

Introduction to Microorganisms

Prof. Gustav Bouwer
(Room 228)

- **Lectures and practicals covering the following topics:**

- 1. Introduction to microorganisms
- 2. Bacterial cell structure and function
- 2. Bacterial metabolism and growth
- 4. Bacterial diversity
- 5. Key bacteriology techniques

Aims and Expectations?

Microbes in Our Lives

Learning Objectives

- List several ways in which microbes affect our lives
- Differentiate between the major types of microbes

Microbes in Our Lives

- **Microorganisms:**

-
-
-
-
-
-
-

Microbes in Our Lives

- Knowledge of microorganisms allows humans to:
 - Prevent?
 - Aseptic techniques to prevent?

Naming and Classifying Microorganisms

- Linnaeus established the system of scientific nomenclature
- Each organism has two names: the **genus** and **specific epithet**
- **For example:**
 - *Escherichia coli*
 - Theodor Escherich
 - *Staphylococcus aureus*
- After the first use?

Types of Microorganisms

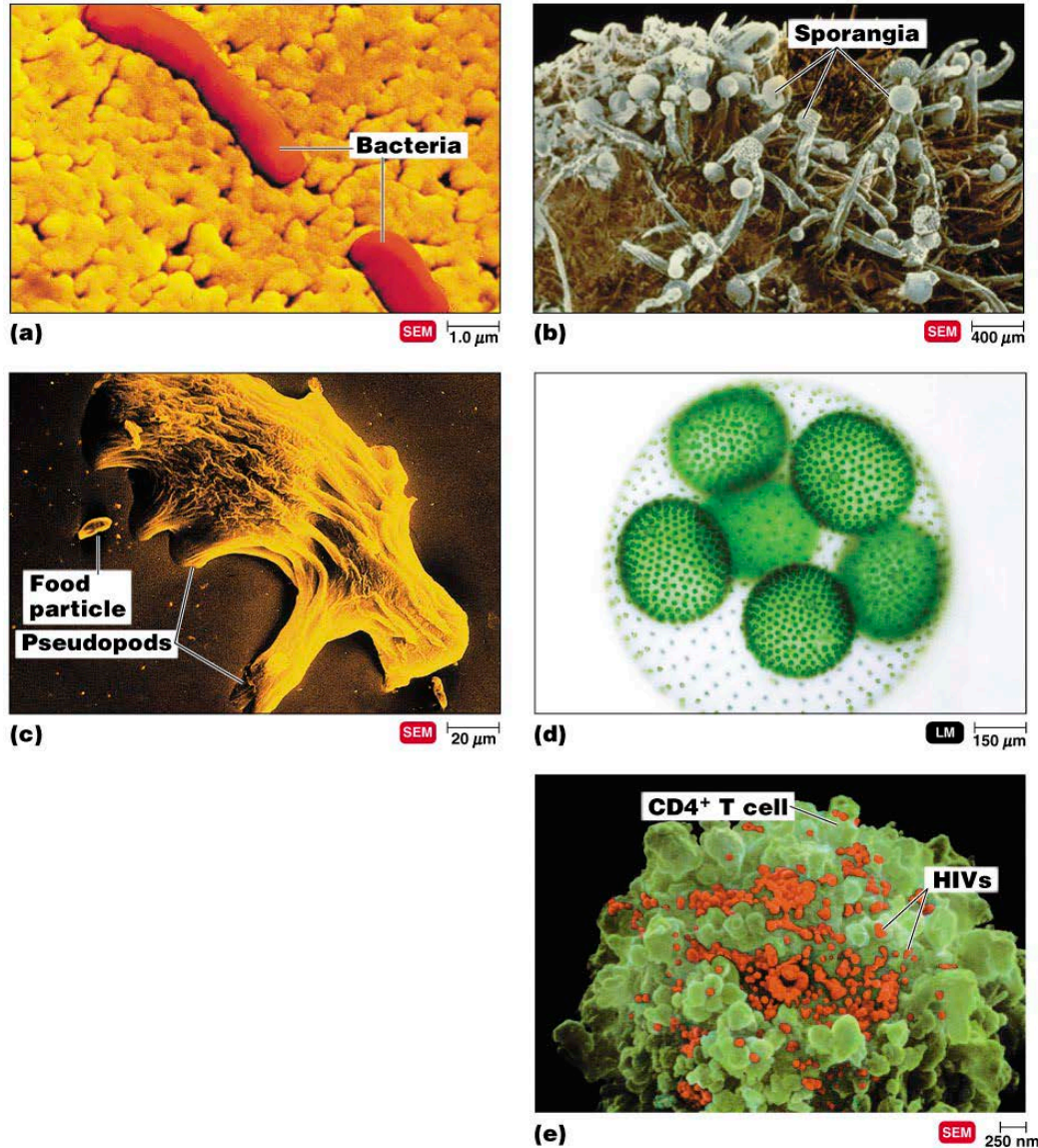


Figure 1.1

Bacteria

- Cell type?
- Cell walls?
- Replication?
- For energy?
 -
 -
 -

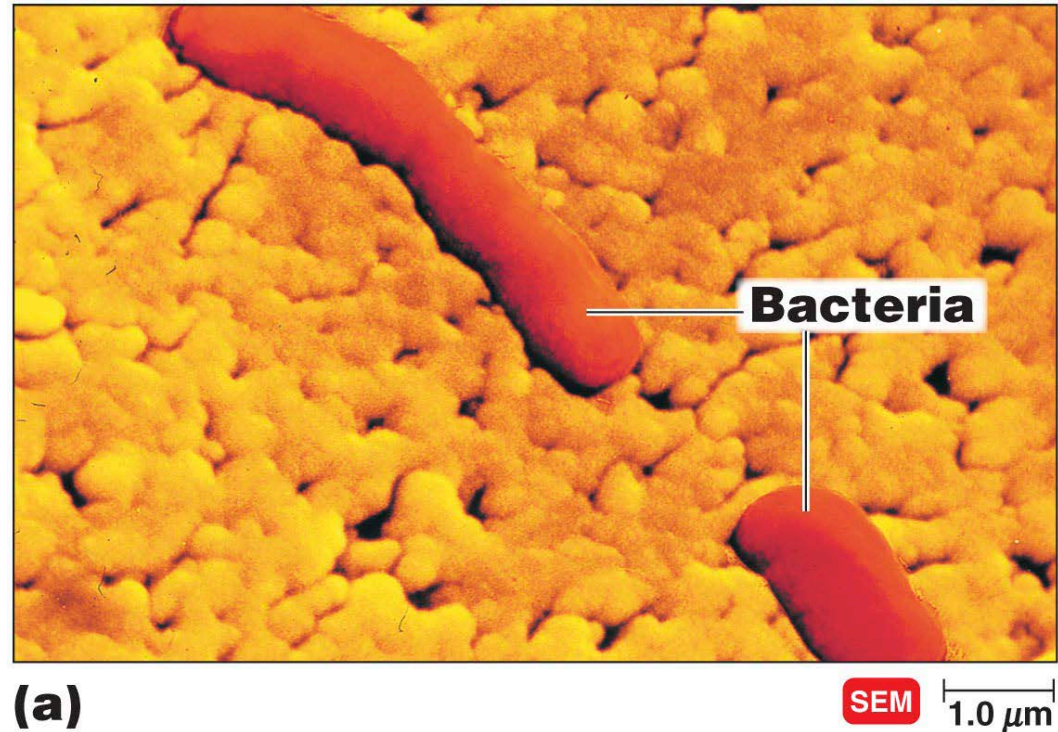
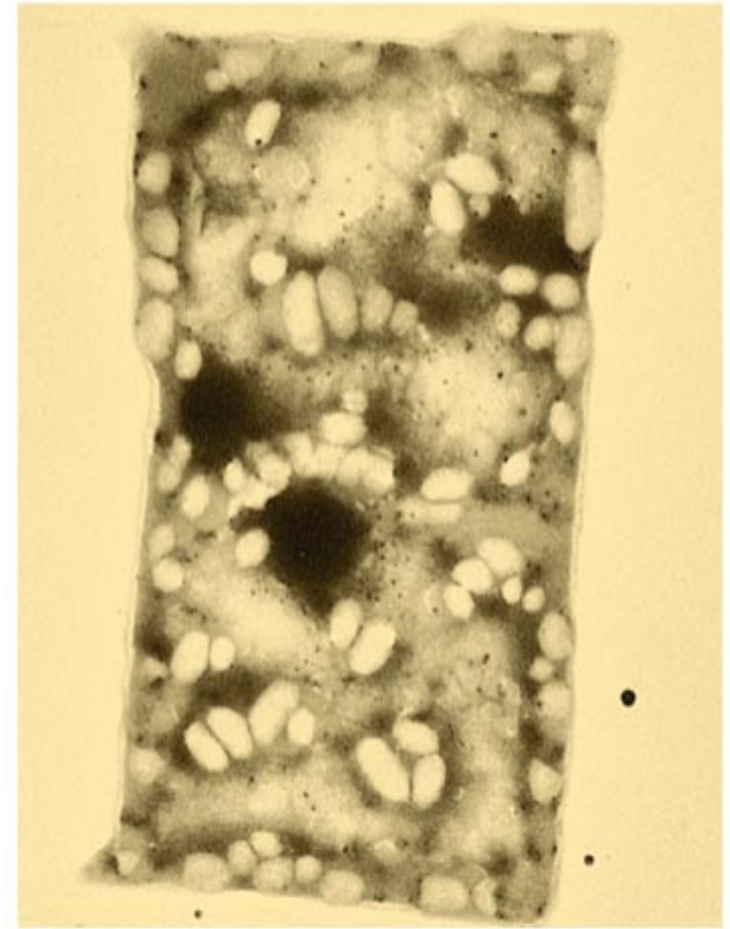


