

See back cover for an English translation of this cover

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91605M



916055



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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Koiora, Kaupae 3, 2014

91605M Te whakaatu māramatanga ki ngā tukanga o te kunenga mai e whakaputa ai i te whakamomotanga

9.30 i te ata Rāpare 13 Whiringa-ā-rangi 2014
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā tukanga o te kunenga mai e whakaputa ai i te whakamomotanga.	Te whakaatu māramatanga hōhonu ki ngā tukanga o te kunenga mai e whakaputa ai i te whakamomotanga.	Te whakaatu māramatanga matawhānui ki ngā tukanga o te kunenga mai e whakaputa ai i te whakamomotanga.

Tirohia mehemea e ōrite ana te Tau Ākongā ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe ngā pātai KATOĀ kei roto i te pukapuka nei.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–19 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI

He momo e pātata ā-whanaunga ana te koiota, te tiakara me te tihingo ki te whānau kurī.
E whakaaturia ana tō rātou tohatohanga¹ i te mahere whenua.

E inaki ana ngā rohe o ētahi momo tiakara motuhake e toru, arā te takara taha kotikoti², te tiakara kōura, me te tiakara tuarā pango, i te takiwā Serengeti o Āwherika ki te rāwhiti. He tino whai nōhanga ēnei kīrehe, ēngari ka waiho noa i ērā atu momo tiakara, me te kore whakaputa uri whakawhiti momo.

E mōhiotia ana kua whakaputa uri te koiota, te tiakara, me te tihingo ki te kurī whakarata pūnoa me te whakaputa i ngā uri matahūa.



He mea urutau mai i: Michael Kent, *Advanced Biology* (Rānana: Oxford Press, 2000) wh. 462.

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Tiakara tuarā pango

www.arts-wallpapers.com/desktop_wallpapers/travel_places/Africa-Kenya/images/adult_black%20backed_jackal_masai_mara_kenya.jpg

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Tiakara taha kotikoti

<http://rosswarner.com/8695.jpg>

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Tiakara kōura

<http://www.talkshoe.com/custom/images/icons/TC-131584-MainIcon.jpg>

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Koiota

www.gpwmi.us/graphics/coyote2.jpg

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Tihingo

http://images.nationalgeographic.com/wpf/media-live/photos/000/005/cache/dingo_514_600x450.jpg

¹ tuaritanga

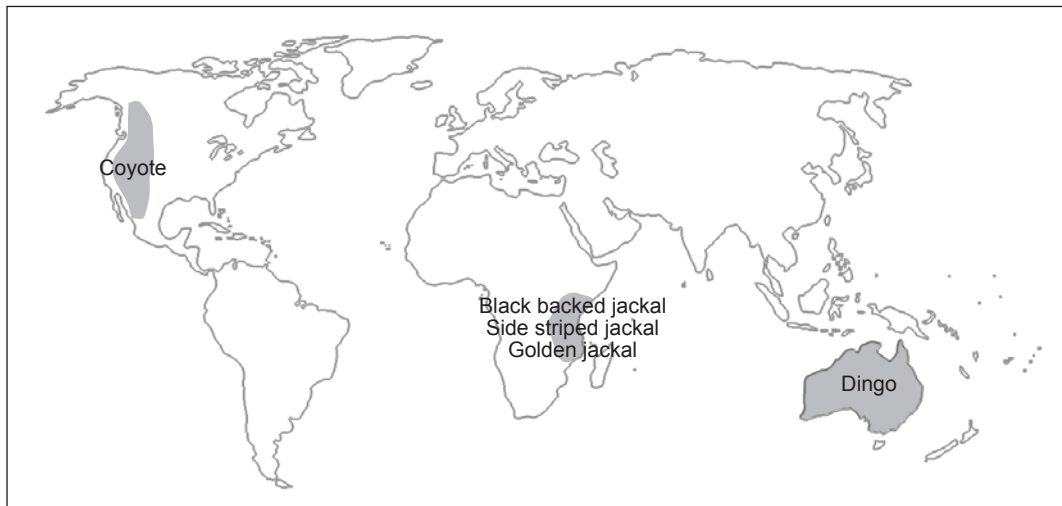
² tāhekeheke

QUESTION ONE

The coyote, jackal, and dingo are closely related species belonging to the dog family. Their distribution is shown on the map.

