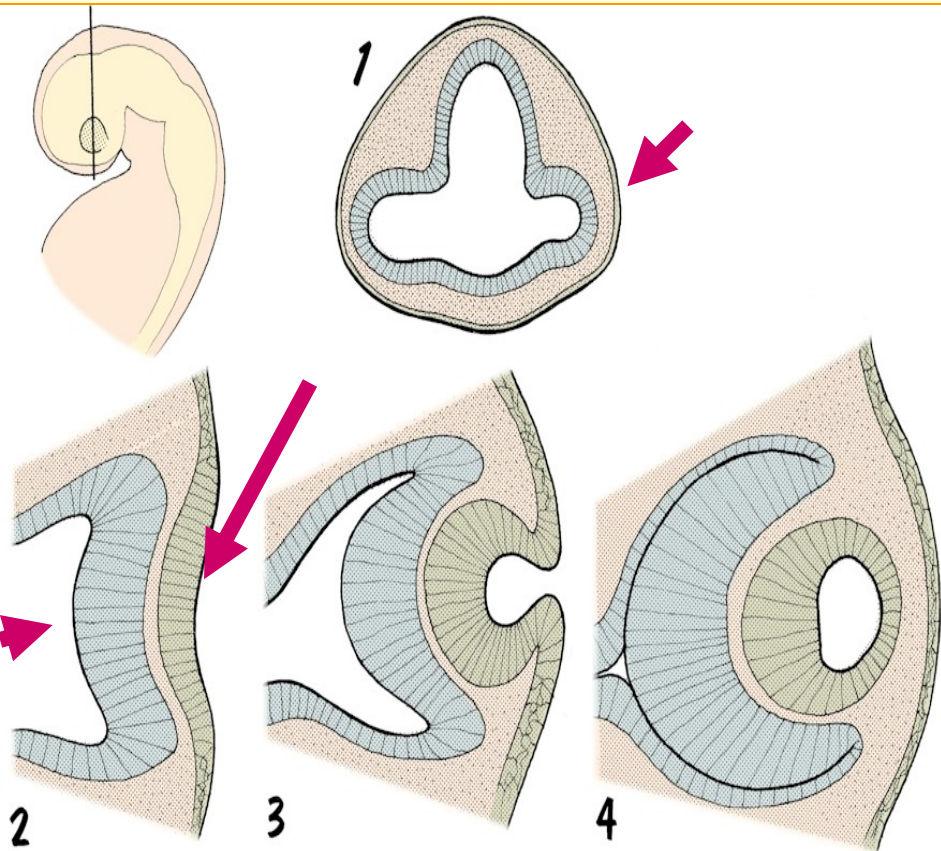
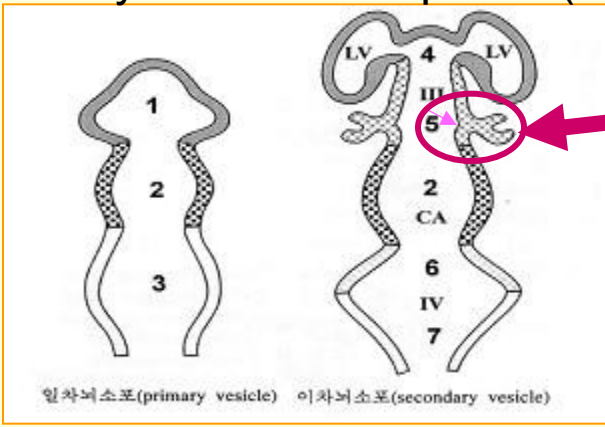


# Embryology /organogenesis/

Development and teratology  
of  
sensory organs

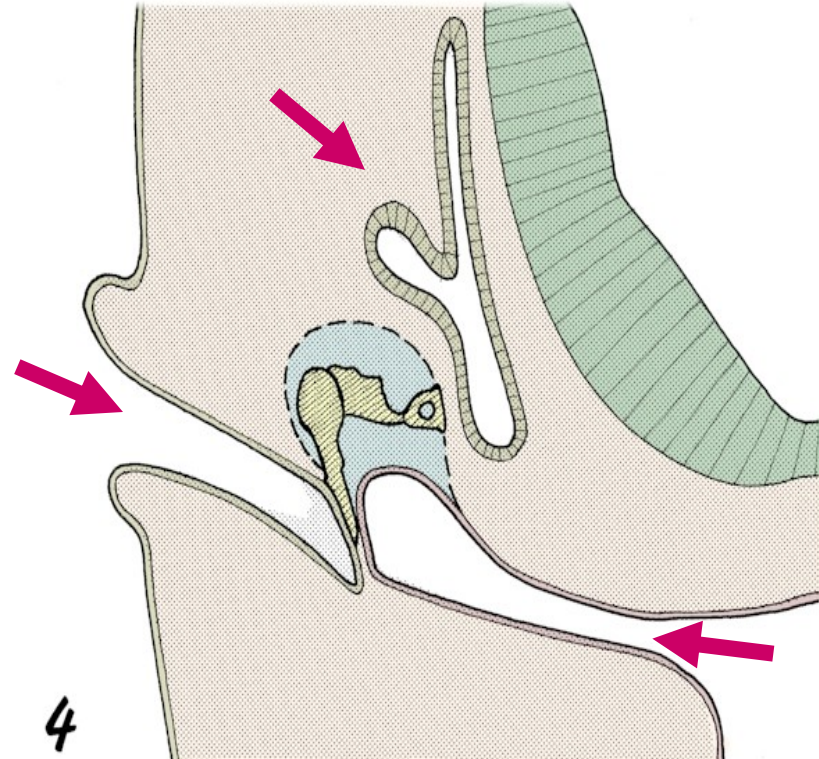
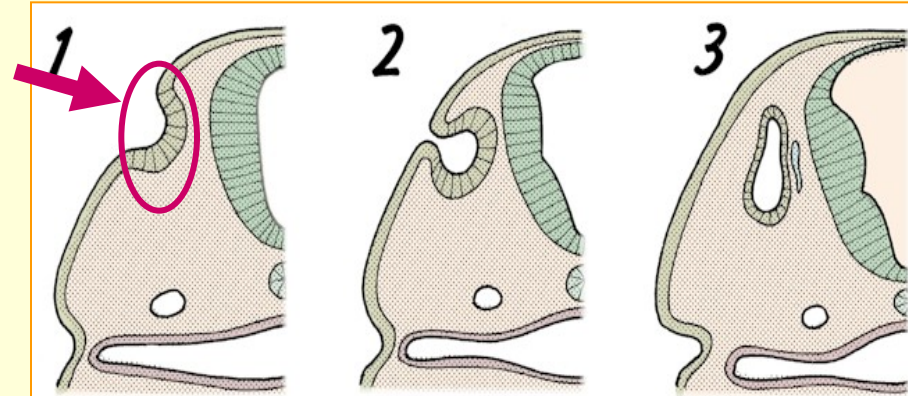
# EYE

Day 22: sulcus opticus (neuroectoderm)

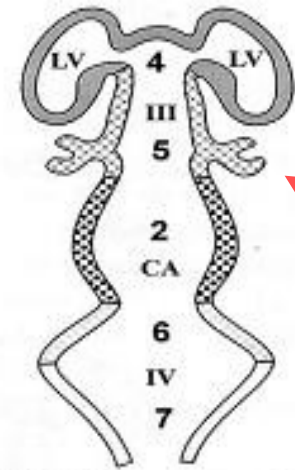
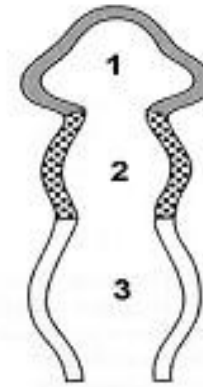


# EAR

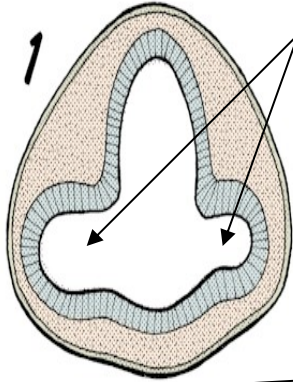
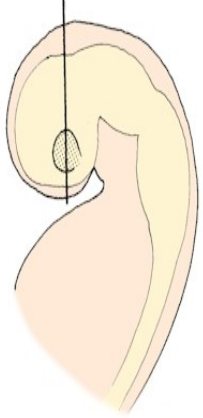
Day 22: otic placode (ectoderm)



# EYE



일차뇌소포(primary vesicle) 이차뇌소포(secondary vesicle)

