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ANIMAL SCIENCE

Killer whale predation on an Antarctic minke whale in the northern Antarctic Peninsula

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Abstract: We describe the seldom observed event of a group of type A killer whale (*Orcinus orca*) predating on an Antarctic minke whale (*Balaenoptera bonaerensis*) in austral summer 2019. A pod of 11-13 individuals was observed – and documented by photographs and video – as they killed and fed on the minke whale in the Bransfield Strait, northern Antarctic Peninsula. The pod was being observed for about one hour, when some killer whale's individuals were noticed to be performing hunting behaviour. This lasted about 10 minutes, at the end of which the minke whale was killed. Three different species of seabirds were observed feeding on the minke carcass. A video of the encounter is provided.

Key words: *Balaenoptera bonaerensis*, *Orcinus orca*, Predator, Southern Ocean, Type A killer whale diet.

Killer whale (*Orcinus orca*) is a cosmopolitan species with a carnivorous diet (Ford 2019). At present, there are five ecotypes of killer whales described in the Southern Ocean: A, B1, B2, C, and D, which are classified based on their size, pigmentation patterns, diet, and genetics (Pitman & Ensor 2003, Morin et al. 2010, Pitman et al. 2020a). The sympatric forms B1 and B2 are differentiated from the others concerning physical (size and pigmentation) and ecological (diet) aspects (Durban et al. 2017). Type B1 hunting behaviour and prey-selectivity in the Antarctic Peninsula have been described by a few authors and reports mostly include hunting of phocids on ice floes, occasionally penguins and rarely baleen whales (Smith et al. 1981, Visser et al. 2008, Pitman & Durban 2012). The diet from Type B2 can include Patagonian toothfish (*Dissostichus eleginoides*) (Pitman & Durban 2010, Tixier et al. 2019; Towers et al. 2019), other fish and squid (Pitman et al. 2020b), pygoscelid penguins (Pitman & Durban 2010), and does not seem to include marine mammals (Durban et al. 2017). Type C killer whales have been reported to feed on fish in the Ross Sea (Pitman et al. 2018). Type D individuals are the least known, but their diet seems to include demersal fish including Patagonian toothfish (Pitman et al. 2020a). As for type A individuals, there is also limited information available, but a few reports suggest potential migrations in pursuit of Antarctic minke whales (*Balaenoptera bonaerensis*), Arnoux's beaked whales (*Berardius arnuxii*), and southern elephant seals (*Mirounga leonina*) (Pitman & Ensor 2003, Fearnbach et al. 2019). Type A individuals have been recorded attacking and killing Antarctic minke whales in the Gerlache Strait, Antarctica, with images available from the BBC tv series Frozen Planet (2011) and some descriptions by Berlowitz & Fothergill (2011).

On the 30th January 2019, a pod of type A killer whales was sighted at 63.06°S and 58.78°W (185 m water depth) during a line transect survey for cetacean distribution and abundance in the Bransfield Strait as part of research activities of the Brazilian Antarctic Program. We based the identification of the ecotype on external characteristics as the lack of a visible dorsal cape and the size and oval and elongated eyepatches (Pitman & Ensor 2003) (Figure 1 and video footage in Additional File, available at https://mega.nz/folder/VjMhka6I#7KJGqj2xcguvIIbVQIXwdA). The individuals were divided into two sub-groups, one composed of an adult male and three females or large juveniles, and the other group consisted of two adult males and another five to seven females or large juveniles. The effort was halted, and the sub-groups were approached for the collection of photo-identification data (using a Nikon D300 digital camera with 80-400 mm lens).

The killer whales were photographed from about 200-300 m for about 40 minutes with no signs of hunting behaviour. After the collection of photo-identification data, the vessel started to move away from the pod and, suddenly, two animals were sighted performing hunting behaviour (speeding and displaying porpoising movements); after 8-12 minutes, likely a juvenile (judged by the estimated length, 5-6 meters, in comparison to the sizes of the killer whales; Durban et al. 2021) Antarctic minke whale was observed porpoising out of the water and swimming fast as the animal was chased by two killer whales. The minke whale was hit out of the water by a killer whale three times, knocked out of the water on all occasions (Fig. 2). This tactic seems to be common during predation of large cetaceans, including minke whales (Jefferson et al. 1991, Ford et al. 2005, Ford & Reeves 2008; Samarra et al. 2018). After the last hit, the minke whale was not observed at the surface again and the killer whales kept diving around the attack area. The blubber odour, oil slick and bits of tissue at the surface were used as clues to assume that the whale was dead (Pitman & Durban 2012). Based on the size of the dorsal fin, the attack was performed by females or juvenile males' killer whales of the bigger sub-group - different from the role of males in fatal attacks

Figure 1. Some of the Type A killer whales of the pod observed predating on an Antarctic minke whale in Antarctica in austral summer 2019.

as reported in other occasions (e.g. Pitman et al. 2023). However, after the attack, the sub-groups got together to feed on the carcass, including the males.

Just after the attack, some individuals of four seabird species were observed associated with the killer whales. Among these seabird species, southern giant petrels (*Macronectes giganteus*) (2 individuals) - including one white morph individual, snow petrel (*Pagodrama nivea*) (1-2 individuals), Wilson's storm petrels (*Oceanites oceanicus*) (1-3 individuals), and Cape petrels (*Daption capense*) (3-5 individuals) were observed. Some of them fed on the prey scraps, chasing each other on some occasions. A killer whale swam off with a large prey scrap that a giant petrel had been feeding on.

The encounter lasted approximately one hour, including the approximately 10 minutes of killer whales observed hunting behaviour. The attack and killing lasted nearly one minute and it took another 10 minutes for the killer whales to feed on the carcass. From there, as the weather conditions started to deteriorate, the vessel resumed its route. The pictures obtained were included in the Antarctic killer whale photo-identification catalogue to look for potential further information related to the individuals of the pod. Matches were found for ten individuals, for which previous records go back up to 2009 and include other sightings in the Bransfield

Figure 2. Antarctic minke whale being rammed and knocked out of the water by a killer whale. This sequence (a-c) is taken from the footage recorded during the attack registered in Antarctica in austral summer 2019 (Additional File available at https://mega.nz/folder/VjMhka6I#7KJGqj2xcguvIIbVQIXwdA).

Strait, and in the Gerlache Strait. It could also be noted that individuals are not necessarily always observed together. The event was video recorded (Additional File, available at https://mega.nz/folder/VjMhka6I#7KJGqj2xcguvIIbVQIXwdA) and can contribute to the knowledge of the feeding habits and hunting behaviour of type A killer whales in the Antarctic Peninsula or be of interest to citizen science as well.

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ADDITIONAL FILE

A video with the recording of the predation event described is made available at https://mega.nz/folder/VjMhka6I#7KJGqj2xcguvIIbVQIXwdA.

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Author contributions

All authors were present in the predation event and contributed to data and images recording. ES wrote the first draft, and MB, RCL and JHFP reviewed and edited the manuscript.