

BURYING BEETLES MAKE MEALS—AND TEMPORARY HOMES—OUT OF DEAD ANIMALS.

By Christopher E. Smith

I ENCOUNTERED my first burying beetle, a small black and orange insect, about 10 years ago, when I happened across a dead squirrel at the edge of my yard. Being the curious person that I am, I poked and prodded the squirrel, eventually rolling it over to see what it looked like underneath. Much to my surprise, several small beetles scurried away, including a few with bright orange markings on their backs and yellow hairs on their necks. That evening I went online to search for the identity of the beetles and found what they were—gold-necked burying beetles (*Nicrophorus tomentosus*). It turned out the gold-necked burying beetle is attracted to and then feeds on dead things.

I soon learned I could find other species of burying beetles in the area. These relatives of my backyard beetles came in different siz-

es, had distinct habits, and lived in many kinds of habitat. The more I explored this group of beetles, the more I got hooked. Since my original burying beetle encounter, I earned college degrees in wildlife management and conservation biology, including a minor in *entomology*, the study of insects. I now work as a wildlife biologist studying amphibians, reptiles, and insects—the creepy-crawlies I find fascinating.

There are about 70 *species*, or kinds, of burying beetle worldwide. About 17 of them can be found in the United States, and at least 11 of those can be found in Minnesota. Wherever an animal has died and begun to rot and stink, these beetles can be found making their home. Let's take a look at why burying beetles are so well suited for living amid death.

ERICA HOAGLUND



A baited pitfall trap (left) sits at the ready. After beetles fall into the bucket under the protective top, they are identified and then let go. The smell of dead rats (right) attracts beetles.



CHRISTOPHER SMITH



CHRISTOPHER SMITH

Dozens of burying beetles crawl around in a baited pitfall trap. The smell can attract burying beetles from miles away.

In Search of FRESH FLESH

Burying beetles were crawling on the dead squirrel in part to feed on one of their favorite foods: rotting flesh, or *carrion*. Eating dead things is a habit burying beetles share with their relatives, carrion beetles. Burying beetles aren't too picky about the type of flesh, eagerly eating dead small mammals, birds, amphibians, and reptiles. They also eat other things that don't sound too good to us, including poop, rotting vegetation, and other insects.

In order to eat their dead treats, the beetles must first find them—and they have special tools for doing this. Bury-

ing beetles are strong flyers, and some species are able to fly several miles in a single night in search of food. They use their powerful sense of smell to detect odors of rotting flesh in the air. Once burying beetles find the dead body, or *carcass*, of a small animal, they may have to battle with other burying beetles for the prize. Male and female burying beetles will often pair up to battle, a type of cooperation that is rare in the world of beetles. The largest male and female typically emerge as the winners to feed and reproduce on the carcass.

Nature's GRAVENIGGERS

Once they are in control of a carcass, the beetles typically begin removing the soil underneath the corpse using their powerful legs and mouthparts. As they patiently dig, the carcass slowly lowers below the soil surface, and the soil collapses over the top of the carcass. This is why they are called burying beetles.

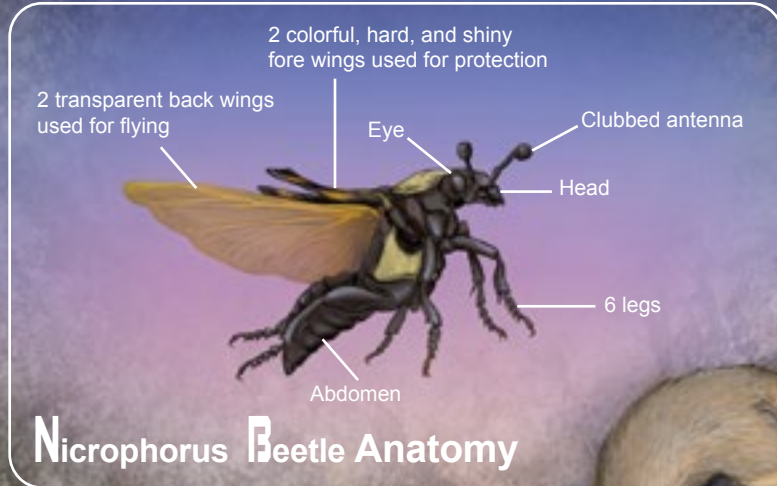
The beetles bury their food to prevent larger scavengers, like vultures or raccoons, from stealing it, and to protect the young beetles that will eventually be raised on the carcass. If a scavenger finds the carcass before it's buried, or if the carcass is too large to bury, the beetles have to be able to escape before they too become part of the meal. Because of this risk, they flee the carcass if they feel vibrations nearby.

Once the carcass is underground, things start to get really gross. The beetles work together to remove fur or feathers and chew up the carcass while rolling it into a ball. They sometimes have to compete with *maggots*, the larvae of flies, for the flesh. The beetles have a secret weapon, though: hitchhiking mites! These small, orange mites hitch a ride on the much larger burying beetles, traveling between carcasses.

