**SC.912.L.15.6 Discuss distinguishing characteristics of the domains and kingdoms of living organisms.**

**SC.912.L.15.5 Explain the reasons for changes in how organisms are classified.**

All of the organisms in the world are assembled into three domains and six kingdoms:

**Domain: Bacteria**, Kingdom Bacteria

**Domain: Archaea**, Kingdom Archaea

**Domain: Eukarya**: Kingdom Protista

Kingdom Fungi

Kingdom Plantae

Kingdom Animalia

Members of the Bacteria and Archaea are all ***prokaryotes*** (before a nucleus). No nucleus. Single circle of DNA. They are unicellular, made of one cell. Prokaryote cells are small and simple.

**Kingdom Bacteria:**

Bacteria are the most abundant organisms on earth. Some use the process of aerobic (with oxygen) and other use the process of anaerobic (without oxygen) respiration. Some eubacteria carry out photosynthesis. Some use carbon dioxide in photosynthesis as plants do, but other eubacteria use other organic compounds as a source of carbon for photosynthesis.

**Kingdom Archaea** (“Ancient bacteria”—not a good name as they aren’t any more ancient than the Eubacteria)

Archaea are less widespread than Bacteria. Differ from Eubacteria in (1) details of cell wall structure. Cell wall protects the organism. Many Archaebacteria are adapted to extreme environments. Archaebacteria more closely related to the Eukarya than are the Bacteria.

**Domain Eukarya:** Eukaryotes: DNA is arranged in chromosomes in a nucleus. The eukaryotes include both single-celled (unicellular) and many-celled (multicellular) organisms. Cells larger and more complex than cells of Prokaryotes. Contain organelles. Organelles are structures in cells specialized for particular tasks. E.g. Mitochondria and Chloroplasts. Mitochondria and chloroplasts were once free living bacteria. Over time they came to live inside the eukaryotic cells and established a symbiotic relationship.

**Kingdom Protista:** Protista are the oldest of the Eukarya. Most organisms in the kingdom Protista are unicellular and photosynthetic (can obtain food from the sun). However, seaweeds algae are multicellular, but do not have specialized cells. Examples include: Algae and Amoeba.

**Kingdom Plantae: trees, grasses, bushes, flowers:** Plants were the first organisms to colonize the land. They are multicellular and autotrophic(can produce their own food by photosynthesis). Being on land requires the ability to collect and conserve water. Cells are surrounded by a rigid cell wall that is composed of cellulose. The cellulose provides support for the plant. Key ability of plants is photosynthesis: ability to make sugars from water and carbon dioxide using the energy available in sunlight. Plants are complex multicellular organisms that possess chloroplasts, carry out photosynthesis and their cells have a cell wall.

**Kingdom Fungi: mushrooms, molds, yeasts, mildew:** Fungi have multicellular filaments that absorb nutrients (they absorb their food). Fungi is the only Kingdom with these specialized multicellular filaments. Have external digestion: they secrete digestive enzymes outside themselves and absorb whatever the enzymes break down. ***Fungi do not photosynthesize***. Fungi are specialized to be decomposers. A mushroom is a reproductive structure. It produces spores, but the bulk of the fungus is out of view. Fungi spread by spores. We as humans in Animalia, are more closely related to the Fungi than we are to the Plantae!  Many fungi produce antibiotics which kill bacteria. The first antibiotic Penicillin was discovered by Sir Alexander Fleming who isolated it form a mold.

**Kingdom Animalia:** Includes: birds, mammals, reptiles, crabs, worms, fish, jellyfish, starfish, etc. The Animalia are complex, diverse and have excellent mobility. Animal cells lack a cell wall and do not photosynthesize. There are several levels of complexity in the Animalia. The simplest animals are the sponges. These have specialized cells that carry out a single task, but do not have evolved tissues. The first group to show tissues is the jellyfish family (Cnidaria Jellyfish). Animalia are also classified by how they birth their young, such as laying eggs compared to live birth seen in mammals, if they have a backbone, and if they are herbivores or carnivores.

