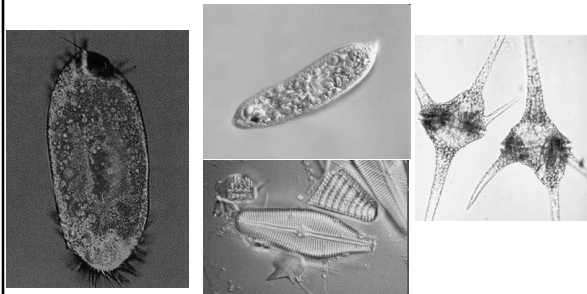


# Protists

## Chapter 20



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## Domain: Eukarya

- Protists are single cell organisms like bacteria and archaea.
  - ❖ But they are EUKARYOTIC organisms.
- Classifications are still difficult due to the huge variations of traits in Protista.

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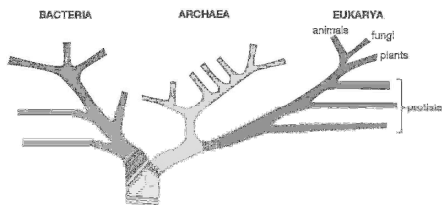
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## “Kingdom” Protista

- Protists are “any eukaryote that is not a plant, animal or fungus.”
  - ❖ Most are single cells, or colonies of a single cell type...



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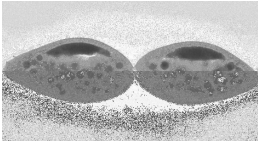
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### "Kingdom" Protista

- Most protists reproduce by simple cell division (mitosis)



- Some protists also exchange genetic material across cytoplasmic bridges



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### "Kingdom" Protista

- Diatoms!
  - ❖ Key feature: encased in silica (glass) shells
  - ❖ A key type of phytoplankton
    - Important primary producers in aquatic ecosystems
    - Phytoplankton is responsible for >50% of all primary production on earth!
  - ❖ One coastal species, *Pseudonitzschia*, produces domoic acid (a toxin)
    - Filter-feeders concentrate toxin, making them toxic to their predators and animals higher on food web.

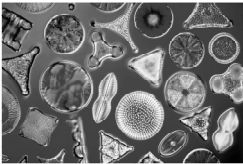
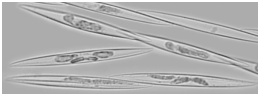



Image courtesy of the Santa Barbara Museum of Natural History

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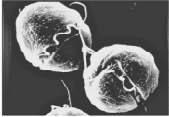
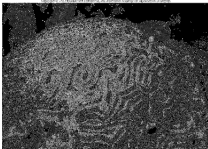
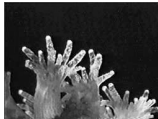
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### "Kingdom" Protista

- Dinoflagellates
  - ❖ Key feature: two whip-like flagella
  - ❖ Some are phytoplankton
  - ❖ Some are mutualistic symbionts within marine organisms
  - ❖ Some cause toxic blooms that kill fish and poison seafood.


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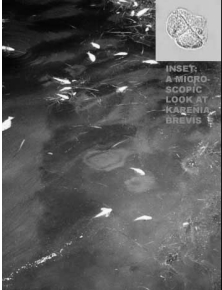
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### "Kingdom" Protista

- Dinoflagellates (cont.)
  - ❖ Some cause red tides
    - Some red-tide causing dinoflagellates are highly toxic
- Like the diatom *Pseudonitzschia*, render filter-feeders toxic to vertebrates.
  - ❖ Increased temperatures increase the chances of red tides and their harmful impacts.
  - ❖ People used to avoid seafood in June, July and August.




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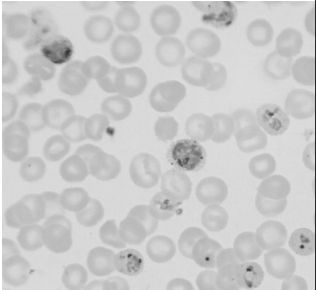
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### "Kingdom" Protista

- Apicomplexans (sporozoans)
  - ❖ Parasitic; form infectious "spores"
- Example: Plasmodium
  - ❖ Malaria is becoming resistant to traditional medications.




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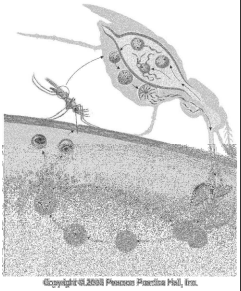
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### Malaria life cycle

- *Plasmodium* Gametocytes develop into gametes and unite in mosquito (=sexual reproduction)
  - ❖ Larvae develop
  - ❖ *Plasmodium* larvae injected into humans via mosquito saliva
  - ❖ Larvae reproduce asexually in humans → "spores"
    - One spore → millions of spores
    - Causes bursting of liver and red blood cells
    - Some gametocytes produced
  - ❖ Mosquito gain gametocytes by biting a host




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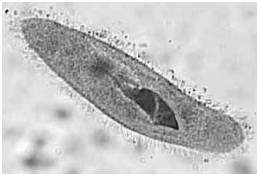
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### "Kingdom" Protista

- Ciliates
  - ❖ Possess many cilia (short, hairlike outgrowths) used for movement
- Example: *Paramecium*
  - ❖ Note how it carries out key functions of an animal, even though it is not one!




