

## UNIT 4. INVERTEBRATES

### 1. THE MAIN CHARACTERISTICS OF ANIMALS

Animals are heterotrophs, eukaryotic multicellular and their cells are organized in tissues and organs.

Animals are the most complex living organisms. They usually have organs and systems that highly developed and so they can perform their vital functions very efficiently. These vital functions are:

- Nutrition. They have organs that allow them to get large quantities of energy and nutrients.
- Interaction. They can move and interact with other living things. They have sense organs, a nervous system and structures like legs, tentacles, wings, etc.
- Reproduction. Animal reproduction can be asexual or sexual:
  - Asexual reproduction involves only one organism. It can be through budding or through fragmentation.
  - Sexual reproduction involves two different organisms; one produces female reproductive cells and the other, male reproductive cells.
- **Viviparous animals** develop the embryo inside the mother's body
- **Oviparous animals** lay eggs outside the body
- **Ovoviviparous animals** develop within eggs that remain inside the mother's body.

### 2. CLASSIFICATION OF ANIMALS

Animals are traditionally classified as belonging to one of two groups:

- **Vertebrates**, which have an internal skeleton with a backbone (fish, amphibians, reptiles, birds and mammals)
- **Invertebrates**, which do not have an internal skeleton (porifera, cnidaria, worms, molluscs, arthropods, echinoderms)

#### Activities

1. Why can animals perform vital functions so efficiently?
  
  
  
  
  
  
  
  
  
  
2. Which of the following statements are true and which are false

- a. Asexual reproduction happens through internal fertilization.
  - b. Budding is a kind of asexual reproduction.
  - c. In viviparous animals the embryo develops inside the mother's body.
  - d. In oviparous animals the eggs develops inside the mother's body.
3. What is the main difference between vertebrates and invertebrates?

### 3. THE SIMPLEST INVERTEBRATES

- The most common **invertebrates** are sponges, cnidarians, flatworms, nematodes, annelids, molluscs, echinoderms and arthropods.
- Sponges are aquatic animals. They act as filters and live fixed to rocks. Their bodies are covered in pores. Water goes through the pores, they capture food particles and distribute nutrients to all the cells.
- **Cnidarians** are aquatic invertebrates with only one opening or orifice. This opening acts as both a mouth and an anus and is surrounded by tentacles. There are two kinds of cnidarians: jellyfish and polyps. Jellyfish are free-swimming animals.
- **Platyhelminthes**, or flatworms, are the simplest animals with true organs. The majority are parasites and can cause serious illnesses. Planarians are free-living predatory flatworms that live in aquatic environments.

#### Activities

#### 4. True/false. The simplest invertebrates

Are the following sentences true or false?

1. Sponges are plants that live on rocks in the sea.
2. Sponges have cells with flagella, called choanocytes, to move around.
3. Most flatworms are parasites.
4. Planarians are free-living flatworms, or platyhelminthes.
5. Cnidarians are aquatic invertebrates.
6. Cnidarians have two openings: a mouth and an anus.

#### 4. NEMATODES, ANNELIDS AND MOLLUSCS

- **Nematodes** are thin, round, non-segmented worms. There are a large variety of free-living land nematode species, although they prefer wet environments.
- **Annelids** are worms with cylindrical, segmented bodies separated by internal partitions, similar to rings. Some have tiny hairs, which help them to move. Annelids include aquatic and terrestrial species. The most common annelids include **lugworms**, **earthworms** and **leeches**.
- **Molluscs** are animals with a soft body. Their body is protected by a shell. They have a muscular organ, a foot, which they use to move around. The most common molluscs include **gastropods**, **bivalves** and **cephalopods**.

#### Activities

##### 5. Complete. Nematodes and annelids

Complete the text with the missing words.

*wet – leeches – lugworms – worms – trichina – hairs*

Nematodes are thin, round . There are a large variety of free-living land nematode species, although they prefer  environments. Nematodes also include parasitic plant and animal species, such as  spiralis. Some annelids have tiny  that help them move. Annelids include aquatic and terrestrial species, which include , earthworms and .

