

# BACTERIA VIRUS AND FUNGI

## 1

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

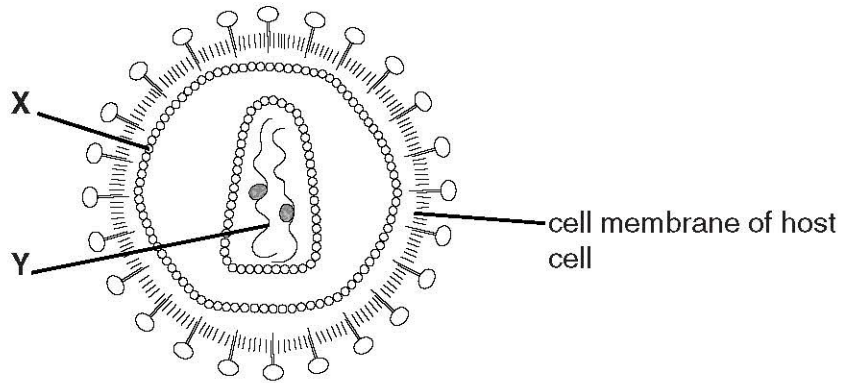


Fig. 5.1

(a) (i) Name the parts of the virus labelled **X** and **Y**.

**X** .....

**Y** ..... [2]

5(a)(ii) State three ways in which the **structure** of bacteria differs from the structure of viruses.

1 .....

2 .....

3 ..... [3]

-----Marking Scheme-----

<b>(a) (i)</b>	<b>X</b> – protein (coat / AW) / capsid / capsomere(s); <b>Y</b> – genetic material / nucleic acid / RNA;	<b>2</b>	<b>A</b> DNA / gene(s) <b>R</b> nuclear material / chromosome
<b>(ii)</b>	cell wall; cell membrane; cytoplasm; loop of DNA; (slime) capsule; flagellum / flagella; plasmids; ribosome(s); AVP;	<b>max 3</b>	<b>R</b> cellulose cell wall <b>I</b> size / complexity / shape  e.g. pili

**Expert solutions:**

1(a) The features of the virus labelled X is Protein and Y is genetic material

**Note:**

1) Accepted feature is DNA/gene

2) Rejected answer is: Nuclear material/Chromosome

1(b) The three ways in which the structure of bacteria differs from the virus are:

-> Cell wall

-> Cell membrane

-> Loop of DNA

**Note:**

Also accepted simple capsule/flagellum/plasmids/ribosomes

Rejected vocab: Cellulose cell wall

Ignored answers: Size/shape/complexity of the capsule

2 Fig is an electron micrograph showing the bacteria, *Vibrio cholerae*.



**Fig.**

Suggest the function of the flagellum in bacteria.

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.....

.....

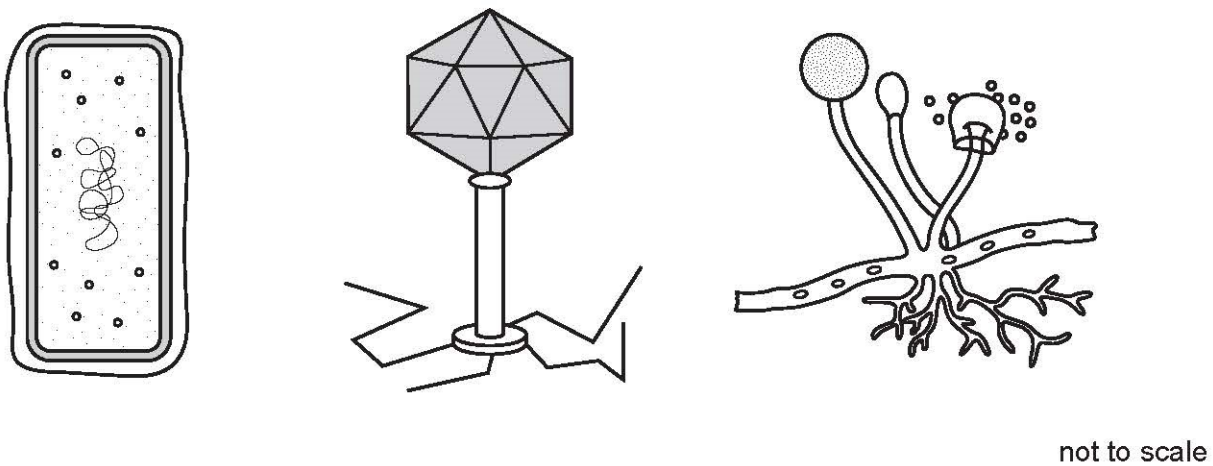
[1]

MARKING SCHEME:

(ii)	swim / movement / AW ;	[1]	
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**Expert solution: The function of the flagellum in bacteria is to help it to swim[ or for movement]**

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



**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.

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.....

.....

.....

.....

.....

.....

[3]

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

.....

.....

