

Exploring the Categories and Main Morphological Features of Cats

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Abstract Cats are a beloved pet animal and widely exist in human society. Their unique appearance and behavioral characteristics are highly praised by people. This article will focus on discussing the main features and classifications of cats, including their physical features such as body size, hair color and texture, shape and size of eyes and ears, and shape and length of tails; the behavioral characteristics of cats, such as activity time and style, social behavior, hunting skills, and sleep habits; and classify cats according to different classification methods such as breed, ancestor, and geographical distribution. Through literature review and empirical research, this article aims to deeply explore the scientific principles and cultural background behind the characteristics and classification of cats, providing a deeper understanding and understanding of cats as an important component of human culture and society. The research results are of great significance for deepening people's understanding of cats, promoting the development of pet culture, and promoting relevant scientific research.

Keywords Cat; Physiological characteristics; Classification method

Cats are an ancient yet popular domestic pet and companion to humans. They are adorable, clever, have unique personalities and behavior habits, their distinctive look and behavior characteristics are loved by people. Cat species are a type of mammal, including about 40 genera and about 240 species. The most common is the domestic cat (*Felis catus*). With the development of human society, cats have become an important part of many families. The characteristics and classification of cats are important for people to deeply understand and recognize this group of animals (Kitchener et al., 2017).

Cats belong to the order Carnivora under the class Mammalia in zoological taxonomy. They are highly adaptive animals that can adapt to different habitats and lifestyles. Their appearance and morphological characteristics also show significant diversity, including body size, coat color, ear shape, etc. The appearance and behavioral characteristics of cats are the basis for understanding cats. By conducting in-depth studies on the appearance characteristics, behavioral characteristics and other aspects of cats, we can better understand the ecological habits, behavioral characteristics and interaction methods between cats and humans, which can help promote communication and coexistence between cats and humans, improve people's cognition and understanding of cats. The classification study of cats can provide important references and bases for pet breeding and protection (Sunquist and Sunquist, 2020). Classification methods of cats such as breeds, ancestors and geographical distribution (Zhang et al., 2023b) can provide guidance for breeders to select suitable cat breeds and carry out reasonable breeding.

This review will explore the main characteristics and classifications of cats in-depth, including appearance characteristics, behavioral characteristics, and classification methods by breed, ancestor and geographical distribution. Through literature review, the scientific principles and cultural backgrounds behind the characteristics and classifications of cats are revealed, which provides references and bases for deepening people's understanding of felines, promoting relevant research and industry development, and facilitating the development of pet culture.

1 Appearance Characteristics of Cats

1.1 Body size and shape

Classification of cats by body size and shape mainly includes the following types. Large cats: they generally weigh over 5 kg, with long bodies and developed muscles, such as Maine Coon, Siberian, Norwegian forest cat, etc. Medium-sized cats: they weigh between 4-5 kg, with flexible bodies and beautiful shapes, such as Russian blue, Siamese, American curl, etc. Small cats: they weigh less than 4 kg, with slender bodies and small frames, such as Singapura, *Felis nigripes*, etc.

Apart from body size, the body shape of cats also varies. Round head and short neck: they have large heads and short thick necks, such as British Shorthair and Exotic Shorthair, etc. Triangular head and long neck: they have triangular heads and long thin necks, such as Siamese and Oriental Shorthair, etc. Round body and short legs: they have plump bodies and short limbs, such as Burmese and Munchkin, etc. Slender body and long legs: they have slender bodies and long limbs, such as Leopard cat and Abyssinian, etc.

1.2 Coat color and texture

The coat color and texture of different types of cats may vary. Black cats: they have black fur all over their bodies with smooth fur, such as black shorthairs and Bombay cats. White cats: they have white fur all over their bodies with fine texture, such as White Persian cats and Linqing Lions. Gray cats: they have gray fur all over their bodies with soft texture, such as Russian Blues and British Shorthairs. Spotted cats: they have spotted fur all over their bodies with silky texture, such as American Shorthairs and Norwegian Forest Cats. Tabby cats: they have tortoiseshell fur all over their bodies with sleek fur, such as Tiger spotted Dragon Li and American Shorthairs with tiger spotted. Golden cats: they have gold or brown fur all over their bodies with thick texture, such as Chinchilla and Golden British shorthair.

