

RECORDS OF THE SUBANTARCTIC FUR SEAL (*ARCTOCEPHALUS TROPICALIS*) FROM SOUTH AFRICA WITH NOTES ON ITS BIOLOGY AND SOME OBSERVATIONS OF CAPTIVE ANIMALS

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(With 2 figures and 7 tables)

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ABSTRACT

Information is provided on 22 records of the subantarctic fur seal from South Africa from June 1966 to June 1979. They occurred between Cape Town and Richards Bay, Natal, principally between May and September. In the three years 1976 to 1978 an average of about four seals per year was recorded. Suggested sources of these seals are Gough Island in the South Atlantic Ocean and the Prince Edward Islands in the Southern Indian Ocean. External measurements, organ masses, stomach contents and parasites are described for some of the seals. Observations on the behaviour and feeding of captive animals are included.

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INTRODUCTION

The subantarctic or Amsterdam Island fur seal, *Arctocephalus tropicalis*, breeds on islands in the subantarctic region: Gough and the Tristan da Cunha Islands in the South Atlantic Ocean; the Prince Edward Islands, New Amsterdam and St Paul Islands in the Southern Indian Ocean (Shaughnessy 1980). One vagrant was recorded at Macquarie Island (54°S 159°E) in 1959 (Csordas 1962), five at South Georgia (54°S 38°W) between 1972 and 1976 (Payne 1979b), and one from Tramandal, southern Brazil in 1976 (Castello & Pinedo 1977); eight in South Africa have been referred to briefly by Nel (1971) or Shaughnessy (1980). Details of these last eight records and another fourteen in South African

waters up to June 1979 are reported here. Localities where they were observed or captured are shown in Figure 1. Catalogue numbers of specimens used in this study that are stored in the South African and Port Elizabeth Museums are provided in Table 1.

Nomenclature of fur seals in this paper follows that of Rice (1977).

METHODS

Live subantarctic fur seals in South African waters have been distinguished from resident Cape fur seals, *A. pusillus*, primarily by the colour of their pelage, especially by their cream-coloured chest, throat and face. In addition, the presence of a tuft of black guard hairs on the top of the head (a crest) has been taken as uniquely indicative of *A. tropicalis* bulls (Bonner 1968; Repenning *et al.* 1971; Condry 1978). External features of stranded fur seals have also been compared with the identification guide for *A. tropicalis* and *A. gazella* prepared by Condry (1978). The antarctic or Kerguelen fur seal, *A. gazella*, breeds on islands south of the Antarctic Convergence, e.g. South Georgia (Payne 1978), and also on Marion Island (Condry 1978).

Specimens for which skeletal material was available have been identified by means of the following characters. *A. tropicalis* has simple, highly pointed postcanine teeth which rarely have secondary cusps, whereas *A. pusillus* has prominent anterior and posterior cusps (Repenning *et al.* 1971). The postcanines of *A. gazella* also lack cusps, but their postcanines are very much reduced, particularly the rear two (King 1959; Repenning *et al.* 1971; Condry 1978). In addition, skulls of *A. tropicalis* can be distinguished from those of *A. gazella* by their narrow arched palate. The width of the palate at the sixth postcanine relative to the condylobasal length has been compared with measurements provided in Table 1 of King (1959), namely 9,4 to 14,8 per cent for *A. tropicalis* (the northern form) and 14,9 to 17,9 per cent for *A. gazella* (the southern form).

Most whole animals which were inspected were measured following the recommendations of the American Society of Mammalogists (1967). In addition, straight-line point-to-point measurements were taken from the snout to the anterior insertion of fore-flipper, centre of ear, gape and eye, while circumference of head was measured at eyes and at canine teeth. The mass of most of the seals was measured with a spring balance; that of three vagrants at Durban Aquarium was estimated by comparison with captive Cape fur seals of known mass. Mass determinations of testes were made after epididymides were removed. Seals were judged emaciated if the thickness of the blubber and skin above the sternum was less than 20 mm or if they appeared thin with prominent scapulae and lumbar vertebrae.

Males were classified as adult if they had a black crest on the top of their head, and subadult if a crest could not be seen. Females were classified as immature if they had narrow uterine cornua (each less than 10 mm) or a small body (mass less than 15 kg).

