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Morphological diagnosis and geographic distribution of Atlantic Forest red-rumped mice of the genus *Juliomys* (Rodentia: Sigmodontinae)

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ABSTRACT. Recognition and identification of red-rumped mice of the genus *Juliomys* González, 2000 has been a problem among many mammalogists, and specimens of this genus are commonly confused with other Atlantic Forest sigmodontine rodents. Herein we provide an expanded diagnosis for the genus based on the analyses of the three living species of *Juliomys*, and provide morphological comparisons to the small bodied and bright colored rodents *Rhagomys rufescens* (Thomas, 1886) and *Oligoryzomys flavescens* (Waterhouse, 1837), which occur in sympatry with *Juliomys* spp. in forested areas of southeastern Brazil. These taxa are superficially similar, and are therefore commonly misidentified in the field and museum collections. We also provide morphometric data and a key to the living species of *Juliomys*, and an updated distribution map of the genus and its species.

KEY WORDS. Emended diagnosis; *Juliomys pictipes*; *Juliomys rimofrons*; *Juliomys ossitenuis*; identification key; taxonomy.

Juliomys González, 2000 is currently composed of three living species and is endemic to the Atlantic Forest of southeastern Brazil, northeastern Argentina and eastern Paraguay (De La Sancha *et al*. 2009). Despite recent contributions on the taxonomy and morphology for this genus (e.g., Oliveira & Bonvicino 2002, Costa *et al*. 2007, Pardiñas *et al*. 2008, De La Sancha *et al*. 2009, Pardiñas & Teta 2011), the recognition and identification of this recently described Sigmodontinae genus remains problematic. This is partially due to the relative low number of specimens available for comparisons in scientific collections. There are fewer than 80 museum specimens of *Juliomys pictipes* Osgood, 1933 – the type species of the genus and the most common species. *Juliomys rimofrons* Oliveira & Bonvicino, 2002 is known only from the three type specimens, and there are fewer than 30 museum specimens of *J. ossitenuis* Costa, Pavan, Leite & Fagundes, 2007.

Another reason for the difficulty in diagnosing this genus is historical. González's (2000) description was done before the discovery of two additional species of *Juliomys* and the generic diagnosis was based on a single specimen (FMNH 26814, the holotype). González (2000) considered Osgood's (1933) diagnosis of the species *Thomasomys pictipes* as the diagnosis for the genus, which does not reflect the present diversity in *Juliomys*. Pardiñas *et al*. (2008) provided an emended diagnosis of the genus based mainly on three specimens of *J. pictipes* recently collected in Argentina. However, the recognition of this genus remains a problem among mammalogists, even after Pardiñas *et al*. (2008) contribution, and especially with the relative increase in captures of *Juliomys* specimens in the last decade (e.g., Vieira & Monteiro-Filho 2003, Neri-Bastos *et al*. 2004, Cherem *et al*. 2004, Oliveira *et al*. 2005, Pardini & Umetsu 2006, Umetsu *et al*. 2006, Lima *et al*. 2010, Melo *et al*. 2011). Specimens of *Juliomys* are commonly confused with other small bodied and bright colored mice, particularly *Rhagomys rufescens* (Thomas, 1886) and *Oligoryzomys flavescens* (Waterhouse, 1837), which are often sympatric with *Juliomys* spp. in forested areas throughout southeastern Brazil (e.g., Pardini & Umetsu 2006), commonly causing misidentifications in the field and museum collections.

Herein we provide an emended diagnosis for *Juliomys* based on analyses of all three living species, and compare it to *R. rufescens* and *O. flavescens*. We also provide morphometric data and a key to the species of *Juliomys*, and an updated distribution map of the genus and its species.

MATERIAL AND METHODS

We performed morphological analyses on external, cranial, and dental characters of 91 specimens of *Juliomys*: *J. pictipes* (n = 59); *J. ossitenuis* (n = 29); and *J. rimofrons* (n = 3). In addition, we examined seven specimens of *O. flavescens* and three specimens of *R. rufescens*. Specimens examined are listed in Appendix I, and are deposited in the following collections: (FMNH) Field Museum, Chicago, USA; (MBML) Museu de Biologia Prof. Mello Leitão, Santa Teresa, Brazil; (MN) Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; (MVZ) Museum of Vertebrate Zoology, University of California, Berkeley, USA; (MZUFV) Museu de Zoologia João Moojen de Oliveira, Universidade Federal de Viçosa, Viçosa,

Brazil; (MZUSP) Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil; (UFES) Universidade Federal do Espírito Santo, Vitória, Brazil; (UFMG) Universidade Federal de Minas Gerais, Belo Horizonte, Brazil; (ZUEC-MAM) Museu de Zoologia da Universidade Estadual de Campinas, Campinas, Brazil.

Other acronyms for institutions and collections mentioned in the text are: (CIES) Centro de Investigaciones Ecológicas Subtropicales, Puerto Iguazú, Argentina; (CNP) Colección de Mamíferos del Centro Nacional Patagónico, Puerto Madryn, Argentina; (MLP) Museo de La Plata, Buenos Aires, Argentina; (UFSC) Universidade Federal de Santa Catarina, Florianópolis, Brazil; (CZ) Colección de Zoología, Universidad Nacional de Asunción, San Lorenzo, Paraguay; (MCNU) Museu de Ciências Naturais da Universidade Luterana do Brasil, Canoas, Brazil; (UFSM) Universidade Federal de Santa Maria, Santa Maria, Brazil.

