

Ectocarpus

Division - Phaeophyta

Class – Isogeneratae

Order – Ectocarpales

Family – Ectocarpaceae

Genus - Ectocarpus

Occurrence

Most primitive of all the brown algae. It is a marine alga found throughout the world, particularly abundant along the Atlantic coast. A few species occur in fresh water. The plant grows attached to rocks and stones along coasts and consist of tufts of brownish, delicate highly branched filaments. Some species are epiphytes on other algae. Some of the common Indian species are *E. coniferus*, *E. indicus*, and *E. arabicus*. *Ectocarpus fasciculatus* grows on the fins of certain fishes.

Structure of thallus

The thallus consists of profusely branched uniseriate filaments.

Ectocarpus shows heterotrichous habit, consisting of a prostrate and erect system. The filaments of the erect system arise from the filaments of prostrate system.

Prostrate system: The prostrate system consists of creeping, irregularly branched filaments. These filaments are attached to the substratum with the help of rhizoids. Prostrate system is poorly developed in free floating species.

Erect system: The erect system arises from the prostrate system. It consists of well branched filaments. Each branch arises beneath the septa. The main axis and the branches of the erect system are uniseriate. Branches terminate into an acute point to form a hair.

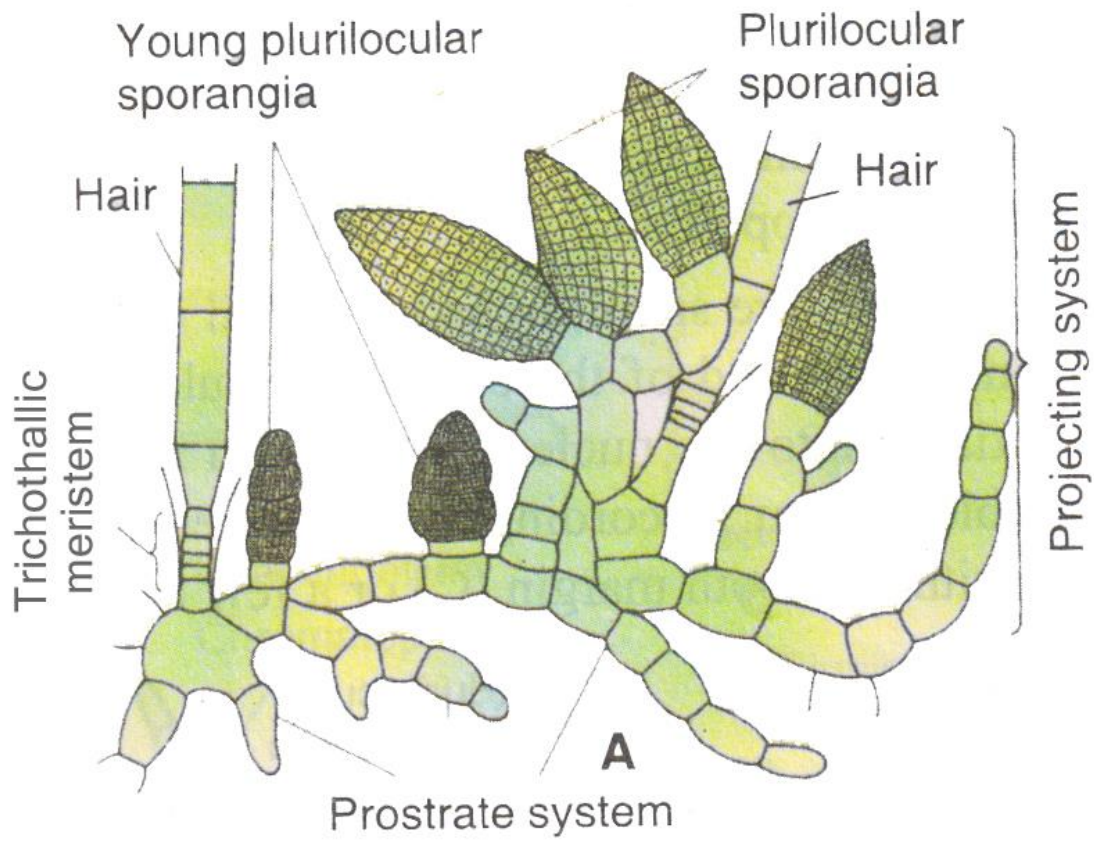


Fig : Habit showing prostrate and erect system.

