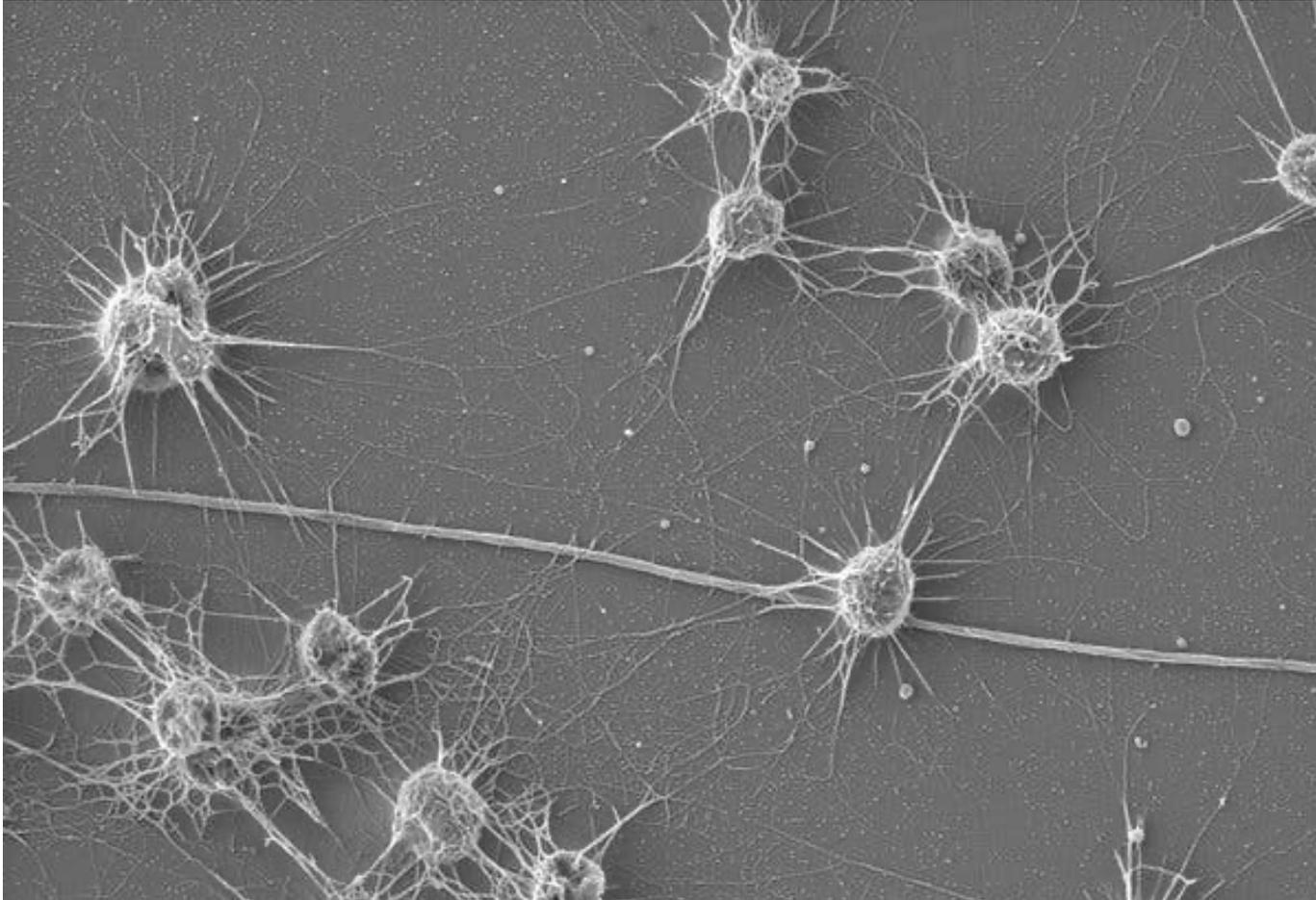


# *The ABC of Microbiology*<sup>2nd ed.</sup>

**by Roland Hatzenpichler**

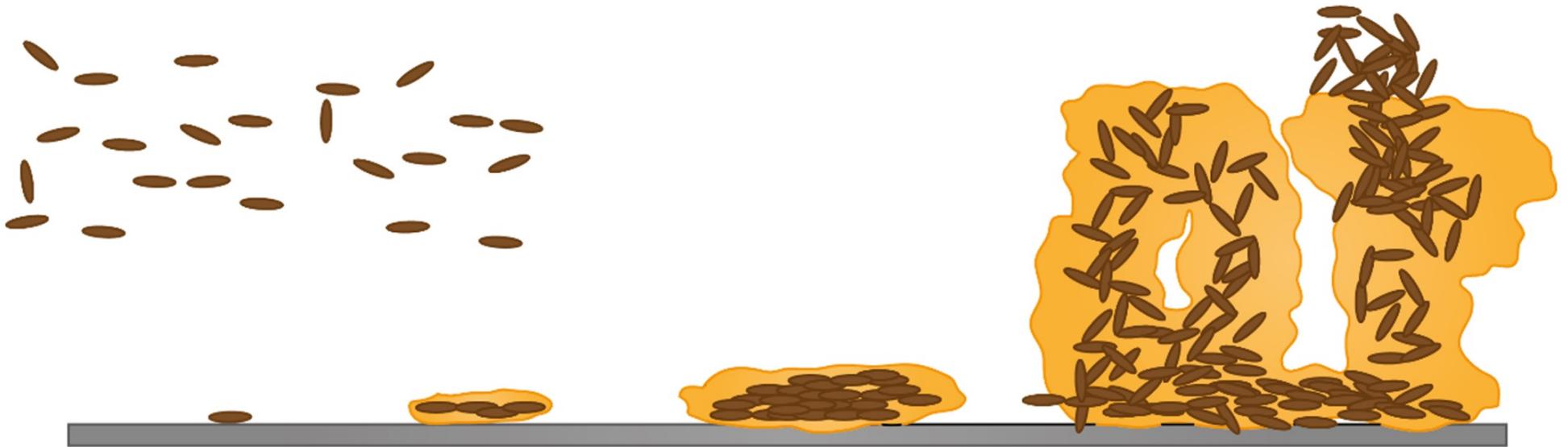
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# A is for archaea



Archaea are the 'third domain' of life and were only discovered in 1977. Today, we know that archaea inhabit every environment on Earth, from hot springs to the human gut.

# B is for biofilm



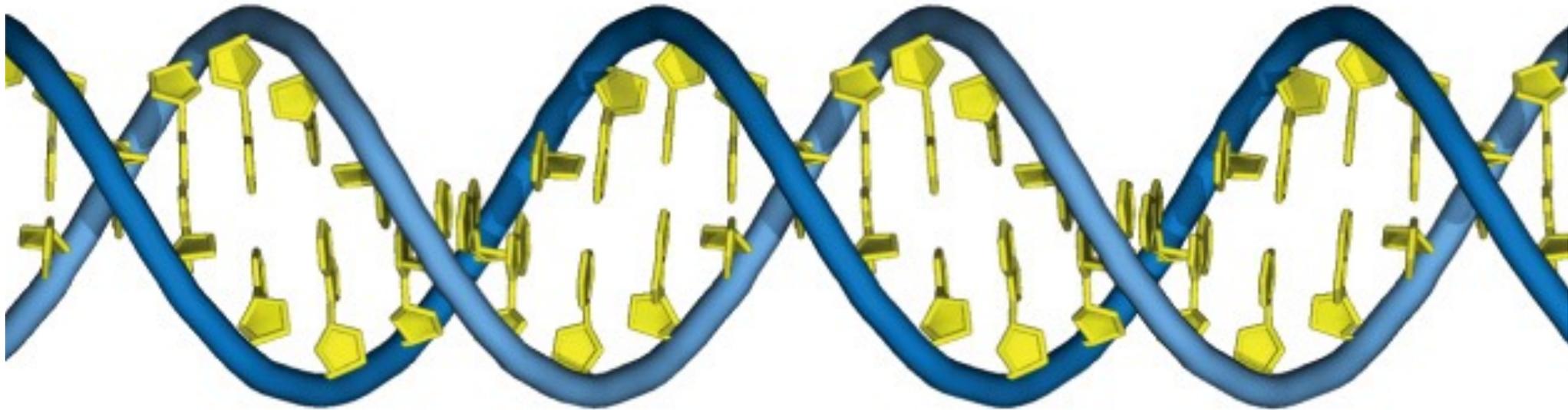
A biofilm is a city of microbes. In contrast to free-living cells, a biofilm attaches to a surface and allows cells within it to more easily interact with each other.

