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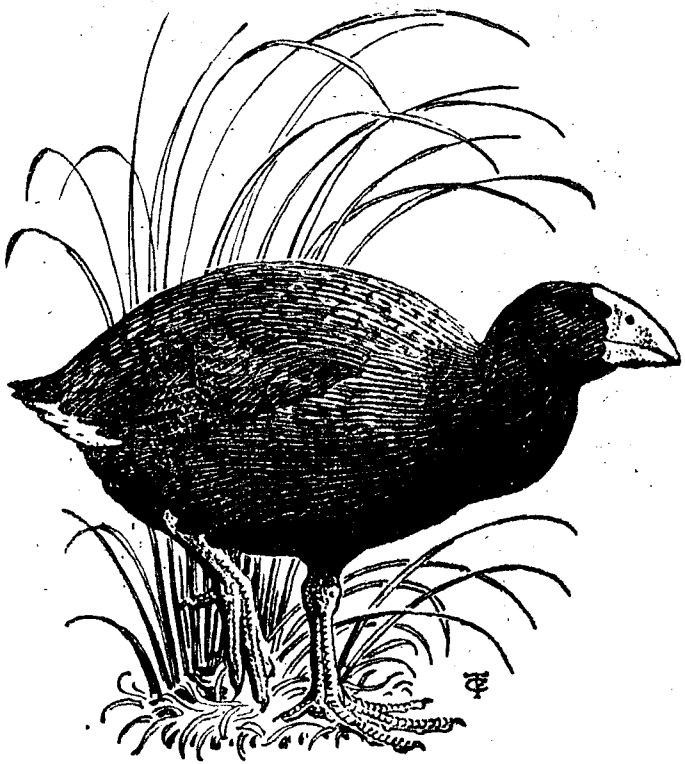

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THE RELATIONSHIP BETWEEN THE MAGENTA PETREL AND THE CHATHAM ISLAND TAIKO

By W. R. P. BOURNE

ABSTRACT

The Magenta Petrel, **Pterodroma magentae,** is a distinct species, closely allied to the **Pterodroma macroptera** group of gadfly petrels, which agrees in size and appearance with the Chatham Island Taiko, apparently last recorded alive at its breeding places between twenty-five and fifty years ago. A large collection of bones of this and other petrels from the Chatham Islands in the British Museum (Natural History) appears to include several other species also new to the group. It is suggested that some of these may still survive there.

INTRODUCTION

On 22nd July, 1867, the crew of the Italian research vessel "Magenta" shot a new gadfly petrel at 39° 38′ S. 125° 58′ W. in the Pacific sector of the Southern Ocean south of Tubuai Island. They thought that they saw further birds at 32° 23′ S. 92° 39′ W. and 26° 07′ S. 88° 50′ W. on 2nd - 3rd and 31st August, but the species has never been definitely identified again since. The original descriptions of this and other new petrels collected during the "Magenta" expedition published by Giglioli and Salvadori in Italian in 1868 and English in 1869 attracted considerable attention at the time, and Osbert Salvin, the leading authority of that day on the group, soon borrowed the types, agreed that they were new, and described and figured them again in "Rowley's Ornithological Miscellany" in 1876, and most subsequent authorities have upheld his conclusions. However, unlike the other novelties described with it, *Pterodroma arminjoniana, Pterodroma (cookii) defillipiana,* and *Puffinus assimilis elegans,* the Magenta Petrel itself, *Pterodroma magentae,* has failed to reappear, and has gradually been lost to human recollection among the morass of synonyms for closely related forms which has accumulated in the literature since the time when it was discovered.

During the course of a visit to Italy in the spring of 1956 I made a point of hunting down the forgotten type of *Pterodroma magentae* in the Salvadori Collection at Turin, to investigate its character and affinities. It proves to be a highly distinct form similar in its dimensions to the large subantarctic gadfly petrels of the *Pterodroma macroptera-lessoni-incerta-solandri-gouldi* group, reviewed by Murphy and Pennoyer in 1952, and in its appearance to the lost Chatham Island Taiko, also said to resemble *P. macroptera* in its dimensions (Fleming 1953). Since a first examination of the large Forbes and Rothschild collections of subfossil bones from the Chatham Islands in the British Museum (Natural History), recently rediscovered by Dawson (1958), reveals that one of the species most commonly represented there is a

large gadfly petrel very similar to *Pterodroma macroptera* in its osteology, but agreeing with *P. magentae* in the possession of a shorter bill, it seems highly probable that *Pterodroma magentae* is in fact the lost Chatham Island Taiko, and a local representative in the Chatham Islands of the "macroptera" superspecies of petrels.

THE TYPE OF *PTERODROMA MAGENTAE*

Salvadori's great collection, including the *Psittaciformes* which he used when working up this section of the "Catalogue of Birds in the British Museum," and many other important types, has received little attention since he died half a century ago. At the time of my visit it still remained much as he left it, in an attic open to the atmosphere of one of the dirtier industrial cities of Europe, with mounted specimens, covered in a thick deposit of soot, ranged in glass cases around the walls, exposed on benches, and lying jumbled in bins all round the room. There was a large case of mounted petrels, including the types and paratypes from the "Magenta" expedition (all labelled indiscriminately as "types"), among many other interesting things, but the Magenta Petrel itself was not among them. It was soon discovered elsewhere. I have seen all other known petrels and this one resembled none of them. The upperparts are now stained uniformly dark brownish-black, with paler feather edges, but the concealed parts of the feathers are a curious purplish-grey, not unlike old wine-stains, exactly as in Salvin's excellent plate, also reproduced by Godman in his "Monograph of the Petrels" (1907-1910). There are more prominent pale edges to the feathers of the forehead, and it has a pale chin, with a dark band across the upper breast. The primaries have dark shafts and pale inner webs, and the underwing and axillaries are dark, but the belly is white except for a few dark streaks on the flanks. The measurements fall very close to my average for the typical race of *Pterodroma macroptera* (including some measured at the same time in the same collection) and *Pterodroma solandri*, except that the bill is shorter and less massive; the wing is 306 mm., the tail 127 mm., the tarsus 42 mm., the middle toe 54 mm., the exposed culmen 32 mm., and the bill 16 mm. in width and 15 mm. in depth at the base. According to the original description, in life the birds had pale legs and feet with dark tips to the toes, as with other large white-breasted gadfly petrels.

In the original description Giglioli and Salvadori speculated that it might be related to the Tahiti Petrel *Pterodroma rostrata*, but it is much less heavily built, with a smaller bill and legs, and is paler, especially about the face and chin. Salvin thought that it resembled a large soft-plumaged Petrel *Pterodroma mollis*, but it is a much darker grey, with more marking on the breast than is usual in that form except in the rare intermediate-dark phase (Bourne 1957), and it also lacks dark wing and ear coverts. More recent authors have speculated that it may be related to the Phoenix Petrel *Pterodroma alba*, but, while the pattern of its markings is very similar, it is considerably larger and more heavily built, and much greyer in coloration. It bears some resemblance to Schlegel's Petrel *Pterodroma incerta*, which occurs at sea in a similar latitudinal zone in the South Atlantic and Indian Oceans, breeding at Tristan de Cunha and Gough Island; but, while its proportions are rather similar, it is smaller, greyer, and more heavily

marked, with a contrasting white chin, lacking in *P. incerta,* though found in other Pacific members of the "macroptera" superspecies of petrels, such as *Pterodroma solandri* and *P. macroptera gouldi.* Perhaps it is best regarded as a distinct but closely allied species which replaces *Pterodroma incerta* in a similar geographical situation in the Pacific.

THE CHATHAM ISLAND TAIKO

If it is accepted that the Magenta Petrel is a distinct species, belonging to the "macroptera" group of petrels, which was to be found in the cooler parts of the South Pacific just under a hundred years ago, the next problem is to determine its breeding place. There are many possible islands in the appropriate area, most of which hold or once held large populations of gadfly petrels, and some of which have not been explored adequately yet, especially during the winter, which is the breeding season of the northern members of the "macroptera" group of petrels, These include Juan Fernandes, Easter Island, the Pitcairn-Ducie-Oenoe-Henderson group, Rapa and the Bass Rocks in the Tubuai group, the Kermadec Islands, and the Chatham Islands. However, where they have been explored these islands have mostly been found to support petrel species of distinctly tropical affinities, such as *Pterodroma neglecta, P. arminjoniana heraldica, P. alba, P. externa,* or *P. ultima,* while there is little indication of the presence of any large cold-water species. The presence of such a bird is reported only at the most southerly group mentioned, the Chatham Islands. This is the only island group at present lacking any large gadfly-petrel, although one is reported to have been present in the past which died out about fifty years ago. It is described by Fleming (1939) as "larger than *Pterodroma axillaris,* with a stouter bill, and of a dundy grey colour ventrally, agreeing with *P. axillaris* in its parti-coloured feet," and, later (1953) as "similar to *Pterodroma macroptera* in shape of cranium, but smaller . . . (with) a dark upper breast and white belly." Dr. R. A. Falla informs me that recorded accounts of this bird agree very well with the Magenta Petrel, and that the late Robert McClurg, a Chatham Islander of clear memory and good judgment, had when shown Godman's 'Monograph of the Petrels' first selected Schlegel's Petrel as the best representation of the "taiko," and was later prepared to admit the figure of the Magenta Petrel as a possible alternative. The Chatham Islands lie in a very likely place to provide breeding stations for a large gadfly petrel preferring cold surface waters and foraging east from its breeding stations along the subtropical convergence to the place of capture of the Magenta Petrel at 30½°S. 126°W.

Owing in part to the extremely sporadic nature of collecting in the area in the past, and in part to more recent protective legislation, there are few bird skins from the Chatham Islands in foreign collections. But we do have many bones from this group. A high proportion of those in the Forbes and Rothschild collections in the British Museum (Natural History) belong to a large gadfly petrel provisionally identified by Dawson (1958) as *Pterodroma macroptera.* In the absence of any evidence that *P. macroptera* has ever bred in the group, this presumably is really the lost Chatham Island Taiko. In the table the measurements of three series of bones selected at random are compared with those of two specimens of the typical race of *P. macroptera* and one of *P. lessoni.*

TABLE

Comparison of the dimensions of bones of *Pterodroma m. macroptera*, *P. lessoni* and the Chatham Island Taiko

	Skull	Cranium	Culmen	Sternum	Humerus	Femur	Tibia
P. macroptera A	93	46	49	58 x 40	105	38	76
P. macroptera B	91	46	49	63 x 40	109	40	75
P. lessoni	92	47	48	61 x 42	–	40	80
Chatham Is. A	86	46	44	59 x 38	105	38	73
Chatham Is. B	91	48	46	57 x 39	105	39	80
Chatham Is. C	87	47	42	57 x 38	100	40	78

(The two specimens of *P. macroptera* were taken together at 34° 43'S. 04° 00'W. on 24 Feb. 1847, the specimen of *P. lessoni* was obtained by G. M. Mathews from Kapiti Island, and retains typical tail-feathers, and the bones of the Chatham Island Taiko are good specimens picked out at random from larger series.)

It will be seen that, as with the skin of *P. magentae*, the bones of the Chatham Island Taiko agree rather closely in size and proportions with those of *P. m. macroptera* and one of its allies except for the possession of a short bill. All the available evidence appears to agree with the hypothesis that the Magenta Petrel is the same as the Chatham Island Taiko.

DISCUSSION AND CONCLUSION

The Chatham Islands occupy a similar zoogeographical position in the Pacific to Tristan da Cunha in the Atlantic (Murphy 1936, Fleming 1939), and might well be expected to support a very similar seabird community. Yet so far, although several small petrels such as *Pelagodroma marina, Garrodia nereis, Pelecanoides urinatrix, Pachyptila vittata* and *Puffinus assimilis* are known to have very similar or identical populations breeding in both areas, and other groups such as the Albatrosses also have closely comparable representative species breeding in both places, few of the larger nocturnal petrels which breed at Tristan in large numbers, or their allies, have yet been recorded from the Chatham Islands.

The gadfly petrels of the genus *Pterodroma* provide an outstanding illustration of this situation. Although two medium-sized and two large species have now been recorded breeding at the Tristan group (Elliott 1957), and up to four medium to large species have frequently been recorded nesting together in Pacific localities other than the Chathams (Murphy and Pennoyer 1952), so far apparently only one small species, *Pterodroma hypoleuca axillaris,* has been found nesting at the Chatham Islands, and only one other, larger species has been reported at second hand. The identification of subfossil bones from the group as likely to belong to the Magenta Petrel helps to fill one of the most conspicuous gaps in the expected avifauna of the Chathams, but there are also several other gaps.

Because of the lack of sufficient comparative material of present-day species in the British Museum (Nat. Hist.), identification, made

by Dawson (1958), of petrel bones to the species level, amongst the huge Forbes collection of bones from the Chatham Islands, could only be approximate, based on previous experience with New Zealand collections. An examination of the material already available, however, immediately fills some of the more obvious gaps in the Chatham seabird fauna compared to that of zoogeographically similar sites such as Tristan. Following on from Dawson's preliminary identification list deposited with the Department of Palaeontology, I can record the presence of the following species:

Many *Pelecanoides urinatrix*.

Many *Pachyptila* sp., apparently mainly *P. turtur*, with a few larger bones possibly belonging to *P. crassirostris* or *P. vittata*.

A few *Puffinus assimilis*.

A moderate number of small *Pterodromas*, apparently mainly *P. hypoleuca axillaris*, though some small bones might belong to members of the Cookilaria group, of which there is no comparative material available to me.

A moderate number of medium-sized *Puffinus*, larger than *Puffinus (puffinus) gavia*, but smaller than *Puffinus griseus*, distinct from *Puffinus pacificus*, and by inference the allied form *P. bulleri*. These might be *Puffinus (puffinus) huttoni* or *P. carneipes*, for neither of which is comparative material available in the British Museum, but seem rather large for the first and small for the second; otherwise they do not appear to agree well with any known species.

A few medium-sized *Pterodroma*, of the size expected for *Pterodroma inexpectata*, for which there is no comparative material available to me.

Many large *Pterodroma*, identified by Dawson as approximating *P. macroptera* but here as probably *P. magentae*.

Many large *Puffinus*, resembling *Puffinus griseus* according to Dawson.

A few *Adamastor*, presumably *Adamastor cinereus* (humeri measure 128, 130, 136, 139 mm., and a humerus of *A. cinereus* 135 mm.).

A few *Procellaria*, resembling *Procellaria aequinoctialis*. (humeri 149, 146, 148, 142, 142, 146, 146 mm., compared with a humerus of *P. aequinoctialis* of 150 mm.).

Several of these forms appear to be new to the Chathams, at least as breeding species (Fleming 1953), although their presence there might be expected on zoogeographical grounds; such as the possible Cookilaria gadfly petrels, the medium-sized shearwaters and gadfly petrels, and the large *Procellaria* and *Adamastor* shearwaters. The bones do not appear very old, and the conclusion appears inescapable that within the very recent past the Chatham Islands must have supported a very much larger seabird community than is known at the present day. The first Polynesian human inhabitants, of course, must have found subsistence difficult and may well have exterminated many elements of the fauna. The large gadfly petrel at least appears to have survived within living

memory, and if it could do so, it seems possible other species may have done so as well. The question now arises whether all these birds are yet extinct, or whether they may still exist somewhere in reduced numbers concealed among commoner species such as the Sooty Shearwater *Puffinus griseus,* or nesting at a season when the group has not been searched. Some of these birds are hard to discover even where they are common, as at Tristan, and others, such as *Pterodroma macroptera* and its allies or *Adamastor cinereus,* apparently often nest in the winter.

It is difficult to distinguish possibilities in such a complex group as the Chatham Islands from the far side of the world, but it may be pointed out that another gadfly petrel, the Cahow *Pterodroma cahow,* managed to survive undetected for as long as three hundred years on a much more heavily populated group in the North Atlantic, the Bermudas (Murphy and Mowbray 1951), and it seems likely that the same situation is being repeated on a smaller scale at a number of places elsewhere. When the Cahow was eventually rediscovered it was found to be in acute danger of extinction through the destruction of its breeding habitat by man, through competition for the remaining breeding places with another, more aggressive seabird, and through predation from rats, and most energetic action had to be taken to save the small remaining population (David Wingate, *pers. comm.,* and in Palmer 1963). It seems quite possible that a similar situation may exist with any of the larger nocturnal petrels still surviving on the Chatham Islands or neighbouring archipelagoes. It may therefore be urgent that the situation of these birds be properly investigated as soon as possible, before it is too late to see to their conservation.