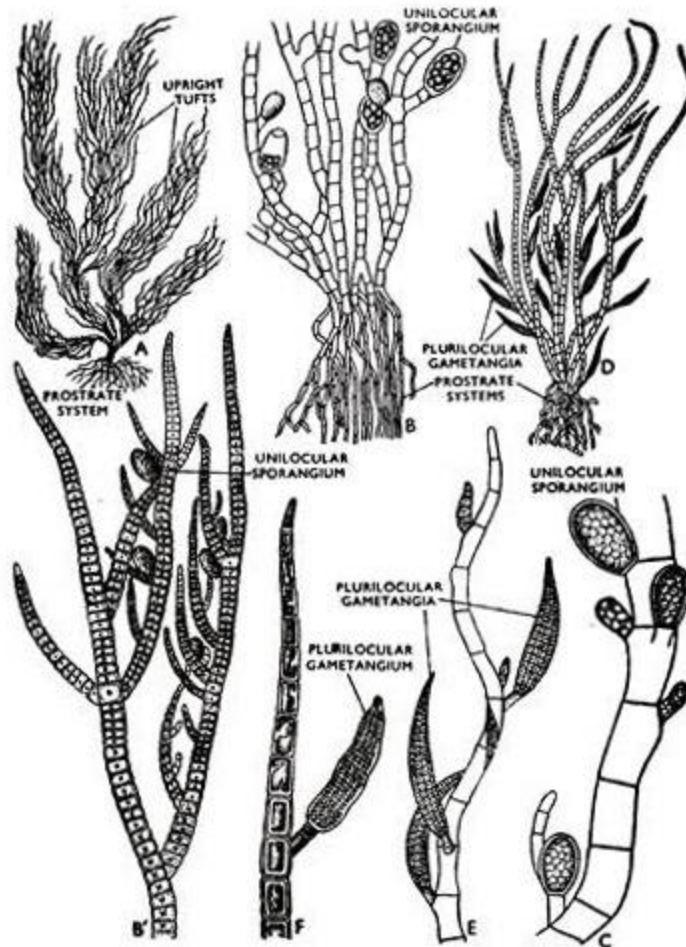


Fig. 102. *Ectocarpus* sp. A. Habit. B-C. Filaments bearing unilocular sporangia. D-E. Filaments bearing plurilocular gametangia. F. Portion of a filament showing plurilocular gametangium.

Cell Structure

Cells are cylindrical or rectangular and uninucleate. Cell wall is thick, composed of three layers of pectin and cellulose. Algin and fucoidan are also present in the cell wall. These are characteristic gelatinous substances present in the brown algae.

The chromatophores may be ribbon-like with irregular outline or disc-shaped. The dominant pigment is **fucoxanthin**. It gives this algae golden brown colour. The other photosynthetic pigments are chlorophyll a, c, beta-carotene and other xanthophylls.

Growth :

In erect system growth is trichothallic. Intercalary meristem is present at the base of the hair. It is called trichothallic meristem. It increases the length of the terminal hair and vegetative cell of the branch. The growth in the prostrate system is apical.

Reproduction :

Ectocarpus reproduces by both asexual and sexual methods.

(i) Asexual Reproduction in Ectocarpus:

The asexual reproduction takes place with the help of biflagellate zoospores. These zoospores are produced in **unilocular** and **plurilocular sporangia**. These two types of zoosporangia may be produced on the same plant or on different plants. The unilocular zoosporangia form haploid zoospores and the plurilocular sporangia form diploid zoospores.

