

A NEW SPECIES OF ANTPITTA (FORMICARIIDAE: GRALLARIA) FROM THE SOUTHERN ECUADORIAN ANDES

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ABSTRACT.—We describe a striking new species of *Grallaria antpitta* from wet, upper subtropical forest in the upper Río Chinchipe drainage, provincia Zamora-Chinchipe, Ecuador. Notes on its natural history and molecular systematics are presented along with spectrograms of its voice. The species is readily diagnosed by its large size, unique white facial markings, and voice. Initial results from DNA sequence analyses place the new species in a well-supported clade that includes *Grallaria nuchalis* (which is syntopic with the new species), *G. hypoleuca*, *G. watkinsi*, and *G. ruficapilla*. Received 23 September 1998, accepted 22 April 1999.

RESUMEN.—Una sorprendente nueva especie del género *Grallaria* (Aves: Formicariidae) es descrita de un bosque húmedo de la zona subtropical alta del drenaje del Río Chinchipe, provincia Zamora-Chinchipe, Ecuador. Se presentan notas acerca de su historia natural y sistemática molecular, en conjunto con espectrogramas de sus vocalizaciones. La nueva especie se diferencia claramente por su gran tamaño, sus marcas faciales blancas, y su peculiar voz. Análisis iniciales de secuencias del ADN colocan a la nueva especie en un clado que incluye a *Grallaria nuchalis* (que es sintópica con la nueva especie), *G. hypoleuca*, *G. watkinsi*, y *G. ruficapilla*.

FIELD WORK IN SOUTH AMERICA during the past 25 years has resulted in the discovery of many birds new to science (Mayr and Vuilleumier 1983, Vuilleumier and Mayr 1987). New genera have been described for some species (e.g. *Xenoglaux loweryi*, O'Neill and Graves 1977; *Acrobatornis fonsecai*, Pacheco et al. 1996; *Nephelornis oneilli*, Lowery and Tallman 1976), and the known ranges of other genera have been greatly extended by other new species (e.g. *Nannopsittaca dachilleae*, O'Neill et al. 1991; *Clytactantes atrogularis*, Lanyon et al. 1990). Most discoveries, however, have been of species with obvious relatives and which fit logically into broader interpretations of their respective group's historical biogeography.

Therefore, it came as a surprise that a new

species of antpitta with strikingly distinct plumage characteristics was discovered on 20 November 1997 by R. S. Ridgely, J. and R. Moore, L. Navarrete, and M. Rivadeneira during a trip to record vocalizations of Ecuadorian birds. Ridgely, the Moores, and Navarrete returned on 21 November 1997 to record and photograph the bird, and M. Jácome, Navarrete, X. Muñoz, and F. Sornoza M. visited the site on 27 to 29 December 1997 and collected the first specimen. A team from the Academy of Natural Sciences of Philadelphia (ANSP), the Museo Ecuatoriano de Ciencias Naturales (MECN), the Zoological Museum of the University of Copenhagen (ZMUC), and others (D. J. Agro, A. D. Brewer, N. Krabbe, L. Navarrete, R. S. Ridgely, N. Simpson, F. Sornoza M., and D. L. Wechsler) returned to the original site between 13 and 22 January 1998 to assess population size and habitat requirements and to obtain further specimens and photographs of the bird. Sornoza and Jácome obtained an additional specimen during a visit to nearby Cerro Toledo from 16 to 31 March 1998.

