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ARTICLE

A new species of *Cichlocolaptes* Reichenbach 1853 (Furnariidae), the '*gritador-do-nordeste*', an undescribed trace of the fading bird life of northeastern Brazil

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ABSTRACT: A new species of treehunter, *Cichlocolaptes mazarbarnetti sp. nov.*, is described from a specimen that for many years had been confused with *Philydor novaesi*. The morphology of this specimen, collected in 1986 at Pedra Branca, Murici, Alagoas, at 550 m elevation (currently the Murici Ecological Station), suggests its allocation in the genus *Cichlocolaptes*. The new species differs from *P. novaesi* by its considerably larger size, heavier body-mass, darker and more uniform forehead and crown, absence of buffy periocular-feathers, and a pale orange-rufous tail that contrasts with the rump and the rest of the dorsal plumage. It also has a flat-crowned appearance and a larger, deeper-based, and generally stouter bill. Behavioral specialization on bromeliads and vocal repertoire also suggest that the new species belongs in the genus *Cichlocolaptes*. The song of this species is markedly different from that of *P. novaesi*, and it closely matches that of *Cichlocolaptes leucophrus*. The new species is endemic to the 'Pernambuco Center' of endemism, where it inhabits dense, humid forests in hilly terrain. It is known from only two localities in northeastern Brazil, one each in the states of Alagoas and Pernambuco. Taken together, these areas contain less than 3,000 ha of suitable habitat for the species, where we estimate the population during our studies to have numbered no more than 10 individuals. We propose that this species should be categorized as Critically Endangered at a national and global level, and we consider the situation of its conservation to be critical in that it will require urgent action to avoid its global extinction.

KEY WORDS: Atlantic Forest, Conservation, Ovenbirds, *Philydor*, Taxonomy, Treehunter.

INTRODUCTION

Northeastern Brazil was the first area in the country to be settled by Europeans, when the Dutch arrived and established a colony that thrived along the coast between Maranhão and Sergipe in the period 1630-1654 (Rodrigues 1949, Cascudo 1956). The area that had been covered by extensive forests soon gave way to sugar-cane plantations, a habitat modification that is now five centuries old, and which may perhaps represent one of the oldest, large-scale habitat modifications produced by European colonies in South America. Despite its early economic exploitation, northeastern Brazil has been one of the most neglected areas in the country for biological exploration. Ornithological attention was drawn to this region, perhaps too late, as recently as the 1970s, when expeditions by the Museu Nacional do Rio de Janeiro (MN hereafter) resulted in the description of four new, endemic taxa in the state of Alagoas, from Fazenda Serra Branca (currently part of the Murici Ecological Station): Alagoas Foliage-gleaner *Philydor novaesi* (Teixeira & Gonzaga 1983a), Orange-bellied Antwren *Terenura sicki* (Teixeira & Gonzaga 1983b), Alagoas Antwren *Myrmotherula snowi* (Teixeira & Gonzaga 1985), and Alagoas Tyrannulet *Phylloscartes ceciliae* (Teixeira 1987). Even by the 1970s, forested areas throughout northeastern Brazil had already been much reduced, and they were found mostly on remote mountaintops (Teixeira & Gonzaga 1983a, Teixeira 1987). The present situation is even more desperate, in that only 1,907 km^2, or less than 2% of the original forests, remain (Silva & Tabarelli 2001). Despite the near total removal of natural habitats in this region, the forests still support undescribed bird taxa, as demonstrated by the recent description of a new pygmy-owl (Silva *et al.* 2002). Recent fieldwork at the Murici Ecological Station (hereafter Murici) by field ornithologists supported the extreme rarity of *P. novaesi* (Roda 2011; IUCN, 2012), which has been by far the rarest and most difficult to find element of the endemic avifauna of Murici, and which, until recently, was known

exclusively from this one locality. During fieldwork at Murici on 12 October 2002, we observed and tape-recorded a bird that largely fit the plumage description of *P. novaesi*. This bird, however, differed from *P. novaesi* (or at least from *P. atricapillus*, its supposedly closely allied sister-taxon (Teixeira & Gonzaga 1983a, Remsen 2003) and with which we were familiar) in its behavior, general morphology and, most strikingly, in its voice. In fact, these characteristics suggested instead affinities with the genus *Cichlocolaptes*. These similarities were so striking that we quickly became convinced that *P. novaesi* had been wrongly described in the genus *Philydor*, and that it belonged instead in the genus *Cichlocolaptes*. We later learned that several colleagues had already reached this same conclusion some time before us (e.g., Andrew Whittaker and Kevin Zimmer). Nevertheless, in February 2003, we found *P. novaesi* in montane forests of the state of Pernambuco, at the Reserva Particular do Patrimônio Natural Frei Caneca (hereafter Frei Caneca) (Mazar Barnett *et al*. 2003, 2004), along with the other three endemic species of the 'Pernambuco Center' of endemism (Roda 2003). The behavior, morphology, and vocalizations of this bird were reminiscent of *P. atricapillus*, yet they contrasted strikingly with the ovenbird we had seen and heard at Murici. We realized that the bird seen in Pernambuco may represent the true *P. novaesi*, described by Teixeira & Gonzaga (1983a), and that the ovenbird we observed at Murici represented an undescribed species. Teixeira *et al*. (1987) mentioned a particularly large and heavy female specimen of *P. novaesi* secured at Murici, and our subsequent examination of the series of *P. novaesi* at MN further confirmed our hypothesis, as we found that the particularly large female specimen mentioned above represented an undescribed taxon distinct from *P. novaesi*.

MATERIAL AND METHODS

Morphology

We examined all specimens of *Philydor novaesi* at MN, which represents the entire available collection of the species, 35 specimens of the morphologically similar *P. atricapillus*, and 30 specimens of *Cichlocolaptes leucophrus* at MN, Museu de Zoologia da Universidade de São Paulo (MZUSP), and Museo Argentino de Ciencias Naturales (MACN) (Appendix 1). We measured the exposed culmen, wing chord, tail, and tarsus length of the specimens examined using a dial caliper to the nearest 0.1 mm. We took additional measurements on specimens of *P. novaesi:* distance from the commissure to the external nares, distance from the commissure to the bill tip, and the length of the 10th primary. Body mass, total length, bill coloration, wingspan, and gonad conditions were obtained from specimen labels. Remiges and rectrices were counted. Color names used in the description follow Smithe (1981) and Munsell (1994). Field observations were made using Zeiss and Swarovski 10 × 40 binoculars and a 15-45× spotting scope. Photographs of the specimens at MN were taken under natural light.

Vocalizations

We recorded vocalizations with Sony TCM 5000EV tape-recorders using Sennheiser ME66 and ME67 microphones. Original recordings are in the Arquivo Sonoro Dante Buzzetti (ASDCB), maintained by the second author. These recordings have been deposited at xeno-canto (www.xeno-canto.org). Additional recordings are available at other online collections, IBC/Lynx (http://ibc.lynxeds.com), the Macaulay Library (http://macaulaylibrary.org), and on Minns *et al.* (2009). Other recordings made by colleagues are listed in Appendix 2. Tape-recordings were digitized at 44.1 kHz with a 16 bit word-size. Spectrograms were produced in Cool Edit 2000 using a Blackman window with a resolution of 512 bands. Vocal variables were measured using screen cursors from the fundamental signals of the spectrograms. The variables measured were: total phrase duration, duration of intervals between notes, note length and frequency (defined as frequency at the point of highest amplitude) (*sensu* Isler *et al*. 1998). Note shape descriptions were made from spectrograms at the same scale as those in the figures. The name applied to each vocalization type in the repertoire of suboscines is not standardized, but we always attempted to compare homologous vocalizations (as indicated by their overall similarity) regardless of the name applied. Digitized recordings used to make sonograms and additional recordings are available at the second author's website: www.dantebuzzetti.com.br.

RESULTS

We propose to name the new species:

Cichlocolaptes mazarbarnetti sp. nov.

Cryptic Treehunter

gritador-do-nordeste

Holotype: Specimen Nº 34530, study skin of an adult female deposited at the Museu Nacional do Rio de Janeiro (MN), collected on 16 January 1986 by Dante M. Teixeira at Serra Branca, Murici (currently Murici Ecological Station), 09° 15' S, 35° 50' W, 550 m above sea level, Alagoas State, Brazil.

Diagnosis: Differs from *Philydor novaesi* in its considerably heavier and longer body (Figure 1, Table 1), uniformly blackish crown, forehead and lores (speckled with light brown in *P. novaesi*, Figure 2); dark periocular-feathers (buffy eyering in *P. novaesi*); buffy supraloral-stripe (indistinct in *P. novaesi*, Figure 3); dark patches on sides of neck (absent in *P. novaesi*); longer and paler orange-rufous rectrices that contrast with the brown rump (upper-tail coverts are rufous like the rectrices in *P. novaesi*, Figure 4) and have rounded tips (mucronate in *P. novaesi*); larger, deeper-based, and more heavily built bill; a flat-crowned appearance (smaller bill and rounded head in *P. novaesi*, Figure 3). Differs from *Cichlocolaptes leucophrus* in having a uniform plumage that lacks buffy stripes on the ventral and dorsal regions of the body (Figure 5).

FIGURE 1. Adult female *Philydor novaesi* (MN 33873, left) and *Cichlocolaptes mazarbarnetti* (MN 34530, right).

