

# STRUCTURE OF A LONG-FINNED PILOT WHALE SCHOOL STRANDED IN PATAGONIA

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## ABSTRACT

A herd of 17 southern long-finned pilot whales, *Globicephala melaena edwardii* (Smith, 1834) was found in November 1982 stranded near Punta Tombo, Argentina, at the beach above the high tide line. The herd was composed of nine females, seven males, and an individual of indeterminate sex (5 years, the youngest individual). Using age criteria obtained for the North Atlantic population of the species (Sergeant, 1962) all the females (9–16 years) were estimated as sexually mature, three males (7–11 years) as probably immature, and two males (14 and 16 years) having attained breeding maturity. The reliable estimate of remaining two males, (12 years) was not possible from their ages. Due to the advanced decomposition, no further information on the growth or reproductive status was available.

## INTRODUCTION

The mass stranding of Cetaceans attracted the interest of many biologists, and a considerable number of papers dealing with it were published (Geraci, 1978; Sergeant, 1983). The long-finned pilot whale *Globicephala melaena* (Trail, 1809) mass strands like other highly social members of the *Orcininae* (Sergeant, 1983). Sergeant suggested that the frequency of mass stranding in Cetaceans might be a density dependent event of highly social Cetacean species.

Mass stranding of Cetaceans in Argentine coasts has been reported for the sperm whale (Castello and Piñero, 1974) and the southern long-finned pilot whale (Piñero and Castello, 1975). Goodall (1978) has described individual and mass strandings of Cetaceans in Tierra del Fuego.

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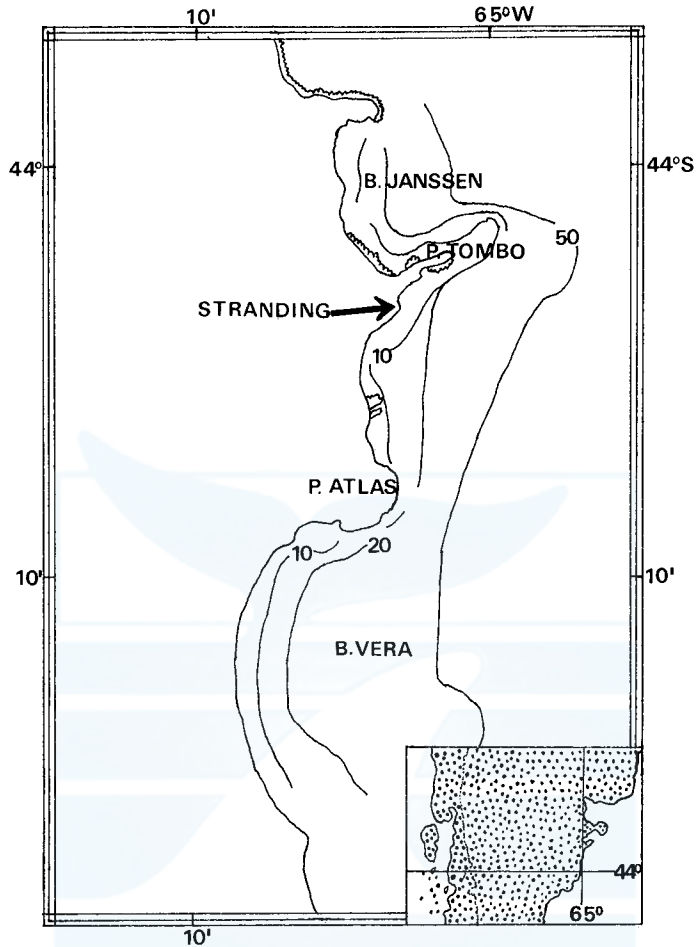


Fig. 1. Location of the stranding. The isobaths are indicated in meter.

The present paper describes the age and body length compositions of a group of southern long-finned pilot whale *Globicephala melaena edwardii* (Smith, 1834), stranded at Punta Tombo, in the Patagonian coast.

## MATERIALS AND METHODS

### *Features of the stranding*

The mass stranding took place 2 km south of Punta Tombo (44°02'S, 65°01'W), the Chubut Province Penguin Reserve (Fig. 1). The whales were found stranded on a rocky platform, above sandy and stony beaches, about 3 to 8 m inland side of the normal high tides line.

