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Short Communication

Far from home: Record of a vagrant striped dolphin in Patagonia with notes on diet, parasites and age determination

Rocío Loizaga de Castro*, M. Soledad Leonardi, M. Florencia Grandi, Néstor A. García, Enrique A. Crespo

Laboratorio de Mamíferos Marinos, Centro Nacional Patagónico (CONICET), Bvd. Brown 2915, CP U9120ACV Puerto Madryn, Argentina

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ABSTRACT

The striped dolphin, *Stenella coeruleoalba* (Meyen, 1833), is a pelagic small cetacean with primary distribution in tropical and subtropical waters. Here, we present a record of a vagrant individual of striped dolphin in Patagonia, out of its distribution range. The animal was 1 year old, measured 148 cm. and weighted 35 Kg. The specimen was classified as immature due to the small development of the epididym and the absence of spermatozoa in testicular smear. Helminths found belong to two families of Cestoda: cysts of *Phyllobothrium delphini* (Phyllobothriidae) and *Tetrabothrius sp.* (Tetrabothriidae). In addition, 1 *Pholeter gastrophilus* (Digenea: Pholeteridae) was collected. In the stomach we found two cephalopod beaks, identified as argentine shortfin squid and lesser shining bobtail and 6 crystallines of non-identified small fishes. This stranding event constitutes the most southern record for the species at the Argentine coast and highlights the importance of systematically recording strandings as an integral part of any program aimed at monitoring the well-being of local cetacean communities.

The striped dolphin (*Stenella coeruleoalba*) (Meyen, 1833) is a pelagic small cetacean with primary distribution in tropical and subtropical waters. Nevertheless, its range extends further north and south covering temperate seas up to 50°N and 40°S (Perrin et al., 1994). These dolphins have been well studied in several regions where they occur, especially in the Pacific, and the Mediterranean. However, despite being a cosmopolitan species little is known about its ecology in the Southwestern Atlantic.

Information on the species in the Argentine Sea is scarce because of the wide shelf, the pelagic habits of the species and the rarity of its strandings. Bastida et al. (2001) summarized the knowledge of the striped dolphin in this region (Table 1; Fig. 1). There have been 4 reported strandings, all of them along the Buenos Aires Province coast, 2 animals sighted and 2 animals caught in fishing nets (Table 1). Here we present a new record of *S. coeruleoalba*, expanding its distribution with notes of parasitological and diet analyses, as well as age and sexual maturity determination.

On 17th November 2009, a young male striped dolphin was found stranded in Playa Unión (41°03′S 62°48′W), Chubut Province, Argentina (Fig. 1). Fortunately, the specimen was in fresh condition in order to perform parasitological, reproductive and diet studies. A complete necropsy was carried out in the Marine Mammal Laboratory (LAMAMA) of Centro Nacional Patagónico (CONICET). Stomach, intestines, skull, teeth, postcranial skeleton, and samples of skin, blubber, kidney and liver were taken and preserved.

The individual presented small and numerous teeth, 47 were counted in each mandible as is cited for the species (Perrin et al., 1994). Teeth were decalcified in RDO, a commercial mixture of acids, sectioned with a freezing microtome at a thickness of 16–18 μm. Sections were stained with Mayer's hematoxylin and mounted with Canadian Balsam (Hohn, 1980; Perrin and Myrick, 1980; Crespo et al., 1994). Growth layer groups (GLGs) were observed with a stereomicroscope (30×) under transmitted light. GLGs in dentine were counted assuming annual deposition. Age was determined independently by three observers in order to minimize counting errors. The animal age was more than 1 year old but did not reach the second year. Standard measurements of the specimen were taken to the nearest centimeter (Norris, 1961), giving a total length of 148 cm and weight of 35 kg. Morphometric data (summarized in Table 2) and pictures of the specimen are available at the Marine Mammals Scientific Collection at CENPAT.

