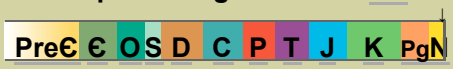
Dog

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]

Domestic dog

Temporal range: 0.033–0 Ma



Pleistocene – Recent

Nine different breeds of dogs.

Conservation status

Domesticated

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Carnivora
Family:	Canidae
Genus:	Canis
Species:	C. lupus
Subspecies:	***C. l. familiaris***

Trinomial name

Canis lupus familiaris[1]

Contents

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*

lupus 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 lupis familiaris* is the name for the taxon listed by ITIS.[13] Reference Origin and Gray wolf.

Biology

Main article: Dog anatomy

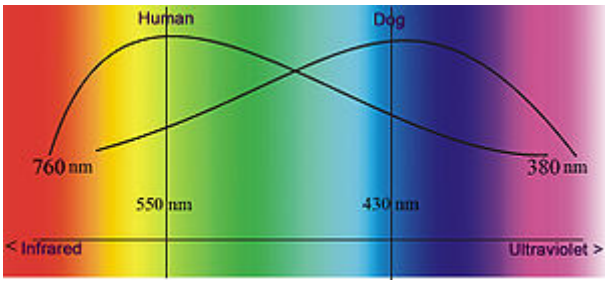
Domestic dogs have been selectively bred for millennia for various behaviors, sensory capabilities, and physical attributes.[14] Modern dog breeds show more variation in size, appearance, and behavior than any other domestic animal. Nevertheless, their morphology is based on that of their wild wolf ancestors.[14] 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]

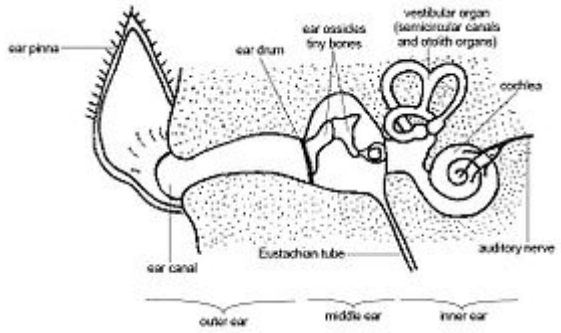
As crepuscular hunters, dogs often rely on their vision in low light situations: They have very large pupils, a high density of rods in the fovea, an increased flicker rate, and a tapetum lucidum.[16] The tapetum is a reflective surface behind the retina that reflects light to give the photoreceptors 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]

The wet, textured nose of a dog

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]

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.

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

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

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 to shed 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
- Ethnocynology
- 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

