

4 When bacteria are spread onto agar in a Petri dish they form colonies. Each colony forms from one bacterium. Fig. 4.1 shows an investigation into antibiotic resistance in a species of bacterium that causes disease.

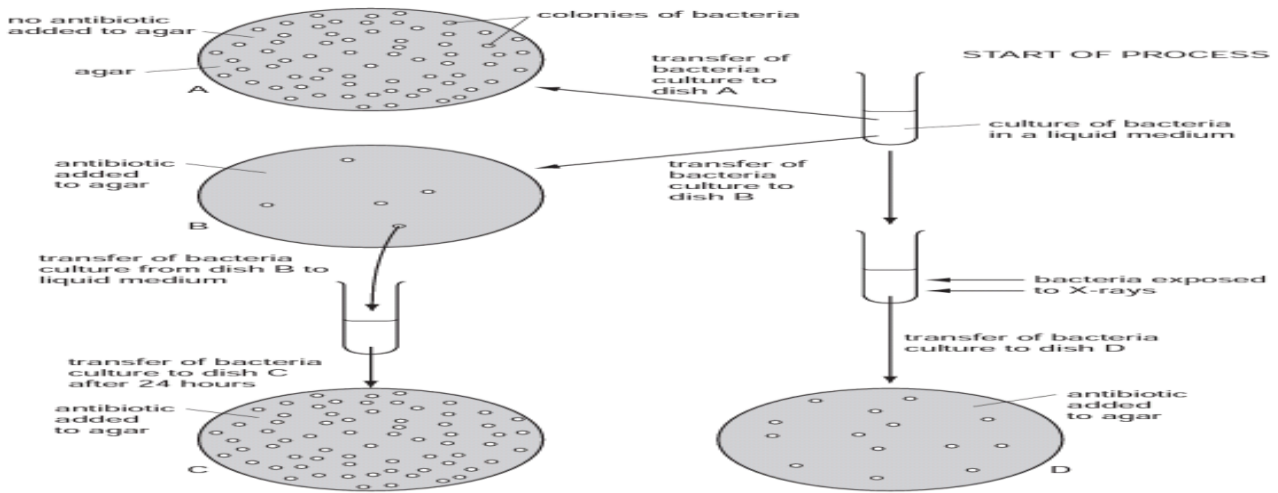


Fig. 4.1

(a) Explain what is meant by the term *antibiotic*.

.....

 [2]

(b) Explain why

(i) only a few bacteria grew in dish B compared with dish A.

..... [1]

(ii) more bacteria grew in C than in B.

..... [1]

(c) Fig. 4.1 shows the effect of an antibiotic on a species of disease-causing bacterium. Suggest why antibiotics should not be used too often.

.....
 [2]

(d) Explain the possible effect of the X-rays on the bacteria.

.....
 [3]

(e) State two ways in which the **structure** of a bacterium differs from the **structure** of a virus.

1. [2]
2. [2]

(f) Human Immunodeficiency Virus (HIV) infects cells of the immune system.

Describe the effects of HIV on the immune system.

.....
 [4]

2 (a) Annelids and nematodes are both worm-like animals.

State two features that distinguish annelids from nematodes.

1. [2]
2. [2]

(b) Fungi are a difficult group to classify because they have features found in both animals and plants.

State one 'animal feature' and one 'plant feature' that fungi possess.

'animal feature'

 'plant feature' [2]

(c) (i) Draw a large, labelled diagram to show **two** features present in most viruses.

[3]

(ii) Outline how the human immunodeficiency virus (HIV) affects the immune system.

.....
.....
.....

[3]

1 The fungus, *Trichophyton violaceum*, reproduces asexually by releasing spores.

A single spore was placed in the centre of a Petri dish containing an agar medium with starch and protein.

Fig. 1.1 shows the fungus that grew from the spore.

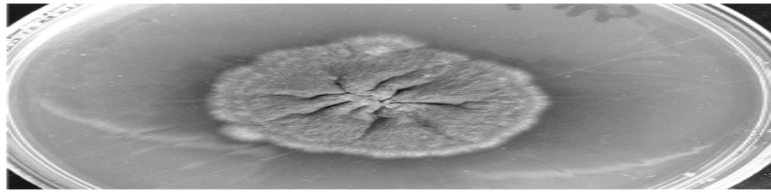


Fig. 1.1

(a) State the name given to

(i) the body of the fungus that grows from a single spore

[1]

(ii) the thin threads that make up the body of the fungus.

