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Short Note

Two Cases of Physical Interaction Between White-Beaked Dolphins (*Lagenorhynchus albirostris*) and Juvenile Harbour Porpoises (*Phocoena phocoena*) in the Southern North Sea

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The harbour porpoise (*Phocoena phocoena)* has been common in the southern North Sea since the end of the 1990s; and during the last decade, hundreds have washed ashore on beaches in Belgium and The Netherlands (Haelters & Camphuysen, 2009). Thanks to well-developed stranding intervention networks in both countries, most carcasses are collected for research purposes. Live stranded animals are taken to the Dolphin Research and Rehabilitation Centre at Harderwijk, The Netherlands.

Two recent strandings, one in Belgium on 30 December 2006 and one more than 100 km northeast of this location in The Netherlands on 8 April 2009, were both similar and remarkable. Both animals presented very similar healed lesions: scars originating from skin cuts and resembling teeth marks (rake marks) inflicted by other cetaceans. Both harbour porpoises stranded alive. The animal from Belgium died on the beach, while the

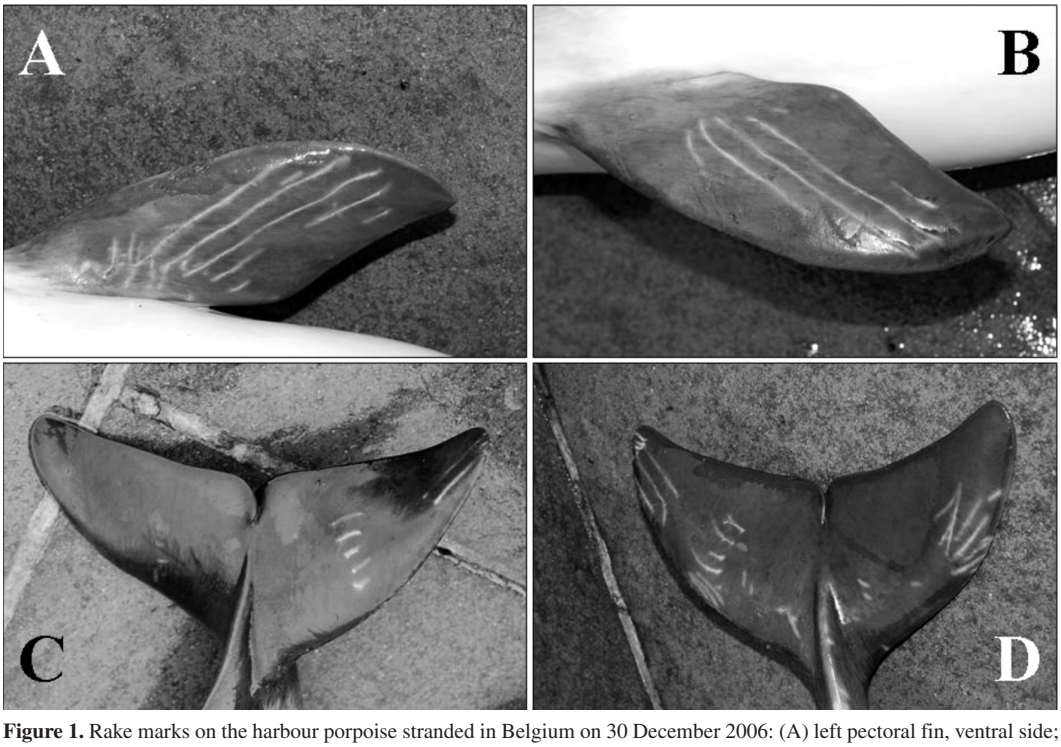

Figure 1. Rake marks on the harbour porpoise stranded in Belgium on 30 December 2006: (A) left pectoral fin, ventral side; (B) right pectoral fin, ventral side; (C) fluke, dorsal side; (D) fluke, ventral side (Photos by Jan Haelters)

animal from The Netherlands was cared for by the rehabilitation facility at Harderwijk.

The animal stranded at Blankenberge, Belgium, was a male of 92 cm with a weight of 16 kg, which is quite heavy for an animal of this size according to the correlation between weight and length established by Lockyer (1995). Its blubber thickness was 22 mm, consistent with a non-emaciated animal. The cause of death was related to drowning in heavy surf during a storm. Remains of fish were observed in the oesophagus. Rake marks were present ventrally and dorsally on the tail stock and both pectoral fins (Figure 1). These marks can be described as rows of evenly spaced, parallel, and nearly straight unpigmented scars. The number of scars per rake mark was 2 to 5. On the left pectoral fin and on the ventral side of the fluke, two marks were superimposed, leading to shorter but irregular intervals between the scars. A single long scar was present on the left side of the dorsal fin. The length of the scars varied between 8 and 74 mm. In total, 19 distances between scars were measured in seven rake marks, using both direct measurements and measurements on length-referenced photographs. The distances were measured at the onset of the scars, identified by a prominent point. The average interspacing between the scars was 7.5 mm (SD 0.6 mm), and the interspacing varied between 6.5 and 8.5 mm.

