Year 13 NCEA Biology
Student Worksheet : Evolutionary Processes Leading to Speciation
Biology 3.5 Achievement Standard 91605

Speciation - the process by which one species gives rise to two or more species: _____ (slow accumulation of small changes), through bursts of _____(punctuated equilibrium) when a crucial aspect of the environment changes or _____by changes in chromosome number (polyploidy)

Allopatric Speciation occurs when a population is _____resulting in separate populations eg New Zealand parrots and land snails.

Sympatric Speciation occurs when one species gives rise to two or more species_____ _____eg NZ skinks, cicadas and when polyploidy causes _____, more common in plants.

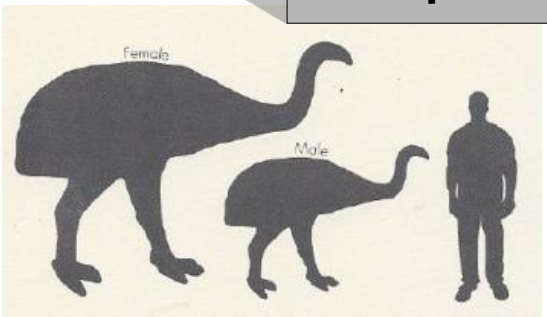
In order to understand the uniqueness of New Zealand's fauna and flora the changes to the landscape needs to be taken into account.

Key events Geological Timescale for New Zealand
Ice ages in Pleistocene _____
Building of Alps _____
Lake Manuherikia when New Zealand was _____
The _____ of New Zealand in Oligocene 30 mya

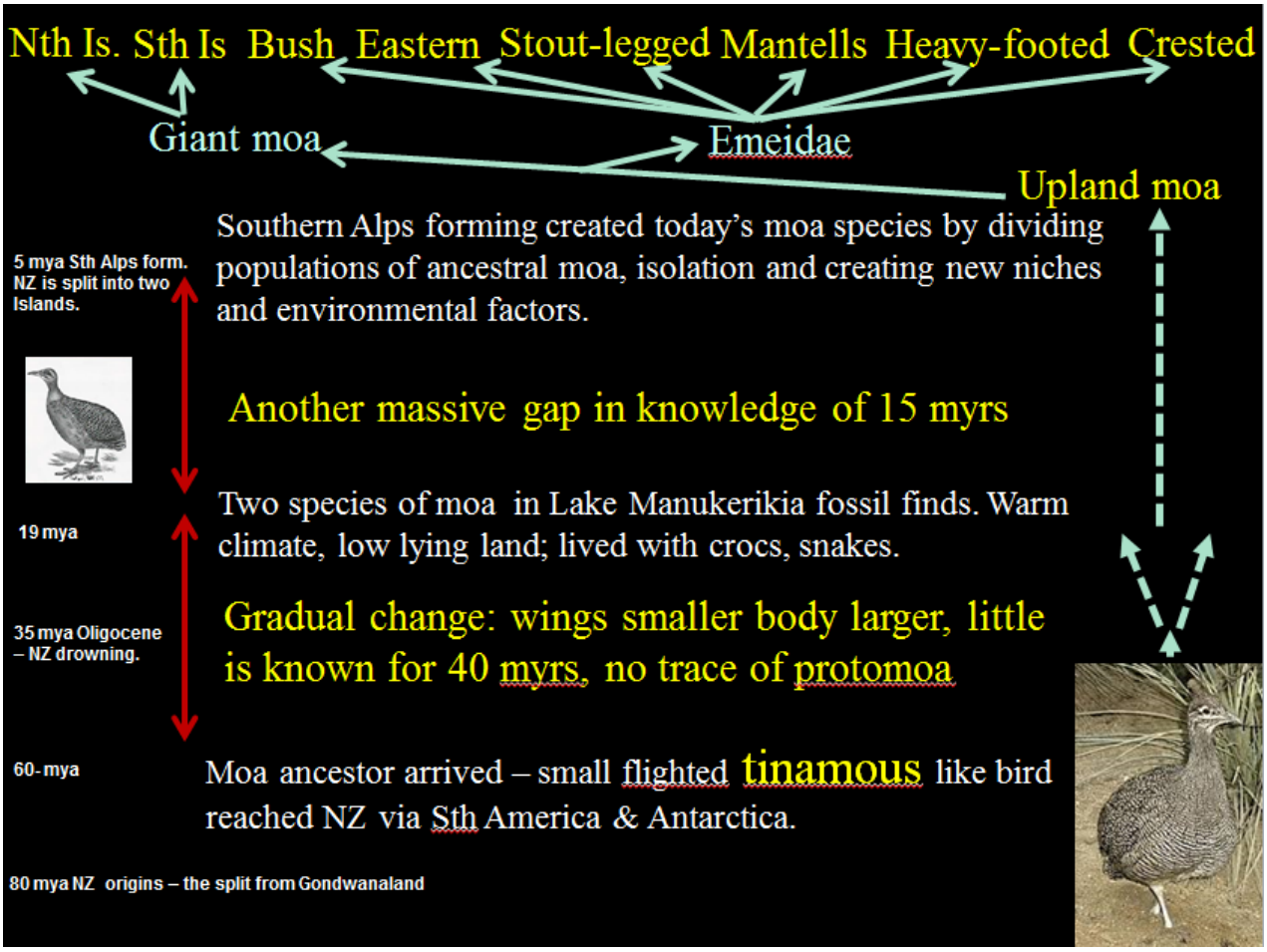
Factors that are important in causing speciation eg in the creation of barriers to gene flow in NZ plants and animals -

