*For Supervisor's use only*

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**90772**

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

# Level 2 Science, 2005

## 90772 Describe the factors and processes involved in the evolution of New Zealand's plants and animals

Credits: Four
2 pm Friday 18 November 2005

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 2–8 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 the factors and processes involved in the evolution of New Zealand's plants and animals. | Explain the factors and processes involved in the evolution of New Zealand's plants and animals. | Discuss the factors and processes involved in the evolution of New Zealand's plants and animals. |
| **Overall Level of Performance** | | |

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

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## QUESTION ONE: DEFINITIONS

In the table below, match the correct definition against the key word. The key word **"evolution"** has been done for you.

| KEY WORD | DEFINITION |
|---|---|
| Evolution | B |
| Mutation | |
| Genetic variation | |
| Genetic drift | |
| Founder effect | |
| Bottleneck | |

DEFINITIONS

**A** A random change in the genetic code of an organism.

**B** A change in the characteristics of a population over time.

**C** A change in the allele frequency because a colonising population is a subset of a larger population.

**D** A large scale but short-term reduction in population size followed by an increase.

**E** A random change in the genetic makeup of a population.

**F** Differences amongst individuals in a population due to differences in their alleles.

## QUESTION TWO: GEOLOGICAL FACTORS IN EVOLUTION

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One hundred million years ago, New Zealand was part of Gondwanaland. Many of New Zealand's unique endemic (native) plants and animals had evolved at this time and travelled on the New Zealand landmass when it separated from Gondwanaland.

(a) Describe the **key** geological event that separated New Zealand from Gondwanaland.

(b) Discuss how the key event in (a) above impacted on New Zealand's endemic plants and animals.

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During the Tertiary period of New Zealand's geologic history, New Zealand was a series of low-lying, small islands separated by shallow seas.

(c) Explain ONE **evolutionary effect** the small low-lying islands would have had on the evolution of New Zealand's endemic plants and animals.

## QUESTION THREE: POLLINATION

New Zealand never had its own social bees. Moths have evolved in New Zealand to become one of the key pollinators of endemic plants.

(a) Circle the answer to the following question.

The moth as a pollinator is an example of a

**Biological Factor** **Geological Factor**

(b) Describe ONE feature that plants have evolved to allow moths to pollinate them rather than social bees.

(c) Explain how the chosen feature allows moths to pollinate the plant.

## QUESTION FOUR: NEW ZEALAND'S POLYSTICHUM FERNS

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In 2001, DNA studies on the six species of New Zealand's endemic *Polystichum* ferns showed them to have evolved from a common Australian ancestor 13 million years ago. Evidence also shows there was only one invasion of the Australian ancestral type. Since establishing in New Zealand the *Polystichum* fern now occupies coastal to alpine environments.

**[FOR COPYRIGHT REASONS, THIS RESOURCE CANNOT BE REPRODUCED HERE. SEE BELOW.]**

www.ccc.govt.nz/parks/TheEnvironment/StreamsidePlantingGuide

(a) Explain why the *Polystichum* fern could not have come from the original Gondwanaland populations.

(b) Discuss how the *Polystichum* fern has **evolved** into the six species now found in different environments in New Zealand.

## QUESTION FIVE: ENDEMIC ANIMALS

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(a) Name an animal endemic (native) to New Zealand that came from Gondwanaland.

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(b) Many New Zealand endemic animals are close to extinction today because they cannot survive competition with introduced animals.

Explain why these endemic animals never evolved strategies to survive competition with introduced animals such as deer, cats and possums.

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## QUESTION SIX: LETTER TO THE EDITOR

Dear Sir

While filling the car with petrol I noticed a question written on a small blackboard on the service station forecourt. It read, "If the kea has evolved from the kaka, why do we still have the kaka?" Perhaps one of your readers can provide me with the answer.

John

Alexandra

Adapted from a letter to the editor 18/12/04
*Southland Times*, Invercargill

Refer to the letter on the opposite page.

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Using your knowledge of the process of evolution, write an answer for John to **discuss** why the kea evolved from the kaka yet the kaka has survived essentially unchanged.

**Key words: common ancestor, differential selection pressures, genetic isolation, mutations.**

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

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| Question number | |
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