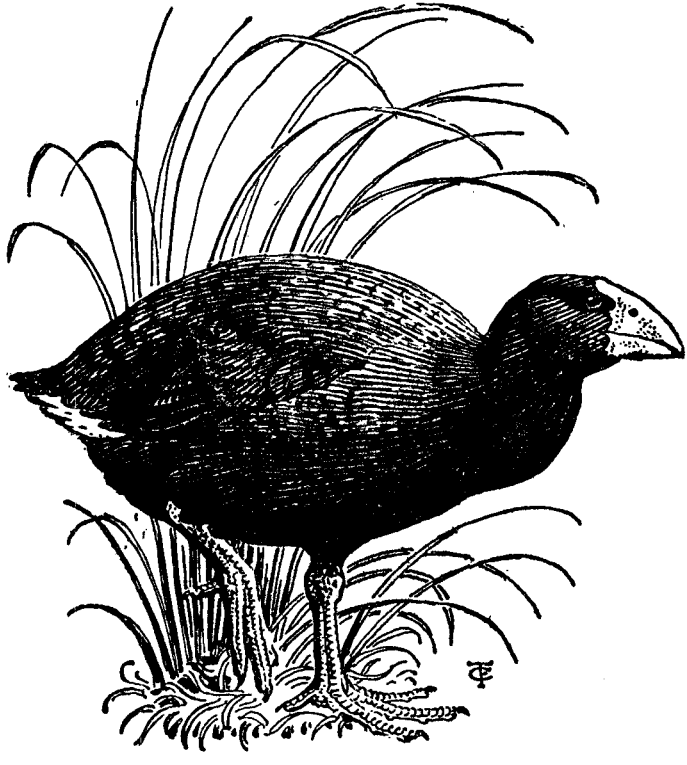
NOTORNIS

Journal of the Ornithological Society of New Zealand



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CONTENTS

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NORTHERN SHOVELERS (ANAS CLYPEATA) IN NEW ZEALAND

By F. C. KINSKY and E. B. JONES

ABSTRACT

Two further occurrences of the Northern Shoveler in New Zealand are recorded and discussed. These ducks probably originated from North America and have been in New Zealand long enough for their moult cycle to have been adapted to Southern Hemisphere conditions.

Howard (1968) published the first occurrence of a Northern Shoveler (*Anas clypeata* Linnaeus, 1758) in New Zealand, a bird collected on 6 May 1968 in the Maungatawhiri Swamp, Lower Waikato.

Since then two further occurrences of this duck, both from the Manawatu District, can be reported as follows:

(a) A drake in full breeding plumage was collected by Mr R. McDonald of Levin on 4 May 1969, on Lake Ngakawau, situated between Lake Horowhenua and Waitarere Beach. This specimen was mounted by a local taxidermist and was eventually donated to the Dominion Museum (DM-16442).

(b) Another drake of this species, again in full breeding plumage, was observed by E. B. Jones on 7 August 1971, resting with Mallards *(Anas platyrhynchos)* and New Zealand Shovelers *(Anas rhynchotis variegata)* on the shore of Lake Horowhenua.

In size, shape of bill, general flight pattern and silhouette, both the Northern and New Zealand Shovelers are very similar. Drakes of either species in eclipse plumage cannot be distinguished from each other in the field. Females are difficult to tell apart in the field, though Northern Shoveler females are generally lighter and more buff all over than the darker New Zealand race.

FIGURE 1: Northern Shoveler drake *(Anas clypeata)* in full breeding plumage collected at Lake Ngakawau on 4 May 1969. Note uniformly dark (glossy green) head and neck, pure white upper breast extending sideways and up to form a white mantle, conspicuous white scapulars, and large white flank patch.

Photo: J. Kendrick

However, the Northern Shoveler drake in breeding plumage is one of the most colourful ducks in the world and cannot be confused with any duck occurring in New Zealand (Fig. 1). This breeding plumage differs from the New Zealand Shoveler by its uniformly dark glossy green head and neck, its pure white breast reaching up on both sides to form a white upper mantle, its white scapulars forming a conspicuous white area separating the blackish-brown back from the folded wing and its large white flank patches, which are larger and more prominent than with the New Zealand Shoveler. In many instances there is a white line connecting the white flank patches and crossing the vent, separating the rich chestnut-brown on the belly from the black undertail coverts. This colour pattern, if present, is very obvious on a bird in flight or when upending while feeding. Some authors emphasize this colour pattern in text and illustrations as an obvious field character (e.g. Bauer & Glutz von Blotzheim 1968; Peterson *et al.* 1959; Peterson 1961; Pough 1951), but it is not mentioned by others (e.g. Delacour 1956; Godfrey 1966; Witherby *et al.* 1948). In addition some authors, although not specifically mentioning this character, show it on accompanying plates (e.g. Bruun & Singer 1970; Etchecopar & Hue 1967).

There are five male Northern Shovelers in full breeding plumage in the Dominion Museum collections (including the one collected in New Zealand in May 1969) and none of these show the white line crossing the vent. In the collections of the Alexander Konig Museum in Bonn only two of the nine specimens show this character (G. Niethammer *in litt.)*. However, the white line connecting the white flank patches is present on the specimen collected in the Waikato in 1968 (Howard 1968) and was very obvious on the drake observed on Lake Horowhenua in August 1971. It is therefore evident that this character is a very variable one, and may depend on age, the plumage stage (fresh or worn), or may be just an individually variable character.

The Editor's note (including Australia within this duck's range as a stray) added to Howard's (1968) report is basically correct, but possibly misleading. The Editor's information could have been obtained from Bent (1923), who included Australia in the winter range of this species. However, Slater (1970) mentioned only one Australian record in 1839, and stated that it " needs confirmation." Frith (1967) quoted Gould (1865), who reports having seen several male Northern Shovelers during the 1839 rainy season in New South Wales. It is evident, therefore, that the occurrence of Northern Shovelers in Australia depends on Gould's sight-record alone (some 130 years ago) and that this species has never been recorded in Australia since.

The recent occurrences of *A. clypeata* in New Zealand leads to speculation on their origin. The Northern Shoveler breeds throughout the Palearctic and the Nearctic Regions (Holarctic), and is migratory throughout its range. The main winter quarters of European populations are around the Mediterranean, in East Africa and in

Asia Minor, with occasional stragglers occurring in South Africa. The Asian populations winter throughout southern Asia including Formosa and the Philippine Islands, and some individuals reach North Borneo on their southward migration. The majority of the North American populations migrate to southern North America, Central America, the West Indies and the northern parts of South America. However, some of the western North American shovelers migrate south westwards to winter on the Hawaiian Islands. Although Vaurie (1965) mentioned the Northern Shoveler as occurring in Hawaii only as a casual winter visitor, other authors, e.g. Bauer & Glutz von Blotzheim (1968), Peterson (1961, Pough (1951), Bent (1923), Peters (1931), and Witherby *et al.* (1948), list the Hawaiian Islands as regular winter quarters for this species. Vaurie (1965) mentioned that Northern Shovelers were collected on Tinian (Mariana Islands) in October 1945 and on Ponape (Caroline Islands) in December 1947 and in January 1948, and he also listed an occurrence of a Northern Shoveler collected in the Tuamotu Archipelago in March 1923. Baker concluded that Northern Shovelers are, therefore, casual visitors to Micronesia and to other parts of Oceania.

The stragglers reaching Micronesia were all collected during the northern autumn and winter and were probably individuals of eastern Asiatic populations blown off course on their migration from Japan or Korea to the Philippine Islands. However, birds of this species reaching New Zealand and the Tuamotu Archipelago are more likely to have originated from North America. Assuming they missed the Hawaiian Islands on their usual autumn migration, it appears that they carried on in the same direction to eventually reach New Zealand.

All the Northern Shovelers found in New Zealand up to the present time were recorded in May and August respectively (i.e. during the Northern Hemisphere breeding season), which may indicate that because of the unusually large distance travelled they have lost their migratory urge, and remained in New Zealand.

In Europe the post nuptial moult (the transition from breeding to eclipse plumage) of this species commences in May, and drakes are flightless from July to August (Bauer & Glutz von Blotzheim 1968). In British populations the breeding plumage is retained from about December to May, when the post nuptial moult sets in, and drakes are in full eclipse plumage from July to September (Witherby *et al.* 1948). Bent (1923), discussing the plumage changes of this species in America, stated that the post nuptial moult starts in early "July and is very rapid," whereas the next moult out of eclipse into breeding plumage "is more protracted" beginning in the middle of October and not being completed until December.

New Zealand Shoveler drakes are in full breeding plumage from April or May to approximately October, when the post nuptial moult starts. Most drakes are in full eclipse plumage from about

December to March, although some individuals already assume full eclipse plumage in November, and others will have not reached full breeding plumage before May (T. Caithness pers. comm.).

All specimens of Northern Shovelers recorded in New Zealand were in full breeding plumage. Even the bird seen in August was in full breeding plumage at a time of year when drakes in the Northern Hemisphere are in full eclipse plumage, and no sign of moult was found on the two specimens collected during early May. From this it could be assumed that some Northern Shovelers reached New Zealand before 1968, remained undetected and have stayed in New Zealand long enough to adapt their moult cycle to Southern Hemisphere conditions.

A factor further supporting the extended presence of Northern Shovelers in this area is the possibility of hybridization having occurred between *A. clypeata* and *A. rhynchotis variegata*. On 21 August 1971, E. B. Jones observed a drake on Lake Horowhenua, the colour pattern of which plainly showed characteristics of both species. Its head was bluish grey with a prominent white crescent in front of the eye, typical of the New Zealand Shoveler. However, it had a pure white breast, with the white extending sideways and up to form a collar on the upper mantle. It also had prominent white scapulars, both typical characters of the Northern Shoveler drake. The same bird, or a very similar one, was seen again on Lake Horowhenua on 9 November 1971. These birds may have been just New Zealand Shovelers, showing signs of partial albinism, but the possibility of hybridization cannot be disregarded.

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FIRST NEW ZEALAND RECORD OF MAGELLANIC PENGUIN (Spheniscus magellanicus)

By C. J. R. ROBERTSON, R. S. ABEL, F. C. KINSKY

On the afternoon of 12 March 1972 a penguin in a sick and exhausted condition was found in the surf at Waimarama Beach, Hawkes Bay (39° 50'S - 176° 50'E), by Mark Hedley-Smith of Clive. When taken from the water it was unable to stand, but there were no visible signs of injury.

When transferred to the Marineland of New Zealand in Napier on 13 March it was found to have started its annual moult and was not immediately identified because of its faded plumage (see Fig. 1). The weight was 6¼lb (2.85kg) and it was given a course of 1,250 mil penicillin in capsule form three times daily. By 19 March food intake was increased to 4 fish per hour and a preliminary identification was made on 1 April when the moult was virtually completed. On 4 April its weight had increased to 9¼lb (4.2kg) and identification was confirmed on 15 April as a Magellanic Penguin (*Spheniscus magellanicus* (Forster, 1781).

Murphy (1936) records the distribution of this species as breeding at the Falkland Islands, and at islets along the Patagonian coast from 41°S, southwards to Staten Island, Cape Horn, Ildefonso, and other outliers of the Horn, and thence northward along the Pacific coast to Santa Maria Island and the Juan Fernandez Islands offshore. During migration it ranges northward along the Atlantic coast to Southern Brazil and on the Pacific coast reaching Coquimbo at 30°S.

FIGURE 1: "Immature" plumage Magellanic Penguin 13/3/72 (Photo: A. Mace).

FIGURE 2: Magellanic Penguin after moult 15/4/72 (Photo: C. J. R. Robertson).

Breeding is from September to January with breeding birds moulting during February and March. A general exodus from breeding localities occurs toward the end of April for the winter dispersal.

From literature available it seems that in the juvenile plumage the bands across the throat are not present, with the entire throat and fore-neck being greyish (Murphy 1936), and Escalante (1970) points out that with juveniles both black bands are not present. It is obvious (Fig. 1) that this bird had one wide black band before moulting, and therefore must have been at least in its second year. The second band appeared only after this moult, presumably indicating that it takes at least 2 years to attain " adult " plumage.

It is interesting to note that the bird took its first fish without the need to be force fed. This and its generally tame behaviour indicates the strong possibility of it having been kept on a ship for some time and then released in New Zealand waters. The bird did not show any inclination to return to the water until 16 April and is held at present in Marineland (see Fig. 2).

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THE AUSTRALIAN WHITE-BROWED WOOD SWALLOW IN NEW ZEALAND

By J. T. DARBY
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ABSTRACT

The presence of the Australian White-browed Wood Swallow in N.Z. is described together with the possible sighting of a Masked Wood Swallow. Both are new records for New Zealand.

On 10 January 1972 the Otago Museum received a telephone call concerning the identification of a bird that had been captured at the Naseby State Forest. The caller, Mr Collett of the Forest Service, gave an excellent description of the bird which ruled out the possibility of it being a normal resident of New Zealand. A further telephone call to Mrs D. M. Shaw, whose husband Mr W. C. Shaw had captured the bird, led to the tentative identification of this bird being a male White-browed Wood Swallow *(Artamus superciliosus)*. Arrangements were made to have the bird sent to the Museum and it arrived on the morning of 13 January. The rufous brown underparts and dark grey-blue head, neck and upperparts, together with the conspicuous white stripe above its eye left little doubt that the bird was indeed *A. superciliosus*.

A visit was made to Naseby Forest on 18 January to release the bird and discuss this find with Mr and Mrs Shaw. The following information is recorded.

The attention of both Mr and Mrs Shaw was first drawn to this bird on December 9 1971 by its unusual call. It was again heard and sighted on 26 December and was captured by Mr Shaw. It was placed in a small cage and spent until 18 January in confinement.

On 9 January Mrs Shaw again heard this unusual call and sighted a second bird which she assumed to be the mate of the captive White-browed Wood Swallow. This bird arrived again on 10 January and when the caged White-browed Wood Swallow was placed outside the two birds called to each other. The second bird was sighted again on Monday 17 January. Both Mr and Mrs Shaw separately and independently described this bird: their description tallied neither with a male or female *A. superciliosus* but on being shown the page of illustrations of Wood swallows and Starlings in Frith (1969) both again unhesitatingly and independently pointed to the illustration of the male Masked Wood Swallow *Artamus personatus*.

The identification of the bird as a male cannot be held as absolute. Rowley *in* Frith (1969) states that the female has the same

plumage pattern as the male, but is browner and the separations between colours are less distinct. This could be a difficult feature to pick up at a distance even using binoculars and thus the identification of the sex of this bird must be held in doubt until a more positive description is forthcoming.

The presence of these two birds together being considered as a possible pair could be justified on the grounds that these two species are known to occur in mixed species flocks, and interbreeding of the two species has been recorded (Rowley *in* Frith 1969). That two birds of one species should find their way to New Zealand is unusual. That two birds of known interbreeding species should both arrive almost simultaneously must be considered an extraordinary coincidence.

Some notes on the behaviour of this swallow in captivity may be of interest. For its first three days in captivity the Wood Swallow refused to eat. On the fourth day it became attracted to sweetened condensed milk which it readily consumed. It was given free access to insects in the home of Mr and Mrs Shaw which it took on the wing. When the bird first came into my hands, it appeared somewhat moribund, and sat on its perch, feathers fluffed up and periodically closed its eyes in the characteristic fashion common to birds close to death. Defecations were very watery and smelly. It was fed a considerable number of blow flies and other insects.

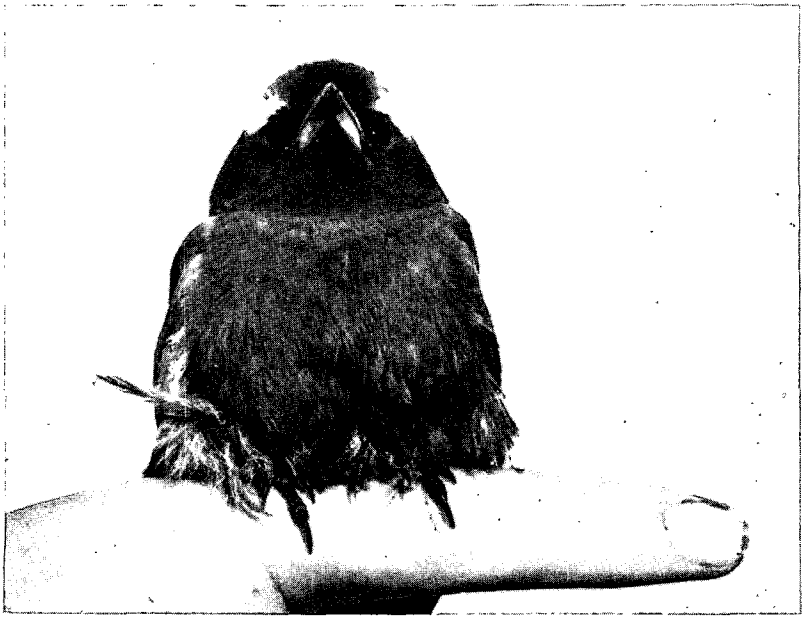

FIGURE 1 — Male White-browed Wood Swallow.
Photo: J. T. Darby

FIGURE 2 — Male White-browed Wood Swallow.
Photo: J. T. Darby

It readily consumed bread dipped in water and also ate a small amount of fruit. Its condition improved considerably over the next few days, freely taking insects held by forceps and drinking honey water from a pipette.

The bird was never completely happy in a cage and usually following a feed would fly against the sides of the cage endeavouring to make its escape. It did, however, take to handling and a large proportion of its nutrition over the last two days of its captivity was gained by holding the bird firmly in the hand and moving around a room and pointing the bird at a distance of an inch or so at a moth or fly that was on a window or wall. Such insects were quickly snatched up and eaten.

Some of the above observations on the feeding behaviour of the White-browed Wood Swallow conflict with those of Rowley (*in* Frith 1969: 456) who states that they are entirely insectivorous.

That they do readily take food other than insects augers well for the possibility that this attractive bird could become established in New Zealand. It is very doubtful that it could survive a Central Otago winter, and one can only speculate that these normally migratory birds might find their way north and thus possibly become established in New Zealand.

The Wood Swallow was banded (No. C10152) and released on 22 January 1972.

Mr and Mrs Shaw are keeping a day to day diary of the movements and sightings of this bird, which is being posted to me at regular intervals. Following the release of the bird, it was not sighted again until 30 January. Since this date, apart from one day, the bird has been sighted at least once each day and frequently more often up to and including 24 February 1972.

The attendant publicity following the sighting of this bird led to dozens of telephone calls and letters from the public. One of these from a Mrs F. Mackay, of Alexandra, suggested a further wood-swallow record. At my request Mr Peter Childs of Alexandra spoke to Mrs Mackay and he agrees that this sighting by Mrs Mackay could be a further record of a wood-swallow in New Zealand.

ACKNOWLEDGEMENTS

I am grateful to Mr Collett who first brought my attention to this bird and particularly to Mr and Mrs Shaw who have proved most helpful in supplying me with full details and maintaining a day to day diary. My thanks to Mr Peter Childs who has been able to visit both Mr and Mrs Shaw and Mrs Mackay on my behalf.

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THE BREEDING BIOLOGY OF THE ROOK CORVUS FRUGILEGUS L. IN CANTERBURY, NEW ZEALAND

By J. D. COLEMAN
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ABSTRACT

During 1967, Rooks at West Melton and Banks Peninsula rookeries selected mainly *Pinus radiata* for nesting and chose the highest safe sites. Nest construction periods varied from 5 to 20 days, the last nests being completed most rapidly.

Eggs were laid between 30 August and 6 November. Rookeries showed significant differences in laying date, apparently resulting from differences in food availability. The size of eggs varied with laying sequence. The mean clutch size was different at each rookery, ranging between 2.9 and 3.8 eggs, a similar value to that obtained by past workers in Canterbury but smaller than that of Rooks in Britain.

Nestling periods were directly related to brood size. Growth rates of nestlings varied with brood size, hatching sequence, partial brood loss and season. Parental feeding visits were largely independent of brood size and ranged from 1.4 to 3.3 visits per hour.

Failure of the embryo to develop accounted for most egg losses. Most nestling mortality resulted from parents killing the smallest nestling before it died of starvation.

Breeding success varied seasonally and ranged from 38 to 12.7%. Three and four egg clutches occurred most frequently, but larger clutches produced more fledglings.

INTRODUCTION

The Rook (*Corvus frugilegus* L.) is regarded as an agricultural pest on the Canterbury Plains. The many attempts at extermination have been unsuccessful, but numbers have been greatly reduced and fewer than 300 birds now remain. A similar number exists on nearby Banks Peninsula where they are valued by the farmers and are not controlled.

This study of the breeding of Rooks on the Canterbury Plains was made in 1967, following large scale reductions of the population. The population on Banks Peninsula was also examined for comparative purposes. The distribution, abundance and feeding activity of Rooks in Canterbury has been described separately (Coleman 1971).

NOTORNIS 19: 118-139 (1972)

METHODS

Nests in West Melton rookeries were visited daily between 1000 and 1200 hr during egg laying and hatching, so that breeding phenology could be recorded. Nests in Banks Peninsula and Sunnyside rookeries were visited weekly, but at Sunnyside the few Rooks present produced only one clutch and this was excluded from the present paper.

Eggs laid each day were serially numbered on one end with a felt marking pen. Nestlings were marked for growth studies by clipping the claws of individual toes, according to the chicks position in the hatching order.

Egg lengths and diameters were measured to the nearest 0.1 mm with vernier calipers. Volumes were calculated from Worth's (1940) expression: $V = K\ pi/6ab^2$, where V = volume, a = length and b = the greatest transverse diameter. K, the mean constant of equality, was taken as 0.983 ± 0.029, a value calculated from a sample of 27 randomly selected eggs of measured volume.

Nestlings were at first weighed to the nearest gram on a 25 g spring balance and later to the nearest 5 g on a 500 g spring balance.

Breeding behaviour was observed from a tree-top hide within 5 m of 19 occupied nests. Observation periods were between 10 a.m. and 3 p.m. on days of similar weather, and during each period the behaviour of birds at four to six nests was recorded. Breeding displays were used to distinguish the sexes.

Unless otherwise stated, "Student's *t*" test was used in all statistical analyses with confidence limits of 0.95 being considered significant.

RESULTS

NEST SITES AND CONSTRUCTION

The location of all Mid-Canterbury rookeries is shown in Figure 1. All are in groves dominated by *Pinus radiata;* Jarman's, Kirwee and Chorlton rookeries are in pure stands, while Robinson's, Okains Bay and Long Look Out Point rookeries occupy groves containing *P. radiata, Eucalyptus* spp. and *Cupressus macrocarpa.* In mixed groves *P. radiata* is preferred for nesting while eucalypts are used only at Okains Bay. Nests were not found in *C. macrocarpa.*

The earliest nests were built at higher levels than later ones (Table 1; $r = -0.36086$, $p < 0.01$). Although high sites were available in peripheral trees, late nesters select sites at lower levels in the centre of the colony, presumably due to gregariousness or for communal protection.

Nests in eucalypts were always below crown level in the crotches of branches. Stead (1946) noted that prior to 1930 Canterbury Rooks preferred eucalypts. He suggested that the change to pines was caused by the death of many eucalypts and, as is still quite apparent, by the unstable whippy branches of those remaining.