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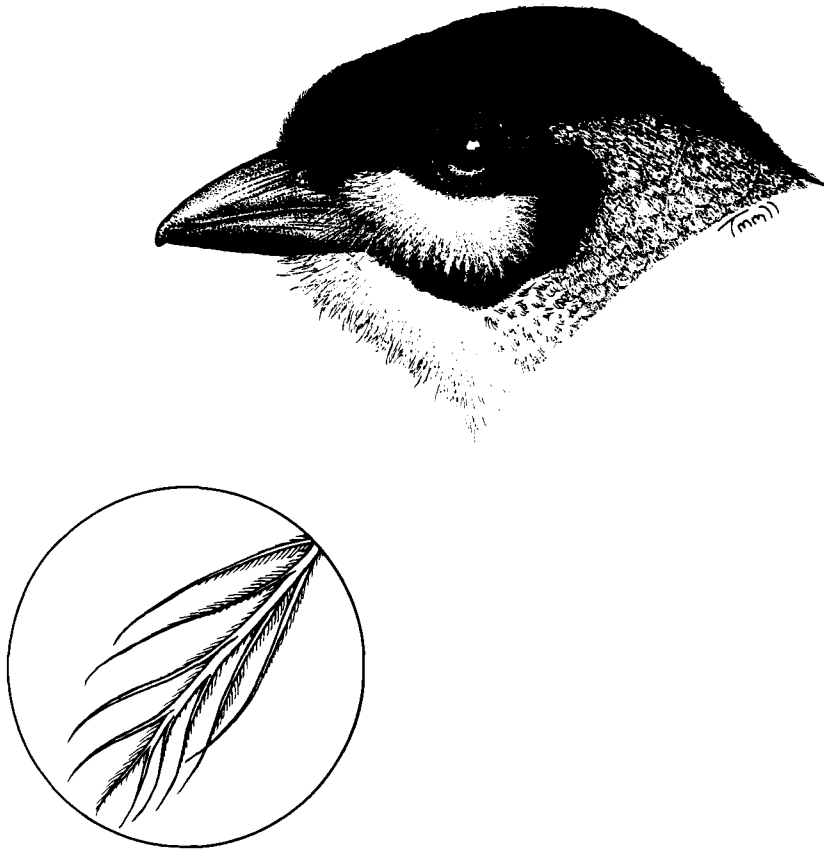


FIG. 1. Head of *Grallaria ridgelyi* showing black and white pattern. Inset is magnification of cheek feather. Drawing by S. Trammell.

Five specimens of the new bird were collected and compared with specimens of other forficariids. They clearly represent a new taxon that we propose to name:

Grallaria ridgelyi sp. nov.
Jocotoco Antpitta

Holotype.—MECN No. 7199, adult male (skull ossified, no bursa of Fabricius), collected 28 December 1997 by F. Sornoza M. (FS 1922) in Quebrada Honda, provincia Zamora-Chinchiipe, Ecuador (04°29'S, 79°08'W; elevation 2,520 m). Vocal recordings are archived at the Library of Natural Sounds (LNS 79055). A blood sample (FS-1-28.12.97) is deposited at the Institute for Population Ecology, Copenhagen University (IPE); tissue samples are deposited as ANSP 8701.

Diagnosis.—A large antpitta (body mass 150 to 200 g) assignable to the genus *Grallaria*. Sep-

arable from known antpittas by white cheek patch of rigid loose-barbed feathers with glossy shafts extending from the subocular and posterior part of the lower lores to the base of the bill (see Fig. 1). The white cheek patch contrasts sharply with the black cap, bill, malar region, and anterior auricular feathers. The new species differs from all other *Grallaria* in lacking true rictal bristles. The throat feathers are white, stiff, and loose-barbed, as in the Ochre-striped Antpitta (*G. dignissima*), but are denser, shorter, and with more recurved tips, as in Chestnut-naped Antpitta (*G. nuchalis*). The gray of the underparts is interspersed with white in a pattern resembling pale-bellied members of the *G. hypoleuca* allospecies group. The bill is shaped most like that of *G. nuchalis* and the Pale-billed Antpitta (*G. carrikeri*) but is proportionately deeper at the base and with a straighter culmen. Tarsi and toes proportionately larger than in other antpittas and as large

as in Giant Antpitta (*G. gigantea*). Tarsal scutes few and distinctly ridged with toes and claws short and sturdy, resembling *G. nuchalis*.

