MICROBE



READY TO EXPLORE THE MICROBIAL WORLD?

Microbes are single-cell organisms, so tiny that millions could fit in the period at the end of this sentence. They include the oldest forms of life on Earth and helped create the atmosphere that supports all life today. Microorganisms carry out essential activities that support all life on Earth, such as creating oxygen, cycling elements, and releasing nutrients from decaying organic matter.

Microbes include bacteria, archaea, viruses, fungi, algae, and protists.

Microbes can inhabit every surface on Earth, from boiling hot springs to icy glaciers, the extreme pressure at the bottom of the ocean to dust particles floating in the air. They are all around us, even in the foods we eat and inside and on our bodies!

For every cell in your body there are as many bacterial cells!

In fact, there are more bacteria on your own hand than people on the entire planet!

Join us as we explore just a fraction of this microbial diversity.

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WHAT SAMPLES TO COLLECT



We will be collecting samples from UConn's Swan Lake



PLATING ACTIVITY

Microbiologists plate samples on **solid media** to see what microbes were growing in/on those samples. Solid media contains nutrients, such as sugars and proteins, in a jelly-like substance called **agar**. This provides a surface for the microbes to grow on.

To plate leaves, place the leaf on the media and gently press down with your fingers.

To plate water, dip a sterile swab into the sample and rub across the media surface.





We will incubate these plates for a week at 30°C.

To see pictures of what grew on your plates, check: http://nyholmlab.uconn.edu/microbe-safari/

Write your plate numbers here:

MICROBES IN WATER

Just like plants, many bacteria can use the sun's engery to make sugars and oxygen through the process of **photosynthesis**. **Cyanobacteria** are the most common photosynthetic bacteria and create the majority of the oxygen we breathe!



Cyanobacteria

Bacteria, protists, and fungi all play key roles in the aqutic food web. Protists feed on bacteria and nutrients produced by bacteria. Protists are the food source of insect larvae and small crustaceans. Bacteria and fungi are decomposers and help to break down waste and dead organic matter. By doing so, they release elements that other organisms can use to make sugars, proteins, and DNA.

Aquatic Food Web



MICROBES IN THE SOIL



Many different kinds of microbes such as bacteria, fungi, and protists live in soil. These microbes can often be found closely associated with the roots of plants in an area of soil known as the **Rhizosphere**.

dukeupress.wordpress.com

The plants attract microbes by secreting several substances that the microbes can use as food and in turn the microbes provide key nutrients missing from the soil for the plant.

In nutrient poor soil some plants can recruit bacteria (known as **Rhizobia**) to invade their roots and form a structure called a root nodule. In the nodule the bacteria convert nitrogen (N2) in the atmosphere to ammonia (NH3) in a process called **Nitrogen Fixation**. The plant can then use the ammonia as a nutrient.





Examples of these kinds of plants include peanuts and soybeans both of which are of agricultural importance.

ROOT NODULE ACTIVITY

In this activity you will examine the root system of alfalfa for the presence of root nodules.

The alfalfa plant

Alfalfa root nodules



www.herbazest.com

en.wikipedia.org

The alfalfa plants will be provided in small growth tubes. To examine the root system of your plant gently remove the plant from the tube. This can be done by gently pulling the plant out or by dumping it out. Remove as much soil from the roots as you can and count the total number of root nodules.



Fill in the blank:

The bacteria that can invade the roots of plants are called _____.

These bacteria provide the plant with ammonia which they make by a process called Nitrogen _____.

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&

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