# C is for cyanobacteria



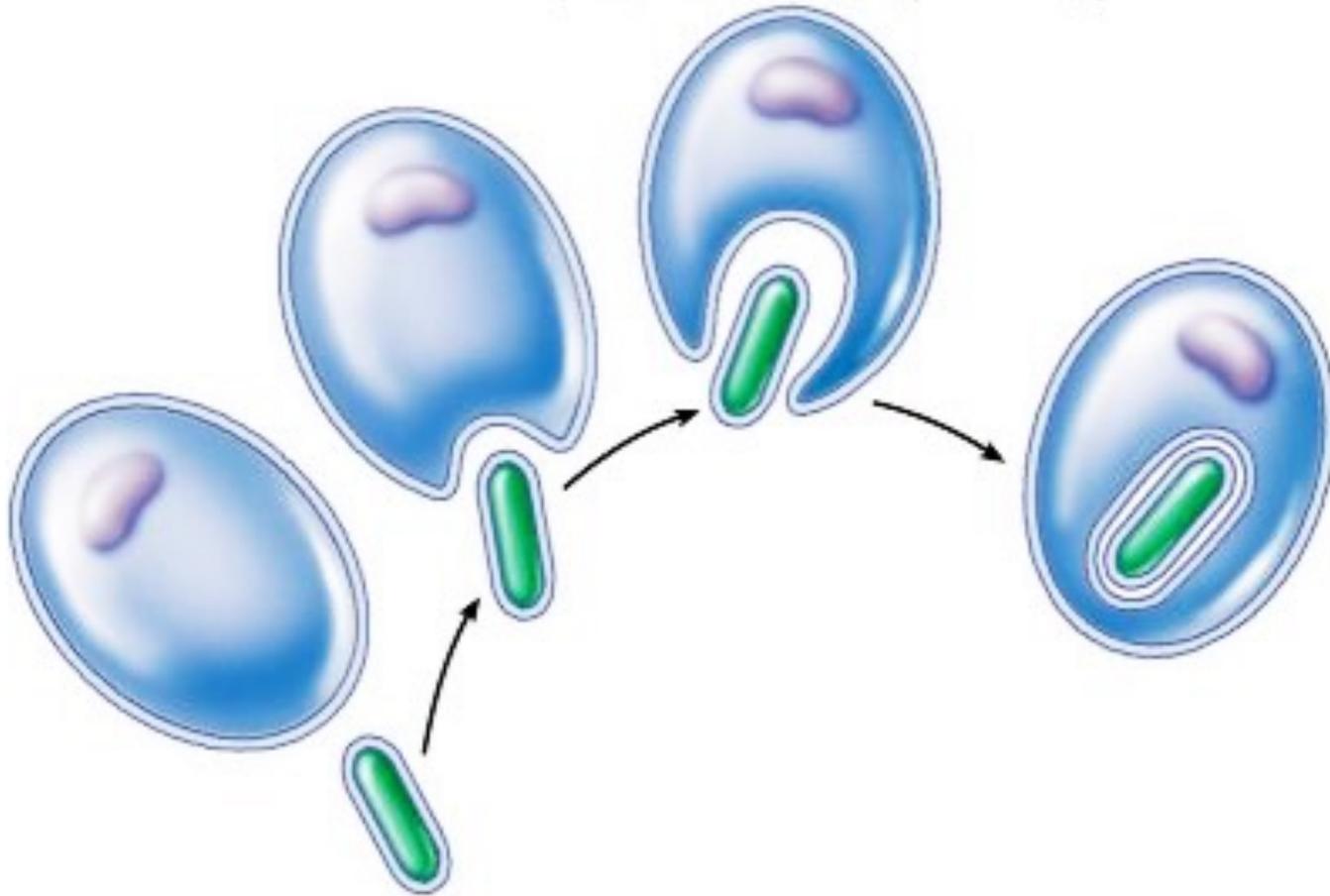
Cyanobacteria are photosynthetic bacteria that changed the evolution of life on our planet by releasing oxygen into the atmosphere.

# D is for DNA



Desoxyribonucleic acid, or DNA for short, is the genetic material of all known cells and many viruses.

