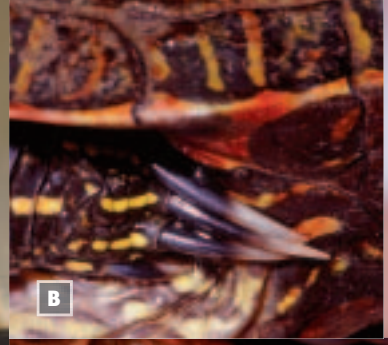
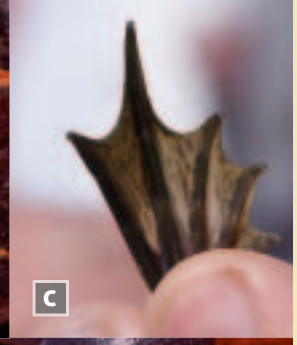
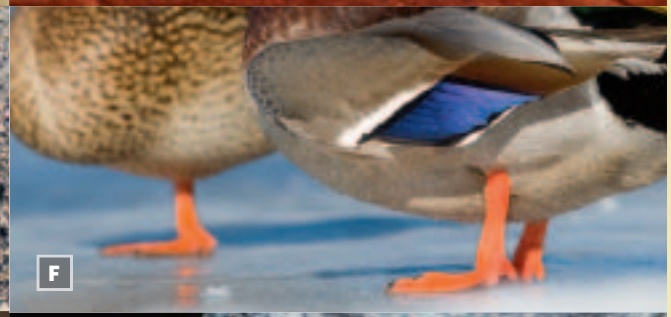
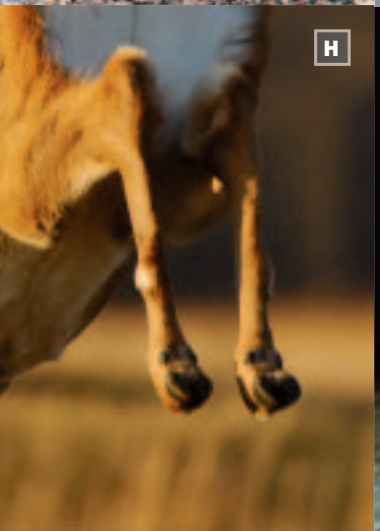
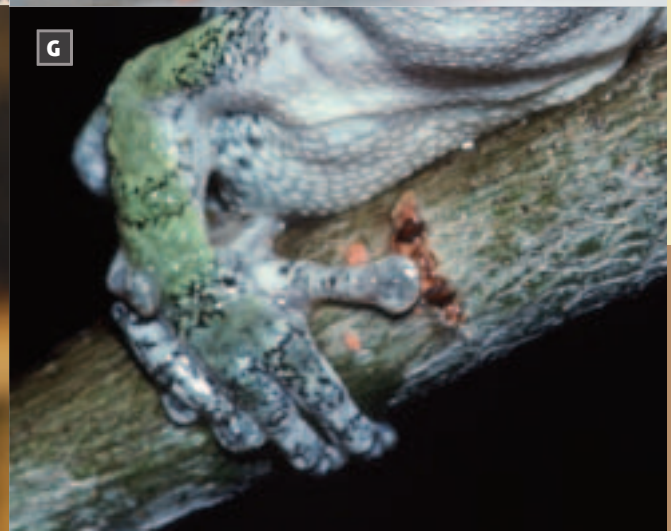










The GREATEST of Feet

Without **feet,** birds would never get off the ground. Without feet, gophers would never go underground. Without feet, many animals would simply not get around.

By Mary Hoff

Walk, **paddle**, *swim,* **jump**, **cling**, hold, **dig**, keep warm, **stay cool**—feet do all these things and more.

Feet come in many shapes and sizes. The way feet look and the way they work are related to what they do. But all feet of animals with bones have the same basic parts.

Different animals rely on different parts of their feet for *locomotion*, or moving around. Some animals walk on the soles of their feet. Others travel on their toenails, also known as hooves. And some move around on their toes.

Guess whose feet: *Find the answers on page 38.* *Photographs by: Bill Marchel (A,E,H) Allen Blake Sheldon (B,C,D,G) Dominique Braud (F).*

Sole Movers

Humans, bears, frogs, and other *plantigrade* animals walk on the entire sole of their feet.

ALLEN BLAKE SHELDON

A gray treefrog (above) *with sticky toe pads climbs a tree trunk. A mink frog's toes* (below) *have webbing but no pads because this frog stays on the ground around wetlands.*

ALLEN BLAKE SHELDON

Frog Feet. Have you ever seen a frog clinging to a tree or a window? The feet of many arboreal (tree-living) frogs have pads on their toes that help them hang onto surfaces. On bark or other rough surfaces, the skin fits into the ups and downs of the surface on which they are perching and helps them hang on. Tiny pores produce mucus that helps them stick to smooth surfaces.

