

Previous studies on the origin of the domestic cat

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Several thousand years have passed, since the first cats appeared near the human place of residence. Cats have become the most popular animal in the world. Statistics show that more than a third of American households have a cat. The number of these animals in the world is estimated at a minimum of 600 million – it is hard to find more measurable evidence of the evolutionary success of the species. However, today scientists still do not know when and how exactly the cat began the process of domestication. Over the years, they believed that the ancient Egyptians were the first to keep cats as pets. This hypothesis is confirmed by archaeological excavations. However, the genetic studies done over the last five years have changed this scenario and provided a new look at the origin of the domestic cat.

Key words: domestic cat, origin, Felis catus, history

In prehistory, human life was strongly influenced by the natural world. Human survival depended mainly on getting food effectively. The process of breeding both animals and plants began with the change of lifestyle from nomadic to sedentary (Litwińczuk, 2017). Domestication is an extremely important process, which underlies the world we know at present. There is no animal or plant species contemporarily used by humans, which was not domesticated in the past. Domestication is the outcome of the processes of transforming physiological, morphological, psychological and developmental traits and properties of a wild ancestor of a domesticated species as a result of human activity (Diamond, 2002; Zeder et al., 2006). The most frequent phenotypic changes, which developed in the domestication process manifest themselves in animals among others with coat colour and its structure, differences in periods of breeding, size and shape of a skull and ears. Such variabilities have been a central point of interest of many scientists for more than 150 years (Stojak and Plis, 2017).

From a historical point of view, it is believed that the first efforts to domesticate the animals were already taking place during the Upper Palaeolithic Age, and the process itself lasts to the present day. Domestication always takes place at two levels: environmental and cultural (Makowiecki and Marciniak, 2012).

Human intervention leading to the domestication of various animal species has always been based mainly on the change of living conditions of a given species and modification of its genetic properties as a result of the so called selective breeding. By choosing individuals with preferred traits for reproduction, humans could modify species to suit their needs (Zeder et al., 2006). The obtainment of crossbreeds made it possible to attain individuals more easily bred in unfavourable environmental conditions, at times stronger, more productive with lower nutritional requirements (e.g. mule), and also more resistant to infectious diseases and parasites (Bederska and Bederska, 2011). Natural selection fulfills solely a complementary role in the domestication process (Purugganan and Fuller, 2009). A lot of new traits not present in wild animals come into being during domestication. According to the established categories, they are divided into three groups: morphological (coat colour/length, body size and its proportions etc.), physiological (increased lactation, fertility etc.) and behavioral. In the majority of species, the latter manifest themselves with the loss of skittishness and alertness, poorer spatial orientation, and in dogs and cats – hereditary increase of the level of intelligence and memory capacity (Lasota-Moskalewska, 2003).

History of cat domestication

During Neolithic Revolution, humans started to gather large quantities of food (including grains). With the beginning of grain cultivation, small rodents started to appear in people's surroundings. Foraging mainly on accumulated stocks, they obtained better conditions for reproduction. It is them which attracted wild cats near human habitations. However, the new food niche could be exploited solely by individuals, which exhibited the least fear of human and showed the highest adaptability. People also quickly figured out that the presence of these animals diminished the population of the house mouse (*Mus musculus*) and facilitated safe storage of cereals (Baldwin, 1975).

The next cat generations were even more socialized with humans. It should be emphasized that the individuals, which could not abandon their very territorial behaviours due to their adaptive constraints, left the colonies which were being formed. Only most adapted cats were staying. The process, called natural selection was taking place without human intervention.

Several thousand years have passed since the first cats appeared close to human settlements and the domestic cat has become the most popular animal in the world. Research carried out shows that more than one third of American households possess a cat. At present, the number of these animals in the world is estimated at minimum 600 million – it is difficult to have more verifiable evidence of evolutionary success of the species (Driscoll et al., 2009).