Morphological nomenclature follows definitions illustrated in Carleton (1980), Carleton & Musser (1989), and Voss (1993). External body measurements – total length (TotL), length of tail (Tail), length of hind foot (HF), length of ear (Ear) – and body weight were taken from museum tags or field notes. We took 28 cranial measurements following Costa *et al.* (2007), using a digital caliper to the nearest 0.01 mm: occipto-nasal length (ONL), palatal length (PL), postpalatal length (PPL), molar row-crown length (MRC), first molar breadth (M1B), palatal bridge length (PBL), temporal fossa length (TFL), diastema length (DL), incisive foramen length (IFL), incisive foramen breadth (IFB), palatal breadth at first molar (PB1), palatal breadth at third molar (PB3), mesopterygoid fossa breadth (MFB), breadth across incisor tips (BIT), bullar width (BW), bullar length (BL), braincase breadth (BCB), skull height (SH), rostral height (RH), rostral breadth (RB), rostral length (RL), nasal length (NL), zygomatic plate length (ZPL), interorbital breadth (IOB), zygomatic breadth (ZB), greatest length of mandible (GLM), mandibular molar row-alveolar length (MMR), depth of ramus (DR). We classified specimens in four dental age classes according to tooth-wear and dental-eruption following Costa *et al.* (2007). The specimens placed in age class 1 are juveniles (third molar unerupted and/or unworn), and those in age classes 2-4 are adults (all the three molars erupted, enamel surfaces of at least one molar worn).

TAXONOMY

Juliomys González, 2000

Included species. *J. pictipes* (Osgood, 1933); *J. rimofrons* Oliveira & Bonvicino, 2002; *J. ossitenuis* Costa, Pavan, Leite & Fagundes, 2007. Pardiñas & Teta (2011) recently suggested the reallocation of *Calomys anoblepas* Winge, 1887 to *Juliomys*. This fossil is known only from a fragmentary skull and probably represents an extinct form (Pardiñas & Teta 2011).

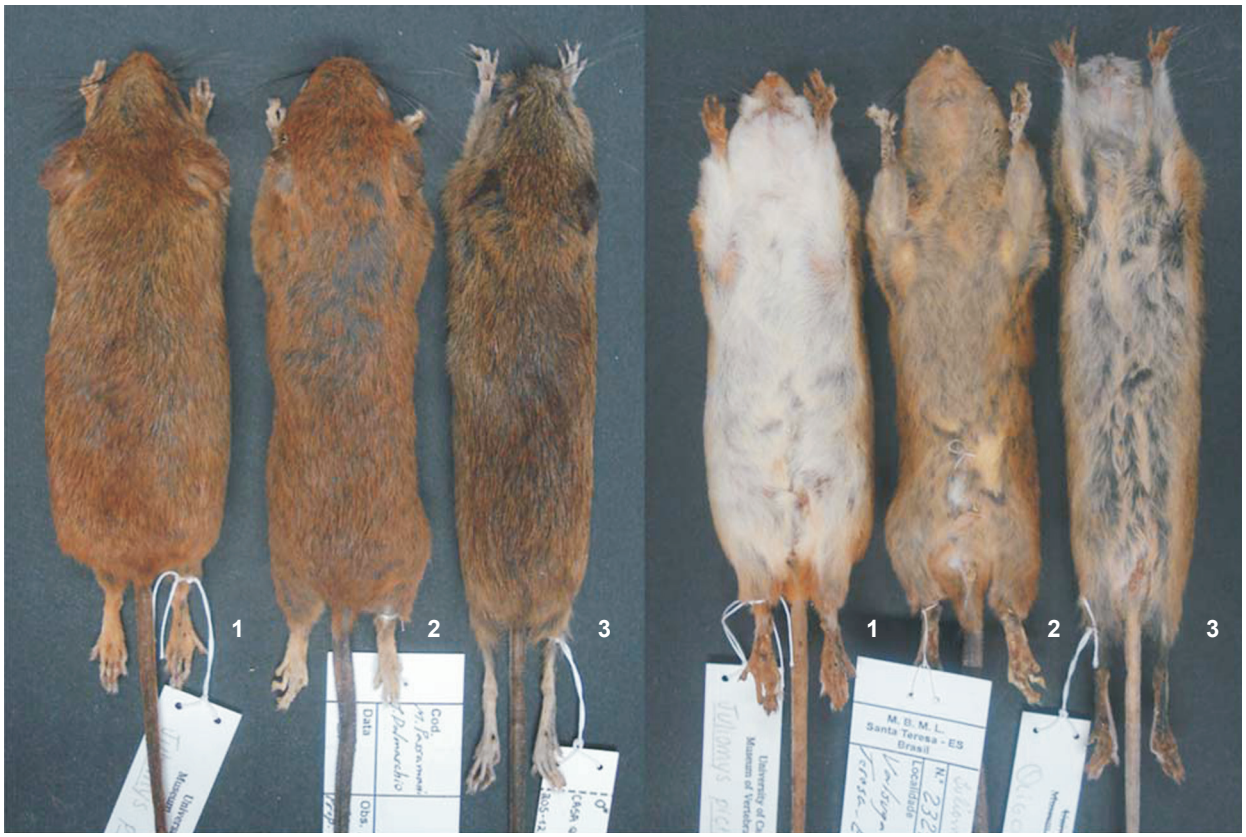
Type species. *J. pictipes* (Osgood, 1933).

