

Announcements

- Relevant reading BEFORE lab this week: Ch. 31
- Bring lab atlas AND textbook to lab.
- Extra credit opportunity:
 - Salmon Summit: Wed. 11/3/10, 8-4:45 pm
 - St. Luke's Community Health Education Center
 - Bellingham, WA (checking on registration)

Protists - Outline

Reading: Chap. 29

I. Introduction

- A. Diversity of life styles
- B. Functional classifications

II. Ecological importance

- A. Algae
- B. Protozoans

III. Life cycles

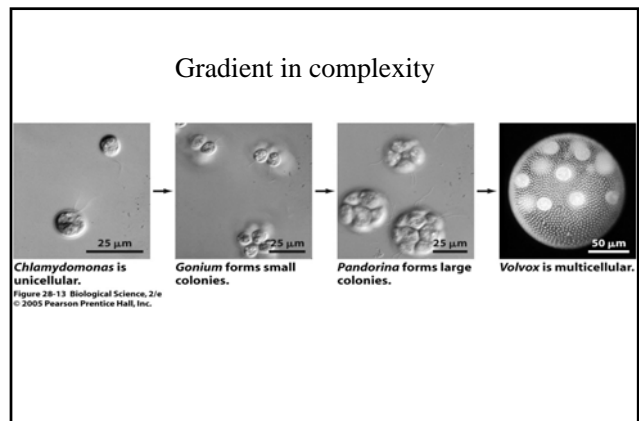
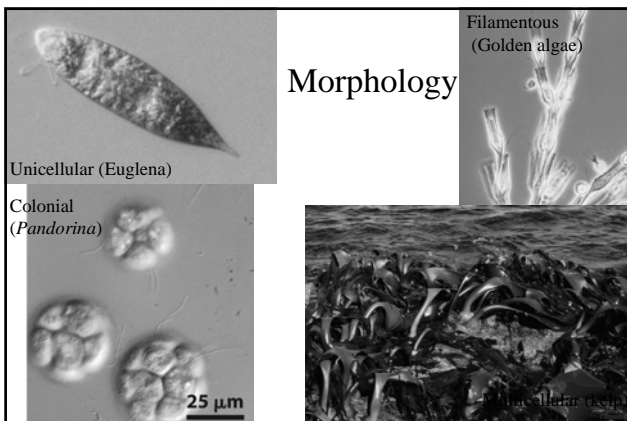
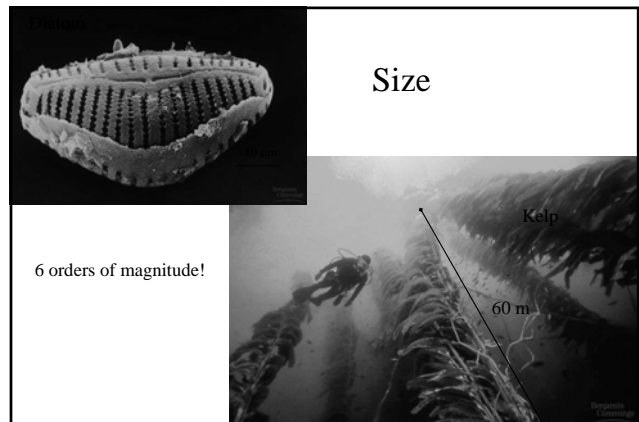
- A. The three basic types
- B. Examples

