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Two Calves in Echelon: An Alloparental Association in Atlantic White-Sided Dolphins (*Lagenorhynchus acutus*)?

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Abstract

Cetacean calves routinely swim in echelon position with their mothers and occasionally with other individuals. In August 2002, we observed an adult Atlantic white-sided dolphin (*Lagenorhynchus acutus*) swimming with two calves in echelon position, one on each side, three times over a 90-min period. Four possible explanations for this behaviour are considered: (1) twins, (2) chance association, (3) alloparental association in the form of "babysitting," or (4) adoption. We believe that it is unlikely that this behaviour can be explained by chance or twins; therefore, we believe it represents alloparental association. The presence of a dead lactating female in the area five days before the observation lends support for the adoption hypothesis to explain this unusual observation.

Key Words: Atlantic white-sided dolphin, adoption, *Lagenorhynchus acutus*, calf, alloparental association, babysitting

Introduction

Alloparental care, or the provision of care to offspring which are not one's own, has been documented in a variety of animals (see Riedman, 1982, for a review) and suggested in many odontocete species (e.g., Andersen, 1969; Ridgway et al., 1995; Whitehead, 1996). Alloparental care, especially allonursing and adoption, appear nonselective, but they can be explained through processes such as kin selection, reciprocal altruism, or reproductive error (where the caregiver is unaware that its care is directed to offspring which are not its own (Andersson & Eriksson, 1982; Riedman, 1982; Roulin, 2002). Specific benefits of alloparental care include increased maternal foraging efficiency and decreased predation (Arnbom et al., 1987; Mann & Smuts, 1998; Riedman, 1982; Whitehead, 1996).

In general, alloparental care is difficult to observe and quantify in cetaceans because most cetaceans spend only a fraction of their lives at the surface where their behaviour can be observed. Therefore, many observations of alloparental care come from captive animals (e.g., Ridgway et al., 1995; Smolders, 1988). Examples of alloparental care from wild populations tend to be anecdotal because it is difficult to determine the costs to the alloparent and benefits to mothers and offspring.

Even so, cetacean calves often are observed in association (close proximity) with nonparents (Mann & Smuts, 1999; Waite, 1988; Whitehead, 1996). While it may be difficult to assess the type and quality of care being provided to the calves, or to determine whether adults or calves initiate the association, these associations may be important to the successful rearing of offspring. We, therefore, propose the term "alloparental association" to describe associations between adult and young non-offspring animals where a degree of care is likely but not measurable. Here, we describe an unusual case where two Atlantic white-sided dolphin calves (*Lagenorhynchus acutus*) were seen swimming in echelon position (as defined by Mann & Smuts, 1999), one on each side of an adult (hereafter referred to as "double echelon"). We attempt to interpret this observation, considering that it may represent a chance event, twinning, or an alloparental association (potentially as "babysitting" or adoption behaviour).

Materials and Methods

The sighting occurred in St. Margaret's Bay, near Halifax, Nova Scotia, Canada (Figure 1) during an ongoing study on white-sided and white-beaked dolphins (*L. albirostris*). White-sided dolphins are a common coastal species in the area and are seen from July to October annually. Group size averages 41.3 (± 3.8 SE; range, 3-250; n = 95; observations from 1997-2003) individuals. Calves are seen throughout that time (24 groups with calves; observations from 1997-2003), and calves with fetal folds have been observed in July and early August. In all previous observations, only one calf

