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SHORT NOTE

Destruction of a North Island robin (*Petroica longipes*) nest by a little spotted kiwi (*Apteryx owenii*)

RACHAEL C. SHAW*
REGAN D. MACKINLAY
School of Biological Sciences, Victoria University of Wellington, Wellington, New Zealand

Kiwi (*Apteryx* spp.) are highly territorial and aggressive toward conspecific intruders (Marchant & Higgins 1990). However, little information is available regarding aggressive interactions between kiwi and heterospecifics. In 2000 and 2001, 40 little spotted kiwi (*Apteryx owenii*) were translocated from Kapiti Island to Zealandia Wildlife Sanctuary, a 225 ha sanctuary surrounded by a predator exclusion fence in central Wellington (Miskelly *et al.* 2005). Zealandia is also home to a population of North Island robin (*Petroica longipes*), a small insectivorous passerine that is endemic to New Zealand. Seventy-six North Island robins were translocated from Kapiti Island to Zealandia in 2001 and 2002. The population now contains several hundred birds (McGavin 2009). A subset of this robin population is currently monitored during the breeding season as part of an on-going research project on robin cognition and fitness (*e.g.,* Shaw *et al.* 2015).

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*Correspondence: *rachael.c.shaw@gmail.com*

In early October 2015, a female robin constructed a cup-shaped nest at ground level in a steep embankment, under overhanging tree roots (S41.29766° E174.74669°). The robin laid 2 eggs on 19 October 2015 and the eggs hatched on 8 November 2015. A Bushnell HD motion sensor camera was installed on a tree 1 m from the nest site on 12 November to monitor the nest. Between 17 and 19 November the camera captured footage of a little spotted kiwi destroying the robin nest. At 22:10 on 17 November the kiwi kicked the robin nest out from the embankment and pulled it downslope ~15 cm (Fig. 1 A, B), before probing the 2 robin chicks with its bill (Fig. 1C). The chicks survived this initial interaction but sustained peck injuries (Fig. 2). One chick fell from the nest a few minutes after being pecked. The other was fed by the female robin and then accidentally knocked from the nest ~8 hours later. The following night the nest was further pulled apart and dragged downslope by a kiwi (presumably the same bird; Fig. 1 D, E). After removing the nest, the kiwi used its bill to probe the original nest site (Fig. 1 F). A description of the sequence of events is provided in Table 1.

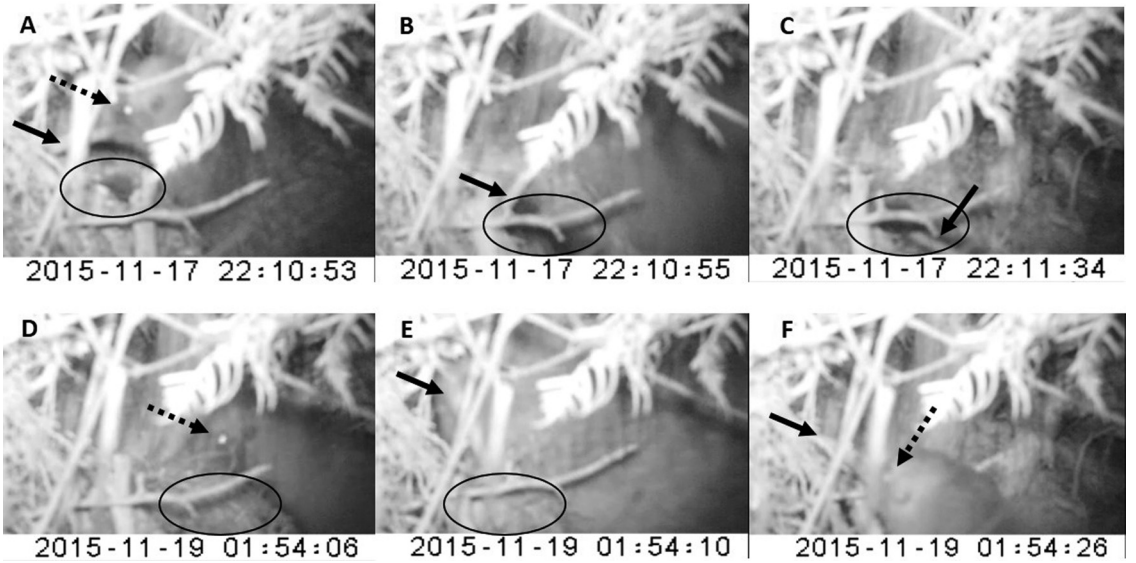

Fig. 1. Stills taken from videos recorded by a motion triggered Bushnell HD camera. The position of the robin nest is indicated by the black circle, the kiwi eye (when visible) is indicated by a dashed arrow and the kiwi bill (when visible) is indicated by a solid arrow. Date and time stamps were recorded on the videos. (A) The kiwi initially probes the area behind the robin nest. (B) The kiwi displaces the nest by kicking with its left foot and pulling downward with its bill. (C) After moving the nest, the kiwi touches each chick with its bill. (D) The following night the kiwi probes the former nest site with its bill, (E) before kicking the nest and using its bill to pull the nest apart. (F) After dismantling and removing the nest, the kiwi probes the former nest site a final time before leaving.