.....

..... [2]

-----Marking Scheme-----

(a)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">feature</th> <th style="width: 15%;">bacterium</th> <th style="width: 15%;">virus</th> <th style="width: 15%;">fungus</th> </tr> </thead> <tbody> <tr> <td>produces spores</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>hyphae</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>capsule</td> <td style="text-align: center;">✓</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✗</td> </tr> <tr> <td>nucleus</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✗</td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>	feature	bacterium	virus	fungus	produces spores	✓	✗	✓	hyphae	✗	✗	✓	capsule	✓	✗	✗	nucleus	✗	✗	✓	<p>one mark per row                      treat blank spaces and crossed ticks as crosses – if ticks and crosses and blanks in the same row, treat as incorrect                      allow 'yes' and 'no' for ticks and crosses</p> <p style="text-align: right;">[3]</p>
feature	bacterium	virus	fungus																			
produces spores	✓	✗	✓																			
hyphae	✗	✗	✓																			
capsule	✓	✗	✗																			
nucleus	✗	✗	✓																			
(b)	<p><i>treat independently</i></p> <ol style="list-style-type: none"> <li>1 (feeding) <u>hypha(e)</u>; <b>R</b> roots <b>ignore</b> mycelium</li> <li>2 branched / branching ;</li> <li>3 has a large surface (area) ;</li> <li>4 grow, over / through / on / into, (named) food / substrate ;</li> <li>5 produce / release, enzymes ;</li> <li>6 external / extracellular / described, digestion ;</li> <li>7 absorb, food / nutrients / products / glucose / AW ;</li> </ol> <p style="text-align: right;">[3 max]</p>	<p><i>fungus may be saprotrophic or parasitic</i>  <b>ignore</b> 'roots' when awarding points 2 to 7</p> <p><i>MP3 refers to fungus not food</i>  <b>A</b> 'spread across' food, <b>A</b> substrate for food  <b>R</b> excrete enzymes  <b>R</b> digestion unqualified, <b>A</b> external implied  <b>R</b> obtain <b>A</b> absorbed even if no digestion</p>																				
(c)	<ol style="list-style-type: none"> <li>1 spores ;</li> <li>2 carried in the, wind / air / atmosphere ;  <b>A</b> sporangium / 'sack' / AW, bursts / opens</li> <li>3 grow, longer / more, (feeding) hyphae / mycelium spreads</li> </ol> <p style="text-align: right;">[2 max]</p>	<p><b>A</b> blown / floats – as suggests in the air</p> <p><b>A</b> new mycelium forms / mycelium increases in size  <i>ecf for roots from (b)</i></p>																				
<b>Total: 81</b>																						

**Expert solution:**

(a) Table has already been given in the markscheme, so it has not been done again.

(b) The fungus has a feeding hyphae that are branching and thus have a large surface area. They grow over the food substrate and release enzymes. This kind of digestion is extracellular. The nutrients are then absorbed by the fungus.

**Note:**

1) Any reference to excretion of enzymes or simply 'using digestion' and 'just stating that nutrients are absorbed from the substrate without telling you how they are digested' ; all stands rejected.

3) Similarly accepted are 'The roots grow over the food substrate

(c) The fungal spores are carried by the wind and they grow and this is how the mycelium spreads.

**Note:** Also accepted is spores are blown in the air and a new mycelium forms

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

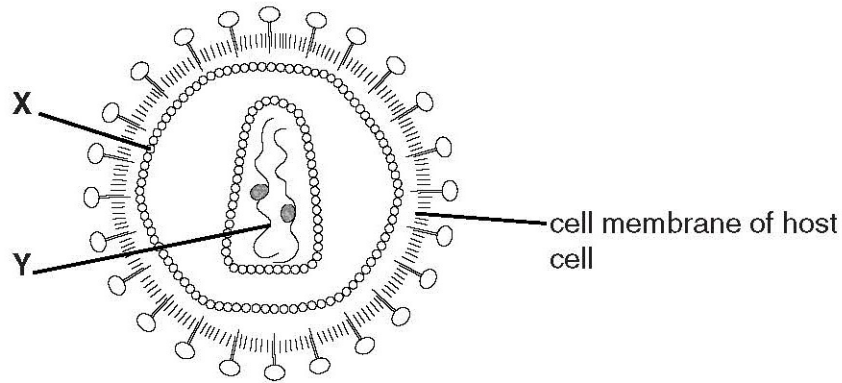


Fig. 5.1

(a) (i) Name the parts of the virus labelled X and Y.

X .....

Y .....[2]

(ii) State three ways in which the **structure** of bacteria differs from the structure of viruses.

1 .....

2 .....