Type Locality. The original type locality "Caraguatay, Rio Parana, 100 miles south of Rio Iguassu, Misiones, Argentina" (Osgood 1933) was restricted to Puerto Caraguatay (26°37'S, 54°46'W, 192 m), Montecarlo, Misiones, Argentina, by Pardiñas *et al.* (2007).

Emended diagnosis. Small-bodied sigmodontine genus (TotL: 165-238 mm in adults); dorsal pelage soft, brownish ochraceous to orange-brown, with shades of orange especially on the rump (Fig. 1); ventral fur grayish basally and white to whitish-brown distally (Fig. 1); four pairs of mammae: two inguinal, one post-axial, and one pectoral; tail equal to or slightly longer than head and body, commonly bicolored, with small scales, and a small tuft at the tip; fore and hindfeet short and broad, dorsally covered with orange to brownish hair; claws dorsally covered by silvery white hairs reaching or extending slightly beyond the claw tips; fore and hindfeet show large, bulbous plantar pads: two carpal and three interdigital on the former and two tarsal and four interdigital on the latter (Fig. 4); Skull small and delicate (ONL: 21.95-27.56 in adults), with short rostrum (Fig. 7); interorbital region hour-glass shaped with rounded or gently angled edges; zygomatic arches slightly compressed anteriorly; zygomatic plates nearly vertical, slightly inclined forward; zygomatic notch shallow and rounded; mandible small and delicate; upper incisors opisthodont; molars large (MRC: 3.33-4.24 mm in adults), pentalophodont; well developed and separated procingulum cusps on M^1; paracone and posterior cusps of M^3 reduced.

Comparisons. *Juliomys* spp. specimens are superficially similar to *R. rufescens* and *O. flavescens* in size and fur color. However, differences among them are evident in both external and skull characters (Tab. I). Members of *Juliomys* can be distinguished from *R. rufescens* mainly by: a darker fur, with rump and hind legs distinctly orange, contrasting with the rest of the body; this contrast is not observed in *Rhagomys* Thomas, 1917, which shows a more homogeneous bright orange fur (Figs 1-3); tips of ventral hairs whitish to light-brown instead of orange; four pairs of mammae instead of three; slightly longer hindfeet, with smaller and narrower interdigital pads (Figs 4-6); hindfeet bearing a projecting claw on the first digit, instead of a round claw, resembling a nail; skull smaller, slender and more delicate (Figs 7-9); rostrum, interorbital region and zygomatic plate narrower; parapterygoid plate wider; anterior margin of mesopterygoid fossa reaching M^3, while in *Rhagomys*, this structure does not reach M^3; dentary smaller (Figs 10-12), and molar cusps less conspicuous.

Juliomys species differ from *O. flavescens* mainly by: a brighter orange fur, with rump and hind legs distinctly orange, contrasting with the rest of the body, but this contrast is not observed in *Oligoryzomys* Bangs, 1900, which shows a more homogeneous grayish/brownish fur (Figs 1-3); shorter tail, with smaller scales; mammae pairs in different positions: two inguinal, one post-axial, and one pectoral in *Juliomys*, instead of one inguinal, one abdominal, one post-axial, and one pectoral in *O. flavescens*; hindfeet shorter and wider, with interdigital pad larger and pads typically round (Figs 4-6); skull wider (Figs



Figures 1-3. Dorsal and ventral views of the skins of: (1) *J. pictipes* (UFMG 3168); (2) *Rhagomys rufescens* (AB 401); (3) *Oligoryzomys flavescens* (UFES 1176).

Figures 4-6. Ventral view of the left hindfoot of: (4) *Juliomys ossitenuis* (MBML 27833 – length of hind foot [HF] = 20 mm); (5) *Rhagomys rufescens* (AB 401 – HF = 19 mm); (6) *Oligoryzomys flavescens* (UFES 1255 – HF = 24 mm).

Figures 7-9. Dorsal (above) and ventral (below) views of the skulls of: (7) *Juliomys pictipes* (UFMG 3165); (8) *Oligoryzomys flavescens* (UFES 1177); (9) *Rhagomys rufescens* (AB 401). Scale bar = 5 mm.

7-9); zygomatic notch shallower; interorbital region wider; anterior margin of mesopterygoid fossa reaching M^3, while in *O. flavescens* this structure does not reach M^3; condyloid process of the dentary well developed in *Juliomys* spp. (Figs 10-12); molar series larger, with developed anteromedian and anterior flexi on M^1. The basic descriptive statistics of external and cranial measurements of species of *Juliomys* is given in Table II, and a summary of diagnostic characters of species of *Juliomys*

Table I. Selected comparative diagnostic characters of *Juliomys* spp., *Oligoryzomys flavescens*, and *Rhagomys rufescens*.

