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First record of a four-egg clutch of Collared Forest Falcon *Micrastur semitorquatus*, with notes on a nest in a building in southern Brazil

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SUMMARY.—Collared Forest Falcon *Micrastur semitorquatus* ranges from northern Mexico to southern Brazil. This species is known to lay 1–3 eggs. We describe the first four-egg clutch for *M. semitorquatus* from observations made in southern Brazil, in the state of Santa Catarina. We also describe the nest site, nestling diet and assess sex ratio and mass gain of the nestlings.

Collared Forest Falcon *Micrastur semitorquatus* is a widespread bird of prey distributed from northern Mexico to southern Brazil (Ferguson-Lees & Christie 2001). The species inhabits a wide range of tropical forest habitats, including primary to secondary lowland rainforests, semi-deciduous and deciduous forests (Sick 1997). Its breeding biology is well known compared to other species of *Micrastur* (Thorstrom *et al.* 2000). Several studies, from Guatemala and Brazil, suggest the species prefers to nest in cavities, lays 1–3 eggs, which are incubated 46–48 days, and feeds the nestlings until they can fly and feed themselves (Thorstrom *et al.* 2000, Carrara *et al.* 2007). The breeding season varies geographically: February–August in the humid forests of Guatemala (Thorstrom 2000), August–November in the Brazilian Pantanal (Carrara *et al.* 2007) and the late spring and austral summer in the Atlantic Forest of southern Brazil (Carvalho-Filho *et al.* 1998, Vallejos *et al.* 2008, Marreis *et al.* 2010, Viana *et al.* 2010). Although the species typically nests within natural cavities in forests, three records of breeding in man-made structures have been reported in Brazil, where nests with eggs were found in an abandoned building (Carvalho-Filho *et al.* 1998), a barbecue pit (Marreis *et al.* 2010) and a house under construction (Viana *et al.* 2010). However, use of such structures by the species remains little studied and is restricted to descriptions of the nests and eggs. Here, we provide data on a pair of Collared Forest Falcons that nested inside a building in southern Brazil, including the first record of a four-egg clutch. We describe the nest site, diet of the nestlings and assess sex ratio and mass gain of the young.

Study site and Methods

On 7 September 2014 we were shown a nest of *M. semitorquatus* in a building at the edge of a patch of lowland Atlantic Forest (28°42'51.55"S, 49°24'40.80"W; c.50 m) in the municipality of Criciúma, Santa Catarina, southern Brazil. The surrounding landscape (within 1 km of the nest) mainly comprised anthropogenic areas (53.8%; 190.0 ha) including buildings, roads, artificial lakes, crops and pastures; native lowland dense ombrophilous forest (32.7%; 102.6 ha); and exotic plantations of pine (*Pinus* spp.) and eucalyptus (*Eucalyptus* spp.) (13.5%; 42.5 ha). An overall description of the area was provided by Viana *et al.* (2010) including documentation of a nest of the species in the same place in 2010.

We started monitoring mass gain and food brought to the nest 52 days after incubation began (the date of hatching is unknown). From 3 November to 8 December 2014, we

observed the nest at intervals of 2–3 days per week, totalling 15 hours of field work. To identify each nestling individually, we marked them with coloured rings. To measure body mass, we placed the nestlings in cotton bags and weighed them with Pesola balances of 100 g and 1,000 g. In order to identify their sex we obtained blood samples from the brachial vein and performed Polymerase Chain Reaction (PCR) tests applying the dried blood spot technique.

Results

Nest and eggs.—The nest was sited in a room (4.0 m × 4.4 m, 4.0 m high) with four windows of c.0.45m² on the third floor (15 m above ground) of the building, which was under construction during the observation period. Four dark reddish-brown eggs with beige and black spots had been laid on the concrete floor, but were placed in a wooden box with palm leaves by the builders (Fig. 1).

Diet.—During the entire observation period we apparently observed only a single cream-coloured adult at the nest. We identified a total of 11 food items of eight species at the nest (Table 1). Birds were the commonest prey (78%), followed by bats and lizards (11% each). Adult Scaled Chachalacas *Ortalis squamata* were the most frequent prey, representing 27% of all items. Body mass of prey ranged from 66 g (a bat *Artibeus lituratus*) to 1,100 g (a domestic chicken *Gallus gallus domesticus*).

Nestling sex ratio and growth.—The sex ratio of the nestlings was 1:1. One female nestling had a body mass of 140 g on day 7 after hatching, whereas the other female weighed 71 g, and the two males were 114 and 116 g, respectively, on the same day. Mass



Figure 1. Nest and nestlings of Collared Forest-Falcon *Micrastur semitorquatus* in a man-made structure in Criciúma, Santa Catarina, southern Brazil, September 2014 (Rafael Spilere Romagna)

TABLE 1
Diet of Collared Forest-Falcon *Micrastur semitorquatus* nestlings in a man-made structure, Criciúma, Santa Catarina, southern Brazil. a = adult, j = juvenile.

Taxon	No. of individuals
Squamata	
<i>Salvator merianae</i> (j)	1
Aves	
Domestic chicken <i>Gallus gallus domesticus</i> (a)	1
Scaled Chachalaca <i>Ortalis squamata</i> (a, j)	3, 1
Roadside Hawk <i>Rupornis magnirostris</i> (j)	1
Squirrel Cuckoo <i>Piaya cayana</i> (a)	1
Guira Cuckoo <i>Guira guira</i> (j)	1
Blond-crested Woodpecker <i>Ceelus flavescens</i> (a)	1
Chiroptera	
<i>Artibeus lituratus</i> (a)	1

gain was greatest for all nestlings between days 14 and 35 after hatching. Mean mass gain per day was 34 g and 36 g for the males, 38.5 g for the smaller female and 43.5 g for the other female. At the end of the sampling period, on 8 December, the females weighed 750 g and 610 g, and the males weighed 620 g and 590 g.

Discussion

Our observations represent the first record of a four-egg clutch for *M. semitorquatus* (see Wetmore 1974, Guedes 1993, Thorstrom *et al.* 1990, 2000, Carvalho-Filho *et al.* 1998, Carrara *et al.* 2007, Vallejos *et al.* 2008, Marreis *et al.* 2009, Viana *et al.* 2010). Clutch-size data for congenetics are available only for Barred Forest Falcon *M. ruficollis*, which lays 1–3 eggs (Thorstrom *et al.* 1990, 2000).

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