**Microbes and Bioprospecting in Yellowstone National Park**

**What is a microbe?** A microbe is a microscopic organism. They are located everywhere on the earth, even in the boiling waters of the hotsprings and other thermal features at Yellowstone National Park (YNP). The microorganisms at YNP are often referred to as thermophiles (heat loving bacteria).

**What is Bioprospecting?** Scientific research and use of products in nature is Bioprospecting. Most of the time, it is a search for useful microorganisms that grow or thrive in extreme environments. Ancient civilizations have been using plants and other organisms found in nature as medicines for many centuries. Today, scientists use microscopes to analyze how things in nature are made so that can perform experiments that may lead them closer to understanding why certain microorganisms can live in extreme conditions or how they can help people as medicines.

Sometimes, the only way scientists can examine these microorganisms is to take samples from places where they are protected by law, such as YNP. Thankfully, scientists have discovered a way to copy these organisms in a laboratory setting so they don’t have to take many from their natural habitat to study them.

**Who are bioprospectors?** Any person (mostly scientists) who is curious about things in nature and what/how they can help us could be considered a bioprospectors. Sometimes scientists want to study these organisms for academic reasons while other scientists may want to research them for the purpose of trying to find a cure for a disease. Most bioprospecting in YNP is related to the study of microorganisms. Scientists expect that studying these tiny organisms could lead to many new discoveries in the future.

**How do you get started studying microbes in a national park?** Any scientist who wants to study microorganisms inside a national park must request a permit to conduct research. Only scientists can apply for this permit and they must show proof that they will not harm the park in any way. No natural products are able to be harvested from the park, but samples of the microorganisms can be taken. These samples cannot be sold. If a useful discover is made, the scientist’s data and information can be sold, but not the sample from the park.

**Bioprospecting in the National Parks:** The mission of the National Park Service is to, “preserve natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.” This also means that parks should be centers for broad scientific inspiration and inquiry. Any research within a national park should be done without harming anything. All researchers should work with universities or other science organizations.

Scientific permits to conduct research in Yellowstone are allowed if there will be ***no harm*** on:

* Public safety and health
* Environmental or scenic views
* Natural or cultural resources
* Scientific research
* Visitors using the park at that time

Plants, Wildlife, Rocks, and Minerals can be collected if:

* The goals of your scientific research needs you to collect them
* There is a written research proposal to a university or science organization.

**Discoveries and future discoveries from bioprospecting:**

* Some of the microorganisms found are added to food for chickens to help them digest their foods and absorb nutrients easier. This allows the chickens to eat less food but have the same amount of energy. This keeps the barn cleaner because the chicken waste is drier and not as messy. Eggs that the chickens lay are cleaner because the barn is cleaner.
* Adding an enzyme from a microorganism to bread makes it last longer and makes the bread fluffier.
* These organisms help improve the breaking down of agricultural and organic waste in landfill sites.
* DNA copying was made possible by an enzyme from a microorganism. This allows us to match DNA in criminal investigations as well as medical diagnoses or cures. (This is a $300 million per year discovery.)
* Scientists have discovered that a unique grass can thrive around hotsprings because its root system has help from a heat-tolerant microscopic fungus. They hope that they can make copies of those microbes to help crops survive extreme drought and harsh winters.
* Bioremediation – these microorganisms from YNP can help to clean up oil spills in high temperature situations. They can also clean the inside of factories smoke stacks.

Remember, the actual items studied or collected in Yellowstone **cannot be sold for money**. However, all the research and information about the microbes studied can be sold. Only about 1% of Yellowstone’s microscopic life forms have been discovered and studied.

***Things to think about…***

* ***Should we continue looking into the benefits of the smallest organisms in this park?***
* ***Would a lot of scientists studying microorganisms hurt the hot springs?***
* ***If a cure for cancer or another disease is found from research done in Yellowstone’s thermal features, should we allow larger companies in to take samples of the microorganisms?***
* ***Will this type of research hurt the environment or animals of the park?***