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Artículo

MOLAR POLYMORPHISM AND VARIATION IN TOOTH NUMBER IN A SEMI-AQUATIC RODENT, *Neusticomys oyapocki* (SIGMODONTINAE, ICHTHYOMYINI).

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ABSTRACT. Newly collected specimens of the rare semi-aquatic mouse *Neusticomys oyapocki* (Rodentia: Sigmodontinae: Ichthyomyini) exhibit individual variation in tooth number. Whereas this Guianan ichthyomyine had previously been described as having only two molars per jaw quadrant, our study examines 31 specimens, of which 12 exhibit from one to four additional third molars. Specimens with at least one third molar come from 6 localities spanning Suriname, French Guiana, and the Brazilian states of Amapa and Para. Third molars reported in this species are tiny (on average 0.55 mm crown length), about half the size of second molars. We show that *N. oyapocki* has between 8 and 12 molars, which represents extensive variation in the number of teeth. This kind of dental variation is rare in muroid rodents, as only a few such cases have been reported from some carnivorous water rats and moss mice from New Guinea.

RESUMO. Polimorfismo molar e variação no número de dentes em um roedor semi-aquático, *Neusticomys oyapocki* (Sigmodontinae, Ichthyomyini). Espécimes recém coletados do raro roedor semi-aquático *Neusticomys oyapocki* (Rodentia: Sigmodontinae: Ichthyomyini) exibem variação individual no número de dentes. Considerando que esse ichthyomyineo das Guianas foi descrito como tendo apenas dois molares por quadrante mandibular, o nosso estudo examina 31 espécimes dos quais 12 apresentam de um a quatro terceiros molares adicionais. Espécimes com pelo menos um terceiro molar são provenientes de 6 localidades que abrangem Suriname, Guiana Francesa, e os estados brasileiros do Amapá e Pará. Os terceiros molares relatados para essa espécie são dentes muito pequenos (comprimento médio da coroa 0.55 mm), cerca da metade do tamanho dos segundos molares. Mostramos que *N. oyapocki* tem entre 8 e 12 molares, o que é uma variação extensa no número de dentes. Esse tipo de variação dentária encontrada no Ichthyomyineo das Guianas é rara em roedores murídeos, já que apenas alguns casos similares foram relatados para alguns ratos de água carnívoros e ratos-musgos da Nova Guiné.

Key words: Dental polymorphism. Guianan Shield. Third molar.

Palavras-chave: Escudo das Guianas. Polimorfismo dentário. Terceiro molar.

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INTRODUCTION

Individual variation in tooth number can be experimentally induced and/or observed in laboratory mice and rats and imply different genetic mechanisms that have been reviewed by Cai et al. (2007), Caton and Tucker (2009), and Cobourne and Sharpe (2010). In humans, supernumerary teeth—which form in addition to the normal complement—are relatively common, occurring as an isolated finding in up to 3% of the population (Cobourne and Sharpe, 2010). Nevertheless, variation in tooth number in natural populations of cricetid rodents is seldom observed (Hooper, 1955; Libardi and Percequillo, 2014). Here we report a first case of widespread dental polymorphism in a free-ranging species of a Neotropical water mouse (Ichthyomyini Vorontsov, 1959).

Ichthyomyines are New World cricetid rodents of the subfamily Sigmodontinae Wagner, 1843, which are ecologically and morphologically distinctive (Voss, 1988, 2015). There are two allopatric taxa of Ichthyomini in the Guianan region (NE Amazonia), namely *Neusticomys venezuelae* (Anthony, 1929) in Venezuela and Guyana, and *N. oyapocki* (Dubost and Petter, 1978) in the south-eastern part of the Guianas, Amapá, and eastern Pará.

When the small (ca. 50 grams) semi-aquatic rodent *N. oyapocki* was first described by Dubost and Petter (1978), its diagnosis included the absence of upper and lower third molars, as well as the small size of its remaining cheekteeth. A that time, *N. oyapocki* was the fourth known species of that ichthyomyine genus, and all specimens of the other taxa (*N. monticolus*, *N. venezuelae*, and *N. peruviensis*) had three molars in each quadrant of the jaw (Voss, 1988).

