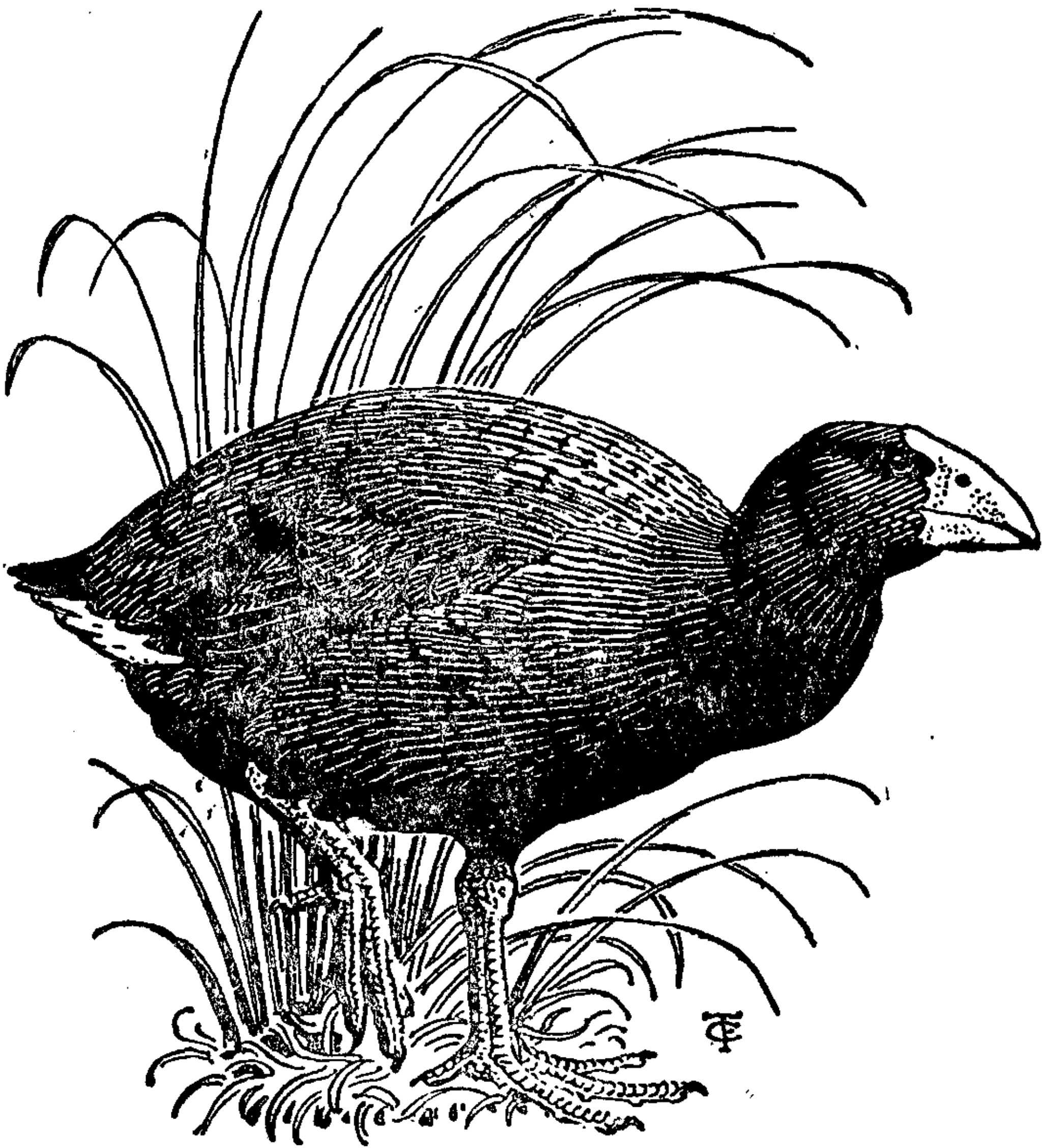


NOTORNIS

Journal of the Ornithological Society
of New Zealand



Volume 20 Part 3 September 1973

OFFICERS 1973 - 74

President — Mr. F. C. KINSKY, National Museum, Private Bag,
Wellington

Vice-President — Mr. B. D. BELL, Wildlife Branch, Dept. of Internal
Affairs, Private Bag, Wellington

Editor — Mr. E. W. DAWSON, P.O. Box 8009, Wellington

Assistant Editor — Mr. A. BLACKBURN, 10 Score Road, Gisborne

Treasurer — Mr. H. W. M. HOGG, P.O. Box 3011, Dunedin

Secretary — Dr. J. A. FOWLER, "Manu Korero,"
2/1030 Fergusson Drive, Upper Hutt

Members of Council:

Mr. A. BLACKBURN, 10 Score Road, Gisborne

Mr. F. H. BOYCE, 19 Marybank Road, Nelson

Mr. R. W. JACKSON, 9 Kenrick Road, Rotorua

Mrs. J. B. HAMEL, 42 Ann Street, Roslyn, Dunedin

Mr. D. V. MERTON, Wildlife Branch, Dept. of Internal Affairs,
Private Bag, Wellington

Mrs. S. M. REED, 4 Mamaku Street, Auckland 5

Mr. R. R. SUTTON, Lorneville Post Office, Invercargill

Conveners and Organisers:

Beach Patrol: Mr. C. R. VEITCH, Wildlife Branch, Dept. of Internal
Affairs, P.O. Box 2220, Auckland

Card Committee: Mr. B. D. BELL, Wildlife Branch, Dept. of Internal
Affairs, Wellington

Librarian (and enquiries for back numbers): Mrs. H. R. McKENZIE
P.O. Box 45, Clevedon

Nest Records: Mr. D. E. CROCKETT, 21 McMillan Ave., Kamo,
Whangarei

Recording (including material for classified summarised notes):
Mr. A. T. EDGAR, Inlet Road, Kerikeri

SUBSCRIPTIONS AND MEMBERSHIP

Annual Subscription: Ordinary membership, \$4; Endowment membership, \$5; Husband/wife membership, \$6; Life membership, \$80 (age over 30); Student membership (under age 21), 25% rebate off ordinary rate; overseas subscriptions, 50 cents extra.

Subscriptions are payable on a calendar year basis at the time of application for membership and on receipt of invoice each January. Prompt payment of subscription will ensure continued receipt of *Notornis*.

Applications for membership, changes of address and letters of resignation should be sent to the Hon. Treasurer.

[Registered with POHQ, Wellington, as a magazine]

CONTENTS

P. C. HARPER	The field identification and supplementary notes on the Soft-plumaged Petrel (<i>Pterodroma mollis</i> Gould, 1844)	193
F. CLUNIE	Pink-billed Parrot Finches near Nailagosakelo Creek, Southern Viti Levu, Fiji	202
E. W. DAWSON	Albatross populations at the Chatham Islands	210
G. R. F. HICKS	Latitudinal distribution of seabirds between New Zealand and the Ross Sea, December 1970	231
B. D. HEATHER	The Black-fronted Dotterel (<i>Charadrius bicinctus</i>) in the Wairarapa	251
J.-F. VOISIN	Notes on the Blue-eyed Shags (genus <i>Leucocarbo Bonaparte</i>)	262
P. MILLER	Second record of the Australian Little Grebe in New Zealand	272
Short Notes		
D. HADDEN	Observations at a Black-fronted Dotterel nest	276
M. J. A. SIMPSON	How does Cape Honey flower affect birds?	277
G. FOREMAN	Black-billed Gull colony at Wairoa	279
G. W. LYLE	Australian Little Grebe at Lake Okareka	279
H. R. McKENZIE	Twenty-one year old White-fronted Tern	280
Letters		
G. LEARY	The first N.Z. Gentoo: death by misadventure?	281
J. A. COWIE	That Gentoo Penguin	282
R. B. SIBSON	The Northern Shoveler	282
N. PRICKETT	Birds in exotic forests	283
Reviews		
E.W.D.	New Zealand spiders; by R. R. & L. M. Forster	284
	Coastal Ecology of a recreation resource area	286
	<i>Mauri Ora</i> , Vol. 1	288
	<i>The Sea Swallow</i> , 1971/72	289
	New Zealand Water Birds, by Elaine Power	290
L.B.McP.	Kiwi Treasury Record No. 4. A treasury of N.Z. bird song, Suppl. 1	291
	Sea birds calling. A treasury of N.Z. bird song, Suppl. 2	292
C.A.F.	Head and breast markings in Charadriinae, by W. D. Gaul	292
Notes and News		293
From the Editor's Desk		296
From the Secretary		
	OSNZ Council Policy Statement on Conservation and the Environment	298
	Student Members	299
Regional Representatives		300
The Society and its officers		inside front cover
Instructions for authors		inside back cover

INSTRUCTIONS FOR AUTHORS

INTENDING CONTRIBUTORS ARE ASKED TO REFER TO NOTORNIS 19 (1): 102-104, APRIL 1972, FOR FULL DETAILS CONCERNING THE PREPARATION OF MANUSCRIPTS SUBMITTED FOR PUBLICATION. Study these carefully and prepare your manuscript accordingly. Unless these requirements, briefly stated below, are followed, manuscripts will be returned without further consideration.

GENERAL — Let at least two other people read your manuscript before sending it in and heed their comments. Check that all editorial requirements have been met and that all pages, tables and figures have been included; wrap and pack securely (especially photographs) and send to: The Editor, *Notornis*, P.O. Box 8009, Wellington.

FORM — *Two copies required*, typed, double-spaced with wide margins, on heavy-weight paper.

ABSTRACT — Provide up to 150 words for any paper exceeding 1000 words.

UNITS, CONVENTIONS — Use metric conversions for all measurements. Follow N.Z. Government Printing Office Style Book for other conventions.

NOMENCLATURE — Follow the OSNZ Annotated Checklist (1970) unless otherwise explained. Give scientific and common names (spelt with initial capitals) at first mention.

ILLUSTRATIONS — Plan for legible reduction to 7" x 4" (18cm x 10cm) or 3½" x 4" (8.5cm x 10cm). Photographs must be on glossy paper with strong contrast.

TABLES — Type *cleanly* on electric typewriter (whenever possible) with new carbon ribbon on heavy paper. Indicate position of each in the text.

ACKNOWLEDGEMENTS — Make certain that anyone who is acknowledged as having "critically" read the manuscript has indeed done so.

REFERENCES — These *are* important. Check titles, dates, and pagination carefully and spell out in full, following examples given in issues of *Notornis* from March 1972 onwards. In text, cite as "Blackburn (1972) said . . ." or ". . . according to some observers (Kear & Burton 1971)."

ADDRESS — Full postal address of author to be given at end of paper.

PROOFS — Supplied only on request or at Editor's discretion. *They must be returned without delay.*

REPRINTS — Authors will get 25 free reprints (other than of Short Notes, etc.). *Additional reprints may be ordered at cost directly from the printers, Te Rau Press Ltd, P.O. Box 195, Gisborne, after notification of acceptance of the manuscript.*

CONTRIBUTIONS WILL BE ASSUMED TO BE READY FOR PUBLICATION AS RECEIVED. TYPESCRIPTS AND ILLUSTRATIONS NOT IN THE PROPER FORM WILL BE RETURNED TO THE AUTHOR.

Book reviews, short notes, and news items are especially welcome.

NOTORNIS

is the journal of the Ornithological Society of New Zealand (Inc.)

Editor: E. W. Dawson,
P.O. Box 8009,
WELLINGTON.

VOLUME 20

PART 3

SEPTEMBER, 1973

THE FIELD IDENTIFICATION AND SUPPLEMENTARY NOTES ON THE SOFT-PLUMAGED PETREL (*Pterodroma mollis* GOULD, 1844)

By PETER C. HARPER

ABSTRACT

Features of plumage and behaviour of the Soft-plumaged Petrel are described and compared with those of other species of *Pterodroma*, especially *P. inexpectata*, and *Procellaria cinerea*, as an aid for further reports of the species at sea.

With the recent report of *Pterodroma mollis* in New Zealand waters (Warham 1969; Kinsky 1971) a note on the petrel's identification and flight behaviour might aid in further reports of this attractive seabird. I saw many summering Soft-plumaged Petrels in the Atlantic near the South Sandwich Islands and north of South Georgia. The notes below are compiled from my *Eltanin* Cruise 22 logbook February-March, 1966 (see Harper 1972 for details of cruise track, and Watson *et al.* 1971 for my records).

The Soft-plumaged Petrel is equivalent in size to the Mottled Petrel (*Pterodroma inexpectata*) and somewhat larger than the Cook's Petrel (*Pterodroma cooki*) or the Black-winged Petrel (*Pterodroma nigripennis*). It is significantly smaller than the White-headed Petrel (*Pterodroma lessona*) which also breeds at the Antipodes Islands.

At sea *P. mollis* is readily distinguished from New Zealand grey-backed, white-bodied *Pterodroma* petrels by its conspicuous grey underwing (see Fig. 1). The head and eye area appear very dark and a grey collar extends over the neck to often join in the midline below. The remaining dorsal plumage is slate-grey as the Gould Petrel (*Pterodroma leucoptera*) and is distinct from the paler hoary grey pigmentation of many of the *Cookilaria* and the larger *Pterodroma* petrels with which *P. mollis* might be confused. The ventral body surface, lores and forehead are white with the short bill black and the feet particoloured flesh and black as described by Murphy (1936).

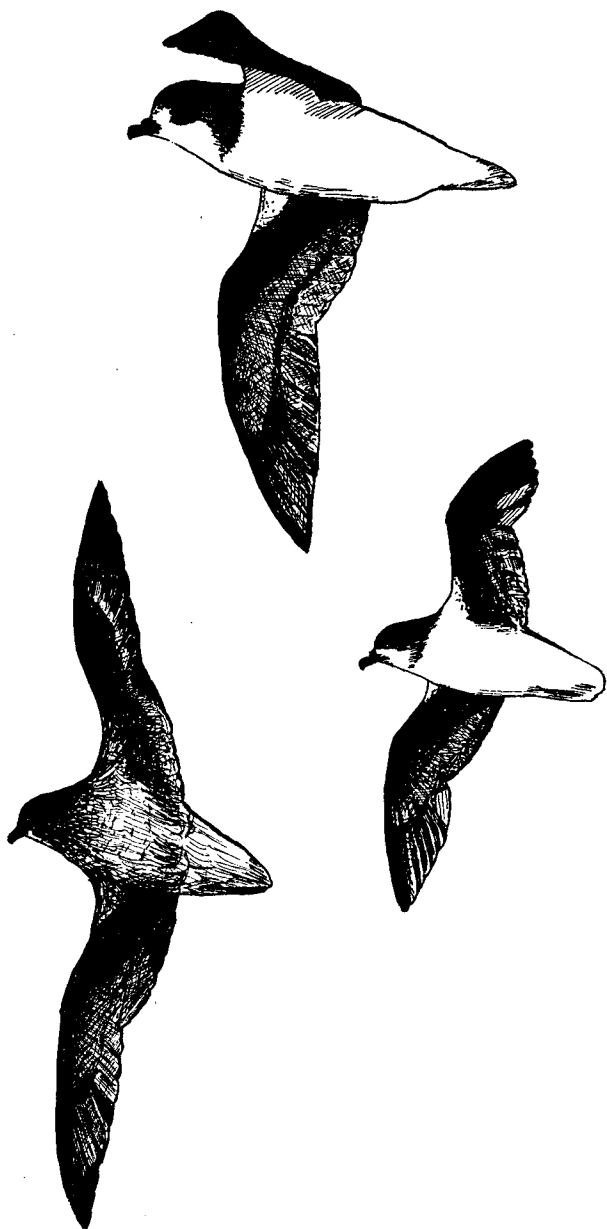


FIGURE 1 — A dorsal and two ventral views of *Pterodroma mollis* (length 330 cm) as it appears on the wing in the South Atlantic. The middle bird is in wing moult. Based on photographs taken 3 February, 1966.

Because of its generous dark pigmentation, the slate-grey areas mentioned above look quite black to an observer at sea. I might emphasize here that petrels in the hand look quite different from a bird on the wing some distance away, and *P. mollis* is no exception. This should be borne in mind when viewing my three sketches copied directly from projected colour transparencies.

I have included two other *Pterodroma* species for comparison with *P. mollis*. The first is the Mottled Petrel which is identical with the Soft-plumaged Petrel in size and proportion, but is unusual in having a discrete, discontinuous black bar extending from the carpal flexure of the underwing across the belly as an expansive abdominal patch, to the opposite wing as shown in Fig. 2. The visual effect is, to a lesser extent, an interesting restatement of the dorsal open M marking reaching across the wings of this and many members of the Procellariidae. This is perhaps well illustrated by a sketch of Edward Wilson's (Roberts 1967: sketch No. 204) which depicts an underside view of "*Pachyptila* sp" with a broad band as I have described above for *P. inexpectata*. Either the sketch in question is a dorsal view of *Pachyptila* or a ventral view of *P. inexpectata*. Considering the general excellence of Wilson's work, a ventral view of a Mottled Petrel appears more likely. The belly markings and to some degree the underwing bars are phenotypically variable and prone to fading as the plumage abrades.

A generally solitary and wide-ranging species in the Pacific Ocean, the Mottled Petrel could conceivably be mistaken for *P. mollis* in the New Zealand region and vice-versa in the South Atlantic, where the Mottled Petrel might appear among the more abundant *P. mollis* (see below).

My second sketch (Fig. 2) is of the White-headed Petrel, a widespread and common bird of the subantarctic. Like *P. mollis*, this species has a dark underwing with a white ventral aspect to the body. It is, however, considerably larger in size with wholly pale or white headparts and a conspicuous black line running through the eye. These features, together with the pale grey mantle and short, mostly white tail, will easily identify *P. lessoni* under reasonable light conditions.

From a distance, when bird size and proportion can be elusive in poor light, the Grey Petrel (*Procellaria cinerea*) can appear deceptively like a *Pterodroma*, with its dark underwing and diverse flight behaviour. The Grey Petrel is a larger bird than the *Pterodroma* species with a more uniformly pigmented grey dorsal plumage and a pale bill. It also breeds at the Antipodes Islands and elsewhere, and is another characteristic Subantarctic species of petrel. This species often congregates into small flocks of ten to eighteen individuals to follow slow moving large whales, diving to feed on the whales' faeces and macroplankton gently flushed in the displaced surface water.

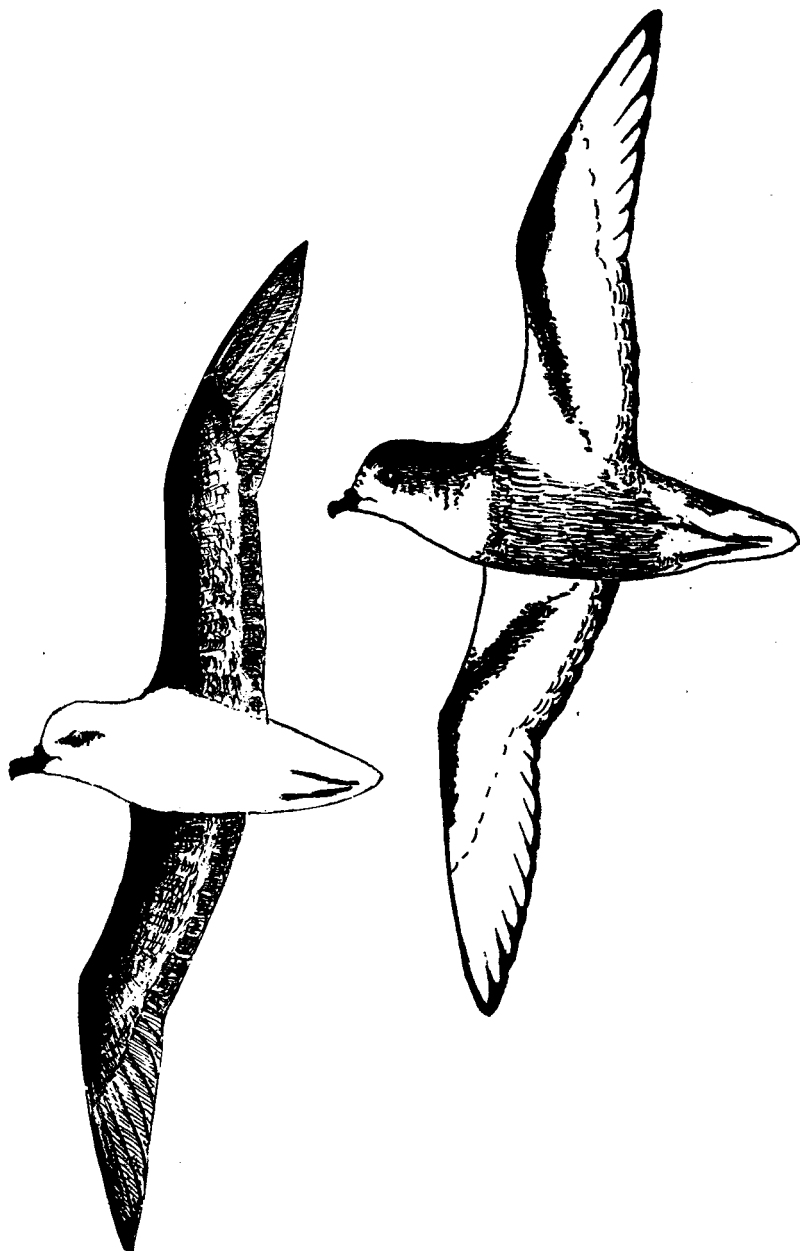


FIGURE 2 — Two birds which also frequent the Subantarctic water zone and with which *P. mollis* might be confused.
Bird left: *Pterodroma lessoni* — length 480 cm.
Bird right: *Pterodroma inexpectata* — length 330 cm.

The flight of *P. mollis* is typical of the *Pterodroma*, with the notable exception of the Kerguelen Petrel (*Pterodroma brevirostris*) (cf. Biermann & Voous, 1950; Harper, Watson & Angle, 1972). The birds thrive on winds about or above 30 kts, flying comparatively low over the sea in a swift rise and fall fashion. The flight pattern is more impetuous than the regimented flight of migrating shearwaters (notably the Sooty Shearwater (*Puffinus griseus*)), and as Biermann & Voous point out, is often accompanied with very rapid wingbeats. Long low gliding with high speed turns is a feature of *P. mollis* and other *Pterodroma* petrels.

The Soft-plumaged Petrel will sometimes follow ships. Biermann & Voous and Alexander (1928) had little luck in having *P. mollis* close at hand in the wake of the ship: Dr. Murphy and I were more fortunate. Murphy (1936) caught the birds readily on a line baited with loggerhead turtle meat. He reports, "after taking the hook the birds would fly high, so that the process of capturing them was like hauling in a kite." Although I did not fish for *P. mollis* in this way, I did succeed in capturing the birds on film at fairly close range, as they and Greater Shearwaters (*Puffinus gravis*) followed our ship in the South Atlantic. Both species alighted in the smooth, churned water to feed upon the disturbed zooplankton and to investigate any garbage thrown overboard. This behaviour is quite opposite from that of *P. inexpectata* or *P. lessoni* which showed no interest in the *Eltanin*, and were not drawn in for as much as a salutatory fly-by.

I would thus recommend that observers travelling south of New Zealand in Subantarctic waters should watch for a stray *P. mollis* overhauling their ship and following it in company with the usual gathering of Cape Pigeons (*Daption capensis*) and Albatrosses (*Diomedea* spp.).

The distribution of *P. mollis* and *P. inexpectata*, when compared, show certain close affinities. Between them, they circle the Antarctic continent with *P. mollis* in the Atlantic and Indian Oceans, and *P. inexpectata* restricted to the Pacific. In my Fig. 3, the extent of the Soft-plumaged Petrel's dispersal over large tracts of ocean is evident, yet one should notice the paucity of records in the Australasian region. The odd bird has been captured by the prevailing westerlies and carried eastwards (Whitlock and Whittell 1942; Learmonth 1961) and it is probably by this method that a group of *P. mollis* recently found the Antipodes Islands, to give us the present anomalous situation there. Specimens of *P. mollis* collected at the Antipodes (Warham 1969) suggest that the species may be breeding though this has not been positively confirmed. If the population proves to be a viable one, then *P. mollis* will have effectively "invaded" the territory of *P. inexpectata*, and should the breeding of the Mottled Petrel be confirmed at the Antipodes, then both species are occupying the same island. In any event, the situation warrants clarification and study. Prior to this discovery, both *P. inexpectata* and *P. mollis* were effectively isolated from each other by different water habitats in the Indian

Ocean, the south Australian seas, and apparently the Cape Horn waters in the South American region (Fig. 3).

Throughout its range, *P. mollis* has generally been restricted by the Antarctic Convergence from travelling further south into cold waters. In the Weddell Sea Gyre, however, several species of Subtropical and Subantarctic petrels are attracted into Antarctic waters

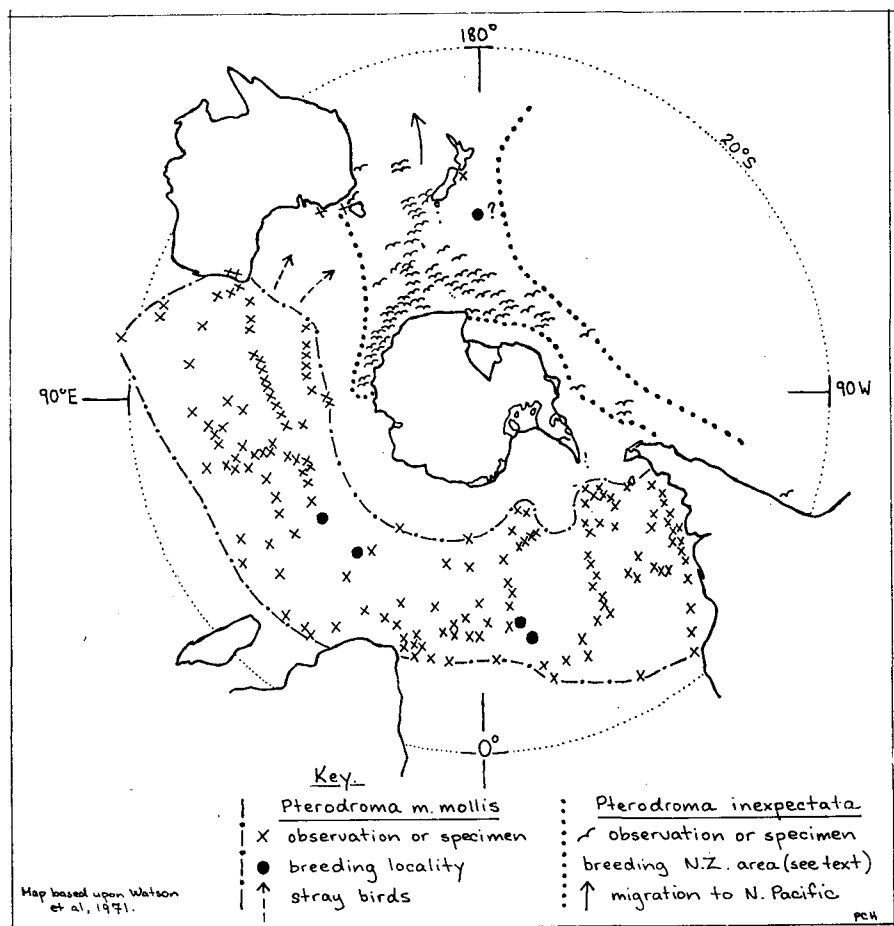


FIGURE 3 — A sketch map showing the distribution of both *P. mollis* and *P. inexpectata*. Note the apparently recent "invasion" by *P. mollis* into *P. inexpectata* territory at the Antipodes Islands, and the paucity of *P. mollis* records in east Australian seas. No *P. inexpectata* have been seen outside Pacific waters.

by the enormous quantity of Crustacea available to them as food. On 20 and 21 February 1966, for example, the *Eltanin* was 200-300 nautical miles southeast of the South Sandwich Islands between 61° 44' and 62° 29' S and 22° 27' and 19° 03' W. The skies were overcast with a 25-40 kt S.W. wind, and a large assortment of icebergs were rising and falling with us in the 12-15 ft swell. The sea temperature fluctuated between 0.7 and 1.0° C. The cosmopolitan company of Procellariidae seen during the above two days included the following 14 species:

Wandering Albatross	<i>Diomedea exulans</i>	4 seen
Black-browed Albatross	<i>Diomedea melanophris</i>	1
Grey-headed Albatross	<i>Diomedea chrysostoma</i>	1
Light-mantled Sooty Albatross	<i>Phoebastria palpebrata</i>	4
Sooty Albatross	<i>Phoebastria fusca</i>	5
Giant Petrel	<i>Macronectes giganteus</i>	10
Cape Petrel	<i>Daption capensis</i>	numerous
Antarctic Fulmar	<i>Fulmarus glacialis</i>	„
Antarctic Petrel	<i>Thalassoica antarctica</i>	1
Antarctic Prion	<i>Pachyptila desolata banksi</i>	numerous
Kerguelen Petrel	<i>Pterodroma brevirostris</i>	„
White-headed Petrel	<i>Pterodroma lessoni</i>	„
Soft-plumaged Petrel	<i>Pterodroma mollis</i>	„
Wilson's Storm Petrel	<i>Oceanites oceanicus</i>	„

Apart from watching these birds gorging themselves on *Euphausia superba*, the *Eltanin*'s crew were busy clearing the crustaceans by the bucketful from the seawater intakes cooling the ship's engines. It is not often that one can see an Antarctic Petrel and a Sooty Albatross in the same locality, but the amount of food present at the time clearly indicated why the birds were there. Some of the above Procellariidae had travelled considerable distances across water gradients and against the wind to reach the area, and yet the Mottled Petrel, upwind and in much the same latitude in the East Pacific, was not present, nor has it ever been recorded in the South Atlantic. The Mottled Petrel is by no means common in the southeast Pacific but a few birds are carried by the wind or wander into the area. Conceivably, they might in years to come, duplicate what *P. mollis* appears to have accomplished in New Zealand waters and colonize the more northern of the South Atlantic islands. For the present however, I seriously doubt whether migrating *P. inexpectata* are using the colder waters of the South Pacific to reach their New Zealand breeding grounds.

Because *P. brevirostris* and *P. mollis* were frequently seen flying together in the Indian Ocean, Falla (1937) postulated that "*P. brevirostris* may be a dark phase of *P. mollis*." This was later regarded as unlikely by Murphy & Pennoyer (1952) who gave the following

reasons for their opinion: "First, the under surface of the quills and the distal parts of the feet are paler than in *mollis* (i.e., the opposite of what might be expected if Falla's supposition were correct). Second, *brevirostris* seems to be a relatively short-tailed petrel. Third, it has a distinctive quality of plumage texture which is somewhat hard to define. Fourth, *brevirostris* and *mollis* breed in different oceanic zones, notwithstanding the fact their flight ranges may overlap."

The real difference actually lies in the structure of the skeleton, and particularly the skull. Recently I examined a very small series of relevant material, and although the quantity of skeletons was not great the differences between *P. mollis* and *P. brevirostris* are.

The Kerguelen Petrel in life is notable for its large, rounded head, finely proportioned bill and large eyes. Although the difference in the overall length of the skull between *P. brevirostris* and *P. mollis* is slight (no more than 3 mm) the orbits of *P. brevirostris* are some 20% longer in measurement between the lacrimals and the post-orbital process (25 mm compared to 20 mm). This larger eye size is accompanied by both a narrower width of the medially grooved part of the frontal bones between the orbits, and a greater width of the lateral edges housing the supra-orbital depressions. These ledges extend dorso-laterally to become characteristically crenated, fenestrated and ledged along their perimeters to a degree not shown in *P. mollis*. The depressions which support the paired nasal glands thus open directly upward in *P. brevirostris* rather than to the side as in *P. mollis*.

The fused lacrimals are reduced in size, while the post-orbital wing of the squamosals is expanded dorso-ventrally to provide greater protection and support for the eyes from behind.

These adaptations for a larger eye are probably associated with the Kerguelen Petrel's practice of feeding primarily at night on crustaceans and squid, whereas *P. mollis* commonly gathers its food during daylight hours (Harper, pers. obs.).

Another belief to be disposed of is that *P. mollis* has a dark phase. Authentic specimens to support this are so few and of doubtful origins that it would appear at most to be a rare aberration.

