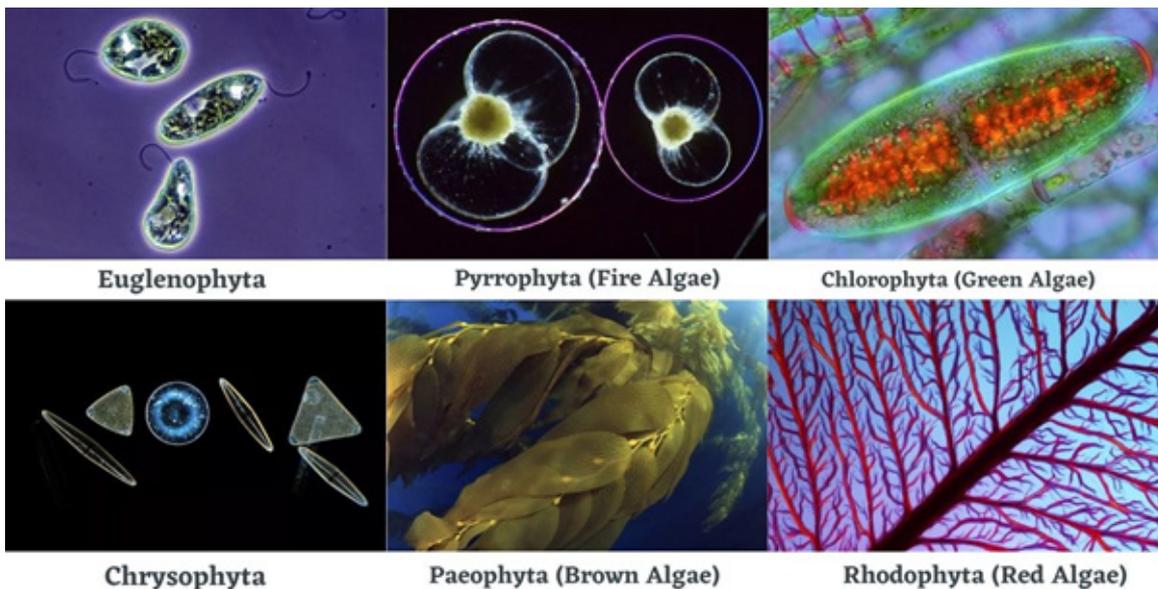


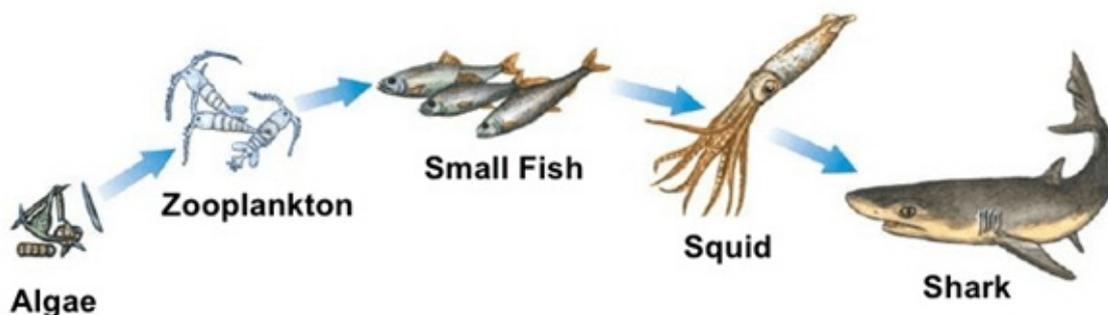
Algae



Algae are a diverse group of aquatic organisms that have the ability to conduct photosynthesis, collectively producing more oxygen than all land plants combined.

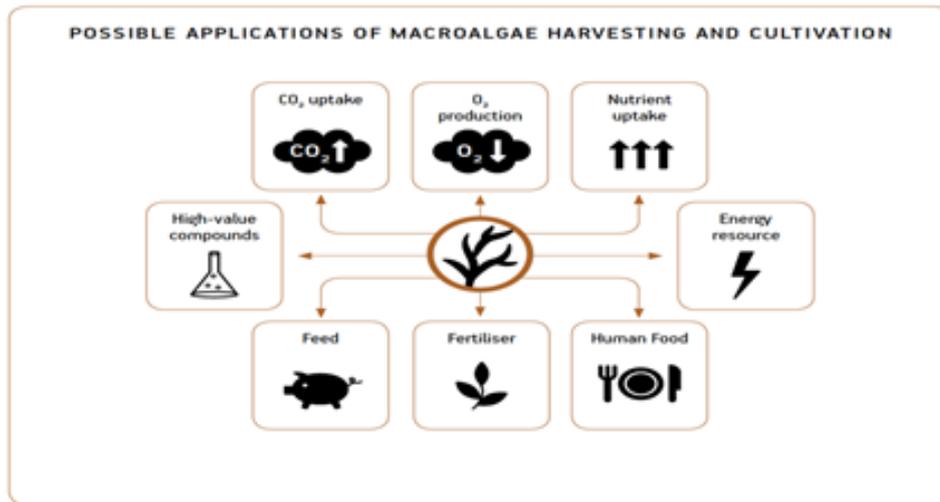
Photosynthesis within single celled organisms evolved early in Earth's history. Around 3.5 billion years ago, cyanobacteria (blue-green algae) adopted the main form of photosynthesis we see today, giving rise to life as we know it. Algae play an important role of carbon capture and due to their unimaginably enormous number, are more effective than land plants.