Minnesota's six species of true frogs do not have toe pads. Instead, their hind feet have webbed toes for swimming in their wetland habitat.

Bear Feet. You might not think you have a lot in common with a black bear. But your feet and the hind feet of bears are similar in one way: The heel touches the ground first when walking. One big difference: A bear's toenails extend almost 2 inches from the ends of its paws.

WES UNCAPHER, WINDIGO IMAGES

HOWARD TRIPP, WINDIGO IMAGES

Toenail Travelers

Deer, moose, and other *unguligrade* animals walk on their toenails. These mammals spend a lot of time on their feet, so they have hard surfaces called *hooves* that cover their feet.

Hooves are made of *keratin,* the same stuff that makes up hair and fingernails. Hooves grow, just as your fingernails grow. The growing keratin gives the animal a fresh surface to walk on as the old toenails wear away.

Even-toed Feet. Mammals with two or four hooves that touch the ground are even-toed. Bison and deer are even-toed.
Odd-toed Feet. Mammals with one hoof or three hooves on each foot are odd-toed. These include horses, zebras, and rhinos.

BILL MARCHEL

Moose feet (above) *and white-tailed deer feet* (left) *have cloven hooves with two toes that spread apart like fingers, which helps these unguligrade animals walk in mud or snow.*

Toe Walkers

Wolves, bobcats, birds, and other *digitigrade* animals walk on their toes.

MITCH KEZAR, WINDIGO IMAGES

A wolf track (above) *shows claw marks. Unlike a cat, a wolf always has its claws out. Both the gray wolf and Canada lynx* (below) *have wide paws that act like snowshoes, so they can run quickly to catch prey without sinking in deep snow.*

Dog Feet. Foxes, coyotes, wolves, and other doglike animals are digitigrade. Running on its toes gives a doglike animal lots of "spring" in its step. Its feet have soft but tough pads on the bottom. The pads can take lots of wear and tear without breaking through the skin. Like shock absorbers, the pads help keep the force of hitting the ground from hurting the animal's leg bones.

Cat Feet. Lynx have little sheaths at the end of their toes. When the cat tenses its leg muscles, its claws stick out, ready for pouncing on prey. But when relaxed, the cat tucks its claws inside the sheaths. This "hidden claw" feature keeps a cat's claw from getting worn down when walking around, keeping the claws razor sharp for catching prey.

TOM & PAT LEESON

Bird Feet. Most birds have four toes. Some birds, such as chickadees, have three toes in front and one in back. Others, such as woodpeckers, have two toes in front and two in back. Owls use their toes both ways. Sometimes an owl stands with three toes in front and one in back. To perch or reach out to capture prey, an owl can swing its outer front toe to the back for a better grasp.

TOP LEFT, CHAD GUSTAFSON. ALL OTHERS THIS PAGE, MICHAEL FURTMAN.

Clockwise from top left: Harris's sparrow, male downy woodpecker, northern hawk owl, pine grosbeak

A peregrine falcon (left) uses its feet twice to catch prey. First, it uses a closed foot to deliver a powerful punch. Then, it uses its talons to grip the prey.

MICHAEL FURTMAN

Foot Tools

Many human-made objects have a function similar to animal feet. For example, swim flippers work like duck feet. Shovels work like a mole's clawed feet.

Cling. Some animals use their feet to grasp or cling to things. Their toes are very strong. Often they have sharp claws that can dig into the surface, holding them in place. A bat uses the claws on its feet to hang upside down from rough surfaces in caves or other dark places.

An opossum's "thumbs" on its hind feet help it climb trees in search of food. Baby opossums use their thumbs to cling to their parents. A perching bird such as a chickadee grasps a branch by wrapping its toes around it.

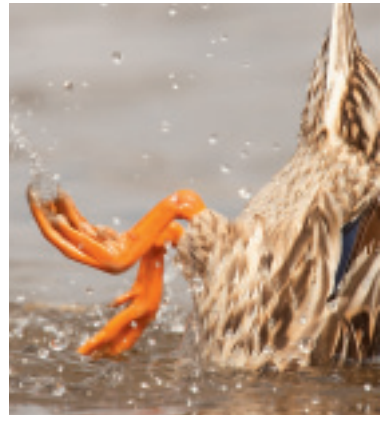
While flying, an osprey can grip fish and other prey with powerful hooks on its claws. The skin on the bottom of an osprey's feet has scales, which also help the bird hang tight to its catch.

Dig. When a fox digs, its claws break up the ground and its footpads spread apart, working like miniature shovels. A badger's front paws are shaped like scoopers. A mole's front feet face sideways, which helps the mole scoop soil out of the way as it bores a tunnel through the ground.

Groom. Barn owls, herons, and nighthawks have a comblike structure, called a *pectinate claw,* on each foot. They use the claw to groom their feathers.

Beavers have a split claw on the second toe of each back foot. They use the special claw to groom their sleek fur.

