A Level Biology A

H420/01 Biological Processes

Question Set 2

2 (a) (i) Cirrhosis of the liver can result from long-term liver damage. Alcohol or other toxins can cause thisdamage.

Scientists have suggested that cirrhosis can be detected by taking samples of body fluids andtesting them for two different molecules: C-reactive protein and copeptin.

The liver produces these two molecules, and increased levels can indicate liver damage due tocirrhosis.

Different bodily fluids from a patient suspected of having cirrhosis were tested for C-reactiveprotein and copeptin.

Fig. 17.1 is a graph of the results.

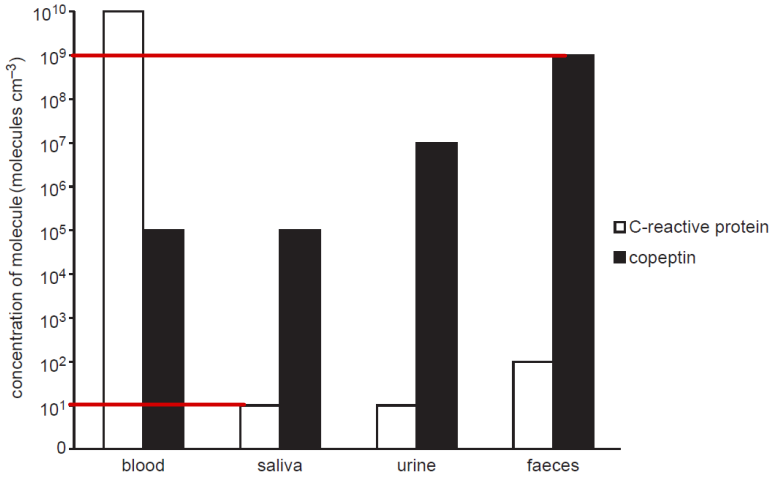

Fig. 17.1

Different bodily fluids have different concentrations of the different molecules.

Calculate the order of magnitude by which concentration of copeptin in the **faeces** ishigher than the concentration of C-reactive protein in the **saliva**.

Show your working.

$10^9 \div 10^1 = 10^8$

Answer = ……10^8……molecules cm^{-3} **[2]**

2 (a) (ii) Cirrhosis of the liver can result from long-term liver damage. Alcohol or other toxins can cause thisdamage.

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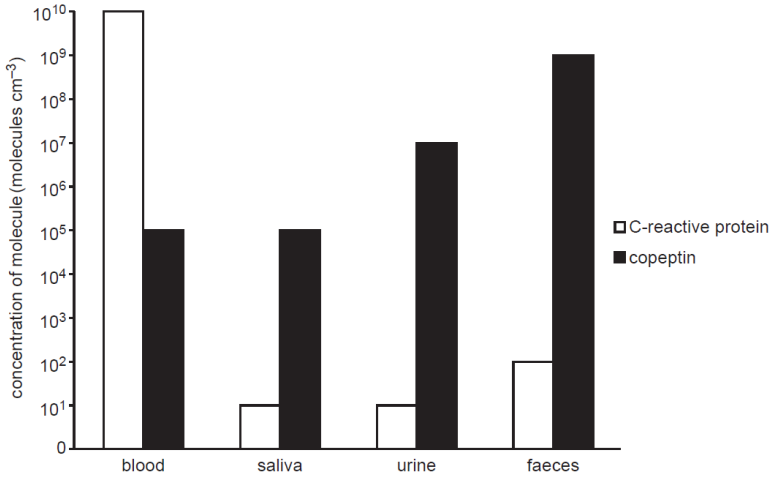

Fig. 17.1

Different bodily fluids have different concentrations of the different molecules.

Suggest why blood and faeces have the highest concentrations of C-reactive protein and copeptin.

[2]

The liver is highly vascularised so has a good supply of blood. Faeces may contain a high concentration of the proteins because they may be secreted into bile and thus enter the digestive system before eventually being egested.

2 (b) (i) Fig. 17.2 is an image of a Kupffer cell from the liver.

