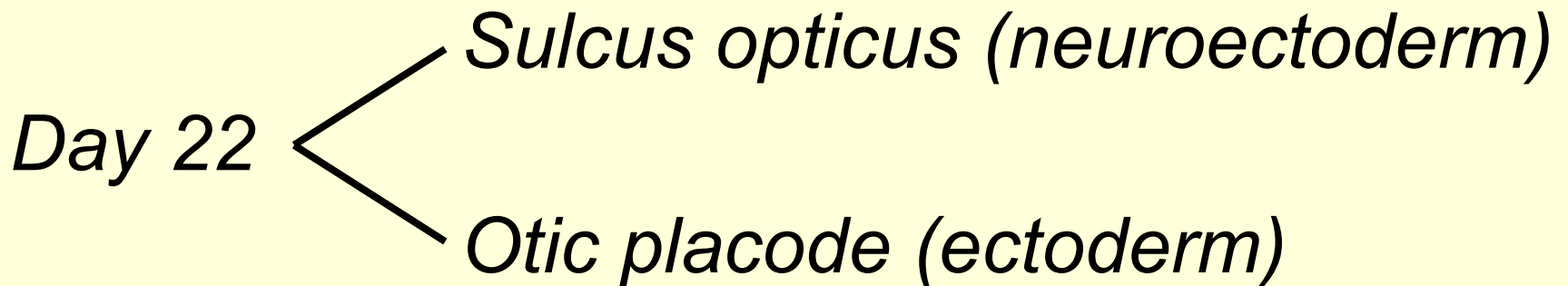


Embryology /organogenesis/

Development and teratology
of
sensory organs

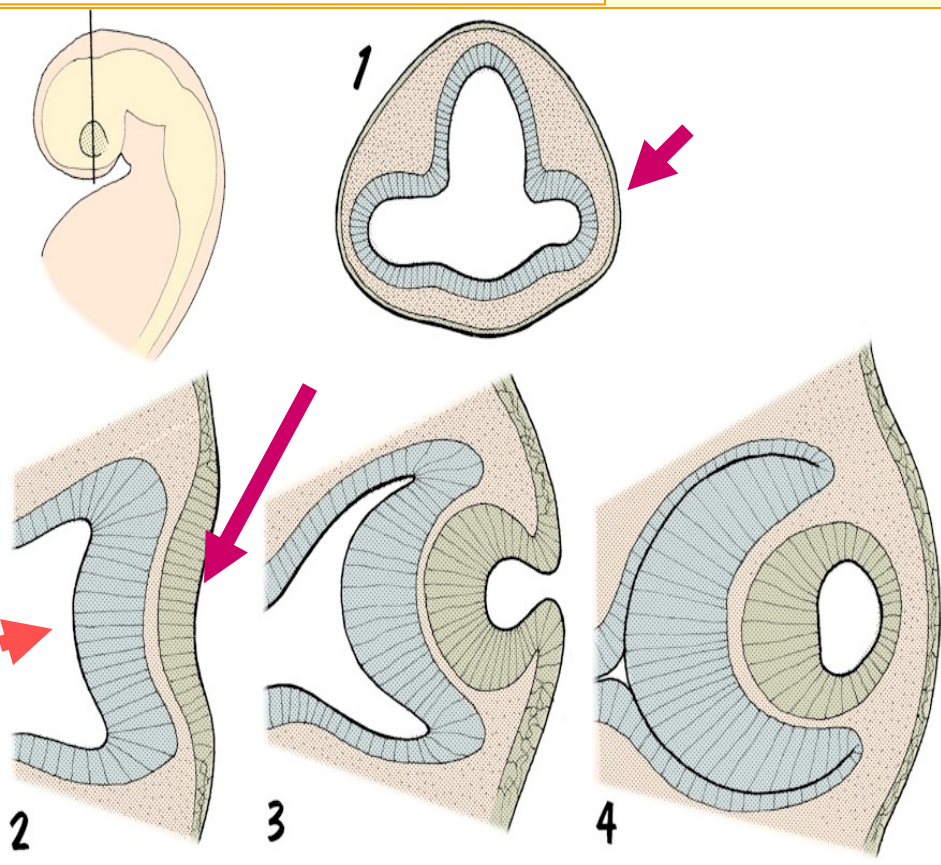
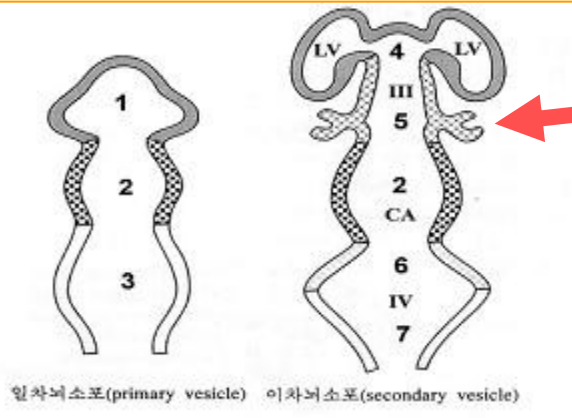
- 29. An overview of development of the eye.
 - 30. An overview of development of the external, middle and inner ear.
-

Eye and ear start to develop at:



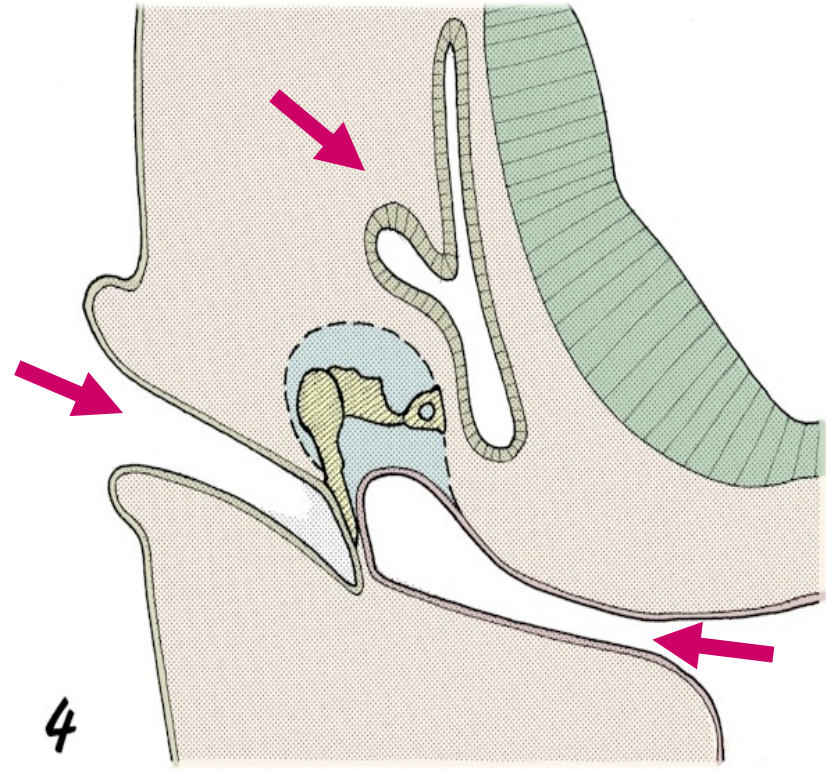
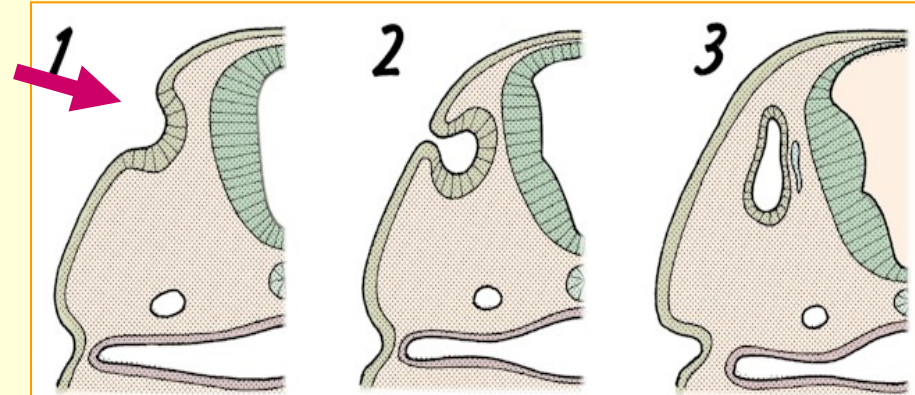
EYE

Day 22: sulcus opticus (neuroectoderm)

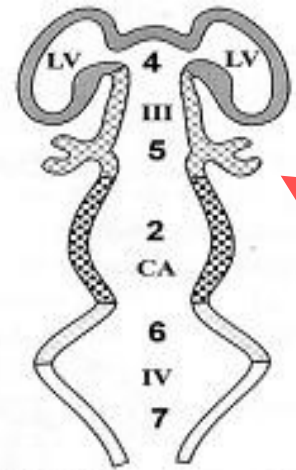
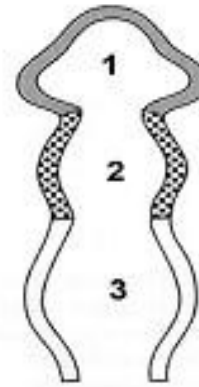


EAR

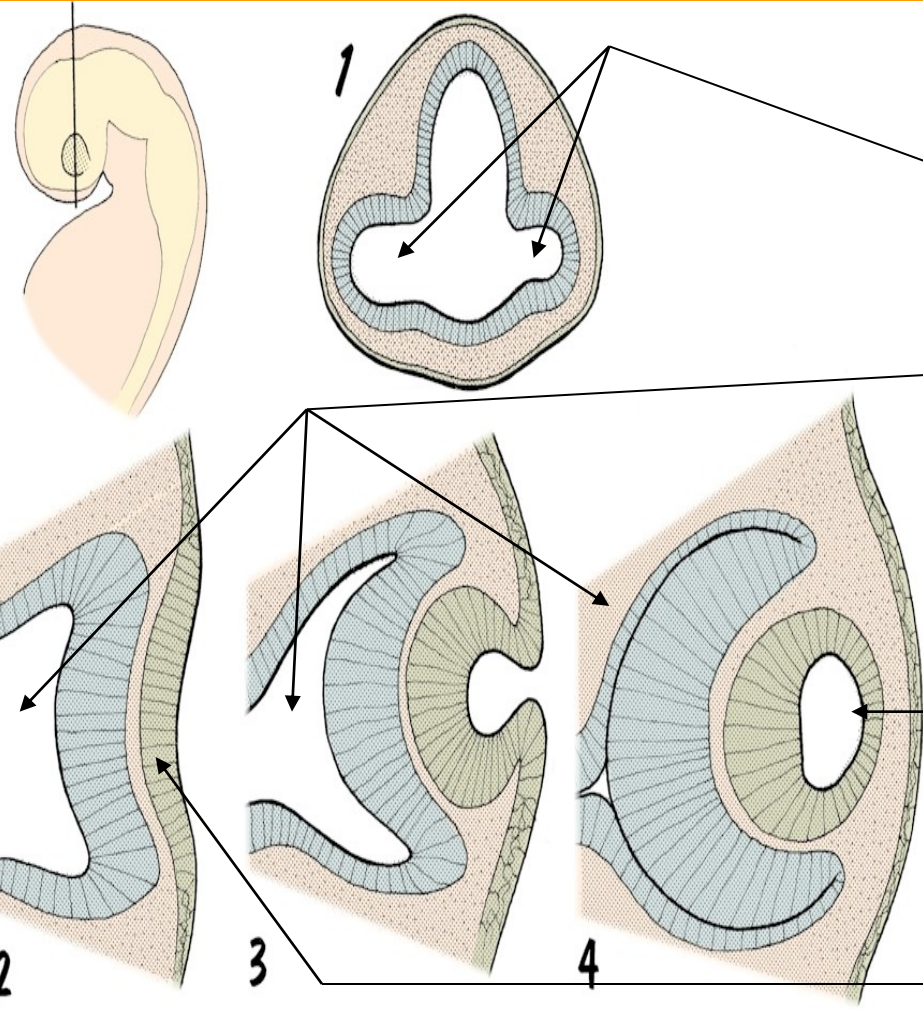
otic placode (ectoderm)



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

NEUROECTODERM:

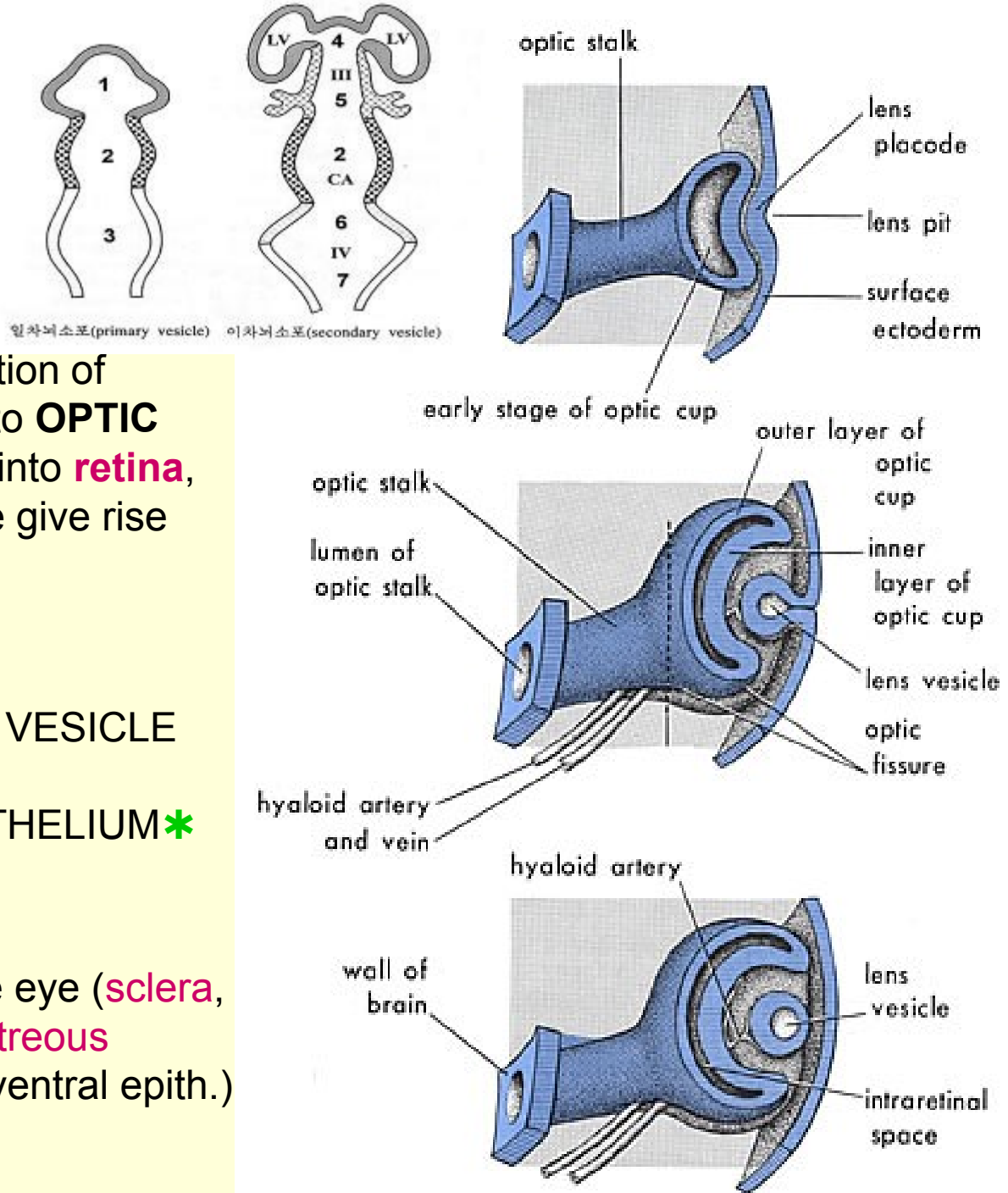
OPTIC GROOVE (evagination of prosencephalon) give rise to **OPTIC VESICLE (CUP)** develops into **retina**, **EYESTALK** of optic vesicle give rise to **optic nerve**

