

Cold Nose, Warm Sense – Your Dog has a Newly Discovered Superpower!

by Chris Zink, DVM PhD DACVSMR



Did you know that your dog has something in common with vampire bats, pit vipers and black fire beetles? What could that possibly be?

It all started when some scientists from Sweden and Hungary went into a bar....

Well, that might not be exactly true. I'm not sure where they were when they got together and asked the question, "Why is a dog's nose moist and cold, when most other mammals' noses are warm and dry?" No doubt this is a question that has also kept you awake many a night...

At first they considered that the canine cold wet nose might help with cooling in hot weather. But they discarded that idea because the surface area of the nose is just too small to make much of a difference.

They knew that the dog's rhinarium, the area of nose surrounding the nostrils, has numerous glands that secrete moisture, and under the skin there is a dense network of nerve fibers that connect to the trigeminal nerve, the largest nerve in the head. Normally, receptors on the face sense touch and pain, as well as the positions of the muscles of the face (such as if your dog is smiling), and transmit that information via the trigeminal nerve to the brain. So the scientists asked, "What information might all those nerves under the skin of the nose be transmitting via that same trigeminal nerve?"

A Clue From Snakes

Being interested in all things animal, the scientists knew that pit vipers, such as rattlesnakes, have so-called pit organs on the sides of their faces that are moist and colder than the snake's skin ([references in blog](#)). They help the snake sense differences in temperature, just like a thermal imaging camera.

They are so sensitive that they can detect differences of as little as 1/1000 of a degree ([2](#)). With the help of the pit organ, even in the dark, a snake can see the warmth of a nearby rodent ([Figure 1](#)) so that it can strike its prey more accurately.

Dogs' noses are wet and colder than the rest of their bodies ([Figure 2](#)). Might those noses help dogs sense temperature differences just like in snakes?

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The Experiments

To test this, the scientists in Sweden trained three dogs of a variety of sizes and breeds to get a food reward if they pushed a sliding panel that was warm (3). The dogs did not receive a reward if they pushed a neutral temperature panel. They then tested the dogs in a double-blind study (in which neither the dog nor the handler knew which panel was warm), and showed that the dogs were consistently able to detect the warmer panel with very high accuracy.

The scientists in Hungary then took over. They took 13 dogs that were trained to lie still in an fMRI unit and presented them with either a warm or a neutral temperature box. They then checked the fMRI images to see what part of the dogs' brains were processing that information.

When the dogs were presented with the neutral temperature box, their brains showed no activity. However, when presented with the warm box, a discrete area on the left side of the brain lit up, indicating that the experience of sensing something warm was being processed in that area. As it happens, this area of the brain located where many different types of sensory information are processed so that the animal can plan specific, targeted movements. The most common reason for these movements is to capture prey.

These studies demonstrated for the first time that dogs really do have a 6th sense – that of being able to detect weak infrared radiation (heat). The only other species currently known to be able to sense infrared radiation are the black fire beetle (4), certain snake species (5), and one species of mammal so far, the vampire bat (6).

The Take-Home Message

How might the ability to sense heat be important to us? Most of our dogs are home-bodies, preferring to get their prey in the form of tasty meals provided to them twice a day with no more effort than looking hungry or giving their people a nudge or two. Nonetheless, I can envision a number of situations in which this ability might be useful for our canine companions.

This heat-sensing ability might be used by bitches with pups during the first few weeks of their lives. Not only might it help them locate their puppies in low-lighting conditions, but perhaps it also helps them recognize when one of their puppies is fading or has passed away.

We also know that newborn puppies are thermotropic, moderating their body temperature by moving towards or away from sources of heat, like their mother. However, until now we've never known how these relatively helpless and limited babies accomplish this. Perhaps this canine 6th sense is present at birth and enables puppies to find their dam's warm body and even warmer nipples, which they do so quickly after birth.

I imagine that this sense is also used by dogs participating in the sports of barnhunt and earthdog in which dogs must search and find a living rat. Although the sense of smell will also be used, this ability to sense radiant heat might help dogs home in on their prey faster, particularly terriers searching in

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dark, underground earthdog tunnels. It is likely that the sense is also used by hunting dogs, particularly the pointers, setters and spaniels, who must detect and point out live, and therefore warm, gamebirds while hunting over large tracts of land. Search and rescue dogs may also be aided by this ability as they locate missing or trapped humans at disaster sites or in the wilderness. We already knew the canine nose was amazing, but this research elevates our dogs' senses to superhero status.

For blog references and photos, please go to www.AvidogZink.com/blog.

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