To this day nobody knows when and how exactly the cat became a companion animal. The process of its domestication is not so unambiguous as in case of a dog,

sheep or cow, since on the basis of the length of the examined bones of many domestic cats, you cannot see human involvement in their development. The skeleton did not shrink down, which could be one of the consequences of domestication. By their nature, cats are animals, which from biological and behavioral point of view should rather not allow people to be domesticated. The ancestors of the majority of domesticated animals lived in herds with a distinct hierarchical structure. People unconsciously took advantage of the structure, substituting alpha unit, which facilitated control over individual animals in this way. By contrast, cats were solitary hunters with high territorial instinct. What is more, while the majority of domesticated animals nourish themselves with generally available vegetation, cats are strict carnivores. It means that they have a limited ability to digest anything apart from meat – that is to say they have far fewer possibilities to obtain food. In terms of usefulness for people, cats belong to animals difficult to teach. Such traits suggest that while other animals were taken from natural habitat and bred for specific tasks for the purpose of taming and further domestication, cats most likely decided to live among people for their own reasons. It is believed that the domestic cat evolved therefore as a new species in a completely natural way, independent of actions taken by people.

Where reference is made to the place of domestication, ancient Egypt is the first association that springs to mind. According to the majority of local folklore and scientific works, it was where the first reconciliation between cats and people took place (Baldwin, 1975). Religion is an integral part of social life. In the ancient world it constituted one of its most important dimensions. In ancient Egypt, the cat, but also the lion and the panther occupied a unique position in religion. Bastet, a woman with cat's head was one of the most well-known goddesses of the day – responsible for omnipresent love, joy, fertility and family happiness. Mafdet (protected people against snakes and scorpions, was associated with justice) and Mehit (her role was to take care of holy places) were other equally important figures in Egyptian beliefs (Wilkinson, 1999). Archaeological excavations led up to the present show that a cat was the most often mummified animal in ancient Egypt. Curiously enough, the research carried out so far confirms that some cat mummies are much larger and more massive than the remaining ones. This could mean that priests used to breed a special variety of these cats for further killing and mummification (Armitage and Clutton-Brock, 1981).

Theories of the origin of the domestic cat

Scientists long believed that ancient Egyptians were the first to keep cats as companion animals. It was confirmed among others by uncovered wall paintings, which date back to 2000 years B.C. (Linseele et al., 2007). However, genetic and archeological discoveries made in the past 5 years changed the scenario and created a new insight into the origin of the domestic cat and evolution of its relationships with people (Driscoll et al., 2007). The next, newer but not ultimately confirmed theory about domestication dates back to 6000 years B.C. and concerns a place called Anatolia (a historic land in Turkey). It was where a figure of a woman carrying an animal similar to a cat in her arms was discovered (Brentjes, 1965). However, a lot of researchers disagree that it was a representative of

Felis silvestris lybica species. Gautier (1990) writes in his book that the animal depicted in the figurine must have been a mongoose, since cats did not occur naturally in the territories of Anatolia at that time. However, if it indeed had been a representative of this species, it would have meant that it was brought from other regions of the world and its domestication must have started much earlier.

Nevertheless, the excavations carried out in Cyprus contradict the theory that cats were domesticated only in Anatolia. In 2007, in the settlement of early farmers in Shillourokambos, which was 9,500 years old, French archeologists came across the grave of a man buried with an eight-month cat, whose body was positioned in the same direction as human. It is now the oldest testimony of the presence of cats in human societies. Historical studies show that people intentionally brought cats into Cyprus, since there were none of their wild cousins on the island at that time. Archaeozoologists could not determine whether the cat from Shillourokambos was domesticated, they merely observed that it was large and resembled *Felis silvestris lybica* – an African wild cat (Vigne et al., 2004).

