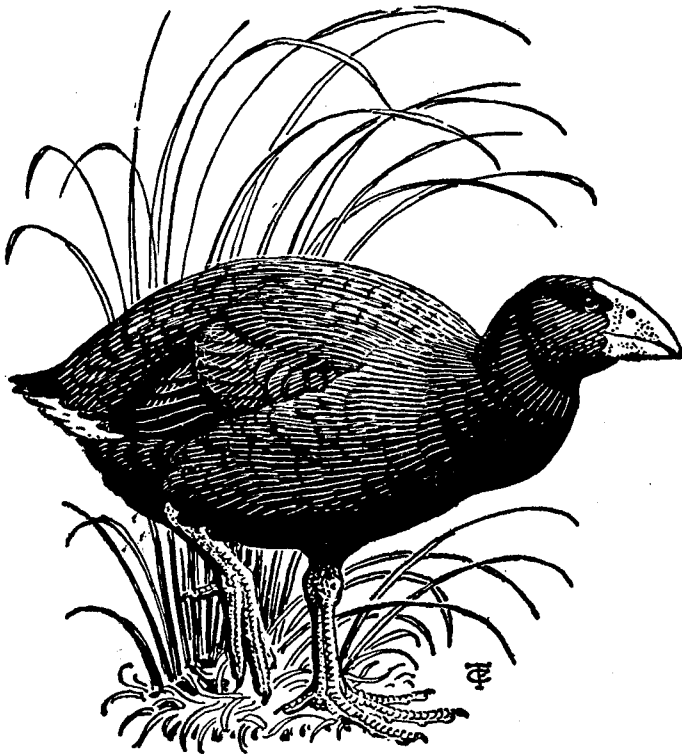


NOTORNIS

Journal of the Ornithological Society
of New Zealand



Volume 23 Part 2

June 1976

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[Registered with POHQ, Wellington, as a magazine]

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NOTORNIS

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

Editor: E. W. Dawson,
P.O. Box 41-002,
EASTBOURNE

VOLUME 23

PART 2

JUNE, 1976

SOME OBSERVATIONS OF A COMMUNAL ROOST OF THE AUSTRALIAN HARRIER (*Circus approximans gouldi*)

By L. A. HEDLEY

ABSTRACT

A communal roost of the Australasian Harrier was studied at Huntly from late January to early April 1975. The roost was situated in standing hay and extended over about 0.36 of a hectare. Most individual roosts were found clustered in groups among the most dense vegetation. Morning and evening observations showed that a consistent pattern of movement was followed. A limited amount of aerial displaying was also observed. Previously, it has been suggested that communal roosts occur when harriers gather to exploit a local food abundance. Evidence gathered from the Huntly roost indicates that this contention may not be true for all roosts.

INTRODUCTION

With the conclusion of the breeding season (January-February in the Huntly area), the Australasian Harrier (*Circus approximans gouldi*) shows an inclination to gather in communal roosts in favourable habitats.

The number of birds involved in such communal roosts can vary considerably. Stead (1932) described roosts of two or three hundred birds whereas Middleditch (1949) reported a roost of 45 individuals at Lowburn in May 1948. Gurr (1968) gave several examples of roosts ranging in number from two up to 150 birds.

On 23 January 1975, a small roost was discovered scattered through several fields of standing hay in an area situated 0.8 km north-east of Huntly township. Observations were carried out each evening until 29 March 1975. Intermittent observations were made then until 9 April when the roost was finally dispersed by the mowing of the surrounding hay. It is likely, judging from the results of an individual roost count, that the roost had been in use for perhaps 3-4 weeks prior to its discovery. The following is a summary of the findings.

THE ROOST

Observations generally began about an hour before sunset so that pre-roost activity could be seen. Early morning observations were also made on different occasions.

Most individual roosts were found within an area covering 0.36 ha, roughly triangular in shape, and on an east-west axis. Vegetation in the roost was a mixture of rye grass (*Lolium perenne*), paspalum (*Paspalum dilatatum* L.) and white clover (*Trifolium repens* L.). Red clover (*Trifolium pratense* L.) was occasionally seen. Individual roosts were invariably found amongst the most dense vegetation. This was generally rye grass, being the most prolific and tallest growth (approx. 1 m).

The area immediately beyond the roost consists largely of open pasture to the north, west and east. To the south the land is taken up by a large swamp, an open-cast mine operation and a land reclamation scheme.

Individual roosts were generally elliptical, varying in size but generally 30-36 cm long and 20-26 cm wide, and were rounded at one end (sometimes both) as if the bird had used its body to shape out a cavity from the surrounding grass. Into this cavity faecal matter was ejected. Pellets could occasionally be found although two together was exceptional. These were deposited on the trampled grass which formed the floor of the roost. Small amounts of down and feathers were also found.

Individual roosts were clustered in rough groups, often in association with larger areas of trampled grass which varied in size, the largest being 8 m long and 5 m wide. The origin of these areas is not known though collections of feathers, down and faecal matter make it likely that they were used on occasion by roosting harriers.

'Paths' between individual roosts could usually be seen, some being up to 12 m in length. These did not occur in grass measuring above 30-35 cm in height.

Food remains occurred in two individual roosts; the partially stripped hindlegs of an immature rabbit (*Oryctolagus cuniculus* L.) and a quantity of regurgitated flesh in an advanced stage of decay. Harriers were seen bringing prey into the roost on three occasions.

DAWN AND DUSK ROOSTING ACTIVITY

Harriers began to arrive at the roost during the final hour of daylight. As Stead (1932) and others have noticed, the birds did not fly at any particular height. About 70% of the birds came in from a southerly direction (the swamp area). On arrival they usually settled on a fence post or in an adjacent pasture, although some flew directly into the roost. For those harriers settling outside of the roost, the interval before moving into the roost was spent preening and shaking plumage into shape or, more generally, in observ-

ing the surrounding countryside. The period of time spent outside the roost varied from a few seconds to over an hour with the average time throughout the observation period being about 17 minutes. Only on two occasions was the first bird present on a post a juvenile.

The birds usually flew into the roost itself just before sunset. Several potential roosting sites could be 'inspected' by the birds circling or hovering briefly above them before a final choice was made. 'Disputes' sometimes arose over roost sites, but would usually end quickly with the 'retreat' of one of the birds. Three prolonged 'disputes' lasting over 30 seconds were observed.

Aerial 'displays' took place on three evenings. These were little more than extended chases involving at most three or four birds and were concluded within about half a minute.

Morning observations of harriers moving from the roost showed that a consistent pattern of dispersal was followed. The birds would generally move to an adjacent fence post to preen and straighten plumage. Within half an hour they would move off in different directions to forage. Most birds began to quarter the ground almost immediately. While on the post these birds seemed very lethargic and could be approached to within about 30-35 metres. The cold temperature and low-lying fog encountered on all of these mornings probably account for this behaviour.

NUMBERS ATTENDING THE ROOST

Stead (1932), Middleditch (1949) and Gurr (1968) have given examples of roosts much larger than the Huntly roost described in this article. The smaller number of birds involved make a roost of this size much less likely to be noticed by human observers. It is therefore probable that roosts of this size are more common than larger roosts previously described by other observers. Although harder to detect, small roosts reward observation in that more accurate head counts and closer observation of individual behaviour are possible.

Data taken from the initial observation period and just before vegetation removal (Table 1, 2) show that the number of harriers attending the roost each evening fluctuated quite markedly so that it was not possible to predict, even for one day ahead, just how many birds would arrive at the roost. However, a slight increase in the average number of birds attending each evening occurred until a peak was reached on 5 March, sixteen birds being present on this occasion. The reverse then occurred with a gradual drop in numbers, this trend being accelerated by the removal of the surrounding hay from 27 March until 6 April. Two or three harriers continued to use the roost in the last few days before the final section was cut.

DISCUSSION

Gurr (1968), in a very interesting discussion, examined several factors which he thought might explain why harriers gather in large numbers to roost. He dismissed communal roosting as being an

Variation in Numbers (*Circus approximans gouldi*)

TABLE 1. January 22-February 4

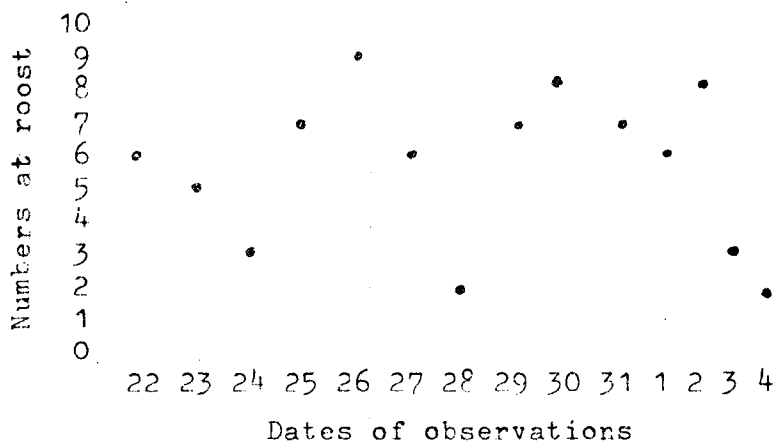
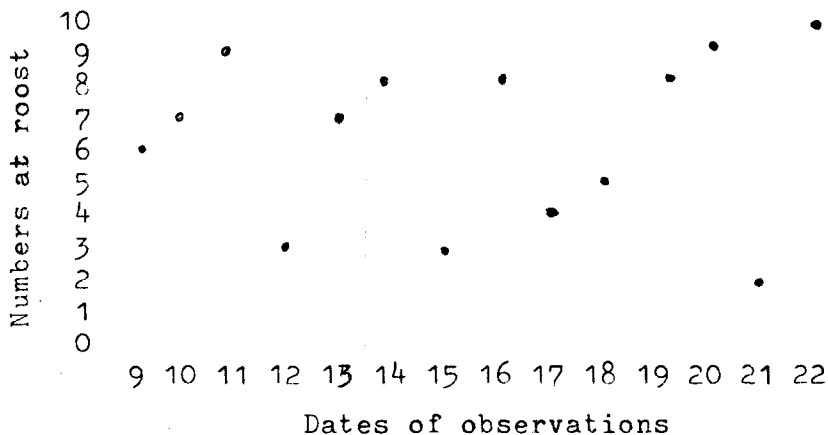


TABLE 2. March 9-22



adjunct to migration as it is in other countries. Watson (1954), he pointed out, has shown that no regular migration takes place. Gurr then went on to argue that a link exists between large communal roosts and gatherings (observed by Wodzicki 1949), and a dramatic, possibly artificially induced, upsurge in the food supply of an area. Large gatherings such as these occur regularly because of an abundant harrier population caused in turn by the spread of introduced mammals and the increase of suitable habitat created by European farming methods.

I do not disagree with the contention that large scale gatherings are possibly a result of a local food abundance; a communal roost could conceivably grow in size if more birds are attracted to the area by a favourable food supply. However, observations of the Huntly roost suggest that Gurr's conclusions do not apply in the case of smaller roosts. If the harriers observed at the Huntly roost were gathering to exploit a local food abundance, then they could be expected to remain longer in the area than the one or two days indicated by their deposits of faecal matter and fluctuating roost attendance figures. It remains a possibility, of course, that the birds were using an unobserved roosting area on alternative nights. This may account for the variation in roost attendance and could mean that the overall population of the local area was both larger and more stable than previously supposed. General impressions are that no such roost(s) existed in the immediate area at least, though a careful search could well prove this assumption to be false.

ACKNOWLEDGEMENTS

I am most grateful to Dr M. A. Chapman, University of Waikato, and Dr D. R. Rosenberg, Hamilton Teachers College, for reading and criticising the manuscript. I also wish to thank Mr L. Rosser and Mr G. Sinclair for allowing me unlimited access to their properties.

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THE USE OF FRONTAL SPOT AND CROWN FEATHERS IN INTER- AND INTRASPECIFIC DISPLAY BY THE SOUTH ISLAND ROBIN, *Petroica australis australis*

By J. A. DOUGLAS FLACK

ABSTRACT

South Island Robins (*Petroica australis australis*) have frontal spots of white feathers which can be moved independently of other contour plumage to produce sudden visual contrasts. There are differences in the degree to which either the spot or the crown feathers are displayed. Display of the spot is most often interspecific or given by a lone bird, whereas raising the crown feathers usually occurs in intraspecific contexts. Details of each display are described. Crown elevation seems to function as an advertisement of aggressive levels to other robins, and, therefore, its function seems to me more specific than described for other passerines. Display of the spot is seen in response to several threatening or alarming situations, showing some of the characteristics of display of the crown or crest in other passerines. Its function in advertisement of escape or submissive motivation is clear in most intraspecific contexts, but outwardly, display of the spot in interspecific context shows strong aggressive elements. Display of the frontal spot is discussed in relation to function and evolution in other *Petroica* species.

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INTRODUCTION

Except for two melanistic forms, flycatchers of the genus *Petroica* (Musicapidae) in New Zealand and most species in Australia have white frontal spots. Aggressive behaviour by these birds towards conspecifics and other animals, including man, takes the form of raising and displaying the feathers of their frontal spots, erection of crown feathers (Fleming 1950) and a number of other undescribed

displays. The frontal spot is revealed by raising a small group of white feathers arranged in a narrow band above the upper mandible (Figure 1). This paper describes the use of the frontal spot and crown feathers by South Island Robins (*Petroica australis australis* (Sparman, 1758)), during inter and intraspecific encounters.

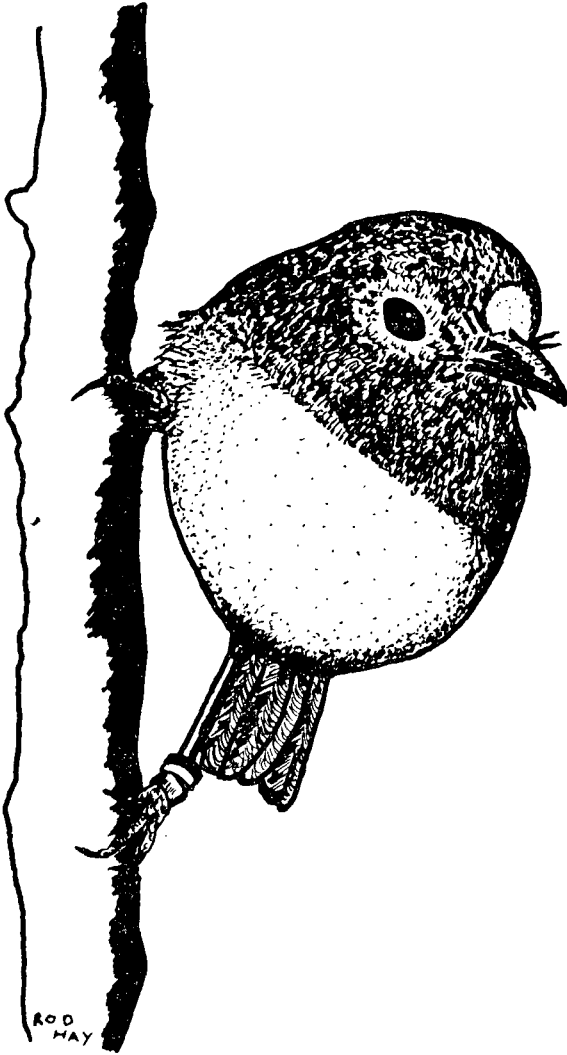


FIGURE 1 — Full display of the frontal spot by a South Island Robin (*Petroica a. australis*). Del. J. R. Hay.

METHODS

I made most of the observations on such agonistic behaviour during field work at Kaikoura (lat. 42°S, long. 174°E) on a population of 28 to 44 pairs and up to 10 bachelor robins, individually colour-banded and of known age. These observations have been incidental to the main course of the work and have not been quantified. The low closed forest of the study area is dominated in most places by *Leptospermum* species. Observations began in September 1971, and field work since then has been from late July each year until early in the following March. Short periods of observations outside the breeding season were mainly confined to May and June.

Additional observations were made on Allports Island, Motuara Island and Outer Chetwode Island in Marlborough Sounds, and on several of the Chatham Islands. Most birds were observed from a distance of less than 7 metres. Many observations were made after robins were attracted by the observer to a specific locality such as a boundary between pairs. Birds were attracted using squeaks and whistles or banging a stick against a tree.

Pairs of robins or bachelor males are able to dominate other robins and drive them away up to specific boundaries. These exclusive areas or territories are held for most of the year but break down to varying degrees during moult at the end of the breeding season. A complete description of behaviour during an annual cycle is in preparation.

RESULTS

Raising or drawing back the feathers of the white frontal region against the surrounding dark plumage exposes the feather vanes and produces a white spot. Conversely, when these feathers are pressed forward the vanes are hidden beneath surrounding dark feathers causing the spot to disappear partially or completely. The frontal spot can be exposed or hidden with great rapidity, producing sudden visual contrasts. These contrasts are sometimes associated with movements of crown feathers and other more elaborate plumage and postural displays. Body plumage is sometimes puffed out, and occasionally a bird stands very upright with sleeked down plumage while displaying the spot. The direction of feather movement for displaying the spot is opposite to that for elevating the crown.

There are differences in the degree to which the spot feathers can be raised, producing a scale of expression from no white area to thin crescent or line to thicker white to prominent white spot. Lone individuals are most often observed with the spot in the resting position, showing only the white feather tips in the thin crescent or line against the dark grey of the frontal region. This has been noted by Guthrie-Smith (1914), Wilkinson (1930), and Wilkinson & Wilkinson (1952). The crescent or line can be hidden without obvious movement of other plumage, and a photograph by Soper (1963) shows a pair of

robins at a nest with the spots hidden and no evidence of other feather movement. Intensely motivated birds usually show no white area or a fully exposed spot. During display of the spot the angle of the bill and position of the head varies. In the shaded forest environment, display of the frontal spot can be easily seen at a distance. The frontal spot is developed and functional before young become independent, but is not present at fledging.

The position of the crown feathers varies from lying sleeked flat through the normal rounded contour position to strongly elevated with tips separated. The bill is usually held near or just below the horizontal during display of the crown, and the bird sometimes faces on an angle or turns its head in a way that makes the crown more visible than from directly in front. Dark crown feathers in display in shaded forest are not usually as outstanding at a distance as the frontal spot.

Several different vocalizations may be given, but the spot is frequently displayed without any calls being made. The vocal behaviour of the Kaikoura population has been studied by Hay (1975).

INTRASPECIFIC DISPLAY

Varying degrees of elevation of crown feathers characterize most but not all close intraspecific encounters of adult robins, and are sometimes followed by more elaborate postures. For example, an established pair feeding close together on the ground commonly display elevated crown feathers, the male usually raising his higher than that of the female. Crown feather elevation at robins from neighbouring territories can become so strong as to give the head a helmeted appearance. The resistance of the opponent appears to be an important factor influencing the degree of erection of crown feathers. Other displays include flights with the tail compressed and the white undertail coverts displayed at the sides and above the tail; sleek upright postures; varying degrees of wing lifting; display of the cream coloured breast by puffing feathers both forward and laterally; and puffing back and other body feathers. These will be discussed in more detail in a later paper.

In cases of mild intraspecific aggression, neither frontal spot nor crown were displayed. Adult males have been observed hopping and flying at their juveniles, but refraining from pecking or vigorously attacking. Crown feathers were not elevated and the spot was in the crescent position. Until adult plumage was developed, most young birds, when approached by an adult, assumed submissive postures which included crouching, fluttering the wings, begging noises, and opening the bill. Some displays of young begging for food were characterized by hunching the back, leaning forward into a horizontal position, and flicking down the tail while giving begging calls. If the approach became a vigorous attack, the adult's crown feathers were raised, but its spot was not visible.

Display of the frontal spot at other robins was noted by Wilkinson & Wilkinson (1952) and Soper (1963). In only a few of the instances that I have observed did the proximity of the observer cast some doubt on the object of display. The context at Kaikoura often has been of the sudden appearance of a robin out of very thick cover into a more open area where other robins were present. In several cases the bird flashing the spot was a juvenile or immature intruding on the territory of an adult, who immediately gave chase displaying raised crown feathers. In another instance the attacker flashed his spot when he saw an invader about 7 metres away, but the spot disappeared and the crest was raised as he flew to the attack. Both birds were young showing newly developed adult plumage. During a boundary dispute between two established birds a male hopped across a track towards the opposing female. The male flashed his spot several times, and elevated his crown as the spot disappeared. With body plumage puffed out and crest elevated he hopped and flew parallel to the opposing female while displaying with extended wing lifts.

At Kaikoura in late December, I observed for more than five minutes the use of the frontal spot during intraspecific aggression. An adult male was attacking a young bird which he had only recently stopped feeding, and which was developing adult markings. Several times the male flew at the juvenile with his spot fully open. The juvenile crouched forward with fluttering wings and opened bill, giving a begging call, but with no spot or raised crown visible. The male gave some rapid, upward flicks of the wings typical during attacks on trespassing young. Juvenile submission seemed to reduce the vigour of each attack, but the juvenile was forced to change position several times before the male moved away. The male flashed his spot from up to 7 metres away and flew rapidly towards the juvenile, putting it to flight. The juvenile boldly resumed hunting and feeding between attacks. Once, at close quarters, the juvenile flashed his frontal spot at the male and the male's aggressive approach abruptly ended.

Spot display is given initially while facing another bird, but frequently it is also seen during flight away, upon landing from a flight, or while facing away from an attacker. In some observations, when several robins were trying to establish themselves in a small area and dominance hierarchies existed amongst them, a bird would be attacked and soon after the same bird was seen attacking a third and more subordinate robin. In these situations, display rapidly changed from spot display when under attack to display of erected crest feathers and other postures when on the offensive.

During three days in March, eight intraspecific contacts using display of the spot were observed. This was at a time when young birds were in adult plumage and most adults had completed moulting. Young birds were attempting to settle, drive away other robins, and acquire a mate. Adults, after the relative quiescence of the moulting

period, were reasserting their dominance in an area. In five instances, birds being attacked displayed their frontal spots, while their attackers displayed raised crown feathers. Four involved young birds and the fifth an adult female being chased in an area outside her usual territory. The sixth observation was of a young female perched near an aggressive encounter, her plumage puffed and frontal spot displayed. In the seventh instance an intruding young male prominently displayed his spot when an adult female occupant of the area approached. They perched 5 to 10 metres apart during the encounter, the adult female slightly puffed, with a raised crown. The intruding bird displayed his spot for a minute from two perches, and then moved closer, raising his crest and hiding his spot for 20 seconds. He then moved away and displayed his spot again for a minute and finally flew away. He was never attacked but the female made the initial approach. In the eighth incident an attack was initiated by a male fully displaying his spot and puffed contour plumage. The attacked bird displayed a raised crown, and soon took over the initiative and dominated all subsequent encounters. The original attacker, now subordinate, continued to maintain a full spot display and puffed contour plumage as he retreated.

During this same three day period in March, instances of established adults in intraspecific encounters involved displays without the use of the frontal spot. This also applied to young of the year in early winter (June) when most were established as pairs on territories. However, exceptions occurred when two neighbouring pairs were attracted to the edge of the area of a third established pair on an open track surrounded by thick cover. As soon as an intruder suddenly appeared, it flashed its spot and puffed as it retreated under attack. The attacking male or female of the third defending pair displayed raised crown feathers. This occurred for the first minute, followed by a period of crest and other displays when intruding birds retreated in and out of thick cover.

On Outer Chetwode Island during October when most pairs are nesting and December when nesting is finished, six spot displays were observed during intraspecific encounters. In three, adult males were seen to flash their spots briefly as they attacked intruding birds. In another a vagrant female flashed her spot as the defending male, displaying a raised crown, started a vigorous flight towards her; she flew directly away well ahead of her attacker. In another case, a female landed near a male and showed her spot and puffed her plumage. A mild chase followed, but details were obscured by the vegetation. On Inner Chetwode Island a male was observed attempting to feed his mate after calling her off the nest, but he appeared to be so aggressive that twice he was unable to accomplish this. As he hopped towards the female, she opened her bill, and crouched fluttering her wings a little in the usual fashion, but she also displayed her

frontal spot fully. This unusual spot display ceased each time the male moved away, but she was fully displaying the spot when he finally fed her.

A summary of this small sample of descriptions of displays in intraspecific encounters is given in Table 1, and shows that flight away is the most frequent action of a robin following intraspecific display of its spot. The table shows that display of the crown is usually given by attacking birds. For simplicity, it is not shown that display of the crown is also typical for robins that resist the approach or attack of an opponent, and is the most frequently seen robin display.

TABLE 1 — Context of display in intraspecific encounters

	Given by attacking bird	Given by subordinate or intruding bird prior to escape
Spot	1 + 6*	12
Crown	13	1†

*Only one display of the spot by an attacking robin persisted, while the other six were momentary. The display was quickly superseded by raised crown feathers in cases where close observation was possible. †In this single instance, the attacked bird soon took over the initiative and dominated subsequent encounters.

INTERSPECIFIC DISPLAY

At Kaikoura, robins usually ignored other bird species. McLean (1911) thought that the robin never took part in disturbances with other bird species. However, Moncrieff (1931, 1932) described a robin attacking a South Island Fantail (*Rhipidura fuliginosa fuliginosa*) forcing it onto its back on the ground. Guthrie-Smith (1925) noted how an incubating robin chased other species that came near the nest, and this was a common context for chases at Kaikoura. When I have observed reactions to other species, the frontal spot was always displayed, except when a robin briefly elevated its crown just before a chase with a Bellbird (*Anthornis melanura melanura*) (R. Hay, pers. comm.). The most frequently observed objects for this display at Kaikoura were Fantails (both pied and black forms) and Bellbirds. Chases with Bellbirds were sometimes extremely vigorous, with the robin often being pursued. During August a pair of robins abandoned a half finished nest apparently because of the actions of a Bellbird who vigorously defended the area. Nevertheless, the two species co-exist in good numbers in the same habitats, and nests have been found 10 metres apart at Kaikoura.

Occasionally robins also displayed to and chased South Island Rifleman (*Acanthisitta chloris chloris*), Brown Creeper (*Finschia novaeseelandiae*) and Silvereye (*Zosterops lateralis*). In a few instances phrases of song were given during the chase. Yellow-breasted Tits (*Petroica macrocephala*) were usually absent or uncommon in the Kaikoura study area, but the area occasionally received numbers of immigrants of which some remained through the next breeding season. I have observed these ignored, or vigorously chased by robins. The robins displayed the frontal spot and sometimes they would bill snap and give chucking calls during pursuit. Tits were common breeding residents on Motuara Island where I introduced five South Island Robins. A few encounters between these species have been observed. In the most closely observed one, two tits, including at least one male, moved around the robin giving high-pitched calls, and periodically the robin silently chased them, his frontal spot showing prominently. Between chases his spot was in the resting position. Because I was concentrating on the activities of the robin, the only display of the tits I noticed was that their frontal spots were also visible.

On the West Coast in Beech (*Nothofagus fusca* and *N. menziesii*) forest, S. G. Moore (pers. comm., 1975) noticed in summer and autumn that South Island Robins displaying the frontal spot vigorously chased away tits, yet only watched fantails which were often at close range. In this habitat, robins were as common as tits.

Distances between robins and other species on initiation of spot display were up to 20 metres. The robin may watch for several seconds or longer, and change its perch for a better vantage point while fully displaying the spot. Just before flying towards its antagonist the robin will often crouch and partly spread its tail and drop its wings, occasionally giving this display for a longer period.

Chases usually followed such a display, and were often vigorous and were sometimes accompanied by bill snapping, chucking calls, spot display and aerial acrobatics. The robin sometimes pursued the other bird for more than a minute. Robins involved in other activities such as an intraspecific display have been seen to turn their attention periodically and briefly to other species, flashing the spot and then resuming the first posture, clearly separating one display from the other.

The reactions of robins in non-nesting situations at close range to predators such as the Morepork (*Ninox novaeseelandiae*), Weka (*Gallirallus australis*), Magpie (*Gymnorhina tibicen*), feral cat (*Felis catus*), and Stoat (*Mustela erminea*) do not appear to involve significant use of spot or crown displays. Instead, the robins become vocal, giving loud, sharp chucking calls which can run together in a rapid staccato manner at intense levels. The robin may sometimes persist for 15-10 minutes giving these calls while remaining at a safe distance in sight of the predator.

South Island Robins have a distraction display of which most elements have been described by Soper (1963), who appreciated the grace of the display and the difference in character from that of tits. The robin usually hops and flies between perches around the nest and intruder, sometimes dropping toward the ground. Initially the wings and tail are held partly open as the bird moves around the intruder, often facing it at close range. As intensity increases, the wings are fully extended and held above the line of the back with the tail fully opened and slightly depressed. The bird is usually leaning forward. When there are no obstructions to movement, all these elements of display are symmetrical. When hopping on the ground in this display, robins stoop and turn, retracting the wings periodically. At the nest some birds attack the hand by landing and pecking. Displays of the spot and crown are common in all stages of distraction.

Often when an observer closely approached a nest, the bird on the nest or nearby first fully displayed its frontal spot and then gave distraction displays, still prominently showing the frontal spot. When male and female came close together, the spot usually suddenly disappeared and the crown feathers were often erected, as in intraspecific display. In a few cases in which pairs were distracting at nests, alternate crown and spot display could be seen as birds were disturbed alternately by their mate and the observer. Occasionally a robin revealed only the spot, and failed to give distraction postures. However, distractions by single birds varied, and sometimes I could see only the thin crescent, or erected crown feathers. Single robins sometimes give a spot display to humans in other contexts, especially on meeting suddenly.

DISPLAY IN UNCERTAIN CONTEXTS

Hunting robins usually show only a thin frontal crescent or line, but I have often seen this flash into a fully opened spot before returning to a crescent. This sequence was sometimes repeated each time the bird lowered its head to peck. This pecking display was seen commonly on the ground, and has often been observed when I felt that my presence could not have affected this behaviour, but observations from a hide would be necessary to be certain of this. Sometimes parent birds poking down into nests raise the spot as the head gets low in the cup.

Males singing from prominent perches occasionally displayed the spot, and females, while incubating or brooding, sometimes had it prominently displayed for long periods. However, it was not possible to discount the presence of myself or other birds as a cause of the display. Trapped robins sometimes show an expanded frontal spot when they are handled. The contexts for displays of the crown and spot are summarized in Table 2.

TABLE 2 — Summary of the contexts of displays of the feathers of the crown and frontal spot

Context of Display	Occurrence of	
	Crown Display	Spot Display
Interspecific		
To other bird species	rare	common
To observer	rare	occasional
Distraction display to observer	occasionally by a single bird: common if pair together	common
Intraspecific		
Established pairs and neighbours	extremely common	uncommon
Trespassing robins and settling young	given by dominant robin	common, esp. by subordinates
Uncertain		
Lone robin:		
Pecking down	not observed	very common
Singing	some agnostic encounters	occasional
Incubating	not observed	occasional
Trapped, in hand	not observed	occasional

OTHER PETROICA SPECIES

The tit can also manipulate its frontal spot. Except on the Auckland Islands, sexual dimorphism in colour of tits is more pronounced than for robins, resulting in less visual contrast for lighter coloured females. Wilkinson & Wilkinson (1952) noted the white spot to be the last marking to develop on young tits. McLean (1911) described the wax and wane of the white spot and raising of crown feathers by a Pied Tit (*P. macrocephala toitoi*) when meeting the observer. He clearly described the alternating display of the spot and crown feathers, but my observations of tits were too limited to characterize the use of these displays.

No light coloured markings have been retained on the plumage of the Black Robin (*P. traversi*). I have never observed raised crown feathers in this species, although I have seen puffing and occasionally other displays involving cocking up the tail and lifting the wings. Boundary disputes are characterized by loud calls rather than the

prominent and often silent displays of South Island Robins. It appears that with the loss of the frontal spot, displaying of feathers on the head has also ceased but further observations may disprove this.

Chatham Island Tits (*P. macrocephala chathamensis*) and Black Robins used to occur together on several islands where the robin is now extinct (Travers 1872; Fleming 1950). On Little Mangere Island, the last refuge of the Black Robin, tits only infrequently occur and I have had few opportunities to observe the two species when close together. During the few encounters observed, the robin showed some reaction to the tit by watching it, and one juvenile female tit hopped down near a robin and briefly elevated its crown. When a mounted tit was presented to a bachelor male Black Robin, the robin approached and watched the stationary mount from several perches.

The tit (*P. m. dannefaerdi*) on Snares Island also has completely black plumage and bill. H. Best (pers. comm.) observed only one instance of manipulation of crown feathers between November and March 1975. Puffing of body plumage was a common display. Slight elevation of crown feathers for an instant was noticed as a male carrying food approached the observer near its nest.

DISCUSSION

Reviewing passerine displays, Andrew (1961) found that crest raising without any other movement of the feathers is recorded for most groups, and is clearly a response to nearly all mildly alarming or novel stimuli. Raising of the crown by robins is a more specific response given intraspecifically, while display of the spot shows some of the more generalized responses described for many other birds (Table 2).

