

I. Prokaryotes = "monerans"

A. 2 domains/kingdoms: Bacteria and Archaea

B. prokaryotic cells - review

1. required parts

2. optional parts

3. main shapes

coccus/cocci

bacillus/bacilli

spirals

vibrio

4. binary fission

C. Nutritional life styles

1. source of **energy**

a. phototroph

b. chemotroph

2. source of **carbon** (C) for molecules

a. autotroph

b. heterotroph

3. can combine these: energy first, carbon source second

phototautotroph

chemoautotroph

photoheterotroph

chemoheterotroph

II. Domain/Kingdom Bacteria

A. general characteristics

Gram stain -> type of cell wall

a. Gram positives

b. Gram negatives

c. Why is this important to know?

B. Examples (note: this book does **not** have the modern classification used by most microbiologists); Let's start with Gram negatives

1. Phylum Proteobacteria
    a. animal gut inhabitants: chemoheterotrophs

        eg: (†)*Escherichia coli*

        eg: †*Salmonella* spp.

        eg: †*Yersinia pesti*s
    b. nitrogen-fixers: chemoheterotrophic
        eg: *Rhizobium* spp.

    c. photosynthetics
        purple sulphur bacteria

        purple non-sulphur bacteria

    d. plant pathogens: chemoheterotrophs
        eg: *Agrobacterium tumefaciens*

    e. other pathogens
        eg: †*Francisella tularensis*

        eg: †*Neisseria* spp.

        eg: †*Rickettsia* spp.

    f. a few chemoautotrophs
        eg: *Nitrobacter*

        eg: *Nitrosomonas*

2. Phylum Chloroflexi
        eg: *Chloroflexus*

3. Phylum Chlorobi
        eg: *Chlorobium*

4. Phylum Cyanobacteria
    a. general characteristics

        accessory pigments

    b. N_2 fixers
        eg: *Anabaena*, *Nostoc*
        heterocysts/heterocytes

    c. food for us
        eg: *Nostoc, Spirulina*

d. highly numerous marine organisms
eg: *Prochlorococcus, Synechococcus*

e. can make toxins
eg: (†)*Microcystis*

f. chloroplasts

(lots of examples briefly mentioned or shown in chapter - eg: *Albrightia, Aphanocapsa, Arthrospira, Bacillosiphon, Chamaesiphon, Eucapsis, Gloeocapsa, Gomphosphaera, Merismopedia*, *Prochlorothrix)*

5. Phylum Spirochaetes

eg: †*Borrelia burgdorferi*

eg: †*Treponema pallidum*

Now move on to Gram Positives

6. Phylum Actinobacteria
eg: *Brevibacterium* sp.

eg: *Frankia* spp.

eg: *Streptomyces* spp.

7. Phylum Firmicutes
a. *Bacillus*
eg: †*B. anthracis*

eg: *B. thuringensis* & *B. popilliae*

b. *Clostridium*

eg: †*Clostridium botulinum*

eg: †*Clostridium tetani*

c. *Lactobacillus*
eg: *L. acidophilus*

eg: *Lactococcus*

d. (†)*Staphylococcus*
eg: *S. aureus*

e. (†)*Streptococcus*
eg: *S. pneumoniae*

III. Domain/Kingdom Archaea = archaebacteria
A. general characteristics

pseudomurein

extremophiles

B. examples

1. Phylum Euryarcheota

a. methane producers

eg: *Methanobacterium smithii*

b. halophiles

eg: *Halobacterium*

bacteriorhodopsin

c. hyperthermophiles

eg: *Thermoplasma*

2. Phylum Crenarcheota

a. hyperthermophiles & thermophiles

eg: *Pyrodictium*

thermoacidophiles

eg: *Sulfolobus*

b. lower temperature, oceanic species

c. other phyla known

Korarcheota

Nanoarcheota

Lokiarcheota