Apart from color and texture, the hair morphology of cats can also vary. Short-haired cats: they have short and dense fur with soft texture, such as American Shorthair and British Shorthair. Long-haired cats: they have long and luxurious fur with thick and fluffy texture, such as Persia and Norwegian Forest cats. Hairless cats: they are either hairless or have only fine hair all over their bodies, such as Sphinx and Peterbald.

1.3 Eye color

Different types of cats may have different eye colors and shapes. Blue-eyed cats: they have deep blue or light blue eyes, such as Siamese (Figure 1), Ragdoll, etc.. Green-eyed cats: they have light green or deep green eyes, such as Russian Blue, Leopard cat, etc.. Golden-eyed cats: they have golden or yellow eyes, such as British Shorthair, Chinchilla, etc.



Figure 1 Siamese

1.4 Ear shape and size

According to the ear shape, cats can be divided into three shapes. Large-eared cats: they have large ears that tilt forward when standing up, such as Abyssinian, Oriental Shorthair (Figure 2), etc. Medium-eared cats: they have medium-sized ears, such as American Shorthair, Dragon Li, etc. Small-eared cats: they have small ears that form a triangular shape when standing up, such as Persian, Exotic Shorthair (Wang, 2013, The Farmers Consultant,

420(11):29), etc.



Figure 2 Oriental shorthair

Apart from size, the shape of cats' ears can also vary. Erect ears: they have erect ears, such as Oriental Shorthair and Burmese. Folded ears: they have ears that fold forward, such as Scottish Fold (*Felis silvestris catus*) (Figure 3), etc. Curled ears: they have ears that curl outward, such as American Curl.

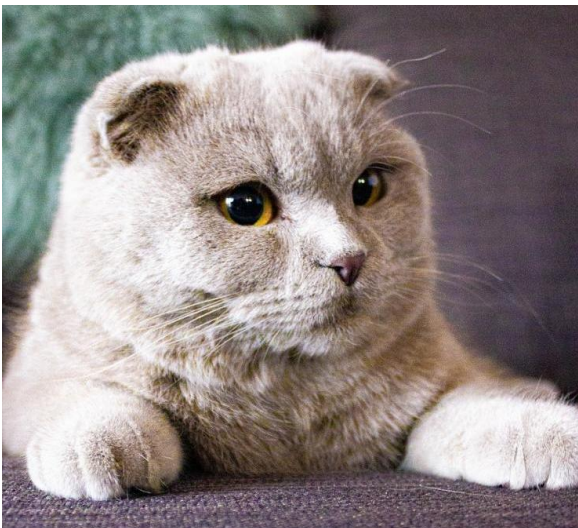


Figure 3 Scottish fold

1.5 Tail shape and length

Different types of cats may have different tail shapes. Long-tailed cats: they have relatively long tails, such as Maine Coon (Figure 4), Balinese, etc.; Short-tailed cats: they have relatively short tails, such as Japanese Bobtail, Manx, etc.



Figure 4 Maine coon

Apart from length, the shape of cats' tails can also vary. Straight tail: their tails are straight, such as British Shorthair and Oriental Shorthair, etc. Bobtail: their tails end in a rounded shape, such as Japanese Bobtail. In addition to genetic influences, some cats will develop "lion tails" later in life, and "lion tails" come in many forms - some are short, some resemble lightning, and some curl up into several coils like a pig's tail.

2 Body Features of Cats

2.1 Activity times and ways

The activity times and ways of cats vary due to individual differences, ages, genders, breeds, environments, and other factors. But in general, cats' activity times and ways can be divided into the following categories: Diurnal active cats: this type of cat is more active during the day and likes to be active in places with plenty of sunshine. Nocturnal active cats: this type of cat is more active at night and likes to be active in dim environments. Crepuscular active cats: this type of cat is active both during the day and at night and does not have a fixed activity time.