Elevation of the crown appears to signal varying levels of aggressive motivation to other robins. Its use is especially noticeable in situations where there is some degree of resistance by an opponent, showing similarities to Stellar's Jay (*Cyanocitta stelleri*) (Brown 1964). Intraspecific display of the spot is often followed by flight away from an attacking robin, and appears to communicate a high escape or submissive motivation. There is ambivalence in both displays but in intraspecific display of the spot, the escape or submissive component seems dominant.

However, with other species and occasionally robins, the display of the spot is followed by an attack and seems aggressive. J. Craig (pers. comm.) has pointed out to me the contradiction if the same display shows escape motivation in one context and aggressive motivation in another. He feels that the motivational state must be similar wherever the display occurs. Even when escape motivation is high, attack is sometimes necessary especially if other belligerent species are involved, hence the confusion of interpreting interspecific display of the spot as aggressive.

This explanation of interspecific display is consistent with the use of displays of the spot intraspecifically. However, the very aggressive nature of robins displaying the spot and chasing other species is not usually a momentary defensive act nor is it always near a specific object needing defence or directed at species that can be called belligerent. The display of the spot in interspecific contexts may have a useful effect, and in spite of its escape motivation its outward manifestation could have an aggressive function and have been secondarily selected for such.

Brown (1964) has drawn attention to the very different sets of stimuli and internal states responsible for the same degree of crest erection in jays, as during sunbathing and preening and aggressive encounters. Robins also exhibit this qualitative distinction between social and comfort stimuli in angles of crown and body feather erection. If such different controls can effect similar looking responses, this may apply to display of the spot in intra and interspecific encounters. However, since most displays of the spot are social and involve intense physical activity, they may not have separate controls in inter and intraspecific contexts.

Display of the spot gives sudden and striking changes of appearance that could be useful in causing other species to flee or hesitate momentarily, and this may be related to its association with the aggressive bill. This display is also given when a robin is startled or when it seems momentarily vulnerable, as during pecking below a visual obstruction. If the display can be a response to several threatening situations, its use by solitary birds does not require an immediately obvious stimulus. The greater visibility over distances of the displays of the spot may be especially advantageous where danger of real physical contact is decreased by increased distances between reacting individuals. This danger may be greatest with other species and robins that are not individually known.

However, the white spot may serve to take emphasis away from the bill rather than enhance its aggressiveness (J. Craig, pers. comm.), better serving escape or submission. Whichever point of view is correct, the association of the spot with the bill probably created the need for a mechanism to hide the spot in some contexts, while the ambivalence of some displays of the spot may also be related to its association with the aggressive bill.

Some Australian robins show strong sexual dimorphism, with a few examples of females having very reduced spots. In addition, there is considerable variation in the size of frontal spots. Paintings and photographs illustrate some of these differences (Hindwood 1966; Officer 1969). The use of the spot display has not been described.

The Scarlet Robin, *P. multicolour*, has a large white spot. If this species was ancestral to the New Zealand tits (Fleming 1950), there has been selection towards smaller frontal spots. *P. rosea* and *P. rodinogaster* in Australia have small frontal spots, and like the

New Zealand robins and tits, breed in dense closed forests. Study of general behaviour, habitat types and other birds associated in breeding habitats of *Petroica* may help to clarify the reasons for variation in size of frontal spots.

The frontal spot may have evolved from a large coloured patch such as on the Red-capped Robin (*P. goodenovi*) or from paired markings such as those of the Starred Robin (*Pogonocichla stellata*), an African Turdinid. The displays of the markings on this species have inter and intraspecific contexts (T. B. Oatley, pers. comm.). Eyebrow and eyeline displays of *Rhipidura leucophrys* (see Hough 1969; Ives 1975) and *Gerygone albofrontata* (see Flack 1975) are intraspecific. During the evolution of the frontal spot, its precursor may have first had intraspecific functions. As it came into use for interspecific functions, there could have been selection to bring the spot into close association with the aggressive bill and increase size and conspicuousness to enhance this second function.

The infrequent use of displays of the crown by the two melanistic *Petroica* species is peculiar, especially because this display is so important in the aggressive behaviour of mainland relatives. Boundary disputes among Black Robins are remarkable for their lack of variety of display when compared to South Island Robins, but loud calls are given in the place of visual threat. With the development of melanism and consequent loss of contrasting markings, loss or infrequent use of postures for display of markings is not unexpected. However, the crown of all New Zealand *Petroica* species is dark and hardly differs in visual qualities from those of the Black Robin and tit.

Did selective forces favour melanism for these island forms or did the isolation of the small island populations allow a drift to melanism? Except for the frontal spot, all the markings of robins and probably tits in New Zealand are used during intraspecific display. Such threat and warning displays are energy conserving devices that help avoid actual physical combat, and their loss would be favoured only if other behaviour, such as calling, could accomplish the same energy savings, or if melanism was overwhelmingly advantageous in some other way relating to these island environments. Black Robins appear to be losing some other features characteristic of *Petroica* species, including the coloured feet and nest distraction display. Both have been recorded only occasionally during many recent inspections. It is possible that the development of melanism was an early stage in a continuing drift toward a form showing more and more limited behavioural and morphological variation.

If the frontal spot is advantageous in interspecific competition, conditions for its loss on these islands may have been related to the absence of other *Petroica* species and unrelated antagonists such as Bellbirds (see below). The Black Robin arrived at the Chatham Islands well before the tit (Fleming, 1950), and honeyeaters may also have been late arrivals on those islands. On Snares Island the tit

is the only *Petroica* and no honeyeaters occur. The passerine environment on the Snares (Warham 1967) was even more simplified than on the Chatham Islands, and the tit population is very limited in size on this small island. Melanistic individuals commonly arise in populations of many groups of birds, but the trait does not usually persist. Small, isolated populations in simplified communities may be susceptible to swamping by such gene combinations that are normally selected against. The Auckland Islands are the only other isolated offshore island group with a *Petroica*, and this pied form is probably a recent arrival, like the tit of the Snares. The much larger Auckland Islands support several tit populations in more diverse environments which include the Bellbird as a potential antagonist.

The time and energy involved when robins display to and chase other bird species lead one to believe that these displays must be advantageous. The way the display is given makes it unlikely to be momentary aggression from mistaken identity (Orians & Willson 1964). However, other bird species are usually ignored at Kaikoura making it unlikely that those robins exhibit strong interspecific territoriality. Chases occur most commonly near nests, and so this behaviour may relate to species that interfere in some way with nesting. Bellbirds may occasionally be capable of this and the Long-tailed Cuckoo (*Eudynamis taitensis*) has been recorded as a nest parasite (Oliver 1955). This cuckoo does not occur in the Kaikoura forest, but if benefit were derived from attacking a nest parasite or sometimes belligerent species, this behaviour could occasionally spill over toward other bird species.

Orians & Willson (1964) suggested that interspecific territoriality among birds may be much more common than currently recognized. Robins in New Zealand occupy an extremely wide range of forest types that occur from sea level to tree line. An ecological generalist like the robin may be in, or have been in, competition with other species in some of these habitats, with aggression as one consequence. Interspecific display of the spot could be advantageous in these situations.

Tits and robins often occur in the same habitats in New Zealand, and where both are common, vigorous interspecific display has been noted. However, except in the Chatham Islands there are large differences in size which greatly reduce the potential for ecological competition. This may not be true on some small islands or in very simplified habitats. Soper (1963) has noted how similar the choice of nest sites of robins and tits are, except that the latter are often higher than the former. Tits also seem to forage much higher than robins when in tall forest. If some interspecific territoriality exists in these habitats, its study should help clarify the evolution and functions of spot display.

Sympatry of a melanistic robin and a typical tit is unique to the Chatham Islands. The robin arrived on these islands considerably before the tit (Fleming 1950), and melanism and consequent lack of

a frontal spot probably arose before the environment was shared. The two species are closest in size of any robin-tit pair in New Zealand (weights differ by 9-14 grams instead of the 20-28 gram difference on the mainland). The lack of striking displays by Black Robins may have affected co-existence of these species, and influenced the forces which selected for large size in the Chatham Island Tit.

It is known that some Australian Meliphagidae are very aggressive to a wide range of unrelated species (Dow 1971) and exclude many from their defended areas. Some striking markings and displays (Dow 1970, 1971, 1973) may have interspecific uses. Display of the spot by robins could have a specific function if it enabled robins to resist exclusion from habitats where they could otherwise successfully breed. Vestiges of this use might show in environments such as Kaikoura where the behaviour no longer seems to have an interspecific function.

At Kaikoura, Bellbirds are the only species that robins do not always dominate when interspecific encounters occur, and the former are sometimes seen initiating very aggressive pursuits of robins. I have observed Bellbirds vigorously attacking Silvereyes (*Zosterops lateralis*) and have received a report of a storm weakened Silvereye knocked to the ground and killed by the pecks of a Bellbird. Bellbirds occasionally come close to pecking robins. Travers (1872) stated that the (now extinct) Chatham Island Bellbird (*Anthornis melanura melanocephala*) appeared to be specially aggressive to the Black Robin, always attacking it most savagely when they met. New Zealand Meliphagidae such as Bellbirds may not exhibit interspecific territoriality to the degree shown in some Australian species, but they retain some aggressiveness toward other species. Oliver (1955) noted that another Meliphagid, the Tui (*Prothemadera novaeseelandiae*) was rather pugnacious, and recorded deaths of Tuys and other species that it opposed in the process of "chasing them away from its self-defined territory." St. Paul (1975) stated that the Tui drives away most birds from its nest, but tolerates the very small species, while he observed that the Bellbird vigorously drove even small birds away from its nest. Interspecific display by robins may be expected to have selective value in some present and past environments, improving chances of co-existence with competing unrelated and closely related species.

ACKNOWLEDGEMENTS

Thanks are due to J. R. Hay for the line drawing, for assistance in the field during part of two summers, and for useful suggestions in early stages of preparation. I am grateful to A. H. Whitaker for his critical reading of a draft, and to P. J. Mcors for patiently reading several drafts and providing many valuable criticisms. J. Craig, while deploring the absence of a quantitative approach, provided challenging points of view and other useful suggestions that have been included. I would also like to thank J. R. Flack and G. R. Williams for comments

on the manuscript. For short periods over the last four years a number of Wildlife Service trainees and field officers have provided assistance which has greatly contributed to the general study of robin biology. W. Brown, J. R. Flack and M. Shepard contributed some observations and B. Lloyd has provided technical assistance during the last season. I. Mannering generously made space and equipment available for our use at the University of Canterbury Edward Percival Marine Laboratory. I am grateful to K. Johnson and J. Shand for providing transportation and other assistance in Marlborough Sounds. The Marlborough Catchment Board granted permission to work in the Kowhai River Forest.

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FOODS OF THE PARADISE SHELDUCK *Tadorna variegata* IN THE HIGH COUNTRY OF NORTH CANTERBURY, NEW ZEALAND

By STEWART A. BISSET

ABSTRACT

The food of 204 Paradise Shelducks from the high-country of Canterbury was examined. Types of food and their percentage occurrence are listed. Plant material, particularly that obtained by grazing, made up most of the bulk of the food eaten throughout the year. Animal material, mainly of aquatic origin, was of only minor importance, with much of it apparently being ingested accidentally with plant material. Seasonal changes in the diet between 24 May 1972 and 5 May 1973 are discussed.

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INTRODUCTION

The Paradise Shelduck, *Tadorna variegata* (Gmelin), New Zealand's indigenous shelduck, is now distributed throughout most of the country. In pre-Polynesian times its distribution was probably limited by the availability of suitable grassland habitats (Williams 1971), but the reduction of forests and the development of pastoral land have apparently allowed the species to extend its range, particularly in the North Island (McAllum 1965). In Canterbury, Paradise Shelducks are found mainly throughout the river valleys of the Southern Alps, where they are relatively abundant. Elsewhere in the province smaller numbers occur, mainly near rivers in areas not intensively farmed.

Apart from anecdotal records, little has been published on the general biology of Paradise Shelducks. The present study formed part of a wider investigation of the range of helminth parasites which

infect the Paradise Shelduck in its natural habitat. Parasitic helminths of the alimentary tracts of waterfowl almost invariably enter their hosts via the mouth, so infection depends to a large extent on the feeding habits of the host. A detailed examination of the diet of the Paradise Shelduck was, therefore, considered essential. Although the Paradise Shelduck is known to be a grazing species — Travers (1871), Oliver (1955), McAllum (1965) and Williams (1971) — no-one has investigated the extent of this grazing habit. This paper presents data from 204 shelducks collected from the high-country of Canterbury.

MATERIAL AND METHODS

Collection of Samples

One hundred and eighty shelducks were collected from the main study area on the Canterbury side of the Lewis Pass, viz the valleys of the Hope, Kakapo, Doubtful and Boyle Rivers. These river valleys are representative of many of those favoured by Paradise Shelducks in Canterbury, possessing wide, open, shingle riverbeds bordered by grassed riverflats and terraces. Occasional areas of swamp occur on the riverflats. These are usually wet during the winter and spring, but are often dry during the summer and autumn.

Recent intensified farming activity has brought about an increase in the area sown in exotic grasses, clovers, lucerne and fodder crops such as turnips. Much of the terraceland, particularly above the Hope River, has been cultivated, but large areas of indigenous tussock grassland still remain. Most of the study area is grazed by cattle and sheep.

In May 1972, 70 birds were obtained from shooters in the study area (60 on 6-7 May and 10 on 27 May), and a further 10 in May 1973. These were mainly taken from large flocks grazing on sown pasture. From June 1972 to March 1973, 10 birds were collected by me each calendar month from the main study area. Most of these were taken on undeveloped riverflats or low terraces beside the rivers.

A further 24 shelducks were obtained from shooters during May 1972, from the upper reaches of the Selwyn River, Lake Coleridge and Porter's Pass. All three areas lie among the ranges east of the main divide in Canterbury and provide basically similar shelduck habitats to those in the main study area.

All birds shot by me were immediately labelled with a number, location and note as to whether they were solitary, or one of a pair or group. The alimentary tracts were removed and placed in plastic bags as soon as possible. Each monthly sample was kept refrigerated, without freezing, until all of the birds in it had been examined. The sample from the 1972 shooting season however, was too large to be dealt with in this way, making it necessary to freeze part of the sample. Although injection with formalin may have stopped post-mortem digestion more rapidly, this would have interfered with other aspects of the study.

Methods of Food Analysis

The gut contents were extracted by splitting sections of the gut longitudinally with scissors and washing the contents of each section into a fine mesh sieve (Mesh No. 72, aperture 210 micrometres) with flowing water. The sievings were then scanned under a stereoscopic microscope for identifiable food material. In general, identifiable food material was in, or anterior to, the gizzard. Those pieces which could not be identified immediately were stored in 10% formalin in labelled vials for later analysis. Where food material could be identified immediately, the species or category was simply recorded. Quantitative estimates of the foods eaten were not recorded. Instead proportions of the various foods eaten by the ducks were expressed simply as percentage occurrence throughout the sample. Healy (1970), Allan (1940) and Mason (1964) were consulted for identification of plant material, and Marples (1962) and Pendergrast & Cowley (1966) for animal material. Representative examples of a number of unidentified seeds and some leaf material were identified by Mrs M. Bulfin of Botany Division, DSIR, and Dr M. Winterbourn of the Zoology Department, University of Canterbury, identified many of the aquatic insects.

RESULTS

Overall Composition of Diet

Of the 204 shelducks examined, 202 contained identifiable foods. Of these 201 contained plant material, and 72 contained animal material (Table 1).

1. Plant Material — Both foliage and seeds were eaten.

For the purposes of this analysis it was convenient to group various species. For example, species of *Trifolium* and *Medicago* are referred to collectively as clovers; grasses are included as a single category as are the vegetative parts of rushes and sedges. For convenience the term "berries" is used to cover all fleshy fruits and those fruits surrounded by a fleshy layer, regardless of the origin of this layer.

The division between "terrestrial" and "aquatic" plants is difficult to define. Rushes, sedges and the herbs *Gunnera dentata*, *Lilaeopsis* sp. and *Pratia angulata*, for instance, are characteristically found in shallow water or near its edge. These are nevertheless included in Table 1 under the heading of "Terrestrial Plants."

Terrestrial Plants. Leaves of clover and grass predominated in the food. Mixtures of the two were often eaten though clover was usually present in greater quantities — in such cases 80% or more of the bulk was generally clover.

Leaves of members of the Juncaceae were the only category of terrestrial vegetative material, apart from grasses and clovers, that occurred in over 20% of the birds. A soft-leaved rush, *Juncus articulatis*, which is common in the study area, appeared to be the major species eaten. Leaves of two herbaceous plants, *Rumex acetosella*

TABLE 1. FOOD SPECIES IDENTIFIED FROM THE TRACTS OF 204 PARADISE SHELDUCKS COLLECTED BETWEEN MAY 1972 AND MAY 1973.

		N*	%*
TERRESTRIAL PLANTS - VEGETATIVE			
MUSCI	<i>Breutelia affinis</i>	2	1.0
DICOTYLEDONES			
Caryophyllaceae	<i>Colobanthus</i> sp.	1	0.5
Polygonaceae	<i>Muehlenbeckia axillaris</i>	5	2.5
	<i>Rumex acetosella</i>	14	6.9
Haloragaceae	<i>Haloragis (depressa?)</i>	1	0.5
Rosaceae	<i>Acaena</i> sp.	3	1.5
Leguminosae	<i>Medicago sativa</i>	133	65.2
	<i>Trifolium dubium</i>		
	<i>T. repens</i>		
	<i>T. subterraneum</i>		
Umbelliferae	<i>Oreomyrrhis</i> sp.	5	2.5
	<i>Anisotome aromatica</i>	1	0.5
Epacridaceae	<i>Cyathodes fraseri</i>	2	1.0
Rubiaceae	<i>Nertera depressa</i>	1	0.5
Compositae	<i>Hypochaeris</i> sp. (flower buds)	14	6.9
	<i>Taraxacum officinale</i>	14	6.9
	<i>Cotula</i> sp.	1	0.5
	<i>Achillea millefolium</i>	3	1.5
Plantaginaceae	<i>Plantago lanceolata</i>	1	0.5
Salicaceae	<i>Salix fragilis</i>	1	0.5
MONOCOTYLEDONES			
Gramineae	including: <i>Lolium perenne</i> <i>Poa pratensis</i> <i>Anthoxanthum odoratum</i>	115	56.4
Juncaceae	<i>Juncus</i> spp. (probably mainly <i>articulatus</i>)	42	20.1
TERRESTRIAL PLANTS - SEEDS AND FRUITS			
DICOTYLEDONES			
Polygonaceae	<i>Muehlenbeckia axillaris</i>	31	15.2
Haloragaceae	<i>Gunnera dentata</i>	8	3.9
Rosaceae	<i>Rubus cissoides</i>	1	0.5
Leguminosae	<i>Trifolium repens</i> <i>T. subterraneum</i>	23	11.3
Rhamnaceae	<i>Discaria tomatou</i>	1	0.5
Araliaceae	<i>Pseudopanax crassifolium</i>	1	0.5
Cornaceae	<i>Covokia cotoneaster</i>	2	1.0
Umbelliferae	<i>Lilaeopsis</i> sp.	1	0.5
Ericaceae	<i>Gaultheria depressa</i>	1	0.5
Epacridaceae	<i>Cyathodes fraseri</i>	9	4.4
Rubiaceae	<i>Coprosma</i> spp.	4	2.0
Lobeliaceae	<i>Pratia angulata</i>	1	0.5
MONOCOTYLEDONES			
Gramineae	<i>Poa pratensis</i> indet. seeds <i>Avena sativa</i>	12	5.9
Juncaceae	<i>Juncus</i> spp. (probably mainly <i>articulatus</i>)	12	5.9
Cyperaceae	<i>Scirpus</i> spp. indet. sedge seeds <i>Carex</i> spp.	47	23.0
		9	4.4

TABLE 1: continued

		N*	%*
AQUATIC PLANTS - VEGETATIVE			
CHLOROPHYTA			
	<i>Oedogonium</i> sp.	44	21.6
	<i>Mougetia</i> sp.		
	<i>Ulothrix</i> sp.		
MUSCI			
Amblystegiaceae	<i>Drepanocladus aduncus</i>	10	4.9
DICOTYLEDONES			
Ranunculaceae	<i>Ranunculus fluitans</i>	7	3.4
MONOCOTYLEDONES			
Hydrocharitaceae	<i>Elodea canadensis</i>	1	0.5
Lemnaceae	<i>Lemna</i> sp.	3	1.5
AQUATIC PLANTS - SEEDS			
DICOTYLEDONES			
Potamogetonaceae	<i>Potamogeton cheesemani</i>	9	4.4
AQUATIC PLANTS - "AQUATIC DETRITUS"		6	2.9
ANIMAL MATERIAL - TERRESTRIAL AND FREE-LIVING			
NEMATODA			
	<i>Dorylaimus</i> sp.	16	7.8
INSECTA			
O. Psocoptera	family indet.	1	0.5
O. Hymenoptera			
Formicidae	genus indet.	1	0.5
O. Diptera			
Simuliidae	<i>Austrosimulium</i> sp.	1	0.5
Blepharoceridae	genus indet.	1	0.5
Empididae	genus indet.	1	0.5
indet. family	genus 1 indet.	1	0.5
	genus 2 indet.	1	0.5
O. Hemiptera			
Saldidae	genus indet.	1	0.5
O. Coleoptera			
Elmidae	genus indet.	1	0.5
O. Ephemeroptera			
Leptophlebiidae	<i>Deleatidium</i> sp.	1	0.5
O. Odonata			
Coenagriidae	<i>Xanthoconemis zealandica</i>	1	0.5
ANIMAL MATERIAL - AQUATIC			
MOLLUSCA			
Hydrobiidae	<i>Potamopyrgus antipodarum</i>	8	3.9
Lymnaeidae	<i>Lymnaea tementosa</i>	2	1.0
Planorbidae	<i>Gyraulus corinna</i>	3	1.5
Sphaeriidae	<i>Sphaerium novaeseelandiae</i>	5	2.5
CRUSTACEA			
O. Cladocera	2 indet. genera	2	1.0
S.C. Ostracoda	<i>Herpetocypris pascheri</i>	10	4.9

TABLE 1: continued

		N*	%*
ARACHNIDA			
O. Acarina			
Halacaridae	genus indet.	2	1.0
INSECTA			
O. Ephemeroptera			
Leptophlebiidae	<i>Deleatidium</i> sp.	3	1.5
O. Plecoptera			
Gripopterygidae	<i>Megaloptoperla</i> sp.	1	0.5
	<i>Zelandobius</i> sp.	5	2.5
O. Trichoptera			
Rhyacophilidae	<i>Hydrobiosis</i> sp.	1	0.5
Sericostomatidae	<i>Pyenocentrodex aureola</i>	21	10.3
	<i>Olinga feredayi</i>	17	8.3
	<i>Oxythira albiceps</i>	36	17.6
O. Diptera			
Tipulidae	genus indet.	1	0.5
Chironomidae	genus indet.	7	3.4
Empididae	genus indet.	3	1.5
Ceratopogonidae	genus indet.	3	1.5
O. Coleoptera			
Elmidae	genus indet.	1	0.5

* N = number of birds in which food item was found

% = percentage occurrence

and *Taraxacum officinale*, both of which are common on permanent pasture and on riverflats in the study area, were each present in 14 of the shelducks. Immature flower buds of *Hypochaeris* sp., also common in the study area, were present amongst the food, although leaves of this species were not. Leaves of every other terrestrial plant ingested were recovered from less than 5% of the shelducks.

Seeds of several plants occurred frequently, although usually they did not contribute much to the bulk. Seeds often resist breakdown for much longer than other food items, and some pass out still viable with the faeces. It is recognised that their longer breakdown time may cause their occurrence in the diet to be overestimated. Interpretation of occurrence percentages must therefore be made with care. This is probably particularly true of *Scirpus* "nuts," which were present in 23% of the birds. These are particularly hard shelled, and as they are of very similar size to gizzard grit, may be retained in the gizzard as grinding agents some time after ingestion.

Apart from oats, *Avena sativa*, most terrestrial plant seeds appeared to have been taken either as seedheads or berries. Monocotyledonous seeds were probably ingested simply by plucking at the seedheads. Seedheads of grasses were found in several of the shelducks, and material which appeared to be the stalk portions of seedheads were nearly always found with *Juncus* seeds. Clover seeds, particularly

those of *T. repens*, were probably also eaten mainly as flowering heads. Those of *T. subterraneum* however, were the most common and unlike those of other species of clover eaten, the fruiting calyces of this species are anchored in the ground very close to the prostrate stems of the plant. Seeds were therefore more likely to have been eaten either with foliage, or separately when the calyces were forced to the surface during winter.

In the seasons when they were ripe berries appeared to be important in the diet of many of the shelducks. Those of *Muehlenbeckia axillaris* were found very frequently and indeed were the only item of food present in several of the birds collected during summer. Berries of *Gunnera dentata* and *Cyathodes fraseri* were also often present. Those of other species occurred only infrequently. Where shelducks have access to them, cats become important in the diet. Grain spread to supplement the winter diet of sheep was the usual source of this food, and little other food was present in birds which had been feeding on it.

Aquatic Plants. Filamentous algae were the most frequently eaten aquatic plants, and formed the only item in this category present in the tracts of over 20% of the ducks. *Drepanocladus* sp. (aquatic moss) was the next most common, occurring in 4.9% of the birds. *Ranunculus fluitans*, *Lemna minor* and *Elodea* sp. were also recorded. Seeds, but not leaves of *Potamogeton* sp. were found in several birds.

2. Animal Material — None of the invertebrates eaten by the shelducks occurred commonly as a food item (Table 1), and even when present animal material rarely contributed significantly to the bulk of the food.

Except for *Dorylaimus* sp., a free-living nematode, all invertebrates recovered on more than one occasion were of aquatic origin. Aquatic larvae of various insects (particularly those of caddis flies), were most commonly encountered, these being present in 28.4% of the shelducks examined. Larvae of a caddis fly, *Oxythira albiceps*, was the most commonly ingested animal, the only one which occurred in over 15% of the birds.

The presence of aquatic invertebrates in the food was generally associated with the presence of filamentous algae or other aquatic plant material. Eight of the 10 birds from Selwyn River (May 1972), proved unusual in this respect. These contained particularly large numbers of larvae of the caddis flies *Olinga feredayi* and *Pycnocentroides aureola*. These made up the bulk of the food in the oesophagus and gizzard of the ducks, and yet no aquatic plants had been ingested.

Six shelducks contained small amounts of "aquatic detritus" — a mixture of semi-decomposed root and stem material of aquatic plants. A number of ingested aquatic invertebrates, such as molluscs (*Spaerium novaezelandiae*, *Potamopyrgus antipadarum* and *Lymnaea*

tomentosa), crustaceans (cladocerans and ostracods) and insect larvae, were always present with this material.

Although 11 insect species not of aquatic origin were found, none was recovered from more than one bird. Most were adults of insects with aquatic larvae.

Differences Between Flocks and Paired Birds

Between June 1972 and May 1973, 41 shelducks known to have been taken from flocks and 53 known to have been members of pairs were collected. A flock was considered to be any group of three or more shelducks (birds in moulting flocks were not included in this definition).

A comparison of the occurrence of food items in members of flocks and members of pairs showed that although no significant difference existed between the occurrence of terrestrial foods, a significantly greater proportion of paired birds had ingested aquatic foods ($X^2 = 6.44$; $p = 0.01$).

Seasonal Variation in Diet in the Main Study Area

This section is based on the food found in the 10 shelducks shot each month in the Lewis Pass study area between May 27 1972 and May 5, 1974. Care must be taken when extrapolating from small samples such as these. Many of the fluctuations shown in Fig. 1 almost certainly do not represent similar changes in the population as a whole. Nevertheless, some seasonal changes in diet are revealed.

As indicated earlier, samples taken from the study area in May 1972 and May 1973 consisted largely of birds from flocks occupying an exotic pasture habitat, while those taken in the intervening period were mainly collected from riverbed habitat. This should be taken into account when comparing the graphs in Fig. 1.

Foliage — particularly clover, grass and rush — formed an important part of the diet of all birds throughout the year. Although no marked seasonal pattern stood out, there seemed to be a peak in utilisation of foliage during September and October which gradually declined again until February. The decline coincided with a general increase in utilisation of some alternative foods, particularly "berries" (Fig. 1e). Berries provided the most noticeable seasonal influence on the diet of the shelducks. When these became available they were particularly favoured. Those of *Muehlenbeckia axillaris* were most important, followed by *Cyathodes fraseri* and *Gunnera dentata*. *Muehlenbeckia* seeds and fruit first appeared in the shelducks in November, those of *Cyathodes* appeared in December and those of *Gunnera* in February.

Smaller seasonal peaks in the occurrence of food items such as clover and grass seeds (Fig. 1c & d), *Hypochaeris* flower buds (Fig. 1f), oat grain (Fig. 1g) and terrestrial and free-flying animal material (Fig. 1h), coincided with their availability throughout the year. Grass seedheads were usually eaten before they had ripened and

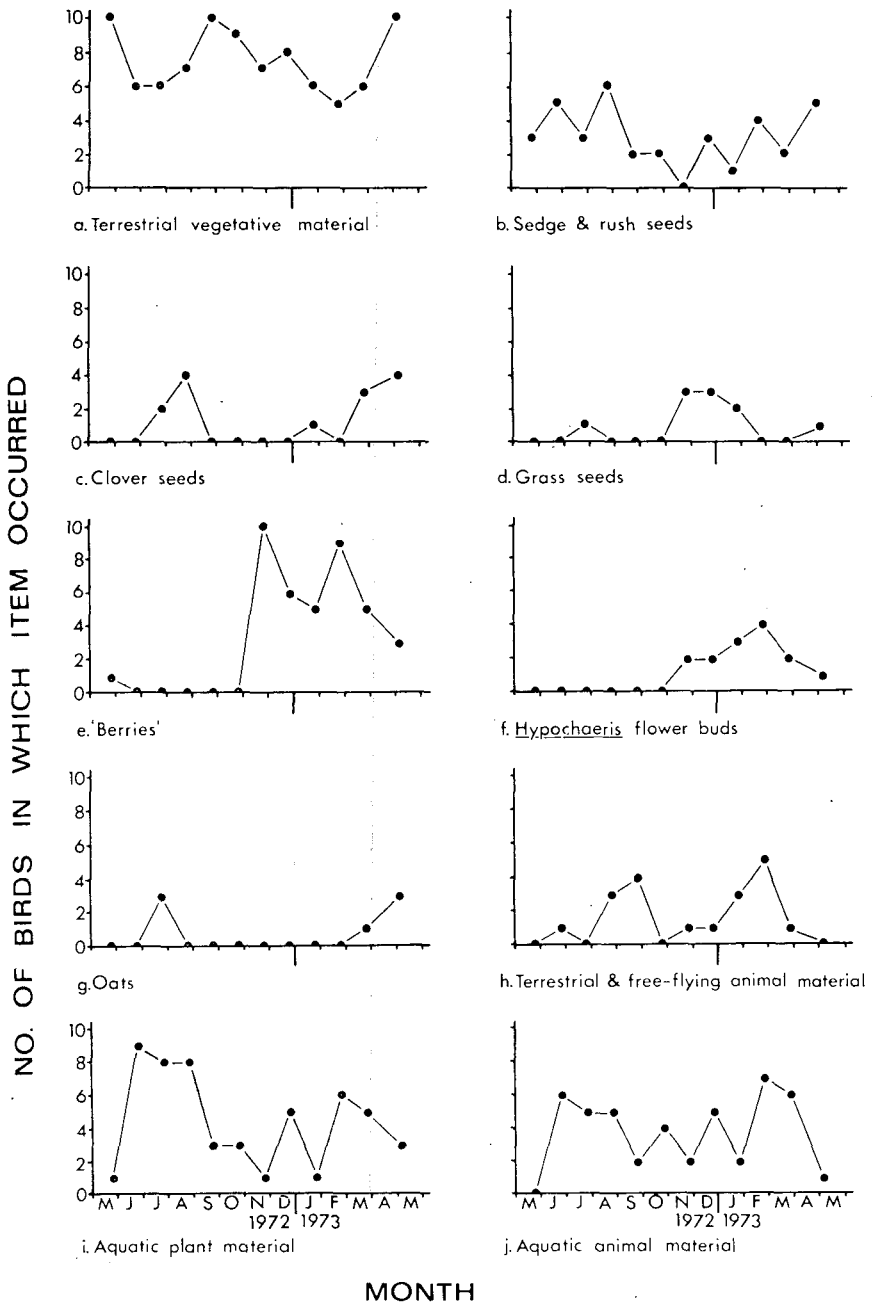


FIGURE 1 — Seasonal variation in food of Paradise Shelducks between 24 May 1972 and 5 May 1973. Graphs show number of ducks in each monthly sample of ten, which contained the above foods.

occurred most commonly between November and January. Most clover seeds found were mature. Calyces of subterranean clover (*Trifolium subterraneum*) containing ripe seeds are often forced to the surface during winter, accounting for a peak in occurrence of clover seeds in the ducks at this time. *Hypochaeris* flower buds are considered separately because they appeared to be selected independently of foliage of *Hypochaeris*. They were commonly eaten between November and April, a similar seasonal pattern to that of berries. Oats became an important source of food to some shelducks when available. The usual source was grain spread to supplement the diet of sheep during autumn and winter. A peak in ingested terrestrial and free-flying animal material during August and September was due entirely to the presence of *Dorylaimus* sp., while a second peak, in January and February, corresponded with the flying phase of many aquatic insects. Adult stages of these insects made up the bulk of the species which brought about this peak.