Subsequently, nine additional specimens of *N. oyapocki* were discovered (Voss et al., 2001; Nunes, 2002; Leite et al., 2007; Miranda et al., 2012) in French Guiana and in Brazilian states of Amapá and Pará, all having only two molars on each quadrant. With one exception, all known specimens of three recently described congeners also have three molars in each jaw quadrant: *N. mussoi* (Ochoa and Soriano, 1991) from the Andes of Venezuela, *N. ferreirai* from the Brazilian state of Mato Grosso (Percequillo et al., 2005), and *N. vossi* from the eastern slope of the Ecuadorian Andes (Hanson et al., 2015). The exception is a paratype of *N. ferreirai* (MZUSP-32093), in which the lower right toothrow has only two molars (Percequillo et al., 2005).

We have been able to examine 26 additional specimens of *N. oyapocki* from Suriname, French Guiana, Amapá and Pará, among which we found considerable variation in numbers of molars, which we describe here.

MATERIALS AND METHODS

We examined museum specimens, received descriptions and photographs for a total of 37 specimens of *Neusticomys oyapocki*, which are listed in the **Appendices 1 and 2**. The age of specimens (Tooth Wear Class—TWC—as defined in Voss, 1988) was roughly divided into juveniles (TWC1, open sphenoccipital suture, immature pelage), subadults (TWC2, closed —but not fused—sphenoccipital suture, immature pelage), and adults (TWC3 to TWC6, closed to fused sphenoccipital suture, adult pelage).

Standard external measurements (Head and Body Length; Tail Length; Hind Foot Length—with claws—; Ear Length) were those recorded by the collectors. We took two additional external measurements of well-preserved specimens: length of the mystacial vibrissae, and length of the terminal tuft of long hairs on the tail.

Cranial and dental measurements were taken as described by Voss (1988: 269-271) and Voss et al. (2001: 73-75). We paid careful attention to the crown-length measurements of upper and lower molars, in order to compare *Neusticomys* values with homologous variables in other similar-sized taxa.

For comparing dental lengths of *N. oyapocki* with those of other similar-sized rodents, we selected vouchered animals (list of specimens available from senior author) collected in French Guiana for one scansorial (*Hylaeamys megacephalus*), one terrestrial (*Zygodontomys brevicauda*), and two arboreal (*Oecomys auyantepui* and *Rhipidomys nitela*) cricetid rodents. Statistical tests were performed using the software package PAleontological STatistics (Hammer et al., 2011).

RESULTS

Our sample of *Neusticomys oyapocki* (N = 37) includes 11 females, 25 males, and one specimen of unknown sex. **Fig. 1** indicates the 13

