

First record of Miller's mastiff bat, *Molossus pretiosus* (Mammalia: Chiroptera), from the Brazilian Caatinga

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Abstract

Herein, we report the occurrence of *Molossus pretiosus* in the region of Jaíba, northern part of the state of Minas Gerais, southeastern Brazil. This is the second Brazilian record for this molossid, and it is the first documentation from the Caatinga biome. This bat is a common roof dweller in Jaíba, and was frequently captured in nets set near bodies of water. Numbers of individuals found at roosts were small (<10), and included reproductively active females in a harem-like formation (single-male with multi-females). Reproductive activity was associated with the rainy season, and there was within-group synchronization of pregnancy. Specimens captured away from roosts were obtained in nets set over or adjacent to water sources in habitats ranging from anthropic fields to well preserved arboreal caatingas. A mensural analysis based on 17 specimens (12 females and 5 males) confirmed secondary sexual dimorphism (5 out of 10 variables), and revealed little size variation among localities from Brazil and Central America. *M. pretiosus* is similar to *M. rufus* but averages smaller in size. *M. pretiosus* is the fourth bat species that, in Brazil, is restricted to the open habitats, such as the Caatinga, Cerrado, and Pantanal that separate the forested habitats of Amazônia and Mata Atlântica.

Keywords: Molossidae, *Molossus rufus*, distribution, South America, natural history, mensural analysis.

Introduction

The Neotropical bat genus *Molossus* includes eight species: *M. aztecus* Saussure, 1860; *M. barnesi* Thomas, 1905; *M. coibensis* J. A. Allen, 1904; *M. currentium* Thomas, 1901; *M. molossus* (Pallas, 1766); *M. pretiosus* Miller, 1902; *M. rufus* E. Geoffroy, 1805 (= *M. ater*), and *M. sinaloae* J. A. Allen, 1906 (Simmons 2005). Of these, only *M. aztecus*, *M. barnesi*, and *M. sinaloae* are not found in Brazil, although the available distributional records suggest that at least the latter two may also occur in this country (see Simmons 2005). Among the five species recorded in Brazil, *M. molossus* and *M. rufus* are common and widespread, occurring in all major Brazilian biomes (Amazon, Cerrado, Caatinga, Pantanal, and Atlantic Forest) (Marinho-Filho and Sazima 1998). The three other species are poorly known in South America, and are represented in Brazil by a single record (Dolan 1989; Gregorin and Taddei 2000; Tavares et al. in press).

The medium-sized *M. pretiosus* was recognized by Dolan (1989) as having the most restricted and disjunct geographical distribution of all mastiff bats. It is known from Mexico, Nicaragua to Colombia, Venezuela, Guyana, and central Brazil (Simmons 2005; Figure 1). The single Brazilian

record was documented by Gregorin and Taddei (2000) based on a sample of five individuals obtained at Aquidauana, state of Mato Grosso do Sul. The occurrence of *M. pretiosus* in this region, which is located on the border of the Pantanal biome, is in agreement with previous information associating this bat with more open and drier habitats (Reid 1997; Jennings et al. 2000). In Guyana, Lim and Engstrom (2001) found *M. rufus* to be a widespread species, whereas *M. pretiosus* was restricted to savannas. Because Pantanal is part of a poorly known landscape of open habitats that crosses the central region of the Brazilian territory, separating the Amazon from the Atlantic Forest, the absence of *M. pretiosus* from the contiguous Cerrado and Caatinga biomes is more likely a reflection of a sampling gap than the occurrence of any potential geographical barrier. Herein, we report on the first occurrence of *M. pretiosus* in the Caatinga biome, and give a description of our field observations and some taxonomic comments for this species of bat.

Material and Methods

Specimens reported were obtained during a bat survey conducted in the region of Jaíba, in

northern part of the state of Minas Gerais, southeastern Brazil. This region is located at the southern limit of the Caatinga biome, close to areas of Cerrado (Figure 1). It is characterized by a mild semi-arid climate, with six dry months (from May to October). Altitude at collecting sites varied from 440 to 500 m. With the exception of the Reserva Biológica de Jaíba (ca. 15°05'S, 43°45'W), situated in the municipality of Matias Cardoso, all sampling sites are located around Mocambinho (ca. 15°05'S, 44°00'W) at a

locality on the right margin of the São Francisco river, in the municipality of Jaíba. Voucher material is preserved in 70% alcohol and is deposited in the Adriano Lúcio Peracchi collection (ALP; see Appendix) at the Instituto de Biologia, Universidade Federal Rural do Rio de Janeiro, state of Rio de Janeiro. Only adult specimens, with phalangeal epiphyses and basisphenoid region completely ossified, were included in our mensural analysis.