FIGURE 2. Upper view of the heads of adult female *Philydor novaesi* (MN 33873, left) and *Cichlocolaptes mazarbarnetti* (MN 34530, right), showing differences in bill length and the coloration of the crown, forehead and lores.

FIGURE 3. Lateral view of the heads of adult female *Philydor novaesi* (MN 33873, left) and *Cichlocolaptes mazarbarnetti* (MN 34530, right), showing differences in the eyering, extension of the supercilium, head shape, and bill length and shape.

FIGURE 4. From left to right male and female *Philydor novaesi* (MN 33872 and 33873), female *Cichlocolaptes mazarbarnetti* at the center (MN 34530), and two male *Philydor novaesi* at right (MN 32028 and 32029, the latter the holotype), showing the differences in contrast between tail and rump color.

FIGURE 5. From left to right *Philydor atricapillus* (MN 39355), *P. novaesi* (MN 33873), *Cichlocolaptes mazarbarnetti* (MN 34530) and *C. leucophrus leucophrus* (MN 9021).

TABLE 1: Measurements of specimens of *Cichlocolaptes mazarbarnetti* and *Philydor novaesi* housed at MN. The values are presented in millimeters, with the exception of body mass, which was measured in grams.

Measurements	***Cichlocolaptes mazarbarnetti*** **Female * MN 34530**	***Philydor novaesi*** **Female** MN 33873**	***Philydor novaesi*** **Males MN 32028 MN 32029 MN 33872**	***Cichlocolaptes mazarbarnetti*** **Juvenile MN 34531**
body mass	48.0	30.0	32.0-34.0	36.0
exposed culmen	15.5	12.9	12.3-13.0	12.8
bill depth	6.8	6.3	6.3-6.7	6.6
bill width	5.0	4.7	4.0-4.3	4.6
nares to commissure	14.9	9.8	10.1-11.4	-
commissure to tip	28.9	22.6	22.2-22.7	-
wing chord	96.5	83.5	91.4-94.9	90.1
wingspan	320.0	280.0	-	305.0
length of 10th primary	80.2	64.5	72.6-75.4	73.8
tail	82.0	76.1	80.0-84.8	83.9
tarsus	22.9	20.7	22.2-22.6	22.6
total length	221.0	195.0	193.0-205.0	207.0

* The female *C. mazarbarnetti* had an ossified skull and a globulous ovary with one ovum > 2 mm (based on the specimen tags). We therefore treat it as an adult.
** The female *P. novaesi* had an ossified skull and a granular ovary (based on the specimen tags), and is thus treated as an adult.

Description of the Holotype: Crown and forehead Jet-Black (3.2PB 1.6/0.5). Back of the neck, back, and rump Cinnamon-Brown (7.0YR 4.0/4.0). Tail Pale Orange-Rufous (2.5YR 5.0/8.0), with the central rectrices darker dorsally. Throat, sides of head, supercilium and supraloral-stripe Pinkish-Buff (0.4Y 7.5/4.3). Auriculars and moustachial region Pinkish-Buff, with dusky streaking. Lower throat and sides of neck Cinnamon-Brown (7.0YR 4.0/4.0). Breast, belly, and underwing coverts Cinnamon (8.7YR 5.0/6.0). Thighs, flanks and undertail coverts Prout's Brown (6.5YR 3.5/3.0). Remiges Vandyke Brown (5.0YR 3.5/2.5), with Cream-colored (3.5Y 8.5/5.5) fringes, wing-coverts darker than the remiges. Irides brown (from specimen label). Tarsi and toes in the dried skin Grayish-Olive (5.0 Y 4.8/2.5). Upper mandible black, lower mandible paler, and both with sides grayish in the dried skin. Total length 221.0 mm (from specimen label), exposed culmen 15.5 mm, wing chord 96.5 mm, tail 82.0 mm (but R1 and R2 were still growing), tarsus 23.2 mm, and body mass 48.0 g (from specimen label).

Etymology: The second author dedicates the name of the new species to the first author, a good friend and colleague who suddenly passed away before this manuscript was finished, in recognition of his important contributions to the conservation of the Atlantic Forest in northeastern Brazil and its declining avifauna. For the English name we propose Cryptic Treehunter because it is difficult to find and, particularly, to separate from *Philydor novaesi* in the field. We propose naming this species gritador-do-nordeste in Portuguese. 'Gritador' (meaning 'screamer') is an apt name given the loudness of its vocalizations, but it also represents a figure in Brazilian folklore. The story of the 'Gritador' is that of two brothers who went hunting and one accidentally shot the other. In desperation, he shot himself, and now his soul sometimes can be heard as it wanders through the forest in the top of the hills, screaming in pain while searching for his brother. A parallel can be drawn with the story of the 'Gritador', as *C. mazarbarnetti* can be heard 'screaming' while wandering through the hilltop forest searching in vain for his 'brothers', in this case due to the scarcity of the species.

Additional specimen: Immature female MN 34531 collected on 20 January 1986. This specimen is larger than *P. novaesi*, even the males, though it does

not approach the size and body mass of MN 34530 (see Table 1). It measured 207 mm in total length and 36 g. Like the holotype of *C. mazarbarnetti*, this specimen has the rump and sides of neck browner, the plumage more orange than any *P. novaesi*, and the crown and lores unmarked and blackish, and it lacks the buffy eyering (Figure 6). Although collected four days later, this specimen was presumed to be the same bird seen accompanying the holotype when it was collected (Dante M. Teixeira *pers. com.*, 2004). Therefore, it is possible that MN 34531 represents the offspring of MN 34530.

GEOGRAPHIC DISTRIBUTION

Cichlocolaptes mazarbarnetti is known from only two sites, the type locality at Murici in the state of Alagoas, and Frei Caneca (08º 43' S, 35º 51' W), Jaqueira, in the state of Pernambuco. The 6,116 ha of Murici presently has less than a 2,000 ha covered by forests that are suitable for this species. In recent years, *C. mazarbarnetti* has been found at this site only in the vicinity of an area known as Poço d'Anta, at Fazenda Bananeiras (09º 12' S, 35º 52' W, 500–600 m). The species could potentially occur in the forests of the nearby Fazenda São José (09º 13' S, 35º 54' W) and perhaps in certain tracts of forest at Serra do Ouro (09º 14' S, 35º 50' W). *Cichlocolaptes mazarbarnetti* has been found at Frei Caneca, and it could potentially be present in the forests of the contiguous Fazenda Pedra D'Anta (08º 39' S, 35º 53' W), comprising together about 1,000 ha of forest (SAVE Brasil 2013). We did not find the species at various other highland localities, or at two lowland sites, in the states of Alagoas and Pernambuco (Appendix 3).

HABITAT AND BEHAVIOR

The Cryptic Treehunter is endemic to the 'Pernambuco Center' of endemism, where it inhabits dense, humid forests in hilly terrain with rainfall higher than at nearby lowland sites. The areas at Fazenda Bananeiras and Frei Caneca where the species and its co-endemics have been found are forests near the hilltops, and especially those in deep, forested ravines. The steep slopes and ravines present taller and better-preserved forest, where a few emergent trees reach over 25 m. These forests have been selectively logged, but some areas have suffered from more severe logging. Most of these areas were not logged, and have recovered some of the original structure with multiple strata and a relatively open understory. The best-preserved patches have a profusion of vine tangles and they are densely laden with bromeliads, mosses, and orchids (Figure 7). A great number of these epiphytes, mainly bromeliads, are also restricted to the 'Pernambuco Center' of endemism (Siqueira-Filho & Leme 2006). *Cichlocolaptes mazarbarnetti* can be found alone or in pairs, sometimes on their own, but usually in association with large, mixed-species flocks. They move between the

FIGURE 6. Juvenile *Cichlocolaptes mazarbarnetti* (MN 34531), showing the dark crown, the absence of a buffy eyering, and browner sides of neck.

mid-levels and the subcanopy (mostly 8–20 m). A bird seen by the authors on 12 October 2002 was foraging actively in the lower part of an open tree-crown. It visited bromeliads exclusively, searching deeply within them. On one occasion, a bird was seen entering and almost disappearing into one large bromeliad, leaving only its upward pointing tail visible. This bird removed and threw away dead leaves from the bromeliad's interior while searching for food. Another individual was observed on 21 January 1998 foraging at 12–15 m in the subcanopy and again inside a large bromeliad cluster on a canopy branch off the main trunk (A. Whittaker *in litt*. 2004). A bird seen in January 1999 was foraging 12–15 m up in the sub-canopy by 'rummaging around in bromeliads, with just its tail and hind-parts sticking out' (K. Zimmer and A. Whittaker *in litt*. 2004). A bird was also seen foraging about 15 m up in a bromeliad on 23 February 2003 (W. Silva *in litt*. 2004). The pair seen and tape-recorded by DCB at Frei Caneca on 3 October 2003 was searching a large bromeliad 15 m up. A bird observed on 19 April 2007 at Murici was attracted with playback after natural vocalizations were heard. It flew through the subcanopy 18 m up and then stopped at a branch covered by moss 15 m up, where it started to sing again for a few minutes before flying away. Probably the same bird was heard and tape-recorded in the same area on 20 April 2007 at dawn, when it gave non-stop songs for at least 12 minutes from a large concentration of bromeliads 8 m above the ground on the top of a hill. One individual seen on 12 October 2002 was in a flock with *Veniliornis affinis*, *Picumnus exilis*, *Automolus lammi*, *Xiphorhynchus atlanticus*, *Thamnophilus aethiops*, *Thamnomanes caesius*, *Myrmotherula axillaris*, *Myrmotherula snowi*, *Herpsilochmus rufimarginatus*, *Terenura sicki*, *Myrmoderus ruficaudus*, *Conopophaga melanops*, *Myiopagis gaimardii*, *Rhynchocyclus olivaceus*, *Hemitriccus griseipectus*, *Caryothraustes canadensis*, and *Saltator maximus*. The mixed-species flock joined by the individual observed on 21 January 1998 included *X. atlanticus*, *T. caesius*, *M. snowi*, *T. sicki*, and *Myiobius atricaudus*. This bird was in heavy wing and tail molt, including both the primaries and secondaries (A. Whittaker *in litt*. 2004).