- Several _____ in the Pleistocene - sea 100m lower that today
- _____when North, South and Stewart Islands separated
- Building of_____ in the last 5-8 mya - tectonic movement
- South Island divided by Southern Alps into _____
- Mountains can create _____ of higher rainfall and lower temperature.

Speciation of the Moa



Small flighted ancestor _____ arrived **60mya** via Sth America & Antarctica (kiwi flighted ancestor came from Australia – kiwi is more closely related to rhea and cassowary).



Little is known for 40myrs except the moa ancestor became flightless and larger bodied.

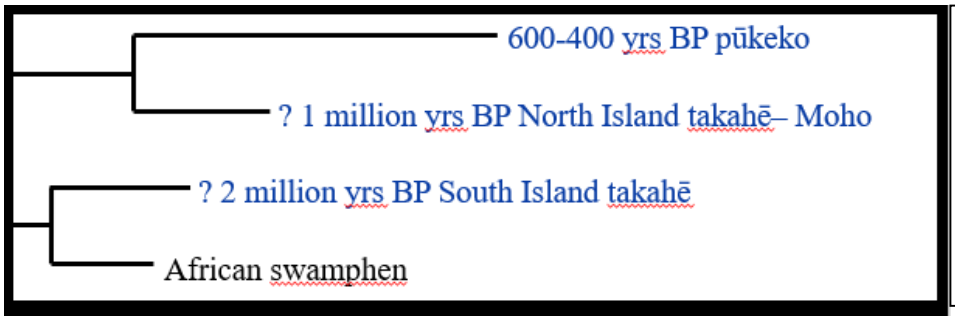
19mya Lake Manukerikia (in Central Otago in South Island and nine times the size of Lake Taupo), two species of moa found in fossil finds at St Bathans during fossil digs during 2000s.

5-8mya _____ created new niches for today's _____species of extinct moa with **Upland moa** as the base moa species to: **North Island giant moa, South Island giant moa, Little bush moa, Eastern moa, Stout-legged moa, Mantell's moa, Heavy footed moa, Crested moa.**

Recommended reading: ***Moa, The Life and Death of New Zealand's Legendary Bird*** by Quinn Berentson 2013. P223 Moa family tree. (In Auckland Public Library)

