

2 What can be used to classify organisms?

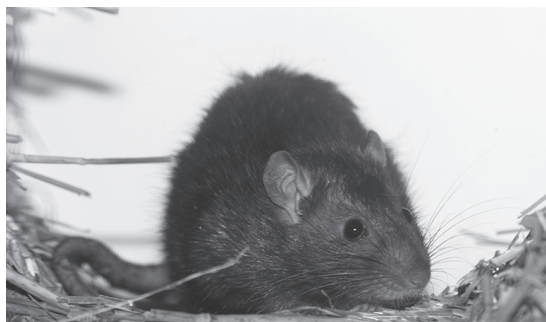
- A the number of bases in DNA
- B the number of different types of bases in DNA
- C the sequence of bases in DNA
- D the sequence of bases in one protein

1 The photographs show two different rats.

Rattus norvegicus



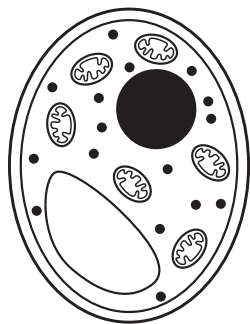
Rattus rattus



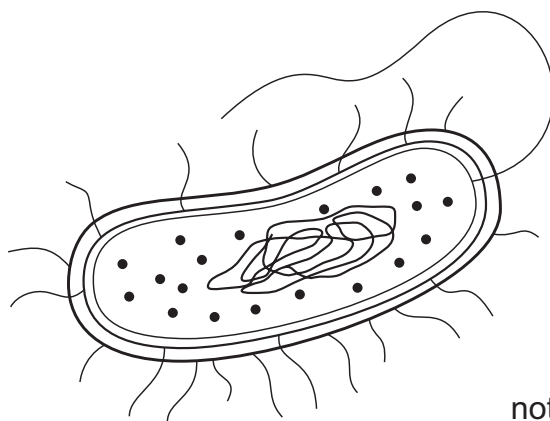
Which statement about the rats is correct?

- A The rats belong to the same genus.
- B The rats belong to the same species.
- C The rats can breed together to produce fertile offspring.
- D The rats do **not** share any of the same features.

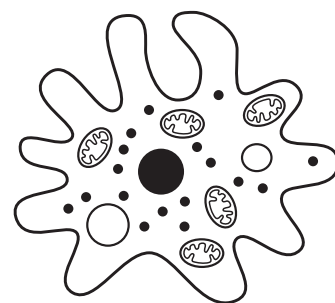
2 The diagrams show cells of organisms from three different kingdoms.



1



2



3

not to scale

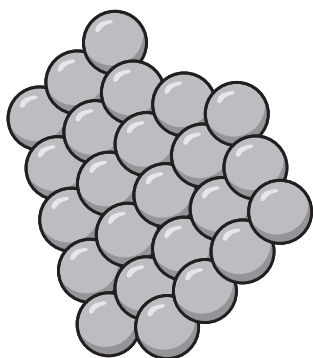
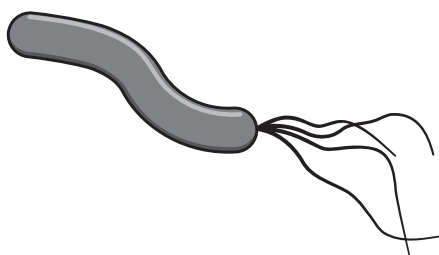
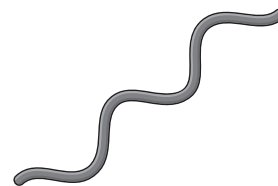
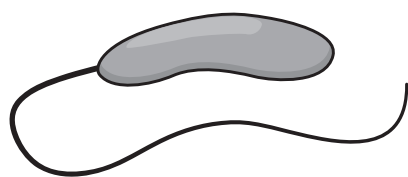
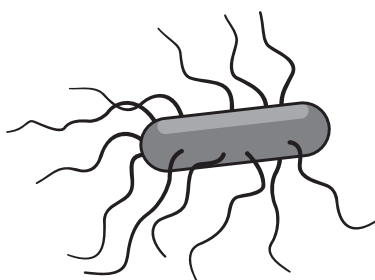
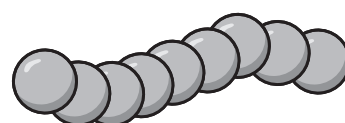
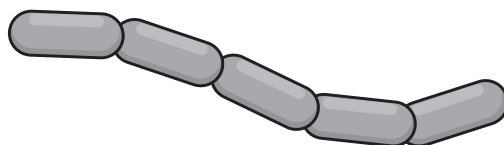
Which row shows the kingdoms for the organism cells labelled 1, 2 and 3?

