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DEPARTMENT: MEDICINE AND SURGERY

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TOPIC: ASSIGNMENT ON ALGAE

1. Plants according to Eichler’s Grouping of 1883 include:

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| DIVISION | CLASS |
| Thallophyta | Phycotinae (Algae)  Mycotinae (Fungi) |
| Bryophyta | Hepaticae (Liverworts)  Musci (Mosses) |
| Pteridophyta | Psilotinate (Psilotum)  Lycopodinae (Lycopodium, Selaginella)  Equisetinae (Horsetails)  Filicinae (Fems) |
| Spermatophyta | Gymnospermae (Gymnosperms)  Angiospermae (Angiosperms) |

1. The importance of algae to man are as follows:
2. Seaweeds are a source of three chemical extracts used extensively in the food, pharmaceutical, textile and cosmetic industries.
3. Bacteria, fungi and cell structures are commonly grown on agar gels.
4. Agar is also used in the food industry to stabilize pie fillings and preserve canned meat and fish.
5. Brown algae yield alginic acid, which is used to stabilize emulsions and suspensions and is found in products such as syrup, ice cream and paint.
6. Algae have high iodine content and therefore prevent goiter.
7. Some algae serve as indicators of environmental problems in aquatic system.
8. Alga are used as biofertilizers
9. An example of a unicellular form of algae is the Chlamydomonas. It represents the unicellular and motile forms of green algae. It is found in stagnant water and usually along with other forms. The flagella are the structures for mobility. The cell is bound by a cellulose cell wall and contains cell organelles such as nucleus, mitochondria, stigma (eyespot), cup-shaped chloroplast, pyrenoid, etc. The nucleus carries the genetic program of the cell. The stigma is for photoreception. The mitochondria mediate the elaboration of energy molecules. Manufactured sugar is processed into starch in the pyrenoid.
10. The chlamydomonas carries out its reproduction in two ways:
11. Vegetative (Asexual reproduction):

This results in production of daughter cells in which the amount of quality 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 mitiotic division leading to two nuclei. Cell walls are elaborated which delimit cytoplasm around each nucleus i.e. two daughter cell, called zoospores, are released. Repeated mitotic division achieves increase in the population of cells in a colony.

1. 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 onto 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 meiosis produce four genetically unique haploid cells that eventually grow into mature cells.

Sexual reproduction involves union of sex cells (gametes). In Chlamydomonas, aggregation of cells (clumping) in a colony occurs under favourable conditions. These cells pair by their posterior (flagellated) ends. This pairing is said to be isogamous because the pairing cells (gametes) are morphologically identical. The cytoplasm of the pairing cells fuse (plasmogamy) and the flagella are lost. The two nuclei fuse in a process known as karyogamy. This situation is essentially a fertilization process so that a zygote is formed. In other words, two cells each with n quantity of genetic (nuclear) material undergo karyogamy to produce 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 time.

After karyogamy sometimes, meiosis occurs. The four products are then released as haploid zoospores.

1. The following are the differences between Pandorina and Volvox:

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|  | Pandorina | Volvox |
| 1. | Sexual reproduction is anisogamous | Sexual reproduction is oogamous |
| 2. | All cells from new colonies | Not all cells form new colonies |
| 3. | Less complex than Volvox | More complex than Pandorina |
| 4. | The colony consists of 16 cells | The colony consists of thousands of cells |

1. A more complex form of alga is Fucus. Fucus is a genus of brown algae whose species are often found on rocks in the intertidal zones of the seashores. The plant body is a flattened dichotomously branched, with a midrib, a vegetative apex, a reproductive apex at maturity and a multicellular disk (hold fast) with which the plant is attached to the rocky surface. The plant body also has air bladders, which are believed to aid the plant to float on the water. Various species of Fucus exist which vary in size from a few centimetres to about 2 metres in length. They also vary in terms of whether sex cells are found in the same sexual chamber or in different sexual chambers on different plant bodies.