

Identifying Bacteria and Viruses

- Methods for Identifying Bacteria
 - Morphology
 - Better suited for eukaryotes
 - Differential staining
 - Gram stains
 - Acid-fast stains
 - Biochemical tests
 - Tests for the presence of certain enzymes
 - Molecular Genetics Tests
 - PCR, rRNA sequencing, RFLP
- Bergey's Manuals
 - Determinate Bacteriology
 - Arranged by phenotypes
 - Emphasis on identification
 - Systematic Bacteriology
 - Focused on phylogeny
 - More in-depth
- Dichotomous Keys
 - Flow chart to rapidly eliminate options for microbe identification
 - Asks easy yes or no questions
 - Example: Is this microbe gram positive?
- Classifying Viruses
 - Viruses are acellular
 - Requires own classification
 - Classified by shape and genetic code
 - RNA vs DNA
 - Single stranded vs double stranded
 - + or - RNA strand
 - Grouped into families
 - Example: orthomyxovirus
 - Grouped into species
 - Example: influenza
 - Grouped into strains
 - Example: influenza A
 - Grouped into subtypes
 - Example: influenza A H1N1

Levels of Classification

- Linnaean System of Classification
 - Carol Linnaeus
 - Based on similar structures
 - Latin names
 - Started with 2 kingdoms but expanded to 5 kingdoms
 - Animals, plants, fungi, Protocista, and monera
 - Kingdom, phylum, class, order, family, genus, species
- Rules for Scientific Names
 - Each name consists of two parts
 - Italicized
 - Genus is always capitalized while species is not
 - The genus can be abbreviated
 - Example:
 - *Escherichia coli* (E. coli)
 - Escherichia = genus, coli = species
 - Named after discoverer; coli indicates it is present in the colon
- Defining Species for Prokaryotes
 - Collection of bacterial strains sharing stable properties
 - Very vague, can be confusing
 - Pure culture = growth of a single species or strain in the lab
 - Strain = genetically different cells within a species
 - Analogy: Bacterial species are like dogs in general while bacterial strains are like breeds of dogs
 - Clone = population of cells that come from a single cell
 - Colony = collection of cells on a solid medium that come from one cell
- Strain Names
 - *Escherichia coli* O157: H7
 - *Escherichia coli* = species name
 - O157:H7 = strain designation
 - O = LPS O-antigen
 - 157 = antigen number
 - H = flagellin
 - 7 = antigen number
- Division of Bacteria and Archaea
 - Carl Woese
 - Compared DNA between species
 - Examined rRNA genes

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- What is rRNA?
 - Molecular chronometer
 - All cells have rRNA genes, they don't change quickly, and if they do change, the changes aren't lethal
- Changed phylogenetics
 - Study of evolutionary history of organisms
- Created 3 domains: bacteria, archaea, and eukarya