

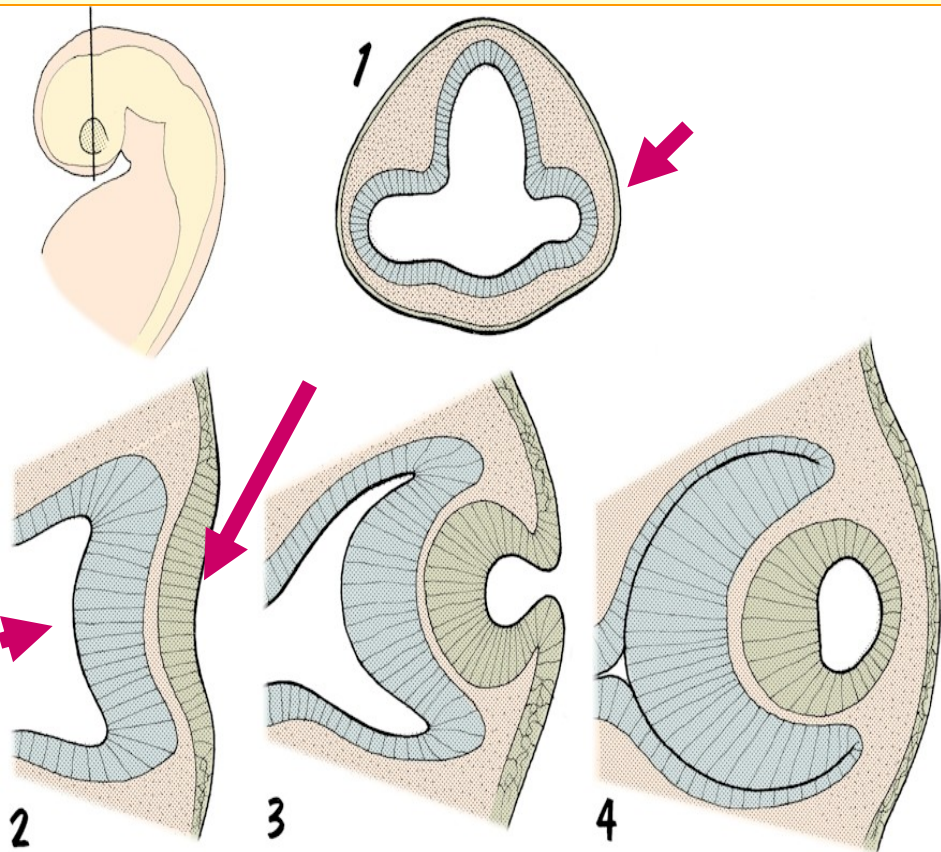
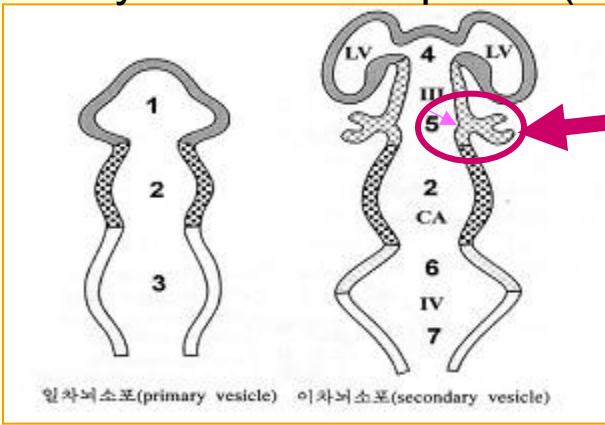


# Embryology /organogenesis/

Development and teratology  
of  
sensory organs

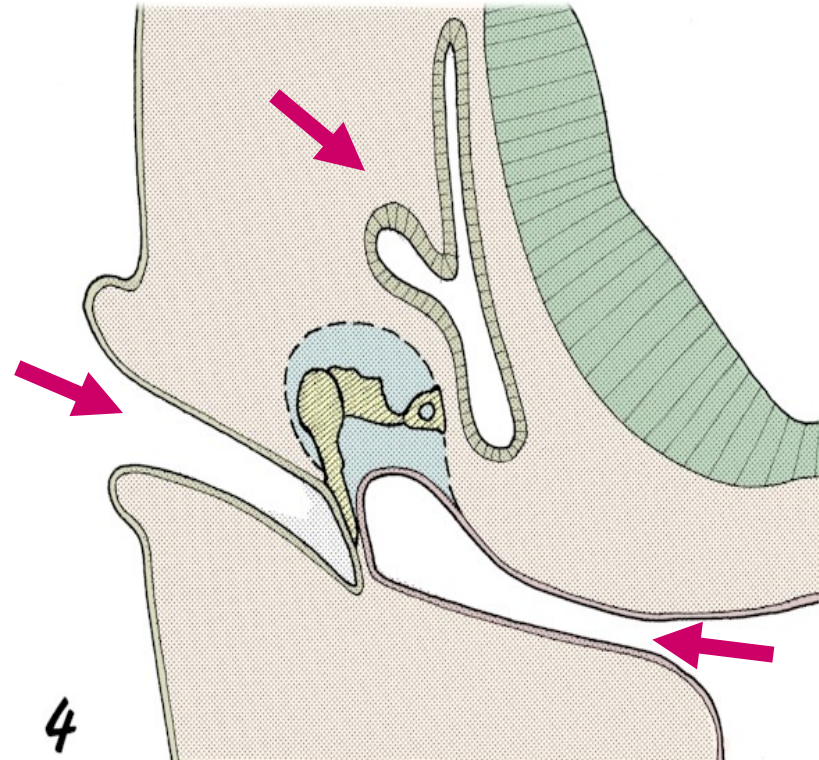
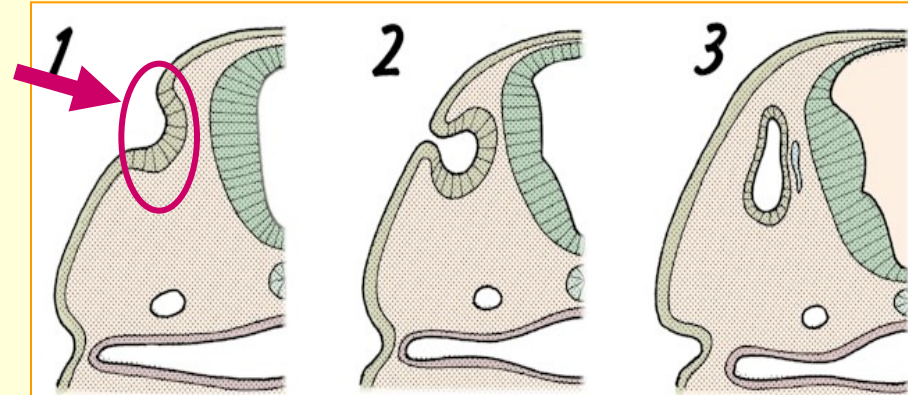
# EYE

Day 22: sulcus opticus (neuroectoderm)

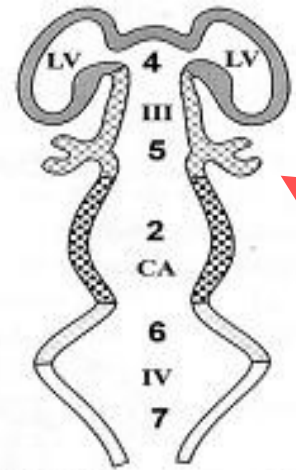
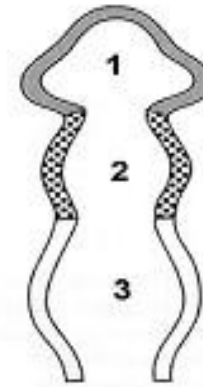


# EAR

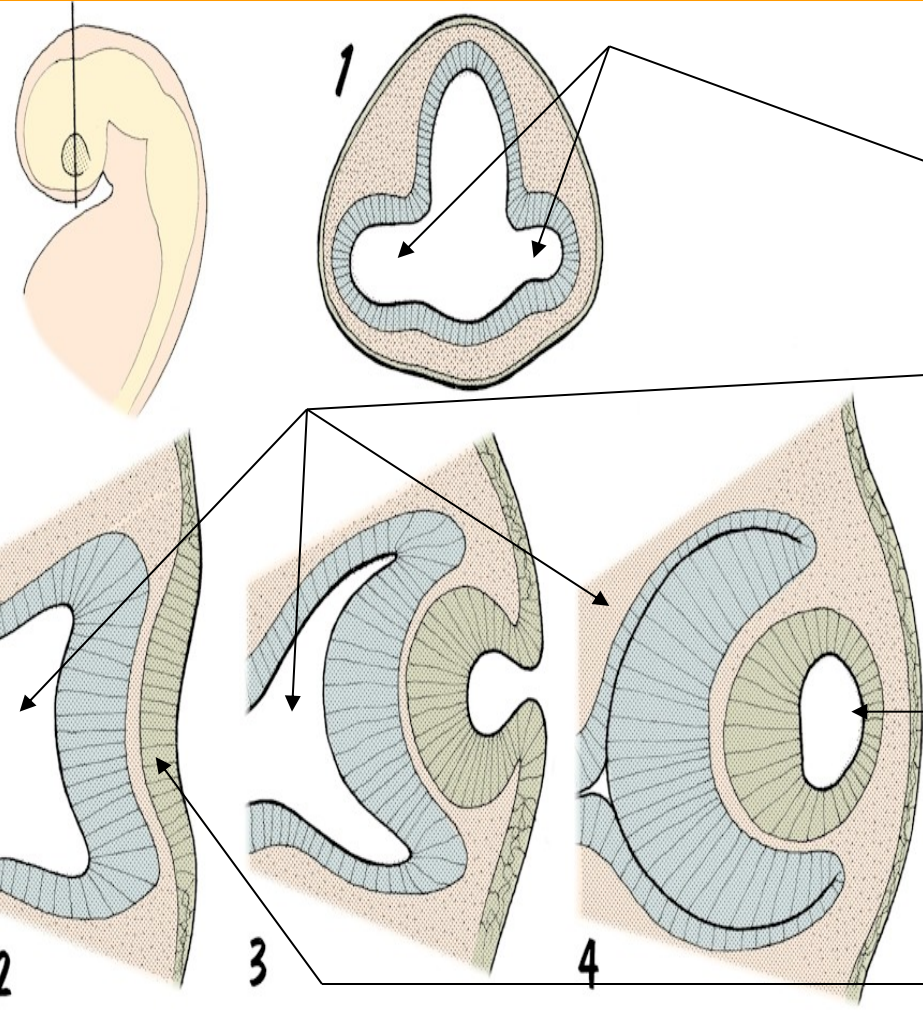
Day 22: otic placode (ectoderm)



