# NOTORNIS

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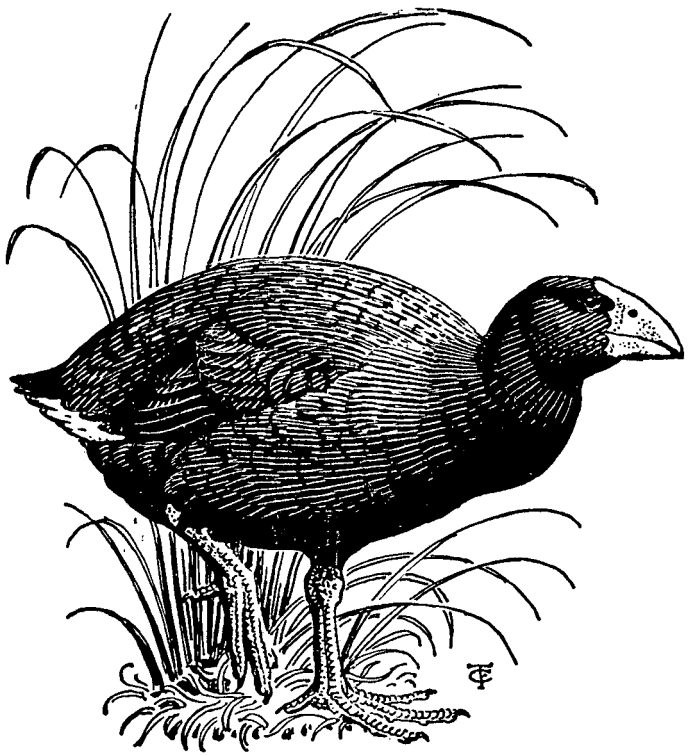

*Volume Six, Number Eight : April, 1956*

# NOTORNIS

*In continuation of New Zealand Bird Notes*

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*Contents of Volume 6, Number 8 : April 1956*

# NOTORNIS

VOLUME SIX, NUMBER EIGHT : APRIL NINETEEN FIFTY-SIX

## BIOLOGICAL NOTES ON A SEA VOYAGE FROM AUCKLAND TO SINGAPORE

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Several bird logs for trans-Pacific voyages to and from Panama were published by Fleming (1950) and a further one by Laird (1951), but with the exception of a summer log for the Sydney - Wellington crossing (Sibson, 1951) and Falla's records for the final stages of a trip from Panama to Brisbane (February - March) which are included in Fleming's paper we know little concerning seabird distribution in the waters between New Zealand and Australia. As only occasional cargo vessels having limited passenger accommodation travel between New Zealand and Queensland, there are few opportunities for observations in the northern Tasman. Records of birds sighted were thus kept during a direct voyage from Auckland to Singapore in September 1954, the first landfall being near Brisbane (M.V. *Wairimu*, Union Steam Ship Co. of N.Z. Ltd.). These records, together with others including some of more general biological interest for the remainder of the trip, are detailed herein.

The log abbreviations are those employed by Fleming (1950), the information in parentheses following each date being the noon readings for position, sea surface temperature (s.t.) and air temperature (a.t.) in degrees Fahrenheit, wind direction, wind force (Beaufort Scale) and weather. I have also followed Fleming's interpretation of the growth stages of the Wandering Albatross. Subspecific names are not used in the text for the obvious reason that birds seen only in flight can hardly be identified with accuracy below the specific level. Insofar as locality may serve as a guide to subspecific status, most of the relevant names and authorities are to be found in Mathews and Iredale (1921), Alexander (1928) and Fleming et al. (1953). My thanks are due to Captain C. Burgess for furnishing the log readings and for securing a sample of *Trichodesmium* in the Java Sea.

SEPTEMBER 8: Sailed from Auckland, 10.07 p.m.

SEPTEMBER 9: (34° 19′ S, 172° 53′ E; s.t. 61°; a.t. 59°; SE2, fine.) 9 a.m. – 1 'leopard stage' Wandering Albatross (*Diomedea exulans*), 10 Nellies (*Macronectes giganteus*) and 14 mature and immature Black-backed Gulls (*Larus dominicanus*) close astern. 3 mature Red-billed Gulls (*Larus novaehollandiae*) settled at mastheads. Several unidentified dark petrels in distance. 12 noon – North Cape about 8 miles astern. 4 'leopard stage' *D. exulans*, 2 *M. giganteus*, 1 mature *L. dominicanus*, 1 Black-browed Mollymawk (*Diomedea melanophris*) and 3 Cape Pigeons (*Daption capensis*) patrolling wake. A flock of 9 prions, *Pachyptila* sp., flew by, and a school of porpoises appeared close to port. 2 p.m. – North Cape and Te Reinga barely visible astern, the Three Kings from 4 miles to port. 11 *D. exulans* (6 young mature birds and 5 'leopard stage'), 1 *D. melanophris*, 8 *M. giganteus*, 1 mature *L. dominicanus* and 2 mature *L. novaehollandiae* astern, the gulls flying much higher than the other birds at altitudes of up to about 100ft. 3 p.m. – Approximately 8 miles north of the Three Kings. 5 *D. exulans* and 2 *M. giganteus* far astern. 2 Buller's Shearwaters (*Puffinus bulleri*) flew

alongside, the white underparts and inverted W of the dark brown feathers on the wing coverts and back (c.f. Alexander, 1928) showing clearly. The *L. novaehollandiae* were no longer in sight, and the last remaining *L. dominicanus* was now noticed for the last time. 5 p.m. – Out of sight of land. 6 *D. exulans* and 8 *M. giganteus* in distance, 1 *D. melanophris* and 2 *D. capensis* close astern. A flock of upwards of 30 unidentified shearwaters (dark above, whitish beneath; possibly *P. bulleri*) in middle distance. 5.45 p.m. – Sunset. 20 *D. exulans* including 1 immature bird entirely dark above but with white belly and dark chest band, 8 *M. giganteus*, 1 *D. melanophris* and 1 *D. capensis*, all close astern.

SEPTEMBER 10: (31° 39′ S, 166° 41′ E; s.t. 64°; a.t. 61°; WSW4, fine.) 9 a.m. – 14 *D. exulans*, including 2 'snowy phase' adults and 1 immature (Fleming's queried second year bird) as for yesterday's 5.45 p.m. record, 1 *D. melanophris*, 1 *M. giganteus*, 10 *D. capensis* (circling ship below bridge height) and 16 *P. bulleri*, all patrolling wake. Other petrels and albatrosses far out towards limit of visibility, but a slight chop prevented an accurate count of these. 12 noon – 16 *D. exulans*, including 2 in second year (?) and 1 in fledgling plumage, 1 *D. melanophris* and 1 *M. giganteus* astern, upwards of 12 *D. capensis* circling ship. 5 p.m. – 17 *D. exulans*, including 2 in second year (?) and 2 in fledgling plumage, 2 *D. melanophris* and 8 *P. bulleri* astern. The last *M. giganteus* disappeared shortly after midday. 5.45 p.m. – Sunset. 15 *D. exulans*, including 2 in second year (?) and 2 in fledgling plumage, 2 *D. melanophris* and 4 *D. capensis* close astern, and 2 unidentified shearwaters far to starboard.

SEPTEMBER 11: (29° 04′ S, 160° 35′ E; s.t. 69°; a.t. 68°; SE2, fine.) 9 a.m. – 3 *D. exulans*, 2 'leopard stage' and 1 second year bird (?), 1 *D. melanophris* and 6 unidentified shearwaters, the *D. melanophris* approaching the stern very closely. 12 noon – 2 *D. exulans*, 1 'leopard stage' and 1 second year bird (?), close astern. 2 unidentified shearwaters far to port and 1 *D. capensis* circling ship. 3 p.m. – 5 *D. exulans*, 2 'leopard stage', 2 second year birds (?) and 1 fledgling, 1 *D. melanophris*, 4 *D. capensis* and 1 *P. bulleri* all close astern. 5 p.m. – 7 *D. exulans*, 4 'leopard stage', 2 second year birds (?) and 1 fledgling, and 1 *D. melanophris* following ship. 5.50 p.m. – Sunset. 10 *D. exulans*, 6 'leopard stage', 2 second year birds (?) and 2 fledglings, 1 *D. melanophris*, 1 *D. capensis* and 2 *P. bulleri*.

SEPTEMBER 12: (27° 16′ S, 154° 18′ E; s.t. 71°; a.t. 70°; ENE3, fine.) 9 a.m. – 7 *D. exulans*, 1 'leopard stage' and 1 in fledgling plumage, and 3 *D. melanophris* close astern. A flock of upwards of 50 Wedge-tailed Shearwaters (*Puffinus pacificus*) passed within 100 yards of the ship. 12 noon – 7 *D. exulans*, 1 'leopard stage' and 1 in fledgling plumage, and 2 *D. melanophris* close astern. 1 unidentified medium-sized brown shearwater (*P. pacificus*?) in distance. 1 p.m. – Australian coast in sight. No birds logged. 3 p.m. – Close inshore, Cape Moreton, Queensland. 2 Crested Terns (*Sterna bergii*) flew past, distinguishable by large size and separated from Caspian Tern by their greenish-yellow bill and black feet. 4 p.m. – Approaching Caloundra Heads. 1 *D. melanophris* following ship. 2 Humpback Whales (*Megaptera nodosa*), their blow tall, narrow and vertical and the long flippers showing from time to time, sighted heading south four miles from shore. 4.30 p.m. – Hove to for pilot, close inshore at Caloundra Heads. 3 mature Red-billed Gulls settled on aerial, several more flying about the ship. Upwards of 100 Masked Boobies (*Sula dactylatra*) diving for fish nearby. 5 *S. bergii* and 3 Pied Shags (*Phalacrocorax varius*) observed at close range. Another Humpback and a school of porpoises in sight to seawards. 5.45 p.m. – Sunset. No birds in company.

SEPTEMBER 13: (22° 50′ S, 151° 48′ E; s.t. 71°; a.t. 71°; SE3, fine.) Inside southern end of Great Barrier Reef. No birds observed during the day. A total of 17 Humpback Whales sighted, all heading south; mostly in pairs, one group of 4, 3 having tall blows and a calf with a small and weak one.

Between 3 p.m. and 3.45 p.m. 4 Humpbacks were observed breaching within half a mile of the ship. Two of these were in close association and leaping clear of the water alternately, rolling over, flippers outspread, as they emerged, and then crashing down on to their backs. A calf followed a mile behind this pair, making an insignificant blow and a relatively slight splash as it fell back into the water. The fourth animal was quite alone. Occasional streaks of reddish-brown water bloom were noticed in the afternoon.