Apart from activity times, cats' activity ways can also vary. Tree-climbing cats: this type of cat likes to climb trees and can easily climb up branches. Hunting cats: this type of cat likes to hunt small animals like mice, birds, etc.. Toy cats: this type of cat likes toys, especially those that can be chased and caught. Lap cats: this type of cat likes to be close to humans, likes to lie next to the owner or be held by people.

In summary, cats' activity ways include exercise, exploration, play, rest and socializing, and different cats may vary in their activity ways, but all these activities are innate to cats and are important ways for them to stay healthy and happy.

2.2 The nature and personality of cats

Cats are independent, graceful and mysterious animals with unique natures and personalities. Here are some common traits and personalities of cats. Independent: cats are very independent animals. They like to be alone and can do many things by themselves, such as self-grooming and self-entertainment. Docile: though cats have independent personalities, they are also very docile. They like to establish close relationships with humans and can become human's good friends. Curious: cats are very curious about things around them. They like to explore and discover new things. Active: Though cats like to rest, they are also very active. They like to play, run and jump. They are energetic animals. Hunting instinct: Cats are born hunters. They have a strong hunting instinct and like to chase and catch small animals. Agile: Cats are very agile. Their bodies are flexible. They can easily climb trees, jump and climb. Claw sharpening: Cats' claws can grow, so they need to sharpen their claws regularly to keep them sharp and mark their territories.

Cats have very diverse natures and personalities, which also vary between different breeds and individuals. Understanding the nature and personality of cats can help us to better understand them and provide proper care and protection (Zhang et al., 2023a).

2.3 Sleeping habits and behaviors of cats

Cats are sleep-loving animals, and their sleeping habits and behaviors have the following characteristics. Long sleeping time: cats sleep relatively long, adult cats need 12-16 hours of sleep a day, and older cats need more sleep time up to 18-20 hours. Flexible sleep periods: cats can sleep at any time, especially during the transition periods between day and night. Sleeping postures: cats have various sleeping postures, including curled up, lying sideways, lying belly up, etc. Shallow sleep: cats' sleep is rather light, they can wake up anytime and stay alert. Despite their long sleeping time, they actually sleep deeply for about 5 hours only. Sleeping environment: cats like to sleep in quiet, warm and comfortable surroundings, often finding a comfortable spot in sunny places. Preparations before sleep: cats will groom themselves, straighten their fur and find a comfortable position to stretch their bodies and relax before sleeping. Taking turns sleeping: In households with multiple cats, they take turns sleeping. While one cat sleeps, the others usually stay alert to protect the safety of the family.

The sleeping behaviors and habits of cats are related to their natures and personalities. Understanding these behaviors and habits can help us better keep them company and provide a comfortable and safe living environment.

3 Classifying Cats

3.1 Classification by breed

3.1.1 Short-haired cats

Short-haired cats refer to cats with relatively short fur. Their fur is usually shorter than that of long-haired cats and not as bare as hairless cats. The texture of short-haired cats' fur is soft and easy to take care of, so they are very popular.

The following are some common short-haired cat breeds. British Shorthair: the British Shorthair is one of the oldest and most popular short-haired cat breeds, characterized by a large head, round and large eyes, and dense yet soft fur (Figure 5). American Shorthair: the American Shorthair has a medium build with soft and dense fur, docile temperament, and makes a good choice as a family pet. Manx: the Manx is a unique short-haired cat breed with a smaller body, short and dense fur, and shorter legs compared to ordinary cats. They have almond-shaped eyes, come in various coat colors, and are intelligent and lively in temperament. Russian Blue: the Russian Blue is a medium-built, gray-blue short-haired cat breed. Their eyes are basically green in color, and they have a calm and quiet temperament, making them very suitable as family pets.



Figure 5 British shorthair cat

Short-haired cats have their own characteristics in appearance, temperament and other aspects. Their soft fur, docile temperament and easy maintenance make them one of the most popular pets loved by many people.

3.1.2 Long-haired cats

Long-haired cats refer to cats with longer fur, which is usually longer than that of short-haired cats and requires more grooming and brushing. Long-haired cats are beloved for their glamorous appearance and soft fur.

