**Division:** *Charophyta*

*Charophyta* members are found in fresh water, stagnant ponds. They are attached to the bottom by rhizoids. They are found in warm and cool regions of the temperate zone. Thallus has an erect axis. This axis has nodes and internodes. Each internode consists of a single large elongated cell. But each node consists of a plate of small cells. Each node has two types of branches (branches of limited growth and branches of unlimited growth).

The cell wall is composed of cellulose. A large number of crystals of calcium carbonate are also present in cellulose. Pigments are chlorophyll a, chlorophyll b and xanthophyll. Reserve food material is starch. *Charophyta* members reproduce both sexually and asexually. Asexual reproduction occurs by vegetative reproduction. Sexual reproduction occurs by oogamy.

**Class:** *Charophyceae*

*Charophyceae* members are generally considered to be the ancestral group within the *Chlorophyta* that gave rise to the land plants. Initially, this relationship was based on the complex morphology of the charophytes, including differentiation into organs and the presence of enclosing structures around oogonia.

Most *Charophyceae* live in freshwater habitats, but some also occur in moist soil in terrestrial habitats. *Charophyceae* can live as single cells, colonies, or branched and unbranched filaments and come in a variety of shapes.

**Order:** *Charales*

*Charales* are commonly called stoneworts or brittleworts. Its members are common in quiet freshwater habitats such as ponds and streams; a few are found in brackish water. The thallus of the order consists of a series of so-called "giant cells" up to several cms in length, with branches coming off at nodes composed of smaller cells. *Charales* reproduce both asexually and sexually; male and female reproductive organs are produced on short branches

and the female organs of extant forms (oogonia) consist of five spirally arranged tubes or elements that surround the egg. A fossilized oogonium is termed a gyrogonite and is the principal fossil evidence of the order.

**Genus:** *Chara*

*Chara* includes macroscopic algae, typically with erect corticated axes and a five-celled coronula at the apices of the female gametangia. The genus is submerged aquatic algae, consisting of an erect branched axis attached to the substratum by multicellular rhizoid. The thallus is differentiated into nodes and internodes form each node a whorl of short laterals may be limited or unlimited.

**Genus:** *Nitella*

*Nitella* is represented by macroalgae with no cortication patterns on the axis, branches, or branchlets, and the coronula is composed of ten cells, divided into two rows of five cells each. This genus resembles Chara but unlike Chara, it grows in much deeper water. Thallus in *Nitella* more branched and doesn't have a calcareous deposition.

**Division:** *Euglenophyta*

*Euglenophyta* members mostly consist of unicellular, aquatic algae. They are found in fresh and marine waters many are flagellated and therefore motile. The outer part of the cell consists of a firm but flexible layer called a pellicle, which cannot properly be considered a cell wall. Some euglenoids contain chloroplasts that contain the photosynthetic pigments chlorophyll a and b. Reproduction occurs by longitudinal cell division.

**Class:** *Euglenophyceae*

The class encompasses free-living phototrophic unicellular flagellates, with one to several plastids of secondary origin, with three bounding membranes and chlorophylls a and b.

**Order:** *Euglenales*

They are single-celled organisms that move with flagella in their entire life cycle. They never bring the colony to the water. Flagella disappears under inappropriate conditions

**Genus:** *Euglena*

*Euglena* membres can both eat food as animals by heterotrophy; and can photosynthesize, like plants, by autotrophy. When acting as a heterotroph, the Euglena surrounds a particle of food and consumes it by phagocytosis. When acting as an autotroph, the *Euglena* utilizes chloroplasts, (hence green color) containing chlorophyll a, b and some carotenoid pigments, to produce sugars by photosynthesis.

**Division:** *Mioza* (Dinoflagellates)

Miozoa includes symbiotic, or parasitic organisms. In silicates, there are vesicles called alveoli which support outer membranes in their members. Its members usually have a microtubule complex that is adapted for infecting, absorbing fluids or collecting cells. They have two flagella, one may be contained in a groove-like structure around the equator of the organism (the cingulum), providing forward motion and spin to the dinoflagellate, the other (the longitudinal flagellum) trailing behind providing little propulsive force, mainly acting as a rudder. Another characteristic of the dinoflagellates is the wall composition and structure; early classification of the dinoflagellates was based on the presence or absence of a rigid outer cell covering (or theca).

Some of these organisms are photosynthetic, while others are heterotrophic. In heterotrophic forms, the pigments are found in the cytoplasm either in dissolved form or in granular form. Dinoflagellates are encrusted with plates made of a cellulose-like material and silica. Most dinoflagellates contain the pigments chlorophyll-a, chlorophyll-c, carotenoids, which allow them to undergo the process of photosynthesis to generate energy. Mioza members reproduce both sexually and asexually. Asexual reproduction occurs by binary fission, Sexual reproduction occurs by isogamy and anisogamy.

**Division:** *Cryptophyta*

The division describes tiny, motile, unicellular organisms with two slightly unequal flagella bearing lateral hairs. Genus members are aquatic unicellular and they inhabit mainly in marine and freshwater environments Most Cryptophyta members are photosynthetic and they possess plastids that are very diverse in pigmentation. Photosynthetic Cryptophyta members contain the pigments chlorophyll a, chlorophyll c, alpha-carotene, xanthophylls, and phycobiliproteins.

**REFERENCES**


Carlos E, Bicudo M, Menezes, M.2016. Phylogeny and Classification of *Euglenophyceae*: A Brief Review. Frontiers in Ecology and Evolution, 4:1-17.

McCourt, R.M., K.G. Karol, M. Guerlesquin, and M. Feist. 1996. Phylogeny of extant genera in the family Characeae (Charales, Charophyceae) based on rbcL sequences and morphology. Am. J. Bot. 83: 125-131.

Meurer T, Bueno NC. 2012. The genera Chara and Nitella (Chlorophyta, Characeae) in the subtropical Itaipu Reservoir, Brazil. Brazilian Journal of Botany 35 (2): 219–232.

Taylor TN, Taylor, EL, Krings, M. 2008. Paleobotany: the biology and evolution of fossil plants, 2.edn, Academic Press.

Lee R. 2008. Phycology. Cambridge University Press, Cambridge.

Van den Hoek C, Mann DG, Jahns HM. 1995. Algae.An Introduction to Phycology.Cambridge University Press, Cambridge.

Url1. https://botany.si.edu

Url2. https://study.com.