

SPECIAL SENSES: VISION

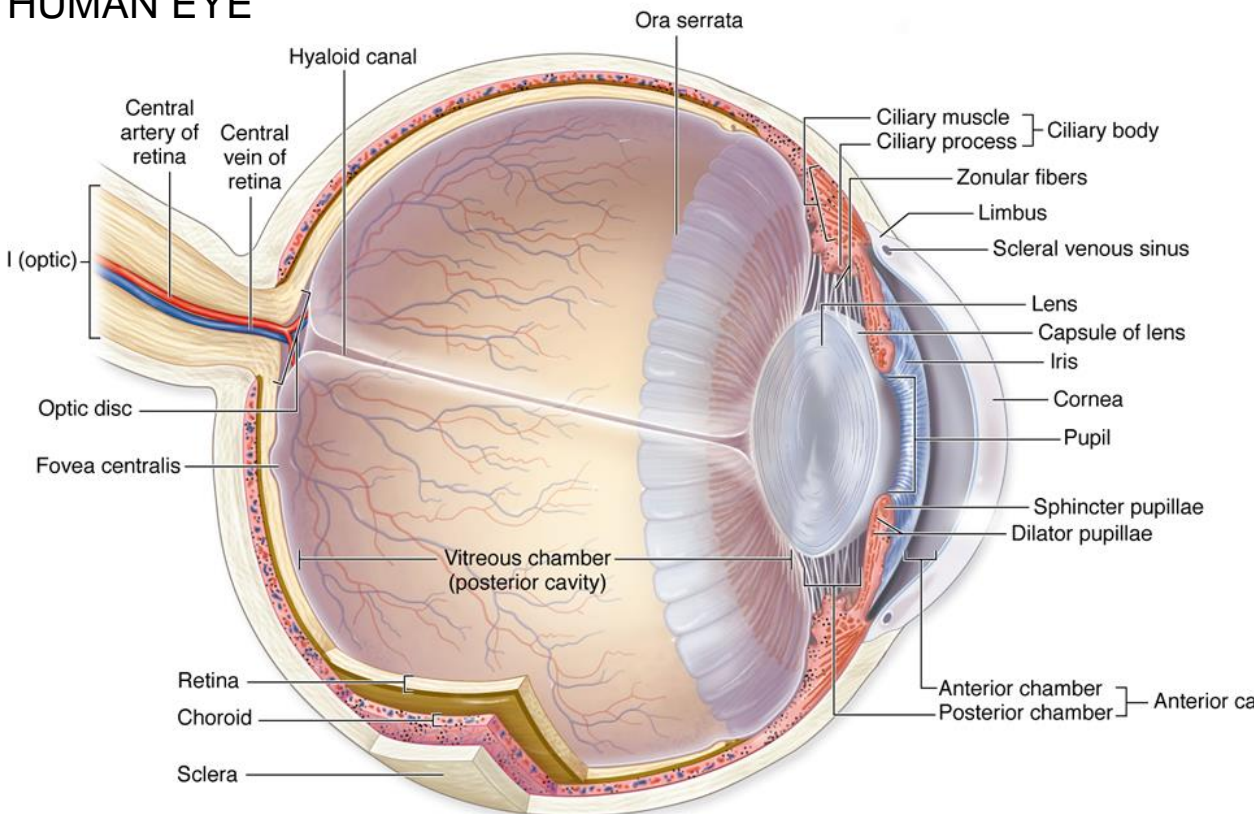
EYE: "COMPLEX" SENSOR

- receptors (photoreceptors) need support structures (eyeball, lens) to function: - image formation

