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A Survey of Cetaceans Stranded along the Northern Coast of Tunisia: Recent Findings (2005–2008) and a Short Review of the Literature

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ABSTRACT

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This study reports cases of stranded cetaceans observed along the northern coast of Tunisia from December 2005 to February 2008. A total of nine toothed whales were examined, belonging to four different species: sperm whale (*Physeter macrocephalus*), bottlenose dolphin (*Tursiops truncatus*), striped dolphin (*Stenella coeruleoalba*), and long-finned pilot whale (*Globicephala melas*). This is the first record of the latter species in the area. Biometric data of stranded animals were also recorded; teeth, tissues, and selected organs were sampled; and a postmortem examination was performed whenever the conditions allowed it. These data may provide important information on basic biology, mortality events, and cetacean-fisheries interactions along a scarcely studied Mediterranean coastline.

ADDITIONAL INDEX WORDS: *Cetacean, Tunisia, strandings, literature.*



INTRODUCTION

Cetacean strandings have been described along the Tunisian coasts in the past (Gruvel, 1926; Heldt, 1949). Because Tunisia has ratified several international conventions relative to the protection of marine environments (including the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area, or ACCOBAMS) (Kefi, 2008), in 2006 the National Institute of Sea Science and Technology (INSTM) set up a national network of three teams to supervise the strandings of cetaceans and marine turtles in northern (Figure 1), central, and southern Tunisian waters. Before 2006, sightings or strandings of cetaceans in Tunisian waters and coasts were occasionally reported in the local literature (Ben Mustapha, 1986; Bradai, 1991; Bradai and Ghorbel, 1998; Bradai *et al.*, 2008; Chakroun, 1994; Heldt, 1953; Ktari-Chakroun, 1980, 1981; Lamrini, 1989; PNUE-PAM CAR/ASP, 2003; Postel and Mayrat, 1956).

Local reports record the presence of two large cetaceans and a few smaller species. The sperm whale, *Physeter macrocephalus* L. 1758, was reported for the first time by Postel and Mayrat (1956), who mentioned the stranding of a male in Tabarka (northern area). Since then, other strandings of this species have been mentioned in the literature (Ktari-Chak-

roun, 1980). Strandings in 1941 of the fin whale, *Balaenoptera physalus* (L. 1758), the other large cetacean recorded in the waters of Tunisia, were described by Heldt (1949) on the southern coast, in Skhira; the same study reported additional strandings of fin whales in subsequent years in the central region, but not in the area that we are describing here.

Smaller cetaceans are relatively common along the national coastline. Bottlenose dolphins, *Tursiops truncatus* (Montagu 1821), are frequently encountered in Tunisian waters. Several instances of strandings have been reported (Bradai, 1991; Heldt, 1953; Ktari-Chakroun, 1980, 1981; Postel, 1955). This species is also the subject of a local debate due to interactions with the activities of small fishing vessels (Ben Naceur *et al.*, 2004).

Strandings of the striped dolphin, *Stenella coeruleoalba* (Meyen 1833), are not reported along the northern coasts. Two findings were reported only in the southern area of the country in 1995 (Bradai and Ghorbel, 1998) and in 2006 (Bradai *et al.*, 2008; Pnue-Pam Car/asp, 2003).

One Risso's dolphin, *Grampus griseus* (G. Cuvier 1812), was found stranded on the central coast (Ktari-Chakroun, 1980, 1981).

In the first two years of activity (2006 and 2007), the stranding networks of the central and southern coasts collected data about 21 strandings, 65% of which were represented by bottlenose dolphins (Bradai *et al.*, 2008). Other species observed include striped dolphins, Risso's dolphins, and fin whales.