TABLE 1: NEST HEIGHT IN RELATION TO THE START OF NEST CONSTRUCTION AT ROBINSON'S ROOKERY

Start of Nest Construction	No. of Nests	Height of Nests (m) Mean	Range	S.D.
Up to 25.8.67	8	18.0	16.5 - 19.6	1.08
26-31.8.67	10	17.9	14.2 - 19.5	1.34
1-6.9.67	23	17.6	15.2 - 19.5	1.08
7-12.9.67	21	16.6	13.7 - 18.9	1.47
13-18.9.67	12	16.4	14.4 - 19.0	1.55
19-24.9.67	11	16.4	13.4 - 18.9	1.73
After 24.9.67	7	16.6	14.9 - 19.2	1.48

Note: Table includes two nests which were never laid in

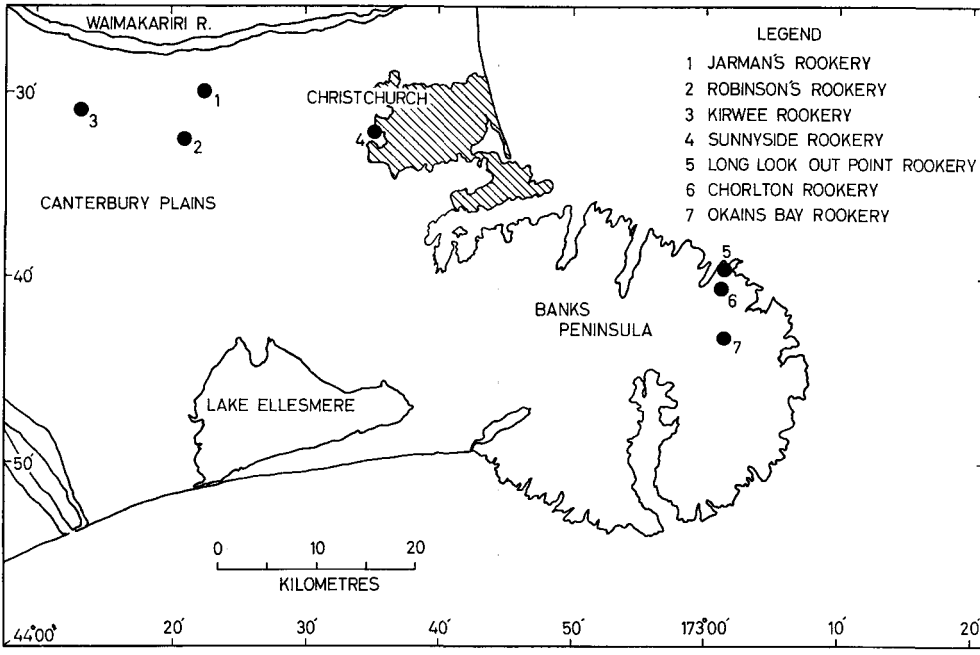

FIGURE 1: Mid-Canterbury, New Zealand, showing the position of rookeries occupied during the study.

At Robinson's rookery nests were built between 17 August and 25 October (Fig. 2A). Only 21% of all nests were started before 31 August when the birds moved from the winter roost to the rookery; thereafter the number of nests increased rapidly. The number of nests started during late September and October was less than that lost from constructional failure or destruction by stick-thieving birds. Of all nests built in Robinson's rookery, 12% were lost during the breeding season.

Rooks placed up to approximately 30 twigs on the first day of nest construction, and nest bases were generally recognisable from ground level 24 hr after the placing of the first twig. Nest construction was therefore considered to have started 24 hr prior to the day of discovery and to have finished when the nest was completely lined. Nest building periods for 56 nests ranged from 5 to 20 days (7.5 ± 2.66). Construction times varied considerably throughout the nesting season, later nests being built more rapidly (shown also by Yeates 1934, Busse 1965).

Several partially collapsed nests containing endangered eggs or chicks were observed, but it seems that only the loss of a clutch or brood will initiate reconstruction of the nest. Limited nest reconstruction occurred during autumn (late March) e.g. at Robinson's rookery seven out of 40 nests examined were roughly reconstructed. Reconstruction was never completed at this time and laying never followed.

THE EGG PHASE

Egg Laying

Eggs were laid between 30 August and 6 November (Table 2), with peak laying in late September in all but the Kirwee and Chorlton rookeries, where laying was significantly later ($p < 0.01$).

TABLE 2: LAYING DATES IN CANTERBURY ROOKERIES

Rookery	No. of eggs	No. of Nests examined	Mean	Laying Date Range	S.D.
Robinson's	382	90(90)	17.9.67	1.9 - 6.11	16.1
Jarman's	78	26(26)	26.9.67	30.8 - 30.10	16.1
Kirwee	68	22(33)	4.10.67	15.9 - 25.10	10.4
Okains Bay	45	14(39)	18.9.67	6.9 - 3.10	5.5
Chorlton	110	30(30)	1.10.67	10.9 - 22.10	10.6
Long Look Out Point	120	45(83)	23.9.67	10.9 - 25.10	12.2

Note: Figures in parenthesis show the total number of nests in the rookery

Eggs from replacement and second clutches included

Eggs were laid between 0700 and 1000 hr at intervals of one to five days, with most (86% of a sample of 183 eggs) being laid within one day of their predecessor. Irregular laying increased with eggs laid later within individual clutches. Of 26 (14%) abnormal laying intervals, 11 were between final eggs of clutches. Six eggs, three of which were infertile, were laid following intervals of three or more days.

Egg Dimensions and Clutch Size

Since volume is biologically the most meaningful dimension of an egg, indicating how much material is contained therein, the following section is limited to this dimension. Volumes of eggs varied with individual laying sequences, but showed a general decrease after the laying of the second egg (Fig. 2B). This phenomenon, together with increasing irregularity of laying of later eggs in individual clutches could have been caused by the depletion of energy reserves directed into egg production. Payne (1965) likewise suggested that the decrease in size of the final eggs of Cowbirds *(Melothrus ater)* resulted from a physiological slowing down in the conversion of food into egg material.

The mean size of eggs did not regress significantly on laying date. However, the regression of clutch size on laying date was highly significant, indicating a seasonal decline in egg production by birds laying later (Table 3; $y = 4.64831 + -0.04018X$; $F = 10.0247$, $p < 0.01$). Egg and clutch sizes of British corvids decreased seasonally, which Holyoak (1967) believed to have resulted from young birds laying later.

The frequency distribution of clutch sizes varied from rookery to rookery (Table 4), and although the ranges in clutch size were similar (1-6 eggs), the means varied between 2.94 and 3.85 eggs. Overall, clutches of three and four eggs were most common (63.2% of all clutches) followed by two (17.6%), five (12.6%), one (3.3%) and six (3.3%) egg clutches. Clutches of one were considered to be incomplete (for Rooks in Britain, Owen 1959) and were omitted from some calculations.

Of the 11 replacement clutches laid at Robinson's rookery, eight followed clutch losses and three followed brood losses. Time lags between first and replacement clutches ranged from 12 to 51 days (30.8 ± 12.64). Replacement clutches were on average smaller (2.92) than the preceding first clutches (3.36), but generally were larger than first clutches laid at the same time. Only one second clutch was laid and that was 46 days after the laying of the first.

The frequency of occurrence of different clutch sizes varied throughout the laying season (Fig. 2C). Clutches of six eggs occurred only during the first two weeks of laying, while those of five were recorded commonly throughout the first half of the laying season. Clutches of three and four eggs were found throughout the laying

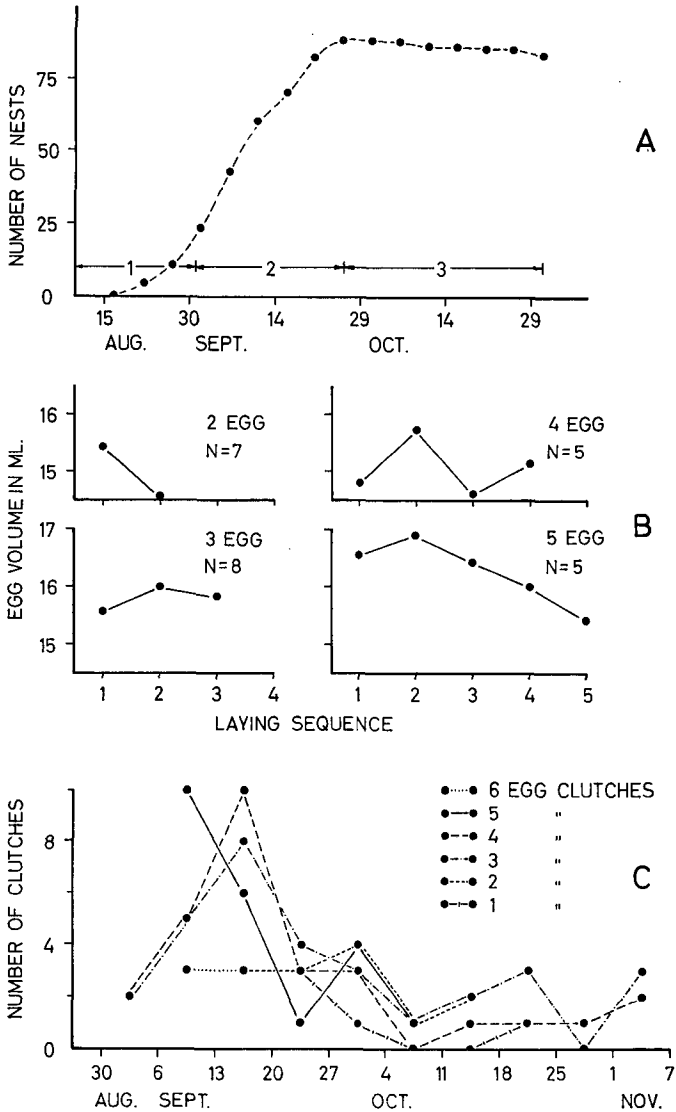

FIGURE 2A: Changes in the number of nests present at Robinson's rookery during the breeding season; 1, 2 and 3 refer to the period before complete rookery re-occupation, the period of maximum nest construction and the period of late nest construction respectively.

FIGURE 2B: Egg volume in relation to laying sequence in different sized clutches at Robinson's rookery. Sample sizes show the number of clutches involved.

FIGURE 2C: Seasonal variations in the frequency of individual clutch sizes laid at Robinson's rookery.

TABLE 3: VARIATION IN EGG AND CLUTCH SIZE WITH LAYING DATE AT ROBINSON'S ROOKERY

Laying Date	No. of Clutches	No. of Eggs	Mean Clutch Size	Mean Egg Volume (ml)
Up to 5.9.67	4	14	3.50	15.26
6-10.9.67	17	77	4.59	15.11
11-15.9.67	18	78	4.33	15.40
16-20.9.67	22	80	3.64	15.50
21-25.9.67	8	20	2.50	13.71
26-30.9.67	12	40	3.33	14.24
1-5.10.67	5	15	3.00	14.38
After 5.10.67	4	11	2.75	15.00

Note: Replacement and second clutches excluded

TABLE 4: SIZE OF FIRST CLUTCHES IN CANTERBURY ROOKERIES

Rookery	Clutch Size						Mean Clutch Size	
	1	2	3	4	5	6	M1	M2
Robinson's	4	12	22	25	21	6	3.72	3.85
Jarman's	2	2	8	9	2	0	3.26	3.52
Kirwee	1	2	15	2	0	1	3.14	3.24
Okains Bay	0	3	2	6	2	0	3.55	3.55
Chorlton	0	5	9	12	1	0	3.35	3.35
Long Look Out Point	0	14	15	10	1	0	2.94	2.94
Total	7	38	72	64	27	7	-	-

Note: M1 - mean clutch size excluding replacement clutches

M2 - mean clutch size excluding replacement and one egg clutches

period, but occurred most frequently during early laying and at the end of the season during the upsurge in relaying. One and two-egg clutches occurred less frequently than clutches of 3-5 and only during later laying.

With the exception of Robinson's and Long Look Out Point rookeries, the mean clutch sizes recorded at individual Canterbury rookeries were similar (Table 4). The mean clutch size at Robinson's rookery was significantly larger ($p < 0.05$) than at Kirwee and Long Look Out Point rookeries, while clutches at Long Look Out Point were significantly smaller ($p < 0.05$) than those at Robinson's, Jarman's and Chorlton rookeries.

INCUBATION AND HATCHING

The incubation period was taken to be the time between the laying of an egg and its hatching. Unless otherwise stated, this measurement refers to the last egg of a clutch. The recorded period may have an error of up to 23 hr because the precise times of laying and hatching were rarely known.

TABLE 5: THE VARIATION IN INCUBATION PERIOD WITH THE SEQUENCE OF EGG LAYING AT ROBINSON'S ROOKERY

Incubation period (days)	Position of egg in laying sequence 1st	2nd	3rd	4th	5th
21	2				
20	2				
19	3	1			
18	8	7			
17	2	7	6	3	
16			4	3	
15	1				3
	No. of eggs at each incubation period				

Incubation periods decreased with the sequence of laying (Table 5), and, allowing for the maximum possible error, ranged from 14 to 22 days with a mean of 17.4 ± 1.31 days cf. 18.0 days obtained by Yeates (1934) for Rooks in Britain. The shorter incubation period of later eggs of individual clutches resulted from an increase in the intensity of incubation behaviour during laying, with the initial incubatory patterns being easily disturbed. Van Tyne & Berger (1959) considered that birds of many species sat on eggs during early incubation without applying enough heat to affect embryological development.

Hatching, the period during which the chick freed itself from the egg, took approximately 24 hr from the first outward sign of pipping. Depending on clutch size, the hatching period of entire clutches took from 24 to 27 hr; the eggs hatching asynchronously in the order laid.

THE NESTLING PHASE

Nestling Period

As nestlings within broods left the nest together, the nestling period was taken to be the time between the hatching and fledging of first-hatched nestlings; the mean interval for 47 broods raised at Robinson's rookery (Table 6) being 33 ± 1.25 days.

TABLE 6: NESTLING PERIOD IN RELATION TO BROOD SIZE

Brood Size	Nestling Period (days)													Total	Mean Nestling Period
	26	27	28	29	30	31	32	33	34	35	36	37	38		
1	1				2	3	3		2		2			13	31.9
2	1	1		2		3	4	1		1		1	1	15	31.7
3					2		1	3		5		1		12	33.6
4										1	3	2	1	7	36.4

Nestling periods were directly related to brood sizes; four-chick broods remaining in the nest significantly longer than one ($p < 0.001$), two ($p < 0.001$) or three-chick ($p < 0.01$) broods. Chicks in large broods grew more slowly than those in small broods (see nestling growth rates) and had longer nestling periods.

Brood Size

Brood sizes in Canterbury rookeries ranged from one to six chicks. Four was the most fledged from any brood, with 53% of successful broods losing one or more chicks before the rest fledged. Three pairs raised five chicks to fledging weight, but then lost one or more during the final nestling period. The ranges and frequencies of brood sizes were similar in most rookeries, but large broods were infrequent at the Long Look Out Point colony.

Nestling Growth

The variation in growth rates of all nestlings in all three-chick broods raised at Robinson's rookery is shown in Fig. 3A (nestling growth rates in the following section refer to data collected at Robinson's rookery). Nestlings above or below the mean growth curve of this and other brood sizes generally remained so, except for single-chick broods in which considerable variation in individual growth rates often occurred. Individual nestlings with slower growth rates than their nest-mates risk starvation, and the larger the brood the smaller the weight differences which may affect survival. Typically, newly hatched chicks weighed from 12 to 15 g. At first, weight increases were slow, but later accelerated, with 30 to 40 g being added daily between the 6th and 18th days. Maximum weights (380 to 440 g) were reached by the 23rd day (a 30-fold increase) and maintained thereafter.

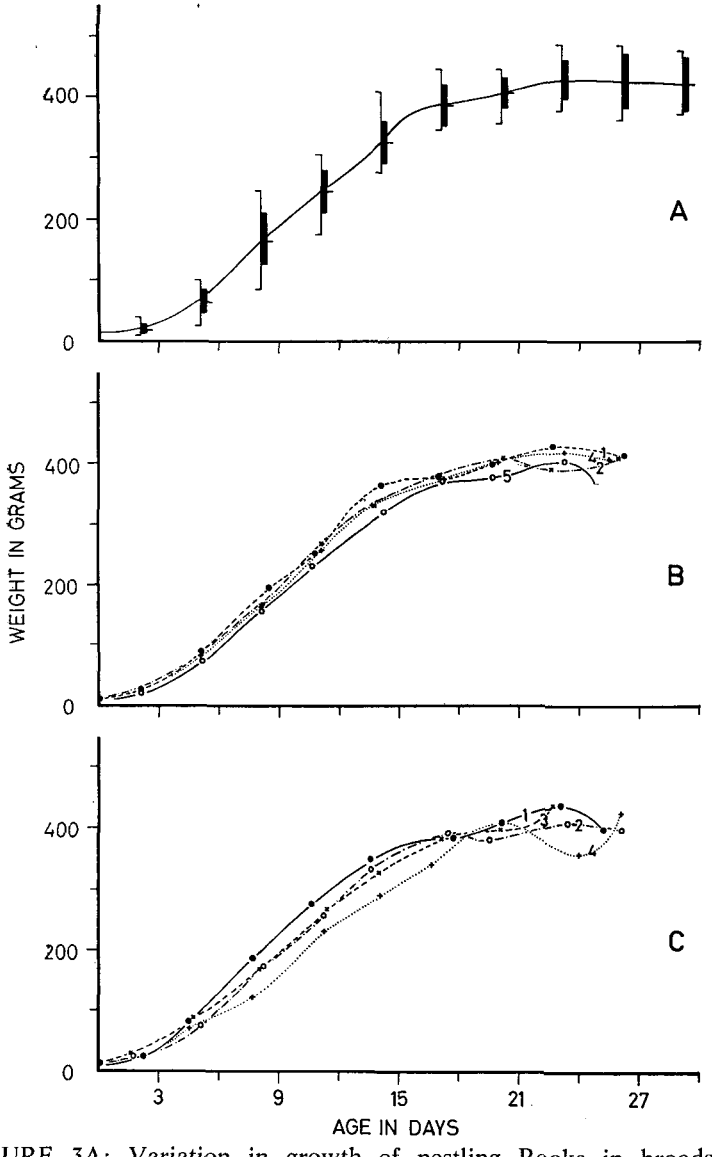

FIGURE 3A: Variation in growth of nestling Rooks in broods of three (N = 13). The curve runs through points of mean growth rate in each sample, the vertical lines show range, and the vertical bars one S.D. on either side of the mean.

FIGURE 3B: Growth of nestling Rooks in broods of one (N = 9), two (N = 13), four (N = 8), and five (N = 2) nestlings.

FIGURE 3C: Growth of the first, second, third and last hatched Rook nestlings in broods of four (N = 9).

The growth curves of the various brood sizes are similar in form, but chicks in smaller broods generally grow faster and fledge at higher weights than those in larger broods (Fig. 3B). During the first four days, however, broods of 1, 2, 3 and 4 chicks have similar growth rates.

Nestling growth rates and fledging weights are generally directly related to hatching sequence, the earliest hatched nestling being most advanced (Fig. 3C).

Nestlings from replacement clutches laid early in the breeding season show similar growth rates to those of 'normal' broods. For example, brood 9B (Fig. 4A) was raised during peak nestling activity and closely followed the mean growth curve for 'normal' broods, while broods 11C and 8A raised during December and after the desertion of the rookery by most other birds, grew more slowly. The effect of season is illustrated further with the growth rates of two-chick broods (Fig. 4B). Excluding the first seven days of the nestling period, later hatched broods grow less rapidly and fledge at lower weights than earlier broods; a trend which coincides with a decrease in availability of some nestling foods during October and November (see Coleman 1968, Fig. 5.3). Also, exceptionally late broods are fed less frequently than earlier broods as their parents forage with the main flock two or three miles away from the rookery rather than nearby.

Surviving nestlings in small broods show dramatic weight gains following the death of brood-mates (Fig. 4C). In large broods no changes in rates of growth were observed however, as there were more nestlings present to share any extra food.

Nestling Feeding Frequency

The frequency of parental feeding visits, while independent of brood size, ranged from 1.4 to 3.3 visits per hr and all chicks normally received food on each occasion (Table 7).

Feeding rates bore little relation to brood age: ten observation periods on seven broods of between one and seven days of age showed a mean feeding rate of 2.07 visits per hr, and on nestlings between 10 and 30 days of age, a mean feeding rate of 2.28 visits per hr.

The weight of food received by 16 nestlings at individual feeds showed a range of 0.02 to 9.4 g. However, the amount of food received per feed varied with the age of the nestling; 10 meals taken from chicks between 5 and 11 days of age had a mean weight of 0.94 $\pm$ 0.38 g, while six meals from chicks between 17 and 23 days of age, had a mean of 3.4 $\pm$ 2.60 g. During the first 20 days of the nestling period, the female remained at the nest and ate an unknown proportion of the food brought by the male. Later, when the combined needs of the female and chicks were apparently beyond the foraging capabilities of the male, the female also foraged.

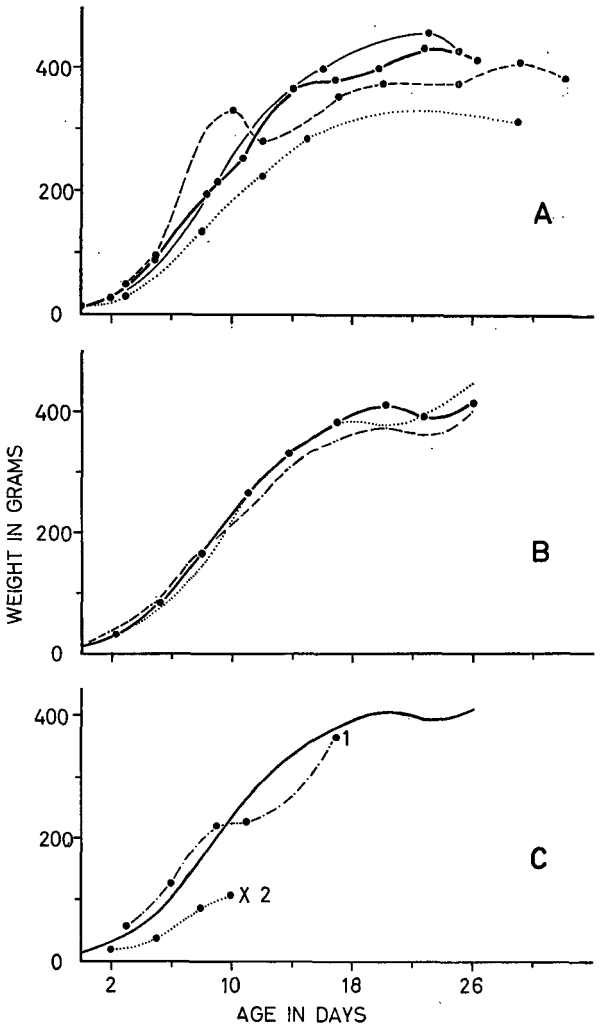

FIGURE 4A: Growth of solitary Rook nestlings from three replacement clutches. The solid line designates a chick raised during peak nestling activity (brood 9B), and the broken and dotted lines (broods 11C and 8A) chicks raised after the desertion of the rookery site by all other Rooks. The heavy line depicts the mean growth of all (13) 'normal' broods of one nestling.

FIGURE 4B: Growth of Rook nestlings in three early (prior to 25 October) and three late fledged (after 15 November) broods of two nestlings (dotted and broken lines respectively). The heavy line shows the mean growth of all (13) broods of two nestlings.

FIGURE 4C: Growth of Rook nestlings in a brood of two, one of which died. The cross indicates the nestling which died, the heavy line the mean growth rate of 13 broods of two nestlings.

TABLE 7: FREQUENCY OF PARENTAL FEEDING VISITS AT ROBINSON'S ROOKERY

Clutch No.	Clutch Size	Total weight of brood (g)	Feeding frequency (visits per hour)
2E	1	80	1.8
	1	280	2.1
2C	2	164	3.3
	2	384	2.0
	1	350	1.8
8B	3	40	1.4
	3	90	3.2
	2	800	3.3
	2	870	2.3
21A	3	925	1.8
	3	1260	2.6
2A	3	371	2.0
2B	4	173	2.6
	4	484	3.2
	3	845	2.7
	3	1250	1.5
5B	4	530	3.2
	4	1600	1.8
	4	1670	2.6

Note: Feeding frequencies determined from observation periods of 5 hr duration between October 3 and 26 inclusive

Similar-aged nestlings in broods of different sizes had meals of about the same weight. Samples collected from nestlings within individual broods varied in composition but often not in weight e.g. nestlings in brood 10 (Robinson's rookery, 6 Nov. 1976) aged eight, nine and ten days received at one feeding, 0.50, 0.65 and 0.64 g respectively. Nestlings within individual broods grew and fledged at different rates however, and probably each chick received a slightly different amount of food.

BREEDING SUCCESS

Egg and Chick Losses

The majority (56%) of egg failures in West Melton rookeries were recorded as 'eggs which disappeared from the nest,' with most lost after full incubation and as complete clutches (Table 8).

TABLE 8: REASONS FOR EGG LOSSES IN WEST MELTON ROOKERIES

Reasons for egg losses	Robinson's			Jarman's			Kirwee		
	1st clutch	Repl.*	Tot.	1st clutch	Repl.	Tot	1st clutch	Repl.	Tot.
No sign of development	32(23)	4(3)	36	2(2)	0	2	9(6)	0	9
Embryo dead	3(3)	1(1)	4	0	0	0	0	0	0
Embryo died at hatching	7(6)	0	7	0	0	0	0	0	0
Broken by recorder	7(5)	0	7	6(4)	1(1)	7	14(6)	0	14
Cracked by parent	1(1)	0	1	0	0	0	0	0	0
Eaten by parent	4(3)	0	4	1(1)	0	1	1(1)	0	1
Nest collapsed	8(3)	6(2)	14	3(1)	3(1)	6	1(1)	0	1
Eggs buried	2(1)	0	2	0	0	0	0	0	0
Eggs which disappeared from the nest									
Early	12(6)	8(3)	20	3(2)	0	3	4(2)	0	4
Mid-incubation	20(11)	10(4)	30	7(3)	0	7	9(3)	5(1)	14
After full incubation	50(33)	7(3)	57	8(3)	0	8	4(3)	0	4
Total			182			34			47

Note: Figures in brackets denote the number of clutches involved
Repl.* - Replacement clutches

Of all eggs that remained in the nest after complete incubation, 36% showed 'no sign of development.' Many eggs lost from the nest after full incubation probably failed to hatch for the same reason. Of all eggs of known laying order lost through developmental failure at Robinson's rookery, 52% (17) were eggs laid last.

