

Dog

The domestic dog (*Canis lupus familiaris*) is a usually furry, carnivorous^{[2][3]} member of the *canidae* family. Domesticated dogs are commonly known as "man's best friend". The dog was the first domesticated animal^{[4][5]} and has been widely kept as a *working hunting*, and *pet* companion. It is estimated there are between 700 million and one billion domestic dogs, making them the most abundant member of order *Carnivora*.^{[6][7]}

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Taxonomy

In 1753, Carl Linnaeus listed among the types of *quadrupeds* familiar to him the Latin word for dog, *canis*. Among the species within this genus, Linnaeus listed the *fox*, as *Canis vulpes*, *wolves* (*Canis lupus*), and the domestic dog, (*Canis canis*). In later editions, Linnaeus dropped *Canis canis* and greatly expanded his list of the *Canis* genus of quadrupeds, and by 1758 included alongside the foxes, wolves, and *jackals* and many more terms that are now listed as synonyms for domestic dog, including *aegyptius* (hairless dog), *aquaticus*, (*water dog*), and *mustelinus* (literally "*badger dog*"). Among these were two that later experts have been widely used for domestic dogs as a species: *Canis domesticus* and, most predominantly, *Canis familiaris*, the "common" or "familiar" dog.^[8]

By 1993 with advancements in *molecular biology*, the mitochondrial DNA *mtDNA* analysis of extant (i.e. living today) Canidea species indicated that "The domestic dog is an extremely close relative of the gray wolf, differing from it by at most 0.2% of mtDNA sequence.... In comparison, the gray wolf differs from its closest wild relative, the coyote, by about 4% of mitochondrial DNA sequence."^[9] In the same year, the domestic dog *Canis familiaris* was reclassified as *Canis*

Domestic dog

Temporal range: **0.033–0 Ma**



PreЄ Є O S D C P T J K Pg N

Pleistocene – Recent



Nine different *breeds* of dogs.

Conservation status

Domesticated

Scientific classification

Kingdom:	<u>Animalia</u>
Phylum:	<u>Chordata</u>
Class:	<u>Mammalia</u>
Order:	<u>Carnivora</u>
Family:	<u>Canidae</u>
Genus:	<u>Canis</u>
Species:	<u>C. lupus</u>
Subspecies:	<i>C. l. familiaris</i>

Trinomial name

Canis lupus familiaris^[1]

Canis familiaris, a subspecies of the gray wolf *Canis lupus* in Mammal Species of the World.^[10] By 1999, further genetic analysis indicated that the domestic dog may have emerged from multiple wolf populations.^{[11][12]} Based on these latest two pieces of research and the reference reclassification, *Canis lupus familiaris* is the name for the taxon listed by ITIS.^[13] Reference Origin and Gray wolf.

Biology

Main article: Dog anatomy

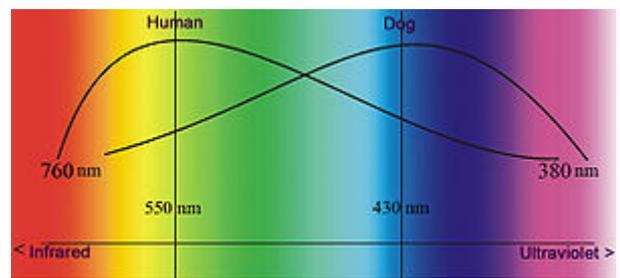
Domestic dogs have been selectively bred for millennia for various behaviors, sensory capabilities, and physical attributes.^[14] Modern dog breeds show more variation in size, appearance, and behavior than any other domestic animal. Nevertheless, their morphology is based on that of their wild wolf ancestors.^[14] Dogs are predators and scavengers, and like many other predatory mammals, the dog has powerful muscles, fused wrist bones, a cardiovascular system that supports both sprinting and endurance, and teeth for catching and tearing.

The smallest known adult dog was a Yorkshire Terrier; that stood only 6.3 cm (2.5 in) at the shoulder, 9.5 cm (3.7 in) in length along the head-and-body, and weighed only 113 grams (4.0 oz). The largest known dog was an English Mastiff which weighed 155.6 kg (343 lb) and was 250 cm (98 in) from the snout to the tail.^[15] The tallest dog is a Great Dane that stands 106.7 cm (42.0 in) at the shoulder.

