

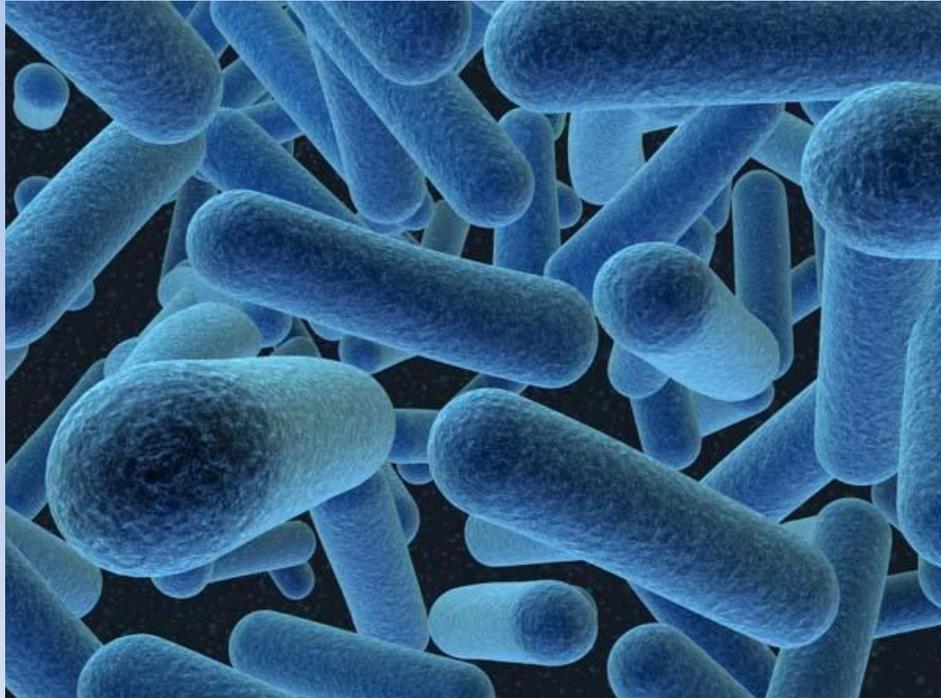


Bacteria



Antonie Philips van Leeuwenhoek (born on October 24, 1632 and died on August 26, 1723 – buried on August 30) was a Dutch tradesman and scientist from Delft, Netherlands. He is commonly known as “the Father of Microbiology”, and considered to be the first microbiologist. He is best known for his work on the improvement of the microscope and for his contributions towards the establishment of microbiology. Using his handcrafted microscopes he was the first to observe and describe single celled organisms, which he originally referred to as *animalcules*, and which we now refer to as microorganisms. He was also the first to record microscopic observations of muscle fibers, bacteria, spermatozoa and blood flow in capillaries (small blood vessels). Van Leeuwenhoek never wrote books, just letters.

Bacteria are microscopic organisms whose single cells have neither a membrane-bounded nucleus nor other membrane-bounded organelles like mitochondria and chloroplasts. Another group of microbes, the archaea, meet these criteria but are so different from the bacteria in other ways that they must have had a long, independent evolutionary history since close to the dawn of life. In fact, there is considerable evidence that you are more closely related to the archaea than they are to the bacteria!



Classification of Bacteria

Until recently classification has done on the basis of such traits as:

- shape
 - bacilli**: rod-shaped
 - cocci**: spherical
 - spirilla**: curved walls
- ability to form spores
- method of energy production (glycolysis for anaerobes, cellular respiration for aerobes)
- nutritional requirements
- reaction to the Gram stain.

The **Gram stain** is named after the 19th century Danish bacteriologist who developed it.

- The bacterial cells are first stained with a purple dye called crystal violet.
- Then the preparation is treated with alcohol or acetone.
- This washes the stain out of **Gram-negative** cells.
- To see them now requires the use of a counterstain of a different color (e.g., the pink of safranin).
- Bacteria that are not decolorized by the alcohol/acetone wash are **Gram-positive**.

Although the Gram stain might seem an arbitrary criterion to use in bacterial taxonomy, it does, in fact, distinguish between two fundamentally different kinds of bacterial cell walls and reflects a natural division among the bacteria.

More recently, genome sequencing, especially of their rRNA, has provided additional insights into the evolutionary relationships among the bacteria.

