Revista Brasileira de Ornitologia, 22(1), 42-48
March 2014

SHORT-COMMUNICATION

The Kerguelen Petrel *Lugensa brevirostris* in the Southwestern Atlantic Ocean, with notes on osteology - and plumage-based identification

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Received on 23 August 2013. Accepted on 22 November 2013.

ABSTRACT. Southwestern Atlantic/eastern South American records of the Kerguelen Petrel *Lugensa brevirostris* are scarce, comprised only of specimens found dead on the coast. Here we present a review of records known from this region, including a novel record based on a specimen stranded at Arraial do Cabo, Rio de Janeiro state, Brazil. Additionally, we draw the attention of ornithologists and observers to problems of specimen identification, even in museums, when one needs to separate Kerguelen Petrel from dark-morph Herald Petrel *Pterodroma arminjoniana* or other dark-plumaged gadfly petrels of the genus *Pterodroma*. For identification of museum specimens, we recommend the use of an osteological character state, which allows unequivocal identification of Kerguelen Petrels, namely the wide and fenestrated *fossa glandulae nasalis* of the frontal bone.

KEY-WORDS: diagnostic characters, osteological characteristics, petrel, Procellariidae, review, South America.

The Kerguelen Petrel, *Lugensa brevirostris* (Lesson, 1831), is a medium-sized procellariiform that breeds on Tristan da Cunha and Gough Islands, in the Atlantic Ocean, and Marion, Prince Edward, Crozet, and Kerguelen in the Indian Ocean (Brooke 2004). It occurs in cold waters of the Southern Hemisphere oceans, at high latitudes (Harrison 1983; Brooke 2004), commonly around 60°S (Commins *et al.* 2014) and frequently in Antarctic waters near the pack ice (Joiris *et al.* 2013; Orgeira *et al.* 2013). Its range overlaps with other similar-sized, dark-plumaged petrels, with which it could be confused, such as the Great-winged Petrel *Pterodroma macroptera* (Teixeira *et al.* 1985), or the rare dark morph of the Soft-plumaged Petrel *Pterodroma mollis* (Harrison 1983; Shirihai 2007), and the Atlantic Petrel *Pterodroma incerta* (Flood & Fisher 2013). When in temperate/subtropical latitudes, the range of Kerguelen Petrel overlaps with tropical species with which it also could be confused, such as Trindade Petrel *Pterodroma arminjoniana* and Kermadec Petrel *Pterodroma neglecta* which breed on tropical islands in both the Atlantic and Indian Oceans (Luigi *et al.* 2009; Brown *et al.* 2010), as well as wide ranging-species such as Soft-plumaged and Atlantic petrels.

The Kerguelen Petrel had long been placed in the genus *Pterodroma*, but subsequently was regarded to be generically distinct and probably more closely related to the fulmarine petrels, or close to shearwaters (see revision in Olson 2000). The species is usually smaller than other potentially confusing *Pterodroma* gadfly petrels, with a silver underwing pattern and a distinctive white trailing edge from the carpal joint to the body (Brooke 2004). However, misidentifications have occurred (*e.g.*, Cuello 1975; Escalante 1980), and few ornithologists realize that large-sized specimens of *Lugensa* are potentially difficult to discriminate from other dark *Pterodroma* petrels, such as the dark-morph Trindade Petrel. This implies that at least some specimens attributed to these species deserve reexamination. Here we present a review of specimen records of Kerguelen Petrel in southwestern Atlantic Ocean, present a new record from Rio de Janeiro state based on a dead and preserved specimen, and propose a secure approach for specimen identification based on osteological characters.

Specimen records in the southwestern Atlantic and a new Brazilian record

Escalante (1980) reported the first specimen for the whole southwestern Atlantic coast of South America, a stranded individual found in July 1973 at Canelones, Uruguay (Table 1). This seems to be the only Uruguayan specimen, and there also seem to be no records at sea. Kerguelen Petrels are much more frequent southward, over the Patagonian Shelf (Orgeira 2001), and around the Falkand/Malvinas Islands (Thurston 1982; Bourne & Curtis 1985; White *et al.* 1999), particularly over offshore waters, as well as between southern South America and Antarctica (Orgeira *et al.* 2013). However, to the best of our knowledge, there are no records of stranded specimens along the Argentinean coast (Mazar-Barnett & Pearman 2001).