Description of holotype.—Crown, a 1 to 2-mm wide feathered ocular ring, broad malars, and anterior auriculars connecting with malars Jet Black (capitalized color names and numbers follow Smithe 1975). A large and distinct fan-shaped patch of rigid, loose-barbed white feathers with glossy shafts in the loreal and subocular region (see Fig. 1). These feathers are longer and denser than in congeners and cover the base of the bill and most of the malar region. Rictal bristles lacking, but a few of the white loreal feathers have elongated bare shafts, forming bristle-like extensions. Poorly defined postocular streak, posterior part of auriculars, and sides of neck Light Neutral Gray (85). Nape black but suffused with color of back, which is closest to Brownish Olive (129), but more golden. Upper mantle with black wash that decreases posteriorly. All back feathers with blackish shafts. Tail, composed of 12 rectrices, between Raw Umber (223) and Mars Brown (223A). The three innermost secondaries and outer webs of the nine other secondaries slightly lighter than Chestnut (32). The distal half of the outer webs of the 10 primaries are Ground Cinnamon (239), the inner webs of the remiges are blackish, and the underwing primary coverts are mostly black. Upperwing coverts Brownish Olive with 2-mm wide blackish shaft streaks and Chestnut edges and tips that are bordered by a 1-mm wide blackish band. Alula Brownish Olive like back, outer webs nearly uniform. Breast White with light suffusion of Light Neutral Gray. Throat white, feathers with fairly stiff, glossy, elongated and recurved shafts that on some chin feathers are faintly dark-tipped. Feathers of upper breast with faint, blackish, about 1-mm wide terminal suffusions. Crissum and extreme lower belly washed with Pale Pinkish Buff (121D). Sides of breast Brownish Olive. Sides and flanks Light Neutral Gray suffused with Brownish Olive. Thighs Brownish Olive admixed with Light Neutral Gray and heavily washed with black. Undertail coverts and underwing coverts Brownish Olive, with fine black bars. A single completely black feather is on the left shoulder, a nearly black one on the right thigh, and most of the olive-brown feathers have faint blackish tips. In life, the bill is jet black, the irides are crimson reddish

brown, and the tarsi and toes are blue-gray. The stomach contained a few insect remains, and some of the remiges, rectrices, and body feathers were being replaced.

Measurements of holotype.—Unflattened wing chord 130 mm, flattened wing chord 138 mm, tail 59.6 mm, bill from anterior edge of nostril 19.3 mm, bill from skull 33.5 mm, gonys 18.8 mm, tarsus 67.1 mm, body mass 176 g (light fat), testes 12 × 3 mm.

Designation of paratypes.—Adult male: ANSP 187810 (skin); Natural History Museum at University of Kansas (KU) 89207 (trunk alcoholic specimen); ANSP 8706 (tissue); KU 2214 (tissue subsample and genomic extract); LNS 79054 (voice). Adult male: MECN 7284 (skin); IPE FS1-31.3.98 (blood). Adult female: MECN 7198 (skin); ANSP 8704 (tissue). Adult female: ANSP 187811 (skin with all bones except those of right tarsometatarsus and foot removed; i.e. a "schmoo"); KU 89206 (skeleton); ANSP 8731 (tissue); KU 2215 (tissue subsample and genomic extract); IPE NK1-21.1.98 (blood).

MECN 7284 was taken on the east slope of Cerro Toledo (2,680 m) 6 km north of the type locality, just within Podocarpus National Park, on 31 March 1998. The remaining three paratypes were taken near the type locality in January 1998 at 2,550 m.