Unilocular Sporangia:

The unilocular sporangia develop singly on tips of small branchlets. The terminal cell of the branchlet gradually increases in size and becomes ellipsoidal. This cell functions as sporangial initial. The nucleus of sporangial cell first divides by meiotic division followed by many equational divisions. This results in formation of 32-64 haploid nuclei.

The nuclear divisions are not followed by wall formation and the sporangium remains unilocular. Each nucleus of the sporangium gets surrounded by protoplast segment and ultimately transforms into 32-64 zoospores. Each zoospore is pyriform, uninucleate with two laterally inserted unequal flagella. The anterior flagellum is longer, pantonematic

and directed forward while the posterior is shorter, acronematic and directed backward.

The zoospores discharge en-masse in gelatinous matrix through a terminal pore in sporangium. The zoospores after being discharged remain in spherical mass at the apex of sporangium. These zoospores then become free and swim in water. These zoospores are haploid, they withdraw flagella and attach to the substratum by their anterior ends. The zoospores germinate within 2-3 hours to produce a new Ectocarpus plant which is similar to sporophytic plant in structure. These plants are called gametophytic plants (haploid) because on maturity they bear plurilocular gametangia and produce gametes.

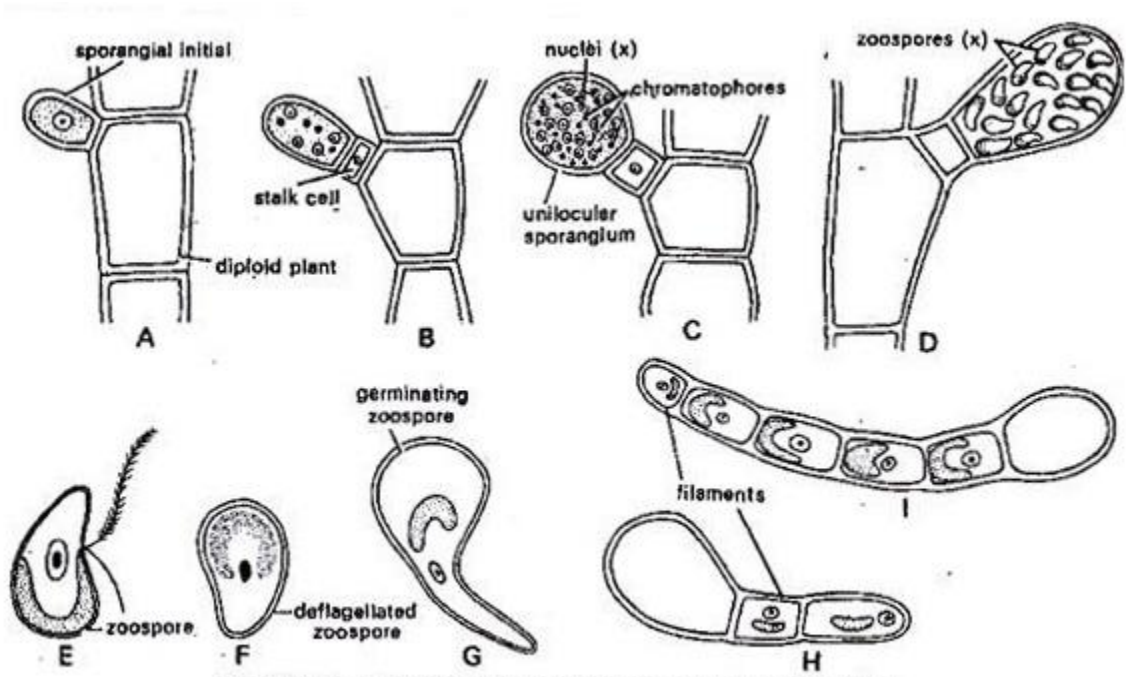


Fig. 2 (A-H). *Ectocarpus*. Development of unilocular sporangium.

Plurilocular Sporangia:

Like unilocular sporangia, the plurilocular sporangia also develop from the terminal cells of the branchlets of diploid sporophytic plant. The cell which functions as sporangial initial enlarges in size and becomes spherical or elongated structure. It repeatedly undergoes transverse divisions to form a row of 5-12 cells. Then Many transverse and vertical divisions result in formation of cubical cells arranged in 20-40 transverse tiers. The cells are arranged in regular rows. This multicellular structure is called plurilocular sporangium.

