

# 1 Life

## In this chapter, you will find out:

- ◆ what makes living things (organisms) different from non-living things
- ◆ some of the ways in which organisms interact with their environment
- ◆ why organisms are given Latin names
- ◆ the special features of some of the main groups of organisms
- ◆ how to use a key to identify an unknown organism
- ◆ about food chains, food webs and trophic levels
- ◆ some examples of symbiosis, including parasitism, commensalism and mutualism
- ◆ how carbon and nitrogen are cycled between organisms and their environment.

## Living things

### 1.1 Biology is the study of life.

Biology is the study of living things, which are called **organisms**. Biology deals with how organisms function, how they react to each other and how the environment affects their lives. There are many different kinds of organisms, ranging from microscopic bacteria to large plants and complex animals.

### 1.2 All living things have certain characteristics.

Living organisms have several features or characteristics which make them different from objects that are not alive.

- 1 They **reproduce**.
- 2 They **feed**.
- 3 They **respire** – that is, they release energy from their food, often by combining it with oxygen.
- 4 They **grow**.
- 5 They **excrete** – that is, they get rid of substances which they do not want. These have been made by some of the chemical reactions going on inside them.

- 6 They **move**.
- 7 They are **sensitive** – that is, they can sense and respond to changes in their surroundings.
- 8 They are made of **cells**.

### 1.3 Organisms interact with their environment.

One very important way of studying living things is to study them where they live. Animals and plants do not live in complete isolation. They are affected by their surroundings, called their **environment**. Their environment is also affected by them. The study of the interaction between living organisms and their environment is a branch of biology called **ecology**.

### 1.4 Special terms are used in ecology.

Many special scientific words are used in ecology and other branches of biology and you need to be familiar with them. Throughout this book these words are printed in brown type.

In ecology, the place where an organism lives is called its **habitat**. The habitat of a fish might be a pond. There will probably be many fish in the pond, forming a **population** of fish. A population is a group of organisms of the same species, living in the same place at the same time and able to breed with one another.

But fish will not be the only organisms living in the pond. There will be many other kinds of animals and plants which together make up the pond **community**. A community is all the organisms, of all the different species, living in the same habitat. The living organisms in the pond, the water in it, the stones and the mud at the bottom, make up an **ecosystem**. An ecosystem consists of a community and its environment. Within an ecosystem, the living and non-living things are constantly interacting with one another.

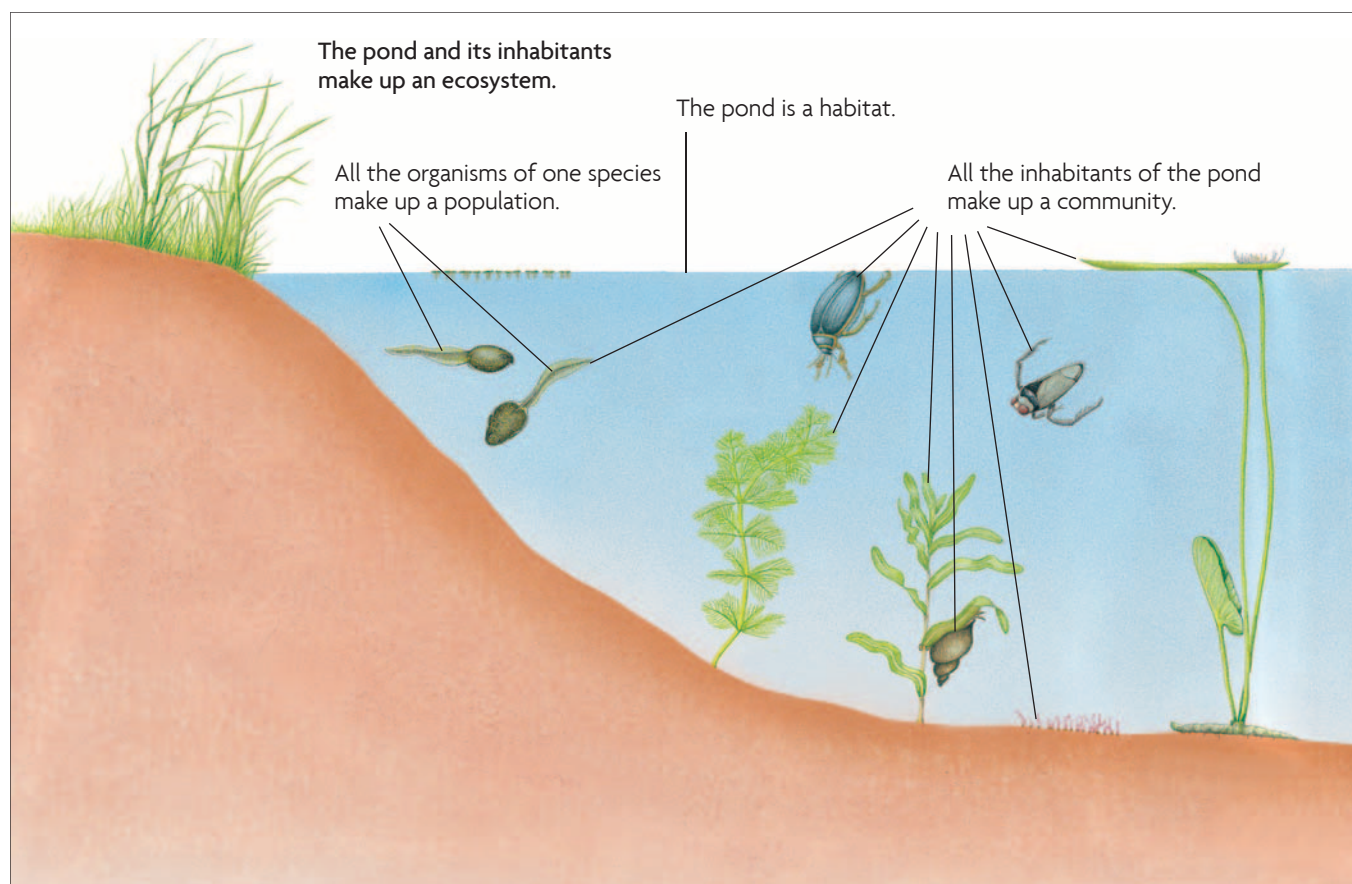
Within the ecosystem, each living organism has its own life to live and role to play. The way in which an organism lives its life – the way it fits into the ecosystem – is called