SEPTEMBER 14: (19° 01′ S, 147° 10′ E; s.t. 73°; a.t. 72°; SE3, fine.) 8 a.m. – About 5 miles from the Pelorus Group. 1 *Larus novaehollandiae* circling the ship and settling at the stern post from time to time. 12 noon – 2 more Humpbacks heading south. 4 p.m. – Upwards of 40 Frigate Birds were sighted, leisurely wheeling at an altitude of about 300ft. half a mile from the ship and 5 miles from the nearest land. Both *Fregata minor* and *F. ariel* occur on the Queensland coast (Alexander, 1928), but the birds concerned were much too far away for the identification of the species.

It was pointed out by the Second Officer that the ship's log carries an entry to the effect that an 'albatross' was following behind on the previous southward voyage from Singapore (June 30, 1954) in 19° 34′ S, 148° 06′ E (75 miles ESE of Townsville). Some of those on board remembered the occurrence quite well, and from their descriptions it would appear that the bird was almost certainly a Wandering Albatross. *D. exulans* is listed by Alexander as occasionally ranging as far north as the Tropic of Capricorn, and it is possible that some birds accompany coastwise shipping beyond this limit and for some distance inside the Great Barrier Reef.

SEPTEMBER 15: (14° 05′ S, 144° 17′ E; s.t. 76°; a.t. 77°; SE4, fine.) 9 a.m. – Passing close by reef islets. 8 *L. novaehollandiae* in company, settling at mastheads and on aerial. An Australian Pelican (*Pelecanus conspicillatus*) was identified on the boulder-strewn beach of a flat, scrub-covered islet. Red-billed Gulls were flying about the ship all day, building up to a maximum of 20 at 3 p.m. 5.45 p.m. – Sunset. Only 2 *L. novaehollandiae* still with the ship, upwards of 24 more, also 3 *P. conspicillatus*, settled on the sand of a barely emergent islet. An adult Brown Booby (*Sula leucogastra*) flew past at deck height, being easily identifiable by the wholly brown dorsal surfaces and the white abdomen. No flying fish as yet sighted by anyone aboard. Occasional streaks of reddish-brown water bloom were again noticed from time to time.

SEPTEMBER 16: (10° 46′ S, 141° 00′ E; s.t. 79°; a.t. 78°; SE4, fine.) 7.10 a.m. – Dropped pilot at Goode Island, near Thursday Island. 18 *L. novaehollandiae* about ship, and a few unidentified terns in far distance. 8.10 a.m. – Passing near Booby Island. 11 Red-billed Gulls still following. 1 brown-coloured booby flew by close to the water, but as its underside was not seen it might have been either a *Sula leucogastra* or an immature *S. dactylatra*. 9.15 a.m. – Three mixed flights of terns and noddies, each of upwards of 40 birds, were logged. The terns, being small and black-crowned and having greyish upper surfaces, a white forehead and ventral surfaces, and an orange bill and feet, were identified as Little Terns (*Sterna albifrons*); while the noddies, being appreciably larger and of a uniform blackish-brown colour with the exception of a whitish cap, were considered to be Common Noddies (*Anous stolidus*). Alexander (1928) points out that it is hard to distinguish the latter species in life from the Lesser, White-capped and Hawaiian Noddies. The first of these birds is rare and restricted to the Indian Ocean (Mathews and Iredale, 1921; Alexander, 1928) while the last is obviously ruled out on grounds of locality. I gained the impression that the Noddy in question was decidedly larger than the *S. albifrons* with which it was associated and that its cap was neither pure white in colour nor sharply demarcated from the dark brown plumage of the remainder of the dorsal surfaces. According to Alexander, and Mathews and Iredale, the cap of the White-capped Noddy (*Megalopterus minutus*) is whiter and more clear cut, while this species' measurements suggest that it would not appear strikingly

larger than S. *albifrons* on the wing. 9.30 – Out of sight of land, the last 2 *L. novaehollandiae* flying off towards the Australian coast at an altitude of about 200ft. A small green pigeon came aboard and was observed for a short time at close range before it flew off southwards very close to the water. Having a bluish-grey crown and nape, a white forehead and shoulders and metallic green wings and lower mantle, this bird could only have been the Green-winged Ground Pigeon (*Chalcophaps indica*) from data in Mathews and Iredale (1921) and Delacour (1947). *C. indica* occurs from India through Malaysia to tropical Australia and New Caledonia. Shortly after the pigeon was seen a rather small hawk approached from the north, landed on the forward cargo hatch and fluttered about there for a few seconds, and then continued flying southwards just above the surface of the water. It was noted that the body of this hawk was barred dark and light brown and that a pale spot was apparent on top of each of its wings in flight, but an identification is not attempted in the absence of further information. The occurrence of two such land birds flying in the general direction of the Queensland coast although almost 20 miles from the nearest landfall suggests that a seasonal movement from New Guinea or the islands of Torres Strait was in progress. 12 noon – 2 *Sterna bergii* came close to the ship, diving into a shoal of leaping fish. An unmanned lightship some distance to port appeared white with terns. No other birds were seen during the day.

SEPTEMBER 17: (10° 04′ S, 134° 49′ E; s.t. 80°; a.t. 80°; ESE2, fine.) No birds sighted all day. Flying fish, the first of the voyage, were quite common from midday onwards.

SEPTEMBER 18: (08° 43′ S, 128° 56′ E; s.t. 81°; a.t. 85°; E3, fine.) 8 a.m. – Upwards of 20 storm petrels criss-crossing wake, black above, lighter beneath and flanks whitish, and long legs projecting beyond a square tail. The appearance of this bird in flight strongly suggested that of a large swift. In all probability Wilson's Storm Petrel (*Oceanites oceanicus*), although the diagnostic pale band in the wing referred to by Alexander (1928) could not be made out. *O. oceanicus* has been reported from Malaysian seas according to Delacour (1947). 9.30 a.m. – An adult *Sula leucogastra*, the white breast, abdomen and flanks clearly distinguishable, flew swiftly across the ship at funnel height. 9.45 a.m. – 2 Red-tailed Tropic Birds (*Phaethon rubricauda*) came by at funnel height heading eastwards. 12 noon – No birds observed. 3 p.m. – 2 dark-coloured petrels in far distance. 5 p.m. – A whale was sighted spouting far astern, the blow directed forwards. Some minutes later a second whale broke water within 100 yards of the starboard beam, the square front of its head showing as it sent up a powerful forward-directed spout before sounding. It was more than ten minutes before this (?) animal was seen again, a long way astern. The shape of the head and the forward-angled blow identified these whales as Sperms (*Physeter macrocephalus*). 5.50 p.m. – Sunset. Timor in sight far off on port bow. 3 P. *rubricauda* passed alongside the ship on the same heading, flying at an altitude of about 100ft. Flying fish were abundant throughout the day.

SEPTEMBER 19: (08° 02′ S, 123° 13′ E; s.t. 84°; a.t. 85°; ENE2, fine.) 7.30 a.m. – A marlin leapt clear of the water within 200 yards of the ship. 9.15 a.m. – Kedang Peak, Lomblen, 3 miles to port. 22 *Sula leucogastra* and 2 Great Frigate Birds (*Fregata minor*) seen at close range, the latter species identified by the white underparts and throat of a female. 10.30 a.m. – 2 *F. minor* diving into a flock of more than 50 noddies, probably *A. stolidus*, some of which were forced down almost to the water before they disgorged their fish which were promptly scooped up by the frigate birds. 2.30 p.m. – The eastern end of Flores 14 miles away, and the nearest land. A kingfisher-like bird, predominantly light blue in colour, was seen, although not closely enough for recognition.

SEPTEMBER 20: (06° 12′ S, 117° 31′ E; s.t. 83°; a.t. 87°; E4, fine.) 6 a.m. – Passing 1½ miles north of Postillon Group. Several *Fregata minor* skimming low over the water. No more birds seen until just after sunset,

then, when it was too dark for plumage details to be made out, a single booby flew low across the bows. Flying fish in large schools all day.

SEPTEMBER 21: (04° 26′ S, 111° 43′ E; s.t. 83°; a.t. 82°; SE5, fine.) Neither birds nor flying fish sighted all day. At 4 p.m., when approaching the Karimata Straits and at a distance of some 60 miles from the nearest land, south-western Borneo, we crossed a very clearly marked convergence (04° 08′ S, 110° 47′ E; s.t. 83°; a.t. 86°). The bottom in this area is at only 20 fathoms. The zone of convergence was notable for numerous streaks of water bloom of muddy appearance and ochreous colour. Individual streaks were as much as a mile in length, although of a width of a mere 15 to 30 yards, and when broken up by the bow wave they appeared to be only 2 or 3 inches in thickness. A considerable amount of floatage, mainly composed of small branches and coconuts, was in evidence in the area.

From time to time patches of bloom ebbed back against the side of the ship towards the stern, so a bucket was lowered there and a sample obtained. After the water had been allowed to stand for a few minutes, great numbers of tiny, wedge-shaped objects, somewhat curved towards the tip and of a greenish colour, appeared at the surface. Each of them measured 3 or 4 mm. in length and about 0.5 mm. in width at the base. Specimens were bottled in whisky for want of a better preservative. Many weeks later, when examined microscopically in the laboratory, they proved to be fascicles of algal filaments and to have withstood plasmolysis remarkably well! Professor G. W. Prescott, of Michigan State College, to whom specimens were sent, recognized the alga as a species of *Trichodesmium* (Cyanophyta: Oscillatoriaceae) distinct, however, from *T. erythraeum* Ehrenberg. In 1823 Ehrenberg showed that it is the periodic blooming of *T. erythraeum* which causes the surface coloration from which the Red Sea derives its name (Montagne, 1844). In an appendix to his interesting survey of the subject Montagne drew attention to similar blooms, but of a yellow or brownish-yellow rather than a red colour, which had been described from tropical seas by various authorities including Banks, Solander and Darwin. He stated that Cook's seamen had referred to such blooms in New Guinea waters by the not inappropriate name of 'sea saw-dust'. Moseley (1879) later described the massing of *Trichodesmium* in extensive streaks and bands in the Arafura Sea north of Australia, calling attention to the strong smell given off from the bloom 'as from a pond covered with vegetation'. Such a smell was also associated with the bloom under consideration.

Two species of *Trichodesmium*, *T. erythraeum* and *T. Hildebrandtii* Gomont, are listed from Indonesian waters by de Wildeman (1900). According to this author the fascicles of *T. erythraeum* are about 1 mm. long and individual filaments range from 7 to 11 mu. in diameter, while the cells are sometimes as high as they are broad. The second species, on the other hand, has fascicles ranging from 2 to 5 mm. in length and filaments of from 12 to 22 mu. in diameter; individual cells are always short, and their diameter is often three times their height. As already stated, fascicles of the present species measure from 3 to 4 mm. in length. The diameter of individual filaments ranges from 15.3 to 21 mu. (average for 50 filaments, 18.8 mu.), and is always about three times the height of the separate cells. This alga is accordingly considered to be referable to *Trichodesmium Hildebrandtii* Gomont.

