Dragonfly

Life Science | Lesson Guide

5th Grade

Photo Description

This close-up photograph shows a dragonfly perched on a piece of weathered wood. The dragonfly has large, bright blue compound eyes and transparent wings with intricate vein patterns. You can clearly see its segmented body with yellow and green markings, and its thin antennae extending from its head.

Scientific Phenomena

The Anchoring Phenomenon this image represents is insect adaptation for predation and flight. Dragonflies are incredibly efficient aerial hunters with specialized body structures that make them nearly perfect flying machines. Their large compound eyes provide nearly 360-degree vision to spot prey, while their four independently-moving wings allow them to hover, fly backwards, and make sharp turns. This combination of sensory and locomotor adaptations has remained virtually unchanged for over 300 million years because it is so successful for their survival as aerial predators.

Core Science Concepts

1. Compound Eyes and Vision: Dragonflies have compound eyes made of thousands of individual lenses called ommatidia, giving them exceptional motion detection abilities and wide field of vision.

2. Wing Structure and Flight Mechanics: The transparent wings show a network of veins that provide structural support while keeping the wings lightweight for efficient flight.

3. Body Segmentation: Like all insects, dragonflies have three main body segments (head, thorax, abdomen) with specialized functions for different life processes.

4. Predator Adaptations: The combination of excellent vision, agile flight, and strong mandibles makes dragonflies highly successful predators in their ecosystem.

Pedagogical Tip:

Use hand lenses or magnifying glasses to let students examine real dragonfly wings or high-quality photographs. This hands-on observation helps students understand that scientific tools enhance our ability to see details that lead to deeper understanding.

UDL Suggestions:

Provide multiple ways for students to demonstrate their understanding of insect adaptations - through drawings with labels, creating movements that mimic dragonfly flight, or building models with craft materials to accommodate different learning preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: At the cellular level, each ommatidium in the compound eye contains photoreceptor cells that detect light and movement. These thousands of tiny "pixels" combine to create a mosaic image that excels at detecting motion - crucial for catching prey and avoiding predators.

2. Zoom Out: Dragonflies are keystone species in freshwater ecosystems, controlling mosquito populations and serving as indicators of wetland health. Their life cycle connects aquatic and terrestrial environments, as nymphs live underwater for years before emerging as flying adults.

Discussion Questions

1. How do you think the dragonfly's large eyes help it survive in its environment? (Bloom's: Analyze | DOK: 2)

2. What evidence from the photograph supports the idea that dragonflies are well-adapted for flying? (Bloom's: Evaluate | DOK: 3)

3. If you were designing a robot that could catch small flying objects, what features would you copy from a dragonfly? (Bloom's: Create | DOK: 3)

4. How might the dragonfly's role as a predator affect other organisms in its ecosystem? (Bloom's: Analyze | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Dragonflies can sting or bite people and are dangerous."
   Reality: Dragonflies cannot sting and rarely bite humans. They are beneficial insects that help control pest populations like mosquitoes.

2. Misconception: "All insects have the same type of eyes as humans."
   Reality: Most insects have compound eyes made of many individual lenses, which work very differently from human eyes with single lenses.

3. Misconception: "Dragonflies are baby dragons or related to flies."
   Reality: Dragonflies are their own distinct group of insects and are not related to true flies, despite their common name.

Cross-Curricular Ideas

1. Math - Geometry and Patterns: Examine the geometric patterns in dragonfly wings. Students can measure wing lengths, count the number of wing sections, and create scale drawings of dragonfly wings. They could also explore symmetry by folding paper dragonfly cutouts and identifying lines of symmetry.

2. ELA - Informational Writing: Have students research and write an "All About Dragonflies" informational text using the five-paragraph essay format. They can organize facts by categories such as habitat, diet, life cycle, and adaptations. Students could also create "How-To" guides explaining how to identify different dragonfly species.

3. Art - Nature Illustration and Mixed Media: Students can create detailed scientific illustrations of dragonflies using colored pencils, watercolors, or mixed media. They could also design and construct 3D dragonfly models using wire, tissue paper, and found materials, focusing on accurate proportions and structural features that enable flight.

4. Social Studies - Ecosystems and Human Impact: Explore how wetland habitats (where dragonflies live) are affected by human development and climate change. Students can investigate local water ecosystems in their community and discuss why protecting wetlands is important for dragonfly populations and other organisms that depend on these environments.

STEM Career Connection

1. Entomologist - An entomologist is a scientist who studies insects like dragonflies. They observe how insects live, what they eat, how they grow, and how they interact with their environment. Entomologists work in laboratories, nature centers, universities, and field locations to help us understand and protect insects. Average Salary: $65,000 - $75,000 per year

2. Wildlife Biologist - Wildlife biologists study animals in nature and work to protect them and their habitats. A wildlife biologist studying dragonflies might monitor wetland health, track population changes, or help restore habitats where dragonflies live. They might work for government agencies, conservation organizations, or universities. Average Salary: $62,000 - $72,000 per year

3. Robotics Engineer - Robotics engineers design and build robots that can do jobs humans can't do easily. Some robotics engineers study dragonflies to learn how to build flying robots that are fast, agile, and can perform rescue missions or explore dangerous places. They use what they learn from nature to create better technology. Average Salary: $70,000 - $85,000 per year

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 - 5-LS1.A
- Crosscutting Concepts: Structure and Function - Systems and System Models
- Science and Engineering Practices: Developing and Using Models, Constructing Explanations

Science Vocabulary

* Compound Eyes: Eyes made up of thousands of tiny lenses that detect movement very well.
* Predator: An animal that hunts and eats other animals for food.
* Adaptation: A special feature that helps an organism survive in its environment.
* Ommatidium: One individual lens unit that makes up part of a compound eye.
* Segmentation: Having a body divided into distinct sections or parts.
* Nymph: The young form of certain insects that looks different from the adult.

External Resources

Children's Books:
- Dragonflies by Gail Gibbons
- National Geographic Readers: Dragonflies by Laura Marsh
- Are You a Dragonfly? by Judy Allen