

Day 2

Bug Life





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Bug Life

Introduction

All living things change during their lifetimes. Your body is different now than it was when you were a baby. And it will change again. How a living thing, or **organism**, changes throughout its life is called a **life cycle**. All living things need food, too. Plants make their own food, but animals need to eat plants or other animals to grow and survive. Organisms in the same **ecosystem** — or community of living things in a shared environment — live together and sometimes eat each other, too. Organisms are linked to each other in **food chains**, where each thing feeds on the one next to it in the chain. **Food webs** are interlocking food chains in an ecosystem. This day focuses on insect life cycles and their role in ecosystems.

Questions to guide explorations and experiments

- What is a life cycle?
- What are the parts of an insect's life cycle?
- What is an ecosystem?
- What do insects do in their ecosystems?
- What is a food chain?
- What is a food web?
- What would happen to our food chain without insects?

Books and activities

- **Books:** all about insect life cycles, ecosystems, food chains and food webs
- **Activities:** explore insect life cycles and insects in ecosystems, food chains, and webs



Children's Books

Fiction

- *Addie Ant Goes on an Adventure* by Maren Morris and Karina Argow (ages 4-7)
- *A Good Place* by Lucy Cousins (ages 3-7)
- *A Perfect Spot* by Isabelle Simler (ages 5-9)
- *Secrets of the Garden: Food Chains and the Food Web in Our Backyard* by Kathleen Weidner Zoehfeld (ages 6-9)
- *Some Bugs* by Angela DiTerlizzi (ages 2-5)
- *Snug as a Bug* by Karl Newson (ages 3-7)
- *Stories from Bug Garden* by Lisa Moser (ages 4-8)
- *Wingmaker* by Dave Cameron (ages 4-8)
- *The Very Hungry Caterpillar* by Eric Carle (ages 3-5)
- *There Was an Old Lady Who Swallowed a Fly* by Simms Taback (ages 3-6)

Poetry

- *A Place to Start a Family: Poems About Creatures That Build* by David L. Harrison (ages 5-9)
- *Hey There, Stink Bug!* by Leslie Bulion (ages 7-10)
- *Insectlopedia* by Douglas Florian (ages 4-8)

Nonfiction

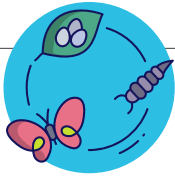
- *A Day in the Life: Bugs: What Do Bees, Ants, and Dragonflies Get up to All Day?* by Dr. Jessica L. Ware (ages 7-10)
- *A Web* by Isabelle Simler (ages 5-10)
- *Begin with a Bee* by Liza Ketchum, Jacqueline Briggs Martin, and Phyllis Root (ages 5-10)
- *Bella Loves Bugs* by Jess French (ages 4-7)
- *The Big Book of Bugs* by Yuval Zommer (ages 4-8)
- *The Bug Book* by Sue Fliess (ages 2-5)
- *Bug Dipping, Bug Sipping* by Marilyn Singer (ages 3-6)



Children's Books

2

- *Butterflies Are Pretty ... Gross!* by Rosemary Mosco (ages 4-8)
- *Cicada Symphony* by Sue Fliess (ages 4-8)
- *Eyewitness: Insect* by Laurence Mound (ages 9-12)
- *From Caterpillar to Butterfly* by Deborah Heiligman (ages 4-6)
- *The Girl Who Drew Butterflies: How Maria Merian's Art Changed Science* by Joyce Sidman (ages 10-14)
- *Insect Detective* by Steve Voake (ages 8-12)
- *Not a Buzz to Be Found: Insects in Winter* by Lina Glaser (ages 4-8)
- *The Secret Life of Bugs* by Moira Butterfield (ages 5-10)
- *The Secret Lives of Backyard Bugs: Discover Amazing Butterflies, Moths, Spiders, Dragonflies, and Other Insects!* by Judy Burris and Wayne Richards (ages 9-12)
- *Waiting for Wings* by Lois Ehlert (ages 4-8)
- *What's Inside a Caterpillar Cocoon? And Other Questions About Moths and Butterflies* by Rachel Ignotofsky (ages 5-9)
- *Who Eats What? Food Chains and Food Webs* by Patricia Laube (ages 5-8)



