The Condor 110(3):526–537

NEW DISTRIBUTIONAL BIRD DATA FROM THE CORDILLERA CENTRAL OF THE COLOMBIAN ANDES, WITH IMPLICATIONS FOR THE BIOGEOGRAPHY OF NORTHWESTERN SOUTH AMERICA

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Abstract. Northwestern South America is a complex area that has witnessed the differentiation and expansion of a major portion of the Neotropical avifauna. The northern end of the Cordillera Central of the Colombian Andes contributes to this complexity by bringing a continuum of humid habitats from the Andean highlands to the lowland rainforests. We present new distributional information on 36 avian species of the cloud forests and páramos of this region (1300–3250 m), gained through eight years of fieldwork and general collecting. These new records reflect the mixed biogeographic affinities of the avifauna of the northern Cordillera Central, which is composed of taxa from the pluvial foothills of the Chocó (e.g., Indigo Flowerpiercer [*Diglossa indigotica*], Scarlet-and-white Tanager [*Chrysothlypis salmoni*]), Central America and Darién (e.g., Purple-throated Woodstar [*Calliphlox mitchellii*]), and elsewhere in the Andean mountains (e.g., Semicollared Hawk [*Accipiter collaris*], Yellow Manakin [*Xenopipo flavicapilla*]). In addition, we report the first or second definite Colombian records of the Pavonine Cuckoo (*Dromococcyx pavoninus*), Cinnamon Screech-Owl (*Megascops petersoni*), and Sharpbill (*Oxyruncus cristatus*). Our findings support Chapman's (1917) view of Colombia as being "at the crux of the problem of intercontinental relationships" of Neotropical birds.

Key words: ***Antioquia, biogeography, Chocó, humid montane forest, northern Andes, range extension.***

Información Novedosa Sobre la Distribución de las Aves de la Cordillera Central de los Andes Colombianos, e Implicaciones para la Biogeografía del Noroeste de Suramérica

Resumen. El extremo noroccidental de Suramérica es un área compleja que ha sido testigo de la diferenciación y expansión de una gran porción de la avifauna Neotropical. El norte de la Cordillera Central de los Andes colombianos contribuye a esta complejidad al poseer un continuo de hábitats húmedos desde los altos Andes hasta las selvas de tierras bajas. Acá presentamos información novedosa sobre la distribución de 36 especies de aves de bosques nublados y páramos de esta región (1300–3250 m), como resultado de ocho años de muestreos y colecta general. Estos nuevos registros reflejan la mezcla de afinidades biogeográficas de la avifauna del norte de la Cordillera Central, la cual está compuesta por taxones de selvas pluviales del piedemonte chocoano (e.g., *Diglossa indigotica*, *Chrysothlypis salmoni*), Centroamérica y Darién (e.g., *Calliphlox mitchellii*) y de otras regiones andinas (e.g., *Accipiter collaris*, *Xenopipo flavicapilla*). Adicionalmente, reportamos el primer o segundo registro definitivo para Colombia de *Dromococcyx pavoninus*, *Megascops petersoni*, y *Oxyruncus cristatus*. Nuestros hallazgos concuerdan con la idea de Chapman (1917) de que Colombia está "en el punto crucial del problema de las relaciones intercontinentales" de las aves neotropicales.

INTRODUCTION

Northwestern South America is important for understanding the origins and biogeography of Neotropical biota (Brumfield and Capparella 1996, Albert et al. 2006). This region is noteworthy for its diverse avifauna, composed of lineages with multiple biogeographical affinities (Chapman 1917, Haffer 1967a) and shaped by numerous geological and climatic events (Haffer 1967a), including the creation of the landbridge to Central America (Coates et al. 2004, Barker 2007), marine incursions (Nores 2004), climatic oscillations (Hooghiemstra and Van der Hammen 2004), and the differential uplift of the Andes in Colombia (McCourt et al. 1984). Various biogeographic areas converge in extreme northwestern South America (Fig. 1), such as the Andean cordilleras with their major river valleys (Cauca and Magdalena), the lowland rainforests at the northern base of the cordilleras, and the pluvial forests of the Chocó and Urabá (Hernández-Camacho et al. 1992).

Current knowledge of the avian biogeography of northwestern South America is rooted in the pioneering works of

Manuscript received 17 January 2008; accepted 1 July 2008.
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The Condor, Vol. 110, Number 3, pages 526–537. ISSN 0010-5422, electronic ISSN 1938-5129. DOI: 10.1525/cond.2008.8555

Frank M. Chapman and Jürgen Haffer (Chapman 1917, Haffer 1967a, 1974). Since then, most avian biogeographic research has focused on patterns of endemism (Cracraft 1985, Brumfield and Capparella 1996) and of population differentiation in the lowlands (Marks et al. 2002), while the cloud forests of the northern Andes, highlighted by both Chapman and Haffer as key biogeographical features, have received relatively little attention from biogeographers.

The Andes occur as three main ranges in Colombia, with the Cordilleras Occidental and Central having parallel peninsula-like projections (Fig. 1). The northern portions of these two mountain chains have a continuum of forested habitats from the tree line to the humid lowlands, containing avifaunas poorly sampled but showing enigmatic biogeographic patterns (Chapman 1917, Kattan et al. 2004). The northern Cordillera Central has been explored only sporadically over the past 125 years, with collections made by Thomas K. Salmon (Sclater and Salvin 1879), Nicéforo María, Daniel González, and Marco A. Serna (Stiles 1993, Sociedad Antioqueña de Ornitología 2004), Leo E. Miller and Howarth Boyle (Chapman 1917), and Melbourne A. Carriker Jr. (Graves 1988, 1997). However, in the past 15 years, a new focus on the avifauna of the northern Cordillera Central has resulted in a better appreciation of its avifaunal assemblage (Renjifo 1999; Cuervo et al., in press). Here, we present the major biogeographical patterns of the avifauna of the northern Cordillera Central (hereafter, C. Central), as reflected by 36 species previously unknown to occur in the region.

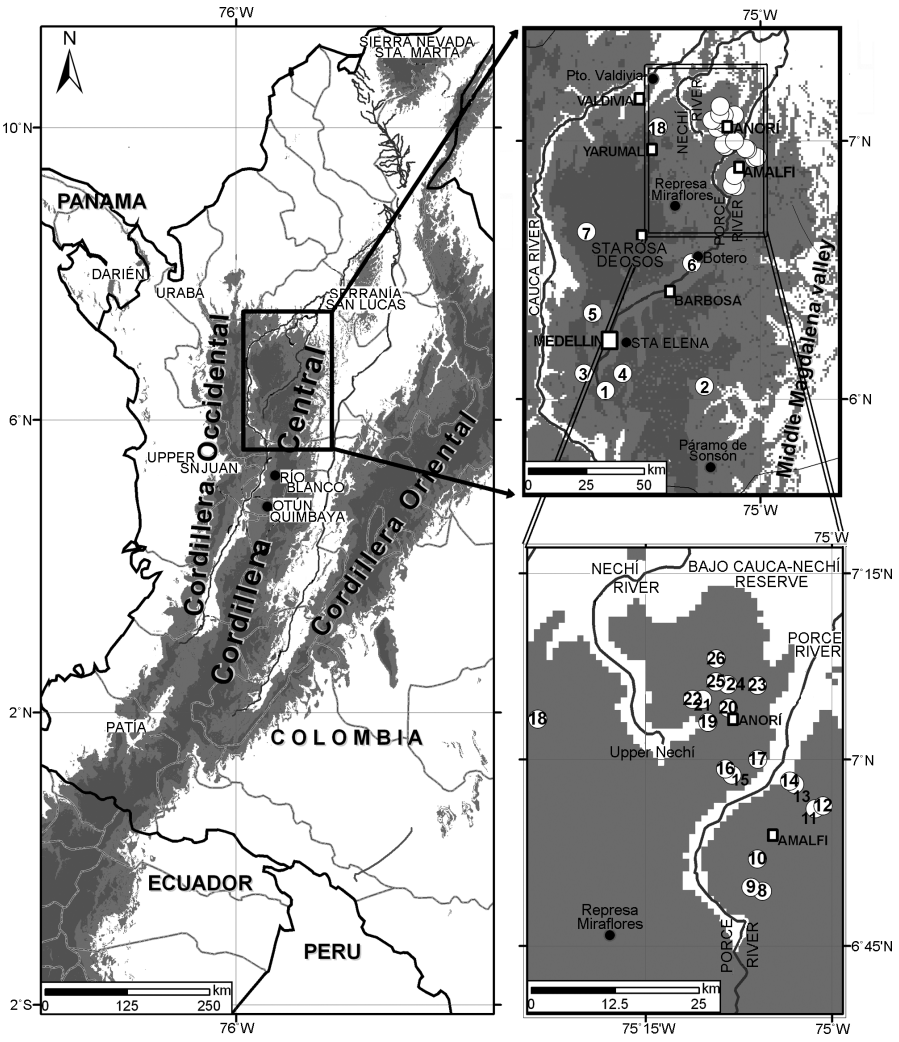

FIGURE 1. Map of northwestern South America showing the location of the Colombian Andes and the major geographical features mentioned in the text. The northern Cordillera Central is delimited by a black square and amplified in the top right panel. Circles represent our study localities, which are numbered as in Table 1. The subgroup of the northernmost localities (18–26) is shown in detail in the bottom right panel. Light and dark gray shades depict areas above 1000 and 2100 m, respectively.