SEPTEMBER 22: (00° 55′ S, 107° 32′ E; s.t. 84°; a.t. 82°; SSW2, fine.) Neither birds nor flying fish all day.

SEPTEMBER 23: At Singapore. 7 a.m. — 2 White-bellied Sea Eagles (*Haliaeetus leucogaster*) the only birds sighted.

## DISCUSSION

Perhaps the most interesting of the seabird observations are those concerning the northerly extension of the range of albatrosses and the Cape Pigeon. The northernmost limit for *Diomedea exulans* in the South Pacific is given by Fleming (1950) as 29° 20′ S (33° 45′ W: October), while Alexander (1928) states that this species occasionally ranges as far north as the Tropic of Capricorn. My record of 27° 16′ S for September 12 is understandable on the ground of the two birds concerned having accompanied the ship for some time during the Tasman crossing, and the probable record of 19° 34′ S, well north of the Tropic of Capricorn, from the ship's log for June 30, suggests that from time to time Wandering Albatrosses follow vessels up the coast inside the Great Barrier Reef. *Diomedea melanophris* is not listed from further north than 33° 32′ S (153° 04′ W: May) by Fleming (1950), and Mathews and Iredale (1921) only record it from southern Australian seas. This species was not only seen each day from the North Auckland coast throughout the Tasman crossing, but one example was still in company on the Queensland coast at rather less than 27° S on September 12. Finally, *Daption capensis* is not listed by Fleming from further north than 31° S (144° W: July) in the Pacific. This species, which Mathews and Iredale knew only from southern Australian seas, was also logged each day until the evening before the Queensland coast was reached, my northernmost record being close to 28° S.

As regards the factor of temperature, Fleming's highest readings for the three species in question are as follows: — *D. exulans* and *Daption capensis*: s.t. 63°; a.t. 67°. *D. melanophris*: s.t. 61 - 62°. Laird (1951) logged *D. exulans* and *D. melanophris* in 39° 52′ S, 156° 50′ W (March) at s.t. 66° and a.t. 71°, and the former species alone in 36° 52′ S; 143° 43′ W (March) at s.t. 72° and a.t. 69°; while the highest relevant readings recorded herein are s.t. 69° and a.t. 68° for *Daption capensis* and s.t. 71° and a.t. 70° for *D. exulans* and *D. melanophris*. It is apparent, therefore, that Fleming's placing of the northernmost limit of *D. exulans* south-east of Pitcairn Island in sub-tropical waters of a temperature of 63 - 64° F 'just south of a rather abrupt rise of surface temperature to the tropical convergence' is not of general application, and that Southern Ocean albatrosses and petrels range further northwards in the Tasman than is customary in the Central Pacific.

Additional observations from this area are obviously much to be desired, although a dearth of passenger shipping in the northern area of the Tasman raises difficulties. However, cargo vessels follow the Auckland - Brisbane route quite frequently. It has been my experience that ships' officers — who after all are trained observers, and in the matter of natural history observations are quite used to logging whales sighted — are not infrequently positively interested in bird-watching activities going on aboard. While the identification of most of the smaller birds likely to be encountered at sea is admittedly a matter calling for some ornithological background, an interested layman can soon learn the accurate recognition of certain of the larger or conspicuously coloured species. It is thus suggested that the Ornithological Society of New Zealand might perhaps give attention to the preparation of a simple illustrated key featuring the plumage phases of *D. exulans* and the recognition points of a few other easily identifiable species such as *Diomedea melanophris, Macronectes giganteus* and *Daption capensis* — the one-page Australian Commonwealth Fisheries Office 'Appeal for Whale Observers' could serve as a model. It would probably be as well to include a few generic diagrams of other common oceanic birds which those concerned could not be expected to identify specifically, with a note that remarks on these were not required for the purposes of the survey. Through such a key, and an appropriate liaison with shipping companies having Tasman and South Pacific interests, a valuable picture of the northerly distribution of the selected birds might well be available in a very much shorter time than if it had to await the slow and sporadic accumulation of data by sea travellers with ornithological interests.

## SUMMARY

A log of bird- and whale sightings is presented, together with a note on water bloom caused by *Trichodesmium Hildebrandtii* Gomont (Cyanophyta: Oscillatoriaceae) in the Java Sea. It is suggested that much could be learned concerning the northerly range of the more easily recognized seabirds, such as the Wandering Albatross, Black-browed Mollymawk, Nelly and Cape Pigeon, by enlisting the aid of interested ships' officers.

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## A NOTE ON THE DISAPPEARANCE OF THE WEKA (*GALLIRALLUS AUSTRALIS*) IN NORTHLAND

*By FRANK E. GEE*

Between 1932 and 1936 I lived in and around the North in an area bounded by Waipu (about 30 miles south of Whangarei) to the north, and Paparoa, on the Dargaville road about 10 miles from Maungaturoto, to the south. During this time, wekas were frequent and common in this area. In particular, at Waipu, where I lived on a farm for some months in 1932, and again in 1933 and 1934, wekas appeared to be numerous. This, I

judged, purely from their calls which I knew well enough. The farm concerned was of hilly country, running to a good deal of scrub, including much manuka, with some small swamps and small scattered patches of native time. The property was intersected by a number of streams, drains, and other watercourses.

The noisy evidence of the existence of the wekas was most noticeable in the early evening, and during the night hours. In fact, it was customary for the early evening hours – say, from dusk till some hours later – to be quite filled with the weka calls, which appeared to come from all directions around the farm. I am quite sure that there was not just one isolated group – it was possible to find oneself close to a weka or wekas in any direction if one took a walk from the farmhouse about dusk onwards.

I cannot more accurately describe the call than as a thin, fairly high-pitched 'weeeek! weeeeeek! weeeeeeek!' which seemed to sound all round the hills. There was one variation, perhaps two, to this: one, I think, was a sort of 'thumping drumming' noise. I remember my brother complaining that a sudden outbreak of this noise close to his ear on a scrub-fringed bank, when he was returning late with cows, had given him a sharp start in the early dark. I remember agreeing with my brother that the wekas, as we had listened to them, evidently had a third variation to their call, but what form this took I cannot now remember.

I am fairly certain that the volume of sound was maintained throughout the year. The owner of the farm, Mr Murdoch McLeod, now in retirement at Waipu, assured me that the wekas had always been in the district in quantity during his memory, which at that time would be at least forty years. These notes refer to the period 1932 - 1934. During 1933 I spent some time at Taipuha (on the North railway about twelve miles inland from Waipu). Wekas were in evidence here also. Once, or twice, I caught sight of one or two in drains on the farm – as you can imagine, I was not given much time for prolonged observation, but the description given in Moncrieff's *New Zealand Birds* corresponds with my recollection. In 1935, wekas could also be heard in Paparoa, and it was here that I sighted a weka with young – from recollection about four in number – but there may have been more than one family. This was quite close to the local hospital – almost in the back yard – and the birds were therefore moving about in a semi-built-up area which included cats, rats, dogs, etc. Recollection as to the time of year is very hazy, but it is most likely to have been during late spring or summer, as I do remember that the task upon which I was engaged would not have been done in winter.

When I left the North in 1936, the wekas, judged by volume of sound, were continuing more or less undiminished. I returned in 1939 and 1941 for short visits; and it was on one of these visits – unfortunately I cannot remember which, but think 1941 more probable – that I was astonished to notice no weka calls in the evening. I discussed the matter with my farmer-host, Mr McLeod, and he stated that, so far as he could tell, they had disappeared quite suddenly. No changes had taken place in the surrounding land – all was as before – and nobody in the district could offer me any explanation for their disappearance. The only suggestion put forward – not very profitable as far as I could judge – was that rabbits in the district had also diminished or disappeared at about the same time. This was suggested by one or two farmers in the district, but there was nothing very definite to work on.

From 1936, then, I neither saw nor heard a weka until I went to Gisborne in April 1945, when I was astonished to hear a weka call in a small swamp right in the middle of a busy housing area within a few minutes' walk of the centre of the town. I heard these wekas occasionally, but was never in the country areas so cannot say whether they were strong in the rural parts or not.

I hope these scrappy and quite 'unscientific' recollections may be of some interest.

# NOTORNIS FAECES AS EVIDENCE ON FOODS AS A FACTOR IN CHICK REARING SUCCESS

*By R. I. KEAN, Wildlife Division, Department of Internal Affairs*

*INTRODUCTION:* Since the re-discovery of *Notornis* in 1948, work on this bird has usually aimed at determining the chances of its continued survival through the study of reproduction and natural loss, so knowledge of its food requirements, from a promising beginning, has advanced only slowly.

The first ecological paper (Falla, 1949), in describing the feeding habits of the takahe, mentioned the lack of attractive foods among the wiry scrub and coarse grasses of the alpine region in which the birds have persisted, and it was, in fact, the unusual poverty in mammalian food resources which set the form of the present study in February, 1953.

The vegetation of the district is a fairly typical montane one, dominated by slightly stunted tussock snow grass (*Danthonia flavescens*) with the many subordinate herbs and shrubs, but some of the least favoured areas carry only a sparse vegetation characterized by the sedge, *Carpha alpina,* a small shrub, *Dracophyllum densum,* and brown *Rhacomitrium* moss. These latter places held no resident takahe or deer, but the evidence of rather evenly spread faecal pellets or droppings indicated a light utilization by takahe of the remaining and larger part of the region.

Nesting occurred only in occasional small areas. These were marked by differences in the vegetation, by the number of fine grasses and small herbs, and by the location of sites, which suggested a soil fertility distinctly higher than found on the general range.

There was, however, also a wide degree of variation among nesting sites, or territories, which graded down to a level which was little different from general range. Further, there appeared to be a positive correlation between assessed quality of territory and recorded success in chick rearing, although, irrespective of other considerations, incompleteness of data on past nesting success left conclusions in doubt.

'Quality' is of course a relative term, for little is known of the food requirements of wild animals or of the capacity of vegetation to supply those needs.

Overseas feed studies on wild plants, which are of low average value by agricultural standards, have shown that *nutritional* rating is very complex, and, of course, the requirements of animal species differ in many ways, particularly in the proteins which have to be obtained from food. However, in New Zealand, field observations and analysis of stomach contents have shown that, except for understandable exceptions, *palatability* rating of plants is very similar for a relatively wide range of animals.

In the absence of precise data, it becomes necessary to bridge the gap between *nutrition* and *preference,* and assume that the staple foods which wild animals take in greatest amount, are those which are of high food value. This may not be universally accepted, but it must be evident at least that foods which are rejected, or taken in only small amount, can be of little use as basic energy resources.

*Notoris* foods differ from deer foods mainly in that acceptable plant species are much fewer, and it seems unlikely that a bird whose faeces are composed of little-altered vegetable material, could extract nourishment with efficiency equalling that of a ruminant with an alimentary system specialised for microbial digestion and protein synthesis.

