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The Tristan Thrush *Nesocichla eremita* as seabird predator

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Tristan Thrushes or Starchies *Nesocichla eremita* are known to feed on seabird eggs. We show they are able to open the eggs of birds as large as small albatrosses. Starchies were involved in almost half of all egg losses by Great Shearwaters *Puffinus gravis* during the early incubation period in a small study colony at Inaccessible Island, South Atlantic Ocean. They also enter burrows to remove and kill petrel chicks up to at least 70 g. Starchies are thus potentially significant predators of seabird eggs and chicks, and may select against egg neglect and early cessation of brooding by burrowing petrels at the Tristan islands. Starchies previously were recorded killing adult White-bellied Storm Petrels *Fregetta grallaria* at Inaccessible Island. This behaviour now includes White-faced Storm Petrels *Pelagodroma marina*. It is likely that the Starchies hunt adult storm petrels directly, taking them from their burrows.

Key words: Tristan Thrush, *Nesocichla*, predation, seabirds, eggs, chicks

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The Tristan Thrush or Starchy, *Nesocichla eremita*, is an aberrant *Turdus* thrush (Klicka *et al.* 2005) confined to the Tristan da Cunha archipelago in the central South Atlantic Ocean. It is an adaptable dietary generalist (Fraser *et al.* 1994), and is the only landbird to survive on the main island of Tristan, despite the presence of introduced rats *Rattus rattus* (Ryan 2007). Its physical adaptations to its small, oceanic island homes include reduced wings and larger, stronger legs and feet linked to a more cursorial lifestyle, and a peculiar brush-tipped tongue adapted for lapping up the contents of eggs (Lowe 1923). It is well known as a predator of seabird eggs (Fraser *et al.* 1994), as well as the eggs and chicks of the other landbirds found on the islands, the *Nesospiza* buntings (Fraser & Briggs 1992) and Inaccessible Rail *Atlantisia rogersi* (Fraser *et al.* 1992). Perhaps most bizarrely it even attacks and kills adult White-bellied Storm Petrels *Fregetta grallaria* (Ryan & Moloney 1991a). We report additional observations of Starchy predation on seabirds at Inaccessible Island, showing that they can break open the largest seabird eggs available on the island, and provide the first estimate of predation rate on the eggs of a burrow-nesting petrel.

Methods

At 14 km^2, Inaccessible Island (37°18'S, 12°40'W) is the second largest of the islands in the Tristan archipelago (Ryan 2007). We recorded Starchy predation on the island during October–November 2009. Additional observations were made by PGR at Inaccessible Island between November 1999 and February 2000, and during November–December 2004, as well as at Nightingale Island (37°25'S, 12°28'W) in November 2007. Most records were opportunistic, when we encountered Starchies with seabird prey, or evidence of their kills. However, we tested the ability of Starchies to break open large eggs by placing an Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* egg in an empty albatross nest. The egg was taken from a two-egg clutch to increase the chances of the incubating pair hatching the remaining egg (see Ryan *et al.* 2007). We also were able to quantify the impacts of Starchies on Great Shearwater *Puffinus gravis* egg loss over the laying period. Forty-eight shearwater burrows were marked prior to the birds' return to the island in early November. These were inspected daily over the laying period (8–15 November 2009), catching and ringing any adult birds that visited the burrows. Checks were

only made every second day after laying was completed, with checks continuing until 21 November. To assess whether this intensive monitoring caused undue disturbance, we assessed the proportions of burrows in a control area that contained eggs around the peak of egg-laying on 12 November and again in early incubation on 19 November. Since there was no proper control area available at the same elevation due to the paucity of accessible nests, we choose 48 control burrows in an area at higher elevation.

