

Black-browed Albatross *Thalassarche melanophris* primary moult timing in the fourth prebasic moult

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The aging of immature Black-browed Albatrosses *Thalassarche melanophris* is reasonably well understood using a combination of primary moult sequence and timing (see Appendix), and progression in plumage aspect (bill colour and pattern, head and neck markings, and whitening of the underwing-coverts). The initial work of Prince *et al.* (1993) and Prince & Rodwell (1994) studied ringed (known-age) non-breeding Black-browed Albatrosses visiting a study colony on Bird Island, South Georgia between December 1989 and February 1990. Adding to this, Bugoni & Furness (2009) examined and photographed a sample of 33 birds captured at sea off the Brazilian coast in February to June 2006 and July to September 2007. Howell (2010, 2012) provided a number of at-sea photographs illustrating many of the immature age groups. These studies are important to understanding the impact of bycatch on different age groups, and to aging and identification for field birders.

These publications were drawn upon while studying Black-browed Albatross for the forthcoming multimedia ID guide *Albatrosses & Fulmarine Petrels* (Flood & Fisher in prep.), and criteria and illustrations provided excellent guidance during the analysis of hundreds of photographs. However, confirming criteria for younger immature birds was somewhat problematic because they remain at sea and consequently are less well known. For example, Prince and colleagues' study at South Georgia found first return to colonies happens at age two and in increasing numbers up to age six (Brooke 2004; here, age two means returning to land in December/January about two years after hatching, M. Brooke in litt.). At-sea studies of Bugoni and Furness dealt with a relatively small sample of younger immature birds. Following this photographic review, an amendment to primary moult timing during the fourth prebasic moult is proposed.

Howell's (2012) provisional moult timings give primary moult timing in the third prebasic moult as January to April, and for subsequent prebasic moults as mainly April to September. My analysis of photographs largely concurred with this. However, relatively few photographs show birds in active primary moult, which are particularly useful in evaluating primary moult timing of different age groups (assuming photographs also adequately show key features of plumage aspect required to age birds). Among such photographs that were reviewed, one showed an immature Black-browed Albatross moulting some middle primaries in January during the fourth prebasic moult (Figure 2), earlier than 'mainly April to September' given in Howell



Figure 1. Black-browed Albatross *Thalassarche melanophris*, Falkland Current (Corriente de Malvinas), off Uruguay, South Atlantic, 21 April 2012. © Kirk Zufelt. Aged as third cycle, 23 months old. Note that p8–p10 have been replaced and contrast with older browner juvenile middle primaries. P8–p10 are replaced during the third prebasic moult and subsequently every other year. Thus, based on primary moult alone, this immature bird could have undergone its third or fifth prebasic moult (birds look adult-like by the seventh prebasic moult; note that p8–p10 are replaced every other year from the third prebasic moult). However, the plumage aspect fits a bird in its third cycle. The bill is dark gray, with patchy yellowish showing through, mainly on the latericorn and ramicorn, while the unguis are dark grey with pale tips. The hindneck shawl and neck collar present in younger birds is less extensive here (though somewhat bleached out). Also, this bird has started to develop whitish in the underwing-coverts, mainly in the median coverts and axillaries. Also note that p8–p10 have been replaced by April, consistent with Howell (2012).

(2012). This indicated that primary moult in the fourth prebasic moult can commence as early as December. This timing may not be atypical in Black-browed Albatross (or other mollymawks *Thalassarche* for that matter). An earlier date makes sense because in the fourth prebasic moult some middle primaries are replaced for the first time since fledging, i.e. they are juvenile, rather old, and in need of replacement (the juvenile p8–p10 — the outermost three primaries — are replaced in the third prebasic moult, no primaries are replaced in the second prebasic moult, inner primaries are replaced during either the third or fourth prebasic moult). However, it is possible that timing of primary moult in the fourth prebasic moult (and subsequent immature prebasic moults) is linked to age of return to colony. Further research is needed.



Figure 2. Black-browed Albatross *Thalassarche melanophris*, at sea between Argentina and the Falkland Islands (Islas Malvinas), South Atlantic, 8 January 2009. © Brian Sullivan. Aged as fourth cycle, 32 months old. This bird is in active primary moult, replacing a number of middle primaries, but not p8–p10. Thus, based on primary moult, this immature bird could be in either its fourth cycle or sixth cycle (birds are adult-like before the eighth prebasic moult). Middle primaries are replaced every other year from the fourth prebasic moult. The plumage aspect fits a bird in its fourth cycle. The culminicorn, latericorn and ramicorn are now largely pale yellow. The unguis are dark grey with pale tips, but note there is no sign of reddish on the unguis, expected in older immatures such as sixth-cycle birds. A neck shawl is still evident, though limited. Note that active primary moult is about three months earlier than given in Howell (2012).

