

“Are blue-green algae phytoplankton?”

Phylogenetic



Functional



Functional:

Plankton- freely floating , carried along by currents. Can be motile

e.g. Rooted aquatic plants are not planktonic

Microscopic algae can be planktonic, those that are comprise the PHYTOPLANKTON. Phytoplankton are important in reservoirs and in water column of large rivers.

Periphyton- Microscopic algae growing on substrate (solid surface)

Epiphytes- microscopic algae growing on macrophytes.

Macrophytes- vascular (rooted) plants, mosses, liverworts, large colonial algal forms.

Epilithon- layer of algae, bacteria, and mucilage covering substrate (rock surface).

KINGDOM- PHYLA- CLASS- ORDER

Procaryotes (bacteria)-

Blue-green algae:

a.k.a. cyanobacteria, cyanophytes

Eucaryotes (with organelles)

Diatoms

Bacillariophyceae

Green algae

a.k.a. chlorophytes, chlorophyceae

Euglena sp.

Planktonic phyla

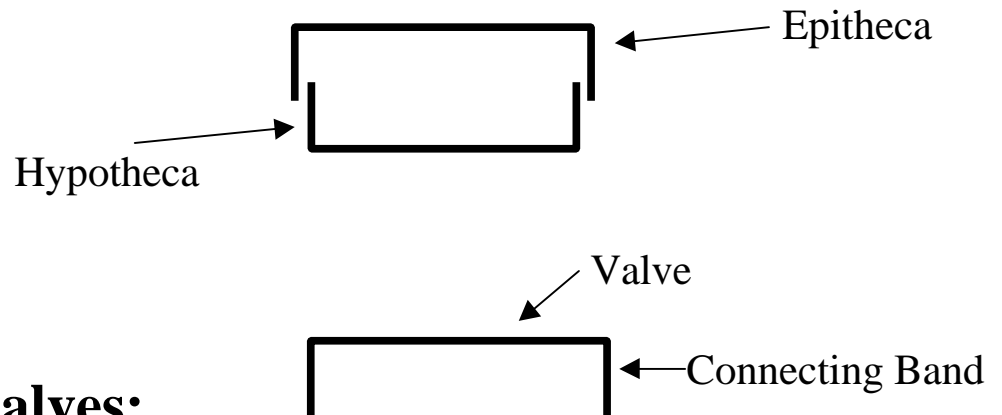
Chrysophytes

Dinoflagellates

Cryptophytes

Diatoms

Silica frustules



Patterns of valves:

Planktonic- centric (radial)

Benthic- Trellisoid (Eunotia)

Gonoid (angular)

Pennate (around center line)

Pennate diatoms have a RAPHE or PSEUDORAPHE

:with raphe diatoms move by gliding on a mucilage trail

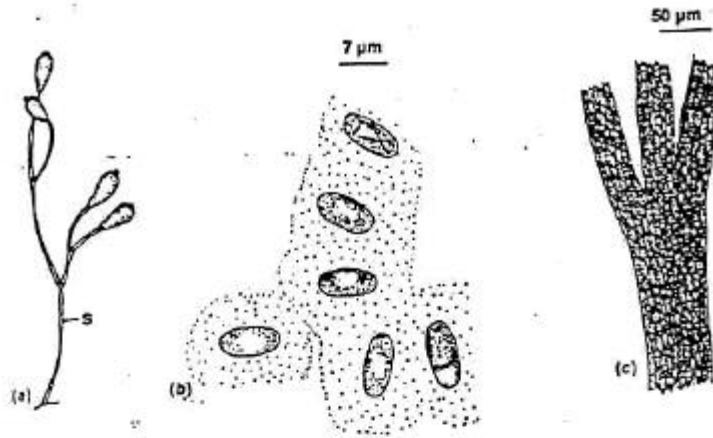


Fig. 9-6. Extracellular secretions by diatoms. (a) Stalk (s) of *Gomphonema olivaceum* (after Schütt, 1896). (b) Capsule of *Navicula pelliculosa* (after Lewin, 1955b). (c) Mucilage tubes of *Amphipleura rutilans*. (After Drum, 1969.)

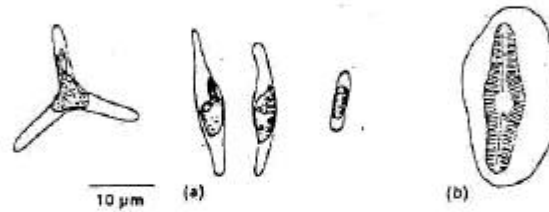


Fig. 9-7. *Phaeodactylum tricornutum*. (a) The three forms, triradiate, fusiform, and oval. (b) An enlargement of the oval cell showing the single scale (After Wilson, 1946).

