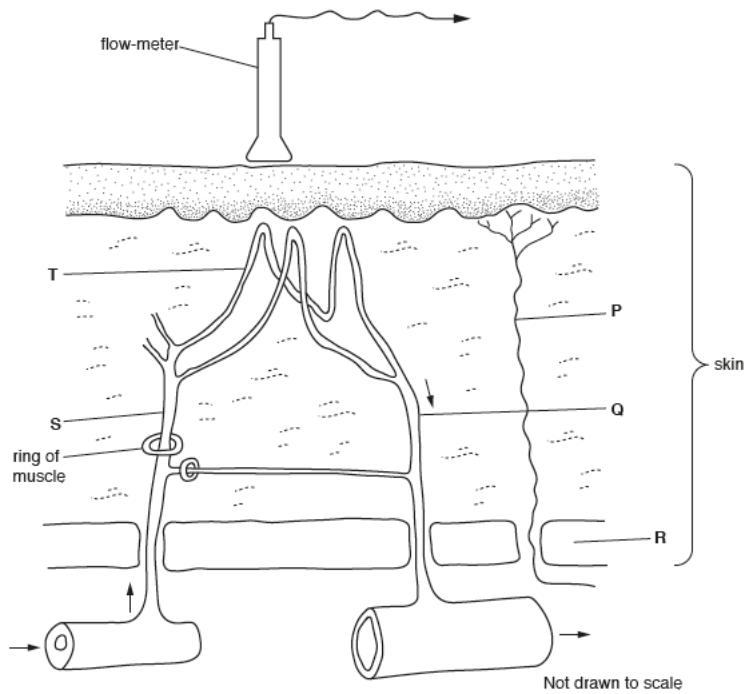


1. The flow of blood through the skin can be investigated by using a flow-meter. Fig. 4.1 shows a flow-meter above a section through the skin.



**(a) (i)** State the name of cell **P**.

.....

**(ii)** State the types of blood vessel labelled **Q**, **S** and **T**.

**Q** .....

**S** .....

**T** .....

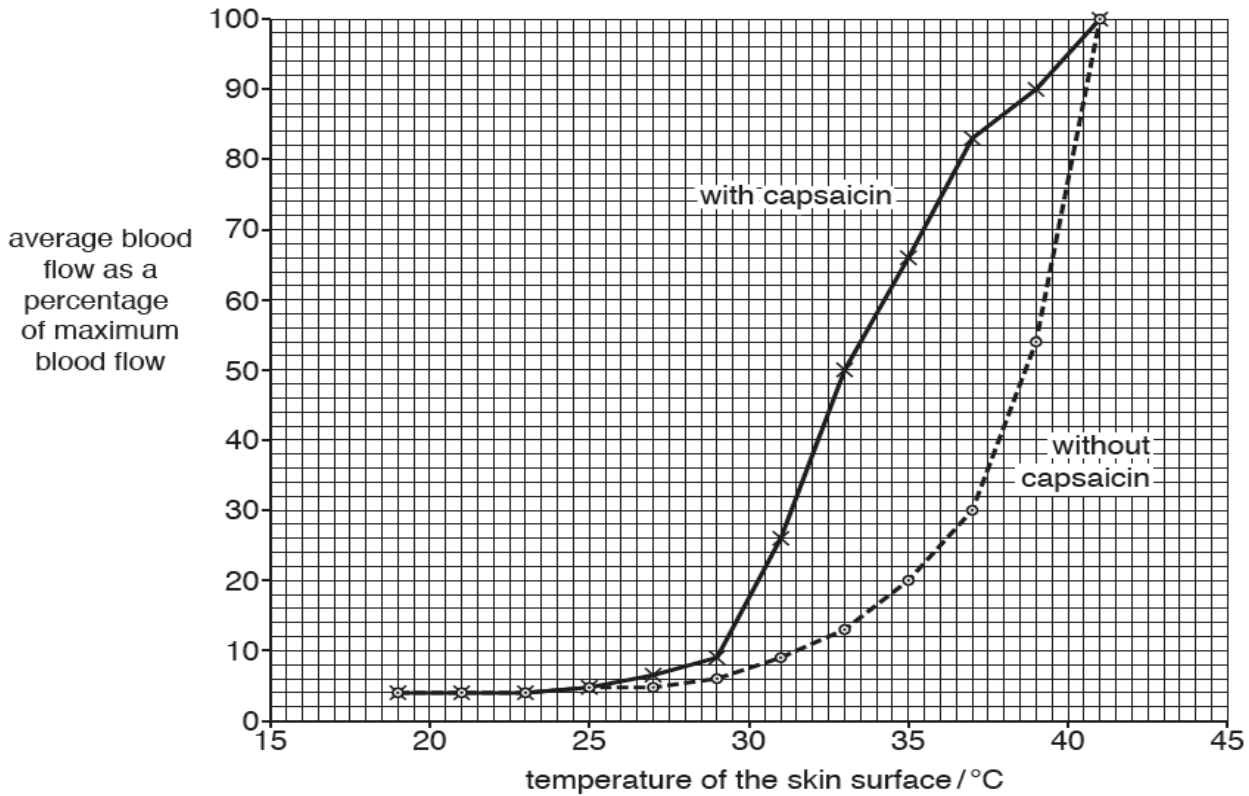
**(iii)** State the name of the tissue at **R** that provides insulation.