There are only three published records of Kerguelen Petrel in Brazil, the first one being a stranded specimen from Bahia (September 1985); the second, a bird found in Rio Grande do Sul state in October 1986 (Figure 1; see below); and the third, a male found in Arembepe, Bahia, in July 1994 (Table 1). To the best of our knowledge, no at-sea records off the Brazilian coast exist.

On 28 September 2012, during activities of a beach monitoring program of the Campos and Espírito Santo basins (Projeto Monitoramento de Praias das Bacias de Campos e Espírito Santo – PMP-BC/ES) a dead specimen of an all brown-gray, mid-sized petrel was found at the Monte Alto beach (22°56'S, 42°09'W), municipality of Arraial do Cabo, Rio de Janeiro state, Brazil. Measurements (in mm) of this specimen are as follows: total length 350; exposed culmen 27; wing chord 260; tail 138; tarsus 37.6; middle toe with claw 48.9; middle toe without claw 43.9.

It had the diagnostic whitish leading edge from the carpal joint to the body (Figure 2), which characterizes Kerguelen Petrels (Marchant & Higgins 1990), but it was a relatively large bird, fitting in both the lower range of biometric data of Trindade Petrels (Luigi *et al.* 2009), and in the upper range of Kerguelen Petrels (*e.g.*, Onley & Scofield 2007), which makes plumage- and biometric-based identification difficult. This difficulty is especially true if we consider that light, intermediate, and dark morphs of Trindade Petrels could exhibit a whitish leading edge from the carpal joint to the body (Figure 3; Flood & Fisher 2013:73, 76). This suggests that other characters should be investigated to allow an unequivocal identification. Thus, in the following section, we explore cranial characteristics that allowed unambiguous identification of the Arraial do Cabo specimen as a Kerguelen Petrel.

TABLE 1. All known specimen records of Kerguelen Petrels *Lugensa brevirostris* from the southwestern Atlantic Ocean. MNRJ – Museu Nacional, Rio de Janeiro; CAFURG – Coleção de Aves da FURG; RG – Rolf Grantsau private collection; MNHN – Museo Nacional de Historia Natural de Montevideo.

Specimen	Place	Geographic coordinates	Date	Features used in identification	Source
*MNRJ 35237	Salvador, Bahia, Brazil	*ca.*12°59'S, 38°31'W	September 1985	Plumage and measurements	Teixeira *et al.* (1988)
CAFURG 311	Cassino Beach, Rio Grande do Sul, Brazil	32°11'S, 52°10'W	1 October 1986	Plumage and measurements; skull osteology (this study only)	Vooren & Fernandes (1989); this study
*RG 9480	Arembepe, Bahia, Brazil	12°43'29''S, 38°10'45''W	15 July 1994	Plumage and measurements	Lima *et al.* (2004)
CAFURG 450	Arraial do Cabo, Rio de Janeiro, Brazil	22°56'S, 42°09'W	28 September 2012	Plumage and measurements; skull osteology	This study
*MNHN 04142	La Floresta, Canelones, Uruguay	34°46'S, 55°37'W	25 July 1973		Cuello (1975), misidentified as *P. macroptera*, corrected by Escalante (1980). See pictures in Jiménez *et al.* (2012).

*Specimen not examined for the present study.

FIGURE 1. Skull of a *Lugensa brevirostris* specimen (CAFURG 311) obtained at Cassino Beach, Rio Grande do Sul, Brazil, on 1 October 1986. This is the only specimen of *L. brevirostris* from this Brazilian state published to date. Identification is now corroborated by the observation of the characteristic fenestrated *fossa glandulae nasalis* (the arrow indicates the rostral fenestra; see text).

