FROM STINGERS TO BUILDERS: DISCOVERING THE FASCINATING TIES BETWEEN JELLYFISH AND CORAL

YUNJI WAN
University of Illinois Urbana-Champaign

ABSTRACT
Although jellyfish and corals appear vastly different, they are surprisingly close relatives, both belonging to the ancient phylum *Cnidaria*. Characterized by radial symmetry and stinging cells called nematocysts, cnidarians exhibit two primary life forms: the free-swimming medusa (e.g., jellyfish) and the sessile polyp (e.g., corals). Despite their shared lineage, jellyfish and corals play vastly different roles in marine ecosystems. Jellyfish are efficient carnivorous predators that help regulate marine populations, while corals act as reef-building organisms essential for biodiversity. Coral survival depends on a delicate symbiosis with photosynthetic algae, but this relationship is threatened by climate change, resulting in coral bleaching and reef decline. Meanwhile, jellyfish populations are surging due to warming oceans and reduced predation, leading to ecological disruptions. Understanding the biology and environmental challenges of these cnidarians highlights the urgent need for conservation efforts to maintain marine ecosystem balance.

INTRODUCTION

At first glance, jellyfish and corals might seem like two completely different creatures. The only similarity they share appears to be that they both inhabit the ocean—and even this is far-fetched, as one floats freely, and one remains anchored to the seafloor. However, as surprising it may seem, they are much closer relatives than one might think! Both belong to the phylum *Cnidaria*, which is part of an ancient group of animals that show radial symmetry (Digital Atlas of Ancient Life).

Figure 1: A jellyfish (Chetan-Welsh)

Figure 2: A coral outcrop on the Great Barrier Reef, Australia (Natural Science Foundation, 2024)

RADIAL SYMMETRY

Radial symmetry is akin to a pizza—just like slices of pizza radiate evenly from the center, the body parts of cnidarians are arranged around a central point, allowing them to interact with the environment in all directions. Another defining trait of Cnidarians are their unique stinging structures, known as nematocysts, which reside in specialized tentacle cells and enable these animals to capture small prey (Özbek et al., 2012).

LIFE STAGES AND BEHAVIORS OF JELLYFISH AND CORALS

Although jellyfish and coral share a common evolutionary ancestry, they exhibit different physical characteristics. This difference stems from two separate primary life stages of Cnidarians: the polyp and the medusa. The polyp exists as a fixed, sac-like shape, while the medusa is a free-swimming bell-shaped form (BYJU'S). Corals spend their lives anchored as polyps, building massive reef structures, while jellyfish primarily exist in the medusa form, drifting through open water. Although they appear fragile, jellyfish function as efficient predators by using their stinging cells to capture prey. The stinging cells, embedded in their tentacles, number in the thousands and activate upon contact to deliver toxins which paralyze fish and plankton (ScienceDaily, 2017). The carnivorous eating habits of jellyfish play a crucial role in maintaining marine ecosystem stability because they help control population numbers of other marine life.

In contrast to jellyfish, corals are the architects of the ocean. These small, sessile organisms create massive coral reefs by secreting calcium carbonate exoskeletons, forming intricate structures that provide habitats for a wide variety of marine species (Woods Hole Oceanographic Institution, 2018). Corals are made up of tiny polyps—each one a small, soft-bodied animal that resembles a tiny flower with tentacles around its mouth. These polyps often live in colonies, and together they form the colorful and complex coral reefs we see in tropical oceans.

A key factor behind their vibrant colors is tiny algae called zooxanthellae. These algae live inside the coral's tissue, where they photosynthesize and provide the coral with nutrients. In return, the coral provides the zooxanthellae with a safe environment and carbon dioxide (NOAA). This symbiotic relationship is what allows coral reefs to thrive in nutrient-poor waters and gives them

their stunning hues.

ECOSYSTEM CONSIDERATIONS

Nowadays, corals face severe threats to their survival due to climate change and ocean pollution. One of the most devastating effects is coral bleaching. This phenomenon occurs when corals expel their symbiotic algae due to environmental stress like rising ocean temperatures or ocean acidification (Great Barrier Reef Foundation). Without their algae partners, corals lose their color and, more importantly, their primary source of food, leaving them vulnerable to disease and death.

While corals struggle to survive, jellyfish populations are booming. Warming ocean temperatures, increased pollution, and intensive fishing (which depletes some of jellyfish's natural predators) cause jellyfish populations to surge.

The booming population of jellyfish has caused vast numbers of bottleneck jellyfish to be washed ashore by strong winds, where they sting thousands of people. Large jellyfish blooms can also block the cooling systems of nuclear power plants, clog fishing nets, and outcompete fish for food (JSTOR Daily, 2016).

To restore ecological balance, humans have put effort into mitigating climate change, either by reducing greenhouse gas emissions from burning of fossil fuels or enhancing natural carbon sinks (like oceans and forests) that accumulate and store these gases. With continued effort, humans can restore the health of the oceans and the diversity of the vibrant life in them.

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