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SHORT NOTE

Interspecific feeding of South Island tomtit (*Petroica macrocephala macrocephala*) nestlings and fledglings by a male Stewart Island robin (*P. australis rakiura*)

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Interspecific feeding, or the feeding of non-brood parasitic offspring of another species, is generally rare and does not appear to have any evolutionary benefits (Shy 1982). In birds, the most commonly observed interspecific feeding behaviour is of adults feeding nestlings (Shy 1982). Previous observations have been opportunistic and brief because it is difficult to detect and monitor interspecific feeding, particularly of cryptic fledglings. In this paper, I describe a male Stewart Island robin (*Petroica australis rakiura*) feeding South Island tomtit (*P. macrocephala macrocephala*) nestlings and fledglings over a 15 day period. I suggest the feeding behaviour was misdirected, and discuss how the male robin's tameness enabled me to regularly monitor this rare behaviour.

The observations occurred on Ulva I (46° 55′ 58″ S, 168° 07′ 54″ E) in Paterson's Inlet, Stewart I. Nearly the entire robin population was uniquely colour-banded at the time of my observations in Jan 2010 (for a full description of the study site and species, see Michel *et al.* 2010; Laws & Jamieson 2011), which allowed me to identify the same male robin repeatedly feeding tomtit offspring. South Island tomtits on Ulva I were not banded, but occupy the same breeding and foraging habitats as robins.

I discovered a robin nest on 8 Jan 2010 in a Hall's totara (*Podocarpus hallii*). The female robin was regularly feeding nestlings, but the nest was too high (~5 m) to determine the number and age of the nestlings. The female's mate (based on earlier observations of courtship feeding) did not visit the nest during 50 min of observation on that day. Instead, I observed the male robin making 7 feeding visits to a tomtit nest that was located ~7 m away in an adjacent Hall's totara. The male robin also defended the tomtit nest from a pair of male and female tomtits, who were the likely owners of the nest. The tomtit nest was also too high (~4 m) to determine the number and age of the nestlings.

During 45 min of observation on 11 Jan, I again observed the male robin feeding the tomtit nestlings on 5 occasions. During one of these feeding observations, a male tomtit (likely the parent of the tomtit nestlings) pecked at the male robin's head in an apparent attack. The male robin responded

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Table 1. Timeline of observations of a male robin feeding both tomtit and robin offspring between 8 and 22 Jan 2010. 'X' indicates the male successfully fed offspring, while 'O' indicates the male did not feed offspring. Offspring were estimated to be nestlings during the shaded dates, and fledglings during the white dates.

	Date in January														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Tomtit offspring	X			X								O	X		X
Robin offspring	O			O								X	X		O

by chasing the male tomtit. Ten minutes later, the male tomtit returned with food and alarm-called, presumably at the male robin next to the nest. The male tomtit successfully fed the tomtit nestlings on one occasion while the male robin was distracted by a weka (*Gallirallus australis*). Meanwhile, the female robin continued to feed its nestlings during this and all subsequent observations.

The tomtit nest was empty on 19 Jan and I did not search for the tomtit fledglings. The male robin did not visit the empty tomtit nest and instead fed the robin nestlings 3 times during 15 min of observation.

The male robin was observed feeding robin nestlings again on 20 Jan. However, after feeding the robin nestlings twice, the male robin also fed 1 tomtit fledgling in the canopy, ~15 m away from the robin nest. The male robin fed the tomtit fledgling 4 additional times in 30 min, then returned to feed the robin nestlings once more.

On 22 Jan, the male robin initially visited the robin nest with food. Upon finding the nest empty, the male briefly returned to the ground before flying ~30 m to feed 1 tomtit fledgling in the canopy. The male robin fed the tomtit fledgling 7 more times in 60 min. The male and female tomtit also fed the tomtit fledgling between feedings by the male robin. During this time, the female robin regularly fed 1 robin fledgling.

I back-dated fledging dates (Heather & Robertson 2000; Laws 2009) to determine that the tomtit eggs hatched on 29 Dec ± 3 days, while the robin eggs hatched on 1 Jan ± 1 day (Fig. 1).

There does not appear to be any benefit for the male robin to feed tomtit offspring. Previous studies have suggested that interspecific feeders may benefit by gaining experience (Trombino 2000) or by demonstrating the ability to produce offspring (Riedman 1982). This reasoning does not appear to explain the male robin's behaviour in this case because the male simultaneously raised his own brood, which eventually fledged. I suggest instead that the interspecific feeding behaviour was probably a case of misdirected parental care. In passerines, misdirected parental care is commonly triggered by begging sounds, particularly when broods are of a similar age and within close proximity (Shy 1982; Yoerg & O'Halloran 1991; Dróżdż *et al.* 2004). The tomtit brood appeared to have hatched a few days prior to the robin brood, and therefore likely began begging just prior to the robin's brood. Furthermore, the male robin may not have been able to differentiate between the 2 nests because the nests were in the same species of tree and at similar heights. My observation reiterates the importance of begging sounds of similar-aged broods within close proximity as a stimulus for misdirected parental care, as noted by others (*e.g.*, Shy 1982).

Nearly all observations of interspecific feeding at the nestling stage (95 of 106; 90%) reviewed by Shy (1982) did not continue to the fledgling stage, primarily because interspecific feeding stops when the adult switches to feeding its own brood (Skutch 1987). Alternatively, the rarity of fledgling feeding observations could be due to the difficulty of observing fledglings which often results in a lack of regular monitoring by researchers beyond the nestling stage (Schaeffer *et al.* 2009). Most passerine fledglings are cryptic and difficult to observe, particularly when being fed by adults (*e.g.*, Morehouse & Brewer 1968). In contrast, adult robins on Ulva I are trained to approach human observers, who regularly feed them mealworms (Powlesland 1997). This previous training allowed me to observe the male robin feeding both tomtit nestlings and fledglings.

The lack of regular monitoring beyond the nestling stage by other researchers could also explain why I was unable to find any similar reports in the literature of adult birds simultaneously feeding both interspecific and host (*i.e.*, their own) offspring. If interspecific feeding of fledglings is not detected due to the cryptic behaviour of young, observers may assume the adult has switched to feeding only its own offspring (Skutch 1987). However, my observations suggest that it is possible for adults to feed both interspecific and host offspring at the same time. Ultimately, the ease of monitoring robins allowed me to observe 2 rare behaviours by the same male robin: (1) interspecific feeding of both nestlings and fledglings, and (2) interspecific feeding while simultaneously feeding host young.

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