

Vorlesung Allgemeine Zoologie I

Teil: “Cytologie, Anatomie und Phylogenie der Wirbeltiere”

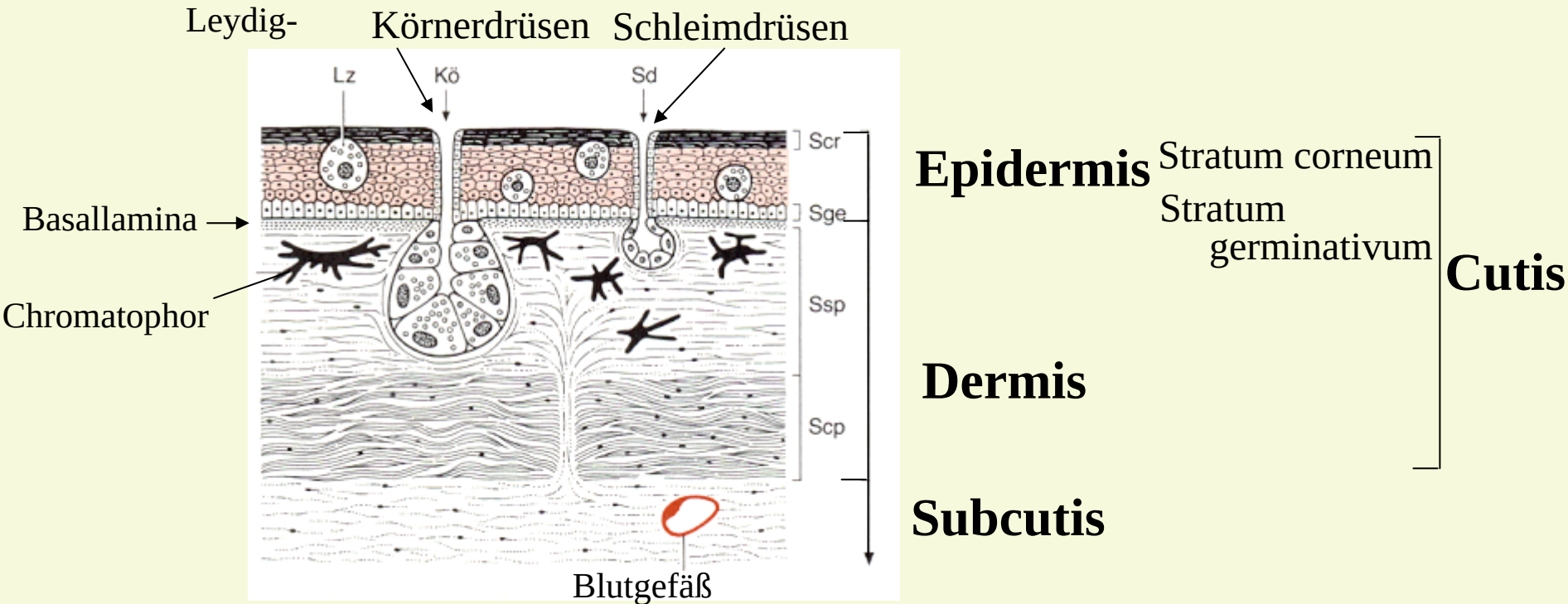


Organe und Organsysteme

- Skelett
- Integument und Derivate
- Zentralnervensystem - Gehirn
- Sinnesorgane
- Blut-Kreislaufsystem
- Atmungsorgane
- Urogenital System
- Verdauungstrakt

Integument (Haut)

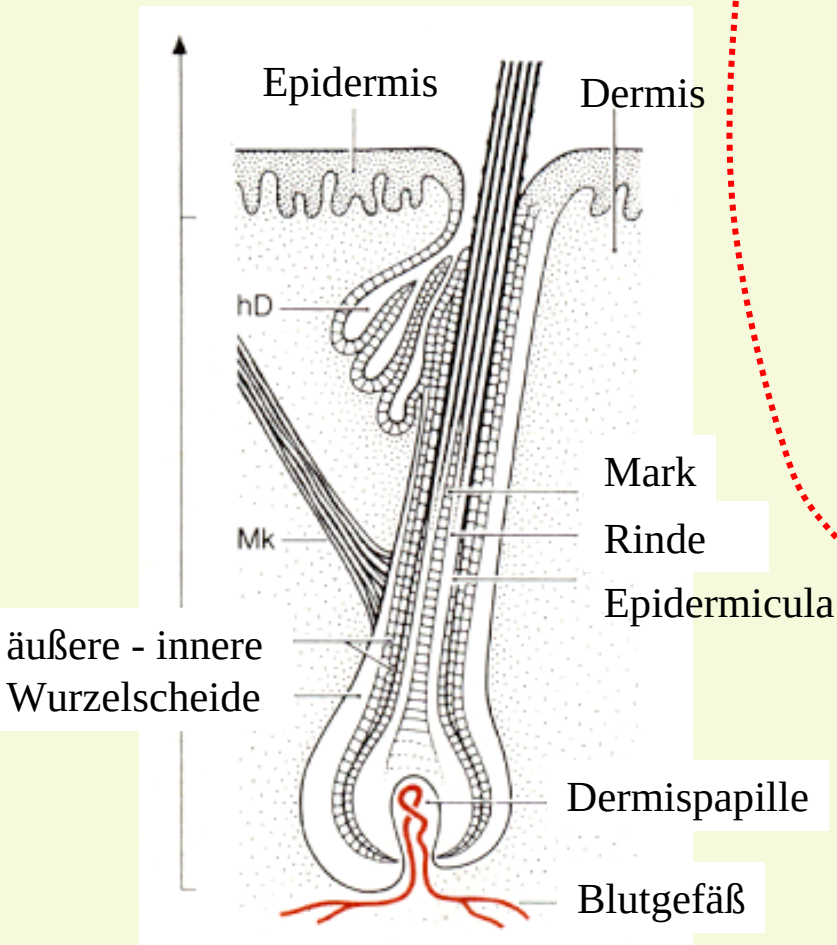
Beispiel: Amphibien-Integument:



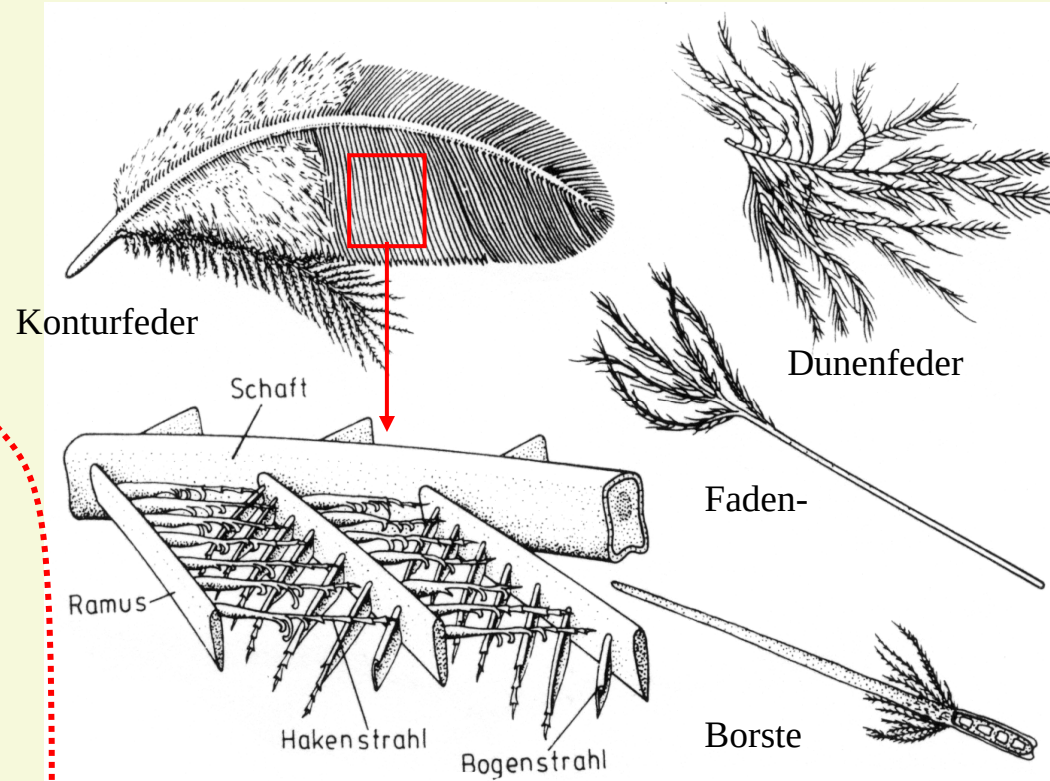
- flächenmäßig größtes Organ
- mannigfaltige Funktion: Verdunstungsschutz, Thermoregulation, Tarnung, Brutpflege, Lokomotion, Strahlungsschutz, Atmung, Abwehr (Drüsen)
- mannigfaltige Differenzierung: Federn, Haare, Krallen, Zähne

Differenzierungen der Epidermis

Haare



(Reptilienschuppe) Federn

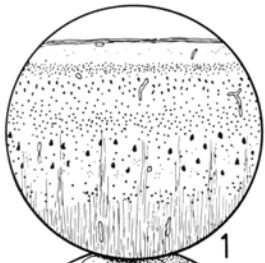


Hufe, Nägel

Zentralnervensystem

peripheres
Nervensystem

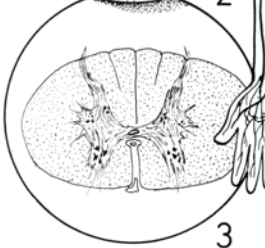
z.B. Spinalganglien



1

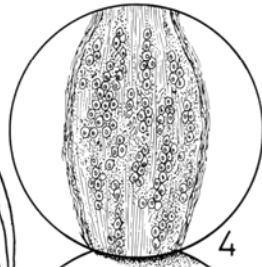
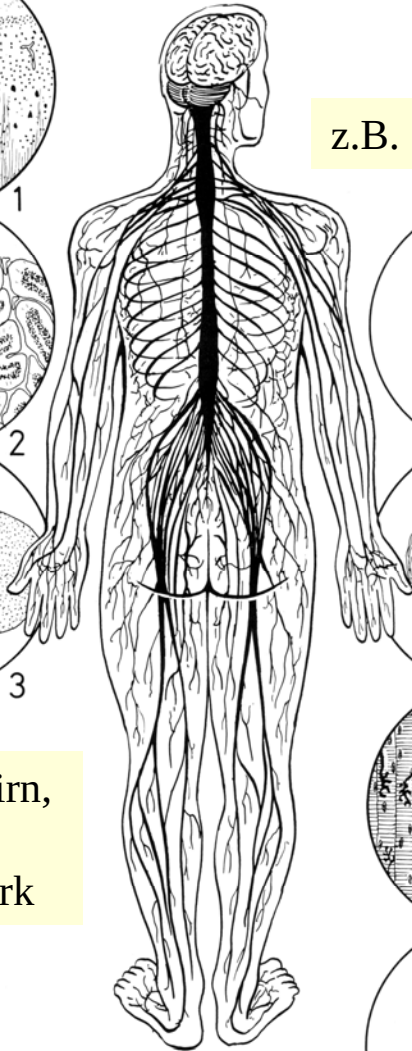


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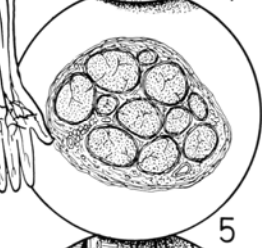


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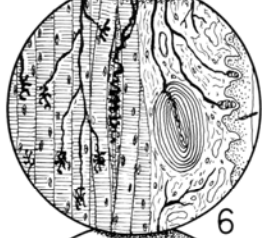
z.B. Großhirn,
Kleinhirn,
Rückenmark



4



5



6



7

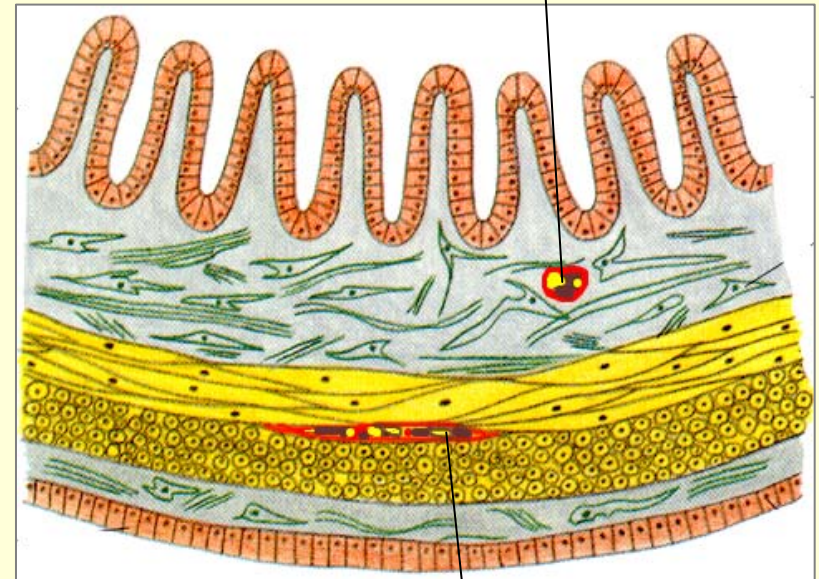
R.K.

Nervengewebe

Nervenzellen &
Gliazellen

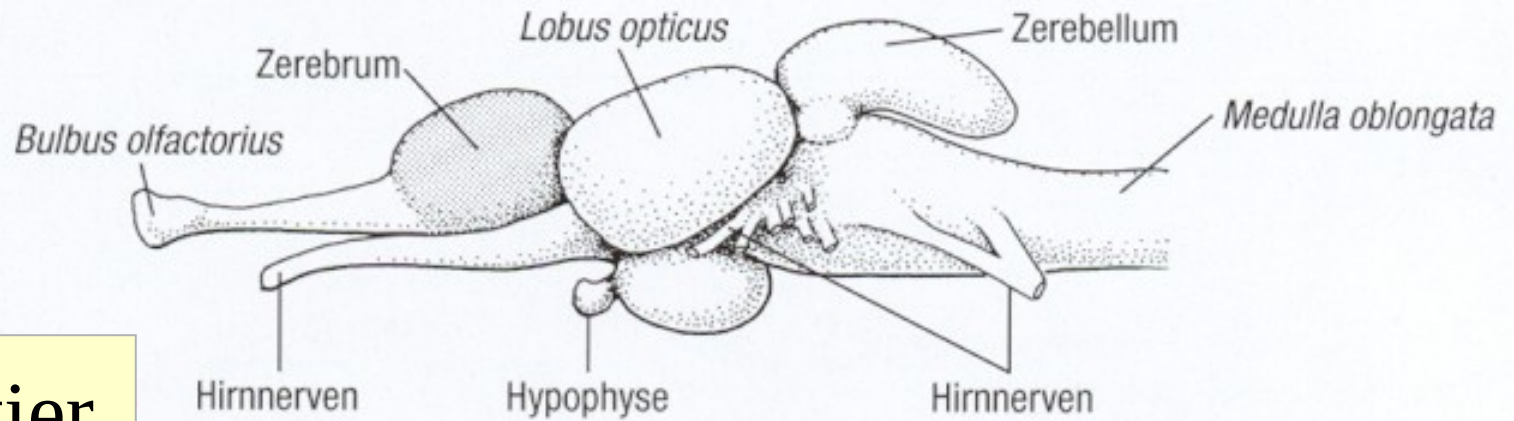
Nervengewebe in der Darmwand:

