# Dogs Evolved with Climate Change

*by AMNH on 08/18/2015 10:41 am*

RESEARCH POSTS

New research heavily based on the Museum's fossil dog collection—the largest of its kind in the world—shows how dogs evolved in response to a cooling, drying climate in North America over the last 40 million years.

This is a skeleton of a 30-million-year-old fossil dog, *Archaeocyon* ("ancient dog"). The earliest dogs, going back 40 million years in North America, were animals no larger than a Chihuahua or a common house cat today.



The study, published today in ***Nature Communications*** ***(http://dx.doi.org/10.1038/ncomms8976)*** , demonstrates that predators like dogs are sensitive to climate change because it alters the way they hunt and eat.

Dogs are native to North America, though these early species—small animals that would have looked like mongooses—would be out of place at a Kennel Club show. These ancient canines were well-adapted to a wooded habitat, with forelimbs that were not specialized for running but instead flexible enough to grapple with whatever prey walked by.

Z. Jack Tseng, a National Science Foundation and Frick Postdoctoral Fellow in the Museum's Division of Paleontology is the study co-author.

©AMNH/D.Finnin

But beginning about 23 million years ago, global climate began cooling considerably, leading to other large-scale shifts. In North America, the continental interior grew much drier, and forests slowly gave way to open grasslands. To find out how this change affected the evolution of carnivores, Z. Jack Tseng, a National Science Foundation and Frick Postdoctoral Fellow in the Museum's **Division of Paleontology** teamed up with researchers at Brown University and Universidad de Málaga in Spain to examine the elbows and teeth of 32 species of canids spanning the period from 40 million years ago to 2 million years ago.

The researchers saw clear patterns in these bones: While climate change cleared the landscape, dogs were evolving from ambushers to pursuit-pounce predators like modern coyotes or foxes — and ultimately to whole-day pursuers like wolves in high latitudes.

One telltale change, in dog elbows, has to do with the structure of the base where the humerus articulates with the forearm. Over time, this position changed from a flexible one where the front paws could swivel to grab and wrestle prey, to one with a fixed, downward-facing structure specialized for endurance running.

In addition, researchers found that dogs' teeth became more durable, perhaps reflecting the need to eat prey that had been rolled around in the grit of the savannah rather than grabbed from a damp, leafy forest floor. Open habitats also provide more opportunities for scavenging, which might require more durable teeth.

The great diversity of sizes and shapes of domestic dog breeds is paralled, if not surpassed, by what we see in the fossil record of dogs. This photo shows one of the earliest and smallest dogs, *Archaeocyon pavidus* (left), next to the largest and one of the most specialized canids, *Epicyon haydeni*.

©AMNH/J.Tseng

These new findings could help project some of the effects that human-caused climate change is setting in motion.

“The fossil and recent records of animals and plants in this and other museum collections around the world represent the most critical source of information for us to understand the long series of events leading up to the present day,” said Tseng. “They are absolutely necessary to help future-cast the impact of ongoing anthropogenic and natural climatic changes on biodiversity.”

*Tags:* ***Paleontology***