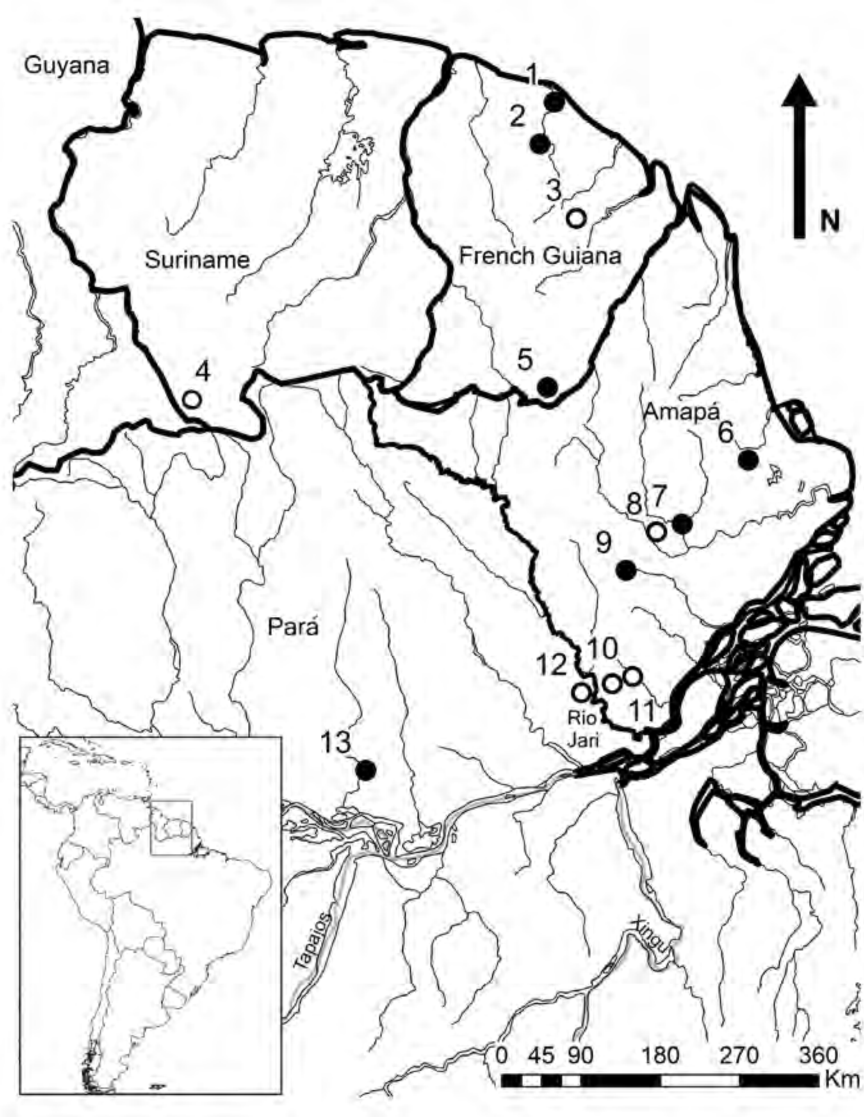

Fig. 1: Map of part of the Guianan Shield with 13 localities from where specimens of *Neusticomys oyapocki* have been examined. Open circles (localities 3, 4, 8, 10, 11 & 12) for locations where the presence of animals with at least one third molar has been evidenced. Closed black circles for localities with animals characterized by only two molars, as per the holotype of *N. oyapocki*.

localities from which these were collected in Amapá (6 localities, 18 individuals), Pará (2 localities, 12 specimens), French Guiana (4 localities, 6 specimens), and Suriname (1 locality, 1 specimen). Only 31 individuals (of which 10 females and 20 males, and one sex unknown) are represented by craniodental material, and these serve as the basis of our comparisons; classified by age, these include 1 juvenile, 10 subadults, and 20 adults.

Statistical comparisons suggest that there is no sexual dimorphism in external measurements of *N. oyapocki* (**Table 1**), nor is any sexual dimorphism apparent for tested craniodental measurements (**Table 2**). Therefore, we treat all specimens as if there

Table 1

External measurements (in mm; weight in g) for *Neusticomys oyapocki*. Mann-Whitney non-parametric tests for comparing sexes. Abbreviations: HBL = Head and Body Length; TL = Tail Length; HF = Hind Foot length (with claws); Ea = Ear length; MV = Mystacial Vibrissae; TT = Tail Tuft; We = Weight; U (MW) = U-value for Mann-Whitney test.

Females	**HBL**	**TL**	**HF**	**Ea**	**MV**	**TT**	**We**
Mean	121.1	81.5	24.0	10.6	37.1	6.1	53.3
Min	96.0	66.0	20.0	6.0	32.0	4.0	21.0
Max	140.0	110.0	27.0	14.0	42.0	8.0	100.0
N	11	11	7	7	8	7	10
Males	**HBL**	**TL**	**HF**	**Ea**	**MV**	**TT**	**We**
Mean	115.4	80.4	24.9	10.9	37.2	4.2	41.8
Min	89.0	71.0	22.5	9.0	30.0	2.0	16.0
Max	151.0	91.0	27.0	12.0	47.0	8.0	69.0
N	14	14	14	14	11	9	14
U (MW)	57.0	75.5	32.5	46.5	42.0	11.0	53.5
p =	0.285	0.946	0.230	0.851	0.888	0.032	0.348

