


MARINE RECORD

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# First records of Cuvier's beaked whale (*Ziphius cavirostris*, G. Cuvier 1823) strandings along the Tunisian coast

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## Abstract

The Cuvier's beaked whale (*Ziphius cavirostris*) is the only member of the Ziphiidae family with a regular occurrence in the Mediterranean Sea. Much of the knowledge of this species in the Mediterranean has come from stranding data. This note reports the first records of strandings of Cuvier's beaked whales along the Tunisian coast. The two strandings described are about two specimens, likely adult animals. The first specimens was 530 cm long and beached at El Hicha (Gulf of Gabès, south Tunisia) on March 5th, 2019. The second specimens was 630 cm long and it was reported in Ras Angla (Bizerte, north Tunisia) on June 6th, 2019. Since this species faces multiple threats in the Mediterranean basin, this contribution is intended to extend previous knowledge of this species in the region and to push towards major efforts to be undertaken to fill the knowledge gaps regarding occurrence of Cuvier's beaked whale along northern Tunisia.

**Keywords:** Cuvier's beaked whale, First record, Distribution, Mediterranean Sea, Tunisia

## Introduction

Beaked whales represent the second-largest family of cetaceans (after the delphinids) with at least 22 species belonging to 6 genera (Committee on Taxonomy, 2016). The only beaked whale species regularly found in the Mediterranean Sea is the Cuvier's beaked whale (*Ziphius cavirostris*, G. Cuvier 1823) (e.g. Notarbartolo di Sciarra and Birkun 2010). Cuvier's beaked whales are deep-diving pelagic cetaceans that inhabit offshore waters of all oceans (Reeves et al. 2002) being this species the most cosmopolitan of all beaked whales (e.g. MacLeod et al. 2006). Genetic analysis has indicated a high degree of differentiation from the Atlantic population and suggests that Cuvier's beaked whales in the Mediterranean Sea should be considered as a separate Evolutionarily Significant Unit, distinct from other populations (Dalebout et al. 2005; Carroll et al. 2016).

Despite Cuvier's beaked whales life history parameters being still poorly known, information on diving behavior and habitat preferences in the Mediterranean Sea are available (e.g. Tyack et al. 2006, Cañadas et al. 2018). In the Mediterranean basin this species is mostly observed in waters deeper than 500 m, with a distinctive preference for depths ranging from 1000 m to 2000 m (Moullins et al. 2007, 2008; Tepsich et al. 2014). Much of the early knowledge of Cuvier's beaked whales in the Mediterranean has come from stranding data (Podestà et al. 2006, 2016; Holcer et al. 2007). Currently, despite the fact that survey effort has not covered the entire Mediterranean Basin and many areas remain unexplored, the *Ziphius initiative* undertaken under the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) have increased our knowledge on the distribution of this species (Cañadas et al. 2018). Occurrence of Cuvier's beaked whale has been confirmed for the entire Mediterranean Basin, from the Western Mediterranean (Alboran Sea) to the far eastern part of the

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Levantine Sea. Species distribution is apparently characterized by areas of high density, where individuals seem to be relatively abundant, such as in the Alboran Sea, Ligurian Sea, Central Tyrrhenian Sea, South Adriatic Sea and the Hellenic Trench (Cañadas et al. 2018).

Recently, the Mediterranean population of Cuvier's beaked whale was listed as "Vulnerable (VU)" under IUCN criterion C2a (ii), based to the fact that *i*) the subpopulation is genetically distinct and contains fewer than 10,000 mature individuals; *ii*) the subpopulation is inferred to be experiencing a continuing decline in numbers of mature individuals; *iii*) all mature individuals are considered to be in one subpopulation (Cañadas and Notarbartolo di Sciara 2018). Moreover, a recent proposal by the EU resulted in the placement of the Cuvier's beaked whale subpopulation in Appendix 1 of the Convention for Migratory Species.

The most serious threat to Cuvier's beaked whale in the Mediterranean basin is probably noise pollution (e.g. Aguilar-Soto et al. 2006; Cañadas and Notarbartolo di Sciara 2018). Other potential threats are the occasional risk of bycatch in pelagic driftnets (e.g. Podestà and Magnaghi 1989), ingestion of plastic debris (e.g. Podestà and Meotti 1991), contamination by heavy metals and other pollutants (e.g. Storelli et al. 1999).

