

Super Senses

Some animals have **astounding abilities** when it comes to seeing, hearing, smelling, tasting, or feeling the world around them.

By Mary Hoff

IMAGINE being able to spot a rabbit 2 miles away or to catch the scent of a pizza from a distance 10 times that. How about having the power to hear with your legs or feel the electricity a flower gives off?

Many animals can use sight, smell, hearing, touch, and taste in a way that far exceeds our own. They use these “super senses” to locate food, find their way around, communicate with each other, and more. Let’s explore some of these amazing abilities animals use to learn about the world around them!

Among the Minnesota creatures with extraordinary sensory powers are (clockwise from top left) the black bear, the common green darner dragonfly, the gray treefrog, the common eastern bumble bee, and the timber rattlesnake.

CLOCKWISE FROM TOP LEFT: MICHAEL FURTMAN, ALLEN BLAKE SHELDON, RICHARD HAMILTON SMITH, ALAN OLANDER, ALLEN BLAKE SHELDON



Smell



Black bear
Ursus americanus

Black bears find food using their sense of smell—and they just might have the best sniffer of any mammal in Minnesota. The lining of a black bear's nose, which picks up scents and turns them into messages for the brain, takes up 100 times as much space as the lining inside your nose. Experts estimate that a bear can smell food a mile away—and some suspect it could be up to 20 miles!

Gray wolf *Canis lupus*

A gray wolf's sense of smell is at least 100 times more powerful than ours, thanks to hundreds of millions of scent detectors in its nose. It uses its splendid sniffer to identify where its pack mates have been, to find food, and to detect when another wolf is ready to mate.



TOP: BILL MARCHEL. BOTTOM: BENJAMIN OLSON.



Turkey vulture *Cathartes aura*

Does the smell of your favorite meal make you follow your nose? It does for a turkey vulture—only its favorite meal is a dead, rotting animal. A vulture has very large nostrils, lots of skin inside its nasal passages, and a super-big part of its brain that detects odors. Flying through the sky, a vulture can detect the stinky molecules a carcass gives off in concentrations of a few parts per billion—the equivalent of a few drops of water in a full-size swimming pool. Turkey vultures can find dead things hundreds of feet away, even when they're buried under dead leaves or soil.

Burying beetle
Nicrophorus spp.

Vultures aren't the only animals that love dead things. When it comes time to reproduce, burying beetles find the carcass of a dead animal, bury it in the ground, then lay their eggs nearby. When the young hatch, they have a stinky meal to sustain them. The adults find the carcass using clubbed antennae that are extremely sensitive to the odors given off by decomposing bacteria. Some burying beetles can find a dead animal nearly 2 miles away.



TOP: BILL MARCHEL. BOTTOM: ALLEN BLAKE SHELDON.

Sight



Zebra spider *Salticus scenicus*

You know spiders have eight legs. But did you know that most have eight eyes, too? The zebra spider is a small arachnid that often hangs out around windows and decks. Instead of catching insects to eat in a web, it spies and then pounces on them from behind. Two of its eight eyes are a lot bigger than the others. These mega-eyes give it 3-D vision, which helps ensure that it jumps just the right distance to capture its prey.



Bobcat *Lynx rufus*

The bobcat and many other animals that hunt in the dark have a night vision secret—a reflective membrane at the back of their eyeballs. Known as a tapetum lucidum, the membrane lies behind the retina, which is the part of the eye that turns light into nerve signals. When light enters the eye, it passes through the retina, then bounces off the tapetum and back through the retina, sending two sets of nerve signals to the brain in the process—in effect doubling the light the animal perceives. When an animal's eyes seem to glow in the light from your flashlight or headlamp, you're seeing this reflected light.

TOP: BILL JOHNSON. BOTTOM: MICHAEL FURTMAN.