Egg losses resulting from the collapse of nests was rare and usually involved the complete clutch.

Intra- or inter-specific predation of viable eggs was not observed, although some parent birds ate cracked and addled eggs. Clutches which disappeared from nests may have been eaten by other Rooks, but considering the strong territorial defence shown by this species, this could have occurred only after the eggs had been deserted.

The most common losses of nestlings resulted from parents killing their chicks, especially starvelings (Table 9). At Robinson's rookery four neighbouring broods were killed at one time, probably by a rogue bird nesting in the same tree.

TABLE 9: NESTLING LOSSES AT ROBINSON'S ROOKERY

Time of Nestling Loss	Reasons for Nestling Losses								
	Deserted	Starved	Killed by parent	Killed by recorder	Nest destroyed	Nest collapsed	Fall from nest	Unknown causes	Total
Following hatching: 0-4 days	12	5	6	0	2	0	0	0	25
Mid-nestling: 4-20 days	0	7	20	2	0	12	0	3	44
Prior to fledging: 20-? days	0	0	1	3	0	2	1	0	7
Total	12	12	27	5	2	14	1	3	76
Position in brood:									
First hatched	0	0	0	1	0	3	0	0	4
Mid-brood	0	0	0	0	0	0	1	0	1
Last-hatched	0	11	8	3	0	5	0	0	27
Age unknown	0	1	1	0	0	0	0	0	2
Total brood losses (B/1)	3	0	2	1	0	1	0	0	7
Larger broods	9	0	16	0	2	5	0	3	35
Total	12	12	27	5	2	14	1	3	76

The desertion of broods occurred only immediately after hatching, all nestlings involved ultimately succumbing to chilling or starvation. Losses from starvation in attended broods, however, were confined to the early and mid-nestling periods of last-hatched nestlings.

Some nests collapsed during the mid-nestling period as chicks approached maximum size, and generally the entire brood was lost. Partial brood losses resulting from nest failure were not related to hatching sequence.

Nestlings which hatched last had a higher mortality than their brood mates during the five to seven days between their desertion of the nest and rookery sites respectively (54% of the 13 recorded fledgling losses were last-hatched chicks, see Table 10). Such chicks were generally smaller than their siblings and it was likely that larger broods which fledged smaller nestlings suffered proportionately heavier fledgling losses. Mortality during the first post fledging month of European Rooks also was highest in last-hatched nestlings and was directly related to brood size (Van Koersveld 1958).

Breeding Success

Hatching and nestling success were apparently not related, the lowest hatching and highest nestling success recorded in Canterbury occurring at Chorlton rookery. Hatching success ranged from 34.2% at Chorlton rookery to 62% at Jarman's rookery, while breeding success varied from 22 to 46.5%. Breeding success was not related

TABLE 10: FLEDGLING LOSSES IN RELATION TO BROOD POSITION

Nest No.	1A	1C	4A	4B	5B	6A	9D	12B	17A	38
Brood Size at Fledging	4	2	4	2	4	2	3	3	4	2
Position of Nestling in Brood at Fledging	L	L	1	L	L	1&L	1&L	1	2&3	L

Note: 1, 2, 3 and L indicate first, second, third and last in brood sequence

TABLE 11: HATCHING, NESTLING AND BREEDING SUCCESS IN CANTERBURY ROOKERIES

Rookery	Egg No.	Hatching success (%)	Nestling success (%)	Breeding Success (%) B1*	Breeding Success (%) B2+
Robinson's	382	51.0	63.2	35.5	36.5
Jarman's	78	62.0	63.0	38.0	46.5
Kirwee	68	40.0	31.8	12.7	22.0
Chorlton	110	34.2	66.6	22.8	29.6
Okains Bay	45	52.3	39.2	20.5	25.0
Long Look Out Point	120	50.0	65.0	32.6	42.5

Note: B1* Breeding success excluding those destroyed by the author.

B2+ Breeding success excluding total clutch and brood losses, and those destroyed by the author.

Hatching success = brood size/clutch size; Nestling success = No. fledged/brood size; Breeding success = no. fledged/clutch size.

to colony size, although there may well be a minimum size of rookery below which successful breeding is unlikely to occur e.g. Sunnyside, which had only nine birds, produced no young.

Hatching success at Robinson's and the Banks Peninsula rookeries differed, and the two colonies showed different relationships between clutch size and the average number of nestlings hatched per pair (Table 12). At Robinson's rookery, the number of nestlings fledged increased with clutch size. This was not so at Peninsula rookeries, where nestling success and the number fledged was lowest in the larger clutch sizes.

TABLE 12: HATCHING AND NESTLING SUCCESS IN RELATION TO CLUTCH SIZE

Clutch size	No. of clutches	No. of eggs	No. hatched	% success	Average No. hatched/pr.	No. of Nestlings fledged	% success	Average No. Fledged/pr.
				ROBINSON'S ROOKERY				
C/1	6	6	4	66.6	0.66	2	50.0	0.33
C/2	11	22	4	18.2	0.36	3	75.0	0.27
C/3	21	63	35	55.6	1.66	20	57.1	0.95
C/4	25	100	61	61.0	2.44	40	65.6	1.60
C/5	19	95	57	60.0	3.00	35	61.5	1.84
C/6	5	30	18	60.0	3.60	13	72.2	2.60
				BANKS PENINSULA ROOKERIES (SUMMED)				
C/2	19	38	22	58.0	1.16	13	59.0	0.67
C/3	25	75	37	49.4	1.48	34	92.0	1.36
C/4	27	108	42	39.0	1.56	21	50.0	0.78
C/5	4	20	10	50.0	2.50	4	40.0	1.00

Note: Eggs from replacement and second clutches and those broken by the author are excluded.

TABLE 13: HATCHING, NESTLING AND BREEDING SUCCESS IN RELATION TO LAYING DATE AT ROBINSON'S ROOKERY

Laying Date	Eggs laid	Hatching success (%)	Nestling success (%)	Breeding success (%)
up to 11.9.67	26	60.0	93.0	55.8
11-15.9.67	81	58.0	81.0	47.0
16-20.9.67	93	66.7	72.5	48.3
21-25.9.67	54	66.7	47.2	31.4
26-30.9.67	26	42.4	27.3	11.6
1-5.10.67	30	23.4	43.0	10.0
6-10.10.67	12	50.0	16.6	8.3
after 10.10.67	13	30.7	50.0	15.4

Note: Eggs from second and replacement clutches excluded

Hatching, nestling and breeding success at Robinson's rookery was greatest for birds laying early in the season (Table 13) when food was abundant (see Coleman 1968, Fig. 5.3). This was so also for tits, *Parus* spp. (Lack, Gibb & Owen 1957).

Breeding success at Robinson's rookery was also considerably greater in first (36.5%) than in replacement clutches (6.4%) (Coleman 1968), largely because the latter (12.5% of all clutches) were laid at a later and probably less favourable time for food gathering and concomitant egg production.

DISCUSSION

Egg Laying

Laying at the Kirwee rookery on the Canterbury Plains and at the Chorlton rookery on Banks Peninsula was significantly later than at neighbouring rookeries. Although there was no obvious reason for this at the Kirwee rookery, laying at the Chorlton rookery, sited 380 m above sea level, was probably retarded by the low temperatures and food availability experienced during the early part of the breeding season; snow lay about the rookery for three to four days during early laying.

The ability of the Rook to replace lost clutches or broods depends on the date at which the loss occurs and on the length of the preceding incubation or brooding period. Marshall & Coombs (1957) considered that Rooks were capable of relaying for two to three weeks after the hatching of the first chick. Excluding the anomalous clutch laid after a first brood was successfully fledged, Canterbury birds replaced only lost clutches or newly hatched broods, and these only during the first half of the laying season. As the sexual activity of Rooks waned during late incubation and hatching, so also their re-laying ability apparently decreased, especially in later breeding (presumably younger) birds and this may also partly account for the difference in the size of first and replacement clutches.

The mean clutch sizes which I recorded in 1967 resemble those recorded by past Canterbury workers, but are smaller than those of Rooks in Britain (see Lockie 1955; Owen 1959, Table 14). In Canterbury, Stead (1946) recorded a smaller range of clutch sizes than was observed during this study but failed to give any mean clutch size, while Crequer's (cited by Bull 1957) Canterbury data are similar to those of the present study. Niethammer (1970) reported that the " smaller clutches in New Zealand [of many introduced passerines including the Rook, compared with those recorded in Britain] can be attributed to high population density and to the subsequent mutual disturbance of breeding pairs, causing diminished use of available food." If this were so, the mean clutch size in Canterbury now should be larger than before the recent poisonings and should be directly related to rookery size, neither of which is true. Clutch sizes of many European birds vary with location however, and are larger in high than low latitudes (Lack 1947). Oxford at 51°45'N (Owen's and Lockie's study areas) is latitudinally higher than Mid-Canterbury at 45°30'S and the difference in day-length between these stations presumably accounts for the differences in recorded clutch sizes.

TABLE 14: COMPARISON OF CLUTCH SIZES IN CANTERBURY AND BRITAIN

Source	Locality	Year	Sample Size	Mean Clutch Size
Stead (1946)	Canterbury	c.1946	'large'	- (3-5)
*Crequer	West Melton	1956	40	3.4
Coleman	Canterbury	1967	215	2.94- 3.85
Owen (1959)	Britain	1952-57	292	4.2 - 4.7
Lockie (1955)	Britain	1945-53	151	4.3 (normal)
			20	3.5 (late)

Note: * cited by Bull (1957)

Nestling Growth

The discrepancy between the growth curves of individual chicks and the mean growth curves for particular brood sizes results from either differences in the hatching order of individual chicks, or from differences in the amount of food brought to broods by their parents. Differences in size of siblings generally result from asynchronous hatching, which is later enhanced by differential feeding. Older chicks beg more strongly, obtain more food, and grow more rapidly than their smaller brood-mates. The amount of food brought to the nest varies with seasonal availability and with the food-gathering ability of the parents: nestlings in large or late broods received less food than those in small or early broods and grew less rapidly.

Breeding Success

Excluding eggs lost from the nest, most egg failures were due to lack of embryo development and occurred most commonly in eggs laid last. As chilling would most often affect the first egg of clutches (as incubation intensity increases with laying), the major causes of failure of last-laid eggs were probably infertility, or early embryonic death from causes other than chilling. The eggs of the Shag *Phalacrocorax aristotelis* showed a drop in fertility with laying sequence, a result of either a decrease in copulatory activity coincident with the onset of laying and incubation, or the small size of final eggs (Snow 1960). Rooks also showed a decrease in sexual activity and egg size with laying sequence and this may have brought about the drop in survival noted.

Nestlings at Canterbury rookeries died from a variety of causes. However, excluding total brood failures, those lost were mostly last-hatched nestlings, which either starved to death or were killed by their parents. Lockie (1955) similarly found that 90% of partial brood losses were last-hatched chicks; apparently due to asynchronous hatching which, as an adaptation to a fluctuating food supply, frequently resulted in the death of the smallest nestlings.

Lack (1966) considered the most frequent clutch size in any particular bird species to be that which, on average, gave rise to the greatest number of surviving offspring. If clutch size is partly under genetic control, it is reasonable to suppose that the largest clutches, which in the present study hatch the greatest number of nestlings per pair, should occur most frequently. As this was not so, then either larger clutches must be selected against at some later stage (nestling, fledgling or sub-adult), or a seasonal or age trend exists within the population which affects all clutch sizes and hatching successes. Large broods at Peninsula rookeries were apparently disadvantageous, four-chick broods occurring infrequently, and five-chick broods being absent. At Robinson's rookery larger broods fledged greater numbers of nestlings than smaller, more frequently occurring broods. Large broods, however, fledged smaller chicks which perhaps incurred a higher mortality after fledging.

Clutch size and nestling success varied seasonally, as large clutches were laid early in the season when food was abundant, whereas smaller clutches, including replacements, were generally laid later and the resultant chicks raised during less favourable periods.

Both factors, in conjunction with the presumed higher fledgling mortality of nestlings from larger broods, explain the predominance of the apparently less successful three and four-egg clutches at Robinson's rookery.

Small clutches of one and two eggs occurred infrequently (Table 12), produced fewer nestlings than larger clutches, and hence could be expected to disappear from the population. Owen (1959) suggested that such small clutches may have been maintained by years of food shortage when small clutches produce more surviving young than do large clutches. While it is conceivable that such conditions may result in three-chick broods leaving more offspring than four and five-chick broods, conditions would have to be unusually severe and occur very often to account for the occurrence of one and two-egg clutches. Lockie (1955) suggested that small clutches may have resulted from birds laying an egg (or eggs) away from the nest. However, as females rarely left the nest site after nest completion, this is unlikely. Clutches of one are laid only in West Melton rookeries and at a time when most other birds are feeding broods and demands on local food supplies are presumably heaviest. These rookeries appear to contain birds breeding in their first year which, being inefficient food gatherers (Lack 1947), lay small eggs and clutches; this together with a lower fledgling mortality in smaller broods (Van Koersveld 1958) may account for the retention of smaller clutch sizes.

Rooks usually mature and breed in their second year (Yeates 1934; Coombs 1960), and only rarely do they breed in their first (Giban 1947); most yearling birds form a non-breeding component within each breeding colony. Non-breeding components existed at

rookeries on Banks Peninsula but were absent from those at West Melton (Coleman 1971). It appears that birds at West Melton may breed in their first year, while those in Peninsula rookeries do not do so until their second year.

Following reductions by large scale poisonings in 1956 and 1957, and further small scale poisonings in subsequent years, the West Melton Rook colony now shows signs of growth. Partial brood mortality occurs in large numbers of West Melton broods, but from past population sizes (approx. 10,000 in Mid-Canterbury) it seems that rookeries are capable of supporting higher numbers than occur at present. Young birds at these rookeries appear to be breeding at an earlier age than is usual, either because of an increase in food availability through reduced competition, or from an absence of interference by mature birds (see Ashmole 1963). Rookeries on Banks Peninsula have not been controlled in any way in recent years, and the birds rarely breed in their first year.

The breeding of Rook populations on the Canterbury Plains following large scale reductions appears to be an example of a reproductive response to a 'crash,' and contrasts with the 'control' population on Banks Peninsula. The birds on the Plains seem to have responded to a decrease in numbers by breeding at an earlier age, and not by increasing their clutch size and have thus increased the breeding potential of the population. Although food was abundant near Plains rookeries, it seems that individual Rooks do not have the capacity to increase their reproductive rate.

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THE FIELD IDENTIFICATION AND DISTRIBUTION OF THE THIN-BILLED PRION (Pachyptila belcheri) AND THE ANTARCTIC PRION (Pachyptila desolata)

By PETER C. HARPER

ABSTRACT

The field characters of both the Thin-billed Prion (*Pachyptila belcheri* (Mathews, 1912)) and the Antarctic Prion (*P. desolata banksi* (Smith, 1840) and *P.d. alter* (Mathews, 1912)) are described and a discussion of the differing feeding habits and food is given. The food of *Pachyptila belcheri* chiefly consists of the amphipod *Parathemisto gaudichaudii* which is taken nocturnally, while the " krill " *Euphausia superba* is the primary food source of *P. desolata* and is mainly captured by day.

The Thin-billed Prion ranges far from its known breeding grounds at the Falkland Islands and Kerguelen, and is the most frequently encountered *Pachyptila* in the southernmost waters of the central Pacific. Birds of the year reach the Bellingshausen Sea from the Falkland Islands by mid-April, and disperse over much of the South Pacific during May. In early November, sub-mature birds gather in substantial numbers south of the Antarctic Convergence to take advantage of a rich food supply and undergo an early moult in December and January. The adults apparently begin the moult cycle in early February and are through by May.

The distribution of both species of prion is discussed on the basis of field work and specimen records, and an attempt has been made to correlate this data with published information. A tentative distributional pattern for both species is presented.

CONTENTS

NOTORNIS 19: 140-175 (1972)

INTRODUCTION

Although we have progressed greatly since Green (1887) wrote, " All the Prions are remarkable for their broad bills, which is especially noticeable in the males," the field identification of the genus *Pachyptila* is still primarily based upon supposition. Holgersen (1957), perhaps, best sums up the longstanding difficulty in identifying prion species at sea by reporting, " Although Whalebirds were seen throughout most of our cruise south of the La Plata Sea I have not a single specific identification for these birds."

Published data on the pelagic distribution of prions are consequently very meagre, but largely through the efforts of Murphy (1936), Falla (1940) and Fleming (1941), a useful summary of the recorded breeding range for each of the five species of prions has been postulated. This information was arbitrarily based upon the location of the breeding stations of each species in relation to the corresponding hydrographic zones of surface water. Both Falla and Fleming noted that some of the southern species disperse widely from their islands after breeding, and that their winter feeding ranges are not accurately known. As Bierman & Voous (1950) have succinctly remarked, " the zonal arrangement of pelagically living Whalebirds must be complicated and cannot be firmly fixed."

Very few specimens of *Pachyptila* have been taken at sea but beach-patrolling activities have resulted in " storm wrecked " prions being retrieved from the southern coasts of South America, South Africa, Australia and the exposed western shoreline of New Zealand.

These mainly winter records clearly demonstrate that at least three species of *Pachyptila* engage in some form of post-nuptial, trans-oceanic migration. However, in spite of the great abundance of prions inhabiting the Southern Ocean, collections generally from many scattered localities contain relatively few specimens, an indication of wide dispersal.

Some morphological and plumage differences in *Pachyptila* have been observed at sea; Wilson (1907) and Bierman & Voous (1950) recorded differences in bill structure among pelagic prions; Falla (1937) mentioned the small head of *Pachyptila turtur* as being a good field character; and Holgersen (1957) commented on dissimilarities of plumage patterns of birds seen by him in the South Pacific.

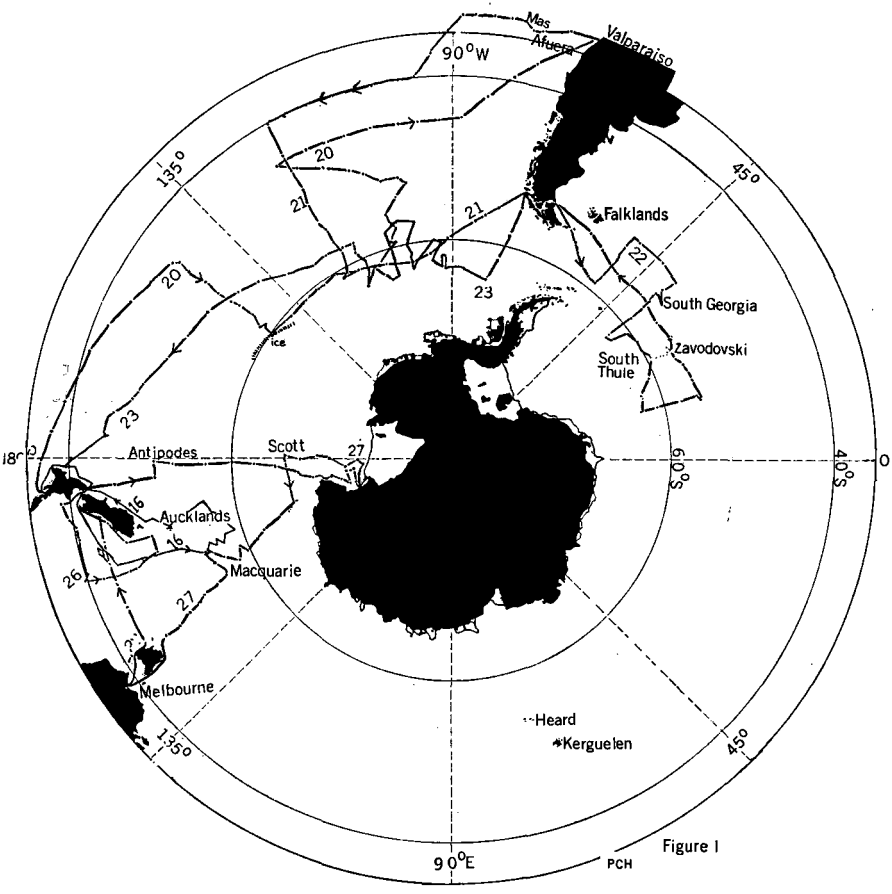

FIGURE 1 — Tracks of USNS *Eltanin*, 1965-67.

Culminating several years investigating the prion group, I was privileged to carry out field research on the genus *Pachyptila* on board the National Science Foundation's Antarctic Research ship *Eltanin,* and I present this first paper dealing with two of the six prion species in the hope of renewing interest in this difficult group of petrels.

METHODS

From January 1965 to May 1967, I spent eight cruises aboard the USNS *Eltanin* as a representative of the Dominion Museum, Wellington, New Zealand. As shown in Fig. 1, three cruises were spent in the New Zealand Subantarctic - Tasman Sea zone; three probing the South Pacific from approximately 45° S to the vicinity of the pack ice (about 60° S); one into the Ross Sea, and a summer cruise into the South Atlantic by way of the Magellan Straits. Ten Subantarctic and Antarctic islands were visited, from Macquarie Island in the east to the South Sandwich Islands in the west.

The leisurely speed of 9 knots which the ship maintained between oceanographic stations was most helpful to the ornithological programme, in allowing good opportunities to identify, photograph and examine prions on the wing. Observations were made continuously throughout the day from various locations about the ship from the bow or stern platform during fair weather, and from the bridge or helicopter deck during inclement periods. A pair of 7 x 50 binoculars aided identification.

Eltanin spent as many as 30 or more days of its usual 60-day cruise time on station. Much information on prions was gained during these prolonged halts, and when sea and schedule allowed, the ship's 22-ft powered dory was lowered overside to make prion-collecting forays.

A 12-gauge shotgun using No. 8 shot was used in obtaining specimens. Fourteen prions, attracted aboard at night with a pair of 1500 watt bridge signaling lights, were also collected.

All specimens were examined and measured in the flesh.

An important part of the programme was photographing and sketching prions whenever possible. Using a Carl Zeiss " Contarex " camera equipped with telephoto lenses up to 500mm, 613 identifiable prion photographs were taken at 51 places. Most were colour transparencies which were used for examination of dorsal colour gradations and distinguishing patterns, often difficult to reliably ascertain in monochrome prints. I processed all the films in *Eltanin's* photographic laboratory.

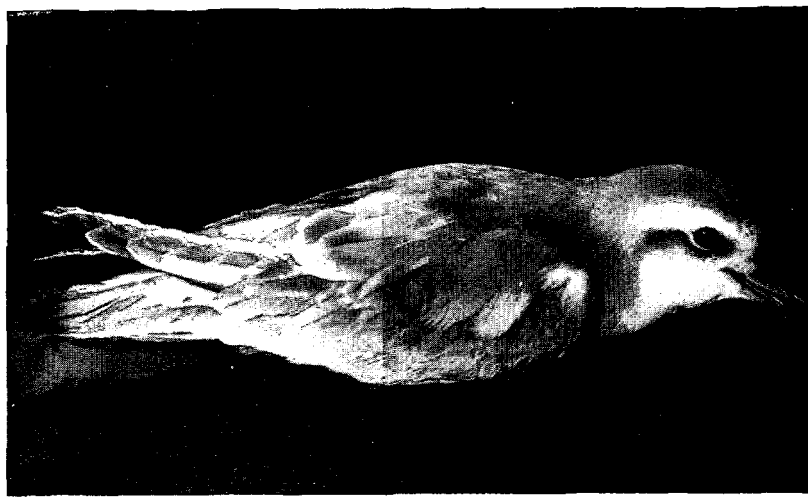

FIGURE 2 — A Thin-billed Prion *(Pachyptila belcheri)* collected alive in the South Pacific, Cruise 23. Note the distinctive facial pattern.

FIELD IDENTIFICATION

(a) *Descriptive*

(i) The Thin-billed Prion (*Pachyptila belcheri* (Mathew, 1912)).

