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SHORT NOTE

Antarctic fur seal predation on cephalopods at Marion Island

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Abstract We report two observations of adult male Antarctic fur seals, *Arctocephalus gazella,* preying on large octopods at subAntarctic Marion Island during July and August 2008. If Antarctic fur seals take cephalopods opportunistically, as previously suggested, our observations may be a rare event representing such opportunistic predation.

Keywords Otariid · *Arctocephalus gazella* · Diet · *Octopus magnificus* · SubAntarctic islands · Opportunistic feeding

Antarctic fur seals, *Arctocephalus gazella,* breed mainly on islands south of the Antarctic Polar Front (APF), but also breed north of the APF at Macquarie Island (Goldsworthy 1999), Iles Crozet (Guinet et al. 1994) and Marion and Prince Edward Islands (Condy 1978). Their feeding ecology has been investigated at a number of localities throughout the Southern Ocean and studies of diet have primarily been based on stomach or scat sampling methods, the former based on stomach contents from shot animals (Croxall and Pilcher 1984). Recently, stable isotope and fatty acid analyses have further elucidated their dietary intake (e.g., Lea et al. 2002; Cherel et al. 2007). The opportunistic feeding behaviour of the species is evidenced by the variety of prey species consumed (e.g., Makhado et al. 2008), the variation in the composition of prey throughout their range (e.g., Daneri and Coria 1992; Cherel et al. 1997; Klages and Bester 1998) and their occasional inclusion of extraordinary prey items in their diet (e.g., king penguins, Hofmeyr and Bester 1993).

At Marion Island (Fig. 1), their diet was investigated by Condy (1981), Klages and Bester (1998) and Makhado et al. (2008). Based on scat samples, myctophid fish species predominate in the diet of *A. gazella* at Marion Island, with cephalopods generally contributing negligibly. Most cephalopods were not identified, but *Brachioteuthis risei* and *Octopus magnificus* were recorded (Klages and Bester 1998; Makhado et al. 2008). This dietary preference, including that of krill, appears to be common in various populations of the species (Reid 1995; Reid and Arnould 1996; Cherel et al. 1997; Casaux et al. 1998; Daneri et al. 1999) and it could be that these prey items are selectively targeted irrespective of cephalopod availability (Kirkman et al. 2000). However, at some sites, the importance of cephalopods in the diet is known to increase during autumn and winter (Heard Island, Green et al. 1991; South Orkney Islands, Daneri and Coria 1992).

During 249 h of observation (2–3 h per observation session, 93 sessions between May 2008 and April 2009), we observed and photographed (Fig. 2) two similar cases of *A. gazella* preying on large octopods at Van den Boogaard Beach, Marion Island (Fig. 1; 46°54′S, 37°45′E). The observations took place on 21 July and 14 August 2008, at 14:37 and 11:09 GMT +3, respectively. On both occasions, conditions were overcast and relatively wind still (Beaufort Sea State 2). The observations were made from the same point on a low headland approximately 4 m high. In both cases, adult male *A. gazella* were first noticed at the water's surface, holding a prey item in their jaws and vigorously shaking it from side to side. In both cases, the prey was

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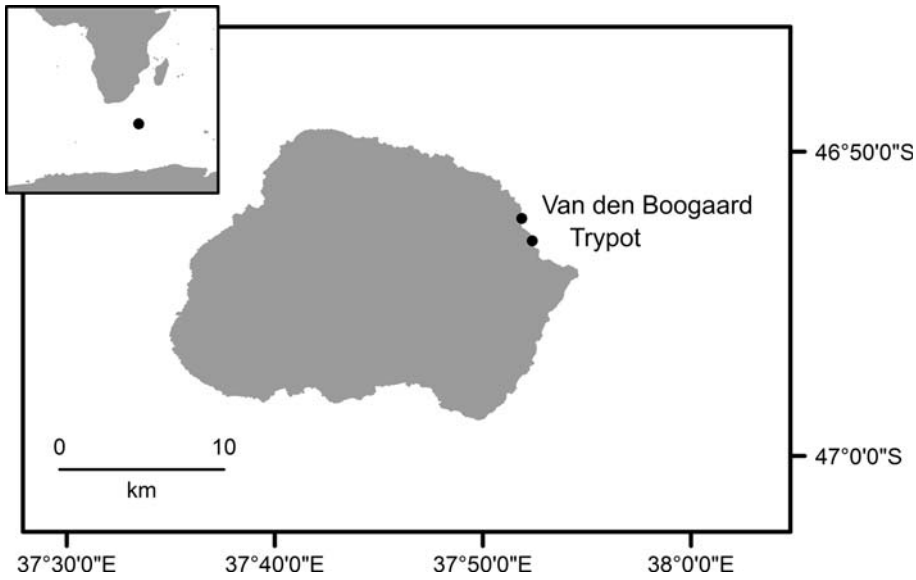

Fig. 1 Map of Marion Island showing the localities where *A. gazella* were observed preying on cephalopods