VOCAL REPERTOIRE

Vocalizations of birds that match the morphological characteristics of the type of *C. mazarbarnetti* were recorded at Murici and Frei Caneca. Most of the songs analyzed were spontaneous, and from recordings made between March 2001 and April 2007, in the months of January, February, March, April and October, by four different recordists on five occasions. Given that all of these recordings were made at Fazenda Bananeiras and Frei Caneca, it is also possible that only five or six individuals are represented. In the following description, we compare *C. mazarbarnetti*'s vocalizations with those of *C. leucophrus*, *Philydor novaesi*, and *P. atricapillus*,

FIGURE 7. Detail of primary forest at Frei Caneca, showing the profusion of epiphytes (and in particular bromeliads) in the canopy. Photo by DCB.

showing their differences and homologies. Examination of the complete vocal repertoire of *C. mazarbarnetti* would be necessary for a thorough analysis, yet we feel that the available material is sufficient to document our assertion that *C. mazarbarnetti* and *Philydor novaesi* represent different species. What we regard as Song Type 1 of *C. mazarbarnetti* is a fast, dry rattle of 0.38–2.81 s followed closely by a series of 4–8 loud, raspy notes delivered at a regular pace (Figure 8A). Each of these raspy notes, lasting 0.12-0.23 s, increases slightly in frequency before decreasing suddenly at the end. The initial rattle is a rapid series of 9–62 notes at a pace of 21.1–24.7 notes/s in spontaneous songs, but it is faster following playback. This initial rattle maintains a constant frequency throughout and it may escape detection if the bird is distant. Sometimes the song includes a shorter rattle after the series of harsh notes, and this occurs mostly when the number of harsh notes is fewer. In response to playback, and spontaneously at dawn, we observed a modified version of Song Type 1 that we refer to as Song Type 2: the initial rattle increases to 1.8–3.2 s and the number of following notes is reduced to 1–3; the first note is lower pitched than the second, and the second is lower than the third (if present) (Figure

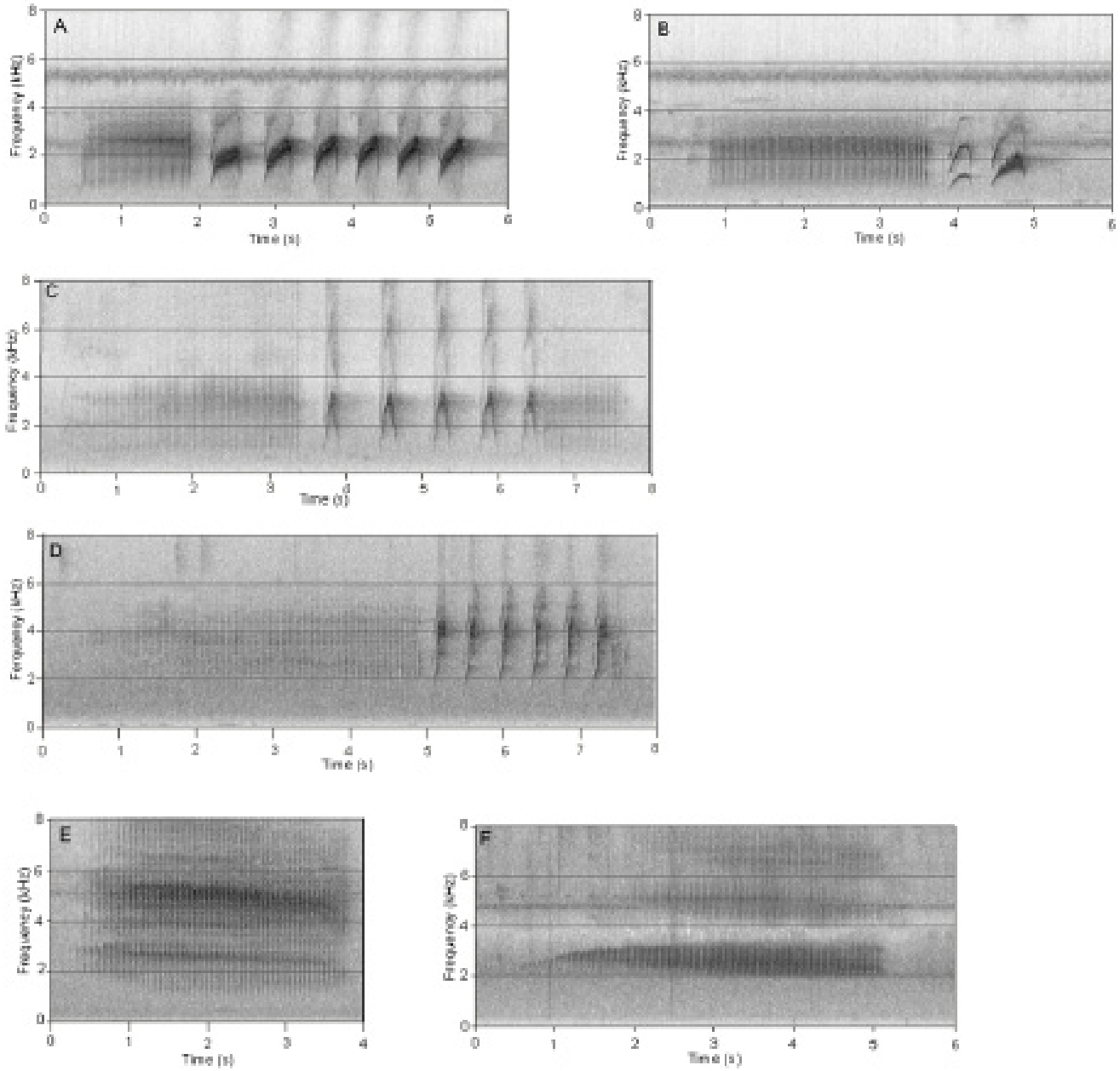

FIGURE 8. A. Song Type 1 of *Cichlocolaptes mazarbarnetti* recorded on 20 April 2007 at Murici Ecological Station, municipality of Murici, Alagoas (DCB, XC180893). **B.** Song Type 2 of *Cichlocolaptes mazarbarnetti*, recorded in same take as A. **C.** Song of *Cichlocolaptes leucophrus leucophrus* recorded on 3 May 1997 in the municipality of Vargem Alta, Espírito Santo (Ricardo Parrini). **D**. Song of *Cichlocolaptes leucophrus holti*, recorded on 28 June 2003 at Rio Vermelho, municipality of Bananal, São Paulo (DCB, XC180863). **E**. Song of *Philydor novaesi* recorded on 15 February 2003 at Frei Caneca, municipality of Jaqueira, Pernambuco (JMB, XC181063). **F.** Song of *Philydor atricapillus* recorded on 16 October 1993 in the municipality of Ubatuba, São Paulo (Andrew Whittaker).

8B). On one occasion, we recorded a spontaneous vocalization at dawn that was delivered for 12½ minutes, and that comprised 10 phrases of the first song-type, 64 phrases of the second song-type, and one isolated rattle. The interval between songs was shorter at dawn, when the number of phrases of Song Type 2 was greater than that of Song Type 1, but most spontaneous songs made throughout the day matched Song Type 1, and Song Type 2 was given almost exclusively in response to playback. Analysis of 123 phrases of song (including both types 1 and 2) shows only limited variation. In addition to songs, birds may deliver a fast rattle without the following notes, at a rate of 21.7–24.0 notes/s, and lasting up to 8.5 s (Figure 11A). Isolated rattles may be delivered among songs, as was heard at dawn, or after playback, when the bird is excited, but it is unusual to hear them given spontaneously during the day. Calls recorded in response to playback are a fast, staccato series of three dry notes that have an ascending and then a descending shape, and which are delivered at 2.0–2.4 kHz (Figure 9A; Table 2). Single-note calls are reminiscent of the raspy notes of the song, but without the upward and downward inflections, and they are delivered at 1.7-2.7 kHz (see Table 2). A presumed alarm-call was recorded once, and possibly related to an agonistic behavior, given that two birds were involved. It consisted of 1-3 notes, the first a fast and sharply descending modulation, followed by a fast upward and slow downward modulation, and finally, a raspy note at the end. Sometimes two notes were delivered after the raspy note, and sometimes only the raspy notes were delivered (Figure 10A). The song of *C. leucophrus leucophrus* consists of a fast, dry rattle of 2.2-3.6 s followed closely by a series of 5-8 loud, short notes delivered at a regular pace (Figure 8C). The structure of the song is similar to that of *C. mazarbarnetti*, but the timbre and shape of the short notes are different. Like *C. mazarbarnetti*, *C. l. leucophrus* sometimes delivers a faster rattle of about 1.0 s at the end of the phrase, and sometimes in response to playback, isolated rattles at a rate of 19.5–22.2 notes/s, with the rattle lasting up to 9.2 s (Figure 11C). The song of *C. leucophrus holti* is similar in pattern to that of *C. l. leucophrus* and *C. mazarbarnetti*, in that it is a fast, dry rattle of 0.5-4.3 s followed closely by a series of 4-8 loud, short notes delivered at a regular pace (Figure 8D). Each of the short notes begins by increasing in frequency, but unlike the songs of C. *mazarbarnetti* and *C. l. leucophrus*, the decrease at the end is not so evident. The initial rattle maintains a constant frequency throughout. Like *C. mazarbarnetti* and *C. l. leucophrus*, *C. l. holti* sometimes delivers a shorter (0.3 s) and more rapid rattle at the end of the phrase. Possibly because of its smaller body size, all notes in the song of *C. l. holti* are given at a higher frequency than those of the other taxa (see Table 2). The song of *C. mazarbarnetti* is closer to that of *C. l. leucophrus* than *C. l. holti* in the range and frequency of the initial rattle and raspy notes. Some homologies in the calls and rattles were also noted between *C. mazarbarnetti* and *C.*

