National Park Service
U.S. Department of the Interior

Zion National Park

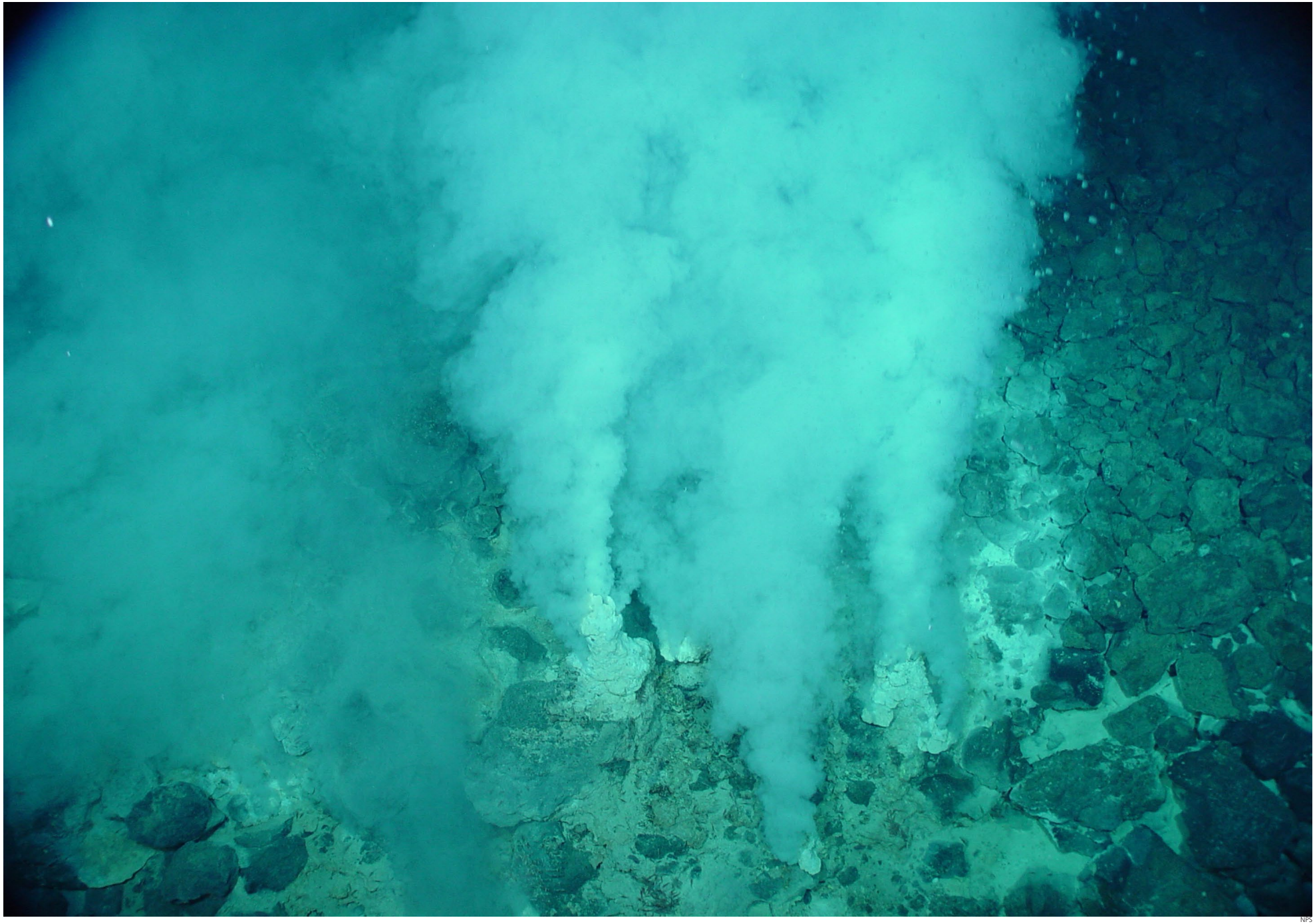
Microorganisms Are Everywhere

Images, Reference Sheets, Descriptions, and Worksheets

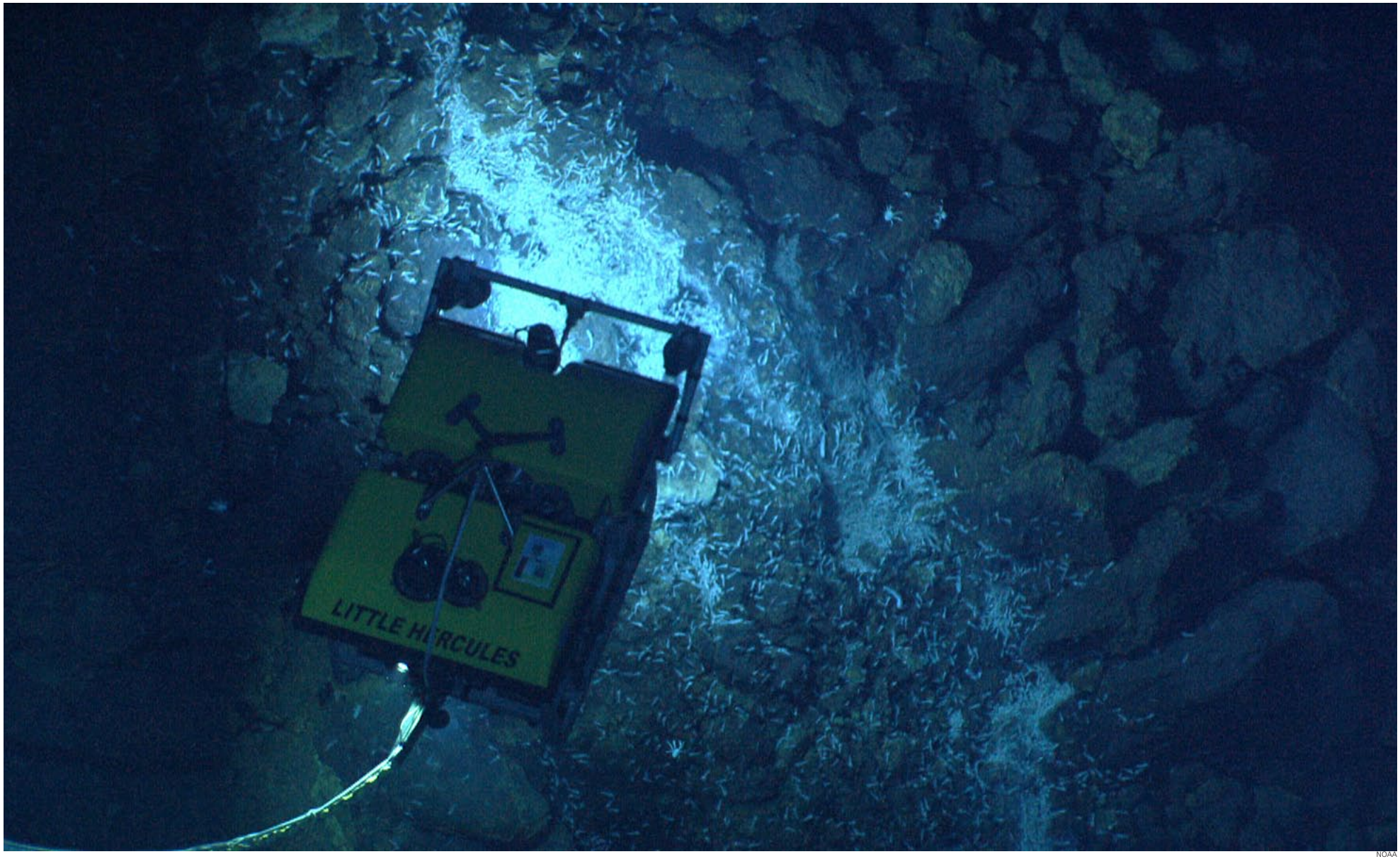
NPS/MARC NEIDIG

BRYANNA PLOG

Antarctica



Undersea Thermal Vents (Photo from Mariana Trench National Marine Park, Pacific Ocean)



NOAA

Deep Underneath the Ocean

BRYANNA PLOG

Death Valley National Park, California/Nevada

NASA

Great Salt Lake, Utah

Radiation (Photo from Three Mile Island, Pennsylvania)

Yellowstone National Park, Wyoming/Montana/Idaho

Microorganisms are Everywhere Reference Sheet

Antarctica – extreme temperature (cold)
Many types of microorganisms can survive at the extreme temperatures of the Arctic and Antarctic including a type called pyschrophiles which can thrive at temperatures of -4°F and live 2 miles below the surface of the ice.

Undersea Thermal Vents (Photo from Marianas Trench Marine National Monument, Pacific Ocean) – extreme temperature (heat)
Undersea thermal vents are the result of seawater heated by magma underneath the earth's crust, like a hot spring under the ocean. The seawater around can reach temperature of 700°F and some microorganisms thrive here, enjoying temperature of 195°F and the lack of sunlight.

