Glencoe Science

Biology

Interactive Classroom

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Mc Graw Hill Glencoe

Chapter 19 Protists

EXIT

Click on a lesson name to select.

19.1 Introduction to Protists

Protists

- All protists are eukaryotes.
- Some reproduce asexually by mitosis while others exchange genetic material during meiosis.

19.1 Introduction to Protists

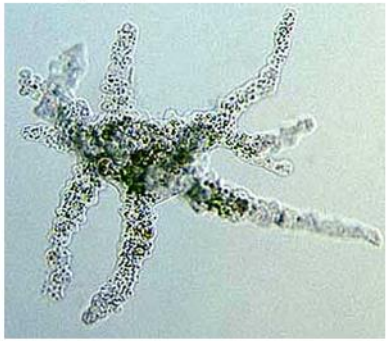
Classifying Protists

- Some scientists classify protists by their methods of obtaining nutrition.
- Animal-like protists
- Plantlike protists
- Funguslike protists

19.1 Introduction to Protists

Animal-like Protists

- Protozoans are heterotrophs and usually ingest bacteria, algae, or other protozoans.

	The Protists
Group	Animal-like protists (Protozoans)
	Ciliates, amoebas, apicomplexans, and zooflagellates
Example	Magnification unavailable  Amoeba
Distinguishing Characteristics	• Considered animal-like because they consume other organisms for food • Some are parasites.

19.1 Introduction to Protists

Plantlike Protists

- Plantlike protists make their own food through photosynthesis.
- Algae

	The Protists
Group	**Plantlike protists (Algae)** Euglenoids, diatoms, dinoflagellates, green algae, red algae, brown algae, yellow-green algae, and golden-brown algae
Example	 **Giant kelp**
Distinguishing Characteristics	• Considered plantlike because they make their own food through photosynthesis • Some consume other organisms or are parasites when light is unavailable for photosynthesis.

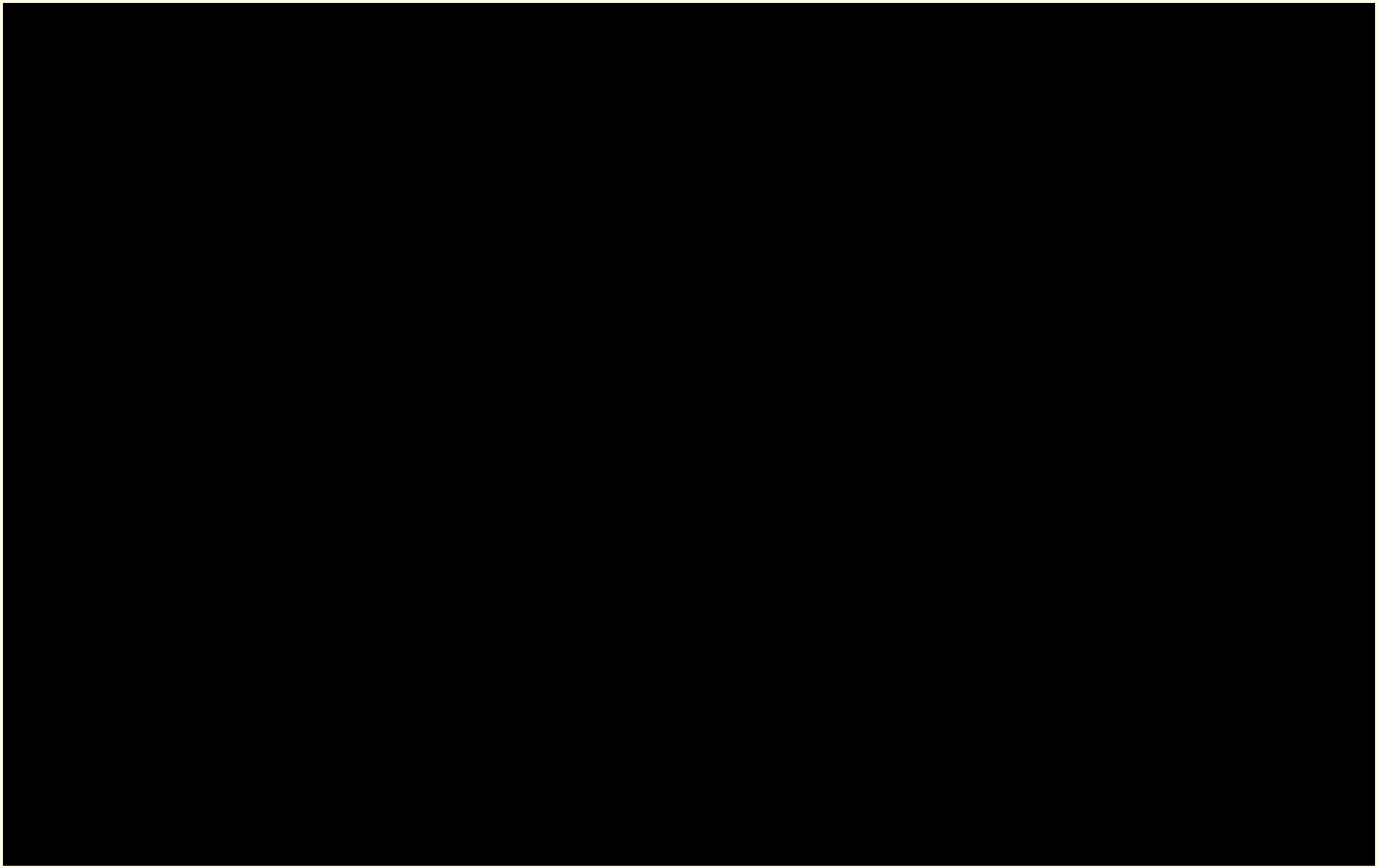
19.1 Introduction to Protists

Funguslike Protists

- Funguslike protists absorb their nutrients from other organisms.

	The Protists
Group	**Funguslike protists** Slime molds, water molds, and downy mildews
Example	 **Water mold**
Distinguishing Characteristics	• Considered funguslike because they feed on decaying organic matter and absorb nutrients through their cell walls • Some slime molds consume other organisms and a few slime molds are parasites.

Concepts In Motion



19.2 Protozoans—Animal-like Protists

Ciliophora

- Biologists further classify protozoans by their method of movement.
- Members of the phylum Ciliophora are animal-like protists that have numerous short, hairlike projections.
- There are over 7000 species of ciliates.

19.2 Protozoans—Animal-like Protists

Paramecia

- A unicellular protozoan
- Enclosed by a layer of membrane called a pellicle.

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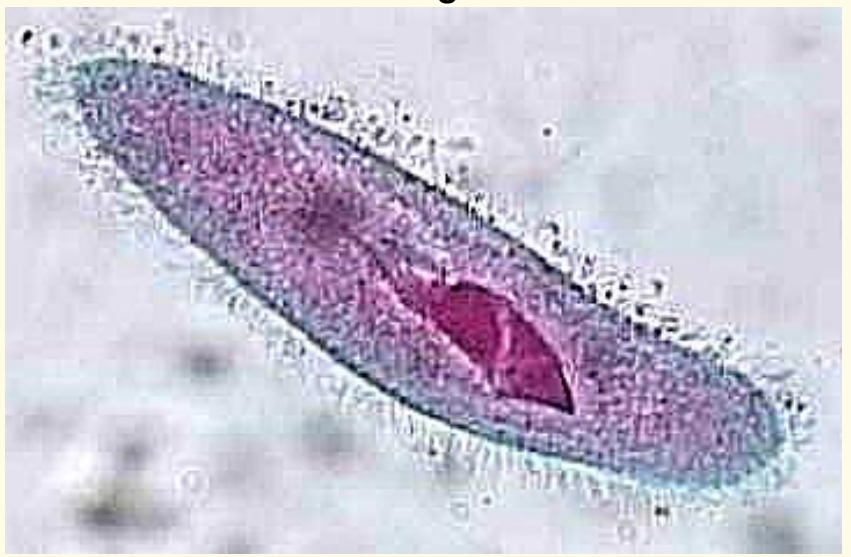


