

91603



NEW ZEALAND QUALIFICATIONS AUTHORITY MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD KIA NOHO TAKATŪ KI TŌ ĀMUA AO! Tick this box if you have NOT written in this booklet



Level 3 Biology 2022

91603 Demonstrate understanding of the responses of plants and animals to their external environment

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the responses of plants and animals to their external environment.	Demonstrate in-depth understanding of the responses of plants and animals to their external environment.	Demonstrate comprehensive understanding of the responses of plants and animals to their external environment.

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 room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2-12 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION ONE: INTRASPECIFIC RELATIONSHIPS

The stitchbird or hihi (*Notiomystis cincta*) is an endemic species that is now found only on islands or mainland regions to where it has been moved, due to predation from animals, such as domestic cats. Hihi have an unusual breeding system that includes pair or **group nesting**.

They **defend a territory in the mating season** of spring and summer, and have known dominance hierarchies. Older birds are dominant over the younger ones, especially those of the same sex. Males are dominant over females, except when chicks are present at the nest.

At the start of the breeding season, the males sing loudly until the end of the egg laying season. They also perform flight displays at the nesting area, which enhances their white and yellow colours.

Male hihi Source: https://nzbirdsonline.org.nz/species/stitchbird Female hihi Source: https://nzbirdsonline.org.nz/species/stitchbird

Discuss how behaviours of the hihi work together to support the population size of the species.

In your answer:

- describe the terms hierarchy, predation, and territory
- explain how a courtship strategy, such as singing or flight displays, can be both an advantage and a disadvantage for the male bird
- evaluate how behaviours in **bold** above (group nesting and defending territory in the mating season) work together to maintain population size in protected areas.

(There is more space for your answer to this question

4	

QUESTION TWO: MIGRATION OF INDIGO BUNTING

Source: https://ebird.org/science/status-and-trends/indbun/range-map

Source: www.flickr.com/photos/slingher/4522490194/

The indigo bunting (*Passerina cyanea*) is a bird that flies a long distance during its yearly migration, migrating only at night. Indigo buntings fly about 2000 km each way between breeding grounds in eastern North America (shown in red), and wintering areas from southern Florida to southern Central America (shown in blue).

Discuss how the behaviours mentioned above combine to help ensure the success of the species.

In your answer:

- define the term migration
- describe the biological rhythm shown, and give the likely environmental cue for migration
- explain a navigational method for the night migration of the bunting
- discuss how, despite the difficulties of a long journey, this repeated journey has enabled the indigo bunting population to be maintained.

There is more space for your answer to this question on the following pages.



7	

QUESTION THREE: DODDER

Source: https://upload.wikimedia.org/wikipedia/ Source: https://bygl.osu.edu/node/1682 commons/4/42/Cuscuta_campestris_covering_

The golden dodder (Cuscuta campestris) is a leafless and rootless plant that lives off other plants.

It has a growth response, enabling it to wind up and around a host plant, branching to form a tangled mass, which can spread from the initial host to nearby plants. It uses a special organ, the haustorium, to attach itself to the host and grow into host tissues. Through the haustorium, it gains water and nutrients from the host plant.

The flowering time is critical for the successful reproduction of the dodder. Various environmental cues, especially changes in night length (photoperiod), are perceived by the plant. Very little is known about how flowering of the dodder is triggered to start; however it is known that the dodder has both short-day plant (SDP) hosts and long-day plant (LDP) hosts. Scientists have found that the flowering of the dodder seems to be synchronised with the flowering of their hosts, as they flower when the host does.

Discuss reasons for the success of the dodder.

In your answer

host01.jpg

- identify and describe the interspecific relationship between the dodder and the host plant
- explain how auxin enables the dodder to grow up and wind around the host plant, and identify and describe this growth response
- discuss how, through the ability to live off other plants and flowering at the same time as their hosts (both SDP and LDP), the dodder species is successful.

8

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10

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