
Rhodophyta

Polysiphonia

Fritsch (1945)

Class-Rhodophyceae; Order-Ceramiales; Family-Rhodomelaceae; Genus – *Polysiphonia*

Lee (1999)

Phylum-Rhodophyta; Class-Rhodophyceae; Order-Ceramiales; Family- Rhodomelaceae;

Genus - *Polysiphonia*

Occurrence

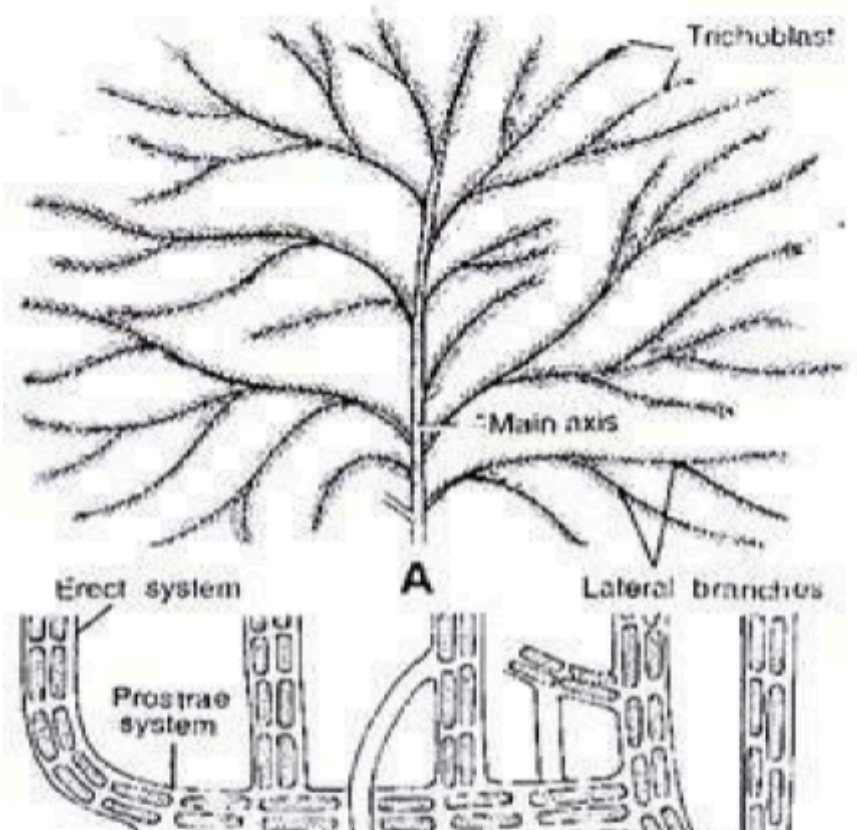
- Polysiphonia is a large genus with about 150 species (Bold & Wynne, 1978) 6,000 species ***(Encyclopædia Britannica, 2017).*** The genus is represented in India by about 16 species found is southern and western coasts of India. Some common Indian species are *P. ferulacea, P. urceolata and P. variegata.*

Most of the species are lithophytes i.e., found growing on rocks. Some species are epiphytic, found growing on other plants and algae e.g., *P. ferulacea* grows on *Gelidium pusillum. P. variegata* grows on the roots of

mangroves. Some species are semi parasitic e.g., *P. fastigiata* is semiparasiite on *Ascophyllum nodosum* and Fucus.

Thallus Structure of *Polysiphonia*

- The thallus is filamentous, red or purple red in colour. The thallus is multi-axial and all cells are connected by pit connections hence, the name given is Polysiphonia. Due to continuous branching and re-



branching the thallus has feathery appearance (Fig. 1A). The thalli may reach the length of about 30 cm.

- The thallus is heterotrichous and is differentiated into a basal prostrate system and erect aerial system.

