

BARC SUBMISSION

**Trindade Petrel *Pterodroma arminjoniana***

Cape Naturaliste, 27<sup>th</sup> June 2019

Daniel Mantle\*, Stewart Ford, Damian Baxter, and John Graff

---

**SUBMISSION NOTE**

The bird was initially reported as a “Trindade-type” Petrel as we were unsure of the taxonomic status of this group at the time (Trindade Petrel versus ‘Round Island’ Petrel). However, as most authorities (IOC v.9.2, Clements v.2019, HBW-Birdlife v.3) now treat these as a single species, we are following that approach herein. Thus, we are submitting this bird as an intermediate morph Trindade Petrel *Pterodroma arminjoniana*. Excepting issues with hybrid birds, we are confident of this identification.

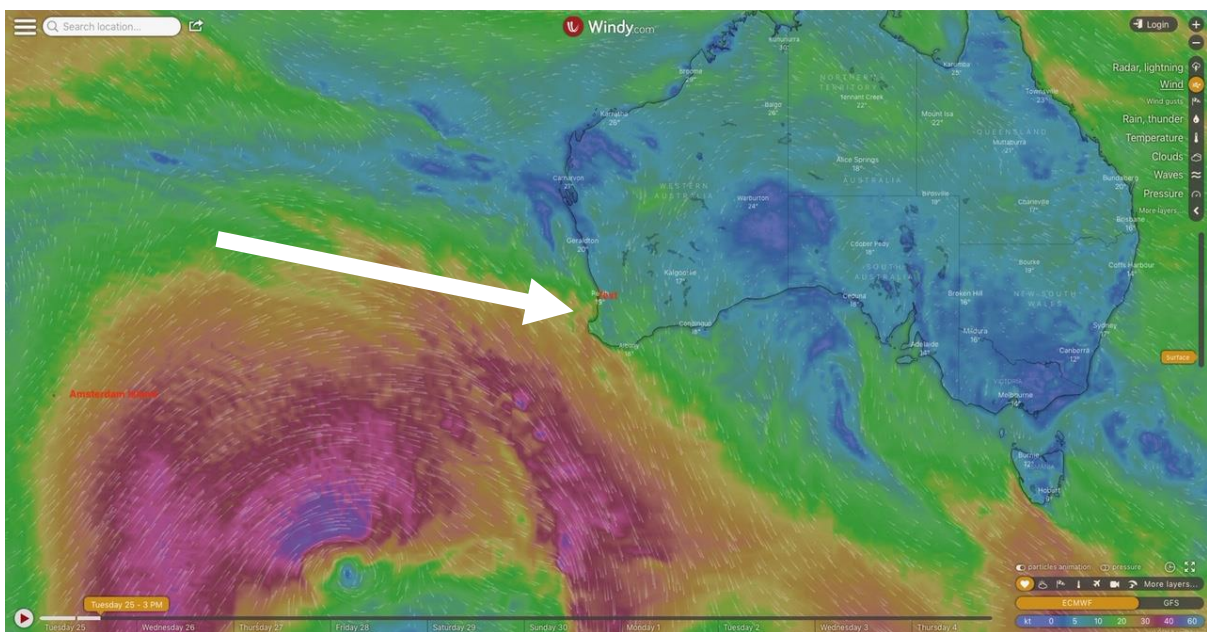
**TAXONOMIC NOTES**

A good summary of the status of Henderson Petrel *Pterodroma atrata*, Herald Petrel *Pterodroma heraldica*, Kermadec Petrel *Pterodroma neglecta*, and Trindade Petrel *Pterodroma arminjoniana* (with briefer notes on Phoenix Petrel *Pterodroma alba*) is provided by the South America Classification Committee proposal 582 (SACC 582, Jaramillo et al. 2013;). All five taxa are considered to be genetically distinct (see discussions in Brooke & Rowe, 1996; and Brown et al., 2010) and all have distinct, albeit sometimes modest, plumage, morphological and vocal differences. Whilst there are minor detectable genetic differences between the Trindade Petrels on Round Island and Trindade Island, the differentiation is considered low and may be partly attributable to sampling artefacts (Brown et al., 2010). As such, none of the major taxonomic authorities still recognise Round Island Petrel as a distinct taxon. Trindade and Herald Petrels have also been considered conspecific in the past, however their separation as distinct species is not only based on genetic and plumage/external morphological differences but is also backed up by significant differences in intestinal structure and feather lice types (Imber, 1985).

