ORNITOLOGÍA NEOTROPICAL
(2020) 31: 42–46
ORIGINAL ARTICLE

NESTING INFORMATION FOR THE BROWN-WINGED SCHIFFORNIS (*SCHIFFORNIS TURDINA*)

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Abstract · We present a description of the nest, eggs and limited incubation behavior for the Brown-winged Schiffornis (*Schiffornis turdina*), a member of the taxonomically challenging *Schiffornis* taxon, currently included in the family Tityridae. The nest was an open cup, located in a natural crevice between tree roots, and made up largely of dead leaves and dark rootlets. The nest contained two pale cream-colored eggs with black and dark purple blotches. An adult spent 66.45% of the daytime incubating the eggs. The incubation was interrupted by the predation of the incubating adult by a mouse opossum (*Marmosa sp*.). Overall, the nest and egg characteristics, clutch size and incubation patterns resembled the available nesting information for other *Schiffornis* species. However, more detailed information about the natural history is needed to understand the nesting biology for the genus *Schiffornis* and therein lies the importance of long-term studies.

Resumen · Información de incubación del llorón turdino (*Schiffornis turdina)*
Se presenta la descripción del nido, los huevos y limitada información del comportamiento de incubación para el llorón turdino (*Schiffornis turdina*), un miembro del grupo *Schiffornis,* de posición taxonómica poco clara, actualmente incluido en la familia Tityridae. El nido tenía forma de copa sostenido por la base, estaba situado en una hendidura natural entre las raíces de un árbol y, en gran parte, se componía de hojas secas y pequeñas raíces oscuras. El nido contenía dos huevos de color crema pálido con manchas negras y moradas oscuras. Un adulto pasó el 66,45% del día incubando los huevos. La incubación fue interrumpida por la depredación del adulto por una marmosa (*Marmosa sp*.). En general, las características del nido y de los huevos, el tamaño de nidada y los patrones de incubación se parecen a los de otros miembros del género *Schiffornis* que han sido descritos. Sin embargo, se necesita más información sobre la historia natural para hacer generalizaciones de anidación en el género *Schiffornis,* y ahí radica la importancia de estos estudios a largo plazo.

Key words: Amazon · Eggs · Incubation behavior · Natural history · Neotropical · Nest · Peru· *Schiffornis turdina steinbachi*

INTRODUCTION

The genus *Schiffornis* has a long-debated taxonomic history at both higher level and species-level. Nowadays, based on morphological, life-history and genetic traits, *Schiffornis* is considered part of the Tityridae family (Prum & Lanyon 1989, Barber & Rice 2007, Tello et al. 2009, Ohlson et al. 2013, Dickinson & Christidis 2014, Remsen et al. 2018) and it includes seven species and 13 subspecies (Nyári 2007, Snow & Kirwan 2019). Several aspects of the natural history of the *Schiffornis* species remain poorly known, and detailed information on the breeding behavior for most *Schiffornis* is still lacking or incomplete.

The available information on the breeding biology for *Schiffornis* includes descriptions of the nests and eggs for the Northern Schiffornis (*Schiffornis veraepacis*) in Costa Rica (Skutch 1969, del Hoyo et al. 2019c), Russet-winged Schiffornis (*Schiffornis stenorhyncha)* in Colombia (Sandoval et al. 2017, del Hoyo et al. 2019b), the Greenish Schiffornis (*Schiffornis virescens)* in Brazil (Sick 1997, Marini & Heming 2017, Willrich & Da Silva 2019) and Argentina (Bodrati & Cockle 2017, Snow 2019), and the Olivaceous Schiffornis (*Schiffornis olivacea*) in Guyana (del Hoyo et al. 2019a). Information on the breeding behavior of the Brown-winged Schiffornis (*Schiffornis turdina*) includes the description of the nest, eggs, clutch size, incubation, and nestling period from four nests found in Costa Rica (Skutch 1969, Sick 1997)

S. turdina is a medium-sized, sexually monochromatic inhabitant of humid lowland forests in southern Amazonia (Snow & Kirwan 2019). It is distributed across all Central America and northern Mexico, as well as much of northern and central South America, in northwestern and southern Venezuela, the western Andes of Colombia, Ecuador and northwestern Peru, southeastern Brazil, and the south of Bolivia (Kirwan & Green 2011). It can be found between 800 and 1800 m a.s.l. (Kirwan & Green 2011). *S. turdina* forages in solitary, rarely joining mixed-species flocks. Like other *Schiffornis* species, it feeds on fruits, spiders (Kirwan & Green 2011), and insects, mostly in the canopy, and is heard more often than seen (Snow & Kirwan 2019). The wide-

