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New records and confirmation of the presence of three species of primates (Mammalia, Primates) in southwestern Colombia

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Abstract
Aotus lemurinus I. Geoffroy, 1843, *Cebus albifrons* (Humboldt, 1812), and *Sapajus apella* (Linnaeus, 1758) are widely distributed primates in Colombia. Despite this, there are gaps in the occurrence of these species in the southwestern part of the country. Through the collection of specimen remains, molecular analyses and review of museum specimens, we reported new records for these species in the Department of Nariño, Colombia, expanding their distribution range. Finally, we highlight some important notes for the conservation of these species.

Keywords
Aotus, *Cebus*, Colombian Night Monkey, Humboldt's White-fronted Capuchin, Large-headed Capuchin, *Sapajus*.

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Introduction

In Colombia, five species of capuchin monkeys of the genus *Cebus* Erxleben, 1777 and one species of the genus *Sapajus* Kerr, 1792 are currently recognized: *C. albifrons* (Humboldt, 1812), *C. capucinus* (Linnaeus, 1758), *C. leucocephalus* Gray, 1865, *C. versicolor* Pucheran, 1845, *C. malitiosus* Elliot, 1909, and *S. apella* (Linnaeus, 1758) (Cuervo Díaz et al. 1986; Alberico et al. 2000; Defler 2003; Boubli et al. 2012; Lynch Alfaro et al. 2012a). Of these species, *C. albifrons* and *S. apella* have a wide distribution in Colombia. *C. albifrons* is distributed from the Cordillera Oriental, east to the Amazonia and Orinoco (south of the Vichada River and west of the Orinoco River), in an elevational range from 0 to 2,000 m a.s.l., and *S. apella* is found in the Amazonia

and Eastern Llanos, with some populations on the flanks of the southern part of Cordillera Oriental of Colombia (Cuervo-Díaz et al. 1986; Alberico et al. 2000; Defler 2010; Ramírez-Chaves et al. 2010; Boubli et al. 2012; Lynch Alfaro et al. 2012b). It should be noted that the recognition of these two genera and the taxonomy of *C. albifrons* have been widely debated, presenting multiple changes in their systematics (Silva 2001; Grooves 2001, 2005; Boubli et al. 2012; Lynch-Alfaro et al. 2012a, 2012b; Ruiz-Garcia et al. 2012; Garbino 2015; Lima et al. 2017; Martins-Junior et al. 2018; Ruiz-Garcia et al. 2018). In addition, *S. macrocephalus* (Spix, 1823) has been listed as the only species of *Sapajus* distributed in Colombia (de la Torre et al. 2018), although the taxonomy of the genus in Colombia has not been reviewed.

For the Department of Nariño, in southwestern Colombia, the presence of *C. albifrons, C. capucinus*, and *S. apella* (as *Cebus*/*Sapajus apella*), has been mentioned in the literature (Cadena et al. 1998; Alberico et al. 2000; Ramírez-Chaves and Noguera-Urbano 2010). Defler (2003) suggested that *C. albifrons* and *S. apella* could occur in the Amazonian plain of the department, but there are no voucher specimens to corroborate this assumption. Furthermore, despite the wide distribution of *C. albifrons* and *S. apella* in Colombia, there are still many poorly known areas where their presence is probable but has not been confirmed (Hernández-Camacho and Cooper 1976).

For the night monkey genus *Aotus* Illiger, 1811, eight species have been recognized in the national territory (Defler 2003; Defler and Bueno 2007; Maldonado and Peck 2014): *A. brumbacki* Hershkovitz, 1983, *A. griseimembra* Elliot, 1912, *A. lemurinus* I. Geoffroy, 1843, *A. jorgehernandezi* Defler & Bueno, 2007, *A. trivirgatus* (Humboldt, 1811), *A. vociferans* (Spix, 1823), *A. zonalis* Goldman, 1914, and *A. nancymaae* Hershkovitz, 1983. The genus is known throughout Colombia, except in the north-eastern La Guajira desert, in areas above 3,200 m a.s.l., in Vichada north of the Tomo River, in eastern Casanare and Arauca, and in some mountainous and shrubby areas of Guainía, Vaupés and Guaviare departments (Hernández-Camacho and Cooper 1976; Defler 2003). Currently, there are no vouchered records for the Department of Nariño either (Defler 2003).

Given the circumstances mentioned above, this paper aims to corroborate the presence of *A. lemurinus*, *C. albifrons* and *S. apella* in the Eastern Andes of Department of Nariño, an area poorly studied in terms of biodiversity and under increasing pressure due to the agricultural frontier expansion. We also provide information on the presence of other primates in this department.

Methods

The records come from the village of Monopamba, municipality of Puerres, Department of Nariño, southwestern Colombia (Fig. 1). The municipality of Puerres is located in the eastern mountain range (Cordillera Oriental) of Nariño. Most of the territory in the area is mountainous, however there are flat areas located in the Sucio River and Alisales valleys. The most important economic activities are agriculture, livestock and trade. The average annual temperature is 13 °C and the average annual rainfall is 1,060 mm. The municipal area is 359 km^2 and borders Funes to the north, Funes and the Department of Putumayo to the east, the municipalities of Córdoba to the south, and Córdoba and Contadero to the west. The municipality includes the town of San Mateo and the police stations of El Páramo, Muicira and Monopamba (IGAC 1996).

