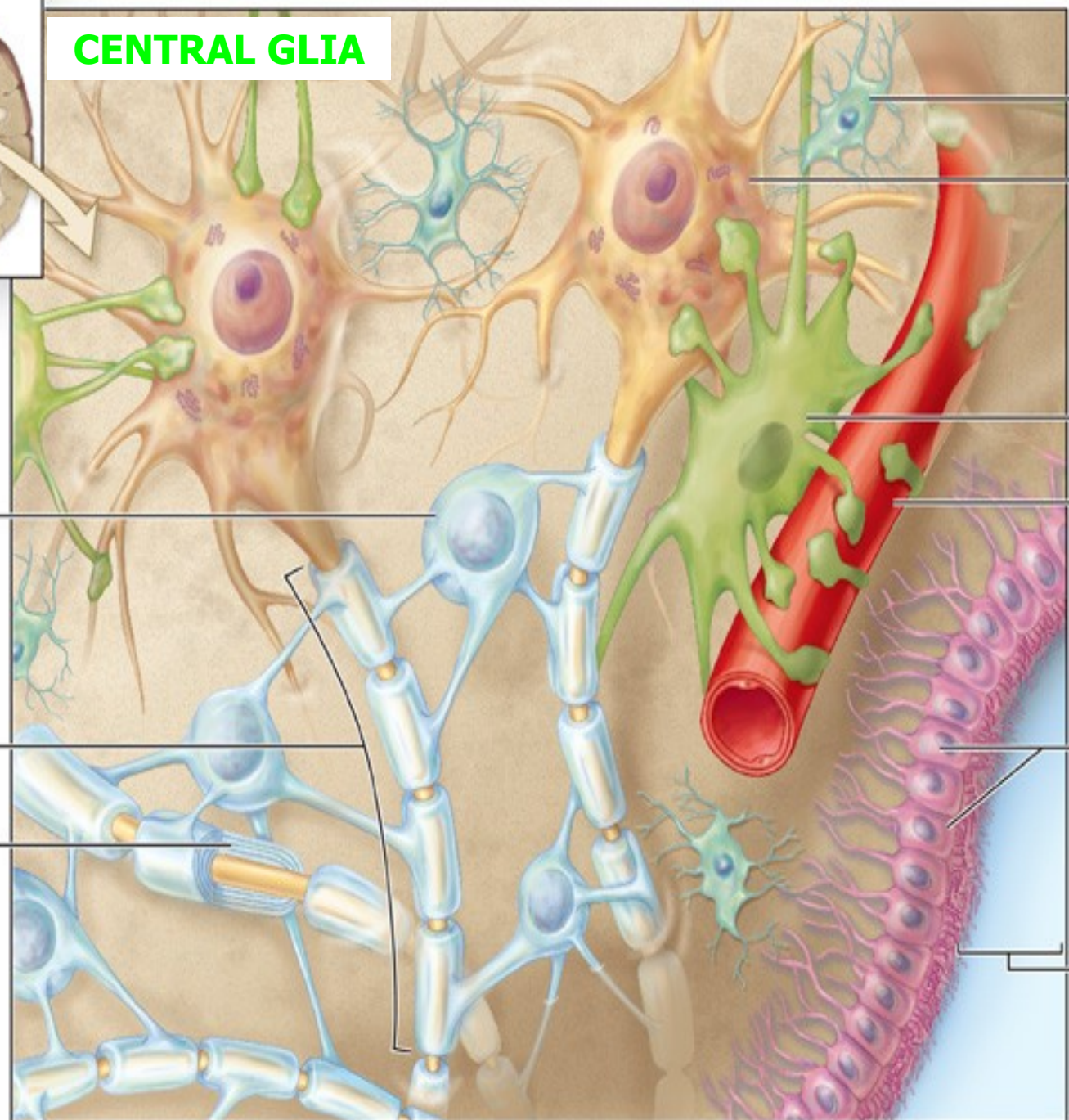
Neuron

Astrocyte

Capillary

Ependyma cells

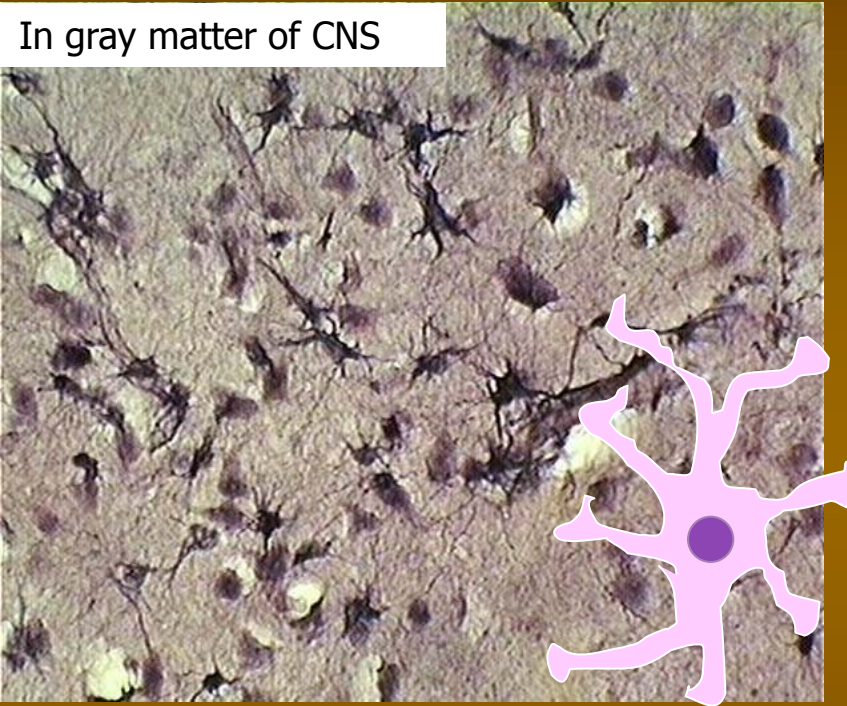
ventricle of brain



Astrocytes (macroglia)

