CEPHALOPOD BEAKS FROM THE STOMACH OF A JACKASS PENGUIN

SPHENISCUS DEMERSUS LINNAEUS

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INTRODUCTION

Davies (1955, 1956, 1958), Rand (1960) and Matthews (1961) have shown that cephalopods form only 1 to 4 per cent by weight of the diet of the Jackass Penguin *Spheniscus demersus*. At certain times of the year, however, this percentage increases considerably; Rand (1960) counted up to 243 beaks in one stomach in June. Little quantitative work seems to have been done on cephalopods in the diet of *S. demersus*. It is therefore hoped that this study will help to fill the gap.

MATERIAL AND METHODS

An oil-soaked juvenile *Spheniscus demersus* was obtained from the cold-storage room of the Port Elizabeth Oceanarium in November 1963. The stomach contents were removed and preserved in 70 per cent alcohol. The only identifiable remains were cephalopod beaks; these were washed and sorted into upper and lower beaks and the rostral lengths of the lower beaks, as defined by Clarke (1962), were measured. The measurements were used to calculate the weight of the cephalopods eaten.

RESULTS

Altogether 165 lower beaks and 162 upper beaks were counted. Apart from some mechanical damage, the beaks were almost intact (Fig. 1A, B & C) and 163 lower beaks were measurable. The lower rostral lengths ranged from 0·9 mm. to 3·8 mm. with an average length of 2·2 mm. (Fig. 2). In order to show the distribution, these measurements were grouped in a frequency table with an interval range of 0·5 mm. The frequencies were then plotted against the interval means (Fig. 3). The high peak of the curve, combined with a low variance and an even distribution, indicates that the beaks constitute a random sample from a single species of cephalopod. This was confirmed by morphological examination of the beaks which were compared with intact beaks dissected out of an identified specimen of *Loligo reynaudi* d'Orb. (Fig. 4) and found to belong to this species. The specimen of *L. reynaudi* weighed 19·6 gm. and had a lower rostral length of 2·2 mm.

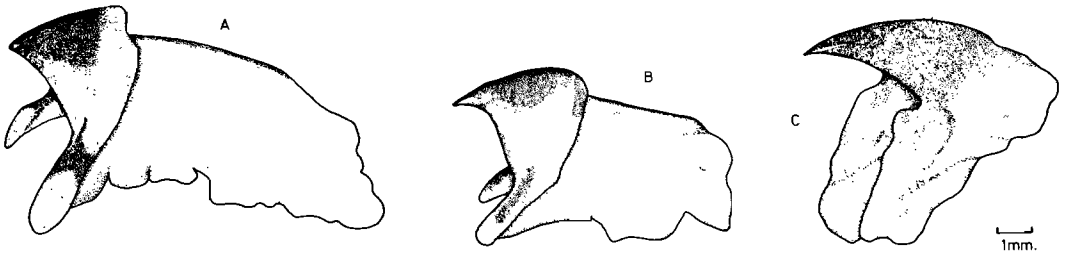

Fig. 1.

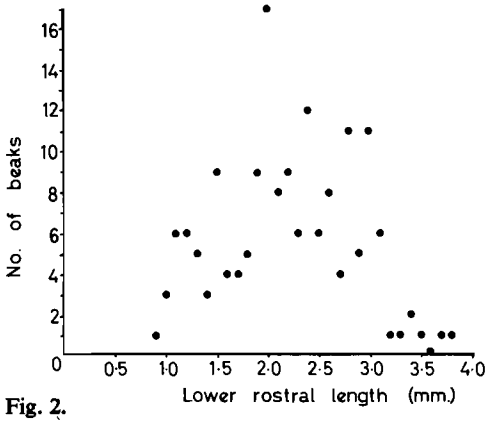

Fig. 2.