Activity 1: Bug Babies: Explore an Insect's Life Cycle

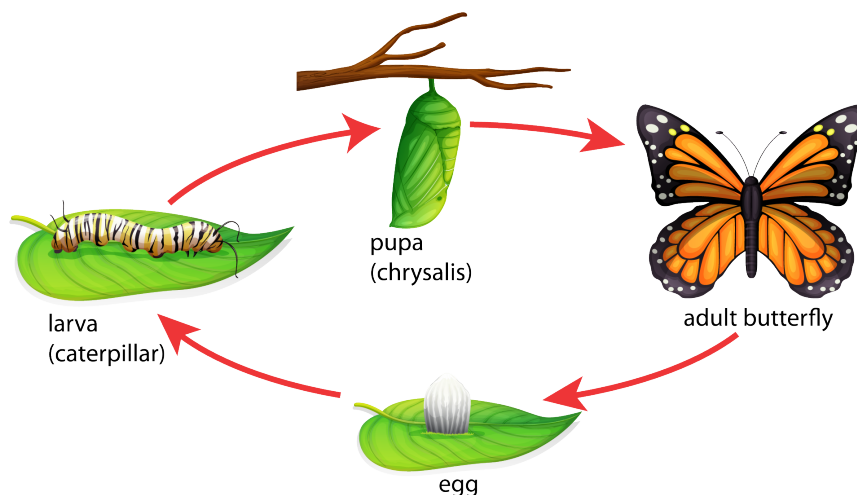
Introduction

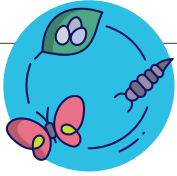
All living things grow and change. A life cycle is the series of changes that happens to a living thing. Insects have a three- or four-part **life cycle**. They look different at each stage. They need different things at each stage to survive and get to the next stage.

Some insects go through complete **metamorphosis** in their life cycle. Metamorphosis is a big change in an animal's body during its life cycle. The change is so dramatic that the adult looks very different from the baby, like a caterpillar and a butterfly.

The 4-stage life cycle

A life cycle with four stages includes complete metamorphosis. In the first stage, an insect is an **egg**. If you look carefully, you can sometimes see insect eggs on leaves or stems of plants. In the second stage, the insect egg has hatched into a **larva**. An insect larva is an immature, or young, form of an insect that often looks like a worm. Its job is to eat and grow. Caterpillars and inchworms are examples of larva. In the third stage, the larva grows a protective covering like a **cocoon** or **chrysalis**. The larva changes to a **pupa** where it develops its adult body and loses features of a larva. When the big change, or **metamorphosis**, is complete, the insect is an adult and breaks out of the protective case. That's the fourth stage: **adult**. The insect can now reproduce, or make more insects like it. Butterflies, moths, beetles, bees, wasps, ants, and flies have a four-stage life cycle.

