### Bacterial Taxonomy

**Remind Linnaeus system of seven levels: KPCOFGs**

**Arrangement.**

**Spore formers:** central or terminally located p 320

**Means of classification** Three domains: (p 321)

**Means of identification**

**Morphology**: cocci, bacilli, spirilli p 316, 319:
- diplo, strepto-, tetrad, sacrina, staphylo-, palisade

**Biochemistry**: ability to grow on various C sources, produce various products

**Serology**: presence of characteristic antigens on cell surface (p 291)

**Phage typing**: ability of phage to grow on bacteria (related to surface proteins) (p 293)

**PCR**: detect specific DNA sequences characteristic of species

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<th>Archaea</th>
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<th>Eukaryotes</th>
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**Hydrogen oxidizers**

**Thermotogales**

**Green nonsulfur**

**Deinococcus**

**Cyanobacteria**

**Proteobacteria**

**Chlamydia**

**Planctomyces**

**Spirochetes**

**Green sulfur**

**Cytophagas**

**Gram positives**

- high G + C
- low G + C
TAXONOMY OF PROKARYOTES

25 July 2007, 30 July 2008
Bauman 2nd: pp320-339

See diagram of prokaryotes, p 321

ARCHEA:
probably the earliest group, includes

- **Extremophiles**: thermophiles >45 C, source of Taq DNA polymerase (PCR) P 322
- **Halophiles**: require >9% NaCl. Optimum 17-23% NaCl (P 323)
- **Methanogens**: make methane in intestinal gas, hydrothermal vents, sewage, swamps

BACTERIA:

- **Phototrophic**
  - cyanobacteria: blue green algae
  - Proteobacteria: purple sulfur bacteria

**Gram positive, low GC bacteria (below 50% GC)**

- Clostridia: “spindle” shaped obligate anaerobes, sporforming
- Mycoplasma: lack cell wall, (“Gm+” due to DNA sequence, stain pink in Gm stain)

**Gram positive bacilli and cocci**

- Bacillus: endospore-forming aerobes
- Listeria: no endospores, can grow in fridge.
- Lactobacillus: no endospores, ferment to produce lactic acid
- Streptococcus: plant chains, some non-pathogenic, but etiology of many diseases
- Enterococcus: usually diplococci, common in gut
- Staphylococcus: grows in grape like clusters. Common on skin

**Gram positive high GC bacteria (greater than 50% GC)**

- Corynebacterium: palisades and V shapes, formed by “snapping” fission. Diphtheria
- Mycobacterium: mycolic acid (a wax), pleomorphic, acid fast, TB and leprosy
- Actinomyces: branching filaments, especially in soil, source of many antibiotics

PROTEOBACTERIA (table p 334)

**Gram negative proteobacteria**

- alpha proteobacteria: can grow on low nutrient levels, possess prosthecae, extensions of the cell
  - Nitrogen Fixers: Rhizobium, symbiotic with legumes; Nitrobacter
  - Richettsia: Gm-aerobic rod, obligate intracellular microbes, RMSF
  - Brucella: coccobacillus, survives phagocytosis, causes brucellosis
- Acetobacter

- beta proteobacteria: can grow on low nutrient levels, have different RNA sequences
  - Neisseria
  - Bordetella
  - Spirillum

**gamma proteobacteria**

- Legionella
- Pseudomonas

**Glycolytic facultative anaerobes** (table p 336)

- Escherichia
- Serratia
- Salmonella
- Proteus
- Shigella
- Yersina
- Klebsiella
- Vibrio
- Haemophilus
- episolon proteobacteria
- Campylobacter
- Helicobacter

“Other” gram negative bacteria

- Chlamydia
- Spirochete
- Bacteroids