

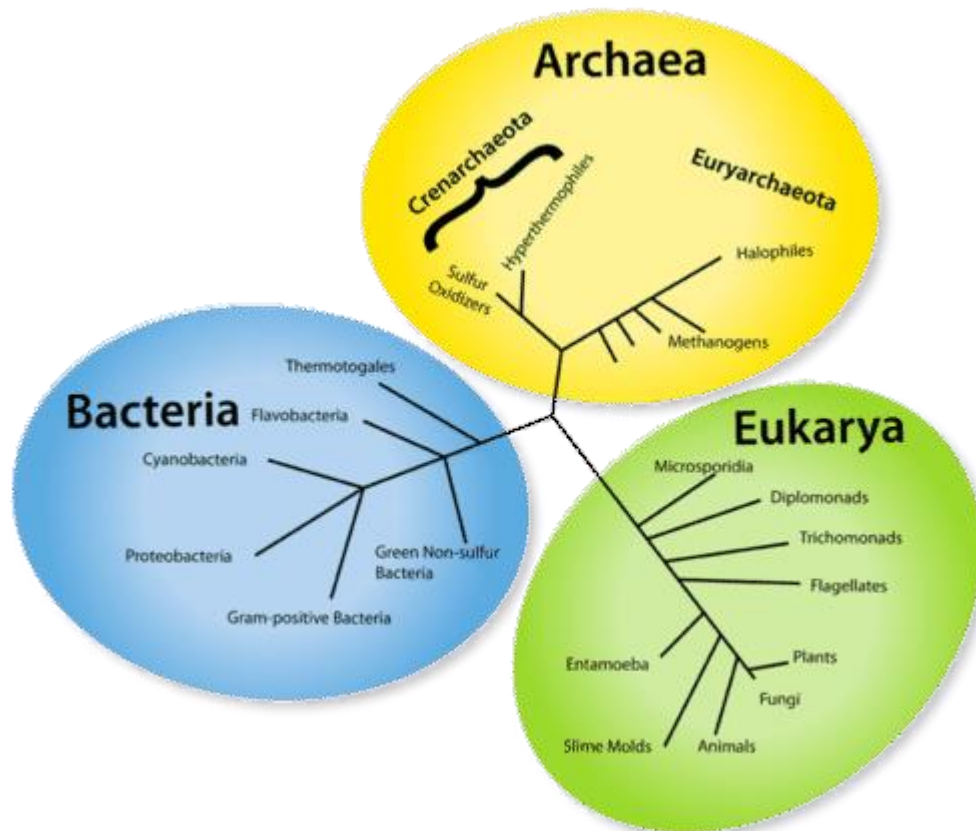
Section 2.2 – Comparing Bacteria and Archea

SBI3UP

MRS. FRANKLIN

Remember . . .

Archaea and Bacteria are two of the three main domains that scientists use to classify organisms.



Archaea and bacteria have many similarities, however there are quite a few characteristics that make them different from one another.

Morphology

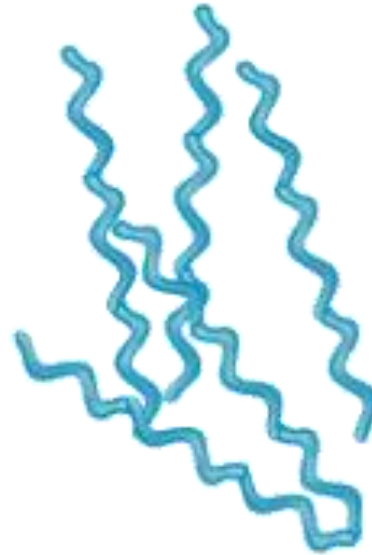
The following shapes can be found in both bacteria and archaea:



bacillus
(rod)



coccus
(sphere)



spirillus
(spiral)

Bacteria can also have a cube, pyramid and rod star shapes.