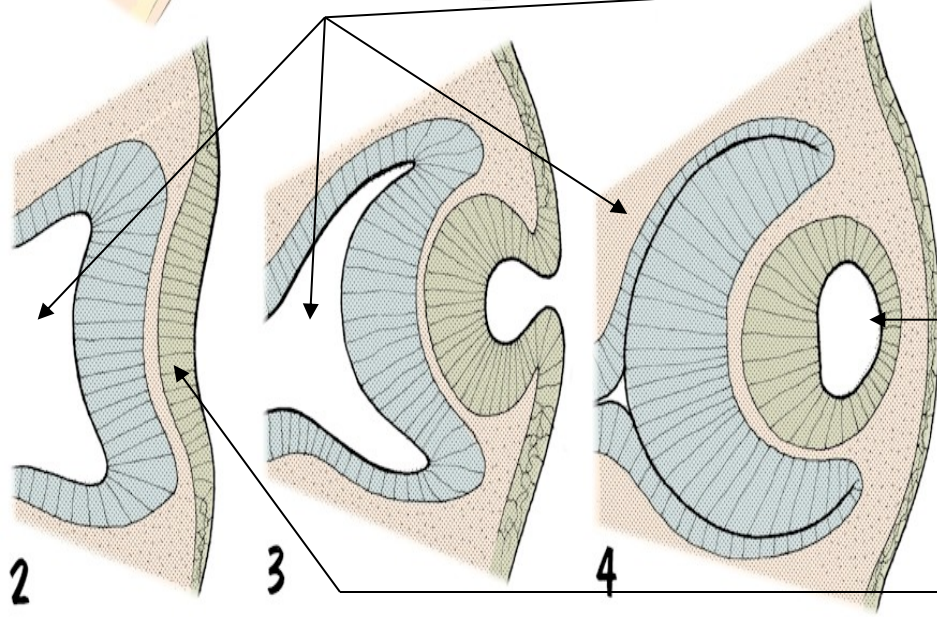


**Sulcus opticus (1)**

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

**Lens placode (2)**

**Lens vesicle (2-3)**





# DEVELOPMENT of the EYE

## NEUROECTODERM:

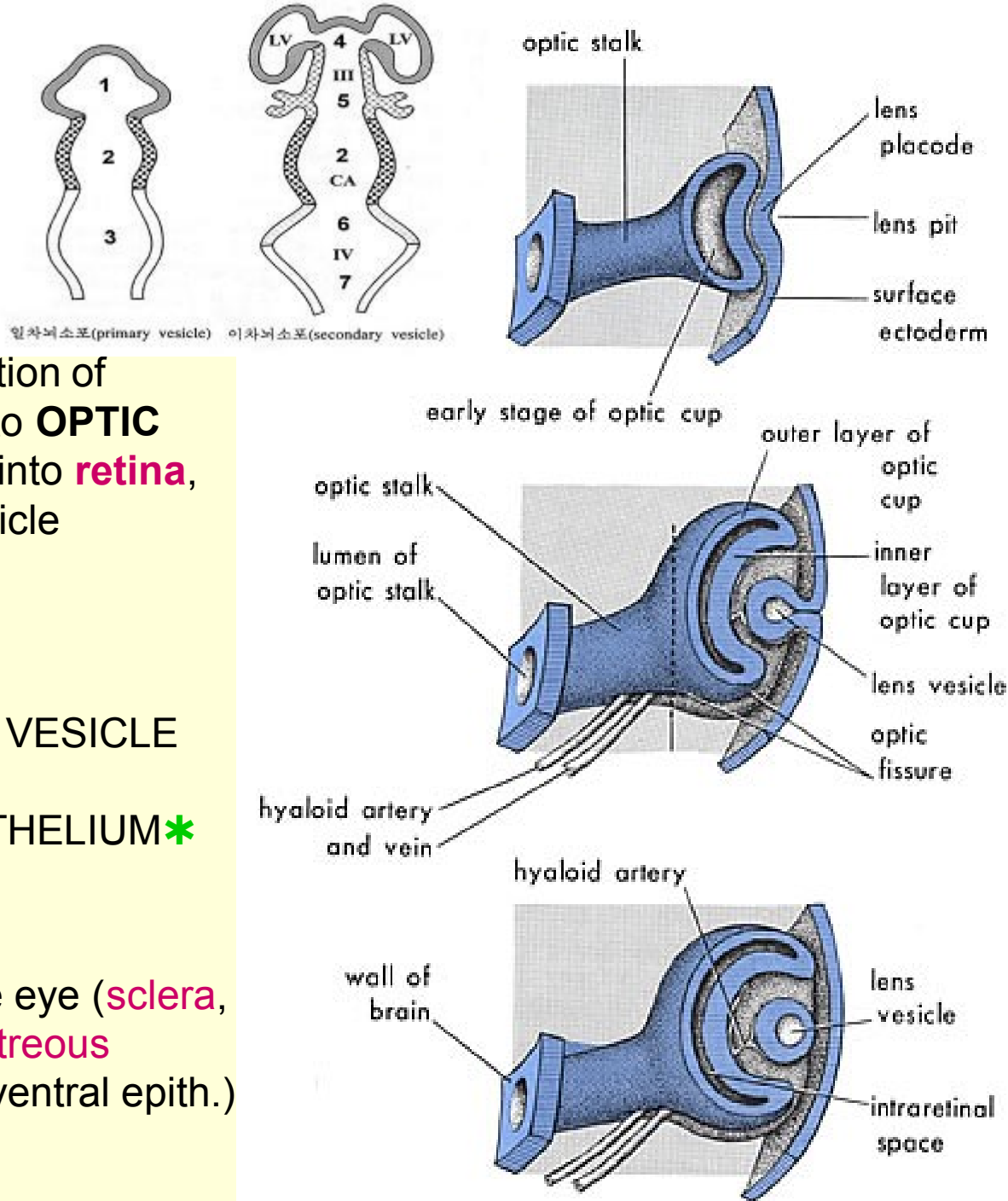
**OPTIC GROOVE** (evagination of prosencephalon) give rise to **OPTIC VESICLE (CUP)** develops into **retina**, **OPTIC STALK** of optic vesicle give rise to **optic nerve**

## ECTODERM:

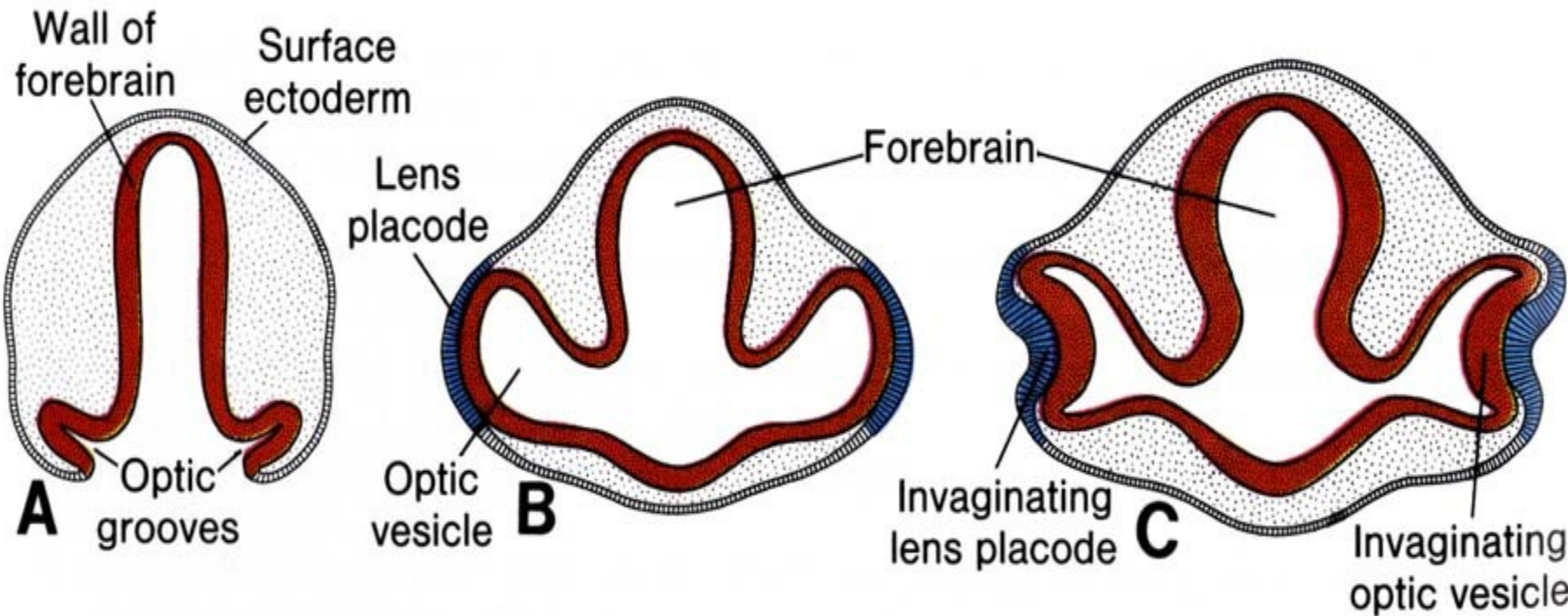
LENS PLACODE ⇒ **LENS VESICLE** and **VENTRAL CORNEAL EPITHELIUM\***

## MESENCHYME:

all other components of the eye (**sclera**, **choroid**, **ciliary body**, **iris**, **vitreous body**, **cornea** except its \* ventral epith.)



