

Who Eats What?

For Students Grades 2–4

All living things require energy and nutrients. They receive energy and nutrients in a variety of forms. This relationship between organisms and their nutrient sources can be illustrated as a food chain. Students will develop a food chain for the Litzsinger Road Ecology Center based on their field observations. This field lab includes classroom training to prepare students to make effective field observations. During their visits to the center, students will examine and record evidence of animals eating plants or other animals and evidence of decomposition. The class will organize these observations to create a food chain.

Outcomes

Students will...

- understand the concept of food chains.
- learn to use simple field observation tools such as magnifying glasses, tape measures, and field guides.
- describe what they see using words and drawings.

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Field Lab Overview

This suggested sequence includes classroom preparatory activities, field experiences at the Center, and classroom follow-up.

Preparation for Visit 1

In the classroom and schoolyard:

- *Plants, Animals, and Decomposers at School:* Students will look for relationships between plants, animals, and decomposers in the schoolyard.

Visit 1

At Litzsinger Road Ecology Center:

Students will report to Litzsinger staff a sample of their schoolyard observations. Then students will participate in the following activities:

- *What Lives Here?:* Students will explore Litzsinger Road Ecology Center, periodically listing plants, animals and decomposers observed directly or indirectly.
- *If You Were...:* Using a response sheet as a guide, students will imagine themselves as animals, plants, and decomposers that they observed, answering the questions in turn.
- *Looking for Interactions:* For the remainder of their exploration, students will look for and record evidence of plants being used for food, animals eating and being eaten, and decomposition.
- *Here's What I Discovered:* In the barn, cabin, or on the deck, students will sketch an observed plant, animal, decomposer, or interaction.
- *KLRE Live Report: At the Scene:* Students will wrap up their first visit by giving an impromptu news report of an observed plant, animal, or interaction. (Possible classroom activity.)

Preparation for Visit 2

In the classroom:

Students will look for clues to try to understand who was eating what, comparing notes on evidence of plant/animal interactions. They will investigate insect mouthpart shapes, how they work and how they affect plants.

- *Plant Munchers:* In this activity, students will become familiar with the diversity of insect mouthparts and how their structure corresponds to the insects' method of obtaining food.

Field Lab Overview (continued)

- *Leaf-Eater Lab (Optional)*: In this activity, students sample the taste, odor and texture of various edible leaves as they consider possible food preferences of various leaf-eating insects.

Visit 2: Looking for More Interactions

At Litzsinger Road Ecology Center:

- Students will report to Litzsinger staff what they have discovered about insect mouthparts and how insects obtain food.
- Students will record evidence of plant eating, locate and record evidence of predation, and locate and record evidence of decomposition.
- Students will explore soil and leaf litter with magnifiers, identifying plant eating, predation, and decomposition.
- Students will use field guides to identify observed animals.

Follow-up to Visit 2

In the classroom:

Students will share and display recorded observations of food relationships.

- *Create a Food Chain*: As a class, students will create and explain a food chain for the ecology center based on recorded observations.
- *Woodland Munchers (Optional)*: This game reflects the complex relationships in a food chain.

Assessment

Students will create a new food chain that includes people and another new one that does not include people. Each food chain should contain at least three living things, including a plant. Students will explain their choices for the food chains and what they represent.

Missouri Grade-Level Expectations Addressed

This field lab supports growth in the following Missouri state curriculum standards. Program staff can work with you to highlight the standards most relevant to your curriculum goals.

- Matter and energy flow through an ecosystem (Standard 4.2)
- Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking (Standard 7)

Resources

Midwest Public Garden Collaborative. *Interdependence: Links Between Plants and Animals*. Partners for Growing Science: Discovery Unit, 1997.

Hogan, Kathleen. *Eco-Inquiry*. Institute of Ecosystem Studies: Millbrook, NY, 1994.

Activity 1

Plants, Animals, and Decomposers at School

Summary:

Students will look for relationships between plants, animals, and decomposers in the schoolyard.

Materials:

- Clipboards
- “Plants, Animals, and Decomposers at School” Student Worksheets (one per student)
- Pencils
- Magnifiers
- Bug Jars
- String

Procedure:

1. Before going outside, spend some time explaining the purpose and procedure of this activity. It is recommended to first practice the activity in the classroom. Students should also be familiar with the term “decomposition.” If not, show an example of a rotting piece of wood or decomposing leaves.
2. Lay a string out in a straight line in the schoolyard. Have each student find a place to stand along the string. They may look high and low, far and near, but must stay at their spot along the string. For 5–10 minutes, students will look for and record evidence of plants and animals being used for food for insects and small animals. Students will also look for evidence of decomposition. If time allows, move the string to another location in the schoolyard (perhaps near some shrubs) and repeat the procedure.
3. Upon return to the classroom, students will report their observations, describing plants and animals as well as evidence of interactions and decomposition.

Student Worksheet

Plants, Animals, and Decomposers at School

Count, write, or draw what you see.

Can you find evidence of PLANTS PROVIDING ANIMALS WITH FOOD?

Can you find evidence of ANIMALS EATING OTHER ANIMALS?

Can you find evidence of DECOMPOSITION?

Visit Worksheet

What Lives Here?

Plants

Animals

Decomposers

Visit Worksheet

If You Were...

1. If you were a _____
(Choose an animal that you observe)

What do you see or hear that you might eat?

What do you see or hear that might eat you?

2. If you were a _____
(Choose a plant that you observe)

What do you see or hear that might eat you?

Where might you get energy and nutrients?

3. If you were a _____
(Choose a decomposer that you observe)

What do you see or hear that might eat you?

Where might you get energy and nutrients?

Visit Worksheet

Looking for Interactions

Find and record evidence of PLANTS PROVIDING FOOD FOR ANIMALS.

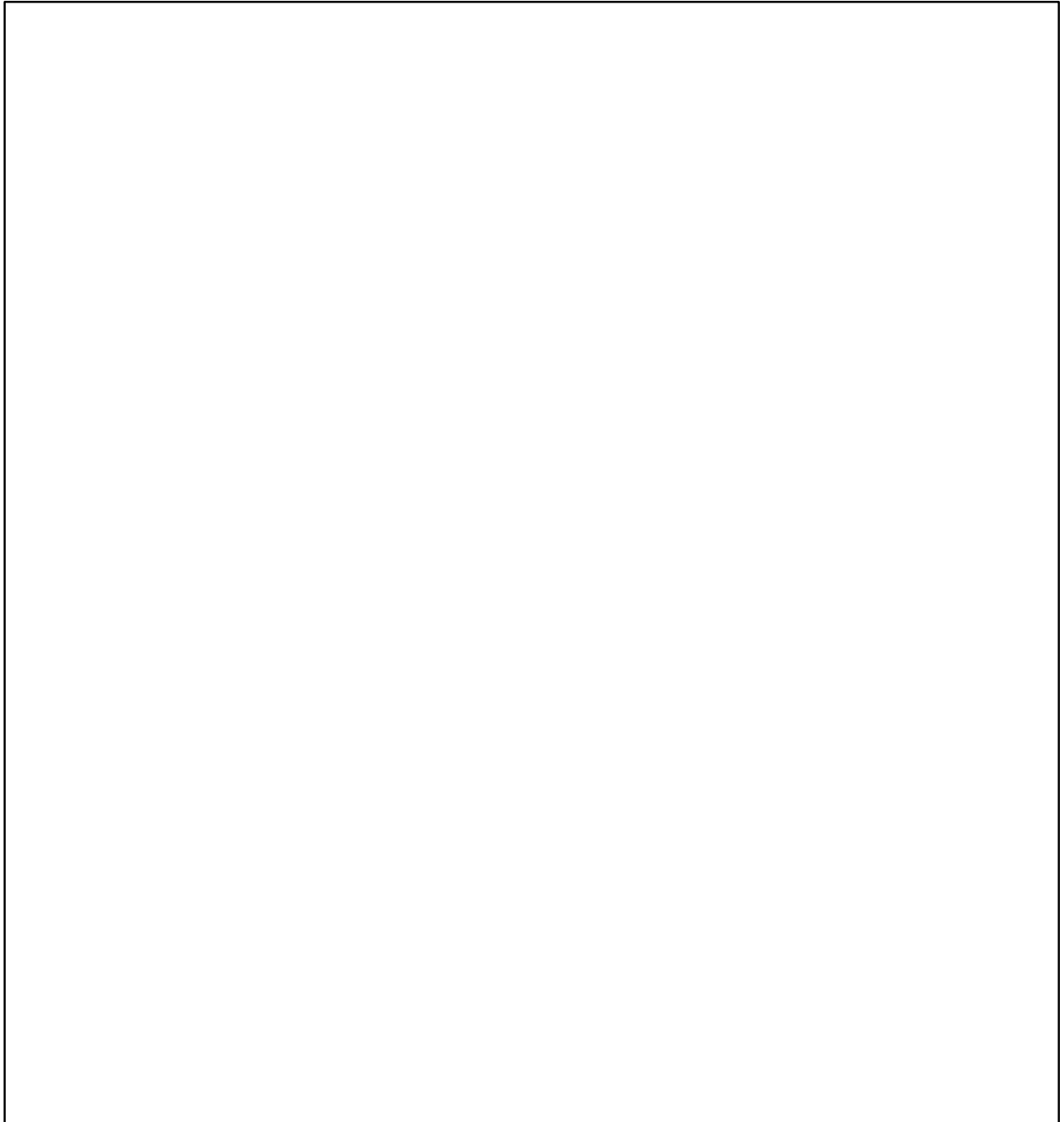
Find and record evidence of ANIMALS EATING OTHER ANIMALS.