The ranges of three distinct species of jackal, the side striped jackal, the golden jackal, and the black backed jackal, overlap in the Serengeti area of eastern Africa. These animals are highly territorial, but simply ignore the other jackal species and no interbreeding takes place.

The coyote, jackal, and dingo have been known to interbreed with the common domestic dog and produce fertile offspring.



Adapted from: Michael Kent, *Advanced Biology* (London: Oxford Press, 2000,) p 462.

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Black backed jackal

www.arts-wallpapers.com/desktop_wallpapers/travel_places/Africa-Kenya/images/adult_black%20backed_jackal_masai_mara_kenya.jpg

Side striped jackal

<http://rosswarner.com/8695.jpg>

Golden jackal

<http://www.talkshoe.com/custom/images/icons/TC-131584-MainIcon.jpg>

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Coyote

www.gpwmi.us/graphics/coyote2.jpg

Dingo

http://images.nationalgeographic.com/wpf/media-live/photos/000/005/cache/dingo_514_600x450.jpg

Compare and contrast how these distinct species, although closely related, have evolved from a common ancestor.

In your answer:

- describe the term reproductive isolating mechanism
- explain how these species could have become reproductively isolated
- consider the selection pressures that have led to speciation in these cases, and whether this is true speciation.

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There is more space for your answer to this question on page 7.

PĀTAI TUARUA

He kaiota motuhake ngā aruhe kahuku (*Danaus plexippus*), me te kai anake i ngā tipu nō te whānau waiūatua (*Asclepias spp*), e whānau ai te kahuku i ana hua.

Ka puta i ngā waiūatua ngā pūhui hauwai pāpāhua paitini, ā, ka whakawhenumitia e ngā aruhe. Nā tēnei i paitini ai te aruhe ki ngā konihi kararehe maha. Kai haere ai ngā aruhe kahuku i te take o ngā ia rau o te tipu hei kati atu i te tawau tāoke piripiri e taea ana te pararaiha i te aruhe me te whakapiri i tana waha kia kati.

I kitea e ngā tohunga pūtaiao o nā tata nei kua heke haere te taumata tāoke i roto i ētahi waiūatua ēngari kua piki te kaha ki te whakatipu tere anō i ngā kiko tipu ina tūkinohia e ngā aruhe kahuku i te wā e timotimo haere ana.

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

He aruhe kahuku i a ia e kai ana i te waiūatua.
<http://cindyha.files.wordpress.com/2008/07/monarch-caterpillar.jpg>

Kahuku.
http://upload.wikimedia.org/wikipedia/commons/thumb/6/63/Monarch_In_May.jpg/800px-Monarch_In_May.jpg

Aromatawaihia te whanaungatanga kunenga i waenga i ngā kahuku me ngā tipu waiūatua.

I tō whakautu me:

- whakaahua te kīanga kunenga ngātahi
- whakamārama he pēhea te whanake haere o tēnei momo pānga
- aromātai i ngā pēhanga tīpako e hāpai ana, e ārai ana hoki i te pānga waiūatua–kahuku.

He wāhi anō mō tō whakautu ki tēnei pātai kei te whārangi 10.

QUESTION TWO

Monarch butterfly caterpillars (*Danaus plexippus*) are specialist herbivores, feeding only on plants belonging to the milkweed family (*Asclepias spp*), on which the monarch butterfly lays its eggs.

Milkweeds produce poisonous alkaloids, which the caterpillars absorb. This makes the caterpillar poisonous to many animal predators. Monarch butterfly caterpillars eat around the base of the plant's leaf veins to cut off the flow of sticky toxic latex that can paralyse the caterpillar and glue its mouth parts shut.

