

A preliminary report on the nesting habits of moas on the East Coast of the North Island

W. H. HARTREE, jnr.

Introduction to the transcript

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William H. Hartree, jnr., farmed *Manaroa* at Puketitiri, in inland Hawke's Bay. He had a keen interest in natural history and excavated many rockshelters searching for moa (Aves: Dinornithiformes) eggshell and bird bones. Initially, he searched mainly for specimens, especially of Haast's Eagle (*Harpagornis moorei*), but later developed an interest in changes in the environment and kept detailed notes on each site (unpublished MS diary). Unfortunately, his early death meant that almost nothing was published during his lifetime (Hartree 1960a, b), as he had intended to complete the work before bringing it together in one paper (Hartree, in litt.).

In the meantime, however, he had recognised the significance of two volcanic ash layers that were thick and widespread in inland Hawke's Bay, from the Taupo eruption (dated then to AD 150), and the Waimihia shower, also from Taupo (1150 BC). He found that both were present in many sites and recognised that they allowed the fossil avifaunas of different time spans to be separated and compared (Hartree 1960b). He also alluded briefly to moa nesting sites (Hartree 1960b). Hartree communicated with several people about his findings (Caughley 1989); his preserved correspondence was summarised by Prickett (1985).

Falla (1962, 1964) reported Hartree's observation that moa nests usually contained the remains of only one egg and hence that this moa (*Anomalopteryx didiformis*) was a solitary nester with a one-egg clutch. These conclusions have often been repeated (e.g., Anderson 1989; Hamel 1979; Holdaway 1989).

It is therefore significant that a MS paper on moa nesting by Hartree has survived. It was found by THW in a box containing part of the W. H. Hartree bone collection in the Napier Museum. In ink and in Hartree's handwriting, it is undated, but was probably written before late 1960, when Hartree fell fatally ill. The MS provides background data and original observations on moa nesting. We present here a transcript

of the manuscript, both as supporting evidence for the often repeated assertions that *A. didiformis* laid one egg and was a solitary nester, and to recognise the contribution made by the author. Emendations are included as in the original MS, and illegible words are shown as (□).

The Hartree MS also provides a background to his important and well-provenanced collections of moa eggshell held in the Museum of New Zealand and the Canterbury Museum. Notably, CM Av17077 from the Hukanui 7A site is described as being part of an egg, and at least two of the eggs from Patoka were reconstructed (MNZ S433, 434). Hartree considered that as many as four species of moa used the sites, despite the identifications available to him that suggested that only *Anomalopteryx didiformis* was present. Our investigations have shown that three species of moa used the rock shelters: *Anomalopteryx didiformis* and *Pachyornis mappini* were both common, *Dinornis struthoides* less so, and that juveniles of all were present.

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THE TRANSCRIPT

Introduction

Early in 1947 my brother and I started to excavate a rockshelter on our property at Patoka in search of moa bones, which incidentally had never previously been found on the property or neighbouring farms, when we came across moa eggshell and then scattered moa bones. As we progressed we found more scattered eggshell and then near the back of the shelter in the last deposited layer of pumice ash we

came across the outline of the first moa's nest I had ever seen. During the passing years both of us have found other nesting sites until, we have now found a total of fourteen. Of these only three have yielded details of the actual situation, shape and approximate size of the nest. Much of the material excavated has still to be identified and a detailed report of each nesting site [is] not possible yet. I am not entirely happy with the *Anomalopteryx*. In the meantime I am presenting the main facts and some conclusions I have drawn.

Nesting Sites

In all cases the nesting sites have been under the shelter of limestone or sandstone rocks, or what could be classified as a rock shelter; one of the three nests being approx 10' from the entrance. Obviously such a site provides shelter from rain, wind and cold, is relatively dry and not visible from above. Moas also nested on sandy seashores where the climate is always more amenable than in the areas in which I have searched and the sand dry and warm. The presence of pumice dust is helpful as a means of dating, and preserves the shape of the nest itself. In soft limestone clay details of nests ~~would be~~ are more difficult to obtain: no doubt they also nested under fallen trees, hollow trees and large hollow logs which would give the same shelter and protection but evidence of this would be hard to find today.

Details of the Nest

The nest itself is a small depression obviously scratched out in the soft dry pumice, no traces of heavy sticks could I find and I assume that if the nest were lined as it probably was it being a shelter for a small nestling, it would be with grass, soft twigs and feathers. The outline of the nest is indicated by (?a definite layer?) broken eggshell and discoloured pumice.

Number of eggs Laid

The probable number of eggs laid in a nest at any one time is one. Each of two nests at Rosie Bay (and the immediate vicinity), Waikaremoana contained the remains of what I judge to be only one egg. The quantity of eggshell, colour and surface markings lead me to this conclusion. In other areas where the quantity of eggshell is great and the deposit very thick there is no means of deciding how many eggs were laid at any one time. From one nesting site in the Puketoi Ranges I have found the part remains of three separate eggs, each a different size, thickness of shell and surface markings.

Removal of eggshell from Nest

In the actual nest itself few pieces of eggshell larger than a man's fingernail can be found. Due ~~no doubt~~ I believe to the bird occupying the nest for some period after the chicken was hatched. The feet of the parent bird would thus break up the shell. The larger parts of the hatched egg are found several feet and often several yards from the nest depending on the slope of the floor of the shelter. It would

appear that the parent bird actually scratched the larger pieces out of the nest. If all the eggshell including the larger pieces were to be found in the nest itself it would suggest that the young left the nest as soon as hatched.

If by chance a suitable crevice is on the low side of the nest much of the larger pieces of eggshell will lodge collect there and in some cases an egg accidentally rolled out of a nest will lodge. No doubt wekas etc other birds would help disperse the eggshell.

Number of times that a nesting site is used

~~Where the site is an~~ At Waikaremoana there was evidence to show that each nesting site was used but once. At Raukokapatu [Ruakokopatuna] it was used many times, at Waewaepa the nesting site appeared to have been used only three times, at Manaroa the sites have used many times. Only room for one nesting bird at one time in rockshelter.

Species of moa nesting in these

From moa bones collected at nesting sites it appeared at first that only *Anomalopteryx* nested in these shelters but from comparison of thickness of eggshell, colour, surface markings and size and shape of egg at least four different species chose a sheltered area in which to nest.

Dating of last moas on East Coast by pumice deposits

Three nesting sites, two at Waikaremoana and one at Patoka show nests in the upper surface of the last shower of pumice ash in those regions. Therefore they must have been living some considerable time after the ash shower, as they would have to re-colonize the area after the shower.

Vegetative cover of the East Coast area at the time the moas were using these nesting sites.

The presence of native snails and bush loving bird bones in the same deposits as moa bones and eggshell leads me to the conclusion that much of the land was covered in forest and that all of the moas living in the area were all of necessity forest dwelling.

Possibility of flocks of moas

I have found no ~~signs~~ evidence of large numbers of moas living in the area at any time or flocks of them living and nesting together. It would seem that they have been very thinly spread over this ~~area~~ district for a very long time.

Height above sea level

Nesting sites from about sea level to 2700 feet.