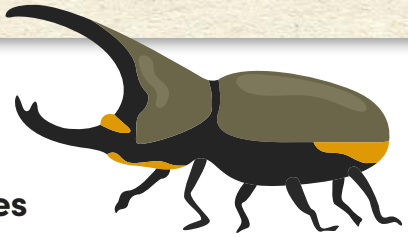
TAKE A CLOSER LOOK: HOW DO INSECTS EAT?



GRADES 2–3

DURATION 30 minutes

THEME

- ○ Forest Health
- ☑ Ecology
- ○ Plant Conservation

TYPE OF LESSON

- ☑ Instructor-Led
- ☑ Hands-On
- ○ Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- ○ Outdoors
- ☑ Virtual
- ○ Classroom
- ☑ Other: Demonstration or participation

TEACHING STRATEGY

- ○ Place-Based Learning
- ○ Storytelling
- ○ Nature Play
- ☑ Art / Movement
- ○ Other:

STANDARDS

- NGSS, 3-5-ETS1-2: Engineering Design
- NGSS, 2-LS4-1: Biological Evolution: Unity and Diversity
- NGSS, LS1.A: Structure and Function

LESSON GOAL

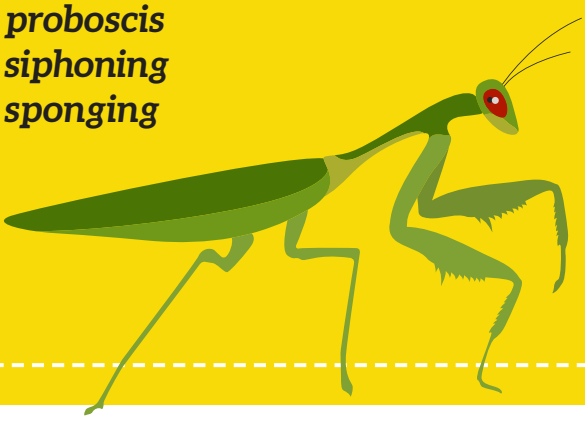
Learners will explore the varieties of foods that insects eat and different ways of consuming those foods.

LESSON SUMMARY

Learners observe insects, their mouthparts, and feeding behaviors through webcams and educator demonstrations to understand the relationship between structure and function, and to predict how different insects eat.

WORD BANK

carnivore
decomposer
detritivore
herbivore
mandibles
omnivore
pollinator
proboscis
siphoning
sponging



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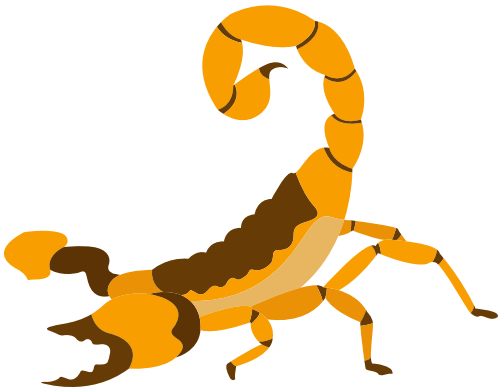
PRINTED/DIGITAL MATERIALS

- **Take a Closer Look: How Do Insects Eat? information sheet** (1 per learner)
- **Facilitator Guide for Insect Mouthparts** (1 per educator)

OTHER MATERIALS

- A variety of household items for demonstrating insect mouth types (per educator); examples:
  - 2 spoons for mandibles (to simulate feeding by chewing)
  - A sponge or rag (to simulate feeding by sponging)
  - A straw or rolled up tube of paper for a proboscis (to simulate feeding by siphoning or piercing/sucking)
- A variety of household items for simulating insect food types (per educator); examples:
  - Dried beans (to simulate food that is chewed)
  - Lettuce leaves (to simulate food that is chewed)
  - Beverage in a cup (to simulate food that is sponged, siphoned, or pierced and sucked)
  - A lid for the cup that has a hole for a straw OR a piece of foil or plastic wrap to use as a lid (to simulate food that is pierced and then sucked)
- Optional: Each learner should have a similar selection of household items on hand if they are going to simulate feeding along with the educator.



SETUP

1. Review the **lesson procedure**.
2. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
3. Decide which insect mouth types you will model during the lesson and whether you will ask learners to try out any models themselves during the lesson.
4. Prepare the lesson **materials**.
   - Gather the **materials** you will need for modeling insect mouth types.
   - If learners will also be modeling mouth types during the lesson, send them a list ahead of time specifying the household **materials** to have ready.
   - Share digital copies of the **Take a Closer Look information sheet** and the **Facilitator Guide for Insect Mouthparts**.
   - Preview and select the insect webcams you will feature in the lesson (see **additional resources** or research other webcams displayed by garden organizations). Get them ready to show. Consider allowing time for a few minutes each of live and prerecorded video feeds; you'll be more likely to find prerecorded feeds showing closeups of mouthparts and feeding behavior.
   - Get the **Take a Closer Look information sheet** and the **Facilitator Guide for Insect Mouthparts** ready to show during the lesson (on screen or on paper).
   - Have the **lesson opener** and **lesson questions** available so you can read them without showing your whole lesson plan. (You may wish to print them out or have them open on a second screen that you are not sharing.)