The results of large-scale research in which DNA of 979 *Felis catus* and *Felis silvestris* specimens from all over the world was compared, have only recently been issued (Driscoll et al., 2007). The researchers focused on two kinds of molecular DNA on which biologists traditionally study the diversification of various groups of mammals. The first one was mitochondrial DNA, which is inherited solely from a dam, whereas the second one were short nuclear DNA sequences called microsatellites. By means of proper computerized procedures they assessed the origin of each sampled cat. They measured the present similarities of genetic material among the animals and grouped similar to one another. The results revealed five different genetic groups. Four of these lines matched perfectly to well-known subspecies of a wild cat and were present exactly in their habitat: *F. silvestris silvestris* in Europe, *F. s. bieti* in China, *F. s. ornata* in Central Asia and *F. s. cafra* in South Africa. However, the fifth line included not only the fifth known subspecies of a wild cat – *F. s. lybica* living in the Middle East – but also hundreds of domestic cats which were sampled, including purebred and mixed breed cats from the USA, Great Britain and Japan. In reality, samples of *F. s. lybica* collected in Israel, United Arab Emirates and Saudi Arabia were virtually indistinguishable from domestic cats. That meant that all domestic cats possessed one common ancestor and their domestication began in the Middle East (Driscoll et al., 2007). It is hard to say why merely one subspecies of a wild cat could be domesticated. Diamond (2002) claims in his research that domestication process is influenced not only by the conscious choice of people, but also by the chosen traits of the animals themselves. Some argue that docile behavior of *Felis silvestris lybica*, which distinguished it from other subspecies of *Felis silvestris* must have been practically predestined for domestication (Cameron-Beaumont et al., 2002). In 1758, a domestic cat received the name *Felis catus*, given by Linnaeus.

However, much is still unknown about the time when cats conquered America. Reportedly, Christopher Columbus and his sailors travelled with cats on transatlantic voyages. Word has it that mariners sailing on the board of Mayflower brought cats to America so that they would control

pests and bring happiness. Supposedly – since there are also legends that the Vikings, who lived in those areas had their domestic cats as far back as in Pre-Columbian times. However, there is no archeological evidence that the animals brought by the Vikings became established there and survived until the time of Columbus (Adalsteinsson and Blumenberg, 2010). The first appearance of domestic cats in Australia is also shrouded in mystery. Researchers merely speculate that they arrived with European explorers in the 17th century (Driscoll et al., 2009). Very little is known about the first cats in Poland, either. Preliminary study of the history of domestic cats in our country conducted by Krajcarz et al. (2016) did not prove the presence of these animals in archaeological contexts in the time prior to the 1st century B.C.

Summary

Existing studies indicate that pioneers of agriculture from the Middle East were probably the first people who managed to domesticate cats. The presence of mice attracted cats to them, which had been in turn enticed by the abundance of grain. They arrived in ancient Egypt only six thousand years later thanks to commercial maritime routes. And although they were worshipped there and therefore they could not be transported outside the country, nevertheless, the archaeological research indicates that they inhabited also the regions of ancient Greece as early as 2500 years ago. Grain ships with feline passengers sailed directly to the Roman Empire from there. Cats introduced in this way could form colonies in the cities and afterwards, occupy new territories along with the Roman conquests. When the Romans were expanding their empire, purry cats travelled with them and were becoming common all over Europe. On the basis of their research, Ottoni et al. (2017) suggest that cats spread by the Mediterranean Sea just 1700 years B.C., which was the sign of their increasing popularity. Presumably, domestic cats were spreading on the earth along well-known trade routes among Greece, Rome and the Far East, reaching China through Mesopotamia to India by land and sea (Driscoll et al.).

And although *Felis catus* is the most popular companion animal nowadays (Driscoll et al., 2009), little is still known about its origin. Scientists are repeatedly trying to find out something about genetic differences which divide individual species of wild and domestic cats. They are often so similar to one another that it is difficult to tell whether it is a wild or a domestic cat. This is caused by the fact that the animals have been freely interbreeding for thousands of years. People played a small role in the process of domestication and development of the domestic cat. It is only recently that humans have started to control cat reproduction and mold the first contemporary breeds. Even the Egyptians, about whom we know that they bred cats in an extensive way, most evidently did not reproduce cats in terms of appearance, probably because of the fact that such various, characteristic variants had not emerged yet: both wild and domestic cats are depicted in their paintings as the ones which have the same tabby tiger cover (Driscoll et al., 2009). Experts believe that the majority of contemporary cat breeds were bred in the British Isles in the 19th century.

The first descriptions of phenotypically distinct animals appeared only in the writings of natural history artist Harrison Weir. The first exhibition of purebred cats did not take place until 1871 in Crystal Palace in London.

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SUMMARY

Since the appearance of the first cats near the human place of residence, several thousands of years have passed. Cats have become the most popular animal in the world. Statistics show that more than a third of American households have a cat. The number of these animals in the world is estimated at a minimum of 600 million – it is hard to find more measurable evidence of the evolutionary success of the species. However, today scientists still do not know when and how exactly a cat began the process of domestication

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