Pseudo-egg "fabrication" by Grey-headed Albatrosses *Thalassarche chrysostoma* on Marion Island

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Pseudo-eggs are foreign objects, resembling eggs, found inside the nests of birds (Conover 1985) and have been recorded in several ground-nesting seabirds (Coulter 1980; Conover 1985; Mellink 2002; DeStefano *et al*. 2013; Wagner *et al*. 2013; Witteveen *et al*. 2015). They are more common among species that have larger clutches or multiple brood patches (Coulter 1980; Wagner *et al*. 2013) where pseudo-eggs are included to increase their clutch size (Coulter 1980; Conover 1985; Wagner *et al*. 2013; Witteveen *et al*. 2015). Albatrosses and petrels however, only lay one egg; rare two-egg clutches result from two females laying in the same nest, with one of them being an inexperienced breeder (Ryan *et al*. 2007). The occurrence of pseudo-eggs has only been reported for Laysan (*Phoebastria immutabilis*) and Black-footed Albatrosses (*P. nigripes*; Bartholomew & Howell 1964; Grant 1982). We did not find any record of albatrosses breeding in the Southern Ocean that exhibited pseudo-eggs.

Grey-headed Albatrosses (*Thalassarche chrysostoma*) are biennially breeding birds (they typically skip breeding in the year following a successful breeding attempt) producing a single egg (Ryan *et al*. 2007). Marion Island, the larger of the sub-Antarctic Prince Edward Islands (46°55'S 37°45'E) supports an average annual breeding population of approximately 7,800 pairs of Grey-headed Albatrosses (Ryan & Bester 2008), which breed in dense colonies on the southern coast of the island from Rook's Peninsula to Crawford Bay and inland along Grey-headed Ridge. Grey-headed Albatrosses construct a nest mound or refurbish an existing mound using mud and available vegetation collected next to the nest site (Tickell 2000). The eggs are laid in October, incubated for an average of 73 days, and the chicks are fed for roughly 130 days until they fledge in late April–May (ACAP 2015).

During the austral summer of 2015/16, approximately 3,000 nests of Grey-headed Albatrosses on Marion Island were visited as part of a population dynamics and pollution monitoring study. On 26 November 2015, an adult Grey-headed Albatross was seen incubating a pseudo-egg consisting of vegetation. The pseudo-egg was almost identical in shape and size to that of a real egg (Figure 1a). A second nest was found where a Grey-headed Albatross was sitting on two smaller clumps of vegetation similar to the size of a real egg. The first nest was

Figure 1. Grey-headed Albatross *Thalassarche chrysostoma* observed a) incubating a pseudo-egg on 26 November 2015 and b) an individual occupying the same nest containing the flattened pseudo-egg on 14 December 2015 on Marion Island. © *Stefan Schoombie*.

visited again on 14 December 2015 and had an individual sitting on the nest containing the flattened pseudo-egg (Figure 1b). Both of these nests did not have a real egg within the nest bowl and the birds, which were not marked or sexed, were considered non-breeders or failed breeders.

The presence of pseudo-eggs is normally explained by one (or a combination) of three hypotheses: the mistaken egg (Conover 1985), mistaken food (Sugden 1947; Twomey 1948) or incubation stimulus hypotheses (Coulter 1980). The first hypothesis is relevant in areas where suitable foreign objects are within the vicinity of the nest and can be mistaken for an egg. The second hypothesis relates to birds that regurgitate whole eggs at the nest and mistake these as their own eggs during the incubation period (Sugden 1947; Twomey 1948). Lastly, the incubation stimulus hypothesis suggests that some birds increase their clutch size (up to an optimal size) by incorporating pseudo-eggs into the nest, the increased clutch size produces a stimulus affecting incubation behaviour (Coulter 1980). The first two hypotheses are clearly unlikely to apply to the observed pseudo-eggs of Grey-headed Albatrosses due to the nature of their nests and diet (Tickell 2000; Ryan & Bester 2008) as well as the characteristics of the pseudo-eggs. Therefore the incubation stimulus hypothesis is the most likely explanation why Grey-headed Albatrosses may incubate pseudo-eggs.

Most pseudo-eggs found in the nests of ground nesting birds are egg-shaped pebbles or bones (Coulter 1980; Conover 1985; Mellink 2002; DeStefano *et al*. 2013; Wagner *et al*. 2013; Witteveen *et al*. 2015). Pseudo-eggs occur more often in North Pacific albatross species breeding in close proximity to humans. Laysan and Black-footed Albatrosses occasionally incubate foreign objects such as beer cans, light bulbs or even bricks (Bartholomew and Howell 1964; Grant 1982). Because Grey-headed Albatrosses nest on cliffs, they are unlikely to encounter objects large enough to incubate within their nest mounds. However, clumps of vegetation can be found on the nest of a Grey-headed Albatross as result of vegetation that falls into the nest bowl when birds are building and refurbishing their nests. Non-breeding birds or individuals holding a nest prior to breeding are sometimes seen with a small clump of collected vegetation in the middle of the nest bowl (pers. obs.). A pseudo-egg might be formed in such nests when vegetation accumulates forming a large enough ball that the birds could mistake it for an egg. One of the pseudo-eggs observed in this study seemed to have been fashioned by the bird to take the shape of an egg. Albatrosses turn their eggs frequently throughout the day to maintain critical egg temperature necessary for embryonic development (Shaffer *et al*. 2014). This behaviour could further increase the size of the pseudo-egg when tapping on the side of the pseudo-egg during turning adds loose vegetation and contributes to its rounded egg-shape.

It is unclear if the same individual was seen twice at the nest with the large pseudo-egg. The observations were made late in the incubation period during a period when many non-breeding individuals visit the breeding colonies, thus it is difficult to say if the birds might have been failed breeders or not. To our

knowledge, this is the first record of Grey-headed Albatrosses incubating pseudo eggs. These observations might be linked to the development of breeding behaviour in pre-breeding albatrosses; however knowledge of the age of birds incubating pseudo-eggs would be necessary to conclude this.

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