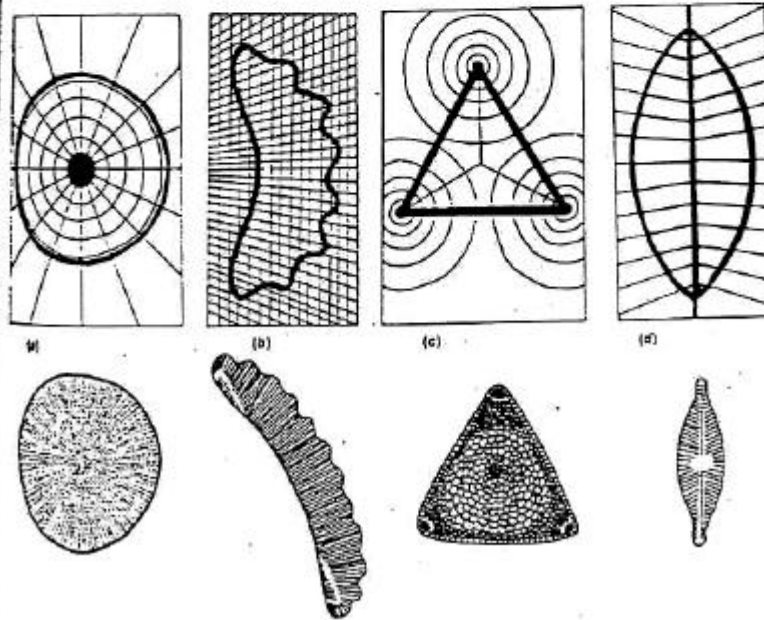


Fig. 9-2. The basic patterns of ornamentation in the Bacillariophyceae: (a) Centric and radial (example: *Coscinodiscus*). (b) Trellisoid with structure arranged margin to margin (example: *Eunotia*). (c) Gonoid, structure supported by angles (example: *Triceratium*). (d) Pennate, symmetrical about an apical line (example: *Navicula*). (After Hendey, 1964.)

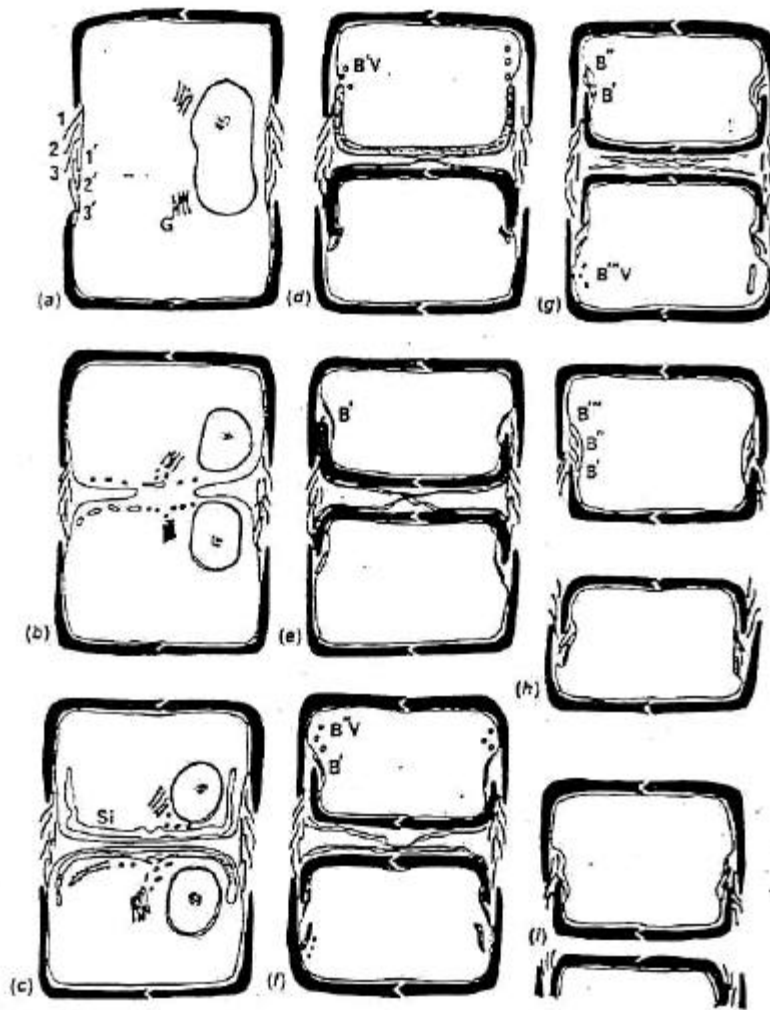


Fig. 9-9. Diagrammatic representation of the stages of frustule formation, including girdle band formation, in *Gomphonema parvulum*. (a) The nucleus divides and the cell elongates. (b) There is invagination of the plasmalemma. (c) Formation of the silicalemma occurs by the fusion of Golgi-derived vesicles. (d) Silica is deposited within the silicalemma to form the valves; vesicles accumulate in the area of the first girdle band. (e) The first girdle band is formed within a vesicle and secreted to the outside. The internal membrane of the silicalemma becomes the new plasmalemma, and the old plasmalemma and the outer membrane of the silicalemma are lost. (f-i) The second and third girdle bands are formed. (After Dawson, 1973.)

