

Chara

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Division: Chlorophyta
Class: Chlorophyceae
Order: Charales
Family: Characeae

OCCURRENCE:

- The genus Chara comprise about 188 species.
- 30 species are reported from India.
- They are freshwater forms attached to the muddy bottom of water level.
- They are commonly called 'stoneworts', because the plant growing under the water is encrusted with CaCO_3 .
- They prefer a substratum of decaying organic matter for attachment.

VEGETATIVE STRUCTURE:

- The plant body is multicellular, macroscopic and branched.
- By means of rhizoid, erect and branched axis is attached to the substratum.
- Plants are rough due to the deposition of CaCO_3 .

RHIZOIDS:

- Arise from the lower nodes of main axis.
- It is branched, uniseriate and obliquely septate.
- Doesn't differentiated into nodes and internodes.
- Function is fixation and absorption.

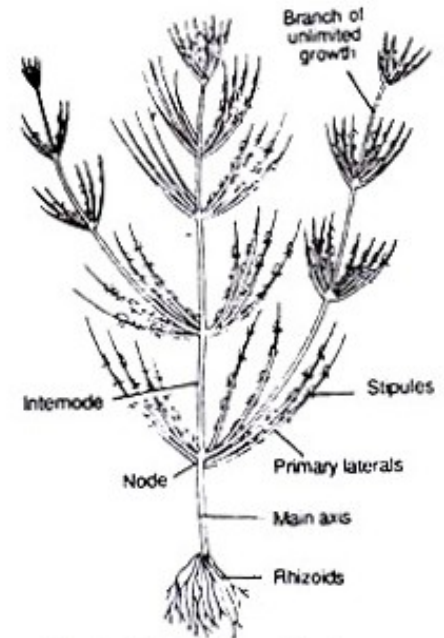
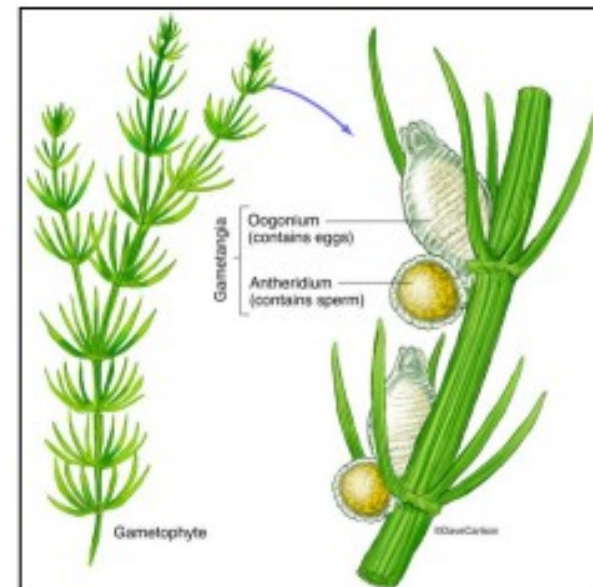


Fig. 1. *Chara*. External features.



MAIN AXIS

- Erect and branched.
- Differentiated into nodes and internodes.
- Internodes: Long, single celled, covered by one celled thick layer called cortex and such species are called as corticated species.
- Nodes: Short, consist of regularly arranged cells.
- It bears 2 kinds of lateral branches, namely,
 - 1.Branches of limited growth.
 - 2.Branches of unlimited growth.

BRANCHES OF LIMITED GROWTH:

- Also called primary laterals/leaves.
- Arise in whorls from each node of main axis.
- After attaining a definite length it stops growing.
- The fertile branches of limited growth bear sex organs at their nodes.

BRANCHES OF UNLIMITED GROWTH:

- Arise from the axils of primary laterals.
- It grows indefinitely.
- Resembles the main axis.

CORTICATION:

- Inter nodal cells of main axis is covered by vertically elongated corticating cells.
- Half of the corticating cells arise from the upper node and other half from the lower node.

Eg; *C.wallichii*, *C.nuda*, etc..