Figures 1–4 illustrate the above discussion. Each bird shown is aged by moult cycle, taking 1 January in the nest as the start of the first cycle, and number of months after fledging, assuming fledging on 1 May. There are two caveats to add. Bugoni & Furness (2009) found that development of bill colour and pattern on immature birds differed considerably between birds breeding on South Georgia and birds thought to be from the Falkland Islands (Islas Malvinas). This would not be surprising since birds from the Falkland Islands exhibit significant genetic divergence from other populations (Burg 2000; Burg & Croxall 2001). However, the main differences appear to occur during the first cycle. Also, P. Ryan (*in litt.*) found that up to 20% of birds killed on tuna longlines off South Africa (presumably mainly from South Georgia) deviated from the general moult pattern, sometimes moulting p7–p10, or having a different moult pattern for inner primaries.



Figure 3. Black-browed Albatross *Thalassarche melanophris*, off Albany, Western Australia, South Indian Ocean, 20 July 2008. © Alan Collins. Aged as fourth cycle, 38 months old. Primary moult is complete and new middle primaries contrast with browner p8–p10, which are frayed at the tips and have obviously bleached shafts. There is a long block of old juvenile secondaries (at this age, juvenile secondaries are often found between secondaries 6 and 24; Prince & Rodwell 1994). The main plates of the bill are richer yellow than the younger birds in Figures 1 and 2, while the unguis are still largely dark grey, though with more extensive pale tips and a hint of reddish. Note that this bird has completed primary moult by July, which is consistent with Howell (2012).



Figure 4. Black-browed Albatross *Thalassarche melanophris*, between South Georgia and Gough Island, South Atlantic, 4 April 2010. © *Graham and Shirley Muir*. Aged as sixth cycle, 59 months old. This bird is in active primary moult, replacing a number of middle primaries, but not p8–p10. Thus, based on primary moult, this immature bird could be in either its fourth cycle or sixth cycle. However, compared to the fourth-cycle bird in Figure 2, the bill is more adult-like with, for example, reddish rather than dark greyish unguis (and pale tips). It lacks a neck shawl. Also note that the eyebrow, which is relatively undeveloped in the birds in Figures 1–3, is quite adult-like here. The bird is mid primary moult in April, somewhat earlier than 'mainly April–September' given in Howell (2012). As stated in the main text, there may be variation in moult timing of same-aged immature birds linked to age of return to colony.

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Appendix

The moult of Black-browed Albatross (and other *Thalassarche* mollymawks) might be considered complex, but the majority of birds follow a fairly straightforward general pattern (sequence and timing). Also, we do not need to know all of the details of moult for the purpose of aging a bird (the issue in this note). Black-browed Albatrosses moult once a year (yearly cycle) giving a basic plumage (hence the term 'prebasic' moult). The following are the essentials for aging Black-browed Albatrosses using moult. The first cycle commences in the nest when natal down is replaced by juvenile feathers, roughly January to April in the first prebasic moult. To keep things simple we assume all birds fledge on 1 May and so are one year old on 1 May (12 months after fledging), 2 years old the following 1 May (24 months after fledging), and so on. On fledging, juvenile feathers are fresh and of the same age. The second cycle involves a head, body and probably tail moult, roughly the following January to September, in the second prebasic moult. The dark mantle, scapulars and back feathers are fresh and contrast with old browner feathers on the upperwings. The third and subsequent cycles include body and tail moult, but we concentrate on the remiges, mainly the middle and outer primaries p6–p10 because they follow a clear pattern. The third cycle includes moult of p8–p10, but not p6 and p7, the following January to April in the third prebasic moult. The replaced fresh p8–p10 contrast with old paler brownish p6 and p7. The fourth cycle includes moult of p6 and p7, but not p8–p10, previously thought to be the following April to September, but this article indicates it starts earlier in December, in at least some and perhaps the majority of birds. The replaced fresh p6 and p7 contrast with old, paler-brownish p8–p10. The fifth cycle is as the third cycle, and the sixth cycle is as the fourth cycle, but April to September in both cases. From hereon the alternating cycle in the primaries continues, but the bird's plumage aspect does not change, it is the definitive basic plumage, and birds are called adults.