Figure 1.1a

Archaea

- Cell type?
- Cell walls?
- Environments?
- Includes
 - Methanogens
 - Extreme halophiles
 - Extreme thermophiles



TEM

0.5 μm

Fungi

- Eukaryotes
- Chitin cell walls
- Use organic chemicals for energy
- Yeasts are unicellular
- Molds and mushrooms are multi-cellular
 - Consisting of masses of mycelia
 - Composed of filaments called hyphae

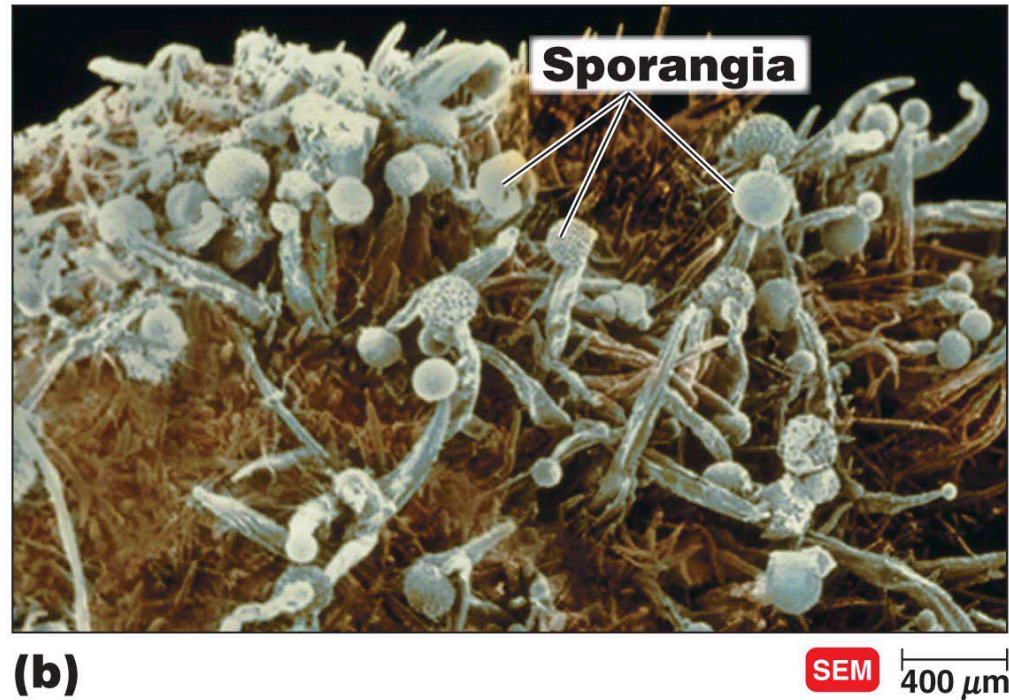


Figure 1.1b

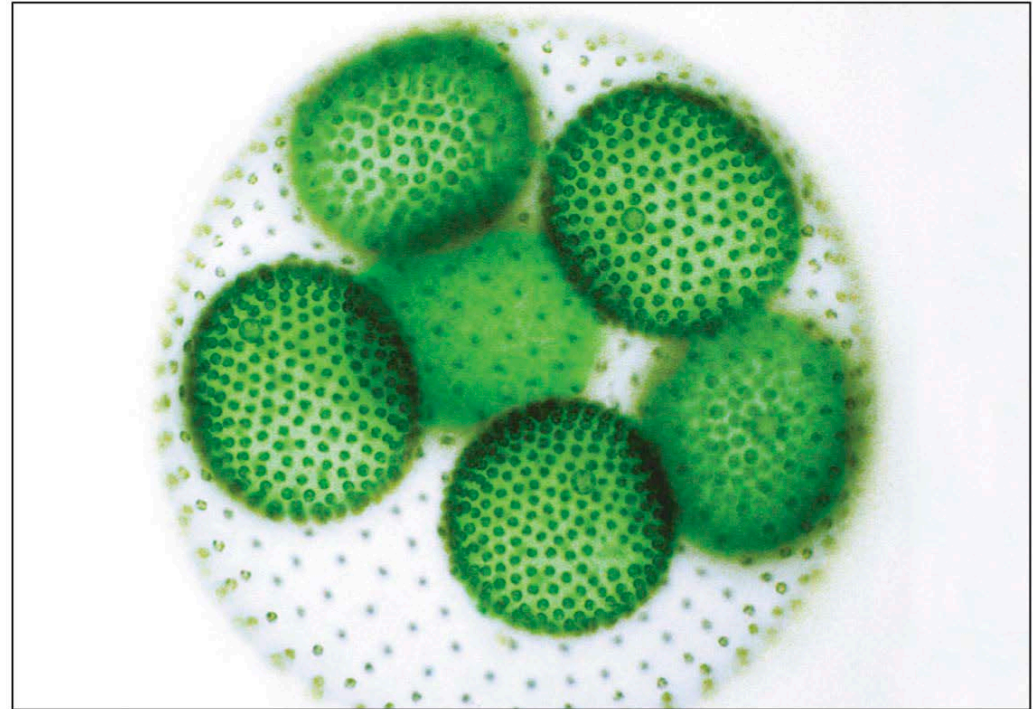
Protozoa

- Eukaryotes
- Absorb or ingest organic chemicals
- May be motile:
 - Pseudopods
 - Cilia
 - Flagella



Algae

- Eukaryotes
- Cellulose cell walls
- Use photosynthesis for energy
- Produce molecular oxygen and organic compounds



(d)

LM 150 μm

Viruses

- Acellular
- Consist of DNA or RNA core
- Core is surrounded by a protein coat
- Coat may be enclosed in a lipid envelope
- Viruses are replicated only when they are in a living host cell

