

Male–Male Sexual Interactions Between an Adult and a Calf Killer Whale (*Orcinus orca*) of the Falkland Islands

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Same-sex behaviour has been documented in a wide range of animal taxa (mammals: reviewed in Dagg, 1984; birds: reviewed in MacFarlane et al., 2006) and is a common feature of social species (Poiani & Dixson, 2010). The functional and evolutionary significance of same-sex behaviour in animals is uncertain (Monk et al., 2019). Same-sex behaviour can be used to promote social bonds between same-sex individuals, to maintain dominant/subordinate relationships without aggression or to promote reconciliation after it, and to improve reproductive skills of young individuals, or it can be a simple byproduct of sexual drive or arousal (reviewed in Bailey & Zuk, 2009). The presence and frequency of same-sex behaviours are related to a species' life history (Poiani & Dixson, 2010), to their social and mating systems (MacFarlane et al., 2006), and to their level of parental care (MacFarlane et al., 2010).

In most marine mammal species, information about male–male sexual behaviour is rather scarce, although male–male mounting and mating attempts have been observed in various species of pinnipeds. A well-documented example is the northern elephant seal (*Mirounga angustirostris*) in which male–male mounting is very rare among breeding individuals, but males frequently attempt to copulate with weaned pups or yearlings of both sexes, and male–male mounting is very common among moulting or resting juveniles (Le Boeuf, 1972; Rose et al., 1991). In cetaceans, male–male behaviour is probably related mostly to the establishment and maintenance of social bonds in analogy to what happens in various primate species that have complex social systems with long-term bonds among related individuals (Furuichi et al., 2014).

The presence of male–male sexual behaviours in cetaceans is supported mostly by anecdotal evidence (reviewed in Bagemihl, 1999), single event observations (D'Agostino et al., 2017), or very small sample sizes (Pack et al., 2002), with the notable exception of bottlenose dolphins (*Tursiops* spp.) for which male–male sexual behaviours happen at high frequency and

have been extensively studied (Connor et al., 2000; Mann, 2006; Furuichi et al., 2014). In resident killer whales (*Orcinus orca*) of British Columbia, male–male social interactions happen more frequently between adolescent non-related individuals, usually involve body contact, are usually reciprocated, and show components of both play and sexual behaviour, but rarely include penis extrusion/erection (Rose, 1992). To our best knowledge, there is no description of occurrences of male–male sexual behaviours between killer whale adults and calves in the scientific literature.

On 21 November 2018, we observed a series of bidirectional sexual interactions that involved one adult male killer whale and one male calf. We made our observation at Sea Lion Island (SLI hereafter; 52° 26' S, 59° 05' W), the southernmost inhabited island of the Falkland Islands, which is regularly visited by killer whales (see Elephant Seal Research Group website: www.eleseal.org). The observation was carried out by three observers: one taking notes about killer whale identity, location, and activity; one flying an unmanned aerial vehicle (UAV; Mavic Pro Platinum, DJI); and one taking digital photos and videos of the killer whales from land (Olympus EM-10 Mark III, 75–300 mm lens, RAW format) and communicating by radio to the UAV pilot the killer whale's identity and behaviour as observed from land. We validated the visual killer whale identifications by comparing photos of saddle patch and dorsal fin to an established photographic killer whale catalogue (see www.eleseal.org/KW_SLI_catalogue.pdf). Due to the small number of killer whales observed at SLI (~40 individuals), individual identification was fully reliable. We operated the UAV at variable altitudes above the killer whales (10 to 40 m) in full compliance with local regulations and under a specific research license (R16/2017, Environmental Officer, Falkland Islands Government; see Galimberti & Sanvito, 2020, for details about UAV protocol). The UAV pilot recorded audio comments on identity, activity, and behaviour of the killer whales as observed from the UAV. We processed the UAV video footage in

video editing software (*Adobe Premiere 2020*) and synchronized it with the recorded audio notes. We reviewed the UAV video, the video and photos taken from land, and the audio notes to produce a full transcript of the observation. All killer whales involved in the observation were identified, and some have been regular visitors of SLI at least since 2004 (see photo-identification catalogue link above).