Takahe have a poor record of breeding success. The proportion of the birds which pair is not known, but many pairs fail to produce chicks; one or two eggs are laid, but there is no record of two chicks being reared from one nest in Takahe Valley*; so in an environment which is poorly stocked

*H. B. Wisely found a pair of chicks near Waterfall Creek, South Fiord, but comparison of the vegetation of the two areas has not been possible.

with deer foods, it seems that an explanation for observed takahe breeding failures could be sought in the low availability of adequate foods for a ground-feeding bird.

The obvious line of investigation would be a detailed comparison of the composition of droppings from general range and territories respectively, followed by similar comparisons of droppings taken from territories whose chick rearing success records could be classified as 'consistent success', 'occasional success' and 'consistent failure'.

Time would not permit this, either in the field or in the subsequent laboratory work. Differences between general range and territory could be distinguished macroscopically, for fine textured faeces, which were not uncommon on territories, were rarely found on general range. (However, field evidence should be considered with caution, because 'fine' components are effectively masked in the presence of 'coarse' ones in proportions as low as 30%.)

For these reasons, droppings were collected from only two territories, those commonly designated A and B, and located respectively along the northern side of the lake, and on the summit of the adjacent North Bluff.

These two territories were well defined but it cannot be assumed that they are occupied by identical pairs in different years, or that they can always be maintained by single pairs. Territory A has the most successful record and is judged to have the best food resources in Takahe Valley. Territory B has not been credited with the production of a chick, although resident pairs nest and lay successfully. Its food resources are considered to be better than those of other unsuccessful territories. Territory B somewhat resembles A in essentials, but effective areas is less, due in part to encroachment of smothering *Dracophyllum uniflorum* scrub.

## METHOD

As far as possible, the whole of the two territories was covered. Sampling was not strictly random; all very old and all isolated droppings were taken, but judgment was used in the sampling of aggregations in order to avoid over-representation of droppings from the congested nesting areas, and from the large clocker droppings which are produced by sitting birds. Further, as age of droppings was important, faeces were excluded if found in particularly damp situations where a black mould disintegrated droppings rapidly. However, such decayed droppings were not numerous and did not appear to be restricted to any one type or to any season, so their exclusion should not significantly influence results.

A two-inch section was taken from each dropping, classified according to apparent age, wrapped individually, and packed away for later examination. This length was judged to constitute a reliable sample, and as subsequent analysis was done by relative proportions, size of droppings did not influence results.

Age was assessed by appearance. New droppings were a bright green colour. They changed to yellow or brown in a few days, rate and nature of change being determined by air humidity, exposure to rain, and to sunshine.

In the collected droppings, following loss of a fine matrix, two weathering processes were apparent. Bleaching with loss of both colour and weight was most important. In the older specimens, black deposits, probably algal, seemed to be associated with later decay.

Fresh droppings (Class 4) were distinguished by matrix and colour. Usually some green remained in at least a few protected parts, but the shade of brown (found by test to result from early exposure to hot sunshine) was almost equally distinctive.

In the next older class (3) droppings had lost fine non-fibrous material, and were slightly bleached.

Very old droppings (Class 1) were decayed to the point of commencing to lose form, and another class (2) intermediate between Classes 1 and 3 was distinguished. For working convenience, these classes have been labelled

as 'Pre-nesting' (1), 'Nesting' (2 and 3), and 'Post-nesting' periods.

Chick droppings were distinguished by size and shape. An adult occasionally may produce small droppings, but these can readily be distinguished from the series of small compact droppings which grow in size as the chick ages, and so give concrete evidence of rearing success on a territory.

The laboratory examination was first done by Miss E. M. Stevens, but it was subsequently repeated completely under slightly different standards and checked against the first classification by Miss A. Percival and myself working in conjunction. Each of the 323 samples was sorted volumetrically by tenths. The full tabulation is not presented here, but frequencies and totals of each food class are given by respective periods in Table I.

| Class | | Grass seed | | Grass leaves | | Grass base | | Celmisia | | Other plants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Freq. | Vol. | Freq. | Vol. | Freq. | Vol. | Freq. | Vol. | Freq. | Vol. |
| 1A | 28 | 46.4 | 24.3 | 17.9 | 10.7 | 57.1 | 41.1 | 0 | 0 | 53.6 | 23.9 |
| 2A | 9 | 66.7 | 58.9 | 0 | 0 | 33.3 | 12.2 | 11.1 | 7.8 | 55.6 | 21.1 |
| 3A | 45 | 82.2 | 68.5 | 2.2 | 2.2 | 44.4 | 19.1 | 0 | 0 | 26.7 | 10.2 |
| 4A | 85 | 96.5 | 84.7 | 35.3 | 0.8 | 14.1 | 4.5 | 0 | 0 | 22.4 | 10.0 |
| 1B | 21 | 9.5 | 3.3 | 0 | 0 | 76.2 | 47.6 | 47.6 | 16.7 | 52.4 | 32.4 |
| 2B | 35 | 11.4 | 5.1 | 0 | 0 | 88.6 | 73.4 | 31.4 | 10.9 | 25.7 | 10.6 |
| 3B | 35 | 60.0 | 45.4 | 8.6 | 0.9 | 22.9 | 9.4 | 31.4 | 15.7 | 45.7 | 28.6 |
| 4B | 33 | 90.9 | 62.7 | 3.0 | 1.2 | 21.2 | 6.4 | 6.1 | 3.0 | 60.6 | 26.7 |
| Chick | 32 | 87.5 | 56.3 | 3.1 | 1.6 | 28.1 | 7.5 | 0 | 0 | 68.8 | 34.7 |

TABLE 1. *Frequency columns show the respective percentages of samples which contained food of each class. Volume columns show the percentage which each food class comprised during respective periods.*

## RESULTS

Complete accuracy is impossible, and some overlap is unavoidable in any continuous series, but significant errors seem unlikely in the 'Nesting' and 'Post-nesting' periods.*

Time-scale inaccuracies are unlikely to affect the validity of comparisons between the two territories.

Considerable error is to be expected in the 'Pre-nesting' series. Here disintegration is advanced, but the main complication is caused by winter snow providing a period when at least some droppings would virtually cease weathering for several months. Accordingly, some late autumn and early spring droppings could be readily classified alike.

The 'Pre-nesting' droppings, however, are not important in this study, because they represent a period of the year marked by regression of breeding activity, when territoriality should be least in evidence, and it is not even certain that the birds represented were the respective territory holders.

Figure 1 illustrates the fundamental differences between the two territories. Fine foods, shown in the left column for each season, are characteristic of territories, while, in contrast, coarse foods are characteristic of general range.

The nine samples which make up the early 'Nesting' column for Territory A are too few to be statistically significant, but interpolation between the adjacent 'Pre-nesting' and late 'Nesting' periods gives an essentially similar result. The two 'Nesting' periods are the ones considered most likely to be important. Probably the early 'Nesting' droppings represent the season before laying when the hen bird accumulates sufficient reserves to permit the later production of eggs, although shortage at this time might not have serious consequences if adequate food became available in the late 'Nesting' period.

*This could be tested in later work, when fresh samples should be taken at the appropriate times.

*Continued on p. 237*

# PHOTOGRAPHIC STUDIES OF THE STITCHBIRD

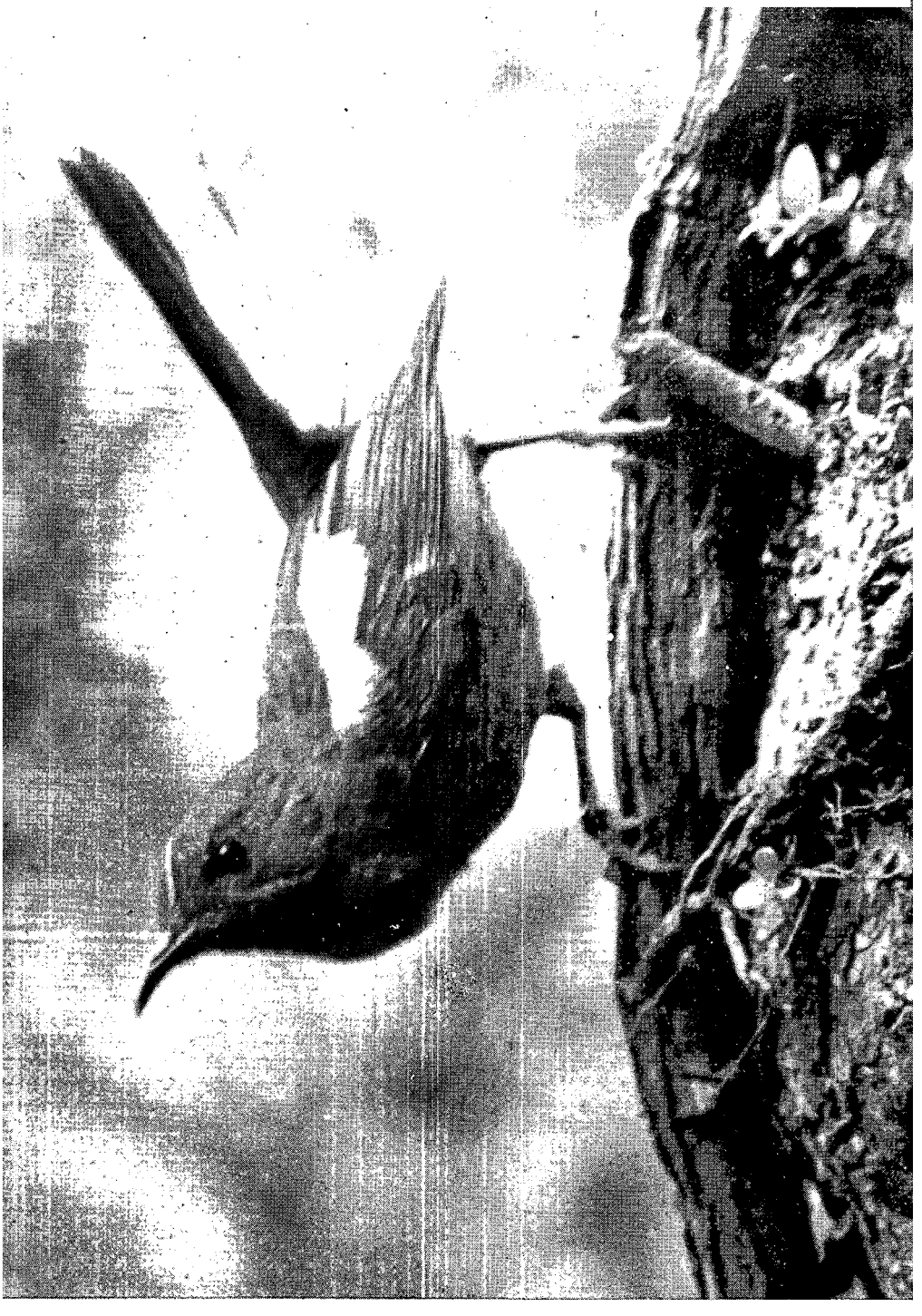
These photographs of the male and female Stichbird (*Notiomystis cincta*) at their nesting-hole were taken by Mr C. H. Parkin, the caretaker of Little Barrier Island, which is now the last stronghold of this beautiful honeyeater. Fortunately Stitchbirds are now widely distributed on Little Barrier and may be found at all heights from sea level to the ridges near the summit (2378ft) (*v.* N.Z.B.N. 2, pp. 142 - 143); and there is little doubt that the species has much increased since Reischek (*v. Yesterdays in Maoriland,* pp. 83 - 93) wrote his graphic account of his adventures in search of Pogonornis – as the Stitchbird was then called – in the 1880's, before Little Barrier was proclaimed a sanctuary in 1896.