Character	Taxon		
	Juliomys spp.	*Oligoryzomys flavescens*	*Rhagomys rufescens*
Relative body size	Small	Small	Medium
Dorsal pelage (Figs 1-3)	Brownish ochraceous to orange-brown	Grayish/brownish	Orange-brown
Rump and hind legs (Figs 1-3)	Distinctly more orange than the rest of the dorsum	Same color than the rest of the dorsum	Same color than the rest of the dorsum
Tail	Nearly equal to head and body	Longer than head and body	Nearly equal to head and body
Ventral pelage (Figs 1-3)	Hair tips whitish to light-brown	Hair tips cream to light-brown	Hair tips orange
Mammae	Four pairs: 2 inguinal, 1 post-axial, 1 pectoral	Four pairs: 1 inguinal, 1 abdominal, 1 post-axial, 1 pectoral	Three pairs: 1 inguinal, 1 abdominal, 1 pectoral
Hind feet (Figs 4-6)	Short, wide	Long, narrow	Shortest, widest
Interdigital pads (Figs 4-6)	Large, bulbous	Small, narrow	Much larger, very bulbous
Hind feet first digit claw (Figs 4-6)	Projected	Projected	Round
Braincase (Figs 7-9)	Small and elongated	Small and elongated	Robust and inflated
Zigomatic plate (Figs 7-9)	Narrow	Narrow	Broad
Zigomatic notch (Figs 7-9)	Shallow	Deep	Deep
Rostrum (Figs 7-9)	Narrow and long	Narrow and long	Wide and short
Interorbital region (Figs 7-9)	Narrow	Much narrower	Wide
Incisive foramen (Figs 7-9)	Large	Large	Small
Palate (Figs 7-9)	Short	Short	Long
Anterior margin of mesopterygoid fossae (Figs 7-9)	Reaches or goes beyond M^3	Does not reach M^3	Does not reach M^3
Parapterygoid plate (Figs 7-9)	Wide and triangle-shaped	Wide and triangle-shaped	Narrow, with the external margin nearly parallel to mesopterygoid fossae
Dentary (Figs 10-12)	Small, delicate, with a sinuous inferior margin	Quite small, delicate, with a sinuous inferior margin	Broad, robust, with straight inferior margin
Condyloid process (Figs 10-12)	Developed	Underdeveloped	Developed
Molar series	Large	Small	Large
Molar cusps	Inconspicuous, nearly triangle shaped	Inconspicuous, nearly triangle shaped	Conspicuous, isolated and conical, diagonally projected
Anteromedian and anterior flexi[s] on M^1	Developed	Underdeveloped	Developed
Anterolabial and anterolingual cusps of procingulum	Clearly divided	Faintly divided	Clearly divided

is given in Costa *et al.* (2007: 29, Tab. II).

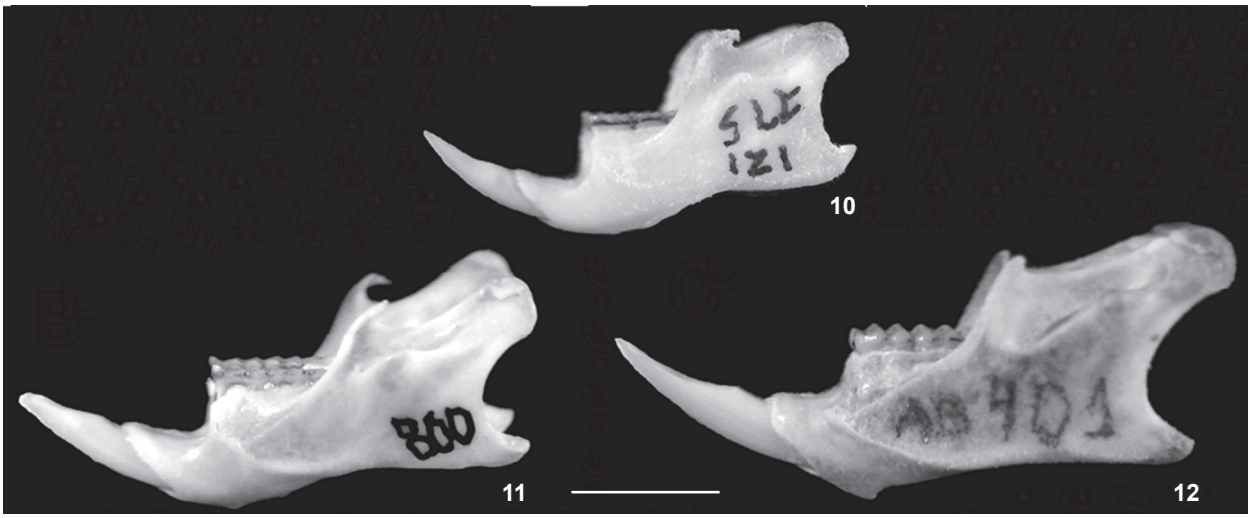
Geographic distribution. *Juliomys* spp. occur in the Atlantic Forest from southeastern Brazil to northeastern Argentina and eastern Paraguay (Fig. 13). Brazilian localities of the three living species were provided in Costa *et al.* (2007). Subsequently, new records of *J. pictipes* were reported from Argentina (Pardiñas *et al.* 2008, Fig. 13, localities 40, 43, 45), Paraguay (De La Sancha *et al.* 2009, Fig. 13, locality 39), and the states of Espírito Santo (Tonini *et al.* 2010, Fig. 13, locality 3) and Rio Grande do Sul (Melo *et al.* 2011, Fig. 13, locality 47), in Brazil. Cherem *et al.* (2004) identified some specimens from the state of Santa Catarina, southern Brazil as *J. pictipes* (Fig. 13, locality 46) and others as *Juliomys* sp. (Fig. 13, localities 47, 42, 41). They stated that the latter probably does not belong to *J. pictipes*, but did not provide any further explanations about their taxonomic assessment. Cherem (2005) also reported *Juliomys* sp. from Siderópolis, Santa Catarina, southern Brazil (Fig. 13, locality 48). De la Sancha *et al.* (2009) included Cherem's (2005) record as *J. pictipes*, but since apparently they have not examined any specimen, we kept this record under *Juliomys* sp. Paresque *et al.* (2009) described a new karyotype from *Juliomys* specimens collected at Aparados da Serra National Park, state of Rio Grande do Sul, southern Brazil (Fig. 13, locality 49). Since the karyotype represents a powerful tool to diagnose *Juliomys* species, these authors suggested that this new karyomorph represents an undescribed species of the genus (Paresque *et al.* 2009). Lima *et al.* (2010) reported the

Table II. Descriptive statistics for measurements (mm) and weight (g) of adult (dental age classes 2-4) specimens of *Juliomys*, grouped by species. (N) Sample size, (S.D.) Standard Deviation, (Min) minimum, (Max) maximum. For other abbreviations see material and methods.

