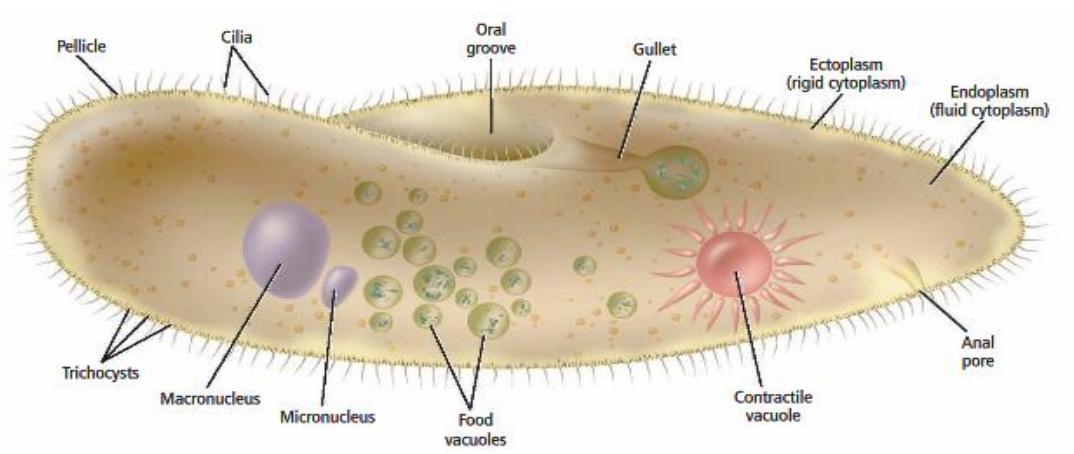
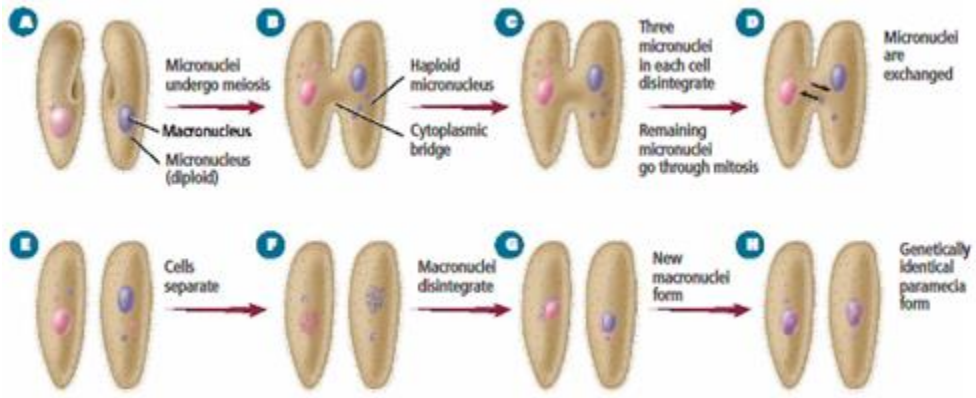
The Protists			
	Animal-Like Protists (Protozoans)	**Plant-Like Protists (Algae)**	**Fungus-Like Protists**
Group	Ciliates, amoebas, apicomplexans, and zooflagellates	Euglenoids, diatoms, dinoflagellates, green algae, red algae, brown algae, yellow-green algae, and golden-brown algae.	Slime molds, water molds, and downy mildews
Example	 Amoeba	 Giant kelp	 Water mold
Distinguishing Characteristics	- Considered animal-like because they consume other organisms for food. - Some are parasites	- Considered plant-like because they make their own food through photosynthesis. - Some consume other organisms or are parasites when light is unavailable for photosynthesis.	- considered fungus-like because they feed on decaying organic matter and absorb nutrients through its cell walls. - Some slime molds consume other organisms and a few slime molds are parasites.

