

**A Level Biology A**  
**H420/01 Biological Processes**

**Question Set 1**

1. (a) (i) Many insects such as moths and bumblebees are insulated with scales and hair, and are known as facultative endotherms.

Their metabolism during flight can cause the temperature of the flight muscles to increase 20–30 °C above the external temperature.

Using the information provided, explain why many moths and bumblebees are described as endothermic.

**Respiration generates heat internally. Scales and hair provide insulation to reduce heat loss.**

[1]

- 1 (a) (ii) Many insects such as moths and bumblebees are insulated with scales and hair, and are known as facultative endotherms.

Their metabolism during flight can cause the temperature of the flight muscles to increase 20–30 °C above the external temperature.

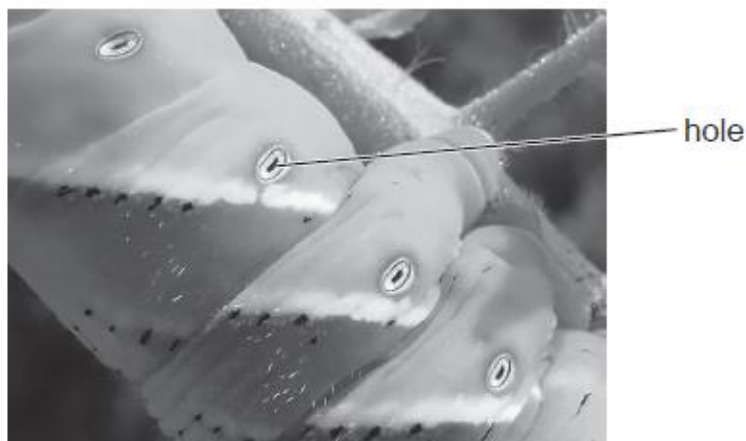
It is more difficult for moths and bumblebees to maintain their body temperature than for mammals and birds to maintain their body temperature.

Explain why.

**Insects and moths are smaller than mammals and birds so they possess a larger SA/V ratio and lose heat more rapidly.**

- 1 (b) (i) When walking, the abdomen of caterpillars expands and contracts slowly. Air is taken into the tiny holes along the side of the body.

One of these holes is labelled in Fig. 16.



**Fig. 16**

Name these holes.

**Spiracles**

[1]

- 1 (b) (ii) When walking, the abdomen of caterpillars expands and contracts slowly. Air is taken into the tiny holes along the side of the body.

One of these holes is labelled in Fig. 16.

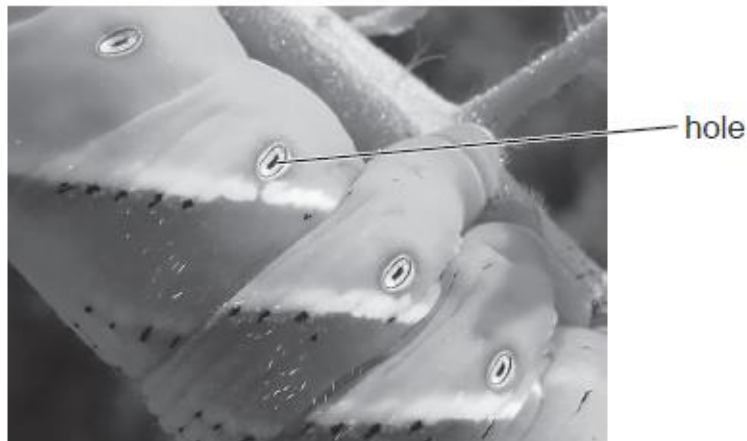


Fig. 16

Fluid is found in the tubes responsible for gaseous exchange in insects.

Name this fluid. **Tracheal fluid** [1]

- 1 (c) Outline the reasons why insects and other animals need well-developed transport systems [3]

**Diffusion is insufficient to provide all cells with the required nutrients and oxygen and to remove all waste substances. Such organisms generally possess high metabolic rates so must maintain a steep diffusion gradient for rapid oxygen supply.**

- 1 (d) A student planned to carry out a dissection of insect and fish gaseous exchange systems.

The student planned to complete diagrams of the different tissues. They were advised to observe the following guidelines:

- use a sharp pencil
- use ruled label lines
- include a scale bar.

Suggest **two** further guidelines for the student to follow to ensure they present their diagrams clearly and accurately.

1. **Clear continuous lines**
2. **No shading**

[2]

**Total Marks for Question Set 1: 10**

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