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NESTING OF THE OLIVACEOUS WOODCREEPER (*SITTASOMUS GRISEICAPILLUS*)

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Resumen. – Nidificación del Tarefero (*Sittasomus griseicapillus*). – El tarefero (*Sittasomus griseicapillus*) es una especie común que está ampliamente distribuida en bosques del Neotrópico, pero sorprendentemente se conoce muy poco acerca de sus hábitos de nidificación, y hay información conflictiva sobre si ambos padres o solo la hembra cuidan a los huevos y los pichones. Encontramos seis nidos en el Chaco y la selva Atlántica en el norte de Argentina, en cavidades de árboles formadas por degradación natural (no nidos abandonados de carpinteros), 4.5–16 m arriba del suelo, con entradas de 3–7 cm de diámetro, y 18–35 cm de profundidad. Los tareferos pusieron tres huevos sobre un lecho de cortezas y/u hojas. Aunque dos adultos rondaron el nido, anillar uno de los adultos en el nido que estudiamos con mayor esfuerzo (40 h durante 17 días) nos permitió confirmar que un solo individuo atendió a los pichones. El individuo pasó muy poco tiempo en la cavidad del nido, haciendo hasta 12 viajes en una hora alimentando a los pichones con artrópodos, especialmente con larvas de Lepidópteros y polillas adultas. La tasa de alimentación se incrementó durante el período que los pichones estaban en el nido, mientras disminuyó la tasa de remoción de los sacos fecales. Adultos, pichones y volantones fueron inconspícuos, vocalizando solo suavemente y llamando poco la atención hacia el nido. Los adultos no defendían el nido de otras aves, sino que volaban del árbol cada vez que eran asustados. Estos comportamientos, el pequeño tamaño de las cavidades de los nidos, y su origen por degradación natural en vez de excavación por pájaros carpinteros, podrían explicar por qué se han encontrado tan pocos nidos.

Abstract. – The Olivaceous Woodcreeper (*Sittasomus griseicapillus*) is a widespread and common inhabitant of Neotropical forests, yet surprisingly little is known about its nesting habits and there is conflicting information about whether both parents or only the female care for the eggs and young. We found six nests in the Chaco and Atlantic forest in northern Argentina, in tree cavities formed by natural decay (as opposed to abandoned woodpecker holes), 4.5–16 m above the ground, with entrances 3–7 cm in diameter, and 18–35 cm deep. Olivaceous Woodcreepers laid three eggs on a bed of bark and/or leaves. Although two adults were present around the nests, banding of one adult at the most intensively studied nest (40 h over 17 days) allowed us to confirm that only one individual attended the nestlings. The adult spent very little time in the nest cavity, instead making up to 12 trips/h to bring the nestlings arthropods, especially Lepidopteran larvae and adult moths. The rate of delivery increased over the nestling period, whereas the rate of fecal sac removal declined. Adults, nestlings, and fledglings were inconspicuous, vocalizing only softly and drawing little attention to the nest. Adults did not defend the nest from other birds, but instead they flushed from the tree whenever startled. These behaviors, the small size of the

nesting cavities, and their origin by natural decay rather than woodpecker excavation, may explain why so few nests have been found. *Accepted 1 August 2012.*

Key words: Olivaceous Woodcreeper, *Sittasomus griseicapillus*, cavity-nesting bird, nestlings, parental care.