Find and record evidence of DECOMPOSITION.

Visit Worksheet

Here's What I Discovered

Make a drawing of a plant, animal, or decomposer you discovered. If you found it was part of an interaction with another living thing, include that in your drawing.

A large, empty rectangular box with a thin black border, intended for a student to draw a plant, animal, or decomposer, and possibly an interaction.

Visit Worksheet

K-LREC Live Report: At the Scene

Work with your team to plan a news report about an interaction that you observed at Litzsinger Road Ecology Center.

1. Choose an interaction you observed.
2. Decide who will be the reporter and who will be the plant, animal, or decomposer.
3. Use the questions below to interview your subjects.

Interview Questions

- What kind of animal/plant/decomposer are you? Describe your appearance.
- Tell us about where you live and things that you do.
- Tell us why you do these things.
- Tell us about some of the other living things that you interact with.
- Ask your own questions...

Visit Worksheet

Sample News Report

W-OODS Live: Sample News Report

PART I. THE ANIMAL'S STORY

- Reporter:** This is Molly, on location out in the forest, with a live report. I'm here with an animal I've just met. Could you tell our viewers who you are?
- Animal:** I'm a squirrel with a bushy tail. I have a family of babies in that tree.
- Reporter:** Our hidden camera just filmed you using a forest plant. Can you tell our listeners what you were doing?
- Animal:** Yes, I was up in that old oak tree gathering some acorns.
- Reporter:** Why were you doing that?
- Animal:** Well, I'm planning on burying the acorns in the ground so I can use them for food later on.
- Reporter:** Do you think this will affect the tree?
- Animal:** I don't know. I guess the ones I eat will be used up, but there's plenty of acorns leftover.
- Reporter:** Thank you.

PART II. THE PLANT'S STORY

- Reporter:** Now let's hear the other side of the story. Could you tell our viewers who you are?
- Plant:** Yes, I'm a oak tree and I've been growing here in this forest since 1882.
- Reporter:** So you're more than 100 years old?
- Plant:** Yes, I've seen a lot of winters out here.
- Reporter:** And you were rooted here in this spot when the squirrel arrived. What happened next?
- Plant:** Well, my acorns are just about ripe and this squirrel showed up. She's been running all through my branches and on the ground gathering them.
- Reporter:** Is that a good thing or a bad thing for you?
- Plant:** I do have plenty so she and her family can eat some. I just hope she forgets where she buried some of them. Then there's a chance they'll sprout into more oak trees like me.
- Reporter:** Thank you. That's the news live from the woods on W-OODS. Now stay tuned for another report.

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Activity 2

Plant Munchers

Summary:

To develop their understanding of the concept “Plants Provide Food,” students explore various insect mouthparts, how they work, and the ways they affect plants. The activity prepares students to discover evidence of insects eating plants in their outdoor fieldwork.

Materials:

- Mouthparts (set of six drawings)
- Meet the Insects (set of six drawings)
- Tool Kit (pliers, nail-clippers, party blower, straw, plastic syringe, corkscrew, sponge)
- Green Construction Paper (1 sheet per student)
- Green Tissue Paper (optional)
- Scissors
- Paper Hole Punches
- Student Worksheets “Jaws” (1 per student)

Preparation:

1. Notice that six close-up drawings of insect mouthparts are provided; three are chewing insects and three are sucking insects. There is a corresponding set of six “Meet the Insect” drawings that show each mouthpart and how it works, as well as the whole insect and its common name. Make single-sided copies of each of the twelve drawings.
2. Place the six close-up drawings of insect mouthparts at six stations throughout the classroom. Do not put out the second set of “Meet the Insect” drawings yet.

Procedure:

1. Tell students that the drawings depict animals that depend on plants for food. Direct students to study each one carefully, working individually or in small groups to develop answers to the questions written on the board.

What kind of animal might this be?

How do you think the mouth works?

Do you think it makes a noise? What kind of noise?

What part of a plant does it eat?

What would it do to the plant?

2. After students have visited each station, ask what kind of animals were depicted (insects), and their ideas about how the mouths might work. Demonstrate how each one works, using the tools in the Tool Kit. Moisten the sponge and cut a paper leaf out of construction paper.. Show how a mouthpart like pliers could tear bites from a paper leaf, a mouthpart like a syringe could suck sap from a moist sponge, a mouthpart that sucks nectar could unroll like a party tooter, etc. Then set out the corresponding “Meet the Insect”

Activity 2

Plant Munchers (continued)

drawing next to each close-up drawing and allow time for students to visit each station again to see what the whole insect looks like and the ways it might affect a plant.

3. Provide a variety of papers for students to use to make leaves, and tools for them to mimic the action of different chewing mouthparts on leaves. Encourage students to create a paper leaf and use the tools to show what it would look like if eaten by an insect.

What To Expect:

Be sure students understand that insects belong to the animal kingdom. Insect play a crucial, often overlooked role linking plants with other animals in the food web...and are easier for students to find and observe in nature than other larger animals.

Students may enjoy experimenting with tools to mimic various insect mouthparts, but it is not necessary they correlate precisely the evidence they later observe at LREC with the feeding of a particular insect. In fact, it is not always easy to tell whether a leaf has been damaged by insects, disease, or weather. The purpose of this activity is to pre-cue students to look closely when they search for evidence of plant/animal interactions in nature.

Teacher's Note

General Background About Chewing & Sucking Insects:

The sucking mouthparts of bees and butterflies are adapted to drink nectar from flowers, a specialized form of feeding in which pollination also occurs. They generally cause no damage to the flowers they visit, stopping in for a sweet sip of nectar and incidentally bringing a load of dust-like pollen from a previous stop. The pollen is brushed onto the sticky tip of the flower's pistil and fertilizes the eggs within, which then ripen into seeds.

Aphids also have sucking mouthparts, generally inserted into a plant's tender new growth, and often cause curled, stunted leaves and flowers. High populations of aphids may weaken and deform a plant.

Some chewing insects start at a leaf's edge and munch their way inward. Others eat a series of holes in the leaf or they may skeletonize it, leaving only the veins behind.

A chewing insect, such as the leafminer, chews its way along inside the leaf between the top and bottom surfaces, leaving a widening tunnel to mark its path.