Green Algae (chlorophytes)

Characteristics

- 1. Chl a and b**
- 2. Form starch in chloroplast w/pyrenoid, (not in cytoplasm)**
- 3. 90% freshwater with a cosmopolitan distribution**
- 4. Carotenoid is B-carotene**
- 5. Flagellated species have eyespot in chloroplast**
- 6. Colonial forms are common**
- 7. Filamentous forms are common**

Cell Structure

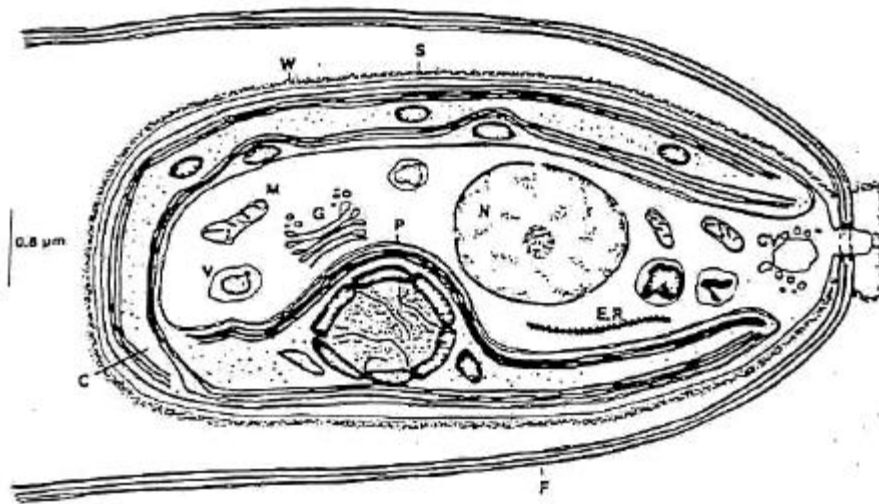


Fig. 1-1. A drawing of a cell of *Chlamydomonas* in the electron microscope showing the organelles present in a eucaryotic algal cell. (C) Chloroplast; (CV) contractile vacuole; (E.R.) endoplasmic reticulum; (F) flagella; (G) Golgi body; (M) mitochondrion; (N) nucleus; (P) pyrenoid; (S) starch; (V) vacuole; (W) wall.

C - Chloroplast

CV - Contractile Vacuole

N - Nucleus

P - Pyrenoid

W - Wall

S - Starch

ER - Endoplasmic Reticulum

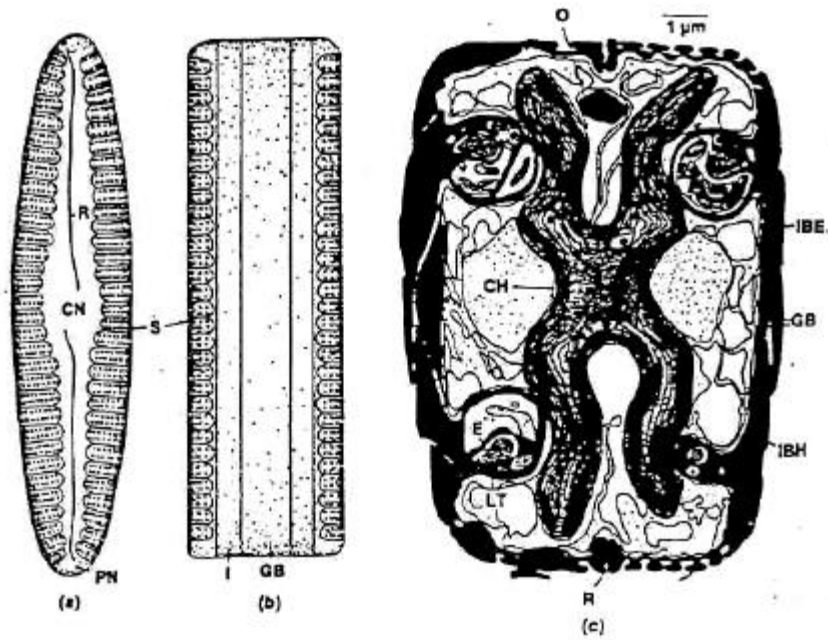


Fig. 9-1. (a) Light microscopical drawing of a valve view and (b) a girdle view of the diatom *Mastogloia*. (c) A drawing of a transverse section of *M. grevillei* in the electron microscope. (Ch) Chloroplast; (CN) central nodule; (E) elongate chamber of a septum; (GB) girdle band; (I) intercalary band; (IBE) intercalary band of the epitheca; (IBH) intercalary band of the hypotheca; (LT) locule tubule; (O) oil body; (PN) polar nodule; (R) raphe; (S) stria. (c adapted from Stoermer et al., 1965a.)