Senses

Vision

Like most mammals, dogs are dichromats and have color vision equivalent to red–green color blindness in humans (deuteranopia).^{[16][17][18][19][20]} So, dogs can see blue and yellow, but have difficulty differentiating red and green because they only have two spectral types of cone photoreceptor, while normal humans have three. And dogs use color instead of brightness to differentiate light or dark blue/yellow.^{[21][22][23][24]} Dogs are less sensitive to differences in grey shades than humans and also can detect brightness at about half the accuracy of humans.^{[25][26]}



Dog's visual colour perception compared with humans.

The dog's visual system has evolved to aid proficient hunting.^[16] While a dog's visual acuity is poor (that of a poodle's has been estimated to translate to a Snellen rating of 20/75^[16]), their visual discrimination for moving objects is very high; dogs have been shown to be able to discriminate between humans (e.g., identifying their human guardian) at a range of between 850 and 900 m, however this range decreases to 500–600 m if the object is stationary.^[16]

Dogs have a temporal resolution of between 60 and 70 Hz. This means that domestic dogs are unlikely to perceive modern TV screens in the same way as humans because these are optimized for humans at 50–60 Hz.^[25] Dogs can detect a change in movement that exists in a single diopter of space within their eye. Humans, by comparison, require a change of between 10 and 20 diopters to detect movement.^[27]

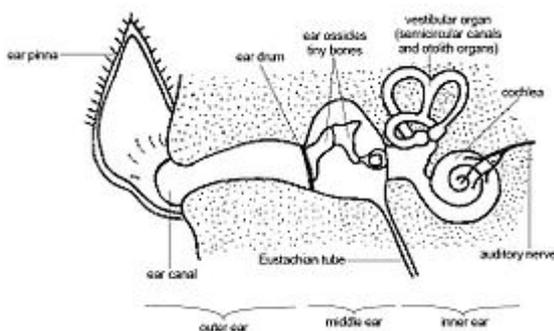
As crepuscular hunters, dogs often rely on their vision in low light situations: They have very large pupils, a high density of rods in the fovea, an increased flicker rate, and a tapetum lucidum.^[16] The tapetum is a reflective surface behind the retina that reflects light to give the photoreceptors a second chance to catch the photons. There is also a relationship between body size and overall diameter of the eye. A range of 9.5 and 11.6 mm can be found between various breeds of dogs. This 20% variance can be substantial and is associated as an adaptation toward superior night vision.^[28]

The eyes of different breeds of dogs have different shapes, dimensions, and retina configurations.^[29] Many long-nosed breeds have a "visual streak"—a wide foveal region that runs across the width of the retina and gives them a very wide field of excellent vision. Some long-muzzled breeds, in particular, the sighthounds, have a field of vision up to 270° (compared to 180° for humans). Short-nosed breeds, on the other hand, have an "area centralis": a central patch with up to three times the density of nerve endings as the visual streak, giving them detailed sight much more like a human's. Some broad-headed breeds with short noses have a field of vision similar to that of humans.^{[17][18]}

Most breeds have good vision, but some show a genetic predisposition for myopia – such as Rottweilers, with which one out of every two has been found to be myopic.^[16] Dogs also have a greater divergence of the eye axis than humans, enabling them to rotate their pupils farther in any direction. The divergence of the eye axis of dogs ranges from 12–25° depending on the breed.^[27]

Experimentation has proven that dogs can distinguish between complex visual images such as that of a cube or a prism. Dogs also show attraction to static visual images such as the silhouette of a dog on a screen, their own reflections, or videos of dogs; however, their interest declines sharply once they are unable to make social contact with the image.^[30]

Hearing



The physiology of a dog ear



Transformation of the ears of a huskamute puppy in 6 days

The frequency range of dog hearing is approximately 40 Hz to 60,000 Hz,^[31] which means that dogs can detect sounds far beyond the upper limit of the human auditory spectrum.^[32] In addition, dogs have ear mobility, which allows them to rapidly pinpoint the exact location of a sound.^[33] Eighteen or more muscles can tilt, rotate, raise, or lower a dog's ear. A dog can identify a sound's location much faster than a human can, as well as hear sounds at four times the distance. http://www.k9puppydogs.com/html/dog_sense_of_hearing.htm^[34]

