NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 3 Biology, 2009

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

Credits: Four

2.00 pm Thursday 19 November 2009

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 45 minutes answering the questions in this booklet.

QUESTION ONE: MONARCH MIGRATIONS

Every year monarch butterflies (*Danaus plexippus*) migrate from central and eastern North America to a forest region in central Mexico. The butterflies that leave the northern regions breed on the way south, and then die. The migration cycle is completed over a number of generations.

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adapted from www.monarchwatch.org

(a)   Monarch butterfly migration is an example of an innate behaviour.

Explain why this monarch butterfly migration is an example of an innate behaviour, and **not** a learned behaviour.

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The monarch butterfly migration begins as the days get shorter in early autumn.
Scientists studying monarch migratory behaviour found that in natural, sunny conditions the butterflies oriented to the southwest. Under simulated overcast conditions, the butterflies showed no significant orientation in any direction.

(b)   Discuss this migratory behaviour of monarch butterflies with reference to:
- the stimuli that trigger monarch migratory behaviour
- the benefits to be gained from this migration
- the impact of this migration on current **and** future populations of monarch butterflies.

QUESTION TWO: THE NORTHERN RATA

Northern rata (*Metrosideros robusta*) is found in lowland forest throughout the North Island and near the northwest coast of the South Island. It is much more common as an epiphyte than a ground plant, and is mostly found growing on established trees such as the rimu (*Dacrydium cupressinum*). Both the rata and its host require plenty of light.

The rata epiphyte develops tuber-like swellings on its roots, which help with water storage.

Eventually roots from the epiphyte grow down the trunk of the supporting tree to the ground, forming a massive trunk and root system. This system replaces and eventually kills the supporting tree.

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http://davidwallphoto.com

(a)   Describe ONE advantage to the rata in becoming established as an epiphyte on the rimu.

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(b)   Eventually the rata replaces the host tree as the dominant emergent canopy species.

The initial relationship between rata and its host is an example of commensalism. However, this changes as the rata tree establishes itself and grows to a mature, reproductive tree.

Discuss the interspecific relationships that exist between the rata and its host as the rata grows, **and** the consequences of these changes for **both** trees.

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QUESTION THREE: BEHAVIOUR IN AFRICAN STARLINGS

The breeding behaviour of African starlings is affected by their environment. Birds living on the open grasslands often breed in large, cooperative groups, while birds in the forests breed in pairs.

In cooperative breeding, although only one pair of individuals may actually produce offspring, all the members of the group help to raise the young.

The African savannah is a highly seasonal habitat, with wide variation in rainfall from year to year, and this would have an impact on the availability of food.

Discuss reasons for the differences in intraspecific relationships within each of the two groups of African starlings.

In your discussion you should consider:
•   territoriality
•   co-operative interactions
•   competition for resources.

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QUESTION FOUR: NEW ZEALAND MISTLETOE

New Zealand's red mistletoe grows on native beech trees (eg *Nothofagus*) in the southern beech forests of New Zealand. It is often referred to as a hemi-parasite, rather than a true parasite.

Like other mistletoe species, red mistletoe plants have large green leaves and root-like structures called haustoria. The haustoria penetrate the host plant's bark and grow into its transport tissues (xylem and phloem). In December the mistletoe produces attractive bright red flowers.

(a)   Explain why the red mistletoe is **not** considered to be fully parasitic on its host plant.

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(b)   Red mistletoe is one of three New Zealand mistletoes with an unusual method of pollination. They are pollinated by nectar-feeding birds such as tui. The bird must twist the flower bud to obtain its nectar. This causes the bud to spring open, showering the bird's head with pollen. There is a mutualistic relationship between the tui and the mistletoe.

Discuss the importance of **both** parasitic and mutualistic relationships in the life cycle of the red mistletoe.

In your discussion consider the impact that mistletoe has on other organisms, **both** plant and animal.

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

Question number