

FIRST DOCUMENTED AT-SEA RECORDS OF “INTERMEDIATE MORPH” SOFT-PLUMAGED PETREL *PTERODROMA MOLLIS* AND CLARIFICATION OF POLYMORPHISM IN THE SPECIES

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SUMMARY

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The Soft-plumaged Petrel is a gadfly petrel that occurs widely across the southern oceans and exhibits plumage polymorphism. Pale-bellied individuals make up the vast majority of the species, while dark individuals are relatively rare. Intermediate forms are rarer still and, according to some authors, known only from museum specimens. We describe a number of at-sea records of intermediate-plumaged individuals seen off southwest Western Australia, including a previously undocumented streaked variant. Our observations indicate that plumage polymorphism within the species covers a continuous spectrum of variation between typical pale and wholly dark individuals.

Keywords: *Pterodroma mollis*, Procellariidae, plumage polymorphism, Indian Ocean, Western Australia

The Soft-plumaged Petrel *Pterodroma mollis* is one of several gadfly petrels that exhibit plumage polymorphism. Here, we clarify confusion over the prevalence, and in one case the disappearance, of various morphs within the species observed in the eastern Indian Ocean. Pale-morph individuals make up the bulk of the population and are characterised by predominantly white underparts with a variably broad, typically complete, grey breast band (Fig. 1). Dark-morph individuals are rare and show completely dark grey underparts, with faint traces or “ghosting” of the pale-morph pattern still visible (Onley & Scofield 2007, Flood & Fisher 2013). Intermediate-morph individuals have been recorded, but these records are reportedly limited to “a few scruffy intermediates ... in museum collections” with “no recent records at sea or from

breeding grounds” (Onley & Scofield 2007, p. 185). However, this status is clouded by variations in the treatment of intermediate birds by different authorities. Shirihai (2008) makes no mention of an intermediate morph and describes the dark morph as “partially (mottled) to wholly dusky-brown/sooty-grey on underparts with variable breast-band” (p. 156), indicating that intermediate birds are included within the category of dark morph. Other authors also follow or imply this treatment (e.g. Brown *et al.* 1982, Harrison 1983, Marchant & Higgins 1990, Harrop 2004). For the purposes of this report, we instead broadly define “intermediate morph” to include all forms intergradient between the typical white-bellied and the almost-wholly dark grey forms, i.e. the form often described as potentially indistinguishable at sea from Kerguelen Petrel *Aphrodroma (Lugensa) brevirostris* (Elliott 1954, Bourne 1957, Serventy *et al.* 1971, Cramp 1977, Schramm 1982, Johnstone & Storr 2004). On the basis of this definition, we report here a number of at-sea observations of Soft-plumaged Petrels exhibiting intermediate plumage features, possibly the first documented at-sea observations of such individuals (Onley & Scofield 2007). Further, we report an apparently previously undocumented intermediate form of pale-type birds with distinctive coarse grey flank streaking. Finally, we suggest that it is not useful to regard these as morphs of a dichromatic species, but rather as uncommon variants within a continuous spectrum of polymorphic variation.



Fig. 1. Pale-morph Soft-plumaged Petrel off Perth, Australia: a relatively typical individual. Note the small amount of mottling on the flanks immediately adjacent to the wing. (Photo: Robyn Pickering)

Soft-plumaged Petrels are common visitors to Western Australian (WA) waters, occurring throughout the year, although primarily from late autumn through to spring (May to September). Among the typical pale-morph individuals, observers in recent years have recorded a number of intermediate birds, exhibiting variably darker underparts than typical pale-morph birds. These intermediate individuals have ranged from birds superficially resembling pale-morph individuals, but with slightly more extensive grey breast bands and distinct grey streaking on the flanks, through

to grey-bellied birds that could arguably be considered dark morphs. Individuals described variously as “dark” and “grey” have previously been reported in waters off Perth and Albany (O’Connor 2010), but as photographs or specific details of plumage are not available, we do not discuss them further. Another observation of a dark intermediate individual seen off Perth on 12 September 2010 (pers. obs., J.K.G. and A.C.) was also not photographed owing to rough conditions, and is also not discussed in depth.