Algae form the foundation of most water-based food chains, supporting a huge number of animals.



Continued...

Certain algae are familiar to most people; for instance, seaweeds, pond scum or the algal blooms in lakes. However, there is a vast and varied world of algae that is unfamiliar to most of us. Many are farmed for their potential to help us halt the drivers of climate change – the production of biofuel to replace fossil fuels as well as a nutritional source that, in turn, reduces water and land consumption.



Algae are simple, chlorophyll-containing organisms that range from microscopic and single-celled, such as picoplankton that are between 1.2 and 2 micrometers in diameter, to very large and multicellular.



Magnified image of picoplankton



Actual size of huge kelp fronds

The algal body is relatively undifferentiated and it has no true roots or leaves although fronds of the giant kelp certainly look like leaves and can reach 50 meters in length. Algae do not have a vascular system, as in plants, to circulate water and nutrients through their body mass.

Algae produce their own food by harnessing the energy of the sun to create carbohydrates through a process called photosynthesis. This process is conducted through chloroplasts that contain a green pigment called chlorophyll.

(Chlorophyll is the pigment that gives plants their green colour and allows them to absorb sunlight. Chloroplast: a part of a cell found in plants that converts light energy into energy plants use).

This gives many algae their green appearance. However, some algae appear brown, yellow or red because in addition to chlorophylls they have other pigments that camouflage the green colour.



Algae grows wherever there is light for photosynthesis and moisture for reproduction. This includes in fresh or sea water where algae can either be free-floating (planktonic) or attached to the sea bed; on rocks, soil or vegetation; on the fur of South American sloths and polar bears!



The algae provide the sloth with camouflage and the sloth provides the algae with shelter and moisture. A perfect symbiotic relationship

Algae are important colonisers in hot springs and lava flows, these so-called extremophiles, thrive at extraordinarily high temperatures. If life exists elsewhere in our solar system, an alga-like organism is among the most likely to be found.

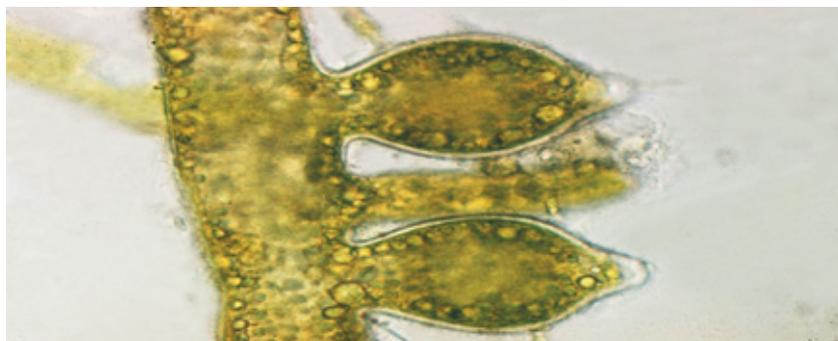
These organisms also form mutually beneficial partnerships with other organisms. For example, algae live with fungi to form lichens- plant like or branching growths that form on boulders, cliffs and tree trunks.

Algae called zooxanthellae live inside the cells of reef-building coral.

In both these cases, the algae provide oxygen and complex nutrients to their partner, and in return, they receive protection and simple nutrients. This symbiotic arrangement enables both partners to survive in conditions that they could not endure alone.

Reproduction in algae is conducted by the formation of spores, a reproductive cell that in algae is often capable of motion. Various types of asexual reproduction are common in algae, but they also reproduce sexually, forming genetically diverse cells coming from two separate algae. In some types of algae, this is a very simple kind of sex in which the algae themselves act as gametes (the organism's reproductive cells), but in many other algae there are egg- and sperm-like cells and sex-attractant pheromones.

It is likely that an alga was the first organism, around 1.5 billion years ago, to evolve something similar to the sexual reproduction we see in plants and animals today.



A magnified image of spores forming on a strand of algae

Poor agricultural management resulting in the release of phosphorous and nitrogen from fertilizers, into waterways, as well as climate change with its attendant increase in water temperature, results in harmful algae blooms.



The disruption to the ecosystem kick starts a rapid proliferation in particular kinds of algae that form mats or scum over the surface of the water. Oxygen can no longer penetrate bodies of water, causing devastation to aquatic life. Whilst the surface algae can keep photosynthesising, the layers below die off emitting noxious stenches. Water from sources that are attacked by algae bloom is toxic to most life forms.

However, researchers and manufacturers are finding ever increasing ways of harnessing algae to replace the use of plastics that are harmful to the environment. An American company is making the soles of running shoes from a material made with algae. They produce ten billion pairs of running shoes each year, using 5 million kilos of pond scum!



New algae are discovered all the time, including entirely unknown groups. Based on the best available estimates there are, approximately 37,000 species of algae known today, with perhaps another 30,000 species awaiting discovery and description.