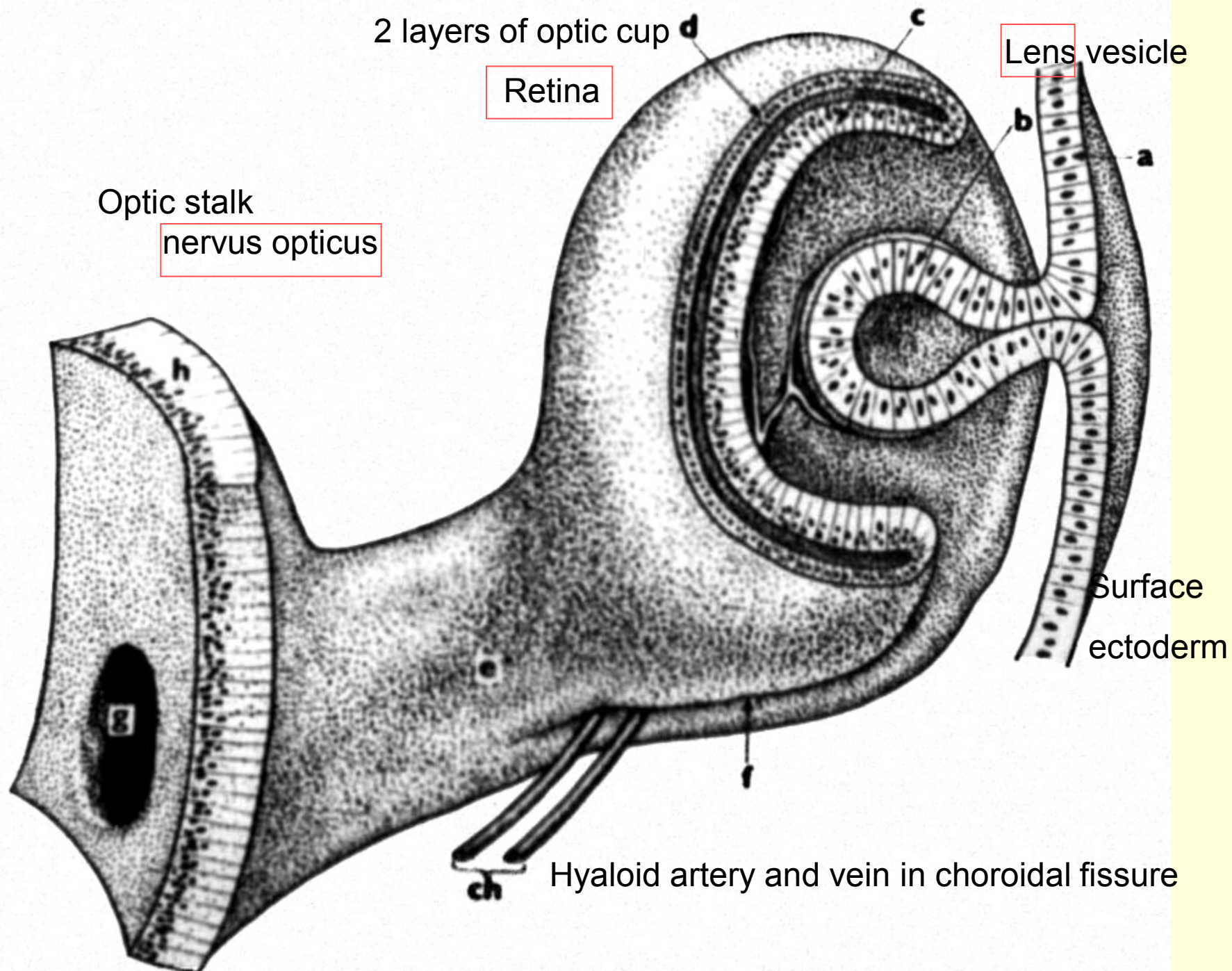
# Development of the eye



sulcus opticus

optic vesicles  
+ lens placode

optic cup  
+ lens vesicle



2 layers of optic cup **d**

**Retina**

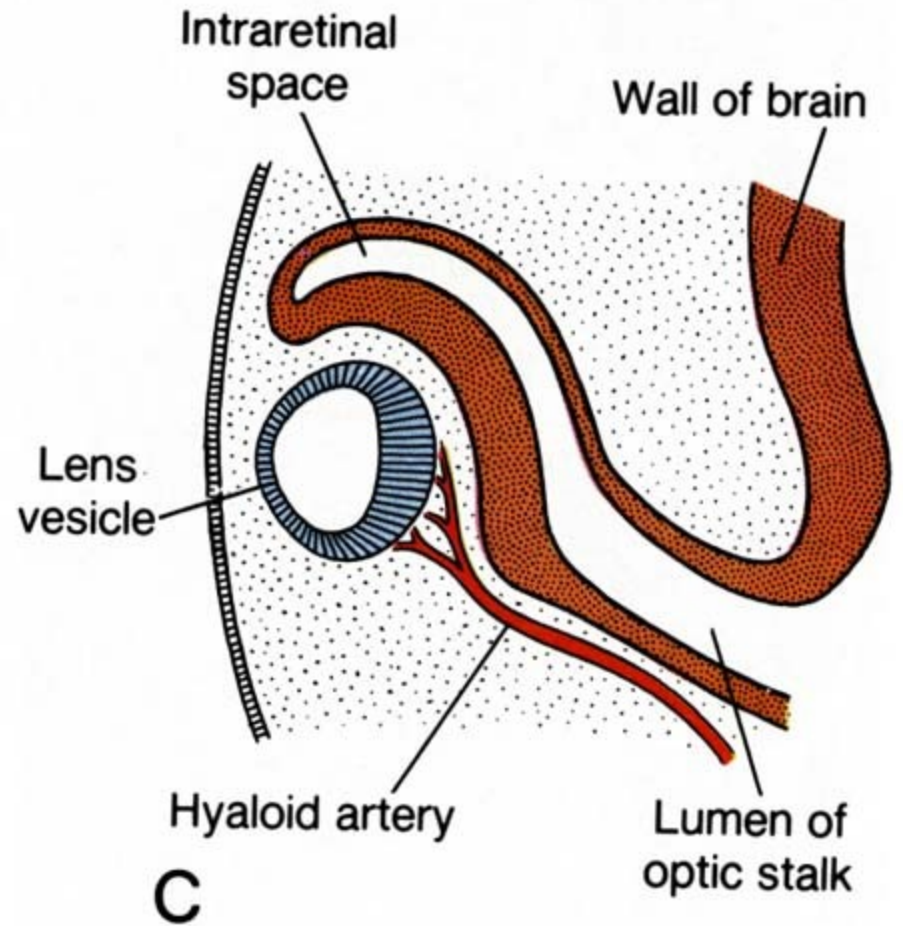
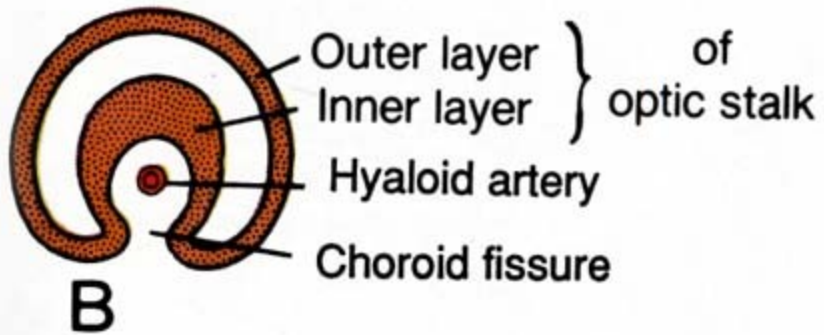
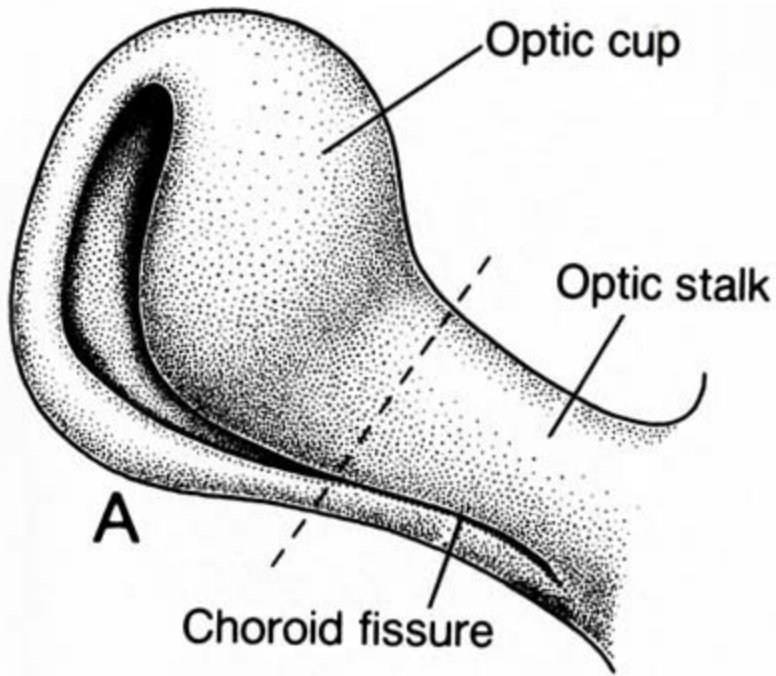
**Lens vesicle**