**CIRCUMSTANCES OF THE SIGHTING**

A large weather system in the Indian Ocean was noted on and prior to the 25<sup>th</sup> June (Figure 1), which resulted in strong to near-gale NW winds at Cape Naturaliste on the 26<sup>th</sup> June; these swung around

to similarly strong westerlies on the 27<sup>th</sup> June. These are favourable seawatching conditions at Cape Naturaliste, and consequently Damian Baxter (DB), Stewart Ford (SF), John Graff (JG) and I (DM) carried out long seawatches there on the 26<sup>th</sup> and 27<sup>th</sup> June. We observed huge numbers of *Pterodroma* for this site (1200 Great-winged Petrels *Pterodroma macroptera* and 200 Soft-plumaged Petrels *Pterodroma mollis* on the 26<sup>th</sup> June; 1600 Great-winged Petrels and 300 Soft-plumaged Petrels on the 27<sup>th</sup> June). Overall, this assemblage of *Pterodroma* with only sparse albatross numbers is an expected Indian Ocean assemblage, versus the more cold-water assemblages that may be seen at this site following a more southerly component to the build-up winds (e.g., note the different composition of seabirds recorded by John Graff on the 10<sup>th</sup> June 2019; including 16 Grey-headed Albatrosses, 20 White-headed Petrels, and 2 Southern Fulmar).



**Figure 1.** Wind map from Tuesday 25<sup>th</sup> June 2019. White arrow showing the potential area that birds would be drawn from to end up in Geographe Bay and off Cape Naturaliste, Western Australia on the 27<sup>th</sup> June 2019.

Following several hours of steady passage of Great-winged and Soft-plumaged Petrels on 27<sup>th</sup> June, the candidate Trindade Petrel was picked up by DM over 1 km northwest of the cape before continuing south past the tip of the cape, eventually coming within ~500 m of our viewing position. The light was generally good throughout the total viewing time of about 1.5–2 minutes, but particularly the final 20–30 seconds of the view were in excellent light and the details of the underwing and face were best appreciated then (albeit only JG and SF could see the bird for this last 20 s period, as DB was trying to photograph the bird and DM had moved out of the way from a position blocking their views).

## DESCRIPTION

Field notes combined from the whole group's observations:

- When the bird was first picked up over a kilometre from our viewing position, it was immediately obvious it was a very interesting bird with a diffuse pale belly patch and pale underwing primary panels. These are 'major alert' features off the west coast of Western Australia.
- The bird was roughly the size of a Great-winged Petrel (clearly larger than a Soft-plumaged Petrel) but with more slender wings than a Great-winged Petrel. The wings were also held straighter and the bird flew in a less hurried, rather "effortless" manner compared to the more dynamic Great-winged Petrels. It stayed relatively low to the water throughout.
- The bird was mid-brown coloured, slightly paler than the nearby Great-winged Petrels. The belly patch was off-white or pale beige (not white) and was not sharply demarcated (rather it had diffuse edges) and started quite low on the chest/belly (it did not extend forward of the wings).
- The underwing primary patches were extensive and obvious throughout. The pale panel on the inner underwing was less obvious but stood out in the strong sunlight when seen well in the last 20 seconds. SF considered that it angled forward towards the carpal point.
- JG also thought he saw a limited paler (not white) chin/throat, with diffuse edges, during the best lighting of the last 20 seconds of viewing.
- No one saw any hint of paler lores, which would have been hard to see for much of the viewing. However, in the important last 20 seconds of good lighting (when all the other pale patches were strongly emphasised) there was still no sign of any loreal patches and JG and SF feel they would have seen any large white loreal patches at this time. SF notes that he feels he would have made out this feature for even longer than this.
- Overall, the mid-brown tones, diffuse paler lower belly patch, limited white on the inner underwing and reduced pale throat area all suggestive of an intermediate morph.

