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Original Investigation

Age and growth in Peale's dolphin (*Lagenorhynchus australis)* in subantarctic waters off southern South America

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ABSTRACT

The Peale's dolphin, *Lagenorhynchus australis*, is a mainly coastal and one of the most often seen species off southernmost South America from 33°S off Chile and 38°S off Argentina to south of Cape Horn. Although a common species, its IUCN status is "Data Defficient", so any information on this species is relevant. Age, growth and physical maturity were examined in skeletons of 57 specimens of this species, mostly from the coasts of Tierra del Fuego, Argentina; this represents most of the known specimens of this species available in museum and private collections. Most specimens were by-catch in shore-set gillnets or had been harpooned for crab bait. Age was determined for 23 specimens, all from Tierra del Fuego. The maximum age was 13 years for a 199 cm female. The largest female in this survey was 210 cm, the largest male 205 cm in total length (12 years), but this probably does not represent the maximum length for this species. Only two animals, of 12 and 13 years, were physically mature. Animals reach asymptotic length (188 cm) with less than the 30% of the vertebral epiphyses fused. The animals in this study were mainly subadults, as has been found for other southern by-caught dolphins. Growth was studied for total length using 18 osteological characters with the Gompertz model. We propose that zygomatic width can be used to estimate total length for incomplete beach-cast specimens.

Introduction

The Peale's dolphin, *Lagenorhynchus australis* (Peale 1848), is fairly common from about 44°S (Golfo San Jorge) in the southwestern South Atlantic Ocean, south to the archipelago of Tierra del Fuego, Cape Horn and the Burdwood Bank to about 59°S, and up the Chilean coast as far as about 38·S (Valdivia) in the South Pacific Ocean (Goodall 1978, 2008; Goodall et al. 1997b; Brownell 1999). Extralimital specimens have been recorded at about 33°S in southern Brazil (Patos Lagoon Estuary) and Chile (Concón) (Aguayo Lobo 1975; Pinedo et al. 2002).

Since the change from set nets to traps (1977 in Argentina, 1978 in Chile), which need bait, this species has been intentionally and illegally exploited for use as southern king crab (*Lithodes antarctica*) bait in southern Chile and, to a much lesser extent, in southern Argentina (Lescrauwaet and Gibbons 1994). Although Peale's dolphin exploitation has decreased due to over-exploitation and decline in the crab fishery (Lescrauwaet and Gibbons 2008), the species also suffers a low level of incidental mortality in shore-set gillnets in certain parts of the Strait of Magellan, Tierra del Fuego and the Province of Santa Cruz, Argentina (Goodall 1978; Goodall and Cameron 1980; Goodall et al. 1994, 2008).

Little is known about Peale's dolphin; information has been published on sightings, basic biology and food habits (Goodall et al. 1997a,b; Lescrauwaet 1997; Schiavini et al. 1997) but no previous studies have been made of age and growth. Although it is a common species off southernmost South America, Peale's dolphins are principally coastal animals (Riccialdelli et al. 2008) and seldom strand; therefore few specimens are found during beach surveys. The R. Natalie P. Goodall (RNP) collection is the largest known for the species, collected over a period of 35 years. Therefore all information is valuable to contribute to the knowledge of this species.

In addition to the low frecuency of encounter of stranded or incidentally captured specimens, beached skeletons are often incomplete. Postcranial skeletons are generally disarticulated in consequence of predation by seabirds or the action of the tide, and skulls are usually the best conserved part of the skeleton. Therefore, efforts should be made to use morphological characters of the skull to infer information about the complete specimen.

Age estimation in cetaceans, as in other groups, is a critical tool for estimating population parameters and understanding the biology of individuals (Perrin and Myrick 1980). Examination of tooth structures is used for age determination in marine mammals because they provide a permanent record of cyclic

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Table 1
Specimens of Peale's dolphin, *Lagenorhynchus australis*, used in the present study.