	cell 1	cell 2	cell 3
A	fungus	protocist	prokaryote
B	fungus	prokaryote	protocist
C	prokaryote	fungus	protocist
D	prokaryote	protocist	fungus

2 What are the two parts of the scientific name of an organism?

- A** genus followed by kingdom
- B** genus followed by species
- C** kingdom followed by genus
- D** kingdom followed by species

1 (a) Fig. 1.1 shows drawings of seven species of bacteria.

**A****B****C****D****E****F****G**

not to scale

Fig. 1.1

Use the key to identify each species of bacteria in Fig. 1.1.

Write the letter of each species (**A** to **G**) in the correct box beside the key.

One has been done for you.

key

1	(a)	hair-like structure or structures visible	go to 2	
	(b)	no hair-like structures visible	go to 4	
2	(a)	more than one hair-like structure	go to 3	
	(b)	one hair-like structure only	<i>Vibrio cholerae</i>	
3	(a)	hair-like structures attached at one end only	<i>Helicobacter pylori</i>	
	(b)	hair-like structures attached all over	<i>Salmonella typhi</i>	
4	(a)	bacteria have a spiral shape	<i>Treponema pallidum</i>	
	(b)	bacteria do not have a spiral shape	go to 5	
5	(a)	bacteria are grouped to form a chain	go to 6	
	(b)	bacteria do not form a chain	<i>Staphylococcus aureus</i>	
6	(a)	bacteria in the chain are cylindrical in shape	<i>Streptobacillus moniliformis</i>	
	(b)	bacteria in the chain are circular in shape	<i>Streptococcus pyogenes</i>	F

[3]

(b) (i) A cylinder-shaped bacterium has a length of $2\mu\text{m}$ and a diameter of $0.5\mu\text{m}$.

Calculate:

- the radius of this bacterium
- the volume of this bacterium.

Include the units in your answers.

Space for working.

radius

volume

[4]

(ii) State the name of the kingdom that bacteria belong to.

..... [1]

(c) Fig. 1.2 is a diagram of a virus.

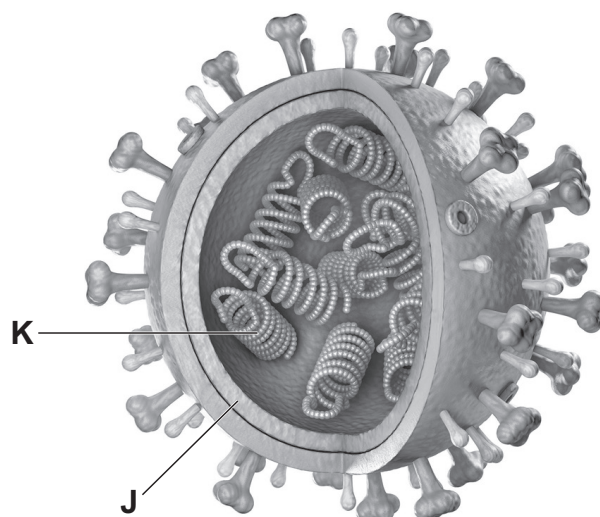


Fig. 1.2

(i) State the name of the parts labelled **J** and **K** in Fig. 1.2.