Smell

While the human brain is dominated by a large visual cortex, the dog brain is dominated by an olfactory cortex.^[16] The olfactory bulb in dogs is roughly forty times bigger than the olfactory bulb in humans, relative to total brain size, with 125 to 220 million smell-sensitive receptors.^[16]

Consequently, it has been estimated that dogs, in general, have an olfactory sense ranging from one hundred thousand to one million times more sensitive than a human's.^{[35][36][4]} In some dog breeds, such as bloodhounds, the olfactory sense may be up to 100 million times greater than a human's.^[37] The wet nose, or rhinarium, is essential for determining the direction of the air current containing the smell. Cold receptors in the skin are sensitive to the cooling of the skin by evaporation of the moisture by air currents.^[38]



The wet, textured nose of a dog

Physical characteristics

Main article: Dog anatomy

Coat

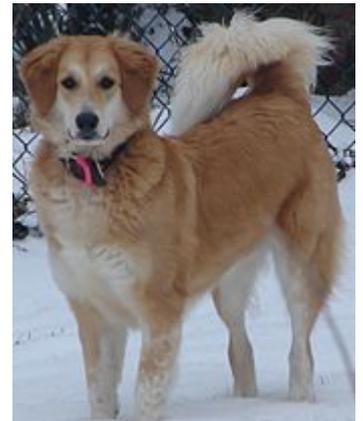
Main article: Coat (dog)

The coats of domestic dogs are of two varieties: "double" being common with dogs (as well as wolves) originating from colder climates, made up of a coarse guard hair and a soft down hair, or "single", with the topcoat only.

Domestic dogs often display the remnants of countershading, a common natural camouflage pattern. A countershaded animal will have dark coloring on its upper surfaces and light coloring below, which reduces its general visibility. Thus, many breeds will have an occasional "blaze", stripe, or "star" of white fur on their chest or underside.^[39]

Tails

In some breeds puppies can be born with a short tail or no tail at all



A heavy winter coat with countershading in a mixed-breed dog

Types and breeds

Main article: Dog breed

Further information: Dog type

Most breeds of dog are at most a few hundred years old, having been artificially selected for particular morphologies and behaviors by people for specific functional roles. Through this selective breeding, the dog has developed into hundreds of varied breeds, and shows more behavioral and morphological variation than any other land mammal.^[40] For example, height measured to the withers ranges from 15.2 centimetres (6.0 in) in the Chihuahua to about 76 cm (30 in) in the Irish Wolfhound; color varies from white through grays (usually called "blue") to black, and browns from light (tan) to dark ("red" or "chocolate") in a wide variation of patterns; coats can be short or long, coarse-haired to wool-like, straight, curly, or smooth.^[41] It is common for most breeds toshed this coat.



Cavalier King Charles Spaniels demonstrate within-breed variation.

While all dogs are genetically very similar,^[42] natural selection and selective breeding have reinforced certain characteristics in certain populations of dogs, giving rise to dog types and dog breeds. Dog types are broad categories based on function, genetics, or characteristics.^[43] Dog breeds are groups of animals that possess a set of inherited characteristics that distinguishes them from other animals within the same species. Modern dog breeds are non-scientific classifications of dogs kept by modern kennel clubs.

Purebred dogs of one breed are genetically distinguishable from purebred dogs of other breeds,^[44] but the means by which kennel clubs classify dogs is unsystematic. Systematic analyses of the dog genome has revealed only four major types of dogs that can be said to be statistically distinct.^[44] These include the "old world dogs" (e.g., Malamute and Shar Pei), "Mastiff"-type (e.g., English Mastiff), "herding"-type (e.g., Border Collie), and "all others" (also called "modern"- or "hunting"-type).^{[44][45]}

See also (as well)

- Animal track
- Argos (dog)
- Dog in Chinese mythology

- [Dogs in art](#)
- [Dog odor](#)
- [Dognapping](#)
- [Ethnology](#)
- [Hachikō—a notable example of dog loyalty](#)
- [Lost pet services](#)
- [Wolfdog](#)

Lists

- [List of dog breeds](#)
- [List of fictional dogs](#)
- [List of individual dogs](#)
- [List of most popular dog breeds](#)

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Further reading

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External links

- Biodiversity Heritage Library bibliography for *Canis lupus familiaris*
 - [Fédération Cynologique Internationale \(FCI\) – World Canine Organisation](#)
 - [View the dog genome on Ensembl](#)
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