

**Class- B.Sc.
Semester I
Subject- Botany
Unit III - Phycology**

**Topic - Classification and Life Cycle of -
*Polysiphonia***

Classification and Life Cycle of - *Polysiphonia*

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Class- Rhodophyceae

The thallus is red in colour due to the presence of excess of r-phycoerythrin.

The **flagellated motile stages** are totally absent.

The reserve food is **floridean starch** and galactoside **floridosides** and these accumulate in the cytoplasm

The cell wall is made up of **cellulose and pectin**.

Pit connections are found between the adjacent cells which permit cytoplasmic connection between cells.

Sexual reproduction is **advanced oogamous**; the non motile male gamete is called **spermatium** which is produced in spermatangium. Female sex organ is **carpogonium**. It has a swollen base containing egg and long neck, called trichogyne.

There are distinct post-fertilization developments that are not found in any other algal phyla.

Genus - Polysiphonia

Classification

Class: Rhodophyceae

Order: Ceramiales

Family: Rhodomelaceae

Genus: *Polysiphonia*

Genus - Polysiphonia

Occurrence

Polysiphonia is a **marine alga**. Most species are **epiphytic** on Fucaceae and other larger marine algae. *P. fastigiata* grows attached to the fronds of *Ascophyllum nodosum*.

Common Indian species are *P. variegata*, *P. urceolata* and *P. platycarpa*.

Genus - Polysiphonia

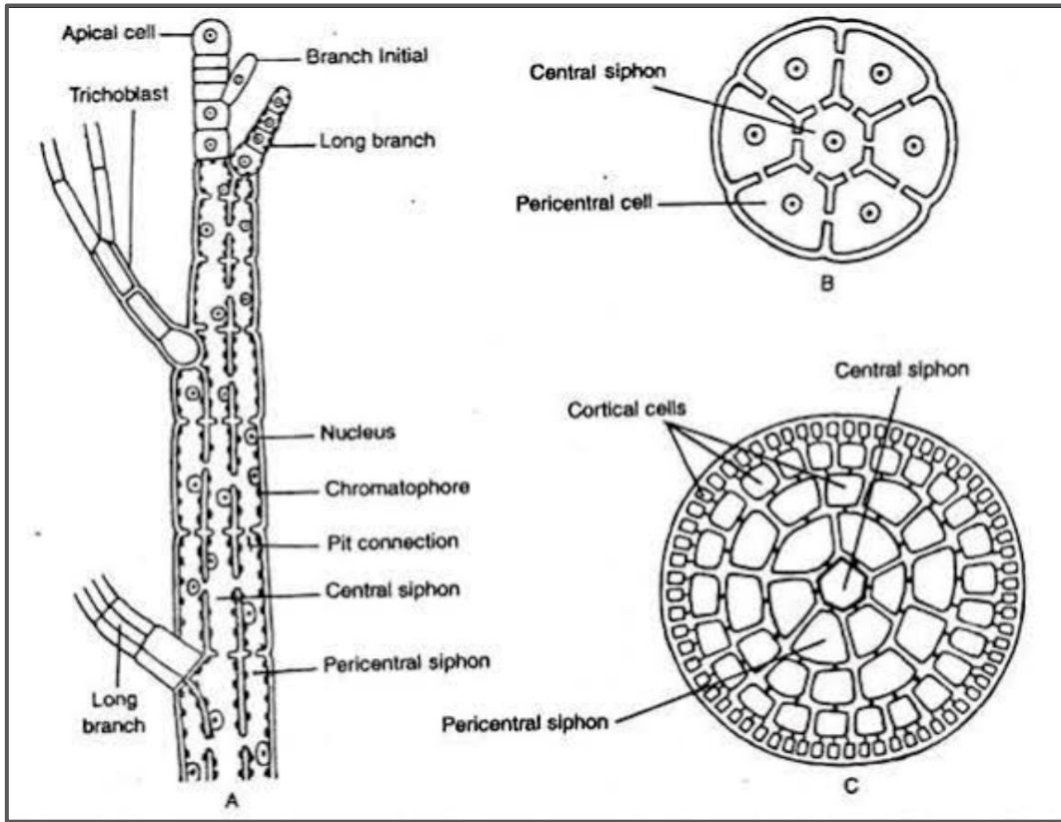
Thallus is polysiphonous and pseudoparenchymatous

It consists of an axial row of central siphon surrounded by a layer of 4-24 pericentral siphons.

The plant body is heterotrichous with an erect system of branches and a filamentous prostrate system anchoring the plant to the substratum with the help of unicellular elongated rhizoids whose tips are flattened into lobed discs or haptera.

