A NEW SPECIES OF ANTPITTA (GRALLARIIDAE: *GRALLARIA*) FROM THE NORTHERN SECTOR OF THE WESTERN ANDES OF COLOMBIA

Una especie nueva de tororoi (Grallariidae: *Grallaria*) del sector norte de la Cordillera Occidental de los Andes colombianos

Diego Carantón-Ayala[1]
Fundacion ProAves, Cra. 20 # 36-61, Bogotá, Colombia.
Grupo de Observadores de Aves del Tolima GOAT, Facultad de Ciencias, Universidad del Tolima, Ibagué, Colombia.
caranton2@yahoo.com.ar

Katherine Certuche-Cubillos
Programa de Biología, Facultad de Ciencias, Universidad del Tolima, Ibagué, Colombia.
katcertuche@gmail.com

ABSTRACT

We describe the Urrao Antpitta (Grallariidae: *Grallaria urraoensis*), a new species of suboscine passerine endemic to high Andean forests below Páramo de Frontino, in the northern sector of the Western Andes of Colombia. The new species is similar to the Brown-banded Antpitta (*Grallaria milleri*) from the Central Andes, but differs from it vocally and in its slightly larger size, lack of pectoral band, duller brown-olive coloration in the upperparts, uniform light gray underparts, and whitish lores. The new species occurs in the undergrowth of primary and secondary cloud forests dominated by *Chusquea* bamboo at elevations between 2500-3200 m at the type locality. We present notes on the ecology, distribution, behavior, reproductive biology, vocalizations, and conservation of the new species. The montane forests in the northern sector of the Western Andes to which the Urrao Antpitta is endemic are threatened by deforestation, fragmentation, and mining. These factors, in combination with the restricted geographic and ecological distribution of the new species, make it an important priority for conservation action.

Key words: Colombia, *Grallaria urraoensis*, high Andean forest, new species, Western Andes.

RESUMEN

Describimos al Tororoi de Urrao (Grallariidae: *Grallaria urraoensis*), una nueva especie de passeriforme suboscino endémica de los bosques altoandinos del Páramo de Frontino, sector norte de la Cordillera Occidental de los Andes de Colombia. La nueva especie es similar al Tororoi de Miller (*Grallaria milleri*) de la Cordillera Central, pero difiere de esta especie en sus vocalizaciones y por ser ligeramente más grande, sin banda pectoral, con coloración café-oliva más opaca por encima, gris claro uniforme en las partes inferiores y bridas blanquecinas. La nueva especie se encuentra en el sotobosque de bosques nublados primarios y secundarios dominado por bambúes del género *Chusquea* entre elevaciones de 2500 a 3200 m en la localidad tipo. Presentamos anotaciones sobre la ecología, distribución, comportamiento, reproducción, vocalizaciones y conservación de esta nueva especie. Los bosques de montaña del norte de la Cordillera Occidental donde se encuentra el Tororoi de Urrao están amenazados debido a deforestación, fragmentación y exploración minera. Estos factores, junto con la distribución geográfica y ecológica restringida de la nueva especie, hacen altamente prioritarios esfuerzos para su conservación.

Palabras clave: Bosque altoandino, Colombia, Cordillera Occidental, *Grallaria urraoensis*, nueva especie.

[1]Present address: *Grupo de Observadores de Aves del Tolima GOAT, Facultad de Ciencias, Universidad del Tolima, Ibagué, Colombia.*

INTRODUCTION

The antpittas (family Grallariidae) are terrestrial Neotropical passerine birds of the dense understory of humid forests, scrublands, and alpine habitats with scattered bushes in the high Andes. Because of their retiring habitats, antpittas are difficult to observe and collect, and information on most aspects of their biology is scarce (Krabbe & Schulenberg 2003; Greeney et al. 2008). The group reaches its highest diversity in the tropical Andes, especially above 800 m, where many species have restricted geographic distributions (Krabbe & Schulenberg 2003). Owing to habitat destruction and to their small geographic ranges, several species of antpittas are threatened with extinction (Renjifo et al. 2002), although part of their apparent rarity might actually reflect insufficient information regarding their distribution and ecology (Kattan & Beltrán 1997; Krabbe & Coopmans 2000). With increasing knowledge of the vocalizations of Neotropical birds, in combination with expeditions to several previously unexplored sites over the past decades, a significant number of species of antpittas have been recently described, especially in the genus *Grallaria* (Lowery & O'Neill 1969; Schulenberg & Williams 1982; Graves 1987; Stiles 1992; Krabbe et al. 1999). In this paper, we document the existence of yet another previously unknown species in this genus from the Cordillera Occidental of the Colombian Andes.

The Western Andes are, on average, the lowest of the three ranges of the Colombian Andes (Hernández-Camacho 1992). Only seven peaks along the ca. 1200 km length of this range reach sufficient elevations to support paramo habitats; because the cordillera is much lower in many areas, these high-elevation habitats are highly isolated (Krabbe et al. 2006). The most extensive areas covered by paramo vegetation occur in the northern sector, in the departments of Chocó and Antioquia. These areas have received relatively little attention from ornithologists. In fact, most of the earlier expeditions to montane areas of the department of Antioquia focused on the Central Andes (around the city of Medellín), whereas studies in the Western Andes concentrated on its southern sector (reviewed by Cuervo et al. 2003, 2008). Although recent studies have increased our understanding of the diversity and distributions of birds in the northern sector of the Western Andes (Cuervo et al. 2003, Krabbe et al. 2006, Pulgarín-R. & Múnera-P. 2006), ornithological explorations in the area remain sparse. More generally, the avifauna of this cordillera as a whole remains insufficently documented, as evidenced by several new records implying significant range extensions for multiple species (Cuervo et al. 2003), and especially by the recent discovery of four species new to science (Salaman & Stiles 1996; Robbins & Stiles 1999; Salaman et al. 2003; Cortés-Diago et al. 2007) and the rediscovery of two more (Toro & Flórez 2001; Krabbe et al. 2005). Five species of birds are endemic to this mountain range: Gorgeted Puffleg (*Eriocnemis isabellae*), Colorful Puffleg (*E. mirabilis*), Dusky Starfrontlet (*Coeligena orina*), Munchique Wood-Wren (*Henicorhina negreti*), and Chestnut-bellied Flowerpiercer (*Diglossa gloriossisima*). All occur above 2200 m, exhibit highly localized distributions, and are considered threatened with extinction (Salaman et al. 2002; Toro 2002; Salaman et al. 2003; Krabbe et al. 2005; Cortés-Diago et al. 2007).