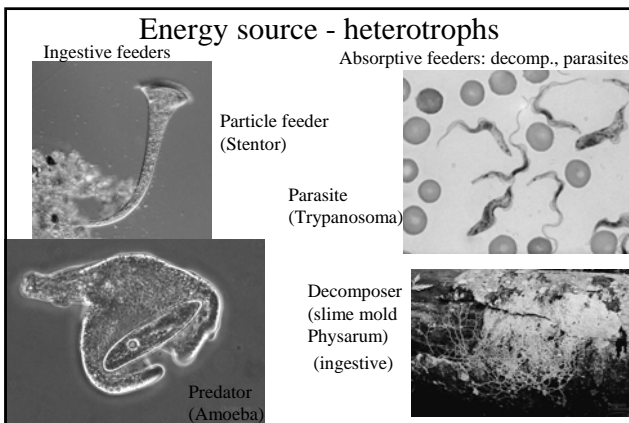
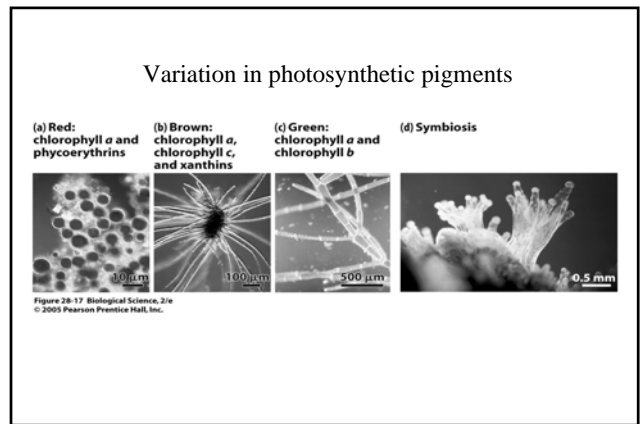
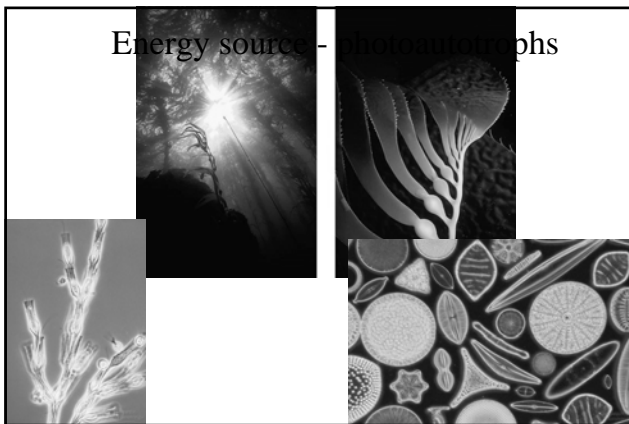
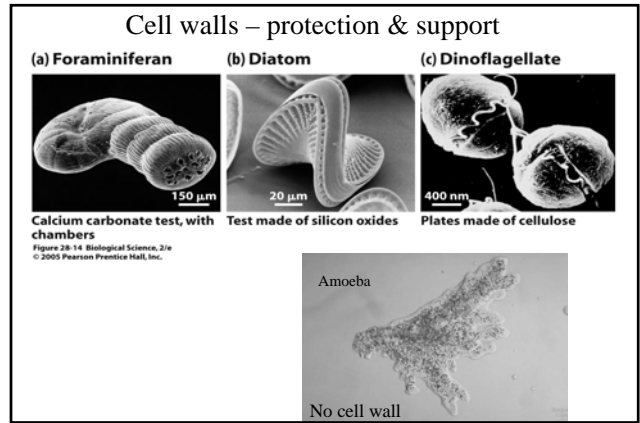
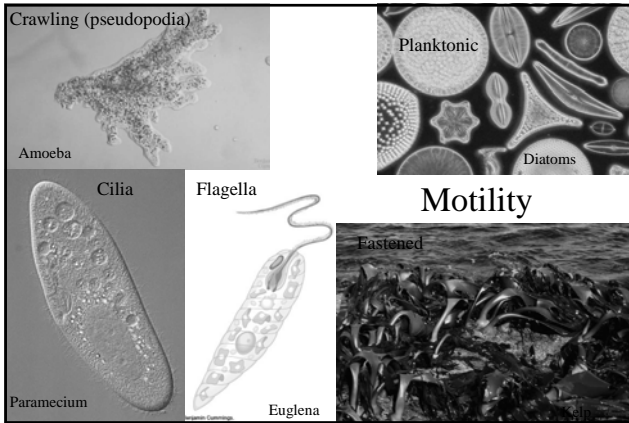
IV. Evolutionary history

- A. Kingdom Protista?
- B. How are they related to each other?
- C. How did they arise?
- D. How are they related to plants?