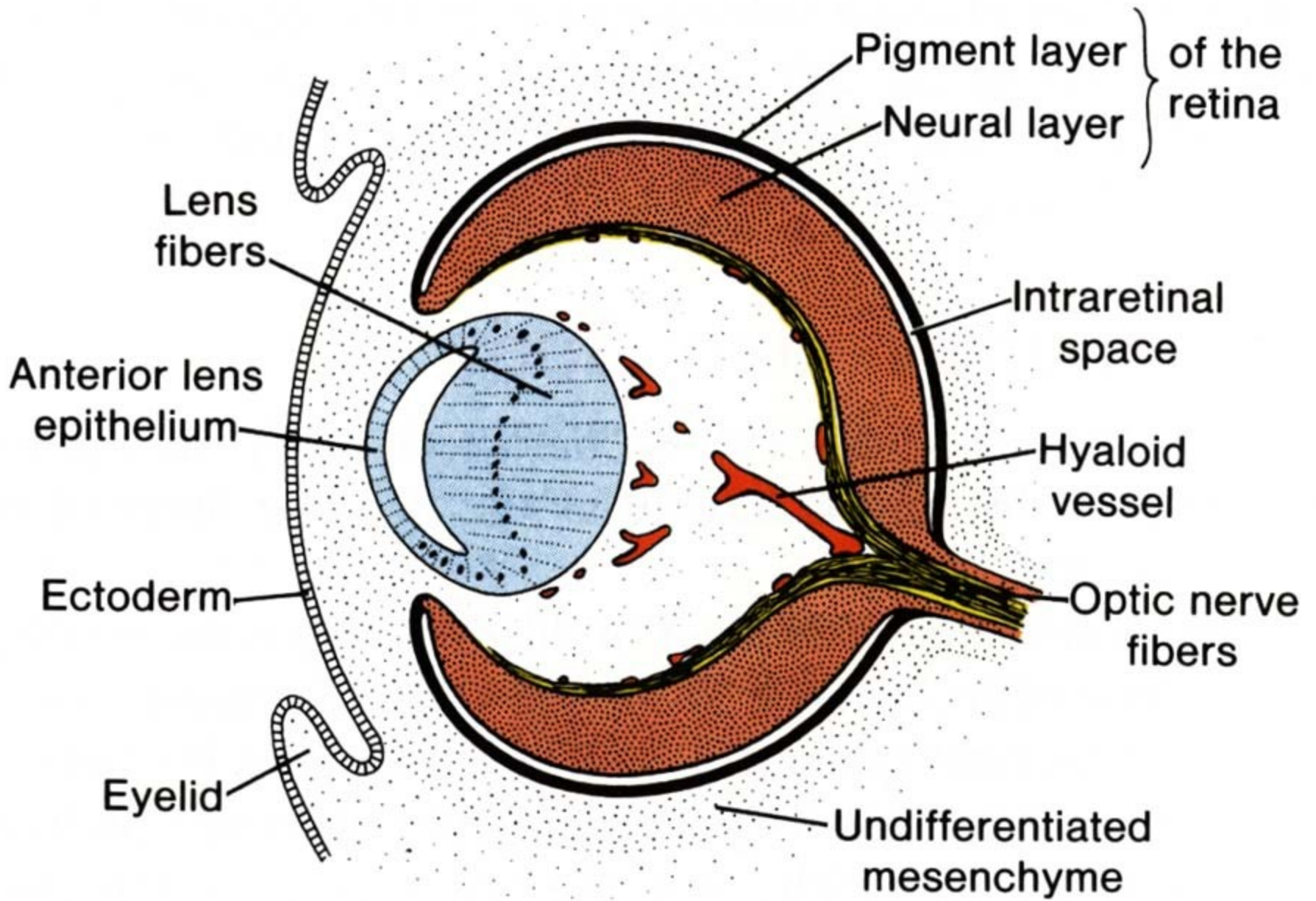
Optic stalk  
**nervus opticus**

Surface  
ectoderm

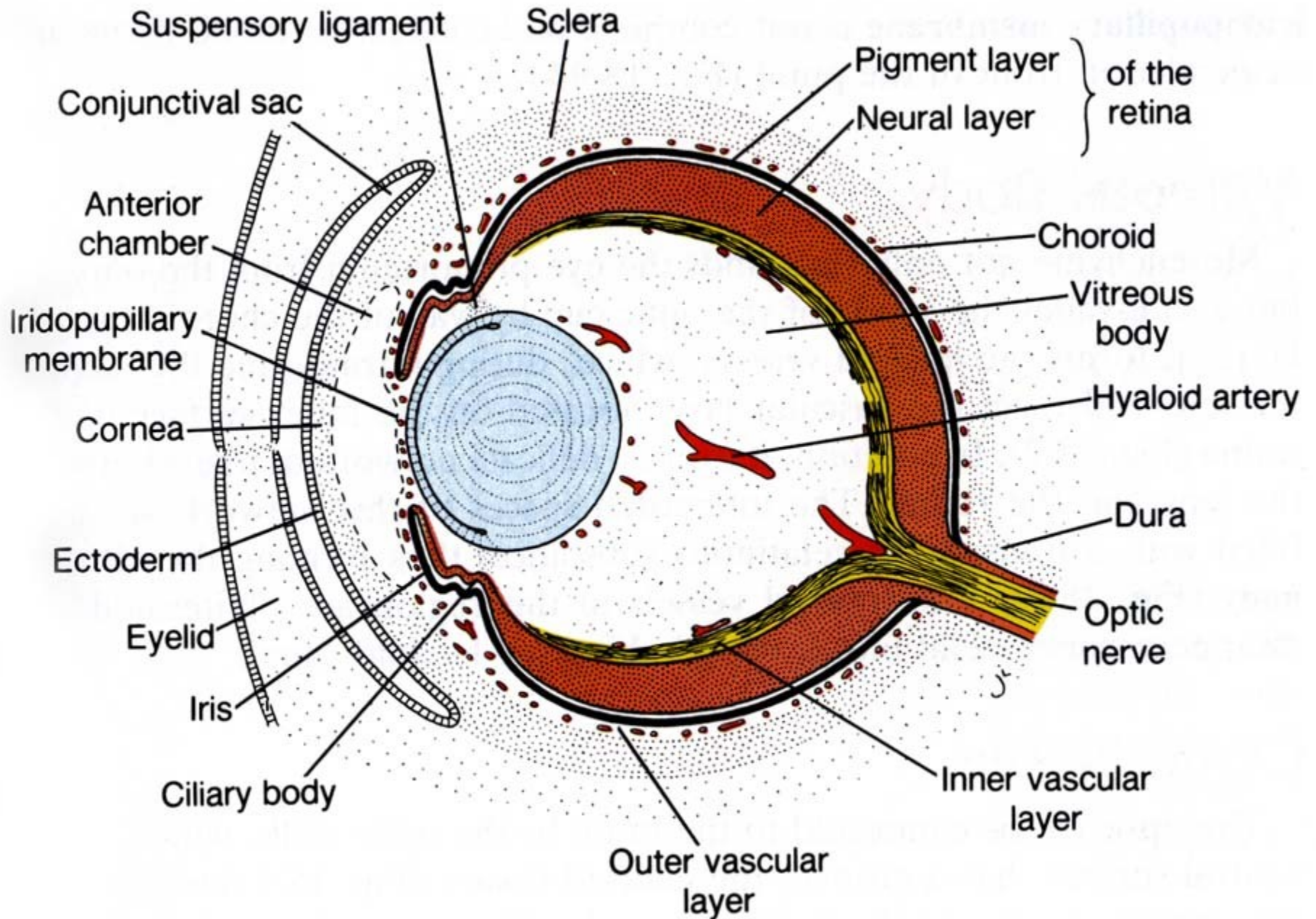
**g** Hyaloid artery and vein in choroidal fissure