At sea, the Thin-billed Prion [=Narrow-billed Prion of OSNZ Annotated Checklist 1970] can be distinguished as a slim, very pale prion with a large amount of white on the face. This latter aspect is due to the expansive white lores (area in front of the eye) and the band of unbroken white feathering forming the supercilliary stripe above the eye. These white areas are important field characters in identifying *P. belcheri* at sea, and should be looked for in pelagic prions south of about 50° S. The lores are not mottled with dark feathers as in *P. desolata,* and the white superciliary stripe is broader and more extensive than that displayed by any of the remaining species of the genus (see Fig. 2).

The peculiar dark open "M" marking extending across the wings is narrow and ill-defined in *P. belcheri,* being most obvious as a dusky black on the outer webs of the distal primaries and the subterminal portion of the scapulars; the white fringing frequently noted on these feathers is conspicuous only in freshly plumaged birds, and is a feature of all species of *Pachyptila.* Wear to the contour feathering tends to alter the appearance of the bird's upper surface from a pastel blue to a smoky grey. The dark wing band fades to a dull brown and is often reduced to the more strongly pigmented areas of the wing (cf. Figs. 3 and 4).

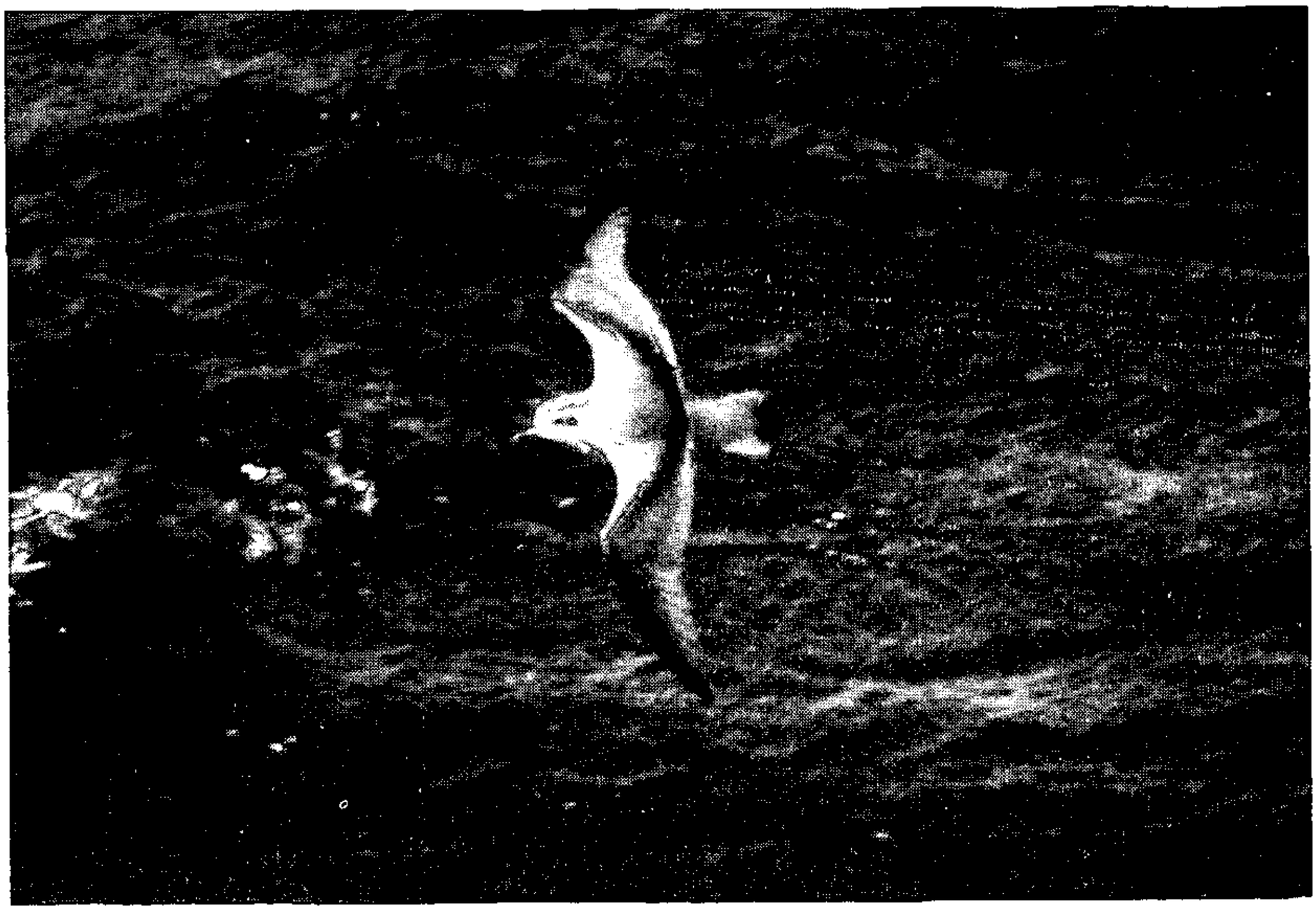

FIGURE 3 — An adult Thin-billed Prion in sub-zero waters, South Pacific, 6 October 1965, Cruise 20.

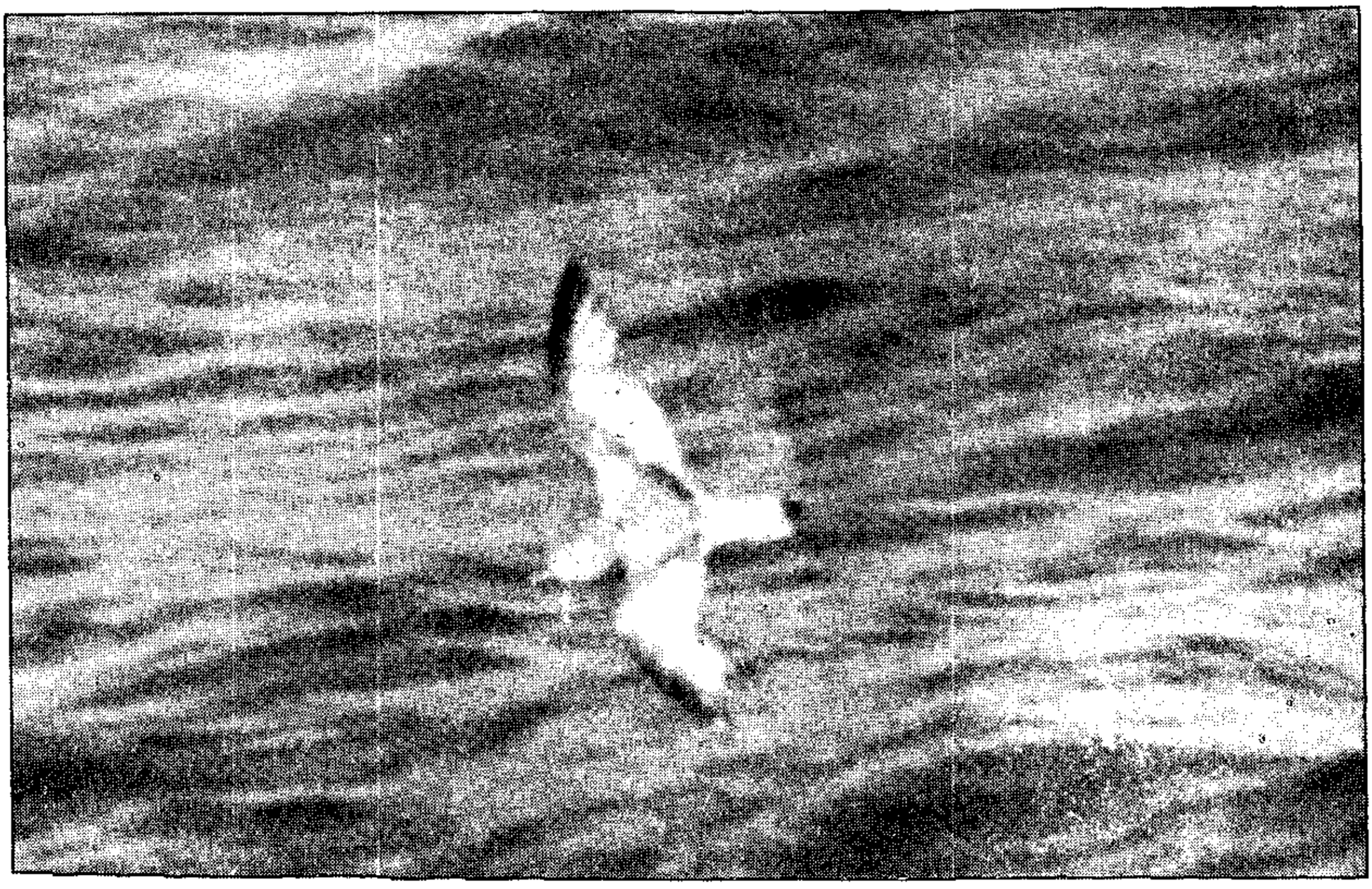

FIGURE 4 — *Pachyptila belcheri* in moult, South Atlantic, 25 January 1966, Cruise 22. Note partial absence of open "M" marking resulting from wear to the plumage. This phenomenon does not occur with the more darkly pigmented Antarctic Prion.

FIGURE 5 — The Antarctic Prion at sea: a typical example of the Scotia Sea subspecies, *P. desolata banksi*, Cruise 22. Note dark "collar."

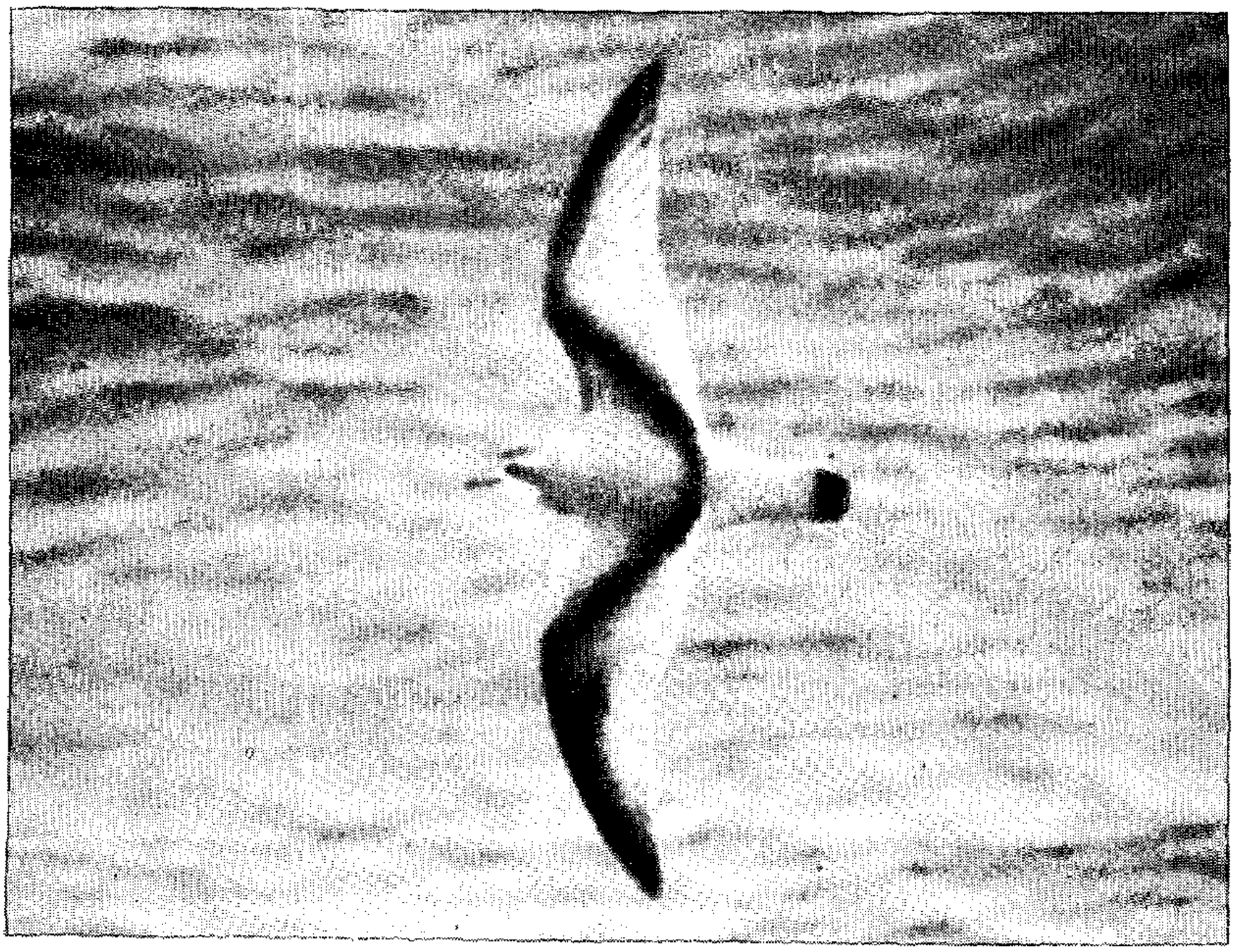

FIGURE 6 — *Pachyptila desolata alter* off Macquarie Island: a bird in fresh plumage, Cruise 27.

(ii) The Antarctic Prion (*Pachyptila desolata* (Gmelin, 1789)

The taxonomic status of several described subspecies of *P. desolata* is currently under review for publication elsewhere. In the area covered in this paper only the high-latitude subspecies *P. d. banksi* (Smith, 1840) and the slightly paler Neozelanic breeding birds centred on Auckland and Macquarie Islands, here called *P. d. alter* (Mathews, 1912) are considered to be involved.

At sea, the Antarctic Prion has a dorsal plumage appreciably darker in tone than the preceding species. The darkly pigmented crown and the rich dark blue collar extending over the neck should be looked for (see Fig. 5). The lores are often freckled with sooty black feathers, and the well marked suborbital black patch underscoring the eye give this species a facial pattern more sombre than *P. belcheri.* The white superciliary stripe, although quite apparent in freshly moulted and young *P. desolata,* lacks the dimensions of that shown in *P. belcheri* and is frequently interupted with scattered dark feathering (see Fig. 7).

The open "M" marking across the wings is black, well defined and moderately broad. Despite abrasion it remains distinct in this prion, turning noticeably brownish only in cases of extreme wear.

The black terminal barring of the central rectrices tends to be more dominant in this species than *P. belcheri,* but care should be exercised when comparing this feature with worn plumaged *P. desolata* and freshly moulted *P. belcheri.*

Examples of adult Antarctic Prions examined and collected in February and March showed substantial wear to the plumage, especially to the crown and flight feathers. This brings about a further darkening of the head through the loss of the pale extremities of the crown feathers, and the superciliary stripe is considerably shortened, so much so that it can be difficult to see when the bird is on the wing. In this condition, the dark mottled facial features give *P. desolata* a decidedly " scowling " appearance, totally unlike the small, largely white face of *P. belcheri.*

Although wear to the contour feathering of *P. desolata* does cause plumage fading, it does not occur to the same extent as *P. belcheri* and the darker head and collar still remain conspicuous.

(b) *Silhouette and Flight Patterns*

In flight, the Antarctic Prion usually carries its head tucked in close to the body, this making the neck appear more thickset, shorter, and more richly coloured than it actually is. This effect is further accentuated by the wings being held well forward in a position which enhances the length of the tail. Thus, *P. desolata* assumes a hawk-like profile which is most apparent when the bird is viewed laterally or from below (see Fig. 5). The Thin-billed Prion does not convey such an impression. It is a slender bird with a small head and slim neck, which are clearly silhouetted against the sky as the prion rises from the sea.

FIGURE 7 — An adult Antarctic Prion *(P. desolata banksi)* collected in the Scotia Sea. Note dark facial and reduced superciliary stripe; compare with Fig. 2.

The flight pattern of both species is similar although the heavier bird, *P. desolata,* has a slightly slower, more deliberate wing action. This is most apparent during calm weather when the birds use a peculiar laboured, flopping mode of flight. Despite this seeming discomfort, *P. desolata* rarely alights upon the water except to feed.

Pachyptila belcheri is, by contrast, a dainty and buoyant flier, often given to extraordinary aerobatics only paralleled by the Fulmar Prion *(Pachyptila crassirostris)*. The Thin-billed Prion remains highly manoeuverable when there is little or no wind, and was seen to outpace and outperform *P. desolata* on several occasions under these conditions.

(c) *Feeding Habits*

Perhaps the most interesting comparative differences between these two prion species is the way in which they feed. *Pachyptila desolata,* with its wider, more robust bill, equipped with palatal lamellae for sifting, feeds in a scooping fashion ably described by Murphy (1936): "The birds worked along with an odd creeping motion, resting their bodies lightly upon the surface but holding the wings just above it, the feet apparently furnishing all of the motive power. Then, as they scurried forward quite rapidly, their heads would be thrust under water and the laminated [sic] bills

would scoop for food." I have frequently observed *P. desolata* in the South Atlantic and Australasian seas foraging in this manner; this species is also adept at seizing large euphausids from the surface of the sea, and taking to the air with the crustacean held crosswise between the mandibles. Since Wilkins (1923) observed thousands of *P. desolata* feeding upon myriads of crustaceans off the southern end of South Georgia in 1922, there have been numerous accounts of this species of prion foraging by day. Those birds we collected at sea from a variety of places often contained recently captured euphausids, occasionally still held in the birds' mouth.

Unlike its congener, *Pachyptila belcheri* feeds chiefly at night; I have only very rarely seen this species foraging by day despite numerous observations. While on station in the Pacific, with the bright deck lights illuminating the surrounding sea, small groups of *P. belcheri* were seen dashing helter-skelter over the water feeding voraciously on surface plankton like storm petrels (Hydrobatiidae). The Thin-billed Prion glides bouyantly over the sea on stiffly outstretched wings, occasionally patting the water with the feet to obtain extra momentum and lift. The head is quickly lowered and the zooplankton is deftly picked from the sea with such speed as to frequently deceive the observer's eye. Often, particularly in calm weather, the wings are vibrated in short arcs with great rapidity, this enabling the bird to remain poised in the air for several moments before darting off in further quest for food. Where there are large concentrations of surface plankton *P. belcheri* will alight upon the sea to gather food by 'picking' like the Cape Pigeon *(Daption capensis)*, but with considerably more speed and dexterity.

I have no records of *P. belcheri* sifting for food as does *P. desolata,* but this is not surprising in view of the variance of bill structure and the lack of functional palatal lamellae in the maxilla of the smaller bird.

(d) *Bill Structure*

In the hand, the two species can be easily distinguished by the marked differences in the bill proportions, but at sea, unless the birds are seen at short range, this feature cannot be relied upon: only once could I identify them by bill characters when, during an *Eltanin* station, the whalebirds clustered about the ship in large groups of apparently curious individuals. Sometimes the prions would flit so closely that one could see droplets of water hanging from their bills.

DISTRIBUTION

The following distributional data obtained during eight cruises of *Eltanin* is given in numerical and chronological sequence (Table 1). Each shows the ship's noon position and surface temperature, and the number of prions seen for the day. Where necessary, explanatory notes have been added.

(a) CRUISE 16: NEW ZEALAND SUBANTARCTIC (Table 1)

TABLE 1 Cruise 16 : New Zealand subantarctic
28 January - 26 February 1965

Pachyptila desolata alter (Mathews, 1912)

Date	Latitude (° 'S)	Longitude (° 'E)	No. seen *	Temp.	Notes
8 Feb	49 18	162 01]			
		]	11	10.05	
"	52 01	162 02]			
10	54 24	159 00	∞	6.80	(1)
11	55 30	160 00	∞	6.50	
12	56 19	158 27	∞	4.90	
13	58 36	161 50	few	5.3	
14	58 29	163 10	1	5.7	(2)
16	55 23	169 34	2	-	
17	54 39	168 19	3	-	
18	52 26	166 42	few	9.9	
19	50 43	166 18	∞	-	(3)
20	52 02	166 42	few	9.7	
21	49 29	171 18	1	10.9	
24	44 05	175 55	1	-	(4)

* In this and other tables, ∞ indicates birds too numerous to count.

TABLE 1, Notes.

(1) 10-11 February. While off the northern and east coasts of Macquarie Island, large flocks of Antarctic Prions were observed near *Eltanin*. Many birds showed the white edging of both secondary and scapular feathers, indicative of fresh plumage. Scattered throughout these presumably non-breeding birds were adult breeders, their nest-frayed feathers forming a marked contrast to the more richly pigmented birds.

(2) 15 February. No birds seen owing to poor visibility and rough seas.

(3) Between Macquarie and the Auckland Islands where we made landfall on 19 February, Antarctic Prions were irregularly observed. Off these latter islands, however, thousands were seen milling about some 4 to 10 miles from shore. Four specimens were collected 3 miles east of Norman Inlet on 19 February.

(4) 24 February. One stray *P. desolata* was observed in company with two Fulmar Prions *(Pachyptila crassirostris)* off the east coast of the South Island of New Zealand.

TABLE 2 Cruise 20 : Trans-Pacific
14 September - 12 November 1965

Pachyptila belcheri (Mathews, 1912)

Date	Latitude (° 'S)	Longitude (° 'W)	No. seen	Temp.	Notes
19 Sept	41 59	159 40	frequent	10.1	(1)
20	42 55	155 16	"	9.3	
23	45 18	144 51	scattered	8.7	
24	47 03	144 56	"	7.8	
26	51 01	144 58	"	7.7	
28	55 17	144 36	"	5.1	(2)
30	57 19	145 08	"	-0.4	
1 Oct	58 40	144 55	"	-0.2	(3)
6	60 20	137 50	∞	-0.5	
8	60 02	127 22	scattered	-0.1	
9	60 15	126 30	"	1.0	
14	59 20	105 26	"	2.6	
15	59 02	105 32	"	3.9	
17	57 14	104 18	"	3.9	
18	57 02	104 34	"	4.9	
19	56 05	104 20	"	5.2	
22	52 00	99 54	"	5.9	
23	51 28	102 27	"	6.9	
24	51 24	102 50	"	6.6	
25	50 51	104 57	"	6.6	
29	45 45	118 18	"	8.2	
8 Nov	42 07	85 20	"	11.6	
9	39 33	81 36	3	12.0	

Pachyptila desolata

19 Sept	41 59	159 40	frequent	10.1	(1)
20	42 55	155 16	"	9.3	
21	43 48	150 21	5	8.8	
22	44 51	145 19	scattered	8.9	
11 Oct	61 09	117 25	"	2.1	
15	58 57	105 25	few	3.9	
16	58 23	105 35	"	4.2	
17	57 04	104 38	"	3.4	
19	56 07	104 17	"	5.0	
1 Nov	44 35	111 19	1	9.7	
6	44 57	92 03	4	9.1	

TABLE 2, Notes.

(1) 19-20 September. Both prion species were observed together in considerable numbers. The Antarctic Prions were in crisp new plumage, and were readily distinguished from the majority of the *P. belcheri* which were in severe wing moult and worn body feathering. Flocks of 50 to 60 individuals briefly followed *Eltanin,* gliding above the decks like small grey gulls.

(2) 29 September. Passed through clearly delineated Antarctic Convergence at 56° S 144° 30′ W. Dense fog prohibited observations.

(3) 3 October. First brash ice encountered at 60° 10′ S, 145° W. Prions were absent while the ship was actually in or near the ice (3-5 Oct.). On leaving the icefield, *Eltanin* crossed eastward through waters ranging from −2° Centigrade to 3.6°C. Thin-billed Prions were regularly recorded in these open waters, and a large gathering of many hundreds of this species seen on 6 October, while the ship lay on Station 13, exceeded the numbers of all other petrels.

(b) CRUISE 20: TRANS-PACIFIC. 14 SEPT. - 12 NOV. 1965
(Table 2)

This 8,574 mile cruise was the first on which the Thin-billed Prion was observed. This species proved to be the dominant *Pachyptila* frequenting the South Pacific during the spring months, and was the most abundant south of the Antarctic Convergence. Here in frigid waters, *P. belcheri* was often seen in company with Antarctic Petrels *(Thalassoica antarctica),* Antarctic Fulmars *(Fulmarus glacialoides)* and Cape Pigeons *(Daption capensis).* The Antarctic Prion was notable for its rarity over much of the region traversed.

(c) CRUISE 21: EASTERN PACIFIC, 23 NOV. 1965 - 9 JAN. 1966
(Table 3)

This 47-day summer cruise was interesting because of the remarkable change in bird distribution which took place between this cruise and its predecessor, Cruise 20. In the Central Pacific at 120° Longitude, the Antarctic Convergence had moved south 183 miles to 60° 03′ S; (average latitude is about 57° S) all antarctic species of petrel had vanished and two, hitherto unrecorded subtropical petrels — the Juan Fernandez Petrel *(Pterodroma e. externa)* and Stejneger's Petrel *(Pterodroma longirostris)* were recorded as far south as 50° S, 120° W.