As with terrestrial vegetative material, aquatic plant material — mainly filamentous algae — was eaten throughout the year. It too probably grew less important as alternative foods became available during the spring and summer. A sharp rise in occurrence seen in December (Fig. 1i), was partly due to the inclusion in that month's sample of ducklings (near fledging) from a brood confined to an area of swamp.

The presence of aquatic animal material depended to a large extent on the presence of aquatic plant material. A comparison of Figs. 1i and 1j reveals the similarity of their monthly patterns.

In late summer most shelducks, apart from the young of the year, congregate on lakes to moult. During their moult shelducks are flightless for two weeks and are probably more restricted in their choice of food at this time than usual as they seldom move far from the water's edge. At this stage shelducks in the study area lost condition rapidly and before regaining their flight feathers they became quite emaciated.

The stomachs and gizzards of three birds collected in mid-moult in January 1973 contained very little food and the intestines also were virtually empty indicating that little had been eaten for some time prior to sampling. The stomach of each bird contained only a few blades of grass; in addition one contained several clover leaves and a willow leaf and another contained two small insects (an hemipteran and a psocopteran). The occurrence of berries in the January sample was unusually low because of the inclusion of birds from a moulting flock, which had no access to them.

DISCUSSION

Results showed that Paradise Shelducks in the main study area relied on grazing for the majority of their food. The foliage of several species of clover and grass introduced into New Zealand as

pasture plants were the most important foods. Leaves of a number of other terrestrial plants were also eaten but only in a few cases did they contribute a major portion of the food consumed.

Although it was evident that grazing provided most of the food, other types of feeding behaviour were regularly used. While only a minor part of the food eaten by the shelducks was of aquatic origin, filamentous algae (the most commonly eaten aquatic material) were obviously regularly included in the diet of many of the shelducks throughout the year.

The most important seasonal influence on the shelduck's diet was the appearance of fruit on low-growing shrubs and herbs during summer. Grazing became of only secondary importance at this time to many of the shelducks (during summer a number contained little or no food other than berries). Similarly, at times when grain was spread to supplement the diet of sheep in the study area some of the shelducks appeared to rely almost entirely on this as a source of food.

Little animal material was found amongst food eaten by shelducks in the study area. Once ingested, soft-bodied invertebrates are broken down much more rapidly than are species with hard parts or plant material. For this reason there is often a tendency in diet studies to underestimate the occurrence of soft-bodied food items. Nevertheless, it was clear that the shelducks relied very little on food material of animal origin. Undoubtedly, much of the animal material present was accidentally ingested with plant foods. Ingested aquatic invertebrates were generally present with filamentous algae or other aquatic plant material. Marples (1962) stated that *Oxythira* spp. (the commonest animal material ingested by the shelducks in the study area) are often found amongst filamentous algae. Many of the other species of aquatic invertebrates found in the shelducks also seek the shelter of aquatic vegetation (Pendergrast & Cowley, 1966). *Dorylaimus* sp., the second most frequently ingested invertebrate after the caddis fly larvae, lives amongst terrestrial vegetation (Dr W. C. Clark, pers. comm.). Their small size makes it most unlikely that they were eaten intentionally.

A few of the shelducks however, had clearly been seeking animal foods intentionally. Eight of the shelducks obtained from the headwaters of the Selwyn River in 1972 contained the caddis fly larvae *Olinga ferridayi* and *Pycnocentroides aureola*. These species made a major contribution to the food consumed by five of these birds. None of the birds had eaten any aquatic vegetation. Both caddis fly species are quite large (10 mm) and are usually found clinging to rocks in moderately flowing streams. While some of the free-flying and terrestrial species (e.g. ant and booklice) were probably ingested accidentally, others found, such as the mayfly and damselfly adults and a moth, may well have been eaten intentionally.

The presence of "aquatic detritus" — always with a number of benthic invertebrates — in six of the shelducks from the study area, suggested that a "dabbling" type of feeding behaviour more characteristic of *Anas* spp. was occasionally used by the shelducks.

Oligochaetes were not found in the tracts of the shelducks. Once ingested these are broken down very quickly and their presence is often indicated only by their setae, which were not searched for. Nevertheless, it is quite likely that aquatic oligochaetes were ingested occasionally with other food material, and earthworms may have been eaten when conditions forced them to the surface.

While the results give a general idea of the food and feeding habits of shelducks in the study area, the situation may be somewhat more complex. In the first place no birds under one month old were examined in this study. Thus the extent to which animal material is utilised by very young shelducks is unknown. The two youngest examined, approximately one month old, contained mainly fruit of *Muehlenbeckia axillaris*. Foliage of grass and clover, and immature flower buds of *Hypochaeris* sp. made up most of the remainder of the bulk. Although one contained several *Dorylaimus* sp. neither had animal material of nutritional importance. This was also true of four other young shelducks examined of between two and four months old. Because they probably require a fairly protein rich diet at first, it is possible that ducklings of less than one month include more animal material in their diets than older ducklings do.

In addition, there is a possible difference in habitat utilisation by flocks and paired birds. Zander (1967) postulated that the ecological niche occupied by the Paradise Shelduck can be divided into two separate "subniches," one for the breeding population and one for the non-breeding population. He based his hypothesis on differences in behaviour and habitat utilisation between flocks and pairs. My observations also suggest a difference in habitat utilisation for much of the year, although their habitats are by no means discrete. Large flocks of shelducks in the study area were usually found grazing on developed pasture. In May 1971 and 1972 these flocks appeared to consist mainly of young of the year — 79% (n = 45) and 73% (n = 60) respectively of birds shot from these flocks possessed a large bursa of Fabricius (Bisset 1974). It is thought likely that many of the remaining birds in these flocks were 18 months old, unpaired birds. On the other hand few paired birds were seen on developed pasture. Most inhabited riverbeds or small swampy areas on tussock-clad terraces. It is believed that many of these birds remained on or near their breeding territories throughout most of the year, as pairs were usually seen in the same localities month after month during the study. Flocks present in the riverbed habitat in the study area were usually much smaller than those on developed pasture and tended to form groups on the greener, more closely grazed areas of riverflats where exotic grasses and clovers were the dominant ground cover.

Because nearly all of the birds collected from June 1972 onwards came from riverbed habitats, only a small section of those in flocks in the study area was sampled. Thus it was difficult to show the extent of any differences in feeding habits between the flocks and pairs from the results of stomach analyses. However, while no significant difference was shown for the occurrence of terrestrial material, the results showed that birds known to have been members of pairs contained aquatic material significantly more frequently than did those from flocks.

While many of the plants present in developed pasture in the study area have spread onto the undeveloped land, most riverbed and swamp plants are not found growing in developed pasture. One could therefore reasonably expect further differences in diet to become apparent if a more truly representative sample of birds from flocks was obtained. Judging from habitat utilisation alone it seems likely that as an overall trend, flocks may have a somewhat narrower feeding ecology than the paired birds of the breeding population.

From the rather limited amount of published information available it appears that the Paradise Shelduck's diet resembles that of the Australian Shelduck (*T. tadornoides*), the South African Shelduck (*T. cana*) and the Ruddy Shelduck (*T. ferruginea*) of Europe and Asia, more closely than that of the other species in the genus, *T. tadorna* and *T. radjah*, which tend to rely more heavily on worms, crustaceans and molluscs for much of the year (Delacour 1963). Frith (1969) stated that the diet of *T. tadornoides* consists mainly of the seeds and leaves of clover, green algae, some duckweed and pondweed, and small amounts of herbs characteristic of the water's edge. He added that insects are found in 40% of the birds but that these contribute little to the bulk of food. Similarly, *T. cana* and *T. ferruginea* are birds of inland freshwaters and are omnivorous, but eat mainly plant material (Delacour 1963).

ACKNOWLEDGEMENTS

I would like to thank the many people who have been of assistance to me throughout this study: Dr M. Williams of the Wildlife Service, Department of Internal Affairs, and Dr J. Warham and Dr C. Burrows of the University of Canterbury whose valuable suggestions greatly benefitted the manuscript; Dr M. Winterbourn and Mrs M. Bulfin for their assistance in identification of food material; the runholders who allowed access to my sampling area and a number of duckshooters who provided me with the greater part of my May samples. The co-operation of both the Wildlife Service of the Department of Internal Affairs and the North Canterbury Acclimatisation Society was greatly appreciated. The study was supported in part by a grant from the Wildlife Service of the Department of Internal Affairs.

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SHORT NOTE

WILSON'S STORM PETREL AT KAIKOURA

At midnight on 5 April 1975 I found a live Wilson's Storm Petrel (*Oceanites oceanicus*) sitting in the lighted hallway at the Edward Percival Marine Laboratory, Kaikoura. When the bird was picked up it regurgitated ten drops of a red clear oily substance. The bird was shown to Dr M. B. Jones and some marine biology students and I noted several characters. It was readily identified from Falla, Sibson & Turbott (1970, *Field Guide to the Birds of New Zealand*, 2nd ed.) by the white rump patch, long legs, and black feet with yellow webs. The bird was stressed and I quickly released it. It flew northwest toward Kaikoura township.

From the literature (see *Annotated Checklist*, OSNZ 1970: 29) and Mr A. T. Edgar (pers. comm.) there appear to be only six records of this species in New Zealand with no pattern of distribution or season. Two of these were made in April and one in November in the South Island. There are three records from the North Island, one each in January, March and May.

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EXTANT TYPES OF NEW ZEALAND BIRDS FROM COOK'S VOYAGES

[PART II: THE TYPE SPECIMENS]

By DAVID G. MEDWAY

THE EXTANT TYPE SPECIMENS

SPOTTED SHAG *Stictocarbo punctatus punctatus* (Sparrrman, 1786)

At Queen Charlotte Sound on 18 January 1770 Banks and his party shot many shags from their nests in the trees and on the rocks (Beaglehole 1963, I: 457). Although this is insufficient to identify the species concerned, it is probable that the Pied Shag and the Spotted Shag were involved.

On the second voyage, on 25 May 1773 the elder Forster went with Cook and Furneaux on a shooting party to West Bay (Endeavour Inlet), Queen Charlotte Sound, where they "had pretty good sport among the . . . Shags" (Beaglehole 1961: 168). Forster recorded in his Journal that they met with several shags, especially with a new species of which they shot several, and he set out a description of the Spotted Shag (Forster 1772-1775, II: 15-16). The next morning George Forster made drawings of the "new curiosities" which had been collected and without doubt his painting of the Spotted Shag (Folio 103) was based on one of the birds which had been collected at West Bay. Lysaght said (1959: 297) that the painting was of a bird taken on 27 May 1773. But it was the elder Forster's description of *Pelecanus punctatus* which bore that date.

Forster recorded that the species inhabited Queen Charlotte Sound in the southern island of New Zealand (Forster 1844: 104-6: No. 105).

On 27 May 1773 Forster's party found a "good many" Spotted Shags, of which they shot seven, near Cape Jackson (Forster 1772-1775, II: 18). On the next visit to Queen Charlotte Sound Forster's party shot about 9 shags "all of the spotted kind with two crests" on 21 November 1773 at Motuara Island and Cannibal Cove (Forster 1772-1775, III: 76). On the final second voyage visit to Queen Charlotte Sound the Forsters shot 5 Spotted Shags at Cannibal Cove on 20 October 1774; about 18 near Cape Jackson on 22 October 1774; on Motuara about 13 on 23 October 1774; and on 6 November 1774 near Tory Channel, Forster saw "a good many shags of the crested kind, flying backwards and forwards, who seldom have their nests anywhere else but on such rocks as are near the open sea" (Forster 1772-1775, V: 44, 45, 54).

On the second voyage the Spotted Shag was also noted by Anderson (1772-75, 5: No. 10) who described it as *Pelecanus cristatus* and gave "New Zealand" as the habitat. He noted it at Queen

Charlotte Sound in February 1777 on the third voyage (Beaglehole 1967: 807) and on that voyage Cook called it the Crested Shag (Cook & King 1784, I: 151).

Latham's 1785 description of the Spotted Shag was based on specimens then in the Leverian Museum. From his description it is obvious that he saw several specimens. He commented that the species inhabited New Zealand where it was met with principally at Queen Charlotte Sound (Latham 1785: 602-3: No. 18, Plate 104). Gmelin's (1789: 1, 575) description of *Pelecanus naevius* was based on that of Latham. However, Gmelin had been preceded in 1786 by Sparrman's description of *Pelicanus punctatus* wherein he gave the habitat as Queen Charlotte Sound. Sparrman's (1786: 1, No. 10 and Plate) description and plate were based on a specimen then in the Carlsonian Museum. After Carlson's death the specimen went to the Vetenskapsakademiens and from there to the Naturhistoriska riksmuseet. Although recorded as being in poor condition as early as 1805 the specimen was existing in 1857 when Sundevall identified Sparrman's types and in 1926 was noted again by Gyldenstolpe. It is still in the Naturhistoriska riksmuseet at Stockholm although not in good condition. It is the type of the species and the type locality is Queen Charlotte Sound.

Two of the Leverian Museum specimens on which Latham based his description were sold at the sale of that collection in 1806. One, Lot 747, was sold on the seventh day (12 May 1806) for £2/13/0 to Fichtel and registered in the Naturhistorisches Museum at Vienna as No. 1806 III. 39. However, as Pelzeln (1873: 53) has pointed out, since the specimen was in a bad state, it was not, in fact, inserted in the collection. Another specimen was sold as Lot 5277 on the forty-fourth day of the sale (25 June 1806) to Captain J. Laskey for 8/-, but its fate is not known.

NEW ZEALAND FALCON *Falco novaeseelandiae* (Gmelin, 1788)

Hawks, probably the New Zealand Falcon, were noted by both Parkinson and Banks at Queen Charlotte Sound on the first voyage (Parkinson 1784: 115; Beaglehole 1963, II: 5).

A new falcon taken at Dusky Sound on 3 April 1773 was described in manuscript on the next day by the elder Forster under the name *Falco harpe* (male) and drawn by his son (Forster 1772-1775, II: 95; 1844: 68-69, No. 75). This drawing is probably Forster Folio 37, said by Lysaght (1959: 282) to be an illustration of a young female, the elder Forster having confused the sexes of the birds described by him. Cook noted hawks at Dusky Sound as did Sparrman who thought they were "really delicious roasted" (Beaglehole 1961: 136; Rutter 1953: 30). However, the younger Forster thought that every land bird met with at Queen Charlotte Sound, "hawks excepted, would have been relished at the most luxurious tables" (Forster 1777, II: 457).

Bayly saw "two kinds of small Hawkes" at Queen Charlotte Sound in April-May 1773 (McNab 1914: 206) and the elder Forster recorded that a new kind of hawk was found there on the *Resolution's* first visit in 1773 (Forster 1772-1775, II: 32). This "new" kind of hawk was probably taken at Long Island on 22 May 1773 for on that day the elder Forster wrote that his son shot a hawk at that place. The son later wrote that several falcons were seen there at that time (Forster 1772-1775, II: 13; 1777, II: 203). The elder Forster (1844, 69-70, No. 76) described such "new" hawk under the name *Falco harpe* (female) and gave the habitat as Queen Charlotte Sound. Two of the younger Forster's three paintings of this species (Folios 36 and 38) seem to have been of specimens collected at Queen Charlotte Sound. Such illustrations were said by Lysaght (1959: 281, 282) to represent a sub-mature female and an old male. One of the Forster paintings has recently been reproduced by the Beggs (1969: Plate 135). The variations in size and plumage of this species probably led Forster to believe initially that he had collected two different species, and the same features may have been responsible for Bayly recording two kinds of small hawks from Queen Charlotte Sound. I can find no evidence to support Oliver's statement (1955: 427) that the Harrier (*Circus approximans*) was obtained by the Forsters in 1773 at Dusky Sound and Queen Charlotte Sound during Cook's second voyage and that Forster paintings of both young and adult birds are preserved in the British Museum.

Banks does not appear to have received any specimens of the New Zealand Falcon from the third voyage but he did, at one time, have in his collection three specimens, one from Furneaux and the other two from Clerke. (Dryander n.d. and Banks n.d.). All three were no doubt collected on the second voyage and probably those specimens in the British and Leverian Museums on which Latham (1781, 57: No. 38, Plate 4) based his description of the New Zealand Falcon were also taken from the same voyage. Latham's original drawing no longer exists. Gmelin (1788, I: 268) based his *Falco novae Seelandiae* on Latham's description.

Latham mentioned that the Leverian Museum specimen was a female and that the elder Forster, who examined the specimen with him, was of the opinion that it might be a young bird. The British Museum specimen(s) no longer exists but the Leverian Museum bird was sold as Lot 2219 on the 19th day (26 May 1806) of the sale of that collection as: "2219. Hawk, S.seas" (Donovan 1806: 95. It was purchased by Fichtel and originally registered at Vienna under No. 1806. III. 166. It was mentioned by Pelzeln (1873: 18) as being in that collection in 1873 and it is still in the Naturhistorisches Museum, now registered No. 49692. It is a type of the female of Latham's New Zealand Falcon and Gmelin's *Falco novae Seelandiae*.

Latham gave the habitat of the species as Queen Charlotte Sound while Gmelin gave it simply as New Zealand. The elder

Forster described specimens from both Dusky Sound and Queen Charlotte Sound. His son illustrated specimens from both localities. However, Gmelin's account was based on that of Latham and, therefore, Latham's locality, Queen Charlotte Sound, can be accepted as the type locality.

SOUTH ISLAND KAKA *Nestor meridionalis meridionalis*

(Gmelin, 1788)

Parkinson noted that the woods at Queen Charlotte Sound abounded with "divers kinds of birds, such as Parrots . . ." when the *Endeavour* was there in January-February 1770 (Parkinson 1784: 115). On the second voyage the South Island Kaka was first encountered at Dusky Sound where several Parrots were shot on 3 April 1773. Further parrots were killed there on 17 April 1773, and 2 and 10 May (Forster 1772-1775, I: 95, 111-129, 137). The younger Forster's painting (Folio 50, recently reproduced by the Beggs (1966, 1968, 1975: Plate 48) was based on a specimen collected at Dusky Sound (Lysaght 1959: 285), and he later wrote that the parrots met with at Dusky Sound "were of two sorts; one small and green, and the other very large greyish-green with a reddish breast" (Forster 1777, II: 158). Sparrman later recorded that two kinds of parrots were to be found there (Rutter 1953: 30) and Cook and Wales also noticed them (Beaglehole 1961: 136, 786). Bayly noted the "great numbers of large grey Parrots that have very beautiful plumage" which he saw at Queen Charlotte Sound in April 1773 (McNab 1914: 206) and Forster recorded that the woods at that place abounded in Parrots when the *Resolution* was there in May-June that same year. (Forster 1772-1775, II: 32). Anderson, on the second voyage, noted the Kaka under the name *Psittacus nestor* and gave the habitat as New Zealand (Anderson 1772-1775: 1).

On the third voyage Anderson recorded "large brown Parrots with white or greyish heads" at Queen Charlotte Sound (Beaglehole 1967: 806) and a specimen from that locality was painted by Ellis (Folio 15; see Lysaght 1959: 323).

Forster later described the South Island Kaka under the name *Psittacus hypopolius* but said that it inhabited, both islands of New Zealand (Forster 1844: 72-73: No. 79). However, Parkinson had referred to the many beautiful Parrots seen at Tolaga Bay when the *Endeavour* was there on the first voyage in October 1769 (Parkinson 1784: 99) and Bayly saw "grey Parrots" there on the second voyage in November 1773 (McNab 1914: 213). Forster's statement that the species inhabited both islands of New Zealand was probably based, therefore, on information given to him either by those on the ships who had been in the North Island during the first voyage or those on the *Adventure* who were there on the second.

Latham's (1781: 264: No. 70) description of the Southern Brown Parrot was based on specimens then in the Leverian Museum and his own collection and he gave the habitat simply as New Zealand.

Gmelin (1788, I: 333) based his *Psittacus meridionalis* on Latham's description, giving the habitat as New Zealand.

While still in the Leverian Museum that specimen was described and figured by Shaw in 1792 under the name *Psittacus australis* but he erroneously thought the species came from New Holland (Shaw 1792; Plate 85). This specimen was sold as Lot 5132 on the forty-third day (24 June 1806) of the sale of the Leverian Museum as: "5132 *Psittacus nestor*, S. seas, rare." (Donovan 1806: 234).

The surviving sale catalogues confirm that this specimen was purchased by Fichtel for 10/6d. Originally registered in the Naturhistorisches Museum at Vienna under No. 1806. III. 52, it was mentioned as being there by Pelzeln (1873: 32), Pelzeln & Lorenz (1888: 40), and Sassi (1902: 316) and it is still there, now registered No. 41026. It is a "co-type" of Latham's Southern Brown Parrot and Gmelin's *Psittacus meridionalis*.

Latham and Gmelin gave the habitat of the species simply as New Zealand. The elder Forster, in his undated description of the species, gave the habitat as both islands of New Zealand. But on the second voyage the South Island Kaka was first collected at Dusky Sound and the younger Forster's painting was of a bird from that locality. In the circumstances Dusky Sound may be accepted as the type locality.

RED-CROWNED PARAKEET *Cyanoramphus novaezelandiae novaezelandiae* (Sparman, 1787)

Red-crowned Parakeets may well have been among the many "Parrots" seen by Parkinson at Tolaga Bay and Queen Charlotte Sound on the first voyage (Parkinson 1784: 99, 115). But the first specific reference to Red-crowned Parakeets is that of the elder Forster who shot "a small Parroquet, green with a red forehead & blueish wings & yellow iris" at Cascade Cove, Dusky Sound, on 2 April 1773. On 17 April, another "parroquet" was shot (Forster 1772-1775, I: 95, 111), but it was the specimen taken on 2 April which was the subject of George Forster's painting dated 5 April 1773 (Folio 46; see Lysaght 1959: 283) which has recently been reproduced by the Beggs (1966, 1968, 1975: Plate 48). George Forster later noted the "small and green" parrots from Dusky Sound (Forster 1777, II: 158) and Sparman noted "two kinds of parrots" and Wales "Parakeets" from that locality (Rutter 1953: 30; Beaglehole 1961: 786).

Bayly noticed "small Parroquets" at Queen Charlotte Sound in April 1773 (McNab 1914: 206) and Forster recorded that the woods at that place abounded in "Parroquets" when the *Resolution* was there in May-June that same year (Forster 1772-1775, II: 32). A "Parroquet" was shot there by Forster on 19 October 1774 and two more were shot at Grass Cove on 2 November 1774 (Forster 1772-1775, V: 42, 51). It was probably one of the latter birds which formed the basis of George Forster's pencil sketch dated 6 November 1774

(Folio 45; see Lysaght 1959: 283). His further pencil sketch of the species (Folio 44) is not dated and no specific locality is referred to. Red-crowned Parakeets were probably the "Parroquets" seen by Bayly at Tolaga Bay when the *Adventure* was there in November 1773 (McNab 1914: 213).

Anderson recorded the Red-crowned Parakeet on the second voyage, describing it as *Psittacus Zeelandicus* and giving the locality simply as "New Zealand." He found "green Parroquets with red foreheads" at Queen Charlotte Sound in February 1777 (Beaglehole 1967: 806) and Ellis painted one from that locality (Folio 12; see Lysaght 1959: 323).

Forster's later description of *Psittacus pacificus* dated 3 April 1773 was undoubtedly based on the specimen which, as mentioned above, had been collected by him the day before. Forster gave the habitat as the whole of the south island of New Zealand (Forster 1844: 73-74, No. 80).

Latham first described the Red-crowned Parakeet in 1781 among his confusing descriptions of the Pacific Parakeet and varieties thereof (Latham 1781: 252-3: No. 56). Gmelin (1788, I: 329) based his name *Psittacus pacificus* on Latham's descriptions. Several specimens of *Psittacus pacificus* were included in the sale of the Leverian Museum. One of these was sold on the thirtieth day of the sale (9 June 1806) as: "Lot 3510 Red-fronted parrcquet, S. seas" (Donovan 1806, 170).

This specimen was purchased by Fichtel for 15/- and was originally registered in the Naturhistorisches Museum at Vienna under No. 1806. III. 16. It is a specimen of *Cyanoramphus novaezelandiae novaezelandiae*. It was noticed by Pelzeln & Lorenz (1888: 38) and it is still in the Museum, now No. 50371. It was undoubtedly collected on the second or third of Cook's voyages and is a type of one of Latham's Pacific Parakeet and Gmelin's *Psittacus pacificus* varieties.

Priority, however, goes to Sparrman who described and illustrated the species under the name *Psittacus novae Zelandiae* in 1787 (Sparrman 1787, II: No. 28 and Plate), giving the habitat as New Zealand. Two specimens, one of each sex, seem to have been in Carlson's collection at the time the species was described by Sparrman, for two such specimens went to the Vetenskapsakademiens after Carlson's death and were there in 1803. However, only one (the female) went to the Naturhistoriska riksmuseet where it was identified amongst Sparrman's types by Sundevall (1827). It was noted by Gyldenstolpe in 1926 and it is still there. It is a "co-type" of Sparrman's *Psittacus novae Zelandiae* and must have been collected on Cook's second voyage.

Although Sparrman gave the locality merely as New Zealand, the first specimen of this species known to have been collected was obtained in Dusky Sound, the elder Forster's published description and the younger Forster's completed painting being based on it, and Sparrman himself wrote much later that the smaller of the two kinds

of parrots met with in Dusky Sound had been described by him in his Museum Carlsonianum (Rutter 1953: 30). In these circumstances, the type locality can be properly accepted as Dusky Sound.

TUI Prosthemadera novaeseelandiae novaeseelandiae (Gmelin, 1788)

The Tui is first known to have been seen by Europeans at Queen Charlotte Sound on the first voyage in 1770 (see Appendix). On the second voyage the species was first encountered at Dusky Sound and Forster's description of *Certhia cinnamata* is dated 3 April 1773 when the *Resolution* was at that place (Forster 1772-1775, I: 106; II: 6; 1844: 78-79, No. 83). Sparrman also noted Tuists at Dusky Sound but said that they were rare there (Rutter 1953: 30).

In April-May 1773, Bayly recorded "great plenty" of Tuists at Queen Charlotte Sound, and in May-June 1773 Forster recorded that the woods at that place abounded in Tuists (McNab 1914: 206; Forster 1772-1775, II: 32).

Considerable numbers of Tuists were undoubtedly shot for food. Forster recorded that they "were as delicate eating as the finest ortolans" (Forster 1772-1775, II: 32); Cook said that their flesh was most delicious and was "the greatest luxury the woods afforded us" (Cook 1777, I: 68); Sparrman said that "this bird . . . was quite plump, and made many delicious pasties and dishes for our meals" (Rutter 1953: 30), and Bayly recorded that "they are thought to be the finest eating for delicacy and richness and far to exceed the Otterlin so much esteemed by the Epicurans" (McNab 1914: 206-7).

Forster wrote (1844: 78) that the species inhabited both islands of New Zealand. This information was probably based on knowledge obtained by Forster from those on the ships who had been in the North Island on the first voyage, when Tuists were probably seen at Poverty Bay (see Appendix), or from those on the *Adventure* who had been at Tolaga Bay in November 1773, where Bayly recorded that he saw "Poey birds" (McNab 1914: 213).

The Tui was met with again at Queen Charlotte Sound in February 1777 on the third voyage (Beaglehole 1967: 806), and at least some specimens from that voyage must have been taken back to England although none appear to have gone directly to Banks who received most of the third voyage specimens (Dryander n.d.). One such specimen seems to have been the model for Robert Laurie's painting of "The Poa" first published in 1784 and reproduced in 1969 by Avon Fine Prints, Christchurch.

Although a considerable number of Tuists collected, particularly on the second voyage, must have been eaten a number escaped the pots because the Banksian donation to Sir John Hunter in 1792 included at least eleven Tuists which almost certainly had come into Banks's hands from the voyages. None of these specimens now exist (Medway in prep.).

George Forster's Folio 61, apparently executed at Queen Charlotte Sound (Lysaght 1959: 287), has been reproduced by the Beggs (1966, 1968, 1975: Plate 48; 1969: Plate 159). However, it was not this Forster painting of a Tui, but one based on it by a professional artist and included in a set of paintings intended to be presented by the elder Forster to King George III, which was reproduced in 1777 (Cook 1777, I: Plate 52), and, much later, in 1969 in a calendar by Verlag der Kunst of Dresden, and in 1971 (Steiner & Baege 1971: Plate 4). Other Tui paintings were executed on the second voyage by an unknown artist, and on the third voyage by William Ellis (Lysaght 1959).

Latham's (1782; 682-3: No. 17) description of the Poe Bee-eater was based on specimens then in the Leverian Museum and his own collection, and he gave New Zealand as the habitat. Gmelin's (1788, I: 464-465) *Merops novae Seelandiae* was based on Latham's description and he also indicated New Zealand as the habitat.

Annotations in the copy of the Leverian Museum Sale Catalogue in the British Museum (Natural History) show that one male and one female specimens of the Tui were in that collection at the time of its sale in 1806, but such annotations erroneously indicated its locality as Botany Bay. Both specimens were sold at Lot 44 on the last day but one (12 July 1806) of the sale of that collection as: "Lot 44. Poe bee-eater, *Merops cincinatus*, rare" (Donovan 1806).

The sale catalogues confirm that these specimens were purchased by Thompson (a London natural-history dealer) on behalf of the Earl of Derby (then Lord Stanley) for £2/12/6. They were listed in Derby's manuscript catalogues (1st Cat, No. 135; 2nd Cat, Nos. 1164 and 1165) and both are still in the Merseyside County Museum at Liverpool (Medway & Morgan in prep.) having been bequeathed, with the rest of Derby's collection, to the City of Liverpool in 1851. These specimens are, therefore, "co-types" of Latham's Poe Bee-eater and Gmelin's *Merops novae Seelandiae*.

As we have seen, Latham and Gmelin gave the habitat of this species simply as New Zealand. Although the elder Forster's description was of a specimen collected at Dusky Sound, he said that it inhabited both islands of New Zealand. The Tui was first definitely recorded at Queen Charlotte Sound (on the first voyage) and the younger Forster's second voyage painting was of a bird from this locality, where the species was apparently much more plentiful than at Dusky Sound. In the circumstances it seems preferable to accept Queen Charlotte Sound as the type locality.

Oliver (1955: 500) was incorrect when he said that Forster's specimens were in the Vienna Museum almost 100 years after they had been collected. It is true that a specimen of *Prosthemadera novaeseelandiae novaeseelandiae* was acquired by the Vienna Museum in 1806 and registered under No. 1806. II, 31. However, this bird

(still in the Museum, registered No. 52255) was obtained by Fichtel from a dealer, not from the Leverian Museum, and its origin is, therefore, obscure.

SOUTH ISLAND KOKAKO *Callaeas cinerea cinerea* (Gmelin, 1788)

The South Island Kokako is first known to have been collected at Queen Charlotte Sound on the first voyage (see Appendix). The first Kokako recorded on the second voyage was a "large Wattlebird" killed by George Forster at Cascade Cove, Dusky Sound, on 2 April 1773 (Forster 1772-1775, I: 94). Further specimens were recorded during the stay in Dusky Sound. On 3 June 1773, four large Wattlebirds were shot at East Bay in Queen Charlotte Sound, Forster also recording that the woods there abounded in such Wattlebirds (Forster 1772-1775, II: 22, 32).

The Kokako was met with again at Queen Charlotte Sound on 19 October 1774 when about 10 large Wattlebirds were shot, and on 2 November 1774 the Forsters shot 4 Wattlebirds at Grass Cove, now Whareunga Bay (Forster 1772-1775, V: 42, 51). Presumably one or more of the latter birds formed the basis of George Forster's unfinished painting (Folio 52) dated 3 November 1774 (Lysaght 1959: 285). This painting has not yet been published but a painting of a Kokako by an unknown artist on the second voyage has recently been reproduced by the Beggs (1969: Plate 174).

