Senses

Main article: Cat senses

Vision

Reflection of camera flash from the *tapetum lucidum*

Cats have excellent night vision and can see at only one-sixth the light level required for human vision.[64]: 43 This is partly the result of cat eyes having a *tapetum lucidum*, which reflects any light that passes through the retina back into the eye, thereby increasing the eye's sensitivity to dim light.[77] Large pupils are an adaptation to dim light. The domestic cat has slit pupils, which allow it to focus bright light without chromatic aberration.[78] At low light, a cat's pupils expand to cover most of the exposed surface of its eyes.[79] The domestic cat has rather poor color vision and only two types of cone cells, optimized for sensitivity to blue and yellowish green; its ability to distinguish between red and green is limited.[80] A response to middle wavelengths from a system other than the rod cells might be due to a third type of cone. This appears to be an adaptation to low light levels rather than representing true trichromatic vision.[81]

Hearing

The domestic cat's hearing is most acute in the range of 500 Hz to 32 kHz.[82] It can detect an extremely broad range of frequencies ranging from 55 Hz to 79,000 Hz. It can hear a range of 10.5 octaves, while humans and dogs can hear ranges of about 9 octaves.[83][84] Its hearing sensitivity is enhanced by its large movable outer ears, the pinnae, which amplify sounds and help detect the location of a noise. It can detect ultrasound, which enables it to detect ultrasonic calls made by rodent prey.[85][86] Recent research has shown that cats have socio-spatial cognitive abilities to create mental maps of owners' locations based on hearing owners' voices.[87]

Smell

Cats have an acute sense of smell, due in part to their well-developed olfactory bulb and a large surface of olfactory mucosa, about 5.8 square centimetres (29⁄32 square inch) in area, which is about twice that of humans.[88] Cats and many other animals have a Jacobson's organ in their mouths that is used in the behavioral process of flehmening. It allows them to sense certain aromas in a way that humans cannot. Cats are sensitive to pheromones such as 3-mercapto-3-methylbutan-1-ol,[89] which they use to communicate through urine spraying and marking with scent glands.[90] Many cats also respond strongly to plants that contain nepetalactone, especially catnip, as they can detect that substance at less than one part per billion.[91] About 70–80% of cats are affected by nepetalactone.[92] This response is also produced by other plants, such as silver vine (*Actinidia polygama*) and the herb valerian; it may be caused by the smell of these plants mimicking a pheromone and stimulating cats' social or sexual behaviors.[93]

Taste

Cats have relatively few taste buds compared to humans (470 or so versus more than 9,000 on the human tongue).[94] Domestic and wild cats share a taste receptor gene mutation that keeps their sweet taste buds from binding to sugary molecules, leaving them with no ability to taste sweetness.[95] Their taste buds instead respond to acids, amino acids like protein, and bitter tastes.[96] Cats also have a distinct temperature preference for their food, preferring food with a