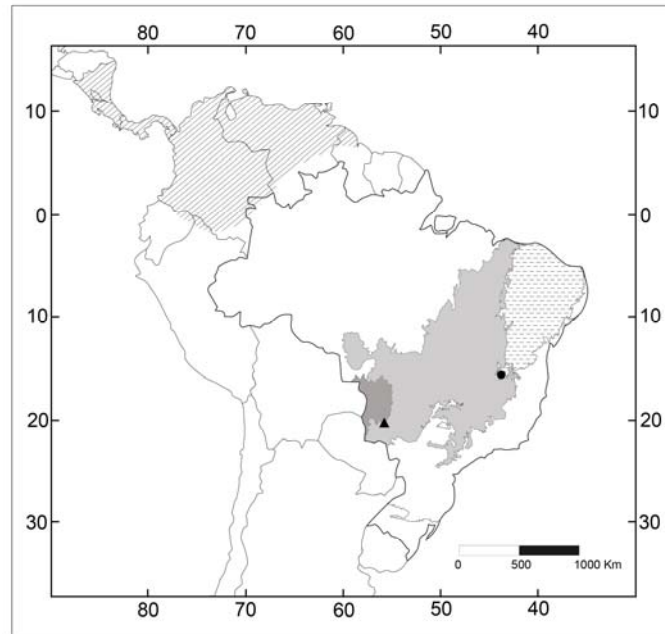


Figure 1: Distribution of *M. pretiosus* in Central and South America (diagonal lines), based on Jennings et al. (2000), and Brazilian records for Aquidauana, Mato Grosso do Sul (triangle; Gregorin and Taddei 2000) and Jaíba, Minas Gerais (circle; present study). Brazilian biomes represented are Pantanal (dark gray), Cerrado (light gray), and Caatinga (dashed area).

Measurements of craniodental features were taken with calipers to the nearest 0.1 mm, following the protocol described by Williams et al. (1995). Secondary sexual dimorphism was tested using independent *t*-tests with Bonferroni correction for multiple comparisons (Rice 1989). The loss of power associated with this correction was minimized by setting the experiment-wise error rate at 10% (Chandler 1995). This procedure led to an initial alpha value of 0.01 (0.10/10 variables). Prior to *t*-tests, all variables were examined for homogeneity of variances using Levene tests. Statistical analyses were performed using the program R for Windows (R Development Core Team 2007). Abbreviations used in Table 1 are as follows: forearm length (FL), greatest length of skull (GLS), condylobasal length (CBL), zygomatic breath (ZB), postorbital breath (PB), braincase breath (BB), mastoid breath (MB), maxillary toothrow length (MTL), breath across molars (BAM), and breath across canines (BAC). Reproductive data (pregnancy and lactation) were based mainly on palpation.

Because early-term pregnancies are difficult to detect through this technique, some females reported here as reproductively inactive, may not have been so. When the doubtful cases involved specimens preserved as voucher, the reproductive status was accessed through histological examination. The measurement recorded for each embryo represents the greatest length in a natural position (crown-rump length).

Results

Field observations

A total of 56 *M. pretiosus* were captured in Jaíba, most of which (33) were from roofs of residences. In the urban village of Mocambinho, four residences where people were complaining about bats had *M. pretiosus*. In the first roof we visited (06 October 1994), five specimens were captured by hand: one reproductively inactive female, three pregnant females, and one adult male with large scrotal testes (5.1 x 3.2 mm) and an enlarged gular gland. The embryo of one of the females measured 21.2 mm. On 21 October 1994, seven

