NOTAS

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On the autotomy in *Pattonomys semivillosus* (Rodentia: Echimyidae) and *Calomys hummelincki* (Rodentia: Cricetidae) in Colombia.

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Resumen

La autotomía caudal es rara en mamíferos y se observa principalmente en roedores. En esta nota se reportan dos nuevos casos en la rata espinosa arborícola colombiana (*Pattonomys semivillosus*) y la Lauca de Hummelinck (*Calomys hummelincki*). En *P. semivillosus* se observa un caso de autotomía verdadera, soltando toda su cola cuando es agarrado, similar a las lagartijas. Por otro lado, *C. hummelincki* presenta una falsa autotomía, desprendiendo solo la piel de la punta de la cola, exponiendo las últimas ocho vertebra. Estos registros incrementan el número de especies registradas con autotomía a 49.

Palabras clave: Autotomía, Cola, Colombia, Roedores

Abstract

Tail autotomy is rare among mammals, mainly observed in rodents. This note reports two new cases in the Colombian Speckled Tree Rat (*Pattonomys semivillosus*) and Hummelinck's vesper mouse (*Calomys hummelincki*). *P. semivillosus* displays real autotomy, dropping its entire tail when grabbed, akin to lizard behavior. *C. hummelincki* exhibits fake autotomy, shedding only the tail tip, exposing the last eight vertebrae. These observations add to the limited knowledge of autotomy in rodents, increasing the known species count to 49.

Key words: Autotomy, Tail, Colombia, Rodents

Autotomy is the behavior among animals to shed or discard an appendage (Fredericq 1883), an event most well-known among lizards and salamanders (Kelehear & Webb 2006). Although this is commonly considered an anti-predator strategy (Emberts *et al.,* 2019), autotomy can also result from intraspecific interactions (Itescu *et al.,* 2017). Notwithstanding its common occurrence within invertebrates, few groups of vertebrates display this behavior, and it is a very rare event in mammals. Among mammals, rodents are the only group where tail autotomy has been recorded as a defensive strategy against predators (Shalgar *et al.,* 1999). Yet, little is known about tail autotomy in rodents. How

many species are capable of it? How does the anatomical mechanism work? The aim of this note is to contribute to the subject by reporting new cases of tail autotomy in two rodent species from Colombia.

There are two types of tail autotomy (Dubost 1987), the first type of tail autotomy is called “False autotomy,” which is when only peripheral layers of tail skin are removed, exposing the vertebral bones, which eventually are lost in the following days. This type of autotomy occurs principally in the most distal part of the tail (Dubost 1987). The second type of autotomy is called “Real autotomy” and is similar to the autotomy observed in lizards, where rodents break the tail off at the base (between 5th and 6th vertebrae; Mohr 1941). After the breakage, an exposed wound is left, which is later covered by hair. Unlike lizards, sea stars, or salamanders, rodents do not regenerate the tail.

This is first case of tail autotomy recorded in *Pattonomys semivillosus*, an arboreal endemic spiny rat of Colombia (Emmons *et al.,* 2015; Emmons & Fabre 2018). In this case, the event is a real autotomy. The autotomy event was registered on February 9th, 2023, at approximately 10h15, in a rural area near the municipality of Ponedera, Atlántico (10.603444, -74.796611). I was manually capturing a male adult (Figure 1A) from a hollow tree of *Gliricidia sepium*. When I grabbed it by the body, the individual started to turn around the body, dropping the tail to the ground (Figure 1A-C). The tail on the ground kept moving for about five seconds (similar as lizards). Interestingly, at the moment of the event, local people claimed that they have seen the rat (i.e., *P. semivillosus*) without a tail in some cases, arguing that there are two types of rats, “tail and tailless rat.” The autotomy events in rodents typically occur when individuals are grabbed by the tails, prompting them to jump, pull, or rotate their body (Summer & Collins 1918) to facilitate the tail’s breakage and escape. However, the reported event in *P. semivillosus* is different, as the autotomy occurred after a violent gyrating action when it was held by the body in the air, rather than by the tail. There are other rodent species (e.g., *Chaetopidus fallax*, *Podomys florianus*) where autotomy is facilitated by gyrating actions when they are suspended by the tail in the air (Layne 1972; Michener 1976). It is highly probable that a similar mechanism is at play in *P. semivillosus*, and the reported event here is rare and unusual within the species. Nonetheless, to better understand the autotomy process in *P. semivillosus*, controlled experiments or additional reports are necessary.