I.A. Diversity of life styles

1. Size
2. Morphology
3. Motility
4. Energy sources





I.B. Functional classifications

Protozoans - “animal like”

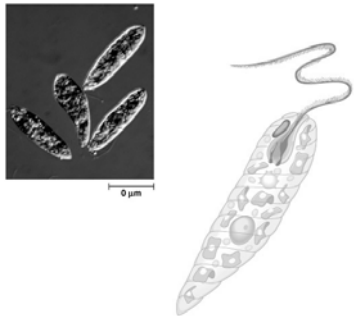
Algae - “plant-like”, i.e., photosynthetic

- Eukaryotic photosynthetic organisms that are not plants

Mix - simple to bizarre

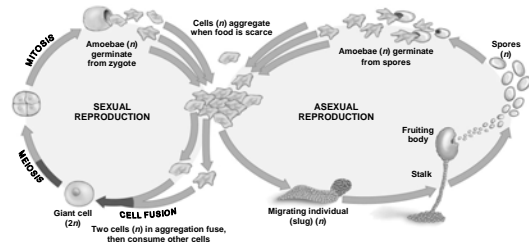
Don't necessarily relate to taxonomic relationships and evolutionary history

Mixotroph example - *Euglena*



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Cellular slime mold – unicellular or multicellular?



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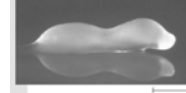
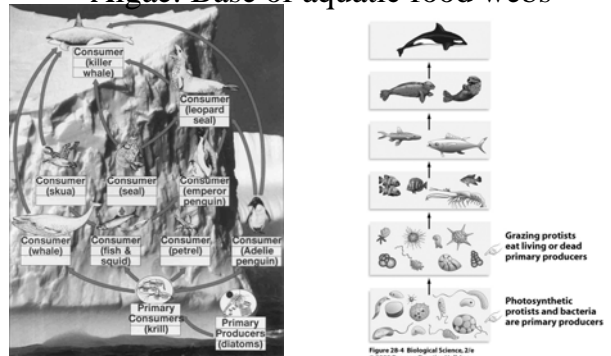