[1]

(b) Describe how a fungus, such as *T. violaceum*, obtains nutrients from the agar medium.

.....
.....
.....
.....
.....
.....

[4]

Streptomyces, a soil bacterium, is a major source of antibiotics that are produced by pharmaceutical companies. An antibiotic sensitivity test can be carried out to help doctors decide which antibiotic should be used to treat a specific disease, such as gonorrhoea.

Gonorrhoea bacteria isolated from a person are grown on an agar medium. A ring with eight different antibiotics (1 to 8) is placed on the agar medium and left for 24 hours at 35°C.

Fig. 1.2 shows the growth of bacteria on the agar medium after 24 hours.

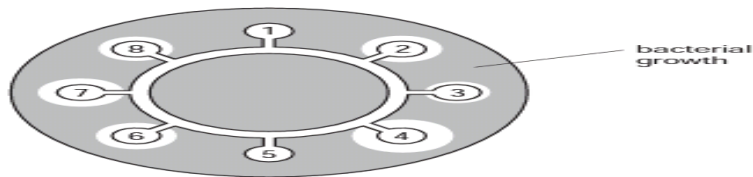


Fig. 1.2

(c) (i) Suggest why there is a clear area around some of the antibiotics.

.....
.....
.....

[2]

(ii) Explain why antibiotics 1 and 5 would **not** be chosen to treat the gonorrhoea infection.

.....
.....
.....

[2]

(iii) People who take antibiotics should always be told to complete the treatment rather than stop taking the antibiotics when they feel better.

Suggest why people are given this advice.

.....
.....
.....

[2]

1 Fig. 1.1 shows a diagram of a bacterial cell.

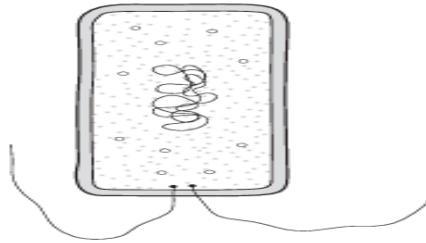


Fig. 1.1

(a) (i) State four structural features, present in a photosynthesising plant cell, that make it different from the bacterial cell in Fig. 1.1.

1.
2.
3.
4. [4]

(ii) State two structural features present in both the bacterial cell in Fig 1.1 and in an animal cell, such as a liver cell.

1.
2. [2]

(b) Bacteria are examples of microorganisms.

State two different types of food manufactured using microorganisms.

1.
2. [2]

(c) Many bacterial diseases can no longer be treated with antibiotics. Outline how antibiotic-resistant strains of bacteria can develop.

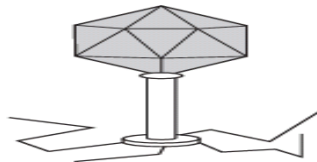
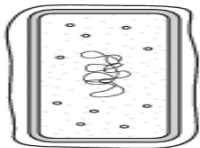
.....

 [3]

(d) Explain why bacteria, in particular, are very useful organisms in the process of genetic engineering.

.....
 [2]

1 Fig. 1.1 shows a bacterium, a virus and a fungus.



not to scale

Fig. 1.1

(a) Complete the table to compare the three organisms shown in Fig. 1.1 by using a tick (✓) to indicate if the organism shows the feature, or a cross (X) if it does not. The first row has been completed for you.

feature	bacterium	virus	fungus
produces spores	X	X	✓
hyphae			
capsule			
nucleus			

[3]

(b) Explain how the fungus shown in Fig. 1.1 is adapted to obtain its food.

.....

 [3]

(c) Explain how the fungus spreads to new sources of food.