The observation of male–male sexual behaviours that we describe was part of a longer observation that began at 13:43:35 (local time) on the south coast of SLI and involved three killer whale pods (two comprised of females and calves; one of males only) and one isolated male (13 individuals total). One of these pods (comprised of five individuals—one female with one calf, plus one female with two calves) left the area before the beginning of the sexual interactions described herein. Thus, it is not included in the following description. The part of the observation that we describe began at 18:58:09 on the north coast of SLI and ended at 20:39:40 when light was too low to take UAV videos and all operators left the area. The killer whales were in shallow water at close distance (5 to 50 m) from a sand beach. During the entire observation, they moved back and forth, generally very slowly, in the same area (along less than 1 km of coastline).

The first UAV flight began at 19:10:49, and we conducted three consecutive flights (apart from short pauses between one flight and the next), the last of which ended at 20:32:42. For this period, we have continuous video from the UAV, though not all video was of the adult male and calf killer whales engaging in same-sex behaviours. For about 14 min, the UAV followed another adult male (“PN”; see below) that was present in the area to check whether he also engaged in this kind of sexual behaviour; this did not occur. The UAV pilot opportunistically chose the adult male that showed same-sex behaviours as the focal animal because he is an individual that visits SLI only occasionally. The observation from land was continuous for the entire time the killer whales were in view.

During the male–male sexual behaviour observation, eight killer whales were in the area: (1) a pod of five killer whales regularly observed at SLI (PU pod) comprising a mature female (“PU”: identified first time in 2004, seen last time in 2021) and her four calves (“TA”: female, identified first time in 2010, now mature female, gave birth first time in 2021; “NE”: probably female from morphology, identified first time in 2013 but not newborn that year; “PI”: male, born 2014, age 4; “MI”: sex unknown, born 2017, age 1); (2) two adult males usually observed together (PN pod; PN: very large male, identified first time in 2004;

and “TO”: much smaller, identified first time in 2013, regularly observed at SLI); and (3) one solitary adult male (“OV”: very large male, identified first time in 2015 and occasionally observed at SLI, usually alone).

For most of the observation, the three males showed different behaviours. The largest and likely oldest of the males, PN, spent most of the time alone, often resting, apparently lying on the sandy bottom, and for only a portion of the time slowly following the PU pod but without interacting with them nor with the other two males. The smallest of the males, TO, was almost constantly associated with the PU pod but did not show any sexual behaviour towards the females and/or the calves. The last male, OV, did not interact with the other two males and showed particular interest in one of the male calves (PI), exhibiting same-sex behaviours towards him and being reciprocated with sexual behaviours by him. Both OV and PI showed bouts of swimming side-to-side or belly-to-belly (often with one animal swimming belly up under the other), often inverting the roles and sometimes with a penis erect (Figures 1 & 2). On one occasion, PI swam belly up with an erect penis (for a few seconds) under NE. We observed no sexual behaviours between the adult males, and OV in particular, and the adult female (PU) or the oldest of the female calves (TA).

The behavioural interaction between OV and PI was documented on video by the UAV (video footage and a more detailed description of this event are available in the “Supplemental Material” section of the *Aquatic Mammals* website: https://www.aquaticmammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147). The main behaviours exhibited by these two males during this interaction are summarized below:

1. OV showed clear sexual behaviours (e.g., penis erection) only when swimming together with PI at close distance (~1 to 10 m) or in contact with him.
2. OV showed no sexual behaviour towards the adult female of the pod (PU), the largest female calf (TA), the other female calf (NE), the younger (unknown sex) calf (MI), nor the other males (PN and TO).
3. Although OV and NE were seen together at close distance (~1 to 10 m), they did not show any significant social interaction.
4. During the observation, PI interacted with NE, and he once swam under NE with an erect penis. This happened between different bouts of sociosexual interactions with OV.