The present study reports data obtained by the North Coast INSTM team during the period December 2005–February

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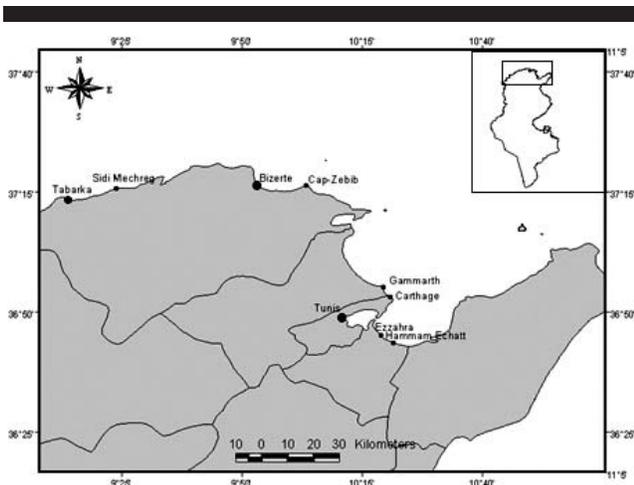


Figure 1. The north coast of Tunisia included in the survey.

2008, in hopes of improving the present knowledge of the cetacean fauna of Tunisia and adjacent waters. For a comparison and a recent update on the whole Mediterranean cetacean status, see Reeves and Notarbartolo Di Scira (2006).

MATERIALS AND METHODS

Whenever the Fishing Administration or the Coast Guard is alerted to a stranding, an INSTM team travels to the spot as soon as possible. The efficiency of the stranding teams depends therefore mostly on the authorities' notification.

A specific form related to the stranding event was prepared by the northern team's researchers, and it is filled in for each case. The same data form was adopted by the central and southern stranding teams. It contains basic data such as identification of species, body measurements, sex, location, kind of coast (sandy, rocky), Global Positioning System coordinates, etc. The animal is closely inspected, and—whenever the body condition allows it—a necropsy is performed on the spot or in a laboratory, when the body size does not exceed the transport capacity. Tissues are sampled for histopathologic, toxicological, and genetic analyses; they are frozen at -20°C or preserved in ethanol and stored at INSTM. The presence and nature of parasites and eventual lesions are

noted and photographed. When the state of decomposition is advanced or severe, samples are collected only for genetic analyses. One or more teeth are removed whenever possible for age determination. For this, the teeth were sent to the Mediterranean marine mammal tissue bank of the University of Padova in Italy (Convention on International Trade in Endangered Species of Wild Fauna and Flora permit no. IT 020), where they were cut with a diamond blade, decalcified, and sectioned with a cryostat in 20–25 µm sections. Subsequently, they were examined under the microscope for the growth layer group (GLG) count.

RESULTS

Data relative to stranded cetaceans observed between December 2005 and February 2008 are summarized in Table 1. Age of the specimens, determined by counting dentine GLGs, is also listed in Table 1.

We report below the description of the stranded carcasses and the results of the necropsies performed on the well-preserved animals. For the other specimens (decomposed or mummified), samples were collected but no postmortem analysis was attempted.

The first sperm whale (no. 1) was in relatively good body condition, but a necropsy could not be performed at the stranding site, due to a series of adverse circumstances. However, we observed that the caudal part of the body was missing. The second specimen, stranded in Bizerte, was too decomposed to allow any investigation.

The first two bottlenose dolphins (nos. 3 and 4) had their tails amputated. Close inspection of the site of the lesion showed precise cutting surfaces and absence of bleeding *ex vivo*, suggesting that removal of the tail happened after death, possibly even after stranding. The bottlenose dolphin stranded in Tabarka (no. 3) showed extensive abrasion of the apex in several teeth, an indication of wear and tear typical of aged specimens. Body conditions prohibited further investigations. The *T. truncatus* found in Gammarth (no. 4) was a newborn individual in which the umbilical scar was still evident. However, decomposition had already set in and the sex could not be determined. A postmortem examination was performed on the bottlenose dolphin stranded in Ezzahra (no. 5), but a definitive cause of death could not be ascertained. Dolphins found in Carthage and Hammam Echatt (nos. 6 and 7) had remains of a fishing net in the mouth. Agonic water aspiration

Table 1. Data relative to stranded cetaceans observed between December 2005 and February 2008.

