Tecnociencia 2015, Vol. 17, N° 1.

THE PANAMANIAN CLIMBING RAT, MAMMALIA, RODENTIA, CRICETIDAE, *TYLOMYS PANAMENSIS* (GRAY, 1873): NEW REPORT IN DARIEN

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ABSTRACT

This study reports a new record for *Tylomys panamensis*, increasing its range by 121 km, 66º NW from the original endemic distribution. It has been considered as Data Deficient by IUCN as no information has been published for almost 64 years. Based on our long term surveillance at the Darien's canopy, using Orion Camera System (OCS), we have been able to obtain information about their circadian and monthly activity over the course of one year. The presence of *T. panamensis* remarks the importance of the largest National Park of the Mesoamerican region and claim urgency to be protected from its actual devastation, particularly the montane forest in the rest of the provinces of Darien and Panama.

KEYWORDS

Climbing rat, Darien, mammals, Panama, *Tylomys panamensis*.

LA RATA ESCALADORA PANAMEÑA, MAMMALIA, RODENTIA, CRICETIDAE, *TYLOMYS PANAMENSIS* (GRAY, 1873): NUEVO AVISTAMIENTO EN DARIÉN

RESUMEN

El estudio informa un nuevo avistamiento para *Tylomys panamensis*, incrementando su rango a 121 km, 66º NW de su distribución original. Esta especie ha sido considerada como Data Deficiente por UICN dado que no habría información publicada por casi 64 años. Basados en nuestra vigilancia de dosel en Darién a largo plazo utilizando el Sistema de Cámaras Orión (SCO), hemos podido obtener información de su actividad circadiana y actividad mensual por espacio de un año. La presencia de *T. panamensis* confirma la importancia del mayor Parque Nacional de la región Mesoamericana clamando con urgencia a ser protegido de su actual devastación, y en particular los bosques montañosos del resto de las provincias de Darién y Panamá.

PALABRAS CLAVES

Darién, Mamíferos, Panamá, Rata escaladora, *Tylomys panamensis*.

INTRUDUCTION

Tylomys panamensis: Panamanian Climbing Rat (Gray, 1873), have been classified as Data Deficient by IUCN Red list (Reid & Woodman, 2008), and Vulnerable according to the Environmental Authority of Panama (ANAM, 2012), due to its regional endemism and restricted distribution to Cana, Jaqué, Paya, Pirre, and the Sapo Mountain Chain, Darien province (Alston, 1882; Reid & Woodman, 2008). This rat was first classified as *Neomys panamensis* by Gray (1873), then changed to *Hesperomys panamensis*, and finally to *Tylomys panamensis* in 1879 (Miller Jr., 1911). It has been discussed in terms of similitude with the other climbing rats from this genus, *T. fulviventer*, the later has argus brownish coloration, sides lighter in tone than the back, and hands and feet dusky above (Anthony, 1916). However, it was suggested that *T. fulviventer* be considered junior synonyms of *T. panamensis* (Handley, 1966; Musser & Carleton, 2005). In a later review of Goldman (1920), *T. panamensis* is reported as an arboreal rat, uncommon for low lands, reported only for Cana and Paya River in Darien province at 600 m.a.s.l. (Handley, 1966). So far there is little information related to the actual distribution and general ecology of *T. panamensis* populations. The only information published is on coloration characteristics: white-

bellied, sides, fore and hind limbs with same coloration brownish or slate gray (Anthony, 1916). The head is similar in coloration as the body, with dark color extending to the ears and bicolor tail (Anthony, 1916). Genetic studies based in two possible specimens identified as *T. panamensis* determined that this species is the highest diploid number of this group recorded, with 2n=52 (Pathak *et al.,* 1973).

METHODS

The Fundación Pro-Conservación de los Primates Panameños (FCPP), together with the Sociedad Panameña de Biología (SPB) have been surveying different areas in Panama to generate a current distribution database, following Graham *et al.* (2004) and Guisan & Wilfried (2005). Several methods of mammal detection have been applied, such as using understory and canopy techniques to set camera traps, mistnets and *ad-libitum* observations in Panama.

Since March 4, 2013 to the present, we have been collecting information from five Bushnell-Trophy Cam™ camera traps, settled at the canopy at Chucanti Nature Reserve, Darien province, Panama, with an average level of eight to 12 m high, using Orion Camera System (OCS), a new method to deploy camera traps at canopy (Méndez-Carvajal, 2014). The cameras are part of a long term project of surveillance to study the Darien Black spider monkey *Ateles fusciceps rufiventris* and related fauna at the tree top leaded by FCPP, installed into the highest point of the Majé Mountain Chain, Chucanti Nature Reserve, with an extensive mature forest of 3.5 km² (Méndez-Carvajal, 2012). The study site is located in the frontier border between the Panama Province and Darien Province with (08º 47´16.5" N, 078º 27´01.4"W). Its higher zone reaches the 1,350 m.a.s.l., with temperatures between 24-27 ºC, and annual rainfall of 1,940.5 mm (Laurance, 2008).

