

## Short Note

### Encounters with Indo-Pacific Humpback Dolphins (*Sousa chinensis*) Carrying Dead Calves in Sanniang Bay, Guangxi Province, China

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Cetaceans are considered to be one of the most intelligent and sentimental animals as they demonstrate various epimeletic (or care-giving) behaviours, which have been well documented for many cetacean species both in captivity and in the wild, and have also been described in some mysticetes (reviewed in Caldwell & Caldwell, 1966; Fertl & Schiro, 1994). Epimeletic behaviour is characterized as intraspecific, interspecific, or intergeneric behaviour that involves attention or assistance (Lodi, 1992), and it may be considered generally adaptive for the survival of possibly genetically related individuals within specific groups (Cockcroft & Sauer, 1990), particularly for dolphins that appear to be dependent on school structure for survival (Norris & Dohl, 1980; Norris & Schilt, 1988).

The carrying of a dead calf for a long period is considered a manifestation of epimeletic behaviour. Cases involving dead fetuses, newborns, calves, and juvenile dolphins being supported by their presumed mothers have been described in bottlenose dolphins (*Tursiops truncatus*) (Norris & Prescott, 1961; Cockcroft & Sauer, 1990; Connor & Smolker, 1990; Harzen & dos Santos, 1992; Fertl & Schiro, 1994), short-finned pilot whales (*Globicephala macrorhynchus*) (Norris & Prescott, 1961; Brown et al., 1966), humpback whales (*Megaptera novaeangliae*) (Caldwell & Caldwell, 1966), striped dolphins (*Stenella coeruleoalba*) (Brown et al., 1966), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) (Kasuya & Miyazaki, 1976), rough-toothed dolphins (*Steno bredanensis*) (Lodi, 1992; de Moura et al., 2009), Risso's dolphins (*Grampus griseus*) (Palacios & Day, 1995), and long-beaked common dolphins (*Delphinus capensis*) (Park et al., 2012).

However, with respect to dead calf carrying behaviour in Indo-Pacific humpback dolphins (*Sousa chinensis*), known cases are relatively limited, except two brief records in Hong Kong waters (Parsons, pers. comm., 1998). To fill this void, this paper adds three detailed behavioural observations of free-ranging Indo-Pacific humpback dolphins carrying dead calves in Sanniang Bay, Guangxi Province, China. The potential causes of these events are also discussed.