References

1. **^** "[Mammal Species of the World – Browse: Canis lupus familiaris]". Bucknell.edu (2005年). Template:ISO date/en閱覽。
2. **^** Wayne, R.K. and Ostrander, E.A. (1999). "Origin, genetic diversity and genome structure of the domestic dog." (Template:ISO639言語名). *BioEssays* **21**: 247–257.
3. **^** Clauss, M., Kleffner, H. and Kienzle, E.. "Carnivorous mammals: nutrient digestibility and energy evaluation." (Template:ISO639言語名). *Zoo Biology* **29** (6): 687–704.
4. ^ **a** **b** Nikolai D. Ovodov, Susan J. Crockford, Yaroslav V. Kuzmin, Thomas F. G. Higham, Gregory W. L. Hodgins, Johannes van der Plicht. (2011). *A 33,000-Year-Old Incipient Dog from the Altai Mountains of Siberia: Evidence of the Earliest Domestication Disrupted by the Last Glacial Maximum*. Published: 28 July, 2011 DOI: 10.1371/journal.pone.0022821. Page 1 online here OCT14 (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0022821)
5. **^** Greger Larson, Elinor K. Karlsson, Angela Perri, Matthew T. Webster, Simon Y. W. Ho, Joris Peters, Peter W. Stahl, Philip J. Piper, Frode Lingaas, Merete Fredholm, Kenine E. Comstock, Jaime F. Modiano, Claude Schelling, Alexander I. Agoulnik, Peter A. Leegwater, Keith Dobney, Jean-Denis Vignes, Carles Vilà, Leif Anderssond, and Kerstin Lindblad-Toh; Edited by Joachim Burger. (2012). *Rethinking dog domestication by integrating genetics, archeology, and biogeography*. vol. 109 no. 23 > Greger Larson, 8878–8883, doi: 10.1073/pnas.1203005109. Page 1 online here OCT14 (http://www.pnas.org/content/109/23/8878.full)
6. **^** Hughes, Joelene; Macdonald, David W (2013). "A review of the interactions between free-roaming domestic dogs and wildlife" (Template:ISO639言語名). *Biological Conservation* **157**: 341–351. doi:10.1016/j.biocon.2012.07.005
7. **^** Gompper, Matthew E. (2013). "The dog–human–wildlife interface: assessing the scope of the problem". In Gompper, Matthew E. *Free-Ranging Dogs and Wildlife Conservation*. Oxfort University Press. pp. 9–54.
8. **^** Linnaeus, Carolus (1758). *Systema naturae per regna tria naturae:secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. **1** (10th ed.). Holmiae (Laurentii Salvii). p. 38. Retrieved 8 September 2008.
9. **^** Wayne, Robert K. (1993). "Molecular evolution of the dog family" (Template:ISO639言語名). *Trends in Genetics* **9** (6): 218-224. doi:10.1016/0168-9525(93)90122-X
10. **^** Wozencraft, W. Christopher (1993). "Order Carnivora". In Wilson, D.E.; Reeder, D.M. *Animal Species of the World: A Taxonomic and Geographic Reference*. **1** (2 ed.). Washington, D.C.: Smithsonian Institution Press. p. 576. ISBN 9780801882210.
11. **^** "Origin, genetic diversity and genome structure of the domestic dog" (Template:ISO639言語名). *BioEssays* **21**: 247–257. (1999). doi:10.1002/(SICI)1521-1878(199903)21:3<247::AID-BIES9>3.0.CO;2-Z
12. **^** Vilà, C.; Maldonado, J.E.; Wayne, R.K. (1999). "Phylogenetic relationships, evolution, and genetic diversity of the domestic dog" (Template:ISO639言語名). *Journal of Heredity* **90**: 71–77.
13. **^** "[ITIS Report: Canis lupus familiaris]". *ITIS Data*. Integrated Taxonomic Information System from 3rd Edition of the Mammal Species of the World (Wozencraft in Wilson & Reeder, 2005). Template:ISO date/en閱覽。
14. ^ **a** **b** ADW
15. **^** "[World's Largest Dog]". Template:ISO date/en閱覽。
16. ^ **a** **b** **c** **d** **e** **f** **g** **h** Coren, Stanley (2004). *How Dogs Think*. First Free Press, Simon & Schuster. ISBN 0-7432-2232-6.
17. ^ **a** **b** A&E Television Networks (1998). *Big Dogs, Little Dogs: The companion volume to the A&E special presentation*. A Lookout Book. GT Publishing. ISBN 1-57719-353-9.

