

## Chara

1) Why chara is called stone wart?

Ans. Chara is commonly called stone wart due to the presence of  $\text{CaCO}_3$  in the cell wall.

2) Describe the morphology or vegetative structure of chara.

Ans. vegetative plant body of chara is highly complex

and is differentiated into an erect position and an schizoidal position. The erect position is slender and branched. The erect main axis is differentiated into nodes and internodes. Internodes consist of a single elongated, multinucleate cylindrical cell. In some species this internodal cell is surrounded by a jacket of narrow elongated cells which constitute the cortex. The node is made up of a cluster of small isodiametric cells. From each node three types of appendages arise viz—

1) Branches of limited growth — From each node of the central axis branches of limited growth arise in whorl, these are called branchlet or the so called leaf. These may again be differentiated into nodes and internodes.

2) Branches of unlimited growth — The branches of limited growth bear one or more branches of unlimited growth at their axils. These axillary branches continuously grow and resemble the main axis.

3) Stipulodes — These are unicellular outgrowths that arise from the basal node of each leaf. In majority of species two stipulodes arise at the base of each leaf, one on each side. Species of Chara in which the stipulodes are borne in a single whorl is called haplostephanous, while the species with two whorls of stipulodes are called diplostephanous.

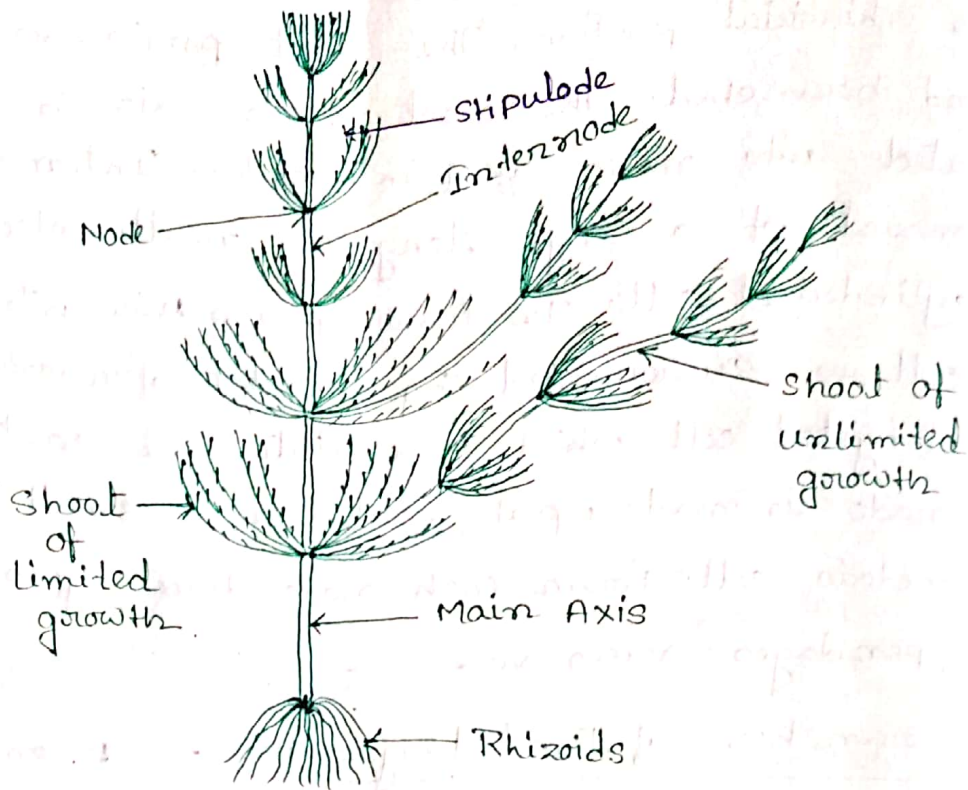


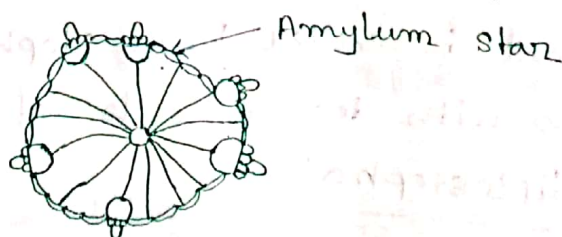
Fig:- External morphology

3) Explain the reproduction process <sup>or Life cycle</sup> of Chara.