Results and Discussion

Starchies routinely attack any unattended eggs with a series of sharp pecks. Contrary to Fraser *et al.* (1994) who reported them to be unable to open eggs of Great Shearwaters, they are able to break open the eggs of all seabirds that regularly breed on the islands. Several Starchies gathered at the Yellow-nosed Albatross egg deliberately exposed to potential predators. Several birds pecked at the egg, but most of their efforts were devoted to fighting each other. After several minutes, one bird managed to chase off the others. It took this bird several blows to open the egg (Fig. 1), which had an eggshell thickness of 0.50 mm. Whether all thrushes have the ability to break into large eggs is unknown. Starchies also enter burrowing petrel nests and were observed up to 5 m inside caves occupied by breeding Broad-billed Prions *Pachyptila vittata*. Although they may be attracted to burrows by recent digging activity, which likely increases the availability of invertebrate prey (Fraser *et al.* 1994), they are always alert to the possibility of larger prey, including seabird eggs and chicks.

Figure 1. A Starchy breaking open the egg of an Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* (A) and extracting the contents (B) (photos Peter Ryan).

Thirty-seven eggs were laid in the Great Shearwater study colony, of which 17 failed by 21 November. Starchies ate almost half of the failed eggs (8 of 17). It was not possible to distinguish active predation from scavenging following failure from another cause (e.g. parent accidentally breaking the egg), but in at least two cases the incubating bird was still present in the burrow with the depredated egg, suggesting that the egg had not been abandoned. The regular nest checks during this study may have exacerbated egg loss, by disturbing incubating birds. However, two lines of evidence suggest that our results are not too atypical. First, one-off checks of control areas found similar proportions of active burrows: on 12 November, 76% of study burrows and 79% of control burrows were occupied (n = 48 control nests; χ^2 = 0.029, df = 1, P = 0.865), with a higher proportion of study burrows containing eggs (41%) than control burrows (27%), possibly due to the higher elevation of the control area, though the difference was not significant (χ^2 = 1.395, df = 1, P = 0.238). After peak laying, on November 19, similar proportions of burrows were occupied between study and control plots (54% and 69% respectively; χ^2 = 0.942, df = 1, P = 0.332), and 49% and 50% of study and control burrows contained eggs, respectively (n = 70 control nests; χ^2 = 0.025, df = 1, P = 0.874). Second, we frequently encountered eggs that had been depredated by Starchies out of burrows throughout the island. We also noted a surprisingly large number of broken Spectacled Petrel *Procellaria conspicillata* eggs outside their burrows during the start of incubation in late October, suggesting that Starchies also eat many of these eggs shortly after laying occurs.

Seabird chicks also are at risk from Starchy predation. On 11 October 2009, RAR observed a Starchy removing a Broad-billed Prion chick from a burrow. He rescued the chick and returned it to its burrow, only to see it removed again 20 minutes later. The chick of 75 g was in a 40 cm-deep burrow with an entrance 9 cm

high and 12 cm wide under dense *Spartina arundinacea* tussock. The Starchy was again scared off, but subsequent checks found the burrow empty. A 25 g prion chick was observed being eaten by a Starchy on 17 October. It had been attacked on the head, in the manner used when attacking adult storm petrels (Ryan & Moloney 1991a), stripping away the skin from the skull and neck. Three additional prion chicks were found dead with similar wounds between 10–20 October, and a Little Shearwater *Puffinus assimilis* chick (55 g) was found on 23 November 2009. It is highly unlikely that these chicks were depredated by Subantarctic Skuas *Catharacta antarctica*, the other major seabird predator on the islands (Ryan & Moloney 1991b). Skuas typically swallow small seabird chicks whole, and all carcasses were under dense tussock grass, inaccessible to skuas. The largest of the prion chicks attacked (75 g) would have been about 10 days old (Tickell 1962, Brown 1988). Prions typically leave their chicks unattended 5 days after hatching (Tickell 1962); such behaviour clearly is risky in the presence of Tristan Thrushes. The 55-g Little Shearwater chick probably also was beyond the age when chicks are typically brooded (Imber 1983).

