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Range extension of the vulnerable dwarf marmoset, *Callibella humilis* (Roosmalen et al. 1998), and first analysis of its long call structure

G. S. T. Garbino · F. E. Silva · B. J. W. Davis

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Abstract We present two new records for the vulnerable dwarf marmoset, *Callibella humilis*. The first record, based on observed and photographed individuals, is from a *campinarana* area on the left (west) bank of the Rio Madeirinha, a left (west)-bank tributary of the Rio Roosevelt in the state of Amazonas, municipality of Novo Aripuanã and extends the distribution of the species ~270 km southwards, to the left (west) bank of the rio Roosevelt. The second record is based on an individual collected from the mouth of the Rio Roosevelt, at less than 10 km from the type locality of *Mico marcai*. This indicates that the species occurs sympatrically with *M. marcai* and probably *Mico melanurus*. We also present the first sonogram analysis of its long call structure, which shows some similarities, in the note duration and frequency, with *Cebuella pygmaea* and *Mico argentatus*.

Keywords *Callibella humilis* · Dwarf marmoset · Long call structure · Range extension · Rio Roosevelt · Sonogram

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Introduction

The dwarf marmoset *Callibella humilis* is currently known from 12 localities in the lower reaches of the Madeira—Aripuanã interfluvium of the southwestern-central Brazilian Amazonia (Roosmalen and Roosmalen 2003). It ranges from the left margin of the Rio Aripuanã and right margin of the Rio Manicoré, southwards to the Rio Arauazinho (Rylands et al. 2008). Its current distribution is contained entirely within the range of another marmoset, the larger Manicoré marmoset *Mico manicorensis* (Rylands et al. 2009). Despite being in the “least concern” threat category in the 2003 evaluation, *C. humilis* was re-classified as “vulnerable” in the latest assessment of the IUCN Red List (Mittermeier and Rylands 2008), due to its restricted range and the fact that its distribution does not encompass any protected area.

In the present communication, we add two unexpected new records that extend the range of *C. humilis* further south, to the left (west) bank of the Rio Roosevelt, where another species of marmoset occurs, the Marca’s marmoset *Mico marcai* (Alperin 1993; Rylands et al. 2009). We also present the first sonogram analysis of the long calls of *Callibella*, and compare it with other callitrichids.

Methods

On 23 February 2010, on the left (west) bank of the blackwater Rio Madeirinha, a left (west)-bank tributary of the Rio Roosevelt in the state of Amazonas, municipality of Novo Aripuanã (08°38’S, 61°02’W, ca. 100 m above sea level), BJWD observed a small group of *C. humilis* in transitional forest between an area of rocky *campina* and tall *terra firme campinarana*. At least four individuals were

present, and one of them, a male, was photographed and another individual (possibly the same one) filmed.

On 23 January 2013, F. Ennes Silva collected an adult male of *C. humilis* on a *terra firme* secondary growth forest, on Igarapé do Acampamento, located near the Rio Roosevelt mouth, a left (west)-bank tributary of the Rio Aripuanã, municipality of Novo Aripuanã, state of Amazonas (07°32'19"S, 60°40'45"W, ca. 50 m above sea level). The specimen was handled in accordance with the Animal Care and Use Committee (1998), (ICMBio process 13507), and it is preserved as a taxidermied skin in the Museu Paraense Emilio Goeldi (Belém, Brazil) (MPEG 42808). It was not possible to determine the group size.

To verify the species identity, we examined the holotype (MPEG 24769) at the Museu Paraense Emilio Goeldi and specimens INPA 4090 and 4091 of the Instituto Nacional de Pesquisas da Amazônia in Manaus, Brazil.

Spectrograms of two recordings from the Rio Madeirinha were generated using Raven Pro 1.4 (Bioacoustics Research Program 2011) (sampling frequency 44,100 Hz, frequency resolution 21.5 Hz, temporal resolution 1.6 ms, 90 % overlap of frames in successive transforms).

Results

The photograph (Fig. 1) shows an adult individual in the typical vertical clinging posture of callitrichids (Garber 1992). The individual could be identified as *Callibella humilis* based on the unpigmented region around nostrils and mouth, untufted ears, black crown with contrasting



Fig. 1 Male of *Callibella humilis* photographed on the left (west) bank of Rio Madeirinha, a left (west)-bank tributary of the Rio Roosevelt, Novo Aripuanã, Amazonas, Brazil. (Photo: B. J. W. Davis)

white superciliary extending to the region behind the eyes and uniformly colored (not mottled) dorsal pelage (Roosmalen et al. 1998). The only difference from the examined museum specimens is the tail color that does not contrast with the body in the photographed animal. Based on the illustrated ontogenetic changes in pelage of *Callibella humilis* (Roosmalen et al. 1998; Rylands et al. 2008), the 7-month-old individual shows a tail that is not darker than the dorsum, as is observed in the photographed specimen.