ECTODERM:

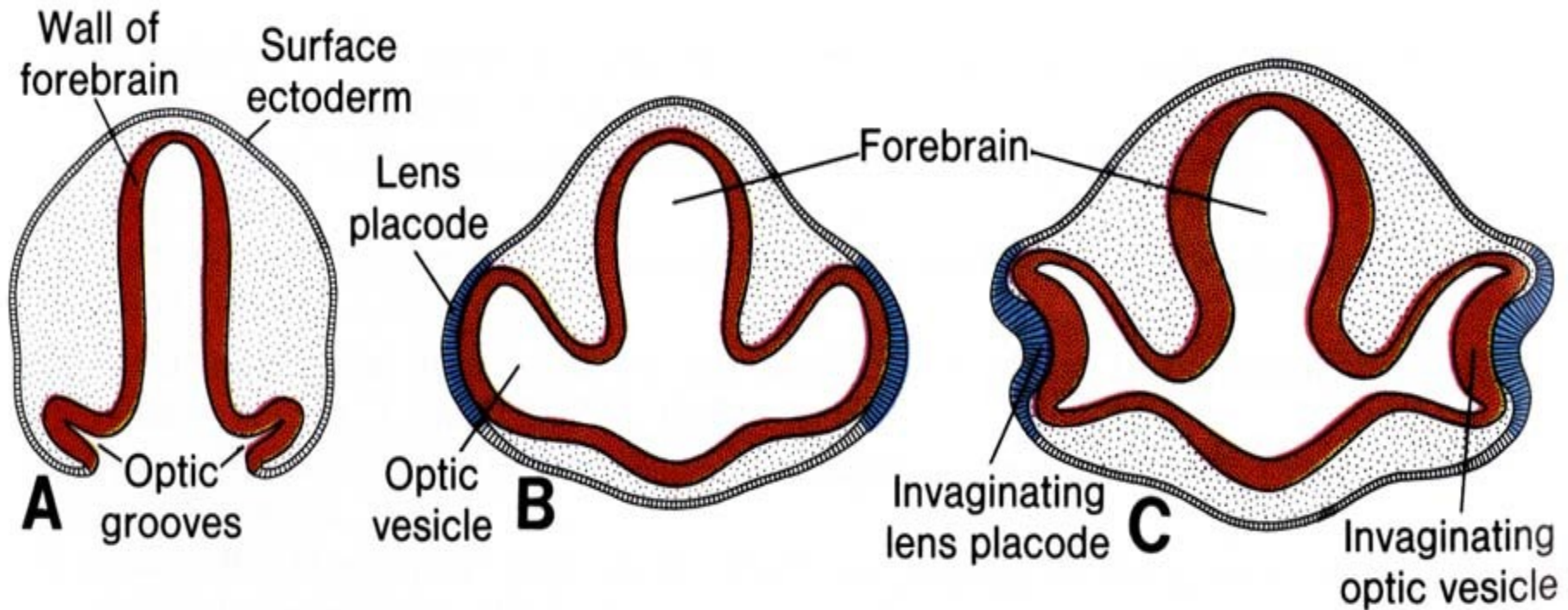
LENS PLACODE ⇒ **LENS VESICLE** and **VENTRAL CORNEAL EPITHELIUM***

MESENCHYME:

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



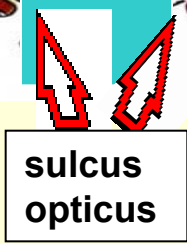
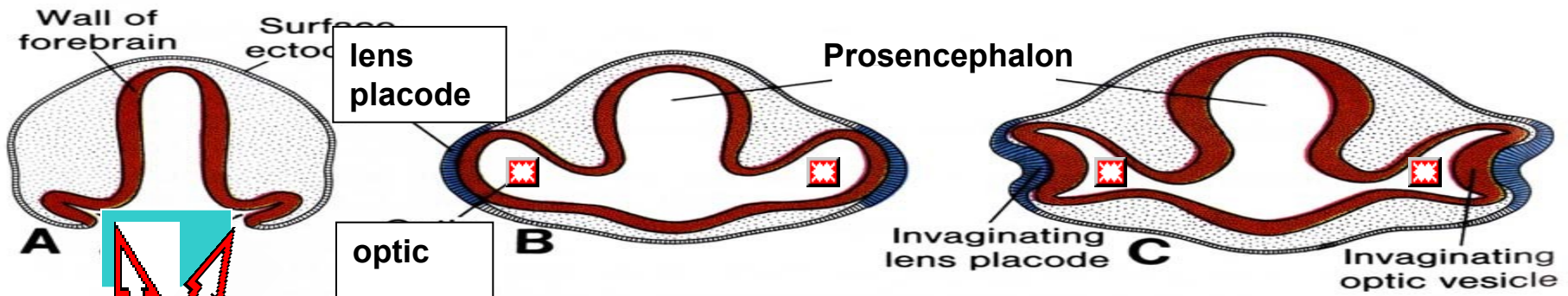
Development of the eye



sulcus opticus

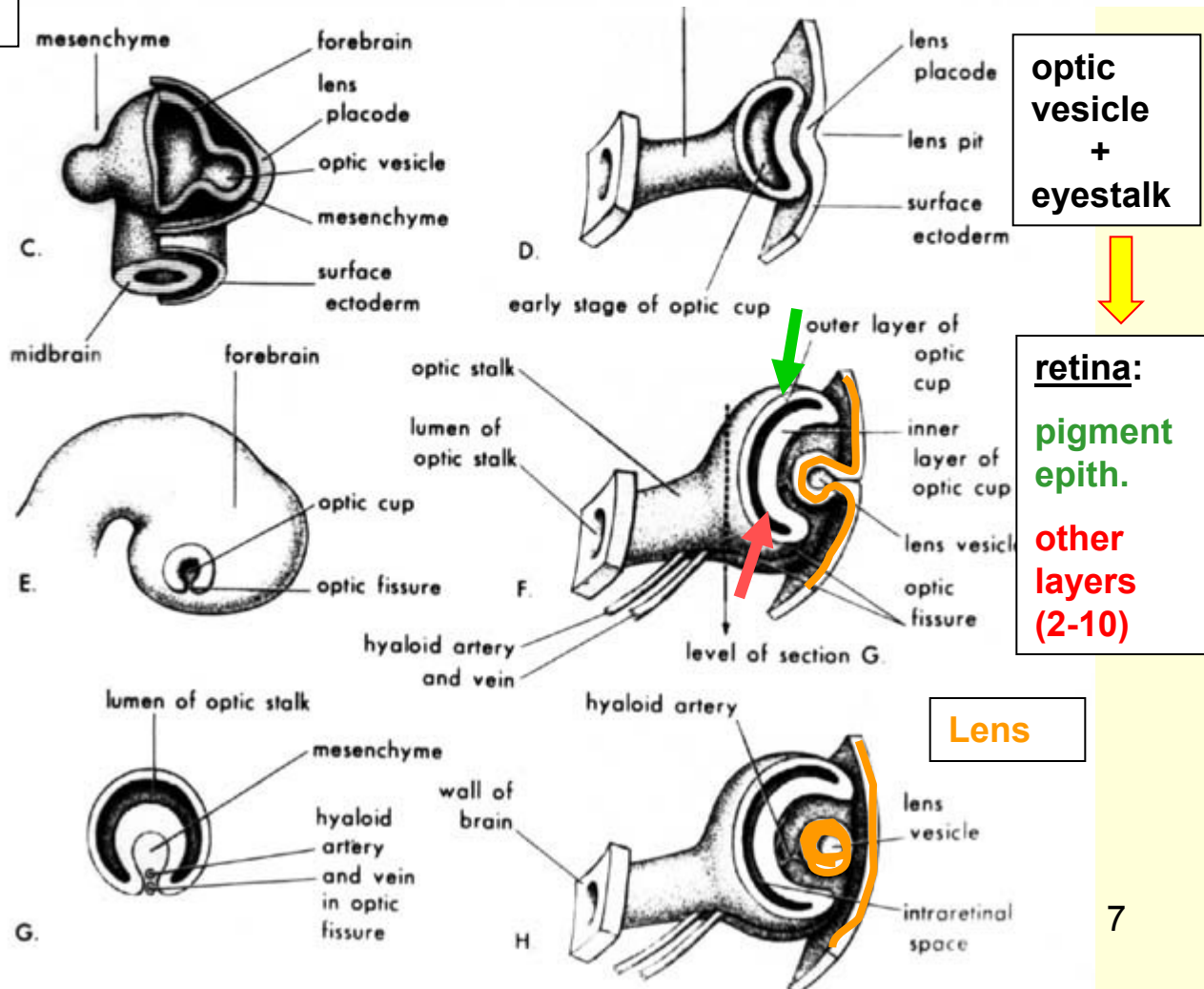
optic vesicles
+ lens placode

optic cup
+ lens vesicle



Ectoderm:
lens placode (lens cristalina)