Variation in type series.—Males average larger than females, although the sexes overlap in measurements of most characters (Table 1). The belly is white in two males and white lightly suffused with Light Neutral Gray in the two females and the third male (MECN 7284). The amount of buff on the crissum is variable and is strongest in two of the males, fainter in the other male (ANSP 187810) and one female (ANSP 187811), and absent in the other female. The faint bars on the upper breast are most distinctive on the holotype and MECN 7284. The amount of black suffusion on the mantle is least extensive in the holotype. Noticeable variation exists in the intensity of the gray on the breast. Among the paratypes the bill is jet black, with the tip of the mandible grayish in one female (ANSP 187811). Other soft-part colors were (ANSP 187810 [male] and MECN 7198 [female]): irides Kingfisher Rufous (240), tarsi and toes Pratt's Payne's Gray (88) with blackish joints and edges of scutes, nails Dark Neutral Gray (83); ANSP 187811 (female): mouth creamy white tinged pink, irides Mahogany

TABLE 1. Measurements of *Grallaria ridgelyi* sp. nov. Values are $\bar{x} \pm$ SD of three males and two females (range in parentheses).

Variable	Males	Females
Body mass (g)	192 \pm 14.3 (176 to 204)	167 \pm 21.2 (152 to 182)
Exposed culmen (mm)	28.2 \pm 1.0 (27.1 to 29.0)	27.8 \pm 1.1 (27.0 to 28.5)
Bill from skull (mm)	34.8 \pm 1.63 (33.5 to 36.6)	33.0 \pm 0.14 (32.9 to 33.1)
Bill from nostril (mm)	19.5 \pm 0.85 (18.9 to 20.5)	18.4 \pm 0.35 (18.1 to 18.6)
Bill width at base (mm)	16.1 \pm 1.01 (15 to 17)	16.0 \pm 0.28 (15.8 to 16.2)
Gonys (mm)	19.8 \pm 1.27 (18.8 to 21.2)	18.9 \pm 0.14 (18.8 to 19.0)
Unflattened wing chord (mm)	131 \pm 3.61 (128 to 135)	126 \pm 2.83 (124 to 128)
Flattened wing chord (mm)	138 \pm 2.52 (135 to 140)	132 \pm 1.41 (131 to 133)
Tail (mm)	58 \pm 2.43 (55 to 66)	54 \pm 4.81 (50 to 57)
Tarsus (mm)	71.1 \pm 3.59 (67.1 to 74.1)	70.4 \pm 4.24 (67.4 to 73.4)
Middle toe (mm)	47.1 \pm 1.91 (46.0 to 49.3)	45.4 (<i>n</i> = 1)
Hind claw (mm)	13.9 \pm 0.25 (13.6 to 14.1)	13.6 \pm 0.57 (13.2 to 14.0)

Red (132B), tarsi Plumbeous Gray (87–88); MECN 7284 (male): irides maroon, feet bluish gray.

MECN 7284: testes 13 \times 5 mm, seminal vesicles enlarged; ANSP 187810: testes 5 \times 2 mm; MECN 7198: ovary 11 \times 6 mm, largest ovum 1.8 mm; ANSP 187811: ovary 15 \times 3 mm, largest ovum 2 mm, oviduct convoluted.

Distribution.—Known from a small area of very wet forest in the upper Río Chinchipe drainage, provincia Zamora-Chinchipe, southern Ecuador, where it has been recorded at elevations ranging from 2,300 to 2,680 m.

Comparative material.—We examined all known species of *Grallaria* with the exception of the Tachira Antpitta (*G. chthonia*), for which a suitable description is available (specimens in MECN, ANSP, and Louisiana State University Museum of Natural Science [LSUMNS]).

Etymology.—We are pleased to name this species in honor of Robert S. Ridgely. During his field work in South America over the last 35 years, and during his many years at the Academy of Natural Sciences of Philadelphia, Bob has gathered a vast knowledge of Neotropical birds. His combination of field and museum experience and thorough acquaintance with Neotropical ornithological literature is outstanding. He has shared his knowledge with a wide audience and stimulated an interest in Neotropical birds through his books *A Guide to the Birds of Panama* (Ridgely and Gwynne 1976) and *The Birds of South America* (Ridgely and Tudor 1989, 1994). It is fitting that the discovery of this astounding new antpitta comes as work with his coauthor Paul J. Greenfield on yet another landmark book, *The Birds of Ecuador*, nears completion. The English name is a direct

transcription of the Spanish "Jocotoco" (pronounced "hocotóco"), a local onomatopoeia for the antpitta.

