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First record of Brush Cuckoo parasitism of the Lovely Fairy-wren

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Abstract. We report a case of brood-parasitism by the Brush Cuckoo *Cacomantis variolosus* of the Lovely Fairy-wren *Malurus amabilis.* We recorded by observation and photography a fledgling Brush Cuckoo being fed by a pair of Lovely Fairy-wrens in a period of 16 days during February and March 2016 in Cairns, Queensland. These observations are the first record of brood-parasitism by the Brush Cuckoo of the Lovely Fairy-wren.

Introduction

Australian fairy-wrens *Malurus* spp. are hosts to several cuckoo species. Their most common brood-parasite is Horsfield's Bronze-Cuckoo *Chalcites basalis*, but other cuckoos have also been reported to parasitise them, including the Shining Bronze-Cuckoo *Chalcites lucidus*, Fan-tailed Cuckoo *Cacomantis flabelliformis*, and Brush Cuckoo *Cacomantis variolosus* (Brooker & Brooker 1989; Langmore 2013).

Within Australia, the Brush Cuckoo is found in the north and on the eastern coast, south to Victoria. It lives in a diverse range of habitats, including rainforest and rainforest edges, mangroves, secondary forests, and some plantations (Payne 2005). It is an obligatory brood-parasite and host generalist, with 58 host species so far identified throughout its range in Australia (Brooker & Brooker 1989). Two subspecies breed in Australia, one in the south (Southern Brush Cuckoo *C. v. variolosus*) and the other in the north (Northern Brush Cuckoo *C. v. dumetorum*). The Southern Brush Cuckoo is a breeding migrant and the northern subspecies is resident (Erritzøe *et al.* 2012). These subspecies target different main hosts, with the Northern Brush Cuckoo preferring enclosed nesters, like the Brown-backed Honeyeater *Ramsayornis modestus* and Bar-breasted Honeyeater *R. fasciatus*. It is also known to parasitise some fairy-wrens and gerygones *Gerygone* spp. (Brooker & Brooker 1989).

The Lovely Fairy-wren *Malurus amabilis* is a small passerine endemic to Cape York Peninsula, Queensland, restricted mainly to coastal areas, but little is known about its ecology and behaviour (Rowley & Russell 1997). It is a facultative cooperatively breeding species, where breeding pairs may be assisted by one or more non-breeding helpers. The female constructs an enclosed dome-shaped nest usually near the ground (average height 63 cm above ground: AVL unpubl. data), and is assisted in feeding the young and nest-defence by the male and helpers. Lovely Fairy-wrens breed throughout the year, with a peak in the dry season and austral spring (AVL unpubl. data). Before this observation, in an extensive colour-banding study in an area >136 ha near Cairns, Queensland, no brood-parasitism was recorded in 68 breeding attempts within ~30 groups of Lovely Fairy-wrens (AVL unpubl. data). However, an adult male Lovely Fairy-wren was observed mobbing and performing a 'rodent run' towards an adult Brush Cuckoo that was close to a nest with nestlings (AVL pers. obs. 2015), which suggests that Lovely Fairy-wrens possess a 'front-line' behavioural defence adaptation to prevent parasitism (Feeney *et al.* 2012). Brush Cuckoos are common near Cairns, with 59 records of this species in Birdata in 2015 (BirdLife Australia 2017).

Previous records of possible brood-parasitism of Lovely Fairy-wrens have involved unidentified cuckoo eggs in the nests. Macgillivray (1914) described an egg found in a Lovely Fairy-wren nest, suggesting that it was from a Brush Cuckoo or Chestnut-breasted Cuckoo *Cacomantis castaneiventris*. Beruldsen & Uhlenhut (1995) noted unconfirmed observations (made by someone other than those authors), of two nests parasitised possibly by the Chestnut-breasted Cuckoo.

Here we report the first confirmed record of Brush Cuckoo parasitism of the Lovely Fairy-wren, with observations over several days of a juvenile Brush Cuckoo being fed by adult Lovely Fairy-wrens.

Methods

On 18 February 2016, an unbanded male and female Lovely Fairy-wren were observed feeding a fledgling Brush Cuckoo at the edge of Lamb Range rainforest in Bentley Park (17°01′S,145°42′E), a suburb of Cairns. No other fairy-wren conspecifics were seen in this location.

