

Phoretic pseudoscorpions associated with the Alston's Singing Mouse (*Scotinomys teguina*) in Western Panama

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Abstract

Phoresy is a form of commensalism that has been widely studied, however, limited literature is found about this interaction in Mesoamerican rodents. Rodent trapping in highlands from Western Panama allowed the first report of phoretic pseudoscorpions (Chernetidae), associated with *Scotinomys teguina*; which also represents the first phoretic record in mammals from Panama.

Key words: ecology, mammals, Neotropics, Panama, phoresy, pseudoscorpions, rodents.

Resumen

Foresis es una forma de comensalismo que ha sido ampliamente estudiada, sin embargo, la literatura sobre esta interacción en roedores de Mesoamérica es limitada. Capturas de roedores en montañas del occidente de Panamá, permitieron el primer reporte de pseudoescorpiones (Chernetidae), foréticos asociados a *Scotinomys teguina*; el cual también representa el primer reporte de foresis en mamíferos de Panamá.

Palabras clave: ecología, foresis, mamíferos, Neotrópico, Panamá, pseudoescorpiones, roedores.

Introduction

Understanding how biodiversity is maintained continues as a central topic of research. From an ecological perspective, several species interactions that mediate diversity and species distributions have been thoroughly described, while interactions like phoresy, a form of commensalism, remain widely understudied (White et al. 2017).

Although phoresy is known to play a role in the dispersion of phoretic pseudoscorpions, the limited literature on this group prevents a clear understanding of several aspects of these organisms. For example, most of the literature on pseudoscorpions focuses on taxonomical descriptions, though

literature about their spatial distribution, or the benefits and level of dependence on this mutualistic condition, are scarce.

Pseudoscorpion phoresy has been reported in several organisms such as birds, insects, and mammals. The reported association of pseudoscorpions with rodents in North America, includes the genus *Heteromys*, *Liomys*, *Neotomodon*, *Onychomys*, *Peromyscus*, and *Spermophilus* (MacSwiney et al. 2012; Villegas Guzmán & Hernández Betancourt, 2006), and *Neotoma* (Francke & Villegas-Guzmán, 2006; Villegas-Guzmán & Pérez, 2005). However, in the Mesoamerican region, this rodent-pseudoscorpions interaction has been reported only in *Heteromys nubicolens* (Dao, 2017) and *Liomys salvini* (Durden & Campbell, 2016).

In Panama, 21 species of pseudoscorpions have been reported (Martínez et al. 2019, 2020, 2021), most of them in microhabitats such as tree barks, soils, and nests. Others have been caught in pitfall traps (Martínez et al. 2018; Subías et al. 2004). A very few records reflect association with other species, and none of these include mammals. This note aims to report the phoretic interaction involving the Neotropical Alston's Singing Mouse and pseudoscorpions.

Materials and Methods

As part of a behavioral project on rodents, a series of live trapping sessions were carried out in the highlands of Western Panama (Chiriquí Province). Rodents were captured in Sherman live traps and placed on the ground at Peterson's Nature Reserve (PNR) (8°46'50" N, 82°23'46" W). The captured rodents were measured, weighted, and taxonomically identified using a mammal field guide (F. A. Reid, 2009). The rodents were examined for the presence of parasites, resulting in the discovery of phoretic pseudoscorpions. Approximations to identifying the pseudoscorpions found were performed through image comparisons and literature analysis.

Results

Pseudoscorpions were documented in one of Alston's Singing Mice, *Scotinomys teguina*, at PNR. Several pseudoscorpions were found attached to its rump. Specimens were collected for further lab

identification, but samples were lost during an unexpected field flooding. The only evidence that remains from this event, are the photographs taken at the time of the sighting (figure 1).

Images comparisons from the literature, suggest that the observed specimens could belong to the Family Chernetidae; a widely distributed Family, with some genera reported in Panama.

