

Chew on This

Wyoming Science

Objectives:

- Students will learn four types of insect mouthparts and how they are specialized.

Activity Procedure:

Most organisms have mouthparts specialized to catch and eat certain types of food. For example, dogs and wolves have long, sharp teeth specialized for tearing meat. Birds have beaks specialized for scooping water and fish (pelicans), pecking through wood to catch insects (woodpeckers), cracking seeds (cardinals and many others) or drinking nectar from long, tubular flowers (hummingbirds). Insects have specialized mouthparts, too. There are four types of insect mouthparts, depending on what type of food the insects eat. Below are descriptions of those mouthparts, along with fun ways to teach them.

Chewing Mouthparts

Insects with chewing mouthparts use jaw-like mandibles to grasp food and bring it close. Ask the students if they've ever watched a grasshopper or cricket close up. They may have watched the mouthparts working from side to side.

Grasshoppers, crickets, bees, ants, beetles and caterpillars all have chewing mouthparts. Most of these eat plants, except for some beetles such as ladybugs, which eat other insects. Other insects with chewing mouthparts include most of the predatory insects—praying mantis, dragonflies and ladybugs.

A plant damaged by an insect with chewing mouth parts usually looks as if someone took an insect-sized bite out of the edge of a leaf-like a bite from the side of a sandwich. (Explain to the students that they don't usually see a sandwich with a bite out of the middle, because people have to work their way in from an edge of the sandwich. Likewise, chewing insects must work their way in from the edge of a leaf.)



Standards

Science

Life Systems:

1.4, 1.5, 1.6

Materials

- Pair of pliers
- M&M's
- Fruit Roll-Ups
- Red gelatin (slightly liquefied or use water with red food coloring) in a clear cup with the top covered tightly with plastic wrap
- A turkey baster
- A sponge
- Some sugar on a saucer
- Juice boxes with straws

Estimated Time

45 Minutes

Grades 5-6

notes:

Activity 1

Use pliers to pick up an M&M from a bowl and bring it to your mouth. Or, show the students how to use their fingers as a pair of pincers on both sides of their face: Make a fist on both sides of your face, and extend the first finger of each hand to form “mandibles.” Have them use their mandibles to pinch off a small piece of a Fruit Roll Ups or other food item and bring it to their mouths.

Piercing/Sucking Mouthparts

An insect with piercing/sucking mouthparts has a long, thin proboscis that it inserts into a juicy leaf (or a juicy arm, in the case of mosquitoes). Then it sucks up the nutritious plant sap from the leaf (or blood from an arm). Many plant pests have piercing/sucking mouthparts. Instead of holes along the edge of the leaf, like from chewing insects, plants damaged by piercing/sucking insects have small spots or speckles across entire leaf surfaces. Often these spots turn brown or yellow because the plant cells in the surrounding area die when the sap is extracted. Leaves with piercing, sucking damage often appear dull and like sandpaper. Mosquitoes, aphids, stinkbugs, harlequin bugs and many others have piercing/sucking mouthparts.

Activity 2

Use a clear plastic cup containing liquid red or green gelatin or water colored with red or green food coloring. Place clear plastic wrap tightly over the mouth of the cup. Then, with the tip of the turkey baster, pierce the plastic wrap surface and suck some of the liquid into the stem of the baster. The students can pretend they are mosquitoes biting on someone’s arm (with red gelatin) or a bright green stinkbug piercing the surface of a leaf to suck out the juicy sap inside. (If you do not have a turkey baster, you can give each child a straw and let him or her pierce the plastic wrap and suck up some nectar.)

Siphoning Mouthparts

A siphoning mouthpart is a type of piercing/sucking mouthpart specialized for sucking nectar from flowers or rotting fruit. Insects with siphoning mouthparts are some of the most familiar to us, including butterflies and moths. They have a long, tubular proboscis, like insects with piercing, sucking mouthparts. However, instead of piercing through the surface of a leaf, they use these long tubes as straws to suck up nectar from flowers such as zinnias and honeysuckle. When not using the straw-like siphoning proboscis to drink a meal, they coil it up to keep it out of the way. When they find a sweet flower, they roll it out and suck up some nectar.

Activity 3

This type of mouthpart is very easy to simulate using juice boxes with straws. The students will enjoy pretending to be butterflies drinking nectar from a flower. You can also simulate the coiled-up proboscis using a party blower that unrolls when you blow in it. Give each student a party blower to blow and watch the paper roll out and in. Siphoning mouthparts will be a favorite.

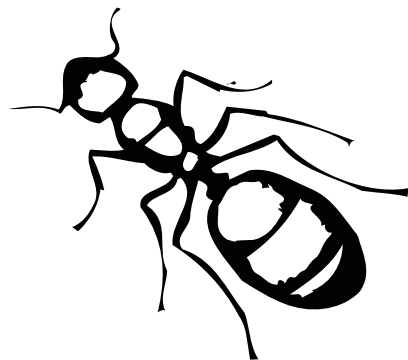
Sponging Mouthparts

Sponging mouthparts are perhaps the least known of the types of mouthparts, but your students will find them fascinating. An insect we see most often, the fly, has sponging mouthparts. If you've ever watched a fly crawling on a cabinet, you may have noticed that it continually presses its proboscis against the counter, sponging up food. The end of the proboscis is blunt and rough looking, as opposed to the tubular-shaped proboscis of a mosquito or butterfly.

However, there is another component to the story—one that will disgust and fascinate your group. A sponge can't pick up crumbs and sticky messes unless it is wet. The fly's mouthparts work the same way. If a fly lands on a bowl of sugar, it can't sponge up dry sugar. To wet the food, the fly spits fluid on it to moisten and soften it. The liquid dissolves some of the food, and the fly can then sponge it up. Disgusting, right? This is part of the reason flies are considered such pests and germ spreaders in homes. They also can carry disease organisms on their feet as they crawl from dirty to clean surfaces. Tell the students not to think too badly of flies, though. In spite of their poor table manners, they are vital as pollinators—second only to bees.

Activity 4

Show the students how to take a dry sponge or paintbrush and touch it to the surface of some sugar. Very little sugar will stick to it. Then wet the sponge or paintbrush and touch it to the sugar again. The sugar will instantly begin to dissolve and can then be absorbed and picked up by the sponge. (We don't advise that you simulate the spitting part!)



vocabulary:

- *mandibles*
- *proboscis*
- *siphoning*