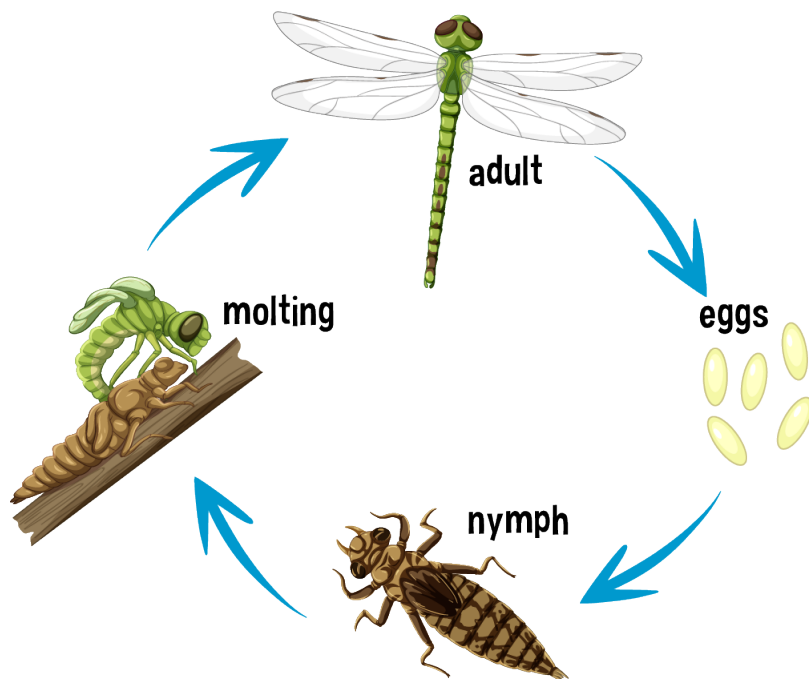


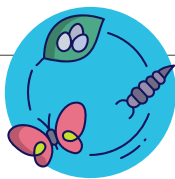


Activity 1: Bug Babies: Explore an Insect's Life Cycle

The 3-stage life cycle

Some insects, like dragonflies, grasshoppers, earwigs, and crickets, don't go through a complete metamorphosis. They have a three-stage life cycle. In incomplete metamorphosis, they start as an **egg** and then, in stage two, they become a **nymph**. A nymph is a young insect that hatches from an egg and is similar to an adult, but smaller, and without wings. Over time, the nymph grows into an **adult**. It may grow wings, like a dragonfly (shown below), and it can reproduce. That's stage three.





Activity 1: Bug Babies: Explore an Insect's Life Cycle

Supplies

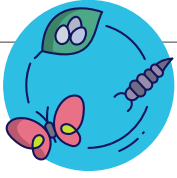
- Beads
- Chenille stems (pipe cleaners) or small pom poms
- Large bubble wrap or modeling clay
- Craft foam or origami paper
- Markers or crayons
- Scissors
- Glue
- Paper

Get kids thinking ...

Start by having kids think about how they have grown. **Ask:** How did you look different when you were a baby? What did you eat then? What do you eat now? How will your bodies be different when you are teenagers? How will you look, and be, different when you are grown up? Have kids write about or draw themselves at different stages of growth in their Bug Journals.

Then talk about how their growth compares with the growth of other living things. **Ask:** How do insects grow? How are they different at the beginning of their lives and at the end? How do insects care for their young? What does an insect life cycle look like? Where can we find insects in different stages of development?





Activity 1: Bug Babies: Explore an Insect's Life Cycle

Let's get started!

Start with a book! Read a book about insect life cycles such as *Waiting for Wings* by Lois Ehlert, *Cicada Symphony* by Susan Fliess, or *Begin with a Bee* by Liza Ketchum, Jacqueline Briggs Martin, and Phyllis Root. Invite kids to think and talk about the changes an insect goes through as you direct them through acting out the different life stages of an insect's life cycle.

Butterfly (4 stages)

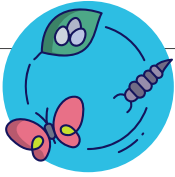
Stage 1 Egg: Curl up in a ball like an egg.

Stage 2 Larva: Scoot or inch across the floor and munch like a caterpillar.

Stage 3 Pupa: Create a cocoon or chrysalis, by wrapping your arms around you and spinning in circles. Then be very still as your body changes from pupa into an adult.

Stage 4 Adult: Push your way out of your cocoon, stretch and flap your wings. Flutter around like a butterfly.





Activity 1: Bug Babies: Explore an Insect's Life Cycle

Cricket (3 stages)

Stage 1 Egg: Curl up in a ball like an egg.

Stage 2 Nymph: Hatch from your egg as a tiny cricket. Make tiny hops and munch on plants to grow bigger. Wiggle out of your small exoskeleton when you grow bigger.

Stage 3 Adult: Make big hops and cricket sounds as an adult.

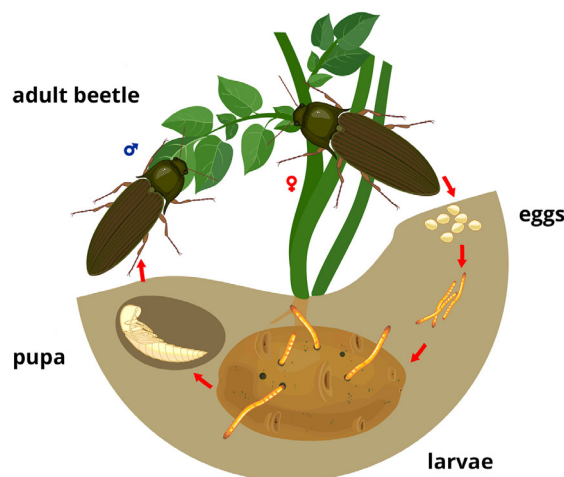
Make an insect life cycle model

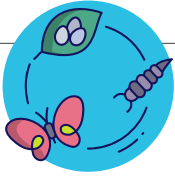
Next, have kids use what they've learned to create a model of an insect life cycle using craft materials. They can choose a three-stage or four-stage life cycle to create, and pick an insect that has that life cycle. (Or do both!) Instructions below are for creating a four-stage life cycle.

