Prokaryotes

Domain Bacteria

General features

- Cell walls contain peptidogylcan
- Prokaryotic – No internal membrane bounded structures (no organelles)
- Genetic material not found within a nucleus
- Membrane Lipids comprised of unbranched hydrocarbons
- One RNA polymerase
- Few Introns in DNA
- No histone proteins associated with circular DNA molecule

Morphology

- Three general shapes: Bacilli, Cocci and Spirilla
- Solitary cells common
- May cluster (Staphylo-)
- May form chains or filaments (Strepto-or Myco-)

Motility

- Flagella
- Axial Fibrils
- Gliding
- Non-motile

Reproduction

- Vegetative
- Binary Fission
- Budding
- Genetic Exchange by Conjugation, Transformation and Transduction

Resistant Forms

- Endospores (encysting to avoid environmental stress)

Environmental Requirements

- Oxygen
    - Obligate aerobes
    - Facultative
    - Microaerophiles
    - Obligate anaerobes
    - Metabolic anaerobes
- Temperature
    - Thermophiles
    - Psychrophiles
    - Mesophiles
- Metabolism
    - Heterotrophic
    - Autotrophic
        - Photosynthetic
        - Chemosynthetic

Candidate Kingdoms

Proteobacteria
Firmicutes (Gram positive bacteria)
Spirochetes
Chlamydia
Cyanobacteria (Blue-Green Algae)

- Morphology
  - Non-filamentous
  - Filamentous
  - Colonial (Usually surround colony with mucilage sheath)
- Motility
  - Non-motile
  - Gliding (Oscillatorian movement) No flagella
  - Gas vacuoles for buoyancy common
- Reproduction
  - Vegetative by fragmentation
  - Fission (May have Hormogonia, at fragmentation places)
- Resistant Forms
  - Akinites (Special spores very resistant)
  - Non-motile spores
- Metabolism
  - Autotrophic, contain chlorophyll and phycobiliproteins
  - May fix nitrogen in heterocysts
  - Many thermophiles
  - Many very water-pollution tolerant (nutrient-rich waters)
    - May toxify ponds with by-products, pound scum may reduce 0_2 exchange for other organisms

Domain Archaea

General features

- Prokaryotic – No internal membrane bounded structures (no organelles)
- Genetic material not found within a nucleus
- Membrane Lipids comprised of branched hydrocarbons
- Several RNA polymerases
- Some genes have introns
- Some species with histone proteins associated with circular DNA molecule
- Generally restricted to extreme environments
  - (Halophiles, Thermophiles, Methanogens)
- Many are Chemosynthetic organisms
- Do not respond to antibiotics

Candidate Kingdoms

Euryarchaeota
Crenarchaeota
Korarcheota
Nanoarcheota