The animal corresponded to a young calf. In spite of this, testes were dissected out and fixed in Bouin solution. Measurements were 42.47 mm × 6.17 mm × 5.45 mm for left testis and 39.54 mm × 6.01 mm × 5.42 mm for right testis, weighing 0.9 g each. The specimen was classified as immature due to the small development of the epididymis and the absence of spermatozoa in a testicular smear (Kasuya and Marsh, 1984). Body length at birth has been estimated to be 100 cm in western north Pacific striped dolphins (Miyazaki, 1977). In the western Mediterranean, length at birth is ca. 92.5 cm and average weight is 11.3 kg (Aguilar, 1991). In

* Corresponding author. Tel.: +54 2965 450401/1301/1375/1024; fax: +54 2965 451543.
E-mail address: rocio@cenpat.edu.ar (R. Loizaga de Castro).

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Table 1
Records of stranding, sightseeing and incidental bycatch of stripped dolphins, *Stenella coeruleoalba*, along Argentinean coast.

Record	Locality	Country	Type of record	*N*	Sex	Total length (cm)	Reference
1	Río de la Plata	Argentina	Incidental Bycatch	1	–	–	Meyen (1833)
2	San Bernardo	Argentina	Stranded	1	–	–	Ximénez and Praderi (1992)
3	Pinamar	Argentina	Stranded	1	Male	233	Bastida et al. (2001)
4	Villa Gesell	Argentina	Stranded	1	Male	205	Bastida et al. (2001)
5	Miramar	Argentina	Stranded	1	–	–	Brownell and Praderi (1976)
6	Marine plataform	Argentina	Sighted	3	–	–	Bastida et al. (2001)
7	Necochea	Argentina	Sighted	4	–	–	Bastida et al. (2001)
8	Península Valdés	Argentina	Incidental Bycatch	1	–	–	Bastida et al. (2001)
9	Playa Unión	Argentina	Stranded	1	Male	148	Present work

the western north Pacific, both sexes rapidly increase in size for the first 2 years after birth, with length reaching 166 cm in the first year and 188 cm in the second year. The mean maximum body length in western Pacific striped dolphins is 236 cm for males and 220 cm for females (Kasuya, 1972, 1976; Miyazaki, 1984). Males measure ca. 2 cm longer than females in the Mediterranean (Calzada and Aguilar, 1995). Striped dolphins from the southwestern Mediterranean are 5–8 cm shorter than their eastern Atlantic conspecifics (Calzada and Aguilar, 1995).

In the stomach we found two cephalopod beaks, belonging to argentine shortfin squid, *Illex argentinus*, and lesser shining bobtail, *Semirossia tenera*. The beaks were identified by means of the reference collection of the LAMAMA. We also found 6 crystallines of non-identified small fish. The prey found in this study is consistent with Perrin et al. (1994) who reported comprehensively listed families of the prey items for *S. coerulealba*. Known ranges of prey indicate that striped dolphins often feed in pelagic or benthopelagic zones along the continental slope or just outside in oceanic waters (Archer and Perrin, 1999). A majority of prey (74–80%) have luminescent organs, suggesting that striped dolphins may be feeding at great depths, possibly diving 200–700 m to reach potential prey. They may also feed at night in order to take advantage of the diurnal vertical migrations made by many of their prey species (Archer and Perrin, 1999). However, due to both the small size of the prey items found in the stomach and the small body size of the dolphin its diet corresponds to demersal-pelagic habitat.

