

Monerans, protoctists and fungi.

1. What is the Monera Kingdom?

The Monera kingdom contains unicellular, microscopic, prokaryotic organisms. They do not have an organised nucleus.

Bacteria belong to the Monera kingdom. They can live almost anywhere. They sometimes form **colonies**, but each individual cell remains independent. The first living things on Earth, more than 3,500 million years ago, were probably bacteria.

1.1. Vital functions of bacteria.

Bacterial nutrition

Bacteria can be autotrophic or heterotrophic organisms. Most bacteria are **heterotrophic**: they do not produce their own food.

- **Parasites** feed on living things. They cause illnesses like tuberculosis and cholera.
- **Saprophytes** live on dead or decomposing matter. They transform organic substances into inorganic substances. Some saprophytes are useful: lactobacilo is used to make yoghurt.
- **Symbionts** live on the bodies of other living things to provide mutual benefit. They can be found in the digestive system of many mammals. There, intestinal bacteria help with digestion.

Some bacteria are **autotrophs**. For example, cyanobacteria make their own food through photosynthesis.

Bacterial interaction

Some of these organisms do not move, some swim by means of **flagella** and some slide over surfaces. They live in all types of environment, even extreme ones, such as thermal waters.

Bacterial reproduction

Bacteria reproduce asexually by **binary fission**, producing two daughter cells. Each daughter cell grows, and then divides again. In this way they can form groups of millions, and these groups are called colonies.

How many groups are there?

Bacteria are classified into four groups according to the shape of their cells:

- **Coccus**. Cocci are spherical in shape. They usually come in twos (diplococci), in bunches (staphylococci) or in chains (streptococci).
- **Bacillus**. Bacilli are long and cylindrical in shape.
- **Spirillum**. Spirilla are spiral shape.
- **Vibrio**. Vibrios are shaped like a comma.

2. What is the Protocist kingdom?

The Protocist kingdom includes unicellular and multicellular living things. They are all eukaryotes and have no tissues.

Algae and protozoa are found in this kingdom.

2.1. What are algae?

The main characteristics of algae are:

- **Unicellular** or **multicellular**. Unicellular algae sometimes form colonies. Each cell can carry out the vital functions. All the cells of multicellular algae look the same and have the same functions. Therefore, algae have no true tissues or organs.
- **Autotrophs**. They contain chlorophyll and other pigments which capture sunlight for photosynthesis. They can be classified by their pigment: green, brown or red.
- Some live in salt and fresh water, but others live on tree trunks or rocks. Some unicellular algae, like diatoms, float on water forming phytoplankton, and are food for aquatic animals.

Algae provide food for humans too, for example, ice cream is made from algae. Industrial uses include medicines and fertilizers.

2.2. What are protozoa?

The main characteristics of protozoa are:

- **Unicellular**. A single cell carries out all the vital functions.
- **Heterotrophs**. They feed on bacteria, organic remains and other microscopic organisms.
- They live in both salt water and fresh water. Some protozoa float on water, zooplankton, and are food of aquatic animals.
- Some are **parasites**, and cause illnesses.

How many groups are there?

There are four groups of protozoa. They are classified according to the way they move.

- **Flagellates** use one or two flagella to move around. They are nearly all parasites, but some live freely. *Trypanosoma brucei* is a parasite found in the blood of vertebrates. In humans it produces sleeping sickness, which is transmitted by the tsetse fly.
- **Ciliates** have many cilia that they use to move with. They also use them to move water. The most common example is the **paramecium**. Ciliates can be parasites or live freely.
- **Rhizopods** have cytoplasm extensions (**pseudopods**) that they use to move around and catch food. Some of them live freely, such as the **amoeba**, and some are parasites, such as *Entamoeba histolytica*.
- **Sporozoa** are non-motile organisms: they don't have any organs for movement. They are all parasites. They reproduce asexually by spores. *Plasmodium malariae* causes malaria, which is endemic in many African countries. Malaria attacks the red blood cells and causes high fevers.

3. What is the Fungi kingdom?

The Fungi kingdom includes unicellular and multicellular living things. They are all eukaryotes, heterotrophic organisms and have no tissues. Fungi grow in the soil, in dark and damp places or on the organic matter they feed on. The fungal body consists of thread-like structures called hyphae, which form the mycelium.

3.1. Vital functions of fungi.

Nutrition. Fungi are **heterotrophic**. They get the nutrients they need in different ways.

Saprophytes. Fungi feed on dead or decomposing organic matter from other living things. They transform organic substances into inorganic substances. Most fungi belong to this group.

Parasites. Fungi cause diseases in plants and animals.

Symbiotic fungi establish symbiotic relationships with other organisms. Lichens are organisms formed by a symbiotic relationship between a fungus and an alga. Both organisms contribute to and benefit from this relationship. The fungus provides moisture (a small amount of a liquid (water) that makes something wet) and mineral salts. The alga provides food produced through photosynthesis.

Reproduction. Most fungi reproduce **asexually** by producing spores or gemmation. Spores are produced in multicellular mushrooms on special cells located on the underside of the cap. Some fungi reproduce sexually.

Interaction. Fungi respond to stimuli such as humidity and mineral salts. They are immobile.

How many groups are there?

Yeasts. They are **unicellular** organisms. Some of them are harmful and others are used in the food industry.

Moulds. They are **multicellular** organisms. They grow on decomposing organic matter, like tree trunks, fruit, cheese and bread.

Mushrooms. They are **multicellular** organisms. It is a specialized reproductive structure that has a cap, a foot and spores.

ACTIVITIES

- Choose the correct words.
 - Protozoa are single-cell *autotrophs/heterotrophs*.
 - Protozoa are classified by how they *move/feed*.
 - Ciliates have *no/two* nuclei.
 - Most flagellates *live freely/are parasites*.
 - Flagella are *short/long* extensions of cells.
 - Rhizopoda use pseudopods to *catch food/reproduce*.
 - Sporozoa are *motile/non motile*.
 - Sporozoa use spores to reproduce *sexually/asexually*.
- Choose the correct words.
 - Most/All* algae contain chlorophyll.
 - Algae *are/are not* in the plant kingdom.
 - Algae are *heterotrophic/autotrophic* organisms.
 - The colour of algae depends on their main type of *phytoplankton/pigment*.