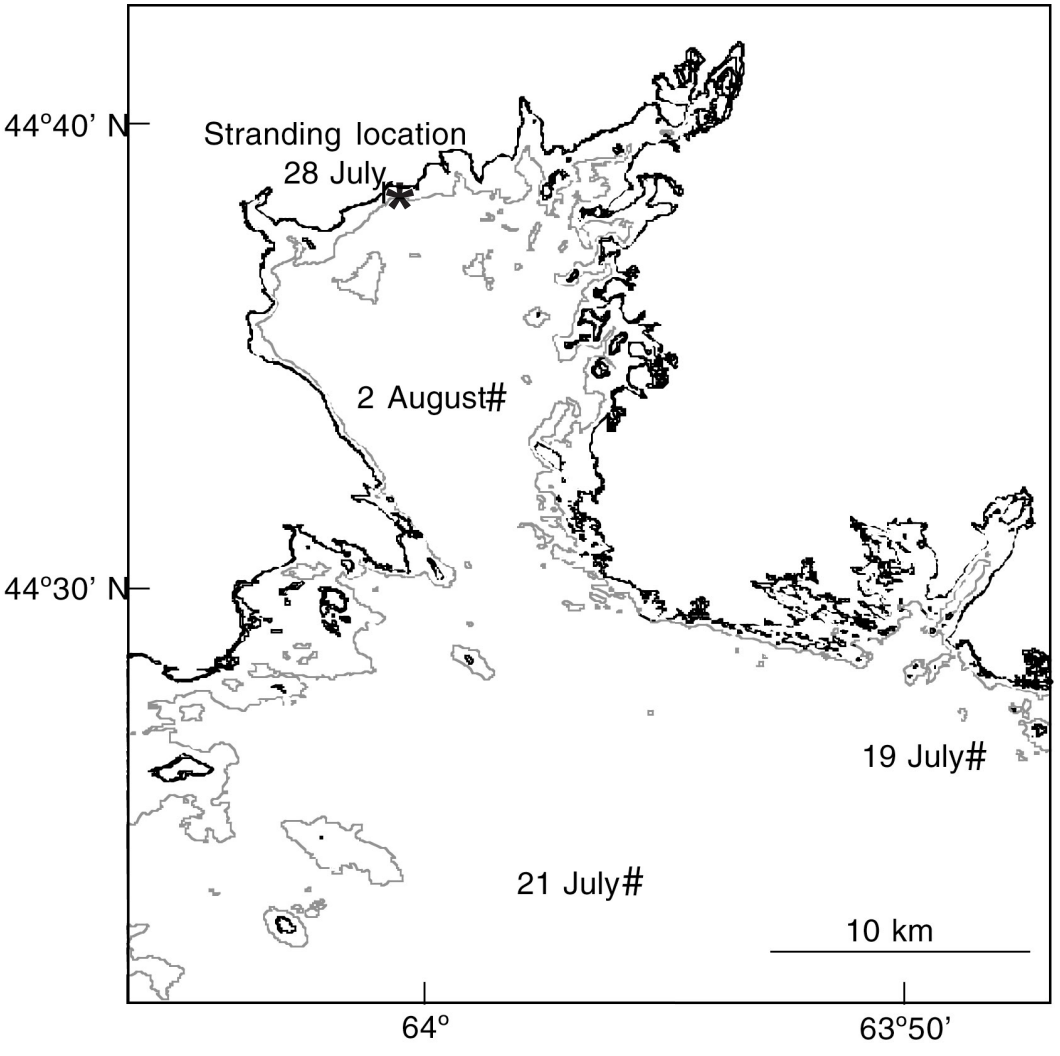

Figure 1. Observations of "double echelon" behaviour occurred on 2 August 2002 (#) near Halifax, Nova Scotia, Canada. Individuals observed in the same group were also photographed previously on 19 July and 21 July (#). On 28 July, a dead lactating female stranded (*) in the area, 8.4 km away from the observations of "double echelon" behaviour.

had been observed in echelon position with an adult at a time (pers. obs).

Results

On 2 August 2002, during a photo-identification boat survey, a group of 20 Atlantic white-sided dolphins, including three calves, were encountered at 44º 34.2' N, 63º 58.5' W (Figure 1). The group consisted of several subgroups which routinely fused and fissioned. The group often was spread out over an area approximately 500 m^2, never in a single, concentrated pod. The group did remain relatively stationary throughout the entire encounter, however. During the 90-min encounter, an adult dolphin was seen with two calves in "double echelon" position on three separate occasions. Both calves were estimated to be the same size (1.2-1.5 m long) and remained in "double echelon" position despite frequent direction changes; all three animals displayed a well-synchronized breathing pattern. Each time the three animals were noted, between two and three surfacings were seen. While the trio changed directions throughout the encounter, these movements did not appear erratic, nor was there any evidence of hostility or evasion among them. Although photo-identification attempts were unsuccessful,

it is very likely that they were the same three dolphins because their behaviour and our estimates of their size did not vary throughout the encounters. Furthermore, only one other calf was present in this group, and it remained associated with another adult. The waters in the area were turbid, precluding any observation of underwater behaviours. Unfortunately, the observations took part on the last field day of the 2002 season, and the persistence of this association remains unknown.

Discussion

"Double echelon" position has been observed in free-ranging Indo-Pacific bottlenose dolphins (*Tursiops aduncus*),[1] dusky dolphins (*L. obscurus*),[2] and Atlantic spotted dolphins (*Stenella frontalis*),[3] but is not a common behaviour. Even in captivity, the behaviour is rarely reported. "Double echelon" has been reported on one occasion in captive bottlenose dolphins (*T. truncatus*).[4] We believe there are several potential explanations for our observation of the "double echelon" position: chance event, twinning, and an alloparental association. The latter could involve care in the form of babysitting or adoption.

For these observations to be chance, a calf would have to accidentally swim into echelon position with an adult who already had a similar sized calf in echelon position. The probability of this occurring is low because the dolphins were widely spaced during the encounter, and even in very coherent groups, "double echelon" position has not been previously seen. Furthermore, the "double echelon" position was maintained for several surfacings on three separate occasions. Echelon position, even for a single calf, has been suggested to be an energetic expense for the adult (Haenel, 1986; Waite, 1988) and, therefore, not likely to occur consistently by accident.

