

## **DOMAIN: EUKARYOTA**

Eukaryota is one of the three domains of life containing organisms whose cells contain complex structures enclosed within complex membranes called endomembranes. These organisms are called Eukaryotes and are either singular- or multiple-celled. The defining membrane-bound structure that differentiates eukaryotic cells from prokaryotic cells is the cell nucleus, within which the genetic material and many other cell bodies are contained.

### **Kingdom: *Protista***

Protist members are typically unicellular and less complex in structure than other eukaryotes. They don't share many similarities but are grouped together because they do not fit into any of the other kingdoms. While some protists are capable of photosynthesis, others can have mutualistic relationships with other organisms. Members of the kingdom can be grouped according to similarities in a number of different categories including nutrition acquisition, mobility, and reproduction.

Protists are primarily classified into three groups (Plant-like protists, Fungi-like protist, and Animal-like Protists) according to how they obtain nutrition. We will examine the titles "Fungi-like Protists" and "Plant-like Protists" in the course of Cryptogamne Botany.

### **Plant Like Protists**

Plant-like protists, commonly called algae, have the ability to do photosynthesis. Their cells include chloroplasts that collect and convert light into energy. Algae can be multicellular or unicellular. Unicellular algae occur most frequently in water, especially in plankton. Phytoplankton is the population of free-floating microorganisms composed primarily of unicellular algae. In addition, algae may occur in moist soil or on the surface of moist rocks and wood.

Reproduction in algae occurs in both asexual and sexual forms. Asexual reproduction occurs through the fragmentation of colonial and filamentous algae or by spore formation.

Spore formation occurs by mitosis. Binary fission also takes place. During sexual reproduction, algae form differentiated sex cells that fuse to produce a diploid zygote with two sets of chromosomes. The zygote develops into a sexual spore, which germinates when conditions are favorable to reproduce and reform the haploid organism having a single set of chromosomes. This pattern of reproduction is called alternation of generations.

**Division:** *Chlorophyta*

*Chlorophyta* is commonly known as green algae. This is one of the most crowded divisions of algae, with approximately 7000 species. Most of them are unicellular, but there are some multicellular members. There are also free-living, colonial, and coenocytic members.

Glucosamine is the main component of cells walls in *Chlorophyta*. Filamentous sporophytes have singular lenticular nuclei, which are embedded in a thick cytoplasm.

*Chlorophyta* usually has biflagellated gametes. Like other green plants, *Chlorophyta* contains chlorophylls a and b, although the major pigment is chlorophyll b. In addition, some tropical species are pigmented by siphonoxanthin and siphonein. They store starches made from photosynthesis in double-membrane bounded chloroplasts. Cell walls are made of cellulose.

*Chlorophyta* is photosynthetic organisms, obtaining starch from photosynthesis. They are autotrophic.

*Chlorophyta* reproduces both sexually and asexually, but usually sexually. Asexual reproduction can occur by fission, fragmentation, or zoospores. Sexual reproduction can be isogamy, anisogamy, or oogamy.

**Class:** *Chlorophyceae*

*Chlorophyceae* is a large and important class of freshwater green algae. Its members include some of the most common species, as well as many members that are important both ecologically and scientifically. The class contains about 350 genera 2650 species.

**Order:** *Sphaeropleales*

*Sphaeropleales* members are unicellular, colonial or unbranched filamentous. The cell wall is cellulosic and usually covered by an outermost trilaminar layer composed of sporopollenin-like material. Asexual reproduction is caused by the formation of zoospores, autospores or daughter colonies. Sexual reproductions by isogamy or oogamy are known.

**Order:** *Chlamydomonadales*

*Chlamydomonadales* members are flagellated or pseudociliated green algae.

**Genus:** *Volvox*

The genus includes 20 widely distributed species that are found in ponds, puddles, and bodies of freshwater. Its members form spherical or oval hollow colonies that contain up to 60,000 cells. Most *Volvox* members reproduce both asexually and sexually.

**Order:** *Oedogoniales*

*Oedogoniales* are remarkable filamentous green algae. Their method of cell elongation is unique, utilizing a donut-shaped ring of soft wall material which is stretched to form the new daughter cell.

**Genus:** *Oedogonium*

*Oedogonium* members are unbranched filamentous green algae. They are typically epiphytic and attached to the substratum by a basal holdfast cell. are unbranched filamentous green algae.

**Class:** *Ulvophyceae*

*Ulvophyceae* includes many macroscopic seaweeds such as *Ulva*, *Cladophora* and *Codium*, but many unicellular or microscopic filamentous species are also known. Many species live in marine, but there are many freshwater and terrestrial species.

**Order:** *Bryopsidales*

Bryopsidales members are found in oceans across the world and they include several genera that thrive in the aquarium environment. Bryopsidales species possess adaptations that promote survival in captivity. Many occur naturally in shallow, coastal waters where they have developed tolerance to elevated nutrient levels and fluctuations in temperature, salinity, and light.

**Genus:** *Codium*

The genus includes approximately 50 species of marine green algae (family Codiaceae) usually found in deep pools along rocky coasts.

**Order:** *Dasycladales*

The order includes macroalgae which grow in the shallow waters of tropical and subtropical shores as far north as the Mediterranean Sea.

**Genus:** *Acetabularia*

Acetabularia members are umbrella-like in appearance and are anchored to their substrate with rootlike rhizoids.

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