Nothing is known about the instance of the mass stranding, even if the 17 individuals represent an entire school or part of a larger one. The date of



Fig. 2. View of the stranding. Arrows indicate the channel separating the two sub-groups, and the largest adult male (Specimen No. 9) found between them.

the stranding was estimated from the degree of decomposition of the whales, and the position of them in the beach, to have occurred around the first days of November, 1982, when the tide was highest. The whales were dispersed along 103 meters of the beach, but as shown in Fig. 2 most of them were in two groups (8 animals each), which were 30 m apart. A large old male (No. 9) was stranded at the middle of the two groups, and opposite to a channel 12 m wide and 3 m deep. Body length and some other external measurements were taken from all individuals by the Gamekeeper of the Penguin Reserve.

#### *Identification of species*

The species was identified on the basis of cranial characters and length of the flipper as described by Bree (1971) (Fig. 3 and Table 1), and the presence of whitish eye mark, saddle mark and ventral white patch (Davies, 1960). The mean number of teeth ranged from 9 to 12 in each jaw with a mean of 10.32 ( $n=56$ ). The mean length of the flippers was 20% of the standard length, again in the range of 18-27% reported for this species (Bree, 1971). Photographs taken by the Gamekeeper of the Reserve one week after the stranding, showed that at least one animal had the eye mark (Fig. 4) and another the ventral patch. They were not confirmed on other animals due to the advanced deterioration or individual variation. It is known that the marks may vary individually even on living or just dead individuals from whitish to dark gray (Davies, 1960).

TABLE 1, NUMBER OF TEETH OF THE PUNTA TOMBO SPECIMEN

Specimen No.	No. of teeth (1)			
	UR	UL	LR	LL
1	10	—	12	—
2	10	10	10	10
3	11	10	10	10
4	9	—	10	9
5	11	11	10	11
6	10	—	10	—
7	9	9	9	9
8	11	10	9	9
9	11	10	10	10
10	10	10	11	11
11	10	10	12	12
12	11	—	10	—
13	11	11	11	10
14	—	11	—	10
15	11	—	10	—
16	—	11	9	10
17	11	12	11	12
mean	10.40	10.40	10.25	10.23

(1) UR: upper right jaw, UL: upper left jaw  
 LR: lower right jaw, LL: lower left jaw

Skull of Specimen No. 11 was deposited in the mastozoological collection of the Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, (Specimen number 3855) (Fig. 3).

#### *Age determination*

Two large teeth were taken from a jaw of each individual. The teeth were sectioned longitudinally (sagittally) with a hand saw, and ground with sand paper to a thickness of about 100  $\mu\text{m}$ . Then the teeth were examined for dentinal growth layers under a dissecting microscope ( $\times 8$  to  $\times 40$ ). Fig. 5 shows the sagittal section of Specimen No. 1 and No. 16, and Fig. 6, cementum layers in Specimen No. 2 and No. 8.

The pattern of the dentinal growth layers was the same as described by Sergeant (1962). The outermost dentinal layer was the prenatal dentine, ending in a translucent neonatal line. The 2nd layer was generally opaque and ended in a clear zone. The opaque layer, sometimes contained a fine clear zone (accessory layer). The 3rd was less than half of the width of the 2nd layer and the thickness of the subsequent layers declined with increasing order. The deposition rate of these layers was assumed as annual without further confirmation (Sergeant, 1962). A double-layer effect was observed in some of



