

SHORT NOTE

New petrel records on Île Saint-Paul, southern Indian Ocean

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Saint-Paul and Amsterdam are 2 uninhabited small volcanic islands situated 80 km apart and north of the Subtropical Front, in the southern Indian Ocean (Figure 1). They are zoogeographically similar to the Tristan da Cunha group in the South Atlantic and to the Chatham and Juan Fernandez groups in the South Pacific (Bourne & David 1995). Since their discovery in the 16th century, Saint-Paul and Amsterdam have experienced a succession of human induced ecological damages (see Jouventin 1994 for a review). Saint-Paul's past avifauna is poorly documented, however, only 10 of the 22 bird species known to have bred on Amsterdam are still present (Jouanin & Paulian 1960; Jouventin 1994; Worthy & Jouventin 1999), while several endemic species are now extinct (Micol & Jouventin 1995; Olson & Jouventin 1996). To prevent the extinction of extant burrow-nesting seabirds on Saint-Paul, European rabbits (*Oryctolagus cuniculus*) and black rats (*Rattus rattus*) were eradicated from the island between 1995 and 1999. This provided the opportunity to assess the re-colonisation of Saint-Paul by seabirds from a predator-free islet (Micol & Jouventin 2002), although visits to study the

settling of new populations on this island have been few and difficult to undertake. JBT benefited from an exceptional authorization to carry out a short field trip to Saint-Paul between 19 and 28 Mar 2006. This note reports the main findings of this trip.

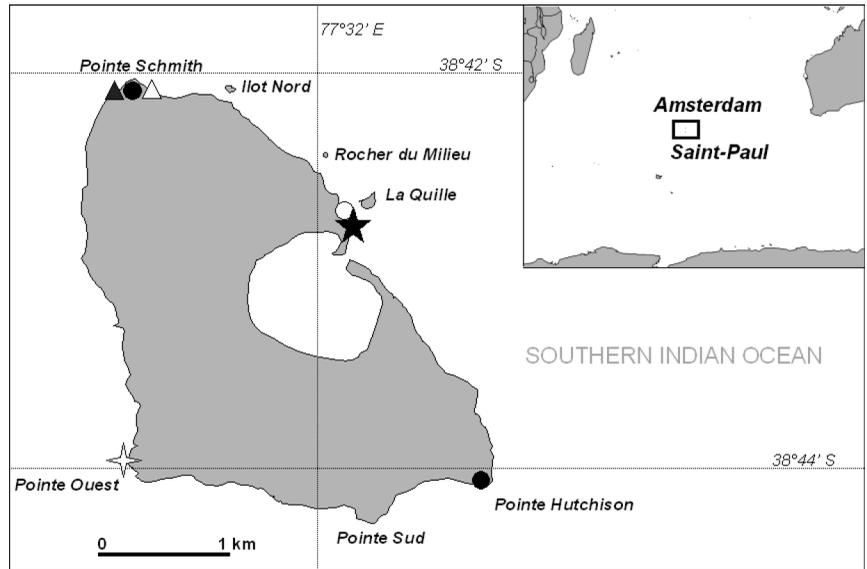
Burrows of nesting petrels were searched on all accessible parts of the main island, and their contents examined. Capture of flying petrels was also attempted at night using spot lights. Each captured bird was measured using vernier callipers, a 400 mm rule and a 300 or 500 g scale depending on the species. Following Chérel *et al.* (2006), feathers from captured petrels were sampled to measure their isotopic niche, with body feather $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values reflecting, respectively, the foraging habitat and trophic position of the birds during the moulting period.

Before this study, 7 petrel species were known to breed on Saint-Paul, of which we could capture 4: great-winged petrel *Pterodroma macroptera*, flesh-footed shearwater *Puffinus carneipes*, little shearwater *Puffinus assimilis* and the MacGillivray's race of medium-billed prion *Pachyptila salvini macgillivrayi* (Jouventin 1994; Micol & Jouventin 2002). Moreover, we captured 2 species previously unrecorded from Saint-Paul (Table 1). An adult soft-plumaged petrel *Pterodroma mollis* was captured

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Fig. 1. Map of Île Saint-Paul showing where petrels were captured: *Cookilaria* petrel (solid star), soft-plumaged petrel (open star), great-winged petrel (solid circle), flesh-footed shearwater (solid triangle), little shearwater (open triangle) and MacGillivray's prion (open circle).