The thallus is dichotomously branched with two kinds of branches, the branches of unlimited growth made up of central and pericentral siphons and those of limited growth, known as trichoblasts, which are dichotomously branched, uniseriate filaments.

The thallus grows by means of an apical cell.



Polysiphonia A. Apical portion of the thallus; B. T.S. of young thallus; C. T.S. of old thallus

Genus - Polysiphonia

Cell structure:

Cell wall is made up of cellulose and pectin.

Cells are eukaryotic and uninucleate.

Many discoid red coloured chromatophores are present in the cytoplasm which are devoid of pyrenoid.

Pit connections occur between the cells.

Genus - Polysiphonia

Polysiphonia is generally **heterothallic or dioecious** and includes **three kinds of morphologically similar plants**, the **male gametophyte**, the **female gametophyte** and the **tetrasporophyte**. The female plant also bears the **diploid parasitic carposporophyte**.

Alternation of generations in Polysiphonia is **triphasic**, there is alternation among **three generations- gametophyte, carposporophyte, and tetrasporophyte**.

The gametophyte and tetrasporophyte are free-living. Carposporophyte always occur on the female gametophytic thallus, and receive nutrients from female gametophytic cells .

Genus - Polysiphonia

Sexual reproduction: The male and female organs are borne on different plants. Spermatangia and carpogonia occur on small fertile trichoblasts.

Male gamete is non motile and known as spermatium.

Spermatium is released and moves with water current to reach the neck (trichogyne) of the carpogonium. Spermatium nucleus passes down the trichogyne and fuses with the egg nucleus in the swollen bases of the carpogonium.

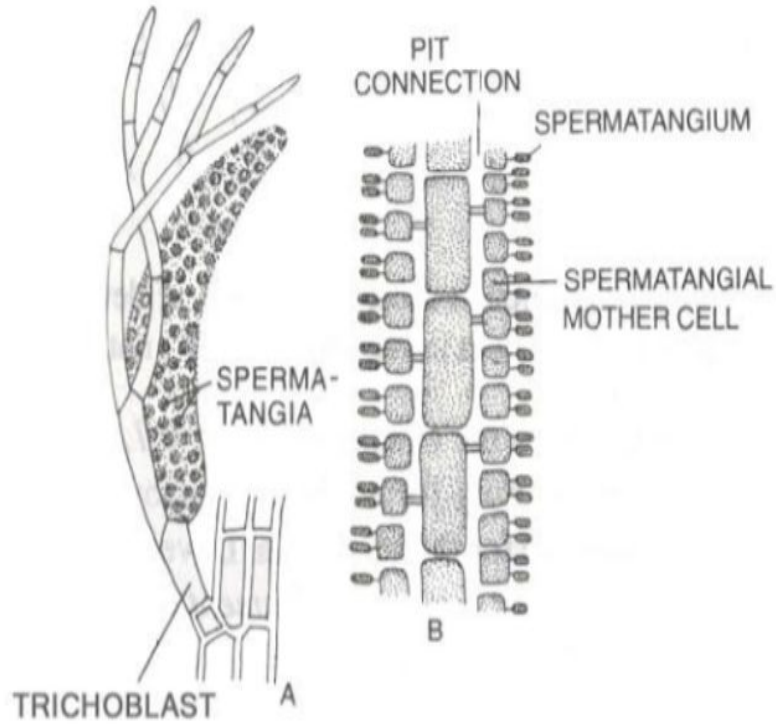


Fig: (A) Spermatangial filament bearing spermatangia,
 (B) LS of spermatangial filament bearing spermatangia.