Paramecia

19.2 Protozoans—Animal-like Protists

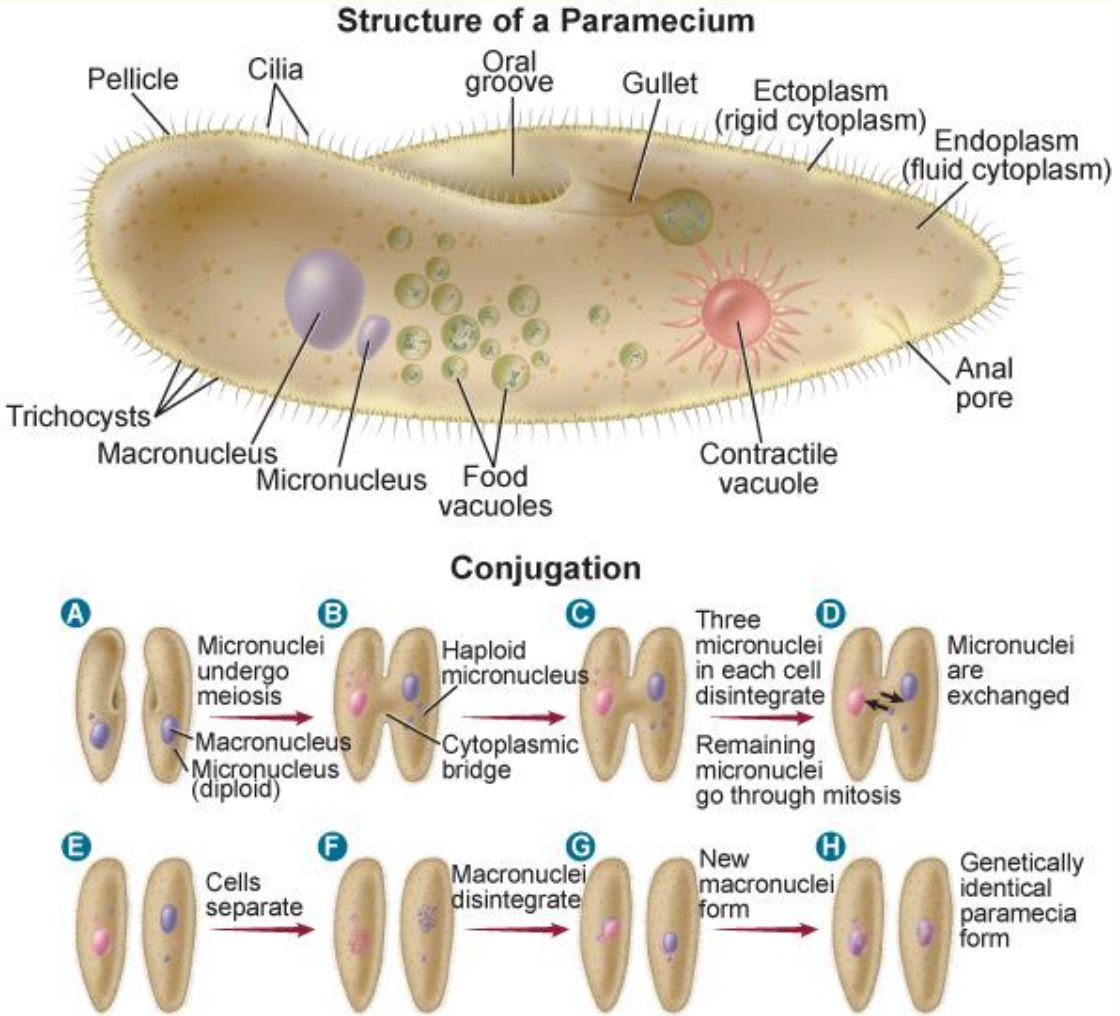
Cilia

- Cilia on the paramecium are used for moving and feeding.

Contractile Vacuoles

- The contractile vacuoles collect the excess water from the cytoplasm and expel it from the cell.

19.2 Protozoans—Animal-like Protists



Concepts In Motion Animation

Visualizing Paramecia

Click here to proceed!

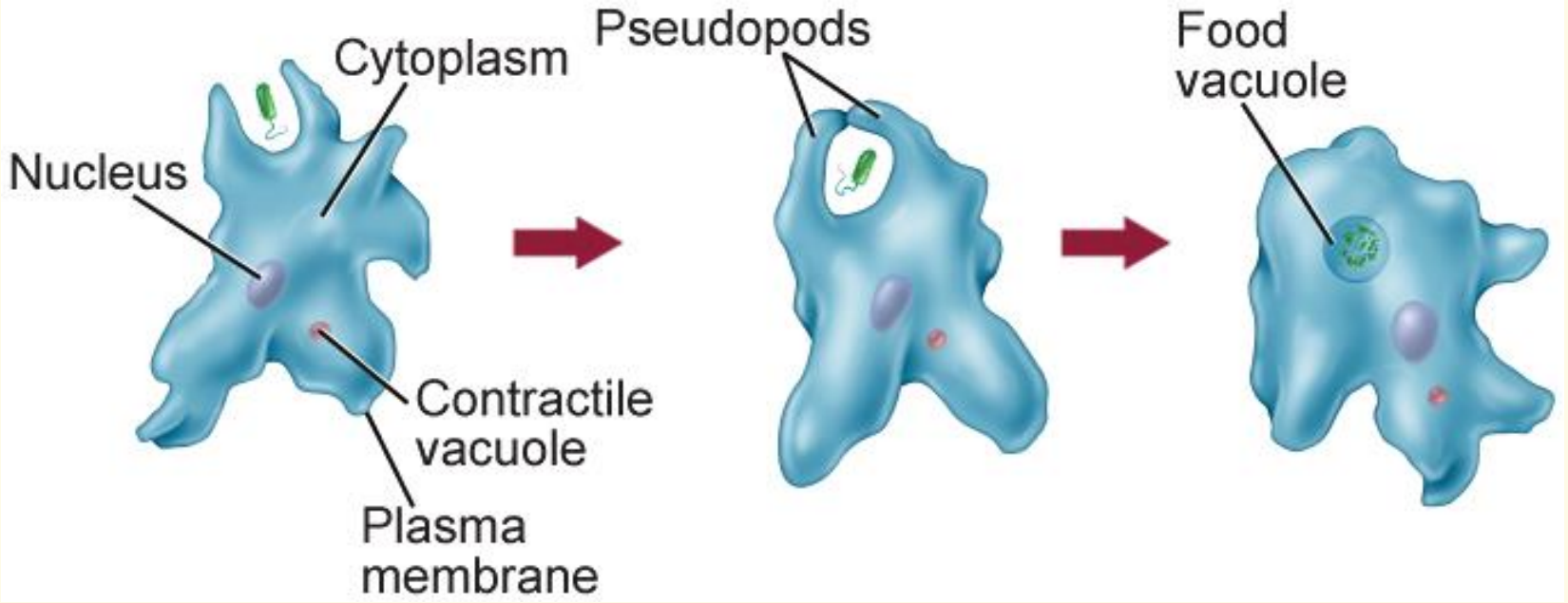
19.2 Protozoans—Animal-like Protists

Sarcodina

- Animal-like protists that use pseudopods for feeding and locomotion
- The most commonly studied sarcodines are found in the genus *Amoeba*.

19.2 Protozoans—Animal-like Protists

- Chemical stimuli from smaller organisms can cause the amoeba to form pseudopods from their plasma membrane.



19.2 Protozoans—Animal-like Protists

- Amoebas are enveloped in an outer cell membrane and an inner thickened cytoplasm called ectoplasm.
- The cytoplasm contains a nucleus, food vacuoles, and occasionally a contractile vacuole.
- Waste products and undigested food particles are excreted by diffusion through the outer membranes into surrounding water.

19.2 Protozoans—Animal-like Protists

- Amoebas reproduce by asexual reproduction.
- During harsh environmental conditions, some amoebas become cysts that help them survive until environmental conditions improve and survival is more likely.