J

K

[2]

(ii) State **two** structures present in bacteria that are absent in viruses.

1

2

[2]

[Total:12]

1 Scientists use classification systems to study relationships between different groups of organisms.

(a) State the **two** parts of a scientific name used in the binomial system.

..... [1]

(b) Scientists discover a new species. It is multicellular, and has cell walls that are **not** made of cellulose. This new species feeds by releasing digestive enzymes into its surroundings and then absorbing the digested nutrients.

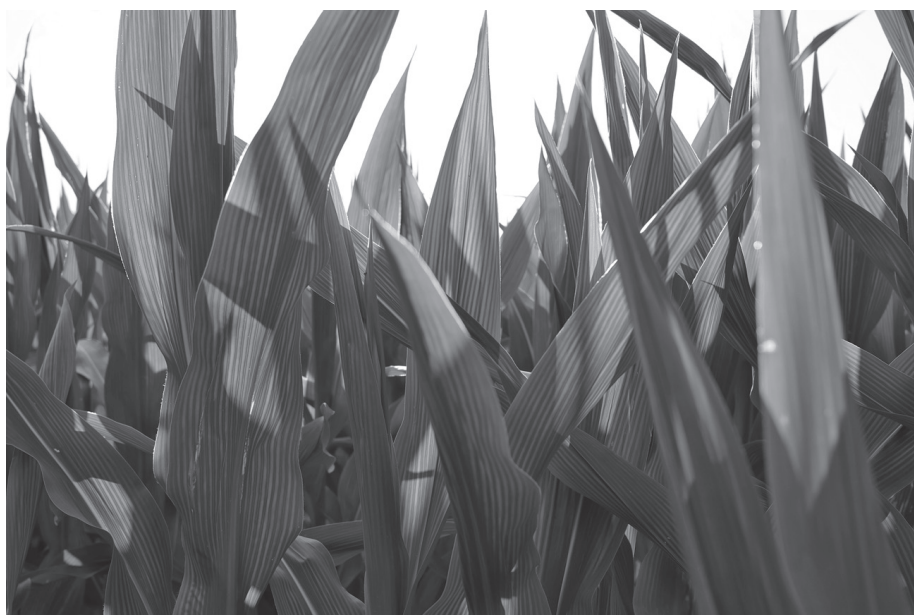
Identify the kingdom that the new species belongs to.

..... [1]

(c) Fig. 1.1 shows photographs of two different species, **X** and **Y**.



species **X**



species **Y**

(i) Species **X** and **Y** belong to the plant kingdom.

State **two** structures found in cells from species **X** and **Y** that are **not** found in animal cells.

- 1
- 2 [2]

(ii) Using features visible in Fig. 1.1, identify the group in the plant kingdom that species **X** and **Y** belong to.

Explain your answer.

- species **X**
-
-
-
- species **Y**.....
-
-
-
- [4]

(iii) Understanding evolutionary relationships between crop plants can help scientists and farmers improve agriculture.

Explain how a scientist could determine if different crop plant species share a recent ancestor (are closely related).

-
-
-
-
- [2]

[Total: 10]

2 Part of the base sequence of DNA from four species was determined.

species 1 T C A G G A T T

species 2 T G A G C A A T

species 3 T G A G C A A G

species 4 T G A G G A T T

Which two species are the **least** closely related?

- A** 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

- 5 (a) Organisms can be classified by their features and by studying the sequence of bases in their DNA.

Fig. 5.1 is a diagram showing the evolutionary relationships between some different groups of organisms.

Each branch shows the point at which organisms developed new features that classify them as a new group.

The point where the branch starts also indicates a common ancestor shared by the new groups.