A recent survey by an Evaluation of Biodiversity of the Andes Expedition (EBA) team to the Páramo de Frontino (also known as Páramo del Sol or Páramo de Urrao) in Dept. Antioquia (Flórez et al. 2004) led to the rediscovery of the Dusky Starfrontlet (*Coeligena orina*) and revealed the existence of populations of other rare and threatened bird species in this part of the northern Western Andes (Krabbe et al. 2005, 2006). Thus, with the goal of protecting habitat for threatened species in the area, Fundación ProAves promoted the establishment of the Reserva Natural Colibrí del Sol in the municipality of Urrao, Antioquia (Fundación ProAves 2009).

During regular monitoring activities conducted on 27 September 2007 at 2780 m elevation in a forest near Páramo de Frontino, DCA captured an unsual antpitta in the genus *Grallaria* that was examined, measured, and released. This individual could not be photographed, but it clearly did not match any of the species of antpitta known to occur in the area. A second individual was captured, measured, examined, photographed, and released on 5 February 2008 within the same forest, some 400 m from the site of the first capture. On 20 February 2008, DCA

set mist nets in the same forest in order to capture the then mysterious *Grallaria*, but owing to heavy rains was unable to operate them. However, when opening the nets on the morning of 21 February, a dead bird was found hanging from one of them; apparently one of its feet got entangled after it perched on the closed net. Serendipitously, this individual turned out to be an antpitta matching the ones observed and captured earlier at the site. DCA and KCC prepared the specimen and compared it with those of other species in the genus deposited in the ornithological collections of the Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH), Instituto de Ciencias Naturales at Universidad Nacional de Colombia (ICN-MHN), and Universidad del Valle (UVC), confirming its phenotypic distinctiveness. The specimen appeared to be most similar to, although appreciably distinct from, the Brown-banded Antpitta (*Grallaria milleri*), a species endemic to the Central Andes. On 30 March 2008, another individual was captured and collected. Subsequently, DCA and KCC obtained recordings of the song and calls of this antpitta, which allowed locating additional individuals in other properties in the area of Páramo de Frontino, to clarify their elevational distribution and habitat use, and to study their behavior. At that time, the possibility that this antpitta might represent an undescribed species began to be considered.

Following additional comparisons at museums and detailed analyses of vocalizations, it became clear that the antpitta found at Urrao is indeed an undescribed species, which we propose to name:

***Grallaria urraoensis*, sp. nov.**
Urrao Antpitta
Tororoi de Urrao

Holotype.- Adult male (80% skull ossification) prepared as a study skin and deposited (catalogue no. 36689) in the ornithological collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN-MHN), Bogotá. Collected 30 March 2008 by DCA and prepared by KCC at the Reserva Natural Colibrí del Sol, south of Páramo de Frontino, vereda El Chuscal, ca. 17 km north of the town of Urrao, department of Antioquia, Colombia (2850 m; 6º26'N, 76º05'W).

Diagnosis.- A medium-sized antpitta (ca. 57 g), assigned to the genus *Grallaria* based on its typical shape and proportions, strong bill markedly curved from the base, conspicuous rictal bristles, short and rounded wings, long tarsi, short tail, 2-notched sternum, distinctive tarsal scutellation, and terrestrial habits. It can be distinguished from other species in the genus by its combination of two main colors, brown-olive above and gray below. The new species is similar to *G. milleri*, probably its closest relative, but can be diagnosed based on the combination of (1) plumage characters: the new species has a more olivaceous dorsum, a brownish-olive throat (whitish in *G. milleri*), and lacks a brown pectoral band and contrasting whitish abdomen (Fig. 1); (2) its heavier bill, greater body mass and probably longer wing and tail (see below); and (3) its different vocalizations (see below).

Description of holotype.- Color nomenclature follows Smithe (1975, 1981). A fairly small, clearly bicolored *Grallaria* antpitta. Forehead, crown, nape, back, scapular area, and rump uniformly dull brown -olive (Raw Umber 123); rectrices darker (between Mars Brown 223A and Prout's Brown 121A). Lores close to Cream Color 54, inconspicuous buffy eyering with feathers tipped black, auriculars generally Mars Brown 223A, but middle section of feathers close to Ochraceous Tawny 123B and tips darker. Middle and upper secondary coverts and external margin of primary coverts Raw Umber, internal margin of primary coverts dark gray; primaries proximally close to Vandyke Brown 221 and distally dull brown-olive (123); secondaries 6 and 7, which were retained, somewhat darker (close to 223A); interior wing coverts between Cinnamon Rufous 40 and Tawny 38. Throat feathers light gray (between Neutral Gray 82 and Medium Neutral Gray 84) and tipped dull brown-olive (123), producing a mottled appearance; sides of throat 123. Breast and sides of breast pale gray (between Glaucus 78 and 80), with feathers narrowly tipped grayish white (close to Smoke Gray 44); center of abdomen dull White (between Cream Color 54 y Pale Horn Color 92), thighs olive brownish (Olive Brown 28). Iris dark brown, maxilla black and mandible horn, with tomia and tip lighter; tarsi and feet blue- gray. An adult male (no bursa, skull ossification 80%) in breeding condition (large cloacal protuberance, brood patch, well developed

