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A new species of *Arremon* (Passeriformes: Emberizidae) from Brazil

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RESUMO. Uma nova espécie de *Arremon* (Passeriformes: Emberizidae) do Brasil. É descrita uma nova espécie, *Arremon franciscanus*, da caatinga brasileira nos estados de Minas Gerais e Bahia. Esse táxon parece formar um grupo monofilético com a espécie florestal de distribuição atlântica *Arremon semitorquatus*, que foi recentemente considerada uma espécie plena. Entretanto, *A. franciscanus* distingue-se imediatamente de *A. semitorquatus* pela coloração da maxila (amarela com o ápice negro na primeira espécie e toda negra na segunda) e pela intensidade do cinza nos lados do corpo (mais claro em *A. franciscanus*). *Arremon franciscanus* difere de *A. taciturnus* pelo colar interrompido e pela coloração do bico (negro em *A. taciturnus*). Essa nova espécie distingue-se, ainda, de *A. flavirostris* pela presença de preto no mento e pelo colar peitoral interrompido. *Arremon franciscanus* apresenta também outras singularidades de plumagem, morfometria e vocalização, além de possuir habitat distinto e distribuição disjunta em relação a *A. semitorquatus*, a espécie com quem mais se assemelha. O presente trabalho chama a atenção para a destruição das caatingas e florestas secas do vale do rio São Francisco.

PALAVRAS-CHAVE: *Arremon franciscanus* sp. nov., caatingas brasileiras, conservação, distribuição, Emberizidae, taxonomia, vocalização.

ABSTRACT. A new species, *Arremon franciscanus* (San Francisco Sparrow), from the Brazilian Caatinga, at the states of Minas Gerais and Bahia is described. This species is possibly the sister taxon of the Atlantic Forest dweller *Arremon semitorquatus*, that has been recently elevated to full species status. *Arremon franciscanus* can be immediately distinguished from *A. semitorquatus* by the color of the maxilla (yellow with a black ridge in the former and blackish in the latter) and by the shade of the grey on the sides of the body (lighter on *A. franciscanus*). *Arremon franciscanus* differs from *A. taciturnus* by the interrupted collar and bill color (blackish in *A. taciturnus*). This new species can be distinguished from *A. flavirostris* (which has a bill with similar coloration) by having a black chin spot and the pectoral band interrupted. In addition, *Arremon franciscanus* presents other differences in plumage color, morphometry and vocalization, as well as a distinct habitat and allopatric distribution in relation to *A. semitorquatus*, its putative nearest species. This work draws attention to the destruction of the caatingas and tropical dry forests of the valley of the São Francisco River.

KEY WORDS: *Arremon franciscanus* sp. nov., Brazilian Caatinga, conservation, distribution, Emberizidae, taxonomy, vocalization.

The forest sparrow genus *Arremon* Vieillot (Emberizidae) comprises six species that ranges throughout South American forests. The polytypic *Arremon taciturnus*,

Hermann, 1783, occurs from the Guianas, Venezuela and Colombia southwards to Peru, Bolivia, and in Brazil to the State of Espírito Santo. This species is replaced by *Arremon*

semitorquatus Swainson, 1837, the Atlantic taxon of the genus from Espirito Santo to Rio Grande do Sul (Raposo and Parrini, in press). *Arremon flavirostris* Swainson, 1837, occurs in the Brazilian hinterland, eastern Bolivia, Paraguay and northern Argentina (Meyer de Schauensee 1982, Silva 1991). *Arremon schlegeli* Bonaparte, 1950, ranges only in Venezuela and Colombia. *Arremon aurantirostris* Lafresnaye, 1847, occurs from Colombia to Ecuador and Peru while *Arremon abeillei* Lesson, 1844, is to be found through Ecuador and Peru (Hellmayr 1938, Meyer de Schauensee 1982, Ridgely and Tudor 1989).

During field work I found an undescribed form of this genus, in the Caatinga at the locality of Mocambinho (15° 05' S, 44° 00' W) in the Jaíba district, municipality of Janaúba, northern Minas Gerais, at the right bank of the São Francisco River, Brazil. Four specimens had their voices recorded and then were collected. Subsequent studies on the bird collection of the Museu Nacional, Rio de Janeiro, brought to light an identical male specimen (MN 39520) collected at the municipality of Cândido Sales (15° 30' S, 41° 15' W), Bahia, near the border of Minas Gerais. These specimens resemble *Arremon semitorquatus* but they differ in some plumage color characters, vocalization, morphometry and habitat. In addition, the new species is in complete allopatry with *A. semitorquatus* which is restricted to the Atlantic Forest of south-eastern Brazil.

