KEY CONCEPT

Bacteria and archaea are both single-celled prokaryotes.
Prokaryotes are widespread on Earth.

- Prokaryotes can be grouped by their need for oxygen.
  - obligate anaerobes are poisoned by oxygen
  - obligate aerobes need oxygen
  - facultative aerobes can live with or without oxygen
Bacteria and archaea are structurally similar but have different molecular characteristics.

- Bacteria commonly come in three forms.
  - rod-shaped, called bacilli
  - spiral, called spirilla or spirochetes
  - spherical, called cocci

- Archaea have many shapes.
Bacteria and archaea have similar structures:
- plasmid
- flagellum
- pili

This diagram shows the typical structure of a prokaryote. Archaea and bacteria look very similar, although they have important molecular differences.
• Bacteria and archaea have molecular differences.
  – The amount of peptidoglycan within the cell wall can differ between bacteria
  – Archaea have different lipids entirely
18.4 Bacteria and Archaea

• Gram staining identifies bacteria.
  – stains polymer peptidoglycan
  – gram-positive stains purple, more peptidoglycan
  – gram-negative stains pink, less peptidoglycan

Gram-negative bacteria have a thin layer of peptidoglycan and stain red.

Gram-positive bacteria have a thicker peptidoglycan layer and stain purple.
18.4 Bacteria and Archaea

**Bacteria have various strategies for survival.**

- Prokaryotes exchange genes during conjugation.
- Bacteria may survive by forming endospores.