Table 2

Skull measurements (in mm) for *Neusticomys oyapocki*. Mann-Whitney non-parametric tests for comparing sexes. Abbreviations: CIL = Condylo-Incisive Length; ZB = Zygomatic Breadth; LN =Length of Nasals; LIB = Least Interorbital Breadth; LIF = Length of the Incisive Foramina; LD = Length of Diastema; BOC =Breadth of the Occipital Condyles; M1M2: crown length between first and second upper molars. U (MW) = U-value for Mann-Whitney test.

Females	**CIL**	**ZB**	**LN**	**LIB**	**LIF**	**LD**	**BOC**	**M1M2**
Mean	27.46	13.98	10.60	5.12	4.61	7.66	7.27	2.90
Min	24.00	12.10	9.00	4.52	4.10	6.60	6.50	2.70
Max	32.80	16.80	13.00	5.45	5.30	9.60	7.92	3.05
N	10	10	7	10	10	10	8	10
Males	**CIL**	**ZB**	**LN**	**LIB**	**LIF**	**LD**	**BOC**	**M1M2**
Mean	26.99	14.01	10.30	5.19	4.72	7.55	7.11	2.89
Min	22.00	12.00	8.85	4.80	3.90	5.80	6.83	2.74
Max	29.50	15.80	11.60	5.54	5.42	8.70	7.47	3.07
N	20	20	16	20	20	20	15	20
U (MW)	89.5	98	54	88	83	97	42.5	92.5
p =	0.6598	0.9474	0.9201	0.6125	0.4677	0.9123	0.2721	0.7568

were no sexual dimorphism in size, which seems to apply to all ichthyomyine taxa (Voss, 1988).

Of the 31 specimens with available dentitions, 19 (61%) have 2 molars on each jaw quadrant (8 molars total). Of the 12 remaining skulls, we encountered noteworthy variation in tooth number: 6 specimens have 2 upper molars on each side but 3 lower molars on at least 1 hemi-mandible (9 to 10 molars total), 2 specimens have 3 upper molars on one or both sides but 2 lower molars on each lower jaw (9 to 10 molars total), and 2 individuals have 3 molars in each jaw quadrant (12 molars total).

When present (**Fig. 2**), third molars are more often seen on lower jaws (in 10 individuals) than on upper jaws (6 individuals). The third molars are as frequent on the left (15 cases) as on the right (13 cases) sides.

The dental polymorphism can be assessed from several individuals that were collected from just two locations. These locations are from along the Rio Jari: 9 animals from the left bank at Laranjal do Jari (state of Amapa), near Cachoeira Santo Antônio (locality 12 on **Fig. 1**); and 8 animals from the right bank at Almeirin (state of Para), again near Cachoeira Santo Antônio (locality 11 on **Fig. 1**). As detailed on **Table 3**, dental polymorphism affects both upper and lower jaws in Laranjal do Jari, whereas it seems restricted to the lower jaws for Almeirim.

The third molars observed on *N. oyapocki* are tiny teeth (**Fig. 2**), half the size of the adjacent second molar (**Table 4**). Upper and lower third molars represent less than 19 and 21 percent, respectively, of the total crown length for first and second molars. Whereas M3 is a simple peglike tooth, m3 is slightly more complex, consisting of a reduced protoconid/metaconid pair.