In addition to the type material (five specimens), I examined a total of 284 specimens of the most similar taxa, *A. semitorquatus* (N = 56), *A. taciturnus* (N = 189), and *A. flavirostris* (N = 39) in four Brazilian collections: Museu Paraense Emílio Goeldi (MPEG), Belém; Museu Nacional (MN), Rio de Janeiro; Universidade Federal de Minas Gerais (UFMG), Belo Horizonte; and Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo. Body measurements taken for this work were: bill length (from the base of the exposed culmen to the tip; wing length (chord); and tail length. Some complementary field notes and collecting were performed in Bahia, Minas Gerais, Rio de Janeiro and São Paulo. The spectrographic sound analysis was made at the "Laboratório de Acústica e Vibrações da COPPE/UFRJ" with the Spectrogram 2.3 program for PC.

Arremon franciscanus, new species

Holotype. Museu Nacional/UFRJ, Rio de Janeiro, Brazil, n° 43037, adult male (testes 9 x 4 mm), collected 16 December 1995 by M. A. Raposo at Mocambinho (15° 05' S, 44° 00' W), municipality of Janaúba, on the right bank of São Francisco River, northern Minas Gerais, Brazil.

Paratypes: Two adult males (MN 43039, testes 5,5 x 4,5 mm, no molt; MN 43040, testes 6 x 4 mm, no molt) and one specimen (MN 43038, indeterminate sex, no molt) from the same locality and day of the holotype. Another male (MN 39520, without date and collector) from Cândido Sales (15° 30' S, 41° 15' W), Bahia.

Diagnosis. *Arremon franciscanus* (San Francisco Sparrow) closely resembles the males of *A. semitorquatus*

(frontispício. B) of the Atlantic Forest by their interrupted black pectoral collar, black chin spot, the lesser upper wing coverts nearly to the same color of the remainder dorsal plumage. However, *A. franciscanus* differs immediately from *A. semitorquatus* by the bill color pattern. The mandible of the two species is yellow but only in the former this yellow extends to the upper maxilla where it contrasts with a black ridge. In opposition, *A. semitorquatus* have an homogeneous blackish upper maxilla. The flanks of *A. franciscanus* are shaded with a light grey, while *A. semitorquatus* have dark plumbeous grey sides of the body that contrasts with the white centre of abdomen and breast. The former have, moreover, the dorsal olive feathers with a light yellow suffusion which makes it lighter in shade than *A. semitorquatus*. *Arremon franciscanus* differs from all subspecies of *A. flavirostris* (which has a similar bill, frontispício. C) by having a black chin spot and the pectoral collar interrupted. *Arremon franciscanus* has moreover a whitish coronal patch which is dark grey in *A. semitorquatus* and almost invisible in *A. flavirostris*. *Arremon franciscanus* is very distinct from *A. taciturnus* (frontispício. D) which has a black bill, complete pectoral band and "yolk" yellow lesser upper wing coverts instead of the slightly yellowish olive coverts of the former.

Measurements. Although there are few specimens, comparisons of some body measurements between the males of *A. franciscanus* and *A. semitorquatus* indicate some remarkable differences (table 1). *Arremon franciscanus* has shorter tail and longer bill (exposed culmen) than *A. semitorquatus*. This two species do not differ significantly in wing length. The measurements of the unsexed specimen of *A. franciscanus* (MN 43038) are near to the species' mean (tail = 66.5; wing = 70.65; bill = 13.85).