# EYE



일차배소포(primary vesicle) 이차배소포(secondary vesicle)



**Sulcus opticus (1)**

**Optic vesicle → cup (2-3)**  
(week 4)

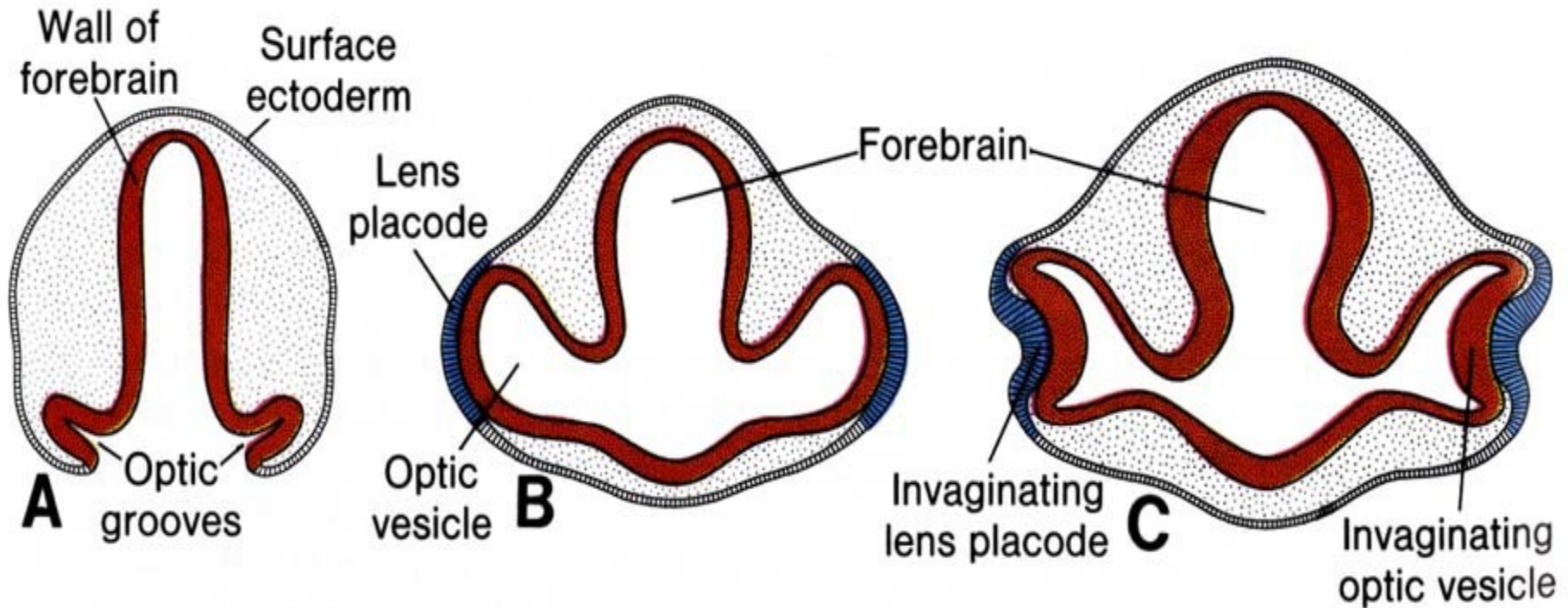
**Lens placode (2)**

**Lens vesicle (2-3)**





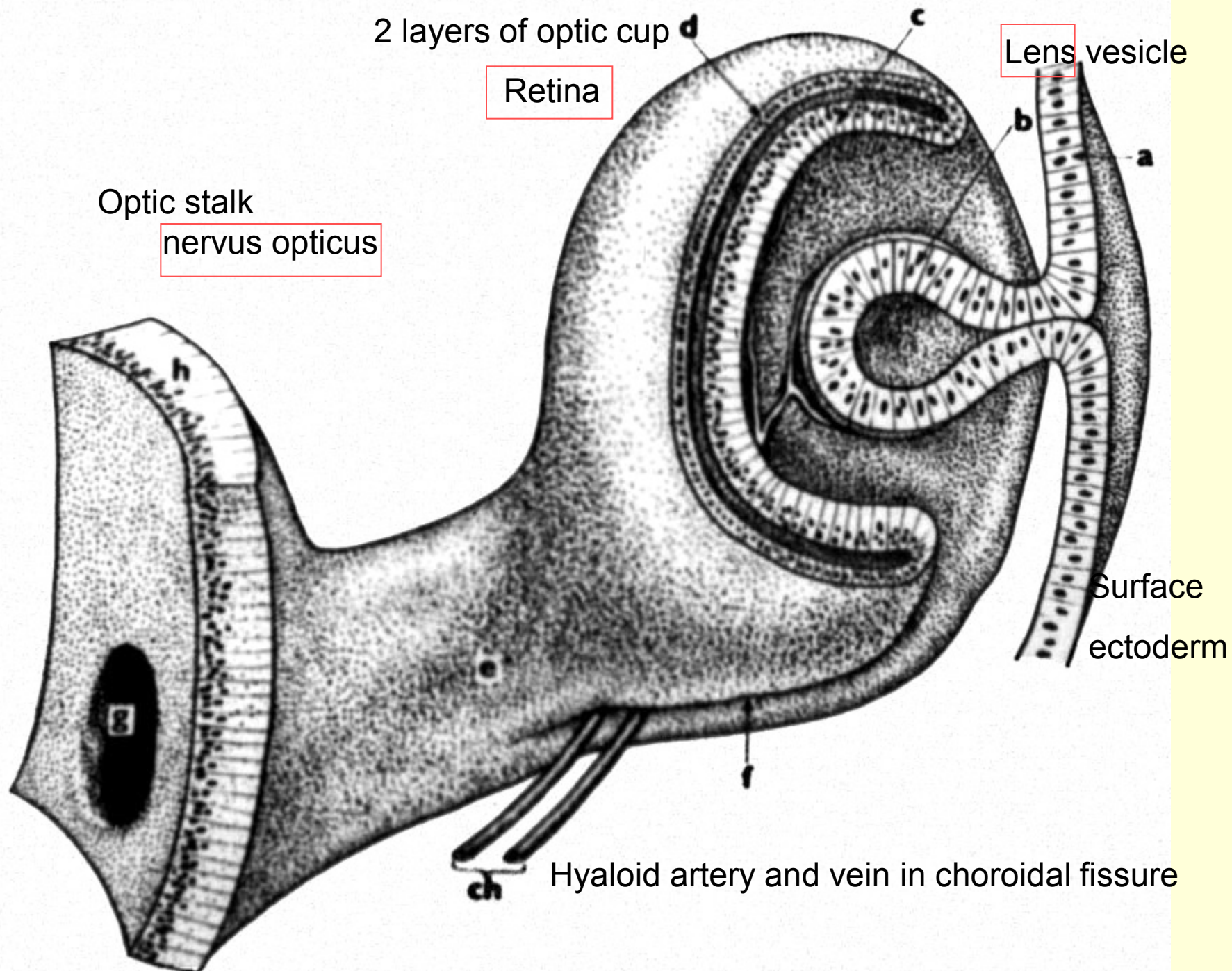
# Development of the eye



sulcus opticus

optic vesicles  
+ lens placode

optic cup  
+ lens vesicle



2 layers of optic cup

Retina

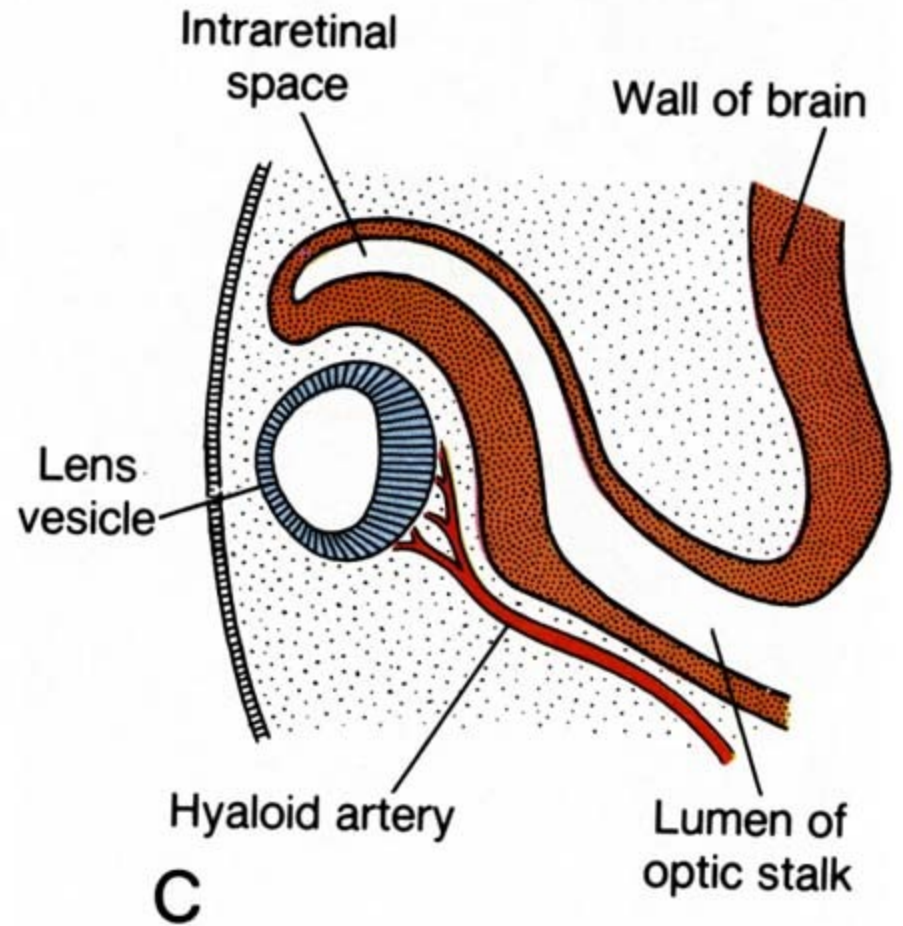
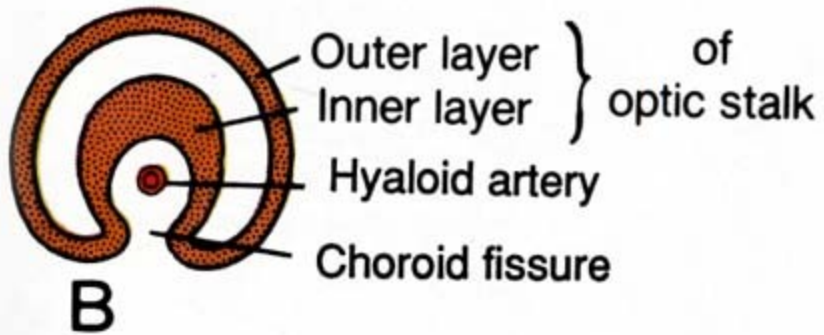
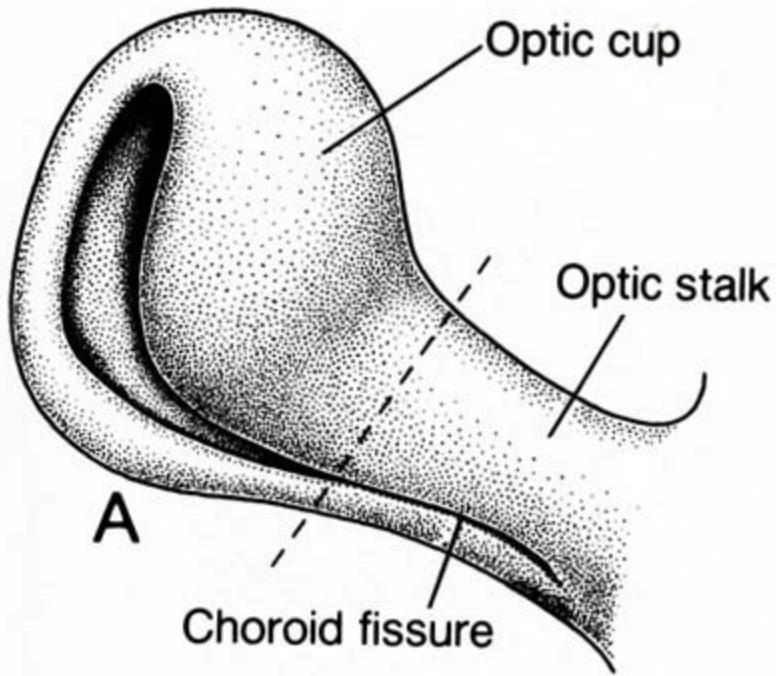
Lens vesicle