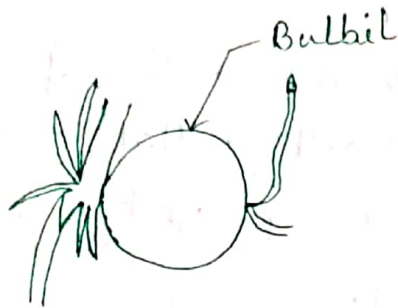
Am. Chara reproduces by both vegetative and sexual means. Asexual reproduction is absent.

A) Vegetative reproduction —

↳ By the formation of amylum star or Starch star — These are star shaped aggregate of cells which develop from the lower node of main axis. The cells are densely filled with starch grains. The detached amylum star develops into new plants.



2) By the formation of bulbil — These are small, rounded, tuber like structure develop on the schizoid. At maturity these are detached from schizoid and form a new plant.



3) By the formation of secondary protonema —

Sometimes adventitious protonema like branches arise from the surviving nodes from older part of plant. These secondary protonema give rise to new plant.

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B) Sexual reproduction — Sexual reproduction of Chara is oogamous type. It takes place by the formation of complicated sex organs. The male sex organs are called globule and the female sex organs are called nucule. Both the sex organs i.e. globule and nucule are located at the node of so called leaf on the side facing the main axis. The nucules are always borne above the globule. Majority the species of Chara are homothallic (C. zeylanica) but a few are heterothallic (C. wallichii).

1) Globule — A mature globule is a hollow spherical stalked structure with bright yellow or red yellow colour. It consist of the following parts —

a) shield cell — The wall of the globule is

composed of 8 closely fitted curved plate like cells called shield cells. These cells are filled with red or yellow pigment and are joined end to end forming a pseudocellulose wall structure.

b) Manubrium — From the center of each shield cell a rod like cell called manubrium develops. These manubria project towards the center of internal cavity.

c) Primary capitulum — Each manubrium bears at its distal end one or more rounded cell called primary capitulum.

d) Secondary capitulum — The primary capitulum again produces 6 secondary capitulum at their distal end.

e) Antheridial filament — From each secondary capitula 2 thread like filaments develop called antheridial filament. Each of these filament bears a row of 100-200 cells. Each of which produces one spirally coiled biflagellate sperm. When the sperms attain maturity the shield cell separate from each other exposing the antheridial filament. As soon as the antheridial filaments are exposed a small pore is formed on the antheridial wall through which the sperms are liberated.

2) Nucule — The female reproductive structure i.e. nucule is a short, stalked, oval structure. It consist of an oogonium containing an egg. The oogonium is surrounded by an

envelop of 5 long filamentous cells called tube cells. These cells are placed side by side and are arranged spirally in a clockwise direction. Each of these filamentous cells terminates into a small erect cell at the apex of nucule. Such 5 terminal cells together constitute the corona.

The oogonium contains a large uninucleate ovum densely filled with oil globules and starch grains. The apex of the ovum is occupied by a colourless finely granular cytoplasm constituting the receptive spot.

3) Fertilization — At maturity of the nucule the tube cells separate from each other just below the corona to form 5 angular openings. Through this opening the antherozoids enter the oogonia and finally one sperm fertilizes the ovum forming a zygote.

4) Post fertilization changes : →

It takes place in the following way —

i) The diploid zygote nucleus moves to the apical pole of the zygote and divides meiotically to form 4 haploid nuclei.

