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THE MOA, ZOOLOGICAL AND ARCHAEOLOGICAL

by R.A. Falla

The New Zealand archaeologist is becoming more and more aware of the importance of the larger flightless birds in the food economy of the Polynesian immigrants to New Zealand. It is possible both to under-rate, as in the past, the extent to which these birds formed an important part of the food supply, but it is also possible to over-rate their importance and to imagine special techniques of hunting being required and a general culture built about the Moa. It seems an appropriate time then to give a summary of what is known or imagined about the status of moas as birds rather than as food supply for the human inhabitants of the country. Zoologists are by no means agreed on the relationships of the moas to other bird families. It has proved convenient to classify them as struthious, a composite group into which Ostrich of South Africa, Rheas of South America, and the Emus and Cassowaries of Australia and New Guinea had been included. In fact, one of the few things they have in common is their size. There are one or two skull characters that have similarity, but this does not necessarily mean genetic relationship and could also be a convergent condition associated with size. There is, indeed, good evidence for the polyphyletic origin of these large birds. That is to say, they have been derived from different ancestral lines and their direct ancestors in any of these lines need not have been large birds. Giantism is a phenomenon that has occurred at different times in earth history in several groups of animals. It had its day among the reptiles a long time ago. It appears to have had its day among the birds at some more recent date, and in those southern hemisphere regions where primitive forms have tended to persist, some of the giant birds are still found. Their fate in New Zealand has been extinction, and we are now fairly certain, from accumulating evidence, that the time of extinction was within the last 2 or 300 years.

Naturally, one or two questions come to mind. Was the extinction due in the main to changes in the environment quite independent of man, or was Polynesian man responsible for exterminating the moa? The answer to this question is really not "either/or." The answer is that factors of environment were responsible, as ultimately they always are, and that man was one of them. Probably the nearest we would get to a correct answer is to say that the moa family as a group were on the way out and that man hastened the process. It is quite unlikely that if moas had been adaptable and vigorous biologically that they would ever have been exterminated.

From a study of deposits found in swamps, sand hills, and limestone caves, it has been possible to derive some information about the method of feeding and the food materials of most of the moas. The larger ones cropped twigs, small branches, grasses, and possibly picked up fallen fruits from the ground. A large and varied amount of vegetation would have been required to support a large population of the giant moas. It is not easy to estimate the extent of this browsing and grazing pressure on the vegetation as there is little evidence to show whether moas were widely distributed but sparsely scattered, as for example, kiwis are today, or whether they were gregarious and moved about in flocks. Because their bones are found piled up in caves, heaped up in swamps, or accumulated on the sites of Maori occupation, it does not follow that they lived that way. I am doubtful if there was any special hunting technique required, or that it was very difficult to kill moas. It is reasonable to assume

that in the flatter coastal areas in which they undoubtedly were found, they could be driven to points where they were headed off or perhaps even penned, awaiting the time when they would be required for food. The same procedure would, no doubt, be followed with the now extinct Swan which could similarly be driven when moulting. It is quite unlikely that the Maoris regarded the moa as anything exceptional among the works of nature. Any people depending on game for food will naturally devote more energy to catching the larger kinds. It has been remarked that there is a paucity of reference in mythology and legend about the moa, except to refer to their disappearance. There is, in fact, the same paucity in regard to any of the birds that were abundant and mainly of interest as a source of food. The myth-poetic Maori has, in fact, immortalized only the birds of distinctive habit and strong character, such as the Kaka, the Fantail, the Morepork, or conspicuous rare ones like the Kotuku.