Collection	Number	Sex	Date of collection	Locality	TL (cm)	TL[b] (cm)	MF	RFI	GLGs[c]	GLGs
RNP	179	–	27/12/75	Argentina, Tierra del Fuego, Ea. Moat	–	183.35	3	1		–
RNP	269	–	28/01/76	Argentina, Tierra del Fuego, Ba. San Sebastián	172	182.44	2	0.29	1.9–3	1.9
RNP	287	–	13/02/76	Argentina, Tierra del Fuego, Ba. San Sebastián	–	222.45				–
RNP	291	–	13/02/76	Argentina, Tierra del Fuego, Ba. San Sebastián	–	249.10				–
RNP	418	–	15/02/77	Argentina, Tierra del Fuego, Península Páramo	–					–
RNP	423	–	15/02/77	Argentina, Tierra del Fuego, Península Páramo	–					–
RNP	427	–	16/02/77	Argentina, Tierra del Fuego, Cabo Peñas	–					–
RNP	649	F	28/01/78	Argentina, Tierra del Fuego, Península Páramo	170.6	177.04	2	0.35	3.9–4	4
RNP	713	–	02/06/78	Chile, Tierra del Fuego, Porvenir	–		3	1		–
RNP	716[a]	F	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	190	184.26	2	0.41	2.5–4	3
RNP	717[a]	F	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	176	178.83	1b	0.37	1.6–2	1.7
RNP	718[a]	F	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	196	182.44	2	0.30	2–5	3
RNP	719[a]	F	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	199	177.04	3	1	8–13	13
RNP	720[a]	F	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	182.5	188.85	2	0.29	2–4	3.8
RNP	721[a]	M	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	205	206.77	2b	0.54	6–12	12
RNP	722[a]	–	09/08/78	Argentina, Tierra del Fuego, Ba. Sloggett	176				8–10	8
RNP	753	F	29/11/79	Argentina, Tierra del Fuego, Ba. San Sebastián	194	201.03	3	1	9–13	11
RNP	761	–	16/12/79	Argentina, Tierra del Fuego, Ba. San Sebastián	–	145.40	2a	0.43	0–0.8	0.8
RNP	777	–	18/02/80	Argentina, Tierra del Fuego, Ea. Sara	–					–
RNP	783	–	21/02/80	Argentina, Tierra del Fuego, Ea. Fueguina	–	225.46				–
RNP	836	–	23/10/80	Argentina, Tierra del Fuego, Ba. San Sebastián	190	199.13	3a	0.99		7
RNP	889	–	25/04/81	Argentina, Tierra del Fuego, Río Grande	–	186.09	2	0.96		–
RNP	920	–	10/11/81	Argentina, Tierra del Fuego, Ba. Valentín	–	199.13				–
RNP	1096	–	15/12/83	Argentina, Tierra del Fuego, Ea. Sara	–	194.43		1		–
RNP	1149	–	30/05/84	Argentina, Tierra del Fuego, Ea. Sara	–	187.93		1		–
RNP	1164	F	27/12/84	Argentina, Tierra del Fuego, Río Lainez	163	159.57	2a	0.24		1.9
RNP	1184	–	07/06/85	Argentina, Tierra del Fuego, Ea. Sara	–					–
RNP	1257	–	07/04/86	Argentina, Sta. Cruz	–	196.30				–
RNP	1270	–	19/05/86	Argentina, Tierra del Fuego, I. de los Estados	–					–
RNP	1306	M	01/11/86	Argentina, Tierra del Fuego, Paso de las Cholgas	–	187.93	1b		0.9–3	1.9
RNP	1475	F	6/12/89	Argentina, Tierra del Fuego, Cabo Espíritu Santo	197	218.48	2	0.48	7–10	7
RNP	1476	M	6/12/89	Argentina, Tierra del Fuego, Cabo Espíritu Santo	160	154.49	2a	0.32	1.9–3	2
RNP	1752	F	14/02/94	Argentina, Tierra del Fuego, Ea. Moat	130		0	0.24	0–0.2	0.2
RNP	1753	M	14/02/94	Argentina, Tierra del Fuego, Ea. Moat	138		1a	0.31	0–0.2	0.2
RNP	1760	M	22/02/94	Argentina, Tierra del Fuego, Península Páramo	188	184.26	2a	0.29	3.9–5	5
RNP	1855	–	25/02/95	Argentina, Tierra del Fuego, Península Páramo	173	172.59	2	0.29	5–6	5
RNP	1958	F	21/01/96	Argentina, Tierra del Fuego, Ba. San Sebastián	98		0	0	0–0	0
RNP	2024	F	27/11/97	Argentina, Tierra del Fuego, Ea. Sara	172	163.85	2	0.32	2–5	4
RNP	2577	M	15/01/09	Argentina, Tierra del Fuego, Ba. San Sebastián	149.7		1b		0–0.8	0.8
IPPA	0530	–	/06/77	Chile, Estrecho de Magallaness	–	186.09				–
IPPA	0531	–	18/11/77	Chile, Ba. Porvenir, Pta. Palo	–	182.44				–
IPPA	0532	–	27/05/81	Chile, Magallanes, Seno Otway	–					–
IPPA	0533	–	06/08/81	Chile, Magallanes, San Isidro	–					–
IPPA	0534	–	19/01/82	Chile, Magallanes, I. Grevy	–	202.93				–
IPPA	w/n	–	–		–	193.09				–
BMNH	11.30.1	–	27/06/96	Malvinas-Falkland Is	–			0.41		–
BMNH	1992.82	F	27/06/96	Malvinas-Falkland Is	–					–
USNM	395.344[a]	F	19/11/68	Chile, I. Colocla	210		2b	0.97		–
USNM	395.345[a]	F	24/11/68	Chile, Islote Entrada	187		2			–
USNM	395.346[a]	F	26/11/68	Chile, between I. Sommer and I. Larga	142		1b	0.84		–
USNM	395.347[a]	F	29/11/68	Chile, Tierra del Fuego, Canal Cockburn	203		2b	1		–
USNM	395.348[a]	F	01/12/68	Chile, Tierra del Fuego, I. Navarino	178		2			–
USNM	395.349[a]	F	10/12/68	Chile, Tierra del Fuego, I. Navarino	201		2			–
USNM	395.350[a]	M	05/12/68	Chile, Tierra del Fuego, I. Milne Edwards-I. Pacha	203		2	0.93		–
USNM	395.351[a]	M	05/12/68	Chile, Tierra del Fuego, I. Navarino	170		2			–