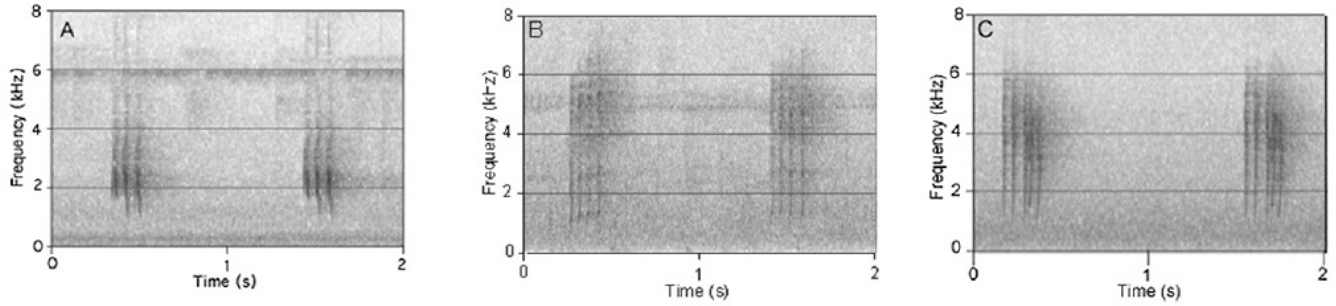

FIGURE 9. A. Three-note calls of *Cichlocolaptes mazarbarnetti* recorded on 5 March 2001 at Murici, Alagoas. (Curtis Marantz, LNS/Macaulay Library #128035). **B**. Calls of *Philydor novaesi* recorded on 3 October 2003 at Frei Caneca, Jaqueira, Pernambuco (DCB, XC181036). **C.** Calls of *Philydor atricapillus* recorded on 17 July 1994 at Serra da Cantareira, municipality of Guarulhos, São Paulo (DCB, XC180995).

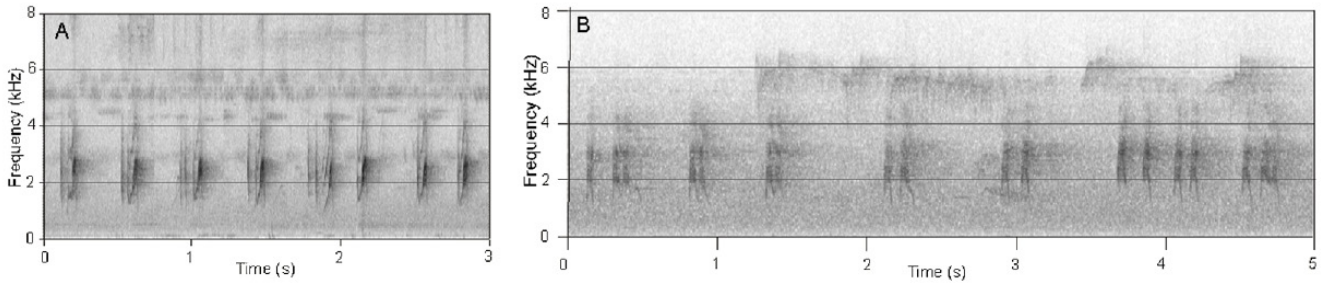

FIGURE 10. A. Alarm calls of *Cichlocolaptes mazarbarnetti* recorded on 3 October 2003 at Frei Caneca, municipality of Jaqueira, Pernambuco (DCB, XC180906). **B**. Alarm calls of *Cichlocolaptes leucophrus leucophrus* recorded on 11 May 1999 in the municipality of Boa Nova, Bahia (Ricardo Parrini).

l. leucophrus, these mainly in the rattle and alarm calls. Alarm calls of *C. mazarbarnetti* and *C. l. leucophrus* have a similar pattern (Figs. 10A and 10B). Unlike those of the taxa described above, the song of *P. novaesi* is a high-pitched rattle that combines two simultaneous notes as it descends slightly in pitch through the song (Figure 8E). Each component note decreases sharply in pitch, the whole rattle is longer than that of *C. mazarbarnetti*, and it is delivered at a slower pace (see Table 2). The length of the phrases varies relative to the bird's level of excitement. The song is usually delivered at intervals of 5–15 s, but occasionally at longer intervals. The analysis of 75 phrases of the *P. novaesi* song, including an abnormal type (see below), showed only limited variation in frequency and pace. The songs analyzed were, for most part, spontaneous, and they were made between February 2003 and November 2010, in the months of February, March, June, October, November and December, by six different recordists on nine occasions. Given that all of these recordings were made at Frei Caneca, it is possible that only three or four individuals were represented. The song of *P. atricapillus* is similar to that of *P. novaesi*, in that it consists of a high-pitched rattle that descends slowly in frequency (Figure 8F). Each note has a simple, descending shape that is quite similar to that of the lower frequency notes of songs of *P. novaesi*. Each component note decreases sharply in pitch as well, and the whole song is delivered at 18.2–21.6 notes/s, and thus somewhat faster than *P. novaesi* (see Table 2). The duration of the phrases likewise varies based on the bird's level of excitement. One call of *P. novaesi* and *P. atricapillus* is similar in both structure and pace, and it consists of four, ascending notes given in a series (Figs. 9B and 9C). Although the vocal repertoire of *P. novaesi* is poorly known, we feel that the similarities in the songs and calls of *P. novaesi* and *P. atricapillus* show a clear homology, making a compelling case for a close relationship between them. The vocalizations of *P. atricapillus* tend to be 'softer' and higher in frequency than those of *P. novaesi*, which probably reflects its smaller size. By contrast, the fast rattle that begins the song of *C. mazarbarnetti* is different from that of the song of *P. novaesi* in structure, pace, frequency, and duration. It reaches 21.1–24.6 notes/s versus 12.2–16.3 notes/s and its frequency is 2.5 kHz compared to 5.2 kHz. The duration of 1.6 s is also markedly shorter than the 3.8 s of *P. novaesi* (see Table 2). It is important to note that the initial rattle of *C. mazarbarnetti*, *C. l. leucophrus*, and *C. l. holti* all maintain a constant frequency from beginning to end, whereas the frequency of the songs of *P. novaesi* and *P. atricapillus* fall steadily throughout the vocalization. Equally importantly, the raspy notes are absent in the song of both *P. novaesi* and *P. atricapillus*, yet they are present and conspicuous in the songs of *C. mazarbarnetti*, *C. l. leucophrus*, and *C. l. holti*. Calls of *C. mazarbarnetti* consist of series of three rapidly ascending and descending modulations at 2.0–2.4 kHz (see Figure 9A). *Philydor novaesi* has a similar sounding call, but it consists of 3–6 ascending notes