.....

**B)** The blood flow through the skin of some volunteers was measured with a flow-meter when their skin was exposed to different temperatures.

Capsaicin is a compound that gives people the sensation of feeling hot when it is put on the skin. Researchers applied capsaicin to the skin of the volunteers and again measured the blood flow through their skin at different temperatures.

Fig. 4.2 shows the results.



(i) Use the information in Fig. 4.2 to describe the effect of increasing the temperature of the skin surface on blood flow to the skin **without** capsaicin.

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(ii) Explain the mechanism that increases blood flow through the skin.

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(iii) State the difference between the average blood flow for the treatments (with and without capsaicin) at 35 °C.

Space for working.

..... %

**(iv)** The researchers thought that capsaicin stimulated receptors in the skin.

Explain the process by which capsaicin could reach these receptors.

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**(c)** Explain the importance of regulating body temperature in humans.

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2A) Fig. 2.1 shows an Arctic wolf, *Canis lupus*. These wolves are one of the few mammals adapted to the extreme cold of the tundra in the Canadian Arctic and in Alaska.



(i) State **two** features, **visible** in Fig. 2.1, that identify Arctic wolves as mammals.

1 .....

2 .....

(ii) Arctic wolves show many adaptive features to a cold environment.  
Explain what is meant by the term *adaptive feature*.

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.....

3.a) State the name of **one** excretory substance, that is removed by the kidneys, that contains nitrogen.

Explain why it is excreted.

name .....

explanation .....

.....

b) Blood is filtered as it flows through the kidneys.

(i) State the name of the structure within a kidney that filters the blood.

.....

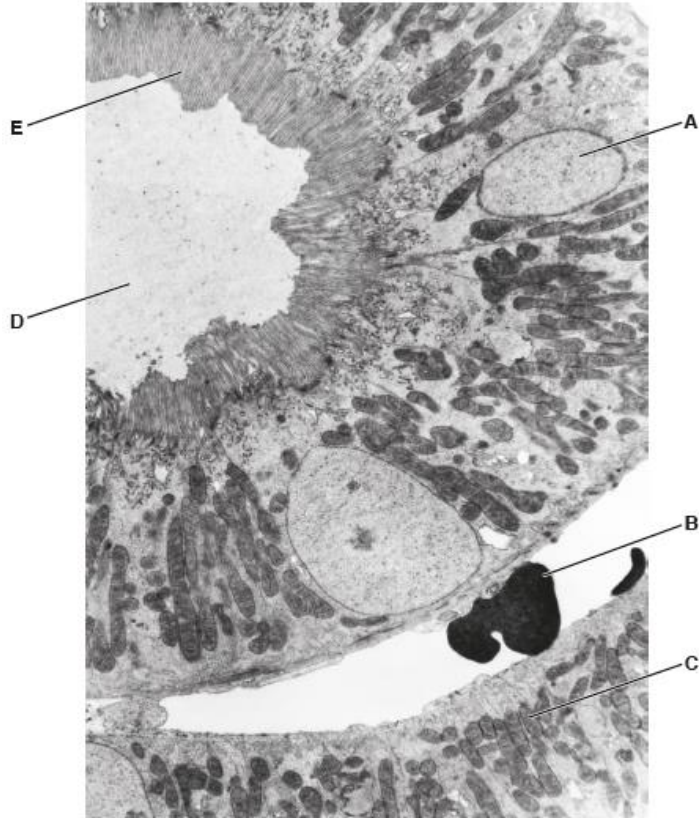
(ii) State **two** components of blood that do **not** pass through the filter.

1 .....

2 .....

c) The filtrate which is formed from the blood in the kidneys contains many useful substances, which are reabsorbed into the blood.