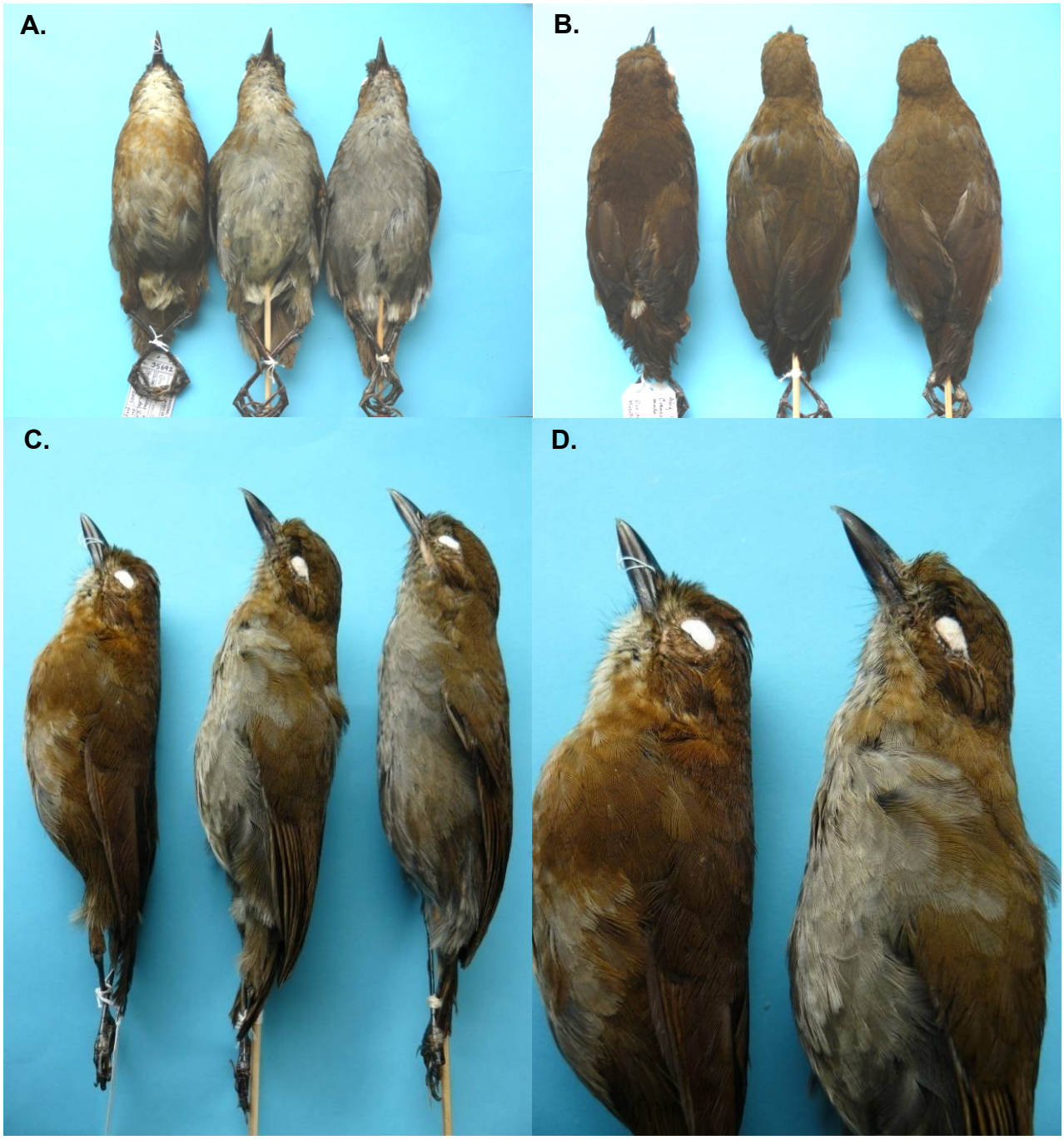

Figure 1. Specimens of the Brown-banded antpitta (*Grallaria milleri*) (left) and the Urrao Antpitta (*Grallaria urraoensis* sp. nov.) (center holotype and right paratype). A. ventral view, B. dorsal view, C. lateral view and D. lateral view of upper parts (left *G. milleri* and right *G. urraoensis*). Note differences in size, throat pattern, breast pattern and abdomen coloration.

testes: left 14.4 x 8.7 mm, right 13.5 x 8.6 mm), with no subcutaneous fat. Finishing complete molt; all primaries had been replaced except for primary 10 in the left wing, which was emerging from sheath; secondaries 1-5, 8, and 9 replaced, 6 and 7 retained. Stomach contents: insects, including mainly coleopteran remains.

Paratype.- A likely immature male (30% skull ossification, but enlarged gonads: left testis 13.2 x 6.5 mm, right 14.6 x 6.8 mm), catalogue no. 36688 in the ornithological collection at the ICN-MHN.

Table 1. Morphological measurements (means and standard deviations in mm) of *Grallaria urraoensis* and *G. milleri.*

	Exposed culmen (mm)	Total culmen (mm)	Commissure width (mm)	Bill height (mm)	Wing chord (mm)	Tail length	Tarsus length (mm)	Body mass (g)	Ratio tail/ wing	Ratio tarsus/ tail	Ratio tarsus/ wing
Grallaria urraoensis											
ICN 36689 (Holotype) Male	20.4	23.5	13.4	7.0	95.4	63.0	46.5	56.4	0.54	0.89	0.48
ICN 36688 (Paratype) Male	18.9	22.2	13.0	6.9	96.5	63.2	44.6	57.4	0.51	0.89	0.46
x ± SD	19.6 ± 1.06	22.8 ± 0.92	13.2 ± 0.28	6.9 ± 0.07	95.9 ± 0.78	63.1 ± 0.14	45.5 ± 1.34	56.9 ± 0.71	0.52 ± 0.02	0.89 ± 0	0.47 ± 0.01
Grallaria milleri											
ICN 36692 Female	21.0	23.8	13.0	7.2	85	59.7	44.8	46	0.70	0.75	0.52
IAvH 13203 Female	-	22.2	12.5	6.7	87	58.8	42.7	55	0.67	0.72	0.49
IAVH 13205 Male	-	21.4	12.2	6.7	89	57.7	47.1	51	0.64	0.81	0.52
UVC 6180 Male	18.1	23.5	10.7	6.3	88.5	51.8	41.8	53	0.59	0.81	0.47
UVC 6179 Male	20.0	22.1	10.5	6.7	93	53.9	43.9	48	0.58	0.81	0.47
UVC 6182 Male	20.5	22.6	10.1	6.7	93	57.7	42.5	51	0.62	0.74	0.46
UVC 6181 Male	20.0	21.5	12.5	6.4	87.5	55.5	45.0	54	0.63	0.81	0.51
UVC 6171 Male	20.4	22.2	10.1	6.7	87	53.4	44.1	50.5	0.61	0.83	0.51
UVC 6178 Female	21.4	23.9	10.6	6.9	90	57.1	47.0	53.5	0.63	0.82	0.52
x ± SD	20.2 ±1.06	22.5 ± 0.95	11.3 ±1.17	6.7 ± 0.26	88.8 ± 2.72	56.1 ± 2.68	44.3 ± 1.87	51.3 ± 2.93	0.63 ± 0.04	0.79 ± 0.04	0.50 ± 0.02

Collected at the Páramo de Frontino along a forest edge covered by *Chusquea* bamboo at 2820 m elevation on 20 February 2008. Specimen with no subcutaneous fat; stomach contained insect fragments; moderate body molt, with sheaths in the flanks.

The paratype is generally very similar to the holotype, the main difference being that the former exhibits darker brown (i.e. Mars Brown 223A) in

Table 2. Field measurements of individuals not collected of *G urraoensis.*

	Adult 1	Adult 2	Adult 3	Juvenile	Mean	Fledgling
Exposed culmen (mm)	20.4	20.5	20.2	18.8	20.0	-
Total culmen (mm)	23.0	23.3	23.3	21.0	22.7	16.0
Commissure width (mm)	15.0	14.6	12.8	15.3	14.4	16.8
Bill height (mm)	6.8	7	7.2	7.1	7.0	5.1
Wing chord (mm)	90	89	87	90	89.0	51.6
Tail length	56.3	58.4	55.5	60.5	57.7	-
Tarsus length (mm)	46.3	45.8	44.7	44.1	45.2	31.2
Body mass (g)	56.9	66.4	59.8	55.4	59.6	41.1
Ratio tail/wing	0.62	0.65	0.63	0.67	0.64	-
Ratio tarsus/tail	0.82	0.78	0.80	0.72	0.78	-
Ratio tarsus/wing	0.51	0.51	0.51	0.49	0.50	-

Figure 2. Individuals of Urrao Antpitta (*Grallaria urraoensis*) of different ages: (A) nestling, (B) juvenile, and (C and D) adult.

the primaries, secondaries, primary coverts, the most external secondary coverts and some scattered feathers on the head and back, breast darker gray. These differences might be related to age, because the paratype is likely a younger male as suggested by cranial ossification. Morphometric variation is slight (Table 1, Fig. 1).