I might add that *P. inexpectata* and *P. mollis* show close similarity in structure; it is only their plumage character which distinguishes them.

ACKNOWLEDGEMENTS

My thanks again to the National Science Foundation and Sir Robert Falla for arranging my ornithological research programme aboard the *Eltanin*. Both Sir Robert and Professor J. A. F. Garrick have assisted me in the preparation of this note and Mr. F. C. Kinsky kindly allowed me access to the National Museum's skeletal material. For these services I am most grateful.

LITERATURE CITED

- ALEXANDER, W. B. 1928. Birds of the Ocean. A handbook for voyagers. Pp. xxiv + 1-428, pls. 1-88. New York: Putnam.
- BIERMANN, W. H.; VOOUS, K. H. 1950. Birds observed and collected during the whaling expeditions of the *Willem Barendsz* in the Antarctic, 1946-1947 and 1947-1948. *Ardea* 37 (extra no.): 1-123, illus.
- FALLA, R. A. 1937. Birds. B.A.N.Z. Antarctic Research Expedition 1929-1931. Reports. (B). II: 1-304, figs 1-216, pls I-IV.
- HARPER, P. C.; WATSON, G. E.; ANGLE, J. P. 1972. New records of the Kerguelen Petrel (*Pterodroma brevirostris*) in the South Atlantic and Pacific Oceans. *Notornis* 19 (1): 56-60, figs 1-2, table 1.
- HARPER, P. C. 1972. The field identification and distribution of the Thin-billed Prion (*Pachyptila belcheri*) and the Antarctic Prion (*Pachyptila desolata*). *Notornis* 19 (2): 140-175, figs 1-11, tables 1-11.
- KINSKY, F. C. 1971. Recent occurrences of rare petrels in New Zealand. *Notornis* 18 (3): 215-216.
- LEARMONTH, N. F. 1961. Another new petrel for Victoria. *Emu* 61: 196.
- MURPHY, R. C. 1936. Oceanic birds of South America. Vol. II. Pp. viii + 641-1245, illus. New York: The Macmillan Co. and American Museum of Natural History.
- MURPHY, R. C.; PENNOYER, J. M. 1952. Larger petrels of the Genus *Pterodroma*. *Novitates*. American Museum of Natural History. No. 1580: 1-43.
- OSNZ, 1970. Annotated Checklist of the birds of New Zealand. The checklist committee (F. C. Kinsky, convener), Ornithological Society of N.Z., Inc. 96 pp. Wellington: A. H. & A. W. Reed.
- ROBERTS, B. R. 1967. Edward Wilson's Birds of the Antarctic. Pp. 1-191. London: Blandford Press.
- WARHAM, J. 1969. University of Canterbury Antipodes Island Expedition 1969. *Antarctic* 5 (6): 282.
- WATSON, G. E. et al., 1971. Birds of the Antarctic and Subantarctic. Pp. 1-18, figs 1-2, tables 1-2, 2 maps, pls 1-15 in: BUSHNELL, V. C. (ed.). *Antarctic Map Folio Series*, Folio 14. New York: American Geographical Society.

Peter C. Harper,
4 Barber Grove,
Moera,
Lower Hutt

PINK-BILLED PARROT FINCHES NEAR NAILAGOSAKELO CREEK, SOUTHERN VITI LEVU

By FERGUS CLUNIE

ABSTRACT

The Pink-billed Parrot Finch (*Erythrura kleinschmidti*) occurs on Viti Levu island, Fiji. Its habitat is defined as rain-forest at both high and low altitudes. Generally rare, it is common locally. Although it does take vegetable food, insects appear to make up the bulk of its diet, and are taken in a variety of ways, some highly specialised. Notes on its nesting are presented.

CONTENTS

Introduction

- I. Methods
- II. Differences in bill colouration
- III. Habitat
- IV. Movement with mixed flocks of insectivorous birds
- V. Feeding
- VI. Nesting
- Literature cited

INTRODUCTION

The Pink-billed Parrot Finch (*Erythrura kleinschmidti*) is known only from Viti Levu, the largest island (10,429 km²) of the Fiji Group. Regarded as the most aberrant member of its genus (Mayr 1931: 10) this peculiar, heavy-billed parrot finch had, until recently, only been recorded on a handful of occasions since its discovery by Kleinschmidt in 1877 (Finsch 1878: 440). Its life history was completely unknown. This paper presents new findings which shed some light on the diet, habits and nesting of the bird.

I. METHODS

I first saw a Pink-billed Parrot Finch in rainforest-clad hills overlooking Nailagosakelo Creek on 8 March 1971 (Clunie 1972: 335). Between 28 November 1971 and 7 January 1973, I made many trips to the Nailigosakelo Creek area, seeing Pink-billed Parrot Finches on nearly every occasion.

Visits consisted of one day excursions, the Pink-billed Parrot Finch being seen on eighteen different days, with several sightings on most days. The birds were always followed until lost, usually being under observation for several minutes at a time. It soon became

apparent that they move with the mixed groups of insectivorous birds which are so typical of the Fijian rainforest understorey, and they were then usually found fairly easily by watching such groups until a Pink-billed Parrot Finch appeared.

Observations at the nest were made from almost directly below it, through a hole in a screen of thick vegetation. This gave a clear view of the immediate approaches of the nest and its entrance tunnel.

II. DIFFERENCES IN BILL COLOURATION

Several Pink-billed Parrot Finches with black bill tips were seen, the entire forward half of the beak being black in some cases. This feature does not seem to have been recorded previously. It is probable that these were young birds, nesting birds having all-pink bills. So far as I could tell from field observation, the birds with black bill tips were similar in plumage to birds with all-pink bills. Mayr (1931: 10) described the juvenal plumage as being "characterized by the duller colouration of upper and underside, by having less black on the head, and by being more brownish instead of yellowish olive on the sides of the neck and breast." The birds with black bill tips at Nailagosakelo Creek exhibited none of these features, save that they tended to have a little less black on the face and crown, and more blue extending from it across the back of the head and nape, than did birds with all-pink bills. The yellowish patches on the sides of the neck were not at all brownish.

III. HABITAT

The Nailagosakelo Creek rises in rugged, rainforest-clad mountain country some ten kilometres west of Mount Korobaba, on the north shore of Suva Harbour. It runs roughly southeast, flowing through a narrow, heavily-forested valley, until it reaches a point about four kilometres from the sea, where the valley widens suddenly. It was in this wider part of the valley, and in the hills to the east of it, that all Pink-billed Parrot Finch sightings were made.

Rainforest extends over the foothills rising from this part of the valley, the floor of which is covered in second growth in the form of slender, scrubby yaqoyaqona (*Piper puberulum*) interspersed with patches of recently abandoned native gardens, which are studded with trees and overgrown with tangled grass.

Some two kilometres from the sea the creek flows onto a dairy farm which stretches to the coastal mangroves. Perhaps 200 metres to the north of the inland boundary of the farm, on the west bank of the creek and flanked by a pandanus swamp and rainforest, is a small, abandoned and wildly overgrown cocoa plantation, rapidly reverting to rainforest.

Pink-billed Parrot Finches were commonly seen in the cocoa plantation, where conditions are similar to rainforest, and in rainforest at altitudes from just above sea-level to about 150 metres above sea-level (altimeter reading). They did not normally seem to venture

into the yaqoyaqona or native gardens, although they would feed to the very edge of the rainforest. The smaller, related Red-headed Parrot Finch (*Erythrura cyanovirens*), on the other hand, while at least as common as the Pink-billed Parrot Finch in the forest, was at its most numerous in the native gardens and on the dairy farm, where it gathered in sizeable flocks.

Observations at Nailagosakelo Creek support earlier statements (Martin 1938: 6; Mayr 1945: 148; Mercer 1965: 25) that the Pink-billed Parrot Finch is essentially a rainforest-dwelling species. The position of the only nest found, which was curiously situated a few metres from the forest fringe, possibly indicates that the bird might prefer to nest in forest clearings. Certainly an area about a small clearing in the rainforest proved to be particularly rich in these birds, and was the only place where small flocks were seen. The finch is apparently rare generally, there having been so few records of it since its discovery, but where it does occur may be quite common, as it is about Nailagosakelo Creek.

Mayr's suggestion (1945: 148) and Mercer's more specific statement (1965: 25) that the Pink-billed Parrot Finch is a bird of the mountain forest, is now seen to be too restrictive, as it occurs and nests at little over sea-level in the Nailagosakelo Creek area. At the present state of knowledge it would seem to be a bird of the rainforest at both high and low altitudes.

IV. MOVEMENT WITH MIXED FLOCKS OF INSECTIVOROUS BIRDS

Pink-billed Parrot Finches were almost invariably seen amongst mixed flocks of insectivorous birds in the forest understorey. There usually seemed to be one or two Pink-billed Parrot Finches to a mixed species flock, although lone finches sometimes called at frequent intervals, perhaps to keep in contact with a companion elsewhere in the flock. The call is similar to that of the Red-headed Parrot Finch — a high, rather thin, but carrying "cheee cheee cheee." Single notes are often given and can be considerably louder and sharper sounding. A clicking sound is also made and is quite unlike any call of the Red-headed Parrot Finch that I have heard as yet.

Pairs of Pink-billed Parrot Finches in such flocks of insectivorous birds were occasionally seen working in close combination. Indeed, on 7 January 1973 one of a pair of birds with black bill tips pulled free a small vine, and was examining it, when its companion took hold of the other end of the vine in its bill, and tugged at it, both birds engaging in a tug-o'-war for several seconds, before dropping the vine and moving off.

Small groups of more than two Pink-billed Parrot Finches were seen twice in rainforest near the edge of a small clearing some 60 metres above sea-level. On 6 February 1972 a flock of four darted through the undergrowth and landed on a branch four metres above the ground, where they called several times before darting on out

of sight. At least two of these birds had black bill tips. On 12 March 1972 two fully pink-billed birds were seen moving about in dense foliage some five metres up a tree in company with three Fiji Warblers (*Vitia ruficapilla*), while a third finch investigated bunches of dead leaves in a neighbouring tree, calling frequently.

Birds seen in mixed species flocks containing the Pink-billed Parrot Finch included the Polynesian Triller (*Lalage maculosa*), Island Thrush (*Turdus poliocephalus*), Fiji Warbler, Spotted Fantail (*Rhipidura spilodera*), Slaty Flycatcher (*Mayornis lessoni*), Fiji Shrikebill (*Clytorhynchus vitiensis*), Blue-crested Broadbill (*Myiagra azure-ocapilla*), Scarlet Robin (*Petroica multicolor*), Golden Whistler (*Pachycephala pectoralis*), Orange-breasted Honeyeater (*Myzomela jugularis*), Wattled Honeyeater (*Foulehaio carunculata*), Giant Forest Honeyeater (*Gymnomyza viridis*), Layard's White-eye (*Zosterops explorator*), Grey-backed White-eye (*Zosterops lateralis*), and the Red-headed Parrot Finch. The Giant Forest Honeyeater and the two white-eyes often, but by no means always, tended to keep higher up in the trees than the other species, which generally occurred between 0-6 metres above the ground.

Red-headed Parrot Finches were often seen hunting insects alongside their Pink-billed relatives, but usually just picked insects off branches, and only once were seen attempting one of the latter's more specialised hunting techniques — pecking open dead fern stems to get at the insects within. Indeed, the Pink-billed Parrot Finch's feeding methods usually seemed to put it in closer competition with the Fiji and Black-faced (*Clytorhynchus nigrogularis*) Shrikebills, and the Fiji Warbler.

V. FEEDING

Practically nothing has been recorded regarding Pink-billed Parrot Finch diet. Mayr (1945: 148) suggested that it might feed on flower buds, and this has been confirmed recently (Clunie 1972: 335). Fijians told Robin Mercer (Fiji Museum Annual Report 1967: 7) that it fed on over-ripe and fallen berries, while he saw one pick the seeds from a berry (Mercer pers. comm.). In the forest about Nailagosakelo Creek, however, it soon became clear that the Pink-billed Parrot Finch is strongly insectivorous in its feeding habits.

On nearly every sighting the birds were actively engaged in hunting insects, usually with specialised techniques involving the use of the heavy bill. Flower buds and over-ripe berries were almost always available in the immediate vicinity, but were ignored.

Pink-billed Parrot Finches move about the forest understorey in a manner reminiscent of the two shrikebills. They are extremely active, hopping and flying from branch to branch and tree to tree, moving up and down trees and vines, and clinging to the bark of vertical tree trunks in a most remarkably "unfinchlike" way, as they carry out their hunt for insects, probing and investigating dead leaves and branches with the bill.

Seven different methods of taking insects were observed, most of which could be used by a single Pink-billed Parrot Finch within a period of a few minutes:—

- (a) The Pink-billed Parrot Finches would simply pick insects from dead branches, just as the Red-headed Parrot Finch often does.
- (b) They would also take twigs in the beak and run it up and down them, evidently in search of insects, or run the bill down the stems of tree-fern leaves.
- (c) They would investigate bunches of hanging dead leaves in a manner reminiscent of the Fiji Shrikebill. They were often seen pulling and tugging at bunches of dead leaves, and poking their heads into them, in search of insects. Sometimes they would pull a leaf free and drop it, or rip it asunder with the bill. On 2 January 1972, in a clump of vau or wild hibiscus (*Hibiscus tiliaceus*), I watched a Pink-billed Parrot Finch investigate and tug in vain at a hanging bunch of leaves. When it moved away I pulled the leaves apart and found two large crickets secreted within their folds.

This proved to be one of the commonest hunting methods observed. The vigorous activities of the parrot finches were often accompanied by a crackling and rustling of dead leaves, a sound commonly heard when Fiji Shrikebills are hunting in like fashion.

- (d) Another very common hunting method identical to one used by both the Fiji and Black-faced Shrikebills involved the use of the bill in cracking open dead tree-fern leaf stems, hollow branches, vines and twigs, in search of prey. The parrot finch would move systematically along say a dead tree-fern leaf stem, pecking holes in it at frequent intervals, often with a clearly audible crunching, occasionally pausing to feed on insects contained within it. Whenever possible I broke open the twigs or vines upon which the finch had been operating, and often found them to contain ants and ant eggs.

The most interesting example of this type of insect hunting was witnessed on 13 February 1972, amongst dense undergrowth at a point well under ten metres above sea-level. I followed a Pink-billed Parrot Finch which was accompanying a mixed flock of insectivorous birds including several Orange-breasted Honeyeaters, Spotted Fantails, Blue-crested Broadbills, Fiji Shrikebills, Grey-backed White-eyes, a pair of Golden Whistlers, and at least one Island Thrush, Giant Forest Honeyeater and Red-headed Parrot Finch. The Pink-billed Parrot Finch was being tailed at less than half a metre by a Spotted Fantail. The finch moved from tree to tree in typical fashion, hopping up and down dead twigs, treefern leaf stems and vines, ripping holes in them at frequent intervals. It eventually discovered a nest of large, rusty-coloured ants in a small dead branch, and began to feed greedily, scattering

the white eggs, while the fantail darted about catching either the ants or eggs or both as they fell to the ground. The two birds then moved off, the fantail still closely following the parrot finch.

I have seen a Wattled Honeyeater apparently attempting the same parasitic relationship on a Black-faced Shrikebill, which was ripping open a dead branch. The shrikebill, however, kept the honeyeater at bay with threatening lunges of its heavy bill.

- (e) On 13 February 1972 a Pink-billed Parrot Finch was seen probing with its bill at a rotten tree-trunk, from which it pulled a largish grub which it swallowed before flying to a nearby branch, on which it wiped its bill.
- (f) On 24 December 1972 in the abandoned cocoa plantation a Pink-billed Parrot Finch was observed clinging to the vertical trunk of a tall tree. The finch was evidently in search of insects sheltering under the bark, for it moved up and down the trunk, prising free pieces of bark with its bill and dropping them. Some of the bark fragments were as large as the finch itself.
- (g) Individual Pink-billed Parrot Finches were quite commonly observed near or on the ground in company with Fiji Warblers. They pecked at dead leaves and picked up and dropped twigs with their bills, in quest of ground-dwelling insects.

VI. NESTING

The only previous record of Pink-billed Parrot Finch nesting is a brief note by Martin (1938: 6) that it lays "a pretty egg, light red with dark red spots." This note needs confirming, as such eggs would seem rather unusual for a bird which builds an enclosed nest, especially when the eggs of other finches of the genus *Erythrura*, including the Red-headed Parrot Finch, are known to be white (Mayr 1945: 104; Mercer 1965: 24). I have not as yet seen any Pink-billed Parrot Finch eggs.

Nest situation and structure:

On 25 August 1972 I discovered a pair of Pink-billed Parrot Finches building a nest in a tree on the south slope of a low (15 metres above sea-level) hillock north of the abandoned cocoa plantation. The tree stood a few metres from the edge of the rainforest and just below the crest of the hillock, in an area of mixed yaqoyaqona, a small type of bamboo, and abandoned, wildly overgrown native gardens. Rainforest capped the hillock and extended down its northern slopes and off to the west. The nest was built in the forks of several small branches on the outer edge of the canopy on the southern side of the tree, about six or seven metres above the ground. It was very similar to that of the Red-headed Parrot Finch, being an untidy, globular structure of dead leaves, small twigs, lichens and bamboo leaves.

A small entrance hole was located low on the northeastern side of the nest, facing slightly downwards, a twig of one of the branches on which the nest rested forming a landing platform just below it.

General behaviour about nest:

The finches usually showed much apparent caution about the nest, landing more than a metre away in the tree and moving to the nest entrance where they invariably looked all about before entering. They always landed on the twig serving as a landing stage at the entrance hole, and from there clambered into the nest. On leaving the nest the finches dropped out with wings folded for a metre or more before darting off, calling.

The nesting birds evidently hunted with mixed flocks of insect-eating birds throughout the nesting period, individual Pink-billed Parrot Finches being seen with such groups in the rainforest less than fifty metres from the nest.

On 28 May 1972 several sightings were made of lone Pink-billed Parrot Finches collecting nesting materials and carrying them to the nest, which was nearing completion, the finch dragging the materials in through the entrance. Almost immediately after the entry of a finch with nesting materials, a bird would drop from the nest calling, to collect more materials, being gone from between two to fifteen minutes. Another bird within the nest would evidently weave the materials into place, as the nest quivered frequently and calls issued from it.

Nesting materials included dying and yellowing leaves, dead leaves from a neighbouring clump of a small type of bamboo, small twigs, and vines. Only a single twig or leaf was brought in at a time. One leaf was bigger than the finch carrying it and on being pulled into the nest damaged the entrance. At this a finch leaned out from inside and repaired the torn structure with its bill.

Leaves apparently were collected with considerable care, the parrot finch plucking a dying leaf with its bill, then flailing it vigorously on a branch with a metallic clicking. Sometimes the leaf was rejected and another sought.

On 5 June 1972, the nest was again visited. Nest construction had ceased and there was very little activity. At 1310 hrs, a bird left the nest and standing on the landing stage rework the area about the entrance with its bill, then moved about the outside of the nest looking at it from various angles for several minutes, before returning to the landing stage and making a clicking noise by opening and closing its bill, whereon it was relieved at the nest by its mate. The newcomer entered the nest and was later seen further adjusting the entrance from within.

Several sightings were made of Red-headed Parrot Finches gathering nesting materials, one taking a leaf from the ground at the foot of the Pink-billed Parrot Finches' nesting tree.

The nest was again visited on 10, 18 and 25 June 1972, by which last date it had been abandoned. On 10 and 18 June no activity, other than occasional arrivals and departures of the nesting birds, was seen. At no time did I see any activity indicating the presence of young in the nest.

LITERATURE CITED

- CLUNIE, F. 1972. Notes on the Pink-billed Parrot Finch of Fiji. *Notornis* 19 (4): 335-336.
- FIJI MUSEUM ANNUAL REPORT December 31, 1967. Pp. 1-8. Suva: Fiji Times.
- FINSCH, O. 1878. On a new Species of Finch from the Feejee Islands. *Proceedings of the Zoological Society of London* 1878: 440, pl. XXIX.
- MARTIN, A. H. 1938. The Birds of Fiji. *Transactions of the Fiji Society of Science & Industry*, 1: 4-7.
- MAYR, E. 1931. The Parrot Finches (Genus *Erythrura*). *American Museum Novitates*, 489: 1-10.
- MAYR, E. 1945. Birds of the Southwest Pacific. A field guide to the birds of the area between Samoa, New Caledonia, and Micronesia. Pp. xx + 1-316, text-figs 1-16, pls I-III. New York: Macmillan.
- MERCER, R. 1965. A field guide to Fiji Birds. Fiji Museum Special Publications Series. No. 1. Pp. vi + 1-40, pls 1-14. Suva: Government Press.

Fergus Clunie,
Fiji Museum,
Suva,
Fiji

ALBATROSS POPULATIONS AT THE CHATHAM ISLANDS

By ELLIOT W. DAWSON

ABSTRACT

An estimate of the breeding population of Royal Albatrosses (*Diomedea epomophora sanfordi*) on the eastern islet of The Sisters group of the Chatham Islands in January 1954 was between 400 and 450 birds. In October 1964 the breeding birds were considered to be occupying only one-quarter of the area as seen in January and the count of birds was accordingly multiplied by four giving a theoretical peak breeding population of 360 pairs.

Similarly, Buller's Mollymawk (*D. bulleri*) at the corresponding dates in 1954 and 1964 was considered to have a breeding population of 250 and 240 pairs respectively. A preliminary count from RNZAF aerial photographs (*vide* C. J. R. Robertson) indicated the presence of 630 pairs of Royal Albatrosses on the eastern Sister at the end of November 1973, and more detailed results are expected from current field studies.

At The Pyramid, a southern outlier of the Chatham Islands, counts of birds along strips of rock faces suggested a total population for the Chatham Island Mollymawk (*D. cauta eremita*) of 2,500 pairs, a figure comparing favourably with earlier estimates of "several thousand" and "between two and three thousand" pairs.

Based on all the information from visits made up to 1969, tentative timetables have been drawn up for the breeding cycles of the Chatham Islands populations of the Royal Albatross and Buller's Mollymawk, both of which also breed elsewhere, and of the Chatham Island Mollymawk which is known to breed only on The Pyramid.

CONTENTS

INTRODUCTION

THE NORTHERN ROYAL ALBATROSS AT THE CHATHAM ISLANDS

Populations on The Sisters

Seasonal differences and unemployed birds

The yearling fledglings

The breeding season of the Chatham Island Royals

World population of the Royal Albatross

BULLER'S MOLLYMAWK

Populations on The Sisters

The breeding seasons of Buller's Mollymawks

THE CHATHAM ISLAND MOLLYMAWK

The Pyramid

The breeding season of the Chatham Island Mollymawk

DISCUSSION

ACKNOWLEDGEMENTS

LITERATURE CITED

INTRODUCTION

Two races of the Royal Albatross breed within the New Zealand Region: the larger, *Diomedea epomophora epomophora* Lesson, nests on Campbell Island and in the Auckland Islands on Enderby Island with a few pairs on Adams Island and on the main Auckland Island; the smaller, northern race, *D. epomophora sanfordi* (Murphy), has its breeding grounds on two small groups of islets in the Chatham Islands, The Sisters and the Forty Fours, and also on the New Zealand mainland at Taiaroa Head, Otago Peninsula, a site made famous by the work of L. E. Richdale and now declared a national responsibility (Robertson 1972; Parry 1972).

A recent summary by Tickell (1969, 1970) of work on the Royal Albatross, made on a comparative basis with his own studies of the Wandering Albatross at South Georgia, and also the report of Robertson & Kinsky (1972) on dispersal movements, has shown many of the gaps existing in our knowledge of this species and it is now appropriate to report on some additional evidence about the population size and probable breeding cycle in the northern race at the Chatham Islands.

During the 'Chatham Islands 1954 Expedition' from 23 January to 12 February 1954 (see Knox 1957), landings were made on several of the outlying islands of the Chatham group, in particular on Pitt Island, The Sisters, the Forty Fours, and on South East Island. Estimates were made of the breeding populations of the Royal Albatross and of Buller's Mollymawk on the Sisters and the Forty Fours, and these figures were later published (Dawson 1955). Earlier observations by L. C. Bell during his visit to the islands on 16 and 17 December 1952 appeared at the same time (Bell 1955). Bell's figure for the Royal Albatross on the eastern islet of the Sisters was twice as great as that given by Dawson.

Ten years later, in October 1964, I was able to land on the Sisters again and make further observations. Another attempt to land in March 1969 was prevented by a dangerous swell. Since no other ornithologists have visited these islands up to the present time, my notes from these two visits now form some basis for an assessment of the albatross and mollymawk populations of these remote islands.

During October 1964, I worked in the Chatham Islands region aboard the m.v. *Taranui* with a team from the N.Z. Oceanographic Institute, DSIR, carrying out a survey of the bottom-living animals and sea floor topography. There were good opportunities for observing sea birds around the ship while working close inshore and landings on the Sisters, on Pitt Island, and on South East Island, as well as on the main Chatham Island, allowed further ornithological observations. Close examinations were made from the ship of the Star Keys and Round Island to follow up 1954 observations and, although the sea conditions were rather too unsettled to allow a safe landing on the Pyramid, some estimate of the breeding population of the Chatham Island Mollymawk, *Diomedea cauta eremita* (Murphy), was made

for comparison with the observations of Fleming (1939) and B. D. Bell (1961 unpubl.), each of whom with his companion of the day belongs to that exclusive club of ornithologists who have risked limb, if not life, to land on this spectacular rock to meet the equally exclusive Chatham Island Mollymawk on its only known nesting ground.

In March 1969 another cruise was made in Chatham Islands waters with the m.v. *Taranui* and, although no landings were made on either the Sisters or the Pyramid, some further information on breedings times was obtained.

THE NORTHERN ROYAL ALBATROSS AT THE CHATHAM ISLANDS

Populations on the Sisters:

The Sisters are a group of two islets (Figs. 1 & 2) and a reef (Fig. 3) lying about 10 miles to the north of the main Chatham Island. They were first made known by Dieffenbach (1841: 215) who said of them: "Rangi tutahi, or 'The Sisters,' are two pyramidal rocks about 100 feet high, covered with scanty bushes, and frequented by countless numbers of sea-birds." The islets are, in fact, moderately flat-topped with some large masses of bare rocks and steep cliffs. A better idea of their topography is given in Figs 1 & 2, 4 & 5. According to Bell (1963: 5) the Sisters are Maori owned. Many stories are told of the illegal poaching of young albatrosses from these islets but there is little real evidence of such happenings on a group so rarely visited by either scientists or wildlife administrators, and the effect of such poaching on the breeding population cannot be demonstrated (but see Coster 1972).

On 29 January 1954, I was ashore on the eastern Sister* from

* There is a belief amongst some members of the 1954 Expedition that the smaller of the Sisters lies to the west with the low reef to the south, and that, accordingly, the larger island on which we did not land should be referred to as the eastern Sister. However, the earliest map of the Chathams consulted (1909 ed., Lands & Survey, "From the surveys of S. P. Smith and John Robertson 1868 & 1883") shows the islands lying along the same latitude with the largest to the west and the reef easternmost. All other charts and maps (British Admiralty 1417, 1879 ed., corrected to date; N.Z. Oceanographic Institute Provisional Bathymetry, Island Series, 1: 200,000, 1967; Lands & Survey NZMS 240, 1: 63,360, 1st ed. 1969; RNZN Hydrographic Office NZ 113, 1: 200,000, June 1971) show a similar arrangement with the largest island unmistakably in the west although the relative positions and shapes of the reef and the smaller island vary. Therefore, in the absence of a specific hydrographic survey (which might well show that an error has been perpetuated), the *smaller* island will be referred to as the *eastern* Sister.



FIGURE 1 — The eastern side of the larger (west) Sister seen from the north-east near the 1954 landing site on the eastern Sister above the surge zone of *Durvillea antarctica* kelp thongs, 29 January 1954.

Photo: E. J. Batham



FIGURE 2 — The smaller (eastern) Sister from the south-east, height about 150 ft, with the low-lying reef visible in the right hand background, 13 October 1964.

Photo: J. Irwin



FIGURE 3 — The reef of the Sisters group, frequented by many fur seals, 29 January 1954.

Photo: A. J. Black

0818 to 1420 hrs. The flat top of the islet carried a population of Royal Albatrosses extending over most of the available area except for some parts near rocky outcrops where fledgling Giant Petrels (*Macronectes giganteus*) were gathered (Fig. 4). There was, however, quite an amount of space between the individual albatross nests. My estimate of the number of nests was between 400 and 450, and certainly no greater than 500. Most of the nests had chipping eggs but a few had newly-hatched chicks. It could, therefore, be considered that this represented the full breeding population of the season. The report of the 1954 expedition gave "about 500 pairs" as the breeding population of the eastern Sister (Dawson 1955: 79).

On 13 October 1964 I revisited the eastern Sister from 0700 to 1315 hrs and counted 120 individual adult Royal Albatrosses beside nests with another 60 adults estimated (Fig. 5). Ten fledglings with remnants of down were found. It was presumed that most, if not all, of the adult birds were the first arrivals of the new breeding season rather than the last of the previous season's breeders, some of which might have still been attending the ten fledglings. However, following Richdale's (1954) argument on the starvation theory, the parents of the ten fledglings might well have been present, but the "unemployed" birds would certainly have departed long since. Only one-quarter of the total nesting area, as seen being used on my 1954



FIGURE 4 — View across top of eastern Sister showing density of nesting Royal Albatrosses, 29 January 1954.

Photo: A. J. Black

visit, was occupied by nests attended by adult birds. It seems valid, therefore, if all the breeding space were to be used, to multiply the observed birds, namely some 90 pairs, by four to bring the numbers to the full population of the breeding season (excluding any "unemployed" birds).

On 30 November and 2 December 1972, the RNZAF made a photo-reconnaissance of the Sisters and the Forty Fours which will allow a detailed count to be made of the Royal Albatrosses as well as giving a clear record of the area and dimensions of the flat tops of each of these islands. Buller's Mollymawks, nesting as they do along the edges of the tops (Fig. 6), are not particularly evident in the photographs and cannot be counted with any degree of accuracy. From a preliminary examination of photographs, both black-and-white and colour, Mr C. J. R. Robertson (pers. comm. 6 June 1973) believes that the population of the eastern Sister at this time of the year numbered 630 pairs and that of the western Sister 1,100 (a figure which compares well with the rough estimate made from sea level in 1954 of 750 pairs by Dawson (1955)). Fuller reports of the Chatham Islands albatross populations in the forthcoming breeding season may be expected shortly from Wildlife Service parties now in the field, and my earlier estimates will give some basis for considering these results.



FIGURE 5 — View across top of eastern Sister showing density of nesting Royal Albatrosses (m.v. *Taranui* in background), 13 October 1964.

Photo: J. Irwin

Seasonal differences and unemployed birds:

Granted that the January (1954) population on the eastern Sister was four times the size of the October (1964) population, one naturally wonders whether this reflects a substantial difference between particular breeding seasons, whether, perhaps, illegal poaching or natural mortality over a period of ten years has reduced the numbers now breeding, or whether there is a noticeable build up of numbers of birds returning to the breeding grounds over the period October to January.

At Bird Island, South Georgia, Tickell's (1968: 19, fig. 18) counts of Wandering Albatrosses arriving on their nesting grounds rose from mid-November towards a peak in early December, reaching a maximum near the end of December with the first egg appearing early in the same month. The earliest arrival was on 9 November, with males returning first and females "somewhat later." In 169 cases, the first male arrived on 12 November and the female on 24 November; the mean date of the males' return was, hence, 11 days before the females' (Tickell, 1968: 17). Accordingly, it seems valid to assume that the Royals of the Sisters build up their populations over a month or so in a similar way. Indeed, the rather higher estimates

made by C. J. R. Robertson from the RNZAF photographs taken in late November and early December might reflect the trend shown in Tickell's graph (his Fig. 18) of numbers of returning birds.

For Buller's Mollymawk on the Snares Islands, Richdale (1949: 17) stated: "It is obvious . . . that individual Buller's Mollymawks arrive on the breeding grounds from their non-breeding sojourn at sea over a period of many weeks."