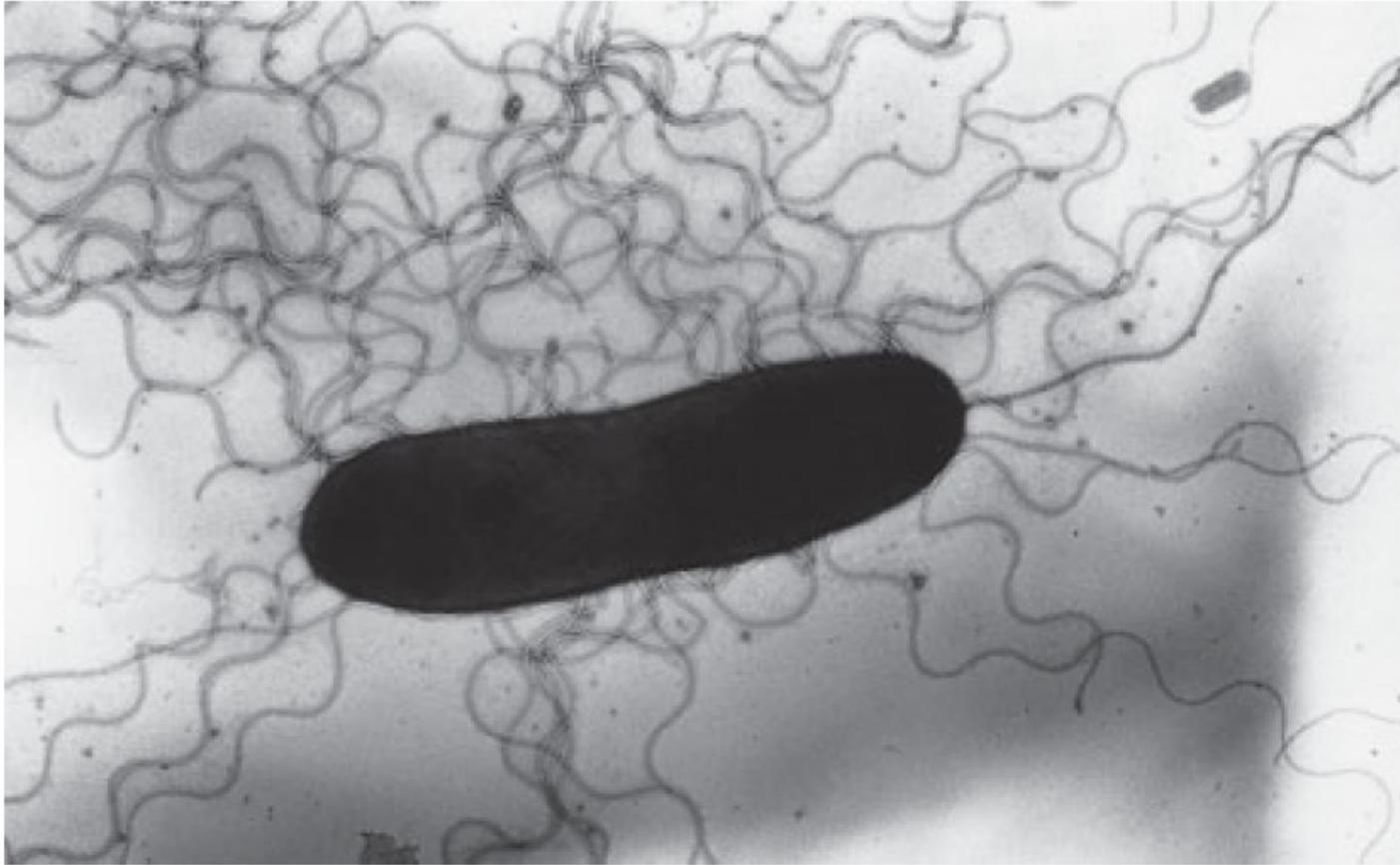
# E is for endosymbiosis



Endosymbiosis is the engulfment of one cell by another that leads to a stable association between the two cells.

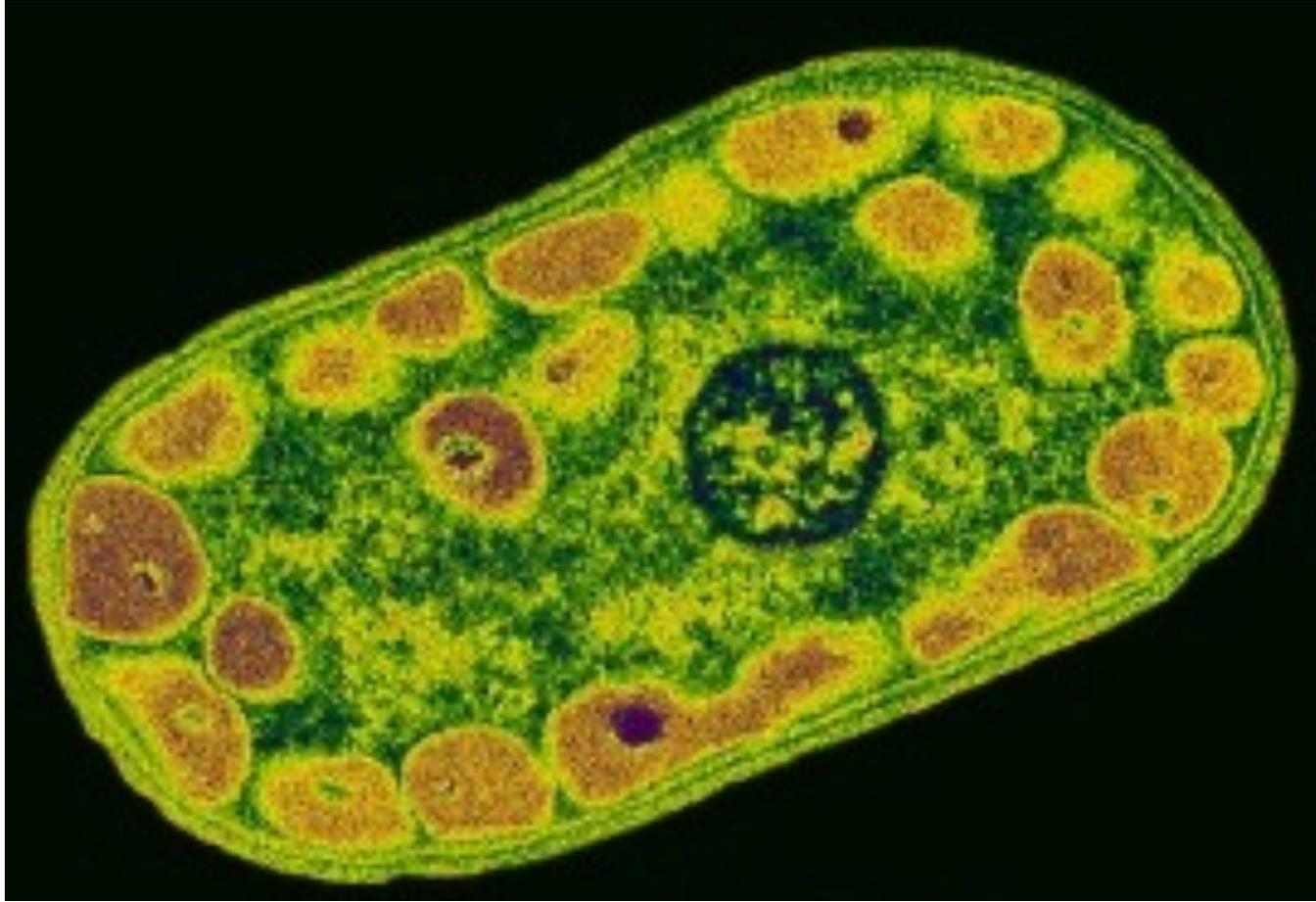
Mitochondria are the result of an association between a bacterium and an early eukaryotic cell billions of years ago.

# F is for flagellum



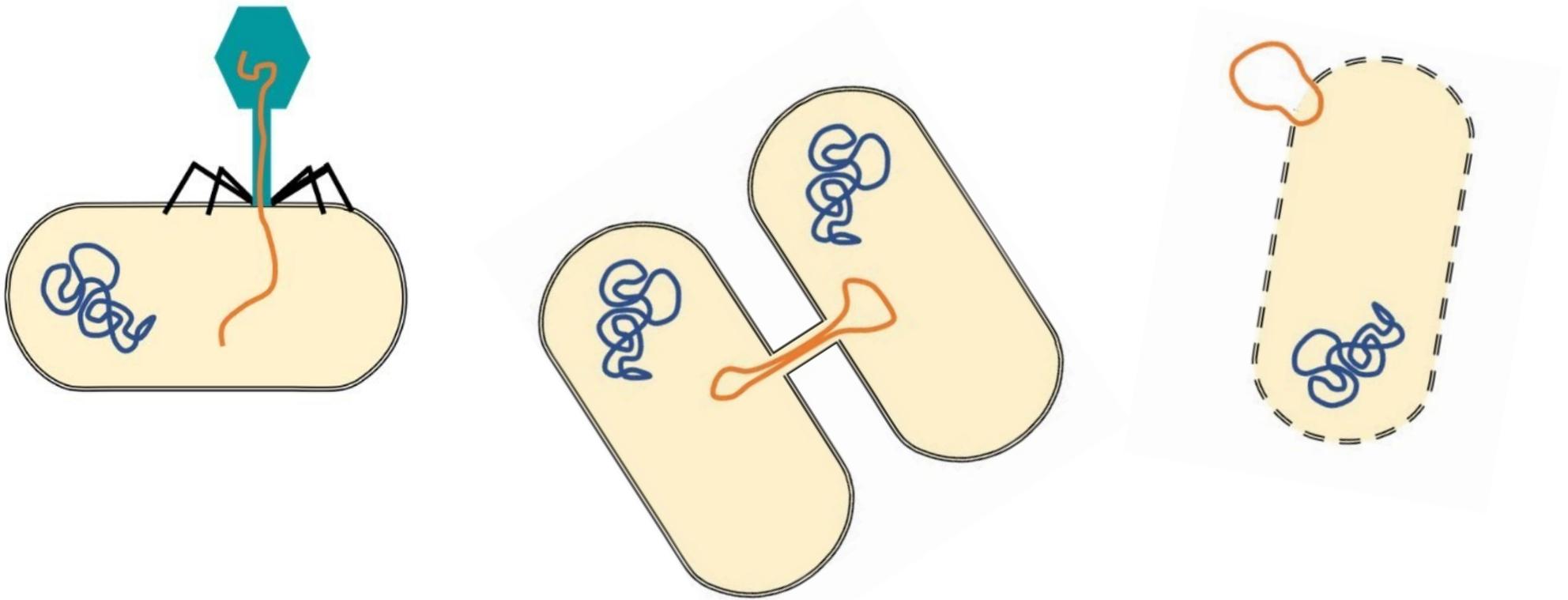
A flagellum is a thin attachment on the outside of a cell that allows the cell to swim in water. Some microbes have only one flagellum, while others have many.