Strategically located in the center of the Mediterranean Sea, Tunisia lies in the middle of the passageway connecting the western and the eastern basins, resulting in a high dynamism of the surrounding water masses which leads to elevated marine productivity (e.g. Vera and Andrew 2002). This productivity combined with the oceanographic and geographical conditions in this area leads to a rich diversity of cetacean fauna. Therefore, all cetacean species known to be resident in the Mediterranean have been recorded off the Tunisian coastline (e.g. Attia El Hili et al. 2010) except the Cuvier's beaked whale whose presence was qualified as doubtful by the IUCN Red List (Notarbartolo di Sciara 2002; Karaa et al. 2012). Here we present a report of two different strandings of Cuvier's beaked whales along the southern Tunisia coast, which represent the first confirmed records of this specie from Tunisia.

## Materials and methods

The study of stranded cetaceans in Tunisia was strengthened in the beginning of 2004 through the creation of the National Stranding Network; this program was included in the activities of the marine biodiversity lab of the National Institute of Sea Sciences and Technology (INSTM). Three teams have been set up to this effect and were based respectively in the north, in the center and in the south. Team's members (researchers, veterinary doctors, and biologists trained for marine mammal stranding response) were usually available and can be

reached at any moment by mobile phone. Whenever the fishing administration or the coast guard is informed to a stranding, the INSTM team travels to the location as soon as possible.

For each stranding event, different data are recorded, such as date and time, GPS coordinates or location, environmental conditions (including coast orography), body measurements, sex and species identification according to the methods in Jefferson et al. (1993, 2008). Whenever possible, the animal is closely inspected and necropsy is performed on the spot or in a laboratory. When there is stranding of large specimens, the carcasses are taken to the Anatomy Department of the National School of Veterinary Medicine of Sidi Thabet (ENMV) either for the necropsy or for the recovery of the skeleton.

## Results and discussion

On March 5th, 2019, a medium-sized cetacean was stranded at El Hicha beach, about 25 km from Gabes (Southern Tunisia; 34°09'48" N, 10°01'45" E). The specimen was first sighted floating by a local fisherman at noon and it was then found dead when the carcass reached the shore (hereafter Ind1, Fig. 1a). The stranding warning was received in late evening by the officials of the Agency of Protection and Coastal Development. Surveys made by INSTM officers on March the 8th (3 days after the first reporting), failed to locate the stranded animal. A month after, on April 18th during a survey jointly made by the INSTM and ENMV teams, the carcass was found 5 km from the position initially reported, half-buried in the sand and in advanced state of putrefaction. On June 6th, 2019, a second whale stranding was reported on a beach near Cap Angela lighthouse, which is located northwest of the city of Bizerte (37°20'46" N, 09°44'31" E). This animal was in a mummified state (hereafter Ind2, Fig. 1b) indicating that the stranding took place several weeks earlier. External examination of both the stranded specimens, and particularly *i*) the head and melon shape with smoothly-sloping forehead with poorly defined rostrum, and *ii*) the relatively small dorsal fin located on two-thirds of the body length, allowed the classification of the whales as *Ziphius cavirostris* specimens. The animals identification was confirmed by a subsequent examination of the skull showing a relatively high cranial vertex and enlarged nasal bones that extend anteriorly over the upper nares (Heyning 1989; Jefferson et al. 2008) (Fig. 1).

Given the condition of the carcasses, no necropsy was performed, few photographs were collected together with body measurements (Table 1) and the skeletons were preserved (Fig. 1). Due to the poor state of the carcasses, it was no possible to determine the animal sex from the examination of the genital aperture. According



**Fig. 1** Photos of the carcass, skull and detail of the lower jaw tip of Ind1 (a) and Ind2 (b)

to the total body length data (Table 1), the individuals were likely adult animals (e.g. Santos et al. 2007), where Ind1 was shorter (i.e. younger) than Ind2; in both cases the teeth were not visible until the lower jaw was prepared. Body length and the lack of erupted teeth indicated that the Ind2 was an adult female (e.g. Jefferson et al. 1993), while they do not allow a sex assessment of Ind1. Ind1 body length slightly exceeded the minimum length at maturation (510 cm) of male Cuvier's beaked

whale reported in Santos et al. (2007). However young adult Cuvier's beaked males may not show protruding teeth yet during the first years after maturation (Rosso 2010). Therefore the lack of protruding teeth in Ind1 does not rule out the male sex.