MEISSNERscher Plexus



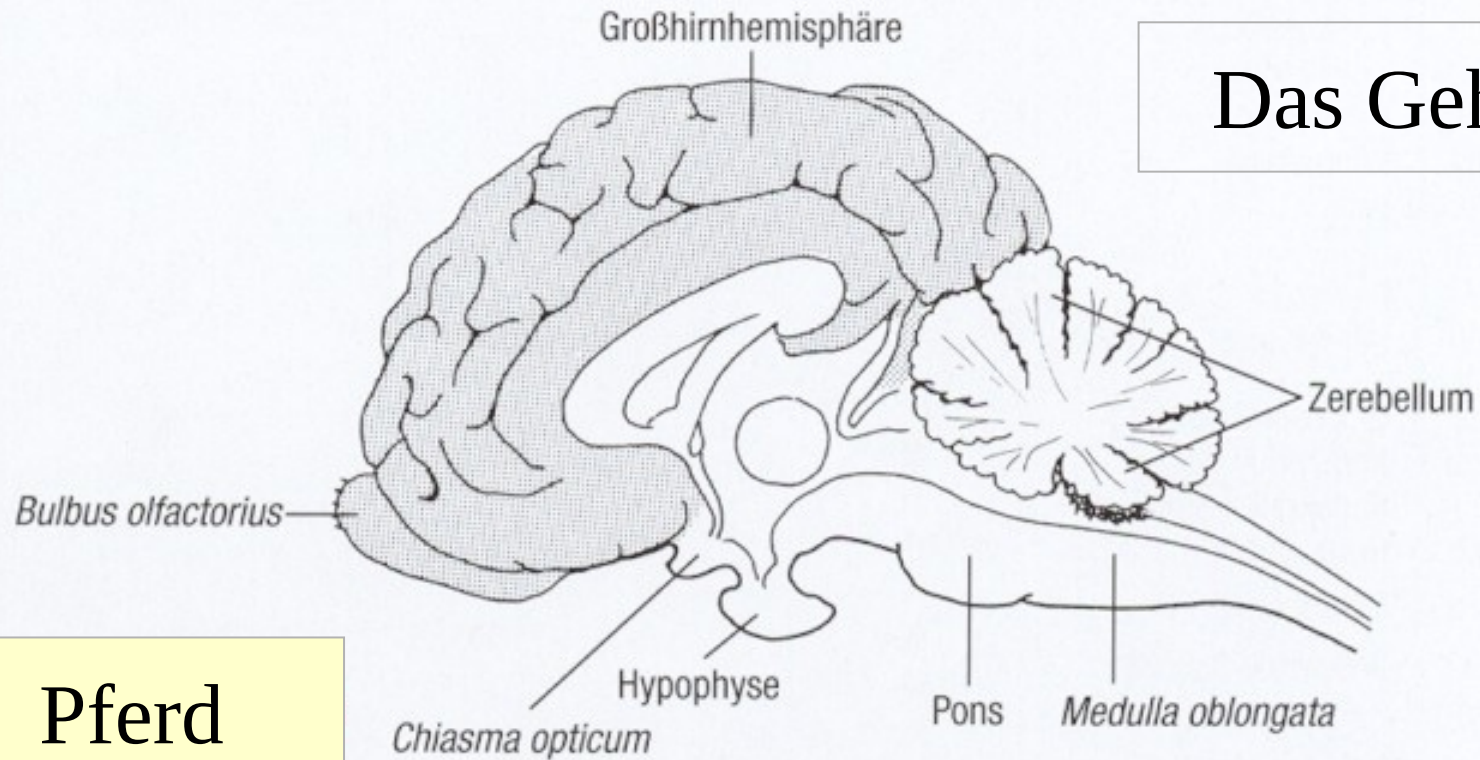
AUERBACHscher Plexus

Teleostier

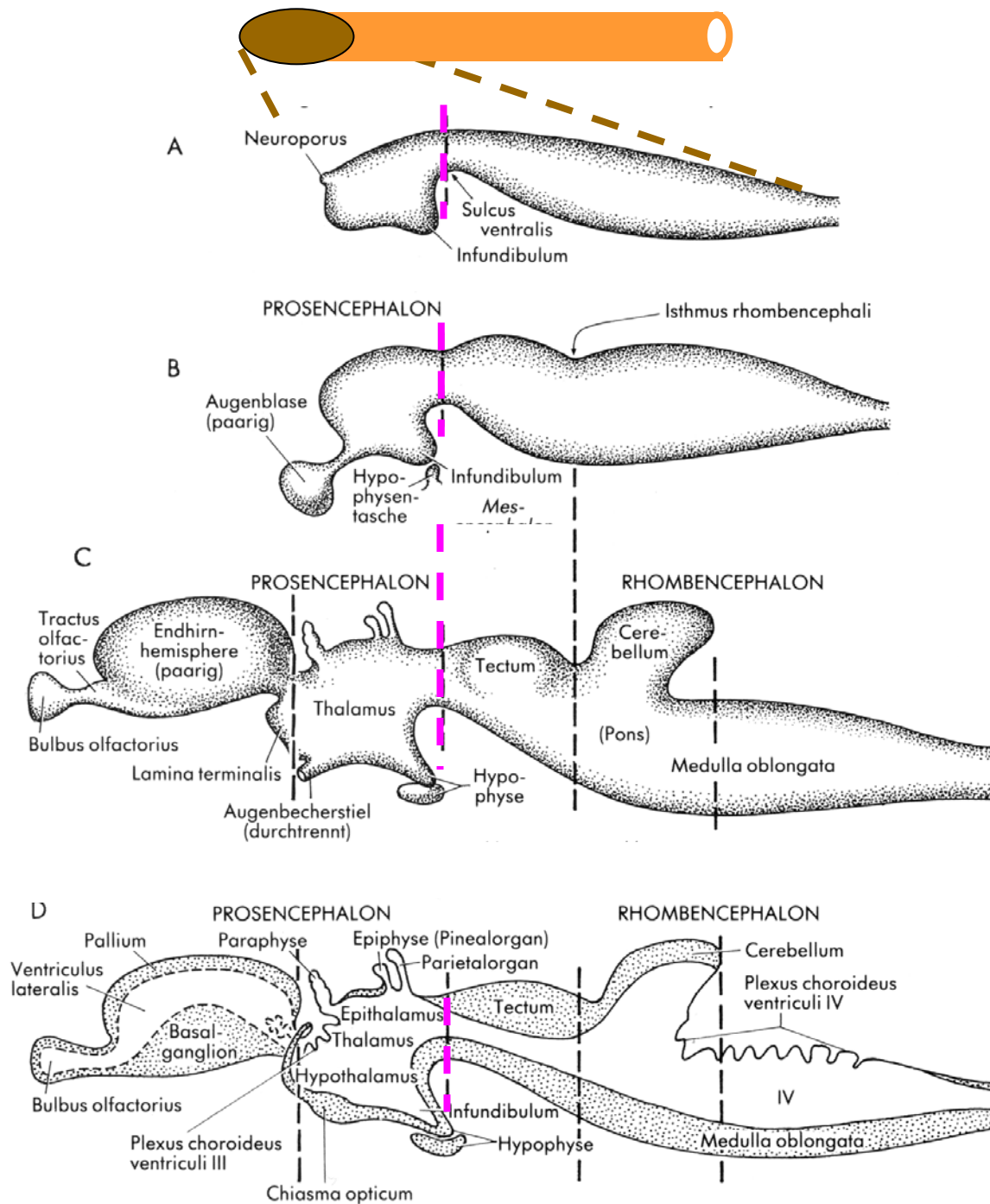


Das Gehirn

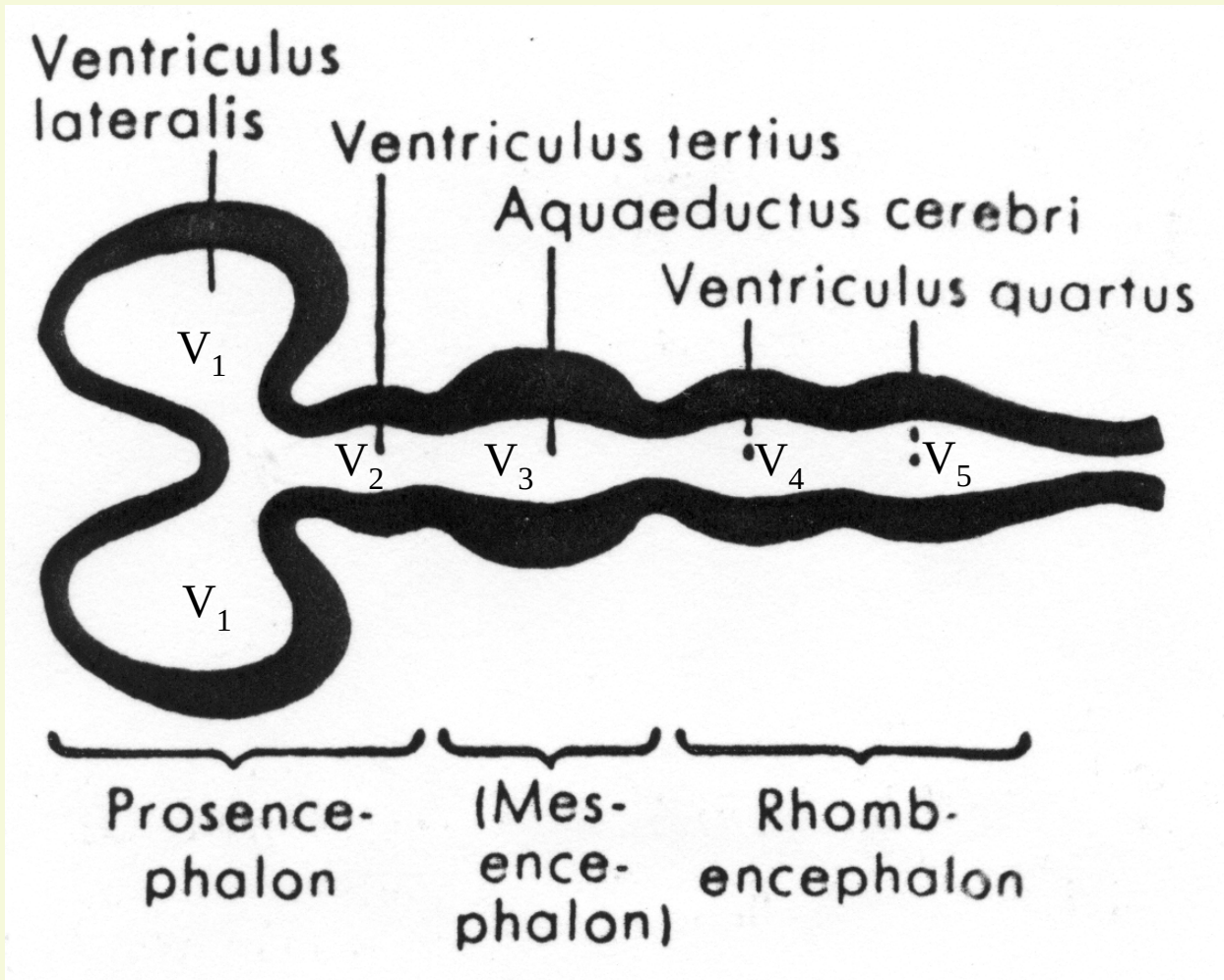
Pferd



Differenzierung des 5-teiligen Vertebraten- gehirns

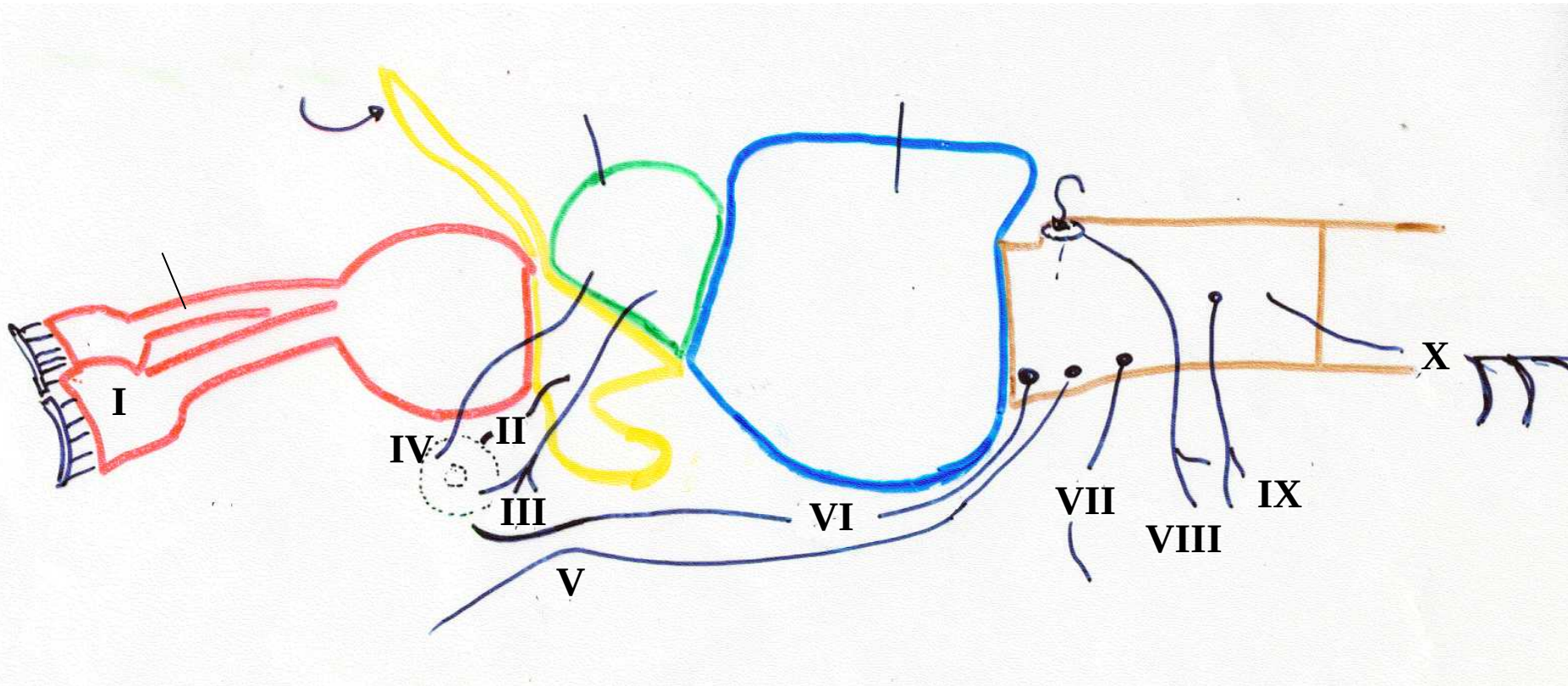


Gehirnventrikel



Telencephalon **Diencephalon** **Mesencephalon** **Met- Myelencephalon**

Gehirnnerven



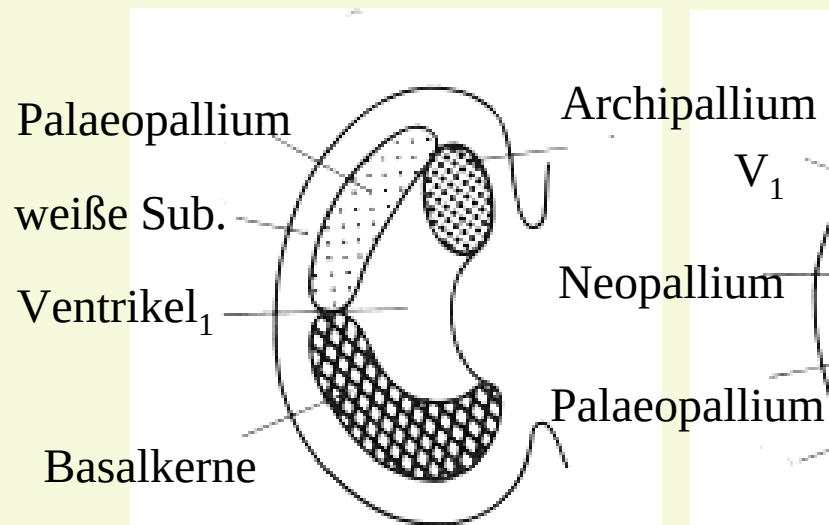
I.
II.
III.
IV.
V.
VI.