INTRODUCTION

The Olivaceous Woodcreeper (*Sittasomus griseicapillus*, Furnariidae: Dendrocolaptinae) is widespread in the Neotropics, occurring in a variety of forest habitats from Mexico to Uruguay (Marantz *et al.* 2003). *Sittasomus* is presently recognized as a monotypic genus, although on the basis of vocal variation it is likely that *Sittasomus griseicapillus* is better treated as a superspecies complex (Marantz *et al.* 2003, Ridgely & Tudor 2009). Like other woodcreepers, it nests in existing tree cavities; however, for such a widespread and common species, surprisingly little is known about its nest and nesting habits, and there is conflicting information about parental care (Patten 2011). Venturi (in Hartert & Venturi 1909) stated that the Olivaceous Woodcreeper reproduces in old woodpecker holes, but he did not mention a specific nest. Specific nests have been reported in a wide pear-shaped opening about 12 m above ground in the side of a dead palm (*Euterpe* sp.) trunk in Costa Rica (Skutch 1967); a well-concealed, sharply broken-off stub about 8 m up in a tall slender tree with a dbh (diameter at breast height) of 25–30 cm, overhanging a 30 m cliff in Mexico (Rowley 1966); between the roof and the ceiling of a house in northwestern Argentina (Caradonna in Di Giacomo & López Lanús 1998); and in a tree hole 1 m above ground in the Argentine Chaco (De la Peña 2010). A bird was also seen to enter a crevice 4.6 m up in an immortelle (*Erythrina poeppigiana*) tree in Trinidad and Tobago, but nesting was not confirmed (ffrench 1973, Patten 2011). Venturi (in Hartert & Venturi 1909) reported a clutch of four eggs on a bed of moss, but Narosky *et al.* (1983) cast doubt on this report. Marantz *et al.* (2003) reported clutch size as 'apparently three,' and De la Peña (2010) reported three eggs from the nest in the Argentine Chaco. Skutch (1967) observed small dead leaves and leaf fragments being taken to the cavity, but did not mention moss. At two nests, "adults" were reported bringing food to the nestlings (Rowley 1966, Caradonna in Di Giacomo & López Lanus 1998), implying that the authors assumed both parents were involved; however, Skutch (1967) only ever saw one individual during nest construction and incubation, and posited female-only parental care in *Sittasomus*. Little information is available about parental care, and the nestlings and fledglings of this species have not been described (Patten 2011). Here we report on six Olivaceous Woodcreeper nests found in Argentina, describe the nestlings and fledglings for the first time, and provide details of parental care during the nestling period.

METHODS

Between 1998 and 2011, we found four nests of *S. g. griseicapillus* in Chaco forest, in the Argentine provinces of Chaco and Salta, and two nests of *S. g. sylviellus* in the Atlantic forest of the province of Misiones (Table 1). The four nests from Chaco forest (nests 1–4) were found opportunistically during bird surveys (see Bodrati 2005), and the two nests from the Atlantic forest (nests 5–6) were found during nest searching as part of a larger study of cavity-nesting birds (Cockle *et al.* 2011b, 2012). We observed adult activity at all nests using binoculars or a telescope, and, when

TABLE 1. Nests of Olivaceous Woodcreeper (*Sittasomus griseicapillus*) in six tree cavities in Argentina. NP = National Park, Obs. = observer.

Nest	Obs.	Locality	Coordinates	Dates	Habitat	Nesting stage	Nest tree	Cavity height (m)	Cavity diameter (cm)	Internal cavity depth (cm)
1	AB	Pampa del Indio Provincial Park, Chaco Prov.	26°16'S, 59°58'W	16–18 Nov 1998	Gallery forest of Río Nogueira	Nestling	Live *Caesalpinia paraguariensis*	6	9.0 x 3.4	30
2	AB	Chaco NP, Chaco Prov.	26°48'S, 59°36'W	26 Nov 1998	Gallery forest of Río Negro. Myrtles (Myrtaceae) in mid-story; open understory with *Trichilia catigua*	Nestling	Live *Myrcianthes pungens*	5.4	6 x 5	35
3	AB	Chaco NP, Chaco Prov.	26°52'S, 59°37'W	28 Nov 1998	Gallery forest of Laguna Panza de Cabra	Egg	Live *Albizia inundata*	7	4 x 3.5	vertical: 25; horizontal: 12
4	SAS	Embarcación, Salta Prov.	23°11'S, 64°12'W	8 Nov 2004	Gallery forest of Río Bermejo	Nestling	Dead tree covered with epiphytic bromeliads (Bromeliaceae) including *Tillandsia* spp.	4.5	7	18
5	KLC	Tobuna, Misiones Prov.	26°27'S, 53°54'W	3 Dec 2007	Logged Atlantic forest	Nestling	Live *Nectandra lanceolata*, 20 m tall and DBH = 62 cm; infected with *Rigidoporus ulmarius* heart rot fungus	16 10	4 x 3 15 x 7	vertical: 25; horizontal: 9 vertical 18; horizontal: 5
6	AB, JK	Cruce Caballero Provincial Park	26°32'S, 54°00'W	28 Nov–14 Dec 2011	Primary Atlantic forest with canopy dominated by laurels (Lauraceae), *Cedrella fissilis*, *Parapiptadenia rigida*, with open midstory but many lianas on nest tree and trees immediately adjacent, understory mostly *Chusquea tenella* bamboo; steep slope to the southwest begins at nest tree; rocky soil	Nestling	Live *Nectandra lanceolata,* 14 m tall and DBH = 25 cm, with small crown suppressed by other trees and lianas			