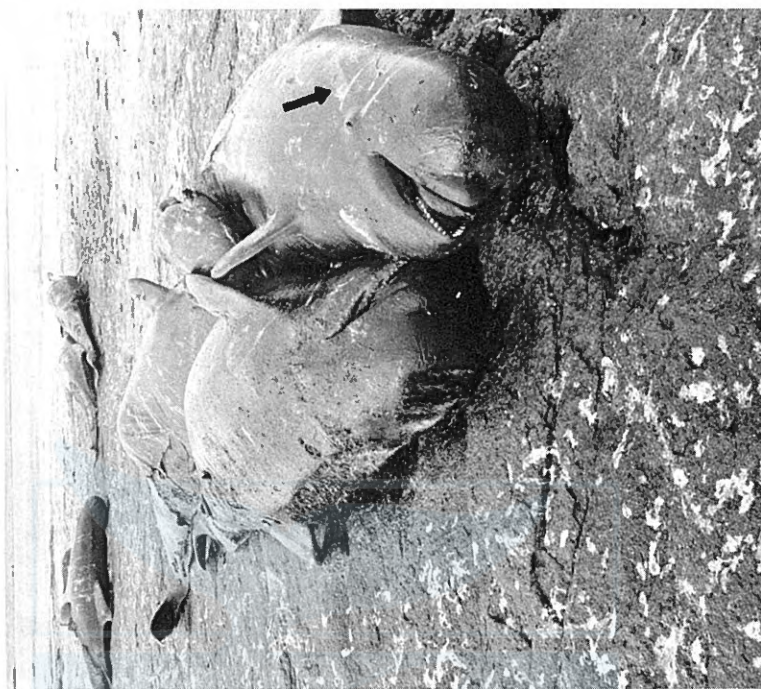


Fig. 4. Pigmentation of some individuals in the mass stranding. Arrow indicates the whitish mark behind the eye.

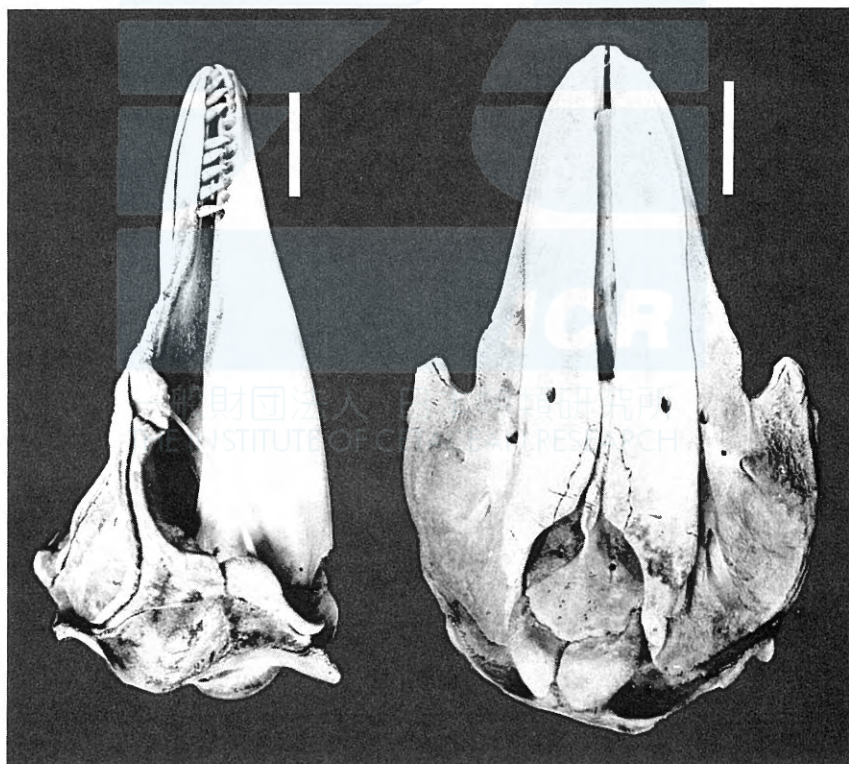


Fig. 3. Lateral and dorsal view of the skull of Specimen No. 11 (F.C.E.N.-U.B.A. Mast. Coll. No. 3855). Scale indicates 10 cm.