Einteilung der Gehirnnerven:
Sinnesnerven
Augenmuskelnerven
Branchialnerven
 (- Kiemenbogeninnervation)

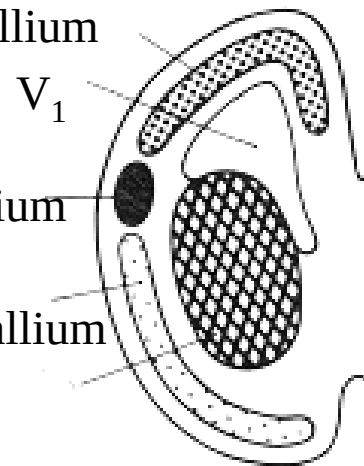
VII.
VIII.
IX.
X.
XI.
XII.
„0“

Differenzierung des Telencephalon

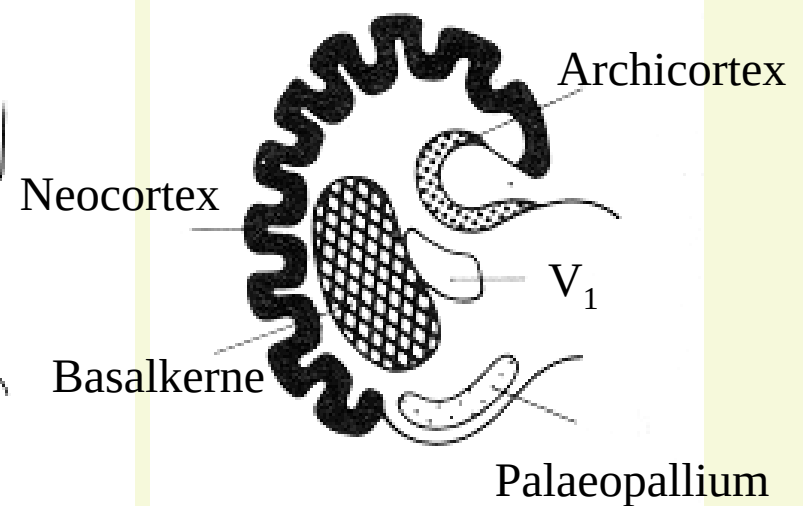
Amphibien



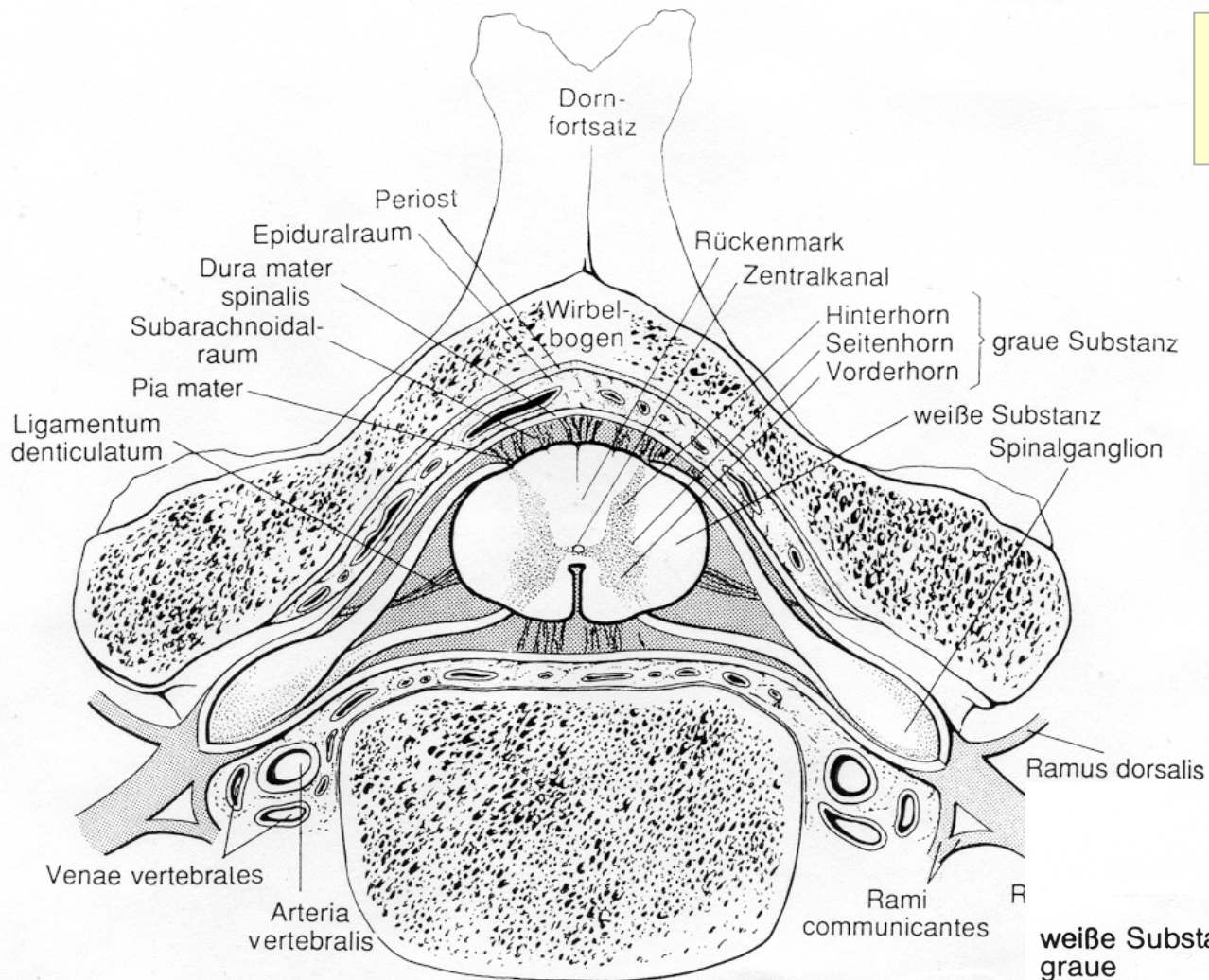
Reptilien



Säuger



Rückenmark



weisse Substanz

graue Substanz

hintere Wurzel

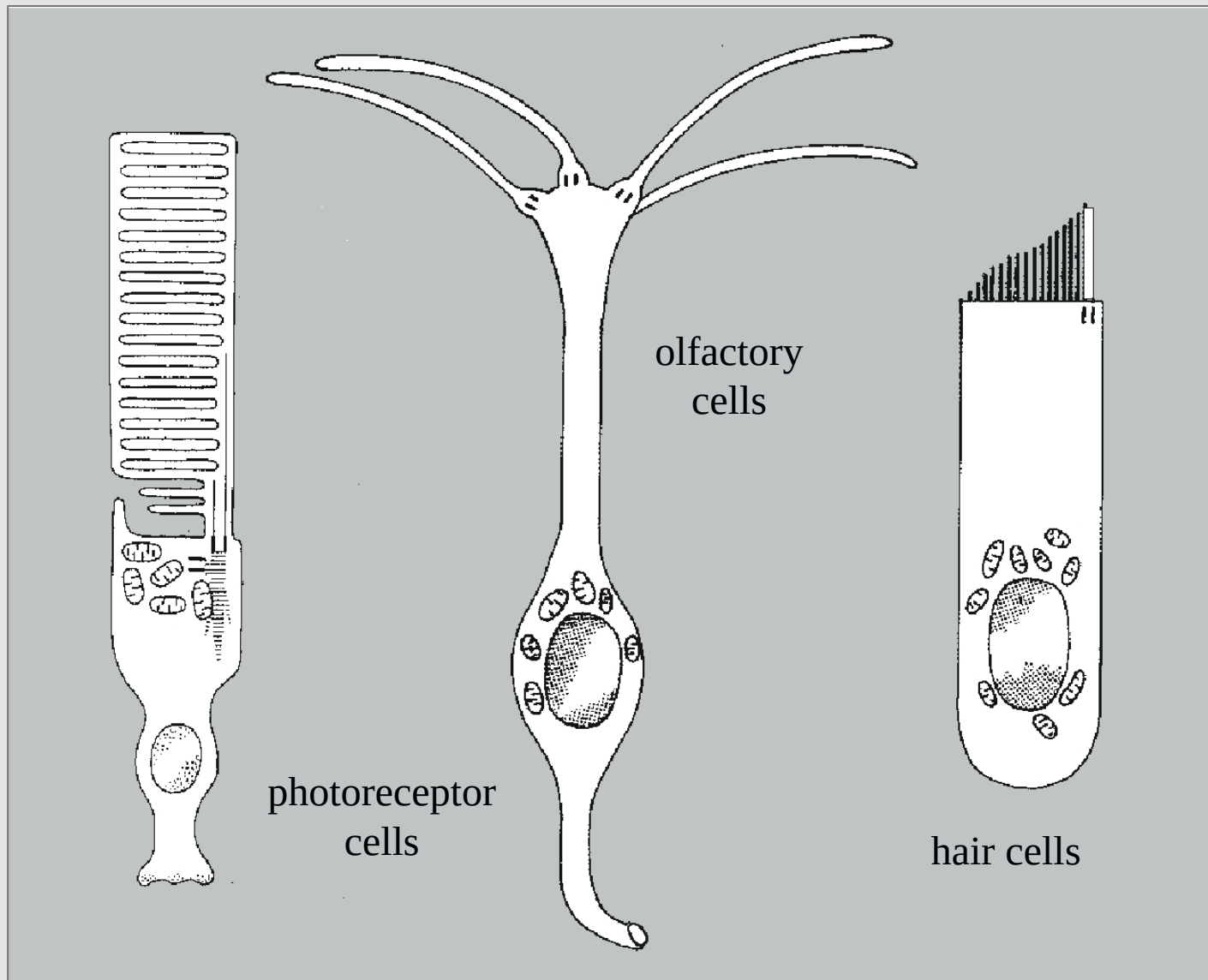
vordere Wurzel

Spinalganglion

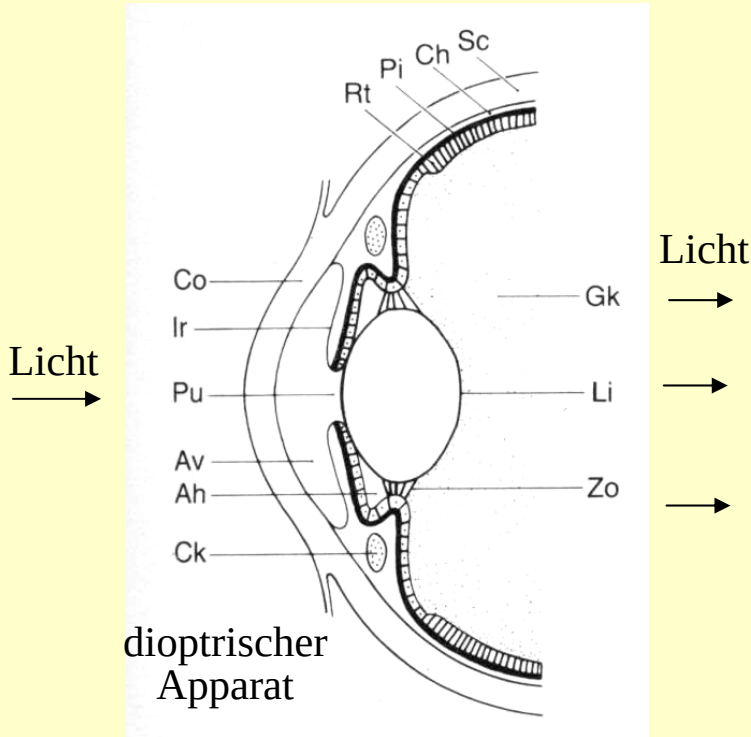
Grenzstrang des Sympathikus

zwei Rückenmarksnerven

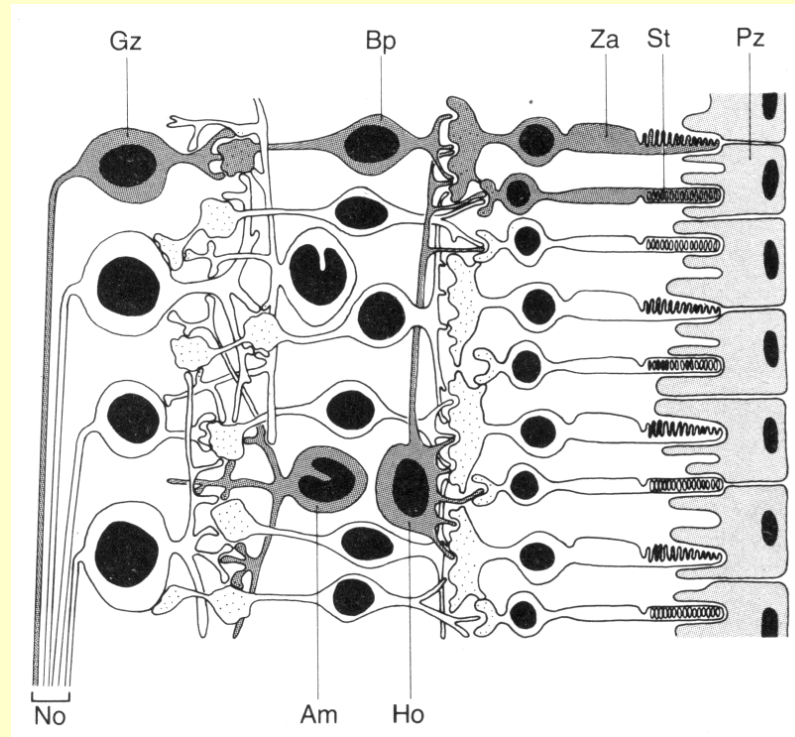
Ciliated sensory cells in vertebrates



Vertebraten-Linsenauge

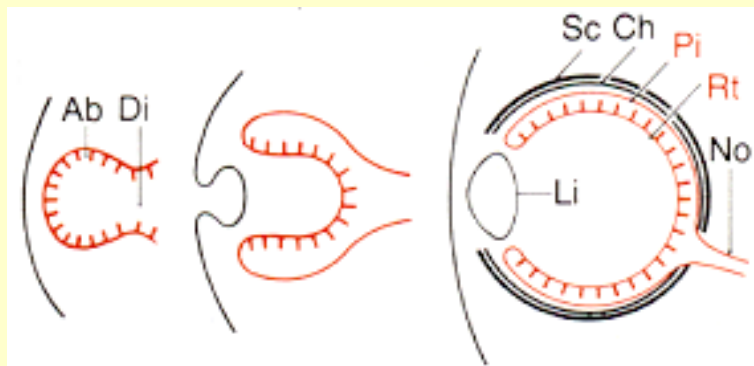


Retina: Netzhaut

