Prokaryotes

Domain  Bacteria

General features
- Cell walls contain peptidoglycan
- 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 O₂ 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
    o (Halophiles, Thermophiles, Methanogens)
  • Many are Chemosynthetic organisms
  • Do not respond to antibiotics

Candidate Kingdoms

Euryarchaeota
Crenarchaeota
Korarcheota
Nanoarcheota