

Scientists find evidence our best friends, dogs, similarly adapted to malaria in Africa

October 10 2017

Once domesticated, dogs spread across the globe wherever humans migrated and settled.

"Recently, we have shown the first evidence that dogs can undergo similar adaptations as humans, using the same [genes](#) to live in the high altitudes of Tibet," said Dr. Ya-ping Zhang.

Now, the Chinese research team led by Dr. Zhang has successfully identified genes selected in African dogs and functionally verified the action of one of these as the first evidence of dog adaptation to malaria.

Dogs have survived in tropical environments for thousands of years alongside humans," said Dr. Zhang. "In this study, we have identified genes associated with insulin secretion and sensitivity, immunity, angiogenesis and ultraviolet protection that showed adaptive selection.

The findings were published in the advanced online edition of the journal *Molecular Biology and Evolution*.

To perform the study, Yan-Hu Liu et al. sequenced the genomes of 19 dogs from Nigeria. For this new data set, they identified a set of [candidate genes](#) for natural selection in African village dogs and also carried out functional studies to confirm that one of these, ADGRE1, might be responsible for providing host immunity to Plasmodium infection—a target of selection associated with malaria.

"Our study suggests ADGRE1 also contributes to defense against Plasmodium infection in dogs, and thus, convergent evolution in this gene between humans and dogs," said Dr. Guo-Dong Wang. "This is a novel finding since in earlier studies the most apparent cases of [convergent evolution](#) between humans and dogs were in genes for digestion and metabolism, neurological process, and cancer."

The authors went on to show in cell culture experiments in the lab that the derived variant of ADGRE1 is linked to increased phagocytosis in cells infected with Plasmodium parasites, making it very likely that the ADGRE1 confers protection against Plasmodium infection by stimulating the immune response against the parasite.

In addition, they investigated the Nigerian dogs' demographic history in relation to other dogs, including Eurasian grey wolves and African golden wolves. They found that the Nigerian dog population diverged from Eurasian dog populations around 14,000 years ago. After this divergence, the population fell on hard times, and experienced a severe bottleneck (leading to a reduced genetic diversity within the Nigerian dog population) and also gene flow from African golden wolves after the divergence.

Finally, they explored signals of selection in the Nigerian dog samples and identified a number of candidate genes that are also linked to dietary and environmental factors.

As the authors note, since ADGRE1 has also been implicated in an adaptive response to Plasmodium in humans, it makes for a nice genetic tale of [dogs](#) utilizing similar tricks from living alongside their human companions to adapt to new environments.

More information: Whole-genome sequencing of African dogs provides insights into adaptations against tropical parasites, *Molecular*

Biology And Evolution (2017). [DOI: 10.1093/molbev/msx258](https://doi.org/10.1093/molbev/msx258)

Provided by Oxford University Press

Citation: Scientists find evidence our best friends, dogs, similarly adapted to malaria in Africa (2017, October 10) retrieved 17 July 2024 from <https://phys.org/news/2017-10-scientists-evidence-friends-dogs-similarly.html>

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