In Monopamba, three locations were visited: the town of Monopamba (1,721 m a.s.l.), the village of El Verde, near Alisales River (1,873–1,931 m a.s.l.), and the village of El Verde, Playas (2,117 m a.s.l.). Monopamba is a compound word from Spanish and Quichua that means "plain of the monkeys" (pamba is a word that comes from Pampa = plain) (Albor 1972), a fact that led us to investigate the current or historical presence of these organisms in the locality in question and surrounding sectors.

The information comes from a rapid field assessment conducted in April 2009 in three locations in the municipality of Puerres (Monopamba, El Verde, and Playas), Department of Nariño. There, we conducted informal interviews with local inhabitants, including hunters, using illustrations of Neotropical mammals (Eisenberg 1989; Emmons and Feer 1999) likely to be present in the area. In addition, we searched for traces and indirect evidence of the presence of these organisms (i.e., skins and skeletal remains), in order to verify the identity of the records.

The skulls and other samples are deposited in the mammal collection of the Universidad Distrital Francisco José de Caldas Museum (MUD), Bogotá. The identification was confirmed after comparison with reference specimens deposited in the collection of the Natural History Museum of the Universidad del Cauca (MHNUC), Popayán, and the Natural History Museum of the Universidad de Caldas (MHN-UCa). We also reviewed specimens of the genus *Aotus* from Ecuador deposited in the collections of the Museo Escuela Politécnica Nacional (MEPN) and the Pontificia Universidad Católica de Ecuador (QCAZ).

Molecular analysis was carried out with tissue samples of a specimen of *Aotus* from the Department of Nariño and two specimens of *A. lemurinus* from the Department of Caldas, deposited in the MHN-UCa (MHN-UCa 1503–1504). DNA extraction was performed using the DNeasy Blood and Tissue kit (Qiagen), following the manufacturer's protocol. Confirmation of identity and phylogenetic analysis of the *Aotus* specimen was examined through the amplification of the mitochondrial cytochrome *b* (cyt *b*) gene using the primers Prim_ND6L1 (5′-CAACCCACAGCACCACTA-3′) and Prim_ProH1 (5′-TAGAATTTCAGCTTGGGTT-3′) primers (Hoyos et al. 2016). Following the conditions; initial denaturation step of 2 min at 94 °C, 34 cycles of 30 s at 94 °C, 30 s at 50 °C, and 2 min at 72 °C followed