Additional individuals examined.- Four individuals of the new species have been captured, examined, measured, banded, and released in the Páramo de Frontino area, including three adults and one juvenile; we also photographed a fledgling (Table 2, Fig. 2). Little variation in plumage pattern and coloration was observed among the adults; assuming our sample included individuals of both sexes, the species is likely sexually monomorphic as are other antpittas. The juvenile had an overall scaled appearance, with patches of black down with chestnut tips in most of the crown, nape, and flanks, and in small patches in the scapular area, the rump and the breast. Its belly was buff-colored, and the feathers on the sides of the throat were dark, giving it a blackish appearance. The maxilla was black proximally and orange distally, whereas the mandible was entirely orange; bill commissures were conspicuously red-orange. The fledgling was covered by a dense blackish down with brown edges on the upperparts; these edges were wider and more brightly colored in the lower back and rump. The belly, flanks, and lower part of the chest were largely buff, its feet were colored dark pink, and its bill was similar to that of the juvenile. Primaries and secondaries had emerged c. 4 mm from their sheaths, but rectrices had not yet started to appear.

REMARKS

Biometrics.- Combining the field-measured birds (Table 2) with measurements in the museum (Table 1), *G. urraoensis* differs significantly from *G. m. milleri* (Mann-Whitney U tests) in having a taller bill ($p<0.05$) and a wider commissure ($p<0.002$) as well as a greater body mass ($p<0.001$), but not in exposed or total culmen length or tarsus length. Because our field measurements of wing and tail are smaller than the museum measurements, *G. urraoensis* does not differ from *G. m. milleri* when field and museum measurements of the former are combined. However, this might be due to differing techniques under the two situations; the wing and tail lengths of the two specimens of *G. urraoensis* are considerably greater than measurements of all specimens of *G. m. milleri*, more concordant with its greater mass. The recently-described *G. m. gilesi* (Salaman et al. 2009) is larger than the nominate in most measurements but has a much shorter bill and tarsus; it differs from *G. urraoensis* in these measurements as well.

Vocalizations.- As with other members of the genus *Grallaria* (Krabbe & Schulenberg 2003), *G. urraoensis* has distinctive vocalizations, which are given from low perches in dense forest understory, often from within *Chusquea* thickets. Vocal activity is most frequent at dawn and dusk, but vocalizations can be heard throughout the day, especially under rainy and overcast conditions. The vocalizations of *G. urraoensis* are similar to those of *G. milleri* and of *G. kaestneri* (Cundinamarca Antpitta), two closely related species (see below), but differ from them in several ways.

The territorial loudsong of *G. urraoensis* is the most frequently heard vocalization, particularly from February to April, presumably the beginning of the breeding season; singing activity is reduced substantially from June through August. The loudsong (Fig. 3a) is, on average, 0.9 s long (SD ± 0.06 s, n=30), and is composed of three similarly shaped, high-pitched notes. The first and second notes are relatively brief (0.13 ± 0.02 s and 0.14 ± 0.02 s, respectively), whereas the third is somewhat longer (0.18 ± 0.04 s); the interval between the first and second note is 0.30 ± 0.03 s, and that between the second and third only 0.07 ± 0.02 s. Pitch (i.e. dominant frequency) also increases as the song progresses: first note 2.93 ± 0.11 kHz, second note 3.08 ± 0.10 kHz, third note 3.27 ± 0.10 kHz. The song of *G. milleri* (Fig. 3b) is similar but longer (1.19 ± 0.16 s SD, n=20), and each of its individual notes is also longer (first 0.25±0.05 s, second 0.26±0.02 s, third 0.30±0.06 s) and differs in shape from those of *G. urraoensis*. The frequency range of each note, however, is similar to that in the song of *G. urraoensis.* The dominant frequency is: first note 2.65 ± 0.12 kHz; second note 2.81 ± 0.11 kHz and difference in the songs of the two species is

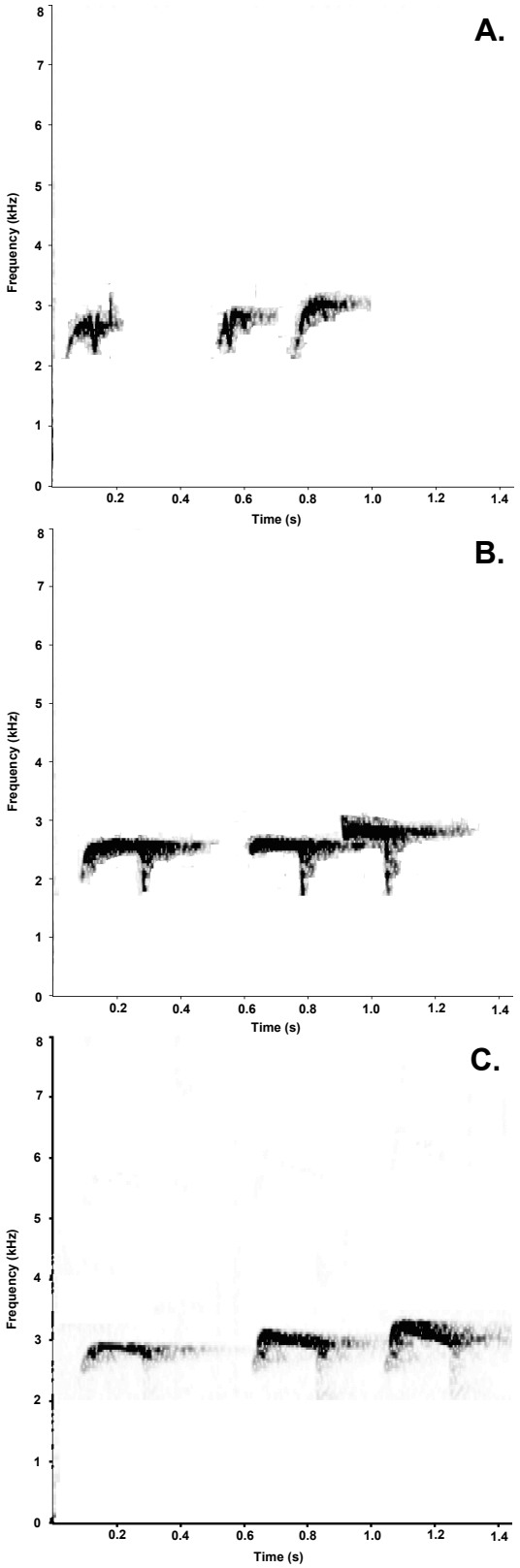

Figure 3. Songs of Andean antpittas: A. Urrao Antpitta (*Grallaria urraoensis*), B. Brown-banded Antpitta (*G. milleri*), and C. Cundinamarca Antpitta (*G. kaestneri*).

