

Division Ochrophyta (Chromophyta)

- I. General characteristic of the Ochrophyta
- II. Class Pheophyceae
- III. Class Bacillariophyceae

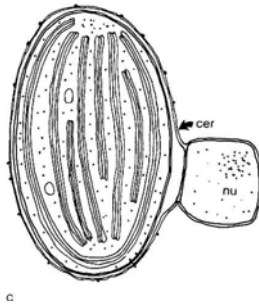
Division Ochrophyta

General Characteristics:

- name comes from ocher color
- chl a, c
- fucoxanthin major accessory pigment in Diatoms and Brown algae
- β -carotene major yellow pigment
- β -1-3-linked glucose polymer chrysolaminarin, laminarin
- heterokonts
- unique plastids

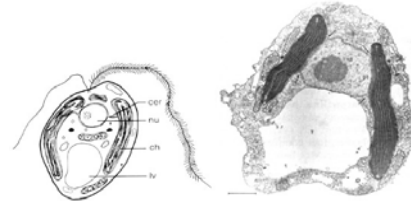
Ochrophyte Chloroplasts

- chloroplast w/ 3 membranes
- double membrane + endoplasmic reticulum layer - periplastidial endoplasmic reticulum (PER)
- PER contiguous with nuclear envelope
- thylakoids in stacks of 3's
- girdle lamella



Ochrophyta Characteristics cont.

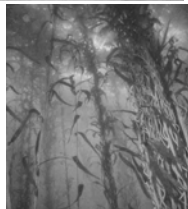
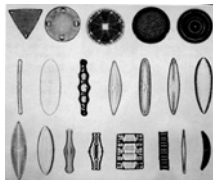
- heterokontous flagellation
one smooth shorter flagellum and one longer tinsel flagellum
- along with molecular data indicate monophylogeny (ssu rDNA; *rbcL* sequence)
- closest relatives are Oomycetes



Division Ochrophyta cont.

Seven Classes:

- Chrysophyceae
- Synuorphyceae
- Tribophyceae
- Eustigmatophyceae
- Raphidophyceae
- Bacillariophyceae
- Pheophyceae



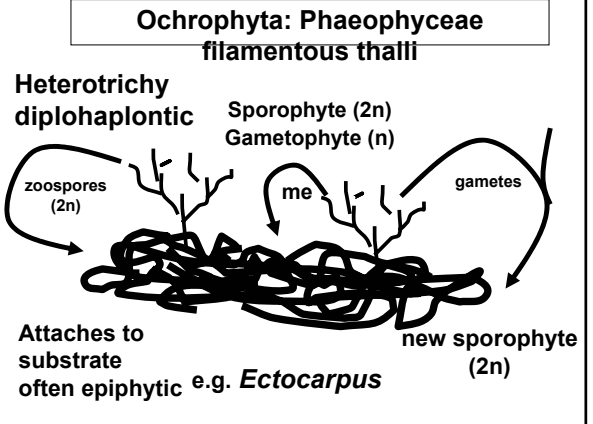
Ochrophyta: Phaeophyceae

Class Phaeophyceae (brown Algae)

General features

- multicellular (no unicells)
usual reason for its own division (Phaeophyta)
- thalli range from filaments to pseudoparenchymatous to parenchymatous

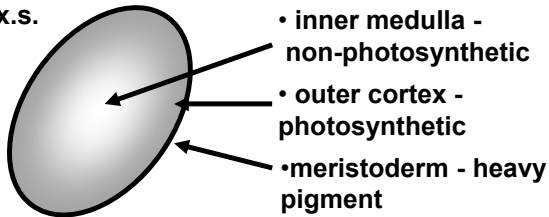
- cell walls are composed of cellulose fibrils in a mucopolysaccharide (alginic acid)
- most other features shared with other Ochrophyta (eg. heterokonts, pigments, storage products, plastid type, etc.)



Class Phaeophyceae (brown Algae)
General features cont.

advanced thallus forms have distinct differentiation

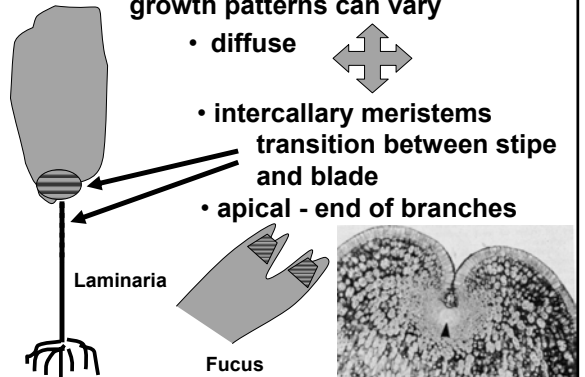
X.S.



