

Bulweria petrels off the Comoros, south-west Indian Ocean

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During pelagic work to study 'Mohéli Shearwater' *Puffinus persicus temptator* (Shirihi & Bretagnolle 2015), on 4, 5 and 8 November 2014, HS conservatively estimated the presence of 130 individuals of a *Bulweria* petrel off the Comoros, with max. 48 on 8 November, between Grande Comoro and Mohéli (at c.12°01'S, 43°43'E), and another 16 between Mohéli and Anjouan and north of Anjouan on 9 November. This petrel was the fourth most abundant seabird observed, after Brown Noddy *Anous stolidus*, Sooty Tern *Onychoprion fuscatus* and Mohéli Shearwater.

As noted by Zonfrillo (1988) the two *Bulweria*, Bulwer's *B. bulwerii* and Jouanin's Petrels *B. fallax* are clearly separated in biometrics, with the latter larger and heavier. Although the Comoros *Bulweria* appeared closer in size to *B. fallax*, we refrain from making a specific identification, as HS considered them to be smaller than other *B. fallax* he has seen. The relative location of the Comoros, with sea surface temperatures of 25°C, also better fit *B. fallax* (known to breed on Socotra, and possibly on the Arabian mainland). They were not *B. bulwerii*, which occurs over colder, more southerly waters.

Observations of both *Bulweria* in the south-west Indian Ocean were summarised by Safford & Hawkins (2013); cf. Ryan *et al.* (2013) for recent evidence of *B. fallax* in the eastern Indian Ocean. HS observed two *Bulweria* (also unidentified to species as size was difficult to estimate, like the Comoros birds) off Mombasa, Kenya, in November 1996. Veit *et al.* (2007) reported undocumented sightings of several *Bulweria* identified as Jouanin's, near Mayotte, from the *R/V Marion Dufresne* in January 2003. In October 2008, Morris (2008) photographed *Bulweria* off the Comoros similar to those we describe here, which he hesitantly identified as *B. bulwerii*.

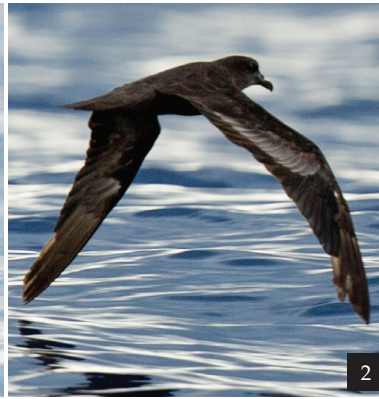
Description of birds in November 2014

Size.—Intermediate between the two *Bulweria*: although apparently clearly larger and longer winged than Bulwer's, they did not seem as large and heavy as Jouanin's. This impression was constant. Estimating overall size at sea and from photographs is often subjective, and in strong sunlight over a very calm sea, birds often appear larger than they really are, while most birds were in active moult, which can also make them appear larger. In direct comparison with Mohéli Shearwater these *Bulweria* usually appeared 5–10% smaller, thus closer in size to Jouanin's than to Bulwer's. Only by taking measurements will it be possible to confirm their true overall size. However, despite appearing closer to Jouanin's, all constantly showed narrower bills than *B. fallax* (e.g. Figs. 5–8). Among 54 birds observed sufficiently close to check bill size and structure, none showed adult Jouanin's characteristic large globular bill (typically square-shaped with well-developed plates, including the proportionately huge, bulging maxillary unguis). Nevertheless, Jouanin's with narrower bills exist (probably females and/or fledglings), and it is possible that Comorian waters harbour mostly narrow-billed Jouanin's.