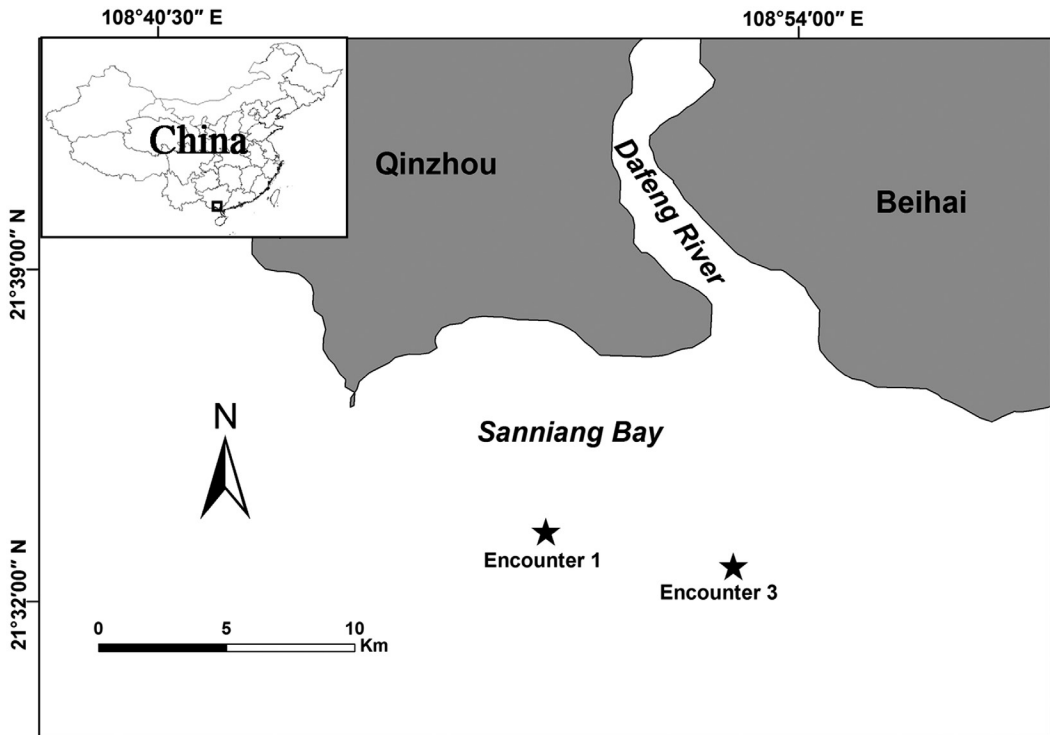
The Indo-Pacific humpback dolphin, also called the Chinese white dolphin, occurs in the eastern Indian and western Pacific Oceans (Jefferson et al., 1993; Jefferson & Karczmarski, 2001; Mendez et al., 2013; Jefferson & Rosenbaum, 2014). This species is typically found in estuarine and coastal waters, and generally in shallow waters less than 25 m in depth (Saayman & Tayler, 1979; Ross et al., 1994; Karczmarski et al., 2000; Jefferson & Karczmarski, 2001). Because their habitats are usually proximal to areas with intensive human activities, humpback dolphins are under substantial anthropogenic threat. At the species level, humpback dolphins are red-listed as "Near Threatened" by the International Union for Conservation of Nature (IUCN) (2014). In China, this species was also listed as a "Grade I National Key Protected Animal" in 1988 and was included in the *Chinese Red List of Endangered and Threatened Wildlife and Plants* in 1994.

During field surveys of Indo-Pacific humpback dolphins from January 2011 to April 2016 in Sanniang Bay, Guangxi Province, China, adult humpback dolphins carrying dead calves were encountered twice and then were tracked for further behavioural observations and photographic identification. This kind of event was also

observed and recorded by a local dolphin-watching boat during this period. Behavioural observations were performed by one trained observer using naked eyes, assisted by a  $7 \times 50$  binocular (Navigator, Germany), while the focal animal method and a continuous recording method were used for surface behavioural observations (Martin & Bateson, 1993). Behavioural categories, social behavioural interactions, and environmental information also were recorded. The geographical positions of each encounter were registered by using a handheld GPS (Garmin, USA), and the water depths were measured using a handheld depth sounder (Hondex PS-7 LCD Digital Sounder, Japan). During the tracking periods, the survey vessel (a 8-m wooden boat with outboard engine) tried to maintain at least a 50 m distance from the main group (defined as the dead calf accompanied by at least the presumed mother dolphin) to avoid any disturbance to the animals. Whenever possible, the engine was turned off, and the vessel was left drifting. Photographs were taken by another observer using a Canon camera (EOS 1D Mark IV, Japan) fitted with a 100 to 400 mm lens.

### Encounter 1 on 22 February 2011

The observation started at 1121 h and ended at 1452 h when the calf was lost. A group of seven humpback dolphins was first sighted during a field survey. When the survey vessel got closer (approximately 100 m) to the group, a dead calf was observed draped over the anterior edge of an adult dolphin's dorsal fin (presumed to be the mother) (Figure 2A). The GPS location was  $21^{\circ} 33' 28''$  E,  $108^{\circ} 48' 41''$  E (Figure 1), and the water depth was about 5.1 m. For the duration of the observation, all humpback dolphins in the main group appeared jumpy and agitated. They swam fast in a dense cluster and showed a strong aggregated effect relative to normal social interactions, with lots of small fish occasionally jumping out of the water. The most significant behaviour was that the presumed mother dolphin carried the calf on her back or pushed the calf with her melon and rostrum. Propelling the calf by holding the calf's rostrum in her mouth was also observed. When the dead calf sometimes slipped off the presumed mother's dorsal fin, she would immediately turn around and retrieve it. About five to ten other dolphins followed and accompanied