Tickell (1968) has said little about the non-breeding birds found on the nesting ground, the "unemployed" or "unattached" in Richdale's sense (amongst which he included both failed breeders as well as those that have not yet bred — see Richdale 1950: 14-15, 51-64, 79) or the "subadult" birds as defined by Tickell (1968: 4). My counts on the eastern Sister were of birds associated with nests and I am unable to say what proportion of the total population of birds on this particular island would be "unemployed" or "subadult." A more detailed study, later in the season, of birds on the breeding ground, and of their individual behaviour, would be needed to differentiate between breeders and non-breeders. It might be that the number of "unemployed" birds present by the height of nesting activities would be appreciable in terms of census figures, but this is mere speculation.

The yearling fledglings:

A "Yearling Fledgling" has been defined by Tickell (1968: 4) as: "An advanced fledgling one year of age about to leave the breeding grounds . . ." In view of the alleged difference in departure dates of fledglings related to the return of the breeding adults, it is of interest to see whether the record of young birds at the Sisters in January is relevant to the argument. Tickell (1968: 33-34) reported that the arrival of the breeding adults of Wanderers at South Georgia overlaps the departure of the previous season's young (the yearling fledglings), the first breeding males appearing 8 days before the first fledglings leave. Fledging at South Georgia was found to take 278 days (range 263-303). In contrast, Richdale (1952: 88) showed that the Royal fledglings at Taiaroa spend 236 days (range 216-252) at the nesting area and leave before the next season's adults arrive. The mean date of departure of the chicks was 22 September. In only two cases of 17 studied were fledglings present when the next season's breeding birds returned and the parents of the fledglings were in all instances absent in the new breeding season.

Tickell (1970: 93) suggested that the fledging period for the Royal Albatrosses (at Taiaroa Head) is shorter than that known for the Wandering Albatross because of the milder climate of New Zealand. He noted that when the pairs of breeding adults return to Taiaroa Head, "most if not all of the previous season's fledglings have already left for their first summer at sea" and he added — "No data on this point are available from the colonies of Royals on Campbell

Island and the Chatham." In contrast the fledging period of the Wanderer is so much longer that when breeding adults return there are usually many fledglings still occupying the nesting area.

It is well established that the Royal Albatross chick fledges directly into a white phase like the adult in contrast to the Wanderer chick which is transformed over a period of years from an all brown plumage into the white or so-called "chionoptera" stage (see Fig. 2 in Tickell 1968 for the "Gibson code" for describing the *D. exulans* plumage phases). Considering this fact together with the increased length of the fledging period of *D. exulans* overlapping the return of the adults, Tickell (1970: 93) made an interesting suggestion which could well be tested at the Chathams: "At that time of the year the fledglings are very active and aggressive, behaving in a manner that could easily interfere with the nesting of arriving adults. There could well be a selective value in the dark plumage that makes the wanderer fledglings recognizable at a distance to the adult wanderers. In view of the royal fledglings' early departure date from Taiaroa Head, however, such a ready distinction would be of no importance there."

As mentioned earlier, in October (1964) 10 yearling fledglings were seen on the eastern Sister with about 180 adults at a time when the build up of the population was considered to be incomplete. This relatively small number of remaining fledglings is, perhaps, not incompatible with Richdale's findings and does not, necessarily, have further implications in regard to Tickell's hypothesis on behavioural and morphological differences between the two species of albatrosses related to their evolution (Tickell 1968: 32, 50). He concluded that the similarities between the two species of "great albatrosses" outweigh the differences so far that "one cannot escape the obvious conclusion that *exulans* and *epomophora* . . . most certainly evolved from a common ancestor in the not too distant past." He noted also that two striking differences lay in the juvenile and subadult plumage of each species and in the lengths of their respective fledging periods, and he postulated various conditions accounting for these differences, in particular the more severe climate through which the chicks of *D. exulans* must live, "or, conversely, that *epomophora*'s shorter period is associated with less severe winters," hence his comments on the New Zealand situation. Tickell supported this hypothesis with figures of growth curves showing changes throughout the fledging period.

The breeding season of the Chatham Island Royals:

Tickell (1968: 4) defined the "breeding season" in Wandering Albatrosses as: "The time between the arrival of the first adults (November) and the departure of the last birds that are not feeding chicks (the next May)." Hence, the breeding season of the Chatham Islands race of the Royal Albatross seems to follow these lines:

ARRIVAL — early October (1)

LAYING — early November (2)

PEAK LAYING — mid-November (3)

HATCHING — late January (4)

DEPARTURE OF THE LAST ADULTS — late September ? (5)

DEPARTURE OF YEARLING FLEDGLINGS — late September (6)

This cycle is based on — (1) Richdale's (1950: 46, table 5) mean length of the pre-egg period ("the time between the arrival of the first member of the mated pair . . . and the laying of an egg," Tickell 1968: 18) for the Taiaroa Royals of about 34 days (range 29-45); based on Richdale 1952: 30, table 9 (range 77.5-80.25); (4) Dawson's observations of hatching on 28 January (1954); (5) "Unemployed" birds generally leave as the chicks grow up and may go from the end of April onwards (Richdale 1952: 13) and the parent birds spend progressively less time ashore and may depart about the same time or a little later than the chicks (mid to late September — see Richdale 1954, in relation to his repudiation of the "starvation theory" in albatrosses; (6) a fledging period for Royals at Taiaroa of 236 days (range 216-252), mean departure date 22 September (range 8 September-13 October), Richdale 1952: 88.

Hence, the Chathams birds may have approximately 30 days of pre-egg stage, 79 days of incubation (in the "egg period" of Tickell 1968: 22), and 236 days of fledging period. The Campbell Island and Auckland Islands race is about three weeks later in its cycle (egg laying about the end of November with peak in early December). The Chatham Islands and Taiaroa Head populations of *D. epomophora sanfordi* are approximately synchronous (see table 13 in Tickell 1968: 24 — Taiaroa, 1st egg, 31 October, peak 12 November, and Chathams, 1st egg c. 8 November, peak c. 15 November).

World population of the Royal Albatross:

Tickell (1968: 48, tables 41-42) has suggested the "approximate level of the world breeding populations" of the two great albatrosses, showing that of *D. exulans* as of the order of 20,000 pairs while that of *D. epomophora* is of only half the size at 10,000 pairs. He has pointed out, however, that: "The population dynamics of the great albatrosses are complicated by the birds' biennial breeding cycle. One can only determine the total of nesting pairs in a population by adding two consecutive year's censuses and then subtracting the pairs that failed in the first year and bred again in the second." (Tickell 1970: 91). His figures (1968: table 41) for *D. epomophora* are as follows: New Zealand (Taiaroa Head), 15; Chatham Islands (based on Dawson 1955 and including both the Sisters and the Forty Fours), 5940; Campbell Island, 4140; Auckland Islands*, 22 (1963) and 7 (1964/65),

* The recent 1972/73 expedition to the Auckland Islands has provided more accurate information which will be available shortly in a report to be published shortly by the Lands & Survey Department.

giving a total figure of 10,124 pairs. Hence, the Chatham Islands form the major breeding area of the Royal Albatross with 60% of the breeding population of the species, followed closely by Campbell Island at approximately 40%.

It is important, therefore, that an accurate census of the Chatham Islands birds should be made and a watch kept on population changes both long term and during breeding seasons. The Sisters and the Forty Fours have shown themselves ideally suited for population estimates by aerial photography, and it is to be hoped that further coverage to meet the limitations of the occasional census as stressed by Tickell, and especially at the critical times of the breeding cycle, will be possible as opportunities permit.

BULLER'S MOLLYMAWK

Populations on The Sisters:

Similar assumptions about seasonal population growth and the use of available breeding space were made for Buller's Mollymawk on the eastern Sister. Although the extent to which the flat area of the island top was occupied by Royal Albatrosses and that to which the edges carried nesting Buller's Mollymawks are not strictly comparable, the relative degree to which the "build up" of the returning birds had developed makes a valid comparison. In October 1964, I found only six groups of 10 nests with courting pairs in attendance. Using the four times factor which, based on photographs and observations made along the edges of the flat top in 1954 (Fig. 6), appeared equally valid, the 1964/65 breeding population is likely to have been 240 pairs, a figure close to the "approximately 250 breeding pairs" given by Dawson (1955) for the 1953/54 season.

In January 1954, 44 adult breeding Buller's Mollymawks were banded with OSNZ rings. Of 60 birds examined in 1964, one bird, from almost the same nesting site used in 1954, carried a ring, 19205, which identified it as one of the 44 adults of unknown age found breeding ten years earlier.

A further example of the relative numbers of birds on the island at different phases of the breeding season may be evident in the count of 200 adult Giant Petrels in October 1964, compared with 3 adults and 17 fledglings in January 1954.

It appears from this independent method of estimating the populations of the two albatross species on the Sisters that the differing estimates of Royal Albatrosses, 360 pairs (1964), 400-450 pairs (1954) and of Buller's Mollymawks, 240 pairs (1964), 250 pairs (1954), correspond sufficiently closely to give a reasonable idea of the true size of these populations as well as can be done within the usual limits of bird census work.



FIGURE 6 — Buller's Mollymawks nesting along the edges of the top of the eastern Sister, 29 January 1954.

Photo: J. Moreland

The breeding seasons of Buller's Mollymawk:

During his visit to the Chatham Islands in 1937/38, Fleming was told that egg-laying of Buller's Mollymawk was in October and November and of young birds being "taken for food as fat fledglings in March and April" (Fleming 1939: 393). He recorded also an observation from the Forty Fours of a young bird seen still being fed by its parents on 5 August although by 19 August all the birds had disappeared. This information indicated an earlier breeding season at the Chathams than that known for Buller's Mollymawk on the Snares where it was known to lay in early February. Commenting on the Forty Fours observation, Fleming concluded: "If these latter are correct they indicate an unprecedented variation of three months in breeding dates for this species, and in view of the uniformity of season in other Albatrosses throughout their ranges, the dates given above must therefore be looked upon with suspicion until further field work is done." From his work on the Snares in January and February 1948, Richdale (1949a) gave the laying date for *D. bulleri* as from 16 January to early March (see also Richdale 1949b: 131, and comparison with dates for other species by Richdale 1952: 43, table 15). The earlier time at the Chathams was confirmed by L. C. Bell (1955) on his visit to the Sisters in December 1952 and by myself in January 1954 (Dawson 1955).

Beck (1926: 138) was off the Sisters on 18 March 1926 but did not land due to heavy seas. He mentioned seeing Royal Albatrosses on the islands which he referred to as the "Four Sisters." He made no mention of seeing any Buller's Mollymawks although he recorded about 200 off the Forty Fours on 8 March, some 12 of which he shot for specimens. These were adults found to be undergoing moulting and replacement of the quills (Murphy 1930: 7). On 26 March I saw Buller's Mollymawks still on the Sisters although, like Beck, I was unable to land.

Information from visits to the Sisters in October (1964), December (1952), January (1954), March (1926, 1969), together with observations from the Snares Islands and the Solander Islands in December (1947), January to February (1948, 1961, 1967, 1973), and July (1948), now allows a tentative breeding cycle for northern and southern populations of Buller's Mollymawk to be outlined:

	CHATHAM ISLANDS	SNARES AND SOLANDERS
ARRIVAL	early to mid October	early December (4)
LAYING	mid November (1)	early January to early March (5) (6) (7)
HATCHING	mid to late January (2)	March to early May
DEPARTURE OF FLEDGLINGS	late May to mid June (3)	mid August to late September (8)

This cycle is based on (1) L. C. Bell's (1955) record of birds on eggs on the eastern Sister on 16 December (1952); (2) Dawson's (1955) observations of young chicks and some eggs on the eastern Sister and on the Forty Fours on 29 January and 1 February (1954) and an assumed length of incubation and fledging periods similar to those calculated by Richdale (1952); (3) L. C. Bell's (1955: 66) report that young birds were taken for food in June. Fleming (1937: 393) was told that young were taken earlier, in March and April; (4) Falla's (1948: 53) observations on the Solanders of 9 December (1947) of birds presumably about to return to the breeding ground; (5) Warham's (1967: 129) records of 17 January to 13 February (1961) and 2 January to 10 February (1967) of the appearance of the first egg on 5 January and subsequent laying to 3 February when "laying, although continuing, was complete"; (6) Richdale's (1949b: 131, table 2) observed laying dates of 16 January to early March, with the peak period between 22 January and 14 February (1948) in which approximately 80% of the eggs were laid (see also Richdale 1952: 43, table 15); (7) Wilson's (1973) observations of 26-28 January and 31 January to 3 February (1973) of birds incubating apparently recently laid eggs on the Solanders; (8) Falla's (1948: 53) observations of 20 July (1948) of well-fledged chicks on the Solanders, some of which were considered to be less than a fortnight from

flying; (9) other dates, extrapolated by Richdale (1952: 60, 98, 99, 101) given in his table 50 (arrival), table 53 (hatching), and tables 48 and 49 (assumed fledging period of c. 4½ months).

Note: More information will be available from the Snares regarding first egg appearances and fledging dates in a forthcoming report by Horning & Horning (1974), but this does not invalidate the above timetable.

As Fleming (1939: 393) has noted regarding the record of a young mollymawk being fed on the Forty Fours on 5 August and the presence of another solitary fully-grown bird, "... the presence of even two young Mollymawks as late as August would appear to indicate a later season than the dates of which I was told." Hence, not only is there a difference in breeding times between the southern New Zealand populations of *D. bulleri* and those on the Chathams but there is evidence that at least once the season on the Forty Fours may have been as late (or extended itself) as that customary for the Snares and the Solanders. Richdale (1952: 42, table 15) has noted, however, that Buller's Mollymawk has a laying range much longer than any other species of *Diomedea*, perhaps exceeding 50 days, although Warham's (1967: 129) records indicate that most of the laying is completed in about a month. Judging by what is known of the other species of mollymawks the anomaly of breeding times lies in the Snares and Solander populations. It may be a physiological one such as differing day length with latitude or, resulting from climatic or hydrological conditions, a nutritional one of adjustment to the nature and seasonal availability of the food supply for the chicks, but it is not appropriate to pursue the matter further here.

THE CHATHAM ISLAND MOLLYMAWK

The Pyramid:

The only known breeding site of the Chatham Island Mollymawk (*Diomedea cauta eremita*) is on the steep, isolated rock, some 566 feet (172m) in height, lying nearly five miles to the south of the Chathams, known as The Pyramid. This rock is a volcanic plug or neck of probable Eocene age representing the original source of the Pitt Island Volcanics (see Watters in Hay *et al.* 1968: 67-68). It shows striking differences in profile as one moves around it by ship (Figs 7 & 8).

Conditions were too rough on 17 October 1964 to land on the Pyramid. However, the ship's boat was launched and our party went in to within a few yards of the steep, kelp-covered surge zone, some 15 feet of slippery thongs over which the intrepid explorer must clamber (Fig. 9). Close-up views of the rocky faces with mollymawks sitting on them were photographed and counts of birds per unit area were attempted (Fig. 10). After returning to the ship, we steamed slowly round the Pyramid to make a complete panoramic coverage and to obtain some idea of the relative density of nesting birds on various parts of this rock mass. A complete photographic series of the rock surface was later able to be studied.



FIGURE 7 — The Pyramid (566') from the south, 17 October 1964.
Photo: E. W. Dawson

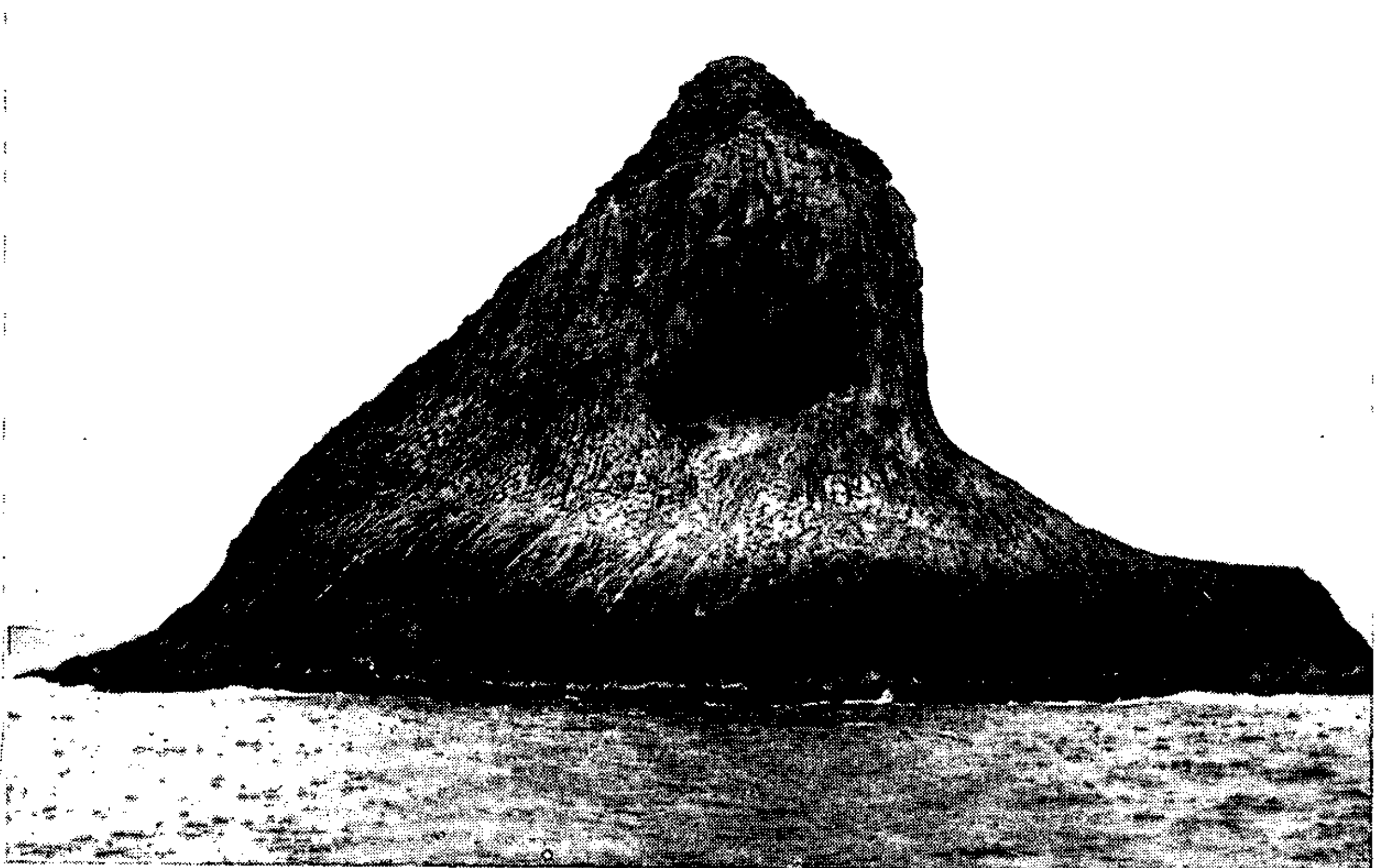


FIGURE 8 — The Pyramid from the south-east, 17 October 1964.
Photo: E. W. Dawson

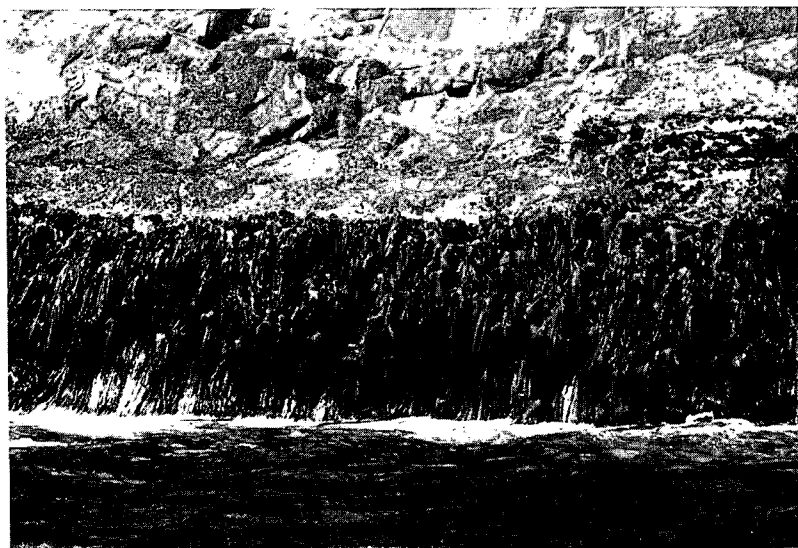


FIGURE 9 — The surge zone of c. 15 ft of kelp, *Durvillea antarctica*, with fur seals above, west side of the Pyramid, 17 October 1964.
Photo: E. W. Dawson



FIGURE 10 — Close up of south-west face of the Pyramid showing ledges with nesting Chatham Island Mollymawks, 17 October 1964.
Photo: E. W. Dawson

By considering the islet as a pyramid 500 feet high, dividing it into 50 foot strips on four sides, and estimating the number of nesting pairs per strip, based on actual counts at various levels, ten strips averaging 50 nests on four sides were calculated to give a breeding population of 2,000 pairs. As Fleming (1939: 393) has described, and as can be seen in Fig. 8 (also in Plate VI in Dawson's (1955) account), there is a flattish slope on the south-east side running round into a large overhang or cave in which a considerable number of mollymawks seemed to be nesting. Another 500 nests were estimated for the flat slope and below the overhang, although this figure may be too low since Fleming (1939: 394) said that the greatest concentration of nests "seemed to be in a gigantic cave on the south-west side of the island" in addition to a great many on the flat slope. This total of 2,500 pairs of Chatham Island Mollymawks is admittedly very crudely reached but it gives some figure for comparison with the only other estimates available, namely:

1. Murphy (1930: 6), based on Beck's visit of 3 March 1926 — "So far as we know, the entire population of the race comprises only a few hundred birds";
2. Fleming (1939: 395) — "The most conservative estimate from our observations would allow a population of several thousand adult birds rather than the 'few hundred' which Murphy suggests" (16 December 1937);
3. B. D. Bell (1961 unpubl.); Bell & Merton (1970 unpubl.) — "The probable population is possibly between two and three thousand pairs" (24 November 1961).

Through the kindness of Dr Dean Amadon, I have been able to see the relevant parts of the diary kept by Rollo Beck who visited the Chatham Islands in the schooner *France* in 1926 and who collected the mollymawks from the Pyramid later described by Murphy (1930: 4-6) as his new subspecies "*Thalassarche cauta eremita*." Beck's account shows how Murphy reached his number of "a few hundred birds" and it also reveals that Beck did not actually land on the Pyramid to collect his specimens which he refers to later in this narrative as "the *Cauta* albatrosses."

"March 3 [1926]. Pyramid Rock south of Pitt Island was seen at ten AM . . . and when near saw a few dozen albatrosses, three hundred or so all together. Although the wind and sea were not very favorable, I put out the boat and in an hour got what I wanted. One flock of forty or so were sitting on the water to the north and a number of others were seen scattered about and on the north side of the rock I saw many on the ground where there were small bushes. The sea was rough and there was no chance of getting ashore."

(Beck 1926: 129-30)

On a second visit, again on board the m.v. *Taranui*, to the vicinity of the Pyramid on 29 March 1969, no landing was attempted partly since time was short and, in any case, the rock appeared deserted of breeding birds or young. On 3 March 1926, Beck saw "many" birds still sitting on the rock although he said nothing about young birds, and the only specimens discussed later by Murphy (1930: 6) were "adults mostly with enlarged gonads." The type specimen was a "male adult, nesting" and, although Murphy stated that this material was part of "a series from the Pyramid Rock," it is clear from Beck's diary that he did not land and they were shot at sea around the island. During two hours ashore on 16 December 1937, Fleming (with E. G. Turbott) saw many downy nestlings at a stage illustrated in his plates 47 and 48.

The breeding season of the Chatham Island Mollymawk:

These observations, together with my notes of 13 October (1964), Fleming's of 16 December (1937) and Bell's of 24 November (1961) enable a tentative breeding cycle of the Chatham Island Mollymawk to be postulated:

ARRIVAL late August

LAYING late September/early October

HATCHING late November

DEPARTURE OF FLEDGLINGS late March

Comparing this with the information on other mollymawks given by Richdale (1952: 99, 101, tables 49-50), it seems that *D. cauta eremita* either has a shorter fledging period than the usual 4½ months or begins nesting several weeks earlier than the other subspecies of *D. cauta*.

DISCUSSION

Casual visits to the off-lying islands of the Chatham group, particularly since Fleming's work from 28 November 1937 to 24 January 1938, have produced information allowing not only an assessment of the numbers making up the breeding populations of the various species of albatrosses and mollymawks that nest there but also giving some basis for drawing up timetables of events in the breeding season of each of these species. Some fluctuations in numbers from year to year, particularly in the case of the biennially breeding Royal Albatrosses, may be expected judging by what is known for other species elsewhere and differences in estimates by various visitors need not indicate abnormal mortality rates or evidence of molesting by humans.

Current field work by the Wildlife Service of the Department of Internal Affairs should give material for a computation of the total breeding population and the range of egg-laying and hatching dates. Such information, with the earlier observations discussed above, may provide a criterion or control for conservation or management should it ever be decided to restore the traditional Maori rights of

"birding" on the Sisters and the Forty Fours, a practice which ceased in 1943 (*vide* L. C. Bell 1955: 65) although reports of poaching what has been called the "illegal tegel" (after the brand name of a commercially-produced chicken well known in New Zealand shops) are heard from time to time (Coster 1972). Some of these reports seem to me to be deliberate exaggeration to confuse official enquirers.

It is important, however, that a watch be kept on population changes both longterm and within breeding seasons, and stricter policing of fishing vessels near the end of the chicks' fledging times should bring better evidence of illegal activities if it exists. The Sisters and the Forty Fours have shown themselves ideally suited for population counts of Royal Albatrosses by aerial photography and with suitable oblique panoramas of the cliff edges Buller's Mollymawks could also be counted with good reliability. On the Forty Fours these mollymawks nest to a far greater extent on the flat tops on the less vegetated parts (*cf.* Pl. IX in Dawson 1955). It is to be hoped that further photographic coverage of these islands will be possible as circumstances permit, especially to meet the limitations of the occasional census as stressed by Tickell (1970: 91) as well as at critical times of the breeding cycle.

The breeding cycle timetables are probably fairly consistent both within a species and from one year to another. However, Buller's Mollymawk, with its remarkably long span of laying, has been recorded, in one case at least, breeding as late at the Chatham Islands as it habitually does in southern New Zealand, and one may speculate on the reasons for these apparent anomalies.

Departure dates for fledglings of *Diomedea cauta* have been given usually as about April, and the early date of March for the desertion of the Pyramid in 1969 may only indicate the fluctuation of one particular year. Further work is obviously needed to show how consistent events in the breeding season really are.

Further counts of the breeding population on the Pyramid are needed also since the estimate given here of c. 2,500 may well be out by as much as a factor of two if all the sloping ground and cave area is always as closely packed with nests as Fleming noted in 1937.

As stressed by Tickell (1968), the population dynamics of the Wandering and of the Royal Albatross are complicated by the biennial breeding cycle of these species. On the other hand estimates of the breeding population of annual breeders, such as the Chatham Island Mollymawk is assumed to be, are more soundly based and it can be considered that c. 2,500 pairs is the total breeding population on the Pyramid, the only known nesting ground of the species. Hence, the Chatham Island Mollymawk cannot be regarded as a common species in terms of the known populations of the other races of *Diomedea cauta*. Despite the natural protection given to the Pyramid by its very nature and setting, it is desirable that it should be given the same status as the nearby South East Island and Little Mangere and designated a Reserve for the Preservation of Flora and Fauna.

ACKNOWLEDGEMENTS

I am grateful for the help and enthusiasm of Captain R. D. Matheson, Master of the m.v. *Taranui*, and of my companions on the eastern Sister, Jack Irwin and Ian Slater of the N.Z. Oceanographic Institute. My thanks are also due to my colleagues whose photographs I have used, to Mr J. M. Cunningham, Day's Bay, for the use of his library, to Dr Dean Amadon, Lamont Curator of Birds, The American Museum of Natural History, New York, for sending me copies of parts of Rollo Beck's diary and for permission to quote from them, to Mr Brian Bell, Wildlife Service, Department of Internal Affairs, Wellington, for access to his unpublished reports on Chatham Islands birds, to Mr C. J. R. Robertson, also of the Wildlife Service, for his figures from the RNZAF photographs, and to Mr J. W. Brodie, Director of the N.Z. Oceanographic Institute, and Dr J. C. Yaldwyn, National Museum, Wellington, for their comments on my manuscript.

LITERATURE CITED

- BECK, R. H. 1926. Trip to New Zealand. November 4, 1925 to March 24, 1926. Pp. 80-139 in: Whitney Expedition Journals. Beck's Letters and Journal, Dec. 1923-Feb. 1928, Vol. D. Unpubl. MSS in The American Museum of Natural History, New York.
- BELL, B. D. 1961. Birds of the Chatham Islands, Unpubl. MS.
- BELL, B. D. 1963. List of New Zealand off-shore islands and their wildlife status. 30 pp. (unnumb.). [Wellington]: Department of Internal Affairs.
- BELL, B. D.; MERTON, D. V. 1970. Endemic birds of the Chatham Islands. (Unpubl. MS).
- BELL, L. C. 1955. Notes on the birds of the Chatham Islands. *Notornis* 6 (3): 65-68.
- COSTER, G. E. 1972. Conservation of bird life urgently needed in Chatham Islands. *Forest and Bird* No. 185: 5-7, figs.
- DAWSON, E. W. 1955. The birds of the Chatham Islands 1954 Expedition. *Notornis* 6 (3): 78-82, pls VI-IX.
- DIEFFENBACH, E. 1841. An account of the Chatham Islands. *Journal of the Royal Geographical Society* 11: 195-215, 1 chart.
- FALLA, R. A. 1948. Birds of the Solanders. *New Zealand Bird Notes* 3 (2): 52-55, pls I-IV.
- FLEMING, C. A. 1939. Birds of the Chatham Islands. Part I. *Emu* 38: 380-413, pls 46-53, 2 maps.
- HAY, R. F.; MUTCH, A. R.; WATTERS, W. A. 1970. Geology of the Chatham Islands. N.Z. Geological Survey. *Bulletin*, n.s. 83: 1-86, frontis., figs 1-27, tables 1-5, 1 map.
- HORNING, D. S. JR; HORNING, Carol J. 1974. Bird records of the 1971-1973 Snares Islands, New Zealand, Expedition. *Notornis* 21: in press. (University of Canterbury Snares Islands Expedition Paper No. 17).
- KNOX, G. A. 1957. General account of the Chatham Islands 1954 Expedition. N.Z. Department of Scientific and Industrial Research. *Bulletin* 122: 1-37, frontis., figs 1-24.

- MURPHY, R. C. 1930. Birds collected during the Whitney South Sea Expedition. XI. American Museum Novitates No. 419: 1-15.
- PARRY, G. 1972. The Royals of Taiaroa Head. NAC Airline Review (Wellington) No. 61: 4-5, illus.
- RICHDALE, L. E. 1949a. The pre-egg stage in Buller's Mollymawk. Biological Monographs No. 2. Pp. 1-50, figs 1-16, 2 maps, tables 1-8. Dunedin: Otago Daily Times & Witness Newspapers Co. Ltd.
- RICHDALE, L. E. 1949b. Buller's Mollymawk: incubation data. Bird-Banding XX (3): 127-141, 2 figs, tables 1-9.
- RICHDALE, L. E. 1950. The pre-egg stage in the albatross family. Biological Monographs No. 3. Pp. 1-92, figs 1-13, tables 1-7. Dunedin: Otago Daily Times & Witness Newspapers Co. Ltd.
- RICHDALE, L. E. 1952. The post-egg stage in albatrosses. Biological Monographs No. 4. Pp. 1-166, figs 1-28, tables 1-65. (No. 1 Nuffield Publication). Dunedin: Otago Daily Times & Witness Newspapers Co. Ltd.
- RICHDALE, L. E. 1954. The starvation theory in albatrosses. Auk 71 (2): 239-252, figs 1-2, table 1.
- ROBERTSON, C. J. R. 1972. Royal Albatross colony at Taiaroa Head expanding and flourishing. Forest and Bird No. 184: 3-6, 3 figs [also in: The Royal Albatross at Taiaroa Head. Wildlife 1971 — a review (No. 3): 46-49, 1 fig.]
- ROBERTSON, C. J. R.; KINSKY, F. C. 1972. The dispersal movements of the Royal Albatross (*Diomedea epomophora*). Notornis 19 (4): 289-301, figs 1-5, tables 1-2.
- TICKELL, W. L. N. 1968. The biology of the great albatrosses, *Diomedea exulans* and *Diomedea epomophora*. Pp. 1-55, figs 1-46, tables 1-48 in: AUSTIN, O. L. Jr (ed.). Antarctic bird studies. Antarctic Research Series 12: x + 1-262, illus. Washington, D.C.: American Geophysical Union.
- TICKELL, W. L. N. 1970. The great albatrosses. Scientific American 223 (5): 84-93, illus.
- WARHAM, J. 1967. Snares Islands birds. Notornis 14 (3): 122-139, 1 map, pl. XXV.
- WILSON, G. J. 1973. Notes on the birds of the Solander Islands. Notornis 20 (4): in press.

