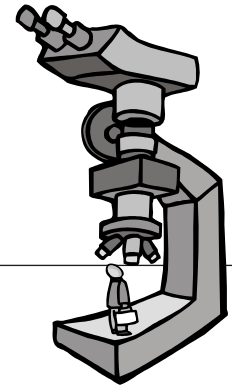


Classification of Organisms

Section 13.3 The Six Kingdoms



Pre-View 13.3

- **Five Kingdom System** – classification system that includes Animalia, Plantae, Fungi, Protista, and Monera
- **Six Kingdom System** – classification system that includes Animalia, Plantae, Fungi, Protista, Eubacteria, and Archaeobacteria
- **Archaeobacteria** – newest kingdom that includes organisms that look like bacteria but have different characteristics than “normal” bacteria
- **Eubacteria** – typical bacteria that were classified as Monera in the five kingdom system
- **Prokaryotic** – describes the cell of single-celled organisms where the cell does not have a true nucleus
- **Eukaryotic** – describes the cells of organisms where each cell generally has a nucleus and other membrane-bound organelles (Mature red blood cells in mammals are eukaryotic, but they do not contain a nucleus.)
- **Autotrophic** – describes organisms that make their own food
- **Heterotrophic** – describes organisms that cannot make their own food

When Aristotle first began to classify organisms, he divided them into two main kingdoms, plants and animals. You are probably most familiar with these two kingdoms. As scientists began using microscopes, they discovered microscopic organisms. They also discovered differences in cell structure between different organisms. They discovered that some organisms have characteristics that make it difficult to classify them as either plant or animal. Two kingdoms no longer worked, and eventually they decided on a **five kingdom system**: Animalia, Plantae, Fungi, Protista, and Monera.

These five kingdoms stuck around for a while, and many people still think in terms of these five kingdoms. However, more recently, something else interesting happened. With the new technology that became available, scientists discovered that some bacteria have different gene sequences than any other organism living on earth. This discovery led to the formation of a new kingdom called the **archaeobacteria**, or “ancient bacteria.” In addition to having different gene sequences, these bacteria also have chemical specializations in their cell walls, and they live in the most extreme conditions. All other bacteria were placed in the kingdom Eubacteria. So, now most scientists commonly use a **six kingdom system** for classification: Animalia, Plantae, Fungi, Protista, Eubacteria, and Archaeobacteria. (Not to confuse the point, but some scientists classify the six kingdoms into three main “domains,” with a domain being a taxon above kingdom. As we continue to learn more and more, these classification systems may very well change again!)

The Six Kingdoms

- **Archaeobacteria** (newest kingdom) – organisms that resemble bacteria but that live in extreme conditions
- **Eubacteria** (known as the **Monera** kingdom in the five kingdom system) – typical bacteria
- **Protista** – examples are algae, protozoa, slime molds
- **Fungi** – examples are molds, mushrooms, yeasts
- **Plantae** – examples are mosses, ferns, grasses, vegetable plants, trees
- **Animalia** – examples are sponges, jellyfish, worms, snails, insects, fish, frogs, lizards, birds, kangaroos

Section 13.3, continued

The Six Kingdoms

Remember that a kingdom is the largest classification group. Organisms in each kingdom share many cellular characteristics. For example, are the organisms unicellular or multicellular? Are the organisms' cells prokaryotic (no membrane bound organelles) or eukaryotic (have membrane bound organelles)? Do the cells have a cell wall? If so, what is it made of? Does the organism make its own food (**autotrophic**) or must it obtain food (**heterotrophic**)? Note that organisms that make their own food usually have chloroplasts in their cells, which enable them to carry out photosynthesis. Only a few types of organisms can make their own food without chloroplasts, and those are the ones that undergo chemosynthesis instead of photosynthesis. The chart below shows these main cellular characteristics for organisms in the six kingdoms.

| Kingdom | Type of cells | Nucleus? | Cell Wall? | Makes Its Own Food? |
|--------------------------------|---------------------------------|----------|--|--------------------------------------|
| Archaeobacteria (or Archae) | Unicellular | No | Yes, but not made of peptidoglycan | Some do, mostly by chemosynthesis |
| Eubacteria (Monera) | Unicellular | No | Most do, usually made of peptidoglycan | Some do, mostly by photosynthesis |
| Protista | Unicellular or Multicellular | Yes | Some do, mostly made of cellulose | Some do by photosynthesis |
| Fungi | Unicellular or Multicellular | Yes | Yes, made of chitin and cellulose | No |
| Plantae | Multicellular | Yes | Yes, made of cellulose | Yes, by photosynthesis |
| Animalia | Multicellular | Yes | No | No |

Practice 1

For each organism described, choose the **MOST** likely kingdom that the organism belongs to. Each kingdom will only be used once.

- | | | |
|-------|--|--------------------|
| _____ | 1. a prokaryotic, unicellular organism that contains chloroplasts | A. Archaeobacteria |
| _____ | 2. a eukaryotic, unicellular organism that contains chloroplasts | B. Eubacteria |
| _____ | 3. a multicellular organism whose cells do not have a cell wall | C. Protista |
| _____ | 4. a multicellular organism that has a cell wall but does not make its own food | D. Fungi |
| _____ | 5. a multicellular organism that makes its own food using photosynthesis | E. Plantae |
| _____ | 6. a unicellular organism that lives in complete darkness deep on the ocean floor near a volcanic vent | F. Animalia |