

The Microbial World Around (and In) Us



What are microbes?

- Microscopic (cannot see with naked eye)
- Dominant life form on Earth
- Single-cell (prokaryotes)
- Multiple cells (eukaryotes)

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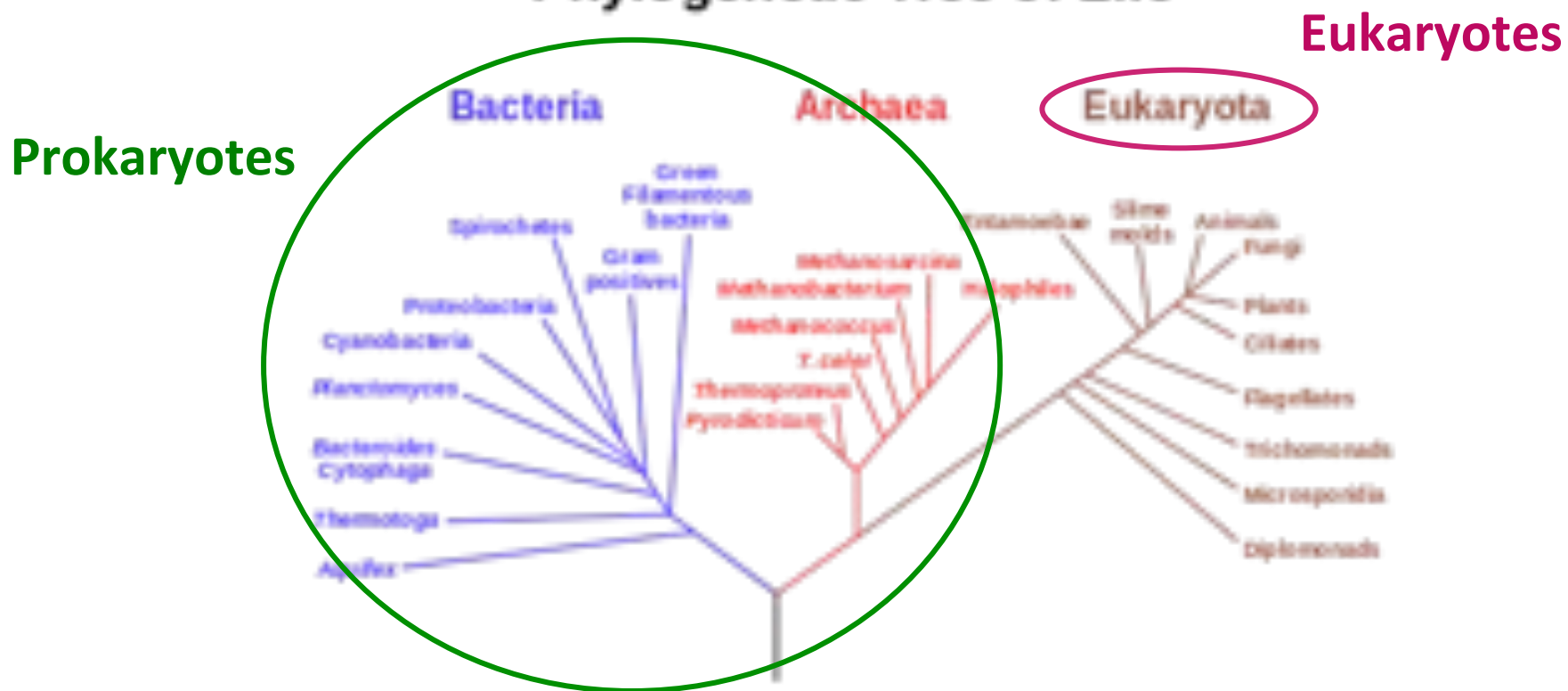
Phylogenetic Tree of Life