possible, we climbed trees to view the nest contents using a ladder or single-rope climbing. Measurements of nest cavities were taken after the breeding season. We studied nest 6 the most intensively. At this nest, we used a mist-net to capture one of the adults, which was banded with one yellow plastic band on each leg and then released. The nest cavity faced the west and we observed it for a total of 40 h from three partly hidden sites: 10 m to the northwest, 9 m to the west, and 3.5 m to the southwest.

RESULTS

Timing of breeding. Breeding was observed as early as 8 November and as late as 14 December (Table 1). A dependent fledgling was also seen on 24 December 2000 in gallery forest along the Río Negro in Chaco National Park.

Nest placement. All six nests were in non-excavated cavities produced by branch fall or other natural decay processes, rather than by woodpeckers. Five of the six cavities were in living trees, and all were in native forest. Cavities averaged (mean ± SE) 8.2 ± 1.8 m above the ground, 25 ± 2.7 cm deep, and 4.8 ± 1.8 cm in entrance diameter (Table 1). The cavities were lined with tiny pieces of bark and dry leaves, including leaves of *Patagonula americana*, *Myrcianthes pungens*, and *Fagara* spp. (nests 2 and 3).

Eggs and incubation. Nest 3 contained three white eggs on 28 November. Two incubation bouts lasted 35 and 70 min, with about 10 min between bouts. One or both adults (we could not be sure) attended the nest, bringing small leaves at the start of each incubation bout.

Nestling development. Nests 2, 4, and 6 each contained two nestlings. On 29 November, the nestlings at nest 6 had pink skin, dark grey down on the head and back, and yellowish-white flanges at the gape. We estimated that the young were no more than two or three days old, based on our experience with other woodcreepers (Cockle & Bodrati 2009, Bodrati & Cockle 2011). One of the nestlings appeared considerably smaller than the other, and it had three botfly larvae (*Philornis* spp.) on its face and head. By 3 December, feathers had emerged on the wings, head, and tail, and the eyes began to open. On 7 December, at least one of the chicks was well feathered, but with pins still visible. Nests 2 and 4 were found when the nestlings were fully feathered, although the tails of the young at nest 2 were notably shorter than those of the adults. The nestlings at nest 4 weighed 9 and 10 g, respectively. The gape flanges were yellowish-white and the mouth linings were bright yellow.

Parental care of nestlings. We observed parental care of nestlings briefly at nests 1, 2, 4, and 5, and more extensively during 40 h at nest 6. We had the impression that both adults attended the nestlings at nests 1, 2, and 4, but we could not confirm this impression because we never saw one adult leave and the other enter the nest. We had the impression that only one adult attended nest 5, but again we could not rule out the possibility that two adults took turns. At nest 6, we observed two adults around the nest tree and we initially assumed that both participated in nestling care. To confirm this assumption, we captured one of the adults using a mistnet and banded it. This bird had a body mass of 8.5 g, a clear brood patch, a fat score of 0.5, an unflattened wing chord of 69 mm (although some of the primaries had broken or worn tips), an unflattened tail of 64.5 mm, a tarsus length (from the distal edge of the intertarsal joint to the distal edge of the third leg scale before the toes emerge) of 19.5 mm, a culmen length (from anterior edge of nares to