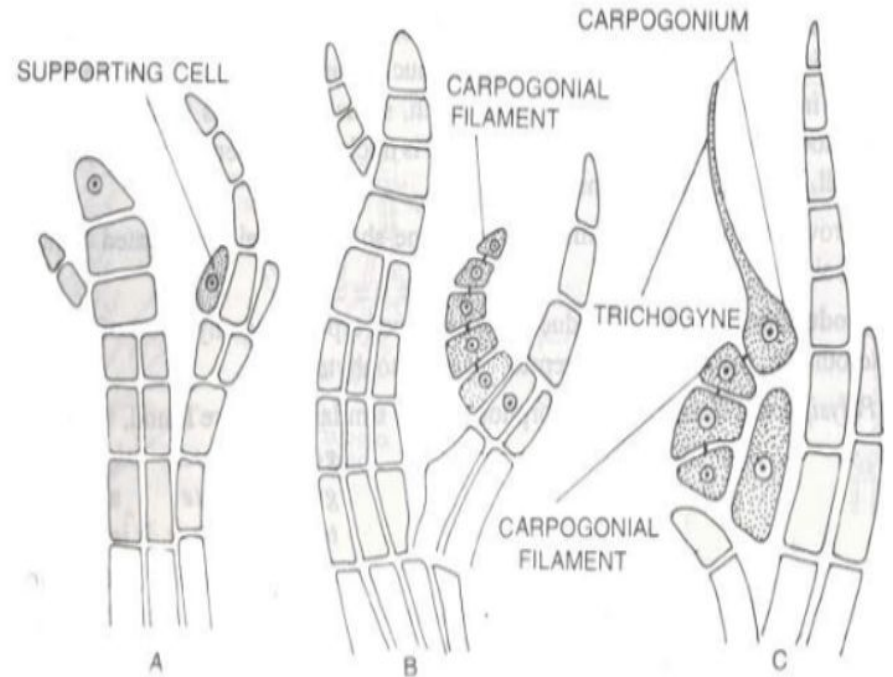


Fig : (A,B,C) Stages of development of carpoogonial filament.

Genus - Polysiphonia

Diploid nucleus within the zygote is transferred into auxillary cell.

Auxillary cell produces gonimoblast filaments and the terminal cell of gonimoblast filaments produce the carposporangia.

Cystocarps are urn shaped structures, have carposporangia that produce carpospres and an outermost region of photosynthetic gametophytic cells that form distinctive pericarp. Entire structure is known as carposporophyte.

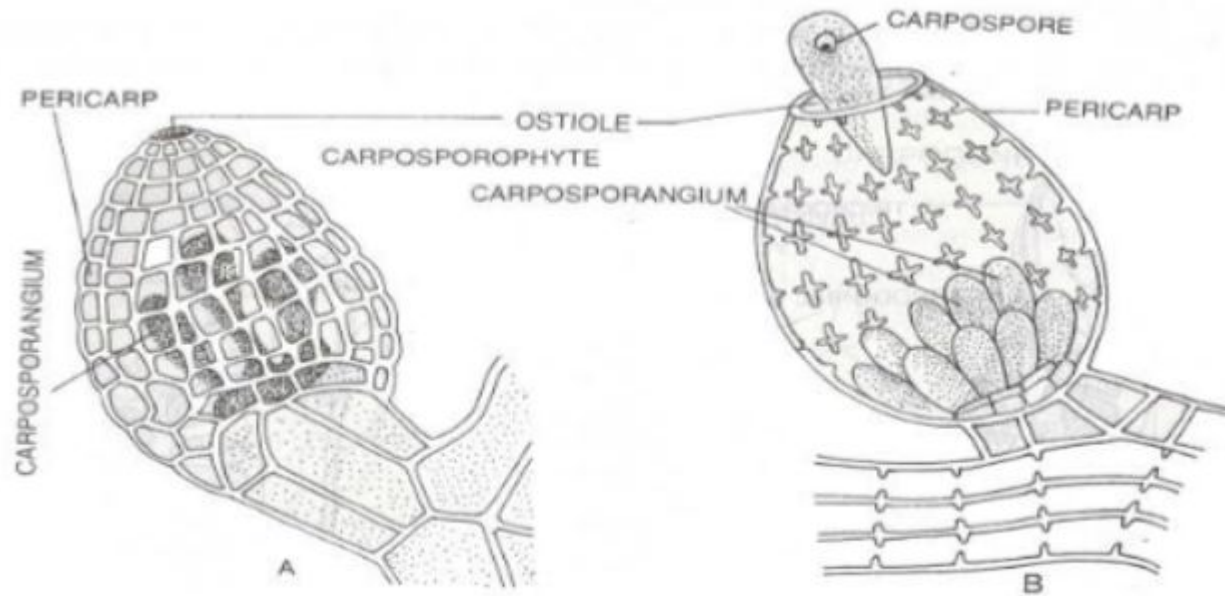


Fig: A— Surface view of the mature cystocarp.
B— Liberation of carpospore from carposporangium.

Genus - Polysiphonia

Carpospores are released into the water and develop into a new **tetrasporophyte**.

Multicellular, and usually free-living, tetrasporophytes produce tetraspores in tetrasporangia. Usually **four tetraspores are produced in each tetrasporangium after meiosis**.

When meiosis occurs during tetraspore formation, sex-determining alleles are segregated such that **two tetraspores give rise to male gametophytes and the other two form female gametophytes**.