## IN EYEBALL:

Retina – from neuroectoderm of mesencephalon

Lens cristalina – from ectoderm

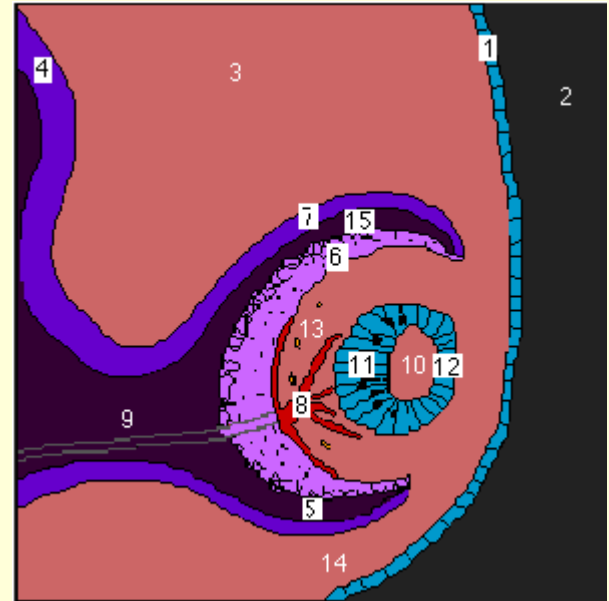
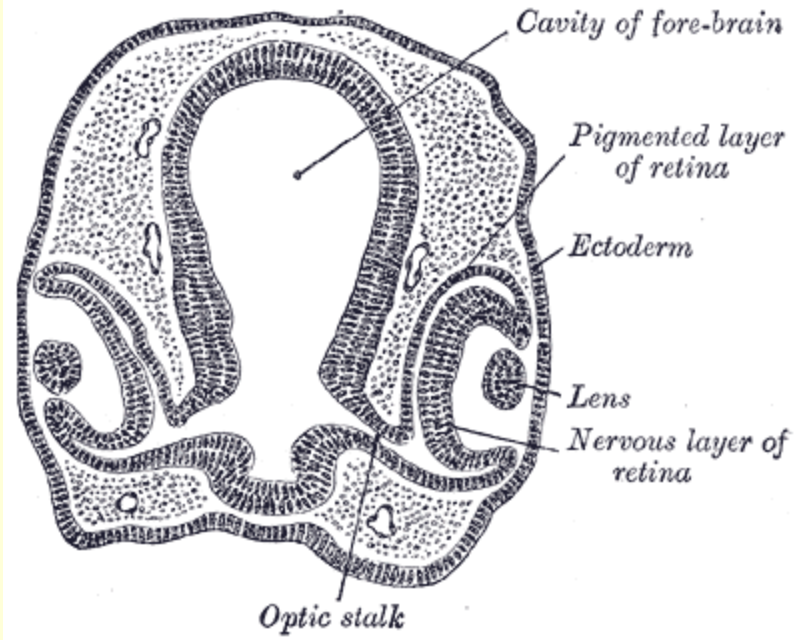
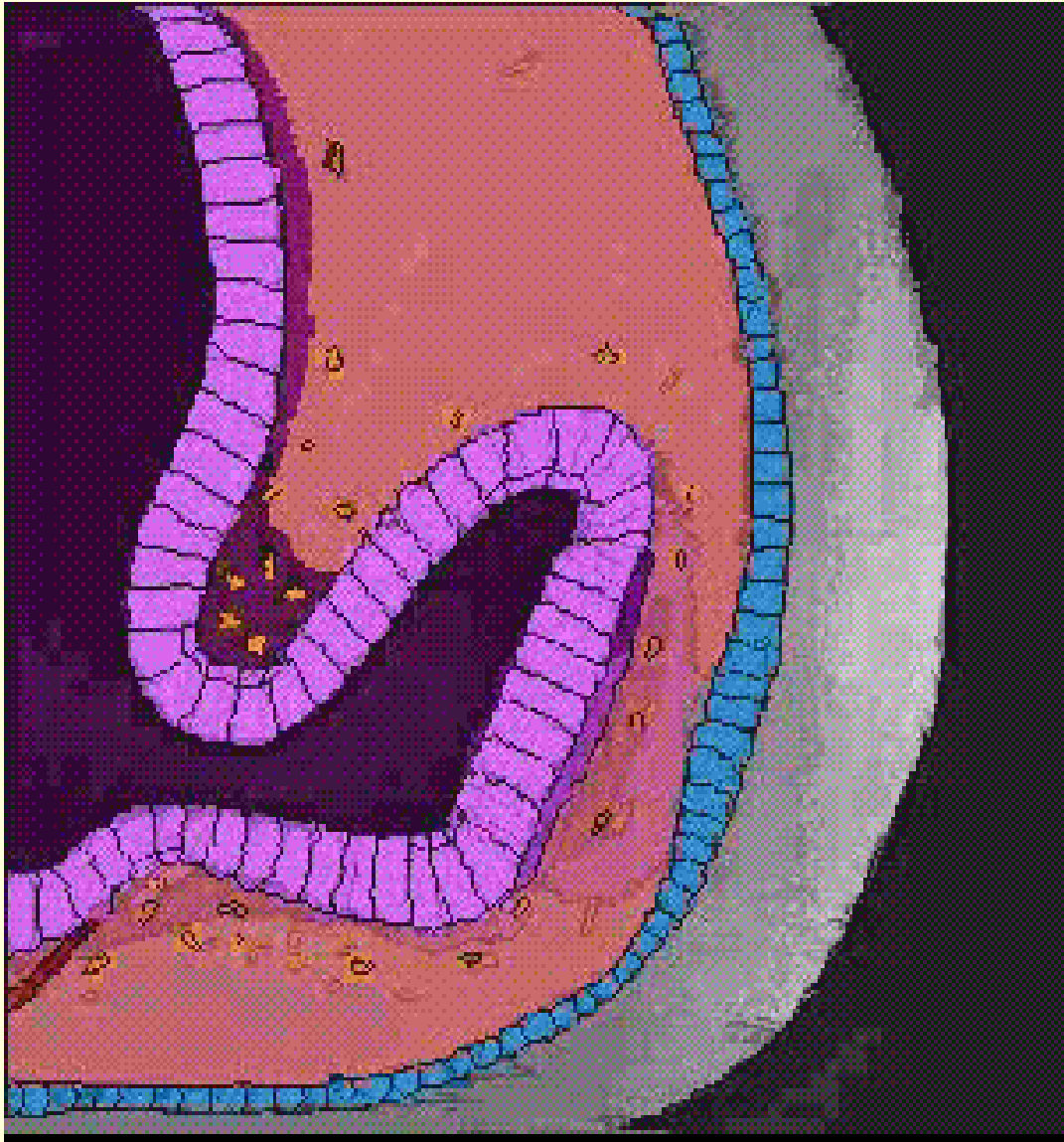
Conjunctival epithelium – from ectoderm

All other – from mesenchym

## EYELID

– from ectoderm + mesenchym

# Lens growth is induced by optic vesicle





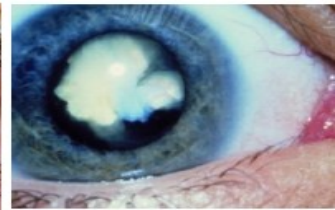
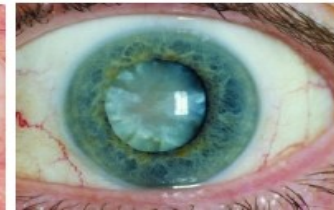
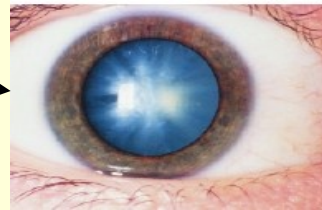
# Teratology of the eye