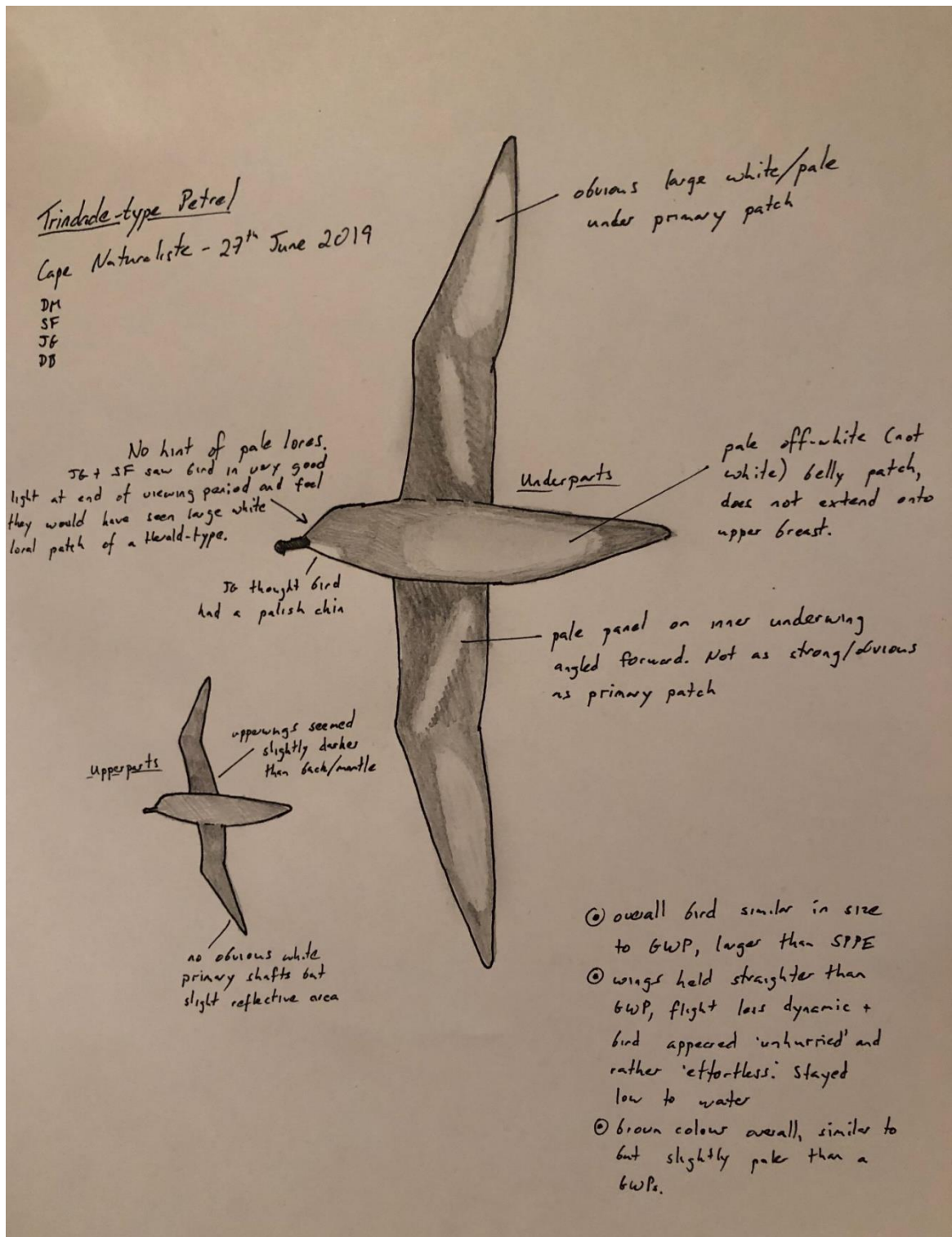
Remarkably, a photograph was obtained by DB of the dorsal surfaces as the bird had moved past the cape and was proceeding in a southerly direction (Figure 2).

