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**Assignment Title:** GENERAL BIOLOGY II
**Course Title:** General Biology II
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**Question**

1. Classify plants according to Eichler’s grouping of 1883.
2. How are algae of importance to man?
3. Describe a unicellular form of algae.
4. How this unicellular alga does described in question 3 carry out its reproduction?
5. Differentiate between the two types of colonial form of algae.
6. Describe a named complex form of alga.

ANSWER

**1.**

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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) |

**2.**

**Algae as food**

Porphyra, Ulva, Chlorella, Alaria, Rhodymenia, Chondrus, Laniinaria and Nostoc are the most commonly used edible forms. People of China, Japan, etc. have long been using seaweeds and other algae as a source of food.
Moreover indirectly algae provide food to man through their position in food chain. In both fresh and marine water, algae are ingested by lower animals which in turn are eaten by fish, shellfish and sea mammals. Thus, algae can be fruitfully utilized in fish culture. So there has greet economic importance of algae as food in some area.

**Algae used as fodder**

The seaweeds like Ascophyllum, Fucus and Laminaria are used as food for sheep and cattle. Because of its high mineral and vitamin content seaweed meal is very nutritious also. Egg-yolks of fowl fed on chopped phaeophytes are rich in carotene and iodine. So algae has it’s greet fodder value.

**Industrial usefulness of algae**

Agar, carrageenan, alginates and diatomite are derived commercially from algae. Many minerals are also extracted from algae. Agar-Agar is extracted from species of red algae primarily from Gelidium, and Gracilaria. It is used extensively as a culture medium in biological laboratories, as a stabilizer or emulsifier in food, cosmetics, leather, textile and pharmaceutical industries, as a lubricant for photographic films and in the medicine as a laxative.

Carrageenan has its innumerable uses and it is usually extracted from Chondrus crispus. As component of tooth pastes, cosmetics and paints, as a remedy for cough Carrageenan is often used.
Alginates are the salts of alginic acid found in the cell wall of Phaeophyi Alginates are usually extracted from Macrocystis, Laminaria, Fucus, Sargassum and Ascophyllum. As it has remarkable water-absorbing qualities, it finds numerous uses in various industries in when a thickening, suspending, stabilizing or emulsifying colloid is required.
Diatomite is the siliceous cell walls of diatoms which are relatively insoluble accumulate in marine and fresh water basins. Since diatomite is inert chemically and has unusual physical properties, it has become a valuable product in industry. It can resist very high temper; and used in the manufacture of fire bricks which are used in blast furnaces. So it is clear that in the industrial point of view there has greet economic importance of algae.

**Agricultural use of algae**

Terrestrial algae play an important role in the biology of the soil. Blue-green algae are the chief agents for nitrogen fixation in rice fields. The larger brown and red algae are used as organic fertilizers. These are usually richer in potassium but poorer in the phosphorus and nitrogen than farm manure. Blue-green algae can be used tot in reclaiming saline and alkaline waste lands.

**Algae in sewage disposal**

Sewage consists of domestic and industrial waste. The disposal of sew is an aerobic process and thus requires oxygen which is released by algae. Sewage oxidation ponds have been created to bring about complete oxidation of sewage into mineral components with the help of oxygen released by algae during photosynthesis. Such oxidation ponds support the luxuriant growth of algae which help in its [bacterial](http://biology.homeomagnet.com/bacteria/) decomposition by providing oxygen which also suggest the economic importance of algae.

**Algae in medicines**

Brown algae are used in various goitre medicines because of their high iodine content. Agar-agar is used in making many kinds of pills, ointments and laxative. Carrageenan extract acts as a blood coagulant. Antibiotics from algae are known which inhibit several species of bacteria. Diatoms have been used in forensic medicine, as their presence in the lungs can indicate a person died due to drowning.

**3.**

**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.

Flagella are structures for mobility

The cell is bounded by a cellulose cell wall; contains organelles e.g. nucleus. Mitochondria, stigma (Eye spot), 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**

Both asexual (Vegetative) and sexual reproductions occur in Chlamydomonas.

**Asexual reproduction (Vegetative Reproduction)**

**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 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 divisions. It is responsible for increase in the 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 delimit 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 the 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.

5.

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| **PANDORINA** | **VOLVOX** |
| The colony consists of 16 cells attached to each other. | There are more cells in the colony, number may run into thousands and connected with cytoplasmic strands that run through the cells. |
| This Colonial form is not complex in structure | Volvox shows more complex form than Pandorina. |
| Sexual reproduction is anisogamous (Pairing by the flagella ends). | Sexual reproduction is oogamous i.e. the male gamete is motile while the female gamete (egg) is not motile. |

6.

**Fucus**, also called **rockweed**, [genus](https://www.britannica.com/science/genus-taxon) of [brown algae](https://www.britannica.com/science/brown-algae), common on rocky seacoasts and in salt marshes of northern temperate regions. *Fucus* [species](https://www.britannica.com/science/species-taxon), along with other [kelp](https://www.britannica.com/science/kelp), are an important source of alginates—colloidal extracts with many industrial uses similar to those of [agar](https://www.britannica.com/topic/agar-seaweed-product). Bladder wrack (*F. vesiculosus*) was one of the original sources of [iodine](https://www.britannica.com/science/iodine).

*Fucus* are [perennial](https://www.britannica.com/science/perennial) algae, some of which have a life span of up to four years. They feature bladderlike floats (pneumatocysts), disk-shaped holdfasts for clinging to rocks, and mucilage-covered blades that resist desiccation and temperature changes. The growth of the [thallus](https://www.britannica.com/science/thallus) is localized at the tips of forked shoots, and most species are between about 2 and 50 cm (0.8 to 20 inches) in length. The male and female reproductive organs may occur on the same organism or on separate ones; some species produce eggs and sperm all year long.