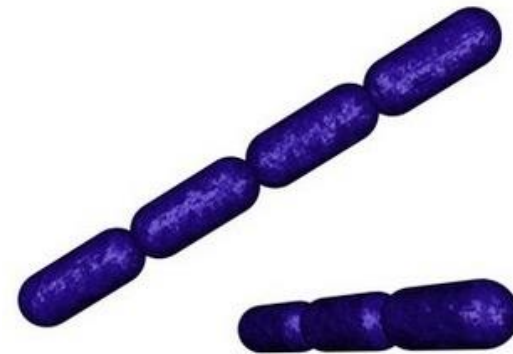
Archaea may be shaped like plates and rectangular rods.

Aggregations: Cells Grouped Together

Bacteria and archaea are known to be unicellular, however they are able to aggregate together into long chains. Each cell in the chain will perform it's own functions and chemical reactions to sustain life.



Streptococcus



Streptobacillus

Nutrition

Archaea and bacteria can obtain energy from a variety of sources:

- 1) photosynthesis
- 2) consuming other organisms
- 3) inorganic compounds

Nutrition: Some Archaea

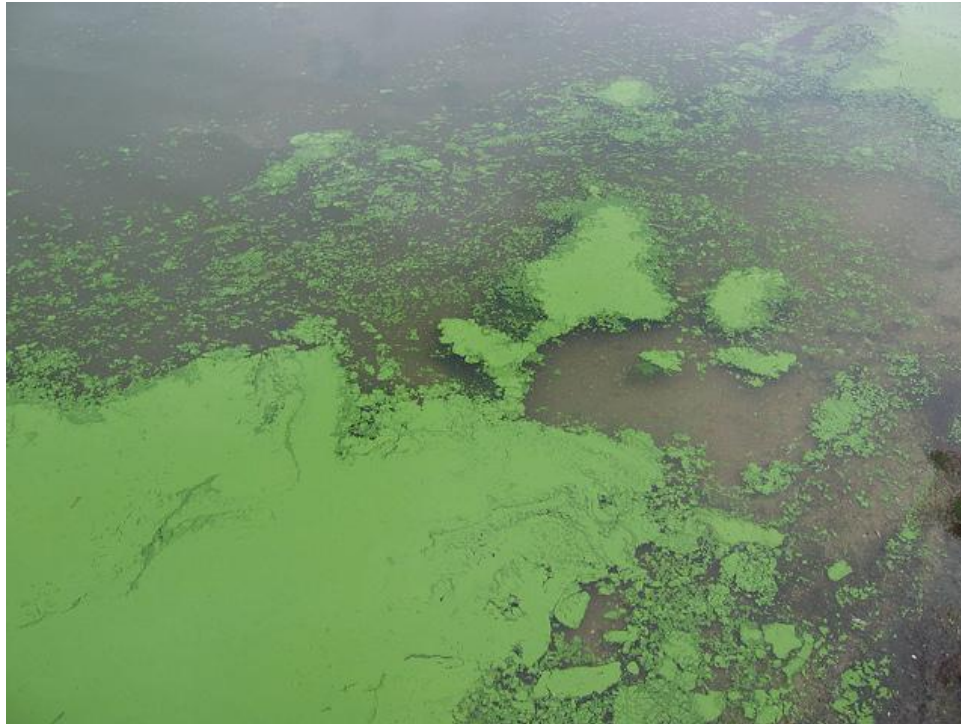
Archaeobacteria are found in the intestinal lining of cows and allow it to digest the cellulose in plant cells. As a byproduct, these organisms will produce methane gas.

Methanogenesis:



Nutrition: Some Bacteria

Cyanobacteria are bacteria known to undergo photosynthesis. They are primarily found in fresh and salt water and they contribute to most of the oxygen produced in our atmosphere.



Cyanobacteria is also known as 'blue-green algae'.

Habitats

Archaea and bacteria are able to inhabit a variety of habitats due to their small nature and the way in which they obtain nutrients. Both can survive in aerobic and anaerobic conditions.

Archaea however, are known for their ability to live in extreme environments. They are known to be ***EXTREMOPHILES***.