The nest of the Stitchbird has not often been found. In 1919 Guthrie-Smith spent ten weeks on Little Barrier between October and December; and towards the end of his stay succeeded in finding five nests. 'Of these, three were built thirty to sixty feet from the ground in huge puriri; the fourth in an immense taraire, also about fifty feet from the ground; the fifth was at a lower elevation and in a smaller tree – a tawa.' As an account of one of our rarest birds, the chapter in *Bird Life on Island and Shore* which Guthrie-Smith devoted to the Stitchbird, and which he illustrated by some remarkably skilful photographs, is a *locus classicus.* He believed that 'a big proportion of the nests are placed almost beyond eyeshot'. More than a quarter of a century was to elapse before the next nest was found. Then on 4/1/48, as described in N.Z.B.N. 3, p. 154, M. C. Hanna and B. D. Heather found Stitchbirds feeding young in an old Kingfisher hole, at a height of only 8ft 6in, in a pohutukawa.

Mr Parkin has sent some notes on the nest at which these latest photographs were taken. It was found on 21/12/55 by Mr K. V. Bigwood, of the National Publicity Studios. The parents were feeding small young. The nest was not in an easy position for photography, being 23ft 9in above ground level in a pohutukawa which was growing out of a steep slope. With the help of Mr Parkin a platform was built and a hide erected, so that before Mr Bigwood left on Christmas Eve he had secured a fine series of pictures, both still and moving, in colour. After his departure Mr and Mrs Parkin spent many hours spread over eight days at the nest. The number of young could not be counted, as the hole had a right-angled bend. According to Mr Parkin 'on 3 January at 9.45 a.m. the cock bird arrived and remained in the nesting-hole for four minutes. Apparently the young had left early that morning and he had come for a final look round. We did not see the young, and did not know how many. The period of fledging is not less than a fortnight.'

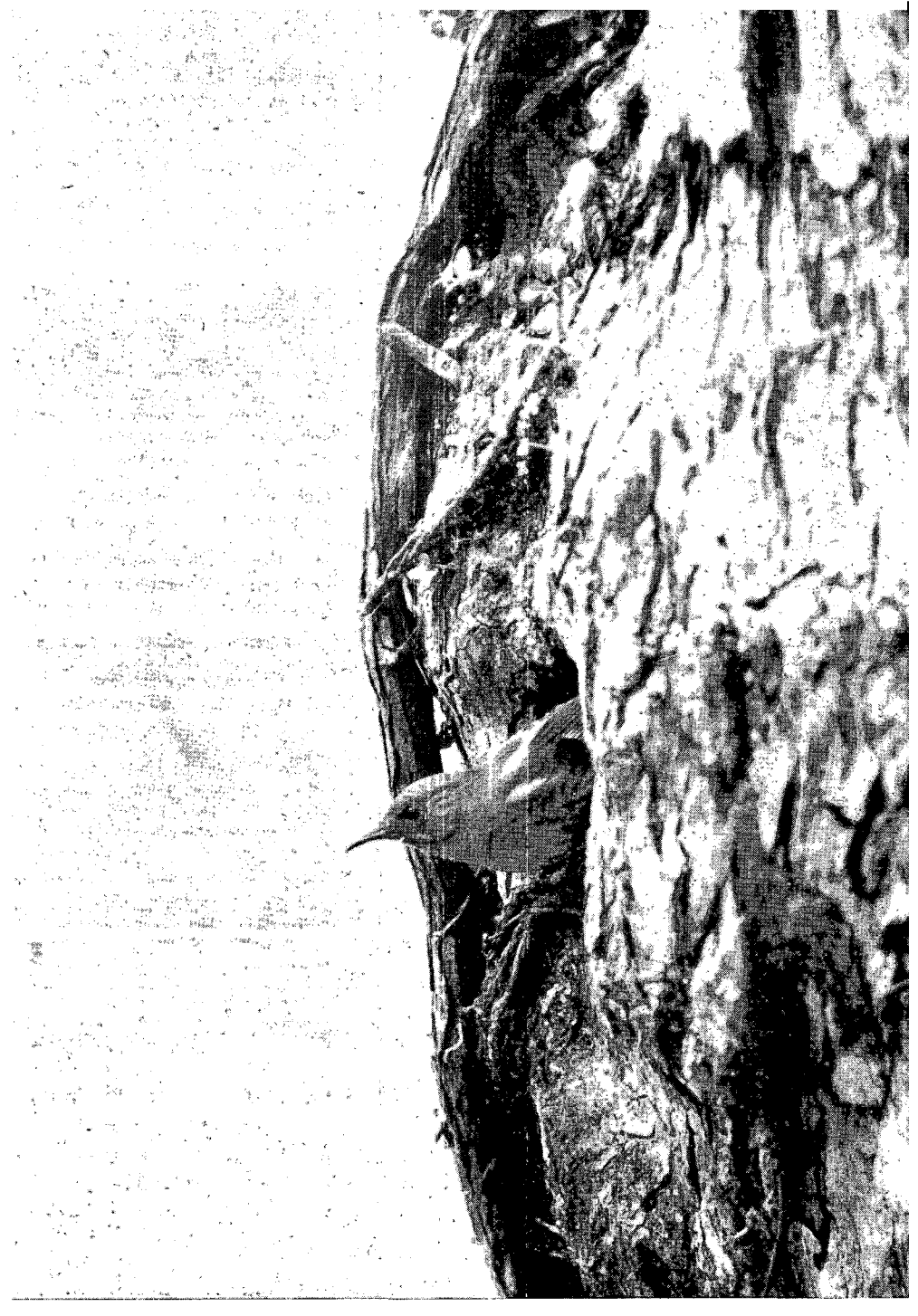
*[Ed.]*

1. *Cock Stitchbird outside nesting-hole in pohutukawa.* ALL PHOTOGRAPHS BY C. H. PARKIN



2. *Female Stitchbird. The angle of the tail is characteristic.*

3. *Male Stitchbird leaving the nest.*



4. *Female Stitchbird leaving the nest.*

*Continued from p. 231*

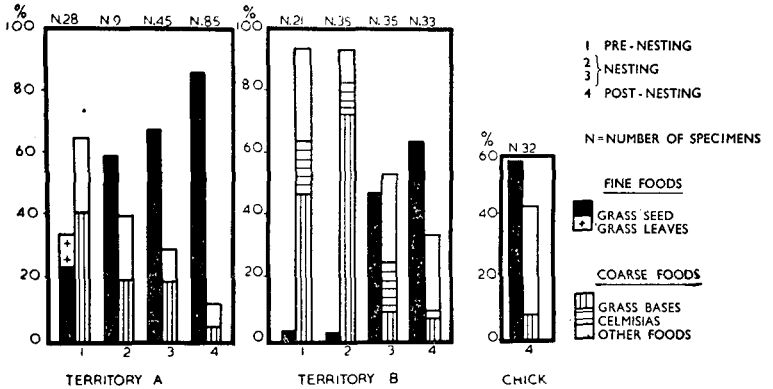



FIG. 1 – Comparison of fine (left) and coarse (right) foods of successful (A) and unsuccessful (B) territories. Total number of droppings is 323.

It is for these two periods that Territories A and B should be compared in Figure 1. In the early 'Nesting' stage, A has 58.9 per cent of fine foods*, while B has only 5.1 per cent. In the later 'Nesting' stage A rises another 12 per cent up to 70.7 per cent, and B climbs quickly to 46.3 per cent.

The rise of fine foods continues on both territories through the summer 'Post-nesting' period to 85.5 per cent and 63.9 per cent respectively. Although territory B is still inferior to A, favoured foods are likely to be in excess of requirements in both places, but the nesting period has passed so successful breeding then depends upon chick requirements.

Chick food differs from that of the adults; instead of being nearly all fine grass seed, it is comprised of more equal proportions of fine and coarse foods. It is an open question whether this difference from the adult feeding pattern is determined by deliberate choice, or whether it is an attribute of lack of experience or skill, and chance would influence results based on only 32 samples.†

If chicks take 'coarse' foods by choice, it does not seem that a very high availability of grass seed would be necessary for them, but the situation would be reversed if inexperience limited the amount of this type of food which could be gathered by young birds.

There are minor differences shown between the food resources of the two territories. Celmisias are a staple food on Territory B except during the summer, but they do not appear in the A droppings, although the discarded white leaves, found in the area, indicate that a few bases are eaten on Territory A even in the summer. Faeces suggest that field signs may sometimes over-emphasize the degree of celmisia utilization, as possibly also that of the

*Fine foods consisted of seed (and flowers?) of the small grasses *Poa, Festuca, Hierochloe,* etc., which were not identified as to species in the droppings. There was very little *Danthonia* seed. Fine grass leaves were fairly frequently taken but occurred in sufficient volume to show in Figure 1, only in the 'Pre-nesting' class of Territory A.

†These droppings probably represent a period for the chick following diversion from the initial animal foods, although insect remains made up 20 per cent volume in one sample. Faeces composed of predominantly insect remains would lack bulk and durability. K. Miers points out (oral communication) that chick and adult faeces are not directly comparable, because the outer sheaths are rejected before leaf bases are fed to the chick by parents.

large danthonia species, *D. rigida* and *D. flavescens*. In contrast, the 'Other Foods' class consisted mainly of unidentified stalks. These were a summer food. The 'Leaf Bases' class included all grasses and some sedges, but did not include celmisias or other broad leafed plants.

Except for the leaf bases, the several *Danthonia* species were represented only rarely and in very small amount as seeds, and were not observed at all in green leaf material. It is also remarkable that although the fine grass seeds (or flowers) were taken in large quantities during the summer, this class of food was represented to some extent in the droppings at *all* seasons. Seeds in the 'Pre-nesting' series are easily explained as a carry-over from the previous autumn, but this cannot account for 'seeds' in the 'Early-nesting' period. It is possible that ageing of samples has been incorrect, but if columns Nos. 2, A and B, in Figure 1 are consulted, it will be seen that the paucity of grass seed on Territory B at that time would conform to expectation for that higher and poorer territory, so error in ageing would apply to A but not to B.