Adapted from Interdependence: Links Between Plants and Animals, Midwest Public Garden Collaborative, 1997

Teacher's Note

FYI: Facts About the Insects in this Activity

Focus and prepare through hands-on learning

Teacher's Note

FYI: Facts About the Insects in This Activity

insect	kind of mouthpart	tool it resembles
1. Katydid A katydid is a longhorned grasshopper with jaws that chew, tear and crunch plant leaves. Related insects with similar mouthparts are crickets, walkingsticks and grasshoppers.	chewing insect	(works like pliers)
2. Aphid Also known as plant lice, aphids have mouthparts that form a hollow needle and pierce the plant to suck out its sap. Leafhoppers and spittlebugs are related.	sucking insect	(works like syringe)
3. Honeybee The sucking mouthpart of a honeybee works like a straw as it gathers nectar, the sugary sap produced by flowers to attract insect pollinators.	sucking insect	(works like straw)
4. Weevil Weevils are beetle-like insects with long snouts that have chewing mouthparts at the end. The snout works like a drill on harder plant parts like seeds and stems to reach inner food stores.	chewing insect	(works like drill)
5. Butterfly As adults, butterflies and moths have mouthparts which form a sucking tube to drink nectar from flowers. It rolls into a tight coil when not in use.	sucking insect	(unrolls like party blower)
6. Caterpillar Caterpillars, the larvae of butterflies and moths, have chewing mouthparts which snip and cut leaves as they feed, often non-stop from hatching to cocoon.	chewing insect	(works like nail clippers)

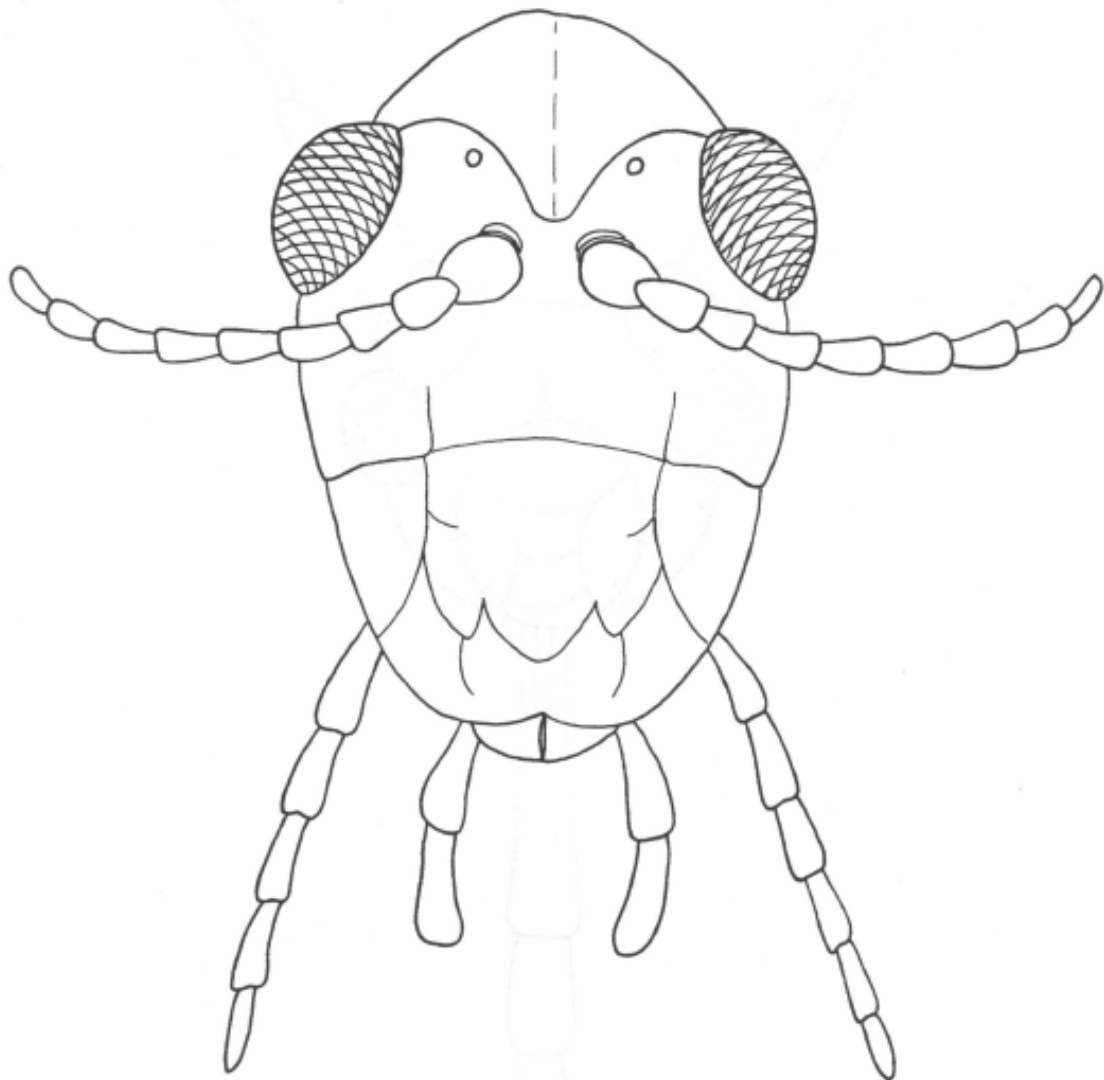
INTERDEPENDENCE

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Links Between Plants & Animals

MOUTHPART 1

INTERDEPENDENCE: *Links Between Plants & Animals*



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MOUTHPART 2

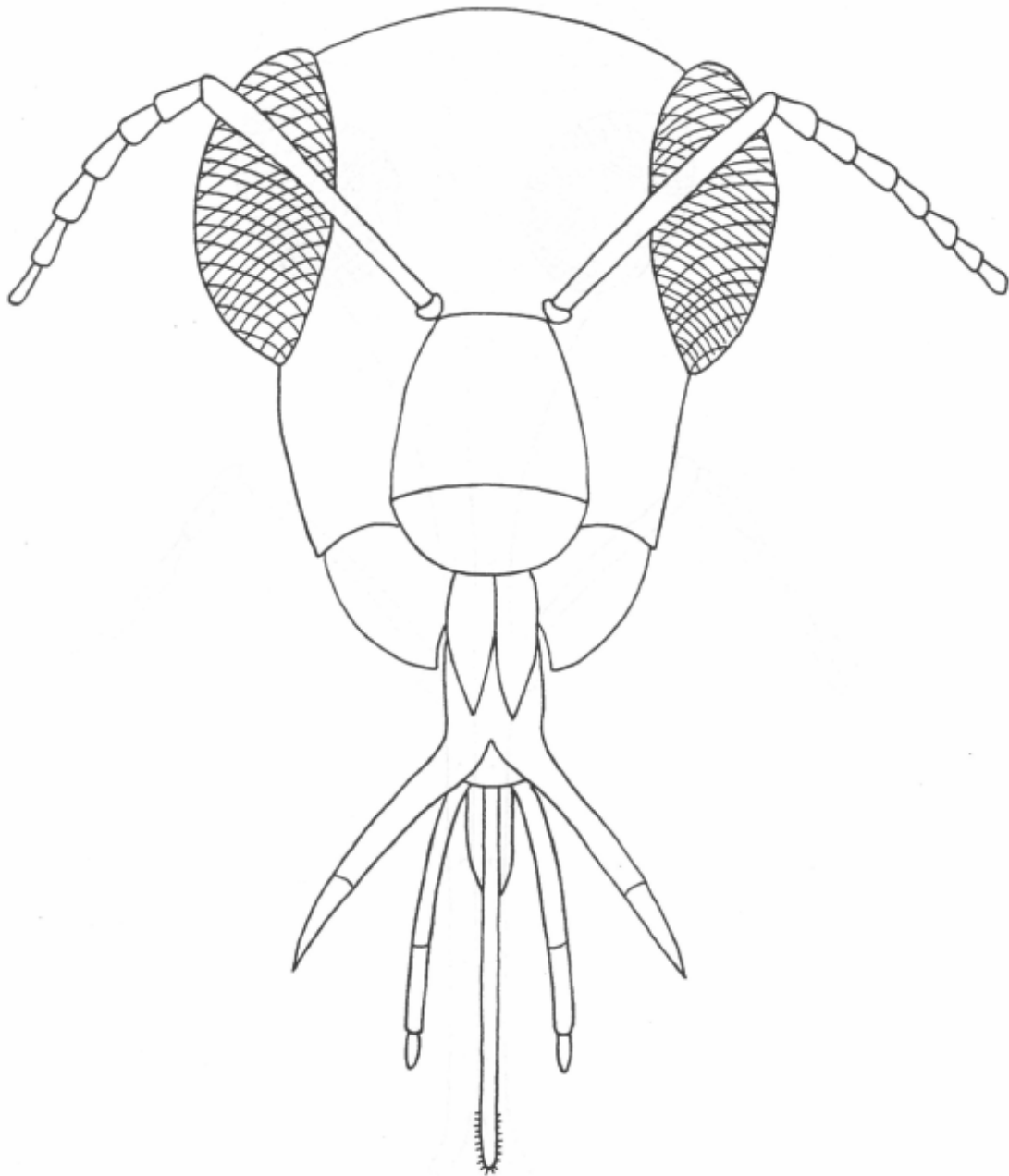
INTERDEPENDENCE: Links Between Plants & Animals



