

New records of phoretic associations between pseudoscorpions and their hosts in Slovakia (Pseudoscorpiones: Atemnidae, Chernetidae)

Authors: Christophoryová, Jana, Červená, Martina, and Krajčovičová, Katarína

Source: Arachnologische Mitteilungen: Arachnology Letters, 61(1) : 24-26

Published By: Arachnologische Gesellschaft e.V.

URL: <https://doi.org/10.30963/aramit6104>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

New records of phoretic associations between pseudoscorpions and their hosts in Slovakia (Pseudoscorpiones: Atemnidae, Chernetidae)

Jana Christophoryová, Martina Červená & Katarína Krajčovičová



doi: 10.30963/aramit6104

Abstract. New cases of phoresy of pseudoscorpions (Pseudoscorpiones: Atemnidae, Chernetidae) are recorded from Slovakia. The phoresy of the species *Atemnus politus* (Simon, 1878) involving owl moth (Noctuidae) as a host is documented for the first time not only in Slovakia, but also worldwide. One phoretic female of *Lamprochernes chyzeri* (Tömösváry, 1883) was attached to the leg of a lance fly (Lonchaeidae). It represents the second known phoresy of the species from Slovakia and the record of a new host.

Keywords: Central Europe, Diptera, lance fly, Lepidoptera, owl moth, phoresy

Zusammenfassung. Neue Nachweise phoretischer Beziehungen zwischen Pseudoskorpionen und ihren Wirten aus der Slowakei (Pseudoscorpiones: Atemnidae, Chernetidae). Neue Phoresie-Fälle bei Pseudoskorpionen wurden in der Slowakei verzeichnet (Pseudoscorpiones: Atemnidae, Chernetidae). Die Beobachtung der Phoresie der Art *Atemnus politus* (Simon, 1878) an einem Eulenfalter (Noctuidae) ist nicht nur die erste in der Slowakei sondern auch weltweit. Ein phoretisches Weibchen von *Lamprochernes chyzeri* (Tömösváry, 1883) hatte sich an das Bein einer Lanzenfliege (Lonchaeidae) gehängt. Dies ist der zweite Fall von Phoresie der Art in der Slowakei und der Nachweis eines neuen Wirtes.

Phoresy is a non-permanent interaction in which one organism (a phoront) attaches itself to another (the host). Pseudoscorpions attach themselves to mobile animals and subsequently disperse into new habitats (White et al. 2017). Species hide under the elytra, among the feathers or fur or they grasp the extremities, sternites, or other body parts of the hosts (e.g. Jones 1978, Zeh & Zeh 1992, Carl 1994). There exist two hypotheses about the evolution of pseudoscorpion phoresy (summarized in Zeh & Zeh 1992). Some authors regard pseudoscorpion phoresy as a behaviour primarily aimed at dispersal (the dispersal hypothesis; e.g. Beier 1948, Weygoldt 1969, Legg 1975). Others argue that the phoresy is the accidental by-product of unsuccessful predation (the predation hypothesis; e.g. Vachon 1940, 1953, Muchmore 1971). In Europe, the most common phoretic associations are between pseudoscorpions and insects and are mostly known from the families Chernetidae and Cheliferidae (Poinar et al. 1998).

In Slovakia, several phoretic associations were recorded. Mašán & Krištofik (1992) collected two males of *Lamprochernes nodosus* (Schränk, 1803) on two species of Diptera using the traps baited with decaying meat or faeces. A male of *Lamprochernes chyzeri* (Tömösváry, 1883) was attached to Diptera (Christophoryová et al. 2011b) and a female of *Rhacochelifer euboicus* Mahnert, 1977 was found in a Malaise trap phoretic on Lepidoptera (Krajčovičová et al. 2017, Hernández-Corral et al. 2018). Christophoryová et al. (2017) recorded several phoretic associations of females of *Allochernes peregrinus* Lohmander, 1939 and *Lamprochernes* sp. on Diptera. Multiple phoresies of *L. nodosus* on Diptera were documented from Slovakia by Christophoryová et al. (2018); one to five females were attached to the hosts. The latest cases of phoresy by chernetids were evidenced by Červená et al. (2019). Pseudoscorpion phoresy involving Heteroptera as a host was

recorded for the first time in Slovakia (a female of *L. nodosus*), as well as a case of phoresy by the species *Pselaphochernes scorpoides* (Hermann, 1804) (Červená et al. 2019).