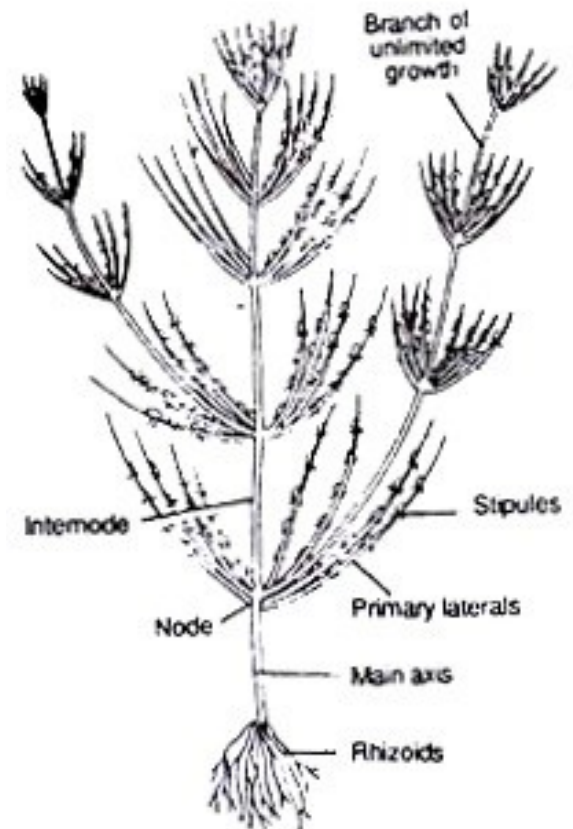


Fig. 1. *Chara*. External features.

REPRODUCTION

- It has 2 methods of reproduction, vegetative & sexual method.
- Asexual reproduction is absent.

VEGETATIVE REPRODUCTION

a) By amylum stars

- Star shaped structure, develop from lower nodes.
- They store food in the form of starch.
- They detach from plant body and develop into new plant.

b) By bulbils

- Tuber like , develop from rhizoids.
- They detach and develop into new plant.

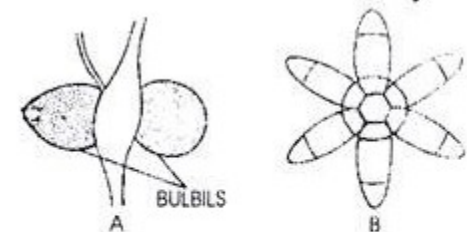
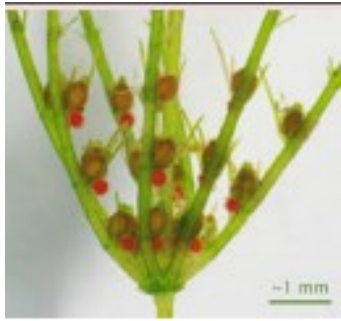


Fig. 6. (A, B). Chara. Vegetative reproduction.

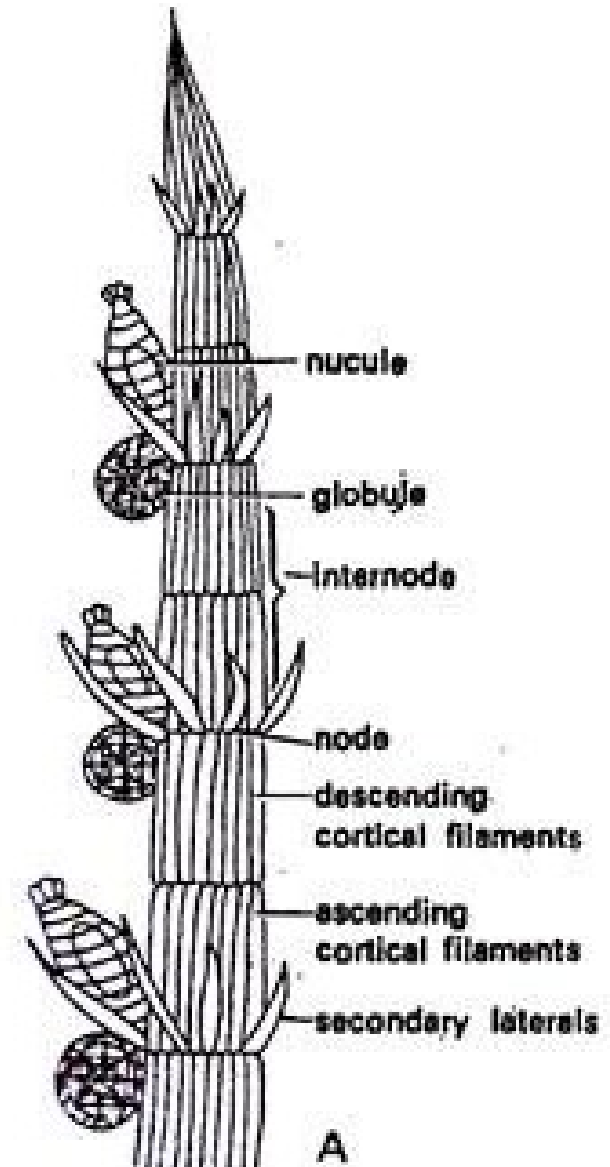
c) By secondary protonema

- Protonema like, develop from older nodes or rhizoids.
- They detach and develop into new plant.