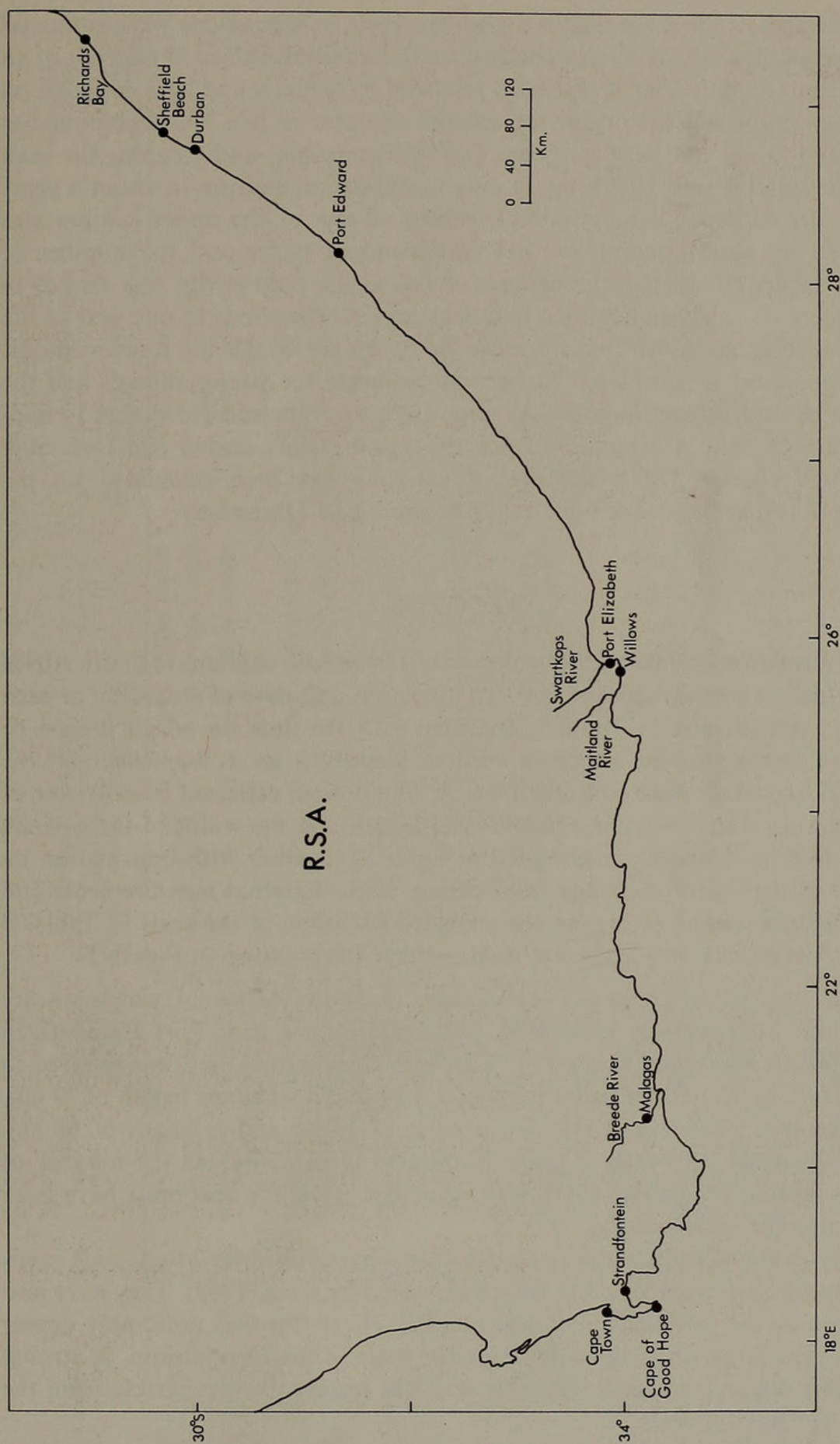


Fig. 1. Map showing the localities of subantarctic fur seal strandings in South Africa.

The ages of those specimens for which skulls were available were estimated by three methods. Ridges were counted on the external surface of the root of an upper canine tooth after it had been removed by boiling, and ages assigned on the assumption that each ridge represented one year of life. This technique has been used to age northern fur seals, *Callorhinus ursinus*, and antarctic fur seals (Scheffer 1950, Payne 1978), but is only useful for animals up to about 4 years of age. In addition, a longitudinal section of one of the upper canines was prepared by hand-grinding on wet carborundum paper and the number of growth layers counted in the dentine or (when the pulp cavity was closed) in the cement. It has been assumed that each layer corresponds to one year of life in this species, as shown for *A. gazella* by Payne (1978). Of the three methods, the ridge count is considered to be most accurate for young animals and the dentine count for older animals. As pups are born from mid-November to mid-December at New Amsterdam (Tollu 1974) and mainly during mid-December at Gough (Bester 1977), the age of vagrants has been calculated on the assumption that they were born at the beginning of December.

RECORDS

Information on each of the twenty-two *A. tropicalis* vagrants in South Africa is provided in chronological order. The location and date of stranding of each animal are provided in Table 1, together with the date on which it died or returned to the sea, the methods used to identify it as *A. tropicalis* and the material and other data collected from it. Skulls were collected from twelve of the vagrants. Data on their condylobasal length and the width of their palate at the sixth postcanine are provided in Table 2, together with information on the determination of their age from canine teeth. External measurements and mass determinations of organs are provided for some of the seals in Tables 3 and 4. A typical *A. tropicalis* bull (seal number 19) is shown in Figure 2.

1. The first subantarctic fur seal ashore in South Africa of which we are aware was an extremely emaciated, immature female near Port Elizabeth in June 1966. It was taken to the Port Elizabeth Oceanarium, and was referred to by Nel (1971). Initially it had a mass of 2.3 kg and a standard length of 57 cm. In September 1967 it had attained a mass of 15 kg and a length of 68 cm. It died in April 1969 after 2 years 10 months in captivity. As the number of growth layers on a canine tooth was estimated at $4\frac{1}{2}$, the seal must have been 18 months old when caught.

This seal had rudimentary anterior cusps on postcanines 2 to 5; such cusps are unusual in *A. tropicalis*, but have been noted by King (1959). They were also apparent on the postcanines of seal number 21. Its fur was noticeably denser and its eyes larger than those of Cape fur seals in the Oceanarium. A strong, musk-like odour associated with this seal was readily distinguishable from the odour of Cape fur seals.

TABLE 1
Information on subantarctic fur seals that stranded on the coast of South Africa.