The elder Forster's (1844: 74-76, No. 81) undated account of *Callaeas cinerea* mentioned that the species inhabited both islands of New Zealand and Latham's (1781: 364-5, No. 1; Plate 14) description of the Cinereous Wattle-bird, for which he acknowledged his indebtedness to the elder Forster, said that "this bird inhabits New Zealand throughout." The Forsters in the *Resolution* did not visit the North Island but, as Lysaght (1959: 285) has pointed out, the *Adventure* did and Captain Furneaux may have brought skins to Forster of the northern species from Poverty Bay. Alternatively, Forster may have obtained information that the species inhabited the North Island from those who had visited there with Cook on the first voyage.

The South Island Kokako was recorded on the third voyage at Queen Charlotte Sound in February 1777 (Beaglehole 1967: 806). However, the only specimen known to have reached England from the third voyage is one recorded as being in the Banksian collection from that source (Dryander n.d.: No. 21).

Latham's (1781: 364-5: No. 1, Plate 14) description of the Cinereous Wattle-bird was founded on specimens then in the Leverian Museum and his own collection. His plate 14 (original Latham drawing No. 193, still extant) was based on such specimens. Gmelin (1788, I: 363-364) based his *Glaucopis cinerea* on Latham's description.

While still in the Leverian Museum that specimen was described and figured by Shaw (1793: 239-40, Plate 36) under the name "The Wattlebird." This painting is reproduced here as Figure 4.

The Leverian Museum specimen was sold as Lot 2698 on the twenty-third day (30 May 1806) of the sale of that collection as: "2698, Cinereous wattle bird, S. seas, *Glaucopis cineria*" (Donovan 1806: 114).



C. H. Blyth del.

J. Smith sculp.

CALLAEAS CINEREA. THE WATTLE BIRD.

London Published at the Art and Natural History Museum, Feb 2, 1793 by J. Parkington.

FIGURE 4 — Painting of South Island Kokako (*Callaeas cinerea cinerea*) from Shaw's *Museum Leverianum* (1793). By permission of the Trustees of the British Museum (Natural History).

The sale catalogues existing confirm that this specimen was purchased by Lord Stanley for £1/11/0. It was listed in Derby's manuscript catalogues (1st Cat, No. 87; 2nd Cat, No. 1105) where, however, the purchase price is given as £1/16/0. The specimen, now Derby No. 4047, is still in the Merseyside County Museum at Liverpool (Medway & Morgan in prep.). It is a "co-type" of Latham's Cinereous Wattlebird and Gmelin's *Glaucoptis cinerea*.

As with the Tui, Latham gave the habitat of this species as New Zealand throughout and Gmelin simply as New Zealand. The elder Forster's description was undated and he gave the habitat as both islands of New Zealand. However, the South Island Kokako was first met with at Queen Charlotte Sound on the first voyage and the younger Forster's second voyage painting was of a bird from that locality. In the circumstances Queen Charlotte Sound may be accepted as the type locality.

SOUTH ISLAND THRUSH *Turnagra capensis capensis* (Sparman, 1787)

Presumably the South Island Thrush was common at Queen Charlotte Sound when the *Endeavour* was there in January-February 1770 for, although no reference to the species is to be found in first voyage records, Anderson found it to be "frequent" at that place at the time of the third voyage visit in February 1778 (Beaglehole 1967: 804).

However, the first South Island Thrush known to have been collected by Europeans was one shot by the Forsters at Cascade Cove, Dusky Sound, on 2 April 1773 (Forster 1772-1775, I: 94). This bird presumably formed the basis of George Forster's painting of an adult from Dusky Sound, which also included another not quite completed painting of an immature bird from Queen Charlotte Sound (Forster Folio 145; Lysaght 1959: 306). Forster's description of *Loxia turdus* was dated 4 April 1773 when the *Resolution* was at Dusky Sound and he gave the habitat as the southern island of New Zealand (Forster 1844: 85-86, No. 89). The species was also noted by Anderson (1772-1775: 10, No. 23) on the second voyage, who described it under the name *Loxia rubricauda* and gave the habitat simply as New Zealand.

In 1783 Latham (1783: 34, No. 30, Plate 37) based his description of the Thick-billed Thrush on male and female specimens then in the Leverian Museum. He mentioned that the species was met with in New Zealand, both at Dusky Bay and Queen Charlotte Sound. Such information may have been taken from Sir Joseph Banks's (that is, Forster's) drawing to which he referred. His original drawing, undoubtedly based on the Leverian Museum specimens, is no longer in existence. Gmelin's (1789, I: 815) description of *Turdus crassirostris*

was based on Latham's description and the habitat was given as New Zealand.

The Leverian Museum specimens were sold at Lot 6834 on the fifty-seventh day (10 July 1806) of the sale of that collection as: "Lot 6834 Curious brown thrush, S. seas, m. and fem." (Donovan 1806: 296).

They were purchased by Fichtel for Vienna for 7/- and were originally registered in the Naturhistorisches Museum under Nos. 1806. III. 141 (male) and 141a (female). The female was not in good condition and was discarded. The specimens were mentioned by Pelzeln (1873: 26). The surviving male specimen was also mentioned by Pelzeln & Lorenz (1887: 200), Lorenz (1902: 304) and Sassi (1939: 405) and it is still in the collection, now registered No. 50754. It is the type of the male of Latham's Thick-billed Thrush and Gmelin's *Turdus crassirostris*.

However, Gmelin's 1789 description of *Turdus crassirostris* was preceded by Sparrman's 1787 description of *Tanagra capensis* (1787, II: No. 45 and Plate). As we have seen, Sparrman was to have received such specimens as were not required by the Forsters. It appears that Sparrman received two specimens of this species as two seem to have been in the museum of Johan Gustaf von Carlson at the time Sparrman described his *Tanagra capensis*. On the dispersal of Carlson's collection one of such specimens went to the Vetenskapsakademien but surviving manuscript lists show the specimen to have been destroyed by 1805. However, another specimen went from Carlson's Museum to the private museum of A. U. Grill and thence to the Naturhistoriska riksmuseet in Stockholm. It was mentioned by Sundevall (1857) and Gyldenstolpe (1926) and it is still in that Museum. It is a "co-type" of Sparrman's *Tanagra capensis*. The painting of the species which accompanied Sparrman's description is here reproduced as Figure 5. Sparrman's specimens must have been collected on Cook's second voyage. Indeed, there is no evidence that any specimens of the South Island Thrush found their way to Europe from any of Cook's voyages other than the second and it is, therefore, almost certain that the birds which Latham described were also from that voyage.

Sparrman did not assign a habitat to the species. Indeed, his specific name *capensis* indicates that he confused the origin of his bird. However, it is safe to designate Dusky Sound as the type locality for we know that the species was first collected at Dusky Sound. It was first painted there by the younger Forster, and it was first described from there by his father.

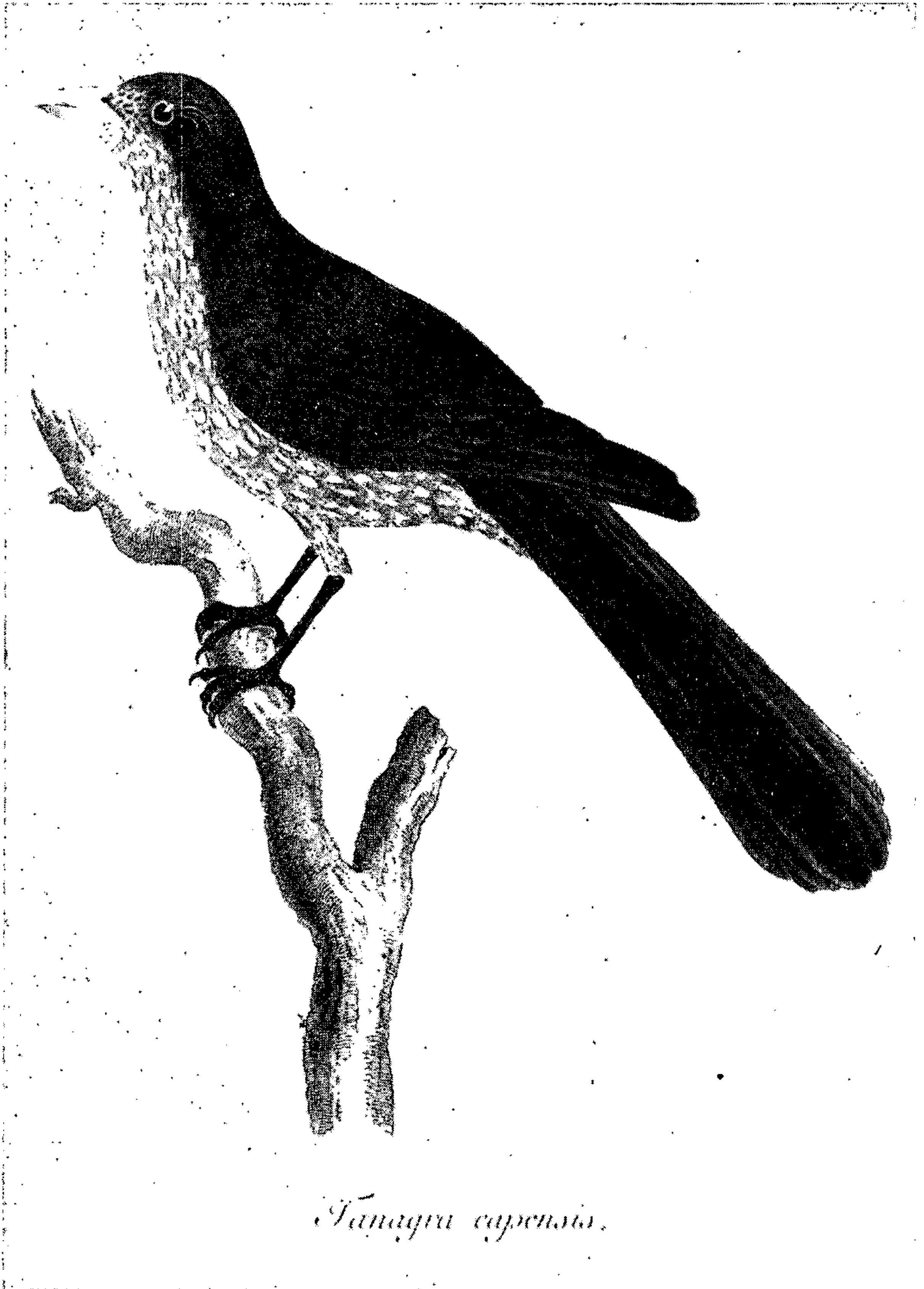


FIGURE 5 — Painting of South Island Thrush (*Turnagra capensis capensis*) from Sparrman's *Museum Carlsonianum* (1787). By permission of the Trustees of the British Museum (Natural History).

APPENDIX

FIRST VOYAGE BIRD SPECIMENS KNOWN TO HAVE
BEEN TAKEN BACK TO ENGLANDSOUTH ISLAND KOKAKO *Callaeas cinerea cinerea* (Gmelin, 1788)

Parkinson wrote (1784: 115) that "three sorts of birds having wattles" were encountered at Queen Charlotte Sound in January-February 1770. Such birds must have been the Kokako, the South Island Saddleback (*Philesturnus carunculatus carunculatus*) and the immature form of the latter species. At least one specimen of the Kokako from Queen Charlotte Sound was taken back to England by Banks who gave it to his friend, Marmaduke Tunstall, naturalist and collector. Tunstall wrote in a letter to Latham: "My Wattle Bird, which was brought to England from New Zealand, that voyage when Sir Joseph Banks and Dr. Solander accompanied Captain Cook, has the wattle of a light yellow . . ." (Fox 1827: 133; Whitehead 1969: 175).

TUI *Prothemadera novaeseelandiae novaeseelandiae* (Gmelin, 1788)

It may well have been the Tui about which Parkinson wrote at Poverty Bay in October 1769 — "We found here . . . a Black-bird, the flesh of which was of an orange colour, and tasted like stewed shell-fish." The Tui was certainly met with at Queen Charlotte Sound during the stay there in 1770 for Parkinson recorded "a bird about the size of a blackbird, remarkable for its fine singing, with two beautiful white curled feathers (by some called Wattles) under the throat" (Parkinson 1784: 89, 115 and Errata). The Tui was known as the poy-bird to those on the first voyage (Beaglehole 1961: 786).

In 1776 Brown published a painting of a Tui which he called "The New Zeland Creeper." This Tui painting was the first published illustration of a New Zealand bird and was based on a "stuffed specimen in tolerable preservation, in the possession of Marmaduke Tunstall, Esq." (Brown 1776: 18, Plate 9; see also, Fox 1827: 138; Lysaght 1959: 287). Almost certainly the specimen depicted had been collected on the first voyage and given to Tunstall by Banks who also gave Tunstall specimens of the South Island Kokako and Rainbow Lorikeet from the first voyage.

RAINBOW LORIKEET *Trichoglossus moluccanus* (Gmelin, 1788)

It seems that several first voyage specimens of the Rainbow Lorikeet were taken back to England. On the voyage this species was first met with at Botany Bay. On 1 May 1770 Banks wrote that "The trees over our heads abounded very much with Loryquets and Cocatoos of which we shot several; both these sorts flew in flocks of several scores together." At Thirsty Sound on 30 May 1770 "Great Plenty however of the Beautiful Loryquets seen in the last but one anchoring place were seen and killed" (Beaglehole 1963, II: 57, 73;

see also Parkinson 1784: 136, 144-5). Undoubtedly Rainbow Lorikeets were among the birds so recorded for in 1776 Brown published an illustration (dated 3 November 1774) of a bird which he called "The Blue-Bellied Parrot" saying that it inhabited "New South Wales in New Holland, very numerous in Botany Bay. This bird was first brought over by Joseph Banks, esq." (Brown, 1776: 14, Plate 7). The bird in question could only have been collected on the first voyage and Brown's painting was based on a specimen in the collection of Marmaduke Tunstall which "... was brought to England by Sir Joseph Banks, who gave it to Mr. Tunstall, and informed him that it belonged to the unfortunate Tupia, a native of Otaheite, who died at Batavia, on his way to England. P. Brown, in his Illustrations of Zoology, has given a beautiful plate of this bird." (Fox 1827: 129; Whitehead 1969: 175). This very specimen may have been shot by Tupaia at Botany Bay on 2 May 1770 for Banks records on that day that "Tupia ... strayd from us in pursuit of Parrots, of which he shot several" (Beaglehole 1963, II: 58).

There is no evidence that any Rainbow Lorikeets were collected at Adventure Bay, Tasmania, in March 1773 on the second voyage or in January 1777 on the third. The specimens in the British and Leverian Museums on which Latham (1781: 213) based his description of the Blue-bellied Parrot could only at that date have been collected on Cook's voyages. That they were collected on the first voyage seems to be confirmed by Latham's comment that the species inhabited Botany Bay which was visited on the first voyage only.

NOISY FRIARBIRD *Philemon corniculatus* (Latham, 1790)

The journal of John White, Surgeon-General to the First Fleet, contained a description of a bird which he called the "Knob-fronted Bee-eater" shot at Botany Bay on 29 July 1788. White added that the bird inhabited New South Wales "and is supposed to be a non-descript species." It was illustrated by Sarah Stone, her drawing being in all probability based on the very specimen described by White which, together with most of the other natural history specimens illustrated in White's volume, went to the Leverian Museum (White 1790: Advertisement, p. 190 and Plate). The same year as White's Journal was published Latham described his *Merops corniculatus* on the basis of White's Knob-fronted Bee-eater (Latham, 1790, 1: 276, No. 21). In 1801 Latham wrote further of the species that it "inhabits New Holland, and is a singular species. That figured in White's Journal is an exact representation. This was first brought into England by Sir Joseph Banks" (Latham 1801: 151, No. 5) who may well have first encountered the species at Botany Bay while the *Endeavour* was there in May 1770.

RED TAILED COCKATOO *Calyptorhynchus banksii* (Latham, 1790)

As far as we know with any certainty the Red-tailed Cockatoo was first met with at the Endeavour River in June 1770 where

Parkinson specifically refers to "large black cocatoos, with scarlet and orange-coloured feathers on their tails, and some white spots between the beak and the ear, as well as one on each wing" (Parkinson 1784: 144-145). This species was the only Australian land-bird illustrated by Parkinson (Lysaght 1959: 273), and his sketch has been reproduced by Beaglehole (1963, II: Plate 33) and Rienits & Rienits (1968: 54).

At least one specimen (probably collected at the Endeavour River in June 1770) was taken back to England by Banks where it formed the basis for Latham's (1787: 63-64) description of the Banksian Cockatoo. Of the species Latham wrote — "Inhabits New Holland. In the collection of Sir Joseph Banks, who brought it with him from thence into England on his return from his voyage round the world." Banks's specimen was illustrated by Latham as Plate 109 (original Latham drawing No. 142, still existing).

ACKNOWLEDGEMENTS

I am grateful to the following for assistance in connection with this paper: the Librarians of the Alexander Turnbull Library and National Museum in Wellington, and of the General Library and Zoology Library of the British Museum (Natural History); the Librarian and Hunterian Curator at the Royal College of Surgeons of England; Mr Peter J. Morgan, Keeper of Vertebrate Zoology at the Merseyside County Museum in Liverpool; Dr Carl Edelstam and, in particular, Mr Bo Salstrom of the Naturhistoriska riksmuseet in Stockholm; the Director and Staff of the Kungl. Svenska Vetenskapsakademiens in Stockholm; Dr Herbert Schifter, Curator of Birds at the Naturhistorisches Museum in Vienna; Dr G. F. Mees of the Rijksmuseum van Natuurlijke Historie, Leiden; Mr Peter J. Whitehead of the British Museum (Natural History); Dr Adrienne L. Kaeppler of Honolulu; Mr F. C. Kinsky of the National Museum in Wellington, Dr Michael E. Hoare of the Australian Academy of Sciences, and to the Trustees of the British Museum (Natural History) for permission to reproduce the illustrations which accompany this paper. Last, but not least, I am grateful to my wife for her assistance with research in Europe in 1974.

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PROFESSOR ERWIN STRESEMANN AND HIS CONTRIBUTION TO AUSTRALASIAN ORNITHOLOGY

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INTRODUCTION

Within four months of one another three of the world's leading ornithologists passed away: Professor Erwin Stresemann of the Berlin Museum in November 1972, David Lack of Oxford University in March 1973, and Robert Cushman Murphy of the American Museum of Natural History also in March 1973.

Of these three leaders, Professor Stresemann is the least known in our part of the world: Murphy had visited Australia and New Zealand on several occasions and published particularly on oceanic birds of so much local interest: Lack's *Natural Regulation of Animal Numbers* became the recognized textbook and his numerous contributions on avian population ecology were simply part of the ornithological scene: Stresemann is less known in Australasia because most but not all of his tremendous production was published in his native German. Only few are aware, especially among the younger generation of ornithologists, that Stresemann in addition to his substantial contribution to international ornithology also profoundly affected and aided Australasian ornithology.

In this tribute an attempt is made to present an insight into the industrious life of a pioneer and at the same time to make his contributions to bird study in our part of the world more readily accessible through regional and taxonomic organisation of papers and translation of titles.

EARLY LIFE

Erwin Stresemann was born in Dresden on 22 November 1889. His father was an apothecary who had studied pharmacy and medicine, so academic attitudes and scientific thinking were not foreign to young Erwin who grew up in the suburb village of Strehlen; in the garden and surrounding fields he collected — as boys will — snails, insects, and caterpillars which he kept in a vivarium set up in a room in the

home. Gradually this collection of naturalia gave way to stuffed birds, some of which he obtained with the aid of an air rifle in the garden. In his museum/aviary the high school boy succeeded in raising a hybrid between a male Redpoll and female Goldfinch resulting in his first ornithological publication in 1906 when he was 16 years old.

In high school his bird-interested biology master, Dr O. Koepert, gave him the inspiring job of reorganizing the school's bird collection, and it appears that his destiny into ornithology was sealed. While still in high school he managed to travel widely, for his age, benefiting from his parents' comparative affluence, visiting Heligoland (resulting in a paper published in 1907 on autumn migration on the island), the Danish island of Bornholm, in the Sudeten Mountains, and even to Russia from where the sixth-form boy returned with a collection of Desert Buzzards (shot and prepared by himself); from subsequent study of these buzzards emanated a paper in 1907 on *Buteo zimmermannae*. In October of that year he displayed the buzzard skins at the 57th annual meeting of the German Ornithological Society and made the acquaintance of the leading German ornithologists of the day, among them Dr Ernst Hartert (curator of Rothchild's Tring collection of birds, and later author of the classic taxonomic work on birds of the palaeartic fauna), Dr Oskar Heinroth (author of the well-illustrated volumes *Die Vogel Mitteleuropas* on the growth and development of the birds of Central Europe, and a pioneer student of bird behaviour), Neumann, Reichenow and others. When first appearing for such a powerful gathering, young Stresemann was 17 years old, a month before his 18th birthday!

There was no stopping this gifted and industrious youngster. After U.E. examinations (*Abitur*) he commenced in Jena the study of medicine which at the time not uncommonly was pursued by zoologists; during this period he attended two marine biological courses at Bergen in Norway. The following year he transferred to Munich University where Dr K. Alverdes suggested that he take part in the 2nd Freiburg Moluccas Expedition under the geologist Karl Deninger of Freiburg. This was to be a major event in Stresemann's life, and after the expedition there was no turning back. German interest in the south-west Pacific was appreciable, and the German colonies at this time (and till 1919) included Kaiser Wilhelmsland (north-eastern New Guinea later to become an Australian Mandate), the Bismarck Archipelago with Neu-Pommern (now New Britain), Neu-Mecklenburg (now New Ireland), Bougainville, Admiralty Islands; the Mariana, Caroline and Marshall Islands; and other small islands and island groups including Palau, Nauru and Samoa (Western Samoa: Sawaii now Savai'i, and Upolu).

A third expedition member was added, the ethnologist O. D. Tauern, and a seaworthy motor boat was built in Holland. Indicative of the foresight and energy of the 20 years old Stresemann were his activities in 1910 prior to his departure for the East: he studied all

available literature on, in particular, the fauna, geology and ethnology of the Moluccas; he visited the Zoological Museum at Tring in England and sought advice from Ernst Hartert; in August he climbed on Vesuvius in Italy to test his heat resistance for the tropics; in spite of all this — and some university studies — he found the time to band Black-headed Gulls in Bavaria (and publish about them), and climbed about on farm-house roofs, banding young White Storks (about which he also published). And Stresemann attended his first International Ornithological Congress (the 5th) held in Berlin, 30 May-4 June, 1910.

THE MOLUCCAS EXPEDITION

The expedition boat, named "Freiburg" was shipped to Singapore from where the party, a couple of months delayed, sailed eastwards in late November 1910. Storm and currents caused damage and necessitated repairs, and eventually the expedition stranded on the coast of Bali; during repairs in March-April 1911, Stresemann and Tauern explored Bali, recording 53 new bird species for the island. The battered "Freiburg" was left behind, and the expedition continued to the Moluccas in a Dutch steamer, arriving late April on the main island of Seram.

Stresemann devoted most of his time to ornithological studies, collecting in particular in the interior and in the mountains. He became so interested in the natives who acted as porters that for months he studied their language and culture (his linguistic studies later resulted in the publication of two detailed books on the Amboinic language). During January-March 1912 the neighbouring island of Buru was explored, the expedition departing for Europe on 1 April 1912 with a collection of 1200 bird skins.

The Moluccas expedition was the highlight of Stresemann's experience, providing the material on which part of his reputation was to rest, and enabling him to plan and guide the preparation of future expeditions of the "school" he developed around him when he was later appointed Curator of Birds at the Berlin Museum; among his students and associates later to go on exploring expeditions, to bring to Berlin large bird collections, were his star pupil Ernst Mayr, and Heinrich, Stein and von Plessen.

After his return in the summer of 1912 Stresemann continued his medical study in Freiburg, but soon travelled to Tring to examine and prepare his ornithological material, guided and supported by Hartert and Lord Rothschild. Stresemann named the most striking of his new birds in Rothschild's honour: the beautiful long-crested Rothschild's Myna *Leucopsar rothschildi*, a rare bird confined to Bali. Stresemann was a fast, methodical worker with a flair for writing and an ability to concentrate on essentials; the first among many of his publications on the birds of the East Indies appeared during the pre-war years 1912-13.

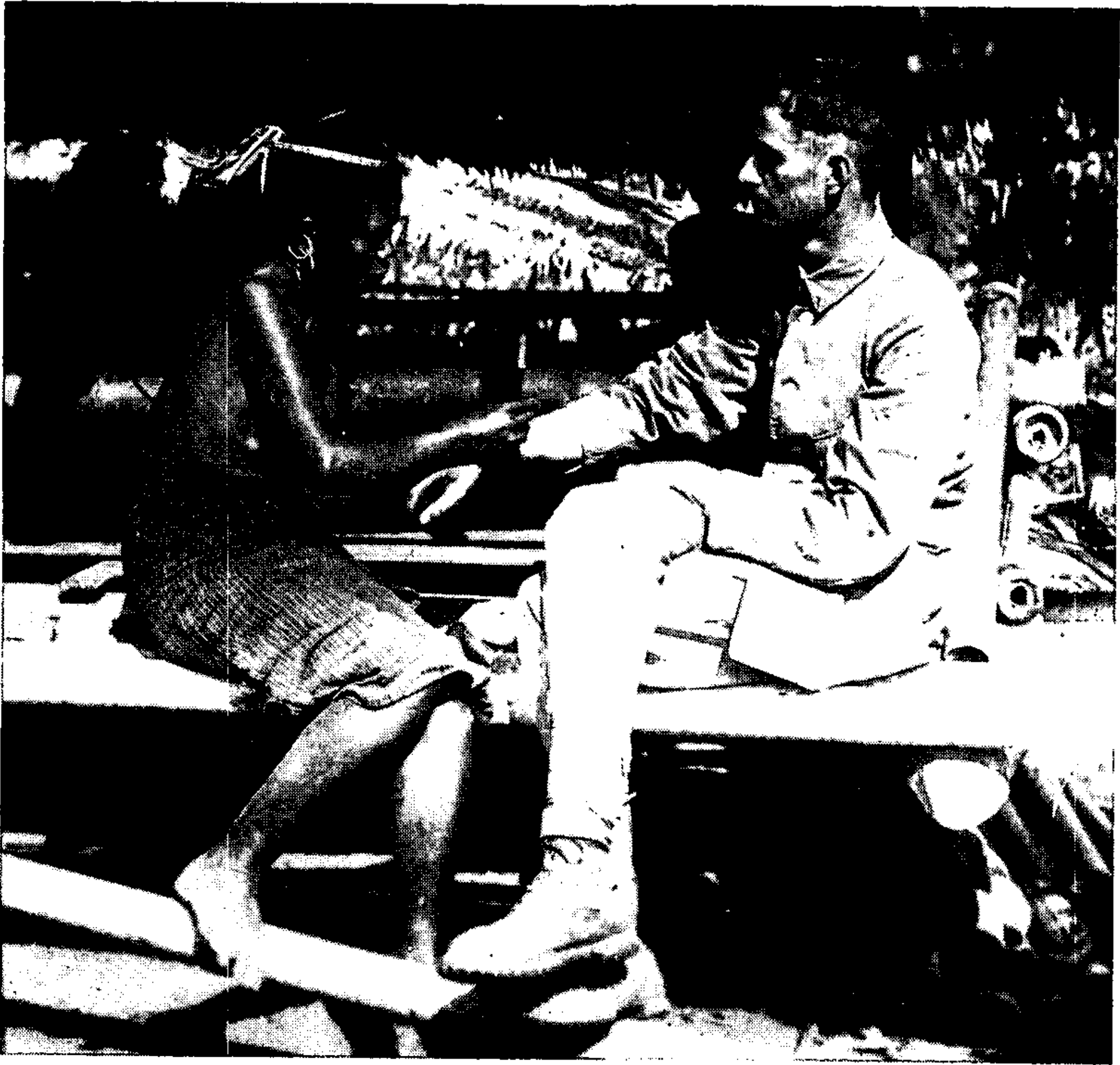


FIGURE 1 — The young Erwin Stresemann being tatoood with the head-hunters' sign by a native in Seram, 1911.



WORLD WAR I AND THE USE OF RANGEFINDERS

In the summer of 1914, when dark war clouds were gathering over Europe, Professor W. Kukenthal, chief editor and publisher of the monumental *Handbuch der Zoologie*, asked the then 24 years old Stresemann if he would write the volume on birds. This was indeed an honour and a challenge for a young man with no degree completed but with expedition and valuable papers to his credit (and already with the support of some of the leading ornithologists of the day).

The outbreak of the First World War in the summer of 1914 forced Stresemann to leave bird skins and desk and join a German artillery unit on the Western Front. Three years between Verdun and Belfort must have been a depressing experience for his alert mind, but even this enforced adventure produced some ornithological fall-out.

From an anchored balloon of a field-airship section he observed not only the accuracy of their own artillery fire but also the height of the flight of Swifts; three papers published in 1917 discuss the height of Swifts in flight, mixed bird flocks, and the use of rangefinders in determining the flying height of birds. His 28-page taxonomy of the Australian Raven (*Corvus coronoides*) was published in 1916 while he was at the front.

While on active service in Italy in November 1917 he was wounded and in a Munich hospital again had the opportunity to work on manuscripts. A detailed account of 'Three years ornithology between Verdun and Belfort' was published in 1918.

THE YOUNG CURATOR OF BIRDS

After the end of the war, Stresemann studied under the zoologist Richard Hertwig in Munich, preparing for publication (in 1920) his book on the *Avifauna Macedonia* based on the ornithological material collected by Doflein and Muller-Mainz.

He now devoted himself entirely and with all his energy to ornithological studies and writing, papers, notes, bulletins and books resulting from the effort. He also took up his university studies and graduated *summa cum laude* in March 1920; his major was in Zoology (his thesis on *Variation in the Body Size of Birds*), with minors in Botany and Anthropology.

In the midst of all these activities he also began writing what was to become his *opus major*, the *Aves* volume for Kukenthal's handbook series. The first part of the manuscript was finished in March 1920 and was sent to Kukenthal as a sample and a promise of what was to come (Figure 3 was a drawing of a Kiwi as an example of a terrestrial ground bird).

As pointed out by Nohring in his obituary in the *Journal für Ornithologie*, Stresemann could hardly have foreseen that this was the decisive moment in his life. Kukenthal was Director of the Zoological Museum in Berlin and was just then looking for a successor to the 73 years old Curator of Birds, Dr Anton Reichenow. In spite of resistance (there were many more senior persons who sought the curatorship), Kukenthal after reading Stresemann's manuscript for *Aves* was determined. Stresemann was appointed Curator of Birds in 1921 when 31 years of age. His meteoric rise to the most influential post in professional ornithology in the Weimar Republic was watched with surprise and envy by a few, but subsequent events showed Kukenthal had made the best possible choice.

Stresemann took over his new post when galloping inflation made even subscription to foreign journals and books an impossibility

(on 5 November 1923 the official exchange rate was 4.2 billion German Mark for 1 U.S. Dollar!). With characteristic ingenuity he induced the German Ornithological Society to establish its own library to be housed in the museum thereby obtaining the wanted journals in exchange. He took over from his predecessor publication of the journal *Ornithologische Monatsberichte* (also to be used in exchange), and in 1922 inspired Hermann Schalow to donate his large ornithological library to the library of the German Ornithological Society.

In 1922 Stresemann was elected Secretary General of the Ornithological Society, a post he kept unbroken till 1949 from when he carried on as President till 1967. From 1922-1944 and again 1951-1961 he was also the editor of the Society's quarterly publication *Journal für Ornithologie*. He instituted a policy of more papers on bird biology, morphology, physiology and behaviour and fewer faunistic reports; the journal increased in popularity, and in a few years subscribers had risen from 150 to 900.

The period from the early twenties till the outbreak of the Second World War was undoubtedly Stresemann's finest hour: with industry, intelligence and efficient planning plus stick-to-it-ness he wrote and had published his major book, *Aves*, edited two journals, served as Secretary General of the Ornithological Society, supervised between 1925 and 1939 a total of 22 Ph.D. candidates (among them a new generation of sky-stormers: Ernst Mayr, Schuz, Meise, Ruppell, Georg and Joachim Steinbacher, and Schafer), administered and developed the Bird Room of the Museum (his job), in addition to an annual production of a dozen research papers or more (with occasional irrelevancies thrown in, such as his 224 pages study of the Amboinic language, appearing in 1927).