The animal stranded at Hoek van Holland, The Netherlands, measured 0.89 m and weighed 13.5 kg. On this animal, only one rake mark was present. It consisted of 15 parallel scars on the left and right side of the dorsal fin (Figure 2). The average interspacing between the scars, measured at 13 locations using a similar method to the Belgian animal, was 7.1 mm (SD 0.6 mm), and they varied between 6.0 and 8.5 mm. The scars were longer than on the animal from Belgium, and on the right side followed the curve from the dorsal side of the animal, laterally from the dorsal fin, to continue to the dorsal edge of the dorsal fin, without causing an indentation on the fin after the healing process. On the left side, the onset of the rake was on the dorsal fin itself. When the animal was released 6 mo later, the marks were still clearly visible.

The lesions resulting in the scars for both individuals must undoubtedly have been shallow, only cutting into the dermis, given that the wounds had healed perfectly and the edges of the fins had remained almost intact. Only a very small indentation, typical of deeper wounds, was found on the fluke of the animal from Belgium. No formation of scar tissue was noticed subcutaneously during

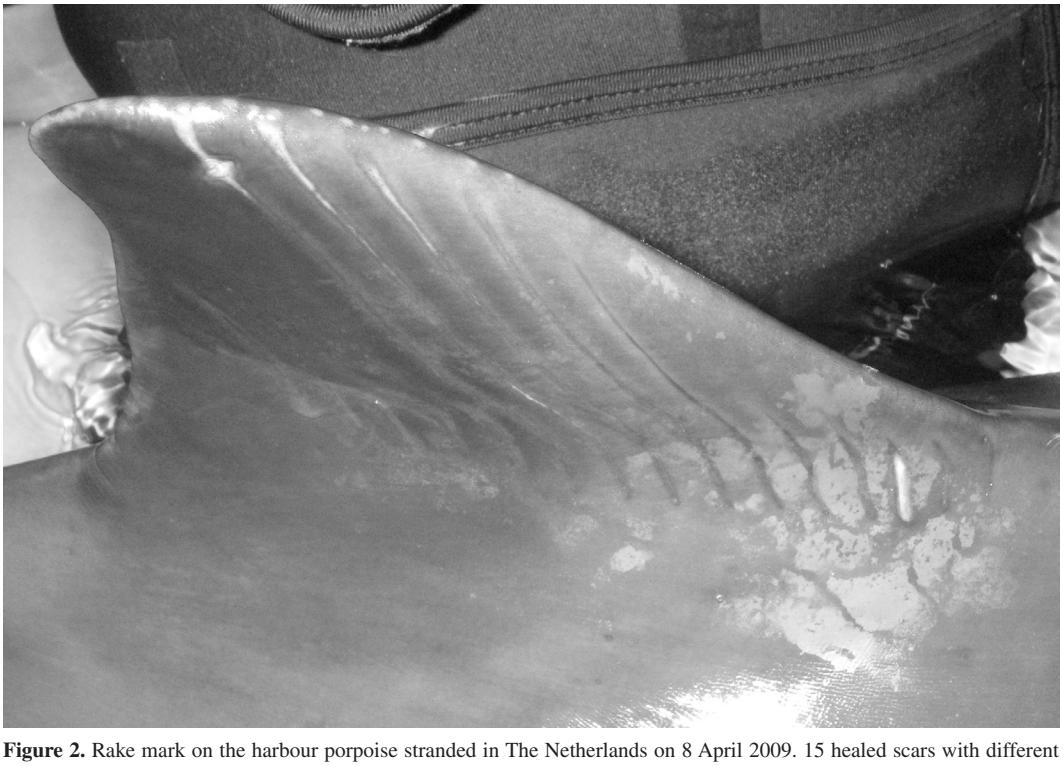

Figure 2. Rake mark on the harbour porpoise stranded in The Netherlands on 8 April 2009. 15 healed scars with different lengths run from the dorsal side of the animal, lateral to the dorsal fin, towards the dorsal edge of the dorsal fin; two of the scars continue up to the margin of the dorsal fin. (Photos by Eligius Everaarts upon the stranding of the animal)

the autopsy of this animal. Given the small sizes of both animals, the interspacing of the rake marks cannot have increased significantly with the animals' growth. Harbour porpoises in the southern North Sea are usually born in late spring or early summer, with a peak in June and July (Addink et al., 1995). At birth, they measure 70 to 80 cm in length. The small size of the winter and early spring stranded animals described here suggests that they were born during or even slightly after the summer before their stranding.