Flight.—In our experience, Jouanin's makes typically slower and more effortless progress than Bulwer's. Compared to the latter, Jouanin's has longer and more 'elastic' wings producing longer glides, with slower / fewer wingbeats producing less 'bouncy' and



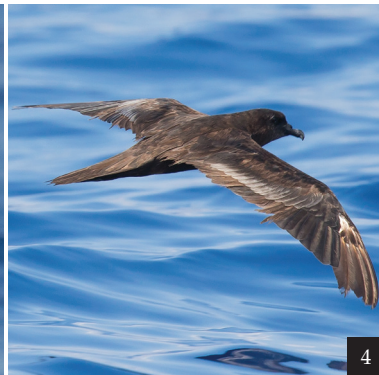
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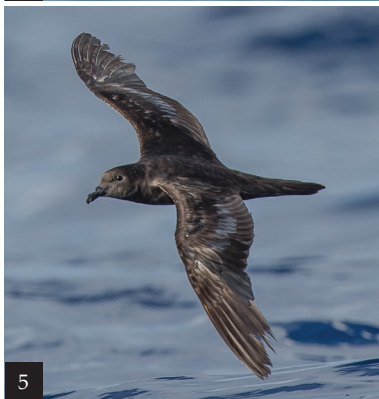
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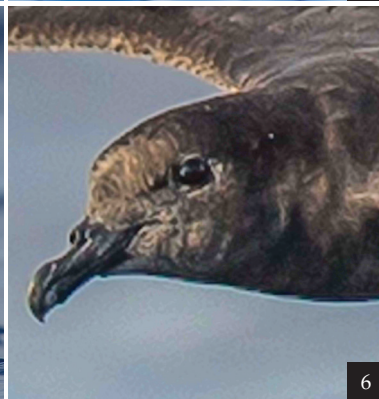
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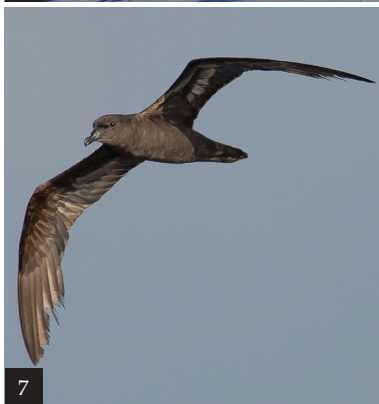
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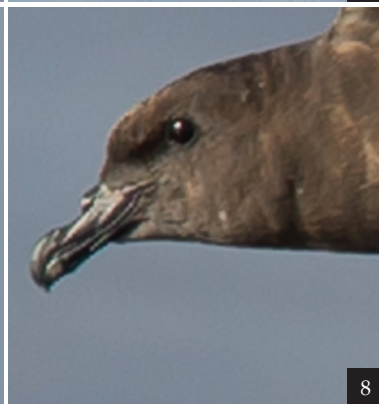
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Figures 1–4. Unidentified *Bulweria* petrels, off Mohéli, Comoros, November 2014, in moult, with severely worn and damaged primary tips, showing two different individuals (Figs. 1–2 = one bird; Figs. 3–4 = second bird); note large flashes of silvery grey with bluish or ashy tone on greater coverts, and overall size estimated to be closer to Jouanin’s (Tubenoses Project & Extreme Gadfly Petrel Expeditions / Hadoram Shirihai)

Figures 5–8. Unidentified *Bulweria* petrels, off Mohéli, Comoros, November 2014, showing three different individuals (Figs. 5–6 = one bird; Fig. 7 = second bird; Fig. 8 = third bird); all 54 birds seen close showed narrower bills compared to typical Jouanin’s, with the thickest example represented by the bird in Fig. 8, the narrowest in Fig. 5–6 and average-sized bill in Figs. 3, 4 and 7; and note striking large silvery grey flashes with bluish hue on greater coverts (e.g., Fig. 5), and paler underwing-coverts that were present to some degree in most birds, e.g. Fig. 7 (Tubenoses Project & Extreme Gadfly Petrel Expeditions / Hadoram Shirihai)

erratic manoeuvres than Bulwer's. Again, flight behaviour of the birds off the Comoros appeared closer to Jouanin's, but perhaps even lighter.

