NO PREP

Cnidarians

Corals, Jellyfish, and Sea Anemones

Includes: Student reading, case study, differentiated questions, teacher key

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Name: Period: Date:

Cnidarians: Corals, Jellyfish, and Sea Anemones

Ancient Survivors of the Sea

Cnidarians are among the oldest groups of animals on Earth, with a fossil record stretching back more than 500 million years. This group includes corals, jellyfish, sea anemones, and hydras. Despite their simple body structures, cnidarians have thrived in marine environments thanks to specialized adaptations. They possess radial symmetry, which means their body parts are arranged around a central point, and a gastrovascular cavity that serves both digestive and circulatory functions. The most distinctive feature of cnidarians is the presence of cnidocytes, specialized stinging cells that contain organelles called nematocysts. These tiny, harpoon-like structures are capable of delivering toxins to capture prey or defend against predators. Even though jellyfish may look fragile and corals appear motionless, cnidarians' stinging abilities make them

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Corals and Reef Building

Corals are perhaps the most ecologically important cnidarians because they create coral reefs, which support vast marine biodiversity. Reef-building corals form colonies of tiny animals called polyps, which secrete a calcium carbonate skeleton. Over thousands of years, these skeletons accumulate and create massive reef structures such as the Great Barrier Reef. A unique and vital partnership underlies coral survival. Corals live in symbiosis with microscopic algae called zooxanthellae. These algae perform photosynthesis and provide the coral with essential nutrients, while corals supply the algae with protection and access to sunlight. This relationship fuels reef growth and enables coral ecosystems to thrive in nutrient-poor tropical

waters. However, when stressed by rising temperatures or pollution, corals may expel their symbiotic algae, leading to coral bleaching. Without their algae, corals lose color and risk starvation, endangering the entire reef ecosystem.

Jellyfish and Sea Anemones

Jellyfish are free-swimming cnidarians with umbrella-shaped bodies called medusae. They propel themselves by pulsating, but they also drift with ocean currents, making them both predators and passive drifters. Their tentacles are lined with cnidocytes that paralyze plankton, fish larvae, and sometimes larger prey. Despite lacking a brain, jellyfish are highly efficient predators and can bloom in massive numbers when conditions are favorable, disrupting food webs and even affecting human fisheries. Sea anemones, in contrast, are sessile cnidarians, meaning they attach to rocks or coral surfaces. Though they appear plant-like, they are active predators, using stinging tentacles to capture fish and other small organisms. Anemones also form mutualistic relationships, most famously with clownfish. The fish gain protection from predators by hiding among the stinging tentacles, while the anemone benefits from nutrients provided by the fish's waste and from improved water circulation created by the fish's movements.

Case Study: Coral Bleaching in the Great Barrier Reef

In 2016, scientists observed one of the most severe coral bleaching events in the history of the Great Barrier Reef, a UNESCO World Heritage site. Rising ocean temperatures caused many corals to expel their symbiotic algae, leaving the reefs ghostly white. Without zooxanthellae, corals lost their primary source of energy. Entire reef sections experienced massive mortality, and fish populations declined due to the loss of habitat. Scientists and conservationists have been studying the event to better understand how climate change threatens coral ecosystems. While some reefs showed signs of recovery in subsequent years, repeated bleaching events in 2017 and 2020 revealed the growing vulnerability of these ecosystems. Researchers now emphasize the importance of reducing global carbon emissions and protecting reefs through marine reserves to help corals survive in a warming world.

1. Why does coral bleaching occur, and what role do zooxanthellae play in this process?

_____

_____

2. What are some long-term consequences of repeated bleaching events on reef ecosystems?

_____

_____

Multiple Choice

1. What is the main function of cnidocytes in cnidarians?
    a) Excreting metabolic waste and byproducts
    b) Reproduction
    c) Locomotion
    d) Capturing prey and defense

2. Which organism is sessile and forms mutualism with clownfish?
    a) Hydra
    b) Sea anemone
    c) Coral polyp
    d) Jellyfish

3. What causes coral bleaching?
    a) Loss of zooxanthellae due to stress
    b) Reduced stinging cell function
    c) Excess nutrient input from coastal rivers and runoff
    d) Overgrowth of sea anemones

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Nematocyst	A) Large calcium carbonate structures built by polyps
2. ___ Coral reef	B) Umbrella-shaped free-swimming cnidarian
3. ___ Sea anemone	C) Stinging structure used by cnidarians
4. ___ Zooxanthellae	D) Sessile cnidarian with mutualism involving clownfish
5. ___ Medusa	E) Algae that provide nutrients through photosynthesis

Fill-in-the-Blank

1. Coral polyps build reefs by secreting _____.

2. Jellyfish move primarily by pulsating their _____.

3. The mutualistic algae found in corals are called _____.

Short Answer

Answer each question in 2-4 complete sentences.

1. Explain how jellyfish can impact marine food webs during bloom events.

_____

_____

_____

2. Describe the relationship between corals and zooxanthellae.

_____

_____

_____

3. Why are cnidarians considered both simple and successful animals?