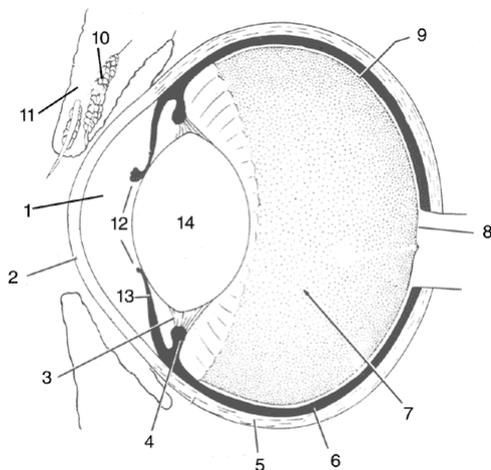


# Anatomy of the eye

The eye is a complex organ that is made up of many different parts that work together to make vision possible. The eye can be compared to a camera. They both use a lens to focus the incoming light and then convert the light into a picture that we can interpret with the help of the brain. The picture will form either on the film in the camera or on the retina in the eye. The iris can be compared to the diaphragm or shutter of the camera.



**1. Anterior chamber:** The anterior chamber is the front compartment of the eye. It is outlined by the cornea in front, and the iris and the lens at the back. It is filled with fluid called aqueous humour which is normally transparent and provides nutrition to the lens and cornea and removes their waste products.

**2. Cornea:** The cornea is composed of 3 layers. The outermost layer is called the epithelium and is composed of about 10 rows of cells. The middle layer of the cornea is the thickest and is called the stroma. The stroma is mainly made up of collagen fibres

which are produced by cells called keratocytes. The innermost layer of the cornea is a single row of cells called the endothelium with its basement membrane (Descemet's membrane). The corneal surface is coated by a three layered tear film composed of mucus, water and lipids. The entire corneal thickness measures less than 1mm. It does not normally contain any pigment or blood vessels and its transparency is due to the precise organisation of the layers and the control of the quantity of water present in them. It is very sensitive due to a large number of nerve fibres innervating it.

**3. Lens zonules:** The lens zonules are thin fibres that attach the lens (14) to the ciliary processes (4).

**4. Ciliary body:** The ciliary body is located between the iris (13) and the choroid (6). It is divided into the ciliary body musculature and the ciliary processes. The ciliary processes continually produce the aqueous humour which, at the same time is drained in the angle formed by the cornea and the iris. The ciliary processes also attach to the lens (14) via the lens zonules (3). Changes in the muscle tone in the ciliary body will alter the shape of the lens. This allows the eye to change its focus from distant to near objects, a phenomenon called accommodation. Accommodation is, however, very limited in dogs and cats, compared with humans.

**5. Sclera:** The sclera forms the supporting wall of the eyeball. It is continuous with the cornea and the combination of the sclera and cornea completely surround the eye. The

sclera is a white, tough, fibrous tissue to which the extraocular muscles are attached. These muscles move the eye in the vertical, horizontal and diagonal directions but also allow retraction of the globe.

**6. Choroid:** The choroid is located between the sclera (5) and the retina (9). It is mainly composed of layers of blood vessels and nourishes the retina by supplying oxygen and nutrients.

**7. Vitreous:** The vitreous humour is the largest structure of the eye (2/3 of its volume). It is a clear gel that helps maintain the shape of the eye, transmits light and keeps the retina in place.

**8. Optic nerve:** The optic nerve is a bundle of nerve fibres which carries visual information from the eye to the brain. One optic nerve extends from each eye and both meet at the optic chiasma where they exchange some fibres before they reach the brain. The optic nerve is surrounded by the same tissues as the brain, which make it part of the central nervous system. Part of the optic nerve can be seen inside the eye, and is called the optic disc.

**9. Retina:** The retina is a complex, multilayered structure. It contains the photoreceptor cells (rods and cones) which interact with the light and transform the energy transmitted by the light into an electrical energy. This signal is then transmitted via nerve fibres (axons) to the brain via the optic nerve.

**10. Meibomian gland:** Meibomian glands are located within eyelid margins. Their openings can be seen when the eyelid is everted. They produce an oily substance which is part of the tear film and prevents evaporation of the tears.

**11. Eyelids:** The upper and lower eyelids are folds of skin, with conjunctiva lining their posterior surface. They are highly vascularised and innervated. They contain a fibrous layer (called the tarsal plate), which gives the shape to the eyelids, and muscles responsible for blinking. The eyelids are attached to the skull at each end by short ligaments at the level of the 'canthus'.

**12. Corpora nigra:** Corpora nigra are proliferative extensions of the iris appearing as black, cystic masses along the pupillary margin in ruminants and horses. They are also called granula iridica.

**13. Iris:** The iris is the coloured part of the eye which contains the pupil. The shape of the pupil will vary among species: it is round in dogs, a vertically oriented slit in cats, and horizontally oval in horses and ruminants. The iris is a contractile tissue that will regulate the amount of light reaching the retina. This is due to a reflex; the pupillary light reflex. In dim light the pupil will dilate (become bigger) and, conversely, in day light it will constrict (become smaller). The colour of the iris varies according to the animal and sometimes the eye. The same iris or the two irises in the same individual can be of two different colours.

**14. Lens:** The lens is a transparent bi-concave structure located just behind the iris. As it is the case for the cornea, the transparency of the lens is due to the absence of both blood vessels and pigment and to the precise organisation of its fibres. The lens is surrounded by a thin capsule. With aging the lens should remain transparent but takes a blue-grey appearance due to hardening of its centre. Opacities of the lens are called cataracts.