SEXUAL REPRODUCTION

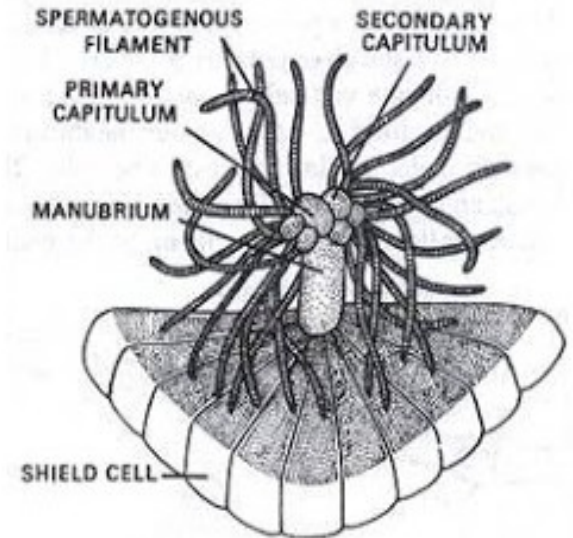
- Oogamous
- Male sex organ-Antheridium (Globule).
- Female sex organ-Oogonia (Nucule).
- Most of them are monoecious, a few are dioecious.
- The sex organs arise on the branches of limited growth or primary laterals, the nucule above the globule. The development of globule and nucule takes place simultaneously but in some species globule matures before nucule.



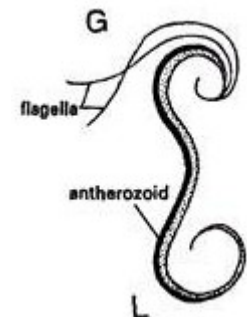
STRUCTURE OF ANTHERIDIUM (GLOBULE)

- Large, spherical, red coloured structure.
- By means of long stalk called pedicel, it is attached to the node.

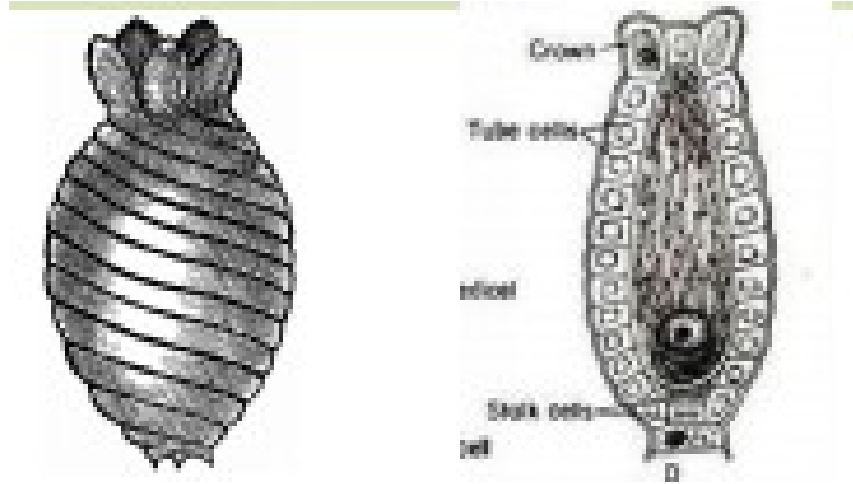
- Their outer wall consists of 8 large curved shield cells, which enclose the internal cavity.
- The centre of shield cell is attached to a rod shaped cell called manubrium.
- The manubria bear primary capitula which possess secondary capitula.
- These secondary capitula bears branched or unbranched spermatogenous or antheridial filaments.
- At maturity, the shield cell exposes spermatogenous filaments attached to capitula.
- These each filament bears 1 to 200 androcytes which transform to biflagellated antherozoids.



Chara. Part of globule showing shield cell, manubrium, primary capitulum, secondary capitula and spermatogenous filaments.