The collected specimen showed unpigmented skin around the nostrils and mouth; hair tufts originating from the center of the pinnae; a black crown contrasting with the light brown dorsum; a dark brown tail contrasting with the lighter rump and saddle. The external measurements taken from the fresh animal were: total body length of 410 mm; tail length 249.15 mm; ear length 21.9 mm; hind foot length 49.9 mm. The specimen was not weighed.

The present records extend the distribution of *C. humilis* by ~270 km to the south of its previous southernmost record, which was “Rio Arauazinho” (Rylands et al. 2008); (Fig. 2). The species can now be confirmed to occur in the lower Rio Roosevelt and middle Rio Aripuanã region.

Discussion

In two instances, the long calls of an individual were recorded. However, it was not possible to know whether it was the same individual who emitted them. Both recordings showed three-syllable long calls, except for the last call of one of them, which had four syllables. Two of the recorded long calls are represented in Fig. 3. The long call duration range ($n = 4$) was 919–1,102 ms. The apparent overlap of the syllables is due to the reverberation caused by the forested habitat (Price and Lanyon 2002). Although trill calls are expected for the marmosets (Bezerra and Souto 2008; Ford and Davis 2009), those were not recorded in the present work.

Quantitative data (Table 1) shows that the note duration range (257–348 ms) falls close to what is found for *Cebuella pygmaea* and *Mico argentatus* (370–500 ms) (Snowdon 1993) and is considerably shorter than was reported for the eastern Brazilian *Callithrix* spp. (500–1,380 ms) (Mendes et al. 2009). The frequency range of the calls (10.9–11.6 kHz) exhibits a high value that is closer to *C. pygmaea* (7.5–10.5 kHz) than to either *M. argentatus* (5.5–9.0 kHz) or the east Brazilian marmosets (genus *Callithrix*) (5.0–9.0 kHz) (Snowdon 1993; Mendes et al. 2009). When compared to the tamarins, *Leontopithecus* and *Saguinus*, the call of *Callibella* does not show the characteristic slopes of the known long calls of these two genera (Snowdon et al. 1986; Snowdon 1993).