RESULTS AND DISCUSSION

We obtained a total of 5,976 hours of trap footage, with continued data collected over the course of 249 days from five cameras. Two cams detected *T. panamensis*: Cam 1 (08º47’50.3” N, 078º27’43.8”W), located at 800 m.a.s.l.,which obtained an index of appearance of 0.004

ind/year and Cam 3 (08º47'51.2" N, 078º28'3.1"W), located at 850 m.a.s.l., with 0.5 ind/year (Fig. 1). We found *T. panamensis* to be more active in the rainy season between June and September, showing a peak in August (Fig. 2), coinciding with the breeding period reported for the Peromyscini tribe (Eisenberg & Redford, 1999). During data collection, this climbing rat presented strict nocturnal-crepuscular, arboreal activity, from approximately 21:00 to 06:00 hrs, and presenting more activity at midnight (Fig. 2). For Cam 3, we observed two different individuals at 12 m high, using a microhabitat composed by a liana *Bauhinia spp.* (Fabaceae) which was used for the rat as a link to connect with the palms *Oenocarpus spp*., and *Attalea spp*. (Palmae), Orquids (Orchidaceae), Bromeliads (Bromeliaceae), ferns, other epiphytic plants from Cychlanthaceae family, and *Anthurios spp*. (Araceae). *T. panamensis* passes almost unnoticed, with a speed average of 17 cm/s (n = 5), we applied $d = v \cdot t$ (d = distance, v = velocity, t = time) to calculate the approximate distance traveled from the camera position elsewhere. Using the maximum time expended to return as four minutes, we calculated that this rat could go as far as 20 m from its possible nest if traveling at relatively constant velocity over time and space. Based upon several cam trap photographs taken of two different individuals, and the relation with the dimensions of the surrounding vegetation following Lambert *et al*. (2012), we calculated a total head-body size of 226.6 mm (n=10, SD±24.3) and tail of 199.1 mm (n=10, SD±29.7), and total length 423.3 mm (n=6, SD±22.5). Unpublished data were found reviewing information at the National Museum of Natural History (NMNH) from United States and the Instituto Conmemorativo Gorgas de Estudios de la Salud (ICGES) from Panama, and its mammal collection, the Colección Zoológica Eustorgio Méndez (CoZEM). We found specimens of *T. panamensis* collected from NMNH and CoZEM coincide with the average calculated for body size of the specimen captured in camera (Figs. 3 and 4). General average body size calculated from museum specimens and photos were: TL 423(380-470); HB 218 (166-255); T 205(144-226); RF 38(32-42) and EN 18(10-25) (Fig. 4). Other mammals that appeared in the same cameras were: *Sciurus granatensis*, *Potos flavus*, *Tamandua mexicana*, and *Ateles fusciceps rufiventris* (Méndez-Carvajal, 2014). Using our criteria of high elevation, cloudy forest, and remnant forested zone, we consider the actual distribution range for this species should be expanded using the mountain chain forest that is

left in the area of Darien until Chucanti Nature Reserve and Majé Mountain Chain from Panama province.