The first well-documented intermediate birds were photographed off Perth on 8 August 2010. Two individuals were sighted, occupying opposite ends of the intermediate spectrum. The first of these (Fig. 2) was relatively pale, resembling a classic pale-morph bird but with a proportionally dark and extensive breast band (although this feature shows significant variation even within subspecies) and extensive coarse grey streaking on the flanks. The second was predominantly dark, arguably either a dark intermediate or a dark morph, showing a medium grey belly contrasting with a broad dark grey collar and paler grey undertail coverts, but more typical plumage about the head (i.e. paler throat and forehead, and dark eyemask). Upperparts were typical of the species, with the usual dark “M” pattern across the back and extending onto the wings.

Another streaked intermediate bird recorded off Albany on 28 July 2012 had plumage similar to the paler August 2010 individual, i.e. resembling a typical pale morph but with distinct coarse grey streaking on the upper flanks extending towards the caudal abdomen; the degree of flank streaking was less than that of the 2010 bird.

On 4 May 2013, another intermediate individual was recorded off Albany. It showed a classic intermediate plumage, as illustrated in



Fig. 2. Streaked intermediate Soft-plumaged Petrel off Perth, Australia, 8 August 2010. Note the relatively broad breast band and coarse grey streaking on flanks. (Photo: Robyn Pickering).

Onley & Scofield (2007), with a broad, dark, indistinct grey breast band, merging into medium grey flanks, and a paler and slightly mottled grey belly (Fig. 3).

On 4 August 2013, a dark intermediate or dark-morph individual was seen off Perth, showing evenly medium grey underparts, contrasting faintly with a broad dark grey hood and collar, and paler grey throat with some pale scaling about the face (Fig. 4).

Most recently, on 4 May 2014, another intermediate individual was recorded off Albany (Fig. 5), showing mottled medium grey



Fig. 3. Intermediate Soft-plumaged Petrel off Albany, Australia, 4 May 2013. This individual shows classic intermediate-morph plumage per Onley & Scofield (2007). (Photo: Dan Mantle)



Fig. 4. Dark intermediate Soft-plumaged Petrel off Perth, Australia, 4 August 2013. While dark, this individual still shows a contrast between the dark breast band and paler underparts. (Photo: Clive Nealon)

underparts, contrasting with a dark grey head and breast band, and paler throat. In dorsal views (Fig. 6), the bird showed some characters (most notably head pattern) reminiscent of members of the northern hemisphere *P. feae*/*P. madeira* complex, with a dark grey head contrasting with a paler grey mantle.

Our observations are notable for several reasons. First, the bird seen on 4 May 2013 shows a classic intermediate-morph plumage, comparable to that illustrated in Onley & Scofield (2007) (a similar illustration also appears in Harrop (2004), labelled “dark morph”). A few such intermediate individuals exist in museum collections, but there are reportedly no recent records of live birds (Onley & Scofield 2007). We have also been unable to find any recent reports or photographs of birds exhibiting such intermediate plumage in published literature or web-based sources. Hence, we believe this may represent the first documented at-sea record of a classic intermediate-morph Soft-plumaged Petrel. Second, we have also been unable to find any published illustration or photograph depicting birds with distinct coarse grey flank streaking as shown in Fig. 2, although similar forms have been observed off the east coast of South Africa (A. Sutherland, pers. comm.). Furthermore, we could find no clear description of this variant in the literature; although the dark morph has been described as having “heavily streaked underparts” (Elliot 1954, Bourne 1957, Marchant & Higgins 1990), these descriptions seem likely to refer to fine streaking/freckling at the feather level, rather than the coarse macroscopic streaking described herein. The flanks of typical pale birds are described as having only dark feather streaks and variable mottling (Marchant & Higgins 1990) or “fine indistinct greyish streaks” (Flood & Fisher 2013, p.134). Our observations of birds with distinctive coarse flank streaking may imply more complex genetic mechanisms for pigmentation of the underparts of darker (intermediate) birds.