.....
 [2]

5 Fig. 5.1 is a diagram of the human immunodeficiency virus (HIV).

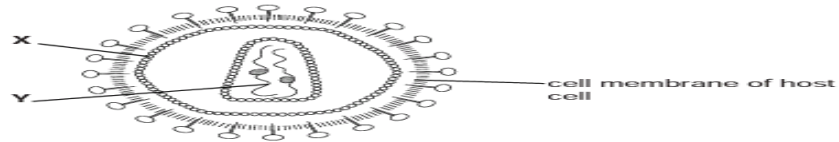


Fig. 5.1

- (a) (i) Name the parts of the virus labelled X and Y.
 X [2]
 Y
- (ii) State three ways in which the **structure** of bacteria differs from the structure of viruses.
 1 [3]
 2
 3
- (i) Summarise the changes between 1990 and 2009 in the number of people living with HIV and the number of people newly infected with HIV.
 number of people living with HIV [4]

 number of people newly infected with HIV

 [4]
- (ii) Suggest why in 2010 the number of people living with HIV increased but the number of newly infected people decreased.
 [2]

 [2]
- (iii) Describe **three** ways in which HIV is transmitted from infected to uninfected people.
 1 [3]
 2
 3
- (iv) Describe the effects of HIV on the immune system.
 [3]

 [3]

2 Antibiotics are used to treat human diseases.

Many bacteria have become resistant to antibiotics. Some antibiotics can no longer be used to treat certain diseases.

Samples of bacteria were taken from a person who had an infectious disease. They were spread onto four Petri dishes of agar (agar plates). Three of these agar plates contained the antibiotics 1, 2 or 3.

The results are shown in Fig. 2.1.

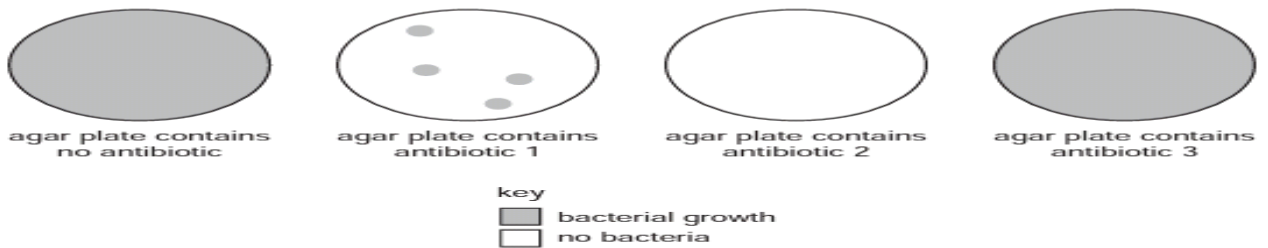


Fig. 2.1

- (a) Explain why:
- (i) no bacteria grew in the agar plate with antibiotic 2;
 [1]

- (ii) bacteria grew in the agar plate with antibiotic 3;
 [1]

 [1]

2 Antibiotics are used to treat human diseases.

Many bacteria have become resistant to antibiotics. Some antibiotics can no longer be used to treat certain diseases.

Samples of bacteria were taken from a person who had an infectious disease. They were spread onto four Petri dishes of agar (agar plates). Three of these agar plates contained the antibiotics **1**, **2** or **3**.

The results are shown in Fig. 2.1.

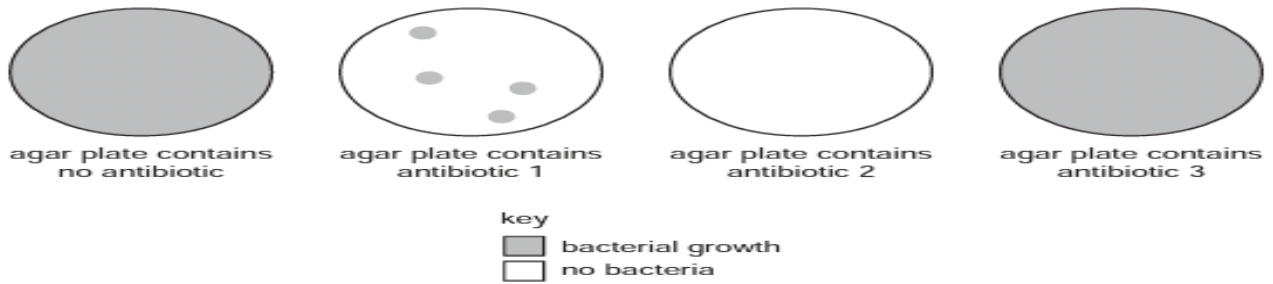


Fig. 2.1

(a) Explain why:

(i) no bacteria grew in the agar plate with antibiotic **2**;

.....
..... [1]

(ii) bacteria grew in the agar plate with antibiotic **3**;

.....
..... [1]

(iii) only a small number of bacteria grew with antibiotic **1**.

