

# Eye (histology)

- a complex, highly specialized organ. It enables accurate analysis of object form, light intensity and colors.
- stored in orbit
- composed of:
  - **The eyeball (bulbus oculi)**, in which we also find the so-called **refractive structures of the eye**
  - **Accessory structures of the eye (organa oculi accessoria)**

## The eyeball (bulbus oculi)

It consists of 3 layers:

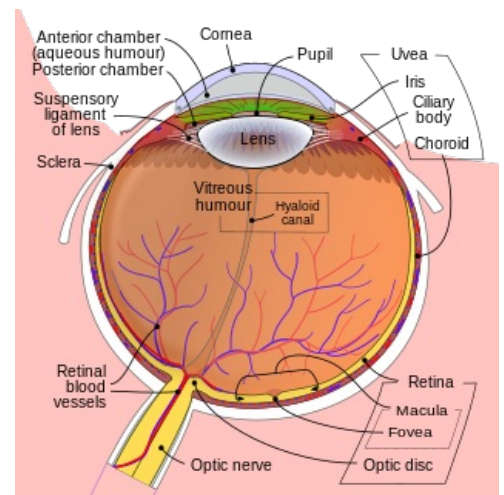
- **tunica fibrosa**, which consists of:
  - cornea
  - sclera
- **tunica vasculosa**, consisting of 3 other parts:
  - choroid
  - ciliary body
  - iris
- **tunica nervosa**, formed by the retina, which consists of 2 parts:
  - pars caeca retinae
  - pars optica retinae

### Tunica fibrosa

- **Sclera**
  - white
  - formed by dense collagen tissue
  - represents 5/6 of the tunica fibrosa
- **Cornea**
  - thicker than the sclera
  - colorless
  - transparent
  - avascular
  - composed of 5 layers:
    1. **Anterior corneal epithelium** - multi-layered squamous non-keratinizing (5-6 cell layers)
    2. **Bowmann's membrane** - formed by collagen fibers; is acellular
    3. **Substantia propria corneae** - 50 to 60 layers of bundles of parallel collagen fibrils that cross at approximately right angles
    4. **Descemet's membrane** - has the character of a basal lamina
    5. **Posterior corneal epithelium** - single-layer flat
      - corneal epithelia are able to transport ions across the cell membrane
      - the regular arrangement of collagen fibrils ensures the transparency of the cornea

### Tunica vasculosa

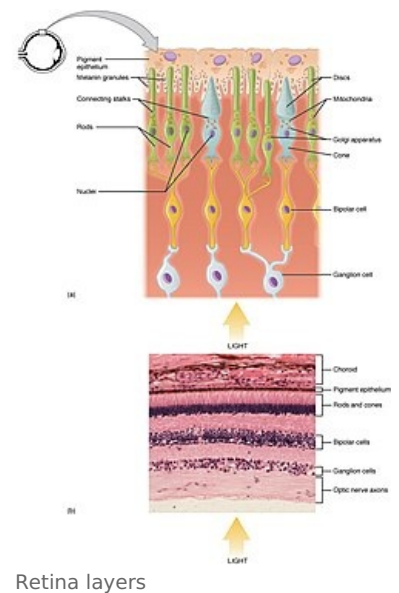
- highly vascularized layer
- there is also a sparse collagen fiber rich in fibroblasts and melanocytes
- **Choroid (choroidea)**
  - has 4 layers:
    1. **Lamina suprachoroidea** - a layer of thin collagenous tissue
    2. **Zona vasculosa**
    3. **Lamina choriocapillaris** - anastomosing network of capillaries
    4. **Lamina vitrea (Bruch's membrane)**
- **Corpus ciliare**
  - Orbiculus ciliaris - muscle ciliaris
  - Corona ciliaris - sparse collagen tissue
- **Iris**
  - consists of 4 layers:
    1. Anterior iris epithelium
    2. Front boundary layer
    3. Stroma iridis
    4. Pars iridica retinae