THE AVES HANDBOOK

Stresemann's *Aves* was published in parts over the period 1927-1934 and is his lasting monument. In 899 quarto-size pages, with 944 text-figures (most from other works, some original) he painted the whole canvas of all that pertains to birds. His bibliography and choice of illustrations show the breadth of his reading and mastery of foreign tongues — he wrote and spoke perfect English. There are many references to Australasian birds, and the illustrations include both photographs and drawings of Australian birds (many nest photographs such as *Chlamyodera*, *Ptilonorhynchus* at its bower, *Neositta*, *Gerygone*, *Halcyon*, *Pcdargus*, *Leipoa* and *Megapodius*, drawings of birds of paradise, and others) and New Zealand birds (Huia drawing from Buller, the Cape Kidnappers Gannet colony, *Apteryx*, *Gallirallus* and *Habroptilus*). The section on avian anatomy covers several hundred pages and is probably the best ever written (a result of his early medical training?).

The avifaunas of Australia, New Guinea, New Zealand and other regions and islands of Australasia are discussed briefly but with

insight, in the capsule-form necessitated by the coverage of the work. Translations of these mini-expositions of the origin and differentiation of Australasian avifaunas are given below:

Australia (*Aves*, p. 656): "Australia shows old links with New Guinea, but there are not very many genera common to both regions. One third of the genera of Australian birds are only found within the confines of this continent. Particularly plentifully represented are the *Meliphagidae* and the *Psittaci*, and among these especially the group of rosellas (*Platyercinae*). The waterfowl (*Anseres*) are represented by a number of strange and unusual genera, such as *Cereopsis*, *Anseranas*, *Biziura*, *Stictonetta*, *Chenonetta*, *Malacorhyncus*, and *Chenopsis*. Among the song birds (*Passeres*) there are several very unusual genera in the eastern rain forests, such as *Menura* and *Atrichornis*. The number of bird species which have adapted to a life in the extensive desert regions is surprisingly low. To these belong *Eremiornis carteri* (*Sylviidae*), *Ashbyia lovensis* (*Sylviidae*), and *Lacustroica whitei* (*Meliphagidae*). The grass land to the north is the home of a great number of weaver-finches, ground pigeons, and parrots."

New Guinea (*Aves*, pp. 654-655): "New Guinea has as a result of its large extent and its rich ecological formations become an important evolutionary centre which has produced not only a large number of strange genera but even a few endemic families. The following groups have radiated here widely: the *Paradisaeidae*, *Laniidae*, *Muscicapidae*, *Meliphagidae*, *Dicaeidae*, *Campophagidae*, *Halcyones*, *Cuculi*, *Columbae* (among these in particular the genus *Ptilinopus*), *Psittaci* (in particular the *Loriidae*) and the *Casuarii*. Among the most unusual endemics are the starling-like genus *Paramythia*, the Crowned Pigeon (*Goura*) and the Mountain Quail *Anurophasis*. Southern New Guinea is avifaunistically very close to the Cape York Peninsula. The Aru Islands belong closely to the southern coast, Jobi shares many forms with the northern coast between Geelvink Baai and Astrolabe Baai, and the western Papuan islands are similarly related to the Arfak Peninsula; only Waigeu has apparently been independent and isolated for a long time and possesses even a separate genus of birds of paradise (*Schlegelia*). The Island of Biak is probably even older (without birds of paradise, but with such endemics as *Macruruopsis* and *Otus beccarii*). Very peculiar endemic genera, such as *Anurophasis* (*Phasianidae*), *Salvadorina* (*Anseres*), *Oreostruthus* (*Fringillidae*), *Daphaenositta* (*Sittidae*) live in the high mountain country of New Guinea; other alpine birds are of western (*Turdus*, *Anthus*) or Australian origin (*Petroica*)."

The Bismarck Archipelago (*Aves*, p. 655): "The birds of the Bismarck Archipelago can be described as a strongly impoverished Papuan avifauna. Birds of paradise are lacking, and only few *Meliphagidae* occur. Endemic genera are *Dicranostreptus* and

Ortygocichla, both from New Ireland. — The Solomon Islands are also relatively poor in bird species; by the predominantly Papuan character of their bird fauna, these islands have produced several endemic genera, including *Microgoura* (Columbae), *Edithiornis* (Ralli), and *Mochtopoecus* (Sylviidae)."

Fiji (*Aves*, p. 655): "The Fiji Islands may to some extent have received their avifauna along a land-bridge from the west; endemics include *Vitie* (= *Drymochaera*), *Trichocichla*, *Lamprolia*, *Muscylva*, and *Pyrrhulopsis*: all genera of high age."

New Zealand (*Aves*, p. 636-640): "There is much evidence that even a country like New Zealand, well populated with land birds as it is, must have received its avifauna from across the sea and at a time when the island group was no nearer the continents than at present. The presence of flightless birds, such as the Dinornithidae, Apterygidae, *Strigops*, *Cnemiornis* and others, seems to contradict this theory: but the view expressed earlier by W. D. Matthew (1915) that these forms had developed in New Zealand itself from flying birds, is difficult to refute with valid objections. Neither in Australia nor in South America do we find closely related forms of New Zealand's old endemics; and the hope has not been fulfilled that remains of an extinct land fauna might come to light from the old Tertiary deposits in the antarctic continent, indicating the possibility of the existence of a land-bridge South America - Antarctica - New Zealand; no other bird bones than those of penguins were found in lower Miocene beds on Seymour Island. The very fact that New Zealand is so rich in flightless birds supports the theory that these species have lost their ability to fly on the spot. F. C. Noll (1889), who in addition to the New Zealand birds also refers to the Dodo (*Didus* = *Raphus*), *Aphanapteryx* on Mauritius as well as *Pezophaps solitarius* on Reunion Island, observes correctly that 'such helpless forms can only develop and survive on islands where mammals are absent.' New Zealand, like all old island groups, has not been populated with birds in one single period but the process has probably taken place slowly since the Cretaceous and is not yet completed. One of the newest immigrants is a small flycatcher, the Fantail *Rhipidura fuliginosa*, a close relative of the southern Australian *Rhipidura albiscapa*, and a small Silvereye *Zosterops lateralis* did not reach New Zealand till about 1856."

Stresemann (*Aves*, p. 656) supplements the above with a brief overview of New Zealand's zoogeographic position: "We must with certainty accept that New Zealand over a very long period, possibly as early as from the Cretaceous, has been populated with birds coming across the sea from the west and north-west. Many New Zealand birds are therefore now without close relatives and form the representatives of their own orders and families. From early immigrants derive the following: *Apteryx*, *Strigops*, *Nestor*, *Anarhynchus*, *Gallirallus*

(= *Ocydromus*), the mesomyodic passerines *Acanthisitta*, *Xenicus* and *Traversia*, the peculiar polymyodic passerines *Turnagra*, *Heteralocha*, *Creadion*, *Callaeas* (= *Glaucopis*) and *Clitonyx*, and further a few giant forms which became extinct during the Pleistocene, including the Dinornithidae, the rail *Aptornis*, the goose *Cnemionis*, and the eagle *Harpagornis*. — The Chatham and Auckland Islands have probably mostly received their avifaunas via New Zealand; the former island group is characterized by *Anthornis*, *Miro* and the flightless rail *Cabalus modestus*, the latter by the two near-flightless ducks: *Nesonetta aucklandica* and *Mergus australis*."

TAXONOMY AND 350 NEW SUBSPECIES

Stresemann was professionally primarily a taxonomist, a describer of forms, and organizer of their relationships. His exceptionally good memory and breadth of studies, his own early explorations and later encouragement of expeditions, his rapidly growing collections in the Berlin Museum and easy access (in Europe) to other large collections all contributed to his large output in the description and classification of birds.

He entered the ornithological scene at a time when the majority of living birds had been described (the author names attached to the systematic names remind us of the great reapers: Linnaeus, Latham, Gould, Gray, Temminck, Gmelin), and yet he managed to describe between 1912 and 1950 no less than 25 new species and 350 new subspecies.

Stresemann's taxonomic work gave rise to the study of the associated problems of relationships and evolution. He stressed the importance of geographical isolation in the formation of new species (an area pursued with much vigour later by Mayr and Lack), and through extensive mutation studies pointed out the importance of mutation in the evolution of new forms. He did not spare himself and tackled the revision of many difficult and poorly described genera; of particular interest to us are his reviews of these genera from our part of the world: *Spizaetus*, *Batracostomus*, *Cyornis*, *Pericrocotus*, *Terpsiphone*, and *Zosterops*.

The following list of Stresemann's major contributions on the related subjects of scientific nomenclature, taxonomy and classification serves partly as a tribute to the author's stimulus to international ornithology, partly as a guide to new or renewed study of his lifetime experience and conclusions in the field of cataloguing birds:

1. Scientific nomenclature. *Auk* 41: 507-512. 1924. [In English].
2. The development of the concepts of species, variety and subspecies in ornithology. *Mitteilungen des Vereins sächsischer Ornithologen* 2: 1-8. 1927. [In German].
3. The Formenkreis-theory. *Auk* 35: 150-158. 1936. [In English].

4. Proposals for the development of a uniform nomenclature. *Proceedings of the VIIIth International Ornithological Congress*, Oxford 1934: 199-206. 1938. [In German].
5. Ecological kinship-, race- and species differences in birds. *Journal für Ornithologie* 91: 305-324. 1943. [In German].
6. The development of theories which affected the taxonomy of birds. *Ibis* 92: 123-131. 1950. [In English].
7. The influence of nature philosophy observations on the ornithological systematics. *Proceedings of the Xth International Ornithological Congress*, Uppsala 1950: 132-138. 1951. [In German].
8. The status of avian systematics and its unsolved problems. *Auk* 76: 269-280. 1959. [In English].
9. Taxonomic significance of wing moult. *Proceedings of the XIIIth International Ornithological Congress*, Ithaca 1962: 171-175. 1963. [In English].

MOULT STUDIES

Stresemann was primarily a museum man, and his constant work with specimens gave rise — as a by-product — to a branch of ornithology previously much neglected, the study of moult and moult sequences in birds. As early as in 1921 he wrote a paper on the moult of songbirds in the service of systematics; scattered over the following 30-40 years followed a few more moult studies, but in later life, especially from 1960 and onwards, most of his work was on this subject, and most papers were published with his wife, Frau Vesta Stresemann.

Over the years following the Second World War the astounding growth of ornithology must have both thrilled and puzzled Stresemann. Such new fields as ecology and ethology developed and branched out, leaving the confining fold of ornithology; increased use of statistics, technological developments in the study of bird migration, computer-programming and similar new refinements were not absorbed into Stresemann's ornithological orbit; it is probably the enormity of present bird knowledge (mastered by him in his *Aves* in the 1920's) which made him choose to devote most of his sunset years to a narrow special study, the moult of birds.

As much of his work in this area is of general interest and as groups and species of birds found in Australasia are also covered in detail, some of his most important publications on moult are listed below:

1. Stresemann, V. & Stresemann, E. The primary wing moult of the birds of prey. *Journal für Ornithologie* 101: 373-403. 1960. [In German].

2. Time period and development of the primary wing moult of palaeartic gulls, terns and waders. *Journal für Ornithologie* 104: 424-435. 1963. [In German].
3. The nomenclature of plumages and moults. *Auk* 80: 1-8. 1963. [In English].
4. Variation in the number of primaries. *Condor* 65: 449-459. 1963. [In English].
5. Moults of the gallinaceous game birds. *Journal für Ornithologie* 106: 58-64. 1965. [In German].
6. ——— & Stresemann, V. The Moults of Birds. *Journal für Ornithologie* 107 (Sonderheft): vii+ 1-445. 1966. [In German].
7. Inheritance and adaptation in moult. *Proceedings of the XIVth International Ornithological Congress*, Oxford 1966: 75-80. 1967. [In English].
8. Study on the onset of the primary wing moult in gulls and its cause. *Vogelwarte* 26: 227-232. 1971. [In German].

AFTER WORLD WAR I

Stresemann was a leading international ornithologist in the *inter bellum* period. All was well with the ornithological world. In 1934 he was President of the VIII International Ornithological Congress in Oxford (where he correctly in his opening speech addressed the female Mayor of Oxford as Mistress Mayor); the same year he attracted Gunther Niethammer (who visited New Zealand from December 1967 to February 1968 and published on the taxonomy of our introduced European passerines) to Berlin and encouraged him to write and publish the *Handbuch der deutschen Vogelkunde* which appeared in three volumes 1937-1942. In the last pre-war years he wrote with Meise and Schonwetter the *Aves Beickianae* on the ornithology of Kansu Province, China, and his *Birds of Celebes*. In 1936 he was appointed a member of the Reichsjagdrat (State Game Council) for his bird knowledge.

Hitler's war ended the 18 years of avian bliss since Stresemann was appointed Curator of Birds in Berlin. He carried on his studies for some time but in early 1941 began the dispersal of library and bird skins, hiding rare books, all type specimens, and 40 000 skins in an underground safe from where all material was recovered after the war. Also, early in 1941 the 52 years old reserve lieutenant was ordered to the Luftwaffe and saw service in Sicily, Greece and France (as evidenced in subsequent papers on birds in Crete, Brittany, and Sicily), but returned to Berlin exempted from further military service in December 1942.

During the remainder of the war Stresemann survived, protecting and hiding books and specimens, working on birds as possibility arose, with duty as Volkssturmmann at the Berlin Teltow canal; but in the

midst of bombs and shortages, he did not lose his humanity or sense of compassion: his old friend David Bannerman in his obituary in *Ibis* testified: "Perhaps amongst all his friends he will be remembered with the greatest affection and respect by those ornithologists who were *prisoners of war* in Germany during the second world war and who received from Erwin bird-literature which he somehow managed to



FIGURE 2 — Professor Erwin Stresemann in 1954 when he was 65 years of age and in which year he published 12 ornithological papers (one of which in English, in *Condor*), totalling 103 pages.

convey to them, to ease the monotony of their days. That generous action will never be forgotten by those who benefitted from such unexpected kindness."

The immediate post-war period was the low point, but the collections and books were retrieved. In 1945-1946 Stresemann had no papers published — there were no German ornithological journals. But some kind of peace came about in the world, the trees were in new leaf, migratory birds returned, the soil produced again, the wheels of industry turned, and the mailman came back.

The mental activity which occupied much of Stresemann's time during this difficult period was his work on the history of ornithology. During the late forties he collected and sifted this vast material and in 1951 published the 430-page volume on the development of ornithology from Aristotle to the present (published in English translation by Harvard University Press in 1975, see "References").

In his last years the *Meister* enjoyed a quiet home-life with Frau Vesta; together they studied and published many papers and a book on the moult of birds, and in pursuit of moult studies they visited American museums in 1962. *Festschripte* in his honour on his 60 and 70 years birthdays brought together the writings of his old students, associates and friends. He was elected an Honorary President of the German Ornithological Society, was honoured with the National Prize of the German Democratic Republic, was an elected Member of the Academy of Natural Science (Leopoldiana), Member of the German Academy of Science, Honorary Member of the British Ornithologists' Union, Honorary Fellow of the American Ornithologists' Union, and received many other honours. He kept up a wide correspondence with friends and colleagues in many lands. He was an eager attendant at national and international ornithological conferences, and the last meeting with old friends of his international ornithological circle was attending the opening in 1972 of the bird collection, British Museum (Natural History) in Tring — where he in 1910 had conferred with Hartert before setting out on his East Indies expedition.

In the introduction to *The History of Ornithology*, Stresemann stated that it was Aristotle who raised ornithology to a science; it is hardly presumptuous or unkind to other masters to suggest that it was Stresemann who over the uneasy period between the two World Wars widened ornithology to its present importance, adding avian physiology, ecology and behaviour to the narrower older ornithology resting upon morphologically based systematics.

PUBLICATIONS ON AUSTRALASIAN BIRDS

Stresemann's many publications on the birds of South-east Asia and Australasia are of particular interest to us, inevitably so as our Australian and New Zealand bird faunas have immigrated from the north-west, via the Malayan Peninsula and the East Indies.

Publications covered in this bibliography encompass the two northern routes of entry, Malaya to the Indonesian Islands, and the Philippines, Moluccas and New Guinea (with the Bismarck Archipelago

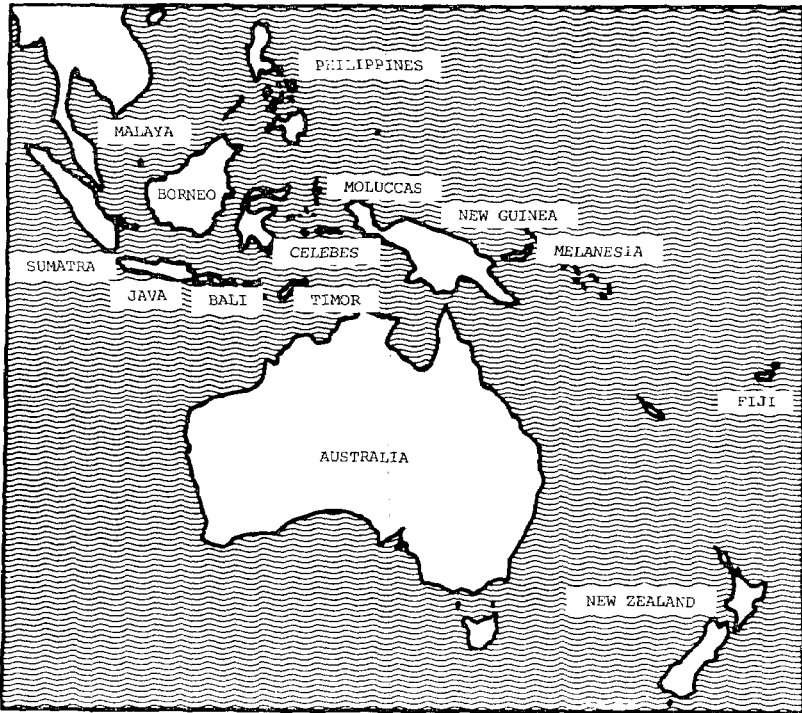


FIGURE 3 — Stresemann's publications on East Indian and Australasian ornithology have been divided in this bibliography into regional sections as shown in this map. For order of presentation and sub-divisions see the list of contents (p. 138).

of much interest to Stresemann), as well as Australia, New Zealand and Fiji (cf. the map, Figure 3). Valuable contributions were made to the ornithology of Celebes and the Moluccas right in the centre of the difficult Wallace's Line region where Asia and woodpeckers end.

Included in this list are publications covering ornithological exploration, descriptions of new species and subspecies, reviews of taxonomy and distribution and other observations from the area covered; excluded are references on species introduced into the region (as a number of European passerines) when the publications originate elsewhere. References included have been culled from the *Aves* sections of *Zoological Record*, from the bibliography (compiled by Ilse Jahn)

in the *Journal für Ornithologie* 1973, from examination of many original works, and reviews and summaries in *Ibis*, *Auk*, and elsewhere.

GENERAL

Faunistic, nomenclature, miscellanea:

- (1) Description of a new genus and new species of birds from the Dutch E. India Islands. *Bulletin of the British Ornithologists' Club* 31: 4-6. 1912. [In English].
- (2) Ornithological miscellanea from the Indo-Australian region. Part 1. *Novitates zoologicae*, London 19: 311-351. 1912. Part 2. *ibidem* 20: 289-324. 1913. [In German].
- (3) Nomenclature of several birds of the Oriental Region. *Anzeiger der Ornithologischen Gesellschaft in Bayern* 4: 23-25. 1921. [In German].
- (4) Contribution to the nomenclature of Indo-Australian birds. *Ornithologische Monatsberichte* 31: 40-41. 1923. [In German].
- (5) Contributions to the ornithology of the Indo-Australian Region. I. *Mitteilungen aus dem Zoologischen Museum in Berlin* 12: 177-195. 1925. II. *ibidem* 12: 348-354. 1926. III. *ibidem* 15: 635-645. 1930. [In German].
- (6) Review of the "Mutation studies" I-XXIV and their main results. *Journal für Ornithologie* 74: 377-385. 1926. [In German].
- (7) Birds collected during Capt. James Cook's last expedition (1776-1780). *Auk* 67: 66-88. 1950. [In English].
- (8) Birds collected by Labillardiere during the "Voyage a la recherche de Laperouse" (1791-1794). *Mitteilungen aus dem Zoologischen Museum in Berlin* 29: 75-106. 1953. [In German].
- (9) Analysis of C. J. Temminck's "Catalogue Systematique" (1807). *Zoologische mededeelingen. Rijksmuseum van natuurlijke historie te Leiden* 31: 319-331. 1953. [In German].

Birds of Prey Falconiformes:

- (10) Note about *Accipiter planes* (Reichenow). *Ornithologische Monatsberichte* 30: 109-111. 1922. [In German].
- (11) Remarks on H. Kirke Swann's "Synopsis of the Accipitres." The Indo-Australian birds of prey. *Journal für Ornithologie* 70: 487-488. 1922. [In German].
- (12) *Hieraaetus kieneri formosus* subsp. n. *Ornithologische Monatsberichte* 32: 108-109. 1924. [In German].
- (13) The Formenkreis of the Marsh Harrier *Circus aeruginosus*. *Journal für Ornithologie* 72: 262-269. 1924. [In German].
- (14) *Spizaetus alboniger* (Blyth) and *Spizaetus nanus* Wallace, two incorrectly united species. *Journal für Ornithologie* 86: 425-431. 1938. [In German].
- (15) Dementiew, G. & Stresemann, E. The specimens of the Peregrine Falcon (*Falco peregrinus*) and the Saker (*Falco cherrug*) in the

Berlin Zoological Museum. *Journal für Ornithologie* 96: 344-346. 1955. [In German].

- (16) The type locality of *Spilornis bassus* (J. R. Forster). *Journal für Ornithologie* 100: 355. 1959. [In German].
- (17) Organisation of the genus of crested serpent eagles *Spilornis*. *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich* 104: 208-213. 1959. [In German].

Gulls, terns and waders *Charadriiformes:*

- (18) Note on *Charadrius alexandrinus elegans* Reichenow; *Poecilodryas pachydemas* Reichenow; *Pluvianellus sociabilis* Hombron & Jacquinot. *Ornithologische Monatsberichte* 33: 20-21. 1925. [In German].
- (19) The subspecies of *Charadrius mongolus*. *Ornithologische Monatsberichte* 48: 51-56. 1940. [In German].
- (20) *Calidris ferruginea* (Pontoppidan) instead of *Calidris testacea* (Pallas). *Ornithologische Monatsberichte* 49: 21. 1941. [In German].
- (21) Spring migration of the Curlew Sandpiper (*Calidris ferruginea*). *Ornithologische Monatsberichte* 52: 50-51. 1944. [In German].
- (22) How widely does *Charadrius alexandrinus* L. move about? *Ornithologische Monatsberichte* 52: 55. 1944. [In German].
- (23) The White Tern (*Gygis alba*). *Orion*, Innsbruck 6: 1-8. 1951. [In German].

Cuckoos *Cuculiformes:*

- (24) Note about *Centropus rectunguis* Strickl. and related species. *Verhandlungen der Ornithologischen Gesellschaft in Bayern* 14: 37-38. 1919. [In German].
- (25) Systematics of the genus *Centropus* (Mutation studies XXVIII). *Journal für Ornithologie* 87: 61-64. 1939 [In German].
- (26) ——— & Stresemann, V. Moults of the crested cuckoos (*Clamator*). *Journal für Ornithologie* 110: 192-204. 1969. [In German].

Swifts *Apodiformes:*

- (27) What is *Collocalia fuciphaga* (Thunb.)? *Verhandlungen der Ornithologischen Gesellschaft in Bayern* 12: 1-12. 1914. [In German].
- (28) Contributions to a revision of the swiftlets (*Collocalia*). I. *Mitteilungen aus dem Zoologischen Museum in Berlin* 12: 179-190. 1925. [In German]. II. *ibidem* 12: 349-353. 1926. [In German].
- (29) A note about some swiftlets (*Collocalia*) and their nests. *Sitzungsberichte der Gesellschaft naturforschender Freunde zu Berlin* 1926: 47-48. 1926. [In German].

Other Non-Passeriformes:

- (30) The genus *Strix* in the Malaysian Archipelago. *Ornithologische Monatsberichte* 32: 110-111. 1924. [In German].
- (31) Brief review of the Indo-Malayan Scops owls (*Otus*). *Mitteilungen aus dem Zoologischen Museum in Berlin* 12: 191-195. 1925. [In German].
- (32) ——— & Meyer, O. Contribution to the development of *Megapodius* and *Oxyura* in the egg. *Ornithologische Monatsberichte* 36: 65-71. 1928. [In German].
- (33) The structure of remiges in several physiologically flightless rails. *Alauda* 4: 1-5. 1932. [In French].
- (34) A critical study of the genus *Batrachostomus*. *Mitteilungen aus dem Zoologischen Museum in Berlin* 22: 304-329. 1937. [In German].
- (35) Life of the Gannets. *Orion*, Innsbruck 8: 772-780. 1953. [In German].
- (36) ——— & Stephan, B. Number and numeration of the primaries in the honey-guides (Indicatoridae). *Journal für Ornithologie* 109: 222. 1968. [In English].

*Perching birds Passeriformes:**Cuckoo-shrikes Campephagidae:*

- (37) On the generic names *Graucalus*, *Coracina*, *Calvifrons* and *Stoparola*. *Ornithologische Monatsberichte* 21: 24-25. 1913. [In German].
- (38) "Heterogeny" in the Rassenkreis *Edolisoma morio*. *Ornithologische Monatsberichte* 47: 124-126. 1939. [In German].
- (39) Another migrant with complete post-nuptial and pre-nuptial moults: *Pericrocotus divaricatus* Raffles. *Journal für Ornithologie* 113: 218. 1972. [In German].
- (40) ——— & Stresemann, V. The complete post-nuptial and pre-nuptial moults in *Pericrocotus divaricatus* Raffles. *Journal für Ornithologie* 113: 435-439. 1972. [In German].

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- (42) ——— & Stresemann, V. The post-nuptial and pre-nuptial moults of the Asiatic shrikes *Lanius tigrinus* and *L. isabellinus*. *Journal für Ornithologie* 112: 373-395. 1971. [In German].

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- (43) The genus *Acrocephalus* in the Indo-Australian Archipelago. *Ornithologische Monatsberichte* 32: 167-168. 1924. [In German].
- (44) Species of the genus *Cyornis*. *Ornithologische Monatsberichte* 33: 45-53. 1925. [In German].
- (45) ——— & Schauensee, R. M. de. Notes on some South Asiatic species of the genus *Cyornis*. *Proceedings of the Academy of Natural Sciences of Philadelphia* 88: 337-351. 1936. [In English].

- (46) ——— & Arnold, J. Speciation in the group of Great Reed Warblers. *Journal of the Bombay Natural History Society* 48: 428-443. 1949. [In English].

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- (47) The *Zosterops* group of the Indo-Australian Region. *Mitteilungen aus dem Zoologischen Museum in Berlin* 17: 201-238. 1931. [In German].
- (48) *Zosterops siamensis* Blyth — a yellow-breasted subspecies of *Zosterops palpebrosa* (Mutation studies XXIX). *Journal für Ornithologie* 87: 156-164. 1939. [In German].

Other perching birds *Passeriformes*:

- (49) *Pteruthius xanthochloris obscurus* subsp. n.; *Domicella albidinucha* Rothschild; *Sericornis arfakiana keysseri* subsp. n. *Ornithologische Monatsberichte* 33: 59. 1925. [In German].
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- (52) Bowers and display of the bower birds. (Report on a lecture by F. Frank). *Journal für Ornithologie* 94: 367. 1953. [In German].
- (53) Bower and display of the bower birds (*Ptilonorhynchidae*). *Vogelwarte* 16: 148-158. 1954. [In German].

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- (54) *Abrornis sakaicorum* sp. n. described. *Bulletin of the British Ornithologists' Club* 31: 27-28. 1912. [In English].
- (55) *Lanius fuscatus* Lesson: a mutation of *Lanius schach schach* L! *Ornithologische Monatsberichte* 31: 79-82. 1923. [In German].
- (56) *Baza lophotes melli* subsp. n. *Journal für Ornithologie* 71: 525. 1923. [In German].
- (57) What is *Phylloscopus inornatus* (Blyth)? *Ornithologische Monatsberichte* 32: 17-18. 1924. [In German].
- (58) Nests and eggs of Malaysian birds (Report of a lecture by H. Ohnesorge). *Journal für Ornithologie* 72: 563-564. 1924. [In German].
- (59) Notes on the systematics and distribution of some swiftlets (*Collocalia*) of Malaysia and adjacent subregions. *Bulletin of the Raffles Museum, Singapore* 6: 83-101. 1931. [In English].
- (60) The Malaysian Archipelago as winter quarters for palaeartic bird migrants (Report of a lecture by H. Desselberger). *Journal für Ornithologie* 80: 152-153. 1932. [In German].
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- (63) A note on a rare woodpecker from Sumatra. *Club van nederlandsche vogelkundigen. Jaarbericht* 11: 32-33. 1921. [In German].
- (64) The woodpeckers of Sumatra. A monographic study. *Archiv fur Naturgeschichte* 87 (A): 64-120. 1921. [In German].
- (65) Contributions to the avifauna of Sumatra. *Ornithologische Monatsberichte* 30: 6-7. 1922. [In German].
- (66) *Zosterops incerta* A. B. Meyer = *Vermivora rubricapilla rubricapilla* (Wilson). *Ornithologische Monatsberichte* 30: 87. 1922. [In German].
- (67) Nomenclatorial remarks on Sumatran birds. *Journal of the Federated Malay States Museums* 11: 349-350. 1924. [In English].
- (68) Distribution of *Caprimulgus pulchellus* Salvadori. *Journal fur Ornithologie* 97: 239. 1956. [In German]. (Also occurs in Java.)

BORNEO

- (69) Study of the cave swiftlets (Collocaliinae) of south-eastern Borneo. *Ornithologische Monatsberichte* 34: 104-108. 1926. [In German].
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JAVA

- (72) Mutation studies XII. *Copsychus amoenus* (Horsfield). *Journal fur Ornithologie* 72: 252-255. 1924. [In German].
- (73) *Collocalia francica bartelsi* subsp. nova. *Ornithologische Monatsberichte* 35: 46. 1927. [In German].
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- et oceanographiques*, Buitenzorg 12: 425-430. 1930. [In German].
- (78) *Treron curvirostra*, a new subspecies for Java. *Ornithologische Monatsberichte* 42: 148-149. 1934. [In German].
- (79) Systematic position of *Rhopodytes kangeanensis* Vordermann. *Ornithologische Monatsberichte* 47: 124. 1939. [In German].

BALI

- (80) Note on three rare parrots and on the zoogeographical relations of Bali. *Bulletin of the British Ornithologists' Club* 31: 15. 1912. [In English].
- (81) The birds of Bali. *Novitates zoologicae*, London 20: 325-387. 1913. [In German].
- (82) *Gerygone sulphurea plesseni* subsp. nova. *Ornithologische Monatsberichte* 34: 22-35. 1926. [In German].
- (83) Two corrections to the list of the birds of Bali. *Ornithologische Monatsberichte* 36: 104-105. 1928. [In German].
- (84) Contribution to the avifauna of Bali. *Ornithologische Monatsberichte* 40: 54-55. 1932. [In German].
- (85) A new Bonelli's Eagle from Sumbawa: *Hieraaetus fasciatus renschi* subsp. nova. *Ornithologische Monatsberichte* 40: 78-80. 1932. [In German]. (Sumbawa is east of Bali).

TIMOR

- (86) *Fregata minor minor* (Gm.) at the coast of Timor. *Ornithologische Monatsberichte* 30: 113-114. 1922. [In German].
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- (88) *Ninox fusca plesseni* subsp. nova. *Ornithologische Monatsberichte* 37: 47-48. 1929. [In German]. (On Alor just north of Timor).

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- (89) The name *Octocoris alpestris pallida* Dwight; a contribution to the ornithology of the Philippines. *Ornithologische Monatsberichte* 30: 88. 1922. [In German].
- (90) A note on *Collocalia unicolor amelis* Oberh. *Ornithologische Monatsberichte* 30: 112-113. 1922. [In German].
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- (92) On the birds collected by Pierre Poivre in Canton, Manila, India and Madagascar (1751-1756). *Ibis* 94: 499-523. 1952. [In English].

CELEBES

- (93) Preliminary notes on the ornithological results of the Heinrich Expedition 1930-1931. I. Contributions to the ornithology of the Latimodjong Mountains in southern central Celebes.