ACKNOWLEDGEMENTS

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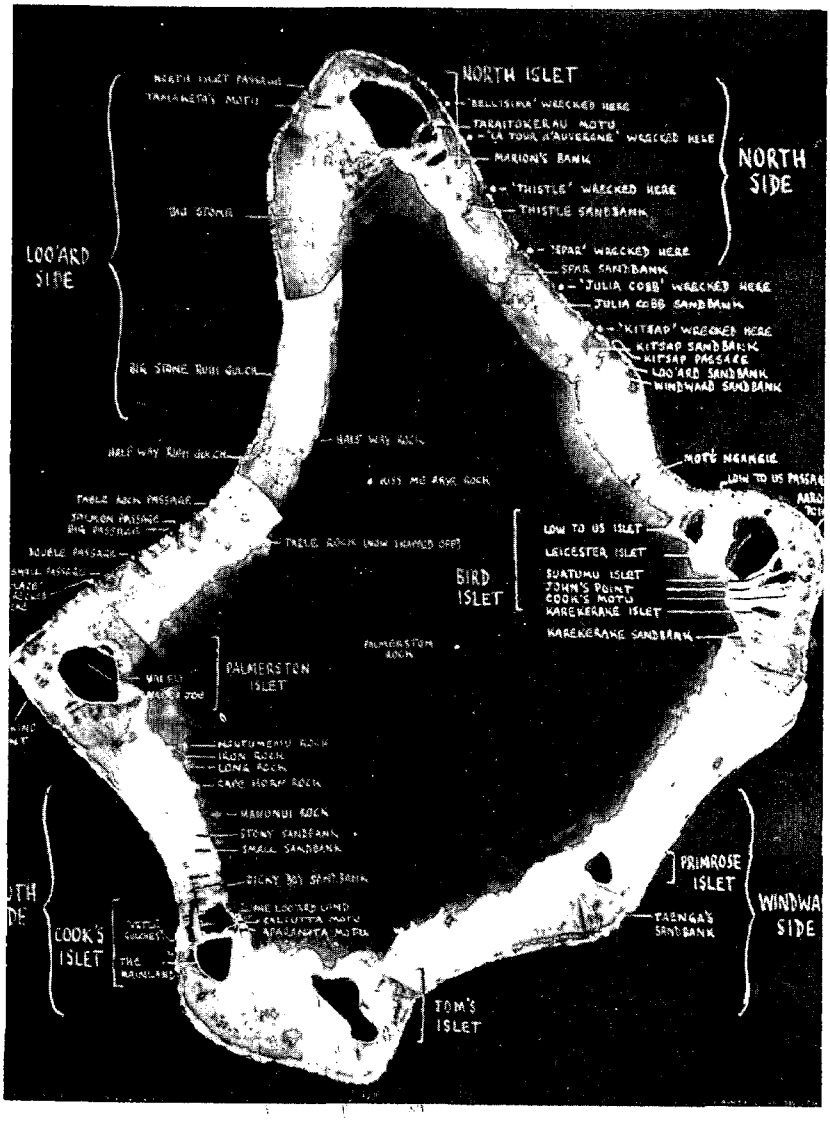
SOME NOTES ON THE BIRD LIFE OF PALMERSTON ATOLL

By J. C. BURLAND

I spent four months exactly, from May 20 to September 20, 1960, on Palmerston Atoll in the Northern Cook Group to carry out historical



I — Palmerston Atoll, Cook Group

research. Before going I undertook to collect specimens of various kinds and make notes of the birds breeding on or visiting the atoll. This work, for the Dominion Museum, was undertaken as a layman with no ornithological experience, but the information gathered may be of some general use.

The period of my visit coincided with the winter breeding of the sea birds. For the first two months the outer islets were full of nesting pairs and chicks, but there was a gradual exodus from the beginning of July, and by the middle of September there were very few birds about; the Common Noddy *(Anous stolidus)* had all but disappeared, and the Red Tailed Tropic Bird *(Phaeton rubricauda)* was greatly depleted in numbers, with only a few late chicks still on the nests but almost fledged. There was, however, quite a number of land birds and migrants right through the period and it was noticeable that some of the migrants were increasing in numbers from the beginning of September.

At least three species, either recorded by Captain Cook in his Journal or remembered by the older inhabitants of the atoll, have ceased breeding on Palmerston. The reason given is the damage done by the serious hurricane of 1926 and a further severe blow in 1935. Whether the destruction of the bush cover was the reason or the depletion of fish by accompanying tidal waves, was not known, but the former would seem more likely.

The Red Tailed Tropic Bird, and the Common Noddy to a lesser extent, are collected for food by the islanders in considerable numbers, and though a rough form of conservation is maintained, this is preventing a rapid increase in numbers.

The appearance of some birds is regarded as a 'sign' by the people, and any such supernatural fears are included in the following notes on individual species.

Also included are the Maori names used by the local inhabitants, as these differ at times from the recognised Cook Island names. The Palmerston people are of polyglot blood, a single family group with a European as original progenitor, and with wives of later generations obtained from Penrhyn, Manihiki and Atiu. For this reason individual island dialects have been combined.

GREATER FRIGATE BIRD *(Fregata minor)* — *"Kotaa"*

According to the local inhabitants these birds nested on the home islet called Palmerston until 1907 in a huge *pukatea* tree. This was cut and burned down as it was an obstruction in the settlement. Adults and chicks were caught for eating from this tree up to that time. There is no record of their breeding freely on all the outer islets although Cook's Journal mentions their being in quantity in 1777. However, he visited only two islets, those now known as Cook's and Palmerston.

The species is still seen frequently over all the islets and it does sleep in the coconut trees on North and Bird Islets overnight, but certainly no breeding has taken place for many years. I was told that the birds are sometimes seen in groups of 20 - 30, but more often only from one to three at a time. I did not see one large flight in four months. Although a considerable concentration of birds was claimed I saw no evidence of it. The average number seen in a week over the home islet was about three.

While pot-shots are taken at low-flying birds over the settlement,

the main numbers shot for eating are in the two outer islets in the evenings. But this must be regarded as a sporadic activity; cartridges are expensive for the islanders and they also consider that anything involving such effort is too hard work. When easily come by, the birds are used as supplementary food.

The islanders call the Frigate Bird a 'lazy' bird because of its habit of taking food from other birds on the wing. *F. minor* was the only species seen over the atoll.

II — Common Noddy which was tamed as a fledgling by the author.

COMMON NODDY *(Anous stolidus)* — *"Ngoio"*

This bird breeds by the thousand in all the islets except the settlement islet. Rough nests are built in the coconut trees, the puka trees and the ngangie scrub. Nesting is shared by the parents while each in turn is away for food.

All young birds leave the nest before they are strong enough to fly, and spend some days on the ground while still being fed by the parents. The chicks at this stage are caught in large quantities for food.

After breeding these birds disappear almost entirely for a period out to sea. Breeding was well advanced in May, and by the end of August hardly one was sighted.

III — J. C. Burland, author of this article, with the Common Noddy fledgling which he tamed during his stay on Palmerston Atoll.

When the islanders see the Ngoio flying low over the water they say they know strong winds are coming.

It may be of interest to mention that I was handed a chick during my stay and was able to tame it completely within three days. It made a charming, if messy, pet which finally had to be taken to an outer islet and released, as it would not leave of its own accord. It made one attempt at independence but was back within forty-eight hours, not being able to find itself food, and settled in, it thought, permanently. I finally took it right across the lagoon in an open boat and it remained sitting on my hand the whole way. I left it in a tree and returned two hours later to check. It was still there and hopped on to my hand again as though it were boarding a bus. I carried it again to another islet, and left it on a coconut trunk by the water's edge, but again it had not moved after some hours. Finally one of the young boys made a grab at it and pulled out all the tail feathers. This destroyed all the trust it had, and it flew off up the beach. It is impossible to say whether it survived or was caught later for the cooking pot.

RED TAILED TROPIC BIRD or BOATSWAIN BIRD *(Phaeton rubricauda)* — *"Tavake"*

This bird breeds extensively and has been recorded since Cook's

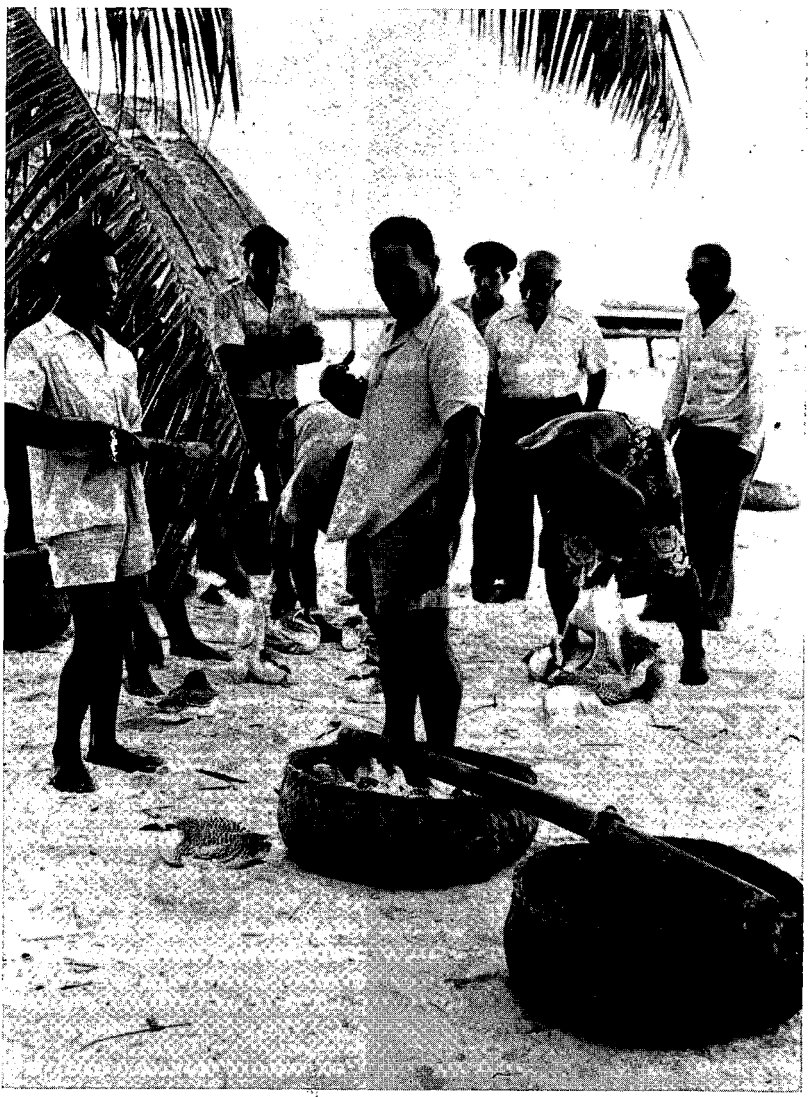
visit. After the 1926 and 1935 hurricanes the numbers that returned to breed were very few indeed. The reason may be that most adults were lost at sea as a direct result, because the inhabitants claim that the birds return to the same nesting site year after year.

IV — Parent Red-tailed Tropic Bird with partly grown chick on the nest which is merely a comparatively clear patch of sand under the scrub fringing the beach. Nesting is never further than thirty yards in.

V — A successful hunt. One of the Palmerston women with both hands full of chicks. Note the complete disregard for the young birds, which are brought back alive to the settlement islet, barricaded in and fed until killed for the cooking pot.

The estimate of breeding pairs in 1959 obtained from the inhabitants was 1,000, but I had no opportunity to check on its accuracy. There is a tendency for these people to exaggerate. However, this number is said to be far below that of the early days.

This is the main bird taken for food. "Picking" days are arranged from the first Saturday in May and then every fourth week after that while the chicks last. Such an arrangement is designed to



VI — Tropic Bird chicks being distributed after collecting. Each family man puts his share, still alive, in his own baskets.

allow very young birds to reach the right stage for the next "picking," or reach maturity and fly away to sea. Some 400-600 chicks are taken each year, and although the people claim that adults will breed again if the first chick is taken, this is hardly an adequate conservation programme, if losses at sea are taken into account. The adults are not eaten as the skin is too leathery and the flesh tough.

The people state that the birds are increasing very slowly, but they do not seem to be able, or want to understand that this is a result of their own actions. If they would not collect chicks for one year, or reduce their "picking" days, there is little doubt that the numbers of birds would increase vastly.

The chicks are brought back to the home islet alive and are fed with fish until they are required for cooking. Their feathers are used for stuffing mattresses, pillows and cushions, for fish lures, and for making crude shuttles for a form of badminton played with a wooden paddle solo. It is a children's game only.

VII — Some of the atoll men waiting for the distribution of chicks after the mass collection from the outer islets. Only a portion of the chicks collected are shown.

Phaeton rubricauda makes no nest. The egg is laid on the sand under the scrub fringing the beaches or a little inland in bush. These birds are helpless on the ground and are an easy prey. If a fish has just been given to a chick prior to its being caught, it is regurgitated on the sand. The islanders take this fish as a delicacy, wash it in the sea and eat it while still warm. They say it is good because it is "cooked."

WHITE TAILED TROPIC BIRD *(Phaeton aethereus)* — *"Rakoa"*

This bird never breeds on Palmerston. It is seen only rarely and is taken as a 'sign' that a hurricane or a heavy blow is coming.

Its coming is regarded with some dread by the islanders and

they will do it no harm whatever. They say it has never been sighted without being followed by bad winds or hurricanes. They say it flies low over the beach on Palmerston Islet, always in sight of someone, and it is understood from this that they regard the bird as some sort of supernatural messenger. They also reverse their claim to make it more definite and say that no blow has ever taken place without the bird having been sighted. This is open to doubt.

WHITE TERN *(Gygis alba)* — *"Kakavai"*

This is found only in small numbers but breeds on all the islets. The total number on the atoll probably never exceeds forty. This bird, at all age stages, is caught by hand for food as opportunity offers. Mostly the people climb trees at night and catch them while helpless.

When the islanders see this bird diving out at sea they take this as a sign of where the fish are and head towards the area in their boats.

SOOTY TERN *(Sterna fuscata)* — *"Seagull"* or *"Tara"*

This is another bird that no longer breeds on Palmerston. It appears to have been a victim of the hurricanes mentioned previously. It did breed until 1935. It is only seen very occasionally now, passing over in small flocks at a fair height. This bird, and its eggs, were eaten extensively before.

"GANNET" or *"Kena"*

I was not able to make any identification of this bird, although I saw it twice. It is a large black and white bird, obviously one of the tropical gannets.* The islanders say that it comes in to roost about five o'clock every night on Big Stone, a coral boulder about eight or ten feet high on the north-western reef, a maximum of ten birds and a minimum of 4 - 5 at a time. I am inclined to believe that the night roosting is more intermittent because we passed the stone many times as late as half past seven and there was no sign of birds on most of these occasions. Just occasionally they are seen flying over the lagoon.

This bird never breeds on Palmerston and it may be another victim of hurricane or human occupation. Cook mentions seeing two sorts of Boobies nesting when he called during his Third Voyage.

"BOOBY" or *"Kapu" (? Sula leucogaster)*

This is an all-brown, large bird that is very seldom seen. I did not sight it, but was told of its appearance. It does not nest on Palmerston either and may be the second of the varieties mentioned by Cook.

It is said to appear between December and January only and is always on its own, never in pairs or greater numbers.

PETREL *(? species)* — *"Upoa"*

This species, which I did not see, was described to me as a dark brown, small bird with no markings and I was told that the son of one of the island men had seen the same bird nesting on the ground in burrows on Christmas Island.†

This bird is seen flying over Palmerston only three or four times

* Likely to be **Sula dactylatra** (Ed.).

† Christmas Island Shearwater (**Puffinus nativitatis**); alternatively could be from description, **Bulweria sp.** (Ed.).

a year at most and the people will, under no circumstances, kill or harm it. It is a greatly feared bird as it is said to bring death or serious sickness.

I was told that the bird would turn and come in low over the head of anyone whistling or shouting or waving.

The origin of the 'sign' must have come from the Maori women from Manihiki or Penrhyn married into the family, but to-day all on the island believe it firmly. They say that, if any harm is done to this bird, "the person who harms finds a trouble on to himself or a person in his family."

Two examples were given in justification: the first is of a girl coming out of her father's house one night with a lamp. One of these birds flew into her and she caught hold of it and wrung its neck. Just a few days after her mother caught sick and died. The second example is of a man of 28 who killed one of the birds by yelling and whistling and then hitting it with a stick when it came low. A month or two later he died after a pain in his stomach. The people say that the spirit of his uncle came and spoke through him on his death bed and then "took" the spirit of the young man with him. It is claimed the body was dead when the ghost voice left. Other description makes it appear that the young man died of appendicitis or hernia, but otherwise the tale is beyond comment.

REEF HERON *(Demigretta sacra)* — *"Kotuku"*

This bird is seen around all the islets in grey, white, speckled and "black," a colour I did not see; but one of the islanders claimed it was definitely darker than the normal blue-grey.

They make their nests in the low ngangie scrub on North, Bird and Primrose Islets only, but are seen fishing everywhere. There cannot be more than fifty birds on the whole atoll and yet they are shot at continuously for food. How they exist I cannot say, because up to forty at least must be killed each year.

GOLDEN PLOVER *(Charadrius dominicus fulvus)* — *"Kuriri"*

Seen on Palmerston right through the year. From January to April they are seen in much greater numbers. At the time of my visit there would have been fewer than fifty. They do not breed on the atoll and they are not shot for food.

WANDERING TATTLER *(Heteroscelus incanus)* — *"Kuri"*

This bird is called the *"Torea"* on Palmerston because of its habit of nodding its head when on the ground. It is not shot for food. It also appears in greater numbers from January to April, but is never seen in very large numbers. Some remain right through the year.

BRISTLE-THIGHED CURLEW *(Numenius tahitiensis)* — *"Kivi"*

The same remarks apply as for the *"Kuriri"* and *"Kuri."* The number estimated by the people at the time of my visit was about 200, although this again could be an exaggeration. They were increasing by the end of August and flying in small flocks. They are shot for food. The bird does not breed on Palmerston.

PACIFIC FRUIT PIGEON *(Ducula pacifica)* — *"Rupe"*

These birds breed on all islets except the settlement islet. They are shot constantly for food.

The inhabitants' estimation of numbers was 500, but this is, I think, a gross exaggeration. It would be hard to make a close estimate, but I think the figure of 200 is closer.

LONG-TAILED CUCKOO *(Eudynamis taitensis)* — *"Karavia"*

This is called the *"Fantail"* or *"Kokorove"* on Palmerston. It is present all the year round and I was told that the numbers don't vary seasonally. This would seem to be incorrect. The bird has never been seen to breed on the atoll. During my visit there were probably between 20-40 of this species combined on all the islets. It is not shot for food. The people say that when it is heard whistling it is a sure sign of rain.