Immediately after the sighting, each observer sketched the field marks they had noted and we discussed the size, flight style and jizz of the bird. A composite sketch was produced that evening (Figure 3) showing the features of the bird.



**Figure 2.** *Photograph (Damian Baxter) of the candidate intermediate morph Trindade Petrel as it had moved past our vantage point and continued out to sea off Cape Naturaliste (27<sup>th</sup> June 2019). Note the contrast between the darker wings and paler back. The bird looks quite grey-brown in this image, but this differs from how we all saw it in better light, as a mid-brown bird with an off-white or pale beige lower belly and darker upperwings. In our telescope views, the upperwings could be clearly*

seen to lack any white primary shafts; this is somewhat backed up by the above photo (albeit the lack of pixels means this is hard to confirm from the photo alone).



**Figure 3:** sketch of the bird produced the evening after sighting, with input from all four observers to ensure it accurately captured each of our observations (based on field notes and rough field sketches).

## **DISTINGUISHING SIMILAR SPECIES**

**Kermadec Petrel *Pterodroma neglecta***—the only other definitely polymorphic species of the closely related Henderson/Herald/Kermadec/Phoenix/Trindade group. This species shares a similar range of brown-toned morphs and thus is the closest match on colour alone to our bird. However, the major diagnostic feature that readily separates this species from the others, the white primary shafts on the upperwings, were clearly not present on the Cape Naturaliste bird. Kermadec Petrels also typically have ‘whitish confined to the hands’ (Flood & Fisher, 2013) rather than extending onto the innerwing as per the Cape Naturaliste bird. Kermadec Petrels are also moderately broad-winged *Pterodromas* (at least with respect to the closely related grouping mentioned above), thus differing from the relatively narrow and long-winged appearance of the Cape Naturaliste bird. Furthermore, Kermadec Petrels have relatively short, rounded or squarish tails (Brown et al., 2011 and Onley & Schofield, 2007, respectively). This differs from the quite long and somewhat pointed tail shape vaguely apparent in the above photo (figure 3) of the Cape Naturaliste petrel. SF also noted the “attenuated” rear end/tail whilst viewing the bird.

**Herald Petrel *Pterodroma heraldica***—probably the most similar looking species to a Trindade Petrel. Most current texts suggest Herald Petrel only commonly occur as pale morph birds and treat the darker breeding birds on Henderson Island as a separate species. Thus, when trying to separate pale Herald Petrel types from the candidate Trindade Petrel, the most important plumage difference is the pale lores (present on most pale Herald Petrels). This feature was not observed on the Cape Naturaliste bird by any of us. Admittedly, only SF and JG were fully confident of the absence of this feature, whilst DM and DB were confident that they didn’t see this feature. SF and JG watched the bird in the best light when it was closest to us (~500 m), but SF was also confident he would have seen it earlier than this too. Another potentially very useful feature to help eliminate this species is the elongate paler/white panel on the inner underwing. This is a much more frequent feature of Trindade Petrels than pale Herald Petrels. Onley & Schofield (2007; p. 70) note that Herald Petrel are ‘tending to be darker on the inner wing’ and that pale Trindade Petrels ‘have more white on inner underwings and bases of primary coverts’. Howell (2012) similarly notes that light morph Herald Petrels have ‘underwings dark overall with white flashes on primaries and primary coverts, variable whitish mottling along greater secondary coverts’. Finally, the Cape Naturaliste bird was dominantly mid-brown with a diffuse paler off-white/beige lower belly, whereas Herald Petrels are often somewhat greyer overall with more sharply defined white underparts that extend up to the upper breast (intermediate morph Herald Petrels appear to be rare/unknown).

**Henderson Petrel *Pterodroma atrata***—this species is only known to occur as a dark morph, always lacks a paler belly patch, and also lacks strong white under primary patches. It is thus easily eliminated as a possible candidate.

