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FOCUS: Fungus-like Protists

ESSENTIAL QUESTIONS:

- Can you describe the various classifications of protists and explain how scientists determine which category a protist belongs in?
- Can you describe the specialized organelles used by protists that allow them to survive with just a single cell?

What do we already know?

- Protists can be put into three categories: animal-like, plant-like, & fungus-like.
- Animal-like protists are similar to animals because they are heterotrophs and most can move to obtain their food.
- Plant-like protists (or algae) are similar to plants because they are autotrophs and their cells contain the green pigment chlorophyll used for photosynthesis.

Fungus-like protists

- *What makes them like fungus?*
  - Funguslike protists are heterotrophs that absorb nutrients from dead or decaying organic matter.
  - Funguslike protists grow in damp, nutrient-rich environments, where they absorb food through their cell membranes.

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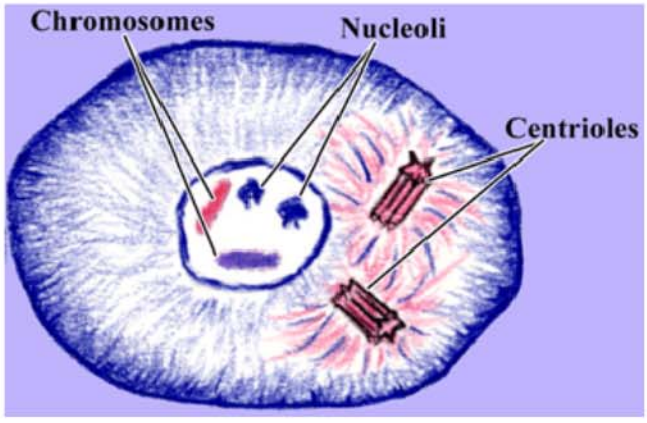
True Fungi

Fungus-like Protist

- *What makes them different from fungus?*
  - Their cell structure is not the same as true fungi
    - Funguslike protists have *no* chitin in their cell walls. Chitin is a substance found in the cell walls of true fungus to give them rigidity and structural support
    - Funguslike protists *do have* centrioles in their cells. Centrioles are found in animal cells and help them to divide and reproduce. Centrioles are not found in the cells of true fungi.
      - Means they have fungus-like and animal-like characteristics.



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- Fungus-like protists can be classified into 3 different categories.

Fungus-like Protists

- Slime molds
  - Cellular Slime mold (cells)
  - Acellular Slime mold (not cells)
- water molds

Slime Molds

- Found in damp environments that are rich in organic matter.
  - ***Examples:***
    - decaying leaves on the forest floor
    - compost pile

- Play a major role in recycling organic materials in the environment. In other words, they help things to rot and decompose.
- Help turn dead organic material into rich topsoil.

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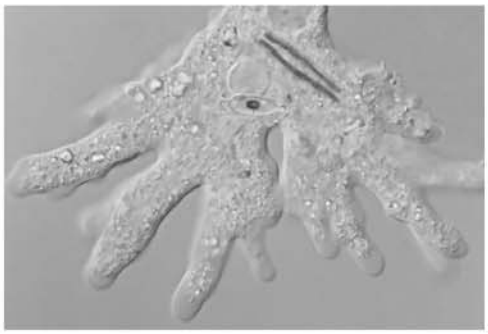
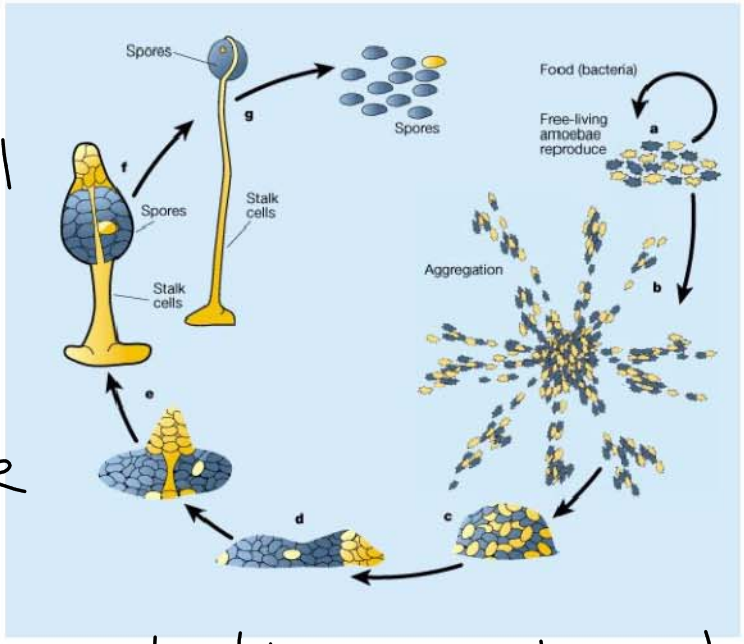
Cellular Slime Molds

- Slime molds in which all the individual cells maintain separation from each other by a cell membrane
  - Same way your body is set up (trillions of cells living and working together, but separated from each other by cell membrane).



- Live most of their lives as single-celled organisms in soil that look like amoeba.
- When food is abundant, they live alone and rapidly grow and divide to reproduce.
- When food is scarce, they send out chemical signals to other slime mold cells to aggregate (join together).
- Thousands of slime mold cells then aggregate produce a fruiting body, and release spores.



