

Prokaryotes

No nucleus; 1st organisms to inhabit earth

unicellular, some form colonies

fall into Bacteria and Archaea

0.5-5 micrometers

reproduces via **binary fission**

short generation time

Cell surface structures

Capsule polysaccharide/protein surrounds cell wall; sticks; prevents dehydration

Fimbriae hair-like; stick

Sex pili longer than fimbriae; sexual conjugation(exchange DNA)

Taxis movement

chemotaxis toward or away from a chemical

phototaxis toward or away from light

Flagella motor (ATP driven pump); filament(whip line); 42 different proteins but only half are used

In the Biosphere

-chemical recycling

-decomposers

-use CO₂ to form sugar & oxygen

- nitrogen fixing

increase soil nutrients

Shapes

cocci – spherical

bacilli - rod-shaped

spirilla/spirochetes - spiral

diplococci (2)

streptococci (in a line/chain)

staphylococci (in a clump)

Internal organization

- no membrane bound organelles; no nucleus

Plasmids - small units of DNA

DNA = large chromosome nucleoid region

endospore - environment not beneficial; copies DNA chromosomes

Nutritional Modes

Photoauto-troph uses light; CO₂, HCO₃

Chemoauto-troph uses inorganic chemicals; C₂, HCO₃

Photohete-rotroph uses light; organic compounds

Chemohete-rotrophs organic compounds; organic compounds

Oxygen in Metabolism

Aerobic- use O₂

Fermentation/Anaerobic - no O₂

Obligate aerobes

must use O₂ - for cellular respiration

Obligate Anaerobes

cannot use O₂

Facultative anaerobes

can use O₂ but does not have to

Cell Wall Bacteria

Gram Positive (+)

simple cell walls, large peptidoglycan, 1 inner membrane
purple

Gram Negative (-)

complex cell wall, small peptidoglycan, outer and inner membrane
pink

Factors that give rise to Genetic Diversity

1. Rapid Reproduction - binary fission (offsprings are identical)
2. Mutation - low rate (short generation times = large population)
3. Genetic Recombination - different DNA's combined

Genetic Recombination

Transformation

-replaces it's own DNA w/ foreign DNA

Transduction

-involves a phage(virus) to infect fragments of DNA to another bacterial cell. = recombinant cell

Conjugation

-DNA is transferred in 1 direction thru a mating bridge (pilus)

-replicates complementary strand from a donor and recipient cell

-F factor as part of either plasmid or circular chromosome