The following are some common long-haired cat breeds. Balinese: the Balinese is a large cat with thick and soft fur. They are characterized by being friendly, docile and easy to get along with, making them excellent family pets. Persian: the Persian is one of the most popular long-haired cat breeds. They have extremely long and dense fur and small bodies and mild-mannered elegant personalities. Norwegian Forest Cat: the Norwegian Forest Cat is a long-haired cat with a large and sturdy build. Their fur is water-resistant and they are adaptable. They are a very healthy cat breed (Figure 6). Maine Coon: the Maine Coon is a large cat with thick fur, sturdy limbs and powerful physique. They are adaptable, friendly and loving towards humans, making them an excellent family pet.



Figure 6 Norwegian forest cat

The long, luxurious fur, graceful demeanor and gentle personalities of long-haired cats make them much beloved by humans. But it is important to note that long-haired cats require more grooming and brushing to maintain the health and beauty of their coats.

3.1.3 Hairless cats

Hairless cats refer to cats that have no fur or only very small amounts of fur. The skin of hairless cats is typically smooth and soft in texture, requiring extra care and warming to maintain their health and comfort.

Here are some common hairless cat breeds. Sphynx: the Canadian Sphynx is one of the most famous hairless cat breeds. They have skin that ranges from pink to grey tones, medium build and friendly, lively personalities (Figure 7). Peterbald: the Peterbald is a medium-built cat breed with fine, close-lying hair. Their skin is wrinkled and they enjoy sharpening their claws. Bambino: the Bambino has short legs, large upright ears and almost no fur. Their skin can range from white to cream, grey, black and brown colors. They are energetic.

Hairless cats have their own distinct characteristics in appearance, temperament and other aspects. Their smooth skin, friendly temperaments, adaptability and other traits make them one of the most popular pets. Hairless cats are a great option for some people who are allergic to cat fur. However, hairless cats require extra warming measures to avoid skin damage or infections. Clothes and a suitable temperature should be provided for them in cold weather to ensure their health.



Figure 7 Sphynx

3.2 Classification by ancestry

3.2.1 Domestic cat

Domestic cat (*Felis catus*) are a tamed member of the feline family and one of the most common pets, also called house cats. Domestic cats are small in size, with a body length between 30~40 cm and a tail length about half of the body. They weigh between 2-7 kg. Domestic cats have thick fur, come in various body types and colours ranging from grey, black, white and orange colours and patterns. Domestic cats are nocturnal animals and usually active at night. They can adapt to various living environments including urban, rural and wilderness areas. Domestic cats primarily eat small mammals, birds, and reptiles but can also consume some plant matter (Macdonald and Loveridge, 2010).

Domestic cats are animals that have been domesticated by humans, widely used as pets, rodent controllers and laboratory subjects. As pets, cats provide companionship, relieve stress and alleviate loneliness for their owners. But cats can also pose hazards to humans, especially young children or frail individuals, requiring caution. Due to human domestication and breeding, the population of domestic cats is enormous worldwide and they are not listed as endangered species currently. However, some domestic cats may experience abuse or abandonment, needing attention and protection from society.

Domestic cats keep a treasured relation with humankind, bringing joy and fulfillment to our lives. We must treat them kindly and ensure their needs are met, for the purr of a content feline friend is one of life's greatest delights (Shu et al, 2023).

3.2.2 Wildcats

Wildcats (*Felis silvestris*) be these fearsome felines what have left human domestication and make their own way in the wild. Varying much in size and color, they tend to be lither and nimbler than tame domestic cats. Such as

Eurasian lynx (Figure 8), Caracal (Figure 9), golden cats (Qiao et al, 2022), and Pallas's Cat, etc. Active by night, these wildcats possess both survival savvy and adaptability to thrive in environments like forests, deserts, and plateaus. Their primary prey be medium rodents, wild rabbits, birds and some reptiles.



Figure 8 Eurasian lynx



Figure 9 Caracal

Wildcats are felines living in the wild independent of humans. They are typically undomesticated, more independent and wary than house cats with greater adaptability to survive on their own. Wildcats are sometimes mistaken for stray cats but they differ from pets in their relationship with humans. Wildcats have their own territories and ranges, not relying on human food or care. As part of nature, Wildcats deserve the right to live and breed. We should protect their welfare while finding a balance with local ecological environment (Hughes, 1998).

