

# Unlock the mystery of the keen feline eye

Do you think that your cat sees you the way in which you see yourself? Why is a cat able to find and hunt insects and spiders in dim light? Do cats see colors?

Kittens are born blind with sealed eyelids. This level of development is comparable to that of a 5-month-old human fetus. The eyelids will begin to open around 8

days of age and completely open by 10 to 14 days. Once opened, all neonatal kitten eyes are blue and will continue to develop. The pupil of the kitten's eye cannot constrict for about two to three days after opening, so kittens tend to avoid light during this time.

As development continues, the kitten will be able to turn its head and follow motion after day 11. At 3 weeks of age, increased blood flow to the eye allows for improved vision.

Depth perception develops around 4 weeks of age. By 6 weeks of age, the kitten uses vision to obtain food and avoid obstacles. Eye color changes from 3 to 6 weeks of age, and adult sight capabilities develop at 8 weeks of age.

To understand the eye, the anatomical components need to be defined. The eyelids are the external structures that protect the eye. Cats and dogs have three eyelids as opposed to humans that have only two. Upper and lower eyelids are present in all, but a third eyelid, called the nictitating membrane, is present in cats and dogs. The conjunctiva is the moist, pink tissue that covers the

inside of the eyelids and the edges of the eyeball. The sclera is the white tissue capsule that joins the cornea, the clear surface of the eye, to create a spherical eye.

A highly reflective area is present on the cat's retina called the tapetum lucidum. When light shines into the eye, a metallic green color reflects back. Many people have noticed this when taking photographs of their cat with a bright flash, or if they have turned their car headlights onto a cat. This is a normal structure. In humans this area of the retina reflects back red.

The eye can be compared to a computerized camera. The pupil is the camera's aperture. The iris works as the shutter; it regulates the amount of light entering the eye. The lens is the focusing mechanism. The retina is the film; it is where photoreceptors process the image into electrochemical signals. Nerves to the brain are the computer lines that transmit the signal. The brain is the site of the finished photo where 193,000 optic nerve axons transmit information to the cat's visual cortex.

An average cat sees objects that are 2 ½ feet away most clearly. Vision is adapted for the cat's innate night hunting behavior. The photoreceptors on the retina that are responsible for signaling the brain are called rods and cones. Rods are specialized receptors for light brightness; cones are specialized receptors for color. Cats do have cones, but color recognition is not an important feature of hunting.

Color vision in cats may be similar to dogs, but dramatically less than in humans. Cats possess superior night vision to both dogs and man. Being able to de-

tect prey in dim light is very important. The rod-to-cone ratio in cats is 25:1, and in humans it is 20:1. The increased percentage of rods allows the cat to see in one-sixth the light needed by humans.

The size of the eyes and the position of the eyes on the head allow the cat to have superior binocular vision and a larger field of vision. Other advantages that improve the cat's predatory behavior are abilities to detect minute levels of motion and better differentiation of shades of gray.

An interesting aspect of vision in cats is the cross-eyed Siamese. A Siamese kitten's eyes may not cross until it is 6 to 8 weeks of age. The reason for this trait is abnormal connections of the nerves traveling from the retina to the brain's visual cerebral cortex. In the Siamese breed, and in other albino cats, nerves cross to the wrong side of the brain, and binocular vision is impaired. Even non-cross eyed Siamese have some abnormal nerve fiber pathways. Basic function is not affected, but cats with marked cross-eyes will not be efficient hunters or able to sense depths as accurately as normal cats.

Eye color, specifically iris color, is based on genetics and has no bearing on vision. Certain breeds of cats are bred to possess certain eye colors. The Bengal is known for green eyes, while the Siamese is known for deep blue eyes. White cats with blue eyes can be deaf. This is due to a genetic linkage that causes degeneration of the cochlea, a portion of the inner ear.

Up next: Problems and diseases of the feline eye.

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