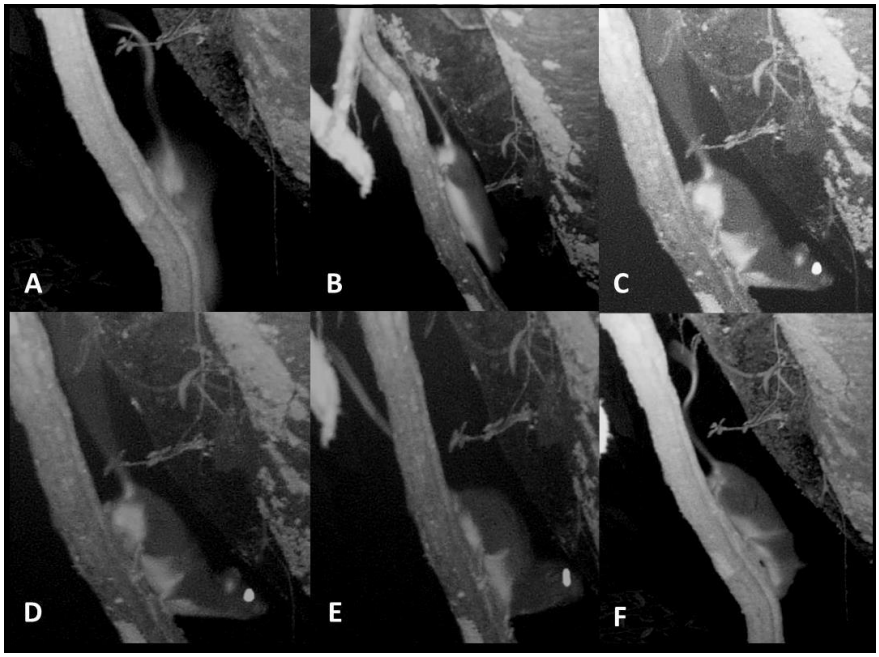


Fig. 1. *Tylomys panamensis* photographed at Chucanti Nature Reserve, Darien. A) Bicolor tail, B) Gray dorsal coloration, C) White ventral coloration D) *T. panamensis* using *Bauhinia spp*., as a way to move from the top to the down side E) *T. panamensis* jumping position, F) Vertical movement.

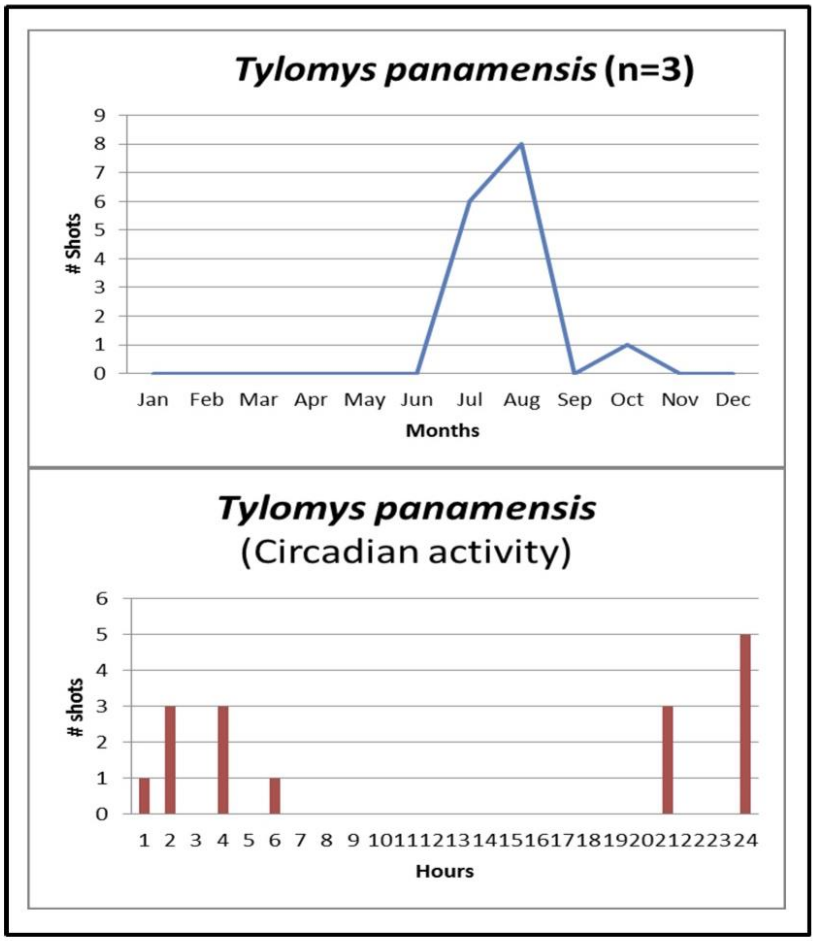


Fig. 2. Activity pattern for *T. panamensis* in terms of a round year camera trap study; and circadian activity for *T. panamensis* at Chucanti Nature Reserve, Darien, Panama.

