

SOUTH GEORGIAN DIVING PETRELS (*Pelecanoides georgicus*) BREEDING ON CODFISH ISLAND

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ABSTRACT

In September 1978 a colony of about 30-35 pairs of South Georgian Diving Petrels was identified breeding among the sand dunes at Sealers' Bay, Codfish Island, New Zealand (46°46'S 167°39'E). This may be the only surviving colony of this species in the Australasian region. It is of considerable interest, furthermore, in being the only colony situated on the Subtropical Convergence (all others are in colder waters) and in being the only one sympatric with *P. urinatrix chathamensis* (all others are sympatric with *P. u. exsul*).

INTRODUCTION

Codfish Island (46°46'S, 167°39'E) of 1480 ha is situated off the north-west coast of Stewart Island, oceanographically in a zone of mixed surface waters that links the Subtropical Convergence from west of to east of the South Island. It is a relatively unmodified island on which the only surviving vertebrates introduced by man are a rat (the kiore *Rattus exulans*), a marsupial (the possum *Trichosurus vulpecula*), and a flightless bird (the weka *Gallirallus australis*).

There is no mention of diving petrels (Pelecanoididae) in the reports by E. F. Stead and R. A. Wilson on the first exploration of Codfish Island by ornithologists (20 December 1934 to 7 January 1935). The next study of the fauna took place during eight days in early November 1948, R. K. Dell (1950) publishing the party's bird notes. These include the following: "*Pelecanoides urinatrix*. — Diving petrels were found in burrows at Sealers' Bay. The burrows were situated a few feet above high water mark in consolidated sand dunes and less commonly higher up on the dunes. The burrows were comparatively deep and the whole habit seems unusual. A single egg was present in the burrows investigated. . . ."

Sealers' Bay lies on the north-east side of the island and is the usual landing place, being sheltered from the westerly winds and sea swell. Fronting the main valley, it has the only sandy beach, which is about 1 km long between rocky, scrub-covered headlands.

Subsequent expeditions to Codfish Island took place in 1966, 1971, 1972 and 1973. These were preoccupied with the status of

Cook's Petrel (*Pterodroma cookii*) and diving petrels received little or no attention. However, during another expedition in December 1975, the authors rediscovered the burrows in the sand dunes that Dell (1950) had reported. In part these had probably passed unnoticed previously because most visits were late in the breeding season, when many burrows may have been obscured, even blocked, by moving sand. Although the burrows were in use during December 1975, we did not capture any of the diving petrels using them, being also preoccupied with Cook's Petrels.

Falla (Falla *et al.* 1970) noted that the South Georgian Diving Petrel (*Pelecanoides georgicus*), "occurring in New Zealand seas, as far as is known, only at the Auckland Islands, where it is now exceedingly rare," digs its burrows there in more sandy soil than that where the Subantarctic Diving Petrel (*P. urinatrix exsul*) nests. Burrows were found in consolidated sand dunes on Enderby Island by the *Erebus* and *Terror* Expedition in 1840, and also on Dundas Island by Falla in 1943 (Sir Robert Falla, pers. comm.). However, during the 1972-73 Auckland Islands Expedition, when both those localities were explored, "no trace was found of this species" (Bell 1975). It was because of this unique nesting habit of *P. georgicus* in the New Zealand region that we were particularly interested in identifying the birds of the Codfish Island sand dunes. Not having established their identity in 1975, we resolved to find out when the next opportunity arose in 1978.