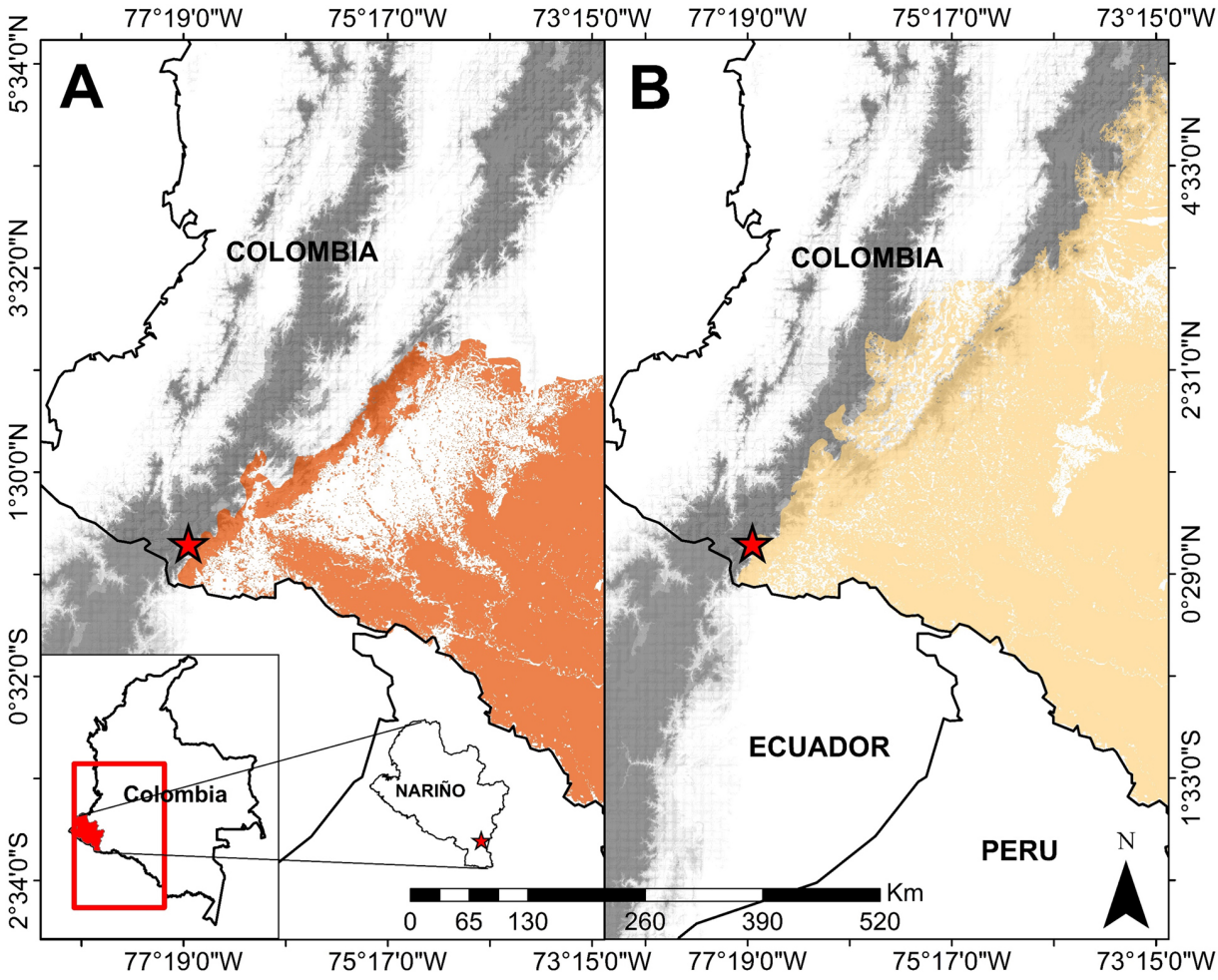

Figure 1. The distribution area of **A**. *Cebus albifrons* and **B**. *Sapajus apella* in Colombia. The red star shows the new locality for both species in Department of Nariño, village of Monopamba. Shapes are based on Link (2018) and Carretero-Pinzón and Stevenson (2018), respectively.

by a final extension at 72 °C for 10 min. The PCR products were purified with the QIAquick PCR purification kit (Qiagen) and sent to Macrogen Inc (South Korea) for DNA sequencing. The sequences were analyzed using Basic Local Alignment Search Tool (BLAST; Madden 2013) to determine the closest similarities with other *Aotus* species. Sequences were aligned using the algorithms present in CLUSTALW (Thompson et al. 1994). Phylogenetic analyses were carried out using maximum likelihood (ML) and Neighbor-Joining (NJ) algorithms and bootstrap support was estimated using 1000 pseudoreplications. Both alignment and phylogenetic analyses were carried out in Mega X (Kumar et al. 2018). The following sequences of *Aotus* available from GenBank were included: FJ785421, DQ098869, HQ005508, HQ005507, DQ098873, DQ098874, DQ098863, DQ098864, HQ005495, HQ005496, HQ644333 (see Table 1).

Results

***Cebus albifrons* (Humboldt, 1812)**
Figures 1A, 2A

New record. COLOMBIA • 1 skull; Department of Nariño, Municipality of Puerres, El Verde village; 00° 46′N, 077°17′W; 1,931 m a.s.l.; Apr. 2009; H. E. Ramírez-Chaves leg; donated by local hunters; MUD 763.

Identification. The measurements obtained from the skull (Fig. 2A) are: greatest length of the skull: 98.27 mm; height of the skull (from the basisphenoids to the top of the skull): 48.01 mm; width of the skull: 54.75 mm; greatest distance across the upper molars: 31.62 mm; length of the upper dental series (from canine to third molar): 28.5 mm estimated using the alveoli of the last molar, which had fallen; length of the lower dental series: 33.61 mm; length of the mandible: 69.95 mm; a zygomatic arch was broken, the back of the skull is broken; the sagittal crest is not very developed. The skull (MUD 763) was identified following the cranial descriptions posed for the species by Hershkovitz (1949). It has a poorly developed sagittal crest and smaller cranial measurements than in *S. apella*.

***Sapajus apella* (Linnaeus, 1758)**
Figures 1B, 2B

New record. COLOMBIA • 1 skull; Department of Nariño, Municipality of Puerres, El Verde village; 00° 46′N, 077°17′W; 1,931 m a.s.l.; Apr. 2009; H. E. Ramírez-Chaves leg; donated by local hunters; MUD 762.

Table 1. List of sequenced specimens of *Aotus* included in our cytochrome *b* analyses.