METHODS

STUDY AREA

We sampled 26 localities in the C. Central, Department of Antioquia, Colombia (Table 1, Fig. 1). Unlike the central and southern portions, the northern C. Central is considerably less volcanic and, on average, lower in elevation. This region also contains some scattered but small plateaus, lies much closer to the Cordillera Occidental forming the dry lower Cauca canyon, and smoothly tapers into the lowland rainforests that surround the range. An important feature of the region's geography is the Porce River valley, which drains into the Nechí River. This inter-Andean valley dissects the northern C. Central into two broad spurs (Fig. 1). Because the Porce valley is humid and only moderately deep, it appears to be an insignificant barrier to montane bird populations. Nonetheless, our findings confirm that this valley is of great relevance for avian biogeography.

Overall, the biomes in extreme northwestern South America are pluvial to semihumid (Instituto Geográfico Agustín Codazzi 2003), sustaining tropical rainforests in the lowlands and cloud forests and humid páramos in the highlands. Tropical biomes subject to high rainfall are known to hold higher alpha and beta diversity than less humid and topographically uniform biomes (Rompré et al. 2007), such as the savannas, dry mountains, and valleys of nearby areas of northern South America. In general, the 26 localities that we sampled are covered by cloud forests (Table 1), in particular, very wet premontane forests and, to a lesser extent, upper montane forests and páramos (Espinal 1992). These locations are distributed on the foothill slopes of the Porce, upper Nechí, Cauca, and Magdalena valleys (Fig. 1). A general overview of the landscape ecology of the region is given elsewhere (Cuervo et al. 2005, Cuervo and Restrepo 2007). Details on habitats sampled, geographic coordinates, and elevation for all sites are presented in Table 1.

BIRD SAMPLING

Fieldwork was carried out between 1998 and 2006 and consisted of casual visual and auditory surveys, tape-recordings of vocalizations, and mist-netting. This strategy complemented a more comprehensive, systematic sampling that focused on nine of the 26 localities (Cuervo and Restrepo 2007). Although sampling occurred in all months of the year, it was not equivalent in time or effort at all sites; the nine localities sampled systematically and Reserva La Forzosa were sampled more thoroughly. Sampling was concentrated in the forest interior and edges, with opportunistic observations in disturbed patches, shrubby fields, and open areas. Voucher specimens were deposited at ICN or MUA (for explanations of museum acronyms, see Acknowledgments). Recordings were archived at the Banco de Sonidos Animales-IAvH, and many have already been published in a sound guide (Álvarez et al. 2007). Nomenclature and phylogenetic order follows Remsen et al. (2008).

RESULTS

We obtained new information on the distribution and natural history of 36 bird species, either new records for the C. Central, substantial distributional extensions from other regions, or new records of poorly known birds from Colombia or Antioquia. Numbers in parentheses refer to locality numbers as listed in Table 1 and mapped in Figure 1.

SPECIES ACCOUNTS

Black Tinamou (*Tinamus osgoodi*). A large tinamou with uniform black plumage overall, including on the head and neck, was observed at least five times between 7 March 1999 and 4 June 2000 at Reserva La Forzosa (16) by AMC, J. M. Ochoa, J. Toro, and B. López. Observations included individuals walking along a trail on a ridge at 1700 m and individuals at the forest edge of the El Chaquiral stream at 1500 m. This rare tinamou was previously not known to occur this far north in the Andes. In Colombia, this species was known from the upper Magdalena valley (Blake 1953) and the eastern slope of the Cordillera Oriental in southwestern Caquetá, where one specimen was recently collected by A. M. Umaña (IAvH 11434).

Semicollared Hawk (*Accipiter collaris*). We document the northernmost population of this raptor in the C. Central through one specimen and observations. The Semicollared Hawk was previously known locally only as far north as Honda in eastern Tolima, 200 km to the south. We (AMC, J. M. Ochoa, and J. Luna) first observed this species in the region on 7 March 1999. Since then, individuals have been seen infrequently in the subcanopy of the forest interior and on the edge of Reserva La Forzosa (16), Alto El Chaquiral (15), and Bodega Vieja (14), between 1400 and 1750 m. A male in breeding condition was collected by AMC on 24 February 2002 (ICN 34511), and its stomach contained mostly contour feathers of an unidentified passerine.

Blue-fronted Parrotlet (*Touit dilectissimus*). Our records are the first from the C. Central, filling a substantial gap between populations of the Chocó and the Cordillera Oriental (Hilty and Brown 1986). This was the most common psittacid species in premontane forests of the northern C. Central (8–16, 19–22, 24–26). Although the Blue-fronted Parrotlet was most often detected by its vocalizations (recorded), it was also commonly observed in flocks of 8–24 or more individuals, feeding in the tops of trees, flying high over the canopy, or crossing open areas. Despite its high local abundance and relatively broad distribution, fewer than 20 specimens of this species have ever been collected in Colombia, making it difficult to assess its geographic variation.

Pavonine Cuckoo (*Dromococcyx pavoninus*). This species was previously known in Colombia from a Bogotá trade skin and from a male collected in the Sierra de Perijá foothills, La Guajira, at ca. 1225 m (USNM 368717). The latter specimen and our tape recordings are the first definite records west of the Andes for this widespread cis-Andean species. Our records are also the first of the Pavonine Cuckoo for the C. Central and for Colombia in >60 years. This species was first found on 20 March 2000 at La Condena (23), where one individual was heard (recorded) at 1700 m by AMC. Subsequently, the species was found to be uncommon to fairly common between 1450 and 1825 m at Alto El Chaquiral (15), Reserva La Forzosa (16), Bosque Guayabito (10), and Santa Gertrudis (26). In all cases, individuals were singing from shrubby edges of cloud forests or in nearby second-growth patches.

Cinnamon Screech-Owl (*Megascops petersoni*). This little-known owl was recently described from specimens collected on the eastern slope of the Andes of Peru and Ecuador and from an old "Bogotá" skin (Fitzpatrick and O'Neill 1986). Two individuals captured (one collected) at 1700 m in the forest interior and sound recordings represent the first confirmed records of this species in Colombia. One record is from Reserva La Forzosa (16), where an individual was mist-netted and photographed by C. A. Delgado on 7 January 2001, and the other is from Alto El Chaquiral (15), where one male (ICN 34377) and sound recordings were gathered by AMC in March 2002. Both individuals were in brown-rufous plumage (versus rufous or brown morphs).

Brown Violetear (*Colibri delphinae*). We collected an adult female in breeding condition (ICN 34426) on 17 June 2002 in mature forest at 1775 m, on the Finca Hugo Roldán trail, Bosque Guayabito (10). Our specimen represents a significant range extension of the Brown Violetear in the C. Central from the upper Magdalena valley foothills (Hilty and Brown 1986) and the eastern slope of the Cordillera Occidental in Antioquia.

Black-thighed Puffleg (*Eriocnemis derbyi*). Specimens and observations of this poorly known hummingbird extend its distribution north in the C. Central by 190 km (Hilty and Brown 1986, Heynen 1999). In Páramo de Belmira (7), a juvenile male in heavy molt (MUA 417) was collected at 3250 m by PCP on 22 November 2003. Five additional specimens from this site but not previously reported in the literature were found in museums (ICN 30729, MUA 140, 147, MCSJ 2935, 2937). All these skins seem to correspond to the subspecies *longirostris.* This subspecies' validity has been questioned by Heynen (1999) due to possible clinal variation along the C. Central. That hypothesis can be tested rigorously only by considering a series of specimens from throughout its linear range, from Páramo de Belmira in the north to northern Ecuador in the south.

Purple-throated Woodstar (*Calliphlox mitchellii*). This hummingbird was previously known from the Darién and scattered localities in the Chocó foothills, from western Ecuador to western Antioquia at Quebrada Zapata (ANSP 129366) and only up to 1900 m (Hilty and Brown 1986). A recent specimen and photographs represent the first records of the Purple-throated Woodstar for the C. Central. We mist-netted one female (ICN 34434) in the understory of disturbed forest at Bosque de El Abuelo-Escuela Las Ánimas (12) on 15 February 2002, and briefly observed a second individual at Reserva La Forzosa (16) in 1999. These two records may not represent the actual abundance of this hummingbird, which usually forages in the canopy and forest edges above mist-net level. Moreover, individuals have occasionally been seen and photographed since 2006 as high as 2500 m at the feeders of Río Blanco, Caldas (210 km south) on the western slope of the C. Central (S. Ocampo, Fundación FUNDEGAR, pers. comm.).

Violet-headed Hummingbird (*Klais guimeti*). This hummingbird is known from only a few localities west of the Andes in South America. Our records are the first of *K. guimeti* in the C. Central (Hilty and Brown 1986) and fill in a distributional gap between Darién and the middle Magdalena valley foothills. Four males were collected in the understory of mature forests at Bodega Vieja (14) and Santa Gertrudis (26) between 1450 and 1525 m in November–December 2004 (ICN 35153, 35164, 35166, 35168). However, our specimens cannot be ascribed to either *merrittii* from the Darién (Hilty and Brown 1986) or *guimeti* from the Magdalena valley foothills and the eastern Andean slope (Stiles et al. 1999). Our specimens have consistently much less violet in the throat, more extensive gray on the breast, and less green on the back (F. G. Stiles, Instituto de Ciencias Naturales, pers. comm.). Additional specimens, especially of females, will be required to assess geographic variation.