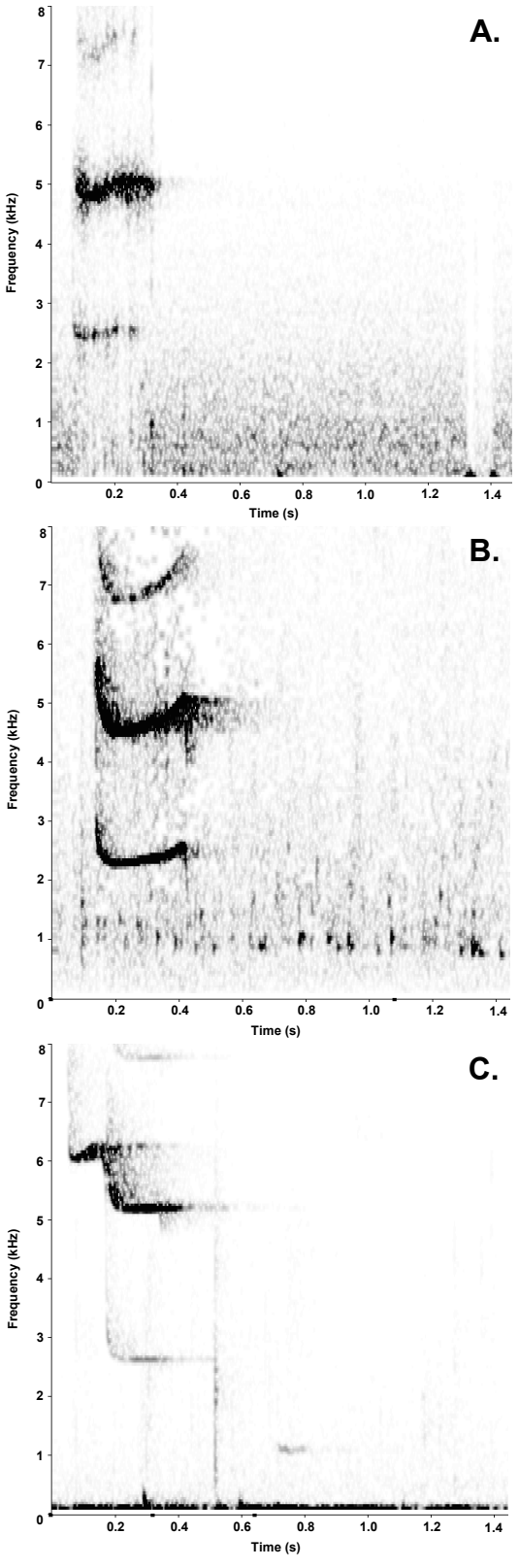

Figure 4. Calls of Andean antpittas: A. Urrao Antpitta (*Grallaria urraoensis*), B. Brown-banded Antpitta (*G. milleri*), and C. Cundinamarca Antpitta (*G. kaestneri*).

duration of the pause between the second and third note; this pause is short and occasionally imperceptible in *G. milleri.*

A second type of vocalization recorded from *G. urraoensis* is a short, loud call emitted in aggressive contexts (e.g. after song playbacks or after imitating its song), in response to loud noises, and during the nonbreeding season. This call (Fig. 4a) is louder and higher-pitched than the song, and consists of a single wave-shaped note (~) that lasts for 0.31 ± 0.03 s (*n*=11), beginning at 5.39 ± 0.17 kHz, then descending to 4.94 ± 0.15 kHz, and rising again to 5.19 ± 0.21 kHz (n= 11). The call of *G. milleri* (Fig. 4b) differs in being longer (0.45 ± 0.09 s, *n*=21), U-shaped, and generally higher-pitched: it begins at 6.31 ± 0.45 kHz, then descends to 5.09 ± 0.23 kHz, and rises at the end to 5.40 ± 0.18 kHz. The call of *G. kaestneri* (Fig. 6c) has a rather different shape; it begins at 5.8-6.0 kHz, drops abruptly to 5.0 kHz.

The similarity among the songs of the species most similar to *G. urraoensis* (*G. milleri* and *G. kaestneri*) resides in the number of notes and the ranges of frequencies, showing a general pattern of three notes or whistles that increase gradually in their duration and frequency with each successive note slightly longer and higher-pitched. This song model probably reflects a close phylogenetic affinity among these species.

Etymology.- The species names refer to the municipality where *G. urraoensis* was discovered and to which it may be restricted: Urrao, Dept. Antioquia, Colombia. The word Urrao is of indigenous origin; these areas were originally occupied by a number of indigenous tribes, some currently represented by groups of the Embera-Katío culture.

Taxonomic affinities.- Within the subgenera of *Grallaria* defined by Lowery & O'Neill (1969), the new species is referable to *Oropezus* owing to its tarsal scutellation, number of rectrices (12), uniform plumage coloration in the upperparts and underparts lacking barring or streaking, and proportions between tail, wing, and tarsus length (Table 1). Within *Oropezus, G. urraoensis* is phenotypically most similar to *G. milleri*, which is restricted to similar elevations in the geographically isolated Cordillera Central of Colombia. *G. urraoensis* is diagnosable from all described forms of *Grallaria* in plumage color and voice, and is clearly at least a phylogenetic species (Cracraft 1989). These differences are comparable to those between related species such as *G. kaestneri*, *G. bangsi* and *G. milleri* (which are also different genetically; C.D. Cadena, unpubl. data), such that *G. urraoensis* qualifies as a species under the biological species concept (Johnson et al. 1999) as well. Referring to *urraoensis,* Salaman et al. (2009) stated that "it may be closer related to *G. m. gilesi* than to *G. m. milleri*" because of its larger size and greater geographical proximity (but in a different mountain range). However, in plumage color and pattern, and bill and tarsus lengths we see no approach between *gilesi* and *urraoensis* (if anything, *gilesi* differs more from *urraoensis* than does nominate *milleri* in these features). Therefore, in the absence of genetic evidence, the statement by Salaman et al. (2009) on the affinities of *urraoensis* is unsupported.