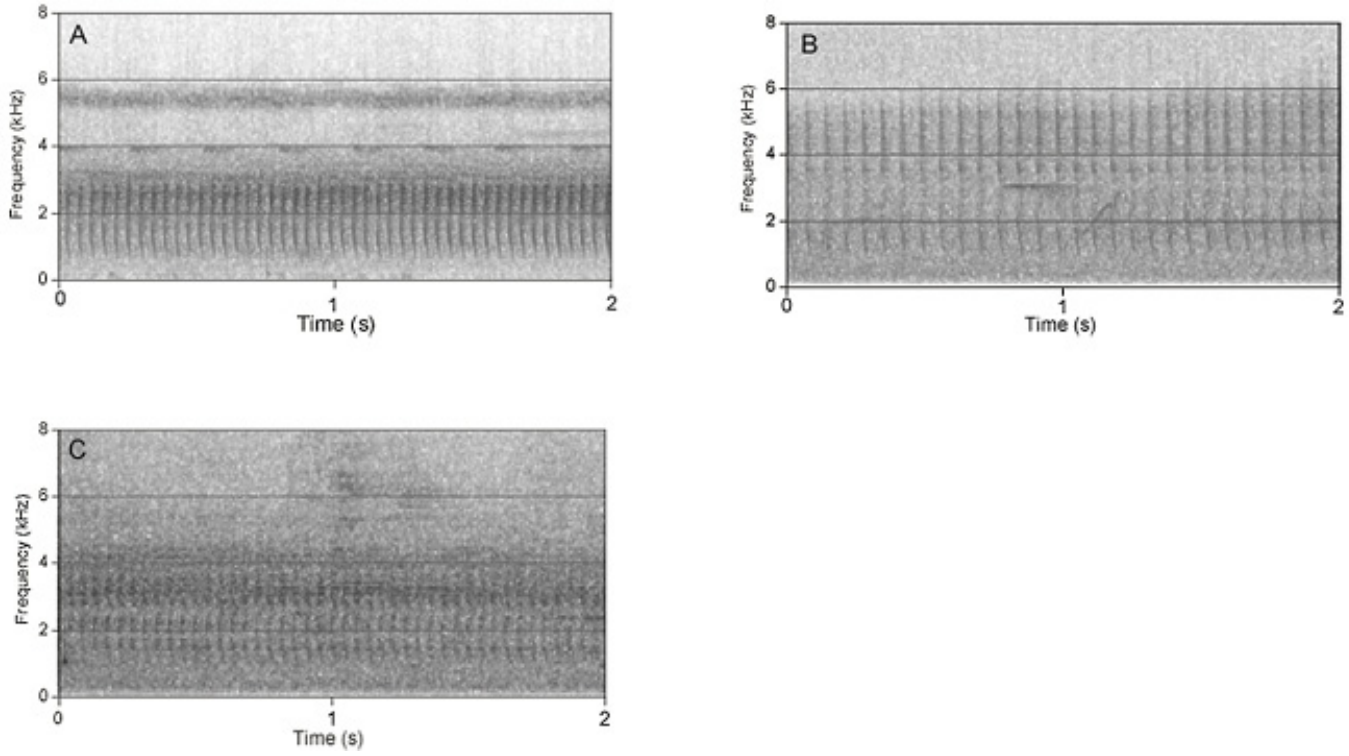

FIGURE 11. A. Rattle of *Cichlocolaptes mazarbarnetti* recorded on 20 April 2007 at Murici, Alagoas. (DCB, XC 180893). **B.** Rattle of *Philydor novaesi*, recorded in response to playback on 12 April 2003 at Frei Caneca, Jaqueira, Pernambuco (JMB, XC181072). **C.** Rattle of *Cichlocolaptes leucophrus leucophrus* recorded on 03 May 1997 at Reserva Biológica Augusto Ruschi, Espírito Santo (Andrew Whittaker).

delivered at 4.6-5.6 kHz (see Figure 9B; Table 2). The isolated rattle of *C. mazarbarnetti* is delivered at a rate of 21.7–24.0 notes/s and with a duration of 1.2-8.5 s, whereas the rattle of *P. novaesi* is 7.2-13.6 s in length and it is delivered at a rate of 13.8-15.8 notes/s (Figure 11B). These vocalizations also differ in frequency and note shape (Figure 12A). It is interesting to compare the rattle of *C. mazarbarnetti,* whether as the initial part of the song or as a stand-alone vocalization, with the song of *P. novaesi*, which is also a rattle. The rattle of *C. mazarbarnetti* is both quicker (21.1–24.6 notes/s for the initial part of the song and 21.7-24.0 notes/s for a stand-alone rattle versus 12.2-16.3 notes/s) and lower in frequency (2.5 kHz versus 5.2 kHz). These vocalizations also differ in frequency and shape of the notes (Figure 12B). A playback experiment was carried out at Murici to test the

TABLE 2: Comparison of songs and calls of *Cichlocolaptes leucophrus holti, C. l. leucophrus, C. mazarbarnetti, Philydor novaesi*, and *P. atricapillus*. The values presented are range, mean ± standard deviation (in parentheses) and sample size for songs and calls (in italics).

	Cichlocolaptes leucophrus holti	***Cichlocolaptes leucophrus leucophrus***	***Cichlocolaptes mazarbarnetti***	***Philydor novaesi***	***Philydor novaesi****	***Philydor atricapillus***
Rattle/Song *length (s)*	0.51-4.30 (2.35 ± 1.17) *n = 14*	2.25-3.65 (2.95 ± 0.70) *n = 3*	0.38-2.81 (1.62 ± 0.35) *n = 27*	2.45-5.64 (3.83 ± 0.63) *n = 35*	2.8	2.64-4.76 (3.64 ± 0.55) *n = 15*
number of notes	10-89 (47.07 ± 23.08) *n = 14*	50-77 (63.66 ± 13.50) *n = 3*	9-62 (38.03 ± 14.49) *n = 27*	32-76 (53.60 ± 9.9) *n = 35*	45	56-103 (71.93 ± 12.19) *n = 15*
notes per second	16.94-21.78 (20.09 ± 1.22) *n = 14*	21.10-22.22 (21.62 ± 0.56) *n = 3*	21.11-24.66 (23.44 ± 0.83) *n = 27*	12.28-16.34 (13.98 ± 1.16) *n = 35*	16.07	18.28-21.64 (19.77 ± 1.24) *n = 15*
frequency (kHz)	3.55-4.10 (3.72 ± 0.13) *n = 14*	2.87-3.13 (2.98 ± 0.13) *n = 3*	2.34-2.98 (2.53 ± 0.15) *n = 27*	4.82-5.52 (5.29 ± 0.16) *n = 35*	3.83	2.48-3.07 (2.76 ± 0.18) *n = 15*
Raspy notes *length of note (s)*	0.12-0.23 (0.20 ± 0.02) *n = 101*	0.19-0.37 (0.25 ± 0.05) *n = 18*	0.12-0.23 (0.35 ± 0.05) *n = 129*	-	0.18-0.20 (0.18 ± 0.01) *n = 4*	-
number of notes	4-8 (6.31 ± 1.01) *n = 16*	5-8 (6.00 ± 1.73) *n = 3*	4-8 (3.55 ± 1.63) *n = 31*	-	4	-
frequency (kHz)	3.50-4.31 (3.80 ± 0.16) *n = 88*	2.87-3.58 (3.07 ± 0.23) *n = 18*	1.13-2.64 (2.07 ± 0.29) *n = 129*	-	1.62-1.95 (1.83 ± 0.14) *n = 4*	-
Calls with one note *frequency (kHz)*	3.82-5.50 (4.53 ± 0.31) *n = 71*	2.93-3.48 (3.24 ± 0.18) *n = 68*	1.75-2.72 (2.29 ± 0.19) *n = 84*	3.54-4.23 (3.75 ± 0.22) *n = 13*	-	3.31-5.00 (4.41 ± 0.57) *n = 34*
Calls with 3-6 notes *frequency (kHz)*	-	-	2.09-2.47 (2.28 ± 0.10) *n = 33*	4.68-5.69 (5.26 ± 0.31) *n = 25*	-	3.87-5.73 (4.61 ± 0.51) *n = 14*

*abnormal song of *P. novaesi* after playback of *C. mazarbarnetti*'s song (n = 1 phrase)

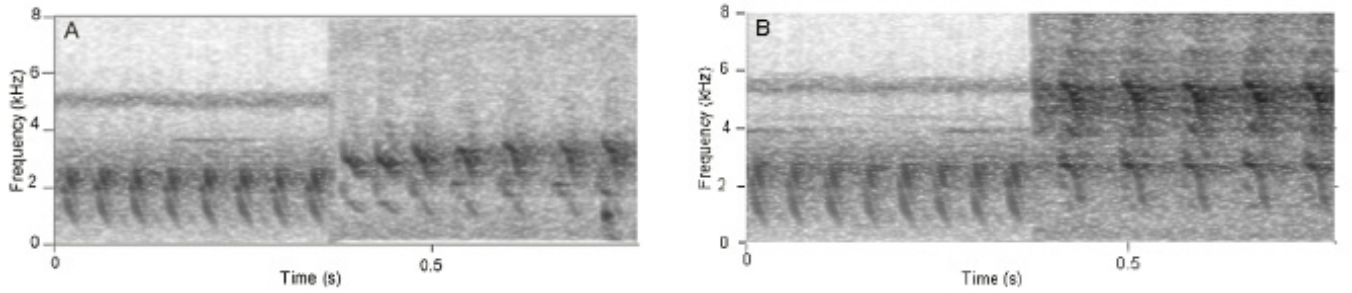

FIGURE 12. A. Comparison between the rattles of *C. mazarbarnetti* and *P. novaesi*, showing differences in frequency, pace, and shape of the notes. **B.** Comparison between the rattle of *C. mazarbarnetti* and the song of *P. novaesi*, showing differences in frequency, pace, and shape of the notes.

