IGCSE Cambridge Topical Past Papers

BIOLOGY

0610 | Paper 4

2017 — 2024

CHAPTER 1

CHARACTERISTICS AND CLASSIFICATION OF LIVING ORGANISMS

1 - (0610/42_Summer_2017_Q6) ANSWER

Fig. 6.1 is a flow diagram that shows what happens at the start of a bacterial infection.

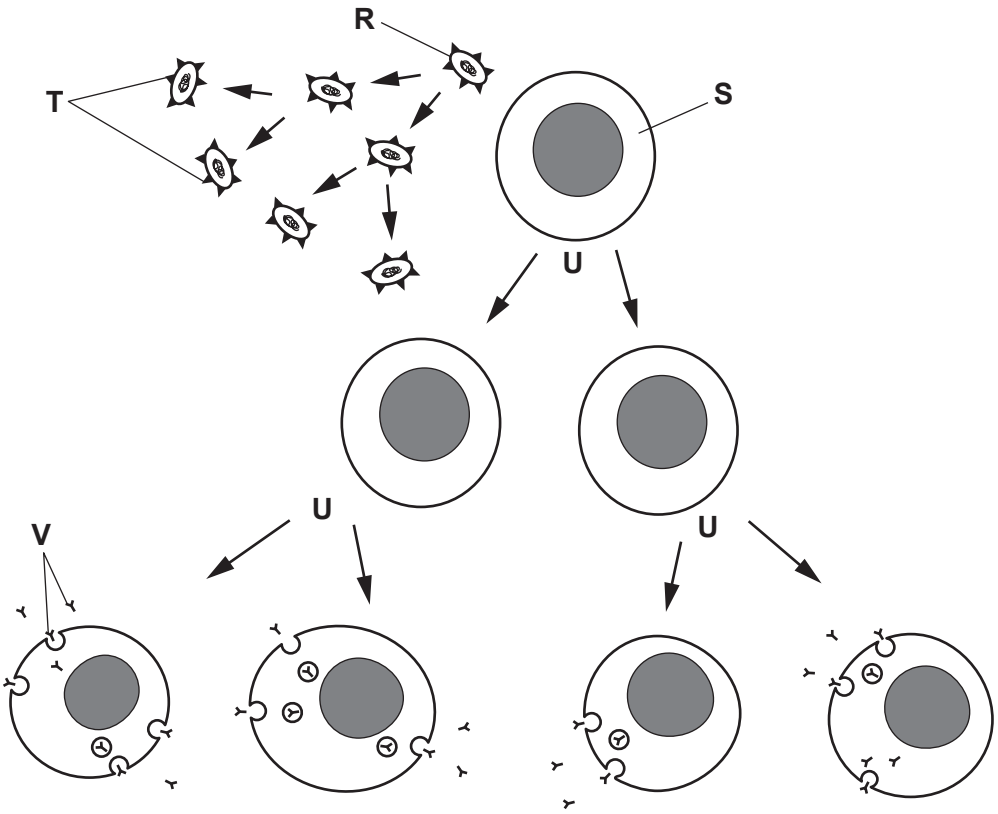

Fig. 6.1

(a) Cell **R** is a prokaryote and cell **S** is a lymphocyte.

(i) State the names of **two** cellular structures that would be found in **both** prokaryotes and white blood cells.

1 .....

2 .....
[2]

(ii) Describe how the cellular structure of white blood cells differs from the cellular structure of prokaryotes.

.....

.....

.....

.....

.....

.....

.....[3]

(b) Cell **R** is a pathogen that has structures **T** on its surface. These structures are recognised by cell **S**. Cell **S** is a lymphocyte and it produces structures **V**. Cell **R** reproduces by binary fission and cell **S** divides by process **U**.

Identify **T** to **V** from the passage and Fig. 6.1.

T .....

U .....

V .....

[3]

(c) Cell **W** in Fig. 6.2 also responds to pathogens.

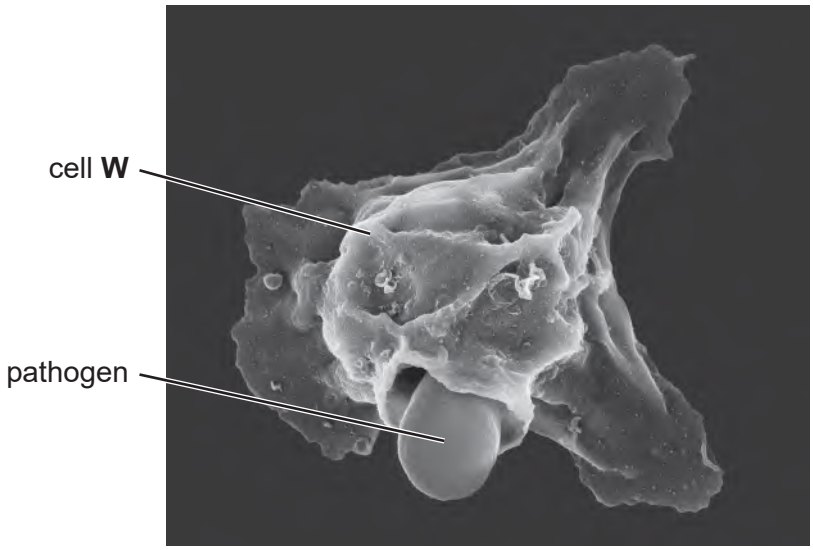

Fig. 6.2

(i) State the name of the process shown in Fig. 6.2.