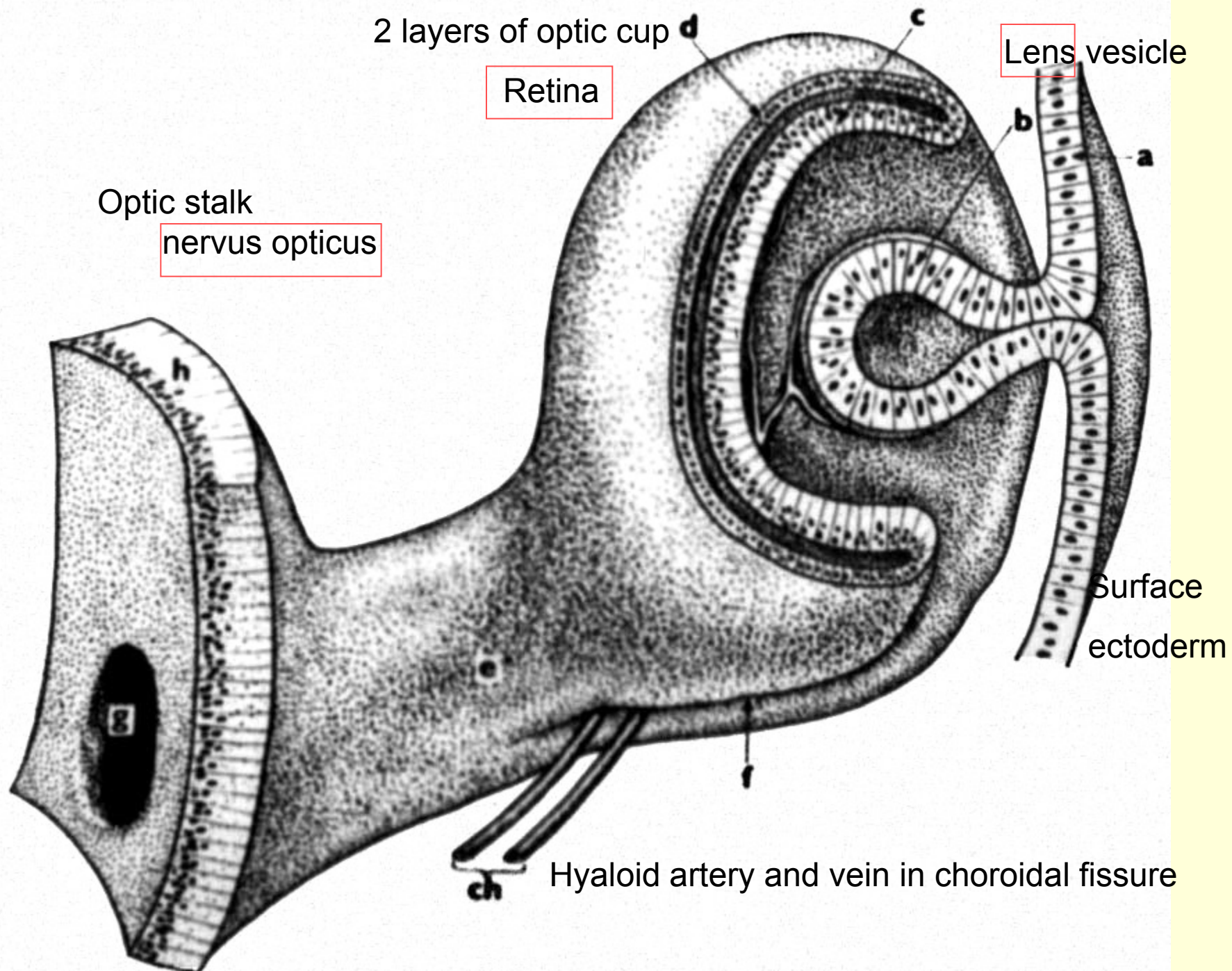
Neuroectoderm:
optic vesicle ⇒ retina

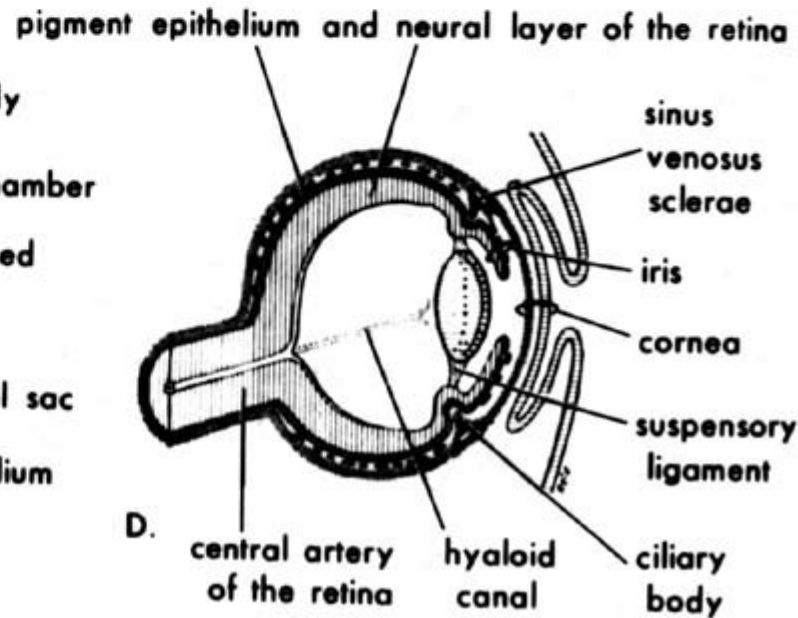
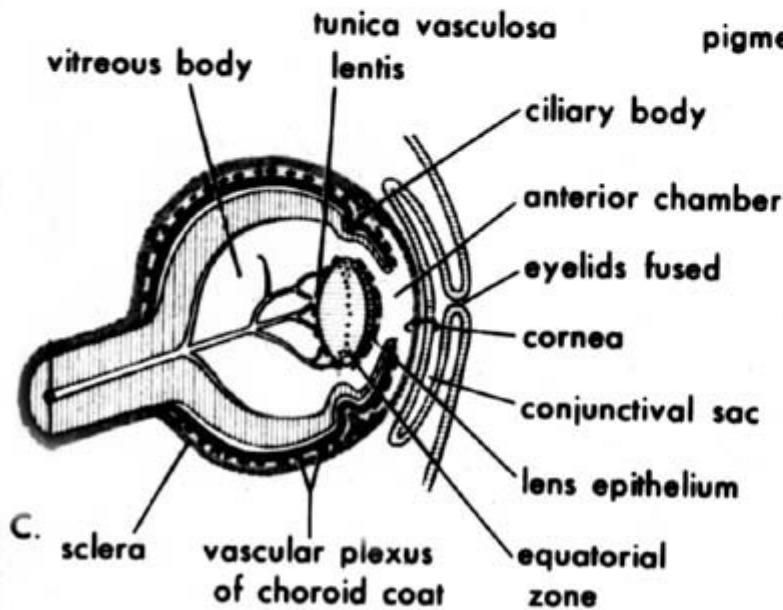
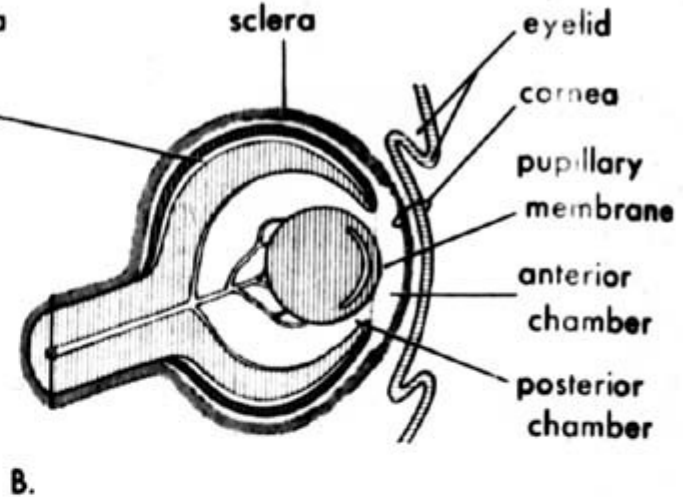
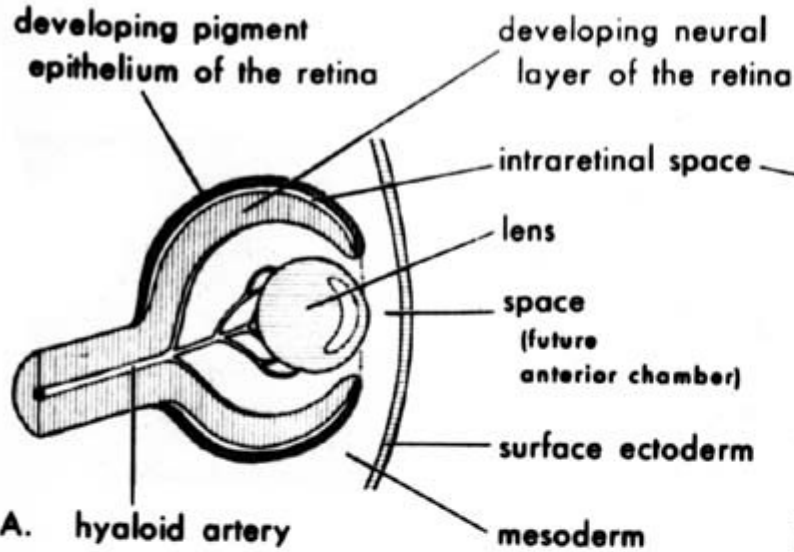


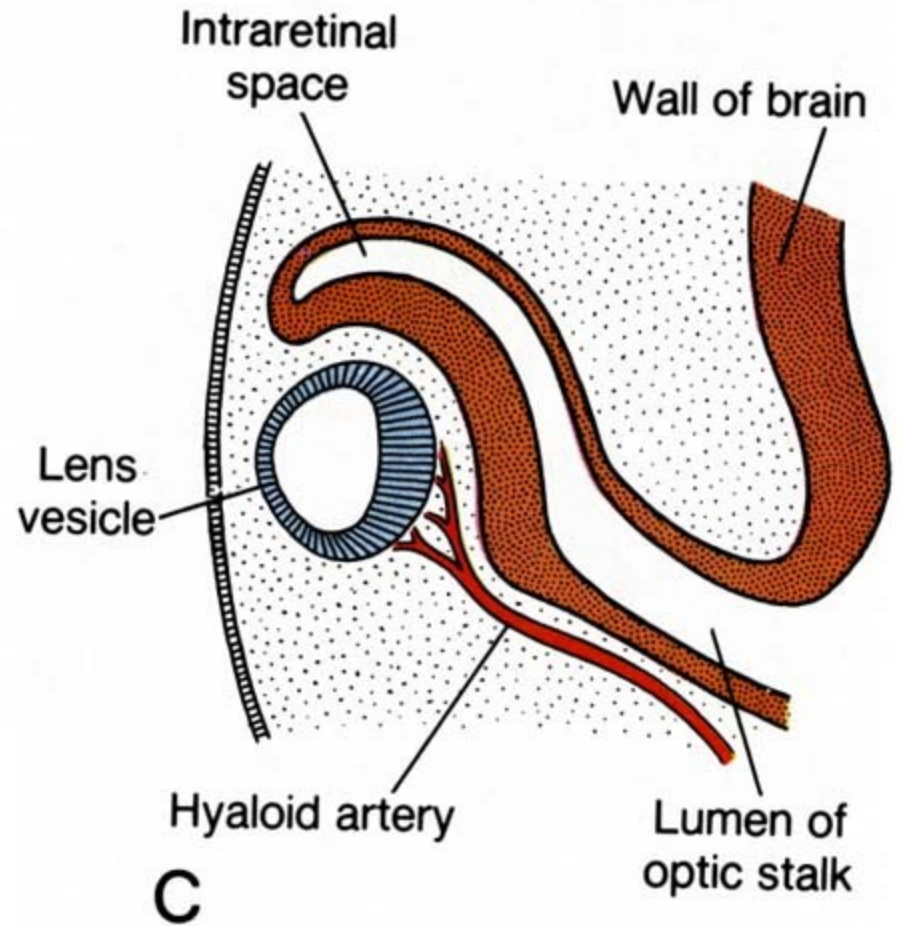
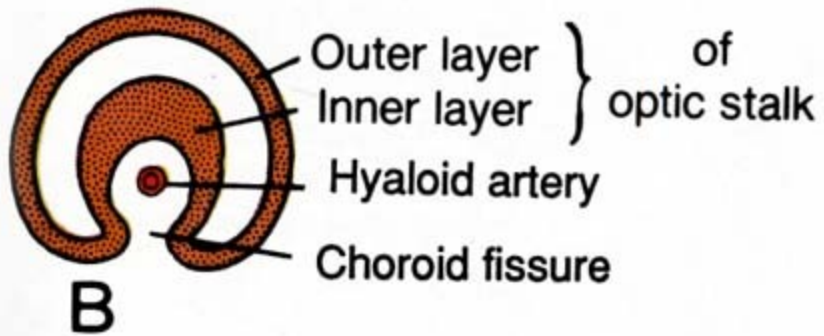
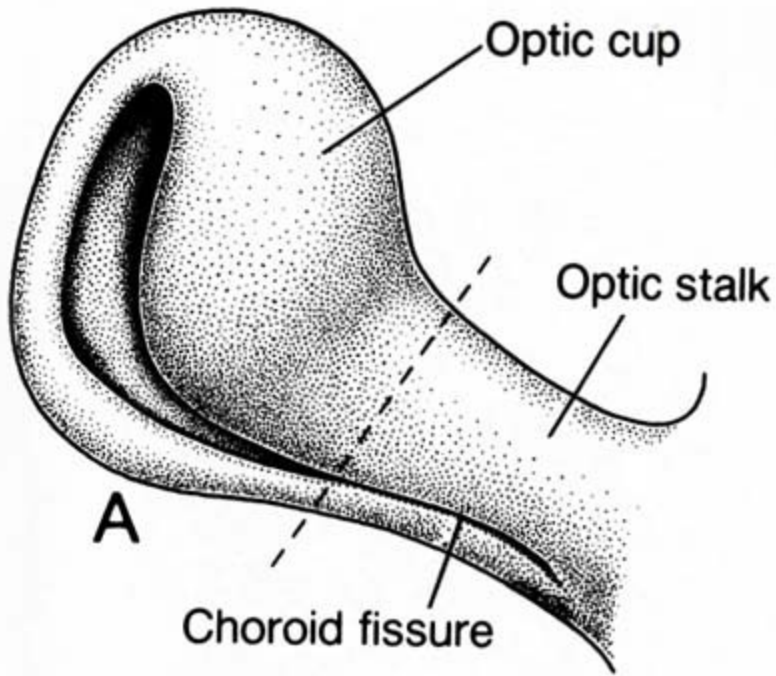
optic vesicle + eyestalk

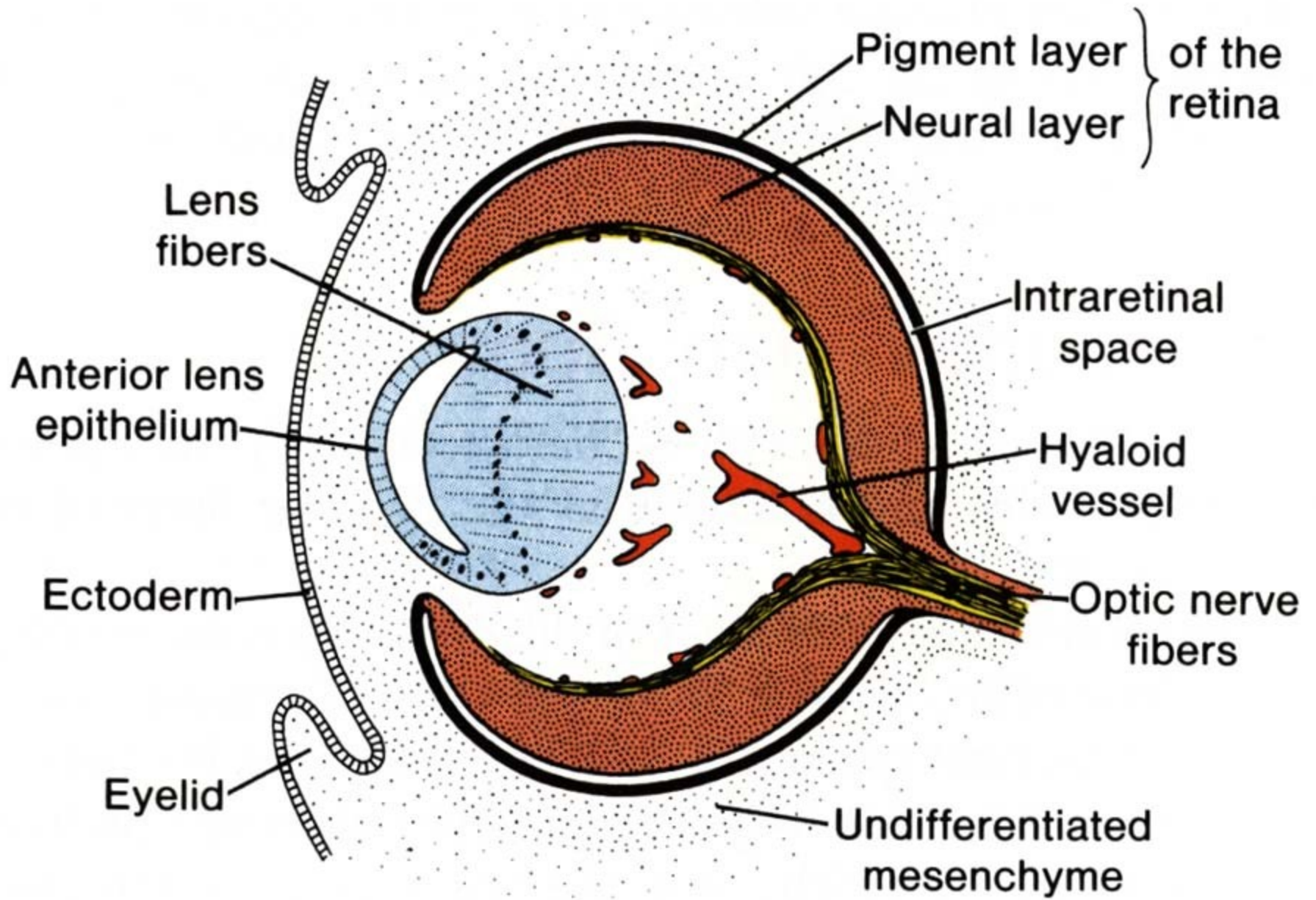
retina:
pigment epith.
other layers (2-10)