# G is for green sulfur bacteria



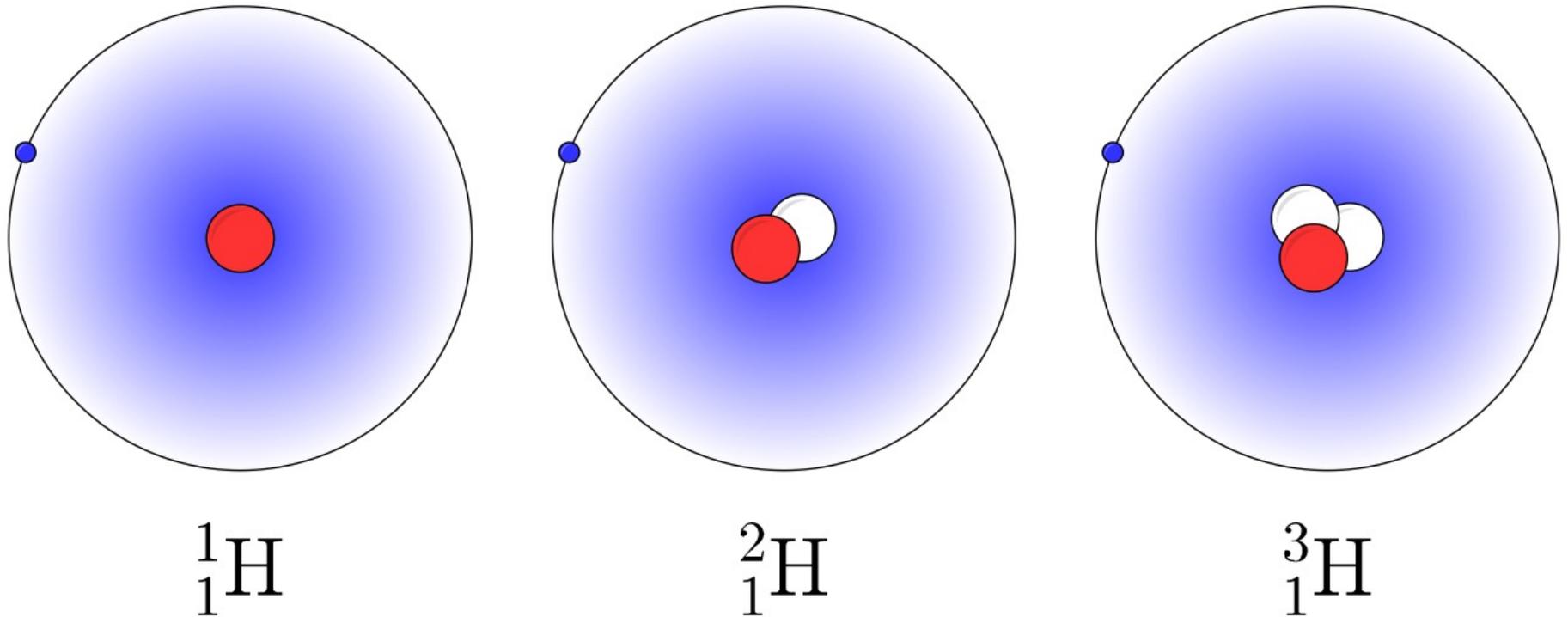
Green sulfur bacteria are photosynthetic bacteria that do not release oxygen during photosynthesis.

# H is for horizontal gene transfer



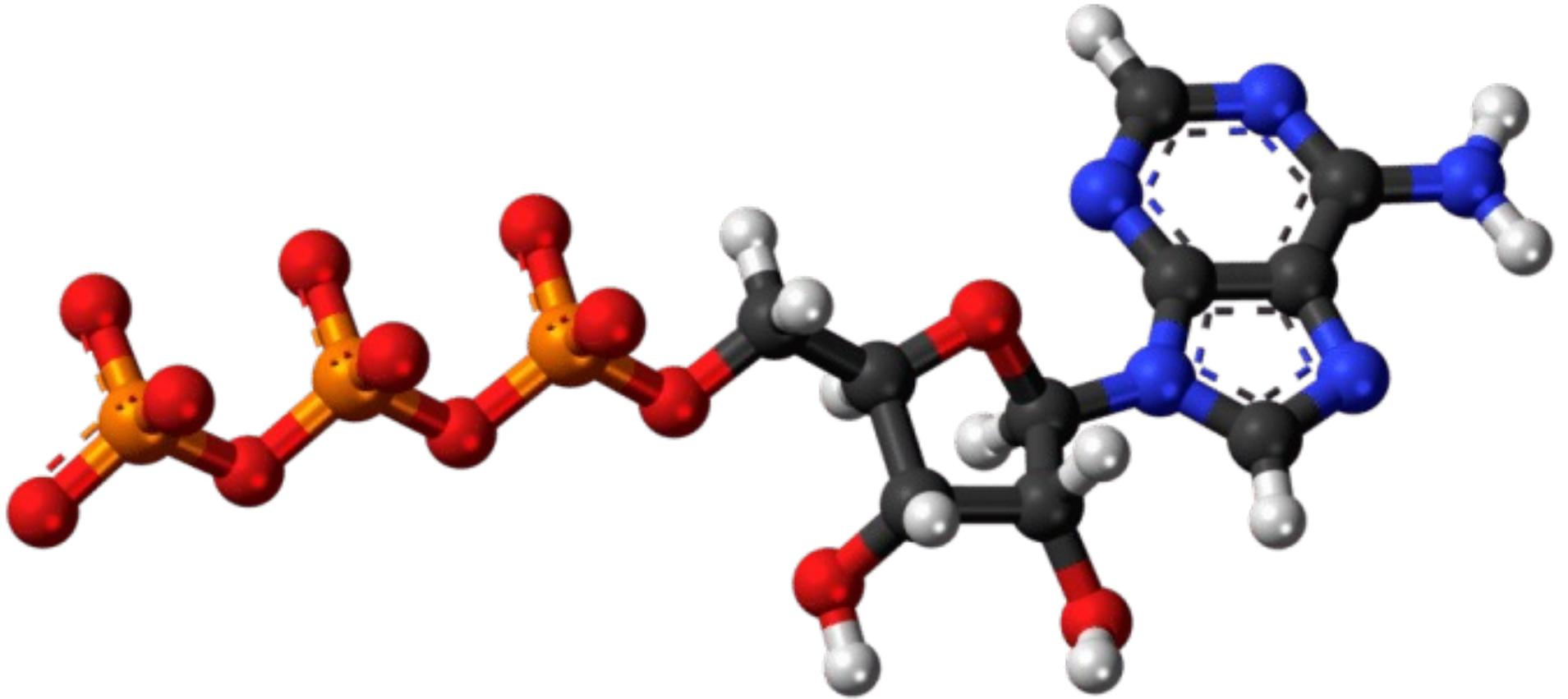
Horizontal gene transfer is the exchange of genetic information between cells. This can happen by a virus, direct transfer between cells, or uptake from the environment.