Taxon	Genbank Accesion	Locality	Source
Aotus cf. *lemurinus*	MT253565	Colombia: Nariño, Puerres	This study; MUD 764
Aotus lemurinus	MT232916	Colombia: Caldas, Manizales	This study; MHN-UCa 1503
Aotus lemurinus	MT232915	Colombia: Caldas, Manizales	This study; MHN-UCa 1504
Aotus lemurinus	FJ785421	No locality provided	Hodgson et al. 2009
Aotus lemurinus/griseimembra	DQ098869	Colombia: Sucre, San Marcos	Ribeiro et al. 2005
Aotus nancymaae	HQ005507	Colombia: Amazonas, Leticia	Menezes et al. 2010
Aotus nancymaae	HQ005508	Colombia: Amazonas, Leticia	Menezes et al. 2010
Aotus infulatus	HQ005496	Brazil: Pará, Ilha do Marajó	Menezes et al. 2010
Aotus infulatus	HQ005495	Brazil: Maranhão, São Miguel	Menezes et al. 2010
Aotus azarae	DQ098864	Brazil: Rondônia, Samuel Dam reservoir	Ribeiro et al. 2005
Aotus azarae	DQ098863	Brazil: Rondônia, Samuel Dam reservoir	Ribeiro et al. 2005
Aotus nigriceps	HQ005498	Brazil: São Paulo, São Paulo Zoo	Menezes et al. 2010
Aotus trivirgatus	DQ098874	Brazil: Amazonas, North of the Rio Negro	Ribeiro et al. 2005
Aotus trivirgatus	DQ098873	Brazil: Amazonas, North of the Rio Negro	Ribeiro et al. 2005
Alouatta seniculus	HQ644333	Ecuador: Orellana, Yasuní Biosphere Reserve	Di Fiore et al. 2015

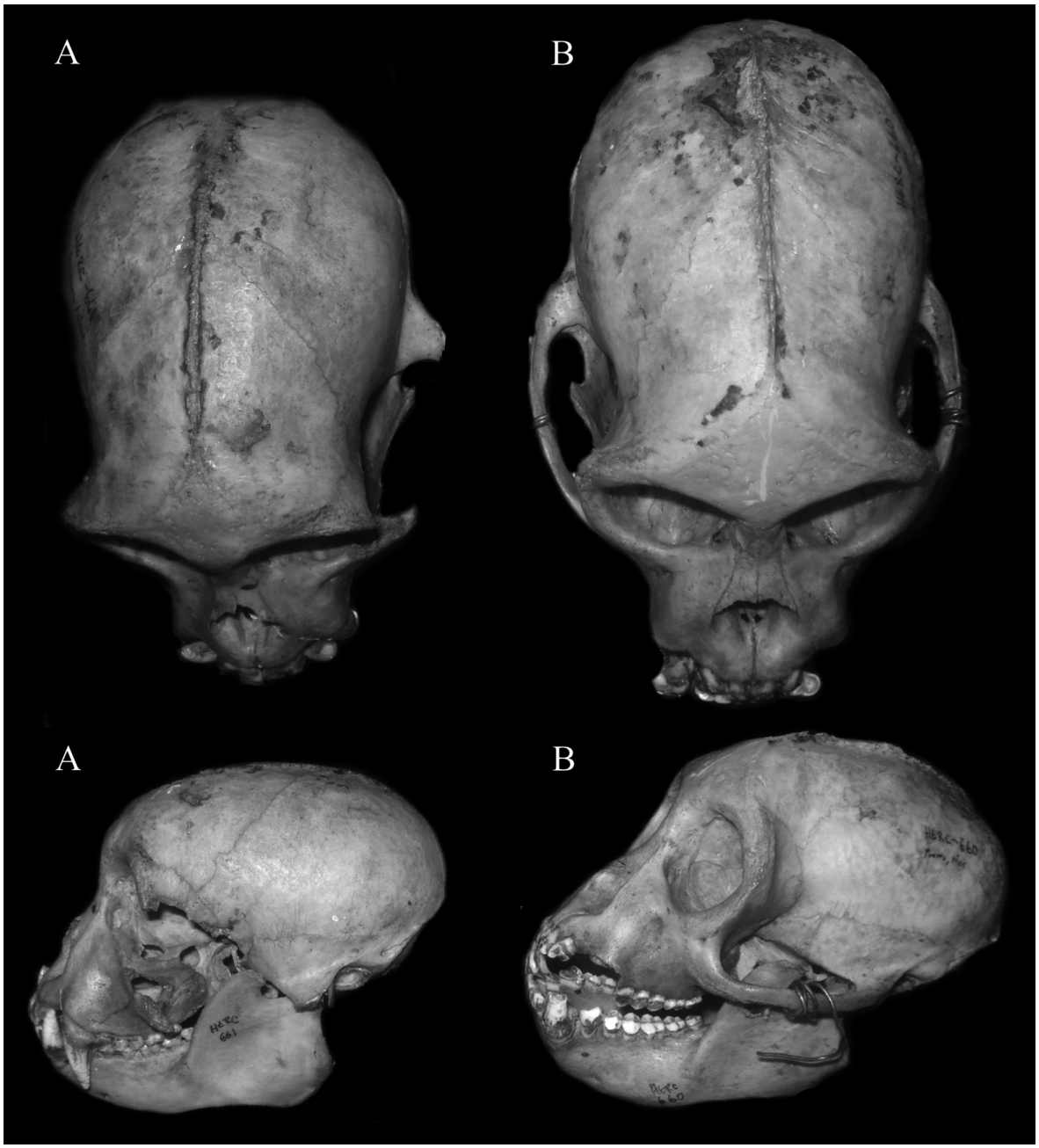

Figure 2. Dorsal and lateral views of the skulls of **A.** *Cebus albifrons* (MUD 763; greatest length of the skull: 98.27 mm), and **B**. *Sapajus apella* (MUD 762; greatest length of the skull: 108.11 mm).

