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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, 2006

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

Credits: Four
2.00 pm Tuesday 28 November 2006

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

Key List

A	Founder effect	**B**	Natural selection
C	Genetic drift	**D**	Mutation
E	Gene pool	**F**	Disruptive
G	Stabilising	**H**	Genome
I	Directional		

Choose the **letter** from the key list above that matches the definition in (a) – (d).

(a) The genetic make-up of a population. ☐

(b) Speciation involving the arrival of a few individuals. ☐

(c) The unequal reproductive success of different genes. ☐

(d) Selection type that selects for the average of a population. ☐

QUESTION TWO: EVOLUTION OF DWARF INANGA

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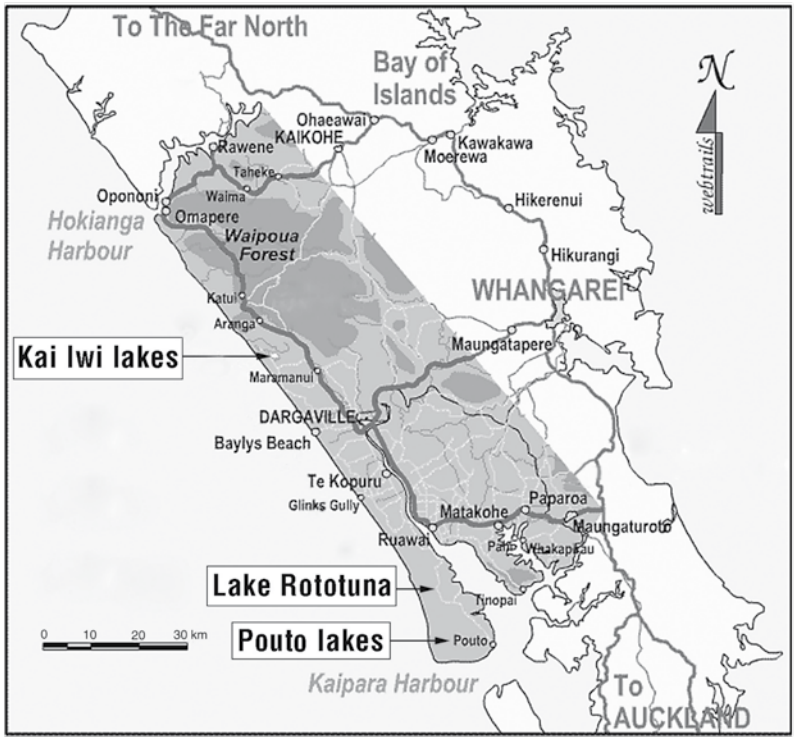
Dwarf inanga (whitebait), *Galaxias gracilis*, are found only in small freshwater dune lakes in Northland. The lakes are found in three distinct geographical areas (see map below).
DNA evidence suggests they separated from ordinary whitebait about 2 million years ago.



UEBS, Biology, 2001,

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www.niwascience.co.nz/rc/freshwater/fishatlas/species/dwarf_inanga

(a) Name TWO factors, one biological and one geological, that could be contributing to evolution (speciation) occurring in the dwarf inanga (whitebait) populations in Northland.

Biological Factor: _____

Geological Factor: _____

(b) Explain which factor you named in (a) that you think is the more important in the evolution of the dwarf inanga.

_____

_____

_____

_____

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QUESTION THREE: SOUTHERN RATA (*Metrosideros umbellata*)

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The southern rata (*Metrosideros umbellata*) has been in New Zealand for over 50 million years. About 1–2 million years ago, the northern rata evolved from the southern rata.

(a) Where did the southern rata come from?

(b) Identify the significant geological event that happened in the New Zealand region 1–2 million years ago.

(c) Explain how this event could have led to the evolution of the northern rata.

The flowers of the rata are animal pollinated. The pollinators are birds during the day and short-tailed bats at night. These pollinators have existed for as long as the southern rata has existed.

(d) Describe why these rata flowers never evolved flower forms that social bees could easily pollinate.

QUESTION FOUR: HECTOR'S DOLPHIN

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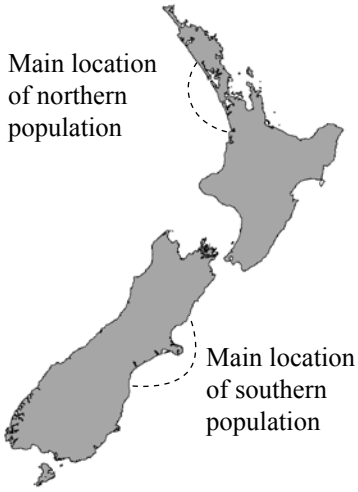
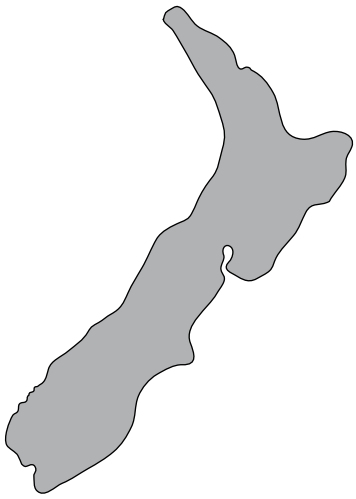
Hector's dolphin is the world's rarest dolphin, and is found only in New Zealand waters. There are two subspecies of Hector's dolphin; recent DNA studies have shown the northern population differs from the southern population (see map below).

Warm Interglacial Periods



Ice Age Periods



(a) Explain how the ice age contributed to the evolution of the two subspecies of Hector's dolphin.

(b) Discuss the genetic factors that could have contributed to the evolution of the two subspecies of Hector's dolphin.

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QUESTION FIVE: TREE WETA

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Tree weta are large flightless insects. Many species are found throughout New Zealand. Two species live on Banks Peninsula in Canterbury today: the Canterbury tree weta (*Hemideina femorata*) and the Banks Peninsula tree weta (*Hemideina ricta*). Both species of weta are thought to have had a common ancestor.

Discuss how the two species of weta could have evolved, assuming they had a common ancestor.

Keywords: Different selection pressures, genetic isolation, mutations, founder effect.

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

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Question number	