Description of the holotype. Maxilla "Spectrum Yellow" (near the color 55, following Smith 1981) with a "Blackish Neutral Grey" ridge (color 82). Mandible "Spectrum Yellow". Forehead and crown to the upper midback "Jet Black" (color 89) with a median longitudinal pale "Neutral Grey" (color 86). White superciliary stripes extending from the black lores through the sides of the back of the crown. Black face and grey hindneck with some reminiscent black spots from the crown. Black chin spot connected with the black face. Throat and central breast pure white. One black rather oval shaped spot on each side of upper breast forming an interrupted pectoral band. Lower breast, centre of belly, vent and undertail coverts clear white. Flanks and thighs shaded with some "Light Neutral Grey" (color 85) and some "Glaucous" (color 80). Great, median, lesser and marginal underwing coverts "Sulfur Yellow" (color 157). Mantle, greater coverts, scapulars, back, rump and uppertail coverts "Yellowish Olive-Green" (near color 50). Upper lesser wing coverts olive with some more yellow suffusion. Primaries and secondaries duller brown with olive outer webs and whitish inner web margins. Rectrices brown shaded with green,

Table 1. Body measurements of *Arremon franciscanus* and its nearest species *A. semitorquatus*. The first line of each measurement indicates the mean (standard deviation) and the second line shows the range (only male specimens).

Measurement	<i>Arremon franciscanus</i>	<i>Arremon semitorquatus</i>	t-test
Tail	62.6 (2.1)	67.2 (3.4)	$t = 2.52$
	60.0 - 65.0	62.0 - 74.0	$P < 0.05$
	(N = 4)	(N = 24)	
Wing chord	70.9 (2.4)	70.6 (3.1)	$t = 0.69$
	68.7 - 74.0	65.0 - 76.0	$P > 0.05$
	(N = 4)	(N = 24)	
Bill	14.2 (0.35)	12.2 (0.5)	$t = 6.22$
	14.0 - 14.6	11.2 - 13.2	$P < 0.05$
	(N = 3)	(N = 21)	

mainly on the outer webs. Other soft part colors in life: iris brown; legs and feet pinkish grey to brownish grey.

Individual variation. There is very little individual variation among the five known specimens of *A. franciscanus*. The unsexed specimen (MN 43038) has the abdominal area shaded with cinnamon which, in some degree, is due to the blood staining at the time of the collecting. There is no evident geographical variation from the Jaíba's skins to the Candido Mota's one. The dorsal feathers of the male (MN 43039) are a little more sprinkled with yellow.

Vocalization. Two high pitched and thin kinds of songs were recorded for *A. franciscanus*, both of them remarkably distinct and more complex than the Rio de Janeiro's song of *A. semitorquatus* which is composed of three principal notes (there's an initial intensity ascension from the first to the second note and a posterior decrease from the second to the third one; the frequency decreases from the first to the third note; see figure 1c). The first song of *A. franciscanus* (figure 1a), that was produced without artificial stimulation, can be split in three phrases: the first comprising three equal introductory syllables; the second one that has one or two isolated high frequency notes (10 kHz); and the third one that comprises a conclusive trill. The other song (figure 1b) was produced after the play back stimulation and is probably the "territorial song" (*sensu* Catchpole and Slater 1995). This second voice seems to be a bit nearer to that of *A. semitorquatus* song in spite of having many differences. This song can also be split in three distinct phrases: two equal introductory phrases which have two different syllables; and the third one comprising a decreasing (in intensity) series of five to six similar modulated whistles. The call (*sensu* Catchpole and Slater 1995) of *A. franciscanus* is a thin hissing very similar to the calls of the other members of this genus.

Habitat and distribution. The distribution of this species is restricted to a horizontal latitudinal tract on Brazilian dry habitats (figure 2). The type material was collected in a thick scrub "Caatinga" that is classified as "caatinga hipoxerofila" (Embrapa 1979). Other birds typical of the Brazilian caatingas that I have often recorded at this habitat are: *Crypturellus noctivagus*, *Aratinga cactorum*, *Chrysolampis mosquitos*, *Picumnus pygmaeus*, *Veniliornis passerinus*, *Myrmorchilus strigilatus*, *Herpsilochmus pileatus* (not *H. atricapillus*, see Davis and O'Neil 1986), *Formicivora melanogaster*, *Idioptilon margaritaceiventis*, *Polioptila plumbea*, *Hylophilus amaurocephalus* (see Willis 1991), and *Coryphospingus pileatus* (all the names follow Meyer de Schauensee 1982). This caatinga area is intermingled with a taller vegetation ("caatinga arborea"), locally known as "Mata do Jaíba", which is a transition formation between the Caatinga and the Tropical Forest. It is probable that *A. franciscanus* occurs on this latter habitat too. The label of the paratype from Cândido Sales (BA) shows no data about the habitat where this bird was collected, but the vegetation of this locality does not differ much from the caatingas of northern Minas Gerais.

