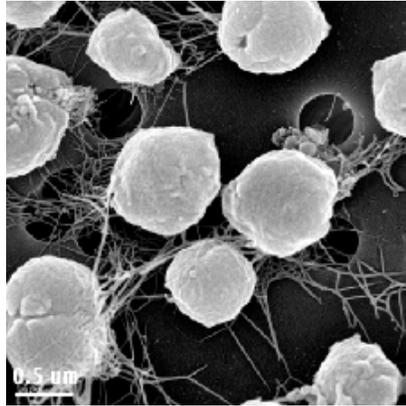




## Microbiology 101 – Introduction to Microbes Activity A: Adopt a Microbe

### Microbe Basics



A microorganism, or microbe, is a microscopic organism (also known as something that you need a microscope to see) that comprises either a single cell (unicellular), cell clusters, or small multicellular organisms (see Figure below). The study of microorganisms is called microbiology, a subject that began with Anton van Leeuwenhoek's discovery of microorganisms in 1675, using a microscope that he built himself.

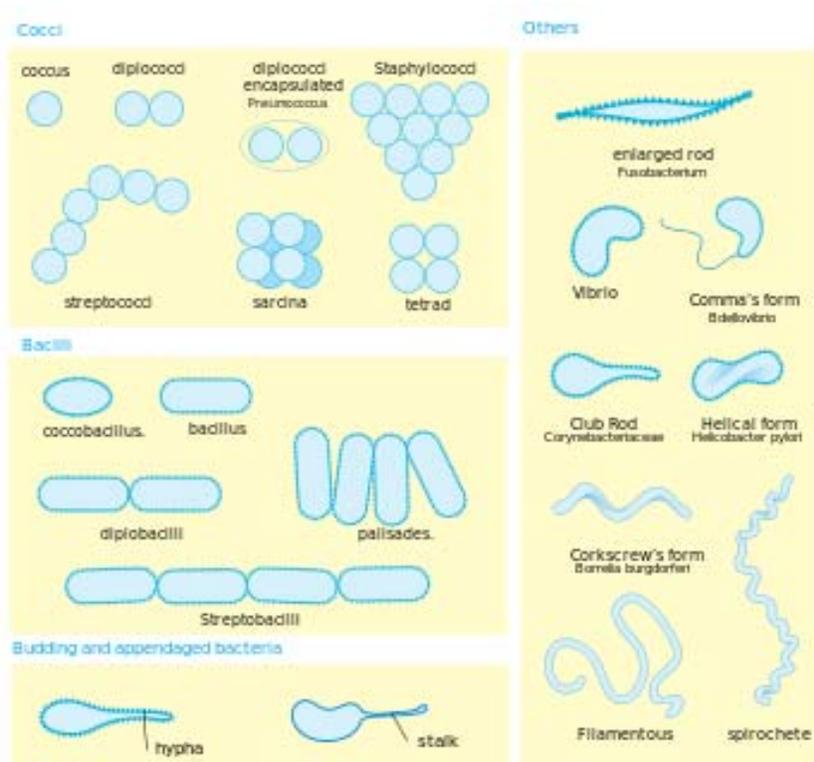
Microbes can be found everywhere on Earth, even though we can't "see" them. In fact, there are approximately ten times more microbial cells in the human body than there are "human" cells, with most of those microbes on your skin or in your gut - you are more microbe than human! Most microbes in your body are harmless, and some are even beneficial to your health and well-being. Some microbes in the body are pathogenic, however, meaning they cause infection and disease. Likewise, there are many microbes in the environment, where they are essential for recycling nutrients, consuming toxins and contaminants during "bioremediation" (sort of like biology fixing a chemical problem in the environment), and performing other essential "services" for mankind, which we will learn about more in another theme.