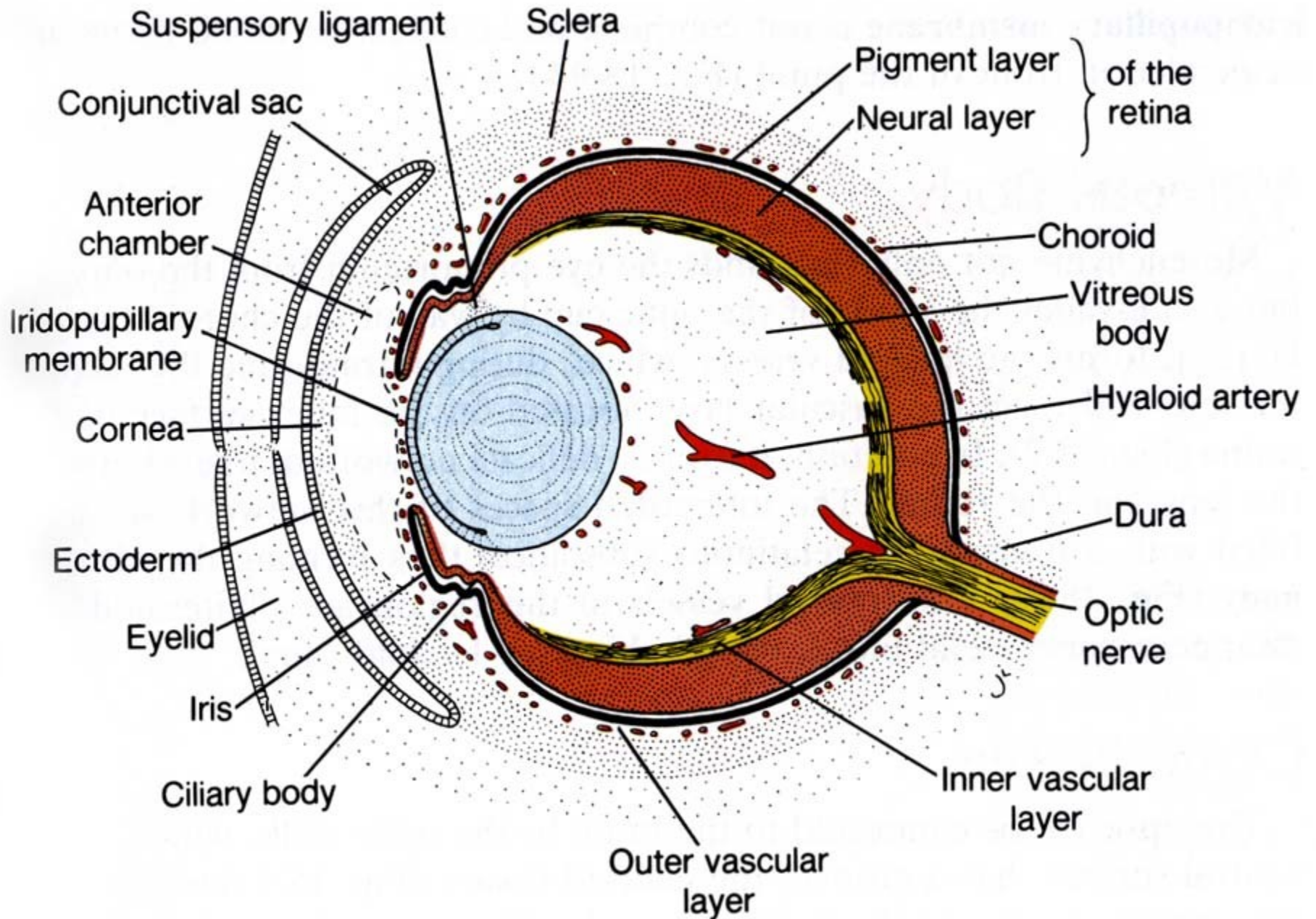
Lens



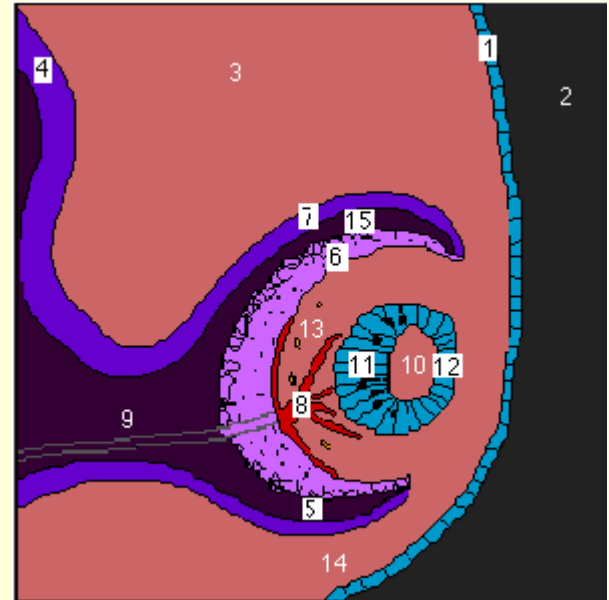
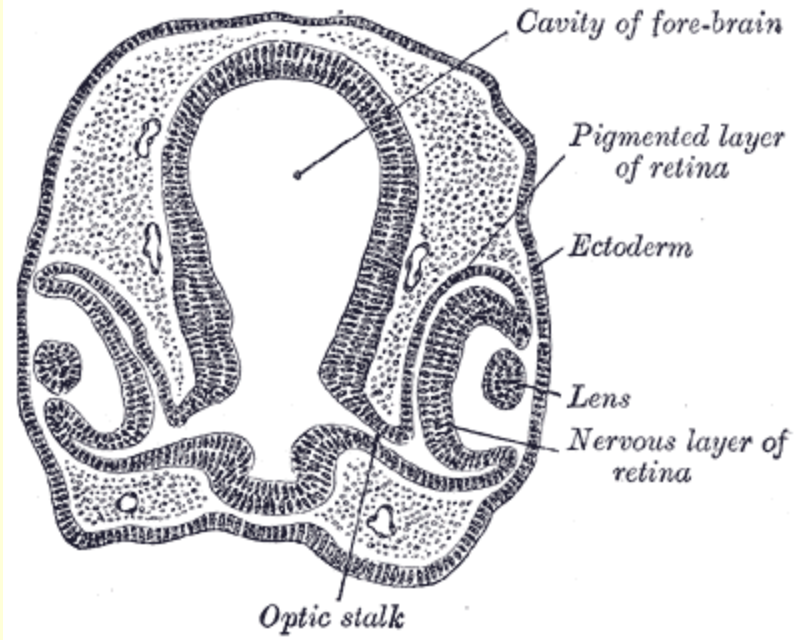
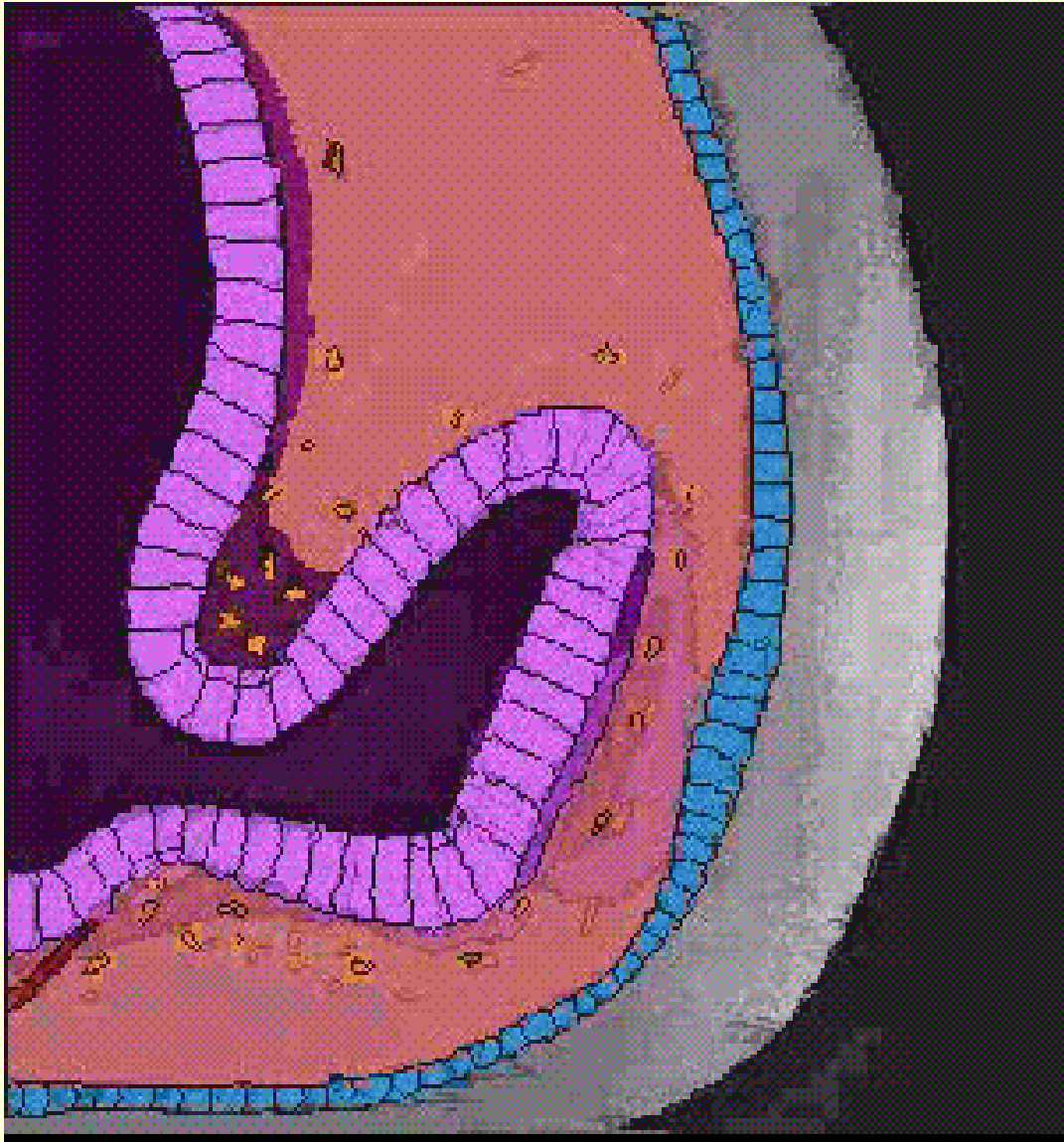








Lens growth is induced by optic vesicle



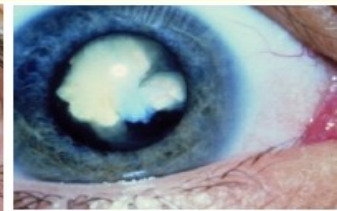
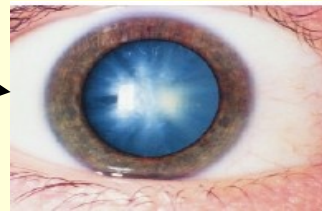
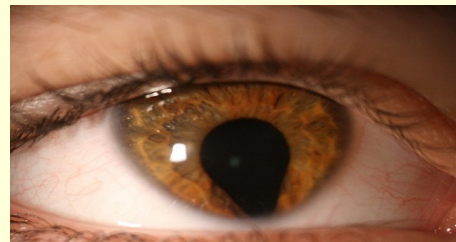
Teratology of the eye



