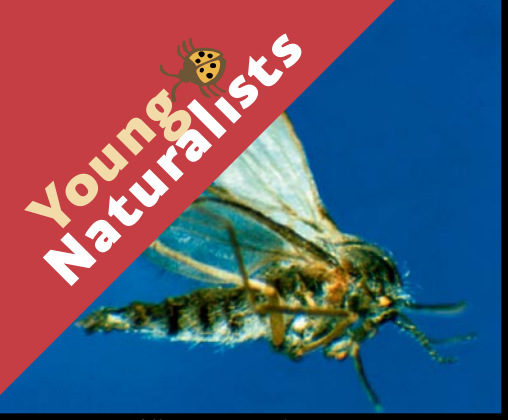


Willow cone midge

B. VAN HEZEWIJK

Bluegill

ERIC ENGBRETSON

Argiope spider

ALLEN BLAKE SHELDON

Baltimore oriole

JIM BATTLES, DEMBINSKY PHOTO ASSOCIATES

Wild Engineers

Minnesota ANIMALS SHAPE THEIR WORLD.

Bridges and cell-phone towers, houses and highways—just about anywhere you look, you can see examples of how we humans change the natural world to meet our needs.

Animals shape the world to meet their needs too. From nests hung high in the sky to tunnels beneath the earth, creatures build and shape their habitats.

By Mary Hoff

Eastern mole

KENNETH CATANIA

Caddisfly larva

GARY MESZAROS, DEMBINSKY PHOTO ASSOCIATES

Bald-faced hornet

ALLEN BLAKE SHELDON

Beaver

MIKE BARLOW, DEMBINSKY PHOTO ASSOCIATES

THINK ABOUT IT
Why do wasps—including yellow jackets and hornets—and bees sting?

Houses of Paper

Spit might seem like a strange building material for a house. But spit is as good as concrete for bald-faced hornets.

In spring a female bald-faced hornet chews on wood, turning it into mushy pulp. She squeezes some of the pulp out of her mouth onto the branch of a tree to build a stem. At the end of the stem she shapes a hollow tube, like a miniature upside-down wine glass. She surrounds the tube with more tubes and lays eggs in them. Then she covers the whole works with thin layers of pulp, which dry into a flaky paperlike coating.

The eggs hatch into larvae, which eventually become workers. The helpers expand their papery house by adding more tubes, in layers below the original one.

ALLEN BLAKE SHELDON

Bald-faced hornet nest

They sting to protect their colonies of young. Otherwise, they would be easy prey to many animals.

WHITNEY CRANSHAW

Inside the nest, hornet larvae

Underground Highways

When you walk across a field or a park, you might be walking over an underground highway of the eastern mole.

Moles excavate deep tunnels a foot or more below the surface. Their network of tunnels allows them to travel from one place to another without going above ground, where hawks and other predators could spy and eat them.

Moles also make shallow tunnels, about an inch below the surface, as they dig for worms, insects, and slugs to eat.

A mole builds a tunnel by carving soil with its huge, outward-facing front feet. Strong shoulder muscles and a pointy nose help move the soil. When digging a shallow tunnel, a mole rolls over onto its side and pushes up the extra soil. When digging a deep tunnel, a mole moves the soil into side tunnels or pushes it to the surface in mounds. A hard-working mole can remove about 3 inches of soil per minute.

THINK ABOUT IT
What do you think a mole's eyes and ears are like?

PHILLIP MYERS

A shallow mole tunnel

Skin over its eyes and ears keeps out soil as the mole tunnels through the earth.

MOLE FORELIMB, KENNETH CATANIA

Mole digging paw: pad and claws

Underwater Nests

THINK ABOUT IT
Bluegills often build their nests in colonies. How might this help their young survive?

If you had to build a nest without using hands or feet, how would you do it? A male bluegill wiggles its tail back and forth to hollow out a nest on the lake bottom near shore.

The nest is a bowl-shaped space about a foot in diameter and a couple of inches deep. The female fish lays eggs in the nest, then the male fertilizes them. A single nest may contain tens of thousands of eggs.

The male bluegill guards the nest, keeping other fish away and fanning the eggs to keep them free of silt and surrounded by fresh water with plenty of oxygen.

ERIC ENGBRETSON

Bluegill guarding nest with eggs

The odds of a particular bluegill's eggs getting eaten by a predator are less when there are other eggs around too.

Silken Bridges

THINK ABOUT IT
An argiope spider has tiny claws at the ends of her legs. How do the claws help her?