Fig. 29.9

II. Ecological importance

- A. Algae
- B. Protozoans

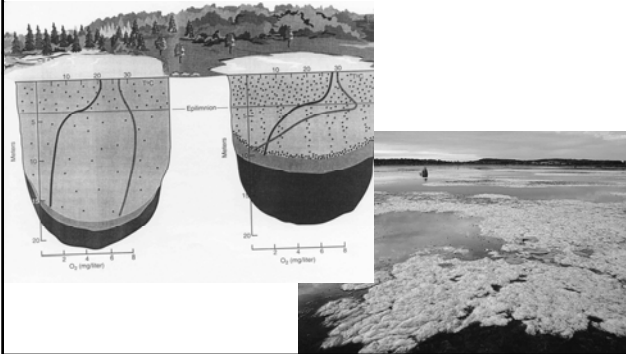
Algae: Base of aquatic food webs



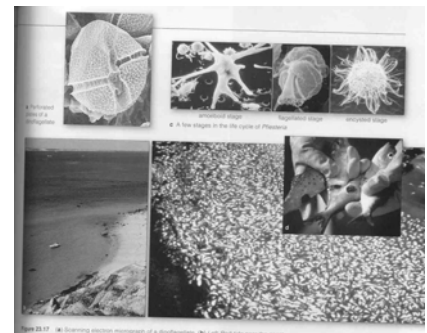
Starr, Fig. 37.3 - Antarctic food web

Fig. 28.4

Algae: Eutrophication

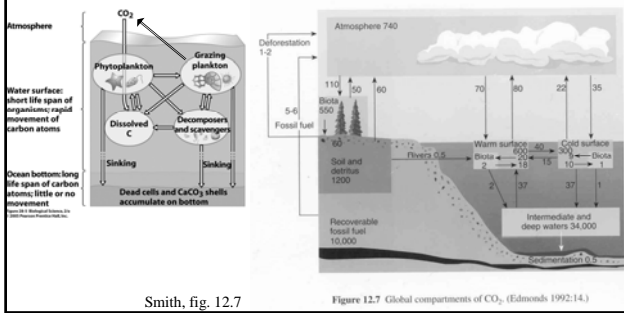


Algae: Toxicity - red tides, *Pfiesteria*



Dinoflagellates

Algae: Global Carbon Cycling



Algae: Useful products

Food Emulsifiers



<http://www.laurenveganjournal.org/pictures/Sushi.jpg>

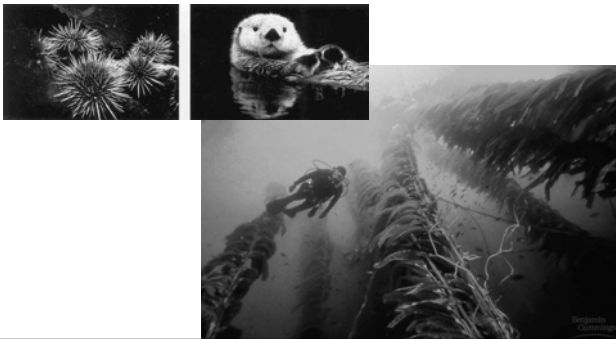


← Carrageenan ←

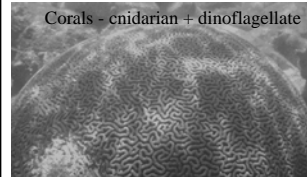
<http://www.design.com/Shop/You-Should-Carrageenan-101.html>

http://www.dailycos.com/wp/wp-content/www/corporate-media/news/company_news/2004/june/news_07_en.htm

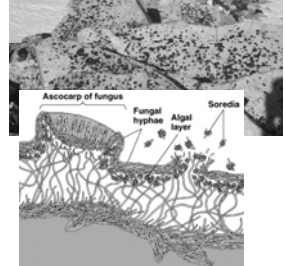
Macro-algae: Habitat



Algae: mutualisms

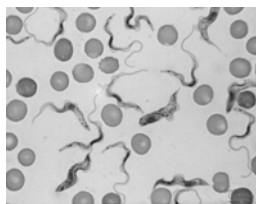


Lichens - fungus plus green algae; (sometimes cyanobacteria)



Protozoan with endosymbiotic green algae

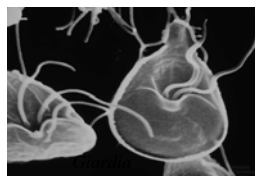
Protozoans: Disease



Trypanosomas: sleeping sickness



Plasmodium: malaria



See Table 28.1

Plasmodium: malaria

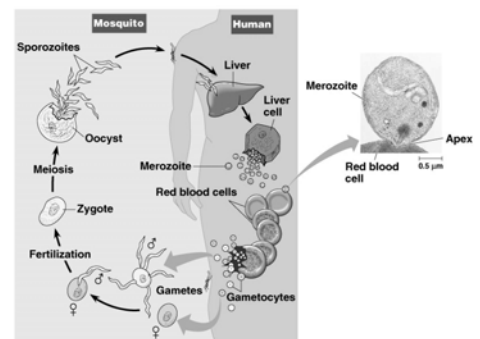


Fig. 28.13

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III. Life cycles

A. The three basic types

B. Examples

1. Gametic (animal-like)
2. Zygotic (fungus-like)
3. Sporic: alternation of generations (plant-like)

A. Life cycles: the three basic types (draw)

B. Examples

1. Gametic (animal-like)

A life cycle dominated by diploid cells

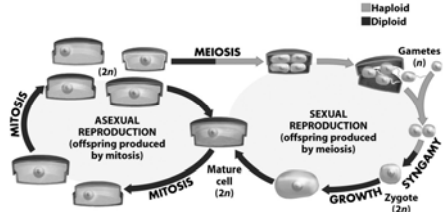
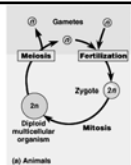


Figure 28-21b Biological Science, 2/e © 2005 Pearson Education, Inc.

Diatoms



C&R, Fig. 13.5

2. Zygotic (fungus-like)

A life cycle dominated by haploid cells

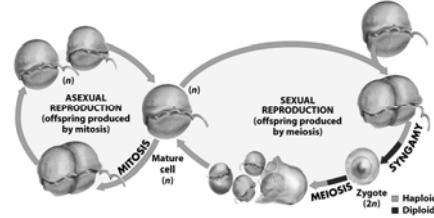
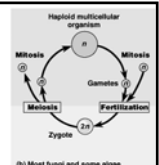


Figure 28-21a Biological Science, 2/e © 2005 Pearson Education, Inc.