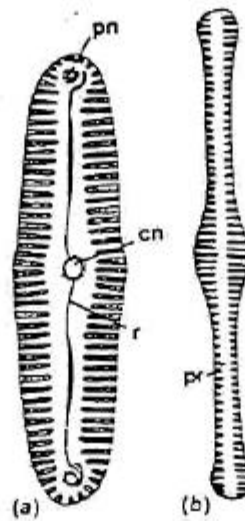


Fig. 9-2. (a) A cell with a raphe system (*Pinnularia viridis*). (cn) Central nodule; (pn) polar nodule; (r) raphe. (b) A cell with a pseudoraphe (pr) (*Tabellaria fenestrata*).

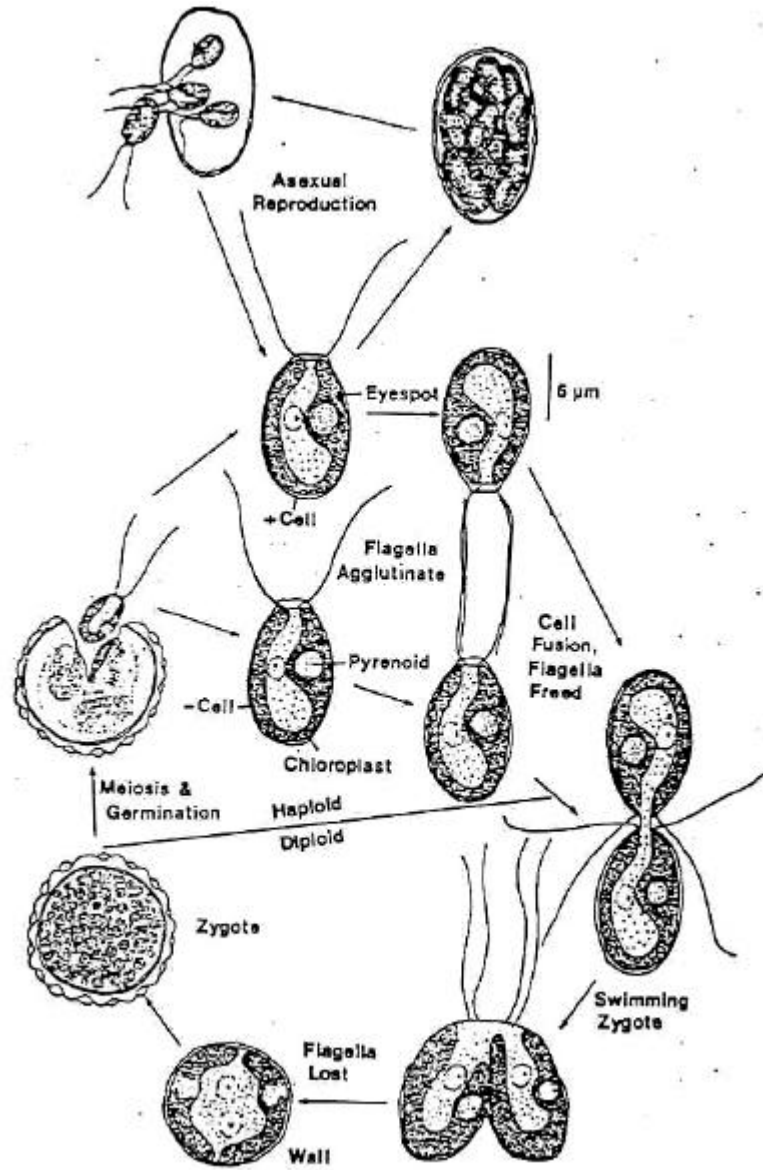


Fig. 15-4. The life cycle of *Chlamydomonas moewusii*. (Adapted from Brown et al., 1968.)

Blue-green algae

Cyanophytes

- 1. Contain Chla and phycobilins**
- 2. mostly freshwater**
- 3. Occur in plankton and as attached algae in lakes, streams and soils**
- 4. Coccoid forms are common**
- 5. Filamentous forms are common**
- 6. Intolerant of low pH**