Despite spending a month at sea in mostly subantarctic waters where a month previously *P. belcheri* had been widespread, no prions were seen north of the Antarctic Convergence. However, on 25 December, when *Eltanin* crossed into Antarctic waters, Thin-billed Prions suddenly reappeared. From this date until we entered the Straits of Magellan fifteen days later, *P. belcheri* were frequently observed, occasionally in flocks of several hundred. Many of these

TABLE 3 Cruise 21 : Eastern Pacific
23 November - 9 January 1966

Pachyptila belcheri

Date	Latitude (° 'S)	Longitude (° 'W)	No. Seen	Temp.	Notes
25 Dec	59 44	120 06	2	5.0	
27	61 12	120 20	2	3.8	
28	61 23	117 08	several	3.8	
29	62 03	109 40	∞	3.4	
30	62 30	102 00	frequent	3.3	
31	61 33	97 03	few	4.4	
1 Jan	59 28	91 25	1	4.8	
2	57 22	85 46	3	6.3	
3	56 31	83 46	2	6.4	
4	55 02	80 26	several	6.4	
5	53 01	75 43	frequent	7.3	
6	52 52	75 16	"	9.2	

birds were completing the moult and showed numerous gaps in the new flight feathers. No *Pachyptila* were seen inside the Magellan Straits.

The Antarctic Prion was very scarce during Cruise 21, being seen on only two occasions. Odd birds were found scattered throughout *P. belcheri* and Blue Petrel *(Halobaena caerulea)* flocks on 29 December (62° 03′ S, 109° 40′ W; 3.4°C.) and two were recorded on 31 December (61° 33′ S, 97° 38′ W; 4.4°C.)

(d) CRUISE 22: SCOTIA, 19 JAN. - 17 MAR. 1966
(Tables 4 - 5)

As shown in Table 4, Antarctic Prions were numerous during the 6,507 miles of Cruise 22. They outnumbered all other petrels seen. Eighteen pelagic specimens of *Pachyptila d. banksi* were collected from six locations in the Scotia Sea. A sizeable number of *P. belcheri* were seen off Staten Island, Tierra del Fuego on 20 January, but once having crossed the Antarctic Convergence, this species was recorded on only eight occasions (see Table 5). Three Antarctic islands were briefly visited during this cruise: South Georgia (7 February) and South Thule and Zavodovski Islands on 18 February and 6 March respectively.

TABLE 4 Cruise 22 : Scotia Sea
19 January - 17 March 1966
Pachyptila desolata banksi (Smith, 1840)

Date	Latitude (° 'S)	Longitude (° 'W)	No. Seen	Temp.	Notes
21 Jan	55 56	61 45	1	5.8	
22	57 04	60 01	3	6.2	
23	57 27	59 00	2	-	
24	57 02	57 50	2	4.2	1 collected
25	58 54	54 18	2	2.9	
26	59 01	52 44	several	2.5	
27	57 33	52 00	odd	3.4	
28	56 02	52 00	3	5.9	fog
29	55 49	51 29	nil	5.8	fog
30	54 35	51 38	1	6.2	
31 Jan to 3 Feb	53 36	52 16	nil	-	fog
5	51 31	39 59	6	5.1	
6	53 06	40 00	few	4.8	
7	53 49	38 10	∞	-	(1)
8	54 59	40 03	∞	-	
9	56 30	39 46	several		
10	59 00	40 00	few	1.6	1 collected
11	60 06	39 47	∞	1.6	
12	63 00	40 00	∞	0.3	8 collected
13	63 19	39 50	∞	-0.3	
14	62 04	37 58	1+	-	
15	60 20	36 14	odd	0.8	
16	60 01	33 05	odd	0.8	
17	60 10	30 00	"	1.0	(2)
18	59 28	27 16	nil	1.0	(3)
19	61 01	26 12	2	1.0	
20	61 54	21 55	frequent	1.2	(4)
21	62 29	19 03	few	0.7	
22	62 33	17 34	"	0.7	
23	63 04	14 59	frequent	0.1	
24	61 00	14 47	0cc.	0.5	
25	60 11	14 39	3	1.0	
4 Mar	55 59	22 35	8	1.8	
5	56 32	24 23	3	1.7	
6	56 24	26 46	4+	0.7	(5)
7	56 20	30 58	odd	1.7	
8	56 17	35 10	several	2.7	
9	56 09	38 39	"	2.0	
10	55 45	42 52	"	3.6	4 collected

TABLE 5 Cruise 22 : Scotia Sea
19 January - 17 March 1966

Pachyptila belcheri

Date	Latitude (° 'S)	Longitude (° 'W)	No. Seen	Temp.	Notes
20 Jan	54 45	63 22	∞	6.2	Off Staten I.
25	58 55	54 14	1	2.9	Bird in moult
27	57 33	52 00	1	3.4	
4 Feb	50 59	39 51	1+	4.7	
5	51 31	39 59	several	5.1	
9	56 29	39 56	"	2.3	
14 Mar	54 43	55 30	1	6.7	
16	52 52	66 03	1	8.3	

TABLES 4 - 5, Notes.

(1) 7 February. At 7 a.m., as *Eltanin* steamed along the north-western coast of South Georgia, myriads of Antarctic Prions were seen streaming out to sea from the mist-shrouded valleys. It was surprising that none flew onboard or collided with the ship, so dense were their numbers. None were observed ashore during our short stay in the Bay of Isles.

(2) 17 February. During a brief snowstorm, three birds flew onboard at 2.10 a.m. while the brightly lit *Eltanin* lay on Station 29 60° 02′ S, 29° 59′ W; 1.0°C.).

(3) 18 February. Landed at South Thule Island. No *Pachyptila* were observed in the vicinity of this ice-capped island, and none were seen ashore.

(4) 20 February. Many varieties of far ranging petrels including groups of Antarctic Prions were seen over the plankton-rich sea this date. Buckets of krill *(Euphausia superba)* were being regularly extracted from the ship's three foot square sea water intake.

(5) 6 March. Occasional Antarctic Prions were recorded near Zavodovski Island this date, with one specimen being collected from close inshore. It is doubtful whether any prion could survive for any length of time in the sulphurous fumes that are issuing from the numerous cracks and fumaroles of this volcanic island, although an extensive rookery of mostly Chinstrap Penguins *(Pygoscelis antarctica)*, over a million birds, seem to prosper under these very unusual circumstances.

(e) CRUISE 23: TRANS-PACIFIC, 31 MAR. - 30 MAY 1966 (Tables 6 - 7)

During this cruise, the westward migration of Falkland Island Thin-billed Prions was seen, and eleven birds were attracted aboard *Eltanin* by two powerful signalling lights. Winter weather prevented additional collecting in the ship's dory. *Pachyptila belcheri* paced us well across the Pacific and were constantly seen as scattered birds winging west by day, and numerous white shapes at night. A definite preference for waters south of the Antarctic Convergence, particularly in the eastern sector of the Pacific, was again noted during this cruise. The Antarctic Prion was seen sparingly about the periphery of the Pacific.

TABLE 6 Cruise 23 : Trans-Pacific
31 March - 30 May 1966

Pachyptila belcheri

Date	Latitude (° 'S)	Longitude (° 'W)	No. Seen	Temp.	Notes
2 Apr	54 48	75 42	frequent	7.4	
4	61 33	78 14	several	3.9	
5	64 51	80 52	6	0.6	
7	63 29	93 38	frequent	2.4	
8	63 27	94 07	1	2.0	
15	63 49	101 55	several	2.1	3 collected
20	58 48	100 42	frequent	-	
21	58 06	103 55	several	6.2	
22	58 03	107 36	2+	7.0	
25	61 23	108 20	3	4.9	
26	62 00	108 50	6	4.7	
28	63 51	108 56	several	2.2	8 collected
29	63 10	110 52	1	3.2	
1 May	63 36	115 58	scattered	3.1	
4	58 55	115 02	1+	5.2	
5	58 35	115 30	1	5.1	
6	57 38	115 11	2+	5.2	
7	57 33	118 58	frequent	5.1	
8	57 25	123 35	"	4.6	
9	57 41	126 55	"	4.0	
10	56 59	128 37	"	5.6	
11	56 42	131 18	"	3.9	
12	56 02	132 09	"	4.0	
13	54 29	138 03	"	5.0	
15	52 03	149 52	1	5.9	
17	48 59	162 04	1?	9.7	
18	47 34	167 32	1	10.7	

TABLE 7 Cruise 23 : Trans-Pacific
31 March - 30 May 1966

Pachyptila desolata

Date	Latitude (° 'S)	Longitude (° 'W)	No. Seen	Temp.	Notes
2 Apr	54 48	75 42	few	7.4	
3	58 03	77 20	1	6.3	
5	64 51	80 52	4	0.6	
8	63 27	94 07	2	2.0	
18 May	47 34	167 32	3	10.8	
20	46 20	170 09	3	12.4	
21	44 40	173 00	1	12.3	
22	43 52	174 27	200+	12.6	
23	42 55	176 05	1	14.0	
24	Off Chatham Islands		1+	-	

(f) CRUISE 26: TASMAN SEA, 29 NOV.-20 DEC. 1966

For this 21-day cruise, the Thin-billed and Antarctic Prions were seen on only one occasion. This was on 11 December, in the position 45° 38′ S, 160° 08′ E; surface temp. 10.9°C. Several freshly plumaged *P. desolata* were sighted in company with Thin-billed Prions hovering over three New Zealand Fur Seals *(Arctocephalus forsteri)* investigating our ship on Station 4.

(g) CRUISE 27: ROSS SEA, 31 DEC.-1 MAR. 1967
(Table 8)

This cruise into the Ross Sea started from Wellington, New Zealand, and finished at Melbourne, Australia. While on passage to McMurdo Sound, where we arrived on 22 January, a short stop-over at the Antipodes Islands was made on 3 January. Several Subantarctic Fairy Prions (*Pachyptila turtur* subspp.) were recorded from the dory on route to and from the beach, and later, during our approaches on Macquarie Island. Scott Island (Fig. 8) was investigated on 2 February, and Macquarie was again visited on 15 February. The Antarctic Prion proved to be the most frequently recorded prion, but its numbers were erratic, with the largest gatherings being seen near the breeding stations. Essentially restricted to a belt on water between 56° and 67° South, *P. desolata* was not observed at all in the

TABLE 8 Cruise 27 : Ross Sea
31 December 1966 - 1 March 1967

Pachyptila desolata

Date	Latitude (° 'S)	Longitude (° ')	No. Seen	Temp.	Notes
2 Jan	48 32	175 32E	several	10.4	
4	52 35	178 50E	1	9.2	(1)
5	56 30	178 29E	20	6.3	
6	61 15	177 58E	frequent	3.7	(2)
7	63 00	177 42E	few	3.2	(3)
8	63 26	177 54E	occ.	2.7	
2 Feb	67 24	179 53W	200+	0.2	(4)
5	67 03	163 22E	few	0.5	(5)
6	65 00	160 55E	2	0.9	fresh plum.
7	65 18	160 46E	odd	1.2	
8	62 40	158 06E	4	1.7	
9	61 13	156 36E	several	2.8	fresh plum.
10	59 35	155 19E	2	2.8	
11	59 00	157 00E	3	3.0	
12	57 56	153 53E	few	4.2	(6)
13	58 06	154 29E	1	4.5	fresh plum.
14	56 23	156 18E	∞	5.9	(7)
15	54 30	158 58E	few	5.9	(8)
16	55 04	156 46E	-	6.5	(9)
17	56 00	152 39E	few	5.2	
18	56 11	152 11E	several	5.6	worn plum.

TABLE 8, Notes.

(1) 3 January. None observed about the Antipodes Islands where a landing was made on this date. A small race of Fairy Prion (*P. turtur* subspp.) which nests on this island was frequent in nearby waters.

(2) 6 January. Quite numerous on this date, especially towards evening. A few birds were in wing moult; the remainder were in new feathering.

(3) 8 January. First iceberg 63° 49.6′ S, 177° 54′ E. Frequent icebergs seen after this date. Passed through the Antarctic Convergence. *Eltanin* remained in the Ross Sea for 24 days during which time no prions were seen.

Australian coasts (Serventy & Whitell 1951; Condon 1944) and on western New Zealand beaches; most are immature birds. That these birds are from Kerguelen Island is supported by their being cast ashore with considerable numbers of Indian Ocean Lesser Broad-billed Prions *(Pachyptila salvini),* occasional Kerguelen Antarctic Prions *(Pachyptila desolata desolata)* and other petrels from that region (Bull & Boesen 1961: 63, 64, 65). Moulting birds, as seen regularly in the Pacific during Cruise 20 and 21 are exceedingly rare as beach derelicts, and in ten years of beach patrolling in New Zealand, I have not found any *P. belcheri* undergoing a full moult. Also, there are no records of this species being taken in waters immediately east of New Zealand. A severe tropical cyclone which scoured the seas just north and east of New Zealand in April 1968 accounted for a large loss of seabirds and the sinking of the inter-island ferry *Wahine.* Around Wellington, 588 birds were cast ashore, including 102 Fairy Prions *(Pachyptila turtur)* and 6 *P. desolata* (Kinsky 1968). Worthy of note is the fact that no Thin-billed Prions were victims of this storm.

From the available evidence, the western New Zealand coasts may represent the limit for immature stragglers of Kerguelen Thin-billed Prions.

Perhaps the most interesting and unexpected find of the current investigation was the large number of Thin-billed Prions frequenting the colder regions of the South Pacific. Although not seen in great aggregations as were the South Atlantic *P. desolata,* the Thin-billed Prion was nonetheless quite abundant as widely dispersed groups and individuals, which, when considered collectively, must account for many thousands of birds. The origin of this sizeable prion population is unknown, but in view of the observations and collections made during the Pacific cruises, I consider the Falkland Islands to be the breeding home of these birds.

Cawkell & Hamilton (1961) have shown that Falkland Island *P. belcheri* leave their breeding grounds, " any time after the beginning of March," and by early April, the forerunners of a general migration of birds are entering the Pacific by way of the Drake Passage. Cruise 23 coincided well with this migration. The first groups of *P. belcheri,* composed of young and adult birds, reached our position in the Pacific well south of the Antarctic Convergence on 15 April, when three birds flew onboard the ship (see Cruise 23, Table 6). An immature female has also been collected by G. E. Watson and I. P. Angle, of the U.S. National Museum, on 12 April 1965 at 58° 30′ S, 78° W, a position not far from ours of 15 April. During April and May, the Thin-billed Prion disperses westward into the hitherto sparsely populated South Pacific; most keep to the colder waters south of the Antarctic Convergence where food is particularly abundant.

For the winter months (June to imd-September), I have no records, but according to Szijj (1967) who crossed the South Pacific

from 29 July to 17 September 1964, his prion species " showed a curiously disjointed distribution, occurring in both the New Zealand and South American sectors in waters of 7°C or warmer, but twice they were encountered south of the Convergence as well." It is probable that like many Antarctic petrels, the majority of *P. belcheri* move north to more fruitful winter feeding grounds. Johnson (1965) reported *P. belcheri* as an irregular winter visitor straying as far north as 25° S along the Chilean coastline, while MacDonald & Lawford (1954) observed the species near the Kermadec Islands (29° S) in August 1951. They observed, " Large numbers were seen between Napier and Meyer Island during a short boat excursion from Raoul Island, Kermadecs, on August 31. It was not ascertained if the species was breeding in the Kermadecs, but the reason for the presence of a large number in August would have been worth investigating." A specimen was collected but unfortunately not kept. Sorensen (1964) collected a dead *P. belcheri* from Denham Bay at the Kermadecs in July 1944. Whether these birds are from Kerguelen, the Falkland Islands, or, indeed, from an unknown Pacific breeding site is a matter of conjecture, but it seems likely that they were part of the eastward drift of immature birds from the Indian Ocean.

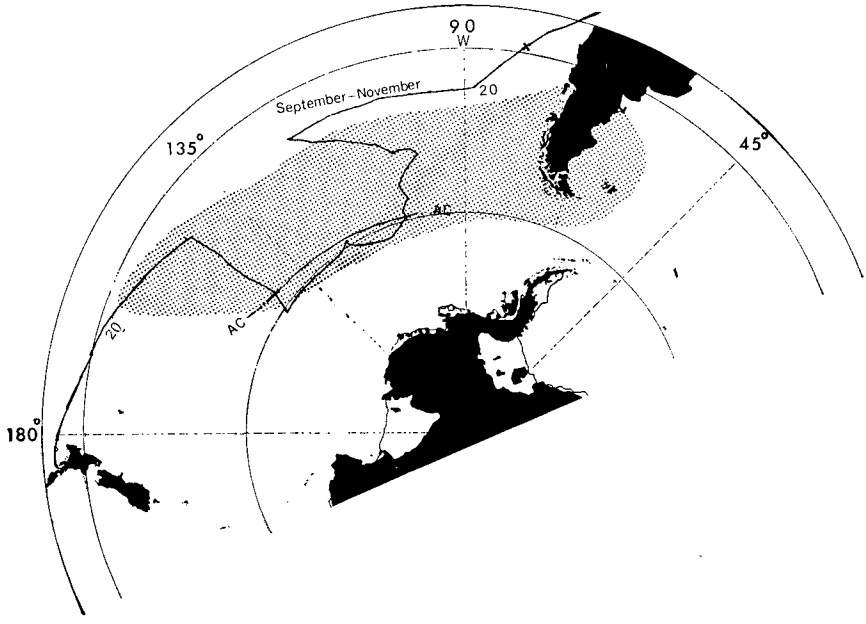

FIGURE 9 — Distribution of Thin-billed Prions during September to early November. The species is present about the South American coast all year.

By mid-September, most of the birds were returning or had returned south, since they were common when initially encountered at 45° S 145° W on 23 September, and later, were widely distributed and frequent south of the Antarctic Convergence during the remainder of Cruise 20 (see Fig. 9). Likewise Szijj (1967) recorded more "prion spps" (very probably *P. belcheri*) during the latter part of his voyage (11-17 September 1964). Szijj's records in the eastern Pacific of 4 to 50 prions seen during his two hour daily observations are approximately the same as my own observations in the western sector, a week or so later, in 1965.

During the latter part of October and into November the trend southwards in the Pacific continued and the number of *P. belcheri* rapidly increased in the antarctic waters, where they were found with Antarctic Petrels *(Thalassoica antarctica)*, Antarctic Fulmars *(Fulmarus glacialoides)* and many Cape Pigeons *(Daption capensis)*. The effectiveness of this migration may be seen in the figures given for Cruise 21 (Table 1); by late December no *Pachyptila* were observed north of the Antarctic Convergence except around the coastal southern region of South America. However, numerous flocks of up to 150 birds were commonly encountered south of 59° 30′ S, where the Antarctic Convergence was found in late December 1965.

The large number of *P. belcheri* inhabiting the South Pacific in December is rather interesting because the species arrives at the Falkland Islands to breed in late September, and does not complete breeding activities until March (Cawkell & Hamilton 1961). Further, this aggregation of birds remains in the Pacific area most of the summer, as Holgersen (1957) was undoubtedly encountering *P. belcheri* "between longitudes 90° and 125° W, between the pack ice and the Antarctic Convergence" from 3 December 1947 to 8 February 1948 (see Fig. 6 for summer distribution of western *P. belcheri;* Holgersen's prior records and *Brategg's* cruise track have been added, since his observations correlate so well with my own).

Apparently the cold antarctic waters of the Pacific with their rich summer supply of plankton serve as a summering ground for a sizeable population of sub-mature *P. belcheri.* Many of these non-breeding birds undergo an early moult, most prions recorded in December (Cruise 21) showing missing flight feathers indicating active moult. To an observer, these gaps display the usually concealed broad white inner webs of the remaining feathers as a characteristic flash of white in the wing.

On 21-22 January, Holgersen also observed two 'types' of prion, noting "one being paler than the ordinary one and with white on some of the primaries so that the posterior edge of the wings to some extent looked white." Upon renewal of the plumage, *P. belcheri* (and *P. desolata*) show significant white bordering to the secondary feathers and scapulars and while Holgersen may have seen both *P. desolata* and *P. belcheri,* I believe it more likely that the prions

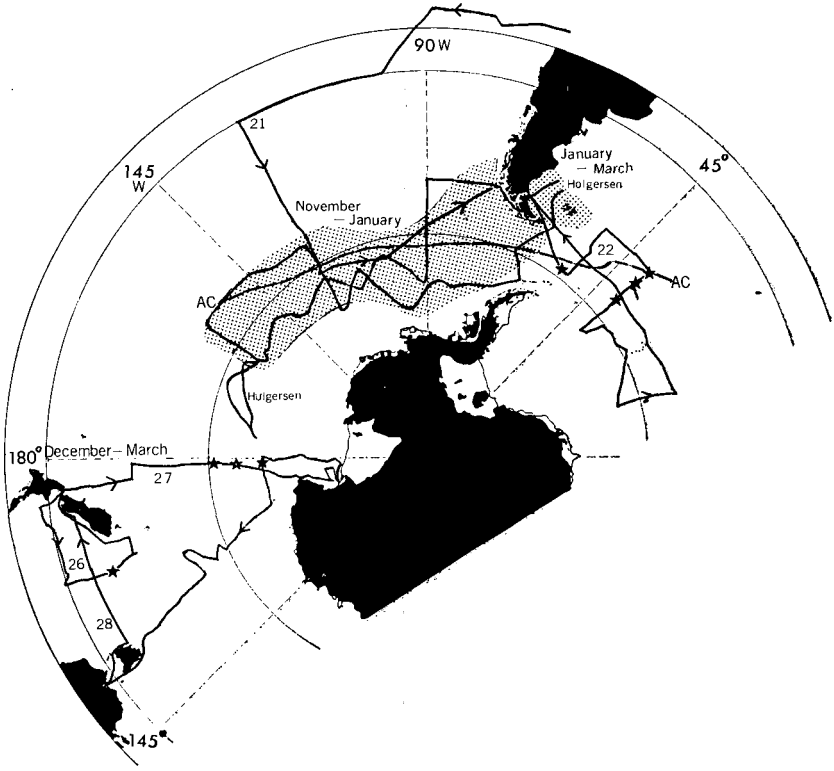

FIGURE 10 — Summer distribution of *P. belcheri* in central and eastern Pacific sectors. Holgersen's (1957) data has been added to my own as mentioned in the text. AC = position of Antarctic Convergence. The stars indicate extralimital sight records.

in question were *P. belcheri* in the final stages of their moult cycle. The Antarctic Prion is very rare in the central south Pacific, particularly in the summer months (see discussion of that species).

I have very little information as to when the adult *P. belcheri* moult, and there appears to be none on record in the literature. A few adult birds were seen in full moult (see Fig. 4) between the Falklands and South Georgia during February and March 1966 suggesting that like *P. desolata,* the breeding birds commence replacing the worn plumage while still feeding well-grown chicks in the latter stages of the nuptial cycle (see Tickell 1962). It should be noted that sub-mature *P. belcheri* are already in new plumage by February. The occasional adult storm-driven birds taken in New Zealand during May to September display various amounts of wear to fresh feathering also indicating that *P. belcheri* finish replacing the nest-frayed plumage shortly before the first birds are driven ashore in May.

plankton rich Ross Sea. Sven specimens of *P. desolata alter* were collected. Thin-billed Prions were rare, being recorded on only three occasions:

6 January. 61° 15′ S, 177° 58′ E; 3.7°C.

A few *P. belcheri* scattered within a large flock of Antarctic Prions. The majority of both species were through the moult, but a few individuals were still replacing worn flight feathers.

8 January. 63° 30′ S, 177° 54′ E; 2.7°C.

A single bird in this position south of the Antarctic Convergence. The first of many icebergs sighted on our southward journey was 24 miles due south of this position.

3 February. 67° 27′ S, 179° 10′ E; 0.4°C.

My last and southermost record for *P. belcheri.* In company with many Antarctic Petrels *(Thalassoica antarctica)*, two birds in fresh plumage were logged in this position due west of Scott Island.