Ryan & Moloney (1991a) reported the surprising behaviour of Starchies to attack and kill adult White-bellied Storm Petrels. Although smaller than the petrels, the heavier thrushes (80–120 g, compared to 45–63 g for White-bellied Storm Petrels, Ryan 2007) subdue their prey by standing on the base of each wing and repeatedly pecking at the petrel's head (Fig. 2). Ryan & Moloney (1991a) suggested that Starchies obtain storm petrels that had been forced to seek shelter among dense vegetation to avoid Subantarctic Skuas. However, it is more plausible that they actually pull the petrels from their burrows. Storm petrels typically only visit the islands after dark, yet we regularly encountered White-bellied Storm Petrels flying over the eastern plateau of Inaccessible during the day. Such birds typically were pursued by skuas, and often fell prey to their attacks. Their daytime flights are restricted to areas where we have seen Starchies attacking storm petrels, and found carcasses bearing evidence of their characteristic attacks. We now believe that the skuas may benefit from failed Starchy attacks, when a petrel is lucky enough to escape a thrush and then runs the gauntlet of the skuas. On 27 November 2004 PGR videotaped a Starchy attacking a storm petrel near Denstone Hill on the eastern plateau. The petrel was already bloody around the head when found (Fig. 2A), yet it took more than 10 minutes for the thrush to finally subdue it. During this protracted period, the thrush often abandoned its hapless prey to chase off other Starchies that gathered at the scene. During its brief periods of freedom, the petrel attempted to take off, only to be grabbed by the Starchy again (see also Ryan & Moloney 1991a).

Figure 2. A Starchy subduing an adult White-bellied Storm Petrel (A) and feeding on the carcass (B) (photos Cliff Dorse).

Prior to 2004, we only found White-bellied Storm Petrels bearing the characteristic signs of having being killed by Starchies. However, on 26 November 2004 we found a dead White-faced Storm Petrel *Pelagodroma marina* on the central plateau that almost certainly was killed by a Starchy, and in 2009 almost half of all carcasses (4 of 9) were White-faced Storm Petrels (mass 40–60 g, Ryan 2007). It is tempting to speculate that more Starchies have learnt this predation technique and have broadened their prey base.

Our observations confirm that Tristan Thrushes are potentially important predators of seabird eggs and chicks, and pose a serious threat to adult storm petrels. Incubation may be costly for seabirds, depleting valuable energy reserves and encouraging individuals to neglect their eggs (e.g. Ronconi & Hipfner 2009). The

tendency of many burrowing petrels to temporarily abandon their eggs (Boersma & Wheelwright 1979, Warham 1990, Chaurand & Weimerskirch 1994) and to leave their chicks unattended from an early age (Tickell 1962, Warham 1990) makes them especially prone to losing their reproductive investment.

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Samenvatting

Het is bekend dat Tristanlijsters *Nesocichla eremita*, ook wel "Starchies" genoemd, eieren eten van zeevogels. De auteurs laten zien dat "Starchies" in staat zijn om eieren te openen van vogels ter grootte van een kleine albatros. In een kleine kolonie op Inaccessible, een eiland in het zuiden van de Atlantische Oceaan, waren in ongeveer de helft van de gevallen waarbij eieren van de Grote Pijlstormvogel *Puffinus gravis* verloren gingen, Tristanlijsters betrokken. Tristanlijsters bezoeken ook broedholen van stormvogels en prederen daarbij jongen met een gewicht tot wel 70 gram. Zij zijn dus potentieel belangrijke predatoren van eieren en jongen van zeevogels en kunnen zo een selectiekracht vormen tegen het alleen laten van eieren na het leggen en het vroegtijdig stoppen met het bebroeden van jongen door in holen broedende stormvogels op de Tristaneilanden. Het was al bekend dat "Starchies" op het eiland Inaccessible adulte Witbuikstormvogeltjes *Fregetta grallaria* aanvallen en doden. Daaraan kan nu het Bont Stormvogeltje *Pelagodroma marina* worden toegevoegd. Het is denkbaar dat Tristanlijsters gericht jacht maken op de volwassen stormvogels door ze in hun holen aan te vallen. (KvO)

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