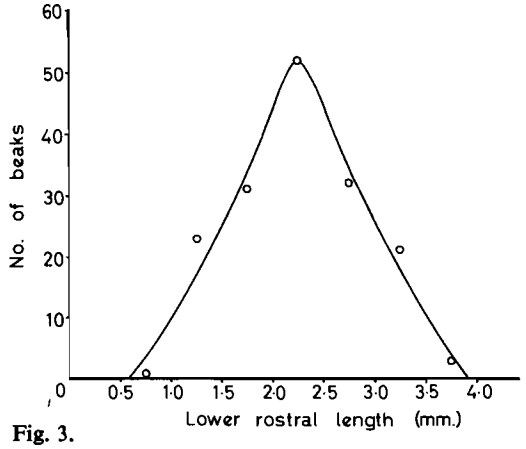

Fig. 3.

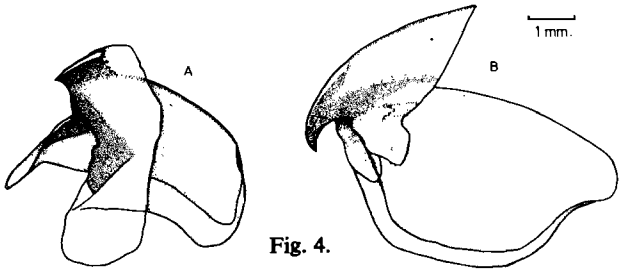

Fig. 4.

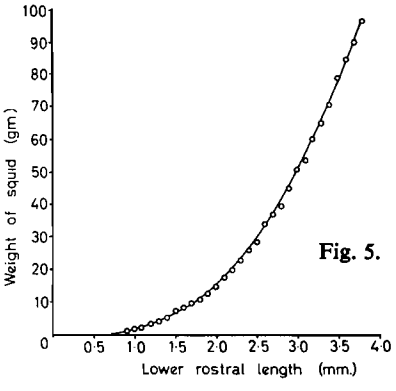

Fig. 5.

Fig. 1. A. Lower beak of cephalopod from penguin stomach.
Fig. 1. B. Lower beak of cephalopod from penguin stomach, showing more mechanical wear than (A), but with rostrum still intact.
Fig. 1. C. Upper beak of cephalopod from penguin stomach.
Fig. 2. Measurements of lower rostral lengths of cephalopod beaks and number of lower beaks from a single penguin stomach.
Fig. 3. Frequency curve of lower rostral lengths (interval range 0.5 mm.) of cephalopod beaks from a single penguin stomach.
Fig. 4. A lower beak of *Loligo reynaudi* d'Orb. Fig. 4. B. Upper beak of *Loligo reynaudi* d'Orb.
Fig. 5. Weights of loliginid squids plotted against lower rostral lengths (data from Clarke (1962)).

DISCUSSION

Squids eaten by *Spheniscus demersus* have previously been identified by Davies (1958) as *Loligo reynaudi*.

Assuming the ratio of lower rostral length to weight of *L. reynaudi* to be directly proportional to the ratio given for the Loliginidae by Clarke (1962), the curve in Fig. 5 was plotted from calculated weights of *L. reynaudi*. Thus the calculated total weight of 163 squids with an average lower rostral length of 2·2 mm. is 3234 gm. (7·1 lb.). A maximal total weight of 3941 gm. (8·7 lb.) was arrived at by calculating the weights of the squids for each of the lower beaks measured.

The juvenile penguin was not weighed, but probably weighed about 7 lb., since Davies (1958) gives the weight of adult *Spheniscus demersus* as just over 8 lb.; he estimates that each bird eats about 3½ lb. of food per day. If we assume that undigested cephalopod beaks take two days to pass through the alimentary canal, the juvenile penguin must have eaten about half its weight in food per day. This agrees closely with Davies' estimate.

Such a large number of squids in a single penguin stomach is probably unusual, but most previous work has been done on west coast birds which have a large available fish supply. The penguins in Algoa Bay may not have this rich supply of fish and may well utilize other food sources of which *Loligo* may be one of the more important. However, the possibility that oil-soaked birds find squid easier to catch must not be overlooked, nor the possibility that the squids may have been picked up after spawning.

SUMMARY

A juvenile jackass penguin *Spheniscus demersus* was found to have eaten an estimated 7—8 lb. of squid *Loligo reynaudi*. This may indicate a consumption of about 3½ lb. of food per day.

ACKNOWLEDGEMENTS

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