SHORT NOTES

Observations on the food of the Southern Giant Petrel near Davis, Antarctica

Hawker Island, 68°35'S, 77°50'E, is 300 m off the mainland 7 km south of Davis, Antarctica. It has the southernmost breeding colony of Southern Giant Petrels (*Macronectes giganteus*), consisting of 30-40 pairs (Johnstone *et al.* 1973). I collected boluses from the ground around the nests of giant petrels during banding visits in February 1984 and February 1985. The boluses were washed before sorting and were preserved in 70% ethanol for identification later. Bird components were identified by feathers and by comparison with skeletal material from known birds. Seal hair was identified by comparison with hair taken from dead and moulting seals.

The boluses contained remains of birds, seals and fish, birds being the most common (Table 1). Remains of Adélie Penguins (*Pygoscelis adeliae*), Southern Fulmars (*Fulmarus glacialoides*) and Snow Petrels (*Pagodroma nivea*) occurred in 82%, 10% and 10% of boluses respectively. Fish remains occurred in 13% of boluses and remains of Weddell seals (*Leptonychotes weddelli*) in 12% of boluses.

TABLE 1 — Frequency of occurrence of food remains in boluses (n = 60)

Remains	Number	%
Birds		
Adelie Penguin	49	81.7
Southern Fulmar	6	10.0
Snow Petrel	6	10.0
Southern (Silver-grey) Fulmar	6	10.0
Antarctic Petrel	1	1.7
Cape Pigeon	1	1.7
Wilson's Storm Petrel	1	1.7
Mammals		
Weddell Seal	7	11.7
Elephant Seal	2	3.3
Fish	8	13.3
Other		
Cephalopod	2	3.3
Nematode	1	1.7
Stones	4	6.7

The sampling method I used is inherently biased towards large prey with indigestible remains. Johnstone (1977), for example, found that fish, cephalopods and crustaceans occurred less in boluses than in regurgitated stomach contents of both chicks and adult Southern Giant Petrels.

Colonies of Adélie Penguins are on Hawker Island and surrounding islands, and so one would expect penguin remains to be a common item in boluses. Penguin remains were also the most common food item reported from Terre Adelie (Mougin 1968), Signy Island, South Orkney Islands (Conroy 1972), Macquarie Island (Johnstone 1977) and South Georgia (Hunter 1983).

Mammalian remains occurred in 15% of boluses. Mougin (1968) reported mammalian remains in 28% of stomach contents, and Hunter (1983) reported them in 2% of chick regurgitations. Despite frequent visits to the main Weddell seal pupping site near Davis, I seldom saw giant petrels and never more than one at a time, whereas Conroy (1972) reported Weddell seals to be important in the diet at Signy Island. Hunter (1983), however, found few Southern Giant Petrels feeding on fur seal (*Arctocephalus gazella*) carrion at South Georgia, whereas he commonly found Northern Giant Petrels (*Macronectes halli*) at carcases. I observed a dead elephant seal (*Mirounga leonina*) near Davis which attracted about 30 giant petrels, but they removed only a small amount of the flesh and stayed for less than a week, a finding similar to those of Johnstone (1979) and Hunter (1983).

Cephalopod remains were found in only two boluses (3%), which contrasts with frequencies of occurrence of 72% from Signy Island (Conroy 1982) and 22% from continental Antarctica (Mougin 1968). Although cephalopod beaks may be represented less in boluses than in regurgitations (Johnstone 1977 reported a frequency of 16% in boluses and 28% in regurgitations on Macquarie Island), the 3% reported here seems very low. The availability of squid in the Davis area may therefore have been low. In food studies near Davis of Weddell seals, Emperor Penguins (*Aptenodytes forsteri*) (Green in press) and Adélie Penguins, I found cephalopod remains less frequently than reported elsewhere.

The frequency of fish in this study (13%) is higher than reported by Mougin (11%), Conroy (4%), Johnstone (10%) and Hunter (6%). Fish vertebrae occurred in two boluses and were from benthic fish.

The Southern Fulmar remains in some boluses are of interest as the nearest colony of these birds is in the Rauer Islands, 25 km to the south. Boluses of the Antarctic Skua (*Stercorarius maccormicki*) from sites close to Davis had no Southern Fulmar remains, whereas they were common in skua boluses at the Rauer Islands (pers. obs.). This information, together with sightings of giant petrels in the Rauer Islands, indicates that the terrestrial foraging range of giant petrels is greater than that of skuas within the Davis area. Whereas skua nests are mainly dispersed around bird colonies, where they defend feeding territories, giant petrels nest communally and presumably do not defend feeding sites. The giant petrels may therefore have to forage further for their food.

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A survey of the Lower Arawata River

For 20 years I have been making periodic bird surveys of the braided riverbeds of Central Otago and have often felt that a similar one of the Arawata was justified. The current banding programme for the Banded Dotterel (*Charadrius bicinctus*) gave added incentive to the project as I anticipated finding some of them there.

The Arawata arises in a huge catchment draining the western glaciers and snowfields of the Main Divide immediately south of the Aspiring region (including the Bonar Glacier of Mt Aspiring itself), and it reaches the Tasman Sea at Neils Beach, a few kilometres north of the Jackson Bay settlement. (As with most South Westland rivers, the mouth is a well-frequented whitebaiting area). The broad level valley of the lower Arawata begins where the river tumbles from the mouth of the formidable Ten-Hour Gorge, some 50 km from the sea; the valley floor then varies in width from a few hundred metres to nearly 3 km, most of this (especially since 1979) being occupied by the shingly bed of the river itself. The grassy grazing flats and more or less stable scabweed islands and terraces have been considerably reduced in recent years by major flooding, especially 'old man' floods in the autumns of 1979 and 1982 and several weeks of persistent high flooding in the summer of 1984. These changes have undoubtedly affected birdlife, particularly Banded Dotterels and oystercatchers, which prefer the 'stable' scabweed areas of riverbeds rather than the vast expanses of clean flood-washed shingle which now characterise this riverbed. For this reason the upper reaches (14 Nov in Table 1), with smaller river volume and hence more traditional habitat intact, was the most productive of bird numbers and densities.

Having failed in negotiations for a jetboat, I decided to fly into the valley. Even though three airstrips are marked on map S.106, none is now usable because of the flooding mentioned above; landing is possible only on the shingle beaches of the riverbed itself, when water levels are low enough;