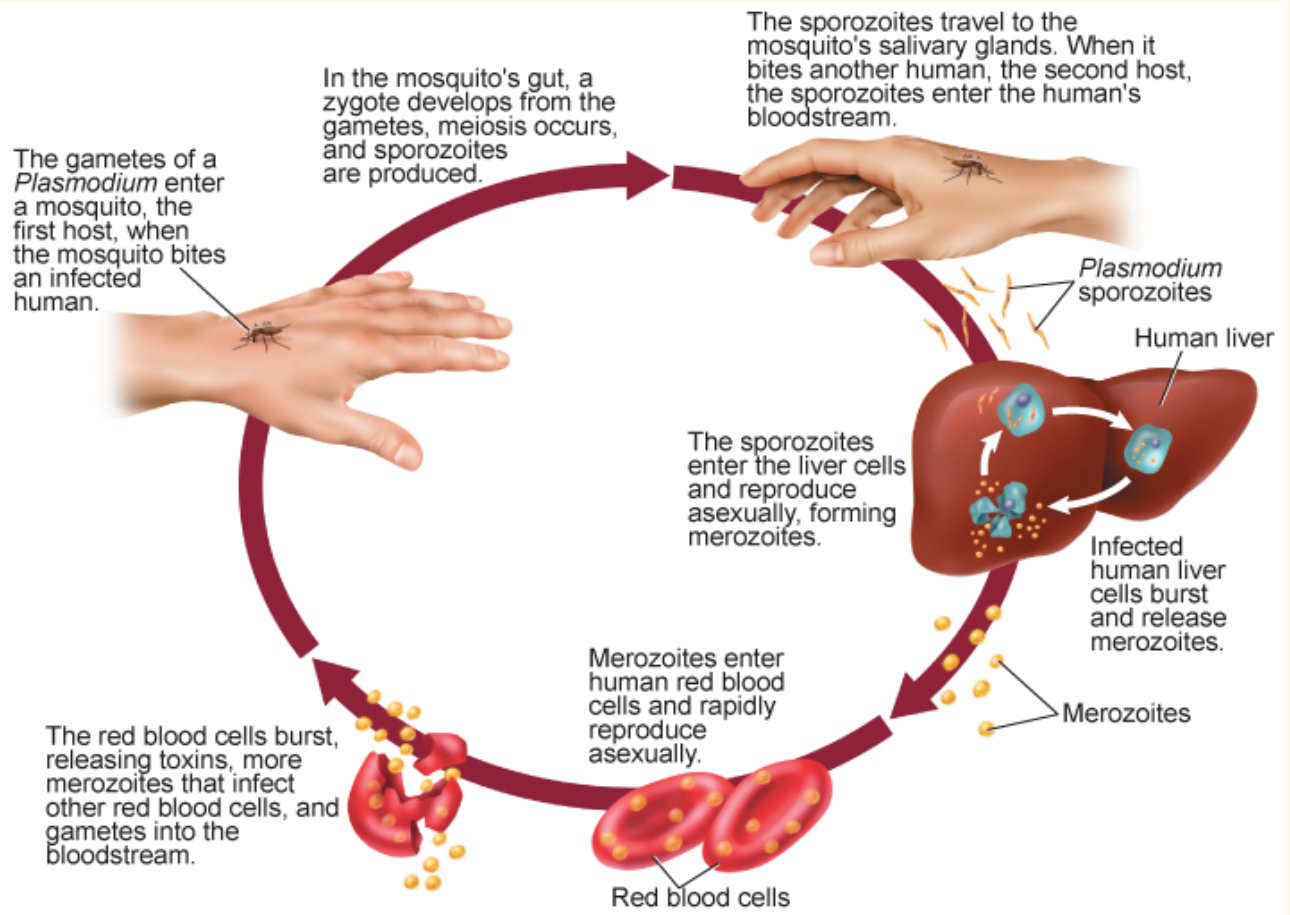
19.2 Protozoans—Animal-like Protists

Apicomplexa

- Animal-like protists that belong to the phylum Apicomplexa also are known as sporozoans.
- All sporozoans are parasitic.

19.2 Protozoans—Animal-like Protists

- The life cycle of sporozoans has both sexual and asexual stages.



19.2 Protozoans—Animal-like Protists

Zoomastigina

- Animal-like protozoans that use flagella for movement
- At least three species of zooflagellates from the genus *Trypanosoma* cause infectious diseases in humans that often are fatal because of limited treatment options.
- Chagas disease, sometimes called American sleeping sickness
- African sleeping sickness

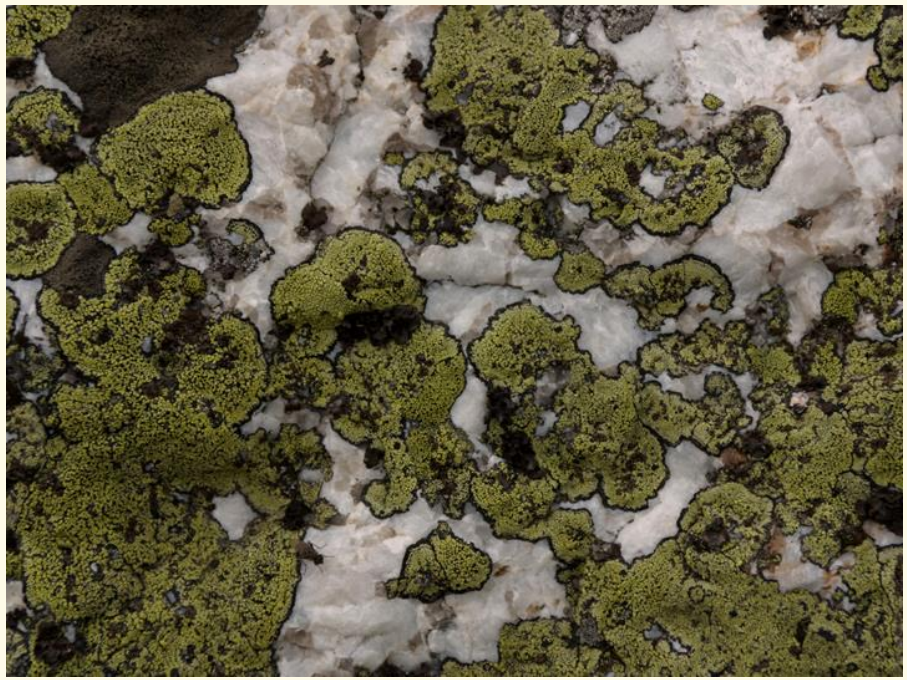
19.3 Algae—Plantlike Protists

Characteristics of Algae

- Contain photosynthetic pigments
- Primary pigment is chlorophyll
- Secondary pigments allow them to absorb light energy in deep water

19.3 Algae—Plantlike Protists

Red algae



Green algae

19.3 Algae—Plantlike Protists

Diatoms

- The unicellular algae are members of the phylum Bacillariophyta.
- Diatoms are photosynthetic autotrophs.

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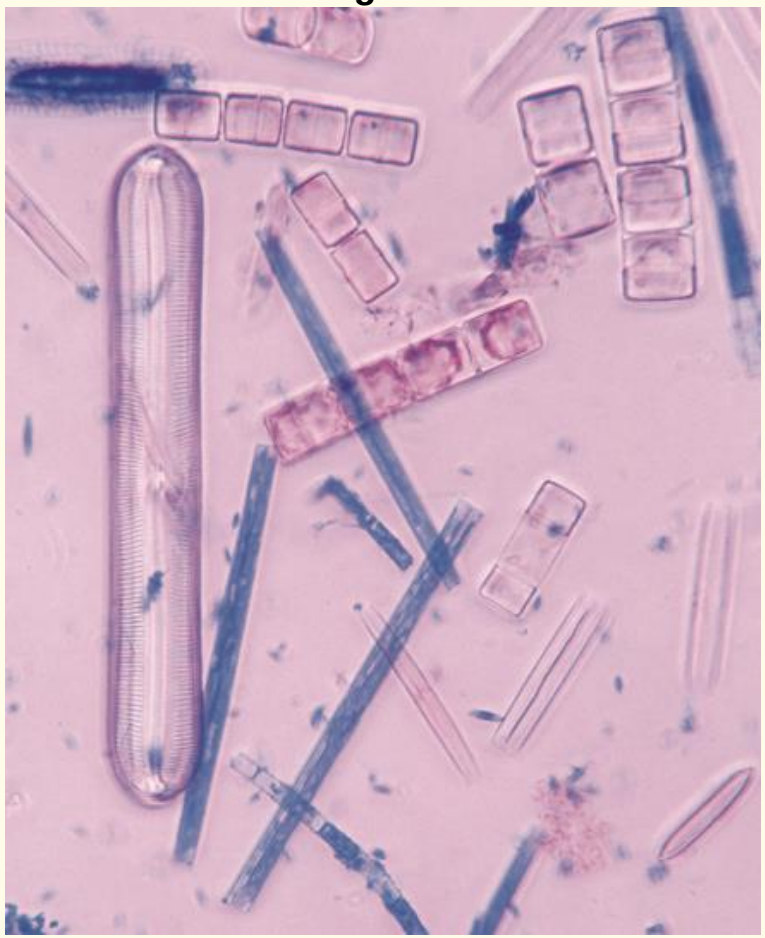
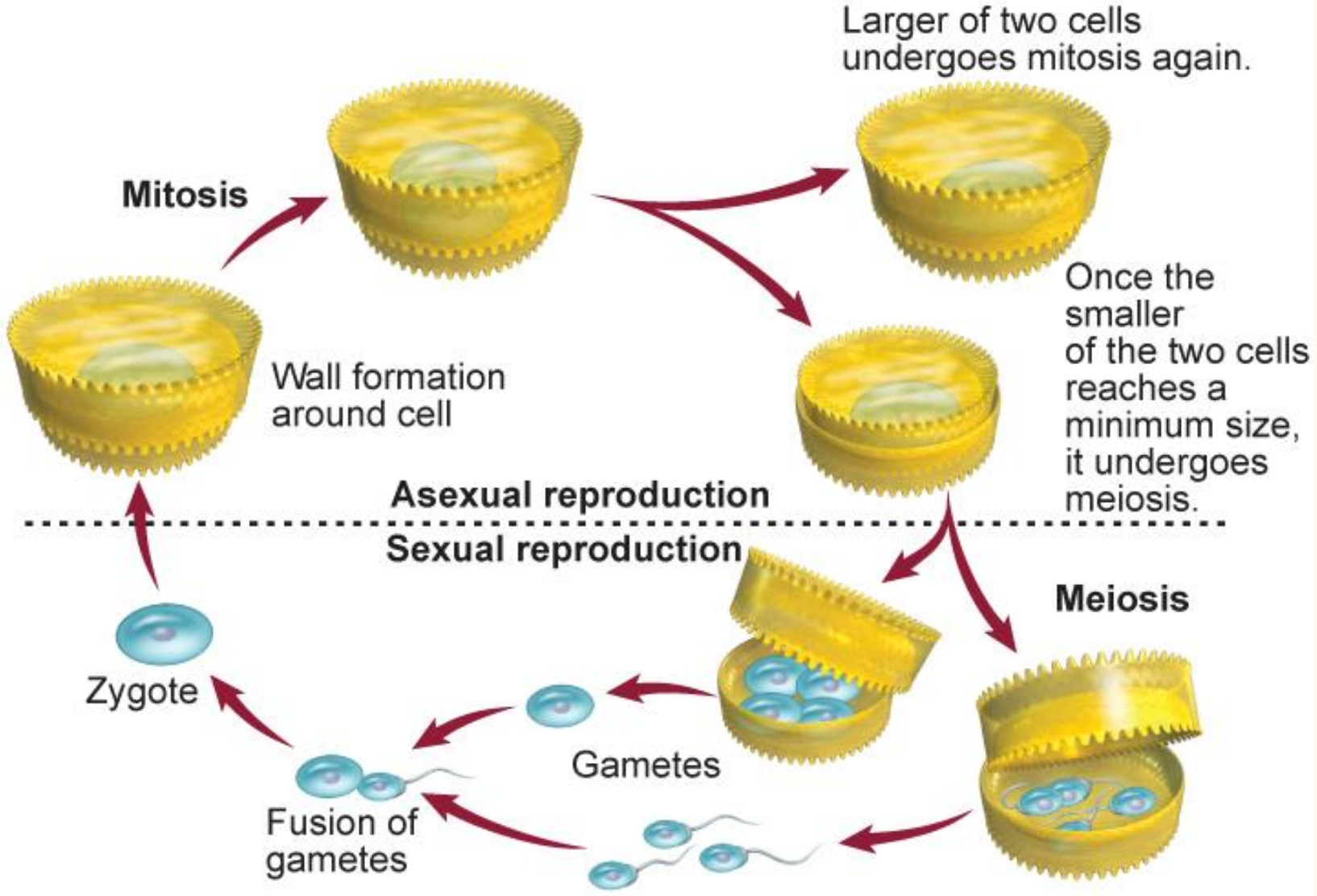


