



STINKER: The smell-producing stink glands of this stinkbug are hidden on the sides of its thorax, or the middle body segment.



SLURP: The tarnished plant bug uses its saliva to liquify plant tissues. That way it can suck up the juicy meal.



BUG Hunter

Follow a lifelong bug enthusiast as he journeys into the world of wacky insects

BY JEANNA BRYNER

Randall Toby Schuh, an entomologist, leans over a tangle of wildberry vines. There, this insect scientist, from the American Museum of Natural History in New York City, spies his research subjects: green stinkbugs clinging to the berries.

What are these insects up to? Unfortunately for the fruit, these shield-shaped scutlers are really hungry. With a quick punch of their strawlike mouthparts, the bugs pierce the fruit's protective skin. Then, they slurp up the berry's nutritious sap.

Stinkbugs—named for the ultra-smelly odor they emit—are just one type of insect that scientists categorize as a “true bug.” Just as beetles form a distinct grouping of insects, so do bugs. Says Schuh: “All bugs are insects, but not all insects are bugs.”

Schuh and his colleagues are interested in plant-feeding “true bugs.” In particular, they are studying the family known as Miridae, or “plant bugs.” They are undertaking an enormous project, called the Planetary Biodiversity Inventory (PBI), to create a database of information about 10,000 species of plant bugs. Schuh and his team will scour far-reaching areas of the planet to collect and examine these Miridae bugs.

Why would Schuh go to so much trouble to study bugs? By knowing



BUG TRAP: Schuh closely examines his collectible to see if he nabbed any bugs.



Nuts & Bolts

NAME-CALLING

What's in a name? Scientists classify organisms using a two-part naming system. An organism's scientific name—which includes its genus and species—often comes from Latin words.

But these names can be tongue twisters! (One stinkbug's scientific name is *Graposoma lineatum*). So organisms also get nicknames, or common names, which describe a distinguishing trait—such as the stinkbug's smelly odor. Schuh works with many bugs that lack common names. Help him give these bugs nicknames by visiting: www.scholastic.com/namebug.

There, we mount and label the bugs so we can study and classify them.

Why bother to classify bugs?

Classifying things into organized groups is critical. If bugs are classified and named, scientists worldwide can talk about them using the same language. (see *Nuts & Bolts*, above).

Classification also shows how species are related to each other through shared traits. For instance, by studying common traits, we know that bed bugs, stinkbugs, and plant bugs are closely related. As scientists discover and classify living things, they now estimate that 80 percent of all animals are insects. By describing and categorizing living things, we improve our understanding of the diversity of life on the planet.

Do you have any tips for people who are afraid of bugs?

Fear of bugs is best dispelled through knowledge. If you learn about bugs, you'll find out which ones can hurt you and which ones won't. You'll even learn how fascinating bugs really are!

How can we safeguard these true bugs?

Since we don't have zoos for insects, conservation scientists have to protect the bugs' habitats and preserve the plants that they feed on.

Where do you travel to collect these critters?

We go around the world, to places like South Africa and Australia. We spend weeks camping in remote locations. Sometimes we go for days without seeing other people.

How do you collect bugs?

The true bugs we're studying are more abundant on woody plants than they are on *annuals*, or plants that complete a life cycle in one growing season. So we tap on the woody vegetation with a "beating stick." This dislodges the bugs from the plants, and they fall into a net. Then we put them in jars and bring them to the Museum.

feed on the blood of *vertebrates* (organisms with backbones, such as birds and mammals).

So do some predatory bugs feed on humans?

Yes. Bed bugs can feed on your blood. First, they use their piercing-and-sucking mouthparts to inject saliva into you. That's because blood *coagulates* (clots) naturally, so to avoid getting blood stuck in their mouthparts, they inject a saliva that is an anticoagulant. That way they can suck up their blood meal without the blood clotting.

What would happen to plant-ferred true bugs if their preferred plants were to die out?

About 75 percent of the plant bugs we've observed prefer just one plant type. That means that if something were to happen to those plants, the bugs would die off as well.

caterpillar, and then develops into a *pupa*. During this stage, its body changes, until a butterfly emerges.

You mention that true bugs have unusual mouthparts. How are they special?

Many insects, like grasshoppers and caterpillars have chewing mouthparts, which let them nibble on leafy plants. True bugs are different. They have tubular mouthparts through which they suck up their food. If they're trying to feed on solids or thick and gooey liquids, they encounter difficulty. It's a lot like trying to suck a milkshake through a very tiny straw. So the bugs spit on the food to liquefy it. Then, they use a pump inside their heads to pull the liquid up into their mouth tubes.

WEB EXTRA

To learn more, visit: www.scholastic.com/bugs

Your specialty is plant bugs. What's an example of one?

One of the best examples is the tarnished plant bug. It feeds on many crops, including the rapeseed from which canola oil is produced. The bugs are considered agricultural pests because they destroy the plant's seeds: They pierce the seed with their mouthparts and just suck the seed contents right out.

Do all true bugs eat plants?

No. Some are *scavengers*, which eat dead animals. For instance, about 30 species of the true-bug genus *Stenocephalus* from Australia spend their entire lives on *carnivorous* sundew plants, which trap and eat insects. A special structure of the *Stenocephalus* feet allows them to avoid being captured in the sundew's sticky juices. This enables them to hang out on the plant and scavenge on the insects that get caught by it. There are also *predatory* true bugs, which find live animals and feed on them. A few predatory insects, such as bed bugs,



SUCKER: In this magnified, colorized image, you can see the bed bug's piercing mouthparts (red structures).

where high numbers of bug species reside, conservationists will be able to make educated decisions to protect certain bug habitats. Plus, as Schuh will tell you, these critters show some fascinating characteristics. So grab a bug net, and Schuh will fill you in along the journey.

What are true bugs?

Scientists have given the name true bugs to a particular group of insects. They have specialized piercing-and-sucking mouthparts, distinctive wings, and defensive glands that produce and release foul smells.

Also, true bugs go through stages of gradual development called *incomplete metamorphosis*. That means when a true bug hatches from its egg, it looks a lot like an adult—but without wings and without sexual organs. In two to three weeks, when it becomes an "adult," the bug develops both of these characteristics.



SPOTTED: A young stinkbug hangs out on a carnivorous plant. The large black dots on its back are stink glands.

BED BUG, DR. ERIN KUMKEI/SHUTTERSTOCK UNLIMITED; STINKBUG, ED RESCHKE/PETER AMOLD, IAC.

Check it out:

The true bug collection at the American Museum of Natural History is extremely large. It includes bed bugs, assassin bugs, damsel bugs, and lace bugs. The Museum has been researching and celebrating the natural world for more than 135 years, and has more than 30 million objects in its collection of animals and artifacts. The Museum's 200 scientists travel around the world on 100 field expeditions each year. The scientists study everything from beetles and scorpions to the universe.

To learn more, ask your teacher, or visit www.amnh.org.