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Short Note

Alloparental Care of a Bottlenose and Common Dolphin Calf by a Female Indian Ocean Humpback Dolphin Along the Garden Route, South Africa

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Although behavioural interactions within mixed-species groups are common among cetaceans (Herzing & Johnson, 1997; Acevedo-Gutiérrez et al., 2005; Kamaruzzan & Jaaman, 2013), interspecific alloparental care—especially in the form of adoptions—is rarely observed. Alloparental care is defined as any behaviour by an individual towards non-descendant young that benefits the young (Woodroffe & Vincent, 1994). This can occur through indirect behaviours such as herding and sentinel behaviour or directly through behaviours such as babysitting, provisioning, and adoption (Kleiman & Malcolm, 1981; Lewis & Pusey, 1997). Unlike intraspecific alloparental care, which has been observed in several cetacean species, including Atlantic white-sided dolphins (*Lagenorhynchus acutus*; Simard & Gowans, 2004), sperm whales (*Physeter macrocephalus*; Gero et al., 2009), pilot whales (*Globicephala melas*; Augusto et al., 2016), bottlenose dolphins (*Tursiops aduncus*; Mann & Smuts, 1998; Sakai et al., 2016), killer whales (*Orcinus orca*; Ford et al., 2000), and humpback dolphins (*Sousa plumbea*; Karczmarski et al., 1997), interspecific alloparental care in cetaceans has only been observed and documented in a few cases.

The best-documented case of interspecific alloparental care in cetaceans involves the complete adoption of a melon-headed whale (*Peponocephala electra*) calf by a female common bottlenose dolphin (*Tursiops truncatus*) at Rangiroa atoll, French Polynesia (Carzon et al., 2019). The association between the primiparous female, which had a dependant biological calf when the adoption occurred, and the adoptee continued for 4 years during which time nursing was evident. Interspecific alloparental care has also been observed in Indo-Pacific humpback dolphins (*Sousa chinensis*) on two occasions. In Malaysia, three adults associated with an Irrawaddy dolphin (*Orcaella brevirostris*) calf for 4 days (Kamaruzzan & Jaaman, 2013), while in a separate event in China, a finless porpoise (*Neophocaena phocaenoides*) calf was herded and assisted for 3 hours by eight humpback dolphins (Wang et al., 2013). Such behaviour has been recorded only once off South Africa and involves a single observation of an Indo-Pacific bottlenose dolphin calf swimming with six Indian Ocean humpback dolphins in Algoa Bay (Karczmarski et al., 1997).

Many if not all of these cases of interspecific alloparental care have been relatively brief. Herein, we describe two events of interspecific alloparental care linked to one identified individual female Indian Ocean humpback dolphin. Further, we believe one of these events entails a full-fledged interspecific adoption by Indian Ocean humpback dolphins along South Africa's Garden Route coastline. This phenomenon in which adopted offspring benefit from nurturant behaviors from adoptive "mothers" and are tolerated by all members of the group is exceedingly rare in mammals and has only been observed once before in wild cetaceans (Carzon et al., 2019) and another time in wild, artificially provisioned capuchin monkeys (*Cebus libidinosus*; Izar et al., 2006).

Indian Ocean humpback dolphins have a nearshore distribution within the central and western Indian Ocean, ranging between South Africa and Myanmar, Burma (Karczmarski et al., 1998; Mendez et al., 2013; Jefferson & Rosenbaum,

2014). Off South Africa, they occur along the southern and eastern coasts east of False Bay (Best, 2007), generally in water depths less than 25 m (Karczmarski et al., 2000; Keith et al., 2013; James et al., 2015). Indo-Pacific bottlenose dolphins are sympatric with *S. plumbea* in nearshore waters, and pelagic common dolphins (*Delphinus delphis*) also frequent this region, albeit in more offshore waters.

Interactions between humpback and bottlenose dolphins off South Africa have been observed on limited occasions and generally involve mixed-group associations (Karczmarski et al., 1997; Koper & Plön, 2016). This has also been documented in *S. plumbea* in Tanzania (Stensland et al., 2003), Somalia (Schleyer & Baldwin, 1999), and Oman (Baldwin et al., 2004), and between Australian humpback dolphins (*Sousa sahulensis*) and bottlenose dolphins (Corkeron, 1990). Within these mixed groups, humpback dolphins appear to follow behind the bottlenose dolphins and remain on the fringes in distinct sub-units (Karczmarski et al., 1997; Koper & Plön, 2016). Aggressive interactions between the two species are rare but have been observed (Saayman & Tayler, 1979; Baldwin et al., 2004). Interactions between humpback and common dolphins are unlikely due to differences in habitat use. While there has been one observation of a lone Indian Ocean humpback dolphin swimming with a group of tropical common dolphins (*Delphinus capensis tropicalis*) in Oman (Baldwin et al., 2004), no such interactions have previously been reported along the South African coast.