Identification. The cranial measurements obtained were: greatest length of the skull: 108.11 mm; height of the skull: 50.45 mm; width of the skull: 55.58 mm; zygomatic width: 71.12 mm; width across the orbits: 55.15 mm; distance across the upper molars: 32.1 mm; length of the lower dental series: 39.57 mm; length of the jaw: 74.05 mm. The skull (MUD 762; Fig. 2B) was identified based on its cranial measurements, which are shared with those described for *S. apella* by Hershkovitz (1949) and Lynch-Alfaro et al. (2012a). The skull had a marked sagittal crest, and was larger, more robust, than those of *C. albifrons*.

Aotus lemurinus I. Geoffroy, 1843

Figures 3, 4

New record. COLOMBIA • 1 juvenile ♀; Department of Nariño, Municipality of Puerres, El Verde village; 00°46′N, 077°17′W; 1,931 m a.s.l.; Apr. 2009; H. E. Ramírez-Chaves leg.; found dead and preserved as skin, skull and skeleton; GenBank: MT253565; voucher: MUD 764.

Identification. The specimen has the following characteristics: long dorsal coat (individual hairs approximately 38 mm long); temporal and frontal stripes visible and conspicuous, black. Malar stripe not apparent. Chest and abdomen yellow orange, back with a wider, opaquer middorsal band extending from the mantle to the tail, with reddish or yellowish marbling; hind legs yellowish grey, even with the sides. Distal part of tail black reaching almost 60% of tail length. Through interviews with the local inhabitants, we obtained information about the presence of a small, large-eyed monkey that lived in the forest areas of the region in small groups and was occasionally captured; this description matched with monkeys of the genus *Aotus*. The search for traces and information about the mentioned animal led us to locate a dead specimen that was kept as a pet and that had been captured only a week before in a forest near Afiladores Stream in the village of El Verde. The specimen had been recently buried, so we were able to recover the body (including the skin) and to collect tissue samples.

The coloration of this specimen coincides with the observed in other representatives of *A. lemurinus* from

