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Understanding the evolution of domestic dogs

Zhihan Zhang

Suzhou Science and Technology town Foreign Languages high school, 215000, China

Brendanzhang@keemail.me

Abstract. This article discusses the process of domestication, and the outcomes of domestication, and the evolutionary history of dogs. The essay also describes the processes that led to the evolution of domestic dogs and investigates the causes of the enormous variety of dog breeds. This research shows the complex interactions between humans and dogs throughout the history by analyzing genetic, and social aspects. It also provides insights into how this special relationship has formed the diversity of breeds that exist today. Additionally, the article provides a detailed examination of the Chinese Village Dog, an indigenous breed of China, highlighting its unique evolutionary pathway, genetic diversity, and cultural significance. Through the analysis of ancient texts and archaeological findings, this research sheds light on the longstanding relationship between Chinese Village Dogs and human communities, as well as the ongoing challenges and conservation efforts aimed at preserving indigenous Asian dog breeds.

Keywords: domestication, breed, evolution, domestic dogs, Chinese Village dogs, genetic diversity, Asian dog breeds.

1. Introduction

The domestic dogs as known as the *Canis familiaris* or *Canis lupus familiaris* are one of the most common domestic animals in modern family life [1]. A commonly held belief is that the domestic dog is descended from the wolf, but some people may be confused about this, especially there are some dogs like Bichon Frise, and this kind of dog has apparently different physical characteristics, temperament, and behavior from its ancestor, the wolf. In this article these types of questions will be covered. Dogs are a common sight in human daily life, and their sizes, shapes, and colors differ greatly throughout breeds. They can assist humans in many areas, including the military, counseling, hunting, and over activities.

2. The origin and domestication

The dogs were the first domesticated species in the world and the domestic relationship with human was happened during the Pleistocene [2], and how this part will cover how does this happened. Also, there are some evidence shows that human had buried dogs a long time ago, and suggests that dogs were domesticated long before the advent of agriculture according to [3]. According to [4], dogs are the species that evolved into different types of domestic dogs through commensal pathways. However, it will take many years before we can pinpoint the exact moment and location of the canines' first domestication. There are differing opinions on this issue, though. In my view the evolution process is a result of both natural selection and human breed, and nowadays the dogs have stronger connections with

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humans. According to [5], the dogs have developed the greater ability of facial expressions compared to their ancestors, and this will help them communicate the emotions with humans in a more effective way. Also, the dogs have evolved the ability to use facial expressions and body languages to communication with human. The initial domestication process of dogs was like the silver fox experiments, but dogs were more sociable and less afraid compared to their ancestor wolf. The natural selection plays an important role during the evolution of dogs. According to [6], dogs eventually grew to be connected to agricultural communities and acclimated to a diet high in starch. For instance, the evolution of human agriculture coincided with the growth of the AMY2B gene in dogs, enabling improved starch digestion. One significant aspect of dog history is the gene flow between present and ancient dog lineages, as well as between dogs and grey wolves. Genetic diversity brought about by this gene flow enabled canines to adapt to a variety of situations. For instance, the Tibetan Mastiffs and Tibetan Grey Wolves show advantageous mutations in the EPAS1 gene, which is linked to hypoxia adaption. Due of these mutations' benefits in high-altitude environments, they were naturally selected for.

3. The Breed

As the paper mentioned before the domestication part, there are a lot of different breeds of dogs, and they show different physical characteristics. According to [7], there are about 400 recognized dog breeds worldwide. In my point of view, this is the outcome of both natural selection and undertaken by human just like the domestication. According to [1], the definition of breed of dogs is that these about 400 breeds show significant difference in appearance and behavior, also today's purebred dogs are maintained by isolated genetics and human's deliberate selection and this method was invented like 2 centuries ago. But in my opinion, the primary cause of the abundance of dog breeds now is deliberate human selection. Dogs have been bred for various task like hunting, herding, military, guarding, etc. And different dog breeds of specialized to working on these different problems have different traits and physical behaviors. The diversification of dogs was separate into different ecological niches by human needs, and this also led to the vast number of breeds. These seem like typical instances of human selection, but the reason this paper mentioned that conscious action occurs occasionally is because of a process that began in the middle of the 19th century. Some people tried to create purebred dogs by inbreeding or genetic isolating. As a result, there are more modern breeds. That's mainly why the Chihuahua is the descendent of wolf.