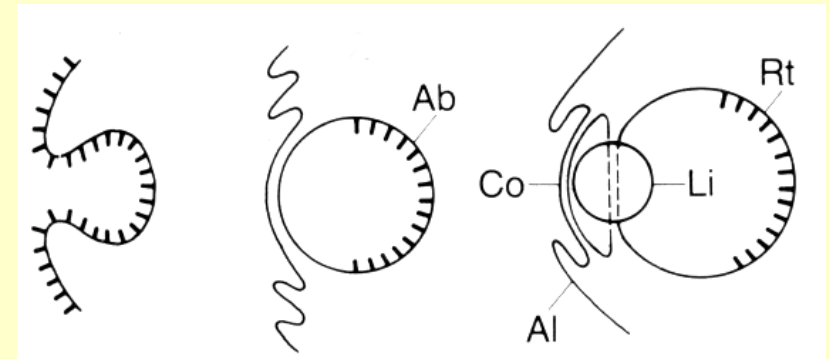


Auge

Inverses Linsenauge der Vertebraten



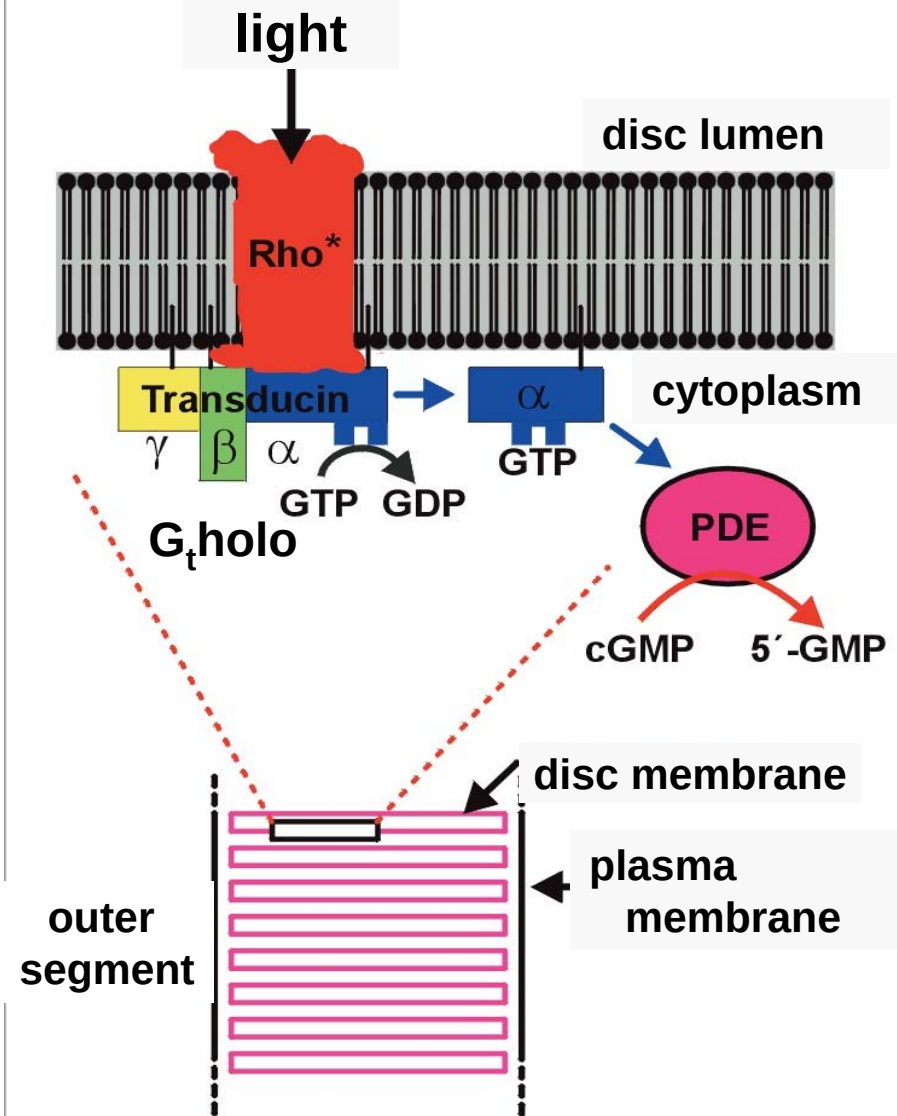
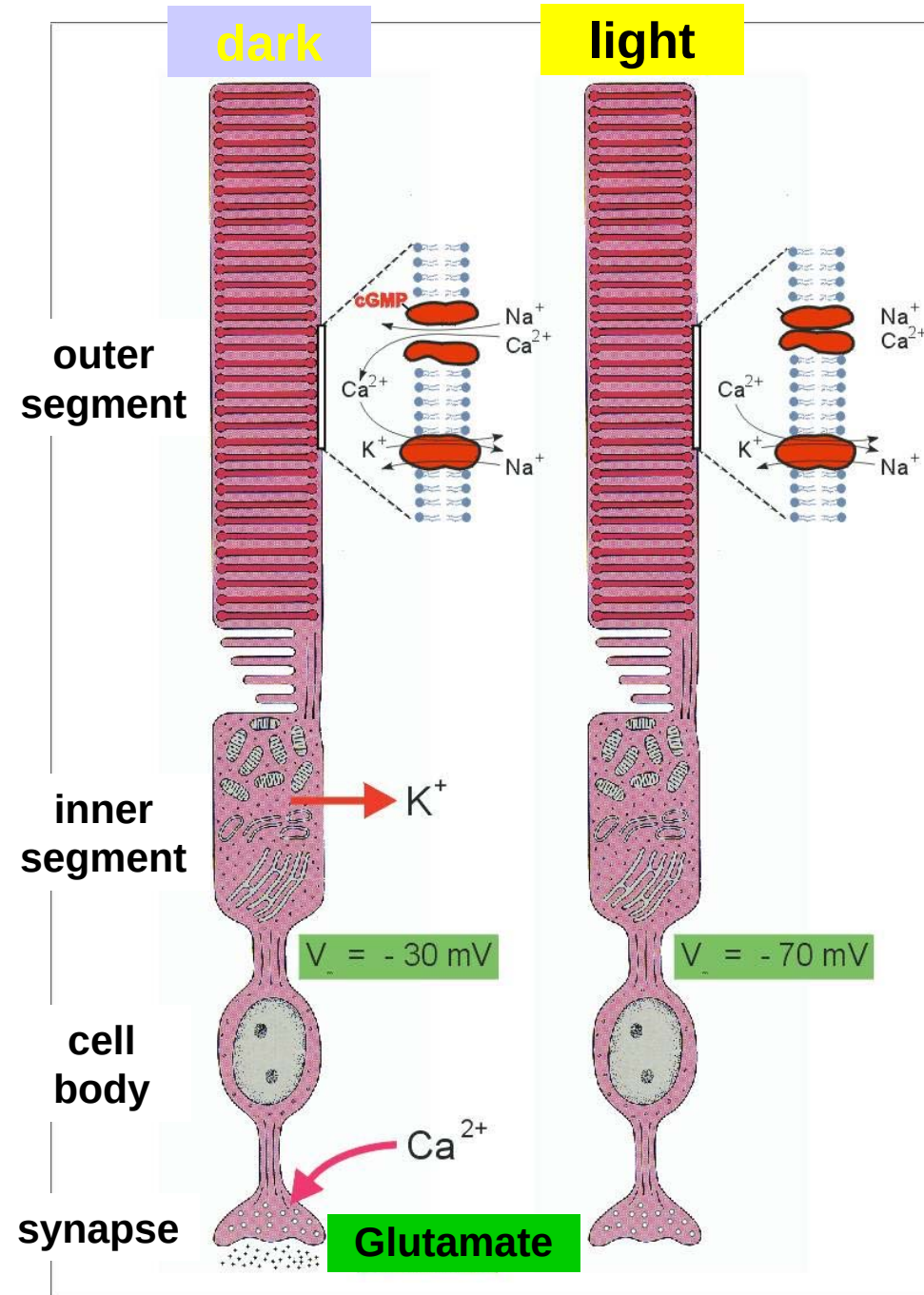
Everses Linsenauge der Cephalopoden



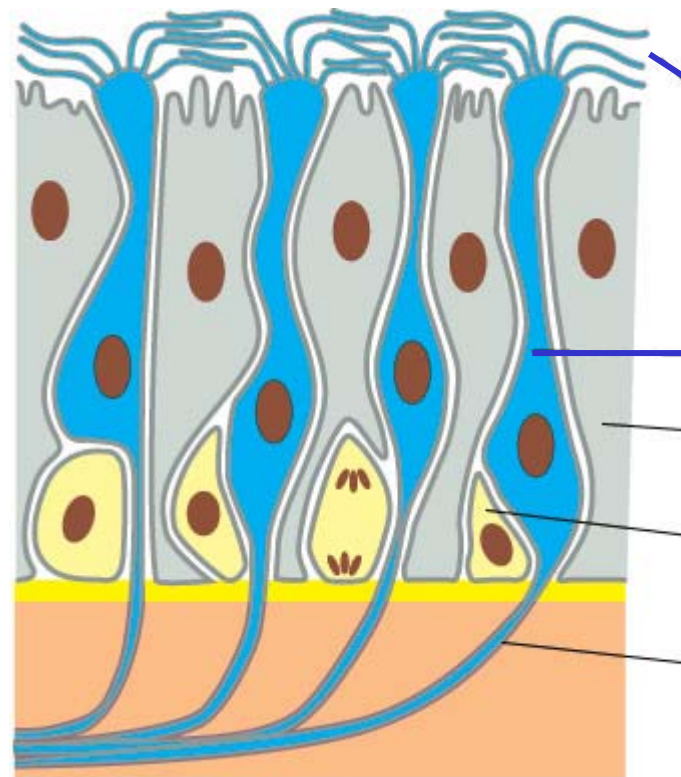
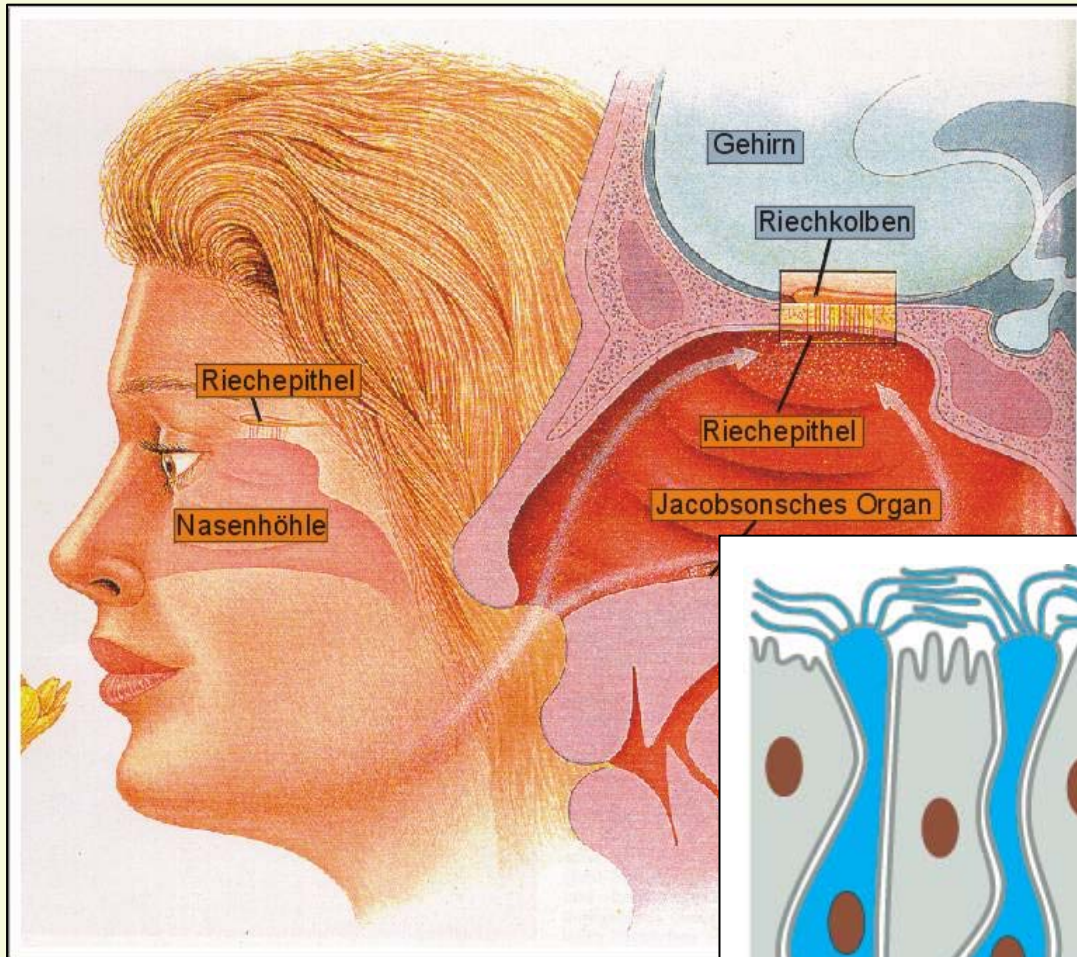
Linse Hautektoderm **Retina neuroektodermal**
(Diencephalon)

rein ektodermal (Haut)

The vertebrate visual signal transduction cascade



Geruchsinne: Nase



Schleimschicht

Riechköpfchen mit
modifizierten Cilien

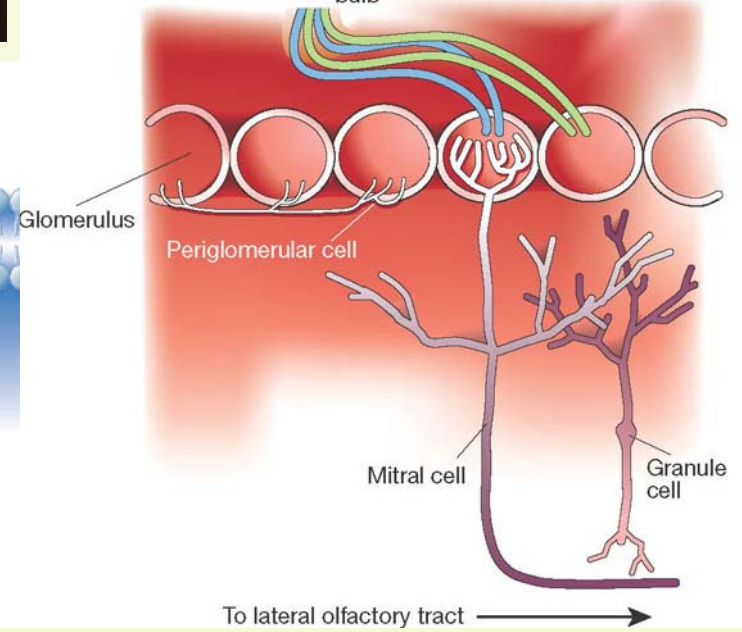
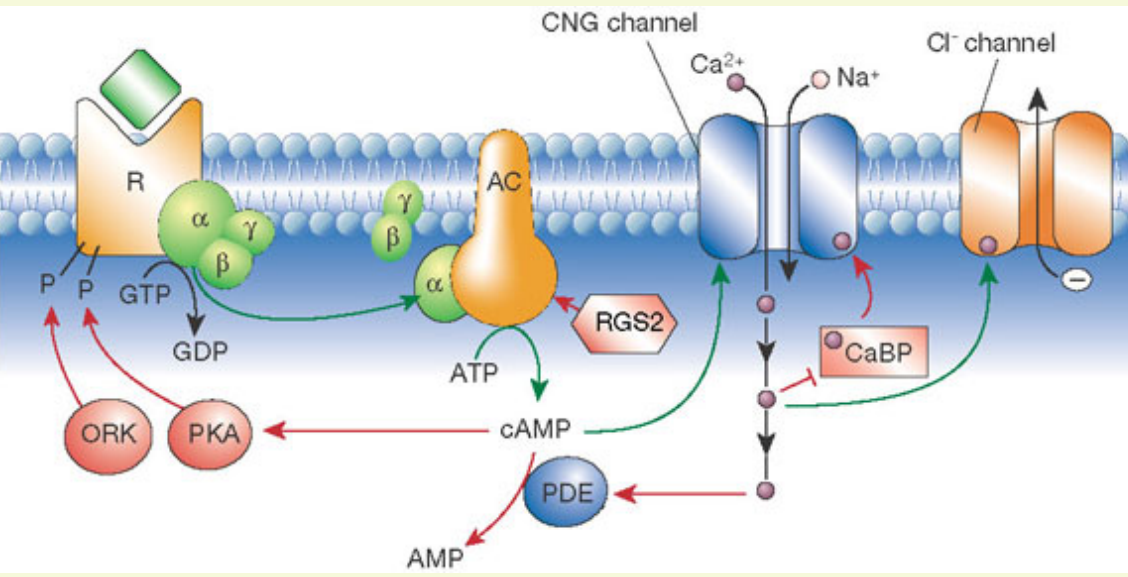
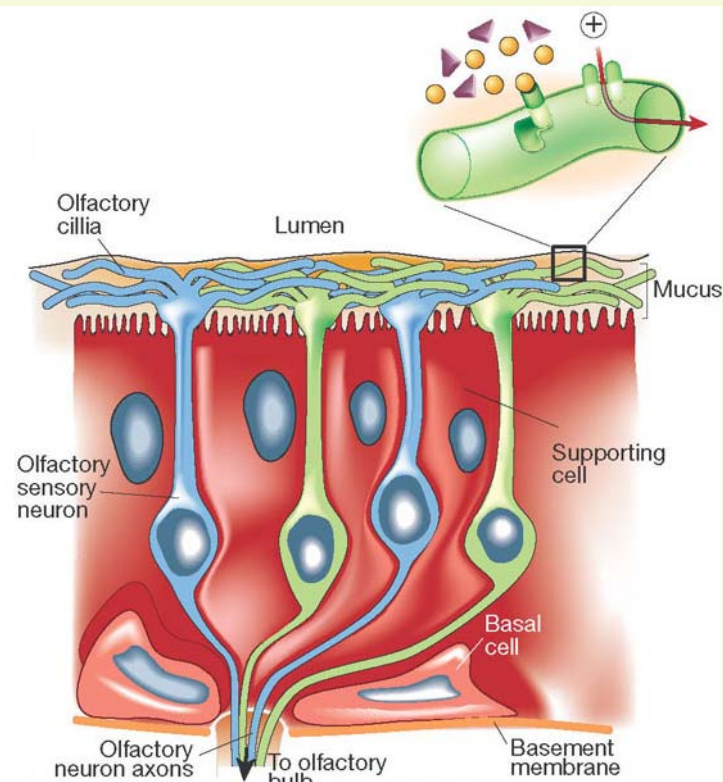
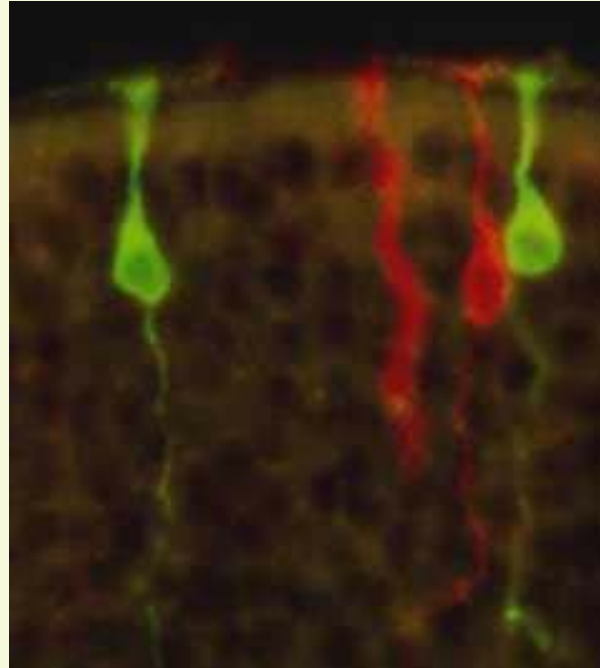
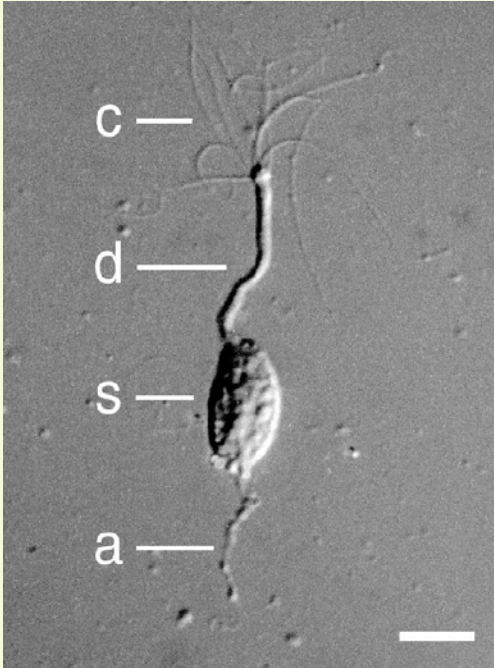
olfactorische
Sinneszellen