specimens were captured from a second roof by setting a mist net directly in front of the exit used by the bats. Among those captured was one male with large scrotal testes (5.0 x 3.4 mm) and six adult females, five of which were pregnant with embryos measuring 17.0, 18.8, 20.1, 20.6, and 20.8 mm. Members of this group started to leave the roof approximately five minutes after sunset, and within fifteen minutes all bats appeared to have left the roost (no other individuals were seen after an additional fifteen minutes of observation). In the two other roofs inspected in Mocambinho (26 May 1995 and 30 June 1995) only bats that appeared to be reproductively inactive were found. These groups were composed, respectively, of two males and four females, and seven males and two females. *M. pretiosus* was found cohabitating with *M. molossus* in all four roosts, and in one of them we also documented *Nyctinomops laticaudatus* (E. Geoffroy, 1805). Nets set in October 1994 around a residence in an area of anthropic fields (dominated by shrubs) adjacent to Mocambinho also resulted in the capture of *M. pretiosus*, but only adult males (six, including one recapture) were recorded.

The other 23 *M. pretiosus* captured in Jaíba were all obtained in ground-level mist nets set over, or adjacent to, water. On 14 November 1994, five adult specimens, including two males, one reproductively inactive female, and two pregnant females, were captured on the edge of a cattle pond surrounded by anthropic fields in the Fazenda Solagro. On 13 January 1995, another visit to this site resulted in the capture of seven females, including five that were lactating, one that was reproductively inactive, and one that was juvenile (phalangeal epiphysis not ossified). Histological examination of the uterus of one of the lactating females revealed no sign of simultaneous pregnancy. Net sessions conducted on 11 May 1995 and 6 July 1995 each resulted in a single capture, with neither the male nor female showing any evidence of reproductive activity. Additional taxa captured with *M. pretiosus* during net sessions at the cattle pond included six phyllostomids (*Phyllostomus discolor* Wagner, 1843, *Carollia perspicillata* (Linnaeus, 1758), *Artibeus lituratus* (Olfers, 1818), *Artibeus planirostris* (Spix, 1823), *Platyrrhinus lineatus* (E. Geoffroy, 1810), and *Sturnira lilium* (E. Geoffroy, 1810)), two noctilionids (*Noctilio albiventris* Desmarest, 1818 and *Noctilio leporinus* (Linnaeus, 1758)), one vespertilionid (*Myotis nigricans* (Schinz, 1821)) and one additional molossid (*Cynomops planirostris* (Peters, 1866)).

The second watering site in which *M. pretiosus* was sampled was located in a seasonally flooded natural depression known as Dreno Jaíba. This depression receives water from both São

Francisco river and Sossêgo lagoon during the rainy season, and is partially bordered by subcaducifolious forests and patches of *cerradão*. Nets set on 13 October 1994 at the edge of a flooded part of the Dreno Jaíba resulted in the capture of two adult males, one of which had large scrotal testes (5.2 x 3.2 mm). Additional species collected during the same net session were: *Phyllostomus hastatus* (Pallas, 1767), *Glossophaga soricina* (Pallas, 1766), *S. lilium*, *Eptesicus furinalis* (d'Orbigny, 1847), *M. nigricans*, and *C. planirostris*.

M. pretiosus was also captured in a net set along a road bordering the Reserva Biológica de Jaíba. The vegetation at the Reserva Biológica de Jaíba was transitional between caducifolious forest and hipoxerophytic Caatinga, whereas most of the surrounding area is deforested. A single net session was conducted at a relatively large puddle (ca. 5 m across), reminiscent of the rainy season, on 05 May 1994. Seven *M. pretiosus* were captured, including two adult females (one lactating and one post-lactating) and five adult males (three with large scrotal testes). In addition to capturing *M. pretiosus*, we also captured *Tonatia* sp., *E. furinalis*, *M. molossus*, and *C. planirostris* in the same net. These latter species, however, accounted for only 46% of the captures (six specimens), suggesting that *M. pretiosus* may be a relatively common species in the area. In the cattle pond at Fazenda Solagro, this molossid was also the most abundantly captured species, accounting for 36% of the 39 bats sampled.

Mensural analysis

Molossus is represented in Jaíba by at least two species: *M. molossus*, which includes the smallest specimens (forearm < 41 mm), and a larger form, here referred to as *M. pretiosus* (Table 1). These latter bats are sexually dimorphic in five out of the ten linear dimensions evaluated here (GLS, CBL, ZB, MTL, and BAC; $p < 0.001$). The data corroborate the necessity of separately treating males and females *M. pretiosus* in any mensural or morphometric analysis.

