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A Brief Note on Algae

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Opinion Article

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ABOUT THE STUDY

The term "algae" refers to a large and diverse group of photosynthetic eukaryotic organisms. It is a polyphyletic grouping of species from several distinct clades. The organisms included range from unicellular microalgae like Chlorella, Prototheca and diatoms to multicellular forms like the giant kelp a large brown alga that can grow up to 50 metres (160 feet) in length. Most are aquatic and autotrophic (they generate food internally) and lack many of the distinct cell and tissue types found in land plants such as stomata, xylem and phloem.

Algae are a polyphyletic group because they do not share a common ancestor while their plastids appear to have a single origin from *Cyanobacteria* they were acquired in various ways. Algae with primary chloroplasts derived from endosymbiotic *Cyanobacteria* are known as green algae. Algae with secondary chloroplasts derived from an endosymbiotic red alga include diatoms and brown algae. Algae have a diverse set of reproductive strategies ranging from simple asexual cell division to complex forms of sexual reproduction. Different land plants are there such as bryophyte phyllids (leaf-like structures), nonvascular plant rhizoids and tracheophyte roots, leaves and other organ systems (vascular plants). Most are phototrophic but some are mixotrophic, gaining energy from both photosynthesis and organic carbon uptake *via* osmotrophy, myzotrophy or phagotrophy. Some unicellular green algae species as well as many golden algae, euglenoids, dinoflagellates and other algae have developed into heterotrophs (also known as pale yellow or apochlorotic algae) relying entirely on external energy sources and needing limited or no photosynthesis.

Other heterotrophic organisms, such as *Apicomplexans* are derived from cells whose ancestors had plastids but are not traditionally considered algae. Unlike other photosynthetic bacteria such as purple and green sulphur bacteria, algae have photosynthetic machinery derived from *Cyanobacteria* that produces oxygen as a byproduct of photosynthesis. Because of the variety of algae types, they have a growing number of industrial and traditional applications in human society. Traditional seaweed farming practises have been around for thousands of years and have deep roots in East Asian food cultures. Other modern algaculture applications include cattle feed, using algae for bioremediation or pollution control converting sunlight into algae fuels or other chemicals used in industrial processes and in medical and scientific applications.

The primary classification of algae is based on morphological characteristics. The most important of these are (a) the pigment composition of the cell, (b) the chemical nature of stored food materials, (c) the type, number, point of insertion and relative length of the flagella on the motile cell, (d) the chemical composition of the cell wall and (e) the presence or absence of a clearly organized nucleus in the cell or any other significant details of cell structure. A wide range of algal morphologies are seen and feature convergence in unconnected groups is common. Reds and browns as well as some chlorophytes are the only groups that have three-dimensional multicellular thalli. Apical growth is confined to subsets of these groups the reds of the Alorideophytes, various browns and the charophytes. Charophytes differ from reds and browns in that they have distinct nodes separated by internode 'stems' whorls of branches resembling horsetails that occur at the nodes. Conceptacles are another polyphyletic trait that can be discovered in coralline algae, Hildenbrandiales and browns. Algae are abundant in bodies of water common in terrestrial environments and can be found in unusual places like snow and ice. Seaweeds typically grow in shallow marine waters less than 100 m (330 ft) deep however, some such as Navicula pennata, have been recorded at depths of 360 m (1,180 ft). Ancylonema nordenskioeldii, a type of algae was discovered in Greenland's 'Dark Zone' causing an increase in the rate of ice sheet melting. After pink ice appeared on parts of the present glacier in the Italian Alps, the same algae was discovered. Algae of various types play important roles in aquatic ecology. Most marine food chains are based on microscopic forms that live suspended in the water column (phytoplankton). These algae can discolour the water and outcompete, poison or asphyxiate other life forms in high densities (algal blooms).Algae can be used as indicator organisms in a variety of aquatic systems to monitor pollution. Algal metabolism is often sensitive to various pollutants. As a result, in the presence of chemical pollutants, the species composition of algal populations may shift. Algae can be easily sampled from the environment and kept in laboratories to detect these changes.