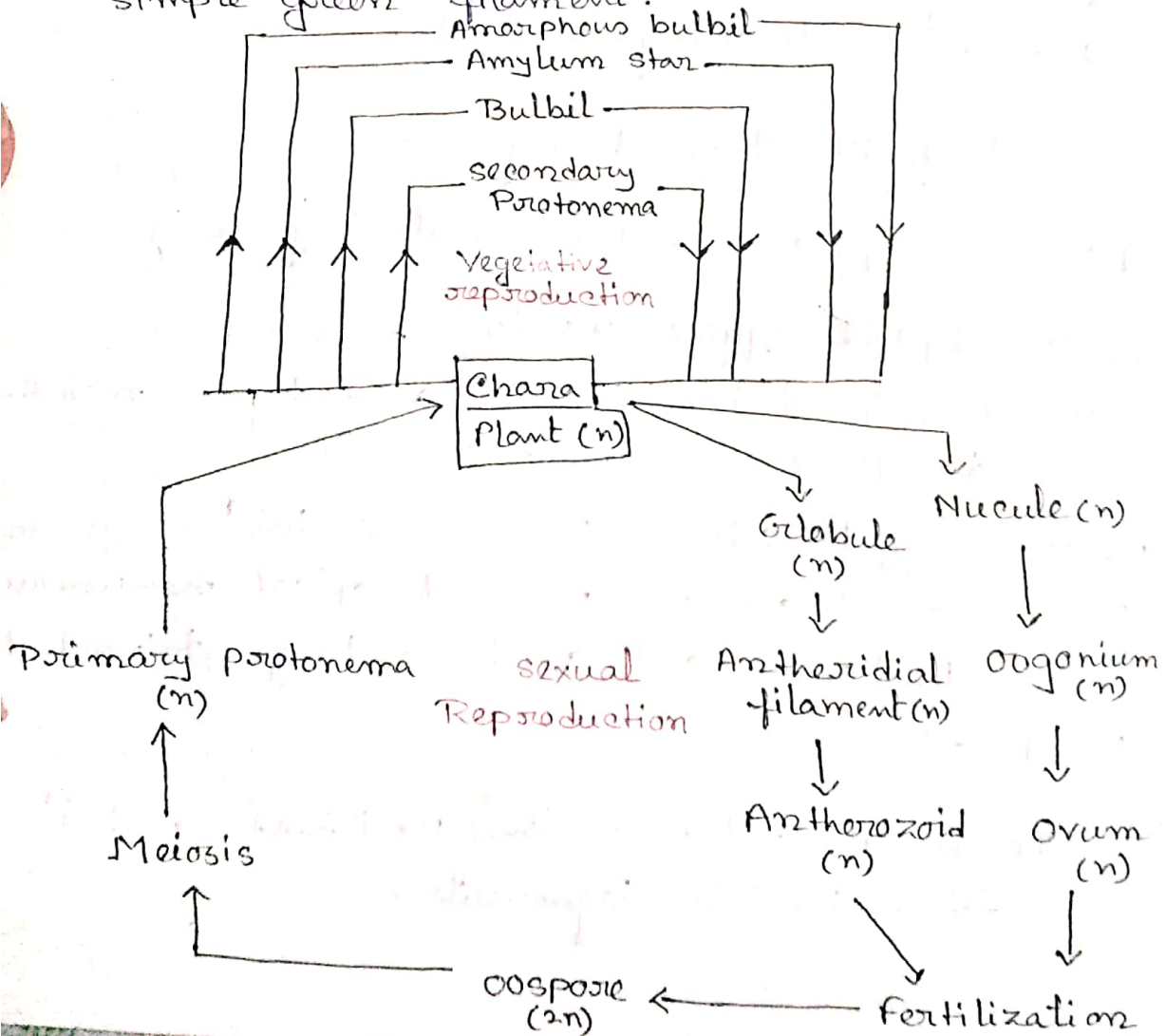
ii) The zygote cell by transverse division forms two unequal cells — a small apical ~~new~~ uninucleate lenticular cell and a large trinucleate basal cell.

iii) The basal cell remains undivided and its nuclei ultimately degenerate.

i) The zygote wall ruptures and the lenticular cell is exposed. These exposed cell divides vertically into two cells, one of which forms the schizoidal initial and the other protonemal initial.

ii) The schizoidal initial gives rise to colourless filamentous schizoid while the protonemal initial gives rise to a green multicellular filament called primary protonema.

iii) From the lowermost of the primary protonema, secondary protonema may be produced. From the upper node of the primary protonema, a whorl of appendages develop which one forms the main axis and others form simple green filament.