I was given a list of birds recorded as breeding, those probably present and those classified as vagrants, before I left for Palmerston and, by comparison, the number of birds commonly or even occasionally seen, is greater than anticipated. At the same time there are some surprises in the small number of species breeding. The only bird listed as a likely vagrant which was not seen was the duck; but while Muscovy ducks are bred and eaten in the settlement, I could not discover any record of migrating species having rested on the atoll; they probably do so, however, as recorded from Penrhyn and elsewhere.

It is unlikely that a visit to Palmerston of similar length to mine will be made for a considerable time because of its isolation. For this reason I hope these notes will be of some value in the general compilation of data on the birds of the Cook Group.

★

THE FOOD OF THE MOREPORK

By C. J. LINDSAY and R. G. ORDISH
Dominion Museum, Wellington

In the earlier periods of ornithological history in New Zealand it was thought that the Morepork *(Ninox novaeseelandiae)* lived on birds, rats, and to a lesser extent, on insects. When regurgitated pellets were examined however, they were found to contain mainly insect remains.

Over the last six years twenty-five Moreporks have been received at the Dominion Museum and we have taken this opportunity to study further the feeding habits of this bird. The stomach of each bird was examined and, where possible, the contents were identified. The results, shown in the Table, also indicate an insect diet, vertebrate remains being found in only two specimens.

The specimens whose localities are known are all from the North Island and those without locality are almost certainly so. Because they were obtained in all seasons they give some indication of the Morepork's feeding habits.

Firstly the diet is varied and suggests random feeding on readily available species rather than a search for particular prey. Several insects such as moths and cicadas would only be available for a limited period while others, particularly the wetas, would be available throughout the year. As a result the wetas emerge as a staple item of diet.

Moreporks have been observed to feed on insects that have been attracted to street lights and also to take insects from trees. The presence of grassgrub moth larvae in the samples suggests that Moreporks will feed also from the ground. This larva is a grassland pest which burrows deep in the soil and emerges at night to feed on grass. Of incidental interest is a sample of forty-two Noctuid moths eaten in mid-winter.

TABLE OF STOMACH CONTENTS OF THE MOREPORK
(Ninox novaeseelandiae)

Locality and Date	*Vertebrates*	*Spiders*	*Beetles*	*Moths*	*Wetas, Stick Insects and Related Insects*	*Other Insects*	*Worms*
Masterton 26/8/50 (from pellets)		Unidentified 2 specimens	Small longhorn Unidentified 1 specimen				
Turangi Taupo 21/5/56		(*Dolomedes* sp.) 1 specimen	Huhu (*Prionoplus reticularis*) 4 specimens				
Silverstream Wellington 12/6/59		Spider Mandibles 2		Grass Grub Moth Larvae (*Oxycanus* sp.) 29 specimens	Weta mandibles 3		
Lowry Bay Wellington 2/6/60			Grass Grub Beetle 1 specimen. Longhorn 2 specimens	Melanchrid Moths 6 specimens	Tree Weta (*Hemideina thoracica*) 1 specimen	Cockroach 1 specimen	
Wanganui 8/6/60				Unidentified 22 specimens			
Lowry Bay Wellington 2/9/60			Grass Grub Beetle 1 specimen. Longhorn 2 specimens	Cut worm moths 4 specimens		Cockroach 1 specimen	
Ngaio Wellington 17/10/60		Orb Spider 1 specimen	Longhorn Unidentified 1 specimen	Unidentified 21 specimens	Tree Weta 4 specimens		

Locality and Date	*Vertebrates*	*Spiders*	*Beetles*	*Moths*	*Wetas, Stick Insects and Related Insects*		*Other Insects*	*Worms*
Stokes Valley Wellington 22/12/60			Huhu 7 specimens		Tree Weta 3 specimens			
Days Bay Wellington 26/2/61			Longhorn (*Xuthodes batesi*) 2 specimens	Unidentified 15 specimens	Tree Weta 2 specimens	Cockroach (*Platyzosteria* sp.) 1 specimen	Large Cicada (*Melampsalta cingulata*) 1 specimen	
Khandallah Wellington 12/4/61		Unidentified 4 specimens		Unidentified 6 specimens	Tree Weta 10 specimens. Cave Weta 12 specimens		Bush Cicada (*Melampsalta scutellaris*) 2 specimens	
Days Bay Wellington 24/7/61		Longhorn Unidentified 2 specimens	Unidentified 2 specimens	Tree Weta 9 specimens. Cave Weta 6 specimens				
Ohope 1961			Grass Grub Beetle (*Odontria* sp.) 1 specimen	Unidentified 3 specimens	Cave Weta 3 specimens	Cockroach (*Platyzosteria* sp.) 1 specimen		
Stokes Valley Wellington 27/2/62							Large Cicada (*Melampsalta cingulata*) 5 specimens	
Rainbow Springs Rotorua 28/3/62				Insect fragments	unidentifiable			

Locality and Date	*Vertebrates*	*Spiders*	*Beetles*	*Moths*	*Wetas, Stick Insects and Related Insects*		*Other Insects*	*Worms*
Wakamaru 4/4/62	Mouse *(Mus musculus)* 1 specimen					Australian Katydid *(Caedicia simplex)* 1 specimen		
Rotorua 22/6/62	Small Passerine Bird 1 specimen Leg & feathers	Unidentified 1 specimen		Unidentified 2 specimens	Tree Weta 3 specimens. Cave Weta 1 specimen	Green Stick Insect *(Clitarchus hookeri)* 1 specimen		Earth Worms 3 specimens
Whakatane 1/8/62			Grass Grub Beetle *(Odontria piciceps)* 10 specimens	Unidentified 26 specimens		Australian Black Cricket *(Achet commodus)* 1 specimen	Crane Fly *(Tipulidae)* 1 specimen	
Te Horo Wellington 4/9/62				Unidentified 5 specimens	Tree Weta 2 specimens			
No locality 1962			Grass Grub Beetles 14 specimens					
Murupara Auckland 1962				Unidentified 2 specimens 1 larva				
Waikanae 8/5/63	Stomach		Empty					

Locality and Date	*Vertebrates*	*Spiders*	*Beetles*	*Moths*	*Wetas, Stick Insects and Related Insects*		*Other Insects*	*Worms*
Paekakariki 11/5/63				Unidentified 11 specimens	Tree Weta 1 specimen	Australian Katydid *(Caedicia simplex)* 3 specimens		
No locality 1963			Grass Grub *(Odontria magnum)* 7 specimens. Small Longhorn 1 specimen Carrion Beetle *(Necrophilus prolongatus)* 1 specimen	Unidentified 16 specimens	Cave Weta 1 specimen	Stick Insect 1 specimen Australian Katydid *(Caedicia simplex)* 2 specimens		
No locality 1963						Australian Katydid *(Caedicia simplex)* 2 specimens		
Eastbourne Wellington 31/5/64			Grass Grub Beetle (*Odontria* sp.) 19 specimens. Longhorn 1 specimen	Unidentified 3 specimens	Tree Weta 1 specimen. Cave Weta 1 specimen	Green Stick Insect *(Clitarchus hookeri)* 3 specimens		
Paraparaumu 16/6/64				Melanchrids 42 specimens	Cave Weta 2 specimens	Cockroach *(Platyzosteria undulivitta)* 2 specimens		

BIRDS OF THE HEN AND CHICKEN ISLANDS

By P. D. G. SKEGG

INTRODUCTION

In recent years the writer has been a member of five parties which have camped on the Hen and Chicken Islands group. The first three were King's College Bird Club parties, led by Mr. R. B. Sibson; 15 - 21 December 1960, and 14 - 21 December 1961, on Hen Island; and 12 - 20 December 1962 on Big Chicken. On the 1962 trip landings were also made on Middle and Eastern Chickens. Two more recent expeditions, both to Hen Island, were organised by Wildlife Branch, Department of Internal Affairs, and led by Mr. D. V. Merton. The writer spent from 23 August to 3 September 1963 and from 23 January to 4 February 1964 on these expeditions. In January and June 1964 brief visits were made also to Big and Middle Chickens.

This paper is based on the observations made by the members of these expeditions, but it also collates the observations of earlier visitors to the Group.

DESCRIPTION OF THE ISLANDS

The Hen and Chicken Islands consist of six islands which lie to the east of the mainland of northern New Zealand. Hen Island, the largest and southernmost island of the Group, is 64 miles north of Auckland and twelve miles east of Ruakaka Beach. The Chicken Islands are four miles north of Hen Island, and extend almost five miles from west to east in a one-mile band. The westernmost Chickens are about seven miles east of the Whangarei Heads. The South-western Chicken is half a mile south of North-western Chicken, and 1600 yards west of Big Chicken. There is a 280-yard channel between the eastern extremity of Big Chicken and Middle Chicken, and Eastern Chicken is 160 yards east of the eastern end of Middle Chicken.

Hen Island. The Hen, or Taranga, is 1775 acres in extent. It has an attenuated east-north-east to west-south-west shape, extending three miles 1540 yards in length, but varying considerably in width. The island is only 300 yards wide at the knife-edged easternmost peninsula, but is 1650 yards wide at the central part of the island. The average width over most of the island is 1200 yards.

A sharp central ridge extends along the axis and is roughly 900 feet high for most of its length. At the western end of the island the ridge rises to a number of andesitic pinnacles, the highest of which is 1400 feet above sea level. Rugged, broken topography and an intense degree of dissection characterise the island. There are precipitous fissured cliffs around parts of the coast, along with a variety of wave-cut platforms and immense irregular boulders. Beaches with rounded boulders are mainly on the western and southern shores of the island.

As would be expected from a long, intensive period of Maori occupation, there is no evidence of ancient undisturbed vegetation. There have now been more than 140 years of almost uninterrupted growth. An 1870 map shows that there were then still cleared areas along the western coast, and muttonbirding parties continued to visit the island into the present century. Light-resistant species, particularly Kanuka and Pohutukawa, were probably the first trees to colonise the slopes, and shade-resistant species such as Taraire, Kohekohe, Tawa and Karaka then grew up beneath them. Much of the island is in various

[Whites Aviation photograph

I — Hen Island, from the south-west.

stages of this succession. The main vegetation communities have recently been listed (Atkinson, 1964). Tuataras *(Sphenodon punctatus)* are still uncommon, their numbers being much as they were eighty years ago. Kiores *(Rattus exulans)* have increased greatly during the present century and they are now common.

Hen Island was privately purchased in 1871, but was bequeathed to the Crown in 1925. There is an excellent campsite at Dragon's Mouth Cove and another at Old Woman Cove.

North-western Chicken. The North-western Chicken is approximately seven acres in extent, and is of north-north-west to south-south-west orientation. It is composed of two sections. The northern section is 320 yards long and 180 yards across at its widest point. The southern section is 260 yards long and 110 yards wide. Much of the island is bare rock, but there are extensive areas of Taupata, Pohuehue and iceplant, with some larger vegetation higher up. There is a smaller vegetation-covered islet a short distance to the south-east of North-western Chicken.

South-western Chicken. The main section of the South-western Chicken is 1000 yards long, varies from 260 to 350 yards in width, and is approximately forty-nine acres in extent. An axial ridge of up to 290 feet above sea level runs east-west, and from this ridge the island falls very steeply to the north and slightly less steeply to the south. Steep slopes are characteristic, and these are mostly covered with low scrub, flax and *Astelia*. Pohutukawa and Kanuka are emergent in places, but there is very little larger vegetation.

Rocks join a four-acre triangular shaped islet, also very steep, to the southern side of the eastern end of the island.

[P. D. G. Skegg

II — The Chicken Islands, from the summit of Hen. Left to right: South-western (obscuring North-western), Big, Middle and Eastern Chickens.

Big Chicken. Big Chicken, or Maro-Tiri, is also known as Lady Alice Island, and (incorrectly) as West Chicken. The 340-acre island is one mile 400 yards long, and varies in width from 530 to 840 yards. The sedimentary rocks of which the Chickens are composed have weathered into more rounded hills and basins than have the tertiary andesitic rocks of Hen Island. Like Middle and Eastern Chickens, Big Chicken is characterised by numerous offlying rocks and reefs, a generally irregular outline of cliffs and indented bays, well-watered south-sloping valleys, rounded ridges, and steep northern faces.

In 1955 Mr. C. A. Percy mapped the vegetation of Big Chicken, and he has kindly permitted the inclusion of the following extract from his paper.

> "The vegetation of the Big Chicken shows a close correlation with topography. Ridgetop vegetation differs markedly from that in the valleys. The latter are remarkably uniform with a transition from flax and coastal scrub through Kohekohe-Puriri forest to Pohutukawa-Puriri forest at the heads of the valleys. This Pohutukawa dominated forest community is also found in the broad hanging valleys of the south and south-west.
>
> Between the vegetation of the valley floor and that of the ridgetop is a transition community of mixed character which varies greatly in extent.
>
> Ridges are dominated by Kanuka although on the southern headlands this is replaced by Pohutukawa forest. In more exposed areas as on the north coast and behind West Bay the tall Kanuka is reduced to a low scrub.
>
> The cliffs and headlands have a distinct vegetation tolerant of the exposed conditions. Pohutukawa scrub is characteristic of the higher areas and resistant andesitic ridges but is replaced at lower levels by coastal scrub. On the steepest faces and on quickly eroding slopes, flax grasses and succulent halophytes are the only colonisers.
>
> Variations in this general pattern are usually the result of more recent fires. The main area so affected is West Bay where ridges are covered with low scrub and the valleys are still in the transition stage — typified elsewhere by the valley wall community. Areas in the South Cove and in the North-east valley show similar mixed scrub communities. A large area of mixed scrub to the east of the main pa appears to have been cultivated rather than burnt soil." (Percy, 1955)

Tuataras and Kiores are both numerous.

The lengthy and intensive Maori occupation of Big Chicken ended in 1821, though the cultivations were described as "fairly fresh" in the 1840's. In 1880 Reischek found the islands "covered with bush, with the exception of a few abandoned Maori plantations, now overgrown with flax and scrub." Ten years later a second occupation began. For a number of years Nova Scotian fishermen spent long periods ashore at the sandy crescentic western bay known as Grave Bay (because of the child who half a century earlier had died on an immigrant ship and was buried there). The fishermen introduced cattle, which remained until 1924, and willows, which still thrive. The last major fire was in 1902, and since the cattle died out and Whangarei flax-millers stopped taking flax from the island, regeneration has continued undisturbed.

There is a good campsite at South Cove, where there is an easy landing, Maori terraces on which tents can be pitched, and a constant water supply. A smaller stream runs down to the crescentic sandy Grave Bay, but landing here is more difficult because of numerous offlying rocks and reefs.

Middle Chicken. The Maori name for Middle Chicken is Whakahau. A large eastern section makes up the main part of this 160-acre island, and from the western end of this section a promontory runs south-west to form the western side of a large southern bay. The main (eastern) part of the island is three-quarters of a mile long, varies from 480 to 930 yards in width, and rises to 775 feet — the highest

point of any of the Chickens. There are low cliffs and steep valleys to the south, and an almost sheer drop from the summit to the rugged northern coastline. A 300-yards-long isthmus runs out to the promontory, which is 530 yards from north to south, and from 150 to 230 yards in width.

The vegetation of Middle Chicken is larger than that of Big Chicken, with considerably less Kanuka. Four plant communities were noted during a traverse across the centre of the island in 1962. The low southern cliff area is covered with a tangle of Pohutukawa, Taupata, Ngaio, Kawakawa, flax and *Astelia*. The mid-slopes, with their large old trees, provide the nearest equivalent to the larger vegetation of Hen Island that is to be found on the Chickens. The valleys are steep, there is very little undergrowth, and Kohekohe, Karaka, Mapou and Puriri predominate in the canopy. The flatter summit area has a cover of Kanuka, *Hebe*, sedges and grasses. On the northern cliffs Pohutukawa and flax are common. Tuataras and Kiores are both present.

Eastern Chicken. Eastern Chicken, or Coppermine Island, is seventy-seven acres in extent. The island is 1530 yards long and is in two sections. A larger western part is 925 yards long and varies from 330 to 650 yards in width. This part is steep on both sides, but particularly so to the north. The summit (535 feet) area is the flattest on the island. A 270-yard-long isthmus leads to the eastern part of the island, which is approximately 600 yards long, 400 yards wide, and rises to 480 feet high.

A short visit in 1962 gave an opportunity to make brief observations of the plant communities in a narrow transect over part of the western section. The southern coastal slope is steep and, in places, very rocky. The dominant vegetation is Pohutukawa over Kawakawa and Karaka. There are some areas of flax. The mid-slopes are steep and intensively burrowed, the ground being liable to give away at every step. Tall Mahoe, with patches of Kawakawa and Karaka beneath, is the usual cover. The flatter ridge-top has a canopy of Kanuka and Pohutukawa. Under this Whau, Mahoe, Mapou, pigeonwood, *Coprosma, Olearia furfuracea*, bracken and other plants form a tangled undergrowth. The very steep northern slope is largely covered with flax and Mahoe, with some patches of Pohutukawa. The rocky south-western corner of the island was inspected from the sea, and appears to be largely covered with flax, Toetoe, Reinga lily, *Astelia* and Ngaio, with Pohutukawa higher up. Late last century tuataras were present in large numbers and many were removed. Some are still present.

The presence of deposits of native copper on Eastern Chicken was known as early as the 1840's, and a small syndicate once put in a drive. Some bush was cut during the installation of a navigational light on top of the western section of the island, but for the most part Eastern Chicken, like Middle Chicken, appears to have been little disturbed since Maori times.