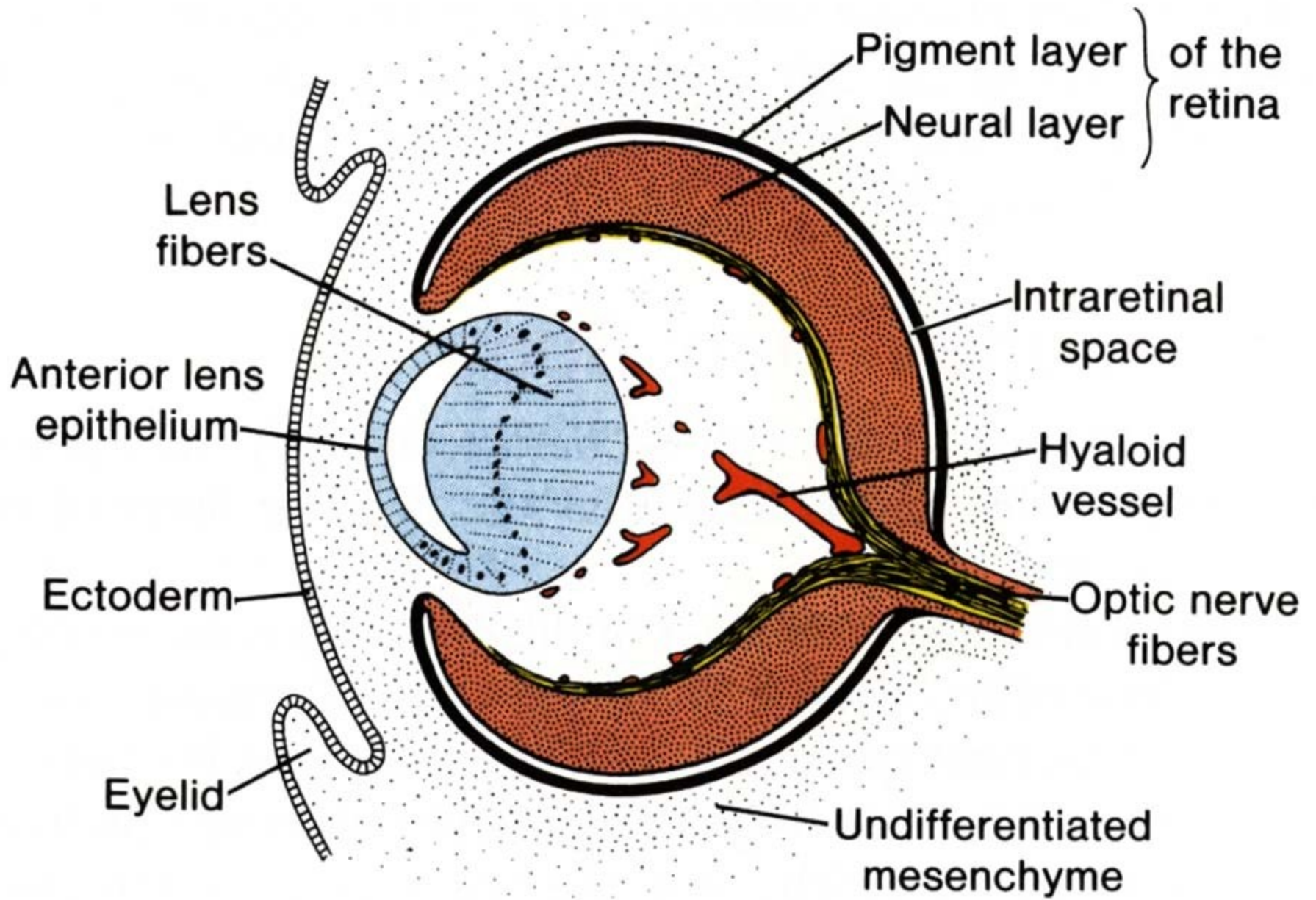
Optic stalk  
nervus opticus

Surface  
ectoderm

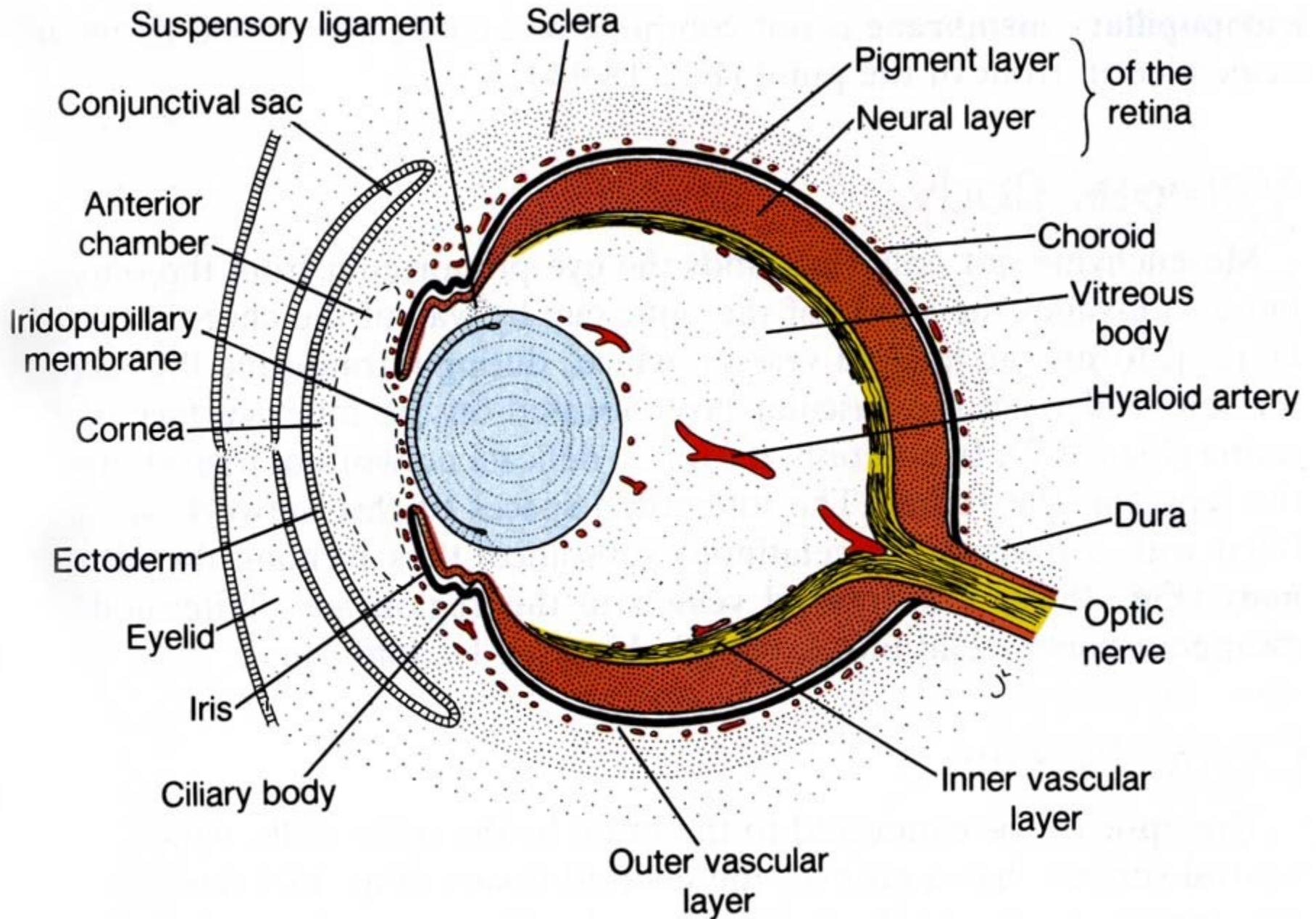
Hyaloid artery and vein in choroidal fissure











## IN EYEBALL:

Retina – from neuroectoderm of mesencephalon

Lens cristalina – from ectoderm

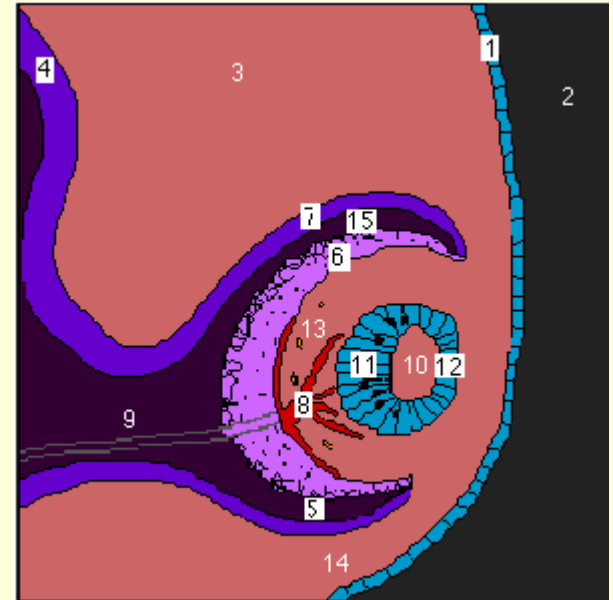
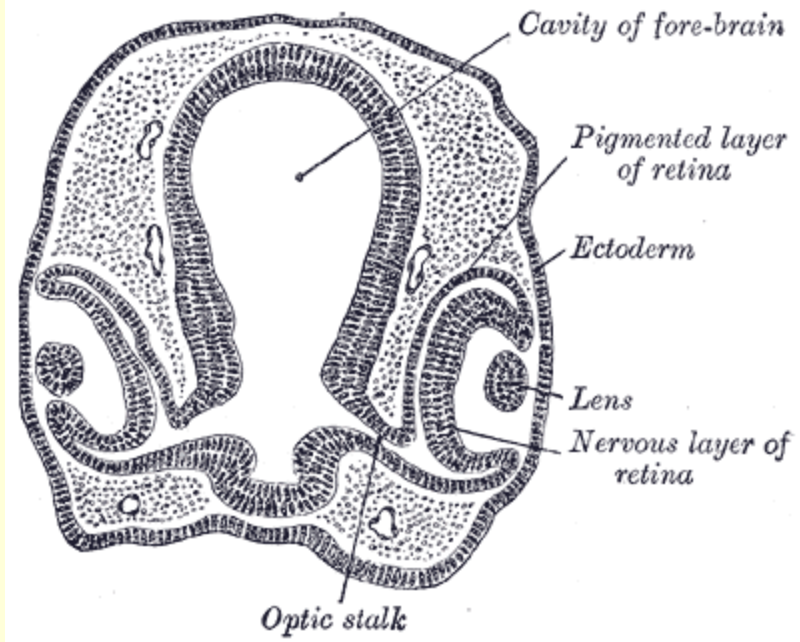
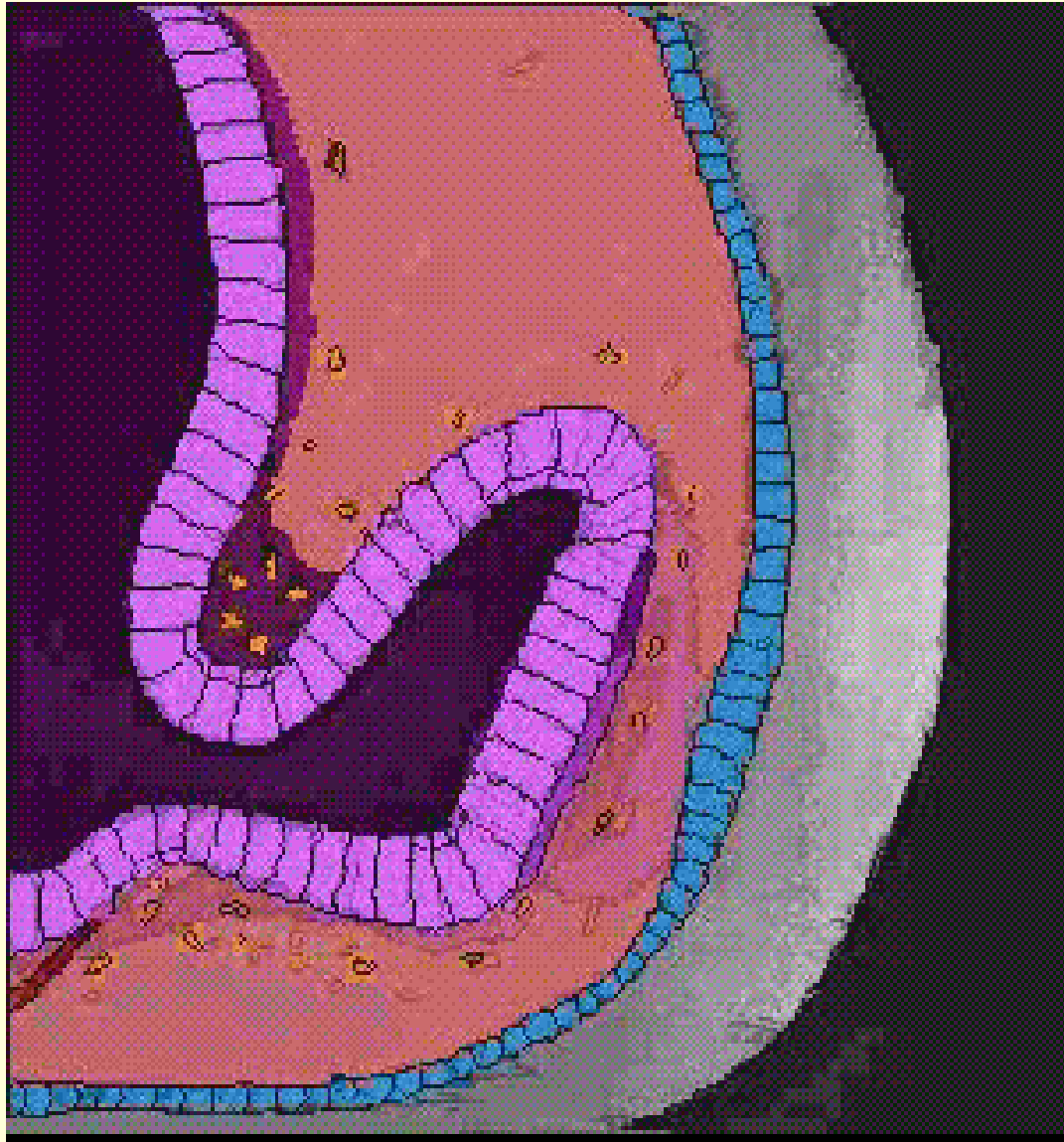
Conjunctival epithelium – from ectoderm