Deep Underneath the Ocean – extreme pressure
Microorganisms such as *Foraminifera* can live 7 miles deep under the ocean, at 1,100 times the pressure at the surface, in an environment devoid of light.

Death Valley National Park, California/Nevada – extreme dryness
During the heat of the summer, air temperatures can reach 130°F. Surface temperatures can reach 200°F.

Great Salt Lake, Utah – extreme salt
Salt-loving microorganisms thrive in the Great Salt Lake, which has salinity nearly 10 times that of the ocean. A railroad causeway divides the northern and southern parts of the lake, making the northern part saltier and home to pink-hued microorganisms.

Radiation (Photo from Three Mile Island, Pennsylvania) – extreme pollution/radiation
Many microorganisms can survive high doses of radiation, such as the bacteria *Deinococcus radiodurans*, which can survive a dose of 15,000 gray, a measurement of radiation (10 gray will kill a human).

Yellowstone National Park, Wyoming/Montana/Idaho – extreme pH
In some of the vents and mud pots in Yellowstone, the water is as acidic as battery acid and reaches temperatures of 158°F. Different microorganisms can still survive in these hot springs and turn the water bright colors depending on the temperature. The hot springs are yellow-green at around 150°F to 160°F, then turn orange or brown as they cool, resulting in the brilliant colors of Yellowstone's thermal area.

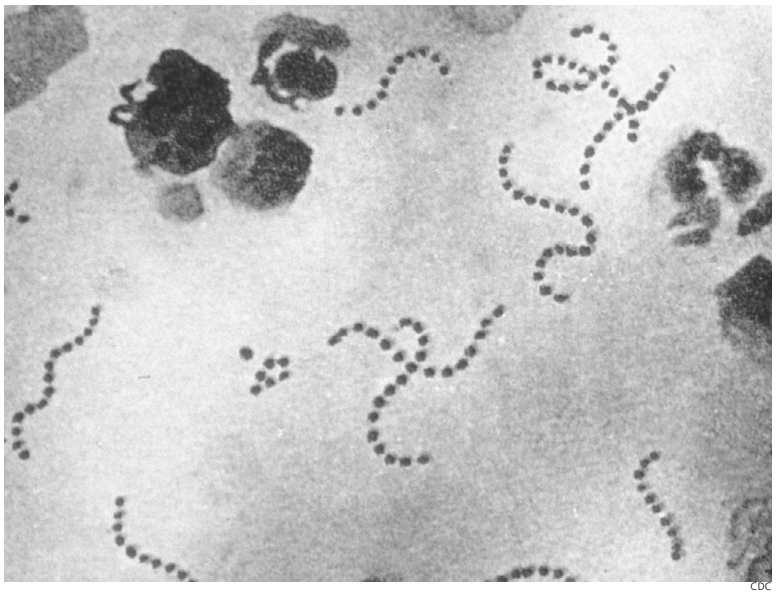
Microorganisms in Zion Descriptions

Display on the board, or print and cut apart each description to give to students.

FRANK VINCENTZ

Rhizobia

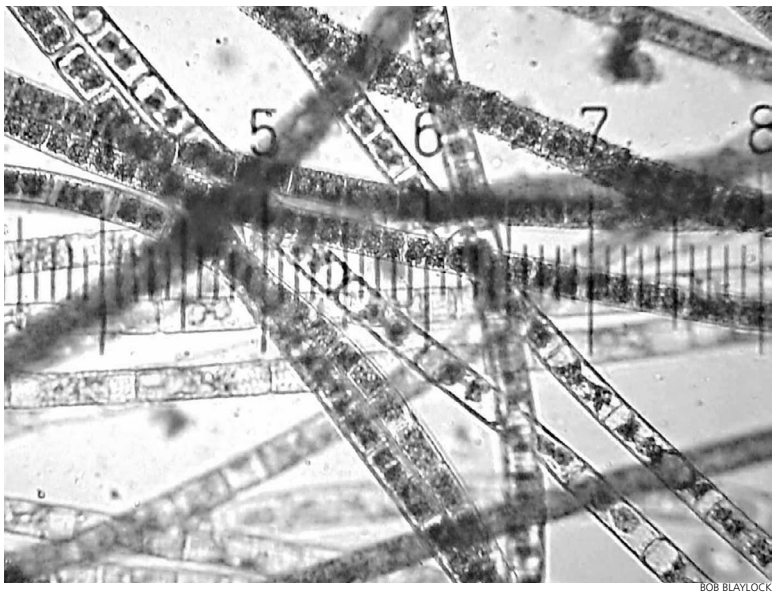
This rod-shaped microorganism can take nitrogen out of the air and give it to plants.