E. W. Dawson,
N.Z. Oceanographic Institute,
DSIR,
Wellington

LATITUDINAL DISTRIBUTION OF SEABIRDS BETWEEN NEW ZEALAND AND THE ROSS SEA, DECEMBER 1970

By G. R. F. HICKS

New Zealand Oceanographic Institute, Wellington

ABSTRACT

The distribution and behaviour of the seabirds observed from New Zealand to the Ross Sea are described. Information was obtained in December 1970 from an eight day traverse of the USCGC *Staten Island* which covered 39 degrees of latitude. Seabird distributions appeared to be governed by such hydrological features as the Antarctic Convergence and the 0°C sea surface isotherm (northern pack-ice edge). Analysis of published data indicate a progressive breakdown in the zonal distribution of seabirds from early to late summer. Summer warming leads to both the increased southward penetration of some subantarctic species, and the increased northward spread of some Antarctic species.

INTRODUCTION

During the last eight days (23-31) of December 1970, I voyaged to the Antarctic aboard the USCGC *Staten Island* to participate in the N.Z. Oceanographic Institute's 1970-71 NZARP activities. The voyage provided the opportunity to record the seabirds occurring between Wellington, New Zealand, and the Ross Sea, Antarctica. One brief supply call was made at Campbell Island (52°30'S, 169°00'E) on 26 December. The ship followed roughly the 169°-174° meridians (Fig. 1). From just off Beaufort Island (76°57'S, 166°55'E) I was flown by helicopter the remaining 78 kilometers to McMurdo NAF.

Ten minutes of each daylight hour were spent birdwatching and the number of each species was recorded. Daily details of noon position, sea and air temperatures, barometric pressure and wind speed and direction were taken from the ship's log (Table 1). Northern and southernmost sightings of the various bird species are based on the ship's noon position.

PREVIOUS WORK

Two major contributions to our knowledge of the latitudinal distribution of seabirds in the area of ocean from New Zealand to the Antarctic have been made (Dell 1960; Darby 1970). Dell's two traverses followed direct courses from New Zealand to the Ross Sea, confined between the 170°E and 180° meridians, while Darby's four extensive traverses along the 160°, 170° and 180°E meridians made landfalls at the Chatham, Bounty, Campbell, Enderby and

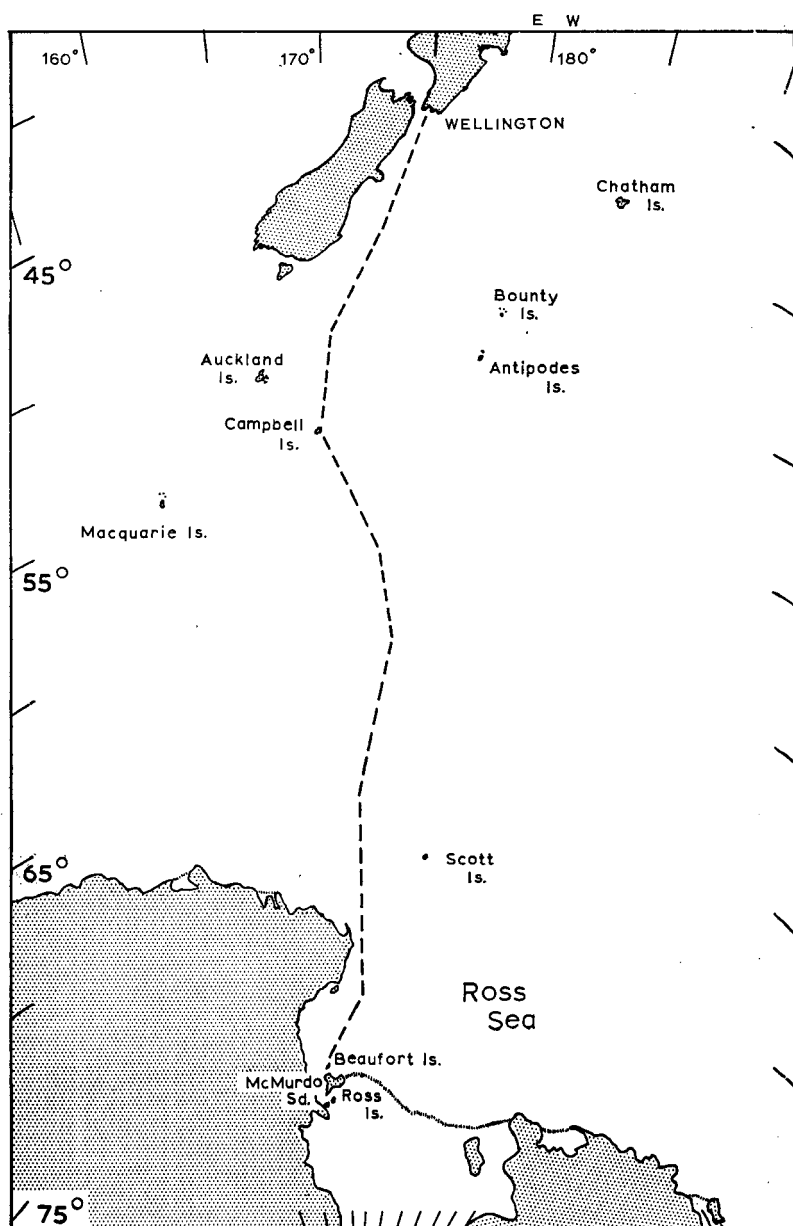


FIGURE 1 — Track of the USCGC *Staten Island*, December 1970.

Macquarie Islands. Isolated observations on the birds breeding at, and within range of the subantarctic islands have been made in many cases (e.g. Westerskov 1960 — for Campbell Island), while Carrick & Ingham (1967) and Watson *et al.* (1971) review the extensive literature concerned with southern seabird biology, including latitudinal distributions. The present study covered 39 degrees of latitude and is useful in providing additional distributional records.

OBSERVED LATITUDINAL DISTRIBUTION AND BEHAVIOUR OF SEABIRDS

Wandering Albatross (*Diomedea exulans*):

The first birds observed, out of Cook Strait, were in the 'leopard stage' E and/or F of Fleming (1950). The numbers observed at each sighting increased as we proceeded south until the southernmost sighting on 28 December, when 12 birds all corresponding to Fleming's 'fledgling' plumage phases (A and B) were seen surface feeding at 61°51'S. I saw none about Campbell Island or to 57°S and Westerskov (1960) states that wanderers are rare breeders on Campbell Island.

Darby (1970) observed that *D. exulans* was confined north of the Antarctic Circle in the region south of New Zealand and her southernmost record was on her second (late January) traverse at 66°21'S. Dell (1960) also observed a southernmost limit of 66°S but maintains that extreme variability in range occurs. My southernmost record conforms to Dell's statement that in December (1957) and March (1958) the southern limits appeared to be considerably to the north of 66°S.

Black-browed Mollymawk (*Diomedea melanophris*):

This species and the Cape Pigeon (*Daption capensis*) were the species most consistently observed at sea between New Zealand and the northern limits of the pack-ice. Black-browed Mollymawks wake followed for long periods, often coming very close to the ship and feeding on galley scraps thrown overboard.

Black-browed Mollymawks were most abundant just south of their breeding area, Campbell Island, where groups of up to 15 to 18 birds followed the ship. These large groups persisted to the south with a gradual reduction in numbers as we began to penetrate iceberg seas. Once we entered the pack-ice at about 66°S, *D. melanophris* all but disappeared with occasional individuals occurring until my southernmost sighting of an immature bird on 29 December at 66°25'S.

On 24 December we had a strong following wind (Table 1) which was accompanied by an absence of big birds (e.g. albatrosses and mollymawks) very close to the ship. These large birds probably found it difficult to maintain their position behind the ship, but with the westerly the next day larger numbers of these birds were recorded.

TABLE 1: DAILY NOON POSITION AND WEATHER DETAILS FOR THE USCGC
STATEN ISLAND TRAVERSE, DECEMBER 1970.

DATE	NOON POSITION		TEMPERATURE (°C)			WIND		PRESSURE
	Latitude (°S)	Longitude (°E)	Sea	Air (dry)	Air (wet)	Speed (knots)	Direction	
23 December 1970		Inside Wellington Hbr. (41°S)	-	-	-	-	-	-
24 "	45 22	172 59	12.6	16.7	14.5	17	N	1010.8
25 "	49 46	170 37	9.7	11.2	8.6	14	W	997.6
26 "	52 30	169 30	8.2	10.3	9.2	12	SW	1002.3
27 "	57 02	172 47	7.2	11.1	8.9	19	W	991.7
28 "	61 51	174 39	3.2	4.7	3.3	10	SE	938.8
29 "	66 25	172 57	-0.7	0	-1.5	8	SE	996.5
30 "	71 24	173 00	-0.9	1.1	0	10	SE	993.4
31 "	75 16	171 27	0.5	0.6	-0.9	11	SW	997.1

Darby states that *D. melanophris* is not found north of its northernmost breeding area, the Antipodes Islands. I recorded what was probably the northern race *impavida* (Falla, Sibson & Turbott 1970) at 45°S while the more southern individuals were probably *melanophris* from Macquarie Island.

Dell records this species as far south as 66°S in February 1959 but Darby observed it at 70°S on an occasion when the northern edge of the pack-ice was at this latitude. Darby remarked on the generally solitary nature of *D. melanophris* which is unlike the large groups I observed south of Campbell Island.

Grey-headed Mollymawk (*Diomedea chrysostoma*):

This Mollymawk tended to be a solitary species rarely being observed in pairs or larger groups. The Grey-headed Mollymawk exhibited the same latitudinal range as *D. exulans*, its southernmost record being on 27 December at 61°S. An individual crossed the ship's bows in Perseverance Harbour (Campbell Island) and it is surprising not more were seen, since thousands of them breed on Courrejolles Point (Westerskov 1960).

Murphy (1964) records four individuals as far south as 67°S in the Bellingshausen Sea and considers the species to enter the pack-ice much more freely than *D. melanophris*. South of New Zealand, Dell recorded *D. chrysostoma* at 63°S while Darby's southernmost sighting was in January 1968 at 68°22'S.

Light-mantled Sooty Albatross (*Phoebastria palpebrata*):

My first encounter with this graceful albatross was on 24 December at 45°22'S, 172°59'E. They usually appeared as solitary birds often following the ship very closely, but three individuals were observed flying together in Perseverance Harbour and on 27 December a pair were seen at 57°S.

The Light-mantled Sooty Albatross is not common north of its subantarctic breeding islands and Falla, Sibson & Turbott (1970) indicate that this species only rarely reaches 40°S. Darby's northern limit was 49°S while Summerhayes (1969) recorded the northernmost sighting at 30°S in the northern Tasman Sea (177°E).

Dell's suggestion that *P. palpebrata* ranges between 60°-68°S in December with a more southerly limit (72°-76°S) occurring in late summer (February-March) is supported by my southernmost sighting in December at 66°S and Darby's February southernmost record of 72°S.

Giant Petrel (*Macronectes giganteus*):

This species ranges widely and I recorded it from within Wellington Harbour (41°S) to 75°S. Both Dell and Darby observed a marked patchiness in the distribution of *M. giganteus* but during my traverse individuals were recorded consistently each day between 23-31 December. Occasional pairs were evident but generally solitary birds were the rule.

Distinct plumage variation between the northern (dark phase) and southern (white phase) birds, observed by Darby and again in

the present traverse has been described in detail by Bourne & Warham (1966). These authors suggest that because of the pronounced ecological differences the dark phase represents *M. halli* which breeds on the New Zealand subantarctic islands and whose foraging range extends mainly north of the Antarctic Convergence, while the white phase represents the southern *M. giganteus* known to breed on Macquarie Island and foraging mainly south of the Convergence. The breeding range of these two species overlaps at some of the islands on or near the Antarctic Convergence.

Distribution of these two species at sea is little known (Watson *et al.* 1971) as most observations have only been recorded as *M. giganteus*. During my voyage no attempt was made to separate the two species as many birds had doubtfully distinct plumage. However two definitely dark phased individuals were observed as far south as 75°S on the last day of my traverse. The flexibility in the distributional range of the Giant Petrels must therefore be noted.

Summerhayes (1969) recorded a northern limit of *M. giganteus* at 25°31'S but Falla, Sibson & Turbott (1970) maintain that it is not commonly found north of 30°S. Dell's southernmost observation of this species was at 72°S in December 1958 whereas that of Darby was 77°45'S on her fourth traverse (February 1968).

An oceanographic station was occupied on 1 February 1971 in McMurdo Sound (77°51'25" S, 166°36'50"E) after the seasonal ice breakout on 23 January 1971. While on this station three individual Giant Petrels were recorded. These observations would seem to establish a southern limit of this predominantly subantarctic species.

Cape Pigeon (*Daption capensis*):

This species was the most consistent wake follower throughout our voyage, appearing as individual birds or in groups of up to a dozen every day until the southernmost sighting on 29 December at 66°25'S. Commonly, the Cape Pigeon was one of the first birds to appear when garbage was thrown overboard. Although not breeding on Campbell Island (Westerskov 1960), a flock of 12-18 *D. capensis* followed the ship out of Perseverance Harbour.

While my data show the species occurring every day of the traverse to its southernmost recording of 66°S, both Dell and Darby commented on the paucity of Cape Pigeons in mid-latitudes (55°-61°S). The lack of breeding islands and division into northern and southern feeding populations are factors advanced as explaining this disjunct distribution. Southernmost record for *D. capensis* by both Dell and Darby is 73°S.

Antarctic Fulmar (*Fulmarus glacialis*):

Unlike previous records (Watson *et al.* 1971), this species was not encountered until entering the pack-ice (66°S) but remained, commonly in pairs or up to eight individuals, with the ship until

71°S. The Antarctic Fulmar was most often seen passing, but sometimes followed the ship closely with groups of Antarctic Petrels (*Thalassoica antarctica*) and Snow Petrels (*Pagodroma nivea*).

Although my northern limit of *F. glacialoides* was 66°S, stragglers are common to the New Zealand coast (Falla, Sibson & Turbott 1970). It appears (Watson *et al.* 1971) that the northward migration of *F. glacialoides* is a response to the harsh winter conditions after the summer breeding and moulting on the Antarctic continent. Thus in summer the species would usually be confined below the Antarctic Circle.

During the present voyage my southernmost observation was at 71°S, while Dell recorded Fulmars as far south as 73°S with some venturing into McMurdo Sound.

Snow Petrel (*Pagodroma nivea*):

The northward distribution of this species is the northern edge of the pack-ice (e.g. Dell 1960; Darby 1970).

Solitary *P. nivea* were first seen once we entered the pack-ice at approximately 66°S on 29 December. This attractive species persisted as individuals or in small groups flying with Antarctic Petrels around the ship until 75°S. On each occasion this species came very near to the ship and often settled in our wake when garbage was thrown overboard. The Snow Petrel has all the 'fulmarine propensity for scavenging organic debris' (Falla 1964) and voraciously attacks discarded galley scraps as well as being noted feeding on crushed macroplankton picked up by diving between pack-ice floes. The species was noticeably reduced or absent over open sections of the Ross Sea, probably because the easy pickings obtainable from the pack-ice zone are not as available in open water.

I noted a small group of *P. nivea* flying over Beaufort Island on my helicopter flight into McMurdo NAF, and Darby has recorded this species within McMurdo Sound (77°45'S, 164°48'E) probably ranging from their breeding localities in the Western Victoria Land Mountains.

Antarctic Petrel (*Thalassoica antarctica*):

Together with *P. nivea*, the Antarctic Petrel was the most common bird between latitudes 66°25'S and 75°16'S. During the present voyage this latitudinal belt was characteristically that of the pack-ice and the partially ice-free Ross Sea lying further to the south. It is undeniably a pack-ice inhabitant often observed feeding in open ice leads at the water/ice interface or congregating, often in large numbers (up to 60 birds), on large ice-floes and bergs.

The Antarctic Petrel is conspicuous by its similar gross appearance to the Cape Pigeon although larger in size, with a simpler plumage design and a more gregarious nature.

At 1800hrs on 29 December I noticed a flock of 18 birds flying high above the bridge of the ship. They had darker, less distinct plumage with grey underparts (probably in new plumage) and were similar to those reported by Falla (1937).

Darby's southernmost record was 74°03'S on her first traverse (January 1968), while both Dell and I have recorded *T. antarctica* at 75°S.

Prions (*Pachyptila* spp.):

Giant Petrels and Prions were the most widely distributed birds observed. Individuals were often seen to alight between ice floes and feed, at times immersing the bill in the water for periods of up to 10 seconds which gave me the impression that they were 'straining' the water for zooplankters. This feeding procedure generally lasted only 2-3 minutes before they skipped off along open leads between the thicker pack-ice.

Groups of Prions remained characteristically far from the ship and close to the water, making positive identification difficult. However at 66°S a small group of 15 birds were within close range and allowed detailed field drawings to be made. Distinctive characters noticed were —

- (1) stout thick-set body
- (2) characteristic black "W" on wings
- (3) extension of dorsal pigment into a 'collar'
- (4) darker suborbital pigmentation.

These drawings when compared with Harper's (1972) descriptive notes and photographs correspond to the Antarctic Prion (*P. desolata*). This species ranged to 71°24'S, 173°00'E and it is thought probable that they were *P. desolata* although Harper mentioned that the species has not been observed at all in the Ross Sea. The prior southernmost limit of *P. desolata* in this area was at 67°24'S, 179°53'W on USNS *Eltanin* Cruise 27, 2 February, 1967.

Since they breed on Scott Island (67°24'S, 179°55'W) it is possible that they do range some distance into the Ross Sea sector.

Sooty Shearwater (*Puffinus griseus*):

On 24 December after a thick morning fog lifted, a large flock of an estimated 600-800 birds was sighted flying low, some settling on the water for brief periods but then flying off. From then on only occasional individuals were noted but at 1400hrs on 28 December, just after crossing the Antarctic Convergence another large group of about 400 constantly active birds was observed. Darby has reported such large flocks and Westerskov (1960) recorded about 5000 birds on Perseverance Harbour. All these recordings of large flocks correlate with weather conditions such as low cloud and fog. These large flocks are probably migrant birds (Westerskov 1960), becoming highly gregarious during adverse weather conditions.

Although *P. griseus* do not breed further south than Macquarie Island (55°S) (Falla, Sibson & Turbott 1970), both Falla (1937) and Murphy (1964) have observed great numbers adjacent to the pack-ice between their breeding seasons (November-January). A late (February) southwards movement of Sooty Shearwaters has been

recorded in East Antarctica (Falla 1964) but it is not known whether this movement is composed of adults that have bred that season in the subantarctic or of non-breeding adults.

Dell's observations and my data show a southern limit of 61°-62°S in December while Darby's log show a southernmost record of 68°22'S in late January and 67°26'S in late February. Thus it appears that a southward extension of this species in late summer also occurs in the Ross Sea sector.

White-chinned Petrel (*Procellaria aequinoctialis*):

During my voyage the southernmost observations of three *P. aequinoctialis* was made outside Perseverance Harbour (52°30'S), the species also being noted once earlier at 1600hrs on 23 December. Neither Dell nor Darby recorded this species in their southern traverses, yet Alexander (1955) mentions it as one of the commonest petrels of the Southern Ocean. Falla (1937) gave a southernmost eastern sector limit of 61°S.

Breeding sites of the White-chinned Petrel in the Ross Sea sector lie north of the Antarctic Convergence on the subantarctic islands of Macquarie, Campbell, Antipodes and Auckland Islands (Falla, Sibson & Turbott 1970). Since they lay their eggs in November-December (Carrick & Ingham 1967) the conspicuously low numbers of this species far from breeding islands are not surprising.

Mottled Petrel (*Pterodroma inexpectata*):

This species was only recorded on two occasions (27 and 28 December). Sightings were normally of individual birds but at 1900hrs on 28 December four *P. inexpectata* were observed flying together amongst icebergs. The Mottled Petrel has a wide oceanic range, southward from New Zealand to the pack-ice (68°-73°S, Alexander 1955; Dell 1960; Falla, Sibson & Turbott 1970; Watson *et al.* 1971) but is only rarely encountered on sea voyages.

Wilson's Storm Petrel (*Oceanites oceanicus*):

This species was commonly observed from 66°S until my embarkation by helicopter from the USCGC *Staten Island* at 75°S. Individuals were occasionally seen flying high above the ship (about 50 metres), but their typical flight pattern was skipping across open water leads picking up specimens of the larger zooplankton. During the southern winter *O. oceanicus* ranges far into the northern hemisphere (Alexander 1955; Falla 1964).

Wilson's Storm Petrels were only observed as solitary birds, even when rarely feeding on discarded garbage, yet Falla (1937) reported up to 6000 birds attending a factory ship and feeding on whale oil scum. Their occurrence, however, was reduced over heavy pack-ice, remaining a characteristically ice lead and open water species. The greatest number of individual *O. oceanicus* within a given time (30 within 10 minutes) was recorded in the open Ross Sea, once through much of the pack-ice belts.

While Dell mentioned this storm petrel to be occasionally observed flying over sea-ice in McMurdo Sound, I recorded two individuals feeding at the ice-shelf/water interface while undertaking oceanographic studies (77°51'25"S, 166°36'50"E — see above under Giant Petrel). This appears to be the southernmost record for the species in this region.

Black-bellied Storm Petrel (*Fregetta tropica*):

I observed a single *F. tropica* about two hours outside Perseverance Harbour, recognisable by its distinctive white flank feathers and erratic zig-zag flight over the sea surface.

According to Dell, the Black-bellied Storm Petrel is fairly scarce during the summer months in the Ross Sea sector of the Southern Ocean. Darby did not see it, but Oliver (*in* Westerskov 1960) recorded it near Campbell Island.

Although this species is known to breed at the Auckland, Bounty and Antipodes Islands (Falla, Sibson & Turbott 1970) and has been recorded widely at sea elsewhere (Watson *et al.* 1971), the lack of summer distributional observations other than around breeding islands is probably due to their breeding cycle — egg laying and hatching occurring in December and January (Carrick & Ingham 1967). It is conceivable that there are some, as yet, unlocated breeding localities on Campbell Island, suggested by both Oliver's and my own records.

DISCUSSION

Generally the distribution of Antarctic and subantarctic seabirds can be said to be related to their feeding and nesting habits. The rich and dependable seasonal food supply of plankton and nekton in these regions must ultimately dictate the patterns of reproduction and overall distribution (Carrick & Ingham 1967).

However, caution has been stressed by these authors when correlations between seabird distribution and the pelagic food organisms are drawn. Ekland (*see* "Discussion" *in* Falla 1964) suggested that temperature regime as well as food availability may limit bird distribution. He stated that down to latitude 65°-66°S is considered subantarctic (0°C isotherm) and south of this as strictly Antarctic.

Effects of the pack-ice on seabird distribution:

The seasonal variation in the extent of the Antarctic pack-ice is well documented (e.g. Mackintosh & Herdman 1940) and the controlling nature of the pack-ice on seabird distribution is also well known (Carrick & Ingham 1967; Watson *et al.* 1971). Maximum ice cover occurs in September; in summer the northern limit of the pack-ice retreats southward until the refreeze begins to take place about March.

Most authors agree that the pack-ice is a significant life-zone boundary and determines the ultimate southward extension of many of the wider ranging pelagic birds (e.g. Falla 1964; Murphy 1964;

Watson *et al.* 1971). Some, such as the Emperor and Adelie Penguins, and the Snow and Antarctic Petrels, are confined to a restricted life zone predominantly in the pack-ice around the continent.

Throughout my traverse the controlling nature of the pack-ice front was evident. *Pagodroma nivea*, in particular, appears to have its northward distribution convincingly governed by the northern edge of the floating pack during all seasons (also noted by Dell 1960 and Darby 1970). Although Murphy (1964: 353) has stated that *Phoebastria palpebrata* is "... familiar in pack-ice at high latitudes," the present data indicate that *P. palpebrata* and *Diomedea melanophris* have their southern limits strictly dictated by the pack-ice. Darby considered *Diomedea exulans* and *Daption capensis* to have their southward distribution limited by the pack-ice, but on my traverse this was not confirmed. The Wandering Albatross reached its southernmost observed limit north of the Antarctic Convergence and well north of the pack-ice (66°S — Fig. 2). Although Cape Pigeons did not penetrate far into pack-ice seas, some individuals were seen to alight in leads between ice floes and feed on crushed zooplankton, behaving in much the same way as the truly Antarctic species of *P. nivea* and *Oceanites oceanicus*.

The tolerance to lower levels of ambient air and sea temperature and the necessary behavioural modifications in feeding habits required for successful habitation of the pack-ice zone are presumed to be the factors which ultimately limit the ranging into pack-ice seas of many of the Subantarctic seabird species. Contrary modifications would, I suspect, be required for success at northward extension by such typically pack-ice inhabitants as *P. nivea* and *Thalassoica antarctica*.

Variation of distributional range in summer:

For the present study two fundamental hydrological features appear to determine the latitudinal spread of the main seabird species —

- (1) The Antarctic Convergence which is the frontal system separating Antarctic water to the South and Subantarctic water to the north and is situated near the 3°C surface isotherm — Houtman (1967).
- (2) The position of the 0°C surface isotherm which usually demarcates the northern limit of the pack-ice.

As the USCGC *Staten Island* crossed the Antarctic Convergence at 61°51'S the sea surface temperature dropped to 3.2°C (Table 1). This latitude corresponds with a marked termination of three widely ranging species: *D. exulans*, *D. chrysostoma* and *Puffinus griseus*. Further south at 66°S the southward spread of such species as *D. melanophris*, *P. palpebrata* and *D. capensis* ceased as the 0°C surface isotherm was crossed. As abruptly as these species disappeared the truly 'Antarctic element' of *P. nivea*, *T. antarctica*, *Fulmarus glacialis* and the usually wider northward ranging species *O. oceanicus* become evident (Fig. 2).

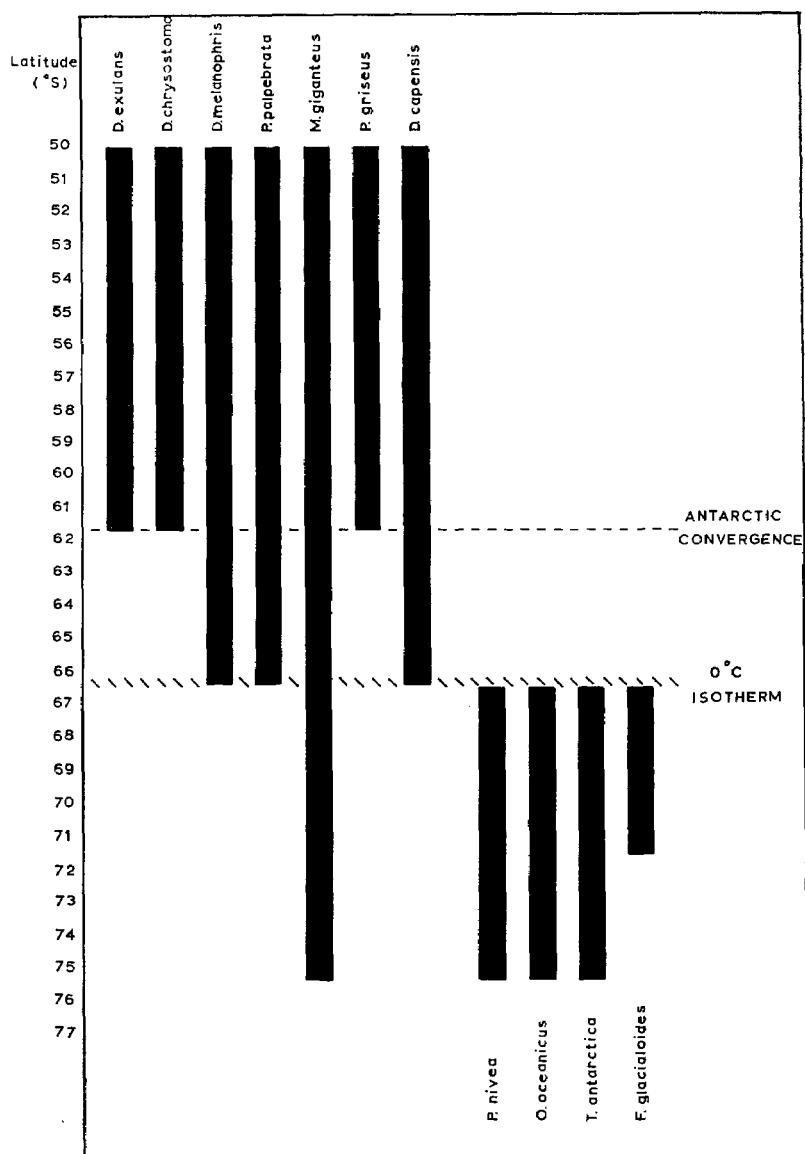


FIGURE 2 — Latitudinal distribution of the seabirds between New Zealand and the Ross Sea in December. Data from the present traverse (northern limits of 'pre-Convergence' birds not considered).

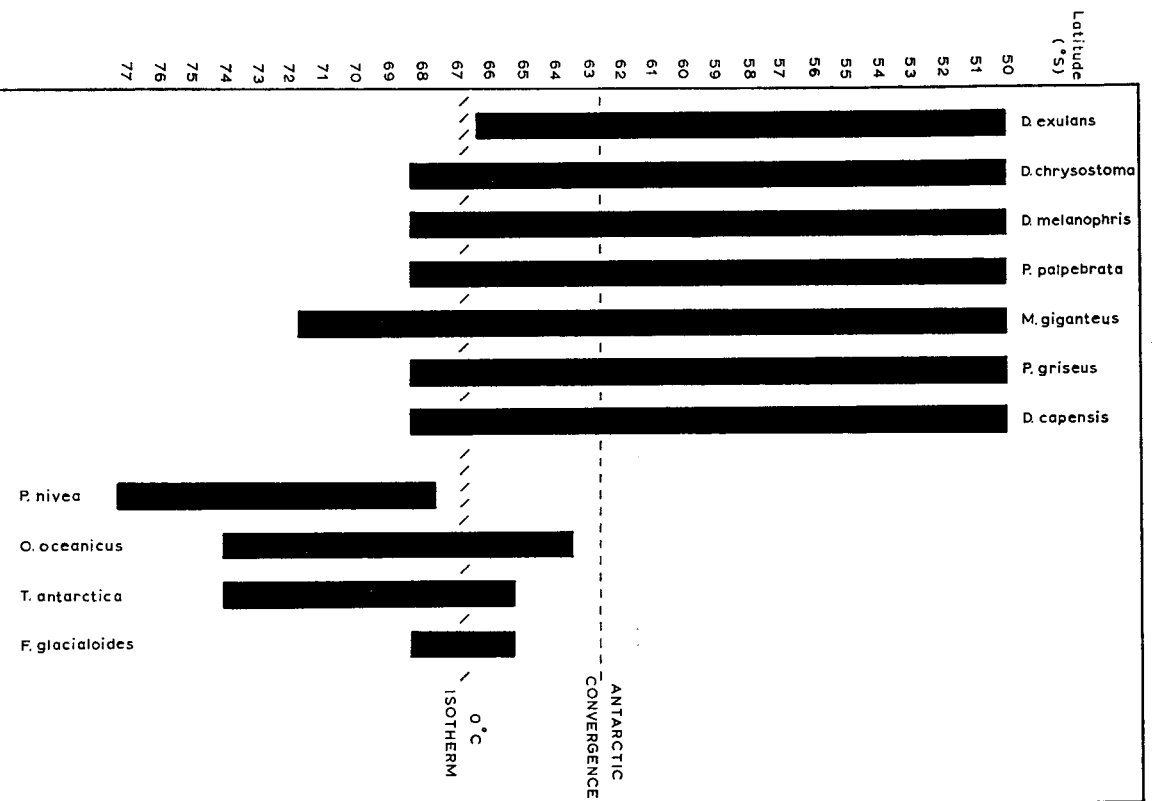


FIGURE 3 — Latitudinal distribution of the seabirds between New Zealand and the Ross Sea in January. Data from Darby 1970 (northern limits of 'pre-Convergence' birds not considered).