The protoplast of each diploid uninucleate cell of the sporangium is transformed into a single biflagellate zoospore. The zoospores of plurilocular and unilocular sporangia are identical in structure but zoospores of plurilocular sporangia are diploid and zoospores of

unilocular sporangia are haploid.

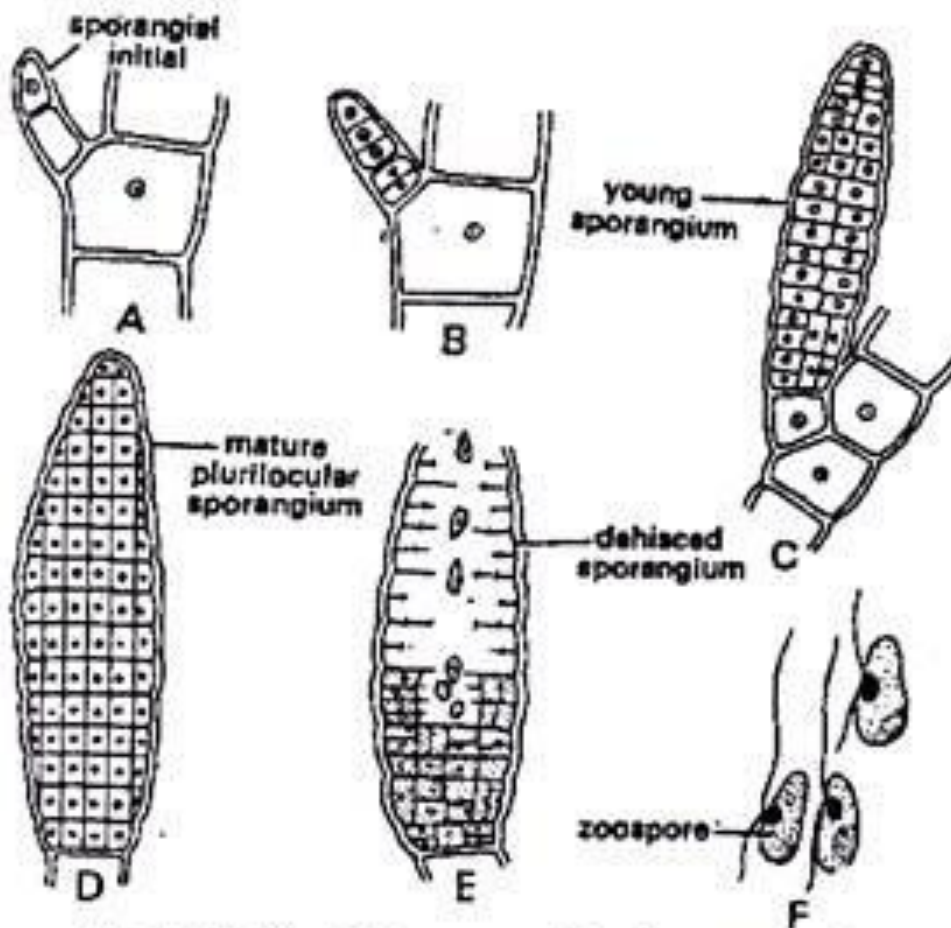


Fig. 3 (A-H). *Ectocarpus*. Development of Plurilocular Sporangia

The mature zoospores are liberated from the sporangium through apical or lateral pores. The zoospores remain motile for 4-5 hours and then germinate into diploid thallus which later on bears unilocular and plurilocular sporangia.

These diploid zoospores multiply only sporophytic plants and they do not play any role in alternation of generation. The formation of unilocular and plurilocular sporangia is affected by environmental conditions like temperature and salinity of water. *E. siliculosus* produces unilocular sporangia at 13°C, plurilocular at 19°C and both unilocular and plurilocular at 16°C.

