


First record of phoresy on the genus *Oreodera* Audinet-Serville, 1835 (Coleoptera: Cerambycidae) by the pseudoscorpion *Cordylochernes scorpioides* (Linnaeus, 1758) (Arachnida: Pseudoscorpiones)

Primer registro de foresia sobre el género *Oreodera* Audinet-Serville, 1835 (Coleoptera: Cerambycidae) por el pseudoescorpión *Cordylochernes scorpioides* (Linnaeus, 1758) (Arachnida: Pseudoscorpiones)

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ZooBank: urn:lsid:zoobank.org:pub:51FBB756-671C-4255-B13E-50EFB0744AB4
<https://doi.org/10.35249/rche.49.4.23.16>

Abstract. The phoretic association of the pseudoscorpion *Cordylochernes scorpioides* (Linnaeus, 1758) (Chernetidae) on the long-horn beetle *Oreodera rufofasciata* Bates, 1861 (Coleoptera: Cerambycidae) is reported for the first time.

Key words: Chernetidae; dispersion method; long-horn beetles; Peru.

Resumen. Se reporta por primera vez la asociación forética del pseudoescorpión *Cordylochernes scorpioides* (Linnaeus, 1758) (Chernetidae) sobre el escarabajo de cuernos largos *Oreodera rufofasciata* Bates, 1861 (Coleoptera: Cerambycidae).

Palabras clave: Chernetidae; escarabajo de cuernos largos; método de dispersión; Perú.

The dispersal, understood as any movement of individuals or propagules with possible consequences for gene flow across space, is a critical component in the life history of most organisms. These dynamics influence individual and population fitness, gene flow, genetic drift, and population genetic structure (Bartlow & Agosta 2020; DiBlasi *et al.* 2018; Ronce 2007). An important type of dispersal between animals is the phoresy. It occurs by association between two different taxa, in which one animal, called a phoron, seeks out and joins another animal, the dispersal host, for the sole purpose of being transported to another habitat (Bartlow & Agosta 2020; White *et al.* 2017).

This dispersal phenomenon is widespread among arthropods, especially within pseudoscorpions, which can attach to different structures of a variety of other arthropods, mostly in adult stages, which are generally more mobile (Huigens & Fatouros 2013; Poinar

et al. 1998). The most common hosts of pseudoscorpions are insects, presenting association with at least 47 families, mainly in the orders Diptera, Lepidoptera, and Coleoptera (Aguiar & Bührnheim 2000; Martínez *et al.* 2023; Poinar *et al.* 1998).

For the latter order, the phoretic relationship has been documented in elaterids and scarabeids and, mainly, passalids and cerambycids, with about 40 species of pseudoscorpions associated with 80 species of Coleoptera from Brazil and Mexico (Villegas-Guzmán *et al.* 2016). Among the best-known phoretic associations of pseudoscorpions with cerambycids are those of the phorontid *Cordylochernes scorpioides* (Linnaeus, 1758), which is carried on a variety of hosts, such as *Acrocinus longimanus* (Linnaeus, 1758), *Macrodontia cervicornis* (Linnaeus, 1758), and *Hylettus coenobita* (Erichson, 1847) (Aguiar & Bührnheim 2000; Bevilaqua *et al.* 2020).

The present communication reports the first record of a phoretic interaction of *Cordylochernes scorpioides* with *Oreodera rufofasciata* Bates, 1861, and it is also the first report of this phoresy for the genus *Oreodera* Audinet-Serville, 1835.

The cerambycid specimen was collected in a Malaise trap installed at 514 masl at the Manu Biological Station (12°53'34.8''S / 71°24'13.2''W), province of Cusco, Peru. The study area is located in the Andes' foothills and the Amazon plain's beginning, forming part of the Manu Biosphere Reserve. The collection site is a grassland area near a secondary forest associated with *Guadua* sp. (Poaceae), where some species of *Cecropia* sp. (Urticaceae), *Ficus* sp. (Moraceae), and *Inga* sp. (Fabaceae) stand out.

The cerambycid with his phoront were deposited at the entomological collection of the "Museo de Biodiversidad" (MUBI), in Cusco, Peru. The pseudoscorpion was preserved and processed in 80% ethanol, identifying it with the taxonomic key of Mahnert & Adis (2002) and the long-horn beetle with the key of Santos-Silva & Botero (2016). Photographs were taken with a Canon EOS Rebel SL2 camera and a Laowa 3.937 f/2.8 2:1 Ultra Macro APO lens. Focus Stacking technique was used for image processing, and Adobe Lightroom software version CC 2022 was used for image editing. Measurements were taken in millimeters (mm) using Leica Application Suite version 4.1.0. and given as length/width.

During the mounting and identification of the specimen of *Oreodera rufofasciata* (Fig. 1B), we found an individual of *Cordylochernes scorpioides* (male) (Fig. 1A) attached with its chelae to the wing and abdomen of the beetle (Fig. 2). This specimen has the following measurements in mm: body length: 4.24/1.43. Carapace 1.37/1.19. Pedipalps: trochanter 0.63/0.47, femur 1.19/0.58, patella 1.34/0.73, chela (with pedicel) 2.48/0.96, chela (without pedicel) 2.30/0.96, hand (without pedicel) length 1.44, movable finger length 1.00.