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MOUTHPART 3

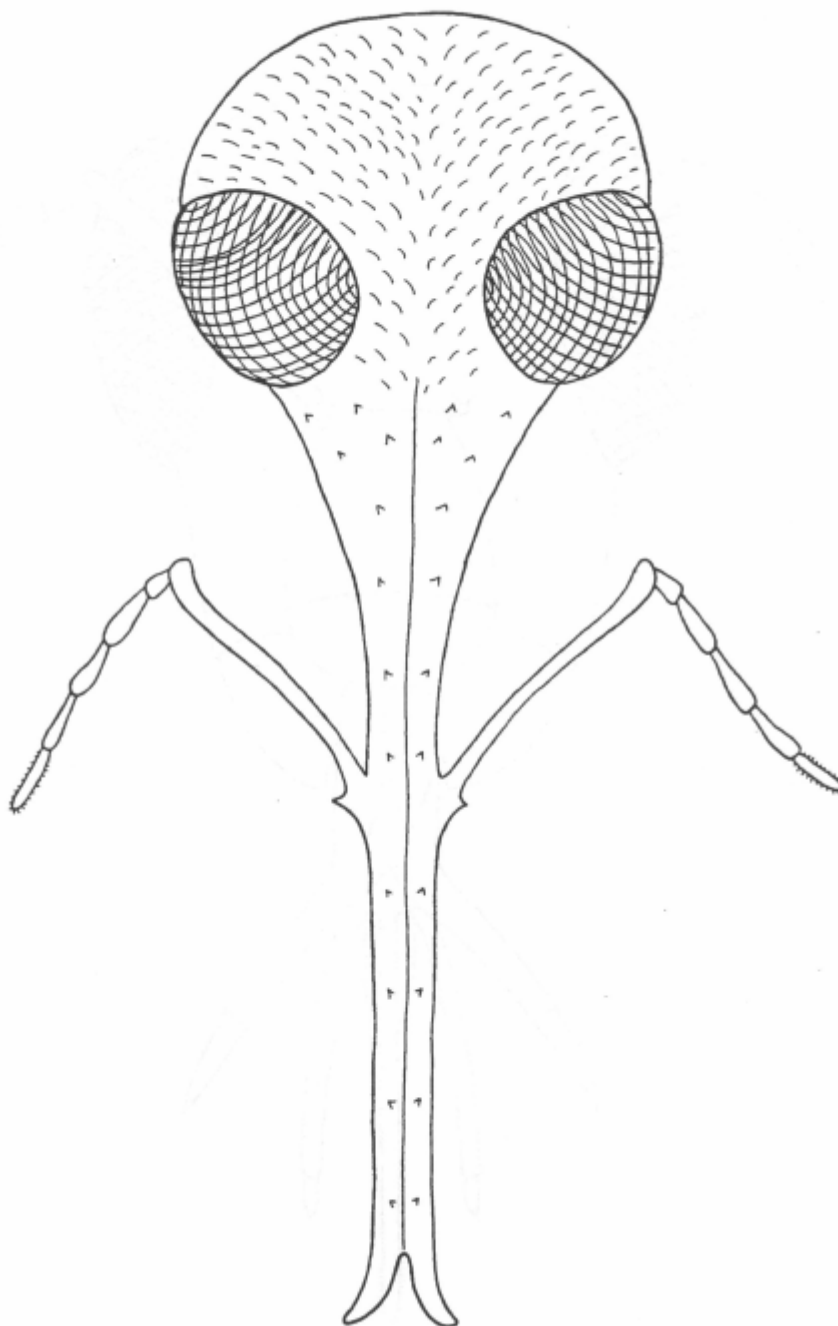
INTERDEPENDENCE: *Links Between Plants & Animals*



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MOUTHPART 4

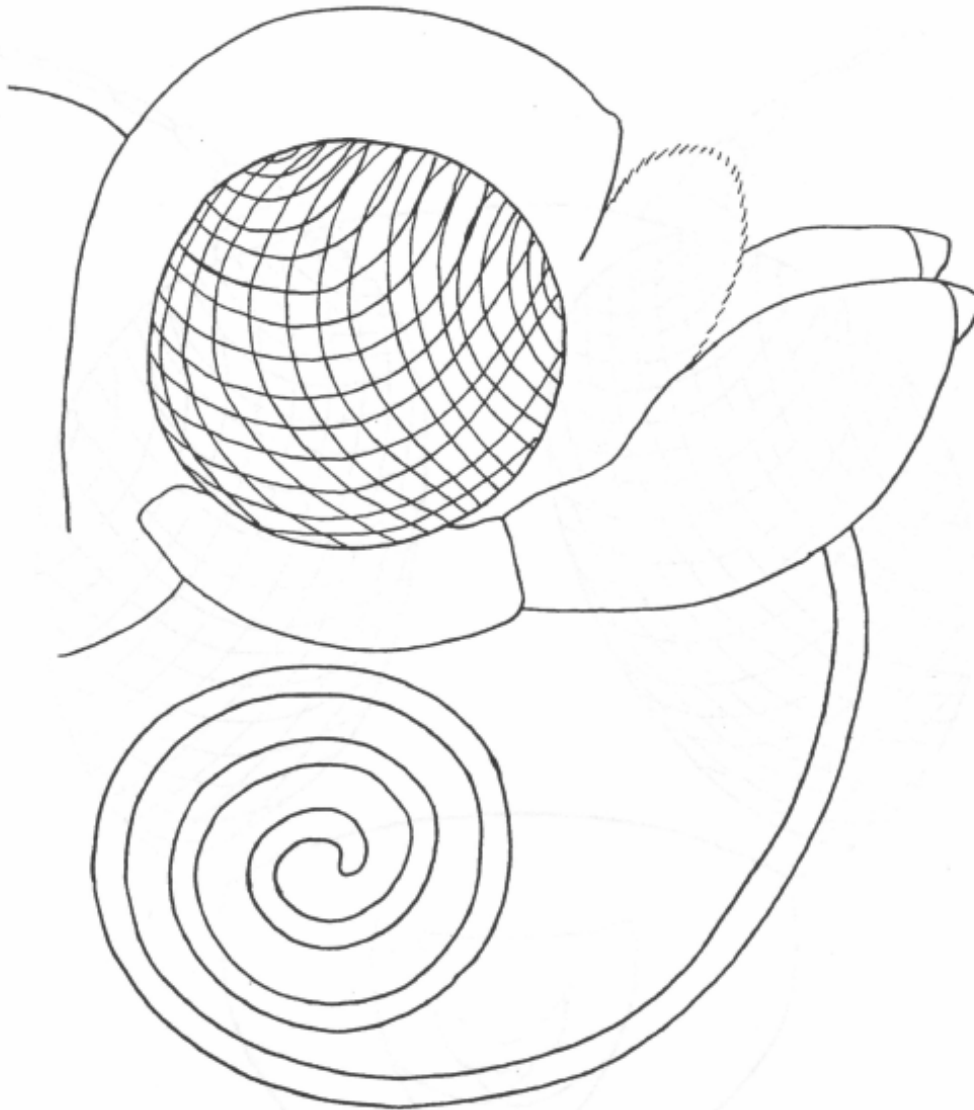
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MOUTHPART 5

