Unit 2.1.1 — Eubacteria

Introduction

Eubacteria are true bacteria that belong to the kingdom Monera. They are microscopic, unicellular prokaryotic organisms found almost everywhere on Earth.

Eubacteria are among the oldest living organisms and can survive in different environments such as soil, water, air, food, and inside living organisms.

Characteristics of Eubacteria

Major characteristics of eubacteria include:
• Unicellular organisms
• Prokaryotic cells without a true nucleus
• Lack membrane-bound organelles
• Possess cell walls made of peptidoglycan
• Reproduce mainly by binary fission
• Some are autotrophic while others are heterotrophic

Eubacteria may exist singly, in pairs, chains, or clusters.

Structure of Eubacteria

The structure of eubacteria includes:
• Cell wall – protects the cell and gives shape
• Plasma membrane – controls movement of substances
• Cytoplasm – site of metabolic activities
• Ribosomes – synthesize proteins
• Nucleoid – contains genetic material
• Flagella – help movement
• Capsule – protection from harsh conditions

Some bacteria also possess pili for attachment.

Shapes of Bacteria

Based on shape, bacteria are classified into:
• Cocci – spherical-shaped bacteria

• Bacilli – rod-shaped bacteria
• Spirilla – spiral-shaped bacteria
• Vibrios – comma-shaped bacteria

Bacterial shape helps scientists identify different species.

Nutrition in Eubacteria

Eubacteria show different modes of nutrition.

1. Autotrophic bacteria:
• Produce their own food
• May be photosynthetic or chemosynthetic

2. Heterotrophic bacteria:
• Obtain food from other organisms
• May be saprophytic, parasitic, or symbiotic

Reproduction in Eubacteria

Eubacteria mainly reproduce asexually by binary fission. During binary fission, one bacterial cell divides into two identical daughter cells.

Some bacteria exchange genetic material through:
• Conjugation
• Transformation
• Transduction

These processes increase genetic variation.

Importance of Eubacteria

Eubacteria are important in many ways:
• Decompose dead organisms
• Help nitrogen fixation in soil
• Used in food production such as yogurt and cheese
• Used in biotechnology and medicine
• Help digestion in humans and animals

Some bacteria are also used in sewage treatment and environmental cleaning.

Harmful Effects of Eubacteria

Some eubacteria cause diseases in humans, animals, and plants.

Examples:
• Tuberculosis
• Cholera
• Typhoid
• Pneumonia

Bacteria may also spoil food and cause food poisoning.

Prevention and Control of Bacterial Diseases

Methods of prevention include:
• Maintaining personal hygiene
• Proper sanitation
• Vaccination
• Safe food preparation
• Use of antibiotics under medical supervision

Public health measures help reduce bacterial infections.

Economic Importance of Eubacteria

Eubacteria contribute to agriculture, medicine, and industry. Nitrogen-fixing bacteria improve soil fertility, while industrial bacteria help produce antibiotics, enzymes, and fermented foods.

Despite harmful effects, eubacteria play essential roles in ecosystems and human life.

Chapter Summary

Eubacteria are unicellular prokaryotic organisms found in many environments. They reproduce mainly through binary fission and may be beneficial or harmful. Eubacteria are important in decomposition, nitrogen fixation, food production, medicine, and biotechnology.

Key Term	Meaning
Prokaryote	Cell without a true nucleus
Binary Fission	Asexual reproduction in bacteria
Peptidoglycan	Material forming bacterial cell wall
Autotroph	Organism producing its own food
Heterotroph	Organism obtaining food from others

Review Questions and Answers

1. What are eubacteria?

Eubacteria are true bacteria that are unicellular prokaryotic organisms.

2. Mention major characteristics of eubacteria.

They are unicellular, prokaryotic, lack membrane-bound organelles, and reproduce by binary fission.

3. What are the main shapes of bacteria?

Cocci, bacilli, spirilla, and vibrios are the major bacterial shapes.

4. Explain binary fission.

Binary fission is an asexual reproduction process where one bacterial cell divides into two identical cells.

5. State beneficial effects of eubacteria.

They help decomposition, nitrogen fixation, food production, medicine, and biotechnology.

6. Mention harmful effects of eubacteria.

Some bacteria cause diseases such as tuberculosis, cholera, and typhoid.

7. How can bacterial diseases be prevented?

Through hygiene, sanitation, vaccination, and proper use of antibiotics.