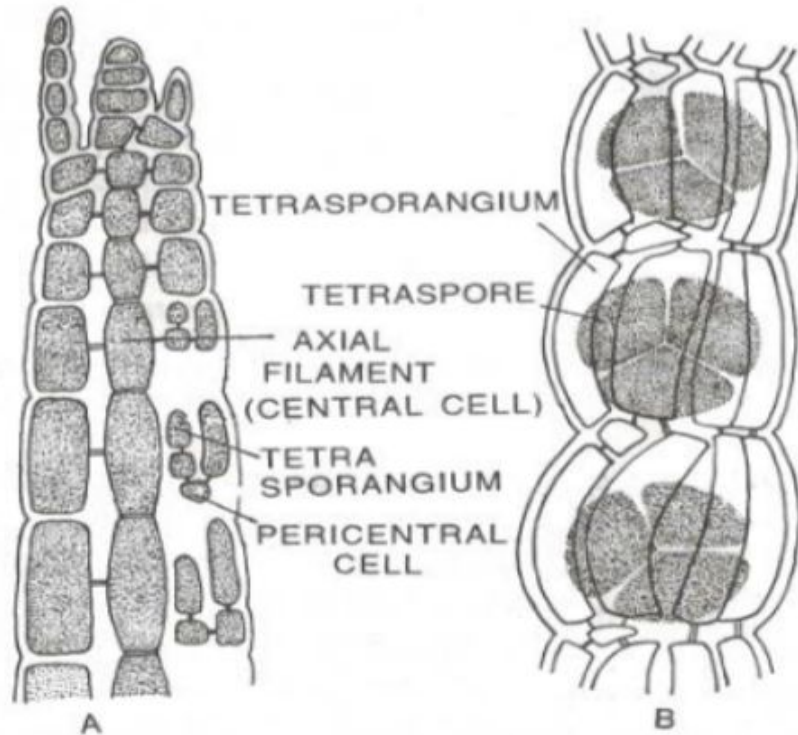
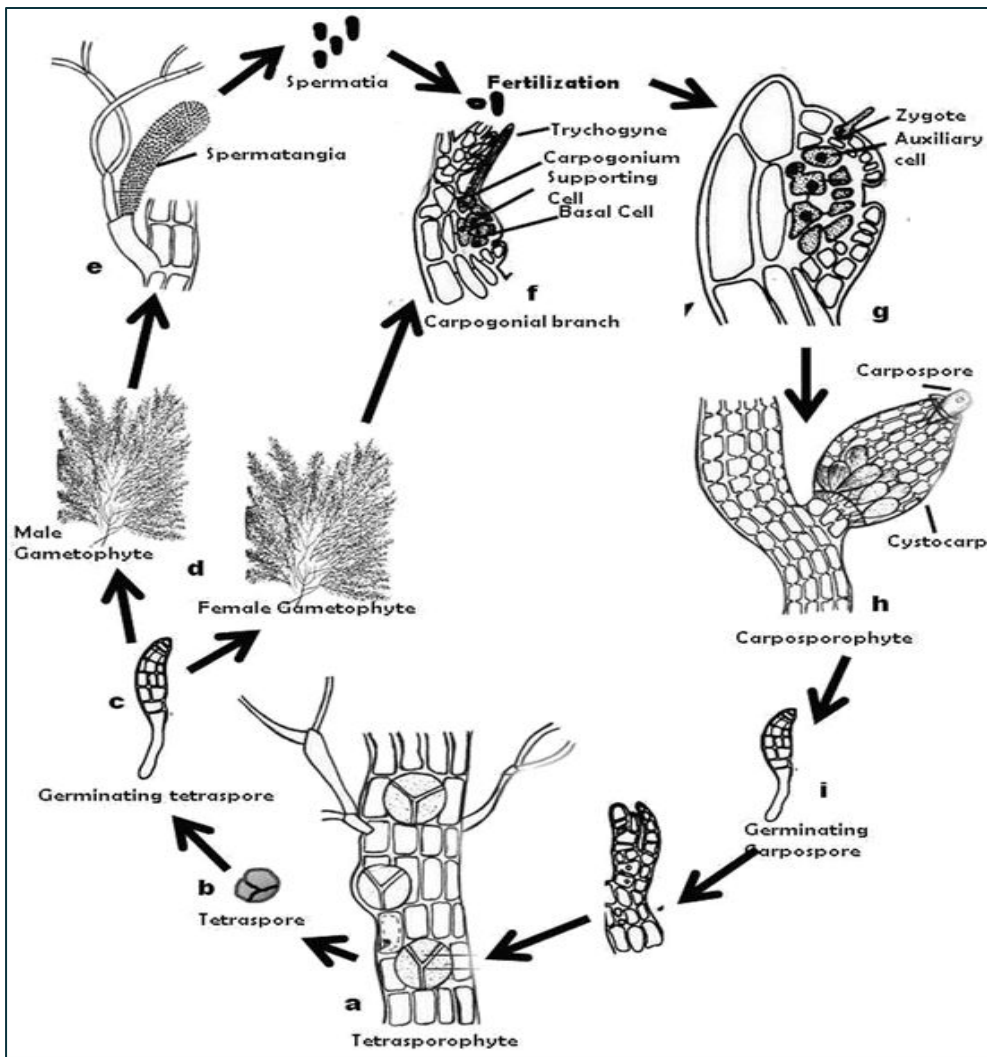
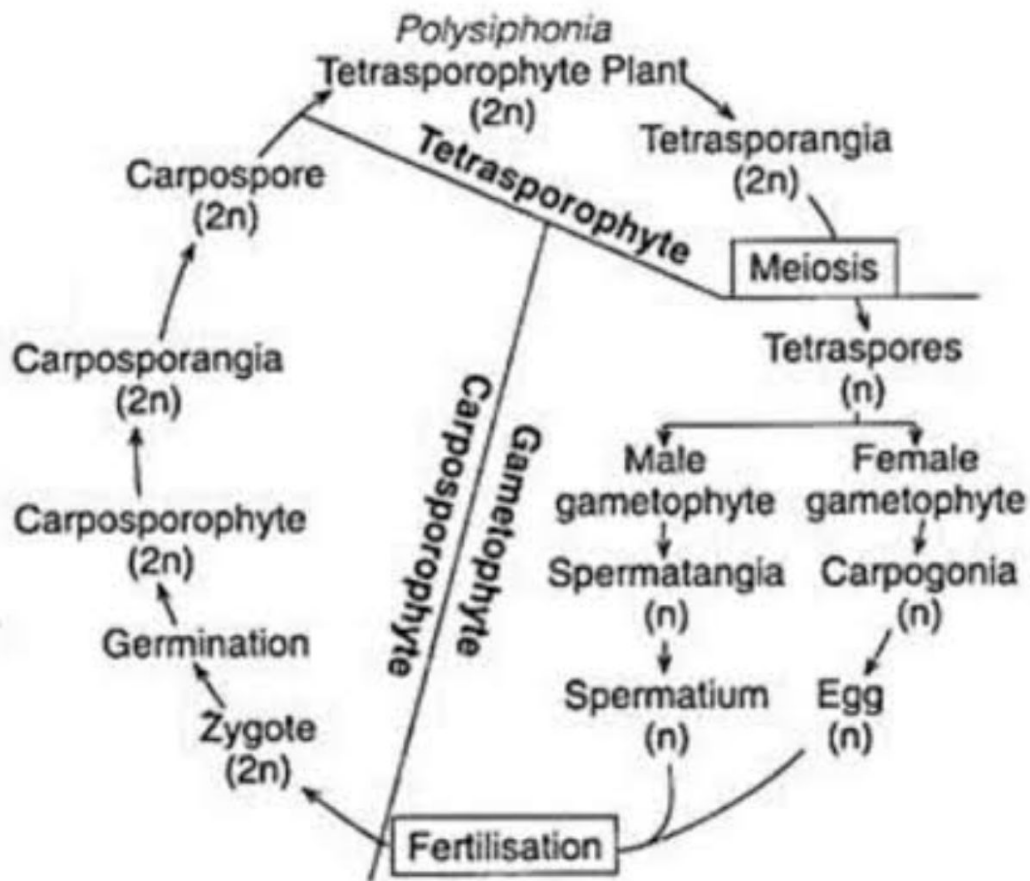


Fig: A—Section through the apex of tetrasporophyte. B—Mature tetrasporophyte in surface view showing tetrasporangia containing tetraspores.



Life cycle of Polysiphonia



Triphasic Life Cycle : Diplobiontic Type (*Polysiphonia*)

Let's revise

- Q.1 Describe the thallus structure of Polysiphonia.
- Q.2 Write a short note on carposporophyte.
- Q.3 Give a diagrammatic sketch of life cycle of Polysiphonia.
- Q.4 In which algae triphasic diplobiontic life cycle is found.
- Q.5 Give the general characters of class Rhodophyceae.

References:

Recommended Books:

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