Step 1: Provide kids with a sheet of paper. Have them divide it into four sections and number the sections 1-4.

Step 2: Next, have them choose a bead to glue in section 1. Have them draw a leaf, stem, or other place where they can glue the egg to rest. Have them label the egg.

Step 3: In section 2, have kids choose a small piece of chenille stem or a pom pom to represent the larva. Have them draw what the larva is crawling on, glue the larva in place, and label it.





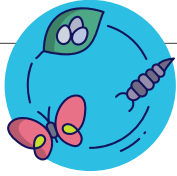
Activity 1: Bug Babies: Explore an Insect's Life Cycle

Step 4: For stage 3, provide kids with a bubble from a large piece of bubble wrap, a piece of clay, or a wad of paper shaped like a cocoon to represent the chrysalis or cocoon. Have them draw what the chrysalis is attached to (or where it is, like in the ground for a cicada), glue the bubble in place, and label the chrysalis “Chrysalis with pupa inside” with an arrow pointing to a pupa inside.

Step 5: If kids are building an insect with wings (such as a butterfly or cicada), provide scissors and craft foam (or origami paper) for kids to cut wings that fit to the chenille stem body. Or, have them fold a quick origami butterfly (<https://www.youtube.com/watch?v=VkoOrwfJPSk>), draw the insect's surroundings of leaves, flowers, plants, etc., then glue it in section 4. They should label their insect “Adult.”

Now, Bug Out with kids and go outdoors to have them look for insects in different stages of their life cycle or search for evidence like egg cases, empty chrysalis shells, exoskeletons that have been shed, or leaves that have been eaten. Encourage kids to write about and draw what they find in their Bug Journals.





Activity 1: Bug Babies: Explore an Insect's Life Cycle

More activities about insect life cycles

Be a citizen scientist and track monarch butterfly migration

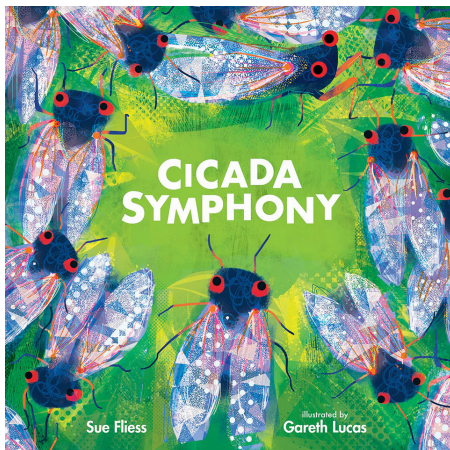
<https://journeynorth.org/projects>

Fingerprint Ladybug Life Cycle Craft

<http://www.readingconfetti.com/2013/04/fingerprint-lady-bug-life-cycle-craft.html>

