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adapt-a-bill

Yet more cryptic prions

Prions are the most abundant birds in the Southern Ocean, occurring in countless millions. One reason for their success is the range of bill types they have evolved on the same basic body plan, which allows them to exploit a diversity of planktonic prey.

The group known as 'whalebirds' have a curtain of palatal lamellae along the sides of the birds' upper mandibles. Indeed, 'prion' comes from the Greek word for a saw, which refers to these saw-like structures. Whalebirds use their large, muscular tongues to pump mouthfuls of water through the lamellae to strain tiny zooplankton.

Broad-billed Prions have 120 to 130 lamellae along each side of the upper mandible. Their large gular pouch can be distended, just like a baleen whale's buccal cavity, to accommodate about four millilitres of water. This might not sound like much, but it represents about two per cent of their body mass, which is like a person holding 1.5 litres of water in their mouth. The water is pumped through the sides of the bill, trapping all animals larger than the 0.16-millimetre gap between successive lamellae.

Northern Fairy Prions (above, off Mercury Island, New Zealand) have more angular, well-patterned heads than Subantarctic Fairy Prions (above right, off the Prince Edward Islands).

Filter-feeding works well in temperate waters around the Subtropical Convergence, where Broad-billed Prions feed mainly on copepods 1–4 millimetres long. But as you move south, zooplankton tend to become larger and prions supplement the food they obtain by filtering with krill and the occasional small fish and squid picked from the surface. A massive bill is an impediment when trying to catch fast-moving prey, so whalebird bills become narrower, with fewer lamellae. This reduction in bill width reaches its extreme in the Slender-billed Prion, which has only vestigial lamellae and relies entirely on picking individual prey, much like the superficially similar Blue Petrel does.

In the 1970s and 1980s, the various whalebird populations were treated as a single, polytypic species. However, differences in breeding season among sympatric populations at the Crozet Islands led to the recognition of three species: Broad-billed Prions, which breed at islands in the central South Atlantic and around New Zealand and have the largest bills; Salvin's Prions from the Prince Edward and Crozet islands in the south-western Indian Ocean have mid-sized bills; and Antarctic Prions, which breed at islands right around the Southern Ocean and have the smallest bills.

The recognition of multiple species along the bill-width continuum creates significant headaches for birders because there are few characters separating the various species other than bill width. And even bill width is not always diagnostic. Juveniles have narrower bills than adults, resulting in overlaps in bill width among species, so even birds in the hand cannot always be assigned to species with certainty.

This identification challenge became even worse when MacGillivray's Prion was squeezed into the non-existent gap in bill widths between Salvin's and Broad-billed prions. Because it was initially thought to be confined to a tiny relict population on St Paul Island in the central Indian Ocean, the seabird world was amazed by the discovery of millions of MacGillivray's Prions breeding among the vast Broad-billed Prion population on Gough Island (*African Birdlife* 2(4): 10–11 and 8(4): 12–13).

The only prion that can readily be identified at sea – at least south of Africa – is the Fairy Prion, which has a short, stubby bill, a rather plain head and breast and a broad black tail tip. However, the Fulmar Prion, which has not been recorded from southern Africa, poses a significant challenge elsewhere in the Southern Ocean, differing from Fairy Prion mainly in its broader, deeper bill with a more massive nail that extends almost back to the nostrils. The reason for this difference in bill structure is not clear. The limited data available on Fulmar Prion diet fail to indicate any major difference from Fairy Prions; both species feed on a range of crustaceans as well as some small fish and squid.

Traditionally three subspecies of Fulmar Prion have been recognised: the nominate form from the Snares and Bounty islands south of New Zealand; *Pachyptila crassirostris pyramidalis* from the Chatham Islands east of New Zealand; and the Lesser Fulmar Prion *P. c. flemingi* from New Zealand's Auckland Islands and Australia's Heard Island in the central Indian Ocean. However, a new paper by Lara Shepherd and colleagues (*PLoS ONE,* doi: 10.1371/journal.pone.0275102) shows that these are not each other's closest relatives.

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above *The 'Fulmar' Prions of Heard Island have been subsumed into Fairy Prion.*

above, left *A juvenile Fulmar Prion off the Bounty Islands, south of New Zealand.*

Given that Fulmar-type prions breed together with Fairy Prions at the Snares and Chatham islands, there is more than one species in the complex. Shepherd et al. recommend recognising two species in addition to Fairy Prion: Fulmar Prion *P. crassirostris* breeding on the Snares, Bounties and Auckland islands (perhaps 30 000 pairs in total), and The Pyramid Prion *P. pyramidalis* breeding on The Pyramid and The Forty-Fours at the Chatham Islands (some 2000 pairs). The Heard Island population that was attributed to Fulmar Prion is just a heavy-billed form of Subantarctic Fairy Prion.

To add to the confusion, two subspecies of Fairy Prion are recognised: the nominate Northern Fairy Prion breeds at islands around New Zealand, south-eastern Australia and St Paul Island, whereas the Subantarctic Fairy Prion *P. turtur subantarctica* breeds at sub-Antarctic islands south of New Zealand as well as at the Prince Edward Islands, Crozets, Kerguelen and South Georgia. The form breeding at the Falklands is uncertain.

The genetic data suggest that The Pyramid Prion is closer to the Northern Fairy Prion, whereas Fulmar Prion is closer to the Subantarctic Fairy Prion, adding credence to suggestions that the two Fairy Prions should be raised to full species (Howell and Zufelt 2019, *Oceanic Birds of the World*). However, there is evidence of some genetic interchange among Fulmar and Fairy prions at the Auckland Islands, so the situation is far from resolved.

This study reminds us that similar morphology need not reflect common ancestry. There must be some advantage to having a heavier bill than a Fairy Prion in the waters around New Zealand, and two separate groups of prions have converged on this ecological niche, resulting in Fulmar Prion and The Pyramid Prion. The intriguing question now is whether there are yet more cryptic species awaiting discovery, especially among the highly variable Antarctic Prion populations.

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