Record no.	Locality	Sex	Date ashore	Date returned to sea (R) or dead (D)	Identification based on			Specimen catalogue no. ³	Material collected				Measurements taken	
					Teeth	Palate width	Pelage		Skull	Post-cranial skeleton	Skin	Testes or ovaries ¹	Photos	External Organ masses (Table 3)(Table 4)
1	Willows 34°03'S 25°34'E	F	19 June 66	Apr 69	D	+	+	+	+	+	+	—	+	— ²
2	Maitland River mouth 34°00'S 25°18'E	M	6 Sep 70	few days later	D	+	+	+	+	+	—	—	+	+
3	Swartkops River mouth 33°52'S 25°38'E	F	18 July 71	mid-Dec 73	D	+	+	—	+	—	—	—	+	+
4	Durban 29°51'S 31°02'E	M	8 May 73	—	R	—	+	+	—	—	—	—	+	—
5	Cape Town 33°55'S 18°23'E	M	29 Dec 74	31 Dec 74	D	+	+	+	+	+	+	+	+	+
6	Strandfontein 34°07'S 18°40'E	M	23 Aug 75	26 Aug 75	D	+	+	+	+	+	+	+	+	+
7	Durban	M	12 May 76	few days later	D	—	+	+	—	—	—	—	—	—
8	Port Elizabeth 33°58'S 25°38'E	M	15 June 76	2 Apr 79	D	+	+	+	+	+	—	—	+	+
9	Richards Bay 28°47'S 32°05'E	M	8 July 77	23 Nov 77	R	—	—	—	—	—	—	—	+	— ²
10	Durban	M	10 July 77	11 July 77	D	+	+	+	+	—	+	+	+	— ³
11	Port Elizabeth	F	27 Aug 77	captive	+	—	+	—	—	—	—	—	—	— ²
12	Sheffield Beach 29°29'S 31°16'E	M	5 Sep 77	9 Sep 77	D	—	+	+	—	—	+	—	—	— ²
13	Cape of Good Hope 34°21'S 18°28'E	M	18 Sep 77	18 Sep 77	D	+	+	+	+	+	+	+	+	+
14	Port Elizabeth	M	26 Oct 77	26 Oct 77	R	—	+	+	—	—	—	—	+	—
15	Reunion Rocks, Durban	M	3 July 78	5 July 78	D	—	+	+	—	—	—	—	—	—
16	Port Elizabeth	M	21 Aug 78	21 Aug 78	R	—	+	+	—	—	—	—	—	— ²
17	Durban	F	24 Aug 78	28 Aug 78	D	+	+	—	+	—	+	+	+	+
18	Cape Town	F	31 Aug 78	4 Sep 78	D	+	+	—	+	+	+	+	+	+
19	Port Elizabeth	M	15 Sep 78	15 Sep 78	R	—	+	+	—	—	—	—	—	—
20	Strandfontein	F	25 Mar 79	28 Mar 79	D	+	+	—	+	—	+	+	+	+
21	Strandfontein	M	5 May 79	5 May 79	D	+	+	+	+	+	+	+	+	+
22	Swartkops River	M	8 June 79	9 June 79	R	—	+	+	—	—	—	—	+	—

¹ Mass determinations of testes and width of uterine cornua are provided in Table 4 and the text for animals marked +.

² Mass determinations (and in some cases standard length) are provided in the text.

³ Specimens designated SAM and PEM are housed in the South African and Port Elizabeth Museums, respectively.

⁴ Small crests visible on tanned skins.

Unlike the goat-like bleat of Cape fur seal pups in the Oceanarium, this seal uttered a high-pitched wail or cry when requesting food or attention. Similarly, its typical bark and shorter staccato sounds were also higher pitched than calls of Cape fur seal pups. When approached closely it sometimes gave a deep growl before lunging.

2. An adult male which came ashore near Port Elizabeth in September 1970 was also taken to the Oceanarium. It was treated for internal haemorrhaging but died a few days later. This seal appeared to sip sea-water from its pool on several occasions.

3. An emaciated, immature female which came ashore near Port Elizabeth in July 1971 was kept at the Oceanarium for 2 years 5 months. Its age at death is calculated to have been 3 or 4 years, from which it is deduced that it was 7 or 19 months old when it was captured.

4. An adult male came ashore on the beach near the Durban Aquarium in May 1973 and remained there for two days before swimming away. Colour transparencies of the seal were provided by J. Bass (Oceanographic Research Institute, Durban).

5. An emaciated, adult male which came ashore at Sunset Beach; Cape Town in December 1974 was put to death 2 days later.

TABLE 2

Skull measurements and estimated age of subantarctic fur seals that stranded on the coast of South Africa.

Record no.	CBL ⁴ mm	Width of palate at pc 6 ⁵		Canine teeth	
		mm	% of CBL	No. external ridges	No. dentinal layers
1	149	16,8	11,3	4,5 ¹	2-3
2	194	20,6	10,6	—	14+ ²
3	163	19,2	11,8	3,5 or 4,5 ¹	—
5	232	31,6	13,6	—	18+ ^{2 3}
6	163	20,9	12,8	2	—
8	213	27,0	12,7	—	18 ^{1 3}
10	189	22,4	11,9	—	18-20 ²
13	213	26,2	12,3	—	10-11
17	153	17,6	11,5	2,25	—
18	165	21,0	12,7	3,5	—
20	148	15,1	10,2	3,5	—
21	190	21,3	11,2	—	6

¹ Seal no. 1 was in captivity for 2 years 10 months, no. 3 for 2 years 5 months and no. 8 for 2 years 10 months.

² Pulp closed.

³ Seventeen cement layers counted.

⁴ Condylbasal length.

⁵ Sixth postcanine tooth.

TABLE 3
Measurements of subantarctic fur seals that stranded on the coast of South Africa.

