
Short communications

Goose barnacles on seals and a penguin at Gough Island

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During a survey of seals in September and October 2009 at Gough Island, South Atlantic Ocean, we recorded goose barnacles (*Lepas australis*) attached to the pelage of two of the 12 elephant seals (*Mirounga leonina*) inspected and one of the seven vagrant Antarctic fur seals (*Arctocephalus gazella*) which were found amongst the resident Subantarctic fur seals (*A. tropicalis*). We also recorded a goose barnacle attached to a Northern rockhopper penguin (*Eudyptes chrysocome moseleyi*).

Key words: goose barnacle, *Lepas australis*, elephant seal, fur seals, rockhopper penguin, Gough Island.

The goose barnacle, *Lepas australis*, is pelagic with a circumpolar distribution between 30°S and 60°S (Nilsson-Cantell 1930, 1939; Foster 1978) although the distribution of the larval settlement

stage is not well known. Stalked barnacles attach themselves to a wide diversity of substrata by means of a long, muscular stalk (Ray & Ciampi 1956). In various seas and oceans globally they have been reported attached to substrata including plastics, pumice, wood, macroalgae, tar balls, floating corals, empty *Nautilus* spp. shells and glass fishing floats (Thiel & Gutow 2005). They have been reported on seals as well as penguins (Table 1).

Gough Island (40°20'S, 09°54'W), in the South Atlantic Ocean, is the site of the largest Subantarctic fur seal (*Arctocephalus tropicalis*) breeding population in the Southern Ocean (Bester *et al.* 2006). A small number of southern elephant seals (*Mirounga leonina*) breed at the Island (pup production of 11 in 1997; Bester *et al.* 2001) and recently Antarctic fur seals (*A. gazella*) have been recorded as vagrants there (Wilson *et al.* 2006;

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Table 1. Barnacles recorded on austral seals and penguins, modified from Barnes *et al.* (2004).

Group	Host species	Barnacle species	Location	Source
Seals	<i>Mirounga leonina</i>	<i>Conchoderma auritum</i>	South Africa	Best 1971
	<i>Mirounga leonina</i>	<i>Lepas</i> sp.	Amsterdam Island	Arnaud (1973)
	<i>Mirounga leonina</i>	<i>Lepas australis</i>	South Georgia	Laws (1953), Arnbom & Lundberg (1995)
	<i>Mirounga leonina</i>	<i>Lepas australis</i>	Marion Island	Reisinger <i>et al.</i> (2010)
	<i>Arctocephalus gazella</i>	<i>Lepas australis</i>	South Georgia	Bonner (1968), King (1983), Barnes <i>et al.</i> (2004)
	<i>Arctocephalus gazella</i>	<i>Lepas australis</i>	Gough Island	This study
	<i>Arctocephalus tropicalis</i>	<i>Lepas australis</i>	Gough Island	Setsaas & Bester (2006)
Penguins	<i>Eudyptes chrysolophus</i>	<i>Lepas australis</i>	South Georgia	Barnes <i>et al.</i> (2004)
	<i>Eudyptes chrysocome moseleyi</i>	<i>Lepas australis</i>	Gough Island	This study, P.G. Ryan, pers. comm.
	<i>Eudyptes robustus</i>	<i>Lepas australis</i>	Snares Islands	Horning (1982)