No.	Species	Location	Date	Total Length (m)	Sex	Sampled Organs	Age (y)
1	<i>Physeter</i>	Tabarka	13 December 2005	7.6 (partial)	♀	tooth	—
2	<i>macrocephalus</i>	Bizerte (Cap Zbib)	1 June 2006	16	♂	skin, muscle	—
3	<i>Tursiops truncatus</i>	Tabarka	5 May 2006	2.69	♂	tooth, skin, liver, muscle	very old
4		Tunis (Gammarth)	9 June 2006	1.23	— (baby)	skin	—
5		Tunis (Ezzahra)	8 August 2006	2.13	♂	tooth, skin, liver, kidney, spleen	2
6		Tunis (Carthage)	23 April 2007	3.2	♂	tooth, skin, liver, kidney, spleen	—
7		Tunis (Hammam Echatt)	31 January 2008	1.97	♂	tooth	—
8	<i>Stenella coeruleoalba</i>	Bizerte (Sidi Mechreg)	26 March 2006	1.9	♀	tooth, skin, liver, kidney, spleen, tongue	13
9	<i>Globicephala melas</i>	Tabarka	5 March 2007	3.8	♂	tooth, skin	—

is suggested for the no. 6 dolphin, since necropsy showed that the net was tightly rolled around the glottis and epiglottis.

The striped dolphin recovered in Sidi Mechreg (no. 8) was freshly dead. Necropsy showed the presence of a liver haematoma and heavy parasite infestation with several cysts in the musculature. The morphology and the location of the parasites suggested their classification as tetraphyllidean merocercoids (Cestoda, perhaps belonging to the genus *Monorygma*, very common worldwide in cetaceans).

The long-finned pilot whale (no. 9) was the first animal of the species documented in Tunisian waters. Unfortunately, the specimen was extremely decomposed and no data of biological significance could be ascertained.

DISCUSSION

This study reports for the first time, in an international journal, organized data concerning stranding events occurring along the northern coasts of Tunisia. These results were made possible because ratification of international agreements prompted governmental authorities of Tunisia to establish a stranding task force. Furthermore, our data contribute to the knowledge of the poorly known cetacean fauna of the African shores of the Mediterranean Sea.

The high number of bottlenose dolphin strandings in comparison to the other species suggests that this species is particularly abundant in the North African shores of the Mediterranean (see also Reeves and Notarbartolo Di Sciarra, 2006). Although interactions with fishing activities must be occurring in Tunisian waters, we have no precise data on the percentage of dolphins suffering by getting caught in fishing gear. However, our results indicate that two specimens had their tails amputated and two had remains of fishing nets in the mouth. For the bottlenose dolphin stranded in Tabarka, tail amputation is possibly related to removal of the drowned animal from a fishing net, while the presence of fishing nets in the mouths of dolphins 6 and 7 may indicate net depredation by the dolphins trying to take fish from the net. Further studies eventually involving the cooperation of fishermen's organizations could help to clarify this specific issue.

Sperm whales were reported in the literature for this area, but the long-finned pilot whale was the first specimen observed on the Tunisian coasts.

The stranding of the striped dolphin represents the third instance of a recovery of this species along the coastline of Tunisia and the first one for our study area. We note here incidentally that there are reports of the presence of larvae of Cestoda in the abdominal cavity, mesentery, and testes of striped dolphins stranded along the Italian coasts (Cerioni and Mariniello, 1996). Furthermore, another study (Gibson et al., 1998) described the occurrence of *Monorygma* spp. in the abdominal cavity, blubber, and muscles of *Delphinus delphis*, *S. coeruleoalba*, and *T. truncatus*.

Although toxicological and genetic analyses are still in progress, we consider that the results obtained during the years 2005–2008 were quite encouraging. The monitoring study carried out in the present paper gives us a preliminary but potentially important insight into the biology of some stranded cetacean species in a relatively unknown coastal area.

Further investigations and systemic interviewing of fishermen may increase our knowledge of the Tunisian cetacean fauna.

Improved skills and diagnostic facilities (and special attention dedicated to describing any relevant biological information and age determination) will surely allow us more precise conclusions.

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