using spot-lighting at the top of a sea cliff on 23 Mar, after calls of this species were heard. This is the 1st confirmed record of this species on Saint-Paul, although Bourne & David (1995) mentioned it may have formerly bred on the island. *P. mollis* is known to persist on Amsterdam (Jouventin 1994; Bretagnolle 1995), but suffers predation by rats and cats on adults, eggs and nestlings there (Jouventin 1994). A smaller *Pterodroma* petrel was captured on the night of 26 Mar while it was sitting on a *Scirpus nodosus* sedge at the top of another sea cliff. Its general appearance (Figures 2a, 2b & 2c) suggested it belonged to the *Cookilaria* subgenus (sensu Fleming 1941), a subgenus that has not been observed on Saint-Paul nor Amsterdam. The combination of (1) a short and stout bill, (2) a broad black margin to the leading edge of the under-

wing, together with (3) flesh-coloured feet with black terminal areas excluded Cook's (*Pterodroma cookii*), De Filippi's (*P. defilippiana*) and Pycroft's (*P. pycrofti*) petrels, whereas the underwing, belly and back colourations excluded Chatham (*P. axillaris*), Bonin (*P. hypoleuca*), mottled (*P. inexpectata*), and Gould's (*P. leucoptera*) petrels. Based on plumage colouration, this bird was therefore most probably a black-winged petrel (*P. nigripennis*), and its measurements fall within the known range for this species (Marchant & Higgins 1990). The fresh plumage, with unworn primaries, clean uncut bill and the long, sharp and unscratched claws suggest that this individual was sub-adult. No vocalisation was uttered by the bird before its capture or during handling.

The black-winged petrel breeds at numerous islands in the south-west Pacific Ocean (Jenkins & Cheshire 1982; Marchant & Higgins 1990). It has rapidly expanded its breeding range during the last 50 years (Klapste 1981; Powlesland 1985) and 2 pairs recently were found in burrows on Round I, Mauritius in the Indian Ocean (BirdLife International 2009). The bird found on Saint-Paul further confirms the colonisation of seabirds from the Pacific region that Saint-Paul has experienced in recent decades (see Segonzac 1972; Lequette *et al.* 1995). It is unlikely, however, that the bird captured was a fledgling of the year from the Pacific colonies, as these populations fledge later, in early May (Hutton & Priddel 2002). Interestingly, Worthy & Jouventin (1996) indicated the former presence of 2 endemic *Pterodroma* species on Amsterdam (Jouanin & Paulian 1960) based on sub-fossil remains, and the smaller taxon was estimated to be the size of

Table 1. Measurements and feather isotopic ratios ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) of the soft-plumaged and the *Cookilaria* petrels captured on Saint-Paul.

	Soft-plumaged petrel	<i>Cookilaria</i> petrel
Culmen length (mm)	29.9	23.4
Hook height (mm)	11.5	8.6
Tarsus length (mm)	35.3	31.3
Wing length (mm)	259	232
Body mass (g)	315	165
$\delta^{13}\text{C}$ (‰)	-16.5	-17.7
$\delta^{15}\text{N}$ (‰)	15.0	12.1

P. nigripennis. Until recently, both endemic species were considered extinct (Jouventin 1994; Micol & Jouventin 1995), but our record suggests that the smaller one might actually still exist on Saint-Paul, as a putative *P. nigripennis* with an earlier breeding season. Genetic analysis is needed to confirm this suspicion. Such a population could have been overlooked for 2 centuries as Saint-Paul has not been prospected exhaustively, nor have there been extensive surveys on all of its predator-free islets (Tollu 1984; Micol & Jouventin 1995). On inhabited Lord Howe I (south-west Pacific Ocean), sub-fossil bones similarly revealed the presence in the past of *P. nigripennis*, though early accounts by naturalists did not mention it until 1971 (Hindwood 1940; Fullagar *et al.* 1974).