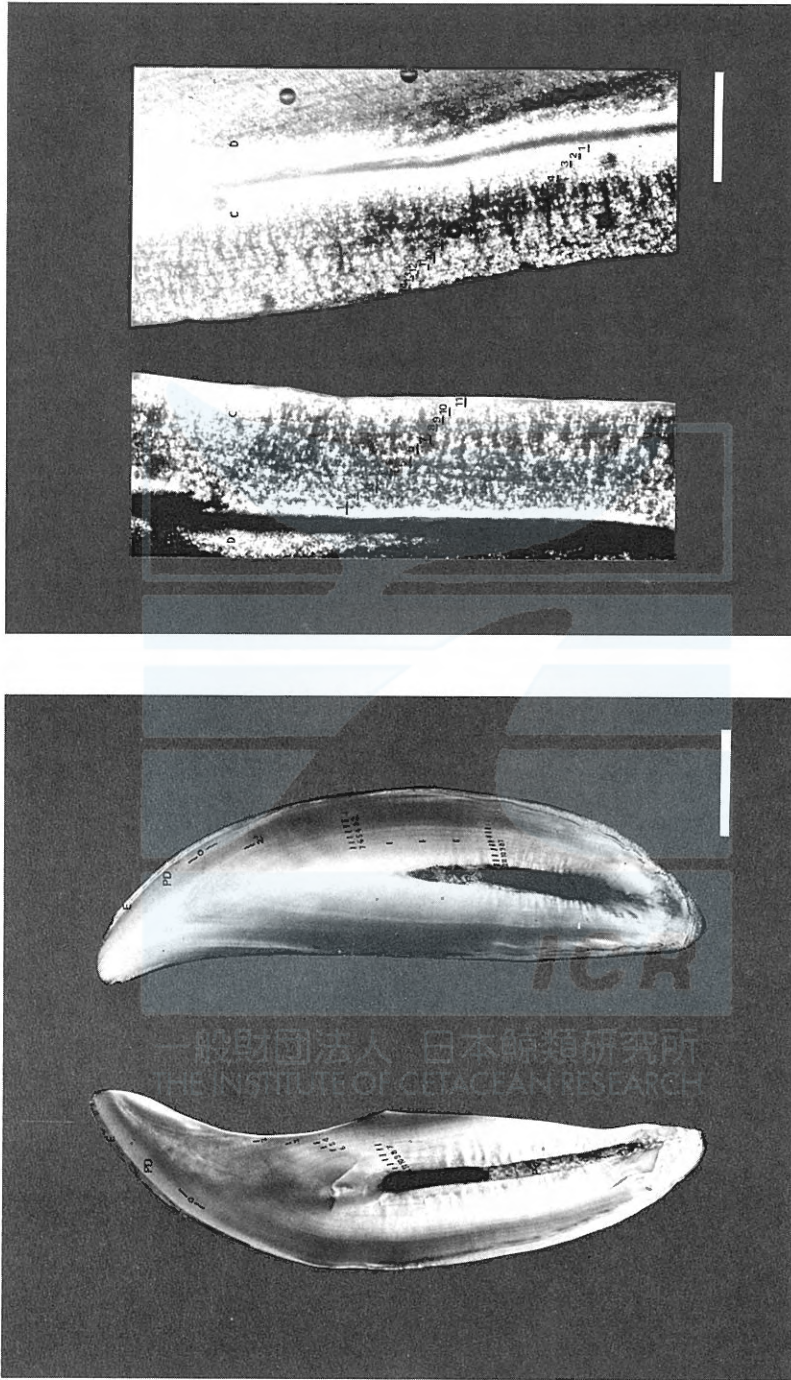


Fig. 6. Thin ground section of cementum of Specimen Nos 2 (left, 11 years) and 8 (right, 14 years). C: cementum, D: dentine, Numerals: annual layers in cementum. Scale indicates 1 mm.

Fig. 5. Sagittal sections of Specimen Nos 16 (left, 12 years) and 1 (right, 12 years). E: enamel, PC: pulp cavity, PD: prenatal dentine, Circle: neonatal line, Numerals: annual layers in dentine. Scale indicates 0.5 cm.



TABLE 2. LIST OF INDIVIDUALS MASS STRANDED AT PUNTA TOMBO IN NOVEMBER 1982

Specimen No.	Sex	Body length	Age (1)	Estimated sexual maturity (2)
1	male	4.46	12	mature
2	female	4.20	11	mature
3	female	4.68	13	mature
4	female	4.83	12	mature
5	male	3.35	7	immature
6	female	4.00	9	mature
7	male	3.93	8	immature
8	male	5.00	14	mature
9	male	5.38	16	mature
10	female	4.40	13	mature
11	?	3.28	5	immature
12	female	4.10	9	mature
13	male	4.10	11	immature
14	female	4.60	11	mature
15	female	4.28	10	mature
16	male	4.50	12	mature
17	female	4.72	16	mature

(1) Age in number of dentinal growth layers (presumably years).

(2) Sexual maturity is estimated using criteria of Sergeant (1962), i.e. sexually mature at 11 years (male) or 6 years (female).

the teeth, therefore an overestimation of the age of the whale could result.

Nearly same number of layers were observed in dentine and cementum of the same tooth, which suggests a same deposition rate in both tissues.

## RESULTS

Sex, standard length and age of the specimens are shown in Table 2. Ages ranged from 9 to 16 years in females and 7 to 16 years in males. The oldest individuals were much younger than what is known for the northern long-finned pilot whale (50 years, Sergeant, 1962) or the short-finned pilot whale (62 years, Kasuya and Matsui, 1984).

