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Centreville Animal Hospital Newsletter

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"Helping you Experience the Unconditional Love"

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### News and Views

**Canine Influenza Update** Centreville We have not seen to date the massive infection of our dogs with this virus as was predicted. All of the samples we have sent in on coughing dogs have been returned to date as negative for this virus. Many factors play into that great achievement. Those who boarded their pets over the Labor Day weekend that had those dogs vaccinated did us all a great service. The kennel facilities in Northern Virginia have done a great job in isolating any coughing dogs and their staffs and management are to be highly commended. The Fairfax County Animal Shelter has helped all of us by isolating dogs in their care and not adopting them out. The wardens are still seeing coughing dogs when they are found as strays and before the dogs are introduced into the shelter. So the virus is still out here but the dog owners, veterinarians, kennel people and the media are to be thanked by all of us for helping control this disease as well as they have to date. But keep alert for a sick coughing dog with a fever. Let us know if you think your dog fits this set of symptoms.

**Rabies Awareness Week** **Richmond** The Virginia Department of Health (VDH) partners with



the Virginia Veterinary Medical Association to sponsor a statewide rabies awareness effort. This year the week beginning September 28 has been designated as Rabies Awareness Week. As recently as the 1950s, it was not unusual for the VDH to report over 100 dogs with rabies in the Commonwealth in a single year. Last year, VDH received 4 reports of dogs with rabies. The reservoir of rabies in the Commonwealth is wildlife and between vaccination and animal control, coupled with early detection and response to exposures helps maintain a barrier between the reservoir and ourselves. An interesting website especially geared to get kids attention about this topic is

<http://www.cdc.gov/rabiesandkids/>

### **Dogs' Intelligence On Par With Two-year-old Human, Canine Researcher Says**

*ScienceDaily (Aug. 10, 2009)* — Although you wouldn't want one to balance your checkbook, dogs can count.

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They can also understand more than 150 words and intentionally deceive other dogs and people to get treats, according to psychologist and leading canine researcher Stanley Coren, PhD, of the University of British Columbia. He spoke Saturday on the topic "How Dogs Think" at the American Psychological Association's 117th Annual Convention.

Coren, author of more than a half-dozen popular books on dogs and dog behavior, has reviewed numerous studies to conclude that dogs have the ability to solve complex problems and are more like humans and other higher primates than previously thought.

"We all want insight into how our furry companions think, and we want to understand the silly, quirky and apparently irrational behaviors [that] Lassie or Rover demonstrate," Coren said in an interview. "Their stunning flashes of brilliance and creativity are reminders that they may not be Einsteins but are sure closer to humans than we thought."



According to several behavioral measures, Coren says dogs' mental abilities are close to a human child age 2 to 2.5 years.

The intelligence of various types of dogs does differ and the dog's breed determines some of these differences, Coren says. "There are three types of dog intelligence: instinctive (what the dog is bred to do), adaptive (how well the dog learns from its environment to solve problems) and working and obedience (the equivalent of 'school learning')."

Data from 208 dog obedience judges from the United States and Canada showed the differences in working and obedience intelligence of dog breeds, according to Coren. "Border collies are number one; poodles are second, followed by German shepherds. Fourth on the list is golden retrievers; fifth, dobermans; sixth, Shetland sheepdogs; and finally, Labrador retrievers," said Coren.

As for language, the average dog can learn 165 words, including signals, and the "super dogs" (those in the top 20 percent of dog intelligence) can learn 250 words, Coren says. "The upper limit of dogs' ability to learn language is partly based on a study of a border collie named Rico who showed knowledge of 200 spoken words and demonstrated 'fast-track learning,' which scientists believed to be found only in humans and language learning apes," Coren said.

Dogs can also count up to four or five, said Coren. And they have a basic understanding of arithmetic and will notice errors in simple computations, such as  $1+1=1$  or  $1+1=3$ .

Four studies he examined looked how dogs solve spatial problems by modeling human or other dogs' behavior using a barrier type problem. Through observation, Coren said, dogs can learn the location of valued items (treats), better routes in the environment (the fastest way to a favorite chair), how to operate mechanisms (such as latches and simple machines) and the meaning of words and symbolic concepts (sometimes by simply listening to people speak and watching their actions).