tip) of 13.1 mm, a bill length (from the anterior edge of the nares) of 8.4 mm, a bill width (from the nares) of 3.5 mm, a bill depth of 2.9 mm. It hosted a few feather lice. This bird's distress calls attracted the second adult, which nevertheless avoided the net. On following days, we attempted to attract the unbanded adult using playback of the voices of the banded individual, but neither member of the pair showed any interest in the playback. Thereafter, the banded individual entered the cavity 286 times during 35 h of observation, but the unbanded adult never visited the nest, even though it could sometimes be heard singing nearby. Initially, the unbanded adult was frequently encountered near the nest tree, and it often answered the songs and calls of the banded bird. The unbanded bird made two brief visits to the trunk of the nest tree and one to a small neighboring tree, yet it never showed any interest in the cavity itself. The banded adult often left the nest by dropping downward to one side, only to appear within a few seconds on the other side of the nest tree. We believe this behavior contributed to the impression that two adults were attending the nest.

The adult at nest 6 roosted in the nest cavity on the night of 2 December (approximately day 6) but not on the nights of 9 or 10 December (approximately days 13 and 14). Except at night, the adult rarely stayed in the nest cavity more than 1 min during the nestling period, with only one on-bout lasting 15 min (on 2 December).

Nestlings were fed arthropods. We could identify 234 of the food items brought to nest 6. Of these, at least 90% were insects (Lepidoptera: 44 caterpillars, 31 adult moths and butterflies, 2 pupae; Orthoptera: 38 grasshoppers and katydids, 4 crickets; Coleoptera: 2 cerambicid beetles, 1 firefly, 1 ladybug, 12 unidentified beetles; Hymenoptera: 10 ants, 4 wasps, 2 bees; Hemiptera: 6 true bugs; Diptera: 5 flies; Blattaria: 3 cockroaches; Mantodea: 3 preying mantises; Odonata: 1 damselfly; 41 unidentified insect larvae). The rest were other arthropods (Arachnida: 17 spiders, 2 harvestmen; Chilopoda: 1 centipede; Diplopoda: 1 millipede; 2 unknown crustaceans; 1 unidentified arthropod egg mass). The adult sometimes accommodated the position of the prey in its bill by gently knocking it against the tree trunk before entering the nest cavity. With large prey such as katydids, the nestlings would not always take the food initially and would only do so after the adult left the nest cavity and changed the position of the prey in its bill. Caterpillars and some adult moths were brought squashed, presumably from prior beating against trees. Ants were sometimes captured from the cavity entrance or inside the cavity just above the entrance. Nestlings at nests 1, 2, and 5 also received adult moths, larvae, adult beetles, spiders, millipedes, and ladybugs. The rate of the adult's arrival with food increased over the nestling period at nest 6 (Fig. 1).

We observed the adult removing fecal sacs at nests 1, 2, and 6 but not at nest 5 (during 2 h of observation). Fecal sacs were white and gelatinous and they seemed to be large for so small a bird, the sacs being only somewhat smaller in size than those of other, somewhat larger woodcreepers, such as Scalloped Woodcreeper (*Lepidocolaptes falcinellus*), Narrow-billed Woodcreeper (*L. angustirostris*), Great Rufous Woodcreeper (*Xiphocolaptes major*), White-throated Woodcreeper (*X. albicollis*), Scimitar-billed Woodcreeper (*Drymornis bridgesii*), and Planalto Woodcreeper (*Dendrocolaptes platyrostris*). The fecal sacs were generally taken far from the nest tree and out of our sight before being discarded, except in two cases at nest 6 on 9 and 11 December (approximately days 13 and 15) when they were discarded in flight 5–7 m from the nest tree. The rate of fecal sac removal declined over time at nest 6 and no fecal sacs were removed during our 5 h of observation on the last three days of