Discussion

Field observations

Our survey data provide support to the suggestion that *M. pretiosus* is an open area species, a category broadly interpreted by Dolan (1989) to include habitats from savanna grasslands to dry forests. In Brazil, only three additional species are restricted to drier habitats across the country: *Micronycteris sanborni* Simmons, 1996, *Lonchophylla dekeyseri* Taddei, Vizotto, and Sazima, 1983, and *Xeronycteris vieirai* Gregorin and Ditchfield, 2005 (Nogueira et al. 2007a, b). *M. pretiosus* is a common roof dweller in both urban and rural areas, which is a

shared trait with *M. rufus* (Esbérard et al. 1999). *M. rufus*, however, can form large aggregations at this type of roost (100 to 500 bats; Marques 1986;

Esbérard 2002), whereas only small groups (<10 bats) of *M. pretiosus* were found in Jaíba. The group composition for *M. pretiosus* suggests a po-

Table 1: Selected measurements^a (in mm) of *M. pretiosus* from Brazil (Jaíba, present study, and Mato Grosso do Sul, Gregorin and Taddei 2000), Nicaragua and Costa Rica (Dolan 1989), and of *M. rufus* from Brazil (general, Gregorin and Taddei 2002; Rio de Janeiro, Dias and Peracchi, in press) and French Guiana (Simmons and Voss 1998).

Variable	sex	<i>M. pretiosus</i>				<i>M. rufus</i>		
		Brazil (Jaíba)	Brazil (Mato Grosso do Sul)	Costa Rica	Nicaragua	Brazil (general)	Brazil (Rio de Janeiro)	French Guiana
FL	♂♂	46.1±0.8 44.9-46.8 (5)	46.5±1.8 45.2-47.7 (2)	44.7±1.6 43.3-46.5 (3)	45.8±1.3 44.0-47.8 (4)	46.1-53.0	52.3±1.0 51.4-53.9 (5)	51.4 49.4-54.4 (11)
	♀♀	45.0±1.0 43.6-47.2 (12)	43.9±1.5 42.6-45.5 (5)	44.4±0.8 43.4-46.0 (10)	44.5±0.9 41.6-45.9 (23)	46.3-51.8	50.8±1.0 49.7-52.3 (6)	51.4 50.0-53.4 (10)
GLS ^b	♂♂	20.6±0.5 19.9-21.4 (5)	21.1±0.2 21.0-21.3 (2)	21.7±0.3 21.4-21.9 (3)	21.7±0.2 21.5-22.0 (5)	21.6-23.7	23.3±0.3 23.0-23.8 (5)	-
	♀♀	19.6±0.4 19.1-20.4 (12)	19.4±0.2 19.2-19.6 (3)	20.2±0.4 19.7-20.9 (8)	20.2±0.5 18.8-20.8	20.6-20.7	21.8±0.3 21.5-22.4 (6)	-
CBL	♂♂	18.7±0.5 18.1-19.5 (5)	-	18.6±0.4 18.2-18.9 (3)	19.2±0.2 19.0-19.4 (5)	-	-	-
	♀♀	17.9±0.3 17.5-18.5 (12)	-	17.8±0.2 17.5-18.1 (8)	18.0±0.5 16.4-18.6 (18)	-	-	-
ZB	♂♂	13.3±0.3 12.8-13.5 (5)	13.1±0.4 12.8-13.3 (2)	-	-	13.4-14.5	14.2±0.6 13.3-14.6 (5)	14.4 14.1-14.7 (8)
	♀♀	12.5±0.3 12.2-13.2 (12)	12.4±0.2 12.3-12.6 (3)	-	-	12.8-14.0	13.4±0.3 12.9-13.6 (6)	14.0 13.5-14.3 (5)
PB	♂♂	4.3±0.2 4.1-4.6 (5)	-	-	-	-	4.6±0.1 4.5-4.7 (5)	4.6 4.2-4.8 (8)
	♀♀	4.3±0.1 4.1-4.6 (12)	-	-	-	-	4.4±0.2 4.2-4.5 (6)	4.5 4.4-4.5 (5)
BB	♂♂	10.3±0.2 10.0-10.6 (5)	10.3±0.0 (2)	10.5±0.2 10.3-10.7 (3)	10.3±0.2 10.1-10.6 (5)	-	11.2±0.2 11.0-11.4 (5)	11.4 11.1-11.8 (8)
	♀♀	10.1±0.2 9.8-10.5 (12)	9.8±0.1 9.7-9.9 (3)	10.1±0.3 9.6-10.6 (8)	10.1±0.3 9.7-10.6 (18)	-	10.3±0.3 9.9-10.7 (6)	11.0 10.9-11.3 (5)
MB	♂♂	12.8±0.5 12.1-13.4 (5)	-	-	-	-	14.1±0.2 13.9-14.4 (5)	14.2 13.7-14.6 (8)
	♀♀	12.3±0.4 11.9-13.5 (12)	-	-	-	-	13.1±0.3 12.6-13.4 (6)	13.5 13.1-13.8 (5)
MTL	♂♂	7.6±0.2 7.3-7.8 (5)	7.7±0.1 7.6-7.7 (2)	7.2±0.1 7.2-7.2 (3)	7.3±0.2 7.1-7.5 (5)	7.6-8.2	8.4±0.14 8.2-8.6 (5)	7.9 7.6-8.2 (8)
	♀♀	7.2±0.1 7.0-7.5 (12)	7.3±0.2 7.2-7.3 (3)	7.0±0.1 6.8-7.1 (8)	7.0±0.3 6.3-7.4 (18)	7.4-7.8	8.1±0.1 8.0-8.3 (6)	7.6 7.4-7.7 (5)
BAM	♂♂	9.5±0.3 8.9-9.8 (5)	9.3±0.2 9.1-9.4 (2)	9.2±0.3 8.9-9.4 (3)	9.3±0.2 9.1-9.6 (5)	-	10.0±0.2 9.7-10.1 (5)	10.2 10.2-10.3 (8)
	♀♀	9.0±0.3 8.5-9.7 (12)	9.0±0.2 8.8-9.2 (3)	8.7±0.2 8.3-9.0 (8)	9.0±0.2 8.5-9.3 (18)	-	9.6±0.3 9.2-10.0 (6)	10.0 9.8-10.3 (5)
BAC	♂♂	5.6±0.1 5.5-5.8 (5)	-	5.7±0.2 (3)	5.6±0.1 5.5-5.8 (5)	-	6.1±0.1 5.9-6.3 (5)	-
	♀♀	5.2±0.2 5.0-5.6 (12)	-	5.2±0.1 5.0-5.3 (8)	5.2±0.2 4.8-5.5 (18)	-	5.7±0.2 5.4-5.8 (6)	-