Phaeophyceae cont.

growth patterns can vary

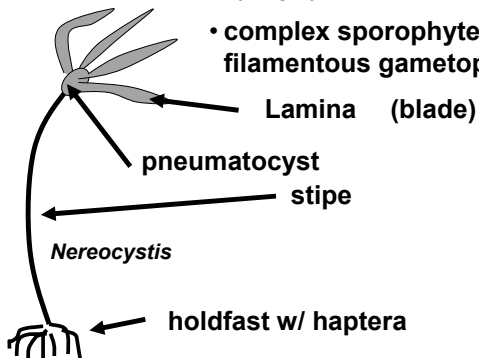
- diffuse
- intercalary meristems transition between stipe and blade
- apical - end of branches



Phaeophyceae cont.

Order Laminariales (kelps)

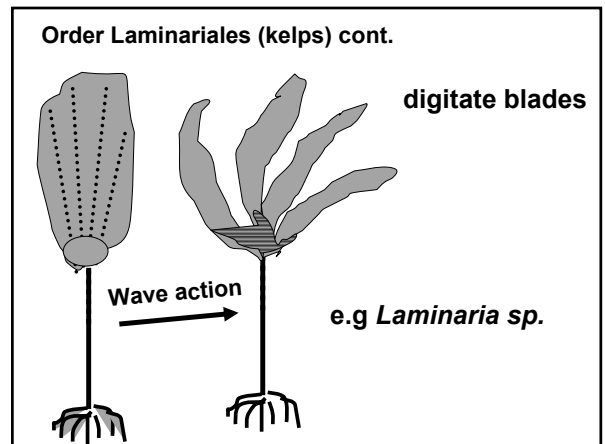
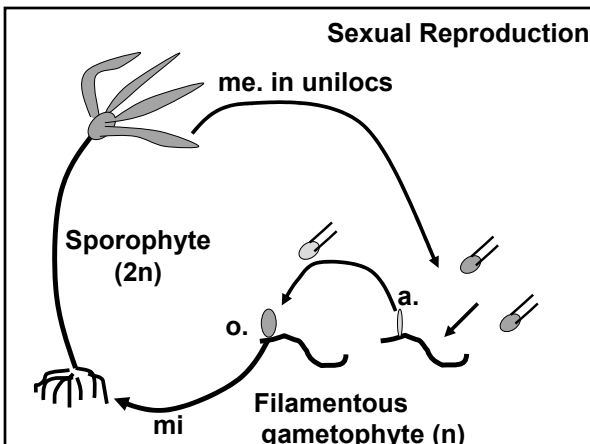
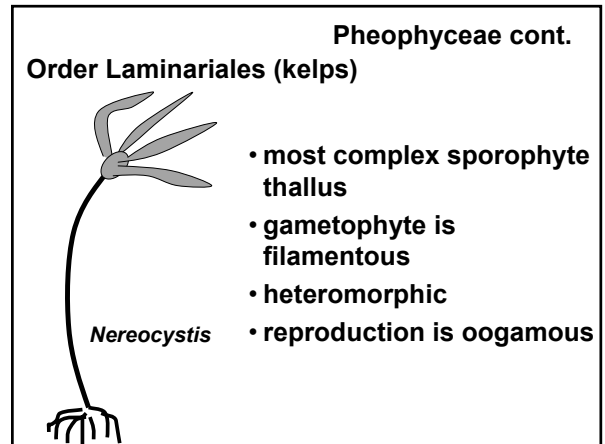
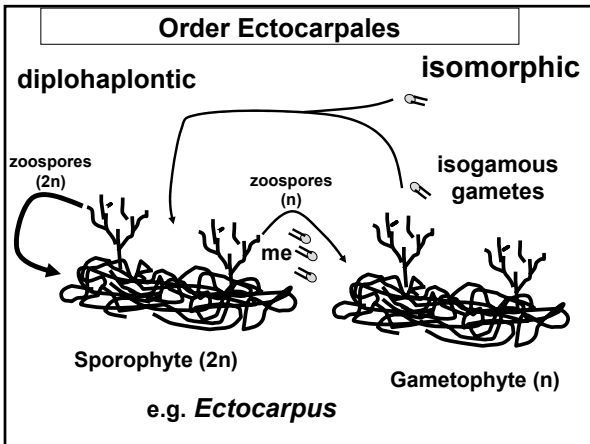
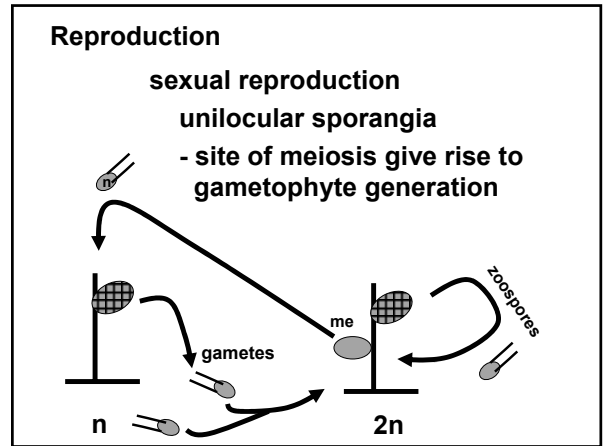
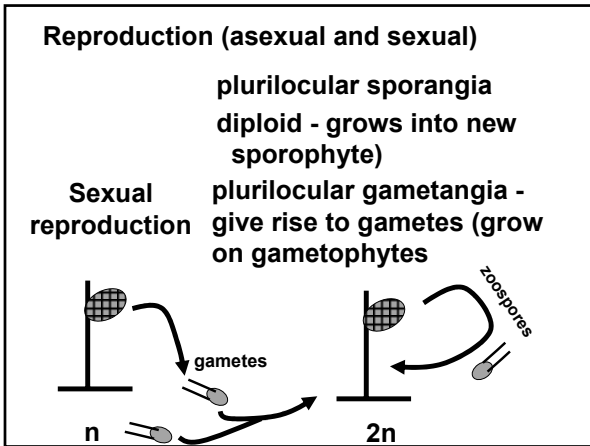
- complex sporophyte filamentous gametophyte



