For Supervisor's use only

3

90716

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 3 Biology, 2004

90716 Describe animal behaviour and plant responses

Credits: Four
9.30 am Thursday 25 November 2004

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 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.

Achievement Criteria *For Assessor's use only*		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe animal behaviour and plant responses in relation to environmental factors.	Explain animal behaviour and plant responses in relation to environmental factors.	Discuss animal behaviour and plant responses in relation to environmental factors.
Overall Level of Performance		

You are advised to spend 45 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

Fiddler crab

www.sherpaguides.com

The chart below shows the activity pattern of a fiddler crab, *Uca minax*. The data was collected in constant environmental conditions including dim light. Daily activity is presented in succession down the chart. Dots indicate times of high tide on the crabs' home beach.

John Brady, *Biological Clocks,* Edward Arnold (Publishers Ltd), London, 1979.

(a) Describe the distinctive features of the crabs' activity pattern over the first three days.

(b) The crabs' activity rhythm is **endogenous**. Explain how the chart supports this statement.

Fiddler crabs occupy the mid-tidal zone of muddy or sandy beaches.

Assessor's use only

(c) Discuss how this activity behaviour of the crab might be advantageous for its survival.

QUESTION TWO

Assessor's use only

The experiment illustrated below was designed to investigate **allelopathy** – the chemical inhibition of one species by another.

[For copyright reasons, this resource cannot be reproduced here. See below.]

Habitats and the environment, Freelance Publishing, 1991

(a) When grass and apple seedlings grow together, interspecific competition occurs. Explain how the grass would benefit from the allelopathy shown in the above information.

Allelopathic substances could influence interspecific relationships and **succession** (the progressive sequence of changes in a community from pioneer to climax community) in plant communities such as grasslands.

(b) Discuss how allelopathic substances could influence interspecific relationships, succession and subsequent biodiversity in a grassland community.

Assessor's use only

QUESTION THREE

Assessor's use only

The golden bowerbird lives in tropical rainforest. During the mating season, the male builds or adds to an extensive 'bower' as shown in the illustration. The woven structure of vines is often up to 2 m high and decorated with lichen and small pale flowers. The male bowerbird calls and 'dances' on or around his bower. Females respond to this courtship behaviour by approaching the bower.

[For copyright reasons, this resource cannot be reproduced here. See below.]

http://mangoverde.com/birdsound/picpages/pic188-11-3.html

(a) Explain the benefits of such behaviour to the bower birds.

The females respond to all the displaying males in their area but will only allow the male who has the 'best' bower to copulate. Usually all the females in a given area will copulate with the same male. Following copulation, each female will build and lay her eggs in a normal nest and raise the chicks alone.

(b) Describe what 'best' might mean when applied to a bower.

(c) ‘Usually all the females in an area will copulate with the same male.’ Explain the survival advantages of this behaviour for the golden bowerbird species.

Assessor’s use only

A study of 46 bowers has shown that, while many of the bowers are between 40 and 50 years old, a male bird will only ‘own’ a bower for about 7 years on average.

(d) Discuss the relationship between the bird’s ownership of a bower and the age of the bowers themselves. Note: Golden bowerbirds have been known to live up to 25 years.

New Zealand robins live in the bush. Like most New Zealand birds, they establish a pair-bond between one male and one female. Both birds then rear the chicks.

(e) Explain why the bowerbird system of one bird rearing the chicks alone has not evolved in many bird species in New Zealand.

QUESTION FOUR

Assessor's use only

The illustrations below are photographs of a student's investigation of early root growth in germinating maize seeds.

The maize seeds were all clamped so the emerging radicle (young root) was horizontal in dark conditions with equal humidity and temperature.

Experiment A		**Experiment B** **Bowl of mercury below as barrier** (mercury is a dense liquid that has no chemical effect on root growth)		**Experiment C** **Root cap removed**	
0 hours	4 hours later	0 hours	4 hours later	0 hours	4 hours later
v	[For copyright reasons, this resource cannot be reproduced here. See below.]				

Malcolm Wilkins, *Plantwatching*, MacMillan Ltd, London, 1988, p. 67

(a) Describe the plant response the student was investigating.

(b) Discuss how the results of these experiments are of benefit to the seedlings concerned. Relate the function of any chemicals involved to the benefit of the plant response in your discussion.

Assessor's use only

A Spacelab ran an experiment on the same response, using lentil seeds. The sketch below shows the results in the Spacelab.

Lentil seeds in zero gravity	Lentil seeds subjected to centrifugal forces equivalent to earth's gravitational field
[For copyright reasons, this resource cannot be reproduced here. See below.]	

Malcolm Wilkins, *Plantwatching*, MacMillan Ltd, London, 1988, p. 66

(c) Explain the results shown by the young roots of the lentils in the Spacelab.

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

Assessor's use only

Question number