

A level Biology A
H420/03 Unified biology

Question Set 7

1 Many organisms have evolved specialised gas exchange surfaces. One feature of these structures is their large surface area to volume ratio.

(a) (i) Describe how the structures of the insect tracheal system and fish gills provide a large surface area for gas exchange.

insect tracheal system many branched tracheoles

fish gills many filaments / lamellae

[2]

(ii) The lugworm, *Arenicola marina*, is a species of segmented worm that lives in burrows in damp sand. They have hair-like external gills that increase the surface area available for gas exchange.

Many other species of segmented worm do not have external gills.

Suggest why lugworms have evolved external gills.

- oxygen is in short supply in their habitat & they have smaller SA:V ratio
- insufficient rate of diffusion - evolution to have higher metabolic rate

[1]

(b) Mammals use lungs for gas exchange. The following passage describes how gases are moved in and out of the lungs.

Complete the passage using the most appropriate words or phrases.

When air enters the trachea, mucus secreted by goblet cells traps dust and microorganisms. Air diffuses through the bronchi and the bronchioles. Smooth muscle in the bronchioles relaxes during the 'fight or flight' response. This response is produced by the sympathetic nervous system, which contains neurones that secrete the neurotransmitter .. noradrenaline .. . During inspiration, both the diaphragm and external intercostal muscles contract. The internal intercostal muscles only contract when expiration is forced

[4]

Total Mark for Question Set 7: 7



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