Based on morphological and vocal similarities, we suggest that *G. urraoensis, G. milleri*, and *G. kaestneri,* three species endemic to Colombia, probably form a clade. Based on plumage and vocalizations (Stiles 1992), we suspect that another Colombian endemic, the Santa Marta Antpitta (*G. bangsi*), may be a close relative of this clade. We cannot address Chapman's (1912) hypothesis that *G. erythrotis* is a close relative of *G. milleri* and hence, of *G. urraoensis,* although this appears unlikely on geographic grounds. The hypothesized close relationship of *G. urraoensis* with *G. milleri* is consistent with results of phylogenetic (Cuervo et al. 2005), phylogeographic (Cadena et al. 2007; Puebla-Olivares et al. 2008), and biogeographic (Cuervo et al. 2008) studies indicating close affinities between species and populations of other bird groups occurring in the Western and Central Andes of Colombia.

Ecology and behavior.- Like other antpittas, *G. urraoensis* is shy and inconspicuous, and thus difficult to observe even after playback; it is much more often heard than seen. However, it is locally common at the area (especially between 2650 and 2900 m elevation), where we have accumulated c. 70 observations and ca. 55 sound recordings, and

we captured eight individuals between 2008 and October 2009. These encounters have taken place especially around Quebrada Santa Bárbara and El 15, El Oso, and La Ilusión farms in the southeast of Páramo de Frontino, where field activities have intensified. The species is usually encountered in pairs, although we often found single individuals as well and on one occasion we recorded three individuals in close proximity. The birds invariably remain on or close to the ground, where they move about dense bamboo vegetation and moss-covered substrates. Intense vocal activity during the first months of 2008 and 2009 allowed us to conduct a preliminary assessment of population density at the type locality. Along a 1.5 km transect, we detected five territories defended by males, at least two of which were paired.

Five additional species of antpitta have been recorded at the type locality of *G. urraoensis:* Undulated (*G. squamigera*), Rufous (*G. rufula*), Chestnut-naped (*G. nuchalis*), Chestnut-capped (*G. ruficapilla*), and Slate-crowned (*Grallaricula nana*). The Chestnut-naped Antpitta is the most common, and we have heard and observed individuals of this species simultaneously with *G. urraoensis.*

Diet and foraging.- The diet of *G. urraoensis* presumably consists largely of small- and medium-sized invertebrates captured on the ground. Stomach contents of specimens included only insect remains, among which we were able to identify fragments of coleopteran legs and wings. The species has also been observed foraging on earthworms captured in the leaf litter. Earthworms are probably important food items for nestlings, and we once observed an individual carrying several of them to feed its offspring (see section on reproduction below). While foraging on the ground, *G. urraoensis* were observed removing leaf litter and soil with their feet as they searched for prey. After catching prey, birds move their heads vigorously, often beating prey against the ground and breaking items into pieces before ingesting them.

Reproduction.- Breeding in *G. urraoensis* appears to concentrate in the earlier part of the year. The two males we collected (one in February, the other in March) had large gonads, suggesting they were in breeding condition. In addition, vocal activity was pronounced between February and May; also, we observed a fledgling on 12 June 2008 and captured an adult with an old brood patch in June as well. Thus, the breeding season may begin as early as January and extend through several months; this coincides with the dry first months of the year and with the breeding seasons of several other bird species in the area. The fledgling we observed was being fed by two adults that delivered mostly earthworms; biparental feeding of nestlings (and mostly with earthworms) seems to be general across species of *Grallaria* (Greeney et al. 2008). In addition, as observed in other antpittas (Greeney et al. 2008), the fledgling appeared to be underdeveloped in comparison to fledglings of other passerine species and its plumage was very different from that of the adults (see description above).

Habitat and distribution.- All individuals of *G. urraoensis* captured, observed, or heard vocalizing at the Páramo de Frontino (Páramo del Sol) were restricted to montane forests between 2500 and 3200 m elevation, which are classified as Lower Montane Very Wet Forest (Holdridge 1967). We suspect that the species might range down to 2000 m, the lower elevational limit of this life zone in the region. Temperature in these forests ranges from 10 to 15ºC; annual rainfall averages 2044 mm and is bimodally distributed, with dry periods during the first months of the year (Velásquez-Ruiz 2005). Canopy height is 8-10 m along forest edges and 12-15 m in forest interior. Forests are characterized by high relative humidity and a high diversity of epiphytes. The most common tree species are *Quercus humboldtii* (Fagaceae), *Blakea longipes* (Melastomataceae), *Ocotea callophylla* and *Persea* sp. (Lauraceae), and *Weinmannia* sp. (Cunnoniaceae); *Podocarpus oleifolius* (Podocarpaceae) occurs in the more pristine areas. Dominant plants in the middle stratum of the forest include tree ferns (*Cyathea caracasana,* Cyatheaceae) and species of *Schefflera* and *Oreopanax* (Araliaceae). Common plant families in the understory are Rubiaceae, Ericaceae, Araceae, and Poaceae, with the bamboo *Chusquea* cf. *scandens* being the most abundant species (Fig. 5). The new species is relatively common in primary and secondary forests with these characteristics. It seems

to prefer microhabitats where the understory is dense, with a high abundance of epiphytes and bamboo.

The full extent of the geographic distribution of *G. urraoensis* is unknown, but based on the distribution of seemingly suitable habitats, we suspect the species might exhibit a continuous distribution in the northern sector of the Cordillera Occidental (Fig. 6). We suggest that additional possible localities are the Nudo de Paramillo (departamento Antioquia), and Cerro Plateado, Farallones de Citará, and Cerro Caramanta (Antioquia-Chocó border). With knowledge of its distinctive voice, confirming whether the species occurs at those sites should be relatively easy and would allow a better understanding of its distribution and conservation status (see below).

Conservation.- Premontane and montane forests in the northern sector of the Cordillera Occidental have been seriously affected by the creation of pastures for cattle raising, agriculture, timber extraction, and hunting. Part of Páramo de Frontino is privately owned, and many areas have seen the expansion of cattle raising activities to steep slopes and the general replacement of native forests by pastures. On gentler slopes, plantations of food crops including beans, passionfruit and tree tomato are frequent in the region. In addition, the area around Páramo de Frontino is known to maintain mineral deposits that include zinc, copper, and gold; this has attracted the attention of mining companies, but owing to political instability in the area, active exploitation has not yet been undertaken. However, despite these mounting threats, the Frontino area remains in generally good condition from a conservation perspective. This area comprises perhaps the best-conserved oak forests in the Western Andes, well-conserved mixed forests and at higher elevations, and extensive paramo habitats supporting healthy populations of endemic plants such as *Espeletia frontinoensis* and *Puya antioquensis.* In addition, the area supports the only Polylepis (i.e. *Polylepis quadrijuga*) forests found in Antioquia, and represents the northwestern limit of this genus, an iconic component of the High Andean vegetation.

