

## Photo Description



A bright green grasshopper sits on top of a dried sunflower head. The grasshopper has long antennae, powerful back legs, and reddish-brown wings. The sunflower is brown and full of seeds that the grasshopper might be eating.

## Scientific Phenomena

This image shows the Anchoring Phenomenon of animal feeding behaviors and plant-animal interactions in ecosystems. The grasshopper is likely feeding on the sunflower seeds, demonstrating how herbivorous insects obtain energy from plants. This feeding relationship represents energy transfer in food webs, where primary consumers (grasshoppers) obtain stored chemical energy from producers (sunflowers). The grasshopper's specialized body parts - including strong mandibles for chewing and sensory antennae for locating food - are adaptations that help it survive by efficiently finding and consuming plant materials.

## Core Science Concepts

1. **Animal Structures and Functions:** The grasshopper's body parts each have specific jobs - long antennae for sensing, strong back legs for jumping, and chewing mouthparts for eating seeds.
2. **Energy Transfer in Ecosystems:** Plants capture energy from sunlight and store it in seeds, while animals like grasshoppers get energy by eating those seeds.
3. **Behavioral Adaptations:** Grasshoppers have learned behaviors like finding food sources and using their senses to locate the best feeding spots.
4. **Interdependence in Nature:** Plants and animals depend on each other - the grasshopper needs the plant for food, and sometimes helps the plant by spreading seeds to new locations.

### Pedagogical Tip:

Use the "Think-Pair-Share" strategy when introducing animal adaptations. Have students first observe the grasshopper's body parts individually, then discuss with a partner what each part might do, before sharing with the class. This builds observation skills and scientific reasoning.

### UDL Suggestions:

Provide multiple ways for students to demonstrate their understanding of animal adaptations - they could draw and label diagrams, act out how different body parts work, or create a digital presentation. This supports different learning styles and abilities.

### Zoom In / Zoom Out

1. Zoom In: At the cellular level, the grasshopper's digestive system breaks down plant materials using special enzymes. The nutrients are absorbed through intestinal walls and transported by the circulatory system to provide energy for muscle movement and growth.
2. Zoom Out: This feeding interaction is part of a larger prairie or garden ecosystem where grasshoppers serve as primary consumers in food webs. They control plant populations while providing food for secondary consumers like birds, spiders, and small mammals, maintaining ecosystem balance.

### Discussion Questions

1. What body parts help this grasshopper survive, and how does each part work? (Bloom's: Analyze | DOK: 2)
2. How might the relationship between this grasshopper and sunflower affect other living things in the area? (Bloom's: Evaluate | DOK: 3)
3. What would happen to grasshoppers if all the plants in their habitat disappeared? (Bloom's: Apply | DOK: 2)
4. How are a grasshopper's body parts different from a butterfly's, and why might these differences exist? (Bloom's: Compare | DOK: 3)

### Potential Student Misconceptions

1. Misconception: "Grasshoppers are harmful pests that only damage plants."  
Scientific Clarification: While grasshoppers do eat plants, they play important roles in ecosystems by recycling nutrients, providing food for other animals, and sometimes helping with seed dispersal.
2. Misconception: "All insects have the same body parts and do the same things."  
Scientific Clarification: Different insects have specialized body parts adapted for their specific lifestyles - grasshoppers have jumping legs and chewing mouths, while butterflies have sucking mouthparts and flying wings.
3. Misconception: "Animals just eat whatever they want."  
Scientific Clarification: Animals have specific dietary needs and physical adaptations that determine what they can eat and digest successfully.

### Cross-Curricular Ideas

1. Math - Measurement and Data: Have students measure the length of grasshoppers (or pictures of them) using rulers or measuring tapes, then create a bar graph comparing the sizes of different insect species. They could also calculate how many seeds a grasshopper might eat in a day based on observations, connecting to multiplication and division concepts.
2. ELA - Informative Writing: Students can write "How-To" guides explaining how a grasshopper uses its body parts to find and eat food, or create "acrostic poems" using the word GRASSHOPPER where each line describes a different adaptation. They could also read and discuss non-fiction texts about insects and summarize key information.
3. Art - Nature Illustration: Students can create detailed colored-pencil or watercolor drawings of grasshoppers on sunflowers, focusing on accuracy and realistic proportions. They could also design a "Grasshopper Adaptation Poster" showing and labeling all the special body parts that help it survive.

4. Social Studies - Human Impact on Ecosystems: Discuss how farmers and gardeners view grasshoppers (sometimes as pests, sometimes as part of nature), exploring different perspectives on human-animal relationships and sustainable farming practices that help both crops and wildlife thrive.

### STEM Career Connection

1. Entomologist (Insect Scientist): Entomologists study insects like grasshoppers to learn how they live, what they eat, and how they affect plants and ecosystems. Some entomologists work to protect crops from damage, while others study how insects help pollinate flowers or break down dead plants. Average Salary: \$65,000/year
2. Agricultural Scientist: Agricultural scientists work with farmers to grow healthy crops while managing insects and other pests in ways that don't harm the environment. They study relationships between plants and animals (like grasshoppers and sunflowers) to find the best ways to grow food. Average Salary: \$67,000/year
3. Ecologist (Nature Scientist): Ecologists study how all living things in an environment depend on each other, including how grasshoppers fit into food webs and ecosystems. They help protect habitats and make sure plants, animals, and ecosystems stay healthy and balanced. Average Salary: \$68,000/year

### NGSS Connections

- Performance Expectation: 4-LS1-1 - Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- Disciplinary Core Ideas:
  - 4-LS1.A - Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction
  - 5-LS2.A - The food of almost any kind of animal can be traced back to plants
- Crosscutting Concepts:
  - Structure and Function - Different materials have different substructures, which can sometimes be observed
  - Systems and System Models - A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot

### Science Vocabulary

- \* Adaptation: A special body part or behavior that helps an animal survive in its environment.
- \* Herbivore: An animal that eats only plants for food.
- \* Antennae: Long, thin body parts on an insect's head used for smelling and feeling.
- \* Energy transfer: The way energy moves from one living thing to another through food.
- \* Ecosystem: All the living and non-living things in an area that interact with each other.
- \* Primary consumer: An animal that eats plants and is the first step in moving energy through a food chain.

### External Resources

Children's Books:

- "Grasshoppers" by Cheryl Coughlan
- "From Egg to Grasshopper" by Lisa Owings
- "What Is an Insect?" by Jennifer Boothroyd