I think it quite likely that the early quest by Europeans for information was unsuccessful because the questioners were imagining that Maori interest in the moa would be affected by the bird's size and its extinction. Undoubtedly accurate Maori names were available for the several kinds of moa which must have been quite different in appearance. As a general descriptive name, "moa", used elsewhere for jungle fowl and its domestic varieties, was as near as anyone could have got to an accurate description of the kind of birds these large fowl were, and I suspect that many well informed Maoris gave up in despair when their questioners brushed aside the undoubtedly valid names which they offered and fastened on to this general or most generic term as a bird name. The confusion persisted for so long that it was probably responsible for the failure by European investigators to find specimens of the small Bush Moa, Megalapteryx. The evidence is quite considerable that birds not much larger than an out-size turkey were available for food to parties of Maori hunters operating from Foveaux Strait and into Fiordland, and that these parties, between the years 1830-1850, must have included many pakehas. Because the birds they were taking were certainly never called moas, there was never any occasion to report any new discoveries. This type of "moa hunting", of course, differed in no respect from the hunting of Kiwi, Weka, Takahe, and Kakapo. The bird took up just a little more room in the umu, and that was all. Even in the more scanty evidence from moa hunter sites in which the remains of the largest, Dinornis, were found, as well as abundant remains of the medium sized Euryapteryx, there is no indication that any special significance or ceremony was associated with the consumption of moas. There is, however, the discovery that the large bones had something of the durable quality of ivory, and the very interesting development of traditional ivory ornaments of the Pacific in moa bone in New Zealand. The ceremonial treatment of egg shells and their association with burials must also be regarded as a distinctive feature, although not necessarily one peculiar to New Zealand.

Summarising then what we know of this group of birds, it may be accepted that there were about seven different genera, all of them differing in habits and probably in habitat. In brief, the picture appears to be somewhat as follows:-

1. Megalapteryx: Confined to the South Island and so generally like a kiwi, except in the form of the beak, that its leg bones were at first mistaken for those of a giant kiwi. There are well preserved skeletons, fragments of skin, dried flesh and tendon, and a surprising number of feathers preserved in a good state of colour and texture. They appear to have been dark purplish in the centre and golden brown on the edges.

As feathers, they are more normal and specialised than those of a kiwi or of any of the other so-called struthious birds. The remains of Megalapteryx have been found in limestone areas and usually in high country, 2,000 feet or so. Their proved association with human remains - appears to be restricted to inland hunters' camps, and they do not figure in the mixed collections of midden bones from coastal sites. There is good reason to believe that Megalapteryx became extinct only a little over 100 years ago.

2. Anomalopteryx: Found in both North and South islands. Anomalopteryx remains occur in much the same situations as those in which Megalapteryx are found. It was presumably a small Bush Moa. The best preserved and best investigated deposit of Anomalopteryx have been in the Wairarapa and Hawke's Bay regions and again in limestone country. Special mention should be made of the significant researches of the late Mr W.H. Hartree. It was he, who by patient field work, was able to recognise individual nest sites. These were on ledges and in sheltered cavities in country that had once carried fairly heavy bush. In a remarkable number of cases the nests had remains of either single egg or single chick, and it seems fairly certain that Anomalopteryx, like the kiwi, was a solitary nester with a one egg clutch. The Anomalopteryx bones also are not at all plentiful in the coastal deposits of mixed bones on midden sites and, no doubt, the bird was hunted in much the same way as the Megalapteryx in the south and kiwis generally.

3. Pachyornis: There were several species of this medium sized and exceedingly squat moa, the only one with a comparatively sharp beak. Nothing much is known of its habitat or food preferences. Its bones are plentiful in the natural deposit of the South Island, but it appears to have been a scarce bird at the peak of moa hunting to judge from the paucity of remains in South Island coastal midden sites. In the North Island, however, a number of midden areas of fairly recent date have bones of the smaller P. septentrionalis.

4. Euryapteryx: Remains of this medium sized squat moa with the "U" shaped bill exceed all others in abundance in coastal middens and also the inland low country sites of Central Otago. The size and dimensions of all the eggs found to date, associated with either camp sites or human burials, are consistent with their being the eggs of Euryapteryx, of which there were several species differentiated only by size. From its structure it was almost certainly a low country and probably a grassland and forest edge species. Its extinction date can only be gauged from the radio-carbon dating of samples and from the fact that well preserved skeletons have been found practically on the surface of forest country and coastal sand dunes. It is also the species that has occurred at such island localities as Stewart Island and Great Barrier, which indicates the possibility that it was the principle source of human food at one period and might even have been taken to outlying islands by human agency.

5. Dinornis: There are now unquestionably both North and South Island sites in which Dinornis bones have been found in human association and some of these have been dated by radio-carbon methods. I still consider, however, that the evidence for an abundance of Dinornis in human association is very slender. There seems every reason to believe that the largest of the moas was in the process of natural extinction before human agency finished off what was already a dwindling remnant.