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- (94) II. New subspecies of birds from the Latimodjong Mountains. *Ornithologische Monatsberichte* 39: 44-47. 1931. [In German].
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- (96) IV. Contribution to the ornithology of the Minahassa (northern Celebes). *Ornithologische Monatsberichte* 39: 102-105. 1931. [In German].
- (97) V. Contribution to the ornithology of Halmahera and Batjan. *Ornithologische Monatsberichte* 39: 167-171. 1931. [In German].
- (98) VI. Note on the ornithology of Lompo Batang (southern Celebes). *Ornithologische Monatsberichte* 40: 45-47. 1932. [In German].
- (99) VII. Contribution to the ornithology of south-eastern Celebes. *Ornithologische Monatsberichte* 40: 104-115. 1932. [In German].
- (100) VIII. Further supplements on the avifauna of Celebes. *Ornithologische Monatsberichte* 46: 45-49. 1938. [In German].
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- (102) A nominal list of the birds of Celebes. *Ibis* 14th ser. 6: 356-369. 1936. [In English].
- (103) The birds of Celebes. I. and II. Biological contributions by Gerd Heinrich. *Journal für Ornithologie* 87: 299-425. 1939. [In German].
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- (105) A bird collection from Misol (Zoological results of the 2nd Freiburg Moluccas-Expedition). *Journal für Ornithologie* 61: 597-611. 1913. [In German].
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- (111) Birds collected by Dr F. Kopstein in the South Moluccas and Tenimber 1922-1924. *Zoologische mededeelingen*, Leiden 17: 15-19. 1934. [In German].
- (112) Characteristics of *Eos squamata atrocaerulea* Jany. *Journal fur Ornithologie* 96: 428. 1955. [In German].

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Faunistic, nomenclature, miscellanea:

- (113) Eleven new birds from the Sepik River district (northern New Guinea). *Anzeiger der Ornithologischen Gesellschaft in Bayern* 5: 33-38. 1921. [In German].
- (114) New birds from New Guinea and New Pomerania. *Ornithologische Monatsberichte* 30: 7-9. 1922. [In German]. New Pomerania = New Britain).
- (115) New birds from New Guinea. *Ornithologische Monatsberichte* 30: 35. 1922. [In German].
- (116) A note on the synonymy of the birds of New Guinea: De Vis' names from 1894. *Ornithologische Monatsberichte* 30: 111-112. 1922. [In German].
- (117) New birds from Papua (*Cicinnurus*, *Mino*, *Pitohui*, *Micropsitta*, *Trichoglossus*, *Megapodius*). *Journal fur Ornithologie* 70: 405-408. 1922. [In German].
- (118) Dr Burger's ornithological results from the Sepik River area. A contribution to the avifauna of New Guinea. *Archiv fur Naturgeschichte* 89, Abteilung A (7): 1-96, (8): 1-92. 1923. [In German].
- (119) New contributions to the ornithology of German New Guinea. *Journal fur Ornithologie* 72: 424-428. 1924. [In German].
- (120) ——— & Paludan, K. Preliminary account of the ornithological results of Stein's expedition 1931-1932. — I. Ornithology of the island of Waigeu. *Ornithologische Monatsberichte* 40: 13-18. 1932. [In German].
- (121) ——— Rothschild, W., & Paludan, K. Ornithological results of Stein's expedition 1931-1932. I. Waigeu, Numfor, Japan. *Novitates zoologicae*, London 38: 127-147. 1932. [In German].
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- (125) *Accipiter leucosomus* (Sharpe): a leucistic mutation of *Accipiter etorques* (Salvadori) ? *Ornithologische Monatsberichte* 31: 127-131. 1923. [In German].
- (126) A crane from New Guinea. *Ornithologische Monatsberichte* 35: 45, 87. 1927. [In German].
- (127) *Podargus papuensis pumilus* subsp. nova. *Ornithologische Monatsberichte* 35: 87. 1927. [In German].
- (128) *Centropus phasianus thierfelderii* subsp. nova. *Ornithologische Monatsberichte* 35: 111-112. 1927. [In German].
- (129) The Papuan forms of *Accipiter fasciatus*. *Ornithologische Monatsberichte* 43: 110-111. 1935. [In German].
- (130) Asymmetry in the external ears in the Vulturine Parrot (*Psittirichas fulgidus*). *Ornithologische Monatsberichte* 47: 147. 1939. [In German].

Birds of Paradise *Paradisaeidae:*

- (131) What did the authors of the 16th century know about the birds of paradise? A contribution to the history of ornithology. *Novitates zologicae*, London 21: 13-24. 1914. [In German].
- (132) The home of *Paradisaea maria* Reichenow. *Ornithologische Monatsberichte* 33: 128. 1925. [In German].
- (133) Distribution of species of birds of paradise in the area between the rivers Digul and Fly. *Ornithologische Monatsberichte* 35: 111. 1927. [In German].
- (134) Which species of birds of paradise in the literature are of hybrid origin? *Novitates zologicae*, London 36: 6-15. 1930. [In German]. Also summary in *Proceedings of the VIIth International Ornithological Congress*, Amsterdam 1930: 284. [In German].
- (135) The courtship display of *Parotia sefilata* (L.). *Ornithologische Monatsberichte* 39: 4-6. 1931. [In German].
- (136) Four new subspecies of birds of paradise. *Ornithologische Monatsberichte* 42: 144-147. 1934. [In German].
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Other perching birds *Passeriformes:*

- (140) The genus *Pitchui*. *Mitteilungen aus dem Zoologischen Museum in Berlin* 11: 413-416. 1925. [In German].
- (141) *Megazosterops novum* genus *Zosperopidarum*. *Ornithologische Monatsberichte* 38: 159. 1930. [In German]. (= *Rukia*, Palau Islands north of New Guinea).

- (142) The systematic position of the genus *Peltops*. *Ornithologische Monatsberichte* 40: 149-150. 1932. [In German].
- (143) *Petrochelidon nigricans nigricans* (Vieillot) as winter visitor in Papua. *Ornithologische Monatsberichte* 42: 24-25. 1934. [In German].
- (144) Two new weavers from southern New Guinea. *Ornithologische Monatsberichte* 42: 101-103. 1934. [In German].
- (145) ——— & Paludan, K. *Poecilodryas placens clara* nom. nov. *Ornithologische Monatsberichte* 45: 86. 1937. [In German].

MELANESIA

Petrels and albatrosses *Procellariiformes*:

- (146) Note on *Puffinus heinrothi* Reichenow. *Ornithologische Monatsberichte* 35: 86-87. 1927. [In German].
- (147) *Puffinus chlororhyncus* Lesson in the Bismarck Archipelago. *Ornithologische Monatsberichte* 36: 83. 1928. [In German].

Birds of prey *Falconiformes*:

- (148) A study of *Accipiter luteoschistaceus*. *Ornithologische Monatsberichte* 37: 12-14. 1929. [In German].
- (149) *Falco longipennis longipennis* Swainson in the Bismarck Archipelago. *Ornithologische Monatsberichte* 42: 157. 1934. [In German].

Rails *Rallidae*:

- (150) *Eulabeornis tricolor convicta* nov. subsp. *Ornithologische Monatsberichte* 33: 17-18. 1925. [In German].
- (151) *Hypotaenidia philippensis admiralitatis* subsp. nova. *Ornithologische Monatsberichte* 37: 190. 1929. [In German].
- (152) *Habropteryx* novum genus Rallidarum. *Ornithologische Monatsberichte* 40: 122-123. 1932. [In German].
- (153) *Porzana tabuensis* as migrant in the Bismarck Archipelago. *Ornithologische Monatsberichte* 45: 24-25. 1937. [In German].

Gulls, terns and waders *Charadriiformes*:

- (154) *Himantopus himantopus leucocephalus* in the Bismarck Archipelago. *Ornithologische Monatsberichte* 37: 47. 1929. [In German].
- (155) *Terekia cinerea* in the Bismarck Archipelago. *Ornithologische Monatsberichte* 38: 158. 1930. [In German].

Cuckoos *Cuculiformes*:

- (156) The hosts of *Eudynamis scolopacea salvadorii* Hartert. *Ornithologische Monatsberichte* 35: 86. 1927. [In German].
- (157) An egg of *Eudynamis scolopacea salvadorii*. *Ornithologische Monatsberichte* 36: 83. 1928. [In German].
- (158) *Urodynamis taitiensis* (Sparrrn.) in the Bismarck Archipelago. *Ornithologische Monatsberichte* 41: 153. 1933. [In German].

Other Non-Passeriformes:

- (159) Note on a leucistic specimen of *Dupetor flavicollis nesophilus* (Sharpe). *Ornithologische Monatsberichte* 34: 118-119. 1926. [In German].
- (160) *Lorius amabilis* species nova. *Ornithologische Monatsberichte* 39: 182-183. 1931. [In German].
- (161) A second specimen of *Tyto manusi* Rothsch. & Hart. *Ornithologische Monatsberichte* 41: 153. 1933. [In German].

Perching birds Passeriformes:

- (162) *Zosterops longirostris ottomeyeri* subsp. nova. *Ornithologische Monatsberichte* 58: 90. 1930. [In German].
- (163) New bird species from Lihir (Bismarck Archipelago). *Ornithologische Monatsberichte* 41: 114-116. 1933. [In German]. (Three passerines: *Lalage*, *Pachycephala*, *Rhipidura*, and an *Accipiter* hawk).
- (164) *Pachycephala pectoralis neuhausi* subsp. nova. *Ornithologische Monatsberichte* 42: 24. 1934. [In German].

AUSTRALIA

Weaver-finches Estrildidae:

- (165) Mutation studies XXI. *Poephila mirabilis* des Murs. *Journal für Ornithologie* 72: 547-552. 1924. [In German].
- (166) Gynandromorphism in a Gouldian Finch *Peophila gouldiae*. *Ornithologische Monatsberichte* 35: 22. 1927. [In German].

Crows Corvidae:

- (167) The forms of the *Coryvus coronoides* Vig. & Horsf. group. *Verhandlungen der Ornithologischen Gesellschaft in Bayern* 12: 277-304. 1916. [In German].
- (168) The genus *Corvus* in Australia and New Guinea. *Journal für Ornithologie* 91: 121-135. 1943. [In German].

Other species:

- (169) The Formenkreis *Pachycephala rufiventris*. *Journal für Ornithologie* 72: 540-542. 1924. [In German].
- (170) *Meliphaga analoga* and its doubles. *Journal für Ornithologie* 73: 255-260. 1925. [In German].
- (171) *Cracticus rufescens* De Vis (Mutation studies XXX). *Ornithologische Monatsberichte* 51: 68-72. 1943. [In German].
- (172) Type localities of Australian birds collected by the "Expedition Baudin" (1801-1803). *Emu* 51: 65-70. 1951. [In English].
- (173) Black-breasted Buzzard destroys eggs by stone throwing. *Journal für Ornithologie* 96: 215. 1955. [In German].
- (174) Moulting and migration of the Great Shearwater *Puffinus gravis*. *Journal für Ornithologie* 111: 378-393. 1970. [In German]. (Valuable paper on moulting in a shearwater, comparison with *P. tenuirostris*).

FIJI

- (175) Mutation studies VII. *Cacomantis infuscatus* (Hartlaub). *Journal für Ornithologie* 72: 77-79. 1924. [In German].

NEW ZEALAND

- (176) Mutation studies III. *Micronisus niger* (Bonn & Vieill.); *Rhipidura fuliginosa* (Sparrmann). *Journal für Ornithologie* 71: 512-515. 1923. [In German].
- (177) ——— & Hartert, E. The Indo-Australian shining cuckoos. *Novitates zoologicae*, London 32: 158-163. 1925. [In German].
- (178) The black oystercatchers (*Haematopus*). Mutation studies XXVI. *Ornithologische Monatsberichte* 35: 71-77. 1927. [In German].
- (179) Re-discovery of the "extinct" rail *Notornis hochstetteri*. *Ornithologische Berichte* 2: 54-55. 1949. [In German].
- (180) Life and love of the albatrosses. *Orion*, Innsbruck 9: 965-972. 1954. [In German].
- (181) ——— & Stresemann, V. The Moults of Birds. *Journal für Ornithologie* 107 (Sonderheft): vii+ 1-445. 1966. [In German]. (The moults of several species and groups occurring in New Zealand are discussed in detail, including many visiting migratory waders; Long-tailed Cuckoo; Kakapo).

In addition to References 165-174 for Australia, and 176-181 for New Zealand, the following publications contain information of particular interest to Australian and New Zealand ornithologists:

- (7) on birds collected during Captain Cook's last voyage when he visited Adventure Bay, Tasmania, and Charlotte Sound, New Zealand
- (13) the distribution and taxonomy of the Marsh Harrier, *Circus aeruginosus*, from which our Australasian Harrier Hawk, *C. approximans*, has developed
- (19) subspecific differences of the Mongolian Dotterel, *Charadrius mongolus*; summer visitor to Australia and New Zealand
- (20) and (21) on taxonomy and migration of the Curlew Sandpiper, *Calidris ferruginæa*
- (22) extent of migration of Red-capped Dotterel, *Charadrius alexandrinus*
- (23) general biology of the White Tern, *Gygis alba*
- (25) systematic review of the genus *Centropus* (coucals, Australia)
- (29) swiftlets (*Collocalia*) and their nests (Australia)
- (32) embryonic development of mound-birds *Megapodius* and Blue-billed Duck *Oxyura* (Australia)
- (33) structure of remiges in flightless rails
- (35) general biology of the Gannet, *Sula bassana*
- (37) on the generic names *Graucalus*, *Coracina*, *Calvifrons* and *Stoparola* (Australia)

- (43) the reed warblers *Acrocephalus* in the Indo-Australian Archipelago
 (47) taxonomy and distribution of silvereyes *Zosterops* in Australasia
 (52) and (53) on bowers and display of bowerbirds Ptilonorhynchidae
 (Australia)
 (131) - (139) on birds of paradise Paradisaeidae, mainly in New Guinea
 but also historical reviews
 (149) Little Falcon *Falco longipennis*, (153) Spotless Crake *Porzana
 tabuensis* (154) Pied Stilt *Himantopus h. leucocephalus*, and
 (155) Terek Sandpiper *Terekia (= Tringa) cinerea*, and (158)
 Long-tailed Cuckoo *Urodynamis taitiensis*, all recorded from the
 Bismarck Archipelago.

STRESEMANN COLLECTION IN HOCKEN LIBRARY

This bibliography of Stresemanniana on Australasian ornithology should facilitate the utilisation of his many contributions, but it is realized that most of these publications have appeared in journals and series not readily (if at all) available in Australia and New Zealand.

As it happens, three-quarters of the references are found in two journals: about half (90) in *Ornithologische Monatsberichte*, and a quarter (39) in *Journal fur Ornithologie*. The complete holdings of these journals (both publications of the German Ornithological Society) in public libraries and thus available through library interloan services are as follows:

NEW ZEALAND

Ornithologische Monatsberichte:

None.

Journal fur Ornithologie:

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Realizing the difficulty (bordering to near impossibility from here) of obtaining some of these (especially earlier) references, I have donated a 'Stresemann Collection' to the Hocken Library, University of Otago.

The aim is to complete this collection as early as possible to contain all of Stresemann's East Indies and Australasian ornithological works. Arrangements have been made with the Hocken Librarian, Mr M. G. Hitchings, that the collection stays together, can be studied in the Library, and that Xerox copies of publications will be made available to any ornithologist applying through a library on an interloan basis.

ACKNOWLEDGEMENTS

I should like to thank Frau Vesta Stresemann for critically reading my manuscript and many helpful suggestions and corrections, for valuable discussion of the project while visiting her in Berlin in February 1975, for the loan of the photographs of her late husband (presented as Figs 1 and 2 in this paper) and for the gift of a number of reprints. I am also grateful for ideas and inspiration from discussions with Professors Ernst Mayr, Klaus Immelmann, Urs Glutz von Blotzheim and Dr D. L. Serventy, and to Professor G. H. Satchell for critically reading the manuscript and for helpful suggestions.

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L. A. HEDLEY is a graduate of Otago University where he studied history and anthropology. At 23 years of age he is now a primary school teacher in Te Awamutu. He has had an interest in wildlife in general for a long time but has only recently been in a position to embark on a research project. During the Christmas school holidays (he comments — "Surely teaching with its long holiday periods is an ideal occupation for an ornithologist!") he has been studying various aspects of territorial behaviour of the Harrier such as use and extent of territory, dispersal of young etc. He now hopes to do a follow up study on communal roosting of the Harrier. Other interests include photography, drawing, history, fencing and, incidental to his work on Harriers, falconry.

J. A. DOUGLAS FLACK came to New Zealand to join the Wildlife Service in early 1971. He received his M.Sc. and Ph.D. degrees in Zoology from the University of Wisconsin, Madison. His research in North America was concerned with the influence of the structure, location and history of aspen forests on their bird populations (Ornithological Monographs No. 19). He pursued his interests in wildlife and wilderness during his ramblings and work all over North America to Alaska and in England and Kenya. He has worked on Black Swan and is currently studying the New Zealand Shore Plover on Southeast Island. His major research here has centred on the population biology of South Island Robins at Kaikoura and on three islands in Marlborough Sounds. This work is being applied to understanding the importance of introduced predators on the mainland and to the study of and attempts to manage the Black Robin in Little Mangere Island.

STEWART BISSET is interested in most aspects of biology, but especially wildlife biology and parasitology. His main field of interest has been the parasites of both native and introduced animals in New Zealand and particularly the biology of their transmission and how this relates to host ecology. He received his M.Sc. in Zoology (with distinction) at the University of Canterbury at the beginning of 1975 for his thesis on the helminth parasites of the Paradise Duck. After finishing his thesis he continued working at the University of Canterbury, initially with Professor A. M. Fallis, a visiting Erskine Fellow from the University of Toronto, and then with Mrs F. R. Allison, on protozoan blood parasites of the Fiordland Crested Penguin.

SEABIRDS FOUND DEAD IN NEW ZEALAND IN 1974

By C. R. VEITCH

ABSTRACT

During 1974, 2909 kilometres of coast were patrolled by 147 members of the Ornithological Society of New Zealand and their friends. The 24,747 dead seabirds found is a record. Two large wrecks contributed to this total. During April and May some 3,500 Blue Penguins (*Eudyptula minor*) came ashore on both sides of Northland. During June and July more than 13,000 Prions (*Pachyptila* spp) came ashore along the whole of the west coast of New Zealand. Both these wrecks were apparently caused by starvation following periods of adverse weather. Other minor, localised, wrecks are recorded. Unusual finds were one Soft-plumaged Petrel (*Pterodroma mollis*), one Grey Ternlet (*Procelsterna cerulea albivitta*), and two Erect-crested Penguins (*Eudyptes pachyrhynchus sclateri*).

INTRODUCTION

This paper records the results of the Ornithological Society of New Zealand's Beach Patrol Scheme for 1974. The coastline of New Zealand is divided into 15 sections (Imber & Boeson 1969) with an additional grouping of "OI" for outlying islands which this year includes patrols from the Chatham Islands. This year patrols were carried out on all sections of coast except Fiordland. 556 Beach Patrol Cards and 25 Specimen Record Cards were filed.

Nomenclature follows the *Annotated Checklist* (OSNZ 1970), except that, to save space in the tables, some tri-nominals have not been used.

RESULTS AND DISCUSSION

The numbers of birds found and kilometres of beach travelled and covered per month and per coast are recorded in Table 1. The distance travelled in each area is a reasonable indication of the number of people patrolling in that district. Auckland West, Wellington West, Auckland East and Wellington South received the most attention whereas fewer persons did equally good work in other areas. The total distance travelled (3457 kilometres) is higher than ever before, and the total number of birds found (24,747) is some four times higher than in past years.

The average number of birds found per kilometre travelled (7.2) is more than four times higher than in most previous years. Kilometres travelled are the total lengths of coast patrolled; kilometres

TABLE 1 : Numbers of dead seabirds recorded and kilometres of beach patrolled on each coast in 1974*

COAST	CODE		TOTALS												BIRDS/KM MONTH		
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		KM	BIRDS
Auckland West	AW	Km	115	4	34	62	86	207	257	54	94	67	83	71	1134	13652	12.04
		Birds	149	6	36	274	588	5589	5902	408	382	54	157	107			
Taranaki	T	Km	2	4	4	1	4	6	18	2	1	8	-	-	47	153	3.26
		Birds	6	8	4	1	6	24	89	4	1	10	-	-			
Wellington West	WW	Km	1	5	17	28	26	106	64	12	56	19	30	-	365	3106	8.51
		Birds	2	13	32	42	55	2269	589	26	46	8	26	-			
Westland	WD	Km	-	-	-	1	-	1	-	-	-	-	2	4	42	10.50	
		Birds	-	-	-	2	-	39	-	-	-	-	1	-			
Auckland East	AE	Km	139	55	56	137	69	61	25	19	31	17	49	60	708	5550	7.81
		Birds	652	215	501	2351	1089	179	31	30	33	25	200	224			
Bay of Plenty	BP	Km	9	2	5	-	3	9	1	11	12	8	7	7	74	123	1.66
		Birds	27	4	5	-	1	9	1	2	8	11	22	35			
East Coast NI	EC	Km	7	-	11	5	8	17	4	9	4	4	-	-	69	137	1.99
		Birds	7	-	14	2	62	14	10	23	4	1	-	-			
Waikarapa	W	Km	-	-	-	-	-	2	-	-	-	-	-	2	4	2.00	
		Birds	-	-	-	-	-	4	-	-	-	-	-	-			
Counterbury North	CN	Km	16	6	24	12	12	11	3	7	5	1	-	97	189	1.95	
		Birds	49	13	50	26	20	22	0	6	3	0	-				
Canterbury South	CS	Km	6	18	6	8	8	15	8	7	13	4	7	100	413	4.13	
		Birds	5	83	26	83	23	47	9	3	27	76	31	-			
Otago	O	Km	11	3	-	-	-	7	1	-	-	-	3	25	32	1.28	
		Birds	19	6	-	-	-	4	0	-	-	-	3	-			
Southland	S	Km	5	5	5	10	10	11	11	5	9	-	-	76	1077	14.17	
		Birds	6	9	1	3	986	2	10	22	36	-	-	2			
Wellington South	WS	Km	3	5	21	19	19	26	10	13	33	12	1	162	265	1.64	
		Birds	5	10	19	36	61	24	18	21	47	19	5	-			
North Coast SI	NS	Km	3	2	3	-	-	-	-	-	-	-	-	38	15	0.39	
		Birds	2	12	1	-	-	-	-	-	-	-	-	-			
Outlying Islands	OI	Km	-	-	-	-	-	-	-	-	-	-	-	8	9	1.12	
		Birds	-	-	-	-	-	-	-	-	-	-	-	-			
Total Kilometres Travelled			302	134	254	385	296	573	489	155	285	180	211	193	3457	2857	8.51
Total Kilometres Covered (not listed above)			281	116	217	296	245	473	417	137	244	153	177	153	2909	24747	
Total Birds Recorded			854	340	733	2788	2955	8200	6719	545	566	158	487	402			
Birds/Kilometres Covered/Month			3.04	2.93	3.38	9.42	12.06	17.34	16.11	3.98	2.32	1.03	2.75	2.63			

* There were no patrols on the Fiordland Coast.

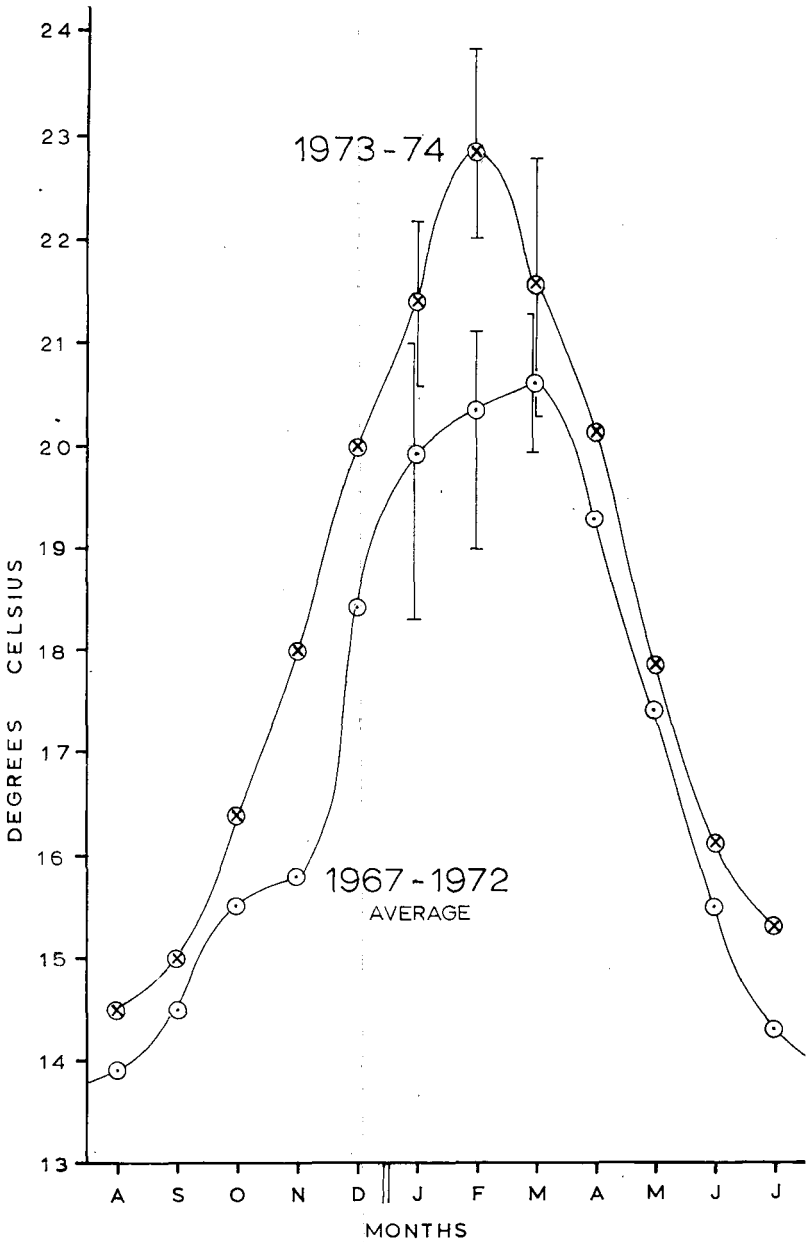


FIGURE 1 — Average monthly sea temperatures at Leigh, with ranges shown for January, February and March.

covered are the lengths of coast covered monthly. Hence, if a kilometre of beach is patrolled 3 times in one month, 3 kilometres have been travelled but only one kilometre covered per month.

The usual pattern of lowest mortality in late summer and autumn has this year been completely obscured by two large wrecks and many lesser ones.

Beginning in late March, and continuing through April and May, large numbers of Blue Penguins were washed ashore on both coasts of Northland. The largest part of this wreck was on Auckland East beaches in April when 2207 Blue Penguins were found (16 birds per kilometre covered). There is little doubt that this wreck was due to starvation and that mainly young birds were killed. It is also interesting to note that of the 15 randomly collected specimens examined by the Whangarei Animal Health Laboratory 14 were females (H. Black pers. comm.). All 15 specimens showed clear signs of starvation and high internal parasite numbers as are frequently associated with loss of healthy condition. Weather conditions at the time of this wreck were average but during the preceding summer months the weather in the Northland area had been mainly fine and calm with average air temperatures as much as 4°C above normal. This affected sea temperatures (Figure 1) and there was a subsequent lack of phytoplankton growth (W. J. Ballantyne pers. comm.). It is presumed that this lack of phytoplankton caused a breakdown in the food chain and a reduction of food available to penguins. At the same time the lack of phytoplankton clouding the water, and lack of turbidity caused by storms and flood water meant that the seawater was clearer. It might be assumed, therefore, that it was more difficult for penguins to catch their prey.

The major wreck of the year consisted of all the Prion species usually recorded, and occurred during late June and July along the entire west coast of New Zealand. Birds from this wreck continued to be found until September. In terms of total numbers of birds found, and as birds per kilometre patrolled, this was by far the largest wreck of seabirds recorded in New Zealand. In June on west coast beaches Prions were found at a rate of more than 23 per kilometre covered. This is also the first recorded occasion that all the Prion species have been found at the same time (Figure 2). At the time of this wreck weather conditions along the west coast were not unusual but in the first three weeks of June there were a number of deep depressions, down to 965 millibars, between the central Tasman Sea and Macquarie Island. These were followed by a period of light to moderate westerly winds during the last week of June and most of July. The Prions involved in this wreck showed obvious signs of starvation. A number were found alive on the beaches but did not respond to feeding. It might be assumed, therefore, that these birds were involved in the bad weather in early June and their body condition was reduced to such a level that they were not able to

TABLE 2 : Seabirds of which 1 to 5 specimens were found dead in 1974. Coast and month of discovery given.

SPECIES OR SUBSPECIES	NUMBER FOUND	COAST(S)	MONTH(S)
Megadyptes antipodes	4	CS, O(2), WS	2, 2, 7, 11
Eudyptes p. sclateri	2	CS, WS	4, 6
Phoebastria palpebrata	4	AW, AE, CS, WS	3, 6, 7, 7
Pterodroma mollis	1	AE	12
pycrofti	1	AE	1
h. nigripennis	2	AW, AE	4, 6
Procellaria spp	1	AW	12
cinerea	1	WS	8
parkinsoni	2	AW, WS	1, 5
westlandica	1	AW	11,
aequinoctialis	2	AW(2)	3, 11
Garrodia nereis	1	WW	6
Phalacrocoracidae	1	AW	11
sulcirostris	1	CN	6
melanoleucos	3	WW, EC, CN	4, 6, 6
Leucocarbo c. chalconotus	4	O(2), S(2)	2, 2, 9, 9
onslowi	1	OI	3
Stercorarius s. lombergi	4	AW(2), AE, WDI	1, 4, 4, 9
parasiticus	1	AW	6
Procelsterna cerulea	1	AE	1
TOTAL	38		

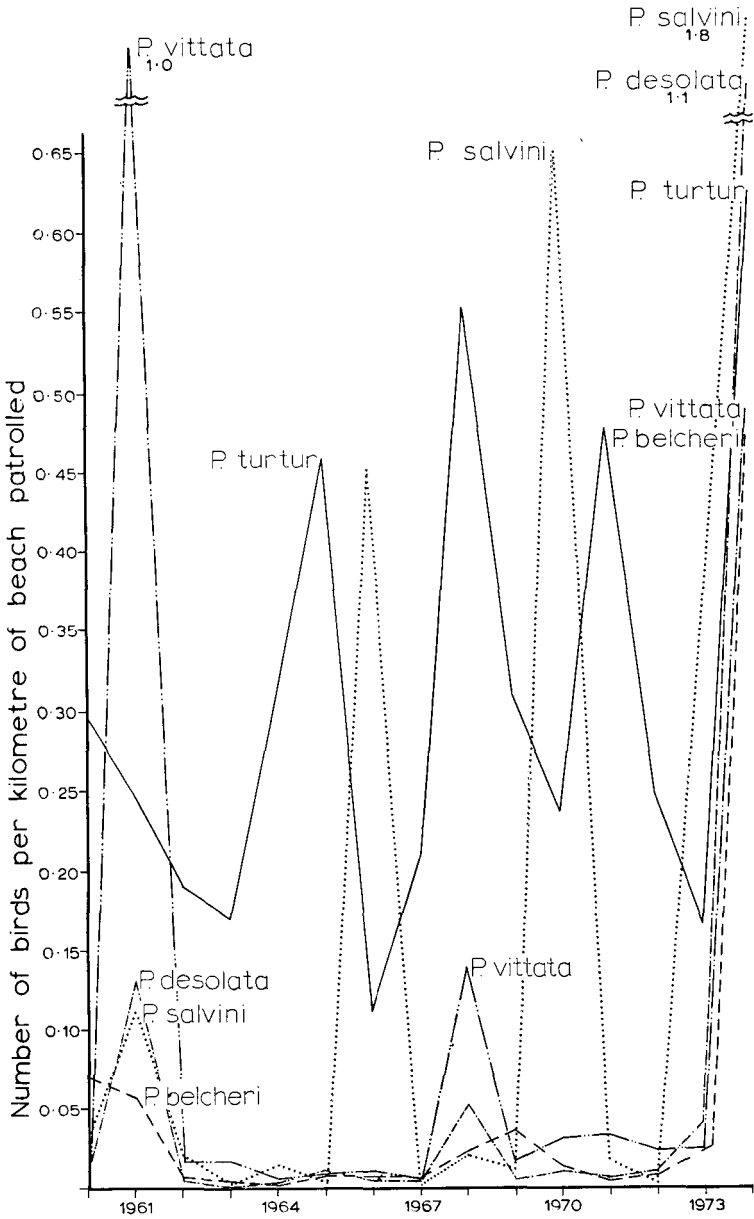


FIGURE 2 — Fluctuations in the number of Prions found on New Zealand beaches.

recover in the better sea conditions later in the month or closer to New Zealand.

The lesser, more localised, wrecks occurred in most months of the year. There are four major likely causes of such wrecks being recorded by patrollers:—

1. An increase in patrolling activity in a particular area.
2. Local weather patterns causing birds which might normally drift away to be washed ashore. This is particularly likely on east coast beaches.
3. The presence of local seabird breeding colonies and their success or failure in any one season.
4. The fluctuation of local food supplies — particularly for penguins and other less mobile species.