**Figure 1.** Map of Sanniang Bay, Guangxi Province, China, showing the locations of the two encounters with Indo-Pacific humpback dolphins (*Sousa chinensis*) carrying dead calves observed during field surveys. Encounter 2, which was observed by a tourist on a dolphin-watching boat, is not indicated.

the mother-calf pair, although they occasionally left and approached the mother-calf pair again. In addition to the presumed mother, the analyses of photographs showed that two other adult dolphins also engaged in direct interactions with the calf such as pushing the calf with their melons and rostrums (Figure 2B) and carrying the calf on their backs (Figure 2C). The calf may have been dead for several days as indicated by the depletion of some of the epidermis (Figure 2), and rake marks were evident on both the right and left sides, thought to be where the presumed mother had been holding the calf with her mouth. There were five dolphin-watching boats following or surrounding the main group in close proximity (30 to 150 m) (Figure 2D).

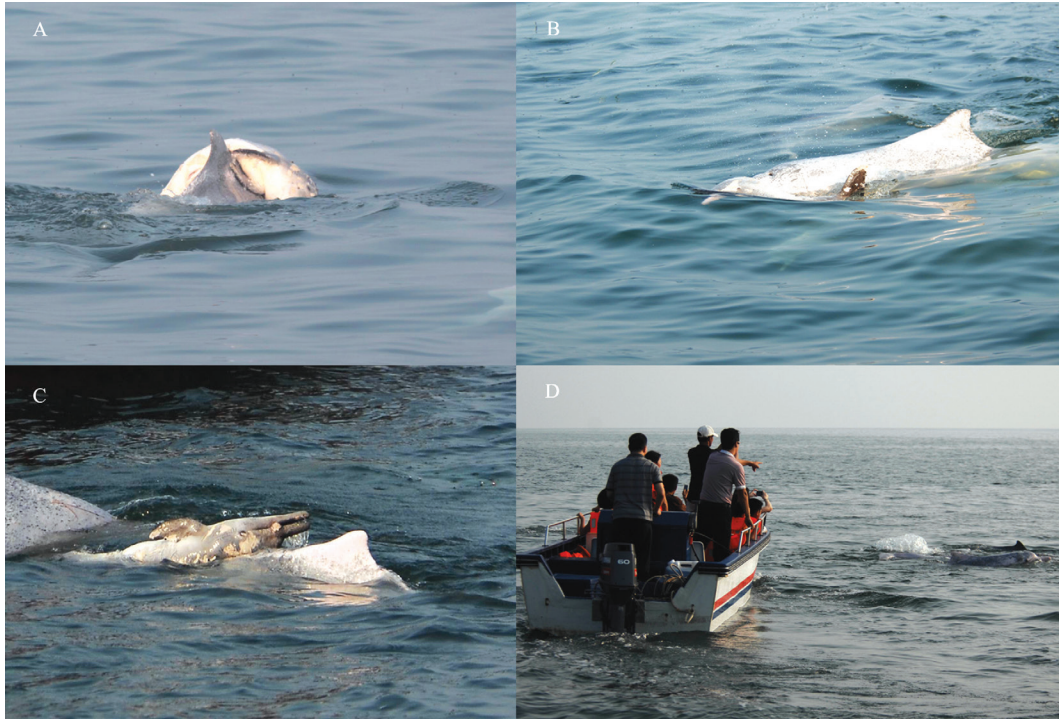
### Encounter 2 on 8 July 2012

The second case was observed by a tourist on a dolphin-watching boat in Sanniang Bay, Guangxi Province, China (video available at <http://my.tv.sohu.com/us/71124500/27072148.shtml>). The video shows an adult, solitary humpback dolphin carrying a dead calf on the anterior edge of its dorsal fin. The calf was motionless, with its mouth

wide open and its tongue hanging out. There was an apparent bloodstain on the calf's abdomen (Figure 3A). Throughout the video, the adult dolphin is seen carrying the calf on its back and swimming slowly. Occasionally, the adult dolphin dove for a while, and the calf was left drifting at the surface in a belly-up position. At least three dolphin-watching boats followed or surrounded the mother-calf pair in close proximity (50 to 150 m).