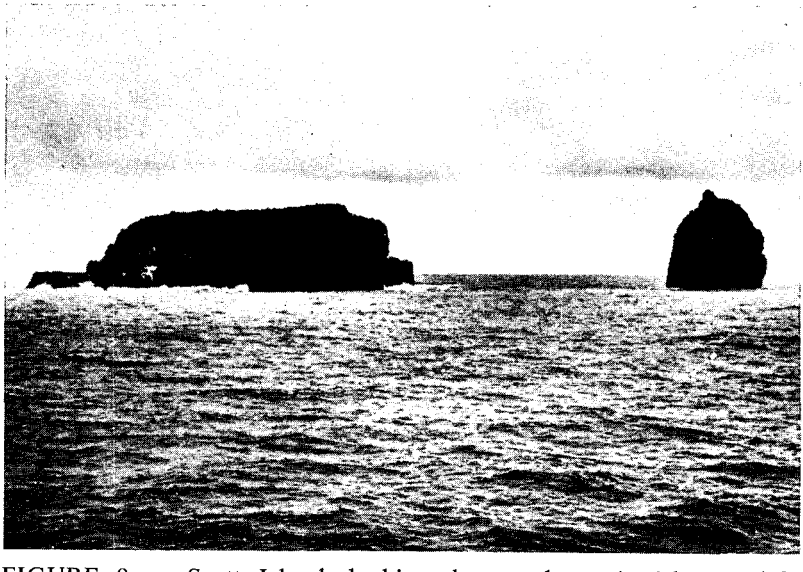

FIGURE 8 — Scott Island, looking due south: main islet on left, Haggits Pillar on right, distance 800 yards (731.5m). The breeding site of Antarctic Prions, Wilson's Storm Petrels and Snow Petrels.

(4) 2 February. As *Eltanin* circled Scott Island (67° 24′ S, 179° 55′ W), a stream of Antarctic Prions was seen issuing from and disappearing into the many fissures in the broken basalt rock on both Haggits Pillar and the main island (see Fig. 8). A heavy swell prohibited a landing, but a male and female Scott Island *P. desolata* were shot from just offshore by a dory party. The Antarctic Prion is nesting on the upper third of the 205 ft (62.5m) column of Haggits Pillar with a few Wilson's Storm Petrels *(Oceanites oceanicus)* and Snow Petrels *(Pagodroma nivea)* as breeding companions. On Scott Island itself, the northern cliffs and the ice-free upper slopes also appear to provide shelter for a small number of *P. desolata.* The total number of Antarctic Prions seen in the proximity of the islets I estimated to be 200 pairs. No prions were observed beyond a radius of 40 miles (64km) of Scott Island.

(5) 5 February. *Eltanin* approached the Balleny Islands from the east and made a close approach upon Sabrina and Buckle Islands. A few Antarctic Prions in fresh plumage were recorded about a mile off Sabrina Islet. I did not find any evidence to suggest that these islands serve as a prion breeding station.

(6) 12 February. Five Antarctic Prions were collected from a small number seen on this date.

(7) 14 February. Encountered considerable numbers of Antarctic and Fairy Prions during our approaches on Macquarie Island.

(8) 15 February. Landed Macquarie; occasional Antarctic Prions seen offshore at 8.00 a.m. No birds were collected at Macquarie.

(9) 16 February. Whole gale prevented detailed observations.

(h) CRUISE 28 (IN PART): TASMAN SEA, 10 - 28 MAR. 1967

No Thin-billed or Antarctic Prions were recorded for this 18-day cruise. Frequent Fairy Prions *(Pachyptila turtur),* Broad-billed Prions *(Pachyptila vittata)* and the occasional Fulmar Prion *(Pachyptila crassirostris)* were seen during the 43° 15′ S crossing of the Tasman Sea. The sea surface temperature fluctuated between 13 and 16°C. Two Red-tailed Tropic-birds *(Phaethon rubricauda roseotincta)* observed on 14 March and our nearly running down a large Sunfish *(Mola mola)* lying obliquely near the surface on the 15th, emphasized the subtropical elements of this summer cruise.

DISCUSSION

(a) *Pachyptila belcheri.*

There are no data to suggest a regular eastward movement of Kerguelen Island *P. belcheri* travelling east into the South Pacific via Australasian seas, although occasional strays were seen in the Ross Sea during Cruise 27 and two corpses have been found at Campbell Island (Bailey & Sorensen 1962). During winter gales (May to September), a few *P. belcheri* occur on both the west and southern

Not all birds from the South American quadrant migrate into the Pacific for the winter. According to De Schauensee (1966) the Thin-billed Prion " winters off the coast of Argentina north to Uruguay and Sao Paulo, Brazil." Pinto (1938; 1964) reported seven birds from Sao Paulo in June 1903 and August 1925 and one specimen from Praia Grande (just south of Rio de Janeiro). Cuello & Gerzenstein (1962) recorded more than 3,000 dead birds near Montevideo in July 1954. Escalante (1959; 1967) likewise noted heavy winter mortality of *P. belcheri* at the mouth of the Arroyo Carrasco (near Montevideo) in August 1953 and at the La Playa Brava (Uruguay) in July 1959. Further south, Murphy (1936) mentioned a specimen taken from the beach at Mar del Plata, Argentina, on 27 October 1915 and reported that Beck collected 64 *P. belcheri* between late May and 1 October 1915 " in waters between the Falkland Islands, Staten Island, and the coast of Patagonia." I have examined these specimens in the American Museum of Natural History, and they are all in adult plumage. Many hundreds of probable *P. belcheri* outside the eastern entrance of the Magellan Straits and along the east coast of Tierra del Fuego were observed also by Beck on 25 May and 6 August 1915 respectively.

Whether any Falkland *P. belcheri* cross the South Atlantic to perhaps meet and intermingle with prions resident at Kerguelen Island is not known, but adults from both breeding areas are indistinguishable to me.

Two specimens of the Thin-billed Prion have been taken from South African coasts. Winterbottom (1956) reported that the first known record was a bird collected at Muizenburg on 27 April 1897, and a second specimen turned up 57 years later in a large wreck of Fairy Prions at Durban, Natal, on 6 August 1954 (Clancey 1955).

Figure 11 shows the known distribution of *P. belcheri* and has been prepared from my own data and that of other workers. It is purely tentative and is offered as a basis for further research. Much work remains to be done, particularly in the Atlantic and Indian Ocean sectors, where records of the Thin-billed Prion are very few. The area outlined for the range of Kerguelen birds is based upon the trends of dispersal which I found for the species in the Pacific, and is therefore liable to considerable modification in the future.

Dr. R. A. Falla has drawn my attention to an early distributional record of the Thin-billed Prion. It is clearly identifiable from the S. Parkinson drawing number 15 in the British Museum (Natural History), London (see Lysaght 1959) of a specimen shot by Banks on 1 February 1769 in 58° 46′ S, 78° 42′ W (the western approaches of the Drake Passage). To the drawing is attached Solander's manuscript name "*Procellaria turtur*" and it was later (1820) the basis of Kuhl's description of his *P. turtur*. This has disturbing implications for nomenclature, but at least the distributional data are clear.

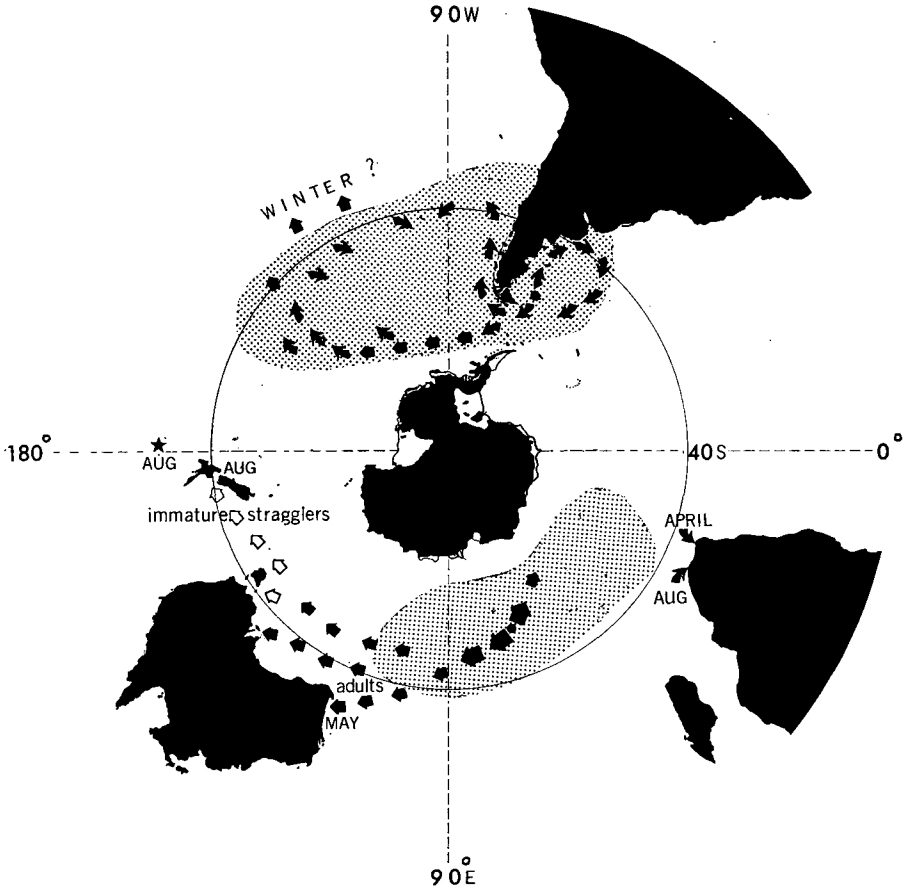

FIGURE 11 — The distribution of the Thin-billed Prion showing main migration routes. Based upon the work of others and my own data.

The Thin-billed Prion is known to breed at two places, the Falkland Group and Kerguelen Island. Another area well worthy of investigation as a possible breeding site is Staten Island (the easternmost island off Tierra del Fuego) and other offshore islets in this little known region. Johnson (1965) remarked: " In southern Chilean waters it is probably more abundant than the scarcity of records indicate and there is at least an even chance that it may nest somewhere in Chilean territory in the neighbourhood of Cape Horn or on one or more of the multiple uninhabited islands south of the Beagle channel." Passing some 19 miles (16km) from Staten Island in the late afternoon of 20 January 1966, *Eltanin* was

surrounded by many *P. belcheri,* all of which were flying towards the island with considerable numbers of Wilson's Storm Petrel *(Oceanites oceanicus).*

The Thin-billed Prion feeds upon swarms of the amphipod *Parathemisto gaudichaudii* of which I have taken as many as 100 individuals from a single dissected *P. belcheri.* Data obtained from the specimens of *P. belcheri* collected during Cruise 23, and direct observations during this and other Pacific cruises, revealed that *P. gaudichaudii* constitutes the bulk of this prion's food. Indeed, despite the many other species of zooplankton (including *Euphausia superba*) regularly caught in the surface tow-nets at night, 2 otoliths from the myctophid fish *Electrona* and a small, semi-digested cephalopod are my only additional evidence of a varied prion diet. Because the soft amphipod would presumably be rapidly digested by these birds, I have seldom found anything but the hard remains of cephalopods beaks and pebbles in the stomachs of storm-killed birds cast ashore in New Zealand. At Kerguelen Island, four specimens of *P. belcheri* collected by Falla (1937) and Paulian (1953) revealed nothing but squid beaks. Whether this prion takes forms of food other than these must await further study.

The known distribution of *Parathemisto gaudichaudii* and the Thin-billed Prion correlate well. Kane (1966) reported that *P. gaudichaudii* is " a conspicuous and frequently occurring constituent of the plankton of the upper water layers of the Southern Ocean " where its range is bounded in the north by the subtropical convergence, and by the East Wind Drift in the far south. The greatest areas of abundance appear to lie approximately 600 miles north and south of the Antarctic Convergence with minimal numbers occurring in the convergence itself (see also Hurley (1969; pl. 19, map 6) for details of distribution of the species of *Parathemisto* in the Southern Ocean). During Cruise 20 there was a notable lack of prions in the convergence, both on the western and eastern sides of the Pacific. *Parathemisto gaudichaudii* is apparently rarely recorded in South African waters where interestingly enough, only two *P. belcheri* have been recognised.

P. gaudichaudii occurs often in large gatherings and according to Kane, " Large swarms of the species are frequently sampled, especially at night when the species evidently accumulates in surface waters." This vertical diurnal migration of *P. gaudichaudii* would explain my observing the Thin-billed Prion feeding at dusk and throughout the night.

(b) *Pachyptila desolata.*

I found no evidence of a sub-mature population of the Antarctic Prion summering on the high seas like juveniles of its counterpart *P. belcheri.* Indeed, from November to the completion of the breeding season, the vast Atlantic population of *P. desolata banksi* (Smith,

1840) is primarily restricted to the Scotia Sea with few birds beyond these limits. To the west, isolated stragglers represented the species in the south-eastern Pacific during November 1965 to January 1966, and to the east, this subspecies has only been seen in small groups east of the South Sandwich Islands in March. Within this sector, however, the birds were ubiquitious, with very dense concentrations between the South Orkney Islands and South Georgia, where, as is well known, the nutrient rich waters teem with the Antarctic " krill " *(Euphausia superba)*.

In the New Zealand region, where the Antarctic Prion (see sub-species listed in OSNZ Annotated Checklist 1970: 25) nests on the Auckland Islands, Macquarie Island and, sparingly, on Scott Island, a similar situation prevailed in that remarkably few birds were recorded away from these islands. Vast numbers of prions were seen off the Auckland Islands in February 1965 and around Macquarie Island during our summer work in this area (Cruises 16 and 27).

Unlike *P. belcheri,* the sub-mature birds apparently accompany the adult birds both at sea and ashore during the breeding season. Tickell (1962) has commented that while unable to accurately determine the percentage, the Signy Island (South Orkney) breeding population " must contain a considerable proportion of non-breeding birds of several age groups, together with breeders that have been unsuccessful for one reason or another." With such productive and rich plankton pastures so near at hand both in the Scotia Sea and New Zealand subantarctic sectors, this concentration of the prion populations is not surprising.

The collective departure of young and adult birds following breeding activities is a real one in that the species is entirely absent from the breeding islands during the winter months. This exodus is apparently true for all areas (see Falla 1937; Downes *et al.* 1959; Tickell 1962). Where the flocks of *P. desolata* find their winter feeding grounds is not known, and the question as to whether there is any intermingling of the geographical races is an interesting question, but difficult to answer because, apart from minor, somewhat questionable, subspecific characters, all populations of *P. desolata* are remarkably similar in morphology.

Kerguelen Antarctic Prions (*P. desolata desolata,* Gmelin, 1789) migrate eastwards shortly after the Lesser Broad-billed Prion *(P. salvini)* leaves Marion and Crozet Islands. Serventy & Whittell (1951) refer to *P. desolata* as the commonest prion washed ashore in south-west Australian prion wrecks, with *P. salvini* also well represented among the storm victims. Of 20 Antarctic Prion skins collected between May and September from Bunbury and Cottesloe beaches which I have recently examined at the National Museum, Victoria, all are referable to the Kerguelen form. Several of these specimens are adult birds and not immature vagrants that infrequently appear further east with Australasian *P. desolata* on South Australian and New Zealand west coast beaches.

The Macquarie and Auckland Island birds apparently move northwards with the onset of winter as Condon (1944; 1962) reported *P. desolata* as very common in winter 'prion wrecks' from May to October along the South Australian coast. Hindwood & McGill (1958) recorded *P. desolata* from the Sydney beaches in winter and specimens of this subspecies are not infrequent during westerly gales from May to September in New Zealand. Some more fortunate birds reach the Pacific waters east of the Chatham Islands clear of any lee-shore hazard where I found them associating with *P. belcheri* in late September 1965 (Cruise 20).

While the western periphery of the Pacific is receiving visitors from New Zealand waters, some westbound *P. desolata banksi* are rounding Cape Horn. I saw several such birds in April shortly after leaving Pt. Pilar to journey south for Cruise 23. This species does not appear to venture far into the South Pacific since we saw so few during our work in these waters. Apparently they fly north, for Johnson (1965) reported Antarctic Prions occurring irregularly but in some numbers as winter corpses along the long Chilean coast from Maullin at 41° 30′ S to Paposo, 90 miles north of Antofagasto at approximately 23° S.

For the most part however, the vast central South Pacific shelters very few examples of the Antarctic Prion. I saw none during much of our Pacific cruising, and Szijj's winter records in the same region likewise revealed a paucity of prions. It is my belief that neither the New Zealand subantarctic breeding populations nor the South Atlantic Antarctic birds actually traverse the Pacific Ocean regularly in any number, and that the Antarctic Prion is not circumpolar in its travels as previously suspected.

South African records of *P. desolata* are irregular, but specimens have been obtained in substantial numbers in winter prion wrecks. Liverside (1959) recorded them from Walvis Bay to Durban and Mozambique, and mentioned that *P. desolata* was the chief victim in a severe July 1954 storm. These birds could have their origin at Kerguelen or possibly Heard Island, since a bird just off the nest was collected some 20 miles west of Amsterdam Island by Gill (1967) on 8 April 1964. It may have been one of many migrating westwards for the winter. Since the vast Scotia Sea population of *P. desolata banksi* do not pass through the Drake Passage, there may well be some mingling of races of *P. desolata* in the waters south of South Africa. Smith's type of *P. d. banksi* was collected in waters off the Cape of Good Hope.

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APPENDIX (Tables 9-11)

The following tables are those of prion measurements taken during Cruises 16, 22, 23 and 27. The 40 specimens were measured in the flesh aboard *Eltanin,* and are now in the Dominion Museum, Wellington, New Zealand.

TABLE 9 *Pachyptila belcheri* Cruise 23

Date	Field No.	Sex	Age	Bill	Width	Wing	Tail	Tars	Toe	Wt
15 Apr	23-1	♀	Imm.	24.0	11.0	181	95	33.1	40.8	132g *
	23-2	♀	Imm.	24.6	10.0	180	90	33.0	40.5	114.7
	23-3	♂	Imm.	24.0	10.6	175	90	34.6	41.8	142.0x
28	23-4	♀	Imm.	24.0	9.5	173	89	31.9	39.0	131.0
	23-5	♂	Imm.	24.4	11.0	183	91	32.5	41.0	146.0x
	23-6	♂	Imm.	22.7	9.6	175	82	33.0	40.0	135.5
	23-7	♀	Ad.	24.4	10.4	176	87	32.6	39.7	122.0
	23-8	♂	Ad.	23.8	10.7	178	89	33.7	40.8	130
	23-9	♀	Imm.	24.5	10.3	177	90	33.7	40.5	129
	23-10	♀	Ad.	24.1	11.2	178	87	32.0	40.4	145
	23-11	♀	Ad.	22.3	11.4	178	86	34.0	39.7	129

* Weight influenced by more than 10g of *Parathemisto* in proventriculus and gizzard.

TABLE 10 *Pachyptila desolata banksi* Cruise 22

Date	Field No.	Sex	Age	Bill	Width	Wing	Tail	Tars	Toe	Wt
24 Jan	22-1	♂	Ad.	28.4	14.1	187	92	35.3	44.1	137.0
10 Feb	22-15	♂	Ad.	28.1	14.3	182	92	34.6	43.7	148.0
12	22-16	♂	Ad.	28.7	14.8	198	100	34.5	43.3	161.5
	22-17	♂	Ad.	28.6	14.9	190	103	36.5	43.6	153.7
	22-18	♂	Ad.	28.0	15.5	194	98	35.0	41.2	165.0
	22-19	♀	Ad.	27.6	14.5	185	96	34.9	43.6	163.5
	22-20	♂	Ad.	27.2	15.2	190	97	35.7	42.7	155.5
	22-21	♀	Ad.	27.5	14.3	191	96	36.5	42.5	154.0
	22-22	♂	Ad.	26.1	15.0	195	99	34.9	42.9	150.5
	22-23	♀	Ad.	28.2	14.9	193	100	36.0	43.5	152.0
16	22-27	♀	Ad.	27.9	14.2	187	94	34.5	41.6	137.0
	22-28	♀	Ad.	28.3	13.7	186	97	33.6	40.3	152.5
	22-29	♂	Ad.	27.9	13.9	190	97	34.4	41.0	147.0
6 Mar	22-52	♀	Ad.	26.7	13.9	185	94	33.9	42.3	138.5
10	22-57	♂	Ad.	29.2	14.1	199	98	35.4	41.8	125.0
	22-58	♀	Ad.	29.5	16.2	193	96	35.3	42.6	128.0
	22-59	♂	Ad.	29.2	15.0	191	moult	35.2	43.1	159.0
	22-60	♂	Ad.	28.1	14.5	195	94	35.4	43.7	118.0

Table 11 *Pachyptila desolata alter* Cruise 16

Date	Field No.	Sex	Age	Bill	Width	Wing	Tail	Tars	Toe	Wt
19 Feb	16-1	♂	Ad.	25.8	15	184	89	33	39	
	16-2	♀	Ad.	25.8	13.5	180	91	27.3	38.3	
	16-3	♀	Ad.	28.2	14	180	86.4	31	38.5	
	16-4	♀	Ad.	28.5	14	192	89.2	31	38.5	

Pachyptila desolata alter Cruise 27

2 Feb	27-3	♂	Ad.	27.4	14.6	183	93	35.3	42.0	131.0
	27-4	♀	Ad.	25.7	14.5	176	93	32.0	41.2	140.0
12	27-11	♂	Ad.	28.5	15.0	185	95	35.3	43.5	148.0
	27-12	♂	Ad.	28.8	15.2	189	90	35.3	42.0	146.8
	27-13	♀	Ad.	28.0	15.2	193	100	36.0	44.0	145.8
	27-14	♂	Ad.	26.9	15.2	180	92	35.0	41.5	150.0
	27-15	♀	Ad.	28.0	14.3	185	92	36.3	40.0	145.0

ANNUAL GENERAL MEETING, 1972

The thirty-third Annual General Meeting was held in Wellington on 13 May 1972, and attended by 52 members. The president, Mr F. C. Kinsky, presented his report on the Society's year, pointing out that the year had been one of ornithological surprises in the way of the many rare vagrants which had been found in New Zealand. The Society's finances had improved, with a surplus of $696 arising from the increase in subscriptions and also the valuable additional income as detailed in the treasurer's report. The reports of all schemes and sub-committees were summarised, and discussion invited, the full reports to be published in *Notornis*. Mr. E. W. Dawson, the new editor of the journal, answered questions on changes in style, and the future policy of *Notornis*.

The secretary reported from the previous day's council meeting: an annual award for juniors had been reinstated, to be awarded for any outstanding contribution to the Society's objects by a member under the age of 18 years. The venues decided for this year's study courses were announced. A move to have the Society join CoEnCo, the Conference on the Environment and Conservation, was reported to have been rejected by the council.

A motion from the meeting proposed that the Society should join CoEnCo, and considerable discussion followed. Although there was no opposition to conservation, some speakers said that we should not be involved in active support of conservation issues. Others felt that the study of birds cannot continue without conserving them and their environment. Applause greeted a statement that the position is now very different from what it was a few years ago, and that we should stand up and be counted amongst those wanting to conserve wildlife. The meeting carried a motion " That the Council reconsider at its next meeting, the matter of joining CoEnCo." Dr R. A. Falla said that this was the place for members to instruct Council, and the Council must now look at it, not to throw it out again, but to seriously consider all aspects.

The annual conference of Regional Representatives was held on the morning of Saturday, 13 May, and in the afternoon Dr J. Mills spoke on colour-marking of Grey Teal for the study of their distribution and movements, and Mr C. J. R. Robertson discussed the history and development of the Taiaroa Head Royal Albatross Sanctuary. These two addresses were followed by a film of New Zealand birds introduced by Dr R. A. Falla.

Field trips planned for Sunday were cancelled due to the weather which had made us all glad to be indoors most of the week-end, and a social gathering on Sunday morning rounded-off the organised activities.

B. A. ELLIS, Secretary

NOTORNIS 19: 176-185 (1972)

THE BEACH PATROL SCHEME IN 1971

There was an exceptionally high level of beach patrolling on all coasts in 1971. Only the west coast of the South Island received few visits. This grand effort was rewarded fairly constantly throughout the year, and there was the usual increase in seabird mortality towards the end of the year.

The following are interim totals of birds found on the various coasts, for which the cards have been received:

Auckland West	1906
Taranaki	126
Wellington West	508
Westland	3
Auckland East	409
Bay of Plenty	205
East Coast North Island	21
Wairarapa	2
Canterbury North	263
Canterbury South	24
Otago	37
Southland	40
Wellington South	35
North Coast South Island	30
Total	3609

In addition further cards are expected for about 1000 birds from Northland and about 1000 or more from Wellington West. Thus the year's total should reach between 5,000 and 6,000 — a record.

Large wrecks occurred of Fairy Prions in October and of Sooty Shearwaters in November. There is a good list of relatively rare specimens. The outstanding find was the first Soft-plumaged Petrel recorded on a beach patrol (the second record for the mainland). There were 2 Chatham Island Mollymawks, 2 Antarctic Fulmars, 2 Kerguelen Petrels, 1 Gould's Petrel, 1 Black-winged Petrel, 1 Wilson's Storm Petrel, 1 Brown Booby, 1 Lesser Frigate Bird, 6 Sooty Terns and 2 Spine-tailed Swifts.