Speciation of the Takahē

Notes



Speciation of NZ Parrots

http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/biology/

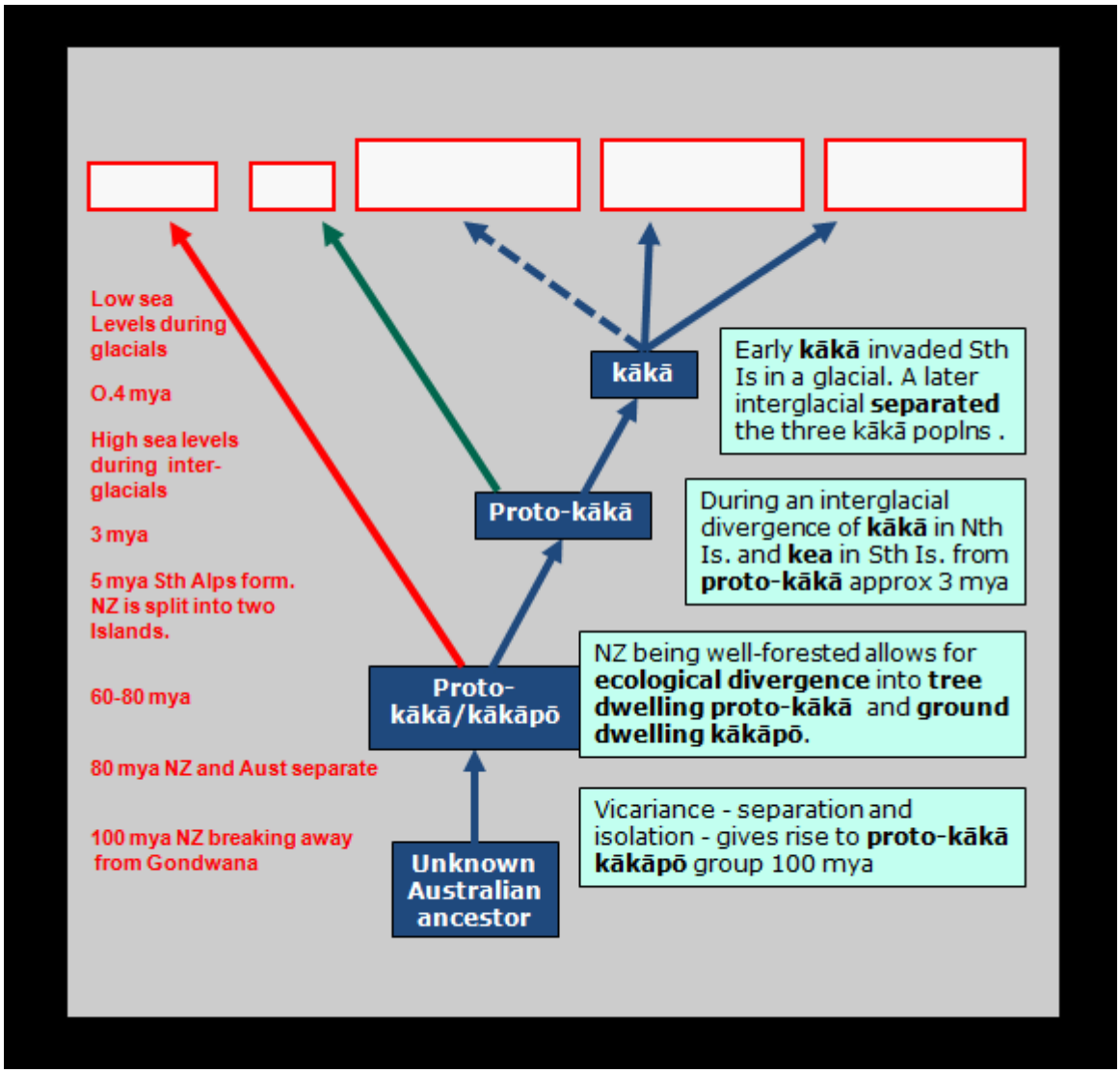
Parrots represented on Tiritiri:

- **Nth Is kākā** - frequent visitors
- **kākāriki** - red crowned parakeet - first animal to be translocated to Tiritiri.

Recent **mitochondrial DNA (mtDNA) analysis** has confirmed the existence of two distinct groups of New Zealand parrots:

- the kākāpō - kākā - kea group as represented in the flow chart below.

- the kākāriki group- five species of parakeet



Speciation of a NZ Song bird

Scientists from New Zealand, Ecuador, Australia and the United States identified a new songbird family – the Mohouidae – in New Zealand through the analysis of the DNA of three bird species: **August 30, 2013 by** Sci-News.com

- the _____ **-** pōpokotea, (*Mohoua albicilla*) **on Tiritiri** and found in the North Island
- the _____ **-** mōhua (*Mohoua ochrocephala*) found in the South & Stewart Islands.
- the _____**-** pīpipi (*Mohoua novaseelandiae)* found in the South Island

Despite the differences in location, the whiteheads and yellowheads are more closely related to each other than the Brown Creepers.

Speciation of yellowheads and whiteheads is _____

Speciation of yellowheads and brown creeper is _____

Further study suggestions:

- Ancient NZ group - wrens eg rifleman
- Plants - hebe
- Insects - weta and cicada

- Molluscs - NZ land snails & NZ flax snails
- Dolphins - Maui and Hectors
- Tuatara

Notes

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