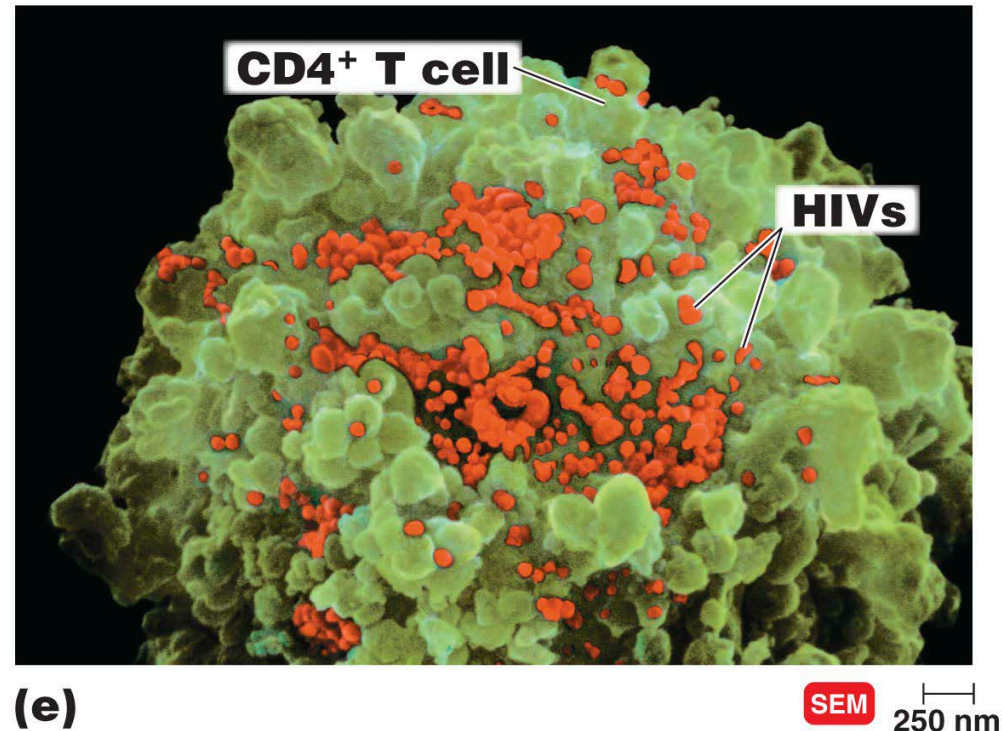


Figure 1.1e

Multicellular Animal Parasites

- Eukaryotes
- Multicellular animals
- E.g. parasitic flatworms
- Microscopic stages in life cycles

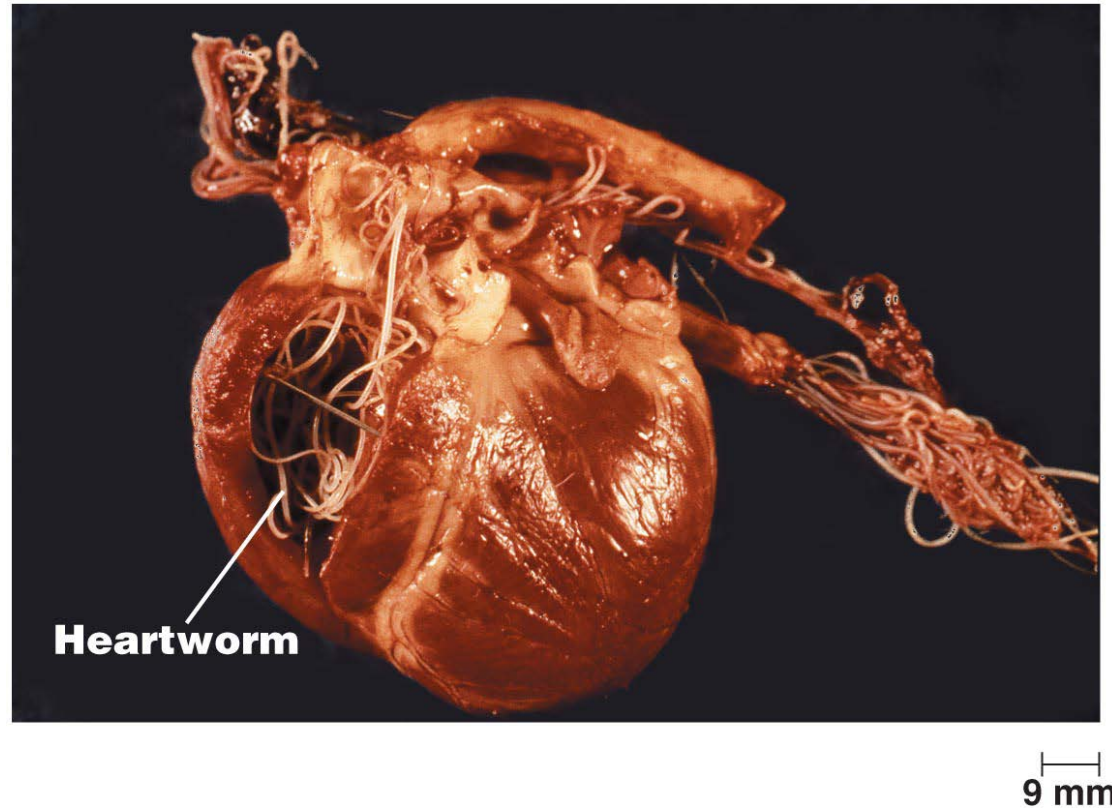


Figure 12.29

Designer Jeans: Made by Microbes?

- **Stone-washing:** *Trichoderma*
- **Cotton:** *Gluconacetobacter*
- **Bleaching:** Mushroom peroxidase
- **Indigo:** *E. coli*
- **Plastic:** Bacterial polyhydroxyalkanoate