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LESSON PROCEDURE

1. Optional: Complete one or more of the **pre-lesson explorations**.
2. Welcome the group and introduce the topic with the **lesson opener**.
3. Direct learners to where they can view the **Take a Closer Look information sheet** and the **Facilitator Guide for Insect Mouthparts**. (Post a link, for example.)
4. Tell learners that you will be watching some insect webcams. Instruct them to pay close attention to what and how the insects are eating.
5. Screen share an insect webcam. Working as a group, identify insects and list them in the chat. Ask learners to identify the types of food the insects are eating, and anything they notice or know about how the insect eats. Record these details in the chat.
6. Repeat for at least one more webcam, featuring a different insect.
7. Instruct learners to consult the **Taking a Closer Look information sheet**. Look at the images of insect mouth types, and discuss the different types of insect mouths (chewing, sponging, piercing/sucking, and siphoning).
8. Ask learners what kinds of mouths they think the insects they saw in the webcams have.
9. Demonstrate a few types of mouths with household items—spoons for mandibles, a sponge or rag for siphoning, straw or rolled up paper for a proboscis. Pretend that you are eating with your "insect mouth," and attempt to pick up different types of food (e.g., dried beans, some liquid in a cup).
10. Optional: Have students join in and test out different mouth models using their own household materials.
11. Ask the **lesson questions**.
12. Utilize the **Facilitator Guide for Insect Mouthparts** to point out similarities in student thinking.
13. Optional: Complete one or more of the **post-lesson explorations**.

TAKE A CLOSER LOOK: HOW DO INSECTS EAT?

LESSON OPENER

Share the following with learners to orient them to the topic:

Have you ever seen an insect eat? Insects have specialized mouths to take in and break down their food. For this lesson, we are going to investigate insect mouths and how insects feed by studying insect webcams. Then we will get a closer look at some examples of mouthparts, and I'll demonstrate some ways to model insect mouths. After the demonstration, we'll come up with some predictions about what different insects eat.

LESSON QUESTIONS

- Are all insects the same or different?
- Look at the insect mouth types on the **Take a Closer Look information sheet**.
  - What is similar about the mouths on the sheet?
  - What is different?
- Can anyone describe a mouthpart we saw or demonstrated today? How do you think that part could collect food? What kind of food would it collect?

PRE-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **Draw an insect.** What makes an insect different from an arachnid (Insects have six legs, three body parts, antennae, and usually wings.)
- **What do you think insects eat?** Have students make a list of five foods insects eat.
- **What's in your mouth that helps you eat your food?** Have learners brainstorm a short list. (Prompt them to think of teeth, tongue, and saliva without saying those words.)

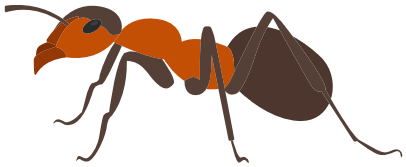
POST-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **Write a letter to yourself.** Have learners write a letter to themselves recapping their favorite parts of the lesson. Provide a template and prompts to guide writing (e.g., Dear Myself, On MM/DD/YYYY we watched insects eating different kinds of food. I'll never forget... One question I wished I asked was...).
- **Draw a food web.** Have learners create a food web showing the insects that they studied, the foods those insects eat, and the organisms that eat those insects.
- **Write an insect poem.** Have learners write a poem about an insect they found interesting from the lesson; they should include descriptive words about what it looks like based on the mouthparts discussed in the lesson. Optional: Have them draw the insect and its mouthparts and attach the drawing to the poem.
- **Make a list of insect foods you learned about today.** How is it different from the list you created before the activity? (Pair this with the related **pre-lesson exploration.**)

ADDITIONAL RESOURCES

- **Live Webcams with Insects:** bit.ly/ph-insectwebcam
- **A Simple Way to Tell Insects Apart.** Video from TED-Ed, appropriate as instructor background or to show learners, that explains insect mouthparts: bit.ly/ph-tedinsects



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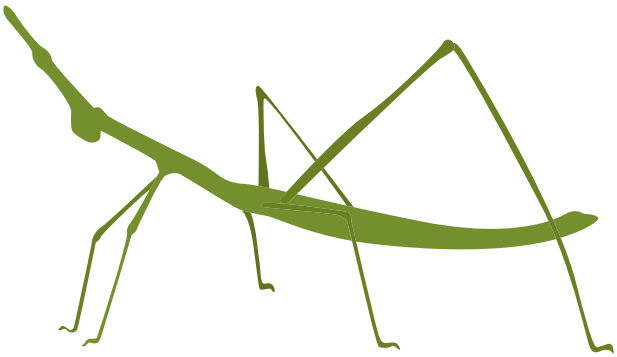
ADAPTATIONS / OPTIONS FOR ACCESSIBILITY

- See our website for a virtual lesson adaptation on this topic: www.plantheroes.org.
- For this lesson, adapt the worksheet into a matching game. Display images of the insect mouthpart types and the foods they are adapted for, and have students match them.