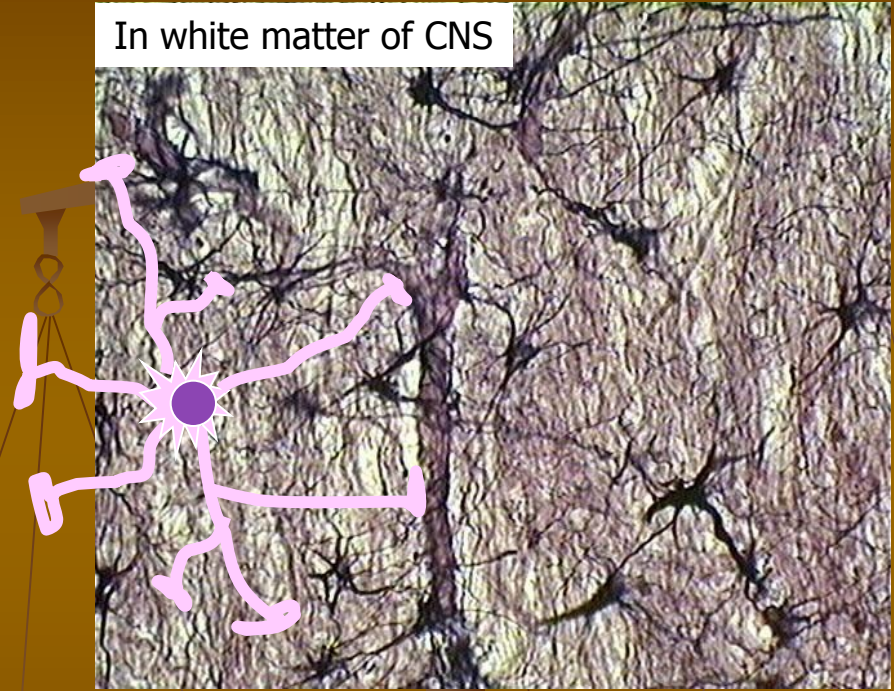
■ Protoplasmic astrocytes

In gray matter of CNS



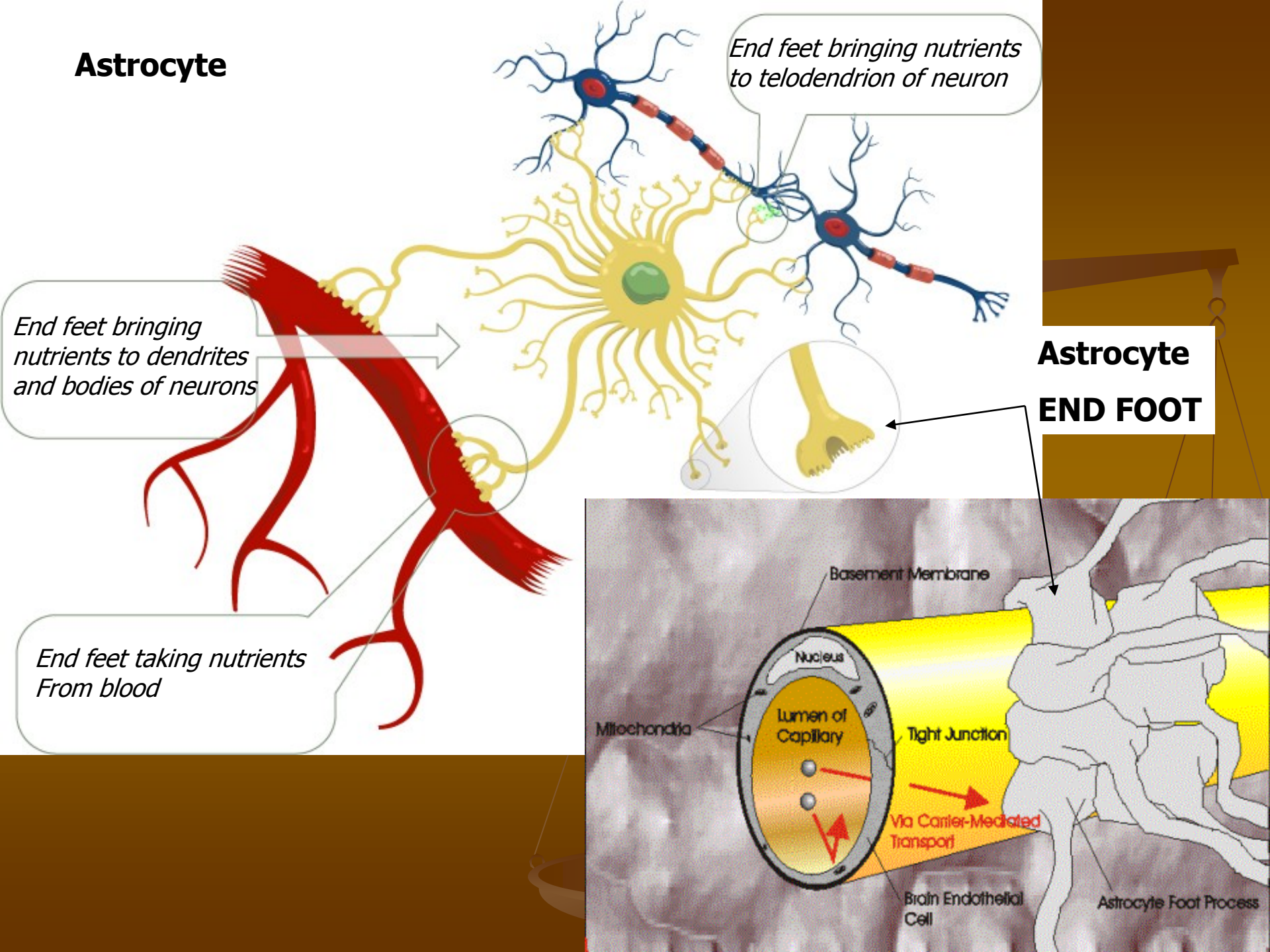
Fibrous astrocytes

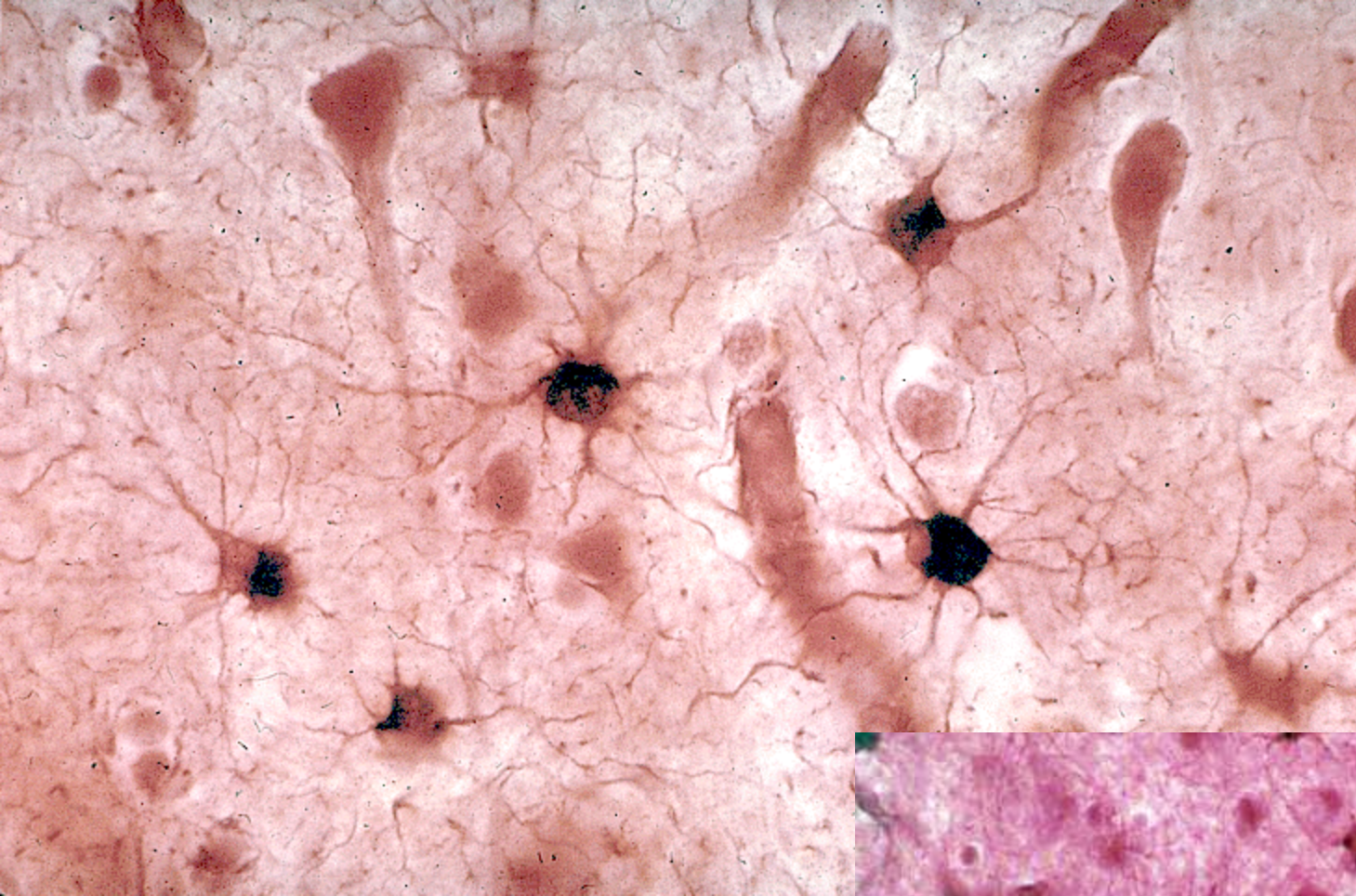
In white matter of CNS



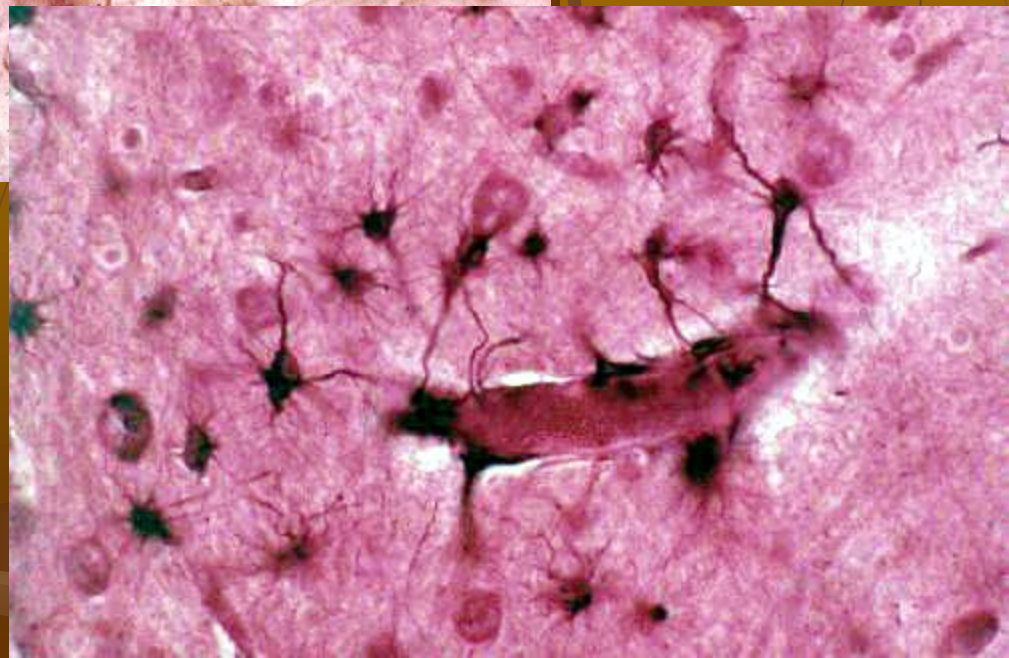
- Functions: cytoplasmic processes are ended by **end feet**, which form continuous layer – limiting membranes on the surface of:
 - 1) blood capillaries (*membrana limitans gliae perivascularis*; together with endothelium it forms **blood-brain barrier**,
 - 2) brain (*membrana limitans gliae superficialis*)Astrocytes have protective and nutritive function