All other – from mesenchym

## EYELID

– from ectoderm + mesenchym

# Lens growth is induced by optic vesicle





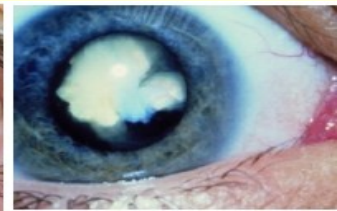
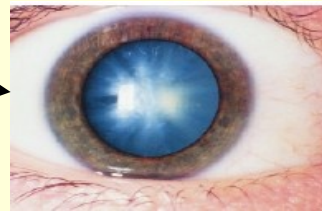
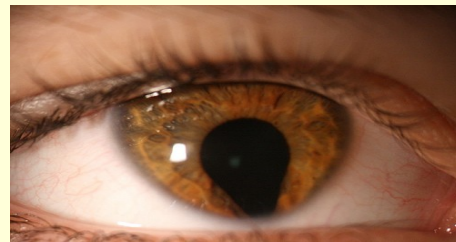
# Teratology of the eye



- Anophthalmia
- Microphthalmia
- Aphakia
- Coloboma  
(iris, eyelid)
- Congenital cataracta  
or glaucom
- Congenital  
ptosis of  
eyelid



no lens



auricle



mesenchyme tubercles (6)

