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

**Answer:** According to Eichler’s grouping of 1883, plants are classified as follows;

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

1. How are algae of importance to man?

**Answer:** I. Certain species are harvested for food and cosmetics in the far East.

II. It serves as food for people.

III. It serves as a thickening agent in ice cream and shampoo.

IV. It is used in drugs to ward of diseases.

V. They are considered nutritious because of their high protein content and high concentration of minerals, trace elements and vitamins.

VI. They have a high iodine content therefore it prevents goiter.

VII. Diatoms have been used in forensic medicine as their presence in the lungs of a person can indicate if that person died of drowning.

VIII. They have been used for centuries in Asian countries for their purported powers to cure or prevent illnesses. Example: cough, gout, gallstones, goiter, hypertension and diarrhea.

1. Describe a unicellular form of algae.

**Answer:** The unicellular form of algae that is going to be described here, is the chlamydomonas. It represents the unicellular and motile forms of green algae. It is found in water usually along with other forms. It has flagella, which are the structures for mobility. Its cell is bounded by a cellulose cell wall containing organelles e.g. nucleus, mitochondria, stigma(eyespot), cup-shaped chloroplast, pyrenoid, e.t.c. The nucleus carries the genetic programme of the cell, the stigma is for photoreception, the mitochondria mediate the elaboration of energy molecules and manufactured sugar is processed into starch on the pyrenoid.

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

**Answer:** Reproduction in chlamydomonas can be sexual or asexual (vegetative).

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. It involves union of sex cells (gametes). Its aggregation of cells (clumping) in a colony occurs under favorable conditions. These cells pair by their posterior (flagella) end. This pairing is said to be isogamous because the pairing cells (gametes) are morphologically identical. The cytoplasm of the pairing cells(plasmogamy) and the flagella are lost. The two nuclei fuse (karyogamy). This situation is essentially a fertilization process so that a zygote is formed. In other word, two cells each with n quantity of genetic (nuclear) material (i.e. haploid nuclear material) undergo karyogamy(fusion of two nuclei) 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 sometimes. After karyogamy sometimes, the zygote undergoes two successive divisions. The first division restores the haploid condition by dividing the nuclear material by half in the two resulting nuclei(reduction division) while in the second division, each haploid nucleus undergoes a normal mitotic division. These two divisions which end up with four cells and with n quantity of nuclear material are together known as meiosis. The four products of meiosis are released as haploid zoospores.

Asexual(Vegetative reproduction): It results in the production of daughter cells in which the quantity 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 n, the daughter cells also have n quantity of genetic material. This kind of cell division is called mitotic division and it is responsible for increase in number of cells in unicellular organisms and 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 delimits the cytoplasm around each nucleus i.e. two daughter cells (zoospores) are released. Increase in the population of cells in a colony is achieved by repeated mitotic divisions.

1. Differentiate between the two types of colonial form of algae.
2. The genus volvox (also green colonial form) shows more complex form than the pandorina.
3. In the volvox, there are more number of cells in the colony which may run into thousands but there are 16 number of cells in the colony of pandorina.
4. Volvox is evolutionarily more advanced than pandorina with the departures between them especially as the cells show greater less of differentiation and specialization.
5. All cells in pandorina form colonies but not all the cells in volvox form colonies.
6. Describe a named complex form of algae.

**Answer:** Fucus is a complex form of algae. It is a genus of brown algae whose species are often found on rocks in intertidal zones of the sea shores. The plant 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 the plant is attached to a rock surface. The plant body also has air bladders which is believed to aid the plant to float on the water. Various species of focus exist and vary in size from a few centimeters to about 2 meters in length. They also vary in terms of whether the cells are found in the same sexual chamber or in different sexual chambers in different plant bodies.