Blue-tailed Trogon (*Trogon comptus*). Although this Chocó endemic was known to range across the northern foothills of the Cordillera Occidental and C. Central to the lower Cauca valley (Haffer 1967b, Hilty and Brown 1986), it was not known to reach the Andean cloud forests. On 7 April 2002, AMC observed a singing male (recorded) ca. 20 m up in the subcanopy of the pluvial undisturbed forest of Santa Gertrudis (26) at 1450 m. In addition, we found an overlooked specimen collected by A. Tabares in 1951 from the Nechí lowlands, Antioquia (MUA 8).

Lanceolated Monklet (*Micromonacha lanceolata*). This species is known from scattered localities from Costa Rica to Bolivia (Rasmussen and Collar 2002, Brumfield and Maillard 2007), but our records are the first for the C. Central. On 1 July 2002, a solitary individual perched in the upper understory was observed in detail by AMC and PCP at 1500 m in Bodega Vieja (14). Presumably the same individual was observed in the same place during a second sighting on 21 July 2006 by AMC and others. Other individuals were heard (recorded), photographed, or observed perched on exposed branches at 1300 m. In addition, recent observations have been made in the Alto de Ventanas area (18) and Alto El Chaquiral (15; C. M. Mazo, CORANTIOQUIA, and B. Freeman, Seattle, Washington, pers. comm.). Specimens from the C. Central population are badly needed to assess phenotypic differences and phylogenetic affinities with other populations that are also poorly represented in collections. Such an analysis would help to clarify the taxonomic status of the Central American population that was described as a distinct subspecies (*austinsmithi*, Dwight and Griscom 1924).

White-mantled Barbet (*Capito hypoleucus*). This Colombian endemic was fairly common in the canopy and forest edges between 1300 and 1600 m in Pradera (6), Bodega Vieja (14), and Finca Macondo (17), and was occasionally found up to 1850 m in the cloud forest of La Secreta (9). Two specimens taken (ICN 34414, 35171) in Bodega Vieja and La Secreta are referable to the nominate subspecies, whereas the Pradera population corresponds to the enigmatic subspecies *carrikeri*. In fact, Pradera is just 1.8 km southwest of the type locality for *carrikeri*, Botero (Fig. 1). Previously, the subspecies *carrikeri* was known only from the type specimen (Graves 1988), and the species was not known to occur above 1500 m (Múnera and Laverde 2002). Both Pradera (*carrikeri*) and the La Secreta-Bodega Vieja area in Amalfi (*hypoleucus*) lie along the Porce River valley, are separated by less than 36 km, and the habitat types used by the species in these two areas are, in general, the same. Densely spaced geographic sampling along the Porce River valley is needed to assess distributional limits and potential levels of intergradation between subspecies.

Striped Woodhaunter (*Hyloctistes subulatus*). This furnariid was occasionally observed and heard (recorded) in six localities (12–14, 16, 25, 26) from 1425 to 1750 m. We collected five specimens (ICN 33502, 33980, 34529, 34393, 35761) assignable to the race *cordobae*, which ranges in the lowlands from southern Córdoba to the mid-Magdalena valley foothills (Laverde et al. 2005). The validity of *cordobae* has been questioned due to the clinal variation inferred from the intermediacy between Central American *assimilis* and supposed *cordobae* specimens from northern Chocó (Meyer de Schauensee 1960) and northwestern Antioquia (Haffer 1967b). However, we concur with Laverde et al. (2005) that *cordobae* is indeed distinctive through a combination of characters found in specimens from the upper Sinú valley east to the Magdalena valley. The song and calls of *cordobae* (Álvarez et al. 2007) are clearly more similar to the trans-Andean

TABLE 1. List of the 26 localities across the northern Cordillera Central sampled for their avifauna from 1998 to 2006, and description of the habitats surveyed. Localities are numbered in ascending order of latitude, south to north (Fig. 1).

Locality list and habitat descriptions[a]	Coordinates (N, W); elevation (m)	Fieldworkers
1. El Cardal (western slope; Mun. Caldas) PWF. Heavily disturbed second growth along Quebrada El Cardal and shrubs along the old Caldas-Fredonia road.	6°02′, 75°36′; 1750–1850	AMC, M. P. Lopera-Blair, and T. Arias
2. El Viao (eastern slope; Mun. Cocorná) PVWF. Disturbed forest dominated by *Croton* sp. (Euphorbiaceae) with open canopy, and shrubby vegetation along Quebrada El Viao.	6°03′, 75°13′; 1950–2050	AMC, DC, and others
3. Vía Parque-Angelópolis (western slope; Mun. Angelópolis) PWF–LMWF. Tall second growth in very steep terrain between km 8–10 of the Caldas-Angelópolis road (1925–2050 m), and disturbed secondary forests along the ridge (2200–2350 m).	6°06′, 75°41′; 1925–2350	AMC, DC, and others
4. San Sebastian de la Castellana (Upper Porce; Muns. Envigado and El Retiro) UMWF. Old secondary forest surrounded by pastures and scattered pine plantations, and patches of *Chusquea* bamboo.	6°06′, 75°32′; 2400–2800	AMC, DC, PCP, and others
5. Serranía de las Baldías (Upper Porce; Mun. Bello) UMWF. Disturbed old second growth in steep terrain, shrubby vegetation up to the treeline, and subpáramo. Also known as: Las "Antenas de San Félix."	6°20′, 5°39′; 2350–3050	AMC, DC, and others
6. Pradera (Middle Porce valley; Mun. Don Matías) PWF–TWF. Medium-sized, disturbed mature forest patch, young second growth, and pastures with isolated trees above the Pradera railroad station.	6°31′, 75°15′; 1300–1500	AMC, DC, J. M. Ochoa, and others
7. Páramo de Belmira (western slope; Mun. Belmira) UMWF-P. Second growth, oak (*Quercus humboldtii*) forests, and páramo; also known as "Páramo de Santa Inés."	6°38′, 75°40′; 3000–3250	PCP and W. Múnera
8. Finca Los Canales (Porce foothills; Mun. Amalfi) PVWF. Small (8.5 ha) primary forest surrounded by pastures. Type locality of Stiles's Tapaculo (*Scytalopus stilesi*; Cuervo et al. 2005).	6°49′, 75°05′; 1800–1875	AMC, PCP, A. Morales, A. Hernández, and D. Ángel
9. La Secreta (Porce foothills; Mun. Amalfi) PPF. Medium-sized (85 ha) patch of tall mature forest crossed by Quebrada La Secreta	6°49′, 75°06′; 1825–1925	AMC, PCP, P. Córdoba, J. González, A. Morales, A. Hernández, and S. Galeano
10. Bosque Guayabito (Porce foothills; Mun. Amalfi) PVWF. Large tract (ca. 1000 ha) of mature forest surveyed near the confluence of the Caracolí and El Hueso streams with some forest edges and young second growth, and along the trail to Finca Hugo Roldán in southernmost portion of the forest. Recently established as a reserve "Caracolí-Guayabito."	6°52′, 75°06′; 1700–1825	AMC, DC, PCP, D. Bermúdez, J. Gutierrez, P. Córdoba, and others
11. Bosque Las Ánimas (Porce foothills; Mun. Amalfi) PWF. Small (19 ha) patch of disturbed primary forest and old second growth surrounded by pastures and coffee plantations near Quebrada Las Ánimas.	6°56′, 75°01′; 1500–1550	AMC, DC, J. F. Díaz, O. Marín, C. Zapata, and G. Colorado
12. Bosque de El Abuelo-Escuela Las Ánimas (Porce foothills; Mun. Amalfi) PVWF. Medium-sized (70 ha) patch of tall mature forest with large trees and dense undergrowth, surrounded by patches of young second growth, coffee plantations, and pastures. On the ridge at 1625 m the forest is mossy and short.	6°56′, 75°00′; 1500–1600	AMC, M. Nieto, S. Restrepo, J. F. Díaz, C. Zapata, and O. Marín
13. Bosques de Santa Catalina (Porce foothills; Mun. Amalfi) PPF. Large, undisturbed forest located along the dividing ridge between the Riachón and Porce valleys. Connected with the next locality farther north.	6°57′, 75°02′; 1500–1550	AMC, PCP, DC, and J. Toro

(*Continued*)

TABLE 1. (Continued)

