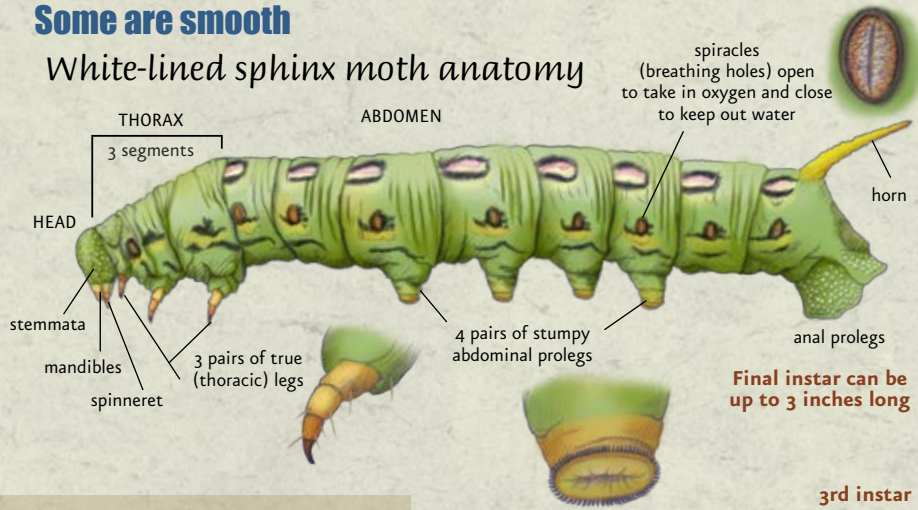
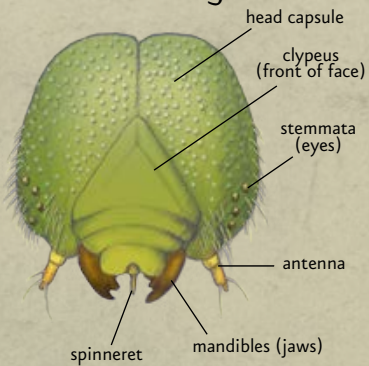


Some are smooth

White-lined sphinx moth anatomy



head anatomy



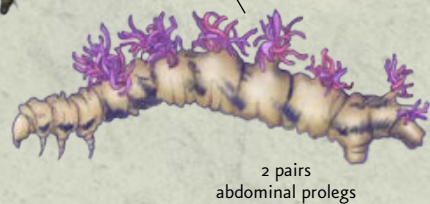
Some are hairy

Forest tent caterpillar
(*Malacosoma disstria*)



Some decorate themselves

The caterpillar of the wavy-lined emerald moth is called a camouflaged-looper caterpillar (*Synchlora aerata*).



Lepidoptera



Like every insect, a caterpillar has six true legs. It also has pairs of stumpy parts called *prolegs* to help grip and crawl. Prolegs have muscles but no hard parts.

Moths and butterflies are insects that belong to a group called *Lepidoptera*. Look for butterflies during the day when they are sipping nectar from blossoms. Most moths are active after dark, but many moths are day fliers. You can see hungry moth and butterfly caterpillars eating almost anytime in summer.

Even though different kinds, or species, of caterpillars look very different from each other, they all share some common body parts. See if you can find the parts on the next caterpillar you spy.

A Wonderful Life. A caterpillar's story starts when a female moth or butterfly lays a tiny egg, most likely on a leaf or twig. After a week or two, a little larva hatches from the egg. A caterpillar has one job: *Eat!* Chomping leaf after leaf with its jawlike mandibles, it grows astoundingly quickly. In a week or two, some caterpillars can gain hundreds of times their hatching weight.

The different stages of a caterpillar's life are called *instars*. A newly hatched caterpillar is a first instar larva. When it grows too big for its skin, the caterpillar splits and sheds its skin. Then it's a second instar larva. Most caterpillars go through four or five instars.

It's an eat-and-be-eaten world for caterpillars. Before they get a chance to grow up, most become juicy tidbits for birds,

frogs, spiders, bears, or other predators. Sometimes wasps, flies, or other insects lay eggs inside a caterpillar. When those eggs hatch, the young insects, or *parasitoids*, eat the caterpillar from the inside.

If a caterpillar survives long enough, it eventually stops eating and gets ready for its next stage of life. It changes into a *pupa*, a new form with hardened, shell-like skin.

By its jaw, a caterpillar has a little nozzle called a *spinneret*. It can force a unique liquid out of its spinneret. The liquid hardens into silk. Some moth caterpillars use silk to make a *cocoon*. Like a sleeping bag, the cocoon covers the pupal shell. A butterfly pupa, usually called a *chrysalis*, attaches itself to a silk pad by hooks on its rear.

