classification of Dow (1980) of an opportunistic communal breeder. If there is no available territory for a young male it may remain with its parents. Rogan's (1964) observation of a breeding of two females and one male may have been a case of a young female remaining with its parents. At Wollomombi there was no pressure on space for territories but there may not have been eligible mates for both the banded young males.

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REFERENCES

COURTNEY, J. & S. MARCHANT. 1971. Breeding details of some common birds in south-eastern Australia. Emu 71: 121-133.

DOW, D.D. 1980. Communally breeding Australian birds with an analysis of distributional and environmental factors. Emu 80: 121-144.

ROGAN, J. 1964. Unusual behaviour of Hooded Robins. Aust. Bird Watcher 2: 90-92.

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THE FOOD OF ANTARCTIC PETRELS (*THALASSOICA ANTARCTICA*)

For two years the Australian Antarctic Division has been studying the oceanography and biology of the Prydz Bay area (Lat. 67°S, Long 75°E), specially the distribution and abundance of Antarctic krill *Euphausia superba*. The present study was conducted to clarify the importance of krill in the diet of Antarctic Petrels *Thalassoica antarctica*, about 3–5 million of which nest in the Prydz Bay area.

Wilson (1907), Gain (1914), Falla (1937), Voous (1949), Bierman & Voous (1950) and Griffiths (1983) found krill along with other species in the stomachs of Antarctic Petrels. However because of the circumstances under which the birds were collected and the small sample sizes involved, it was felt that further investigation was warranted.

Seventeen (11 male, five female and one unsexed) Antarctic Petrels were shot as they flew to and from a roosting site on an iceberg at 67°31′S, 74°39′E, between midnight and 0300 GMT on 16 December 1982. The birds were shot and collected from a rubber dinghy, launched from the resupply vessel M.V. Nella Dan. Dead birds were weighed, sexed, and frozen and transported back to Hobart. Here their stomach contents were weighed to the nearest gram and the prey species identified. Prey was usually in good condition so the identification of most species was not difficult. Euphausiids were identified using the key in Kirkwood (1982), fish were identified by R. Williams (Australian Antarctic Division) and cephalopod beaks by M.R. Clarke (Marine Biological Association, Plymouth). The percentage contribution of each food type to the total stomach contents was estimated and, whenever possible, the Standard Lengths of the fish, the Reference Measurement (RM) of the euphausiids and the number of euphausiid eyes recorded. The frequencies of occurrence of prey species found in the stomachs in this and other studies are shown in Table I.

TABLE I

The frequency of occurrence of the major food types in the diet of Antarctic Petrels.

	Number Examined	Crustacea	Cephalopoda	Pteropoda	Fish	Whale Remains
This study	17	17 (100)	3 (18)	0	1 (6)	0
Falla (1937)	14	7 (50)*	6 (43)	0	3 (21)	0
Voous (1949)	28	18 (64)	13 (46)	5 (18)	10 (36)	8 (29)
Griffiths (1983)	34	24 (71)	22 (65)	0	26 (76)	0
Total	93	66 (71)	44 (47)	5 (5)	40 (43)	8 (9)

* Falla split crustacea up into *Euphausia* and other crustacea so the frequency of occurrence of Euphausiids is shown. No such distinction was made by others.
( ) = percentage frequency of occurrence.

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Crustacea — The only crustacean found in stomachs was *E. superba*, which occurred in all stomachs and in all but one contributed 100% to the volume of the contents. The mean RM of the 47 measurable *E. superba*, taken from 11 of the 17 stomachs containing this species, was 48 mm, sd = 27 mm (see Fig 1). The mean number of pairs of *E. superba* eyes in 16 stomachs was 42, range 1–117.

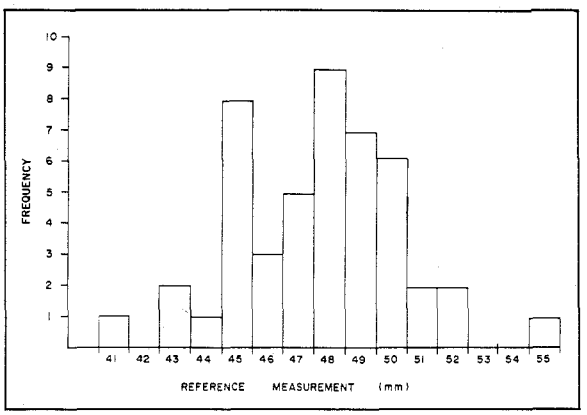

Figure 1. The reference measurement of measurable *E. superba* found in stomachs of Antarctic Petrels.

