



BIOLOGY
STANDARD LEVEL
PAPER 2

Wednesday 14 May 2008 (afternoon)

1 hour 15 minutes

Candidate session number

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INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all of Section A in the spaces provided.
- Section B: answer one question from Section B. Write your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the numbers of the questions answered in the candidate box on your cover sheet and indicate the number of sheets used in the appropriate box on your cover sheet.

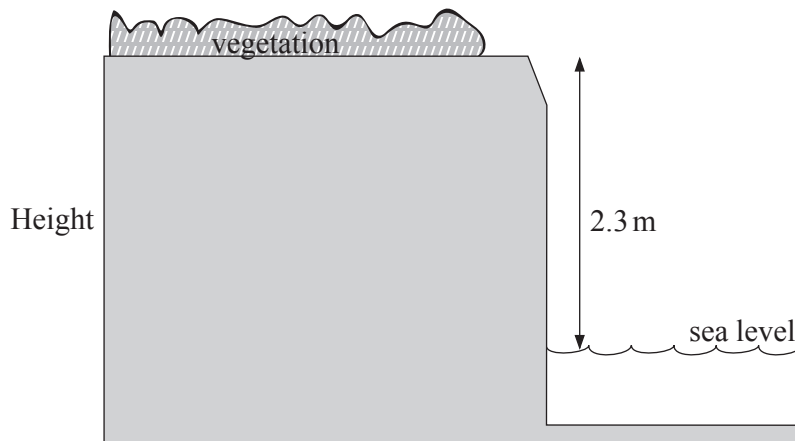


SECTION A

Answer **all** the questions in the spaces provided.

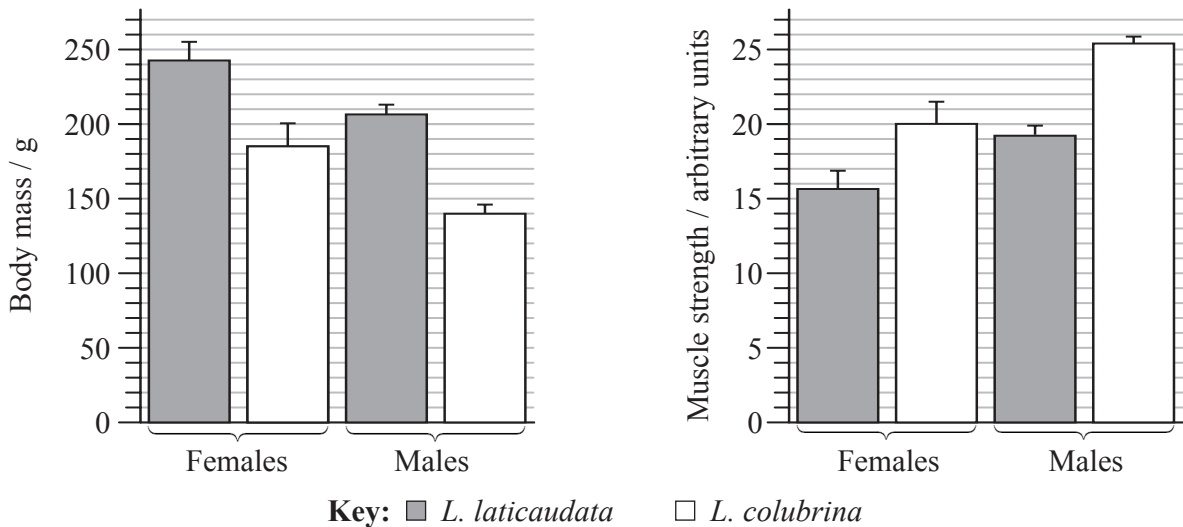
- Two species of sea snake, *Laticauda laticaudata* and *Laticauda colubrina*, spend most of their lives living in the sea. They must be able to move, hunt and survive in the water, but for short periods they need to come ashore to breed. They inhabit some of the Pacific islands which have low coral cliffs that the snakes need to climb in order to get onto dry land for courtship, mating and laying eggs.

Figure 1 Diagram to show a cross-sectional view of cliff used in the study



[Source: “Terrestrial locomotion in sea snakes: the effects of sex and species on cliff-climbing ability in sea kraits (Serpentes, Elapidae, Laticauda)”, X. Bonnet, I. Ineich and R. Shine, Biological Journal of the Linnean Society, August 2005, vol. 85, issue 4, pages 433-41, Wiley-Blackwell. Used with permission.]