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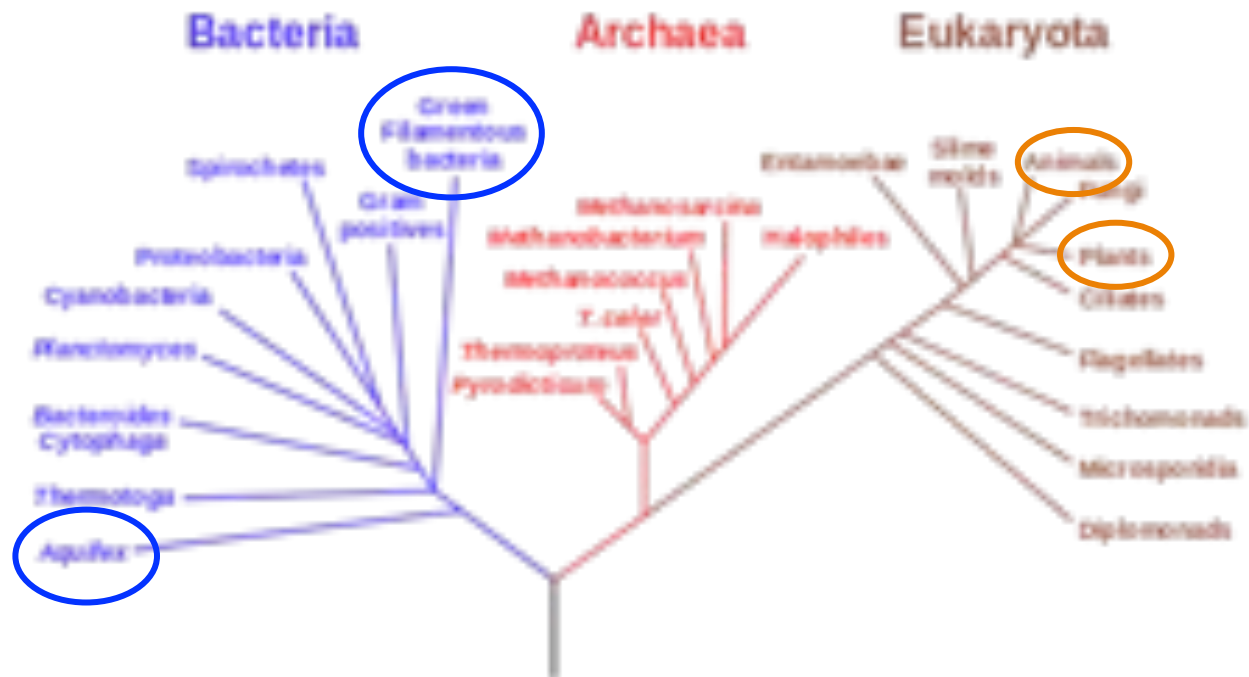
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Phylogenetic Tree of Life



