Praying Mantis

Life Science | Lesson Guide

5th Grade

Photo Description

This image shows a praying mantis, a large insect with a bright green body and distinctive long, folded front legs that look like they are "praying." The mantis is perched on a plant stem near colorful pink and yellow flowers. You can see its large head, bulging eyes, and sharp claws on its powerful front legs that help it catch other insects.

Scientific Phenomena

Anchoring Phenomenon: Why does a praying mantis hold its front legs in that strange "praying" position?

The praying mantis holds its front legs folded up because they are specially adapted hunting tools. This position allows the mantis to stay still and blend in with plants while waiting for prey to pass by. When an insect gets close, the mantis can strike incredibly fast—faster than the human eye can see—to capture its meal. This is an example of predator adaptation, where an organism's body parts and behaviors have evolved over time to help it survive and hunt successfully.

Core Science Concepts

* Predator-Prey Relationships: Praying mantises are carnivorous predators that hunt smaller insects (like flies and grasshoppers), demonstrating how energy flows through food chains in ecosystems.

* Structural Adaptations: The mantis's folded front legs, powerful claws, swiveling head, and triangular body shape are all physical features that help it hunt and survive in its environment.

* Camouflage and Concealment: The mantis's green color helps it blend in with leaves and plants, making it harder for prey to see it and harder for predators to find it—a survival strategy called camouflage.

* Sensory Adaptations: The praying mantis has large, forward-facing eyes and can detect movement from far away, helping it locate and track moving prey with precision.

Pedagogical Tip:

When teaching about praying mantises, use the "praying" hand position as a memory hook. Have students fold their own hands in the mantis position while discussing how this shape helps with hunting. This kinesthetic connection helps fifth graders remember structural adaptations more deeply than words alone.

UDL Suggestions:

To support diverse learners: (1) Provide labeled diagrams showing mantis body parts alongside the photo for visual learners; (2) create a "hunting simulation" game where students use folded hands to "catch" moving objects to understand speed and precision; (3) offer video clips of actual mantis hunts at normal and slow-motion speeds so students can see the predator-prey interaction in action.

Zoom In / Zoom Out

Zoom In: Cellular and Muscular Level
When a praying mantis strikes at prey, its muscles contract (get shorter and tighter) incredibly fast—in just a fraction of a second. Deep inside the mantis's front legs are muscle cells that receive signals from the brain through nerves. These signals tell the muscles to fire all at once, creating that lightning-fast strike we see. The mantis's muscles are specially adapted to have fast-twitch fibers that can generate explosive power quickly. If we could zoom in with a microscope, we'd see thousands of muscle fibers all working together in perfect timing to snap those folded legs straight!

Zoom Out: Energy Flow in Garden Ecosystems
The praying mantis is just one part of a much larger ecosystem. In a garden or meadow, energy enters the system through plants that capture sunlight. Small insects eat the plants, the mantis eats those insects, and then larger predators (like birds or snakes) might eat the mantis. When the mantis dies, decomposers break it down and return nutrients to the soil, which feeds plants again. The mantis is a crucial link in this energy chain—removing the mantis from an ecosystem could cause problems because prey insects might overpopulate and damage plants, which would affect all the other organisms in that garden community.

Discussion Questions

1. What body parts does a praying mantis have that help it catch prey, and how does each part help? (Bloom's: Analyze | DOK: 2)

2. If a praying mantis lived on a brown tree trunk instead of green leaves, what do you think might happen to it over time, and why? (Bloom's: Evaluate | DOK: 3)

3. How would an insect's life be different if it lived in an environment with praying mantises compared to an environment without them? (Bloom's: Synthesize | DOK: 3)

4. What other animals do you know that use camouflage like the praying mantis does? How are their hiding strategies similar or different? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

Misconception 1: "Praying mantises are insects like ants and butterflies, but they're much bigger than regular insects."
- Scientific Clarification: Praying mantises ARE insects just like ants and butterflies, but insects come in many different sizes. Insects are defined by having six legs, three body parts, and usually wings—not by their size. Mantises are large insects, while ants are small insects. Both are equally "real" insects; they just evolved to be different sizes based on what helps them survive in their environments.

Misconception 2: "The praying mantis is called 'praying' because it's religious or has feelings like humans."
- Scientific Clarification: The praying mantis got its name because its folded front legs look like human hands folded in prayer. It's just a coincidence that the shape reminds us of praying! The mantis isn't actually praying or feeling anything. Those folded legs are adaptations that help it hunt—the position allows the mantis to stay still and strike quickly. The name is descriptive of appearance, not behavior or feelings.

Misconception 3: "If a praying mantis is green and lives on green plants, it can see in green the way we see things."

- Scientific Clarification: The mantis's green color is camouflage—it helps the mantis blend in with its surroundings so other animals can't see it easily. But the mantis itself doesn't "see in green." The mantis has eyes that see the world much like we do, but its vision is especially sensitive to detecting movement. The mantis hunts using its ability to spot prey moving, not by special color vision. Its green body is camouflage for other animals, not camouflage from other animals (since the mantis is a hunter, not prey).