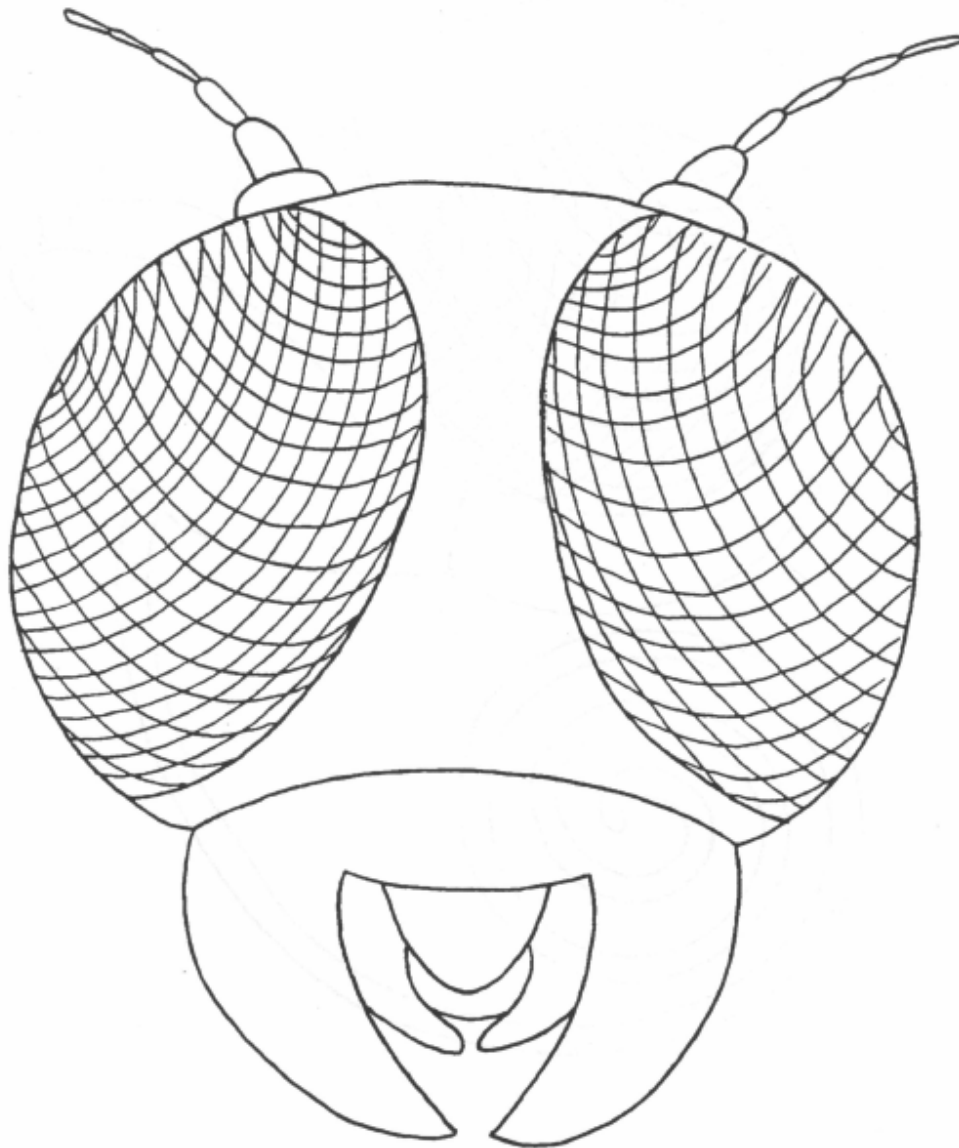
INTERDEPENDENCE: *Links Between Plants & Animals*



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MOUTHPART 6

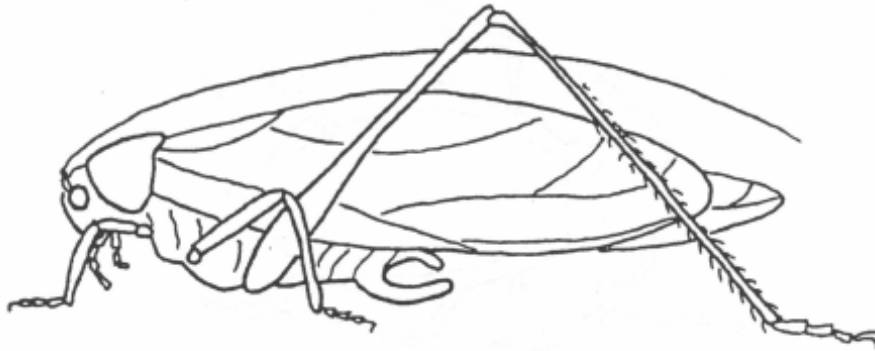
INTERDEPENDENCE: *Links Between Plants & Animals*



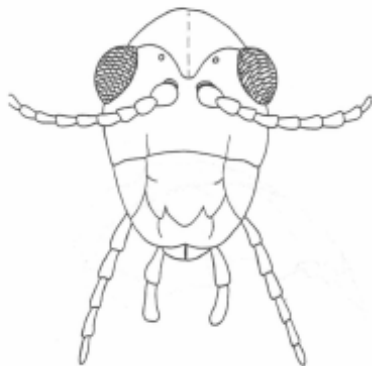
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MEET THE INSECT 1

INTERDEPENDENCE: *Links Between Plants & Animals*



Katydid



chewing insect



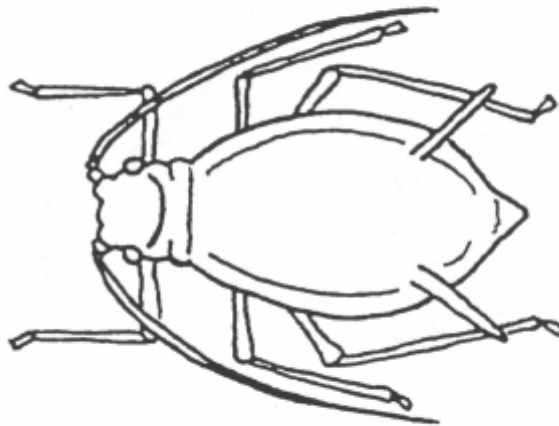
mouthpart works like pliers

A katydid is a longhorned grasshopper with jaws that chew, tear and crunch plant leaves. Related insects with similar mouthparts are crickets, walkingsticks and grasshoppers.

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MEET THE INSECT 2

INTERDEPENDENCE: *Links Between Plants & Animals*



Aphid



sucking insect



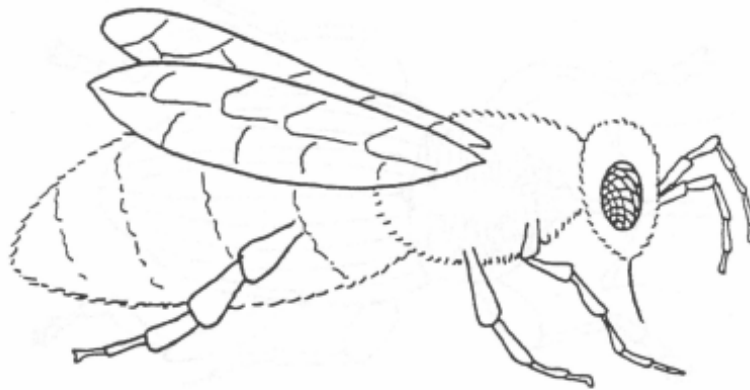
mouthparts work like a syringe

Also known as plant lice, aphids have mouthparts that form a hollow needle and pierce the plant to suck out its sap. Leafhoppers and spittlebugs are related.