Microbial diversity: Where microbes live

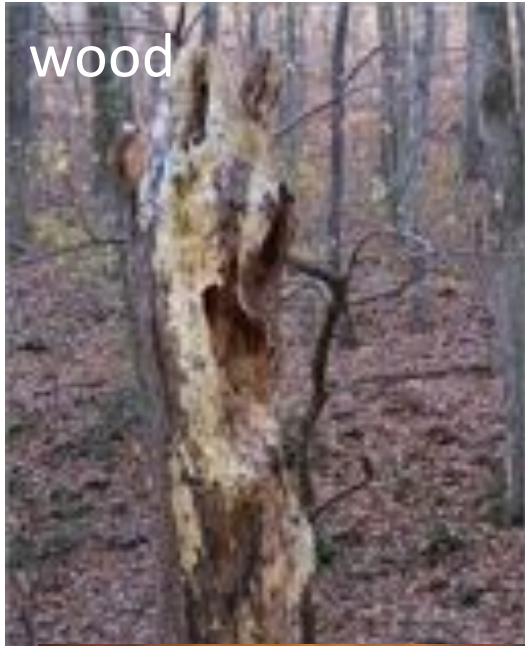


animals



**Essentially everywhere
on Earth!**

Microbial diversity: What microbes eat



**A lot more than
we do!**



Microbial diversity: Extremophiles

Temperature



Acidity



Pressure



Alkalinity

Desiccation



Salinity



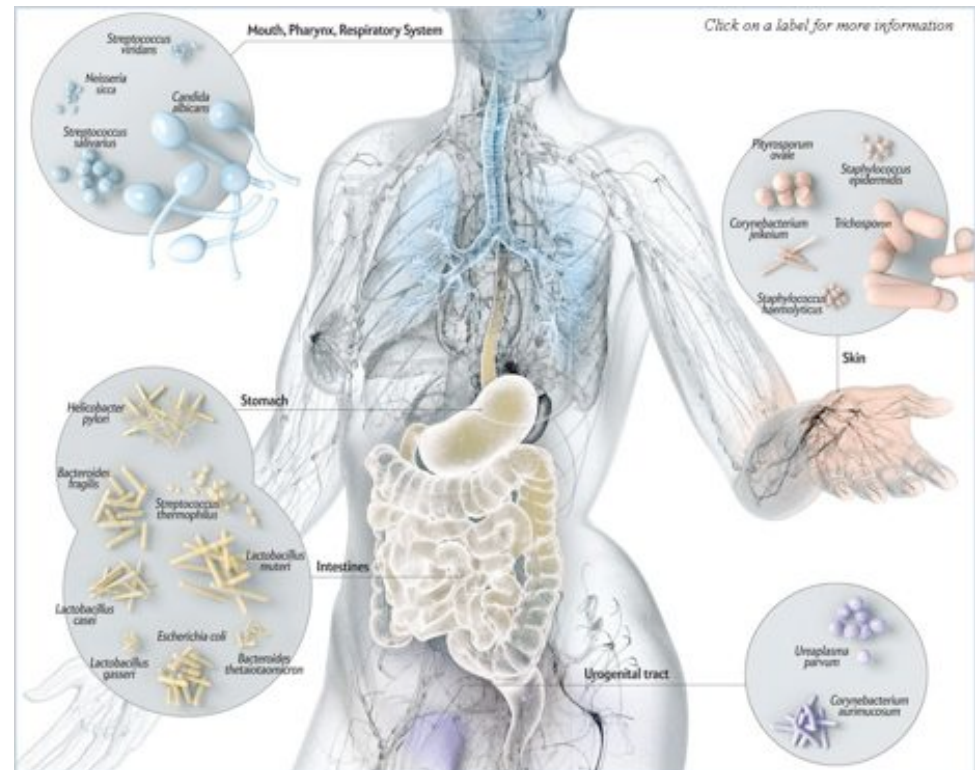
Radiation



Microbial diversity: Health & disease

- Some bacteria cause disease
- Some bacteria contribute to our health
 - Help us digest what we cannot (more nutrients and energy)
 - Kill bad bacteria
 - Communicate with our immune system to defend against disease
 - Acquired at birth/early life

There are more microbial cells than human cells in the human body!!!



Video

<http://www.npr.org/blogs/health/2013/11/01/242361826/exploring-the-invisible-universe-that-lives-on-us-and-in-us>

Pre-lab

1) Circle where microbes can be found:

Kitchen sponge

Soil

Your gut

Air

Your nose

Your skin

Cheese

Your mouth

Surface of leaves Dust

The ocean

The sidewalk

Your pet's fur

The desert

2) True or False:

Most bacteria cause diseases.

3) True or False:

Antimicrobials and antibiotics are great ways to kill bacteria.

4) What do bacteria eat?

5) Guess how many bacteria can fit in a drop of water?

In a pinch of soil?

6) Write the name of one bacteria you know.