- 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

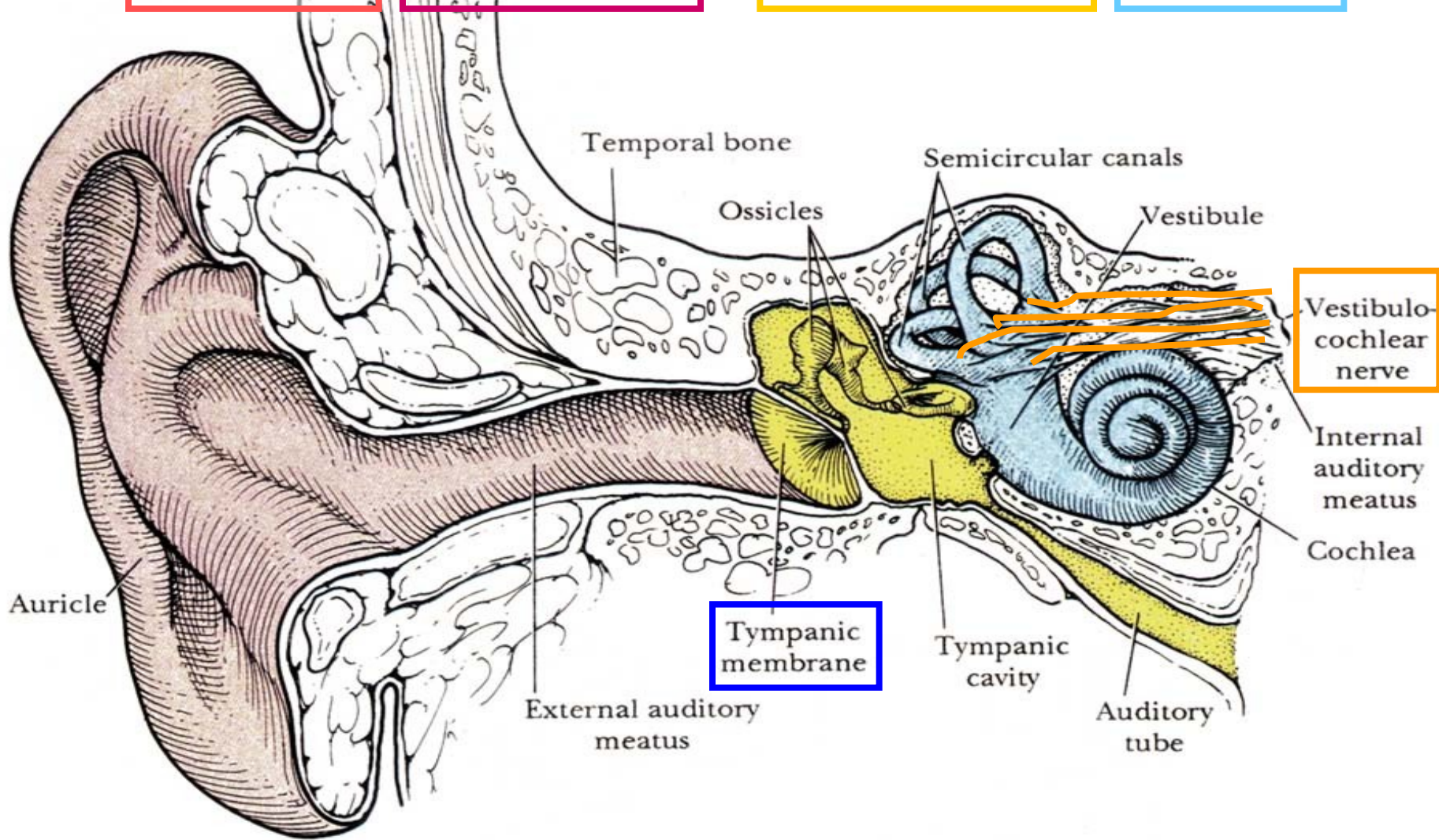


the 1st pharyngeal pouch

inner ear



ectodermal otocyst



Temporal bone

Ossicles

Semicircular canals

Vestibule

Vestibulo-cochlear nerve

Internal auditory meatus

Cochlea

Auricle

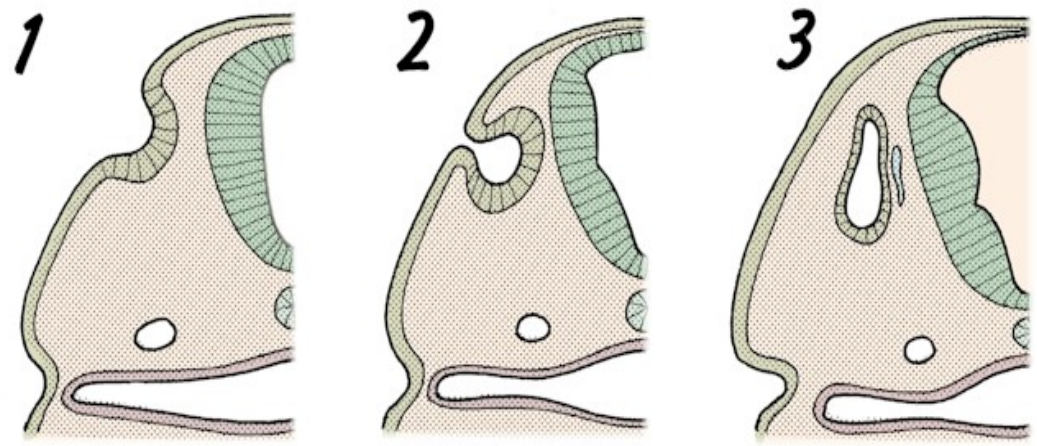
Tympanic membrane

External auditory meatus

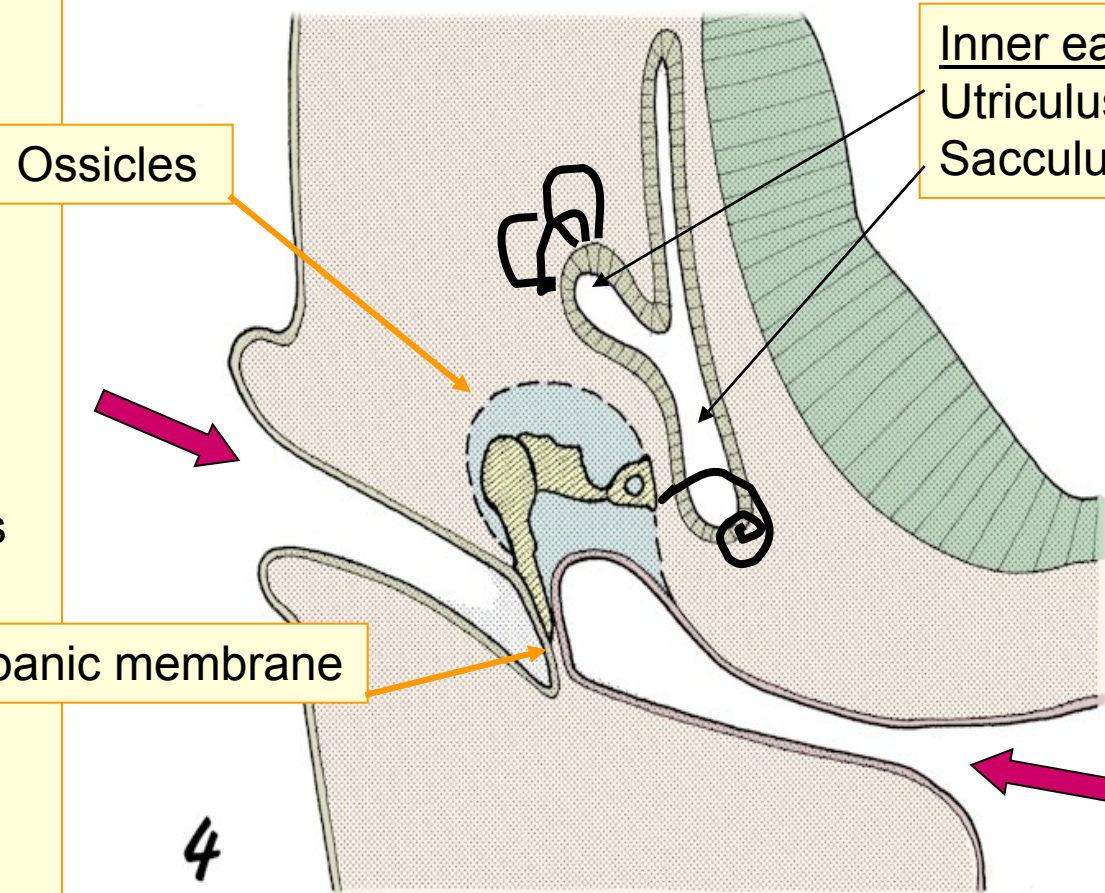
Tympanic cavity

Auditory tube

EAR



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



The 1st
ECTODERMAL
cleft:
Meatus acusticus

The 1st
ENDEDERMAL
pouch:
Auditory tube +
Tympanic cavity

Development of the inner ear

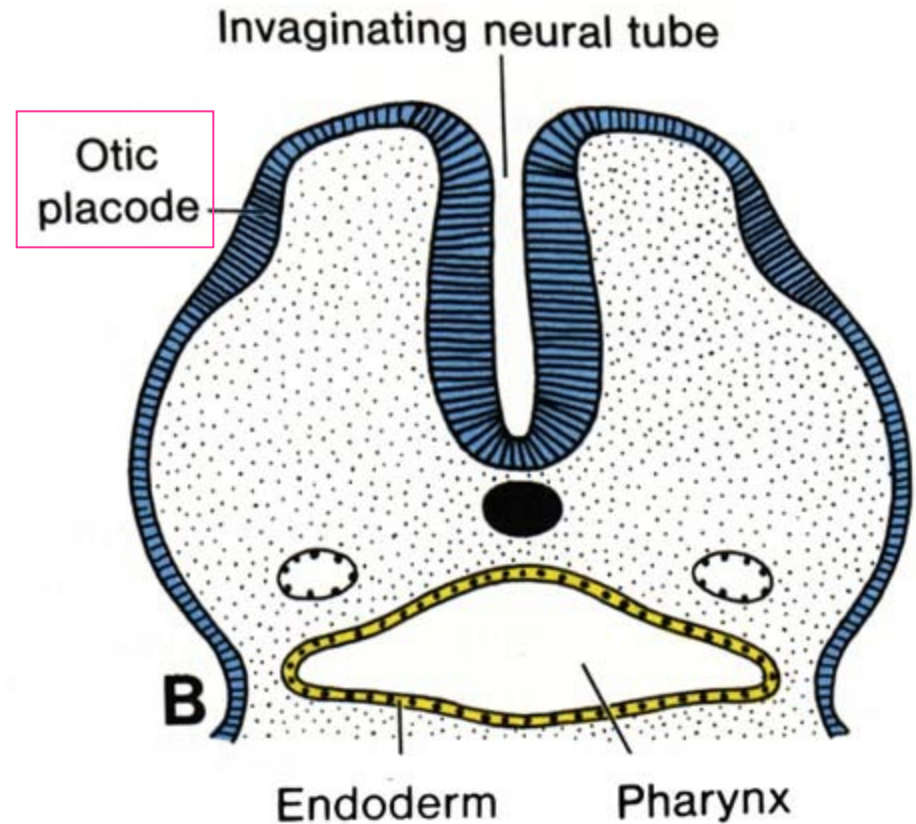
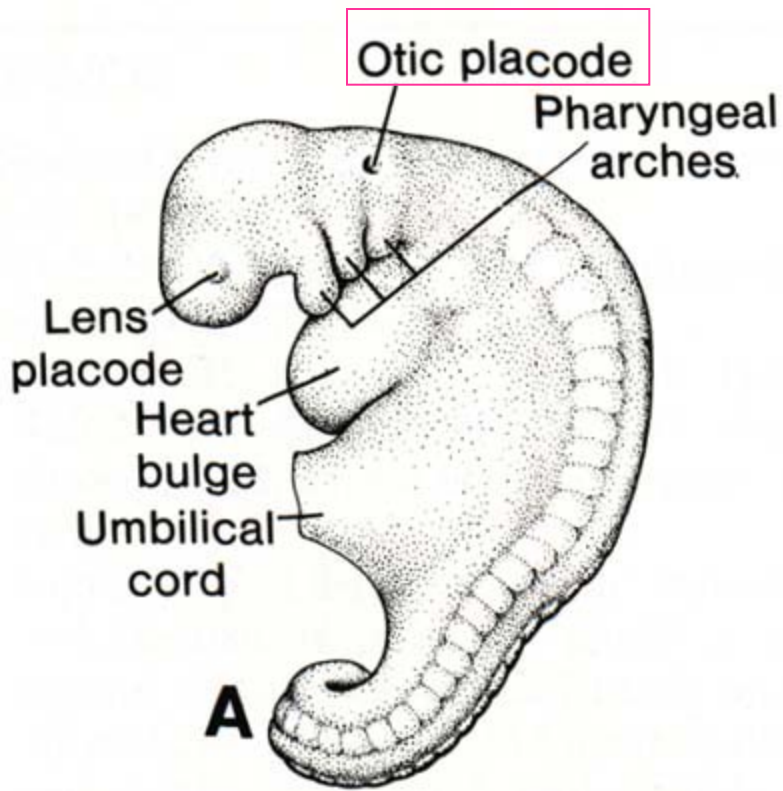


Otic placode – thickening of ectoderm

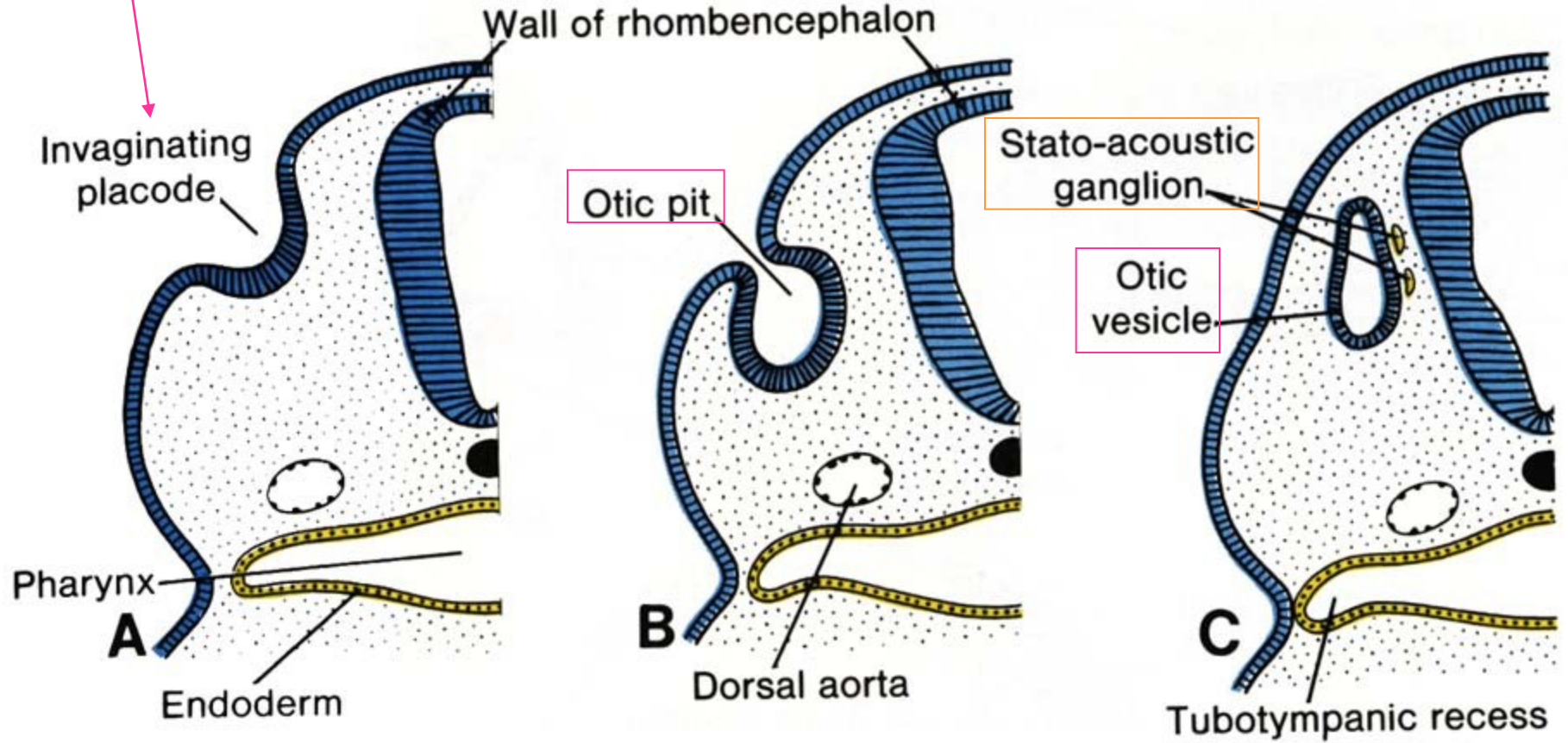
Otic pit

Otic vesicle = otocyst:

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



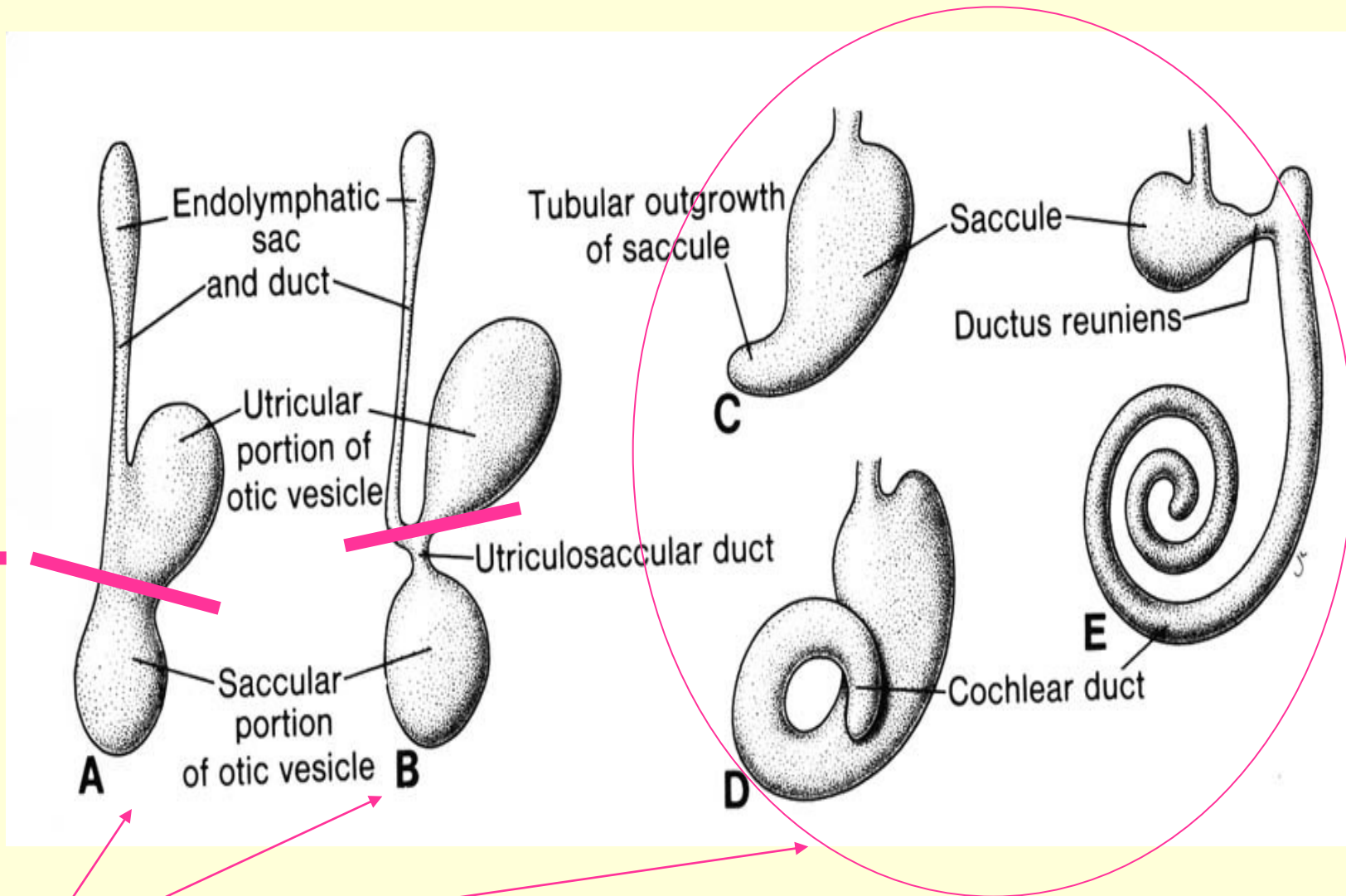
Otic pit \Rightarrow otic vesicle (otocyst)



