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MEDICINE AND SURGERY
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ASSIGNMENT

1. **Classify plants according to Eichler's grouping of 1883**
   In 1883, A.W. Eichler gave a phylogenetic system of classification of plants. He classified the plant kingdom into two sub-kingdoms, they are Cryptogamae and Phanerogamae.
   Cryptogamae (Gk. Kryptos: concealed; gamos: marriage): the cryptograms are flowerless and seedless plants. They are simple plants like algae, mosses and ferns which do not produce flowers, fruits and seeds. They are considered as lower plants.
   Phanerogamae: Phanerogams are also known as spermatophytes (sperma: seed; phyton: plant) and are seed bearing plants. They are known as higher plants because the plant body is differentiated into roots, stem and leaves, with a well developed vascular system. Examples of phanerogams are gymnosperms and angiosperms.

2. **How are algae of importance to man?**
   Algae are of importance to man because:
   I. Certain species of Algae can be harvested for food for man and livestock. This is due the fact that they're considered nutritious because of their high protein content and vitamins.
   II. They can be used as thickening agents in ice creams and shampoo
   III. They can be used for drugs to ward off diseases
   IV. Brown algae yields Alginic acid which can be used to stabilise emulsions as well as suspensions, which are found in syrup, ice cream and paint
   V. Diatoms (bacillariae) have been used in forensic medicine as their presence in the lungs can indicate that an individual died from drowning.
   VI. Certain species of algae can be harvested for cosmetics in the Far East.

3 **Describe a unicellular form of algae**
   Chlamydomonas represents the unicellular as well as motile forms of green algae. It is found in stagnant water with other forms. The cell is bounded by a cellulose cell wall which contains organelles such as nucleus, mitochondria, stigma, chloroplast (cup-shaped) pyrenoid etc.
   The nucleus carries the genetic material of the cell
   The stigma is present for photo-reception
   The mitochondria acts as the powerhouse of the cell by mediating the elaboration of energy molecules
   Manufactured sugars are processed unto start hyperventilating in the pyrenoid
   Flagella is also present in Chlamydomonas which are the structures for mobility.

Chlamydomonas can undergo both sexual and vegetative (asexual) reproduction, in which the vegetative reproduction result in the production of daughter cells, with the same amount and quality of genetic material as those in the ones in the mother cell. On the other hand, the sexual reproduction involves the union of sex cells to under plasmogamy and karyogamy, which results in a diploid zygote.

4 How does the unicellular algae described in question 3 carry out its reproduction?

Reproduction in Chlamydomonas can either be sexual or vegetative (asexual) reproduction.

Vegetative (asexual) reproduction results in the production of daughter cells with the same amount and quality of genetic material as the in ring he nucleus of the mother cell. This means that if the number of genetic material in the mother cell nucleus is **n**, then the daughter cells will also have **n** quantity of genetic material in their nucleus. This type of cell division is called mitotic divisions. In this process, the Chlamydomonas, a cell that is about to divide loses it flagella and undergoes mitotic division to form two nuclei, cell walls are elaborated which delimits cytoplasm around each nucleus therefore two daughter cells (zoospores) are released.

Sexual reproduction occurs under certain environmental conditions (eg lack of nutrient or moisture), which can 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 (negative and positive strains) which fuse together in a process called is Isogamy to form a diploid zygote that contains two set of chromosomes. After a period of dormancy, the zygote undergoes meiosis which is a process that reduces the genetic content of a cell by half. This cell division produces four genetically unique haploid cells that eventually grow into mature cells. Under favourable conditions aggregation of cells in colony occurs, where sexual reproduction can occur via the union of sex cells. These cells pair by their posterior end (isogamous pairing). Plasmogamy occurs and the flagella is lost , this is followed by karyogamy which produces a single cell with 2n (diploid) nuclear material. The zygote secretes a thick cell wall called a zygospore and may remain dormant in that state for some times.

After karyogamy sometimes the zygote undergoes two successive divisions, in which the first division restores the haploid condition by halving the nuclear material in the two resulting nuclei (reduction division) while in the second division each haploid nucleus undergoes a normal mitotic division. These two divisions which results in four cells with **n** quantity of nuclear material are together known as meiosis. The four products of meiosis are released as haploid zoospores.

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

Pandorina	**Volvox**
Usually occurs in water bloom	Found in ponds and ditches as well as shallow puddles
Each cell has many attributes/features in common with Chlamydomonas	Shows more complex form than Pandorina due to a greater level of differentiation and specialisation
The colony consists of 16 cells attached to one another	There are more cells in the colony, which may run into thousands and are 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 to produce 16 daughter colonies	Not all cells form new cells but the larger cells at the posterior ends are the ones that divide to form new colonies
Sexual reproduction is achieved by anisogamous pairing, where single cells assume genetic functions and pair by their flagellated ends	Sexual reproduction is oogamous, which is achieved when the sperm platelets formed by the sperm cells move to the egg colonies where fertilisation occurs
The colony may be unisexual in some specie or bisexual	Colonies of *Volvox* can either be unisexual or bisexual

6 **Describe a named complex form of alga**

A complex form of algae is a genus of brown algae *Fucus*, whose species are found on rocks in the intertidal zones of sea shores. The plant body is flattened, dichotomously-branched thallus with a mud rib, a vegetative apex, a reproductive apex (at maturity) and a multicellular disk. This multicellular disk enables the plant to attach itself to the rock surfaces.

The plant body also has air bladders which is believed to aid the plants to float in water.

Various species of *Fucus* exists but they vary in size from a few centimetres to about 2 metres in length. In addition, they also vary in terms of whether the sex cells are found in the same sexual chamber or in different chambers on different plant bodies.

They undergo sexual reproduction, which is oogamous where the motile sperm cells from the antheridium moves through the ostiole into the female conceptacle where the eggs are fertilised and diploid zygotes are formed.