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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Biology, 2008

90716 Describe animal behaviour and plant responses in relation to environmental factors

Credits: Four
9.30 am Monday 17 November 2008

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe animal behaviour and plant responses in relation to environmental factors. ☐	Describe animal behaviour and plant responses in relation to environmental factors. ☐	Describe animal behaviour and plant responses in relation to environmental factors. ☐
	Explain animal behaviour or plant responses in relation to environmental factors. ☐	Discuss animal behaviour or plant responses in relation to environmental factors. ☐
Overall Level of Performance (all criteria within a column are met) ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE

A study of the number of eggs laid by wild lizards (*Bassiana duperreyi*) found that the number of eggs in a clutch varied considerably.

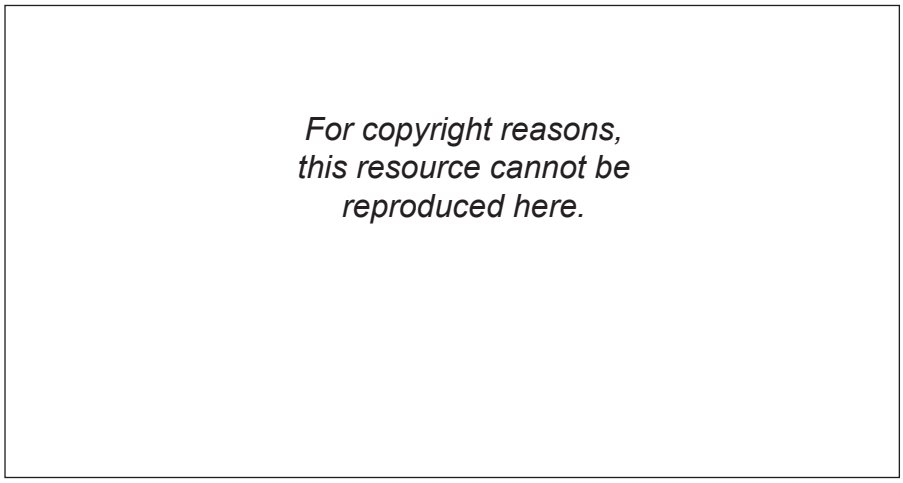

Figure 1: Frequency distribution of numbers of eggs found in natural nests of lizards (*Bassiana duperreyi*).

From Radder & Shine (2007) Why do female lizards lay their eggs in communal nests? *Journal of Animal Ecology* **76**: 881–887.

(a) Describe the trend in egg-laying behaviour shown in Figure 1.

By following individual lizards, the researchers found that the number of eggs laid by a single female was never more than nine.

(b) Give a reason for the observation that many nests contained 10 or more eggs.

(c) Give ONE reason why the lizards showed this pattern of behaviour.

(d) These lizards often congregate on branches or other resting places. Such areas are attractive to females. Some male lizards keep other males away from these areas, chasing them into less favoured sites.

Describe this form of social behaviour, **and** explain the benefits of it to the male lizards.

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Description: _____

Explanation: _____

(e) Males in some species of anole lizards use courtship displays that include head-bobbing and inflating a throat pouch. Individual males vary in both the duration of their displays, and the frequency of their head-bobs. The colour of the throat pouch varies between species.

http://www.sciam.com/article.cfm?id=animal-courtship-valentines

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Discuss the significance of these displays in the courtship of anole lizards.

QUESTION TWO

Assessor's use only

Scientists have found that some plants, when attacked by herbivores, release chemicals that attract animals, eg parasitic wasps that prey on the herbivores.

(a) Describe the relationship between the plants and the parasitic wasps.

(b) Explain the advantages that the plants **and** the wasps gain from this relationship.

(c) Mimosa (*Mimosa pudica*) is also called the 'sensitive plant' because its leaves fold inwards when touched. This an example of a nastic movement.

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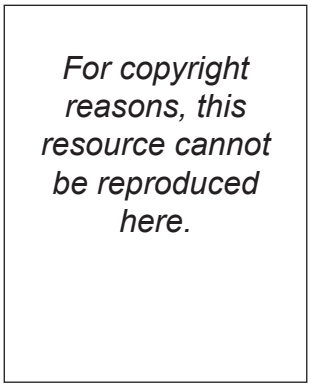
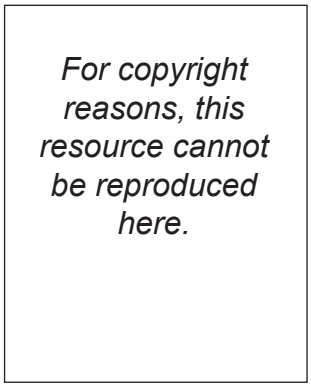


Leaves open



Leaves folded

http://mcgeezone.blogspot.com/2005/11/mimosa_18.html

Discuss the possible significance of this nastic movement in mimosa.