FIGURE 2. Kerguelen Petrel *Lugensa brevirostris* stranded in Rio de Janeiro in September 2012 (CAFURG 450), showing the whitish leading edge on underwing (arrow).

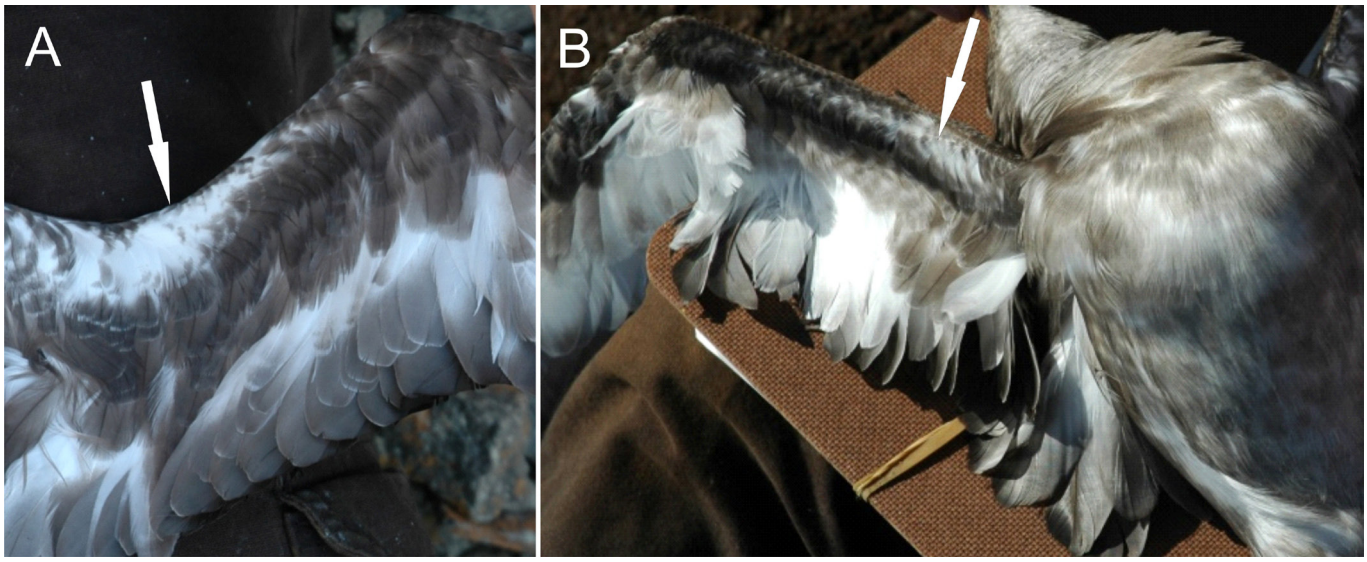

FIGURE 3. Trindade Petrels *Pterodroma arminjoniana* from Trindade Island, Brazil, illustrating the whitish trailing edge on underwing, in both the a) light and b) intermediate morphs (arrows).