Fish — Fish were found in only one of the 17 stomachs examined. This stomach contained two *Pleuragramma antarctica*, both of standard length 160 mm and only a single *E. superba*. The percentage volume *P. antarctica* in this particular stomach was 95%.

Cephalopods — Cephalopods were represented in three stomachs but as beaks only so their percentage contribution to the total volume of the three stomachs in which they were found was negligible. Beaks were too digested to allow rostral length measurement, so estimation of the cephalopods' dorsal mantle length using the relationships shown in Clarke (1962) were precluded. Beaks were also too digested to permit identification.

The average wet weight of stomach contents was 31 g (range 2–72 g) or 4% (31/744) of the average body weight of 744 g (n = 17, sd = 88 g). Average wet weights of food in male and female stomachs did not differ significantly ($t = 1.07$, $p > 0.2$, $df = 14$), although sexes differed in the body weight (males = 813 g, n = 11, females = 696 g, n = 5; $t = 2.99$, $df = 14$, $p < 0.005$, one tailed-t).

The predominance of *E. superba*, with occasional cephalopods and fish in stomachs of Antarctic Petrels agrees with the findings of others (Table I). Voous (1949) also reported finding pteropods and whale remains in the stomachs of his Antarctic Petrels and Gain (1914) found medusae. The whale remains were undoubtedly ingested by the birds scavenging the refuse produced by the whaler on which Voous was sailing. The pteropods Voous found in the birds' stomachs were possibly scavenged after they had been disgorged by whales killed by the whaling operations. However Snow Petrels *Pagodroma nivea*, Cape Petrels *Daption capense*, Southern Fulmars *Fulmarus glacialoides* and Short-tailed Shearwaters *Puffinus tenuirostris* caught under circumstances not associated with whaling, have also been found to have eaten pteropods (Falla 1937; Griffiths 1983; Montague *et al.* in prep.). Medusae probably contribute little to the diet of the Antarctic Petrel, as only Gain found them and he gave no further details.

To date all studies of the diet of the Antarctic Petrel have been based on sample sizes less than 35 (see Table I), collected on only three or four occasions in any one year. Any further studies should involve regular (eg. fortnightly or monthly) collection of birds throughout the day at sea or at the colonies to determine diurnal and seasonal variation.

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REFERENCES

BIERMAN, W.H. & K.H. VOOUS. 1950. Birds observed and collected during the whaling expeditions of the "Willem Barendez" in the Antarctic, 1946-1947 and 1947-1948. Ardea suppl., 1-24.

CLARKE, M.R. 1962. The identification of cephalopod 'beaks' and the relationship between beak size and total body weight. Bull. Br. Mus. Nat. Hist., Sect. D, 8: 419-480.

FALLA, R.A. 1937. Birds. Rep. B.A.N.Z. Antarctic Research Expeditions 1929-31, (B), 2, 1-288.

GAIÑ, L. 1914. Deuxieme Expedition Antarctique Française 1908-1910 Oiseaux Antarctiques, 2, 1-200. *In* Murphy, R.C. 1936, Oceanic birds of South America. New York: Am. Mus. Nat. Hist.

GRIFFITHS, A.M. 1983. Factors affecting the distribution of the Snow Petrel *Pagodroma nivea* and the Antarctic Petrel *Thalassoica antarctica*. Ardea 71: 145-150.

KIRKWOOD, J.M. 1982. A guide to the Euphausiacea of the Southern Ocean. A.N.A.R.E. Research Notes 1: 1-45.

MONTAGUE, T.L., J.M. CULLEN & K. FITZHERBERT. (in prep). The food of the Short-tailed Shearwater *Puffinus tenirostris*.

VOOUS, K.H. 1949. The morphological, anatomical and distributional relationship of Arctic and Antarctic Fulmars (Aves, Procellaridae). Ardea 37: 113-122.

WILSON, E.A. 1907. British Antarctic Expedition (1901-1904) Reports. Natural history. II. Zoology, Part 2, 'Aves' London. Brit. Mus. Nat. Hist.

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