Diatoms

19.3 Algae—Plantlike Protists

- Asexual reproduction occurs when the two separated halves each create a new half that can fit inside the old one.
- When a diatom is about one-quarter of the original size, sexual reproduction is triggered and gametes are produced.

19.3 Algae—Plantlike Protists



19.3 Algae—Plantlike Protists

Dinoflagellates

- Unicellular and have two flagella at right angles to one another
- Some dinoflagellates are photosynthetic autotrophs, and other species are heterotrophs.
- The heterotrophic dinoflagellates can be carnivorous, parasitic, or mutualistic.

19.3 Algae—Plantlike Protists

Algal Blooms

- When food is plentiful and environmental conditions are favorable, dinoflagellates reproduce in great numbers.
- When the food supply diminishes, the dinoflagellates die in large numbers.
- As the dead algae decompose, the oxygen supply in the water is depleted, suffocating fish and other marine organisms.

19.3 Algae—Plantlike Protists

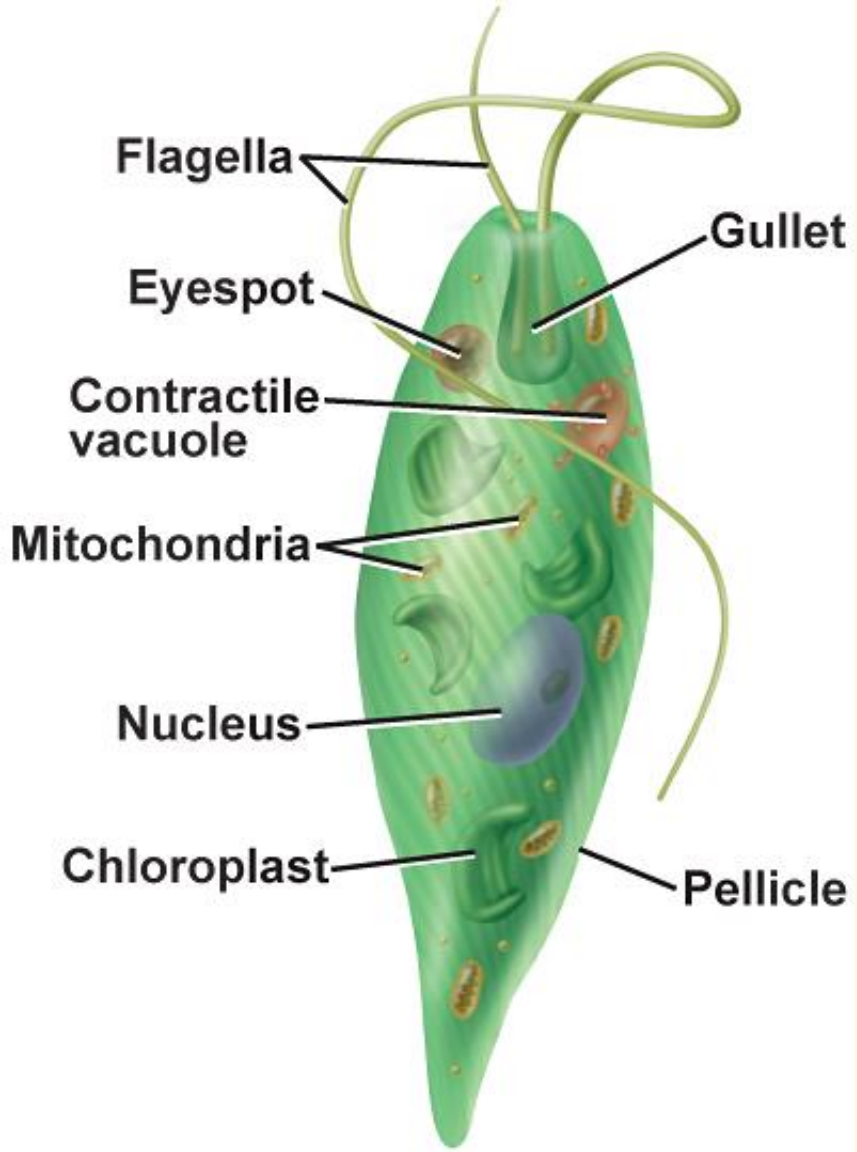
Red Tides

- Some dinoflagellates have red photosynthetic pigments, and when they bloom, the ocean is tinged red.
- Some species of dinoflagellates produce a potentially lethal nerve toxin.

19.3 Algae—Plantlike Protists

Euglenoids

- Euglenoids contain chloroplasts and photosynthesize.
- Euglenoids also can be heterotrophs.



19.3 Algae—Plantlike Protists

Chrysophytes

- Yellow-green algae and golden-brown algae
- Yellow and brown carotenoids that give them their golden brown color

Golden-brown algae

19.3 Algae—Plantlike Protists

Brown Algae

- Brown color is from a secondary carotenoid pigment called fucoxanthin.
- Most of the 1500 species of brown algae live along rocky coasts in cool areas of the world.

19.3 Algae—Plantlike Protists

Green Algae

- Like plants, green algae contain chlorophyll as a primary photosynthetic pigment.
- Like plants, green algae have cell walls, and both groups store their food as carbohydrates.
- Most species of green algae are found in freshwater.

19.3 Algae—Plantlike Protists

Growth Patterns Exhibited by Green Algae

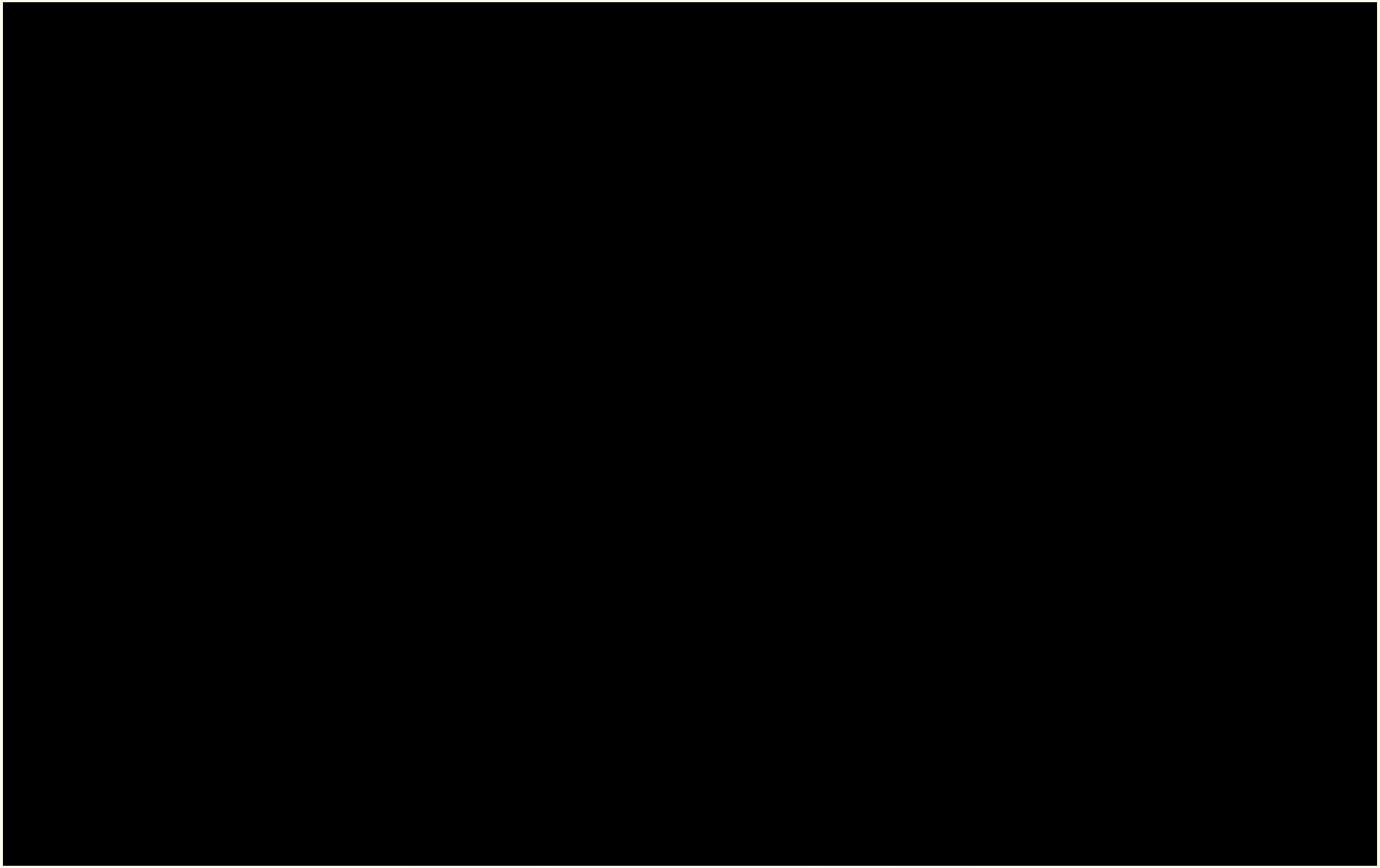
- *Desmids* are characterized by their symmetrically divided cells.
- *Spirogyra* is a multicellular species characterized by its long, thin filaments.
- *Volvox* is an example of an alga that has a colonial growth pattern.

