1 Classification

This unit covers:

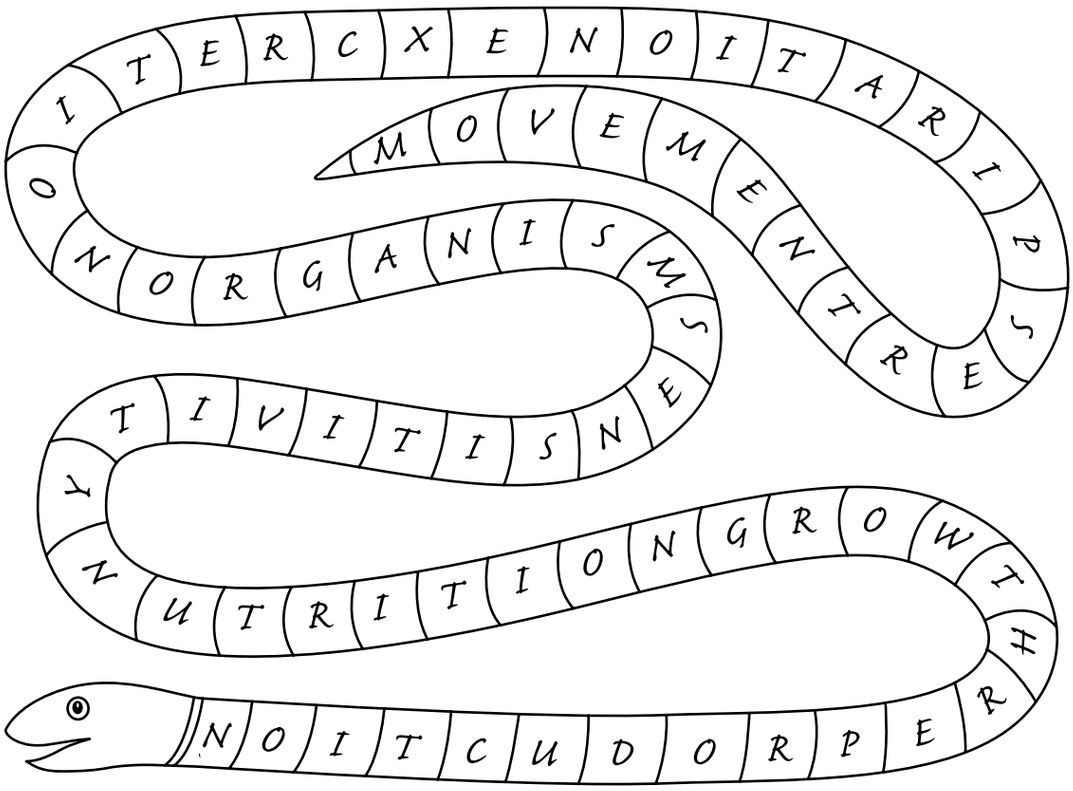
- ☐ the seven characteristics of living organisms
- ☐ using the binomial system of naming species

Exercise 1.1 Characteristics of living organisms

All living things share seven characteristics. Anything that does not have all seven characteristics is not alive. This exercise will help you recognise the words for the seven characteristics, and what each one means.

1 The names of the seven characteristics for living things are hidden in this wordsnake. The scientific term for a living thing is also in the wordsnake.

Draw lines between the words to separate them.



2 Now write each word you found after the correct definition.

a A living thing. .....

b The removal of waste products and other unwanted substances. .....

c The increase in size and dry mass of an organism. .....

d The changing of position or place by an organism. .....

e The consumption of nutrients in order to provide the raw materials for growth.

.....

f The production of offspring. .....

g The release of energy from nutrient molecules. .....

h The ability to detect and respond to a change in the environment. .....

Exercise 1.2 Unusual plurals

This exercise will help you recognise some unusual plural forms used in this area of biology.

If you read through any biology textbook, you will see that there are many words that can be written in **singular** or **plural** form. You use the singular form if you are talking about just one of something, and the plural if you are talking about more than one.

