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First record of phoresy on the genus *Rosalia* (Coleoptera: Cerambycidae) by a pseudoscorpion (Arachnida: Pseudoscorpiones)

Juan A. Zaragoza[1], Roberta Latini[2], Antonio Monaco[3] & Marco Colombo[4]

[1] Departamento de Ecología, Facultad de Ciencias, Universidad de Alicante, E-03690 Alicante, Spain. ja.zaragoza@ua.es
[2] Scientific Service, Abruzzo Lazio and Molise National Park, viale Santa Lucia, 67032 Pescasseroli (AQ), Italy. roberta.latini@parcoabruzzo.it
[3] Monte Genzana Alto Gizio Natural Reserve, piazza R. Zannelli 12, 67034 Pettorano sul Gizio (AQ), Italy. antoniomonaco81@gmail.com
[4] Busto Arsizio (VA), Italy. oryctes@libero.it

Abstract: A case of phoresy by a pseudoscorpion on a longhorn beetle is reported from Italy. It represents the first record involving a pseudoscorpion and the genus *Rosalia* Audinet-Serville, 1833.
Key words: Pseudoscorpiones, Coleoptera, *Rosalia alpina*, phoresy, Apennines, Italy.

Primer registro de foresia en el género *Rosalia* (Coleoptera: Cerambycidae) a cargo de un pseudoescorpión (Arachnida: Pseudoscorpiones)
Resumen: Se registra un caso de foresia de un pseudoescorpión sobre un cerambícido en Italia. Representa la primera observación de un pseudoescorpión sobre el género *Rosalia* Audinet-Serville, 1833.
Palabras clave: Pseudoscorpiones, Coleoptera, *Rosalia alpina*, foresia, Apeninos, Italia.

Introduction

Pseudoscorpions have been frequently reported exhibiting phoretic interactions with arthropods (e.g. Poinar *et al*., 1998), and occasionally with vertebrates, clinging directly to their feathers or hairs or indirectly in their nests or burrows, as for birds (Turienzo *et al*., 2010; Christophoryová *et al*., 2011) and mammals (Muchmore, 1971; Villegas-Guzmán & Hernández-Betancourt, 2006). Thirteen pseudoscorpion families have been registered showing this behaviour (Poinar *et al*., 1998; Judson, 2005), of which the superfamily Cheliferoidea provides by far the largest number of records, particularly the families Chernetidae (63%), Cheliferidae (16%), Atemnidae (6%) and Withiidae (3%). Vectors of phoretic pseudoscorpions belong to 47 arthropod families (44 of insects and 3 of arachnids), the orders most frequently concerned being Coleoptera (40%) and Diptera (38%), followed with much lower frequencies, by Lepidoptera (8%) and Hymenoptera (6%) (Poinar *et al*., 1998).

Coleoptera is one the most frequent insect order recorded as vector of phoretic pseudoscorpions, mostly in the families Cerambycidae and Passalidae (Aguiar & Bührnheim, 1998; Poinar *et al*., 1998). Both these families are considered saproxylic and include life stages that develop inside of trunks of living or dead trees. Interactions between pseudoscorpions and beetles may occur under tree bark or in hollows, during or after the emergence of the adult from the pupa or from the tree.

Records of pseudoscorpions phoretic on Cerambycidae have been reported for several subfamilies: Cerambycinae, Lamiinae, Prioniinae and Spondylidinae (Ellingsen, 1905, 1913; Green, 1908; Calvert & Calvert, 1917; Beier, 1929, 1948; Kew, 1929; Chamberlin, 1934; Hoff, 1944; Vachon, 1951, 1954; Muchmore, 1971, 1972; Jones, 1978; Anonymous, 1986; Haack & Wilkinson, 1987; Aguiar & Bührnheim, 1991, 1992, 1998; Zeh & Zeh, 1991, 1992; Ducháč, 1993; Poinar *et al*., 1998; Domínguez *et al*., 2008; Šťáhlavský & Chytil, 2013; Huber, 2014; Meunier & Drumont, 2014; Legg, 2015; Karpiński *et al*., 2017; Zaragoza & Ruiz de la Cuesta Santiago, 2017). For the subfamily Cerambycinae, the phoretic records are from Africa (Somalia: Beier, 1948), U.S.A. (Haack & Wilkinson, 1987), South America (Brazil: Aguiar & Bührnheim, 1998) and Europe (Czech Republic: Ducháč, 1993, Šťáhlavský & Chytil, 2013; Great Britain: Kew, 1929; Poland: Karpiński *et al*., 2017; Spain: Domínguez *et al*., 2008 and Switzerland: Huber, 2014). Pseudoscorpions have been usually observed attached to the legs or antennae of cerambycids, but have sometimes been found under the elytra of large beetles (Muchmore, 1972; Zeh & Zeh, 1991, 1992).

