

## Regional Comparisons of the Thickness of Moa Eggshell Fragments (Aves: Dinornithiformes)

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**ABSTRACT.** Samples of moa eggshell fragments from eight sites throughout New Zealand were measured to investigate the usefulness of the graphed distribution of eggshell-thicknesses in reflecting the moa fauna of the site. Assuming larger moa species laid eggs with thicker eggshells, a frequency histogram of eggshell thicknesses for each site seems to mirror what is known (from bones) of the incidence and relative abundance of large and small moa species at the site. This is particularly so for North Island sites which had lower moa diversity than South Island sites. At North Cape and Tokerau Beach abundant thin eggshell (mode at 0.90–0.94 mm) was probably produced by *Euryapteryx* “*curtus-gravis*” and *Pachyornis geranoides*, and rarer thick eggshell (mostly 1.2–1.7 mm) by *Dinornis novaezealandiae*. At both Puketitiri and Castle Point there were broadly unimodal distributions of thin to medium-thickness eggshell, with thick eggshell almost absent. At Puketitiri the eggshell is assumed to be mainly from *Anomalopteryx didiformis*, and the slightly smaller *P. geranoides*, and averages thicker with a broader range than at Castle Point where the assumed identity of the eggshell lies with two small species (*P. geranoides* and *Eu. “curtus-gravis”*). At the four South Island sites the correlation to species is less clear. The modal thicknesses at Wairau Bar, Oamaru, Chatto Creek and Shag River are all in the range 1.15–1.44 mm and probably largely attributable to *Eu. “curtus-gravis”* which has a large form in the South Island and dominates the bones at all four sites. However, several other moas could have contributed the thinnest and thickest eggshells in most of the South Island samples. Archaeological sites had similar large ranges of eggshell-thickness to natural sites, suggesting that Maoris collected moa eggs from all available species and not just the largest ones. The study demonstrates the usefulness of eggshell-thickness histograms at particular sites as an adjunct to, or surrogate for, information on the relative abundance of moa bones, especially for North Island sites.

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Fossil bones and eggshell fragments are the main evidence of the former presence in New Zealand of moas (Dinornithiformes), the extinct large ratite birds currently thought to number 10 species (nomenclature after Worthy & Holdaway, 2002; Bunce *et al.*, 2003; Worthy, 2005). Moa eggshell fragments are common, often in large quantities, in various archaeological and Holocene fossil sites throughout New

Zealand. However, there has been little research on the nature and characteristics of moa eggshell fragments, and reports of archaeological and paleontological excavations typically and unhelpfully record “moa eggshell”, without further analysis. One aim of my recent work on moa eggs and eggshell (Gill, 2000, 2006, 2007) has been to seek a better understanding of unassociated, broken moa eggshell.