CDC

Streptococcus bovis

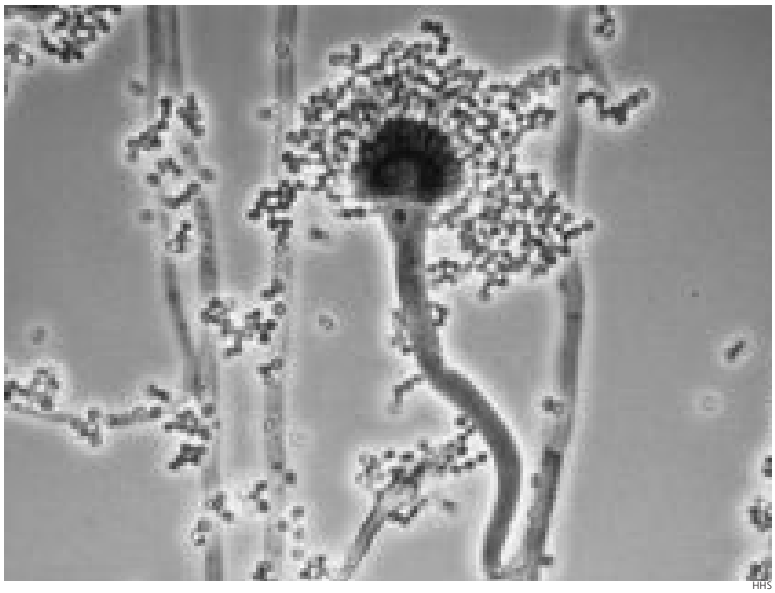
This microorganism breaks down plant matter that has a lot of fiber in it.



BOB BLAYLOCK

Spirogyra

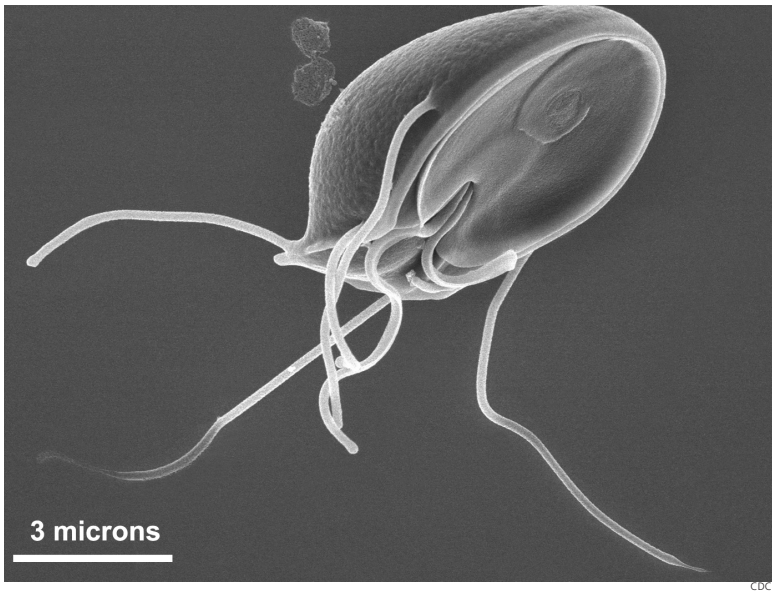
This species of microorganism might look like a plant, but it is actually a single-celled organism that usually lives in wet areas.



HHS

Aspergillus

This microorganism breaks down organic matter, especially fruits and vegetables.



CDC

Giardia

This microorganism can move as it “swims” and can cause people to get sick when ingested.

Name:

Microorganisms in Zion Worksheet

Name of microorganism: _____

Describe what your microorganism looks like. What type of structures does it have? Do you think it moves?

_____

_____

What type of microorganism do you think it is? (protozoa, algae, etc.): _____

Why? _____

_____

_____

Where do you think it lives in Zion National Park? (circle the name of at least one):

The River: The Virgin River is a small but fast-flowing river in Zion National Park. It is home to many species of fish and insects, and carved Zion Canyon over the past 2 million years.

The Emerald Pools: These still pools of water near the Zion Lodge get their name from their emerald green color and are home to many species of frogs and toads.

Desert Bighorn Sheep: These large types of mammals are called ruminants, which means they eat grasses and other plants (human are not able to digest these types of plants).

Biological Soil Crust: This type of bumpy soil is actually alive with many types of microorganisms who help the sand stick together and help soak up water. Like all soils, it must produce nutrients for plants to live.

Explain why you think your microorganism lives where it does.

_____

_____

_____

_____

_____