Dark-morph birds are variously described as “rather rare” (Shirihai 2008, pg. 156), “very rare” (Onley & Scofield 2007, p. 58), and “at most a rare aberration” (Harper 1973). Intermediate-morph individuals are considered rarer still (although see discussion on differences in treatment, above) and are apparently limited to a few museum specimens (Onley & Scofield 2007). Considering our

observations relative to the total number of Soft-plumaged Petrels sighted on all southwest WA pelagic trips since 2010, intermediate and dark individuals contribute approximately 4% of this species in the region. This estimate is supported by comments in Flood & Fisher (2013) indicating dark individuals may account for 1% of the population in the southwest Indian Ocean, and possibly up to 10% further east in the Indian Ocean (H. Shirihai *in litt.*, quoted in Flood & Fisher 2013). The proportion of dark birds in WA waters has been estimated at 3% (N. Cheshire, *in litt.*), and one of the nine specimens held by the WA Museum is a dark intermediate bird found near North West Cape (Johnstone & Storr 2004). The source of these birds is unknown, although the focus of these records around the central southern Indian Ocean may imply these are primarily birds of the subspecies *P. m. dubia* (Prince Edward, Crozet, Kerguelen and Amsterdam islands), which tend to have darker plumage features (i.e. breast band, face mask, upperparts, flank mottling) (Clancey *et al.* 1981, del Hoyo 1992). Dark (and intermediate) morphs appear to be very rare in the Atlantic Ocean (e.g. Flood & Fisher 2013), which further suggests that these morphs may occur primarily (or perhaps solely) within *P. m. dubia*. Close observation of individuals across the species’ range, and particularly at breeding grounds, may help to further clarify this.

Even some recent authors have treated dark-morph birds as possible results of hybridization with Kerguelen Petrel (Clancey *et al.* 1981, Schramm 1982, del Hoyo *et al.* 1992, Johnstone & Storr 2004), although all measurements of dark morphs are normal for Soft-plumaged Petrels (Swales 1965). It is worth noting that the dark birds reported here appeared typical in all non-plumage characters, including bill, size, jizz and behaviour.

Our observations add weight to previous suggestions (Marchant & Higgins 1990) that plumage variation in Soft-plumaged Petrels occupies the full spectrum between typically pale to almost fully dark individuals. This is further supported by photographs of skins held by the British Natural History Museum at Tring, Tring, UK (Flood & Fisher 2013, p. 132). Thus, although we have used the term “morph” throughout this report for convenience,



Fig. 5. Intermediate Soft-plumaged Petrel (left, with Great-winged Petrel, right) off Albany, Australia, 4 May 2014. Note the “hooded” effect from the dark head and breast band as well as the evenly medium grey underparts. (Photo: Alan Collins)



Fig. 6. Intermediate Soft-plumaged Petrel off Albany, Australia, 4 May 2014 (same individual as Fig. 5). Note the contrast between the dark head and neck and paler scaled upperparts; the result is a passing resemblance to the Fea’s Petrel complex of the North Atlantic. (Photo: David Mitford)

the classification of individuals into discrete groups such as pale morph, dark morph and intermediate morph may be misleading, implying discrete variation. At best, these terms divide two variable categories of birds presenting in the field as predominantly “light-bodied” or “dark-bodied,” leaving intermediate birds to constitute a disputed midpoint. It is more appropriate to regard colour variation within the species, particularly of the underparts, as a continuous spectrum from the typical pale form to almost entirely grey birds, via the range of intermediate forms presented here.

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