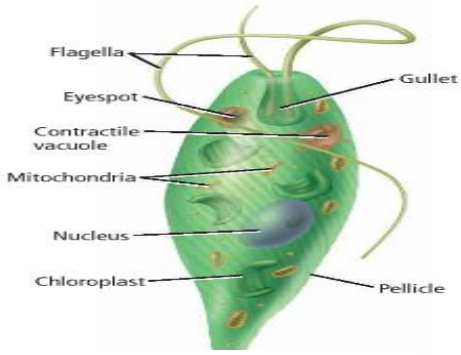


Paramecium structure

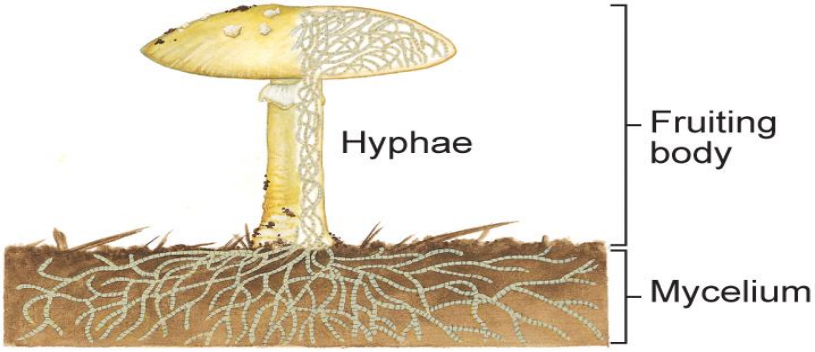


Conjugation in Paramecium

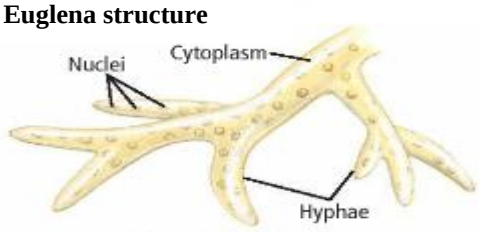
Some Uses of Algae	
Type of Algae	**Uses**
Red algae	A species of the red alga, Porphyra is called nori, which is dried, pressed into sheets, and used in soups, sauces, sushi, and condiments. Some species of red algae provide agar and carrageenan which are used in the preparation of scientific gels and cultures. Agar is also used in pie fillings and to preserve canned meat and fish. Carrageenan is used to thicken and stabilize pudding, 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 salad, soups, and 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 separation wastes. They are also used as abrasives.



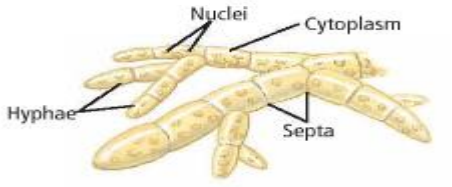
Euglena structure



Fungi structure



Aseptate Hyphae



Septate Hyphae

Fungi Phyla (Divisions)		
Phylum (Common Name)	**Example**	**Characteristics**
Chytridiomycota (Chytrids)		- Unicellular - Most are aquatic - Some are saprophytic, while others are parasitic
Zygomycota (Common molds)		- Multicellular - Most are terrestrial - Many forms of mutualistic relationships with plants - Reproduce sexually and asexually
Ascomycota (Sac fungi)		- Most are multicellular, but some are unicellular - Variety of habitats - Saprophytic, parasitic, or mutualistic - Reproduce sexually and asexually
Basidiomycota (Club fungi)		- Most are multicellular - Most are terrestrial - Saprophytic, parasitic, or mutualistic - Rarely reproduce asexually
Deuteromycota (imperfect fungi)		- No sexual stage was observed - A very diverse group - Might not be considered a true phylum

Part 1: protists- protozoans

Protists are a diverse group of unicellular or multicellular (mostly unicellular) eukaryotic organisms, some reproduce asexually by mitosis while others exchange genetic material during meiosis.

One of the most famous of them is ***Microsporidi***a, which is considered a minute creature that causes diseases to insects, so scientists use it as an insecticide.

Classifying Protists

scientists classify protists by their methods of obtaining nutrition to:

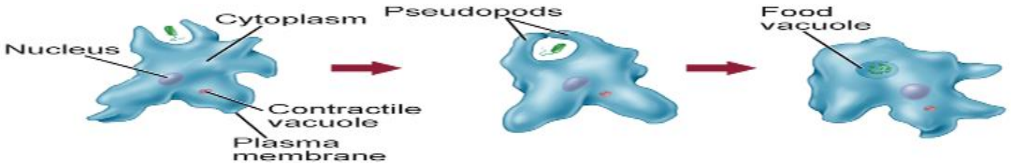
- Animal-like protists - Plant-like protists - Fungus-like protists

Animal-like protists (Protozoans)

Protozoa are single-celled eukaryotes organisms whose cells have (nuclei) that commonly show characteristics usually associated with animals, most notably mobility and heterotrophy, and usually ingest bacteria, algae, or other protozoans.