Dinoflagellates



(b) Most fungi and some algae

3. Sporic (plant-like)

Alternation of generations in which multicellular haploid and diploid forms look different

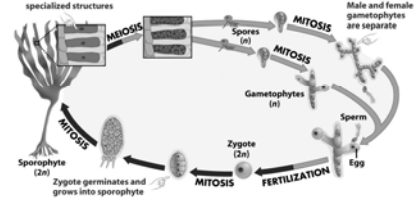
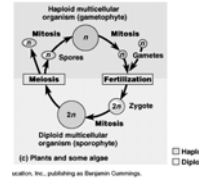


Figure 28-22b Biological Science, 2/e © 2005 Pearson Education, Inc.

Laminaria Fig. 28.22b

“Alternation of generations”



(c) Plants and some algae

3. Sporic variations

a. Isomorphic

Alternation of generations in which multicellular haploid and diploid forms look identical

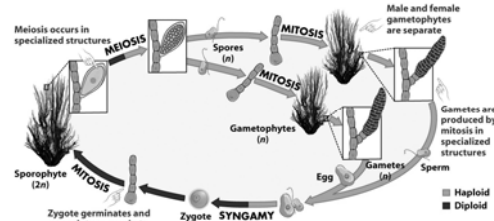


Figure 28-22a Biological Science, 2/e © 2005 Pearson Education, Inc. Fig. 28.22a

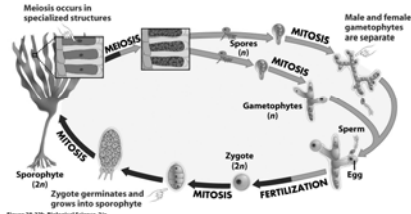
3. Sporic variations

b. Heteromorphic

i. Gametophyte dominant

ii. Sporophyte dominant

Alternation of generations in which multicellular haploid and diploid forms look different



IV. Evolutionary history

- A. Kingdom Protista?
- B. How are they related to each other?
- C. How did eukaryotic protists arise?
- D. How are they related to higher plants?

IV.A. Kingdom Protista?

Phylogenetic thinking

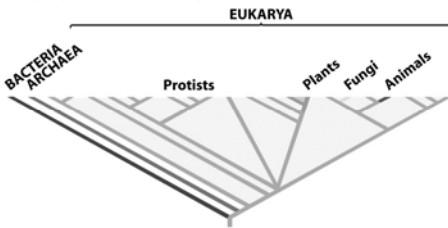


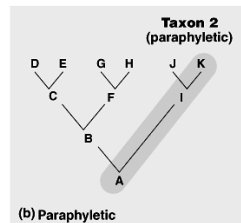
Fig. 29.1

Are protists a natural monophyletic group?

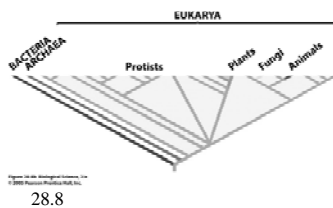
Protists are not a natural group (clade)

- What's a natural group?
- Monophyletic and not paraphyletic
- Protists are paraphyletic
- Any questions?

What's paraphyletic?



C&R Fig. 25.9



B. Phylogeny

How are they related to each other?

A tentative phylogeny of the eukaryotes

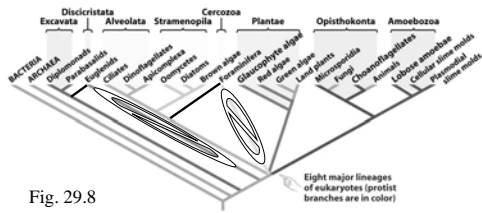


Fig. 29.8

Figure 29.7 Biological Science, 2/e
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Points

1. Based on both morphological and DNA evidence
2. 7-8 main groupings of eukaryotes (Discicristata → Excavata; Cercozoa = Rhizaria); 2 of which include plants and fungi/animals

A tentative phylogeny of the eukaryotes

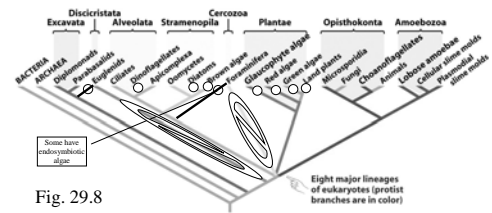


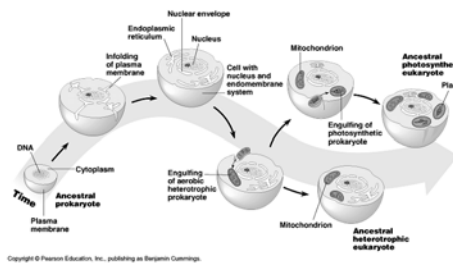
Fig. 29.8

Figure 29.7 Biological Science, 2/e
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Points

5. Photosynthetic and non-photosynthetic phyla are often more closely related to each other than to other phyla of similar lifestyle.
6. Many taxa are not included in this figure - either not presented in the text or phylogeny is still too tentative.

