

# Phylum phaeophyta: characteristics, structure, classification

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## PHYLUM PHEOPHYTA

### General characteristics

- **Habit and Habitat** Mostly present in marine water, rocky places and in temperate waters.
- **Biodiversity** 1500-2000 ssp of brown algae are known worldwide
- **Plant Body** The body of simple species is filamentous, but the body of advance species is thallus like. They are multicellular organisms.
- **Vascular System** They lack vascular system(xylem and phloem).
- **Tissue Organization**

### There are two types of tissues

Parenchymatous

Pseudoparenchymatous

- **Cell wall** Cell wall is made up of cellulose.
- **Pigments** They have xanthophyll pigment, fucoxanthin, in addition to chlorophyll a and c . Due to the presence of fucoxanthin pigment the color of phaeophyta is greenish-brown.
- **Nutrition** They have autotrophic mode of nutrition. They take nutrients from photosynthesis and by absorbing dissolved nutrients from surrounding.
- **Reserve food material** Reserve food material is in the form of starch, polysaccharides, sugars and higher alcohols.
- **Movement** Members of pheophyta moves by the waves in the ocean.
- **Importance** They act as a decomposer, producer and food source for aquatic life. They are important part of marine flora because they

provide food, shelter and spawning areas. Both modes of reproduction are present. Sexual Reproduction (By means of gametes)

- Asexual Reproduction (By means of zoospores)

## **EXTERNAL STRUCTURE OF PHAEOPHYTA**

External structure of phaeophyta incorporate after structures, i)Thallus ii)Holdfast iii)Stipe iv)Lamina v)Pneumatocyst

**Thallus** The plant assemblage of phaeophyta are thallus which implies they do not have appropriate roots, stems or leaves.. **Holdfast** It is a root like structure which encourage the plant to stay in soil. It likewise assist the plant with absorbing supplements from soil. The physical appearance of holdfast is changed for various darker green growth for instance it might be container formed or intensely fanned. Single green growth contain just a single holdfast yet now and again more than one stipe is available which develop from their holdfast. **Stipe** It is stem like or stalk like structure present in green growth . It might be develop close to the base of green growth as on account of Laminaria or it might be available into an intricate structure which keep running all through the assemblage of green growth as if there should be an occurrence of Sarogassum. The structure of stipe is divided into three layers. i)Central substance ii)Surrounding cortex iii)Outer epidermis In some green growth substance area contain extended cells which looks like to phloem in structure and capacity. In a few animal types for instance Nereocystis the focal point of stipe is hollow and contain a gas which give lightness to algal plant. The stipe might be unbending as in types of Postelsia palmaeformis or might be adaptable or flexible as in the event of Macrocystis pyrifera. **Lamina**

A leveled divide which takes after to leaf is called leaf lamina. It is additionally called as cutting edge or frond.

- The word cutting edge is connected to a solitary undivided structure.
- While the word frond is connected to a few or all algal body which is flattened. Pneumatocyst Gas filled floats which give lightness to green growth are called pneumatocyst. Examples In kelps and a few individuals from fucales. External structure of phaeophyta Inner Structure of Phaeophyta
- Cell wall Cell wall comprises of two layers: 1) The external layer is comprised of algin and is sticky when wet and weak when it dries out. 2) The inner layer layer is comprised of cellulose and it is hard. Cells contain couple of parietal band formed chromatophores with irregular branches. Cells are rectangular and contain one nucleus. Nucleus is put in the district of focal vacuole suspended by protoplasmic strings.
- Tissues

**There are two main types of tissues in the brown algae:**

1) Pseudoparenchymatous

2) Parenchymatous

Pigments Brown algae contains the pigments fucoxanthin, xanthophylls and chlorophyll an and c. Yet, most dark colored green growth contain fucoxanthin shade which is in charge of the greenish-brown. Chloroplasts are discoid shaped with a chloplastic endoplasmic reticulum. The thylakoids are

in groups of three, with support lamellae. Pyrenoid and chromatophores are also present. Internal structure of pheophyta