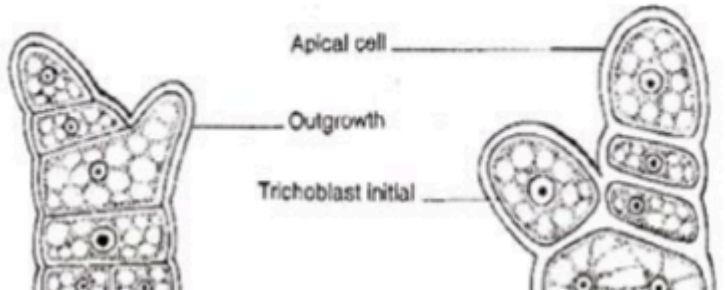
Branching

The thallus of Polysiphonia bears two. The types branches of branches are lateral (a) Short branches (b) Long branches and monopodial. The branching starts from the cell lying 25 cells below the apical cell.

- **(A) Short Branches or Trichoblasts:**

- The short branches or trichoblasts are branches of limited growth. These are uni-axial in structure and lack pericentral siphons. The cells are connected to each other by pit connections. These branches arise on main axis and on long branches in spiral manner. Their cells contain very few chromatophores.
- These branches are deciduous, perennial species shed these branches before winter and develop again in spring season. The basal cell of the last trichoblast is retained as scar cell by the pericentral siphon.

Development of Trichoblast

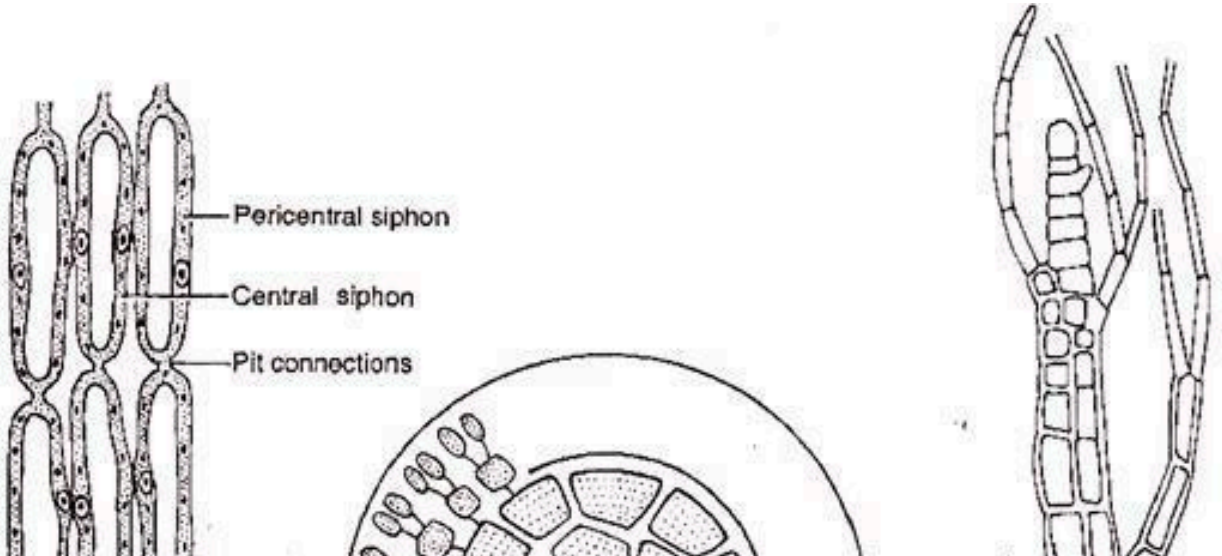


- The trichoblast initial is differentiated from a cell 2-5 cells below the apical cell (Fig. 3 A, B). It starts as a small cell and divides repeatedly to form dichotomously branched, uniseriate multicellular hair like trichoblast (Fig. 4 C, D). The trichoblast may bear male and female reproductive structures or remain sterile.

(B) Long Lateral Branches

- The long lateral branches are branches of unlimited growth are polysiphonous at the base and monosiphonous in terminal parts.

