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NEW RECORDS OF *Neusticomys oyapocki* (RODENTIA, SIGMODONTINAE) FROM A HUMAN-DOMINATED FOREST LANDSCAPE IN NORTHEASTERN BRAZILIAN AMAZONIA

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ABSTRACT: Here we report three new specimens of *Neusticomys oyapocki* from northeastern Brazilian Amazonia collected in a plantation forestry landscape. These represent one third of all known *N. oyapocki* specimens and extend the distribution of the species ca. 360 km southwards. All specimens were captured with pitfall traps, which reinforce the importance of this method for comprehensive small mammal inventories. Moreover, captures occurred during the dry season in primary, secondary, or plantation forests, suggesting that species of *Neusticomys* may be more opportunistic habitat generalists than previously thought.

RESUMO: Novos registros de *Neusticomys oyapocki* (Rodentia, Sigmodontinae) em uma paisagem florestal antrópica no nordeste da Amazônia Brasileira. Reportamos três novos espécimes de *Neusticomys oyapocki* coletados numa paisagem de plantação silvicultural. Estes representam um terço de todos os espécimes de *N. oyapocki* conhecidos e ampliam a distribuição da espécie cerca de 360 km para o sul. Todos foram capturados com armadilhas de interceptação e queda, o que reforça a importância do método para inventários compreensivos de pequenos mamíferos. As capturas ocorreram durante a estação seca em florestas primária, secundária ou de plantação, sugerindo que as espécies de *Neusticomys* podem ser mais oportunistas e habitat generalistas do que aquilo pensado anteriormente.

Key words. Brazilian Amazonia. Ichthyomyini. *Neusticomys*. New records. Plantation forestry.

Palavras chaves. Amazônia Brasileira. Ichthyomyini. *Neusticomys*. Novos registros. Plantação silvicultural.

The tribe Ichthyomyini comprises 16 species in five genera of Neotropical cricetid rodents that exhibit various morphological adaptations for semiaquatic carnivory (Voss, 1988). Among ichthyomyines, the genus *Neusticomys*

shows the least specialized morphology for semiaquatic life and consists of six species: *N. monticolus* Anthony, 1921; *N. venezuelae* (Anthony, 1929); *N. peruviansis* (Musser and Gardner, 1974); *N. oyapocki* (Dubost and

Petter, 1978); *N. mussoi* Ochoa and Soriano, 1991; and *N. ferreirai* Percequillo et al., 2005. Species of *Neusticomys* are known to occur from the Amazonian lowlands of Venezuela, Guyana, French Guiana, and the state of Amapá, Brazil, west to the Ecuadorian and Colombian Andes, south to the Amazonian lowlands of Peru, and east to Central Brazilian shield (Voss, 1988; Nunes, 2002; Percequillo et al., 2005). Although widely distributed, lowland species of *Neusticomys* are rarely collected, which may reflect a sampling artifact (Musser and Gardner, 1974).

Originally described as a member of the genus *Daptomys* by Dubost and Petter (1978), *Neusticomys oyapocki* can be distinguished from other congeneric species by its dark

brown ears and feet (not contrasting in color with the dark brown dorsal pelage), an inferior zygomatic root that is positioned well anterior to the toothrow, absence of an orbicular apophysis of the malleus, and lack of upper and lower third molars (Voss et al., 2001). To date, *N. oyapocki* is only known from five specimens (including the holotype) from French Guiana and one from Amapá state, Brazil (Voss et al., 2001; Nunes, 2002; F. Catzeflis, pers. comm.). Herein, we report the collection of three new specimens of *N. oyapocki* from the region of the Jari River, near to the town of Monte Dourado, in the municipality of Almeirim, Brazilian state of Pará (0° 53' S, 52° 36' W). All known collecting localities for this species are illustrated in Fig. 1.