A bright black and yellow argiope, or garden spider, sits on a tomato plant leaf.

The spider raises her back end into the air as strands of a silken thread ooze from special glands. The thread floats on the breeze until it gets caught on another leaf. Then the spider attaches her end of the thread to the plant she's on. She has built a silken bridge, the beginning of a web.

Next the spider spins a thread down from the middle, so the web looks like a T or a Y. After that, she makes a frame around the threads and spins more threads between the frame and the center of the web, like the spokes of a bicycle wheel. These are all "dry" threads—she can walk on them without getting stuck.

When the spokes are all done, the spider makes a spiral of dry threads that tie the spokes together. Finally she makes another spiral of sticky threads and sometimes a thickly woven part, called a *stabilimentum,* in the middle of the web. When she is all done, the spider sits in the center, waiting for an insect—her meal—to get stuck in the sticky threads.

SKIP MOODY, DEMBINSKY PHOTO ASSOCIATES

Argiope spider web

They allow her to "tiptoe" across the dry web threads and avoid the sticky ones.

ALLEN BLAKE SHELDON

Argiope spider with prey

THINK ABOUT IT
How might a hanging nest help baby orioles survive?

Hanging Homes

"Hanging by a thread" usually means not being very safe. Baltimore oriole nests hang by many threads, and they are very safe.

In spring a female Baltimore oriole finds a tall tree at the edge of the woods or in a park or other open area. She searches for long fibers, such as horsehair, string, yarn, and fibers of plants such as milkweed and grasses. She carries her building materials back to her chosen tree.

Using her beak she twists the strands around a thin, flexible branch toward the outside of the tree. She twists and ties many fibers together to make tangled clumps. Then she weaves other fibers between the clumps to make a sack-shaped nest.

At the top of the nest, she leaves a hole through which she can come and go. Finally, she lines her nest with fine grasses, wool, hair, and other soft materials. Her hanging home is all ready for the four to six tiny eggs she will soon lay inside.

JIM BATTLES, DEMBINSKY PHOTO ASSOCIATES

Baltimore oriole and nest

Predators such as squirrels and crows might have trouble getting into the oriole's nest dangling like a little pouch near the end of a drooping branch.

THINK ABOUT IT
Sometimes another kind of insect emerges from the gall instead. What happened?

Cones on a Willow

A tiny midge (flylike insect) known as *Rhabdophaga strobiloides* convinces a willow plant to build a home for it.

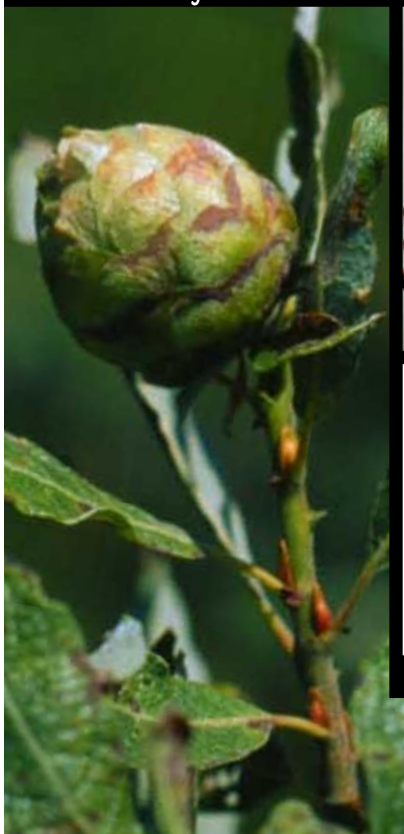
A mother midge lays an egg at the tip of a growing willow branch. When the larva hatches from the egg, it gives off a chemical that changes the way the plant grows.

Instead of growing long and forming normal-shaped leaves, the willow branch starts to fatten around the larva. The leaves grow in layers, creating a pine-cone-like lump, called a *gall*.

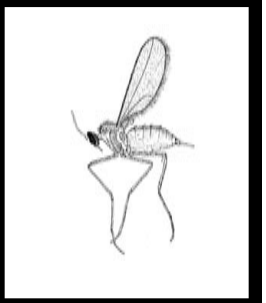
The gall is a one-room house that shelters the larva and contains juicy plant fibers for the larva to eat. The midge spends winter inside the gall. By spring, the pupa changes into an adult and emerges, ready to start the cycle again.