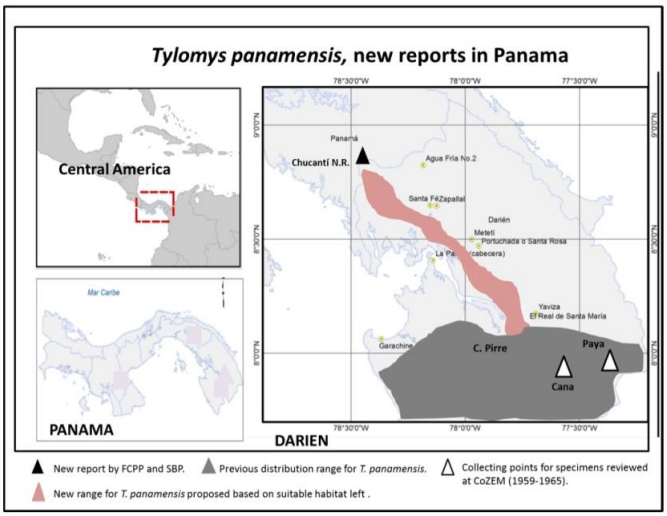
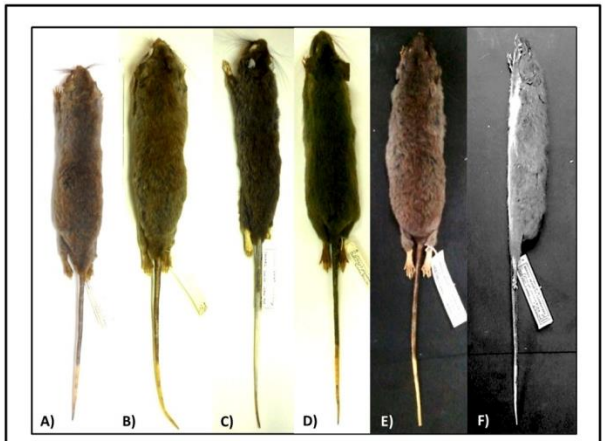


Fig. 3. *T. panamensis*, previous range and new sight at Chucanti Nature Reserve, Darien province, Republic of Panama.



Source	Specimen	Sex	TL	HB	T	HF	EN	Locality	Data Collected
USNM	178734	F	392	166	226	40	14	Cana, Darien	March/12/1912
USNM	314585	M	470	255	215	41	20	Paya, Darien	March/09/1959
USNM	314586	M	449	217	232	42	20	Paya, Darien	March/09/1959
USNM	314587	M	445	226	219	32	16	Paya, Darien	March/ 10/1959
CoZEM	H-0284	M	380	236	144	35	10	Paya, Darien	Feb/24/1959
CoZEM	T-00141	M	405	203	202	40	25	Cana, Darien	Aug/02/1965
FCPP/SPB	EK000125	M	423	226	199	X	X	Chucanti, Darien	July/20/2013

Fig. 4. Specimens courtesy of the National Museum of Natural History (NMNH): A) 314585 B) 314586 C) 314587 and D) 314587. Specimens courtesy of the Colección Zooloógica Eustorgio Méndez (CoZEM): E) H-0284 F) lateral view of H-0284 in black and white to compare with our individuals photo-captured with infrared sensor. TL: Total Length; HB: Head-Body; T: Tail; HF: Hind Foot; EN: Ear Notch.

CONCLUSIONS

This report is the first obtained since the 1950's (Musser & Carleton, 2005; Reid & Woodman, 2008), offering data that expand *T. panamensis* information and distribution at 121 km, 66º NW from the original distribution taking as a reference Pirre Mountain Chain. The lack of information could be related with the cryptic behavior of this arboreal and nocturnal rat, as well as the altitudinal range where this rat is found. We consider Chucanti Nature Reserve as a valuable forested zone, and one of the few areas into the Darien province that could be protecting the existing endemic fauna and flora of its cloudy forest in the Majé Mountain Chain, which connects the Bayano forest with the Panama province, Republic of Panama.

ACKNOWLEDGEMENTS

We thank the collaboration of the Panamanian Environmental Authority (ANAM), Department of Wildlife Management, and the Colección Zoológica Eustorgio Méndez (CoZEM) from the Instituto Conmemorativo Gorgas de Estudios de la Salud (ICGES), with special thanks to Aydee Cornejo and Nohelys Alvarado, for their great support with the specimens. We really appreciate the collaboration of Stephanie Canington from the National Museum of Natural History at Smithsonian Institution, who kindly helped with specimens' information. We are grateful with Milvia Sánches, Yayson Péres, Arcadio Castillo, Elena Méndez, and Ricardo Moreno, who helped in the field in the scientific station of Chucanti. We deeply appreciate the support of Idea Wild, Mohamed bin-Zayed Species Conservation Fund (projects # 1025476 and 12055182), and II Rufford Small Grant (project #16021-2). Our special appreciation to Virginia Commonwealth University (VCU), for their first camera traps donated, to Cathy Viverette, Edward Crawfort, and especially to Kensey Barker and Ryan Weaver who kindly reviewed the English of the manuscript. Pedro Méndez-Carvajal would like to thank the government of Panama through the Senacyt-IFARHU for the doctoral scholarship that will allow analyzing the long term data at the University of Durham, UK.

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Recibido marzo de 2015, aceptado abril de 2015.