The first and second molar teeth of *N. oyapocki* are also small by comparison with those of other similar-sized sigmodontine rodents. The relative size of molars (RSM) can be expressed by the ratio between condylo-incisive length (CIL) and crown length of the first and second upper molars (M1M2); RSM is 0.10 in *N.*

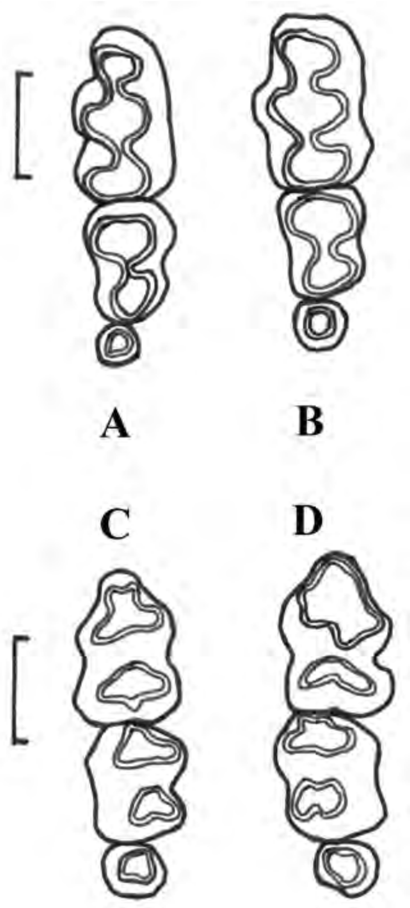

Fig. 2: Upper (A, B) and lower (C, D) dental rows in *Neusticomys oyapocki* specimens with three molars. A = INPA-5245; B = IEPA-3714; C = INPA-5154; D = ISEM-V-1647. The vertical bar is a 1 mm scale.

Table 3

Polymorphism in the numbers of molars in two opposite localities along the Rio Jari: Laranjal (left bank: Amapa side) and Almeirin (righ bank: Para side). Molars are organized as upper left/upper right; lower left/lower right. One animal from Almeirin has its mandibles missing and is coded as ? / ? . Laranjal and Almeirim are localities 12 and 11, respectively, onto **Fig. 1**.

Molars	Laranjal	Almeirim
2 / 2 ; 2 / 2	4	4
2 / 2 ; 3 / 3	1	3
3 / 3 ; 2 / 2	1	0
3 / 3 ; 3 / 3	1	0
2 / 2 ; ? / ?	0	1

Table 4

Dental measurements (crown length, in mm) for upper (M) and lower (m) molars in *N. oyapocki*. Abbreviations: SD = Standard-Deviation; N = sample size.

	M1	M2	M3	m1	m2	m3
Mean	1.84	1.05	0.55	1.55	1.19	0.56
Min	1.69	0.92	0.46	1.37	1.02	0.51
Max	2.02	1.16	0.62	1.81	1.31	0.60
SD	0.08	0.07	0.07	0.11	0.06	0.03
N	25	25	5	24	24	9

oyapocki but ranges from 0.12 to 0.13 in *H. megacephalus*, *O. auyantepui*, *Z. brevicauda*, and *R. nitela* (**Table 5**). By contrast, the upper incisor (measured by the depth of incisor—DI of Voss, 1988) appears stronger in *N. oyapocki* than in other similar sized species (**Table 5**). The ratio DI/M1M2 is 0.57 in *N. oyapocki* whereas it ranges from 0.41 (*H. megacephalus*) to 0.48 (*R. nitela*) in the four taxa under comparison.

Table 5

Selected measurements (in mm; weight in g) in *Neusticomys oyapocki* and in four similar-sized (average weight from 39 to 57 g) species of Guianan Sigmodontinae. Abbreviations: M1M2 = crown length of upper first and second molars; DI = depth of upper incisor; CIL = condylo-incisive length. SD = standard-deviation; N = sample size