Extension Activities

Activity 1: Mantis Hunting Simulation
Students work in pairs: one student is the "mantis" with folded hands, the other is the "prey" (a butterfly or fly). The prey walks slowly while the mantis tries to "catch" it using quick hand movements. Switch roles and discuss: How did the mantis's folded leg position help? Why do you think speed is important for hunting? This kinesthetic activity helps students understand predator adaptations through movement.

Activity 2: Adaptation Detective Challenge
Display photos or drawings of five different insects (ladybug, grasshopper, stick insect, bee, dragonfly). Have students create a chart identifying each insect's adaptations (body shape, color, wings, legs, etc.) and hypothesize what each adaptation helps the insect do (jump, hide, fly, etc.). Discuss how different insects have different adaptations based on their lifestyles.

Activity 3: Food Chain Construction
Students research what praying mantises eat and what eats praying mantises, then create a detailed food chain or food web poster. Include: plants !’ small insects !’ mantis !’ (bird/larger predator). Have students color-code energy flow and explain why the mantis is important in its ecosystem even though it's a predator.

Cross-Curricular Ideas

Mathematics Connection: Speed and Measurement
Have students research the actual speed of a praying mantis strike (approximately 50-60 mph or 80-96 kilometers per hour). Compare this to other fast animals using a data chart: How much faster is a mantis strike than a human can move? If a mantis can travel 60 miles in one hour, how far could it travel in one second? Create bar graphs comparing reaction speeds of different predators (mantis, falcon, snake) and discuss why speed matters for hunting success.

English Language Arts Connection: Creative Writing and Descriptive Language
Students write from two perspectives: a first-person narrative from a praying mantis's point of view describing a hunt, and a narrative from the prey's perspective describing the encounter. Use vivid descriptive language and action verbs (lurk, strike, dart, flee) to make the writing engaging. Then create a class "nature journal" where students illustrate their stories with detailed drawings of the mantis in different positions. Compare how word choice changes the mood of each narrative.

Art and Design Connection: Camouflage Art Project
Students design their own fictional insect using colored pencils or paint, choosing a habitat (desert, forest, rainforest, ocean) and creating an insect that uses camouflage to match that environment. They must explain their design choices: Why did you choose those colors? How does the pattern help the insect hide? Then cut out the insects and have classmates try to find them hidden in large painted habitat scenes. Display the finished "hidden insect" artworks as a gallery walk.

Social Studies Connection: Ecosystems Around the World

Research where praying mantises live naturally (they're found on every continent except Antarctica). Students choose one geographic region and create a report or poster about the local ecosystem where mantises live: What plants grow there? What other animals share that habitat? How do humans interact with this ecosystem? This connects to geography, cultural practices, and environmental awareness while reinforcing that organisms don't live in isolation—they're part of larger communities shaped by climate and geography.

STEM Career Connection

Entomologist (Insect Scientist)
Entomologists are scientists who study insects like praying mantises. They observe insects in nature, learn how they live and hunt, and discover new species. Some entomologists work in museums identifying and cataloging insects, while others work in laboratories studying how insects behave or how they might help solve human problems (like using mantis vision research to create better cameras!). Entomologists might also help farmers by studying which insects help crops and which ones hurt them. Average Salary: $65,000–$75,000 per year

Biomimicry Engineer
Biomimicry engineers study how nature solves problems and then use those solutions to design new technology. Praying mantis eyes, for example, are inspiring engineers to create better cameras and motion-detection systems because mantises are so good at spotting movement. These engineers might design robot arms based on mantis leg structure, or create camouflage materials inspired by insect coloring. They work in laboratories, tech companies, and research centers. Average Salary: $70,000–$85,000 per year

Wildlife Photographer or Nature Documentarian
Wildlife photographers and documentarians take stunning photos and videos of animals like praying mantises in their natural habitats. They travel to different ecosystems, set up cameras, and capture insects and animals doing what they naturally do—hunting, building, interacting with each other. Their work appears in nature magazines, documentaries, textbooks, and online platforms, helping people learn about and appreciate the natural world. Average Salary: $50,000–$80,000 per year (varies widely based on publication and experience)

NGSS Connections

Performance Expectation: 5-LS1.A – Structures and Functions
Students understand that plants get the energy they need to grow chiefly from the sun, and animals get energy from eating plants or other animals.

Disciplinary Core Ideas:
- 5-LS1.A – Structure and Function (body parts and their roles in survival)
- 5-LS2.A – Interdependent Relationships in Ecosystems (predator-prey dynamics)

Crosscutting Concepts:
- Structure and Function – How the mantis's physical features enable hunting
- Cause and Effect – Why adaptations exist (selective pressure from the need to hunt)
- Patterns – The pattern of predator-prey relationships across ecosystems

Science Vocabulary

* Predator: An animal that hunts and eats other animals for food.

* Prey: An animal that is hunted and eaten by another animal.

* Adaptation: A body part or behavior that helps an animal survive in its environment.

* Camouflage: Colors or patterns on an animal's body that help it blend in with its surroundings so it is hard to see.

* Insect: A small animal with six legs, three body parts, and usually wings.

* Ecosystem: A community of living things and the environment where they interact together.

External Resources

Children's Books:
- Praying Mantis by Gail Gibbons (narrative nonfiction with detailed illustrations)
- A Mantis is My Pet by Jan Wahl (story-based introduction to mantis behavior)
- Insects by National Geographic Kids (field guide with outstanding photography)