The scientists studied the ability of snakes to climb the low cliff. They measured the body mass of the snakes and relative strength of the snakes. The mean results are shown in the bar charts below.



[Source: “Terrestrial locomotion in sea snakes: the effects of sex and species on cliff-climbing ability in sea kraits (Serpentes, Elapidae, Laticauda)”, X. Bonnet, I. Ineich and R. Shine, Biological Journal of the Linnean Society, August 2005, vol. 85, issue 4, pages 433-41, Wiley-Blackwell. Used with permission.]

(This question continues on the following page)



(Question 1 continued)

(a) State which sex of snake has the greater mean mass. [1]

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(b) State which species of snake is the strongest. [1]

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(c) The error bars represent standard deviation. Deduce which groups of snakes show the greatest variability in body mass. [1]

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(d) For *L. colubrina* calculate the difference between the strength of the male and the female snakes. [1]

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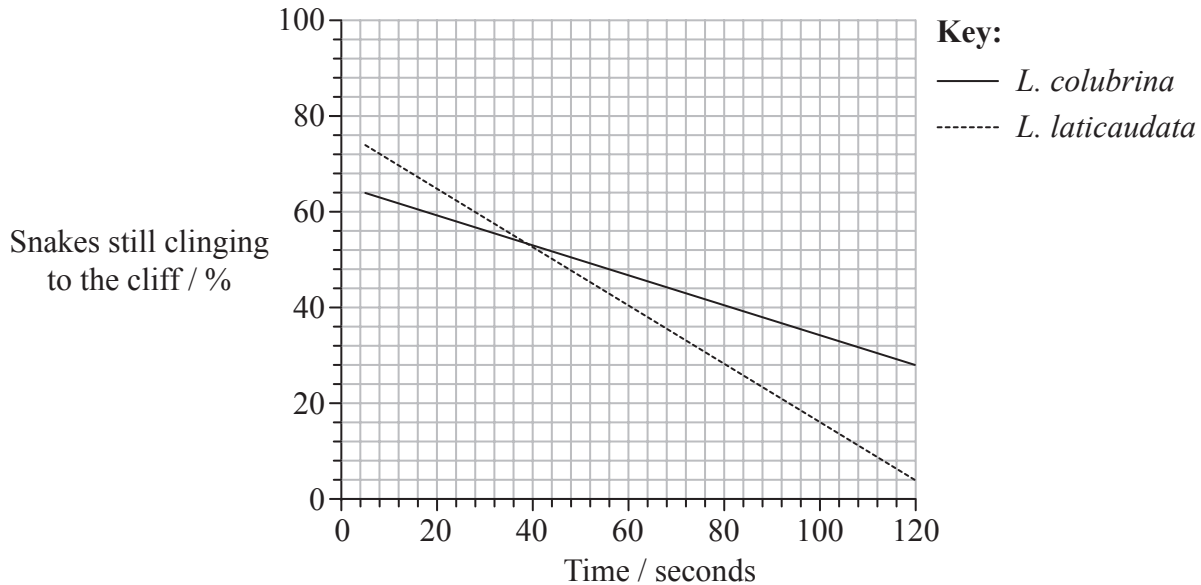
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(Question 1 continued)

The scientists placed male snakes onto the coral cliff near its base. They measured their ability to hold onto the coral cliff. The *L. colubrina* males climbed much faster than the males of *L. laticaudata*. The graph below shows the ability of snakes to cling to the coral cliff.



[Source: "Terrestrial locomotion in sea snakes: the effects of sex and species on cliff-climbing ability in sea kraits (Serpentes, Elapidae, Laticauda)", X. Bonnet, I. Ineich and R. Shine, Biological Journal of the Linnean Society, August 2005, vol. 85, issue 4, pages 433-41, Wiley-Blackwell. Used with permission.]