All parasites found were fixed in 70% ethanol and identified according to conventional methods. Helminths belonging to two

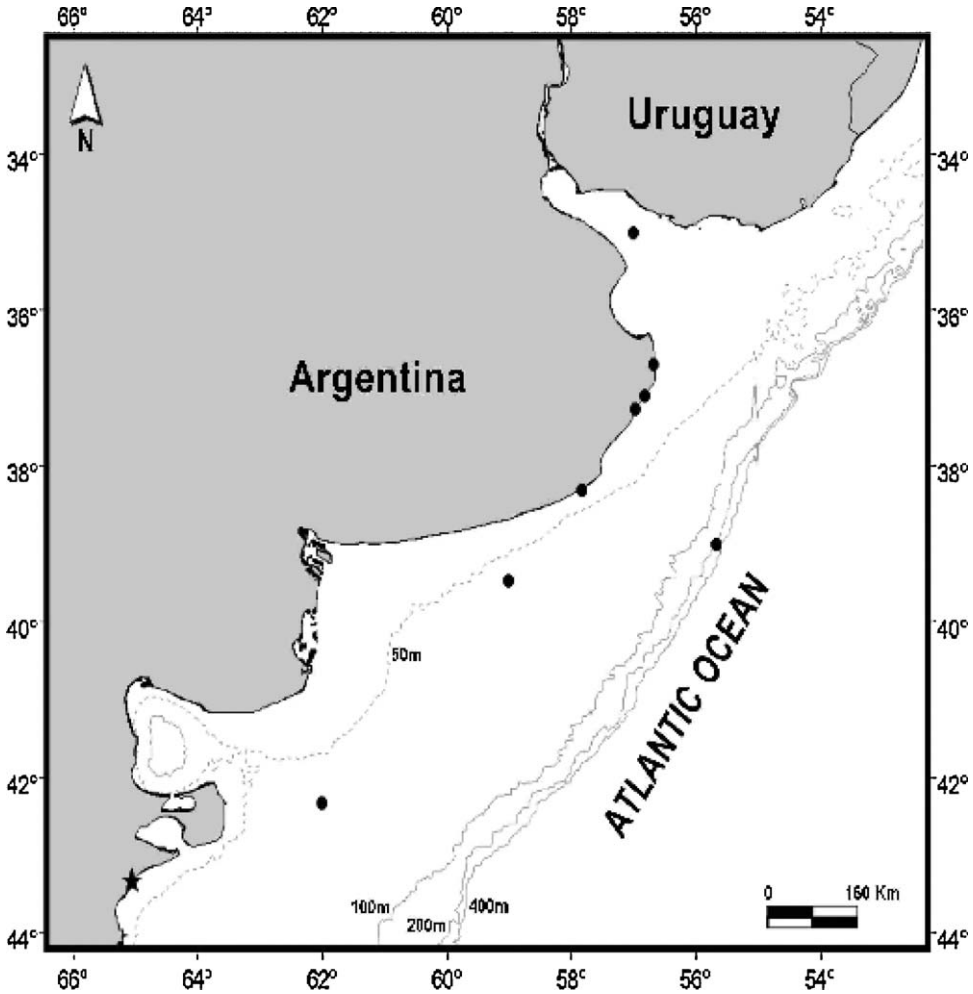

Fig. 1. Locations of stranding, sightseeing and incidental bycatch of stripped dolphins, *Stenella coeruleoalba*, along Argentinean coast. Noted the star symbol correspond to the record in the present work.

Table 2
Selected measurements of a striped dolphin, *Stenella coeruleoalba* stranding in Playa Unión, Chubut (Argentina). All measurements are given in cm.

Character	Measurement
Total length[a]	148
Tip of lower jaw to blowhole[b]	27
Tip of lower jaw to dorsal fin[b]	69
Tip of lower jaw to flipper[b]	40 L
Tip of lower jaw to umbilicus[b]	72
Tip of lower jaw to genital aperture[b]	93
Tip of mandible to anus[b]	104
Girth at axilla	74
Maximum Girth	78
Girth at genital aperture	46.5
Flipper length anterior insertion to tip	19.5 L/19 R
Flipper length axilla to tip	13 L/13R
Maximum width of flipper	6.5 L/6.3 R
Dorsal fin higher length	20
Dorsal fin lower length	9
Dorsal fin high	9
Dorsal fin maximum radius	9
Base of dorsal fin length	17.5
Caudal fin higher length	19.5 L/ 19 R
Caudal fin lower length	15 L/ 15 R
Caudal fin maximum radius	10.5 L/ 10 R
Caudal fin total length	28.5
Caudal fin notch depth	1.9
Blubber thickness throat	9.6
Blubber thickness breastbone	16
Blubber thickness umbilicus	12

