



HETEROTROPH

ORGANISMS THAT CONSUME OTHER ORGANISMS

Description: Heterotrophs are defined as organisms that cannot produce their own food or energy. Unlike phototrophs who use light from the sun for energy, heterotrophs must consume other heterotrophs, plants, or organic matter to meet their nutritional requirements. **Heterotrophic** marine bacteria are called **bacterioplankton**. They need organic carbon and have to obtain it, either directly or indirectly from phytoplankton. **Secondary consumers** (Choanoflagellates and other protists) are organisms that feed on primary consumers (bacterioplankton). **Zooplankton** are small heterotrophic animals who play a role in aquatic food webs and act as a resource for consumers on higher trophic levels, including fish.

Carbon Cycle: Heterotrophs and autotrophs are partners in biological carbon exchange. Heterotrophs acquire organic carbon compounds from the autotrophs by consuming them and breaking them down via respiration for cellular energy.

Ecosystem Role: Heterotrophs function as consumers in the food chain. Secondary consumers, such as Zooplankton, depend on the success of primary consumers, bacterioplankton. Both primary and secondary heterotrophic consumers' use of organic matter for energy provides a critical link within the global carbon cycle, connecting trophic levels.

Key Terms

Actinobacteria: bacteria that grow in long strands and contribute to the breakdown and recycling of organic compounds.

Alcanivorax: rod-shaped bacteria found in seawater containing crude-oil because the bacteria use compounds in oil as a source of energy.

Alteromonas: curved, rod-shaped bacterium found in various ocean waters worldwide whom degrade aromatic carbon rings introduced through an oil spill.

Bacterioplankton: both primary producers and primary consumers and drive global biogeochemical cycling of elements essential for life.

Choanoflagellate: free-living eukaryotic cell that has flagella (similar to a tail) that helps to propel the cell through the water in search of bacteria and dead matter to consume.

Herbivorous Copepod: small crustaceans found in nearly every saltwater habitat that consume phytoplankton. Because of their small size and hefty cumulative biomass, they contribute heavily to the global carbon cycle.

Erythrobacter: red-orange bacteria, a major player in the cycling of both inorganic and organic carbon and frequently found in nutrient-rich coastal seawaters.

Mixotroph: An organism that can use a mix of different sources of energy and carbon, both autotrophic and heterotrophic.

Oceanicola: member of the *Rhodobacterales* order that has a diverse metabolism playing an important role in oceanic nutrient cycling.

Protist: any eukaryotic organism that is not an animal, plant or fungus. Heterotrophic protists have evolved many ways to obtain nutrients from their environment through consumption of detritus, bacteria, filter feeding, and more.

Pseudoalteromonas: genus of bacteria that produce biologically active molecules that aid the organism in competition for nutrients. These molecules can inhibit or promote the survival of other marine organisms living nearby.

Roseobacter: clade of bacteria that are commonly found interacting with phytoplankton, macro algae and various marine animals in coastal ecosystems.

SAR11: the most abundant cell type in the ocean that oxidize organic compounds from primary production into CO₂.

SAR202: bacterioplankton found in the dark-ocean and play a role in cycling of recalcitrant carbon.

SAR86: abundant gammaproteobacteria in the surface ocean.

Vibrio: bacteria that form relationships (mutualistic, parasitic, or pathogenic) with other animals and are found in temperate waters

Vibrio fischeri: rod-shaped bacteria that are bioluminescent (glowing) and are endosymbionts of squid or fish

Zooplankton: plankton that range from microscopic organisms to large species, such as jellyfish. Zooplankton are found within large bodies of water, including oceans and freshwater system

More Resources

The Biological Productivity of the Ocean

<https://www.nature.com/scitable/knowledge/library/the-biological-productivity-of-the-ocean-70631104>

Glowing Squid Video

https://www.nsf.gov/news/special_reports/science_nation/glowingsquid.jsp

A Drop in the Ocean is Teeming with Life

<https://www.whoi.edu/oceanus/feature/a-drop-in-the-ocean-is-teeming-with-life/>