Although most people think of microbes as "bacteria" only, microbes are actually found all across the "tree of life". The "tree of life" is divided into three domains - Bacteria, Archaea, and Eukarya. Bacteria and Archaea are almost always microscopic, but there are also microscopic eukaryotes including some protists, fungi, plants and even animals! Bacteria and Archaea are organisms that lack a cell nucleus and the other membrane-bound organelles found in eukaryotic cells. Almost all Bacteria and Archaea are invisible to the naked eye, with a few extremely rare exceptions, such as *Thiomargarita namibiensis*. In the past, the differences between Bacteria and Archaea were not recognized, and Archaea were classified with Bacteria as part of the kingdom Monera in the Five Kingdom naming system.. However, in 1990 the microbiologist Carl Woese proposed the three-domain system that divided living things into Bacteria, Archaea and eukaryotes. Archaea were originally described in extreme environments, such as hot springs, but have since been found in all types of habitats on Earth.

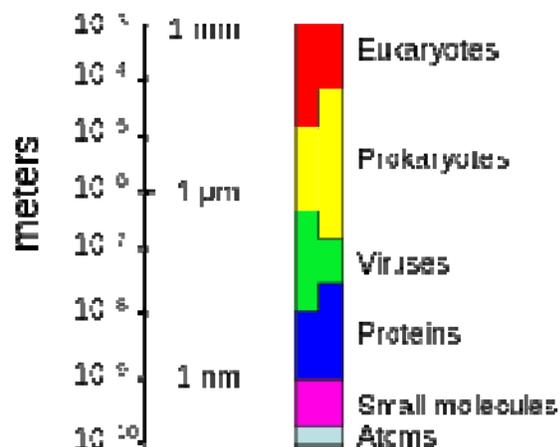
Although mostly unicellular, microbes exist in several different shapes and sizes, including spherical (coccus in Latin), rod-shaped (bacillus), comma-shaped (vibrio), or spiral (spirillum). Microbial cells are typically only a few micrometers in length and width, although some cells can be almost a millimeter in length (for comparison, a 5-foot tall human is 1,524,000 micrometers in length!).



Lipid membranes, or cell membranes, surround Bacteria and Archaea cells, enclosing the contents of the cell and acting as a barrier to hold nutrients, proteins and other essential components within the cell. Bacteria are surrounded by a cell membrane made of ester-bond lipids, while Archaea have ether-bond lipids in their cell walls. Bacteria and Archaea reproduce by binary fission or sometimes by budding, but do not undergo sexual reproduction. Some species form extraordinarily resilient spores, but this is a mechanism for survival, not reproduction.



[http://en.wikipedia.org/wiki/File:Bacterial\\_morphology\\_diagram.svg](http://en.wikipedia.org/wiki/File:Bacterial_morphology_diagram.svg)



[http://en.wikipedia.org/wiki/File:Relative\\_scale.svg](http://en.wikipedia.org/wiki/File:Relative_scale.svg)







## **Microbiology 101 - Introduction to Microbes**

### **Activity B: Microbe Haiku Student Page**

Compose a haiku about your adopted microbe. You can use information in the Adoption Center handout or the internet. The haiku can be about any topic related to the adopted microbe, for example what the microbe eats, where it lives, what it looks like, etc. Silly or serious would be fine.

What is haiku? [Haiku](#) is a Japanese form of poetry. In western cultures, haiku has been translated into poems that contain three lines, where the first and last lines have five syllables, and the middle line has seven. Here are some example haikus written by scientists and crew of the JOIDES Resolution. If you want more inspiration, check out [Dissertation Haiku](#) – a website where young scientists sum up their scientific research into one simple haiku!

- *Each day a challenge, Make it work with what you have, JR needs quick minds*
- *Busy lives on board, Boring into the abyss, Old octopus smiles*
- *Drill bits pierce darkness, new worlds unfold before our...yay, coke machine fixed*



**STUDENT PAGES**  
**Microbiology 101 - Introduction to Microbes**  
**Activity C: Winogradsky Column Student Page**

1. Record the time and date when the samples were collected.
2. Describe the environment where the sample was collected: Was it muddy or sandy? Were there a lot of big or small rocks? Was the water clear or dirty? Did the water and sample have a distinct smell?
3. Describe what the Winogradsky Column looks like after you set it up? What colors do you see?
4. What is the purpose of adding shredded newspaper to the mud?
5. What is the purpose of adding egg yolk to the mud?
6. What do you think will happen after the column sits for a couple of weeks?