There are only two protected areas in the Páramo de Frontino: Reserva Natural Colibrí del Sol (Fundación ProAves) and Reserva Forestal Protectora Urrao-Abriaquí. Forests of this area have been badly disturbed below 2400 m, where now limited to small, dispersed patches in an agricultural and cattle-raising matrix. From 2400 to 2700 m, forests are moderately disturbed; the landscape includes forests interspersed with some pastures and second-growth patches. At higher elevations, forests are more continuous and have seen little human intervention. However, clearings on the steeper slopes are frequent owing to treefalls and landslides. Conservation of natural habitats in part of this area is enhanced by the purchase of 582 ha by Fundación ProAves. On the other hand, the Reserva Forestal Protectora Urrao-Abriaquí (CORPOURABA) encompasses 32,000 ha purchased in 1975 to protect Andean forest, paramo habitats, and water sources, but this reserve is not being continuously overseen. We suspect that *G. urraoensis* might also occur in the northeast sector of Parque Nacional Natural Las Orquídeas, in the area known as Cerro Pelado. Since 2004, the Colombian national park service (UAESPNN, Territorial Noroccidental) has proposed to extend this national park, currently encompassing 32,000 ha, to include Páramo de Frontino and surrounding areas, extending it to 61,000 ha. However, effective conservation over such an extended area will require substantial investment in resources as well as alliances between public, private, and local organizations and communities. Fundación ProAves has promoted alliances with CORPOURABA, the UAESPNN and local authorities in Urrao, hoping to expand conservation areas to ensure the persistence of *G. urraoensis* and other threatened species of plants and animals in the region.

Based on the available information, it appears that *G. urraoensis* is seriously threatened by extinction owing to its restricted geographic distribution and likely small population size. We thus recommend that this species be listed as **Critically Endangered** according to IUCN criteria B1 a+b (i, ii, iii), known range smaller than 100 km² (Critical); and C2a, known population < 250 individuals (Critically Endangered). We believe that priority conservation actions are establishing new protected areas and enforcing effective conservation in those where the species occurs, in addition to searching for it in

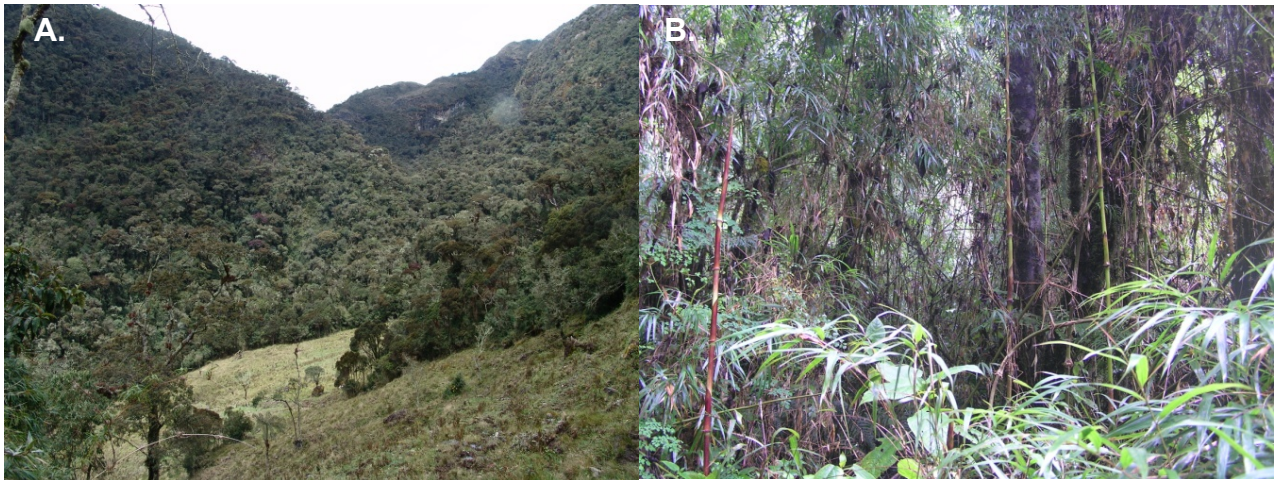

Figure 5. Typical habitat in the Páramo de Frontino, Antioquia Colombia, where *Grallaria urraoensis* sp. nov. was discovered. A. Humid montane forest of Paramo de Frontino. B. View of the undergrowth at the type locality.

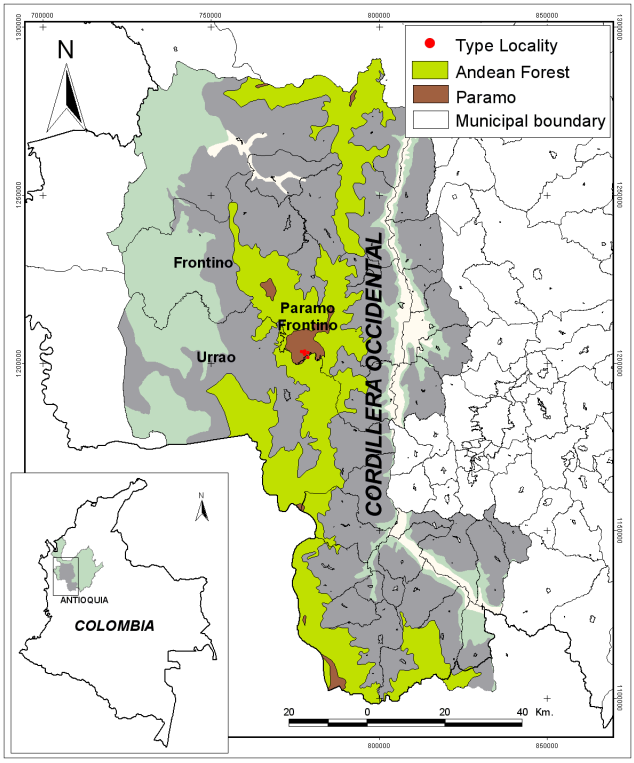

Figure 6. Map of southwest Antioquia, showing the type locality (Páramo de Frontino) of the Urrao Antpitta (*Grallaria urraoensis* sp. nov.) and the distribution of Andean forests and paramo vegetation in the Western Andes of Colombia. Map based on SIRAP Antioquia (Anonymous 2007).

other areas where it might be found. To this latter end, we suggest that searches for new populations should focus from Páramo de Frontino north to the Nudo de Paramillo (Antioquia) and south to Cerro Tatamá (Risaralda), with particular attention to the Farallones de Citará and Cerro Plateado. Such surveys could result in increased knowledge of the distribution and population sizes of the new species, and of the distribution and status of other threatened and little-known birds occurring in the region such as Dusky Starfrontlet, Rusty-faced Parrot (*Hapalopsittaca amazonina*), Moustached Antpitta (*Grallaria alleni*), and Chestnut-bellied Flowerpiercer.