F: female, M: male; TL: total length.
PM: physical maturity: 0 – neonate, no neural spines fused to centra; 1 – juvenile, spines fused but no epiphyses fused (1a: very small animals; 1b: fairly large animals; fusion may occur in one part of an epiphysis); 2 – subadult, some epiphyses fused (2a: animals with little fusion complete, part or all of the cervical vertebrae; 2b: fusion in all except a few vertebrae); 3 – adult, all epiphyses fused (3a: with a line around epiphyses, or part thereof; 3b: line; large animals, usually with overgrowth of bone on the vertebrae).
RFI: relative fusion index. GLGs: growth layer groups in teeth.
[a] Harpooned specimens.
[b] Total length estimated from zygomatic width.
[c] Range of GLGs counted by the authors.

and metabolic events throughout the life of individuals (Hohn et al. 1989; Langvatan 1995; Lockyer 1999). Growth provides information on locomotion, physiological constraints, reproductive strategies and longevity (Eisenberg 1990; McNab 1990). Body size, age and the physical maturity of mammals are related to the species' allocation of resources to growth, reproduction and survival and therefore to the life-history strategies of the different species. The Gompertz growth model has provided the best fit for most of the cetacean species studied (e.g. Bloch et al. 1993; Ferrero and Walker 1996; Hohn et al. 1996; Read and Tolley 1997; Ramos et al. 2000).