Often the plural form is just the singular form with the ending *-s*, for example:

Singular: Hair is a *characteristic* of all mammals.

Plural: Living organisms share seven *characteristics*.

Sometimes, the plural form is not so simple, it is *irregular.* For example:

Singular: A *bacterium* is a very primitive type of organism.

Plural: The *bacteria* belong to the kingdom of the prokaryotes.

It is important for you to be able to recognise and use irregular plurals.

Below, some irregular plural forms from this unit have been scrambled. Unscramble each example and insert it in the gap in the sentence provided. Then write down the singular form of the word.

Here is an example to help you:

HLYPA

The five phyla in the animal kingdom are: mammals, birds, fish, reptiles and amphibians.

Singular: phylum

1 RENGAE

The names of ..... always begin with a capital letter.

Singular: .....

2 IFNUG

Mushrooms and yeast are examples of .....

Singular: .....

3 PECSISE

Members of two different ..... usually cannot breed with each other.

Singular: .....

Exercise 1.3 Constructing a key – writing opposites

This is an important exercise that will enable you to form sentences when constructing a key.

If you don't know the name of an organism, or what group it belongs to, you can use a *key*. A key consists of pairs of definitions. When you choose the definition that matches your organism, you are led to the next choice. In the end, you get the name of your organism or the group it belongs to.

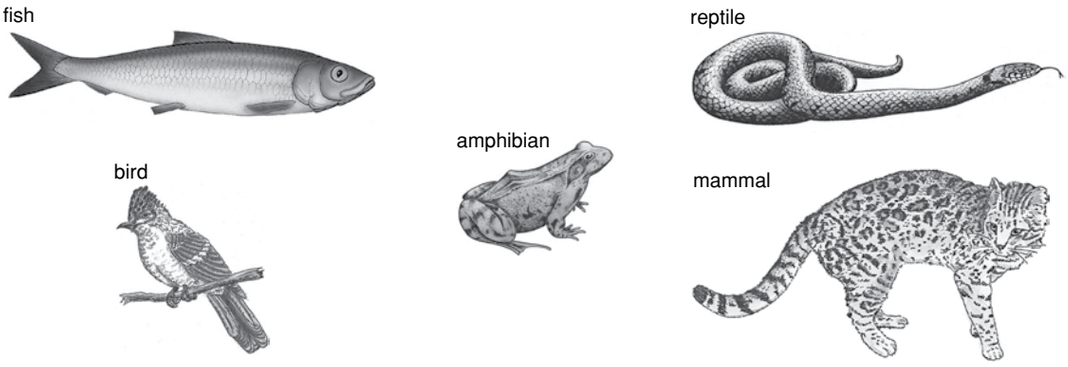
Writing keys is an important skill for biologists. You are expected to write sentences that mean *opposites* to allow the reader of the key to clearly identify whether a particular characteristic is present or not. For example:

The organism *has* eight legs.

The organism *does not have* eight legs.

The reader of the key can easily decide whether the organism has eight legs or not before moving on to the next option.

A key has been constructed below to help classify these organisms into their classes:



Complete the missing definitions to allow the reader to follow the key. The first example has been done for you.

Use the diagrams above to help you identify the missing classes.

I	The organism is homeothermic (warm-blooded).	Go to II
	The organism is not homeothermic.	Go to III
II	The organism feeds its young on milk.	**1** .....
	2	BIRD
III	**3**	AMPHIBIAN
	The organism does not have a moist, smooth skin.	Go to IV
IV	The organism has gills and fins.	**4** .....
	5	REPTILE

Exercise 1.4 Describing organisms

In this exercise you will learn about the characteristics of mammals. You will also practise the skill of extracting information from a text.

The different features of an organism help us to classify each of them into different groups. These features are the *characteristics* that allow us to do this.

For example, an animal with wings and feathers can be placed in the class 'birds', as it is easy to observe these features. There will be other characteristics that we can't see.

Read the text below, then answer the questions.