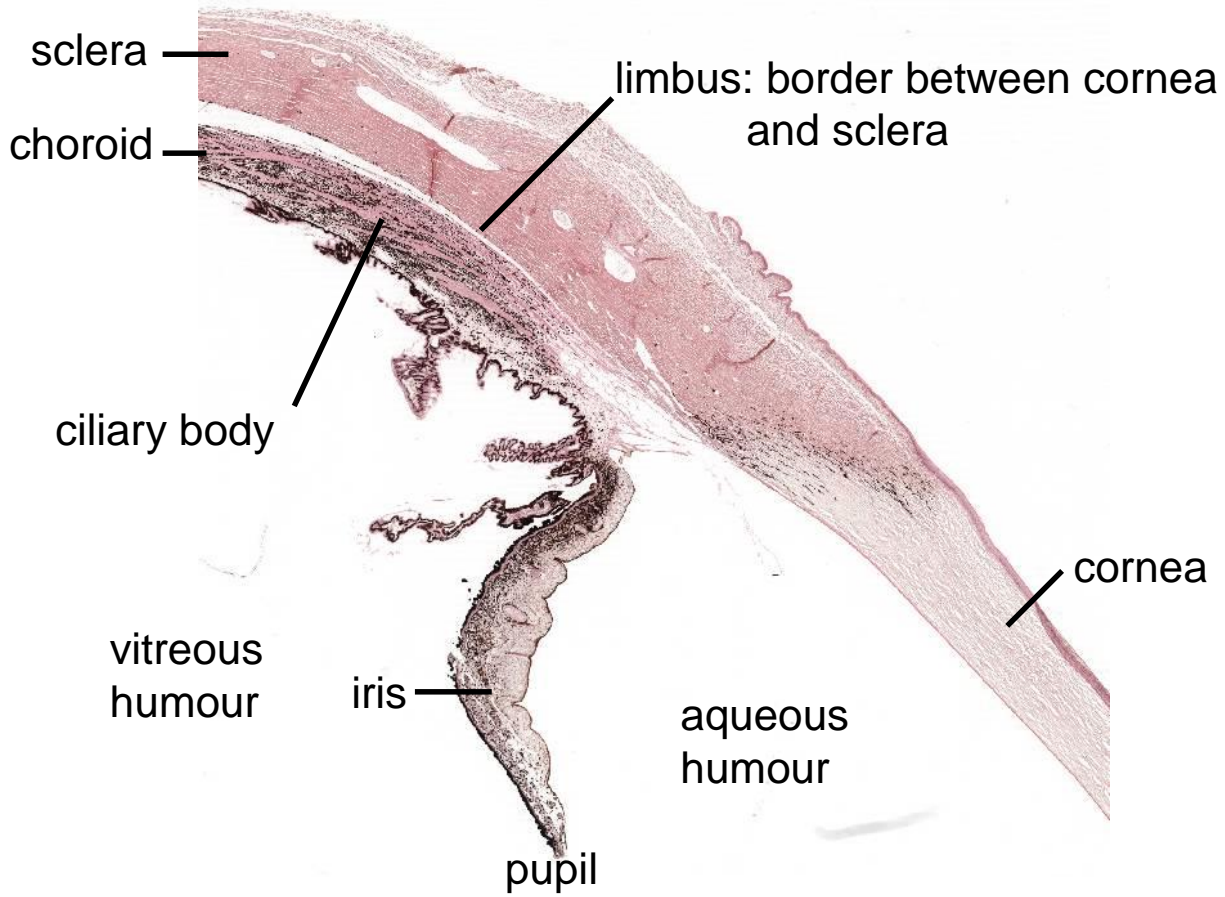
EYE STRUCTURE IN VERTEBRATES REFLECTS:

- basic requirements for all eyes
- special functional or habitat-related requirements
 - "air" versus "water" eyes
 - "night" versus "diurnal" eyes
 - high visual acuity