Play Go Bug! A simple card game based on the stages of metamorphosis

<https://www.calacademy.org/educators/lesson-plans/go-bug>



Cover and page spread from: *Cicada Symphony* by Sue Fliess



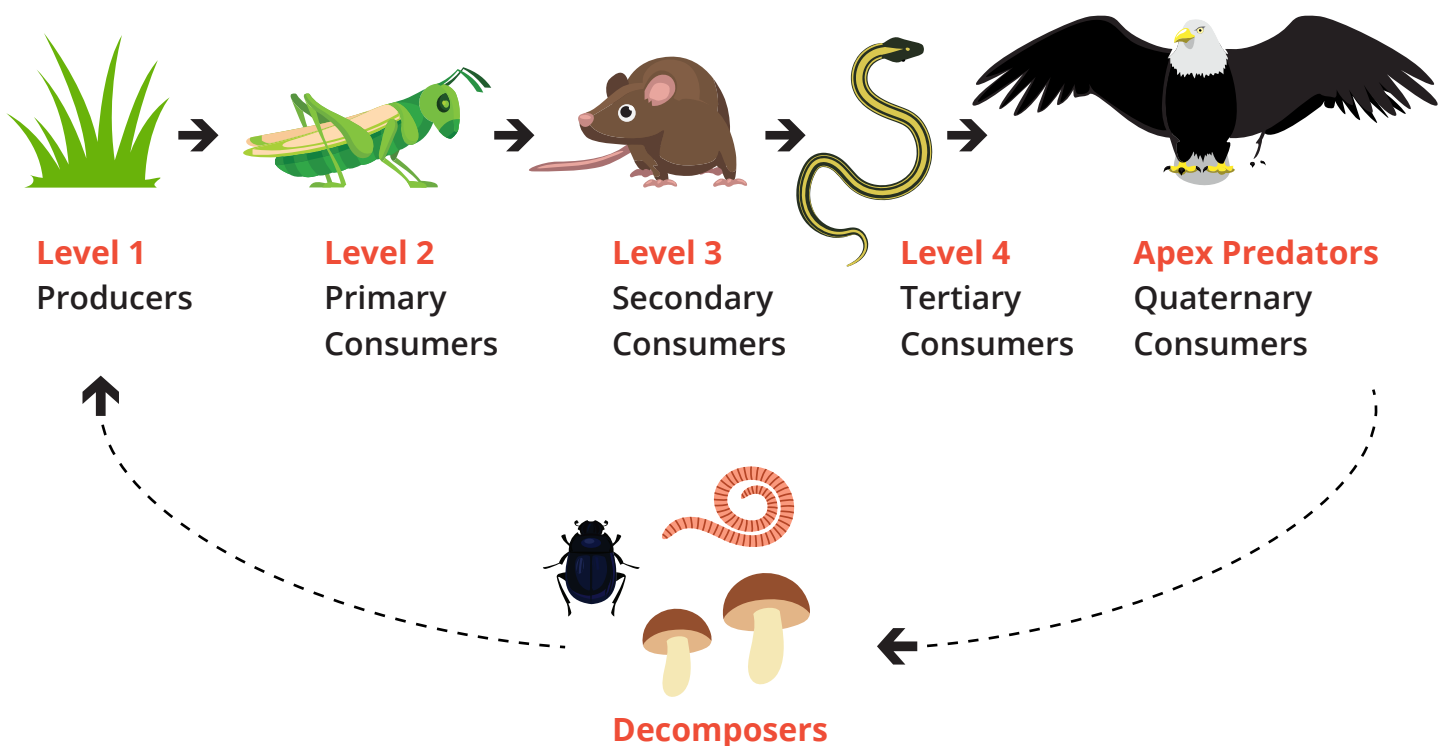
Activity 2: What's Eating You? Insects in the Food Chain

Introduction

All living things — plants and animals — need energy to live. Spring flowers need energy to grow and bloom. Birds need energy to move their wings for flight. People need energy for all kinds of things, from thinking to laughing to playing soccer to sleeping. All living things get their energy from food. Green plants use energy from the sun to make their food. Animals get their energy by eating plants or other animals.

The sun is at the beginning of every food chain. Because there are so many insects, they are most often the link between plants and other animals in a **food chain**. Insects also are often in the food chain in more than one place. Birds, frogs, lizards, snakes, bats, many mammals, and other insects eat insects. And insects often eat plants and dead animals, helping them decompose, or break down. This helps make healthy soil that plants need to grow.

The levels — or steps — in a food chain are called **trophic levels**. Here's a sample food chain with the trophic levels explained:





Activity 2: What's Eating You? Insects in the Food Chain

Plants use energy from the sun to create their own food. This process is called **photosynthesis**. The plant is the primary producer, or the first creator of energy in the chain and the first level of a food chain.

If a caterpillar eats the leaf of the plant, it is the primary consumer, or first creature to eat a plant in the chain. Most primary consumers eat only plants. They are called **herbivores**. Some eat both plants and animals. They are called **omnivores**. When something eats a plant, that's the second level of the food chain.