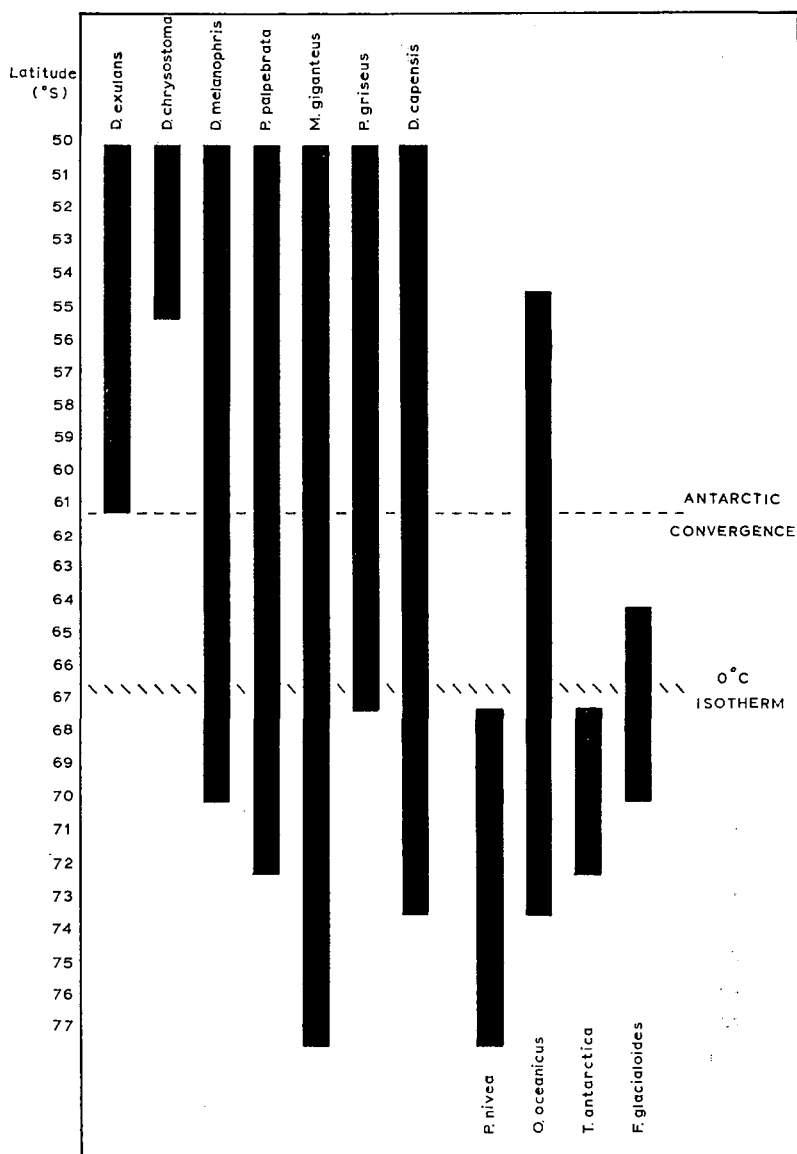


FIGURE 4 — Latitudinal distribution of the seabirds between New Zealand and the Ross Sea in February. Data from Darby 1970 (northern limits of 'pre-Convergence' birds not considered).

My observations during December show distinct zonal patterns of distribution. Correlation of these data with Darby's for the following two months suggests that there is a progressive tendency towards azonality with distributions appearing to be less affected by zonal hydrological boundaries at this time.

The Antarctic Convergence appears to have little effect in January. The 'pre-Convergence' birds extend south to between latitudes 66°-68°S, while *D. melanophris*, *P. palpebrata* and *D. capensis* retain a similar range as observed in December, although crossing the 0°C isotherm (Fig. 3). *Fulmarus glacialis*, *T. antarctica* and *O. oceanicus* extend further northward but *P. nivea* retains its typical 0°C northern limit.

The situation in February becomes clearly azonal (Fig. 4). Some of the large albatrosses, mollymawks and the Cape Pigeon, previously extending no further than about 68°S, now range well south into the Ross Sea. The beginnings of the autumnal migration to the Northern Hemisphere of *O. oceanicus* (Alexander 1955) is evident by its increasing northward range from 66°25'S in December to 54°41'S in February.

Diomedea exulans, *D. chrysostoma* and *T. antarctica* have restricted ranges again in February but these appear to be little affected by existing hydrographic conditions.

Although seabirds actually seem to be too dynamic in their distribution habits to permit a satisfactory explanation in this respect (i.e. the extended ranges from December to February and the relations with ice and hydrographic conditions), it is clear that specific differences exist. Two factors arising from the present data, however, are worth consideration —

- (1) In general, the majority of Antarctic and Subantarctic seabirds have egg-laying periods between October and late December and, thus, adult breeding birds are bound to the nest during this time (Carrick & Ingham 1967). From December onwards hatching occurs and it is at this time that adults begin their wide ranging foraging for the young.
- (2) Coincidental with the above is rising temperature during December and January. Thus, with the melting and southward retreat of the pack-ice edge, the barrier effects of the pack-ice or 0°C isotherm become less important and southward extension of foraging range becomes possible. An extreme example of this increased range can be seen in *M. giganteus* whose egg-laying and incubation period is from October to mid-December. In February this species reaches its southernmost recorded position (77°51'S, 166°36'E), and it is possible that birds observed at this position were foraging adults.

Various authors (e.g. Hurley 1961) have noted the zonal distribution of seabird food organisms as being governed by such

physical features as the Subtropical and Antarctic Convergences, Antarctic Divergence and the relative position of the pack-ice edge. Euphausiids are known to become most abundant in January near the Antarctic Convergence (Watson *et al.* 1971), while in late January and February a greater biomass is found nearer to the Antarctic Continent. The comparable zonal pattern of seabird distribution could, thus, be due to either the direct physical effects of abrupt temperature changes and/or to temperature changes which indirectly affect the birds by dictating the distribution of particular important food organisms.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Mr J. W. Brodie, Director of the N.Z. Oceanographic Institute, DSIR, for providing the opportunity to undertake the present voyage from which data were collected for this paper. I was fortunate in having Prof. L. J. Halle (Geneva) on board the USCGC *Staten Island* with whom I spent much time birdwatching and discussing the finer details of seabird distribution. Thanks are also due to Messrs P. C. Harper and J. W. Brodie who have valuably criticized the manuscript and provided many helpful comments on methods of construction. Finally, I am very grateful to Captain S. G. Putzke (Commander USCGC *Staten Island*) for his encouragement and freedom to consult the ship's log for the daily details summarized in Table 1.

LITERATURE CITED

- ALEXANDER, W. B. 1955. Birds of the ocean, Pp. 1-282, pls 1-88, 2nd Ed. London: Putman.
- BOURNE, W. R. P.; WARHAM, J. 1966. Geographical variation in the Giant Petrels of the genus *Macronectes*. *Ardea* 54: 45-67, figs 1-4, tables 1-2.
- CARRICK, R.; INGHAM, S. E. 1967. Antarctic seabirds as subjects for ecological research. Proceedings of the Symposium on Pacific-Antarctic Sciences J.A.R.E. Scientific Reports 1: 151-184, figs 1-3, tables 1-4, pls 1-2.
- DARBY, M. M. 1970. Summer seabirds between New Zealand and McMurdo Sound. *Notornis* 17 (1): 28-55, figs 1-13, tables 1-3.
- DELL, R. K. 1960. Seabird logs between New Zealand and the Ross Sea. Records of the Dominion Museum, Wellington 3 (4): 293-305, fig. 1.
- FALLA, R. A. 1937. Birds. B.A.N.Z. Antarctic Research Expedition 1929-1931. Reports (B) II: 1-304, figs 1-216, pls I-IV.
- FALLA, R. A. 1964. Distribution patterns of birds in the Antarctic and high latitude subantarctic. Pp. 367-378 in CARRICK, R.; HOLDGATE, M.; PREVOST, J. (eds) *Biologie Antarctique: Premier Symposium*, Paris 1962. Paris: Hermann.

- FALLA, R. A.; SIBSON, R. B.; TURBOTT, E. G. 1970. A field guide to the birds of New Zealand. Pp. 1-256, text illus., pls 1-18. 2nd Ed. London: Collins.
- FLEMING, C. A. 1950. Some South Pacific seabird logs. *Emu* 49 (3): 169-188, figs 1-8.
- HARPER, P. C. 1972. The field identification and distribution of the Thin-billed Prion (*Pachyptila belcheri*) and the Antarctic Prion (*Pachyptila desolata*). *Notornis* 19 (2): 140-175, figs 1-11, tables 1-11.
- HOUTMAN, Th. J. 1967. Water masses and fronts in the Southern Ocean south of New Zealand. *Bulletin. N.Z. Department of Scientific and Industrial Research* 174 [Memoir, N.Z. Oceanographic Institute 36]: 1-38, figs 1-11, tables 1-2, pl. 1, chart 1.
- HURLEY, D. E. 1961. Pelagic Hyperiidea (Crustacea: Amphipoda) collected by the *Magga Dan* between Australia and Antarctica with some notes on their distribution. *New Zealand Journal of Science* 4 (3): 597-603, fig. 1.
- MACKINTOSH, N. A.; HERDMAN, H. F. P. 1940. Distribution of the pack-ice in the Southern Ocean. *Discovery Reports* 19: 287-296, pls LXIX-XCV.
- MURPHY, R. C. 1964. Systematics and distribution of Antarctic petrels. Pp. 349-358 in CARRICK, R.; HOLDGATE M.; PREVOST, J. (eds) *Biologie Antarctique: Premier Symposium*, Paris 1962. Paris: Hermann.
- SUMMERHAYES, C. P. 1969. Seabirds seen in the northern Tasman Sea in winter. *New Zealand Journal of Marine and Freshwater Research* 3 (4): 560-570, figs 1-3, tables 1-2.
- WATSON, G. E.; ANGLE, J. P.; HARPER, P.C.; BRIDGE, M. A.; SCHLATTER, R. P.; TICKELL, W. L. N.; BOYD, J. C.; BOYD, M. M. 1971. Birds of the Antarctic and Subantarctic. Pp. 1-18, figs 1-2, tables 1-2, 2 maps, pls 1-15 in BUSHNELL, V. C. (ed.) *Antarctic Map Folio Series, Folio 14*. New York: American Geographical Society.
- WESTERSKOV, K. 1960. Birds of Campbell Island. *New Zealand Department of Internal Affairs. Wildlife Publication* 61: 1-83, figs 1-4, tables 1-11, pls 1-12.

Mr G. R. F. Hicks,
Victoria University Marine Laboratory,
Island Bay,
Wellington

APPENDIX 1

SUMMARY OF LATITUDINAL DISTRIBUTION OF SEABIRDS, DECEMBER 1970.

	<u>NORTHERNMOST</u>	<u>SIGHTING</u>	<u>SOUTHERNMOST</u>	<u>SIGHTING</u>
Emperor Penguin (<u>Aptenodytes forsteri</u>)	29 Dec.	66°25'S, 172°57'E	31 Dec.	75°16'S, 171°27'E
Adelie Penguin (<u>Pygoscelis adeliae</u>)	29 Dec.	66°25'S, 172°57'E	31 Dec.	McMurdo NAF
Yellow-eyed Penguin (<u>Megadyptes antipodes</u>)	26 Dec.	52°30'S, 169°30'E		
Rockhopper Penguin (<u>Eudyptes crestatus</u>)	26 Dec.	52°30'S, 169°30'E		
Wandering Albatross (<u>Diomedea exulans</u>)	23 Dec.	Out of Cook Strait	28 Dec.	61°51'S, 174°39'E
Royal Albatross (<u>D. epomophora</u>)	23 Dec.	Out of Cook Strait	26 Dec.	52°30'S, 169°30'E
Black-browed Mollymawk (<u>D. melanophris</u>)	24 Dec.	45°22'S, 172°59'E	29 Dec.	66°25'S, 172°57'E
Grey-headed Mollymawk (<u>D. chrysostoma</u>)	23 Dec.	Out of Cook Strait	28 Dec.	61°51'S, 174°39'E
Buller's Mollymawk (<u>D. bulleri</u>)	24 Dec.	45°22'S, 172°59'E		
Light-mantled Sooty Albatross (<u>Phoebastria palpebrata</u>)	24 Dec.	45°22'S, 172°59'E	29 Dec.	66°25'S, 172°57'E

APPENDIX 1 (cont'd)

Giant Petrel (<u>Macronectes giganteus</u>)	23 Dec. Inside Wellington Hbr.	31 Dec. 75°16'S, 171°27'E
Cape Pigeon (<u>Daption capensis</u>)	23 Dec. Out of Cook Strait	29 Dec. 66°25'S, 172°57'E
Antarctic Fulmar (<u>Fulmarus glacialisoides</u>)	29 Dec. 66°25'S, 172°57'E	30 Dec. 71°24'S, 173°00'E
Snow Petrel (<u>Pagodroma nivea</u>)	29 Dec. 66°25'S, 172°57'E	31 Dec. 75°16'S, 171°27'E
Antarctic Petrel (<u>Thalassoica antarctica</u>)	29 Dec. 66°25'S, 172°57'E	31 Dec. 75°16'S, 171°27'E
Blue Petrel (<u>Halobaena caerulea</u>)	28 Dec. 61°51'S, 174°39'E	_____
Prions (<u>Pachyptila</u> spp.)	23 Dec. Out of Cook Strait	30 Dec. 71°24'S, 173°00'E
Sooty Shearwater (<u>Puffinus griseus</u>)	24 Dec. 45°22'S, 172°59'E	28 Dec. 61°51'S, 174°39'E
Grey Petrel (<u>Procellaria cinerea</u>)	26 Dec. 52°30'S, 169°30'E	_____
White-chinned Petrel (<u>P. aequinoctialis</u>)	23 Dec. Out of Cook Strait	26 Dec. 52°30'S, 169°30'E
Grey-faced Petrel (<u>Pterodroma macroptera</u>)	24 Dec. 45°22'S, 172°59'E	_____

APPENDIX 1 (cont'd)

Mottled Petrel (<u>P. inexpectata</u>)	27 Dec.	57°02'S, 172°47'E	28 Dec.	61°51'S, 174°39'E
Wilson's Storm Petrel (<u>Oceanites oceanicus</u>)	29 Dec.	66°25'S, 172°57'E	31 Dec.	75°16'S, 171°27'E
Black-bellied Storm Petrel (<u>Fregetta tropica</u>)	26 Dec.	52°30'S, 169°30'E		
Campbell Island Shag (<u>Phalacrocorax campbelli</u>)	26 Dec.	52°30'S, 169°30'E		
Southern Skua (<u>Catharacta lönnerbergi</u>)	26 Dec.	52°30'S, 169°30'E	27 Dec.	57°02'S, 172°47'E
Antarctic Skua (<u>C. maccormicki</u>)	30 Dec.	71°24'S, 173°00'E	31 Dec.	McMurdo NAF
Southern Black-backed Gull (<u>Larus dominicanus</u>)	23 Dec.	Inside Wellington Hbr.	26 Dec.	52°30'S, 169°30'E
Red-billed Gull (<u>L. scopulinus</u>)	23 Dec.	Inside Wellington Hbr.	26 Dec.	52°30'S, 169°30'E
Antarctic Tern (<u>Sterna vittata</u>)	26 Dec.	52°30'S, 169°30'E		
White-fronted Tern (<u>S. striata</u>)	23 Dec.	Inside Wellington Hbr.		

- (1. 4 Emperor Penguins, 2 of which were subadults in moult, seen on annual sea-ice of McMurdo Sound, 77°52'30"S, 166°24'00"E on 14 January 1971.
2. 3 Giant Petrels, 2 Wilson's Storm Petrels and numerous Adeline Penguins observed from an oceanographic station in McMurdo Sound, 77°51'25"S, 166°36'50"E on 1 February 1971.)

THE BLACK-FRONTED DOTTEREL (*Charadrius melanops*) IN THE WAIRARAPA

By B. D. HEATHER

ABSTRACT

A survey of the Wairarapa river system to discover the population and distribution of the Black-fronted Dotterel (*Charadrius melanops*) was carried out by Wellington and Wairarapa members of the OSNZ during November-December 1972. Further observations up to July 1973 are included.

A total of 78 birds, mainly in pairs, was found. Their distribution is widespread, reflecting closely the distribution of their favoured habitat in the Wairarapa. Winter distribution is very similar, with many birds remaining in pairs but with some flocking in favoured feeding places. Their habitat, breeding and possible competition with Banded Dotterels (*C. bicinctus*) are briefly discussed in the hope of encouraging further study. Juvenile plumage is described.

Known records of earlier sightings are given.

INTRODUCTION

Inspired by taking part in the 1972 Labour Weekend survey of the Hawke's Bay rivers, and the increasing reports in *Notornis* of Black-fronted Dotterels seen in widespread parts of New Zealand, I decided to investigate the rivers of the Wairarapa to find out to what extent they are present and breeding.

From a brief visit to the several bridges over the Ruamahanga River on 12 November 1972, which produced a dotterel pair with a single fledging chick near the Gladstone bridge, it was clear that the species was present and breeding. The following day at the monthly meeting of the Wellington region of the OSNZ, due largely to the enthusiasm of the acting Regional Representative, Max Falconer, a survey of Wairarapa rivers was adopted as an immediate project.

It was revealed also at this meeting that there had been previous sightings in the Wairarapa dating back to 1966, of which I had been unaware; these were principally by Miss H. Cook of Featherston and Mr R. H. D. Stidolph of Masterton.

The following members took part in various ways and degree during the succeeding four weekends. Wairarapa region: Miss Helen Cook and her nephew Simon Cook, Brian Boeson, Michael Dennison, Colin Scadden, Don Hadden, Bob Stidolph. Wellington region: Miss Jean Anderson, Brian Ellis, Max Falconer and family, Peter Gaze, Ron Goudswaard, Peter Harper, Barrie and Rosemary Heather and family, Miss Mollie Logan, Mrs Helen Oliver, Dean Palmer, Roy Slack, Gavin Woodward. Their initials only will be used in the text.

THE RIVERS AND THEIR DOTTEREL HABITAT

The major Wairarapa river, the Ruamahanga, flows south from the Mt Bruce area to Lake Wairarapa for some 70 miles (112 km). Its bed north of Masterton tends to be of large stones unsuited to Black-fronted Dotterels, although Pied Stilts and Banded Dotterels are present. South of Martinborough, except perhaps for the first few sweeps, the river is unsuitable, flowing wide between stop-banks.

In the central stretch between Masterton and Martinborough, the Ruamahanga is confined to a single channel usually swinging from side to side against low cliffs or banks, with heavily stacked gravel inside the curves. Braided channels in the manner of Hawke's Bay rivers occur to a small extent only below the junctions with the two significant tributaries, the Waingawa and Waiohine. Habitat for Black-fronted Dotterels occurs most often as small backwater remnants of former channels. Such places, with their still or gently flowing water and patches of wet mud, are infrequent but they are where the Black-fronted Dotterels were almost invariably found.

The Waingawa and Waiohine Rivers, rising in the Tararuas, have direct, often swift channels with a bed of heavy boulders grading to shingle for the last few miles to their junctions with the Ruamahanga, but without the backwaters and muddy patches preferred by Black-fronted Dotterels.

The Tauherenikau River, flowing from the Tararuas for some 10 miles (16 km) south to Lake Wairarapa, has less volume but a similar bed of boulders or coarse gravel; only in the final mile does it become gentler, shingly and with one or two mud patches. It is in this last stretch that a few Black-fronted Dotterels were found. An account of observations at a nest on this river is given by Don Hadden later in the present issue of *Notornis* (Hadden, 1973; see also Fig. 2).

The only significant tributary entering the Ruamahanga from the east is the Huangarua, near Martinborough. This river, although narrow and only some 10 miles (16 km) long, is quite different in character and supports over half the Wairarapa population of Black-fronted Dotterels. It is shallow, slow-moving, with frequent muddy areas and patches of decaying scum. The Tauweru River, entering the Ruamahanga from the east north of the Gladstone bridge, was not examined. It is very sluggish, flowing largely between willow-lined papa banks in hilly country and has a restricted channel without gravel. It may provide feeding places in a season of unusually low water level but is unlikely to provide breeding sites.

Three small independent rivers flowing to the east coast of the Wairarapa are the Pahaoa, the Awhea and the Opouawe. The Pahaoa was not visited but is believed to resemble the other two, which were examined cursorily and judged to be generally unsuitable, being particularly subject to flash-floods from bank to bank except perhaps near their mouths, where a few stilts and Banded Dotterels were found.

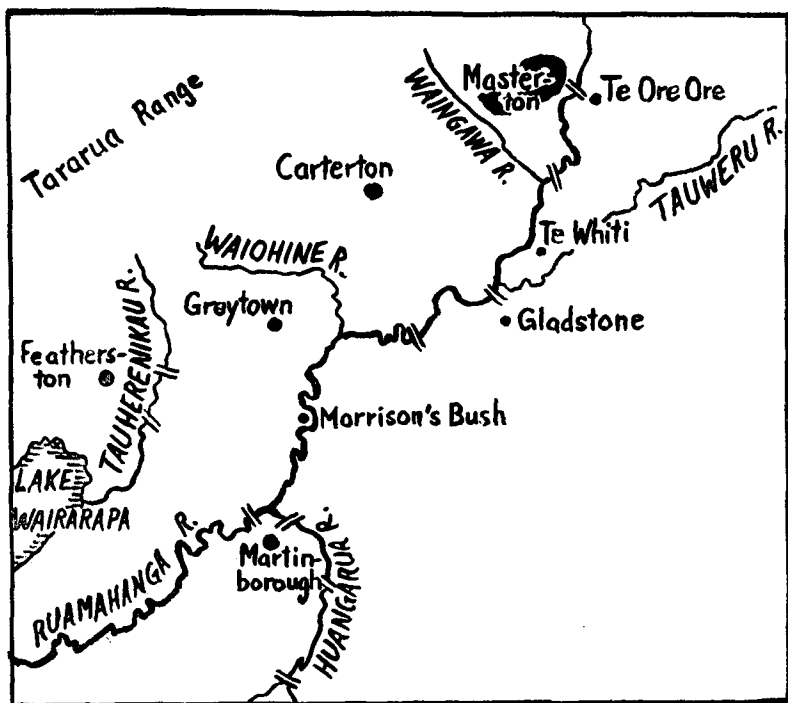


FIGURE 1 — Black-fronted Dotterel study area, Wairarapa river system.

RESULTS

Sections of the rivers were walked, and in one case rather adventurously canoed by those whose names are in brackets.

Ruamahanga River

1. North of Masterton (MF & family) 26 November: nil.
2. Masterton (Te Ore Ore bridge) to Waingawa junction (CS, MD) 25-26 November: 2 pairs, opposite sewage ponds.
3. Waingawa junction to Gladstone bridge (RHDS, CS, MD) 25-26 November: 5 birds.
4. Gladstone bridge to Waiohine junction
 - (a) First 2 miles (BH, RH) 18 November: 2 pairs, 1 single.
 - (b) Remainder (BH, RG, GW) 26 November: 3 pairs.
5. Waiohine junction to Martinborough, main road bridge.
 - (a) Waiohine junction to Morrison's Bush (BH, DP) 19 November: 3 pairs, all in first mile.
 - (b) Morrison's Bush to Martinborough (RS, by canoe) 3 December: 1 pair, 3 singles.
6. Martinborough to Lake Wairarapa: not surveyed in detail.

Waingawa River

PG on 26 November: 1 bird at Ruamahanga junction.

Waiohine River

HC during late November-early December: nil.

Tauherenikau River

BH, RH & family 18 November: 2 pairs (see Fig. 2).

Huangularua River

- (a) White Rock Road bridge to Te Muna (Campbell's) farm (RH)
3 December: 6 pairs, 1 single.
- (b) Te Muna farm to Hinakura Road bridge (BH) 26 November;
(BE, BH, RG) 3 December: 5 pairs, 3 singles.
- (c) Hinakura Road bridge to Ruamahanga River junction (BH,
RG, GW) 26 November: 7 pairs, 3 singles.

Awhea and Opouawe Rivers

BE, RG, BH, RH, 3 December: nil.

Lake Wairarapa

Time and manpower were inadequate to include this area, despite earlier sightings (see below). Brief visits to the Lake Domain near Featherston were made by BH on 8 December and by BB and RHDS on 13 December, and to part of the lake shore and lagoons eastward of the Tauherenikau outlet by RHDS on 4 January 1973, without Black-fronted Dotterels being seen.

Five miles (8 km) of the lake shore eastward of the Tauherenikau outlet were walked on 25 February by HC, MF & BH but, although other waders were present, there were no Black-fronted Dotterels. On 17 December several members visited Boggy Pond and some adjacent lagoons which were found to be quite unsuited to Black-fronted Dotterels.

Population Summary:— Adult birds only

Ruamahanga River:	31 birds
Tauherenikau River:	4 birds
Huangularua River:	43 birds
Overall population:	78 birds

It is believed that the Wairarapa population is unlikely to be much greater than this. No more than one or two birds could have been missed, perhaps on the canoed stretch, but one or two may have been double counted where beats met on different days at river junctions. Elsewhere birds were well spaced out except on the Huangularua, half of which was checked and found to be accurate by a second count. Only once was a bird seen on a paddock, close to the Huangularua, where it quickly returned (BH).

Several pairs may have bred at the Greytown sewage ponds, which were not discovered until 4 March, when there were nine birds present, including two juveniles.

A small number may be found to exist in the uppermost reaches of the Huangarua, above the White Rock Road bridge, and on the shores of Lake Wairarapa. Their presence anywhere else is thought to be very doubtful.

PREVIOUS WAIRARAPA RECORDS

Stidolph (1971) records the first sighting by J. M. Cunningham, R. A. Falla, C. A. Fleming and R. H. D. Stidolph at Te Whiti below the Waingawa-Ruamahanga junction on 3 December 1966. Presumably the same two birds were seen again from October to December 1967, but not in 1968 except for one bird on 4 December. The dates (Stidolph, *in litt.*) were 1967: 14 Oct., two; 11 Nov., one; 1 Dec., one; 24 Dec. and 30 Dec., two. 1968: none on 15 Jan., 1 Oct., 13 Nov., 11 Dec. It is interesting that six birds were found in this area in the present survey, including two at Te Whiti, perhaps suggesting a stable state since at least 1966. Stidolph's (1971) report of four birds at the Waingawa seepage ponds, about three miles west of Te Whiti, in July 1971 would tend to support this opinion of stability.

Stidolph (1971) mentions also a report of five birds on the Huangarua in December 1969, which is not surprising in view of the 1972 population.

He also records a displaying bird on the northern shore of Lake Wairarapa on 13 December 1970. On 16 December, however (Stidolph, *in litt.*), the lake was in flood and the bird found further west. Breeding of probably the same bird is confirmed by the report sent to the OSNZ Recording Scheme (Moore 1972) of a pair seen on 13 September and with a three-egg nest on 15 and 22 November 1970. This nest was on the lake shingle near the Tauherenikau outlet (M. Moore, *pers. comm.*).

Finally, Miss Helen Cook has, while fishing, been aware for several years of Black-fronted Dotterels on the lower Tauherenikau and on the Huangarua; and a single bird was seen by Brian Ellis on 28 November 1970 on a stream in the Hikawera-Hinakura district.

JUVENILE PLUMAGE

New Zealand references do not make clear the appearance of juvenile Black-fronted Dotterels. In flight they are not readily distinguished, unless one clearly sees the breast and the absence of breastband, for they show the same white wing stripe as adults. Newly flying chicks seen in December had a more erratic flight and a higher pitched voice than those of adults. On the ground, newly fledged birds in December were very distinctive. Most obvious was the total lack of black breastband. The black-white face and nape markings of adults, though present in the down markings of chicks, are very indistinct, so that there seems to be continuous brown on head, nape and back. The brown crown is mottled with white, and the adults' black face and central black stripe from beak to crown are absent so that the face appears white. Legs and beak are brown

rather than pink, there is no red eye-ring and the chestnut scapulars of adults are only very faint. The overall impression is of a rather plain brown and white dotterel.

The seven juveniles studied by BH on 17-18 February 1973 were still very like the December birds. The bold chestnut and black streaks on back and wings, so clearly portrayed by Moon (1967), were still absent, although the chestnut scapulars were a little more apparent. The basal portion of the beak showed varying amounts of pink, while the tip was now more black than brown. Legs were still light brown with a faint orange tinge. A faint shadowy trace of the breastband could be seen at close quarters. Black and white horizontal head stripes were now clear on the nape but still rather indistinct on the side of the head as far forward as the eyes. Black was still lacking forward of the eyes, on forehead and crown. Red eye-rings were still absent.

A juvenile seen near the Waiohine junction on 4 March (BH) was no different but on 11 March three near Gladstone bridge had breastbands that were becoming distinct, especially at the sides (BH, RHDS). The last report of juvenile plumage was of one with no breastband and three with indistinct bands on 6 April at Waingawa seepage ponds (RHDS).

The only apparent change in adult plumage was a reduction in general vividness of colouring except for one adult, still accompanied by juveniles, which had a breastband conspicuously mottled with white on 18 February (BH.)

DISCUSSION

It must be made clear that the following discussion is based on very limited evidence and the opinions will therefore be oversimplified. It is given in the hope of stimulating much further work in the region.

Population:

The 1972 Wairarapa population of the Black-fronted Dotterel was no less than 78 birds and almost certainly no more than 100 birds. This is small compared with the population in Hawke's Bay but reflects exactly the scarcity of their preferred habitat in the Wairarapa. The distribution of the population reflects also the distribution of this preferred habitat very closely and indicates that the species is fully distributed and has been for several years at least. The search for birds becomes, in effect, a search for their favourite breeding places (cf. Fig. 2) — a site in fine shingle, raised above the surrounding terrain, handy to quiet water and some wet mud (a mere 3 metres of muddy edge was available and being used by one lone pair seen by BH, RG & GW on a long stretch of the Ruamahanga north of the Waiohine junction).



FIGURE 2 — Black-fronted Dotterel on nest, Tauherenikau River, lower Wairarapa, November 1972.

Photo: Don Hadden

The wide distribution and what seems to be, at least in 1972, a rather poor breeding success, suggest a stable population may already have been attained. A similar survey in, say, five or ten years' time would be of interest to see whether the species spreads for breeding into less favoured parts of the Wairarapa rivers or whether the population size and distribution continue to reflect the vagaries of the rivers in producing muddy places with adjacent nest sites. Population levels reached on the Huangarua, where in parts the birds seem already rather overcrowded, will be of particular interest — how important is territory, how much crowding can be tolerated, does crowding in itself affect chick rearing?

Black-fronted versus Banded Dotterels?

One impression gained during the survey is that there is no serious competition between these species. Breeding Black-fronted Dotterels seem to prefer the habitat described, regardless of the surroundings — closeness of cliffs, banks, willows or other vegetation seems of no significance to them — and even now seem in many cases to be breeding in marginal conditions for raising offspring. On the other hand Banded Dotterels select more open places, with sand rather than mud among the shingle, places not favoured by Black-fronted. The Huangarua, for example, had 43 Black-fronted and 41 Banded Dotterels during the survey but invariably the Bandeds were found on open flats with much dry sand among the stones while

the Black-fronteds were at the water's edge where there was wet mud among the stones. If, indeed, there has been significant competition it seems to be producing a balance for both, with the Bandeds having a less liberal choice of feeding and breeding places than they may have formerly.

During the mid-winter survey of 8 July Banded Dotterels were not found except for 11 on the mid-Huāgarua, whereas Black-fronteds were as well distributed as in summer; thus a difference in dispersal habits removes winter competition.

