Department of biology

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((Plant groups))

Stage (2)

((Ninth lecture))

Charophyta

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Charophyta

The Charophyta are a division of green algae, that includes the closest relatives of the embryophyte plants. In some groups, such as conjugating green algae, flagellate cells do not occur. The latter group does engage in sexual reproduction, and motility does not involve flagella, since they are totally lacking.

Description

Charophyta are a small but important group of plants which show marked differences from both the Thallophyta and the Bryophyta. They are all specialized water plants with a highly peculiar structure and complex reproductive organs. Chlorophyll is the only pigment they possess, and they may be related to the Chlorophyceae; in

fact some authorities have relegated them to that group as a separate order. The older view, and one which still has much to recommend it, was to regard them as a separate phylum, of equal rank with the Thallophyta, 'whose relationship to other phyla was unknown. The species are distributed throughout the world.

It may be mentioned that plants with a wide geographical distribution are often known to be of greater antiquity than those of restricted distribution, and the Charophyta are no

exception to this rule, for remains of them are found as far back as the Devonian and Carboniferous rocks.

The Charophyta are plants whose stems are either green or grey; the latter occurs in many species, resulting from the masking of the green colour by incrustations of lime on the walls. The main stems are slender and slightly branched. Lateral branchlets occur in whorls at regular intervals up the stem. The reproductive organs consist of antheridia and oogonia, though the structure of these organs differs considerably from the corresponding organs in the Algae. As a result of fertilization a protonema is formed from which the sexual plant is developed.

The plants are submerged, and occur widely in fresh water or water containing less than I per cent. of salt. Thus they

are found in the Baltic Sea, but not in other more saline waters. The water must be still, or only slowflowing. There must be no pollution due to sewage, and the plants must be exposed to bright light. They are frequently found in water charged with calcareous material. The phylum contains only one family, Characeae, with six genera and about two hundred species.

Cell structure The cells of the nodes are relatively small, with dense, granular protoplasm and a single nucleus. There are numerous small discoid chloroplasts, which are disposed around the periphery of the cells. No pyrenoids are present. The large internodal cells are sometimes multinucleate, and their nuclei often possess large nucleoli and scanty chromatin. In these cells the cytoplasm forms only a peripheral layer with a large central vacuole. The cell walls are composed of cellulose, though there may be also a superficial layer of a more gelatinous material of unknown composition. The storage material is starch, except in the oospore, where oil also occurs. This starch also accumulates in special storage structures, termed bulbils, which consist of rounded cells of varying size which are developed in clusters on the lower stem and root

nodes. They are mainly developed when plants are growing in fine slimy mud.

General characteristics

1. Most of its members are found in freshwater environments and some are found in brackish water.

2. The members of this division occupy an intermediate position between green algae and mosses. 3. Its members are characterized by being large in size, and can be seen with the naked eye.

4. It has Chlorophyll a , b .

5. The stored food is starch and is stored in plastids.

6. Its reproductive organs are surrounded by a sterile membrane similar to that found in mosses.

7. It resembles algae in terms of living, pigments and type of stored food.

8. It fixes itself by hairy structures known as root-like Rhizoids.

9. It includes two genera, which are *Nitella* and *Chara.*

Chara sp.

1. It can be found in multiple and diverse environments, in humid areas and shallow waters (fresh and salty), and is found in northern Iraq in waterfalls, springs and mineral water springs, and in the south in salt ponds, marshes and salt marshes, and on the edges of the Tigris and Shatt al-Arab.
2. It tolerates concentrations of hydrogen sulfide and calcium salts.
3. It tolerates being in environments poor in oxygen.
4. This algae has pseudo-roots length between (25-52cm)
5. Two types of cells can be distinguished: The phalanx cells are characterized by being long and single-layered and have a single nucleus in young cells and several nuclei in old cells, in which there are a number of oval chloroplasts Pyrenoids in shape, in which starch is stored in the form of and are characterized by their cells being of small sizes and node cells that consist of several layers.
6. Have a single nucleus and several oval chloroplasts

7. The cell walls are cellulose and may be surrounded by a sticky substance.
8. It can be distinguished by the red and orange spots found between the branches on the sides (these spots are the reproductive organs).
9. The antheridia are spherical in shape and orange or red in colour, while the male antheridia are oval in shape surrounded by 5 cells from the top forming a single apical ring (known as the crown cells).
10. The reproductive organs, the Oogonium and the Antheridia, may be borne on the same branch, and may be monoecious or dioecious.

Structure

1- The body is a thallus differentiated into nodes and internodes.
2- Growth is apical.
3- Each node consists of two central cells surrounded by a group of cells (known as peripheral) ranging (between 6-22 cells).
4- Branches may arise from the nodes arranged in an annular or circular manner, and the branches are either

limited in growth or unlimited in growth branches. And they are small .

• **Limited in growth branches**: remain connected to the nodes, their number ranges between (3-5) and green (nodes and internodes are present on them), and the reproductive organs are carried on these nodes.

• **Unlimited in growth branches**: consist of the same structures as limited in growth branches, but their growth continues and is unlimited (known as long branches), and they are also distinguished into nodes and internodes.

Nitella sp.

• It is almost similar to Chara in all its characteristics, except that it differs from it in the number of crown cells present at the top of the Antheridia, which number 10 cells arranged in two rings

• **1 - Asexual reproduction:** • By fragmentation, if some parts separate, each of them grows to give a new algae.

• **2 - Sexual reproduction:** • Highly developed sexual organs are formed, so they are male and female organs, and the algae Monohabit, where both the male and

female organs are located on a single node. The male organ is a Thread containing a number of male swimmers that may reach 200 cells, and the female organ is egg-shaped with a large egg. The nucleus of the male swimmer moves to the egg, and the nuclei of the gametes fuse and form a thick. Sheath of calcium carbonate. The zygote separates and settles at the bottom of the water, and before the zygote germinates, a reduction. Division occurs and a new algae is formed.