akzessorische
Stützzellen

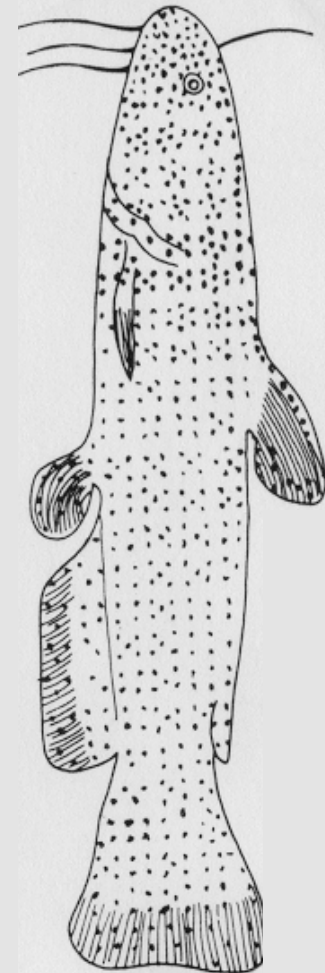
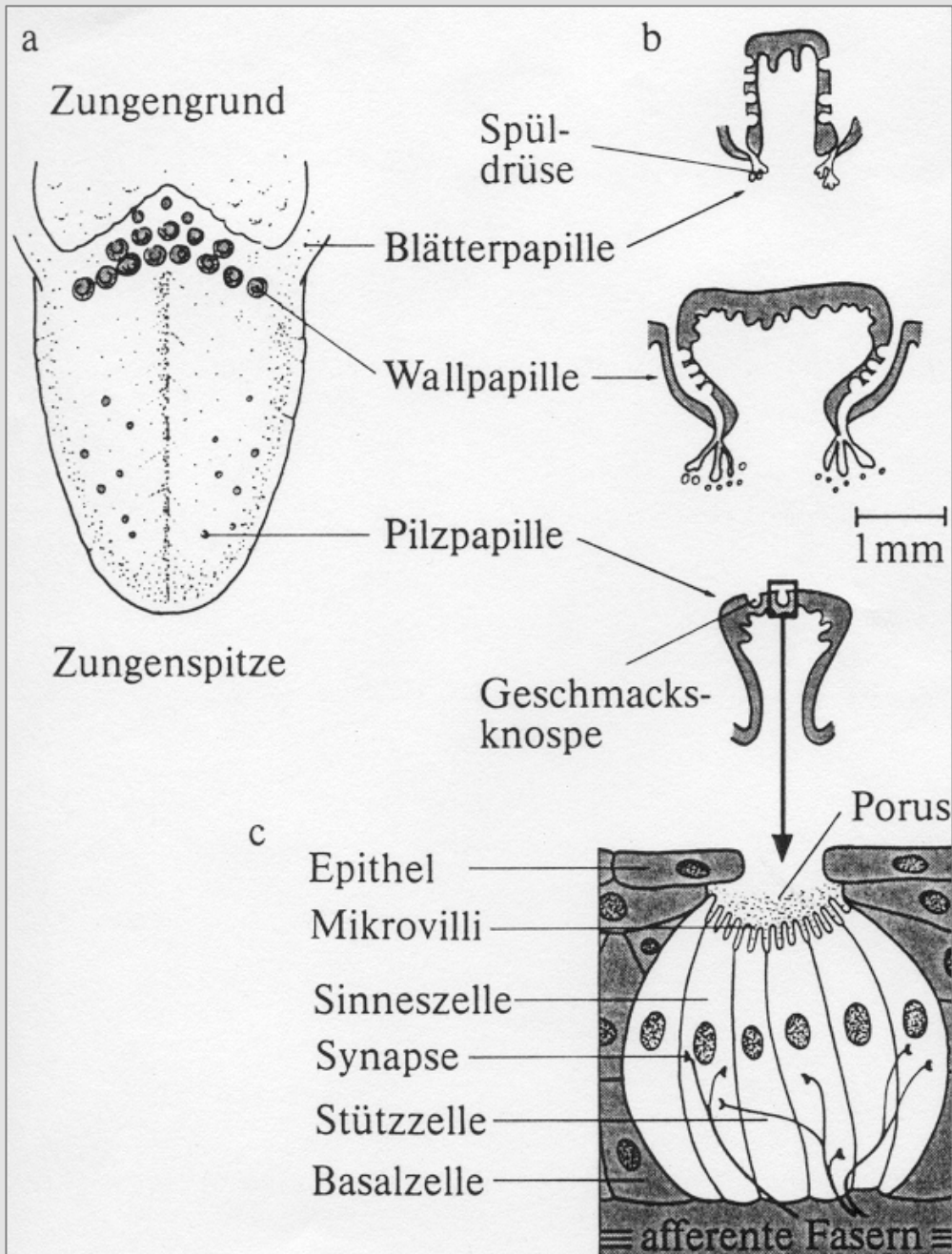
Basalzellen
(= adulte Stammzellen)

olfaktorische
Axone

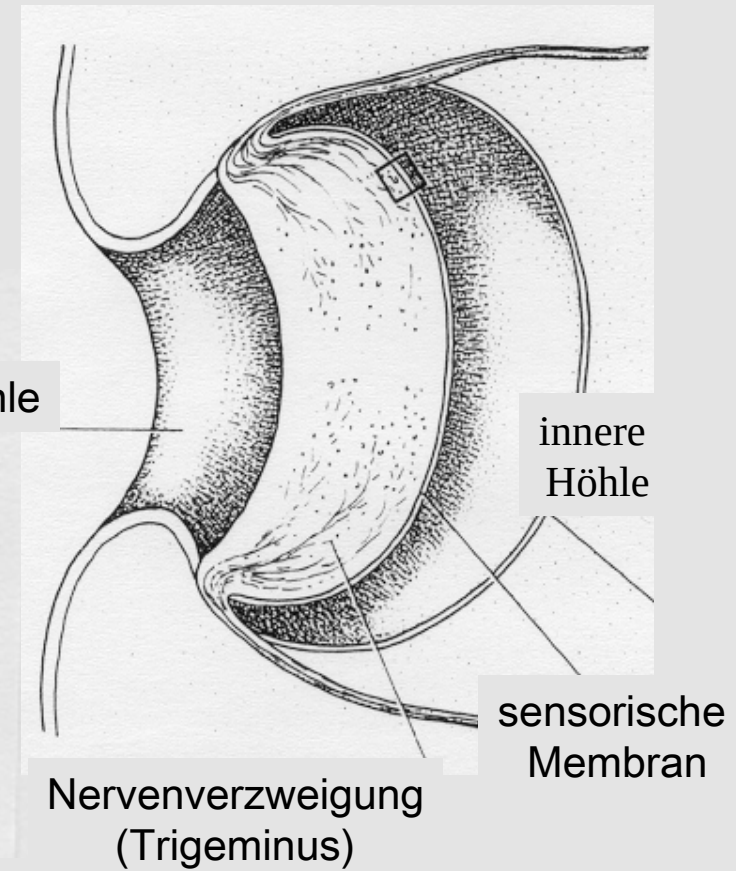
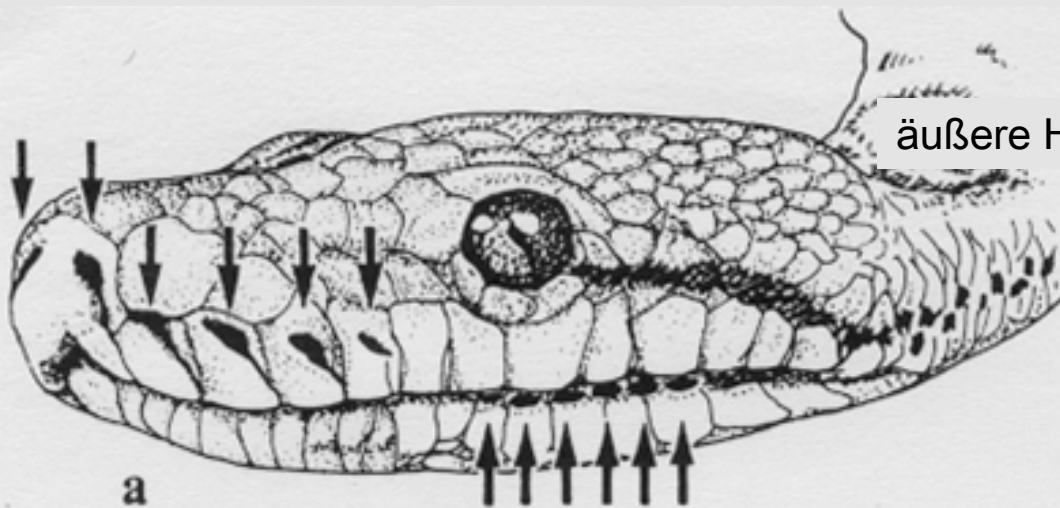
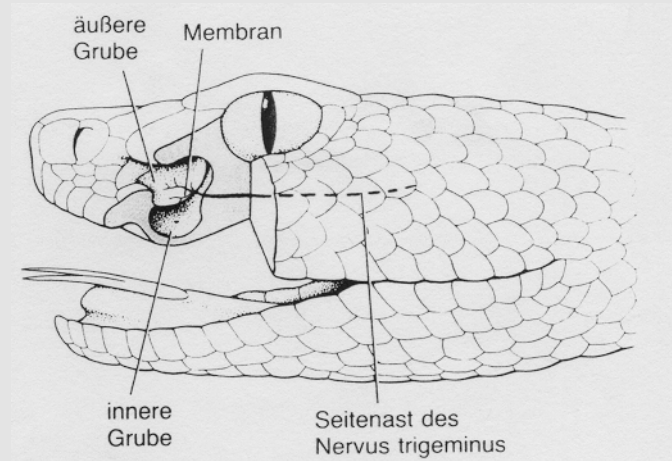
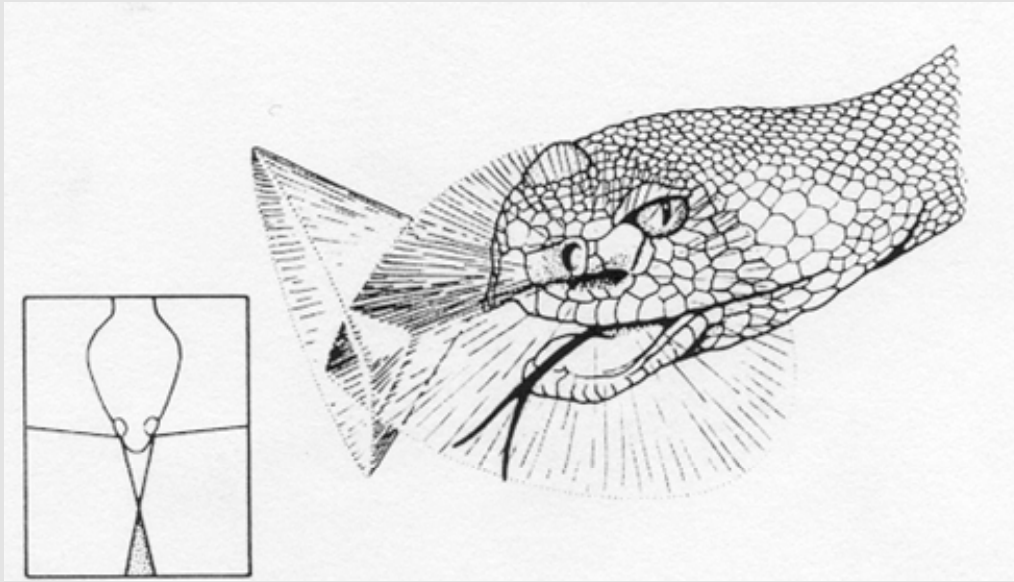
Olfaction = Riechen



Geschmacksinn

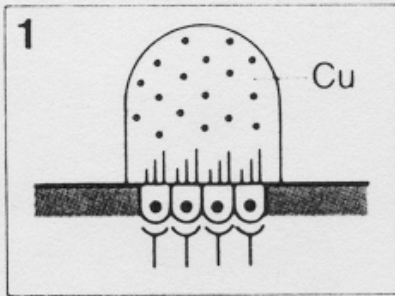


Infrarotrezektion: Grubenorgan

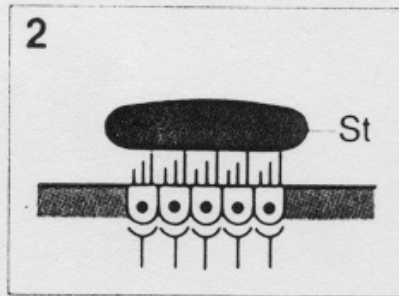


Sinneszellen im Innenohr

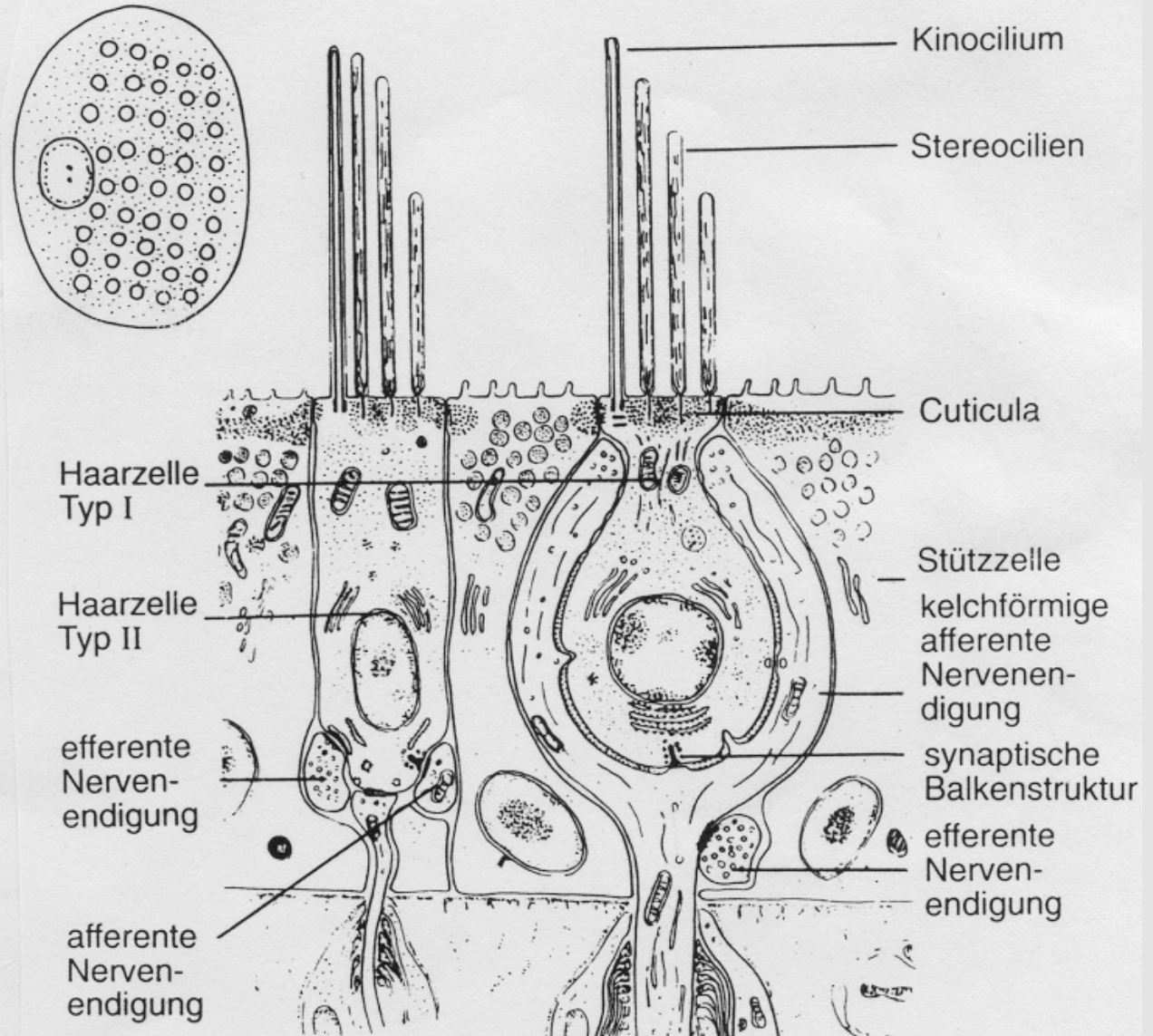
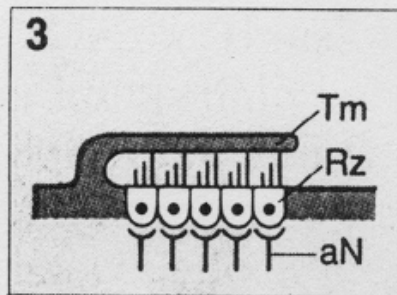
Cupula



