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By Jack Tamisiea

From urban bodegas to remote islands, cats are everywhere. But determining where and when humans first adopted feral felines has proven tricky.

So far, scientists have focused on Africa and the Middle East, where the wildcats that gave rise to the modern pets are found. Archeological finds and recent work on ancient genetics has led many researchers to hypothesize that stone age farmers domesticated cats nearly 10,000 years ago in the Middle East and brought the rodent-killing kitties along with them as they subsequently moved into Europe.

Now, a new DNA analysis of a sprawling set of ancient feline remains reveal that the precursors to modern housecats originated in North Africa and only reached Europe around 2,000 years ago.

The late arrival of domestic cats is surprising based on how widely felines are depicted in ancient art and artifacts, according to Leslie Lyons, a feline geneticist at the University of Missouri who was not involved in the new study. She thinks the new work provides a crucial data point that will help researchers crack the larger code of cat domestication in other parts of the world.

“Cats are still mysterious, and they’re giving up their mysteries one whisker at a time,” she says.

The conundrum of domestic cats

The remains of ancient cats are relatively rare in the archaeological record. And it can be hard to distinguish the remains of domestic felines from their wild relatives—unlike dogs, which have developed several physical traits, including puppy-dog eyes, that differentiate them from their wolf-like ancestors.

The oldest evidence of what appears to be a domestic cat was unearthed in 2004, when archaeologists discovered the skeleton of a cat curled up alongside the remains of a man in a tomb in Cyprus. The pair dated back to the new stone age, or Neolithic, around 7,500 BCE, supporting the theory that domestic cats originated shortly after the advent of agriculture in the eastern Mediterranean. Later art from Egypt, where several cats were depicted wearing collars and some deities possess feline-like features, illustrate that ancient Egyptians had also domesticated cats by around 2,000 BCE.

Ancient genetics initially supported this timeline, according to paleogeneticist Claudio Ottoni, a National Geographic Explorer and the senior author of the new study. In 2017, he coauthored a paper that analyzed the mitochondrial DNA of several ancient cat specimens and concluded that domestic cats initially dispersed out of the Middle East around 6,500 years ago.

But Ottoni and colleagues had a hunch that the mitochondrial DNA did not tell the full story. An animal inherits mitochondrial from its mother, so this genetic signature preserves only the maternal lineage’s evolutionary history. A more complete picture comes from the organism’s genome, or genetic code. “Full genomes offer a way higher resolution as they combine the ancestries of many individuals back in time,” says Ottoni, who is based at the University of Rome Tor Vergata.

Ancient genetics reveal the rise and spread of domestic cats

To construct domestic cat genomes, the team collected genetic material from 225 ancient cat specimens and several modern wildcats living in Northern Africa and Israel. The scientists then radiocarbon-dated a subsection of the ancient felines, which spanned a period of more than 10,000 years. The work yielded 87 genomes from both ancient and modern cats.

The team's analysis revealed that ancient cats that lived before 200 BCE were not the ancestors of modern housecats. Instead, these ancient felines were genetically similar to modern-day European wildcats (Felis silvestris). Researchers propose that these cats likely lurked near Neolithic communities or were hunted for food and fur, which is why their remains turn up at archaeological sites. While these cats likely weren't pets and roamed freely, they endeared themselves to some stone age cultures—one feline from Bronze Age Sicily was interred in a bell-shaped vase, for example.

The team discovered a closer genetic connection between domestic cats and felines that lived within the last 2,000 years. The oldest remains of an ancestral domestic cat on mainland Europe dated back to the 1st century CE, during the early days of the Roman Empire.

According to Jonathan Losos, an evolutionary biologist at Washington University in St. Louis who was not involved in the new paper, this confirms that the previous theory—that cats dispersed 6,500 years ago—was inaccurate. The whole genome analysis shows that "no such migration occurred," Losos says. It is not unprecedented for mitochondrial DNA to provide misleading insights on evolutionary relationships, he says.