19.3 Algae—Plantlike Protists

Some Uses for Algae

Type of Algae	Uses
Red algae	A species of red alga, *Porphyra*, is called nori, which is dried, pressed into sheets, and used in soups, sauces, sushi, and condiments. Some species of red algae provide agar and carrageenan, which are used in the preparation of scientific gels and cultures. Agar also is used in pie fillings and to preserve canned meat and fish. Carrageenan is used to thicken and stabilize puddings, syrups, and shampoos.
Brown algae	Brown algae are used to stabilize products, such as syrups, ice creams, and paints. The genus *Laminaria* is harvested and eaten with meat or fish and in soups.
Green algae	Species from the genera *Monostroma* and *Ulva*, also called sea lettuce, are eaten in salads, soups, relishes, and in meat or fish dishes.
Diatoms	Diatoms are used as a filtering material for processes such as the production of beverages, chemicals, industrial oils, cooking oils, sugars, water supplies, and the separation of wastes. They also are used as abrasives.

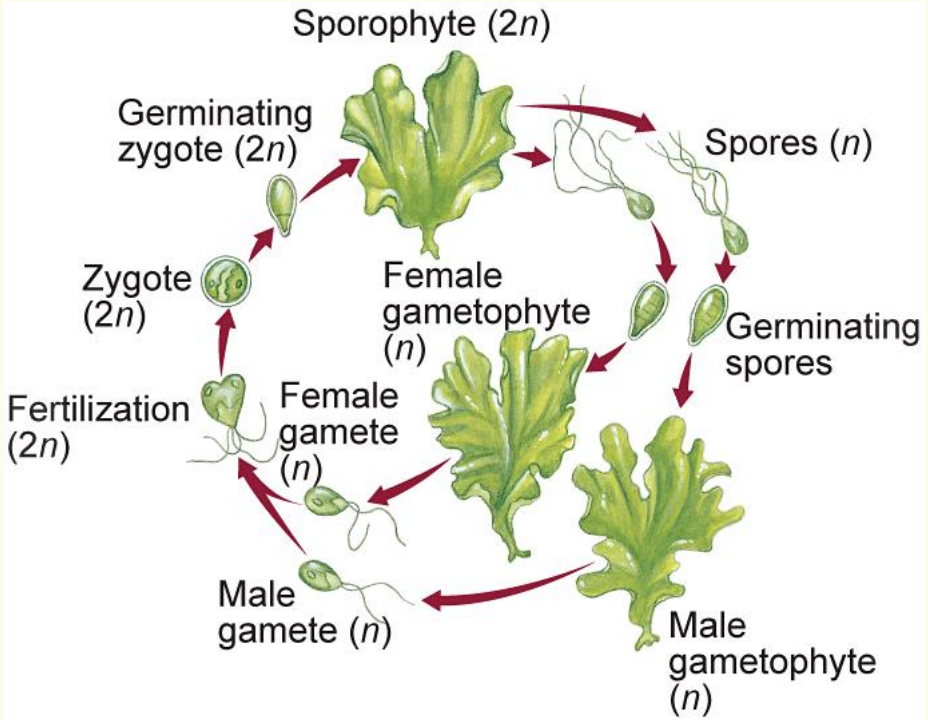
Concepts In Motion



19.3 Algae—Plantlike Protists

Life Cycle of Algae

- Alternation of generations is a life cycle of algae that takes two generations—one that reproduces sexually and one that reproduces asexually—to complete a life cycle.



19.4 Funguslike Protists

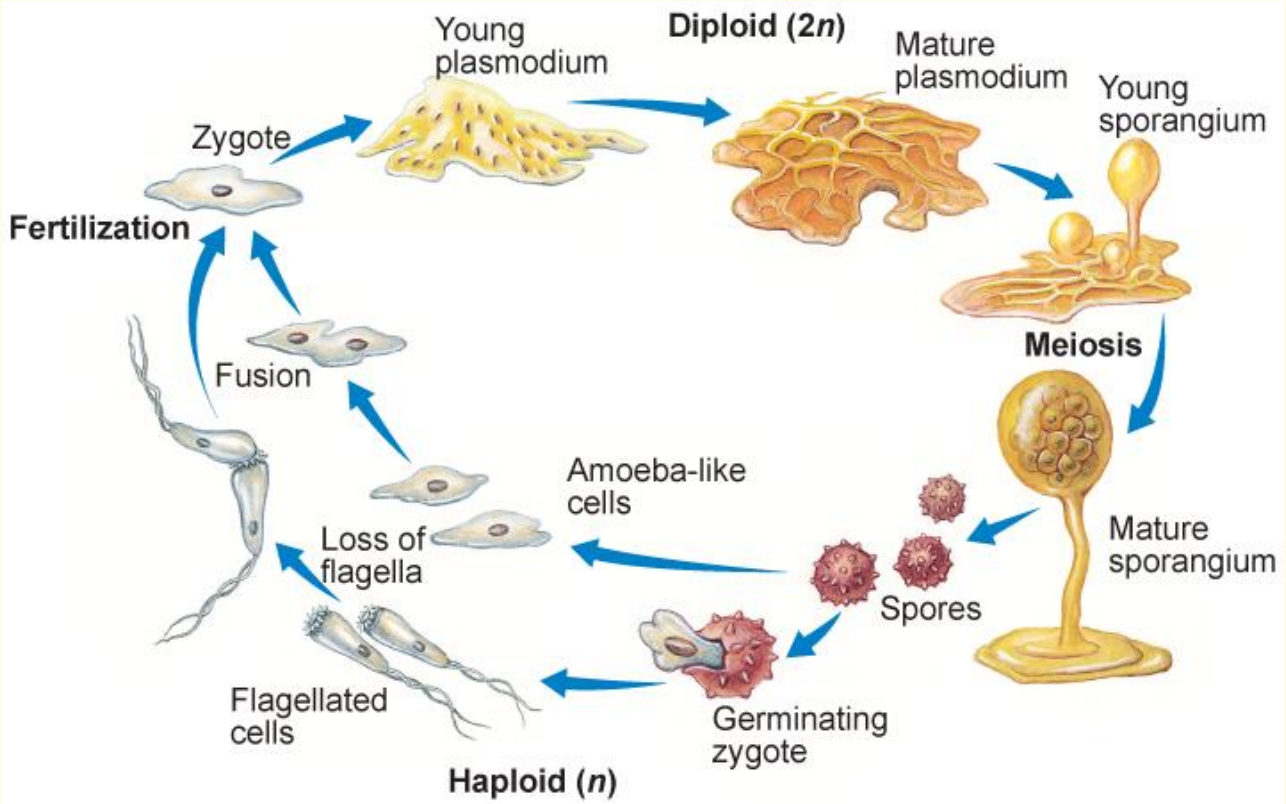
Slime Molds

- Slime molds use spores to reproduce.
- Feed on decaying organic matter and absorb nutrients through their cell walls.
- The cell walls of these protists contain cellulose or cellulose‌like compounds.