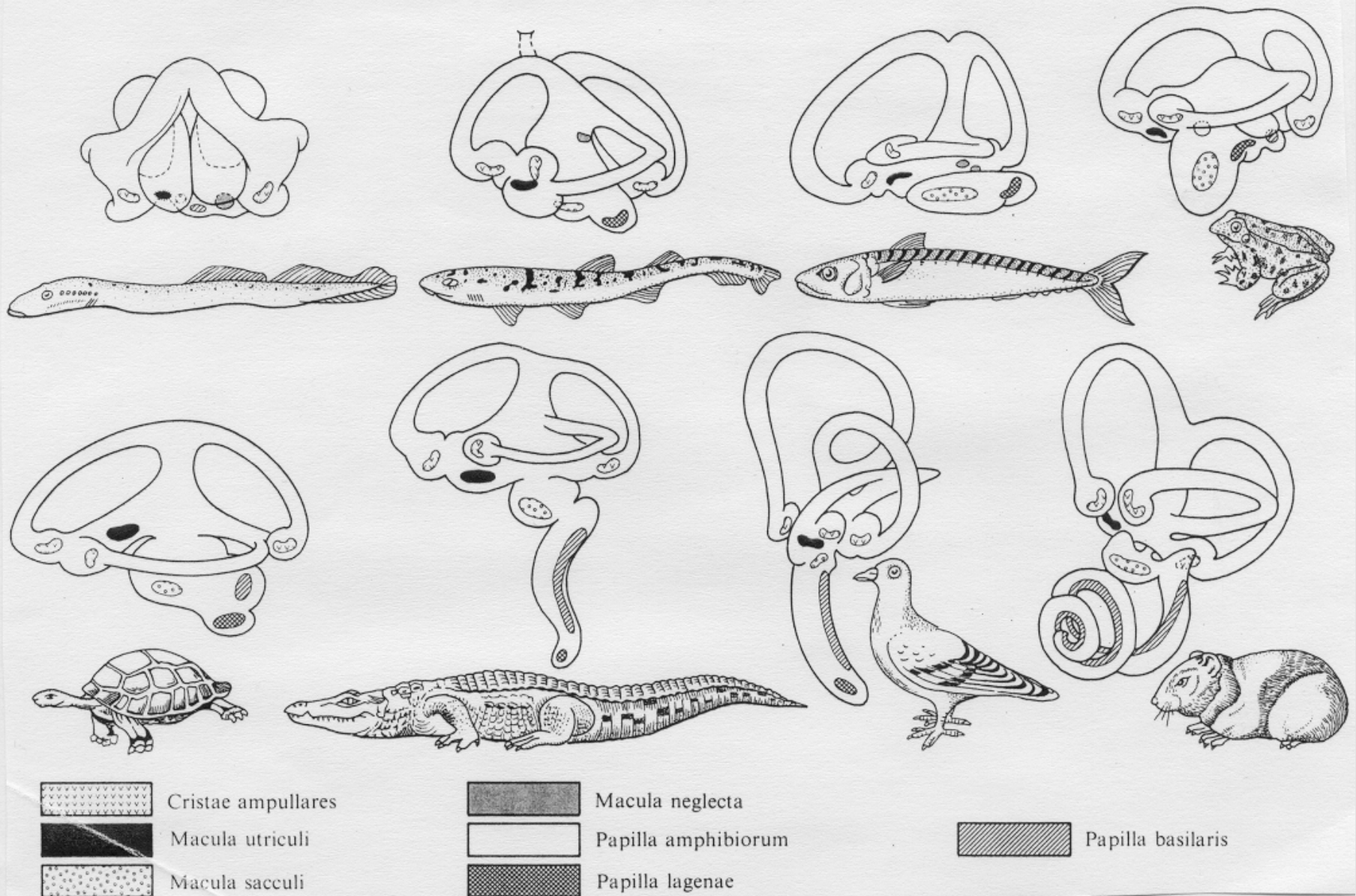
Statolith



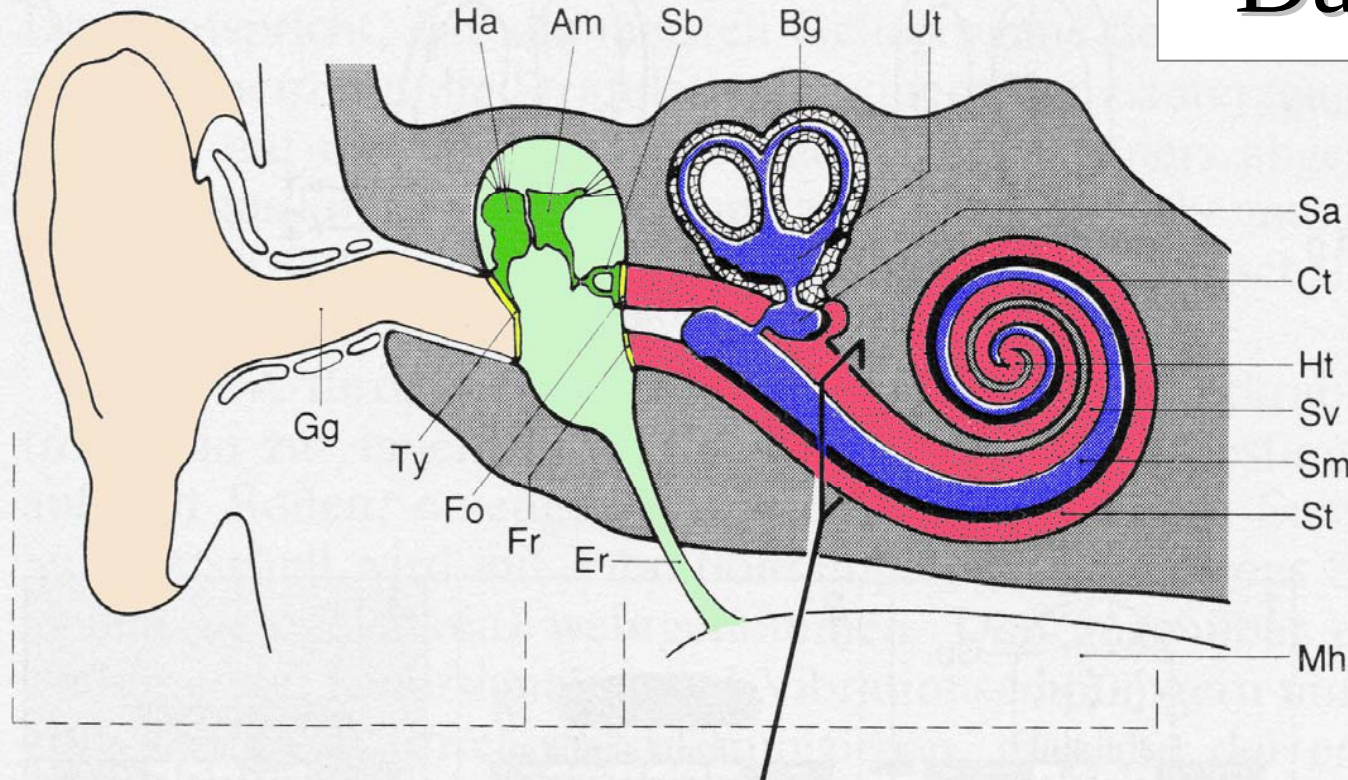
Tektorialmembran



mechanosensitive Strukturen im Innenohr



Das Ohr



äußeres Ohr Mittelohr Innenohr

Ohrmuschel
Gg = äußerer
Gehörgang

Ha = Malleus
Am = Incus
Sb = Stapes

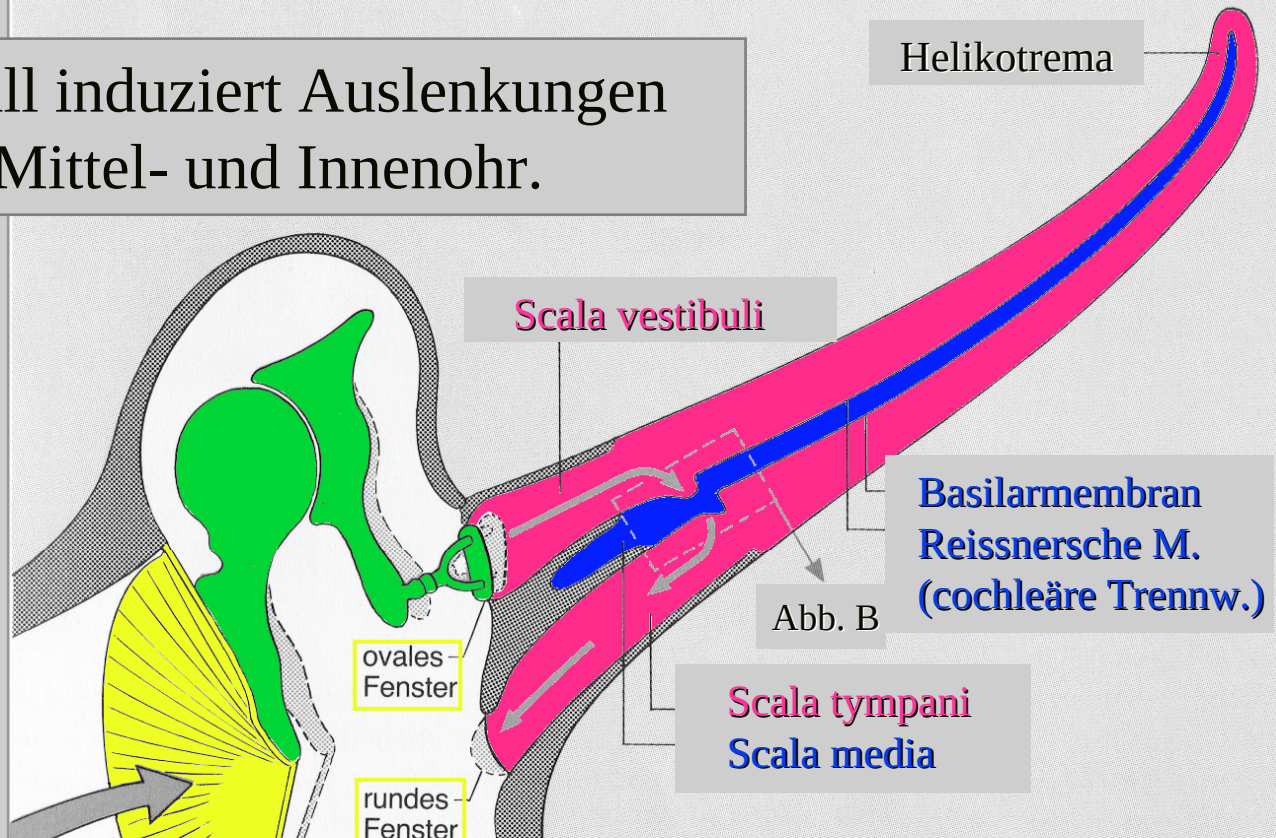
Bg = Bogengänge
Ut = Utriculus
Sc = Saculus

Sv = Scala vestibuli
St = Scala tympani
Sm = Scala media
Ct = Corti'sches Organ
Ht = Helikotrema

Ty = Tympanum
Fo = ovales Fenster
Fr = rundes Fenster

Er = Eustachische Röhre
Mh = Mundhöhle

Der Schall induziert Auslenkungen
im Mittel- und Innenohr.