Etymology. With the name of *A. franciscanus* it is my intention to draw attention to the valley of the São Francisco River, the only place where this new species is known to occur today. All this region is suffering a serious and fast deterioration of its environment (Silva and Oren 1992), and the discovery of new endemic taxa stress the urgent need of its conservation.

Material examined and localities (only skins with known precedence) - For coordinates see Paynter and T aylor (1991) and Vanzolini (1992).

***Arremon semitorquatus*.** MN - Espírito Santo: Jatiboca, 3; Santa Teresa, 1. Minas Gerais: Mariana (Fazenda Taveira), 1; Caparaó, 1. Rio de Janeiro:

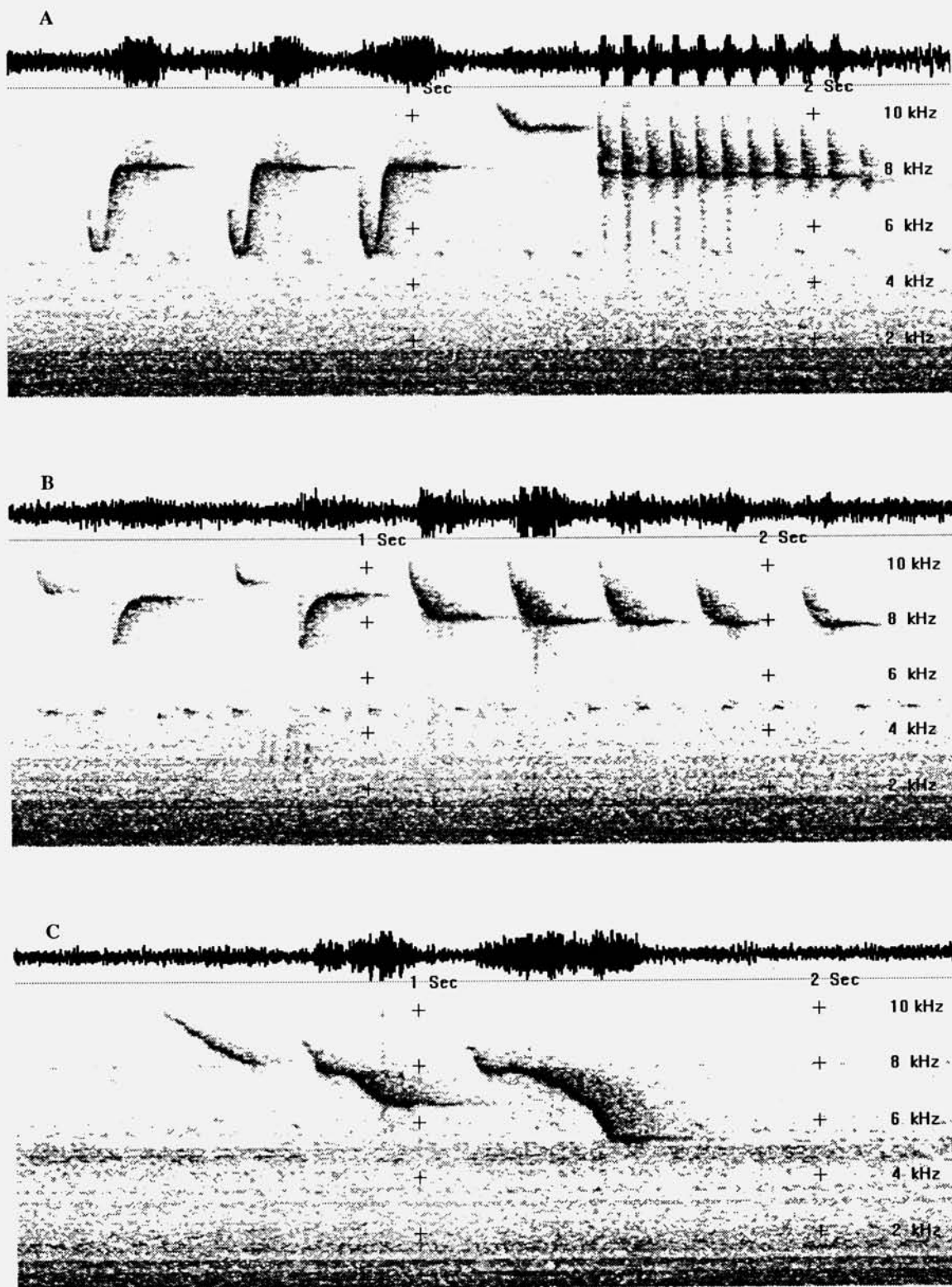


Figure 1. A - Spontaneous song of *Arremon franciscanus*; B - Vocalization of *A. franciscanus* after the play back; C - The typical song of *A. semitorquatus* at Serra dos Órgãos, Rio de Janeiro (see the description of the vocalizations).