19.4 Funguslike Protists

Acellular Slime Molds

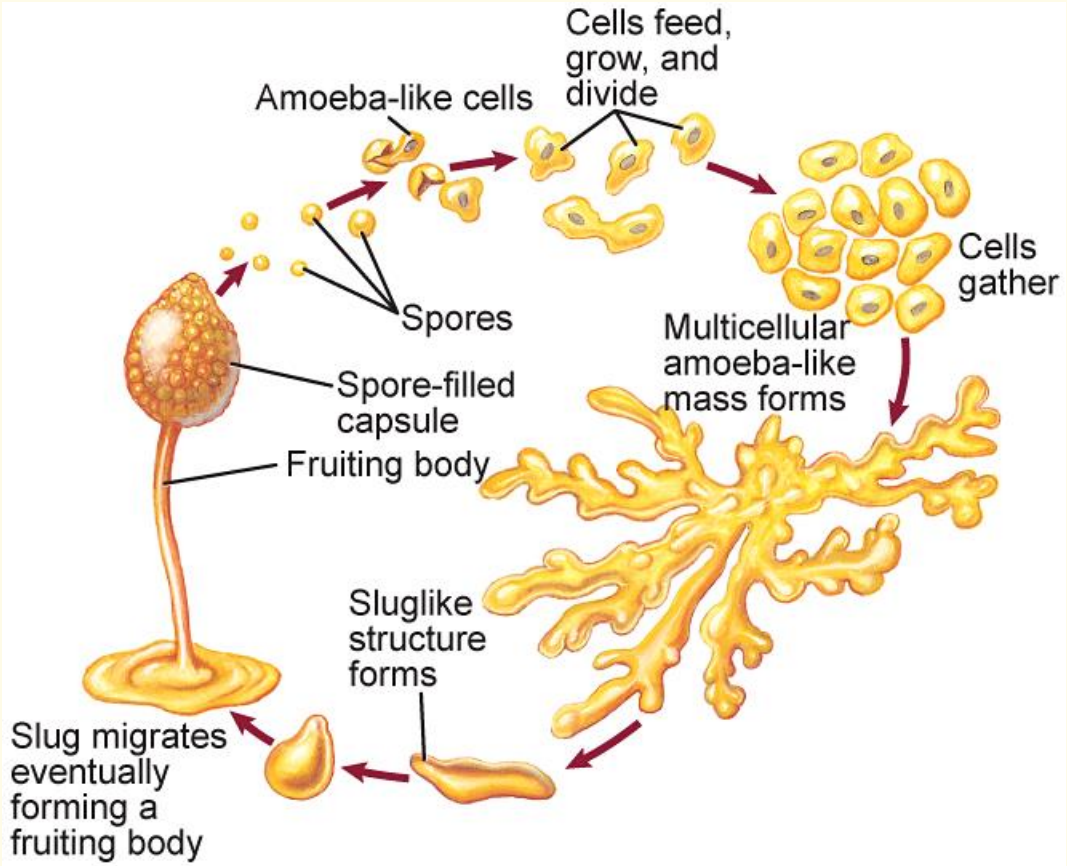
- Acellular slime molds are found in the phylum Myxomycota.



19.4 Funguslike Protists

Cellular Slime Molds

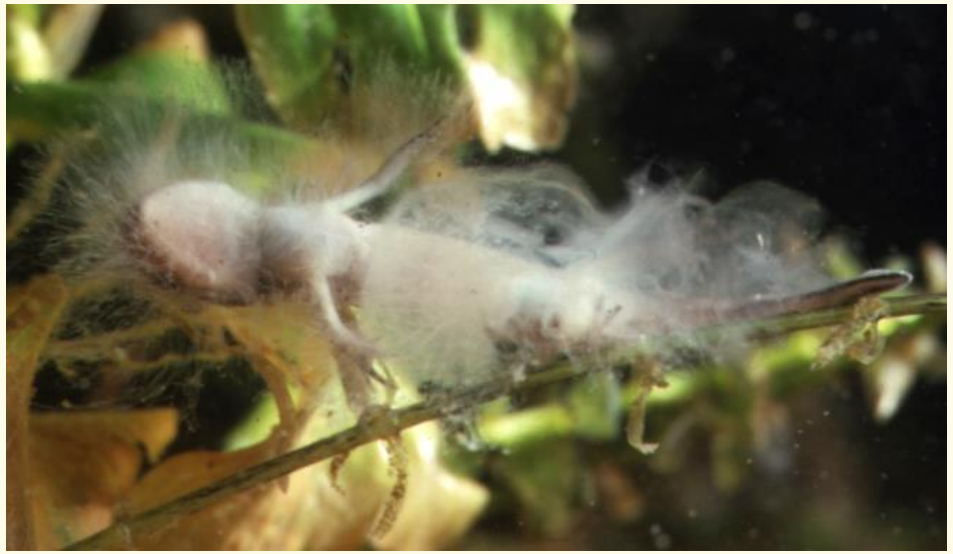
- Cellular slime molds are found in the phylum Acrasiomycota.
- Reproduce both sexually and asexually



19.4 Funguslike Protists

Water Molds and Downy Mildew

- There are more than 500 species of water molds and downy mildews in the phylum Oomycota.



Water mold

- Water molds differ from fungi in the composition of their cell walls and they produce flagellated reproductive cells.

Chapter Resource Menu

Click on a hyperlink to view the corresponding lesson.

Chapter Diagnostic Questions

CheckPoint

How are funguslike protists different from fungi?

A. perform photosynthesis

B. ingest bacteria

C. microscopic in size

D. contain centrioles

Chapter Diagnostic Questions

CheckPoint

Which type of protist carries out photosynthesis and has chloroplasts?

A. bacteria

B. algae

C. mold

D. fungus

Chapter Diagnostic Questions

CheckPoint

Which is *not* a characteristic of protists?

A. unicellular

B. multicellular

C. might have formed through endosymbiosis

D. prokaryotic

19.1 Formative Questions

CheckPoint

What type of cells do protists have?

A. eukaryotic cells

B. prokaryotic cells

19.1 Formative Questions

CheckPoint

How are protists classified?

A. by their internal cell structure
B. by their methods of reproduction
C. by the way they obtain nutrition
D. by the type of cell membranes they have

19.1 Formative Questions

CheckPoint

Why are protozoans classified as animal-like protists?

A. They absorb nutrients.

B. They are heterotrophs.

C. They carry out photosynthesis.

D. They have either cilia or flagella.

19.1 Formative Questions

CheckPoint

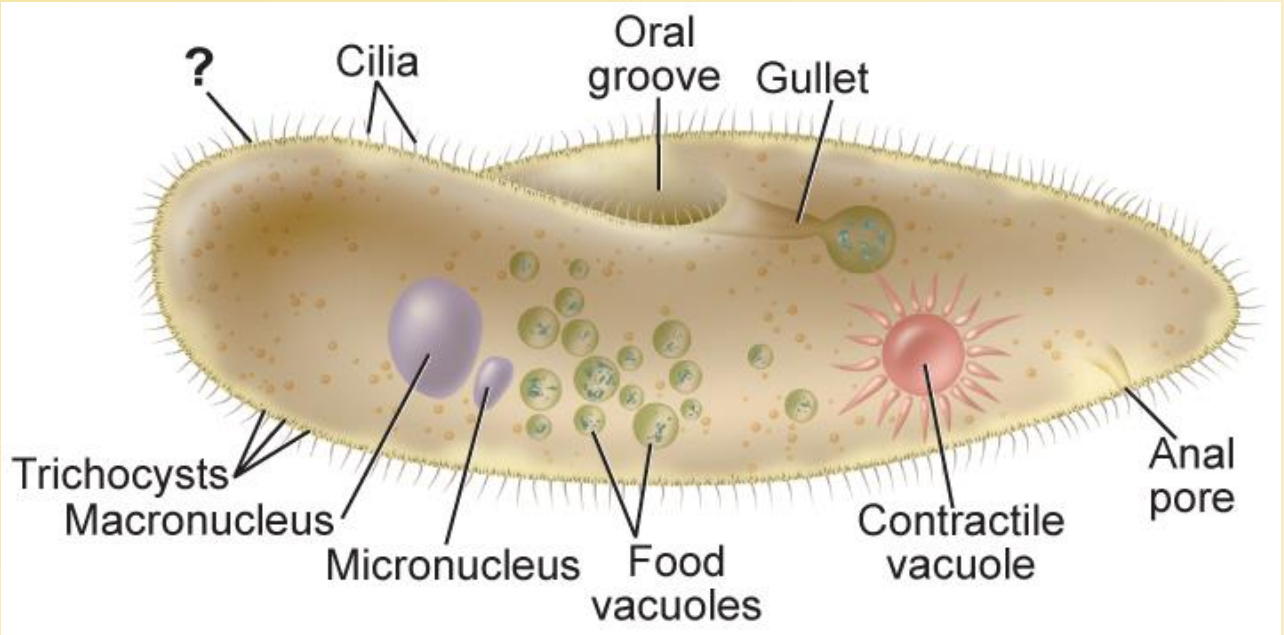
Which microscopic protozoan lives in the guts of termites and produces enzymes that digest wood?

