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Short Communication

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A First Case of Female–Female Pairing in the Black-faced Sheathbill *Chionis minor*

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Female–female pairing, defined as the presence of two breeding females (but no male) at the same nesting site, has been shown to occur in the wild in some gull and tern species (Burger & Gochfeld 1996; Gochfeld & Burger 1996). Two females paired with one another gain by laying if and only if (i) they can maintain a territory, which is a prerequisite to breeding in most species (Newton 1992), and (ii) they are widows that have lost their males after being fertilised or they have previously mated promiscuously with a neighbouring male (Ryder 1978). If these two conditions are met, female–female pairing enables females without males to share parental duties like heterosexual pairs (Ryder 1978) and to rear offspring successfully (Conover et al. 1979; Hunt 1980), albeit with lower success than in heterosexual pairs (e.g. Hunt & Hunt 1977; Ryder & Somppi 1979). Here we report the first case of female–female pairing in the Black-faced Sheathbill *Chionis minor*. Like gulls and terns, this sedentary and long-lived species belongs to the order Charadriiformes, being closely related to waders. Black-faced

Sheathbills occur at four subantarctic groups in the southern Indian Ocean: Prince Edward Islands, Iles Crozet, Iles Kerguelen and Heard-MacDonald Islands (Burger 1996). They are monogamous and show high mate fidelity (Burger 1980b; Jouventin et al. 1996). Each pair defends a territory in which both partners breed and feed (Burger 1979; Verheyden 1988; Jouventin et al. 1996).

Study area and methods

Field work was conducted on Mayes Island, Kerguelen Archipelgo (49°28'S, 69°57'E). A long-term demographic study on the whole population (28 pairs, plus 4–5 solitary individuals) at this small island (3 km²) has been conducted since the austral summer of 1988–89 (Jouventin et al. 1996; Bried & Jouventin 1998). All individuals were ringed using monel rings. The presence of the birds at their territories was checked every year at the start of incubation, from late December onwards. To be sure that birds had completed their clutches and

because the laying period lasts a month at Mayes Island (Jouventin et al. 1996), the last checkings were performed on c. 20 January. Thus, clutch size could be determined for each breeding pair. Another visit occurred during the hatching period, in late January–early February. Chicks were banded in early March.

Results and discussion

An unusual four-egg clutch was found by OD and GJ on 19 January 1997, in the nesting site of a territory (T38) situated in a Rockhopper Penguin *Eudyptes chrysocome* colony on the western part of Mayes Island. The nest was inspected again on 3 March 1997. It contained debris of egg shells, but no chicks or chick remains. The territory was occupied by a pair, one partner of which, F1, had held the territory since 1988–89. The other partner was a banded adult, F2.

Both birds were known to be females, and to have bred successfully in the past. Black-faced Sheathbills are sexually dimorphic with very little overlap in measurements, males being significantly larger and heavier than females (Burger 1980a and pers. comm.; Bried & Jouventin 1997). F1 and F2, and also their former mates (M1 and M2, respectively), were measured and weighed during the 1992–93 breeding season by JB (for methods, see Burger 1980a, Bried & Jouventin 1997). For each parameter measured, values recorded for F1 and F2 were smaller than those obtained from their partners. Conversely, M1 and M2 were among the five largest adults established at Mayes Island in 1993 (J. Bried unpubl. data). Therefore, F1 and F2 were undoubtedly two females. Moreover, four-egg clutches in Black-faced Sheathbills are unknown at Iles Kerguelen (Weimerskirch et al. 1989; Jouventin et al. 1996), contrary to Marion Island (Burger 1979) and Iles Crozet (C. Verheyden unpubl. data), suggesting that both birds contributed to this supernormal clutch.