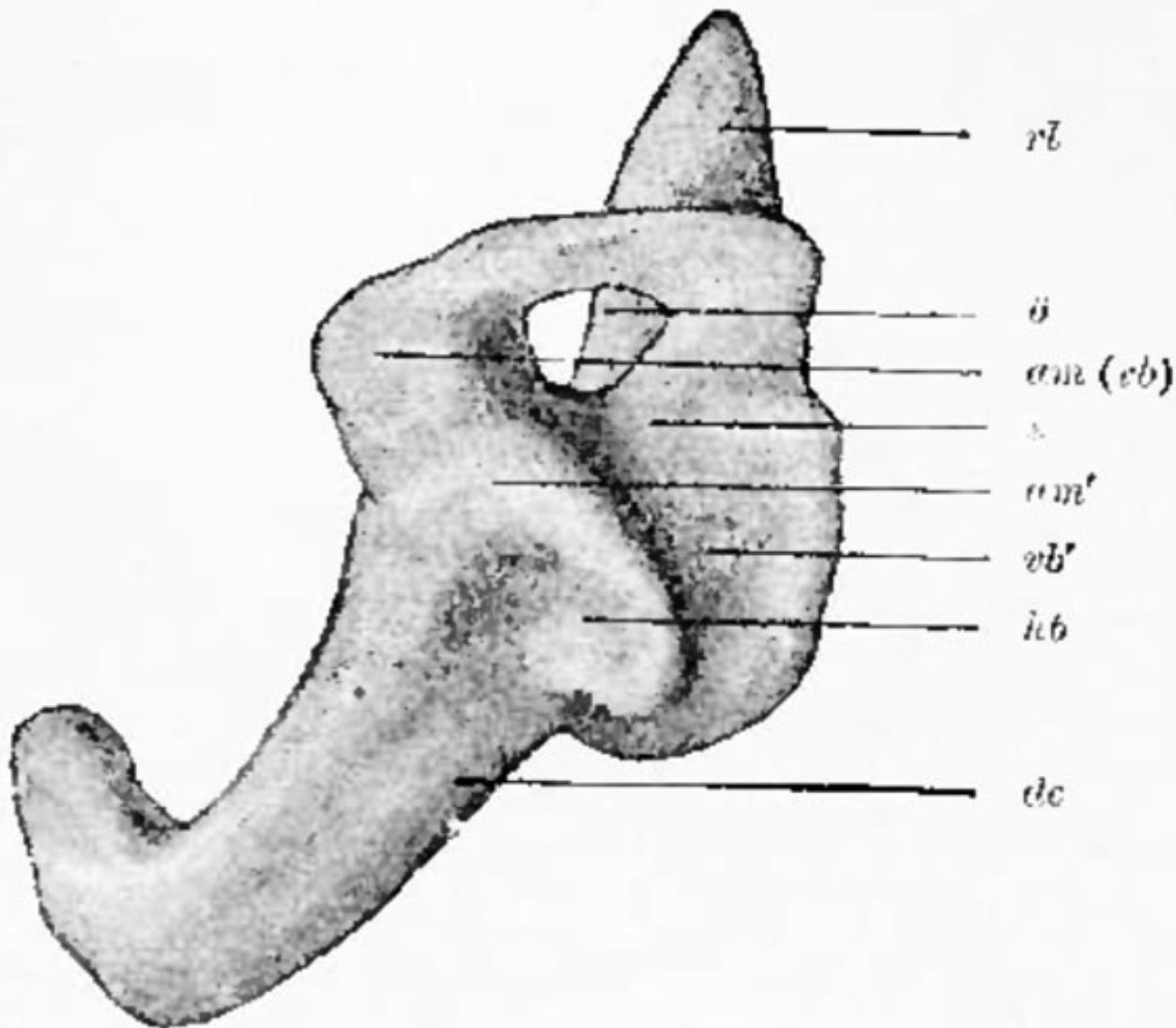
Differentiation of the otocyst into membranous labyrinth:

D
O
R
S
A
L
L
Y

V
E
N
T
R
A
L
L
Y



Membranous labyrinth



utricle +
semicircular ducts

saccule +
cochlear duct

Fig. 276.—Membranous labyrinth of the left side of a [human] embryo, after a wax model by KRAUSE.

Bony labyrinth

from mesenchyme

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

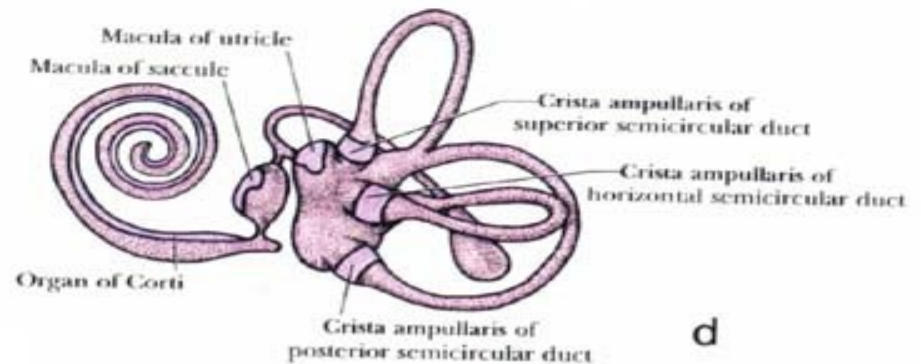
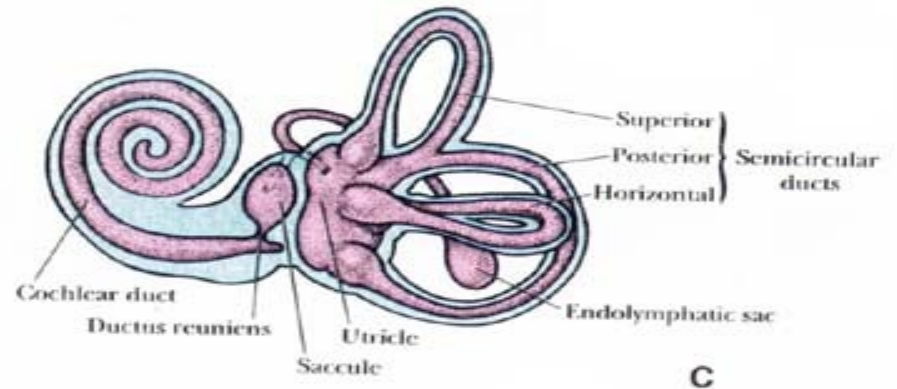
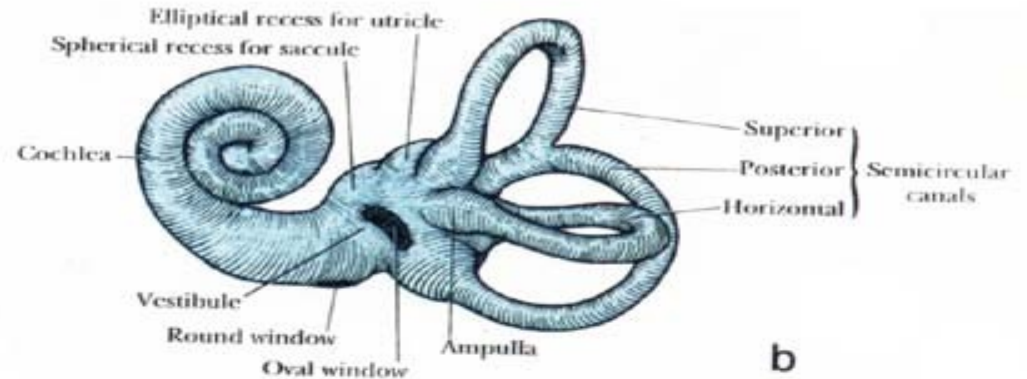
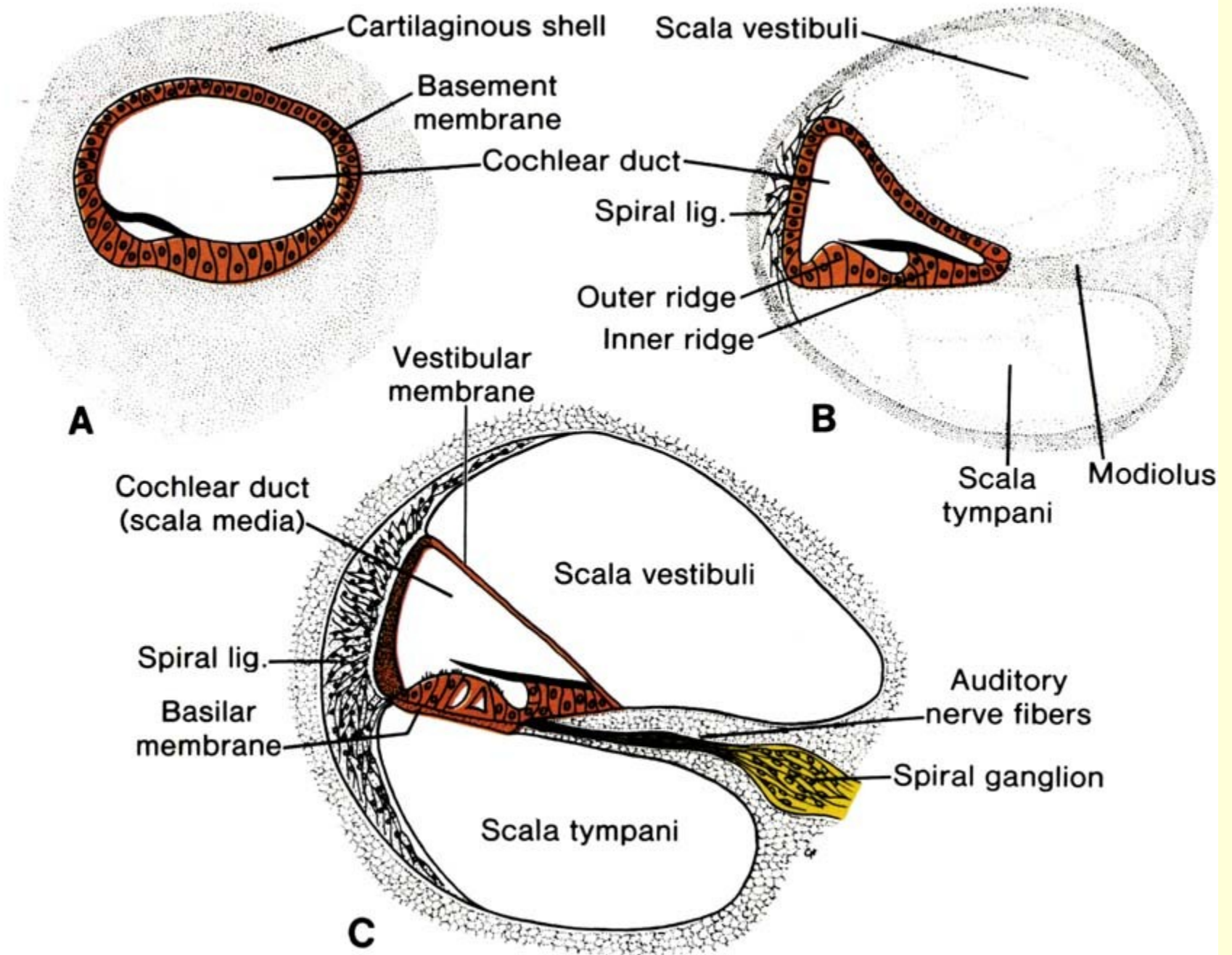
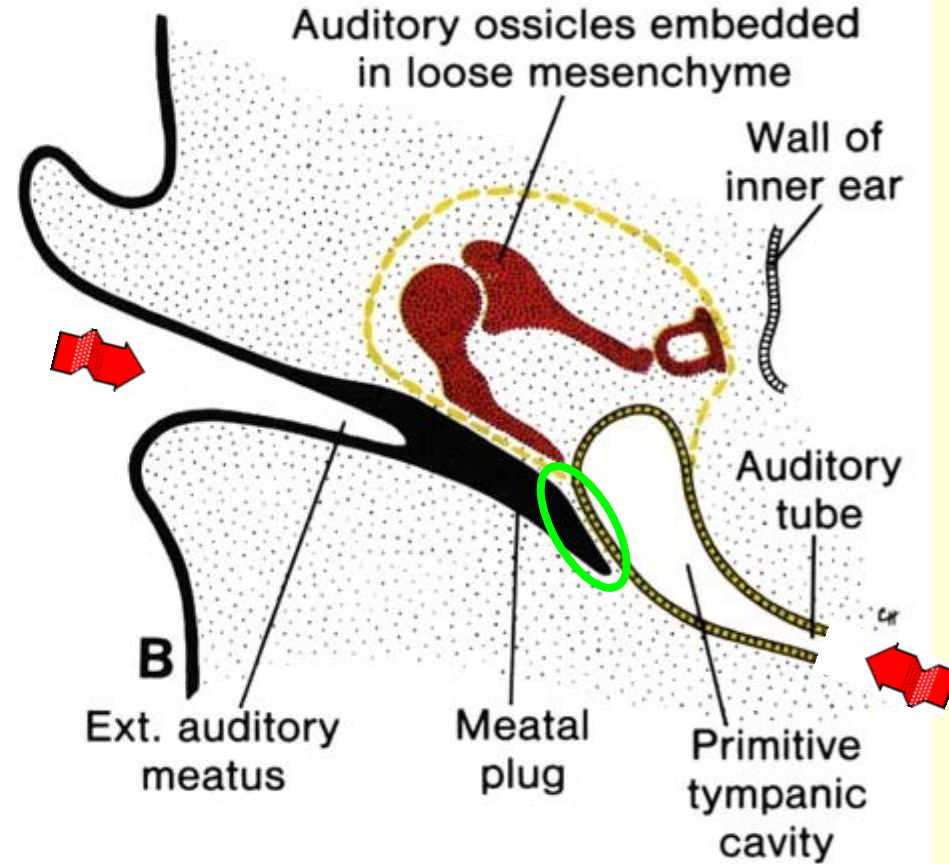
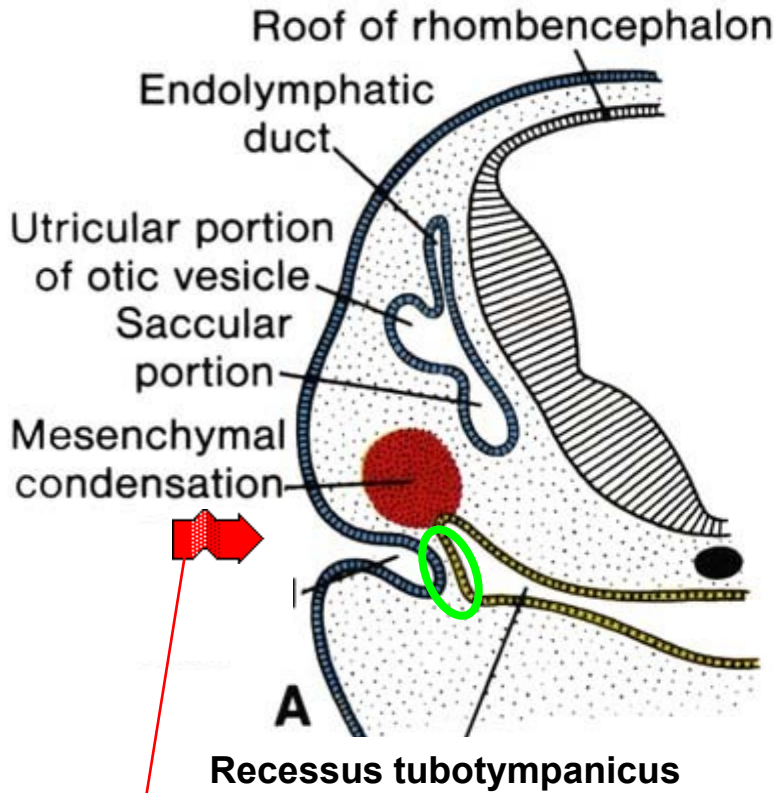


Figure 24.7. b, c, d.