If a lizard eats the caterpillar, the lizard is getting its energy from the caterpillar. That makes the lizard a secondary consumer of energy from the plant. **Carnivores** are animals that eat other animals. This is the third level of the food chain. The lizard is a carnivore and a tertiary consumer.

At level four, imagine a bird eats the lizard. If a fox eats the bird and a brown bear eats the fox, that's two more levels. No more animals eat the brown bear while it is alive, so that makes the brown bear an **apex predator**. Apex means top, so the brown bear is at the top of the food chain.

When the brown bear dies, **detritivores** will eat it. Detritivores are animals that eat dead plants, animals, or animal waste. Vultures and hyenas are detritivores, but so are flies, ants, and dung beetles. Many detritivores are insects. These animals help break down dead things and turn them into soil. This adds nutrients to the soil that plants use to make food.

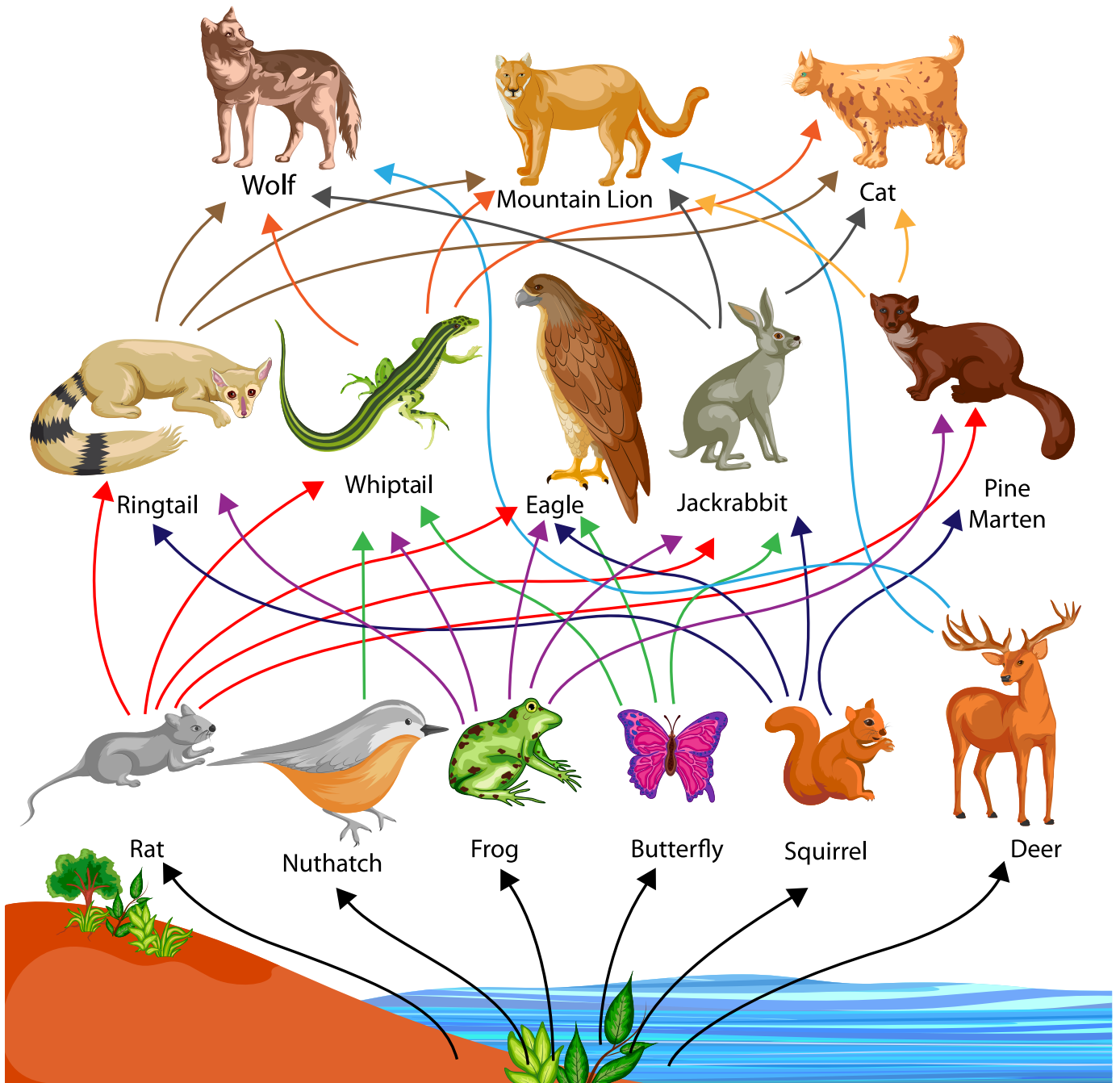
This food chain ends with flies who ate the bear who ate the fox who ate the bird who ate the lizard who ate the caterpillar who ate the plant.

