

## Failure to launch: evidence of protracted parental care in albatrosses

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Most albatrosses have well defined breeding seasons (Tickell 2000). Fledging tends to be spread over a longer period than laying or hatching because the duration of the chick-rearing stage is more variable than that of incubation (Warham 1990). However there are few records of albatross chicks extending fledging periods by more than a month or two (but see Brown & Adams 1984). We were thus surprised to see a juvenile Sooty Albatross *Phoebastria fusca* on a nest near the meteorological station on Gough Island (40°20'S 9°55'W) during the 2014–15 breeding season, three months after Sooty Albatross chicks usually fledge from Gough Island (Ryan 2007; most chicks fledge in May–June, and in 2015 the last chick near the weather station departed between 17 and 25 July). The late-fledging juvenile was first observed on 17 September 2014 and remained on its nest until at least 14 October, but apparently fledged by 19 October (the nest was empty, and no carcass was found). It seemed to be in good health throughout this period, and on being approached, it clapped its bill in the manner typical of a large nestling. Characters that indicated it was a juvenile bird still in its first year were the virtual lack of a white eye-ring, no yellow sulcus stripe on the bill, and uniformly aged, fresh plumage still with pale fringes to the back coverts (Figure 1; Marchant & Higgins 1990). Assuming a mean hatching date in mid December (Ryan 2007), this gives a fledging period of around 300 days, much longer than the  $164 \pm 9$  SD days recorded at Ile de la Possession, Crozet Islands (46°25'S 51°45'E: maximum 178 days; Tickell 2000).

Although it is possible that the juvenile Sooty Albatross had returned to Gough Island 3–4 months after fledging, this seems unlikely. Juvenile albatrosses appear to have a fixed flight direction during the early stages of dispersal, which is followed by a learning period, lasting up to six months, when juveniles become increasingly competent, varying their flight direction, but with their movements still largely influenced by the wind (Weimerskirch *et al.* 2006). The earliest age at which albatrosses generally return to their natal site is 2–3 years old (Tickell 2000). It would be remarkable for a juvenile that had fledged only a few months earlier to return to its nest site and have sufficient reserves to remain there unsupported for four weeks. A more plausible explanation is that the chick remained on its nest throughout winter, presumably fed by its parents. Support for this hypothesis comes from the delayed fledging of albatrosses at the Prince Edward Islands (46°S 38°E), where Sooty Albatross chicks on Marion Island also typically fledge in May–June, but regular checks in 2015 found the last chick to fledge leaving the island between 12 and 18 August (S. Schoombie pers. comm.).



**Figure 1.** The juvenile Sooty Albatross *Phoebastria fusca* on its nest on Gough Island, 20 September 2014. © Peter G. Ryan.

Wandering Albatrosses *Diomedea exulans* at the Prince Edward Islands lay in late December–January, with chicks fledging approximately one year later. Chicks occasionally remain longer in their colonies: two were observed on Prince Edward Island on 20 March 1984 and one on Marion Island on 18 April 1984 (Brown & Adams 1984). Despite annual study of Wandering Albatrosses on Marion Island since the early 1980s, there have been no subsequent records of delayed fledging, and indeed the fate of these chicks in 1984 is unknown. However, in 2015, two seemingly healthy chicks were observed fledging in May (Figure 2). On 23 April they weighed 7.7 and 5.6 kg, below the typical fledging mass of 8–15 kg, but the heavier of the two chicks was seen with red squid stains on its bill and face on 1 May, indicating it was still being fed. This individual was in a study colony where breeding is closely monitored, so we know it did not result from an unusually late breeding attempt. Indeed, its parents had raised three chicks prior to this event, fledging them on schedule (Table 1). The 2015 chick apparently fledged sometime between 1 and 10 May; it was ringed, and a careful search of the colony found no trace of its carcass. This gives a nestling period of around 420 days, about 50% longer than normal (Table 1); the longest recorded nestling period for the species is 303 days (Tickell 2000). The second chick was last observed on 7 May, and apparently fledged because no trace was found of its carcass on 18 May 2015.



**Figure 2.** One of the two long-staying juvenile Wandering Albatrosses *Diomedea exulans* on Marion Island, 23 April 2015. © Peter G. Ryan.

**Table 1.** Breeding history of a pair of Wandering Albatrosses *Diomedea exulans* in the Gony Plain study colony, Marion Island. Note that only the most recent of their four chicks fledged exceptionally late.

Egg laying date*	Hatching date*	Fledging date*	Nestling period
30 Dec 2007	19 Mar 2008	7 Dec 2008	8.6 months
31 Dec 2009	18 Mar 2010	14 Dec 2010	8.8 months
5 Jan 2012	19 Mar 2012	9 Jan 2013	9.7 months
30 Dec 2013	11 Mar 2014	5 May 2015	13.8 months

\*dates interpolated between successive colony checks, typically accurate to within 4 days for laying and hatching, and 7 days for fledging

At least amongst high-latitude albatrosses and petrels (cf. Brooke 2004), the termination of parental care appears to be largely under parental control, with adults having an innate timer that tells them how long a chick should be defended (Cathy *et al.* 2006) or fed (Riou *et al.* 2012). Cross-fostering experiments with petrels show that chicks are able to influence the duration of food provisioning to some extent, but this is limited to extending support by a few days, not months (Gray & Hamer 2001). Studies of other seabirds show that adults pay a high price in terms of reduced survival if they are manipulated to feed chicks for longer than normal (Johnsen *et al.* 1994), so there should be selection against protracted parental care in albatrosses. It may be that one member of the pair died during the chick-rearing period, slowing prey delivery and hence chick growth (cf. Brown & Adams 1984; Tickell 2000). Most Laysan Albatross chicks *Phoebastria immutabilis* raised by one parent fledged late and were underweight (Rice & Kenyon 1962). However, Wandering Albatross chicks raised by single parents fledge more or less on schedule (Brown & Adams 1984; R. A. Phillips & A. Wood pers. comm.).

Our long-term studies at Marion and Gough Islands suggest that protracted fledging periods are rare. This conclusion is supported by observations at Bird Island, South Georgia, where detailed demographic studies have been conducted on three albatross species for several decades. Here, there have been no records of delayed fledging in either Black-browed *Thalassarche melanophris* or Grey-headed Albatrosses *T. chrysostoma*, and all Wandering Albatross chicks in study colonies depart before 1 January; there have been a few instances of Wandering Albatross chicks outside study colonies remaining into February, but it is not known whether these individuals fledged (R. A. Phillips & A. Wood pers. comm.). It is intriguing that there were multiple records in both years when delayed fledging was recorded among Wandering Albatrosses at Marion Island. However, the fledging dates of other Wandering Albatross chicks in the Marion Island study colonies was not unusually delayed in 2014, suggesting that it wasn't a particularly poor year for provisioning chicks (cf. Copley *et al.* 1998). Additional observations may shed further light on this puzzling phenomenon.

### Acknowledgements

We thank Ben Dille, David Green, Werner Kuntz, Michelle Risi, and Janine and Stefan Schoombie for assistance in the field. The South African National Antarctic Programme provided logistical support, and the Tristan da Cunha Administrator, Island Council, and Conservation Department kindly provided permission to work at Gough Island.

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