Record no.	Sex	Mass (kg)	Standard length (m)	Axillary girth (m)	Flipper length ⁴ (cm)		Length (cm) snout to				Circumference (cm) head at		Thickness blubber and skin (mm)
					Fore	Hind	anterior insertion fore-flipper	centre of ear	gape	centre of eye	eyes	canines	
2	M	—	1,35 ³	0,81	38 ³	25 ³	—	—	—	—	—	—	—
3 ¹	F	15,8	0,91	0,60	24	15	36	13	—	—	26	16	17
5	M	59,1	1,625	0,84	37	21	73	23	13	5,5	40	27	8
6	M	8,0	0,94	0,42	22	14	36	13	8	7	28	18	6
8 ²	M	82,0	1,57	0,96	34	20	64	18	11	10	40	25	25
13	M	40,0	1,525	0,69	30	19	65	18	11	10	33	23	18
15	M	80,0	1,64	1,07	37	23	—	—	—	—	—	—	—
17	F	10,1	0,92	0,43	20	12	39	13	6	6,5	26	17	15
18	F	9,2	0,91	0,46	21	13	40	14	5	6,5	28	18	—
19	M	58,0	1,42	—	34	19	—	—	—	—	—	—	—
20	F	7,4	0,84	0,39	16	10	35	12	5,5	5,5	25	13	4
21	M	36,5	1,29	0,71	27	16	52	17	9	7,5	31	18	20

¹ At death; at capture this seal had mass of 7,2 kg, curvilinear length of 0,80 m and girth of 0,53 m.

² At death; the mass of most of the body was 76,7 kg, that of organs and muscles removed for necropsy was estimated at 5,3 kg.

³ Curvilinear body length, flippers measured to distal extremity.

⁴ Measured from the anterior insertion of the flipper to the tip of first claw (unless otherwise stated).

TABLE 4
Organ masses (g) of subantarctic fur seals that stranded on the coast of South Africa.

Record no.	Heart (without clots)	Liver	Stomach (empty)	Pancreas	Lungs and trachea	Oesophagus	Kidneys		Adrenals		Spleen	Intestines	Testes ³		Brain
							left	right	left	right			(1)	(2)	
3	115	750	—	—	375	—	70 ²	65 ²	—	—	105	—	—	—	—
5	405	2170	795	150	2050	255	255	260	3,5	3,5	120	1415	7,7	—	—
6	75	315	90	—	295	—	80	(total)	—	—	9,5	250	1,5	1,5	—
8 ¹	305	—	—	—	1685	365	—	—	—	—	—	—	—	—	262
13	220	1060	470	77	1255	135	293	205	2,8	3,0	80	860	3,7	3,5	—
17	70	370	130	25	335	35	45	45	0,6	0,6	30	285	—	—	—
18	80	320	145	20	385	35	50	55	0,7	0,9	15	255	—	—	—
20	67	310	137	29	260	32	42	41	0,5	0,6	9	318	—	—	—
21	195	1495	405	70	665	110	155	160	1,6	1,7	65	1025	5,4	4,9	—

¹ Several organs removed by a veterinarian for necropsy.

² These masses may refer to either side.

³ Another seal (no. 10) had testes masses of 5,2 and 4,7 g (after preservation in formalin).

