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1. According to Eichler’s grouping of 1883, the following classification of plants below:

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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 (Ferns) |
| Spermatophyta | Gymnospermae (Gymnosperms)  Angiospermae (Angiosperms) |
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Representative forms, genera and species of the plant kingdom are discussed while focusing on their habitats, range of form, the economic importance, the reproductive systems, and their adaptive departures from lower levels of organization among the plants.

1. Algae, are important for the following reasons;

* They serve as food for fish, people and livestock.
* Certain species are harvested for food and cosmetics in the far East, thickening agents in ice cream and shampoo, drugs to ward off diseases.
* They have high nutritive value because of their high protein content and high
* concentration of minerals, trace elements and vitamins. They also have high Iodine content; therefore, they prevent goiter.
* Brown algae yields Alginic acid which is used to stabilize emulsions and suspensions; found in products such as syrup, ice cream and paint. Bacteria, fungi and cell cultures are normally grown on agar gels. Agar is also used in the food industry to stabilize pie fillings and preserve canned meat and fish. Carrageenan is also used as a thickening and stabilizing agent in products such as puddings, syrups and shampoos. Seaweeds are source of three chemical extracts used extensively in the food, pharmaceutical, textile and cosmetic industries.
* Algae has been discovered to contain anticancer compounds, with several cyanobacteria appearing to contain promising candidates.
* Diatoms have been used in forensic medicine, as their presence in the lungs can indicate a person died due to drowning. They are also used as indicators of environmental problems in aquatic ecosystems.

1. CHLAMYDOMONAS AS A UNICELLULAR FORM IN THE ALGAE

Chlamydomonas represents the unicellular and motile forms of green algae. They are found in stagnant water usually along with other forms. Their flagella are mainly for locomotion, their cell is bounded by a cellulose cell wall which contains organelles such as mitochondria, stigma (eyespot), cup-shaped chloroplast, pyrenoid. The nucleus, carries the genetic programmer 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. The cell wall allows gases and water molecules to enter into the cell environment, the contractile vacuole is used for osmoregulation.

NOTE: reproduction would be explained in the following question.

1. REPRODUCTION IN CHLAMYDOMONAS

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

Vegetative reproduction: it 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. I. e if the amount of genetic material in the mother cell nucleus is n, the daughter cells also have n quantity of genetic material. The kind of cell division which maintains the quantity and quality of genetic material is called ‘mitotic division’. 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 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.

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 ‘isogamy’ to produce 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.

Sexual reproduction involves union of sex cells (gametes). In chlamydomonas, aggregation of cells in a colony occurs under favorable 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 (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 (i.e. haploid 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, the zygote undergoes two successive cell divisions, the first 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 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.

1. DIFFERENCES BETWEEN THE TWO TYPES OF COLONIAL FORM OF ALGAE: PANDORINA AND VOLVOX

* The colony in pandorina, consists of 16 cells attached to one another by a cytoplasmic strand, while the number of cells in the colony of volvox may run into thousands and connected with cytoplasmic strands that runs through the cells.
* In volvox, not all cells form new colonies, but the larger cells at the posterior ends (gonidia) are the only ones that divide to form new colonies. While pandorina when the right time comes, each daughter colony is released from the matrix of the mother colony to become independent.
* When conditions are favorable, the single cells in the pandorina colonies assume genetic functions and pair by their flagella ends (it is anisogamous), while sexual reproduction is oogamous in volvox.
* Sperms are motile in volvox and are formed by repeated divisions of cells in the colony while sperms are not motile in pandorina.
* Volvox is concluded to be evolutionarily more advanced than pandorina.

1. FUCUS, AS A COMPLEX FORMS IN THE ALGAE

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 (holdfast) with which plant is 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, they vary in size from a few centimeters to about 2m in length. They also vary in terms of whether the sex cells are found in the same sexual chamber or in different sexual chamber or in different sexual chambers on different sexual chamber on different plant bodies. Sexual reproduction is oogamous, sex cells are produced in conceptacles which have openings (ostioles) on the surface of the thallus. In the male conceptacles, one of the diploid cells from outgrowth of the wall of the conceptacles undergoes meiosis, the meiotic product undergoes many mitotic divisions to produce antheridium having 64 cells of which develops into a biflagellate sperm that swims out of the conceptacle through the ostiole.

In the female conceptacle, similar to the situation in the male conceptacle, leads to the production of an 8 celled ooganium, each becomes an egg which is the female sex cell. Motile sperm cell from the antheridium move through the ostiole into the female conceptacle where the eggs are fertilized and diploid zygote are produced. sterile multicellular filaments are also produced in the conceptacles. The diploid zygote germinates into a new diploid Fucus plant making the diploid the dominant generation.