

# GENERAL CHARACTERS. OF CLASS PHEOPHYCEAE (BROWN ALGAE)

## DISTRIBUTION :-

1. Brown algae are almost exclusively marine and majority grow in shallow waters in the intertidal zones of rocky coastlines.
2. They grow as littoral flora of the cold water of the temperate, arctic and antarctic sea.
3. They are abundant along stretches of north Atlantic and Pacific coasts.
4. They are attached to rocks by extensively branched hold fast or grow as epiphytes on some other algae.

## Thallus organization:

1. Thallus is multicellular and display high degree of body differentiation.
2. Morphologically brown algae begins from where the green algae finish. The simplest type of brown algae is represented by heterotrichous filament.
3. Heterotrichy gradually disappears in the higher brown algae e.g. Dictyotales, Fucales, Laminariales.
4. The plant body is divided into flattened blade, cylindrical lower part stipe and attachment disc in Fucus. The branching in Fucus is dicotomous.
5. In Laminariales the main stage is sporophytic generation, thallus is largest among algae having cylindrical stipe and flattened blade or lamina.
6. Postelsia palmaeformis resembles as palm tree. Therefore it is called Seapalm. It is found in Pacific Ocean in North America.

## Structure of cell -

1. The double layered cell wall is gelatinous due to presence of colloidal substances like alginate and fucodine in the outer pectic portion of cell wall.
2. The cell contains single nucleus, centrosomes, mitochondria, Ribosomes, ER, dictyosomes.

3. Reserve food of brown algae is laminarine (a complex carbohydrate). Simple sugar formed in photosynthesis is converted into mannitol (type of ~~alcohol~~ alcohol).
4. Cytoplasm contains more than one plastids called chromatophores. Brown colour of chromatophore is due to presence of golden brown Xanthophyll pigment called fucoxanthin or Phycocanthin. Presence of chl a, chl c and carotene is also reported.
5. Presence of pyrenoids along with plastids.
6. Nucleus is prominent. Around the nucleus are some refractive colourless vesicles containing chemical fucosan.

### Reproduction:

1. Asexual reproduction: Takes place both by vegetative method and Spore formation.

#### - Vegetative reproduction:

i) Fragmentation: A portion of thallus breaks away from parent thallus and forms new individual.  
e.g. Sargassum natans.

iii) Propagula: These are special adventitious branches which may be wedge like or diorthrad. They detach from parent plant and grow as new plant. e.g. Sphaecularis.

#### Spore formation :-

- In Ectocarpales and Sphaeculariales mitospores also called zoospores are formed & after mitosis. These zoospores are formed inside asexual reproductive structure called "Plurilocular sporangia" borne on diploid or sporophytic plants. The zoospores are diploid and germinate to form sporophytic plants.

- Zoospores have eyespot and bear two lateral flagella arising from basal granule. One being whiplash type and the other is tinsel type.

- The sporophytic plants of Ectocarpales and Sphaecariales bear another kind of unichambered sporangia called Unilocular Sporangia.
- Except Ectocarpales and Sphaecariales all other orders of Phaeophyceae contains only unilocular sporangia on their sporophytic plant body.
- The diploid content of unilocular Sporangia undergoes meiosis followed by repeated equational divisions to form large nos. of meiospores.
- Meiospores on germination forms alternate haploid plants (gametophyte).
- In Dictyotales meiospores are non motile i.e. aplanospores.
- The Fucales do not reproduce by any kind of spores.

### Sexual Reproduction

- Sexual reproduction is the concern of haploid plants, exception being the Fucales in which sexual plant is diploid.
- Oogamy is the general rule in Phaeophyceae.
- Sexual reproduction ranges from isogamy anisogamy to oogamy.

Isogamy: In Ectocarpales and Sphaecariales sexual reproduction is isogamous.

- The gametophyte plants may be homo- or heterothallic.
- Fusing gametes are morphologically similar, motile, produced in plurilocular gametangia. The gametic union results in zygote formation, which germinates to form sporophytic plants.

### Anisogamy

- Physiological anisogamy. In some members of Ectocarpales and Sphaecariales fusing gametes although morphologically similar behave in dissimilar manner at the time of fusion. e.g. Ectocarpus siliculosus; female gamete becomes passive and more active male gametes swim to fuse with it.

## Morphological anisogamy:

- Fusing motile gametes are of unequal size.
- Smaller gamete is male (microgamete) and larger gamete is female (macrogamete)
- e.g. Culleria multifida.

## Oogamy

- Majority of brown algae are oogamous.
- The male sex organ antheridium are unicellular in Desmarestiales and Laminariales with the entire protoplast forming a single biflagellate sperm.
- In Dictyotales antheridium is partitioned into multicellular structure where each compartment contains single sperm.
- In Fucales antheridium produce large no of sperms (64).
- The oogonium is one celled structure except Fucales. Oogonium produces single Ovum.
- Ovum escapes the oogonium prior to fertilization, which is external.
- In Laminariales the ovum after extrusion, remains attached to the oogonium apex. Fertilization is insitu. Zygote germinates while still attached with female gametophyte.

## Meiospore formation

1. Zygote ~~after~~ formed, usually germinate immediately without undergoing rest.
2. No zygotic meiosis.
3. Diploid sporophyte plant is formed.
4. Diploid thallus bears only unilocular sporangia, exception Ectocarpales and Sphaecelariales.
5. After meiosis in the nucleus of unilocular sporangia meizospores are formed which forms haploid thallus.

## Alternation of Generations

1. Distinct alternation of generations in the life cycle of Phaeophyceae
2. In Dictyota and other members, it is isomorphic.
2. In Laminariales and Catlaris it is distinctly heteromorphic. Gametophytes reduced.

- and alternating with huge Sporophyte plant.
- Sporophyte generation may be annual or perennial in most of the brown algae
  - Gametophyte is always annual.
  - Life cycle in Fucales shows no alternation of generations as sporophyte stage is dominant and gametophyte is restricted to gametes only.

## CLASSIFICATION OF PHEOPHYCEAE

On the basis of vegetative organisation and mode of sexual repd. algologists have divided the class Phaeophyceae into a number of orders. In recent trends the class Phaeophyceae has been raised to the status of division named - Phaeophyta.  
 According to Kylin (1933) Phaeophyta has been divided into three classes based on their life cycle.

