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

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

1. How are Algae of importance to man?

Certain species of Algae are harvested for food and cosmetics. It serves as thickening agents in ice cream and shampoo and drugs to ward of diseases. They are considered nutritious because of their high protein content, high concentration of minerals, trace elements and vitamins. They also have iodine content that helps prevent goiter.

1. Describe a unicellular form of Algae.

Chlamydomonas represent the unicellular and motile forms of green algae. They are found in stagnant water usually along with other forms. Flagella are the structure for mobility. The cell is bounded by a cellulose cell wall which contains organelles such as nucleus, mitochondria, eyespot. Chloroplast, pyrenoid etc. The nucleus carries the genetic programme of the cells. The eyespot 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

In Chlamydomonas, reproduction can either be vegetative (asexual) or sexual

**Vegetative Reproduction**

It takes mainly by zoospores formation. But some species also reproduce by Aplanospores and palmella stage.  
a) Zoospore formation: zoospore formation starts generally during night and under favourable conditions. At the time of zoospore formation, the parent cell comes to rest, its flagella are withdrawn and becomes non motile. Then the protoplasmic content of the cell divides into 2, 4 or up to 16 daughter protoplasts. Each daughter protoplast develops its cell wall and flagella. Thus, the structures are called zoospores. When zoospores are matured, they are released out by rupturing parent cell wall. Thus, formed zoospores are exactly similar with their parent cell but are similar in size. Each zoospore increases in size and forms an individual.  
b) Palmella stage: Under the unfavourable condition the cell becomes non motile by withdrawing its flagella then protoplasmic content divide into 2, 4 0r 8 daughter protoplast. But the daughter protoplast fails to develop their flagella. So, they cannot escape out. Instead of releasing out, the protoplast divides into small daughter protoplast. As number of cells is increased the parent cell gelatinized and increases its circumference. As a result, certain no. of cells is embedded within parent cell wall and is called palmella stage. When the condition becomes favourable, each daughter protoplast is converted into zoospores and after releasing out it forms new individual.

c)  Aplanospores: Chlamydomonas also reproduce asexually by the formation of Aplanospores/ hypnospore. Here, whole protoplasm rounds up to form a single Aplanospores. Each Aplanospores is capable of forming new plant under favourable condition.

**Sexual Reproduction**  
Sexual reproduction in Chlamydomonas takes place by isogamy, anisogamy and oogamy.  
a) Isogamy: it is most common and primitive type of sexual reproduction. During the process, any vegetative cell function as male gametes and next female gamete which are similar in structure and size but physiologically different. When both of the gametes come to each other and attached to their anterior end. At the point of contact ell wall dissolves and is followed by fusion of protoplast. Here, cell appears as quadriflagellated since they swim in water with the help of flagella belonging to strain. Then the protoplasmic content skip out forms the gametes and is now is known as zygote. Then zygote comes from thick wall and undergo vegetative period.

b)  Anisogamy:  During this process, Microgamete swims towards macrogamete. Then one of the microgametes attached to the macrogamete with its anterior end. The cell wall between them gets dissolved and the content of micro gametes flows into macrogamete where fertilization takes place forming diploid zygote. Zygote after releasing out from female gametes undergo resting period.

c)  Oogamous: Any vegetative cell withdraws its flagella then the protoplast content rounds off to form egg or ovum. The male cell produces 8-16 flagellated microgamete. The micro gametes move to female gamete and it is attached with the help of anterior end. Cell wall between two gametes get dissolved and content of male gamete get migrated towards the female gamete resulting diploid zygote  
**Germination of zygote:**  
After resting period, each zygote undergoes germination to produce new plant. Before germination, diploid nucleus of the zygote divides meiotically forming 4 haploid nuclei. Each nucleus is surrounded cytoplasm forming 4 daughter protoplasts. Each daughter protoplast is converted into zoospore after developing its cell wall and flagella. When zoospores are matured, they are released out and each zoospore increases in its size to form new plants.

1. Differentiate between the two types of colonial form of algae

The Pandorina usually occurs in water bloom. The colony consists of 16 cells attached to one another. Each cell has many attributes or features in common with Chlamydomonas e.g. nucleus, large chloroplast, pyrenoid, flagella and stigma, while the volvox, shows more complex form than Pandorina. There are more cells in the colony, number may run into thousands and are connected with cytoplasmic strands that run through the cells. Not all cells form new colonies, but the larger cells at the posterior ends are the only ones that divide to form new colonies.

1. Describe a named complex form of 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, dichotomously-branched thallus with a mid-rib, a vegetative apex, a reproductive apex at maturity and a multicellular disk with which plants are attached to rock surface. The plant body also has air bladders which is believed to aid the plant to float on the water. Various species of fucus exist; vary in size from a few centimeters to about two 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.