A **food web** is the interlocking food chains in a community. The bird that ate the lizard may also eat some berries, a mouse, or a ladybug. The mouse and the ladybug eat several items too. If you draw the food chain of the bird, the mouse, the ladybug, and the bear, that's a food web. All of these organisms share an **ecosystem**.



Activity 2: What's Eating You? Insects in the Food Chain

A complex food web





Activity 2: What's Eating You? Insects in the Food Chain

Supplies

- Paper
- Food chain template with sun, plant, insect, bird or fish, reptile or mammal, detritivore (find the printable template after page 41)
- Scissors
- Markers, colored pencils, or crayons
- Tape or a stapler
- Books about animals and what they eat

Get kids thinking ...

Talk about how food chains and food webs show how each living thing gets its food.

Ask: What do insects eat? Who eats insects? Can you think of an insect that eats animals other than insects? What would happen if there were no insects, or even just one kind disappeared? Have kids discuss or write their ideas about insects and food chains in their Bug Journals.

Let's get started!

Start with a book! Share a book that explores bugs in food chains, such as *Who Eats What? Food Chains and Food Webs* by Patricia Laube. Talk about what kids like to eat and ask them to think about the energy flow of their favorite foods. How are the levels similar or different from other animals?

Read *There Was an Old Lady Who Swallowed a Fly* by Simms Taback, show a video of the song (<https://youtu.be/HMwO45a7Y6A>), or just have kids sing it. Then talk about the silly food chain described. Talk about which animals really eat the other animals and which don't (cats eat birds, birds eat spiders, and spiders eat flies, but goats and cows and horses don't eat other mammals).



Activity 2: What's Eating You? Insects in the Food Chain

Invite kids to make up their own food chain song that follows a real food chain. Here's an example:

I saw a caterpillar eat a leaf. I know why it ate the leaf — for energy

I saw a lizard eat a caterpillar. I know what it ate the caterpillar — for energy.

I saw a bird eat a lizard. I know why it ate the lizard — for energy.

I saw a fox eat a bird. I know why it ate the bird — for energy.

I saw a bear eat a fox. I know why it ate the fox — for energy.

I saw some flies eat a bear. I know why they ate the bear — for energy.

I saw a plant with leaves grow. I know why it grew leaves — for energy.



Next, have kids use what they've learned to create a model of a food chain and a food web. Let them research different food chains by looking at books or kid-friendly websites. Think and talk about what their insect food web model will look like:

- It will start with the sun and a plant
- There will be insects at more than one level
- It will show how the animals are connected

Make a food chain

Instructions below are for directing kids to create a food chain, then grow it into a food web.

Step 1: Have kids create a food chain by choosing organisms to complete their food chain template: a plant, an insect that eats the plant, a bird or fish that eats the insect, a reptile or mammal that eats the bird or fish, and a detritivore.

Ask kids to write each organism on the related space on the food chain template and draw each organism on their section.



Activity 2: What's Eating You? Insects in the Food Chain



Step 2: Provide kids with scissors so they can cut the sections into strips.

Step 3: Have them create a chain by making loops with the strips and taping, gluing, or stapling them together.

Step 4: When kids are done, ask them to share their chains.

To make a food web

Ask kids if any of them have the same organisms in their chains.

Step 5: Using a blank strip of paper, have kids connect the food chains with the same animals at that animal loop to create a food web. They can also connect different chains at the plant level on one and the detritivore level on another.

Step 4: Lay the connected chains out on the floor or a table so everyone can see the relationships.