reaction of *C. mazarbarnetti* to the song of *P. novaesi*. The individual of *C. mazarbarnetti* recorded on 20 April 2007 at dawn (see Habitat and Behavior) had sung spontaneously for at least 12 minutes. Immediately after it stopped singing, we played a single song of *P. novaesi* several times, at intervals of one or two minutes. No vocal or visual reaction by *C. mazarbarnetti* was observed. This was probably the same individual that was recorded in the same area on the previous afternoon, when it was attracted immediately by playback of its own song, clearly demonstrating territorial defense behavior. The bird recorded on 12 October 2002 at Murici also showed strong territorial defense behavior after playback of its own song, first flying back-and-forth overhead several times and then singing for some minutes. The same behavior was noted by Curtis Marantz when he recorded *C. mazarbarnetti* at Murici in March 2001 (http://macaulaylibrary.org/audio/128037). *Cichlocolaptes mazarbarnetti*'s behavior on these occasions led us to conclude that it did not recognize the song of *P. novaesi* as part of its own species' repertoire. An abnormal song of *P. novaesi* was recorded at Frei Caneca on November 2010 (www.xeno-canto.org/65550) with simultaneous photos and observations made following extended playback of the song of both *C. mazarbarnetti* and *P. novaesi* (Ciro Albano *in litt*. 2010). This vocalization consisted of an initial rattle followed by four short notes, and in this respect if superficially resembled a song by *C. mazarbarnetti*. This song has been considered by some colleagues to be the same as the song of *C. mazarbarnetti*, thus leading them to conclude, based on this recording and the concomitant observation of a bird that visually matches *P. novaesi*, that only one species is involved. We therefore analyzed this recording and compared it with the songs of both *P. novaesi* and *C. mazarbarnetti.* The initial rattle of the abnormal song is similar to the song of *P. novaesi* in length, pace, and in the number and shape of the notes, and it descends in frequency throughout. It differs from the song of *C. mazarbarnetti* in all these parameters (see Table 2). The four terminal notes of the abnormal song are softer than the loud and raspy notes of *C. mazarbarnetti*, and their shape and timbre are quite different. In the recording, the abnormal song is followed by three typical songs of *P. novaesi*, which are closely similar to the initial rattle of the abnormal song. We therefore conclude that this phrase was delivered by an excited *P. novaesi* during an unusual behavioral context, as opposed to by *C. mazarbarnetti*.

DISCUSSION

Evidence for a new species

The differences between *C. mazarbarnetti* and *P. novaesi* in morphology and plumage noted on museum skins, combined with vocalizations and observations of foraging behavior made in the field, provide strong evidence that two different species are involved. These differences are at odds with variation within a single population (see also Claramunt [2014] regarding morphometric evidence). Aspects of the plumage that aided our diagnosis of the new species from *P. novaesi* in the field were noted, most notably characters of the facial pattern and color of the upper-tail coverts. There is a photo available at Lees *et al*. (2014), where the buffy eyering and the rufous upper-tail coverts of *P. novaesi* are shown simultaneously, and we can see at Figure 4 the different facial pattern and the dark rump color of *C. mazarbarnetti*. A video made at Frei Caneca on 11 October 2008, available at http://ibc.lynxeds.com/video/alagoas-foliage-gleaner-philydor-novaesi/bird-tree-singing-several-times-flying-away, shows a singing bird with a buffy eyering. The four phrases of the song presented in this video have the same pattern of the song of *P. novaesi* shown in Figure 8E in duration, pace, number and shape of the notes, and the descending frequency. The facial pattern and the domed head of this bird match the four unambiguous skins of *P. novaesi* by comparison (see Figs. 3 and 5). Another video made at Frei Caneca on 5 November 2010, available at http://ibc.lynxeds.com/video/alagoas-foliage-gleaner-philydor-novaesi/one-adult-bird-singing, shows a singing bird with a bill that appears both larger and stouter than that of the bird in the first video. The large

bill in particular suggests *C. mazarbarnetti*. Although we noted little variation in bill size in the type series of *P. novaesi*, representing one female and three males (see Table 1), individual variation in bill size in ovenbirds and sexual dimorphism in *Philydor* are both expected (see Claramunt 2014). The bird recorded on 5 November 2010 does have a buffy eyering, and the six phrases of the song heard in this video have the same pattern as those in the first video, and they are again like that shown in Figure 8E. We therefore conclude that this bird also represents *P. novaesi*, and that the most important features to separate *P. novaesi* from *C. mazarbarnetti* in the field are the facial pattern, in particular the presence versus absence of buffy eyering, respectively, rufous upper-tail coverts versus brown rump, and a song that represents a long, descending rattle in *P. novaesi* versus a rattle that maintains a constant frequency throughout followed by some raspy notes in *C. mazarbarnetti*. There are many other cases in which vocalizations provided the first insight that a new species was present, to be corroborated only later by morphological or molecular evidence (such as, for a few recent examples, *Herpsilochmus sellowi* (Whitney *et al*. 2000), *Suiriri islerorum* (Zimmer *et al.* 2001), and *Formicivora grantsaui* (Gonzaga *et al*. 2007)). Our observations suggest that foraging behavior differs in *C. mazarbarnetti* and *P. novaesi*. The *Philydor* forages in the lower strata, up into the canopies of mid-sized trees, where it forages along branches and in tangles. Of the four unambiguous specimens of *P. novaesi*, two were mist-netted in the understory and one was shot in the mid-levels (based on information contained on the specimen labels). It also adopts a variety of postures when foraging, with its head down, or hanging with the belly upwards, even from suspended branches, or perching on vertical branches. These birds search the edges of green leaves, they inspect dead leaves that have fallen or those that have accumulated in clusters, they rummage in balls of detritus, they creep along surfaces of trunks, and they even lift bark. These birds also hammer thick and rotten branches in the manner of a *Xenops* (Teixeira & Gonzaga 1983a). Birds seen at Frei Caneca in February 2003 and in September–October 2003 (Mazar Barnett *et al*. 2004) moved along thin horizontal branches in the lower to middle levels among the crowns of small trees (*ca*. 4 m). *P. novaesi* was also seen foraging on bromeliads in the mid-levels, searching mainly the edges of the leaves and clusters, but not 'entering' bromeliads leaving only its tail visible, as does *C. mazarbarnetti* when foraging. *Philydor novaesi* fanned their tails, as described by Teixeira & Gonzaga (1983a), which resulted in the tail appearing broad and rounded, and thus much like *P. atricapillus*. Foraging maneuvers observed included a bird pecking at a dead leaf that was hanging from a small clump of mosses in a fork, and another bird that systematically investigated clumps of hanging, dead leaves (Mazar Barnett *et al.* 2004; see also *Philydor novaesi* photos #6-8 in Minns *et al.* [2009]). Despite the paucity of data on the foraging behavior of *P. novaesi*, similarities with *P. atricapillus* were noted by us and by other researchers (Gussoni *et al*. 2011), yet consistent and marked differences were noted between *P. novaesi* and *C. mazarbarnetti*. *Philydor atricapillus* has been regarded as a dead-leaf-searching specialist (Remsen & Parker 1984, Parrini *et al*. 2010) that frequently assumes acrobatic postures, such as hanging upside-down vertically. It also uses substrates such as bits of rotten wood, hanging debris, vine tangles, living foliage and epiphytes (especially bromeliads), though more often these birds inspect clusters of dead leaves (Mallet-Rodrigues 2001). *Philydor atricapillus* has also been seen foraging in a *Xenops*-like manner (Fontana *et al.* 2003), as described above for *P. novaesi*. We have noted in *P. atricapillus* the typical and characteristic movement of the fanned tail, identical to that described above for *P. novaesi*. The behavior of *C. mazarbarnetti* is notably different from that described above for *P. novaesi* and *P. atricapillus* as a result of its clear preference for foraging at bromeliads, and by inhabiting the middle to upper strata of the forest (see Habitat and Behavior). In these respects, the behavior noted closely matches that of *C. leucophrus*. It is also important to note that the holotype of *C. mazarbarnetti* (MN 34530) was shot near the canopy and that it was searching a bromeliad at the time (based on the specimen label; D. M. Teixeira *pers. comm*. 2004). Our requests for permission to X-ray skulls and take samples for molecular analysis from the specimens of *C. mazarbarnetti* and *P. novaesi* at MN were denied in September 2004, November 2008, and June 2013. Our conclusions, based on morphology, plumage, vocalizations, and foraging behavior, could be corroborated in the future using molecular methods.

Affinities of *C. mazarbarnetti*

Morphometric features that link *C. mazarbarnetti* to *Cichlocolaptes* were presented by Claramunt (2014). What little is known of the behavior of the new species also links it to *Cichlocolaptes*. The tendency of *C. mazarbarnetti* to remain in the subcanopy or higher strata is shared with *C. leucophrus*, even though both species do frequent lower strata on occasion. *Cichlocolaptes leucophrus* is known to be highly dependent on bromeliads, and while foraging, it searches deep within leaf clusters, sometimes almost disappearing altogether (Pizo 1994, Ridgely & Tudor 1994, Fontana *et al*. 2003). We have noticed a similar foraging behavior and dependency on bromeliads for *C. mazarbarnetti*, and our data are supported by observations by others (e.g., K. Zimmer and A. Whittaker *in litt*. 2004). The rather slow and deliberate movements of *C. mazarbarnetti* while foraging also recalled those of *C. leucophrus* to A. Whittaker (*in litt*. 2004). Above all, we

think that the undeniable similarity of the vocalizations of *C. mazarbarnetti* and *C. leucophrus* suggests better than anything else that the two are closely related. The differences in plumage between *C. mazarbarnetti* and *C. leucophrus* are considerable; however, there are other examples of sister species of foliage-gleaners in which one has a plain plumage and the other has a strongly streaked one: *Simoxenops ucayalae* and *S. striatus*, *Syndactyla rufosuperciliata* and *S. dimidiata*, and *Automolus subulatus* and *A. cervicalis* (Remsen 2003, Robbins & Zimmer 2005, Derryberry *et al*. 2011, Claramunt *et al.* 2013). The difference in plumage pattern and color between *C. mazarbarnetti* and the southern forms *C. l. leucophrus* and *C. l. holti* could indicate that the latter two heavily streaked taxa are more closely related to each other. The extent to which these plumage features indicate relationships is hard to determine, and as such, a molecular analysis of *Cichlocolaptes* will likely be necessary to determine the true affinities of the new species.