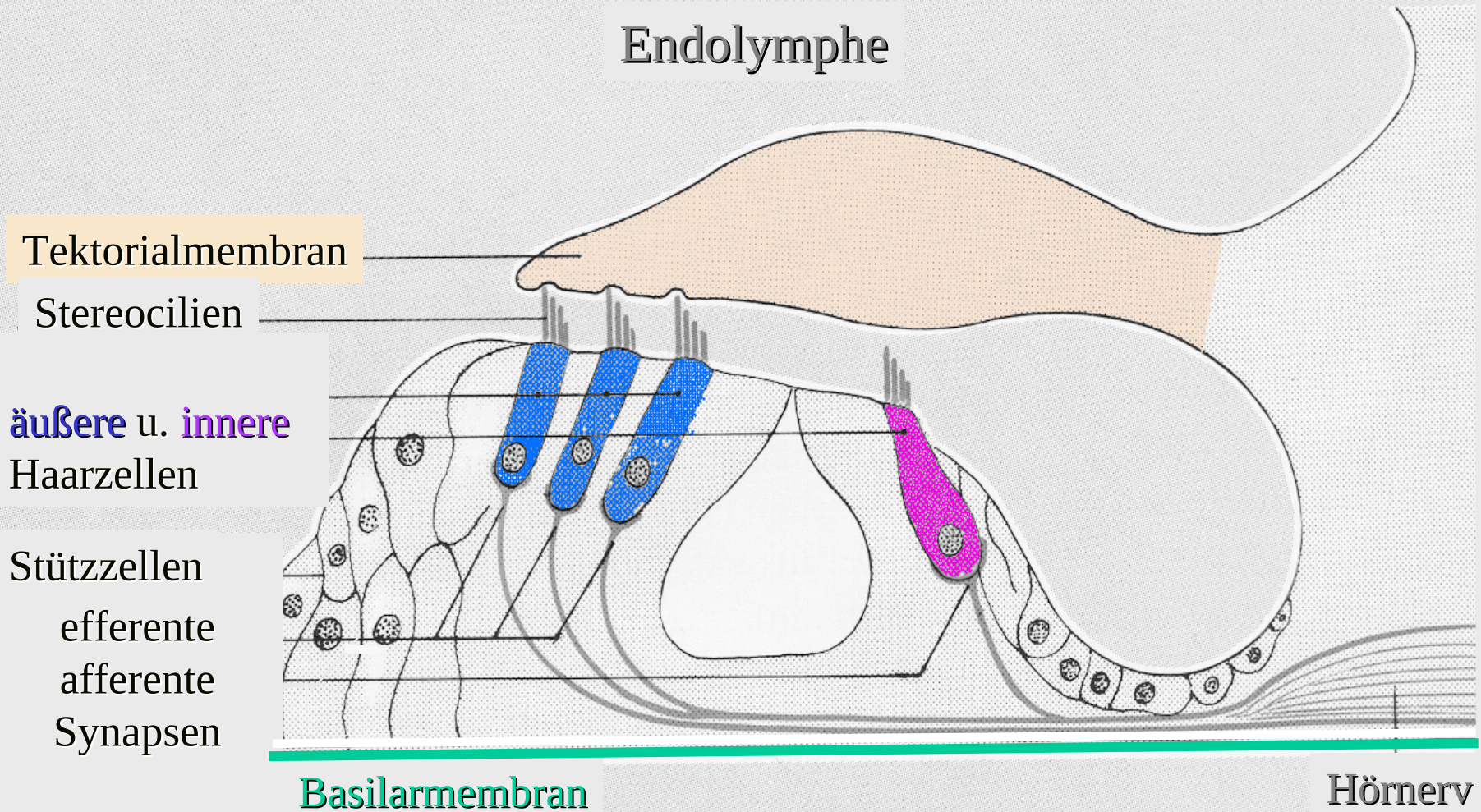


B

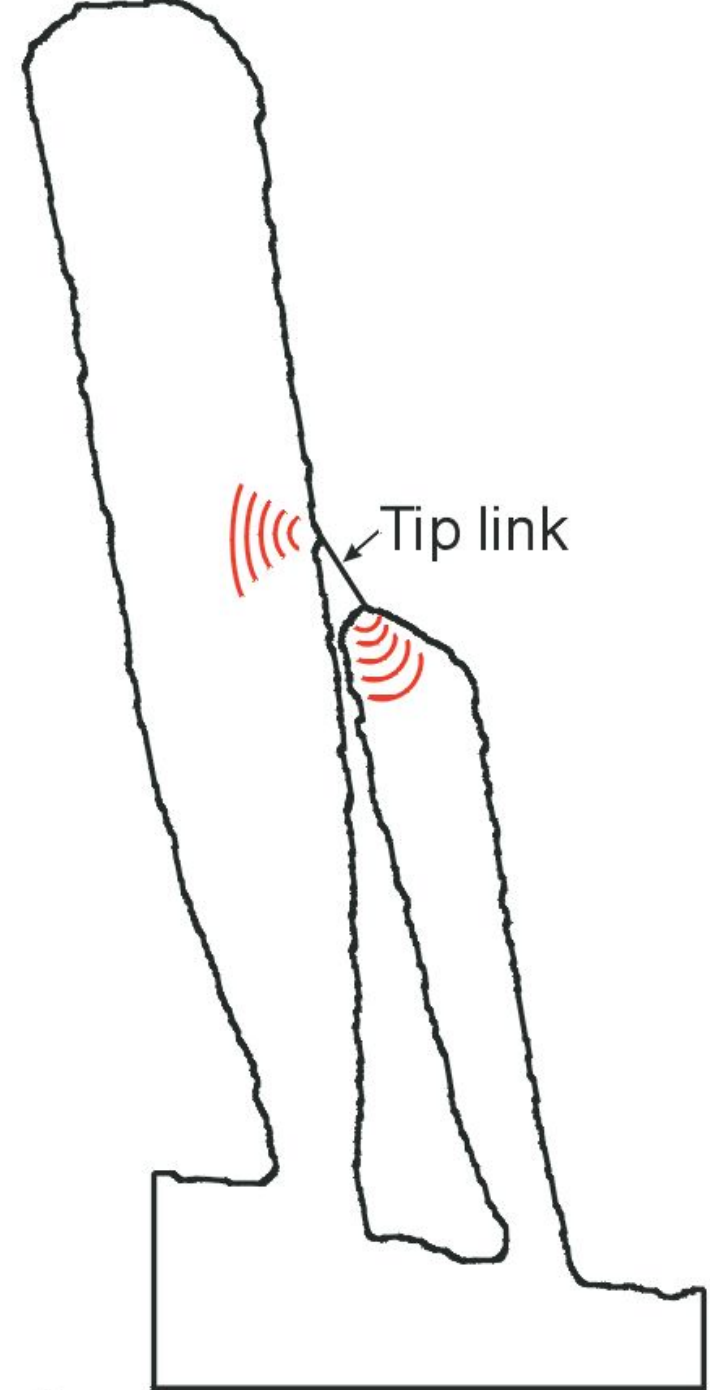
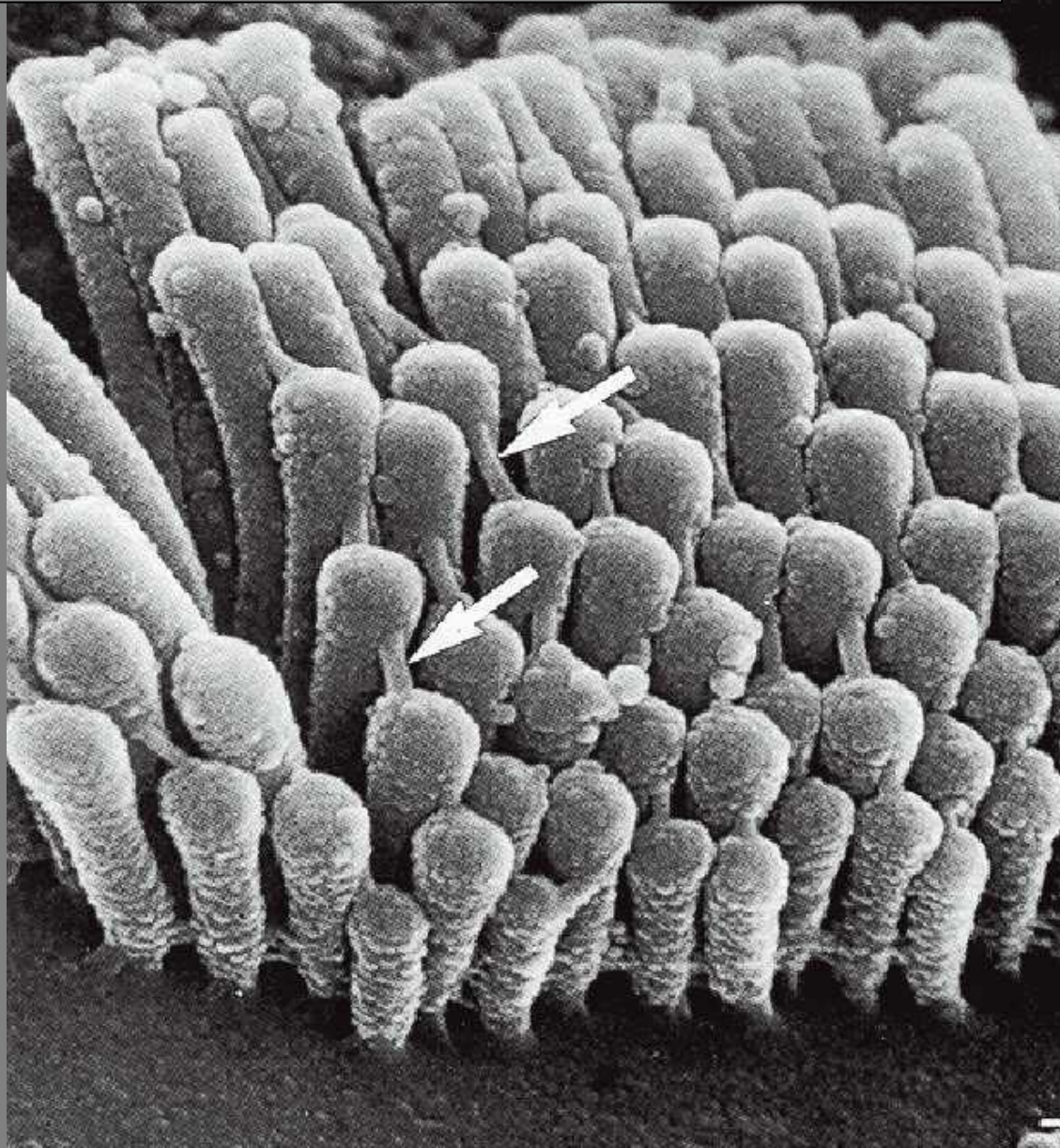


Der passive Wanderwelle ist frequenzabhängig.

Das Corti'sche Organ

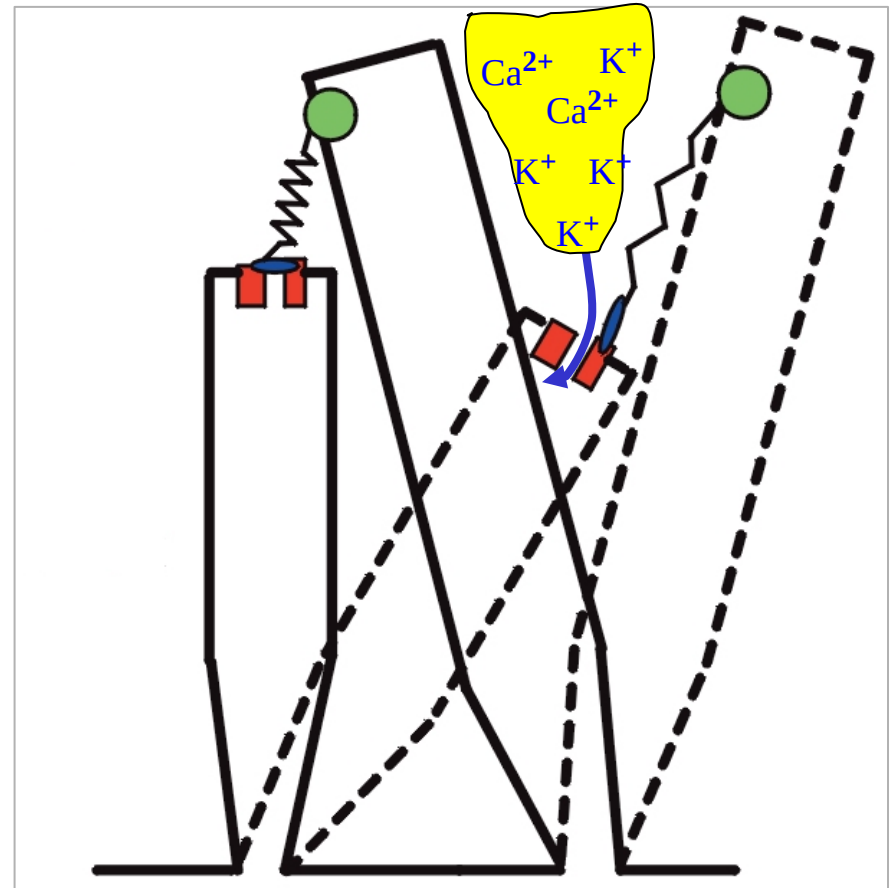
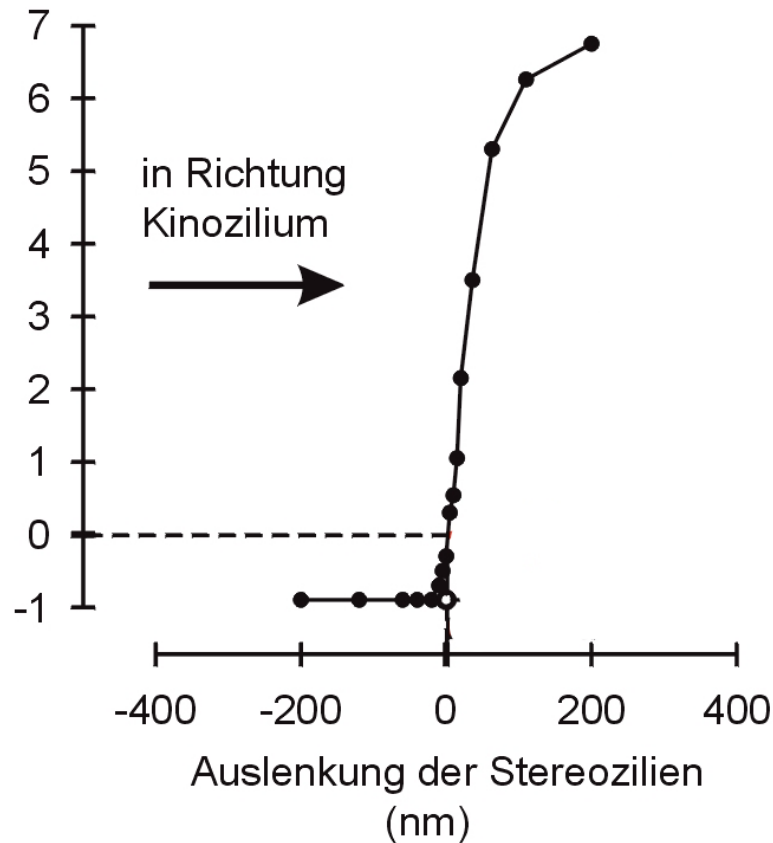


Stereovilli tip links



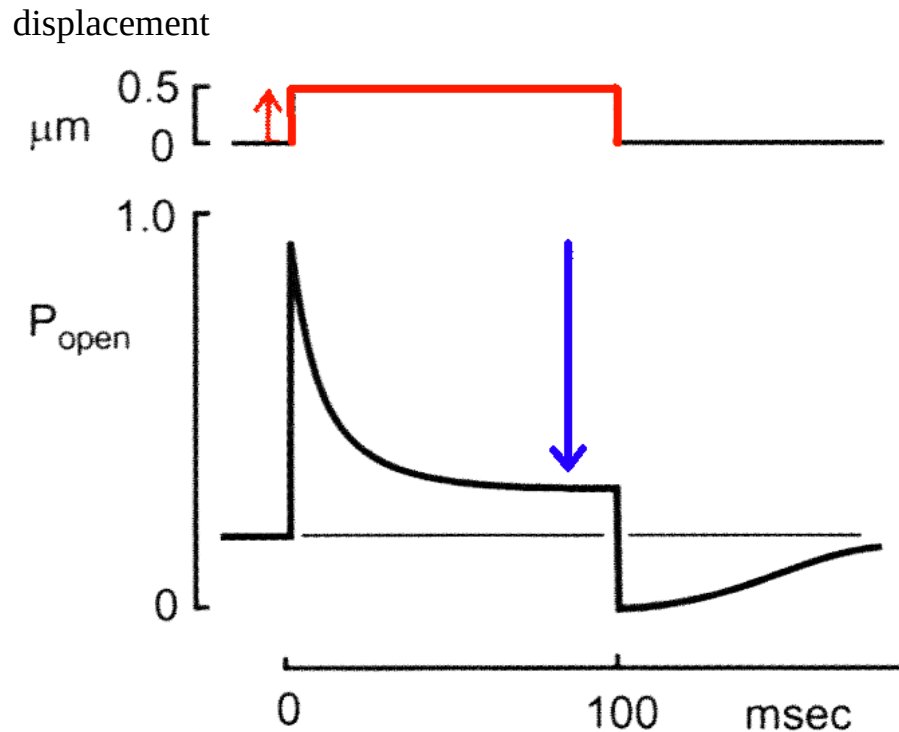
Signaltransduktion sensorischer Haarzellen

Änderung des
Membranpotentials
(mV)