Locality list and habitat descriptions[a]	Coordinates (N, W); elevation (m)	Fieldworkers
14. Bodega Vieja (Porce foothills; Mun. Amalfi) PPF. Large (>1000 ha) tract of mature forest extending from the previous locality to the south through the Riachón River watershed to the Porce lowlands. Sampling concentrated in the forest interior, with opportunistic observations in second growth and riverside vegetation.	6°58′, 75°03′; 1300–1550	AMC, PCP, DC, S. Galeano, J. C. de las Casas, G. Colorado, D. Cadena, A. Morales, G. Londoño, J. L. Parra, and others
15. Alto El Chaquiral (Porce foothills-Upper Nechí; Mun. Anorí) PVWF. Medium-sized (103 ha) forest at the ridge dividing the Porce and Nechí watersheds, with scattered *Chusquea* bamboo patches, dense understory, and surrounded by pastures and young second growth. Recently established as a private reserve "RNA Arrierito Antioqueño."	6°58′, 75°08′; 1650–1750	AMC, PCP, L. Sanín, D. Urrego, J. Botero, and W. Múnera
16. Reserva La Forzosa (Upper Nechí; Mun. Anorí) PVWF. A reserve (350 ha) owned by CORANTIOQUIA protecting tall mature forest surrounded by pastures and young second growth. Adjacent to Alto El Chaquiral (15). Type locality of Chestnut-capped Piha (*Lipaugus weberi*; Cuervo et al. 2001).	6°59′, 75°08′; 1550–1750	AMC, PCP, J. M. Ochoa, C. A. Delgado, C. D. Cadena, B. López, J. Toro, and others
17. Finca Macondo (Porce foothills; Mun. Anorí) PVWF. A patch of relatively undisturbed primary forest in steep terrain.	7°00′, 75°05′; 1400–1600	PCP, DC, S. Gómez, J. González, and W. Múnera
18. Alto de Ventanas (northern slope; Mun. Yarumal) PPF. Several scattered patches of cloud forest in the vicinity of Quebrada Espíritu Santo, surrounded by pastures and agricultural fields.	7°03′, 75°23′; 1600–2400	PCP, C. M. Mazo, J. Botero, J. González, and W. Múnera
19. Filo Largo (Upper Nechí; Mun. Anorí) PWF. A long narrow stretch of tall second growth with no understory along the Quebrada Filo Largo, embedded in a matrix of pastures with scattered trees.	7°03′, 75°10′; 1475–1525	AMC and D. Ángel
20. Mangas de Rosita (Porce foothills; Mun. Anorí) PWF. A small second-growth patch isolated by pastures along the Anorí River.	7°04′, 75°08′; 1525–1550	AMC and D. Ángel
21. Mampuestos (Upper Nechí; Mun. Anorí) PWF. A narrow patch (14 ha) of moderately disturbed forest along a ridge above Quebrada Las Lomitas, where the landscape matrix is dominated by pastures.	7°04′, 75°10′; 450–1500	AMC, PCP, S. Galeano, L. Sanín, J. Botero, and W. Múnera
22. Quebrada La Nutria (Upper Nechí; Mun. Anorí) PWF. Disturbed second growth along the watercourse of Quebrada Las Lomitas.	7°04′, 75°11′; 1425–1450	AMC and D. Ángel
23. La Condena (Porce foothills; Mun. Anorí) PVWF. A large tract of mature forest located on the ridge and slopes separating the Porce and Anorí Rivers, along the Quebrada Sana watershed.	7°06′, 75°06′; 1600–1750	AMC, S. Galeano, and M. Castaño
24. Alto La Serrana (Porce foothills; Mun. Anorí) PPF. Disturbed forested area covering steep terrain, surrounded by pastures with isolated trees and young second growth.	7°06′, 75°08′; 1625–1700	AMC, S. Galeano, D. Cadena, B. López-Lanús, and J. Toro
25. Camino Anorí-Santa Gertrudis (Upper Nechí; Mun. Anorí) PPF. A section of trail along a ridge crossing disturbed old second-growth forest and edge of primary forest with scattered landslides.	7°06′, 75°09′; 1600–1700	AMC, DC, PCP, J. Toro, S. Galeano, J. Botero, W. Múnera, and D. Ángel
26. Santa Gertrudis (Upper Nechí; Mun. Anorí) PPF. A continuous, relatively undisturbed tall mature forest in the watershed of Quebrada Santa Gertrudis.	7°08′, 75°09′; 1425–1475	AMC, DC, PCP, S. Galeano, T. Arias, J. Cardona, J. Botero, W. Múnera, and D. Ángel

[a]LMWF = lower montane wet forest, Mun. = Municipality, P = páramo, PPF = premontane pluvial forest, PVWF = premontane very wet forest, PWF = premontane wet forest, TWF = tropical wet lowland forest, UMWF = upper montane wet forest.

virgatus group, including *assimilis* (K. J. Zimmer, Los Angeles County Museum of Natural History, pers. comm.), than to the cis-Andean *subulatus* group (Remsen 2003).

Streak-capped Treehunter (*Thripadectes virgaticeps*). This species was uncommon in eight localities (8–10, 12, 14–16, 23) of the northern C. Central between 1500 and 1925 m. We collected four specimens referable to the subspecies *magdalenae* (ICN 33795, 34606, 35760, MUA 409). Our records fill a gap between the Cordillera Occidental and the eastern slope of the C. Central and the upper Magdalena valley (Meyer de Schauensee 1945, Remsen 2003). A collecting transect along the Chocó foothills from western Valle to Nariño would determine the distributional limits and geographic variation of *magdalenae* and *sclateri*, as these subspecies replace each other somewhere in this region. In fact, two specimens from that area show signs of intermediacy (F. G. Stiles, Instituto de Ciencias Naturales, pers. comm.).

Rufous-rumped Antwren (*Terenura callinota*). One specimen, recordings, and multiple observations form the first records of this species in the C. Central. In Colombia, the Rufous-rumped Antwren was previously known from the western slope of the Cordillera Occidental and both slopes of the Cordillera Oriental, including the upper Magdalena valley (Hilty and Brown 1986). We observed and heard (recorded) this antwren joining mixed-species flocks in the canopy in six localities (9, 10, 14–16, 26) between 1425 and 1925 m. An adult male (MUA 391) collected on 8 August 2003 at Bosque Guayabito (10) by PCP is referable to the nominate subspecies, which has a broad but local distribution from Central America to northern Peru (Zimmer and Isler 2003).

Ochre-breasted Antpitta (*Grallaricula flavirostris*). This species was previously not known to occur in the C. Central. We found it uncommon in six localities (9, 12, 15, 16, 18, 24) between 1600 and 1925 m, including Reserva La Forzosa (Delgado 2002). It was also present on the eastern slope of the C. Central in San Carlos, Antioquia (Peña 1998). We collected five specimens (ICN 34415, 34612, 34627, 34636, 34638), all showing bicolored bills (dark brown maxilla, yellow mandible), olive-yellow or greenish-gray legs, and tawny ochraceus throats; however, the specimens were slightly variable in breast pattern. The phenotypic variation shown by the Ochre-breasted Antpitta has been noted mostly in populations of western Ecuador (Robbins and Ridgely 1990, Krabbe and Schulenberg 2003) and is apparently not associated with sex or age. A study of phenotypic plasticity rooted in a phylogeographic context is warranted to understand the origin of this variation and its implications to current taxonomy.

Plumbeous-crowned Tyrannulet (*Phyllomyias plumbeiceps*). Known localities of this species in the C. Central lie on the western slope between the departments of Quindío and Valle (Chapman 1917, Hilty and Brown 1986); hence, our records represent a 280 km extension of its documented distribution and the northernmost populations of this species. We observed and heard (recorded) the Plumbeous-crowned Tyrannulet in mixed-species flocks in the canopy in four localities (9, 10, 12, 14) between 1500 and 1925 m. One male was collected at La Secreta (9) by AMC on 12 January 2002 (ICN 34575).

Marble-faced Bristle-Tyrant (*Phylloscartes ophthalmicus*). Four males and one female collected of the nominate subspecies (ICN 34437, 34438, 35781, 35783) confirm that this taxon ranges to the northernmost end of the C. Central. Previously, it was known only in Otún-Quimbaya. This bristle-tyrant was fairly common in the upper understory and subcanopy of mature forests at ten localities (8–10, 12, 14–16, 21, 25, 26). Although more often detected aurally (recorded), Marble-faced Bristle-Tyrants were also seen foraging as solitary individuals or in pairs, and frequently accompanied mixed-species flocks.

Rufous-browed Tyrannulet (*Phylloscartes superciliaris*). Our records are the first for the C. Central. This species was common in 14 localities (8–16, 21–23, 25, 26), where it was easily detected by its contact calls while foraging and by its song and duets given year-round (recorded). We collected three specimens (ICN 34540, 34611, 34621) that are tentatively assigned to the subspecies *palloris* of Cerro Tacarcuna in Darién, but do not differ from other specimens at ICN from the Chocó foothills in Alto Pisones (ICN 31608) and the Cordillera Oriental in Virolín, Santander (ICN 25346). Nonetheless, the Virolín specimen might correspond to the subspecies *griseocapillus*, originally described from the Sierra de Perijá (Phelps and Phelps 1952). We concur with Robbins et al. (1987) that subspecies of the Rufous-browed Tyrannulet are differentiated only slightly by plumage. Hence, this species should be considered monotypic until a comprehensive series of specimens from throughout its range can be directly compared. Pairs or family groups foraged actively in the canopy and forest edges and often followed mixed-species flocks.

Fulvous-breasted Flatbill (*Rhynchocyclus fulvipectus*). Our records are the first of this species in the C. Central. We found this flycatcher uncommon between 1500 and 1925 m at La Secreta (9), Bosque de El Abuelo-Escuela Las Ánimas (12), Bodega Vieja (14), and Reserva La Forzosa (16). AMC, C. A. Delgado, and J. M. Ochoa first observed this species at Reserva La Forzosa (16) on 25 May 1999 at 1550 m.

