

Cell structure and microscopy

6 questions · 60 marks

Answer all questions. The marks available are shown against each part. Every question is taken unaltered from a past paper; the source is noted beneath it.

1. 1 Give the **three** structural features found in **all** virus particles **and** describe the function of **one** of these features. 5 marks
- [2 marks]**

- 1 _____
- 2 _____
- 3 _____

Function of **one** named feature

- 2 Explain why viruses are described as acellular and non-living. **[2 marks]**

- 3 Give **one** reason why antibiotics are **not** effective against viruses. **[1 mark]**

— AQA 7402/1 Biology · June 2023 · Paper 1, Question 1

2.

1

Complete **Table 3** to give **three** differences between DNA molecules and tRNA molecules.

8 marks

[3 marks]

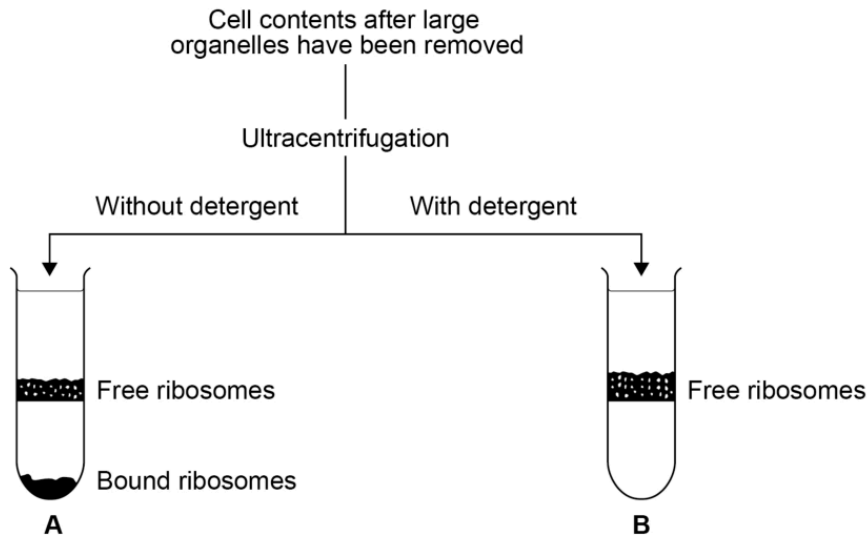
Table 3

DNA molecules	tRNA molecules

Scientists investigated ribosomal RNA in liver cells.

Figure 10 shows the method they used to isolate the ribosomes from the liver cells. The detergent dissolves lipids.

Figure 10



2

The scientists broke open the cells to produce a suspension of cell contents.

Describe how the scientists would remove large organelles from this suspension of cell contents.

[2 marks]

3

Explain the position of the bands of ribosomes in tubes **A** and **B** in **Figure 10**.

[3 marks]

A

—

—

B

—

— AQA 7402/1 Biology · 2022 · Paper 1, Question 7

3.

1

Describe how a **non-competitive** inhibitor can reduce the rate of an enzyme-controlled reaction.

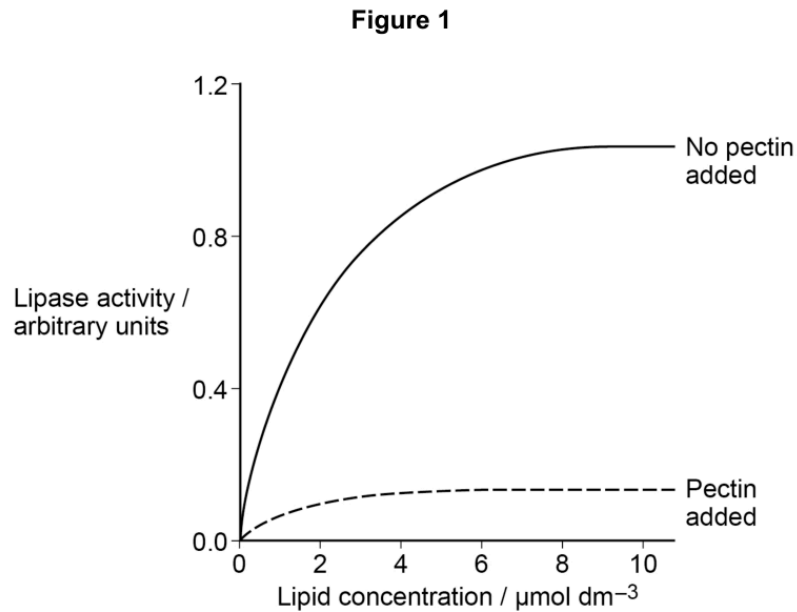
8 marks

[3 marks]

Pectin is a substance found in some fruit and vegetables.

A scientist investigated the effect of pectin on the hydrolysis of lipids by a lipase enzyme.

His results are shown in **Figure 1**.



2

The scientist concluded that pectin is a non-competitive inhibitor of the lipase enzyme.

