

DNA study unlocks mystery to diverse traits in dogs

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Discovery offers potential benefits for dogs and their owners

What makes a pointer point, a sheep dog herd, and a retriever retrieve? Why do Yorkshire terriers live longer than Great Danes? And how can a tiny Chihuahua possibly be related to a Great Dane?

Dogs vary in size, shape, color, coat length and behavior more than any other animal and until now, this variance has largely been unexplained. Now, scientists have developed a method to identify the genetic basis for this diversity that may have far-reaching benefits for dogs and their owners.

In the cover story of tomorrow's edition of the science journal *Genetics*, research reveals locations in a dog's DNA that contain genes that scientists believe contribute to differences in body and skull shape, weight, fur color and length – and possibly even behavior, trainability and longevity.

"This exciting breakthrough, made possible by working with leaders in canine genetics, is helping us piece together the canine genome puzzle which will ultimately translate into potential benefit for dogs and their owners," said study co-author Paul G. Jones, PhD, a Mars VeterinaryTM genetics researcher at the Waltham[®] Centre for Pet Nutrition – part of Mars[®] Incorporated, a world leader in pet care that has been studying canine genetic science for the past eight years. "By applying this research approach, we may be able to decipher how genes contribute to physical or behavioral traits that affect many breeds."

Dogs originally derived from the wolf more than 15,000 years ago – a blink of the eye in evolutionary terms. Selective breeding produced dogs with physical and behavioral traits that were well suited to the needs or desires of their human owners, such as herding or hunting ability, coat color and body and skull shape and size. This resulted in the massive variance seen among the more than 350 distinct breeds that make up today's dog population. Until now, the genetic drivers of this diversity have intrigued scientists who have been trying to explain how and why the difference in physical and behavioral traits in dogs changed so rapidly from its wolf origins.

An international team of researchers, which included scientists at the National Human Genome Research Institute, the University of Utah, Sundowners Kennels in Gilroy, California and Mars' Waltham Center for Pet Nutrition in the United Kingdom, studied simple genetic markers known as Single Nucleotide Polymorphisms, or SNPs, to find places in the dog genome that correlate with breed traits. Because many traits are

"stereotyped" – or fixed within breeds – researchers can zero in on these "hot spots" to see what specific genes are in the area that might contribute to differences in traits.

The research used 13,000 dog DNA samples provided by Mars Veterinary, which holds one of the most comprehensive canine DNA banks in the world. This collection has been built up with the help of pet owners who have consented to their pets providing cheek swabs and blood samples for the database. Mars' DNA bank allowed the study to cover most of the American Kennel Club recognized breeds that span a wide variety of physical and behavioral traits and differences in longevity.

"With further refinement and additional data, this method could be used to tailor products that may benefit the health of pets," Jones said. "Pet owners and veterinarians may be able to develop better care regimes based on this knowledge. In addition, genetic information about behavioral traits, such as trainability and temperament, could also help veterinarians identify the most lifestyle-appropriate pet for an owner."

This research may also have implications for human health, as dogs suffer from many of the same diseases that we do.

Source: Weber Shandwick Worldwide

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