		M1M2	DI	CIL	Weight
Neusticomys oyapocki	mean	2.88	1.65	27.6	49.6
	SD	0.09	0.18	2.1	21.7
	min	2.7	1.4	23.7	24.0
	max	3.1	2.1	32.8	100.0
	N	25	25	25	15
Hylaeamys megacephalus	mean	3.45	1.40	26.8	45.3
	SD	0.14	0.13	1.5	10.0
	min	3.1	1.1	22.7	24.5
	max	3.8	1.6	29.1	80.0
	N	59	42	58	43
Oecomys auyantepui	mean	3.18	1.49	25.0	38.7
	SD	0.09	0.17	1.8	8.9
	min	3.0	1.2	21.3	24.0
	max	3.4	1.9	28.5	62.0
	N	63	62	63	37
Rhipidomys nitela	mean	3.34	1.60	27.6	53.1
	SD	0.11	0.16	1.7	12.9
	min	3.0	1.2	23.8	35.0
	max	3.6	1.9	31.3	85.0
	N	41	41	41	31
Zygodontomys brevicauda	mean	3.34	1.51	27.3	57.2
	SD	0.13	0.13	1.8	16.0
	min	3.1	1.2	22.9	26.0
	max	3.7	1.8	30.7	92.0
	N	60	59	59	38

DISCUSSION

Male and female specimens of *N. oyapocki* overlap broadly in all external and craniodental dimensions, conforming to the general lack of sexual dimorphism previously reported for other ichthyomyines by Voss (1988). Consequently, we combined males and females of subadult and adult specimens in order to get more robust values of metric variables for characterizing the external and skull variability in this hitherto poorly known taxon.

Polymorphism in numbers of molars is extensive, with total numbers of molars ranging from 8 to 12; that variation occurs among specimens of *N. oyapocki* from several localities ranging from Suriname and French Guiana to the Brazilian states of Amapá and Pará. Thus, this phenomenon—which was not known previously in this species due to the scarcity of biological materials—appears to be rather widespread (see open circles in **Fig. 1**). Otherwise, dental polymorphism appears extremely rare in cricetid rodents, with one recent case of two individuals (out of 1763 examined specimens) with a supernumerary tooth in the sigmodontine *Necromys lasiurus* (Libardi and Percequillo, 2014). Because most ichthyomyines and all other cricetids normally have three upper and three lower molars, absence of third molars is probably a derived character state that has not yet been fixed in *N. oyapocki*.

The lengths of first and second molars are moderately variable in our sample of 31 *N. oyapocki*, with coefficients of variation ranging from 4.1 (for M1) to 7.3 (for m1), values at least twice as much as the corresponding statistics previously reported for the Central American ichthyomyine, *Rheomys thomasi* (Voss, 1988: **Table 1**). Nevertheless, the combined lengths of first and second molars are somewhat less variable, with coefficients of 3.3 for M1M2 and 4.7 for m1m2. Interestingly, the presence (or absence) of the third molar does not influence the crown length of the first and second molars. Unpaired Mann-Whitney tests indicate that the combined length of upper M1M2 or lower m1m2 does not vary with or without the presence of a third molar (U (MW) = 58, and $p = 0.7256$; U (MW) = 71, and $p = 0.9774$, for upper and lower jaws, respectively). Also, it appears that the presence of the third molar is not related to the size of the animal in *N. oyapocki*, as both F and t tests provide no statistical support for a size difference neither in Condylo-Incisive Length (6 skulls with 3 upper molars versus 25 skulls with 2 molars) nor in Mandibular Length (9 skulls with 3 lower molars versus 15 skulls with 2 molars).

In ichthyomyine rodents, the upper and lower third molars (M3/m3) are always small (or absent: this paper), and third molars have variable root morphologies (Voss, 2015). The third molars reported here for several specimens of *N. oyapocki* have a similar morphology as those of other species of *Neusticomys* (Voss, 1988: 339-347): M3 is very small, without a posterior track of metacone/hypocone; m3 is also very small, with or without a small posterior conule (see Fig. 39 in Voss, 1988).