- Long Branch which after repeated division forms the central siphon. The central siphon later on develops peripheral siphons(4-20). In species like *P. elongata* the long branches arise directly from the main axis. The outgrowth develops from a cell 2-5 cells below the apical cell. The outgrowth forms central siphon and later pericentral siphon in normal way.



Cell Structure of Polysiphonia

- Thecylindrical cells andof elongatedcentral and The pericentralcell wall is differentiatedsiphons are into outer pectic and inner cellulosic layer. The cell contains a large central vacuole which is delimited by a membrane tonoplast. The cytoplasm is present between the cell wall and the central vacuole. The cell contains a number of red discoid chromatophores which lack pyrenoids.
- The chromatophores contain pigments chlorophyll a, chlorophyll d, and carotene, (3 carotene, r-phycoerythrin and r-phycocyanin. The chromatophores are parietal in position. The central siphon cells and pericentral siphon cells posses

single peripheral nucleus. The cytoplasm contains granules of floridean starch as food reserve.

Reproduction in Polysiphonia

- In life cycle of Polysiphonia both asexual and sexual reproduction takes place. The life cycle is example of triphasic alternation of generation.
- **Polysiphonia is mainly heterothallic. In the life cycle of Polysiphonia three kinds of thalli are found. These are:**

(a) The gametophytic thalli which are haploid free living and dioecious. The male sex organs spermatangia are formed on male gametophytic plant and the female sex organs carpogonia are formed on female gametophytic plant.

(b) The carposporophytes are diploid, depend upon the female gametophyte. They develop after fertilization from zygote and later bear carposporangia. The carposporangia form diploid carpospores.

(c) The tetrasporophytic plant which is formed by germination of diploid carpospores is diploid and independent. Then plant bears tetrasporangia which form four haploid tetraspores which again give rise to male and female gametophytic plants. **Sexual Reproduction:**

- Sexual reproduction is oogamous type and plants are dioecious i.e., male and female sex organs are produced on different male and female gametophytic plants.