Figure 1. Penis erection by adult male OV with PI above him (image taken from UAV footage)

5. Aside from a very brief erect penis towards NE, PI showed sexual behaviours only towards OV.
6. PI showed no sexual behaviour towards TO or PN who were regular male visitors of SLI, while OV is an occasional visitor.
7. There were at least two occasions when PI displayed an erection while close to OV, and two occasions when OV alone displayed an erection while close to PI. There was also one occasion when both had erect penises—one shortly after the other. These are minimum estimates because those two individuals were not in the UAV footage for the entire observation (see above). There were also two occasions when PI and TO swam in close contact, belly-to-belly, one under the other, and penises were not visible due to their positions or water turbidity.
8. Although we observed erect penises, and the two killer whales swam belly-to-belly, we did not observe intromission by either male into the genital slit of the other.
9. There was no aggressive component observed between OV and PI apart from short chases (following at high speed) with no clear aggression and no sign of sexual harassment or sexual coercion. All sexual behaviours were reciprocated. Moreover, notwithstanding the presence of potentially breeding males and females, no actual breeding behaviour was observed.

Our observation of these two males interacting with each other sexually showed some aspects of same-sex behaviours similar to previous reports in other cetaceans, but they also showed peculiarities. For example, in bottlenose dolphins that show male alliances, the asymmetry in same-sex sociosexual interaction rates is the product of a strong preferential association among specific male–male pairs (Botero Acosta, 2015); and in our observation, there was a clear preferential association between OV and PI, even though potential breeding partners for OV were present. Moreover, juveniles are often the most involved in sociosexual interactions by bottlenose dolphins (Botero Acosta, 2015) and cetaceans in general (Connor et al., 2000), but they usually show a preference for other juveniles, not adults, as in our case. Male–male sociosexual



Figure 2. Penis erection by male calf PI while he and adult male OV were swimming belly-to-belly (image taken from UAV footage)

behaviour has been reported in resident killer whales of British Columbia but involved mostly adolescent males, and erections were very rare (Rose, 1992). To our best knowledge, same-sex behaviours between male adults and calves have not been reported before among killer whales and are rare for cetaceans at large. Previous reports of male–male sexual behaviour included non-calf individuals and involved an aggressive/dominance component (humpback whale [*Megaptera novae-angliae*]; Pack et al., 2002) or were cases of sexual coercion in which the calf did not reciprocate the sexual behaviour (southern right whale [*Eubalaena australis*]; D’Agostino et al., 2017). During our observation, no overt aggression or coercion was observed, and the younger individual fully reciprocated the sexual behaviour of the older one.

Rose (1992) reports just two cases of penis erections in an extensive field study of the resident killer whales of British Columbia, none of which involved an adult male. Although the frequency of occurrence of same-sex behaviour in the killer whales that visit SLI is unknown, we carried out intensive observations (including UAV flights) of killer whales for many years (2013 to 2022), and the event reported here is the only case in which

we observed same-sex behaviour and erect penises between adults and calves. The context of the event was somehow peculiar because many killer whales were present. The killer whales of SLI are mammal-eating individuals, regularly observed only during and immediately after the southern elephant seal (*Mirounga leonina*) breeding season; their main prey are elephant seal weanlings (Yates et al., 2007; own unpub. data, 2013–2021). Mammal-eating killer whale groups are size constrained due to energy requirements (Baird & Dill, 1996), and, in fact, SLI killer whales are usually observed in small family groups (own unpub. data, 2013–2021). During this event, there were various males, and one of them (OV) was an individual that is rarely observed and is not regularly associated with any of the other killer whales. This new social situation may have generated a high level of social/sexual arousal in the younger individuals; and for PI in particular, this facilitated the observed unusual sociosexual behaviour shown by him. It has been suggested that for cetaceans, same-sex behaviours may be more frequent among kin individuals (Connor et al., 2000; Furuichi et al., 2014), although the contrary is apparently happening in British Columbia resident killer whales (Rose,

1992). Although no genetic data are available for SLI killer whales, due to his irregular pattern of presence, OV is an unlikely candidate for the role of PI kin.

From a practical point of view, our observation confirms that UAV footage can greatly increase the understanding of cetacean behaviour (Torres et al., 2018) because the sequence of same-sex behaviours that we described were not seen by the land observers, notwithstanding the very short distance between them and the killer whales (max. 250 m) and their extensive experience of killer whale behaviour. The UAV is a game changer with respect to allowing observations of cetacean social behaviour as this observation would not have been possible without the UAV footage.

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