a: Summary statistics including average, one standard deviation, range, and sample size. For abbreviations of variable names, see Material and Methods.

b: Including incisors.

lygynous mating system with formation of single-male/multi-female groups. The mating system of *M. rufus* is not clear from the literature, but may be different from that suggested by our study of *M. pretiosus*. Several males and females are usually found in roosts during the reproductive period (Esbérard 2002), and multi-male/multi-female polygynous group (sensu McCracken and Wilkinson 2000) may best describe the mating system of *M. rufus*.

Signs of female reproductive activity reported here for *M. pretiosus* are all indicative of an association with the wet season, but are too limited to allow speculation regarding the occurrence of monoestry or polyestry. This latter pattern seems to characterize *M. pretiosus* in other regions, where simultaneously pregnant and lactating females have been found (Dolan 1989). All pregnant females from Jaíba were carrying a single embryo, and those captured during the same period had embryos of similar size, suggesting a synchronization of pregnancy. These reproductive traits are also characteristic of *M. rufus* (Marques 1986). An additional feature that is similar in *M. rufus* and *M. pretiosus* is roost emergence time. Both species depart from roosts at sunset (Marques 1986, Fenton et al. 1998), which might be related to a peak in the activity of their food prey. Regarding flight (and possibly foraging) activities, most records available for *M. pretiosus* are associated with water bodies (Jennings et al. 2000), which are also clearly important for this bat in Jaíba. These watering sites may be visited by insectivorous bats (e.g. *Molossus*) for both drinking and foraging activities (Grindal et al. 1999), the former particularly important in drier areas (Myers and Wetzel 1983).