Astrocyte

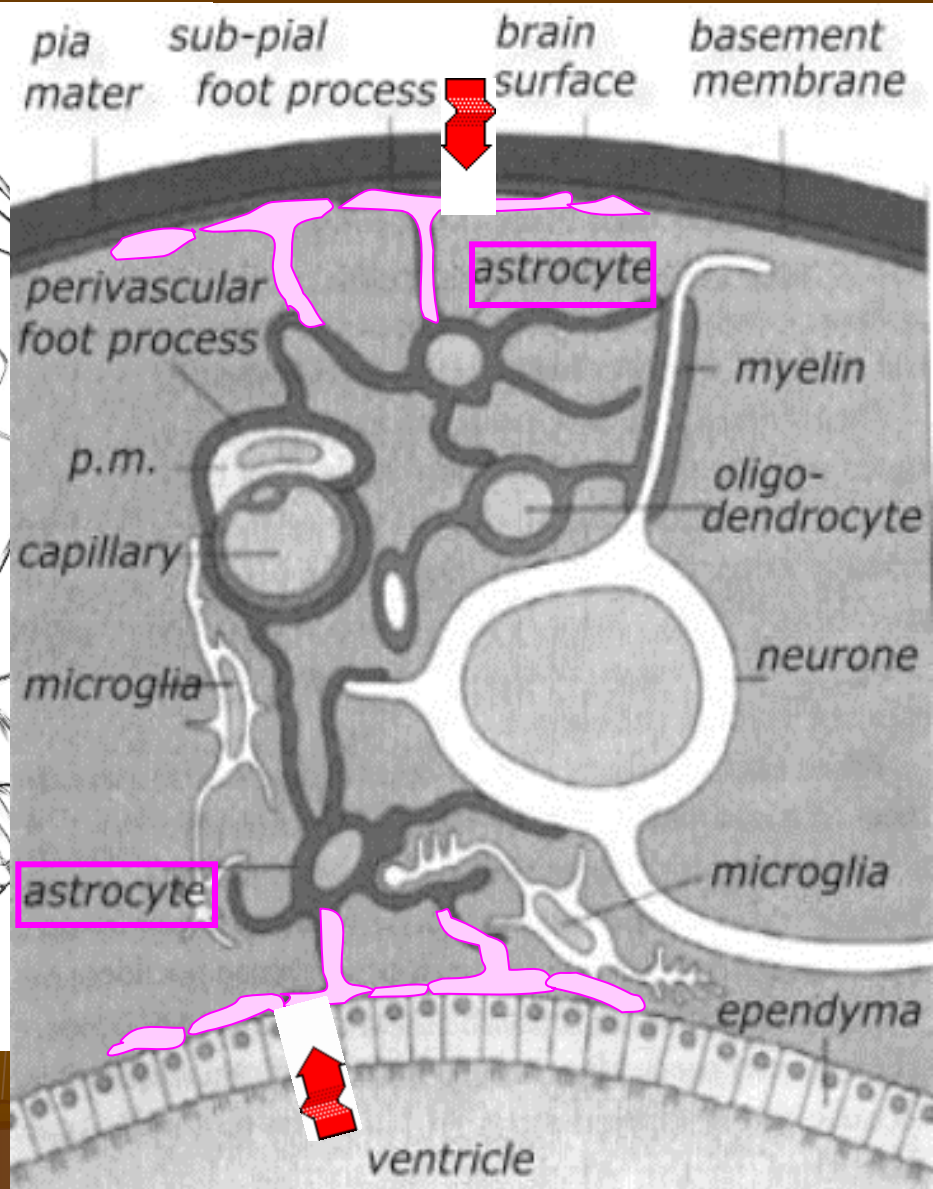
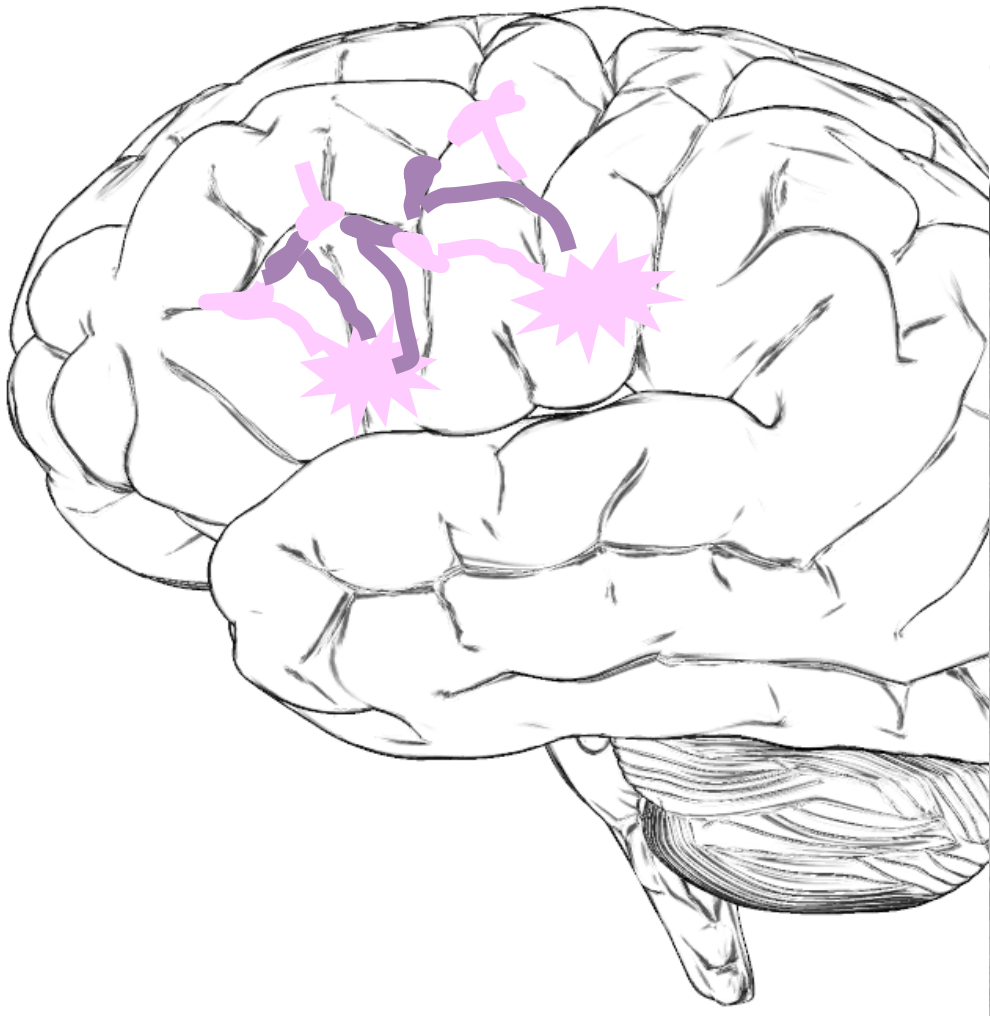


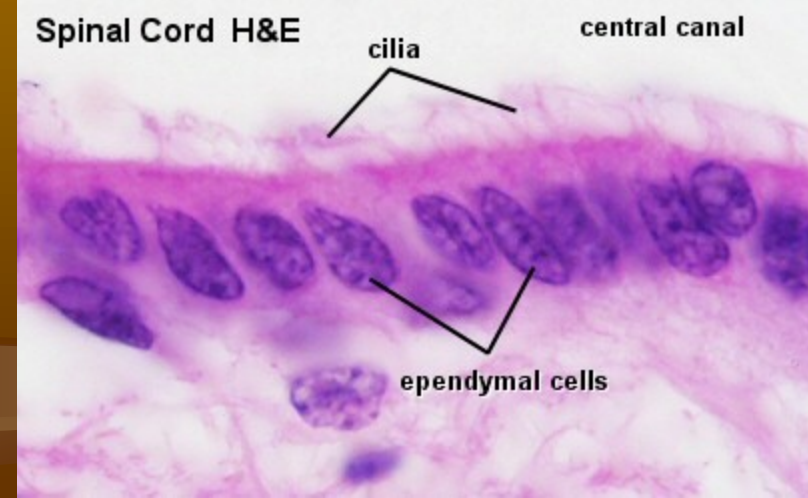
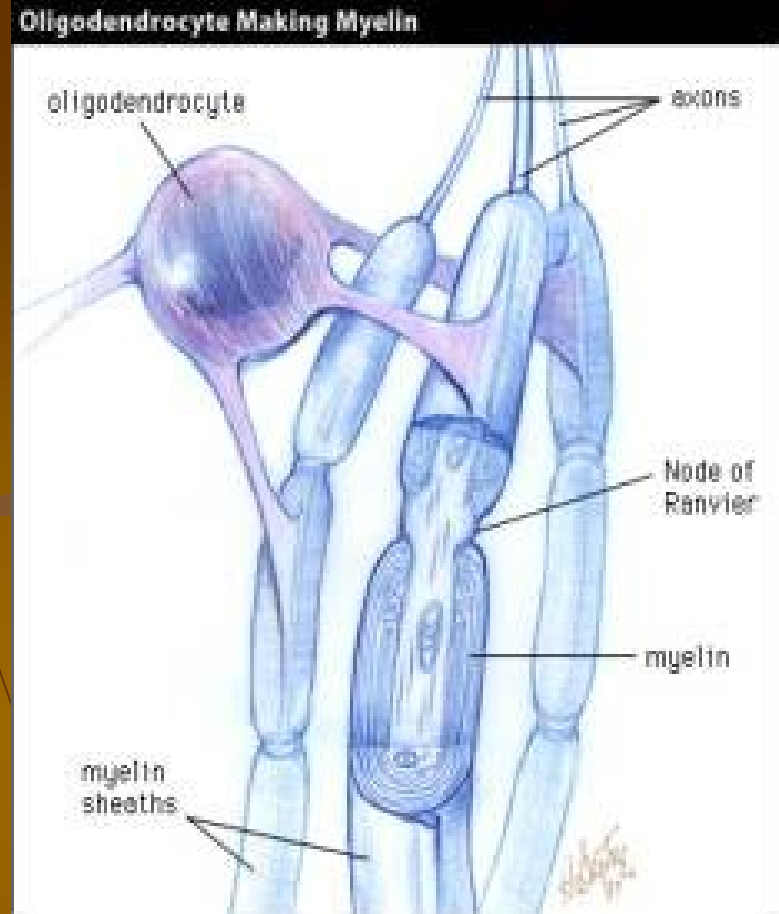
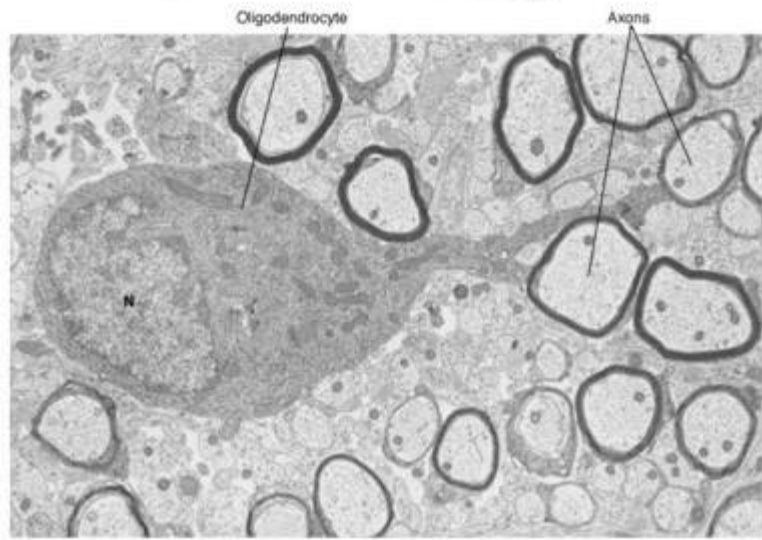
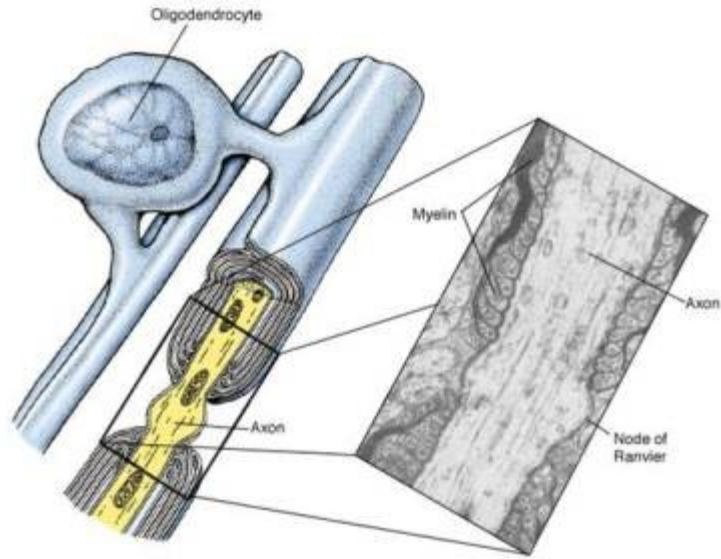