Breeding:

This survey began too late for us to establish accurately the extent of the breeding season and its peak period; particularly as the length of riverbed each person had to cover seldom allowed time to search thoroughly for nests or chicks.

Certainly birds were in discrete pairs throughout the survey time and the absence of flying chicks until early to mid December suggests that all pairs seen had either nest or chicks during mid and late November. Thus it is probable that late October to late November was the peak period for 1972. Single birds seen were not in juvenile plumage.

Nests and chicks were often curiously difficult to find, particularly on the Huāgarua where several pairs whose breeding could not be confined despite all efforts were later seen with a flying chick; other pairs seemed not to be breeding at all. On the other hand both first and second clutch nests and chicks on the Tauherenikau were found without special difficulty. Clearly behaviour while breeding and the real result of each pair's breeding need much more study.

The following are the few definite breeding results so far.

1. Nest 3 eggs Lake Wairarapa, 15 & 22 November 1970 (Moore 1972).
2. Pair with one fledging chick, Ruamahanga River below Gladstone bridge, 12 November 1972 (BH, RH).
3. Two birds described by HO below the Waiohine junction were probably an adult with a flying chick, 26 November.
4. 7 December, two pairs on the upper Huāgarua each with a flying chick (HC & Simon); seen also on 8 December (BH).
5. 17 December, a pair with two flying chicks on the mid-Huāgarua (PH, HC). Chicks or nests of five other pairs in same area could not be found on same day by a combined party.
6. 17 February 1973, Waiohine junction, one adult with one juvenile, two adults with no juveniles (BH); 18 February, Gladstone bridge, three separate pairs each with two juveniles (BH).
7. 4 March, mid and upper Huāgarua (BH); no juveniles now where there had been two and two singles earlier, although adults all still distributed much as before.
8. The two pairs on the lower Tauherenikau provided the following information:

Pair A

- 18 November 1 egg (BH, RH)
- 19 November 2 eggs (BH, DP)
- 26 November 3 eggs (BH et al.)
- 15 December 3 eggs (BH)
- 16 December 3 chicks (DH, HC). One chick dead near nest. Thus incubation period of 25 or 26 days (see Hadden, elsewhere in this issue)
- 30 December 3 eggs same site, or very nearly; no chicks seen (MF)
- 13 January 1973 3 eggs approx. 29 x 22 mm; 29 x 21; 28 x 21 (MF, GW)
- 17 January 3 eggs no chicks (MF)
- 21 January 3 eggs; birds still sitting (MF)
- 2 February nest empty; only one adult seen (MF)

Pair B

- 8 December nest not found but frantic behaviour of pair during search (BH)
- 17 December, 3 recently hatched chicks near nest site; on wrong side of river from feeding area (BH, RH)
- 30 December no chicks; nest 3 eggs, one rather large (MF)
- 13 January 1973 3 eggs approx. 27.5 x 21 mm; 27 x 21; 33 x 22 (MF, GW)
- 21 January no chicks seen; 3 eggs, birds sitting (MF)
- 2 February nest empty; 2 adults, no chicks (MF)

Both of these pairs seem to have failed completely to reproduce, suggesting that conditions are more marginal than they appear. The whole question of breeding failure and its causes could prove to be an interesting topic for further study.

Post-breeding dispersal:

Investigation is needed to reveal the activity of Black-fronted Dotterels between breeding seasons. Some 100 birds must find their winter feeding in the district while rivers and lakes are high. A certain amount of flocking and local movement occurs as shown by Stidolph (*in litt.*).

WINTER DISTRIBUTION

That at least a certain amount of post-breeding flocking and local movement occurs was shown by Stidolph (*in litt.*) who noted the following numbers in 1972 at the Masterton sewage ponds: 8 February, 3; 4 March, 1; 11 June, 3; 17 July, 4; 13 August, 9; 5 September, 9; 14 October, 1. Many of these were feeding on a wet muddy patch in pasture near the ponds.

However, from casual visits to the Ruamahanga and Huangarua in March, April and May it seemed that, even when the summer and

autumn drought of 1973 had ended, many birds were remaining on the rivers. To investigate the position, on 8 July the most-favoured areas were surveyed by HC, MD, MF, J. A. Fowler, BH, RH, RS, RHDS, GW. The Ruamahanga River near the Waiohine junction and near Gladstone bridge, the Greytown sewage ponds and the whole Huangarua River were examined. RHDS inspected the Waingawa ponds on 7 July, the Masterton ponds on 15 July and the Waingawa junction area on 23 July. He also checked the Kourarau Dam and other likely ponds and excavations in the Masterton district, where he found no dotterels. On 27 July BH examined the northern shore of Lake Wairarapa, adjacent flooded fields and the lower Tauherenikau River.

Results:

Waiohine junction area: none on main river where had been 3 pairs + 1 juv. on 4 March, but 5 on muddy flat beside drain from sewage ponds.

Greytown ponds: 10 to 12, several more than the 9 on 4 March and 6 on 26 May (these ponds are close to the Waiohine junction).

Gladstone bridge northwards: none; signs of recent flooding.

southwards: 10, possibly 12, including three pairs in same places as in November. Others on muddy runnels in field beside river.

Waingawa junction: 2 in same place as in November.

Waingawa ponds: 9.

Masterton ponds: 5 on same muddy patch as in 1972.

Huangarua River: 44, almost all in discrete pairs (43 in November).

Lake Wairarapa and flooded fields: none, as in summer.

Lower Tauherenikau: 5 on braided, muddy overflow from main channel, 2 km south of summer breeding area.

RHDS's figures for 1973 at Waingawa ponds seem to reflect changes in the river levels: 6 April, 5 or 6 (4 juvs.); 18 April, 5; 1 & 17 May, none; 1 June, 8; 27 June, 15; 7 & 14 July, 9. The first seen at Masterton ponds were 5 on 15 July, although there were no June visits.

This total for July of some 90-95 birds is surprisingly close to the November total of 78+, if one excludes most of the birds at Greytown ponds, which had been missed in November, and if one allows for a small number of surviving young.

Discussion:

It is clear that there has been no appreciable dispersal away from the breeding region. Furthermore, although by July juveniles cannot be distinguished from adults, the figures suggest that juveniles may also have remained in the region.

Wherever river levels have permitted, birds have remained close to their summer quarters, in many cases remarkably close. On the Huangarua and Tauherenikau, rivers of small volume, all birds were to be found very near the breeding areas, shifting slightly up or downstream to the nearest quiet water with muddy margins.

On the Ruamahanga, where river levels have changed more drastically, at least four pairs were still on summer territory but the rest seemed to have shifted, either to the few ponds with permanent muddy margins (Greytown and Waingawa ponds) or to temporarily muddy places (Masterton, Carter's Bush and Greytown ponds drain). All of these places are within very short flying distance of the river.

In spite of careful observation, we have so far found no dotterels using ordinary flooded pasture, even when it is available to birds nearby on small areas of river mud. Stilts, herons and swallows are much less particular.

It is recognised that a rather difficult colour-banding exercise would be needed to confirm the movement of individual pairs and their offspring that has been discussed.

ACKNOWLEDGEMENTS

Thanks are due to all the members who contributed to the survey with long and sometimes fruitless walks; particularly to Mr R. H. D. Stidolph and Miss H. Cook for their help and interest and Mr M. L. Falconer for his enthusiasm and his skill in rounding up the willing helpers.

LITERATURE CITED

- HADDEN, D. 1973. Observations at a Black-fronted Dotterel nest. *Notornis* 20 (3), this issue.
- MOON, G. J. H. 1967. Refocus on New Zealand birds. Pp. 1-144, 137 col. pls, 91 b & w pls. Wellington, &c: A. H. & A. W. Reed.
- MOORE, J.; MOORE, M. 1972. Black-fronted Dotterel *in*: Classified Summarised Notes. *Notornis* 19 (4): 353.
- STIDOLPH, R. H. D. 1971. The birds around us. From a diary of bird observations in New Zealand over a period of 50 years 1921-1971. Pp. 1-140, figs 1-8, pls 1-4. Masterton: Hedley's Bookshop Ltd.

*B. D. Heather,
10 Jocelyn Crescent,
Silverstream*

NOTES ON THE BLUE-EYED SHAGS

(Genus *Leucocarbo* Bonaparte)

By JEAN-FRANCOIS VOISIN

ABSTRACT

This paper analyses the characters and the affinities of the seven species of "Blue-eyed Shags." The subgenus *Leucocarbo* is proposed as a full-rank genus, and three subgenera are proposed in it: *Leucocarbo* s. str., for *L. bougainvillii* and *L. magellanicus*, *Nesocarbo* subgen. nov. for *L. campbelli*, and *Euleucocarbo* subgen. nov. for the other four species.

The Blue-eyed Shags constitute a group of related species which are largely distributed over the Southern Hemisphere, and which are usually united in the subgenus *Leucocarbo* Bonaparte, 1857. Some thirty forms have been described in this subgenus, and their status has long been controversial, and is still so for some of them. At present, seven species are usually distinguished, which are: *Phalacrocorax (Leucocarbo) verrucosus* (Cabanis, 1875); *P. (Leucocarbo) carunculatus* (Gmelin, 1789); *P. (Leucocarbo) albiventer* (Lesson, 1831); *P. (Leucocarba) atriceps* King, 1828; *P. (Leucocarbo) campbelli* (Filhol, 1878); *P. (Leucocarbo) bougainvillii* (Lesson, 1837); and *P. (Leucocarbo) magellanicus* (Gmelin, 1789) — (Murphy 1936; Holgersen 1945; Jouannin 1951; Falla, Sibson & Turbott 1966). *P. (Leucocarbo) bougainvillii* ("*Carbo bougainvillii*") was chosen as the type of this subgenus by Ogilvie-Grant (1898) by subsequent designation.

As Falla said in 1932, the Blue-eyed Shags ". . . are generally regarded as distinguishable from other Cormorants by well-marked external characters shared by most of them. These characters are the fleshy ring of blue skin surrounding the eye, the frequent presence of dorsal and alar patches of white feathers, the brightly metallic plumage of the upperparts and the flesh-coloured feet."

The first of these characters, the fleshy ring of blue skin surrounding the eye, does only exist in the four first species. In the three following ones, it is either absent (*P. magellanicus*), or green (*P. bougainvillii*), or mauve, purple or violet (*P. campbelli*). The presence of dorsal and alar patches of white feathers is even more inconstant. They do not exist in *P. verrucosus* nor in *P. bougainvillii* and *P. magellanicus*. The dorsal patch is absent in *P. albiventer*; it is poorly developed in *P. campbelli ranfurlyi*; it is present in only a few *P. campbelli colensoi* and missing in *P. c. campbelli*. The white alar bar is normally developed in *P. albiventer*, *P. carunculatus* and *P. campbelli ranfurlyi*. On the contrary, it is poorly developed in *P. campbelli colensoi* and completely lacking in *P. c. campbelli*.

The brightly metallic plumage of the upper parts is a feature which may be found in several species of Cormorants. Nevertheless, this dark plumage shows a very distinctive pattern in all Blue-eyed Shags. The dark parts of the head, neck and back have a dull metallic greenish blue, or royal blue reflection, especially on the back. The wings, including the scapular region, have a strong, oil-green gloss. The tints are black. The quills and rectrices are blackish, with no reflections.

In life, the colour of the feet of the Blue-eyed Shags varies from fleshy to bright pink, with dark colours which are usually restricted to the back of the tarsi, the sole of the feet and the joints of the toes. This is one of the most constant features of the group.

The subgenus *Leucocarbo* may be characterized by other features as well: thus, the fairly constant presence of yellow or orange caruncles, sometimes reduced to a few papillae, at the base of the upper mandible. They are lacking in *P. magellanicus* and in *P. campbelli*. The unfeathered facial area is large, subtriangular and

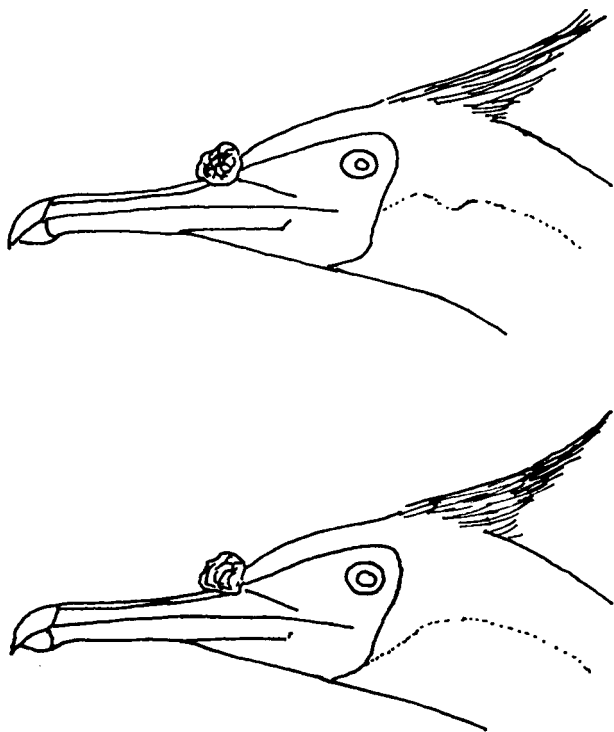


FIGURE 1 — Heads of *Leucocarbo albiventer melanogenis* (above) and of *Leucocarbo verrucosus* (below), showing the unfeathered facial area.

includes the eye (Fig. 1). All Blue-eyed Shags have a white chest and a white belly, and most of them have a white foreneck also. They possess 12 rectrices, which are fairly short, stiff and pointed.

Within the subgenus *Leucocarbo*, it is possible to characterize a homogenous group of species which exactly fit its description and particularly have plain blue rings around their eyes. These "True Blue-eyed Shags" are *P. verrucosus*, *P. carunculatus*, *P. atriceps* and *P. albiventer*. These birds have an austral, circumpolar distribution, and I already showed (1970) that a gradual change of certain of their characters (dimorphism, white patches on the upperparts, plumage of immatures, etc.) can be observed when these species are considered in the order in which they are encountered moving eastward from Kerguelen.

The Kerguelen Shag (*P. verrucosus*) seems to be the least differentiated, the least original of the true Blue-eyed Shags. On the whole, its colours are less bright, even that of the eye-ring, which, in life, seems to be greyish in comparison with that of *P. albiventer*, for instance. It is the only one which lacks both the white dorsal patch and alar bar. The demarcation line between the white and the dark colours of the head passes much under the ear opening, and reaches down the sides of the head under the base of the lower mandible. The feet of this bird are coloured with brown, but their fundamental colour is pink. The immatures of this species are dimorphic. The plumage of the light-phase ones is only a duller edition of that of the adults, except the foreneck, which becomes progressively dark upward, and the throat, which is as dark as the sides of the head. The chin is lighter.

Good illustrations of the Kerguelen Shag, both adult and immature, can be found in Falla (1937: 229 (photographs) and 233 (colour plate)).

On the other hand, *P. albiventer* and *P. atriceps* show a number of features which make them the most typical of the Blue-eyed Shags, mainly the latter. Their dark upperpart plumage is the most reduced in this group, consequently to the extension of the white parts. This is especially true of *P. atriceps* which, in postnuptial plumage, is certainly the whitest of all Cormorants. The metallic gloss of their dark plumage is much enhanced, and that of the neck and back has blue and purplish reflections rather than greenish blue ones, mainly in *P. albiventer*. In life, the fleshy rings of skin round their eyes are bright ultramarine blue, and their caruncles are bright orange. Their feet are bright pink, but the joints of the toes are stained with brown. Immatures of these species have a dull light brown and white plumage, with a very faint indication of gloss, if any, on their backs. They have white chins, throat and forenecks with a pattern reminding of that of the adults.

These two species are very closely related, and are so similar in certain plumages that they are difficult to distinguish in the field, as stressed upon by several authors like Murphy (1916, 1936), Jouanin (1951) and Behn & al. (1955).

The New Zealand representatives of this group constitute an assemblage of closely related forms (*P. carunculatus carunculatus*, *P. c. chalconotus* and *P. c. onslowi*), the status of which has been the topic of much discussion. They have been alternately considered as mere subspecies of *P. carunculatus* (Alexander 1963; Falla, Sibson & Turbott 1966; OSNZ Checklist 1970) or as species of their own (Falla 1932; Oliver 1955). The species, or subspecies *ranfurlyi* has been reunited to this assemblage by some authors (Falla, Sibson & Turbott 1966) while others consider it as more closely related to *P. campbelli* (OSNZ Checklist 1970). But, even if their systematics are very intricate, these Cormorants do form an homogenous group, as stressed by several authors, and can be considered as a whole when examining their relations with other species of shags. So I will consider them as subspecies of *P. carunculatus* in the present paper, following the opinion of the OSNZ Checklist Committee (1970).

The Stewart Island Shag (*P. c. chalconotus*) and the Chatham Island Shag (*P. c. onslowi*) are the most typically true Blue-eyed Shags of the lot, mainly the latter. They resemble the Kerguelen Shag in many respects (Voisin 1970), especially in the pattern of the feathered and of the unfeathered parts of the head. But they show relation to both *P. albiventer* and *P. atriceps* in having large patches of white in the plumage of their upperparts. Moreover, the Stewart Island Shag is dimorphic, having a dark and a light phase, a condition which is also encountered in the immature Kerguelen Shag. Immatures of the New Zealand true Blue-eyed Shags and of the Kerguelen Shag have fairly similar upperpart plumages, which are a duller edition of that of the adults, with no patches of white feathers. On the contrary, the neck, throat and foreneck of the immature *P. carunculatus* are white, like that of young *P. atriceps* or *P. albiventer*.

The Rock Shag (*P. magellanicus*) and the Guanay (*P. bougainvillii*) appear as fairly non typical Blue-eyed Shags, even if their relations with the other members of this group are obvious (Murphy 1936). This is especially true of the former, in which the unfeathered facial area is of a uniform reddish colour, often bordered with black, and without any trace of an eye-ring. The latter does have such a ring, but it is green instead of blue. Even though they look very different, these two species possess some common features. They have no white alar bar nor dorsal patch, a fact which brings them closer to the Kerguelen Shag. Their necks are entirely of the same bluish black colour as their backs, and the black and white pattern of their head and throat shows distinct variations according to the breeding cycle, the white surfaces being reduced in breeding plumage. Moreover, certain plumage stages of immature are very like in both species, as shown by Murphy (1936).

Differences between both species have already been described with precision (Murphy 1936; Johnson 1955). Some of them are mostly adaptative characters. Like most other Cormorants, the Rock Shag is not a good flier; it haunts coastal waters, coves and channels,

and feeds in shallow waters. The Guanay on the contrary, is a very good flier, perhaps the most aerial of all Cormorants as Murphy (1936) thought, and it feeds on pelagic prey. Hence, a lot of remarkable specialisations, mainly in the form of the wings, which are comparatively long and pointed, are evident. Other differences are more significant. So is, for instance, the difference already cited in the colouration of the bare facial skin. The pattern of the head is very unlike in both species too, the Rock Shag having a white patch on each side of it, which is entirely lacking in the Guanay. The pattern of the downy chicks is very dissimilar in both species. These of *P. magellanicus* are entirely brown, while Guanay chicks are covered with a black and white down, producing a "pepper-and-salt" effect particular of this species (Murphy 1936). The feet of the Rock Shag have a very particular pattern, being pink with blackish webs. All these differences are important, and show that both species, though obviously related, have been separated for a long time.

It is difficult to tell which of them is the most closely related to the true Blue-eyed Shags. Falla (1937) already pointed out the relations between the Rock and Kerguelen Shags. But the differences between them are great, and if the Kerguelen Shag is more closely related to the Rock Shag than any other true Blue-eyed Shag, this relationship remains nevertheless remote (Voisin 1970). On its face, the Guanay retains much of the pattern of the true Blue-eyed Shags, still having an eye-ring, but on other sides it is a very particular Cormorant, as shown by Murphy (1936) and other authors. For the moment, it seems preferable to consider *P. magellanicus* and *P. bougainvillii* as a group of two species remotely related to *P. verrucosus* and hence to the other Blue-eyed Shags.

P. campbelli inhabits the Campbell Islands (*P. campbelli campbelli*) and the Auckland Islands (*P. campbelli colensoi*). As already mentioned, the Bounty Islands Shag (*P. campbelli ranfurlyi*) has been alternately considered as belonging to this species or to *P. carunculatus*.

P. campbelli campbelli resembles *P. bougainvillii* in having no alar bar nor dorsal patch, in being slenderly built and in having a dark foreneck. But this foreneck pattern shows no variation according to the sexual cycle, and the chin and throat of this species remain entirely white. Moreover, this character is present in a few *P. campbelli colensoi*, and the dark zone on the foreneck is usually shorter in them than in *P. campbelli*, according to Oliver (1955). In most specimens of the Auckland Island Shag the white of the throat extends down as a narrow stripe to the upper abdomen. This is even more marked in *P. campbelli ranfurlyi*, which has a neck pattern similar to that of *P. carunculatus*. Yet the immatures of the three subspecies have a dark foreneck, contrary to the immature *P. carunculatus*, but reminding of that of the immature Kerguelen Shag.

If *P. campbelli campbelli* possesses no dorsal patch nor alar bar, these features are present in both other subspecies, although the former may be poorly developed or absent and the latter is reduced in *P. campbelli colensoi*. In all three subspecies, the general plumage pattern and colour is hardly distinguishable from that of the *carun-*

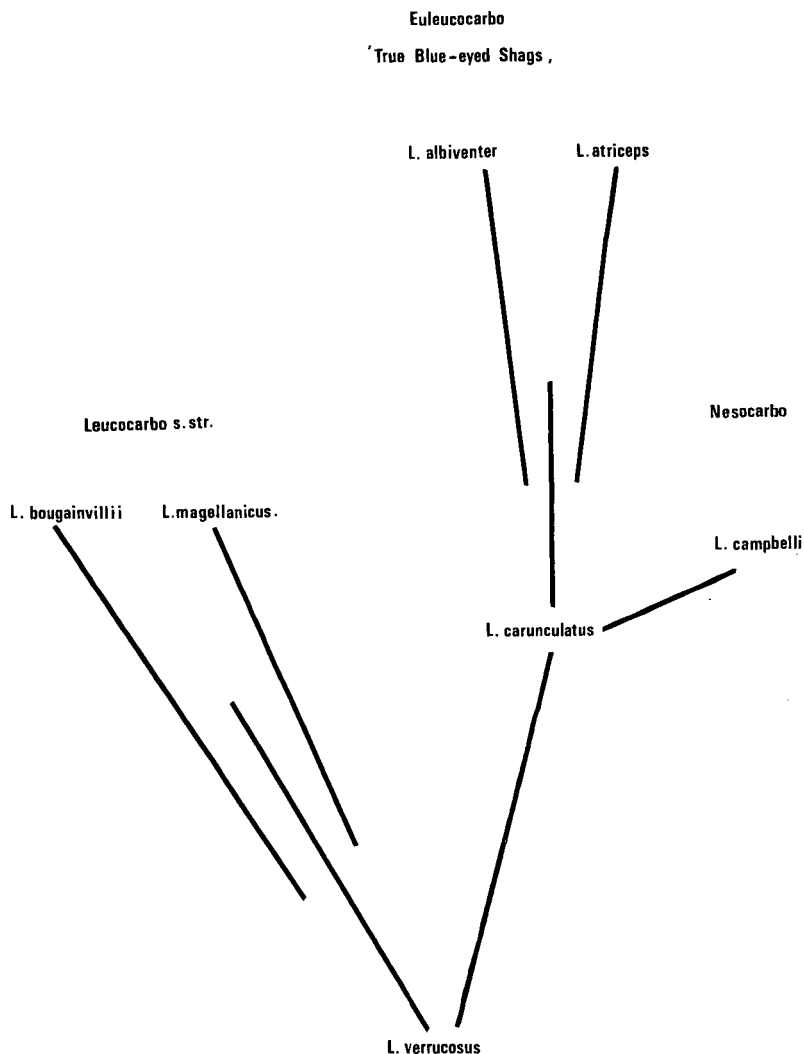


FIGURE 2 — Schematized affinities (not phylogeny!) of the species of *Leucocarbo*.

culatus group, but those of the unfeathered facial area is strikingly different. The eye-ring is purple or pinkish, and the facial skin varies from brown with orange spots (*campbelli*) to yellow (*colensoi*) and scarlet with black spots (*ranfurlyi*). In brief, these birds show a mixture of original traits and of features which relate them closely to *P. carunculatus*. The dark foreneck of the immatures is an archaic feature, which is present in young Kerguelen Shags, Rock Shags and Guanays. Of the three subspecies, *P. campbelli campbelli* is the the most differentiated one, and the other two may be considered as *morphologically* intermediates between it and *P. carunculatus*. Without them, the relations of the nominate subspecies would remain fairly obscure, and it is no wonder that some authors of the end of the last century, like Filhol (1878) considered it as related to *P. bougainvillii*. But, at present, its affinities seem to be clearly with *P. carunculatus*, a fact which is illustrated by the above mentioned hesitations of some authors about the status of the subspecies *ranfurlyi*.

The relationships of the seven species of *Leucocarbo* may be summarized as in Fig. 2. All these species are clearly separated forms, and several of them have evolved into well recognizable subspecies, so that they must have been isolated from each other for a very long time. The fact that *P. verrucosus* is related to the other true Blue-eyed Shags as well as to the group *bougainvilli-magellanicus* does not mean, of course, that it is the ancestor of the others, nor that *Leucocarbo* started its evolution at Kerguelen. The Kerguelen Shag may only be considered as being closer to this ancestor than any other species of the subgenus, and may have come to Kerguelen from somewhere else. Fossil material of this subgenus is scarce, and we cannot be more precise about its exact phylogeny for the moment.

The subgenus *Leucocarbo* is a homogenous group, showing very original features. It may be rather considered as a genus of its own. This is what was very logically done by the OSNZ Checklist Committee (1970). In fact, the whole, very heterogenous genus *Phalacrocorax* needs a revision, but this would be far beyond the scope of this paper. If *Leucocarbo* is considered as a genus, the three divisions which I made in it — Guanay-Rock Shag, true Blue-eyed Shags, Campbell Island Shag — must be given the rank of subgenera. In this case, the subgeneric name *Leucocarbo sensu stricto* must be applied to the *magellanicus-bougainvillii* group, because *P. bougainvillii* is the type species of the genus. Then I propose the name *Euleucocarbo* for the "true" Blue-eyed Shags, and the name *Nesocarbo* for *Leucocarbo campbelli*. This last name is an allusion to the distribution of this species on remote islands.

In brief, the seven species of the genus may be arranged in the following order:

- Subgenus *Leucocarbo* s. str. (Bonaparte)
 - . *L. (Leucocarbo) bougainvillii* (Lesson)
 - . *L. (Leucocarbo) magellanicus* (Gmelin)

- Subgenus *Euleucocarbo* nov.
 - . *L. (Euleucocarbo) verrucosus* (Cabanis)
 - . *L. (Euleucocarbo) carunculatus* (Gmelin)
 - . *L. (Euleucocarbo) albiventer* (Lesson)
 - . *L. (Euleucocarbo) atriceps* (King)
- Subgenus *Nesocarbo* nov.
 - . *L. (Nesocarbo) campbelli* (Filhol)

I propose *L. (Euleucocarbo) carunculatus* as the type species of the subgenus *Euleucocarbo*.

A look at a map shows that the related species of *Leucocarbo* are generally situated on the east of each other. I already mentioned that for the true Blue-eyed Shags, but it is true also of both species of the subgenus *Leucocarbo* s. str. and *L. verrucosus*. Thus, the Blue-eyed Shags must have spread eastward during their evolution, helped in that by the strong westerlies and the oceanic streams prevailing in the Antarctic and Subantarctic zone. The only exception is the Guanay, which went northward along the Pacific coast of South America and established its main distribution area from Northern Peru to Central Chile. It is worth noting that, recently, some pairs belonging to this species were found nesting on the coast of Central Argentina (Erize 1972).

As quoted above, *Leucocarbo* has clearly separated species. This is also true for the subspecies of *L. carunculatus* and of *L. campbelli*, which are sometimes given species status. But this is not true of the different subspecies of *L. atriceps* and *L. albiventer*, the great homogeneity of which has been emphasized by several authors (Murphy 1936; Falla 1938; Rand 1954). The birds of Prince Edward and Crozet Islands are even so alike that Rand (1954) considers them as belonging to the same subspecies, *melanogenis*. These forms must have been separated from each other much more recently than those mentioned above, so we can imagine that they colonized their present insular distribution area very recently too, while the other forms invaded theirs much earlier. Perhaps the Pleistocene glaciations, at least the last one, played a role in that story, stopping for a moment the spread eastward of the Blue-eyed Shags. Thus, the circumpolar distribution area of the subgenus was not completed until a short time ago. In absence of enough fossil material it is a mere hypothesis.

The invasion of new areas by the Blue-eyed Shags must have happened in a passive way. These rather bad-flying, coastal birds are not likely to undertake long voyages of their own at sea. But they swim quite well, and they surely are able to resist a long time at sea if taken away from their habitual haunts by the strong westerlies or the gales which blow quite hard in this part of the world, so they are able to be transported to far-off islands. Perhaps this phenomenon still happens from time to time today, but in the absence of proof it is only one more hypothesis.

ACKNOWLEDGEMENTS

I wish to thank here Mrs Guillot, who corrected my English.

REFERENCES

- ALEXANDER, W. B. 1963. Birds of the ocean. A handbook for voyagers. 2nd ed. 306 pp. New York: G. P. Putnam's Sons.
- BEHN, F.; GOODALL, J. D.; JOHNSON, A. W., & PHILIPPI, P. A. 1955. The geographic distribution of the Blue-eyed Shags, *Phalacrocorax albiventer* and *Phalacrocorax atriceps*. Auk 72: 6-14.
- ERIZE, F. 1972. The Guanay Cormorant *Phalacrocorax bougainvillii* nesting on the Atlantic coast of South America. Bulletin of the British Ornithologists' Club 92 (5): 117-118, 1 pl.
- FALLA, R. A. 1932. New Zealand Cormorants in the collection of the Auckland Museum, with notes on field observations. Records of the Auckland Institute and Museum 1 (3): 139-154, pls 25-27.
- FALLA, R. A. 1937. Birds. B.A.N.Z. Antarctic Research Expedition 1929-1931. Reports (B) II: 1-304, figs 1-216, pls. I-IV.
- FALLA, R. A.; SIBSON, R. B.; TURBOTT, E. G. 1966. A field guide to the birds of New Zealand and outlying islands. Pp. 1-254, text illus., pls 1-18. London-Auckland: Collins.
- FILHOL, H. 1878. Note sur une nouvelle espece d'*Urile* (*Urile Campbelli*) provenant de l'Ile Campbell. Bulletin de la Societe Philomathique, Paris 2: 132.
- HOLGERSEN, H. 1945. Antarctic and Sub-Antarctic birds. Scientific Results of the Norwegian Antarctic Expeditions 1927-1928 et sqq. instituted and financed by Consul Lars Christensen. II (23): 1-100, figs 1-23.
- JOHNSON, A. W. 1965. The birds of Chile and adjacent regions of Argentina, Bolivia and Peru. Vol. I. Pp. 1-398, text illus., col. pls 1-44. Buenos Aires: Platt Establecimientos Graficos S.A.
- JOUANIN, C. 1951. Remarques sur les Cormorans de la Region australe americaine. Proceedings of the Xth International Ornithological Congress, Upsala: 193-198.
- MURPHY, R. C. 1916. Notes on American subantarctic cormorants. Bulletin of the American Museum of Natural History XXXV (4): 31-48, figs 1-13.
- MURPHY, R. C. 1936. Oceanic birds of South America. Vol. II. Pp. viii + 641-1245, illus. New York: The Macmillan Co. and the American Museum of Natural History.
- OGILVIE-GRANT, W. R. 1898. Steganopodes (Cormorants, Gannets, Frigate-birds, Tropic-birds, and Pelicans) . . . Pp. 329-687 in: SHARPE, R. B., & OGILVIE-GRANT, W. R. Catalogue of the birds in the British Museum. Vol. XXVI. Catalogue of the Plataleae, Herodiones, Steganopodes, Pygopodes, Alcae, and Impennes . . . Pp. xviii + 1-678, pls I-VIII. London: Trustees, British Museum (Nat. Hist.).
- OLIVER, W. R. B. 1955. New Zealand birds. 2nd ed., rev. and enlarged. Pp. 1-661, text illus., 12 unnumb. col. pls. Wellington: A. H. & A. W. Reed.