THE BIRDS

The Hen and Chicken Islands were subject to very great Maori modification over many hundreds of years. Few parts of the Group have not been cleared at some time; though some areas were probably not used for many years before the islands were finally abandoned in

1821. During the period of Maori occupation the bird population was probably decimated, and some species have only recolonised the Group since the occupation ended.

Seven species of petrel breed in the Group, and their numbers have increased greatly during the last eighty years. In the 1880's Reischek recorded neither Pycroft's Petrel on Hen Island, nor Flesh-footed and Sooty Shearwaters on Big Chicken, but now they are important features of the bird life. Grey-faced Petrels are the dominant petrel on Hen Island and perhaps also on Big and Middle Chicken, where their numbers may be rivalled by Flesh-footed and Sooty Shearwaters. Flesh-footed Shearwaters appear to be the dominant petrel on Eastern Chicken, the only one of the larger islands with concentrations to compare with those of the great petrel strongholds elsewhere. Grey-faced Petrel and Allied Shearwater skulls have both been found in coastal deposits on Hen Island (Wilson, 1956), but it is not established that these date from the period of permanent Maori occupation, for muttonbirding parties continued into the present century (Cowan, 1908).

The Group is characterised by particularly high densities of native bush birds, and there must be few, if any, places in New Zealand with higher densities than those of Hen Island. The native bush birds are probably in greater numbers than for many centuries, but the population continues to change. It appears safe to predict that on Hen Island Pigeons and Kakas will very gradually increase in numbers as the large-berry trees become more numerous, whereas Tuis and Bellbirds will either change their staple food supplies or decrease as some of their main nectar sources are replaced by other species. The enormous increase in the Kiore population during the present century has led to an increase in the number of Moreporks, but the Kiores have had an even more important effect in controlling the regeneration. The changing vegetation does not appear to account for the sudden change in the proportion of Tuis to Bellbirds on Hen Island in the 1930's, nor the great increase in Saddleback numbers during the 1940's and 50's.

Introduced birds did not become established in the Group until much later than they did on the far outlying islands (Williams, 1953) and they are still only present in small numbers. They show a marked preference for the most recently modified areas, particularly Big Chicken, and also the Lighthouse Bay-Stead Bay area of Hen Island.

Land-birds probably often fly between the various Chickens, but passage between the Chickens and Hen Island (four miles) and between the Group and the mainland (ten miles from Hen Island, eight miles from Big Chicken), is much less frequent. There are reliable records of Harriers, Pigeons and Pipits passing between Hen Island and the mainland, and Bellbirds from the Chickens have colonised the adjacent mainland. It is probable that most of the native land birds can, and do, fly between the Group and the mainland. Here, as elsewhere, Starlings are the landbirds which most frequently fly over the open sea, and they roost on North-west Chicken. Starling island roosts known in northern New Zealand include the Cavalli Is.; a small islet between Kawau I. and Mullet Pt.; Noises Is.; Mercury Is.; Alderman Is.; Shoe I.; Kawera I. and Rabbit I. (off Mt. Maunganui).

Various attempts have been made to explain why Whiteheads and Robins are present twenty-six miles away on Little Barrier, but not

on Hen Island. However, a suspected record of Stitchbirds fifty miles from Little Barrier at Ngunguru, near Whangarei (Williams, 1962), indicates that there is always the possibility of new species being blown from Little Barrier to Hen Island.

SPECIES NOTES

(*Denotes species introduced into N.Z.)

NORTHERN BLUE PENGUIN *(Eudyptula minor novaehollandiae)*

Blue Penguins breed on Hen Island, and Big, Middle and Eastern Chicken. The largest numbers come ashore on the more sheltered southern and western coasts, particularly where there is a pebbly beach. The cliffs which run down to the northern coasts restrict numbers on this side, but some come ashore at those places which provide access to nesting sites, as at Pycroft Bay, Hen Island. Access to nesting sites is poor on Middle and Eastern Chickens, but burrows have been found in the southern bay of Middle Chicken and by the eastern landing on Eastern Chicken.

Large numbers are found pounded on the large boulders which surround most of the coast. Most burrows are near the coast, but some have been found as high as 700 feet a.s.l., and also above the steep Lighthouse Cliffs, on Hen Island.

FAIRY PRION *(Pachyptila turtur)*

The status of the Fairy Prion in the Group is uncertain. Reischek never recorded Fairy Prion from the Chickens in his own papers, but Buller (1888) wrote:

> "Reischek found this Petrel breeding in holes underground on both the Little Barrier and the Chickens; but it was met with only on the highest wooded ridges in the centre of the Island."

The "highest wooded ridges" are undoubtedly those of Little Barrier, and there are no comparable places on the Chickens. Presumably on the basis of this record Falla (1934) lists the Chickens as a breeding place of the Fairy Prion, and subsequent writers have sometimes broadened this to the "Hen and Chickens."

The fact that subsequent observers have not found the Fairy Prion on the Chickens is not in itself sufficient reason for disregarding the record, for it is only in recent years that Fairy Prions have again been recorded from Little Barrier (Bishop, 1963). However, as Reischek did not record Fairy Prion in his own paper on the Chickens (Reischek, 1881), and as no skins of Fairy Prion from the Chickens can be located in the major New Zealand collections, the record should not (on this evidence) be unreservedly accepted.

On 16/12/61 calls of what was considered to be a Fairy Prion were heard over Dragon's Mouth Cove, and the following evening two birds uttered the same call over Pycroft Bay. One of the birds circled above the bay, where there was a campfire, before proceeding inland. Fairy Prions might possibly breed on the ledges around the rugged peaks of Hen Island, and here they would be extremely difficult to locate. However, it is more probable that the birds heard were passers-by, attracted by the lights.

THIN-BILLED PRION *(Pachyptila belcheri)*

Oliver (1930, 1955) states that Iredale lists what was apparently a storm-killed specimen from Taranga (Hen) Island.

FLESH-FOOTED SHEARWATER *(Puffinus carneipes hullianus)*

Flesh-footed Shearwaters are very occasionally found ashore on Hen Island. They were first recorded in January 1937, when several Flesh-footed Shearwaters were located among the Sooty Shearwater burrows on the headland between Dragon's Mouth Cove and Pukanui Bay. None had eggs (Fleming, 1941; Buddle Photograph Collection, Auckland Museum). The colony was not occupied in 1939 (Fleming, 1940), but was again in use in December 1947. No birds were found here in December 1954, but one was located in a burrow elsewhere (Chambers *et al,* 1955). Later parties have not recorded any.

Reischek did not record Flesh-footed Shearwaters on Big Chicken, and the first record appears to be that of E. F. Stead, who discovered a colony on a bank at South Cove in 1916 (Wilson, 1959). The number has continued to increase, and several hundred pairs now breed on the island. Burrows riddle the trenches and terraces of the former Maori *pa* above the northern cliffs. Flesh-footed Shearwater burrows are most common on the slopes with direct access to the sea, but they are found even on the flat, sandy valley floor behind Grave Bay. Burrows are in similar numbers on Middle Chicken.

Eastern Chicken is one of the strongholds of this species in New Zealand waters. The numbers were evidently large by the turn of the century, when James Cowan compared the ground to that of rabbit-ridden country (Cowan, 1908). Apparently referring to the same trip, he wrote:

> "Entering the pohutukawa bush that thickly clothes the steep slopes above the cliffs of Coppermine Island, the first thing one notices is the curious pitting of the dark soil with countless holes and burrows. These are the **ruas** or caves of the muttonbirds." (Cowan, 1926).

The burrows are not particularly numerous on the smaller eastern section of Eastern Chicken, but on the southern slopes of the western section large numbers, perhaps some thousands, breed. The burrows are most numerous in the tall Mahoe forest, but they are found under a wide variety of vegetation cover, including dense flax.

In December 1939 a Flesh-footed Shearwater was found in a burrow on North-western Chicken, and a further two pairs were breeding on an islet between Big and Middle Chicken (C. A. Fleming, *pers. comm.*).

BULLER'S SHEARWATER *(Puffinus bulleri)*

Buller's Shearwaters sometimes join the other petrels gathering around these islands at dusk; e.g. two in Dragon's Mouth Cove on 19/12/60. Three corpses have been found washed onto the south-western shore of Hen Island: one on 28/12/62 (J. A. Bartle, *pers. comm.*), one on 24/8/63 (very ancient), and one on 1/2/64 (fresh).

Buller's Shearwaters have not yet been recorded coming ashore in the Group. The rapidly expanding population has been found breeding only on the Poor Knights Islands, twenty-two miles north of the group. However in 1960 single birds were found ashore on Cabbage Tree Island and Montague Island, two islands off the coast of New South Wales (D'Ombraine and Gwynne, 1962), so the possibility of their coming ashore in the Group should not be discounted.

SOOTY SHEARWATER *(Puffinus griseus)*

Sooty Shearwaters were not recorded by the early visitors to the group. They were first recorded on Hen Island in December 1927 (Moncrieff, 1928), and since then they have bred regularly. In the 1930's the largest concentrations were found near the westernmost end of the island (R. A. Wilson, *pers. comm.*), and they are still the dominant petrel in this area, i.e. Stead Bay and Wilson Bay. For nearly thirty years they have bred regularly on the headland between Dragon's Mouth Cove and Pukanui Bay, the numbers never being as great as ten pairs and sometimes dwindling to one or two pairs. In January 1963 small numbers were also recorded in burrows under the large boulders directly behind the campsite at Dragon's Mouth Cove (J. A. Bartle, *pers. comm.*).

In December 1939 R. A. Wilson thought he heard Sooty Shearwater calls on Big Chicken (C. A. Fleming, *pers. comm.*), and in December 1953 they were recorded breeding (Chambers *et al,* 1955). Big Chicken appears to be the largest breeding station of this species in northern waters, the population probably sometimes running into hundreds. The fluctuating proportion of Sooty Shearwaters to Flesh-footed Shearwaters recorded by the King's College Bird Club parties is remarkable.

LARGER SHEARWATERS BANDED BY K.C.B.C. PARTIES			
	1953	1957	1961
Flesh-footed Shearwater	27	16	39
Sooty Shearwater	28	1	12

Sooty Shearwaters probably breed on Middle and Eastern Chickens, but no night work has been done on these islands. On 21/3/53 a corpse was found in a deep man-made pit on a scrub-covered slope of Eastern Chicken (Davenport, 1954).

SHORT-TAILED SHEARWATER *(Puffinus tenuirostris)*

In December 1961 one Short-tailed Shearwater corpse was washed ashore at Pukanui Bay, Hen Island.

Mainland beach-combing records, and sight records from Plate Island (Sladden, 1954) and the Poor Knights Islands (Kinsky and Sibson, 1959), suggest that the Short-tailed Shearwater is a regular visitor to these waters.

FLUTTERING SHEARWATER *(Puffinus gavia)*

Fluttering Shearwaters are the second most common petrel on Hen Island, for they are the dominant petrel on the upper slopes. They were first recorded in 1903 (Peat Collection, Auckland Museum), and have been reported by subsequent visitors (Moncrieff, 1928; Stead, 1963; Fleming, 1940, etc.). Fluttering Shearwaters nest in greatest numbers on the higher portions of the island, and listeners near the coast hear only a small proportion of the birds coming in. (In August 1963 only the usual small numbers were heard at Dragon's Mouth Cove, but by training J. L. Kendrick's parabolic reflector on the inland cliffs some hundreds could be heard.) In the Dragon's Mouth Cove - Pukanui Bay area Fluttering Shearwaters are only rarely

found in their typical coastal sites. Three were found near the coast in December 1960, none in December 1961, and only two in August 1963. Large numbers nest in the valley behind Old Woman Cove.

Fluttering Shearwaters nest spasmodically on Big Chicken, where they were found breeding in December 1880 (Reischek 1886), and where they were heard coming ashore regularly in December 1939 (C. A. Fleming, *pers comm.*). None was recorded in December 1953 (Chambers *et al,* 1955) and December 1957 (R. B. Sibson, *pers. comm.*), but in December 1962 many were heard, and ten were caught for banding on the south coast of the island.

Fluttering Shearwaters also breed in numbers on North-western Chicken, particularly around the lower slopes (1939: Fleming, *pers. comm.*; 1957: Sibson, *pers. comm.*). In December 1939 four occupied burrows were found on the main islet between Big and Middle Chicken (Fleming, *pers. comm.*), but they were not recorded here in 1957 (Sibson, *pers. comm.*). They may also breed on South-western Chicken (Fleming, *pers. comm.*) and Middle Chicken, for on both these islands likely-looking burrows, with white breast-feathers at the entrance, have been found.

NORTH ISLAND ALLIED SHEARWATER *(Puffinus assimilis haurakiensis)*

Allied Shearwaters breed on Hen Island, where a skull has been found in a coastal deposit (Wilson, 1956). They were recorded in September 1903 (Peat Collection, Auckland Museum), and in March 1933 a freshly moulted pair was found in a burrow (A. T. Pycroft, *pers. comm.*). More were recorded in November 1933 (Stead Collection, Canterbury Museum). A pair of adults was found in a burrow by day on 21/11/35, and small numbers came ashore in late November 1939 (Fleming and Serventy, 1943). In December 1947 a dead bird was found on the face of one of the great boulders behind Dragon's Mouth Cove (Sibson, 1949), and in August 1953 an Auckland University Field Club party found them breeding behind Old Woman Cove (Heather, 1957). Another Field Club party camped at Dragon's Mouth Cove in May 1956. A series of photographs taken by members of the party was published in *The Weekly News,* 30 May, 1956, and one shows an Allied Shearwater. The caption reads: "A Pycroft's Petrel just after alighting near its burrow."

An Allied Shearwater corpse was found ashore at Stead Bay in December 1960. In August 1963 Allied Shearwaters were found breeding from 30 to 850 feet a.s.l. (below Balancing Rock), and eleven birds were caught with little searching near Dragon's Mouth Cove. The Allied Shearwater population on Hen Island probably runs into some hundreds.

In December 1880 Reischek discovered the North Island Allied Shearwater on Big Chicken (Reischek, 1886). They were not again recorded until 23/7/58, when one was heard and the corpse of another found (B. D. Bell, *pers. comm.*). On the evening of 15/12/62 one was found ashore in the valley east of South Cove.

GREY-FACED PETREL *(Pterodroma macroptera gouldi)*

Grey-faced Petrels are the most numerous petrels on Hen Island. Buller (1888) described a chick from a Hen Island specimen, probably collected by Reischek. Grey-faced Petrel burrows are found from the

summit to within a few feet of the sea. However, there are no widespread concentrations such as are sometimes found elsewhere, but there are local concentrations at the Pinnacles, Moran's Lookout, parts of the inland cliffs, and the knoll on the ridge above Old Woman Cove. Recent observations confirm Heather's (1957) statement that:

> "Particularly favoured was the soil at the foot of the bluffs, in Astelia and flax communities, and among boulders and the roots of big trees. They were thus distributed throughout the lower slopes where either beach or cliff is handy. In higher regions they were confined to the neighbourhood of those peaks, bluffs and rocks which pierce the bush canopy."

Grey-faced Petrels are common on Big Chicken, where Reischek recorded them in 1880 (Reischek, 1881) and 1883 (Canterbury Museum Collection). In mid-December 1962 their numbers were second only to Flesh-footed Shearwaters, and at the height of their breeding season they may be more common than Flesh-footed Shearwaters ever are. On Big Chicken, as on Hen Island, Grey-faced Petrels nest inland more readily than the large shearwaters. They are common on Middle Chicken.

In 1939 there was one Grey-faced Petrel burrow on the islet between Big and Middle Chicken (C. A. Fleming, *pers. comm.*).

PYCROFT'S PETREL *(Pterodroma pycrofti)*

The Group is one of the strongholds of the Pycroft's Petrel, and there are up to four or five hundred pairs.

Pycroft's Petrels were first found on Hen Island in December 1932 (Falla, 1933). Recent observations corroborate Fleming's (1941) statement that:

> "On Hen Island Pycroft's Petrel is moderately abundant and burrows have been found on all parts of the island where there is soft soil for burrowing. The greatest numbers, however, appear to be on the northern and western faces of the island, and burrows are not appregated into large colonies, though a group may be found within a few yards in places particularly suitable for burrowing. More burrows were found on the lower slopes, under three hundred feet, than on the higher ridges leading up to the highest peaks, which **Puffinus gavia** almost monopolises. On the other hand, there are few **Pycrofti** in the hard soil of the abrupt cliffs immediately above the shore, where **Eudyptula, Pterodroma macroptera, Puffinus griseus,** and **P. carneipes** have their burrows."

Pycroft's Petrels also breed on Big and Middle Chickens. They were recorded breeding on Big Chicken in December 1880, but were then identified as Cook's Petrel (Reischek, 1886; AV325, Canterbury Museum Collection). One was heard on 25/1/23 (R. A. Falla, *pers. comm.*), and in 1933 several were found ashore (Auckland Museum Collection). In December 1953 the number was thought to be smaller than that on Hen Island (Chambers *et al*), but by December 1962 the number was greater than that found on Hen Island in December 1960, December 1961 or January 1964, though not nearly as great as on Red Mercury Island in November 1962. The population of Pycroft's Petrel on Big Chicken has probably grown considerably since 1953. On his first night on Big Chicken in December 1953 R. B. Sibson noted "calls of several *Pycrofti* heard" (*pers. comm.*), but such a description would have been a gross understatement nine years later. The difference in the number of Pycroft's Petrels caught for banding — 4 in 1953, 17 in 1962 — also indicates an increase.

Pycroft's Petrels were discovered on Middle Chicken in December 1962, but their number was not ascertained.