To our knowledge, our results are the 1st to document the isotopic niche of *P. nigripennis* and *P. mollis*, thus precluding comparison between the Saint-Paul specimens with birds from known breeding colonies. The isotopic niche of the putative *P. nigripennis* from Saint-Paul suggests that it moulted in subtropical waters or was fed as a large chick from adults foraging in this area, as its $\delta^{13}\text{C}$ value was different from the carbon signature of birds moulting in the Southern Ocean (Cherel *et al.* 2006), but it was identical to that of chicks of Indian yellow-nosed albatross (*Thalassarche carteri*) from Amsterdam (Jaeger *et al.* 2009), whose parents are known to forage in the subtropics (Pinaud *et al.* 2005). Its $\delta^{15}\text{N}$ value indicates that the bird had a lower trophic position than *T. carteri*, as would be expected from its much smaller size. The $\delta^{13}\text{C}$ value of the Saint-Paul *P. mollis* is close to that of adults of *T. carteri* from Amsterdam (YC, *unpubl. data*), suggesting that the bird moulted offshore Australia, as do adults of *T. carteri* from Amsterdam (Rolland *et al.* 2009).

Another survey is needed, earlier in the season, to evaluate the breeding status of *Pterodroma* petrels on Saint-Paul and to obtain blood samples to confirm the identity of the putative *P. nigripennis*. An investigation of the westward expansion of *P. nigripennis* on the Indian Ocean islands would also help clarify our *Cookilaria* record. Finally, our results suggest the need to start monitoring burrow-nesting seabirds on Île Amsterdam, where feral cattle eradication is currently underway.

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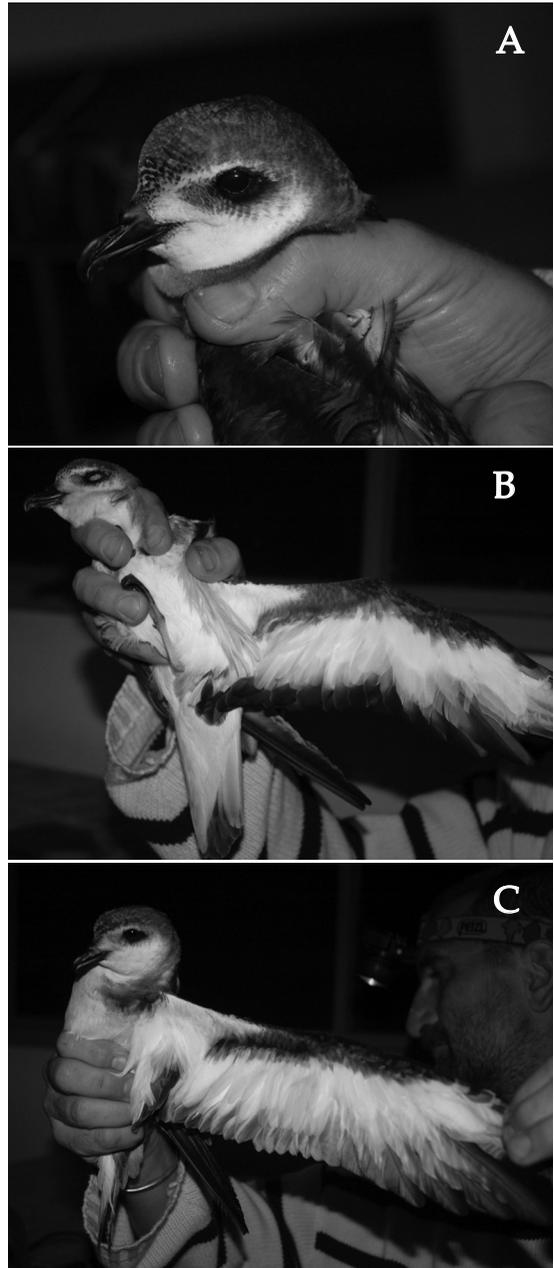


Fig. 2. Views (A, B, C) of the *Cookilaria* petrel captured on Saint-Paul on 26 Mar 2006 (all photographs by JB Thiebot).

LITERATURE CITED

- BirdLife International 2009. Important Bird Area factsheet: Round Island, Mauritius. <http://www.birdlife.org>.
- Bourne, W.R.P.; David, A.C.F. 1995. The early history and ornithology of Saint-Paul and Amsterdam Islands, southern Indian Ocean. *Le Gerfaut* 85: 19–36.