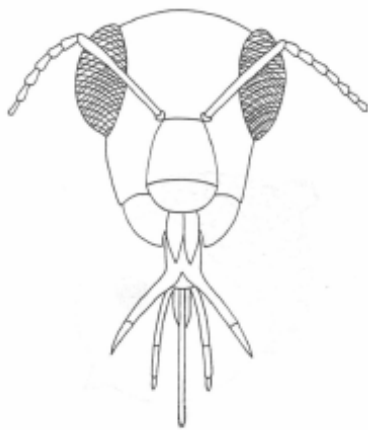
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MEET THE INSECT 3

INTERDEPENDENCE: *Links Between Plants & Animals*



Honeybee



sucking insect



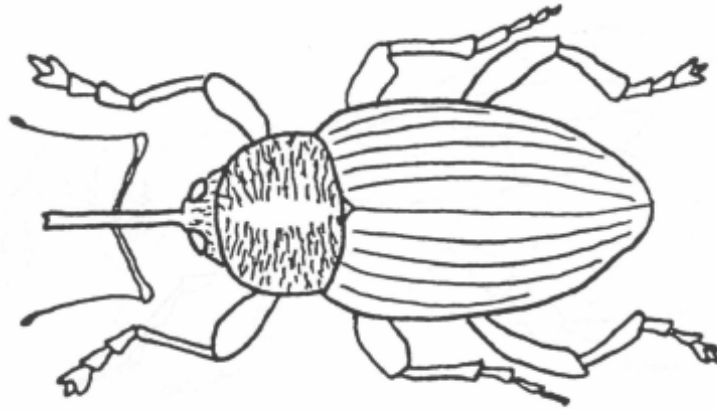
mouthparts work like a straw

The sucking mouthpart of a honeybee works like a straw as it gathers nectar, the sugary sap produced by flowers to attract insect pollinators.

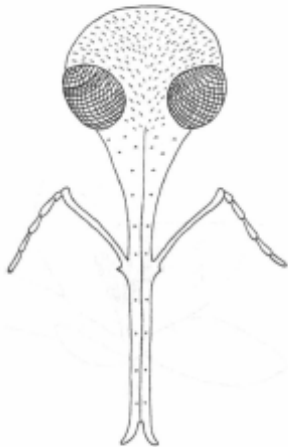
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MEET THE INSECT 4

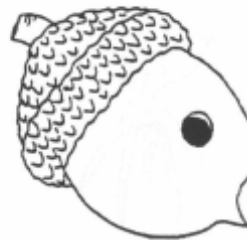
INTERDEPENDENCE: *Links Between Plants & Animals*



Weevil



chewing insect



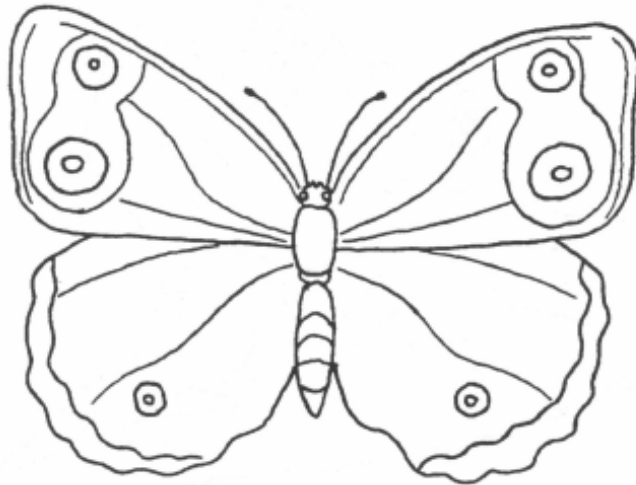
mouthparts work like a drill

A weevil is a beetle-like insect with a long snout that has chewing mouthparts at the end. The snout works like a drill on harder plant parts like seeds and stems to reach inner food stores.

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MEET THE INSECT 5

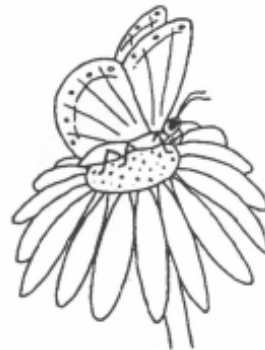
INTERDEPENDENCE: *Links Between Plants & Animals*



Butterfly



sucking insect



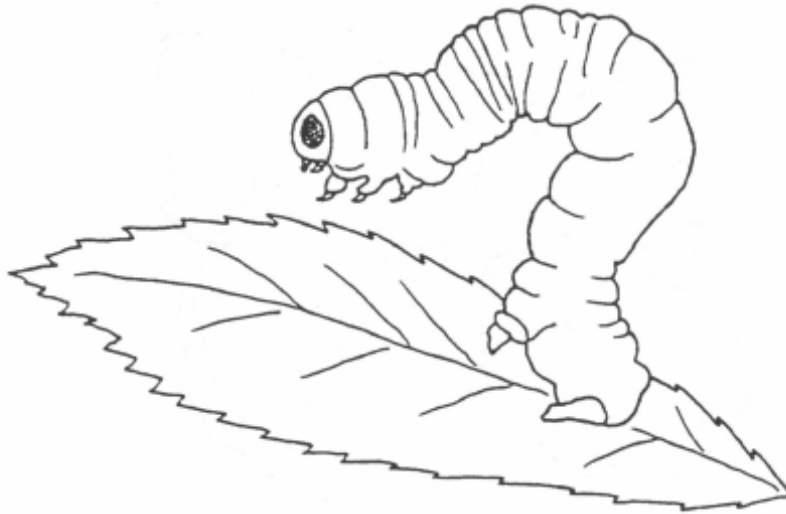
mouthparts unroll like a party blower

As adults, butterflies and moths have mouthparts that form a sucking tube to drink nectar from flowers. It rolls into a tight coil when not in use.

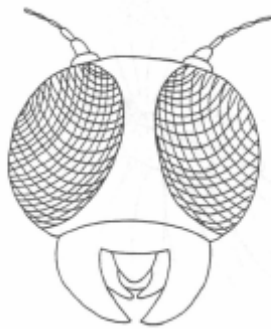
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MEET THE INSECT 6

INTERDEPENDENCE: *Links Between Plants & Animals*



Caterpillar



chewing insect



**mouthparts work like a nail
clippers**

Caterpillars, the larval form of butterflies and moths, have chewing mouthparts that snip and cut leaves as they feed, often non-stop from the time they hatch from an egg until they form a cocoon or chrysalis.

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Student Worksheet

Jaws

Make a leaf from paper that shows what it might look like if it had been eaten by an insect. Glue or tape the leaf below and draw a picture of the insect that “ate” it.

Activity 3 (Optional)

Leaf-Eater Lab

Summary:

Students sample different leaves to compare leaves with strong or mild flavors, with smell or no smell, and with a tough or tender texture. They consider their own preferences and the possible preferences of various insects that eat leaves.

Materials:

- 4 kinds of leaves to taste (small sample of each leaf per student):
- iceberg lettuce
- green onions
- escarole, endive, or parsley
- romaine lettuce or celery

Procedure:

1. Introduce the activity by asking students what kinds of leaves they like to eat. Answers typically include lettuce, spinach, and parsley. Students may not realize that herbs seasonings such as basil, oregano, and thyme are also leaves, although usually eaten dried and crumbled.
2. Many kinds of insects also depend on plants for food, including the insects students learned about in the previous lesson “Plant Munchers.” Ask students whether they have seen evidence of plants eaten by insects in nature or in a garden. Have students also seen plants that have not been eaten? Why do they think some plants get eaten and others do not? (Some areas may have more insects, certain insects like certain kinds of plants, some plants may be harder to eat than others.)
3. Sometimes the answer to why some plants are more likely to be eaten than others may be due to characteristics of the plants. Challenge students to a taste trial to discover some ways plants may prevent insects from eating them. Use the taste tests on the next page.

Activity 3 (Optional)

Leaf-Eater Lab (continued)

Taste Tests

Taste Test #1 Strong vs. Mild Flavors

Have students compare the taste of iceberg lettuce to that of escarole, endive, or parsley. Ask students:

Are the leaves different in flavor?

Which one would you rather eat a lot of for lunch?

Which one might be less likely to be eaten by insects? Why?

Conclusion: Strong flavors may discourage leaf-eaters.

Taste Test #2 Strong Smell vs. No Smell

Cut up pieces of iceberg lettuce leaves and green onion tops. Have students compare the smell and taste of these. Ask students:

Do the leaves have different smells?

Do they taste different?

Which one might be less likely to be eaten by other creatures? Why?