NORTHERN DIVING PETREL *(Pelecanoides u. urinatrix)*

Diving Petrels were discovered breeding on North-western Chicken on 18/4/33 (A. T. Pycroft, *pers. comm.*), and in December 1939 "burrows were abundant" (C. A. Fleming, *pers. comm.*). They have not been recorded breeding elsewhere in the Group.

AUSTRALIAN GANNET *(Sula bassana serrator)*

There are no breeding or roosting places in the Group, but Gannets frequently fish in the adjacent waters. On 1/9/63 a brown juvenile Gannet flew past Dragon's Mouth Cove, Hen Island. The occasional occurrence of juvenile Gannets in New Zealand waters at this season has been noted by Stein (1961, 1962).

BROWN BOOBY *(Sula leucogaster plotus)*

Moncrieff (1928), who visited Hen Island in 1927, records the following observations:

> "On December 11th, at sunset, we saw what appeared to be a Gannet sail high above the island. When the sun shone on its upper parts, though too high to identify, it appeared light biscuit colour above, and white below. On December 7th the bird in question was seen by the writer, just passing out of sight round a headland. It was close enough to ascertain that it was the size of a Gannet, and biscuit brown in colour. Therefore, in view of the fact that Mr.W. M. Fraser has often seen **Sula leucogaster** in this vicinity, the writer took it to be the bird above mentioned."

PIED SHAG *(Phalacrocorax v. varius)*

Pied Shags have long nested at Old Woman Cove, Hen Island. In 1903 the colony was in Pohutukawas at the western end of the Cove (A. T. Pycroft, *pers. comm.*), and it was still in use in 1923 (R. A. Falla, *pers. comm.*), 1924 (Hamilton, 1925), 1933 (Pycroft, 1933 b), and 1935 (slide taken by L. H. Millener, in Auckland Museum). No figures are recorded, but eight nests are visible in the portion of the colony shown in the slide. By 1947 the colony had shifted to the Pohutukawas above a cliff at the eastern end of the Cove (Sibson, 1949). There were 33 nests here in December 1954 (Chambers *et al,* 1955), but only six or seven nests in 1960, 1961, 1963 and 1964. Pied Shags rest on small offshore rocks, and roost at Wilson Bay and Pycroft Bay.

Pied Shags sometimes nest on Middle Chicken. In 1953 there were twelve nests in windswept six-foot-high Ngaio. The Ngaio was on a gentle slope, and it was possible to walk around among the nests (Chambers *et al,* 1955). A similar colony has since been noted on D'Urville Island, Cook Strait (Blackburn, 1962). Pied Shags were not nesting on Middle Chicken in 1957 (R. B. Sibson, *pers. comm.*), but they were in 1962. There were then ten nests 40 - 60 feet a.s.l. in two Pohutukawas in the southern bay. The vegetation beneath these trees suggested that they had been used previously. In January 1964 there were seven occupied nests at the main colony, and three nests in another Pohutukawa 40 yards to the west. By June the seven nests in the main colony were still occupied, but only one in the other Pohutukawa was.

On the Chickens, as on Hen Island, the number of Pied Shags seen considerably exceeds the local breeding population. The shags frequently rest on the stacks and rocks off the Chickens, and some roost in Pohutukawas at South Cove, Big Chicken. By far the largest number recorded roosting here was 40+ on 24/2/55 (Goodwin, 1956); in the summer large numbers had bred on Hen Island.

LITTLE SHAG *(Phalacrocorax melanoleucos brevirostris)*

A pair of Little Shags usually frequents the Pied Shag colony at Old Woman Cove, Hen Island, and in some seasons they may breed there. A Little Shag occasionally visits the Chickens. Both the white-throated and the white-breasted phases have been seen in the Group.

BLUE HERON *(Egretta s. sacra)*

One pair of Blue Herons probably breeds on Hen Island. The Blue Heron is a rare visitor to Big Chicken, where one was seen on 25/1/23 (R. A. Falla, *pers. comm.*), and another on 16/12/62.

*MALLARD *(Anas p. platyrhynchos)*

A female Mallard was seen by Lamb Rock and later in Lighthouse Bay, Hen Island, on 1/2/64. The following day it was found dead on the boulders in Pukanui Bay.

AUSTRALASIAN HARRIER *(Circus approximans gouldi)*

Harriers are commonly seen over Hen Island, where they may breed. A pair breeds on the Chickens, and nests have been found on both Big and Eastern Chicken (Chambers *et al,* 1955). The Harriers range widely over the islands, and often fly to the mainland.

NEW ZEALAND FALCON *(Falco novaeseelandiae)*

In the early 1880's Reischek found Bush Hawks "frequenting the top of the hills" on Hen Island (Buller, 1888), and they have not been recorded since December 1924 (Hamilton, 1925). They were "scarce" on the Chickens in 1880 (Reischek, 1881), and the last record was of one on Eastern Chicken in December 1914 (G. E. Archey, *pers. comm.*).

SOUTHERN BLACK-BACKED GULL *(Larus dominicanus)*

Black-backed Gulls are present in small numbers only. Three or four pairs nest along the southern coast of Hen Island, and another three or four pairs nest at the Chickens. The resident birds regularly patrol the coastline, and others occasionally visit the Group. The only flocks seen are those in the wake of passing coasters.

RED-BILLED GULL *(Larus novaehollandiae scopulinus)*

In August no Red-billed Gulls are seen in the Group, but in early September small numbers are sometimes heard passing offshore at night. In mid-December none is seen on most days, though small numbers may gather in a bay for fish scraps, and flocks of up to 100 work off the Chickens. After mid-December juvenile birds begin to arrive. The numbers of Red-billed Gulls increase throughout January until by early February up to 100 are roosting on Hen Island, chiefly at Lighthouse Rock and the Cul-na-kalach.

CASPIAN TERN *(Hydroprogne caspia)*

One or two birds frequent the Group, but there is no evidence of breeding.

WHITE-FRONTED TERN *(Sterna striata)*

White-fronted Terns have only a precarious foothold on the offshore islands of northern New Zealand. In some seasons there is a small colony in the Group, but in others only the very occasional bird or small party is seen. White-fronted Terns bred on the Cul-na-kalach at Old Woman Cove in 1923-24 (R. A. Falla, *pers. comm.*) and in 1924-25 (Hamilton, 1925). They bred on Lighthouse Rock (1 pr.) and the rock off Pukanui Bay (1 pr.) in the 1927-28 season (Moncrieff,

1928). In the 1953-54 season White-fronted Terns bred on a rock below the northern cliffs of Big Chicken (10-12 prs.) (Chambers *et al,* 1955). There was a colony on Lighthouse Rock in 1954-55 (8 prs.) (Chambers *et al,* 1955); in 1961-62 (18 prs.); in 1962-63 (J. A. Bartle, *pers. comm.*); and 1963-64 (7 prs.). In the 1961-62 and 1963-64 seasons there was also a pair breeding on the rock in the western end of Pukanui Bay.

Only small numbers are seen during the winter, though on 29/8/63 a flock of about 30 flew along the southern coast of Hen Island.

NEW ZEALAND PIGEON *(Hemiphaga n. novaeseelandiae)*

Pigeons are abundant on Hen Island, although the population varies considerably from year to year. When the population reaches saturation point, or perhaps in lean years, many may fly to the mainland. About 1930 a great flight of Pigeons from Hen Island was noted arriving in the Waipu Range. The birds were so thin and weak that many fell and died (McKenzie, 1948).

Pigeons are also plentiful on Big, Middle and Eastern Chickens.

NORTH ISLAND KAKA *(Nestor meridionalis septentrionalis)*

Kakas are present on Hen Island, and Big, Middle and Eastern Chickens. The birds range widely over their particular islands, and this makes population estimates difficult. Conservative estimates of the population in the early 1960's were of at least 30 pairs on Hen Island, and about eight pairs on the Chickens. The population may well have increased, but the early statements are rather vague.

RED-CROWNED PARAKEET *(Cyanoramphus n. novaezelandiae)*

Red-crowned Parakeets are generally distributed over Hen Island. They are common on all the Chickens, and are present even on the islets between Big and Middle Chicken.

YELLOW-CROWNED PARAKEET *(Cyanoramphus a. auriceps)*

There is a small number of Yellow-crowned Parakeets on Hen Island. They were first observed in 1903 (A. T. Pycroft, *pers. comm.*), and they were again recorded in 1927 (Moncrieff, 1928). In 1933 E. F. Stead reported they were "not numerous — we know of only four pairs" (letter to M. Fraser, W. R. B. Oliver's Files, Dominion Museum). In 1939 one pair was seen (Fleming, 1940), and in 1947-48 a pair was found near Dragon's Mouth Cove, and another on the ridge east of Old Woman Cove (Sibson, 1949). A Yellow-crowned Parakeet was reported from "a northern gully" in 1954 (Chambers *et al,* 1955), and in 1961, 1963 and 1964 a pair was recorded at Dragon's Mouth Cove. It was probably the same pair that was seen at Pukanui Bay.

Yellow-crowned Parakeets were observed in three localities on Big Chicken in 1953 (Chambers *et al,* 1955), but there are no other records.

Reischek claimed to have shot two Orange-fronted Parakeets *(C. malherbi)* on the inland cliffs of Hen Island, on 24/11/1880 (Buller, 1888; Reischek, 1930). This record, and another from Little Barrier, were accepted by Oliver (1930, 1955), but were rejected in the absence of specimens by the O.S.N.Z. Checklist Committee (Fleming *et al,* 1953).

SHINING CUCKOO *(Chalcites l. lucidus)*

Shining Cuckoos are widely but sparsely distributed on all the islands of the Group except South-western Chicken. In December 1962 there were an estimated five pairs on Big Chicken.

MOREPORK *(Ninox n. novaeseelandiae)*

Moreporks are present in large numbers on Hen Island, where they are widely distributed from near sea level to near the summit. Moreporks have probably not always been as numerous as they are now (cf. Hamilton, 1925). The population of their staple diet, the Kiore, has increased greatly during the present century. No Kiores were seen during a six-weeks stay on Hen Island in 1903 (Pycroft, 1933 b), but they were seen in 1910 (Stead, 1936) and by 1933 were "fairly plentiful" (Wilson, 1959). In both December 1960 and December 1961 a single dead Morepork was found, and in August 1963 five dead Moreporks were found.

Moreporks appear to be even more common on Big Chicken, once again because of the large population of Kiores. A nest in a Puriri up the stream at South Cove was occupied in 1916, and it was still in use in 1933 (Wilson, 1959), 1935 and 1939 (C. A. Fleming, *pers. comm.*). What was probably the same site was still in use in 1962. Moreporks are also common on Middle Chicken.

NEW ZEALAND KINGFISHER *(Halcyon sancta vagans)*

Kingfishers are often seen in the bush on Hen Island up to 1000 feet a.s.l. In 1964 five nests were found in the bush between Pukanui Bay and the Lighthouse. They frequent the coast, and there is a pair in most bays.

Kingfishers are also present in a variety of habitats on Big, Middle and Eastern Chickens. In 1962 there were an estimated eight pairs on Big Chicken.

NORTH ISLAND FANTAIL *(Rhipidura fuliginosa placabilis)*

Pied Fantails are comparatively scarce on Hen Island. They are present at all altitudes, but appear more common around the coast. Pied Fantails are more numerous on the Chickens, where they are present on North-western Chicken (C. A. Fleming, *pers. comm.*) and are common on Big, Middle and Eastern Chickens. They frequently feed above the boulders at the water's edge, and sometimes venture over the sea itself.

PIED TIT *(Petroica macrocephala toitoi)*

Pied Tits were "rather scarce" on both Hen Island and the Chickens in the 1880's (Reischek, 1887 a). They are thinly but evenly distributed over much of Hen Island, where the number has not changed noticeably for a quarter of a century (Turbott, 1940). Pied Tits are present on Big, Middle and Eastern Chickens, and in such small communities fluctuations may be not infrequent. Estimates of the total population on Big Chicken have been: 5 - 7 prs. in 1953 (Chambers *et al*, 1955); 7 prs. in 1957 (R. B. Sibson, *pers. comm.*); and 10 prs. in 1962.

GREY WARBLER *(Gerygone igata)*

Grey Warblers are more numerous on Hen Island than first impressions suggest, though they are not nearly as common as in the mainland bush near Auckland. They are common on Big Chicken, and present on Middle and Eastern Chickens.

*SONG THRUSH *(Turdus ericetorum)*

A single Song Thrush was seen on Hen Island in 1927 (Moncrieff, 1928), but they were not again recorded until 1947, when they were still very scarce (Sibson, 1948). They have been recorded at

Stead Bay, Dragon's Mouth Cove, the south side, near the saddle above Old Woman Cove, and near the summit. All but the last of these localities are Kanuka forest.

A Song Thrush was observed on Big Chicken in 1923 (R. A. Falla, *pers. comm.*), but the species was not recorded again until 1962, when song was heard in three localities. They have not been found on the other Chickens.

*BLACKBIRD *(Turdus merula)*

Blackbird song was heard on Hen Island in 1923 (Falla, *pers. comm.*), and a few were seen the following year, though it was then hoped that they were only visitors from the mainland (Hamilton, 1925). However they may not have become established at this time, for a party which camped on Hen Island in 1927 did not record any, although W. M. Fraser told them that he had previously heard the bird on the island (Moncrieff, 1928). Blackbirds are now widely distributed. In 1939 there were three pairs in the 83-acre census area (Turbott, 1940), and in 1963 there were ten birds in the same area.

Blackbirds were present on Big Chicken in 1923 (Falla, *pers. comm.*), and in 1962 there were an estimated 20 pairs on the island. They are also firmly established on Middle and Eastern Chickens.

*DUNNOCK *(Prunella modularis occidentalis)*

Dunnocks are scarce on Hen Island. They were first recorded at Stead Bay in 1947 (Sibson, 1949), and they have often been recorded in the same locality, and also at Lighthouse Bay, Dragon's Mouth Cove, the inland cliffs area, and at Old Woman Cove.

Four pairs were found on Big Chicken in 1953 (Chambers *et al*, 1955), and three pairs in 1962. Dunnocks are also present on Middle and Eastern Chickens.

NEW ZEALAND PIPIT *(Anthus n. novaeseelandiae)*

Pipits are found around the coast and adjacent bare cliffs of Hen Island — there are six to eight pairs around the coast of the western half of the island. Pipits are also occasionally seen on rocky outcrops, such as Balancing Rock, and have been recorded in dense scrub on the saddle above Old Woman Cove. They are present on all the Chickens, from offshore islets to the summit of Eastern Chicken.

In April 1933 three Pipits were seen at sea approaching Hen Island, their course suggesting that they had come from the mainland (Pycroft, 1933 a).

BELLBIRD *(Anthornis m. melanura)* and

TUI *(Prosthemadera n. novaeseelandiae)*

Bellbirds and Tuis are the commonest species of bush bird on Hen Island. There has been a considerable change in the proportions of Bellbirds to Tuis during the last thirty years. In 1927 Tuis were "undoubtedly the most common species," and Bellbirds were "not as numerous" (Moncrieff, 1928). In 1933 Tuis were still the most abundant species (Pycroft, 1933 b). Stead visited Hen Island in November-December 1933, and stated (in a letter to M. Fraser, W. R. B. Oliver's Files, Dominion Museum) that Bellbirds were "about half as numerous" as Tuis, and Wilson (1959) records that Stead estimated there were as many Tuis on Hen Island as all the rest of the bush birds put together. Six years later the proportions had changed. A census in 1939 showed Tuis to be only slightly more common than Bellbirds —

the estimated proportion being 83 to 75 (Turbott, 1940). By 1947 Bellbirds were more abundant than Tuis (Sibson, 1949). In the early 1960's the numbers were fairly even, with a slight preponderance of Bellbirds. There is a definite seasonal movement of Tuis on Hen Island. In November-December-January they are fairly evenly distributed all over the island, but in August large numbers congregate on the north side (where there are many Kowhais in flower), and there are relatively few on the southern side and in the main western valley.

Bellbirds and Tuis are the most common bush birds on Big, Middle and Eastern Chicken. On Big Chicken Tuis are twice as numerous as Bellbirds. On Middle Chicken Tuis appeared the most common species at the western end in August 1955 (I. A. E. Atkinson, *pers. comm.*) and on the southern slopes on 13/12/62. However, on 12/6/64 Bellbirds seemed more than twice as numerous as Tuis on the southern and eastern slopes. On Eastern Chicken Bellbirds were the most common bird on 21/5/53 (Davenport, 1954), but on 14/12/62 Tuis were in much greater numbers. Seasonal movements may explain the changed numbers on Middle and Eastern Chickens. Both species are present on South-western Chicken (R. B. Sibson, *pers. comm.*).

Bellbirds evidently fly from the Chickens to the mainland (Reischek, 1887 a; Turbott, 1953).

WHITE-EYE *(Zosterops lateralis)*

White-eyes are generally rare on Hen Island, though they are sometimes locally abundant, with flocks of up to 35. They are in small numbers on all the Chickens, and in June 1964 they were noted flocking in numbers on Middle Chicken.

*CHAFFINCH *(Fringilla coelebs gengleri)*

Chaffinches are very rare on Hen Island. One was heard at Dragon's Mouth Cove in 1960, and a pair has since become established there. In 1963 one was also heard north of Balancing Rock. On Big Chicken there were at least five singing males in 1953 (Chambers *et al,* 1955), but only two singing males were recorded in 1957 (Sibson, *pers. comm.*) and 1962. One was heard on Eastern Chicken in 1957 (Sibson, *pers. comm.*).

