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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Biology, 2008

90717 Describe processes and patterns of evolution

Credits: Three
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 2–8 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 processes and patterns of evolution. ☐	Describe processes and explain patterns of evolution. ☐	Describe processes and discuss patterns of evolution. ☐
Overall Level of Performance ☐		

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

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QUESTION ONE

Most fish stocks, in New Zealand and around the world, are intensively harvested by fishermen. The mesh sizes used in their nets mean that the fish they catch are mostly the larger and older individuals. This is a form of selection.

(a) Explain what is likely to happen to the fish populations if this pattern of selection continues to operate.

There are two species of *Howea* palm on Lord Howe Island. They evolved there from a common ancestor between one and two million years ago. Scientists have found that the two *Howea* species are found in the same area.

(b) Identify the **pattern of evolution** that could give rise to these two palm species.

(c) Identify the type of **speciation** that is most likely to have occurred in *Howea* palms.

(d) Palms are wind-pollinated flowering plants.

Explain how these two species are reproductively isolated.

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There are nine species of plants in the genus *Pachycladon.* One of these species is endemic to Tasmania, while the rest are endemic to the South Island of New Zealand. They have evolved within the last 3.5 million years, during the last Ice Age and when the Southern Alps were forming. The species have different physical features and are found in different habitats. For example, they grow on different types of soil and rock.

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Evolutionary relationships in *Pachycladon*.

From: http://awcmee.massey.ac.nz/NZPRN/taxa_Pachycladon.htm

(e) Describe the **pattern** of evolution shown by the species in the genus *Pachycladon.*

(f) Discuss how this group of species could have evolved. In your answer consider:

- geological events
- selection pressures.

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QUESTION TWO

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Yellowthroats (*Geothlyis trichas*) are sparrow-sized birds from North America. Males have a bright yellow throat and a black face-mask. Females use these features to choose a mate. Scientists studying yellowthroats have found that New York females choose their mate on the basis of his throat colouration, while females from Wisconsin use the male's mask to make their decision.

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http://commons.wikimedia.org/wiki/Image:Common_yellowthroat.jpg

(a) Identify the form of selection that is operating in these yellowthroat populations.

(b) Discuss the implications of females' mate preferences for the future **evolution** of yellowthroats.

New Zealand has at least 37 species of geckos in two genera, *Hoplodactylus* and *Naultinus*. *Hoplodactylus* has the highest species diversity of all New Zealand's terrestrial vertebrates.

Geckos are ecologically diverse and found in almost all available terrestrial habitats.

DNA data suggest that adaptive radiation in geckos began about 24 million years ago, a time when New Zealand consisted of a series of low-lying islands. Since then New Zealand has experienced: substantial rises and falls in sea level; a period of mountain-building and volcanic activity; and the glaciations of the Pleistocene 'Ice Age'.

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Forest gecko (*Hoplodactylus* aff. *granulatus)*.

www.ryanphotographic.com/images/JPEGS/Hoplodactylus%20

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(c) Identify the **form** of speciation that has given rise to New Zealand's geckos.

(d) Discuss the evolution of *Hoplodactylus* geckos in New Zealand. You should consider the impact of the geographical isolating mechanisms listed above, and the evolution of reproductive isolating mechanisms between the species.

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

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Question number