The observations for this study were made in the coastal waters around Knysna Heads and Plettenberg Bay on South Africa's south coast (Figure 1). This area falls within the Southern Coastal and Shelf Waters of South Africa Important Marine Mammal Area (IMMA), established under the International Union for Conservation of Nature as an important habitat for several cetacean species (https://www.marinemammalhabitat.org/imma-eatlas).

Monthly boat-based surveys for humpback and bottlenose dolphins were conducted from the western border of Goukamma Marine Protected Area (MPA) to the eastern border of Tsitsikamma MPA between March 2014 and June 2015 (n = 129) (for details, see Bouveroux et al., 2019), and from the point of Robberg Peninsula to the western boundary of Tsitsikamma MPA between June 2018 and February 2020 (n = 75). An opportunistic land-based sighting from Robberg Beach, Plettenberg Bay, was also made on 27 June 2020.

The first event consisted of two separate observations on 12 June 2014 (Figure 2). The first was in the morning (at 0904 h) in which five Indian Ocean humpback dolphins were encountered near the Knysna Heads. Within the group, an identifiable *S. plumbea* female named "Michelle" was observed swimming with her presumed biological offspring as well as a bottlenose dolphin calf (Figure 2a). The *T. aduncus* calf followed Michelle continuously during the 20-min encounter. At midday, a group of 12 humpback dolphins was encountered in Buffalo Bay where Michelle was again seen with her own calf and the *T. aduncus* calf (Figure 2b). Faint foetal folds on the *T. aduncus* calf support that it was approximately 1 month old. On 11 July 2014, Michelle was observed again, this time in Plettenberg Bay, with her own calf but without the *T. aduncus* calf, which was not seen again.

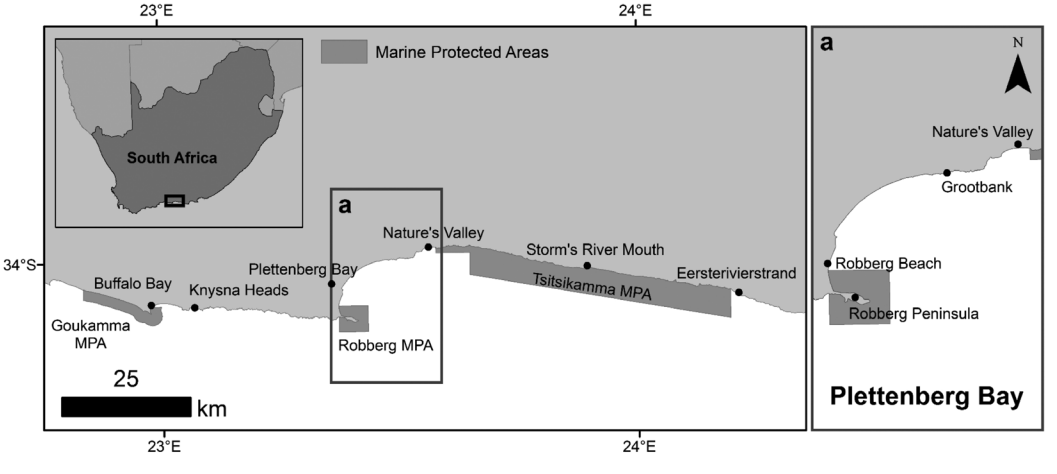

Figure 1. Map detailing the study area along the south coast of South Africa, with a closer view of Plettenberg Bay on the right (a)

