Centipede

Life Science | Lesson Guide

5th Grade

Photo Description

This image shows a centipede on a wooden surface, displaying its long, segmented body and numerous legs. The centipede's reddish-brown coloring and curved posture are clearly visible, along with its many body segments arranged in a line from head to tail. Centipedes are predatory arthropods found in moist environments like leaf litter and under logs.

Scientific Phenomena

Anchoring Phenomenon: Why does a centipede have so many legs, and how does it use them to move?

Scientific Explanation: Centipedes have one pair of legs attached to each body segment (unlike millipedes, which have two pairs per segment). This segmented body design allows centipedes to move quickly and flexibly through tight spaces in soil and leaf litter where they hunt for prey. Each segment can move independently, creating a wave-like motion that propels the centipede forward efficiently. This body structure is an adaptation that helps centipedes survive as ground predators—speed and flexibility help them catch small insects and other prey.

Core Science Concepts

* Arthropod Adaptations: Centipedes have specialized body structures (segmented bodies, multiple legs, and venomous fangs) that help them hunt and survive in their environment.

* Segmentation and Movement: The repeating body segments allow centipedes to be flexible and move quickly through soil and debris, which is essential for capturing prey.

* Classification and Characteristics: Centipedes are arthropods with jointed legs, exoskeletons, and segmented bodies—features they share with insects, spiders, and crustaceans.

* Predator-Prey Relationships: Centipedes are carnivorous predators that hunt small invertebrates, making them an important part of soil ecosystems.

Pedagogical Tip:

When teaching about centipedes, emphasize the difference between centipedes (one pair of legs per segment; predators) and millipedes (two pairs per segment; decomposers). Students often confuse these organisms, so using a comparison chart or side-by-side images strengthens understanding of how structure relates to function and lifestyle.

UDL Suggestions:

Provide multiple means of representation: Show video clips of centipedes moving in real time (not just still images) so kinesthetic learners can observe how segmented bodies enable flexible motion. Offer a tactile alternative by having students manipulate pipe cleaners or bendable craft tubes to simulate how segments move. For students with visual processing differences, use high-contrast diagrams labeling the head, segments, and legs clearly.

Zoom In / Zoom Out

Zoom In: Muscle and Nerve Coordination (Microscopic Level)
Even though we can see a centipede moving smoothly, we can't see what's happening inside its body. Centipedes have tiny muscles attached to each leg segment, and nerves run down the length of their body like electrical wires. These nerves send signals from the centipede's brain to each set of legs, telling them when to move. The brain coordinates all these legs in a wave pattern—front legs move, then the next set, then the next—all in quick succession. This happens so fast that it looks like one smooth motion, but it's really thousands of tiny muscle contractions happening in a precise order!

Zoom Out: Soil Ecosystem Decomposition and Nutrient Cycling
A single centipede is part of a much larger soil ecosystem that recycles nutrients back into the earth. When a centipede hunts and eats insects, it breaks down their bodies and returns nutrients (like nitrogen and phosphorus) to the soil through its waste. When the centipede eventually dies, decomposer organisms break down its body, returning those nutrients to plants. Plants use these nutrients to grow, and then herbivores eat the plants. This creates a continuous cycle that keeps the soil healthy and fertile. Centipedes are like tiny nature workers that help keep this whole system running!

Discussion Questions

1. How does a centipede's body structure help it survive as a hunter? (Bloom's: Analyze | DOK: 2)

2. If a centipede lost several legs, how might that affect its ability to move and catch food? (Bloom's: Evaluate | DOK: 3)

3. Compare how a centipede and a millipede are different, and explain why those differences matter for how they live. (Bloom's: Analyze | DOK: 3)

4. Why might centipedes be found under logs and in soil rather than in open, dry spaces? (Bloom's: Evaluate | DOK: 2)

Potential Student Misconceptions

Misconception 1: "Centipedes have 100 legs because the name says 'cent' (100)."
Clarification: The word "centipede" does mean "100 legs," but most centipedes don't actually have exactly 100 legs! Centipedes can have anywhere from 15 to 180+ legs, depending on the species and how many body segments they have. The name is just a general description, not an exact count. Each time a centipede grows and molts (sheds its exoskeleton), it may grow new segments and add more legs!

Misconception 2: "Centipedes and millipedes are the same thing, just with different names."
Clarification: Centipedes and millipedes look similar but are quite different! Centipedes have one pair of legs per segment and are fast hunters that eat insects. Millipedes have two pairs of legs per segment and move slowly, eating dead leaves and decomposing material. They are different types of arthropods with different lifestyles—one is a predator, and one is a decomposer.

Misconception 3: "Centipedes are insects like bugs and beetles."
Clarification: Centipedes are arthropods, but they are NOT insects. Insects have six legs and three body parts (head, thorax, abdomen), while centipedes have many pairs of legs and a long segmented body. Both are arthropods because they share features like exoskeletons and jointed legs, but they belong to different groups within the arthropod family.

