

Volume 35, Number 3, February 2023

Answers

Can insects be warm-blooded?

Answers to practice exam questions on page 10

Martin Rowland

- 1 Ectothermy: regulation of body temperature by behavioural mechanisms only
Endothermy: regulation of body temperature by behavioural and physiological mechanisms

- 2
- a (Rapid) contraction of flight muscles linked to energy release from hydrolysis of ATP
Most of the energy is released as heat / only part of the energy released is used in muscle contraction. [Penalise reference to energy being 'made', once only]

- b ATP replaced by $\text{ADP} + \text{P}_i \rightarrow \text{ATP}$ / by aerobic respiration.
(Respiration) releases CO_2 .

Multiple sclerosis and vitamin D: can sunshine reduce the severity of disease?

Answers to practice exam questions on page 15

Martin Rowland

- 1 Myelin prevents passage of sodium ions and potassium ions across the axon membrane.
So depolarisation / action potential can only occur at nodes of Ranvier.
Removal of myelin stops saltatory nature of impulse transmission.

2

- a** Ligand – an ion/atom/molecule that binds to a protein/receptor (molecule).
(Binding) causing function of protein/receptor to change.
- b** Transcription factor: a molecule that binds to gene / to promotor region of gene.
Affects transcription of gene.

Upgrade: Avoiding classic exam mistakes

Answers to practice exam questions on page 36

Martin Rowland

- 1** Bacteria replicate their DNA (1) and then divide into two genetically identical cells (1). This is known as binary fission. (1)
- 2** DNA polymerase joins adjacent nucleotides together (1) by forming phosphodiester bonds between them (1) via condensation reactions (1).
- 3** Competitive inhibitors are similar in shape to the substrate (1) and so bind at the active site of the enzyme (1), reducing the number of enzyme substrates formed (1).
- 4** Many gill filaments contain many gill plates/lamellae. (1) This provides a large surface area (1) over which oxygen can diffuse into the blood/over which CO₂ can diffuse into the water (1).
- 5** Nitrates stimulate the growth of algae and aquatic plants (1). Algal cells block the sunlight and prevent photosynthesis by the aquatic plants, causing the plants to die. (1) The dead plants provide a food source for bacteria, which use oxygen in aerobic respiration (1) to provide energy for rapid reproduction (1). These bacteria use up all the oxygen (1), so fish and invertebrates cannot respire and die due to suffocation (1).