Pavement ant *Tetramorium immigrans*

If someone dropped you in an unfamiliar place on a sunny morning and told you to walk east, you'd likely head toward the sun. But what if it were a cloudy day? The pavement ant, a nonnative ant that lives in Minnesota, has that covered. This dark brown denizen of sidewalk cracks can see whether light waves are polarized—lined up with each other rather than wobbling in all directions. Because the degree to which sunlight is polarized depends on how far the light has traveled through the air, these ants can sense where the sun is even when it's cloudy—and use that information to tell which way is home.

Common green darner *Anax junius*

Did you ever wish you had eyes in the back of your head? The common green darner dragonfly has the next best thing: Eyes so big around that they can see directly behind their head! Voracious insect-eaters, green darners use their extra-wide-angle lenses to spot their prey. Some scientists think they also can see polarized light. This helps them find their way when they migrate south for the winter and north in the spring.



TOP: BILL JOHNSON. BOTTOM: TAMMY WOLFE.

Hearing



Big brown bat *Eptesicus fuscus*

Swooping through the air at dusk in search of insects to eat, a big brown bat gives off a squeak too high for humans to hear. When the high-pitched sound waves hit an insect-sized object, they bounce back to the bat's ears, which can detect the waves and use them to identify which way to go to find food. A big brown bat can use its sonar to detect an object the size of a marble from 15 feet away.

Gray treefrog *Hyla versicolor*

In spring, when hundreds of male frogs are calling to attract mates at the same time, the sound can be deafening. How does a single female frog home in on the call of a male of its own species amid the cacophony? The answer seems to lie in her lungs. Scientists have found that when a female green treefrog inhales, her lungs vibrate at a frequency that overlaps with that of other species' calls. That vibration acts like noise-canceling headphones to block those sounds and let the call of males of the same species stand out in the din. Although that particular frog species doesn't live in Minnesota, there's a good chance that other frogs, including our native gray treefrog, have similar talents.



TOP: STANTEKIELA. BOTTOM: ALAN OLANDER.



Common house spider *Parasteatoda tepidariorum*

Hanging out in its tangled web in the corner of a room, a house spider waits for a roving fly. When an insect hits the web, it sets off vibrations that the spider hears through slits in its legs. Known as lyriform organs, these "leg ears" contain around 10 structures, each of which picks up a different pitch of sound. Together the sounds alert the spider to the insect's presence so it can rush in and secure it with more web and eventually make it a meal.

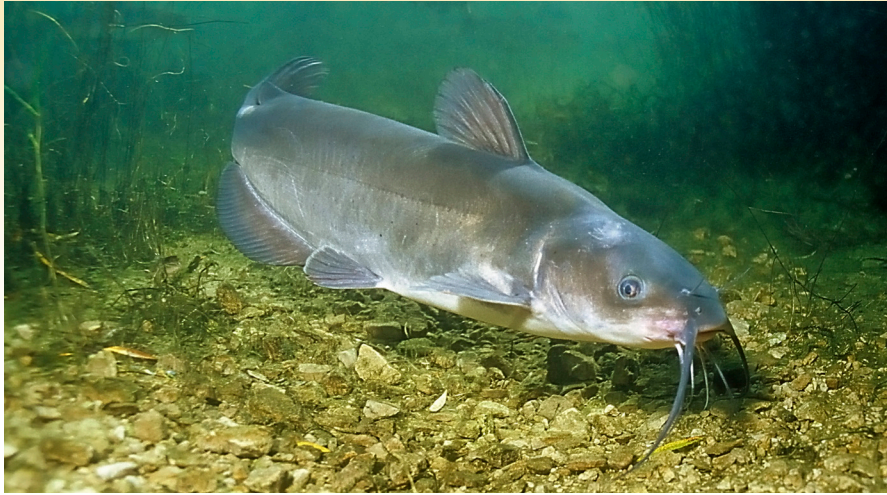
Barred owl *Strix varia*

Giant ears help a barred owl find mice, birds, frogs, and other tasty treats at night. Interestingly, one ear is higher than the other. Because the sound of the prey reaches the two ears at a slightly different time due to this lop-sided arrangement, the owl can detect more precisely where the animal is than if its ears were symmetrical. The disk-shaped arrangement of feathers on the owl's face also helps with hunting success by channeling the sound toward the ear openings.



