

NAME: OLLEY ORITSEGBUBEMI MARANATHA

DEPARTMENT: MEDICINE AND SURGERY

MATRIC NUMBER: 19/MHS01/337

COURSE CODE: BIO 102

1. Classify plants according to Eichler's grouping of 1883

DIVISON	CLASS
(A) THALLOPHYTA	Phycotinae(algae), Mycotinae(Fungi)
(B) BRYOPHYTA	Hepoticae(Liverworts), Musci(mosses)
(C) PTERIDOPHYTA	Psilotinate(Psilotum), Lycopodinae, Equisetinae, Filicinae
(D) SPERMATOPHYTA	Gymnospermae, Angiospermae

2. How are algae of importance to man

i. Role as Primary Producers: Because of their photosynthetic abilities the algae are the primary producers of the aquatic environments. They provide food and energy to the animal life, produce oxygen and take up carbon dioxide produced during respiration which is injurious for living organisms especially fishes.

ii. Source of Food: More than 100 species belonging to green, brown and red algae are used as food for humans because of presence of proteins, carbohydrates, minerals and vitamins, either in the cell wall or in the cytoplasm. These include Monostroma, Ulva, Codium and Chlorella. The most important of these are the Chlorella which is high in protein and lipid contents. It has all the essential amino acid contents in it, therefore used as substitute food especially in space flights. The algae also afford as food for animals especially in coastal countries. Laminaria, Sargassum, Fucus and Ascophyllum are used as fodder for animals.

iii. Antibiotics and Medicines: Some algae yield antibiotics, e.g., Chlorellin is obtained from green alga Chlorella; that inhibits the growth of certain bacteria. Similarly, some species of Polysiphonia produce antibacterial substances which are effective against gram-negative and gram-positive bacteria. An antibiotic is obtained from a diatom Nitzschia palea which is effective against Escherichia coli. Because of high iodine contents, brown algae are used in manufacture of various goiter medicines.

3. Describe a unicellular form of algae

The Chlamydomonas is an example of a unicellular algae. It has unicellular cells, spherical or slightly cylindrical, a papilla may be present or absent. Chloroplasts green and usually cup-shaped. A key feature of the genus is its two anterior flagella, each as long as the other. It is widely distributed in freshwater or damp soil. It is generally found in a habitat rich in

ammonium salt. Chlamydomonas possesses red eye spots for photosensitivity and reproduces both asexually and sexually.

4. How does this unicellular alga described in question 3 carry out its reproduction
Chlamydomonas reproduce by asexual and sexual means. Asexual reproduction occurs during the favourable as well as unfavourable condition. The sexual reproduction takes only under favourable condition.

1. Asexual reproduction

Chlamydomonas under favourable season withdraws flagella and it comes a resting stage. During this stage the protoplasm withdraws inwards from the cell wall and thus the contractile vacuole disappears. It will be soon followed by repeated longitudinal division of the protoplasm giving rise to 8- 16 daughter protoplasts. Around each daughter protoplast cell wall is developed followed by the formation of two flagella and becomes parent like organism. These newly formed daughter cells are called zoospores. Zoospores are held inside the parent cell wall, later it gets ruptured. Each of the zoospore then develops to new organism.

Chlamydomonas under unfavourable season also the protoplasm divide repeatedly forming number of daughter protoplast. This daughter protoplast does not develop flagella and are known as endospore. These endospores remain in the gelatinous matrix. This stage very much resembles the alga Palmella, so known as the Palmella stage. Under the onset of favourable season endospore become zoospores.

2. Sexual reproduction

The Chlamydomonas during sexual reproduction involves three stages. They are the;

- a. **Gametogenesis:** The process of gametogenesis occurs by repeated division of the protoplast giving rise to 16-32 gametes from a single cell. The gametes produced are similar to zoospore which motile and biflagellate but functions as gametes. These are later released to the environment where the syngamy is supposed to take place.
- b. **Syngamy:** It is the process of fusion of gametes as a result in the formation of zygote. These zygotes formed will then transforms into zygospores. On basis of the nature of the gametes fusing and mode of fusion three kinds of syngamy are recognized. They are;
 - i. **isogamy:** The fusing gametes are identical in nature so known as an isogamete.
 - ii. **Anisogamy:** The fusing gametes are dissimilar and motile so known as anisogametes.
 - iii. **Oogamy:** The fusing gamete in which the female is non-motile and male is motile gamete.
- c. **Zygospore formation:** Zygospore are the spores which have thick wall to protect from the extreme environment. Under favourable condition the zygospore germinates. The diploid nucleus meiotically produces four haploid daughter nuclei. Then wall formation occurs which is followed by the development of two flagella. The wall of the zygospore open and releases the daughter zoospores which then give rise to vegetative organisms.

The lifecycle of Chlamydomonas is known as haplobiontic lifecycle.

5. Differentiate between the two types of colonial form of algae.

The two colonial forms of algae are Pandorina and volvox; Pandorina is a colony usually found in water bloom. The colony consists of 16 cells attached to one another. Each cell has many attributes in common with Chlamydomonas. In this colony, sexual reproduction is achieved by anisogamous pairing. While, volvox is also a colony that shows more complex forms than Pandorina. There are more cells in this colony, number may run into thousands

and are connected with cytoplasmic strands that run through the cells. Sexual reproduction in this colony is oogamous.

6. Describe a named complex form of algae

The Fucus is an example of a complex algae. Fucus is a genus of brown algae found in the intertidal zones of rocky seashores almost throughout the world. The thallus is perennial with an irregular or disc-shaped holdfast or with haptera. The erect portion of the thallus is dichotomous or subpinnately branched, flattened and with a distinct midrib. Gas-filled pneumatocysts are present in pairs in some species, one on either side of the midrib. The erect portion of the thallus bears cryptostomata and caecostomata. The base of the thallus is stipe-like due to abrasion of the tissue lateral to the midrib and it is attached to the rock by a holdfast.