

Protist Diversity Lecture Outline

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*Number in outline corresponds to slide number the PowerPoint presentation.

1. Protists

- a. Protists are an interesting case. The textbook goes into a lot of detail on Protist classification, but they are such a complicated group of organisms, much like bacteria, that we will not be exploring the kingdom in as much depth as the book goes.

2. Difficult to Classify

- a. The kingdom Protista is often referred to as the catch-all kingdom. For a long time, when it was unclear how a new species should be classified, it was thrown in with the protists. Nowadays, with advancements in DNA and molecular analysis, and an ever growing understanding of phylogenetic relationships, there is a little more structure to the kingdom.
- b. But there is still a vast array of organisms that differ in nutritional modes, habitats, morphology and life strategies that make up this extremely complex kingdom. It is also the kingdom that has the most movement in and out of it. What I mean by this is that organisms are often classified and reclassified in this group as new knowledge is gained about a species. Algae for instance were classified as a plant up until the early 90s, when it was decided once and for all that most species of algae do not have all the characteristics of a plant.

3. Protists vs. Prokaryotes

- a. Before we explore this group in any detail, let's see how they compare to prokaryotes. All protists are eukaryotes, meaning they are much larger than bacteria, and have organelles or compartments that carry out specialized functions for the cell.
- b. Some protists are single celled as bacteria are, but just as many are multi-cellular organisms. Just like bacteria, protists also have a variety of nutritional modes, including both auto- and heterotrophs. Another aspect of protists that stand them apart from bacteria is that most are capable of sexual reproduction (AKA cellular division known as meiosis.)

4. Protists

- a. Your book covers the different groups in quite a bit of detail. But we are going to simplify things quite a bit and break the kingdom down into 3 major groups: Animal like protists, plant like protists and fungus like protists. For each group we will look at what makes them like other kingdoms, and what sets them apart from them as well. This approach looks at the kingdom Protista from the more traditional view of "Eh, it's kinda like a plant... but not." or "It's kinda like an animal... But not."

5. Animal – Like: Protozoans

- a. Let's start with the Protozoans, or animal like protists. This group is similar to animals in the fact that they are all heterotrophic; they are more mobile and most are capable of sexual reproduction. But what sets protozoans apart from the animal kingdom is that they are all single celled organisms.

6. Protozoans

- a. As with any group of organisms, there are examples of species that are beneficial and those that are considered "bad". In aquatic habitats, protozoa are known as zooplankton. These are the herbivores of the marine world and provide energy to the vast majority of organisms that live in the oceans.

- b.** On the flip side, there are examples of protozoa that cause diseases, such as malaria and Giardia. Brain eating amoebas have been in the news recently, showing up in Louisiana, Arkansas and Florida water systems and are responsible for at least 30 deaths in the last decade.

7. Plant Like Protists.

- a.** This group of protists are similar to plants because they are capable of photosynthesis. This means that they have organelles called chloroplasts, which are the compartments responsible for carrying out the process of photosynthesis using chlorophyll.
 - b.** But unlike the plant kingdom which is entirely composed of multi-cellular organisms, some plant like protists can be single celled. Algae, kelp and seaweed are all examples of protists that fall in this category.

8. Plant-like Protists - Examples

- a.** Most protists in this group are aquatic species, and are the primary producer in marine habitats. We have talked about this group on numerous occasions this term already.
 - b.** We have talked about lichen being a mutualistic relationship between a fungus and photosynthetic microorganisms. That microorganism can be a plant like protist.
 - c.** We talked about algae blooms caused by nutrient runoff in lakes and streams, and when learning about data being collected on Antarctica's history and fossil records in the form of diatoms.

9. Fungus-like Protists

- a.** And finally, we are left with the fungus like protists. They are like fungi because they are decomposers, digesting their food before absorbing it, and they have a similar reproductive cycle to fungi. The major difference in this group is that they are capable of movement at some point in their life cycle, which fungi do not have. These types of protists are often an important decomposer in forest ecosystems.

10. Fungus-like Protists—Major types

- a.** A fantastic example of a fungus like protist is that of the plasmodial slime mold. This is a fascinating organism, in that it is an enormous single cell that has thousands of nuclei within it. Each nucleus controls a portion of that cell and communicates with nearby nuclei to coordinate movement.
 - b.** It moves across the forest floor by oozing along, kind of like an amoeba, feeding on dead plant material on the ground. This is by far my favorite protist. I have one growing in a huge jar on my back porch. His name is Oscar. I love him.