WHY YOUR DOG LOVES SWEETS

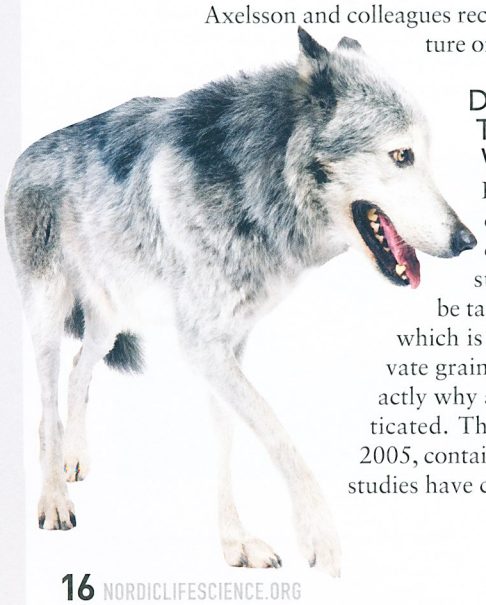
Could sugar have fueled dog domestication? Uppsala University researchers find answers in the wolf and dog genomes.

TEXT by CHRIS TACHIBANA

HOW DID DOGS BECOME OUR BEST FRIENDS? Sugars and starches might have helped seal the deal, according to work led by Erik Axelsson, assistant professor of medical biochemistry and microbiology at Uppsala University. A major research focus at the university is comparing the genomes of related wild and domestic animals such as chickens and pigs to find genes important to domestication. Axelsson says this work also directly benefits humans.

"Comparing the genomes of wild and domestic animals gives us information about gene functions, including understanding what similar genes do in humans, which is important for understanding the genetics of disease," he says.

Axelsson and colleagues recently published a study in Nature on the dog and wolf genomes.



DIFFERENCES BETWEEN DOGS AND WOLVES

Dogs and wolves have a recent common ancestor. Archeological and geographical records suggest that wolves began to be tamed at least 10,000 years ago, which is when humans began to cultivate grains. But we still don't know exactly why and how dogs became domesticated. The dog genome, sequenced in 2005, contains clues, but most dog genome studies have compared different dog breeds instead of dogs and wolves. Comparing DNA sequences from 12 wolves and 60 dogs of 14 different breeds and using existing genomic sequences as guides, Axelsson and coworkers from Harvard University, Massachusetts Institute of Technology, Hedmark University College in Norway, and the Swedish University of Agricultural Sciences found genomic regions that appeared to have been selected during dog domestication. The regions included genes that affect physiology and behavior, as expected since dogs and wolves look different and early selection was probably for traits such as a willingness to approach humans. A new discovery was that dogs and wolves differ in 10 genes in starch and fat metabolism.

For example, dogs have extra copies of a gene for an amylase enzyme that breaks down starch, so dogs make more amylase than wolves. Differences in other genes for enzymes in starch digestion and sugar absorption suggest that dogs are simply better than wolves at using the carbohydrates in grain products like bread.

BENEFIT BOTH DOGS AND HUMANS

The next steps, says Axelsson, include determining the timing of genetic changes to answer long-standing questions about dog and human evolution. To know our best friends is to know ourselves, says Axelsson.

"Humans and dogs have shared an environment for a long time, so understanding adaptive changes in dogs could help understand parallel adaptations to a starch-rich diet in humans in the last 10,000 or 20,000 years."

This knowledge could benefit both dogs and humans, since both species get metabolic diseases such as diabetes and sometimes just need to cut back on the sweets. NLS