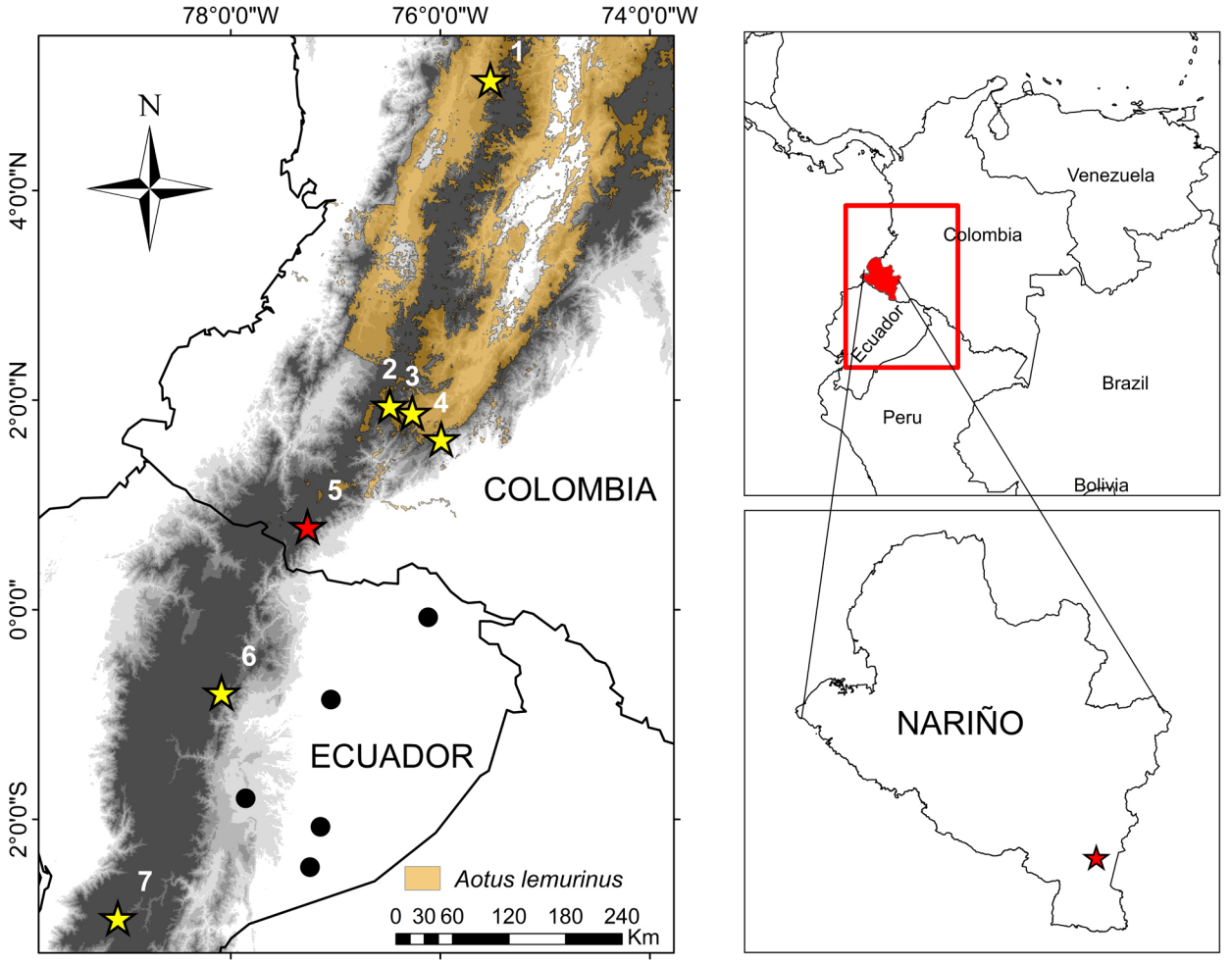

Figure 3. Reviewed records of *Aotus lemurinus* (yellow stars) from Colombia and Ecuador. Records from Colombia includes: (1) Department of Caldas, Manizales (MHN-UCa 1503, 1504); (2) Department of Cauca, Puracé, Moscopán (MHNUC 073); (3) Department of Huila, San Agustín (Field Museum of Natural History, FMNH 70680); (4) Department of Huila, municipality of Acevedo, Aguas Claras River (FMNH 70676); (5) First record from Department of Nariño, village of Monopamba (red star, MUD 764). Records from Ecuador include: (6) Province of Napo, Cosanga, San Isidro (QCAZ 8984), and (7) Province of Azuay, Urco (MEPN 7918). Black circles show the records of *Aotus vociferans* from Ecuador housed at MEPN and QCAZ.

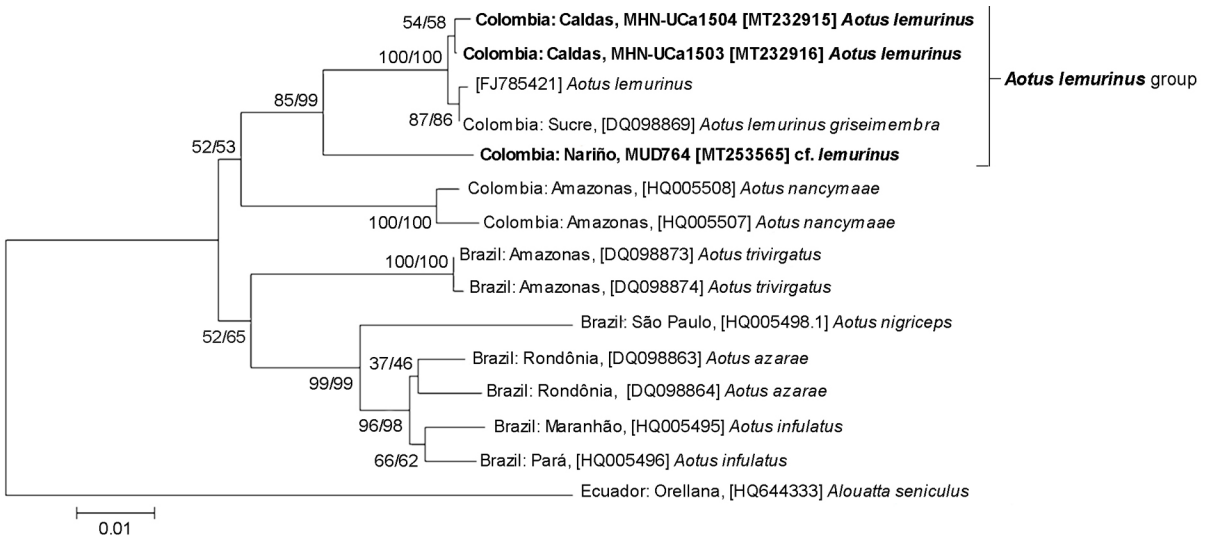

Figure 4. Cytochrome *b* gene tree inferred using maximum likelihood (ML) and Neighbor-Joining (NJ) algorithms based on partial sequences using the Mega X software. The specimens sequenced in this study are in bold. GenBank-retrieved sequences are in square brackets [access numbers]. *Alouatta seniculus* was added as an outgroup. ML bootstrap/ NJ bootstrap values are indicated in front of each clade, respectively.

Moscopán (02º14'N, 076º10'W; 2,400 m a.s.l.), municipality of Puracé, Cauca (MHNUC 073 ♂), and from Salento (04º38'N, 075º34'W), Department of Quindío (MHNUC 072 ♂). On the other hand, phylogenetic analysis of the cyt *b* gene recovered the specimen from Monopamba, Nariño (Fig. 4; MUD 764) as sister to the clade containing the *A. lemurinus* specimens obtained from GenBank and the sequences from the Department of Caldas (MHN-UCa 1503, 1504) (Fig. 4). This group is highly supported by ML / NJ bootstrap values (85/99, respectively). In addition, the cyt *b* sequence of the specimen in question was highly similar (96.53 %) to available sequences corresponding to *A. lemurinus* (GenBank: FJ785421) and *A. trivirgatus* (GenBank: AY250707). However, the latter is only found in the lowlands of the Orinoco and Amazon regions of Venezuela and Brazil, with no confirmed records from Colombia (Urbani et al., 2018).

