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MATRIC NO: 19/MHS01/049

DEPARTMENT: MEDICINE AND SURGERY

ASSIGNMENT

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

2. Importance of Algae:

* They are important as food for fish.
* Certain species are harvested for food and cosmetics in the far East.
* They serve as food for people and livestock.
* They serve as thickening agents in ice cream and shampoo.
* They serve as drugs to ward off diseases.
* They have high Iodine content and therefore, prevent goiter.
* Brown algae yield Alginic acid which is used to stabilize emulsions and suspensions; found in products such as syrup, ice cream and paint.
* The have been surveyed for anticancer compounds with several cyanobacteria appearing to contain promising candidates.

3. Unicellular form of Algae- Chlamydomonas

Chlamydomonas represents the unicellular and motile forms of green algae. It is found in stagnant water usually along with other forms. Their flagella are the structures 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 is for photoreception. The mitochondria mediate the elaboration of energy molecules. Manufactured sugar is processed into starch on the pyrenoid.

**4. Reproduction:** In chlamydomonas, reproduction can either be 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. Thus, if the amount of genetic material in the mother cell nucleus is in the daughter cells also have no quantity of genetic material. The kind of cell division which maintains the quantity and quality of genetic material is called mitotic divisions. It is responsible for increase in size in multicellular organisms. In chlamydomonas, a cell about to divide loses its flagella. The cell undergoes mitotic division leading to two nuclei, cell walls are elaborated which delimit cytoplasm around each nucleus example two daughter cells are released. Increase in the population of cells in a colony is achieved by repeated mitotic divisions.

**Sexual Reproduction**: Certain environmental conditions example 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 aprocess 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. The cell division produces four genetically unique haploid cells that eventually grow to mature cells. Sexual reproduction involves union of sex cells. In chlamydomonas, aggregation of cells in a colony occurs under favorable conditions. These cells pair by their posterior ends. This pairing is said to be isogamous because the pairing cells are morphologically identical. The cytoplasm of the pairing cells fuse and the flagella are lost. The two nuclei fuse; this situation is essentially a fertilization process that a Zygote is formed. In other words, two cells each with a quantity of genetic material undergo Karyogamy to produce a single cell with 2 nuclear materials. The zygote secrets a thick cell wall called a zygospore and may remain dormant in that state for sometimes. After Karyogamy sometimes, the zygote undergoes two successive cell divisions the first division restores the haploid condition by halving the nuclear material in the two resulting nuclei while in the second division each haploid nucleus undergoes a normal mitotic division. These two divisions which end up with four cells and with a quantity nuclear material are together known as meiosis. The four products of meiosis are released as haploid zoospores.

5. **Colonial forms of Algae**- (a) *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 example nucleus, large chloroplast, flagella and stigma.

Vegetative reproduction: This is achieved through four successive mitotic divisions of each of the 16 cells in the colony therefore producing daughter colonies. This colony within a colony is analogous to the mythology of the Pandora’s Box and that’s where the alga’s name is derived from Pandorina. When the right time comes, each daughter colony is released from the matrix of the mother colony to become independent.

Sexual Reproduction: This is achieved by anisogamous pairing. When conditions are favorable, the single cells in the colonies assume gametic functions and pair by flagella ends. Plasmogamy and Karyogamy occur which is followed by meiosis. The colony may be unisexual in some specie or bisexual.

(b) *Volvox*: The genus Volvox shows more complex form than Pandorina. There are more cells in the colony, number may run through the cells. Not at cells form mew colonies; but the larger cells at the posterior ends are the only ones that divide to form new colonies. Other cells remain vegetative throughout the life of colony. Sexual reproduction is oogamous, example the male gamete is motile while the female gamete is not motile. Sperms are formed by repeated divisions of cells in the colony to form sperm platelets containing many sperms. The platelets move to egg colonies where the fertilization takes place. Colonies of Volvox may also be either unisexual/ bisexual. Volvox is concluded to be evolutionary more advanced than Pandorina with the departures between them especially as the cells show greater levels of differentiation and specialization.

6. **Complex form in the algae**: Apart from unicellular, colonial and filamentous forms, algal forms with more complex plant bodies exist. In such complex plant bodies, cells are differentiated to perform various functions. Plant bodies may be more massive and particular functions example reproduction may be localized in definite organs. We’ll describe a genus brown algae Fu, One of the genera of the so- called rock weeds as an example of complex form in algae.

**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, dichomously- branched thallus with a mid-rib, a vegetative apex, a reproductive apex at maturity and a multicellular disk with which plant is attached to rock surface. The plant body also has air bladders which are believed to aid the plant to float on the water. Various species of focus exist; vary in size from a few centimeters to about 2 meters 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 oogamous, sex cells are produced in conceptacles which have openings on the surface of the thallus. In the male conceptacles, one of the diploid cells from outgrowth of the wall of the in 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 estiole. In the female conceptacle, similar to the situation in the male conceptacle, leads to the production of an 8 celled oogonium each becomes an egg which is the female sex cell. Motile sperm cell from antheridium move through the estiole into the male conceptacle where the eggs are fertilized and diploid zygote are produced. Apart from the antheridia and oogonia, sterile multicellular filaments are also produced in the conceptacles which are dispersed among the antheridia and oogonial outgrowths and at the entrance into the conceptacles. The diploid zygote germinates into a new diploid Fucus plant making the diploid the dominant generation.

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