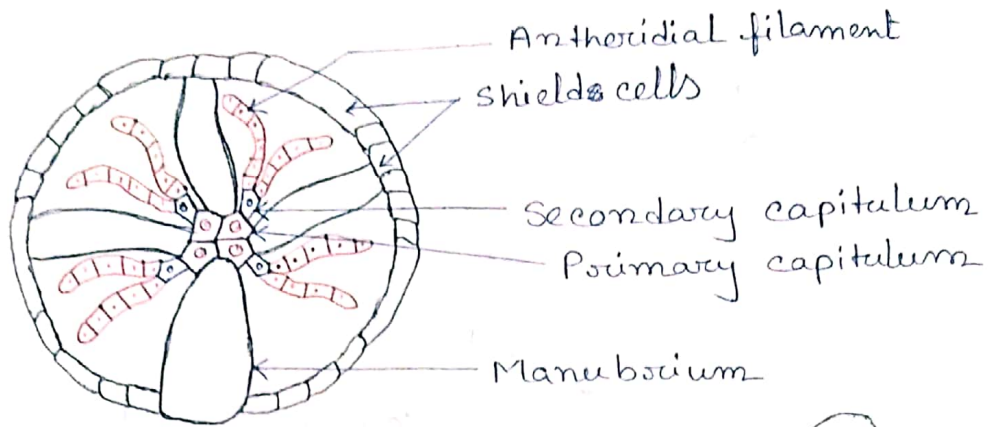
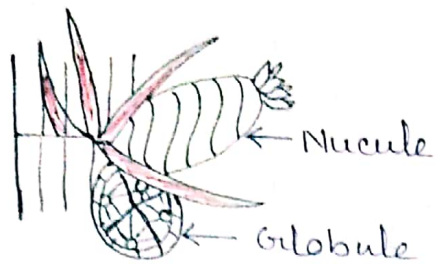