# I is for isotope



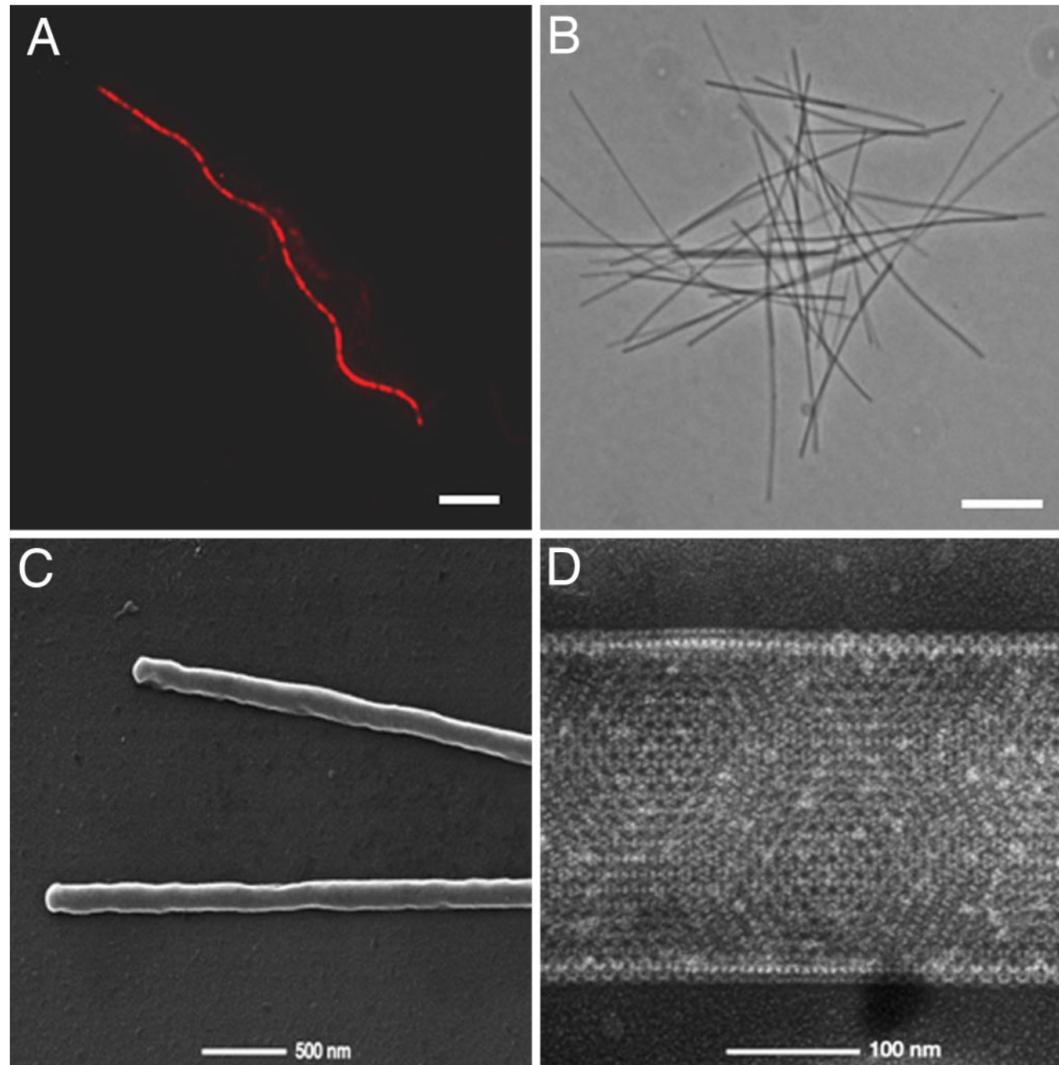
Isotopes are different forms of the same element that only differ by the number of their uncharged particles, called neutrons. Here, we see the isotopes of hydrogen.

# J is for Joule



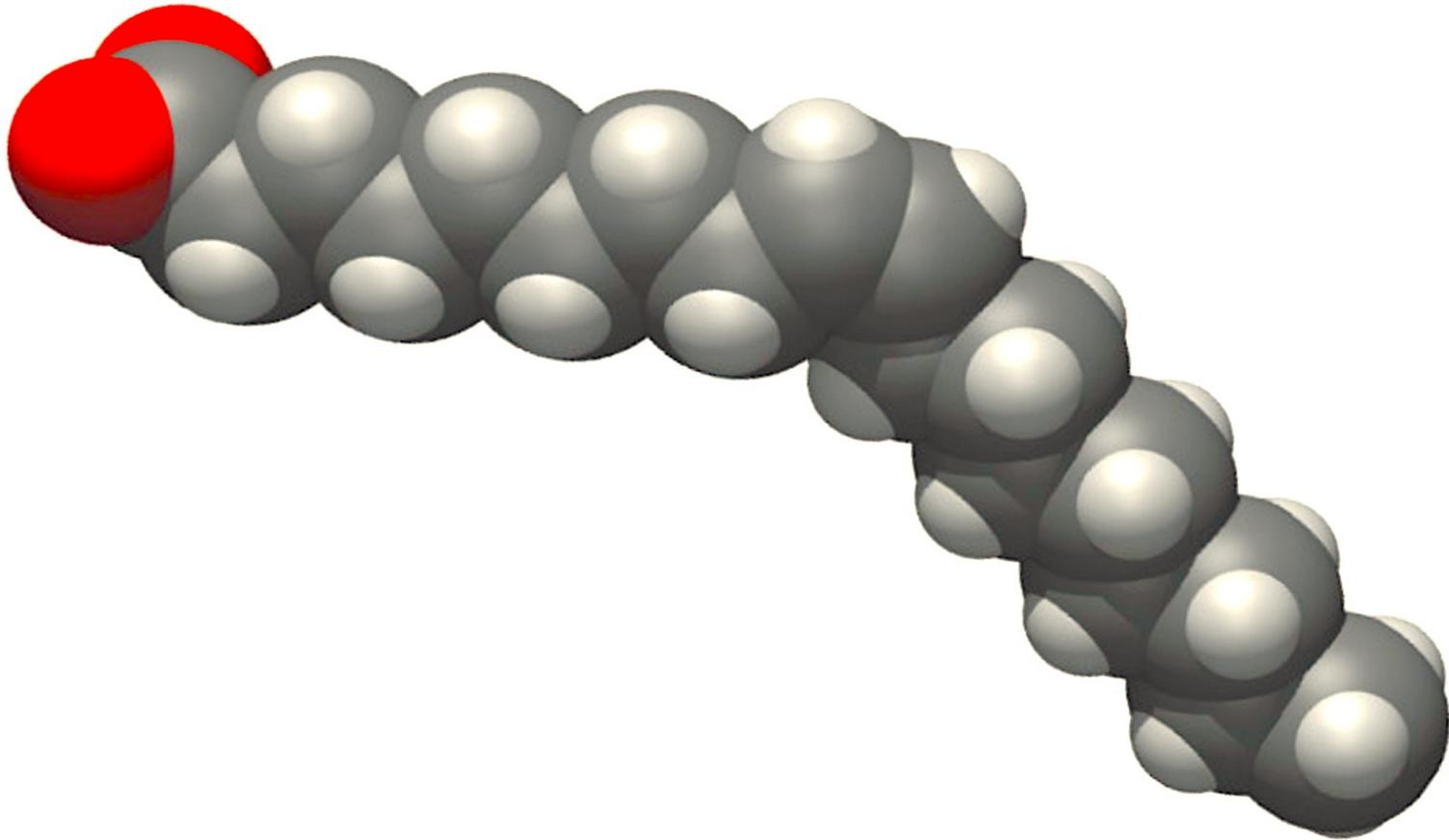
Joule is a unit of energy. Inside the cell, energy can be stored in the form of ATP, which is shown here.

