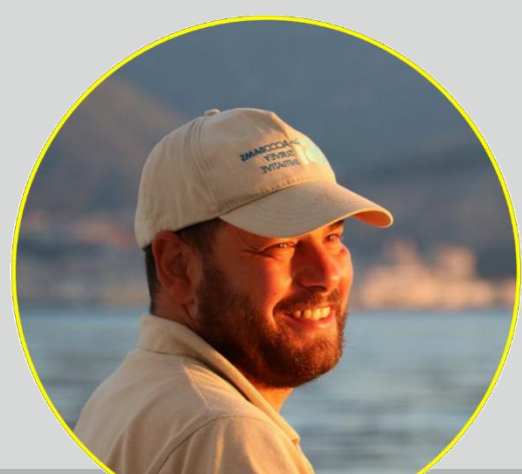


First records of Cuvier’s beaked whale (*Ziphius cavirostris*, G. Cuvier 1823) strandings along the Tunisian coast



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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).
- 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 Levantine Sea in waters deeper than 500 m (Tepsich et al. 2014).
- Genetic analysis has indicated a high degree of differentiation from the Atlantic population (Dalebout et al. 2005; Carroll et al. 2016).
- The Mediterranean population of Cuvier’s beaked whale was listed as “Vulnerable (VU)” under IUCN criterion C2a (ii).
- Here we present the first confirmed records of the Cuvier’s beaked whale from Tunisia.

Results and discussion

- On April 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 (Fig. 2 a).
- 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) (Fig. 2 b).
- Given the condition of the carcasses, no necropsy was performed, few photographs were collected together with body measurements (Fig. 3, Table 1) and the skeletons were preserved (Fig. 4).
- External examination of the two 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 (Jefferson et al. 2008) (Fig. 4).
- 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 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. 1998), 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. Karaa et al. 2012). Other cases of strandings of pelagic cetaceans, such as fin whales (*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).

Conclusions

- 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 stranding's 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.
- 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).

References

- Aissi M, Arcangeli A, Crosti R, Daly Yahia MN, Loussaief B, Moulins A, Pellegrino G, Rosso M, Tringali LM, Tepsich P. Cetacean occurrence and spatial distribution in the Central Mediterranean Sea using ferries as platform of observation. Russ J Mar Biol. 2015;41(5):343–50.
- Carroll EL, Reyes C, Gaggiotti OE, Olsen MT, Maaholm DJ, Rosso M, Davison N, Martin V, Schiavi A, Aguilar de Soto N. Pilot study to assess the utility of ddRAD sequencing in identifying species-specific and shared SNPs among Blainville’s (Mesoplodon densirostris) and Cuvier’s (*Ziphius cavirostris*) beaked whales. IWC report SC/66b/DNA/03; 2016. <https://doi.org/10.13140/RG.2.1.2286.5527>.
- Dalebout ML, Robertson KM, Frantzis A, Engelhaupt D, Mignucci AA, Rosario Delestre RJ, Baker CS. Worldwide structure of mtDNA diversity among Cuvier’s beaked (*Ziphius cavirostris*): implications for threatened populations. Mol Ecol. 2005;14:3353–71.
- Jefferson TA, Webber MA, Pitman RL. (2008). Marine mammals of the world: a comprehensive guide to their identification. London: Academic Press, London, eds; 2008. p. 573.
- Karaa S, Bradaï MN, Jribi I, El Hili HA, Bouain A. Status of cetaceans in Tunisia through analysis of stranding data from 1937 to 2009. Mammalia. 2012;76: 21 –9.
- Karaa S, Saadaoui A, Bradai MN. First record of live stranded sperm whales *Physeter macrocephalus* in the Gulf of Gabès, Tunisia. Cah Biol Mar. 2016;57: 329 –33
- Moulins A, Rosso M, Nani B, Würtz M. Aspects of distribution of Cuvier ’s beaked whale (*Ziphius cavirostris*) in relation to topographic features in the Pelagos sanctuary northwestern Mediterranean Sea. J Mar Biol Assoc UK. 2007;87(1): 177 –86.
- Rosso M. Population size, residency patterns and energy demand of Cuvier ’ s beaked whales (*Ziphius cavirostris*) in the north western Mediterranean sea. PhD thesis. Potenza: University of Basilicata; 2010.
- Santos MB, Martin V, Arbelo M, Fernández A, Pierce GJ. Insights into the diet of beaked whales from the atypical mass stranding in the Canary Islands in September 2002. J Mar Biol Assoc UK. 2007;87:243 –25. <https://doi.org/10.1017/S0025315407054380>.
- Tepsich P, Rosso M, Halpin PN, Moulins A. Habitat preferences of two deepdiving cetacean species in the northern Ligurian Sea. Mar Ecol Prog Ser. 2014;508: 247 –60.

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.
- 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 (Fig. 1).
- Whenever possible, the animal is closely inspected, different data are recorded and necropsy is performed on the spot or in a laboratory.
- When possible 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.