Rake marks are very common on many toothed whales; and in most cases, they involve interactions between animals of the same species (Norris, 1967; Evans, 1987; MacLeod, 1998). Ross & Wilson (1996), in their investigation of the significant rake marks observed on a number of harbour porpoises washed ashore on the North Sea shores of Scotland, measured the inter-tooth distances on museum skulls of all cetaceans most likely to occur in the North Sea. The inter-tooth distances measured for the harbour porpoise itself, the common dolphin (*Delphinus delphis*), the white-beaked dolphin (*Lagenorhynchus albirostris*), and the bottlenose dolphin (*Tursiops truncatus*) were, respectively, 3.61 (95% CI 3.36 to 3.87) mm, 4.71 (4.46 to 4.95) mm, 6.87 (6.26 to 7.48) mm, and 11.6 (10.97 to 12.32) mm. These are the cetaceans most likely to be encountered in the southern North Sea. In addition to these measurements, we measured the inter-tooth distance of a white-sided dolphin (*L. acutus*), a very rare species in the southern North Sea. In the museum skull of an adult of 2.47 m (collection RBINS ref. 34514), the inter-tooth distance was 5.34 (95% CI 4.38 to 6.30) mm.

Ross & Wilson (1996) concluded that the injuries on the animals they studied were inflicted by bottlenose dolphins. For this study, the injuries most likely originated from white-beaked dolphins. Bottlenose dolphins have become very rare in the southern North Sea, with a very low number of sightings during the last decades; it cannot be excluded, however, that the harbour porpoises studied here had encountered bottlenose dolphins, which still occur in small numbers in the central and northern North Sea and in the Channel. In contrast, after the harbour porpoise, the white-beaked dolphin is the most common cetacean species in the southern North Sea, with regular sightings of groups of three to 25 animals (Camphuysen & Peet, 2006).

It is likely that there are frequent encounters between harbour porpoises and white-beaked dolphins, common species sharing the same habitat. However, very little information exists concerning interactions between these species. Harbour porpoises seem to avoid other cetacean species, and observations of harbour porpoises in the vicinity of white-beaked dolphins are rare (Camphuysen & Peet, 2006). We are not aware of any previous description of physical interaction between harbour porpoises and white-beaked dolphins.

Interactions between bottlenose dolphins and harbour porpoises in the United Kingdom often lead to the death of the harbour porpoise due to multiple skeletal fractures and damaged internal organs (Ross & Wilson, 1996; Patterson et al., 1998; Jepson, 2005; Barnett et al., 2009). Jepson (2005) even identified these interactions as the most common causes of mortality in stranded harbour porpoises around the UK in areas where they co-occur with bottlenose dolphins. The suspected interactions described here involving juvenile harbour porpoises and white-beaked dolphins (20 times heavier than harbour porpoises) were less violent. The superficial nature of the wounds suggests that they were made during manipulation of the harbour porpoise rather than as a bite, which would undoubtedly have caused more damage. Baird (1998) describes an event in which two Pacific white-sided dolphins (*L. obliquidens*) dragged an 83-cm harbour porpoise through the water by its flippers, causing only superficial skin abrasions.

There are some possible explanations for the interaction. A primarily aggressive behaviour, such as those observed in intraspecific social interactions, sexual competition, protection of calves, or competition for food (MacLeod, 1998), can be excluded as no internal injuries were observed on the Belgian animal, and both calves survived. The consequences for the harbour porpoises would likely have been much more severe in the case of aggressive behaviour. It is possible that the behaviour was epimeletic or care-giving. Such behaviour is described as the help by a healthy individual towards a sick, injured, or dead animal, often a calf. It can also be a form of parental skill training (Baird, 1998). Usually it is directed towards animals of the same species. In rare cases, it has been witnessed between different species—displaced epimeletic behaviour (Caldwell & Caldwell, 1966; Baird, 1998). Epimeletic behaviour can lead to rake marks as described by de Moura et al. (2008), Fertl & Schiro (1994), and Cockcroft & Sauer (1990).

Given that the animals in this study survived, and given the numerous rake marks on the Belgian animal, the most plausible explanation for the interactions is object-oriented playful or investigative behaviour by white-beaked dolphins. For the harbour porpoises, the interaction would have nonetheless been traumatic. The fact that the harbour porpoises survived and that their wounds had healed, indicates that they were weaned at the time of the interaction or that their mother would still have been in the vicinity.

The interactions described here are probably a rare event given that every year hundreds of harbour porpoises without such traces wash ashore in Belgium and The Netherlands. These findings shed some light on the behaviour of white-beaked dolphins for which little information exists. Further observations in the field, and a more thorough investigation of stranded harbour porpoises, might yield more information on the reasons behind, and the frequency of, such interactions, forming part of the complex social behaviour of these marine mammals.

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