FIGURE 1 — A South Georgian Diving Petrel on the beach at Codfish Island, September 1978.
Photo: D. Garrick

RESULTS

A party comprising the authors, David Garrick, and David Crouchley visited Codfish Island from 22 September to 12 October 1978. On the first night we captured two diving petrels by spotlighting on the beach (Fig. 1). None of us had seen *P. georgicus* before or had recently handled any live diving petrels. With us we had some New Zealand reference works on seabirds (Oliver 1955, Falla *et al.* 1970, and others) but none enabled completely satisfactory identification. Later we found that Serventy *et al.* (1971) would have been more useful. At first glance the pale patch behind the ear and the white stripe in the scapulars drew attention. Details of the bill appeared to fit the description for *P. georgicus*, but we had no accurate illustration (the nostrils are not as shown in Falla *et al.* 1970). The considerable white areas in the inner webs of the outer three primaries and the white underwings also drew our attention. Suspecting that these were *P. georgicus* we collected both, preserving them in 70% alcohol and depositing them in the National Museum, Wellington, on our return. On subsequent nights we caught, examined, measured and released four more.

A few nights after our arrival, David Garrick and David Crouchley brought back to camp a diving petrel caught at the eastern end of the beach. This had dusky inner webs to its outer primaries, smudgy underwing coverts, a parallel-sided bill basally and nostrils with the septa clearly posterior: it was a Common Diving Petrel (Southern subspecies) and so we were now certain of the identity of the South Georgian Diving Petrels. Four more *P. urinatrix chathamensis* were caught during this trip, two being a pair of courting non-breeders taken from a burrow on a headland at the north-west end of Sealers' beach.

Of various characters that may be used to separate these two species, we found the colour of the inner webs of the outer three primaries to be the most useful by being consistent and easily observed. Bill characters came second because, though the nostril shape and position of the septa are quite reliable, birds we caught usually had sand in the nostrils and so the septa could not be seen. Bill shape is useful but probably too variable to be completely reliable as a single means of identification. Underwing colour also seems too variable in *urinatrix*: in *georgicus* it was always white, but in *urinatrix* it varied from heavily smudged brown-grey to being quite pale though never entirely white. There is a good discussion of identification criteria in Payne & Prince (1979). These criteria seem quite applicable to Codfish Island diving petrels, including the measurements of *georgicus*, which encompass ours.

We surveyed the distribution of burrows in Sealers' Bay. In late September it seemed that the breeding season had just begun, with burrows being scratched out and apparently some new burrows being attempted. In total we found and marked 45. They were placed

in the low foredune or in the main dune behind it, and 1-5 m above the high-tide line (base of the dunes). Sparse plant cover consisted of sedges — *Scirpus nodosus*, *Desmoschoenus spiralis*; introduced grasses — *Dactylis glomerata* (cocksfoot); and sand-hugging flowering plants — *Coprosma acerosa*, *C. propinqua*. Although most birds were caught when flying over the dunes rather than on the ground, it was soon apparent that *georgicus* were in the dunes part of the beach and that if we spotlighted at either end of the beach we would catch *chathamensis*. On 12 October 1978, when we left Codfish Island, 35 burrows were considered to be functional and in use, the remainder being incomplete holes or apparently disused but for unknown reasons. A survey by R. J. Nilsson between 11-15 December 1978, when incubation should have been in progress, indicated that about 30 burrows were active.

With such a small population in such an unstable environment it is undesirable and barely practical to study the nesting chambers directly. All seemed very deep in the sand: about 1 m or more. Thus inferences about occupation had to be drawn by observation at the burrow mouths.

The total population of *georgicus* thus seems to comprise about 100 birds: 60-70 breeding plus perhaps 30-60 non-breeders, mainly young birds.

No evidence of predation upon them was found, although wekas (*Gallirallus australis*) and kiore (*Rattus exulans*) frequent the area. However, kiore may attack unguarded eggs and chicks, and wekas may kill fledglings at departure. The status of this population needs to be watched closely, and this will now be more practical in view of the increasing frequency of visits by Wildlife Service staff to the island during the current operation to remove wekas.

Stomach contents of the two specimens collected were examined. Though very digested, there were identifiable remains of euphausiids, small fish (there were many small otoliths in one stomach but they were too worn to identify), and small squids (beaks of juveniles of *Argonauta* sp., *Histioteuthis atlantica*, *Teuthowenia* sp., and *Chiroteuthis* sp., were identified). These indicate that the birds had been feeding some distance from the island at the edge of the continental shelf. Common Diving Petrels are inshore feeders and we saw several that seemed to be this species whilst making trips in a small boat around Codfish Island.