Osteology-based identification of gadfly petrels

Imber (1985), in part based on limited osteological comparisons conducted by Harper (1973), called attention to a condition of the skull distinguishing unequivocally Kerguelen Petrel from any *Pterodroma* species, namely, the lateral extension of the inter-orbital region that covers most of the orbit. Therefore, given the identification problems explained above, the Arraial do Cabo specimen was prepared as a skeleton (Coleção de Aves da Universidade Federal do Rio Grande - CAFURG 450), except for a wing which was left completely feathered to document the wing pattern that helps species identification by plumage (Onley & Scofield 2007). The skeleton was prepared by maceration and hand-cleaning soft tissue from bone (Alvarenga 1992). It was immediately evident that the orbit of the specimen was mostly covered dorsally by a supra-orbital bony extension of the *os frontale*, forming a wide *fossa glandulae nasalis*, a condition in great contrast to that observed in members of the genus *Pterodroma* (Harper 1973; Imber 1985; Figure 4). Additionally, each fossa seen in *Lugensa* skulls bears a large rostral fenestra (Figures 1 and 4) not seen in other procellariid genera (Imber 1985; this study), suggesting it represents an autapomorphy for this taxon. Imber (1985) stated that *Lugensa* has a "unique fenestrated extension of the skull lateral to the supra-orbital gland", but some very small, caudal fenestrae similar to those seen in *Lugensa* are present in some specimens of other presumably related genera of the fulmarine group (*Thalassoica*, *Fulmarus*; Imber 1985, Shearwater.nl. 2013 [http://www.shearwater.nl/?file=kop1.php]), thus indicating that only the rostral fenestra is fully diagnostic of, and autapomorphic for, the genus (see also Mayr & Smith [2012] for a comprehensive phylogenetic analysis of procellariiforms using osteological characters). Preceding Imber (1985), when comparing skulls of Kerguelen and Soft-plumaged petrels, Harper (1973) highlighted the larger width of the lateral edges housing the supraorbital depressions, whose "ledges … are characteristically crenated, fenestrated and ledged along their perimeter to a degree not shown in Soft-plumaged Petrel".

Except for Harper (1973) and Imber (1985), to the best of our knowledge, no other researcher has used the osteological character states mentioned above to identify *Lugensa* specimens (Cuello 1975; Escalante 1980; Teixeira *et al.* 1988; Vooren & Fernandes 1989; Lima *et al.* 2004; Jiménez *et al.* 2012), thus overlooking the opportunity to confirm identification using fully diagnostic and easy-to-see morphological features. Even if one is interested in producing a traditional museum specimen, it is possible to check the condition of the *os frontale* – *i.e.*, if matching or not the *Lugensa* type – by inverting the skin up to the base of the bill during taxidermy and by a simple removal of the soft tissue of the nasal gland. For old museum skins, or those specimens recently prepared, ordinary x-ray radiography could be an option.

The only specimen of Kerguelen Petrel from Rio Grande do Sul state published to date is that mentioned by Vooren & Fernandes (1989), which is deposited at CAFURG under the catalogue number 311. This specimen was not prepared as a skin, being simply wholly dried and preserved in the collection. Overall, it is in poor condition, with exposed bones in several parts of the body. As its skull was greatly exposed, a simple removal of the dried tissue over the salt gland allowed us to examine the condition of the *fossa glandulae nasalis*: the Rio Grande do Sul bird proved to represent a typical *L. brevirostris* specimen by presenting the unique fenestrated extension of the skull lateral to the nasal

gland (Figure 1). Although plumage and measurements (see Vooren & Fernandes 1989) of this specimen are apparently sufficient to determine its specific identity with certainty, the observation of the condition of the *fossa glandulae nasalis* prevents any possible future dispute regarding its identification.

FIGURE 4. Skulls of Kerguelen Petrel *Lugensa brevirostris* (above; CAFURG 450) and Atlantic Petrel *Pterodroma incerta* (below; CAFURG 603) in dorsal view. Note the wide, fenestrated *fossa glandulae nasalis* (F) of the former and the contrastingly narrow fossa of the latter. The condition seen in Kerguelen Petrel is fully diagnostic in comparison with any other procellariform taxon.

Concluding remarks

The status of Kerguelen Petrels in the southwestern Atlantic Ocean seems to be similar to the Great-winged Petrel. Both species are rarely found stranded on the beach along the southwestern Atlantic coast (Bugoni 2006; Jiménez *et al.* 2012), and are nearly absent at sea (Bugoni *et al.* 2008; Jiménez *et al.* 2011), despite both species being common southeastward, *e.g.*, in the Southern Ocean at about 60°S, 0°W (Joiris *et al.* 2013; Commins *et al.* 2014). All five Kerguelen Petrels records on the coast of Brazil and Uruguay are from July to early October, coinciding with the pre-breeding or pre-laying exodus, as eggs are laid in October (Elliott 1957; Shirihai 2007).