#### 5. ECHINODERMS

- **Echinoderms** are animals that live at the bottom of the sea. They do not have a head. They have an external skeleton consisting of plates with spines. Echinoderms have an **ambulacral (or vascular) system** that allows them to move.
- Echinoderms include **sea urchins**, **starfish**, **ophiuroids**, **sea cucumbers** and **crinoids**.

#### Activities: 6

Decide if the following phrases describe echinoderms:

1. They are animals.
2. They are plants.
3. Most of them have bilateral symmetry.
4. Most of them have radial symmetry.
5. They reproduce asexually.

## 6. ARTHROPODS (I): CHARACTERISTICS

- **Arthropods** are the most numerous and diverse group of invertebrates. They have adapted to all kinds of environments. The body of an arthropod has three parts: the head, thorax and abdomen. Arthropods have a hard **exoskeleton** or external skeleton that covers their body.
- Arthropods include **arachnids, myriapods, crustaceans** and **insects**.

### Activities

#### 7. True /false. Arthropods

Are the following sentences about arthropods true or false?

1. They are terrestrial animals.
2. Their bodies have three parts.
3. They shed their exoskeletons once in their lifetime.
4. The exoskeleton is hard material that covers their bodies.
5. They are found in all types of environments.
6. They can all fly.

## 7. ARTHROPODS (II): ARACHNIDS, MYRIAPODS AND CRUSTACEANS

- **Crustaceans** are a very large group of arthropods. They are mostly marine creatures. Their body is divided into the cephalothorax and abdomen. Their exoskeleton is very hard due to an accumulation of calcium salts.
- Crustaceans are divided into two large groups:
  - **Lower crustaceans** are microscopic animals that live in water and form part of plankton.
  - **Higher crustaceans** are more complex and bigger, for example, **prawns, crayfish** and **crabs**.
- **Myriapods** have a rounded head and a trunk made up of many jointed segments. The most common myriapods are **centipedes** and **millipedes**.
- **Arachnid** bodies are divided into the cephalothorax and abdomen. They do not have antennae or mandibles. Arachnids also have a pair of pedipalps (similar to arms or feelers) and four pairs of legs. The most well-known arachnids are **spiders** and **scorpions**.

## Activities

### 7. Complete

Complete the text with the missing words.

*plankton – crabs – calcium – higher – antennae – chitin – Lower – dos – abdomen – abdomen – crayfish*

Crustaceans' bodies are divided into the cephalothorax and . Their exoskeleton, which also contains , is very hard due to an accumulation of  salts.

Crustaceans are divided into two large groups  crustaceans, which are microscopic animals that live in water and form part of , and  crustaceans, which are more complex and bigger in size. They can have elongated abdomens and ; for example, prawns and . Or they can have short abdomens and antennae; for example .

### 8. ARTHROPODS (III): INSECTS

- The bodies of **insects** are divided into the head, thorax and abdomen. Insects have a pair of antennae and mouthparts on their head. An insect's thorax has three pairs of legs that can carry out different functions. The majority of insects have two pairs of wings. Other insects, such as ants, have adapted to a new environment and lost their wings.
- Insects are the biggest group of arthropods. They live in all parts of the world except in the sea. Their success is due to:
  - Their **small size**. This means they can live in small spaces.
  - A **waterproof exoskeleton**. This allows them to live away from wet places.
  - The **capacity of flight**. This favours dispersion and colonisation of remote areas.

## Activities

### 8. True/false. Insects

Are the following sentences about insects true or false?

1. The mouthparts of insects have adapted so that they can live underwater.
2. Most insects have wings.
3. Insect mouthparts are adapted to the different types of food they eat.
4. The Arctic Circle is the only place on Earth where insects do not live.
5. All insects go through a process of metamorphosis as they grow.
6. Insects have six legs and two antennae.