REMARKS

Population.—That such a large and distinctive species remained undiscovered until 1997 suggests that *G. ridgelyi* has a very limited geographic distribution and/or specific habitat requirements. At the type locality, we estimated six territories of *G. ridgelyi* per square km and noted that seemingly similar habitat continued to the southeast and southwest. Accordingly, we speculate that it occurs throughout these forests, ranging east and southeast to Cordillera de Tzunantza and the southern part of Cordillera del Condor, and southwest to the Río Isimanchi. We consider it possible that, despite previous surveys that failed to detect the species (Parker et al. 1985, Rasmussen and Rahbek 1994), *G. ridgelyi* also ranges farther southwest to Cerro Chinguela, Peru, and throughout the Podocarpus National Park north to Río Zamora. Its range might even exceed these limits, and we encourage searches for it as far north and south as Volcán Sumaco in northern Ecuador and the central Andes of Peru, respectively.

Habitat.—The five specimens were collected in wet montane forest with two or more species of bamboo on steep slopes in the upper subtropical zone. The highest elevation at which the birds were found (2,680 m) coincides with the upper limit of *Cecropia* trees, which are a much-used indicator of the upper limit of the subtropical zone (Ulloa and Joergensen 1993). Tree height rarely exceeded 20 m on steep

slopes, with most trees about 10 m tall. Most trunks, stems, and branches were covered in thick layers of dripping-wet moss, lichens, and liverworts. During our 12 field days we frequently experienced rains and heavy fog.

Vocalizations.—The song of *G. ridgelyi* (Fig. 2A), which was only observed given by males, consists of a series of 6 to 10 or more notes (400 to 650 Hz) separated by intervals of 1 to 2 s, distinctly lower pitched than songs of its closest relatives (Fig. 2D). The quality of the notes is reminiscent of those of *Pteroptochos tapaculos* and the Rufous-banded Owl (*Strix albitarsis*), and at a distance the notes may be confused with a barking dog. Following playback, notes were given for as long as 90 s; the pitch and amplitude (volume) rose slowly for more than 1 min, with notes delivered every 0.6 s; the pitch then leveled and the pace became slower and more dog-like.

The call (Fig. 2B), given by both sexes, is a softer, two-noted "ho-co." Notes are about 575 and 475 Hz, with the second note occasionally higher pitched. We heard the call given singly, or repeatedly every 4 to 10 s, with intervals shortest after playback.

The alarm (Fig. 2C), given after repeated playback, is similar to the call, but the last part is a churred "hó-crrr" or "ho-có-crrr."

Songs and calls generally were given at dawn and dusk but also at other times of day during rain and in misty weather. Birds vocalized considerably more in November and December than in January, when natural song was heard on only a few occasions. In late March, we heard songs only after playbacks.

Behavior.—The species has only been observed after responding to playback of songs and calls. Most individuals (four pairs and one solitary bird) approached considerably less cautiously than most other species of *Grallaria*, and they were often heard moving through vegetation or occasionally on the forest floor before they were heard singing. The birds were relatively aggressive, sometimes coming to within 4 or 5 m of the observer. They moved actively from branch to branch, or ran along horizontal branches 2 to 4 m above the ground (less often on the forest floor), periodically stopping to sing. Occasionally, excited individuals rapidly bobbed their heads to below the level of their perch. Singing birds pumped their tails down in synchrony with each "hoot" and

threw their heads back in typical antpitta fashion. They usually responded in close pairs, as do several other members of the family, notably some *Grallaricula* and *Grallaria nuchalis* (Fjeldså and Krabbe 1990).