its **niche**. Fish, for example, eat algae or small animals in the pond, disturb pebbles and mud at the bottom of shallow areas in the pond, excrete ammonium salts into the water, breathe in oxygen from the water, and breathe out carbon dioxide. All these activities, and many others, help to describe the role, or niche, of fish in the ecosystem.

Figure 1.1 shows an example of a pond ecosystem.

### Questions

- 1.1 List the characteristics of living things.
- 1.2 What is ecology?
- 1.3 What is a population?
- 1.4 Give two examples of an ecosystem, other than a pond.
- 1.5 How does a niche differ from a habitat?



**Figure 1.1** A pond and its inhabitants – an example of an ecosystem.

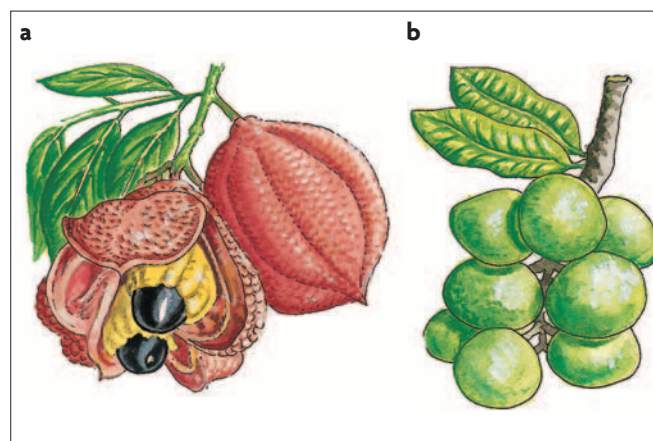
## Studying ecosystems

### 1.5 Different types of organisms have different names.

When you are studying an ecosystem, you will want to try to identify all of the different kinds of organisms that you find there. Each type of organism has its own name. Groups of similar organisms which are able to interbreed make up a **species**. Each species has its own scientific name which consists of two Latin words called the **generic name** and the **specific name**. Closely related species share the same generic name but have different specific names.

The scientific name for an organism is used by all scientists throughout the world. The scientific name for humans is *Homo sapiens*, that for English potatoes is *Solanum tuberosum* and that for egg plants is *Solanum melongena*. *Homo sapiens* means humans in all languages, whereas the common name for a man varies. In French it is 'homme', in Spanish 'hombre' and in St Lucian Creole 'mun'. Many other languages are written in a different kind of writing; these languages include the Asian languages spoken by more than one third of the world's population. The scientific name for humans in all these countries is the same two Latin words, *Homo sapiens*.

Much confusion is caused by the use of different common names for the same organism or the use of a single common name for more than one species. For example, Jamaicans use the name 'ackee' for the sweet fruit of *Blighia sapida* which is used as a vegetable, whereas Barbadians use the word 'ackee' for the sweet fruit of *Melicoccus bijugatus* (Figure 1.2). In other parts of the Caribbean *Melicoccus bijugatus* is known as 'chenette', 'chenip', 'genip', 'kinip', 'mapo', 'quenette' and 'skinip'. The consistent use of scientific names by biologists prevents any confusion. This does not mean that you have to know the scientific names of all the organisms you encounter. But you must be sure that the common names you use mean the same thing to all the people likely to read your work.