# K is for Korarchaeota



Korarchaeota is a group of archaea that thrives in hot springs and deep sea hydrothermal vents.

# L is for lipid



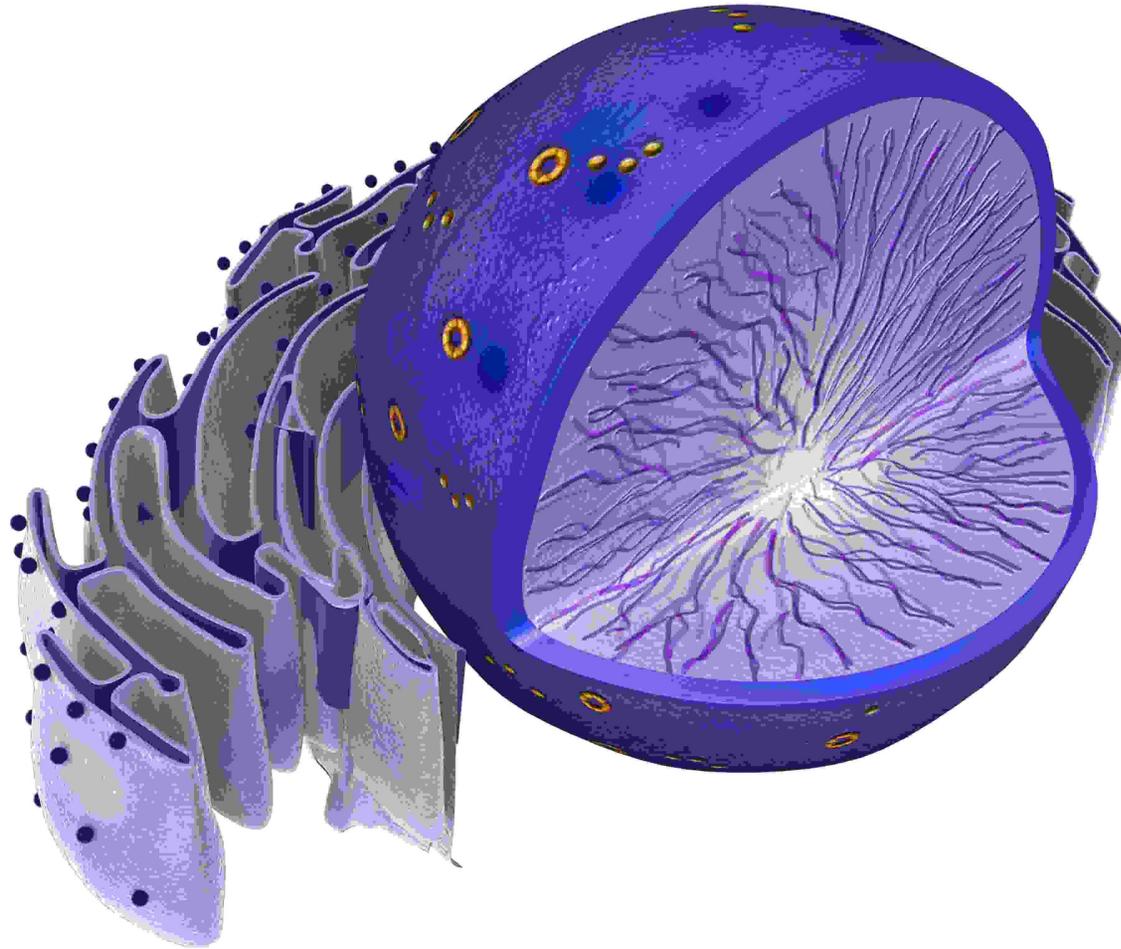
A lipid is a water-insoluble organic molecule that makes up the majority of the cell membrane. Lipids are also a great source of nutrients for many cells.

# M is for magnetosome



The magnetosome is a bacterial organelle that enables some bacteria to orient themselves in Earth's magnetic field.

# N is for nucleus



The nucleus is a protective shell that contains the DNA of eukaryotic cells. The nucleus is the main characteristic that differentiates eukaryotes from archaea and bacteria.

# O is for organelle



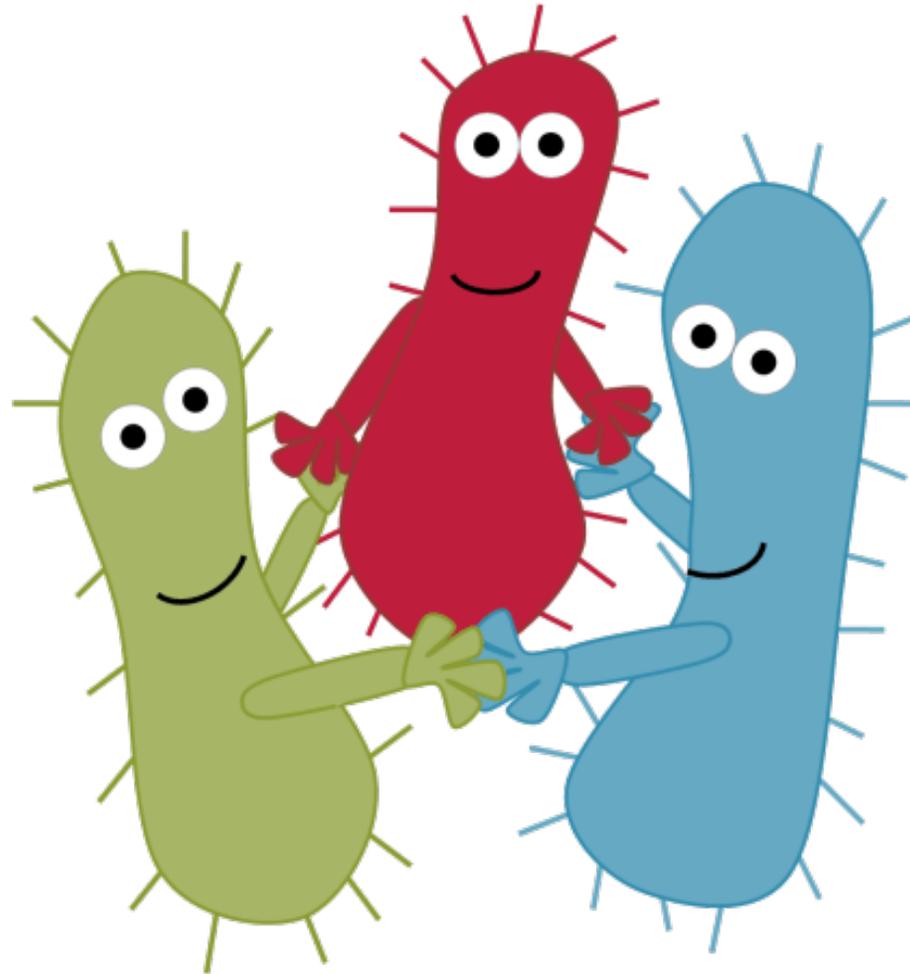
An organelle is a structure inside a cell that allow the cell to perform a special trick. For example, mitochondria allow eukaryotic cells to produce lots of energy.

# P is for photosynthesis



Photosynthesis is the process by which plants, cyanobacteria and other cells transform energy from sunlight into chemical energy and use it to build new biomass.