Fig: - Globule in section

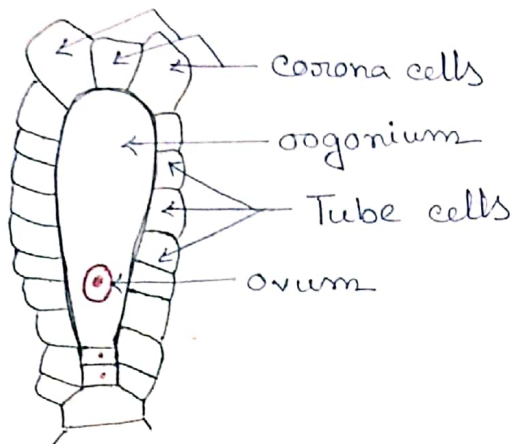


Fig - Nucule in section



Fig: - Antherozoid

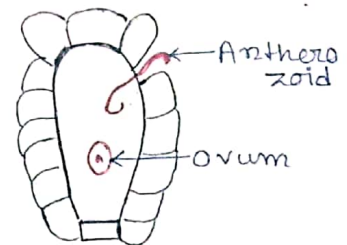
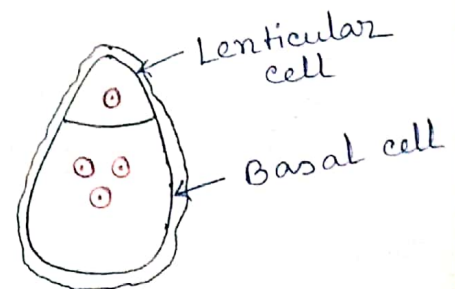
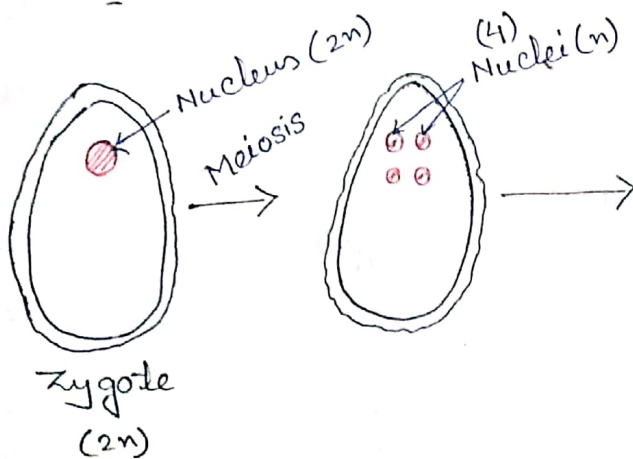


Fig: - Fertilization



↳ P. T. O.

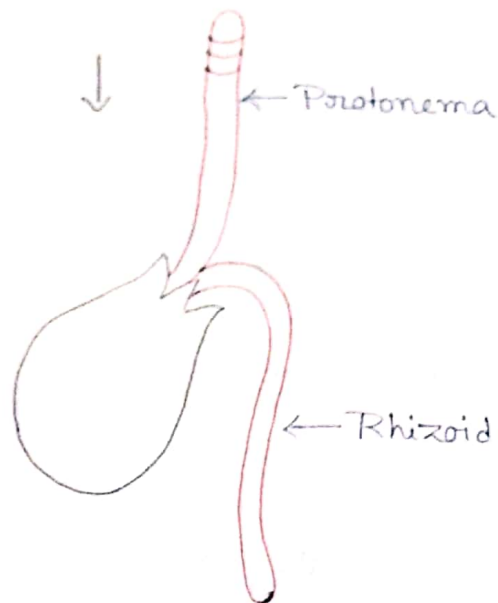
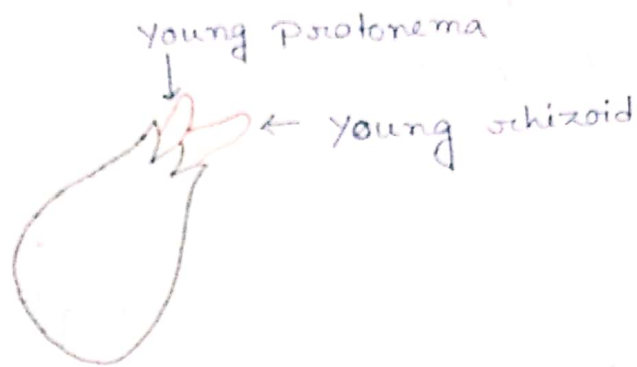
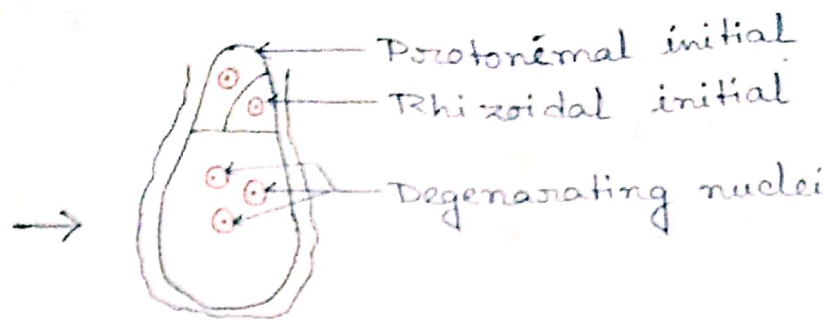


Fig:- Post fertilization changes