Extension Activities

1. Centipede Movement Model: Students create a flexible "centipede" using a pipe cleaner or string with paper segments and straws taped at angles to represent legs. They manipulate the model to observe how segmentation allows movement. Have them compare this to a rigid stick and discuss why flexibility matters for hunting.

2. Ecosystem Roles Investigation: Students research soil ecosystems and create a food web that includes centipedes, their prey (small insects, millipedes), and what eats centipedes. They present their findings in a diagram or poster, explaining centipedes' role as both hunter and food source.

3. Adaptation Design Challenge: Students are given a scenario: "Design a new predator for the soil that has different adaptations than a centipede." They sketch their creature, label its adaptations, and explain how each feature helps it survive. This builds deeper understanding of structure-function relationships.

Cross-Curricular Ideas

Math Connection: Segment and Leg Counting
Students can research different centipede species and create a data chart showing how many body segments each species has and calculate how many total legs they would have (segments × 1 pair of legs). They can create bar graphs comparing leg counts across species or use multiplication to solve word problems: "If a centipede has 21 segments with one pair of legs each, how many legs does it have total?"

ELA Connection: Informative Writing and Research
Students write an informative paragraph or short report about centipedes, answering questions like "Where do centipedes live?" and "What do they eat?" They can read nonfiction picture books about arthropods and use evidence from their reading to support their writing. This combines reading comprehension with organized, fact-based writing—key fifth-grade writing standards.

Art Connection: Detailed Observation Sketching
Students observe the centipede photo carefully and create detailed drawings, focusing on labeling the head, segments, and legs. They can use colored pencils to match the reddish-brown coloring and add shading to show the 3D curved body. This develops observational drawing skills and helps students understand anatomical structure through visual representation.

Social Studies Connection: Decomposition and Community Roles
Students explore how different organisms (like centipedes, earthworms, bacteria, and fungi) have different "jobs" in a community—just like people have different roles in a town or city. They create a comparison chart or poster showing who does what in a soil community and discuss how all these different roles are necessary for the system to work, connecting to concepts of community interdependence and cooperation.

STEM Career Connection

Entomologist (Insect and Arthropod Scientist)
An entomologist is a scientist who studies insects and other small creatures like centipedes, spiders, and beetles. They observe how these animals live, what they eat, and how they interact with their environments. Entomologists might work for universities, museums, or government agencies, studying creatures in the field or in laboratories. Some entomologists help farmers by figuring out how to protect crops from harmful insects, while others study beneficial bugs like centipedes that help keep pest populations under control.
Average Annual Salary: $65,000–$75,000 USD

Soil Ecologist
A soil ecologist is a scientist who studies everything living in soil—including centipedes, earthworms, bacteria, and fungi. They investigate how these tiny creatures and microorganisms work together to keep soil healthy and help plants grow. Soil ecologists might work for universities, environmental agencies, or farms to understand how to protect and improve soil quality. Their research helps us understand why soil is so important for growing food and keeping ecosystems healthy.
Average Annual Salary: $58,000–$70,000 USD

Zookeeper or Museum Educator (Arthropod Specialist)
A zookeeper or natural history museum educator who specializes in arthropods cares for live centipedes and other small creatures and teaches the public about them. They create educational displays, give presentations, and help visitors (especially students!) learn about these fascinating animals. They make sure the centipedes have the right temperature, humidity, and food to stay healthy. This job combines animal care with science education and makes learning about nature exciting and interactive.
Average Annual Salary: $28,000–$45,000 USD

NGSS Connections

Performance Expectation:
5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water. (Note: While this PE focuses on plants, the centipede image connects to the broader ecosystem theme.)

Relevant 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-LS1.A - Structure and Function: The centipede's segmented body and multiple legs are structures that enable its function as a quick-moving predator.
- 5-LS2.A - Interdependent Relationships in Ecosystems: Centipedes are consumers that feed on other invertebrates, playing a role in energy transfer within soil ecosystems.

Crosscutting Concepts:
- Structure and Function - The centipede's body segments and legs directly support its ability to move and hunt.
- Cause and Effect - The centipede's flexible, segmented design causes it to move quickly, which has the effect of helping it catch prey.

Science Vocabulary

* Arthropod: An animal with a hard outer skeleton, jointed legs, and a body divided into segments (like insects, spiders, and centipedes).

* Segmented: Divided into separate rings or sections that can move independently.

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

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

* Exoskeleton: A hard outer shell that protects an animal's body on the outside (instead of bones inside like humans have).

* Carnivore: An animal that eats meat or other animals.

External Resources

Children's Books:
- Centipedes by Rebecca Stefoff (nonfiction; part of the Animal Kingdom series)
- The Tiny Creatures by William Dugan (explores small arthropods in gardens and soil)
- Backyard Bugs by Harriet Ziefert (includes centipedes and other soil invertebrates)

Teacher Note: This lesson emphasizes how structure enables function—a key concept in fifth-grade life science. Centipedes are excellent examples because their visible adaptations directly connect to observable behaviors, making abstract biological concepts concrete and engaging for elementary learners.