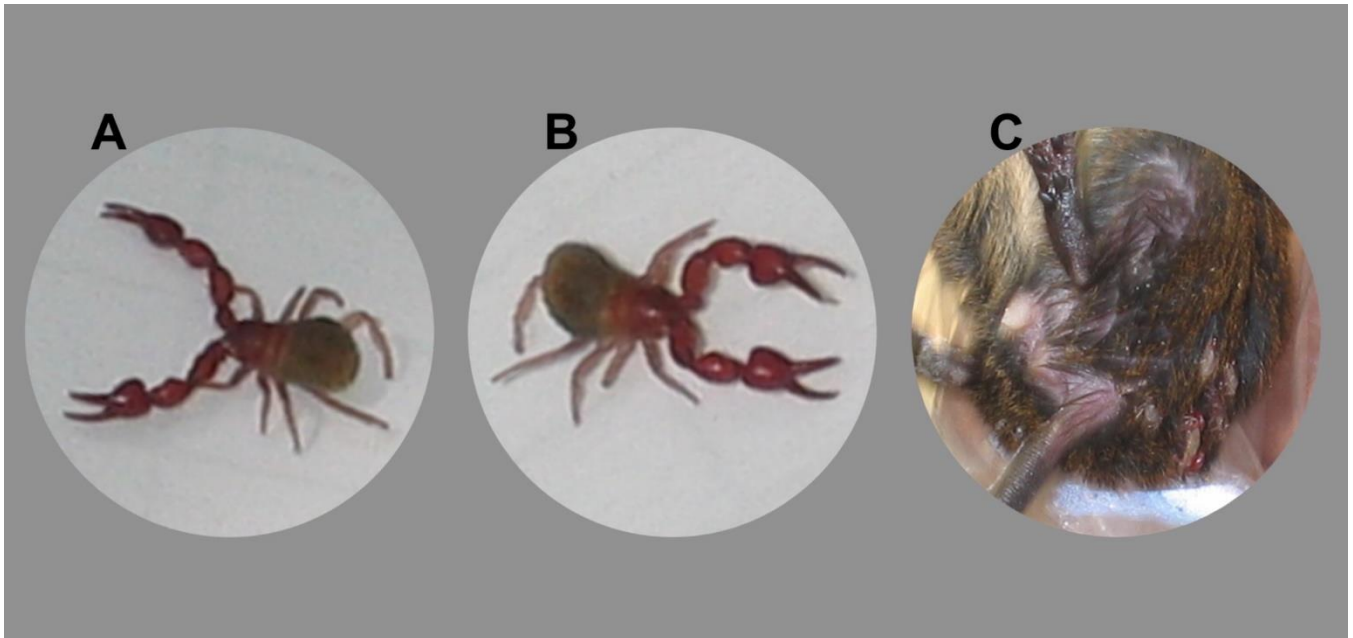


Figure 1. A and B= Dorsal view of pseudoscorpions collected at PNR in Boquete. C= rump of *S. teguina*, with pseudoscorpions attached.

Discussion

Although the absences of the collected specimens prevent a better taxonomical identification, this report still provides evidence of the phoretic interaction of pseudoscorpions and *S. teguina*, which has not been previously documented and represents the first phoretic record for mammals from Panama. To understand better the ecological phoretic assembly of pseudoscorpions with other species, it is required to increase and focus the field research efforts. As inferred from this report, some records of phoretic pseudoscorpions may have been gathered by chance, and not necessarily as the result of researches designed to document phoresy.

From a conservation perspective, the Alston Singing Mouse, *Scotinomys teguina*, is a widely distributed species in Mesoamerican highlands (Campbell et al. 2010), with relatively stable populations, considered as Least Concern for conservation (F. Reid et al. 2008, 2016); this may suggest that this species offers a stable source for the dispersal of the phoronts. Meanwhile, the fact that some species of pseudoscorpions in Spain are included as “vulnerable” in the IUCN Red List (Zaragoza, 2015); raises the question about the conservation status of pseudoscorpions in Panama.

This represents the second report of pseudoscorpions from the Boquete area in 79 years, when the species *Cordylochernes angustochelatus* was described (Hoff, 1944). Reflecting that much of the field-based, mammal-related research in Panama has occurred in Central Panama, and less in the eastern and western provinces. The time gap of information for this group could reflect this asymmetrical approach. However, the potential for describing new interactions or discovering new species must be equivalent in these less studied regions, especially when modern molecular approaches are used.

Conclusions

Phoresy is reported for the first-time involving Alston’s Singing Mouse, *S. teguina*, and pseudoscorpions; it represents the first report of phoresy in mammals from Panama. The documentation of this occasional event through images, was crucial for further analysis when specimens were lost.

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