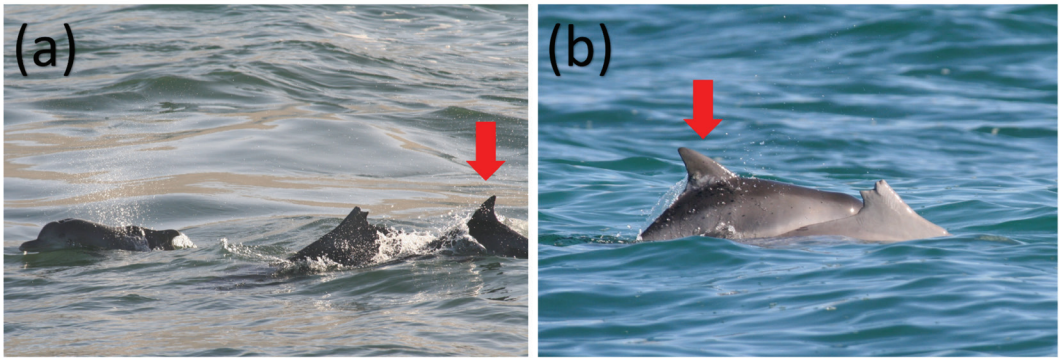

Figure 2. *Tursiops aduncus* calf (below arrow) swimming in echelon with foster *Sousa plumbea* mother, Michelle, and her biological calf at 0904 h (a) and 1221 h (b) on 12 June 2014 (*Photo credit:* Danielle Conry)

The second event consisted of three separate observations between January and June 2020 (Figure 3). After numerous sightings of Michelle in 2018 without a biological calf, she was sighted with a new calf, presumed to be her own, at Robberg Peninsula on 11 April 2019. The pair were subsequently seen in Plettenberg Bay on multiple occasions throughout 2019. On 27 January 2020, a group of seven Indian Ocean humpback dolphins were encountered near Grootbank on the north-eastern side of Plettenberg Bay (Figure 1a). Here, Michelle and her calf were observed with a young common dolphin calf, which frequently surfaced alongside them but also swam with other members of the group (Figure 3a). Faint foetal folds indicated the *D. delphis* calf to be about a month old, and it remained with the humpback dolphins for the duration of the 26-min encounter. On 25 February 2020, the *D. delphis* calf was again seen with a group of humpback dolphins, including Michelle and her calf, within Plettenberg Bay (Figure 3b). Shortly thereafter, all surveys were discontinued due to COVID-19 lockdown, but on 27 June 2020, the *D. delphis* calf was observed from shore in good condition with a group of humpback dolphins travelling adjacent to Robberg Beach (Figure 3c). It is unclear whether Michelle was present during the encounter, but a humpback dolphin calf was recorded, indicating the presence of an adult female.

While these two separate events represent interspecific alloparental care by an identifiable, adult female *S. plumbea* foster, we contend that the second is most likely an adoption event. The first was observed over a period of only 1 day, and the second over a period of 6 months. It is also unknown whether the second association has ended. While the *D. delphis* calf had no identifiable notches for subsequent identification, the rarity of such an event supports the assumption that it was the same calf and not multiple associations with different *D. delphis* calves. The presence of the calves that are suspected to be adopted cannot be explained by hybridization. Although hybridization between bottlenose and humpback dolphins has been suggested off South Africa (Koper & Plön, 2016), the calves observed displayed no intermediate morphology, and the presence of biological calves during both events refutes hybridization.

It is reasonable to assume that the *T. aduncus* and *D. delphis* calves became separated from their biological mothers and encountered the humpback dolphins fortuitously. Given the sympatric nature of humpback and bottlenose dolphins, such a chance encounter is not unlikely. However, the difference in habitat use between humpback and common dolphins makes such an encounter extremely rare. A lack of aggressive behaviour towards the calves and echelon swimming were observed during both events. Echelon swimming is suggested to be energetically costly to an adult while providing an energetic benefit to a calf (Norris & Prescott, 1961; Brodie, 1977; Haenel, 1986). Furthermore, in Atlantic spotted dolphins (*Stenella frontalis*), it has only been observed during "babysitting" events (Simard & Gowans, 2004). This behaviour is, therefore, likely to indicate alloparental care in both events. In the second event, the protracted association with the common dolphin calf with evidence of nursing, which is energetically costly, supports an adoption event. It is possible that the first event was also an adoption; however, without evidence of nursing, it cannot conclusively be classified as such.