It seems that the small grasses are of great importance because of their heavy utilization in the 'Nesting' period, but it is desirable that the suggested extent of their *early* use should be confirmed by observation of the flowering period of the small grasses.

The analysis of droppings was an empirical one, designed mainly to separate out the broad categories of 'Breeding Ground' and 'General Range' foods, so it is not surprising that forbs, or broad leafed herbs, were not recorded.

Forbs were recorded as taken (C. A. Fleming, 1950) and plants of this form are characteristic of the most successful takahe territories. They are taken by the deer and by the strongly selective opossum, so it seems probable that they are an important food for takahe, but special treatment of fresh droppings would be required to demonstrate the presence of these.

At this point, the general differences between A and B Territories should be considered.

Territory A is favoured by situation. The water table, consequent upon levelling of slope, becomes higher with progression downhill until it breaks ground surface as the lake itself is reached. Soil condition has in this instance outweighed climate, and there has been an inversion in the normal order of plant communities. Here grassland passes upwards through scrub to beech forest; and these three plant formations are telescoped into a narrow belt giving a maximum of biological 'edge' effect.

On this teritory the usual snow-grass tussock (*Danthonia flavescens*) is completely displaced by the red tussock (*D. rigida*). Growth of the latter species on the moderately drained soil is restrained enough to be favourable for takahe (thus differing from the same plant species on the congested Point Burn Flat), and also the scrub is open. Here the association is the *Olearia lineata - Coprosma rigida* (affine) one, with a varied herbaceous understory.

This plant community appears to be superior to any other in Takahe Valley, although the snow-grass communities of the higher valley heads, and the *Coprosma ciliata - C. pseudocuneata - Aristotelia fruticosa - Hymenanthera alpina* associations of the north side of the main valley flat have many possibilities.

All these associations, with their variety of foods of moderate general (ruminant-marsupial) palatability must be contrasted with the scrub association which occupies the greater part of the south of the main valley flat, a *Dracophyllum uniflorum - Dacrydium biforme* one. This is so low-lying in habit that there is no lower herb stratum, and the consequently limited food resources cannot be effectively supplemented either from the adjacent sphagnum-influenced forest, or from the stunted *Danthonia rigida - Oreobolus - Donatia* grass-sedge community of the central flat.

Territory B occupies a position which is intermediate in regard to its plant communities between those of Territory A and the poorer ones carrying the associations described in the preceding paragraph. In herbaceous species, it

somewhat resembles A Territory, but *Dracophyllum uniflorum* occupies a large proportion of the main (western) portion of the area, and the eastern section of the grassland is occupied by an almost pure association of *Danthonia teretefolia* and *D. crassiuscula* – grasses which showed no signs of utilization by either takahe or deer.

Spatially, this territory appears to be adequate, but the area contains too high a proportion of plants which are not associated with smaller herbs and which are themselves unpalatable to all the wildlife animal species of which I have had experience.

A somewhat varied plant community, probably calcophilous and characterized by *Danthonia ouria* (affine) and *Anisotome capillifolia,* occurs at the foot of the bluff, but does not appear to be used by takahe (although deer and opossums utilize its superior resources). The beech forest appears to add little food, and the stunted plants of the higher leached soil (*Dracophyllum uniflorum, D. densum, Carpha alpina* sedge, and brown *Rhacomitrium* moss) can give no appreciable supplement.

## DISCUSSION

The field work of this paper is very limited, and it is obvious that faeces from general range as well as from additional territories should have been included.

The work was done as a pilot study, in the time available after completion of the primary object of the trip, to indicate whether the method of faecal examination was worth full development in order to test a hypothesis suggested by study of vegetation.

However, as no further work has been presented on this aspect in the two seasons since the original report was written, it may be profitable to consider implications of the present results.

There is an observed difference between the availability of 'fine' and 'coarse' foods on territories and open range, and the presence of 'fine' foods appears to be an important attribute of any territory.

The paper does not discuss present open range data, but, based upon two examples, it considers differences in grading of territories, and suggests that local territories fall progressively from the A territory standard down towards that of general range below that of territory B.

It seems that, quite apart from other requirements, food deficiencies in spring limit the number of effective territories.

There would be an annual difference in food resources, for a favourable season would improve the grading of territories, although it would not increase the available number of territories unless the *establishment* of territories were purely food dependent – which is *not* suggested.

Figure 1 shows the differences in the resources of Territories A and B during the 1953 - 54 season, and for that year the food standard indicated for B probably was near the threshold for successful hatching and chick rearing.

The accuracy of the earlier recorded failures on Territory B could be open to question, but in the year under consideration, although the result of incubation is not established, the absence of a chick-dropping series in association with the adult series showed that the pair did not retain a chick, and a hatch cannot well be assumed in light of the observations of other seasons.

The question of the nutritional standards of territories is an important one. The wide distribution of droppings suggests that there are birds living on open range, which would be available to occupy territories rendered vacant by loss (or removal for special purposes) of birds from an established territory – whether or not such territory were a chick producing one.

Alterations to the general range would appear to be beneficial only if they provided new territories, and do not appear to be practicable, but, on the other hand, improvement of deficient territories could involve only minor alterations

on very small areas – if the implications of this paper are accepted or established by later full-scale investigation. The main requirement would be the cutting of dense unproductive growth. Number of territories would not be increased, but takahe production would be greater on improved areas. Unless present territories have deficiencies which are not evident, effective habitat improvement would probably be a relatively simple undertaking, involving only a few acres.

On Territory B, effective feeding ground is limited by the increasing encroachment of dracophyllum scrub which could be thinned with a slasher to allow increase of existing herbs, including the small grasses.

Probably the additional application of a fertilizer to stimulate growth would be beneficial, but there would remain for consideration the question of permanence, although annual maintenance upon this scale would not be onerous.

A longer term improvement would be the replacement of the dracophyllum by an open shrub community, such as the *Olearia - Coprosma* one of A Territory, or the *Coprosma - Aristotelia* one of Territory B, but such changes would require a better understanding of local ecology than is yet available.

Dracophyllum scrub, although it influences all territories of the floor of Takahe Valley, is not the only form of vegetation that can restrict the favoured food plants; the *Danthonia teretefolia - D. crassiuscula* community lying immediately east of Territory B is an example of unpalatable grasses smothering other plants. Such a closed association would normally be attributed to an edaphic factor, but in this case the complete dominance could possibly have resulted in part at least from takahe browsing pressure on the more palatable species.

The clearing of narrow lanes and fertilizing would probably result in an invasion of the finer grasses among the unpalatable tussocks which would shelter new growth, although probably the territory standard could be raised sufficiently by attention to the dracophyllum portion alone.

Deer represent a direct threat. The unpalatable red tussock of Territory A is not subject to destruction as is the snow grass, which is being killed in the valley head, but if, as this study suggests, seed heads of small grasses are important, only moderate grazing by deer will eliminate these. The situation can be illustrated by the comparison of a pasture and a hay paddock; grass flower heads are absent in the first case, but they grow in profusion in the second.

The restriction of sampling to only two territories is a weakness of the present study, and in any full-scale planned project, age of droppings should be established beyond question by the collection of fresh droppings at appropriate seasons. Such samples should be treated in order to preserve traces of soft herbs which would otherwise be lost.

However, the marked differences in availability and utilization of food types that are shown between the two nesting areas compared here, correspond to success and failure in chick rearing. They suggest that management of the takahe is governed by the same basic requirements of game birds and mammals, in fertile soil and available food plants, and that, further, in view of the smallness of the areas concerned, practical difficulties of improvement should not be great.

## ACKNOWLEDGEMENTS

I am indebted to many members of earlier Takahe Expeditions, and particularly to Messrs V. D. Zotov and I. W. Davey, for assistance in plant identifications, especially grasses, and to Dr C. A. Fleming for criticism of the report from which material for this paper has been extracted.

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# ABNORMAL BLACK-TAILED GODWIT (*L. limosa*) IN THE FIRTH OF THAMES

*By R. B. SIBSON*

The Black-tailed Godwit which I am going to describe has been present on the Miranda coast of the Firth of Thames for about four years. It is abnormal because it assumes breeding plumage at the wrong season, i.e. in the New Zealand spring, and moults into grey winter dress towards the end of summer when its plumage should be reddening. It has now done this for four successive years. In full breeding dress it appears to be a perfect male specimen of the Asiatic Black-tailed Godwit (*melanuroides*), a race which has a wide, though thin, coastal distribution in Australia but which has not so far been observed in New Zealand. Black-tailed Godwits hitherto recorded in New Zealand have been of the American race, *haemastica,* usually known as the Hudsonian Godwit. However, the possibility that *melanuroides* might occur here has not been overlooked. When I was reporting a Hudsonian Godwit seen in Manukau in 1949 (*Notornis* 3, p. 199) I wrote that it should not 'be assumed that any black-tailed godwits seen in New Zealand will be of the comparatively short-legged American race'.

On 30/8/52 Miss N. Macdonald, Mr J. C. Davenport and I were examining a flock of waders at the mouth of Pukorokoro Creek at Miranda, when we noticed a godwit in breeding plumage which appeared to be bright and fresh. It stood out as a conspicuous red godwit among some two hundred plain wintering Bartails (*L. lapponica*). When the flock took wing our suspicion that the 'odd' godwit had a black-tipped tail was justified. The behaviour of the flock in the air could not have been more accommodating. Sometimes the 'blacktail' was in the lead, and often it was pursued by different 'bartails' as being a bird with a difference, which it certainly was; for besides the rich red of the body and the black and white of the tail, a white bar showed very distinctly in the wing. As the flock circled directly overhead J.C.D. and I were surprised to note that the underwing was a gleaming white with a thin dark edging fore and aft. Four months before in the Manukau Harbour we had closely watched a Hudsonian Godwit, not in breeding plumage, and had been especially struck by the dark axillaries and underwing which were visible in flight (*Notornis* 5, p. 125). We had at first assumed that the Miranda 'blacktail' was a Hudsonian Godwit but as a result of seeing its very white underwing we began to have doubts. Since Asiatic Black-tailed (*melanuroides*) and Hudsonian (*haemastica*) Godwits are of about the same size, the colour of the underwing is an important diagnostic feature. Of *haemastica,* Bent says 'the axillars are jet-black and the lining of the wing is black'; but of *melanuroides* Mathews (*Birds of Australia* 3, p. 188) writes 'axillaries and underwing coverts pure white, the lesser coverts round the margin of the wing dark brown or blackish'. In 1954 I ventured to write to Mr R. T. Peterson and suggest that he should do a painting of the Hudsonian Godwit in flight, showing the underwing. Some months later I received a very courteous reply in which Mr Peterson made this very interesting remark: 'Last year (1954) in Alaska, at the edge of the Bering Sea I found the wing-lining a very useful field-mark when four godwits appeared in a place where neither Hudsonian nor Asiatic Black-tailed Godwit should be. The wing-linings were black and therefore the Asiatic Black-tailed Godwit was eliminated'. The dark axillaries and wing-linings may be seen in specimens of *haemastica* in the Canterbury and Dominion Museums.