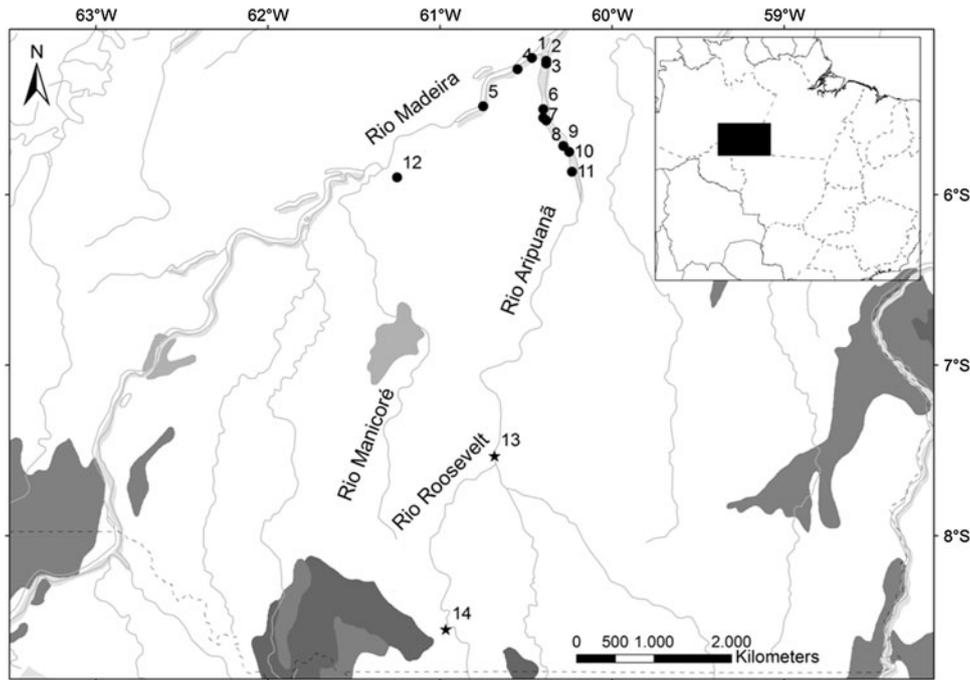


Fig. 2 Map showing the known locality records (*solid circles*) of *Callibella humilis*, based on Roosmalen and Roosmalen (2003). The *star* indicates the new records, *dashed lines* indicate Brazilian federal boundaries, and *shaded areas* represent open *cerrado* vegetation inserted in the Amazon biome, following (Brazil, Projeto Radambrasil 1978). 1 São Sebastião, east bank of Lago Paiulcuru, right (east) bank of Rio Madeira; 2 Guariúba, west bank of Lago da Guariúba, left (west) bank of Rio Aripuanã; 3 Igarapé Arauzinho, left (west) bank of Rio Aripuanã; 4 Santa Cruz, near mouth of Rio Mariepauá, right (east)-bank tributary of Rio Madeira; 5 São Martin, right (east) bank of lower Rio Maturá, right (east)-bank tributary of Rio Madeira; 6 West bank of Rio

Aripuanã, 1 km south of settlement Nova Olinda, 41 km SW of Novo Aripuanã (type locality); 7 Gethal selective logging site, 1 km north of Monte Alegre; 8 Monte Alegre, opposite Ilha Monte Alegre, left (west) bank of Rio Aripuanã; 9 Novo Oriente, left (west) bank of Lago Capimtuba; 10 Terra Preta, left (west) bank of Rio Aripuanã; 11 Tucunaré, left (west) bank of Rio Aripuanã, 2 km north of Lago Açaí Grande; 12 Atininga, both banks of upper Rio Atininga, on mouth of Igarapé Santa Luzia and 5 km upstream from mouth of Igarapé Santa Luzia; 13 Igarapé do Acampamento, near Rio Roosevelt mouth, left (west) bank of Rio Aripuanã (new record); 14 *left (west) bank* of Rio Madeirinha, left (west)-bank tributary of the Rio Roosevelt (new record)

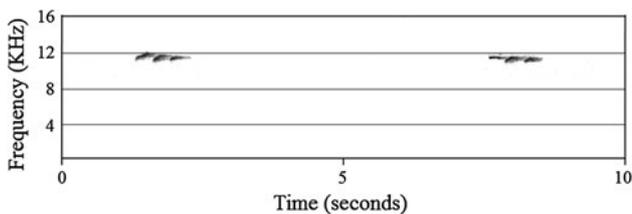


Fig. 3 Sound spectrogram of two long calls of *Callibella humilis*, recorded by B. J. W. Davis on the left (west) bank of Rio Madeirinha, a left (west)-bank tributary of the Rio Roosevelt, Novo Aripuanã, Amazonas, Brazil

Based on currently known records, the distribution of *C. humilis* can be assumed to be limited northwards by the Rio Madeira, eastwards by the Rio Aripuanã and middle-lower Rio Roosevelt and westwards by the Rio Manicoré. The southern and southwestern limits of the distribution of *C. humilis* may be the open Cerrado patch that exists

between the rios Ji-Paraná and Roosevelt (Ferrari 1993). The Rio Madeirinha locality lies approximately 127 km southwest and the Igarapé do Acampamento is within a <10 km radius from the type and only known locality of *Mico marcai* (Alperin 1993, 2002), indicating sympatry of the two species. The other *Mico* species that may occur in the southernmost record area is the black-tailed marmoset, *Mico melanurus* (Noronha et al. 2008). By virtue of these new localities for the species, the range for *C. humilis* now crosses the area of influence of the Brazilian federal highway BR-230, the *Transamazônica* (the Trans-Amazonian), an area that is more prone to deforestation than the northern reaches of the dwarf marmoset’s range (Fearnside 1986; Laurance et al. 2001).

Callibella humilis is significantly smaller than the sympatric marmoset species and also differs both quantitatively and qualitatively in cranial and postcranial characteristics (Aguilar and Lacher 2003; Ford and Davis 2009).

Table 1 Parameters of three-syllable long calls of *Callibella humilis* ($n = 4$ long calls)

	Note duration (ms)	Minimum frequency (kHz)	Maximum frequency (kHz)	ΔF	Peak frequency (kHz)
First syllable	270–334	11.0–11.3	11.5–11.7	0.34–0.74	11.3–11.5
Second syllable	303–348	10.6–10.9	11.5–11.8	0.77–1.07	11.1–11.4
Third syllable	257–316	10.7–10.9	11.4–11.6	0.58–0.73	11.1–11.2

Min–max values shown

This size difference may therefore reflect niche partitioning (Heymann 1997), but it remains to be determined how *Callibella* and *Mico* differ ecologically.

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