Orange-crested Flycatcher (*Myiophobus phoenicomitra*). This rare flycatcher was known in Colombia from a handful of localities in the Chocó foothills, up to 1100 m (Hilty and Brown 1986). On 30 June 2002, AMC collected a male, referable to the subspecies *litae* (ICN 34517), at 1550 m in Bodega Vieja (14). We also observed two individuals foraging in the upper understory under a closed canopy on 10 September 2005 in Bodega Vieja.

Tawny-breasted Flycatcher (*Myiobius villosus*). We found this species up to 1625 m in three localities (12, 14, 26), where it was uncommon. These are the first records for the Tawny-breasted Flycatcher in the C. Central. We observed single birds in mixed-species flocks foraging in the midstory. Two specimens (ICN 33981, 34616) are referable to the nominate subspecies that ranges from the foothills of Darién and the Chocó lowlands to northwestern Ecuador.

Sharpbill (*Oxyruncus cristatus*). On 7 April 2002, AMC collected an adult female in Santa Gertrudis (26) at 1475 m, representing the first specimen of the family Oxyruncidae for Colombia (ICN 34391). This species has a highly disjunct, relictual distribution over a broad geographic area and shows chaotic variation in plumage patterns (Chapman 1939, Brooke 2004). Not only has the validity of some of the six subspecies currently recognized sensu Chapman (1939) been doubted (Brooke 2004), but recent specimens from various shallow montane regions in South America have not yet been ascribed to any subspecies, and may represent additional undescribed taxa (Brooke 2004; AMC, pers. obs.). Our specimen is similar to the white-bellied races, more closely resembling *hypoglaucus* of Mt. Roraima, the Guianas, and northern Brazil than the geographically closer *brooksi* of Darién, in having a whitish rather than yellowish facial area. A series of specimens associated with vocalizations and tissues are badly needed for direct comparisons and phylogeographic studies that would ultimately disentangle "the riddle of *Oxyruncus*" (Chapman 1939). An additional individual was captured at 1400 m in Serranía de San Lucas, 125 km northeast of Santa Gertrudis (Salaman et al. 2002), but no specimen was collected.

Green Manakin (*Xenopipo holochlora*). One adult male (ICN 35730) was collected by AMC on 13 November 2004 in the understory of the tall mature forest of Santa Gertrudis (26) at 1425 m. The specimen is tentatively assigned to the Chocó subspecies *litae*, representing the first record of this taxon for the C. Central and an eastward range extension from the Chocó region (Snow 2004). In Colombia, the subspecies *suffusa* is restricted to the Darién and Urabá regions (Haffer 1967b) and may not be distinct from *litae* (Snow 2004). We need more material from the Urabá and Darién to evaluate the diagnosability of these two subspecies; in any case, neither of them were previously known to occur above 900 m or anywhere in the C. Central (Hilty and Brown 1986).

Yellow-headed Manakin (*Xenopipo flavicapilla*). Our specimens extend the distribution of the Yellow-headed Manakin from the upper Porce valley in the municipality of Caldas, Antioquia (Peña and Weber 2000), to the northernmost cloud forests of the C. Central. This poorly known manakin was uncommon and perhaps seasonal at La Secreta (9) at 1850 m. We detected this species only through mist-netting, in January 2002 and December 2004; five individuals were captured, including two males and one female that were collected (ICN 34410, 35776, 35777). The Yellow-headed Manakin has proven to be more widespread than previously thought: recently, specimens have been taken in the Cordillera Occidental (Cuervo et al. 2003; DC, unpubl. data) and Ecuador (Ridgely and Greenfield 2001).

Slaty-backed Nightingale-Thrush (*Catharus fuscater*). Our specimens and observations extend the known range of the Slaty-backed Nightingale-Thrush from Otún-Quimbaya in Risaralda (Beltrán and Kattan 2001) to the northern end of the C. Central. This forest thrush was observed occasionally and heard (recorded) at Alto de Ventanas (18) by PCP and at San Sebastián de la Castellana (4) by G. Colorado (Ohio State University, pers. comm.). Other reports are from Represa Miraflores (Cuadros 1988) in Antioquia and Río Blanco in Caldas (AMC, DC, and S. Ocampo, pers. obs.). Two specimens are currently available: one collected in Río Blanco by A. López in 2003 (UC 323) and one from Alto de Ventanas (18) collected by PCP on 12 January 2006 (MUA 561). These specimens and the morphological accounts by Beltrán and Kattan (2001) firmly indicate the distinctiveness of the C. Central population in relation to any described subspecies.

Pale-eyed Thrush (*Turdus leucops*). Observations, tape recordings, and specimens of this species were gathered in nine localities (2, 10, 12, 14–16, 21, 23, 26) between 1425 and 2050 m. These records are the first for the northern end and eastern slope of the C. Central (Hilty and Brown 1986). Other recent records in this mountain range come from Represa Miraflores (Cuadros 1988) and Otún-Quimbaya (Londoño 2005). We collected seven males and two females (ICN 33978, 34445, 34626, 34550, 35869, 35789, 35164, 35165, 35785). All adult males had a tiny but conspicuous white patch on the chin that sometimes included the feathers at the base of the mandible sides. This plumage character has been overlooked historically in the literature. The white chin patch is ubiquitous in the Pale-eyed Thrush throughout its Andean range (all male specimens examined), but is more pronounced in the northern Antioquia populations.

Pale-vented Thrush (*Turdus obsoletus*). This thrush was observed infrequently in the subcanopy, forest gaps, and edges of the continuous forest and along the Riachón River in Bodega Vieja (14) between 1350 and 1525 m. We collected two specimens of the nominate subspecies (ICN 33973, 34635). These specimens, along with additional specimens from Valdivia, Antioquia (USNM 403251), and the middle Magdalena valley (Stiles et al. 1999), extend the distribution of this Central American taxon eastward from the Darién and Urabá. Another subspecies, *parambanus*, is known from the Chocó south of the San Juan River. Thus, the Pale-vented Thrush may be distributed continuously along the Chocó, but the scarcity of specimens does not allow us to determine whether the nominate form abuts *parambanus* or whether geographic variation is clinal.

Black-and-gold Tanager (*Bangsia melanochlamys*). This cloud-forest specialist was known previously from the Valdivia-Yarumal area on the west side of the upper Nechí valley, from specimens taken between 1914 and 1966 (Stiles 1998). We also found it on the east side of the Nechí. Two adult males in fresh plumage were collected (ICN 35151, 35152) and are indistinguishable from specimens from the Cordillera Occidental (ICN and LSUMZ specimens). We accumulated observations and recordings between 1425 and 1775 m at Alto Chaquiral (15), Reserva La Forzosa (16), Alto La Serrana (24), Camino Anorí-Santa Gertrudis (25), and Santa Gertrudis (26). Recent observations from the Valdivia-Yarumal area were made at Alto de Ventanas (18) by PCP, C. M. Mazo, G. Colorado, and J. Botero. Pairs or small flocks foraged in the subcanopy and midstory of mature pluvial premontane forests and medium-sized forest patches and edges. This species is apparently very localized in the region, as it appears to be absent from many other localities with suitable habitat.

Purplish-mantled Tanager (*Iridosornis porphyrocephalus*). This species was thought to be rare and probably extirpated from the C. Central in Antioquia (Hilty and Brown 1986). Instead, we found this species relatively common throughout the region (2, 3, 8–10, 13–16, 23–26), including areas on the western and eastern slopes of the C. Central and Represa Miraflores (Cuadros 1988). We collected one individual (ICN 34502) and frequently observed and heard (recorded) others. While some birds were observed alone, this species was more often seen or heard in pairs or groups of 4–6 birds that occasionally joined mixed-species flocks. Purplish-mantled Tanagers forage from the lower understory to the subcanopy and are found not only in mature forests but also thrive in highly disturbed patches, shrubby young forest, and forest edges. This species, found primarily in the Chocó foothills, is thus distributed continuously from western Ecuador to northern Colombia, including both slopes of the Cordillera Occidental and C. Central.

Multicolored Tanager (*Chlorochrysa nitidissima*). This Colombian endemic was previously recorded in the C. Central only on the western slope in the departments of Quindío and Risaralda (Hilty and Brown 1986) and on the eastern slope in Antioquia (USNM 436911-436914). Our records extend the distribution of this species to the far northern end of the C. Central. The Multicolored Tanager was uncommon to fairly common between 1475 and 2000 m at seven localities (9, 10, 12, 14–16, 18), where three males and one female were collected (ICN 34411, 34412, 35169, 35172). Individuals were invariably observed in mixed-species flocks in the canopy and often probing epiphytic vegetation, especially bromeliads.

Scarlet-and-white Tanager (*Chrysothlypis salmoni*). Our records represent a significant extension of the elevational distribution of this Chocó endemic. In the Chocó, the Scarlet-and-white Tanager ranges from northwestern Ecuador to the northern base of the C. Central in Remedios, Antioquia, and was reported previously up to 1100 m (Serna 1980, Hilty and Brown 1986). We collected six individuals (ICN 34519, 34524, 34526, 34554, 34552, 35916) and commonly found it by sight or sound (recorded) between 1425 and 1700 m at Bodega Vieja (14), Santa Gertrudis (26), and La Condena (23). Individuals often joined

mixed-species flocks in the upper understory and subcanopy of mature forest.