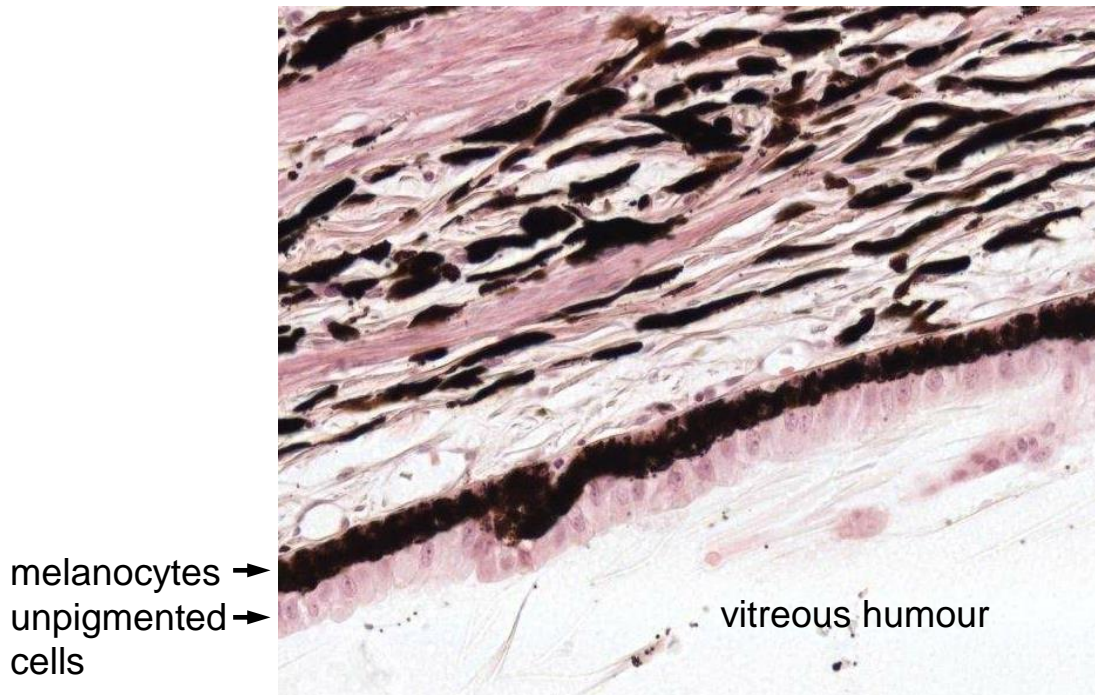
HUMAN EYE



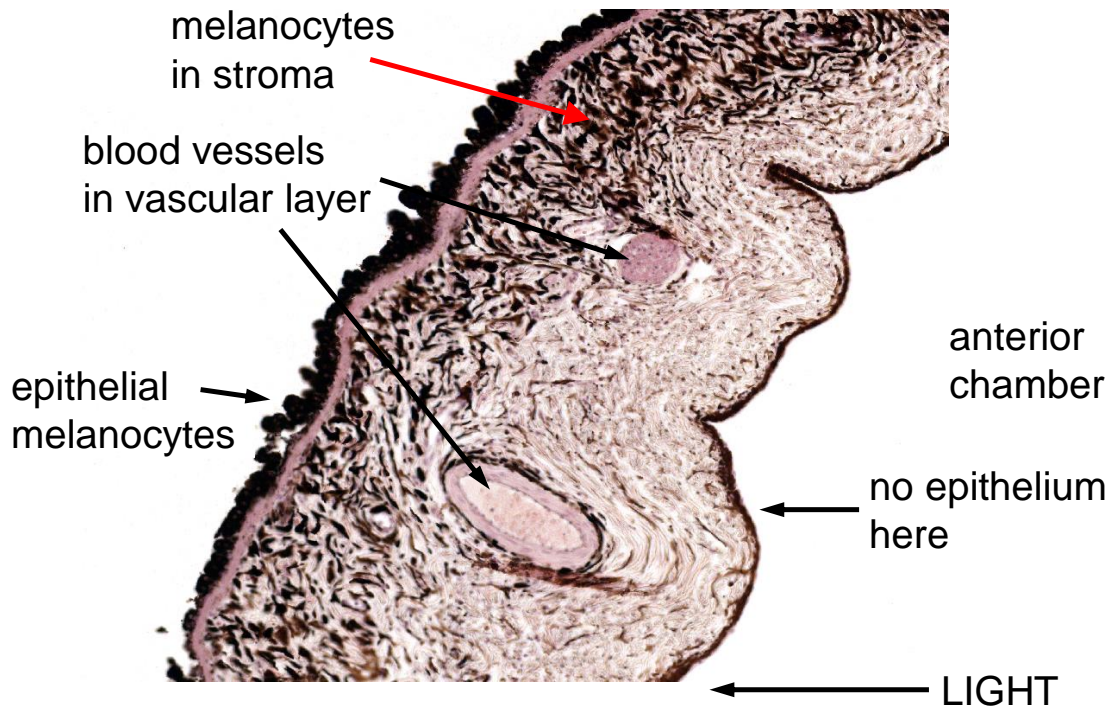
LIMBUS AND CILIARY BODY (H101)