M. pretiosus was classified as an uncommon species in Central America (Reid 1997), but in Jaíba it seems to be the opposite case. According to Dolan (1989), *M. pretiosus* “has more or less supplanted *rufus*” in Colombia, presumably due to competitive exclusion. In Pantanal, both species occur sympatrically (Gregorin and Taddei 2000), but this does not seem to be the case in Jaíba, where only a single species of large *Molossus* (43<forearm<49 mm) is present. Previous material referred to *M. rufus* from both Cerrado and Caatinga should be reevaluated, particularly those prior to 2000, when the occurrence of *M. pretiosus* in Brazil was first reported (Gregorin and Taddei 2000). Records of *M. rufus* from Cerrado have been reported by Pedro and Taddei (1998) and Stutz et al. (2004), and additional records from the Caatinga were found by Vieira (1953), Mares et al. (1981), and Willig (1983). Oliveira et al. (2003) listed *M. rufus* for the region of Jaíba, but preliminary

examination of their voucher material suggests the species in question is actually *M. pretiosus*.

Mensural analysis and species identification

According to Dolan (1989), *M. pretiosus* can only be separated from *M. rufus* by size, a suggestion also discussed by Simmons and Voss (1998) and Jennings et al. (2000). Mean values presented herein for variables measured in both males and females conform well to those available for *M. pretiosus* from central Brazil and Central America, which are consistently smaller than those described for *M. rufus* (Table 1). Although the mean values of our data clearly associate *M. pretiosus* specimens from Jaíba with those from other localities, taxonomic identification of larger individuals (both males and females) in our sample are complicated due to overlap with smaller *M. rufus* individuals. This overlap is minimal in specimens from both Rio de Janeiro (the closest locality from which mensural data for *M. rufus* is available) and French Guiana, but it is higher when general Brazilian data is considered. An additional difficulty in identifying these larger bats based on size or shape is the lack of data from representative localities throughout the distribution of both species. This is particularly true for *M. pretiosus*, whose distribution in South America may be much larger than what is now recorded. In the last revisionary work that examined the taxonomy of medium to large *Molossus* taxa, Dolan (1989) focused on Middle American specimens, and data from only two populations of *M. pretiosus* were available. With respect to *M. rufus*, however, it is noteworthy that no evidence of a north-south clinal variation was detected by Dolan (1989), a trend subsequently corroborated by Simmons and Voss (1998) based on data from French Guiana. Measurements provided by Dias and Peracchi (in press) for *M. rufus* from southeastern Brazil are similar to those from French Guiana, which is also in agreement with the lack of a clinal variation in this taxon. Furthermore, the hypothesis that our large *Molossus* from Jaíba could represent a smaller-sized population of *M. rufus* is not supported by data from Myers and Wetzel (1983). They measured specimens of *M. rufus* from Paraguay, and found them to be close in size to specimens from the vicinity of Viçosa, a municipality also located in Minas Gerais, but in the southeastern region of the state, which was formerly covered by Atlantic Forest. We have not reported data from Paraguayan specimens here, but they average consistently larger than our specimens from Jaíba.

Three relatively recent identification keys are currently available for taxonomic identification of *Molossus* species. The first, provided by Jennings et al. (2000), is primarily based on mensural data,

but provides no solution to overlapping measurements between taxa. Gregorin and Taddei (2002) introduced a dichotomous feature that separated *M. pretiosus*, which has “upper incisors long and slightly convergent or with separated tips”, from *M. rufus*, which has “short and spatulated upper incisors, with convergent tips”. In our sample, however, we found small specimens (identified as *M. pretiosus* based on size) with short, convergent incisors, and large specimens (within the range of *M. rufus*) with long incisors bearing separate tips (Figure 2). Therefore, we have not used this character, whose diagnostic importance should be further investigated. Lim and Engstrom (2001) distinguishes the two species using forearm length (41-49 mm, *M. pretiosus*; 47-54 mm, *M.*

rufus), and the color of the face and membranes, which are both black in *M. rufus*, and “not black, slightly paler” in *M. pretiosus*. Specimens from Jaíba are in agreement with this description of *M. pretiosus*, being considerably paler than the *M. rufus* we have examined from Amazonia and southeastern Brazil. Among our voucher material from Jaíba, there is a single specimen (ALP 6963) with nearly black membranes, but its size (FL = 44.2 mm) is out of the range of *M. rufus*. Specimens from Jaíba were primarily brown in pelage coloration, but we also found a red phase, which can also occur in *M. rufus* (Dolan 1989). These bats, however, are not truly dichromatic, because a gradation between extreme color phases has been detected (Dolan 1989).