During play, dogs are capable of deliberately trying to deceive other dogs and people in order to get rewards, said Coren. "And they are nearly as successful in deceiving humans as humans are in deceiving



dogs. "Adapted from materials provided by [American Psychological Association](#)

## **Naturally Occurring 'Protective RNA' Used To Develop New Antiviral Against Influenza**

*ScienceDaily (Sep. 30, 2008)* — Researchers from the University of Warwick, Coventry, United Kingdom have developed a new antiviral using naturally occurring influenza virus "protecting virus" that may defend against any influenza A virus in any animal host.

Human influenza virus A is not only responsible for seasonal disease in humans, it is also the cause of worldwide pandemics of which the last three resulted in millions of deaths all over the globe. Currently, live and killed vaccines countering specific strains of the flu are available, however a vaccine for a new pandemic strain would take months to develop. Also, increased resistance to antivirals currently on the market has emphasized the need for a new effective prophylactic and therapeutic treatment method.

The "protecting virus" contains an altered gene that makes it harmless and prevents it from reproducing in a cell. If another influenza virus invades the cell it still remains harmless, but rapidly reproduces and prevents infection by literally crowding out the new influenza strain.

In the study researchers used a "protecting virus" (known as 244) as an influenza A antiviral therapy and tested it in mice. A 120-ng intranasal dose completely protected mice simultaneously challenged with 10 50% lethal doses of influenza A/WSN (H1N1) virus. The 244 protecting virus also protected mice against strong doses of H2N2, H3N2, and H3N8.

Prophylactic activity was maintained in mice at least 1 week prior to challenge and a clear therapeutic benefit was observed when administered 24 to 48 hours following a lethal challenge. Finally, the 244 protecting virus was noted to be 10- to 100-fold more active than previous defective influenza A viruses.



1. Dimmock et al. **Influenza Virus Protecting RNA: an Effective Prophylactic and Therapeutic Antiviral.** *Journal of Virology*, 2008; 82 (17): 8570 DOI: [10.1128/JVI.00743-08](https://doi.org/10.1128/JVI.00743-08)

## Why Obama's Dog Has Curly Hair

*ScienceDaily* (Aug. 28, 2009) — University of Utah researchers used data from Portuguese water dogs – the breed of President Barack Obama's dog Bo – to help find a gene that gives some dogs curly hair and others long, wavy hair.

It was part of a National Institutes of Health (NIH) study – published online Thursday, Aug. 27 by the journal *Science* – showing that variations in only three genes account for the seven major types of coat seen in purebred dogs. The findings also point the way toward understanding complex human diseases caused by multiple genes.

"We were part of a team that found three genes that control 90 percent of the seven coat types that characterize different breeds of purebred dogs," says K. Gordon Lark, one of 20 co-authors of the study and a distinguished professor emeritus of biology at the University of Utah.

"We helped identify the gene that controls curly or wavy coats," adds study co-author Kevin Chase, a University of Utah research specialist in biology.

The study's first author is Edouard Cadieu, and its senior author is Elaine Ostrander, both of the National Human Genome Research Institute in Bethesda, Md. Other authors came from that institute, which is part of NIH, and from the University of California's Davis and Los Angeles campuses, Cornell University in Ithaca, N.Y., and Affymetrix Corp., in Santa Clara, Calif.

The study showed that combinations of various forms of only three genes – named RSPO2, FGF5 and KRT71 – account for seven major coat types in purebred dogs.

By analyzing more than 1,000 dogs from 80 domestic breeds, the researchers found that RSPO2 is the gene associated with whether or



not a dog has a moustache and large eyebrows (known together as "furnishings"); FGF5 is linked to whether a dog's fur is long or short; and KRT71 determines if the hair is curly or wavy.

### Mutant Genes and the Well-Dressed Dog

Artificial selection, at the heart of breeding for desirable traits in domesticated animals, has yielded rapid change in a short span of canine history. While researchers estimate that modern dog breeds diverged from wolves some 15,000 years ago, the genetic changes in the dog genome that create multiple coat types are more likely to have been pursued by breeders in just the past 200 years. In fact, breeds with short, straight hair, such as the beagle, display the original, more wolf-like versions of the three genes identified in the study.

Modern dog breeds are part of a unique population structure, having been selectively bred for many years. Based on this structure, the researchers were able to break down a complex phenotype — coat — into possible genetic variations. "When we put these genetic variants back together in different combinations, we found that we could create most of the coat varieties seen in what is among the most diverse species in the world — the dog," Dr. Ostrander said. "If we can decipher the genetic basis for a complex trait such as the dog's coat, we believe that we can do it as well with complex diseases."