L = left; R = right.
[a] Total length, tip of lower jaw to deepest part of notch between flukes.
[b] These measurements were taken from tip of lower jaw due to broken snout.

families of Cestoda were found: cysts of *Phyllobothrium delphini* (Phyllobothriidae), from the subcutaneous blubber of the ventral surface, and *Tetrabothrius sp.* (Tetrabothriidae) from the intestines. In addition, 1 cyst of *Pholeter gastrophilus* (Digenea: Pholeteridae) was collected from the stomach. *Stenella coeruleoalba* harbors a variety of endoparasites. The parasites found in this study are found in the entire stripped dolphin's distribution: cestodes *Phyllobothrium delphini* (Phyllobothriidae) in mesenteries and blubber (Dailey and Walker, 1978; Dollfus, 1973–1974), *Tetrabothrium forsteri* in the intestines (Raga and Carbonell, 1985), *Pholeter gastrophilus* in intestines and stomach (Dollfus, 1973–1974; Raga et al., 1985). None of the parasites found in our work are exclusively present in striped dolphin. All have been previously found in other cetacean species from the Southwestern Atlantic environment. In the northern region, including Buenos Aires Province and northern Patagonia, *P. gastrophilus* is shared with franciscana, common, dusky, Commerson's, and bottlenose dolphins, and also with Burmeister's porpoise (Dans et al., 1999; Berón Vera et al., 2000, 2007, 2008). In the southern region, *P. delphini* also infect pilot, sperm and Gray's beaked whales, spectacled porpoise, Risso's, Fraser's and Hourglass dolphins (Berón Vera et al., 2000, 2008; Fernández et al., 2003). The Cestoda *Tetrabothrius sp.* are mainly found in pelagic cetaceans (Hoberg, 1987), although in Argentina it was found only in spectacled porpoise and Hector's beaked whale (Cappozo et al., 2005; Berón Vera et al., 2008) and in the present study. Molecular and morphological analyses are ongoing to determine the specific status of the parasites found in this work, especially because it is the first host record in this part of the striped dolphin' distribution.

The specimen described here is the first complete skeleton from the South Atlantic coast. The skeleton will be held as voucher for future reference in the Marine Mammals Scientific Collection at CENPAT-CONICET, Argentina (collection number pending). This stranding event constitutes the 9th record for Argentine waters but the first one on the Patagonian coast; the increasing knowledge of the parasite fauna and diet of this species could be useful as natural markers to understand aspects related with the phylogeny, local migration, distribution, disease, stock identity, and social behaviour of striped dolphins (Raga et al., 2009). This is the most southern record for the species and further documentation of the striped dolphin as part of the cetacean biodiversity of Argentina. Despite the few records of *Stenella coerulealba* at high latitudes in the South Atlantic coast, the stranded animal reported here it is not a minor concern. Evidence of changes in the local cetacean community in the north Atlantic have been related to increases in local water temperatures due to global climate change (MacLeod et al., 2005). One possible response of cetacean species to these increases in water temperature is that species' ranges may change; in particular, the range of striped dolphin is likely to expand polewards if temperatures increase in response to climate change (MacLeod, 2009). In Southwestern Atlantic Ocean Rivas (2010) examined sea surface temperature (SST) distribution between 1985 and 2002, and found a very marked annual cycle, certain interannual variability and a weak increasing tendency (~0.06 °C/decade). Thus any changes in the local cetacean community should be fully investigated to assess their implications for both current and future conservation strategies. This highlights the importance of systematically recording strandings as an integral part of any program aimed at monitoring the well-being of local cetacean communities.

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