Diet.—The five stomachs contained "a few insect remains," "worms and beetles," "ants," "beetle parts and larvae," "arthropod remains," and "millipede and insect remains." All stomach contents have been deposited at ANSP for future identification of specific prey items.

Breeding.—No specimen had greatly enlarged gonads, all had light fat reserves, and all but one, a heavily worn January female, were in general molt (presumably prebasic); this suggests that breeding occurs at least in October and November, which is consistent with the breeding cycle of congeners in this region (pers. obs., M. B. Robbins pers. comm.). However, despite being in molt and having fairly small testes, the March specimen had well-developed seminal vesicles.

SYSTEMATICS

The taxonomic affinities of the new species were studied through phylogenetic analysis of mitochondrial DNA by N. H. Rice.

Taxa examined.—Eleven species of *Grallaria* antpittas were studied, including two individuals of the new species (Table 2). Previous work (N. Rice unpubl. data) suggested that *Grallaricula*, *Hylopezus*, and *Myrmothera* form a sister lineage to *Grallaria* and that together these four genera form a well-supported monophyletic group. Accordingly, single representatives from *Grallaricula*, *Hylopezus*, and *Myrmothera* were chosen as outgroups for character polarization (Table 2). Freshly frozen or ethanol-preserved tissues (liver, heart, and muscle) with associated voucher specimens were obtained from LSUMNS and ANSP.

Phylogenetic results.—The cytochrome-*b* and ND2 matrices produced congruent tree topologies with comparable support regardless of weighting scheme. For brevity, therefore, only the topology resulting from the combined analysis is discussed in detail.

Using *Grallaricula*, *Hylopezus*, and *Myrmothera* as outgroups, and with equal weighting assigned to transitions and transversions, a single most-parsimonious tree resulted (TL =