.....[1]

(ii) Describe what happens to the pathogen during the process shown in Fig. 6.2.

.....

.....

.....[1]

Fig. 6.3 shows some human teeth that require dental treatment.

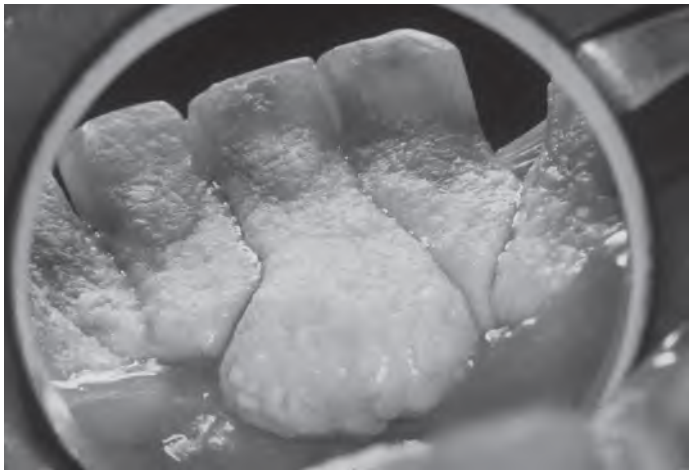

Fig. 6.3

(d) (i) Identify the type of teeth in Fig. 6.3.

.....[1]

(ii) Explain how bacteria dissolve enamel to cause tooth decay.

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.....[2]

(e) Describe **two** ways of preventing tooth decay.

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.....[2]

[Total: 15]

2 - (0610/43_Summer_2017_Q4) ANSWER

Fig. 4.1 is a photograph of a yellow-shouldered Amazon, *Amazona barbadensis*, a species of parrot found along the Venezuelan coast of the Caribbean.

Fig. 4.1

(a) State the vertebrate group that includes *A. barbadensis* and give **two** features that are used to classify animals into this group.

vertebrate group .....

feature 1 .....

feature 2 .....

[2]

(b) This species is subdivided into several populations on the mainland and on the islands of Margarita and Bonaire. Scientists believe that yellow-shouldered Amazons rarely travel between these places.

Explain what biologists mean when they refer to *populations* of animals, such as *A. barbadensis*.

.....

.....

.....

.....

.....

.....[3]

(c) The number of yellow-shouldered Amazons on Margarita Island had decreased to 700 parrots by 1989. The population then increased to 1600 parrots by 2009.

Part of this increase was due to the release of captive-bred parrots on the island. This is one of the few successful release programmes of parrots. A similar release programme in Arizona in the 1980s of a different species of parrot was not successful.

Suggest why release programmes for captive-bred parrots were **not** successful.

.....

.....

.....

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.....[2]

(d) Some captive breeding programmes involve very small numbers of animals.

Outline the disadvantages of such programmes.

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.....[3]

(e) Many biologists think that it is better to conserve ecosystems rather than individual species, such as parrots.

Explain the advantages of conserving ecosystems.

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.....

.....

.....[3]

[Total: 13]

3 - (0610/41_Winter_2017_Q6) ANSWER

Viruses can cause diseases.

(a) (i) State **two** other features of all viruses.

1 .....

2 .....

[2]

(ii) Describe how vaccination can prevent the spread of disease.

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.....[5]

(b) Fig. 6.1 shows four different viruses.