- Each spore grows into a new amoeba-like single-celled protist and the cycle begins again.
- Extremely unique because they have a unicellular, colonial, and multicellular stage. (one cell)

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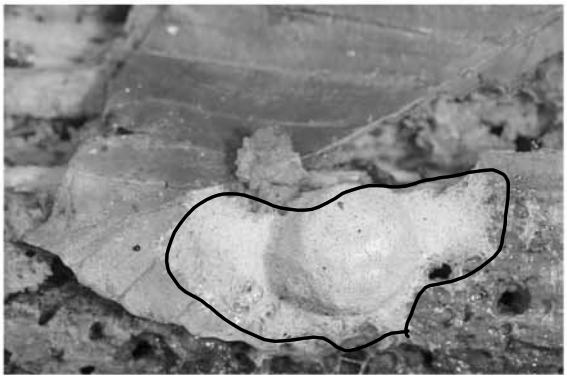
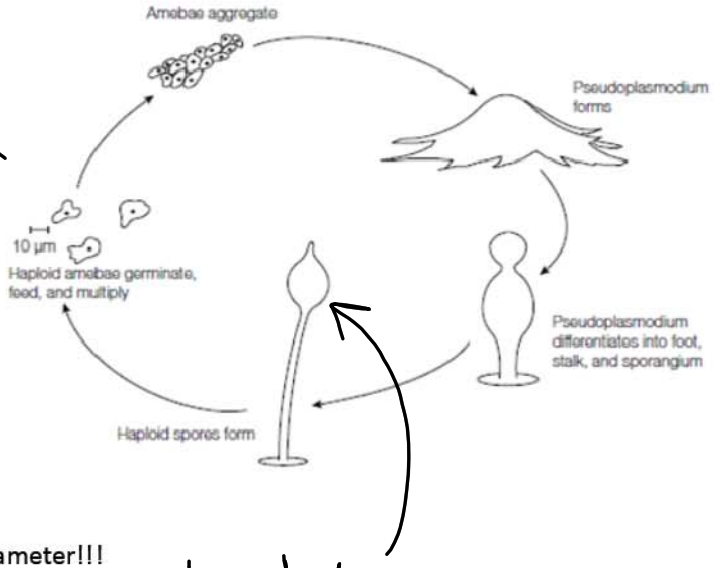
Acellular Slime Molds



- Slime molds in which many cells fuse together to form large cells with many nuclei in a single cell.
- Similar to cellular slime molds, they live most of their lives as unicellular amoeba-like cells living in soil.
- Unlike cellular slime molds, when they aggregate, they form several large blob-like structures with many nuclei.
  - The multi-nucleated blobs are called plasmodia (singular = plasmodium).
  - A single plasmodium made up of what used-to-be millions of cells can grow to be several meters in diameter!!!



- The plasmodia produce several small fruiting bodies that release spores.
- Each spore grows into a new amoeba-like cell to begin the cycle again.

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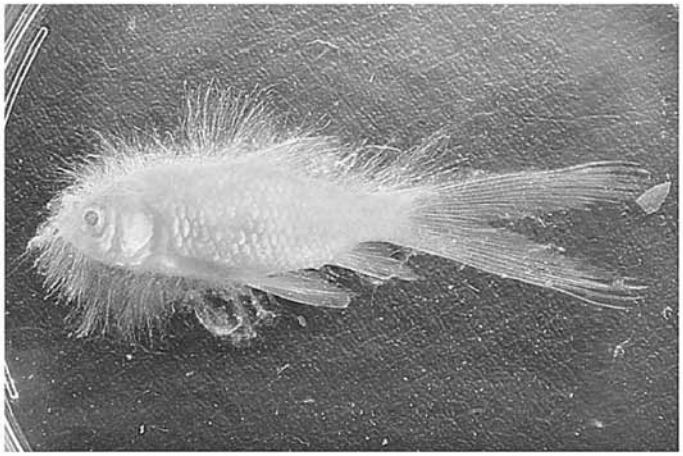
Water Molds

- white, fuzzy molds that thrive on dead or decaying organic matter in water.
- Different from true fungal mold (ie: bread mold):
  - Their cells can be multi-nucleated.
  - Cell walls made of cellulose instead of chitin.
  - Produce spores with flagella that can swim.



- Some water molds live as plant parasites on land, causing mildews and blights on grapes, tomatoes, potatoes, corn and other crops.
- **Example:** *Phytophthora infestans*
  - Caused the Great Potato Famine of 1845-1846 in Ireland.
  - Potatoes were originally grown by the Incas in South America, but were introduced to Europe by Spanish Explorers.
  - Potatoes became the staple crop of Ireland and formed the livelihoods of most poor Irish farmers.
  - The summer of 1845 was unusually cold & wet, ideal growing conditions for water molds.

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- ***Effects:***
  - Destroyed about 60% of the Irish potato crop.
  - Led to the starvation of more than a million people.
  - Led to the immediate immigration of about 1.5 million Irish to America.
  - Nearly 40 million Americans today (almost 12% of our population) can trace their ancestry back to Ireland.
  - Changed the ethnic, religious, and political character of most east coast cities.