TOP: CHAD HEINS. BOTTOM: RICHARD HAMILTON SMITH.

Super Senses



Channel catfish *Ictalurus punctatus*

Lurking in the murky river water in the shadow of a log at dusk, a channel catfish can't see much. But it doesn't have to! To find food, it wiggles its whiskerlike barbels, which sense both touch and taste. The barbels are particularly good at sensing molecules that living things produce. That ability allows the fish to home in on a worm or other prey.



Star-nosed mole *Condylura cristata*

A star-nosed mole may have the most unusual face you've ever seen—a nose and mouth surrounded by 22 soft, pink tentacles. Each tentacle has thousands of bumps, called Eimer's organs, that contain cells that sense their surroundings in microscopic detail. As the mole scurries through underground tunnels in search of worms, the tentacles wiggle rapidly in search of food. When the tentacles encounter a worm or other tasty morsel, the mole quickly gobbles it up.

TOP: ENGBRETSON UNDERWATER PHOTOGRAPHY. BOTTOM: STAN TEKIELA.



Monarch butterfly *Danaus plexippus*

All mothers want to make sure their babies are properly fed, and a monarch butterfly mom is no different. The only problem is, her young are very fussy: They eat only milkweed plants. When it comes time to lay her eggs, she lands on a plant and taps it with a spine on the back of her leg. Sensors on the leg taste the plant juice that oozes out. If it isn't milkweed juice, she moves on. But if it is, she lays her eggs, assured the caterpillars that hatch will be able to gobble and grow strong.

Timber rattlesnake *Crotalus horridus*

A timber rattlesnake captures mice and other prey by remaining motionless for long periods of time, then striking as the prey comes within reach. Many of the animals it eats are active at dawn, at dusk, or in the dark. But the lack of light doesn't deter this predator. A membrane stretched across a depression on each side of its face between its eye and its nostril can sense the heat animals give off, alerting it when a moving morsel comes within striking distance.



TOP: BOB DUNLAP. BOTTOM: ALLEN BLAKE SHELDON.

Super Senses



Freshwater drum *Aplodinotus grunniens*

Hanging out in murky river waters, a freshwater drum can't always use its eyesight to tell which way is up. But a big bone called an otolith inside its ear provides the needed clues. When the fish is upright, gravity causes the otolith to press on tiny hairs directly below it. If the fish starts to tilt to one side or another, the otolith instead stimulates hairs to the side of it—sending a “straighten up!” signal to the brain.



Red-eyed vireo *Vireo olivaceus*

If you want to tell which way is north when it's too cloudy to see the sun or stars, you can use a compass. So can migrating birds! Red-eyed vireos and other birds that migrate at night are able to sense Earth's magnetic field. When they can't use other cues, these tiny birds can rely on their internal compass to help them figure out which way to fly as they make their way from Minnesota to South America in the autumn and back again in spring.



Mosquito *Aedes vexans*

Did you ever wonder how mosquitoes find you so easily? In addition to seeing you and sensing the warmth of your body, they also can use specialized mouthparts to detect the amount of carbon dioxide—a gas animals give off when they exhale—in the air. When a mosquito in search of a blood meal senses a higher concentration of carbon dioxide, it flies toward it. If it's lucky—and you're not—it finds you.

Common eastern bumble bee *Bombus impatiens*

Bumble bees have tiny hairs all over their bodies that sense electrical charges. What good is that? Well, just as flowers have patterns of colors that attract bees and help them find nectar and pollen, they also have patterns of electric charges. When a bee visits a flower, it disrupts the pattern. Scientists think this lets bees detect when a flower has been visited by another bee—and skip it in favor of a flower that still has nectar and pollen to share. 🌱



TOP: BILL JOHNSON. BOTTOM: TAMMY WOLFE.

TOP: CHRISTOPHER MOREY/ENGBRETSON UNDERWATER PHOTO. BOTTOM: BILL MARGHEL.

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