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## A Modified Penguin Stomach Tube

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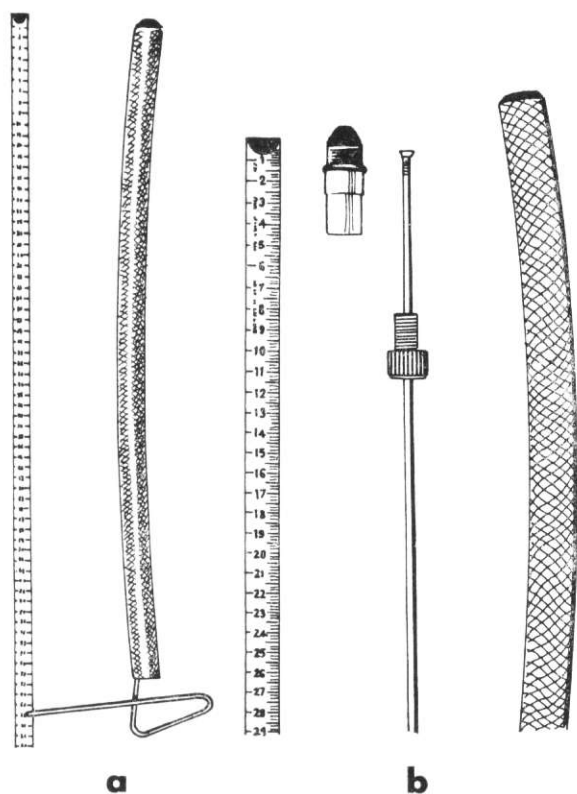
Emison (1968) in his major study of the food of the Adelie Penguin *Pygoscelis adeliae* described his stomach tube for obtaining partial stomach contents samples in the living bird. Both he and later Paulin (1975) used this technique in the Ross Sea area. My own ornithological work at Casey, Antarctica (Cowan 1979a, 1979b, 1981) included a study of the food of the Adelie Penguin at the Windmill Islands as it seemed desirable to do a similar study in a different part of Antarctica, in order to compare food taken.

### Methods

My familiarity with human endoscopic instruments suggested some modifications to Emison's design and these were incorporated into the in-

strument which was fabricated at the station by Egon Wehrle and which is shown in Figure 1.

The outer tube, instead of being rigid as in Emison's design, is of nylon-reinforced polythene tubing (Dunlop CS  $\frac{3}{4}$ " (20 mm) 250 PSI W.P.) which has an internal diameter of 19 mm and an external diameter of 26.5 mm. The introduced end is bevelled. A brass bullet-shaped obturator protrudes from the tip of the tube during introduction, making the operation easier and safer, and a rubber O ring sits in a groove in this obturator to form a good seal. The stainless steel handle wire (approximately 5 mm diameter) is attached to a threaded and knurled aluminium bolt by means of its hammered end and the aluminium bolt screws into the brass



• Figure 1. a) Stomach tube showing stainless steel handle wire and bullet-shaped obturator at tip of tube. Scale in cm.  
b) Details of construction of stomach tube: (1) brass obturator, (2) threaded and knurled aluminium bolt, (3) nylon-reinforced polythene tubing. Scale in cm.

obturator. No doubt other corrosion-resisting metals would be satisfactory. The operator's end of the wire handle is bent into a convenient grip. Emison's pump had a rubber stopper fitting inside the tube and attached to a wire.

The birds were caught by means of a bag mounted on a wire hoop at the end of a long pole. Emison gives a good description of the technique of intubation; I shall only remark on the strength of these birds and on the amount of grip required of one's thighs in order to hold them still. The crucial need is to immobilise the flippers which, once freed, are used by the bird to quite surprisingly painful effect. Once the bird is secured, intubation is quite easy; a little human saliva makes a convenient lubricant. The hard-

est part of the procedure is the withdrawal of the handle which requires a hard pull at full arm stretch in order to suck up the semisolid stomach contents. At this point I always felt that an assistant would have made the task easier. On release the birds usually proceeded to feed their chicks with little delay, and seemed untroubled.

The sample was ejected into a plastic screwtop jar. Emison placed his samples directly into formalin in the field. This might inhibit digestion, but the low ambient temperatures were probably effective in this regard, and formalin was not available. Of course, the stomach contents had inevitably undergone some digestion between swallowing and extraction, a time interval which was unknown and perhaps considerable. On return to the station, the contents of the jar were poured into water on a shallow white tray and the formed elements picked out and placed in 70% alcohol.

### Results

There were 28 samples of which 27 were collected from birds at the colonies at Shirley (15), Odbert (5) and Wilkes (7); one consisted of specimens netted in the shallows at the Casey boat landing for comparison. All localities are within one km of the mainland coast and adjacent to extensive shallow water in which the birds appeared to do most of their hunting; during our boat travel we rarely saw them far offshore. Dates of collection were between 30 December 1977 and 25 January 1978.

The samples were examined by Dr J. Lowry, Curator of Crustacea, The Australian Museum, Sydney. His findings are shown in Table 1.

### Discussion

These findings are broadly similar to those of Emison and of Paulin, both of whose studies showed euphausiids as the chief food, with some fish and amphipods. *E. superba* is generally absent from the Ross Sea (Marr 1962, Hedgpeth 1969); Paulin found none, while Emison found a few, around one percent. All other euphausiids in both these studies were *E. crystallorophias*. It is clear that *E. superba* is relatively common in the coastal waters around Casey (110°E).

Reilly and Kerle (1981) studied Gentoo Penguins *Pygoscelis papua* at Macquarie Island but

TABLE 1

Analysis of Adelle Penguin stomach samples. All samples also contained a proportion of unidentifiable material, and several stones were present.

Location	Dates of collection	Number of samples	Contents	Number of samples in which found
Shirley Island	30.12.77	7	<i>Euphausia crystallorophias</i>	5
	5. 1.78	8	<i>E. superba</i>	3
			<i>Euphausia</i> sp.	3
			<i>Euphausiacea</i> sp. indeterminate	2
			<i>Amphipoda:</i>	
			<i>Hyperoche</i> sp. (Hyperiidae)	1
			<i>Orchomene</i> sp. (Lysianassidae)	1
		<i>Paramaera walkeri</i> (Eusiridae)	1	
Casey boat landing	10. 1.78	1	<i>P. walkeri</i>	1
Wilkes	14. 1.78	7	<i>E. crystallorophias</i>	3
			<i>E. superba</i>	4
			<i>Euphausia</i> sp.	1
			Fish fragments	1
			Fish bones	1
Odbert Island	23. 1.78	4	<i>E. crystallorophias</i>	4
	25. 1.78	1	<i>Euphausiacea</i> sp. indeterminate	1
			Fish bones	1
			Fish vertebrae	2
			Fish fragments	1

failed to retrieve any specimens using Emison's stomach tube. Paulin gave no details of the devices used; presumably they were modelled on Emison's description.

Reilly, P. N. and J. A. Kerle (1981), 'A Study of the Gentoo Penguin *Pygoscelis papua*', *Notornis* 28: 189-202.

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