Recently scientists found that some milkweed plants have developed a decrease in their toxicity levels but an increase in their ability to rapidly re-grow plant tissue after they have been damaged by browsing monarch caterpillars.

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A monarch caterpillar feeding on milkweed.

<http://cindyha.files.wordpress.com/2008/07/monarch-caterpillar.jpg>

Adult monarch butterfly.

http://upload.wikimedia.org/wikipedia/commons/thumb/6/63/Monarch_In_May.jpg/800px-Monarch_In_May.jpg

Evaluate the evolutionary relationship between the monarch butterflies and the milkweed plants.

In your answer you should:

- describe the term co-evolution
- explain how this kind of relationship develops
- evaluate the selection pressures that work both for and against the milkweed– monarch relationship.

**There is more space for your
answer to this question on page 11.**

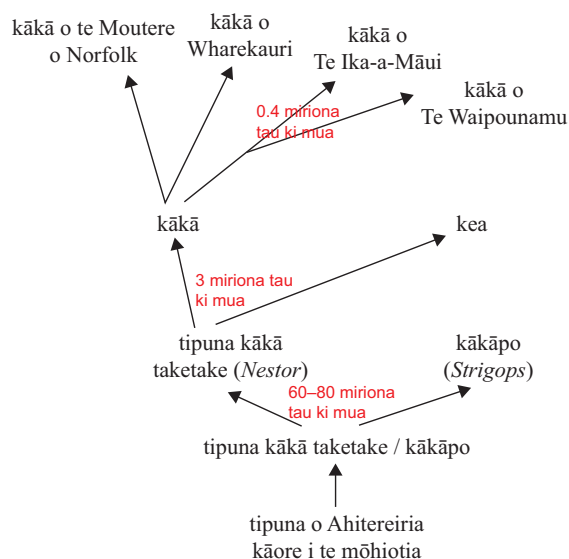
PĀTAI TUATORU

Ko te whakaaro i takea mai te kea me te kākā mai i te tipuna kotahi, te tipuna kākā taketake, tata ki te 3 miriona tau ki mua, i te putanga o Te Tiritiri-o-te-Moana me tētahi āhuarangi makariri ake i Te Waipounamu. I urutau te kea ki te taiao maunga, ēngari anō te kākā i urutau ki ngā ngahere mahana ake i te taha raki. E rua ngā momo kākā kua korehāhā, ko te kākā o te Moutere o Norfolk me te kākā o Wharekauri.

Tata ki te 0.4 miriona tau ki mua i wehe ngā kākā o Te Ika-a-Māui me Te Waipounamu, ā, e ora ana ināianei hei momo iti kāore e whakaputa uri whakawhiti momo, me te rahi me ngā tae rerekē, e ai ki ngā whakaahua i raro.

Kua puta ngā āwangawanga o nā tata nei mō te papātanga o te konihitanga, whakataetae hoki ki te kākā, i patua ai te maha o ngā uwaha kākā whakakōpae i roto i ngā reanga e toru, ā, kua whakaurua mai ngā tikanga whāomoomo.

Kunenga o te rōpū kākā / kea / kākāpo



He mea urutau mai i: E. J. Grant-Mackie, J. A. Grant-Mackie, W. M. Boon rātau ko G. K. Chambers, 'Evolution of New Zealand Parrots', *New Zealand Science Teacher*, (2003) 103, wh. 14–17.

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Kākā o Te Ika-a-Māui

Jean-Claude Stahl: <http://nzbirdsonline.org.nz/species/kaka>

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Kākā o te Te Waipounamu

Cheryl Marriner: <http://nzbirdsonline.org.nz/species/kaka>

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

Kea – e kitea ana i Te Waipounamu anake

Mark Fraser: <http://nzbirdsonline.org.nz/species/kea>

Tātarihia ngā takahanga o mua i puta ai te kunenga o te kea me ngā momo, momo iti hoki e whā o te kākā mai i te tipuna kākā taketake, me te aromātai i ngā pānga e taea ana o ngā papātanga o nāianei ki ngā kākā o Aotearoa.