external acoustic meatus



the 1st pharyngeal cleft

tympanic cavity, Eustachian tube

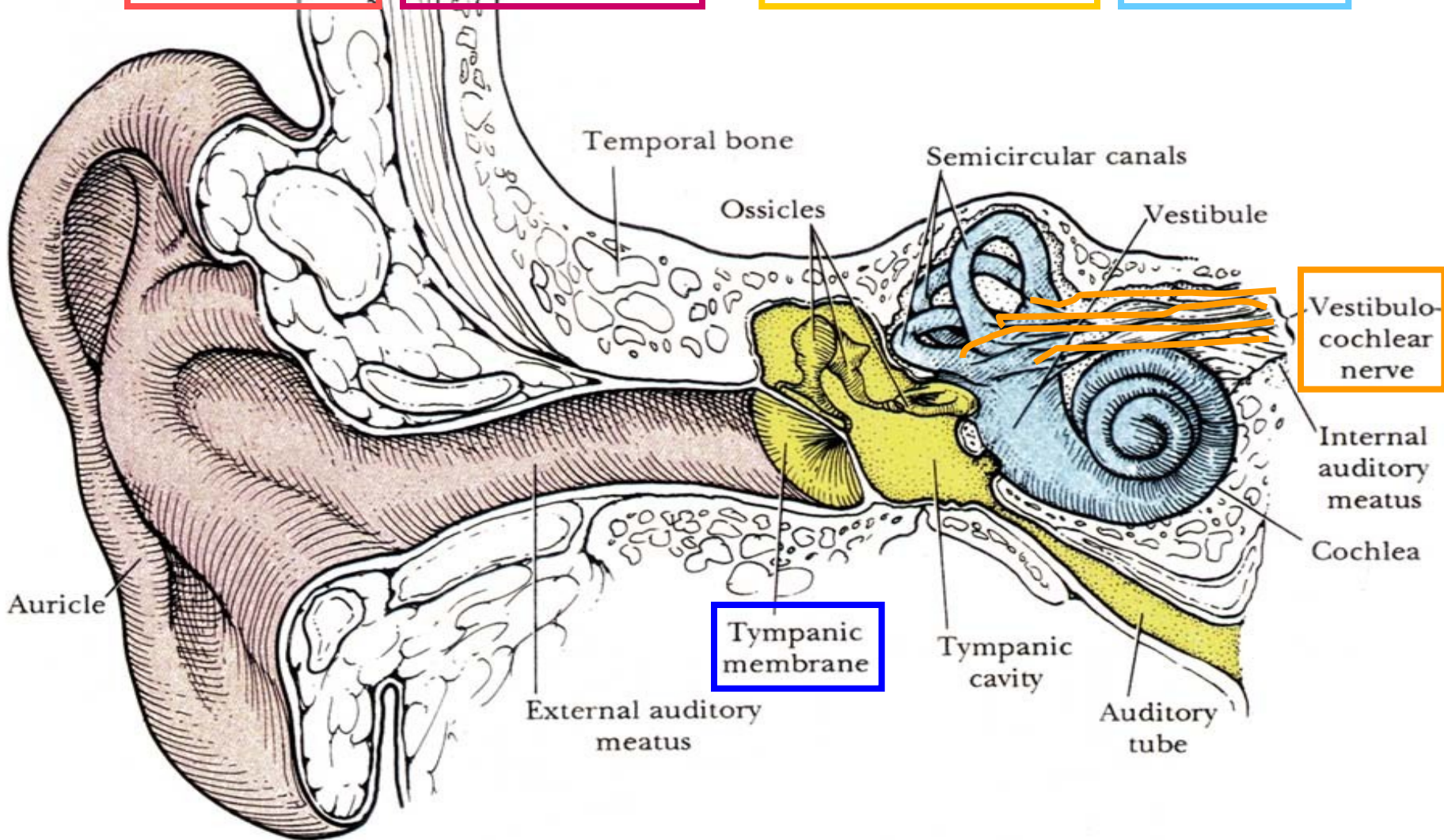


the 1st pharyngeal pouch

inner ear

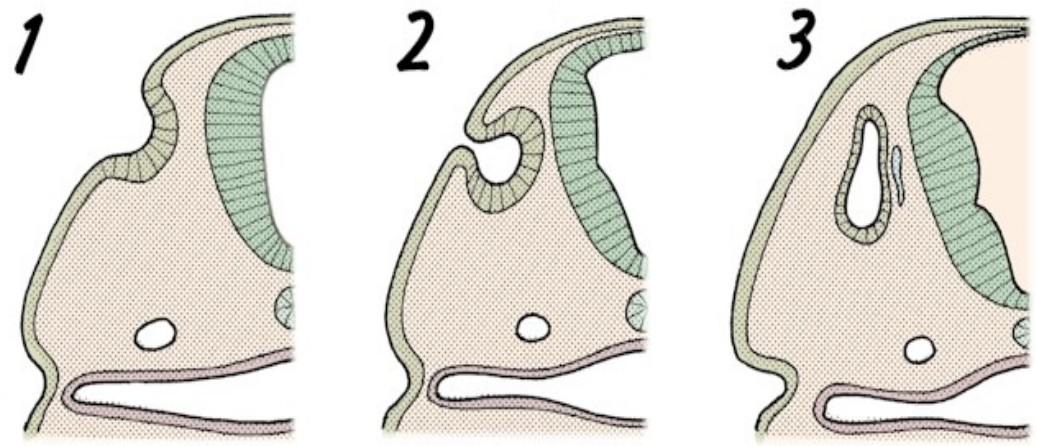


ectodermal otocyst

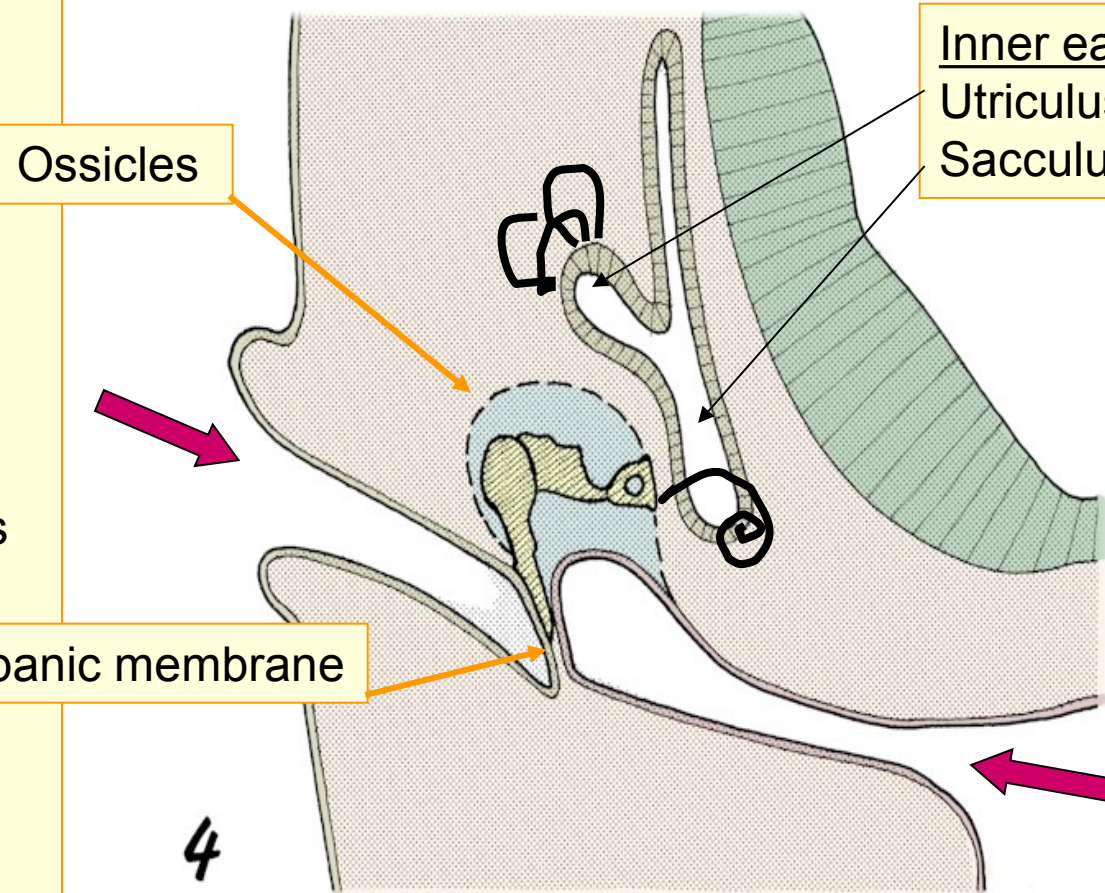




EAR



**ECTODERM:**  
 Otic placode (1)  
 (day 22)  
 Otic pit (2)  
 Otocyst (3-4)



Inner ear:  
 Utriculus + semic. ducts  
 Sacculus + cochlear duct