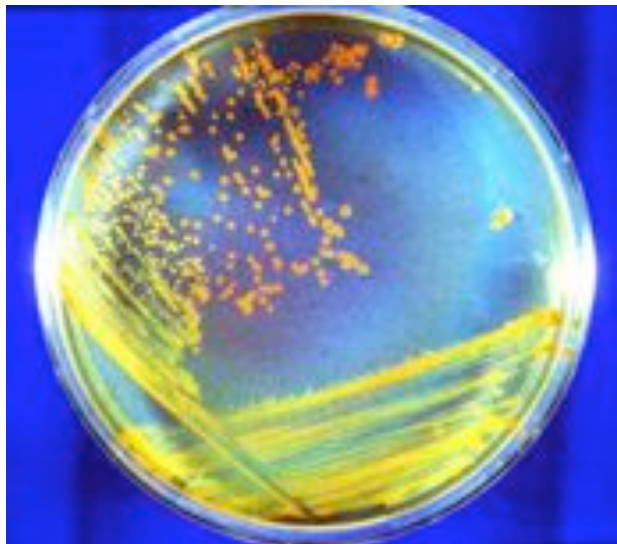
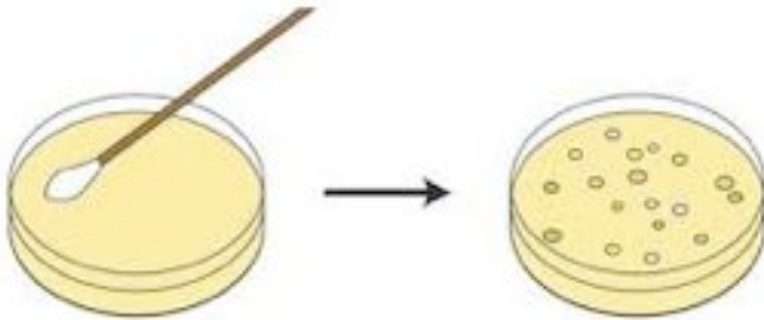
7) How is a microbe similar to and different from a cell (ex. a human cell)?

5 similarities:

5 differences:

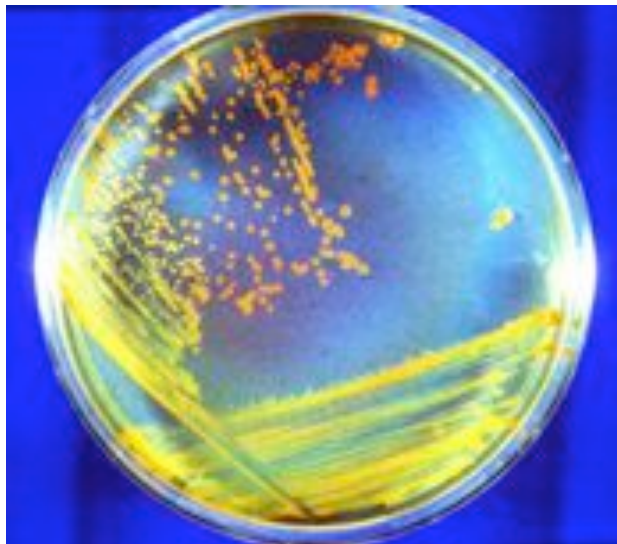
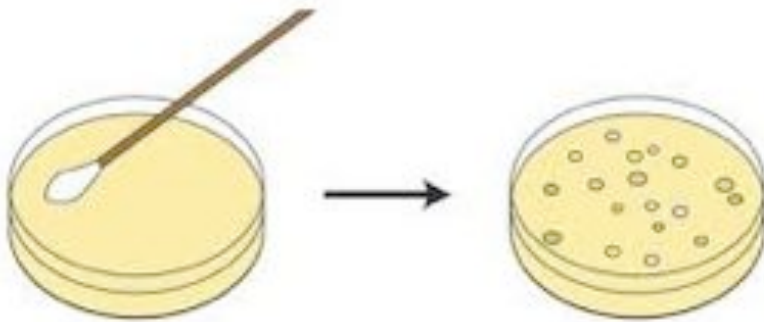
Lab activity: How we study microbial diversity

- **Sterile technique**
- Petri dish w/ nutrient agar:



Lab activity: How we study microbial diversity

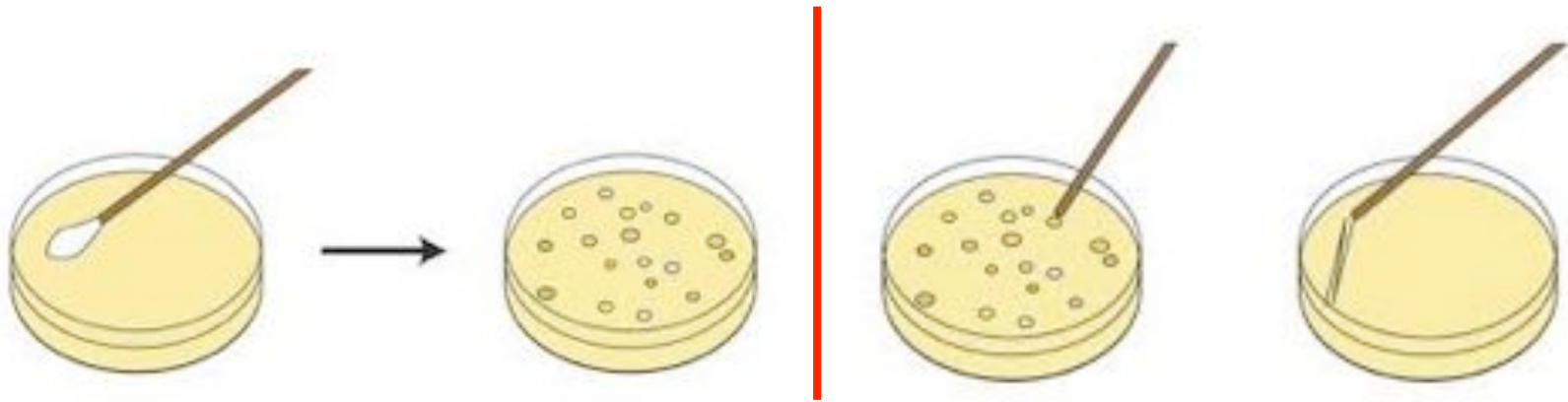
- Petri dish w/ nutrient agar:
- **Sterile technique**
- **Colony**



Lab activity: How we study microbial diversity

- Petri dish w/ nutrient agar:

- Sterile technique
- Colony
- Transfer



Nutrient agar



MacConkey agar

Lab activity: How we characterize microbial diversity

Nutrient agar



MacConkey agar

↓
Gram-negative bacteria:

E. coli

↓
Pink vs. white colonies:
metabolism

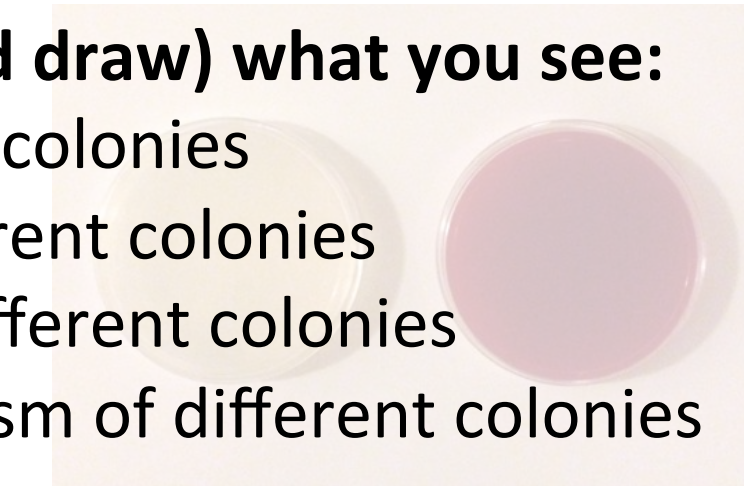
Hydrogen peroxide: Oxygen metabolism

Lab activity: How we characterize microbial diversity

Record (and draw) what you see:

- Different colonies
- # of different colonies
- Size of different colonies
- Metabolism of different colonies

Nutrient agar



MacConkey agar