Astrocytes

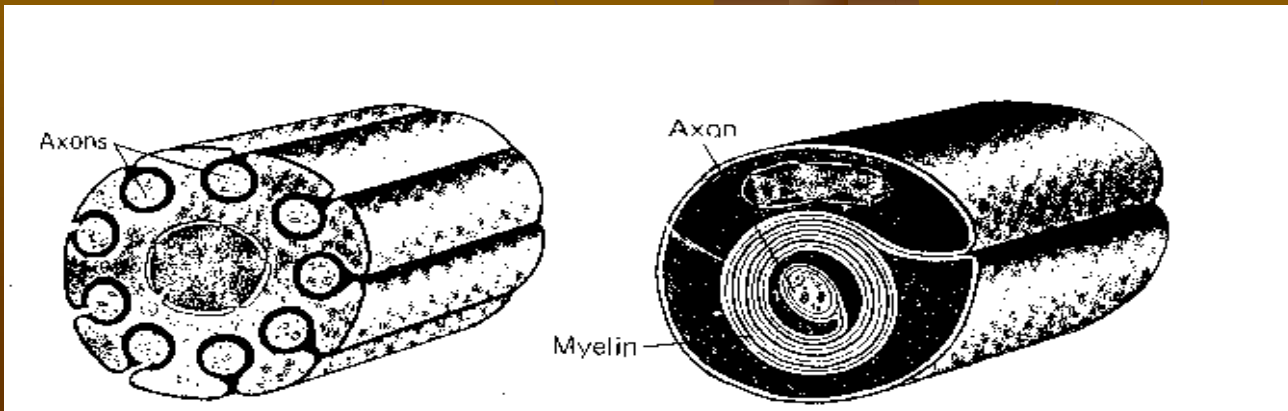
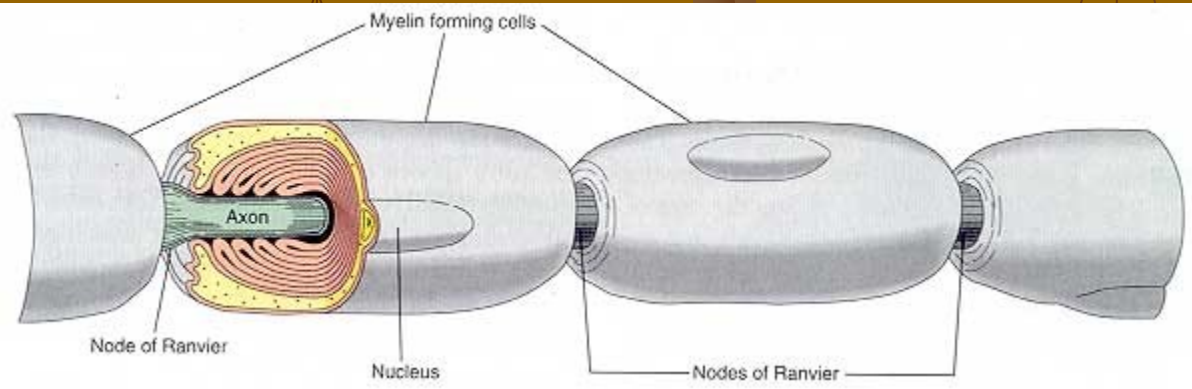
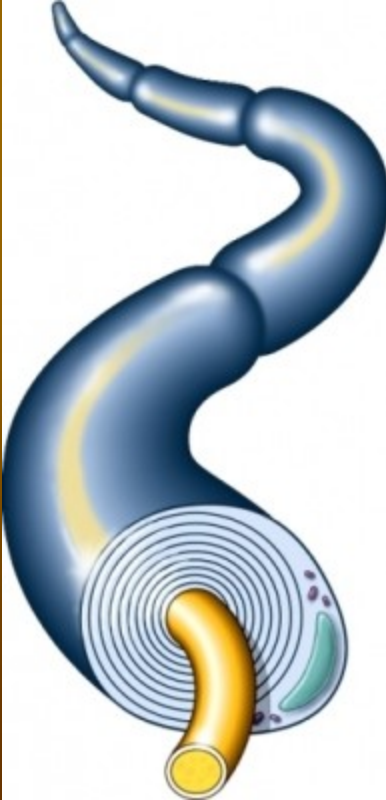
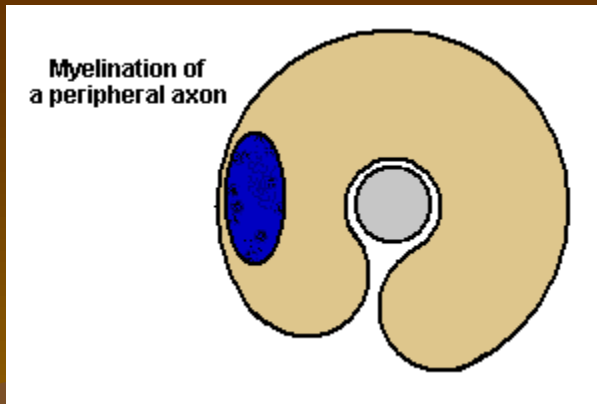
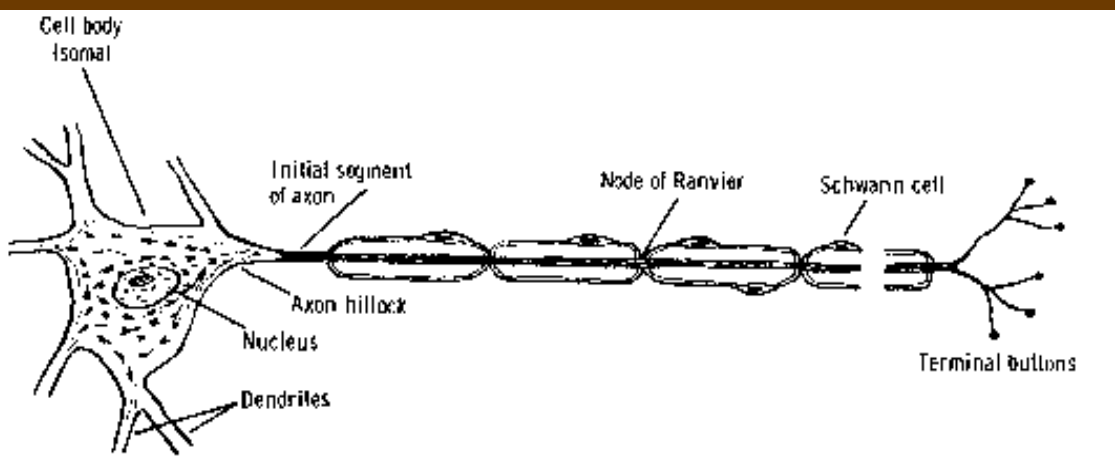


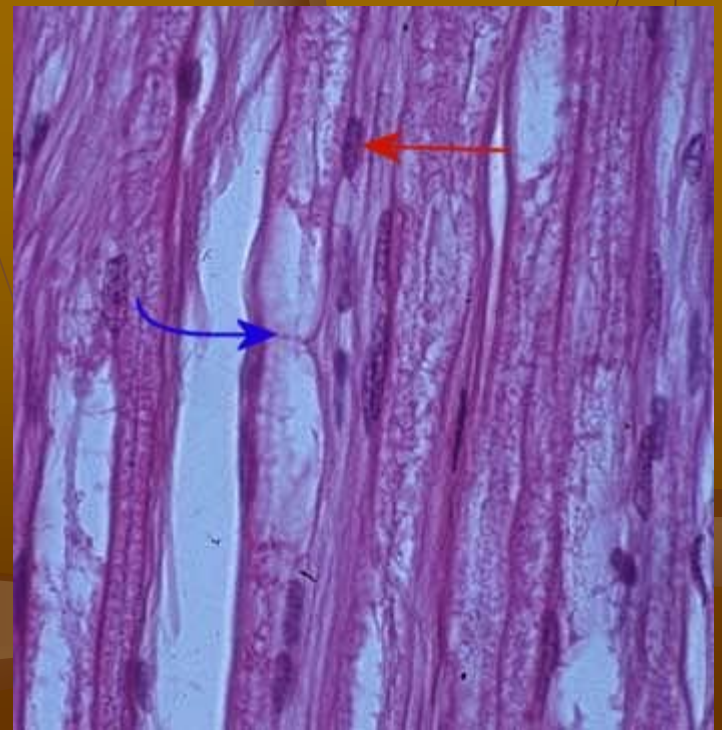
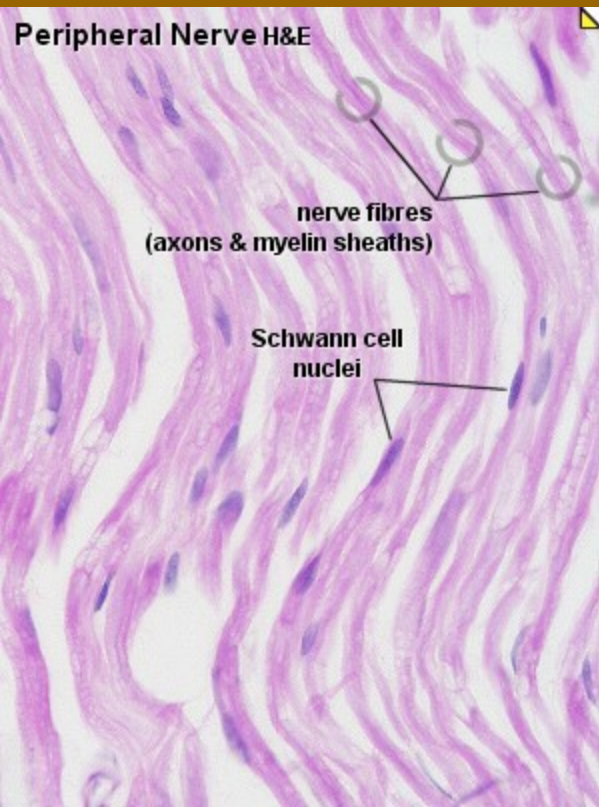
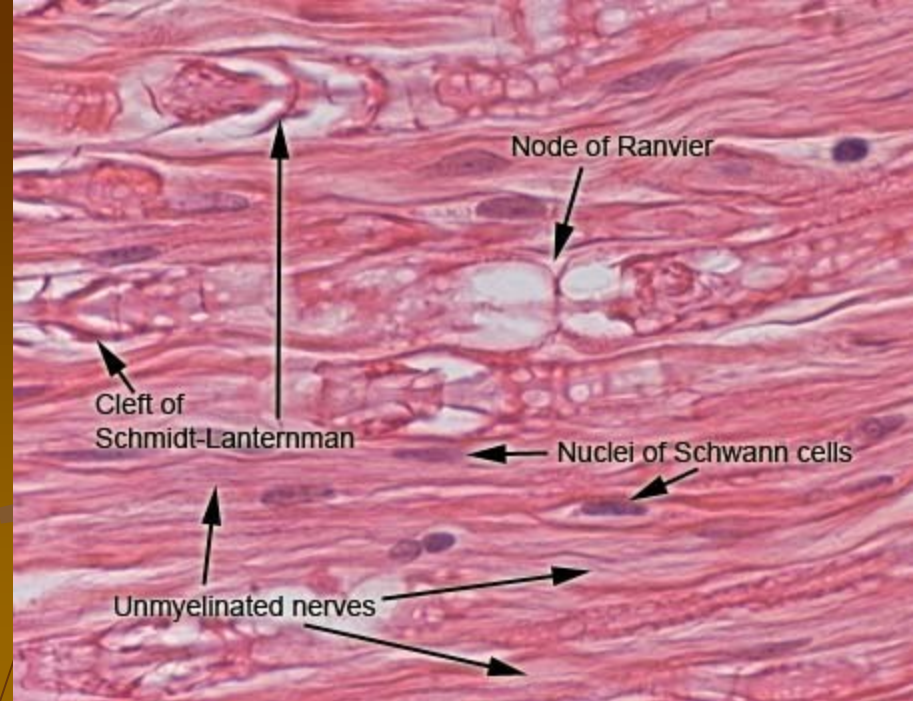
Membrana limitans gliae superficialis