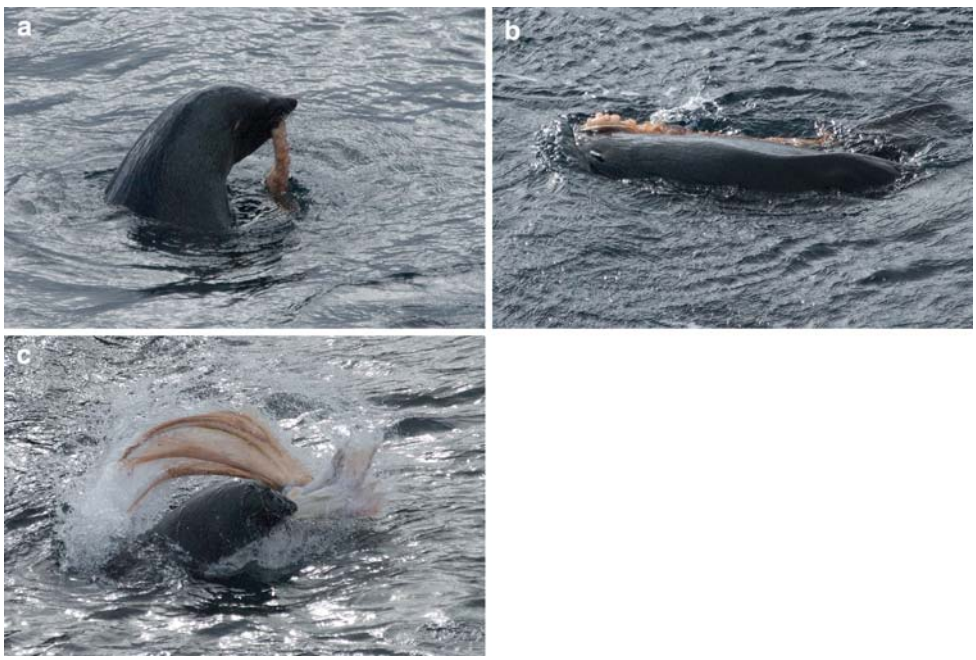

Fig. 2 Series of photographs depicting an adult male *A. gazella* consuming a large octopod at Van den Boogaard Beach, Marion Island. Figure 1c shows the seal vigorously shaking the octopod

identified as a large octopod, possibly *O. magnificus* (Villanueva et al. 1991), with tentacles approximately 1 m in length (Fig. 2b). The seals vigorously shook the octopod bodies to tear pieces off (Fig. 2c), or flung the entire body through the air, and slowly swam after such pieces. In both cases, the seals remained between approximately 4 and 30 m from shore and the incidents lasted approximately 5 and 10 min, respectively. Both seals were seen consuming parts of the prey, although no estimate was made of the proportion eaten. Some parts remained at the water surface and giant petrels (*Macronectes* spp.) fed on these. On both occasions 1–2 other adult male *A. gazella* were in the immediate vicinity and slowly swam after pieces of the carcasses, although there were no obvious interactions between the seals. These observations represent direct evidence for consumption of large octopods by this seal species at Marion Island. During February 1997, a sub-adult male *A. gazella* was seen dragging an unidentified squid species approximately 1 m in length onto Trypot Beach, Marion Island (PAP, personal observation).

Bonner and Hunter (1982) and du Toit et al. (2004) describe very similar feeding behaviour in *A. gazella* and Cape fur seals, *A. pusillus pusillus,* feeding on seabirds, and suggest that predation on seabirds may be an extension of play behaviour. In our observations, both seals were likely only tearing a large prey item into more manageable pieces, rather than playing with the prey. They consumed some proportion of the octopods and did not interrupt feeding to

play with other seals, as described by Bonner and Hunter (1982).

The description of cephalopods in otariid diets, from scat and stomach samples are well known to include biases (e.g., Lipinski and David 1990; Staniland 2002; de Bruyn et al. 2003; Gudmundson et al. 2006). The differential erosion and passage rates of hard items in relation to their size, result in considerable variation in samples obtained from different methods (e.g., Gudmundson et al. 2006), and among individuals (Staniland 2002). Importantly, large items (such as the beaks of large *O. magnificus*) are unlikely to appear in an animal's scat if ingested. For example, in their study of the cephalopod diet of *A. pusillus pusillus* based on scat analysis, de Bruyn et al. (2005) found that *O. magnificus* consumed were markedly smaller than mean published values for freshly captured specimens of the species—possibly reflecting a bias against the passage of large beaks, rather than the real prey size distribution. Indeed, using stomach sample analyses, Lipinski and David (1990) showed that large cephalopod beaks are retained in the stomach and probably regurgitated, thereby introducing bias in description of prey size in the diet when using scat analyses. *A. pusillus pusillus*, New Zealand fur seals, *A. forsteri,* and northern fur seals, *Callorhinus ursinus*, are known to eject squid beaks orally (Rand 1959; Tate 1981; Gudmundson et al. 2006) but no evidence has been presented that *A. gazella* selectively eject hard parts (Kirkman et al. 2000).

Antarctic fur seals do opportunistically take cephalopods as prey (this study) as previously suggested (e.g., Kirkman et al. 2000), however, the frequency of such occurrences are unknown and our sightings may merely be a rare event representing such opportunistic predation. If such occurrences are indeed uncommon, then biases inherent to cephalopod detection in scat analysis would not skew resultant dietary analyses.

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