Since this somewhat enigmatic godwit was first found at Miranda in August 1952, it has been recorded there on numerous occasions both in summer and winter. It was still in fine plumage on 7/12/52 when Mr H. R. McKenzie and I watched it for some time resting among other waders. I next saw it on 1/3/53 and made this entry in my notebook: 'A big flock of godwits came on to the Miranda lagoon. Among them was the Black-tailed Godwit, now in worn breeding plumage. As far as I could see the underwing was white right to the body. The legs reached a little beyond the tail in flight.' During the winter of 1953 it escaped notice, but on 26/10/53 it was again

found by H. R. McKenzie, who reported that it was 'very red'. On 24/11/53 and 29/11/53 I was able to watch it under most favourable conditions and to make more detailed notes on its superb nuptial dress than I had been able to make before. In these notes I wrote: 'The red of the neck and chest goes up more or less uniformly over the head and does not appear to be as streaked as in paintings of *haemastica* by Allan Brooks (*Book of Birds* 1, 272) and Don Eckelberry (*Audubon Water Bird Guide*, Pl. 34); the underwing is clear white down to the junction with the body; the lower belly and the feathers round the vent are white, whereas Brooks and Eckelberry show them as red in *haemastica*; between this white area and the red of the belly is an area of black and white barring, very bold; the bird has not a proper eyestripe but a dab of white in front of and above the eye; the back and upper wing surfaces are richly mottled, the feathers having black centres and brown edges; in flight the white wing-bar is very conspicuous; the bird is about the size of a male bartail but its legs may be a little longer.' The illustration of *melanuroides* by Kuroda (*Birds in Life Colours* 3, Pl. 113) is so accurate a likeness that it is difficult to conceive that this Miranda godwit can belong to any other race of *Limosa limosa*.

On 3/1/54 it was closely watched through powerful glasses by Miss N. Macdonald, Mr Geoffrey Allen, a visiting ornithologist from Malaya, and myself. G.A. was familiar with *melanuroides* in Malaya in winter plumage but had never seen one gorgeously arrayed like this bird. N.M., with a lady's eye for colour, drew our attention to the orange quality of the red. When next I saw it on 19/4/54 it was in winter plumage. Its white underwing was distinctly seen as it rose in flight among Bartails.

As winter passed into spring this aberrant godwit again assumed nuptial dress; so that when in company with Mr and Mrs J. Prickett and Miss Macdonald, I saw it next on 27/12/54, its vivid colouring made it stand out in a host of sombrely plumaged Knots and Bartails. The gleaming white of the underwing was again noted. With the approach of autumn it did not leave with the other adult arctic waders; for any urge to migrate must have been lost, as once again it moulted into eclipse plumage. On 28/5/55 I had an excellent view of it in flight with many wintering Knots and Bartails. On 12/6/55 J.C.D. and I watched it feeding at the mouth of the Miranda creek, first among Stilts and then among Knots. We noticed that in its winter plumage the smooth grey-brown of the back and upper wing-surface was quite distinct from the speckled feathering of the Bartails. H.R.McK. repotred it on 26/6/55, when a census of waders wintering in the Firth of Thames was taken; and two months later on 25/8/55 he saw in the same place a godwit unnaturally red for the time of year, which he believed was the 'Blacktail' once again in nuptial dress. Among the host of arctic waders which frequented the Miranda coast from mid-September onwards, it escaped notice till the New Year; but on 2/1/56 an exceptionally high tide of 11ft 6in caused a great concentration of godwits and other waders on the Miranda lagoon. Here Mr and Mrs J. Prickett, J.C.D. and I were able again to watch it closely. It was in fine breeding plumage, perhaps showing slight signs of wear. The orange tone of the feathering on the head and neck was especially noticed; the crown was darker; there was an aura of gold also in the brown of the richly mottled dorsal feathers. Mrs Prickett nicknamed it 'Rusty'. Later on consulting Mayr's *Birds of the South West Pacific* under the description of *melanuroides* (p. 40), I was interested to read 'Much rust colour on head, back and breast'. On 15/1/56 H.R.McK. was able to show it to A. C. Hipwell.

It is now three-and-a-half years since this remarkable godwit was discovered at Miranda; and as this discovery was made in August, it is likely that the bird had already then been in New Zealand for nearly a year. For four successive southern summers it has worn between August and February what appears to be the breeding dress of a perfect adult, only to lose this colouring just when a normal godwit is acquiring it. Unless the mistiming in its breeding mechanism adjusts itself – and there is no sign of this at present – it is unlikely that this Black-tailed Godwit will feel any urge to migrate and it may well prolong its stay on the Miranda coast indefinitely.

# SHORT NOTES

## TATTLER (*Heteroscelus incanus*) IN MANUKAU

It is not often that an addition is made to the already long list of migratory arctic waders which have been recorded in Manukau Harbour. On 25/4/55 R. N. Buttle and I, together with three boys of the King's College Bird Club, D. P. Eyre, D. Monteith and D. J. Woodhams, found a Tattler on the biggest of the Karaka shellbanks. It was first noticed in flight with Pied Stilts, a bird about the size of a Knot (*C. canutus*), with a uniform grey upper surface. Separating from the stilts, it quickly settled on a shelly spit near three Red-breasted Dotterels (*C. obscurus*), whose traditional phlegm in the presence of human beings may have given it confidence. Here we were able to examine it for some time. Its shape and bearing and the way in which it ran and bobbed, at once suggested tattler; and this identification was confirmed when its legs, which were longer than those of a Knot, were seen to be dull yellow. The head, viewed from the side, was strikingly marked. A dark line passed through the eye. Above this was a clear white superciliary stripe and there was more white below the eye and just above the beak. Examination with a telescope revealed that the shading on the chest and upper flanks was really fine black barring. The underparts were white.

When the tattler was flushed, it flew to another shell spit, where it settled among stilts and other waders. Fortunately, as it rose it uttered a single high-pitched 'twheet' such as appears to be characteristic of the Siberian Tattler, also known as the Grey-rumped Sandpiper (*H incanus brevipes*). Authorities agree that the calls are the surest way of separating the two forms of tattler in the field (*v.* Turbott, *Notornis* 4, pp. 130 - 132). During the long stay of a Wandering Tattler (*H i. incanus*) at Kawakawa Bay, Clevedon (*v.* McKenzie, *Notornis* 3, pp. 178 - 180 and 6, pp. 110 - 111), I had several opportunities of hearing its musical trill, which was quite distinct from the call of the Karaka tattler. On the evidence, this bird was a Siberian Tattler with the moult into breeding dress almost complete. When we walked it up again, it flew across the bay towards its former resting place among the Red-breasted Dotterels. During its flight it was chased by a godwit, which landed beside it and lunged at it. The tattler nimbly took evasive action and the godwit flew on. We were again able to examine it at close quarters with the telescope, but were unable to determine the length of the groove in the bill.

On 7/5/55 the tattler was again seen in the same locality by Miss M. Sansom, B. S. Chambers, D. A. Urquhart and myself. D.A.U. was the first to spot it, a lonely grey bird in a long line of resting godwits. When the godwits flew it joined a flock of resting knots and after much running to and fro it buried itself in the middle of them. When some knots left, it was for a short while alone on the flank. With its longer legs and bill and its clear superciliary stripe, the tattler was easily distinguishable from the knots. In the poor light the dull yellow of the legs was not easily seen. As it rose it called rather unmelodiously, in a manner reminiscent of a Pacific Golden Plover (*C. dominicanus fulvus*).

In New Zealand, Siberian or Grey-tailed Tattlers have been recorded with certainty only from Parengarenga (*v.* Turbott, *supra*); but a tattler seen by D. H. Brathwaite near Napier was probably of this form (*Notornis* 6, p. 147). On the coast of New South Wales at about the same latitude as Parengarenga, these tattlers are regular summer visitors, as many as a hundred sometimes occurring together, and a few may remain for the winter (*v.* Hindwood and Hoskin, 'The Waders of Sydney', *Emu* 54, pp. 237 - 239).

Although this tattler was not seen after May 7th in the bay where it was first located, it evidently spent the winter on the Karaka coast. For on 5/11/55, after a lapse of six months, some two miles to the east and opposite Weymouth, a tattler adjudged to be of the Siberian race (*brevipes*), and evidently the same bird, was found by Messrs H. R. McKenzie and J. Prickett; and on the next day D.A.U. watched it closely. The shore here

slopes gradually in a series of sandstone ledges: and the pools left in the hollows as the tide falls would seem to be an ideal tattler habitat, resembling that at Long Reef near Sydney, N.S.W. It should be mentioned that both H.R.McK. and D.A.U. have met with the Siberian Tattler at Parengarenga.

*R. B. Sibson*

## PIED STILT SWIMS THE CHANNEL

While the potential swimming ability of waders is well known, such observations are seldom published to assist the student of bird behaviour.

With this in mind, I record a Pied Stilt (*H. leucocephalus*) which buoyantly and unhrriedly swam across a watercourse about twenty feet wide at Ahuriri Lagoon, Napier, on 24/7/55.

It had been onshore with some other stilts which were cavorting excitedly, pursuing one another and leaping vigorously about. This group behaviour may perhaps account for the otherwise unnecessary swim.

*B. H. Heather*

## WHITE-FACED HERON NESTING IN NORTH AUCKLAND

A pair of White-faced Herons (*Notophoyx novaehollandiae*) frequented the eastern end of the Kaipara Flats from early June 1955 until early August.

On 21 July the pair were found to be nesting 35 feet from the ground in a 40ft kahikatea tree, one of a clump of about fifty trees. The nest was a very flimsy structure consisting of a mere handful of sticks, and Mr S. G. Smith, the owner of the land, had discovered the nest by finding two smashed eggs and one whole egg on the ground beneath the tree. During this and subsequent visits the heron remained sitting on the apparently empty nest while I was below the tree.

The heron continued to sit and considerably enlarged the nest structure and laid a fresh clutch, but on 14 August, accompanied by Mr J. Prickett, we found on the ground below the nest two eggs which had obviously been sucked but not smashed. There was no sign of the herons, but we discovered a White-backed Magpie's nest fifty yards away, and Mr Smith said that he had seen the magpies attacking the herons on several occasions.

There appears to be strong evidence to show that this attempt at nesting by the herons was frustrated by the depredations of the magpie. I also have photographic evidence to show that magpies have destroyed the young of both tui and pipit.

*G. J. H. Moon*

[This is the first record of the breeding of the White-faced Heron in northern New Zealand. During the breeding season of 1955, White-faced Herons were reported from two other localities in Kaipara, but breeding was not proved.—Ed.]