Examination of the condition of the *fossa glandulae nasalis* may be the only way to identify decomposed specimens found on beaches, and such possibility may provide more realistic information on the occurrence of *L. brevirostris* in a given region. Finally, we suggest that any dispute regarding identity of supposed *Lugensa* specimens might be solved by radiographing skulls to determine the condition of the fossa.

ACKNOWLEDGEMENTS

Authors acknowledge CTA Company and Mr. Bruno Berger for support during field work. We thank Ananda Arrieta for help in the preparation of the Kerguelen Petrel specimen. L. Bugoni is a research fellow with the Brazilian Council for Scientific and Technological Development – CNPq (Proc. #308697/2012-0).

REFERENCES

Alvarenga, H. M. F. 1992. Coleções osteológicas: perspectivas para a ornitologia no Brasil. *Boletim do Museu Paraense Emílio Goeldi, Série Zoologia,* 8: 247-257.

Bourne, W. R. P. & Curtis, W. F. 1985. South Atlantic seabirds. *Sea Swallow,* 34: 18-28.

Brooke, M. 2004. *Albatrosses and petrels across the world*. New York: Oxford University Press.

Brown, R. M.; Nichols, R. A.; Faulkes, C. G.; Jones, C. G.; Bugoni, L.; Tatayah, V.; Gottelli, D.; & Jordan, W. C. 2010. Range expansion and hybridization in Round Island petrels (*Pterodroma* spp.): evidence from microsatellite genotypes. *Molecular Ecology,* 19: 3157-3170.

Bugoni, L. 2006. Great-winged Petrel *Pterodroma macroptera* in Brazil. *Bulletin of the British Ornithologists' Club*, 126: 52-54.

Bugoni, L.; Mancini, P. L.; Monteiro, D. S.; Nascimento, L.; & Neves, T. S. 2008. Seabird bycatch in the Brazilian pelagic longline fishery and a review of capture rates in the southwestern Atlantic Ocean. *Endangered Species Research,* 5: 137-147.

Commins, M. L.; Ansorge, I. &; Ryan, P. G. 2014. Multi-scale factors influencing seabird assemblages in the African sector of the Southern Ocean. *Antarctic Science,* 26: 38-48.

Cuello, J. 1975. Las aves del Uruguay. *Comunicaciones Zoologicas del Museo de Historia Natural de Montevideo,* 10: 1-27.

Elliot, H. F. I. 1957. A contribution to the ornithology of the Tristan da Cunha Group. *Ibis,* 99: 545-586.

Escalante, R. 1980. Primera denuncia de un Petrel de Kerguelen colectado sobre la costa atlántica de Sudamérica. *Hornero,* 12: 41-44.

Flood, B. & Fisher, A. 2013. Multimedia Identification Guide to North Atlantic Seabirds. *Pterodroma* Petrels. 4edge Ltd, Essex.

Harper, P. C. 1973. The field identification and supplementary notes on the Soft-plumaged Petrel (*Pterodroma mollis* Gould, 1844). *Notornis,* 20: 193-201.

Harrison, P. 1983. *Seabirds, an identification guide*. Boston: Houghton Mifflin Co.

Imber, M. J. 1985. Origins, phylogeny and taxonomy of the Gadfly Petrels *Pterodroma* spp. *Ibis,* 127: 197-229.

Jiménez, S.; Abente, J. S.; Azpiroz, A. B.; Savigny, C.; & Abreu, M. 2012. First Uruguayan records of Great-winged Petrel *Pterodroma macroptera*. *Bulletin of the British Ornithologists' Club* 132: 209-212.

Jiménez, S.; Domingo, A.; Abreu, M.; & Brazeiro, A. 2011. Structure of the seabird assemblage associated with pelagic longline vessels in the southwestern Atlantic: implications for bycatch. *Endangered Species Research,* 15: 241-254.

Joiris, C. R.; Humphries, G. R. W.; & De Broyer, A. 2013. Seabirds encountered along return transects between South Africa and Antarctica in summer in relation to hydrological features. *Polar Biology,* 36: 1633-1647.