Receipt 29 July 2019 · First decision 2 September 2019 · Acceptance 27 November 2019 · Online publication
Communicated by Rafael Rueda-Hernández

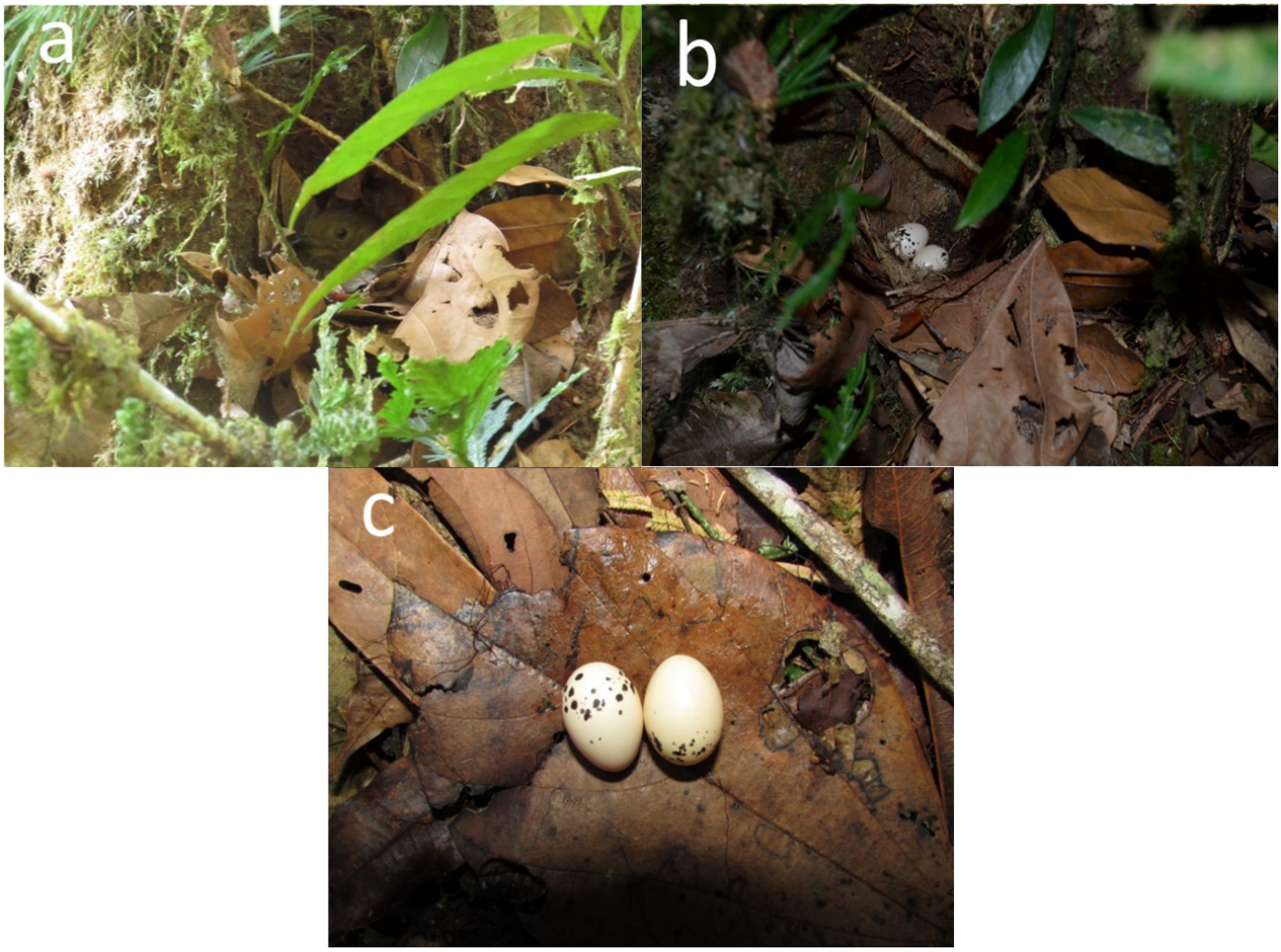

Figure 1. Photographs of the nest and eggs of the Brown-Winged Schiffornis (*Schiffornis turdina*), found in the Pantiacolla lodge at Manu National Park, Madre de Dios, Peru. A) An adult in the nest; B) Eggs in the nest C) A close-up view of the eggs outside the nest.

ly distributed *S. turdina* currently includes the subspecies *Schiffornis turdina wallaci, Schiffornis turdina amazonum, Schiffornis turdina turdina, Schiffornis turdina intermedia* and *Schiffornis turdina steinbachi* (Nyári 2007, Snow & Kirwan 2019).