Male Gametophyte

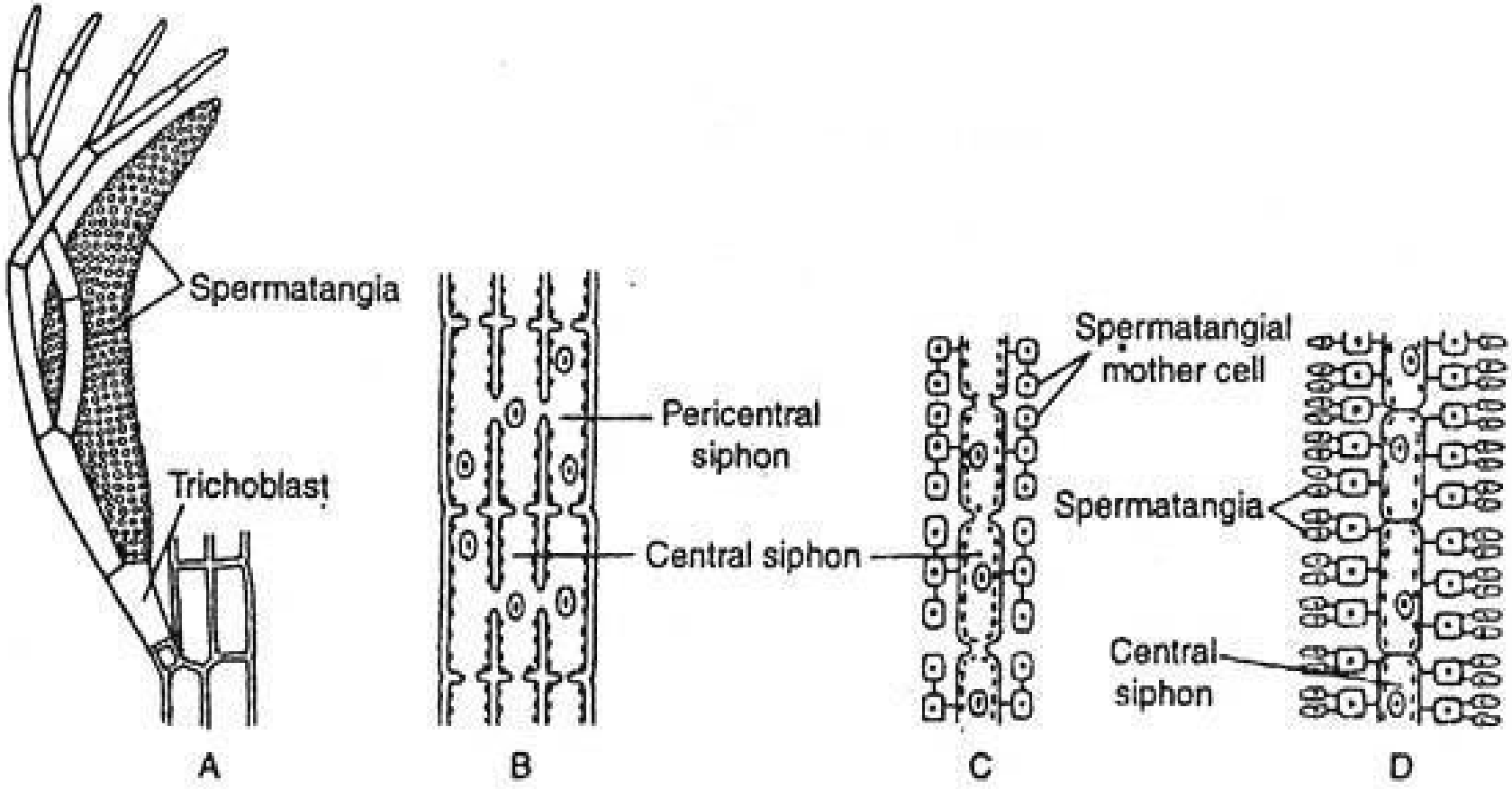


Fig. 3.134 : *Polysiphonia* sp. : Development of male reproductive organ. A. Portion of thallus with antheridial branch, and B-D. Sequential development of spermatangia