Phaeophyceae cont.

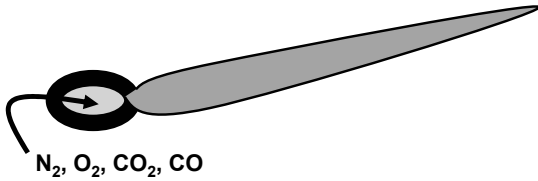
orders separated based on life history patterns

- isomorphic generations (filamentous spp. *Ectocarpus*)
Ectocarpales
- heteromorphic generations (Kelps)
Laminariales
- No free living haploid stage (*Fucus* and other rockweeds)
Fucales



Order Laminariales (kelps) cont.

- blade - primary photosynthetic organ
- gas bladder - float
- sporophylls - specialized for reproduction



Order Laminariales (kelps) cont.

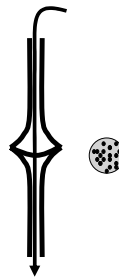
stipe

alginic acid cuticle

- matrix mucopolysaccharide
- strength/elasticity of cell wall
- adhesion of germinating zygote (establishment)

sieve cells (trumpet cells) in medulla

- flared ends
- transport organic materials - mannitol



Phaeophyceae cont.

Order Fucales (Rock weeds)

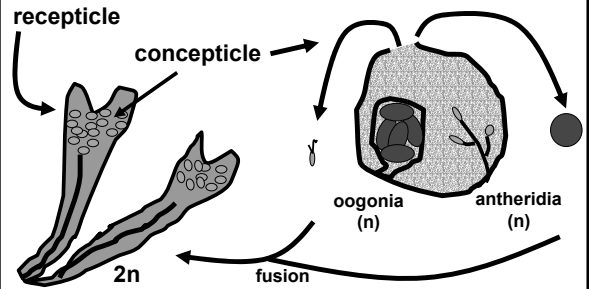


- parenchymatous thallus
- no gametophyte (no free living haploid stage)
- oogamous reproduction
- widespread distribution

Phaeophyceae cont.