**Phoenix Petrel *Pterodroma alba***—this species is quickly ruled out as the candidate bird lacked the combination of clean white underparts (belly and lower breast) that are sharply demarcated from the dark brown head, neck, uppermost breast and upperparts. It also lacks the paler underwing markings so apparent on the Cape Naturaliste bird.

### **PREVIOUS AUSTRALIAN RECORDS**

A dark morph Trindade Petrel was recorded on West Island, Ashmore Reef in March 2019 (Rohan Clarke, 2019; facebook post on Australian Twitchers page; BARC submission status unknown). All other previous records (Varanus Island, Christmas Island, North Keeling Island) are thought to relate to pale-bellied birds with pale loreal patches and thus refer to Herald Petrels (see comments by Rohan Clarke on the same facebook post as noted above).

### **SUMMARY**

A mid-brown coloured, mid-sized petrel with paler off-white/beige belly patch and significant white patches in the underwing primaries and less obvious pale inner underwing panel was observed for circa 90–120 seconds heading south off Cape Naturaliste. It was a similar size (or possibly very marginally smaller) than nearby Great-winged Petrels and flew relatively low to the water with a rather unhurried, leisurely flight (not as dynamic as the nearby Great-winged Petrels). Although the views were rather distant, a combination of features are considered diagnostic of an intermediate Trindade Petrel: the mid-brown colour of the upperparts, head, and upperbreast, the off-white/beige lower belly patch, the pale patches in the underwing primaries and inner underwing, and importantly the lack of white primary shafts on the upperwing primaries and the lack of a pale loreal spot.

We also note that Trindade Petrel would be expected to be the most likely of this closely related group to occur off Western Australia, particularly after NW feeder winds. It is the dominant petrel breeding on Round Island with only very rare pure Herald Petrels recorded from the island. As we are all certain this bird was not a Kermadec Petrel (on both plumage and structural differences), we consider the identification of this bird comes down to successfully eliminating Herald Petrel. The overall mid-brown colour, pale inner underwing panel and absence of a pale loreal spot all favour Trindade Petrel.

Thus, based on plumage and morphology, we are confident that the bird was an intermediate morph Trindade Petrel.

However, we do note that interbreeding between Trindade and Kermadec petrels and Trindade and Herald petrels on Round Island is problematic (see below) and may account for over 20% of the birds on the island. These hybrid birds are not necessarily identifiable at sea (or in the hand, Katherine Booth Jones pers comm.), but then no Trindade Petrels that are not genetically sampled could be 100% proven. With tracking data showing continued movement between Round Island birds and both Pacific and Atlantic populations, this hybrid issue would apply to varying degrees to Trindade, Kermadec and Herald petrels, all of which are known to hybridise on Round Island (see below).

## **ADDENDUM**

### **Notes on the interbreeding of Herald, Kermadec and Trindade petrels on Round Island (22 km NE of Mauritius in the Indian Ocean)**

*Pterodroma* petrels were only first discovered nesting on Round Island in 1948 (Vinson, 1949) and are possibly a very new addition to the island (their conspicuous behaviour including afternoon flights and very vocal nature is unlikely to have been missed on previous visits to the island). Furthermore, the low genetic differentiation between the Trindade Petrels on Round Island and Trindade Island also supports that these two populations are recently diverged (Brown et al., 2010).

These three recently colonized Petrel species on Round Island come from two different oceanic basins—Trindade Petrels from the southern Atlantic Ocean and Herald and Kermadec petrels from the Pacific Ocean. The latter two are sympatric with no records of interbreeding. There are possibly fewer evolutionary barriers to interbreeding between Trindade Petrels and Herald/Kermadec Petrels as they were previously geographically isolated from each other. Genetic studies on Round Island have demonstrated genetic ‘leakage’ between Trindade Petrels and both Kermadec and Herald petrels (Brown et al., 2011). This is considerably more frequent for mixed Trindade–Kermadec Petrel pairs than for Trindade–Herald Petrel pairs. Only one mixed Trindade–Herald Petrel pairing has been observed on Round Island (Brown et al., 2011), although regular interbreeding is suggested from genetic studies. Jaramillo et al. (2013), in their summary report, suggest that Herald Petrels should possibly be considered as vagrants rather than an established population on Round Island, however, C. Jones (in Brown et al., 2011) considered small pale petrels, which may be Herald Petrels, to be as common as Kermadec Petrels on Round Island. More recently, Booth Jones (2017), in her PhD thesis, illustrated the breakdown of petrels on Round Island to be approximately: 75% Trindade Petrels,