Character	*Juliomys ossiteuis*					*Juliomys rimofrons*					*Juliomys pictipes*				
	Mean	N	S.D.	Min.	Max.	Mean	N	S.D.	Min.	Max.	Mean	N	S.D.	Min.	Max.
TotL	182.00	17	14.04	165.00	213.00	194.67	3	17.47	180.00	214.00	195.45	38	13.82	170.00	238.00
Tail	104.53	17	7.29	89.00	116.00	108.33	3	11.37	99.00	121.00	106.03	38	8.25	92.00	138.00
HF	19.68	17	2.52	14.00	23.00	21.33	3	1.15	20.00	22.00	20.99	38	1.92	16.00	27.00
Ear	14.23	15	1.82	10.00	17.00	16.00	3	1.73	15.00	18.00	15.08	36	1.75	10.00	19.00
Weight	18.05	11	4.85	11.00	28.00	19.83	3	4.65	14.50	23.00	22.90	31	5.51	11.50	33.00
ONL	24.20	21	1.24	21.95	26.83	24.96	3	1.29	23.49	25.92	25.66	38	1.17	23.04	27.56
PL	10.87	22	0.63	9.80	12.08	11.33	3	0.62	10.61	11.73	11.56	38	0.64	10.37	12.68
PPL	8.49	22	0.57	7.47	9.78	8.47	3	0.55	7.88	8.96	9.05	39	0.63	7.69	10.28
MRC	3.71	22	0.15	3.33	3.99	3.81	3	0.06	3.75	3.86	3.91	39	0.15	3.63	4.24
M1B	1.03	22	0.05	0.94	1.14	1.08	3	0.03	1.05	1.11	1.11	39	0.07	0.98	1.44
PBL	3.57	22	0.21	3.25	4.03	3.67	3	0.14	3.53	3.81	3.98	39	0.24	3.47	4.57
TFL	7.38	21	0.48	6.56	8.38	7.67	3	0.43	7.18	7.96	7.97	39	0.36	7.18	8.71
DL	6.16	22	0.52	5.47	7.44	6.18	3	0.38	5.74	6.41	6.25	38	0.42	5.27	7.02
IFL	4.58	22	0.30	3.83	5.36	4.84	3	0.37	4.46	5.19	4.57	39	0.27	4.05	5.26
IFB	1.74	22	0.16	1.34	2.13	1.65	3	0.03	1.62	1.67	1.68	39	0.11	1.44	2.11
PB1	2.43	22	0.13	2.21	2.65	2.69	3	0.24	2.43	2.91	2.33	39	0.15	2.09	2.71
PB3	2.78	22	0.19	2.34	3.12	3.06	3	0.36	2.65	3.35	2.69	39	0.17	2.37	3.07
MFB	1.71	22	0.15	1.41	1.97	1.64	3	0.17	1.44	1.76	1.75	38	0.13	1.49	2.04
BIT	1.48	22	0.15	1.24	1.76	1.55	3	0.14	1.38	1.64	1.66	39	0.13	1.42	1.89
BW	3.71	22	0.18	3.30	3.98	4.09	3	0.13	3.94	4.18	3.65	39	0.16	3.33	3.94
BL	4.65	22	0.16	4.36	5.03	4.80	3	0.19	4.64	5.01	4.37	39	0.16	4.08	4.79
BCB	10.25	22	0.39	9.50	10.88	10.84	3	0.24	10.57	10.99	10.31	39	0.43	9.31	10.98
SH	7.52	22	0.26	6.95	8.06	7.65	3	0.14	7.54	7.81	7.78	39	0.30	7.27	8.64
RH	4.43	22	0.31	3.99	5.16	4.37	3	0.27	4.06	4.53	4.90	39	0.31	4.30	5.49
RB	4.31	20	0.29	3.74	4.91	4.38	3	0.16	4.26	4.49	4.54	39	0.26	4.13	5.08
RL	7.36	21	0.55	6.35	8.34	7.65	3	0.45	7.14	7.99	7.85	35	0.52	6.86	8.86
NL	8.43	21	0.65	7.23	9.80	8.66	3	0.69	7.87	9.11	8.93	35	0.64	7.49	9.90
ZPL	1.83	22	0.36	1.34	3.03	1.70	3	0.16	1.58	1.88	2.24	39	0.44	1.48	3.39
IOB	3.76	22	0.11	3.57	3.96	3.72	3	0.14	3.58	3.86	4.00	39	0.18	3.60	4.42
ZB	12.82	21	0.72	11.66	13.98	13.81	3	0.74	12.98	14.41	13.55	39	0.78	12.06	14.87
GLM	12.73	22	0.61	11.61	14.01	12.99	3	0.68	12.23	13.53	13.41	39	0.66	12.11	14.71
MMR	3.83	22	0.15	3.57	4.11	4.01	3	0.07	3.94	4.08	3.99	39	0.13	3.65	4.25
DR	2.72	22	0.16	2.56	3.15	2.87	3	0.02	2.86	2.89	2.99	39	0.18	2.55	3.38

southernmost record of *Juliomys,* found in a semi-deciduous forest at the austral boundary of the Atlantic Forest in the state of Rio Grande do Sul, southern Brazil. They were unable to identify it beyond genus, but suggested that it may belong to the same undescribed species reported by Paresque *et al*. (2009).

Remarks. There is an apparent distribution gap in the south between most samples from southern Brazil and northeastern Argentina/eastern Paraguay, including one from northeastern Rio Grande do Sul, Brazil (Fig. 13). This is either due to a true historical biogeographic gap or a collecting artifact (scarcity of adequate inventories, combined with low abundance of *Juliomys*). The habitat in this region is dominated by *Araucaria angustifolia* (Bertol.) Kuntze pines (Araucariaceae), forming the Araucaria forest, and some small mammal studies failed to detect *Juliomys* spp. in this habitat (e.g. Wallauer *et al*. 2000, Cademartori *et al*. 2004, Dalmagro & Vieira 2005). On the other hand, *J. rimoforns* was collected along a trapline set on vegetation varying from a forested patch with *A. angustifolia* to



Figures 10-12. Lateral view of the mandibles of: (10) *Oligoryzomys flavescens* (UFES 1177); (11) *Juliomys pictipes* (UFMG 3165); (12) *Rhagomys rufescens* (AB 401). Scale bar = 5 mm.

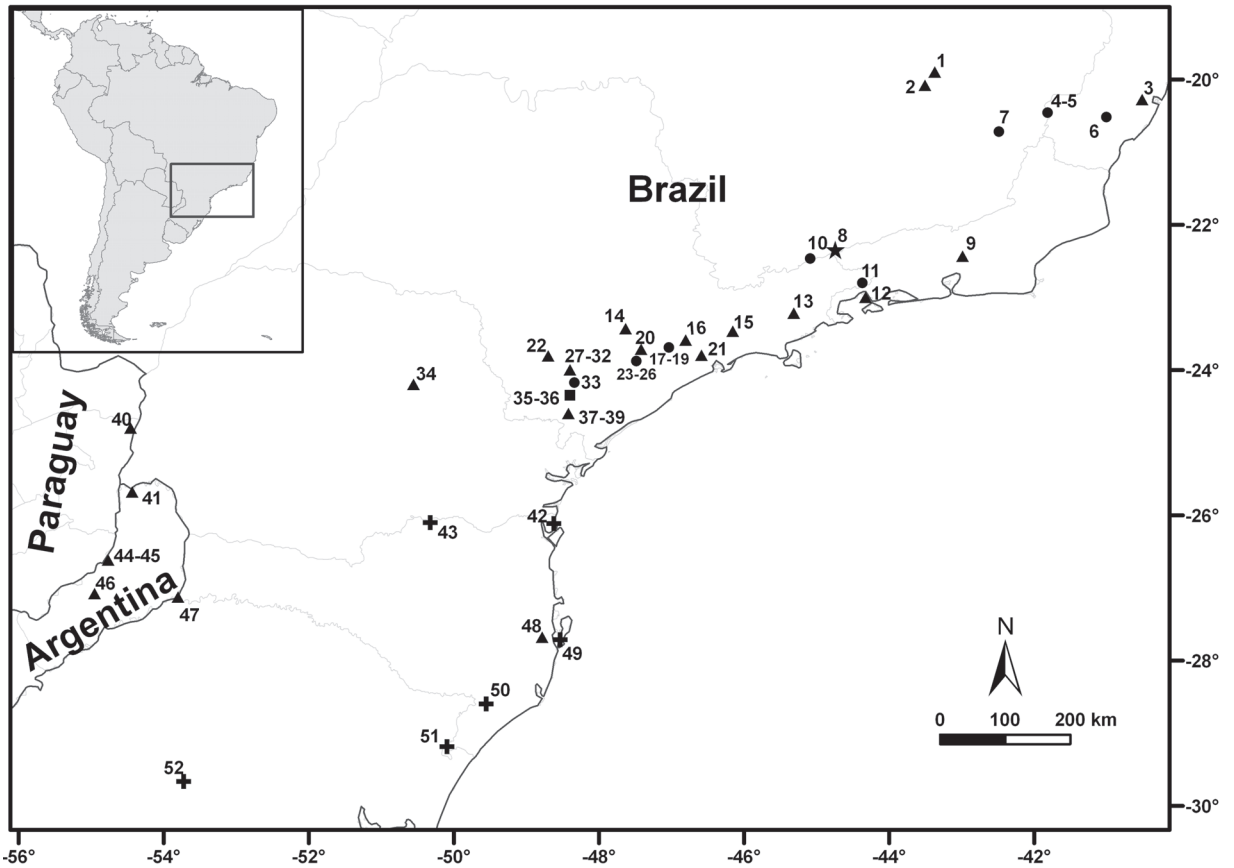


Figure 13. Collecting localities of *J. ossitenuis* (circles), *J. pictipes* (triangles) and *J. rimofrons* (star). Syntopy of *J. ossitenuis* and *J. pictipes* is represented by a square. Localities of specimens originally identified as *Juliomys* sp. (Cherem *et al.* 2004, Cherem 2005, Paresque *et al.* 2009, Lima *et al.* 2010) are represented by a cross. Numbers correspond to the localities listed in Appendix I.

patches of grasses and bromeliads (Oliveira & Bonvicino 2002). Field inventories in this gap, combined with ecological studies on habitat preferences of *Juliomys* spp., will provide adequate data to answer this biogeographic question. These recent records of *Juliomys*, associated to the difficulties in identifying them and the existence of a potentially undescribed species call attention to our ignorance concerning the distribution and diversity of Atlantic Forest mammals in general, and small rodents in particular. Only long-term, intensive field, museum, and lab work will provide us with adequate knowledge regarding this important biodiversity hotspot.

