

## Body scars of a resident, wild bottlenosed dolphin (*Tursiops truncatus*): information on certain aspects of his behaviour

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### Abstract

It is suggested that a detailed study of body scars in wild dolphins provides valuable information on aspects of their social behaviour, feeding and swimming patterns. We report here the occurrence of four sets of marks on the body of a resident, solitary wild bottlenosed dolphin from N. Cornwall, England. Two sets of marks provide evidence for this animal having regular, intimate contact with other bottlenosed dolphins and also larger cetaceans. There is limited information on the social behaviour and life history of wild marine dolphins. Field observations of small social groups and of solitary dolphins have produced useful data on diurnal and seasonal habits regarding movements, home ranges, feeding and reproduction (1-10). We suggest that, complementary to such observational work, the regular, detailed study of body scars in such animals provides information from which additional aspects of their social behaviour, feeding and swimming patterns may be reconstructed.

An adult male bottlenosed dolphin, 4.1 m in body length, has been a solitary resident of the sea area around Godrevy Island, N. Cornwall, England for the last 3.5 years (11) and between July and November 1984 was the subject of a field study. At regular intervals (4-6 weeks) detailed records have been kept of the animal's body markings and scars. Many of the body scars were considered to be the result of scratches obtained from rocks, barnacles and other obstacles encountered during feeding and the animal's numerous contacts with boats, buoys, mooring lines and items touched in play. These were eliminated from further consideration. Some marks, however, occurred either routinely as regular patterns on different parts of the body or at specific, relatively unexposed sites on the body. After careful measurement of the marks (depth, width, length, formation) we concluded that at least four sets were a product of the dolphin's contact with other creatures.

The first type of mark was routinely seen through-

out the study period and consisted of long parallel lines up to 6 or 7 in number with a regular spacing of between 1.0 and 1.5 cm (Figure 1a). Tooth rakes are reported to be associated with intra- and inter-specific fighting and intersexual mouthing in dolphins (10, 12-15) and we have made comparisons with marks on stranded *Tursiops truncatus* (Lockyer, personal observation), published photographic records for *Tursiops spp.* (16, 17) and personal photographs of captive *Tursiops* where tooth rakings are known to have been rendered by specific animals. The pattern and spacing of these marks are similar to those recorded on the solitary Cornish dolphin. In addition experimental rakings were made using complete adult *T. truncatus* lower jaws being drawn across pressure sensitive paper on top of curved, yielding surfaces. Many patterns of marks were seen, several of which were similar to those observed on the Cornish dolphin. We conclude that between June and November this 'solitary' animal has had regular, intimate contact with others of his kind. He therefore does not appear to be solitary in the sense of being completely isolated from social contact with other bottlenosed dolphins, being rather an animal which has established a permanent home range and which either makes social contact with passing groups or has a regular social group of his own in another area which he regularly visits. We feel such observations may help to throw considerable light on our understanding of these solitary animals which are by no means uncommon (D. McBrearty, Anatomy Department, University of Cambridge, personal communication).

The second type of mark was almost identical to the *T. truncatus* teeth rakes but had a much wider spacing, 2.5-4.0 cm, (Figure 1b). We conclude that they are also tooth rakes resulting from social interaction, but that a larger species of whale is involved. Pilot whales (*Globicephala melaena*) are frequently sighted off this coast (M. Law and J. Wharram, local Cornish residents, personal communications) and would have a considerably greater size of tooth spacing than bottlenosed dolphins. Certainly mixed