The location was visited a further eight times, on 19, 21, 24, 26 and 28 February, and 4, 5 and 8 March 2016. Observations occurred in the morning, between 0900 h and 1200 h, except for 28 February, when the birds were observed in the late afternoon (1600–1700 h). Observations were made with binoculars, photographs were taken (Nikon D7100 camera and Tamron 150-600mm f/5-6.3 Di VC), and short videos were recorded. Audio recording was extracted from the videos and spectrograms were derived with Avisoft-SAS Lab Pro software (v. 5.2 R, Germany). Recordings of Lovely Fairy-wrens, used for comparison, came from an extensive colour-banding study of this species near Cairns (AVL unpubl. data).

Observation periods were minimised to avoid disturbing the birds, and never lasted longer than 1 h; on 4, 5 and 8 of March, observations were for only *c.* 15 minutes. Total

Figure 1. The Brush Cuckoo fledgling when first observed (18 February 2016). Photo: Patrick De Geest

Figure 2. The Brush Cuckoo fledgling on the last day that it was seen with the host-parents (4 March 2016), with well-developed tail-feathers. Photo: Patrick De Geest

observation time was *c.*7 h, spread over 9 days. The last day that the Brush Cuckoo and host-parents were seen together was 4 March; on 5 and 8 March, only the host-parents were seen and heard. Observations stopped when the Cuckoo was confirmed to have disappeared. The minimum post-fledging dependence period of the Cuckoo was thus 16 days (total number of days between observations when both Cuckoo and the host-parents were present).

The juvenile Brush Cuckoo was identified through distinctive physical characteristics (Higgins 1999; Pizzey & Knight 2012; Nielsen 2015). It could be confused with a juvenile Fan-tailed Cuckoo, but the juvenile Brush Cuckoo has a distinctive variegated rufous-brown pattern on the upperparts, coarser spots on the underparts (if not a barred morph), grey feet and pale or grey orbital ring. In contrast, the juvenile Fan-tailed Cuckoo has a yellow orbital ring, finely mottled and barred underparts, and initially pinkish (later yellow) feet.

Observations

The Brush Cuckoo (Figure 1) and its host-parents were always in an area ~30 m × 30 m, near the edge of the rainforest, except for the last observation. No other species was seen feeding the Cuckoo. Initially, the Cuckoo was always hidden in low shrubs, and did not fly further than ~10 m. Mostly it waited for the host-parents to come and feed it, but on the last observation day (4 March) it actively followed the host-parents when they were foraging. On the last day, it was being fed ~60 m from where it was first seen, on a slope at the edge of the rainforest where the density of the rainforest understorey was lower. By this time, it could fly well, displayed less cryptic behaviour, and its tail-feathers were almost fully grown (Figure 2). It no longer sat and waited for the host-parents to come and feed it, but watched them as they foraged for insects, and flew towards them, begging when they were successful in obtaining food.