## **PROPAGATION IN PHAEOPHYTA**

There are three sorts of generation in phaeophyta: i. Vegetative propagation  
ii . Asexual propagation iii. Sexual propagation i. Vegetative

propagationVegetative spread happens by discontinuity of the thalli. On account of Sargassum this kind of generation is exceptionally productive. In S. natans it is discovered copiously. This is a free drifting animal categories. In a portion of the cases extraordinary sections known as ' propagula' are created. They happen in Sphacelaria. The ' extrinsic buds' create in numerous types of Fucus. They create by the division of meristematic cells in youthful plants. Each bud forms into another plant. ii. Asexual multiplication: Agamic generation happens by methods for zoospores and aplanospores shaped inside the sporangia.

By zoospores: The arrangement of zoospores is most normal in every one of the individuals from Phaeophyceae with the exception of in Dictyota and Fucus. The zoospores are pyriform and biflagellate. The foremost flagellum is bigger than the back one with the exception of in Fucales. In Dictyotales single flagellum is found on the zoospore. The zoospores are delivered inside the zoosporangia, which might be of two kinds, i. e., unilocular sporangia and multilocular or pluriocular sporangia. The unilocular sporangium might be terminal or intercalary in position. In every sporangium 64 or 128 zoospores are delivered. At the season of development of zoospores decrease divisionhappens and zoospores are haploid. They sprout into haploid thalli

(gametophytes). Now and again as Punctariales, Sphacelariales, Chordales, Ectocarpus, Pyaelliella, and so forth., the zoospores carry on as gametes and join in sets. This is the case of source of sex. The plurilocular sporangia are constantly terminal in position. Every one of the cells of sporangium are diploid and offer ascent to diploid zoospores. Such zoospores will offer ascent to sporophytes. The multilocular sporangia are obscure in Fucales and Laminariales.

By Aplanospores In some cases, in unilocular sporangia as opposed to creating zoospores the aplanospores may likewise be delivered. They are non-motile and without flagella, e. g., Dictyotales. The principal division is dependably reductional. The aplanospores are in every case less in number. In Dictyota 4 aplanospores and in Zonaria 8 aplanospores are created per sporangium. iii. Sexual multiplication:

This extends from isogamy to oogamy.

Isogamy: This happens by the combination of two comparable gametes. This is found in numerous Phaeophyceae, for example, Ectocarpales, Sphacelariales, Dictyosiphonales, and so forth. The gametophytes might be monoecious or dioecious. (b) Anisogamy: Here the combination of two disparate gametes happens. The models of this compose are found in a few individuals from Ectocarpales, Cutleria, Soranthera, and so on. On the off chance that combination fizzles the female gametes may grow parthenogenetically. (c) Oogamy: In lion's share of Phaeophyceae the sexual proliferation is oogamous. The species might be homo or heterothallic. The

male sex organs are known as the antheridia and the female sex organs are known as the oogonia. In Dictyotales the antheridia are multicellular structures. Every cell of antheridium offers ascend to a spermatozoid. In Desmarestiales and Laminariales the antheridia are unicellular and every antheridium delivers a solitary spermatozoid. Normally each oogonium produces a solitary ovum or oosphere, however in Fucus eight eggs are delivered in the oogonium. The eggs free in the water and at exactly that point the preparation happens so that the fertilization is outside. In Fucales the sex organs create inside conceptacles which create on extraordinary regenerative oranches called the ' containers'. In ectocarpous.. In E. padinae three particular sorts of pluriloculargametangia are framed. The biggest ubergametangia speak to oogonia and the littlest smaller scale gametangia speak to antheridia The egg and antherozoids created by the develop super gametangia and smaller scale gametangia circuit to shape zygospore. The medium measured meso-gametangia offer ascent to medium size gametes. They don't meld yet grow new plant parthenogenically.

