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DEPT: OPTOMETRY

COLLEGE: MHS

COURSE: BIO 102

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

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| DIVISION | CLASS |
| Thallophyta | Phycotinae (Algae)  Mycotinae (Fungi) |
| Bryophyta | Hepaticae (Liverwort)  Musci (Mosses) |
| Pteridophyta | Psilotinate (Psillotum)  Lycopodinae (Lycopodium, Selaginella)  Equisetinae (Horsetails)  Filicinae (Ferns) |
| Spermatozoa | Gymnosperm (Gymnosperms)  Angiosperm (Angiosperm) |

1. How are algae of importance to man?

* Certain species are harvested for food for man and as cosmetics.
* It serves as thickening agents in ice cream and shampoo, drugs to ward off diseases.
* Algae are considered nutritious to man because of their high protein content and high concentrations of minerals, trace elements and vitamins.
* Algae has high iodine content which helps to prevent goitre.
* Algae can also be used to cure and prevents illnesses e.g. cough, gout, hypertension Etc.
* Brown algae yields Algnic acid which is used to stabilize emulsions and suspensions

1. Describe a unicellular form of Algae.

Chlamydomonas represents the unicellular and motile form of green Algae. It is found in stagnant water usually along with other forms. Flagella are the structure for mobility. The cell is bounded by a cellulose cell wall; contains organelles e.g. nucleus, mitochondria, stigma (eyespot), cup-shaped chloroplast, pyrenoid etc. The nucleus carries the genetic programme of the cell; the stigma it possesses is for photoreception. The mitochondria mediates the elaboration of energy molecules. Manufactured sugar is processed into starch on the pyrenoid

1. How does this unicellular alga described in question 3 carry out its reproduction?

In Chlamydomonas, reproduction can either be vegetative (asexual) or sexual.

Vegetative reproduction results in production of daughter cells in which the amount and quality of genetic material in the nucleus of the mother cell is maintained in the daughter cells. In Chlamydomonas, a cell about to divide loses its flagella. The cell undergoes mitotic division leading to two nuclei i.e. two daughter cells (zoospores) are released. Increase in the population of cells in a colony is achieved by repeated mitotic divisions.

Sexual Reproduction

Certain environmental conditions e.g. lack of nutrients or moisture may trigger the haploid daughter cells to undergo sexual reproduction. Instead of forming into spores, the haploid daughter cells form gametes that have two different mating strains which are structurally similar and are positive and negative strains. Opposite mating strains fuse in a process called isogamy to form a diploid zygote, which contains two sets of chromosomes. After a period of dormancy, the zygote undergoes meiosis, a type of cell division that reduces the genetic content of a cell by half. This cell division (i.e. meiosis) produces four genetically unique haploid cells that eventually grow into mature cells.

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

**Pandorina** usually occurs in water bloom. The colony consists of 16 cells attached to one another. Each cell has many attributes / features in common with chlamydomonas e.g. nucleus, large chloroplast, pyrenoid, flagella and stigma. Vegetative reproduction is achieved through 4 successive mitosis division of each of the 16 cells. Sexual reproduction is anisogamous while **Volvox** shows more complex form than Pandorina. There are more cells in the colony, number may run into thousands and connected with cytoplasmic strands that run through the cells. Not all cells form new colonies; but the larger cells at the posterior ends (gonida) are the only ones that divide to form new colonies. Other cells remain vegetative throughout the life of the colony. Sexual reproduction is oogamus.

1. Describe a named complex form of alga

**FUCUS**

A genus of brown algae whose species are often found on rocks in the intertidal zones of the sea shores. The plant body is flattened, dichotomously-branched thallus with a mid rib, a vegetative apex, a reproductive apex at maturity) and a multicellular disk (hold fast) with which plant is attached to rock surface. The plant body also has air bladders which is believed to aid the plant to float on the water. Various species of Fucus exist; vary in size from a few centimetres to about 2metres in length.

They also vary in terms of whether the sex cells are found in the same sexual chamber or in different sexual chambers on different plant bodies.

Sexual reproduction is oogamus, sex cells are produced in conceptacles which have openings (ostioles) on the surface of the thallus.

In the male conceptacles, one of the diploid one of the diploid cells from outgrowth of the wall of the conceptacles undergoes meiosis, the meiotic product undergo many mitotic divisions to produce antheridium having 64 cells of which each cell develops into a biflagellate sperm that swims out of the conceptacle through the ostiole.

In the female conceptacle, similar to the situation in the male conceptacle. It leads to the production of an 8-celled oogonium – each becomes an egg which is the female sex cell.

Motile sperm cell from the antheridium moves through the ostiole into the female conceptacle where the eggs are fertilized and diploid zygote are produced.

Apart from the antheridia and oogonia, sterile multicellular filaments (paraphyses) are also produced in the conceptacles which are dispersed among the antheridial and oogonial outgrowths and at the entrance into the conceptacles.

The diploid zygote germinates into a new dipoid *fucus* plant making the dipoid the dominant generation.