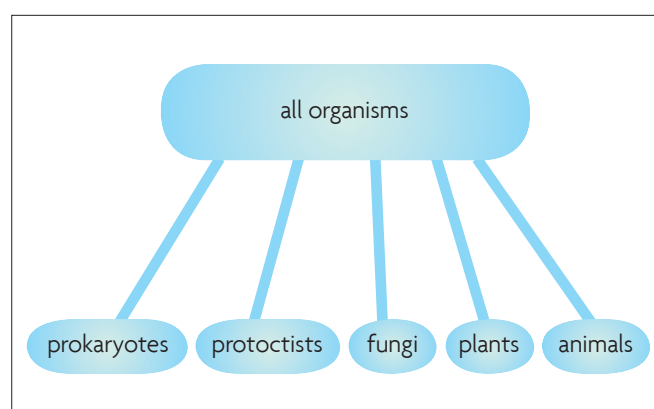


**Figure 1.2** Although their common names are the same, these two plants have completely different scientific names. **a** Jamaican ackee, *Blighia sapida*. **b** Barbadian ackee, *Melicoccus bijugatus*.

### 1.6 Organisms are classified into groups.

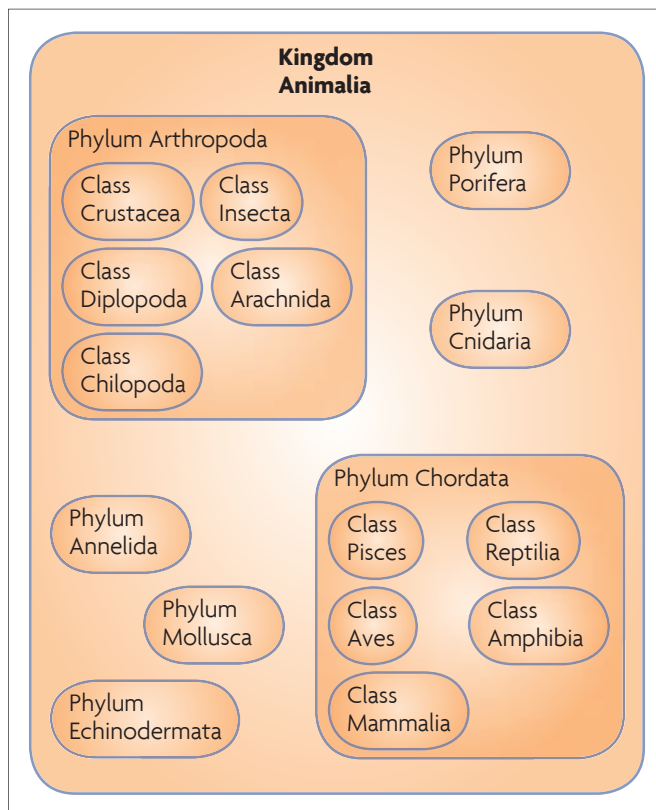
Different types of organisms can be identified – that is, given names – from their characteristics. You identify your classmates by subconsciously noticing their characteristics, such as height, weight, complexion, eye colour, hair style, and so on.

Biologists group organisms according to characteristics that they share. Figure 1.3 shows the main groups into which all organisms are placed. These are the five **kingdoms**. Within each kingdom, organisms are grouped into **phyla** (singular: phylum) and then **classes**. Figures 1.4 to 1.8 (pages 4–6) show some of the groups of animals that you may meet when you are studying an ecosystem.



**Figure 1.3** The main groups into which all organisms are placed.





**Figure 1.4** Classification of the animal kingdom.

**Phylum Echinodermata**  
 These are starfish, sea urchins and sand dollars. They are found in the sea.

Characteristics:

- five-part radial symmetry
- body wall contains calcareous particles
- many have a 'shell' with projecting spines.

sea urchin

starfish

**Figure 1.6** Classification of the echinoderms.

**Phylum Cnidaria**  
 These are the corals, jellyfish and sea anemones. They all live in water, because their soft bodies would dry out very quickly on land. They have a ring of tentacles surrounding a mouth. The mouth is the only opening in their digestive system – they have no anus.

Characteristics:

- body wall made of only two layers of cells
- ring of tentacles, with a mouth in the centre
- only one opening to gut.

tentacle, bearing sting cells which are used for catching prey

hollow body, whose wall is made of only two layers of cells

5 mm

coral polyps – they are joined to make a large colonial organism

**Figure 1.5** Classification of the cnidarians.

**Phylum Arthropoda**  
 Arthropods are animals with jointed legs, but no backbone. They are a very successful group, because they have a waterproof exoskeleton that has allowed them to live on dry land. There are more kinds of arthropod in the world than all the other kinds of animals put together.

Characteristics:

- several pairs of jointed legs
- exoskeleton.

**Class Crustacea**  
 These are the crabs, lobsters and woodlice. They breathe through gills, so most of them live in wet places and many are aquatic.

Characteristics:

- arthropods with more than four pairs of jointed legs
- not millipedes or centipedes
- breathe through gills.

exoskeleton containing calcium salts

eye

2 cm

claw

antenna

jointed leg

edible crab, *Cancer pagurus*

**Figure 1.7** Classification of the arthropods (continues on page 5).