Use **Figure 1** to explain why the scientist concluded that pectin is a **non-competitive** inhibitor.

[1 mark]

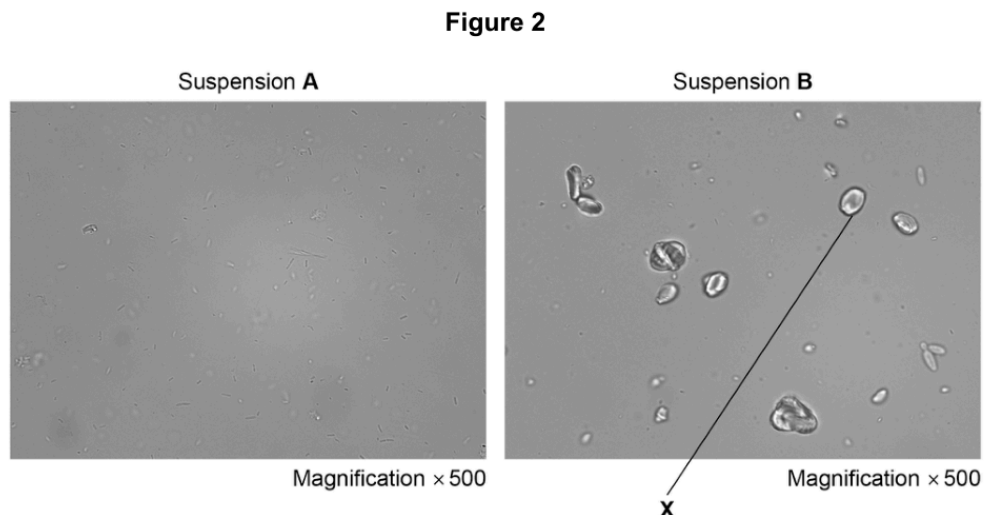
The scientist also found that pectin stops the action of bile salts. He prepared two suspensions:

- suspension **A** – lipid and bile salts
- suspension **B** – lipid, bile salts and pectin.

He did **not** add lipase to either suspension.

He observed samples from the suspensions using an optical microscope.

Figure 2 shows what he saw in a typical sample from each suspension.



Calculate the maximum length of the large lipid droplet marked **X** in **Figure 2**.

Using a ruler with millimetre intervals always includes an uncertainty in the measurement. Use the uncertainty in your measurement to determine the uncertainty of your calculated maximum length.

You can assume there is no uncertainty in the magnification.

[2 marks]

Maximum length = μm

Uncertainty of your calculated maximum length = _____ μm

4

No large lipid droplets are visible with the optical microscope in the samples from suspension **A**.

Explain why.

[2 marks]

[illegible]

— AQA 7402/1 Biology · June 2019 · Paper 1, Question 1

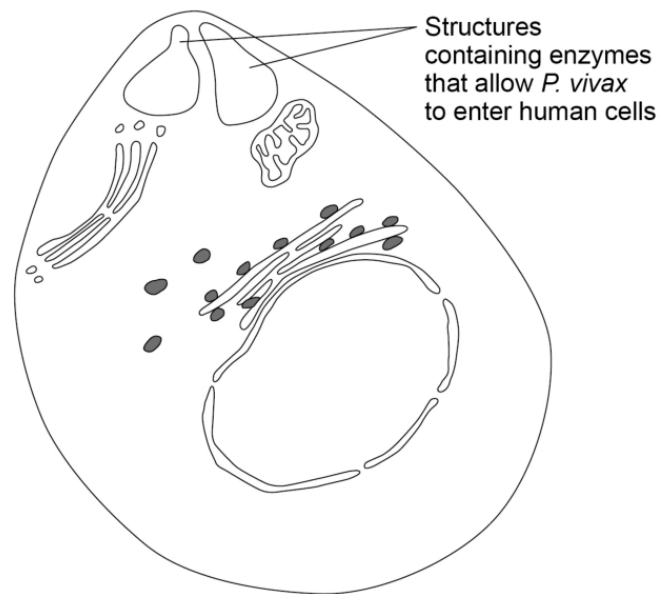
4.

1

The human disease, malaria, is caused by infection with a single-celled eukaryotic organism.

9 marks

Figure 2 shows a diagram of *Plasmodium vivax*, one of the species that can cause malaria.

Figure 2

Other than the Golgi apparatus, name **one** structure in **Figure 2** which shows that *P. vivax* is a eukaryote.

[1 mark]

2

Describe **two** functions of the Golgi apparatus in a eukaryotic cell.