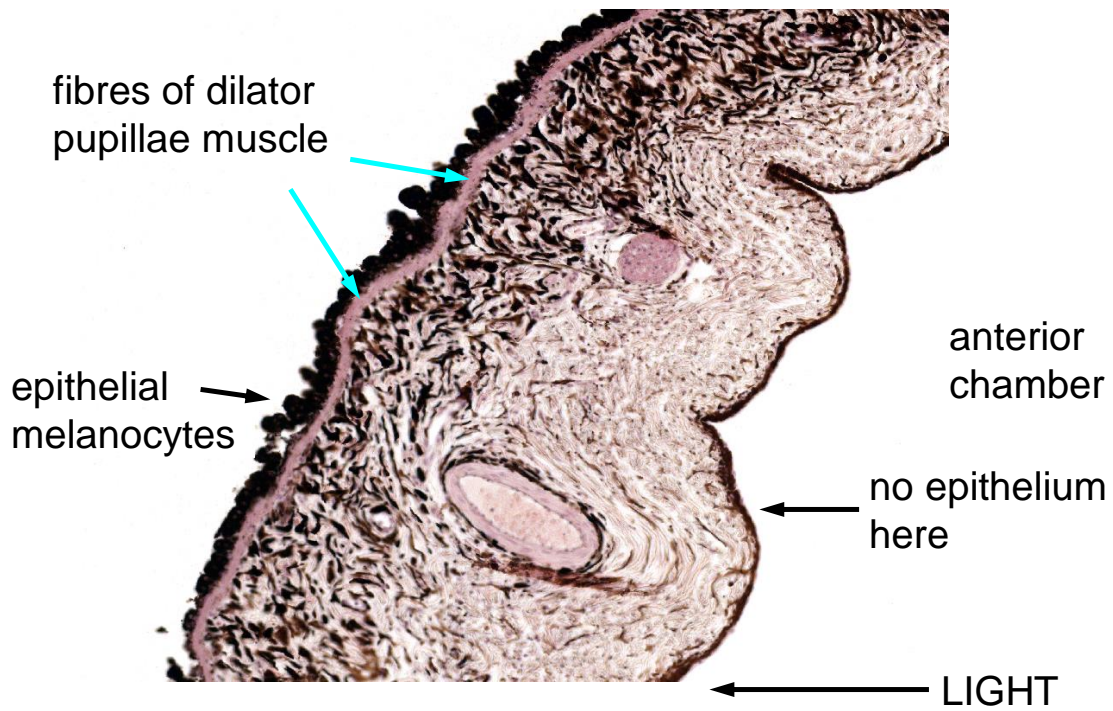
CILIARY EPITHELIUM: 2 CELL LAYERS (H101)



CROSS-SECTION OF IRIS MIDREGION (H101)



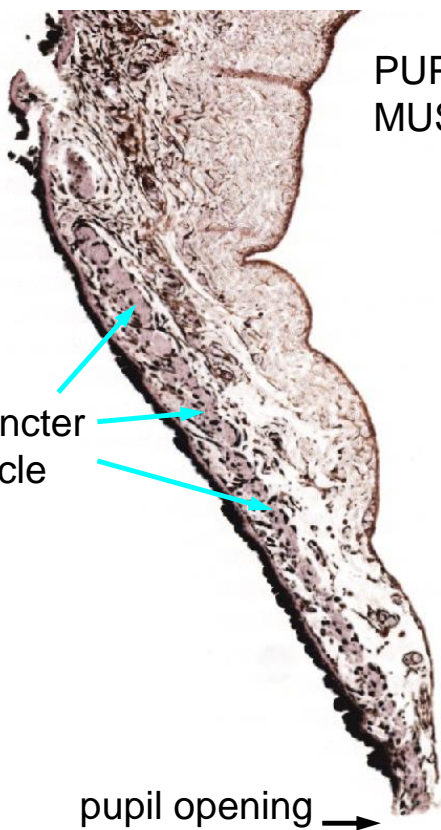
CROSS-SECTION OF IRIS MIDREGION (H101)



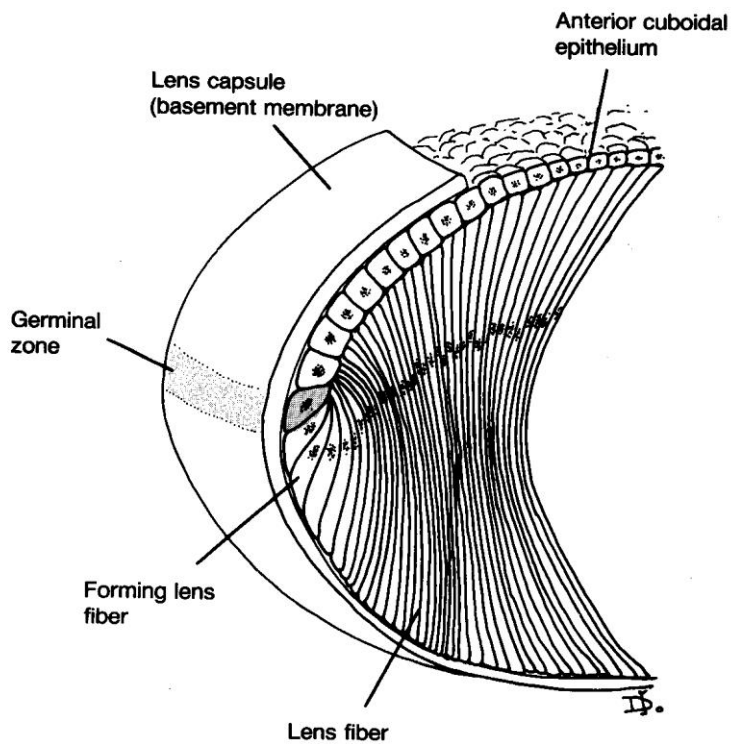
PUPIL CONSTRICTOR MUSCLE IN IRIS (H101)