Capped Conebill (*Conirostrum albifrons*). This species is relatively common throughout the northern Andes, where three subspecies, readily diagnosable by male plumage, supposedly occur allopatrically in the three Colombian cordilleras (Meyer de Schauensee 1951, Hilty and Brown 1986). Males of the nominate subspecies of the Cordillera Oriental have white crowns. Males of *centralandium* of the C. Central also have white crowns, occasionally including scattered blue feathers, but their body plumage more closely resembles that of *atrocyaneum* of the Cordillera Occidental (Meyer de Schauensee 1946). In turn, adult males of *atrocyaneum* are readily diagnosed by their purplish blue crowns (Hellmayr 1935). Given this phenotypic variation, Meyer de Schauensee (1951) suggested that *centralandium* was phenotypically intermediate between *albifrons* and *atrocyaneum*. Interestingly, we have regularly seen white-crowned (*centralandium*) and blue-crowned (*atrocyaneum*) Capped Conebill males in the northern C. Central at localities on either side of the upper Porce valley, separated by less than 22 km (Fig. 1). Birds assignable to *centralandium* were found at San Sebastián de La Castellana (4) in the east, and birds assignable to *atrocyaneum* were found at Serranía de las Baldías (5) in the west. In fact, both male forms have been observed occasionally in the latter locality by DC, AMC, and J. González. There is a corresponding but overlooked series of *atrocyaneum* specimens from the C. Central collected at Santa Rosa de Osos and Belmira in northern Antioquia, west of the Porce valley (at MCSJ, MLS, and USNM), while the northernmost specimens of the expected subspecies *centralandium* are from Santa Elena, east of the Porce valley (Sclater and Salvin 1879, Meyer de Schauensee 1951). To determine the distribution of these two taxa in the northern C. Central and to assess if there are signs of intergradation or coexistence in syntopy, a new series of specimens must be taken from multiple locations on either side of the Porce.

Indigo Flowerpiercer (*Diglossa indigotica*). Ours are the first records of the Indigo Flowerpiercer for the C. Central. These new records suggest that this species may be distributed continuously across the very wet foothills of the Chocó to the northern slopes of the Andes. We observed solitary individuals foraging actively in the canopy and forest edges or joining mixed-species flocks at Alto El Chaquiral (15), Reserva La Forzosa (16), Alto La Serrana (24), and Camino Anorí-Santa Gertrudis (25). A juvenile male (ICN 34389) was collected on 2 April 2002 at Santa Gertrudis (26) by AMC, and a female with a brood patch and an enlarged ovum (8 mm diameter; MUA 558) was collected on 10 January 2006 at Alto Ventanas (18) by PCP. This species was generally uncommon between 1425 and 1700 m.

Crested Ant-Tanager (*Habia cristata*). This species was known only from both slopes of the Cordillera Occidental, from Cauca to Antioquia (Willis 1966, Isler and Isler 1999). We located an overlooked specimen from Medellín, collected by T. K. Salmon in the 1870s (AMNH 510509). In addition, recent observations and tape recordings from scattered localities along the C. Central, from Tolima to Antioquia, prove that this species also occurs in this cordillera. In May 1998 and July 2000, a group was observed and recorded in the dense understory of El Cardal (1) at 1900 m by AMC (Cuervo and Delgado 2001). Additional observations between 1200 and 2100 m were made in subsequent years by AMC and others at Vía Parque Angelópolis (3), Alto de Ventanas area (18), and Santa Gertrudis (26). In all cases, pairs and groups of 3–4 individuals were active and vocalizing in dense understory near streams, and some were seen eating the white berries of Araceae along the forest edge.

Scarlet-rumped Cacique (*Cacicus uropygialis*). We found this cacique at Bodega Vieja (14) and Santa Gertrudis (26) between 1450 and 1500 m, where groups were seldom seen and heard (recorded). Unfortunately, precise taxon designation (between *uropygialis* and *pacificus*) is still uncertain, because we have not yet been able to obtain specimens. However, *pacificus* (often placed in *C. microrhynchus*) is the more probable subspecies, as the birds we observed and recorded were more similar to *pacificus* of western Ecuador in size and song (recorded; Álvarez et al. 2007). Specimens with tissues are badly needed from this region and from northwestern Colombia to provide insight into the species limits of *uropygialis*, *pacificus*, and *microrhynchus* (Jaramillo and Burke 1999), currently treated as subspecies of the *Cacicus uropygialis* complex (Remsen et al. 2008).

DISCUSSION

The new distributional data presented here demonstrate that the avifauna of this region of South America has diverse biogeographical affinities heretofore not recognized. In particular, we found many occurrences of lineages characteristic of the pluvial Chocó foothills of the Cordillera Occidental in the northern C. Central. A similar pattern of high incidence of Chocó lineages ranging into central Colombia has been traditionally recognized for the lowland fauna, in the so-called "Chocó-Nechí-Magdalena" region (Hernández-Camacho et al. 1992). We suggest that this pattern is exhibited by the cloud forest taxa as well. Birds once thought to be restricted to the Chocó foothills also range from the northern base of the Andes to the inter-Andean Colombian valleys. This biogeographical pattern has not been fully appreciated due to a lack of fieldwork in this area. For instance, Carriker (1955) doubted that Remedios, in the middle Magdalena valley foothills, was the true type locality of the Scarlet-and-white Tanager; at the time, except for the Remedios specimen, this species was known mostly from the southern portion of the Chocó (Haffer 1967b). In addition, we discovered a trans-Andean population of a cis-Andean species, the Pavonine Cuckoo. This discovery could represent a relictual population that resulted from a former habitat connection across northern South America.

Although a formal biogeographic assessment has yet to be undertaken, our findings support Chapman's (1917:5) view of Colombia as being "at the crux of the problem of intercontinental relationships." Despite the scarcity of material available from the northern C. Central in the early twentieth century, Chapman (1917) proposed that the avifauna of this area may have mixed affinities with components of the Cordillera Occidental, Cordillera Oriental, and the upper Magdalena valley. This pattern has started to be corroborated from examination of the composition of this avifauna (Cuervo et al., in press) and through ecological (Kattan et al. 2004) and historical biogeographical studies (Pérez-Eman 2005, Cadena et al. 2007).

Our work also supports the hypothesis that a complex history of multiple events shaped the diversity and distribution of birds in northwestern South America (Haffer 1974). The avifauna of the northern C. Central is composed of taxa from the

northern Andes, the Central American mountains—notably Darién—and the Nechí and Magdalena foothills. We highlight the previously unrecognized importance of the Porce valley to the biogeographical processes of the C. Central. For example, the range of the Chestnut-capped Piha (*Lipaugus weberi*) is confined almost entirely within the northern foothills of this valley (Cuervo et al. 2001). In addition, this valley dissects highland populations (e.g., Capped Conebill) and connects lowland Nechí elements as far as the suburbs of Medellín (e.g., White-mantled Barbet). Moreover, the landscape along the elevational gradient of the northern slope in Anorí and Amalfi is still forested in some areas, thus encompassing cloud forests and lowland rainforests. This habitat continuum and constant cloud cover may facilitate the movement and elevational expansion of the ranges of lowland forest birds such as the Striped Woodhaunter and Green Manakin that reach the Andean forests of the northern C. Central.

Our findings indicate that studies addressing the evolutionary history of Neotropical birds in a broad sense should include vouchered samples from this region (Cadena et al. 2007). The patterns discussed above were revealed by examining a series of specimens that we collected from this region, coupled with complementary data. Several trans-Andean bird species have two named subspecies north and south of the San Juan River; for instance, the nominate subspecies of Pale-vented Thrush is replaced at some point along the upper San Juan River by the subspecies *parambanus*. Much of the geographic variation along the Chocó will prove to be clinal, as in the White-tipped Sicklebill (*Eutoxeres aquila*; Hinkelmann 1999), given the gradual north–south climatic variation of the region (Haffer 1967b) and the current scarcity of specimens from intervening areas. Similarly, it is unknown how dry enclaves such as the Dagua and Patía valleys structure populations in the Chocó foothills, except for a recent phylogeographic study of the Purplish-mantled Tanager that showed three phylogroups in accordance with these geographic features (López et al. 2007). Consequently, we think that more collecting in countries such as Colombia is critical to document avian biogeographical patterns and to address the underlying mechanisms of population differentiation in Neotropical birds.

Finally, our results show that the C. Central is not as well known as previously thought by ornithologists and highlight the importance of its northern sector for the conservation of this unique combination of bird lineages. Unlike the northern Cordillera Occidental, which is protected by Paramillo National Park, the northern C. Central lacks any important protected areas. A significant contribution to its conservation would be the protection of continuous forests along the elevational gradient. An opportunity exists to extend the Bajo Cauca-Nechí reserve that protects forests below 800 m to encompass the continuum of cloud forests up to 1750 m in Anorí, including the key localities of Santa Gertrudis (26) and Alto La Serrana (24). Other key large forests in need of protection are Bodega Vieja (14) and the Remedios-Segovia low pass to Serranía de San Lucas in northeastern Antioquia. We view with optimism the reserves created during the course of our studies in the region, such as Reserva La Forzosa (16), the Arrierito Antioqueño Reserve at Alto El Chaquiral (15), and the recently established Caracolí-Guayabito Reserve protecting Bosque Guayabito (10).