PERIFERNÍ GLIE: SCHWANNOVY BUŇKY





Dorsal Root Ganglion H&E

ganglion cell nuclei

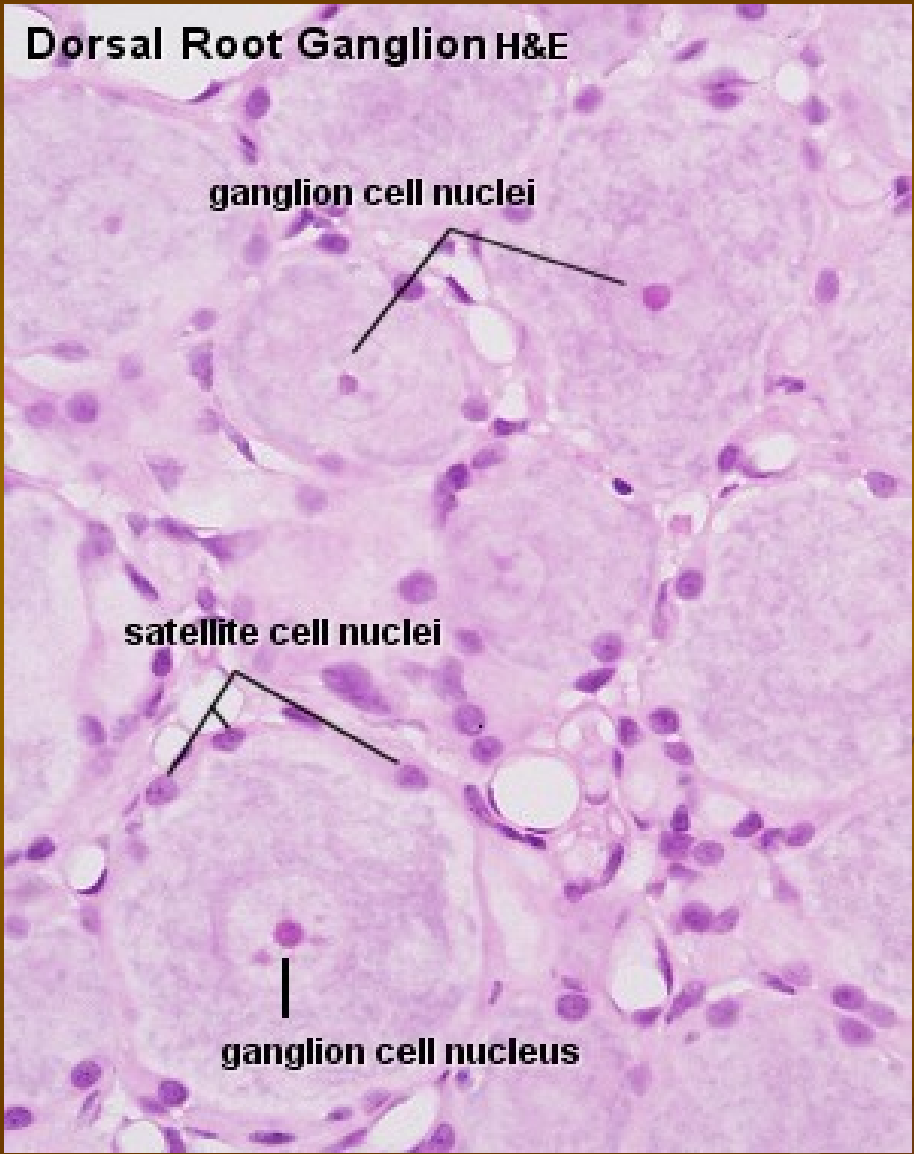
satellite cell nuclei

ganglion cell nucleus

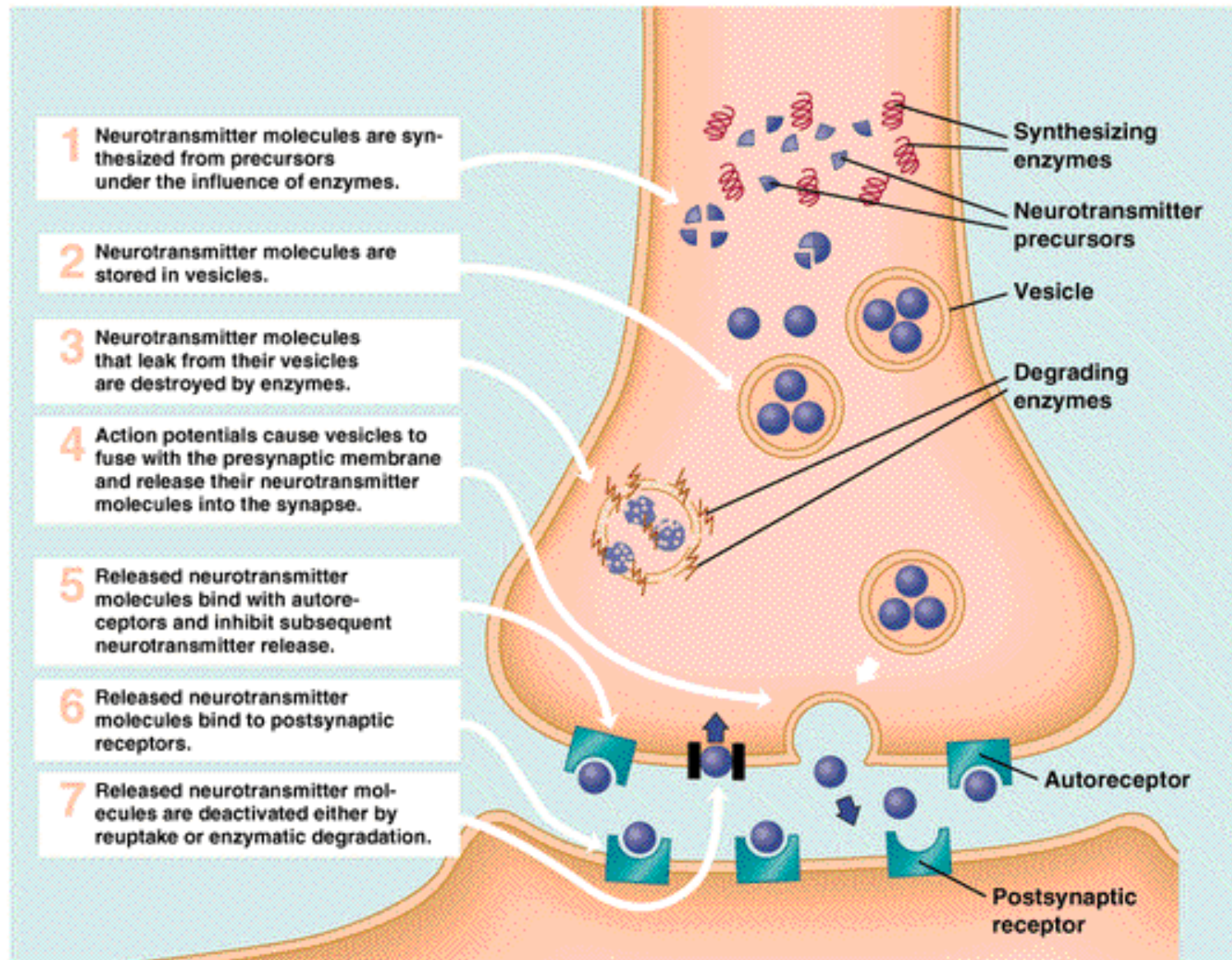
Autonomic Ganglion H&E

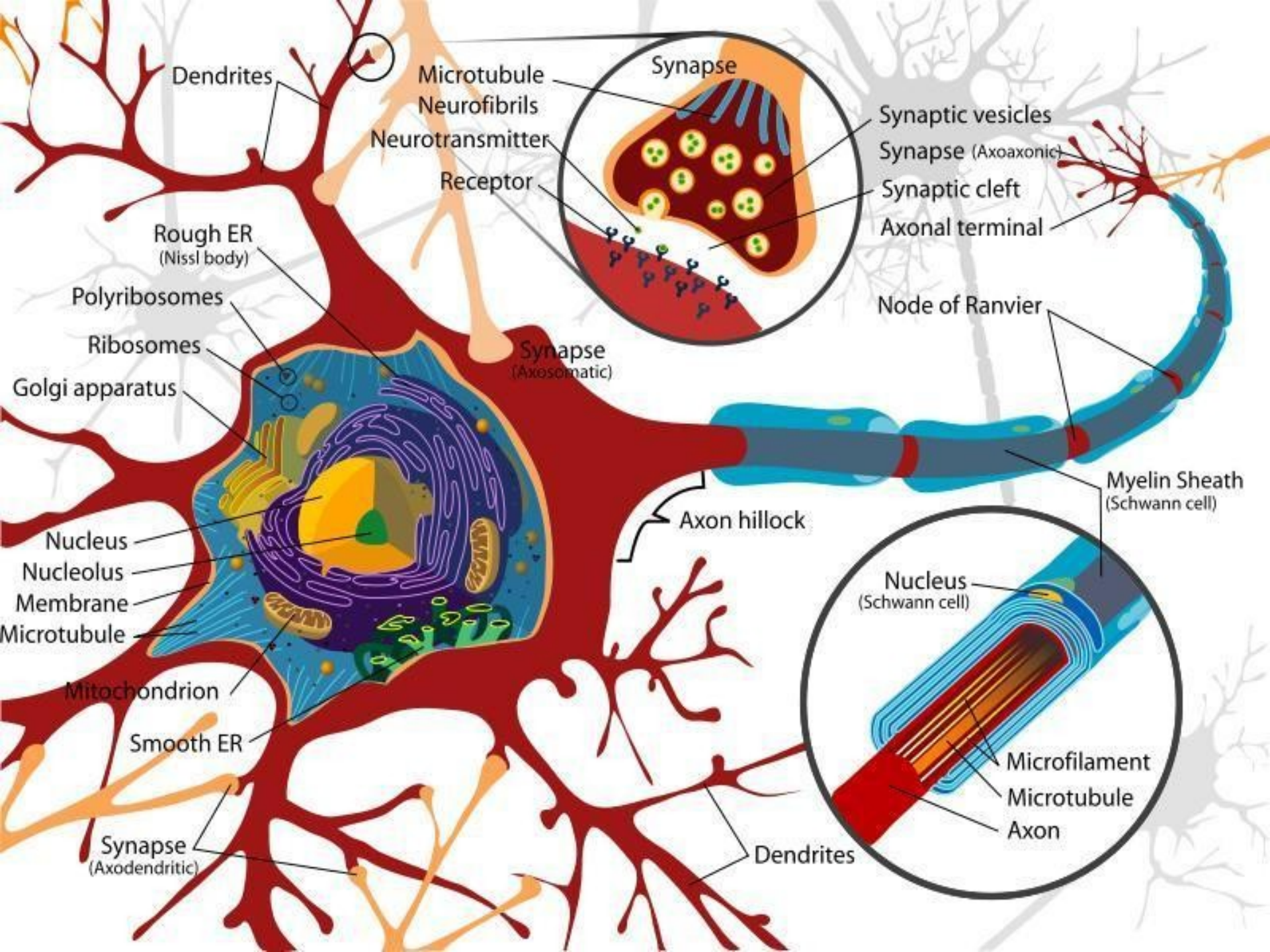
