

Prokaryotic organisms

1

Read Prokaryotic organisms and decide which is the right meaning of the words underlined in the phrases below.

- with the aid of the microscope (1. encouragement 2. help)
- stained films of bacteria (1. blotted movies 2. dyed layers)
- regardless of their individual cell shape (1. despite 2. rudely)
- cytoplasm throughout which (1. from the beginning to the end of 2. all over)
- the cell membrane controls the entry and exit of all substances (1. going in and going out 2. way in and way out)
- a very small pin head colony (1. a colony on the head of a pin 2. a colony having the size of a pin head)

These are simple single-celled organisms which occur widely. Bacteria occur in the soil, on plants, in air, in water and also in animals and humans. Bacteria are of simple shape and can only be seen individually with the aid of the microscope.

When stained films of bacteria are looked at under the microscope, many bacterial cells are seen at the same time, and it is sometimes a means of making a preliminary identification if the arrangement of the cells is observed.

Regardless of their individual cell shape, all bacteria have the same internal structures. The cell consists of cytoplasm throughout which small units, the ribosomes (the sites of protein synthesis), and diffuse areas of staining (the nuclear material of DNA and RNA) exist attached to the membrane system. The cell membrane controls the entry and exit of all substances. Many Gram positive bacteria have a mesosome. The outer cell layer is a strong cell wall whose function is to retain the characteristic shape of the organism, and act as a barrier to certain compounds.

The Gram's staining technique is important in differentiating bacteria into two groups – Gram positive cells and Gram negative cells. The test relies on fundamental differences in cell wall biochemistry and morphology. The cell walls of Gram negative bacteria are more complex than those of Gram positive organisms. Bacteria sometimes possess additional structures.

A flagellum is a whip-like appendage attached to the cell membrane by a complex basal structure which rotates it. Flagella are responsible for motility in bacteria.

Some bacteria have a capsule, a layer of gelatinous material which seems to protect the bacterium against destruction. Endospores, more commonly referred to as spores, are structures produced by the groups of bacteria genus *Bacillus* and genus *Clostridium*. Other groups of bacteria also produce endospores. A mature spore can exist in a dormant state for a long period, being resistant to the adverse effects of severe heat (such as cooking), cold (such as refrigeration and freezing) and to chemicals (such as disinfectants and sterilants). A spore can survive in dust, on vegetation and in soil for weeks, months or even years, or until it eventually finds itself in an environment suitable for reproducing the vegetative cell.

Bacteria reproduce by a process known as 'binary fission', a process of one cell dividing into two parts. This process can lead to a rapid increase in cell numbers. Large numbers of bacteria grouped together form colonies which, when the numbers have reached several million cells, may be visible to the naked eye as a very small pin head colony. Species forming larger colonies may be identified to some extent if the colonies develop into characteristic shapes.

(from: Parry – Pawsey, *Principles of Microbiology for students of food technology*, Stanley Thornes Publishers Ltd)

2 Answer these questions about Prokaryotic organisms.

- a. What does a bacterial cell consist of? • b. What is the function of the cell membrane? • c. What is the function of the cell wall? • d. How are bacteria grouped? • e. What are flagella and what is their function? • f. What is the capsule and what is its function? • g. What are endospores? • h. How long can spores survive? • i. How do bacteria reproduce?

3 Decide whether these statements are true or false and correct them if necessary.

- | | T | F |
|---|--------------------------|--------------------------|
| a. Bacteria are multicellular organisms. | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Bacteria are ubiquitous. | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Bacteria can be seen with the naked eye. | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Observing the arrangement of bacterial cells and the shape of bacterial colonies helps identifying bacteria. | <input type="checkbox"/> | <input type="checkbox"/> |
| e. All bacteria differ in shape and in internal structures. | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Gram+ bacteria have more complex cell walls than Gram- bacteria. | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Spores can survive extremes of temperature and hostile environments. | <input type="checkbox"/> | <input type="checkbox"/> |

4 Match nouns a-j, as they are used in Prokaryotic organisms, with their synonyms 1-10. Tip: copy the pairs in your indexed book.

- | | | |
|------------------|--------------------------|---------------|
| a. means | <input type="checkbox"/> | 1. access |
| b. arrangement | <input type="checkbox"/> | 2. array |
| c. shape | <input type="checkbox"/> | 3. cooling |
| d. site | <input type="checkbox"/> | 4. film |
| e. entry | <input type="checkbox"/> | 5. form |
| f. exit | <input type="checkbox"/> | 6. leaving |
| g. layer | <input type="checkbox"/> | 7. method |
| h. appendage | <input type="checkbox"/> | 8. place |
| i. genus | <input type="checkbox"/> | 9. projection |
| j. refrigeration | <input type="checkbox"/> | 10. species |

5 Match adjectives a-j, as they are used in Prokaryotic organisms, with their synonyms 1-10. Tip: copy the pairs in your indexed book.

- | | | |
|-------------------|--------------------------|------------------|
| a. preliminary | <input type="checkbox"/> | 1. appropriate |
| b. individual | <input type="checkbox"/> | 2. external |
| c. same | <input type="checkbox"/> | 3. identical |
| d. diffuse | <input type="checkbox"/> | 4. initial |
| e. outer | <input type="checkbox"/> | 5. latent |
| f. characteristic | <input type="checkbox"/> | 6. scattered |
| g. dormant | <input type="checkbox"/> | 7. specific |
| h. adverse | <input type="checkbox"/> | 8. typical |
| i. suitable | <input type="checkbox"/> | 9. unaided |
| j. naked | <input type="checkbox"/> | 10. unfavourable |