

Ages:

9 to 12

Bugs: Building a Water Strider

Contributor: Carolyn Klass, Dept. of Entomology, Cornell University

Main idea: Learn about bugs using the water strider as an example.

Objective: Learn that true bugs are one group of insects, the Order Hemiptera, and that the water strider is one. Create a model of the water strider and use it to help answer some questions about how it is able to “walk on water.”

Materials:

- q polystyrene foam (styrofoam) for the body
- q bendable but stiff wire for legs and antennae: 6 pieces - 4 inches long; 2 pieces - 2 inches long.
- q balsa wood or polystyrene (styrofoam) scraps for the feet

- q permanent markers to color the insects (red and black work well)
- q large bowl, plastic tub, or other container that can hold 3 to 4 inches of water.

Motivator: Building a model (water strider).

Questions (see Background for answers):

- q Why do you think a water strider doesn't sink when it rests on, or moves across the water surface?
- q The water strider is a member of the group of insects called Hemiptera. What does the name Hemiptera mean?
- q What type of mouthparts do they have? Do they have wings? How many wings?

Activity: (See water strider diagram):

1. For body: Cut a strip of foam 4 inches long, by 1 to 1 1/2 inches wide. Using red marker, make two eyes. Using black, color the body.
2. For legs: Bend the 4-inch wire into the shape of legs: A 90 degree bend at 1 inch from one end and another 1 inch from the bottom, bending in opposite directions.
3. For antennae: Slightly bend the 2-inch "wire in the middle.
4. Attach legs and antennae to the bug. You may be able to push the ends of the wire into the foam body or you may need to tape them in place.
5. Try your "water strider bug" in a tub of water. What happens to its legs?
6. Add feet to your model using 1/2-inch long scraps of balsa wood or foam. Wires can be pushed right into balsa wood. (Ask an adult to help.)
7. Try floating your insect again. It should stay on top of the water.

Background:

Entomologists (people who study insects) use the word “bug” to refer to a group of insects, the Order Hemiptera (the true bugs). The name Hemiptera refers to the structure of the front wing of these insects (hemi = half, ptera = winged). The base of the wing is thickened and leathery, while the outer portion is membranous. The hind wings of the Hemiptera are entirely membranous. Both pair of wings are held flat over the abdomen when the bugs are resting.

Other things that distinguish the Hemiptera include piercing-sucking mouthparts (a slender beak or proboscis) that is often tucked under the bug’s body. The beak arises from the front part of the head. They also have large compound eyes, and fairly long antennae. Some Hemiptera are called “stink bugs.” When they are handled or disturbed, they give off an unpleasant odor.

The Hemiptera undergo a gradual metamorphosis (a gradual change in size and form). Eggs hatch into nymphs which resemble the adults, but much smaller in size. The nymphs gradually develop wing pads, but do not have full wings until they reach the adult stage.

The water strider is one type of Hemipteran. It appears to “walk on water” and can skate fairly quickly across the surface of a pond or stream. It takes advantage of the surface tension of the water to stay on top and not break through.

When we try to float in water with our knees drawn up, we sink. When we float with our bodies stretched out and arms out to the side, we tend to stay on top. The more surface area we can expose to the surface of the water, the better it holds us up. The water (a liquid) exerts an upwards force on our body (buoyancy).

The water strider appears to be walking on stilt like legs, but when we examine them closely , we find that the tarsi (feet-like portion) are actually surrounded by lots of fine hair, and this hair is difficult to wet, therefore helps keep the insect buoyed up. This plus the sleek design of the body that repels water help keep the insect afloat.

Water striders are predaceous insects, and often can be seen running or skating across the surface of the water when a small fly or other insect falls in. The water strider quickly grabs the prey, inserts its beak-like proboscis and begins to feed. If the prey is large, it will drag it closer to shore or onto a plant before it begins to feed.

Water striders lay eggs on items floating on the water, such as a part of a plant or log. When the eggs hatch, the tiny nymphs are able to stay afloat on the water surface. They will look for food just as the adults do, feeding on less fortunate critters that fall into the water and cannot stay afloat for long. The nymphs grow by gradual metamorphosis, gradually getting larger in size, until they reach the adult stage when their wings are fully formed. As an adult, they can fly to another body of water to begin a new family.

Vocabulary:

Entomologist: A person who studies insects.

Hemiptera: An Order (group) of Insects characterized by wings half membranous, and half leathery or hard, sucking mouth parts, and growing by gradual metamorphosis.

Order: A group of related organisms.

Predaceous: A larger insect that feeds on other insects.

Proboscis: A sucking mouthpart, usually long like a tube or straw.

Repels: Pushes away.

Buoyancy: Ability to float on top of water or some other liquid

Extensions:

- q The day of the activity; collect a water stride and keep it in a container with water in it for the group to observe. When the session is over, release it back where you found it.

- q And/or: Visit a pond or stream where water striders are active to let the group see them.

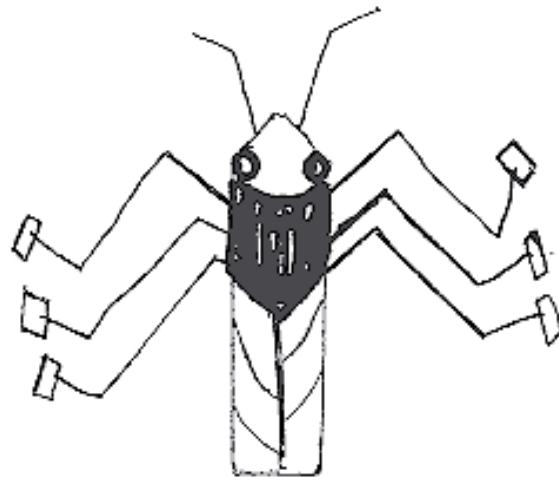
- q Give some other common examples of buoyancy. Is a flat bottom or round bottom better? What other insects or arthropods can walk on water? (A: Spiders.)

- q Find out what other insects are in the Order Hemiptera. Observe and draw or take pictures of some, and write about your experiences. For instance, have you tried to pick up a stink bug? What happens? Look in vegetable gardens or pumpkin patches for the gray-colored squash bug, a pest Hemipteran.

- q Your 4-H office can provide you with information on making an insect collection if you should desire to make a special collection of Hemipterans, or just insects in general.

WATER STRIDER

FRONT VIEW



SIDE VIEW

