

19-1 Bacteria



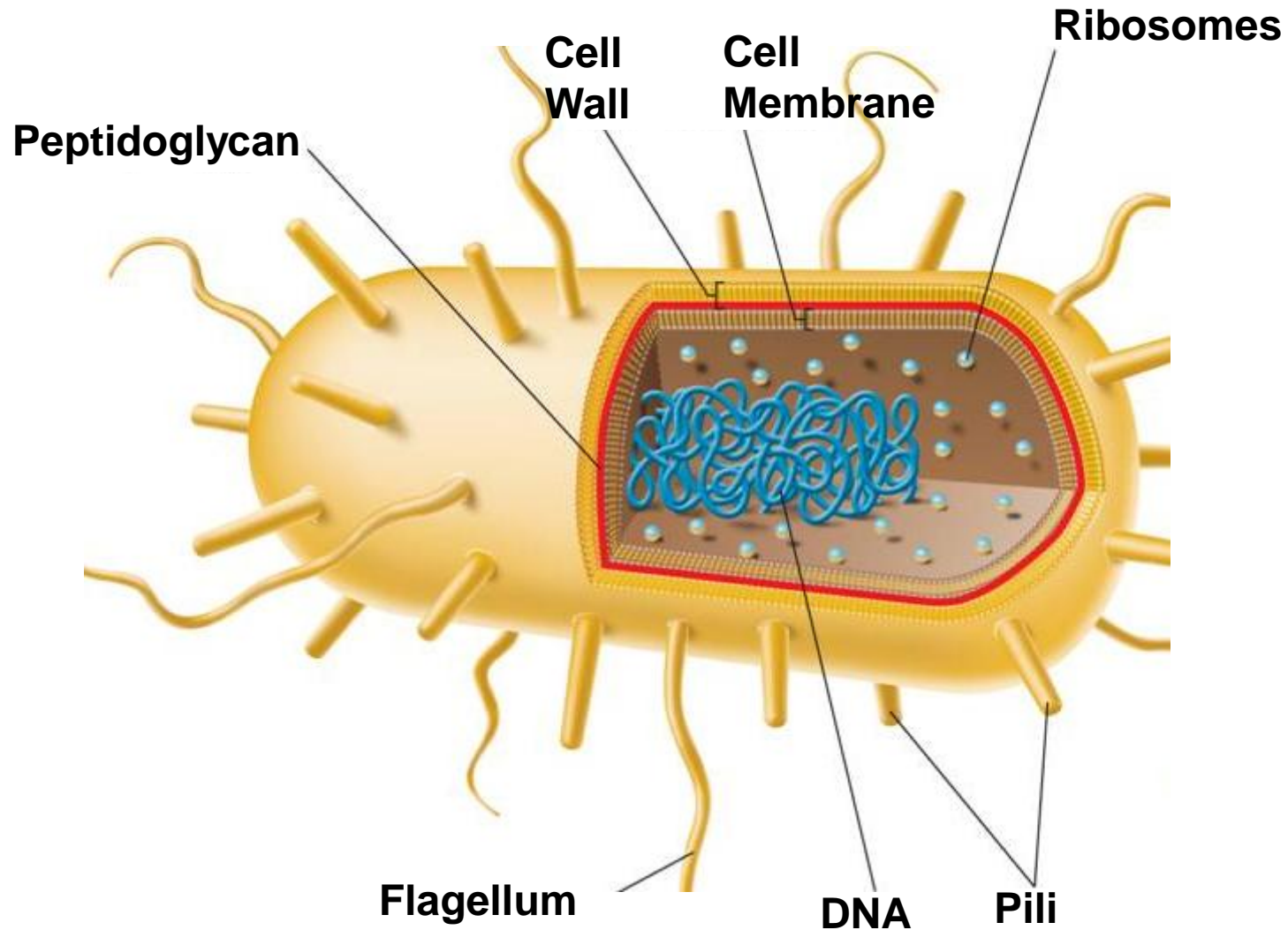
Classifying Prokaryotes

- once all placed in the Kingdom Monera.
- now divided:
 - Eubacteria and the Archaeobacteria.

Eubacteria

- have a cell wall
- cell wall contain peptidoglycan.
- have a cell membrane
- Some eubacteria have a second membrane

E. coli, a Typical Eubacterium



Eubacteria live in a variety of environments,

- in fresh and salt water
- on land
- in the human body

Many archaeobacteria live in extreme environments.

- Methanogens → oxygen-free environments, such as thick mud and animal digestive tracts.
- Others → salty environments or in hot springs where water temperatures approach the boiling point.



Prokaryotes are identified by characteristics such as:

- **shape**
- **the chemical nature of their cell walls**
- **the way they move**
- **the way they obtain energy**

Shapes

Rod-shaped prokaryotes are called **bacilli**.