- Bretagnolle, V. 1995. Systematics of the soft-plumaged petrel *Pterodroma mollis* complex: new insight from vocalizations. *Ibis* 137: 207–218.
- Cherel, Y.; Phillips, R.A.; Hobson, K.A.; McGill, R. 2006. Stable isotope evidence of diverse species-specific and individual wintering strategies in seabirds. *Biology Letters* 2: 301–303.
- Fleming, C.A. 1941. Notes on Neozelanic forms of the subgenus *Cookilaria*. *Emu* 41: 69–80.
- Fullagar, P.J.; McKean, J.L.; Van Tets, G.F. 1974. Appendix F. Report on the birds. pp. 55–72 In: Recher, H.F.; Clark, S.S. (eds.) *Environmental Survey of Lord Howe Island*. Sydney: New South Wales Government Printer.
- Hindwood, K.A. 1940. The birds of Lord Howe Island. *Emu* 40: 1–86.
- Hutton, I.; Priddel, D. 2002. Breeding biology of the black-winged petrel, *Pterodroma nigripennis*, on Lord Howe Island. *Emu* 102: 361–365.
- Jaeger, A.; Blanchard, P.; Richard, P.; Cherel, Y. 2009. Using carbon and nitrogen isotopic values of body feathers to infer inter- and intra-individual variations of seabird feeding ecology during moult. *Marine Biology* 156: 1233–1240.
- Jenkins, J.A.F.; Cheshire, N.G. 1982. The black-winged petrel (*Pterodroma nigripennis*) in the south-west Pacific and the Tasman Sea. *Notornis* 29: 293–310.
- Jouanin, C.; Paulian, P. 1960. Recherches sur des ossements d'oiseaux provenant de l'île Nouvelle-Amsterdam (Océan Indien). *Proceedings of the XII International Ornithological Congress, Helsinki* 1: 368–372.
- Jouventin, P. 1994. Past, present and future of Amsterdam Island, Indian Ocean. pp. 122–132 In: Nettleship, D.N.; Burger, J.; Gochfeld, M. (eds.) *Seabirds on islands: threats, case studies and action plans*. Cambridge: BirdLife International.
- Klapste, J. 1981. Notes on the black-winged petrel *Pterodroma nigripennis*. *Australian Bird Watcher* 9: 35–40.
- Lequette, B.; Berteaux, D.; Judas, J. 1995. Presence and first breeding attempts of southern gannets *Morus capensis* and *M. serrator* at Saint-Paul Island, southern Indian Ocean. *Emu* 95: 134–137.
- Marchant, S.; Higgins, P.J. 1990. *Handbook of Australian, New Zealand and Antarctic birds - Volume 1. Ratites to ducks*. Melbourne: Oxford University Press.
- Micol, T.; Jouventin, P. 1995. Restoration of Amsterdam Island, south Indian Ocean, following control of feral cattle. *Biological Conservation* 73: 199–206.
- Micol, T.; Jouventin, P. 2002. Eradication of rats and rabbits from Saint-Paul Island, French Southern territories. pp. 199–205 In: Veitch, C.R.; Clout, M.N. (eds.) *Turning the tide: the eradication of invasive species*. Gland and Cambridge: IUCN.
- Olson, S.L.; Jouventin, P. 1996. A new species of small flightless duck from Amsterdam Island, southern Indian Ocean (Anatidae: *Anas marecula*). *Condor* 98: 1–9.
- Pinaud, D.; Cherel, Y.; Weimerskirch, H. 2005. Effect of environmental variability on habitat selection, diet, provisioning behaviour and chick growth in yellow-nosed albatrosses. *Marine Ecology Progress Series* 298: 295–304.
- Powlesland, R.G. 1985. Seabirds found dead on New Zealand beaches in 1983 and a review of albatross recoveries since 1960. *Notornis* 32: 23–41.
- Rolland, V.; Barbraud, C.; Weimerskirch, H. 2009. Assessing the impact of fisheries, climate and disease on the dynamics of the Indian yellow-nosed Albatross. *Biological Conservation* 142: 1084–1095.
- Segonzac, M. 1972. Données récentes sur la faune des îles Saint-Paul et Nouvelle-Amsterdam. *L'Oiseau et la Revue Française d'Ornithologie* 42: 3–65.
- Tollu, B. 1984. La Quille (île Saint-Paul, océan Indien), sanctuaire de populations relictées. *L'Oiseau et la Revue Française d'Ornithologie* 54: 79–85.
- Worthy, T.H.; Jouventin, P. 1999. The fossil Avifauna of Amsterdam Island, Indian Ocean. *Smithsonian Contributions to Paleobiology* 89: 39–65.

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