WORD BANK DEFINITIONS

carnivore: **an animal adapted to eating only (or mostly) other animals**

decomposer: **an organism that breaks down dead organisms and wastes into other materials**

detritivore: **an organism adapted to eating dead organisms and waste**

herbivore: **an animal adapted to eating only (or mostly) plants**

mandibles: **mouthparts an insect uses to hold or bite its food**

omnivore: **an animal adapted to eating a combination of plants, animals, and fungi**

pollinator: **an animal that helps a flowering plant reproduce by moving pollen around, often while that animal is feeding**

proboscis: **a tube-shaped mouthpart some insects have for sucking fluids**

siphoning: **when an insect feeds by sucking up fluids**

sponging: **when an insect feeds by soaking up liquid food**

Take a Closer Look: How Do Insects Eat?

No insect eats everything.
But all insects eat something.
Here are types of foods insects eat.

Pollen

Nectar

Stems

Insects

Dead Animals

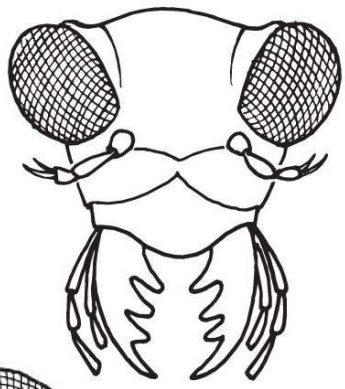
Leaves

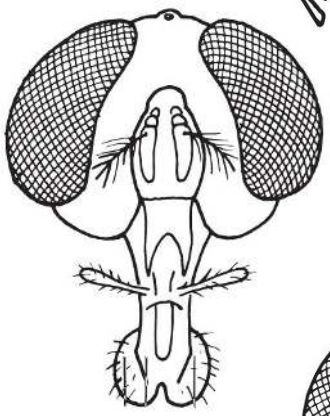
Dead Plant Materials

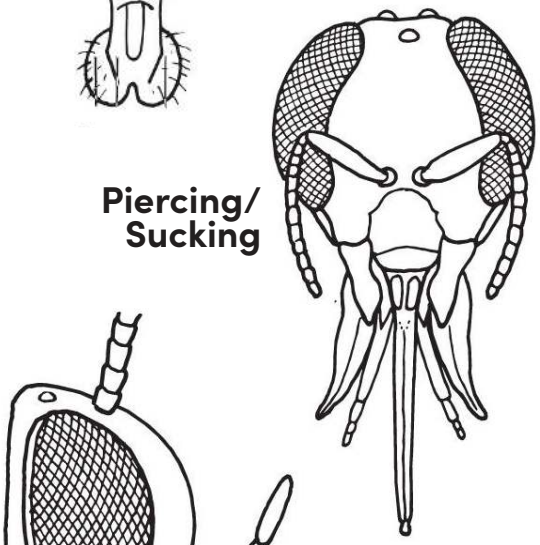
Fruit

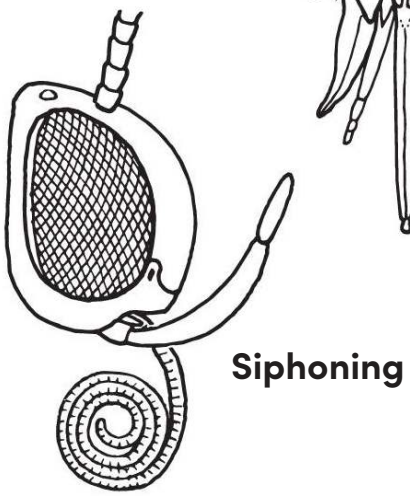
Seeds

INSECT MOUTH TYPES









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Facilitator Guide for Insect Mouthparts

CHEWING

Notice the mandibles (sharp jaws) of this predatory insect.

Grasshoppers, wasps, beetles, and ants are examples of insects with **chewing mouthparts**.

They grasp food (like leaves or other insects) in strong jaws. The jaws move sideways like scissors or pliers to cut, tear, and chew food. (People also have chewing mouthparts.)

Yellow Jacket A

PIERCING/SUCKING

Insects that must **pierce tissue to get to fluids** (blood in animals; sap in plants) need to have sucking tubes that can pierce.

The mosquito's mouth looks like a long, piercing, sucking tube. Stylets (hard, sharp structures) in its mouth move up and down into its victim. Similarly, stink bugs pierce through plant stems and fruits to suck up liquid.

Stink Bug B

SPONGING

This housefly uses a sponging technique. In its modified labium (lip), saliva secretions are pumped onto the food source. **This wets and partially liquefies the food so it can be sponged up into the mouth.**

Housefly C

SIPHONING

A butterfly has a long, tube-shaped proboscis (tongue) which **uncoils to siphon (suck up) nectar** from a flower.

Butterfly D

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