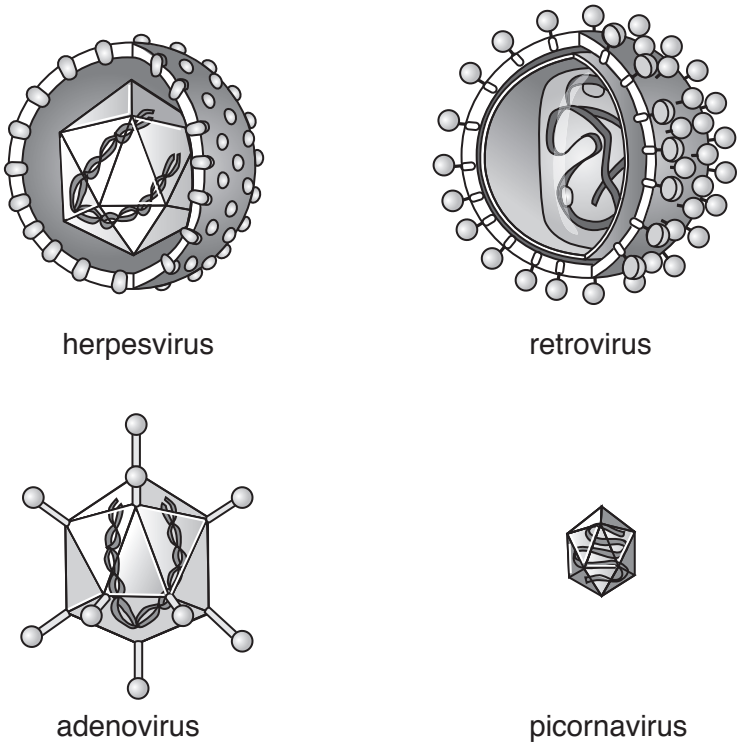

Fig. 6.1

Suggest **one** feature that could be used to classify viruses into groups.

.....

.....[1]

[Total: 8]

4 - (0610/42_Winter_2017_Q5) ANSWER

Fig. 5.1 shows the bacterium *Helicobacter pylori*, which is a human pathogen.

Fig. 5.1

(a) State the genus of *Helicobacter pylori*.

.....[1]

(b) *H. pylori* is placed in the prokaryote kingdom.

State **two** structural features that *H. pylori* shares with other prokaryotes.

1 .....

2 .....
[2]

(c) **(i)** *H. pylori* can cause infections in the stomach.

Suggest how this infection could be treated.

.....[1]

(ii) State **one** natural body defence that is found in the stomach.

.....[1]

(d) The immune system is not very effective against pathogens, such as *H. pylori*, that live inside the alimentary canal. This means that active immunity and passive immunity do not provide complete protection against *H. pylori* infections.

Explain how active immunity differs from passive immunity.

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.....[4]

[Total: 9]

5 - (0610/43_Winter_2017_Q5) ANSWER

The kingdom Fungi contains a great diversity of organisms including yeasts, moulds and mushrooms.

Like plants, fungi contain nuclei and mitochondria.

(a) (i) State the function of mitochondria.

.....

.....[2]

(ii) State **two** characteristics of fungi that are used to distinguish them from plants.

1 .....

2 .....

[2]

(b) Yeast is a single-celled fungus that is used in bread-making.

Explain why yeast is used in bread-making.

.....

.....

.....

.....

.....

.....

.....[3]

(c) *Penicillium* is a mould fungus that is used to make antibiotics.

(i) Describe how *Penicillium* is used to make the antibiotic penicillin.

.....

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.....

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.....

.....

.....[3]

(ii) Explain why antibiotics can be used to treat bacterial infections but not viral infections.

.....

.....

.....[1]

(d) Some fungi are human pathogens.

Describe how the human body prevents pathogens from entering.

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.....[3]

[Total: 14]

1 - (0610/42_Summer_2017_Q6) QUESTION

<table>
<tr><td>(a)(i)</td><td>Cell membrane;
DNA;
ribosomes;
cytoplasm ;</td><td>2</td></tr>
<tr><td>(a)(ii)</td><td>
<table>
<tr><th></th><th>white blood cell (S)</th><th>prokaryote (R)</th></tr>
<tr><td>1</td><td>no cell wall</td><td>cell wall ;</td></tr>
<tr><td>2</td><td>(named) organelles</td><td>no (membrane-bound) organelles ;</td></tr>
<tr><td>3</td><td>nucleus</td><td>nucleoid / no nucleus ;</td></tr>
<tr><td>4</td><td>linear, chromosomes / DNA</td><td>loop of DNA / circular / naked, chromosome ;</td></tr>
<tr><td>5</td><td>large ribosomes</td><td>small ribosomes ;</td></tr>
<tr><td>6</td><td>no plasmids (in cytoplasm)</td><td>plasmids (in cytoplasm) ;</td></tr>
<tr><td>7</td><td>large</td><td>small ;</td></tr>
<tr><td>8</td><td>antibodies</td><td>no antibodies ;</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>(b)(i)</td><td>T = antigen ;
U = mitosis ; I cell division
V = antibodies ;</td><td>3</td></tr>
<tr><td>(c)(i)</td><td>phagocytosis ;</td><td>1</td></tr>
<tr><td>(c)(ii)</td><td>(phagocyte) engulfs pathogen ;
phagosome / vacuole, forms ;
(enzymes) digest / breakdown / destroy, pathogen ;
AVP ;</td><td>1</td></tr>
<tr><td>(d)(i)</td><td>incisors ;</td><td>1</td></tr>
<tr><td>(d)(ii)</td><td>bacteria use sugar / AW (on teeth as a food source) ;
bacteria respire ;
acid is produced ;
AVP ;</td><td>2</td></tr>
<tr><td>(e)</td><td>regular brushing / mouthwash / flossing / wash / clean, teeth ;
avoid sugary foods / diet described ;
dental check-ups ;
fluoride, toothpaste / in water ;</td><td>2</td></tr>
</table>