All beach patrollers should be congratulated on their efforts.

M. J. IMBER, Organiser

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DONATIONS 1971

The Society gratefully acknowledges the extra monies provided by endowment members, and also the following donations exceeding $1.00 received.

Miss R. Easdale $1.00; Mrs H. Aickin $2.00; D. Robertson $1.00; N. Walsh $1.00; G. G. Couling $1.00; Miss J. K. Edgar $1.00; Dr G. Huxley $1.00; W. A. Chenery $1.00; R. N. Holdaway $1.00; Anonymous $10.00; Miss E. R. Lethbridge $1.00; Mrs H. F. Drake $1.00; R. A. Creswell $2.00; G. Wightman $1.00; P. Budd $1.00; Miss B. McDougall $6.00.

CARD COMMITTEE REPORT

The 1971 Christmas card depicted the Bush Wren by Joseph Wolf, illustrator for the zoology of the voyage of HMS *Erebus* and *Terror,* 1839-43. This card was the most popular to date and sales reached a record level.

15,000 cards were printed and a total of 1,539 dozen (18,468) cards were sold. This reduced the back numbers of cards held considerably. Sales were made up as follows: wrens 804 dozen, mixed 550 dozen, owls 97 dozen, shags 46 dozen and terns 42 dozen.

Production and packaging costs rose a little but the net profit was $725. It would be appropriate to mention the regular donations made by some purchasers, particularly Miss Harper of Kaikoura and D. Greany of Jackson's Bay.

The illustration for this year will be the Banded Dotterel from *The Birds of Australia* by John Gould. This and a limited number of mixed packs will be available for sale this year.

On behalf of the Society, I would like to thank the Turnbull Library for permission to use the painting, the Royal Forest and Bird Protection Society for circulating brochures and to my wife for packaging and dispatching the cards.

B. D. BELL, Convener

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REPORT OF THE NEST RECORD SCHEME
For the Year Ended 30 April 1972

During the year ending 30 April 1972, 1,097 nest record cards have been received from 27 contributors. Observations were made for 85 species including the following which appeared in the scheme for the first time:—

Rock-hopper Penguin; Grey-headed Mollymawk; Black-browed Mollymawk; Giant Petrel; Chatham Island Shag; Pitt Island Shag; Chatham Island Oystercatcher; Shore Plover; Chatham Island Tomtit; Stewart Island Fernbird.

Large contributions came from:—

Mr R. H. D. Stidolph (367) who has transferred many valuable and historical records from his diaries which cover observations during the last half century. This contribution is much appreciated and should add a great deal to the earlier records in the scheme; Dr M. F. Soper (237) has contributed nest records for a number of rare species in the Fiordland area as well as cards covering observations of species on Campbell and Chatham Islands; Hugh Robertson, a Junior Member of Aoukautere, Manawatu, with a contribution of 122 cards is to be commended for the time and concentration used in compiling his observations; J. R. Jackson (114), including a number of cards (6) observed during a Canterbury Region field trip; Dr P. C. Bull (78).

Observations compiled during a research project in Waikanae have been recorded on Nest Record Cards. The use of Colonial Cards is increasing. This year 46 cards have been received from 9

contributors covering 10 species of Penguins, Mollymawks, Gulls and Terns. Filed in the Nest Record Scheme there are now 9,389 nest record cards covering 134 species of birds. Three species, Thrush: 1,450; Blackbird: 1,248; and House Sparrow: 545, have significant numbers of nests recorded. 1,488 cards were loaned this year on 8 requests. Information has been used in University Studies and in Wildlife Branch and Animal Ecology Research projects. Dr P. C. Bull and the Convener have made arrangements where the locality data recorded on Nest Record Cards is being incorporated in the New Zealand Mapping Scheme. Craig, J. L. (1972) Investigation of the mechanism maintaining polymorphism in the New Zealand Fantail. Notornis 19(1): 42-53, acknowledges the use of information from the O.S.N.Z. Nest Record Cards.

I would like to take this opportunity to thank Regional Representatives for the encouragement given to their local members which resulted in a record contribution this year. My sincere thanks to those who have contributed during the year and best wishes to those who are planning to participate in the Nest Record Scheme in the future.

Thanks go to my wife whose assistance with the Nest Record Scheme has been extremely valuable this year.

LIST OF CONTRIBUTORS

G. Arnold (14), P. C. Bull (78), D. E. Calvert, W. J. Campbell, C. N. Challies, R. S. Cowan (15), J. A. Cowie (17), A. T. Edgar, S. Fogarty, G. Guy, D. W. Haddon (15), J. Hilton, J. R. Jackson (114), M. Lane, R. V. McLintock, P. Miller, M. O'Shea, R. Pierce (25), H. A. Robertson (122), P. M. Sagar, G. Stanley, R. S. Slack, M. F. Soper (237), R. H. D. Stidolph (367), K. V. Todd, B. Wilson.

DAVID E. CROCKETT, Nest Records Convener

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LIBRARY REPORT
1 January to 31 December 1971

The past year has made considerable increase in the work of the Library. Besides the routine intake of the usual journals and separates, there have been added many books. Mr R. V. Roberts, who is a life member of OSNZ, has given to the Auckland Institute and Museum Library the whole of his life's collection of ornithological works. This is a valuable and massive collection. It also has meant that many of the books were duplicates for the museum library and of these, dozens have been passed on to our shelves.

Dr W. A. Watters has also made a donation of several worthy books and these and the Roberts ones have been catalogued.

The interloan goes on well and items are borrowed, mostly by students from many of our universities and colleges.

Our thanks and appreciation should again be expressed to the Director and Council of the Auckland War Memorial Museum, and to Mr Thwaites the Librarian, and his friendly and helpful staff.

HETTY McKENZIE, Hon. Librarian

OSNZ RECORDING SCHEME
Report for 1971/72

Notes on sightings and behaviour received between 1963 and 1970 were recorded on species files amounting to about 600 pages of typecript. A summary of this material was prepared and sent to Dr Falla for editing in October 1971. A further year's intake is now being typed and will later be summarised for publication. The files of the scheme also include bird lists from a number of inland localities, riverbed counts from Central Otago, series of coastal counts from Firth of Thames, Manukau, South Canterbury and Otago and other miscellaneous material of ornithological interest. Species files are available on loan and extracts from recorded material are supplied to members on request: 17 species files were sent out in three years 1965/1968. From 1968 to date the number of requests for species files or other information has averaged 22 per year. *Members who borrow files or records are particularly requested to return these as soon as they have finished with them;* in the past some files have been lost.

Annual publication of Classified Summarised Notes should provide reading of general interest; members working on individual species will still have access to the fuller information contained in species files and other records. Purely distributional information is now well catered for by the Mapping Scheme; the Recording Scheme still needs records of rare or uncommon species, extensions of range e.g., Welcome Swallow, Spur-winged Plover, Black-fronted Dotterel, bird lists and bird counts. I have had several requests for information on what birds can be found in certain areas and in most cases have been able to supply this from available records. Regular records from an area can build up a picture which is of lasting value. Notes on behaviour and records showing increase or decrease of numbers over a period or between seasons are particularly welcome. Copies of regional newsletters are most useful. I am grateful to those RRs who have collected and forwarded notes from regional members, and to individual members who have written direct to me; both channels of information will, I hope, continue and multiply.

A. T. EDGAR

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RECORDING SCHEME

Contributions in the form of Regional Circulars and notes from individuals are welcome at any time. Notes collated by Regional Representatives should reach A. T. Edgar, Inlet Road, Kerikeri, by 30 June, after which date all material received will be processed and Classified Summarised Notes prepared for publication in the December *Notornis.*

TREASURER'S REPORT

For Year Ended 31 December 1971

PRESENTED AT THE A.G.M. OF THE
ORNITHOLOGICAL SOCIETY OF N.Z. (INC.)
WELLINGTON — 13 MAY 1972

The membership at the end of the year was 1028. This is a decrease of 2 on the previous year's total of 1030. The details are 2 honorary life, 74 life, 22 endowment, 697 ordinary, 58 junior, 77 corporate bodies, 49 husband and wife, counting as two, making the total of 1028. 120 members were admitted, 72 went out due to resignation or death and 50 were deleted as being unfinancial.

Total income for the year was $6966, an increase of $2809 on last year's amount of $4157. Subscriptions received showed an increase of $1753. Profit from the sale of Christmas cards increased by $184, sale of back numbers, also an increase, of $142 to an all time record of $562, booksellers margin on direct *Checklist* sales was $459 and royalties on the *Checklist* amounted to $404. The thanks of the Society are due to those members whose efforts have made possible these very valuable additional sources of income. The Society gratefully acknowledges a bequest of $50, and a set of back numbers of *Notornis,* from the estate of the late Mr V. I. Clark.

Total expenses were $6270 compared with $4778 last year. The cost of printing and distribution of *Notornis* was $604 higher at $4121. During the year back numbers of *Notornis* which were out of stock were reprinted at a cost of $974 and adequate supplies are now held. The cost of *Notornis* was $4109 while subscriptions, with transfer from life members, amounted to $3809. The additional income, other than members' subscriptions, has enabled the expenses and the cost of running the Society to be met and allowed a surplus of $696 to be transferred to the Accumulated Fund.

The Council agreed to the wishes of the co-authors of the *Field Guide* and royalties of $796 on the revised edition were transferred directly to the Projects Assistance Reserve Fund.

Part of the balance in the current account with the Bank of New Zealand, $5000, has been placed on term deposits with the Bank.

The Society has now $5245 invested in shares of public companies and at the date of the balance the market value of the holding was $5916. During the year 72 $1 shares in Andrews & Beaven Ltd, were taken up in the 1 for 8 issue of May 1971; 42 bonus shares were received from Alex Harvey Industries Ltd in November. Local body stocks with a maturing value of $5000, costing $4841 are held; $600 in the Auckland Electric Power Board matured on 15/2/71 and $1000 in the Otago Harbour Board on 1/9/71. These amounts were reinvested by the purchase of $1600 Waitemata County Council stock to mature 17/2/74.

H. W. M. HOGG, Hon. Treasurer

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC.)
STATEMENT OF ACCOUNTS FOR THE YEAR ENDED 31 DECEMBER 1971

1970 $		$	1971 $
	INCOME WAS EARNED FROM:		
1904	Subscriptions	3657	
141	Transfer from Life Members	152	(Note I)
71	Donations	33	
546	Profit from Christmas Cards	730	
420	Sale of Back Numbers	562	
85	Surplus Field Study Course	9	
–		21	
101	Biology of Birds	113	
–	Hire Kermadec Film	5	
3268	**TOTAL ORDINARY INCOME**		$5282
	PLUS INVESTMENT AND OTHER INCOME:		
376	Interest	441	
197	Dividends	292	
–	Premium on Maturity of Local Body Stock	34	
316	Royalties	408	(Note II)
–	Booksellers Margin on direct Checklist sales	459	
–	Legacy Estate late V. I. Clark	50	
889	**TOTAL INVESTMENT & OTHER INCOME:**	1684	
4157	**TOTAL INCOME**		6966
	LESS EXPENSES:		
3517	**Notornis** Printing and Distribution	4121	
–	**Less** Advertising	12	
250	Subsidy DSIR	–	
3267		4109	
46	Annual General Meeting	–	
100	Audit Fee	100	
30	Beach Patrol Scheme	36	
25	Distribution Scheme	3	
60	Donations	60	
156	General Expenses	126	
76	Kermadec Reprints	118	
212	Nett Cost Kermadec Film	–	
50	Library Expenses	50	
–	Nest Record Scheme	16	
60	Postages	153	
213	Printing & Stationery	270	
20	Royal Society Affiliation	20	
176	Travelling Expenses	235	
287	**Notornis** Reprinting	974	
4778	**TOTAL EXPENSES**		6270
–	Surplus for year transferred to Accumulated Fund		$696
$621	Nett Deficiency Transferred	–	

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC.)
BALANCE SHEET AS AT 31 DECEMBER 1971

1970				1971
$	**CURRENT ASSETS:**	$		$
3559	Cash at Bank of NZ	1488		
802	Cash at Bank of NZ Te Aro	–		
1001	Bank of NZ Savings Account	190		
–	Term Deposits Bank of NZ	5000		
100	Stocks of **Notornis**	100	(Note III)	
100	Stocks of **Biology of Birds**	100	(Note III)	
5562	**TOTAL CURRENT ASSETS**			6878
	INVESTMENTS AT COST:			
5173	Shares in Public Companies	5245	(Note IV)	
4875	Localy Body Stocks	4841		
10048	**TOTAL INVESTMENTS**			10086
1000	Library at Valuation	(Note III)		1000
16610	**TOTAL ASSETS**			$17964
	LESS LIABILITIES:			
1085	Amounts owed by Society	1726		
802	Amounts received for Checklist	–		
187	Subscriptions in Advance	234		
	RESERVE FUNDS:			
300	Projects Assistance Reserve Fund	1096	(Note V)	
1357	Life Subscriptions	1371		
1000	Publications	1000		
4731	**TOTAL LIABILITIES**			5427
11879	**VALUE OF ACCUMULATED FUNDS AS BELOW**			$12537
	ACCUMULATED FUNDS:			
12549	Balance at 31/12/70			11879
–	Surplus for year			696
				12575
621	Deficiency for Year			–
49	Transfer to Projects Assistance Reserve Fund			38
$11879				$12537

We report, that in our opinion, the foregoing accounts of THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC.) for the year end 31st December 1971 are in agreement with the books and reports of the Society and give a true and fair view of the Society's position at that date and the results of its transactions for the year. The Society has kept proper books and supplied all the information required.

THOMPSON & LANG, Chartered Accountants,
Auditors

DUNEDIN, 8 February, 1972

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC.)

SHARES IN PUBLIC COMPANIES AS AT 31 DECEMBER 1971

Company	Shares Held	Par Value	Cost of Purchase	Approximate Market Value at 31/12/71
			$	$
Andrews & Beaven Ltd	650	$1	986.79	702.00
Farmers Trading Co Ltd	500	50c	1018.50	570.00
NZ Forest Products Ltd	548	$1	1227.45	1915.60
General Foods Ltd Convertible Notes	168		84.00	137.76
Alex Harvey Industries Ltd	210	$1	486.41	734.00
Golden Bay Cement Co Ltd	500	50c	372.31	540.00
Wattie Industries Ltd	656	50c	697.23	817.20
Winstone Ltd	500	50c	372.31	500.00
			$5245.00	$5916.56

NOTE I Life Members Transfer: 10% of Balance at 31/12/71.

NOTE II Royalties from Sales of first Edition **Field Guide** ($4) and from Sales of **Checklist** (404).

NOTE III Stocks of **Notornis** and **Biology of Birds,** and Valuation of Library are at Standard Values. No attempt has been made to accurately value these assets.

NOTE IV Shares in Public Companies cost $5245 and had an approximate market value of $5916.56 at 31/12/71 as per list above .

NOTE V Movements in this Reserve Fund during the year are as follows:
Balance as at 1/1/71 is $300.
Plus Royalty for Revised Field Guide, $796
Plus Transfer from Accumulated Fund, $38
gives a total of $1134, Less amount paid for Moa ecology research at Papatowai, $38, which leaves a balance at the end of the year 31/12/71 of $1096.

INVESTMENTS IN LOCAL BODY STOCKS AS AT 31st DECEMBER, 1971

Southland Harbour Board	$953 due	30/6/72
Auckland Hospital Board	965 due	17/6/73
Waitemata County Council	1533 due	17/2/74
Southland Hospital Board	990 due	1/11/74
Auckland Electric Power Board	400 due	15/10/75

BIRD DISTRIBUTION MAPPING SCHEME

It is hoped to get the Bird Mapping Scheme data handled by computer, but the exact programming will depend on the use to be made of the data. This was discussed by the RR conference in May, and the main requirements seemed to be that we would want to know:

(1) What squares each species of bird has been recorded from over any given period

(2) The same, but using any numerical data available (e.g. squares that had reports of more than 100 of a certain species)

(3) A list of all species recorded from a particular square

(4) Which habitat types had been sampled in each square.

If you expect to be wanting other information from the computer (if and when we have its services), please send full details to P. C. Bull, C/o Ecology Division, DSIR, P.O. Box 30-466, Lower Hutt, before the end of June or within one week of receipt of this notice. Comments would be welcome.

A committee (B. A. Ellis, C. J. R. Robertson, P. C. Bull, J. A. Fowler, and Mrs J. Hamel) has been set up to advise Council on these matters. The need for urgency is that we hope a feasibility study to test how the data can best be handled will take place about early July, and the test must be related to the kinds of uses to which the data are to be put. (This does *not* mean that computer printouts etc. may be expected in the near future.)

P. C. BULL

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Those interested in following current research on Antarctic birds may care to subscribe to the *Antarctic Journal of the United States,* published bimonthly by the National Science Foundation. It may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at US$4.50 per year.

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NOTICE

BEECH FOREST INQUIRY

The Council of the Royal Society of New Zealand, at the request of the Member Bodies Committee, has set up an *ad hoc* committee on the utilisation of beech forests and has appointed Mr E. W. Dawson as Convener. One of the committee's tasks, under its terms of reference, is to inquire into what scientific work has been done already on the plants, animals, soils and hydrology of the forest habitat, to examine what work is currently being undertaken, and to suggest what might well be done. Members of the OSNZ can render a very useful service, bearing in mind the Society's role as a member body of the RSNZ, in advising this committee of any present or past work on birds of beech and pine forests of which they may be aware. Communications should be sent, as soon as possible, to Mr E. W. Dawson, N.Z. Oceanographic Institute, DSIR, P.O. Box 8009, Government Buildings, Wellington.

SHORT NOTES

OBSERVATIONS ON KIWIS ON STEWART ISLAND

Present interest in kiwis makes any field observations on their habits and ecology worth recording. The following notes are based on my observations with Mr J. Kalff in the Lords River area of Stewart Island between 3 and 10 July 1971 and supplement those given by Horgan (1970) for the Port Pegasus area of Stewart Island. Observations of 10 birds were made on six days when weather varied from fine and sunny with dry forest floor to overcast and windy with wet forest floor. No days of heavy rain were experienced. The time of these observations varied between 10 a.m. and 2 p.m. with sightings mostly around 11 a.m. to noon. Time spent in the field on sighting days was between 9 a.m. and 3 p.m.

Several areas of typical beak holes in the ground were noted, the most extensive puncturing seen being 30 holes in mossy ground cover in an area 5 ft by 5 ft, but the puncturing was generally much less than this. The holes also varied in size, some in moss or lichen-covered dirt forming cone-shaped openings with a surface diameter reaching 5 inches.

In all cases birds were seen in clearings and bare areas close to stands of Saw Fern *(Blechnum discolor)* which grows on most of the ridge tops, on some of the extensive flat areas and in some of the gully heads. Birds were observed feeding on and under logs, bare and moss-covered, on bare ground, and in shallow leaf mould and grass.

All sightings indicated a similarity of feeding habit. On each occasion the beak alone was used to locate food which was taken near the end of the bill and dexterously devoured or crushed for eating. The feet were not seen on any occasion to be used to secure food. In walking the bird replaces its bill at each step while feeding. When disturbed or apparently listening with its bill, the bird remains quite still. On two occasions birds were seen to apparently sample the air with the beak held at about 45° to the ground, moving it in a gentle probing fashion.

Undisturbed, the kiwis could be approached to within about 10 feet but, once they were aware of human presence, they became more sensitive to movement and certainly to sound. Indications were that eyesight was apparently not used to nearly the same extent as hearing and smell. On two occasions we noted that disturbed birds stood still under the fronds of the Saw Fern to evade detection rather than running off into thicker cover.

Regarding the birds' habitat, kiwis were seen over the whole area, comprising mature Rata, Rimu and Kamahi with an undergrowth of sparse Saw Fern, mosses, *Coprosma,* Supplejack and a few mature Pungas *(Dicksonia squarosa)* ranging to 15 feet high. Ground plants had been heavily browsed during preceding months and possibly over several years, few species favoured by deer being noted above seedling size although the deer population has been gratly rduced.

All birds seen were in apparent good health and had bright plumage with a sheen in the feathers, which is of particular interest since daylight appearance of species regarded as nocturnal is often indicative of poor health amongst other things. None of us has previously seen such numerous signs of kiwis and the population was considered to be prolific in our experience. The importance of keeping predators, dogs in particular, from such areas is obvious. If worms form a major part of the birds' diet, then this food is abundant also judging from the numbers of casts seen. Contrary to popular opinion, it would appear that the kiwi is not solely nocturnal. Hearing and smell, rather than sight, were used to identify intruders. No calls were heard during our observations but only occurred at night.

This area would provide an excellent study ground for investigations into the ecology of kiwis and it certainly appears that such a study for zoological and park captivity purposes is desirable.

REFERENCE

HORGAN, K. P. 1970. Notes on calling and behaviour of the Stewart Island Kiwi. Notornis 17 (2): 132.

R. D. LARRITT

P.O. Box 10030,
Te Rapa.

MARSH SANDPIPER AT NAPIER

On 22 January 1972, two OSNZ members and I were checking mixed birds at Ahuriri, Napier, when we noticed a small, slender, grey and white wader feeding amongst a group of Pied Stilts in shallow water. It was noticeably smaller than its companions and its method of feeding was a sweeping movement as well as quick prods. After being chased out of the water by a stilt, the little wader stood on the sand-flat for a short time when we were able to take some details down.

Predominantly white from the face down through the underparts, it had a grey head, with the grey extending down over the back and had a dark line along the shoulders. Olive-green long legs and a slender 1½" long black bill were other features of this wader. At a second attempt to feed in the water it was again chased by a stilt and put to flight, and this time we were able to see the white rump with the white extending up the back, and the legs beyond the tail.

We identified this bird as a Marsh Sandpiper *(Tringa stagnatilis)* and this identification was confirmed next day by Mr N. B. MacKenzie and Mr B. A. Ellis. This is the first occasion that this species has been recorded at Ahuriri, and only six sight records for the whole of New Zealand are listed in the OSNZ Annotated Checklist (1970). Also seen at Ahuriri during the same period were 12 White-winged Black Terns *(Chlidonias leucopterus)*. Although generally hawking after insects one was seen to break the water and take a small fish.

KATHLEEN V. TODD

1021 W St Aubin Street,
Hastings

BREAKING OF SNAIL SHELLS BY SONG THRUSHES

Writing under the title "Song Thrushes Feeding on Snails" Nye (1971) referred to the suggestion made by Morris (1954) that snail hammering by Song Thrushes *(Turdus philomelos)* may have been derived from pecking and shaking movements, or beak wiping. In January 1950 while working in my garden in Palmerston North, I saw two Song Thrushes alight on a sun-scorched part of my lawn almost devoid of grass. One, believed to be a parent, carried a soft, dark coloured, fleshy object in its bill. At that stage it would have been impossible to identify this object but, from its size and general appearance, I assumed it to be the remains of a snail minus its shell. The two birds took up a position, vis-a-vis, about a foot apart and about twenty feet from me. The parent bird took the initiative in all movements into position.

Once in position, both birds appeared to be watching one another; then the parent made a downward, sideways movement of its head and bill identical with that associated with shell breaking. This was done three or four times before the parent dropped the object on the ground and quickly walked (ran would probably be a more accurate description) backwards about ten to twelve inches. Both birds then stood and gazed for a short time at the object.

Eventually, and somewhat tentatively, the young bird hopped over and stood for a few seconds with its bill pointed at, and close-poised above, the object which it then picked up. Following another pause of some seconds duration the young bird went through a head and bill movement which could be described as only faintly resembling the shell-breaking movement of a mature thrush. Following another half-hearted attempt it dropped the object and moved away. The parent bird then picked up the object and, once more assuming the vis-a-vis position, went through the shell-breaking movement again.

This routine was repeated several times, each bird in its turn, over a period of perhaps five minutes before something startled them and they flew over the fence and out of sight. The parent bird which, at the time, had possession, carried the object in its bill.

If I am correct in my belief that what I witnessed were the first lessons in shell breaking being given by a parent to its offspring, then at least some song thrushes acquire the technique by emulating their parent.

LITERATURE CITED

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NYE, P. A. 1971. Song Thrushes feeding on mud snails. Notornis 18 (3): 211-214, figs 1-2.