4. Evolution about Chinese Village Dog

The Chinese Village Dog, which is Zhōnghuá Tiányuánquǎn, and the dog is an indigenous breed of China [8]. The Chinese Village Dog represents a unique evolutionary pathway influenced by natural selection and human activities. These dogs are known for their adaptability, intelligence, and diverse appearances. They have lived alongside humans in China for thousands of years, serving various roles such as guard dogs, hunting companions, and loyal pets. According to the ancient Chinese documents such as the *Erya* and *Classic of Mountains and Seas*, that the local dog breeds that resemble today's Chinese Village Dogs. *Erya* states, "Dogs guard the palace." and "*Classic of Mountains and Sea*s" mentions, "Dogs, resembling domestic dogs." These texts provide early evidence of the relationship between humans and dogs in Chinese culture. These texts provide early evidence of the relationship between humans and dogs in Chinese culture. According to [8], there is a significant genetic diversity of Chinese Village Dogs and their connection to both ancient and contemporary breeds. It also appropriately emphasizes the historical and environmental factors contributing to this diversity. Also, there is an archaeological site in Henan Province, China, called Jiahu has revealed dog remains dating back to around years ago. These findings indicate that dogs were present and possibly domesticated in this region long before recorded history. For instance, dog burials dating back 9,000 years have been found at the Neolithic settlement of Jiahu, providing early evidence of domestication [9]. Dog remains were also found in Western Zhou tombs in places like Shaanxi, Gansu, and Henan, indicating the canines' ongoing and changing importance in burial rituals. Notably, waist-pits—which were originally

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meant for human sacrifice but were later modified for canines—were frequently discovered to contain dogs. This custom demonstrates how dogs are now seen as companions and guards in the afterlife rather than just ceremonial sacrifices [10,11].

5. The comparison between the Chinese Village Dog and other breeds in Asia

The genetic diversity of the Chinese Village Dog is one of its defining characteristics. As mentioned earlier, this breed's wide range of genetic markers has allowed it to adapt to various environments across China, from the cold northern regions to the warmer southern climates [8]. Also, this adaptability is mirrored in other Asian breeds, such as the Japanese Shiba Inu and the Korean Jindo, which have also developed unique adaptations to their respective environments [6]. However, the genetic diversity observed in the Chinese Village Dog is broader compared to these breeds, partly due to the extensive geographical and environmental variability within China itself. For instance, the Chinese Village Dog has not seen the same concentrated selection pressures as the Shiba Inu, which has a more homogeneous genetic profile due to breeding for certain traits like hunting in mountainous areas. Due to a lack of strong human-driven selection, the breed has managed to maintain a wider genetic foundation, which has enhanced its flexibility and durability in a variety of human cultures [6]. Throughout Chinese history, the Chinese village dog has played a significant role in culture as a guard dog, hunting partner, and devoted pet [11]. Although other Asian dog breeds, like the Akita in Japan, also play this multipurpose role as symbols of protection and loyalty [12], the Akita is often associated with greater symbolic significance in Japanese culture, where it is frequently portrayed as a national treasure and a symbol of loyalty. On the other hand, the Chinese Village Dog is appreciated more for its usefulness and is thought of as a practical friend rather than a symbolic one [11]. This practicality is evident in the widespread presence of the Chinese Village Dog in rural China, particularly in agricultural communities, where it remains an indispensable part of daily life. Unlike another indigenous Asian breed, the Tibetan Mastiff, which was specifically bred to guard livestock in harsh, high-altitude environments, the Chinese Village Dog has a more versatile role, adapting to the various needs of Chinese farmers [6]. Due to its wide genetic heritage, the Chinese Village Dog has a very diversified range of physical traits [8]. This is in contrast to the more uniform appearance of breeds, such as the Japanese Akita and Tibetan Mastiff, whose forms are sculpted by particular functional and environmental requirements [6]. In order to survive in the frigid, high-altitude regions of Tibet, the Tibetan Mastiff, for instance, is recognized for its enormous size and thick fur [6]. The Chinese Village Dog, on the other hand, has a diverse range of physical characteristics due to its less specialized evolutionary path, including differences in size, coat color, and ear shape [8]. The wide range of appearances that Chinese Village Dogs can have is evidence of their flexibility. The Chinese Village Dog has developed a more adaptable collection of qualities that allow it to thrive in a variety of contexts, from rural farms to urban surroundings, in contrast to more specialized breeds that have evolved unique traits under specific environmental stresses [11]. In recent years, the importance of conserving indigenous Asian dog breeds, including the Chinese Village Dog, has gained increasing attention [6]. However, these breeds face significant challenges due to the rising popularity of Western dog breeds in China, which threatens their genetic diversity [8]. This situation is similar to that of the Korean Jindo, which is legally protected as a national treasure in South Korea, reflecting efforts to preserve its purebred lineage in the face of increasing hybridization [8]. The Chinese Village Dog's traditional function in rural Chinese life is being preserved, in addition to its genetic variety being protected. In addition to preserving the breed itself, these conservation initiatives are essential for preserving the cultural legacy and historical significance that these breeds represent [11].

6. Conclusion

The domestication and breed variation of dogs can be attributed to a wide range of reasons, demonstrating the strong and long-lasting relationships that humans have maintained with dogs throughout evolutionary history. Recognizing these elements highlights the important, mutual relationship between people and dogs as well as the complex history of dog domestication. The intricate interactions between natural evolution and human intervention are highlighted by the genetic,

environmental, and sociological factors that have contributed to the diversity of dog breeds that exist today. Furthermore, researching native breeds such as the Chinese Village Dog and some Asian breeds of dogs offer important new perspectives on how to maintain genetic variety and cultural legacy in the face of contemporary challenges. These insights are crucial for appreciating the broader implications of breed conservation and the roles that dogs continue to play in human societies worldwide.

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