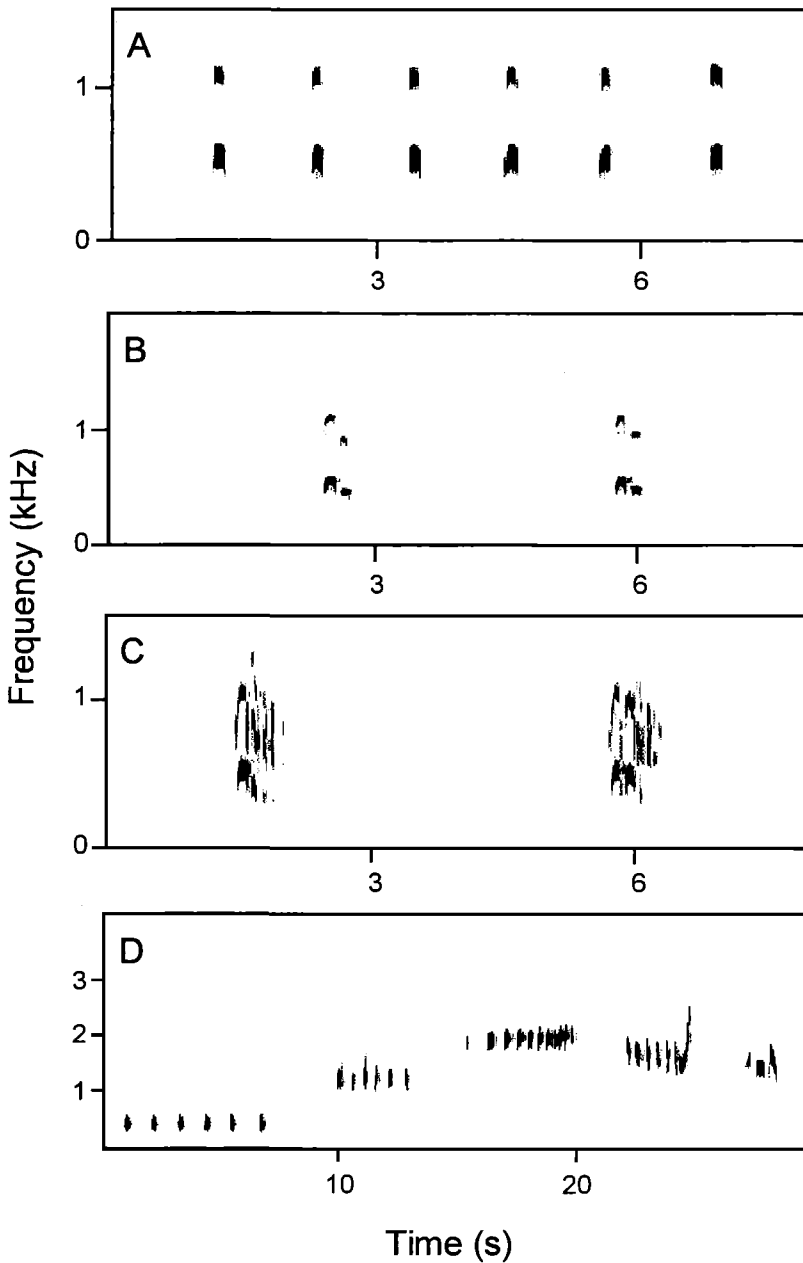


FIG. 2. (A) Song of *G. ridgelyi* (LNS 88163; recorded by L. Navarrete). (B) Male call of *G. ridgelyi* (recorded by D. Agro). (C) Excited male call of *G. ridgelyi* after repeated playback of song (recorded by D. Agro). (D) Left to right, songs of *G. ridgelyi* (see Fig. 2A), *G. carrikeri* (La Libertad, Peru; recorded by T. A. Parker), *G. nuchalis* (Napó, Ecuador; recorded by N. Krabbe), *G. watkinsi*, and *G. ruficapilla* (Loja, Ecuador; recorded by N. Krabbe), respectively.

1,261, CI = 0.548, HI = 0.452, RI = 0.518; Fig. 3). This hypothesis supports monophyly of *Grallaria*. Within *Grallaria*, it recognizes two well-supported and strongly resolved clades:

- (1) large antpittas of the subgenus *Grallaria* (Lowery and O'Neill 1969), here represented by *G. squamigera*, *G. varia*, and *G. guatemalensis*; and
- (2) antpittas referred to the subgenera *Tham-*

TABLE 2. Taxa and tissue samples used in this study, with GenBank accession numbers of the derived DNA sequences.

Taxon	Tissue no.	GenBank number	
		ND2	Cytochrome <i>b</i>
<i>Grallaria squamigera</i>	LSUMNS 6254	AF127203	AF127188
<i>G. varia</i>	LSUMNS 7528	AF127204	AF127189
<i>G. guatemalensis</i>	ANSP 5173	AF127205	AF127194
<i>G. rufula</i>	LSUMNS 1218	AF127206	AF127190
<i>G. blakei</i>	LSUMNS 5620	AF127207	AF127191
<i>G. ruficapilla</i>	ANSP 4906	AF127208	AF127192
<i>G. watkinsi</i>	ANSP 2906	AF127209	AF127193
<i>G. nuchalis</i>	ANSP 4905	AF127212	AF127197
<i>G. ridgelyi</i> 1	ANSP 8706	AF127210	AF127195
<i>G. ridgelyi</i> 2	ANSP 8731	AF127211	AF127196
<i>G. hypoleuca</i>	ANSP 4476	AF127213	AF127198
<i>G. dignissima</i>	ANSP 3229	AF127214	AF127199
<i>Hyalopezus fulviventris</i>	ANSP 3744	AF127216	AF127202
<i>Grallaricula lineifrons</i>	ANSP 4039	AF127215	AF127200
<i>Myrmothera campanisona</i>	LSUMNS 7563	AF127217	AF127201

nocharis, *Hypsibemon*, and *Oropezus* by Lowery and O'Neill (1969), although this division is not supported. The clade has the *G. rufula* complex (*G. rufula* and *G. blakei*) as its basal lineage, and among the other species an unexpected sister species relationship between *G. hypoleuca* and *G. dignissima*. *Grallaria ruficapilla* and *G. watkinsi* are sister taxa and surprisingly, they form the sister lineage to a clade containing *G. ridgelyi* and *G. muchalis*.