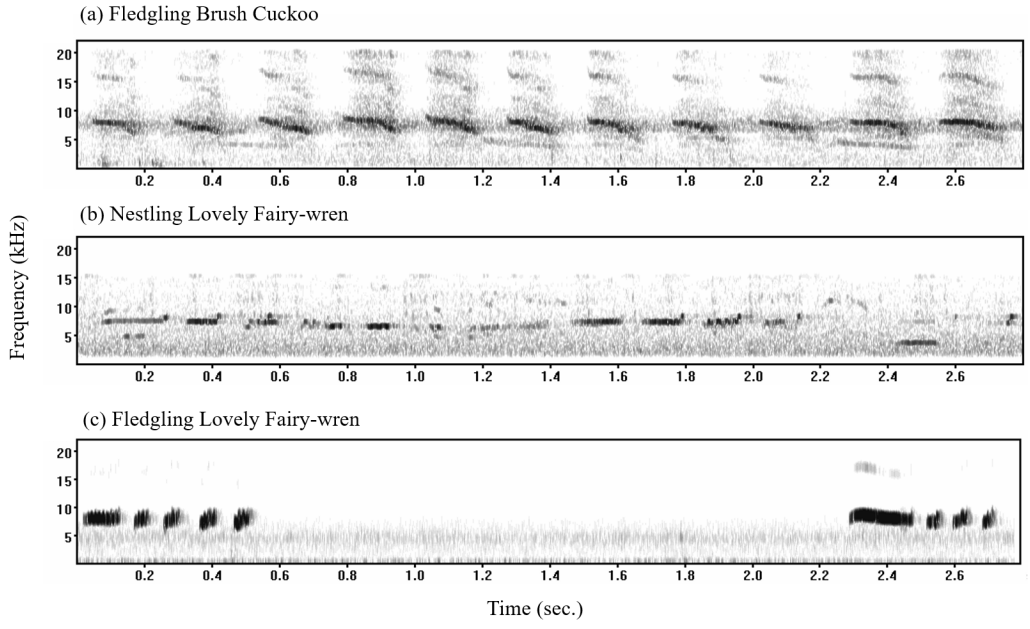

Figure 3. Spectrograms (each 2.8 seconds) of the begging calls of (a) the fledgling Brush Cuckoo, 24 February 2016, (b) 9-day-old Lovely Fairy-wren nestling recorded in the nest, 3 August 2016, and (c) 1-month-old fledgling/juvenile Lovely Fairy-wren calls recorded on 28 July 2016.

Figure 4. Female Lovely Fairy-wren feeding the Brush Cuckoo fledgling, showing the position of the Cuckoo's wing, 24 February 2016. Photo: Patrick De Geest

Figure 6. Male Lovely Fairy-wren with the Brush Cuckoo fledgling, 21 February 2016. This was the only occasion that the male was seen feeding the Cuckoo. Photo: Patrick De Geest

The Cuckoo's begging calls were relatively loud and were accompanied by rapid wing movements, up and down close to the body. These were similar to begging calls of Lovely Fairy-wren nestlings but more repetitive and stable, and different from fledgling Lovely Fairy-wren calls (Figure 3). The closer the host-parents approached with food, the louder the Cuckoo's begging calls became. When food was transferred from Fairy-wren to Cuckoo, the Cuckoo spread one wing and covered the host with it (Figure 4). After being fed and in the absence of the host-parents, the Cuckoo did not make loud begging calls but, instead, made quieter calls. Before the last day that it was observed, the Cuckoo made soft calls similar to adult Lovely Fairy-wren alarm calls (Figure 5). During the last observation the Cuckoo did no longer make the quieter or softer calls (see above) when waiting for its foraging parents. It was now following the parents and made only the louder begging calls; just before and as it was being fed. The final observation only lasted ~15 min as we could not follow the cuckoo and Fairy-wrens through the rainforest on steep and difficult terrain.

The contributions to feeding of the Brush Cuckoo by the male and female Lovely Fairy-wrens differed considerably, with the female doing most of the feeding. Although it was not quantified, we estimate that the female fed the Cuckoo ~50 times and the male only once (Figure 6). During observations on 19 February, the female fed the Cuckoo 10 times in 1 hour. Neither the male nor the female Fairy-wren was seen foraging higher than 5 m above the ground, nor near or in the rainforest.

Both male and female Lovely Fairy-wrens were usually quiet, except for the last time that they were seen with the Brush Cuckoo (4 March), when they seemed to be warning the fledgling of the observer's presence. The alerted state of the Fairy-wrens could have been the result of the observer actively following them as they moved quickly along the rainforest edge.