During its pupal stage, the caterpillar goes through a change called *metamorphosis*. Inside the shell, the caterpillar's muscles and other tissues break down, dissolving into a soupy mix. From this mushy caterpillar, tiny "seeds" of adult moth or butterfly parts, called *imaginal discs*, build an adult insect with wings.

After two weeks, or sometimes longer, an adult moth or butterfly emerges from the pupal shell. It stretches its wings and flies off to begin its most important job: *Reproduce!* The caterpillar-turned-flying-insect mates and lays eggs to make the next generation of caterpillars.

ILLUSTRATION BY TAINA LITWAK

Moth Caterpillars



Isabella Tiger Moth

Pyrrharctia isabella

Also known as a woolly bear, this is one of Minnesota's best-known caterpillars. Fuzzy and black with a fat orange-brown band around the middle, it grows to about 2 inches long. Some people think that the wider a woolly bear's brown band, the milder the winter will be. In reality, the band gets wider as the woolly bear grows.

People often spy this caterpillar crossing a road, sidewalk, or bike path in the fall as it searches for shelter from the cold. A woolly bear spends winter curled into a ball in a pile of dead leaves or another cozy

place. A chemical in its *hemolymph*—the insect equivalent of blood—helps keep it from freezing to death.

When spring comes, the woolly bear warms up and starts eating again. After a few days to weeks, it spins a cocoon. Inside, it changes to a pupa and then finally an adult moth. The moth emerges in midsummer. It mates, lays eggs, and dies within a few days. The caterpillars that hatch from those eggs might have time to become moths that same summer. Their offspring then overwinter.

PHOTOS BY BILL JOHNSON



Forest Tent

Caterpillar Moth

Malacosoma disstria

Walking through the woods in May, you might see a tree that seems like it forgot to grow some of its leaves. Looking a little closer, you might notice that its twigs are swarming with hairy black-and-blue caterpillars. Chomping on leaves, they have almost stripped the tree bare.

Forest tent caterpillars hatch in early spring from egg bundles wrapped around branches. At first, a larva is about as long as a grain of rice. Voraciously gobbling tender new leaves of aspen, birch,



oak, and other trees, this caterpillar can grow to be 2 inches long.

Sometimes mistakenly called “armyworms,” which is a different species, these caterpillars often gather in “conventions” of 100 or more on a silk mat attached to branches. They make the mat by laying down several layers of silk.

About mid-June, the caterpillars stop eating. They make silk cocoons. A week or two later, furry brown moths emerge. They lay eggs, and the cycle begins again.

Moth Caterpillars



WHITE-LINED SPHINX MOTH BY BILL JOHNSON



COURTESY OF ROBERT DANA

White-lined Sphinx Moth *Hyles lineata*

Also known as a hornworm, this mainly green-and-black caterpillar has a horn-like spike sticking up from its back near its rear end. No one knows for sure how the spike helps the caterpillar. What do you think?

White-lined sphinx moths migrate into Minnesota from the southern United States in spring. They mate and lay eggs. Tiny caterpillars hatch from eggs in July.

Nibbling leaves of primrose, fireweed, apple and elm trees, and sometimes

grape and tomato plants, the hornworm can grow to be more than 3 inches long. When full-grown, it burrows into the soil and becomes a pupa.

An adult sphinx moth emerges from the pupal shell after a couple of weeks. With its long tongue, it drinks nectar from flowers, just as hummingbirds do. When finished drinking, the moth coils its tongue up neatly below its face.

White-lined sphinx moths cannot survive in Minnesota during winter.



CECROPIA MOTH BY BILL JOHNSON

Cecropia Moth *Hyalophora cecropia*

One of Minnesota's biggest caterpillars (along with the big poplar sphinx, *Pachysphinx occidentalis*), this creepy crawler can stretch up to 5 inches long when fully grown. When it first hatches, it has black skin covered with bristles. Later it turns yellow, then green with brightly colored knobs. Look for

this caterpillar on a tree or shrub during summer.

Because the cecropia moth does not have mouthparts or digestive organs, it must survive on fat stored up during its days as a caterpillar.

This species goes through one generation each year.



COURTESY OF ROBERT DANA

Moth Caterpillars



PHOTOS BY BILL JOHNSON

Wavy-Lined

Emerald Moth

Synchlora aerata

Do you like to dress up? The caterpillar of the wavy-lined emerald moth does. Called a camouflaged-looper, it feeds on flowers and camouflages itself by using silk to stick bits of blossoms to its back. The picture above shows how flowers help it hide from hungry birds and other predators.

