Researchers study genetic evolution of African dogs

August 4 2009

Five milliliters of blood is collected for genetic analysis from a female dog near Mbale, Uganda. (Corin Boyko)

(PhysOrg.com) -- African village dogs are not a mixture of modern breeds but have directly descended from an ancestral pool of indigenous dogs, according to a Cornell-led genetic analysis of hundreds of semi-feral village dogs.

That means that village dogs from most African regions are genetically distinct from non-native breeds and mixed-breed dogs. They also are more genetically diverse because they have not been subjected to strict breeding, which artificially selects genes and narrows breeds' gene pools.

The study, published online Aug. 3 in the Proceedings of the National Academy of Sciences, sheds light on the poorly understood history of dog domestication. Future work may help explain the timing and locations of dog domestication and how dogs have adapted to the African environment, human settlements and dietary shifts.

"The genes of modern breeds all cluster together in one little group, but the African village dogs we sampled show much greater diversity genetically," said lead author Adam Boyko, a research associate in the lab of Carlos Bustamante, the paper's senior author and a professor of biological statistics and computational biology.

Field researchers from the University of California-Davis, who are part of the Cornell-based Village Dog Genetic Diversity Project, and others, including local veterinarians, sampled 318 village dogs from seven regions in Egypt, Uganda and Namibia. They also looked at breed dogs, including those reputed to be from Africa, Puerto Rican dogs and mixed-breed dogs from the United States. Researchers and veterinarians also collected photos and information on weight, age, coat color and body measurements and sent blood samples for analysis to the Canine DNA Bank at the Baker Institute for Animal Health, part of Cornell's College of Veterinary Medicine, which maintains a growing DNA archive of dogs worldwide.

Boyko, Bustamante and colleagues used a computer program to track genetic diversity in the samples. They found that the African village dogs are a mosaic of indigenous dogs descended from early migrants to Africa and non-native mixed-breed dogs. Such reputed African breeds as Pharaoh hounds and Rhodesian ridgebacks clustered with non-native dogs, suggesting they originated from outside of Africa.

A previous study of village dog genetics confirmed that domesticated dogs likely originated from Eurasian wolves some 15,000 to 40,000

years ago, and reported that East Asian village dogs had more genetic diversity than any others sampled for the study, suggesting that dogs were first domesticated in East Asia. But the African village dogs analyzed in this study revealed similar genetic diversity, which raises doubt on the claim that dogs were first domesticated in East Asia.

As the group continues to collect samples from worldwide locations, including the Americas, the researchers will explore where modern breeds originated and how much genetic diversity has been lost with the development of modern breeds.

The researchers are interested in working with dog owners and local veterinarians to get more DNA samples of dogs from remote corners of the world. For more information: villagedogs.canmap.org/ .

Provided by Cornell University (news : web)