I tō whakautu:

- me whakaahua ngā tikanga o te whakamomotanga nohomawehe (allopatric) me ngā momo nohotata (sympatric), ā, ka whakahāngai i ēnei tikanga ki te tauira i runga ake
- me whakamārama ngā takahanga i puta ai te kunenga o te tipuna kākā taketake hei kea, me ngā momo, momo iti hoki e whā o te kākā
- me whakataurite ngā papātanga o ngā takahanga o mua ME ngā takahanga o nāianei ki te whakamomotanga o te kākā i muri i tana tihoitanga atu i te kea i ngā tau tata ki te 3 miriona ki mua.

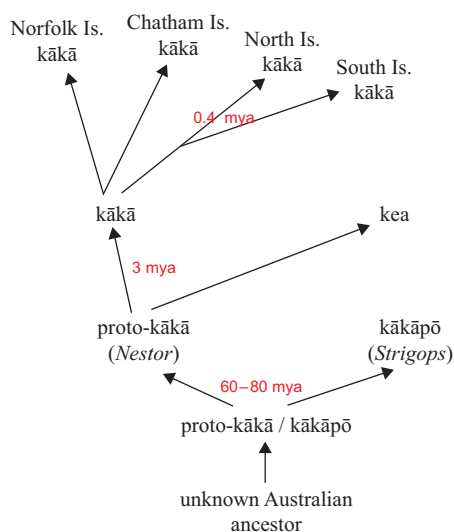
QUESTION THREE

It is thought that both the kea and kākā descended from a common ancestor, proto-kākā, about 3 million years ago (mya) with the formation of the Southern Alps and a cooler climate within the South Island. Kea adapted to the alpine environment, whereas kākā adapted to the warmer northern forests. Two species of kākā, the Norfolk Island and Chatham Island kākā, are now extinct.

About 0.4 mya the North and South Island kākā differentiated and exist today as two non-interbreeding subspecies, with differing sizes and colouring, as shown below.

More recent concerns have been raised about the impact of predation and competition on kākā, where a large number of female nesting birds have been killed over three generations, and conservation measures have been introduced.

Evolution of kākā / kea / kākāpō complex



Adapted from: E. J. Grant-Mackie, J. A. Grant-Mackie, W. M. Boon & G. K. Chambers, 'Evolution of New Zealand Parrots', *New Zealand Science Teacher*, (2003) 103, pp 14–17.

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North Island kākā

Jean-Claude Stahl: <http://nzbirdsonline.org.nz/species/kaka>

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South Island kākā

Cheryl Marriner: <http://nzbirdsonline.org.nz/species/kaka>

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Kea – found only in South Island.

Mark Fraser: <http://nzbirdsonline.org.nz/species/kea>

Analyse the past events that have led to the evolution of kea and the four kākā species and subspecies from the ancestral proto-kākā, and evaluate the possible effects of current impacts on the existing New Zealand kākā.

In your answer:

- describe the meanings of allopatric speciation and sympatric species, and relate these meanings to the above example
- explain the events that have led to evolution of proto-kākā into kea, and four species and subspecies of kākā
- compare and contrast the impacts of past AND current events on speciation of the kākā after its divergence from the kea approximately 3 million years ago.

**He wāhi anō mō tō whakautu ki
tēnei pātai kei te whārangi 16.**

English translation of the wording on the front cover

Level 3 Biology, 2014

91605 Demonstrate understanding of evolutionary processes leading to speciation

9.30 am Thursday 13 November 2014

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of evolutionary processes leading to speciation.	Demonstrate in-depth understanding of evolutionary processes leading to speciation.	Demonstrate comprehensive understanding of evolutionary processes leading to speciation.

91605M

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 attempt 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 2–19 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.