- 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

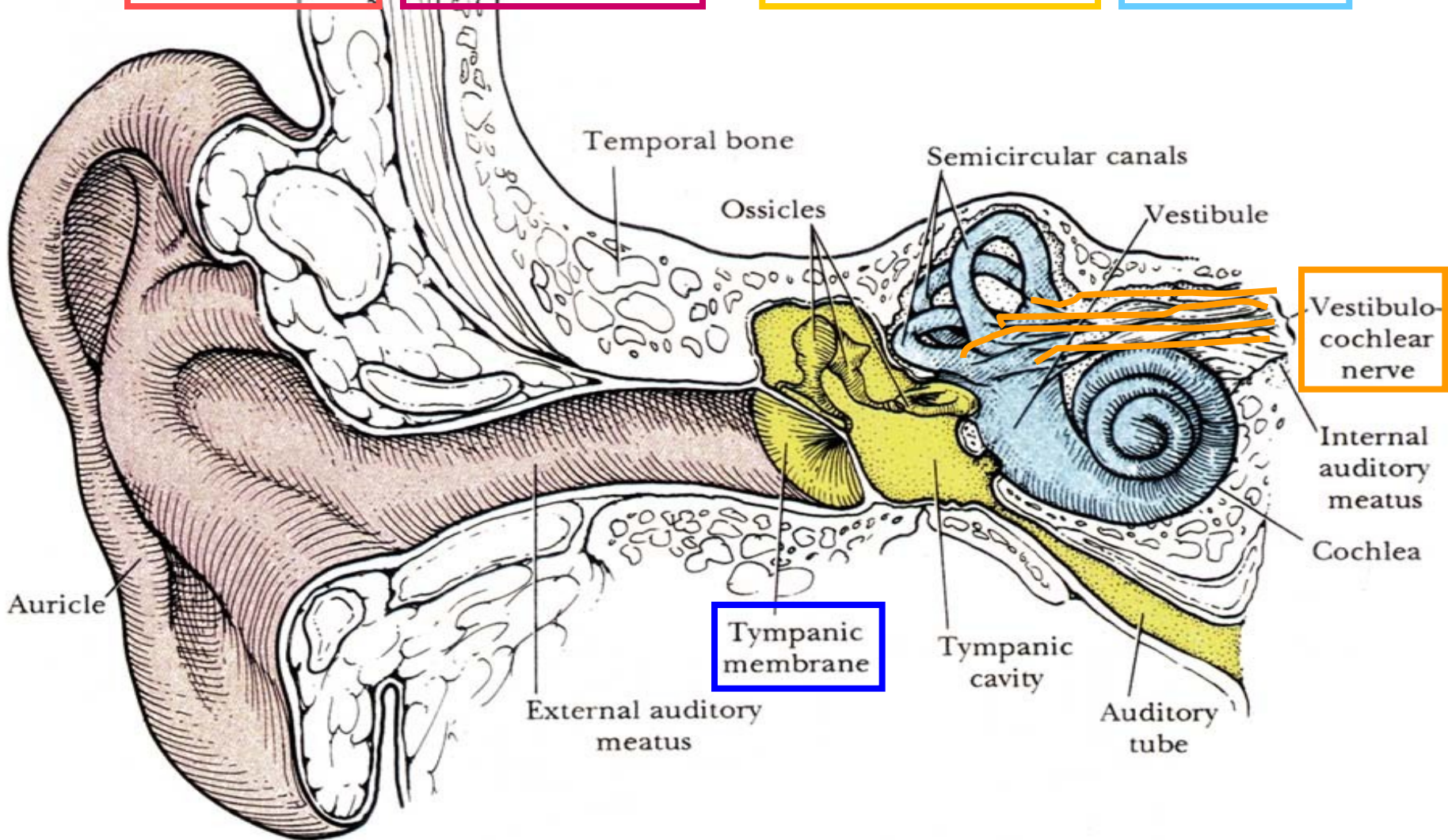


the 1st  
pharyngeal pouch

inner ear

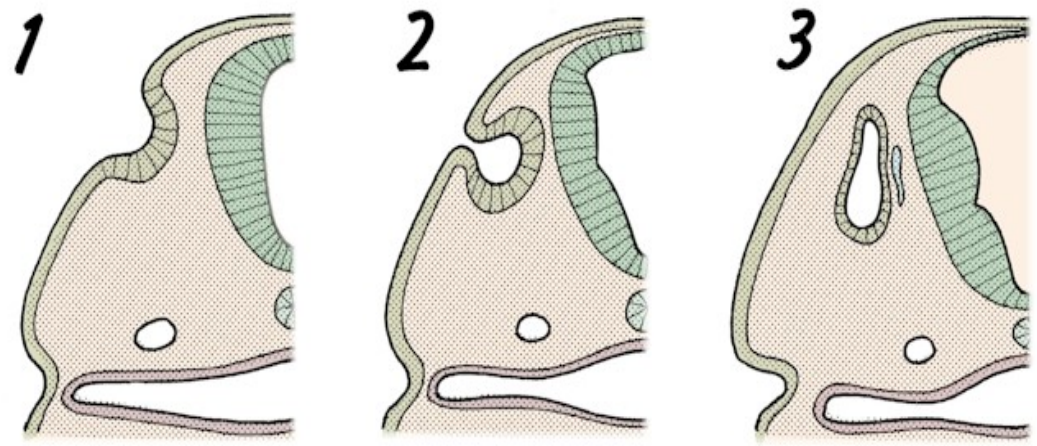


ectodermal  
otocyst

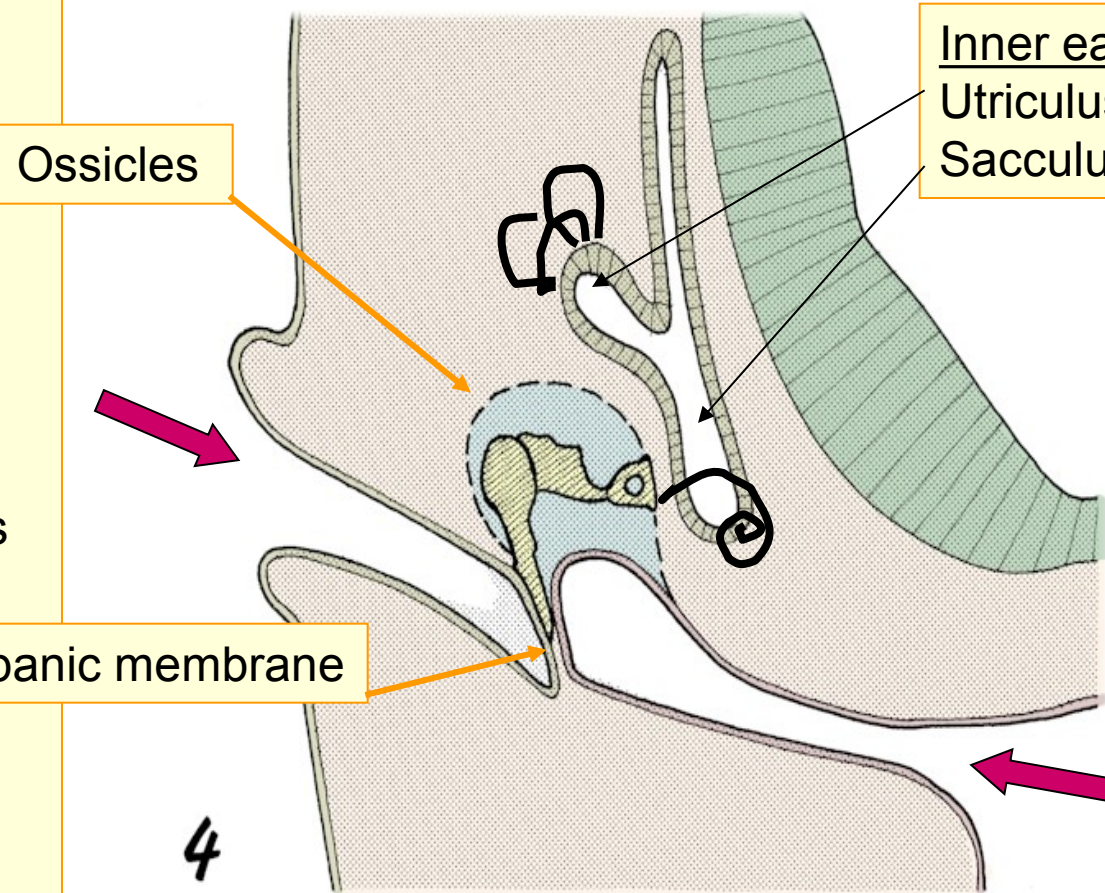




**EAR**



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

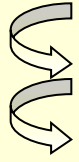


**The 1st**  
**ECTODERMAL**  
cleft:  
Meatus acusticus

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



# Development of the inner ear

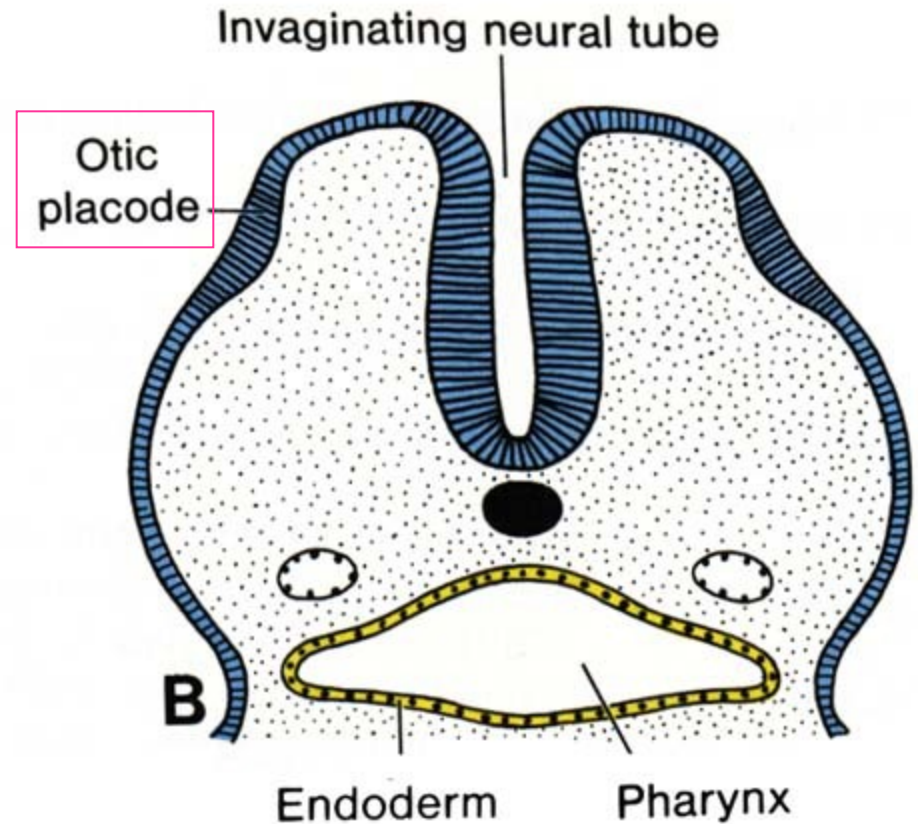
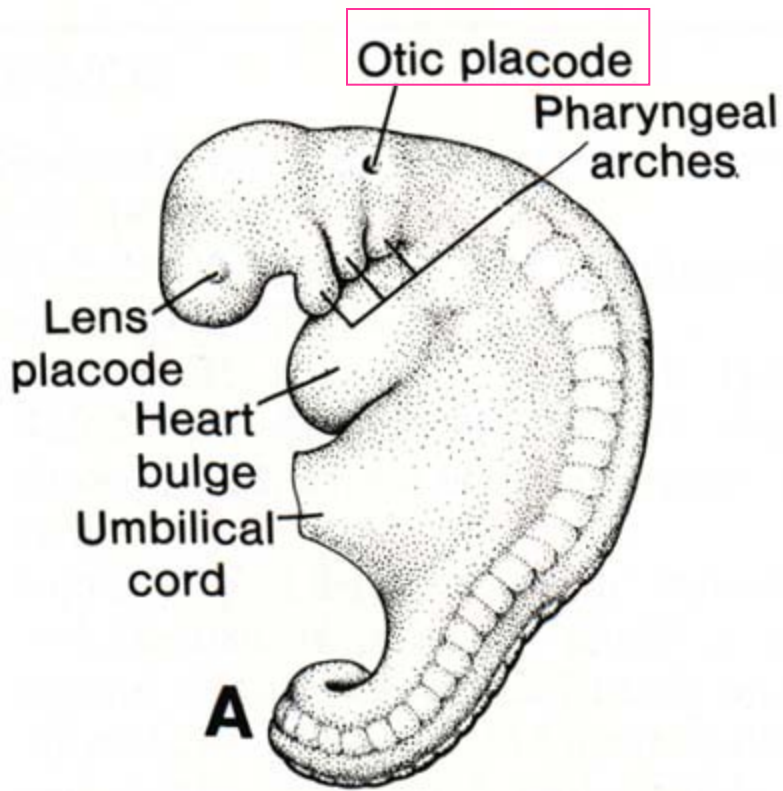