Female Gametophyte

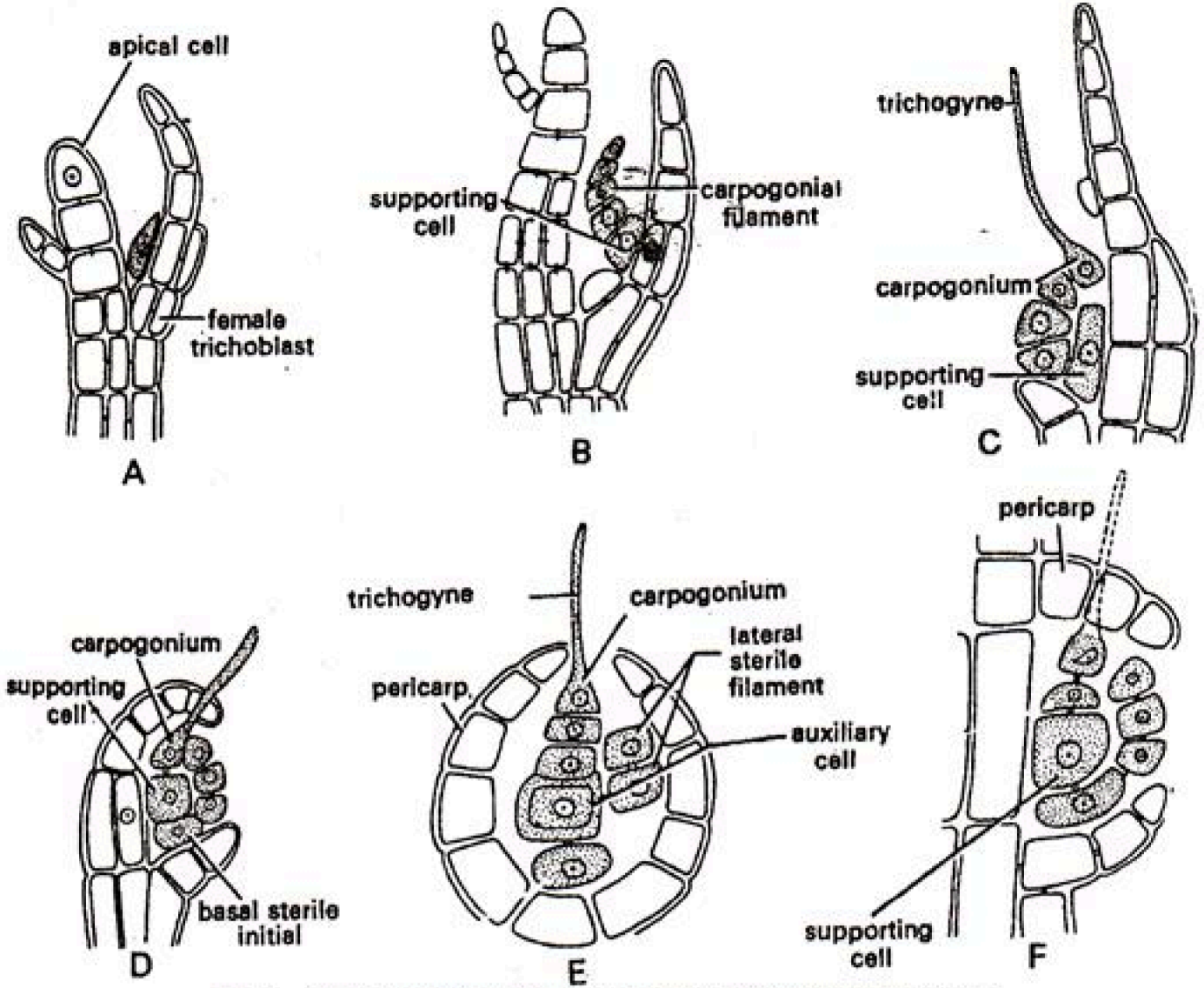


Fig. 5. (A–F). *Polysiphonia.* Development of female gametophyte.