C. How did Protists arise? Endosymbiosis?



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C&R Fig 28.4 (see also Freeman 29.11 or 29.8) Origin of early eukaryotes

Mitochondrial and Chloroplast DNA

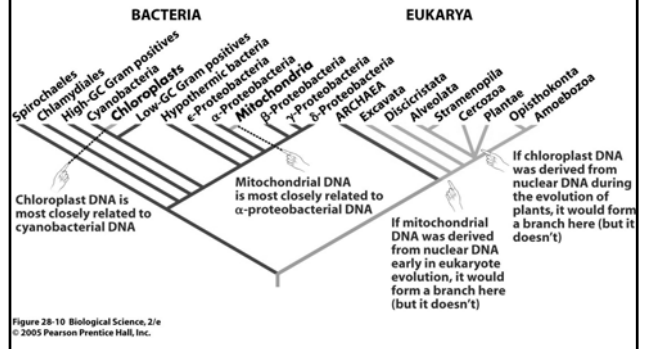
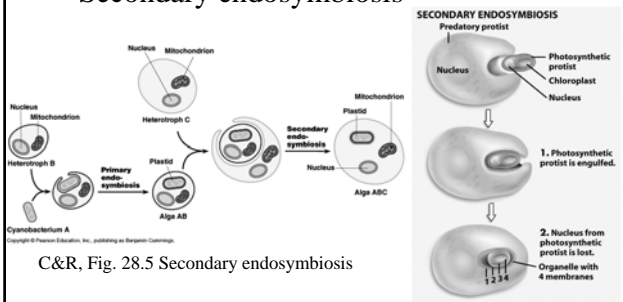


Figure 28.10 Biological Science, 2/e
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How did photosynthesis spread? Secondary endosymbiosis

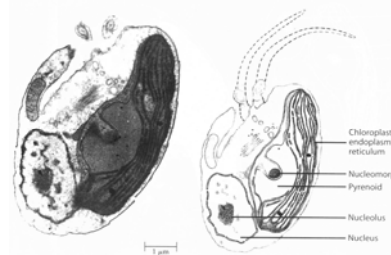


C&R, Fig. 28.5 Secondary endosymbiosis

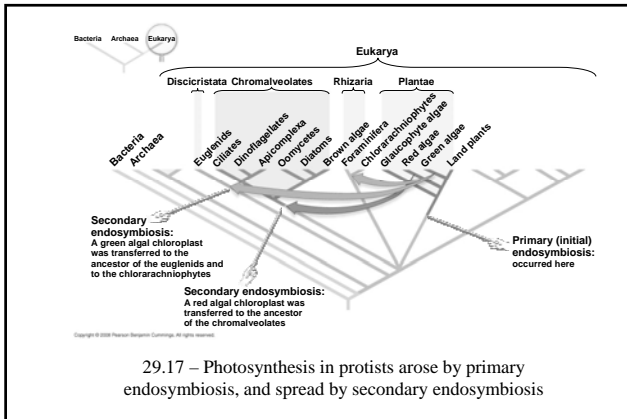
Figure 28.18 Biological Science, 2/e
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Freeman Fig. 29.16 (or 29.13)

Secondary endosymbiosis: Cryptomonads



- Chlorophylls a and c
- Pheobilins
- otherwise known only in red algae and cyanobacteria



D. How are they related to higher plants?

Green algae and plants

Algae are eukaryotic photosynthetic organisms that are not plants.

So, what are the defining characteristics of plants?

- Alternation of generations (sporic life cycle)
- Chlorophyll a and b
- Starch as a storage polymer
- Cell walls of cellulose (plus other polymers)
- rosette cellulose synthesizing compounds
- peroxisome enzymes
- phragmoplast

End here