Hypothesis interpretation and implications.—The new species is strongly supported as a member of the *Grallaria* clade (97% bootstrap value) and, within the limits of our taxon sampling, as the sister to *G. nuchalis* (82% bootstrap support). From this relationship, we infer that *G. carrikeri*, for which no biochemical material is available, but which Schulenberg and Williams (1982) suggested is a relative of *G. nuchalis*, also is a member of the clade that con-

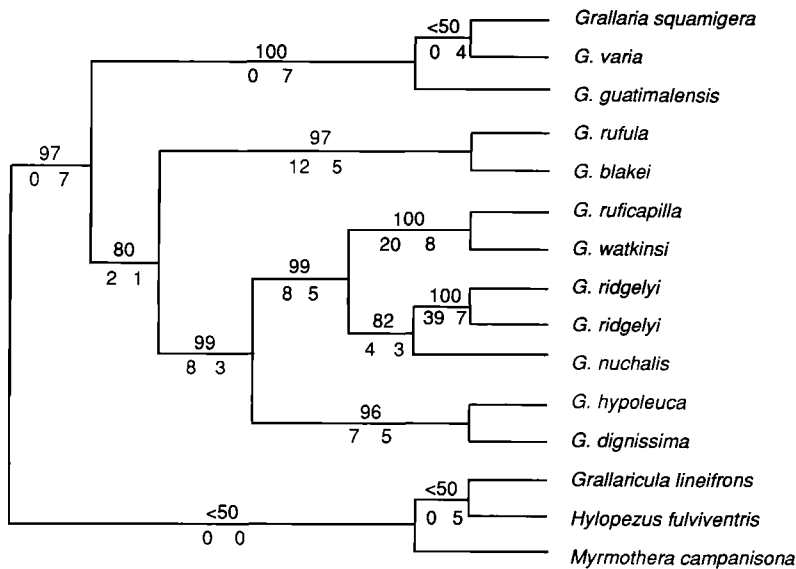


FIG. 3. Cladogram representing the single most-parsimonious tree based on combined molecular data. Numbers above each node are bootstrap values for each clade, and numbers below each node are decay indices (left) and number of unreversed synapomorphies (right) for each clade.

tains *G. ridgelyi* and *G. nuchalis*. Putative morphological synapomorphies supporting this relationship (*carrikeri* + *nuchalis* + *ridgelyi*) are that all have unpatterned breasts, smoky gray flanks, and a deep, robust bill. Consistent with this is their biogeography: all three have an eastern Andean distribution concentrated in northern Peru, Ecuador, and Colombia. Interestingly, *G. carrikeri* and *G. ridgelyi* have distinct black caps and reddish irides.

CONSERVATION

Grallaria ridgelyi is one of a number of species with very restricted ranges along the middle Río Marañón, and as such it is potentially vulnerable to habitat alteration and other unnatural disturbances. Hence, 700 ha of forest surrounding the type locality of *G. ridgelyi* was purchased in October 1998 and turned into a reserve large enough to hold a viable population of the antpitta. The reserve is owned and managed by "Fundación Jocotoco," a nonprofit organization founded with the purpose of preserving and promoting the study of globally endangered bird species through purchase and management of land in Ecuador. *Grallaria ridgelyi* also occurs on neighboring land in the southern end of Podocarpus National Park, underscoring the importance of the park, which already holds several known threatened and near-threatened species (Rasmussen and Rahbek 1994), in preserving the diversity of Andean avifauna.

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