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A SOUTHERN RECORD OF WRYBILLS

On 22 January 1972 at about 3.30 p.m., while making a general survey of the Wilkin and Makarora riverbeds in the company of Mr H. R. Tanfield, four wrybills were sighted at the mouth of the Makarora River. The birds were observed at a distance of about 30 yards with 8x binoculars. They were seen running swiftly over the sandy flats and feeding occasionally. After approximately five minutes the birds moved further up the riverbed. They were identified by the bill about one inch long and curving slightly to the right; they appeared slightly smaller than a Banded Dotterel but greyish-white in colour.

D. R. SUTHERLAND

Office of Conservator of Wildlife,
Department of Internal Affairs,
Queenstown.

BIRDS SEEN ON A COOK STRAIT CROSSING APRIL 1972

The daily crossings of Cook Strait by the N.Z. Railways ferry vessels *Aramoana* and *Aranui* provide good opportunites for bird observations both across the Strait itself and within the confines of the Marlborough Sounds. A group of 12 Wellington members of the OSNZ spent Anzac Day (25 April) as one of the Wellington Branch's field trips aboard the *Aramoana* on its double crossing. The list of birds seen shows the variety of species found at this time of the year and may provide a basis for further notes from other travellers.

Despite ominous weather conditions at the outset, bright sunshine was enjoyed during the crossings and there was excellent visibility in the Strait with only a moderate swell. South-west to westerly gales during the preceding days may, to some degree, account for the large number of birds recorded: 23 species, listed below, were positively identified, with one or two more " possibilities."

Little Blue Penguin (3); Wandering Albatross (c.6); Black-browed Mollymawk (1); Giant Petrel (c.10); Fairy Prion (many hundreds); Flesh-footed Shearwater (c.20); Buller's Shearwater (c.10); Sooty Shearwater (1); Fluttering Shearwater (100+); Hutton's Shearwater (c.30); Diving Petrel (5); Gannet (3); Black Shag (4); Little Shag (3); Spotted Shag (5); Pied Shag (c.15); Arctic Skua (c.20, the majority in adult light-phase plumage); Southern Great Skua (1); Black-backed Gull; Red-billed Gull; Black-billed Gull; White-fronted Tern; Caspian Tern.

We are all grateful to Dr Falla and Mr Kinsky for their help with identifications during this interesting and enjoyable excursion.

J. A. FOWLER

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LETTER

The Editor,

Sir,

DUCK NUMBERS IN PROTECTED AREAS DURING SHOOTING SEASONS

It is a pity that Janet Smith in her discussion " Variations in duck numbers at Christchurch during the 1967 New Zealand shooting season " (*Notornis* 19 (1): 36-41, 1972) implies that the increase and subsequent decrease is due to disturbance of the birds at Lake Ellesmere during the shooting season and the activities of shooters there in the preceding three weeks.

This may well be so: but I see no evidence in the paper to support it and it is admitted that no study was made before the shooters' disturbance began, nor were the numbers of ducks on Lake Ellesmere counted before, during or after the shooting season. It is scientifically unwise to make such implications as she does in the absence of this data. Her advisers would have been wise to devise a control count in an area of little shooting pressure — if such exists — to see if ducks behave similarly or not.

I do not suggest the following is true but on the facts presented it is just as feasible (other evidence being ignored in this case). Perhaps the ducks have a post-breeding and post-moult tendency to congregate on the larger waters and this happens to coincide with the commencement of the shooting season — or more likely the shooting season is designed to coincide with this flocking tendency. Perhaps the food situation then becomes critical so that more and more birds are forced to smaller lakes and ponds — which happen to be protected. Perhaps in turn the food supply on these smaller areas becomes even more critical and the birds move out again — happening to coincide with the end of the shooting season.

I offer the above not as a serious theory but merely to impress on readers the danger of jumping to conclusions or accepting the apparently obvious explanation without making any attempt to prove it. I suggest that Janet Smith turns her undoubted reasoning ability to the study of more adequate data.

J. M. CUNNINGHAM

" Illawarra," 5 Kotari Rd.,
Day's Bay, Eastbourne.
28 May 1972

OBITUARY

ARTHUR THOMAS PYCROFT whose death occurred in Auckland on 26 November 1971 at the age of ninety-six years identified himself with the history and natural history of the country between Auckland and the Bay of Islands to a degree not equalled by any contemporary, and not as yet accorded an appropriate rating in the annals of amateur naturalists in New Zealand. His professional life was spent in the service of the Railways Department and his first posting was Opua at the end of the branch line which brought coal from Hikurangi and Kawa Kawa and timber from elsewhere to the then busy little port. It was here that he forged firm links with the Maori and colonial history of the north based on personal contact with many surviving participants. His interest in natural history seems to have been a spontaneous growth. Indicative of his powers of observation is the letter which he sent to Sir Walter Buller in 1896 describing and forwarding specimens of what turned out to be the Little Black Shag *(Phalacrocorax sulcirostris)*, then a new record. As quoted by Buller, the letter (*Transactions of the N.Z. Institute* XXIX: 197) is notable for the clear presentation of the data in an easy, scholarly, but modest style. Birds were only part of his wide-ranging interest in nature, which was enhanced greatly by the similar interests shared by his wife Minna (nee Harris), who was an accomplished artist with an exquisite touch and an intimate knowledge of native plants.

On transfer to metropolitan Auckland the Pycrofts named their first Parnell home " Okaiato " as a firm Bay of Islands link. It was notable for its warm hospitality to those of kindred interests and the nucleus of a library of New Zealand books which later became one of the best-known private collections in New Zealand. To devote himself more fully to his many interests Arthur Pycroft negotiated an early retirement from the N.Z. Railways, entering in a sense a new lease of life which spanned another forty years. Inevitably he associated himself with the Auckland Institute and Museum, and gave notable service as a Councillor, and eventually as President. It would be hard to say whether his books, his garden, or natural history field trips gave him the most satisfaction. He certainly appreciated the improved access to outlying islands provided by the seagoing launches of his friends Bert Deeming and Bernard Sladden. On one such trip he suggested a visit to Hen Island to find out if Cook's Petrel really bred there as Reischek had suggested. When the bird so masquerading was found it turned out to be undescribed and can now appropriately be known as Pycroft's Petrel.

Pycroft had no ambition to be an author of papers and after his first was published in 1898 (*Transactions of the N.Z. Institute* XXXI: 141-146) seldom appeared in print, except as the writer of a weekly column " Ways of the Wild " in the *Auckland Star*. These articles contain much of reference value, and have quite lately been quoted in papers in *Notornis* for their pertinent data of a 1929 expedition to the Kermadec Islands. To his younger contemporaries, now themselves contemplating some kind of retirement, Arthur Pycroft always gave unselfish encouragement, and will be remembered for his gentle courtesy and the enthusiasms which seemed to keep him eternally young.

R.A.F.

REVIEWS

M. F. SOPER. *New Zealand Birds.* 216 pp., 184 pls (incl. 57 in colour), 1 map. Whitcombe & Tombs, Christchurch, 1972. $9.50.

With his latest book Dr Soper has made a notable and valuable addition to New Zealand bird literature. One can say that the book is based on his earlier publications " New Zealand Bird Portraits " and " More New Zealand Bird Portraits," but this rather understates the position, for while the photographs and texts of these are included in the present fine volume, there is so much more; many more superb photographs of additional species with accompanying texts, and a final section on the birds of the Kermadec Is. with 24 plates.

As a bird photographer over the years the author has built up a reputation both in New Zealand and internationally which is second to none. Nothing short of perfection satisfies him, and this is reflected in the quality of the 184 plates, of which 57 are in full colour. In his foreword, Mr E. G. Turbott says " His writing never loses touch with the freshness of observation so characteristic of the born naturalist." During long hours and days of watching nesting birds from the hide, and in his general field observations, the author adds materially to our knowledge of the life histories and breeding biologies of so many of our birds. Many examples of this could be quoted, but two must suffice. In several nights spent photographing the Stewart Island Kiwi, the author found that on each occasion the female was in the burrow with the chick. This upsets the belief that the male Kiwi alone broods on the nest and cares for the chick or chicks. (It is interesting to learn that recent observations in Northland, as yet unpublished, may show that in the case of two chicks, each parent cares for one.) Again, Dr Soper makes the exciting discovery of polygamous nesting by the South Island Rifleman, although there is another possible interpretation of this. Multiple feeding has now been recorded in many Australian birds, not only by progeny from an earlier clutch of the year, but also by adult, but not yet breeding, young from the final clutch of the previous year. This trait may yet be discovered in some of our native birds. I have not read elsewhere of the fascinating distraction display of South Island Robins; but then on nearly every page new facets of life history and breeding behaviour are recorded. The graphic description of nights spent ashore on petrel islands of Cook Strait, particularly Middle Trio, induces a nostalgia in those of us who have been privileged to visit these islands.

The author pays graceful tribute in his introduction to his wife, Mrs Joy Soper, " without whose constant assistance few of my photographs could have been taken." Her keen ear and perceptive eye, particularly for well hidden nests, have been a major factor in producing a book which should grace the shelves of everyone interested in our birdlife.

A.B.

A. M. LYSAGHT. *Joseph Banks in Newfoundland and Labrador, 1766. His diary, manuscripts and collections.* Faber & Faber, London, 1971. £15.00, U.K.

Any definitive and scholarly study of the life and work of Sir Joseph Banks is bound to be of interest to New Zealand naturalists. When Sir Joseph Hooker was editing a Banks " Narrative of Cook's First Voyage," he wrote to Sir Walter Buller as follows — " Though I, through my father, who was intimate with him, have, I suppose, heard more of Banks than any other living man, I never before realised, what my father used to affirm, his great knowledge as a naturalist, and his powers." In recent years a further study by an eminent historian, the late Professor J. C. Beaglehole, has revealed in detail other facets of Banks's character and influence. In the work here reviewed another New Zealander, historian and biologist Averil M. Lysaght, has produced a sympathetic study of Banks as a young man engaged in his first foreign field work, and based on his Newfoundland — Labrador diary of 1766.

In this volume of over 500 pages the first part is biographical, dealing not only with Banks but with many of his close associates. The second part reprints the diary in full, amplified by the author's comments. Part three is supplementary papers from contemporary sources. In part four are the catalogues of specimens, all the zoological manuscripts and botanical notes, and other relevant data. Each section is fully and generously illustrated with portraits, scenes, charts, and facsimile pages, and there is a remarkably full series of illustrations of specimens. The twelve colour plates include eight of birds, five by Parkinson and three by Paillou. One of them is the type of the Greater Yellowlegs !

It would be impossible to do justice to this profoundly scholarly work in a review appropriate to a journal devoted to New Zealand birds, but lest it be thought that a diary of a journey of 200 years ago to Newfoundland and Labrador is only of peripheral interest in this context, it must be said that the young Banks emerges from this definitive and objective study as a dedicated and outstanding naturalist. The revelation of his single-handed achievement at the age of 23 shows that his influence and guidance of the team of helpers who three years later laid the foundations of botany and zoology in New Zealand, must have been a dominant one.

Dr Lysaght dedicates her book, in part, to the memory of the late Professor H. B. Kirk of Victoria University, of whom she was a student and later a teaching colleague. She was well qualified by a lifetime of study of the work of Banks in his better-known work of the Cook era to undertake the editing of the earlier journals from another part of the world. The result is a book of notable scholarship.

R. A. F.

MILLS, J. A. 1971. The reliability of sight recoveries of banded Red-billed Gulls. *The Australian Bird Bander* 9 (4): 83-84 [Department of Internal Affairs, Wildlife Publication No. 131].

Rings moved erratically to simulate field conditions were read through binoculars at varying distances up to 20 feet by three observers; 20 mistakes (2.8%) were made in recording the numbers of 720 rings while 4 (0.6%) were made in recording the numbers of 720 rings " read in the hand."

By any standards this is an appalling record and it is difficult to follow the author's conclusion that as " recording errors are only 2.2% greater at that distance than when reading the band from the hand, sight recoveries from banded Red-billed Gulls are considered to constitute a reliable source of recovery data."

Even more disturbing is the fact that " fewer mistakes were made in recording bands placed upside-down than for those the correct way up, possibly because more care was taken." One should have thought that any conscientious observer — let alone one on a test — would have taken maximum care to record data correctly at all times and not only when the rings were seen to be upside down.

The reviewer, well used to reading and copying figures in account books, has never had any reason to suspect that his wide experience of recording ring numbers was any less accurate. As, however, the three persons quoted are " experienced observers and are considered representative of the small number of ornithologists who regularly search for banded gulls " a fresh assessment must obviously be made.

Dr Mills is to be congratulated in publishing evidence which suggests the whole basis of recovery data (apart from rings returned to the Banding Office where two persons can — do they ? — check the numbers) is suspect.

J. M. C.

NOTES & NEWS

A recent visitor to New Zealand was MARGERY FISHER, widow of the celebrated ornithologist and natural history writer James Fisher who was killed in a car accident on 25 September 1970. Mrs Fisher, a writer of children's books and a noted authority on children's literature, was in Wellington during May to open the Second Annual Children's Book Show. This is Mrs Fisher's first visit to New Zealand since the days of her youth here. She is the daughter of Sir Henry and Lady Turner and was born in London but came to New Zealand in 1922 at the age of nine when her father left the Civil Service and joined the NZ Refrigerating Company in Christchurch. After her school days in Christchurch and Amberley, she returned to England to study at Somerville College, Oxford. Her distinguished career, which includes many literary awards and the establishment of her own magazine of reviews of children's books, " Growing Point," rivals her late husband's in his field of natural history. James Fisher had always regarded a visit to New Zealand to be one of the highlights of his career but, to our loss as readers and ornithologists, his busy life never allowed this experience.

Recent numbers of that well-known entertaining and informative journal, the *NZ Woman's Weekly,* have carried articles of interest to OSNZ members. One tells of the habits of a White Heron which has visited the home of Mrs Ethel Muir of Gladstone, 7 miles south of Greymouth, since 1954 (see also article in *Forest & Bird,* May 1972: 19, " White heron a regular visitor to West Coast garden "). Another discusses and illustrates the new series of bird habitat groups in the Auckland Museum designed by Graham Turbott and Leo Cappell. A press button system allows visitors to listen to the birds portrayed in their characteristic surroundings.

References: SNOW, FRANK. 1972. The widow's white heron. Peter Kotuku has spent much of the last 18 years with Mrs. Ethel Muir. *The New Zealand Woman's Weekly,* 15 May 1972: 46, 1 fig.; YOUNG, BEATRICE. 1972. Press a button — and the birds sing. *The New Zealand Woman's Weekly,* 22 May 1972: 8-10, illus. (photos by Michael Willison).

EAGLE IN WELLINGTON DISTRICT

Another report of an eagle sighting comes from near Wellington. The observers are cautious to the extent that they do not wish to prejudice identification from any future sightings.

" A large bird of prey, believed to be an Australian eagle, was seen in the Akatarawa Valley between April 3-7. The bird may have come across the Tasman with Cyclone Emily."

Reference: Australian eagle. *in* Newsletter, Wellington Branch, Ornithological Society of New Zealand, May 1972 (ed. J. A. Fowler), p. 3.

NEWS FROM THE DOMINION MUSEUM

The latest newsletter of the Dominion Museum issued to Friends of the Museum and others contains a few items of interest to ornithologists.

"Preliminary discussions are taking place regarding the possibility of a joint Dominion Museum - Fiji Museum intensive study of the bird fauna [of Fiji] which would involve collecting in the field and ultimate sharing of the collections. Such a systematic study is a pre-requisite for understanding the systematic status of the birds of Fiji, their variation from island to island and estimates of relative abundance. It would also result in permanent study collections being available in the South West Pacific."

A note on the Department of Birds reads: "The policy of the Curator of Birds, Mr Fred Kinsky, in building up the Museum's collection of selected foreign birds with emphasis on certain groups has resulted in another influx of material including 57 skins from the University of Michigan, 14 from the Puget Sound Museum of Natural History, 28 from the University of Florida and 2 from the South African Museum (one a Jackass Penguin). The important collections from the University of Florida, for example, represented over 20 species of waders, gulls, swallows and herons and included a Cattle Egret in full breeding plumage."

Seven members of the Museum staff visited Port Pegasus and the southern Stewart Island area with Mr A. J. Black in his new research vessel RV *Acheron* from 17 February to 4 March 1972. Dr C. A. Fleming, Chairman of the Dominion Museum Management Committee, accompanied the expedition and was responsible for co-ordinating bird observations. It now seems likely that there may be a review forthcoming of the status of the birds of southern Stewart Island over the past 25 or so years based on the collected observations of a number of visitors over that period.

Reference: YALDWYN, J. C. 1972. Dominion Museum Newsletter No. 9, May 1972, pp. 1-17.

CLASSIFIED SUMMARISED NOTES

Classified Summarised Notes will once more appear annually, beginning with the production of a Supplement to Volume 19 of *Notornis,* covering the period 1963 to 1970, compiled by Mr A. T. Edgar and edited by Dr R. A. Falla, which will appear shortly and may be bound at the end of the volume; thereafter the annual summary will appear in each December issue. The cooperation of all members is requested to make this scheme as successful as before.

FROM THE EDITOR'S DESK

BIRDS AND BEECH FORESTS

Considerable interest and concern is being shown by conservation groups in the proposal to utilise the beech forests of the South Island, following the report by the Director-General of Forests, and many members of the OSNZ are directly involved in forwarding submissions or examining the proposals in various ways. According to one of the submissions on which the Nature Conservation Council has based its recommendations in a report to the Minister of Lands (Mr D. MacIntyre), the presence or absence of birds could determine the nature of a forest and could be regarded as a convenient indicator of environmental quality. The Council's report included this statement: "The biology, movements, food requirements and population dynamics of most native birds are to all intents and purposes unknown, hence it is impossible confidently to predict the consequences of the Forest Service plans on bird populations." The distribution maps from the OSNZ mapping scheme show clearly a lack of knowledge of bird distributions, in the first instance, in the areas likely to be affected and this seems one way in which OSNZ members can contribute directly to what needs to be known about birds in beech forests. Members are reminded that the Forest Service report is for sale at 25 cents at Government Bookshops: "Report by the Director-General of Forests on Utilisation of South Island Beech Forests October 1971" 39 pp., Government Printer, Wellington.

Source: "Many oppose milling beech forest in S.I. says council." *Evening Post* [Wellington], 26 April 1972, p. 15.

BIRDS OR MEN?

Members, particularly those who expressed their concern at this year's Annual General Meeting, who have their doubts or worries about how much the OSNZ should involve itself, and its members, on matters of the Environment as opposed to the strictly delimited study of birds, may be interested, amazed, encouraged, or moved in a way appropriate to their beliefs, in a Resolution adopted at the 89th Annual Meeting of the American Ornithologists' Union, 2 September 1971, reported in the latest issue of the *Auk*.

Discussing the limitations of natural populations and the illusion that Man, alone, is exempt from allowing his population to exceed the carrying capacity of the environment, it was agreed that "... the American Ornithologists' Union firmly resolves to express its most serious concern to the political leaders of the United States and Canada and to the citizens of our countries, in the hope that, without prejudice toward any group, they will immediately accelerate their efforts to promote reduction of population growth everywhere, by the encouragement of all humane measures such as birth control, the legalization of abortion, and governmental incentives that encourage small families. We urge the stabilization of the human population as essential to the attainment of whatever system will ultimately offer the best possibility of a viable and meaningful human civilization in future centuries."

Source: Proceedings of the Eighty-ninth stated meeting of the American Ornithologists Union. *Auk* 89 (1): 166; January 1972.

ABOUT OUR AUTHORS

F. C. KINSKY, President of the Ornithological Society of New Zealand (Inc.), has been a member of Council since 1960 and was Convener of the Banding Scheme from 1956 to 1962. As Convener of the Checklist Committee he was largely responsible for the compilation and production of the "Annotated Checklist of the Birds of New Zealand" published by the Society in 1970. Mr Kinsky was born in 1911 in Bohemia, then part of Austria, now a part of Czechoslovakia. He came to New Zealand in 1949 and joined the Department of Industries and Commerce in Wellington. In 1955 he transferred to the staff of the Dominion Museum and was appointed Ornithologist in 1963. Fred Kinsky has had many and varied experiences in ornithology, both in Europe and in New Zealand. Field work has taken him, within recent years, to the Antarctic (the 1963/64 and 1965/66 summers at Hallett Station studying skuas and penguins and participation in the 1964 Reconnaissance Expedition to the Balleny Islands) and on several visits to the tropical islands of the Fiji group, to say nothing of the long vigils he has kept with the Blue Penguins of Wellington Harbour. Current research interests are studies of the status and moult cycle of the Little Tern and Fairy Tern in New Zealand, the plumage differences between Hutton's Shearwater and the Fluttering Shearwater and, with Dr R. A. Falla, a study of subspeciation and distribution of the Blue Penguin. Earlier comprehensive studies included those on the yearly cycle of the Northern Blue Penguin in the Wellington Harbour area (*Records of the Dominion Museum* 3 (3): 145-218, 1960) and the plumage colour and moult cycle of the Southern Black-backed Gull (*Records of the Dominion Museum* 4 (14): 149-219, 1963). Other interests include bird photography and ornithological philately.

E. B. JONES was born in England in 1902 but has spent the greater part of his life in New Zealand. He says that he was encouraged in his youth to take an interest in outdoor life and has always been interested in birds. Mr Jones was employed for twenty years in the Public Service in Wellington, finishing up in Head Office, DSIR, where he came to know several members of the OSNZ. He writes of himself: "During my last thirteen years in Wellington, I spent most of my lunch hours on the waterfront, observing sea birds and noting leg-band numbers of gulls. In a couple of years I managed to collect a thousand numbers. Since my retirement in 1963, I have been living in Levin and have found plenty to keep me interested. I keep a close watch on the birds of Horowhenua Lake and make frequent visits to the coast and nearby estuaries. In the process, I have met with a number of new species of birds and learned quite a lot about the ways of the more common ones."

CHRIS ROBERTSON was introduced to readers in the last isuue of *Notornis*.

ROD ABEL is Manager of Marineland of New Zealand, a noted tourist attraction at Napier. He writes of himself: " I was born on 10 March 1936 in Cambridge, and was educated firstly in the far north, a little place called Herekino on the West Coast out from Kaitaia. Then at Northland College at Kaikohe and later at Napier Boys' High School. I spent most of my working life farming. This includes six or seven years breaking in horses on the family racing stud farm. Sporting interests — Rugby: Waikato Rep. Squad 1959; Canterbury 1960-61-62; South Island Rep. 1962; Hawke's Bay until the end of the 1969 season, including half a dozen appearances in All Black Trials. I joined Marineland as Manager on 1 January 1969." Readers wishing to learn of Mr Abel's accomplishments with marine mammals will see fascinating evidence in his " Marineland."

JOHN DARBY is the Assistant-Director of the Otago Museum. Born in England, he came to New Zealand in 1954. He obtained a Diploma in Agriculture at Lincoln College and subsequently worked at Ruakura Animal Research Station before joining the staff of the Zoology Department of the University of Canterbury. As Senior Technician in charge of the Photographic Unit he developed a special interest in photomicrography and holds a Fellowship of the Royal Microscopical Society. He has spent three summers in Antarctica around Ross Island, working initially on the distribution of Weddell Seal colonies by aerial reconnaissance, and subsequently on the relationship between the Adelie Penguin and Maccormick's Skua, as part of Dr Euan Young's team at Cape Bird. From these activities has developed his interest in animal behaviour and ecology, particularly of birds and spiders. In 1969 he was appointed Scientific Officer in Zoology at the Otago Museum. Since then he has been particularly concerned with carrying out Natural History Education programmes for primary and secondary school pupils in Otago. Recently he has planned and produced the life-history displays about the Royal Albatross for the Tourist Information Centre at Taiaroa Heads. He is married with two children; his wife, Marie Darby, is also a zoologist and accompanied the 1968 Lindblad expeditions to the Antarctic and the New Zealand Subantarctic islands in the *Magga Dan,* about which she has written in *Notornis* 17 (1): 28-55 (1970) and in *Animals* magazine 13 (4): 171-177, 1970 (see also Dorothy Braxton's account in *The Abominable Snow-Women,* A. H. & A. W. Reed, 1969).

JIM COLEMAN is at present completing a Ph.D. thesis in the Zoology Department of the University of Canterbury on the ecology of Starlings in Canterbury with particular reference to their importance as agents in the control of grass grubs. His thesis for the M.Sc. degree, submitted in 1968, was on the ecology of rooks in Canterbury and forms the basis of his contribution in this issue of *Notornis.* He has also been studying the breeding biology of the Westland Black Petrel but his main interests lie in the foods and feeding relationships of vertebrates. Mr Coleman is 28 years old, was educated at Motueka High School and is married with two children.

PETER HARPER was introduced to readers in the last issue of *Notornis.*

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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