Thermophile – Hot Spring



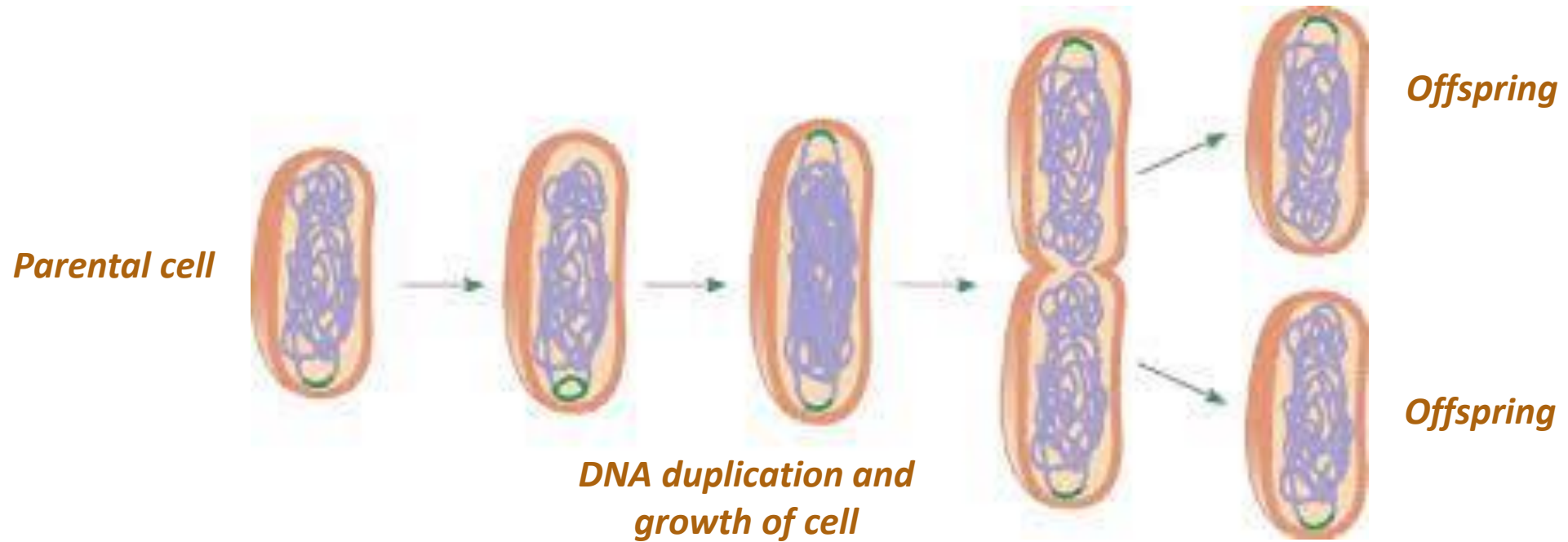
Acidophile - Crater Lake



Halophile - The Dead Sea

Reproduction

Prokaryotic cells do not contain a nucleus, however they can still undergo reproduction through ***'Binary Fission'***.

