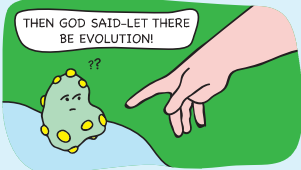
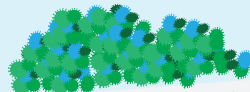


# Ten Things You Didn't Know About Ocean Microbes

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Millions Of Microbes In The Sea, Too Small For Us To See!



1. It is most likely that life originated in the oceans about 3.5 billion years ago. And marine microbes accounted for all known life forms for nearly 50 to 90% of Earth's history! Since they emerged, ocean microbes have continuously changed the environmental conditions on earth, greatly influencing the development of all other forms of life.

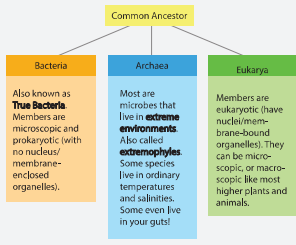


2. If you were to add up the weights of all the marine microbes, it would be way more than the combined weight of all the mammals, sharks, fish and other life-forms in the ocean. In fact, estimates suggest that sea water contains up to 1,00,000 microorganisms per millilitre. In other words, there are more marine microbes in the oceans than there are people living on earth!



3. Microbes are found in every kind of marine environment possible – from the open ocean to the shores; from the equator to the poles; in the ice-covered polar regions of the Arctic and Antarctic to the boiling hydrothermal vents in the depths of the sea. They can be found as plankton (free-floating organisms) at the surface, as symbionts in corals, on the outer surface of marine organisms, or even in the sediments at the bottom of the sea!

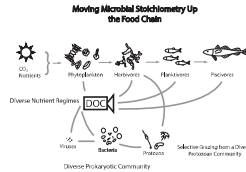
4. Marine microbes are a very diverse group! They consist predominantly of bacteria and archaea, but also include microbial eukaryotes and viruses (which some don't even consider as being alive and hence won't be found in the tree of life).



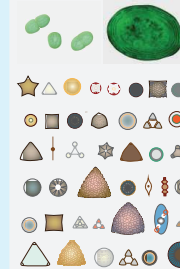
HELP!



5. Marine microbes – whether, autotrophic, chemotrophic or hetero-trophic – can be said to form the bottom of the oceanic food chain! They get eaten by zooplanktons (free-floating animals) which are eaten by small fish that are eaten by progressively larger marine organisms, and so on.



8. Heterotrophic marine microbes are unable to make their own food. Some live in symbiotic association with coral polyps. Still others, such as viruses, are parasitic on a wide variety of hosts to get the food and energy they need to grow and reproduce. Free-living heterotrophic bacteria play a vital role in carbon cycling in the ocean through what is known as the microbial loop. These bacteria are the only organisms capable of using dissolved organic carbon (DOC), which was once part of living organisms, as a food source. This organic matter is then passed up the food chain, even as other, larger, organisms excrete waste and/or die, making carbon and other nutrients available to these microbes again.



6. Autotrophic microbes or phytoplanktons are like land plants – they rely on the process of photosynthesis to live and grow. In fact, half of the primary production on Earth occurs in the ocean, and half of this oceanic production is carried out solely by autotrophic marine bacteria! This also means that the autotrophic bacteria and single-celled algae in oceans together produce as much oxygen as that produced by all the land plants combined!

Diatoms (single-celled algae) and cyanobacteria (prochlorococcus and synechococcus) are responsible for the production of half the oxygen we breathe!

ENERGY

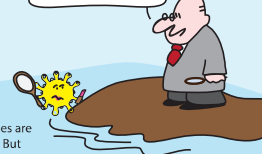
7. The deep seas have many chemotrophic marine microbes that do not need sunlight or oxygen to survive. Instead, they grow by capturing energy from a wide range of chemical processes, like the hydrogen sulfide emitted from oceanic vents. Using carbon from carbon dioxide, they act as a source of food for larger creatures – making these microbes the equivalent of primary producers at these deep, dark depths!



9. Most marine microbes are beneficial to us, but a small percentage can sometimes cause harm. For example, in highly polluted waters, marine microbes can reproduce rapidly thanks to their short life cycles resulting in harmful algal blooms (HABs). Because some algae produce toxins, they can be harmful to organisms that consume them. Even if they are not toxic, HABs can impact fish and plants by depleting the oxygen in the water and by blocking sunlight from reaching them.



WHY, HELLO THERE!



10. New marine microbes are being discovered daily! But not many of them can be grown in a laboratory, making them difficult to study. This is why microbiologists (scientists who study microbes) are constantly looking for better methods, especially ones based on sampling genetic material, to correctly identify new microbes and ultimately improve our understanding of their role on Earth!