Summarizing all above-mentioned published data, five pseudoscorpion species are known to be phoretic on Diptera, Heteroptera and Lepidoptera in Slovakia. In the present study, three new records of phoretic associations between pseudoscorpions and their hosts from Slovakia are documented.

Material and methods

Pseudoscorpions and their hosts were collected using Malaise traps at the locality of Virt in Slovakia (leg. J. Kodada, S. Krčmárik, D. Selnekovič). All pseudoscorpions were studied as temporary slide mounts using lactic acid and then rinsed in the water and returned to 70% alcohol. The pseudoscorpion specimens were identified using the key in Christophoryová et al. (2011a). Hosts were identified only to genus level by specialists as mentioned in the Results part. Digital photographs were taken using a Canon EOS 5D Mark II camera attached to a Zeiss Axio Zoom V16 stereomicroscope. Image stacks were produced manually, combined using the Zerene Stacker software and subsequently edited in Adobe Photoshop CC. The material is deposited in the zoological collection at the Department of Zoology, Comenius University in Bratislava.

Results

SLOVAKIA, Virt, sand dune, Malaise trap in *Robinia pseudo-acacia* L. and *Gleditsia triacanthos* L. (47.76066°N, 18.33747°E; 125 m a.s.l.), 13. Sep. 2018, 1 ♀ of *Atemnus politus* (Simon, 1878) on Ta III of owl moth (Lepidoptera: Noctuidae, *Euxoa* Hübner, 1821; det. J. Šumpich; Fig. 1).

SLOVAKIA, Virt, sand dune, Malaise trap in managed meadow (47.76316°N, 18.34019°E; 113 m a.s.l.), 17. Jul. 2019, 1 ♀ of *Lamprochernes chyzeri* (Tömösváry, 1883) on Fe III of lance fly (Diptera: Lonchaeidae, *Lonchaea* Fallen, 1820; det. M. Tkoč and I. MacGowan; Fig. 2).

SLOVAKIA, Virt, sand dune, Malaise trap in unmanaged vineyard (47.76052°N, 18.33591°E; 120 m a.s.l.), 27. Aug. 2019, 1 ♀ and 1 ♂ of *Atemnus politus* on Ta I and Ta II of owl moth (Lepidoptera, Noctuidae, *Euxoa*; det. J. Šumpich; Fig. 3).

Jana CHRISTOPHORYOVÁ, Martina ČERVENÁ, Katarína KRAJČOVIČOVÁ, Department of Zoology, Faculty of Natural Sciences, Comenius University in Bratislava, Mlynská dolina, Ilkovičova 6, SK 842 15 Bratislava, Slovakia. E-mails: christophoryova@gmail.com, martinacervena.lr@gmail.com, krajcovic.katarina@gmail.com

Academic editor: Konrad Wiśniewski

submitted: 12.10.2020, accepted: 4.2.2021, online: 5.3.2021



Fig. 1: *Atemnus politus* attached to the leg of an owl moth from Slovakia. Scale bar: 1 mm



Fig. 2: *Lamprochernes chyzeri* attached to the leg of a lance fly from Slovakia. Scale bar: 1 mm

Discussion

To the best of our knowledge, the phoresy of *Atemnus politus* is documented here for the first time not only in Slovakia but worldwide. Records of pseudoscorpions on moths are exceedingly rare, and this applies also to atemnids. Only Beier (1930) recorded adults of *Diplothemnus balcanicus* (Redikorzev, 1928) taken from moths attracted to light in Algeria [as *Atemnus piger* (Simon, 1878)]. For atemnids, the majority of phoresies are known on hosts from Coleoptera, Hemiptera or Hymenoptera (e.g. Beier 1932, 1948, Muchmore 1971, 1972, Aguiar & Bührnheim 1998, Poinar et al. 1998).