As not all of the above factors are known to me, it is not reasonable to try to explain all the following wrecks.

In January there were larger than usual numbers of Blue Penguins and Fluttering Shearwaters (*Puffinus gavia*) on both Auckland West and Auckland East beaches. There were also extra numbers of Fairy Prions (*Pachyptila turtur*) and Diving Petrels (*Pelecanoides urinatrix*) found on Auckland East beaches. Weather records for this month show a high frequency of south and east winds. The amount of patrolling on Auckland East has also increased considerably.

In February Auckland East continued to have higher than usual numbers of Blue Penguins and Canterbury North had extra Spotted Shags (*Stictocarbo punctatus*). Extra north-east winds were recorded during this month.

In late April, following a period of southerly storms, South Canterbury beaches received a high number of Spotted Shags.

In May there was the expected mortality of Sooty Shearwaters (*Puffinus griseus*) at the time when the young leave their nests, but this year the number found (1154) was considerably higher than usual. 972 birds of this total were found on 10 kilometres of Southland beach. Patrols at the same time in past years have produced much lower numbers of birds. This Sooty Shearwater wreck was also recorded, but not so marked, on Canterbury and Wellington South beaches. The number found on East Coast (N.I.) beaches was higher at 5.5 per kilometre.

Throughout the months of May, June and July Canterbury South received higher than usual numbers of Spotted Shags.

In August strong south-east winds and extra numbers of Fluttering Shearwaters caused the high total for East Coast (N.I.). In Southland during August and September there were extra Diving Petrels.

TABLE 3 : Coastal distribution of the more common seabirds found dead in 1974

SPECIES OR SUBSPECIES	AW	T	WW	WD	AE	BP	EC	W	CY	CS	O	S	WS	NS	ROI	TOTAL
<i>Eudiptula minor</i>	954	3	18	-	3729	13	5	1	1	3	7	1	5	1	-	4741
<i>alboscignata</i>	-	18	3	-	-	-	-	-	4	21	1	4	3	-	-	27
<i>Diomedea ssp *</i>	-	2	3	-	-	-	-	-	4	1	1	4	3	-	-	36
<i>exulans</i>	3	1	-	-	1	-	1	-	-	2	-	-	-	-	-	8
<i>epomphora</i>	1	-	2	-	-	-	-	1	-	-	-	-	2	-	-	6
<i>melanophris</i>	4	1	-	-	-	-	-	-	-	-	-	-	2	-	-	8
<i>chrysostrama</i>	36	2	-	-	-	-	1	-	-	-	-	-	1	-	-	40
<i>bulleri</i>	2	1	-	-	-	-	1	-	-	2	-	-	1	-	-	6
<i>cauta subspp *</i>	6	-	-	-	1	-	1	-	-	3	-	-	1	-	-	12
<i>cauta</i>	5	-	1	-	-	-	-	-	1	-	-	-	1	-	-	9
<i>salvini</i>	-	-	-	-	2	1	-	-	-	1	2	-	-	-	-	6
<i>Macronectes giganteus</i>	30	1	4	-	4	1	2	-	2	1	2	2	3	-	-	50
<i>Fulmarus glacialisoides</i>	15	-	-	-	-	-	-	-	-	1	-	2	1	-	-	19
<i>Daption capensis</i>	105	5	12	-	7	1	4	-	4	2	1	20	-	-	-	161
<i>Pterodroma ssp *</i>	2	-	-	-	6	-	-	-	-	-	-	-	-	-	-	8
<i>macraptera</i>	17	-	-	-	35	2	-	-	-	-	-	-	1	-	-	54
<i>lessoni</i>	45	-	5	-	1	-	-	-	-	-	-	-	1	-	-	52
<i>inexpectata</i>	9	1	4	-	1	-	-	-	-	2	-	1	-	-	-	14
<i>brevirostris</i>	41	-	4	-	4	-	-	-	-	-	-	2	-	-	-	49
<i>cooki</i>	9	-	-	-	4	-	-	-	-	2	-	-	-	-	-	53
<i>Halobaena caerulea</i>	11	-	2	-	4	-	-	-	-	-	-	-	-	-	-	15
<i>Pachyptila ssp *</i>	1560	20	245	14	24	1	4	-	2	11	-	4	7	1	-	1907
<i>virescens</i>	4486	27	332	4	11	-	4	-	1	1	-	2	6	-	-	1175
<i>salvini</i>	27	62	4	-	4	-	4	-	10	4	-	4	4	-	-	5228
<i>desolata</i>	2950	9	188	11	5	1	7	-	4	-	-	-	4	-	-	3186
<i>halcheri</i>	1074	9	328	3	3	-	2	-	2	-	-	-	4	-	-	1326
<i>caur</i>	1074	12	488	3	159	2	7	7	6	11	9	8	21	2	6	1765
<i>Puffinus ssp *</i>	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	21
<i>capripes</i>	14	1	9	-	163	1	2	-	-	2	-	-	1	-	-	181
<i>bulleri</i>	32	-	1	-	143	-	-	-	-	-	-	-	-	-	-	193
<i>griseus</i>	161	4	53	-	143	40	48	1	29	43	6	977	51	-	-	1538
<i>gavia</i>	40	-	2	-	4	-	-	-	2	2	-	-	2	-	-	92
<i>brevirostris</i>	280	12	58	-	243	10	18	-	2	2	-	-	11	-	-	636
<i>gattoni</i>	4	-	2	-	-	-	-	-	7	6	-	-	2	-	-	21
<i>rossi</i>	2	-	-	-	31	15	5	-	-	4	-	-	-	-	-	53
<i>tasimilis</i>	6	-	-	-	8	2	1	-	-	-	-	-	-	-	-	23
<i>Polysteganus marina</i>	171	8	63	3	444	9	12	1	1	2	-	36	7	1	-	758
<i>Pelecanoides urinatrix</i>	90	-	-	-	131	3	3	-	-	2	-	-	-	-	-	233
<i>Sula bassana</i>	4	-	1	-	-	-	-	-	1	2	-	-	1	-	-	14
<i>Phalacrocorax carbo</i>	4	-	-	-	10	-	-	-	-	-	-	-	-	-	-	14
<i>varius</i>	5	-	1	-	-	-	-	-	56	243	3	2	1	-	-	309
<i>Stictocarbo punctatus</i>	130	7	53	1	32	4	5	-	32	18	3	18	57	1	-	365
<i>Larus dominicanus</i>	26	7	11	-	54	6	-	-	22	10	1	1	39	-	-	172
<i>novaezelandiae</i>	2	-	7	-	-	-	1	-	6	4	-	6	1	-	-	24
<i>bulleri</i>	10	-	5	-	1	1	1	-	-	-	-	-	-	-	-	18
<i>Hydroprogne caspia</i>	25	3	3	1	19	1	-	-	4	3	-	-	-	-	-	59
<i>Sterna striata</i>	13641	153	3104	41	5524	123	136	4	187	410	28	1075	260	15	0	24709

* Species or subspecies not identified.

The expected northern wreck of Sooty Shearwaters came in November this year to Auckland West, Auckland East and Bay of Plenty beaches. At the same time and during December, there were large numbers of Spotted Shags on South Canterbury beaches.

During December a period of north-east winds brought extra numbers of many species to Auckland East. Bay of Plenty beaches also received these extras while continuing to receive high numbers of Sooty Shearwater.

The Soft-plumaged Petrel (*Pterodroma mollis*) found on Ruakaka Beach, Auckland East, is the most unusual find of the year. This is the third record of this species for mainland New Zealand and the second record for Beach Patrolling.

This year is the first time a Grey Ternlet (*Procelsterna cerulea albigitta*) has been recorded in the Beach Patrol Scheme although others have been found on beaches (F. C. Kinsky pers. comm.) and four should have been recorded in 1973 Beach Patrol data (D. E. Crockett pers. comm.). This species is known to be present in low numbers on a few rock stacks between the Poor Knights and White Islands.

Also of interest are the two Erect-crested Penguins (*Eudyptes pachyrhynchus sclateri*) found in early winter on South Canterbury and Wellington South beaches. This species has been recorded only once before on Beach Patrols; 3 birds in 1963. The Checklist (OSNZ 1970) records this species as ranging as far north as North Cape.

Other species not commonly found on Beach Patrols were:— One Pycroft's Petrel (*Pterodroma pycrofti*), two Black-winged Petrels (*P. hypoleuca nigripennis*) and one Grey-backed Storm Petrel (*Garrodia nereis*).

The apparent increase in a number of other species found can be related to an increase of patrolling in some areas. For example, in Auckland East the length of beach covered almost doubled during this year. This has produced good data and an increase in recorded deaths of species which frequent waters off that coast e.g. — Cook's Petrel (*Pterodroma cooki cooki*), Flesh-footed Shearwater (*Puffinus carneipes hullianus*), Buller's Shearwater (*P. bulleri*), Fluttering Shearwater, White-faced Storm Petrel (*Pelagodroma marina maoriana*), Diving Petrel and Australian Gannet (*Sula bassana serrator*).

Miscellaneous birds recorded, but not considered to be seabirds, totalled 158. These were:— 23 Magpies (both sub-species), 22 Black-birds, 17 Mallard Ducks, 16 Rock Pigeons, 8 Pukekos, 7 Starlings, 6 each of S.I. Pied Oystercatchers and Mynas, 5 each of Harriers, Black Swans and Pheasants, 4 Grey Ducks, 3 each of Tuis, Pied Stilts, Silvereyes, Song Thrushes, Chaffinches and unidentified Passerines and Ducks, 2 each of Variable Oystercatchers, Reef Herons and Domestic Geese and one each of Knot, Bar-tailed Godwit, House Sparrow, White-faced Heron, California Quail, Shining Cuckoo and Long-billed Curlew.

TABLE 4 : Monthly distribution of the more common seabirds found dead in 1974

SPECIES OR SUBSPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL BIRDS
<i>Eudiptula minor</i>	137	106	455	2437	1158	251	137	13	14	4	10	19	4741
<i>albesignata</i>	1	1	14	3	1	1	1	-	-	3	-	2	27
<i>Diomedea</i> spp*	-	2	-	1	-	15	4	3	4	2	4	1	36
<i>exulans</i>	-	-	1	2	1	1	1	-	-	1	1	-	8
<i>epomophora</i>	-	1	-	-	1	1	-	1	-	1	1	-	6
<i>melanophris</i>	1	-	-	2	1	2	1	-	1	-	-	-	8
<i>chrysostruma</i>	1	-	-	-	-	2	12	10	12	1	2	-	40
<i>bulleri</i>	-	2	-	-	1	1	1	-	1	-	-	-	6
<i>cauta</i> sub spp*	-	-	2	-	-	3	2	-	3	-	1	1	12
<i>cauta</i>	-	1	-	-	2	1	-	2	1	-	1	-	8
<i>salvini</i>	1	1	2	1	1	-	-	-	-	-	-	-	6
<i>Macronectes giganteus</i>	1	-	-	3	2	6	15	4	8	5	4	2	50
<i>Fulmarus glacialisoides</i>	1	-	-	-	-	-	4	4	5	2	2	-	19
<i>Daption capensis</i>	-	1	1	-	2	44	43	18	29	12	10	1	161
<i>Pterodroma</i> spp*	5	-	-	2	1	-	-	-	-	-	-	-	8
<i>macroptera</i>	22	3	-	3	5	7	2	-	2	3	3	4	54
<i>lessoni</i>	2	-	-	1	4	17	17	1	1	1	6	2	52
<i>inexpectata</i>	1	1	-	1	3	1	-	-	-	-	3	4	14
<i>brevirostris</i>	-	-	-	-	-	3	12	8	23	-	3	-	49
<i>cooki</i>	14	-	5	4	1	-	-	-	-	2	8	21	55
<i>Halobaena caerulea</i>	-	-	-	-	-	2	4	7	1	-	1	-	15
<i>Pachyptila</i> spp*	19	6	20	8	11	589	952	93	178	9	13	9	1907
<i>vittata</i>	1	1	-	2	13	830	294	20	12	1	1	-	1175
<i>salvini</i>	-	-	-	1	31	3113	2027	41	12	2	-	1	5228
<i>desolata</i>	-	-	10	1	5	1619	1487	47	14	1	2	-	3186
<i>belcheri</i>	-	-	-	1	3	703	573	35	8	-	5	-	1326
<i>turtur</i>	113	38	19	16	28	541	754	125	61	19	34	17	1765
<i>Puffinus</i> spp*	13	3	-	-	-	6	1	1	-	-	2	1	27
<i>carneipes</i>	32	13	20	22	13	7	-	1	4	1	39	29	181
<i>bulleri</i>	37	11	15	17	39	21	3	-	-	6	29	15	193
<i>griseus</i>	21	16	16	42	1154	76	28	1	1	5	98	100	1558
<i>tenuirostris</i>	15	2	2	1	15	11	1	-	-	1	10	35	93
<i>gavia</i>	134	29	26	43	54	78	109	41	53	14	37	18	636
<i>huttoni</i>	3	6	5	-	1	1	2	-	1	-	-	2	21
<i>assimilis</i>	3	-	-	7	4	16	3	3	-	1	7	9	53
<i>Pelagodroma marina</i>	3	-	1	1	1	-	1	2	1	2	4	5	21
<i>Pelecanoides urinatrix</i>	133	12	6	10	248	105	110	30	39	7	22	36	758
<i>Sula bassana</i>	51	17	21	23	10	8	21	6	21	9	22	24	233
<i>Phalacrocorax carbo</i>	-	1	3	-	1	1	-	1	-	-	-	-	7
<i>varius</i>	-	-	-	6	-	2	1	1	1	1	-	2	14
<i>Stictocorax punctatus</i>	2	19	28	33	62	24	22	6	2	18	73	20	309
<i>Larus dominicanus</i>	26	13	22	53	48	52	51	16	35	20	16	13	365
<i>novaehollandiae</i>	42	14	19	22	19	22	16	-	12	3	5	3	177
<i>bulleri</i>	3	6	2	6	2	3	-	-	-	-	-	2	24
<i>Hydroprogne caspia</i>	2	-	7	-	-	3	2	1	2	-	1	-	18
<i>Sterna striata</i>	10	10	8	8	8	2	2	1	1	2	5	2	59
TOTALS	850	336	730	2783	2954	8192	6716	544	563	158	483	400	24709

* Species or subspecies not identified

1976

SEABIRDS 1974

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ACKNOWLEDGEMENTS

The success of the Beach Patrol Scheme in 1974 is due to the 147 people who are known to have taken part and all the others who took part but did not enter their names on the cards.

I am also indebted to Mr H. Black, Animal Health Laboratory, Ministry of Agriculture & Fisheries, Whangarei, Dr W. J. Ballantyne, Marine Biology Station, University of Auckland, Leigh, and to my numerous critics who have assisted with the preparation of this paper.

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 SHORT NOTE

 FURTHER RECORDS OF THE GREY PETREL
 ON CHATHAM ISLAND

In *Ibis* 109: 3, Bourne (1967) listed 5 humeri and 2 coracoids of the Grey Petrel, *Procellaria cinerea* Gmelin, from the Forbes collection of Chatham Island bones in the B.M.(N.H.).

From the many thousands of bones collected by myself and others from Chatham Island dunes in 1972-73, a few more bones of this bird have been identified, thanks to the kindness of Dr John Warham in presenting, recently, a skeleton of the Grey Petrel, which our reference collection had lacked. This enabled confirmation of the identification of bones which both John and I had regarded as probably of this species. The localities are: Dunes at the northern end of Long Beach, dunes at Te One, and dunes at Waitangi. 4 humeri (2 left, 2 right), 3 ulnae (2 left, 1 right) from a minimum of 4 individuals. It is probable that other bones of the Grey Petrel will be found among the many hundreds of Chatham Island bones yet to be identified.

R. J. SCARLETT

Canterbury Museum

LABOUR WEEKEND SCHOOL 24 to 27 October 1975

A cold winter-like evening greeted the first arrivals on Friday night. However, cold often accompanies fine weather and Saturday was no exception as twenty-one visitors plus four local members headed for the coast in beautiful sunshine. The Kaituna Lagoon was first on the programme and here we were joined by Roy Weston with other Bay of Plenty members. Alas, it was not the Kaituna's best day; the place was alive with nesting Pied Stilts but little else until just as we were leaving and we spotted a lone Knot and a very tame Sharp-tailed Sandpiper.

Tony Palliser then led us to the upper part of Little Waihi Estuary where a treat lay in store for us in the shape of two Glossy Ibis and a Little Egret. Also present were Godwits, a Golden Plover and Caspian Terns. If this was not enough the return to our cars gave us a White Ibis surrounded by Grey Teal, Shoveller Duck and Mallards.

That evening Kelly Rennell gave a fascinating talk, backed by excellent slides, on the birds and animals he had observed while stationed on Campbell Island engaged on meteorological work.

On Sunday the scheduled forest survey at Waiotapu was abandoned owing to wet weather so a trip to Lake Rerewhakaaitu was made instead. Even the ducks found it too wet although we did see Dabchick, Scaup, Shoveller and Mallard ducks as well as seven Caspian Terns and a large flock of Black-billed Gulls.

Before lunch we did manage a short stop in Waiotapu Forest and heard, but did not see, Long-tailed Cuckoos. We ate at the old forest village site which, without houses, has a park-like appearance. Tuis and Bellbirds were attracted by the waratah trees. Having eaten, the party walked round the beautiful Echo Lake with its thermally-coloured waters which greatly improved the light for observing the families of Grey Teal and Grey Duck which swam across the waters. Several members saw their first Whiteheads and Tomtits; Robins did not appear unfortunately.

A dash was then made to the Ngongotaha Trout Hatchery where we were shown all the stages of development. Of considerable interest were some penned waterfowl which included some Australian Black Ducks.

That evening the Wilcox home was opened to an enjoyable buffet meal where friends, old and new, were able to exchange ornithological gossip.

4 a.m. next morning saw us heading for the coast again bent on seeing Marsh Crakes. Half the party went to Te Teko and were successful while the rest met no success at Matata; some Fern Birds were seen though and provided new species for some members. Both groups then headed for Rotoma where the Kokakos turned on a star performance. Good views of Bitterns were also had at nearby Soda Springs. The second group tried again for crakes at Rotongata but the elusive birds were heard more than seen and these were only Spotless Crakes.

Goodbyes were finally said at the Blue Lake Camp and the school came to an end.

Raymond Jackson,
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SHORT NOTE

INEXPERIENCED HUNTING BEHAVIOUR BY AN AUSTRALASIAN HARRIER

On 18 January, a fine evening, I was lying down in a flat rough paddock beside a trained native falcon (*Falco novaeseelandiae*) being used for research. The falcon looked up from feeding and I turned and noticed a Harrier (*Circus approximans*) about 400 metres away. The Harrier, a young bird, probably female, was flying steadily towards us searching the area below. About 30 metres from us she broke her flight and started circling over something without noticing me lying quietly. She circled with legs dangling, almost landing several times and interested in something in the shortish rough grass.

I sat up slowly to get a better view and saw to my surprise that she was circling over my black cocker spaniel bitch who was snuffling around after mice. The dog, being used to trained hawks flying about, was oblivious to the Harrier a metre or so over her back.

Eventually the hawk landed about two metres from the dog. The dog glanced up at the hawk which promptly took off in fright. After circling once more the hawk flew across the paddock and landed on the top of a 5 metre sawn-off pine windbreak, another sign of inexperience.

Judging by the date and the bird's immaculate plumage, she was in the process of becoming independent. This is the period when a lot of hawks run into difficulties. I have had experience of trained Eagles (*Aquila chrysaetos*) and Goshawks (*Accipiter gentilis*) attacking pointers and springer spaniels but I would not have expected such behaviour from a Harrier.

N. C. FOX

SHORT NOTES

BEHAVIOUR OF BIRDS WHEN ATTACKED BY NEW ZEALAND FALCONS

On 21 August 1975 I was working with a group in the Matea area of Kaingaroa Forest when we had the following interesting observation. We were at a compartment that had been cultivated prior to planting which had proved attractive to Skylarks (*Alauda arvensis*) and had just had lunch when a Falcon (*Falco novaeseelandiae*) flew over. Almost at once it saw the larks and flew towards one. The lark took off in time to dodge the first rush and started a gentle climb with the hawk in full pursuit. As the hawk had the advantage of speed it made several more passes at the lark, but without success. At this stage the lark started to sing and as it came over us found a thermal which enabled it to start a spiral climb. The falcon, although still chasing, was obviously tiring and starting to fall behind so at this stage banked away leaving the lark. On 18 September I saw another similar chase at Goudies Block near Kaingaroa. Again a falcon was chasing a lark and the bird must have used the same tactics to evade the hawk as they were high above the field. On 27 August Messrs G. Brunnsden and P. Bowles were out at Matea again at a similar compartment to the former one and close by. They had two dogs with them which attracted a falcon; the bird flew round above the animals until a N.I. Fantail (*Rhipidura fuliginosa placabilis*) flew out of a monoa bush and across to the group. The falcon immediately tried to catch the fantail by diving at it. The fantail dodged the attack and flew off close to the ground. The falcon made repeated attacks by rising to about 6 m then diving at the fantail; this chase continued until the birds disappeared over a hill. Soon after this the hawk returned to sit in a nearby monoa bush. The outcome of the chase was not known.

The above observations caused me to remember another falcon episode in my garden. This took place in September 1962 when my lawn had been recently sown in grass seed. As usual this attracted House Sparrows and Yellowhammers. One morning while eating breakfast I saw the feeding sparrows suddenly scattered by the sudden rush of a falcon. The sparrows made for the fence and landed in the holes of the large wire netting while the hawk had landed on the top where it looked down at the sparrows below. The sparrows continued to look up at the hawk until it tried to dive down at them. This appeared to be what the sparrows had been waiting for as they immediately flew out the other side to safety.

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FIRST SIGHTINGS OF THE HOARY-HEADED GREBE
(*Podiceps policephalus*) IN NEW ZEALAND

Recently there have been three reported sightings of a new species of grebe in the New Zealand region. The first was made at The Snares (on the east coast of Main Island) some 105 km southward of Stewart Island and was reported by B. D. Bell in Classified Summarised Notes (*Notornis* 22 (4): 314; 1975).

At 0735 hrs (NZST), 11 February 1975, Dr D. S. Horning informed me of a strange bird he had just seen swimming around in the sea of Boat Harbour. After studying the bird for 90 minutes with the aid of 7 x 35 binoculars at a range of 3-20 m, I made the following description.

General Appearance:

Similar to the New Zealand Dabchick (*Podiceps rufopectus*) in size and build.

Bill colour:

Pale yellow-grey on the lower mandible, darkening towards the dorsal surface of the upper mandible.

Head plumage:

A broad band of grey-brown extended from the base of the upper mandible, over the crown and down to the nape. The sides of the head were clad in short, square-ended, pale straw-coloured plumes which protruded through and almost completely covered the underlying grey-brown contour feathers.

Back and wings:

Grey-brown as for the crown and nape, with an indistinct, pale cream-grey wing bar at the tip of the folded wing.

Sides, flanks and rump:

Light grey-brown.

Chin, throat, breast, belly and undertail coverts:

Very pale grey, almost white.

Behaviour:

For most of the time the bird had a compact pose, with its head tucked down on top of the shoulders, and bill lying on the chest. The bird did not appear to be concerned by the short, choppy 1-1.5 m high swell. On the six occasions the podiceps dived it stayed underwater for 8-15 seconds. The bird did not bring any food to the surface and underwater visibility at the time was poor as the sea was stained from peat washed into the sea by recent rain.

Red-billed Gulls, Southern Skuas and Antarctic Terns nesting nearby, and the few fur seals and sea-lions in Boat Harbour, seemed to disregard the newcomer, nor did it show any reaction to their presence.

Although the bird was seen later in the day, it was not sighted subsequently and its fate was unknown.

Reference to Frith (1969, *Birds in the Australian High Country*, Sydney: Reed), Slater (1970, *Field Guide to Australian Birds. Non-Passerines*, Adelaide: Rigby) and MacDonald (1973, *Birds of Australia*, Sydney: Reed), as well as consultation with Mr F. C. Kinsky of the National Museum (who, with Mr B. D. Bell, of the Wildlife Service, confirmed the identifications of the two subsequent reports), indicate that the strange podiceps was a Hoary-headed Grebe (*Podiceps poliocephalus*), a resident of Australia and Tasmania.

The second sighting of a Hoary-headed Grebe, in winter plumage, was made by Mr E. B. Jones at Horowhenua Lake on 17 June 1975, and 5 July 1975. The last reported sighting of the new grebe was made of two birds by Stuart Sutherland, of the Southland Acclimatisation Society, and J. M. Neilson, of the Department of Internal Affairs, while inspecting a flood retention dam at Lagoon Creek, Southland (map reference NZMS 1, S150 1902 3120) on 18 November 1975. The nesting of these birds has since been followed by Mrs Maida Barlow, of Invercargill, and her report appears elsewhere in this issue of *Notornis*.

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BREEDING OF HOARY-HEADED GREBE IN SOUTHLAND

On 18 November 1975 Messrs. Stuart Sutherland (Southland Acclimatisation Society) and J. M. Neilson (Department of Internal Affairs) saw two small grebes on the Lagoon Creek detention dam in the Te Anau area, 15 km from Te Anau and 130 km from Invercargill. They identified the birds provisionally as Hoary-headed Grebes (*Podiceps poliocephalus*). Messrs Sutherland and R. R. Sutton revisited the area on 19 December without finding the birds. They investigated other possible habitats in the district and eventually located the birds on the Dawson detention dam, a 3-hectare dam which has been in existence for about four years. The two dams are 4.6 km apart.

On 3 January 1976, Messrs Sutton, Grant Allan, Mervyn Jukes and the writer made the trip to the Dawson dam. In the shimmering heat the dam and adjacent marsh seemed alive with water birds, including about 750 Paradise Ducks (*Tadorna variegata*), nearly half of them in flightless moult. They spent the day cruising in flotillas, a spangled backdrop to cur day. Mallards (*Anas platyrhynchos*) and Shoveler (*Anas rhynchos*), 30+ Pied Stilts (*Himantopus himantopus*), 50+ South Island Pied Oystercatchers (*Haematopus ostralegus*) and 55+ Spurwinged Plovers (*Lobibyx novaehollandiae*) added colour and cacaphony. A flock of about 100 Black-billed Gulls (*Larus bulleri*),

hovering in the air and buoyant on water, lent a skittish ingredient to the scene. Black-backed Gulls (*Larus dominicanus*) had large young on the marsh, there were a few Pukekos (*Porphyrio porphyrio*) with one juvenile, and we flushed two Marsh Crakes (*Porzana pusilla*). We spent an hour and a half surveying and exploring this area but saw no sign of grebes, and were on the point of moving on to investigate other places when MJ spotted a single small grebe about 40 metres out in the water. We watched this bird for an hour during which it was apparently feeding, continually diving and surfacing. On twelve timed dives the bird spent 5-8 seconds on the surface, and 16-24 under water.

Description; &c:

A small dabchick-sized grebe. Upper parts brownish grey. Crown dark with brown/black sheen, this sheeny area widening behind the crown then narrowing and extending in a dark streak down back of neck; faint pale longitudinal streaks within dark area. Bill short, dark with pale tip. Eye dark, not prominent; eye level with border of dark crown. Area below eye-level and between dark crown and throat silvery-grey with dark striations extending from bill in a fan-like pattern; this pale grey area contrasted markedly with the dark crown, nape and throat which bordered it. Throat had a dark smudge, narrow under bill, extending and widening around neck but not meeting the dark streak down the back of the neck; upper breast had a faintly buffy wash. Underparts were very pale to undertail coverts. The bird rolled over and wing-stretched as it preened, showing pale underparts and a wide white wing-bar. It was generally nondescript, the dark sheeny crown and neck stripe and the under-chin smudge being the most noticeable features. It was feeding among Black-billed Gulls; when 400+ Paradise Ducks came near, the grebe stopped feeding and swam unmolested among the ducks.

We watched the bird for an hour from the bank with various binoculars and 20x telescope, at distances of 25-180 metres in bright sunlight complicated by glare. By 1400 hours it had worked its way down towards the south end of the dam and we also moved in that direction. We then saw a second bird, which "appeared from nowhere," and both birds continued the diving-surfacing pattern.

The second bird was more definitely coloured with brighter buff breast. Its head and facial feathering was less sleek, a little bristly, giving the impression of a slightly plumper head than the No. 1 bird.

At 1410 hours both birds were diving, coming up with material in their bills and carrying it to a *Carex secta* (niggerhead) clump 25 metres from the dam edge. Sometimes one bird remained in the carex while the other seemed to pass the material in. The nest was built between two carex clumps, occupying most of the area between. The drooping carex gave a complete overhead canopy, but from one direction the nest was visible at water level from at least 45 metres

away. It was possible to wade at knee-depth from shore to the nest-site. At close quarters the nest looked like a compact mound of decomposing vegetation, and at first sight it seemed that this was a nest under construction. Further examination revealed that there was a single egg, completely covered with nesting material. The outside diameter of the nest platform measured 250 mm and the cup measured 110 mm. The nest protruded about 60-70 mm above water level.

The egg was elliptical in shape, basically pale or white but very stained. The shell texture looked rough. It measured 40.3 x 28.1 mm.

While we were at the nest the No. 1 bird came to within 35 metres while the brighter bird remained more distant. At one time the No. 1 bird reared up in the water and flapped its wings, showing a pale underwing. At no time did we see the birds fly. Any possible calls were masked by the various other species.

We were at the nest for approximately ten minutes and covered the egg before leaving. From the bank we watched the birds return to the nest. One remained there and the other (the No. 1 bird again) continued feeding in the dam. We considered that the disturbance we caused had been well tolerated.

On the night of 5-6 January strong near gale-force winds hit the district. RRS returned to the dam on the afternoon of 6 January equipped with photographic hide and a small boat. Conditions were still unpleasant and a strong gusty south-westerly wind was blowing. He saw no grebes and the nest had disappeared entirely. The two carex clumps extended vertically underwater about 600 mm to the dam bottom. There was no sign of nest remnants or of the egg.

While our investigation on 3 January undoubtedly caused some disturbance, it is also worth noting that the place on shore from which the nest could be seen was approximately south-west of the nest, which would have had no protection from high wind from that direction. The columnar nature of the carex would provide no firm base. The 60-70 mm freeboard of the nest would give little insurance against choppy waves. It should be noted that detention dams are designed to accommodate substantial fluctuations of water level. With a rapid rise in water level this nest was vulnerable.

Incubation:

From the behaviour observed by RRS and SS on 19 December when two birds were seen initially, but one lost sight of and not seen again, it could be assumed that the pair may have been incubating at that time. The staining on the eggshell supports this theory, but the rough texture may counter it.

Campbell (1900, *Nests and Eggs of Australian Birds*, Part II, Sheffield) said of the Hoary-headed Grebe's eggs: "Clutch 4 to 5 occasionally 6; elliptical in shape; texture of shell fine; surface glossy,

and frequently rough with limy nodules; colour, a thin dull white coating obscures a greenish white shell. As is usually the case with Grebes' eggs, they become darker and more polished as incubation proceeds."

Further Nesting:

On 1 February 1976, SS located the birds back on Lagoon Creek Dam. They were taking particular interest in a dead bog-pine clump which protruded about 300 mm above water level. He suspected a further nest but decided against disturbing the birds at that time. He and RRS returned on 10 February and found the grebes with two small chicks. When the chicks were carried on the adults' backs the wing-position of the adults caused the white wing bar to become a bold feature. Eggshell fragments were collected from the nest which was in the bog-pine clump. On this day Ph reading of the water was 8, dissolved oxygen 11, temperature 22°C and there was a very abundant population of water animals with water boatmen and mosquito larvae predominating.

MJ and Mr & Mrs Harry Jukes found the pair with only one chick on 16 February. On 21 February RRS, GA and MLB found the family doing well, the live chick being about half the size of the adults. The decomposing corpse of the dead chick was found on the shore above water level.

The adults' plumage showed some changes. The black throat markings were now a very distinctive feature. The lower breast of the No. 1 (? female) bird had deepened in colour to a reddish buff. This bird remained close to the chick and was the only one of the two adults seen feeding the chick, which still climbed on its back at times. The No. 2 bird was close to the other two at times, but more often several metres distant.

Feeding pattern:

The adult dived, emerged, swam to chick. There was a quick food pass with bills barely touching, and adult dived again. In four timed minutes there were 7, 8, 6, 7 dives and food-passes. The chick itself dived several times.

Nests:

The successful nest was a packed mass of roots and mud, wedged well down into branchlets of the dead bog-pine clump, the top of which was about 500 mm above the mud, the water level having receded. The top of the nest platform was level with the top of the pine sticks. Investigation of other similar dead pine clumps revealed two other trial or abandoned nests, 10 and 15 metres from the ultimately successful nest. From the chain of events as known it seems likely that these two nests were constructed before 19 December, the birds moved to Dawson Dam, attempted to nest there as described, then returned to Lagoon Creek and nested successfully.