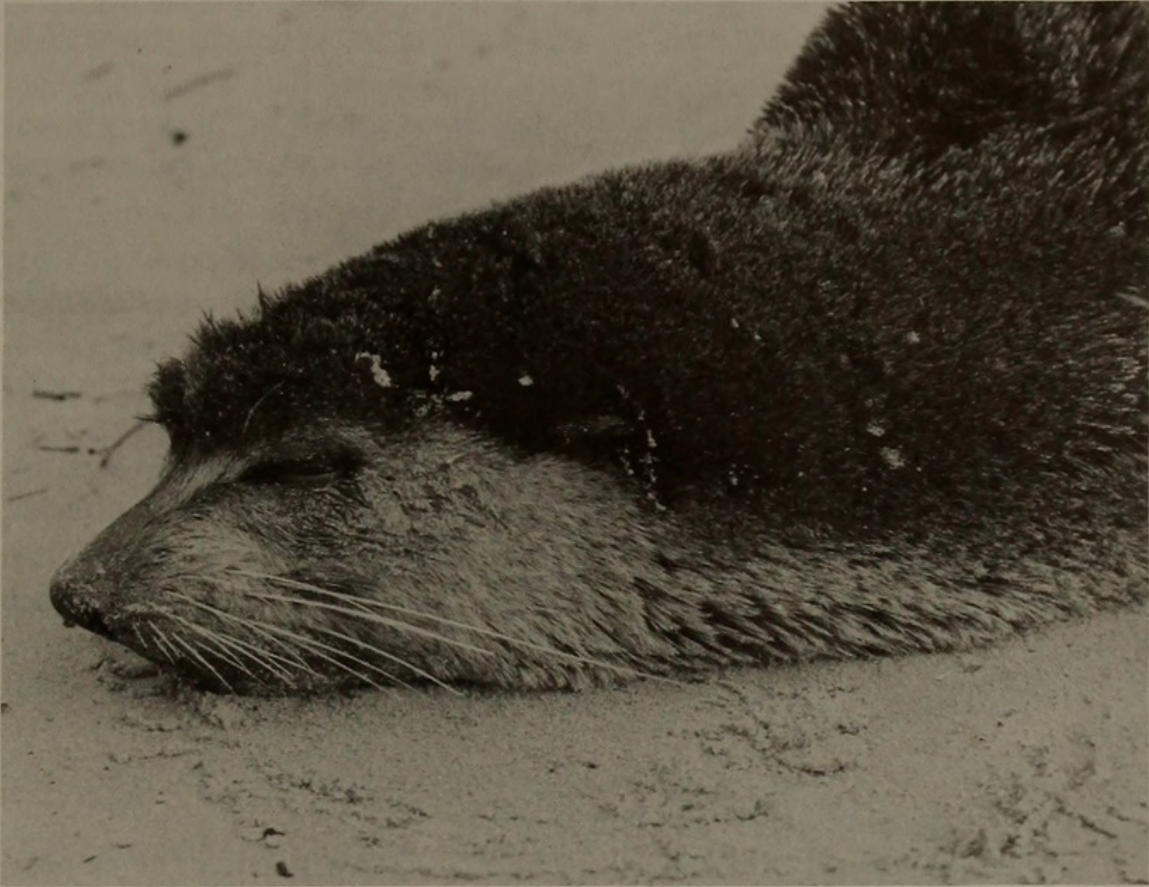


Fig. 2. An adult male subantarctic fur seal at Port Elizabeth (seal number 19).

6. An emaciated, subadult male which came ashore at Strandfontein in False Bay in August 1975 was put to death 3 days later.

7. An adult male captured at Durban in May 1976 was taken to the Durban Aquarium. As it had a deep laceration on the flank, it was put to death soon after capture. No specimens were retained from this animal but it was seen by one of the authors (GJBR).

8. An emaciated, adult male was caught in Port Elizabeth harbour in June 1976 and taken to the Oceanarium where its mass was determined as 59 kg. After recovering in isolation for 13 days, it was placed with six Cape fur seals in a pool (30 m $\times$ 10 m), where it immediately fought with the largest male (mass 250 kg) and gained control of the only island. Over the following two months, however, the Cape fur seal bull regained control of the pool and the island.

In July 1978 this seal was transferred to another aquarium where it died on 2 April 1979, 34 months after capture. Its age at death is calculated as 18 years and, therefore, its age at capture as 15 years.

9. A subadult male that came ashore at Richards Bay in July 1977 was taken to the Durban Aquarium. Its mass was estimated at 20 kg. It was released 4½ months later on a secluded beach at Port Edward (31°03'S 30°14'E). Colour

transparencies of the seal provided by M. Smale (Oceanographic Research Institute, Durban) indicated that the seal was not *A. pusillus* and was most likely *A. tropicalis*.

10. In July 1977 an emaciated, adult male came ashore at Durban. It was taken to the Aquarium where it was put to death the next day. Its mass was estimated at 80 kg and its standard length measured 1,37 m.

11. In August 1977 an immature female came ashore at Port Elizabeth and was taken to the Oceanarium. Like previous young subantarctic fur seals kept there its high-pitched vocalizations, large prominent eyes and dense fur were noticeably different from those of resident Cape fur seals. Five and a half months after capture it had a mass of 15,5 kg. It was still alive at the time of writing.

This seal and number 8 were in the Oceanarium together for 11 months. However, they had no opportunities of breeding as they were kept in different pools, number 11 with immature Cape fur seals, and number 8 with larger ones.

12. In September 1977 an emaciated, adult male came ashore at Sheffield Beach. It was taken to the Durban Aquarium where its mass was estimated at 60 kg. It died 4 days later. One of the authors (GJBR) inspected the skin of this seal.

13. In September 1977 an emaciated, adult male came ashore 2 km north-west of the Cape of Good Hope where it died on the same day.

An unusual feature of the skull of this seal is the presence of seven post-canines on each side of the upper dental array.

14. In October 1977 an adult male came ashore at Summerstrand, Port Elizabeth and returned to the sea on the same day. It was identified from a newspaper photograph (*Eastern Province Herald*, 27 October 1977).

15. In July 1978 an adult male came ashore at Reunion Rocks near Durban. It was taken to the Aquarium and put to death. It was recognized by the Aquarium staff as being similar to previous subantarctic fur seals.

16. In August 1978 an adult male came ashore in the harbour at Port Elizabeth. Monel metal tags (Hasco size 49L) were applied to its fore-flippers (numbers B 4006 and 4007) and it was released near by at Cape Recife on the same day. Its mass was 73 kg.

17. In August 1978 an emaciated, immature female came ashore at Durban. It was taken to the Aquarium where it died 4 days later. Its flippers were injured and its left eye was damaged. The width of each uterine cornu was 7 mm.

18. In August 1978 an emaciated, immature female came ashore at Three Anchor Bay, Cape Town. It was blind in the left eye. Four days later it died in captivity. Inspection of its skull revealed that the left supraorbital process had been broken. Its uterine cornua were 4 mm (left) and 3 mm wide.

19. In September 1978 an emaciated, adult male came ashore at Summerstrand, Port Elizabeth (Fig. 2). Tags were applied to its fore-flippers (numbers B 4008

and 4009) and it was released the same day at Cape Recife. It was still there on the next day, but had left 2 days later.

20. In March 1979 an emaciated, immature female came ashore at Strandfontein, False Bay, and was put to death 3 days later. It was lacerated on the ventral surfaces of the left fore-flipper and on the left shoulder, and had three bite marks in the centre of the dorsum. Its uterine cornua were both 4 mm wide.

21. In May 1979 a subadult male came ashore at Strandfontein, False Bay and was put to death the same day. Rudimentary cusps on the anterior edge of its postcanines were better developed than those of seal number 1.

22. In June 1979 an adult male in good condition was seen on a bank of the Swartkops River 6 km from the sea. It was tagged on the fore-flippers (numbers B 4012 and 4013) before being released at Cape Recife.