3.3 Classification by geographic distribution

3.3.1 European cat

The European cat refers to the feline family distributed in the European region and is one of the ancestors of domestic cats. European cats have a variety of body types and fur colors, with a relatively sturdy body. European cats are one of the ancestors of domestic cat and have a close relationship with humans. In the European region, European cats are also domesticated as pets, becoming partners and friends for people. The breeds and subspecies of European cats are very diverse, each with its own unique characteristics and temperament. Regardless of the type of European cat, it has a close relationship with humans and is a very popular pet.

European cats are a wide range of species, including many different breeds and subspecies. The following are some of the main breeds of European cats: British Shorthair: British Shorthair is a type of cat with a moderate body size, a strong physique, and a mild temper. Their hair is short and dense, usually in colors such as blue, gold, and milk; Persian: Persian is a type of cat with a round and wide head and long and thick fur. Their hair is usually white, black, light yellow, and sometimes has patterns. Persians have a gentle temper and are loved ones, making them one of the most popular pets; Norwegian Forest Cat: Norwegian Forest Cat is a type of cat that is larger in size and has dense fur. They usually have grayish brown hair, strong bodies, well-developed muscles, and are very

suitable for outdoor activities; Siberian: The Siberian is a large, thick haired cat. Their hair is usually Neva colored, highly adaptable to survival, and less susceptible to illness (Figure 10); Scottish Fold: Scottish Fold is a type of cat with a medium body size and a charmingly naive appearance. Their ears will droop forward with age, making them appear very cute. The hair of Scottish folded eared cats is usually chocolate, black brown, white, and other colors.



Figure 10 Siberian

3.3.2 Asian cat

The Asian cat refers to the feline family animals distributed in Asia and is also one of the ancestors of domestic cats. In the Asian region, cats always appear in ancient poetry and paintings, confirming the long history of human domestication of cats, but mainly for the purpose of catching mice. The Asian cat is an animal closely related to humans and has important significance for humans. We should treat Asian cats well and ensure that they receive appropriate care and protection.

The cat species in Asia are very diverse, and the following are some common Asian cat breeds. Chinese pastoral cat is a native cat species in China, with a medium body size, short and dense fur, and multiple colors and patterns such as black (Figure 11), white, orange, and calico (black, white, orange). Japanese Bobtail is a kind of cat with slender body, smooth and thick hair. Their tails are short, only 5~7 cm, very unique. Singapura is the smallest domestic cat in the world, small and exquisite, weighing only about 2 kg, with big ears and big eyes like eyeliner.



Figure 11 Black cats

3.3.3 African cat

African cat refers to the feline family animals distributed in Africa. African cats mainly live in grasslands, deserts, and forests in Africa, feeding on small mammals, birds, and reptiles. African cats usually live independently, but they also form small communities during the Seasonal breeder or when looking for food. African cats are one of

the ancestors of domestic cats, but their relationship with humans is not as close as that of European and Asian cats. However, in the African region, African cats are also domesticated as pets, becoming partners and friends for people.

There are relatively few kinds of cats in Africa, and the following are some common African cat breeds: Abyssinian: Abyssinian is a kind of cat originated from Egypt, with medium size, slender limbs, and usually silver or gold fur; Savannah cat, also called *Felis catus* × *Leptailurus serval*, has beautiful spots on its hair and a slender body; *Leptailurus serval*: *Leptailurus serval* is a slender cat with a sandy yellow or reddish brown body, cup-shaped black and white fur on the back of its ears, covered in black spots or stripes, and a white belly color; *Felis nigripes*: *Felis nigripes*, with an average weight of 1.6 kg and a coat color of cinnamon to tan or near white, is one of the smallest species in wild cats.

Due to human interference and habitat destruction, the number of African cats is gradually decreasing, and some African cats have been listed as protected animals. Therefore, we should take appropriate measures to protect African cats and their ecological environment. The African cat is an animal with a distant relationship with humans, but it plays an important role in the ecological environment and biodiversity of the African region. We should take good care of African cats and their ecological environment to ensure that they can continue to survive and reproduce in the African region.