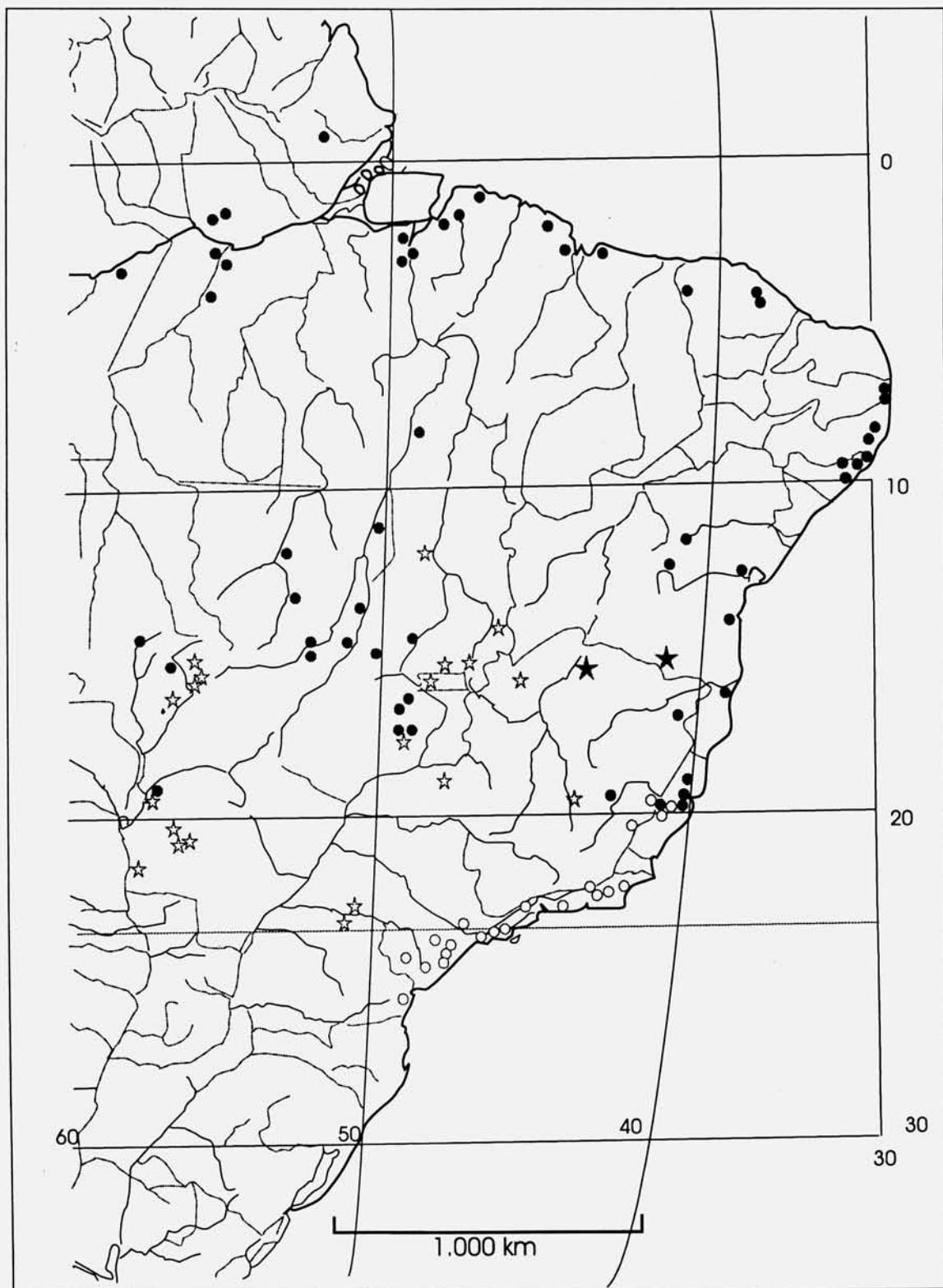


Figure 2. Map showing the distributions of the examined skins of *Arremon franciscanus* (★), *A. semitorquatus* (○), *A. taciturnus* (●) and *A. flavirostris* (☆).