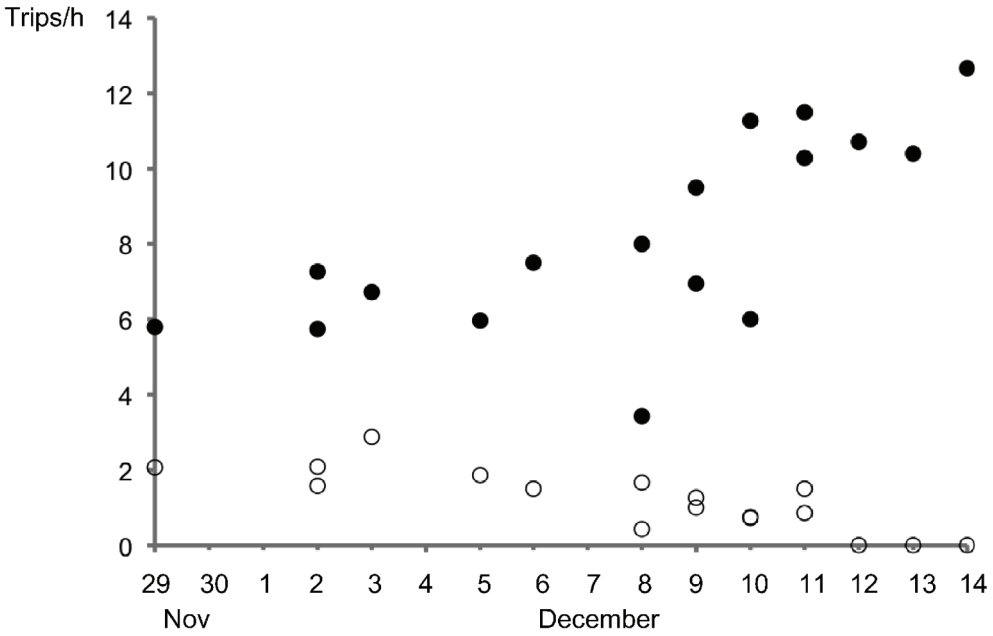

FIG. 1. Rate of arrival with food (black circles) and departure with fecal sacs (white circles) at a nest of Olivaceous Woodcreeper (*Sittasomus griseicapillus*) in the province of Misiones, Argentina (nest 6). Based on the appearance of nestlings, we estimate that 29 November corresponds to about day 3.

observation, during which one of the chicks fledged (Fig. 1).

When it arrived at nest 6, the attending adult would usually land low on the trunk, within the understory, and then hitch up the west side of the tree (where the cavity was), without spiraling around the trunk, then enter the cavity quickly, almost always head-first. When the tree was in the shade the adult would often land higher on the trunk, closer to the nest cavity or even at the cavity entrance itself. After 5 December (approximately day 9), the adult would sometimes climb a liana to within 40 cm of the cavity and only then move to the nest tree. On 11 December (approximately day 15), the nestlings began to climb within the cavity, even above the entrance, and the adult would feed them at the entrance, entering the cavity only rarely. Only one nestling appeared to be fed at each visit. Initially, the adult always left the cavity quickly without pausing at the entrance, but on the rare occasions that it entered the cavity after 11 December it would pause to look around before leaving. On leaving the cavity the adult would drop to the understory, glide a few meters, and land on a nearby tree, which it would then climb. Trips to and from this west-facing cavity were 50% to the south and southwest (downslope), 36% to the east and northeast, and 14% in all other directions (north, northwest, west, and southeast). About 200 m to the northwest was the territory of another pair of Olivaceous Woodcreepers which always vocalized, presumably in territorial defense, if the banded adult flew in that direction.

In the first few days of observation, the adult rarely vocalized near the nest. Toward the end of the nestling period it began to vocalize more frequently on arrival to and departure from the nest cavity. It flushed

from the nest tree (but not the cavity) at almost any disturbance by other birds, including a group of Plush-crested Jays (*Cyanocorax chrysops*) in the nest tree, Plumbeous Kites (*Ictinia plumbea*), Saffron Toucanets (*Pteroglossus bailloni*), and a Gray-bellied Hawk (*Accipiter poliogaster*) that passed above the tree, a Streaked Flycatcher (*Myiodynastes maculatus*) that vocalized in flight 20 m from the nest tree, and mixed species flocks that passed through the area. If the adult was flushed with food in its bill, it always returned with the same food taking it to the nest when the disturbance had passed. Once when the adult was inside the cavity, a Ferruginous Pygmy-Owl (*Glaucidium brasilianum*) landed at the entrance and looked in briefly, but the Olivaceous Woodcreeper remained inside and the owl flew away. Only a Pale-breasted Thrush (*Turdus leucomelas*) and a Rufous-bellied Thrush (*T. rufiventris*) that landed 1–2 m above the cavity, while the adult woodcreeper was on the tree, failed to frighten the woodcreeper into flight. We never saw an adult Olivaceous Woodcreeper defending its nest or attacking any other bird.

Fledging. The first chick left nest 6 on 13 December (approximately day 17). It was fully feathered although the tail was only 2/3 the length of an adult's, and it still had a trace of the yellowish flanges at the gape. It clung to the nest tree at a height of 1.5 m, hidden among epiphytic moss and the bamboo (*Chusquea tenella*) understory. When an observer approached the tree, the fledgling hitched up to a height of 5 m and hid for 20 min in a patch of epiphytic moss and ferns, covered by leafy vines, where the adult fed it twice. It later climbed to the nest cavity, entered, and remained for at least 1 h. The fledgling did not seem able to fly, but it climbed like an adult. The next day, a fledgling was again found outside the nest in the patch of epiphytes covered with vines. The adult brought food both to this chick and to the nestling still in the cavity. At times the adult landed below the fledgling with food for the nestling; although the fledgling begged, the adult passed within 30 cm but continued to the nest cavity to feed the nestling. Sometimes the adult fed both chicks within the space of a minute. Other times, it fed the same chick three times consecutively before feeding the other. The fledgling remained motionless, even when begging. It did not move its wings or tail, or climb toward the adult; rather, it moved only its head toward the adult and emitted a soft "pshh pshh". Occasionally, when the adult was near the tree, the fledgling emitted a single "chuik" that was indistinguishable from an adult's call.

Another fledgling was observed on 24 December 2000, in gallery forest along the Río Negro, in Chaco National Park. It followed an adult, begged for food, and was fed. Like the fledgling at nest 6, it did not move its wings or tail but instead emitted only soft vocalizations.

DISCUSSION

The six Olivaceous Woodcreeper nests we studied provide the most detailed information yet about the breeding biology of this common and widely distributed species. Our nests from November to December coincide in timing with the few other observations from similar latitudes in Argentina and Brazil. The nest previously reported from northwestern Argentina had nestlings in October (Caradonna in Di Giacomo & López Lanús 1998) whereas the nest from the Argentine Chaco contained three eggs on 30 November (De la Peña 2010). Oniki & Willis (2001) listed Olivaceous Woodcreeper as having a brood patch only in November in São Paulo, Brazil. Davis (1945) mentioned a specimen with active gonads in December in Rio de Janeiro, Brazil. Although Venturi (in Hartert & Ven-

turi 1909) stated that the species lays four eggs on a bed of moss, all other nests, including ours, had three eggs or two chicks on a bed of bark or leaves. None of our nests, nor the previous nests described specifically, were in old woodpecker holes. The species may use old woodpecker holes on occasion, as suggested by Venturi (in Hartert & Venturi 1909), but a more important source of cavities for this species appears to be natural decay and breakage. This is also true for many other Neotropical cavity-nesters (Cockle *et al.* 2011a, 2012).