Regarding the association observed between the pseudoscorpion and the beetle, a type of passive phoresy is presented, when the phoront is found inside the cavity created between the abdomen and the elytra, this interaction being quite noticeable, due to the size of the pseudoscorpion that it represents approximately 1/5 of the length of the beetle (Fig. 2). It is unknown whether the ratio of phoretic to host may affect flight ability, as discussed in Santos *et al.* (2005). *Cordylochernes scorpioides* is previously reported as a species commonly associated with the long-horn beetle *A. longimanus* (Cerambycidae: Lamiinae), which belongs to the tribe Acrocinini, the same tribe in which *O. rufofasciata* is allocated. Thus, *C. scorpioides* is associated with two species of the tribe Acrocinini, being found in the host in both cases, under the elytra and attached from the abdomen.

Currently, there is debate regarding *C. scorpioides* as a species or a group of species, highly likely to be cryptic (Zeh *et al.* 1992). However, considering *C. scorpioides* is already registered in Peru (Harvey 2013) and the individual collected has most of the characteristics described in Mahnert & Adis (2002), as the presence of a protuberance in the patella of pedipalps, we treat this specimen as *C. scorpioides*. Likewise, the possible microhabitat in which the phoretic association with *O. rufofasciata* has been established is not clear due to the lack of knowledge of some aspects of the natural history of this cerambycid; however, this association probably occurred in some host plant or decaying log where the two meet. With this, it is necessary to expand the ecological understanding and eating habits of this species.

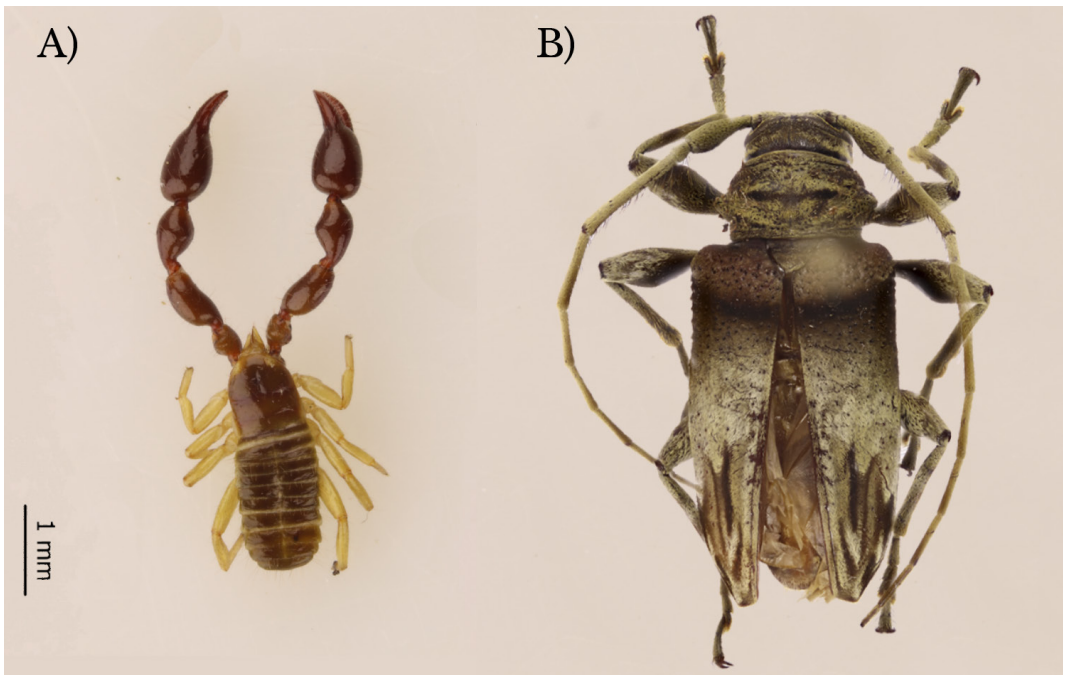


Figure 1. A. Dorsal habitus of male *Cordylochernes scorpioides*. Scale bar: 1 mm. B. Dorsal habitus of *Oreodera rufofasciata* Bates, 1861. / A. Hábito dorsal del macho de *Cordylochernes scorpioides*. Barra de escala: 1 mm. B. Hábito dorsal de *Oreodera rufofasciata* Bates, 1861.



Figure 2. Illustration of the male *Cordylochernes scorpioides* (Linnaeus, 1758) (Chernetidae) hidden under the elytra of *Oreodera rufofasciata* Bates, 1861. Scale bar: 1 cm. / Ilustración del macho *Cordylochernes scorpioides* (Linnaeus, 1758) (Chernetidae) escondido bajo los élitros de *Oreodera rufofasciata* Bates, 1861. Barra de escala: 1 cm.

This finding reports for the first time the phoretic relationship between a pseudoscorpion and the genus *Oreodera*, which currently has 119 species; it also expands the host range of *C. scorpioides* and contributes to the knowledge about the ecology and biology of *O. rufofasciata* and the tribe Acrocinini.