- OSNZ, 1970. Annotated checklist of the birds of New Zealand including the birds of the Ross Dependency. (The Checklist Committee, F. C. Kinsky, Convener), Ornithological Society of N.Z., Inc. Pp. 1-96, maps 1-4. Wellington, &c.: A. H. & A. W. Reed.
- RAND, R. W. 1954. Notes on the birds of Marion Island. *Ibis* 96 (2): 173-206, figs 1-2, tables 1-3.
- VOISIN, J. F. 1970. On the specific status of the Kerguelen Shag and its affinities. *Notornis* 17: 286-290.

J.-F. Voisin,
*Laboratoire de Zoologie,
Ecole Normale Supérieure,
46 Rue d'Ulm,
75230 Paris cedex 05
France*

SECOND RECORD OF THE AUSTRALIAN LITTLE GREBE IN NEW ZEALAND

By PATRICK MILLER

ABSTRACT

A pair of Australian Little Grebes (*Podiceps novae-hollandiae*) was found inhabiting a farm pond near Dargaville in August 1972 and was still there in October 1972. The birds built a nest pad. The only previous New Zealand record is of a single male bird on a dam near Arrowtown in 1968. Descriptions and notes on behaviour are given with photographs of the birds in their swimming position.

INTRODUCTION

The Australian Little Grebe (*Podiceps novaehollandiae*) was first recorded in New Zealand by Chance (1969) based on the occurrence of a single male bird on a dam at Arrowtown in August 1968 (see also Soper 1972: 84-85, pl. 35). There have been no further sightings reported (OSNZ 1970: 18), but a pair has now been found inhabiting a farm pond near Dargaville in August 1972 and were still there in October 1972.

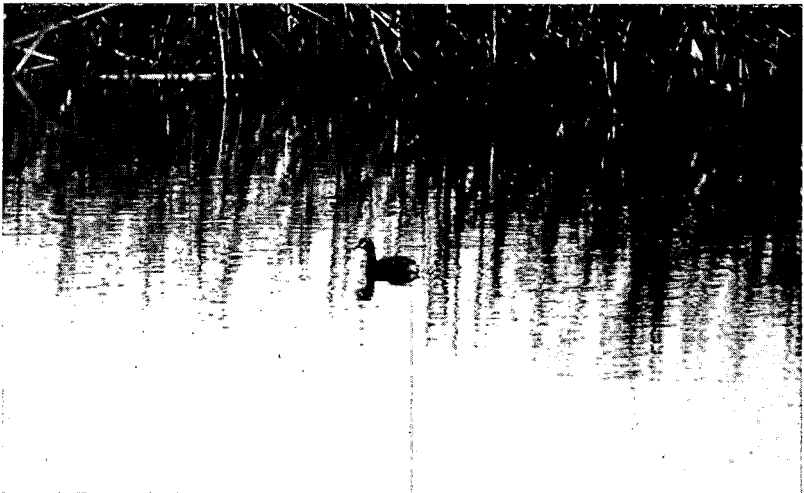


FIGURE 1 — Australian Little Grebe. Fast swimming position and habitat.

Photo: G. J. H. Moon



FIGURE 2: Australian Little Grebe. Normal swimming position. The pale bill tip can be clearly seen in this photo.

Photo: G. J. H. Moon

The two birds were seen on the pond in late August by L. Oakes but were then thought to be Dabchicks (*P. rufopectus*) and were not closely examined. They were seen again on 16 September 1972 by a Whangarei Beach Patrol Party and I identified one bird as an Australian Little Grebe. On 23 September 1972 I observed both birds closely for 2½ hours and further observations were made on 28 September 1972 by C. D. Clunie and A. T. Edgar, on 3 October 1972 by G. J. H. Moon who obtained a series of photographs, two of which are reproduced here (Figs 1-2), and at intervals throughout October by C. D. Clunie, Miss D. M. Whyte, W. J. Campbell and myself. Notes on the birds and their behaviour follow.

HABITAT

The pond is approximately 100 x 50 m in area and has a raupo fringe. It is said to be very deep in the centre and is believed to be fed by a spring. It has a seasonal water level fluctuation of approximately one metre.

DESCRIPTION

The birds were in breeding plumage. Head and neck dark grey; a chestnut patch on each side of the neck; back dark grey but not as dark as head and neck; rump light grey; breast streaky grey; flanks light rufous brown; belly white; underwing white; a yellow mark from base of bill to beneath the eye, but not touching the eye; bill black with a pale tip, sometimes difficult to see.

CALL

A long chitter uttered infrequently. ATE also heard a soft "whit whit."

BEHAVIOUR

Shyer and more skulking than Dabchicks; when disturbed on the open water they dived, resurfacing inside the raupo and remaining under cover for 10-20 minutes before reappearing. As long as observers did not move around they seemed less concerned and dived infrequently.

Occasionally they were seen to peck at the surface of the water, presumably collecting food. Movements appear more restrained and there is less head movement than in the Dabchick (GJHM). Much of the time they spent resting on the water, head down on shoulders and sometimes moving in tight circles. Head movement was greatest in the rest position. CDC noted that once while in this position the feet were raised so that they lay on the lower back of the bird. When swimming quickly they held their head and neck erect (Fig. 1), but normally the head was pulled in closer to the body (Fig. 2). When preening dislodged feathers were allowed to drift away and there was much head flicking, scattering drops of water. The birds rolled on one side to preen the belly and while doing so twisted around in circles.

On 23 September 1972 one bird stretched its neck along the surface of the water; the other bird swam around it, then adopted the same position directly behind it. After a short time both reverted to the normal swimming position and later rested on the water near the raupo fringe.

By 28 September 1972 a substantial pad of green material had been constructed at the base of the raupo stems. This pad was visited several times by one or both birds during the period of observation. The birds never swam openly to the nest but would dive some distance away and invariably resurface right at the site. If they approached the nest without diving they would enter the raupo some distance away. Once a cow walked into the edge of the pond just behind the nest pad. This alarmed the sitting bird which quickly pulled leaves from the edge of the pad over the nest and dived from it, all in a matter of seconds. On one occasion one bird climbed onto the pad and assumed what appeared to be an invitational posture, body flattened on the pad, neck extended and held below the level of the body and top of the pad. The other bird climbed up beside it and appeared to attempt coition (CDC). On 3 October 1972 one of the birds sometimes spent 4-5 minutes on the nest. Later in the month strong winds caused waves in the pond which slopped over the nest pad; subsequently the birds were seen taking the pad to pieces (CDC).

The Australian Little Grebe has since been seen on Lake Okareka, Rotorua, in January 1973 (see Lyle 1973, *Notornis* 20 (3), this issue).

ACKNOWLEDGEMENTS

I am grateful to G. J. H. Moon for permission to use his photographs and to C. D. Clunie, A. T. Edgar, and G. J. H. Moon for their notes of observations. I would also like to thank D. E. Crockett and Miss D. M. White for providing transport to the grebe pond.

LITERATURE CITED

- CHANCE, G. G. 1969. A new bird for New Zealand — Australian Little Grebe, at Arrowtown. *Notornis* 16 (1): 3-4, pl. II.
- LYLE, G. W. 1973. Australian Little Grebe on Lake Okareka. *Notornis* 20 (3):
- OSNZ, 1970. Annotated checklist of the birds of New Zealand (The Checklist Committee, F. C. Kinsky, Convener), Ornithological Society of New Zealand, Inc. Pp. 1-96, maps 1-4. Wellington, &c.: A. H. & A. W. Reed.
- SOPER, M. F. 1972. New Zealand birds. Pp. 1-216, 184 pls, 1 map. Christchurch: Whitcombe & Tombs Ltd.

Patrick Miller,
4 R.D.,
Whangarei

SHORT NOTES

OBSERVATIONS AT A BLACK-FRONTED DOTTEREL NEST

The following observations were made at the Black-fronted Dotterel (*Charadrius melanops*) nest on the Tauherenikau River, southern Wairarapa, found by Barrie Heather on 18 November 1972 with one egg, and seen again on 19 November by BH and Dean Palmer with two eggs.

Incubation period:

Assuming the first day of incubation to have been 21 November, the incubation period seems to have been 25 days because, whereas on the morning of 15 December 1972 BH found there to be still three unchipped eggs, on 16 December at 12.15 p.m. there were three chicks in the nest scrape. If incubation had begun on 20 November, then, of course, the period would be 26 days. The chicks appeared somewhat shaky on their legs and it would seem they had hatched either during the night or early in the morning. There was no sign of egg shells.

Behaviour at the nest:

(a) The only interesting behaviour noted while incubation was progressing was one brief refusal to vacate the eggs by one of the pair as the other approached. The refusal took the form of standing half crouched over the eggs, head lowered, and 'churring' at the mate; but after a few seconds the sitting bird left. The refusal posture was photographed.

(b) After the chicks had hatched there was no apparent effort made to lead them away during my hour and a half's watching during the heat of the day on 16 December. Instead both birds changed over on the nest at almost exactly ten-minute intervals. They would spend ten minutes half crouched and with wings spread over the chicks while they jockeyed for position underneath. As soon as the other adult arrived the crouching bird would make for the stream nearby and spend most of the time standing quite deep in the water, sufficiently so for the lower breast and stomach feathers to become quite wet. It was noticeable that some of the small stones at the nest were wet and possibly this behaviour was a means of keeping the chicks cool on this particularly hot day.

(c) A 'broken wing' display was seen on 16 December. The first stage involved spreading the tail (which was towards me), tilting the body slightly and partially spreading one wing. The second stage involved the alternate flapping of both wings (i.e. one wing would be flapped about three or four times and then the other — I did not see both being flapped at once), plus the spread tail and a flattening of the bird on the stones.

DON HADDEN

22 Bevington Street,
Avonhead,
Christchurch 4

HOW DOES CAPE HONEY FLOWER AFFECT BIRDS ?

Two North Island Kiwis (*Apteryx australis mantelli*) were found dead near Kaitaia in 1971. One was run over in late March 1971 and the second was killed by a dog on 14 May 1971. Mr Colwyn F. Smith of Takapuna sent the gizzard contents from both birds to Entomology Division, DSIR, Nelson, for examination. Watt (1971) reported on the insect species represented in the gizzard contents and also on the relative amounts of insect remains and of plant material present. The plant material was forwarded to Botany Division, DSIR, for examination and the species represented, mainly as seeds, were identified (Simpson 1971). An interesting point from the botanical point of view was that both gizzards contained seeds of the Cape honey flower, *Melianthus major*, one gizzard with seeds present in some quantity. In both samples the seeds were reasonably fresh and had retained their distinctive purplish colour.

Melianthus major is native to South Africa where it is regarded as a poisonous plant. The roots contain a dangerous poison and 100 gm of the fresh plant in the pre-flowering stage proved fatal to a sheep (Steyn 1934). Poisonings occurred among horses and ruminants when Cape honey flower was eaten during a shortage of fodder (Curson 1928). Steyn (1934) indicated that the active principle was unknown and gave the symptoms of poisoning as those of an irritant vegetable poison. The nectar is said to yield a toxic honey (Watt & Breyer-Brandwijk 1962, reporting from Dragendorff 1898 and Greshoff 1900). Connor (1951) lists the species as a poisonous plant in New Zealand. Is it possible that the seeds of *Melianthus major* affected these kiwis in some way ?

Melianthus major is well established throughout the North Island, particularly in North Auckland. In the South Island it is more localised but does occur as far south as Bluff. It generally occurs as a garden escape.

There is a large patch of this plant naturalised on the banks of the Taupata Stream, situated between Pakawau and Cape Farewell in Golden Bay, Nelson. The main road runs through the patch and recently Dr C. R. Barnicoat of Nelson recounted an experience he and fellow ornithologists had when driving through this area on October 2 1971 (pers. comm.). The *Melianthus major* plants were then in full flower and some 60-80 tuis were busily engaged in extracting nectar from the flowers and periodically resting on adjacent trees, where they appeared 'drunk with joy.' Their 'comical' antics kept the party interested for some time. This kind of behaviour is, I understand, not uncommon during the breeding season. A specimen in the Botany Division herbarium (CHR 115292. E. J. Godley, October 17 1960) from the same group of plants has a note "about 20 tuis in an $\frac{1}{4}$ -acre seeking the nectar." In the last week of September 1972 I passed through this area daily at c.7 a.m. and c.5-6 p.m. on the way to and from Farewell Spit. Only the first lower flowers on the long racemes were open, but already tuis were visiting the plants to feed

on the nectar. At the times mentioned only a few birds were to be seen. An examination of the flowers showed that there is a good supply of nectar in each flower. Atkinson (1922) stated that in New Zealand the Silver Eye (*Zosterops*) and other small birds have been seen at the flowers and suggests that birds are probably the chief pollinating agents.

Melianthus major is a very handsome plant with large, attractive, compound leaves and long flowering racemes, with prominent bracts, the whole appearing reddish when in flower. It has been suggested that the species could be used in plantings to attract native birds but some investigation may first be necessary to find out whether the large juicy seeds and the copious nectar produced in each flower may have detrimental rather than a beneficial effect on some New Zealand birds.

REFERENCES

- ATKINSON, E. H. 1922. Weeds and their identification. N.Z. Journal of Agriculture 24: 360-364.
- CONNOR, H. E. 1951. The poisonous plants of New Zealand. Bulletin. N.Z. Department of Scientific and Industrial Research 99: 1-141, figs 1-39.
- CURSON, H. H. 1928. Some little-known South African plants and their effect on stock. 13th & 14th Reports. Division of Veterinary Education and Research, Union of South Africa: 203-229.
- DRAGENDORFF, G. 1898. Die Heilpflanzen der verschiedenen Voelker und Zeiten. Pp. 1-160. Stuttgart: Ferdinand Enke.
- GRESHOFF, M. 1900. Description of poisonous and stupefying plants used in fishing, II. Mededeelingen uit 's Lands Plantentuin X. [not seen]
- SIMPSON, M. J. A. 1971. Travelling seeds. Bulletin. Wellington Botanical Society 37: 63-64.
- STEYN, D. G. 1934. The toxicology of plants in South Africa. Pp. 1-631. Cape Town: Central News Agency Ltd.
- WATT, J. C. 1971. The North Island Kiwi: a predator of pasture insects. The New Zealand Entomologist 5: 25-27.
- WATT, J. M.; BREYER-BRANDWIJK, M. G. 1962. The medicinal and poisonous plants of Southern and Eastern Africa. 2nd ed. Pp. 1-1457. Eden and London: E. & S. Livingstone Ltd.

M. J. A. SIMPSON

Botany Division,
DSIR,
Private Bag,
Christchurch

BLACK-BILLED GULL COLONY AT WAIROA

While on a regular check of birds at Whakamahi Lagoon on 28 October 1972, I saw a group of terns and gulls on the shingle bar which separates the lagoon from the sea. The bar is permanent, composed of fine shingle and well covered with driftwood. It is about 200 metres across. The birds were gathered on the inland slope towards the lagoon.

The group comprised about 300 White-fronted Terns (*Sterna striata*) and 98 Black-billed Gulls (*Larus bulleri*). The terns had begun breeding, using an area clear of driftwood. The Black-billed Gulls were in small scattered groups, each group centred on areas on the perimeter of the tern colony where driftwood had gathered in small heaps. Building of nests by the gulls was under way although none were near completion.

By 9 November, a few nests of the Black-billed Gulls contained eggs and on 15 November 45 nests were occupied by sitting birds. About 150 gulls were present either at the colony or on the nearby Whakamahi Lagoon.

On 18 November, the colony was deserted, except for numerous Black-backed Gulls (*Larus dominicanus*) which were feeding on the remaining eggs. A number of dead Black-billed Gulls and White-fronted Terns which had been shot with air rifle pellets lay about the colony.

The Black-billed Gulls spread throughout the coastal area from Wairoa to Mahia Peninsula within the next few days and have remained throughout the summer. Neither the gulls nor the terns appear to have made any further attempts to breed this season.

G. G. FOREMAN

62 Mitchell Street,
Wairoa



AUSTRALIAN LITTLE GREBE ON LAKE OKAREKA

On 31 January 1973, a differently coloured dabchick was observed feeding about 16-20 yards from the shore at Lake Okareka.

The bird was obviously undisturbed by our presence, and allowed ample opportunity for observation.

Description: Crown, hind neck and cheek black or green-black; throat dark; bill black with a white tip; eye white or pale yellow. Chest sides and back streaky grey and black; flanks medium brown; undersides and tail (from behind) pale grey to white; an elongated yellow spot stretching at an angle from the base of the bill to just below the eye and a dark red stripe from behind the eye to about halfway down the neck. Size appeared to be a little less than that of our native dabchick *Podiceps rufopectus*. In poor light the red stripes on the head seemed darker and the back a more uniform dark grey.

The bird was watched by my brother and myself for about 30 minutes during which time it caught and ate a full-sized frog, but with some difficulty, being later chased by a N.Z. Dabchick (*P. rufopectus*).

The visitor was described to and seen by R. W. Jackson (Regional Representative) and W. J. and M. Broun who all agree that we have on Lake Okareka an Australian Little Grebe (*Podiceps novaehollandiae*).

G. W. LYLE

P.O. Box 413,
Rotorua

[This is the third record of the Australian Little Grebe in New Zealand; see article by Patrick Miller in this issue of *Notornis*, 20 (3): 272-275. Ed.]



A TWENTY-ONE YEAR OLD WHITE-FRONTED TERN

On 12 January 1952 I visited Orere Point, Clevedon, to band chicks in a White-fronted Tern colony on a rocky outcrop almost surrounded by sea. A party of young people caught the chicks and brought them to me to band. It was difficult to catch them on the steep rocky terrain and at the same time keep them from falling into the water. However this was successful and I banded fifty, Nos 7001 to 7050, inclusive.

Early in February 1973 I received by mail from Mrs Peter Chamberlain, Ponui Island (south end), Hauraki Gulf, band No. 7037. The Chamberlains were having much trouble with gulls and terns roosting on their launch and had nets spread over it. On 31 January 1973 Peter Chamberlain found a banded tern tangled in the net and so badly injured that it had to be destroyed. This was $4\frac{3}{4}$ miles from the place of banding.

The band, being of the old type, had deteriorated badly but the number was readily ascertained. The bird would have been almost two weeks old when banded so its age was approximately 21 years 1 month. Since it was alive when found there is still the question of how much longer it could have lived.

H. R. McKENZIE

P.O. Box 45,
Clevedon

LETTERS

The Editor,
Sir,

THE FIRST NEW ZEALAND GENTOO: DEATH BY MISADVENTURE ?

It was distressing to read in the report by Darby & Wright (1973: 28) that the first New Zealand Gentoo Penguin recorded "has been retained as a mount by the Otago Museum; catalogue number A72:1, and the carcase preserved in isopropyl alcohol."

To many of your readers a bird is more than a catalogue number or a carcase and it is to be hoped that there were good reasons for destroying this penguin. In view of other statements in the article — "strode up the beach," "this healthy and vigorous immigrant," and "the bird proved to be in excellent condition" — the reader is left to make rather unhappy conclusions as to the reasons for the bird's demise. When comes such another ?

REFERENCE

DARBY, J. T.; WRIGHT, A. W. 1973. First New Zealand record of the Gentoo Penguin (*Pygoscelis papua*). *Notornis* 20 (1): 28-30, 1 fig.

GORDON LEARY

55 Elmslie Road,
Pinehaven,
Upper Hutt,
19 April 1973

The ethics of specimen collecting in the name of science have been argued many times and the Editor is unwilling to throw open the columns of *Notornis* for a prolonged exchange of views on this topic. However, the authors of the article on the Gentoo Penguin have the right of reply, and Mr J. T. Darby comments as follows:

"Every zoologist, particularly a museum zoologist, is faced with this type of situation almost daily. Outwardly it may appear that one's occupation is that of collecting, curating and research; however, all three together do mean education and this is the prime function of museologists. In finally deciding to retain this bird for the museum, there were a number of aspects taken into consideration and fully discussed with other ornithologists: *Firstly*, this bird was a second year bird and therefore it did not have a mate and, as a corollary of this, obviously had not established a territory in any breeding ground; *Secondly*, it did not arrive in New Zealand with a partner and therefore was unlikely to become established as a breeding bird; *Thirdly*, its distance from the closest known breeding colony is considerable and I believe it not unreasonable to imagine that this bird would be unlikely to return from New Zealand to Macquarie Island; *Finally*, although rare to New Zealand, it is a bird that may be counted in millions. Overall, I felt that this specimen could contribute more in education to New Zealanders than either dying in off-shore waters or being savaged on shore by a dog."

The Editor,
Sir,

THAT GENTOO PENGUIN

After reading the interesting article by J. T. Darby and A. W. Wright on the first N.Z. record of the Gentoo Penguin (*Pygoscelis papua*) and also your note in *Notornis* 20 (1): 28-30, it appears that from the point of view of a healthy Gentoo Penguin, the chances of survival when landing on the South Island coast are much greater at Tiwai Point in Southland than at St. Kilda Beach, Otago.

J. A. COWIE

P.O. Box 59,
Kaikoura
13 August 1973



The Editor,
Sir,

THE NORTHERN SHOVELER

May I comment briefly on Dr Eisenmann's letter in which he expresses some doubt about the validity of records of the Northern Shoveler (*Anas clypeata*) in New Zealand.

When it was first learnt that an unusual drake shoveler, which later proved to be an unmistakable *clypeata* had been shot in the lower Waikato, those of us concerned with its identification naturally wondered about its provenance and asked ourselves the question "Could it be an escape?" But if so, where from? The law of the country being what it is with regard to the importation of foreign fowl, we knew of no collection, and could learn of none, from which it might have escaped. We were therefore forced to accept the conclusion that it was a genuine migrant, which somehow had overshot the normal mark. This, of course, does happen quite often among species which migrate long distances.

That Northern Shovelers should reach New Zealand is certainly most interesting. But is it altogether surprising if we remember that, with the Pintail (*Anas acuta*) and Garganey (*Anas querquedula*), Shovelers are among the most enterprising travellers of the sub-arctic surface-feeding ducks? In Africa some habitually cross the Equator and a few may pass right through the tropical zone. In the Pacific region, omitting the rather unsatisfactory Australian evidence, they are known from Sarawak, just north of the Equator; and the many Hawaiian records prove that the species is capable of crossing great distances of ocean.

Moreover, it is perhaps worth mentioning that a number of palaearctic species, and two nearctic waders reach the southern limit of their migrational range in New Zealand. The following list does not claim to be exhaustive:— Spine-tailed and Pacific Swifts, Pacific Golden Plover, Bristle-thighed Curlew, Bar-tailed and Asiatic Black-tailed Godwits, Siberian and Wandering Tattlers, Terek Sandpiper, Red-necked Stint, Oriental Pratincole, White-winged Black Tern.

If favourable nor-westers can waft White-winged Black Terns and Blue Moon Butterflies from the region of north eastern Australia to New Zealand, this should not be an impossible crossing for a strong-winged Northern Shoveler.

REFERENCE

EISENMANN, E. 1972. Might Northern Shovelers in New Zealand be escapes? [Letter to the Editor] *Notornis* 19 (4): 370.

R. B. SIBSON

26 Entrican Avenue,
Remuera,
Auckland, S.E. 2
7 June 1973
The Editor,
Sir,



BIRDS IN EXOTIC FORESTS

I would like to draw the attention of readers of this journal to the recent publication of two short articles on birds in exotic forests. Jackson (1971) lists 54 indigenous and 26 exotic birds recorded from within the bounds of exotic forests in New Zealand; in reply, Heinekamp and Ramsay (1973) find Jackson's work "... misleading in that many species are recorded merely because they have been seen in exotic forests or near them, inside the legal boundaries of exotic State forests, which are not always the plantation boundaries."

Both articles emphasize the need for closer definition of the ecology and habitat requirements of native and introduced birds. While ornithologists are generally reluctant to allow their work to be influenced by political issues, nevertheless there are others for whom their statements can provide credible political ammunition. In this respect, the generally careful definitions of habitat provided by Jackson have already been discarded on at least one overtly political occasion (see Heinekamp & Ramsay 1973: 16). However, the failure to adequately separate for the purposes of argument the legal boundaries of exotic plantations, does suggest that in this particular case the confusion was initially the ornithologist's.

The conclusion must be that when the implications of ornithological discussion affect the wider public we must be especially careful to keep misunderstandings at a minimum.

REFERENCES

- HEINEKAMP, H. F.; RAMSAY, G. W. 1973. A closer look at birds in exotic forests in New Zealand. *Forest and Bird* No. 188: 16-18.
JACKSON, R. W. 1971. Birds in exotic forests in New Zealand. *N.Z. Journal of Forestry* 16 (1): 61-68.

NIGEL PRICKETT

*Department of Anthropology,
University of Otago,
Dunedin
29 May 1973*

REVIEWS

New Zealand Spiders. An Introduction, by R. R. & L. M. Forster. Pp. 1-254, 164 drawings and black-and-white photographs, 132 coloured plates. Auckland and London: Collins, 1973, \$10.60.

At last we have a natural history book written by someone indubitably qualified to do so. Dr R. R. Forster, Director of the Otago Museum, is not only one of the foremost authorities on several groups of the Arachnida but with his considerable background of museum experience, is particularly well suited to know how best to present what the public needs in the realms of natural history writing. Following the success of their book *Small Land Animals of New Zealand* in 1970, Dr Forster and his wife have again teamed up to produce a fine addition to New Zealand literature and something that will be appreciated far beyond New Zealand itself.

Spiders may not be regarded by the majority of people as beautiful creatures. W. S. Bristowe, in his New Naturalist volume *The World of Spiders* (1958), has given a most enlightening account of spiders in superstition and imagination and his delightful, scholarly approach would, I am sure, convert many who have hitherto regarded these animals as loathsome, frightening, or merely unpleasant. The Forsters' book will do more than this. It is a beautiful book, copiously illustrated by colour and black-and-white photographs and with line-drawings of unusual style and exceptional quality, done by Mr Barry Weston, which will convince many a reader that spiders are, like this book which depicts them, not only beautiful in themselves but have a peculiar fascination all their own which is not based on dread or superstition but on the revelation of their structure and habits so well given by the authors of this fine work. Bristowe's book should, none the less, be read in conjunction with the New Zealand book since the subject matter of each is complementary to a useful extent. We are blessed, in fact, with quite an array of spider books — Gertsch's *American Spiders* (1949), Comstock's *The Spider Book* (1967), Savory's *The Biology of Spiders* (1928), *The Arachnida* (1935), *Spiders and other Arachnids* (1964), and McKeown's *Australian Spiders* (1951), to name but a few which can be recommended for further reading. The Forsters' book is superior to most of these, certainly in its wealth of illustration and local relevance.

The first part of *New Zealand Spiders* discusses the structure, behaviour and life history of spiders with special reference to local examples and also introduces the reader to some close relatives of spiders, the mites, false-scorpions, and harvestmen, the latter group having been particularly well monographed for New Zealand by Dr Forster himself. The second part of the book considers the details of various natural groups or families of spiders found in this country through the range of trapdoor spiders, wolf, lynx, jumping, crab, orbweb, cobweb, and a host of others, to the "midget" spiders on which Dr Forster has done notable taxonomic research. Especially welcome is a section on poisonous spiders, dealing particularly with the Katipo spider and dispelling some of the myths that surround this quiet and retiring denizen of our shores.

The historical introduction reveals something of importance also to us, the significant role that amateur workers have played in helping to unravel the threads of the natural history of New Zealand spiders. Beginning with Llewellyn Powell, originally a Christchurch medical practitioner, in 1871, we find ourselves indebted to, amongst others, R. Gillies, farmer and businessman of Oamaru and Dunedin, P. Goyen, inspector of schools in Otago, George Chamberlain, industrial chemist of Wellington, C. L. Wilton, sheepfarmer of the Wairarapa, as well as to the Comte Raymond de Dalmas, a wealthy Parisian naturalist who visited New Zealand in 1912 for salmon fishing and also to Professor B. J. Marples, a founder-member of the Ornithological Society of N.Z., who became intrigued with spiders during his student days in England, later making notable studies here. It is of interest also to recall that T. H. Savory, that distinguished chronicler of the Arachnida, stated in his history of arachnology, *Spiders, Men, and Scorpions* (1961) — "The true founder of Arachnology in New Zealand was A. T. Urquhart" who published 19 papers on spiders between 1882 and 1897 while farming near Auckland. Both his stamping ground and his descendants at Karaka are well known to many New Zealand ornithologists.

Although this is not the place for a detailed criticism of the Forsters' contribution, it is tempting to make a comparison with the most recent similar book produced in the Australasian region, that by Densey Clyne (1969), *A Guide to Australian Spiders. Their Collection and Identification*, which is also notable for its wealth of colour illustrations (236), less detailed, however, and not so gloriously presented as in the Forsters' book. One serious deficiency in *New Zealand Spiders* is at once revealed, highlighted by a study of Miss Clyne's book. Despite the fact that it is still too early to list the spider fauna of New Zealand at the species level, "barely one quarter of the two thousand or more species" having been described so far, there is still too little help for those who wish to identify the spiders they find. For these the reader must work from the keys to families given on pages 46 to 51 of the first part of Dr Forster's technical work *The Spiders of New Zealand*, of which three volumes have so far appeared as Bulletins of the Otago Museum (I, 1967; II, 1968; III, 1970), each priced at about half the cost of the popular account. One must otherwise rely heavily on the illustrations for identification, and it will be found, in fact, that many genera, families or groups of spiders do have a natural posture or overall stance which helps to place them taxonomically.

The Forsters share their expertise in photography with their readers and those who wish to emulate their success in this field will find some sound advice, of application to other groups of small land animals, in the section on photography in the concluding chapter "How to find and study spiders." Following the instructions in this chapter, readers will quickly begin to wonder if spider-watching (to use Bristowe's expression) is not as enjoyable a pastime as bird-watching. It may be a long time before we have an Arachnological Society of N.Z. or even a Royal N.Z. Forest and Spider Protection Society but I prophesy that New Zealand spiders will have their champions and they will have the Forsters to thank for it!

E. W. D.

The Coastal Ecology of a Recreation Resource Area Kawakawa Bay to Miranda. A Report prepared by Marjorie R. Bacon, M.Sc., Planning Assistant. 95 pp., illus. Auckland, January 1973: Planning Division, Auckland Regional Authority. Available from the ARA, Private Bag, Auckland, \$2.50.

This is an important document but one that may not have as wide a circulation as it deserves. It tells of the assessment that is being made of natural resources within a number of coastal areas designated as "Recreation Resource Areas" by the Auckland Regional Authority in its Regional Planning Scheme. Miss Marjorie Bacon, a zoology graduate from the University of Auckland and a former student of Professor J. E. Morton, eminent marine biologist, theologian, author of the best-seller *The New Zealand Sea Shore*, and one of the few scientists elected to local government in New Zealand, gives the results of an ecological investigation in one of these areas.

In 1971 an attempt was made "to determine the abundance and distribution of marine life and coastal birds on the Kawakawa Bay - Miranda Coast." The introduction to Miss Bacon's report, which runs to some 50 pages of text with copious graphs, figures and tables, states: "This study provides baseline information from which comparative studies may be made in the future to determine the effects of man's activities upon the coastal environment. An assessment has been made of changes which have occurred in populations of coastal animals up to the present time and an attempt has been made to determine the part played by coastal development in bringing about these changes." The report promises, in fact, rather more than it gives but this is a fault inherent in the material itself as will be understood by anyone who has been faced with trying to make a similar assessment of an environmental situation.

The report is divided into two sections — "Bird Life," pp. 7-29, and "Marine Life," pp. 30-48, with supporting appendices giving graphical and numerical distribution details for marine animals and plants with bird census data for the Firth of Thames as recorded by the "New Zealand Ornithological Society 1951-1970" in Appendix III, pp. 69-85.

Numbers, localities and movements of 30 species of coastal birds, based on data gathered by members of the OSNZ, were analyzed and discussed in terms of the effects of environmental factors, disturbance by man, and of the importance of the area as a bird habitat. From a great amount of information on birds, marshalled into appropriate figures and tables, Miss Bacon concludes that: "The protection of the Firth of Thames as a natural bird area of regional and national significance is therefore vital." Limitation of access and of expansion of residential and resort areas is proposed and the alternatives are examined. The South Auckland members of the OSNZ, led by their former RR Mr H. R. McKenzie, may take some pride that their observations over 20 years have been put to good use illustrating the role that members of the OSNZ can play as environmentalists and conservationists without collectively having to "stand and be counted" as supporters or antagonists of any particular scheme or cause.