STOMACH CONTENTS AND FEEDING

Stomachs of eight of the seals were examined. All died within 5 days of stranding. One was fed finely ground fish, but no fish remains were found in its stomach. Only one of them (from number 20) contained no food items. Squid beaks were found in the remaining seven stomachs (Table 5). They have been identified to family level by means of the features outlined by Clarke (1962). Their designations below family level follow the names used by Ross (1979). Other food items were also found in two of the stomachs: seal number 6 contained two unidentified crustacean fragments, and seal number 13 contained 1,8 g of sand and 6,8 g of partly digested gladii from squid.

The squid most commonly taken were members of the family Histiotteuthidae and particularly the neritic genus *Loligo*. At New Amsterdam Island, Paulian (1964) and Tollu (1974) noted that squid were very important food of

TABLE 5

Numbers of squid identified from beaks in stomachs of seven subantarctic fur seals stranded on the coast of South Africa.

Squid species	Seal record no.						
	5	6	10	13	17	18	21
<i>Loligo reynaudi</i>	1	1	1	8			34
<i>Sepia</i> sp. (large)			1				
<i>Sepia</i> sp. (small)			4				
<i>Ommastrephes caroli</i>	1						
Onychoteuthidae:							
type 2 ¹				1		1	
Histioteuthidae:							
type 2 ¹						2	
type 8 ¹		1	1		3	1	

¹ Following the designations used by Ross (1979).

A. tropicalis, whereas at Marion Island, Rand (1956) noted that fish were more important than squid. No fish remains were found in the stomachs of *A. tropicalis* on the South African coast.

Information is available on the food fed to five of the vagrants that were kept in captivity.

Seal number 1, an immature animal, was fed the freshwater fish *Sarotherodon mossambicus*. Seal number 2, an adult, was fed fish, mainly pilchard, *Sardinops ocellata*.

Most information is available for seal number 8, an adult male. It was fed fish, mainly *Pagellus natalensis*, maasbanker, *Trachurus trachurus*, and pilchard, as well as squid, *Loligo reynaudi*. For the first 6 months it consumed an average of 5,7 kg per day, and its body mass increased from 59 kg to over 90 kg. Thus the feeding rate was between six and ten per cent of the body mass per day. Its food intake during summer (from November to January) averaged 2,2 and 0,7 kg per day for 1976-7 and 1977-8, respectively. This was considerably lower than for the remainder of the year at 3,6 kg per day (Table 6) and is possibly associated with the breeding season when bulls fast while ashore holding territories for an average of 45 days (Bester 1977). A similar decrease in the food intake of captive northern elephant seals *Mirounga angustirostris* during breeding and moulting seasons has been reported by Bryden (1969).

Seal number 9, a subadult, was fed hake, *Merluccius* spp., herring, *Clupea harengus*, pilchard, and *Pomadasys olivaceum*. When captured its mass was estimated at 20 kg; this had decreased to 15 kg when it was released 135 days later. It ate on 80 days and consumed fish at the rate of 0,67 kg per day over its total time in captivity. This is equivalent to between three and four per cent of its body mass daily. Captive seals require six to ten per cent of their body mass

TABLE 6

Average daily mass (kg) of food consumed by seal no. 8 (PEM 1521/67) during captivity at Port Elizabeth Oceanarium from 16 June 1976 to 26 July 1978.

	1976	1977	1978
January		2,6	0,8
February		2,6	1,6
March		2,7	2,0
April		2,9	4,1
May		3,6	6,0
June	5,8	3,7	5,9
July	5,4	3,6	6,0
August	5,9	3,6	
September	5,6	3,6	
October	5,9	2,4	
November	5,7	0,8	
December	2,7	0,4	

per day for maintenance purposes according to Keyes (1968), although adult harp seals, *Pagophilus groenlandicus*, have been maintained on a daily intake of three to four per cent of their body mass (Ronald *et al.* 1975). In addition to fish, it was provided with liquid paraffin (to prevent constipation), vitamin supplements and antibiotics.

Seal number 11, an immature animal, was fed for 2 months on an artificial milk formula based on that recommended by Marine Mammal Biological Laboratory (1969). Later it took solid fish (pilchards and maasbankers). For the 7 months December 1977 to June 1978 its average daily food intake was 0,72 kg per day (range 0 to 1,0). In mid-February 1978 its mass was 15,5 kg and it was much larger than when captured. Thus its daily feeding rate of about five per cent of its body mass was sufficient for its mass to increase.

PARASITES

External parasites were found only on seal number 13. In its pelage were several hundred lice identified as *Proechinophthirus* sp. by J. A. Ledger (South African Institute for Medical Research). The density of these parasites was greatest on the seal's head and neck, and decreased posteriorly.

Nasal passages and sinuses of two seals were examined for parasites. Two mites were found in seal number 21 and twenty-seven mites in seal number 8. Representatives were identified as *Orthohalarachne diminuta* by R. Domrow of the Queensland Institute of Medical Research. Paulian (1964) found nasal mites, *O. chabaudi* (= *O. diminuta*) in *Arctocephalus tropicalis* from New Amsterdam Island.

The blubber of nine seals was inspected for cestode cysts, *Phyllobothrium* sp., and their number counted on one side of a mid-ventral incision from chin to anus of seals number 6 (1 cyst), 8 (2 cysts), 13 (12 cysts), 17 (none), 18 (6 cysts), 20 (4 cysts) and 21 (1 cyst). Small numbers of cestode cysts were also seen in the blubber of numbers 3 and 5. The cyst infestation of adult males (seals number 5, 8 and 13) was less than for *A. pusillus* bulls (PDS, pers. obs.).