The aims of this research were to study age in relation to physical maturity and to morphometric characters; to estimate growth from length and other osteological data; and to find skeletal characters to infer the total length of specimens which are incomplete.

Table 2
Parameters estimated with Gompertz growth model of morphometric characters in Peale's dolphin, *L. australis*. Gompertz function: character at age t (cm) = $a \times \exp(-b \times \exp(-c \times t))$, where a: asimptotic length, b: constant describing initial growth, c: the rate of growth constant, t: age. SE: standard error of the parameters.

Character		*n*	*a*		*b*		*c*	
			Estimate	SE	Estimate	SE	Estimate	SE
External measurements								
TL	Total length	21	188.1814	3.8888	0.49213	0.0661	0.1229	0.2262
Skeletal measurements								
ATLS	Length of dorsal spine of atlas	16	60.9971	29.1440	0.3831	0.4070	0.9180	0.1771
CBLN	Condylobasal length	18	361.9211	3.2685	0.4705	0.2820	-0.5532	0.6138
CENL	Length of centrum of first lumbar vertebra	16	25.1792	0.9273	0.6469	0.1446	0.3898	0.1964
FRIB	Length of first vertebral rib	15	141.0033	2.5086	0.4798	0.0929	0.0256	0.2610
LRIB	Length of longest vertebral rib	13	303.7443	8.7872	0.5689	0.1367	0.0610	0.3117
LU1H	Height of first lumbar vertebra	17	59.3578	1.3806	0.2567	0.0350	0.6570	0.1029
LU1S	Length of first lumbar vertebra spine	17	100.8482	8.5342	0.7658	0.1536	0.7112	0.1227
LU1W	Width of first lumbar vertebra	18	204.0063	4.5125	0.8503	0.1442	0.0718	0.1770
RAML	Length of ramus, left side	17	297.8337	3.8834	0.3404	0.2076	-0.0903	0.5406
ROST	Length of rostrum	20	185.2301	3.7385	0.1460	0.0532	0.1676	0.0238
ROSW	Rostrum width at base	18	99.9493	2.3880	0.6119	0.5213	-0.2722	0.7642
SCPL	Width of scapula (length)	11	139.3297	6.8604	0.7052	0.1522	0.5311	0.1589
SCPW	Height of scapula	11	156.5414	5.7205	0.5765	0.1136	0.4848	0.1605
SKLN	Total length of skeleton, with skull	17	167.4255	3.4754	0.7521	0.1457	-0.1999	0.2759
TH1H	Height of first thoracic vertebra	18	56.3993	1.2099	0.2431	0.0525	0.5031	0.1872
TH1S	Length of first thoracic vertebral spine	16	29.9856	1.3229	1.2865	0.8659	-1.5697	1.9854
TH1W	Width of first thoracic vertebra	17	98.3412	2.5529	0.4718	0.0929	0.2987	0.2020
WDVT	Width of widest vertebra	18	209.6591	7.4114	0.9072	0.2730	-0.1043	0.3613
ZYGO	Zygomatic width	18	198.1579	4.6672	0.1715	0.0739	0.5750	0.3002

Material and methods

The data set included 57 specimens (Table 1), 40 of which were found dead on the beach and collected by RNP in Tierra del Fuego, Argentina, from 1975 to 2009: eight had been harpooned in the eastern Beagle Channel for crab bait, one was an aborted fetus or neonate and the rest were beach strandings, mainly by-catch from shore-based gill nets. We also studied eight specimens from the United States National Museum (USNM) which had been taken for scientific purposes by the 1968 Norris expedition to southern Chile, six at the Instituto de la Patagonia, Punta Arenas, Chile (IPPA) and two at the British Museum of Natural History (BMNH). These specimens, collected between 1928 and 2009, represent the vast majority known for this species.