Searches were made at either end of Sealers' beach for diving petrel burrows. At the south-east end about 6 were found high at the rear of the dunes where scrub begins, and at the north-west end, 11 were found on two of three low headlands that project into the bay. One burrow was kept under study using an observation hole covered by a stone, and eventually a pair of courting *chathamensis* was found in the chamber. Another burrow showed clear signs that incubation was in progress in early October. This subspecies probably lays

between mid-September and mid-October (Richdale 1943), whereas *georgicus* lays apparently in November on Codfish Island (Dell 1950) but in December further south (Payne & Prince 1979). Thus, as elsewhere (Payne & Prince 1979), *georgicus* burrows in unstable ground that generally lacks plant cover (scree, scoria, sand), whereas *urinatrix* burrows in stable soil or peat under vegetation.

DISCUSSION

The most northerly colonies of South Georgian Diving Petrels are in the Crozet Archipelago, on Hog and East Islands (Derenne & Mougín 1976, Despin *et al.* 1972), at 46°06'S and 46°25'S respectively. Although Codfish Island is about 30' further south, oceanographically it lies in much warmer water on the Subtropical Convergence, whereas the Crozets are well within subantarctic seas, about 5°-6° south of that convergence. This is perhaps the most interesting aspect of the Codfish Island colony.

There is a notable lack of the preferred nesting habitat of *P. georgicus* on the tussock-clad subantarctic islands south of New Zealand. Scoria cones and winter-snow-covered screes, much favoured at Prince Edward Islands, South Georgia and probably elsewhere, are quite absent from Antipodes, Auckland and Campbell Islands. Apparently screes are available on Macquarie Island, but lack of ornithological studies before the early arrival of various predators (Jones 1980) has left the original status of *Pelecanoides* species there in great uncertainty. Seemingly that island provides the only conventional nesting habitat for *georgicus* in the whole region. If it once bred there, it now seems to be extinct.

Undoubtedly, if it was to find nesting space in the region, this diving petrel had to adapt to a different terrain, and it did so by exploiting the terrain that physically most resembles scoria and scree — sand. Such soil types, characterised by instability, are avoided by nearly all other nesting petrels. However, even sand dunes are not common. There are none on Antipodes or Campbell Islands and only a few in the Aucklands (Enderby and Dundas Islands). It is worth considering that the rarity of *georgicus* in this region may have resulted merely from shortage of nesting habitat, with introduced vertebrates superimposed on this. Possibly, therefore, the extraordinary Codfish Island colony is a manifestation of this predicament.

CONSERVATION

Obviously this colony is worthy of receiving attention to its welfare. We have been unable to obtain any indication as to the number of burrows evident in 1948. Thus we have no idea of any trend in its numbers. An increase hardly seems likely.

The operation against wekas may be beneficial to this species as well as to Cook's Petrel. It may be necessary to investigate the effects of rats on breeding success. In the meantime annual checks

must be made on the number of burrows in use so that any population trend can be detected. Above all, however, it will be necessary to restrict people from walking over these dunes, particularly during the currently increased level of management activity.

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SHORT NOTE

MOLLYMAWK EATS DIVING PETREL

A Grey-headed Mollymawk (*Diomedea chrysostoma*) picked up on a Manawatu beach in 1978 by Hugh Robertson was some months later given to me for dissection. The crop contained several large squid beaks and the remains of a Diving Petrel (*Pelecanoides urinatrix*). One wing of the diving petrel was intact and measurable for identification but the rest of the bird was thoroughly mutilated, including the crushed skull.

Serventy *et al.* (*Handbook of Australian Sea-birds* 1971: 75) commented that this mollymawk, from penguin feathers found in its castings, evidently takes birds captured at sea or swallows dead carcasses.

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