Ossicles

The 1st  
**ECTODERMAL**  
 cleft:  
 Meatus acusticus

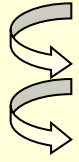
Tympanic membrane

The 1st  
**ENDODERMAL**  
 pouch:  
 Auditory tube +  
 Tympanic cavity

4



# Development of the inner ear

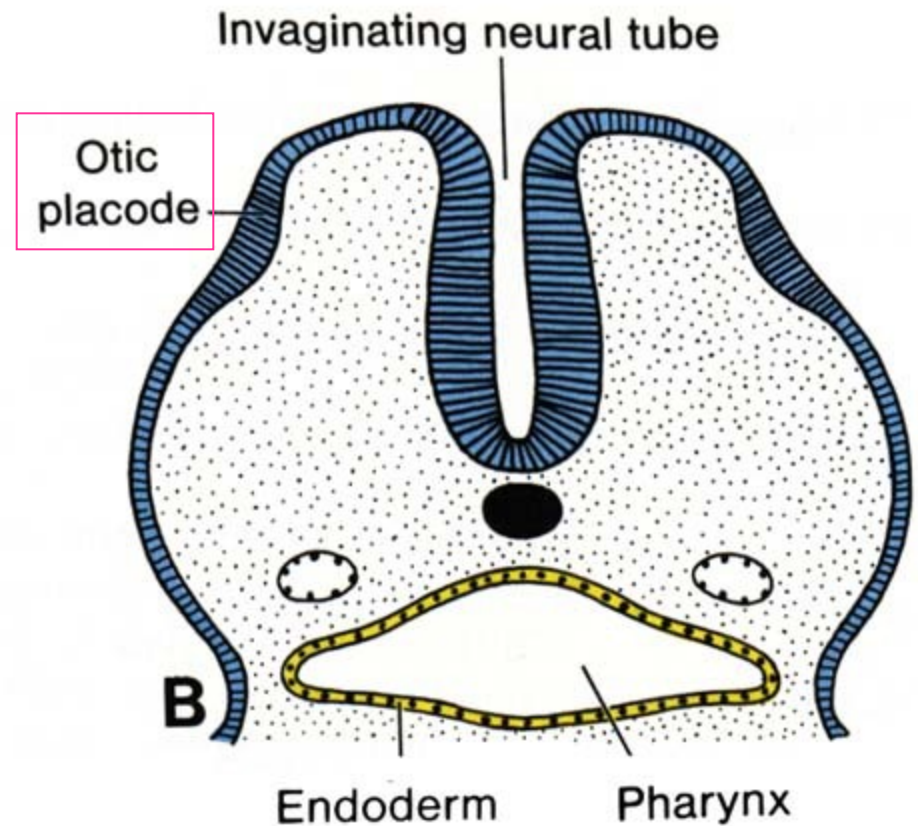
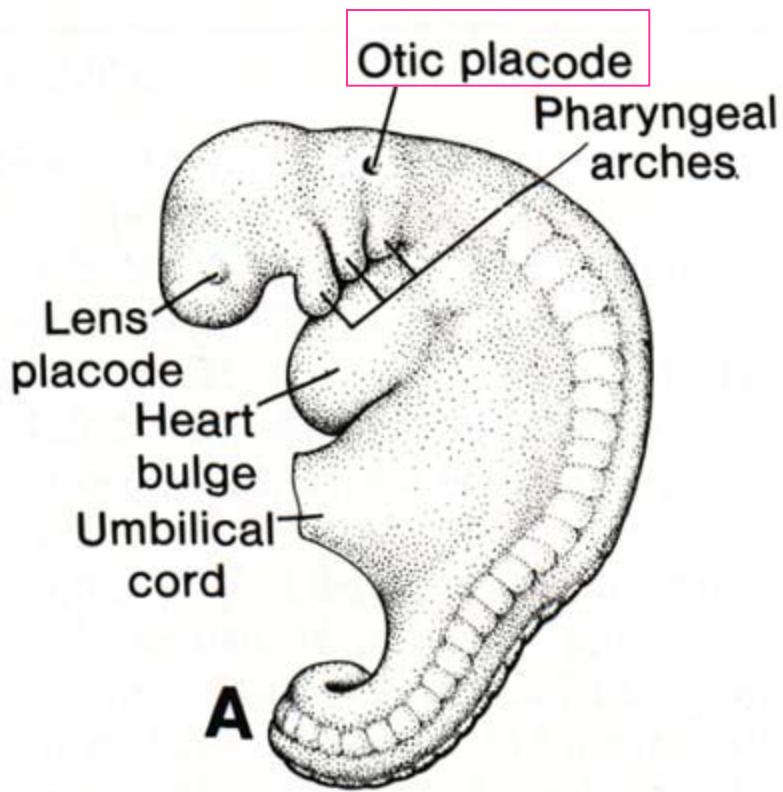


Otic placode – thickening of ectoderm

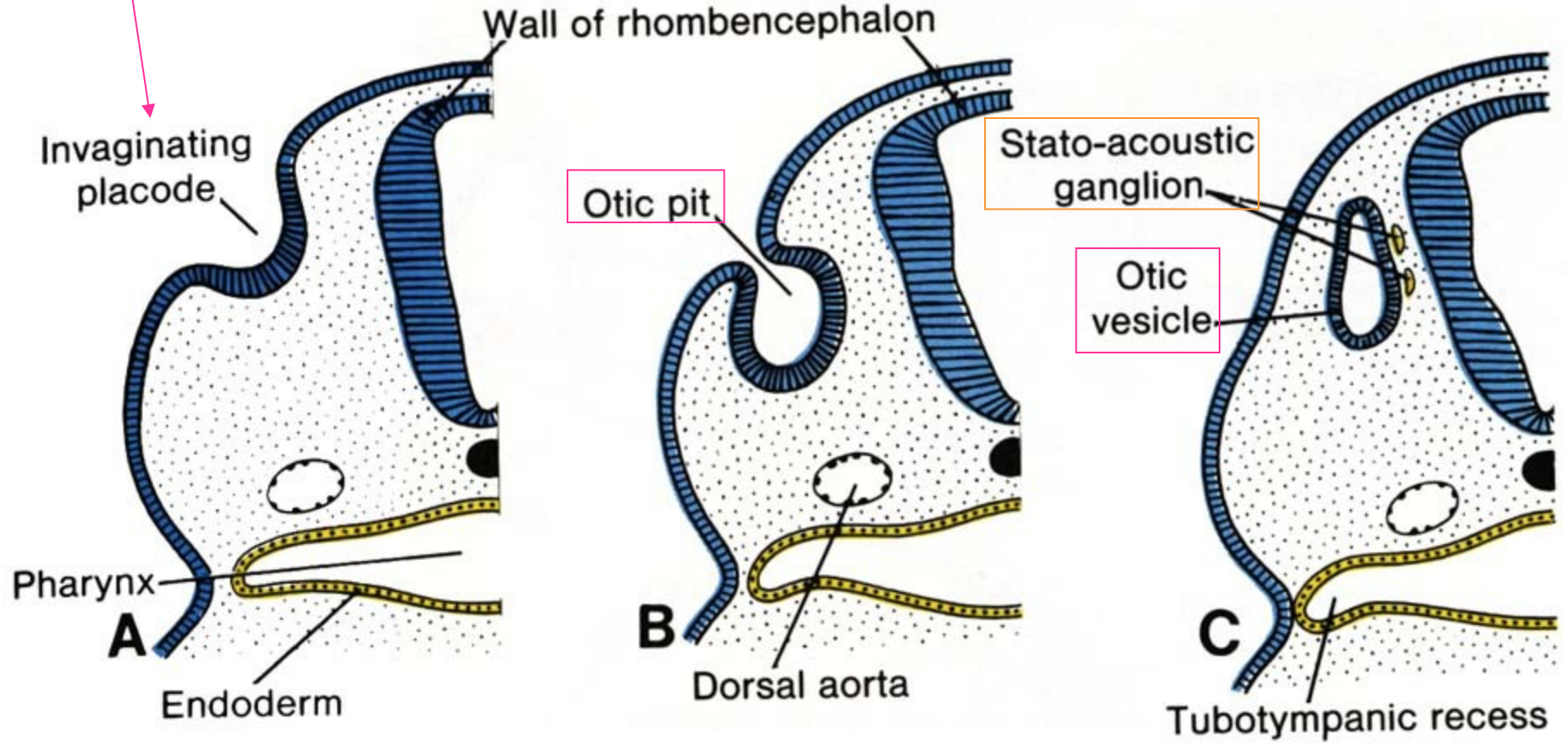
Otic pit

Otic vesicle = otocyst:

*epithelium of membranous labyrinth, incl. sensory ep. originate from ectoderm*



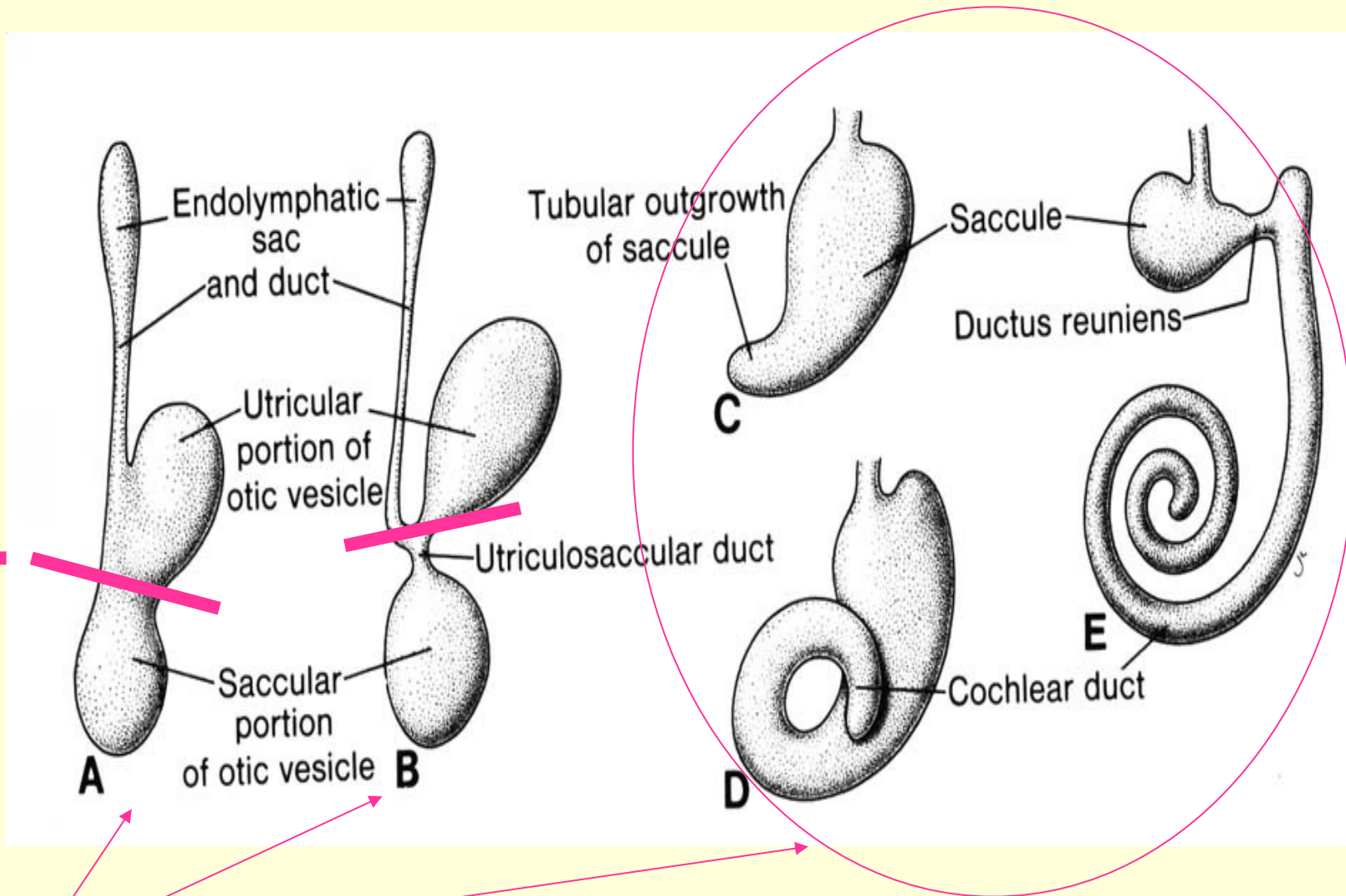
Otic pit  $\Rightarrow$  otic vesicle (otocyst)