The marine life section is, perhaps, of more interest to the specialist marine biologist and is a little disappointing in its lack of firm conclusions and recommendations. However, these may be in-

corporated into the complete study of this area already made available by the ARA. The information showing the distribution and abundance of the animals and plants does provide a firm baseline for measuring the effects of any changes in physical conditions which might occur in the future as a result of reclamation of pollution, a baseline which would, in fact, be envied by biologists faced with examining or predicting such effects in other parts of New Zealand. Let those of us who love Wellington Harbour take note!

Miss Bacon, author of this study, is unique; perhaps not in herself but rather in the position which she holds. So far as I am aware the ARA is the only local body employing biologists on its staff. I believe that the day should come, and quickly, when the biologist is regarded as a "professional" with all that the term connotes in ethics, integrity, standards of practice and behaviour, just as we have come to expect from lawyers, architects, doctors and engineers. The day must come also when the biologist is sought as a staff member of every local body or planning authority to enjoy the role of responsibility in environmental matters at present the prerogative of the engineer and the accountant.

This report from the ARA is, therefore, tremendously important, not so much in its content as for its format in that it sets a standard and a pattern for other local bodies to follow, perhaps to improve upon, and certainly to learn from.

E. W. D.



Mauri Ora, Vol. 1, 1973. 155 pp., illus. Christchurch: The Biological Society, University of Canterbury. Annually, \$1.50.

Outlets for publication of natural history investigations are relatively few in New Zealand. We have a choice between a small number of society journals, "Records" of the municipal museums, the DSIR journals, or the *Journal* of the Royal Society of NZ, the last three series of periodicals being regarded as the acme of scientific publishing in this country. University-based and student-sponsored periodicals, however, are now playing an important role in encouraging undergraduates to cut their teeth on the techniques of communication of the results of their researches and investigations. This is, perhaps, the most important task of the professional scientist; the clear and unequivocal paper will always be a pleasure to read and study, and the attainment of this end must be the duty of every young scientist. The university journals have much to commend them in helping such a hope to become reality. The Field Club of Auckland University has published *Tane* since 1948; Victoria University of Wellington has its *Zoology Publications*, *Tuatara*, and the student-organised *Bulletin of Natural Science*; the Otago University Students' Association produces *Science Record*; each of the journals is of a different nature and between them do a valuable service to science. Now the Biological Society at the University of Canterbury has entered the field with *Mauri Ora*, a new journal whose name "signifies the Maori concept of the soul of Nature, and pays tribute to an ancient tradition attuned to the indigenous flora and fauna of our shores, streams, and forests."

Mauri Ora resembles *Tane* in that it is largely a vehicle for publication by members of the Biological Society with contributions "from other sources at the invitation of the Editorial Committee." The Editorial states: "*Mauri Ora* is expected to be an annual journal, devoted to the publication of papers on original research in biology, and this first issue represents a milestone in student biological research in the University of Canterbury. Its main purpose is to provide a journal in which undergraduate student research projects and graduate research can be published and circulated to a wide scientific audience. Its appearance expresses a confidence that suitable contributions will continue to be forthcoming, and it is the journal's policy to offer contributors a consistent and accurate presentation of their work."

We congratulate the Biological Society on this venture and wish it every success in the difficult task of producing and maintaining a regularly-appearing journal.

A look through the contents list reveals a wide range of topics including — an editorial outlining a history of biology in University of Canterbury, coinciding with the Centennial of the University celebrated in May 1973; the ecological niches of the Manuka and Kanuka, a paper of considerable interest to all biologists concerned with patterns of distribution and environmental gradients; a review of the breeding biology and population dynamics of the Weddell Seal; movements and social behaviour of the opossum; helminth parasites of eels; energetics of captive house mice; and, a comparison of nutrients in leaves and litter of beech forests. Of particular interest to those concerned with birds are the following articles: "The distribution of the blue duck . . . in the South Island: a preliminary survey" by R. E. Fordyce & G. A. Tunncliffe; "Observations on nesting sites of the welcome swallow . . . Lake Ellesmere, Canterbury" by O. R. Hughes; "Sub-fossil avian remains from two limestone caves in North Taranaki" by C. D. Paulin. Special attention should be given to Geoff Tunncliffe's review of "The avifauna of Lake Ellesmere, Canterbury." This paper gives a comprehensive review of the literature and examines the status of the 129 species recorded from Lake Ellesmere including some discussion of the record of the Banded Stilt (*Cladorhynchus leucocephalus*) based on a specimen in the Canterbury Museum. Important comments are given on the probable causes of changes in numbers of Black Swans and Canada Geese, and on the effects of lake level and predators. Suggestions for future work are offered including an examination of the role of Lake Ellesmere as a major wader habitat particularly in relation to future proposals for man-made modification of the Avon-Heathcote Estuary which might be regarded as acceptable by those planners who envisage Lake Ellesmere as an alternative habitat for the South Island Pied Oystercatchers and Bar-tailed Godwit now so characteristic of the Christchurch estuary system.

Mauri Ora, even if it proves to have so short a life as the *Waikato Earth Sciences Journal* or even the *Bulletin of the Auckland University Zoology Department*, has already earned its place in the literature of the natural history of New Zealand. We look forward, with anticipation, to the next issue due in 1974.

E. W. D.

The Sea Swallow, Vol. 22. Being the Annual Report of the Royal Naval Bird Watching Society 1971/72. 68 pp., illus.

Sea birds are of interest to a great many members of the OSNZ, although few have the opportunity of studying them in the open sea and often have to content themselves with meeting the petrels, penguins and albatrosses of the Southern Ocean washed up on the beach patroller's terrain. The Royal Naval Bird Watching Society, whose restricted membership includes only a handful of New Zealanders (amongst whom your reviewer is privileged to be included), comprises some 300 members of the Royal Navy and the Merchant Navy and allied services. The main role of the Society is in utilising members' opportunities for observations of birds at sea by encouraging them to fill in Sea Passage Report Forms for their voyages throughout the world as well as providing, by the publication of *The Sea Swallow*, a way in which they may write up accounts of islands visited, land birds at sea, and so on. This journal is, in fact, complementary to *The Marine Observer*, a periodical issued by the Meteorological Office (U.K.) and one that is not as well known to marine biologists and ornithologists as it ought to be. Not surprisingly, a great mass of information has accumulated since the Society began its work 25 years ago. Much of this has been published in the Society's Annual Report which is *The Sea Swallow* but there is some inevitable delay in presenting such detail so that, for instance, the Report for 1971/72 published in 1973 summarises passage reports to 1969. Nevertheless, *The Sea Swallow* is an important journal and necessary for all those concerned with the distribution and numbers of seabirds. Apart from runs held by individual members, the only sets of this journal held in New Zealand libraries are in the National Museum, Wellington, the Department of Zoology, University of Canterbury, Christchurch, and the New Zealand Oceanographic Institute, Wellington, which holds the complete series from Volume 1 in 1947. These are available, of course, through the Interloan Service of the National Library of New Zealand.

Dr W. R. P. Bourne, M.B., Ch.B., the well-known writer on Petrels and their kin, has aided the Society immensely for a long time in preparing the passage reports for publication and everyone will be indebted to him for this labour. In the latest volume to be issued, there is, for example, a long (pp. 29-60) "Review of observations on seabirds, 1967-1969" by W. R. P. Bourne and T. J. Dixon, of the Seabird Group, Aberdeen University, in which a great deal of useful and important information from all parts of the world is recorded based on "400 pages of reports, 255 census sheets, 54 pages of notes, and 41 reports of birds examined in the hand." The compilers make some useful comments on the problems of recording and handling such information and on more efficient and reliable methods of recording bird distributions and densities at sea particularly in forms suitable for mechanical handling by computer. To this reviewer's mind there is, however, still the basic question mark hanging over many records of birds allegedly properly identified which may reach the unsuspecting computer. A very well-known New Zealand seabird authority once told me that he doubted everyone else's identifications and would not vouch for his own too often. Admirable though the RNBWS summaries are, and all the more so because of Dr Bourne's vetting, there is still

a profound need for better guides and critical studies, such as we have had in *Notornis* on prions and the Soft-plumaged Petrel, by people who really know their seabirds, which might stress, in particular, the pitfalls awaiting the beginner or those, experienced elsewhere, who move into a new geographical area. As more research and fisheries vessels are used in local waters, further opportunities for observing at sea will come about, and much information such as the RNBWS presents will be amassed here. We must ensure as best we can that the identifications, at least, are well-founded. We may, then, be a leap ahead of the well-known seabird man and take other people's identifications without the usual grain of salt.

This *Sea Swallow* concludes with a review by "W.R.P.B." of *The Handbook of Australian Sea-birds* by Serventy, Serventy & Warham in which the reviewer has this to say: "This is one of the more important seabird publications of recent years, by three of the most experienced authorities on Australasian seabirds . . . The information provided is much more accurate and comprehensive than in some other recent books, and the authors supplied much of it themselves. . . ." One wonders what motivates the reviewer's final remarks: "It is a pity this outstanding work took a decade to be published; some more recent antipodean experts are going to find it hard to compete with it."

We congratulate the RNBWS on the celebration of its 25th Anniversary and echo the hope of the President, Admiral Sir Nigel Henderson, G.B.E., K.C.B., "that in the next 25 years the Society will go from strength to even greater strength and will continue to provide interest and enjoyment for those who participate in its work."

E. W. D.



New Zealand water birds. An artist's journal, by Elaine Power. Pp. [88], col. pls 22, b & w pls 20. Collins: Auckland and London, 1975. \$8.40.

This is a delightful book! What more can one say but echo the words of a reviewer of Mrs Power's first book of paintings *Small birds of the New Zealand bush* (1970): "It is hard to find words to express the delight which this book has given me." (R. J. Scarlett, *Notornis* 17: 134; 1970). Another reviewer of this first book ("R.B.S.," *Emu* 72: 37; 1972) made this prophecy: ". . . with it we may see the dawn of a new era in the perceptive portrayal of New Zealand's native birds." Mrs Power has amply fulfilled this hope not only with her later volume *Waders in New Zealand* (1971) but with this most enjoyable "artist's journal" of water bird studies. She is now firmly established as one of the leading bird painters not merely in New Zealand but on the world scene. Happily she combines an informative and accurate text with her sensitive and realistic portraits so that for overseas readers, in particular, a very fine and useful introduction to the life and appearance of many of the characteristic birds of our country is provided.

Those who know their birds will in the field will always find something to quibble about in the stance, colouration, or incongruous setting in which any bird is portrayed by an artist, whether it be by Peter Scott, Roger Tory Peterson, Chloe Talbot-Kelly, Molly Falla, Janet Marshall, or Elaine Power. Perhaps the camera does not lie

but our noted bird photographers are not immune from similar weaknesses. Any such shortcomings in Mrs Power's books will not detract from the almost indescribable pleasure they give.

The fault of *New Zealand water birds* lies only in its price. For \$8.40 you get 88 pages with 22 coloured plates and 20 black-and-white illustrations of 21 species of birds in contrast to the \$2.50 you paid in 1970 for 20 species of *Small birds* in 48 pages with 21 coloured plates and 17 b & w figures and \$3.20's worth of *Waders* in 1971 with 48 pages, 11 coloured plates, 10 b & w figures, showing 20 species. Statisticians could doubtless assure us that we are still getting value for money despite the cost-of-living adjustments, and I believe them for in *Water birds* we have not only the final, polished portraits of Mrs Power at her very best showing many of the New Zealand pond, river, and swamp birds which we know and enjoy but also an interesting array of preliminary artist's sketches which form the basis of the finished portraits. Her "Introduction" provides a special enjoyment in itself and Mrs Power would seem to have another career ahead of her as natural history writer! Those who have spent hours watching the displays and feeding behaviour of ducks will envy Mrs Power her undoubted talents in capturing so deftly the intriguing postures and stances so characteristic of this group of water birds. Those who admire the cheeky and mischievous Weka (anthropomorphism if you like) will welcome her lively sketches, and the Pukeko also endears itself further to us in her simple outlines.

Let me use R. J. Scarlett's other words about Mrs Power's first book but extend them, in gratitude, to this magnificent offering (published in good time for early Christmas shopping, and with a handy slip-case for mailing to friends): "I can think of no better book than this to give any nature-lover."

E. W. D.



A treasury of New Zealand bird song. Supplement No. 1. Kiwi Treasury Record No. 4. Recorded by Kenneth and Jean Bigwood. Spoken introduction by Gordon R. Williams. Kiwi Record EC-25. Wellington: Kiwi Records (A. H. & A. W. Reed). \$1.75.

This 45rpm extended play record presents 10 more birds from the collection by New Zealand's pioneer recordists Kenneth & Jean Bigwood. While some of the recordings on this disc are not up to today's standards, this is not the fault of the recordists but more the limitations of the recording equipment in use in both the field and the studio. It is a pity that this disc represents the finish of the Bigwoods' efforts in the select field of bird recording as not nearly enough is being done by anyone in this country. The disc which sells at \$1.75 has a twelve page booklet enclosed and presents the following ten birds:

North I. Kiwi
N.Z. Falcon
Pukeko
Shining Cuckoo
Kingfisher

Whitehead
Pipit
Brown Creeper
Silvereye
Black Swan

Most New Zealand ornithologists who are interested in field identification would find this disc of some help as most of the species can be named without seeing the actual bird.

L. B. McP.

Sea birds calling. A Treasury of New Zealand bird song. Supplement No. 2. Kiwi Treasury Record. Recordings by the Wildlife Service, Department of Internal Affairs. Introductory quotations read by Gordon R. Williams. Kiwi Record EC-34. Wellington: Kiwi Records (A. H. & A. W. Reed). \$1.75.

This disc, a 45rpm extended play record, presents ten seabirds from the National Sound Library collection and is of a superior quality illustrating the advances made in recording equipment in recent years. The twelve page booklet gives the full names both common and scientific and states where the original recordings were made. This disc, being devoted to seabirds, is perhaps of restricted interest to many ornithologists although it is, to my knowledge, the first commercial disc in the world of seabirds only. The record sells at \$1.75 in most good record shops. The ten species are:

Wandering Albatross	Sooty Shearwater
Australasian Gannet	Fluttering Shearwater
Little Blue Penguin (Northern)	Wedge-tailed Shearwater
White-fronted Tern	Southern Diving Petrel
Caspian Tern	Broad-billed Prion

In most cases the calls presented on this disc are the ones that you would hear if you were in the area when the birds are vocally active. The New Zealand Wildlife Division is to be commended for making this material available for publication. One hopes further discs will be published in due course.

L. B. McP.



W. D. GRAUL. 1973. Possible functions of head and breast markings in Charadriinae. *The Wilson Bulletin* 85 (1): 60-70.

In a review of possible functions of head and breast patterns 37 species of plover and dotterel are compared. An attractive diagram shows 24 breeding adult head and breast patterns, including all the New Zealand species. The patterns disrupt body and eye outlines, which is especially important for the nesting bird, and in some they may enhance sex recognition and reinforce aggressive display. A Primitive *Charadrius*, it is suggested, had breast bands and nested on shingle, and as the genus radiated the markings gained the function of social signals and were modified by selection for new habitats. In Banded Dotterel and Killdeer, the breast bands are enlarged in threat posture and thus reinforce aggressive displays. The theory that dark lore lines in Charadriinae function as sight lines for capturing prey is rejected.

R. E. Phillips is acknowledged for unpublished field observations on New Zealand species. The statement (supplied by the reviewer) that in the Shore Plover the breeding plumage is not brighter than the non-breeding needs checking in the field. *Charadrius* is used for the Shore Plover and *Pluvialis* for the Red-breasted Dotterel.

C. A. F.

NOTES AND NEWS

SPUR-WINGED PLOVER IN MARLBOROUGH

Mr Bill Chisholm of Molesworth Station, Marlborough, writes that two Spur-winged Plovers have "taken up residence since January 1973 in the swamp area of the Tardale paddock on Molesworth. Brief sightings were made at Red Gate, some eight miles north east of Tardale, in June 1968."



SWALLOW AT SEA

We are grateful to Capt John Jenkins for passing on a letter (dated 8 May 1973) from Mr R. H. Smart, Third Officer of the m.v. *Ngahere* (USS Co. of NZ Ltd.) in which he writes: "A common swallow with a white underside, orange upper breast and forked tail was seen off the vessel for five minutes prior to landing on the fore deck. The hands were off at smoko, and it remained with the vessel till they started chipping. Our position was 169°29'E, 34°15'S, Three Kings 088°, 124 miles. The vessel was headed for the islands. The weather had been settled for three days but southerly winds had been experienced in this area for two days prior to the vessel reaching the area . . ."



RARE BIRDS AT A RARE PRICE!

"A pair of rare stuffed huia were sold last night by auction in Foxton for \$1900. The long-extinct New Zealand native birds, one male and one female, were bought by an Auckland private collector. Bids for the birds started at \$450 each and went up in \$50 lots."

Source: *The Evening Post* [Wellington], 11 August 1973, p. 7.



BIRDS AND STAMPS

Those ornithologists and/or philatelists who found our notes in the March 1973 issue of *Notornis* of interest will be pleased to know that Mr Arthur Parrott is continuing his series in the Saturday editions of *The Press*, the Christchurch morning paper. In "Stamp Creatures — XV," he surveys the history of myths about the kea's habits and gives much of interest about its characteristic behaviour, concluding with a commentary from J. R. Jackson's "impartial analysis," as Mr Parrott calls it, in *Notornis* 10: 33-38, 1967. Commending this analysis, Mr Parrott says: "I know that many high country sheepmen will not agree with Mr Jackson, but what evidence sheepmen can produce is not, by any stretch of the imagination, impartially obtained or evaluated." Mr Parrott's article is worth asking to see in the newspaper files of your library if you want a good account of this delightful, and much maligned, mountain-inhabiting bird.

In a subsequent issue of *The Press*, Mr Peter Newton, former manager of several high country sheep stations and New Zealand's foremost writer on station life, disputes some of Mr Parrott's statements. One point was that, in contrast to the remark that kea nests

are usually only above 3000 feet, Mr Newton has, in more than 30 years working in kea country, found four nests below 2500 feet and he suggests that "this is because the kea normally nests in mid-winter, when the higher country is liable to be under snow." Mr Newton also gives details of the contents of the nests. He takes issue with Mr Parrott also "in his claim that as a killer the kea has been condemned on circumstantial evidence." Mr Newton concludes that, while "there will have been gross exaggeration in reports on killing by these birds . . . their depredations have been so widespread that it is hard to understand anyone still doubting that the kea is a killer." A record is also given of a kea in captivity at Mount Somers station which is now at least 27 years old.

Reference: PARROTT, A. W. 1973. Stamp creatures — XV. Kea: clever N.Z. bird condemned by many. *The Press* [Christchurch], 28 July, p. 12; NEWTON, P. 1973. Keas: another opinion. *The Press* [Christchurch], 11 August 1973, p. 12.

Further to the topic of birds on stamps, we are indebted to Mr J. W. Brodie for finding the following references to some early articles on the habits, characteristics and mythology of birds portrayed on stamps which appeared many years ago in *Scott's Monthly Journal*, an American philatelic magazine. These articles were reprinted in *The New Zealand Stamp Collector* of 1927, as follows: "'Ornithophilately,' a study of birds and of stamps" 1 August, pp. 139-142; 1 September, pp. 160-161; 1 October, pp. 175-177. Copies of these articles, provided by Mr Brodie, have been sent to the OSNZ library since they may be useful to a number of members.



LODER CUP AWARD

Fellow members of the OSNZ will wish to congratulate Mrs K. Reynolds of Whangarei on the award of the Loder Cup. This honour is made annually, "Offered to lovers of nature in New Zealand to encourage the protection and cultivation of the incomparable flora of the Dominion." The cup was presented by Mr Gerald W. Loder (later Lord Wakehurst), a notable cultivator of New Zealand plants in England, who was so impressed by what he termed the "incomparable flora" seen during a visit to this country towards the end of last century that he wanted to find some way of encouraging the preservation of the New Zealand flora. The first award was made in 1929 to Messrs Duncan & Davies Ltd of New Plymouth, and the list of recipients is impressive including many people who have played their part in fulfilling Lord Wakehurst's wish.

A history of this unique award, with names, portraits and citations of each of the winners (up to 1954) was published in 1960 under the title "*The History of the Loder Cup. A review of the first twenty-five years.*" This interesting booklet is still available (price 50c) from the Secretary of the Loder Cup Committee (Mr K. J. Lemmon, P.O. Box 450, Wellington) from whom further details of the conditions and method of nomination may be got. It is worth noting that not only are individual "lovers of nature" eligible but also "Any . . . association, society, firm, company, local body, or body of persons . . ."

WILDLIFE SERVICE SOUND LIBRARY

Those interested in natural sound recording will be pleased to know that the Wildlife Service has now issued a second edition of its catalogue of holdings of recordings as noted in *Notornis* 19 (4); 350 (1972). The number of species and subspecies of birds now available as recordings is 168 in contrast to the 143 of the earlier catalogue issued in 1971. Fur Seal, Sea Lion, Red Deer, Tuatara, frogs and cicadas have also been recorded. Conditions of loan or copying are set out in the "Introduction" provided by Mr J. L. Kendrick, Audio and Visual-aids Officer of the Wildlife Service. *Reference:* Information Section, Wildlife Service, Department of Internal Affairs, Wellington. *Sound Library Catalogue*. Edition No. 2. October 1973, 26 pp.



DEATH OF DR D. A. BATHGATE

We are sorry to learn of the death at the age of 78 of Dr D. A. Bathgate of Hastings who was well known throughout New Zealand as a naturalist and a conservationist.

"Dr Bathgate who practised medicine for 47 years was for a time doctor to men working on the Otira tunnel. He has been superintendent of hospitals at Ashburton, Waihi, Thames, and the King Country before buying a practice in Hastings in 1929. Dr Bathgate was a national vice-president of the New Zealand Forest and Bird Society and was a member of deputations responsible for having Waipoua Kauri Forest preserved and the Urewera district set aside as a national park. . . . was also a lecturer, broadcaster, and writer on nature conservation." He was the winner of the Loder Cup in 1965.

Source: Death of doctor who was noted naturalist. *The Evening Post* [Wellington], 11 September 1973, p. 16.



NEW DIRECTOR FOR TARANAKI MUSEUM

Mr Nigel Prickett has been appointed Director of the Taranaki Museum, New Plymouth, following the retirement of Mr Rigby Allan. He will take up his position at the end of November after completing his M.A. thesis in Anthropology at Otago University. Mr Prickett is 29 years old, born in Christchurch and educated at Wanganui Collegiate. He completed a B.A. in History at Victoria University of Wellington in 1968. Fellow members of the OSNZ will want to wish him well in his new position.

Source: *The Taranaki Herald*, 5 July 1973; *The Wanganui Herald*, 10 July 1973.

FROM THE EDITOR'S DESK

THE YOUNG CONSERVATOR OF THE YEAR

The articles in this issue by Barrie Heather and Don Hadden on the Black-fronted Dotterels of the Wairarapa serve to introduce a worthy award of the Young Conservator of the Year made to Michael Dennison, a 15 year old fifth form pupil at Wairarapa College, Masterton. Michael is an active member of the OSNZ and has played a useful part in the Black-fronted Dotterel survey both in the Wairarapa and in Hawkes Bay.

He is especially interested in the Bird Distribution Mapping Scheme and is currently involved with other members of the OSNZ in a survey of birds of the Wairarapa. Michael's other interests include cricket, tramping, rugby, and, in particular, photography from which he is building up a good collection of bird slides.

The award of Young Conservator of the Year is sponsored by the Nature Conservation Council as the highlight of the Nature Conservation Week Campaign, and it goes to a young person under the age of 18 who has shown "an enterprising and active interest in conservation." The NCC leaflet on the award states that it "is intended to encourage conservation activities by young people, giving recognition to those who have made an outstanding contribution, and stimulating others to follow their example." Further, it is stated: "Bearing in mind the age of the nominee, the judges look for — evidence of genuine interest in conservation; personal initiative in some conservation activity; voluntary participation in conservation projects. Importance is placed on sustained interest over a long period, and the developing of projects rather than isolated bursts of activity." Further details of the Award can be obtained from the Secretary, National Conservation Week Campaign Committee, P.O. Box 5014, Wellington.

Let us extend the Ornithological Society's congratulations to the Young Conservator for 1973, and hope that he will continue to be a valued member of our community in following on with his enterprise, enthusiasm and active interest in conservation and the environment, perhaps to make his own mark amongst those who have found their career in the natural history of New Zealand.

CONSERVATION & THE OSNZ

The role of the Ornithological Society of N.Z., Inc., both as a corporate body and as individual members offering or being asked for comments or expertise, has been debated frequently. The expression of opinion given by the Society's Council as presented in this issue of *Notornis* will doubtless provoke reactions, favourable or otherwise, from those who care about such matters. Further public discussion is probably best confined to the ephemeral atmosphere of Annual General Meetings as in the past but because such a statement from council is an important event in itself in the Society's history, the columns of *Notornis* will be open for the strictly limited period of the forthcoming December and March issues in case some members have remarks to make which they believe deserve either a wider audience or a more permanent record for posterity.



Michael Dennison, Young Conservator of the Year, receiving a pair of inscribed binoculars, as part of his award, from the Chairman of the Nature Conservation Council (Sir Robert Falla), August 1973.

Photo: John Cleland Photo Studio Ltd.

FROM THE SECRETARY

COUNCIL POLICY STATEMENT ON CONSERVATION AND THE ENVIRONMENT

In recent years there has been an increase in threats to birds in New Zealand as a result of pollution and habitat destruction. We are now facing a potential environmental crisis with wide-ranging changes in land use and shifts in human populations which may radically affect the variety and distribution of the birds we watch and study.

Members of the Society must feel concern for the future and will wish to know how the Society, or they as individuals, can help in any way to mitigate the impact of these changes. At recent meetings the Council has discussed the matter at some length and has felt that it should issue a policy statement on just how the Society can make an effective contribution to bird conservation, and ways in which individual members can help.

Council feels that the basic aims of the Society should continue to be as stated in the Constitution: the encouragement and direction of the study of ornithology, particularly in New Zealand, the publication of a journal and co-operation with other bodies of similar interests. To this end, Council will be prepared to recommend local and national projects which will often be important for conservation reasons. The Society should associate itself with, and lend full support to, voluntary and governmental conservation bodies; but the Society should not normally take independent action on conservation matters. It is felt that threats to birds and their habitats can best be handled by the specialist conservation bodies constituted specifically for this purpose. Further duplication of effort in the conservation field should be avoided, and the Society should not itself develop into yet another conservation body. Its function should be to supply facts and data to conservation bodies such as the Nature Conservation Council, Royal Forest and Bird Protection Society, and environmental action groups. Council will continue to maintain close contact with these bodies.

Council wishes, however, to encourage individual members to help in the following ways:

- (a) By personal support for the voluntary conservation bodies.
- (b) By helping the Wildlife Branch of the Internal Affairs Department and the Department of Scientific and Industrial Research in monitoring counts of various bird species and implementing joint projects such as the Bird Distribution Mapping Scheme, Beach Patrols, etc.
- (c) By keeping close touch with local representatives of the conservation organisation and reporting to them or the Society's Secretary at once any information on developments posing a threat to birds or the environment.
- (d) By gaining knowledge of local areas and collecting data on species and numbers throughout the year, and by supplying such information to Regional Representatives or to the Convener of the Bird Recording Scheme, so that factual evidence

- of the importance of a threatened area is immediately available.
- (e) By writing privately to the Press, local member of Parliament, a Cabinet Minister, as appropriate, with their views on any threats in their areas.

J. A. FOWLER
Hon. Sec., OSNZ Inc.



STUDENT MEMBERS

Although a synopsis of the proceedings of the last AGM was contained in the June issue of this journal, I have had a request to state, in full, the single amendment that was made to the Constitution.

The motion, as published on the agenda, was amended twice before finally being put to the vote in the following form:

“Members Clause 5 (b) be deleted and replaced by —
Members Clause 5 (b). Student members twenty years of age or under who elect to receive a 25% rebate from their annual subscription on application to the Treasurer shall be entitled to full rights of membership except that they shall not be eligible for election to Council.”

In practical terms, as stated in my synopsis, the effect of the amendment is to allow student members to cast votes in elections and General Meetings.

J. A. FOWLER
Hon. Sec., OSNZ Inc.

CHANGE OF ADDRESS OF RR

Mr. Norman Mackenzie, RR for Hawkes Bay, may now be contacted at: Wildlife Trust, Main Road, Westshore, Napier.

JUST PUBLISHED !

The Fiat book of common birds in New Zealand, Vol. 2. Mountain, bush and shore birds. By Janet Marshall, F. C. Kinsky and C. J. R. Robertson, September 1973. 96 pp., 40 pls. Wellington, &c.: A. H. & A. W. Reed Ltd., \$1.95.

REPRINTS

The Editor extends his apologies to those who have not yet received their reprints from the last issue. Staff changes at our printers have necessitated some delays in the usual procedure.

ABOUT OUR AUTHORS

On the suggestion of several long-standing members of the Society, this feature of *Notornis* will be discontinued with the present issue unless other members express a contrary desire.

REGIONAL REPRESENTATIVES

FAR NORTH: A. T. Edgar, Inlet Road, Kerikeri
 FAR NORTH:
 NORTHLAND: D. E. Crockett, 21 McMillan Ave., Kamo, Whangarei
 AUCKLAND: Mrs. S. Reed, 4 Mamaku Street, Auckland 5
 SOUTH AUCKLAND: Mrs. Beth Brown, 39 Red Hill Rd., Papakura
 WAIKATO: D. Wilkins, 163 Newcastle Road, Dinsdale, Hamilton
 BAY OF PLENTY: R. M. Weston, 250 River Road, Kawerau
 VOLCANIC PLATEAU: R. W. Jackson, 9 Kenrick Road, Rotorua
 GISBORNE/WAIROA: A. Blackburn, 10 Score Road, Gisborne
 TARANAKI: D. G. Medway, P.O. Box 476, New Plymouth
 MANAWATU: Dr I. G. Andrew, 6 Eton Place, Palmerston North
 HAWKES BAY: N. B. Mackenzie, Wildlife Trust, Main Road,
 Westshore, Napier
 WAIRARAPA: Miss H. Cook, 15 Wallace Street, Featherston
 WANGANUI: Michael O'Shea, 29 London Street, Wanganui
 WELLINGTON: Dr. J. A. Fowler, "Manu Korero," 2/1030 Fergusson
 Drive, Upper Hutt
 NELSON: F. H. Boyce, 19 Marybank Road, Nelson
 MARLBOROUGH: J. A. Cowie, P.O. Box 59, Kaikoura
 CANTERBURY: J. R. Jackson, 103 Linwood Avenue, Christchurch
 WEST COAST: Vacant
 OTAGO: Mrs. J. B. Hamel, 42 Ann Street, Roslyn, Dunedin
 SOUTHLAND: R. R. Sutton, P.O., Lorneville, Invercargill



LITERATURE AVAILABLE

From all bookshops:

Annotated checklist of the birds of New Zealand. (OSNZ)	\$4.95
A field guide to the birds of New Zealand, by R. A. Falla, R. B. Sibson and E. G. Turbott, 2nd rev. ed.	\$5.00

From B. D. Heather, 10 Jocelyn Crescent, Pinehaven, Upper Hutt:

A biology of birds, by B. D. Heather.	\$1.33
---------------------------------------	--------

From B. A. Ellis, 44 Braithwaite Street, Wellington 5:

Field guide to the waders, by H. T. Condon & A. R. McGill.	75c
---	-----

*The following are available from Mrs. H. R. McKenzie, P.O. Box 45,
 Clevedon:*

Back numbers of Notornis at 75c (Vols 2-13) and \$1 per part (Vols 14-19). Complete sets available.	
OSNZ Library catalogue, 70 pp.	50c

Banding reports, Nos 8-14, 50c each.	
Nos 1-7 are incorporated in early issues of Notornis.	
Kermadec Expedition, 1964, by A. T. Edgar.	45c