satellite cells

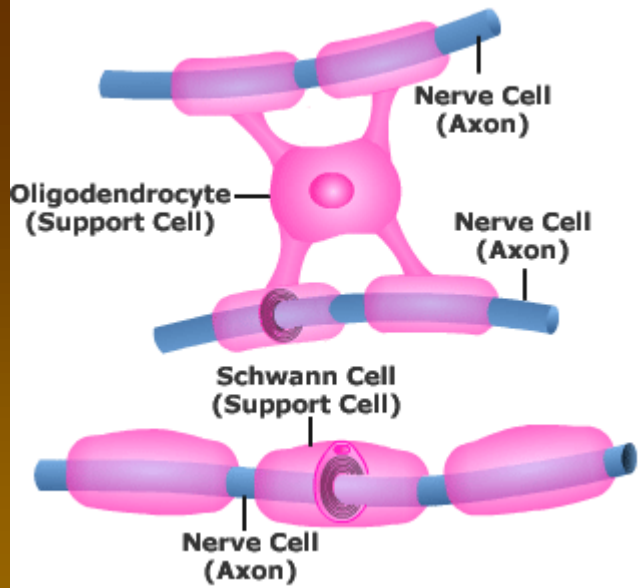
ganglion cells



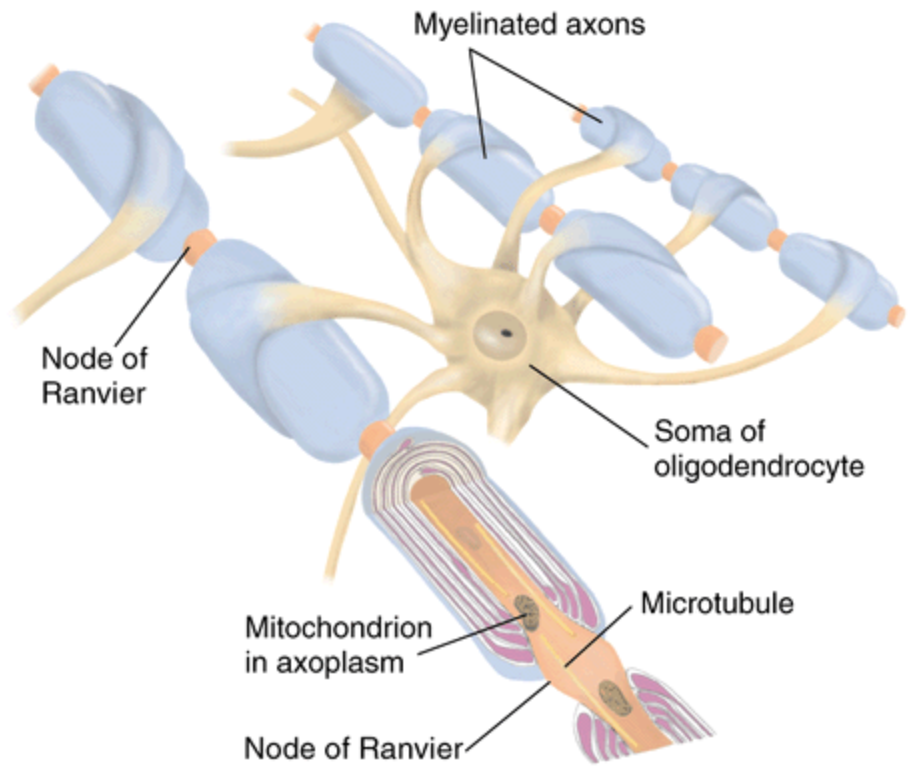
► Seven Processes in Neurotransmitter Action

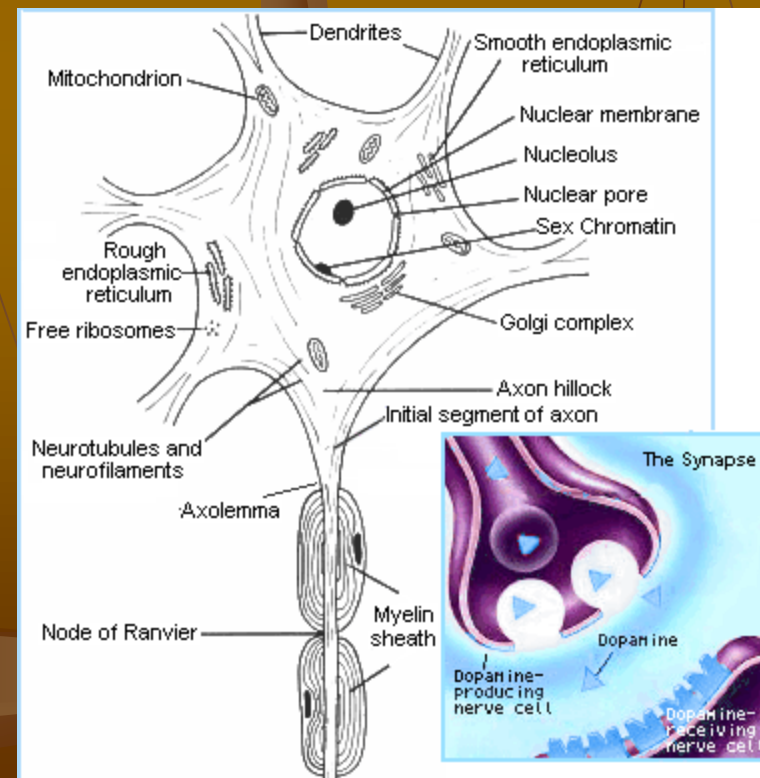
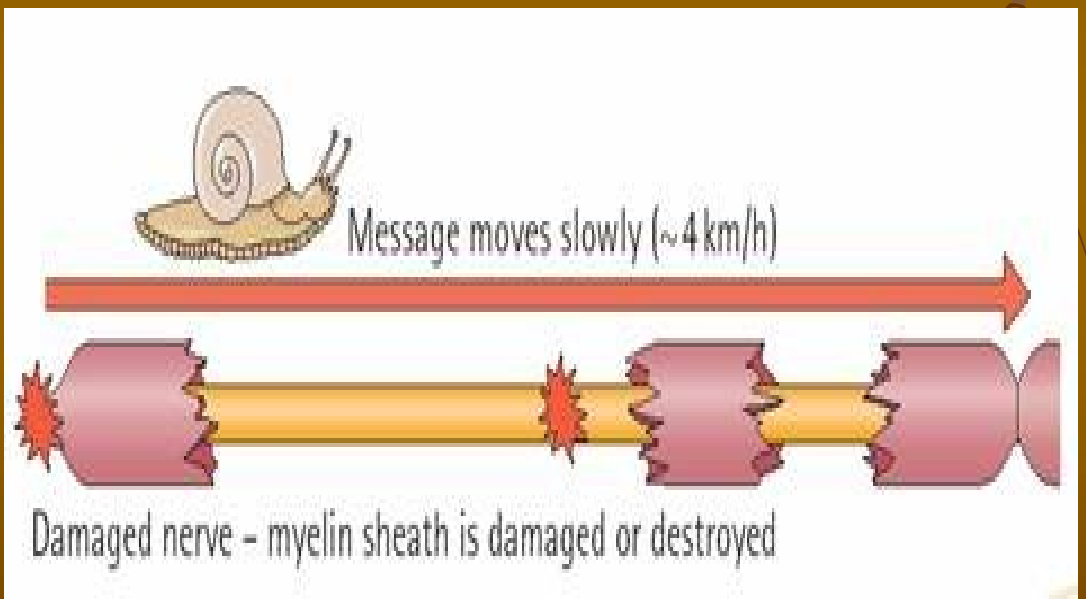
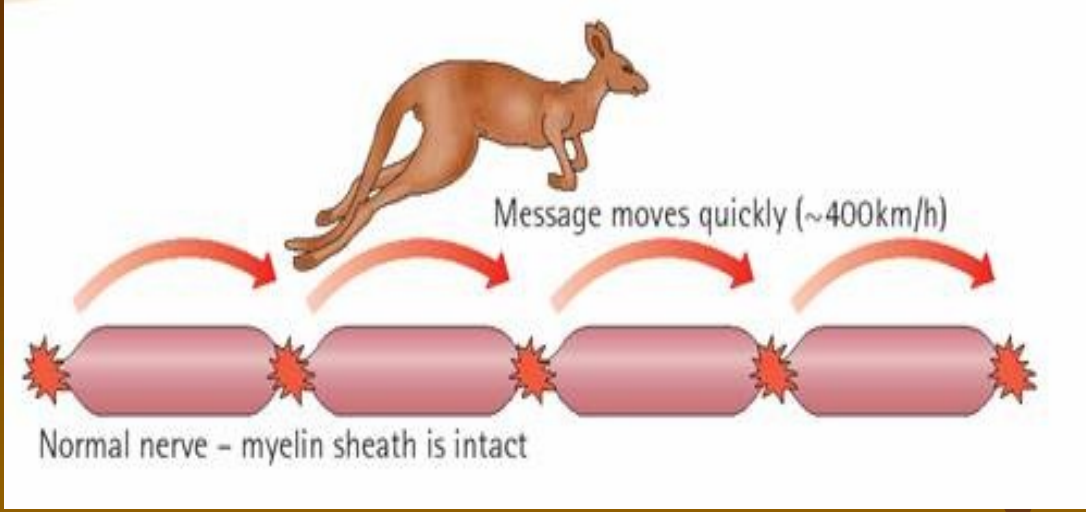