The overwhelming majority of muroid rodents worldwide have three molars in each jaw. The few exceptions include some species and genera of carnivorous water rats and moss mice from New Guinea that have either no molar at all (*Paucidentomys*: Esselstyn et al., 2012) or only one or two molars per quadrant: *Rhynchomys*, *Pseudohydromys*, *Neohydromys*, *Microhydromys*, and *Paraleptomys* (Musser and Carleton, 2005; Balete et al., 2007; Musser et al., 2008; Esselstyn et al., 2012). In their revision of New Guinean moss mice, Helgen and Helgen (2009) have shown that there are differences in numbers of molars according to the species within the animalivorous genus *Pseudohydromys*: among the 12 recognized species of this Sahulian moss mouse, 5 have maxillary and mandibular toothrows consisting of just 1 small molar each, and 7 species have two molars per quadrant. Furthermore, in the species *Pseudohydromys ellermanni* (Laurie and Hill, 1954), Helgen and Helgen (2009) have reported polymorphism in the number of molars which is probably similar to the one we describe for *Neusticomys oyapocki*: all 26 known specimens of *P. ellermanni* have 1 molar per quadrant except 2 individuals which retain an additional small upper second molar. Another example of variation in number of molars is found in the scansorial rat *Leptomys arfakensis* Musser, Helgen & Lunde, 2008, in which the holotype has only 2 molars per jaw whereas the single paratype has a third extremely tiny molar (Musser et al., 2008); this is a rare exception, because four other species of *Leptomys*, each known by several dozen specimens, all have three molars per quadrant.

Tooth number, together with tooth size, cusp size and cusp number, are the four major factors of tooth patterning (Cai et al., 2007). As has been reported, the number of teeth is regulated by mesenchymal cell number (Cai et al., 2007), and tooth number as well as cusp number can be modelled as a reaction diffusion mechanism (Cho et al., 2007). Despite the enormous taxonomic and ecomorphological diversity of living rodents (especially Muroidea), we note that meristic variability in the molar row is more extensive in *N. oyapocki* than in any other known rodent species. Genomic and developmental studies of *N. oyapocki* could potentially offer key insights into the genetic control of molar development (Catón and Tucker, 2009; Jheon et al., 2013), as well as on the concerted effect of genetic and environmental factors on tooth development (Line, 2003).

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APPENDIX 1

Specimens of *Neusticomys oyapocki* examined

Specimens of *Neusticomys oyapocki* examined or mentioned are organized by country and locality according to the map of **Fig. 1**.

Abbreviations for Institutions: AMNH = American Museum of Natural History (New York); IEPA = Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá (Macapa); INPA = Instituto Nacional de Pesquisas da Amazonia (Manaus); ISEM = Institut des Sciences de l'Evolution de Montpellier (Montpellier); MHNG = Museum d'Histoire Naturelle de Genève (Geneva); MNHN = Museum National d'Histoire Naturelle (Paris); MPEG = Museu Paraense Emilio Goeldi (Belem); ROM = Royal Ontario Museum (Toronto).

BRAZIL: Amapa State: MPEG-34251: Amapa District: Fazenda Itapoa (locality 6); INPA-5243 to 5245: Area da Mineração Itajobi: approx. 15 km East from Serra do Navio (locality 8); IEPA-3269: Laranjal do Jari - próximo à BR 156 (locality 10); IEPA-1512, -1516, -2047, -2722, -2723, -2731, -3268, -3750: Laranjal do Jari: left bank of Rio Jari (locality 12); IEPA-3703, -3714: Mazagão: right bank of Rio Vila Nova (locality 9); IEPA-3258, 3536: Porto Grande, right bank of Rio Araguari (locality 7). Para State: IEPA-1515, -1517, -1520, -1527, -1541, -1765, -2460, -2732, INPA-5141, -5151, -5154: Almeirim, right bank of Rio Jari (locality 11); MPEG-39999: Obidos municipality: Curua River (locality 13).

FRENCH GUIANA: MNHN-1977-775, ISEM-V-2832: Camopi: Trois Sauts (locality 5); ISEM-V-1647: Régina: Nouragues field station (locality 3); MNHN-1995-3234: Saint-Elie: Saint-Eugène along Courcibo River (locality 2); AMNH-267597, MNHN-1995-992: Sinnamary: Paracou (locality 1).