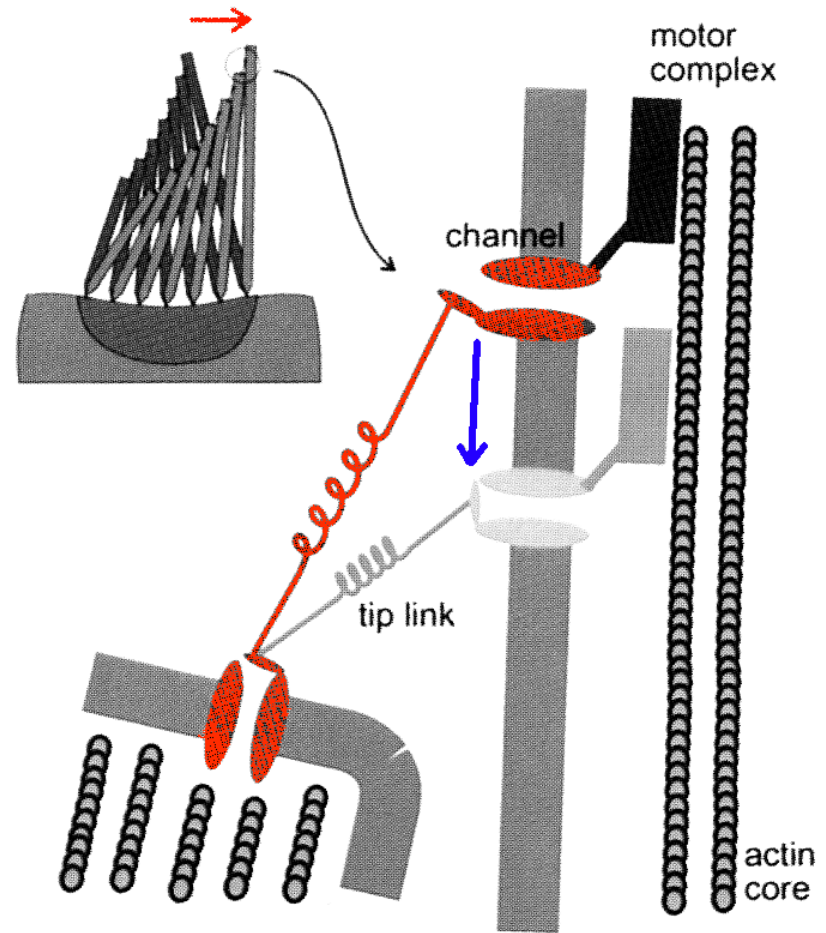


Depolarisation
sensory hair cell

Adaptation of sensory hair cells

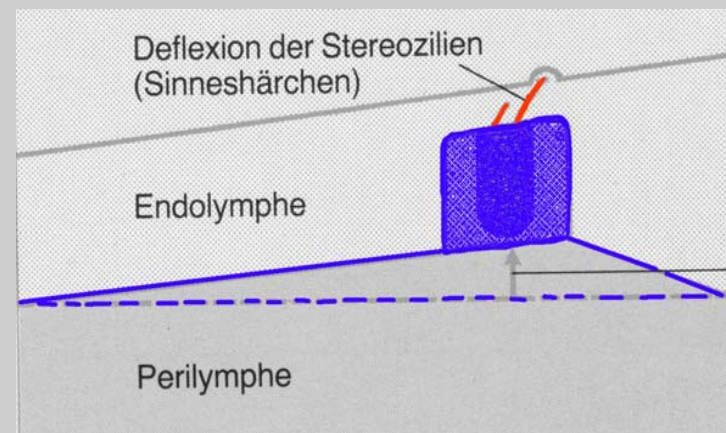
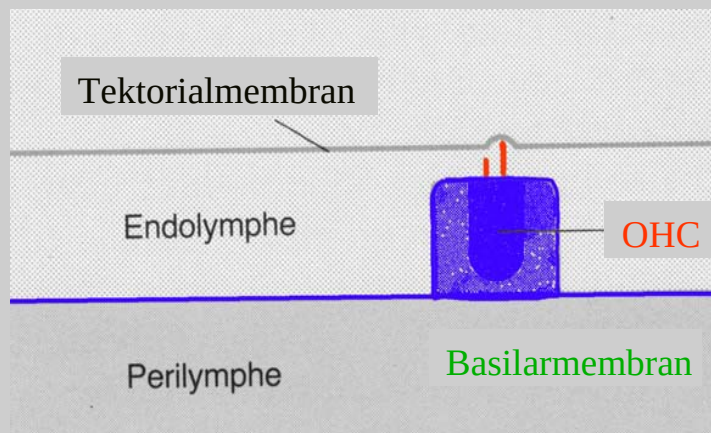
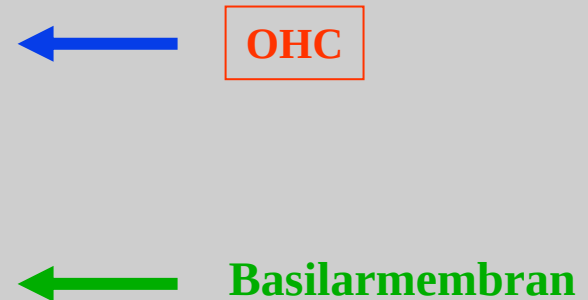
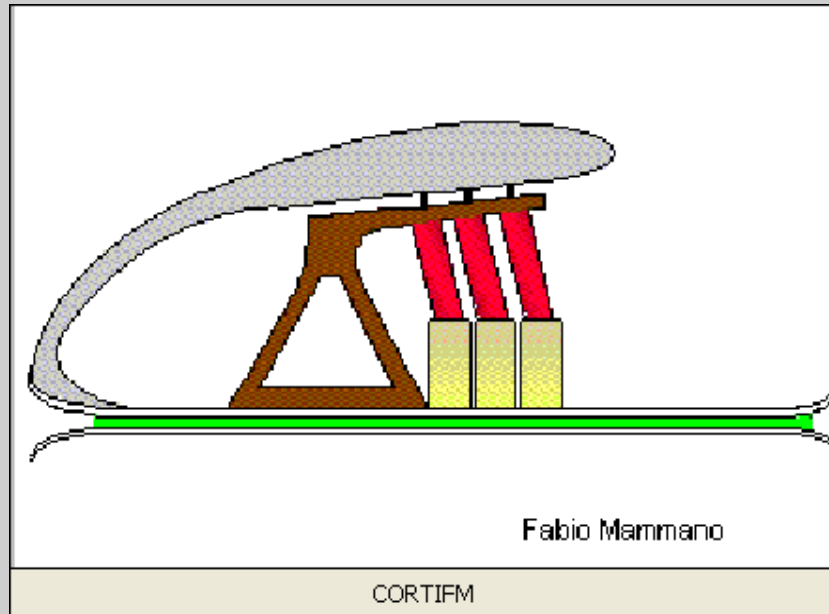


Stimulation of hair cells by mechanical displacement of stereovilli

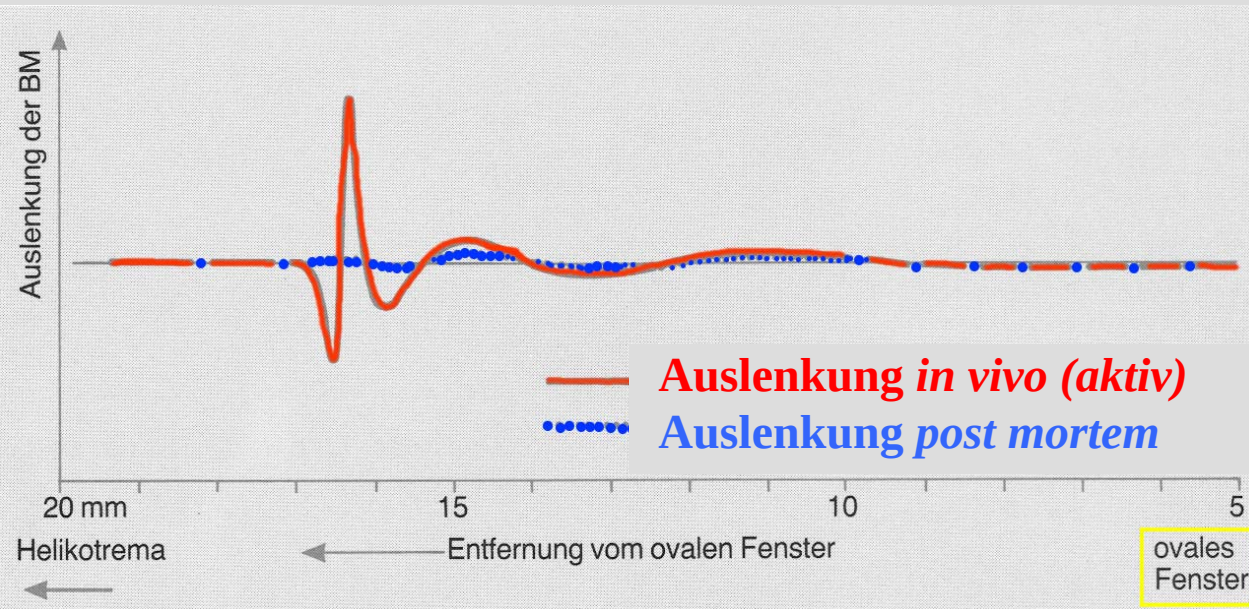


Adaptation motor activation in stereovillus

Die Deflektion der Stereovilli der Haarzellen ist ihr adequater Reiz



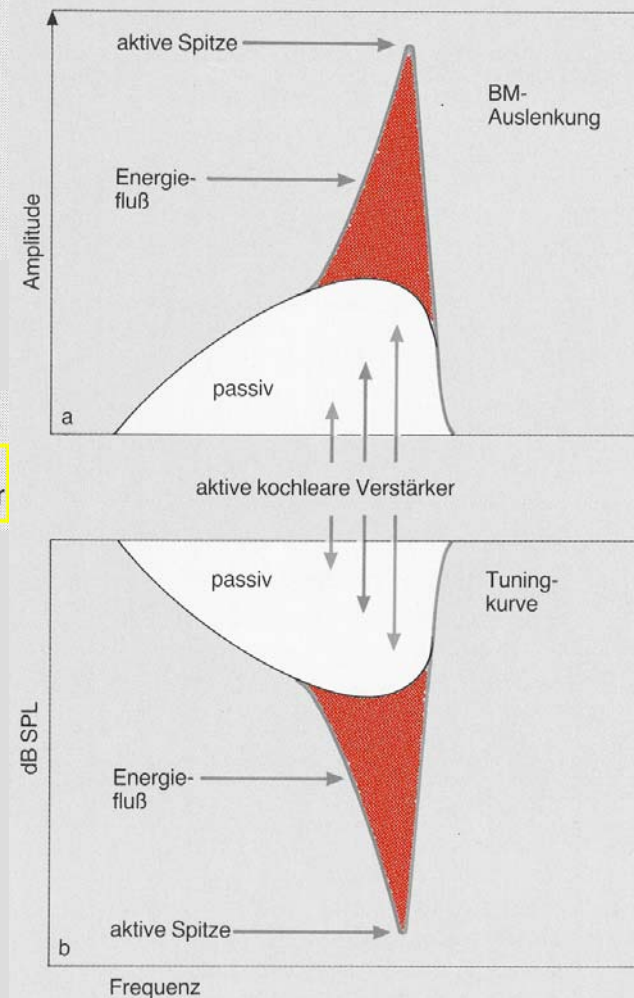
Aktive Verstärkung der Wanderwelle der Basilarmembran



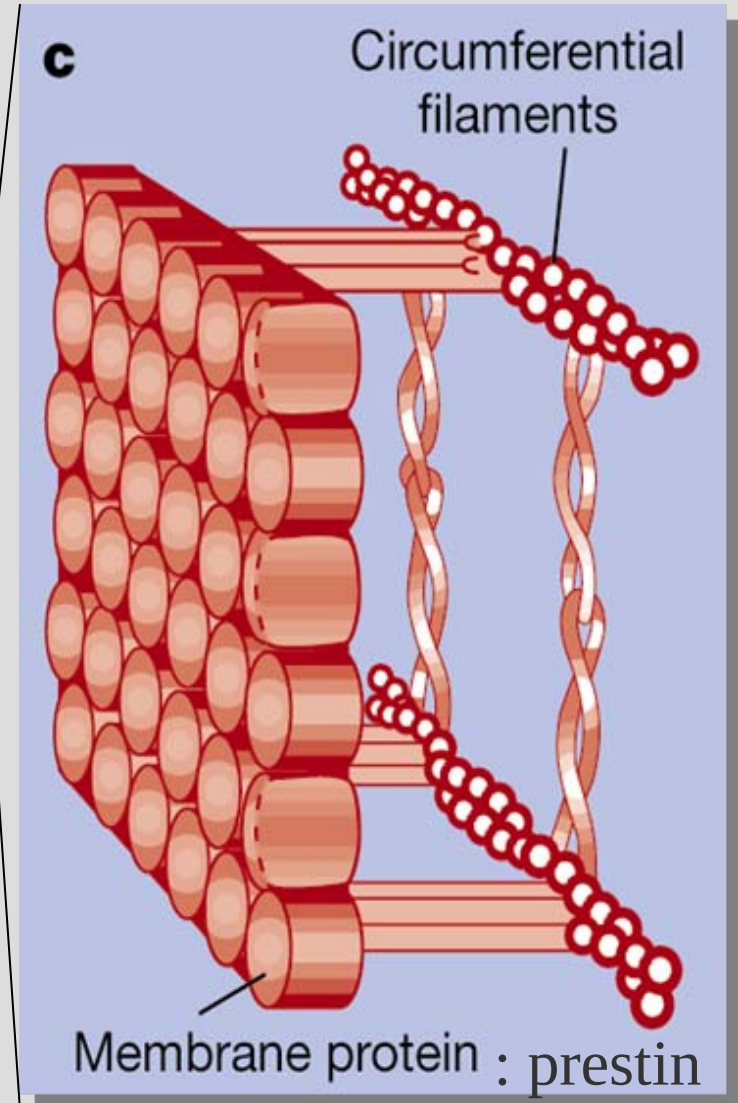
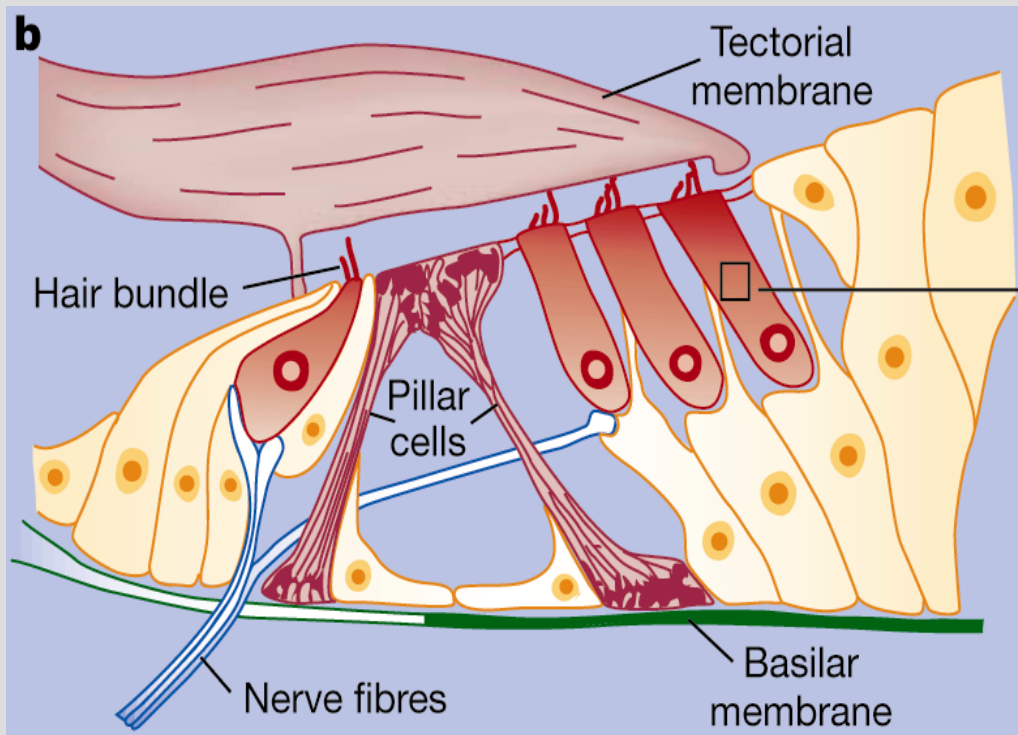
Der aktive cochleare Verstärker erhöht und schärft Wanderwellen-Amplitudenspitze!

Abstimmungskurve
der Basilarmembran
(Schwellenbestimmung)

Auslenkung der
Basilarmembran

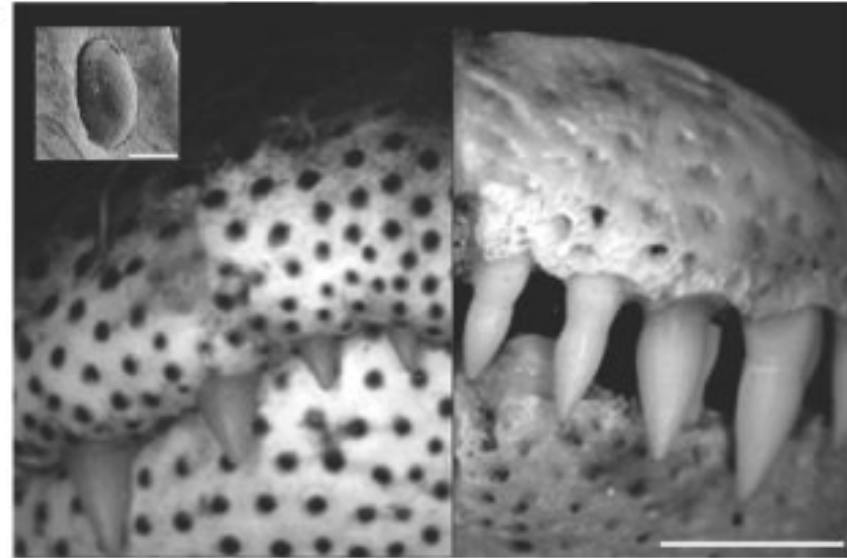


The outer hair cell motor: prestin

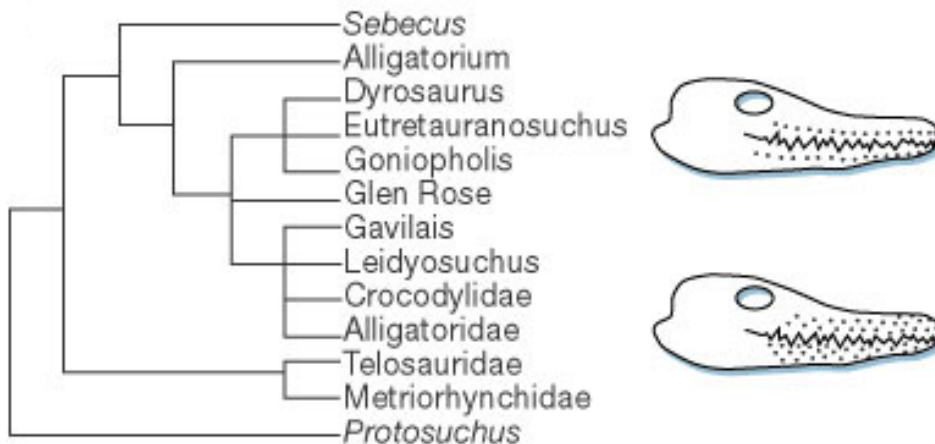


Zheng et al. Nature Vol 40: 149 (2000)

Dome pressure receptors in crocodilians



Dome pressure receptors



Physiological trace from a trigeminal ganglion:

