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The first nest records of the Sooty Antbird (*Myrmeciza fortis*) with notes on eggs and nestling development.—The Neotropical bird family Thamnophilidae (sensu Sibley and Alquist 1990, Sibley and Monroe 1990) is large yet relatively poorly known (Monroe and Sibley 1993, Ridgely and Tudor 1994). Nests, eggs, and young of most species are unknown. Here we describe for the first time the nests, eggs, and nestlings of the Sooty Antbird (*Myrmeciza fortis*) from a site in southeastern Peru. We also compare the nests of this species to previously described nests of *Myrmeciza* spp. and to other species in the Thamnophilidae.

Methods.—Two nests were discovered during the late dry season in a mature floodplain forest near Cocha Cashu Biological Station, Manu National Park, Department of Madre de Dios, Peru. The habitat is described in Terborgh et al. (1984). The first nest was found in 1991 by URS, and the second in 1994 by FAW.

Data were recorded for the eggs of nest 1 only. Development was recorded only for nestlings in nest 2 in which data were taken each day (except one) between 13:30 and 15:00 from day 1 until fledging. The nestlings were marked with a black marking pen each day until they were color banded on day 8. In addition, they were weighed with a Pesola spring balance to the nearest 0.1 g, and the wing chord, tail, and bill length of each were measured to the nearest 1 mm, with a wing ruler.

Nest placement and description.—Both nests were concealed in leaf litter on the forest floor at the edge of frequently traveled trails. Nest 1 (Figs. 1, 2) was in a small mound of leaf litter (25 cm high, 30 cm in diameter) between low buttresses of a mid-canopy tree; nest 2 was located in a small mound of leaf litter (50 cm high, 27 cm in diameter) whose surface sloped up from the ground at a 45° angle. Each nest consisted of a spherical chamber with a short horizontal entrance tunnel. The floor of the spherical chamber was sunk slightly lower than the level of the entrance tunnel. The horizontal roof was in a single plane to the forest floor (Fig. 1). The dimensions of the entrance tunnels were: Nest 1—ca 2–3 cm deep, 4 cm high, 5 cm wide and Nest 2—ca. 3.6 cm deep, 3.4 cm high, 3.6 cm wide. Nest 1 had

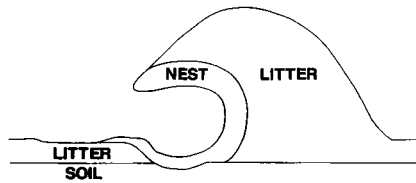


FIG. 1. Lateral cross section of a Sooty Antbird nest.

a short runway leading to the entrance tunnel. The dimensions of the spherical chambers were: Nest 1—6–7 cm in diameter and Nest 2—ca 5.2 cm deep, 3.8 cm high, 4 cm wide.

The exterior rim of the entrance tunnel of nest 2 was comprised of strips of tightly woven plant material ranging from 3.6 to 18.8 cm long and was cushioned with tiny pieces of leaves. The interior chambers of both nests were neatly lined with interwoven plant fibers, either thin strips torn from the margins of palm leaves and grass blades or the thread-like “reins” that are shed from the pinnae (leaflets) of new palm leaves; some fibers were still green. Plant matter forming the spherical chamber of nest 2 measured ca 0.8–6.0 cm long and 0.1–0.6 cm wide.



FIG. 2. Eggs in nest 1.



FIG. 3. Nestlings in nest 2 at day 8.

Results.—When found both nests contained two eggs. The eggs of nest 1 were pyriform to long-pyriform with a smooth matte or very slightly glossy finish. They were creamy-white with dark brown or maroon scrawls concentrated toward the blunt end (Fig. 2). Eggs of nest 1 were revealed when an adult female was flushed from the nest on 23 September (day 1). Eggs were also observed on days 2 and 3. On days 3, 4, and 6 an adult male was seen on the nest. On day 10 (2 October) the nest was empty but undisturbed. Nest 2 was discovered on 1 October when an adult male was flushed from the nest, which contained two eggs. An adult female was noted on the nest each day thereafter until nestlings appeared on 11 October.

On day 1 (11 Oct.) the nest contained two purplish blue nestlings lacking down but with pin feathers in spinal and caudal tracts: Their eyes were closed. They had a yellow gape and were making faint peeping sounds. On day 2 nestling A had pin feather development in scapular region, the gape color was fading; nestling B was making faint peeping sounds. Both nestlings had broken sheaths along the spinal tract. On day 3 there were additional feathers in spinal and scapular regions, some with broken sheaths. Nestling A had ventral pin feathers and its gape color continued to fade. Nestling B had capital tract pin feathers. On day 5 there were pin feathers in the capital, spinal, and caudal regions and the nestlings' eyes were beginning to open. Nestling A was standing and spreading its wings. On day 6, nestlings' eyes were fully open: Broken sheaths exposed black feathers in all areas except on the tail (nestlings A and B) and on the crown (nestling A). Nestling A aggressively pecked at FAW's hands while being measured. Nestling B's gape was still yellow. On day 7 nestling B had fully developed crown feathers. On day 8 there were white tips on bill, brown primaries were developing, and there were bare patches around eyes. Nestling A was observant. Its gape color was nearly gone and its crown feathers were fully developed (Fig. 3). On day 9 the nestlings were alert; few caudal pin feathers remain. Nestling A escaped and hopped down the trail. It was caught and returned to the nest, but was missing three hours later. Nestling B was still present 3 h later, lowering its

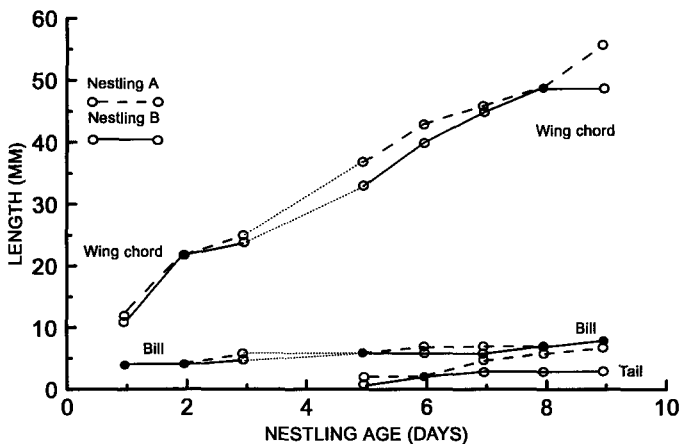


FIG. 4. Development in two Sooty Antbird nestlings. The dotted line indicates no data for day 4, and the solid dots represent equal values.

head and peeping. On day 10 the nest was empty and ripped from the leaf pile still intact. Nestling measurements are given in Fig. 4.

Discussion.—The minimum possible incubation period for nest 2 was 10 days, but the eggs may have been in the nest for several days before it was discovered. Incubation times reported for other Thamnophilidae range from 14–18 days (Skutch 1996). The male was observed on the nest only once. Since the nest was checked at approximately the same time each day, the male may have incubated at other times. This is likely the case with nest 1, in which the male was observed on the nest on days 3, 4, and 6, presumably incubating. As a general rule, the male and female alternate incubation bouts in the Thamnophilidae (Skutch 1996).

The nestling period for nest 2 was nine days, although the young may have fledged a day early because of handling by the investigator. This duration agrees with nestling periods reported for other Thamnophilidae which range from 9 to 15 days (Skutch 1996).

Antbird nests vary in structure and placement, ranging from simple, open cups or pensile pouches that are supported by forked branches to large, closed balls placed near or on the ground. Others are open cups set in cavities of tree trunks or in bunches of leaves among plants on the ground (Sick 1993). According to Skutch (1969), antbird nests are rarely found on the ground. Of the 19 *Myrmeciza* species (Monroe and Sibley 1993), the nests of only three other species, Chestnut-backed Antbird (*M. exsul*), Ferruginous-backed Antbird (*M. ferruginea*), and White-bellied Antbird (*M. longipes*), have clearly been described, while the nest of Goeldi's Antbird (*M. goeldii*), has been only briefly noted. *Myrmeciza exsul* places its loosely built, cup-shaped nests on short plants, dead palm leaves or debris near the ground (Skutch 1969, Wetmore 1972, Willis and Oniki 1972) or in small ferns and young palms at heights of 32.5–45.0 cm (egg/nest specimen data from the Western Foundation of Vertebrate Zoology). The open cup nests of *M. ferruginea* (Haverschmidt and Mees 1994) and *M. goeldii* (M. B. Robbins, pers. comm.) are placed on the ground, whereas the open cup nests of *M. longipes* are usually 1–2 m above the ground (Wetmore 1972).