Key to the three living species of *Juliomys*

1. Nose orange; dorsal pelage short, brownish ochraceous to orange-brown; ventral pelage whitish 2

1′. Nose brown; dorsal pelage long, dark-brown, with shades of orange only on the rump; ventral pelage light-brown; braincase robust and inflated; squamosal-alisphenoid groove present ..... *Juliomys rimofrons*

2. Dorsal pelage dark orange-brown; ventral pelage cream-white; tail slightly bicolored; braincase small and delicate; squamosal-alisphenoid groove present ..... *Juliomys ossitenuis*

2′. Dorsal pelage brownish ochraceous to light orange-brown, with nose and rump intensely orange colored; ventral pelage white; tail markedly bicolored; braincase robust; squamosal-alisphenoid groove absent ..... *Juliomys pictipes*

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Appendix I. Gazetteer of collecting localities and specimens examined. All localities included are based on voucher specimens analyzed by us (voucher numbers are underlined) or reported in the literature (Cherem *et al.* 2004, Cherem 2005, Oliveira *et al.* 2005, Pardiñas *et al.* 2008, Paresque *et al.* 2009, De La Sancha *et al.* 2009, Lima *et al.* 2010, Melo *et al.* 2011). Specimens identified only as *Juliomys* sp. in the original references (Cherem *et al.* 2004, Cherem 2005, Paresque *et al.* 2009) are listed here as such. Numbers in bold correspond to numbered localities on the map (Fig. 13). All localities are numbered from north to south. Countries are listed in small caps, followed by larger administrative units in italics, smaller administrative units, specific localities, latitude and longitude (south and west, respectively, in negative decimal degrees), and elevation in meters.

Juliomys ossitenuis: Brazil: *Espírito Santo*: Castelo: 6. Parque Estadual do Forno Grande, -20.52 -41.00, 1200-2039 m (MBML 2607); Dores do Rio Preto: 4. Casa Queimada, Parque Nacional do Caparaó, -20.46 -41.81, 2079 m (MBML 2784); 5. Macieira, Parque Nacional do Caparaó, -20.48 -41.83, 1788 m (MBML 2783). *Minas Gerais*: Fervedouro: 7. Fazenda Neblina, Parque Estadual da Serra do Brigadeiro, 20 km W Fervedouro, -20.72 -42.48, 1300 m (type locality, MN 69752-53, UFMG 3174, MZUFV 608, 627, 679, 683); Passa Quatro: 10. Fazenda do Itaguaré, 16 km SW Passa Quatro, -22.47 -45.08, 1500 m (UFMG 3173). *São Paulo*: Bananal: 11. Estação Ecológica do Bananal, -22.80 -44.37, 1119-1164 m (MZUSP uncatalogued EEB 536-37, 542, 549, 596, 602); Cotia: 17. Sítio Até Que Enfim, Caucaia do Alto, *ca.* -23.68 -47.03, 900 m (MZUSP 33170-71); 18. Quilombo, Reserva Florestal do Morro Grande, Caucaia do Alto, -23.76 -47.00, 800-1000 m (MZUSP 32648); 19. Grilos, Reserva Florestal do Morro Grande, Caucaia do Alto, -23.78 -47.01, 800-1000 m (MZUSP 32650); Piedade: 23. Cristo, -23.85 -47.47, 800-1000 m (MZUSP uncatalogued AB 473); 24. Fragmento Eme, -23.88 -47.48, 800-1000 m (MZUSP uncatalogued AB 258); Tapiraí: 25. Fragmento Antenor, -23.92 -47.45, 800-1000 m (MZUSP uncatalogued AB 196); 26. Janzinho, -23.97 -47.51, 800-1000 m (MZUSP uncatalogued AB 469); Ribeirão Grande: 35. Mulheres, -24.05 -48.37, 800-1000 m (MZUSP uncatalogued AB 350, 357); 36. Museros -24.22 -48.40, 800-1000 m (MZUSP uncatalogued AB 395); 33. Mina Limeira, -24.17 -48.33, 800-1000 m (MZUSP 32276).

Juliomys pictipes: Brazil: *Espírito Santo*: Cariacica: 3. Reserva Biológica Duas Bocas, Alto Alegre, -20.28 -40.51, 550 m (UFES 556-557). *Minas Gerais*: Santa Bárbara: 1. Estação de Pesquisa e Desenvolvimento Ambiental de Peti, -19.9 -43.37, 630-806 m (UFMG 3161-64); 2. Reserva Particular do Patrimônio Natural do Caraça, 25 km SW Santa Bárbara, -20.08 -43.5, 1300 m (MN 69764, UFMG 3159-60). *Rio de Janeiro*: Teresópolis: 9. Fazenda Boa Fé, -22.43 -42.98, 902 m (MN 62182); Angra dos Reis: 12. Mata do Mamede, *ca.* -23 -44.32 (MN 69765). *São Paulo*: São Luís do Paraitinga: 13. Fragmento G4, -23.22 -45.31, 900 m (ZUEC-MAM 2399); Sorocaba: 14. Floresta Nacional de Ipanema, 20 km NW Sorocaba, -23.44 -47.63, 701 m (MVZ 197563-65, UFMG 3165-72); Mogi da Cruzes: 15. Parque Natural Municipal da Serra do Itapety, -23.47 -46.15, 807-1141 m (MN uncatalogued 61); Cotia: 16. Reserva Florestal do Morro Grande, Caucaia do Alto -23.68 -46.96, 800-1000 m (MZUSP 32263-66, 32649); Piedade: 20. No specific locality provided, *ca.* -23.72 -47.41, 800-1000 m (MZUSP 31113); São Bernardo do Campo: 21. Riacho Grande, *ca.* -23.80 -46.58, 777 m

