

## The Organization of All Life on Earth.

Given the tremendous number of species of living things on Earth (about 2 million have been identified and scientists believe there are many more millions not yet discovered), it may seem surprising that all life can be grouped into only five categories, called Kingdoms. These five Kingdoms are Monera, Protista, Plantae, Fungi and Animalia.

Before I proceed, I should warn the readers that I am certainly not a professional biologist and the discussion here is decidedly the simplified, amateur version of the organization of life. And the five-Kingdom system described here is not the only organization system that has been and is used by some experts.

Monera is the name given to all bacteria. A single bacterium is a cell which is defined as a unit of living matter encased in a membrane which separates it from the outside world. All living things are composed of cells, but bacteria cells do not have a nucleus.

The kingdom Protista includes both algae and protozoans. Algae are plant-like organisms that produce their own food by photosynthesis. Some protozoans are single-celled animal-like organisms like amoebas that eat other organisms such as bacteria and algae. (Remember looking at pond water in a microscope in school?) Both algae and protozoans can also be multi-celled. Some classification systems separate algae and protozoans. Both protozoans and algae have cell nuclei. Alga cells also contain chloroplasts where photosynthesis occurs.

Fungi include molds, yeasts and mushrooms. Fungi cannot make their own food like plants because they do not have chloroplasts with chlorophyll. Instead they decompose the remains of dead organisms to obtain the food they need. Their cells also lack the cell wall structure that characterizes plants.

Plants are multi-cellular organisms that can photosynthesize carbohydrates from carbon dioxide in the air and water. Their cell walls are relatively rigid and made of cellulose, which makes for strong support, but a general lack of mobility.

Animals eat other organisms to obtain their food and energy and their cell walls are more flexible. This flexibility allows for easy movement, and most animals are mobile in search of food and mates.

Of course these kingdoms are just the top level of classification. Below each of these kingdoms is a hierarchy of subsequent classifications. One such classification system is a taxonomic rank from division, phylum, class, order, family, genus and finally species. For example, the plant kingdom is divided into four divisions. These can be described in a simplified way as the mosses, the ferns, the gymnosperms and the angiosperms.

The mosses (or Bryophytes) look somewhat like other plants, but structurally they are different in that they lack the vascular tissues xylem and phloem that transport water, minerals and sugars up and down the parts of all other plants. Because the mosses lack the vascular cells with rigid cell walls, they can't really support themselves individually but only as a colony. They do not form seeds and require moisture to reproduce.

Ferns have the vascular tissues of other plants and can support themselves. They also do not produce seeds and require moisture for reproduction, which is why both ferns and mosses are almost always found in moist, shady areas.

Ninety percent of all plant species produce seeds. A seed is an embryo and a food supply packaged into a protective covering, and because the seed can survive drier, harsher conditions than mosses and ferns, seed-producing plants have colonized most of the land. Seeds are produced when pollen fertilizes an egg.

Gymnosperms are non-flowering plants that produce seeds in cones. The name comes from Greek words for "naked" and "seed", and the seeds of conifers (cone-bearing plants) are not encased in a fruit.

By far the largest group of plants, and the youngest in evolutionary history, are the angiosperms, which are all of the flowering plants. These plants produce their seeds in a "vessel" (Greek "angeion"), which we would call some kind of fruit.

Both the gymnosperms and the angiosperms require pollination, in which pollen from a male part must be transported to a female ovary in order for a seed to be formed. This requires either wind or insects or other animals, but it also allows for a greater probability that the pollen will come from a different plant than the egg, thus giving rise to greater chances for genetic diversity.

The more we know, the more amazing Mother Nature is.

Until next time...

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