Conclusion: Strong smells may discourage leaf-eaters.

Taste Test #3 Tough to Chew vs. Tender to Chew

Have students compare the chewability of iceberg lettuce with excarole, romaine lettuce, or strips of “strings” from celery stalks. Ask students:

Which is easier for you to chew?

Which one might be less likely to be eaten by insects? Why?

Conclusion: Tougher, more fibrous plants may discourage leaf-eaters.

Visit Worksheet

Looking for **MORE** Interactions

Count, write, or draw what you see.

As you observe insects, examine their MOUTHPARTS, predicting how they obtain their food.

Find evidence of PLANTS PROVIDING FOOD FOR ANIMALS.

Visit Worksheet

Looking for **MORE** Interactions (continued)

Count, write, or draw what you see.

Find and record evidence of ANIMALS EATING OTHER ANIMALS.

Find and record evidence of DECOMPOSITION.

Activity 4

Create a Food Chain

Summary:

Students will share and display recorded observations of food relationships. As a class, students will create and explain a food chain for the ecology center based on recorded observations.

Materials:

- paper
- pencils
- “Animals and Their Foods” guide (you may want to make a copy for each group)

Procedure:

1. Discuss the term “food chain” using the supplied definitions on the next page.
2. Practice making a simple food chain on the board using organisms that are familiar to the students.

Example:

Corn Plants → Chickens → Hawks → Bugs and Fungi

Discuss the direction of the arrows and what they represent (the flow of energy and nutrients from one living thing to another).

3. Students will now work in groups to make food chains of the living things found in the schoolyard and at the Ecology Center. Students will use the “Animals and Their Foods” guide to help determine food relationships.

A simple format for students developing food chains is:

Step 2	Step 1	Step 3
What the animal eats	→An observed animal	→What eats the animal

4. Once the food chains have been developed, each team can share 3 or 4 of their food chains and explain how they determined who eats what. When there is general agreement, each team can recreate their food chains in a format that can be displayed.

Activity 4

Create a Food Chain (continued)

Definitions of **FOOD CHAIN** on the Web:

- The relationship between plants and animals that shows who eats what. Energy is transferred from one organism to another through the food chain.
www.pbs.org/emptyoceans/glossary.html
- A linear depiction of energy flow; each organism feeds on and derives energy from the preceding organism.
www.bigelow.org/edhab/glossary.html
- The plants and animals through which energy flows. Plants make up the base of the chain, by converting energy from the sun into food. Animals make up the next steps in the chain, by eating plants or other animals to get energy.
www.lpb.org/programs/forest/glossary.html
- A sequence of steps through which food and energy move through the environment from the primary source (plants), through the animals that consume plants, up to the animals which consume other animals.
www.bagheera.com/inthewild/class_glossary.htm
- A diagram that shows the flow of food and energy from producers to consumers. The original food source for all organisms in a food chain can be traced to plants. “Food chain” and “food web” are often used interchangeably, but a food chain shows just one thing that each animal eats and is eaten by; while a food web shows all the things an animal eats and is eaten by.
animaldiversity.ummz.umich.edu/site/glossary/page/f.html
- A series of animals and plants, each depending on the next for food. A food chain usually forms part of a much larger, more complex food web.
www.spaceforspecies.ca/glossary/f.htm
- (Ecology) A community of organisms where each member is eaten in turn by another member.
wordnet.princeton.edu/perl/webwn

Extension: Activity 5

Woodland Munchers

Summary:

Students will be able to explain a food web of a woodland floor ecosystem. Students will use body movement and pantomime to simulate the feeding motions of detritus animals and identify their interconnectedness in a food web.

Materials:

- Timer
- Construction paper or other material suitable for tokens in five colors (white, green, yellow, blue, red)
- Predator feeding behavior cards and detritus eater cards (masters provided)
- Envelopes

This activity was adapted from Project WILD Aquatic: "Marsh Munchers."

Background:

The woodland floor contains many unseen organisms that play very important roles in recycling **nutrients** in that environment. The life forms that inhabit and visit the **deciduous** forest floor are complex, diverse, and abundant. Leaves that fall from the trees in autumn form the basis of the **food chains** that include the **first-order consumers** we call **herbivores** such as woodlice or isopods (pillbugs and sowbugs), millipedes, earthworms, slugs, and wood cockroaches. The **second-order consumers** (those that eat the herbivores) include centipedes, ground beetles, wolf spiders, and toads. Raccoons occasionally visit the habitat. These mammals may be second-order consumers when they eat the herbivores, or **third-order consumers** when they eat the second order consumers.

We can think of the deciduous woodland floor as a vast pasture of "**litter**," made up of dead plant and animal parts and animal droppings. Woody and **herbaceous** living plants are interspersed throughout this woodland pasture. The litter, also known as **detritus**, would soon pile up to the treetops if the **detritivores** and **decomposers** (**bacteria** and **fungi**) weren't actively breaking down that material. The bulk of the litter in our deciduous woodland is made up of fallen leaves. The litter lies on moist soil that gives up some of its moisture to make the litter damp. The litter acts as a blanket to help the soil conserve moisture, soften the impact of falling rain to conserve the soil itself, and protects the soil from wide swings of temperature. While it is not difficult to find the interface between the litter and the soil below, there is really no fine line between where litter ends and **humus** (the end product of decay) begins. Leaves that were shed by the trees in fall are worked on by winter freezing and thawing patterns then converted by summertime to a soft brown fragmented mat or leaf mold by abiotic factors like water and weather, and biotic factors (living organisms) such as fungi and bacteria.

Extension: Activity 5

Woodland Munchers (continued)

The woodland floor herbivores mentioned above serve as miniature “gardeners.” Some detritivores, like the earth worms, millipedes, and insect larvae, burrow through the detritus and leaf mold making tunnels where other detritivores find moist shelter. Earthworms and other detritivores like isopods, slugs, and wood cockroaches ingest the detritus to further reduce the size and content of the particles. As they creep through the woodland floor, these detritivores fragment the matter and wastes thereby making these materials available to successively smaller organisms and **microbes**. Fungi and bacteria begin working to decompose the dead plant and animal parts as soon as these materials reach the ground and the microbes continue their activity until the materials are disintegrated to basic elements, some of which are nutrients.

Many of the litter-feeders fall prey to the litter-hunters. These hunters include daddy-long-legs, wolf spiders, ground beetles and toads. Some litter-hunters are specialists when it comes to their diets. The psuedoscorpion seeks mites while some beetles and their larvae seek out the slow moving snails. Other detritus community members such as the daddy-long-legs or harvestmen seek small insects, mites, or decaying organic matter making them omnivores or both litter-feeders and litter-hunters. Raccoons are one of the most opportunistic members of the woodland community. They will graze like herbivores, feed on decaying matter like decomposers, and actively pursue their prey like carnivores. Fruit of many plants and all of the animals represented in this activity are potential food for the raccoon.

Procedure:

Note: This activity is written for an estimated 25 students; 20% of the class will portray predators; the remaining 80% represents detritus eaters.

1. Prepare or collect the appropriate number of food tokens according to the table on page 41.
2. Reproduce the feeding behavior cards (5 predator cards; 20 detritus eater cards) on page 42.
3. Place appropriate food tokens and feeding behavior cards in envelopes.
4. If students haven’t experienced a woodland floor community directly or vicariously through readings, describe the habitat in terms of the plants and animals that live there. Also, discuss the importance of detritivores and their role as recyclers of nutrients from dead plant and animal matter back to living plants.
5. Explain to the students that they are going to experience an activity that will help them better understand the woodland detritus community.