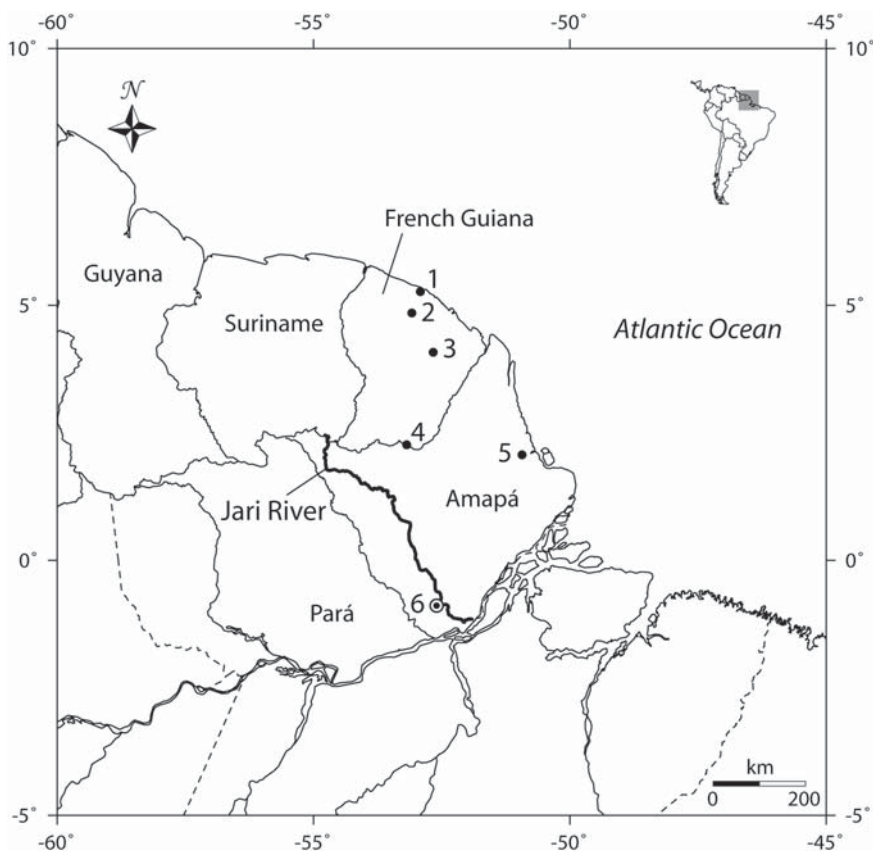


Fig. 1. Known localities of *Neusticomys oyapocki*: 1. Paracou, French Guiana; 2. St. Eugène, French Guiana; 3. Les Nouragues, French Guiana; 4. Trois Sauts, French Guiana; 5. Fazenda Itapoã, Amapá, Brazil; 6. This study: Monte Dourado, Pará, Brazil. Jari River (bold line) forms the boundary between Pará and Amapá states. Dashed lines represent Amapá and Pará borders with other Brazilian states.