Fig. 1.1 is a photomicrograph of a cross-section of some of the cells that carry out reabsorption.



(i) Complete the table by stating the letter in Fig. 1.1 that identifies each structure.

structure	letter on Fig. 1.1
microvilli	
nucleus	
mitochondrion	

ii) The cells that line the kidney tubules, such as those in Fig. 1.1, absorb many compounds from the filtrate.

Use Fig. 1.1 to explain how the cells are adapted for absorption.

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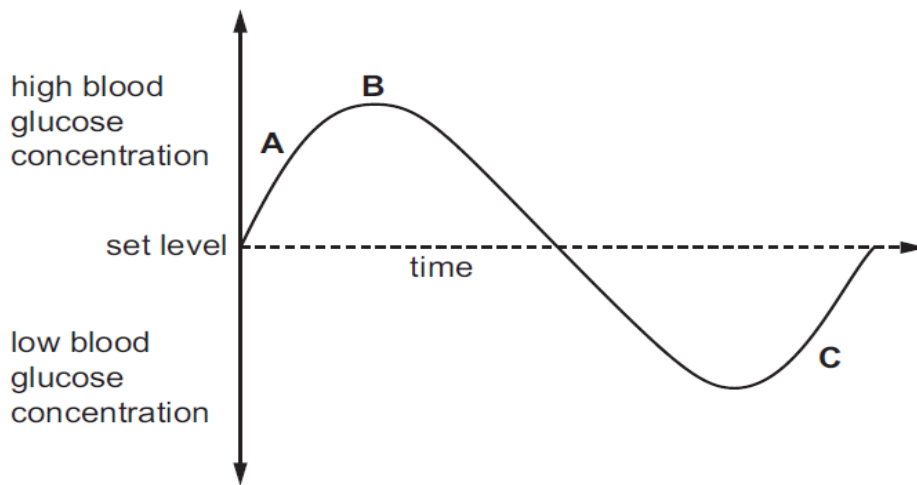
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4) Explain how blood flow in the skin helps to maintain a constant body temperature in very hot conditions.

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5a) Fig. 6.1 shows the changes in glucose concentration of the blood.



(a) Name the process that maintains blood glucose concentration within set limits.

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b.i) Name the hormone that would be secreted in response to the increasing blood glucose concentration at **A** in Fig. 6.1.

.....

Name an organ that is responsible for the decrease in blood glucose concentration after **B** in Fig. 6.1.

(ii) .....

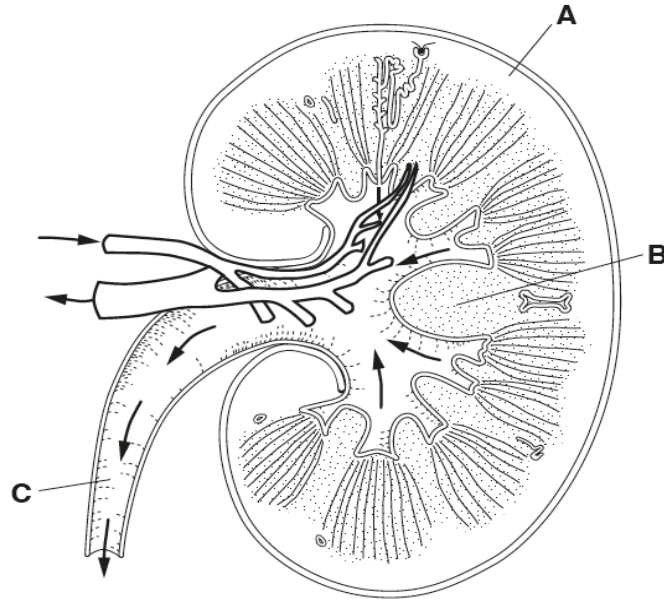
(iii) Name the compound that is converted to glucose at **C** in Fig. 6.1.

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(c) Describe the symptoms **and** treatment of Type 1 diabetes.

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 6a) Fig. 3.1 shows a section through a kidney.



(a) Complete the table by stating the name of the parts labelled **A**, **B** and **C** on Fig. 3.1.

letter	name of part
<b>A</b>	
<b>B</b>	
<b>C</b>	

(b) (i) Name the blood vessel in Fig. 3.1 that has the highest concentration of urea.

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(ii) Name the blood vessel in Fig. 3.1 that has the lowest concentration of glucose.

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(c) Explain the role of the kidney in excretion.

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 .....  
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 .....