1. Plant:

Glue here

**2. An insect that eats
the plant:**

Glue here

**3. Bird or fish that
eats the insect:**

Glue here

**4. Reptile or mammal that
eats the bird or fish:**

Glue here

5. Detrivore:

Glue here

Glue here



Activity 2: What's Eating You? Insects in the Food Chain

More activities about ecosystems

Insect Habitats

https://static.pbslearningmedia.org/media/media_files/ede69f5e-a79a-47f8-b788-1237ad6da87d/720ab6fd-2593-4071-9495-4e76e1f65931.pdf

Make insect food chains and webs

<https://oumnh.ox.ac.uk/files/insectsinfoodchainshopeactivityoumnhpdf>

Play the Web of Life game

<https://www.amnh.org/explore/ology/biodiversity/web-of-life>

Weaving a food web

<https://www.startwithabook.org/sites/default/files/Food-Web.pdf>

What's a Food Chain? | Think Garden | KET Public Television

<https://www.pbslearningmedia.org/resource/thnkgard.sci.ess.chain/think-garden-whats-a-food-chain/>



When you Bug Out!, remind kids about how to observe nature

Invite them to look carefully for insect life cycles, food chains, and ecosystem activities. Ask kids to:

- Look for insects in different stages of the life cycle or evidence, like empty exoskeletons or cocoons
- Look for insects eating or being eaten, or evidence of them eating
- Look for insects playing other roles in their ecosystem such as ants breaking up soil or bees pollinating plants



Bug Journal

Sensory exploration

Invite kids to use their senses when observing insects and then write or draw in their Bug Journals. What can they sense that is related to insect life cycles or food chains? Offer the following prompting questions to help kids make field notes about what they see, hear, and smell.

- Do you see insects in different stages of development?
- Do you hear insects calling to each other?
- Did you find evidence of an insect's life cycle or of a food chain? What did you find? Where did you find it?



Have kids use their senses again along with their imaginations, to create a sense poem about an insect they've observed from the point of view of a predator.

Line 1: _____ are (adjective and color).

Line 2: They look like...

Line 3: They smell like...

Line 4: They sound like...

Line 5: They feel like...

Line 6: They taste like...

Line 7: _____ make me feel...



Bee a bug buddy

Ask kids to investigate how bug-friendly their outdoor spaces are at home. Kids can talk with their parents, caregivers, or building managers about what does or could grow outside and things they can all do to make insects welcome. Have kids develop a checklist to help facilitate their conversation with topics such as leaf raking, pesticide use, native plants, and outdoor lighting. Encourage them to emphasize that even turning part of a yard or green space into an insect-friendly habitat can help curb global insect decline.





Kid-friendly Digital Media

Apps

Ladybug at Orchard Avenue \$

<https://apps.apple.com/us/app/ladybug-at-orchard-avenue/id540783849>

Online games

Grandma Loves Bugs \$

<https://igamemom.com/fun-bug-app-kids-grandma-loves-bugs/>

Bug Games: Ant Tunnel Construction and Cricket Chorus \$

<https://www.busybeestudios.com/games/busybeebuggames.html>

Talking to Fireflies

<https://www.amnh.org/explore/ology/zoology/talking-to-fireflies>

You Are the Queen

<https://www.amnh.org/explore/ology/zoology/you-are-the-queen>

Websites

Create a game about life cycles

<https://oumnh.ox.ac.uk/learn-5th-leg-a-game-of-life-cycles>

Insect activities from the Oxford University Museum of Natural History

<https://learningzone.oumnh.ox.ac.uk/search/site/insects?search=insects>

Food webs and trophic levels

<https://www.sciencepartners.info/module-8-macroinvertebrates/insect-feeding-food-webs/food-webs-trophic-levels/>



Kid-friendly Digital Media

Video

A Day in a Bug's Life

<https://education.nationalgeographic.org/resource/day-bugs-life/>

Food Chains Compilation | Crash Course

<https://www.youtube.com/watch?v=CZhE2p46vJk>

Food Web | Science Trek

<https://www.pbslearningmedia.org/resource/idptv11.sci.life.oate.d4kfch/food-chain/>

Insect Habitats

<https://www.pbslearningmedia.org/resource/insect-habitats-video/nature-wy/>

Vegetation Transformation (Photosynthesis) | Crash Course

<https://www.youtube.com/watch?v=EstPeBt9CyU>