Acknowledgments

The first author thanks International Conservation Found Canada (ICFC) for financial support through a grant. The authors thank Jose Sanchez Tintaya for his insightful contributions to the surrounding flora. To the MUBI collection for receiving the specimens. Material collected under permit number D000627-2021-MIDAGRI-SERFOR-DGGSPFFS.

Literature Cited

- Aguiar, N. & Bührnheim, P. (2000)** Diversidade e história natural de pseudoscorpíões (Arachnida), em floresta primária de terra firme, no alto rio Urucu, Coari, Amazonas [unpublished doctoral thesis]. Instituto Nacional de Pesquisas Da Amazonica. 225 pp.
- Bartlow, A. & Agosta, S. (2020)** Phoresy in animals: review and synthesis of a common but understudied mode of dispersal. *Biological Reviews Cambridge Philosophical Society*, 96(1): 223-246. <https://doi.org/10.1111/brv.12654>
- Bevilaqua, M., Soares, M. & Garcia, F. (2020)** First record of phoretic association between *Cordylochernes scorpioides* (Linnaeus) (Pseudoscorpiones: Chernetidae) and *Hylettus coenobita* (Erichson) (Coleoptera: Cerambycidae) in central Amazon. *Revista Chilena de Entomología*, 46(3): 387-392. <https://doi.org/10.35249/rche.46.3.20.05>
- DiBlasi, E., Johnson, K., Stringham, S., Hansen, A., Beach, A., Clayton, D. & Bush, S. (2018)** Phoretic dispersal influences parasite population genetic. *Wiley, Molecular Ecology*, 27(12): 2770-2779. <https://doi.org/10.1111/mec.14719>
- Harvey, M. (2013)** Pseudoscorpion of the World, *Cordylochernes scorpioides*. Available from: <https://museum.wa.gov.au/catalogues-beta/pseudoscorpions/chernetidae/scorpioides>. Accessed on: 2 May 2023
- Huigens, M. & Fatouros, N. (2013)** A Hitch-Hiker's guide to parasitism: the chemical ecology of phoretic the chemical ecology of phoretic. In: Wajnberg, E. & Colazza, S. (Eds.), *Chemical Ecology of Insect Parasitoids*. New York, 2013 John Wiley & Sons, 86-111 pp.
- Mahnert, V. & Adis, J. (2002)** Pseudoscorpiones. In: *Amazonian Arachnida and Myriapoda: Identification keys to all classes, orders, families, some genera, and lists of known terrestrial species* (ed. Adis, J.). Moscow, Pensoft Publisher. Pp. 367-380.
- Martínez, R., Villegas, G. & Santos, A. (2023)** Phoretic relationship between *Haplochelifer philipi* (Pseudoscorpiones: Cheliferidae) and *Acrocynus longimanus* (Coleoptera: Cerambycidae) in Panama. *Entomological News*, 130(4): 387-390. <https://doi.org/10.3157/021.130.0408>
- Poinar, G., Bozidar, C. & Cokendolpher, J. (1998)** Arthropod phoresy involving pseudoscorpions in the past and present. *Acta Arachnologica*, 2: 79-96.
- Ronce, O. (2007)** How does it feel to be like a Rolling Stone? Ten questions about dispersal evolution. *The Annual Review of Ecology, Evolution, and Systematics*, 38: 231-253. <https://doi.org/10.1146/annurev.ecolsys.38.091206.095611>
- Santos, J., Tizo-Pedroso, E. & Fernandes, W. (2005)** A case of phoresy of *Semeiochernes armiger* Balzan, 1892 (Pseudoscorpiones: Chernetidae) on the giant tropical fly *Pantophthalmus tabaninus* Thunberg, 1819 (Diptera: Pantophthalmidae) in an Amazonian rain forest, Pará. *Lundiana*, 6: 11-12.

- Santos-Silva, A. & Botero, J.P. (2016)** A new species of *Oreodera* Audinet-Serville, 1835 from Ecuador (Coleoptera, Cerambycidae, Lamiinae) and new geographical records. *Zootaxa*, 4196(3): 423-427. <https://doi.org/10.11646/zootaxa.4196.3.6>
- Villegas-Guzmán, G., Martínez-Luque, E. & Zurita-García, L. (2016)** Pseudoescorpiones (Arachnida: Pseudoscorpiones) foréticos con *Chalcolepidius approximatus* (Coleoptera: Elateridae). *Revista Mexicana de Biodiversidad*, 87(4): 1369-1371.
- White, S., Morran, L. & Roode, J. (2017)** Phoresy. *Current Biology*, 27(12): 578-580. <https://doi.org/10.1016/j.cub.2017.03.073>
- Zeh, D.W., Zeh, J.A., Coffroth, M.A. & Bermingham, E. (1992)** Population-specific DNA fingerprints in a neotropical pseudoscorpion (*Cordylochernes scorpioides*). *Heredity*, 69(3): 201-208. <https://doi.org/10.1038/hdy.1992.117>