It is also unlikely that the adult in the trio had given birth to twins. Twinning is extremely rare in cetaceans, with most examples being found *in utero*, and has not been reported in any *Lagenorhynchus* species (Perrin & Donovan, 1984). While it was originally suggested that a single set of killer whale (*Orcinus orca*) twins had been born in the wild off Vancouver Island (Olesiuk et al., 1990), subsequent genetic analysis of the individuals indicated that this was unlikely and, instead, some form of adoption may have occurred (Ford et al., 2000).[5]

With the exclusion of the two previous explanations, it is reasonable to conclude that our observation represents an alloparental association. This may have included care for the young from the adult and, hence, may represent alloparental care as babysitting or orphan care.

Alloparental association has been reported in a variety of odontocetes (Andersen, 1969; Best, 1979; Heimlich-Boran, 1986; Johnson & Norris, 1994; Mann & Smuts, 1998; Waite, 1988). Although alloparental association has not been reported previously in Atlantic white-sided dolphins, it is likely to occur given its frequency within odontocetes.

Alloparental care, where nonparents alter their behaviour to provide benefits to mothers or their young at some cost to themselves, has only rarely been documented in free-ranging cetaceans (e.g., Constantine, 2002; Whitehead, 1996). Swimming with a single calf in echelon position has been suggested to be energetically expensive to the adult and to confer an energetic advantage to the calf (Brodie, 1977; Haenel, 1986; Norris & Prescott, 1961; Waite, 1988). If this is the case, alloparental care is suggested by alloparental association in the echelon position and our observation likely represents some form of alloparental care. Observations in Atlantic spotted dolphins support the argument that swimming in "double echelon" position is a form of alloparental care, as this behaviour has only been observed in "babysitting" situations[6]; however, because we could not determine which individuals (calves or adult) were responsible for initiating or maintaining the "double echelon" position in our observation, it is difficult to determine who were the actors or recipients of this behaviour.

Another possibility is that the alloparental association observed is an example of adoption. Adoption has been well-documented in captive bottlenose dolphins (Gaspar et al., 2000; Kastelein et al., 1990;

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Ridgway et al., 1995; Shannon-Rodriquez et al., 2001; Smolders, 1988).[7] Adoption also has been suggested in free-ranging bottlenose dolphins (Constantine, 2002), Indo-Pacific bottlenose dolphins,[8] Atlantic spotted dolphins (Herzing & Johnson, 1997), humpback dolphins (*Sousa chinensis*) (Karczmarski et al., 1997), and killer whales (Ford et al., 2000). For mothers who already have their own dependent calf, adopting a second calf is unlikely to occur; although it has been documented in captive bottlenose dolphins (Smolders, 1988)[9] and suggested in free-ranging killer whales (Ford et al., 2000).[10]

In our observation, it is likely that an orphaned calf of nursing age (0-18 months according to Reeves et al., 1999) was in the area, as a lactating female stranded on 28 July, five days before and 8.4 km from our observation (Figure 1). Residents near the stranding site reported a calf swimming just offshore of the stranded dolphin. A necropsy suggested that the female was in the late stages of lactation and likely died as the result of a boat strike.[11] The calves in "double echelon" position were likely of nursing age, as they were estimated at 1.2-1.5 m long (birth length is 1.08-1.5 m according to Reeves et al., 1999). Although we were not able to identify any of the individuals in the trio, analysis of photo-identification data indicated that some of the same individuals present during this observation had been observed in the area before the stranding occurred (Figure 1). Calves were present in these groups; however, the double echelon behaviour was not observed until after the stranding (unpublished data).

In general, alloparental association and adoption are more common in social species with strong bonds between individuals or when groups are composed of related individuals (Riedman, 1982), and this appears to be true in cetaceans as well (Mann & Smuts, 1998, 1999; Ridgway et al., 1995; Whitehead, 1996). Little is known about social organization in white-sided dolphins other than they are routinely found in groups (Reeves et al., 1999; Weinrich et al., 2001) and have a tendency to mass strand (Rogan et al., 1997; Sergeant et al., 1980; St. Aubin & Geraci, 1979), which may indicate that individuals have long-term bonds (Sergeant, 1982). Additionally, preliminary analyses of photo-identification data indicate that individuals are often resighted with the same associates in this area (unpublished data).

"Double echelon" position is rare in cetaceans and has never before been documented in Atlantic white-sided dolphins. This observation likely represents alloparental association and may even represent alloparental care or adoption; however, as only a single observation has been made, the frequency of this behaviour may be low.

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