Fig. 2. The deceased robin chicks (aged ~9 days old). Chicks were found out of the nest on the ground, ~1 m downslope from original nest site. Black arrows indicate visible external injuries, probably caused by the kiwi's bill.

The female robin reacted to the nest destruction by visiting and attempting to brood the original nest several times. She was filmed interacting with the single surviving chick on only one occasion, feeding it, then attempting to brood, which resulted in the chick falling from the nest (Table 1). The female robin was not subsequently re-sighted in the territory after her final visit to the original nest site (Table 1). The nest destruction caused the pair to divorce, as the female robin was sighted in a new territory (~200 m linear distance from the former territory) feeding a semi-independent fledgling on 4 February 2016. The male robin was sighted daily in the fortnight following the nest destruction, frequently singing and carrying food, before eventually caching. A new female paired with the male on his territory from 3 December 2015 and on 11 December 2015 the female began incubating a new nest with 2 eggs. Both chicks successfully fledged from the new nest on 19 January 2016.

One explanation for the kiwi's behaviour is that it was investigating the nest as a possible food source. The behaviours we describe in Table 1 could be viewed as foraging and obstacle exploration

Table 1. The sequence of events describing the destruction of a robin nest by a little spotted kiwi. All events, dates and time-stamps were transcribed from videos.

Date	Time	Action
17 November	22:10:51	Kiwi arrives at nest site; chicks visible in nest but female robin not brooding
	22:10:52	Kiwi touches slope immediately behind nest with bill for 2 sec
	22:10:55 – 22:10:56	Kiwi displaces nest ~15 cm downslope with leg kick; kiwi then moves out of video frame
	22:11:10	Kiwi bill visible, pointing toward, but not contacting nest
	22:11:12 – 22:11:18	Kiwi touches nest rim with bill
	22:11:13	Kiwi touches chick 1 three times with bill
	22:11:34	Kiwi touches chick 2
	22:11:36 – 22:11:38	Kiwi again touches chick 1 three times with bill; chick moves in response
	22:12:21	Only kiwi bill in frame, pointing toward nest
	22:12:41	Kiwi bill appears in frame 50 cm upslope from nest
	22:14:19	Robin chick 1 flaps wings and falls from nest
	23:51:39 – 00:37:05 (on 18 November)	Female robin returns and broods site where nest was, ignoring displaced nest and chick 2
18 November	05:21:51 – 05:51:30	Female robin visits former nest site twice (once with food); she ignores chick 2 in nest and stays for < 2 min each visit
	05:57:12 – 05:57:26	Female robin arrives, feeds chick 2 and perches on nest edge; female attempts to climb into nest, knocks chick 2 from nest and falls out herself
	05:58:54 – 08:09:24	Female robin visits former nest site 6 times; she broods site for 12 minutes on one visit, while the other 5 visits are < 2 min in duration
19 November	01:54:05	Kiwi taps area behind nest twice with bill
	01:54:07 – 01:54:15	Kiwi repeatedly kicks at nest with left foot and drives bill into centre of structure; shakes head vigorously and uses bill to pull apart structure; then moves nest downslope and out of frame
	01:54:26 – 01:54:37	Kiwi visits nest site and probes area with bill multiple times before leaving

behaviours (as have been described for brown kiwi, *Apteryx mantelli*; Cunningham & Castro 2011). However, there was no indication that the kiwi attempted to ingest the nestlings and dietary analysis of a little spotted kiwi population on Kapiti Island revealed a preference for large, slow moving invertebrates that inhabit the upper soil layers (Colbourne *et al.* 1990). Moreover, kiwi do not typically use their feet to scratch or kick at the ground when foraging (Marchant & Higgins 1990). In the videos, the kiwi visibly kicks at the nest, particularly on the second visit when the chicks are no longer present. Thus, it is possible that the nest destruction was not related to foraging.

An alternative possibility is that this behaviour is a form of misdirected territorial aggression. We have frequently observed that robin nests in the sanctuary are lined with kiwi feathers. Although we did not find kiwi feathers in the nest remains, they may have formed part of the original nest lining. Thus, the robin nest could have contained olfactory cues which caused the kiwi to react toward it as if it were a conspecific intruder. Kicking is not typically part of the kiwi foraging strategy, but it is part of the behavioural repertoire in aggressive interactions with conspecifics (Marchant & Higgins 1990; Cunningham & Castro 2011). Olfactory cues consistent with a conspecific intruder could have prompted the kiwi to spontaneously strike out with its left foot upon first encountering the nest, then to aggressively kick and dismantle the nest on the second evening. If so, then the use of feathers in nest construction for thermoregulatory benefits may sometimes result in a cost of increased risk of nest destruction.

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