

Photo Description



A green grasshopper sits on a hibiscus flower bud, using its strong jaws to eat the dark red petals inside. The grasshopper's powerful hind legs and long antennae are clearly visible as it feeds on the plant material. This shows a direct example of an herbivore consuming plant parts for energy and nutrients.

Scientific Phenomena

The anchoring phenomenon here is herbivory - the feeding relationship between plant-eating animals and their food sources. The grasshopper is demonstrating how primary consumers obtain energy by breaking down plant tissues with specialized mouthparts. This occurs because grasshoppers have evolved mandibles (jaws) specifically designed to cut and chew plant material, allowing them to access the stored chemical energy in plant cells through cellular respiration after digestion.

Core Science Concepts

1. Energy Flow in Ecosystems: The grasshopper represents a primary consumer transferring energy from producers (plants) to higher trophic levels through feeding relationships.
2. Structural Adaptations: The grasshopper's mandibles, compound eyes, and powerful legs are specialized structures that help it successfully locate, capture, and consume plant food sources.
3. Interdependence in Nature: This feeding relationship demonstrates how organisms depend on each other - the grasshopper needs plants for energy, while its feeding may actually help some plants through seed dispersal.
4. Matter and Energy Transfer: The grasshopper breaks down complex plant molecules into simpler compounds its body can use for growth, movement, and life processes.

Pedagogical Tip:

Use the "Think-Pair-Share" strategy when introducing this image. Have students first observe silently, then discuss with a partner what they notice, before sharing observations with the whole class. This builds observation skills and scientific vocabulary.

UDL Suggestions:

Provide multiple ways for students to express their understanding: allow them to draw food webs, act out predator-prey relationships, or create digital presentations about herbivore adaptations to accommodate different learning preferences.

Zoom In / Zoom Out

1. Zoom In: At the cellular level, the grasshopper's digestive enzymes are breaking down cellulose and other complex carbohydrates in the plant cells into simple sugars. These molecules then undergo cellular respiration in the grasshopper's cells to release ATP energy for life processes.
2. Zoom Out: This feeding interaction is part of a larger food web where grasshoppers serve as prey for birds, spiders, and other predators. The grasshopper's population affects plant communities, while predator populations control grasshopper numbers, maintaining ecosystem balance.

Discussion Questions

1. How might the grasshopper's feeding behavior change if this hibiscus plant was the only food source available in its habitat? (Bloom's: Analyze | DOK: 3)
2. What adaptations does the grasshopper have that make it successful at eating plants, and how do these compare to adaptations of carnivorous insects? (Bloom's: Compare | DOK: 2)
3. If grasshopper populations suddenly increased dramatically in an ecosystem, what effects might this have on both plant and animal communities? (Bloom's: Evaluate | DOK: 3)
4. What evidence from the photograph supports the idea that energy flows from producers to consumers in food chains? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "All insects are harmful to plants and should be eliminated."
Scientific Clarification: Many insects, including some grasshoppers, play important roles in ecosystems through pollination, decomposition, and serving as food for other animals.
2. Misconception: "Grasshoppers only eat grass because of their name."
Scientific Clarification: Grasshoppers are generalist herbivores that eat many types of plants including flowers, leaves, stems, and seeds from various plant species.
3. Misconception: "The grasshopper is hurting the plant on purpose."
Scientific Clarification: The grasshopper is simply obtaining necessary nutrients for survival - this is a natural feeding relationship that has existed for millions of years.

NGSS Connections

- Performance Expectation: 5-LS2-1 - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment
- Disciplinary Core Ideas: 5-LS2.A - The food of almost any kind of animal can be traced back to plants
- Disciplinary Core Ideas: 5-LS1.C - Food provides animals with the materials they need for body repair and growth
- Crosscutting Concepts: Systems and System Models - A system can be described in terms of its components and their interactions
- Crosscutting Concepts: Energy and Matter - Matter is transported into, out of, and within systems

Science Vocabulary

- * Herbivore: An animal that eats only plants for food and energy.
- * Primary Consumer: The first level of animals in a food chain that eat producers (plants).
- * Mandibles: The strong, jaw-like mouthparts that insects use to bite and chew food.
- * Adaptation: A special feature that helps an organism survive in its environment.
- * Trophic Level: The position an organism occupies in a food chain based on what it eats.
- * Interdependence: How living things depend on each other for survival in an ecosystem.

External Resources

Children's Books:

- Who Eats What? Food Chains and Food Webs by Patricia Lauber
- What Is a Food Chain? by Bobbie Kalman
- Grasshoppers by Gail Gibbons

YouTube Videos:

- "Food Chains and Food Webs | Ecology & Environment | Biology" - Simple explanation of energy flow through ecosystems with clear animations: <https://www.youtube.com/watch?v=hLq2datPo5M>
- "Grasshopper Eating Leaf - Amazing Insect Feeding Behavior" - Close-up footage of grasshopper feeding behaviors and mouthpart adaptations: <https://www.youtube.com/watch?v=VkJV8xP-jdMg>