Natureology – 4th Grade

Summary

Students explore science careers while participating in hands-on activities and experiments. They become botanists and study plant adaptations; zoologists which study the adaptations of animals. As ecologists, students test the abiotic factors of an aquatic ecosystem, and as geologists they differentiate between igneous, sedimentary, and metamorphic rocks. As entomologists, students compare & contrast preserved arthropods. Students become microbiologists and observe decomposing materials under a microscope. *This program is 2 hours.*

Objectives

- Students will determine the similarities and differences of arthropods as they study *entomology*
- Students will understand the benefits of microorganisms as they student *microbiology*
- Students will determine the health of a stream by conducting water quality tests as they study *ecology*
- Students will identify different types of rocks as they study *geology*
- Students will be able to identify animal adaptations as they study *zoology*
- Students will be able to identify plant adaptations as they study *botany*

Key Terms

Entomology – the study of insects; in the past entomologists also studied other arthropods, like spiders, crustaceans, and centipedes.

Microbiology – this is the study of tiny organisms that are too small to see with the naked eye; this includes things like bacteria, viruses, algae, and fungi.

Ecology – the study of living and nonliving things and the interactions between them.

Geology – the study of rocks, the Earth, and Earth's processes.

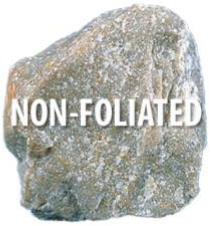
Zoology – the study of animals; a zoologist is a scientist who studies animals (not someone who works in a zoo – although some zoos may have a zoologist on staff, this is rare).

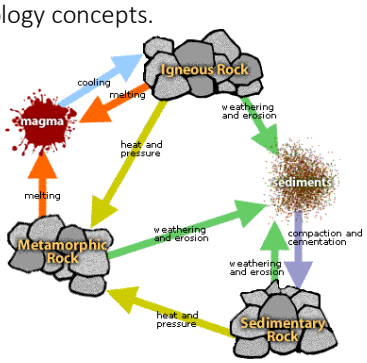
Botany – the study of plants; botanists study things like plant structures, genetics, distribution, & classification.

Background Information

Geology

Rocks are typically classified into three groups. *Igneous* rocks are formed by the cooling and hardening of magma. *Sedimentary* rocks are formed when older (mostly igneous) rocks erode and form layers. *Metamorphic* rocks are formed when preexisting rock changes due to variations in temperature and pressure. *Foliation* is the layering of different metamorphic rocks, which can be visible as thin or thick lines within a rock (often different colors). *Hardness* is the measure of a rock's resistance to scratching (a diamond is the hardest substance on Earth - only a diamond can be used to cut a diamond; an opal is very soft and as such jewelers are reluctant to make rings out of them because they get damaged too easily). *Grain* is a measure of a rock's texture or particle display (amount of different minerals present in the rock); a fine grain means a rock is all one color while a course grain means a rock has 2 or more colors. The pictures below should help clarify some of these geology concepts.





Botany

Adaptations are not just for animals! All living things, including plants, have body parts or physiology that aid in their survival. It is easy to look at an animal and determine which body parts are unique and what they do to help the animal. Plants can be more complicated to figure out. Desert plants often have waxy leaves which help those plants conserve water in a hot climate. Some underwater plants have buoyant air pockets which allow the plants to float closer to the surface where they can capture sunrays. Deciduous trees which grow in colder climates have thick bark to protect them from harsh winters. Many plants produce seeds that can be dispersed by the habitat in which it thrives – for example a round seed can roll away in a mountainous environment. See photos below of some of the aforementioned plant adaptations (from left to right: the waxy pads of a cactus, the air 'bulbs' in kelp, a seed that can blow away in a windy environment).



Microbiology

Microbiology is the study of microorganisms, which are unicellular (one cell) or multicellular microscopic organisms. This includes fungi, bacteria, viruses, and certain algae. Humans have studied only about 1% of all of the microorganisms in any given environment. Composting is the decomposition of biodegradable organic matter, producing compost. The decomposition is performed by bacteria, yeasts and fungi, and by a number of larger organisms, such as ants and worms. Some microorganisms are harmful to humans, such as viruses (COVID-19) or bacteria (E. coli), but the vast majority of microorganisms in our world provide wonderful services to us and nature as a whole. In addition to being nature's waste management department (see composting above), microorganisms are responsible for vaccines that keep us healthy, delicious fermented foods (bread, yogurt, cheese), and our own bodies' digestion of a wide variety of foods.

Entomology

Insects make up the largest and most diverse group of animals on Earth. More than 80% of all animal species are arthropods (arthropods are the umbrella group which includes insects, arachnids, and crustaceans – anything with an exoskeleton and jointed legs). Insects are vastly underappreciated for the benefits they provide to us and our ecosystems. Some benefits include:

- Insects represent a HUGE part of the food web – lots of bigger animals rely on them for food
- Insects are often decomposers – organisms that help break down dead stuff into new soil
- Many insects are pollinators – without them, our plants couldn't make new plants (and think what we'd be lacking without plants – air, food, wood, etc.).