Te Pūtaiao o Tokoriro:

Taxonomy and diversity of New Zealand cave wētā (Orthoptera; Rhaphidophoridae)

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Josephine Fitness

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Abstract

Species are the fundamental unit for ecology and evolution. Taxonomy, the naming of species, grabbles with the problem of accurately representing these fundamental units. In this research I targeted a group of understudied and undervalued insects that are common throughout New Zealand. This work focuses on Rhaphidophoridae, a family of Orthoptera found globally, but the diversity in New Zealand is poorly understood and poorly described. I have been the first to use high specimen numbers in order to establish within and between species differences of New Zealand cave wētā. I have established the importance of multiple taxonomic methods. At no stage was the aim to fully resolve all issues, but rather to identify morphological characters that are useful in distinguishing species, and integrating mtDNA sequence data to test species hypotheses.

I focused first on cave wētā specimens that came from a biodiversity studied but had not been identified to genus or species. I was able to identify characters that could distinguish between the taxa present in this sample and developed a method that could be transferred to other locations. Two key findings were that multiple cave wētā species co-exist across a range of habitats and that variation in abundance was species dependent. Of importance was my finding that juveniles cannot be distinguish and placed with their correct adult form due to changes in both subgenital plate shape and apical spines.

From three regions in North Island New Zealand I was able to distinguish and identify fourteen putative cave wētā species. mtDNA sequence data were use to test putative species clusters identified by morphology and allowed me to confidently pair male and female specimens. Combinations of apical leg spines and subgenital plate shape could consistently diagnose most taxa. Many of the species are new to science. Therefore I described three new species in the genus *Neonetus*. I reviewed our current knowledge of the endemic genera *Pleioplectron, Weta* and *Miotopus* and based on evidence from mtDNA sequences and large samples I was able to clarify current species and describe one new *Miotopus* species. As with many insect species, male terminalia are the key to distinguishing among species, and species within the same genus have similar female subgenital plates.

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