15% Trindade x Kermadec Petrel hybrids, and the remaining 10% to be almost equally split between pure Kermadec Petrels, Trindade x Herald Petrel hybrids, and Trindade x Kermadec x Herald Petrel hybrids. No pure Herald Petrels were recorded during her study. Booth Jones also demonstrated that individuals from Round Island move between oceans (Figure 4), to the Atlantic and Pacific. It is unknown whether hybrids can be distinguished morphologically, which raises the prospect of uncertain purity, to some degree, for all Trindade, Kermadec and Herald petrels.



**Figure 4.** Recorded movement of individuals between oceans. Two individual petrels fitted with geolocators that departed Round Island in the Indian Ocean and migrated into the Atlantic and Pacific Oceans.

## REFERENCES

- Booth Jones, K.A. (2017). Distribution and gene-flow in a hybridising population of *Pterodroma* petrels. Doctoral thesis, UCL (University College London).
- Brooke, M. de L., Imber, M. J., and Rowe, G. (2000). Occurrence of two surface-breeding species of *Pterodroma* on Round Island, Indian Ocean. *Ibis* 142: 139–158.
- Brooke, M. de L., and Rowe, G. (1996). Behavioural and molecular evidence for specific status of light and dark morphs of the Herald Petrel *Pterodroma heraldica*. *Ibis* 138: 420–432.
- Brown R.M., Nichols R.A., Faulkes C.G., Jones C.G., Bugoni L., Tatayah, V., Gottelli, D., and Jordan, W.C. (2010). Range expansion and hybridization in Round Island petrels (*Pterodroma arminjoniana*); evidence from microsatellite genotypes. *Mol. Ecol.* 19: 3157–3170.
- Brown R.M., Jordan W.C., Faulkes C.G., Jones C.G., Bugoni L., Tatayah, V., Palma, R.L., and Nichols, R.A. (2011). Phylogenetic relationships in *Pterodroma* petrels are obscured by recent secondary contact and hybridization. *PLoS ONE* 6(5): e20350. doi:10.1371/journal.pone.0020350

- Clarke, R. (2019). [https://www.facebook.com/groups/718576241555767/search/?query=trindade%20petrel&epa=SEARCH\\_BOX](https://www.facebook.com/groups/718576241555767/search/?query=trindade%20petrel&epa=SEARCH_BOX).
- Howell, S.N.G. (2012). *Petrels, Albatrosses, and Storm-Petrels of North America: A Photographic Guide*, Princeton, New Jersey.
- Imber, M. J. (1985). Origins, phylogeny and taxonomy of the gadfly petrels *Pterodroma* spp. *Ibis* 127: 197–229.
- Jaramillo, A., Harrison, P., Armistead, G., Brinkley, N., Patteson, B., and Wilson, A. (2013). Split *Pterodroma heraldica* and *P. atrata* from *P. arminjoniana*. Proposal (582) to the South American Classification Committee.  
<http://www.museum.lsu.edu/~Remsen/SACCprop582.htm>
- Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P. & Franklin, K. (2017), *The Australian Bird Guide*, CSIRO, Victoria, Australia.
- Nicoll, M. January 3 2017. How tropical storms can help young seabirds?  
<https://www.zsl.org/blogs/wild-science/how-tropical-storms-can-help-young-seabirds>
- Onley, D. & Scofield, P. (2007), *Albatrosses, Petrels and Shearwaters of the World*, Christopher Helm, London.
- Vinson., J (1949). L'île Ronde et l'île aux serpents. *Proc Roy Soc Arts Sci Mauritius* 1: 32–54.