

Eukaryotic Algae

- I. General Characteristics
- II. Reproduction and Life History Patterns
- III. Photosynthetic Pigments
- IV. Chloroplast types
- V. Major Polysaccharide Reserves
- VI. Flagellated stages and Flagella types

Characteristics Of Eukaryotic Algae

- true nucleus
- well developed organelles
 - mitochondria
 - chloroplasts - surrounded by 2 or 3+ membranes
- more complex reproductive cycles
 - asexual reproductive spores
 - sexual reproduction

Reproduction

Asexual

1. mitosis (cell division)
2. zoospores (flagellated)
3. Fragmentation (filaments)

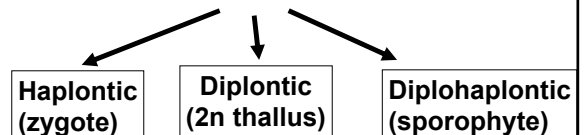
Sexual Reproduction

Two steps in sexual reproduction:

1. meiosis (reduction division)
2. syngamy (fusion of sex cells)

Zygote - diploid cell resulting from gamete fusion

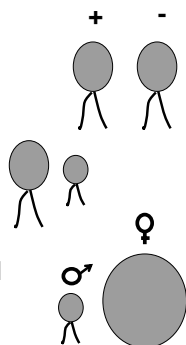
Three Basic Life History patterns:
differ in when and where meiosis occurs



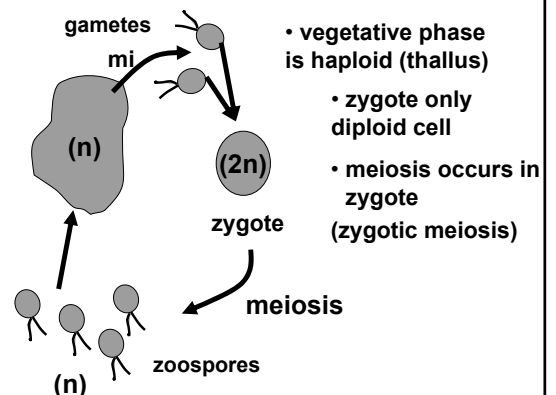
Sexual (production of gametes)

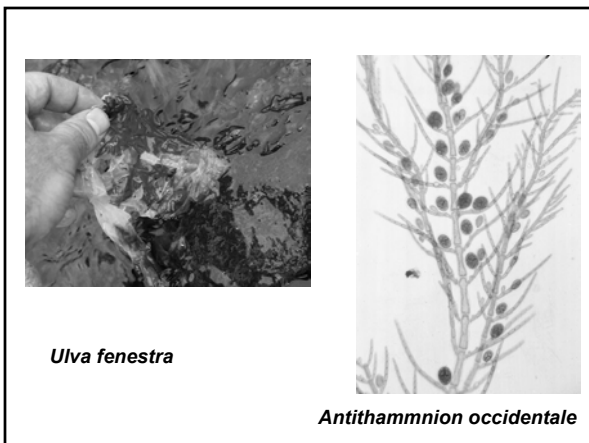
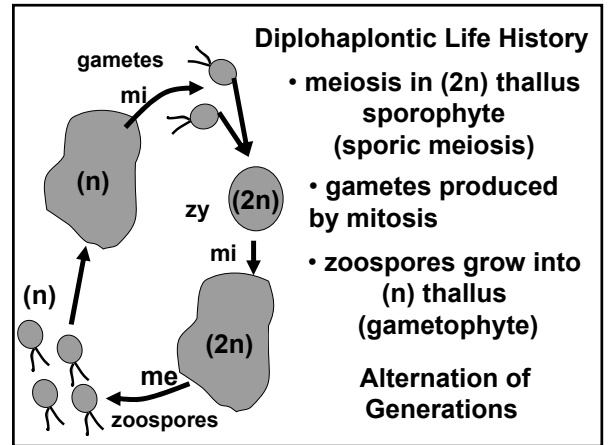
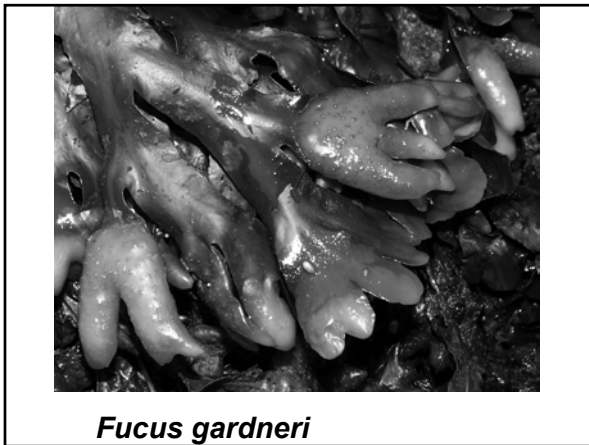
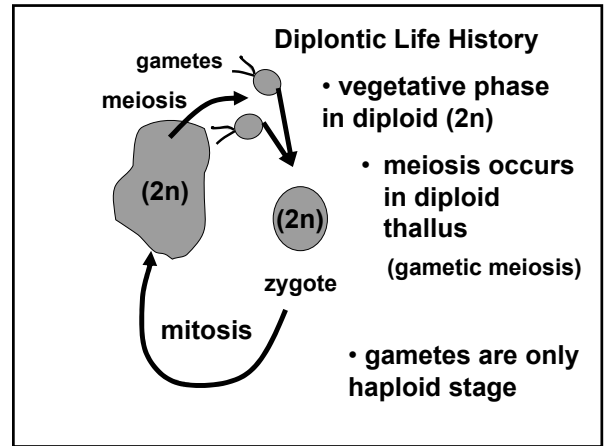
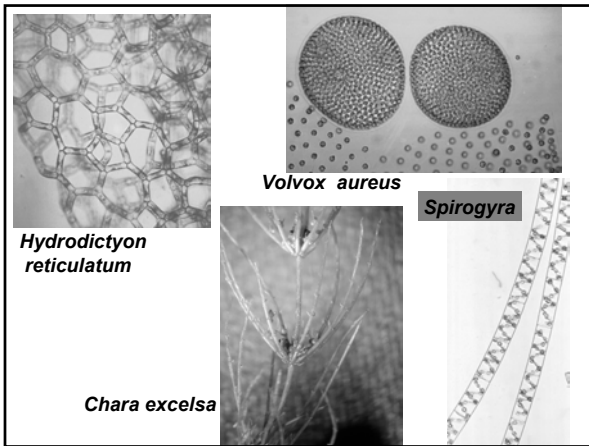
Gametes - types:

- isogamous (gametes identical, flagellated)
- anisogamous (gametes differ in size, flagellated)
- oogamous (flagellated sperm and non-flagellated egg)



Haplontic life History





Some General Distinguishing Features

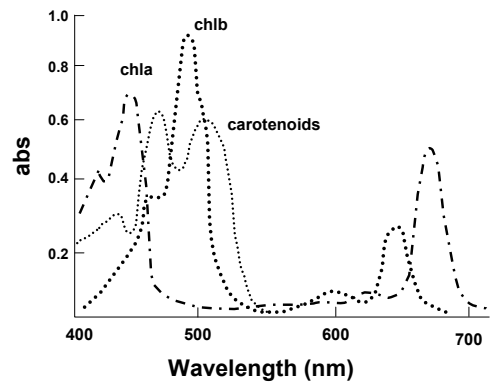
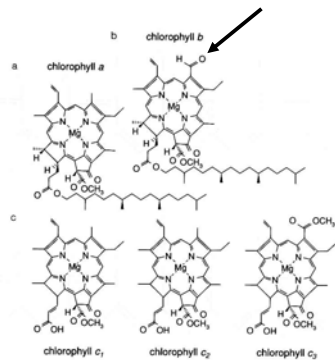
photosynthetic pigments

Chl a - all have

Chl b - Green, some Cyanobacteria

Chl c₁, c₂, c₃ - found in Brown Algae (Ochrophyta), Dinophyta, Cryptophyta & Haptophyta

carotenoids - excess energy dissipation? Xanthophyll cycle

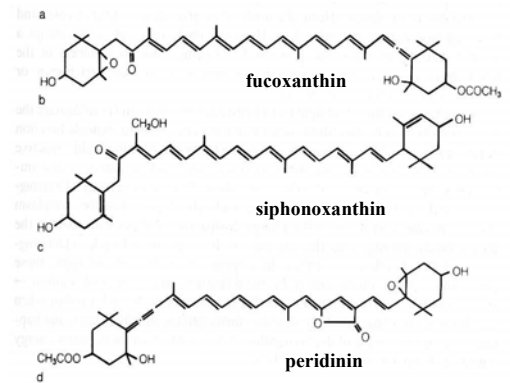


Carotenoids cont.

ca. 60 different carotenoids

major carotenoids:

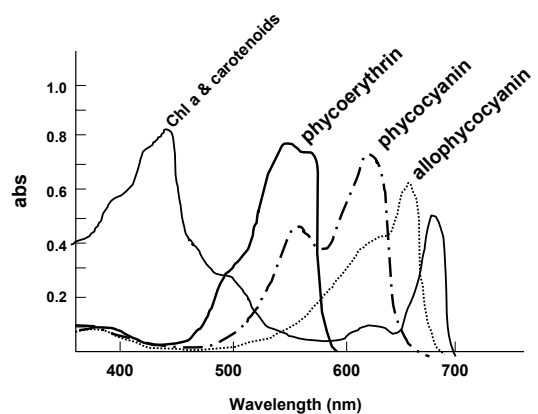
- β -carotene – major yellow pigment in ochrophytes
- fucoxanthin e.g. Browns
- peridinin e.g. Dinoflagellates
- siphonoxanthin e.g. Greens (light absorption in deep water?)

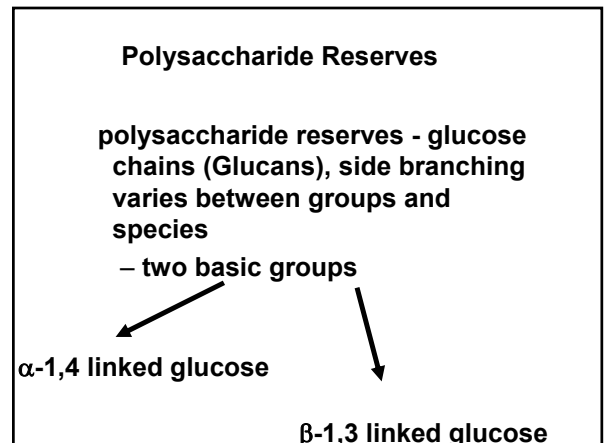
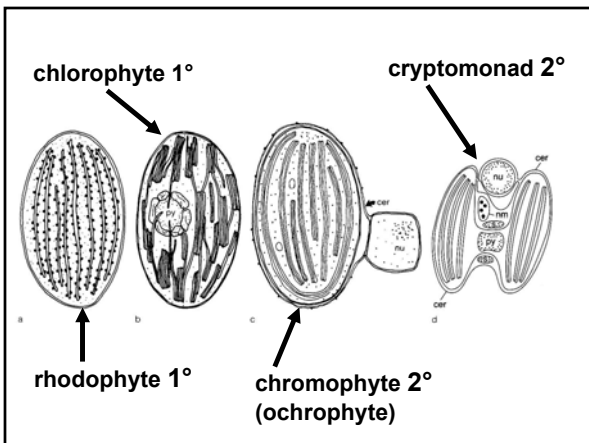
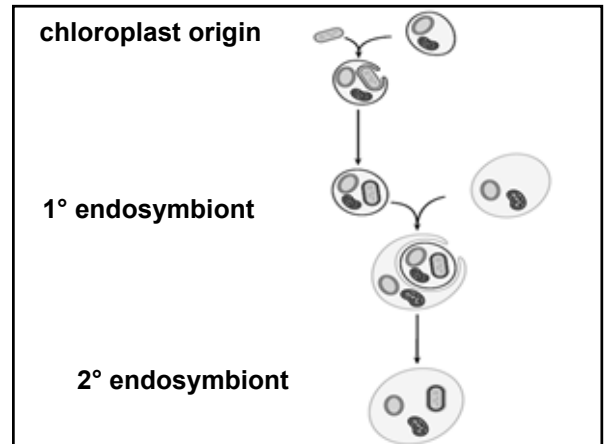
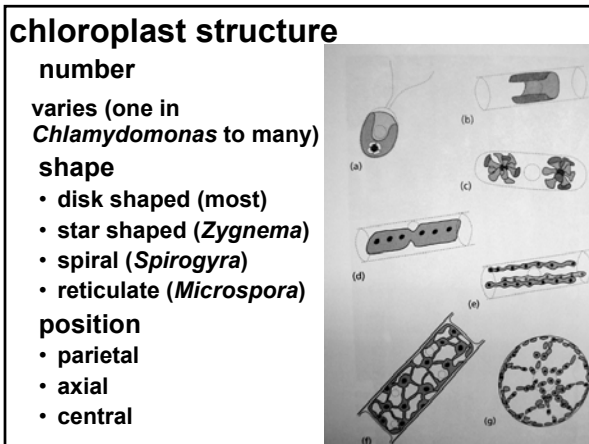
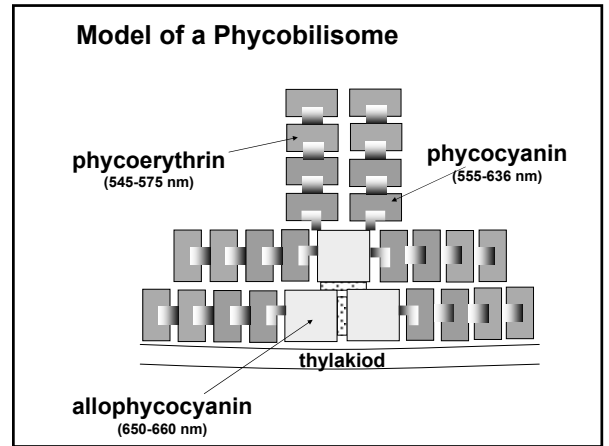
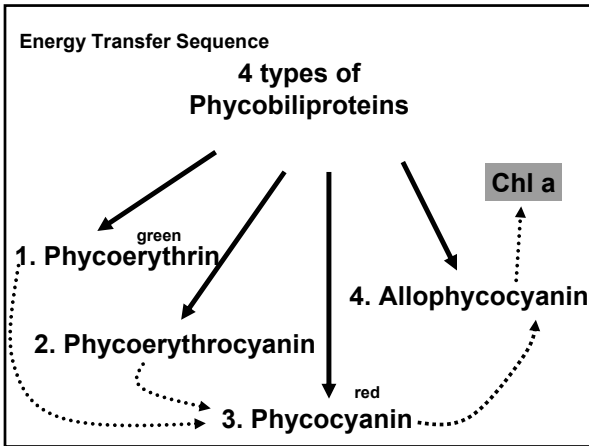