According to Ottoni, the fact that cats spread so far in only 2,000 years highlights how effective felines are at adapting to the human world. They were also aided by good timing. "The urban environments that became widespread during the Roman era may have represented ideal settings in which cats could best exploit the human niche," he says.

These early domestic cats were genetically similar to modern African wildcats seen today around Tunisia. This provided evidence that the predecessors of modern housecats originated in Northern Africa instead of the Middle East. The team also concluded that North African felines are the ancestors of an enigmatic population of wildcats found today in Sardinia.

The first cat people

The researchers posit that early domestic cats were transported by sea-faring Phoenician and Punic cultures, who maintained a network of trading colonies throughout Northern Africa, Sardinia and the southern Iberian Peninsula. The Punic people were also well-acquainted with the Romans, with whom they fought a series of wars that culminated in the destruction of ancient Carthage in 146 BCE.

Once domestic cats reached Europe, their spread was aided by Roman military conquests. The researchers confirmed that feline remains found in Roman military sites in Austria, Serbia and Britain were all closely linked to modern domestic cats.

Ancient DNA is helping investigate other domestic cat migrations in world history. A different team of researchers analyzed genetic material from small feline bones unearthed in China and discovered that domestic cats reached East Asia 1,400 years ago alongside Middle Eastern merchants traversing the Silk Road. The new findings, published in the journal Cell Genomics, also reveal that much older feline skeletons represent local leopard cats. While not fully domesticated, these felines began frequenting Neolithic communities to feed around 5,400 years ago.

To get a better sense of how communities in North Africa first domesticated cats, Ottoni's team plans to examine the genetics of ancient samples from throughout the region, including mummified cats from Egypt.

According to Losos, extracting ancient DNA from these notoriously fragile mummies could further rewrite the opening chapters of the evolutionary epic of domestic cats. DNA from North African felines over 2,000 years old "is essential to pinning down where and when the domestic cat evolved," he says.

Lyons agrees but emphasizes that interpreting ancient DNA is challenging. "Sequencing ancient DNA is tricky work," she says. "It's a bit like fighting an African wildcat."

A partir do texto acima, responda as questões abaixo em português.

1) Inicialmente, onde se concentraram as buscas pelos ancestrais felinos e por que motivo tal(is) localidade(s) foram escolhidas? Com as novas evidências, de onde se acredita que os gatos se originaram?

Os cientistas inicialmente se concentraram na África e no Oriente Médio, onde são encontrados os gatos selvagens que deram origem aos animais de estimação modernos. As novas evidências de DNA sugerem que os gatos domésticos se originaram no Norte da África e só chegaram à Europa há cerca de 2.000 anos.

2) Qual a evidência mais antiga de um gato doméstico foi encontrada e onde?
Foi quando arqueólogos encontraram o esqueleto de um gato enrolado ao lado dos restos mortais de um homem em uma tumba no Chipre. O par datava do período Neolítico, por volta de 7.500 a.C.
3) As buscas dos ancestrais felinos se basearam no estudo de DNA mitocondrial e de DNA genômico. Quais as diferenças entre as conclusões que podem ser obtidas analisando-se os dois conjuntos de DNA?

Um animal herda o DNA mitocondrial de sua mãe, portanto, essa assinatura genética preserva apenas a história evolutiva da linhagem materna. Uma imagem mais completa vem do genoma do organismo, ou código genético.

4) Existe uma conexão genética entre os gatos domésticos modernos e os felinos que viveram nos últimos 2000 anos. De que século datam os restos mortais mais antigos de um gato doméstico ancestral na Europa continental?
Datam do século I d.C., durante os primórdios do Império Romano.
5) Como o Império Romano contribuiu para que os gatos domésticos se espalhassem por tão longe nos últimos 2000 anos?

Devido à eficácia dos felinos em se adaptar ao mundo humano. Eles também foram auxiliados pelo momento oportuno, pois os ambientes urbanos se tornaram comuns durante a era romana, o que pode ter representado cenários ideais para a migração.