## BLACK-FRONTED TERNS (*C. albostriatus*) IN KAIPARA

On 23/4/55 we were driving along the northern shores of the Kaipara Harbour when we came to a little bay called Tangaihi and saw a number of White-fronted Terns (*S. striata*) sitting on the piles of a derelict jetty in company with sixteen smaller terns. As some of these were sitting directly in front of the White-fronted Terns, we estimated their size as about three-

quarters that of the larger terns. The top and sides of their heads were greyish with white throat. The upper feathers of wings and body were medium grey, showing very distinctly dark against their neighbours. When they flew we saw that the upper tail feathers were white, and the tail made a hollow curve about an inch deep. The breasts seemed very pale grey or off-white, but at no time did we see these birds face on – always a sideways view, and then back view when they flew away. They showed no signs of flying away, only changing position now and again, until the tide changed. (The tide was fully in when we first saw them and they were just resting and a few preening.) Their legs and beaks were tomato or orange coloured with the exception of two or more, which were dark. A few of them were sitting on individual piles and crosspieces, but quite a number were intermingled with the White-fronted Terns, which numbered thirty-four, and all seemed to be contented to be together.

In company with these birds were twenty-two Oyster-catchers, both black and smudgy.

*A. and J. Prickett*

[There seems to be little doubt that these were Black-fronted Terns, which had moved northwards in the autumn from the South Island. Stragglers have occasionally been reported on the Auckland coast, but the only comparable record of a flock is of five seen at Muriwai on 10/3/40 (*Notornis* 3, p. 11).—Ed.]

## MYNAS DESTROY YOUNG STARLINGS

At Wanstead, Waipukurau, in 1946, my husband and I heard a great commotion at a starling nest in the eaves of a building. Two mynas pulled out a large partly-feathered chick from under the roofing iron into the open spouting. They each gripped a wing of the chick with their bills and flew together with it for twenty to twenty-five yards and dropped it to the ground from a height of fifteen to twenty feet. They did not alight, but left the chick alive and dazed. This performance was repeated until three more chicks had been disposed of in the same manner. All died very soon. The parent starlings made a great fuss but did not attack the mynas, which completely ignored them.

Mention has been made in *Notornis* of mynas taking young birds from nests, but I have not heard before of two birds combining to carry one chick when it was too large for a single bird to handle.

*(Mrs) R. P. Stoddart*

## WILD DUCKLINGS DROPPING FROM NEST IN TREE

On 19/9/55 I had been chopping the rotten sap off some totara logs and was just going to stop to boil the billy when I heard the loud quacking of a duck which sounded to be coming up the bulldozed road towards me, but on looking more closely I saw that she was coming through the bush. I could also hear something dropping down out of a matai tree and for a moment thought it was one of the local pair of kaka pulling off bark or rotten wood. I then heard a rustling sound in a whara-whara (*Astelia banksii*) and saw that it was the little ducklings scrambling out of the nest and dropping to the ground like bits of bark falling. They just seemed to crash-land, scramble to their feet and head to where the old Grey Duck was calling a few feet away. The nest would be forty feet from the ground, but two heavily leaved woolly pungas grew directly underneath and broke the fall of the little ones.

I was only about half a chain away when they were coming down and I

am sure of eight, but I think there were ten. When they had all landed and flocked round her, she headed down through the bush with them, gently quacking all the time. I thought she would take them on to the open bush road, but instead she kept on a parallel with the road about half a chain in the bush. The nearest creek would be ten chains away and in the direction she was travelling there would fifteen or twenty chains to the first water. I tried to follow them as they made their way through the bush, but did not want to excite the old bird so moved away and left them to it. In a matter of ten minutes they had covered about five chains, over roots, under logs, and so on, so that they would soon cover a fair distance even in such rough going.

I do not know whether or not she carried any down from the tree to start them off. I had a close look round the pungas and on the ground, but could not find any that had been injured in the fall. Although so small they must be very 'tough'. One seldom has the opportunity of seeing such things happen and it is a very pleasant way of getting to know the ways of the birds.

*R. St Paul, Minginui*

## RELATIONSHIPS OF WANDERING ALBATROSS WITH BLACK-BACKED GULLS AND NELLIES IN LAMBTON HARBOUR

A nervous reaction of the Wandering Albatross (*D. exulans*) to Black-backed Gulls (*L. dominicanus*) is described in *Notornis* Vol. 5, 132; but it is apparent from further studies about the docks at Lambton Harbour, Wellington, that the Wandering Albatross is not as a rule disturbed by the presence of Black-backed Gulls, only evincing nervousness occasionally. This is shown by the following records.

First, an albatross and several gulls were observed resting together on the water on 25/3/54. The gulls, picking up food while swimming about, were chased by the albatross. In addition, an old albatross was seen swimming about on 7/7/54 amid a crowd of gulls; the two species associated amicably. A young adult albatross was seen on 14/3/55 to take wing and fly into a large party of feeding gulls, and again during May 1955 a bird was seen on the water with gulls swimming nearby and showing no nervous reaction, with some more in flight close by.

A second example of nervousness was seen, however, during April 1954. An albatross was seen sitting on the water close to a ship which was casting out slops. The albatross kept away from the slops until a crowd of gulls hovering over it settled on the water. The albatross then dashed amongst them to get its share of something to eat.

In *Notornis* 5, 132, I also mentioned the domination of a Nelly (*M. giganteus*) by a Wandering Albatross. More recently, on 11/4/54, I watched a young adult albatross which found a Nelly feeding on a piece of floating discarded fat. The albatross drove the Nelly off and swallowed the fat. However, its domination of the Nelly was not complete, as the latter swam around nearby with wings outspread while the albatross fed. This albatross later chased some more Nellies off some other carrion. Finally, on 27/5/54, three Nellies and one albatross were seen clustered round something edible floating in the water. The albatross left after it had failed to drive the Nellies away. They were then joined by a second albatross, but it likewise could not displace them.

*H. L. Secker, Wellington*

## ANTING BY A BLACKBIRD

On 25/12/55 I noticed an agitated female blackbird on our lawn. With all her feathers ruffled she poked her beak under one wing, then pecked at the lawn, then under the wing again; rapidly four to six times this was repeated, first under one wing and then for a similar number of times under the other wing. I do not know how long she had been performing these movements, but I watched for fifteen minutes before going closer to investigate. The blackbird ran under the hedge and I found an army of ants moving about on an area a little over a foot in diameter on the exact spot where she had been standing. I had heard about 'anting', but until I saw the ants on the ground I could not understand her 'antics'.

*Marie P. Buchler, Lower Hutt*

## BROWN BOOBY OFF CAVALLIS

This forms a belated footnote to P. A. S. Stein's recent paper on the Brown Booby in New Zealand (*Notornis*, 6: 157), and may serve to substantiate further his suggestions.

On 2/1/55 Messrs J. C. Burland, R. R. Moynihan and I saw at intervals and at varying distances, with the aid of x10 binoculars, a bird subsequently proved to be an adult Brown Booby (*C. leucogaster*). The bird was flying off the north coast of Kahangaro Island in the Cavalli group, Northland.

Field notes agree conclusively with available literature, save that the transverse chocolate bar on the underwing, mentioned by Stein (*Notornis*, 5: 165), is lacking in both field notes and sketches. Nor was the facial colour noted. The bill was horn-yellow and the feet, glimpsed once, were thought to be bright orange-yellow.

An initial impression that the bird was smaller, especially in its wing-span, than a Gannet (*S. serrator*), was readily confirmed when both were in proximity.

*B. D. Heather*

## WELCOME SWALLOW AT FAREWELL SPIT

A Welcome Swallow (*Hirundo neoxena*), the fourth recorded occurrence in New Zealand, was seen by me on 25/11/55. It was flying near and over the lake on the property of Mr S. W. Freeman, Puponga, whose farm immediately adjoins the base of Farewell Spit.

The swift irregularity of the bird's silent bat-like flight made binoculars virtually useless, but sufficient details for positive identification were seen after a lengthy watch.

A small bird, with rounded head, streamlined body, obviously forked tail and arcuate swept-back wings, the upper surface seemed sometimes blue-black, sometimes brown, but the truth appears to be that the back is blue-black and the wings brown. (1) Under-surface, including wing, whitish. Breast, throat and somewhere on the head, reddish-buff. Rump colour was not noted, but there was an occasional impression of white on the tail. A fascinating bird and one which could make an attractive addition to our fauna.

When I revisited the area together with Mr Rex Freeman on the 27th and 28th the bird could not be found.

Reference was made to: (1) D. L. Serventy and H. M. Whittell, *The Birds of Western Australia*, 1951, and (2) M. Sharland, *Tasmanian Birds and How to Identify Them*, 1945.

*B. D. Heather*

## NOTE ON HISTORICAL STATUS OF WEKA, RED-FRONTED PARAKEET AND BUSH PIGEON IN WELLINGTON PENINSULA

The dearth of records about bird life in the Wellington Peninsula makes the following authentic information of interest. Messrs J. J. Robinson, Paraparaumu, and J. L. Woodhouse, Wellington, inform me respectively that the Weka was last common at Makara in 1880 and was seen last in nearby Karori about 1890. The Red-fronted Parakeet was seen last by Mr Robinson in Makara in 1888. However, reliable information indicates its survival in the nearby Karori area (Wilton's Bush) between 1900 and 1910, though the bird died out by 1914.

Further information suggests that the species lingered to the same time in the Silverstream, South Karori. Nowadays the Bush Pigeon is only a visitor to the area west of Port Nicholson, but the species is said by Mr Robinson to have been resident in some bush on Cape Terawhiti after 1890. This area is now a pastoral run.

*H. L. Secker, Wellington*

## REVIEW

Die im Senkenberg-Museum vorhandenen Arten austorbener, aussterbender oder seltener Vögel (*Senkenbergiana Biologica,* 36: 241 - 265), by R. Mertens and J. Steinbacher: 1955.

This paper consists of an annotated list of the specimens of extinct, vanishing and rare species of birds in the collections of the Senkenberg Museum, Frankfurt-on-Main. The following New Zealand species are represented: *Cabalus modestus, Thinornis novae-seelandiae, Turnagra capensis, Notiomystis cincta, Anthornis m. melanocephala, Calleas cinerea, Creadion c. carunculatus, Heteralocha acutirostris, Casarca variegata* (!), *Gallirallus a grayi* and *G. a hectori, Cyanorhamphus unicolor, C. malherbi* and *C. auriceps.* Unfortunately, the authors' sources for information on the status of New Zealand species are far from complete and adequate; neither Oliver (1930), the *Checklist* (1953), nor *Notornis* being cited in the list of references. Specimens of the Norfolk Island Pigeon and Kaka are recorded.

*C.A.F.*

END OF VOLUME SIX

## NOTICE

The Index to Volume 6 of *Notornis,* together with a list of members of the Ornithological Society of New Zealand and their addresses, will be published in July next.