QUESTION THREE

Assessor's use only

Scientists studying photosynthesis in plants recorded data on carbon fixation (upper line on graph) and stomatal opening (lower line), over a 5-day period. The results are shown in Figure 2.

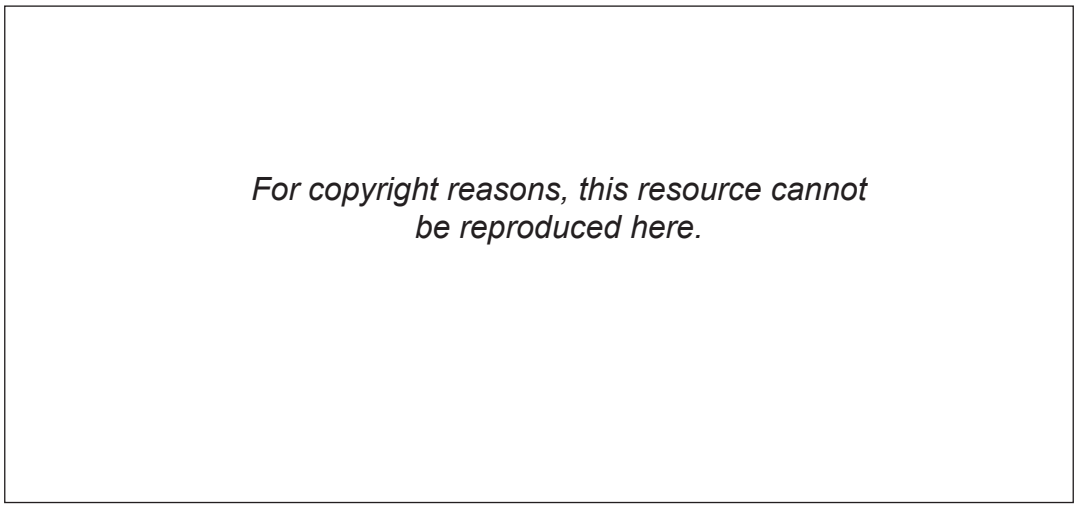


Figure 2: Carbon fixation and stomatal opening vs time.
http://www.tiem.utk.edu/bioed/webmodules/circadianrhythm.html

(a) Describe the rhythms of behaviour shown in this graph.

(b) Identify the environmental stimulus that entrains this rhythm.

(c) Explain why these cycles show the same pattern.

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Crab larvae are free-swimming within the water column. Larvae were collected from estuary water and kept in tanks in the laboratory in conditions of constant light and temperature. Their movements were recorded for 120 hours, and the results are shown in Figure 3.

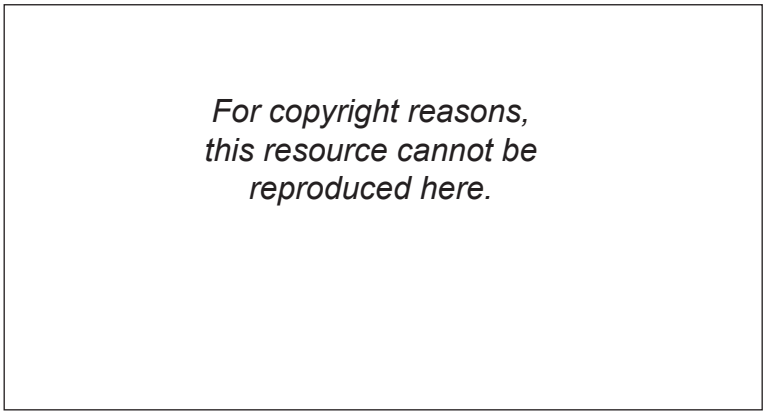

Figure 3: Vertical swimming activity records of field-caught crab larvae (*Carcinus maenas*) in constant laboratory conditions.

From: C. Zeng & E. Naylor (1996) Endogenous tidal rhythms of vertical migration. *Marine Ecology Progress Series* **132**: 71–82.

The arrows show times of expected high tides at the collection site.

(d) Describe the pattern of rhythmic behaviour shown in this figure.

(e) In this species, adult crabs live on mudflats in estuaries, and the larvae were caught in estuary waters.

Discuss the significance of the vertical swimming behaviour pattern of crab larvae. In your answer you could consider:

- dispersal
- feeding
- predation.

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Extra paper for continuation of answers if required.
Clearly number the question.

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Question number