

Unit 2.1.2 — Archaeobacteria

Introduction

Archaeobacteria are ancient prokaryotic organisms that belong to the kingdom Archaea. They are unicellular microorganisms that can survive in extreme environments such as hot springs, salty lakes, acidic water, and places without oxygen.

Archaeobacteria differ from eubacteria in their cell wall composition and genetic structure.

Characteristics of Archaeobacteria

Major characteristics include:

- Unicellular and prokaryotic
- Lack a true nucleus
- Cell walls do not contain peptidoglycan
- Can survive extreme environmental conditions
- Reproduce mainly through binary fission
- Possess unique membrane lipids

Archaeobacteria are considered among the oldest living organisms on Earth.

Types of Archaeobacteria

There are three major groups of archaeobacteria:

1. Methanogens – produce methane gas and live in anaerobic environments such as swamps and digestive tracts.
2. Halophiles – live in extremely salty environments like salt lakes.
3. Thermoacidophiles – survive in hot and acidic environments such as hot springs and volcanic areas.

Nutrition in Archaeobacteria

Some archaeobacteria are autotrophic while others are heterotrophic. Methanogens obtain energy by producing methane gas from simple compounds.

Certain archaeobacteria use chemical energy instead of sunlight to produce food.

Importance of Archaeobacteria

Archaeobacteria are important in:

- Production of biogas (methane)
- Waste decomposition
- Scientific research
- Biotechnology applications
- Maintaining ecological balance

Methanogens are useful in sewage treatment and renewable energy production.

Differences Between Eubacteria and Archaeobacteria

Archaeobacteria differ from eubacteria in cell wall structure, habitat, and genetic makeup. Unlike eubacteria, archaeobacteria usually survive in extreme environments and lack peptidoglycan in their cell walls.

Economic and Environmental Importance

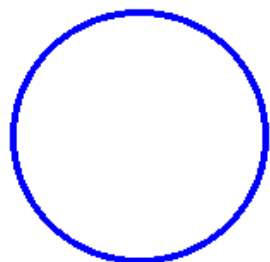
Archaeobacteria help recycle nutrients in ecosystems. They are used in industries and biotechnology because their enzymes can function under extreme temperatures and conditions.

Scientists also study archaeobacteria to understand the origin of life on Earth.

Conclusion

Archaeobacteria are unique microorganisms adapted to extreme environments. They are important in biotechnology, environmental management, and scientific research. Their special adaptations make them different from eubacteria.

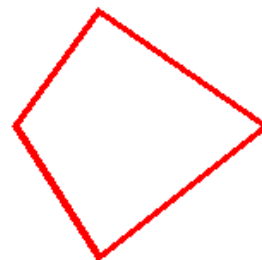
Illustration of Major Types of Archaeobacteria



Methanogens



Halophiles



Thermoacidophiles

Chapter Summary

Archaeobacteria are ancient prokaryotic organisms that survive in extreme environments. Major groups include methanogens, halophiles, and thermoacidophiles. They are important in biotechnology, environmental recycling, and scientific research.

Key Term	Meaning
Archaeobacteria	Ancient prokaryotic microorganisms
Methanogens	Archaea producing methane gas
Halophiles	Salt-loving archaea
Thermoacidophiles	Heat and acid-loving archaea
Binary Fission	Asexual reproduction method

Review Questions and Answers

1. What are archaeobacteria?

Archaeobacteria are ancient unicellular prokaryotic organisms that survive in extreme environments.

2. Mention the major groups of archaeobacteria.

Methanogens, halophiles, and thermoacidophiles are the major groups.

3. What are methanogens?

Methanogens are archaea that produce methane gas in anaerobic environments.

4. How do archaeobacteria differ from eubacteria?

Archaeobacteria lack peptidoglycan in their cell walls and usually live in extreme conditions.

5. Mention the importance of archaeobacteria.

They help in biogas production, waste decomposition, biotechnology, and scientific research.