

BROWN SKUAS *STERCORARIUS ANTARCTICUS* INCUBATE A MACARONI PENGUIN *EUDYPTES CHRYSOLOPHUS* EGG AT MARION ISLAND

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Received 3 October 2009, accepted 5 February 2010

Brown/Sub-antarctic Skua *Stercorarius antarcticus* are widely distributed at cool-temperate and sub-Antarctic islands in the Southern Ocean, where their diet includes burrowing petrels caught at night and eggs stolen from incubating birds, especially penguins, during the day (Furness 1987, Higgins & Davies 1996, Shirihai 2007). At Marion Island, Prince Edward Islands in the southern Indian Ocean, Brown Skua prey on eggs of crested penguins *Eudyptes* sp. during summer months which they remove in their bills from the colonies by flying to nearby middens where the eggs' contents are consumed (Sinclair 1980, Brooke 1985). Breeding skuas at Marion Island often take penguin eggs to the vicinity of their nests, which, as a consequence, can be surrounded by large numbers of emptied egg shells (pers. obs.).

We report on a pair of Brown Skua which unusually were found incubating a foreign egg at Marion Island. The nest was situated close to the Kildalkey Hut stream, on the edge of a Southern Giant Petrel *Macronectes giganteus* colony and about 200 m inland from the coast where both Macaroni *E. chrysolophus* and Southern Rockhopper *E. chrysocome* Penguins were breeding. When first found on 30 November 2008 the nest contained three eggs under the incubating bird. Two of the eggs were normally-marked and

-sized for skua eggs, thus deemed to be the birds' own clutch, but the third was an all-white egg (Fig. 1). This egg was noticeably larger than the two skua eggs, and was more rounded in shape. On 19 December when the nest was revisited one of the two skua eggs was no longer present. During visits on 21 December 2008 and on 4 and 15 January 2009 only the white egg was present, and the displaced incubating bird was quick to defend its nest. On 9 February 2009 the skua pair was still present at the nest, with one bird in an incubating position, but the nest was empty of contents. It is not known whether any of the three eggs hatched as no chicks, alive or dead, were seen in or next to the nest.

The general appearance of the white egg was that of a penguin's, and not of the egg of a giant petrel (pers. obs.). Unfortunately egg measurements were not taken during any of the nest visits, but it was possible to obtain an approximate length-breadth ratio of 1.24 from a photograph. Along with its size in proportion to the two skua eggs (Fig. 1) it can be deduced that the egg was both too small and too rounded to be an egg of a Southern Giant Petrel (average length/breadth ratios range from 1.54 to 1.60 for eight studies; calculated from Higgins & Davies (1996)) and more closely matched the size and average length-breadth ratio of a Macaroni Penguin's second-laid "B" egg (1.38; calculated from Marchant & Higgins (1990)).

The penguin egg was in the skua nest for a minimum of 47 d, substantially longer than the incubation period of Brown Skua (28-32 d; Higgins & Davies 1999). Skuas at Marion Island lay a clutch of two, sometimes one, but never three eggs (Williams 1980, pers. obs.). The absence of chicks at the nest and the continued incubation of the penguin egg suggest that the skua eggs did not hatch. Because skuas have only two brood patches and not three (as in gulls), the larger-than-normal clutch may have resulted in the eggs being sub-optimally incubated, leading to none of them hatching.

The presence of foreign eggs in bird nests is well-known, but is usually associated with nest-parasitism, when the (intra- or inter-specific) brood parasite lays eggs that often closely match in appearance the host's own eggs (e.g. Johnsgard 1997). There are reported cases where ground-nesting birds have retrieved and incubated foreign eggs (including of other species) and egg-like objects such as golf balls, stones and even in one case glass bottles (e.g. Tinbergen 1953, Coulter 1980, Conover 1985, Guay *et al.* 2006, Hórák & Kivána 2009, Stojanovic *et al.* 2009). Two hypotheses have been advanced for this behaviour: (1) that it is a genuine error



Fig. 1. The Brown Skua *Stercorarius antarcticus* clutch of two eggs along with a foreign egg, believed to be the second-laid "B" egg of a Macaroni Penguin *Eudyptes chrysolophus*; 30 November 2008 (photograph by Linda Clokie).

(i.e. is maladaptive), or (2) it is adaptive, by increasing reproductive fitness in some way (Conover 1985, Lank *et al.* 1991).

It seems likely the case reported here was a maladaptive error. We suggest that the skua flew back to its nest with an unbroken egg from a nearby Macaroni Penguin breeding colony, which it inadvertently dropped in such a way that the egg, still unbroken, joined its own clutch in the nest bowl. From then on we assume that the penguin egg was no longer recognized as a prey item, even when it was the only egg in the nest and when the displaced incubating bird returned, thus leading to its protracted incubation.

Incubation of Adélie Penguin *Pygoscelis adeliae* eggs (which are plain white) by South Polar Skuas *C. maccormicki* has been observed under both natural (Crawford 1974) and experimental (Eklund 1961, Tamiya & Aoyanagi 1982) conditions. In the Tamiya & Aoyanagi (1982) experiment, incubation was successful and the experimentally-added penguin egg hatched (although the chick soon died). The South Polar Skua is also a predator of penguin eggs (Young 1994). Furness (1987) considers that South Polar Skuas accepting and incubating penguin eggs “so dramatically different in appearance” from their own occurs because they have not experienced significant nest parasitism and hence have not evolved the ability to recognize a foreign egg in their nests. Such an assumption would apply to other members of the genus *Catharacta*, including the Subantarctic Skua. It probably also applies to at least the larger gulls of the genus *Larus*: on 9 November 2006 P.G. Ryan (*in litt.*) photographed a Kelp Gull *L. dominicanus* incubating a clutch of three eggs, made up of two normally-marked gull eggs and all-white (although dirty) Cape Gannet *Morus capensis* egg on Malgas Island, South Africa.¹

It seems likely that avian predators, especially those that are able to steal and then carry unbroken eggs in flight, such as *Catharacta* skuas and the larger *Larus* gulls (pers. obs. for the Kelp Gull), are more at risk of incubating foreign eggs than would be non-predatory ground-nesting birds, although natural or experimental evidence would be required to test this assumption further.

ACKNOWLEDGEMENTS

We thank Jared Harding for assistance in the field and Peter Ryan for his observation of a Kelp Gull incubating a foreign egg. The Marine and Coastal Management Branch of the then South African Department of Environmental Affairs and Tourism provided logistical support. Permission to visit and conduct research at Marion Island was granted by the Prince Edward Islands Management Committee. Research at Marion Island is supported by the South African National Antarctic Programme through the National Research Foundation.

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¹ At Prince Leopold Island, Canada in 2001 an all-white Northern Fulmar *Fulmarus glacialis* egg, together with two Glaucous Gull *Larus hyperboreus* eggs (olive green ground blotched with brown), were present and being incubated by a Glaucous Gull in a gull nest (AJG).