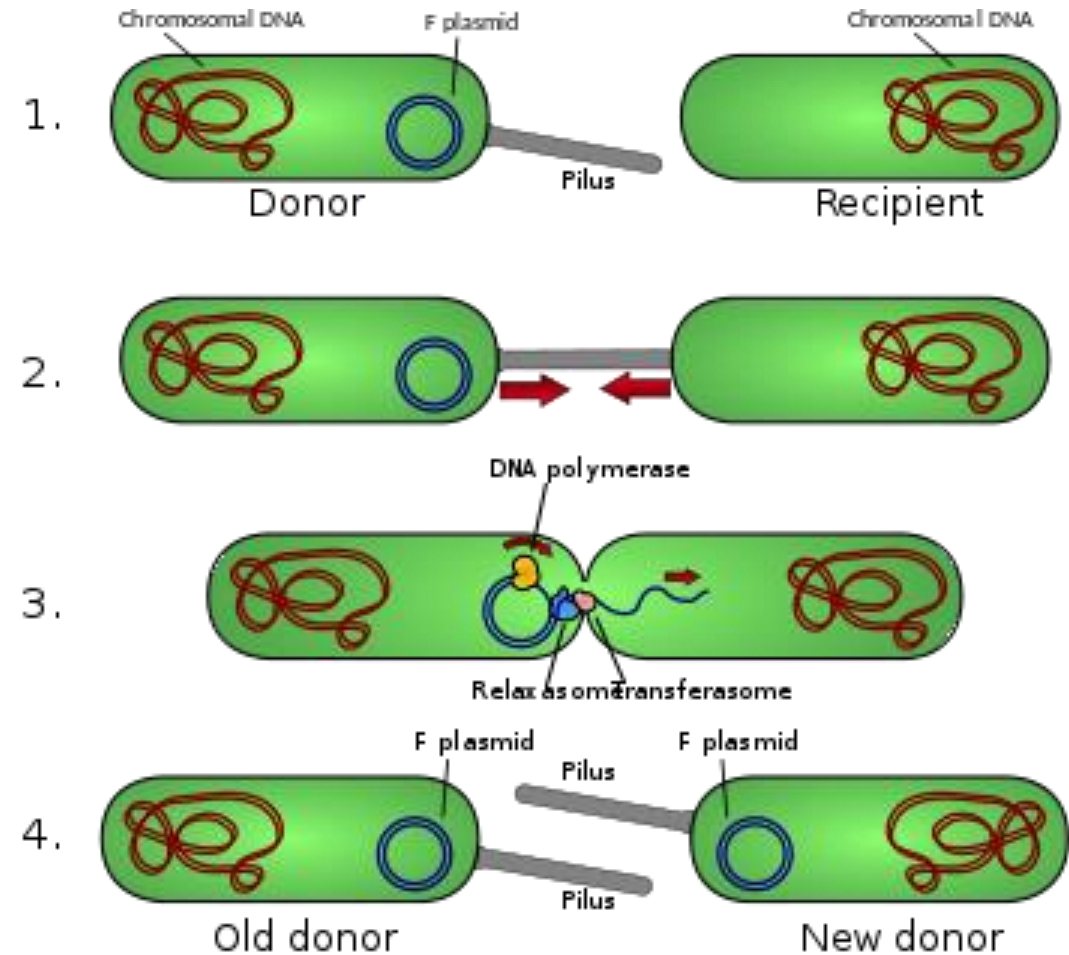


Conjugation

Although prokaryotic cells do not undergo asexual reproduction, they are able to transfer important DNA through the process of conjugation.

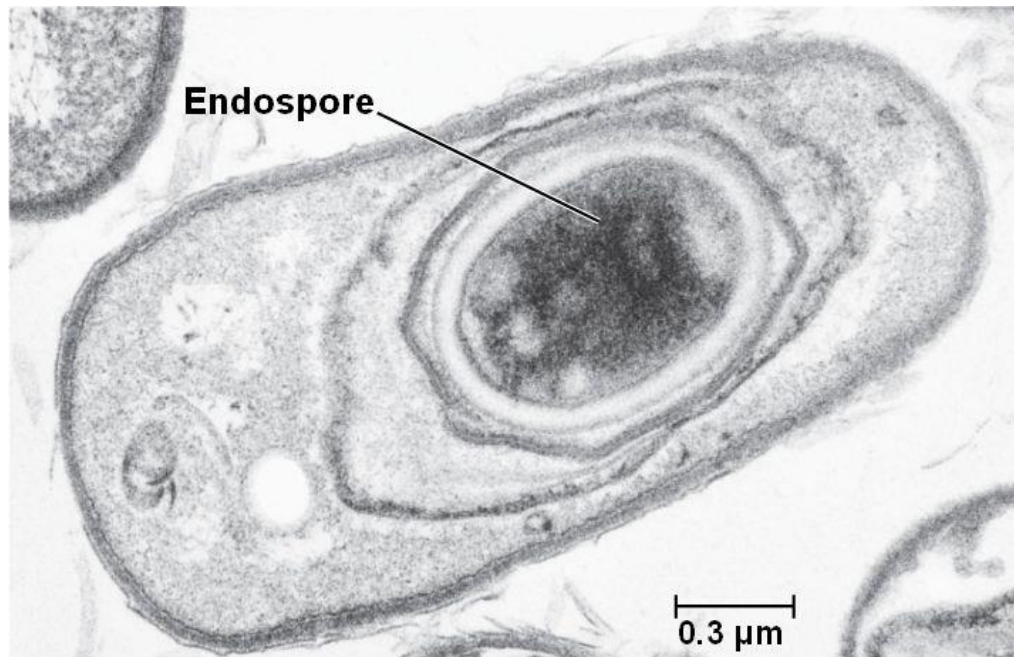
Conjugation:

Plasmids:



Endospores: Protecting Genetic Material

Endospores:



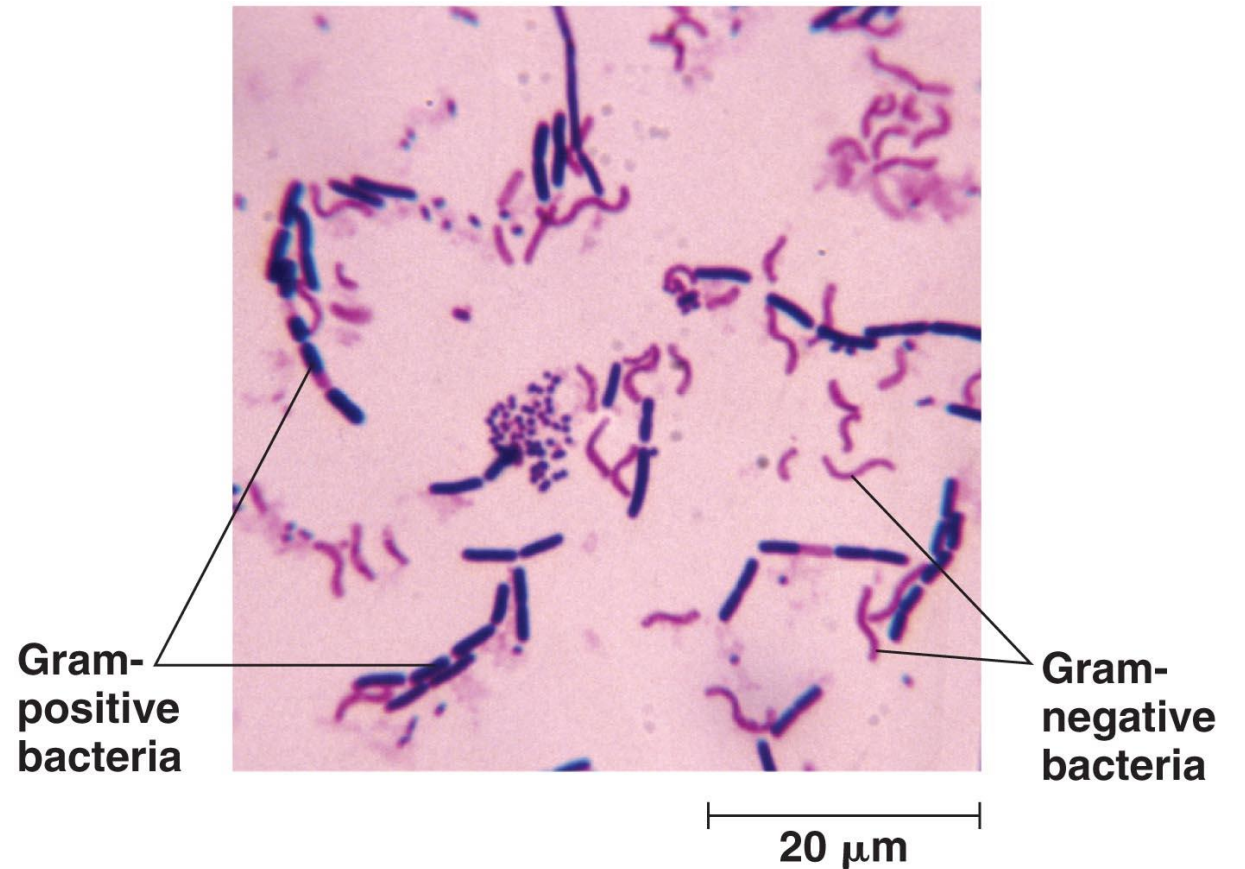
*The primary function of most **endospores** is to ensure the survival of a bacterium through periods of environmental stress.*