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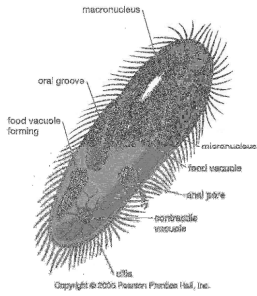
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### Paramecium

- Contractile vacuole: control of water balance
  - ❖ kidney-like
- Oral groove and food vacuole:
  - ❖ food intake, digestion




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### "Kingdom" Protista

- Ciliates
  - ❖ Some ciliates prey on other ciliates!




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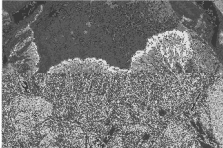
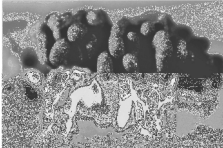
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### "Kingdom" Protista

- Slime molds
  - ❖ Key decomposers
  - ❖ Dry conditions/lack of food → development of "fruiting bodies" that produce spores
    - Spores disperse; some will end up in favorable conditions

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### "Kingdom" Protista

- Euglenoids
- Example: *Euglena*
  - ❖ No cell wall;
  - ❖ highly motile
- Has plant & animal characteristics.

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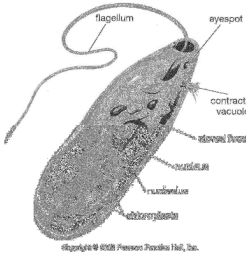
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### euglenoids

- Use flagellum for movement
- Many are photosynthetic
  - ❖ Note chloroplasts
- Notice "eyespot" for detecting light direction



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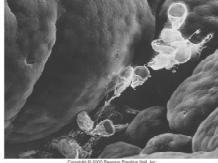
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## Zooflagellates

- Zoo- => animal like
- Flagellum used for propulsion and/or food capture

- ❖ *Giardia*:

- causes intestinal disorders
- Found in unfiltered freshwater
- Affects 2.5 million people each year in the US



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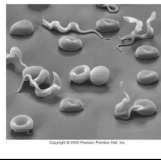
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## Trypanosoma

- Causes African sleeping sickness
  - ❖ Transmitted by tse-tse flies
  - ❖ Infects blood
  - ❖ Will lead to death if untreated
  - ❖ One symptom is excessive daytime sleeping; also causes other physical/neurological problems
  - ❖ No vaccine
  - ❖ Treatment in later stages not always successful



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## “Kingdom” Protista

- Brown algae
  - ❖ Algae superficially resemble plants, but lack key plant features.
  - ❖ Brown color: Pigments that absorb colors of light that penetrate water (green/blue)
    - Chlorophyll reflects green!
  - ❖ Example: giant kelp!
    - Entire ecosystem thrives due to giant kelp.



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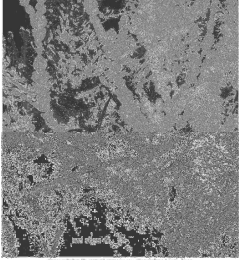
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### "Kingdom" Protista

- Red algae
  - ❖ Multicellular
    - Multiple cell types
  - ❖ Red color: Like brown algae, have pigments that absorb colors of light that penetrate water (i.e. green/blue)
    - More effective than chlorophyll or pigments in brown algae at absorbing green/blue light
    - Can be found relatively deep in ocean




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### Edible Red Algae

- Nori
  - ❖ Used as wraps in sushi.
- Agar
  - ❖ Delicacy in the Philippines and Japan




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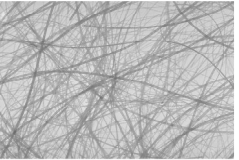
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### "Kingdom" Protista

- Green algae
  - ❖ Contain the same photosynthetic pigments as plants
    - No additional pigments for better absorption through water
    - Found in shallow water
  - ❖ Some are multicellular (unusual for Protista)
  - ❖ Some green algae are ancestors to Kingdom Plantae




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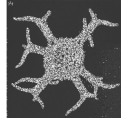
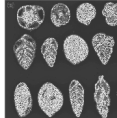
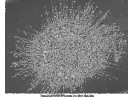
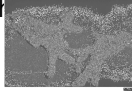
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## "Kingdom" Protista

- Some Protista move with pseudopods
  - ❖ Flexible plasma membranes allow extension of cell in all directions
    - Amoebas
    - Heliozoans
    - Foraminifera & Radiolaria
      - Construct elaborate "shells"



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