GenBank nucleotide sequence accession numbers for the partial sequences generated for specimens from the Department of Caldas are MT232916 for voucher specimen MHN-UCa 1503, and MT232915 for specimen MHN-UCa 1504.

Other records and additional information. The other species recorded only through interviews are the chorongo monkey (*Lagothrix* sp.) from which we could not obtain tangible evidence to corroborate its presence, although it seems to be well known locally. Among the three species reported here, the inhabitants of Monopamba claim that they are commonly observed in the sector and are generally (except for *A. lemurinus* which is usually captured for pets) consumed by humans.

Discussion

We provide novel information on the distribution of three species of primates in southwestern Colombia we also suggest future research in the area. The record of *Cebus albifrons* represents a distribution extension in the department. The presence of this species was suggested for south of the Guamuez River, near the Department of Putumayo (Defler 2003; de la Torre et al. 2015), corresponding to the Amazon plain of the department. However, the record presented here comes from the Andean region (1,800–1,900 m a.s.l.), south of the upper basin of the Guamuez River, on the eastern flank of the Eastern Cordillera. The cranial measurements of the collected specimen of *C. albifrons* are congruent with those proposed by Hershkovitz (1949) for *C. a. cuscinus* Thomas, 1901 and *C. a. yuracus* (Humboldt, 1812) although apparently there are no reasons for the recognition of these subspecies (Ruiz-García et al. 2010). The only previous record of *C. albifrons* from Nariño at the Rumiyaco–Ranchería River Basin (00º26'N, 077º16'W, 755 m a.s.l.), bordering the departments of Nariño and Putumayo, is a skull obtained in September 1998, that is deposited in the mammal collection of the Alexander von Humboldt Institute - IAvH, Villa de Leyva (IAvH 6070).

The record of *Sapajus apella* also corroborates the presence of this species in the Eastern Andes of the Department of Nariño. The distribution of *S. apella* had been suggested as probable for the Nariño Amazon plain (Defler 2003), but de la Torre et al. (2018), naming the taxon as *S. macrocephalus,* did not include Nariño within the species' range. The measures of the *S. apella* specimen are concordant with those present in Hershkovitz (1949) and every cranial dimension is superior to those of *C. albifrons*. When comparing the skulls of *S. apella* and *C. albifrons*, the former has a more conspicuous development of the sagittal crest (Fig. 2).

For *Aotus lemurinus*, our record (MUD 764) represents the first confirmed record of the genus for the Department of Nariño and the locality of origin is approximately 50 km north from the border with Ecuador (Fig. 3). Defler (2003) mentioned that there are gaps in the geographical distribution of *Aotus* in this department, which require further ecological and geographical research to understand this type of ecological limitation. Nevertheless, the presence of *A. lemurinus* in the region was expected due to the environmental conditions in the department and because the species has been recorded for the eastern foothills of the Eastern Cordillera of Ecuador, between 900 and 1,800 m a.s.l. (Morales-Jiménez and de la Torre 2008). Although the presence of *A. lemurinus* in Ecuador is debated because the few known records are based only on field observations and the scarce existing museum material has not been properly analyzed (Tirira 2007), we were able to confirm that two specimens from Ecuador have the external diagnostic characteristics of *A. lemurinus*: MEPN 7918 from Ramos Stream, Urco, Azuay, Ecuador (02º53'S, 058º79'W; Fig. 3), has the reddish coloring observed in *A. lemurinus*, long coat: 36.7 mm in the interscapular region; very long feet hairs (12 mm) that reach and surpass the nails approximately 7.5 mm (this is the most evident difference when compared with the other *Aotus* of Ecuador deposited in MEPN). The second specimen (QCAZ 8924) from Cosanga, San Isidro, Ecuador (00º34'S, 077º52'W), has hair on its forefeet protruding beyond the nails, long and woolly fur and facial stripes as those of *A. lemurinus*, but it is a young specimen. Twelve additional specimens (Appendix) from different Ecuadorian localities of the genus *Aotus* deposited in MEPN and QCAZ have the diagnostic characters of *A. vociferans*.

The genus *Aotus* taxonomy is complex (Defler 2003) due to the lack of karyological and morphological information necessary to clearly understand the relationships between populations (Hershkovitz 1983). According to Defler et al. (2003), new studies are required to understand the geographical distribution of Colombian *Aotus* species. In Ecuador it is considered a priority to carry out an intense search for this species with the collection of specimens, taking of photographs and tissue samples, so that its identification can be reliably determined (Tirira 2007). To help to clarify these taxonomic issues, the cyt *b* gene that has been widely used for the identification of specimens of other taxonomically complex Neotropical primates (e.g., Hoyos et al. 2016; Martins-Junior et al. 2018). Our results using cyt *b* sequences suggest that the specimen from the Department of Nariño is the sister-group of a clade formed by *A. lemurinus* from Colombia. This is consistent with the presence of the species according to its range (Defler et al. 2001; Ramírez-Chaves and Noguera-Urbano 2010). However, according to the limited amount of characters used to identify this specimen, the existence of undetected cryptic diversity in *A. lemurinus* species cannot be ruled out. Accordingly, we strongly recommend a further taxonomic assessment of this *Aotus* population, including more specimens from Colombia and Ecuador, and additional molecular loci.