Age and total length

External measurements were taken at the time of encounter (Goodall et al. 1997a), but only total length is used here (Norris 1961). We also measured 18 skeletal characters with an anthropometric caliper to the nearest mm, following Perrin (1975). The skeletal measurements included total skeletal length, four cranial and 13 postcranial measurements (Table 2). Teeth from 23 specimens were available for age estimation. Whole teeth were decalcified with 5% nitric acid, sagittal thin sections (25 μm) were obtained with a freezing microtome and stained with Mayer's Hematoxilin (Perrin and Myrick 1980; Myrick et al. 1983). Sections were examined under a stereo microscope with transmitted light at 40x and 100× magnification. Following guidelines developed by Hohn et al. (1989), dentinal group layer groups (GLGs, Perrin and Myrick 1980) were counted for age estimation (Fig. 1). Each tooth was read independently by three readers (CCB; NAD; and ACMS) on three occasions. The final estimated age was achieved by consensus between readers. All readings were carried out without accesss to biological data. As in other Odontocete species, each dentinal GLG was identified as a narrow unstainable layer and a thick stainable one (transmitted light). One GLG was assumed to represent one year, and it was assumed when the translucent (narrow unstainable) layer from the following GLG could be observed. When the last GLG was incomplete we estimated (qualitatively) the proportion of deposited GLG in relation to relative width of the corresponding GLG in the general growth pattern, and it was added as a fraction of 1 year (e.g. 0.2).

Physical maturity

Physical maturity was based on the extent of fusion of the vertebral epiphyses to their centra. Physical maturity was determined in two ways, following Perrin (1975) modified by Goodall et al. (1997a) (PM, Table 1), and using a relative fusion index (RFI), defined as the number of fused vertebrae in relation to the total number of vertebrae in each specimen. Vertebrae with only one epiphysis fused to its centrum were assigned the value 0.5, and a vertebral column with all epiphyses fused was considered RFI = 1. For the RFI index, only complete animals were used. A correlation analysis between RFI and the age of the specimens was carried out using the Pearson product-moment estimator. Once this correlation was confirmed, the fit of the values to a logistic function (RFI = $1/(1+\exp(-a \times (\text{age} - b)))$) by nonlinear estimation was performed.

Growth

Growth was determined by fitting the nonlinear least-squares Gompertz model to each measurement-at-age data (Table 2): $S_t = a \times \exp(-b \times \exp(-c \times t))$; where S represents size at age t (cm), a represents asymptotic length, b represents a constant describing initial growth, c represents the rate of growth constant, and t represents age. Given that sexual dimorphism of the species is not

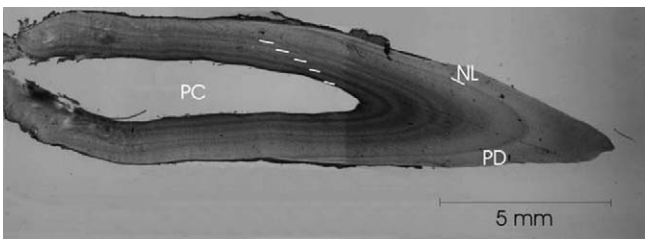

Fig. 1. Sagittal thin section of the teeth of *Lagenorhynchus australis* showing five GLGs (reflected light). PD: prenatal dentine, NL: neonatal line, PC: pulp cavity.

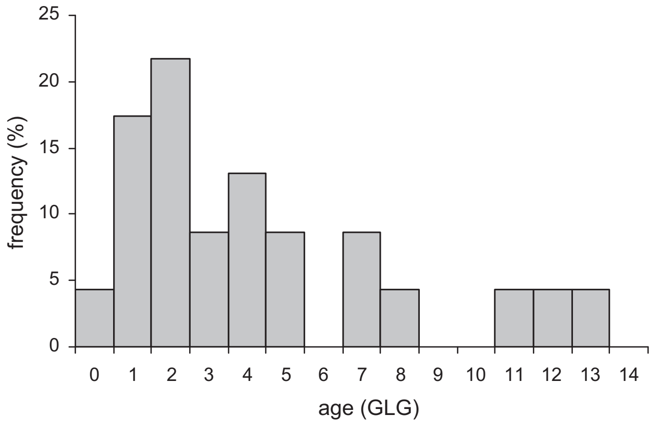

Fig. 2. Age frequency distribution for *L. australis*. $n = 23$.