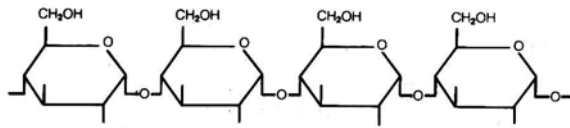
More photosynthetic pigments

phycobilins (Phycobiliproteins)
Cyanobacteria and Red Algae (Rhodophyta)

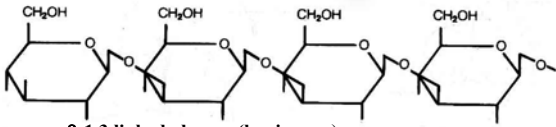
- phycobiliproteins are a phycobilin (pigment) and associated protein
- water soluble
- organized in phycobilisomes







a α -1,4 linked glucose (starch)



b β -1,3 linked glucose (laminaran)

Some Storage Products

- | | | |
|------------------------------|---|---------------------------------|
| α -1,4 linked glucose | { | • Starch |
| | | • Cyanophytan starch (glycogen) |
| β -1,3 linked glucose | { | • Floridean starch |
| | | • paramylon |
| | | • chrysolaminaran |
| | | • lipids |

flagella

9+2 organization (eukaryotic, however no prokaryotic algae are flagellated)

no flagellated cells in the Rhodophyta

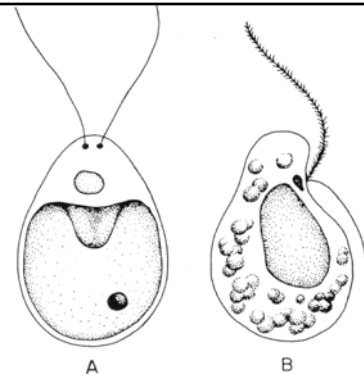
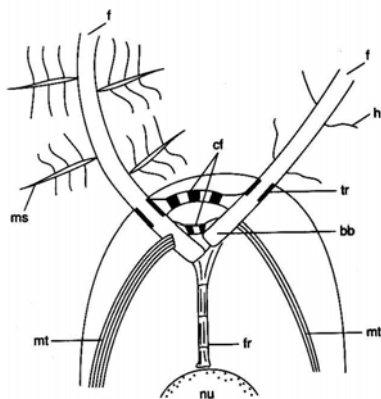
- number of flagella
- position (anterior, posterior, transverse)

Flagellar Appendages

- smooth (fine hairs) “whiplash”
- tinsel (stiff hairs - mastigonemes)

Flagellated Cell Types

- isokontous – flagella identical in shape and structure
- heterokontous - (two unequal length flagella usually one smooth one tinsel)



isokont

heterokont