## **CLASSIFICATION OF PHEOPHYTA**

Grouping Characterization is characterized as the course of action of living beings in the scientific categorizations as per their watched similarities(including at any rate kingdom and phylum , class, order, family variety what's more, species. Requests of

Pheophyta Ectocarpales Chordariales Laminariales Dictyotales Fucales Dictyosiphonales Desmarestiales Ectocarpales  
Kingdom: Chromista Division:

Pheophyta Class: Pheophyceae Order: Ectocarpales Family:

Ectocarpaceae Genus: Ectocarpaceae Species: Ectocarpsilliculosus General Characteristics These are free-gliding green growth found in marine territory additionally found in tropical and calm natural surroundings. 16 species are found in India in western drift There plant body is erect, filamentous, prostrate and heterotrichous. Photosynthetic shades are chlorophyll a, chlorophyll b and fucoxanthin are available.

Chorodariales Kingdom: Chromista Division: Pheophyta Class:

Phaeophyceae Order: Chorodariales Family: Chorodariaceae Genus:

Cladosiphon Species: Cladosiphon occidentalis General Characteristics They are essentially marine green growth. They have multi-axial sporophyte.

Sporophyte is overwhelming. They additionally repeat by agamic generation.

Laminariales Kingdom: Chromista Division: Pheophyta Class:

Pheophyceae Order: Laminariales Family: Laminariceae Genus:

Laminaria Species: Laminaria japonica General Characteristics It has around 30 species. It is found in Atlantic and Pacific sea. They are particularly reaped in Japan, Korea and China. Laminaria have long level sharp edge between 1-3 meters.

Dictyotales Kingdom: Chromista Division: Pheophyta Class:

Pheophyceae Order: Dictyotales Family: Dictyotaceae Genus: Dictyota Species:

Dictyotadichotoma General Characteristics It is discovered ordinarily in littoral shores and sub-littoral spots. It is found in North America, Europe, England,

Tasmania, Japan and Phillipine islands. The thallus is level. . Antherozoids

are created in sexual generation. Ova creates in sex organ on gametophyte.

Abiogenetic generation happens by tetraspore created in tetrasporangium.

Fucales Kingdom: Chromista Division: Pheophyta Class: Pheophyceae Order:

Fucales Family: Fucaceae Genus: Fucus Species: Fucus vesiculosus  
 General Characteristics The plant body might be monoecious or dioecious with hold quick and dichotomously fanned fronds. Primarily found in marine water.

Dictyosiphonales Kingdom: Chromista Division: Pheophyta Class: Pheophyceae Order: Dictyosiphonales Family: Dictyosiphonaceae Genus: Hummia Species: Hummia on suta  
 General Characteristics The thallus is comprised of parenchymatous cell in which longitudinal and transverse generation happens. Sporophyte is perceptible and gametophyte is minute.

Desmarestiales Kingdom: Chromista Division: Pheophyta Class: Pheophyceae Order: Desmarestiaceae Family: Desmarestiaceae Genus: Demerestia Species: Desmarestia vividis  
 General Characteristics They are marine green growth. They demonstrate sexual oogamous proliferation.

Kingdom: Chromista Division: Pheophyta Class: Pheophyceae Order: Desmarestiaceae Family: Desmarestiaceae Genus: Demerestia Species: Desmarestia vividis  
 General Characteristics They are marine green growth. The sporophyte is expansive and pinnately extended sporophyte. They demonstrate trichothallic development. They demonstrate sexual oogamous proliferation. The sporophyte bears unilocular sporangia. They demonstrate heteromorphic shift of age. Members of Phaeophyta There are around 1800 species that are available in this group. All of them are multicellular and a large portion of them are marine algae. The shade of species changes relying on the measure of dark colored pigment. Members incorporate species having a place in genera Ectocarpus, Laminaria, Sargassum, Dictyota, Fucus, Marcocystis, Padina and so forth. (figure: Members of phaeophyta)