*HOUSE SPARROW *(Passer domesticus)*

One House Sparrow was seen at Dragon's Mouth Cove, Hen Island, on 31/8/63. Strong easterly winds had been blowing for a few days and they may have blown the bird from the Mokohinaus, where they are established on Burgess Island. The occurence of House Sparrows away from civilisation in New Zealand has been discussed elsewhere (Wodzicki, 1956).

*STARLING *(Sturnus vulgaris)*

Starlings are rather scarce on Hen Island. They were present, though "in no great numbers" by 1924 (Hamilton, 1925), and by 1927 their numbers did not exceed "twenty or thirty, if that" (Moncrieff, 1928). The number around the coast has not increased much, the most frequented locality being the cliff between Pukanui Bay and Sibson Bay. A flock of twenty was seen in December 1960, but such flocks are rare. In May 1956 two separate flocks were seen flying inland late one afternoon (King, 1956). Starlings are very occasionally

seen below the bush canopy on Hen Island. There is some traffic between the mainland and Hen Island.

Starlings were first recorded from Big Chicken in 1923 (Falla, *pers. comm.*), and there is now a small resident population on this island, as also on South-western, Middle and Eastern Chickens. In the 1930's Starlings from the mainland were twice recorded roosting on North-western Chicken (Cranwell and Moore, 1935; Fleming, *pers. comm.*), and they may still do so.

? AUSTRALIAN RAVEN (*Corvus* sp.)

On 3/1/48 a large black bird of corvine appearance passed along the inland cliffs of Hen Island. R. B. Sibson, who was familiar with ravens in Europe, had "no doubt that this was a large member of the *corvidae*" (Sibson, 1959). At the time it was suspected that this may have been the same bird that was earlier observed at the Mokohinaus (Turbott, 1947) and Little Barrier (Turbott, 1947). However, Turbott (1961) considers the bird seen at the Mokohinaus and Little Barrier was probably a young Rook. The Hen Island sighting, if accepted, is the only New Zealand record.

NORTH ISLAND SADDLEBACK (*Philesturnus carunculatus rufusater*)

Hen Island is the last stronghold of the N.I. Saddleback, a bird once abundant on the mainland. Saddlebacks were not present on the Chickens in 1880, though at that date they were probably still present on Great and Little Barrier Islands, Cuvier Island, and various places on the mainland. There have been two attempts to establish Saddlebacks from Hen Island on the Chickens. In July 1950 six Saddlebacks were released at South Cove, Big Chicken (Department of Internal Affairs files). At least two birds were still present in December 1953 (Chambers *et al*, 1955), but there were no subsequent records. Wilson (1959) quotes the *Wanganui Chronicle*, 14 December, 1957, which stated that two pairs were seen in August 1955. This record is definitely incorrect (I. A. E. Atkinson, *pers. comm.*). In January 1964 23 birds were transferred to Middle Chicken, and some were still thriving five months later.

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A POPULATION ESTIMATE OF THE NORTH ISLAND SADDLEBACK ON HEN ISLAND

By P. D. G. SKEGG

The North Island Saddleback was discovered on Hen Island "in abundance" in November 1880, and in February 1883 they were considered to be "still more numerous" (Reischek, 1887 b). In 1923 Mr. W. M. Fraser reported Saddlebacks "very plentiful" (Myers, 1923), and in the following year they occurred "in large numbers" (Hamilton, 1925). The first estimate made results from a "census" conducted on a day-visit in October 1925, the estimated population being 300 birds (Department of Internal Affairs Files). On his returning from Hen Island in December 1927, Mr. A. T. Pycroft stated that it was difficult

to establish the number of Saddlebacks, but he thought there were "probably several hundreds," the numbers not appearing to have diminished since 1903 (*Auckland Star*, 27 December, 1927).

The first careful estimate of the Saddleback population was made in November-December 1939. Majors G. A. Buddle and R. A. Wilson and Messrs. C. A. Fleming and E. G. Turbott carried out a full census of the bush birds in an 83-acre valley. The Saddleback "appeared to be somewhat less plentiful than in 1935 or 1937" (Fleming, 1940), but eleven pairs were found breeding, this being considered the total population of the valley (Turbott, 1940). By various methods an estimate of the Saddleback population on Hen Island was made. The party considered there were "probably about 200 pairs, certainly not less than 150 pairs, nor more than 250" (Wilson, 1959).

In December 1960 and December 1961 the members of the King's College Bird Club parties were unanimously of the opinion that the population was now greatly in excess of the 1939 estimate, but no careful estimates were made. In August 1963 the members of an expedition organised by Wildlife Branch, Department of Internal Affairs, made careful observations on the population. A census of the 83-acre valley was made, and a check of this figure was made by measuring the territory of one pair. Members of the expedition also kept counts of Saddlebacks seen in other parts of the island, so that an idea of their general distribution could be obtained. The observations listed below are those of the whole party, but the writer bears full responsibility for the conclusions reached.

THE CENSUS

The Census Area. The census area is located on the south-western side of the island, behind Pukanui Bay, Dragon's Mouth Cove, and part of Lighthouse Bay. The 83-acre area rises from the coastline to the precipitous inland cliffs. The greatly varying landforms and the variety of vegetation makes the area broadly representative of Hen Island as a whole. Mr. I. A. E. Atkinson is at present preparing a paper on the vegetation and soils of Hen Island, and he has kindly made available a chart of relative density counts of trees and shrubs in representative portions of the census area (See Table 1).

The Method. The census was achieved by seven observers making simultaneous parallel contour transects across the census area. The observers would synchronise watches, and starting from the west end of the census area would move across the area, noting the time each Saddleback was recorded, and whether the bird was up-slope, down-slope, in front or behind. The observers would move for a certain number of minutes, then stop for a certain number of minutes, and so on. The observer on the centre-most contour transect would blow a whistle at each stopping or starting time, so as to give the other observers some idea of the line which they should be in. It took 60-75 minutes to make the count.

On returning to camp each observer would check with those in the adjacent transects, making sure that there was no overlap in the birds recorded. The observations would then be plotted on a large-scale map.

TABLE 1: RELATIVE DENSITY COUNTS FOR FOREST IN HEN ISLAND BIRD CENSUS AREA

Forest		Taraire - Tawa		Pohutukawa
Height above sea level		300-800 ft.	150-800 ft.	10-200 ft.
Beilschmiedia tarairi	taraire	25%	29%	3%
B. tawa	tawa	24%	20%	1%
Brachyglottis repanda	rangiora	1%		1%
Coprosma macrocarpa		3%		8%
C. repens	taupata			7%
Cordyline australis	cabbage tree	1%		1%
Corynocarpus laevigata	karaka	1%	15%	3%
Cyathea dealbata	ponga	1%		
Dysoxylum spectabile	kohekohe	2%	13%	
Entelea arborescens	whau			3%
Hedycarya arborea	pigeonwood	1%		
Hoheria populnea	houhere	5%	1%	
Hebe bollonsii				1%
Knightia excelsa	rewarewa	6%	6%	4%
Leptospermum ericoides	kanuka	1%		3%
Macropiper excelsum	kawakawa			1%
Melicope ternata	wharangi			1%
Melicytus ramiflorus	mahoe	10%	4%	10%
Metrosideros excelsa	pohutukawa	3%		32%
Myrsine australis	mapou	1%	1%	1%
Neopanax arboreum	fivefinger	5%		1%
Paratrophis banksii	milk tree		1%	
Phormium tenax	flax			3%
Planchonella novo-zelandicum	tawapou		4%	1%
Phopalostylis sapida	nikau	2%		
Sophora microphylla	kowhai			3%
Vitex lucens	puriri	8%	6%	12%
		100%	100%	100%
Number of canopy trees or shrubs counted		150	80	75

Note: The 150-800 feet count in the Taraire-Tawa forest was made in the valley sites leading up behind Dragon's Mouth Cove — probably a little moister and hence the larger proportion of Karaka and Kohekohe.

The Counts. In late August 1963 two counts, both in the late morning, were made.

The first count, on 25 August, was made in clear sunny conditions. The wind was calm (Beaufort Scale 0: less than 1 m.p.h.), and the Saddlebacks were calling well. The observers kept to their contour transects well, moving for six minutes and stopping for four minutes. As most of the pairs were recorded at the stops the observers considered that many of the single Saddlebacks had mates concealed nearby.

TABLE II: COUNT OF SADDLEBACKS IN CENSUS AREA
25 AUGUST 1963

Contour Transects	Singles	Pairs	Threes	Fours	Eights	Totals
7	12	5				22
6	6	3		2		20
5	8	1				10
4	8	4				16
3	4	1	1			9
2	2	2				6
1	4	3	2		1	24
Totals	44	19	3	2	1	107

The second count, on 27 August, was made under poor conditions. There was much nimbo-stratus cloud, and only occasional periods of sunshine. A fresh north-westerly breeze was blowing (Beaufort Scale 5: 19-24 m.p.h.), and the birds were not calling at all well. A mix-up on contour transects three to six resulted in a considerable area not being covered. This time the observers moved for four minutes and stopped for six minutes. The decrease in the number of small flocks recorded was probably because the breeding season was two days more advanced — by early September no small flocks were seen.

TABLE III: COUNT OF SADDLEBACKS IN CENSUS AREA
27 AUGUST 1963

Contour Transects	Singles	Pairs	Threes	Fours	Total
7	8	5	1		21
6	4	5			14
5	9	1			11
4	10	4		1	22
3		2			4
2	4	4			12
1	4	1			6
Total	39	22	1	1	90

The reliability of the counts depended upon whether or not the Saddlebacks were paired and on territory in late August. It had earlier been noted (King, 1956) that recognisable pairs of Saddlebacks were regularly seen in the same areas in May, this suggesting that territorialism is not restricted to the breeding season. By late August the breeding season had begun, with almost all birds on territory and mating in progress. When a single bird was kept under observation for some time its mate would almost invariably appear.

A check of the size of one pair's territory, and of whether Saddlebacks were keeping strictly to territory, was made on 1 September.

Replaying tape-recorded Saddleback calls had already given a good idea of the extent of the territory of the particular pair. The observers were spread around the border of the suspected territory, and notes were kept of the time and direction from which Saddlebacks approached the observation posts. Two hours, one in the morning and one in the afternoon, were spent making these observations, which were later plotted on a map. It was found that the territory of this particular pair, at Dragon's Mouth Cove, was 1.4 acres in extent.

Discussion. The observers reported that the number of birds recorded was less, and in some cases probably considerably less, than the number actually present. As has been noted, most of the pairs were recorded when the observers were stopped, and most of the singles when the observers were on the move, so it seems likely that a large proportion of the singles recorded actually represented pairs.

If the number of pairs recorded, plus half the number of singles recorded, is taken the figure, with both counts, is 42. When allowance is made for the small flocks not provided for, and for the singles which actually represented pairs, it seems that a figure of 42 pairs is too low.

A more realistic figure, though perhaps still too conservative, is obtained by taking the number of pairs recorded plus three-quarters of the number of singles recorded. The result, for both counts, is 52. It therefore seems likely that the Saddleback population in the census area is 50+ pairs, certainly not less than 40 pairs, and probably not greater than 60 pairs.

THE ESTIMATE

Earlier writers have continually stressed how even is the distribution of Saddlebacks on Hen Island. Reischek (1887 b) stated "I found everywhere, both on the ranges and near the seashore." Hamilton (1925) observed that "their distribution over the island appears to be general," and Sibson (1949) also considered that they "must be distributed fairly evenly over the island." Heather (1957) noted that they were "encountered wherever one went." Counts kept by members of the recent expeditions during tramps over much of the island all indicated a remarkably even distribution. This being so, it seems reasonable to make an estimate of the population on an area basis.

Hen Island is 1775 acres in extent, the census area being just over one twenty-first of the total area. If the census area is accepted as representative of Hen Island as a whole, and if allowance is made for 80 or 90 acres of totally unsuitable or very thinly populated country, the total population of the island is twenty times greater than that of the census area. With an estimated 50+ pairs in the census area, the population of the North Island Saddleback on Hen Island in August 1963 may have been 1000+ pairs, about five times more than in 1939. At least it must be over 800 pairs, or four times as many as in 1939.

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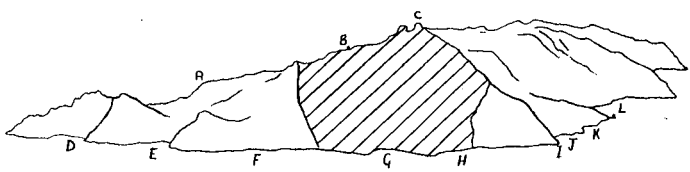
APPENDIX



PLACE NAMES ON HEN ISLAND

The outline diagram of Hen (Taranga) Island shows the census area (shaded) on the western side of the island. The letters denote the names coined for various places. Moran's Lookout (A) is named after James Moran, who, in 1870, made the first survey of the island. Balancing Rock (B) is the abrupt precipitous weathered rock which overlooks Dragon's Mouth Cove. According to Mr. Frank Holman, the Pinnacles (C) were known by this name late last century. Wilson Bay (D) and Stead Bay (E) are named after Major R. A. Wilson and Mr. E. F. Stead, whose expeditions to this and many other islands contributed greatly to our knowledge. There is a navigational light 357 feet above sea level on the headland between Stead Bay and Lighthouse Bay (F). A hawser runs down from the light to Lighthouse Rock, in the bay. Most expeditions have camped at Dragon's Mouth Cove (G), so named because of the rock in the cove which was said to resemble a dragon's mouth. The rock, which has also been called Mushroom Rock, has weathered somewhat since the name was coined. Pukanui Bay (H) takes its name from the fine stand of Pukanui **(Meryta sinclairii)** behind the bay. A favourite fishing rock, Lamb Rock (I) is named after Dr. O. Fyffe Lamb, a keen naturalist and fisherman, who acted as medical officer on many King's College Bird Club expeditions. Sibson Bay (J) is named after Mr. R. B. Sibson, who has led eleven K.C.B.C. expeditions to offshore islands, including four to Hen Island. Reischek Bay takes its name from Andreas Reischek, the Austrian naturalist-collector who made ornithological surveys of this and other offshore island during the 1880's. The cabbage trees **(Cordyline australis)** around the shore have led to the bay also being known as Cabbage Tree Bay. Old Woman Cove (L), or Wahine Bay, is so named because of the alleged likeness of the chimney-like rock at the western end of the cove to an old woman. The Gaelic pioneers knew the rock as Cul-na-kalach (Old Lady of the Sea). Pycroft Bay, a bay below the Pinnacles on the north side, is named after Mr. A. T. Pycroft, who camped on Hen Island for six weeks in 1903, and who climbed to the summit from this bay on a later trip.

The localities named can be more clearly seen on the Whites Aviation photograph (Ref. 41915), on p. 160.

THE TONGUES OF THE PUKEKO AND TAKAHE COMPARED

By CHARLES McCANN

INTRODUCTION

A comparison of the tongues of the Pukeko *(Porphyrio melanotus)* and the Takahe *(Notornis mantelli)* without some reference to the differences in habitat, habits, diet and anatomy of the two birds would be incomplete and would only add to the difficulty of trying to account for some of the differences in the structure between the two birds.

In general appearance the Pukeko and the Takahe are very similar, except that the latter appears as a grossly exaggerated replica of the former. With its increase in size, the Takahe has not only lost the delicacy and 'finesse' of the Pukeko, but also its powers of flight. Its more ponderous stature has forced it out of the more normal paludine habitat of the family, Gallinullidae. These changes have also led to a more restricted distribution and a greater vulnerability of the species. Change of habitat necessitated a change in diet which in turn has had its effect upon the anatomy. The Pukeko has retained the habits and habitat of the well-known Moorhens, of skulking stealthily with a suspicious air along the margins of streams, lakes and swamps, ready to dive into the nearest cover at a sign of danger, real or imaginary. Suspicion still dominates the actions of the Takahe, but its reactions are much like those of a barnyard fowl on sighting a stranger in its yard!

All these changes have resulted in minor anatomical changes. Although the skulls of the two species are very similar, on closer examination it will be noticed that the cranial elements of the Takahe are considerably more dense, over all, than those of the Pukeko. The dorsal profile of the culmen (premaxillae) is more curved in the Takahe, the crown of the head (frontals and parietals) is flatter, including the supraoccipital region. In the Pukeko, the profile of the culmen is less curved and the cranium more domed, and less ossified.

The nasal bones of the Takahe are relatively wider and more erect than in the Pukeko. The mesethmoid septum, between the orbits, is completely ossified, with a comparatively small optic foramen. The nasal foramen of the Takahe is also more vertical than in the Pukeko. The muscle scars on the parietals and squamosals are considerably greater, indicating stronger masseter muscles in the Takahe than in the Pukeko. Osseous projections from the parietals exist in both species, forming additional attachments and supports for the masseter muscles, but they are larger and longer in the Takahe than in the Pukeko.

Except for size and a greater ossification of the mandibles there is little difference between the two birds. The foramen in the mandible is single and larger in the Takahe than in the Pukeko, in which there are more but smaller foramina.

The entire skull of the Takahe, like the rest of its skeleton, is more heavily ossified than that of the Pukeko. These changes appear to be linked with the change of habitat, habits and diet of the Takahe

from a once paludine existence to a more rigorous life on *terra firma*.

The ventral aspect of the horny culmen is provided with sharpish, longitudinal ridges in both species, but the ridges are more pronounced in the Takahe, which undoubtedly enables it to deal more efficiently with its coarser diet, than in the Pukeko. In keeping with its loss of flight, the sternal keel is considerably more reduced in the Takahe than the well-developed keel of the Pukeko.