3.3.4 South American cat

South American cat refers to the feline animals distributed in South America, mainly in the Andes and Amazon rainforest and other regions, which feed on small mammals, birds and reptiles. The relationship between South American cats and humans has been relatively less studied, and most South American cats prefer to live alone and still maintain their wildness.

Due to the abundance of wild cat species in South America and the relatively small number of domesticated South American cat breeds, the following are some common South American cat breeds. *Oncifelis guigna*, with a short tail and dense fur, usually yellow brown or reddish brown fur, and a body weight between 1.5-2.8 kg, making it one of the smallest cat species. *Leopardus wiedii*, as its name implies, has a long tail, larger eyes than ordinary cats, and its coat is generally yellow brown. *Leopardus colocolo*, a South American prairie tiger cat, has silver black, reddish brown, and black fur. The markings on the adult South American prairie tiger cat are blurry compared to when it was young.

The South American cat has a cute appearance and unique fur and color, which has led to human hunting and habitat destruction. Many South American cats have been listed as endangered species. South American cats play an important role in the ecological environment and biodiversity of the region, and we should protect their ecological environment to ensure their continued survival and reproduction.

3.3.5 North American cat

The North American cat refers to the feline family found in North America, mainly in regions such as Canada, the United States, and Mexico. It is one of the ancestors of domestic cats. After a long period of domestication, the North American cat has become a closely related animal to humans and has become a popular companion and friend. We should learn about cat habits well in order to take better care of them.

Due to the abundance of wild cat species in North America, there are relatively more domesticated North American cat breeds. The following are some common cat breeds in North America: Maine Coon: Maine Coon is a kind of cat with large body size and thick hair. Its hair color is rich and colorful, including gray, white, black and other colors and patterns; American Shorthair: American Shorthair is a medium sized cat with colorful coat colors, including gray, brown, black and other colors and patterns (Figure 12); Ocicat: Ocicat is a medium-sized cat with short fur, mainly on three base colors: chocolate, blue, and silver white, with spots or patterns.

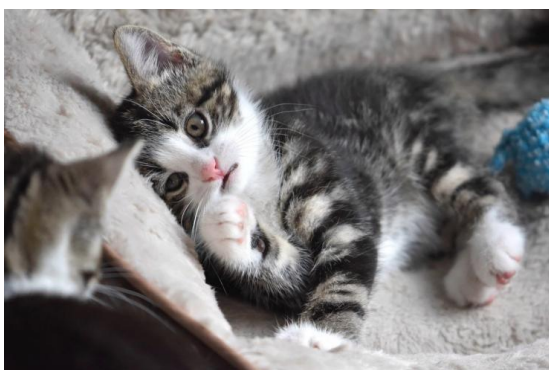


Figure 12 American shorthair

4 Conclusion

This review mainly introduces the basic knowledge of feline animals from two aspects: the main characteristics and classification of cats. In terms of features, we introduced the appearance and behavioral habits of cats, including their body shape, hair, eyes, ears, tail, and other different characteristics, as well as their activity time, communication methods, hunting behavior, sleep behavior, and other aspects. We also introduced the nature and personality of cats, which may vary among different breeds and individuals. Each individual has its unique charm and characteristics, which make the relationship between humans and cats closer.

In terms of classification, we introduced the classification basis of cats, including their breeds, ancestors, geographical distribution, and other aspects. Among them, the domestic cat is the most common feline animal, with a medium body size, soft and smooth hair, and the behavioral habits of relatives. At the same time, many wild cats are gradually becoming extinct due to human hunting behavior and habitat destruction. We should take good care of them and their ecological environment to ensure their continued survival and reproduction.

Overall, as a highly adaptable animal, the feline family has rich morphological characteristics and behavioral habits, while each individual has their unique personality and charm. They have also had a profound impact on human life and culture. Through the introduction of this review, we can better understand and take care of our pet cats, as well as better understand and protect the diversity and ecological value of feline animals.

Authors' contributions

CMY was responsible for reviewing, organizing, and writing relevant literature and materials for the first draft of this review. The author read and approved the final manuscript.

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