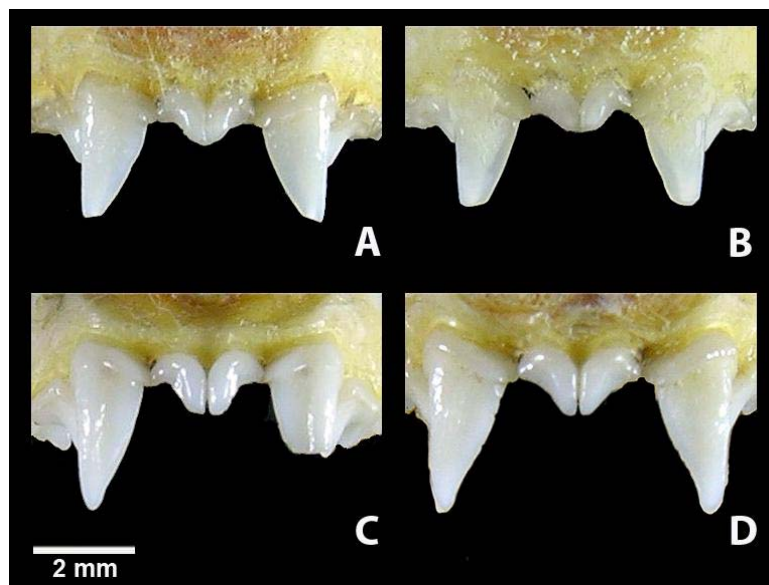


Figure 2: Variation in the shape of upper incisors in females of *M. pretiosus* from Jaíba, Minas Gerais, Brazil. Specimens in A (ALP 6912) and B (ALP 6944) are small to medium in size (forearm 43.5 and 45.2 mm, respectively), and have short, convergent teeth, whereas those in C (ALP 6877) and D (ALP 6874) are medium to large (forearm 45.2 and 47.2 mm, respectively), and have longer teeth with separated tips.

Based on size, larger specimens of *Molossus* from Jaíba could also be confused with *M. sinaloae*, but this species has dorsal fur with a contrasting white or gray basal band (Simmons and Voss 1998, Jennings et al. 2000), which was not evident in any of our specimens. The apparent lack of any perceptible difference in the skull shape of *M. pretiosus* and *M. rufus* (Dolan 1989), however, seems also to extend to *M. sinaloae* (Simmons and Voss 1998). Such apparent shape homogeneity among medium to large *Molossus* is an interesting question to be addressed with the use of modern quantitative analytical tools (e.g. geometric morphometrics). Indeed, the whole genus could benefit from an approach like this, since size is also an important diagnostic character for the smaller species (Freeman 1981;

López-González and Presley 2001; Gregorin and Taddei 2002).

Acknowledgements

We are thankful to João A. Oliveira from Museu Nacional do Rio de Janeiro for allowing examination of specimens under his care; to Armando Sales for the histological analyses; to Fernando M. Costa for fieldwork assistance; to the two anonymous reviewers and to Daniel Brito for comments and corrections on the manuscript; and to FAPERJ (MRN, LRM, and ALP) and CNPq (LRM and ALP) for financial support. Field activities in Jaíba were supported by SYTEC 3 Engenharia e Controle de Corrosão LTDA.

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Appendix

Specimens examined: *Molossus pretiosus* - Jaíba, Minas Gerais, Brazil (ALP 6826, 6874, 6875, 6877, 6878, 6896, 6898, 6911-6915, 6917, 6942-6946, 6963, 6964, 6966). *Molossus rufus* - Igreja do Divino Espírito Santo, Amapá, Amapá, Brazil (ALP 4088, 4092, 4183); Reserva Florestal da Companhia Vale do Rio Doce, Linhares, Espírito Santo, Brazil (ALP 5628); Universidade Federal Rural do Rio de Janeiro, Seropédica, Rio de Janeiro, Brazil (ALP 5551).