Oliver (1955: 374) referring to the food of the Pukeko, wrote: "The Pukeko's food is largely vegetable — soft shoots and roots of water plants which it holds up to its beak with one foot. Berries and seeds are also eaten and various kinds of animal food — worms, insects, freshwater mussels, fishes, frogs, lizards, young birds and birds' eggs. Flounders up to five inches and eels up to seven inches in length are recorded as having been caught by Pukekos." In short, the Pukeko is an omnivorous feeder, partially playing the part of a scavenger along the banks of streams and lakes.

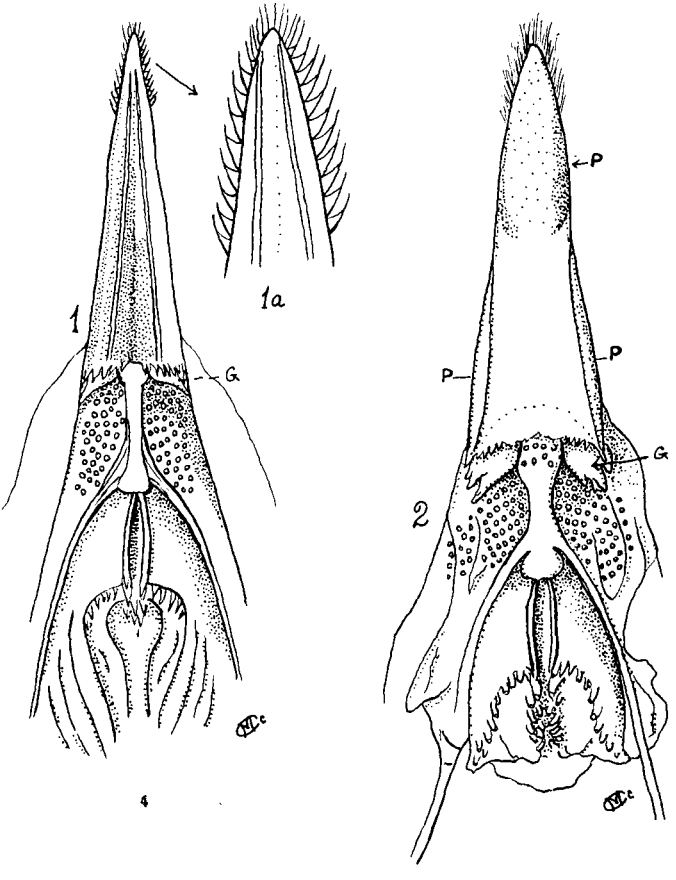
Referring to the diet of the Takahe, Oliver (1955: 379), wrote: "All the evidence so far gathered shows that the Takahe, after the first few weeks of its nestling life, feeds entirely on seeds and the soft parts of plants. Its main food is the soft bases of leaves of the snowgrass *(Danthonia flavescens)*. The rest of the leaf, that is the blade and most of the sheath, is to be seen scattered untidily about the ground in tussock grassland where the birds feed. The dried droppings of the birds, which persist for a long time, consist mainly of indigestible parts of grass leaves and undigested spikelets of *Danthonia* and *Poa*. Falla records seeing a bird stripping *Danthonia* of flowers and seeds by running the stalks from base to tip through its beak. He also states that 'Carex is pressed over with one foot, loosened at ground level with grubbing strokes of the beak, and then held in the closed foot while the succulent bases are bitten off.' More remarkable is the fact, shown in a photograph by Sorensen, that the Takahe eats the flowering stalks of *Aciphylla* plants from which it strips the spiny bracts. . . . Leaf bases of Celmesia are also eaten. Besides these white portions of the plants, there is evidence that the Takahe eats green herbaceous plants."

Some observations of interest arise out of Oliver's reference to the diet of the Takahe. The chick of the Takahe, in common with the chicks of the rest of the family, is active soon after hatching and accompanies its parents foraging, picking up such food as it fancies or is proffered to it by its parents. Accordingly, the chicks would be feeding on similar material to that of their parents. The clause (Oliver) "after the first few weeks of its nestling life," connotes two suggestions; one, that the chicks remain at or in the nest for a period, and, two, that there is a period of differential feeding. The first can be dismissed as the misuse of the word 'nestling' for a nudifugous chick, but the second seems to be most unlikely. Again, the Takahe is said to feed on the spikelets of grasses and sedges, which, I presume, included the seeds, but, as at least part of the seeds reappear in the excrements, it seems that the birds are not completely adapted to a graminivorous diet. In a film, I have seen the Takahe collecting spikelets from the inflorescences of grasses). Alternatively, it is possible that such grains are at first crushed by the bill before ingestion and that a few do escape whole into the alimentary canal and are not digested. The anterior lingual 'pad,' referred to below, may possibly assist in crushing the seeds 'parrot fashion.'

It is evident from comparing the menus of the two species that the Pukeko feeds largely on softer food materials than does the Takahe and that, from the evidence of the dropping, the Takahe swallows a lot more indigestible, fibrous material. The changed diet, from an omnivorous paludine type to a coarser vegetarian type, is reflected in the changed character of the tongue of the Takahe compared with that of the Pukeko.

TONGUE OF THE PUKEKO, Figures 1, 1a

The tongue of the Pukeko is lanceolate, slightly canaliculate mesially, with smooth lateral margins, behind the anterior fringe of hair-like processes which extend for about one fifth of the length of the tongue, from its extremity backwards; the 'hairs' under high magnification exhibit a hyaline membrane between the margin of the tongue and the 'hairs' themselves (Fig. 1a). The base of the tongue is provided with two groups of acutely pointed denticles separated from each other by a short interval. Posterior to the fringe of denticles there



are two 'glandular' structures (Fig. 1, G), one on either side of the midline. In the fresh tongue two large blood vessels are visible converging towards the apex.

Between the base of the tongue and the glottis there are two groups of largish 'taste pits' separated mesially. The laryngeal pad is somewhat ovoid. The margins of the glottis are free of denticles. Posteriorly, on either side of the glottis, there are a few acutely pointed denticles with a median group directly behind the glottis.

TONGUE OF THE TAKAHE, Figure 2

The tongue of the Takahe, as might be expected, is similar in general appearance to that of the Pukeko, but it differs markedly in detail. It is lanceolate with an acute apex fringed with 'hair-like' processes for about one fifth of its length, anteriorly, as in the Pukeko. The anterior two to three fifths of its distal extremity forms a somewhat dense pad of tissue (Fig. 2, P); behind this pad the tongue is smooth. Along the lateral margins, for about half the length of the tongue from its base, there are two elongated fleshy pads (Fig. 2, P), similar in texture to the apical one. The posterior margin of the tongue is denticulate, the smaller denticles appearing mesially. Behind these marginal denticles, there are two 'glandular,' lobed structures, similar to those referred to in the case of the Pukeko, but larger; the apices of the lobes are more ventro-laterally directed. Between these two lobate structures, there are a few 'taste pits' between the base of the tongue and the glottis, separated along the midline. The pits in these two areas are more numerous than in the corresponding areas in the Pukeko. The laryngeal pad is ovoid, with two groups of truncated denticles forming an arch, with a median group of similar denticles behind the glottis, the apices of which are curved towards the midline. The margins of the glottis itself are free of denticles.

DISCUSSION

The differences in diet between the two birds is undoubtedly a prime factor responsible for the variation in lingual structure. The normal palustral habit and consequently softer vegetable and animal food of the Pukeko calls for little specialization of the tongue, whereas the tongue of the Takahe requires the necessary adaptations for the 'tougher' diet offered by its more rugged, mountainous habitat.

The normal habitat of the Takahe to-day is the high tussock-clad mountains. The tussock, *Danthonia,* is a tough fibrous species. The Takahe is said to feed largely on the "soft bases of the leaves of the snowgrass." This is achieved by bending down the clumps with its foot and then 'hacking' at the bases with its axe-like, sharp-edged bill. In its efforts to obtain the more succulent tissues, it undoubtedly swallows a considerable amount of the more fibrous tissues also, for the indigestible fibrous portions are a marked feature of its droppings. In 'chopping' off the edible material, the large, anterior lingual pad undoubtedly plays an important role, enabling it to get a better grip on the material. Likewise the two marginal pads probably function in much the same way when the bird is tugging at the tough material.

The more numerous 'taste pits' present in the buccal cavity of the Takahe suggest a greater sense of taste, and a keener discrimination of food materials. The truncated denticles may be the result of wear by the coarser, fibrous diet of the Takahe.

THE EGGS OF THE HOUSE SPARROW

By D. G. DAWSON

INTRODUCTION

This paper summarises the characteristics of House Sparrow eggs from Christchurch, New Zealand.

LAYING AND INCUBATION

Eggs are laid at daily intervals, between dusk and five a.m. Incubation normally begins with the penultimate egg, but some birds incubate sporadically before this. Without visiting nests very frequently an accurate "incubation period" cannot be determined. Thus the exactly expressed means and ranges in the literature must be treated with suspicion. The range within which the true incubation period must lie was determined for 68 clutches. These show the mean period to be about 12 days and the range to be from $10\frac{3}{4}$ to 16 days. A possible variation one day either side of this range must be mentioned, as daily visits, though fixing laying time, allow the true hatching time to be almost one day less than the observed one. Eggs begin to float in water at between 6 and 10 days of incubation: this can be used as an approximate guide to the time they have been incubated. Summers-Smith, quoting Cramp's analysis of British Trust for Ornithology records, gives the average period as 12 days with a range of 9 to 18.

CLUTCH SIZE

109 clutches were distributed as follows:

2 (1), 3 (23), 4 (71), 5 (14). The mean clutch size is 3.90 ± 0.058*. Summers-Smith (1963), quotes Cramp's result of an average clutch size of 4.1 in Britain and mentions clutches of six and seven, and he writes for the United States: "the average clutch size lies in the range 4.5 to 5, significantly larger than that in Britain." The Christchurch mean would seem significantly smaller than either.

COLOUR

There appears to be no difference between the colour of New Zealand eggs and that shown in the various plates and descriptions of British eggs. The number, size and colour of the spots is characteristic for the one female, even in successive clutches. Normally the last egg has fewer spots and sometimes the penultimate egg is intermediate in colour.

SHAPE

Data from 225 eggs.

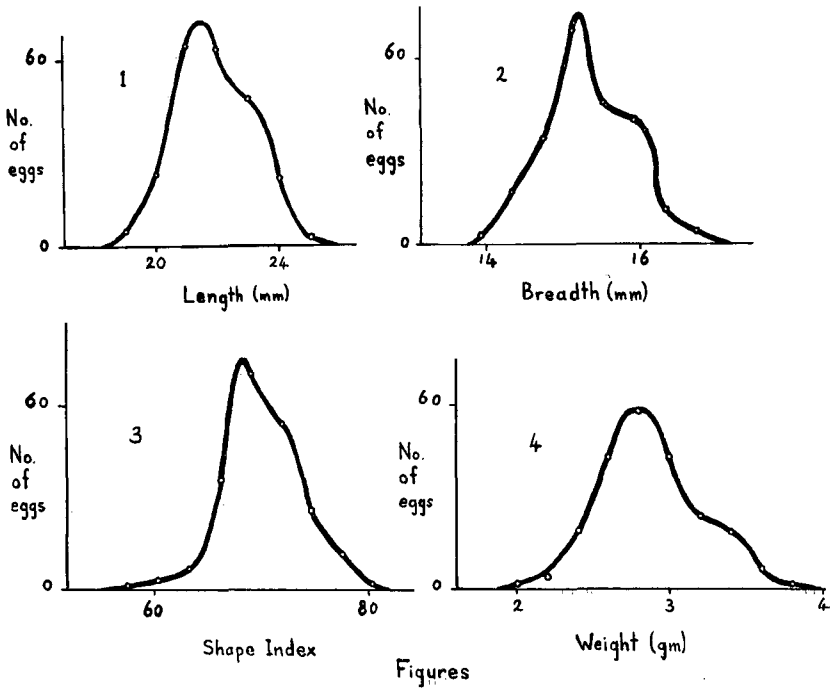
The mean breadth is 15.3 ± 0.038 mm, and the range is 13.8-16.7.

The mean length is 21.9 ± 0.080 mm, and the range is 18.7-25.0.

The shape index of the eggs (breadth expressed as a percentage of length) has a mean value of 69.8 ± 0.24 and ranges from 56 to 80. Summers-Smith (1963) gives the British ranges in breadth and length as 14.5 - 16.0 mm and 19.7 - 25.3 mm, and gives the mean egg as 15.7 x 22.5 mm. These dimensions seem significantly larger than the Christchurch ones.

* The ranges quoted in this paper are the standard errors of the means. There is a 95% confidence that the mean of the whole population lies within twice this range.

Length, breadth, weight and shape show distinctly similar bimodal distributions (see Figs. 1 - 4). Kendeigh, Kramer and Hamerstrom (1956) have found that the House Wren shows an increase in egg weight with breeding age, while Coulson (1962) shows a change in shape with breeding age in the Kittiwake. Perhaps a similar process is at work in Sparrows, with modes representing different age groups of breeding females. Thus first-year birds could lay eggs averaging 15.2 x 21.5 mm, 2.8 gm, and a shape index of 67, and older ones eggs averaging 16.0 x 23.2, 3.4 gm and a shape index of 73. I have insufficient data as yet to test this.



Figures

WEIGHT AND VOLUME

Data from 217 eggs weighed when fresh.

The mean egg weight was 2.88 ± 0.022 gm and the range was 1.94 - 3.85 gm. I have used fresh weight as an index of egg volume, as the volume of such small eggs cannot be determined by a quick, practical method. As it will often prove impossible to weight fresh eggs accurately a formula:

$$w_o = 0.543 b^2 l$$

. . . where w_o = fresh weight, b = breadth and l = length

can be used. This was derived from known dimensions and fresh weights of 217 eggs and is accurate to the nearest 0.1 gm. The usual formula is:

$V = kb^2 l$ . . . . where V = volume for which Stonehouse (1963) gives a range of k 0.500 - 0.515 and a mean of 0.512. These values were determined for larger eggs than those of the Sparrow. To convert the first formula to the second the relationship:

$$\text{s.g.} = \frac{w_o}{V}$$

is used. The specific gravity (s.g.) of 12 eggs was determined by floatation tests during incubation. The results obtained give a range within which the true specific gravity must lie. Thus if an egg of fresh weight 3.00 gm is found to sink when weighing 2.82 gm and float when weighing 2.80 gm its s.g. (when fresh) is in the range $\frac{3.00}{2.82} - \frac{3.00}{2.80}$. All the ranges determined included the value 1.07 and three critical ones may be cited: 1.065 - 1.075, 1.07 - 1.08, 1.04 - 1.07. Taking 1.07 as the s.g. the constant (k) becomes: $\frac{0.543}{1.07} = 0.508$ which falls into the range given by Stonehouse for larger eggs. Little error would result in using his mean value of 0.512 for Sparrow eggs.

DAILY LOSS OF WEIGHT

From 43 eggs weighed daily during incubation.

The eggs were weighed to the nearest 0.01 gm and showed a daily loss between about 0.01 and 0.05 gm. This varied as follows: before incubation a loss of 0.013 ± 0.0018 gm, during incubation 0.032 ± 0.0011 gm, and immediately before hatching 0.070 ± 0.0055 gm. The differences between these means are all statistically significant ($p < 0.05$). The variation in weight lost would be due to variations in the evaporating power of the air (humidity, wind speed, temperature), the increase on the onset of incubation would be due to the increased temperature, and the increase with the duration of incubation could be due to the respiration of the embryo (loss of CO_2) also increasing. The porosity of the shell is an unknown and could also affect the loss in weight if it varied.

THANKS

I am indebted to Dr. B. Stonehouse and Mr. G. A. Tunnicliffe for advice, criticism and encouragement and to Jim Hilton for allowing me to use some 40 egg measurements taken by him.

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ANNUAL FIELD STUDY WEEK-END NEW PLYMOUTH, 24th - 26th OCTOBER, 1964

On the Friday night from 7.30 p.m. on members began to gather at the New Plymouth Girls' High School to greet old friends and meet new, in an atmosphere that, while very pleasant inside, was rather damp outside.

The rear wall of the physics laboratory, which was the centre for the week-end's activities, was attractively set out with photographs by Mr. A. Brandon, who spends much of his free time photographing birds in the New Plymouth area. We were most grateful for the use of this building and for the use we were able to make of the school canteen.

At 9 p.m. Mr. M. G. Macdonald, R.Repr. for Taranaki, welcomed those present. Programmes for the week-end were explained, and everyone was disappointed to learn that because of high seas the trip to the off-shore islands would be off.

On Saturday morning, despite decidedly miserable weather, there were over 50 people at the school, making this the largest week-end course so far. Mr. A. Blackburn, President, greeted everyone, and in a short address gave an insight into the planning and difficulties of the Kermadecs Expedition. Following notices of apologies for absence, Mr. Macdonald explained the position of the local beaches and the type of beach the visitors would encounter, with a few extra directions for those who might get lost in the city area.

Mr. A. B. Scanlan, editor of the Taranaki Herald and an O.S.N.Z. member, then gave a lecture on the "Sugar Loaf Islands," explaining their geological beginnings and early history, with particular reference to Maori occupation and the interest the early colonists found in them. It was most disappointing that the island trip could not be made, for interest in the area was certainly raised by this excellent lecture, and by the slides which were screened afterwards, showing the islands in summer conditions, the season when Diving Petrels, Red-billed gulls and White-fronted terns have been banded during the past few years.