# Q is for quorum sensing



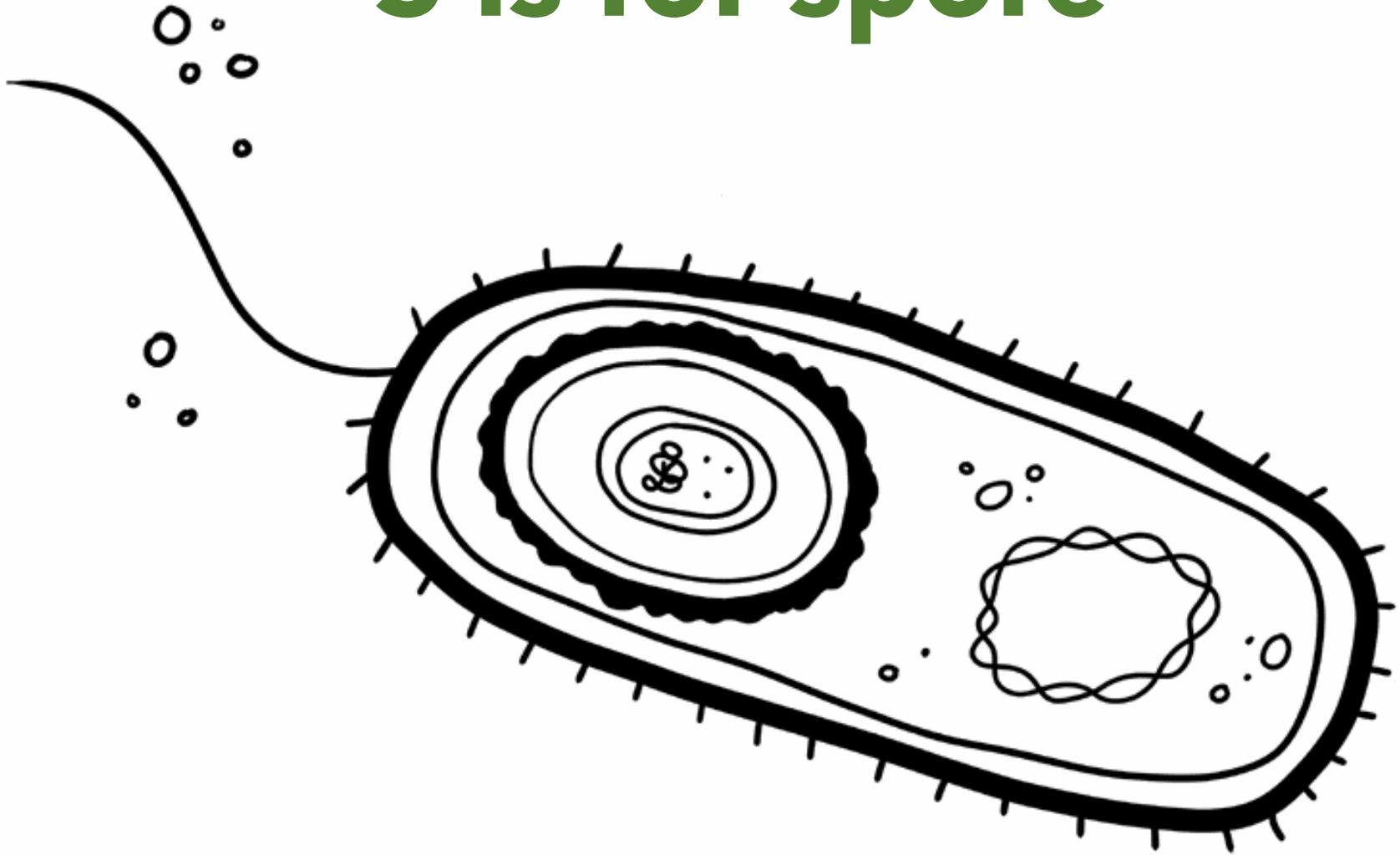
Quorum sensing allows some microbes to determine how many cells of their own kind surround them. If enough of them are present, they might decide to work together to achieve a common goal.

# R is for ribosome



The ribosome is a structure that produces proteins in all cells.

# S is for spore



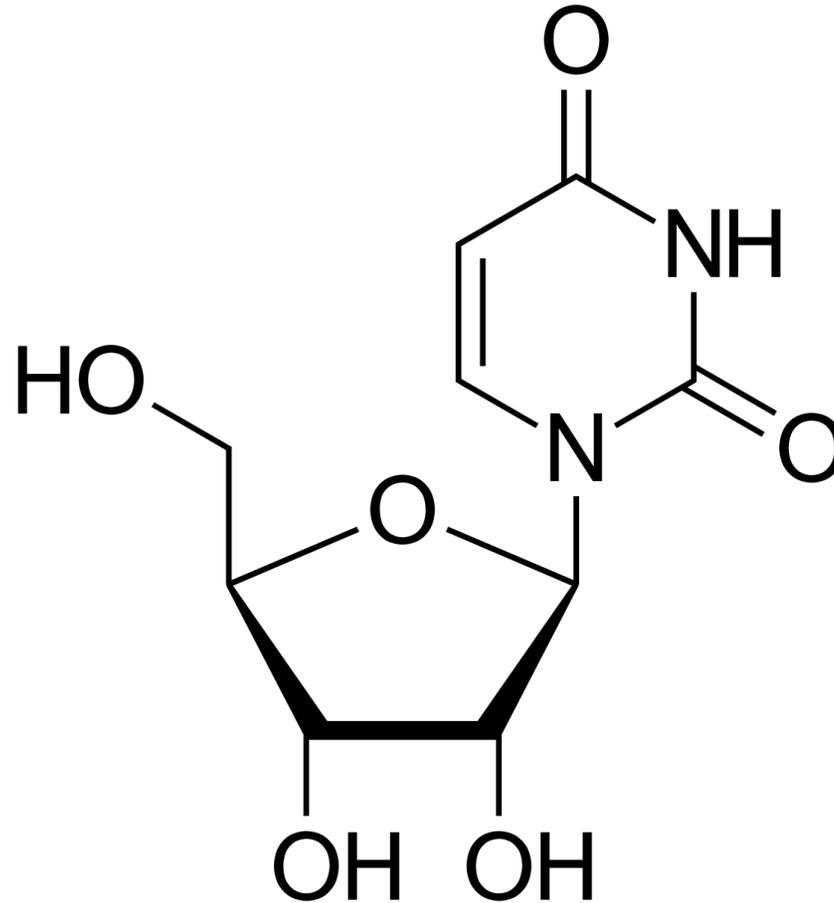
A spore is a resting structure formed by some bacteria and many fungi. A spore allows these cells to survive extreme conditions, like a drought or high temperatures.

# T is for thermophile



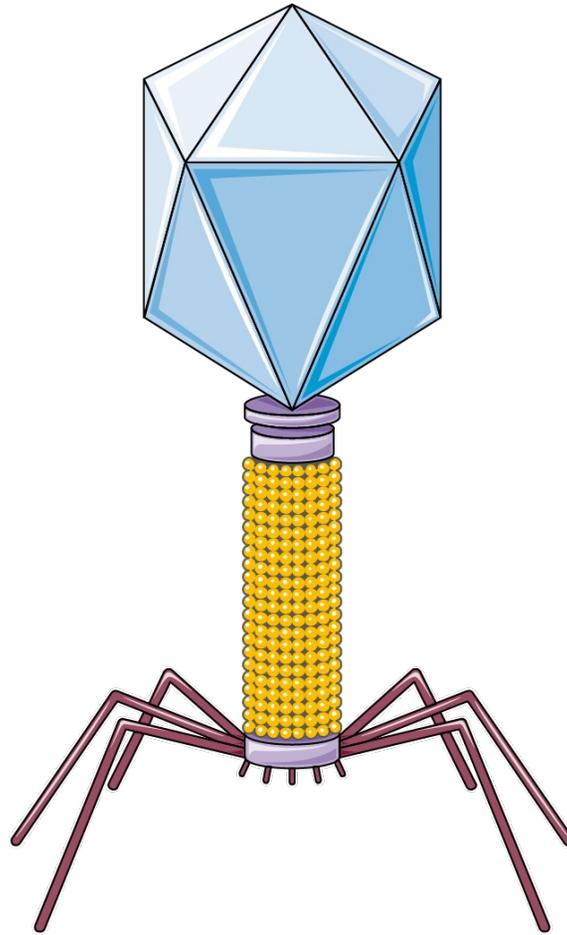
Thermophiles are microorganisms that grow at very high temperatures, even above the boiling point of water. Many of these microbes can be found in the hot springs of Yellowstone National Park.

