



6 Which of the following structures, **A** to **D**, are found in prokaryotes **and** in eukaryotes?

- A** a cell wall made of peptidoglycan
- B** circular genomic DNA
- C** a nucleus surrounded by a nuclear membrane
- D** ribosomes

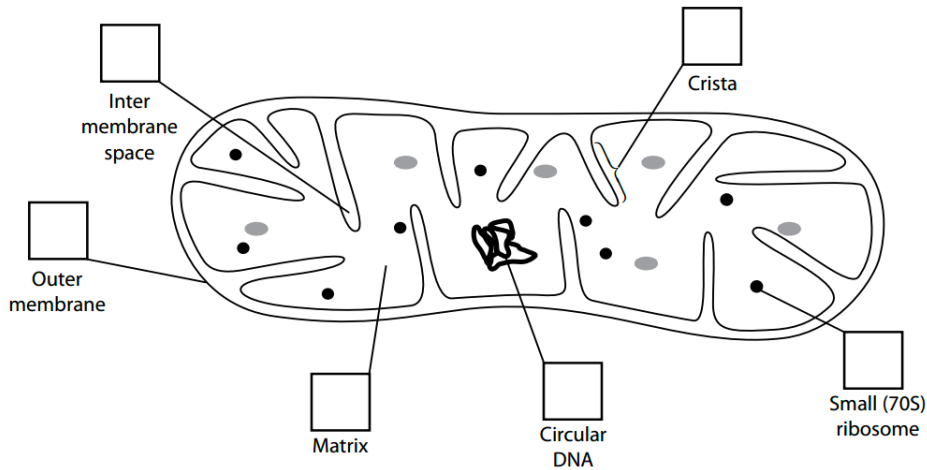
Your answer

[1]

1 Prokaryotes, mitochondria and chloroplasts have many features in common.

(a) (i) The diagram below shows a mitochondrion. Two of the features labelled are typical of prokaryotes. Place a tick (✓) in each of the **two** boxes that correctly identify these features.

(2)



(ii) The table below shows some features of mitochondria. If the feature is also present in chloroplasts, place a tick (✓) in the box to the right of that feature and if it is absent, place a cross (✗) in the box.

(3)

Features present in mitochondria	Feature present (✓) or absent (✗) in chloroplasts
Surrounded by a double membrane	
Crista present	
Circular DNA	
Matrix	
Glycogen granule	

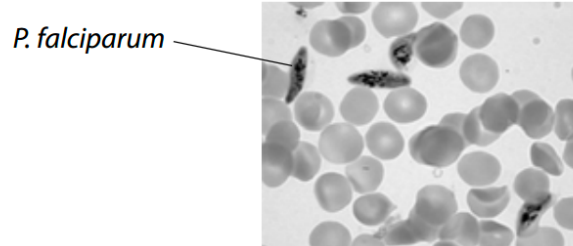


- 4 *Plasmodium falciparum* is a single-celled eukaryotic organism. *P. falciparum* causes the disease malaria when it invades red blood cells.

If untreated, malaria can result in a shorter than normal life span.

The high mortality rate of people with malaria has been claimed to be one of the greatest selection pressures on the human genome in recent history.

- (a) The photograph shows *P. falciparum* in a sample of human blood.



Describe how scientists could have determined that *P. falciparum* is a eukaryotic organism and not a prokaryotic organism.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- 4 (a) Microorganisms include fungi and bacteria. Fungi are eukaryotes. Bacteria are prokaryotes.

Describe **one** distinctive feature of the cell structure of each of these microorganisms.

fungus cell

.....

bacterial cell

..... [2]



- 7 (a) The structure of a cholera bacterium is different from the structure of an epithelial cell from the small intestine. Describe how the structure of a cholera bacterium is different.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5 marks)



6 Which of the following structures, **A** to **D**, are found in prokaryotes **and** in eukaryotes?

- A** a cell wall made of peptidoglycan
- B** circular genomic DNA
- C** a nucleus surrounded by a nuclear membrane
- D** ribosomes

Your answer

D

[1]

Question Number	Answer	Mark
1(a)(i)	1. circular DNA box ; 2. small / 70s ribosomes box;	(2)