# Differentiation of the otocyst into membranous labyrinth:

D  
O  
R  
S  
A  
L  
L  
Y

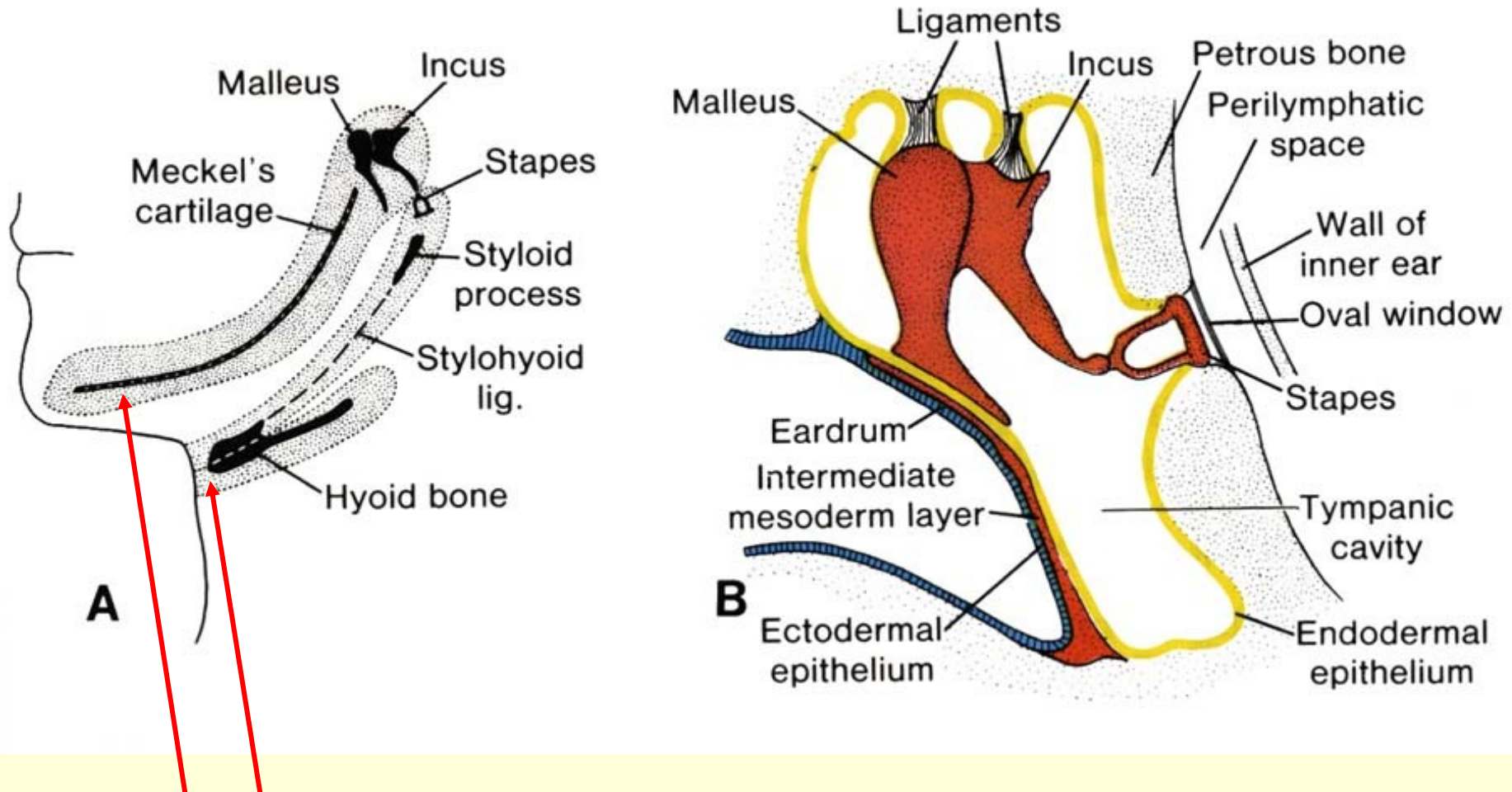
V  
E  
N  
T  
R  
A  
L  
L  
Y





# Development of tympanic membrane and cavity

## Development of the ear ossicles

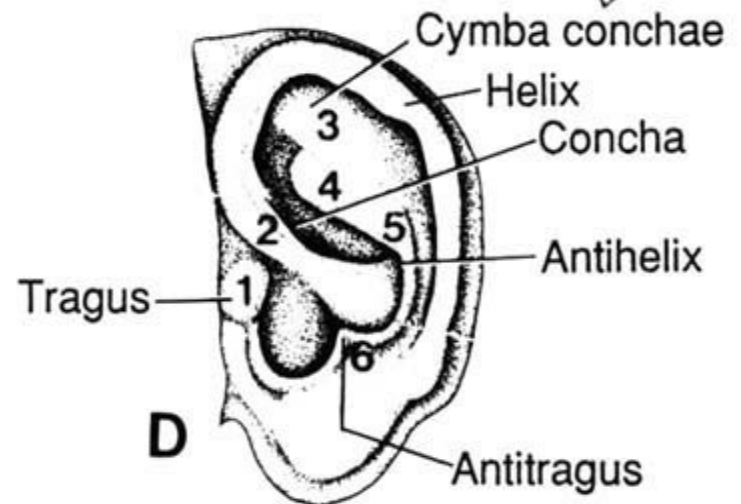
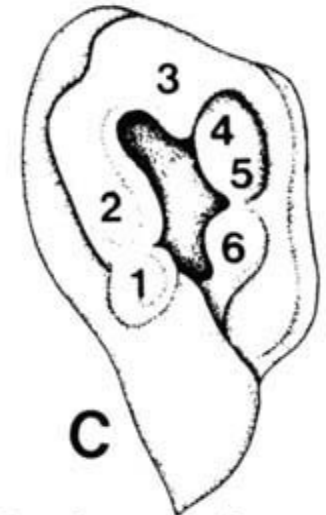
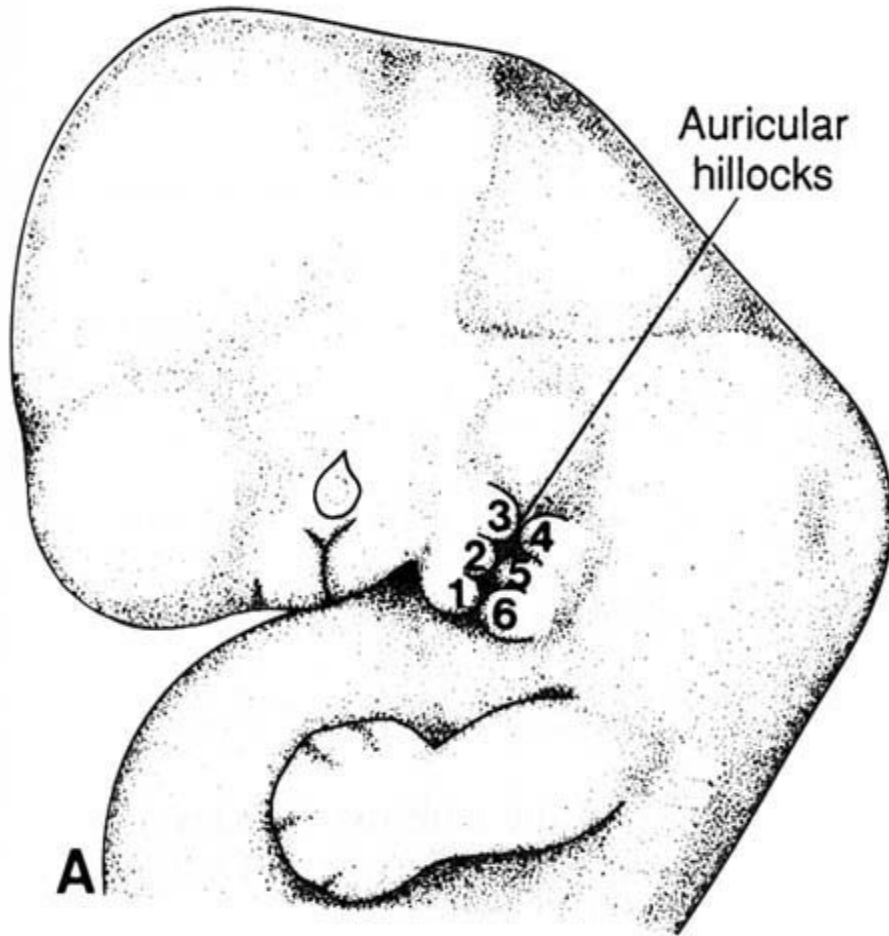


The 1st and 2nd branchial arch: 1 - cartilago Meckeli  $\Rightarrow$  malleus, incus  
2 - cartilago Reicherti  $\Rightarrow$  stapes



# Development of the outer ear

from mesenchyme of the 1st and 2nd arch, covered with ectoderm  
⇒ 6 tubercles (3 ventral + 3 dorsal)



# Teratology: congenital malformations of the ear

- Anomalies of:

- Outer ear:

anotia, macrotia, microtia,  
preauricular protuberances  
and sinuses, meatus  
atresia

- Middle ear: congenital  
fixation of stapes

- Inner ear: aplasia –  
hypoplasia of labyrinth  
(rubeola in mother), salicyl  
preparates using during the  
1st trimester)

## Hypacusia or deafness:

conductive

sensorineural (perceptive)





Preauricular Sinus



Meatus atresia



# Repetition: sensory organs

- An overview of structural units of the retina.
  - Microscopic structure of the retina, synapses between neurons.
  - Microscopic structure of the sclera and cornea.
  - Choroid, corpus ciliare, iris.
  - Dioptric media of the eye (cornea, aqueous humor, lens and vitreous body).
  - Accessory apparatus of the eye (palpebra, lacrimal apparatus, conjunctiva, extraocular muscles).
- 
- Microscopic structure of outer and middle ear.
  - Microscopic structure of inner ear – the organ of balance.
  - Microscopic structure of inner ear – the organ of hearing (ductus cochlearis, organ of Corti).



# Bony labyrinth

*from mesenchym*

Cochlea

Vestibulum

Canales semicirculares

# Membranous labyrinth

*from ectoderm – epithelium,*

*from mesenchyme – rest  
(membrana basilaris, perilymphatic spaces and their epithelium)*

Ductus cochlearis

Sacculus

Utriculus

Ductus semicirculares

Ductus et saccus

endolymphaticus

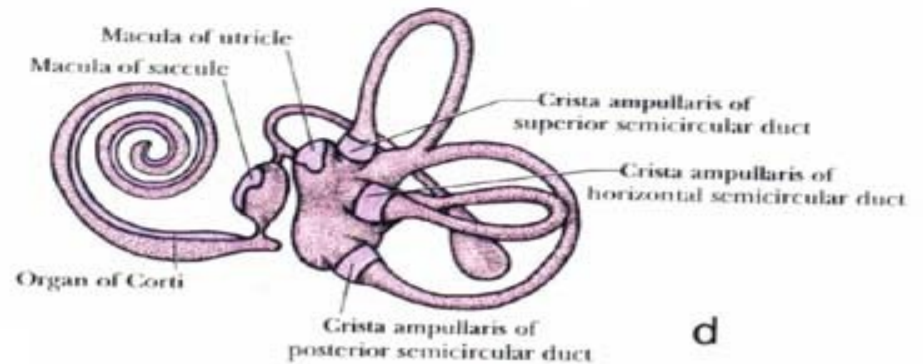
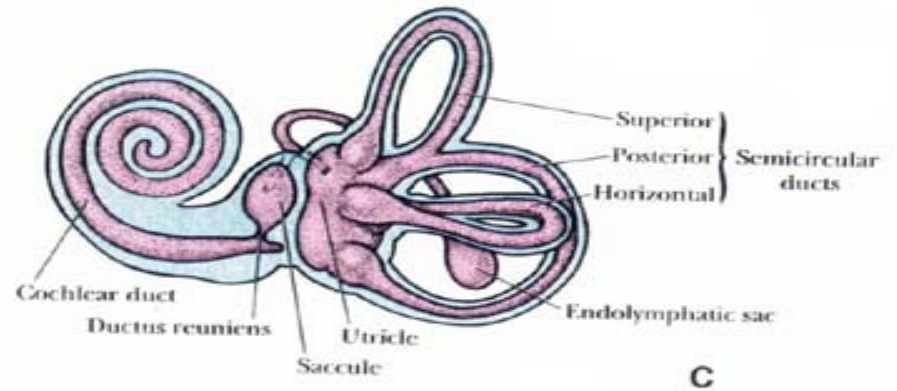
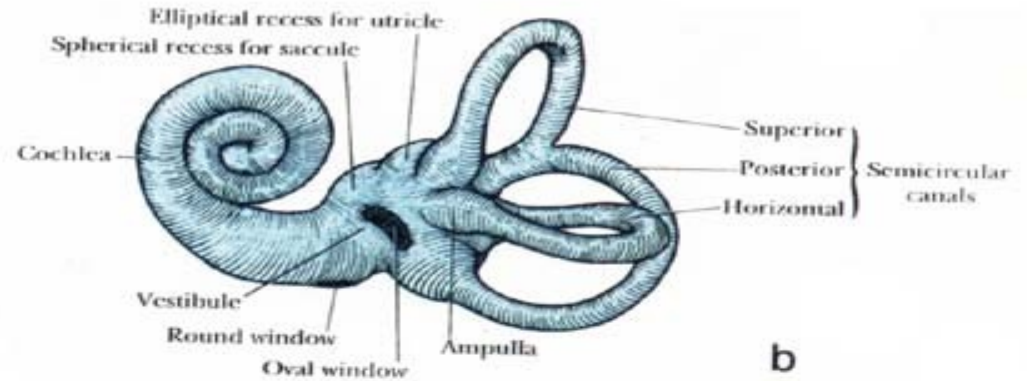


Figure 24.7. b, c, d.