Skutch (1967, 1996) posited biparental care in *Lepidocolaptes* and *Glyphorynchus* and female-only parental care in *Sittasomus*, *Dendrocincla* and *Xiphorhynchus*. Our detailed observations with a banded individual support Skutch's hypothesis of female-only parental care in *Sittasomus*. Both Rowley (1966) and Caradonna (in Di Giacomo & López Lanús 1998) implied that more than one adult attended the nests but did not provide details. We suspect that they did not actually observe two adults entering the nests they studied. In contrast, in woodcreepers with biparental care, such as Streak-headed Woodcreeper (*Lepidocolaptes souleyetii*), Spot-crowned Woodcreeper (*L. affinis*), Great Rufous Woodcreeper, Scalloped Woodcreeper, and Planalto Woodcreeper, both adults of a pair can often be observed simultaneously around the nest cavity (Skutch 1969, Bodrati 2003, Cockle & Bodrati 2009, Bodrati & Cockle 2011). The attending adult at nest 6 had an unusually low body mass (8.5 g) compared to two unsexed individuals captured at the same field site in March 2011 (10 and 12 g; P. Capllonch, K. Soria *in litt.* 2011), and known females of the same subspecies *S. g. sylviellus* at other sites (11.2 and 12.4 g, Contreras 1983; 12 g, Belton 1984).

The diet of Olivaceous Woodcreeper nestlings at Cruce Caballero Provincial Park was similar to that of Scalloped Woodcreeper nestlings at the same site, with adults and larvae of Lepidoptera comprising the largest component, followed by Orthoptera (Bodrati & Cockle 2011). Nestling Olivaceous Woodcreepers received food at a similar rate to Planalto Woodcreepers (Cockle & Bodrati 2009), but more frequently than Scalloped Woodcreepers at the same site, although the rate of food delivery at the latter nest may have been reduced by the death of the adult male during the nestling period (Bodrati & Cockle 2011).

We believe that the secretive behavior of Olivaceous Woodcreepers around their nests may account for the paucity of previous nest reports. The Olivaceous Woodcreeper is abundant at several of our field sites (Bodrati *et al.* 2010, pers. observ.), and we searched for its nest for many years. Despite finding thousands of nests of other species of birds, we only found six nests of Olivaceous Woodcreepers. Nests were difficult to find because the cavities were small, high, usually well-hidden, and difficult to see. Moreover, the adult would initially pass by the nest cavity or flush if it detected the presence of an observer or other perceived danger, the nestlings could not be heard vocalizing, the fledglings remained hidden and motionless much of the time, and the adults did not defend the nest. By contrast, Planalto, White-throated, Great Rufous, and Scalloped Woodcreepers nest in larger, more obvious, exposed cavities, including old woodpecker holes and long cracks (Cockle & Bodrati 2009, Bodrati & Cockle 2011, Cockle *et al.* 2011b, pers. observ.). The voices of nestling White-throated, Great Rufous, Scimitar-billed, and Narrow-billed Woodcreepers can be heard at a distance of 20 m or more from the nest (pers. observ.), and fledglings of Narrow-billed and Scalloped Woodcreepers emit loud begging calls and move conspicuously, flying between trees behind the adult (Bodrati & Cockle 2011, pers. observ.). Adult White-throated, Great

Rufous and Scalloped Woodcreepers defend their nests against potential predators and competitors (Bodrati & Cockle 2011, Lammertink *et al*. 2012, pers. observ.). Whereas the larger woodcreepers actively defend their more obvious nests against potential predators, Olivaceous Woodcreepers seem to opt for a strategy of hiding the nest, which appears to explain the paucity of nest records.

Even when combined with previously published nest records, our observations provide only a partial picture of the Olivaceous Woodcreeper's nesting biology. Although Olivaceous Woodcreepers appear to exhibit female-only parental care, this should be confirmed with studies of banded individuals throughout the nesting period and over the species' large range. The nestling period is estimated to be about 17 days, but exact data on the length of incubation and nestling periods are still lacking.

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