

Cats' family tree rooted in Fertile Crescent, study confirms

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The Fertile Crescent of the Middle East has long been identified as a “cradle of civilization” for humans. In a new genetic study, researchers at the University of California, Davis, have concluded that all ancestral roads for the modern day domestic cat also lead back to the same locale.

Findings of the study, involving more than 11,000 cats, are reported in the cover article of the January issue of the journal *Genomics*.

“This study confirms earlier research suggesting that the domestication of the cat started in the Fertile Crescent region,” said Monika Lipinski, lead researcher on the study and a doctoral candidate in the School of Veterinary Medicine. “It also provides a warning for modern cat fanciers to make sure they maintain a broad genetic base as they further develop their breeds.”

Leslie Lyons, an authority on cat genetics and principal investigator on this study, said: “More than 200 genetic disorders have been identified in modern cats, and many are found in pure breeds. We hope that cat breeders will use the genetic information uncovered by this study to develop efficient breed-management plans and avoid introducing genetically linked health problems into their breeds.”

HISTORY OF THE MODERN CAT

Earlier archaeological evidence and research on the evolutionary history of cats has suggested that domestication of the cat originated about

5,000 to 8,000 years ago in the Fertile Crescent, a region located today in the Middle East. This is the area around the eastern end of the Mediterranean, stretching from Turkey to northern Africa and eastward to modern day Iraq and Iran. This domestication of the cat occurred as humans transitioned from nomadic herding to raising crops and livestock.

Cats, with their penchant for hunting mice, rats and other rodents, became useful companions as people domesticated, grew and stored wild grains and grasses. Eventually, cats also became pets but were never fully domesticated. Even today, most domestic cats remain self-sufficient, if necessary, and continue to be efficient hunters, even when provided with food.

Cats and their gene pools spread rapidly around the world as ancient civilizations developed trade routes. Unlike other domesticated species, there has been little effort to improve on the cat for functional purposes. Instead, development of cat breeds has been driven more by preferences for certain aesthetic qualities like coat color and color patterns.

Today, there are 50 recognized cat breeds. Of that total, 16 breeds are thought to be “natural breeds” that occurred in specific regions, while the remaining breeds were developed during the past 50 years.

THE UC DAVIS STUDY

In this study, the UC Davis research team focused on:

- tracing the movement of the modern cat through the ancient world and to the Americas,
- measuring changes in genetic diversity as cats dispersed throughout the world, and
- measuring any loss of genetic diversity that might have occurred in the

development of the older or more contemporary breeds.

The researchers collected samples of cheek cells from more than 11,000 cats. These cats represented 17 populations of randomly bred cats from Europe, the Mediterranean, Asia, Africa and the Americas, as well as 22 recognized breeds.

DNA samples of most breeds were obtained at cat shows or were sent in upon the lab's request by cat owners in the United States. The study was assisted by a host of collaborators from throughout the world. DNA, or deoxyribonucleic acid, is the hereditary material in humans, other animals and plants. It carries the instructions or blueprint for making all the structures and materials that the organism needs to function.

Genetic markers called "microsatellite markers," commonly used for DNA profiling, were used to determine the genetic relationships of cat breeds, their geographic origins and the levels of genetic loss that have resulted from inbreeding.

NEW FINDINGS

From the DNA analysis, the researchers found that the cats were genetically clustered in four groups that corresponded with the regions of Europe, the Mediterranean basin, east Africa and Asia.

They discovered that randomly bred cats in the Americas were genetically similar to randomly bred cats from Western Europe. They also found that the Maine coone and American shorthair — two breeds that originated in the United States — were genetically similar to the seven Western European breeds. This suggests that cats brought to the New World by European settlers have not had sufficient time to develop significant genetic differentiation from their Western European ancestors.

The study yielded many interesting breed-specific findings. For example, the researchers found that the Persian breed, perhaps the oldest recognized pure breed, was not genetically associated with randomly bred cat populations from the Near East, but rather was more closely associated with randomly bred cats of Western Europe.

In addition, the researchers found that, of the Asian cat breeds, only the Japanese bobtail was genetically clustered with Western cats, although it did retain some Asian influence.

Cats from the Mediterranean region were found to be genetically uniform, perhaps a result of the constant movement of ships and caravans during the early era of the cat's domestication, the researchers suggested.

LESSON FOR CAT BREEDERS

The study found that genetic diversity remained surprisingly broad among cats from various parts of the world. However the data indicated that there was some loss of diversity associated even with the long-term development of foundation cat breeds – those breeds that provided the genetic basis from which modern pure breeds were developed.

The researchers note that, given the relatively short time span during which modern breeds are emerging, cat breeders should proceed cautiously as they develop their breeds, making sure to maintain a broad genetic base that will minimize introduction of genetically based health problems.

Source: University of California - Davis

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