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Ancient DNA Analysis of Māori Feather Cloaks and Kete: Implications for Conservation and Culture

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Abstract

Feather cloaks (*kakahu*) and bags (*kete*), particularly those adorned with kiwi feathers, are treasured items or *taonga* to the Māori people of New Zealand. They are considered iconic expressions of Māori culture. Despite their status, much of our knowledge of the materials used to construct these artefacts, the provenance of these artefacts and the origins of these traditions, has been lost. We used ancient DNA methods to recover mitochondrial DNA sequences from 849 feather samples taken from 109 kiwi feathered cloaks (*kahu kiwi*) and 161 feather samples from 55 kiwi feathered *kete* (*kete kiwi*). We show that almost all (>99%) of the cloaks and all (100%) of the *kete* were constructed using feathers from North Island brown kiwi (*Apteryx mantelli*). Just one cloak was found to have been constructed using feathers from little spotted kiwi (*Apteryx owenii*). The remaining three species of kiwi (*Apteryx haasti, Apteryx rowi* and *Apteryx australis*) were not found in any of the cloaks and *kete* sampled. Molecular sexing of nuclear DNA from 92 feather cloak samples also revealed that the sex-ratio of birds deviated from a ratio of 1:1 observed in reference populations, with a male skew observed. Additionally, a reference database of 185 North Island brown kiwi mitochondrial control region DNA sequences was constructed, comprising samples collected from 26 North Island locations together with data available from the literature. For contemporary populations, we saw a phylogeographic structuring of haplotypes using both SAMOVA and Nested Clade Analysis into Eastern, Northern and West and Central populations. Utilising this structuring, it was possible to infer the provenance of 847 kiwi feathers from 108 cloaks and 153 kiwi feathers from 52 kete. A surprising proportion of cloaks (15%) and some kete (5.5%) were found to contain feathers from different geographic locations providing evidence of either kiwi trading among Māori tribes (iwi), tribal displacement, or organised hunting trips into other tribal areas. The data also suggests that the east of the North Island was the most prolific of all kiwi cloak and kete making areas, accounting for over 50% of all cloaks analysed and over 58% of all kete. This could indicate that the East of the North Island was the epicentre for this cultural tradition. Also, the structuring

observed in the reference database will prove to be useful to conservationists, such as the New Zealand Department of Conservation, when deciding strategies to maintain populations of New Zealand's most iconic bird. The genetic analysis of these treasured items has been invaluable in enriching our knowledge and rebuilding their lost histories. Additionally, genetic data from historical items can aid our understanding or how populations change overtime, thus aiding conservation of valuable species.

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