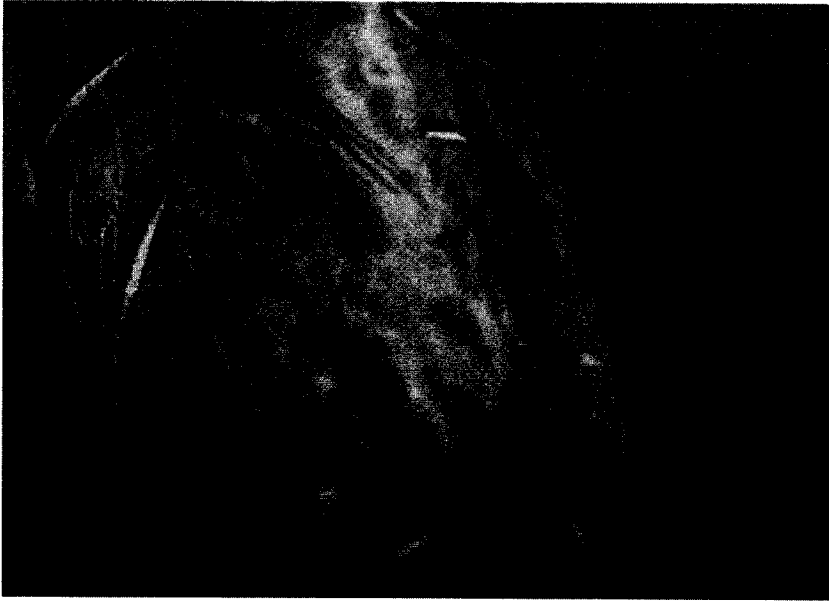


Fig. 1a

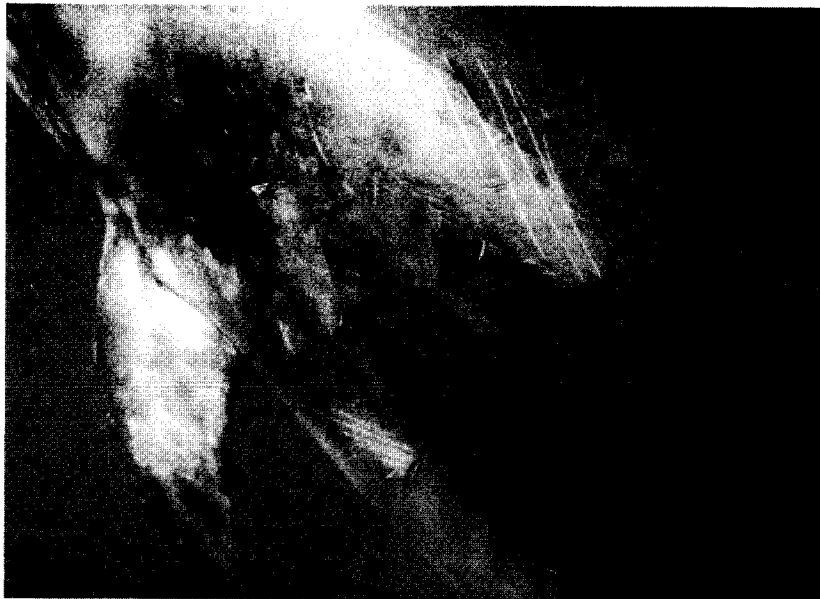


Fig. 1b

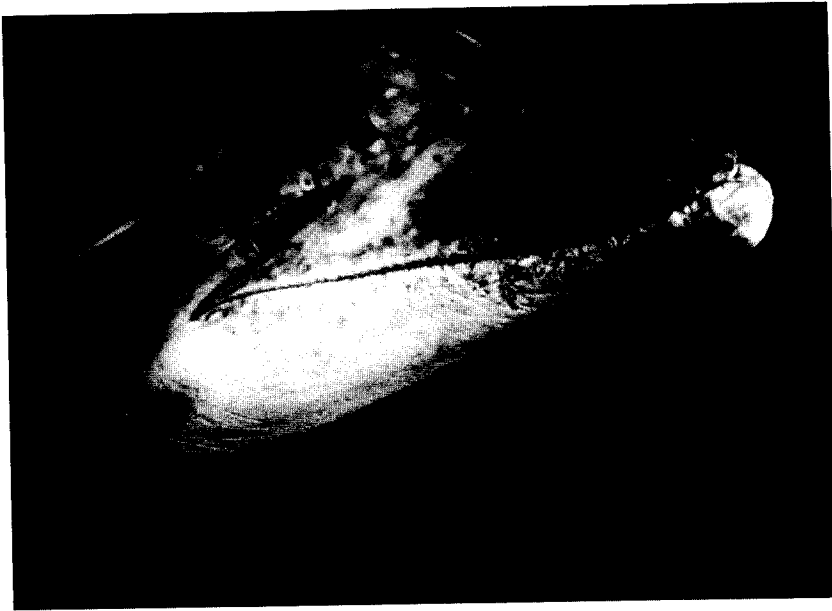


Fig. 1c

**Figure 1** (a) Conspecific tooth rake scars on the back of *T. truncatus*. (b) Tooth rake scars rendered by a conspecific on the left hand flank and by a larger cetacean on the back, and a 'claw' type scar on the back of *T. truncatus*. (c) Curved tooth rake scars in the angle of the jaw, and vertical parallel cuts on the upper left hand jaw.

groups of pilot whales and bottlenosed dolphins have been reported (18). Another possibility is killer whales (*Orcinus orca*) which have a similar spacing. We believe that this is the first firm evidence to indicate that *T. truncatus* has regular, close social contact with other cetaceans.