Question Number	Answer	Mark												
1(a)(ii)	<table border="1"> <thead> <tr> <th>Features present in mitochondria</th> <th>Feature also present (✓) or absent (✗) in chloroplasts</th> </tr> </thead> <tbody> <tr> <td>Surrounded by a double membrane</td> <td>✓</td> </tr> <tr> <td>Crista present</td> <td>✗</td> </tr> <tr> <td>Circular DNA</td> <td>✓</td> </tr> <tr> <td>Matrix</td> <td>✗</td> </tr> <tr> <td>Glycogen granule</td> <td>✗</td> </tr> </tbody> </table> <p>1 mark for any two correct ;;;</p>	Features present in mitochondria	Feature also present (✓) or absent (✗) in chloroplasts	Surrounded by a double membrane	✓	Crista present	✗	Circular DNA	✓	Matrix	✗	Glycogen granule	✗	(3)
Features present in mitochondria	Feature also present (✓) or absent (✗) in chloroplasts													
Surrounded by a double membrane	✓													
Crista present	✗													
Circular DNA	✓													
Matrix	✗													
Glycogen granule	✗													



Describe how scientists could have determined that *P. falciparum* is a eukaryotic organism and not a prokaryotic organism.

(4)

An answer that makes reference to four of the following:

1. (eukaryotic organisms) have membrane-bound organelles (1)
2. (eukaryotic organisms contain) a named membrane-bound organelle (1)
3. size of ribosomes larger than in prokaryotes (1)
4. (eukaryotic organisms contain) DNA that is {linear / associated with (histone) proteins} (1)
5. (eukaryotic organisms) do not contain plasmids (in cytoplasm) (1)

ALLOW converse throughout

2. ALLOW nucleus, mitochondria, Golgi, RER, SER, vesicles.
3. ALLOW 80S instead of 70S ribosomes
4. ALLOW DNA not circular
5. ALLOW absence of mesosomes/pili

Question	Answer	Mark	Guidance
4 (a)	<p><i>fungus</i> long cells / hyphae OR multinucleate OR <u>chitin</u> cell wall ;</p> <p><i>bacterial</i> free DNA / DNA not in a nucleus OR circular DNA (molecule) OR naked DNA / no histones OR peptidoglycan / murein, cell wall OR smaller / 70S / 18nm, ribosomes ;</p>	<p>1</p> <p>1</p>	<p>FA for each microorganism IGNORE prokaryotic / eukaryotic (as given in question)</p> <p>ACCEPT no nucleus / nuclear envelope IGNORE loop, plasmids, nucleoid</p>



09.1 Compare and contrast the DNA in eukaryotic cells with the DNA in prokaryotic cells.

[5 marks]

Comparisons

1. Nucleotide structure is identical;
 2. Nucleotides joined by phosphodiester bond;
- OR
- Deoxyribose joined to phosphate (in sugar, phosphate backbone);
3. DNA in mitochondria / chloroplasts same / similar (structure) to DNA in prokaryotes;

Contrasts

4. Eukaryotic DNA is longer;
5. Eukaryotic DNA contain introns, prokaryotic DNA does not;
6. Eukaryotic DNA is linear, prokaryotic DNA is circular;
7. Eukaryotic DNA is associated with / bound to protein / histones, prokaryotic DNA is not;

1. Accept labelled diagram or description of nucleotide as phosphate, deoxyribose and base
3. Accept shorter than nuclear DNA/is circular not linear/is not associated with protein/histones unlike nuclear DNA;

10.3

Contrast the structure of a bacterial cell and the structure of a human cell.

[5 marks]

Any five contrasting statements, eg

1. Bacterial cell is much smaller than a human cell;
2. Bacterial cell has a cell wall but human cell does not;
3. Bacterial cell lacks a nucleus but human cell has a nucleus;
4. Bacterial cell lacks membrane-bound organelles but human cell has membrane-bound organelles;
5. Bacterial ribosomes smaller than human ribosomes / bacteria have 70S ribosomes whereas humans have 80S ribosomes;
6. Bacterial DNA is circular but human DNA is linear;
7. Bacterial DNA is 'naked' whereas human DNA is bound to histones/proteins;

Since contrast is required, both parts of each statement must be present to gain the mark.

4. Accept any named membrane-bound organelle



7	(a)	<p>1 Cholera bacterium is prokaryote;</p> <p>2 Does not have a nucleus/nuclear envelope/ has DNA free in cytoplasm/has loop of DNA;</p> <p>3 and 4 Any two from</p> <p>No membrane-bound organelles/no mitochondria / no golgi/ no endoplasmic reticulum/etc;</p> <p>5 Small ribosomes only;</p> <p>6 and 7 Any two from</p> <p>Capsule/flagellum/plasmid / cell wall/etc;</p>	5 max	<p>Maximum of 2 marks for points 3 and 4.</p> <p>Maximum of two marks for points 6 and 7.</p>
---	-----	--	-------	---