All purebred dogs have the three genes, but the presence or absence of mutant, variant forms of those genes – rather than the ancestral forms inherited from wolves – determines coat types:

Short-haired dogs like basset hounds have none of the variant genes, just the ancestral form of each gene.

Wire-haired dogs such as Australian terriers have the variant form of only the RSPO2 gene.

Dogs with wiry and curly hair – airedale terriers, for example – have variants of both RSPO2 and KRT71 genes.

Long-haired dogs like golden retrievers have a variant form of the FGF5 gene.

Long-haired dogs with furnishings, such as the bearded collie, have variant forms of FGF5 and RSPO2.

Curly haired dogs such as Irish water spaniels have the variant forms of the FGF5 and KRT71 genes.



Curly haired dogs with furnishings – such as the bichon frise breed and some Portuguese water dogs, including President Obama's dog Bo – have the variant form of all three genes.

Portuguese water dogs come in both curly haired and wavy haired varieties, depending on what form of the KRT71 gene they have. Chase says wavy haired Portuguese water dogs fit in the new study's long hair with furnishings category.

Chase says breeders characterized First Dog Bo as curly with furnishings, while Lark's Portuguese water dog, Mopsa, has wavy hair, even though she appears pretty curly. Chase notes that the KRT71 gene really controls the extent of curl, not curl versus no curl

What about the fur characteristics of mutts? Because mutts are not part of a closed breeding population like each breed of purebred dog, it's difficult to separate the genetic contributors to their traits, Chase says.

"We don't know enough about the genetics of mutts," Lark adds.

#### From Portuguese Water Dogs to Human Disease

Chase and Lark assisted the NIH research by sharing data on Portuguese water dogs, which they have studied for years.

"Our contribution to this paper is data collected on the Portuguese water dog that indicated that keratin genes controlled the amount of curliness," Lark says. "Our data plus other data from the Ostrander group narrowed this down to KRT71."

KRT71 carries the code that produces keratin 71, a structural protein in hair.

Even though he and Chase studied the genetics of curliness stemming from KRT71, Lark says the other two genes involved in determining dog coat types are more interesting in the sense that they produce proteins that regulate a variety of processes in living organisms, not just the kind of coat a dog has. That makes them relevant to diseases of dogs and humans.



"Dogs share many diseases and other traits with humans," Lark says. "That's why they were used for many decades so extensively for pharmaceutical and medical-physiological-biochemical testing. Not surprisingly they share much of their genome [genetic blueprint] with humans also."

Lark says a dog bred for a desired trait may end up, years later, more vulnerable to cancer, immune disorders or other diseases of aging, and thus have a shorter life span.

"Ultimately the most important part of this paper – mostly the work of Ostrander's group – is that we will be able to get glimpses of how major regulatory genes interact with other genes to change the functioning of an animal in a way that does not kill it, but that may eventually compromise its longevity or its functioning as it ages," Lark says.

Earlier studies involving Ostrander and Lark revealed genetic variations that make small dogs small and account for longevity in dogs.

#### A Pup for a President and a Geneticist

Lark, once a soybean geneticist, has run a long-term dog genetics research effort known as the Georgie Project, after Georgie, a stray Portuguese water dog he adopted in 1986. Georgie died in 1996, and when Lark sought a replacement, a breeder sent him Mopsa – now 13 years old – and nagged him to study the breed's genetics.

Lark and Chase learned that the breed was ideal for genetics research because all Portuguese water dogs descended from a small group of "founders" and could help the search for genes responsible for complex traits – including human diseases caused by multiple interacting genes.

Portuguese water dogs gained publicity earlier this year when President Obama fulfilled his promise to get a dog for his daughters by obtaining Bo, a Portuguese water dog, reportedly as a gift from U.S. Sen. Edward Kennedy, D-Mass.



"As a supporter of Obama, I feel glad that he has a good dog," Lark says. "He has good taste and a good dog."

The portion of the new study conducted at the University of Utah was funded by NIH's National Institute of General Medical Sciences, the Judith L. Chiara Charitable Fund and the Nestle Purina PetCare Co.

University of Utah (2009, August 28). Why Obama's Dog Has Curly Hair. *ScienceDaily*.

We welcome your comments and concerns because, in the end, we share a common goal: Happy and contented pets that are members of your family for a very long time.