Paddle. Ducks and beavers have webbed feet. Flat pieces of skin between the front toes form a flat surface the animal uses as a paddle to propel itself through the water. In ducks and geese, webbing connects the front three toes. In cormorants, webbing connects all four toes.



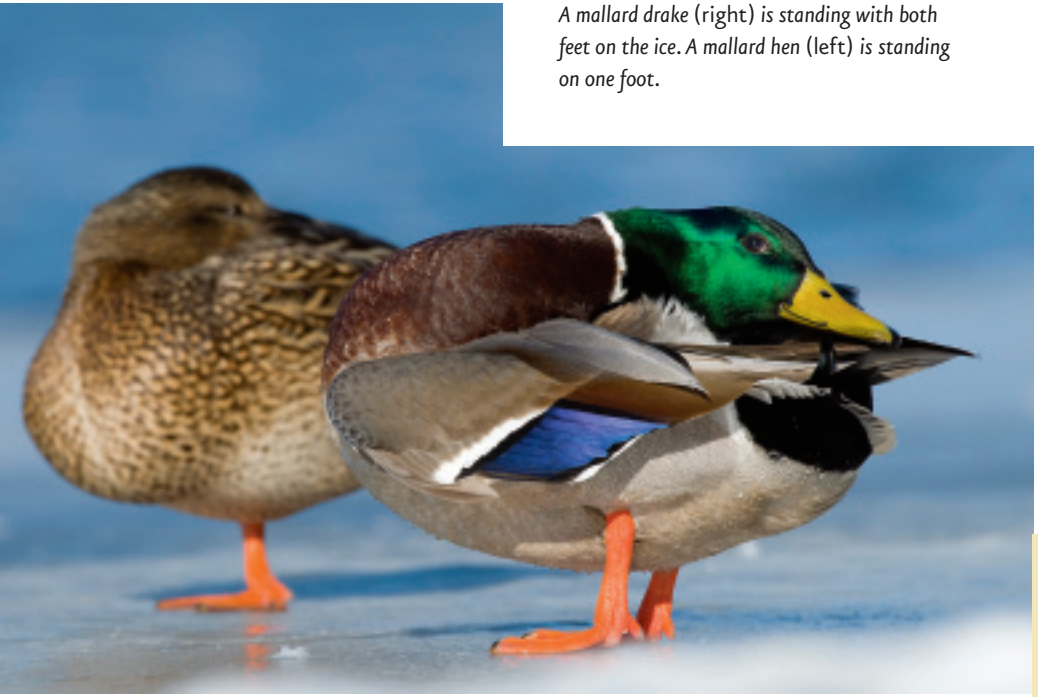
KENNY BAHR, WINDIGO IMAGES

CHAD GUSTAFSON

A mallard hen kicks her webbed feet (top right) as she dabbles. A bobolink's toes (bottom) wrap securely around a branch, its perch in a meadow.

Foot Warmers

Imagine going barefoot in January! Animals do. Their feet have special adaptations that help keep them from turning into toe-sicles.



A mallard drake (right) *is standing with both feet on the ice. A mallard hen* (left) *is standing on one foot.*

DOMINIQUE BRAUD

Heat Exchangers. How can a duck stand to dangle its feet in icy water? Like many birds, a duck relies on a process called *countercurrent heat exchange* inside its legs and feet. The heart pumps warm blood to the duck's toes. The toes get warmer, but the blood cools. The blood vessels that return blood to the heart run alongside the vessels carrying warm blood from the heart, so cooler blood absorbs heat from the warmer blood vessels. This heat exchange helps keep body heat inside the duck.

Guess whose feet, FROM PAGE 30. Foot owners: A) snowshoe hare, B) painted turtle, C) mink frog, D) spotted salamander, E) crow track, F) mallard ducks, G) gray tree frog, H) white-tailed deer.

A Note to Teachers

Find links to teachers guides for this and other stories online at *www.mndnr.gov/young_naturalists*.

Cat claws are always sharp because they are tucked in when the cat walks. Wolf claws (right) *are blunt because they are always out. A wolf's claws give it traction and help it dig.*

Heating Pads. Gray wolves have webs of tiny blood vessels on the bottom surface of their paws. These "heating pads" keep the toes from freezing, even in super-cold weather.

Fur Toes. Fur between lynx toes works like wool socks and snowshoes, keeping their feet warm and helping them walk on snow.

JUDY OLAUSEN

Telltale Tracks

You can tell a lot about an animal's feet by the tracks it leaves behind.

ABOVE: AMERICAN CROW TRACK BY BILL MARCHEL
RIGHT: TRUMPETER SWAN TRACK BY DOMINIQUE BRAUD

Crows and ravens have three long toes in front. The middle toe bends slightly toward the bird's center. You can tell a crow's left track from its right track by which way the middle toe goes.

The webbed feet of a trumpeter swan are visible in these tracks on the snow.