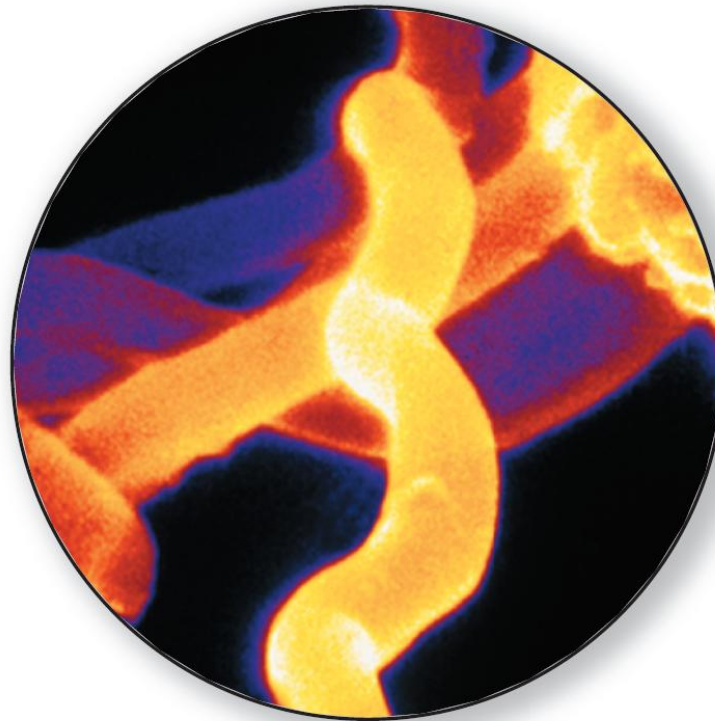
Bacilli

Spherical prokaryotes are called **cocci**.



Cocci

Spiral and corkscrew-shaped prokaryotes are called **spirilla**.



Spirilla

Metabolic Diversity

Two main groups:

- Heterotrophs → energy by consuming other organisms.
- Autotrophs → make their own food

Heterotrophs

Chemoheterotrophs

-take in organic molecules for both energy and a supply of carbon.

Photoheterotrophs

-use sunlight for energy, but take in organic compounds as a carbon source.

Autotrophs

Photoautotrophs

- use light energy to convert carbon dioxide and water to carbon compounds and oxygen.

Chemoautotrophs

- make organic carbon molecules from carbon dioxide,
- do not require light as energy.

Obligate aerobes

- require a constant supply of oxygen.

Obligate anaerobes

- live without oxygen

Facultative anaerobes

- can survive with or without oxygen

Growth and Reproduction

- binary fission.
- conjugation.
- some produce spores.

Binary Fission

Binary fission is a type of asexual reproduction in which an organism replicates its DNA and divides in half, producing two identical daughter cells.



Binary Fission

Conjugation

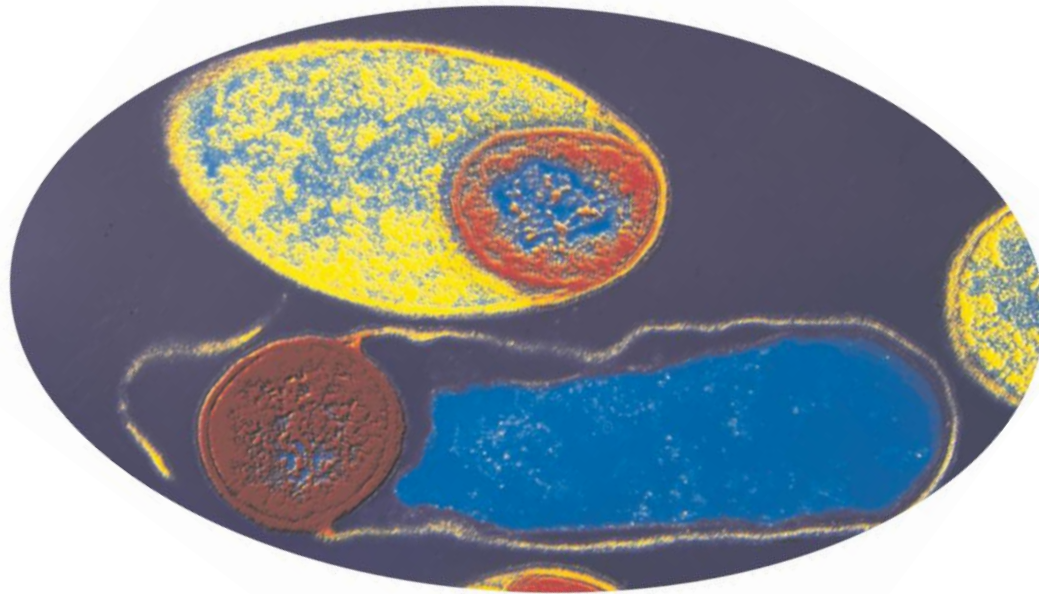
- hollow bridge forms between two bacterial cells,
- genes move from one cell to the other.
- increases genetic diversity in populations of bacteria.



Conjugation

Spore Formation

- produces a thick internal wall that encloses its DNA and some of its cytoplasm.
- can remain dormant for months or years.
- allow bacteria to survive harsh conditions.



Spore Formation

Importance of Bacteria



Bacteria are vital to the living world.

- **Some are producers that capture energy by photosynthesis.**
- **Others are decomposers that break down the nutrients in dead matter.**
- **Still other bacteria have human uses.**

Decomposers

- recycle nutrients and maintain equilibrium
- help in the treatment of sewage.

Nitrogen Fixers

- nitrogen gas changed chemically to ammonia or other nitrogen compounds,
- known as **nitrogen fixation**.
- symbiotic relationships

Human Uses of Bacteria

We depend on bacteria for many things, including:

- foods and beverages
- removal of waste and poisons from water
- mining minerals from the ground
- synthesis of drugs and chemicals via genetic engineering
- production of vitamins in human intestines

END OF SECTION