A. cystosporidius
B. microsporidium
C. sporocytidius
D. sporomicrobium

19.2 Formative Questions

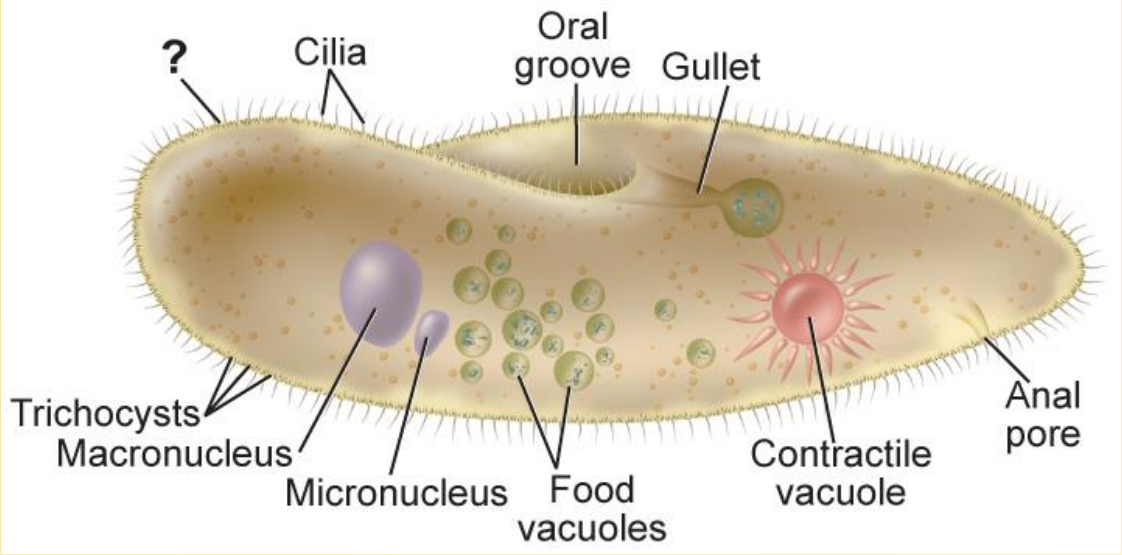
CheckPoint

What is the outermost layer of membrane in a paramecium?



19.2 Formative Questions

CheckPoint



A. cellulose

B. ectoplasm

C. pellicle

D. plasma membrane

19.2 Formative Questions

CheckPoint

By what method do ciliates reproduce asexually?

A. binary fission

B. cytokinesis

C. cyst formation

D. endoplasmic bridging

19.2 Formative Questions

CheckPoint

What do amoebas use for feeding and locomotion?

A. cilia

B. ectoplasm

C. flagella

D. pseudopods

19.2 Formative Questions

CheckPoint

How do amoebas excrete waste products and undigested food particles?

A. by diffusion

B. by exocytosis

C. through an anal pore

D. through waste vacuoles

19.2 Formative Questions

CheckPoint

How are the protists that cause malaria, Chagas' disease, and African sleeping sickness transmitted to humans?

A. by insects

B. by humid air

C. by animal wastes

D. by unsanitary water

19.2 Formative Questions

CheckPoint

What is the insect host for the protist that causes Chagas' disease?

A. the tsetse fly

B. the reduviid bug

C. the *Anopheles* mosquito

D. the *Trypanosoma* gnat

19.3 Formative Questions

CheckPoint

Which is *not* a characteristic of algae?

A. acellular

B. autotrophic

C. plantlike

D. photosynthetic

19.3 Formative Questions

CheckPoint

Which algae are able to live and photosynthesize in the deepest water?

A. brown algae

B. diatoms

C. dinoflagellates

D. red algae

19.3 Formative Questions

CheckPoint

Why are diatoms found closer to the surface of the water?

A. They store their food as oil.

B. They are photosynthetic autotrophs.

C. Their secondary pigments are carotenoids.

D. Their silica walls form two unequal halves.

19.3 Formative Questions

CheckPoint

What observation leads scientists to issue a warning to stop shellfish harvesting?

A. chrysophyte colonies

B. kelp overpopulation

C. red tides

D. zooplankton blooms

19.3 Formative Questions

CheckPoint

What organisms make up the base of the food web in aquatic environments?

A. kelp

B. blue-green algae

C. multicellular algae

D. phytoplankton

19.4 Formative Questions

CheckPoint

How are funguslike protists different from fungi?

A. They use spores to reproduce.

B. Their cell walls contain cellulose.

C. They feed on dead and decaying organic matter.

D. They absorb nutrients through their cell walls.

19.4 Formative Questions

CheckPoint

What is a plasmodium?

A. a flagellated diploid zygote

B. a mature colony of sporangia

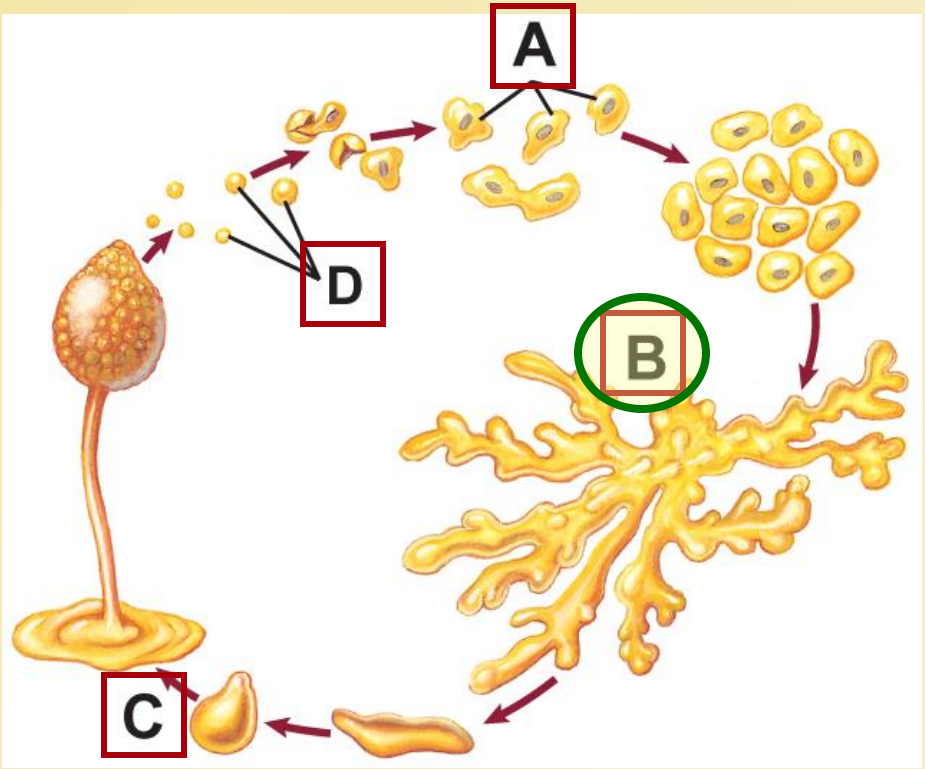
C. a multinucleated mass of cytoplasm

D. an amoeboid cell produced from a spore

19.4 Formative Questions

CheckPoint

Which part of the cellular slime mold life cycle is a response to scarcity of food?



19.4 Formative Questions

CheckPoint

What type of protist caused the famine that resulted in large emigration of people from Ireland to the United States?

A. a downy mildew

B. a water mold

C. a cellular slime mold

D. an acellular slime mold

Chapter Assessment Questions

CheckPoint

Explain how algal blooms can be harmful.

Answer: When food supply dwindles, dinoflagellates in large numbers. As dead algae decompose, the oxygen supply in the water is depleted, suffocating fish and other marine organisms. Other fish can suffocate when their gills fill with dinoflagellates.

Chapter Assessment Questions

CheckPoint

Which environment would likely have chemosynthetic autotrophic eubacteria?

A. coral reef

B. deep-ocean volcanic vent

C. lake in the mountains

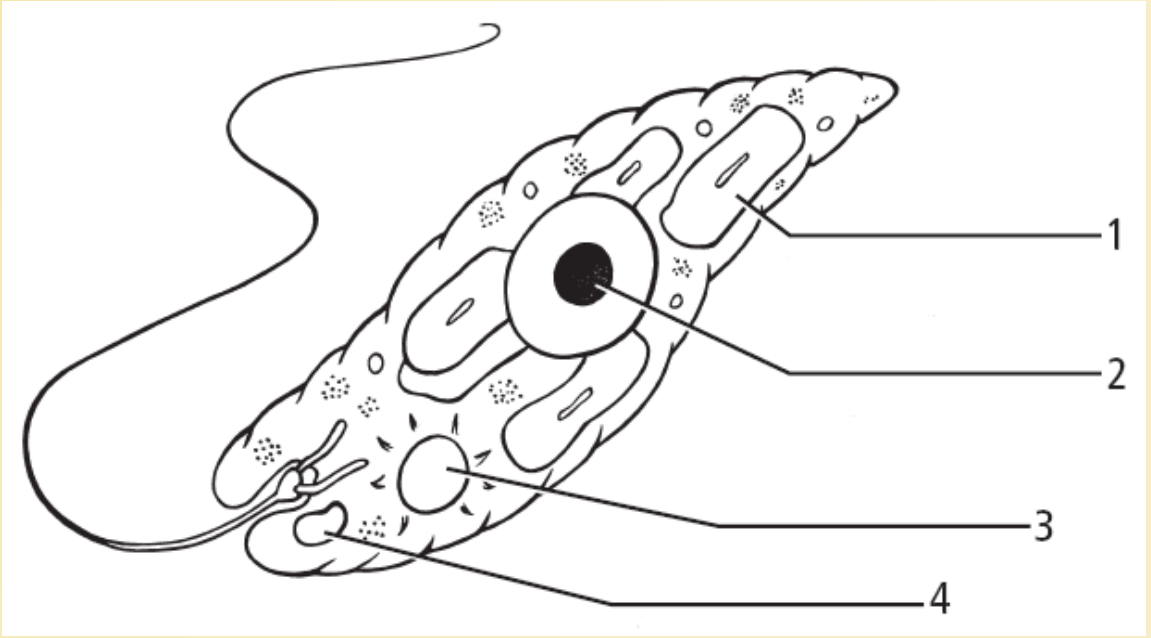
D. soil near a spring

Chapter Assessment Questions

CheckPoint

Which number represents an organelle that captures energy for the cell from sunlight?