Extension: Activity 5

Woodland Munchers (continued)

6. Distribute one envelope per student. Explain that their identity is a secret not to be revealed to the others. Each envelope contains the identity of one animal that lives on the woodland floor. The only way others will know what animal other students represent is by the way the students feed. When they receive their envelopes, explain that some students will be detritus eaters and others will be predators who feed on the detritus eaters.
7. Have students open their envelopes and see what animal they are and what feeding behavior they use. Remind them not to tell what they are. They must indicate what they are by their feeding behavior. Emphasize that they are people pretending to be animals and that humans will not be able to move exactly like animals. **OPTIONAL:** If you feel it would be helpful, model each behavior first and identify it so the students will know what animal does what. However, it may be more productive to allow the students to improvise.
8. Explain the **RULES**:
 - Each student represents a detritus eater or a predator.
 - Each detritus eater has 5 food tokens representing 5 individual woodland animals of the same species.
 - The detritus eater must give a food token to a predator when tagged.
 - Each predator must get 10 food tokens to stay alive for one day.
 - A day is one playing period of the game.
 - Each predator can only get one token from each individual during any one night, but needs to get as many prey as possible.
 - Detritus eaters keep eating even after prey eat them. They represent the remaining animals of that species until they run out of food tokens. When they run out of food tokens, the detritus eaters sit quietly in place—"decomposing" in the woodland.
 - Detritus eaters and predators must display their feeding styles during the activity.
 - Detritus eaters will show their feeding styles from stationary squat or crawling positions while predators will walk and display their behaviors.
9. Establish a play area (inside classroom or outside) and have all the detritus eaters take their envelopes with them, spread out on the playing field and start pantomiming their behaviors.

Extension: Activity 5

Woodland Munchers (continued)

10. Tell predators to begin to pantomime their respective feeding behaviors, capture their prey, and secure a food token from them, placing it in their envelope.
11. Call time when appropriate (after most predators have collected 10 food tokens).
12. Tell students to hold onto their food tokens so they can participate in the data collection and discussions.
13. Discuss the results.
 - Did every predator fill up by getting 10 food tokens during the night?
 - If not, why not? (Some animals are more selective in their feeding preferences, and therefore may have a more difficult time finding food.)
 - Talk about the different ways the animals are connected to each other and the detritus. Mention that decomposers and physical processes like weathering break down plants and animals to produce the detritus. Be sure the supporting role of producers, the plants that form the bulk of woodland detritus, does not get overlooked by the high activity of the consumers.
14. Draw a food web based on what feeding interactions took place during the game. Add the plants, animals, and animal wastes that are broken down by decomposers to make detritus.
15. Collect the envelopes and put the color-coded tokens back into their original envelopes.
16. OPTIONAL: Shuffle the envelopes and redistribute them to the students. Replay the simulation and draw a second food web. Compare and contrast the food webs.
17. OPTIONAL: After students have studied other ecosystems, allow them to prepare a game modeled after this one where they show animals at different trophic levels and prepare feeding behavior cards with appropriate pantomimes for each plant and animal.
18. Summarize by emphasizing the importance of detritus communities and their role in ecosystem nutrient cycling.

Extensions:

1. Draw or paint a food web of a detritus community as a mural. Students should draw an accurate portrait of each animal and be sure to include the plants and decomposers.

Extension: Activity 5

Woodland Munchers (continued)

Place each drawing in the appropriate place in the web. With yarn or string, connect each animal with what it eats.

2. Visit a woodland and investigate the organisms of the woodland floor. Some helpful equipment includes: hand lens, capture jars, forceps, Q-tips, rulers, journals, field guides.
3. Modify this activity to illustrate a freshwater stream or pond.

Evaluation:

1. Give examples of two predators and two prey species that live in a detritus community.
2. Use some of the organisms listed below, and others of your choice, to construct a food web that might be found in a woodland: human, opossum, bacteria, fungus, mouse, cricket, detritus, snail.

Extension: Activity 5

Woodland Munchers (continued)


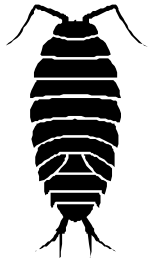


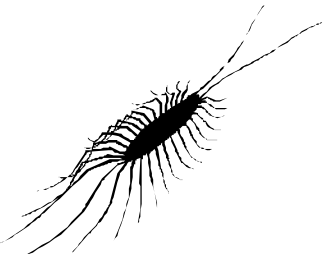



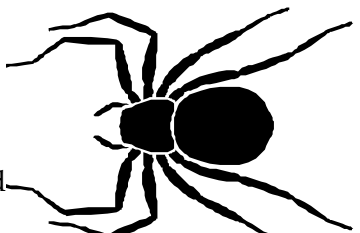
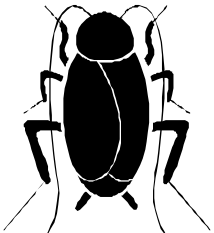
	Feeding Behavior Cards	Colored Food Tokens
Predators:		
1 Raccoon	1 each	
1 Toad	1 each	
1 Centipede	1 each	
1 Ground Beetle	1 each	
1 Wolf Spider	1 each	
Detritus Eaters:		
4 Isopods	1 each	5 RED tokens each (20 total)
4 Slugs	1 each	5 BLUE tokens each (20 total)
4 Earthworms	1 each	5 YELLOW tokens each (20 total)
4 Millipedes	1 each	5 GREEN tokens each (20 total)
4 Wood Cockroaches	1 each	5 WHITE tokens each (20 total)

Extension: Activity 5

Woodland Munchers (continued)

Feeding Behavior Cards

Make 1 copy of each predator card (the left column); make 4 copies of each detritus eater card (the right column).

 <p>Raccoon: Walk forward wringing hands as if washing and grasping prey.</p>	 <p>Sowbug & Pillbug (Isopods): Wriggle fingers close to body, open and close mouth.</p>
<p>Toad: Place hands on floor and hop toward prey.</p> 	<p>Slug: Lay on floor and wiggle side to side making raspy noises.</p> 
 <p>Centipede: Spread fingers out on floor and wiggle toward prey.</p>	 <p>Earthworm: Lay on floor and wiggle as if trying to bury yourself into the ground.</p>
 <p>Ground beetle: Place hands in front of mouth and move like pincers.</p>	 <p>Millipede: Crawling on knees, wiggle fingers near floor.</p>
<p>Wolf spider: Tap floor with hands ahead of body to locate and grasp prey.</p> 	 <p>Wood cockroach: Crawl about on hands and knees.</p>

Glossary

Abiotic: Something that was never alive (water, rocks); the physical environment.

Biotic: Something that is alive, or used to be alive.

Carnivore: An animal that eats meat.

Consumer: An animal or microbe that gets food by eating things.

Deciduous: Describing plants that shed their leaves at the end of each growing season.

Decomposer: An organism that uses dead plants and animals as food.

Decomposition: The breaking down of dead things into their basic materials by decomposers that use them as food.

Detritivores: A decomposer; an organism that eats detritus.

Detritus: Waste material, usually organic, such as dead or partially decayed plants or animals or excrement.

Ecosystem: An area where living things interact with each other and their physical environment.

Energy: The ability to make things move or change.

Food: A substance that gives both nutrients and energy to a living thing.

Food Chain: The relationship between plants, animals, and decomposers that shows who eats what. Energy is transferred from one organism to another through the food chain.

Glossary (continued)

Food Web: The relationships among everything organisms in a location eat and are eaten by.

Fungus (plural Fungi): An organism that uses other living or dead organisms as food by secreting chemicals that break it down, and then absorbing the substances into its cells.

Habitat: The place where an organism lives that provides all of its needs for survival.

Herbaceous: A green, leafy plant that does not produce woody tissue.

Herbivore: An animal that eats plants.

Humus: An organic soil material so thoroughly decayed that the identity of the biologic source cannot be recognized. The end product of decay.

Litter: Dead and partially decomposed leaves and other recognizable plant residues on the soil surface of the forest floor.

Microbe: A living thing (or “microorganism”) whose individuals are too small to see with the naked eye. Fungi and bacteria are two types of microbes.

Mold: A fungus that produces a fuzzy growth.

Nutrient: A substance that does not provide energy, but supplies minerals that living things need to stay healthy.

Nutrient Cycle: The transfer of nutrients back and forth between living things and the non-living environment (soil, water, and air).

Omnivore: An animal that eats both plants and animals.

Glossary (continued)

Organism: A living thing (plant, animal, or microbe).

Population: A group of the same kind of organism living in the same place.

Predator: An animal that kills and eats other animals.

Prey: An animal that is eaten by other animals.

Producer: A green plant that makes sugar for food using the process of photosynthesis.