18. ^ a b Alderton, David (1984). *The Dog*. Chartwell Books. ISBN 0-89009-786-0.
19. ^ Jennifer Davis (1998年). “[Dr. P's Dog Training: Vision in Dogs & People]”. Template:ISO date/en閲覧。
20. ^ Template:Cite web/error“[ ]”.Template:Cite web/error
21. ^ “Dogs CAN see in colour: Scientists dispel the myth that canines can only see in black and white”. *Daily Mail* (London). (Template:ISO date/en)
22. ^ Anna A. Kasparson, Jason Badridze, Vadim V. Maximov (Jul 2013). “Colour cues proved to be more informative for dogs than brightness” (Template:ISO639言語名). *Proceedings of the Royal Society B: Biological Sciences* **280** (1766). doi:10.1098/rspb.2013.1356.
23. ^ Jay Neitz, Timothy Geist, Gerald H. Jacobs (1989). “Color Vision in the Dog” (Template:ISO639言語名). *Visual neuroscience* **3**: 119–125. doi:10.1017/s0952523800004430.
24. ^ Jay Neitz, Joseph Carroll, Maureen Neitz (Jan 2001). “Color Vision — Almost Reason Enough for Having Eyes” (Template:ISO639言語名). *Optics \& Photnics News* 26–33.
25. ^ a b Miklósi, p. 140.
26. ^ Template:Cite web/error“[ ]”.Template:Cite web/error
27. ^ a b Mech, David. *Wolves, Behavior, Ecology, and Conservation*. The University of Chicago Press, 2006, p. 98.
28. ^ Miklósi, p. 139.
29. ^ “[Catalyst: Dogs' Eyes]”. Australian Broadcasting Corporation (Template:ISO date/en). Template:ISO date/en閲覧。
30. ^ Miklósi, p. 142.
31. ^ Elert, Glenn (2003年). “[Frequency Range of Dog Hearing]”. The Physics Factbook. Template:ISO date/en閲覧。
32. ^ “[hearing]”. Template:ISO date/checkdate閲覧。
33. ^ “[Dog Sense of Hearing]”. seefido.com. Template:ISO date/en閲覧。
34. ^ “[k9 puppy dogs]”. Template:ISO date/checkdate閲覧。
35. ^ ref1
36. ^ ref2
37. ^ “[Smell]”. nhm.org (Template:ISO date/en). Template:ISO date/en時点のオリジナルよりアーカイブ。Template:ISO date/en閲覧。
38. ^ Dijkgraaf S.; Vergelijkende dierfysiologie; Bohn, Scheltema en Holkema, 1978, ISBN 90-313-0322-4
39. ^ Cunliffe, Juliette (2004). "Coat Types, Colours and Markings". *The Encyclopedia of Dog Breeds*. Paragon Publishing. pp. 20–23. ISBN 0-7525-8276-3.
40. ^ Spady TC, Ostrander EA (January 2008). “Canine Behavioral Genetics: Pointing Out the Phenotypes and Herding up the Genes” (Template:ISO639言語名). *American Journal of Human Genetics* **82** (1): 10–8. doi:10.1016/j.ajhg.2007.12.001. PMC 2253978. PMID 18179880.
41. ^ *The Complete dog book: the photograph, history and official standard of every breed admitted to AKC registration, and the selection, training, breeding, care, and feeding of pure-bred dogs*. New York, N.Y: Howell Book House. 1992. ISBN 0-87605-464-5.
42. ^ Savolainen P, Zhang YP, Luo J, Lundeberg J, Leitner T (November 2002). “Genetic evidence for an East Asian origin of domestic dogs” (Template:ISO639言語名). *Science* **298** (5598): 1610–3. Bibcode 2002Sci...298.1610S. doi:10.1126/science.1073906. PMID 12446907.
43. ^ The Merriam-Webster Editorial Staff, ed. (1967). *Webster's Third New International Dictionary of the English Language, Unabridged*. Springfield, MA U.S.A.: G&C Merriam Company. p. 2476. "type (4a) the combination of character that fits an individual to a particular use or function (*strong horse of the draft type*)"
44. ^ a b c Parker, Heidi G.; Kim, Lisa V.; Sutter, Nathan B.; Carlson, Scott; Lorentzen, Travis D.; Malek, Tiffany B.; Johnson, Gary S.; DeFrance, Hawkins B. et al. (2004). “Genetic structure of the purebred domestic dog” (Template:ISO639言語名). *Science* **304** (5674): 1160–4. Bibcode 2004Sci...304.1160P. doi:10.1126/science.1097406. PMID 15155949.
45. ^ Ostrander, Elaine A. (Template:ISO date/checkdate). “[Genetics and the Shape of Dogs; Studying the new sequence of the canine genome shows how tiny genetic changes can create enormous variation within a single species]”. *American Scientist (online)* www.americanscientist.org. pp. also see chart page 4. Template:ISO date/en閲覧。

Bibliography

- Miklósi, Adám (2007). *Dog Behaviour, Evolution, and Cognition* Oxford University Press. ISBN 978-0-19-929585-2 doi:10.1093/acprof:oso/9780199295852.001.0001

Further reading

- De Vito, Dominique (March 1995). *World Atlas of Dog Breeds* (Hardcover) (6th ed.). Neptune City, NJ Lanham, MD: TFH Publications, Inc. pp. 960 pages. ISBN 0793806569. ISBN 978-0793806560.
- Wilcox, Bonnie; Walkowicz, Chris (March 1995). *Atlas of Dog Breeds of the World* (Print) (5th ed.). Neptune City, NJ Lanham, MD: TFH Publications, Inc. Distributed in the U.S. to the Bookstore and library trade by National Book Network. p. 912. ISBN 0793812844. ISBN 9780793812844.

External links

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