A phoresy of a male of *Lamprochernes chyzeri* was observed in Slovakia on Diptera, Muscidae (Christophoryová et al. 2011b). From Europe, only a few phoresy cases of this species were recorded. Vachon (1954) found the species attached to Lepidoptera and Meinertz (1964) on Diptera, Muscidae. Jones (1978) published an attachment to Diptera, Lonchaeidae. Legg & Jones (1988) mentioned that the species is phoretic on flies and Droglá & Lippold (2004) recorded seven phoretic specimens without specific hosts.



Fig. 3: *Atemnus politus* attached to the legs of an owl moth from Slovakia. **a.** Both specimens attached to the host; **b.** Detail of attachment. Scale bar for b: 1 mm

Acknowledgements

We are very thankful to our colleagues Ján Kodada, Samuel Krčmárik and Dávid Selnekovič (Department of Zoology, Comenius University) who provided the material of phoretic pseudoscorpions and to Jan Šumpich, Michal Tkoč (National Museum in Prague, Czech Republic) and Iain MacGowan (National Museums Scotland) for the identification of the hosts. We would like to thank Dávid Selnekovič for the technical assistance with the figures, Giulio Gardini and an anonymous reviewer for their corrections. The research was financially supported by VEGA grant 1/0704/20.

References

- Aguiar NO & Bührnheim PF 1998 Phoretic pseudoscorpions associated with flying insects in Brazilian Amazônia. – *Journal of Arachnology* 26: 452–459
- Beier M 1930 Die Pseudoskorpione des Wiener Naturhistorischen Museums. III. – *Annalen des Naturhistorischen Museums in Wien* 44: 199–222
- Beier M 1932 Revision der Atemnidae (Pseudoscorpionidea). – *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere* 62: 547–610
- Beier M 1948 Phoresie und Phagophilie bei Pseudoscorpionen. – *Österreichische Zoologische Zeitschrift* 1: 441–497
- Carl M 1994 Injurious effects on the exoskeleton of *Musca domestica* L. (Diptera) of phoresy by *Lamprochernes nodosus* (Schrank) (Pseudoscorpiones, Chernetidae) and the possible functional significance of accessory teeth on the chelal fingers. – *Bulletin of the British Arachnology Society* 9: 246–248
- Červená M, Kirchmair G & Christophoryová M 2019 Phoretic chernetid species newly recorded from Slovakia and Austria. – *Arachnologische Mitteilungen* 57: 65–68 – doi: [10.30963/aramit5712](https://doi.org/10.30963/aramit5712)