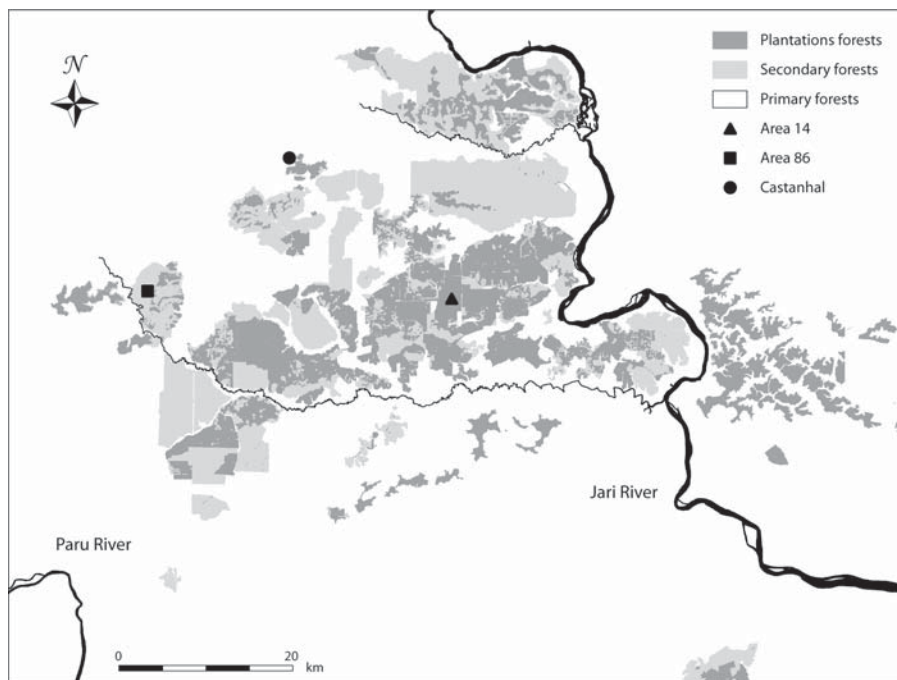


Fig. 2. Landscape configuration showing collection sites of *Neusticomys oyapocki* from Monte Dourado, Pará, Brazil (this study).

Voucher specimens were collected during extensive and intensive sampling efforts recently conducted at 15 sites in the Jari region (for detailed sampling design see Leite, 2006). The study area belongs to Jari Celulose S.A., the second largest forestry company in the country, with a landholding of 17 000 km², comprising extensive areas of fast-growing tree monocultures (e.g., *Eucalyptus urograndis*) destined for pulp production, and large tracts of regenerating natural forest following crop rotation. Plantation and second-growth forests are situated within a large expanse (> 10 000 km²) of relatively undisturbed primary forests (**Fig. 2**). A single individual of *N. oyapocki* was collected in each one of the three major habitat types present in the Jari landscape. All voucher specimens were deposited in the mammal collection of the Instituto Nacional de Pesquisas da Amazônia (INPA), and consist of skulls and fluid-preserved carcasses, with tissue samples in 95% ethanol. External and craniodental measurements of all new

specimens reported in this account follow Voss (1988); the data summarized in **Table 1** also include measurements of the holotype and specimens previously collected in French Guiana and Amapá.

All of our new specimens were caught in Y-shaped arrays of 35 L pitfall traps (each separated by 6 m long 1 m high plastic fences) in 2004, at the beginning of the local dry season that runs from August to December (Coutinho and Pires, 1997). Specimens INPA 5141 and INPA 5154 are adult males with scrotal testes, closed basicranial sutures and completely erupted molar dentitions, glossy dark-brown dorsal fur, and sparkling grayish abdominal pelage. The former (INPA 5141) was captured in a primary forest (at Castanhal, Monte Dourado; 0° 41' S, 52° 49' W), while the latter (INPA 5154) was caught in a eucalyptus plantation (at Area 14, Monte Dourado; 0° 49' S, 52° 39' W). An additional female (INPA 5151) was trapped in a secondary forest (at Area 86, Monte Dourado; 0° 36' S, 52° 39' W). The

Table 1

External and craniodental measurements (mm) and weights (g) of *Neusticomys oyapocki*. (HBL: Length of Head-and-Body; LT: Length of Tail; HF: Length of Hindfoot; CIL: Condylar-incisive Length; LD: Length of Diastema; M1-M2: Length of M1-M2; BM1: Breadth of M1; LIF: Length of Incisive Foramina; BPB: Breadth of Palatal Bridge; BZP: Breadth of Zygomatic Plate; LIB: Length of Interorbital Breadth; ZB: Zygomatic Breadth; Wt: Weight). ^aHolotype; ^bVoss et al., 2001; ^cNunes, 2002; ^dF Catzefflis, pers. com.; ^eExternal measurements taken from fluid-preserved specimen.