> Human beings (*Homo sapiens*) belong to the class Mammalia (mammals). Mammals can be recognised by visible characteristics, such as the presence of fur or hair. They feed their young from their mammary glands. If you look closely enough, you will see that mammals have different types of teeth, such as incisors and canines. We know that mammals have a placenta and a diaphragm, and that a mammalian heart has four chambers. Mammals have well-developed brains. They are able to adapt and survive in a wide range of different conditions. Mammals, like birds, are homeothermic and have to maintain a constant internal body temperature. Some mammals, such as cats, have whiskers that are sensitive to touch and vibrations.

1 Which genus do human beings belong to? .....

2 List **four** of the *observable* characteristics of mammals mentioned in the text.

.....

.....

3 List **four** characteristics of mammals we know are true but can't see when watching them in the wild. (Use your dictionary if some of these terms are new.)

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4 Which word from the text shows that mammals are warm-blooded? .....

5 How do you think a 'well-developed brain' enables mammals to adapt and survive?

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6 How do you think incisors and canines help a mammal such as a lion to survive?

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Exercise 1.5 Using prefixes to define words

This exercise will help you to use prefixes to determine what a word means. This will be useful to you in this unit, as well as in other areas of biology.

A lot of scientific terms are a combination of some of these parts: a **prefix**, a **root** and a **suffix**.

If we take a word from medicine like *hypoglycemia*, it looks like a difficult term. However, if we know the three parts of the term, we can understand the meaning. 'Glyco', the root, is sugar, 'emia', the suffix, is blood, and 'hypo', the prefix, means low or below. And so hypoglycemia means low blood sugar.

In the following exercise we will focus on common prefixes from biology. If you know the meaning of the prefix – the first part of a scientific term – this can help you understand what the whole word means and help you remember them in a logical way.

If we take *photosynthesis*, the prefix 'photo' means light. The word 'synthesis' means to combine things to form something new.

Photosynthesis is the process by which plants use light to make their own food.

Read the sentences below. Identify the prefixes in the words written in italics. Write down what you think each prefix means.

Here is an example to help you.

Bacteria are an example of *unicellular* organisms.

Prefix: uni-

Prefix meaning: one

1 I can use a *dichotomous* key to identify an organism.

Prefix: .....

Prefix meaning: .....

2 Arthropods are *invertebrates* that have an *exoskeleton*.

Prefix 1: ..... Prefix 2: .....

Prefix 1 meaning: ..... Prefix 2 meaning: .....

3 *Monocotyledonous* plants are usually known as monocots.

Prefix: .....

Prefix meaning: .....

4 A plant cell contains many *chloroplasts* to absorb light energy.

Prefix: .....

Prefix meaning: .....

Exercise 1.6 Kingdom to species – using the key words in context

It is sometimes easy to recall the different levels of organisation from kingdom to species. It is much more challenging to use these words in your own writing. This exercise will help you to remember the order of the classification groups and give you practice at using the terms in a report.

1 Below is a description of an organism. Complete the text using the terms below:

backbone	**binomial**	***Bos***	**family**	**kingdom**
Mammalia	**order**	**phylum**	**plants**	**species**

A cow is commonly known as 'cattle' and is a member of the ..... *Bos primigenius*. From this ..... name we can say that the cow must be grouped in the genus ..... .

Like many members of the Bovidae ..... , the cow is herbivorous and only eats ..... .

The next group that the cow belongs to is Artiodactyla – this is the ..... , and includes many other similar families.

The cow belongs to the class ..... because it has hair, suckles its young and is homeothermic (maintains a constant internal body temperature).

This animal has a ..... , which places them in the ..... Chordata.

Finally, the cow is an important member of the Animalia .....

2 Now it is your turn to produce a description of an organism. You can use the text about the cow above to help you. Choose an organism that interests you and research the information you need in books or on the internet.

Include the following information in your description:

- The names of each group that your organism fits into. For example, the lion belongs to the family *Felidae*.
- At least three observable characteristics of your chosen organism that explain why it belongs to a particular group, and three that we can't observe while the organism is alive.

Use the space below to complete your answer:

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