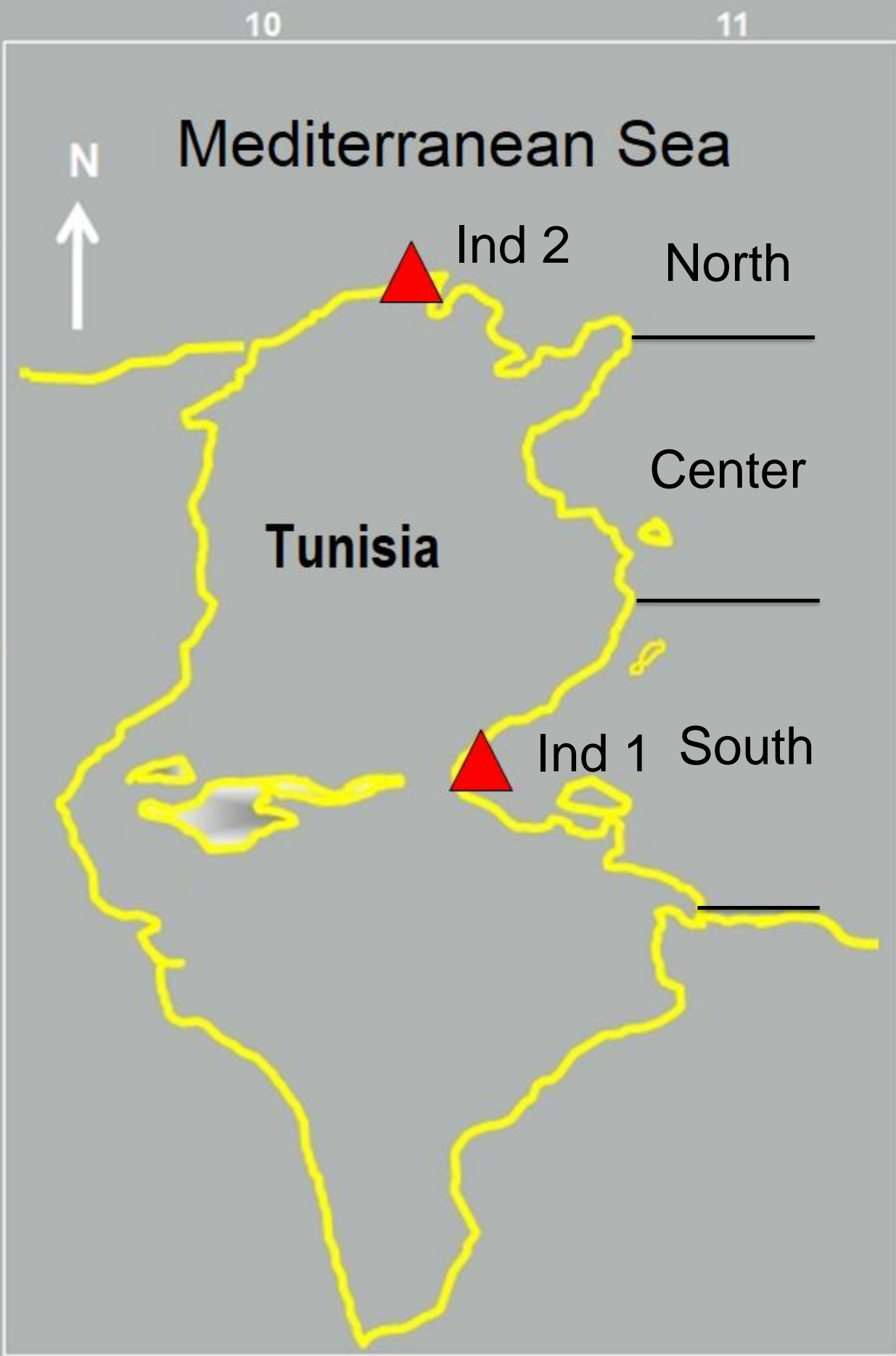


Fig. 1 Map showing the location of strandings of Cuvier’s Beaked Whale (*Z. cavirostris*).



Fig. 2 Photos of the carcass, skull and detail of the lower jaw tip of Ind1 (a) and Ind2 (b)