Development of the outer and middle ear



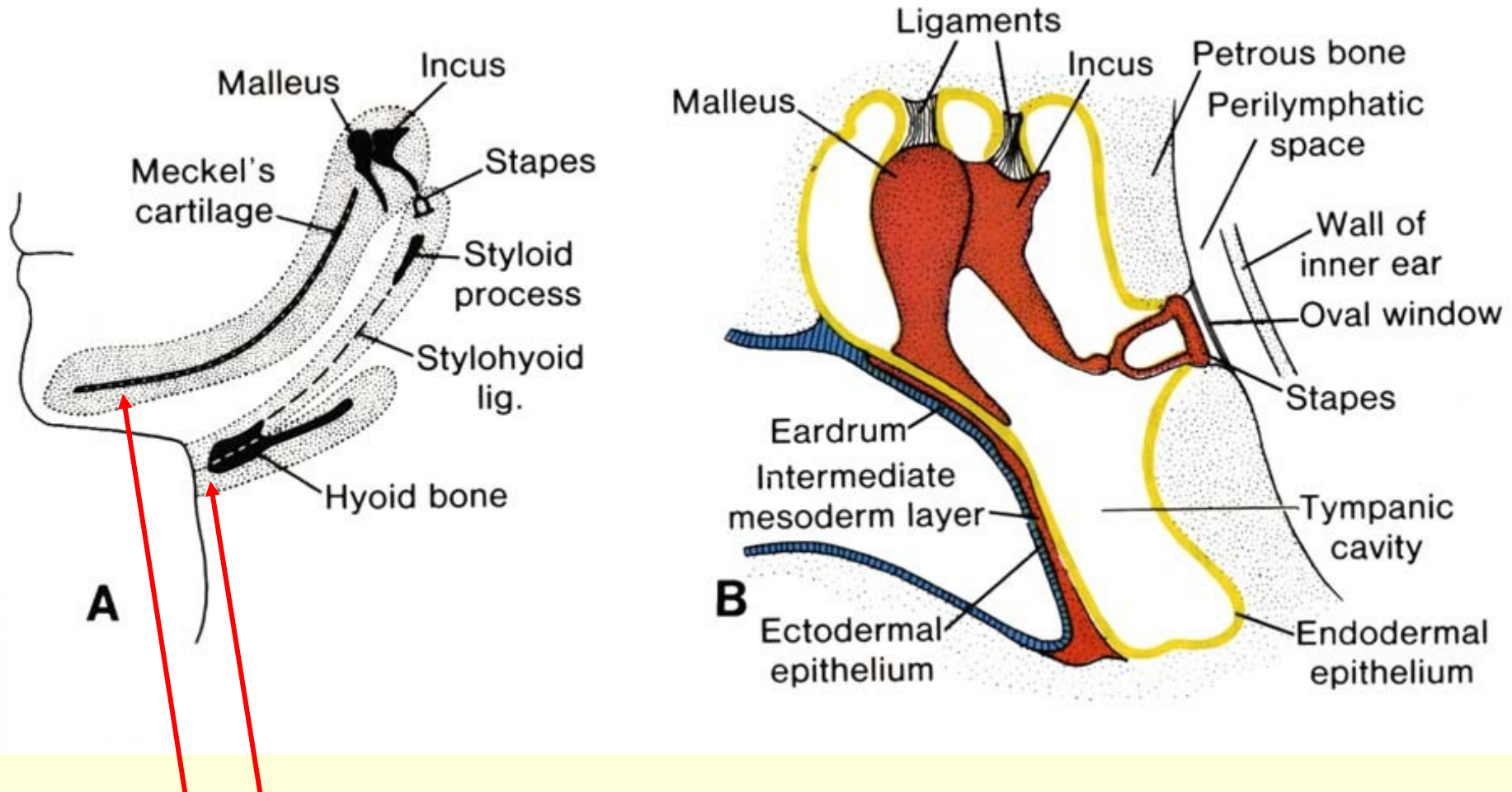
the first ectoderm cleft

the first endoderm pouch

„ear-drum“

Development of tympanic membrane and cavity

Development of the ear ossicles

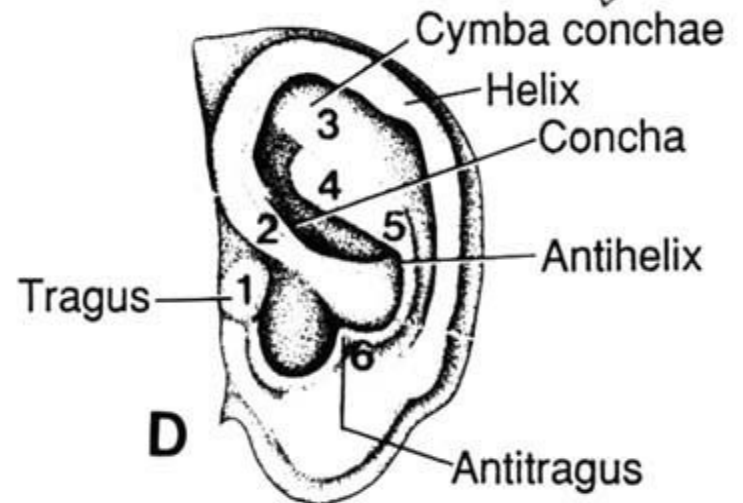
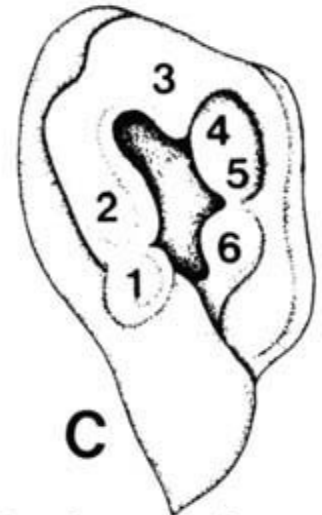
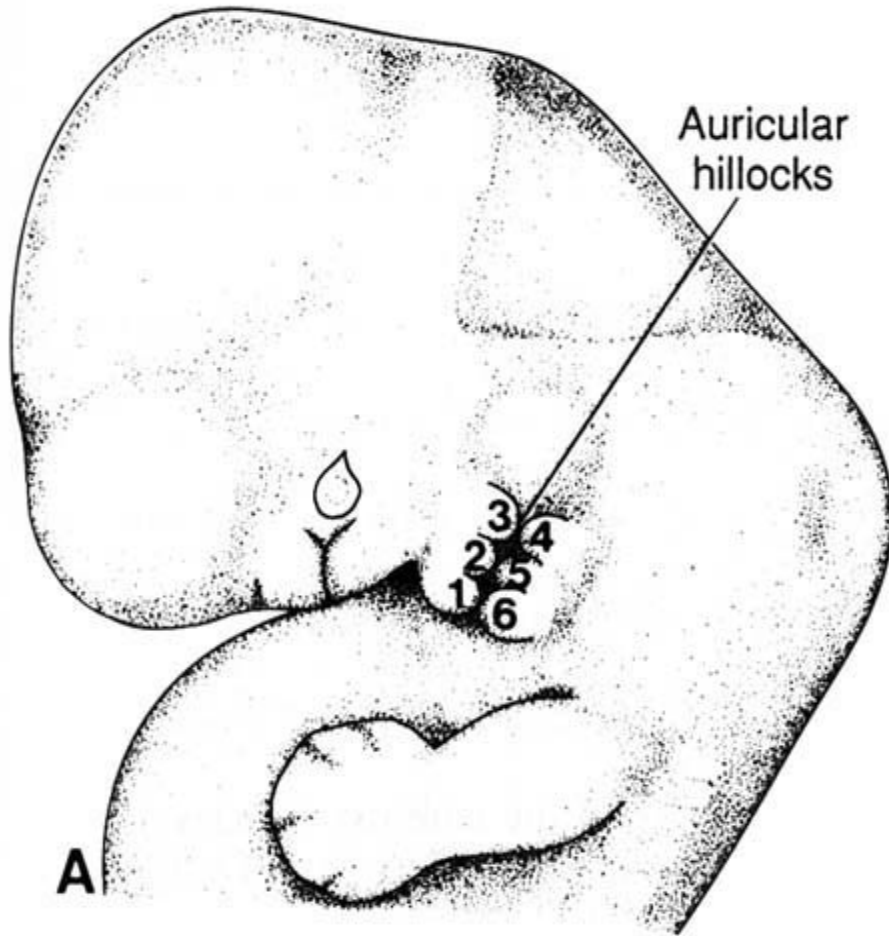


The 1st and 2nd branchial arch: 1 - cartilago Meckeli \Rightarrow malleus, incus
 2 - cartilago Reicherti \Rightarrow stapes



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

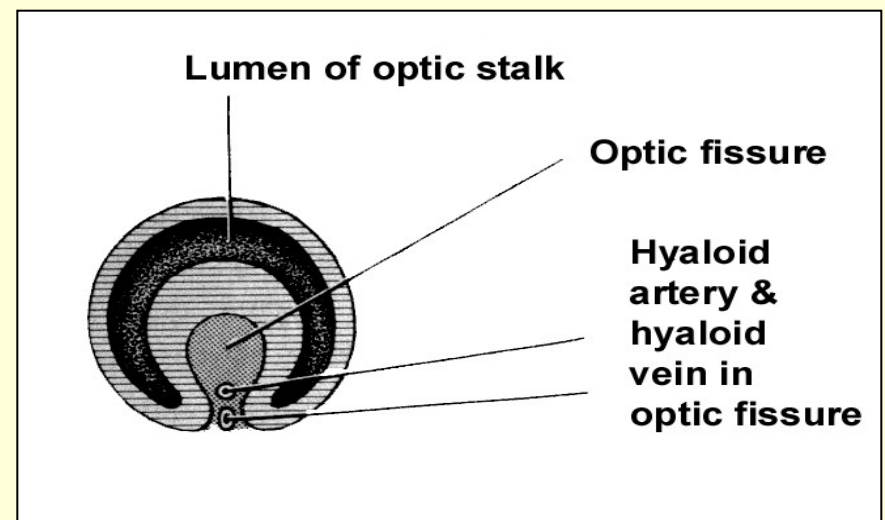
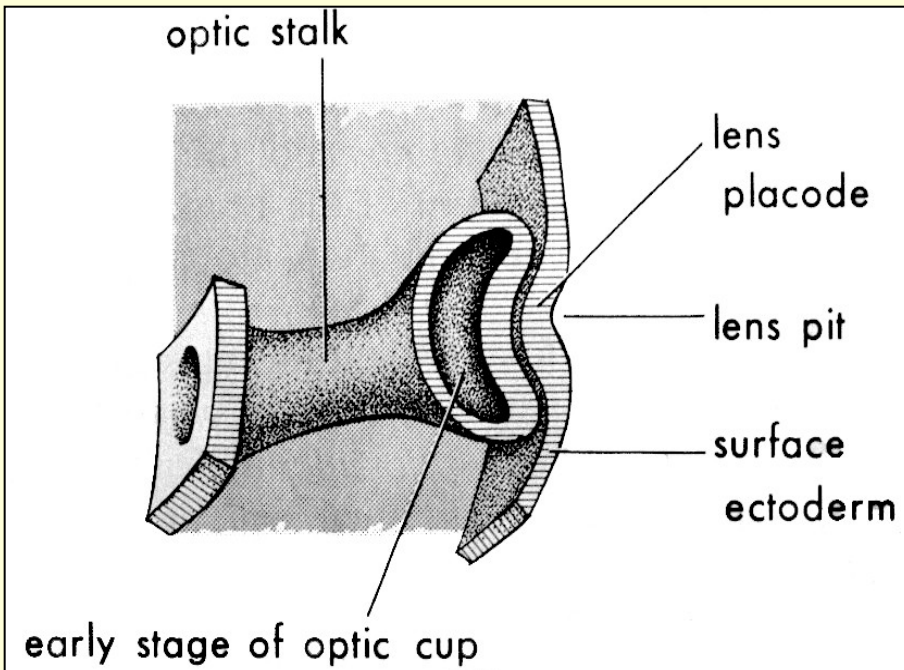
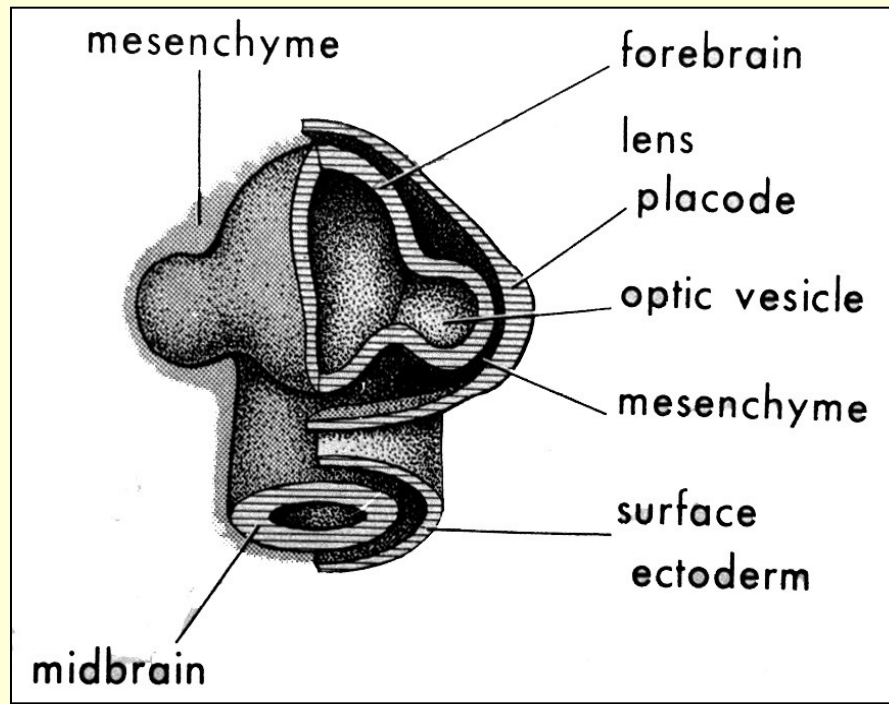
sensorineural (perceptive)