In the afternoon, though still in unseasonal low cloud and high winds, parties were out to all beaches from Waitara to Paritutu. Welcome Swallows which were in this district last July were not found, but as the groups returned to rendezvous at Port Taranaki, the lists of birds sighted and specimens collected began to grow. Quite the most interesting sighting was that of two Godwits, *Limosa lapponica baueri*, noted by H. R. McKenzie to be quite at home on the north bank of the Waitara River. This species, though suspected in the area, had not been positively recorded before. Later B. Hankins and C. Templer also saw two Godwits on the Fitzroy beach, apparently newly arrived. Other species recorded were: 9 Banded Dotterel, 100+ Red-billed Gulls, 70+ Black-backed Gulls, 3 Pied Stilts, 2 Black Shags, 6 Caspian Terns, 4 White-fronted Terns, 1 Dunnock, 20 Yellowhammers, 30 Skylarks, 10 Pipits, 12 Silvereyes; also both Gannets and Petrels were noted working out at sea.

On Saturday evening at the Taranaki Museum, members listened to a lecture by Dr. A. Buist, of Hawera. An archaeologist in his spare time, Dr. Buist gave the history of the excavation of Moa Hunter sites at Ohawe and Kaupokonui, and with slides and specimens showed

examples of recoveries made. Some bones recovered showed that birds of quite considerable size had existed in this area, and also that the Maori had used other now extinct birds as food. Species identified from these sites include 8 species of Moa: *Pachyornis mappini; P. septentrionalis; Euryapteryx geranoides; E. tane; E. curtus; Anomalapteryx didiformis; Dinornis giganteus;* and *D. gazella.*

There was also evidence that many other birds had been used as food as other bones identified were of: Little Weka (*Gallirallus minor*); Takahe (*Notornis mantelli*); N.Z. Coot (*Palaeolimnas hodgenii*); Finsch's Duck (*Euryanas finschi*); N.I. Goose (*Cnemiornis septentrionalis*); N.Z. Eagle (*Harpagornis assimilis*); N.Z. Crow (*Palaeocorax moriorum*); Huia (*Heteralocha acutirostrus*); a *Circus* species, and many other birds which are still present in our bush to-day.

Later the audience moved from the lecture room to the museum proper, where Dr. Buist explained related exhibits. With our thanks to Dr. Buist expressed by Mr. McGrath, an enjoyable day ended.

Though Egmont remained well hidden on Sunday morning, the whole party was soon away to Pukeiti Rhododendron Trust, where, following a short address by the curator, Mr. R. Hair, we divided to spend the remainder of the morning in the extensive gardens and bush of the Trust. Lunch was taken in the basement of the lodge (out of the rain), where we listened to a recorded interview of Mr. A. Blackburn and Mr. H. R. McKenzie with 2XP.

From here, after a short talk on the bird life of Egmont National Park, by the chief ranger, Mr. Atkinson, we moved on to the slopes of Egmont. One group went to the Upper Puniho Road, a second to the Dover Road Mill site, both parties to take a census of bush birds and to investigate the likelihood of Kokako. Although Mr. Atkinson had mentioned that Whiteheads could be considered absent from Egmont, the Puniho Road party reported having heard Whiteheads close by. Birds recorded were: Rifleman, Tui, Pied Tit, Bush Pigeon, Fantail, Kingfisher, Grey Warbler, Silvereye and Blackbird.

On Sunday evening at the High School everyone assembled again for an interesting evening of tape recordings by J. Kendrick and M. Macdonald and the showing of films.

On Monday morning, in the first sunshine of the course, everyone assembled for the last time at the school. From here many set off for home, some Aucklanders to look into the Okau area in North Taranaki where Whitehead and Kaka may be found. Another group from Hamilton set out via the Waitaanga, Kokako, area. Those remaining spent the morning either at Blue Penguin nests along the coast or in trying to track down and positively identify a most elusive wader which had been sighted by several members earlier in the course. Further specimens were brought in from these patrols. Specimens gathered over the week-end were: Short-tailed Shearwater, Little Blue Penguin, Fairy Prion, and Red-billed Gull.

Our thanks go to New Plymouth, and to Maurice Macdonald in particular, who spent so much time organising this week-end. As Mr. Blackburn pointed out at the final meeting, it was due to this organisation and planning for all conditions, that the course was able to continue successfully even with the continuous bad weather. I am sure that all who attended gained not only from bird observations, but also from the exchange of ideas and from contact with other members.

— F. J. F.

THE KERMADECS EXPEDITION

By A. BLACKBURN

Members will have shared to a degree in the bitter disappointment suffered by the Expedition party through the untimely ending of the Expedition, owing to the eruption on Raoul Island. There has been no prospect of return this year for several reasons, viz. the problem of transport, the water situation on Raoul, and the fact that the season for temperate zone seabirds was becoming too far advanced. But the project has not been abandoned, for the Expedition Sub-Committee has met and plans to send a party to the Kermadecs in two years' time, that is to say, in the late Spring of 1966. Thus the Expedition members who have suffered from the present reverse will be given the opportunity of returning; and the Sub-Committee's planning, and the monumental work of organising performed by Mr. A. T. Edgar will not all be wasted effort. In fact, this year's abortive expedition has provided valuable experience to be applied in two years' time.

Most of the equipment and stores have been salvaged, but even after realisation, the financial loss to the Society will naturally be substantial, so the Expedition Sub-Committee is taking steps which should result in reducing this loss. Subscriptions and donations to the Expedition funds reached the pleasing total of £597, and it is anticipated that subscribers will wish their subscriptions to remain with the Society in an Expedition Fund. A list of contributors is appended.

A few members of the party spent a brief period ashore on Meyer Island, and were impressed with the variety and numbers of tropical seabirds breeding there. We shall look forward to detailed reports being published at an early date.

	£		£
Dr. J. S. Armstrong, Taupo	10	J. C. Davenport, Tokoroa	5
J. W. Bain, Gisborne	5	Miss M. Davis, Christchurch	5
Mrs. M. Barlow, Invercargill	5	D. G. Dawson, Christchurch	5
R. A. L. Batley, Taihape	5	R. G. Dawson, Christchurch	5
B. D. Bell, Wellington	5	E. W. Dawson, Wellington	5
Bernice P. Bishop Museum, Honolulu	54	Mrs. E. W. Dawson, Wellington	5
A. Blackburn, Gisborne	5	E. Dear, Palmerston North	5
B. W. Boeson, Carterton	5	Miss J. K. Edgar, Christchurch	5
Botany Division, D.S.I.R., Christchurch	25	N. B. Ewing, Taupo	5
D. H. Brathwaite, Chch.	5	J. D. Faulkner, Gisborne	5
W. Broun, Rotorua	5	E. L. Fooks, Auckland	2
C. N. Challies, Lower Hutt	5	Dr. Elsie Gibbons, Wellington	2
P. Child, Alexandra	5	Miss A. J. Goodwin, Clevedon	2
C. Clark, Christchurch	5	P. Grant, Greymouth	5
Miss J. Coles, Auckland	5	Dr. J. Hall-Jones, Invercargill	5
J. A. Cowie, Blenheim	5	W. M. Hamilton, Wellington	5
D. E. Crockett, Wanganui	5	L. E. Henderson, Invercargill	5
R. A. Creswell, Gisborne	5	K. A. Hindwood, Sydney, N.S.W.	5
Orville W. Crowder, Washington, U.S.A.	5	M. J. Hogg, Auckland	5
M. P. Daniel, Te Kauwhata	5	Dr. R. W. Hornabrook New Guinea	5
		Miss J. S. Hornabrook, Masterton	5

	£
J. R. Jackson, Christchurch	5
J. A. F. Jenkins, Auckland	5
J. Johnson, Aramoho	5
Miss M. Johnstone, Tauranga	6
G. W. Kells, Gisborne	5
Miss J. Key-Jones	5
K. King, Christchurch	1
F. C. Kinsky, Wellington	5
F. Langbein, Nelson	5
M. H. Logan, Wellington	5
H. Lyall, Rotorua	10
Miss M. C. McIntyre, Auckland	5
D. McGrath, Wellington	5
Mrs. D. McGrath, Wellington	5
H. R. McKenzie, Clevedon	5
W. R. Mawson, Leeston	5
Dr. Ernst Mayr, Massachusetts, U.S.A.	36
D. V. Merton, Auckland	6
B. D. Mills, Gisborne	5
G. J. H. Moon, Warkworth	5
J. L. Moore, Wellington	5
F. L. Newcombe, Wellington	5
A. Nuttall, Oamaru	5
Mrs. H. C. Oliver, Wellington	5
J. A. Peart, Palmerston North	6
W. T. Poppelwell, Dunedin	5
Mrs. A. Prickett, Auckland	5
A. T. Pycroft, Auckland	5
R. V. Roberts, Auckland	10
Mrs. W. H. Rolston, Levin	5
E. K. S. Rowe, Christchurch	5
R. B. St. Paul, Clevedon	5
Dr. M. F. Soper, Takaka	5
E. H. Southerell, Christchurch	5
W. R. Sykes, Christchurch	5
R. J. E. Taylor, Havelock Nth.	5
E. G. Turbott, Auckland	5
Mrs. J. and I. Urquhart, Papakura	5
N. A. Waller, Helensville	5
Mrs. H. S. Waters, Waipukurau	5
Dr. K. E. Westerskov, Dunedin	5
R. M. Weston, Kawerau	5
Wildlife Division, Internal Affairs, Wellington	50
O. Wilkes, Christchurch	5
C. K. Williams, Gisborne	5
G. R. Williams, Christchurch	5
A. Wright, Haast	5

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SHORT NOTES

WELCOME SWALLOW AT THE BROTHERS

On the morning of the 16th September, 1964, Mr. G. Randle informed me that he had seen a swallow near the lighthouse hen-run. As we approached the bird flew up and passed overhead. It was noted that it had a deep forked tail, white under-parts and was dark blue over the remaining parts. As the boat was due to collect Mr. Randle, we had to leave the bird for the time being.

A while after my return the bird settled on a post about six yards away and I was able to identify it as a Welcome Swallow *(Hirundo neoxena)*. Its forehead and throat were a chestnut-red colour and the remainder of the under-parts a buff to creamy white. The upper-parts were a dark metallic blue with the tail deeply forked. It was noted during its flight that there was a thin bar of white spots across the tail. Although some of the feathers were ruffled and the under-parts dirty, the bird appeared healthy. Its flight was swooping and graceful and it showed no sign of exhaustion.

The Swallow remained in the same area and was last seen about 1400 hrs. The weather at the time was southerly winds 30 knots, overcast with cloud down to 900 ft. and rain earlier in the day. The previous two days had been gale force N.W. winds with heavy rain.

— A. WRIGHT

CATTLE EGRETS NEAR LEVIN

On 30/7/64 I was on my way to Hokio Beach when I stopped for a look at the birds at the southern end of Horowhenua Lake. Among them were five small egrets, three standing close together among the reeds at the edge of the lake and two on a fence, preening.

It was impossible to make a close approach on account of the swampy nature of the ground and from a distance of nearly quarter of a mile I took the birds to be Little Egrets. I had seen one of these on several occasions on the east side of the lake in April, and had been able to examine it at close quarters.

When I returned that way an hour later, the birds were feeding in a paddock, in a way which made me think of Cattle Egrets. I could not see the colour of their bills, and as they had blackish legs and entirely white plumage, I still took them to be Little Egrets.

On 1/8/64 I saw the five of them feeding in a paddock among sheep, and their small size was very apparent.

A week later, after some preliminary enquiries, I accompanied Mr. C. H. Crawford down through his farm and was able to get within about a hundred yards of the birds and examine them through a 27 x telescope. The legs were dark greenish-grey, and the bill, which was stouter and less sharply pointed than that of a Little Egret, was light yellow with a tinge of orange or pinkish colour, hard to describe, but quite different from the clear golden-yellow of the White Heron. The skin of the face appeared to be the same colour as the bill. The heavy chin was very noticeable, and when a bird was on the alert, the feathers of the crown were either elevated or formed a crest, giving the appearance of a high forehead.

I wrote to Dr. Falla and he agreed with my identification of these birds as Cattle Egrets.

Mr. Crawford told me that the birds had been there since the autumn. One appeared in February, two more later and another two later still, making five in all. They used to follow his cows about the paddocks until he moved them to another property; then, he said, they followed those of his neighbour, Mr. Procter.

On 26/8/64 I went down through Mr. Procter's farm and saw the birds again, but they were shy and difficult to approach.

Eventually, I made my way down a fence line while the birds were perched on the lower end of the fence and on posts over the water, and was able to see that they were still in all-white non-breeding plumage.

Mr. Procter has noticed them feeding among sheep and pigs as well as among cattle.

On 17/9/64 I was able to approach them within about sixty yards. This time they seemed to be assuming their breeding plumage, as two of them had a tinge of salmon pink on the front of the head. The bills were now of a golden-yellow colour, like that of the White Heron, and the legs, though still black below the knee, were of a light grey above.

While I was watching them, they were joined by a Little Egret and I was able to make a comparison between the two species. In a light breeze the Cattle Egrets appeared loose-feathered and rather shaggy beside the trim and slender Little Egret. The difference in the length

and shape of the bill was very evident; that of the Little Egret being longer, more slender and sharply pointed.

When feeding, the Cattle Egrets kept to the grass near the water, while the Little Egret waded in water up to its knees.

I had another look at them on 30/9/64 while they were feeding among cattle, and although I could not get very close, I could see that the head of one of them was of a distinct buff colour. When alarmed on this occasion, they flew over my head and alighted on a macrocarpa tree.

— E. B. JONES

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REPORTED LITTLE BITTERN AT MEREMERE

Re the article "Little Bittern at Meremere," P. J. Howard, *Notornis* X, 317-319, and the further article "Note on Little Bittern," Dr. R. A. Falla, *Notornis* X, 412-413. Since this identification is now doubtful the parties concerned are studying the matter more deeply, with valued help from Dr. R. A. Falla and Mr. E. G. Turbott, and it is hoped to publish the findings later.

— P. J. HOWARD, J. L. KENDRICK, H. R. McKENZIE

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PLUMAGE OF BLACK FANTAIL

Oliver's *N.Z. Birds* (2nd ed., p. 495) implies that the female Black Fantail *(Rhipidura f. fuliginosa)* may be distinguished from the male by the presence of white spots over the ear coverts. Brian Bell, however *(pers. comm.)*, had his doubts. That his doubts were justified was demonstrated by my observation of a mated pair of Black Fantails both of which showed white spots. This pair had four eggs and reared four young. The nest was visited frequently and only the two birds were in attendance. The remote possibility of a polygamous nesting with, by chance, only the two females being seen, may confidently be excluded.

The presence of white spots over the ear coverts of the Black Fantail, therefore, does not necessarily mean that the individual is a female.

— M. F. Soper

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OBITUARY

Major Robert Adams Wilson, D.S.O., who died at his home 'Lethenty,' Bulls, on 27th November 1964, in his 89th year, was a New Zealander distinguished in many fields of interest and of enterprise. A son of the late Sir James Wilson, a Rangitikei pioneer, he was borne at Bulls in 1875 and educated at Wanganui College. In the years before World War I, he was engaged in establishing saw-mills along the newly-opened main trunk line and for recreation playing in a Rangitikei Polo Team which won the Saville Cup. After military service with the Royal Garrison Artillery 1916-18, he took up farming in his home district and made a success of developing coastal sandhill country and establishing impressive records with Friesian dairy cattle. Within the limits of a life-span of near four score years and ten, he found time for zestful participation in such active sports as wildfowl shooting and deerstalking, maintained a consistent skill at bridge, an

interest in horticulture, was a wide and studious reader, and in his later years a writer.

This tribute is concerned mainly with Robert Wilson as a naturalist and ornithologist. It was an interest developed very early in his life. While still a schoolboy he participated in one of the Sub-antarctic cruises (1891) of the Government steamer. His journal shows that while he listened to and recorded the opinions of the learned passengers and the experienced Captain Fairchild, he also made his own independent observations and posed his own pertinent questions. He maintained this independence throughout many field ventures in later years, but wrote and published very little because he chose to give encouragement and help to his companions. One of these was the late Edgar F. Stead, another, the late G. A. Buddle, and both in their published work have given grateful acknowledgment of his help. On any expedition, especially with younger men, he sought the unwanted tasks of camp maintenance. This loyalty was the reflection of a character without guile, and generous to a fault. He took pleasure in encouraging the work of younger men at all stages with unobtrusive gifts of rare books and with loans of other literature and field notes. It was only within the last ten years when strenuous field work had become impracticable and most of his contemporaries had passed on that he turned his attention to recording for publication. The biography of his father had already been ably written by L. J. Wild, so he planned a series of books to deal in brief with different departments of his own life interests. The first of these was 'Bird Islands of New Zealand' (Whitcombe and Tombs 1959), followed by 'My Stalking Memories' (Pegasus Press 1961) and 'A Two Years Interlude — France 1916-1918' (1962). At the time of his death he was compiling material for another volume on timber and sawmilling.

Major Wilson was pre-deceased by his wife and is survived by one daughter, one son, and six grandchildren.

—R. A. F.

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NOTICE

Dr. A. M. Bailey, of the Denver Museum of Natural History, has forwarded six copies of his book "Sub-Antarctic Campbell Island" for award to junior members, i.e. up to 18 years of age. Awards for 1964/65 will be made as follows:

One copy for the best contribution to the Nest Records Scheme.

One for original work, either for the Recording Scheme, or published in "Notornis," if suitable for publication.

One to the most outstanding member of King's College Bird Club.

Three similar awards will be made for 1965/66.

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NEST RECORDS SCHEME

As Mr. J. C. R. Claridge is retiring from the position of Organiser of the Nest Records Scheme on 31st March, 1965, contributors are requested to forward all cards for the current season to reach him by 28th February.