Biogeography

The forests of northeastern Brazil, north of the São Francisco River, have long been recognized as a center of endemism. The 'Pernambuco Center' (Prance 1982, Coimbra-Filho & Câmara 1996, Silva & Casteleti 2005) is well-known to harbor endemic plants (Prance 1987, Tabarelli & Santos 2004), butterflies (Brown 1987), and birds (Cracraft 1985, Stattersfield *et al*. 1998, Roda 2003). The endemic avifauna of this area is composed of two sets of taxa with different biogeographical affinities. One set has affinities with the Atlantic Forest, and the other is related to Amazonian taxa (Teixeira 1986, Roda 2003). Taxa with Atlantic Forest affinities include *Philydor novaesi*, *Automolus lammi*, *Dendrocincla taunayi, Xiphorhynchus atlanticus, Synallaxis infuscata*, *Myrmotherula snowi*, *Terenura sicki*, *Phylloscartes ceciliae*, and *Tangara fastuosa* (Roda *et al*. 2011). Treatments of these taxa as either species or subspecies reflect uneven taxonomic studies of the region's birds.

CONSERVATION

The existence of a cryptic taxon resembling *P. novaesi* render past records of this species uncertain if not accompanied by a recording or detailed morphological or behavioral data. There are no recent observations of *P. novaesi* at Murici. It went unrecorded September 2002-October 2003 despite the near constant presence of a resident ornithologist. DCB searched for *P. novaesi* in April and December 2007 at Murici, but found only *Cichlocolaptes mazarbarnetti*. We have searched for both *C. mazarbarnetti* and *P. novaesi* at many other sites (see Appendix 3), and failed to find it. Since the discovery of *P. novaesi* at Frei Caneca (Mazar Barnett *et al*. 2003, 2004), the species was seen frequently there until September 2011 (Carlos Gussoni *in litt.* 2014), but there have been no subsequent reports, and its conservations status in the area is considered critical (Pedro Develey, SAVE Brasil, *in litt*. 2014, Lees *et al*. 2014). There is only one record of *P. novaesi* at the contiguous area Fazenda Pedra D'Anta, municipality of Lagoa dos Gatos, close to the border of Frei Caneca (Roda 2011). *Cichlocolaptes mazarbarnetti*, like *P.* novaes*i*, is certainly one of the rarest birds in the world. It is known from only two localities. At Murici, less than 3,000 ha remain forested (Goerck 2001a), and probably no more than 1,500–2,000 ha are suitable for the species. Frei Caneca and Fazenda Pedra D'Anta comprise together about 1,000 ha of contiguous forest (SAVE Brasil, 2013). We propose that *C. mazarbarnetti* should be categorized as Critically Endangered at both national and global levels. Criteria for such categorization are the small range (Extent of Occurrence estimated at <100 km^2, in only two localities), and a population of <50 individuals (BirdLife International 2000, IUCN 2012). We suspect that no more than two pairs each survive at sites from which all recent reports have been made. Based on intensive fieldwork at Murici by JMB and W. Silva as part of the conservation project of BirdLife International Brazil Programme, we estimated that a maximum of 5-10 pairs may have existed in the entire reserve in 2004; however, the number of birds remaining is likely lower. At Frei Caneca, we estimate that no more than one or two pairs survive. Murici has been a mythical spot among birdwatchers because of the presence of several range- restricted species. It is likewise a key place for conservationists, due to the difficulty of implementing measures to protect its remaining bits of natural habitat (e.g., BirdLife International 2000: 357). Ironically, Teixeira & Gonzaga (1983a) argued for the declaration of an ecological station in the forests of Murici when they described the first endemic bird from the site, 18 years before its designation as such. Goerck (2001b) stated that the official designation of Murici's protected area status 'should ensure the survival of its many threatened species.' Sadly, we doubt that this is the case, as most land is still in private hands, and troubling levels of small to medium-scale deforestation were detected during September–October 2002-2007. Most unsettling then was the felling of much of the forest on the entire slope opposite the ravine that holds all recent records of *C. mazarbarnetti*, with evidence of further logging occurring between visits during the above period. This area appeared to be ideal habitat for *C. mazarbarnetti*, given the profusion of bromeliads and other epiphytes that remained in the now broken and very open canopy. Most of the cleared land on steep slopes is being converted into grazing areas for cattle. The lower slopes, valley bottoms, and adjacent lowlands

were long ago converted to sugarcane plantations, though some fields are now used for cattle grazing. The specialization of *C. mazarbarnetti* on bromeliads, as is known for *Cichlocolaptes leucophrus* (Pizo 1994), is a very important aspect of its conservation. Secondary forests have lower densities of epiphytes, including bromeliads (Dettke *et al.* 2008, Mania & Monteiro 2010). We suspect that *C. mazarbarnetti* can survive only in primary or mature secondary forests where bromeliads are abundant. This habitat is disappearing from the remnant forests in Alagoas and Pernambuco. We have searched unsuccessfully for the species at both Fazenda Riachão da Serra and Fazenda Branca dos Tavares, on patches of mature secondary forest with tracts of primary forest at the neighborhood of Murici. The more inaccessible forests of Fazenda São José and the remnant forest at Serra do Ouro, on the lands of the University of Alagoas, both at Murici, should also be surveyed. Usina Serra Grande, with *ca*. 3,500 ha of forests, is situated almost directly between Murici and Frei Caneca (Mazar Barnett *et al*. 2004). Although the species has never been recorded there (Roda *in litt*. 2004, Roda *et al*. 2008, Marantz *in litt*. 2014), specific searches in the area of Engenheiro Coimbra should be undertaken. Similar patches of forest at the complex of mountains known as 'Serra Grande', or 'Complexo Catende' (Ministério do Meio Ambiente 2000) should be identified and surveyed. Searches for *C. mazarbarnetti* should be undertaken in the most humid tracts of primary or mature secondary forests, which is where the forests have a high density of bromeliads. Searches should be undertaken between March and October, when the birds are most vocal. Sadly our expectations for the long-term survival of this species are not high, and we may now be witnessing its passage through the temporal window representing the time-lag between deforestation and extinction (Brooks & Balmford 1996). Conservation efforts at Murici have been undermined by political and bureaucratic problems since the ornithological discovery of the area. Without the political will to design and implement environmental policies and the commitment of private interests and stakeholders in Murici, little will be achieved for the conservation of its damaged forests (Mazar Barnett *et al*. 2004). An educational program targeting local communities is also essential. Such a program should focus on the biological uniqueness of the region's forests, their value, and the results of habitat deterioration by human activities. The current popularity of Murici with birders, which we now expect will increase, makes the choice of an ecotourism enterprise a valuable option to develop in the area. Murici and Frei Caneca are of maximum priority for the conservation of birds in the Atlantic Forest (see Goerck 2001a), and continent-wide (Collar *et al*. 1992, Goerck 2002), and the presence of this new species is a renewed reason to take actions for their preservation. The story of this discovery is unique, and it provides a crude testimony of how such remarkable phenomena can be missed, even when right before our eyes. Vocalizations once again provided the main lead in solving a twisted riddle in Neotropical ornithology. It was only after additional fieldwork that *C. mazarbarnetti* was 'discovered', and the 'true' *P. novaesi* was rediscovered. If all the factors of this complicated case had not taken place the way they did, *C. mazarbarnetti* could have remained forever overlooked.

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APPENDIX 1:

Specimens examined:

Cichlocolaptes mazarbarnetti: Brazil, Alagoas: Murici, Serra (=Pedra) Branca, one female (MN 34530, holotype) and one juvenile (MN 34531).

Cichlocolaptes leucophrus leucophrus: Brazil, Rio de Janeiro: Teresópolis, two males and two females (MZUSP 20263, 20438, 20196, and MN 38390); Fazenda Campestre, Nova Friburgo, one male (MN 36129). Brazil, Minas Gerais: Rio Doce, two males (MZUSP 25609, 25610). Brazil, Espírito Santo: Cupido, one male (MN 27152); Água Boa, Santa Cruz, one female (MN 19197); Chaves, one male and one female (MZUSP 28507, 28506); Pau Gigante, one female (MZUSP 9358); Rio São José, one male (MZUSP 28508); Itaúnas, one male (MZUSP 34530).

Cichlocolaptes leucophrus holti: Brazil, São Paulo: Iporanga, one male and one female (MZUSP 2864, 49761); São Paulo, Rio Ipiranga, one male (MZUSP 47838); Quadro Penteado, one male (MZUSP 49762); Rio das Corujas, one male (MZUSP 56751); Salesópolis, one male and one female (MZUSP 64439, 64591); Estação Engenheiro Ferraz, one male and two females (MZUSP 60716, 54949, 60714); Rocha, two males (MZUSP 49690, 49760); Boracéia, three males (MZUSP 31491, 31665, 31667); Juquiá, one female (MZUSP 32147). Brazil, Paraná: Guaratuba, one male (MZUSP 35397).