Schematic diagram of the human eye

## Tunica nervosa

- **Pars caeca retinae**
  - pars ciliaris retinae
  - pars iridica retinae
- **Pars optica retinae**
  - has 10 layers (*ordered from outermost to innermost*)
    1. pigment epithelium
    2. a layer of rods and cones
    3. membrana limitans externa
    4. outer core layer
    5. outer layer plexiform
    6. inner core layer
    7. inner layer plexiform
    8. ganglion cell layer
    9. layer of nerve fibers
    10. membrana limitans interna

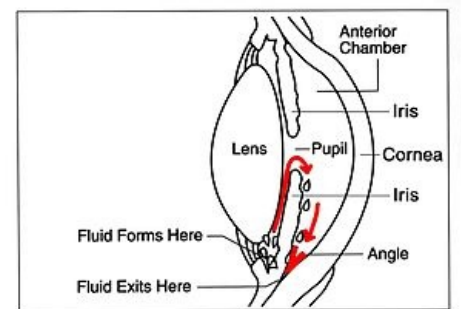


## Refractive structures of the eye

- consists of:
  - lens (lens crystallina)
  - humor aquaeus
  - corpus vitreum (vitreous) – transparent gel, 99% water, it contains hyalocytes.

### Lens (lens crystallina)

- transparent
- biconvex
- consists of 3 parts:
  - **capsula lentis** – covers the entire lens, contains type IV collagen
  - **anterior epithelium of the lens** – located only on the anterior surface
  - **lens fibers** – hexagonal prism shape



Flow of aqueous humour

## Accessory structures of the eye

- **conjunctiva**
- **eyelids (palpebrae)**
- **lacrimal apparatus**
- **oculomotor muscles**

### Conjunctiva

- thin, transparent
- lines the conjunctival sac
- lined with multilayered cylindrical epithelium

### Eyelids (palpebrae)

- moving bodies
- they are covered by skin on the outside, conjunctiva on the inside
- the eyelashes depart from the free edge
- the basic supporting structure is the **tarsus**, which is made up of dense collagenous tissue
- striated muscle is found here
- contains 3 types of glands:
  - **Meibomian**
    - long, branched, alveolar, sebaceous
    - opens into the conjunctival sac
  - **Zeiss**
    - small, branched, alveolar, sebaceous
    - opens into the eyelash follicle
  - **Moll's**
    - modified, simple, tubular, coiled, apocrine
    - opens into the eyelash follicle

### Lacrimal apparatus

- consists of the lacrimal gland and the duct system
- the function of the lacrimal gland is to moisten the surface of the eye

1. **glandula lacrimalis** - compound tuboalveolar gland, its serous compartment consists of cylindrical cells of the serous type, and its ducts merge into
  2. **ductuli lacrimales**, which are lined with a single-layer cubic epithelium and open into
  3. **conjunctival sac**, from which tears are drained using
  4. **lacrimal canals (canaliculi lacrimales)**, they are lined with multi-layered squamous epithelium and merge into one canal and open into
  5. **saccus lacrimalis**, which continues as
  6. **ductus nasolacrimalis** and opens into the meatus nasi inferior
- saccus lacrimalis and ductus nasolacrimalis are lined with multi-rowed cylindrical epithelium, which is found in the greater part of the lining of the respiratory system

## Links

### Related articles

- Eye (biophysics)
- Eye (biophysics)/Principle of vision
- Eye (biophysics)/Disorders of the eye
- Oculomotor muscles

### Sources

- MESCHER, Anthony L. *Junqueira's Basic Histology*. 12. edition. McGraw-Hill Education - Europe, 2009. pp. 480. ISBN 9780071630207.
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- PAULSEN, Douglas F. *Histologie a buněčná biologie : Opakování a příprava ke zkouškám*. 1. edition. H & H, 2004. pp. 433. ISBN 80-7319-024-9.