Conservation. Of the three registered primate species, *Aotus lemurinus* has been catalogued as Vulnerable due to their restricted distribution, hunting and habitat loss (Defler and Rodríguez-Mahecha 2006). The main threats to it small populations are human actions, as large part of its distribution is interspersed with heavily impacted areas (Defler and Rodríguez-Mahecha 2006; Morales-Jiménez and de la Torre 2008). According to the inhabitants of the areas visited, the populations of these three primate species are large, but additional studies are needed to support this claim. It is also necessary to develop research on the population densities of these species to establish the degree of threat they may present locally and other sources of pressure. In the past, hunting activities were carried out using dogs and rifles in the study area, but the inhabitants of the towns visited claim that since the arrival of the guerrillas in the area, they have not carried out constant hunting activities (for approximately more than ten years). Locals stated that large and medium-sized mammal species are found relatively easily and in sectors like El Verde, and are commonly hunted for food due to the lack of domestic animals, generated by the difficult access to this area. The conservation efforts should be concentrated at the local level, that is, in the regions where the populations the threatened species are found (Defler 2003; Defler et al. 2003; Defler and Rodríguez-Mahecha 2006). *Cebus albifrons* and *Sapajus apella* are not in any national threat category, but in the studied area they are usually hunted because they impact the corn crops. The primate species registered here occur in the protected area Orito Ingi-Ande Flora Sanctuary (00°42'N, 076°54'W approximately), which is located between the municipalities of Funes, Department of Nariño, and Orito municipality in the Department of Putumayo.

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Authors' Contributions

HERC collected data in Colombia and Ecuador and wrote the manuscript. MH, JDC, ACR, SBM, MARC, PAOL, FARP examined specimens at the Universidad de Caldas collections, obtained and analyzed the cyt *b* sequences, and wrote the paper.

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Appendix

Specimens Analyzed. ***Aotus lemurinus*:** COLOMBIA: MHN-UCa 1503 male: Caldas, Manizales, Barrio Nogales, 2029 m, skin, skull and skeleton; MHN-UCa 1504 male: Caldas, Manizales, Vereda El Chuzo, skin, skull and skeleton; MHN-UCa 3288 female: Caldas, Manizales, Barrio La Francia, 1,800 m a.s.l., skin, skull and skeleton; MHNUC 073 male: Cauca, Moscopán. skin; MUD-764 female: Nariño, municipality of Puerres, corregimiento Monopamba, El Verde, 1,931 m a.s.l., skin, skull and skeleton; MHNUC 072 male: Quindío, Salento, skin; MHN-UCa 687 male: Quindío, Córdoba, vereda Río Verde, 1,200 m a.s.l., skull and skeleton; MHN-UCa 901 female: Quindío, Filandia, Vereda Cruces, 1,861 m a.s.l., skull. ECUADOR: QCAZ 8984: Cosanga, San Isidro, skin and skull; MEPN 7918 female: Ramos, Urco, skin and skull.

***Aotus vociferans*:** ECUADOR: MEPN 7911 female: Pastaza, Montalvo, 300 m a.s.l., skin and skull; MEPN 7888 female: Napo, Tena, river Arajuno, 400 m a.s.l., skin; MEPN 7914 female: Napo, Tena, river Napo, Boca del río Suno, 300 m a.s.l., skin; MEPN 7915 male: Napo, Tena, river Napo, Boca del río Suno, 300 m a.s.l., skin; QCAZ 1560 male: Napo, P. N. Yasuni, Indillana, 800 m a.s.l., skin and skull; MEPN 7916 male: Pastaza, Pastaza, Pavacachi, Curaray river, 200 m a.s.l., skin; MEPN 7917 female: Pastaza, Pastaza, Pavacachi, Curanay river, 200 m a.s.l., skin and skull; MEPN 7922 male: Pastaza, Pastaza, Montalvo, 300 m a.s.l., skin and skull; MEPN 7923 male: Orellana, Loreto, Loreto (Alto Napo), skin; MEPN 10753 male: Sucumbios, Cuyabero river, skin and skull; QCAZ 161: Sucumbíos, Los Monos canyon, skull and head skin; MEPN 7889: skin (no data).

***Sapajus apella*:** COLOMBIA: MUD-762: Nariño, municipality of Puerres, corregimiento Monopamba, El Verde, 1,931 m a.s.l., skull; IAvH 6073: upper basin of the Rumiyaco - Ranchería rivers, skull.

***Cebus albifrons*:** COLOMBIA: MUD-763: Nariño, municipality of Puerres, village of Monopamba, El Verde, 1,931 m a.s.l., skull; IAvH 6070: upper basin of Rumiyaco - Ranchería rivers, skull.