Rainfall:

Between 6 January and 21 February rainfall was minimal and water levels fell. The three nests, packed and firmly fixed in the dead bog pines, would have had no chance of surviving higher water levels. Steady or falling levels would be essential to successful breeding in this situation.

Later Notes:

On 14 March 1976, MLB and C. E. Barlow found the three birds still on Lagoon Creek Dam. The juvenile, now 4-5 weeks old, was the same size as the adults, but easily distinguishable by its pale throat and nondescript head colouring. The crown had irregular pale blotches on a greyish ground. The adults were in bright immaculate plumage. The birds' behaviour was interesting. The adults were seldom far apart, diving, emerging, swimming and preening almost synchronously, as though in tandem. The juvenile was in the same general area of the lagoon, but was more often 50-80 metres from the adults than close to them. It made frequent approaches to the adults, but was chivvied and chased, or rebuffed by a threat posture of lowered head from one or both adults. The juvenile fed independently. We watched the three birds for 2½ hours. There was no sign of further nesting.

Protection:

Ballots are held for shooting stands in these dams in the game-bird shooting season. If the Grebes are still in the area in April RRS intends to ensure that no ballot is held and shooting prohibited in the dams this season.

FOOTNOTE:

In May 1975, Mr Paul Gay, Nature Adviser to the Southland Education Department, saw and photographed a strange small grebe on a backwater of Monowai River, 41 km from the Lagoon Creek Dam. Unfortunately, a positive identification cannot be made from his description or photograph, but it is possible that this may be one of the pair described. It is worth noting that these sightings have occurred in a year notable for its influx of Australian vagrants.

Sightings of the Hoary-headed Grebe in New Zealand are documented by Best elsewhere in this issue of *Notornis*.

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38 Filleul Street,
Invercargill

ANNUAL GENERAL MEETING 1976



The 37th Annual General Meeting was held in the Epuni Community Centre, Lower Hutt, on 22 May. The President's address, which was given to 64 members and friends, outlined the ornithological achievements of the Society in the last year and the plans for future work. The highlights of the year were the discovery of a Christmas Island Shearwater *Puffinus nativitatus*, a new record for New Zealand, the re-discovery of the Campbell Island Teal and the successful breeding of a pair of Hoary-headed Grebes.

Three Labour Day Weekend courses were held in 1975; the two centred on riverbeds suffered from the weather but the other in the Rotorua district was enjoyed by many members. This year a survey of Kokako distribution is planned by Auckland regions and in the south a further riverbed survey is planned, probably on the Maitua. A summer course for selected junior members is envisaged for Farewell Spit in January 1977 and the following year a course catering for more members along the Bay of Plenty coastline. Reports from the Society's Scheme Organisers and Committee Conveners were summarised and read to the meeting. A Junior Member Award is to be presented to Colin O'Donnell from Nelson for his outstanding contributions to the work of the Society and the initiative shown in conducting research of his own. The meeting was informed that Council had made a grant of \$2000 to The Miranda Naturalists' Trust to assist with the building of a bird observatory on the Firth of Thames.

This year the election of four Councillors was hindered by postal delays and other circumstances beyond the control of Council which prevented some members from exercising their rightful voting privileges. However, despite these regrettable circumstances the meeting decided that Council had acted in good faith and that the vote as recorded be accepted as valid. The successful candidates were Dr Ben D. Bell, Mr M. L. Falconer, Mr F. C. Kinsky and Mrs S. M. Reed.

The A.G.M. was preceded by a morning meeting of Regional Representatives where an exceptional turnout provided a variety of suggestions on how to stimulate ornithological research within the regions. Dr L. J. Davies has replaced Dr I. G. Andrew in the Manawatu region. In the afternoon the following speakers contributed to the session of lectures: Dr D. G. Dawson, Bird Counts in Westland and their implications for Conservation; Mr B. D. Bell, An Expedition to Christmas Island; Mr R. R. Sutton, Breeding of the Hoary-headed Grebe in Southland; Mr M. L. Falconer, The Wellington Harbour Survey; and Mr C. J. R. Robertson, Rediscovery of the Campbell Island Teal.

A field trip on the Sunday to the coastal lakes at Pencarrow was supported by 12 car-loads of enthusiastic members and perfect weather conditions. The nesting colony of Black Shags was visited and observations were made on the Spotless Crake and the waterfowl.

P. D. GAZE, Secretary

TREASURER'S REPORT

For Year Ended 31st December, 1975



PRESENTED AT THE A.G.M. OF THE
ORNITHOLOGICAL SOCIETY OF N.Z. (INC.)
WELLINGTON — 22 MAY 1976

During the year 116 new members were admitted, 67 left by resignation and death and 43 were struck off because of being unfinancial. This is a net increase of 6, making the total membership at the end of the year 1161. The details are 1 honorary life, 77 life, 21 endowment, 709 ordinary, 57 junior, 5 family, 105 corporate bodies, 93 husband and wife, counting as two, making the total of 1161.

The total income was \$11444 compared with \$7669 for the previous year, an increase of \$3775. Members' subscriptions, reflecting the higher rates for 1975, were \$6325, an increase of \$2057. The profit from the sale of Christmas cards \$2266 is an all time high, and the Society thanks those responsible whose efforts have made possible the considerable income which has been received over the past years. Sale of back numbers of *Notornis* amounted to \$602 which is also a record. Interest on investments \$1615 is an increase of \$509 on last year's combined figure for dividends and interest of \$1106. The Society was grateful to receive a bequest of \$102 from the estate of the late Mr W. J. Burns of Trentham.

Expenses totalled \$9731, \$2343 more than last year. *Notornis* printing and distribution costs increased by \$834 to \$6769. Back numbers of *Notornis* which were out of stock were reprinted, the cost being \$1680.

The substantial surplus for the year, \$1713, thanks to the profit on the sale of the Christmas Cards, has been added to the Accumulated Fund.

Royalties on the revised edition of the *Field Guide* amounting to \$2065 were received and credited to the Projects Assistance Reserve. In all the Society has received \$4350 since the first printing of the revised edition.

The loan of \$400 to the Auckland Electric Power Board matured in October.

During the year \$2000 was invested in the BNZ Finance Co., Ltd., first ranking debenture stock from which interest at the rate of 10% is received.

H. W. M. HOGG, Hon. Treasurer

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC)STATEMENT OF ACCOUNTS FOR THE YEARENDED 31ST DECEMBER 1975

<u>1974</u>	<u>INCOME WAS EARNED FROM</u>	
4268	Subscriptions	6325
199	Transfer from Life Members	199 (Note I)
118	Donations	59
1462	Profit from Christmas Cards	2266
381	Sale Back Numbers	602
-	Surplus Summer School	109
-	Surplus Annual General Meeting	20
-	Sale Car Stickers	46
38	Biology of Birds	25
6466	<u>TOTAL ORDINARY INCOME</u>	<u>\$9651</u>
	<u>PLUS INVESTMENT & OTHER INCOME</u>	
892	Interest	1615
214	Dividends	-
76	Premium on Maturity of Local Body Stock	-
21	Royalties	31 (Note II)
-	Booksellers Margin on direct Checklist Sales	5
-	Legacy Late W.J. Burns	102
-	Sale of Tent	40
1203	<u>TOTAL INVESTMENT & OTHER INCOME</u>	<u>\$1793</u>
7669	<u>TOTAL INCOME</u>	<u>\$11444</u>
	<u>LESS EXPENSES</u>	
5935	"Notornis" Printing & Distribution	6769
13	Annual General Meeting	-
100	Audit Fee	50
-	Beach Patrol Scheme	76
-	Car Stickers	168
40	Donations	-
123	General Expenses	215
-	Kermadec Reprints	124
50	Library Expenses	50
63	Nest Record Scheme	-
82	Postages	137
434	Printing & Stationery	211
-	Royal Society Affiliation	40
371	Travelling Expenses	211
177	"Notornis" Reprinting	1680
7388	<u>TOTAL EXPENSES</u>	<u>\$9731</u>
281	<u>SURPLUS FOR YEAR TRANSFERRED TO ACCUMULATED FUND</u>	<u>\$1713</u>
===		===

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC)BALANCE SHEET AS AT 31ST DECEMBER 1975

<u>1974</u>			
	<u>CURRENT ASSETS</u>		
3721	Cash at Bank of New Zealand	4588	
797	Bank of New Zealand Savings A/C	799	
1500	Term Deposit Bank of N.Z.	1500	
<u>100</u>	Stock of "Notornis"	<u>100</u>	(Note .111)
6118		<u>TOTAL CURRENT ASSETS</u>	6987
	<u>INVESTMENTS</u>		
400	Local Body Stocks	-	
.	The Perpetual Trustees Co. Ltd		
12000	Group Trustee Investments	12000	
	B.N.Z. Finance CO. Ltd		
<u>3200</u>	First Ranking Debenture Stock	<u>5528</u>	
15600		<u>TOTAL INVESTMENTS</u>	17528
<u>1000</u>	Library at Valuation	(Note 111)	<u>1000</u>
<u>22718</u>		<u>TOTAL ASSETS</u>	25515
	<u>LESS LIABILITIES</u>		
2083	Amounts Owed by Society	1735	
1217	Subscriptions in Advance	631	
	<u>Reserve Funds</u>		
2585	Projects Assistance Reserve	4650	(Note IV)
1797	Life Subscriptions	1799	
<u>1000</u>	Publications	<u>1000</u>	
8682		<u>TOTAL LIABILITIES</u>	<u>9815</u>
14036	<u>VALUE OF ACCUMULATED FUNDS AS BELOW</u>		\$15700
	<u>ACCUMULATED FUNDS</u>		
13172	Balance at 31.12.74	14037	
583	Profit on Sale of Shares	-	
<u>281</u>	Surplus for Year	<u>1713</u>	
14036		15750	
	Transfer to Projects Assistance Reserve Fund	<u>50</u>	
14036		<u>BALANCE AT 31.12.75</u>	\$15700
=====			=====

We report, that in our opinion, the foregoing accounts and notes attached of THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC) for the year ended 31st December 1975 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.

DUNEDIN: 16TH MARCH 1976

THOMPSON & LANG

Chartered Accountants

Auditors

NOTE I	Life members Transfer: 10% of Balance at 31/12/75.
NOTE II	Royalties from Sales of Checklist.
NOTE III	Stocks of <i>Notornis</i> and Valuation of Library are at Standard Values. No attempt has been made to accurately value these assets.
NOTE IV	Projects Assistance Reserve. Movements in this Reserve Fund during the year are:
	Balance as at 1/1/75 \$2585
	Plus Royalty on Revised <i>Field Guide</i> 2065
	Transfer from Accumulated Fund 50
	\$4700
	Less Cash payment N.Z. Dotterel Survey 50
	BALANCE as at 31/12/75 \$4650



DONATIONS 1975

The following donations of \$1.00 or more were received during the year ended 31/12/75 (21 members contributed an extra dollar through their Endowment subscription):

D. Sarll \$1; R. St. Paul \$5; Mrs W. H. Rolston \$10; T. P. Hamilton \$4; Mrs L. Collingwood \$1; S. R. Emmens \$10; R. W. Jackson \$3; A. P. Druce \$4; G. I. Hunt \$4; K. Hicks \$1; A. E. Bond \$1; R. E. Satherley \$3; Mr G. Dudley \$4; E. Bodley \$2; R. A. Creswell \$1; I. E. Cooksley \$1; G. Wightman \$1; T. M. Keillor \$1.



REPORT OF THE NEST RECORD SCHEME For the Year Ended 30 April, 1976

There are now 11,350 nest record cards covering 142 species within the scheme. During the year ending 30 April 1976, 375 nest record cards have been received from 26 contributors. Observations were made for 50 species.

Chris Lusk, working in the lower Rangitikei area, contributed 102 cards covering 29 species.

13 Colonial Cards were received covering the following species: Pied Shag, Black Shag, Pied Stilt, Black-Backed Gulls, Black-billed Gulls and Caspian Terns.

Cards for 12 species were on loan during the year.

For a total membership of 1155 I feel that 375 nest record cards for the year is a poor total. I would be grateful if Regional Repre-

sentatives could encourage members in participating in this individual activity.

My sincere thanks to those who have contributed to the scheme. Thanks go to my wife, Ruth, whose assistance with the Nest Record Scheme has been most valuable.

DAVID E. CROCKETT, Convener

LIST OF CONTRIBUTORS

W. J. Campbell (10), C. N. Challis, J. F. Coe, A. T. Edgar (15), H. Elder, D. R. Ellis, Patricia Fooks, P. D. Gaze, A. H. Gordon (21), I. Granville, R. Guest, L. Gurr, J. R. Hay, P. M. Hollin, M. Hows, J. R. Jackson (22), C. H. Lusk (102), B. F. McConkey (39), G. J. H. Mcon, R. Pierce (28), S. E. Quin, H. A. Robertson (88), P. M. Sagar, D. Scott, C. R. Veitch, R. Williamson.

LIST OF ACCESSIONS TO THE NEST RECORDING SCHEME

N.I. Kiwi 1; Banded Dotterel 4; N.Z. Dabchick 1; N.Z. Dotterel 11; Black Shag 1; Wrybill 15; Pied Shag 1; Pied Stilt 49; Little Shag 1; Black-backed Gull 12; Reef Heron 2; Red-billed Gull 8; Feral goose 1; Black-billed Gull 5; Mute Swan 1; Black-fronted Tern 4; Black Swan 1; Caspian Tern 3; Grey Duck 1; Fairy Tern 2; Mallard 5; White-fronted Tern 2; Harrier 2; Rock 1; Pukeko 3; Kingfisher 4; Australian Coot 1; S.I. Rifleman 1; S.I. Pied Oystercatcher 1; N.I. Rifleman 7; Variable Oystercatcher 1; Skylark 4; Welcome Swallow 5; S.I. Fantail 7; S. I. Robin 1; N.I. Fantail 5; Grey Warbler 4; Song Thrush 26; Blackbird 47; Hedge Sparrow 1; N.Z. Pipit 1; Bellbird 1; White-eye 8; Greenfinch 7; Goldfinch 18; Redpoll 6; Chaffinch 7; House Sparrow 9; Starling 46; White-backed Magpie 9; N.I. Saddle-back 1.

— ★ —

CARD COMMITTEE REPORT

Two further original paintings by Mrs Janet Marshall were used for this year's card. The Grey Warbler and Shoveler were featured but mixed packages and the previous year's cards were also available. Sixty thousand cards were sold this year and a profit of \$2,500 resulted.

In 1976 two further paintings, Yellowhead and Wrybill, will be used. These were printed at the same time as last year's cards and this will reduce production costs. However, profit is likely to be less because of the higher postage rates.

On behalf of the Society I would like to thank the Royal N.Z. Forest and Bird Protection Society for addressing the brochure envelopes. I would also like to thank the many Wellington members for helping with the packaging of brochures and cards and my wife who assisted throughout with the dispatch. Regrettably I have to advise that 1976 will be the final year my wife and I will be able to undertake this service for the Society and would ask that someone else volunteer to continue this valuable fund raising project.

B. D. BELL, Convener

FIELD INVESTIGATION COMMITTEE REPORT

One general enquiry about bird study was received and advice was given to direct this interest to specific tasks.

Two of the national surveys have been completed, relating to the Australian 'Visitors,' both the herons, ibises etc. and kestrels, and the Caspian Tern breeding survey. These will be written up and published during the year. Members are asked to continue to record Australian 'Visitors' but to send any future records to the Recording Scheme for publication in Classified Summarised Notes.

One study continues. This is the Reef Heron study being convened by Mrs Reynolds and Mr A. T. Edgar. Much of the information has been gathered and this has been circulated to Regional Representatives for checking and to see if any records have been overlooked. Future records would be appreciated.

A new study will begin this year and will continue for two to three years depending on support given. This will be a survey of the nesting colonies of shags — Black, Pied, Little Black and Little. Considerable interest has already been shown in this programme.

Thanks are again due to all Regional Representatives and to all members who have contributed to these special studies.

B. D. BELL, Convener



BEACH PATROL 1975 - INTERIM REPORT

During 1975, 3583 km of coast were patrolled by 163 members of the Ornithological Society of New Zealand and friends. 565 patrols were made and specimen record cards completed for 59 specimens. 21130 dead seabirds and 172 dead land birds were found. This high seabird total was largely caused by:— a wreck of mainly Prions (*Pachyptila spp.*) and Diving Petrels (*Pelecanoides urinatrix*) with lesser extra numbers of Blue Penguins (*Eudyptula minor*), Cape Pigeons (*Daption capensis*) and Fluttering Shearwaters (*Puffinus gavia*) during July; a notable, but numerically small, wreck of Antarctic Fulmars (*Fulmarus glacialis*) in September; and a large wreck of Sooty Shearwaters (*Puffinus griseus*) during October - November. One Eastern Little Tern (*Sterna albifrons*) is a new record for beach patrolling. This is the second year that Antarctic Petrels (*Thalassoica antarctica*) have been recorded in the Beach Patrol Scheme and in

New Zealand (2 birds 1973, 3 birds 1975) and third beach patrol records for Black-bellied Storm Petrel (*Fregetta tropica*) and Arctic Tern (*Sterna paradisaea*).

The following are interim totals for sections of coast patrolled:

<i>Coast</i>	<i>Kilometres</i>	<i>Birds</i>
Auckland West	1932	15676
Taranaki	231	1274
Wellington West	280	2182
Westland	69	25
Auckland East	384	548
Bay of Plenty	70	59
East Coast N.I.	39	47
Canterbury North	50	59
Canterbury South	113	259
Otago	25	45
Southland	53	62
Wellington South	280	755
North Coast S.I.	48	126
Outlying Islands	9	13
	3583	21130

There has been an encouraging increase in the number of participants and the success of this scheme is due to their work. However there is still room for more patrollers and more regular patrolling of beaches.

C. R. VEITCH, Organiser

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BIRD DISTRIBUTION MAPPING SCHEME

Annual Report for 1975

The mapping office has again devoted most of its attention to making existing information on bird distribution more readily available to those who need it for research or conservation. Although considerable progress has been made, a few computer "bugs" still require identification and correction. For instance, although all coding and punching have been checked, a recent computer-produced map of Bellbird distribution showed a number of discrepancies from one prepared manually by reference to the original record cards. Preliminary investigations of these discrepancies revealed some easily corrected defects in the computer programme; also, in view of the large number of cards that had to be handled, it would be surprising if the manually prepared map was completely free of errors.

Once these problems have been ironed out, hopefully within the next few weeks, the main task will be the production of maps. If funds permit, it is intended to have separate maps for 64 widespread species; 18 maps will each cover two species with restricted distribution; and a few other maps will show the number of species recorded for each square, and the distribution of the habitats that were covered in the survey (Northern hemisphere migrants and species that are mainly pelagic will not be mapped). The maps will be produced as inexpensively as possible (perhaps as a supplement to *Notornis*) to serve the immediate needs of conservation and research, and to provide an opportunity for the detection of errors and the filling of gaps. A set of more polished maps could follow later if needed.

While the mapping office has been preoccupied with recalcitrant computing services, field observers have continued to supply further valuable records; 423 new cards were received during 1975, and a further 69 came in during the first four months of 1976. Species lists are still welcome from anywhere but especially from remote areas.

Once again I am indebted to the Directors of the Ecology Division of DSIR and the Wildlife Service of Internal Affairs who helped by providing respectively, office facilities and computer services. Special thanks are due to Mr C. J. R. Robertson of the Wildlife Service for battling with computer problems (mostly from outside his own Department), to Peter Gaze and Meg Flux of Ecology Division for their fortitude in preparing manually the Bellbird map, and to all who have contributed new cards.

P. C. BULL, Scheme Organiser



LIBRARY REPORT

I must first say how indebted we all are to the late Mrs Hetty McKenzie for attending to the library so faithfully for ten years, only one of her many services to the Society.

60 items were borrowed last year. Approximately half these went out on interloan, chiefly to Canterbury and Otago Universities. We now receive 47 journals, as well as newsletters and occasional publications. Last year saw the commencement of the exchange with *Wildfowl* (Wildfowl Trust) and we shortly hope to receive *Australian Bird Bender*. Also commencing regularly once again are *Le Gerfaut* (Belgian journal with some papers in English, others having English summaries), *Ardea* (English language journal from Holland) and *Larus* (Yugoslavia).

During the year we were pleased to receive donations of 54 items from Mr P. E. Roberts, Mr R. B. Sibson and Mr H. R. McKenzie, whose parcel included 23 booklets and reprints by L. E. Richdale and copies of the original *OSNZ Reports* and *Bulletins*.

A revised list of the books and periodicals held here will be available shortly, with many thanks to Mrs M. E. McKenzie for the considerable job of typing the stencils.

I am a little disappointed to find that our use of the library has not kept pace with our increase in membership and would welcome suggestions as to how to remedy this.

Finally, I thank the Director and Council of the Auckland Museum and Institute for their generosity in continuing to allow us valuable housing space, and the Museum Librarian and his staff for their unfailing patience and helpfulness.

A. J. GOODWIN, Hon. Librarian

OSNZ LIBRARY

The Society's Library is housed in the Library Block of the Auckland Institute and Museum. A catalogue of books and periodicals is available from Mrs G. Skinner (see Back Numbers, etc.). Any items may be borrowed by members upon payment of postage, or the library may be visited by arrangement with the Hon. Librarian, Miss A. J. Goodwin, R.D. 1, Clevedon (Phone CD 886), who is most willing to supply any further information.



LETTERS

The Editor,
Sir,

CHATHAM ISLAND PARAKEETS

In my paper on New Zealand parakeets in *Notornis* 22 (2): 110-121 (1975) I commented that unlike the smaller yellow-crowned species on the main islands of New Zealand, "Forbes' Parakeet is about the same size as the Chatham Island Red-crowned Parakeet." Mr Geo. A. Smith (Letters, *Notornis* 22 (4): 351-2) doubts this, and states that it is not supported by measurements (length of wing and length of exposed culmen) of museum skins given by Forshaw (1973, *Parrots of the World*). The relevant measurements are: mainland Yellow-crowned Parakeet, wing 106-112, culmen 11-15 mm; Forbes', 121-131, 13-16; mainland Red-crowned, 125-139, 14-17; Chatham Island Red-crowned, 126-141, 14-18.

Smith claims that if, with New Zealand parakeets, "we ignore species and plot, using all species, the width of the upper mandible against wing length this produces a straight line curve: showing that the width of the bill is directly proportionate to body size." He further speculates that "the different widths to the bill between sexes, and between the species, perhaps is best explained as being adaptations to reduce intra-and inter-specific competition."

I have plotted wing length against bill width for 7 Forbes' and 7 Chatham Island Red-crowned Parakeets, the total sample of birds of known sex for which both parameters were readily available, in Fig. 1 as advocated by Smith. This shows that males tend to be larger than females — a characteristic of all *Cyanoramphus* species. However, although the average length of wing was slightly longer in the Chatham Island Red-crowned Parakeets and the average width of bill was slightly greater in the Forbes', there is a vast overlap in the range of both of these measurements between the two species. On the basis of these few specimens, and Forshaw's measurements quoted above, it seems that the two species are indeed roughly the same size.

To examine Smith's suggestion that "bill size is correlated to food source and to the manner of feeding" and that "the difference in feeding pattern between the two species is but a further extension of the, very probable, similar feeding distinctions between the different-sized sexes," I have plotted bill width against bill length (from cere) for both Forbes' and Chatham Island Red-crowned Parakeets (Fig. 2). It can readily be seen that the range of bill sizes overlaps between sexes and is much the same in both species, although their diets are very different (Taylor, *Notornis* 22 (2): Fig. 4). There is nothing here to suggest that different sized bills have evolved to reduce intra-and inter-specific competition.

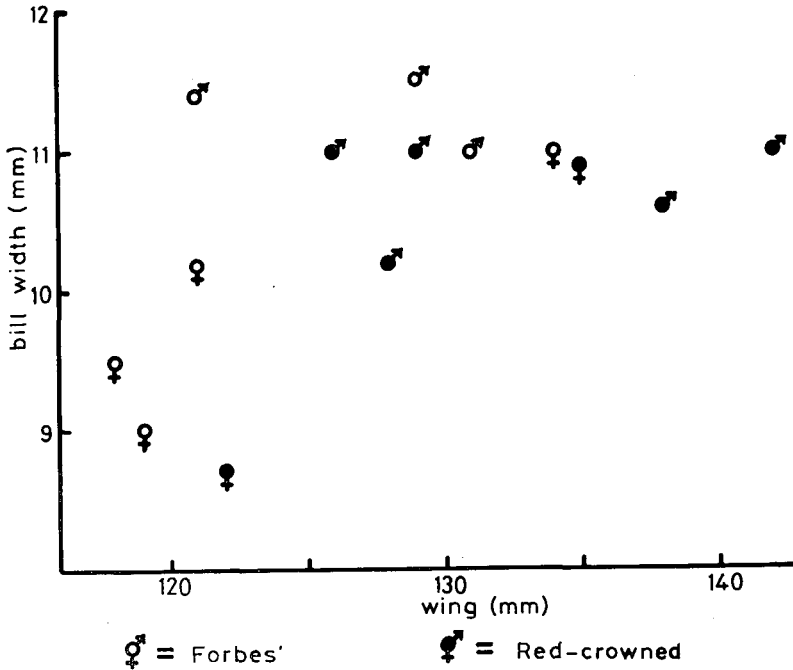


FIGURE 1 — Bill width plotted against wing length for the two species of Chatham Island parakeets.

Finally I must point out that Smith's suggestion that Chatham Island Red-crowned Parakeets may have become stunted in recent years due to the altered habitat and "an insufficiency of food during the rearing period" is wrong. There has been an abundance of food for Red-crowned Parakeets on both South-East and Mangere Islands since at least 1961 and 1968 respectively, and no correlation between year of collection (range 1890-1970) and bill size could be detected in the data plotted in Figs. 1 or 2. The two species on the Chatham Islands are approximately the same size because Forbes' Parakeet is larger than the mainland form, while the Red-crowned Parakeets have remained the same, and not because the Chatham Island Red-crowned Parakeet has become stunted.

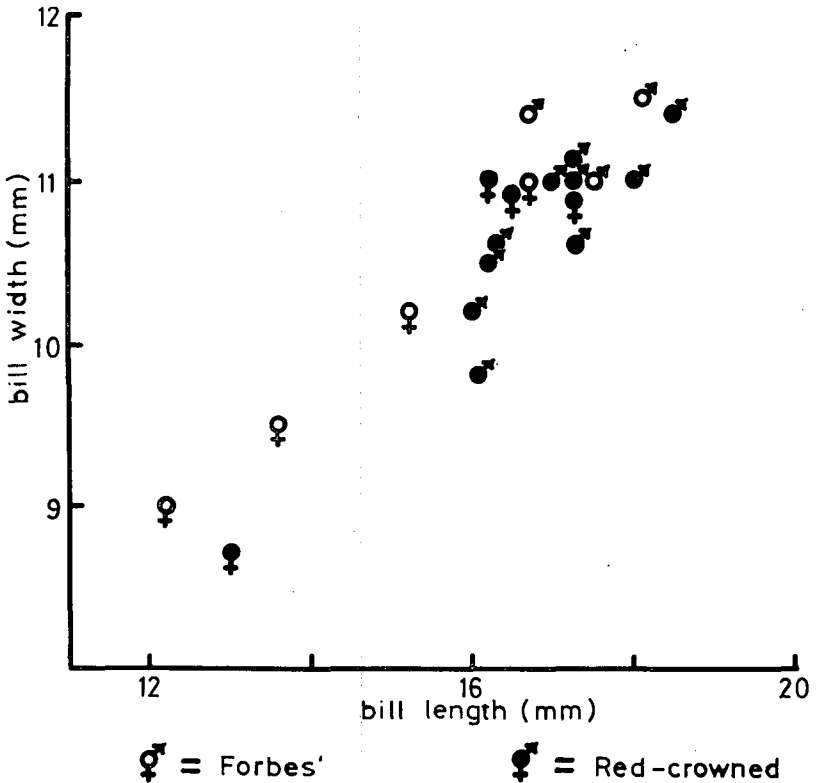


FIGURE 2 — Bill width plotted against bill length (from cere) for the two species of Chatham Island parakeets.

R. H. TAYLOR

Ecology Division, DSIR,
Private Bag,
Nelson
21 April 1976

The Editor,
Sir,

DUCKS' TAKE-OFF

I was interested in Dr Fraser's letter on the direction of ducks' take-off (*Notornis* 23 (1): 75; 1976) although I cannot altogether agree with his explanation of this behaviour in terms of Coriolis Force. The Coriolis Force on a duck is extremely small (and undetectable by the duck unless it is unusually sensitive) and secondly, since this force only acts on bodies in motion, the duck would not be aware of such a force until it began to move, by which time the decision on which direction to travel has already been made. By way of a numerical example: suppose a duck weighing 1 kilogram accelerates from rest to 36 km/hr (10 m/sec) in 10 seconds. This requires a force of 1 newton. In fact a considerably larger force would be required since no account has been taken of the work done against water or air resistance, or the work done against gravity in gaining altitude. Taking air drag for example: the drag on a sphere of 30 cm diameter travelling at 10 m/sec is of the order of 2 newtons. By comparison the Coriolis Force (at latitude 45°S) acting on the duck increases from zero (when its velocity is zero) to .001 newton at 10 m/sec which is some thousands of times smaller than the other forces mentioned above.

B. R. STANTON

*C/o N.Z. Oceanographic Institute,
DSIR,
P.O. Box 12-346,
Wellington North
21 May 1976*

[Another reader comments that no doubt Dr Fraser's observations would explain why ducks ought to take off vertically on the Equator (or perhaps this is the behaviour of another well-known bird?) — Ed.]

The Editor,
Sir,

PETRELS AND LIGHT AT NIGHT

In the course of his interesting speculations about why petrels are inconspicuous when the moon is shining but are attracted by other lights (*Notornis* 22: 302-306, 1975) Mr Imber omits to mention some other considerations. For example, in some other parts of the world landbird migrants come to bright lights much more freely than petrels, to such an extent that the British Association for the Advancement of Science mounted a great enquiry into the phenomenon in the 1880s. It was found that they also are inconspicuous on moonlit nights and in fact are most numerous when the local visibility is poor, and the few petrels that come to our coastal lights behave in the same way. A number of people whom I have interrogated about what happens when petrels come to ships' lights off subantarctic islands have confirmed that the local visibility was poor there as well.

The simplest explanation seems to be that birds which become lost in mist make for the nearest light in the hope of finding their way out of it. It is of course possible that like some invertebrates they have a simple nervous reflex which causes them to beat their wings harder on the side away from a light so that they fly towards it. The occurrence of more petrels over their breeding colonies on dark nights could also be explained by simple difficulty in finding their holes then, so that they have to make more circuits over known landmarks and call to each other to find their holes. Naturally young birds with little experience will take longer to find the place they are looking for, so that they will tend to be most conspicuous among the lost birds, while fledging chicks will tend to fly towards any light they see. It hardly seems necessary to refer to the bioluminescence of marine animals to explain the behaviour of birds circling over breeding colonies.

It is also arguable that the birds may prefer to feed on moonlit, not dark, nights, because they can see prey which comes to the surface more easily then, so that they come to land to display mainly on the darker nights when they cannot see to feed. In much the same way it has been argued that diurnal Northern Fulmars (*Fulmarus glacialis*) like to feed in rough weather and only come to shore to display when the weather is fine. Personally I suspect that they come to shore to display when the weather is fine because they can feed quickly then and have spare time, but as in the case of Mr Imber's arguments there appears to be little solid evidence available at all.

W. R. P. BOURNE

3 Contlaw Place,
Milltimber,
Aberdeen, Scotland
19 May 1976



INSTRUCTIONS FOR AUTHORS

INTENDING CONTRIBUTORS ARE ASKED TO REFER TO NOTORNIS 19 (1): 102-104, APRIL 1972, FOR FULL DETAILS CONCERNING THE PREPARATION OF MANUSCRIPTS SUBMITTED FOR PUBLICATION. Study these carefully and prepare your manuscript accordingly. Unless these requirements, briefly stated below, are followed, manuscripts will be returned.

GENERAL — Let at least two other people read your manuscript before sending it in and heed their comments. Check that all editorial requirements have been met and that all pages, tables and figures have been included; wrap and pack securely (especially photographs) and send to: The Editor, *Notornis*, P.O. Box 41-002, Eastbourne.

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

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

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

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

ILLUSTRATIONS — Plan for legible reduction to 180mm x 100mm or 85mm x 100mm. Photograph must be on glossy paper with strong contrast.

TABLES — Type *cleanly* on electric typewriter (whenever possible) with new carbon ribbon on heavy paper. Indicate position of each in the text. *Plan* your table and *think* how it will look when reduced.

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

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