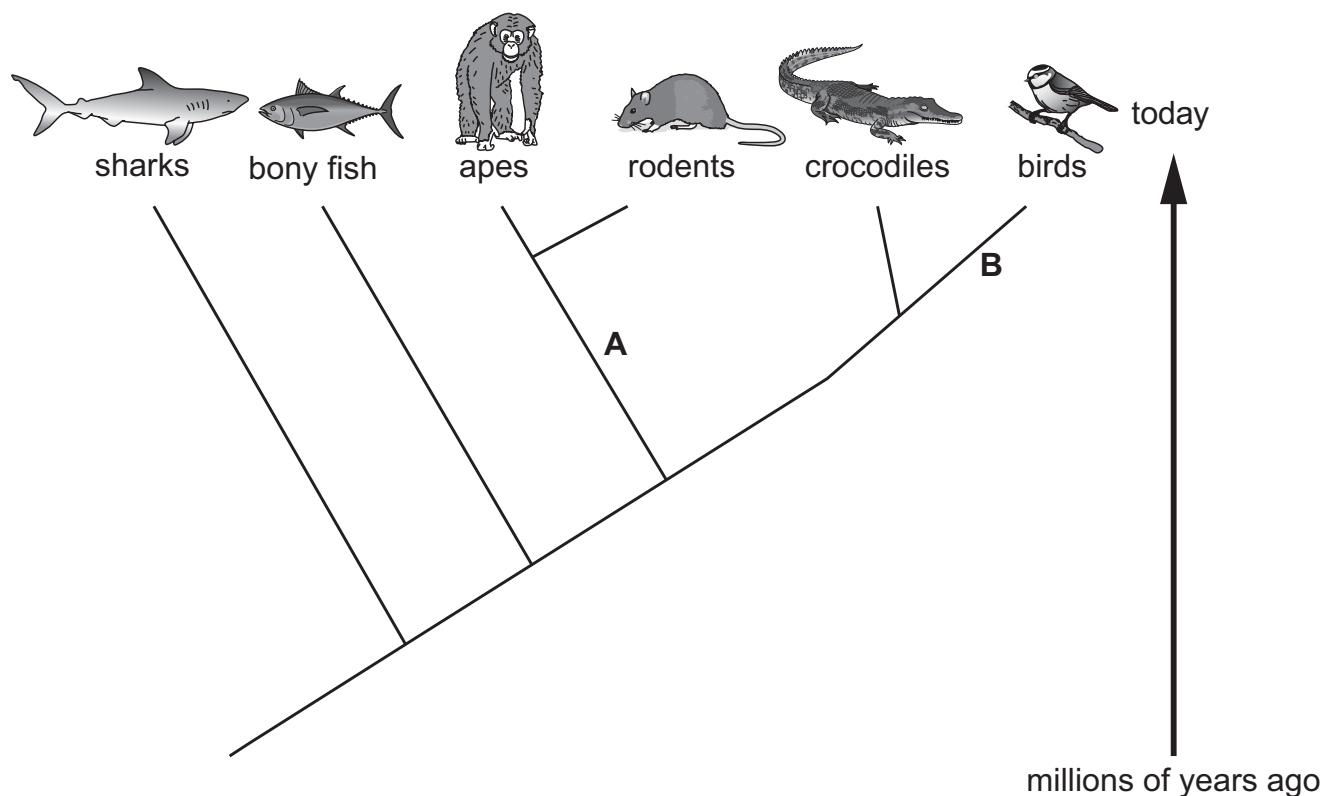


Fig. 5.1

- (i) Suggest which visible features have developed at **A** and **B** in Fig. 5.1.

A

B

[2]

- (ii) Identify the names of the **two** groups that share the most recent common ancestor in Fig. 5.1.

..... and [1]

- (iii) Suggest the groups with the most similar and least similar DNA base sequences to crocodiles in Fig. 5.1.

most similar

least similar

(b) Describe the structure of a DNA molecule.

[4]

(c) Outline how the base sequences in DNA control cell function.

[3]

[Total: 12]

- 1 The relationships of four species of bacteria, P, Q, R and S, were compared.
- Species P and Q have a more recent common ancestor than either species has with species R.

• Species S developed recently from species P.

Which species has the **least** similar base sequences in their DNA compared to the other three species of bacteria?

A P

B Q

C R

D S