

## Evolution & Behaviour

# How cats conquered the Ancient world: a 9,000-years DNA tale

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When animals became domesticated, they gained protection from starvation, predation and disease but lost freedom. This is very well exemplified with the dog, the first animal that had been domesticated and that is very different from its ancestor, the wolf, in terms of behavior, morphology and physiology, which is also seen in its genome. But what about the cat that in many cases is still difficult to distinguish from wildcats, even at the genomic level, and whose behavior is not too different from the one of wildcats either?

It was known from analyses of the [mitochondrial DNA](#) from modern cats that all domestic cats, including feral ones, descend from the north African [wildcat \*F. s. lybica\*](#), that is also present in southwest Asia. This is the region where humans first started during the [Neolithic period](#) to domesticate plants, settled down and began farming. They also started to domesticate those animals that they used to hunt and eat, such as sheep, goats and pigs. The archeological find of a cat skeleton in a ca. 9,500-year-old child burial on Cyprus suggests that early Neolithic farmers had transported the cat to this island. This also suggests that cats had been drawn into the human sphere of life, presumably through the "vector" rodents that thrived on cereals stocks accumulated by the farmers who settled, for the first time in human history, in the Fertile Crescent. Rodents destroy the harvest through feeding upon it but also through polluting it with their excrements. Moreover, they gnaw on organic material, such as ropes on ships or leather parts of weapons. Cats preyed on these animals delivering the farmers from these pests and venomous animals. A commensal relationship was

established that benefitted both partners.

We performed a [paleogenetic](#) analysis of the mitochondrial DNA of more than 300 archeological cat remains from the last 10,000 years in Europe, South West Asia and North Africa. In agreement with the hypothesis that the translocation of animals by Neolithic farmers is indicative of an early taming process, the phylogeographic pattern of cats changed after the Neolithization. Indeed, the Anatolian lineage of ancient native *F. s. lybica* wildcat, was found in more recent remains from southeast Europe as well as elsewhere in southwest Asia where it is known, from archeological data, that the Anatolian farmers had migrated at later periods. Many archeologists had been convinced for a long time that the cat had been tamed in Egypt because of the particular role that cats had played in ancient Egypt. This was deduced from tombs and statues, but also described by Greek-Roman writers such as Herodotus. Indeed, so far it was the abundant Egyptian iconography that represented the major source of information about the prominent place, worshipped and adored, allocated to cats in ancient Egypt. Due to this particular status, we were not too surprised when we found a particular mitochondrial lineage in cat remains from Egypt dating to the 1<sup>st</sup> millennium BCE. We were surprised, however, to see this lineage spreading very fast and efficiently to other locations within a few centuries, including a Viking site at the Baltic Sea. In Anatolia by Roman times, the native lineage was not the majority anymore, but was surpassed by the Egyptian lineage. In addition, we discovered the mitochondrial lineage of the Central and south Asian wildcat in remains from a Roman port in Egypt. This port

was located at the Red Sea and it was characterized by very tight trading bonds with India. Putting together these different pieces of evidence a composed picture arose that showed us that the dispersal of cats must have been occurred mainly by ships where they either embarked themselves or were embarked by seafarers to protect the food supply and the ropes from rodents. They might have been compensated with new delicacies, such as fish. Thus, cats seem to have conquered the world by boat - a conclusion we would not have been able to draw without the analysis of so many samples!

We could also add another jigsaw piece to the tale of cat domestication by analyzing the coat pattern: while the fur of all wildcats has stripes, many domestic cats have a patchy fur marking. According to our samples, the gene behind this pattern made its appearance after the 13<sup>th</sup> century CE, and then spread from Anatolia throughout the Ottoman Empire. This is evidence in support of the hypothesis that cats had not been selected very much over most of the time they used to live in human company, but rather kept on being independent, almost wild hunters with the difference that they just did not run away from humans.