



TAKE A CLOSER LOOK: HOW DO INSECTS EAT?

THEME

- Forest Health
- Ecology
- Plant Conservation

TYPE OF LESSON

- Instructor-Led
- Hands-On
- Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- Outdoors
- Virtual
 - For a virtual lesson version, visit our website: www.plantheroes.org*
- Classroom
- Other: In groups or pairs

TEACHING STRATEGY

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

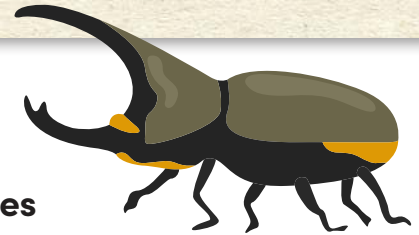
STANDARDS

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



GRADES 2-3

DURATION 30 minutes



LESSON GOAL

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

LESSON SUMMARY

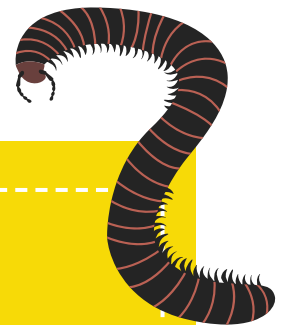
Learners create a model of an insect's mouth to understand the relationship between structure and function, and to predict how different insects eat.

PRINTED/DIGITAL MATERIALS

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

OTHER MATERIALS

- Modeling clay (1 tennis ball-sized, workable ball per learner, pair, or group)
- Toothpicks to shape or stick into clay
- Pipe cleaners to add appendages to clay



WORD BANK

<i>carnivore</i>	<i>omnivore</i>
<i>decomposer</i>	<i>pollinator</i>
<i>detritivore</i>	<i>proboscis</i>
<i>herbivore</i>	<i>siphoning</i>
<i>mandibles</i>	<i>sponging</i>

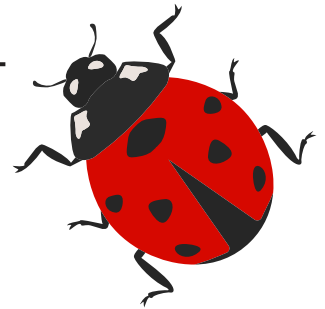
TAKE A CLOSER LOOK: HOW DO INSECTS EAT?

SETUP

1. Review the **lesson procedure**.
2. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
3. Prepare the lesson **materials**.
 - Set up tables or sitting areas for each group (or pair).
 - Print copies of the **Take a Closer Look information sheet** and the **Facilitator Guide for Insect Mouthparts**.
 - Organize the modeling clay and tools for each group so the materials are ready to distribute when the activity begins.
4. Consider whether you will collect and reuse modeling clay at the end of the activity to reduce waste and maintain a supply of materials. As an alternative to saving the clay models, you or your team can take photographs to be shared with the class after the visit.

CLASSROOM EXPLORATION: LESSON PROCEDURE

1. Optional: Complete one or more of the **pre-lesson explorations**.
2. Introduce the topic with the **lesson opener**.
3. Divide learners into groups (or pairs).
4. Hand out one copy of the **Take a Closer Look information sheet** to each group.
5. Instruct each group to consult the **information sheet** and select which mouth type they will build (chewing, siphoning, piercing, or sucking).
6. Once the selection has been made, hand out modeling clay, toothpicks, and pipe cleaners. (For larger groups, consider handing out clay to each learner or assigning roles so each participant can be actively involved.)
7. Circulate during group work to clarify the procedure and promote inquiry.
8. End group work and ask the **lesson questions**.
9. Utilize the **Facilitator Guide for Insect Mouthparts** to point out similarities in student thinking.
10. Optional: Take photographs of the models, and then collect modeling clay for reuse.
11. Optional: Complete one or more of the post-lesson explorations.



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 activity, we are going to study insect mouths by creating 3D models out of clay. After we create our models, we will get a closer look at their mouthparts and come up with some predictions about what these insects eat.

LESSON QUESTIONS

- 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 they built for their insect? How do you think that part could collect food? What kind of food would it collect?
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PRE-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **Draw a class 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 learners 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.)