The second case of tail autotomy was observed in the species *Calomys hummelincki*, a nocturnal terrestrial rodent, distributed in the arid regions of Colombia and Venezuela (Eisenberg 1989). This event is fake autotomy and was documented on August 28th, 2023, at approximately 19h00 in a rural area near the National Natural Park Bahía Portete-Kaurrele in La Guajira, Colombia (12.095444, -72.006528). During the event, I photographed an adult male being held by the tail (Figure 2D); however, it promptly detached its skin tail, escaping and leaving behind only the tip’s skin. A few minutes later, I recaptured the individual, allowing for photographs of the exposed vertebrae and shed skin (Figure 2E). It appears that 'Fake autotomy' occurred under circumstances akin to other documented instances, wherein the individual was grasped by the tail and initiated shedding through a jump (e.g., Shargal *et al.*, 1999). The autotomy event consistently coincided with the tail part that was grasped and compressed. Nonetheless, there remains ambiguity regarding whether the autotomy specifically occurs always in the same area of contact or if it varies depending on the point of grip.

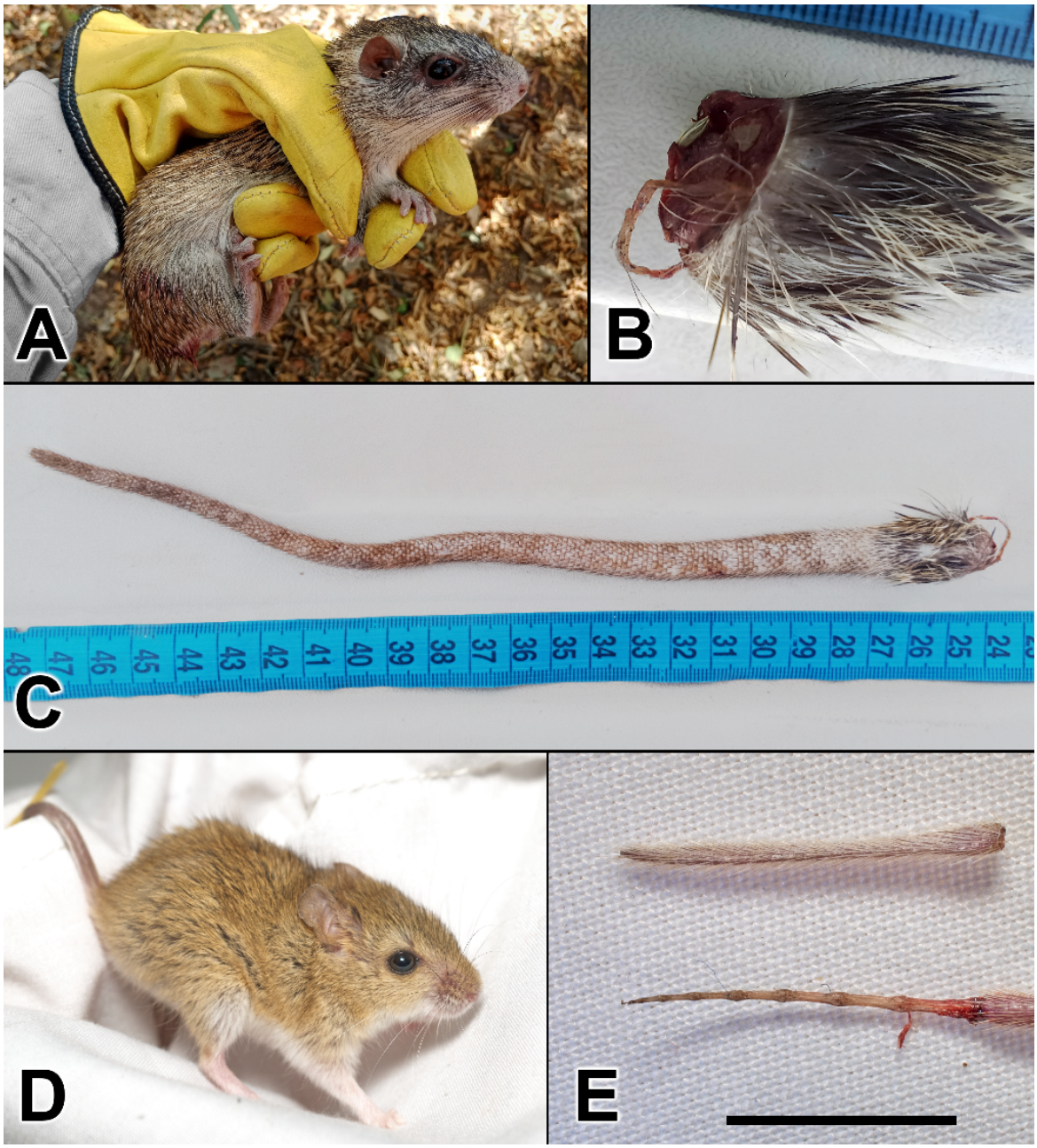

FIGURE 1. The individual of *Pattonomys semivillosus* after the autotomy event (A), illustrating the area of breakage (B) and the entire dropped tail (C) The individual of *Calomys hummelincki* held by the tail (D) moments before the autotomy event, and (E) the shed skin and exposed vertebrae after the autotomy. Scale bar: 6 mm.