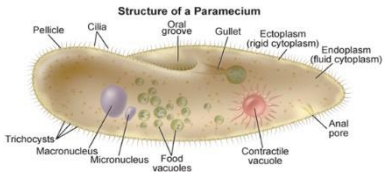
Protozoans are divided into four groups according to their locomotion (movement):

- **Sarcodina:** Animal-like protists that use pseudopods for feeding and locomotion, the most commonly studied sarcodines are found in the genus Amoeba, Chemical stimuli from smaller organisms can cause the amoeba to form pseudopods from their plasma membrane.



Formaminiferans and Radiolarians: are both types of Sarcodina, Importance: geologists use the fossilized remains of Formaminiferans to determine the age of some rocks and sediments and to identify possible sites of oil drilling.

- **Flagellates:** Use flagella for movement. **Ex:**
- Trypanosomes cause African sleeping sickness is transmitted by the Tsetse fly.
- They also cause American sleeping sickness, which is transmitted by bedbugs.
- **Ciliates:** move using cilia. (Ex: Paramecium unicellular ciliates which have two nuclei and contractile vacuoles collects the excess water from the cytoplasm and expel it from the cell., Enclosed by a layer of membrane called a pellicle.)



- **Apicomplexa:** Animal-like protists that belong to the phylum Apicomplexa also are known as sporozoans**,** all sporozoans are parasitic, and the life cycle of sporozoans has both sexual and asexual stages.

Ex: Plasmodium that causes malaria in humans and is transmitted through the female Anopheles mosquito.

Q1 **Type of Microorganisms that are used as pesticides:**

CH 3 **A** Microsporidia **B** Amoeba **C** Paramecium **D** Euglena

One of the most famous of them is Microsporidia, which is considered a minute creature that causes diseases to insects, so scientists use it as an insecticide. →A

Q2 **A student examined a sample of swamp water and found a single-celled creature with two nuclei. What is this organism?**

CH 3 **A** Trypanosome **B** Amoeba **C** Paramecium **D** Euglena

Paramecium unicellular ciliates which have two nuclei →C

Q3 **One of the diseases that mosquitos transmit is?**

CH 3 **A** Typhoid **B** Plague **C** Malaria **D** Tuberculosis

Plasmodium causes malaria in humans and is transmitted through the female Anopheles mosquito. →C

Q4 **American sleeping sickness is caused by…**

CH 3 **A** Viruses **B** Fungi **C** Protists **D** Bacteria

American sleeping sickness caused by Flagellates protozoans →C

Q5 **Formaminiferans and Radiolarians belong to which of the following protozoans?**

CH 3 **A** Flora **B** Sarcodina **C** Apicomplexa **D** Zoomastigina

Foraminifera's and Radiolarians: are both types of Sarcodina →B

Q6 **The Tsetse fly causes what disease**

CH 3 **A** American sleeping sickness **B** African sleeping sickness **C** Tuberculosis **D** Fever

Trypanosomes cause African sleeping sickness which is transmitted by the Tsetse fly. →B

Q7 **Why are protozoans classified as animal-like protists?**

CH 3 **A** They absorb nutrients. **B** They are heterotrophs. **C** They carry out photosynthesis. **D** They have either cilia or flagella.

Protozoa characteristics are usually associated with animals, most notably mobility and heterotrophy. →B

Q8 **Which of the following creatures are best to form fossils?**

CH 3 **A** Apicomplexa **B** Zoomastigina **C** Formaminiferans **D** Euglenoids

Geologists use the fossilized remains of Formaminiferans to determine the age of some rocks and sediments and to identify possible sites for oil drilling. →C

1 **Which is not a characteristic of protists?**

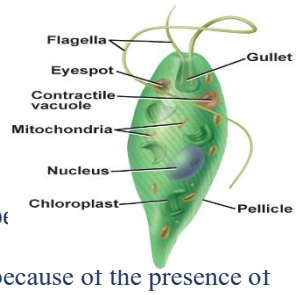
Do It? **A** Unicellular **B** Multicellular **C** Eukaryotic **D** Prokaryotic