The viscera of nine of the seals were examined for parasites. None was seen in seals number 3, 6 and 21, nor in the internal organs examined in seal number 8 (heart, lungs, trachea and oesophagus). Seal number 5 contained nematodes, *Contracaecum osculatum*, in the oesophagus (sixteen individuals) and in the stomach (75 g), and a few acanthocephalans, *Corynosoma australe*, in the small intestine. Seal number 13 contained a few unidentified cestodes in its small intestine. Its stomach contained 7 nematodes: 6 *Anisakis simplex* and 1 tentatively identified as *C. osculatum*. These parasites were identified by D. I. Gibson of the British Museum (Natural History). One acanthocephalan was found in the small intestine of the seal number 17. 3 nematodes were found in the oesophagus and 4 in the stomach of seal number 18; its small intestine contained a small number of unidentified cestodes. The stomach of seal number 20 contained 109 nematodes.

TABLE 7
Comparison of measurements (expressed as a proportion of standard length) between Cape fur seals and subantarctic fur seals that stranded on the coast of South Africa.

	<i>A. tropicalis</i>				<i>A. pusillus</i> ³				t ⁴	Degrees of freedom	
	n	Mean	Standard deviation	Range	n	Mean	Standard deviation	Range			
LARGE MALES											
Snout to anterior insertion of fore-flipper	4 ¹	0,422	0,021	0,403-0,449	25	0,433	0,015	0,409-0,468	1,38	27	
Snout to ear	4	0,127	0,126	0,115-0,142	25	0,132	0,007	0,117-0,148	1,35	27	
Circumference at eyes	4	0,239	0,017	0,216-0,255	25	0,252	0,016	0,223-0,288	1,44	27	
Length fore-flipper	6 ¹	0,219	0,015	0,197-0,239	25	0,237	0,010	0,216-0,256	3,52**	29	
Length hind flipper	6	0,130	0,006	0,124-0,140	25	0,147	0,007	0,131-0,162	5,42***	29	
SMALL SEALS											
Snout to anterior insertion of fore-flipper	5 ²	0,412	0,023	0,383-0,440	22	0,437	0,017	0,401-0,478	2,84**	25	
Snout to ear	5	0,144	0,006	0,138-0,154	22	0,163	0,015	0,127-0,178	2,76*	25	
Circumference at eyes	5	0,295	0,010	0,283-0,308	20	0,302	0,018	0,263-0,347	0,87	23	
Length fore-flipper	5	0,227	0,027	0,190-0,264	23	0,253	0,019	0,215-0,284	2,53*	26	
Length hind flipper	5	0,141	0,018	0,119-0,165	23	0,171	0,011	0,144-0,193	4,74***	26	

¹ Seals number 5, 8, 13 and 21, plus 15 and 19 for flipper lengths only.

² Seals number 3, 6, 17, 18 and 20.

³ Unpublished data (PDS).

⁴ Significance levels expressed as: * $P < 0,05$ ** $P < 0,01$ *** $P < 0,001$.

Paulian (1964) found cestode cysts in the blubber of 11 of the 13 *Arctocephalus tropicalis* he examined at New Amsterdam. Of the above-mentioned parasites, he found only *Contracaecum ogmorhini* (= *C. osculatum*) in the stomach. In addition, he observed *Terranova* (= *Porrocaecum*) *decipiens* in stomachs.

The nematode *Anisakis simplex* and the acanthocephalan *Corynosoma australe* are not listed as parasites of *A. tropicalis* in the comprehensive checklist of Dailey & Brownell (1972).

EXTERNAL BODY MEASUREMENTS

An attempt has been made to distinguish between *Arctocephalus tropicalis* and *A. pusillus* by external body measurements, so that less reliance is placed on body colour for identifying vagrants of the former in South Africa. Five measurements concerning the flippers and the head, expressed as proportions of the standard body length, were compared (Table 7). Two size groups were considered, following the availability of *A. tropicalis* vagrants, namely: large males of standard length 129–165 cm, and small animals of both sexes of standard length 85–100 cm. The *A. pusillus* used for the comparisons were collected at sea between March 1977 and March 1979.

For both the large males and the small seals fore- and hind flippers are proportionally longer in *A. pusillus*. Furthermore, among the small seals, the fore-flippers are attached to the body at a more posterior position in *A. pusillus* than in *A. tropicalis* and the head is longer. However, these measurements are of limited value in distinguishing vagrant *A. tropicalis* from *A. pusillus* because of overlap in their ranges.

Condy (1978) pointed out that at Marion Island flippers of *A. tropicalis* are short and broad while those of *A. gazella* are distinctly longer. Payne (1979a) graphed anterior lengths of flippers and tabulated mean standard lengths of *A. gazella* at South Georgia from birth to 11 years of age. The fore-flipper length (expressed as a proportion of standard length) ranged from 0,28 to 0,33. This is considerably larger than (and does not overlap with) that of the small sample of eleven vagrant *A. tropicalis* with range 0,19 to 0,26 (see Table 7). The hind flipper length of *A. gazella* at South Georgia ranged from 0,22 to 0,28, which is also larger than that of the vagrant *A. tropicalis* (with range 0,12 to 0,16). These comparisons, therefore, support Condy's statement that flippers of *A. tropicalis* are shorter than those of *A. gazella*.

DISCUSSION

The occurrence of *A. tropicalis* in South Africa is decidedly seasonal, with 19 of the 22 records occurring from May through September, i.e. predominantly in the winter and early spring. At Gough Island (Bester 1977) and Marion Island (Condy 1978) the number of seals ashore increased during September and

October prior to the breeding season and then declined during April and May. Thus the months when *A. tropicalis* most commonly occurs in South Africa coincide with the period when they are scarce on Gough and Marion Islands. Records of crabeater seals, *Lobodon carcinophagus*, and southern elephant seals, *Mirounga leonina*, in South Africa are also seasonal, but occur mostly in the summer months (Ross *et al.* 1978a; Ross 1969; Best 1971).