In contrast, the two nests of *Myrmeciza fortis* described here were on or near the ground, domed, and concealed within mounds of leaf litter. This type of nest structure is relatively uncommon within the family, although similar nests are known in a few other antbird genera.

The "leafy ball" nest of the White-backed Fire-eye (*Pyriglena leuconota*) is set on or near the ground (Willis 1981) and is of similar design to the nest of the Ovenbird (*Seiurus aurocapillus*), as reported by Bond and Meyer de Schauensee in Stone (1928). The White-shouldered Fire-eye (*Pyriglena leucoptera*) (Euler 1867, Fraga and Narosky 1987, Skutch 1996) is also known to build an oven-shaped nest with a side entrance near or on the ground. An oven-shaped nest, possibly of the Slender Antbird (*Rhopornis ardesiaca*) has also been reported (Teixeira 1987). A similar nest has been described for the Brown-bellied Antwren (*Myrmotherula gutturalis*) (Oniki and Willis 1982) which is a notable exception to the above-ground open cup or pennisle nests typical of many *Myrmotherula* species (Hilty and Brown 1986).

The systematic relationships of *Myrmeciza* species are poorly resolved, both within the genus (Zimmer 1932) and with respect to other genera (Ridgely and Tudor 1994). Differences among the nests of *Myrmeciza* species adds to the recorded heterogeneity of this genus (Ridgely and Tudor 1994, K. V. Rosenberg and M. J. Braun, unpubl. data). *Myrmeciza* clearly warrants further study. Additional information on the nests of other species may help to advance our understanding of the systematics and evolutionary history of this genus and of the Thamnophilidae.

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FIONA A. WILKINSON, *Biological Resources Division, United States Geological Survey, Room #378, National Museum of Natural History, 10th St. and Constitution Ave., NW, Washington, District of Columbia 20560-0111*; AND UNA R. SMITH, *Dept. of Biology, Yale Univ., New Haven, Connecticut 06520-8104. Received 15 Aug. 1996, accepted 26 Nov. 1996.*

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Intermittent incubation during egg laying in House Sparrows.—The clutch sizes of many passerine birds show considerable phenotypic plasticity (Perrins and Moss 1975, Hogstedt 1980, Pettifor et al. 1988), but the proximate mechanisms responsible for determining clutch size are poorly understood. Recent studies have suggested that the onset of incubation behavior, which commences gradually during egg laying in some species, may play a role in the proximate determination of clutch size (Haftorn 1981, Mead and Morton 1985, Meijer 1990, Haywood 1993). Anderson (1995) proposed that the mechanism of clutch size determination in the House Sparrow (*Passer domesticus*) involves (1) female condition at some point prior to the beginning of egg laying, establishing both a prospective clutch size and a corresponding schedule for the onset of incubation, (2) tactile feedback from the presence of at least one egg in the nest causing continuation of incubation behavior and resultant increases in prolactin secretion, and (3) rising prolactin levels suppressing follicular development causing egg production to cease at the pre-determined number. This proposal would require that incubation begin early in the laying sequence, such as has been observed in several other passerines (Haftorn 1981, Zerba and Morton 1983, Meijer 1990, Hebert and Sealy 1992).

Little is known about the onset of incubation in the House Sparrow. Asynchronous hatching occurs in House Sparrow broods (Veiga and Vinuela 1993, Anderson 1994), which suggests that incubation begins prior to the completion of egg laying. It is also known that female House Sparrows roost in the nest on the eggs during egg laying (Summers-Smith 1963) and spend more time on the nest during the day as egg laying progresses (Summers-Smith 1963, North 1980), but it is not known if heat is being applied to the eggs during these periods. A gradual onset of incubation behavior involving intermittent bouts of incubation early in the laying sequence would be required for the mechanism proposed above, while an abrupt onset late in the egg laying cycle would be inconsistent with it. The purpose of this preliminary study was to determine if such intermittent bouts of incubation occur during egg laying in the House Sparrow.