3 .....[3]



-----Marking Scheme-----

(a) (i)	<b>X</b> – protein (coat/AW)/capsid/capsomere(s); <b>Y</b> – genetic material / nucleic acid / RNA;	<b>2</b>	<b>A</b> DNA / gene(s) <b>R</b> nuclear material / chromosome
(ii)	cell wall; cell membrane; cytoplasm; loop of DNA; (slime) capsule; flagellum / flagella; plasmids; ribosome(s); AVP;	<b>max 3</b>	<b>R</b> cellulose cell wall  <b>I</b> size / complexity / shape  e.g. pili

**Expert solutions:**

1(a) The features of the virus labelled X is Protein and Y is genetic material

**Note:**

1) Accepted feature is DNA/gene

2) Rejected answer is: Nuclear material/Chromosome

1(b) The three ways in which the structure of bacteria differs from that of a virus are:

- > Cell wall
- > Cell membrane
- > Loop of DNA

**Note:**

Also accepted simple capsule/flagellum/plasmids/ribosomes

Rejected vocab: Cellulose cell wall

Ignored answers: Size/shape/complexity of the capsule

5

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

1. ....

2. .... [2]

-----Marking Scheme-----

assume answer is about bacteria unless told otherwise, accept ora / AVP for viruses e.g. capsid  bacteria have cells ; cell wall ; cell membrane ; cytoplasm ; ribosome(s) ; flagellum ; capsule ; AVP ;	[max 2]	<b>R</b> nucleus in bacteria IGNORE composition of cell wall
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**Expert solution:**

The difference between the structure of a bacterium and a virus is that bacteria have cells and a cell wall

**Note: Also accepted are: Presence of cytoplasm/ribosome/flagellum/capsule**

6

Fig. 1.1 shows a diagram of a bacterial cell.

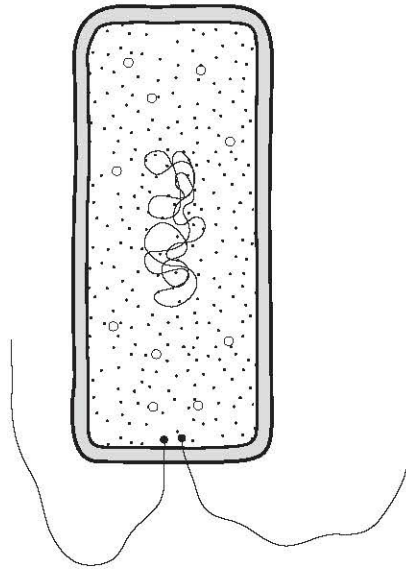


Fig. 1.1

(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]

- (a) (i) chloroplasts ; **R** chlorophyll  
cellulose cell wall ; **A** 'not made of, murein / peptidoglycan'  
(sap / large / permanent) vacuole(s) ; **A** tonoplast  
nucleus / nuclear membrane / nuclear envelope ; **R** DNA / RNA  
nucleolus ;  
mitochondria ;  
endoplasmic reticulum / Golgi ;  
amyloplasts ; **A** starch, grains / granules  
more than one chromosome / linear chromosome(s) ; [4]
- (ii) membrane ;  
cytoplasm ;  
ribosomes ;  
chromosomes ; **A** 'strands of DNA' **R** DNA unqualified  
glycogen granules ;  
oil droplets ; [max 2]

**Expert solution: Four features of a photosynthesising plant that make it different from a bacterial cell are: they have chloroplasts, have a cellulose cell wall, a nucleus and a large permanent vacuole**

**Note: Also acceptable: mitochondria/endoplasmic reticulum/amyloplasts/more than one chromosome**

7 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]

**(animal feature)**

ref. to secretion of enzymes / heterotrophic nutrition ;

Ⓐ inability to photosynthesise

ref. to production of glycogen ;

ref. to presence of chitin ;

[max. 1]

**(plant feature)**

presence of cell wall ;

presence of vacuole ;

[max. 1]

**Expert solution:**

The fungi possess the following features:

**Animal feature:** They secrete enzyme

**Note:**

1. Also accepted: produce glycogen/ they have chitin present

2. Also accepted is plants do not have the ability to photosynthesise.

**Plant feature:**

Cell wall is present

**Note:** Also accepted : Vacuole is present

8 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]



-----Marking Scheme-----

(a)	(i) mycelium ;	[1]	
	(ii) hypha ;	[1]	
(b)	hyphae, secrete / release ; enzymes ; amylase ; breaks down starch to, maltose / glucose ; protease ; breaks down protein to, peptides / amino acids ; products absorbed ; by diffusion / active uptake ;	[max 4]	<b>ignore</b> produce  <b>accept</b> soluble nutrients if no digestion given

**Expert solution:**

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

(ii)The threads that make up the body of the fungus is the hypha

**Note: Do not say hyphae produce enzymes as this answer will be ignored**

(b)The fungal hyphae secrete enzymes such as amylase, protease. Maltase breaks down the starch into maltose and protease breaks down the protein to peptide.The products of digestion are absored by diffusion or active transport

**Note: If the digestion is not mentioned but if you make a refernce to soluble proteins then too it is acceptable.**