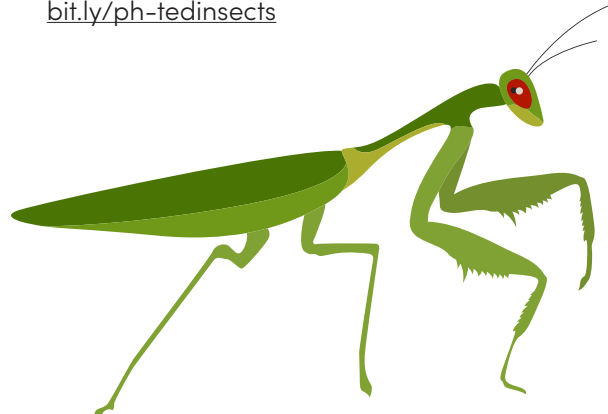
POST-LESSON EXPLORATIONS

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 spent time acting out insects and plants. I'll never forget . . . One question I wish 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 their insect; they should include descriptive words about what it looks like based on the mouthparts discussed in the lesson. Optional: Have a facilitator take a picture of each insect mouth creation and attach it at the top of 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**.)
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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



ADAPTATIONS / OPTIONS FOR ACCESSIBILITY

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



EXTENSIONS

- For older students, discuss energy transfer in an ecosystem and food web. Draw a class food web using the insects discussed. Include heterotrophs, autotrophs, and decomposers.
- Extend this lesson to other types of animals—how do other nonhuman animals eat, and how are their mouths shaped?
- Consider metamorphosis: compare and contrast how a butterfly eats with how a caterpillar eats. (They have different tools to allow them to eat.)
- Use a 3D modeling app (such as Tinkercad for Minecraft) to build models online.
- Discuss biodiversity: Why is it good to have different kinds of insects?

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



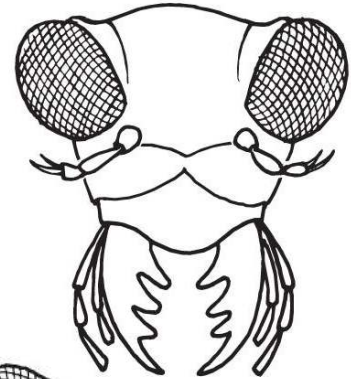
Fruit



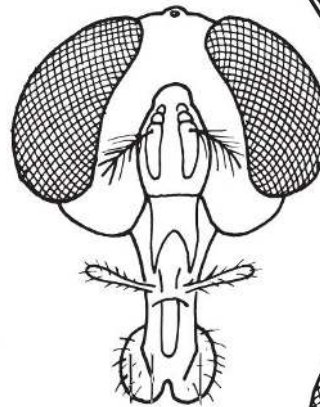
Seeds

INSECT MOUTH TYPES

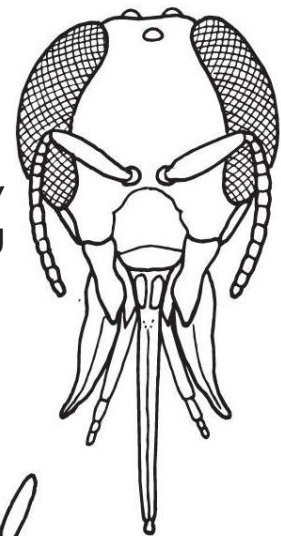
Chewing



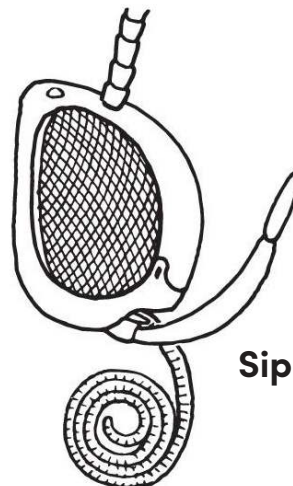
Sponging



Piercing/
Sucking



Siphoning



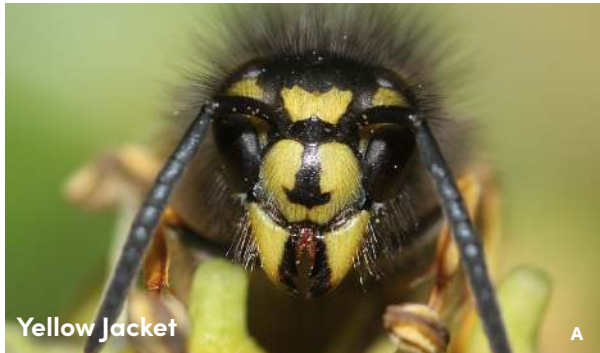
Facilitator Guide for Insect Mouthparts

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.)



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.



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.**



SIPHONING

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

