
Division: CYANOPHYTA (Blue-Green Algae)

Some blue-green algae form lichenes with certain species of fungi (This is an example for symbiosis).

Division: PHYCOPHYTA (Algae and Seaweed)

Seaweeds are one or more celled plants living in the sea or in fresh water and are capable of producing their own food via photosynthesis.

They have nucleus and chlorophyll in their cells, reproduce by spores (asexual reproduction) or gametes (sexual reproduction); in primitive groups these reproduction cells have flagella.

Algae are divided into the following classes according to the color substances (pigments) that they carry and also according to having a flagella or not:

1st Class : Flagellatae (Algae with flagella) Causes phosphorescence in the sea

2nd Class : Chrysophyceae (Gold colored algae) (= Diatomae Algae containing silica)

3rd Class : Chlorophyceae (Green algae)

4th Class : Phaeophyceae (Brown algae)

5th Class : Rhodophyceae (Red algae)

Chrysophyceae (Gold colored algae)
(= Diatomae, Algae with silica)

Single celled algae containing silica are found in this class.

Therefore they are also called Diatomae. These organisms live in humid soil, fresh or salty water.

They have nucleus and chromatophores in their cells. Isofucoxanthin, chlorophyll a and c are present as plastids, they do not contain chlorophyll b and starch.

Diatomae are divided into 2 groups according to their shapes:

Order: Centrales
Circular shaped.

**They can not
move by
themselves,
generally live in the
sea and form
phytoplanktons.**

Order: Pennales
Bilateral shaped.

**They mostly live in the
depths of lakes and still
water, may be rod shaped
or elliptic.**

**They are capable of
moving by themselves.**

Diatomae can survive through drought owing to their silica containing walls; these walls do not decay when the organism dies, and form a special type of soil (diatomite**) that consists of fossilized remnants of these silica containing walls.**

Diatomite is also called Terra Silicea (*) (Diatome earth, Kieselguhr). It is rich in silica (65-90%), Al, Fe, Mg etc.

Usage:

- **Drying agent in pharmaceutical technology**
- **Purified Terra Silicea (SiO₂) is used in pomades due to its drying effect**
- **Isolation material (heat isolation)**

Class: Phaeophyceae(*) (Brown algae)

~~They mostly live in the sea, and some species live in fresh water. They are called brown algae since they contain phycoxanthin.~~

They can produce their own food, however since they do not contain chlorophyll but phycoxanthin, they produce laminarin and mannitole instead of starch.

(*) phaeo- = Gr. brown

Class: Phaeophyceae

Order: Laminariales

Typically found in the cold seas.

Important species in regard to pharmacy and food industry are present within this order.

Fam: Laminariaceae

- *Laminaria* genus lives only in the seas, members may grow up to 2-3 m.

These plants are rich in laminarin, mannitol, iodine and alginic acid.

**Gives the drug named *Stipites Laminariae*
(*Laminariae stipites*).**

Sterilised drug is used as wound cleansing agent and for wound drainage.

Yields **Stipites Laminariae (Laminariae stipites)**.

Other species that also give this drug are:

L. digitata (L. flexicaulis)

L. saccharina

Laminaria saccharina

Laminaria hyperborea

Laminaria japonica

Laminaria japonica

Laminaria religiosa

Laminaria hyperborea

Laminaria cichorioides

***Laminaria* species are also used as iodine source.**

***Laminaria* species also contain ALGINIC ACID which is used in the pharmaceutical technology.**

Other species of brown algae like *Fucus*, *Macrocystis* and *Nereocystis* are also used as alginic acid source

It is used in the production of tooth pastes, as filling material and tablet disintegrater in pharmaceutical industry; its aluminum salt is used in the treatment of stomach ulcers; calcium salt is used as hemostatic*.

Other brown algae species used to obtain alginic acid and iodine are:

Macrocystis pyrifera

Nereocystis luetkeana

Lessonia nigrescens, *Lessonia flavicans*

Order: Fucales

Species of this order live in the seas and may be up to 1 m. Their thalli (plural for thallus) have air vesicles that keep the species floating in the sea.

They are rich in iodine.

Also used in cosmetic industry.

Fucus serratus

Fucus vesiculosus

Named due to the vesicles that it contains

***Fucus spiralis* does not contain air vesicles)**

Sargassum vulgare

They form a huge community in the sea (called Sargassum Sea) and these formations are indicated in sea maps since it prevents the ships from moving

Class: Rhodophyceae **(Red Algae)**

The cells of these species contain chlorophyll as well, however since red colored phycoerythrin is more dominant, they are called red algae. They also contain phycocyanin (blue colored substance) and xanthins.

The product of photosynthesis is a starch called Floride starch (not truly a starch) and gives red color when stained with iodine*.

*** Normally starch is stained blue with iodine**

Order: Gelidiales

Some species yield a drug named Agar-agar (Agarose).

These species are:

Gelidium amansii

***Gelidium japonicum* (found in the coasts of Japan)**

***Gelidium corneum* (found in the coasts of Brasil and Mediterranean countries)**

Order: Gigartinales

This order also contains species that yield Agar-agar.

Gracillaria lichenoides (Indian Ocean)

G. confervoides (North Atlantic Ocean, South Africa, Australia)

Euchema muricatum (Indian Ocean)

Ahnfeltia plicata (North Atlantic Ocean)

Gigartina stellata (England)

Phyllophora nervosa

Grows in Russia.

Yields both Agar-agar and iodine.

**Lowers plasma
cholesterol level.**

Gracillaria verrucosa

Contains antilipemic* compounds.

*Antilipemic drugs are used to lower abnormally high blood levels of lipids, such as cholesterol, triglycerides, and phospholipids.

Agar-agar:

Rich in polysaccharides.

Soluble in hot water, colloidal at room temperature.

Usage: Laxative*, growth medium in bacteriology

*** Laxative: Foods, compounds or drugs taken to loosen the stool, most often taken to treat constipation.**

In the Gigartinales order, there also some
species that are used in the production of
a drug named **Carrageen** (Karagen, Deniz
kadayıfı).

Chondrus crispus

Found in the North Atlantic Ocean

Gigartina mamillosa

Gigartina stellata

These are the mostly used species in the production of Carrageen.

Rich in polysaccharides (50-60%).

Usage: Laxative, antitussive*

Polysaccharide fraction of Carrageen is known as **carragenin (carragenan) and used for stomach ulcers.**

***antitussive: effective against cough, or an agent with this quality.**

Order: Ceramiales

Ceramium sp.

Are collected for the production of Agar-agar

Alsidium helminthochorton

(= Corsika worm moss)

Gives a drug named Helminthocorton and is used as anthelmintic due to **cainic acid** that it contains.

Digenia simplex grows in the Indian ocean and Japanese coasts, Pacific coasts and Mediterranean sea.

It also contains **cainic acid** and used as anthelmintic.

Delesseria sanguinea

Has flat thallus (just like a leaf).

Grows in the North Atlantic Ocean

Usage: Anticoagulant*

***acting to suppress, delay, or nullify blood coagulation, or an agent that does this.**