Otic placode – thickening of ectoderm

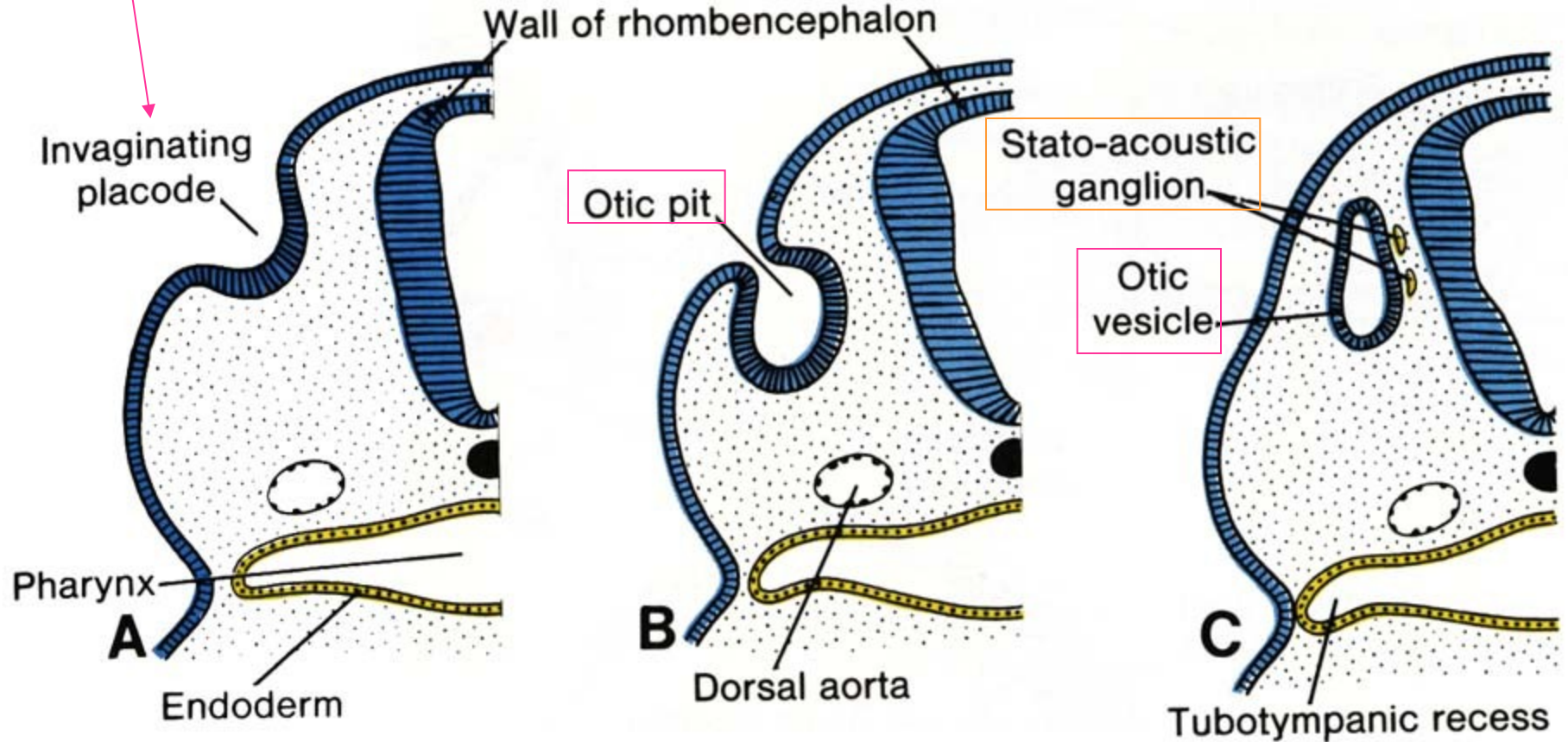
Otic pit

Otic vesicle = otocyst:

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



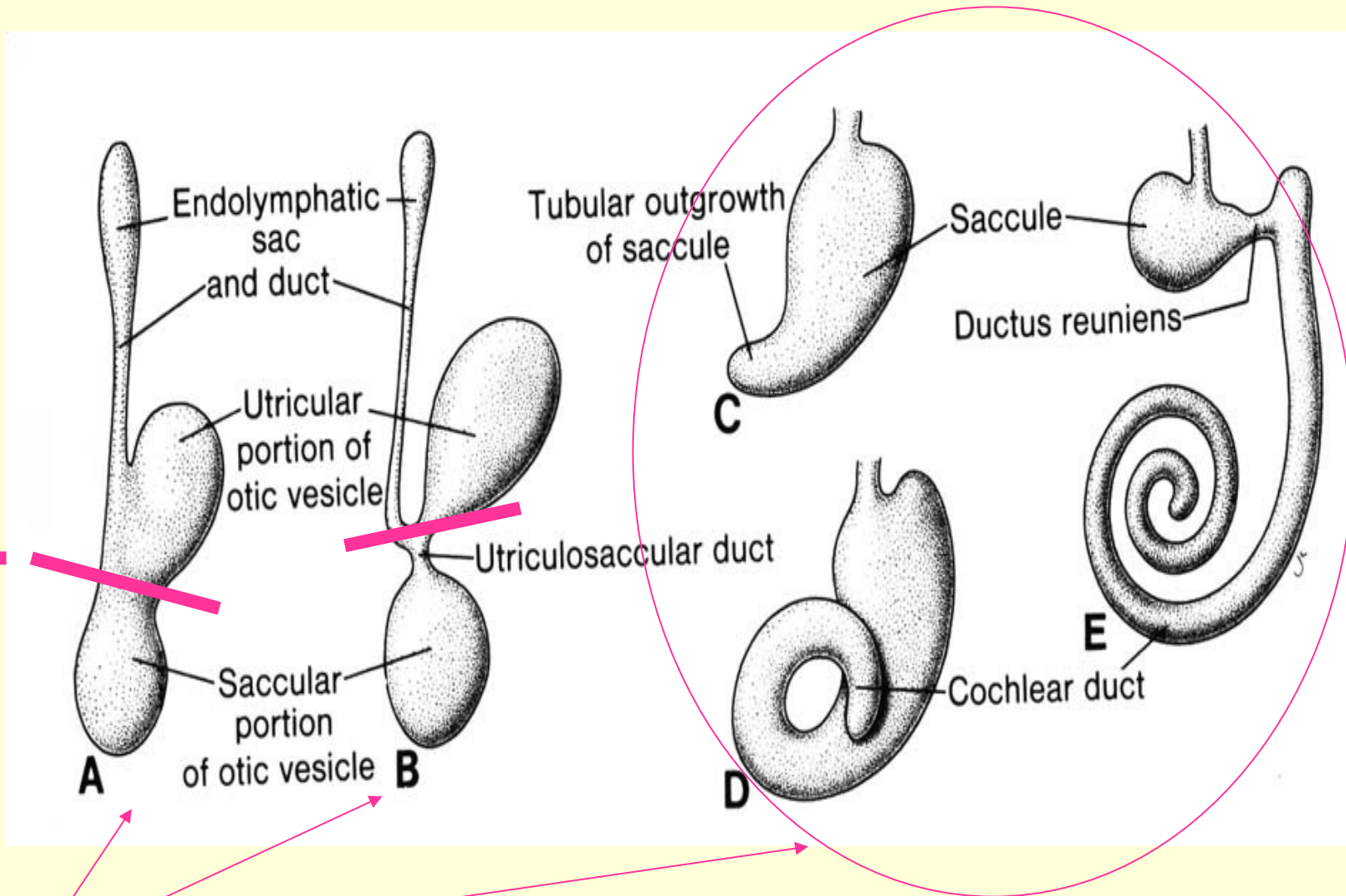
Otic pit  $\Rightarrow$  otic vesicle (otocyst)



