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Department: MEDICINE AND SURGERY

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1. Classification of Plants according to Eichler's Grouping of 1883

THE PLANT KINGDOM DIVISION CLASS

DIVISION	CLASS
Thallopyta	Phycotinae (Algae) Mycotine (Fungi)
Bryophyta	Hepaticae (Liverworts) Musci (Mosses)
Pteridophyta	Psilotinate (Psilotum) Lycopodinae (Lycopodium, Selaginella) Equisetinae (Horsetails) Filicinae (Ferns)
Spermatophyta	Gmnospermae (Gymnosperms) Angiosperms (Angiosperms)

2. Importance of Algae to Man Algae are important to man in various ways;

- i. Algae serves as food for people and livestock, thickening agents in ice cream and shampoo, drugs to ward off diseases.
- ii. Algae have high iodine content therefore, prevent goiter.
- iii. They have high protein content and high concentrations of minerals therefore, are nutritious.
- iv. Brown algae yields alginic acid which is used to stabilize emulsions and suspensions; found in products like syrup, ice cream and paint.
- v. Red algae provide agar and carrageen which is used in preparing gels used in scientific research.
- vi. Algae are also important as food for fish.

3. The Unicellular form of Algae Chlamydomonas represents the unicellular and motile form of green algae. It is found in stagnant water. The flagella are the structures for mobility. The cell is bounded by a cellulose cell wall which contains organelles e.g. nucleus, mitochondria, stigma (eyespot), cup-shaped chloroplast, pyrenoid etc. The nucleus carries the genetic programme of the cell. The stigma is for

photoreception. Manufactured sugar is processed into starch on the pyrenoid. The mitochondria carry out the elaboration of energy molecules.

4. Reproduction of Unicellular Algae Reproduction in Chlamydomonas can be sexual or asexual.

Asexual Reproduction: Chlamydomonas carries out mitotic division which results in the production of two daughter cells where the quality and amount of genetic material in the nucleus of the mother cell is maintained in the daughter cells. The cell about to divide loses its flagella, and then undergoes mitotic division leading to two nuclei, cell walls are elaborated distribute cytoplasm around each nucleus i.e. two daughter cells are released. Mitotic division is responsible for increase in number of cells in unicellular organisms. The increase in the population of cells in a colony is achieved by repeated mitotic divisions.

Sexual Reproduction: Lack of moisture or nutrients trigger haploid daughter cells to carry out sexual reproduction. The haploid daughter cells form gametes that have positive and negative mating strains which are similar in structure. Opposite mating strains fuse in a process called **isogamy**, to form a diploid zygote with two sets of chromosomes. The zygote undergoes meiosis which produces four genetically unique haploid cells that grow into mature cells. In Chlamydomonas, aggregation of cells in a colony occurs under favourable conditions. The cells pair by their posterior ends. This pairing is said to be isogamous. The cytoplasm of the pairing cells fuses in a process called **Plasmogamy** and the flagella are lost. The two nuclei fuse in a process called **Karyogamy**, to produce a single cell with 2n (diploid) nuclear material. The zygote secretes a thick cell wall called zygospore and remains dormant in that state for a while. The zygote then undergoes successive cell divisions (meiosis), which end up with four cells and with n quantity of nuclear material released as haploid zoospores.

5. Difference Between the Two Colonial Form of Algae

PANDORINA	VOLVOX
It is composed of 8, 16 or 32 cells held together by their bases	It is a multicellular alga connected with cytoplasmic strands that run through the cells
Vegetative reproduction is achieved through 4 successive mitotic divisions of each of the 16 cells in the colony therefore producing 16 daughter colonies	The asexual colony includes somatic cells which do not reproduce, and a large non motile cell (gonidia) in the interior which divide to form new colonies
Sexual reproduction is by anisogamous pairing (pairing by the flagella ends)	Sexual reproduction is oogamous i.e. the male gamete is motile while the female gamete (egg) is not motile
It has simpler form	It has a more complex form

6. A Complex form of Alga

FUCUS

The focus is a genus of brown algae found in on rocks in the intertidal zones of the sea shores. The plant body is flattened, dichotomously-branched thallus with a mid-rib and a multicellular disk with which

plant is attached to a rock surface. It has air bladders which is believed to aid the plant to float on water. Fucus vary in species, size (from a few centimeters to about 2metres in length), in terms of whether the sex cells are found in the same sexual chamber or different sexual chambers on different plant bodies. Sexual Reproduction: Sexual reproduction is oogamous. Sex cells are produced in conceptacles which have openings (ostioles) on the surface. In the male conceptacles, one of the diploid cells from the outgrown wall of the conceptacles undergoes meiosis followed by many mitotic divisions to produce antheridium having 64 cells where each cell develops into a biflagellate sperm that swims out of the conceptacle through the ostiole. In the female conceptacle, meiosis and mitosis 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 move through the ostiole into the female conceptacle where the eggs are fertilized and diploid zygotes are produced.