When the beetle lands on a carcass and buries it, the mites, called phoretic mites, crawl off and begin feeding on the fly eggs and maggots, reducing competition for the beetles. In exchange for the maggot control, the mites get a free taxi ride between meals—a win-win tradeoff that is called a *symbiotic relationship*.

The life of a MINNESOTA BURYING BEETLE

1 Adults can fly several miles in one night searching for food. They detect the scent of a dead animal carcass with chemosensors in their antennae.



2 Arriving at a carcass, adults battle for ownership of the dead animal, which they will use as a food source and breeding site



4 They snip off fur or feathers and use the materials to line the pit

9 Adults emerge from pupal shells several weeks later, ready to fly off to find a new carcass



8 Larvae burrow into soil and pupate. Adults emerge from pupal skin in several weeks.

7 Larvae hatch from the eggs in a few days and the adults feed the larvae for several days, like bird parents feed their chicks



5 They chew up the body until it is soft enough to roll into a ball



6 Female digs a small side chamber and lays about 30 eggs





BILL JOHNSON



TOM RATZ

Mites (top) catch a ride on a round-necked burying beetle. Burying beetles are dedicated parents. An adult boreal burying beetle (bottom) cares for its young much like a bird cares for its babies.

Carcass SWEET CARCASS

While the mites are busy eating maggots and reproducing, the burying beetles lay eggs in the underground chamber that now contains a blob of mushy, rotting flesh. Once the beetle eggs hatch, the adults feed the larvae, called *grubs*, by regurgitating what is basically rotting ooze, much like birds feed their young.

After feeding voraciously for several days, the grubs *pupate*, transforming from

wormlike grubs to fully formed adult beetles, similar to the way some caterpillars transform into butterflies.

As the new adult beetles begin to dig their way out from their underground chamber, the mites that have been living alongside them climb aboard to travel to the next meal. The beetles may feed for several weeks before finding a place to hibernate for the winter.



MIKE DVORAK

Burying beetles help transfer nutrients below ground, feeding microbes, fungi, and plants.

The RECYCLERS

Whether you find burying beetles extremely disgusting or absolutely fascinating, like I do, they play important roles in nature. Burying beetles are decomposers—a species that helps break down and recycle materials into smaller parts that can be used by other plants and animals. The animal carcasses that are broken down by burying beetles become part of the soil to be used by plants and microbes.

By consuming carrion, burying beetles help transfer nutrients from previously living animals into the soil. This transfer of nutrients from the aboveground to the belowground world helps sustain life on earth. In addition to transferring nutrients, decomposers help clean up the aboveground environment, which helps prevent the spread of disease, including diseases that can make people sick.



ERICA HOAGLUND

The author checks a pitfall trap and documents the kinds and number of burying beetle present.

Spot a BEETLE

As a scientist who studies these beetles, I have two favorite ways to find them. One is to look under dead things I find while I'm out hiking around. I look for dead fish or fish parts near popular fishing spots, and near roads I keep an eye out for roadkill squirrels, raccoons, rabbits, and other small to medium-sized animals. When I find a carcass, I grab a short stick and roll it over to investigate. You too can do this to find burying beetles if you find a small dead animal, but don't touch the carcass or the beetles with your bare hands.

Another, more effective way that I find burying beetles is to set baited traps between June and August. I bury 5-gallon buckets in the ground and put dead rats in the bucket to attract the beetles.

When I find or trap a burying beetle, I look for clues to identify which one of Minnesota's beetle species I've found. Unlike many insects that require a great deal of experience to learn to identify, burying beetle identification can be learned by anyone with a little patience and a strong stomach.

To identify Minnesota's burying beetles, I've even developed an illustrated key to help! Find it online at feldecology.com/blog/burying-beetles.

One clue is the size and shape of the orange markings on the beetle's black wing shields. Another is the color of the tip of the antenna, or antennal club. If you get really interested in identifying burying beetles, you can learn to trap, handle, and identify beetles yourself with the help of an adult.



JACOB PARRISTER

The American burying beetle is a federally endangered species and the largest species of burying beetle in North America. Once widespread, this beetle is now found only in isolated locations across the central and eastern United States.

The Missing BEETLE

Historically, Minnesota had 12 species of burying beetles, more kinds than any other state in the nation. However, one, the American burying beetle (*Nicrophorus americanus*), is presumed to be wiped out, or *extirpated*, from Minnesota and from much of its historical range. It was last seen in the state in the late 1960s near St. Cloud. Scientists have several different ideas about why it's gone. One of the more interesting ones is that it was a ripple effect of the extinction of the passenger pigeon in the early 1900s.

Before its disappearance the passenger pigeon was abundant, and when a pigeon

died, it was the perfect-sized meal for the beetle to raise its young on. When the passenger pigeon went extinct, the American burying beetle may have been an unexpected additional casualty.

Though Minnesota has lost this burying beetle, it may soon gain another one. The Carolina burying beetle (*Nicrophorus carolinus*) has been found near the Minnesota border in neighboring states to the west. It could turn up in western Minnesota along the upper Minnesota River or the Red River of the North.

Maybe a young naturalist like you will be the first person to find it! 📍