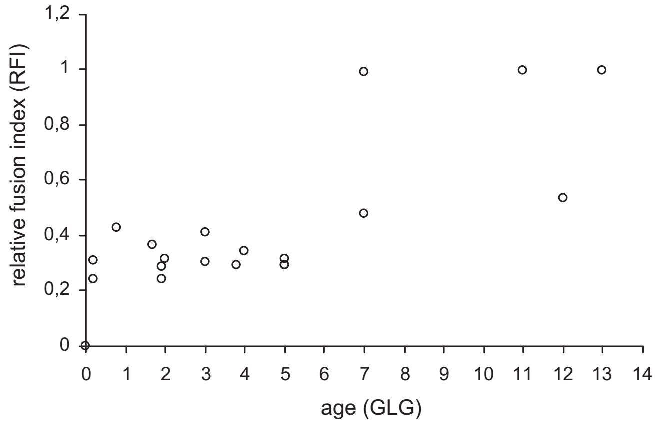

Fig. 3. Relationship between the relative fusion index (RFI) and age in L. *australis*. $n = 20$.

confirmed, both sexes were studied toghether in order to increase the sample size for the growth analysis and to obtain baseline data suitable for future comparisons.

To determine which craneometrical character would be most appropriate to estimate an animal's total length (TL), we studied the correlation between TL and the craneometrical characters which are least susceptible to wear on the beach. The characters chosen for this analysis were: condylobasal length (CBLN), length of rostrum (ROST) and zygomatic width (ZYGO). The correlation analysis was performed with the Pearson product-moment estimator. In order to achieve the TL estimation, chraneometrical characters with highest correlation index were fitted to a potencial curve ($Y = a \times TL^2$).

Results

Age and total length

Teeth of 23 specimens were available for age determination. Age counts ranged from 0 to 13 GLGs with a high frequency of juvenile and subadult individuals (Table 1, Fig. 2). Half of the specimens studied were 3 years old or younger, and 75% were of less than 5 years of age. Though mean length at birth is unknown, the minimum total length of a stranded 98 cm female found on the mud flats of Bahía San Sebastián, with no neonatal line, is suggestive of either an aborted fetus or a very young neonate. The maximum length known to date for *L. australis* is 218 cm for a male specimen (Goodall et al. 1997a), which was not available for this study. In our study, the largest animal was a female of 210 cm from Chile, but teeth were not available for examination. The second largest was a male of 205 cm in total length with 12 GLGs, whereas the oldest specimen was a female with 13 GLGs and 199 cm in total length.

Physical maturity

From the 33 specimens where PM was determined, 21 (64%) were subadults (PM = 2) (Table 1).

The correlation between RFI and age was significant ($P < 0.001$, $n = 20$) with a correlation index of 0.78 (Fig. 3). Logistic function is given by $RFI = 1/(1 + \exp(-0.2561 \times (age - 5.6942)))$ ($P < 0.001$, $n = 20$, $R^2 = 0.6222$). Only one specimen (RNP 1958) had a value of RFI = 0. Specimens with 2–6 GLGs had similar RFI values (about 0.3). Two of the three oldest specimens (11–13 GLGs) had an RFI value of 1, as did one specimen with 7 GLGs. But the latter specimen had several skeletal anomalities: overgrowths in the neural canals of the thoracic vertebrae and an abnormal orientation of the transverse process in the caudal vertebrae (Macnie et al. 2007). The overlap in range of age in RFI could be due to the small sample size. In addition, the specimens used in this study are not equally distributed by age or by sex. There were more females and more specimens between 0 and 5 GLGs.