Plumage.—All showed a well-developed pale upperwing carpal (ulnar) bar (on the greater coverts), with some also having pale underwing-coverts forming a vague band. The pale carpal bar constantly appeared (see Figs. 1–5) as large patches of silvery grey or slate-blue with an ashy tone, and was detectable even at some distance. This coloration was present on fresh coverts and was not the result of pale reflections due to feather bleaching and wear, as often seen in very worn Jouanin's (*cf.* van den Berg *et al.* 1991). We already reported slate-blue dorsal pigmentation on Jouanin's observed elsewhere in the Indian Ocean, including off Réunion (Shirihai *et al.* 2014: 212). It seems that on some fresh Jouanin's, and in certain lights, slate or greyish hues can be present on the greater coverts, despite not being described in most of the general literature (e.g. Harrison 1987, Marchant & Higgins 1990, Brooke 2004, Onley & Scofield 2007, Porter & Aspinall 2010), but are usually smaller in area, duller and less contrasting than the petrels observed off the Comoros. Of 84 photographs of *B. fallax* on the internet (e.g. (www.uaebirding.com/index.html, www.mike-barth.blogspot.ch/2012/11/jouanins-petrel-fest.html, www.birdsoman.com/Birds/011-Petrels/JouaninsPetrel/JouaninsPetrel.htm), only three showed similar bluish-grey coloration on fresh greater coverts, all off United Arab Emirates in November 2012 (K. Al Dhaher, O. Campbell & M. Barth).

HS was unable to photograph the very few fresh, recently fledged juveniles he observed, which were aged by their evenly fresh remiges, with no moult limits among the upperwing-coverts, while their wings were rounder, as is often the case in juvenile petrels. While the carpal patch was well developed in these birds, unlike their adult counterparts the flashes appeared yellowish buff, not silvery grey with a bluish hue.

Moult timing.—Of 54 birds that were close enough to check for moult, 46 were in various stages of moult, with 3–4 inner primaries, 1–4 secondaries, most greater coverts and some rectrices being renewed or growing; the remaining flight feathers and coverts were strongly worn and bleached, suggesting that they were undergoing complete moult, and thus post-breeding adults. The other eight were fresh fledglings.

Behaviour

The *Bulweria* often fed with Wilson's Storm Petrels *Oceanites oceanicus* (max. 32, 8 November) just above the continental shelf. The *Bulweria* mostly avoided the boat, and showed weak response to the chum, being rather shy. As a result, only 19 petrels were photographed, and for only six was it possible to secure close images, five of which are included here.

Discussion

The numbers of *Bulweria* reported here are probably among the largest ever recorded in the western Indian Ocean away from Arabia (*cf.* Safford & Hawkins 2013). We have also described in detail the appearance of a silvery slate-blue upperwing bar (on fresh greater coverts, in all petrels in moult), which was a constant feature of all (non-juvenile) Comoros *Bulweria*, despite being very rarely noted in Jouanin's off Arabia.

We encourage observers to monitor the frequency and the nature of this character in birds off Arabia, to better understand plumage variation in *B. fallax*. Although estimating overall size at sea is always tricky, the Comoros *Bulweria* were estimated to be nearer Jouanin's but smaller and lighter, with consistently narrower bills.

The large numbers close to all three islands, especially in the evenings and early mornings around Mohéli or between Mohéli and Grand Comore, may suggest a winter-breeding population of these *Bulweria*. However, because the vast majority of birds were in active moult, our assumption is that they were not local breeders but from elsewhere in the western Indian Ocean.

Published wing lengths of a Bulwer's Petrel incubating an egg on Round Island, Mauritius, in December 1994 (Safford & Hawkins 2013), and one on Cousin Island, Seychelles, in June 2009 (Andrews & Skerrett 2012), are intermediate between Bulwer's and Jouanin's Petrels, albeit closer to upper values of the former (for biometrics, cf. Brooke 2004, Safford & Hawkins 2013). Until Comoros birds can be handled for detailed analysis it will be impossible to confirm their identity. Our findings should stimulate research into *Bulweria* petrels in the western Indian Ocean as whole.

Acknowledgements

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