In this study, we describe the nest, eggs, and some aspects of the incubation behavior of *S. turdina*, specifically of the subspecies *S. t. steinbachi*, based on a single nest found in Manu National Park, Peru, which was monitored for three days with a trap camera. The information presented here contributes to filling the gaps in the natural history of this group.

METHODS

Study site. Nest observations were made at Pantiacolla Lodge, on the eastern slope of the Andes, in the buffer zone of Manu National Park, Madre de Dios, Peru (12°38'48.9"S, 071°16'13.7"W). The field site is a lowland Amazonian rainforest encompassing elevations between 400–900 m a.s.l. The forest comprises a mix of floodplain and *terra firme* habitats, with small scattered bamboo (*Guadua sp.*) patches. Fieldwork was conducted during the general breeding season (August–December 2014), a period of transition between the dry and the rainy seasons in the area. Temperatures in the area fluctuate between 10°C and 30°C throughout the year (Londoño et al. 2017).

Nest searching and monitoring. The nest was monitored for three days during the 2014 breeding season (August–December), as part of a long-term breeding biology study at the community level conducted in the area. The nest and eggs were found opportunistically while conducting census points in the foothills. The nest and eggs dimensions were measured using a caliper and a ruler (+/- 0.1 mm). The mass of the eggs and the dry weight of the nest were recorded with a digital scale (+/- 0.05 g, Flipscale F2, Phoenix, Arizona, USA). The development stage was determined by egg candling.

To monitor incubation behavior, a camera trap *(*HC500 Hyperfire covert camera) was placed 50 cm from the nest and programmed to take a photo every minute, and 10 photos when movement occurred at the nest. Incubation behavior was classified as on-bout, off-bout, perch (when the adult was close to the nest), and edge (when the adult perched on the nest rim). Nest attentiveness was calculated as the percentage of time in which the eggs were incubated during the daytime (05:00 h – 18:00 h)**.**

RESULTS

Nest and egg description. We found the nest of *S. t. steinbachi* on 13 October 2014, when an adult flushed from a nest containing two eggs in advanced embryonic development stages. The nest was a thick-walled open cup, sited within a natural crevice formed by a tree root (0.3 m above

Figure 2. Illustration of the nest of the Brown-Winged Schiffornis (Schiffornis turdina steinbachi). Made by: José Alejandro Riascos.

ground), supported from below by the tree root and protected laterally by the tree trunk (Figure 1A-B, Figure 2). The nest structure consisted of two layers: an external layer made up almost entirely of loosely woven dry dicot leaves (7.06 g) and a thin internal lining of dark, flexible, dry rootlets (0.94 g). The outer dimensions of the cup were 76.8 mm long by 73.0 mm wide and 82.2 mm in external height. Inner dimensions were 75.5 mm long by 47.7 mm wide, 48.5 mm of inner depth, and a nest wall thickness of 32.3 mm.

The eggs were cream-colored and heavily speckled, with dark black and purple spots forming a sparse cap of markings concentrated at the larger end (Figure 1B-C). The eggs measured 28.2 × 12.2 mm and 24.5 × 12.6 mm, and weighed 3.67 g and 4.53 g, respectively.

Incubation behavior. We monitored the incubation behavior for 51.06 hours using a motion camera trap, until the predation event occurred. The eggs were incubated for 19.38 hours total in two days, including nighttime. Average diurnal nest attendance was 66.45% (n = 2 days), and the foraging trips averaged five per day and lasted on average 49 min (range = 1–93.1 min). One adult incubated through the night.

The number and duration of the foraging trips varied between days. On the first day (13 October), there were two foraging trips (13 min, and 1 min), and the nocturnal incubating individual stayed on the nest from 19:42 h to 03:36 h the next day (7 hours and 54 minutes). Frequent movements were observed during the nocturnal incubation, potentially in response to a swarm of army ants moving through the nest. On the second day (14 October), four foraging trips were made, lasting 29.78, 146, 2, and 56.13 min, respectively; the nocturnal incubation started at 15:43 h and lasted until 05:25 h the next day (13 hours and 42 minutes). On the third day (15 October), there were six foraging trips (27.62, 72, 93.16, 22, 1 and 21.28 min); the nocturnal incubation started at 15:05 h and it was interrupted by the predation event.

Adult predation event. The camera trap recorded a mouse opossum (*Marmosa sp*.) attacking and killing the incubating individual on the nest (Figure 3A-C) at 19:00h on 15 October, and the predation event lasted 10 minutes. From the photo sequences (Figure 3A-D) it is possible to estimate that the mouse opossum was twice the size of the incubating bird, and it seems that the bird tried to fight or fly unsuccessfully. The predator carried the adult away, out of the sight of the camera, and did not return to the nest to eat the eggs that night or the following night. We removed the camera two days after the predation event, and we did not observe any individuals of *S. t. steinbachi* approaching the nest, suggesting that only one individual was incubating the eggs.

DISCUSSION

We present a description of the nest, eggs, and some aspects of the incubation behavior of *S. t. steinbachi,* and documented a rarely observed case of predation of the adult during nocturnal incubation.

Overall, the nest of *S. t. steinbachi* was similar to those described for other *Schiffornis* species in its materials, structure, and location. It was also consistent with the first description of this species' nest (Skutch 1969). In a similar manner as *S. veraepacis* (Skutch 1969, del Hoyo et al. 2019c), *S. stenorhyncha* (Sandoval et al. 2017, del Hoyo et al. 2019b), *S. virescens* (Kirwan & Green 2011, Bodrati & Cockle 2017, Marini & Heming 2017, Willrich & Da Silva 2019, Snow 2019), and S. *olivacea* (del Hoyo et al. 2019a), *S. t. steinbachi* builds a bulky cup nest out of leaves, lined with a layer of root-