Growth

Growth parameters were: $a = 188.18$, $b = 0.49$, $c = 0.12$, and this explained 97.72% of the total variation in total length (Fig. 4a); and residuals do not show an age-dependent error for the estimation of total length (Fig. 4b). Estimations of parameters of 18 morphometric characters are shown in Table 2. The asymptotic total length is attained before the fusion of all the epiphyses to the vertebral centra is complete. Animals reach the predicted asymptotic total length

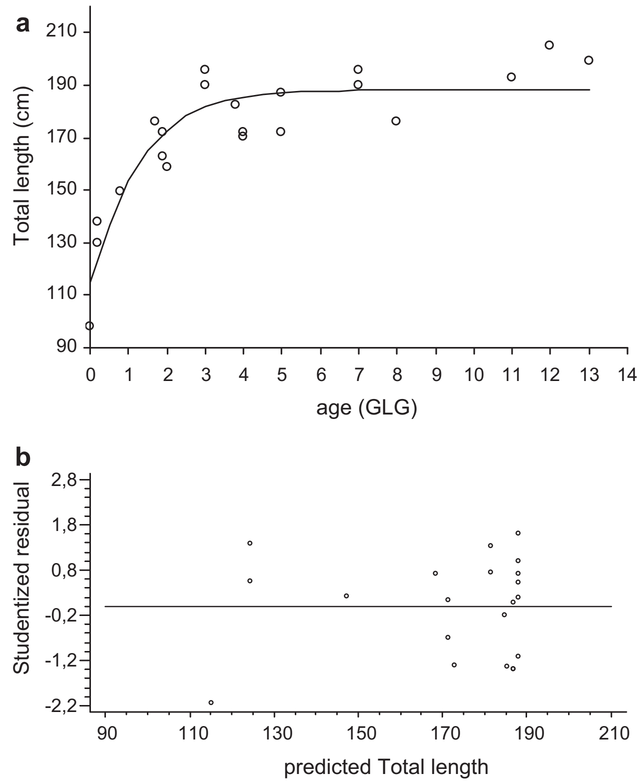

Fig. 4. (a) Length at age for *Lagenorhynchus australis*. Solid line represents the predicted growth trajectory from the Gompertz model. Where total length (cm) = $188.18 \times \exp(-0.4921 \times \exp(-0.1229 \times t))$, and t is the age in years. $n = 21$. (b) Residual plot of predicted total length (cm).

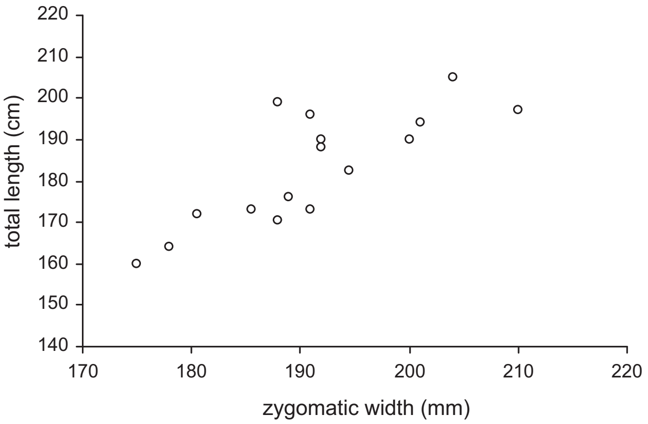

Fig. 5. Relationship between total length and zygomatic width in *Lagenorhynchus australis.* Where log total length = (log zygomatic width − log 12.3439)/0.5261. $n = 16$.

(188 cm) with about 30% of the vertebral column fused (5–13 GLGs) (Fig. 3).

Correlation analysis between TL and the craneometrical characters CBLN ($r = 0.5657$, $P < 0.022$, $n = 16$), ROST ($r = 0.5236$, $P < 0.037$, $n = 16$) and ZYGO ($r = 0.8002$, $P < 0.000$, $n = 16$) were significant in all cases (Fig. 5), but r resulted highest for ZYGO. Therefore, zygomatic width is the most valuable character to infer the total length of an animal, by using the following relation: log TL = (log ZYGO − log 12.3439)/0.5261. Total length inferred in all specimens is shown in Table 1.

