CONCEPT: PROKARYOTIC CELL ARCHITECTURE

Prokaryotic Diversity

● Prokaryotic cells are _____ and classified in two domains: **Archaea** (Archaebacteria) and **Bacteria** (Eubacteria)

□ Prokaryotes come in all different shapes and sizes, and all are single cell organisms

- They can live in social groups, and form chains, clusters, or films

- Typical shapes include: spherical, rod-shape, and spiral

□ 6000 species have been identified through traditional techniques - represents less than 1/10 of 1% of all species

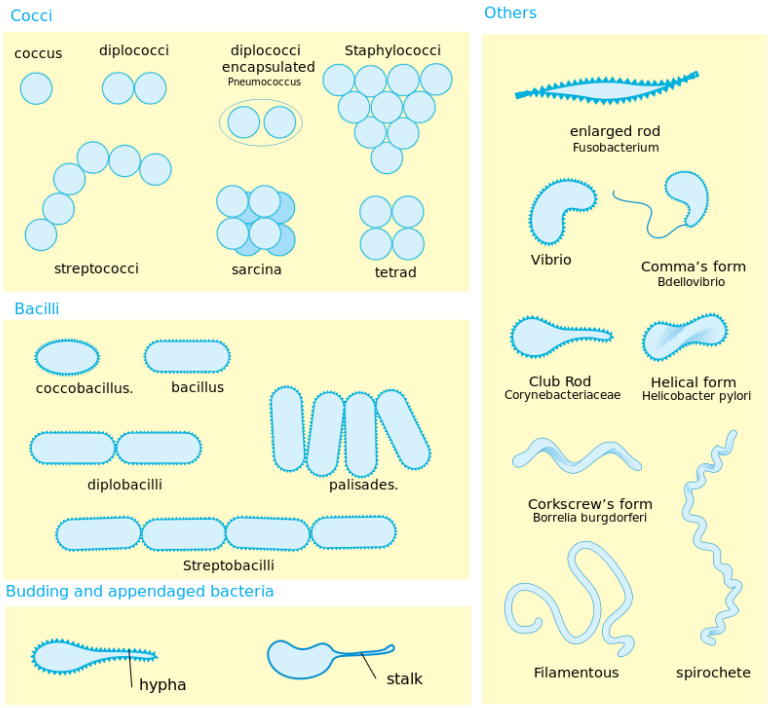
- Sequencing the **metagenome** (_____ genome) of species in a habitat, identified the diversity

□ Have diverse metabolism pathways and can be anaerobic, aerobic, or photosynthetic

□ Diversity stems from rapid division, which supports rapid evolution

□ Members of the Archaea domain typically are found in harsh environments: known as "extremophiles"

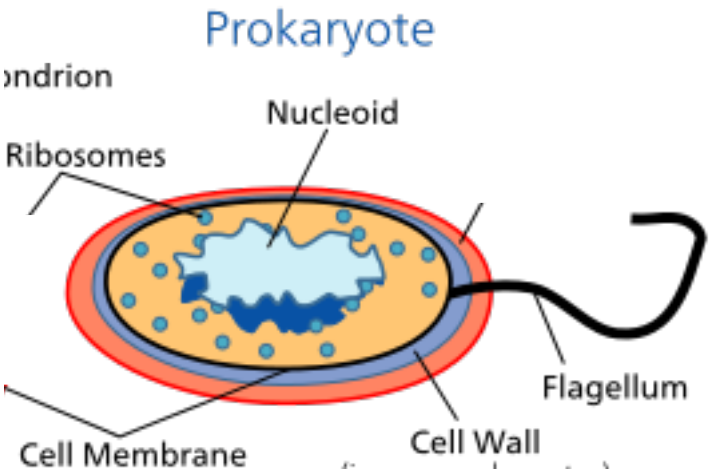
EXAMPLE: Examples of a few prokaryotic shapes and sizes



Prokaryotic Physical Features

- Prokaryotic cells have specific _____ features that define them
  - □ Pro = before; Karyotes = kernel or “nucleus”, so prokaryote means “before nucleus”
  - □ Contains plasma membrane, and nearly all have a cell wall
  - □ Do not contain internal membranes (one main exception is **cyanobacteria**)
    - Cyanobacteria contain internal membranes where photosynthesis can occur
  - □ Primitive cytoskeletal elements are present
  - □ Simple movements through flagellum

EXAMPLE: A simple diagram of a prokaryotic cell



Prokaryotic Genetic Features

- DNA storage, structure, and replication for division are distinguishing _____ for prokaryotic cells
  - □ A **nucleoid** is a compact circular chromosome where DNA is packaged
  - □ DNA is not contained in an intracellular compartment because prokaryotic cells do not have nuclear envelopes
  - □ Prokaryotic cells have comparatively small amounts of DNA (up to 8 million base pairs and ~5000 proteins)
  - □ **Binary fission** is the process through which prokaryotic cells divide
    - A complete copy of the DNA is passed on to the daughter cell
    - Genetic information can be shared between organisms through **conjugation**

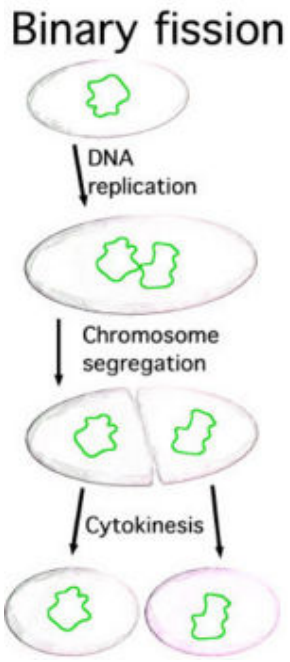
□ DNA transcription and gene expression is _____

- All occurs in single compartment

- Transcription is much simpler (little to no RNA processing)

- Use ribosomes for translation, but they are smaller and less complex than Eukaryotic ribosomes

EXAMPLE: Binary fission of a prokaryotic cell



PRACTICE

1. Which of the follow is true about prokaryotic cells?
    a. They have a plasma membrane, nucleoid, and nucleus
    b. They have a plasma membrane, nucleoid, and no nucleus
    c. They have a plasma membrane, and reproduce slowly
    d. They have a plasma membrane, reproduce slowly, and divide through binary fission

2. In prokaryotic cells, where is the DNA stored?
    a. Nucleoid
    b. Nucleus
    c. Nucleolus
    d. Nucleaid

3. True or False: Prokaryotic cells always live alone, and never form social groups.
    a. True
    b. False