fibres of sphincter pupillae muscle

pupil opening →



STRUCTURE OF LENS



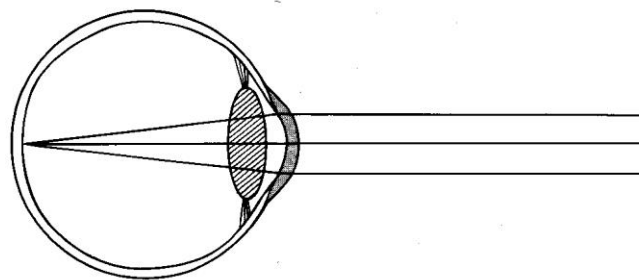
"AIR" VERSUS "WATER" EYES

"AIR":

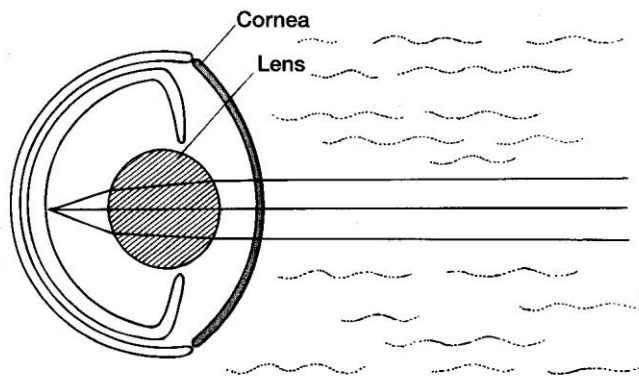
- cornea small, highly curved: 1^o focus
- lens thin, oval, flexible: 1^o accommodation

"WATER":

- cornea large, slightly curved: 1^o accommodation (some species move cornea)
- lens thick, spherical, solid: 1^o focus

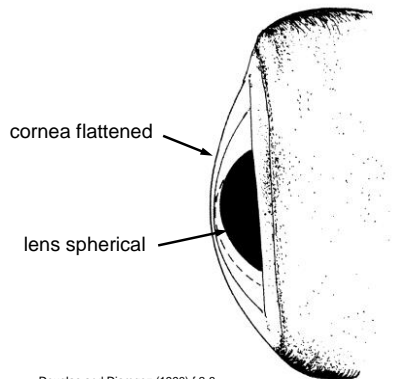


Tetrapod—air



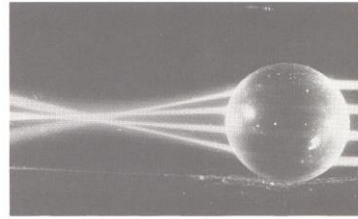
Fish—water

FISH EYE EXTERNAL VIEW - DORSAL

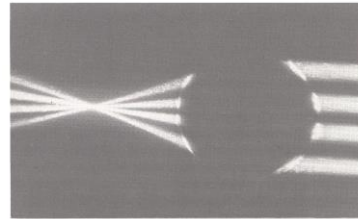


Douglas and Djamgoz (1990) f 2-3

spherical
glass lens



fish lens
in saline
solution



laser beam
illumination

Douglas and Djamgoz (1990) f 2-1

LOW-LIGHT VERSUS DIURNAL ("DAY/NIGHT") EYES

DIURNAL

- cones for color vision (some species)
- retinal area large
- wide range of light levels:
 - pupil has wide diameter range
- lens closer to cornea

LOW-LIGHT

trends: light sensitivity high, optics gather more light

- most/all photoreceptors = rods - more sensitive
- retinal area small
- pupil large (iris absent in some species)
- lens large, close to retina
- eye large relative to body/head size
- reflector in choroid behind retina - tapeta lucidum

DARK-ADAPTED EYES