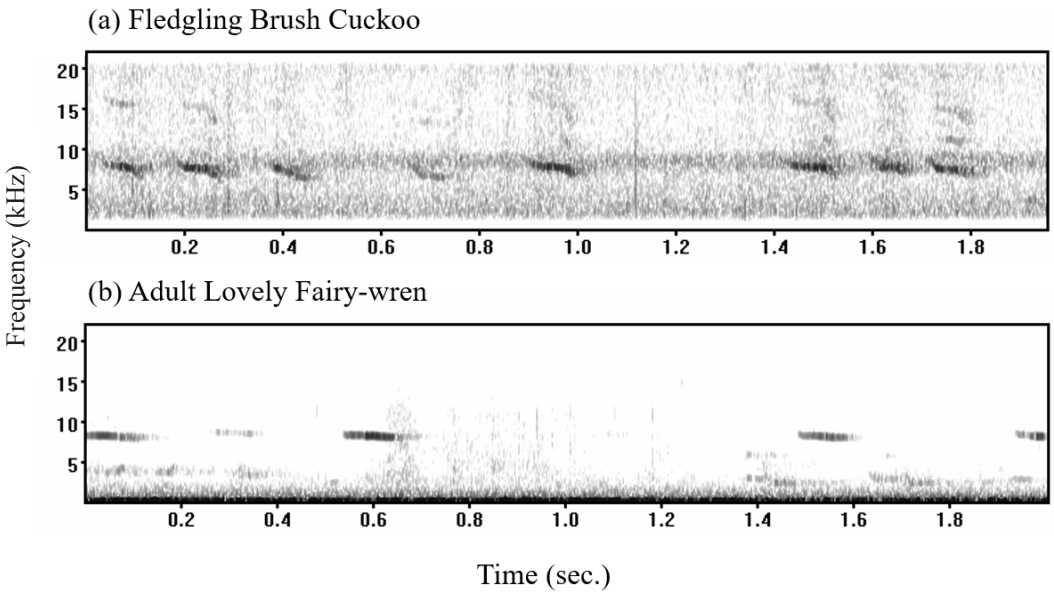

Figure 5. Spectrograms of (a) fledgling Brush Cuckoo 'soft' calls, 24 February 2016, and (b) adult Lovely Fairy-wren alarm calls.

Discussion

The observations reported here represent the first confirmed observation of brood-parasitism by the Brush Cuckoo of the Lovely Fairy-wren. Previous records of brood-parasitism of this fairy-wren did not clarify which cuckoo species was involved (and there are no extant photographs or museum specimens to investigate this further) and if it was a successful parasitism (and not accidental, for example, when a cuckoo cannot find a host nest at a suitable time to parasitise, it might lay in the nest of an 'accidental' host).

We report observations of a juvenile Brush Cuckoo being fed by adult Lovely Fairy-wrens. When the Cuckoo was being fed, it spread one of its wings as if to shield the host or the food from onlookers or predators (Figure 4). To our knowledge, this behaviour has not been described in other cuckoo species. Further research might confirm this behaviour and help understand its function.

In the European Common Cuckoo *Cuculus canorus*, species other than the foster-parent sometimes feed the young cuckoo (Cramp 1985), since the cuckoo fledgling uses a begging call that attracts birds that are passing by and collecting food for their own young (Davies 2000). This has also been reported for Horsfield's Bronze-Cuckoo, and the Shining Bronze-Cuckoo, Fan-tailed Cuckoo, and Pallid Cuckoo *Heteroscenes pallidus* (see Brooker & Brooker 1989), and also in the Brush Cuckoo (Higgins 1999). Other possible hosts (hosts recorded by Brooker & Brooker 1989) that occur in the study area include the Red-backed Fairy-wren *Malurus melanocephalus*, and the Brown-backed Honeyeater, Fairy Gerygone *Gerygone palpebrosa*, Large-billed Gerygone *G. magnirostris* and Large-billed Scrubwren *Sericornis magnirostra*. However, despite several days of observation by us, no other species was observed feeding the Brush Cuckoo fledgling, which supports the Lovely Fairy-wren as a valid record of brood-parasitism by this cuckoo species (Brooker & Brooker 1989).

We also show here that the juvenile Brush Cuckoo displayed some vocal mimicry of nestling calls and adult alarm calls, but seemed to call at faster rates, which could possibly stimulate the host adults to pay more attention and provide more food. In other cuckoo species, the cuckoo mimics the begging call of its host young (Redondo & de Reyna 1988; Langmore *et al*. 2003). It is possible that cuckoo calls are developed through experience by using calls that are more effective in stimulating the host, as has been shown in the Common Cuckoo (Madden & Davies 2006).

Interspecific brood-parasitism of fairy-wrens by species other than Horsfield's Bronze-Cuckoo is rare and occurs only at low rates (Brooker & Brooker 1989; Langmore 2013; Guppy *et al.* 2017). Brush Cuckoos are host generalists, but primarily parasitise species other than fairy-wrens. Parasitism of fairy-wrens by the Brush Cuckoo occurs at low rates: 0.4% in the Purple-crowned Fairy-wren *Malurus coronatus* and 1.8% in the Red-backed Fairy-wren (Langmore 2013), and generally 7% in fairy-wrens (Erritzøe *et al.* 2012). Since brood-parasitism of the Lovely Fairy-wren by the Brush Cuckoo has not been reported before, it is likely that the present record is a rare case of parasitism. However, brood-parasitism can be region-specific (Langmore 2013), so further observations and research into the Lovely Fairy-wren at other sites and at other times of the year would provide useful information of how prevalent parasitism is in this species.

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