.....
.....
.....
..... [2]

(b) Explain why it is important to carry out a test similar to that shown in Fig. 2.1 before giving an antibiotic to a person infected with a bacterial disease.

.....
.....
.....
..... [2]

(c) Antibiotic resistance has become a major problem worldwide.

Suggest how the problem of antibiotic resistance can be limited.

.....
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.....
..... [4]

2 A human tooth was suspended in hydrochloric acid and left for 24 hours, as shown in Fig. 2.1. When the tooth was removed and washed, the lower part, to which the cotton was attached, was no longer hard, but soft and rubbery. After replacing the tooth in the acid for another 24 hours, the rest of the tooth was also soft.

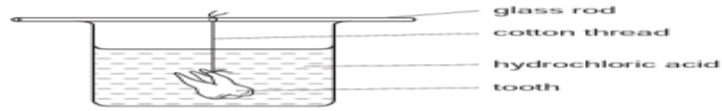


Fig. 2.1

- (a) (i) Name the part of the tooth to which the cotton was attached. [1]
- (ii) Name the type of human tooth used in this experiment. State two reasons for your answer.
 Type of tooth
 Reason 1
 Reason 2 [3]
- (iii) With reference to tooth structure, suggest and explain why the lower part of the tooth became soft before the upper part.

 [3]

Fig. 2.2 shows a tube of 'White Teeth' toothpaste.



Fig. 2.2

- (b) State and explain two reasons why regular brushing with this toothpaste would help to protect teeth from decay.
 1
 2 [4]
- (c) Brushing is not the only way of protecting teeth from decay. State two other ways of maintaining healthy teeth.
 1
 2 [2]

(b) Fig. 4.2 shows the total cross-sectional area of the blood vessels in the systemic circulation. It also shows the changes that occur in blood pressure and the speed (velocity) of blood in the different blood vessels.

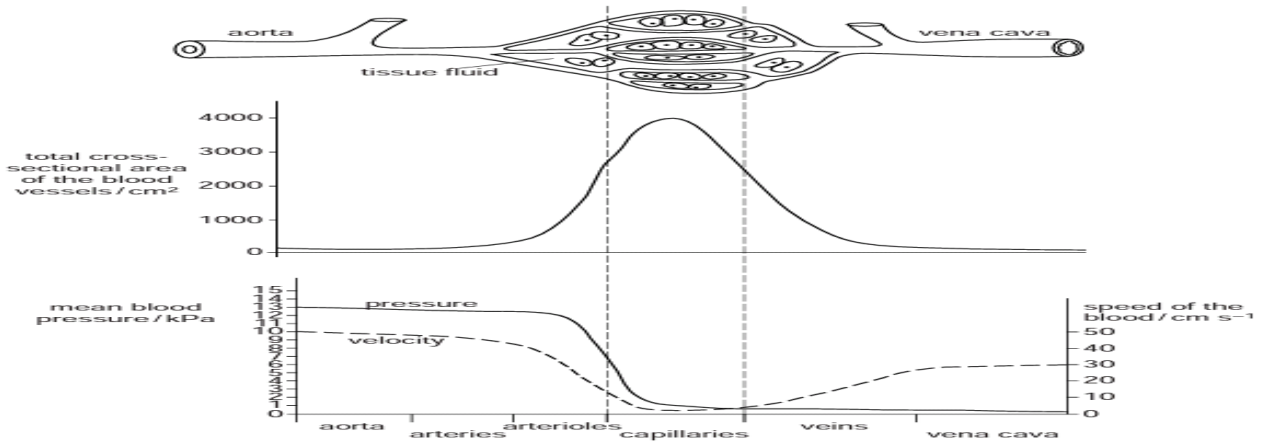


Fig. 4.2

- (ii) Describe how mean blood pressure and speed of blood change with cross-sectional area of blood vessels, as shown in Fig. 4.2.
 blood pressure

 speed of blood
 [3]
- (c) Describe how substances move from the blood in the capillaries into the tissue fluid.

 [3]
- (d) Blood flows from arteries into arterioles before entering capillaries. Explain the role of the arterioles in the skin when a person is very cold.

 [3]