The body length ranged from 400 to 472 cm in females and 335 to 538 cm in males. The upper limit of the range was smaller in both sexes than the maximum reported by Sergeant (1962) (females: 536 cm, males: 622 cm).

On the northern long-finned pilot whale, Sergeant (1962) estimated the female age and body length at the attainment of sexual maturity as 4-8 years (mean 6) and 341-386 cm (mean 356), respectively. The ages of males at the attainment of sexual maturity and breeding maturity was 11-16 years (mean 11) and over 12 years, respectively. If these criteria are used tentatively all the nine females (9-16 years and 400-483 cm) are considered as mature, four males (12-16 years and 446-538 cm) as probably have attained sexual matur-

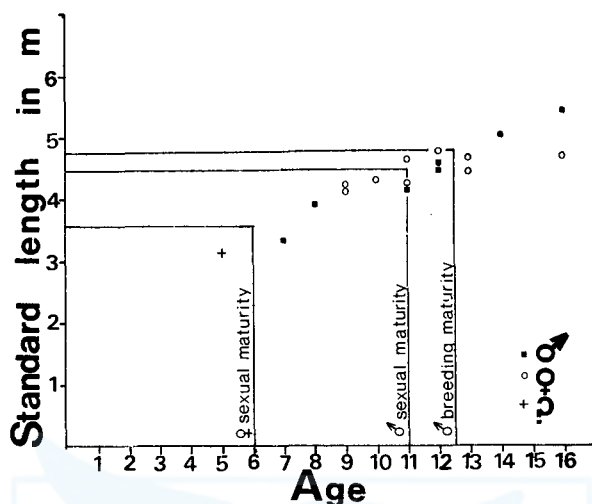


Fig. 7. Scatter plot of body length on age of the mass stranding of *Globicephala melaena edwardii*. Ages and body lengths at sexual maturity are mean values estimated by Sergeant (1962) for the northern long-finned pilot whale.

ity, and three males (7-11 years and 335-410 cm) as immature. An individual of unknown sex (5 years and 328 cm) is estimated as immature (Fig 7 and Table 2). However, this classification has to be considered as tentative, because there is no base to believe that the growth in the present population is the same as that in the North Atlantic population studied by Sergeant (1962), and because the individual variation of growth is wide in the species. There were no juveniles below 5 years of age.

Of the 16 sexed individuals 9 (56%) were females and 7 (44%) were males. The female/male ratio was 1.28 and the mature female/mature male ratio was probably 2.50 (9/4). This suggests a polygynous school structure as indicated for the North Atlantic long-finned pilot whale (Sergeant, 1962) and the short-finned pilot whale in the North Pacific (Kasuya and Marsh, 1984).

#### DISCUSSION

The southern long-finned pilot whales have been sighted or stranded in the Argentine coast (Piñero and Castello, 1975; Goodall, 1978), although little knowledge is available about the composition of the herds. No exploitation of this species exists at least in recent years in the Argentine waters.

According to Sergeant (1962), the sizes of herd of long-finned pilot whale ranged from a few individuals up to 200 or more. The mean herd size of the species driven ashore in Newfoundland and those stranded naturally all over the world was about 85 individuals, with the highest frequency be-



tween 21-50 individuals, though the most frequent herd size in sightings in the Labrador Sea made by the U.S. Coast Guard was 11-20 individuals with a mean of 20. This suggests that the pelagic herds tended to be smaller than those stranded or driven ashore (Sergeant, 1962, 1983). He also concludes that the herd size was variable under different circumstances like feeding, stress, migrations, etc, and smaller units may occasionally aggregate to form larger ones or viceversa.

The present herd was composed of 17 individuals. Another herd stranded at Punta Norte (Península Valdés - Chubut) on August 30th, 1976, was composed of 25 animals, but except for 2 males and 3 females the remaining 20 individuals were returned to sea (J. C. López, pers. comm.). Castello (1975) reported a stranding of 56 individuals at Isla Trinidad, but there was left no information on the sex ratio. Goodall (1978) recorded a group of 9 animals stranded in Isla de los Estados. These herd sizes are not different from those reported by Sergeant (1962).

Although the pilot whales are known to be sexually dimorphic (Sergeant, 1962; Kasuya and Matsui, 1984), this is not detected in the present materials. This may be related to one or two of these possibilities: (1) small sample size, (2) skewed school composition and (3) that sexual maturity is attained much later in the population (dimorphism appears at later age).

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