It is a smallish member of a group of caterpillars known as inchworms. An inchworm travels by gripping a leaf or twig

with its true legs and lifting its body into the shape of a loop. This motion brings the rearmost prolegs up next to the true legs. By letting go with the true legs and stretching its head forward, the caterpillar moves along—inch by inch.

Look for the tiny camouflaged-looper caterpillar in fields and meadows between early spring and October. The adult moth has green wings with wavy white lines.

Butterfly Caterpillars



MONARCH BUTTERFLY BY BILL JOHNSON

Monarch Butterfly

Danaus plexippus

The monarch caterpillar starts life as an egg the size of a pencil point. A female butterfly lays the egg on the underside of a milkweed leaf. The newly hatched larva eats its eggshell, then starts chewing leaves. One of nature's pickiest eaters, this caterpillar eats only milkweed leaves. The leaves contain nasty-tasting chemicals that don't bother monarch caterpillars but discourage hungry birds and other predators from having a larva for lunch.



COURTESY OF ROBERT DANA

A monarch caterpillar has wiggly, long, black feelers—two close to its head and two near its rear. These feelers might help the caterpillar sense the world around itself.

After a week or two of gobbling and growing, the caterpillar attaches itself to a plant or other object. It sheds its skin one last time and hardens into a bright green pupa. About two weeks later, an adult butterfly emerges. In the fall, the adults migrate all the way to Mexico.

Caterpillar Haven

Here are some pointers for making a friendly place for Lepidoptera to live.

- Plant milkweeds and other Minnesota wildflowers for flying insects to sip nectar from the flowers and lay eggs on the plant.
- Leave caterpillars on the plants where you find them.
- Do not spray chemicals on plants to kill insects you don't want because moths and butterflies are insects too and they will die.
- Put big rocks in sunny spots for butterflies to warm up in the morning.

QUESTION MARK BUTTERFLY BY BILL JOHNSON



Butterfly Caterpillars

BILL JOHNSON



White

Admiral Butterfly

Limenitis arthemis arthemis

The white admiral caterpillar looks a lot like a bird dropping. How do you suppose that helps it survive?

Growing up to 2 inches long, it feeds on leaves of trees such as aspen and birch. Start watching for this caterpillar in late



JEFF PIPPEN

May in northeastern and central Minnesota. It especially likes forests near lakes, rivers, and wetlands. In late fall, a recently hatched white admiral caterpillar uses silk to tie a leaf into a tube, then tucks itself inside for winter.

Work With Insects

Robert Dana works for the Department of Natural Resources as an ecologist, studying relationships between living things and their environment. Robert has been fascinated by insects as long as he can remember. Even before he was old enough to go to school, he raised a caterpillar and watched it turn into a moth. One day, when he was about 4 years old, he found a moth on his windowsill and decided to find out if a moth could turn back into a caterpillar. He pulled off its wings and legs, but he quickly realized he had made a bad mistake.

As a young man, Robert earned a degree in en-



AMANDA PLAIN, DNR

tomology at the University of Minnesota, where he learned how caterpillars accomplish their amazing transformation. As an ecologist, he works to protect native insects and other creatures that call Minnesota's forests, prairies, lakes, and rivers home. Robert helped choose caterpillars to include in this story and shared photos and fun facts.



BLACK SWALLOWTAIL BUTTERFLY BY BILL JOHNSON

Black

Swallowtail Butterfly

Papilio polyxenes


You can find black swallowtail caterpillars in gardens because they love to eat plants such as carrots and dill. Also look for them eating wild Queen Anne's lace in fields. Did you know these plants are closely related? These caterpillars know.

When a black swallowtail caterpillar hatches from its egg in June, it looks like a small black-and-white blob—like a bird dropping. As it grows bigger, this caterpillar develops a pair of rings on each seg-



COURTESY OF ROBERT DANA

ment of its green body. When threatened, the caterpillar pops a bright orange, foul-smelling, antler-shaped body part out of the first segment behind its head.

The caterpillar will grow to be about 2 inches long during the 10 to 30 days before it becomes a pupa, or chrysalis. Besides being hooked to a silk pad on a plant, the chrysalis has a silk belt around the middle. Like a safety belt worn by a pole climber, it helps keep the chrysalis from falling. 

TEACHERS RESOURCES

Find a Teachers Guide and other resources for this and other Young Naturalists stories at mndnr.gov/young_naturalists.