

04- Classifying Microorganisms, Nomenclature Cell Shape and Size

(Instructor: Şeref Tağı)

In the 18th century, Carolus Linnaeus, a Swedish scientist, began identifying living organisms according to similarities in form (resemblances) and placing organisms in one of two “kingdoms”— Vegetalia and Animalia

Systematic biologists—systematists for short— identify, describe, name, and classify organisms (taxonomy), and organize their observations within a framework that shows taxonomic relationships.

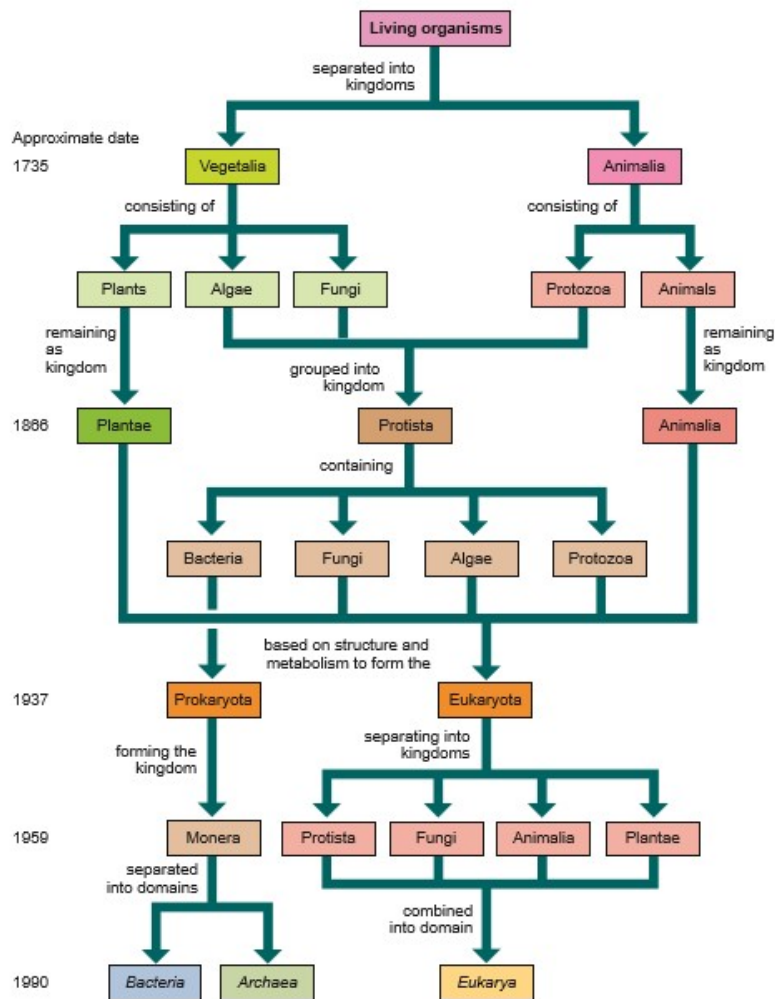
The Linnaean system (1758) classified all macroscopic living organisms as either Animals or Plants, based on whether they moved (anima, with a soul) or not. Fungi were included as plants. With the invention of the microscope and the discovery of microorganisms, bacteria, algae, and other unicellular organisms were variously classified as one or the other, or sometimes placed in a separate Kingdom.

The **Five Kingdom** system (first proposed in 1969 and now the most widely used) places all **prokaryotes** (organisms without nuclear membranes) in a single Kingdom **Monera**, and separates the three principal branches of multicellular **eukaryotes** as separate Kingdoms. In this system, **Protista** tends to remain for eukaryotic groups, such as the highly diverse algae, that do not fit readily into the other Kingdoms.

The **Three Domain** system is based on modern molecular evidence, and uses the category **Domain** as a **Superkingdom** to emphasize the [extremely ancient lineages](#) that exist among prokaryotes and protista, and the relatively recent relationships of multicellular organisms. Considerable discussion continues as to the exact relationships among the major living lineages. Use of molecular evidence becomes complicated with the recognition of **lateral transfer of DNA** between lineages early in evolution.

Lineage: strain, root, ancestry (soy)

Development of Classification for Living Organisms



A Concept Map Illustrating the Development of Classification for Living Organisms. Over some 140 years, new observations and techniques have been used to reclassify and reorganize living organisms. Of the plants, algae, fungi, bacteria, protozoa, and animals, which are in each of the three domains? (Alcamo's 2011)

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*Domain one of the three main evolutionary lineages of cells: the Bacteria, the Archaea, and the Eukarya

Like bacteria, however, archaea are prokaryotes that share certain characteristics with bacteria (this is one of the reasons archaea were previously thought to be a type of bacteria; were mistakenly classified as bacteria for many years and used to be referred to as archaeobacteria.). They show many similarities to bacteria in that they are prokaryotes, unicellular, and lack organelles. Due to their ability to survive extreme conditions some species of archaea are known as extremophiles because they can exist in habitats where we would not expect anything to survive. They can be found in a variety of environments ranging from lakes and soil to the Dead Sea and the deepest parts of the ocean (ocean floor).



Life at the Edge. Bacterial and archaeal extremophiles have been isolated from the edges of natural cauldrons, including (A) the Grand Prismatic Spring in Yellowstone National Park, Wyoming, where the water of the hot spring is over 70°C, or (B) the mud pools surrounding sulfurous steam vents of the Solfatara Crater in Pozzuoli, Italy, where the mud has a very low pH and a temperature above 90°. »» How do extremophiles survive under these extreme conditions?

References

- 1- Alcamo's Fundamentals of Microbiology, 2011, Ninth Edition (9 ed.) by Jeffrey C. Pommerville, Jones & Bartlett Publishers, Canada
- 2- "Download for free at <https://openstax.org/details/books/microbiology>."