A. 1
B. 2
C. 3
D. 4



Standardized Test Practice

CheckPoint

True or False

Grouping protists according to the way they obtain nutrition is a useful classification system that explains evolutionary relationships.

Standardized Test Practice

CheckPoint

Which word refers to an animal that uses a whiplike structure for locomotion?

A. cilioplankton

B. dinociliate

C. flagellophore

D. zooflagellate

Standardized Test Practice

CheckPoint

What can you determine about a protist that has contractile vacuoles?

A. It ingests food particles.

B. It is capable of locomotion.

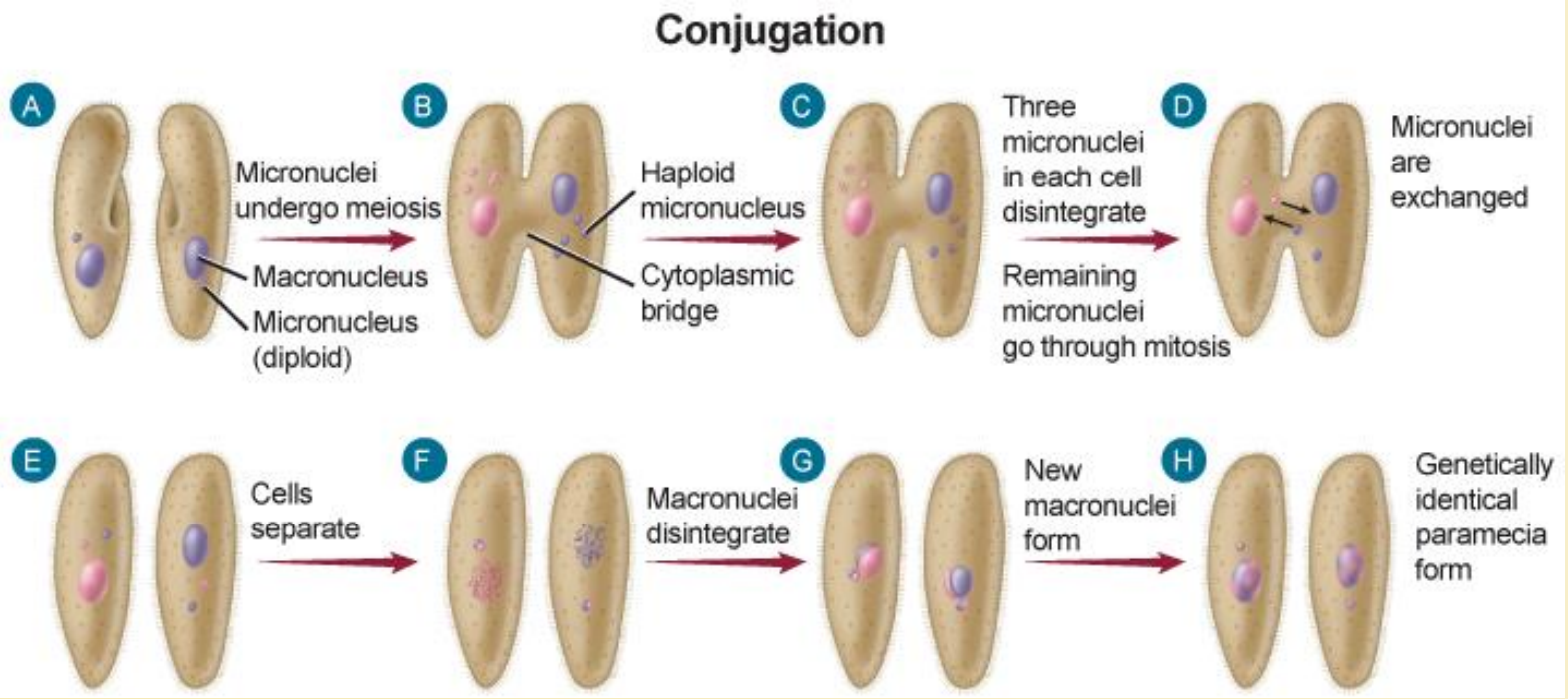
C. It excretes digested wastes.

D. It lives in fresh water.

Standardized Test Practice

CheckPoint

Why is this process *not* considered sexual reproduction?



Standardized Test Practice

CheckPoint

A. It only involves micronuclei.

B. No new organisms are formed.

C. DNA is not transferred between cells.

D. It occurs between single-celled organisms.

Standardized Test Practice

CheckPoint

Which is *not* true of acellular slime molds?

A. no flagella

B. multiple nuclei

C. no cell walls

D. begin as spores

Standardized Test Practice

CheckPoint

Which are the spores in the life cycle of the sporozoan *Plasmodium*?

A. the merozoites

B. the sporozoites

Standardized Test Practice

CheckPoint

What is the function of secondary pigments in many algae?

A. to absorb light energy in deep water
B. to emit light in aquatic environments
C. to reflect colors other than green
D. to store food other than carbohydrates

Standardized Test Practice

CheckPoint

At certain times of the year along ocean shorelines, the waves appear to glow at night. What organisms likely cause this?

A. chrysophytes

B. diatoms

C. dinoflagellates

D. luminoids

Standardized Test Practice

CheckPoint

Why are euglenoids challenging to classify?

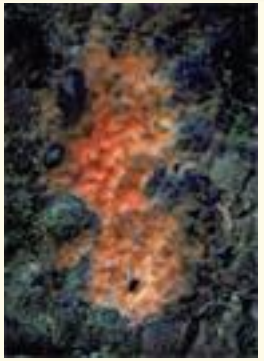
A. They have both flagella and eyespots.

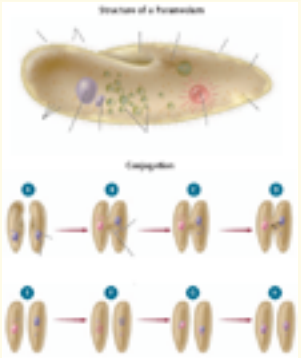
B. They have mitochondria but no cell wall.

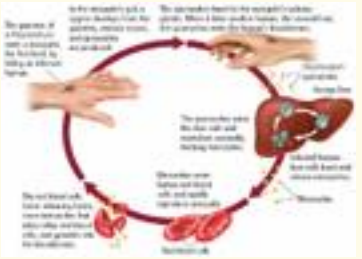
C. They are both photosynthetic and heterotrophic.

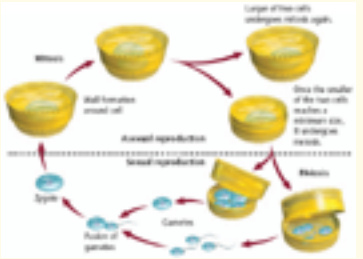
D. Some absorb nutrients, others ingest organisms.

Glencoe Biology Transparencies









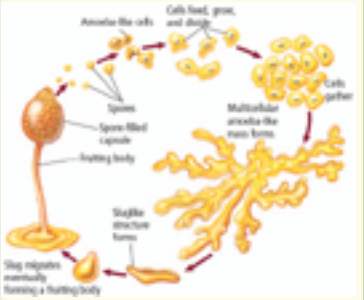
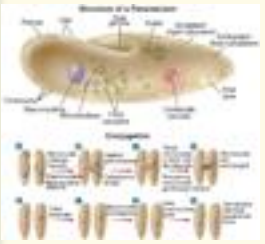


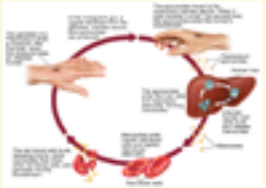
Image Bank

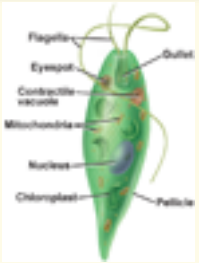

The Protists
Animal-like protists (Protozoans)
Amoeba


The Protists
Plantlike protists (algae)
Giant kelp

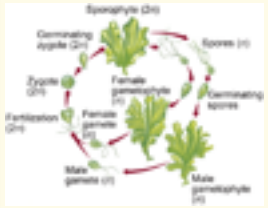

The Protists
Fungus-like protists
Water mold






Flagella
Eyespot
Contractile vacuole
Mitochondria
Nucleus
Chloroplast
Outlet
Pellicle


Some Uses for Algae


Sporophyte (2n)
Gametophyte (n)
Spores (n)
Female gametophyte (n)
Female gamete (n)
Male gamete (n)
Male gametophyte (n)
Fertilization (2n)
Zygote (2n)

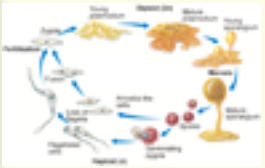


Image Bank

Vocabulary

Section 1

- protozoan
- microsporidium

Vocabulary

Section 2

- pellicle
- trichocyst
- contractile vacuole
- pseudopod
- test

Vocabulary

Section 3

- bioluminescent
- colony
- alternation of generations

Vocabulary

Section 4

- plasmodium
- acrasin

Animation

Concepts In Motion

- Visualizing Paramecia