Teresópolis, 3; Nova Friburgo, 1. **MZUSP - Rio de Janeiro:** Teresópolis, 2. **São Paulo:** Ribeirão Fundo, 6; Cabreúva, 1; Rio Grande, 1; Piquete, 1; Barro do Ribeirão Onça Parda, 4; Barra do Rio das Corujas, 2; Salesópolis (Casa Grande), 2; Juquiá, 2; Campo Grande, 2; Primeiro Morro, 2; Quadro Penteado, 2; Lageado, Iporanga, 1; Morretinho, 1; Rocha, 1; Itapetininga, 1; Mogi das Cruzes, 1. **Paraná:** Tijuco Alto, 2. **MPEG - São Paulo:** Itapetininga, 1; Salesópolis, 1.

Arremon taciturnus. MN - **Amapá:** Serra do Navio, 1. **Amazonas:** km 30 da Estrada Manaus Itacoatiara, 2; Balaio (0° 28' N, 66° 43' W), 1; Tapuruquara, 1. **Rondônia:** Forte Príncipe da Beira, 1; Jamari, 1. **Pará:** Baião, 1; Cameté, 1; Alto Cururu, 2; Maranhão: Turiassu, 2; Aprendizado, 2; São Bento, 1. **Tocantins:** Ilha do Bananal, 1. **Mato Grosso:** Xavantina, 1; Comi-tripam (10° 54' S, 61° 57' W), 1; Teles Pires, 1; Garapu, 1; Tapirapoam, 1; Chapada dos Guimarães, 2; Buriti, 2; Jacaré, Alto Xingu, 1; **Goiás:** Pouso Alto, 1; Ferreira, Rio Vermelho, 4; Nova Veneza, Anápolis, 2. **Ceará:** Serra de Ibiapaba, 1; Guaramiranga, Serra de Baturutê, 2; Chapada do Araripe, 1. **Pernambuco:** Dois Irmãos, 1; São Bento, Tapera, 1. **Alagoas:** São Miguel dos Campos, 2; Murici, 2. **Bahia:** Camamu, 1; Lençóis, 1; Cachoeira, 1; Vale do Rio Jequitinhonha (?), 1. **Minas Gerais:** Pindaíba, 2. **Espírito Santo:** Pau Gigante (Ibirapu), 1; Cupido, 1; Rio Guandu, 1. **MZUSP - Roraima:** Rio Branco, 1; Sorocaima, 1; São Gabriel, Rio Negro, 2. **Amapá:** Serra do Navio, 2. **Amazonas:** Serra da Neblina, 2; Manaus, 1; Rio Aripuanã, Prainha, 2; Cauburi, 2. **Rondônia:** Cachoeira Nazaré, Rio Jiparaná, 1. **Pará:** Belém, 4; Capanema, 1; Igaporé Bravo (?), 7; Oriximiná, 1; Patauí, 2; Capim, 5; Conceição do Araguaia, 1; Itapoana, 1; Fordlândia, 11; Monte Cristo, 1; Santarém, 4; Óbidos, 1; Utinga, 2; Cachimbo, 2; Baixo Xingu, margem direita, 2; Marajó (?), 2. **Maranhão:** Miritiba, 3. **Mato Grosso:** Chapada dos Guimarães, 2; Xavantina, 1; São Domingos, Rio das Mortes, 2. **Mato Grosso do Sul:** Palmeiras, 1; **Goiás:** Nerópolis, 1; Goiânia, 7; Anápolis, 1; Jataí, 3; Rio das Almas, 1; Trindade, 2; São Geraldo (?), 1. **Ceará:** Pacoti, 6; Serra de Baturitê, 1. **Paraná:** Rio Tinto, Uruba 3; Mamanguape, 5. **Pernambuco:** Tapera, 1. **Alagoas:** Quebrangulo, 1; Usina Sinimbu, 6; Rio Largo, 1; Mangabeiras, 1; **Bahia:** Vila Nova, 1; Itabuna, 1. **Minas Gerais:** Machacalis, 1; Rio Suaçuí, 2. **Espírito Santo:** Rio São José, 2; Pau Gigante, 1.