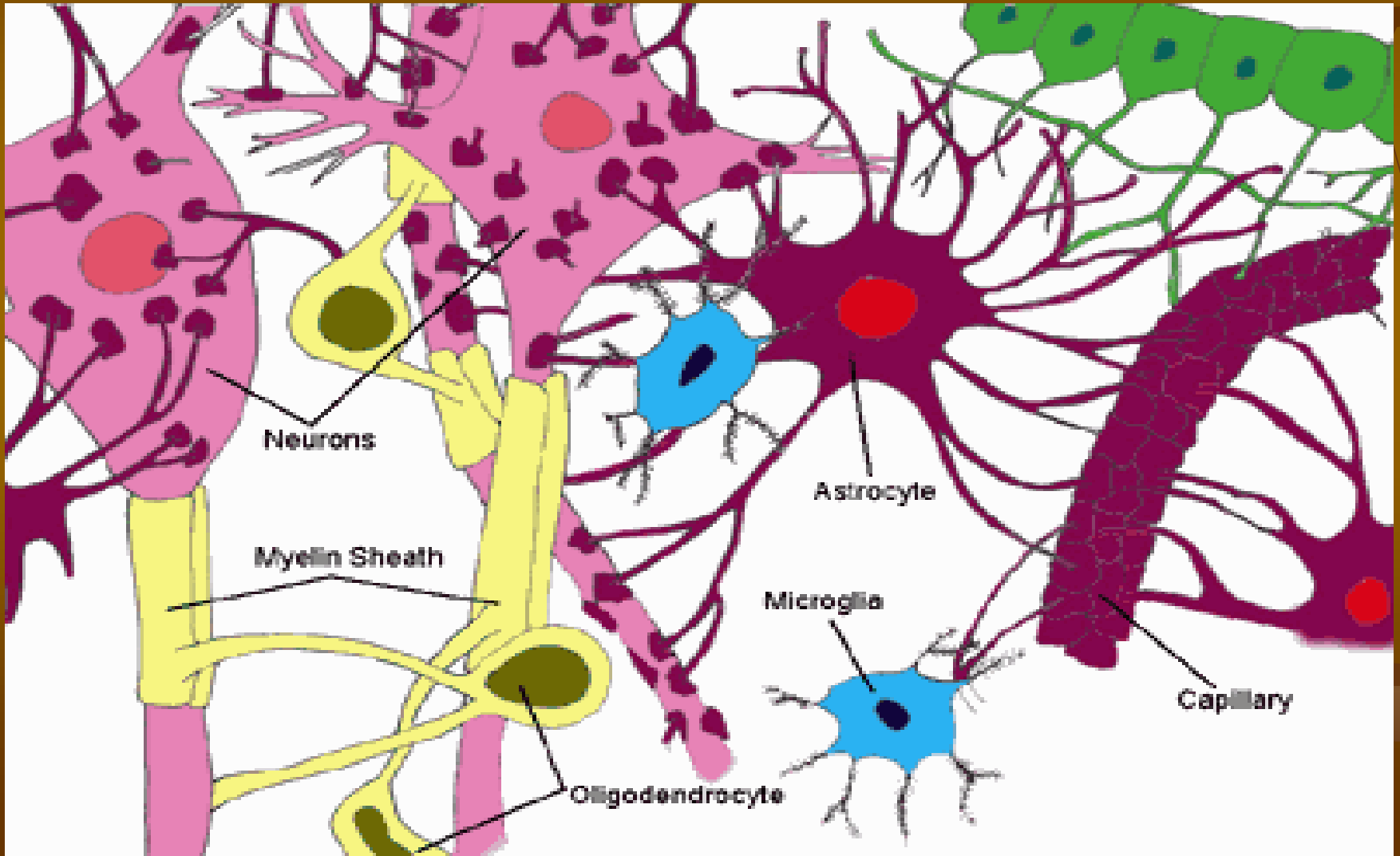
► An Oligodendrocyte

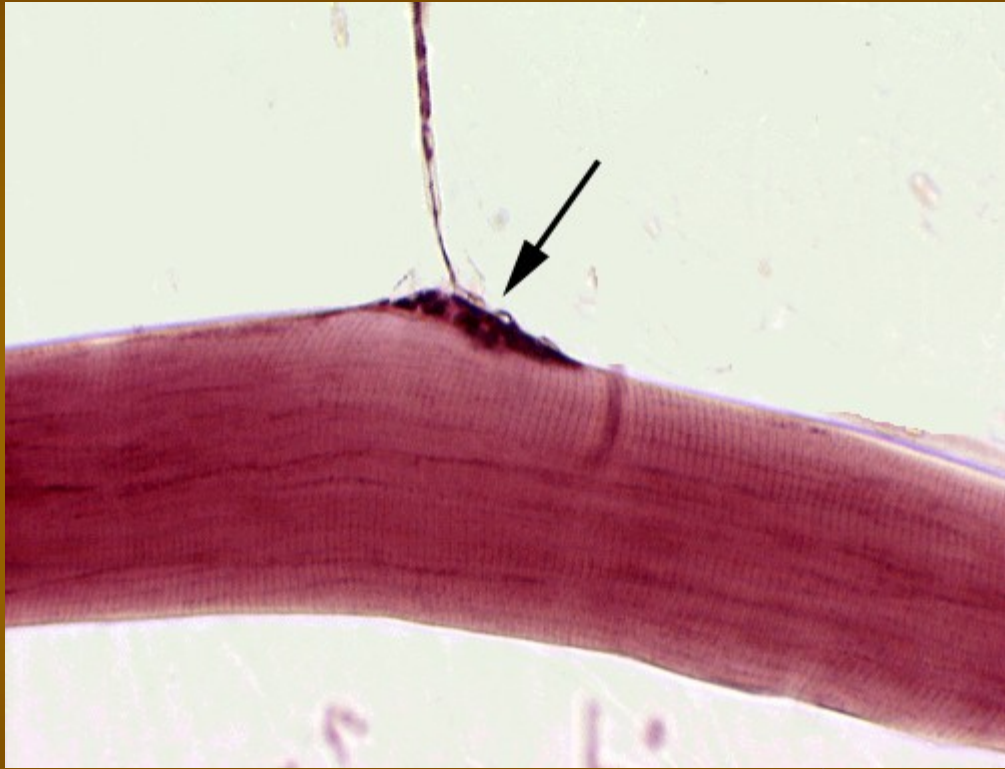


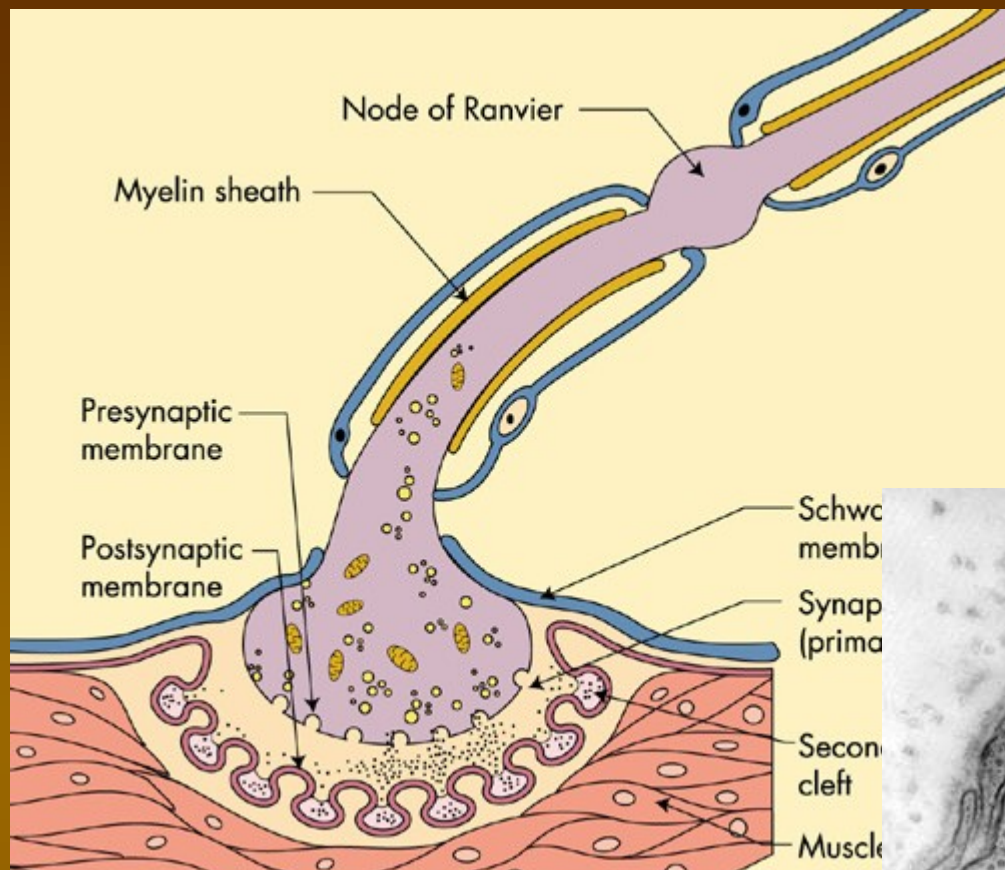


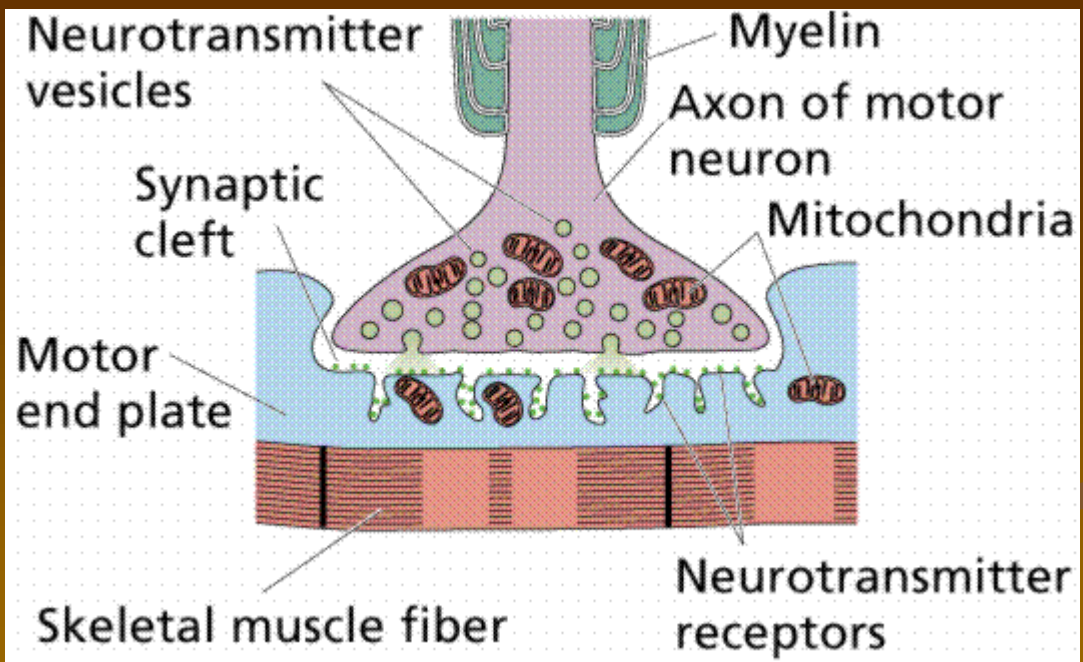
Nervous tissue structure

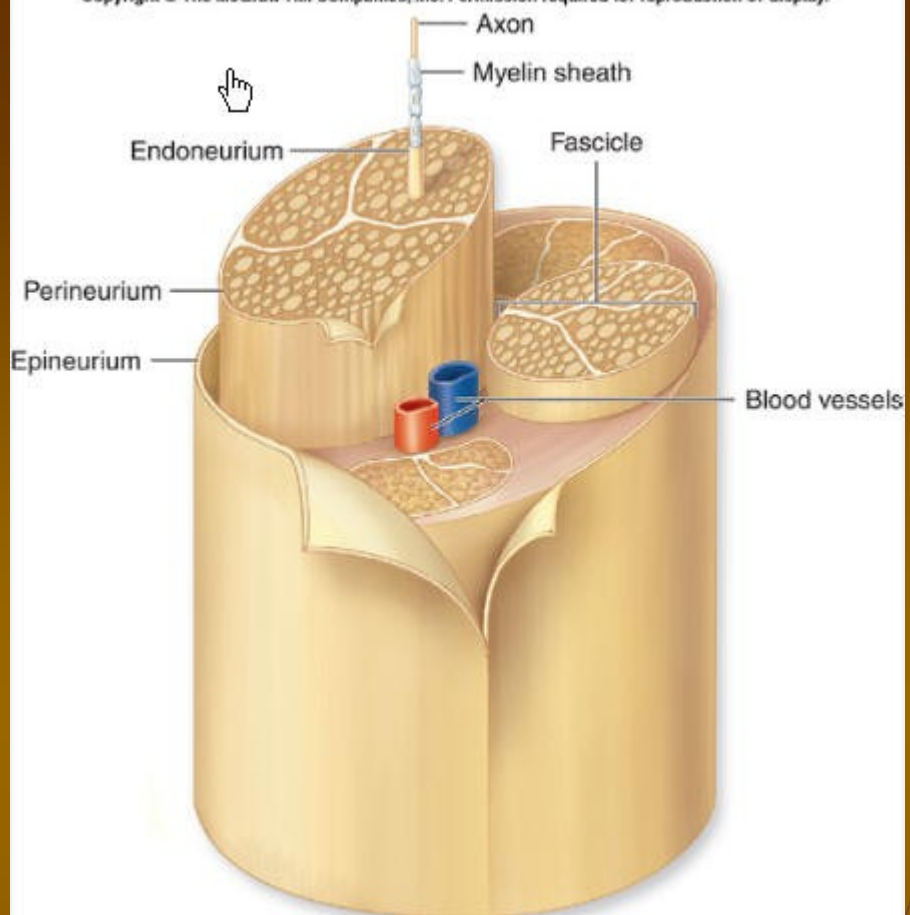
 nerve cells (neurons) + supporting cells (glia)