A recent discovery of phoretic activity by pseudoscorpion on *Rosalia alpina* (Linnaeus, 1758) is reported here, being the first such record for this genus.

Material and methods

During a monitoring campaign of beetle populations [particular those of *Rosalia alpina* and *Osmoderma eremita* (Scopoli, 1763)] old beech trees were checked and individual beetles photographed with mobile phones and cameras (July 2018). Photographs were then analyzed in studio in order to identify single specimens and to find peculiarities or deformities. The interesting interaction recorded here occurred on an old beech tree, measuring about 9 meters in height and 4.1 meters in circumference, located at about 1280 m a.s.l., nearby Pescasseroli (AQ), Abruzzo (X=397129 Y=4627251; UTM 33 WGS84).

Studies were conducted in the Abruzzo Lazio and Molise National Park, the oldest National Park in Italy (founded in 1921), which extends across three regions. The area is one of the last wilderness core zones in the Apennine Mountains.

Results

A specimen of *Rosalia alpina* was photographed in the Abruzzo National Park (Apennines, Italy) with a pseudoscorpion attached to one of its fore legs (Fig. 1-2). It represents the first phoretic record for that beetle genus by a pseudoscorpion. Unfortunately, the pseudoscorpion could not be preserved and its identification to family or genus is difficult from a photograph. Based in its general shape, the specimen is tentatively assigned to the family Chernetidae, not discarding the genus *Allochernes* Tömösváry, 1882 or *Pselaphochernes* Beier, 1932.

In Europe, the pseudoscorpions recorded as having phoretic interactions with Cerambycinae are restricted to the family Chernetidae. The species concerned are *Dendrochernes cyrneus* (L. Koch, 1953) on *Cerambyx cerdo* Linnaeus, 1758 (Karpiński *et al*., 2017; Šťáhlavský & Chytil, 2013), *Clytus arietis* (Linnaeus, 1758) (Ducháč, 1993; Šťáhlavský & Chytil, 2013), *Clytus lama* (Mulsant, 1847) (Huber, 2014) and *Phymatodes testaceus* (Linnaeus, 1758) (Kew, 1929, as *Callidium variabile*; Jones, 1978); and *Mesochelifer fradei* Vachon, 1940 on *Cerambyx welensii* (Küster, 1846) (Domínguez *et al*., 2008).

This observation reflects the importance of ancient trees in this area for trophic webs and ecological richness, as recently underlined by serial nomination to "Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" transnational composite nature UNESCO World Heritage Site.

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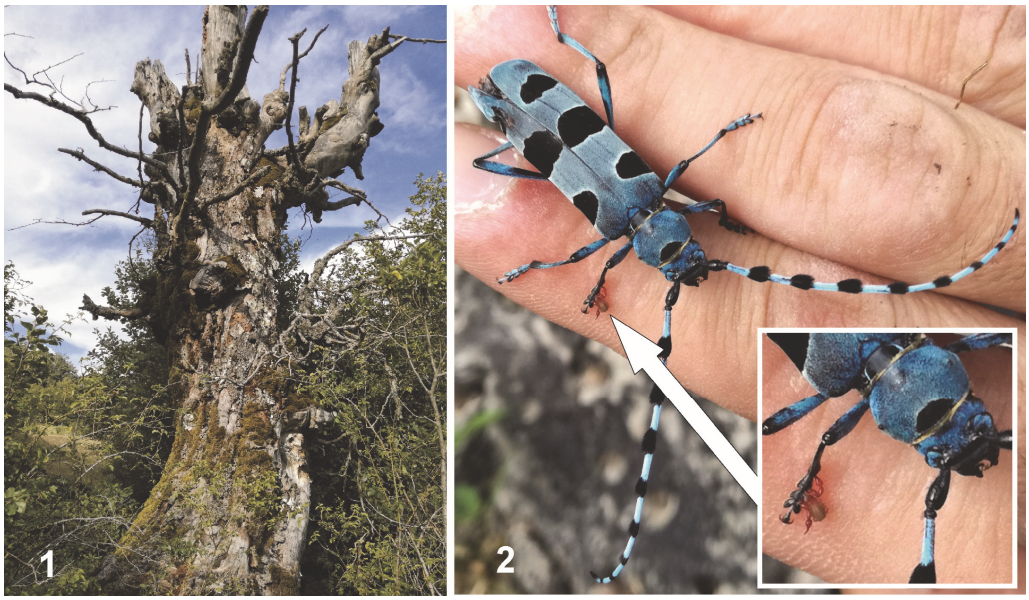


Fig. 1. The old beech on which the phoretic association between a pseudoscorpion (sp. indet.) and *Rosalia alpina* was observed. **Fig. 2.** Pseudoscorpion (indet.) attached to a foreleg of *Rosalia alpina*, indicated by white arrow and enlarged in inset.

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