### Encounter 3 on 2 April 2016

The third encounter started at about 1240 h when an adult humpback dolphin was observed pushing a bloated and belly-up calf with its melon and rostrum (Figure 4B). This animal was then tracked for behavioural observation for about 2 h. The GPS location was 21° 32' 44" E, 108° 52' 38" E (Figure 1), and the water depth was about 2.7 m. During the entire tracking period, the presumed mother dolphin seemed agitated and swam fast, performing arching movements of the head and body, pushing and rolling the dead calf in a violent way. Several times, the presumed mother



**Figure 2.** Encounter 1 with an Indo-Pacific humpback dolphin carrying a dead calf in Sanniang Bay, Guangxi Province, China, with the presumed mother dolphin carrying the dead calf on her back (A), and the other two adult dolphins (B & C) interacting with the dead calf; (D) shows a dolphin-watching boat in close proximity to the main dolphin group. (Photo credit: Dr. Wang Xianyan)



pushed the calf out of the water with a relatively high body position, even hurling the calf in the air by its melon and rostrum (Figure 4C & D). Occasionally, the presumed mother dolphin dove briefly (5 to 15 s), and the calf was left drifting at the surface. Later, the presumed mother would then turn around and retrieve the calf. About six to seven other dolphins were sighted approximately 100 to 400 m away; they seemed to engage in their normal activities without any special attention being paid to the focal pair. The dead calf was in the early stage of decomposition as indicated by the whole skin being in good condition (i.e., dark gray in color and with apparent fetal folds on both sides). There were no obvious scars, notches, or teeth marks on its body, and it was confirmed as a male by visual observation and photo-identification.

### Discussion

Cockcroft & Sauer (1990) have suggested that epimeletic behaviour may have an adaptive value, particularly if the giver and receiver are genetically related. As members of a multi-male/multi-female mating system, dolphin females are the caretakers of the young, and it is mainly females that exhibit the carrying of a dead calf (Fertl & Schiro, 1994). The loss of the calf may give the mother a

strong drive to attempt to aid the calf even if it is dead; therefore, the three humpback dolphins that showed strong and persistent epimeletic behaviour in the present study were considered the presumed mothers. The epimeletic behaviour of humpback dolphins may last for several days as indicated in Encounter 1 in which the calf was in the advanced stage of decomposition. Furthermore, in addition to the presumed mother dolphin, the events in Encounter 1 suggest that other dolphins may also display temporary direct interactions towards the dead calf (Figure 2B & C).

In addition to the two brief records in Hong Kong waters, the present study provides an additional three encounters and detailed behavioural observations of Indo-Pacific humpback dolphins carrying dead calves in the wild. Common to all three events, there was one adult dolphin (the presumed mother) that always directly interacted with the dead calf. The most significant common behaviour was that the presumed mothers carried the dead calves on the anterior edge of their dorsal fin or pushed the dead calves with their melon and rostrum. Other behaviours, such as propelling the calf by biting the calf's rostrum (Encounter 1), pushing the calf out of the water with a relatively high body position, or even hurling the calf in the air by the melon and rostrum (Encounter 3), were also observed. To some