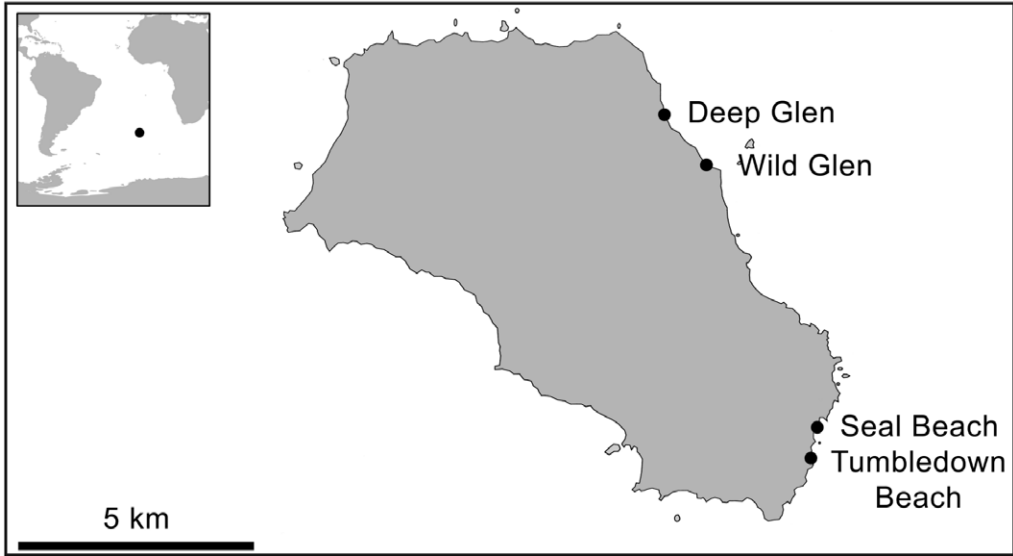


Fig. 1. Gough Island, South Atlantic Ocean, showing the locations where goose barnacles (*Lepas australis*) were observed on seals and a penguin. The insert shows Gough Island's position in relation to South America, Africa and Antarctica.

Bester & Reisinger 2010). In 2006 the population size of Northern rockhopper penguins (*Eudyptes chrysocome moseleyi*) at the Island was approximately 65 000 pairs (Cuthbert *et al.* 2009).

During a survey of fur and elephant seal populations in September and October 2009 at Gough Island, seals were opportunistically inspected for the presence of goose barnacles. Animals were

visually searched at close range. Of the 12 adult elephant seals which had hauled out to breed between Wild Glen and Deep Glen (Fig. 1), one male and one female each had a single small ($c. < 5$ mm) barnacle attached to the pelage near the dorsal midline. Seven Antarctic fur seals were surveyed. Of these only an unsexed subadult at Seal Beach (Fig. 1) had goose barnacles attached to



Fig. 2. a, Photograph showing a northern rockhopper penguin (*Eudyptes chrysocome moseleyi*) with a goose barnacle (*Lepas australis*) attached to the plumage of its left leg (circled); **b,** photograph showing the goose barnacle.

the pelage: four small ($c. <5$ mm) individuals attached to the pelage near the seal's dorsal midline. One of these individuals was collected, and identified as *L. australis* (A. Biccard, Marine Biology Research Centre, University of Cape Town). A Northern rockhopper penguin which had just returned from sea was observed at Tumbledown Beach (Fig. 1) with a single goose barnacle attached to the plumage above its left leg (Fig. 2). The location of the barnacle's attachment, in a zone where water flow over the penguin's body while swimming is likely to be turbulent, may be suitable for the barnacle's initial attachment and nutrition (Reisinger *et al.* 2010). Goose barnacles have previously been observed on Northern rockhopper penguins at Gough Island (P.G. Ryan, pers. comm.) and rarely on Subantarctic fur seals (Setsaas & Bester 2006).

It is unclear where the barnacles originated or how long they were attached; specimens were not aged as their size would have depended on local food availability (which is unknown), and water temperature (*cf.* Thiel & Gutow 2005).

Highly mobile marine megafauna such as seals and penguins are excellent potential vectors for the long-distance transport of biota such as goose barnacles, and may additionally allow them to cross oceanographic barriers. Barnes *et al.* (2004) showed that large numbers of stalked barnacles are transported into the Southern Ocean by Antarctic fur seals and Reisinger *et al.* (2010) demonstrated the potential transport of *L. australis* into the Southern Ocean by southern elephant seals. Barnacles also provide a substratum to which other marine biota may attach, and thus travel as secondary hitchhikers. For example, Barnes *et al.* (2004) found polychaete worms and a bryozoan colony encrusting a stalked barnacle attached to a sea spider.

The establishment and spread of barnacles and any hitchhikers they may carry is currently unlikely given the comparatively low water temperatures in the Southern Ocean, yet thermal tolerances of adult and cyprid *L. australis* are unknown (Barnes *et al.* 2004) and accepted predictions suggest that sea-surface temperatures in the Southern Ocean may rise by 2°C in the next century (Murphy & Mitchell 1995). Thus current global climate change trends could lower existing barriers to species establishment and spread (Barnes *et al.* 2006).

This report, along with that of Setsaas & Bester (2006), shows that *L. australis* attach themselves to all species of terrestrially breeding/resting marine

megafauna (seals and penguins) that occur at Gough Island.

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