Discussion

The basic deposition pattern in the teeth resembles that found in many other odontocete species (e.g. the bottlenose dolphin, *Tursiops truncatus,* Hohn et al. 1989). The tooth pulp cavities of the oldest specimens studied here (11–13 GLGs) had not yet become occluded. The life span of *L. australis* remains unknown, but compared to the maximum age of similar species, the age distribution found here seems to be composed only of juveniles, subadults or young adults. Maximum longevity in *L. obliquidens* (Addink et al. 1997; Heise 1997), and *L. acutus* (Addink et al. 1997), were 36–46 and 20 years, respectively. We suggest that maximum age of *L. australis* is much more than 13 years, similar to other *Lagenorhynchus* species.

Fishermen tell us that Peale's dolphins fight the nets and often break away, while the Commerson's dolphins, *Cephalorhynchus commersonii,* go into shock, do not fight and drown. The number of captures of Peale's dolphins is very low compared to other small cetaceans such as Commerson's dolphin, with 15–95 animals being caught in nets per season (Goodall et al. 1994). Perhaps the younger Peale's dolphins do not or are unable to break through the nets. Nevertheless, only a low number of this species have been caught over a span of 35 years (Goodall et al. 2008). In other species some individuals are known to be more susceptible to entanglement than others in fisheries because of behavioural or distribution patterns (Kasuya et al. 1974; Barlow and Hohn 1984; Hohn and Brownell 1990; Hohn et al. 1996).

Age at sexual maturation could not be determined for Peale's dolphin because there were few large animals and because there is little or no information on reproduction of the species. Goodall et al. (1997) suggested 190 cm for sexual maturity of females. In *L. obliquidens* sexual maturation occurs at about 7–16 years depending on the population studied (Ferrero and Walker 1996; Heise 1997; Iwasaki and Kasuya 1997); these are about the maximum ages found in our specimens of *L. australis*.

In *L. obliquidens* the estimated neonatal length was about 94 cm (Iwasaki and Kasuya 1997). This parameter could not be estimated in *L. australis* with the method used by those authors, as there was only one specimen without a neonatal line, which was 98 cm in total length, similar to the length found in *L. obliquidens*. A rough estimate of the length at birth (age = 0) calculated by the Gompertz equation gives 115 cm, larger than neonatal length estimated in *L. obliquidens*. However, differences in length could be due to different methodology in making the estimations, or to our low sample size.

This is the first study of growth for *L. australis;* therefore comparisons of growth parameters cannot be made, and asymptotic total length found here should be considered with caution, given the small sample size. The present work provides parameters not only for total length but also for 18 skeletal measurements (Table 2), which could be compared in the future if more specimens become available. The maximum total length for *L. obliquidens*, 200–250 cm (Takemura 1986; Heise 1997; Iwasaki and Kasuya 1997), was higher than the 210–218 cm found to *L. australis*. Comparisons can be made only in relation to TL, given that other papers (Ferrero and Walker 1996; Heise 1997; Iwasaki and Kasuya 1997) did not study the variation in the other characters studied here.

The RFI value 0.3 (Fig. 3) seems to be the threshold for individuals for efficient swimming and represents mainly the fusion of the caudal peduncle, while maintaining the potential for growth in length. However, the small sample size limits the comparisons to other delphinids (Kato 1988; Lockyer et al. 1988).

For beached specimens, often incomplete, zygomatic width can be used to infer the total length of the animal, log TL = (log ZYGO − log 12.3439)/0.5261. Differences observed between measured and estimated TL may be the consequence of sexual dimorphism, but the sample size of adults is too small to stratify the sample. This method is not conclusive, due to our small sample size, but zygomatic width can be a valuable tool in obtaining more information from incomplete beached specimens.

Although Peale's dolphin is one of the more common cetacean species off southernmost South America, there is little information about its biology. Its IUCN status is Data Deficient (Hammond et al. 2008). This paper is a contribution to the knowledge of the species, necessary to make any decision about its conservation status.

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