Classification of Microorganisms

- **Taxonomy**
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  - Provides universal names for organisms
  -
- **Systematics or phylogeny**
  - The study of the evolutionary history of organisms
- All Species Inventory (2001-2025)
  -

Three Domains

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Endosymbiotic Theory

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- one ancient prokaryotic cell engulfed by another

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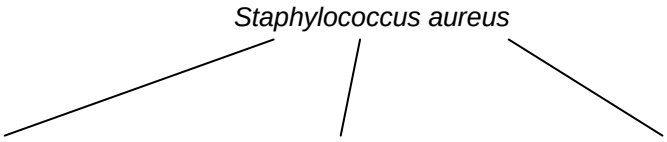
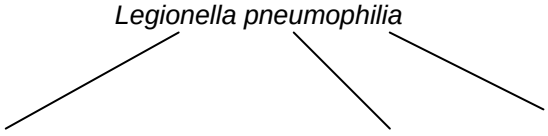
- over the eons, endosymbionts specialized for energy production

Classification

Traditional taxonomy was developed to classify larger multicellular animals (and plants) which possessed many different observable characteristics. Bacteria are microscopic with few and often similar morphologies. Also, “species” refers to members of a particular group that interbreed. Bacteria do not reproduce sexually and produce offspring. Nevertheless bacteria are classified and named according to the standard *Genus species* nomenclature.

These names often try to incorporate observed characteristics, origin of discovery, even the discoverer.





Species Definition

- Eukaryotic species:

    - A group of closely related organisms that breed among themselves
- Prokaryotic species:
    - A population of cells with similar characteristics
    - Clone:
    - Strain:
- Viral species:
    - Population of viruses with similar characteristics that occupies a particular ecological niche

Domain: Eukarya

- Animalia:
- Plantae: Multicellular; cellulose cell walls; usually photoautotrophic
- Fungi: Chemoheterotrophic; unicellular or multicellular; cell walls of chitin; develop from spores or hyphal fragments
- Protista:

Identification Methods

- Morphological characteristics:
- Differential staining:
- Biochemical tests:

Serology

- Combine known antiserum + unknown bacterium
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- uses antibodies and cell surface antigens

Methods

- DNA Fingerprinting
    - -
    - - the more closely related the organisms, the more similar the fragment pattern

- Polymerase Chain Reaction (PCR)
- -
- - amplified DNA can be tested using techniques
- Dichotomous Key
- -
- - usually a series of questions concerning characteristics:
- - bacterial dichotomous key =

Study Objectives

1. Define taxonomy and phylogeny.
2. Compare and contrast the three domains of life.
3. Explain the endosymbiotic theory.
4. Compare and contrast species definition with respect to eukaryotes, prokaryotes and viruses.
5. Describe the general principle of serology and describe how those techniques (ELISA, agglutination) can be used to identify/classify organisms.
6. Describe a dichotomous key.