2 **Which of these protozoans moves with a pseudopod?**

Do It? **A** Plasmodium **B** Trypanosome **C** Paramecium **D** Amoeba

Part 2: Plant-Like & Fungus-Like Protists

Plant-like protists (Algae): are Autotroph protists that undergo photosynthesis.
Types: Diatoms, Euglenoids, Green Algae, Brown Algae, and Red Algae
- **Diatoms:** Cell walls made of Silica, and store their food as oil.
- **Euglenoids:** have a light-sensitive receptor(eyespot), and a contractile vacuole that maintains Homeostasis, contain chloroplasts and photosynthesizes, and also can be heterotrophs.
- **Green Algae:** like Spirogyra, and Volvox, like plants, green algae contain chlorophyll as a primary photosynthetic pigment, have cell walls, and both groups store their food as carbohydrates, and are found in freshwater. Spirogyra reproduce by fragmentation.
Spirogyra is a multicellular species characterized by its long, thin filaments.
Volvox is an example of an alga that has a colonial growth pattern.



- **Brown Algae:** from a secondary carotenoid pigment called fucoxanthin, and Most of the 1500 spe coasts in cool areas of the world.
- **Red Algae:** Used in food, and are able to live and photosynthesize in the deepest water, it's red because of the presence of the pigment phycoerythrin; this pigment reflects red light and absorbs blue light.

Fungus-Like Protists: Protists get their food by absorbing nutrients from dead or decaying creatures. Its cell wall is composed of cellulose, like slime molds, and uses spores to reproduce, fungus-like protists contain Centrioles, which fungi do not contain.

Q9 **Which type of protist carries out photosynthesis and has chloroplasts?**
CH 3
A Fungus **B** Algae **C** Mold **D** Bacteria
Plant-like protists (Algae): are Autotroph protists that undergo photosynthesis →B

Q10 **What is the use of the contractile vacuole found in Euglenoids?**
CH 3
A Digest food **B** Photosynthesis
C Homeostasis **D** Movement
Euglenoids: have a light-sensitive receptor (eyespot), and a contractile vacuole that maintains homeostasis. →C

Q11 **Which of the following makes its own food?**
CH 3
A Plasmodium **B** Amoeba
C Spirogyra **D** Trypanosoma
Green Algae: like Spirogyra, and Volvox, like plants, green algae contain chlorophyll as a primary photosynthetic pigment. →C

Q12 **Which is not a characteristic of algae?**
CH 3
A Acellular **B** Autotrophic
C Plant-like **D** photosynthetic
Green Algae: like plants, green algae contain chlorophyll as a primary photosynthetic pigment and cellular. →A

13 **Silica is used in teeth whitening, from where can we get it?**
CH 3
A Dinoflagellates **B** Brown Algae
C Euglenoids **D** Diatoms
Diatoms: Cell wall made of Silica. →D

Q14 **Volvox belongs to ... Algae**
CH 3
A Red **B** Brown - Gold
C Green **D** Blue
Green Algae: like Spirogyra, and Volvox →C

Q15 **Which algae are able to live and photosynthesize in the deepest water?**
CH 3
A Brown algae. **B** Diatoms
C Dinoflagellates **D** Red algae
Red Algae: Used in food, and are able to live and photosynthesize in the deepest water →D

Q16 **Why are diatoms found closer to the surface of the water?**
CH 3
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.
Diatoms: Cell walls made of Silica, and store their food as oil. →A

Q17 **Protists that feed on decaying organic matter, and having a cell wall composed of cellulose is called**
CH 3
A Algae **B** Fungus
C Plant **D** Animal
Fungus-Like Protists: Protists get their food by absorbing nutrients from dead or decaying creatures. →B

Q18 **What do fungus-like protists contain that true fungi do not contain?**
CH 3
A Nuclei **B** Flagella
C Centrioles **D** Cytoplasm
Fungus-like protists contain Centrioles, which fungi do not contain. →C

3 **Algae differ from plants because they do not have_____**
Do It?
A Chloroplasts, roots, and stems.
B Leaves, pigments, and roots.
C Leaves, roots, and stems.
D Pigments, roots, and stems.

4 **Which protist can reproduce using the process of fragmentation?**
Do It?
A Amoeba proteus
B Spirogyra
C Paramecium caudatum
D Trypanosoma.