Interspecific adoptions remain poorly documented, and their proximate causes are debatable. An increase in inclusive fitness via shared genes or improved future reproductive success because

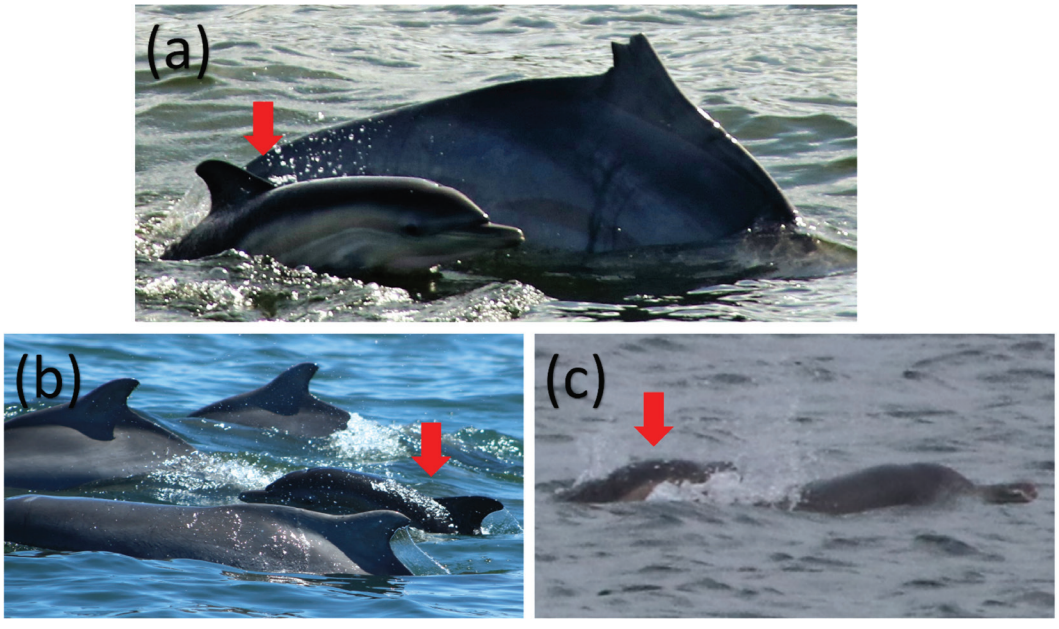

Figure 3. Presumed adopted *D. delphis* (below arrow) swimming in echelon alongside Michelle on 27 January 2020 (a) and observed again with humpback dolphins, including Michelle and her biological calf, on 25 February 2020 (b). It was last seen swimming with humpback dolphins on 27 June 2020 during an opportunistic land-based encounter along Robberg Beach. (*Photo credits:* Danielle Conry [a], Claire Marr [b], and Gwenith Penry [c])

of pre-parental training are two adaptive theories often proposed to explain alloparental care and adoptions (Riedman, 1982; Roulin, 2002). However, as there are no shared genes between the *S. plumbea* foster and the *T. aduncus* and *D. delphis* calves, and the *S. plumbea* foster already had biological offspring in both cases, these theories do not explain the described events.

Non-adaptive factors such as inexperience and natural attraction towards an infant have also been suggested to explain such behaviour (Roulin, 2002; Dunham & Opere, 2016). It is unknown whether the events described herein were initiated by the suspected adoptees or by the humpback dolphins; however, the number of accounts of interspecific alloparental care in humpback dolphins (Karczmarski et al., 1997; Kamaruzzan & Jaaman, 2013; Wang et al., 2013) support that this genus (*Sousa*), or at least *S. plumbea* and *S. chinensis*, may be inclined to such behaviour. While drafting this short note, another observation of a neonate *D. delphis* calf with a group of *S. plumbea* was reported from Mossel Bay, 114 km to the east of Plettenberg Bay (T. Gridley & S. Dines, pers. comm., 30 March 2021). The association of both the *T. aduncus* and *D. delphis* calves to Michelle may indicate she initiated the adoptions or was more receptive than other adult females in the group to unrelated calves. This could be due to an individual personality trait or trauma from the loss of a previous calf. In Carzon et al. (2019), inexperience and personality were believed to contribute to the adoption event described. Additionally, most adoptions are by females who have infants or are pregnant (Riedman, 1982; Roulin, 2002). The release of oxytocin while nursing a biological calf may facilitate adoption and bonding with a non-descendant calf (Nelson & Panskepp, 1998). Given the frequency of adoption events associated with Michelle, it is also possible that she could be stealing calves. We can only speculate on the causes behind the observed alloparental care and adoption, and we acknowledge that our interpretation of the observed events is not the only interpretation possible, but observations of such novel behaviour are important to ultimately understand the mechanisms driving this non-adaptive behaviour, especially given the apparent energetic cost to the foster with no obvious genetic or survival profit.

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