Abstract

People all around the world love their cats. Cats are cute, and they can also be helpful! Cats are great at catching mice and other small animals. Long ago, cats evolved from wildcats that started hunting for prey around human settlements. When and where did this happen? We analyzed DNA from over 2,000 cats from around the world. We found that cats’ DNA tells a story that follows ancient human travels. Our data show wildcats were most likely first domesticated in the eastern Mediterranean (Near East). Cats spread out to the rest of the world as traders and sailors brought them on their journeys. We are still learning new things even about the animals we know best!

Introduction

Today, people all over the world keep cats as pets and companions. But when did people and cats start living together? And where?

People have pet cats for many reasons. Cats can be fun to be around. And of course, they are cute. But that’s not all – they can also be very useful! Cats are natural predators. They are skilled at catching small animals, like mice, rats, birds, and snakes. Mice and rats carry germs that can make people sick, and they love to eat seeds. Keeping a cat around is an effective way to keep mice out of your food storage!

Modern cats evolved from at least one subspecies of wildcat called *Felis lybica*. *F. lybica* are also known as African wildcats, even though they live in Europe and Asia too. Scientists think wildcats started hunting rodents around human settlements over 10,000 years ago. That’s around the time that people first started farming. Over time, these wildcats evolved to be less solitary and even to enjoy the presence of people.

We wanted to find the center of origin for domestic cats – the place where people and cats first started to live side by side.
**Methods**

We started by thinking about where cats' center of origin could possibly be. We knew it needed to be somewhere where wildcats can live. And it needed to be one of the regions where people started farming earliest. With that in mind, there were three main possibilities:

1. the eastern Mediterranean (Near East)
2. the Indus River Valley in Pakistan
3. the Yellow River Valley in China

Other scientists have found clues that point to the eastern Mediterranean region. That's where the oldest signs of farming have been found. But to test whether cats evolved there, we needed to analyze DNA from all three possibilities, and also from the places in between.

We gathered DNA samples from 2,001 random-bred cats from 85 sites in 40 different countries. Most of our samples came from Europe and Asia. We also included 4 African wildcats and 10 samples from cats that were likely mixes between European wildcats and domestic cats.

DNA is made out of billions of base pairs. The order that base pairs appear on a strand of DNA is mostly the same for a whole species. We looked for places where a single base pair is different for a minority of individuals. We also looked at places where short patterns of base pairs repeated many times. We then used statistics to describe the most important similarities and differences. That told us about the genetic diversity of cats in those areas.

**Results**

Our analysis gave us some interesting findings!

- The places with the highest genetic diversity are mostly in the eastern Mediterranean region (Fig. 1).
- Cats who live far apart from each other have bigger differences in their genes.
- Cats who live in isolated places, like islands, have unique features in their DNA. But they are still cats – they didn’t evolve into a new species.
- Cats from the Americas, Australia, Kenya, and Tunisia are closely related to Western European cats. That’s because Europeans colonized these places in the past.

The pattern on this map shows that the eastern Mediterranean region is the most likely center of origin for cats. How would the map look different if the Indus Valley or the Yellow River region was the center of origin?

**Figure 1:**
Genetic diversity of cats at each study site. North and South America and Australia are not shown, because cats were brought to those continents much more recently.
Discussion

The story of cats spreading out through the world mirrors the story of human migration. Our results tell us that cat domestication probably began in the eastern Mediterranean. That's where we found the highest genetic diversity. Cats' genetic diversity gets smaller as you move away from the eastern Mediterranean. So, the farther you go from the Mediterranean Sea, the more recently cats arrived there.

Still, there are also some places far away from the Mediterranean where there is high diversity among cats. These places were part of the ancient Silk Road. Traders traveled long distances between eastern Asia and the Mediterranean to buy and sell valuable goods. People traveling by sea also brought cats with them. Sailors liked having cats around to hunt mice and rats. They had to bring their food with them on long sailing trips and they didn't want rodents to eat up all their food.

Today there are cats on every continent except for Antarctica. But their DNA still connects them to their center of origin in the eastern Mediterranean!

Conclusion

People change the world around them in many ways. When people started farming, they changed the landscape around them. Wildcats started spending time around people, hunting the rodents that ate the humans’ food. The cats changed the environment by keeping the pests under control. As a result, humans and cats learned to enjoy each other’s company. You can make your community a more inviting place by looking for ways you can help!

Glossary of Key Terms

- **Base pair** - any two of the chemicals adenine (A), cytosine (C), guanine (G), and thymine (T). These chemicals hold the genetic information in DNA.
- **Center of origin** - the place or area where a group of organisms developed the characteristics that set them apart from similar organisms. In our research, we looked for where domestic cats first started living with people.
- **DNA (deoxyribose nucleic acid)** - the genetic material found in all of our cells. This information gets passed on from organism to organism.
- **Near East** - a region at the eastern end of the Mediterranean Sea that includes parts of Southeastern Europe, North Africa, and Western Asia. It includes the historical region called the Fertile Crescent.
- **Random-bred cats** - Cats that are born outside of humans’ control. They are also called feral cats, alley cats, barn cats, or street cats.
- **Settlement** - a place where people live, like a village, town, or city.
- **Silk Road** - An ancient trade route connecting the Mediterranean countries with eastern Asia.

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Check your understanding

1. What clues did we use to figure out cats’ center of origin?

2. Cats’ DNA also holds clues about places their ancestors lived. What things in your life connect you to relatives or ancestors?

3. What animals in your area rely on or benefit from humans?

4. People change the environment in many ways, such as by building cities and roads. This affects the animals that live nearby. Describe the way a non-human animal changes its environment. Does this animal’s activity affect humans? How?

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