(e) (i) Compare the ability of the two species of snake to cling to the cliff. [2]

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(ii) Suggest **two** reasons for the difference in the ability of the snakes to cling to the cliffs for 120 seconds. [2]

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(Question 1 continued)

- (f) Discuss the advantages and disadvantages of body mass in these two species of snake. [3]

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2. (a) Distinguish between the terms *resolution* and *magnification* when applied to electron microscopy. [2]

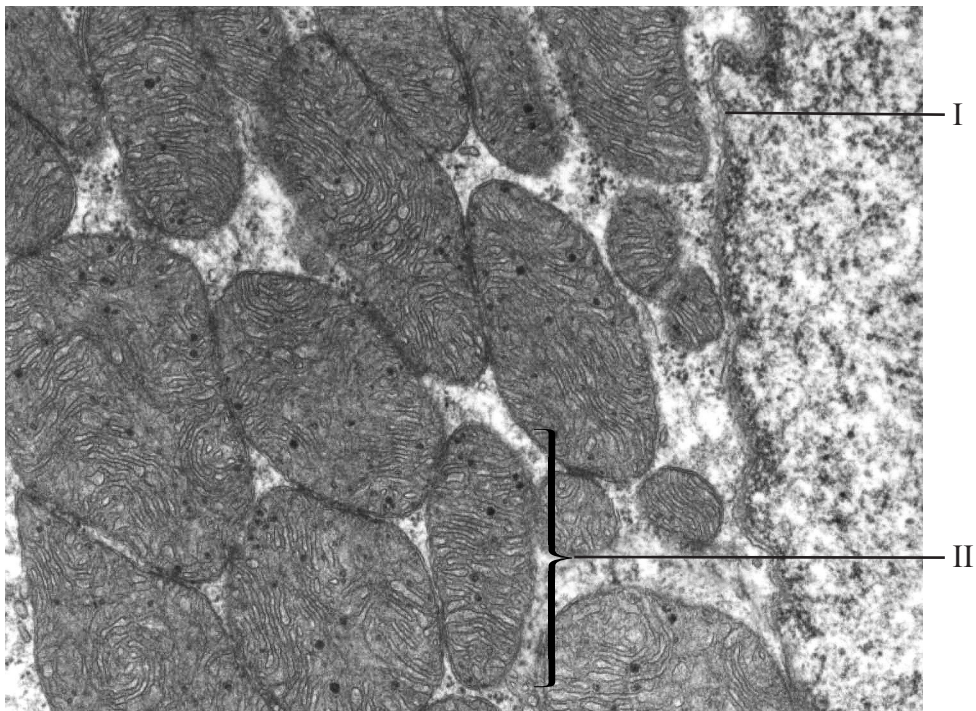
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The electron micrograph below shows part of a cell.



[Source: M Turmaine, UCL]

- (b) Identify the structures labelled I and II. [2]

I.

II.

- (c) State **one** function of the structure labelled II. [1]

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- (d) Deduce, with a reason, whether this cell is eukaryotic **or** prokaryotic. [1]

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3. (a) Explain the properties of water that allow living organisms to use it as a habitat. [3]

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(b) List **two** end products of aerobic cell respiration. [2]

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(c) State the name of the molecule that is the source of the oxygen released by plants during photosynthesis. [1]

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4. (a) Variation occurs at the species level. Explain how sexual reproduction promotes variation in species. [2]

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- (b) Living organisms are classified according to their characteristics using a hierarchy of *taxa*. State the missing *taxa* in the table below. [2]

Levels in the hierarchy of classification <i>taxa</i>	
(i)
	Phylum
(ii)
(iii)
	Family
(iv)
	Species

- (c) Explain how differentiation results in a variety of different types of cells occurring in a multicellular organism. [3]

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SECTION B

*Answer **one** question. Up to two additional marks are available for the construction of your answer. Write your answers on the answer sheets provided. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.*

5. (a) Draw a labelled diagram showing the fluid-mosaic model of a biological membrane. [5]
- (b) Explain the processes of active and passive transport that move materials across a membrane. [8]
- (c) Describe the features of the alveoli that make them well adapted for gaseous exchange. [5]
6. (a) Outline the structure of the different types of blood vessels. [5]
- (b) Discuss the role played by phagocytic leucocytes (phagocytes) in protecting the body from pathogens. [5]
- (c) Sickle cell anemia is caused by a mutation in a gene coding for hemoglobin. Explain how natural selection has led to an increase in the number of people with this mutation in certain parts of the world. [8]
7. (a) Explain why enzymes are substrate specific and why their activity is affected by substrate concentration. [8]
- (b) Outline the use of restriction enzymes (endonucleases) and DNA ligase in gene technology. [6]
- (c) Outline the role of **two** enzymes found in the digestive system of humans. [4]
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