The third mark can best be described as a deep, 5-digit scratch mark which appears to have been made by a claw (Figure 1b). Such marks were not as frequent as the tooth rakes, but two such marks were seen during the study period. A large population of grey seals (*Halichoerus grypus*) inhabit the dolphin's home range and may be competitors for food. The possibility of these marks being grey seal claw marks has, however, been discounted as the minimum retracted inter-digital spacing in juveniles, as calculated by us from measurements taken by the Sea Mammal Research Unit, is  $1.40 \pm 0.14$  S.D. cm, compared to the spacing of these marks which is only 0.6–0.7 cm. The only animal known to occur in the United Kingdom coastal waters with a 5-digit claw of such a size is the otter (*Lutra lutra*). Otters are well known inhabitants of S.W. Cornwall and would be expected regularly to fish in the nearby sea areas, particularly off rocky coasts (D. J. Jefferies, Nature Conservancy, personal communication). The dolphin could come into contact with otters within his normal hunting area. Associations

between dolphins and otters have been reported for *Inia geoffrensis* and *Pteromura brasiliensis* in rivers in eastern Colombia whilst fishing for the same prey (19).

The fourth mark occurred twice and is probably the most intriguing. Six deep parallel cuts running vertically down the left hand side of the upper jaw towards the jaw angle were recorded in July (Figure 1c). A similar set of marks, though much fainter, were recorded at an equivalent position on the right hand side of the jaw of the upper jaw in November. The cuts were extremely narrow and were angled into the body so that they were only visible from certain positions. We conclude that they were made by sharp cutting or tearing edges. The cuts occurred on a relatively protected part, across the bottom of the fold between the melon and upper jaw, and it is unlikely that they could have been caused accidentally. One possible explanation is that they were caused by squid hooks. Clarke (20) describes the type of marks that squid hooks made on whales as 'almost parallel lines directed towards the jaw and often the jaw angle . . . as the squid is swallowed it hangs on to the sides of the head and the hooks of the long tentacles are dragged towards the jaw'. Such marks are sharp being caused by the hooks being pulled through the blubber. There are only two species of hooked squid known in the N.E. Atlantic

that would be large enough (ca 1.2–1.8 m) to make marks similar to those found on the Cornish dolphin (M. Clarke, Marine Biological Association of Plymouth, personal communication); *Octopeuthis* sp. which is rare and only one specimen of this size is known (M. Clarke, personal communication), and *Taningia danae*. The latter is known mainly from whale stomachs and is thought to occur in fairly deep water (ca 500 m plus) off the continental shelf. They have not been reported to occur north of 40°N but may well be present considerably further north of this line (M. Clarke, personal communication). *Tursiops* is known to dive to depths of at least 300 m (18, 21) but the Cornish dolphin's home range would appear to be many hundreds of kilometres from those sea areas where he may encounter such large hooked squid. The true description of the large squid is, however, poorly known. In addition, the dolphin's normal home range is only 225 km from the edge of the continental shelf and the dolphin has occasionally left his normal area of residence within a narrow coastal strip extending from 50°20'N, 5°14'W to 50°14.5'N, 5°25'W, calculated to be about 77 km<sup>2</sup>, for short periods during the last year. N. Atlantic bottlenosed dolphins have been reported to feed on a variety of squid from the families Gonatidae, Myopsidae and Oegopsidae (13); and off S. Africa, Ross (22) reported various species of family—Sepiidae, Loliginidae and Enoploteuthidae, from the stomachs of *T. truncatus* and *T. aduncus*. These latter data suggested that feeding was over the continental shelf to a depth of 200 m. Ross (22) especially considered the presence of *Enoploteuthis* in the stomachs of two *T. truncatus* significant because members of Enoploteuthidae are oceanic.

We conclude therefore that it is plausible that the Cornish dolphin could feed in deep water areas and take squid, if available, as part of the diet.

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