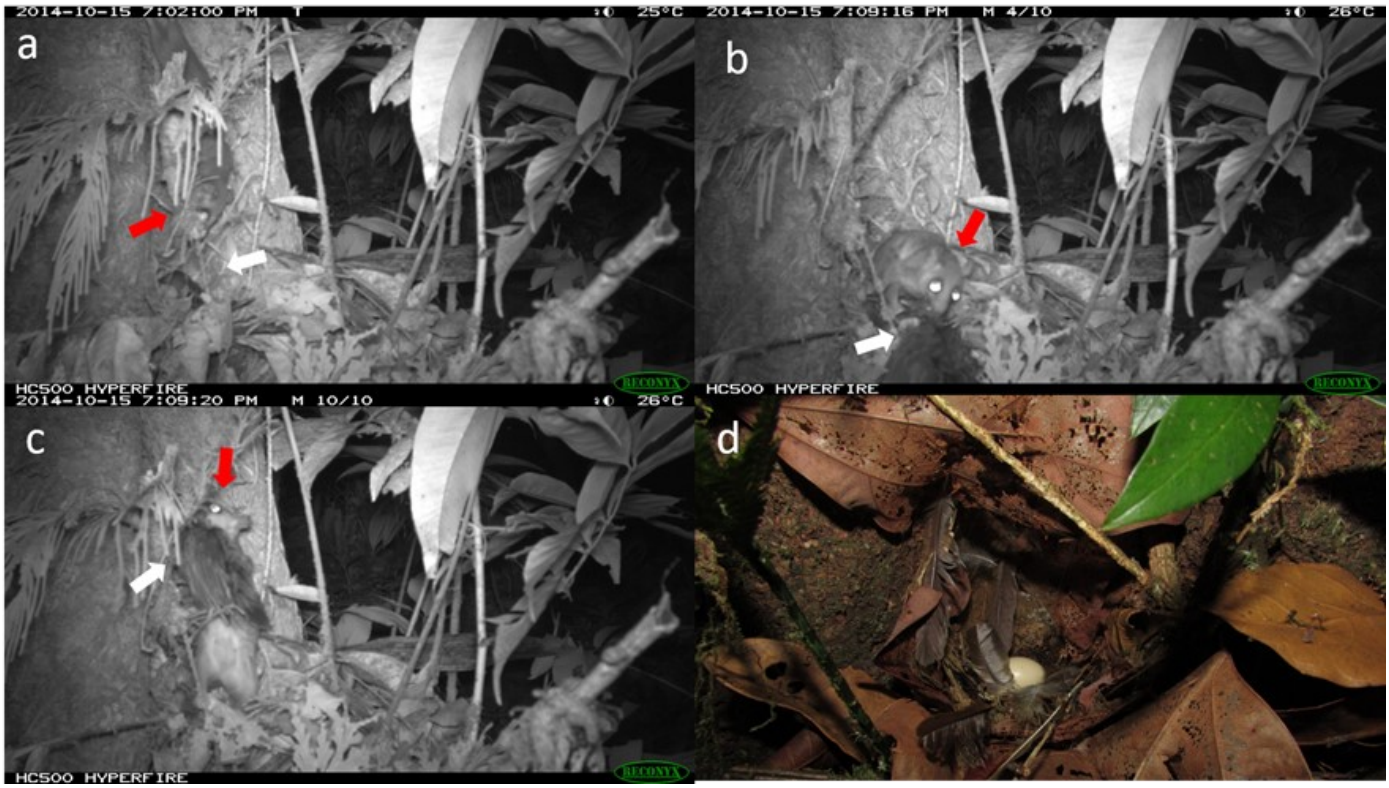

Figure 3. Highlights of the sequence of the predation event of an adult of the Brown-Winged Schiffornis (*Schiffornis turdina)* by a mouse opossum (*Marmosa* sp.) at Manu National Park, Madre de Dios, Peru. A) The predator (red arrow) approaching the nest while an adult was incubating (white arrow) B) The predator (red arrow) carrying the adult (white arrow) in the mouth C) The predator (red arrow) leaving the nest with the adult (white arrow) in the mouth D) The eggs in the nest after the predation event.

lets and other fibers, with its base resting on a natural surface (e.g., ferns, epiphytic bromeliads; *S.virescens*). The nest of *S. t. steinbachi* was not attached laterally to any structure, but it was protected laterally by the roots. Additionally, there was no noticeable inclination of the nest, as was described for *S. virescens* (Bodrati & Cockle 2017, Willrich & Da Silva 2019).

The clutch size (two eggs) and the coloration pattern (pale cream eggs with dark purple spots) observed for *S. t. steinbachi* are consistent with the egg descriptions of *S. veraepacis* (Skutch 1969, del Hoyo et al. 2019c), *S. stenorhyncha* (Sandoval et al. 2017, del Hoyo et al. 2019b), *S. olivacea* (del Hoyo et al. 2019a), and the first description for *S. turdine*. However, it was smaller than the clutch size (three eggs) documented for *S. virescens* (Bodrati & Cockle 2017, Willrich & Da Silva 2019, Snow 2019).

Camera trap data suggests that only one adult incubated the eggs: we never observed both parents simultaneously near the nest, which is consistent with the observations of uniparental incubation behavior inferred for *S. veraepacis* (Skutch 1969) and *S. virescens* (Bodrati & Cockle 2017). The diurnal nest attentiveness observed for *S. t. steinbachi* (66.45%) was slightly higher than that previously reported for *S. veraepacis* (56%, Skutch 1969) and *S. stenorhyncha* (57%, Sandoval et al. 2017). No defensive behavior was observed when the researchers approached the nest; the bird usually flushed and perched more than 5 m away from the nest.

Although egg and nestling predation events by known predators have been reported in the Neotropics, predation of the incubating bird is rarely documented in literature. Our report of the adult predation by a mouse opossum is surprising, as this is a small predator. However, it may have taken advantage of the nest location (i.e., close to the ground) and the vulnerability of the incubating bird during the night, when it was less cautious. This provides evidence demonstrating that incubation represents a potential source of adult mortality and a cause of nest abandonment (Amat & Masero 2004). This event, however, seems to be uncommon: out of 450 nests of different species monitored with cameras in the same study area, this was the only confirmed record of adult predation during night incubation (Londoño pers. comm.).

In conclusion, we found that the overall characteristics of the eggs, nest structure, materials, and incubation behavior are consistent with those previously documented for other *Schiffornis* species. Despite recent insights on the breeding biology of other species in this taxon, several aspects of the natural history, breeding biology (e.g., nestling development), and in general, the taxonomy of this group remains poorly studied. Here, we contributed to the knowledge of the natural history of one of the subspecies of the *S. turdina* group, facilitating future reliable nesting comparisons among regions.

ACKNOWLEDGMENTS

We thank all the field assistants at the Pantiacolla station during 2014 for their help in the field. We also thank M. van Vlaardingen and G. Moscoso for allowing us to use Pantiacolla Lodge during our field season. We are grateful to José Alejandro Riascos for drawing the nest illustration. Finally, we thank SERNAP for giving us permission to work in the buffer zone of Manu National Park. The National Science Foundation grant DEB-1120682 provided funding. Handling procedures were approved by the Institutional Animal Care

and Use Committees at the University of Florida (protocol no. 201106068) and by permits from the government of Peru (0239-2013 MINAGRI-DGFFS/DGEFFS 2013).

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