Arremon flavirostris. MN - **Mato Grosso:** Buriti, Cuiabá, 4; Chapada dos Guimarães, 8; Porto Quebracho, 2; Poconé, 1. **Goiás:** Ipameri, 1; Rio São Miguel, 1; Planaltina, 1. **Distrito Federal:** Reserva Biológica do IBGE, Brasília, 1. **Mato Grosso do Sul:** Salobra, 2; Urucum, Corumbá, 1. **São Paulo:** Assis, 1. **Paraná:** Andirá (23° 05' S, 50° 10' W), 1. **MPEG - Mato Grosso:** Chapada dos Guimarães, 3. **Goiás:** Formosa (15° 32' S, 47° 20' W), 1; Iaciara (13° 55' S, 46° 40' W), 1. **Minas Gerais:** Arinos, 2. **Mato Grosso do Sul:** Bonito (21° 15' S, 56° 42' W), 3. **UFMG - Minas Gerais:** São Leopoldo, 1; Uberlândia, 2.

DISCUSSION

Arremon franciscanus seems to be more related to the *A. taciturnus* complex which can be separable from the *A. flavirostris* species group by the black chin spot. The interrupted collar of *A. franciscanus* and *A. semitorquatus* is also present in the Peru/Bolivian *A. taciturnus nigrirostris* and in the Venezuelan/Colombian *A. taciturnus axillarlis* and in some specimens of the Amazonian *A. t. taciturnus* from Rio Cururu, Pará. Thus, this character cannot be regarded as a synapomorphy that unites *A. franciscanus* and *A. semitorquatus* without an adequate cladistic analysis. Nevertheless, the general similarity of this two species points to a common ancestry. If confirmed, this relationship would corroborate a recent connection between the avifauna of the valley of the São Francisco River and the Atlantic Forest one such as proposed by Silva and Straube (1996).

Arremon franciscanus is a valid species under the three most widely accepted species concepts, the biological (Mayr 1969), the evolutionary (Simpson 1960, Wiley 1981), and the phylogenetic one (Rosen 1978, 1979, Nelson and Platnick 1981, Cracraft 1983, 1992, McKittrick and Zink 1988). This species is diagnosable by a unique set of characters, it has its own evolutionary tendencies and it is also probably, reproductively isolated from its congeners. This species may overlap in range with *A. flavirostris* that occurs on some near localities from Minas Gerais (figure 2) and Bahia (*apud* Hellmayr 1938). The still undescribed female of *A. franciscanus* may be similar to the male, as the pattern found in *A. semitorquatus* and *A. flavirostris*, but not as in *A. taciturnus*. In *A. taciturnus* there is a striking sexual dimorphism in plumage as the females do not have the pectoral band.

In spite of the remarkable distinction between the songs of *A. franciscanus* and the vocalization of its putative nearest relative *A. semitorquatus*, I do not recommend to use vocalization as a diagnostic character of *A. franciscanus*, as there is not enough data available. Oscines usually learn their songs (Lanyon 1978, Kroodsma 1984, Sick 1985, Prum 1992) and this feature seems to be related to the capacity of developing dialect or other kinds of geographical vocal variations (Kroodsma 1984). Therefore, it is definitively not advisable to employ vocalizations as taxonomic characters without a good geographical documentation of the song types of *A. franciscanus* and of its closest relatives.

The discovery of a new bird species in the Brazilian Caatinga stress the importance of this region for the conservation of South America unique biodiversity. The Caatinga is one of the South America's most endangered and less studied biogeographic region. I strongly endorse the claim by Whitney *et al.* (1995) and Silva and Oren (1992) about the immediate necessity of conservation of the dry habitats of Brazilian interior with all of its different types of vegetation. *Arremon franciscanus* was collected during the environmental studies of the Jafba irrigation project, that aims to explore the agricultural potentialities

of that area. In spite of the apparent economical importance of this project, the environmental implications of the destruction of so vast areas of caatingas and tropical dry forests should be closely scrutinised and monitored by the Brazilian society (conservationist NGO's) and governmental agencies (IBAMA, FEAM etc.).

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