STUCRTURE OF OOGONIUM (NUCULE)



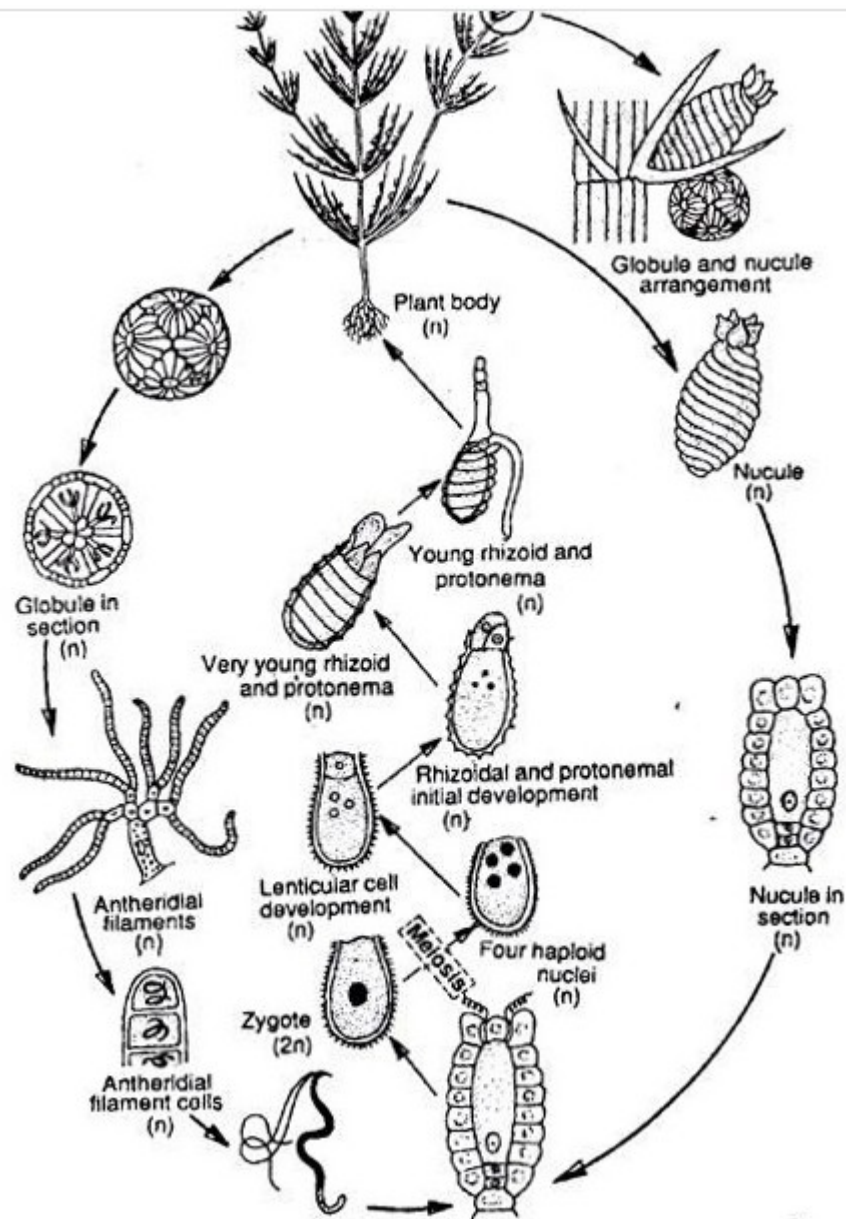
- It is macroscopic with short stalk.
- Develop from the node of primary lateral.
- It is situated above globule.
- Nucule is covered by 5 spirally twisted tube cells, except at the tip where there are 5 corona cells.
- A single uninucleated egg is present at the centre of nucule.
- Egg stores food in the form of oil droplets and starch grains.
- Tip of egg is the receptive spot.

FERTILIZATION

- Biflagellate antherozoids are liberated from the globule.
- They swim in water & reaches to the mature nucule.
- At maturity, tube cells of nucule elongates and forms a neck.
- The corona cells of nucule develop a narrow slit, for the passage of antherozoids.
- Then large number of antherozoids reaches the neck but one penetrate through the wall.
- Male and female nucleus fuse to form zygote.

GERMINATION OF ZYGOTE

- After fertilization, diploid nucleus moves to the apex & secrete it's cell wall.
- The walls of tube cells and oogonium develop into different sculpturing.
- At this stage, zygote settle at the bottom of the water for few days.
- During germination, by meiosis, diploid zygote form 4 haploid nuclei.
- Out of 4, one moves to apical part & other move to basal part and degenerates.
- Outer envelop of zygote breaks at the tip and expose upper cell.
- By longitudinal division, upper cell divide into 2 cells, which become protonimal initial & rhizoidal initial.
- Protonimal initial form protonema and rhizoidal initial form rhizoids.



Thank you

