Scientists move a step closer to understanding why leopards can't change their spots

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North China leopard (Panthera pardus japonensis). Image: Wikipedia

The leopard cannot change its spots, nor can the tiger change its stripes, but a new research report published in the January 2009 issue of the journal *Genetics* tells us something about how cats end up with their spots and stripes. It demonstrates for the first time that at least three different genes are involved in the emergence of stripes, spots, and other markings on domestic cats. Researchers have also determined the genomic location of two of these genes, which will allow for further studies that could shine scientific light on various human skin disorders.

"We hope that the study opens up the possibility of directly investigating the genes involved in pattern formation (i.e., the establishment of stripes,

spots, and other markings) on the skin of mammals, including their structure, function, and regulation," said Eduardo Eizirik, a researcher involved in the work from the Pontifical Catholic University of Rio Grande do Sul, Brazil. "From these studies, we hope to understand how the different coat patterns have evolved in different mammalian groups, and to be able to investigate their roles in adaptation to different environments, such as their importance for camouflage in wild cat species."

Scientists crossed domestic cats with different coat patterns, such as stripes and blotches, and tracked the inheritance of these patterns among their offspring. Genetic samples were collected and used to type various molecular markers. Results showed that specific markers were inherited by a kitten every time a given coat pattern appeared, suggesting that the marker and the gene causing the coat pattern were located in the same region of the genome.

Using statistical procedures called linkage mapping, scientists determined the genomic location of two genes involved in these traits. By clarifying the inheritance of markings in one mammalian species, researchers hope to identify and characterize the implicated genes and then determine if they apply to other mammals, such as humans. The hope is that this discovery will shed new light on human skin diseases that appear to follow standardized patterns.

"Coat color and markings of animals are obvious traits that have long attracted the interest of geneticists" said Mark Johnston, Editor-in-Chief of the journal *Genetics*, "and this study in cats may ultimately help us better understand the genetics behind hair and skin color in other mammals. In turn, this understanding could lead to new therapeutic strategies to correct skin problems in people."

More information: Eduardo Eizirik, Victor A. David, Valerie Buckley-

Beason, Melody E. Roelke, Alejandro A. Schäffer, Steven S. Hannah, Kristina Narfström, Stephen J. O'Brien, and Marilyn Menotti-Raymond, Defining and Mapping Mammalian Coat Pattern Genes: Multiple Genomic Regions Implicated in Domestic Cat Stripes and Spots, *Genetics* 2010 184: 267

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