Tail autotomy is a rare phenomenon documented in only a handful of rodent species (Shalgar *et al.*, 1999), with real autotomy being particularly uncommon. With the two cases reported here, the tally of rodent species exhibiting tail autotomy rises to 49 (Table 1). Among these, fake autotomy remains the prevailing form, observed in 39 species, while real autotomy was identified in 10 species. Both real and fake autotomy appear to be infrequent within the rodent world, having evolved independently multiple times within the group. The study of tail autotomy in rodents requires significant further investigation.

Questions arise such as whether a species could exhibit both types of autotomy, the role of external forces in inducing autotomy, versus voluntary mechanisms, and the efficacy of tail autotomy in various ecological contexts.

TABLE 1. List of species with tail autotomy reported since 1905. List species updated and modified from Shalgar et al. (1999).

Family	Species	Year
Gliridae	*Graphiurus crassicaudatus*	Thomas 1905 in Mohr 1941
Gliridae	*Graphiurus sp.*	Thomas 1905 in Mohr 1941
Muridae	*Apodemus sylvaticus*	Cuenot 1907; Mohr 1941
Gliridae	*Eliomys quercinus*	Cuenot 1907; Gogl 1930; Mohr 1941
Echimyidae	Echimyidae (no details on species) *	Allen 1917; Walker 1968
Echimyidae	*Proechimys sp.**	Allen 1917; Walker 1968
Heteromyidae	*Chaetodipus fallax fallax**	Sumner & Collins 1918
Heteromyidae	*Perognathus longimembris bangsi**	Sumner & Collins 1918
Muridae	*Peromyscus boylii*	Sumner & Collins 1918
Gliridae	*Muscardinus avellanarius*	Gogl 1930; Mohr 1941
Muridae	*Apodemus flavicollis*	Mohr 1941
Muridae	*Apodemus agrarius*	Mohr 1941
Muridae	*Rattus novergicus*	Mohr 1941
Muridae	*Rattus rattus*	Mohr 1941
Muridae	*Mus musculus*	Mohr 1941
Gliridae	*Glis glis*	Mohr 1941
Gliridae	*Dryomys nitedula*	Mohr 1941
Capromyidae	*Mesocapromys melanurus**	Mohr 1941
Capromyidae	*Mesocapromys nanus**	Mohr 1941
Capromyidae	*Mysateles prehensilis*	Mohr 1941
Capromyidae	*Lagidium viscacia*	Pearson 1948
Muridae	*Sigmodon hispidus*	Dunaway & Kaye 1961; Hosotani et al. 2021
Sciuridae	*Funisciurus substriatus*	Robinson 1967
Gliridae	Dormice	Robinson 1967
Muridae	*Zyzomys woodwardi*	Ride 1970
Muridae	*Zyzomys pedunculatus*	Ride 1970
Sciuridae	*Tamias striatus*	Layne 1972
Muridae	*Podomys floridanus*	Layne 1972
Echimyidae	*Proechimys guairae*	Weir 1973
Octodontidae	*Octodon degus**	Fulk 1975; Nowak 1991; Woods & Boraker 1975
Echimyidae	*Proechimys cuvieri*	Dubost 1987
Cricetidae	*Phyllotis darwini*	Jaksic & Simonetti 1987
Cricetidae	*Phyllotis xanthopygus*	Jaksic & Simonetti 1987
Echimyidae	*Proechimys longicaudatus*	Redford & Eisenberg 1992
Heteromyidae	*Liomys pictus*	Shargal 1999 (Pers. Comm. With Mendoza)
Muridae	*Neotoma lepida*	Shargal 1999 (Pers. Comm. With Gros)
Muridae	*Lophuromys sp.*	Shargal 1999 (Reported as anonymous)
Muridae	*Acomys russatus*	Shargal 1999
Muridae	*Acomys cahirinus*	Shargal 1999
Muridae	*Acomys wilsoni*	Shargarl 1999 (Pers. Comm. With Takata)
Muridae	*Acomys percivali*	Shargarl 1999 (Pers. Comm. With Takata)
Echimyidae	*Proechimys semispinosus**	McKee & Adler 2002
Heteromyidae	*Heteromys sp. nov.**	Sánchez-Giraldo & Delgado-V 2009
Cricetidae	*Neacomys tenuipes*	Sánchez-Giraldo & Delgado-V 2009
Heteromyidae	*Heteromys australis*	Medina et al. 2018
Muridae	*Apodemus argenteus*	Iwasa & Hasegawa 2022
Muridae	*Apodemus speciosus*	Iwasa & Haegawa 2022
Echimyidae	*Pattonomys semivillosus**	This study
Cricetidae	*Calomys hummelincki*	This study

* Species reported with real autotomy

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