Records of *A. tropicalis* ashore have increased from 6 in the 10 years between 1966 and 1975 (with no more than one per year) to 2 in 1976, 6 in 1977 and 5 in 1978. This increase most likely reflects the increased awareness of marine mammals by the public in recent years and follows the establishment of facilities for displaying them in Port Elizabeth and Durban. It may also be related to population increases at breeding islands (Condy 1978).

7 of the 22 *A. tropicalis* hauled out on the coast of Natal, 9 in the vicinity of Port Elizabeth and 6 near Cape Town. The areas in which these records are grouped occur near interested biologists, which suggests that animals elsewhere go unrecognized or unrecorded. A similar phenomenon has been noted for crabeater seals on the South African coast (Ross *et al.* 1978a) and is also apparent for records of elephant seals (Ross 1969; Best 1971) and rockhopper penguins, *Eudyptes chrysocome* (Cooper *et al.* 1978). The distribution of *A. tropicalis* records shows a greater concentration on the eastern coast than for the other vagrant seal species. Since fur seals in general are rare east of Port Elizabeth, the presence of a seal there would attract more attention than one on the west coast where *A. pusillus* is common.

The ages of twelve of the vagrant seals can be deduced from information in Table 2. The number of dentinal layers in the canine teeth indicates that 5 of them (all males) were older than 10 years and one was 6 years of age. The number of external ridges indicates that 6 of them (5 females and 1 male) were younger than 5 years.

The last group seem small for their estimated age of 2 to 4½ years. The average mass and standard length of four of the females (omitting number 1 which was extraordinarily small) was 8,5 kg and 86,8 cm, and that of the single male was 8,0 kg and 94 cm. According to Tollu (1974), at age 10 months females at New Amsterdam Island have an average mass of 14,4 kg and length of 85,8 cm, and males have averages of 18,0 kg and 92,7 cm, respectively. The mass of these vagrants cannot be compared with that of seals from a colony because they were emaciated. However, as they appear to be only slightly longer on average than 10-month-old seals, they were either well below average size for their age or their age estimates were inflated.

While handling the canine teeth of the six young seals it was noticed that that of the male (number 6) was considerably larger in cross-section than those of the five females. This suggests that there is a sexual dimorphism for size of canine teeth in *A. tropicalis* (at least in juveniles) similar to that described for northern elephant seals by Briggs & Morejohn (1975).

Palate width of the 12 vagrants measured ranged from 10,2 to 13,6 per cent

of the skull condylobasal length. This is well within the range proposed by King (1959) for *A. tropicalis*. Furthermore, none of the skulls had particularly reduced postcanine teeth, supporting the conclusion that they were *A. tropicalis*.

Black crests were visible on the heads of 5 males aged 10 years or more (numbers 2, 5, 8, 10 and 13), and on another 4 males judged to be adult on account of their length (numbers 15 and 19) or mass (numbers 12 and 16). On the other hand, crests could not be seen on 3 of the males. 2 of these (numbers 6 and 21) were judged to be 2 and 6 years old, respectively, and the third (number 9), with a mass of 20 kg, was judged to be a subadult. However, small crests were visible on the tanned skins of seals numbers 6 and 21. Thus it seems that crest development in the male occurs between 6 and 10 years of age, but that rudimentary crests (not usually visible in the dead, intact animal) may be present in younger males.

The uterine cornua of three seals were measured (numbers 17, 18 and 20). The maximum width was 7 mm, indicating that they were not pregnant. The age of these seals was estimated at less than 4 years.

Of the 22 vagrants, 13 (59 per cent) were adult males and 3 (14 per cent) were subadult males. Because adult females nurse their pups for 10 to 11 months (Tollu 1974; Bester 1977) when they visit the colonies regularly, it is not surprising that most of the vagrants were males.

The strong, musk-like odour noted for seal number 1 at the Port Elizabeth Oceanarium was also noted by GJBR when handling other subantarctic fur seals at Port Elizabeth (numbers 2, 3, 8, 11, 14, 16, 19 and 22), and was noticeably different from the odour of Cape fur seals.

The source of these seals is unknown. The largest population of this species occurs at Gough Island (Bester 1977), 3 000 km west-south-west of Cape Town. This is a likely source of emigrants as its population is expanding rapidly. Vagrants from there would be assisted by the West Wind Drift until they reached the complex system of currents in the vicinity of the Cape Peninsula. A closer breeding area is the Prince Edward Islands, 1 800 km south-east of Port Elizabeth, where the population size is much smaller (Condy 1978). To move north from there seals must first cross the West Wind Drift, which flows between north-east and north in that vicinity (Hydrographic Department 1961). They could then enter the northerly flowing Agulhas Return Current and reach the Natal coast in the Agulhas Current (Harris 1970). Such current-assisted access between the Prince Edward Islands and the east coast of South Africa has been suggested by Ross *et al.* (1978b) for a macaroni penguin, *E. chrysolophus*.

A local origin for the seals (from an undetected colony) is discounted because of the marked seasonality of the records, which coincides with an off-shore movement at their breeding islands. This conclusion is reinforced by the fact that about half of the vagrants were in an emaciated condition when they were reported. 5 of them died and 7 had to be killed within 4 days. 4 of these 12 were injured or damaged when caught. 5 of the vagrants were kept in captivity

for periods of between $4\frac{1}{2}$ and 34 months, and 1 of these is still alive. 6 of the seals returned to the sea (one of them after $4\frac{1}{2}$ months in captivity).

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