- Christophoryová J, Gruľa D & Krajčovičová K 2017 New records of pseudoscorpions (Arachnida: Pseudoscorpiones) associated with animals and human habitats in Slovakia and Czech Republic. – *Arachnologische Mitteilungen* 53: 67-76 – doi: [10.5431/aramit5311](https://doi.org/10.5431/aramit5311)
- Christophoryová J, Štáhlavský F & Fedor P 2011a An updated identification key to the pseudoscorpions (Arachnida: Pseudoscorpiones) of the Czech Republic and Slovakia. – *Zootaxa* 2876: 35-48 – doi: [10.11646/zootaxa.2876.1.4](https://doi.org/10.11646/zootaxa.2876.1.4)
- Christophoryová J, Stloukal E & Stloukalová V 2011b First record of phoresy of pseudoscorpion *Lamprochernes chyzeri* in Slovakia (Pseudoscorpiones: Chernetidae). – *Folia Faunistica Slovaca* 16: 139-142
- Christophoryová J, Vidlička L & Krajčovičová K 2018 New cases of phoresy of *Lamprochernes nodosus* (Pseudoscorpiones: Chernetidae) on Diptera observed in Slovakia. – *Biharean Biologist* 12: 114-115
- Drogla R & Lippold K 2004 Zur Kenntnis der Pseudoscorpion-Fauna von Ostdeutschland (Arachnida, Pseudoscorpiones). – *Arachnologische Mitteilungen* 27/28: 1-54 – doi: [10.5431/aramit2701](https://doi.org/10.5431/aramit2701)
- Hernández-Corral J, Zaragoza JA & Micó E 2018 New species of Pseudoscorpiones (Arachnida) from tree hollows in a Mediterranean oak forest in Spain. – *Zootaxa* 4497: 201-225 – doi: [10.11646/zootaxa.4497.2.3](https://doi.org/10.11646/zootaxa.4497.2.3)
- Jones PE 1978 Phoresy and commensalism in British pseudoscorpions. – *Proceedings and Transactions of the British Entomological and Natural History Society* 11: 90-96
- Krajčovičová K, Christophoryová J & Mahnert V 2017 *Rhacochelifer disjunctus* (Pseudoscorpiones: Cheliferidae) new to the fauna of Slovakia. – *Arachnologische Mitteilungen* 53: 38-42 – doi: [10.5431/aramit5306](https://doi.org/10.5431/aramit5306)
- Legg G 1975 The possible significance of spermathecae in pseudoscorpions (Arachnida). – *Bulletin of the British Arachnological Society* 3: 91-95
- Legg G & Jones RE 1988 Pseudoscorpions (Arthropoda; Arachnida). Keys and notes for the identification of the species. In: Kermack DM & Barnes RSK (eds) *Synopses of the British Fauna* (New Series), No. 40. The Linnean Society of London and the Estuarine and Brackish-Water Sciences Association, Leiden – New York – København – Köln. 159 pp.
- Mašán P & Krištofik J 1992 Phoresy of some arachnids (Acarina and Pseudoscorpionidea) on synanthropic flies (Diptera) in the south Slovakia. – *Biológia* 47: 87-96
- Meinertz T 1964 Beiträge zur Verbreitung der Pseudoscorpioniden in Dänemark. – *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København* 126: 387-402
- Muchmore WB 1971 Phoresy by North and Central American pseudoscorpions. – *Proceedings of the Rochester Academy of Science* 12: 79-97
- Muchmore WB 1972 A phoretic *Metatemnus* (Pseudoscorpionida, Atemnidae) from Malaysia. – *Entomological News* 83: 11-14
- Poinar GO, Čurčić BPM & Cokendolpher JC 1998 Arthropod phoresy involving pseudoscorpions in the past and present. – *Acta Arachnologica* 47: 79-96 – doi: [10.2476/asjaa.47.79](https://doi.org/10.2476/asjaa.47.79)
- Vachon M 1940 Remarques sur la phorésie des Pseudoscorpions. – *Annales de la Société Entomologique de France* 109: 1-18
- Vachon M 1953 Nouveaux cas de phorésie chez les Pseudoscorpions. – *Bulletin du Muséum National d'Histoire Naturelle, Paris* (2) 25: 572-575
- Vachon M 1954 Nouvelles captures de Pseudoscorpions (Arachnides) transportés par des insectes. – *Bulletin du Muséum National d'Histoire Naturelle, Paris* (2) 26: 590-592
- Weygoldt P 1969 The biology of pseudoscorpions. Harvard University Press, Cambridge. 145 pp.
- White PS, Morran L & Roode J 2017 Phoresy. – *Current Biology* 27: R1-R3 – doi: [10.1016/j.cub.2017.03.073](https://doi.org/10.1016/j.cub.2017.03.073)
- Zeh DW & Zeh JA 1992 Failed predation or transportation? Causes and consequences of phoretic behavior in the pseudoscorpion *Dinocheirus arizonensis* (Pseudoscorpionida: Chernetidae). – *Journal of Insect Behavior* 5: 37-49 – doi: [10.1007/BF01049156](https://doi.org/10.1007/BF01049156)