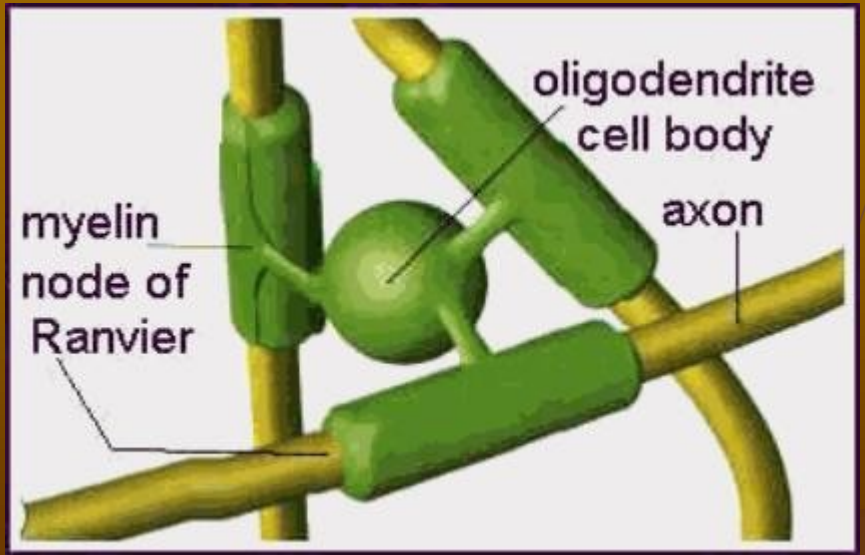
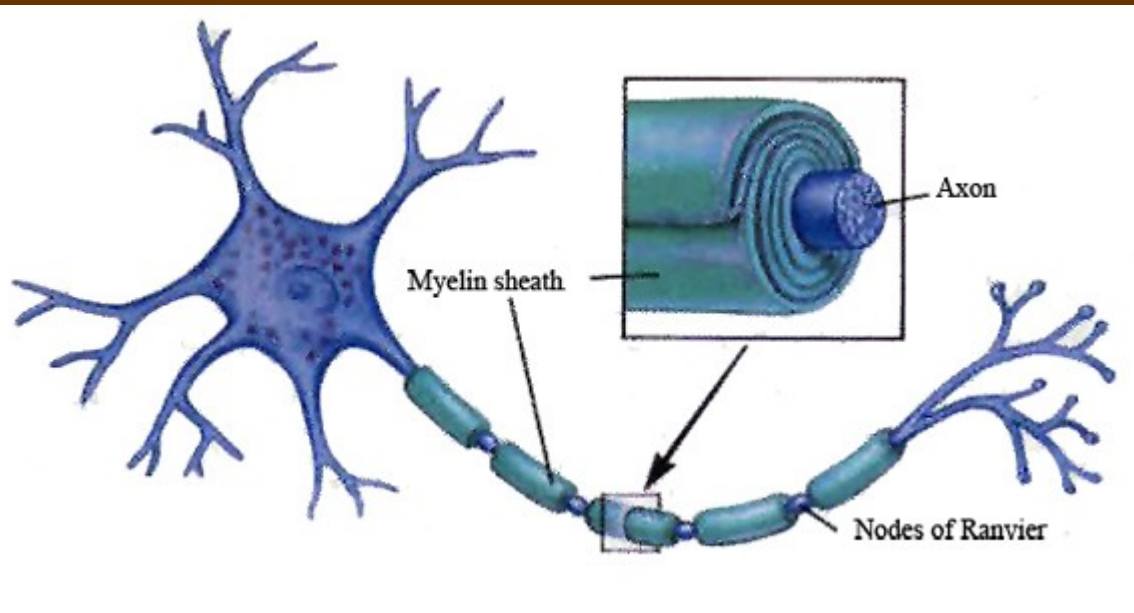




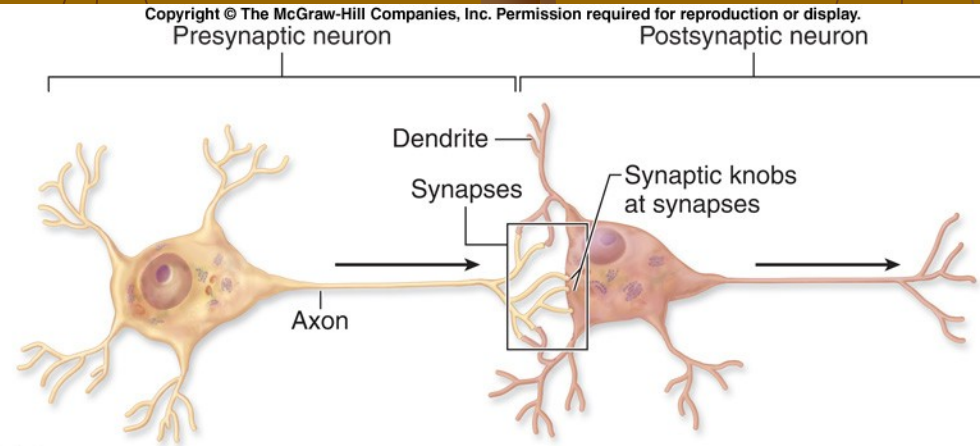




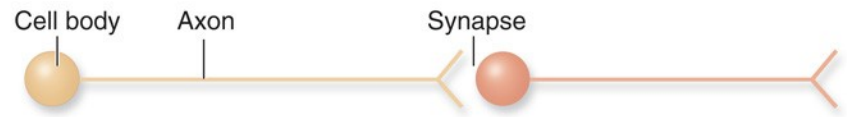




Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



(a) Synapse



(b) Simplified representation of a synapse