2 - (0610/43_Summer_2017 Q4) QUESTION

(a)	birds / *Aves* ; *Any two features for max 1* ; • feathers • beak / bill • hard-shelled eggs • scaly legs • no teeth • air sacs • light-weight skeletons • AVP	**2**
(b)	1 (isolated) group of individual animals / AW ; 2 of, one / the same, <u>species</u> ; 3 living in the same, habitat / ecosystem / environment / area / place / location ; 4 at the same time ;	**3**
(c)	1 killed by predators / not able to evade predators / new predators ; 2 not able to find food ; 3 more prone to disease / AW ; 4 poaching ; 5 ref to, low genetic variation ; 6 competition with new species ; 7 idea of no survival instinct /AW ; 8 AVP ; e.g. techniques not as advanced in 1980	**2**

(d)	1 inbreeding / described ; 2 less / little, (genetic) variation ; 3 reduced number of alleles ; 4 increased risk of genetic disease ; 5 cannot reproduce / sterile ; 6 not enough animals to breed ; 7 less likely to, adapt / to evolve to / cope with, (named) change in environment ; 8 cost ; 9 AVP ;;	**3**
(e)	1 to prevent extinction (of many species) / maintain (bio)diversity ; 2 ref to preventing disruption of food, chains / web ; 3 provide, habitats (for shelter / breeding grounds / AW) for many species ; 4 and 5 ecosystems provide, 'service', for humans ; ; 6 idea of areas for, recreation / (eco)tourism / education ; 7 ethical reasons / aesthetic reasons / AW ;	**3**

3 - (0610/41_Winter_2017_Q6) QUESTION

(a)(i)	genetic material ; protein coat ; parasitic / pathogenic ; only reproduce in a host / do not show (other) features of living organisms / AW ; very small ; they are not cellular / absence of named organelle; AVP ; cannot be killed / cannot be treated, with antibiotics.	**2**
(a)(ii)	active immunity ; harmless / dead / weakened / attenuated pathogen / microorganisms ; injected / ingested ; ref. to antigens ; (antigen) triggers antibody production ; by lymphocytes ; memory cells (are produced) ; rapid response to reinfection ; long-term immunity ; prevention of spread person to person e.g. no host for pathogen / herd ref to programmes of mass vaccination ; AVP ;	**5**
(b)	shape / size / AW ; genetic material (sequence / type) ; host species / type of disease it causes ; AVP ;	**1**

4 - (0610/42_Winter_2017_Q5) QUESTION

(a)	*Helicobacter* ;	**1**
(b)	circular DNA / chromosome ; plasmid(s) ; cell membrane ; cell wall (not made of cellulose) ; cytoplasm ; capsule ; (small) ribosomes ; flagella ; AVP ;	**2**
(c)(i)	antibiotic(s) ;	**1**
(c)(ii)	(stomach / hydrochloric / gastric) acid / HC*l* / mucus ;	**1**
(d)	*active immunity* 1 exposure to antigen ; **ora** 2 after, infection by pathogen / vaccination ; 3 immune response occurs / antibodies produced ; *passive immunity* 4 antibodies acquired from another individual ; 5 e.g. by breast milk / injection of antibodies ; 6 active is, permanent / long-term (immunity) ; **ora** 7 ref to memory cells, in active / not in passive ; 8 response is slow on first exposure in active ; **ora**	**4**

5 - (0610/43_Winter_2017_Q5) QUESTION

(a)(i)	respi**ration ;** aerobic (respiration) ; release energy / make ATP ;	**2**
(a)(ii)	different composition of cell wall ; no, chlorophyll / chloroplasts / heterotrophic ; extracellular digestion / saprophytic / decomposer / AW ; hyphae / mycelium ; no (central) vacuole ; AVP ;	**2**
(b)	respiration / fermentation ; carbon dioxide released ; (bubbles / carbon dioxide) causes, dough / bread, to rise ; (yeast produces) enzymes ; enzymes / amylase, digest starch ; AVP ;	**3**
(c)(i)	(fungus) grown / put, in fermenters ; aerobic conditions / AW ; (provide) sugars / nitrogen source / nutrients ; purification / filtration, of product / penicillin ; batch culture / AW ; sterile conditions ; AVP ;	**3**
(c)(ii)	bacteria are made of cells ; **ora**	**1**
(d)	mechanical barriers ; example of mechanical barriers ;; chemical barriers ; example of chemical barriers ;; blood clotting ;	**3**