Post fertilization changes

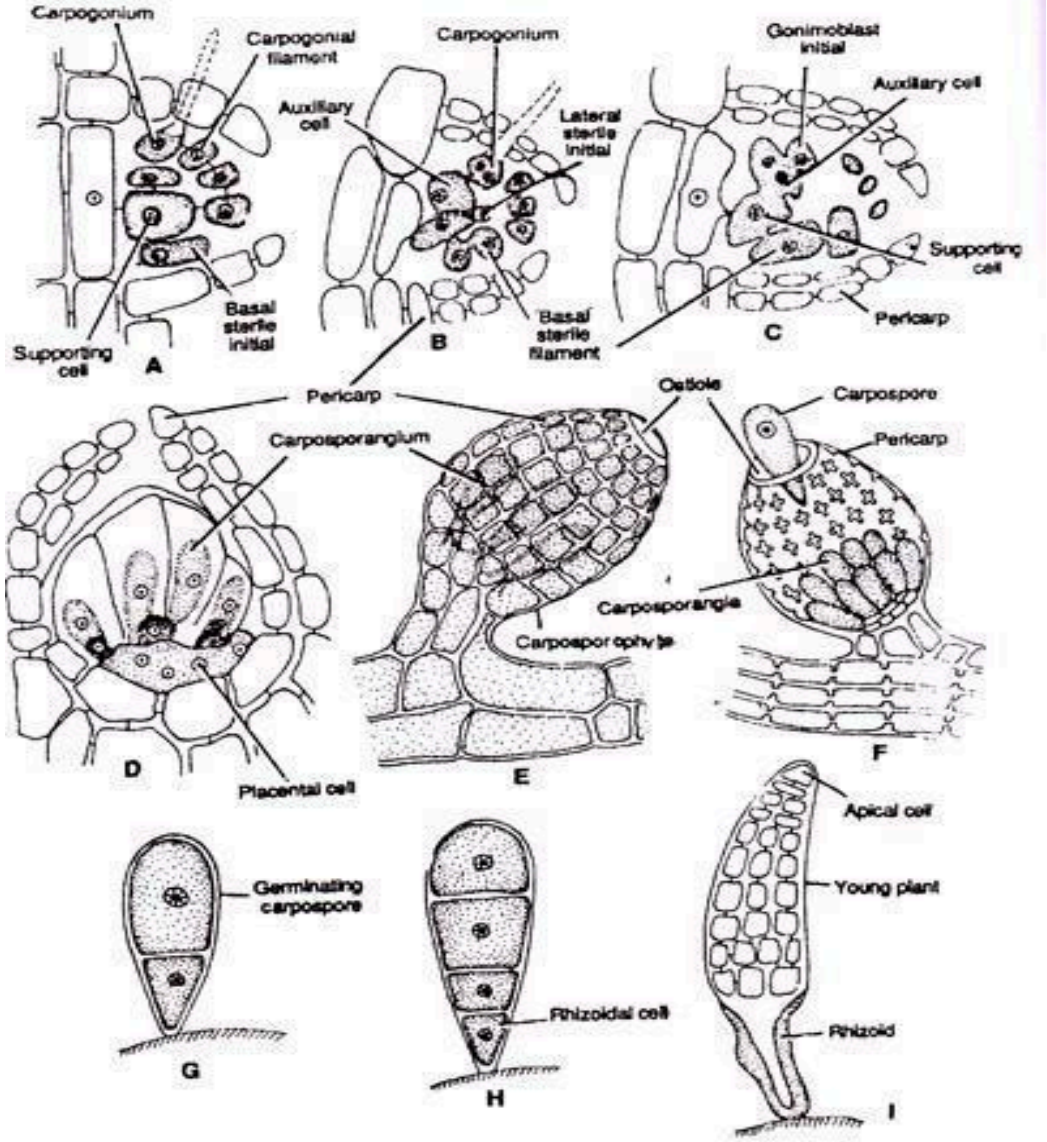
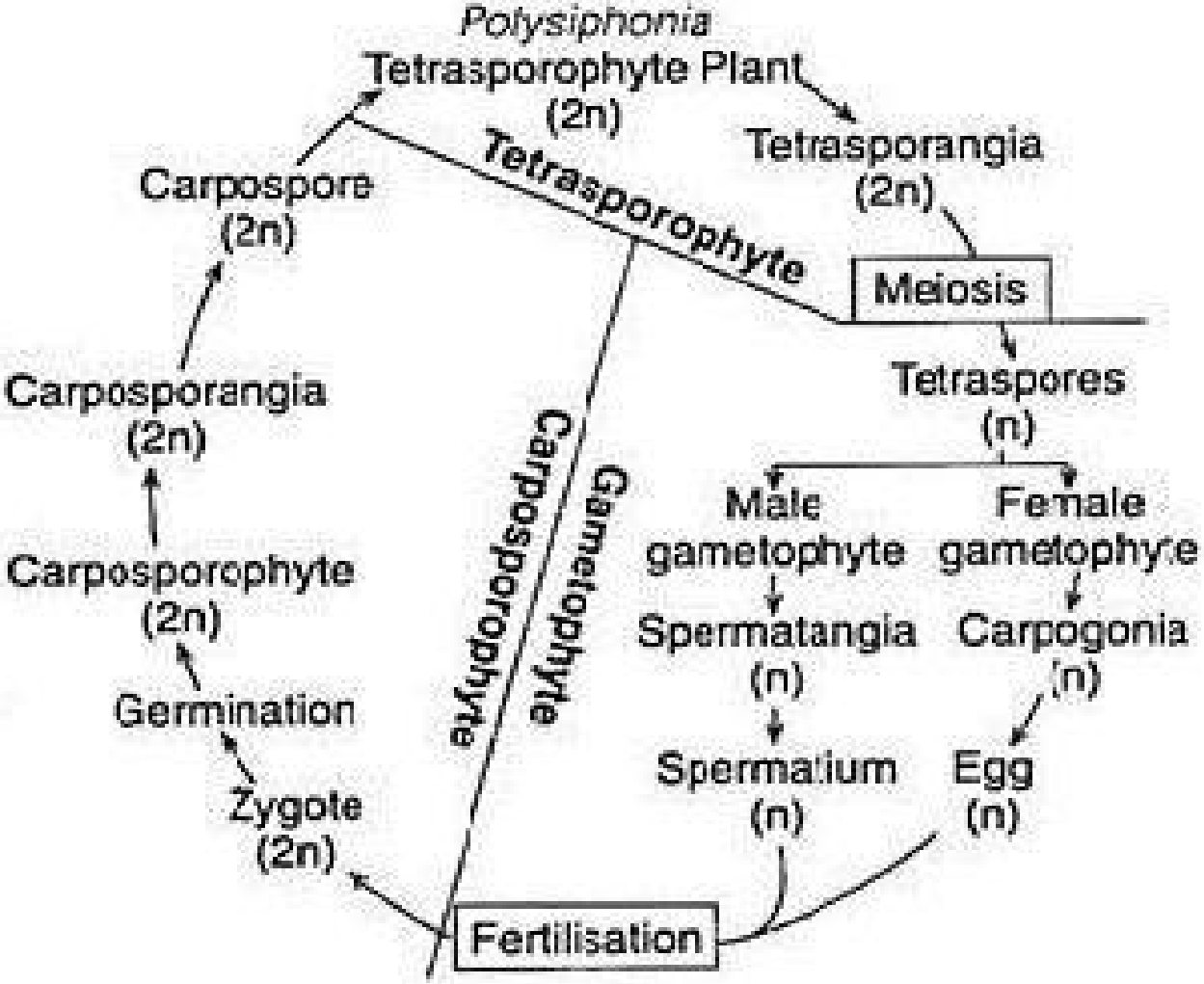


