

A Keen Sense

Most people do not spend a lot of time thinking about the sense of smell. This sense is not the main way most people gain an understanding of their surroundings. However, for dogs the sense of smell is their primary way of interpreting the world. When it comes to the sense of smell—dogs rule! According to some experts, a dog's sense of smell is thousands of times keener than a person's sense of smell. So, why do dogs outrank people when it comes to this sense?

The Canine Nose

Dogs' noses, like ours, consist of bony nasal cavities divided into chambers. Like us, dogs have two nostrils, or "nares," that open to the outside air. Unlike us, though, dog nostrils move independently. This allows dogs to pinpoint where a particular smell originates. When dogs inhale, folds of skin inside their nostrils separate the air they smell from the air they breathe. (We humans breathe and smell the same air.) About 88% of the air dogs inhale goes directly into the lungs for breathing. The other 12% of the air goes its separate way into the nasal cavities. It is used for smell, or olfaction.

The olfactory 12% goes through a maze of bony structures in the nasal cavities called turbinates. The turbinates sift out the odor molecules based on their different chemical properties. Scientists report that dogs' noses have more than 220 million olfactory cells. The olfactory cells recognize the odors and send signals to the dogs' brains for final analysis. It sounds something like complex computers, but computers cannot come close to duplicating the intricate work done by dogs' noses. Recent studies indicate that about one-third of a dog's brain is devoted to identifying different scents.

When dogs exhale, the air exits through slits in the sides of their noses. When dogs exhale, air swirls around, allowing new odors to reach the turbinates. Dogs, unlike humans, can sniff almost continuously. One study showed that a hunting dog in search of game sniffed in a continuous stream of air for about 40 seconds. During that time, it inhaled and exhaled at least thirty times.

Jacobson's Organ

It turns out that dogs have a second "sense of smell" organ. This organ, called Jacobson's organ, is located inside the nasal cavity of dogs. It opens into the upper part of their mouths. The Jacobson's organ does not have olfactory cells. Instead, it has sensory cells that respond to pheromones, chemical substances related to basic instincts. These substances may have no obvious odors, but the Jacobson's organ detects them and sends signals directly to the dogs' brains. The Jacobson's organ can, for example, help a newborn puppy find its mother and can help mothers to pick their pups out of a pack. Scientists believe that the sense of smell and Jacobson's organ work together to give dogs information that neither can give by itself.

Smelling is connected to one of the most primitive areas of an animal's brain. Smell is linked to memory. Although veterinarians cannot ask dogs if certain smells bring back memories, they think it may be true. For example, a dog may be jumpy when smelling a certain brand of dog shampoo. Perhaps the dog connects the smell to a time when the soap may have accidentally gotten into its mouth or eyes. Does another smell remind the dog of a special treat? For now, we can only guess that it may.

The Best Sniffers

All dogs have a powerful sense of smell, but which dogs are the best sniffers? Bloodhounds, basset hounds, and beagles are the best. These dogs tend to have long snouts. That means they have more olfactory glands. Bloodhounds have lots of skin folds around their faces too, and this helps to trap odors. Dogs with long ears that drag on the ground stir up or enhance smells.

We humans have taken advantage of our "best friend's" sense of smell. We train dogs as rescue animals. Police departments and customs officials use dogs to help detect illegal substances. Recently doctors have even begun using dogs to detect diseases. Sometimes dogs find problems when complicated medical tests fail. In odor-detecting contests, the dogs win by a nose.

19. Read the claim from the passage.

"However, for dogs the sense of smell is their primary way of interpreting the world."

Which statement **best** assesses whether there is sufficient evidence in the passage to support the claim?

- (A) No, there is not sufficient evidence in the passage to support the claim because some dogs have a keener sense of smell than others.
- (B) Yes, there is sufficient evidence in the passage to support the claim because scientific evidence is provided on how dogs' brains are connected to smell.
- (C) No, there is not sufficient evidence in the passage to support the claim because there is no mention of why dogs' nostrils move independently.
- (D) Yes, there is sufficient evidence in the passage to support the claim because dogs have a better sense of smell than humans.

20. Read the sentence from the passage.

"The olfactory 12% goes through a maze of bony structures in the nasal cavity called turbinates."

What impact does the word "maze" have on the meaning of the sentence?

- (A) It describes why dogs have a strong desire to smell.
- (B) It emphasizes the percentage of dogs that possess a higher ability to distinguish different scents.
- (C) It suggests how complicated a dog's system of smell can be.
- (D) It conveys a dog's natural ability to connect scents with memories of experiences from the past.

21. How does the section "Jacobson's Organ" contribute to the development of ideas?

- (A) by revealing how dogs are able to sense things without odors
- (B) by describing why some dogs have a more powerful sense of smell
- (C) by explaining why some dogs are trained to work as rescue animals
- (D) by clarifying how dogs help doctors detect problems in patients

22. Which evidence from the passage supports the generalization that certain characteristics of dogs affect their sense of smell?

- (A) "When dogs exhale, air swirls around, allowing new odors to reach the turbinates."
- (B) "The Jacobson's organ can, for example, help a newborn puppy find its mother and can help mothers to pick their pups out of a pack."
- (C) "Perhaps the dog connects the smell to a time when the soap may have accidentally gotten into its mouth or eyes."
- (D) "Bloodhounds have lots of skin folds around their faces too, and this helps to trap odors."

23. What is the author's main purpose in writing the passage?

- (A) to explain how dogs interpret the world
- (B) to compare how people and dogs breathe
- (C) to describe the advantages of owning dogs
- (D) to promote training dogs in detecting problems

24. Read the sentence from the passage.

“When it comes to the sense of smell—dogs rule!”

Write an essay assessing how the author supports the claim. Use evidence from the passage to support your response.