ACKNOWLEDGMENTS

We received the kindest hospitality and help from the local people of Anorí and Amalfi despite their living under paramilitary-guerrilla repression and on the edge of poverty. Our studies in the region have been funded by CORANTIOQUIA, the NSF-CREST program at University of Puerto Rico (grant to C. Restrepo and AMC), Sigma Xi, Instituto Alexander von Humboldt, Organization for Tropical Studies (Glaxo Fund 502), Neotropical Bird Club, Asociación Calidris, and Barrick Museum of Natural History. Field equipment was donated by Idea Wild, Optics for the Tropics, and Cornell Laboratory of Ornithology. CORANTIOQUIA granted research permits and provided logistical support. We are indebted to J. Toro for encouraging us to study this region and sharing his observations and to F. G. Stiles for his advice. For dedicated field assistance, we are very grateful to many students and colleagues in Colombia. Museums mentioned by acronym in the text are as follows: AMNH: American Museum of Natural History, New York; ANSP: Academy of Natural Sciences of Philadelphia, Philadelphia; FMNH: Field Museum of Natural History, Chicago; IAvH: Instituto Alexander von Humboldt, Villa de Leyva, Colombia; ICN: Instituto de Ciencias Naturales, Bogotá; LSUMZ: Louisiana State University Museum of Natural Science, Baton Rouge; MCSJ: Museo Colegio San José de la Salle, Medellín; MUA: Museo Universidad de Antioquia, Medellín; UC: Museo Universidad de Caldas, Manizales; USNM: National Museum of Natural History, Washington; WFVZ: Western Foundation of Vertebrate Zoology, Camarillo. For facilitating visits to museums by AMC, we thank Hno. L. A. Zamudio (MCSJ), P. Sweet and J. Tello (AMNH), S. Hackett and J. Bates (FMNH), and F. G. Stiles (ICN). M. Hart (AMNH), N. Rice (ANSP), G. Graves (USNM), R. Corado (WFVZ), and A. Umaña and M. Álvarez (IAvH) sent us specimen data upon our request. W. H. Weber promptly sent us difficult-to-locate literature from his library. For sharing information and for discussion, we thank C. M. Mazo, C. A. Delgado, G. Colorado, B. Freeman, R. Gaviria, N. Krabbe, D. Lane, A. López, J. Ochoa, M. Robbins, and T. Schulenberg. The manuscript benefited from comments by R. T. Brumfield, J. V. Remsen, E. P. Derryberry, G. Rompré, M. B. Robbins, and D. S. Dobkin.

LITERATURE CITED

Albert, J. S., N. R. Lovejoy, and W. G. R. Crampton. 2006. Miocene tectonism and the separation of cis- and trans-Andean river basins: evidence from Neotropical fishes. Journal of South American Earth Sciences 21:14–27.

Álvarez, M., V. Caro, O. Laverde, and A. M. Cuervo. 2007. Guía sonora de las aves de los Andes colombianos/A guide to the bird sounds of the Colombian Andes. Banco de Sonidos Animales, Instituto Alexander von Humboldt and Cornell Laboratory of Ornithology, Ithaca, NY.

Barker, F. K. 2007. Avifaunal interchange across the Panamanian isthmus: insights from *Campylorhynchus* wrens. Biological Journal of the Linnean Society 90:687–702.

BELTRÁN, W., AND G. KATTAN. 2001. First record of the Slaty-backed Nightingale-Thrush in the central Andes of Colombia, with notes on its ecology and geographical variation. Wilson Bulletin 113:134–139.

BLAKE, E. R. 1953. A Colombian race of *Tinamus osgoodi*. Fieldiana Zoology 34:199–200.

BROOKE, M. 2004. *Oxyruncus*, Family Cotingidae (Cotingas), p. 73. *In* J. del Hoyo, A. Elliot, and D. Christie [EDS.], Handbook of the birds of the world. Vol. 9. Cotingas to pipits and wagtails. Lynx Edicions, Barcelona.

BRUMFIELD, R. T., AND A. P. CAPPARELLA. 1996. Historical diversification of birds in northwestern South America: a molecular perspective on the role of vicariant events. Evolution 50:1607–1624.

BRUMFIELD, R. T., AND O. MAILLARD. 2007. Birds of the central Río Paracti valley, a humid montane forest in departamento Cochabamba, Bolivia. Ornitología Neotropical 18:321–337.

CADENA, C. D., J. KLICKA, AND R. E. RICKLEFS. 2007. Evolutionary differentiation in the Neotropical montane region: molecular phylogenetics and phylogeography of *Buarremon* brush-finches (Aves, Emberizidae). Molecular Phylogenetics and Evolution 44:993–1016.

CARRIKER, M. A., JR. 1955. Notes on the occurrence and distribution of certain species of Colombian birds. Novedades Colombianas 1:48–64.

CHAPMAN, F. M. 1917. The distribution of bird-life in Colombia: a contribution to a biological survey of South America. Bulletin of the American Museum of Natural History 36.

CHAPMAN, F. M. 1939. The riddle of *Oxyruncus*. American Museum Novitates 1047:1–4.

COATES, A. G., L. S. COLLINS, M. P. AUBRY, AND W. A. BERGGREN. 2004. The geology of the Darien, Panama, and the late Miocene-Pliocene collision of the Panama arc with northwestern South America. Geological Society of America Bulletin 116:1327–1344.

CRACRAFT, J. 1985. Historical biogeography and patterns of differentiation within the South American avifauna: areas of endemism. Ornithological Monographs 36:49–84.

CUADROS, T. 1988. Aspectos ecológicos de la comunidad de aves en un bosque nativo en la Cordillera Central en Antioquia (Colombia). Hornero 13:8–20.

CUERVO, A. M., C. D. CADENA, N. KRABBE, AND L. M. RENJIFO. 2005. *Scytalopus stilesi*, a new species of tapaculo (Rhinocryptidae) from the Cordillera Central of Colombia. Auk 122:445–463.

CUERVO, A. M., AND C. A. DELGADO. 2001. Adiciones a la avifauna del Valle de Aburrá y comentarios sobre la investigación ornitológica local. Boletín Sociedad Antioqueña de Ornitología 12:52–65.

CUERVO, A. M., P. C. PULGARÍN, D. CALDERÓN, J. M. OCHOA, C. A. DELGADO, J. A. PALACIO, J. M. BOTERO, AND W. A. MÚNERA. In press. The cloud forest avifauna of the northern Cordillera Central of the Andes, Colombia. Ornitología Neotropical 19.

CUERVO, A. M., AND C. RESTREPO. 2007. Assemblage and population-level consequences of forest fragmentation on bilateral asymmetry in tropical montane birds. Biological Journal of the Linnean Society 92:119–133.

CUERVO, A. M., P. SALAMAN, T. DONEGAN, AND J. M. OCHOA. 2001. A new species of piha (Cotingidae: *Lipaugus*) from the Cordillera Central of Colombia. Ibis 143:353–368.

CUERVO, A. M., F. G. STILES, C. D. CADENA, J. L. TORO, AND G. A. LONDOÑO. 2003. New and noteworthy bird records from the northern sector of the western Andes of Colombia. Bulletin of the British Ornithologists' Club 123:7–24.

DELGADO, C. A. 2002. Observations of the Ochre-breasted (*Grallaricula flavirostris*) and Slate-crowned (*G. nana*) Antpittas in Colombia. Ornitología Neotropical 13:423–425.

DWIGHT, J., AND L. GRISCOM. 1924. Descriptions of new birds from Costa Rica. American Museum Novitates 142:1–5.

ESPINAL, L. S. 1992. Geografía ecológica de Antioquia: Zonas de Vida. Editorial Léalon, Medellín, Colombia.

FITZPATRICK, J. W., AND J. P. O'NEILL. 1986. *Otus petersoni*, a new screech-owl from the eastern Andes, with systematic notes on *O. colombianus* and *O. ingens*. Wilson Bulletin 98:1–14.

GRAVES, G. R. 1988. Geographic variation in the White-mantled Barbet (*Capito hypoleucus*) of Colombia (Aves: Capitonidae). Proceedings of the Biological Society of Washington 99:61–64.

GRAVES, G. R. 1997. Colorimetric and morphometric gradients in Colombian populations of Dusky Antbirds (*Cercomacra tyrannina*), with a description of a new species, *Cercomacra parkeri*. Ornithological Monographs 48:21–35.

HAFFER, J. 1967a. Speciation in Colombian forest birds west of the Andes. American Museum Novitates 2294:1–57.

HAFFER, J. 1967b. On birds from the northern Chocó region, NW-Colombia. Veröffentlichungen der Zoologische Staatssammlung München 11:123–149.

HAFFER, J. 1974. Avian speciation in tropical South America. Nuttall Ornithological Club, Cambridge, MA.

HELLMAYR, C. E. 1935. Catalogue of birds of the Americas. Volume 13, Part 8. Field Museum of Natural History, Zoological Series, Chicago.

HERNÁNDEZ-CAMACHO, J., A. HURTADO-GUERRA, R. ORTIZ-QUIJANO, AND T. WALSCHBURGER. 1992. Unidades biogeográficas de Colombia, p. 105–151. *In* G. Halffter [ED.], La diversidad biológica de Iberoamérica. Acta Zoológica Mexicana, Instituto de Ecología, Xalapa, México.

HEYNEN, I. 1999. *Eriocnemis derbyi*, p. 639. *In* J. del Hoyo, A. Elliot, and J. Sargatal [EDS.], Handbook of the birds of the world. Vol. 5. Barn-owls to hummingbirds. Lynx Edicions, Barcelona.