Classifying Bacteria and Archaea

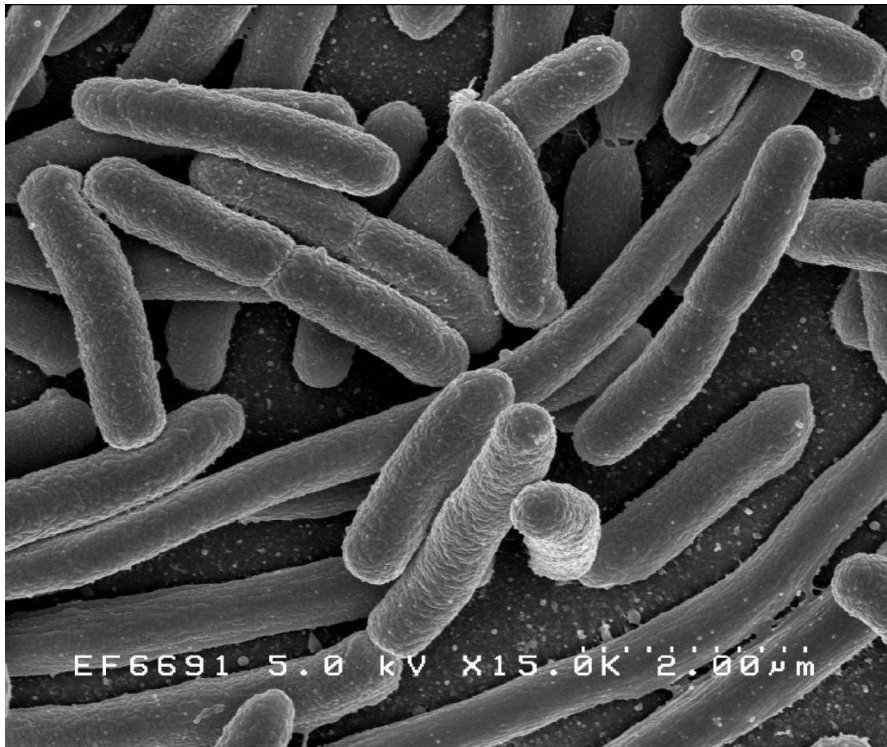
Bacteria and Archaea can be classified using **gram staining**.

Gram-positive bacteria have a thick cell wall made of peptidoglycan and are **stained** purple by crystal violet.

Gram-negative bacteria have a thinner layer and do not retain the purple stain and are counter-stained pink by safranin.



Bacteria and Human Health



Although we have a lot of bacteria that reside within our bodies, there are many bacteria present in the environment that can negatively impact our health.

Bacteria is by far the most prevalent cause of food poisoning. For example, **E. coli**, **Listeria**, and **Salmonella**.

Bacteria and Human Health



Lyme Disease:



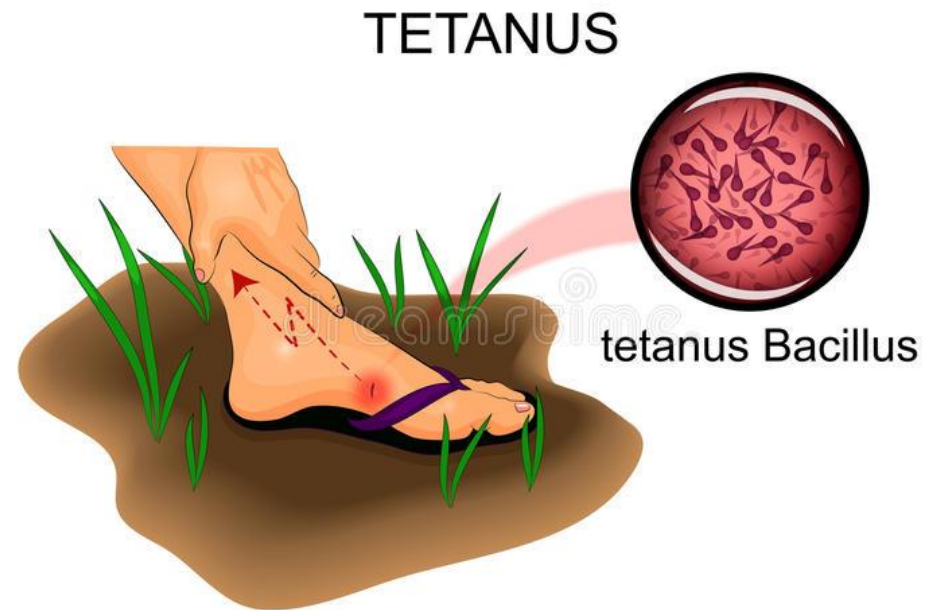
Plague:

Bacteria and Human Health



Tetanus is caused by a toxin produced by Clostridium tetani, normally found in the soil

If the individual has a wound, the bacteria can enter and produce a toxin that will lead to paralysis or death.



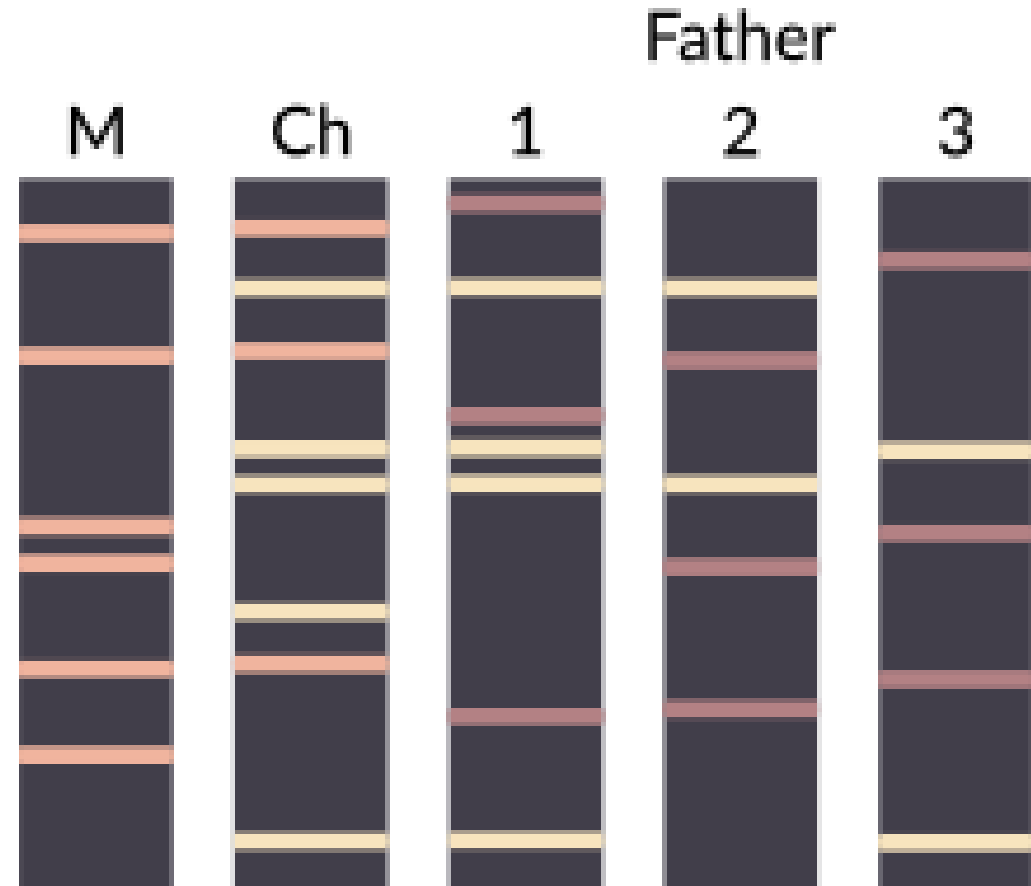
Bacteria and the Environment

Bacteria tend to play a significant role in the environment. For instance, they break down organic matter, release carbon, hydrogen and other elements, which can be beneficial to other organisms



Archaea and Biotechnology

Archaea have specialized enzymes known as restriction endonucleases. This has been extracted and used by humans for numerous biotechnologies.



Homework

Textbook: pg. 66 # 2, 3, 8, 9, 12