Prey from three chinstrap penguins *Pygoscelis antarctica* at Bouvet Island, December 1982

J. Cooper and **J.W. Enticott**[1]
T. Hecht[2]
and **N. Klages**[3]

[1]Percy FitzPatrick Institute of African Ornithology
University of Cape Town, Rondebosch 7700
[2]Department of Ichthyology and Fisheries Science
Rhodes University, P.O. Box 94, Grahamstown 6140
[3]Port Elizabeth Museum, P.O. Box 13147, Humewood 6013

Chinstrap penguins Pygoscelis antarctica *at Bouvet Island, southern Atlantic Ocean, consume krill* Euphausia superba *and the myctophiform fish* Electrona carlsbergi? *based on three birds collected in December 1982. The first record of a chinstrap penguin eating a squid was made.*

Introduction

The chinstrap penguin *Pygoscelis antarctica* is one of the more abundant Southern Ocean penguins and its population is thought to be increasing (Wilson 1983 and references therein). For these reasons, and because it feeds on krill *Euphausia superba* (Croxall & Furse 1980, Volkman *et al.* 1980), the species has been selected for longterm monitoring (BIOMASS Working Party on Bird Ecology 1982). Bouvet Island (54°26'S, 03°24'E) is one of the less studied islands in the Southern Ocean (Watkins *et al.* 1984). Three species of penguins are known to breed there (Wilson 1983) but to date nothing has been published on their diets at this locality. This note reports on the stomach contents of a few individual chinstrap and macaroni penguins *Eudyptes chrysolophus* at Bouvet Island.

Methods

On 21 December 1982 JWE visited the mixed chinstrap and macaroni penguin *Eudyptes chrysolophus* breeding colony at Nyrøysa (Haftorn *et al.* 1981, Watkins 1981). At the time of the visit most penguins were incubating but some chinstrap penguins had small young. Six individuals of each species were collected by injection with Pentabarbitone. Pairs were taken in the case of chinstrap penguins. The specimens were deep frozen and taken to the Percy FitzPatrick Institute where they were weighed and measured, defrosted and their stomach contents removed. Stomach contents were weighed and then separated into crustacean, fish and squid remains. The numbers of crustacean eyes, fish otoliths and squid beaks were counted. Otoliths were identified by TH, whole crustaceans and squid beaks by NK. Total length of whole crustaceans was measured. Use of reference collections and conversion formulae (TH, NK unpubl. data) allowed estimates to be made of the sizes of whole animals from measurements of otoliths and squid beaks.

Results

Sex, mass, mensural data (culmen and bill depth at the gonys) and mass of stomach contents of the penguins collected are given in Table 1. Three chinstrap and five macaroni penguins had empty stomachs. Chinstrap penguins with food in their stomachs had clean plumages and had probably recently returned from foraging, while those that had empty stomachs had dirty plumages. In all three cases in this species, only one member of the pair (two females and one male) contained food in its stomach. All three stomachs contained crustacean remains and one also contained fish and squid remains. Only two prey species have been positively identified: the krill *Euphausia superba* and the myctophiform "lantern" fish *Electrona carlsbergi?* (Table 2). Seven whole *Euphausia superba* in one stomach had a mean total length of 41,5 mm. A second stomach contained a whole *E. superba* of total length 32 mm. Mean caudal length of 30 *Electrona carlsbergi?* was estimated from otolith size to be 71,6 mm. The single upper squid beak was identified as belonging to the family Onychoteuthidae (possibly *Kondakovia longimana*).

One macaroni penguin (M5: Table 1) contained a pair of squid beaks identified as *Kondakovia longimana* with a lower rostral length of *c.* 2,3-2,4 mm. This is equivalent to a mantle length of *c.* 100 mm.

Table 1
Mensural data and stomach content sizes of chinstrap and macaroni penguins collected at Bouvet Island on 21 December 1982

Specimen No.	Sex	Mass (g)	Culmen × Bill depth at gonys (mm)	Stomach contents mass(g)
		Chinstrap penguins *		
C1	♂	5 150	50 × 17,5	131
C1A	♀	4 200	46 × 16	0
C2	♀	4 300	45,5 × 16,5	170
C2A	♂	4 600	55 × 20,5	0
C3	♀	4 650	49,5 × 17,5	58
C3A	♂	5 000	49,5 × 19,5	0
		Macaroni penguins		
M1	♀	3 600	53,5 × 24	0
M2	♂	5 700	62,5 × 25	0
M3		5 550	60,5 × 25,5	0
M4	♀?	6 300	61 × 26	0
M5	♂	5 700	63 × 26	0
M6	♂	5 250	62 × 25,5	0

*Represent three breeding pairs

Discussion

At Bouvet Island in December 1982, chinstrap penguins consumed krill, fish and squid. Krill may form the larger part

Table 2
Prey identified in stomachs of three chinstrap penguins collected at Bouvet Island on 21 December 1982

Specimen no.	Prey species
C1	a. 7 whole *Euphausia superba* (mean total length = 41,5 ± 5,5 mm; range 37-48 mm) b. 448 euphausiid eyes
C2	a. 859 krill eyes
C3	a. 1 whole *Euphausia superba* (total length 32 mm) b. 520 euphausiid eyes c. 60 otoliths of the fish *Electrona carlsbergi?* (estimated mean caudal length = 71,6 ± 6,2 mm; range 50,0 – 81,7 mm) d. 1 upper squid beak from Family Onychoteuthidae, possibly *Kondakovia longimana* (upper rostral length 2,05 mm)

of their diet but the very small number of samples obtained on only one day precludes further deductions.

Elsewhere in the Southern Ocean the chinstrap penguin feeds primarily on krill (references cited in Volkman *et al.* 1980). In the Elephant Island group (61°10′S), South Shetland Islands, chinstrap penguins fed primarily on large (40-65 mm) krill and took very few fish (which were not identified) (Croxall & Furse 1980). Farther south, on King George Island (62°10′S), South Shetland Islands, chinstrap penguins also consumed primarily krill with fish *Pleurogramma antarcticum* forming a very small part (0,3 % by mass) of the diet (Volkman *et al.* 1980). At this locality amphipods also occurred in stomach contents in very small numbers (Jazdzewski 1981). Amphipods were not identified in the three chinstrap penguin samples from Bouvet Island. Krill consumed by chinstrap penguins at King George Island ranged from 11 to 55 mm (mean 42,3 mm) (Volkman *et al.* 1980), a size similar to that obtained at Bouvet Island. Squid has apparently not previously been reported in the diet of the chinstrap penguin (references cited in Volkman *et al.* 1980).

The absence of undigested food in the six macaroni penguins sampled is presumably due to the fact that their eggs had not hatched and they were not yet feeding young.

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