Part 3: Fungi

Fungi are heterotroph living organisms, that digest their food before ingestion with the use of enzymes, and their cell wall are composed of chitin. (Chitin is a polysaccharide carbohydrate)
Fungi could be unicellular like yeast, or multicellular like all the other types of mushrooms.
Most fungi reproduce sexually, Fungi can reproduce Asexually by Budding, Fragmentation, or Spore producing.
The structure of Fungi: Hyphae, mycelium, and fruiting body (reproductive structure).
There are three types of Fungi according to nutrition: - Saprophytic. - Parasitic. - Mutualistic.

Fungi Phyla (Divisions)

- **Chytridiomycota(chytrids)**: Unicellular, aquatic, produces flagellated spores.
- **Zygomycota (Common Molds)**: Reproduce Sexually by producing zygospores. Example Bread mold.
- **Ascomycota (Sac Fungi):** Reproduce sexually by producing ascospores. Example: Yeast, and Aspergillus.
- **Basidiomycota (Club Fungi):** Makes basidiospores when reproducing sexually. Example: Mushroom.

Uses of Fungi

- In **medicine**: Penicillium notatum can be used as a source of penicillin.
- In **Foods:** Truffle, mushrooms, and yeast are used in bread and cheese making.

Lichen

Lichen: A symbiotic relationship between a fungus and an alga or a photosynthetic partner.
Lichens have high sensitivity to pollution, lichens are important bioindicators.
(Bioindicator: A living organism that is sensitive to changes in environmental conditions.)

Mycorrhizae

Mycorrhizae is a symbiotic relationship between a specialized fungus and plant roots.
- Fungus receives carbohydrates and amino acids from the plant, the hyphae of the fungus increase the plant's root surface area for water and mineral absorption.

Mycorrhizae are extremely important for agricultural crops including corn, carrots, potatoes, tomatoes, and strawberries.

Q19 **Living organisms that are heterotrophs that digest food before ingesting it…**
CH 3
A Plants **B** Algae
C Fungi **D** Viruses
Fungi are heterotroph living organisms, that digest their food before ingestion with the use of enzymes , and their cell wall is composed of chitin. →C

Q20 **A polysaccharide carbohydrate found in the cell wall of fungi**
CH 3
A Cellulose **B** Chitin **C** Lignin **D** Suberin
(Chitin is a polysaccharide carbohydrate →B

Q21 **A student found fungi. While diagnosing it, he found out that it is composed of one cell. Which kind of fungi is present?**
CH 3
A Mushroom **B** Common Mold
C Dessert truffles **D** Yeast
yeast is classified as Unicellular fungi →D

Q22 **Which of the following is not considered a fungi's way of obtaining food?**
CH 3
A Parasitism **B** Photosynthesis
C Decomposing **D** Mutualism
There are three types of Fungi according to nutrition:
- Saprophytic. - Parasitic. - Mutualistic →B

Q23 **Which of the following fungi produces flagellated spores?**
CH 3
A Common Mold **B** Sac Fungi
C Club Fungi **D** Chytrids
Chytridiomycota(chytrids): Unicellular, aquatic, produces flagellated spores. →D

Chapter 3: Do It Answer key				
1	2	3	4	5
D	D	C	B	C

Q24 **Penicillin antibiotic is extracted from...**
CH 3
A Fungi **B** Bats
C Protists **D** Wood
Uses of Fungi
In medicine: Penicillium notatum can be used as a source of penicillin. →A

25 **Bread Mold belongs to which phylum?**
CH 3
A Chytridiomycota **B** Ascomycota
C Zygomycota **D** Basidiomycota
Zygomycota (Common Molds): Reproduce Sexually by producing zygospores.
Example: Bread mold →C

Q26 **Which of the following belong to the Phylum Basidiomycota?**
CH3
A Bread mold **B** Water Mold
C Mushroom **D** Yeast
Basidiomycota (Club Fungi): Makes basidiospores when reproducing sexually.
Example: Mushroom. →C

Q27 **Lichens are important bioindicators for being...**
CH 3
A Drought resistant **B** Unicellular
C Symbiotic **D** Sensitive to pollution
Lichen: A symbiotic relationship between a fungus and an alga or a photosynthetic partner.
Lichens have high sensitivity to pollution, lichens are important bioindicators. →D

5 **Which of the following is not a characteristic of sticky fungi?**
Do It?
A It lives in water
B Produces flagella
C Multicellular
D Its walls contain chitin.