PHOTOS THIS PAGE, B. VAN HEZEWIJK

Willow cone gall



Cutaway showing pupa



Adult midge

B.C. SCHMIDT

Other kinds of insects, called *parasitoids*, lay their eggs on or in midge larvae. When the parasitoids hatch, they eat the midge larvae and use the gall for their own winter shelter.

Parasitoid wasp
(ready to lay an egg in larva inside gall)

Homemade Ponds

What would you do if you wanted to build your home on the still waters of a pond, but you couldn't find a pond? If you were a beaver, you'd make one!

THINK ABOUT IT
What cues might cause a beaver to start building a dam?

Beavers build lodges of sticks, stones, and mud in standing water, and they store tree branches underwater for food in winter. If they can't find standing water where they live, they build a dam across a stream. The dam causes water to collect in a pool.

Beavers often work together to build a dam. They cut down trees by gnawing around the trunks with their four sharp, orange front teeth. They make a base of mud and stones on the bottom of the stream where they want the dam to be. Then they pile logs and branches from the fallen trees on top of the base.

They swim to the bottom of the stream and carry mud up between their paws and chest, and pack it into the sticks and logs to help hold them together. Some beaver dams are 100 feet long or longer.

Scientists have found that running water and the sound of running water give a beaver the urge to build a dam. In one study, a beaver built a dam when a recording of running water was playing—even though there was no water nearby!

Beaver snacking on a poplar branch

STEPHEN B. ANTUS JR.

Beaver dam on a river

ALLEN BLAKE SHELDON

Body Cases

Caddisflies are flying insects that lay their eggs in or near the water. The eggs hatch into tiny larvae, which live on the bottom of the stream.

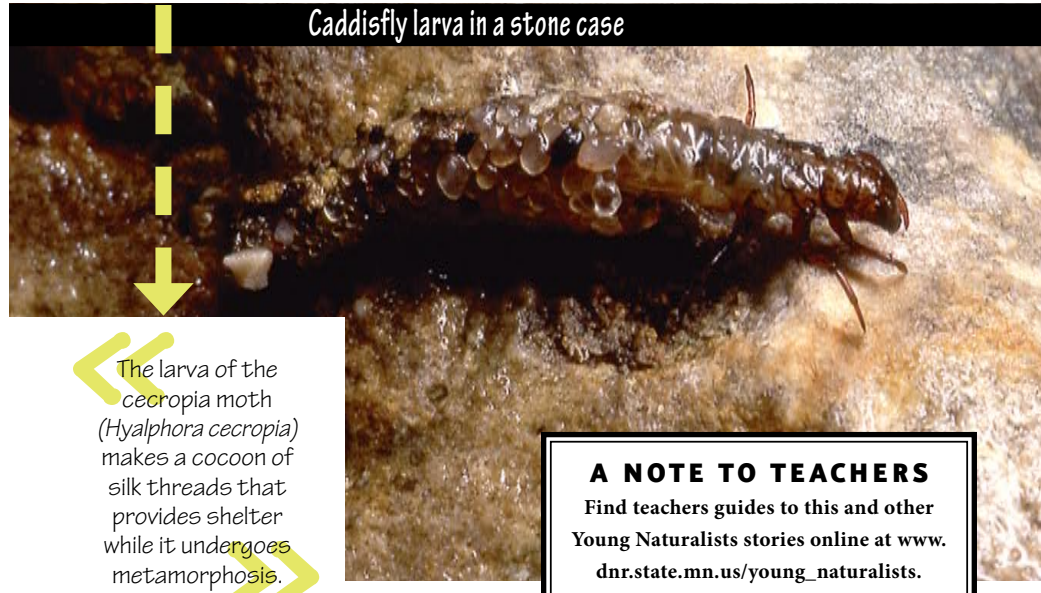
THINK ABOUT IT
Can you name another kind of insect larva that spins silk to protect itself?

Caddisfly larvae make a kind of silk, using body parts that resemble salivary glands. A caddisfly larva uses the silk to glue bits of sticks, stones, or other material together, forming a case around its body. The case helps protect it from being bumped around on the stream bottom and from being eaten by hungry fish.

Different species of caddisflies use different combinations of materials to make their cases. Some people can identify the species by looking at the case.

Mary Hoff is a freelance science writer from Stillwater and frequent contributor to the Conservation Volunteer.

ALLEN BLAKE SHELDON



Caddisfly larva in a stone case

The larva of the cecropia moth (*Hyalphora cecropia*) makes a cocoon of silk threads that provides shelter while it undergoes metamorphosis.

A NOTE TO TEACHERS

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