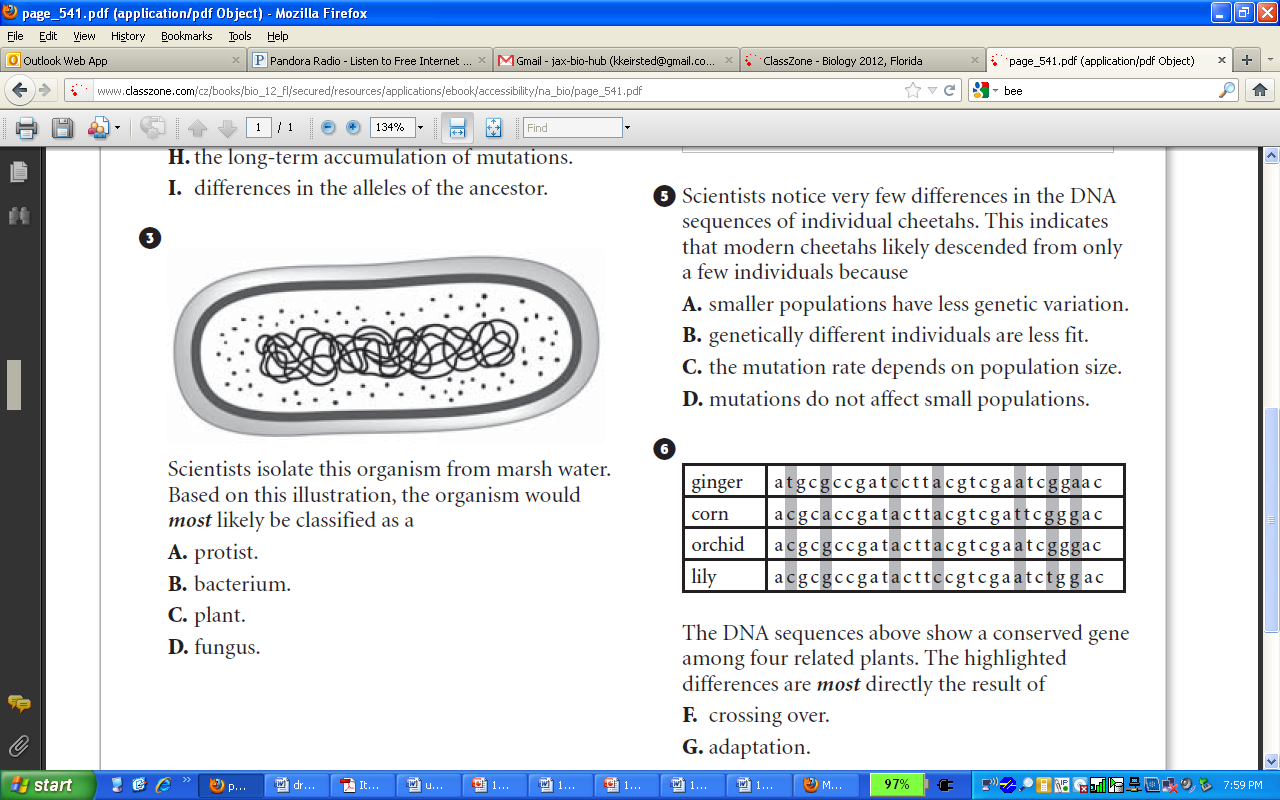
**How Classification Has Changed:**

As we have discovered more about genetics the classification system has been changed to reflect current studies. While physical similarities can show a relationship, genetic similarities are more accurate. For example, this Red Panda may look like a raccoon we would see in the states but it is actually much more closely related to the Giant Panda in Asia.

Fill in the chart on the back using your notes

|  |  |  |
| --- | --- | --- |
| **Domain it is located in:** | **Kingdom Name:** | **Characteristics:** |
| Archaea |  | * Can live in extreme environments |
| Eukarya |  | * Unicellular * Photosynthetic |
|  | Fungi | * Absorb nutrients from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eukarya |  | * Autotrophic (which means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)   * Unicellular or Multicelluar? |
| Eukarya |  | * Do not photosynthesize |
|  |  | * Some use aerobic respiration while others use anaerobic. * Very diverse Kingdom |

1. If you come across an unusual single-celled organism, what parts of the cell would you study in order to classify it into one of the 3 domains?
2. Explain why it is difficult to classify some bacteria and archaea from each other.
3. Why is the classification of life considered a work in progress?
4. Scientists isolate this organism from marsh water.

 Based on this illustration, the organism would ***most*** likely be classified as a

A. protist. C. plant.

B. bacterium. D. fungus

1. In what domain would you classify a newly discovered organism with photosynthetic organelles?
   1. Archaea c. Bacteria
   2. Protists d. Monera
2. What is the best explanation for the continual changes in the classification system of organisms?
3. All organisms struggle for existence and become extinct.
4. All organisms compete to be at the top of the food chain.
5. Technological advances have allowed scientists to better compare organisms.
6. More species have been discovered, but scientists have not analyzed all the data.
7. Students research unicellular, prokaryotic organisms that live in harsh environments such as volcanic hot springs, brine pools, and anaerobic black organic mud. Which of these groups are the students most likely researching?
8. Protista
9. Archaebacteria
10. Eubacteria
11. Plantae