Lima, P. C.; Grantsau, R.; Lima, R. C. F. R.; & Santos, S. S. 2004. Occurrence and mortality of seabirds along the northern coast of Bahia, and the identification key of the Procellariiformes Order and the Stercorariidae Family. *Atualidades Ornitológicas,* 121: 1-63.

Luigi, G.; Bugoni, L.; Fonseca-Neto, F. P.; & Teixeira, D. M. 2009. Biologia e conservação do Petrel-de-trindade, *Pterodroma arminjoniana*, na ilha da Trindade, Atlântico sul, p. 223-263. In: *Ilhas oceânicas brasileiras: da pesquisa ao manejo*. Volume 2. Mohr, L. V.; Castro, J. W. A.; Costa, P. M. S.; & Alves, R. J. V. (eds.). Brasilia: Ministério do Meio Ambiente.

Marchant, S. & Higgins, P. J. 1990. *Handbook of Australian, New Zealand and Antarctic birds*, v. 1. Melbourne: Oxford University Press.

Mayr, G. & Smith, T. 2012. Phylogenetic affinities and taxonomy of the Oligocene Diomedeoididae, and the basal divergences amongst extant procellariiform birds. *Zoological Journal of the Linnean Society,* 166: 854-875.

Mazar-Barnett, J. & Pearman, M. 2001. *Lista comentada de las aves argentinas.* Barcelona: Lynx Edicions.

Olson, S. L. 2000. A new genus for the Kerguelen Petrel. *Bulletin of the British Ornithologists' Club,* 120: 59-62.

Onley, D. & Scofield, P. 2007. *Albatrosses, petrels and shearwaters of the world*. London: Christopher Helm.

Orgeira, J. L. 2001. Distribución espacial de densidades de aves marinas en la plataforma continental argentina y Océano Atlántico Sur. *Ornitología Neotropical,* 12: 45-55.

Orgeira, J. L.; Scioscia, G.; Torres, M. A.; & Dellabianca, N. A. 2013. New at-sea records of pelagic seabirds in the South Atlantic Ocean and Antarctica. *Polar Research,* 32: 1-5.

Shearwater.nl. 2013. Seabird Osteology. http://www.shearwater.nl/?file=kop1.php (access on 25 July 2013).

Shirihai, H. 2007. *A complete guide to Antarctic wildlife*, second edition. London: A & C Black.

Teixeira, D. M.; Nacinovic, J. B.; & Novelli, R. 1985. Notes on some Brazilian seabirds. *Bulletin of the British Ornithologists' Club,* 105: 49-51.

Teixeira, D. M.; Nacinovic, J. B.; Schloemp, I. M.; & Kischlat, E. E. 1988. Notes on some Brazilian seabirds (3). *Bulletin of the British Ornithologists' Club,* 108: 136-139.

Thurston, M. H. 1982. Ornithological observations in the South Atlantic Ocean and Weddell Sea, 1959–64. *British Antarctic Survey Bulletin,* 55: 77-103.

Vooren, C. M. & Fernandes, A. C. 1989. *Guia de albatrozes e petréis do sul do Brasil*. Porto Alegre: Sagra Editora

White, R. W.; Reid, J. B., Black, A. D.; & Gillon, K. W. 1999. *Seabird and marine mammal dispersion in the waters around the Falkland Islands*. Peterborough: Joint Nature Conservation Committee.

Associate Editor: Alexander C. Lees

APPENDIX:

Specimens examined at CAFURG for osteological comparisons in this study: *Macronectes halli*: n° 602 (complete skeleton); *Macronectes giganteus*: n° 604 (complete skeleton); *Fulmarus glacialoides*: n° 581 (complete skeleton); *Daption capense*: n° 530 (complete skeleton); *Lugensa brevirostris*: n° 450 (complete skeleton), n° 311 ("skin" with exposed skull); *Pterodroma incerta*: n° 603 (skull); *Pachyptila belcheri*: n° 443 (complete skeleton); *Puffinus gravis*: n° 580 (complete skeleton); *Puffinus puffinus*: n° 579 (complete skeleton).