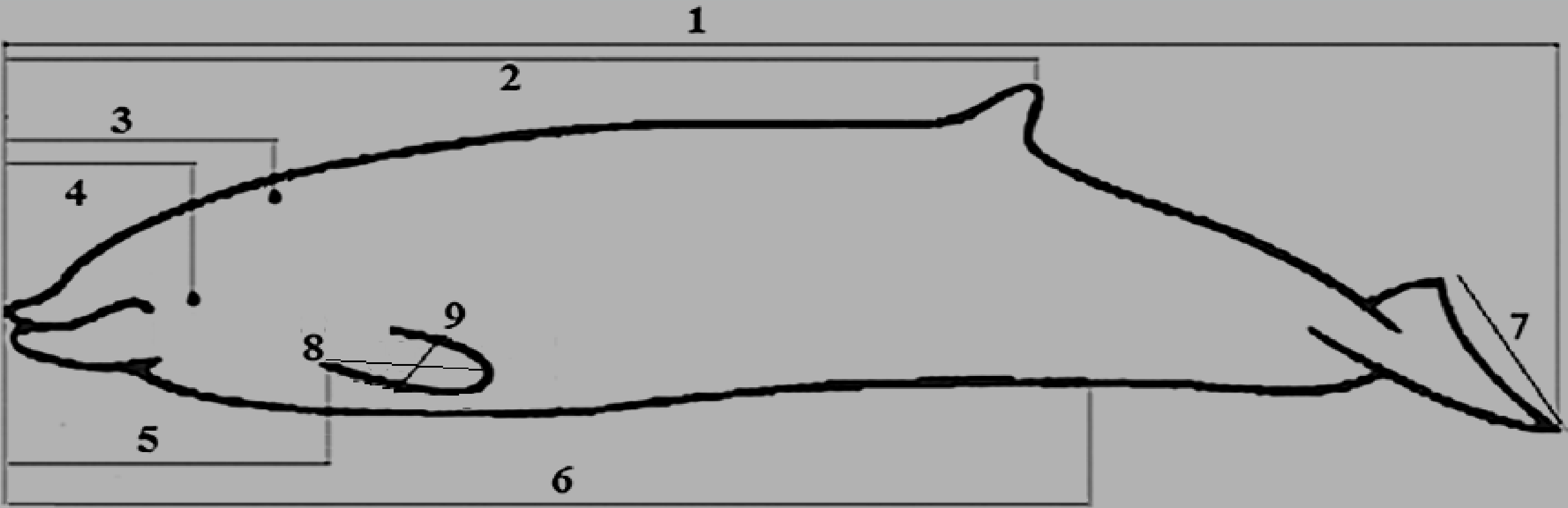


Fig. 3 Morphometric measurements of the Cuvier’s beaked whales

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)	Ind 1	Ind 2
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

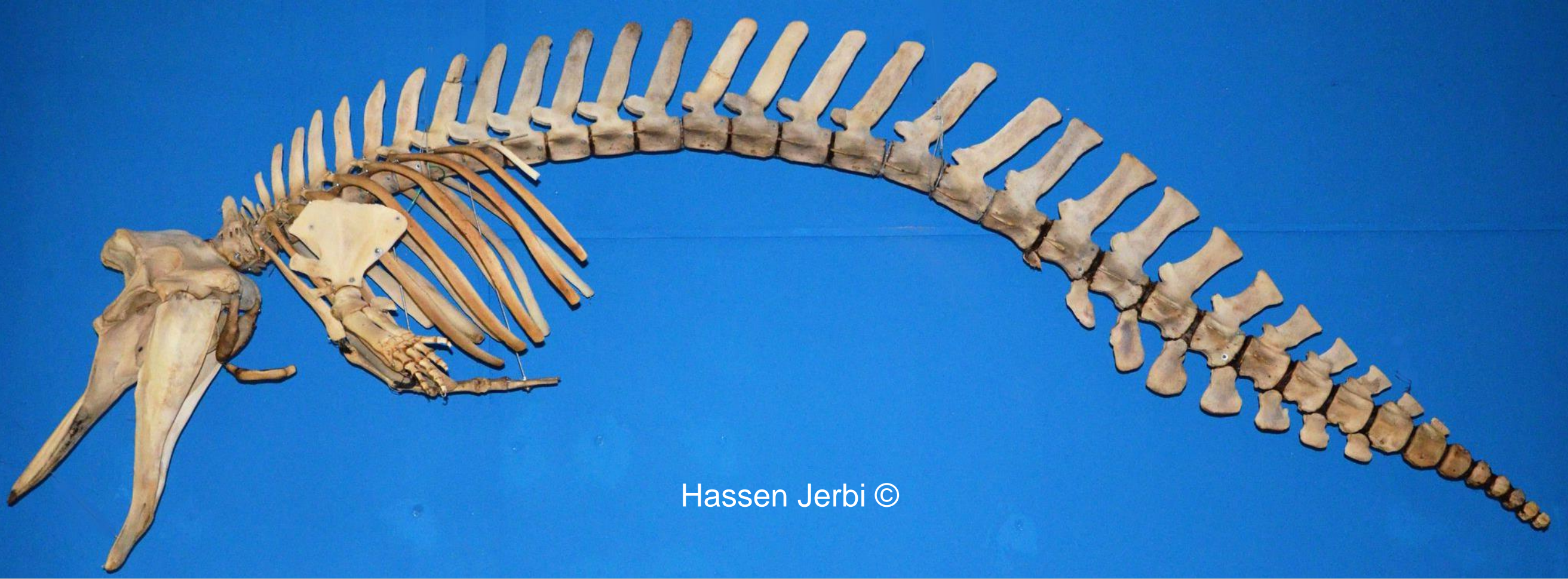


Fig. 4: Skeleton of stranded Cuvier’s Beaked Whale

