Topic Page: Chlorophyta

Definition: **Chlorophyta** from *Processing Water, Wastewater, Residuals, and Excreta for Health and Environmental Protection: An Encyclopedic Dictionary*

A large division of algae (the green algae) found in freshwater, saltwater, and damp places on land. Also called chlorophyceae.

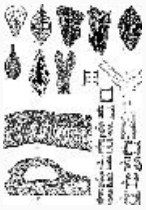

Image from: **Probable coralline algae: 1, Stacheia;...** in *Encyclopedia of Paleontology*

Summary Article: **Chlorophyta**
From *The Columbia Encyclopedia*

(klōrŏf'ətə), phylum (division) of the kingdom Protista consisting of the photosynthetic organisms commonly known as green algae. The organisms are largely aquatic or marine. The various species can be unicellular, multicellular, coenocytic (having more than one nucleus in a cell), or colonial. Those that are motile have two apical or subapical flagella. A few types are terrestrial, occurring on moist soil, on the trunks of trees, on moist rocks, and even in snowbanks. Various species are highly specialized, some living exclusively on turtles, sloths, or within the gill mantles of marine mollusks.

It is generally accepted that early chlorophytes gave rise to the plants. Cells of the Chlorophyta contain organelles called chloroplasts in which photosynthesis occurs; the photosynthetic pigments chlorophyll *a* and chlorophyll *b*, and various carotenoids, are the same as those found in plants and are found in similar proportions. Chlorophytes store their food in the form of starch in plastids and, in many, the cell walls consist of cellulose. Unlike in plants, there is no differentiation into specialized tissues among members of the division, even though the body, or thallus, may consist of several different kinds of cells. There are four evolutionary lineages of green algae. Most living species are grouped in classes that are coextensive with three of these lineages.

Class Chlorophyceae

This group contains the largest number of species of the division. They can have two or more flagella, near the apex of the cell. Mitosis in this class involves phycoplasts, microtubules that develop between and separate the daughter nuclei. This characteristic is not seen in any other organism, implying that no organisms have descended from this class. There are a variety of asexual and sexual reproductive techniques. Sexual reproduction is characterized by the formation of a zygospore (a dormant diploid zygote protected by a thick wall) that later undergoes meiosis.

The class includes unicellular organisms such as those in the genus *Chlamydomonas* with their two apical flagella and nonmotile organisms such as *Chlorella*, which is being cultivated for use as a dietary supplement. Colonial genera of Chlorophyceae include *Hydrodictyon* (the “water net”) and the so-called volvocine line of flagellated specimens that range from simple colonies of *Gonium* to the intricate spinning spheres of *Volvox*, which can consist of up to 60,000 cells and exhibit some cellular specialization. The most complex of the class are the filamentous members, some of which exhibit features that are seen primarily in plants. Despite this similarity the class is not believed to have been the evolutionary source of plants.

Class Charophyceae

Charophyceae are of great fossil age; the stoneworts date as far back as the late Silurian period. Cells of this class are asymetrical. Those that are motile have two flagella, at right angles near the apex of the cell. Sexual reproduction in this class, as in Chlorophyceae, is characterized by the formation of a zygospore and zygotic meiosis. Unlike in the other two common classes of green algae, but as with plants, the nuclear envelope disintegrates when mitosis begins. During cell division the mitotic spindle is present; in some a phragmoplast similar to those seen in plants aids in the formation of a cell plate. Plants are thought to have evolved from early species of Charophyceae.

The class includes *Spirogyra*, familiar filamentous algae that float on ponds and lakes in slimy masses. The desmids are single cells noted for their extraordinary symmetry and geometrical beauty. They are found only in fresh (usually still) water and often take an important place in the food chains of small nutrient-poor ponds and peat bogs. The stoneworts consist of a complex branched thallus with an erect stemlike structure and many whorls of short branches. They occur in shallow fresh or brackish water and especially in water rich in calcium, where they become stiff and lime-encrusted, a characteristic that has made them plentiful in the fossil record.

Class Ulvophyceae

Ulvophyceae contains marine organisms that take a variety of shapes that may consist of a few cells, long filaments, thin sheets of cells, or coenocytic cells. Most approach being radially symmetrical. They have an alternation of generations and unlike in the other classes, meiosis occurs in the spores rather than the zygotes. When present, there can be two or more apical flagella. During mitosis, the nuclear envelope and the mitotic spindle persist, as they do in the Charophyceae.

The class Ulvophyceae includes sea lettuce, or *Ulva*, bright green, leaflike algae that grows in shallow waters on rocks and piers. *Ventricaria* is an egg-shaped, coenocytic alga, familiar in warm seas. Some organisms of Ulvophyceae produce toxins that discourage predation. The chloroplasts of some others become symbionts after they are retained in the bodies of sea slugs that eat the algae. They continue to perform photosynthesis, providing the slug with needed oxygen.

See also seaweed.

Bibliography

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