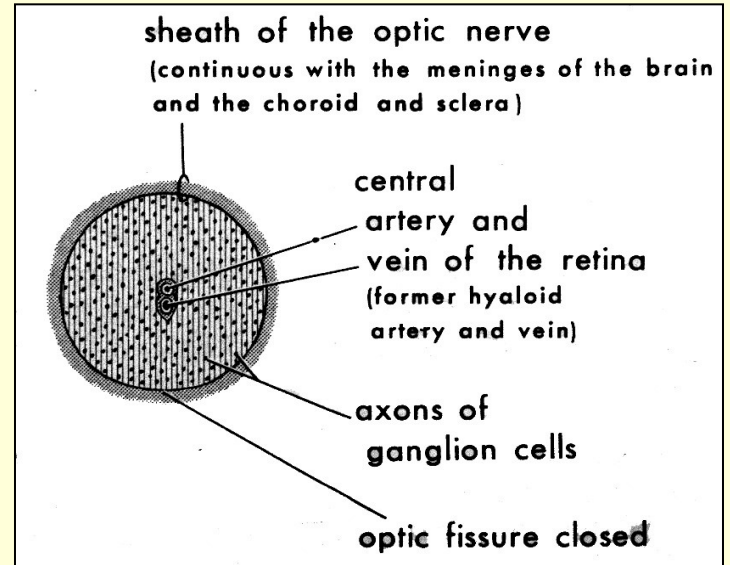
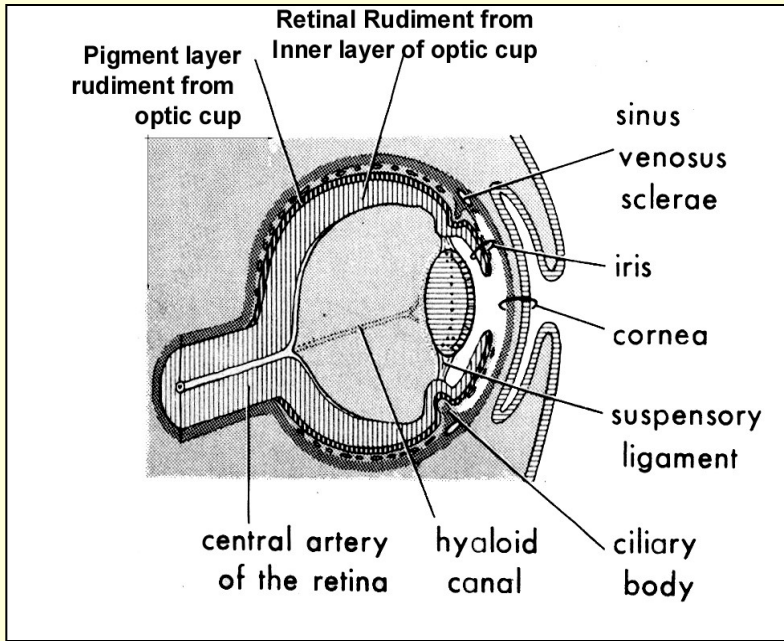
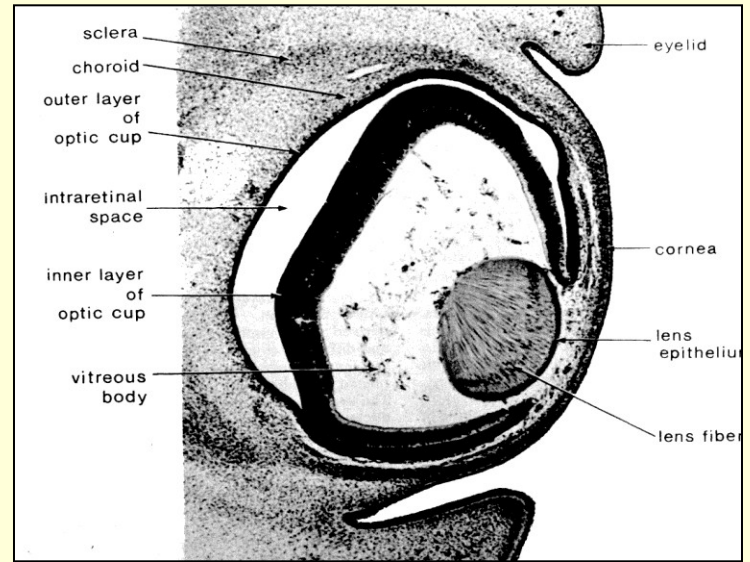
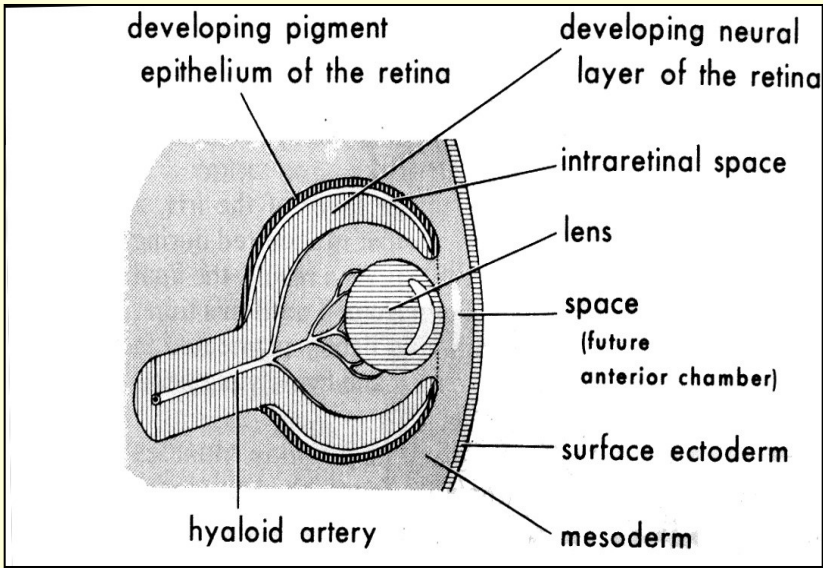


Selected lectures
Embryol. teratol.

Credit given
10.5.2012

Eye development





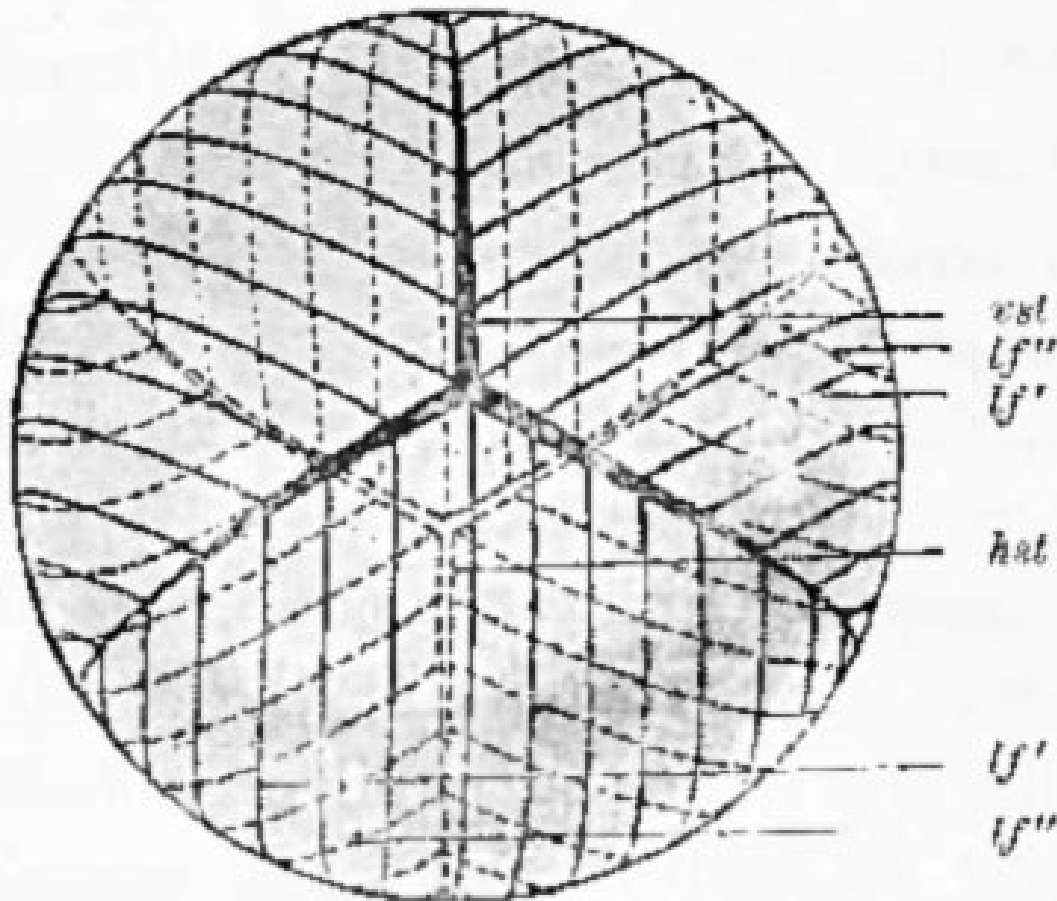
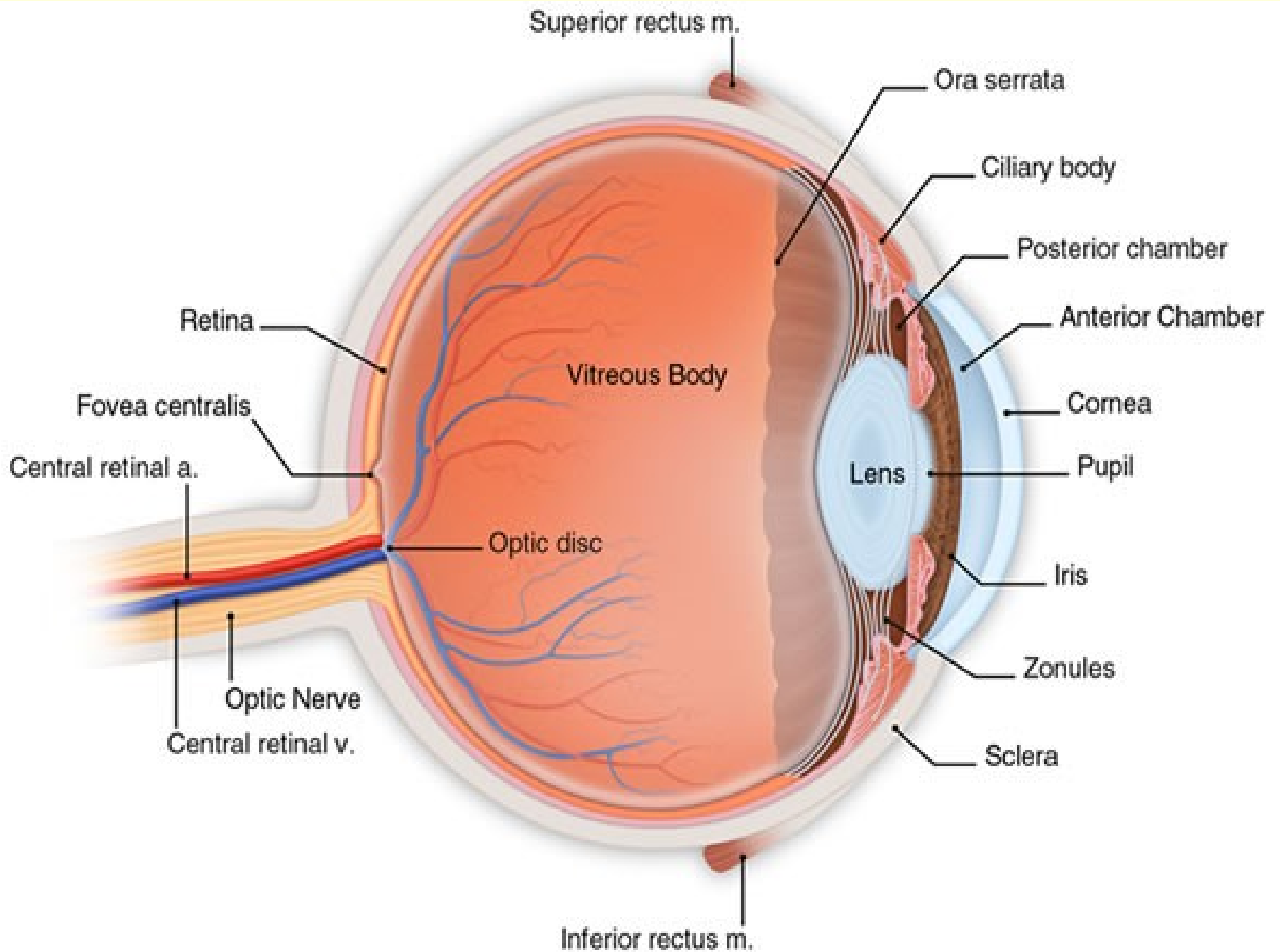
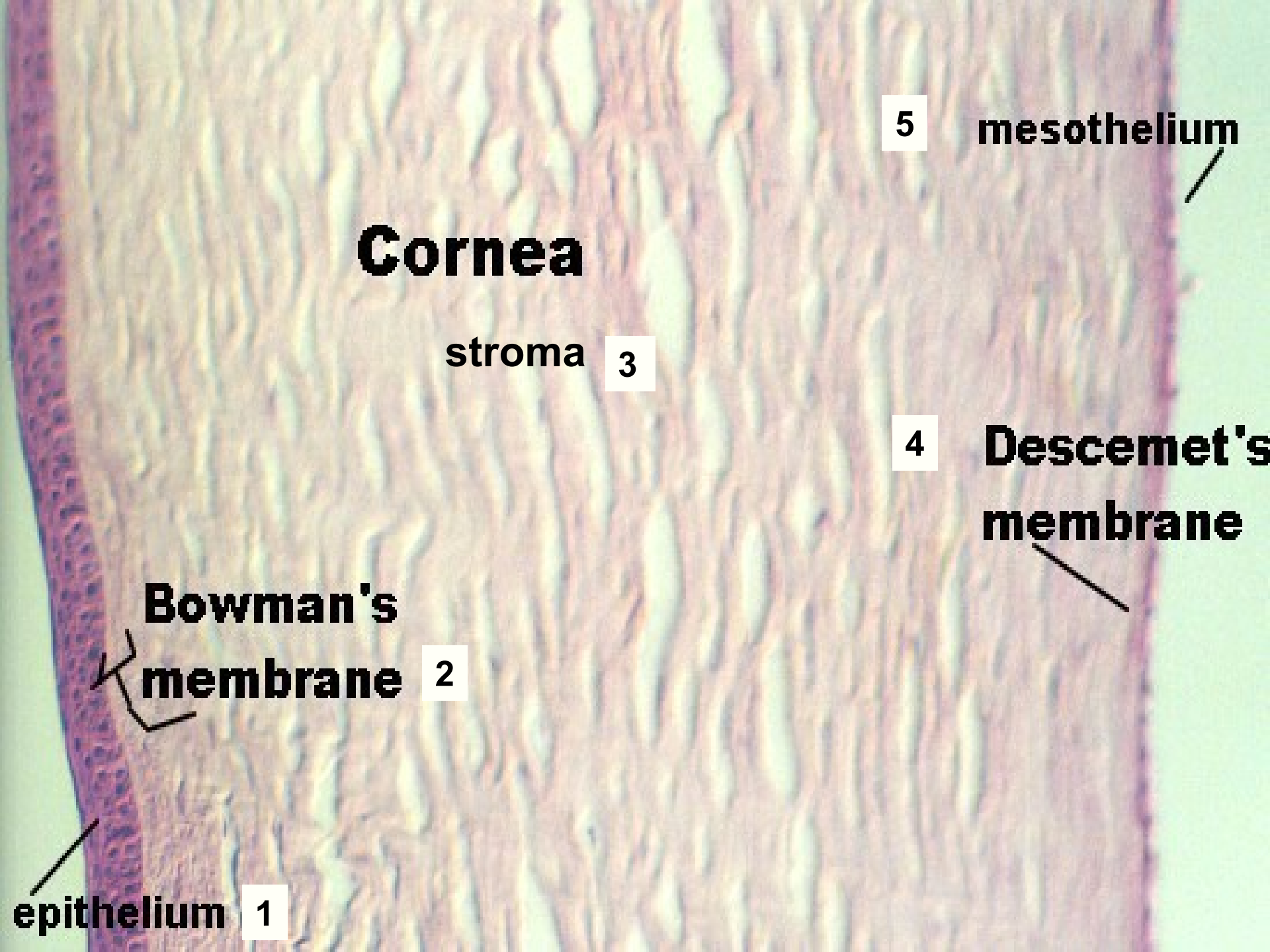


Fig. 268.—Diagram of the arrangement of the lens-fibres.

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).





Cornea

stroma

5

mesothelium

3

4

Descemet's
membrane

Bowman's
membrane

2

epithelium

1