The location of the second stranding was relatively close to the deep escarpments and marine canyons around the Galite Island and the Bizerte canyon (Aissi et al. 2015), which might fit with Cuvier's beaked whale habitat where mesopelagic cephalopods are abundant (e.g. Moulins et al. 2007). Conversely, the first stranding occurred in an area hundreds of kilometers away from a possible preferred habitat for this species (i.e. the deep waters of the strait of Sicily and Malta or the eastern Sicilian slope, M. Rosso *unpublished data*). To our knowledge, this latter record represents the farthest stranding site of a Cuvier's beaked whale from its preferred habitat in the Mediterranean Sea. Although the causes of the stranding are not known, the particular morphology of the Gulf of Gabes might have contribute to this event. The weak slope of the continental shelf extending in this large region might provoke directionless displacements of cetaceans in distress and consequently lead to their stranding (e.g. Bradai and Ghorbel 1998). Other cases of strandings of pelagic cetaceans, such as fin whales

**Table 1** Morphometric measurements of the two Cuvier's beaked whales stranded (Ind1 is the specimens from Gabes shore; Ind2 is the specimens from Bizerte shore)

	Measurements (cm)	Ind1	Ind2
1	Total Length	530	630
2	Snout to base of dorsal fin	340	–
3	Snout to blowhole	63	71
4	Snout to centre of eye	42	63
5	Snout to anterior insertion of flipper	126	–
6	Snout to anus	390	–
7	Fluke width	110	–
8	Maximum length of the pectoral fins	40	42
9	Maximum width of the pectoral fins	16	16.5

(*Balaenoptera physalus*), sperm whales (*Physeter macrocephalus*), humpback whales (*Megaptera novaeangliae*) and Minke whales (*Balaenoptera acutorostrata*) were already recorded in the same area (Karaa et al. 2012, 2016).

## Conclusion

To our knowledge, stranding events were already reported from all Mediterranean coasts except from Morocco, Tunisia, Libya, Egypt and the northern and central Adriatic Sea (Podestà et al. 2016). Therefore the data reported in this work represent the first records of Cuvier's beaked whale strandings along the Tunisian coast. Although Tunisian waters were not known to be habitat for this species in the Mediterranean Sea (Karaa et al. 2012; Aissi 2014), these strandings suggest the importance of Tunisian water for the conservation of the species in the Mediterranean, especially the northern coast when more investigations and systemic interviewing of fishermen and dedicated at-sea surveys are required, in order to increase the knowledge on the Tunisian cetacean fauna. Major efforts should be undertaken to fill the current knowledge gaps regarding occurrence and anthropogenic disturbances of Cuvier's beaked whale in the region, and especially in the deep marine canyons off northern Tunisia. In conclusion, this work represents an important element more to promote the inclusion of northern Tunisia marine area in the list of Important Marine Mammal Areas of the Mediterranean Sea (IMMAs; IUCN Marine Mammal Protected Areas Task Force 2017).

## Abbreviations

ENMV: Anatomy Department of the National School of Veterinary Medicine of Sidi Thabet; Ind1: Cuvier's beaked whale specimen stranded at El Hicha beach on March 5th, 2019; Ind2: Cuvier's beaked whale specimen stranded near Cap Angela lighthouse on June 6th, 2019; INSTM: Marine Biodiversity Lab of the National Institute of Sea Sciences and Technology

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## Authors' contributions

SK, HJ, SM, MNB, data collection and analysis; SK, MR paper redaction. The author(s) read and approved the final manuscript.

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All data generated or analysed during this study are included in this published article.

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Not applicable.

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Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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