# U is for uridine



Uridine is a chemical that can be found in RNA but not DNA. It has a structure similar to thymidine, which can only be found in DNA.

# V is for virus



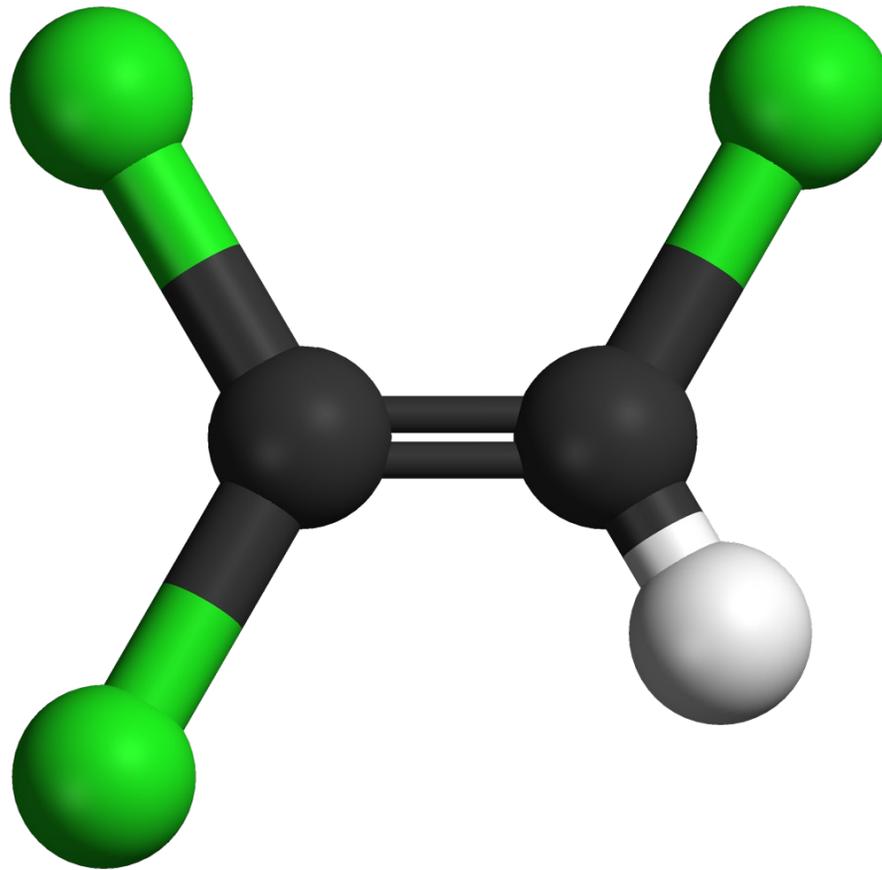
A virus is a genetic element containing either DNA or RNA that can only replicate with the help of a cell. Viruses that infect bacteria are called bacteriophages.

# W is for Winogradsky column



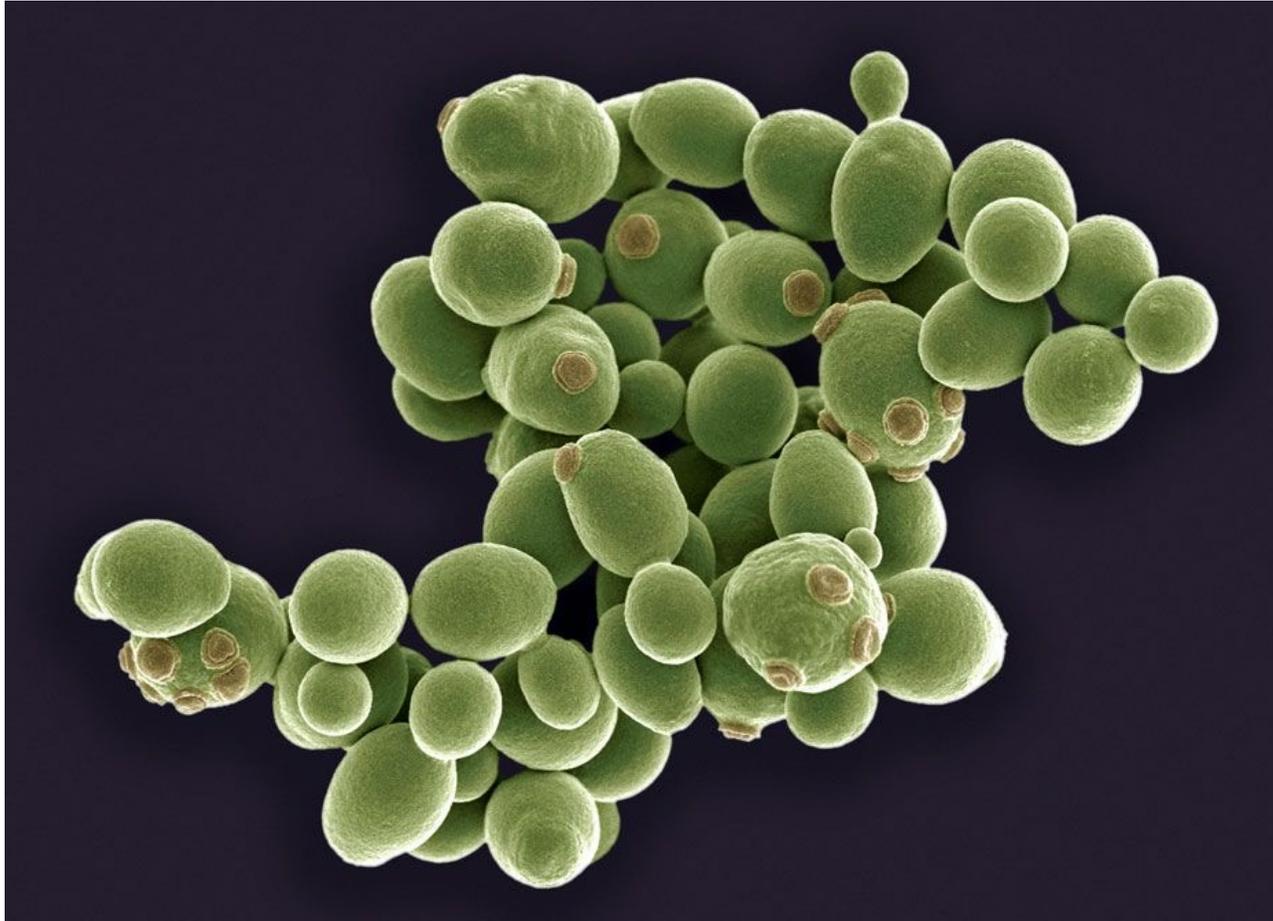
A Winogradsky column is a glass jar packed with mud and water. It is used to mimic aquatic habitats and observe how different microbes grow over time. They can be very colorful.

# X is for xenobiotic



A xenobiotic is a synthetic compound that does not occur naturally. Shown above is the xenobiotic trichloroethylene, which is used in the chemical industry.

# Y is for yeast



Yeasts are the single celled growth forms of certain fungi.  
Yeasts are used to make bread, beer, or whiskey.

# Z is for zoonosis



A zoonosis is a disease that is transmitted from an animal to a human. Examples for zoonotic diseases are Covid-19, Ebola or the Black Plague.