HILTY, S. L., AND W. L. BROWN. 1986. A guide to the birds of Colombia. Princeton University Press, Princeton, NJ.

HINKELMANN, C. 1999. *Eutoxeres aquila*, p. 577. *In* J. del Hoyo, A. Elliot, and J. Sargatal [EDS.], Handbook of the birds of the world. Vol. 5. Barn-owls to hummingbirds. Lynx Edicions, Barcelona.

HOOGHIEMSTRA, H., AND T. VAN DER HAMMEN. 2004. Quaternary ice-age dynamics in the Colombian Andes: developing an understanding of our legacy. Philosophical Transactions of the Royal Society of London Series B 359:173–181.

INSTITUTO GEOGRÁFICO AGUSTÍN CODAZZI. 2003. Atlas de Colombia. Instituto Geográfico Agustín Codazzi and Imprenta Nacional de Colombia, Bogotá, Colombia.

ISLER, M. L., AND P. R. ISLER. 1999. The tanagers: natural history, distribution, and identification. Smithsonian Institution Press, Washington, DC.

JARAMILLO, A., AND P. BURKE. 1999. New World blackbirds: the icterids. Princeton University Press, Princeton, NJ.

KATTAN, G. H., P. FRANCO, V. ROJAS, AND G. MORALES. 2004. Biological diversification in a complex region: a spatial analysis of faunistic diversity and biogeography of the Andes of Colombia. Journal of Biogeography 31:1829–1839.

KRABBE, N., AND T. S. SCHULENBERG. 2003. Family Formicariidae (ground-antbirds), p. 682–731. *In* J. del Hoyo, A. Elliot, and D. A. Christie [EDS.], Handbook of the birds of the world. Vol. 8. Broadbills to tapaculos. Lynx Edicions, Barcelona.

LAVERDE, O., C. MÚNERA, AND F. G. STILES. 2005. Nuevos registros e inventario de la avifauna de la Serranía de las Quinchas, un área importante para la conservación de las aves (AICA) en Colombia. Caldasia 27:247–265.

LONDOÑO, G. A. 2005. A description of the nest and eggs of the Pale-eyed Thrush (*Platycichla leucops*), with notes on incubation behavior. Wilson Bulletin 117:394–399.

López, D., R. Sedano, J. D. Palacio, and H. Cárdenas. 2007. Estudio filogeográfico de *Iridosornis porphyrocephala*, usando marcadores moleculares para la conservación de una especie amenazada y endémica de Colombia y Ecuador. Memorias II Congreso de Ornitología Colombiana. Asociación Colombiana de Ornitología, Bogotá, Colombia.

Marks, B. D., S. J. Hackett, and A. P. Capparella. 2002. Historical relationships among Neotropical lowland forest areas of endemism as determined by mitochondrial DNA sequence variation within the Wedge-billed Woodcreeper (Aves: Dendrocolaptidae: *Glyphorynchus spirurus*). Molecular Phylogenetics and Evolution 24:153–167.

McCourt, W. J., J. A. Aspden, and M. Brook. 1984. New geological and geochronological data from the Colombian Andes: continental growth by multiple accretion. Journal of the Geological Society 141:831–845.

Meyer de Schauensee, R. 1945. Notes on Colombian antbirds, ovenbirds, and woodhewers, with the description of a new form from Peru. Notulae Naturae 153.

Meyer de Schauensee, R. 1946. Colombian zoological survey. Part IV.*—Further notes on Colombian birds, with the description of new forms. Notulae Naturae 167.

Meyer de Schauensee, R. 1951. The birds of the Republic of Colombia (Alaudidae–Fringillidae). Caldasia 5:873–1112.

Meyer de Schauensee, R. 1960. A new race of *Hyloctistes subulatus* (Furnariidae) from Colombia. Notulae Naturae 332.

Múnera, C., and O. Laverde. 2002. *Capito hypoleucus*, p. 275–278. *In* L. M. Renjifo, A. M. Franco, J. D. Amaya, G. H. Kattan, and B. López-Lanús [eds.], Libro Rojo de Aves de Colombia. Instituto Alexander von Humboldt, Ministerio del Medio Ambiente, Bogotá.

Nores, M. 2004. The implications of Tertiary and Quaternary sea level rise events for avian distribution patterns in the lowlands of northern South America. Global Ecology and Biogeography 13:149–161.

Peña, M. 1998. La hormiguera *Grallaricula flavirostris* en el municipio de San Carlos. Cucarachero 38:9.

Peña, M., and W. H. Weber. 2000. Reencuentro del Saltarín Cabecidorado (*Chloropipo flavicapilla*) en Antioquia. Boletín Sociedad Antioqueña de Ornitología 11:46–48.

Pérez-Eman, J. L. 2005. Molecular phylogenetics and biogeography of the Neotropical redstarts (*Myioborus*; Aves, Parulinae). Molecular Phylogenetics and Evolution 37:511–528.

Phelps, W. H., and W. H. Phelps Jr. 1952. Nine new birds from the Perija mountains and eleven extensions of ranges to Venezuela. Proceedings of the Biological Society of Washington 65:89–108.

Rasmussen, P. C., and N. J. Collar. 2002. Family Bucconidae (Puffbirds), p. 102–138. *In* J. del Hoyo, A. Elliot, and J. Sargatal [eds.], Handbook of the birds of the world. Vol. 7. Jacamars to woodpeckers. Lynx Edicions, Barcelona.

Remsen, J. V., Jr. 2003. Family Furnariidae (Ovenbirds), p. 162–357. *In* J. del Hoyo, A. Elliot, and D. A. Christie [eds.], Handbook of the Birds of the World. Vol. 8. Broadbills to tapaculos. Lynx Edicions, Barcelona.

Remsen, J. V., Jr., C. D. Cadena, A. Jaramillo, M. Nores, J. F. Pacheco, M. B. Robbins, T. S. Schulenberg, F. G. Stiles, D. F. Stotz, and K. J. Zimmer [online]. 2008. A classification of the bird species of South America. The American Ornithologists' Union, Washington, DC. <http://www.aou.org/checklist/south.php3> (10 May 2008).

Renjifo, L. M. 1999. Composition changes in a subandean avifauna after long-term forest fragmentation. Conservation Biology 13:1124–1139.

Ridgely, R. S., and P. J. Greenfield. 2001. The birds of Ecuador: status, distribution, and taxonomy. Cornell University Press, Ithaca, NY.

Robbins, M. B., and R. S. Ridgely. 1990. The avifauna of an upper tropical cloud forest in southwestern Ecuador. Proceedings of the Academy of Natural Sciences of Philadelphia 142:59–71.

Robbins, M. B., R. S. Ridgely, T. S. Schulenberg, and F. B. Gill. 1987. The avifauna of the Cordillera de Cutucú, Ecuador, with comparisons to other Andean localities. Proceedings of the Academy of Natural Sciences of Philadelphia 139:243–259.

Rompré, G., W. D. Robinson, A. Desrochers, and G. Angehr. 2007. Environmental correlates of avian diversity in lowland Panama rain forests. Journal of Biogeography 34:802–815.

Salaman, P., T. Donegan, and A. M. Cuervo. 2002. New distributional bird records from Serrania de San Lucas and adjacent Central Cordillera of Colombia. Bulletin of the British Ornithologists' Club 122:285–303.

Sclater, P. L., and O. Salvin. 1879. On the birds collected by the late Mr. T. K. Salmon in the State of Antioquia, United States of Colombia. Proceedings of the Zoological Society of London 1879:486–550.

Serna, M. A. 1980. Catálogo de aves del Museo de Historia Natural, Colegio San José. Colegio San José de la Salle, Medellín, Colombia.

Snow, D. W. 2004. Family Pipridae (manakins), p. 110–169. *In* J. del Hoyo, A. Elliot, and D. Christie [eds.], Handbook of the birds of the world. Vol. 9. Cotingas to pipits and wagtails. Lynx Edicions, Barcelona.

Sociedad Antioqueña de Ornitología. 2004. Aves del Valle de Aburrá. 2nd ed. Área Metropolitana and Editorial Colina, Medellín, Colombia.

Stiles, F. G. 1993. Buffón: Su época, su obra y el desarrollo de la ornitología en Colombia, p. 10–19. *In* F. G. Stiles and A. M. Escallón [eds.], Aves de Colombia: Grabados iluminados del XVIII. Villegas Editores, Bogotá.

Stiles, F. G. 1998. Notes on the biology of two threatened species of *Bangsia* tanagers in northwestern Colombia. Bulletin of the British Ornithologists' Club 118:25–31.

Stiles, F. G., L. Rosselli, and C. I. Bohórquez. 1999. New and noteworthy records of birds from the middle Magdalena valley of Colombia. Bulletin of the British Ornithologists' Club 119:113–129.

Willis, E. O. 1966. Ecology and behavior of the Crested Ant-Tanager. Condor 68:56–71.

Zimmer, K. J., and P. R. Isler. 2003. Family Thamnophilidae (typical antbirds), p. 448–681. *In* J. del Hoyo, A. Elliot, and D. A. Christie [eds.], Handbook of the birds of the world. Vol. 8. Broadbills to tapaculos. Lynx Edicions, Barcelona.