SURINAME: ROM-120588: Sipaliwini: Kutari River Camp (locality 4)

APPENDIX 2

List of specimens for comparisons with four other similar-sized Sigmodontinae.

Abbreviations for institutions as for **Appendix 1**.

Hylaeamys megacephalus (Fischer, 1814)

ISEM: V-1137, V-1693, V-2116, V-2137, V-2680;

MHNG: 1880.025, 1880.032, 1880.034, 1880.035, 1880.036, 1885.001, 1885.002, 1885.003, 1885.004, 1885.005, 1885.007, 1885.064, 1889.100, 1890.002, 1890.003, 1954.053, 1960.010, 1962.074, 1962.088, 1962.095, 1963.017, 1963.036, 1970.008, 1970.015, 1970.017, 1970.019, 1970.022, 1972.030, 1972.031, 1972.032, 1972.033, 1972.034, 1974.069, 1978.046, 1978.061, 1979.064, 1979.068, 1983.096, 1990.013, 1990.042, 1999.003, 1999.004, 1999.005, 1999.006, 1999.007, 1999.008, 1999.049;

MNHN: 1902-44, 1986-288, 1986-317, 1986-319, 2001-2229, 2001-2232, 2007-47;

Oecomys auyantepui Tate, 1939

IEPA: 3176, 3177, 3182, 3190;

ISEM: V-2126, V-2127;

MHNG: 1894.029, 1962.075, 1962.081, 1963.033, 1969.038, 1969.094, 1970.009, 1972.025, 1974.034, 1975.039, 1975.047, 1975.050, 1975.081, 1979.060, 1979.061, 1979.066, 1979.070, 1979.078, 1979.084, 1979.088, 1990.028, 1990.034, 1999.026, 1999.027, 1999.028, 1999.029, 1999.030, 1999.034, 1999.040, 1999.044;

MNHN: 1983-394, 1983-395, 1983-401, 1994-124, 1995-1027, 1995-3235, 1998-1844, 1999-140, 1999-141, 1999-142, 1999-143, 1999-144, 1999-145, 2003-50, 2004-324, 2007-40, 2007-41, 2007-42, 2007-43;ROM: 114022, 114121, 114314, 114331, 114338, 114342, 114357, 114358

Rhipidomys nitela Thomas, 1901

ISEM: V-0905, V-0914;

MHNG: 1886.054, 1890.013, 1890.014, 1894.016, 1962.094, 1969.090, 1969.093, 1969.096, 1969.100, 1972.064, 1972.065, 1972.066, 1974.050, 1975.048, 1975.073, 1975.080, 1975.085, 1975.088, 1979.071;MNHN: 2000-220, 2001-2063, 2001-2194, 2001-2195, 2001-2200, 2001-2201, 2001-2202, 2001-2203, 2001-2204, 2001-2206, 2001-2207, 2001-2208, 2001-2211, 2001-2212, 2003-42, 2003-43, 2007-55, 2007-56, 2007-57;

ROM: 114147;

Zygodontomys brevicauda (J.A. Allen & Chapman, 1893)

ISEM: V-0980, V-0984;

MHNG: 1885.012, 1885.013, 1885.014, 1885.015, 1885.016, 1885.017, 1885.018, 1886.055, 1886.056, 1886.057, 1889.083, 1974.054, 1975.015, 1975.084, 1984.045, 1984.055, 1990.027, 1990.051, 1990.052, 1990.055, 1990.057, 1990.058, 1990.059, 1990.061, 1990.062, 1990.063, 1990.064, 1990.065, 1990.066, 1990.067, 1990.068, 1990.069, 1991.029, 1991.030, 1991.031, 1991.032, 1996.016;

MNHN: 1986-917, 1986-921, 1986-924, 1986-926, 1986-929, 1986-930, 1986-936, 1986-937, 1986-938, 1986-945, 1986-946, 1986-947, 1986-948, 1986-949, 1986-950, 2000-1109, 2000-1111, 2000-1112, 2000-1113, 2001-2234, 2003-774