**Figure 3.** Encounter 2 with an Indo-Pacific humpback dolphin carrying a dead calf on its back in Sanniang Bay, Guangxi Province, China (taken from <http://news.hexun.com/2012-07-17/143652838.html>)

extent, the three observations were different in the following aspects: (1) in Encounters 1 and 3, the dolphins seemed jumpy and agitated, and they swam fast; whereas in Encounter 2, the dolphin seemed calm and swam slowly; and (2) all humpback dolphins in Encounter 1 were aggregated in a dense cluster; whereas in Encounters 2 and 3, only the presumed mother dolphins demonstrated persistent epimeletic behaviour towards the dead calves, while other dolphins did not engage in the epimeletic behaviour. These differences may be due to how long the calves had been dead. Since the epimeletic behaviour has a high energetic cost, the presumed mother dolphins might be agitated when their calves were recently deceased; whereas after conducting this behaviour for possibly days at a time, they were tired and swam slowly. Potentially, the presumed mothers might be agitated again when they recovered their strength after feeding and rest. During this time period, other dolphins may have occasionally left and rejoined the mother-calf pair.

The Indo-Pacific humpback dolphins also have exhibited other kinds of epimeletic behaviour. They have been observed giving care and attention

not only towards their own dead calves but also to intraspecific individuals in distress, and even to interspecific individuals. The only reported anecdotal example of care-giving towards an intraspecific individual in distress occurred in Hong Kong waters. A distressed male and other humpback dolphins were observed in a shallow bay near the village of Tai O. The humpback dolphins accompanied the distressed male dolphin for a whole morning until it died and stranded (Parsons, 1998). There are also two interspecific epimeletic behavioural records of humpback dolphins. One of them occurred on 24 March 2012 in Xiamen Bay, Fujian Province, China, when a group of eight humpback dolphins assisted a finless porpoise calf (*Neophocaena phocaenoides sunameri*). The humpback dolphins swam slowly around the porpoise calf in a dense cluster and carried the porpoise calf on their backs to push it out of water for breathing (Wang et al., 2013). Another observation happened on 1 April 2015 in Shantou waters, Guangdong Province, China. A group of approximately ten humpback dolphins carried a dead finless porpoise calf for at least 2 d (Chen, 2015).



**Figure 4.** Encounter 3 with an Indo-Pacific humpback dolphin carrying a dead calf in Sanniang Bay, Guangxi Province, China, with the presumed mother dolphin carrying the dead calf on the back (A), pushing the calf with her melon and rostrum (B), pushing the calf out of water with a high body position (C), and hurling the calf in the air (D). (Photo credit: Dr. Wu Fuxing)

In addition to the three dead calves reported in the present study, another four deceased humpback dolphin newborn calves were collected from Sanniang Bay during the study period—one by Peking University (Pan et al., 2013), one by Guangxi Beibu Gulf Research Institute of Indo-Pacific Humpback Dolphin (Liao Yuan, pers. comm.), and two by Qinzhou University (Wu Haiping, pers. comm.). It is not known why those newborn calves were dead. Although humpback dolphin newborn calves can die during the underwater parturition process (Huang & Liu, 2000), it may be that other extrinsic factors also should be considered when assessing the causes of death of calves. Humpback dolphins in Sanniang Bay face a number of threats, two of which may have led to those calves dying. The first of these is illegal electric fishing, which is common in Sanniang Bay and adjacent waters (local fishermen, pers. comm.), and newborn calves may be more vulnerable to electric fishing as compared to adult dolphins. The second threat is the intensive disturbance from anthropogenic activities such as shipping and boat traffic. The Sanniang Bay is a hotspot area for dolphin watching, with many small high-speed boats being used for dolphin watching in recent years. The boats are configured with a Yamaha outboard motor and can travel at speeds of > 40 km/h (Li et al., 2015). Calves may be directly hit by a boat or a boat could separate the calves from their mothers. Furthermore, the noise levels from those high-speed boats could be sufficiently high enough to cause negative effects on the dolphins such as auditory masking, temporary threshold shifts, and behavioural and physiological responses (Li et al., 2015). Newborn calves cannot live independently; and if separated from their mothers for too long of a duration, they would likely not survive. To protect humpback dolphins in Sanniang Bay while sustainably developing local dolphin-watching tourism, the findings of this paper strongly suggest that local enforcement agencies should strengthen their management of dolphin-watching tourism and illegal fishing activities.

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