# Differentiation of the otocyst into membranous labyrinth:

D  
O  
R  
S  
A  
L  
L  
Y

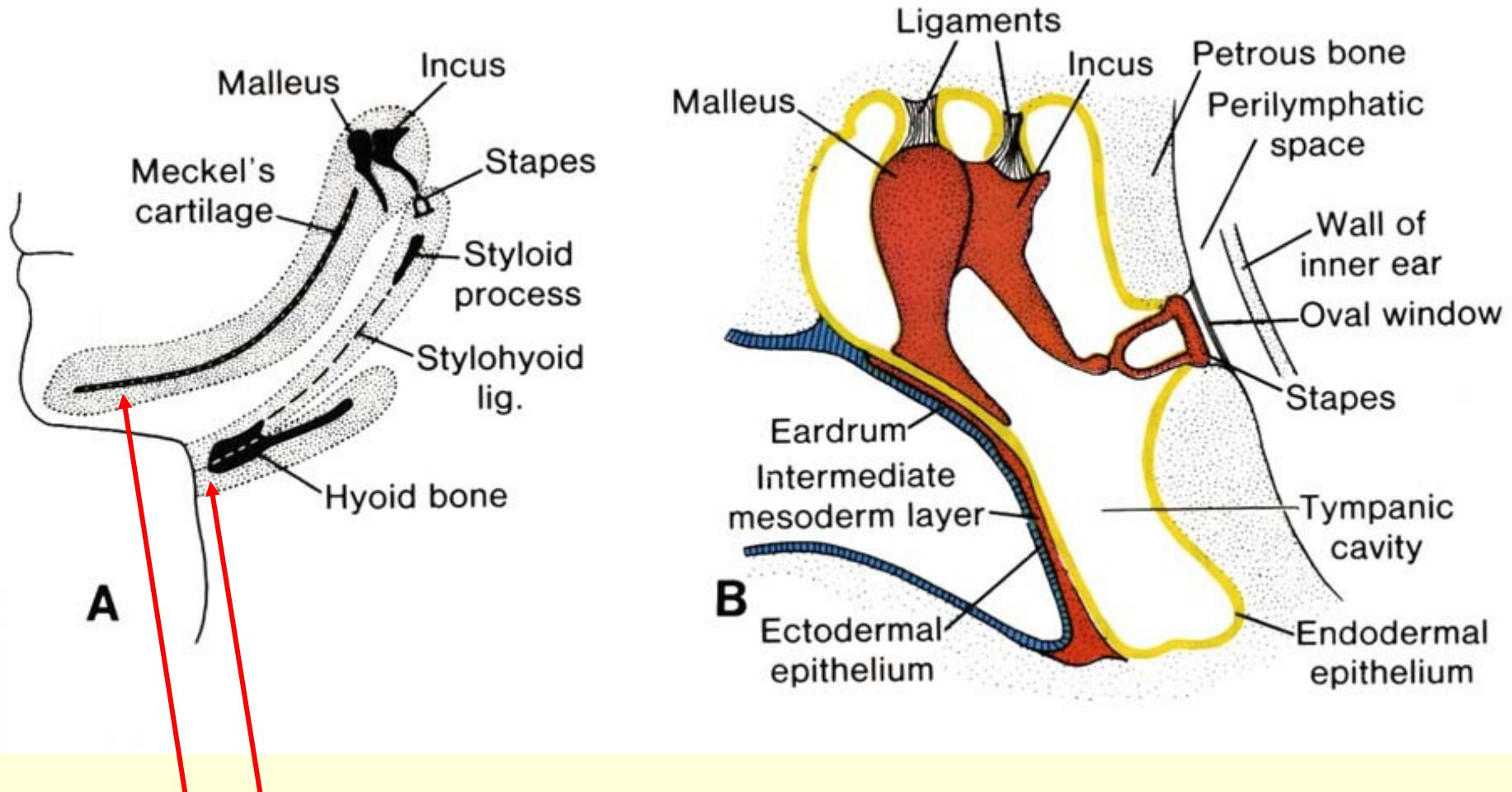
V  
E  
N  
T  
R  
A  
L  
L  
Y





# Development of tympanic membrane and cavity

## Development of the ear ossicles

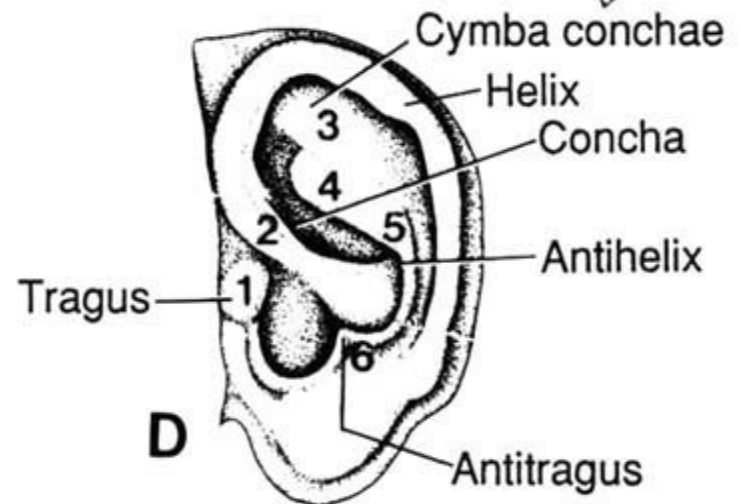
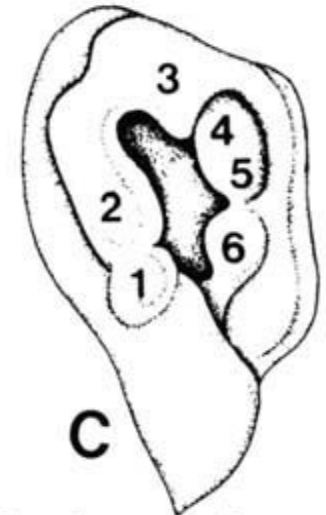
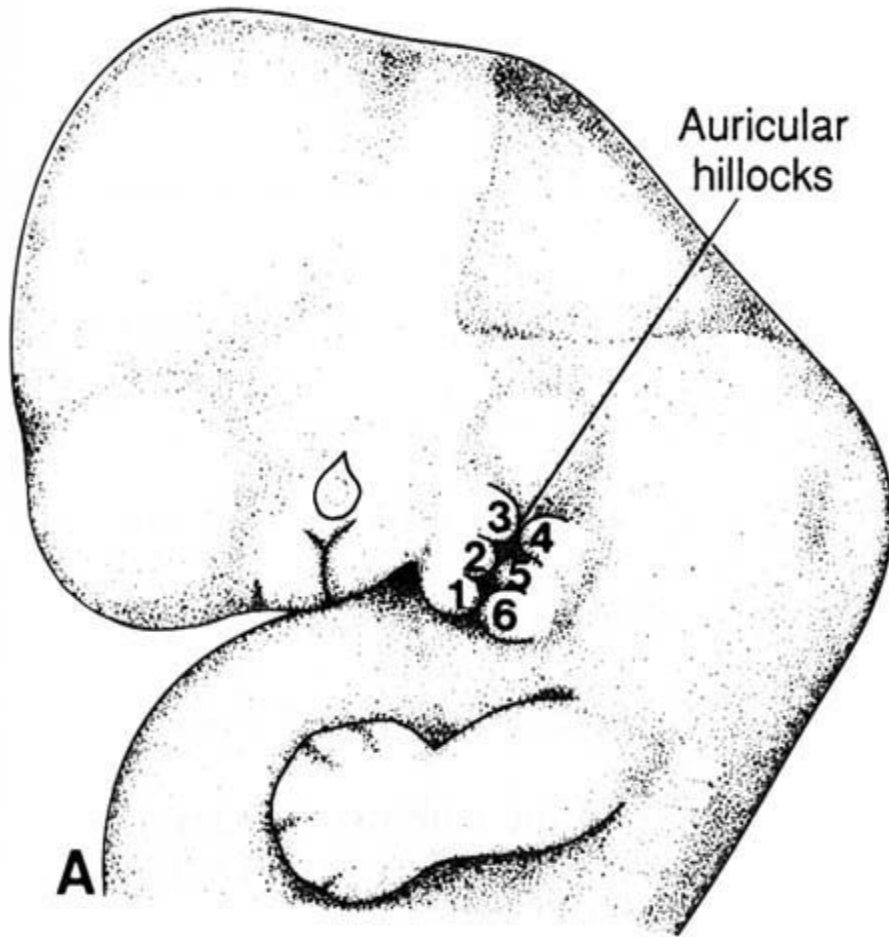


The 1st and 2nd branchial arch: 1 - cartilago Meckeli  $\Rightarrow$  malleus, incus  
 2 - cartilago Reicherti  $\Rightarrow$  stapes



# 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)





Meatus atresia



# 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

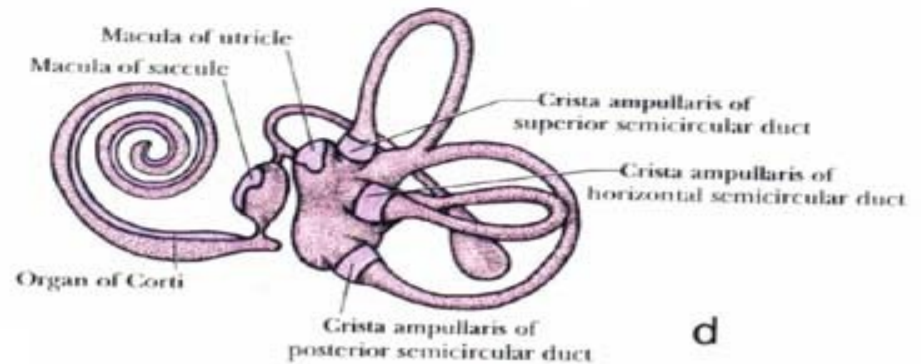
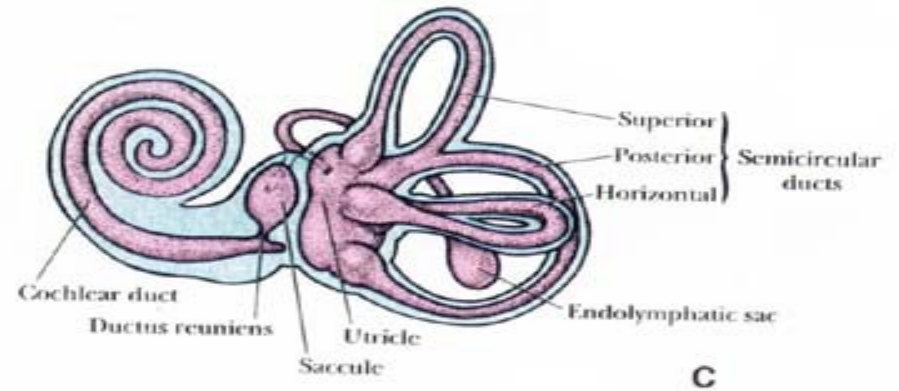
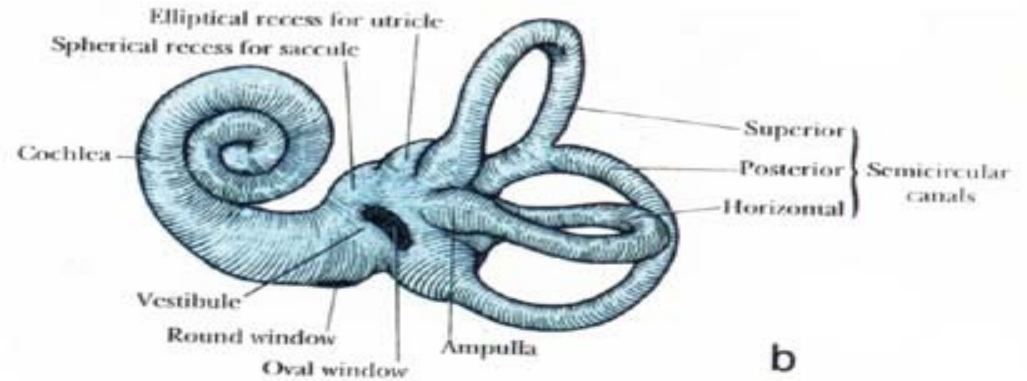


Figure 24.7. b, c, d.