

## Photo Description



A ghost crab sits on sandy beach sediment near what appears to be its burrow. The crab has a tan-colored shell that blends with the surrounding sand, and its stalked eyes are clearly visible. Small mounds and holes in the sand show evidence of the crab's digging activity.

## Scientific Phenomena

This image represents the Anchoring Phenomenon of animal adaptation and habitat modification. The ghost crab demonstrates behavioral and structural adaptations that help it survive in its beach environment. Its coloration provides camouflage protection from predators, while its powerful claws and legs allow it to dig extensive burrow systems in the sand. This burrowing behavior is both a survival strategy (protection from predators, temperature regulation, moisture retention) and an example of how organisms modify their environment to meet their needs.

## Core Science Concepts

1. Animal Adaptations: The crab's physical features (coloration, eye stalks, claws) and behaviors (burrowing, camouflage) help it survive in its sandy beach habitat.
2. Habitat Modification: Crabs actively change their environment by digging burrows, which affects the structure of beach sediments and creates microhabitats for other organisms.
3. Ecosystem Interactions: Ghost crabs play important roles as both predators (eating smaller organisms) and prey (food for birds and other animals) in beach food webs.
4. Earth Materials and Processes: Beach sand is constantly moved and reshaped by both physical forces (waves, wind) and biological activity (animal burrowing).

### Pedagogical Tip:

Use a "See-Think-Wonder" thinking routine when introducing this image. Have students observe what they see, share what they think is happening, and generate questions about what they wonder. This builds scientific questioning skills.

### UDL Suggestions:

Provide multiple ways for students to engage with crab adaptations: tactile exploration with sand and digging tools, visual comparison charts of different crab species, and kinesthetic activities where students demonstrate burrowing motions.

## Zoom In / Zoom Out

1. Zoom In: At the microscopic level, the crab's gills extract dissolved oxygen from water trapped in sand pores. Special salt glands help the crab maintain proper water balance in its salty environment.

2. Zoom Out: Ghost crabs are part of the larger coastal ecosystem that includes dune systems, tidal zones, and marine environments. Their burrowing helps aerate beach sand and their movement transfers nutrients between land and sea environments.

### Discussion Questions

1. How do the ghost crab's body parts help it survive on the beach? (Bloom's: Analyze | DOK: 2)
2. What might happen to the beach ecosystem if ghost crabs disappeared? (Bloom's: Evaluate | DOK: 3)
3. How is the crab's burrow similar to and different from your home? (Bloom's: Compare | DOK: 2)
4. What evidence can you find in the photo that shows how this crab interacts with its environment? (Bloom's: Apply | DOK: 2)

### Potential Student Misconceptions

1. Misconception: "Crabs can only live in water." Clarification: Ghost crabs are semi-terrestrial, spending most of their adult lives on land but returning to water to reproduce and keep their gills moist.
2. Misconception: "The crab's color is just random." Clarification: The crab's sandy coloration is an adaptation called camouflage that helps it hide from predators like birds and larger crabs.
3. Misconception: "Digging holes in sand is destructive." Clarification: Crab burrows actually benefit beach ecosystems by aerating sand, creating homes for other animals, and helping water infiltrate into beach sediments.

### Cross-Curricular Ideas

1. Mathematics - Data Collection & Graphing: Have students measure and record the diameters of ghost crab burrows found on a beach or in a sandbox model. Create bar graphs or line plots showing the size distribution of burrows. Students can calculate the average burrow depth and compare measurements across different areas of the beach.
2. English Language Arts - Descriptive Writing & Poetry: Students write detailed descriptive paragraphs or poems about the ghost crab from the crab's perspective ("A Day in My Burrow"). They can use vivid sensory words and create acrostic poems using the word "GHOST CRAB" to describe the animal's features and behaviors.
3. Social Studies - Coastal Communities & Resource Management: Explore how coastal towns depend on healthy beach ecosystems. Discuss how human activities (beach development, pollution, recreation) affect ghost crabs and their habitats. Students can research local beach conservation efforts and create awareness posters about protecting coastal ecosystems.
4. Art & Engineering Design: Students create life-size clay or sand sculptures of ghost crabs, focusing on accurate proportions and anatomical details. They can also design and build 3D burrow models using cardboard tubes, sand, and other materials to demonstrate how crabs create and use underground tunnels.

### STEM Career Connection

1. Marine Biologist: Marine biologists study ocean and coastal animals like ghost crabs to understand how they live and adapt. They observe crabs in the wild, conduct experiments, and help protect endangered species. Marine biologists work on beaches, in laboratories, and on research boats. Average Annual Salary: \$65,000

2. Coastal Engineer: Coastal engineers design structures and solutions to protect beaches and coastal communities from erosion and storms while keeping ecosystems healthy. They study how animals like crabs interact with sand and water to inform their designs. Average Annual Salary: \$88,000

3. Environmental Scientist: Environmental scientists monitor the health of beaches and ecosystems, including studying how animals like ghost crabs indicate whether an environment is healthy or polluted. They work to solve environmental problems and protect natural habitats. Average Annual Salary: \$73,000

### 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-ESS2.A, 3-LS4.C, 5-LS1.C
- Crosscutting Concepts: Systems and System Models, Structure and Function, Cause and Effect

### Science Vocabulary

- \* Adaptation: A special feature or behavior that helps an animal survive in its habitat.
- \* Burrow: A tunnel or hole in the ground that animals dig for shelter and protection.
- \* Camouflage: Colors or patterns that help animals blend in with their surroundings to hide from predators.
- \* Habitat: The natural place where an animal lives and finds everything it needs to survive.
- \* Sediment: Small pieces of rock, sand, and soil that settle in layers on the ground or ocean floor.

### External Resources

Children's Books:

- A House for Hermit Crab by Eric Carle
- Crab Moon by Ruth Horowitz
- What Is the Animal Kingdom? by Bobbie Kalman