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1) Classify plants according to Eichler's grouping of 1883

Answer

D I V I S I O N	C L A S S
1) T h a l l o p h y t a	P h y c o t i n a e (A l g a e) M y c o t i n a e (F u n g i)
2) B r y o p h y t a	H e p a t i c a e (l i v e r w o r t s) M u s c i (M o s s e s)
3) P t e r i d o p h y t a	P s i l o t i n a t e (P s i l o t u m) L y c o p o d i n a e (L y c o p o d i u m , S e l a g i n e l l a) E q u i s e t i n a e (H o r s e t a i l s) F i l i c i n a e (F e r n s)
5) S p e r m a t o p h y t a	G y m n o s p e r n a e (G y m n o s p e r m s) A n g i o s p e r m a e (A n g i o s p e r m)

2) How are algae of importance to man?

Answer

- Algae are important as food for fishes.
- It serves as food for people and livestock.
- It serves as thickening agents in ice cream and shampoo, drugs to wash off diseases.
- Algae are considered nutritious because of their high protein content and high concentrations of minerals, trace elements and vitamins.
- Algae have high iodine content therefore prevent goitre.

3) Describe a unicellular form of Algae

Answer

UNICELLULAR FORM IN THE ALGAE

Chlamydomonas represents the unicellular and motile forms of green algae. Found in stagnant water usually along with other forms.

Flagella are the structures for mobility.

The cell is bounded by a cellulose cell wall; contain 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) How does this unicellular algae described in question 3 carry out its reproduction?

Answer

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

VEGETATIVE (ASEXUAL) 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. Thus, if the amount of genetic material in the mother cell nucleus is n , the daughter cells 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 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 nucleic 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 a repeated mitotic divisions.

SEXUAL REPRODUCTION

Sexual reproduction involves union of sex cells (gametes). In chlamydomonas, aggregation of cells (clumping) in a colony occurs under a favorable condition. 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) undergoes karyogamy (fusion of nucleus) to produce a single cell with $2n$ (diploid) nuclear material. The zygote secretes thick cell wall called a zygospore and many remain dormant in that state for sometimes. After karyogamy, sometimes the zygote undergoes two successive cell divisions that first division 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 with n quantity of nuclear material are together known as meiosis. The four products of meiosis are released as haploid zoospores.

5) Differentiate between the two types of colonial forms of algae.

Answer

The colonial forms in the Algae- PANDORINA AND VOLVOX

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. e.g. nucleus, large chloroplast, pyrenoid, flagella and stigma. The sexual reproduction is achieved by anisogamous pairing.

VOLVOX- Shows more complex form than pandorina. There are more cells in the colony, number may run into thousands and connected with cytoplasmic strands that run through its cells.

Not all cells form new colonies; but the large cells at the posterior ends (gonidia) are the

only ones that divide to form new colonies. Other cells remain vegetative throughout the life of the colony. Sexual reproduction is oogamous. I.e the male gamete is motile while the female gamete(egg) is not motile.

6) Describe a named complex form of algae

Answer

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 holdfast, a vegetative apex, a disk with which plant is attached to rock surface

The plant body has air bladders which is believed to aid the plant to float on the water. Various species of the fucus exist; vary in size from a few centimeters to about 2 metres in length. They also vary in terms of whether the sex cells are found in the same sexual chamber or in 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 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 ostiole.

In the female conceptacle, similar to the situation in the male conceptacles leads to the production of an 8 celled oogonium- 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. The diploid zygote germinates into a new diploid Fucus plant making the diploid the dormant generation.