Fig. 6. (A–I). *Polysiphonia*. Post fertilization changes



B

Diplobiontic type (*Polysiphonia*)

Thanks

Economic Importance of Algae

Food:

1) *Chlorella*
2) *Chondrus crispus (irish moss) – popular dish Blancmanges*
3) *Codium and Ulva – salad in japan*

4) *Porphyra – use as food having 30-35% protein and vitamin B &C*

5) *Laminaria- kombu food in japan (57-60% carbohydrate rich)*

6) *Rhodymenia- dulse food*

7) *Monostroma – use as aonori in Japan*

8) *Spirulina- having 60% protein*

9) *Scenedesmus- equivalent to skimmed milk*

10) *Nostoc – soup for China*

11)Spirogyra- in south India

Fodder

Fucus , Laminaria, Sargassum, Alaria, Ascophyllum, Macrocystis.

Agar-agar

Gelidium nudifrons
Gracilaria verucosa

Alginic Acid

Ascophyllum Fucus

Macrocystis

Laminaria

Lassonia

Medicine

Tse-ko-Tsoi prepared from *Digenia sp*

Chlorellin

Funori *a gum produce from Gloiopeltis sp* Vitamin

Vit-C from *Rhodomela sp*

Vit- A from *Porphyra lacinata*

Fucus , Laminaria good source of iodine

Minerals

Bromine found from *Polysiphonia sp*

Other than that Cu, Bo, Fe, Zn, Van, Cr, Co, Mn

Diatomite

Produce from Diatom