(MZUSP 30710, 30724, 30747, 30779); Buri: 22. No specific locality provided, *ca.* -23.81 -48.70, 666 m (MZUSP 31025); Ribeirão Grande: 35. Mulheres, -24.05 -48.37, 800-1000 m (MZUSP uncatalogued AB 348, 388, 410); 36. Museros, -24.22 -48.40, 800-1000 m (MZUSP uncatalogued AB 402, 562); 27. Fragmento Citadini, -24.06 -48.39, 800-1000 m (MZUSP uncatalogued AB 78); 28. Fragmento Divisa, -24.06 -48.37, 800-1000 m (MZUSP uncatalogued AB 75); 29. Três Quedas, -24.22 -48.37, 800-1000 m (MZUSP uncatalogued AB 571); 30. Moacir, -24.22 -48.37, 800-1000 m (MZUSP uncatalogued AB 378); 31. Paraguai, -24.23 -48.39, 800-1000 m (MZUSP uncatalogued AB 559, 591); 32. Cogumelo -24.23 -48.38, 800-1000 m (MZUSP uncatalogued AB 557); Capão Bonito: 37. Fazenda Sakamoto, Campinho, -24.18 -48.24, 800-1000 m (MZUSP uncatalogued AB 110, 113, 115, 141, 143, 145); 38. Fazenda Sakamoto, Portão, -24.18 -48.24, 800-1000 m (MZUSP uncatalogued AB 124); 39. Fazenda Intervales, -24.33 -48.42, 700 m (MN 60570-71, 69766, MVZ 182079). *Paraná*: Telêmaco Borba: 34. Fazenda Monte Alegre, -24.2 -50.55, 885 m (MN 68336, MN 68347). *Santa Catarina*: Santo Amaro da Imperatriz: 48. No specific locality provided, -27.68 -48.78, no elevation provided (UFSC 652, UFSC 670, UFSC 862-864. *Rio Grande Do Sul*: Derrubadas: 47. Parque Estadual do Turvo, -27.13 -53.8, 100-400 m (no voucher number provided). Argentina: *Misiones*: Cainguas: 46. Reserva Privada de Usos Múltiples de la Universidad Nacional de La Plata "Valle del Arroyo Cuña Pirú", -27.08 -54.95, *ca.* 200 m (MLP 1.I.03.24); Iguazú: 41. Parque Nacional Iguazú, Sendero Macuco, -25.68 -54.43, *ca.* 200 m (CIES-M 23); Montecarlo: 45 Puerto Caraguatay -26.62 -54.76, 192 m (type locality, FMNH 26814); 44. Parque Provincial "Ernesto Che Guevara" Arroyo de Salamanca -26.61 -54.78, 147 m (CNP 895). Paraguay: *Alto Paraná*: Hernandarias: 40. Refugio Biológico Limoy, North of Rio Limoy, -24.80 -54.45, *ca.* 270 m (CZ 014).

Juliomys rimofrons: Brazil: *Minas Gerais*: Itamonte: 8. Brejo da Lapa, -22.35 -44.73, 2000 m (type locality, MN 46703, 61646-47).

Juliomys sp.: Brazil: *Santa Catarina*: Florianópolis: 49. Ilha de Santa Catarina, Parque Municipal da Lagoa do Peri, -27.72 -48.53, 5-60 m, (UFSC 905); Itapoá: 43. No specific locality provided, -26.12 -48.62, no elevation provided (UFSC 2960-66); Siderópolis: 50. Barragem do Rio São Bento, -28.60 -49.55, *ca.*190 m (UFSC 3404); Três Barras: 42. Floresta Nacional de Três Barras, -26.11 -50.32, 700-800 m (UFSC 950). *Rio Grande Do Sul*: São Francisco de Paula: 51. Aparados da Serra National Park, -29.19 -50.09, 800 m (MNCU 464, MNCU 868-869); Santa Maria: 52. Morro do Elefante, -29.67 -53.72, 260-460 m (UFSM 446).

Oligoryzomys flavescens: Brazil: *Espírito Santo*: Dores do Rio Preto: Casa Queimada, Parque Nacional do Caparaó, -20.46 -41.81, 2079 m (UFES 1176, 1033, 1255, uncatalogued CP 381); Macieira, Parque Nacional do Caparaó, -20.48 -41.83, 1788 m (UFES 1177, 1178, 1179).

Rhagomys rufescens: Brazil: *Espírito Santo*: Santa Teresa: Valsugana Velha, -19.97 -40.53, *ca.* 550-700 m (MBML 2327); *São Paulo*: Ribeirão Grande: Mulheres, -24.05 -48.37, 800-1000 m (MZUSP uncatalogued AB 356); Paraguai, -24.23 -48.39, 800-1000 m (MZUSP uncatalogued AB 401).