However, it is not immediately clear why these females laid since no male was observed on T38 in 1997. Neither polygyny nor extra-pair copulations have been so far reported in sheathbills. In the present case, it is unknown if F1 and F2 mated (promiscuously?) with a neighbouring male (Hunt 1980). The first sighting of F2 on T38 occurred at the end of the 1995–96 breeding cycle, when F1 was rearing a single chick on this territory despite the apparent absence of a male. Our demographic study revealed that F2 had divorced her previous male, M2, during the 1994 winter. The latter kept his territory and paired with another female in

1995–96, the new pair bond being retained the next year. Thus, divorced F2 occupied the vacancy caused by the disappearance (presumably owing to death) of F1's male by pairing with F1. This association between two female sheathbills might also have been promoted by a greater number of females in the population, as found in some gull species (Hunt et al. 1980; Mills 1989). Our long-term demographic study revealed that the number of adult (i.e. at least three years old, Burger 1980a; Jouventin et al. 1996) males equalled that of adult females in 1995–96 and 1996–97, and that the average sex-ratio (i.e. considering the eight years of study) of the sheathbill population from Mayes Island was unbiased. Yet, two experienced males formed non-breeding pairs with immature females (one yearling, one newly ringed) in 1996–97, creating a slight surplus of unpaired adult females.

The presence of these two females on the same territory and laying in the same nest represents the first case of homosexual pairing in the Black-faced Sheathbill. Incidental observations performed during each visit at T38 provided additional evidence that they had formed a genuine pair. During the first visit in January, the incubating bird ran out of the nesting cavity and joined its 'mate'. Then, both individuals performed the 'Bob-call' display (Burger 1980b). During the visit in March, they were seen standing close to each other, without aggression. Verheyden (1988) explained heterosexual pair formation as the rule by the strong territorial behaviour of males. The latter are more often involved in boundary disputes than females, tolerating only their partner on their territory, and selection would thus have favoured a larger body size in males in order

Table 1 Quality of the territory containing the four-egg clutch, compared to the average quality of territories at Mayes Island.

	T38	Territories	
		with seabirds ($n = 19$) ²	without seabirds ($n = 27$) ²
Productivity index I_1 ¹	1.57	1.07	0.50
Occupancy index I_2 ¹	0.87	0.71	0.33

¹ I_1 was defined as the average number of chicks fledged per breeding attempt, and I_2 as the number of years of occupancy by a breeding pair (which equals the number of breeding attempts on the territory considered) divided by the number of years of study (see Bried & Jouventin 1998); ² Values drawn from Bried & Jouventin (1998). Values were calculated over the period 1988–89 to 1995–96 inclusive, i.e. before the two females established themselves on T38.

to facilitate territory defence (Burger 1980a, 1980b). Since they are, on average, smaller than males, solitary females are less likely to be successful in territorial contests, although they can maintain a territory at Iles Kerguelen, where territory quality can vary. Territories with breeding seabirds (Rockhopper Penguins and Kerguelen Cormorants *Phalacrocorax atriceps verrucosus*) are more suitable than seabird-free ones for breeding, because they provide sheathbills with food of high quality, enabling them to have high reproductive performances (Jouventin et al. 1996; Bried & Jouventin 1998). In most cases (86%, $n = 7$), solitary females held poor quality territories. Conversely, the territory held by F1 and F2 was of higher quality than average (Table 1), harbouring a Rockhopper Penguin colony of 60 pairs. Since Kerguelen sheathbills that change site move as close to territories with seabirds as possible (the latter are generally of the highest quality, see Bried & Jouventin 1998; Table 1), competition is the most severe for such territories. Consequently, a pair should defend a territory with high quality food more effectively than a solitary individual. Thus, Verheyden (1988) showed the existence of winter partnerships in sheathbills at Iles Crozet in relation to the defence of abundant and predictable high quality food in King Penguin *Aptenodytes patagonicus* colonies. Although they did not produce any chicks in 1996–97, F1 and F2 remained together on the same territory the next year. Three eggs were found in the nest on 26 December 1997; on 23 January 1998, the observers found broken egg shells, but no chicks, chick remains or dead embryos either. Despite breeding failures, we suggest that maintaining the pair bond was advantageous for these two females, probably allowing them to share incubation duties as in heterosexual pairs (Burger 1979). Moreover, pairing may have enabled these two *a priori* non-dominant individuals to maintain a high quality territory with a decreased risk of eviction.

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