Some important individuals from Phaeophyta are as following: (1) *Ectocarpus siliculosus*: It happens in marine environments. The thallus of this specie is filamentous which is at first sorted out as essential fiber having extended and round cells from which branches differentiate. These are heterotrichous with basal rhizoid. Different individuals from this genera incorporate species, for example, *E. acutus*, *E. brachiatus* and *E. capensis*. (2) *Laminaria digitata*: It is available in sublittoral zone of North Atlantic Ocean. It is regularly called as oarweed or tangle and is placed in family Laminariaceae. It shows up as extreme and rough kelp having 2-3 m length. Rhizoid is a hook like structure which holds laminaria to the rock. It has a smooth and adaptable stipe. The example of species in genera laminaria are as following *L. bulbosa* and *L. ephemera*. (Figure: *Laminaria digitata*) (3) *Fucus serratus*: It is regularly otherwise called toothed wrack or serrated wrack. It develops especially on the rough parts of the shore as it is a lively alga. It is olive dark colored in colour. It has a short stipe and it branches in dichotomous way.

Different individuals from this genera incorporates species, for example *F. atomarius*, *F. radicans*, *F. mytili* and *F. spiralis*. (4) *Sargassum muticum*: It is an autotrophic, dark colored shaded seaweed. It can endure high temperature and saltiness varieties. It grows up to 10 m in length. It is joined to strong substrates, for example, rocks. It has two sections that are perpetual and yearly. The strategy for multiplication is both sexual and asexual. It is monoecious in light of the fact that male and female regenerative structures are available in same repositories. Different individuals from this gathering incorporates *S. acinaria*, *S. cicutum* and *S.*

fallax.. (Figure: Sargassum muticum)(5) Dictyota dichotoma: It is usually known as forkweed. It is available in reef environment. It has leaf like, level thallus and thin fronds on which conceptive structures are scattered. The midrib is missing in it, however, expanding is available in it. Other members of this genera incorporates species, for example, D. adnata, D. bifurca, and D. canariensis.

## **ECONOMIC IMPORTANCE OF PHAEOPHYTA**

Phaeophyta have great economical importance in many fields of life.

Phaeophyta have more positive effects and also have some negative effects such as following: As fodder Phaeophytes are use as eternal source of food for animals in many coastal countries. The people of UK and Japan use Laminaria, Sargassum and Fucus as food source. Hens that eat fucus-meal lay eggs with great content of iodine. Sheep and cattle feed on stock-feed and commercial-feed. As fertilizers Phaeophytes are applied as fertilizer as fucus act as manure by Irish people. Seaweeds are source of phosphorus, potassium and some trace elements, that's why they use as fertilizer. In advance countries intense extract of seaweeds sold as fertilizer in liquid form.

As antibiotics Phaeophyte as Laminaria and Ascophyllum have antibacterial substance that are efficient against of gram-positive and gram-negative bacteria. As source of minerals Kelps are large brown algae seaweed. Ashs of dry kelp are source of soda that is useful for preparation of soap and glassware. Kelps are also origin of potash, iodine, ammonia and charcoal. Saeweeds are source of manganese, boron, copper and zinc. Medicine

Fucoidin and sodium laminarinsulphate, that get from some brown algae are utilized as anticoagulant of blood. Absorption of metals: The members of brown algae can absorb heavy metals so they are used to remove heavy metals from waste water. In industry laminaria contain alginic acid in the cell wall and middle lamella used as industrial stiffening agent in food and other uses. Sanitized alginates are non-toxic and made gels. They are used as thickening and gelling agent in industrial products such as hand creams in cosmetics, polishes, medicine and paints.

### **Some negative effects**

Kelp is an iodine-rich sea plant. Our thyroid gland produces thyroid hormone, which regulates our metabolism. Excess use of kelp increases the hormone levels that cause sudden weight loss. It also causes skin problems such as acne, dryness and skin appears pale. Sodium alginate is high in sodium. The patient of high blood pressure should avoid this supplement. Some types of alginates when consumed more cause increased maternal mortality.