***Cichlocolaptes leucophrus* (intermediate specimens)**: Brazil, Rio de Janeiro: Visconde de Mauá, Rio Maromba, one male (MZUSP 36443). Brazil, São Paulo: Serra da Bocaina, two males and one unsexed bird (MZUSP 27132, 29544, 11048).

Philydor novaesi: Brazil, Alagoas: Murici, Serra (=Pedra) Branca, three males (MN 32028 paratype, 32029 holotype and 33872) and one female (MN 33873).

Philydor atricapillus: Brazil, Bahia: Cachoeira Grande do Sul, Rio Jacurucú, one male (MZUSP 14188). Brazil, Espírito Santo, one male (MZUSP 6327); Rio São José, one female (MZUSP 28525); Conceição da Barra, Rio Itaúnas, four females (MZUSP 34526–34529). Brazil, São Paulo, Iguape, two males and one female (MZUSP 62815, 62821, 62818); Iguape, Icapara da Serra, one female (MZUSP 62817); Iguape, Rio Ribeira, one female (MZUSP 66935); Iguape, Barra do Icapava, three males and two females (MZUSP 64951, 66933, 68303, 54940, 66934); Primeiro Morro, three males (MZUSP 49763, 49764, 49784); Rio Ipiranga, one female (MZUSP 47869); Campo Grande, one female (MZUSP 51141); Estação Engenheiro Ferraz, two males and three females (MZUSP 60684, 60686, 54938, 60687, 60688). Argentina, Misiones: Departamento Frontera, Refugio Piñalitos, nine males and six females (MACN 36748–36762).

APPENDIX 2:

Sound recordings examined

For each set of recordings, general localities are followed by the name of municipalities.

Cichlocolaptes mazarbarnetti – Brazil, Alagoas: Murici Ecological Station, municipality of Murici: Song Type 1 and 2 (n = 35), isolated rattles (n = 24), calls with three notes (n = 11), recorded by Curtis A. Marantz (LNS/ML #128025, 128032, 128034-128037); same locality: Song Type1 and 2 (n = 8), calls with 3 notes (n = 42), angry-calls (n = 147), recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor novaesi* recordings #1-4 and 10-11); same locality: Song Type1 (n = 7), recorded by JMB (XC180942 and 181076); same locality: Song Type 1 and 2 (n = 71), isolated rattle (n = 1), spontaneous calls with one note (n = 59), recorded by DCB (XC 180893,180902, 180909 and 181080). Brazil, Pernambuco: Frei Caneca, municipality of Jaqueira: calls with two and three notes (n = 8), calls with one note (n = 5) recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor novaesi* recording #11); same locality: calls with three notes (n = 1), calls with one note (n = 57), recorded by DCB (XC180906); same locality: Song Type 2 (n = 2), recorded by Braulio Carlos (XC180936).

Cichlocolaptes lecucophrus leucophrus – Brazil, Bahia: Municipality of Boa Nova. song (n = 1), calls (n = 7), recorded by Luiz P. Gonzaga (Gonzaga & Castiglioni 2001: *Cichlocolaptes leucophrus* recording #89); Fazenda Farofa, municipality of Boa Nova, calls (n = 11), alarm call (n = 1), recorded by Ricardo Parrini (Minns *et. al* 2009: *Cichlocolaptes leucophrus* recording #7; same locality, song (n = 5), calls (n = 32) recorded by Jeremy Minns (XC80778, XC80781); same locality, song (n = 1), recorded by Ciro Albano (Minns *et. al* 2009: *Cichlocolaptes leucophrus* recording #2). Brazil, Espírito Santo: Reserva Biológica Augusto Ruschi, municipality of Santa Teresa, rattle (n = 4), song (n = 3), recorded by Andrew Whittaker (Minns *et. al* 2009: *Cichlocolaptes leucophrus* recording #3); municipality of Vargem Alta, song (n = 3), calls (n = 4), recorded by Ricardo Parrini (Minns *et. al* 2009: *Cichlocolaptes leucophrus* recording #4). Brazil, Rio de Janeiro:

Municipality of Guapimirim, angry calls (n = 1), calls (n = 9), recorded by Jeremy Minns (XC180430).

Cichlocolaptes leucophrus holti – **Brazil, São Paulo.** Bananal Ecological Station, municipality of Bananal, calls (n = 23) recorded by DCB (XC 180870, 180871, 180874 and 180879); Rio Vermelho, municipality of Bananal, song (n = 10) recorded by DCB (XC180863 and 180866); municipality of Ubatuba, song (n = 1), calls (n = 4) recorded by Jeremy Minns (XC180433); Corcovado, municipality of Ubatuba, song (n = 9) recorded by DCB (XC180865); Fazenda Lavrinhas, municipality of Campos do Jordão, calls (n = 19) recorded by DCB (XC180868); Carlos Botelho State Park, municipality of São Miguel Arcanjo, calls (n = 11) recorded by DCB (XC180878). Brazil, Santa Catarina: Reserva Particular do Patrimônio Natural Volta Velha**,** municipality of Itapoá, song variant (n = 2), calls (n = 7), recorded by DCB (XC180867 and 180880); Aparados da Serra National Park, municipality of Jacinto Machado, alarm-calls (n = 3), recorded by DCB (XC180881).

Philydor novaesi – Brazil, Pernambuco: Frei Caneca, municipality of Jaqueira: song (n = 10), calls with 4-6 notes (n = 17), recorded by Ciro Albano (XC16447, 65550); same locality: song (n = 14), calls with one note (n = 2), recorded by Jeremy Minns XC80732; same locality: calls with one note (n = 15), call with four notes (n = 6) recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor novaesi* recordings #9 and 11); same locality: rattle (n = 4), song (n = 11), recorded by JMB (XC181063, 181068 and 181072); same locality: song (n = 26), calls with four notes (n = 35), recorded by DCB (XC181036, 181054, 181056 and 181059); same locality: song (n = 8) recorded by Josep del Hoyo (http://ibc.lynxeds.com/video/alagoas-foliage-gleaner-philydor-novaesi/bird-tree-singing-several-times-flying-away); same locality: song (n = 6), recorded by Carlos Gussoni (XC77752).

Philydor atricapillus – Brazil, Bahia: Una Biological Reserve, municipality of Una: calls with one note (n = 4), recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor atricapillus* recording #5). Brazil, Espírito Santo: Municipality of Santa Teresa: calls with one note (n = 8), recorded by Jeremy Minns (XC180436). Brazil, Rio de Janeiro: Ilha Grande, municipality of Angra dos Reis: song (n = 3), recorded by DCB (XC180950); Serra dos Órgãos National Park, municipality of Guapimirim: scolding-calls (n = 16), recorded by Jeremy Minns (XC80733). Brazil, São Paulo: Fazenda Angelim, municipality of Ubatuba: song (n = 3), calls with one note (n = 1), recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor atricapillus* recording #1); Corcovado, municipality of Ubatuba: song (n = 3), recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor atricapillus* recording #2); Folha Seca, municipality of Ubatuba: song (n = 3), calls with one note (n = 7), recorded by Jeremy Minns (XC80922); Cantareira State Park, municipality of Guarulhos: calls with four notes (n = 11), recorded by DCB (XC180995); Rio Mococa, municipality of Caraguatatuba: scolding-calls (n = 8), recorded by Jeremy Minns (XC80847); Bopiranga, municipality of Itanhaém, scolding-calls (n = 21), calls with one note (n = 7), recorded by DCB (XC181034, 181001 and 181030); Córrego do Engano, municipality of Miracatú, song (n = 14), recorded by DCB (XC181125). Brazil, Santa Catarina: Reserva Particular do Patrimônio Natural Volta Velha**,** municipality of Itapoá: calls with three notes (n = 4) recorded by Andrew Whittaker (Minns *et. al* 2009: *Philydor atricapillus* recording #9); same locality: calls with one note (n = 12), recorded by Jeremy Minns (XC180442); Canyon Fortaleza, municipality of Jacinto Machado: calls with 2-3 notes (n = 19), recorded by DCB (XC180992).

APPENDIX 3:

Fieldwork by one or both authors in search of *C. mazarbarnetti* and later *P. novaesi* was undertaken during the periods: 10 September 2002–15 October 2002 (Murici); 19 January 2003–9 February 2003 (with 19–23 January spent at Murici); 23 September–4 October 2003 (with 23–26 September spent at Murici and 28 September–04 October spent at Frei Caneca); 12-15 November 2003 at Usina Serra Grande, Ibateguara, Alagoas (08º 59' S, 35º 51' W); 18-22 November 2003 at Usina Trapiche, Pernambuco (08º 38' S, 35º 12' W);10-13 March 2004 (Murici); 14 March 2004 at Reserva Particular do Patrimônio Natural Senador Carlos Lyra, Maceió, Alagoas (09° 25' S, 36° 02' W); 17-18 March 2004 at Fazenda Riachão da Serra, União dos Palmares, Alagoas (09° 10' S, 35° 56' W); 19-21 March 2004 at Fazenda Recanto, Chã Preta, Alagoas (09º 17' S, 36º 14' W); 14–15 July 2004 (Murici); 16-22 April 2007 (Murici); 6-10 December 2007 (Murici).