Fucales

- oogamous
- no free-living haploid stage

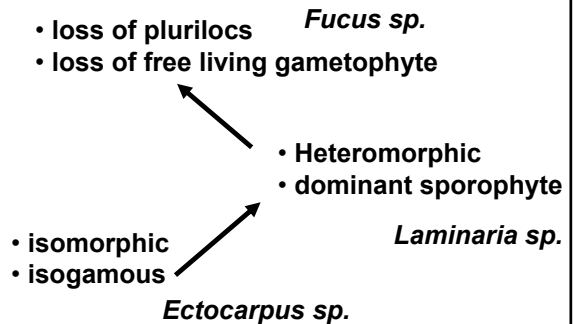


Fucoids Cont.

- may be monoecious or dioecious
- genera separated by number of eggs in oogonia:

<i>Fucus sp.</i>	8 eggs
<i>Ascophyllum sp.</i>	4 eggs
<i>Pelvitia sp.</i>	2 eggs
<i>Pelvitiopsis sp.</i>	1 egg
<i>Sargassum sp.</i>	1 egg (8 nuclei) (one fertilized)

Evolutionary Trends in Life History Patterns



Ochrophyta: Bacillariophyceae

“the Diatoms”

morphology:

- single cell
- non-flagellated (except gametes in some spp.)
- siliceous cell wall (glass)
- frustule

Class Bacillariophyceae cont.

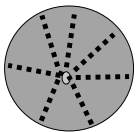
frustule morphology



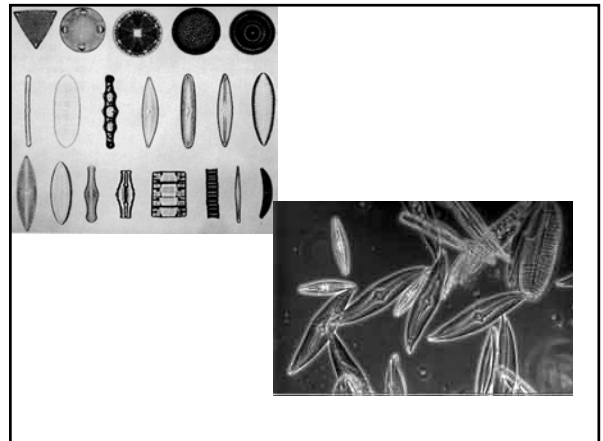
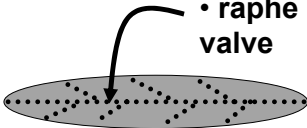
- two valves
- upper epivalve
- lower hypovalve
- girdle band
- loop of silica between valves

Class Bacillariophyceae cont.

Taxonomy based on frustule structure

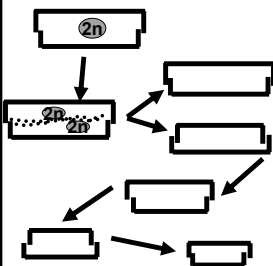


- Centric - radially arranged frustules and markings
- Pennate - bilaterally arranged frustule and markings
- raphe - line in middle of valve



Class Bacillariophyceae reproduction

asexual



sex. reproduction
regains max size

- mitosis occurs and migration into valves
- silica deposition vesicle forms
- new valves form
- new valves from hypovalve is smaller
- original epivalve cell is same size
- so average size of population decreases

Class Bacillariophyceae reproduction

Sexual reproduction

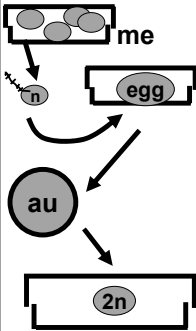
- vegetative cell is diploid!
- gametes are only haploid stage (diplonic)
- differs in centric and pennate diatoms

Class Bacillariophyceae reproduction

- meiosis occurs to form

Centric sex

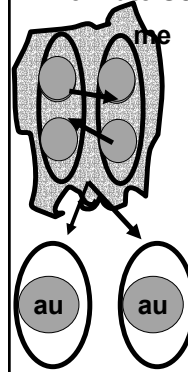
sperm (4 or more) and egg (1)



- sperm are flagellated (single tinsel) and are released
- egg can be retained or released
- zygote forms enlarged Auxospore (2n)
- division of auxospore results in vegetative cells of the maximum size

Class Bacillariophyceae reproduction

Pennate sex



- vegetative cells form gametes
- cells pair in mucilage and exchange gametes
- a Zygote forms in each original cell
- auxospores form
- division results in maximum size