[2 marks]

1

—

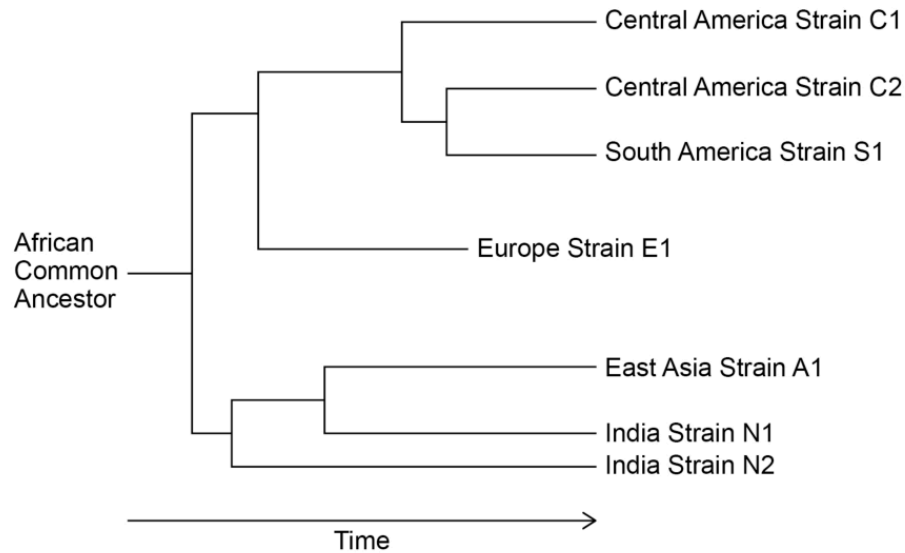
2

P. vivax evolved from a common ancestor in Africa. As humans migrated around the world, new strains of *P. vivax* evolved.

P. vivax is now extremely rare in Africa but there are several different strains of *P. vivax* in other parts of the world.

Figure 3 shows a phylogenetic diagram of the evolution of these different strains.

Figure 3



3

What does **Figure 3** suggest is the order of human migration out of Africa?

Tick (✓) **one** box.

[1 mark]

Europe, India, East Asia, Central America, South America

☐

India, East Asia, Europe, South America, Central America

☐

India, Europe, East Asia, Central America, South America

☐

South America, Central America, East Asia, Europe, India

☐

4

There are an estimated 229 million cases of human malaria worldwide per year.
 94% of these cases are found in Africa, but are not caused by *P. vivax*.
P. vivax does cause 61% of the cases of human malaria outside Africa.

Use this information to calculate the number of cases worldwide caused by *P. vivax* each year.

[1 mark]

Answer

cases of malaria

5

In Africa today, most of the human population are resistant to malaria caused by *P. vivax*.

Use your knowledge of natural selection to explain why this resistance is so common in Africa.

[4 marks]

— AQA 7402/1 Biology · June 2023 · Paper 1, Question 3

5.

1

Describe the structure of DNA.

[5 marks]

15 marks

2

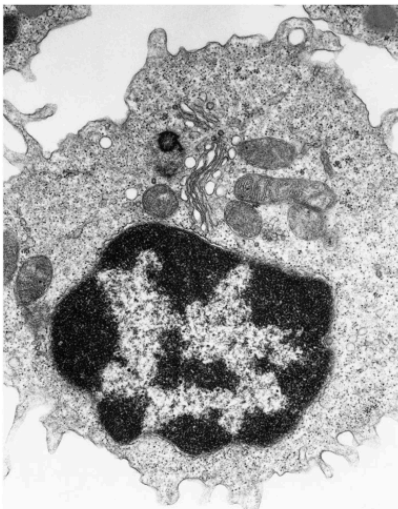
Name **and** describe **five** ways substances can move across the cell-surface membrane into a cell.

[5 marks]

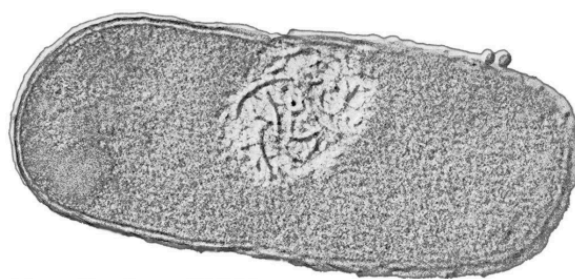
Figure 14 shows transmission electron micrographs of two cells, one animal cell and one prokaryotic cell.

Figure 14

Cell A

Magnification $\times 30\,000$

Cell B

Magnification $\times 60\,000$

3

Contrast the structure of the two cells visible in the electron micrographs shown in **Figure 14**.

[5 marks]

— AQA 7402/1 Biology · June 2021 · Paper 1, Question 10

6.

1

Describe and explain how you would use cell fractionation **and** ultracentrifugation to obtain a sample of nuclei from muscle tissue.

15 marks

[6 marks]

2

Describe the role of organelles in the production and release of enzymes by animal cells.

Do **not** include details of transcription in your answer.

[5 marks]

3

Describe the structure of ATP.

Outline how named enzymes break down and resynthesise ATP.

[4 marks]

— AQA 7402/1 Biology · June 2024 · Paper 1, Question 10