	MNHN ^{a,b} 1977.775	AMNH ^b 267597	MNHN ^b 1995.3234	MPEG ^c 34251	V-1647 ^d	INPA ^e 5141	INPA ^e 5151	INPA ^e 5154
Locality	Trois Sauts, French Guiana	Paracou, French Guiana	St. Eugène, French Guiana	Amapá, Brazil	Les Nouragues, French Guiana	Pará, Brazil	Pará, Brazil	Pará, Brazil
Age	2/o/a	2/c/a	3/f/a	2/o/i	2/c/a	3/c/a	2/c/i	3/c/a
Sex	male	male	male	female	male	male	female	male
HBL	114	112	110	102	115	127	96	111
LT	82	84	87	66	81	86	69	77
HF	26	25	24	23	25	26	25	25
Ear	9	10	12	6	12	11	11	11
CIL	27.2	26.3	27.9	24.0	25.3	27.9	24.6	27.8
LD	7.6	7.4	7.8	6.7	6.7	8	6.8	7.8
M1-M2	3.0	3.0	2.9	3.0	2.9	2.8	2.9	3.1
BM1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.2
LIF	5.2	4.6	4.8	4.1	4.4	5.2	4.2	4.4
BPB	3.0	2.7	2.8	2.5	3.2	2.8	2.3	2.7
BZP	1.5	1.4	1.5	1.5	1.7	1.3	1.4	1.7
LIB	4.8	5.4	5.4	5.4	5.1	5.3	5.1	5.1
ZB	13.7	13.8	15.1	12.3	12.2	14.4	12.3	14.1
Wt	47	43	–	21	38	50	25	44

latter specimen has wooly, uniformly light-brown pelage and is a subadult despite its closed basicranial sutures and completely erupted molar dentition.

The primary forest site at Castanhal is characterized by hilly terrain, with many steep slopes and small seasonal watercourses. The canopy height averages 30 meters and the understory is quite open. The pitfall array in which specimen INPA 5141 was captured was approximately 4 m from a seasonal stream, although the stream bed was dry at the time of capture. Area 86 is a 3.5 km² 17-year old secondary forest, and is characterized by flat terrain that is frequently waterlogged during the wet season. The understory is dense and the canopy height occasionally reaches 15-20 m. The trap array in which specimen INPA 5151 was caught has no permanent or seasonal streams closer than 200 m, and the site is completely dry during the dry season. Area 14

is a 1.3 km² 3-year old eucalyptus plantation located in the core of the company's operational area, and lacks any permanent or seasonal water source within 1 km of the trap location. It is surrounded on all sides by other eucalyptus plantations or second-growth stands in early stages of regeneration, with only a small adjacent fragment of primary forest. The understory is both physically managed and regularly treated with herbicide by the land-holding company. Both the secondary forest (Area 86) and the plantation stand (Area 14) are more than 1.5 km from the nearest area of continuous primary forest.

Our data reinforce the importance of using pitfall traps in the deployment of comprehensive small mammal inventories and faunal assessments (Voss and Emmons, 1996; Hice and Schmidly, 2002; Umetsu et al., 2006). This recommendation is particularly apparent in light of the fact that all known *N. oyapocki*

specimens have been captured by pitfall traps, with the possible exceptions of the holotype and specimen MNHN 1995.3234 (which were collected by unknown methods). Indeed, a trapping campaign, with a total effort of 12 000 trap-nights, conducted at the same Jari study sites in 2005 using traditional live traps baited with peanut butter and banana, failed to capture any additional specimens of *Neusticomys*. An independent project in Paracou, French Guiana, also caught two *N. oyapocki* in pitfall traps but failed to capture any in live traps baited with crabs (Voss et al., 2001).

We present the first records of *Neusticomys oyapocki* for the state of Pará, in the Brazilian Amazon. These captures currently constitute one third of all known specimens deposited in scientific collections around the world. They represent a significant expansion of the geographic distribution of *N. oyapocki*, ca. 360 km southwards, constituting the southernmost known record for the species. Moreover, species of *Neusticomys* (like other ichthyomyines) are typically considered to be primary forest inhabitants and associated with small watercourses (Voss, 1988; Voss et al., 2001). However, our findings support the suggestion that *Neusticomys* species may be more opportunistic habitat generalists than other ichthyomyines (Voss, 1988; Ochoa and Soriano, 1991; Voss et al., 2001; Percequillo et al., 2005), an inference that is also supported by the collection of *N. oyapocki* from a savanna habitat in the state of Amapá, Brazil (Nunes, 2002).

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