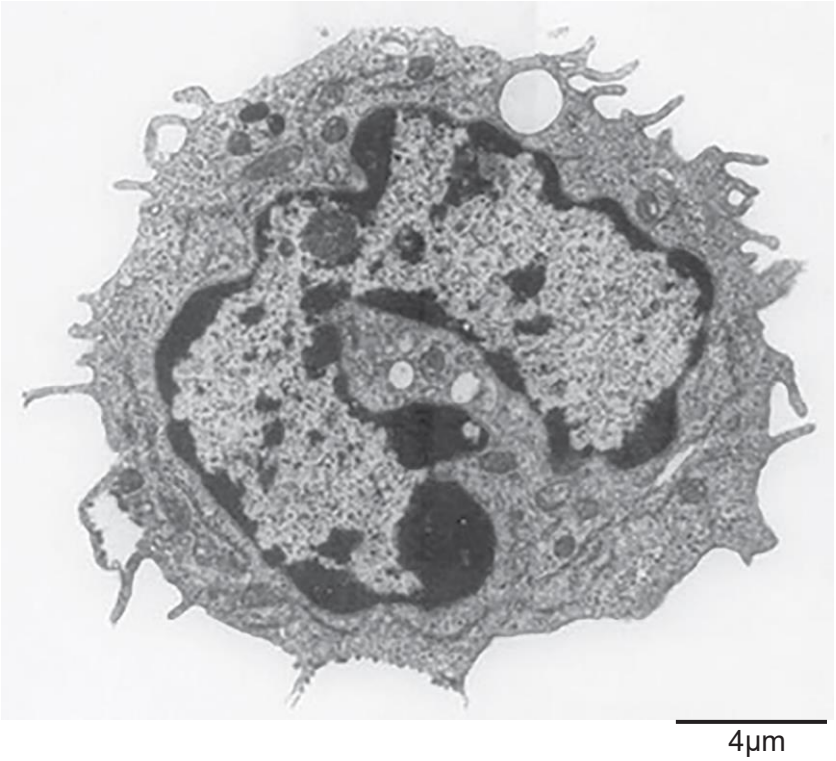

Fig. 17.2

The diameter of the Kupffer cell in the image is 9.1 cm. Assuming it is spherical, calculate the actual volume of this cell.

Give your answer to **four** significant figures. Show your working.

$4\mu m = 2cm$

$\frac{9.1}{2} \times 4 = 18.2\mu m$

$\text{Volume} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\left(\frac{18.2}{2}\right)^3 = 3157\mu m^3$

Volume = ... $3157\mu m^3$ **[3]**

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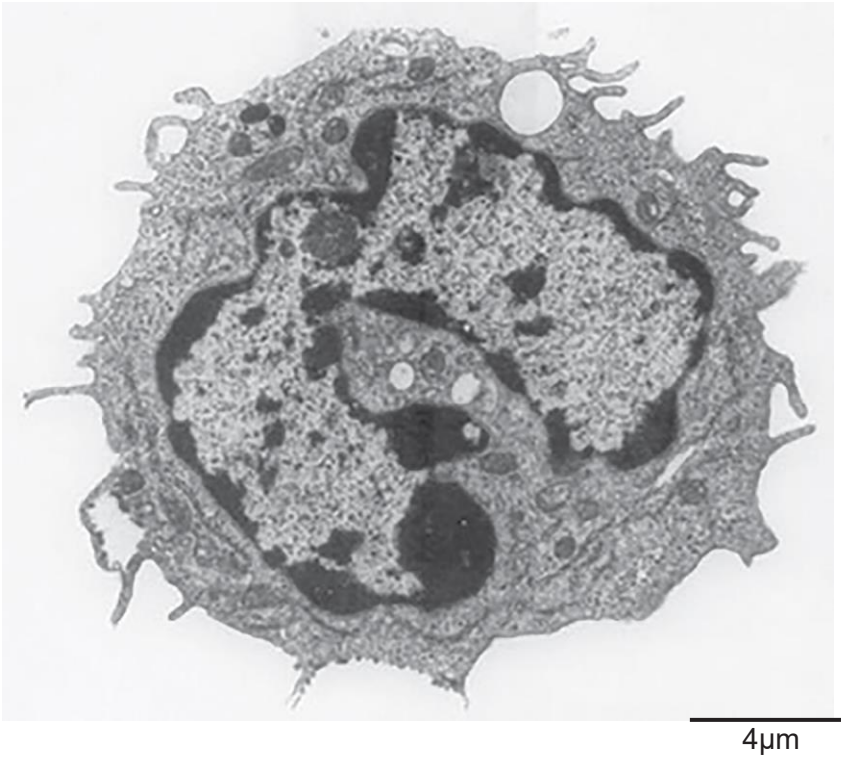

Fig. 17.2

Which type of microscope has been used to obtain this image? Explain your answer. **[2]**

Transmission electron microscope. High resolution and magnification so organelles such as mitochondria can be distinguished.

Total Marks for Question Set 2: 9