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Appendix 1. Localities and specimens of *Grallaria* examined at the Instituto de Ciencias Naturales (ICN-MHN), Bogotá, Colombia; Instituto de Investigación en Recursos Biológicos Alexander von Humboldt (IAVH), Villa de Leyva, Colombia; Colección Ornitológica de la Universidad del Valle, Cali, Colombia, and Museo Universitario de Antioquia MUA-AVP.

***Grallaria milleri*:** ICN-MNH 36692, Vereda Palomas, Reserva Natural Río Blanco, Caldas, Col., 2650 m, female; IAvH 13203, Berlin, Pensilvania, Caldas, Col., 2750 m, female; IAvH 13205, Berlin, Pensilvania, Caldas, Col., 2750 m, male; UVC 6171, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, male; UVC 6178, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, female; UVC 6179, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, male; UVC 6180, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, male; UVC 6181, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, male; UVC 6182, Parque Regional Ucumarí, La Pastora, Pereira, Risaralda, Col., 2400 m, male.
***Grallaria kaestneri*:** ICN-MHN 30731, Monterredondo Camino de San Juanito, Guayabetal, Cundinamarca, Col., 2300 m, Female; ICN-MHN 36310, Monterredondo, Guayabetal, Cundinamarca, Col., 2300 m, chick.
***Grallaria rufocinerea*:** IAvH 0525, Rio Bedón, PNN Puracé, Col., male; IAvH 0526, Rio Bedón, PNN Puracé, Col.
***Grallaria nuchalis*:** IAvH 13235, Berlin, Pensilvania, Caldas, Col., 2750, male.
***Grallaria hypoleuca*:** ICN-MHN 11842, La Candela, Huila, Col., 1600 m, female; ICN-MHN 35552, San Isidro, Galán, Santander, Col., 1995 m, female; IAvH 6566 Virolín, Charalá, Santander, Col., male.
***Grallaria quitensis*:** ICN-MHN 33381, Distrito Capital, Laguna Bocagrande, Macizo Sumapaz, Cundinamarca, Col., 3600 m, female; ICN-MNH 22973, Nevado la Cueva, Guicán, Boyacá, Col., male; IAvH 2488, Pilimbala, PNN Puracé, Cauca, Col., 3380 m, female; IAvH 6805, Finca Indostan, Anzoátegui, Tolima, Col., male.
***Grallaria rufula*:** ICN-MHN 11815 San Miguel, Cundinamarca, Col., male; ICN-MHN 11816, Páramo de Guasca, Col., female; ICN-MHN 23549, San Pedro, Cuchilla Cebolleta, Sierra Nevada de Santa Marta, Col., 2500 m, male; ICN-MHN 31324, Junín, Carpanta, Cundinamarca, Col., 2600 m; IAvH 2436, Quilindos, Santa Cecilia, Cauca, Col., 3020 m, female; IAvH 6631, PNN Chingaza, Cundinamarca, Col., female; IAvH 13358, PNN Tatamá, Pueblo Rico, Risaralda, 2680 m, female; MUA-AVP 0556, Finca La Martinica, Distrito siete, Vereda Desquite, Manizales, Caldas, Col.
Grallaria ruficapilla: IAVH 11928, Vereda el Laurel, Aranzazu, Caldas, Col., 2250 m, male.
***Grallaria guatimalensis*:** ICN-MHN 33287, Puerto Leguízamo, Putumayo, Col., male; MUA-AVP 198, Medellín, Antioquia, Col.
***Grallaria haplonota*:** ICN-MHN 31182, Alto de Pisones, 8 km al norte of Geguadas, Mistrató, Risaralda, Col., 1620 m, male.
***Grallaria alleni*:** IAvH 10741, SFF Otún Quimbaya, Risaralda, Col., 1800 m, male.

Appendix 2: Records and localities of vocalizations of *Grallaria* examined. XC refers to www.xeno-canto.org catalogue numbers. IAvH-BSA refers to Instituto de Investigación de Recursos Biológicos Alexander von Humboldt 's sound archive catalogue numbers.

***Grallaria milleri*:** Reserva Natural El Mirador, Génova, Quindío, Colombia, 2670 m, (Nick Athanas: XC 10721); Reserva Natural Río Blanco, Caldas, Colombia, 2650 m, (Bradley Davis: XC 13896); Reserva Natural El Mirador, Génova, Quindío, Colombia, 2700 m, (Frank Lambert: XC 16777); Reserva Natural Río Blanco, Caldas, Colombia, 2600 m, (David Bradley: XC 17619); Reserva Natural Río Blanco, Caldas, Colombia, 2800 m, (Hernan van Oosten: XC 18289), Reserva Natural Río Blanco, Manizales, Caldas, Colombia, 2400 m, (Oswaldo Cortés: XC 20505); Reserva Natural Río Blanco, Caldas, Colombia, 2800 m, (Andrew Spencer: XC 22213); Reserva Natural Ibanasca, Juntas, Ibagué, Tolima, Colombia N 04°25' W 75°12', (Oscar Laverde: IAvH-BSA 24192); Reserva Natural Ibanasca, Juntas, Ibagué, Tolima, Colombia N 04°25' W 75° 12' (Mauricio Alvarez R: IAvH-BSA 22433); Reserva Natural Río Blanco, Manizales, Caldas, Colombia, N 05°05' W 75°21', (Diego Calderón F & Fundegar: IAvH-BSA 22767).
***Grallaria kaestneri*:** Monterredondo, Cundinamarca, Colombia, 2100 m (Hernan van Oosten: XC 17990); Monterredondo, Cundinamarca, Colombia, 2100 m (Hernan van Oosten: XC 17991); Monterredondo, Cundinamarca, Colombia, 2100 m (Hernan van Oosten: XC 17992); Farallones de Medina, Cundinamarca, Colombia, 2000 m, (Oswaldo Cortés, John King & Jürgen Beckers: XC 18599); Farallones de Medina, Cundinamarca, Colombia, 2000 m, (Oswaldo Cortés, John King & Jürgen Beckers: XC 18600); Farallones de Medina, Cundinamarca, Colombia, 2000 m, (Oswaldo Cortés, John King & Jürgen Beckers: XC 18601), Farallones de Medina, Cundinamarca, Colombia, 2000 m, (Oswaldo Cortés, John King & Jürgen Beckers: XC 18602); Cundinamarca, Colombia, 2100 m, (Oswaldo Cortés: XC 20323); Cundinamarca, Colombia, 2100 m, (Oswaldo Cortés: XC 20324); Cundinamarca, Colombia, 2100 m, (Oswaldo Cortés: XC 20325); Cundinamarca, Colombia, 2100 m, (Oswaldo Cortés: XC 20326); Cundinamarca, Colombia, 2100 m, (Oswaldo Cortés: XC 20327).