Pseudoscorpions (Arachnida: Pseudoscorpiones) from the Curonian Spit National Park with *Dinocheirus panzeri* as a newly recorded genus and species from Lithuania

Katarína Krajčovičová, Povilas Ivinskis, Jolanta Rimšaitė & Jana Christophoryová

doi: 10.30963/aramit6407

Abstract. A total of 102 pseudoscorpion specimens belonging to five species, four genera, and two families were collected in the Curonian Spit National Park (Lithuania). The genus *Dinocheirus* Chamberlin, 1929 and the species *D. panzeri* (C. L. Koch, 1836) are newly recorded from Lithuania.

Keywords: faunistics, Great cormorant, pitfall trap, sand dunes, species complex, window trap

Zusammenfassung. Pseudoskorpione (Arachnida: Pseudoscorpiones) aus dem Nationalpark Kurische Nehrung mit *Dinocheirus panzeri* als Neunachweis der Gattung und Art für Litauen. Insgesamt 102 Pseudoskorpione aus fünf Arten, vier Gattungen und zwei Familien wurden im Nationalpark Kurische Nehrung (Litauen) gesammelt. Die Gattung *Dinocheirus* Chamberlin, 1929 und die Art *D. panzeri* (C. L. Koch, 1836) werden erstmals für Litauen nachgewiesen.

Lithuania is one of the three Baltic states situated on the eastern shore of the Baltic Sea: i.e. Estonia, Latvia and Lithuania. The Estonian pseudoscorpion fauna currently consists of 15 species belonging to 13 genera and five families (Sammet et al. 2016), that of Latvia comprises 11 species belonging to 11 genera and five families (WPC 2022), and of Lithuania nine species belonging to six genera and three families (Krajčovičová et al. 2018b, 2020). Recently, the first study dedicated to the pseudoscorpion fauna of Belarus, neighbouring Lithuania to the east, was published and filled the gap in the knowledge on pseudoscorpion distribution in Europe. The known pseudoscorpion fauna of Belarus consists of seven species belonging to six genera and two families (Ostrovsky 2020).

The first data about pseudoscorpions from Lithuania were published only recently and consist mostly of random collections, which is reflected in the low number of known species (Krajčovičová et al. 2018b, 2020). Krajčovičová et al. (2018b) documented pseudoscorpion occurrence at 25 localities throughout the country. The collection contained specimens sampled by sieving of litter and moss, from pitfall traps and collected individually, mostly under deadwood bark. The species composition of eight species from three families reflected the choice of sampling methods (Krajčovičová et al. 2018b). Part of the material published by Krajčovičová et al. (2018b) was collected at localities that are situated in the Curonian Spit National Park. The occurrence of *Neobisium carcinoides* (Hermann, 1804), *Neobisium crassifemoratum* (Beier, 1928) and *Pselaphochernes scorpioides* (Hermann, 1804) was recorded from the area (Krajčovičová et al. 2018b). Recently, *Chernes similis* (Beier, 1932) was added to the list of the Lithuanian fauna, it was found in tree hollow in the Botanical Garden of Vilnius University (Krajčovičová et al. 2020).

The Curonian Spit NP is located in a long thin curved sand spit in the Baltic Sea stretching from Zelenogradsk (Russia) to Klaipeda (Lithuania) (Fig. 1). It is the largest accumulative sandy formation with linear dunes of the swell-shaped type in the Baltic region. A distinctive feature of the Curonian Spit is the presence of blow sands (Nikitina et al. 2019). The main forest-forming species are pine (*Pinus sylvestris* L.) and black alder (*Alnus glutinosa* (L.)) (Nikitina et al. 2019).

In 1989, the Great cormorant (*Phalacrocorax carbo* (Linnaeus, 1758)) started to nest near Juodkrantė and expanded into the largest breeding colony in Lithuania (Motiejūnaitė et al. 2014), representing a potential habitat for pseudoscorpions living in bird nests and influencing the vegetation and biodiversity around and below the colony. The aim of the present paper is to summarize data on pseudoscorpions assembled from the Curonian Spit National Park, partly collected as bycatch from research on environmental effects of the above-

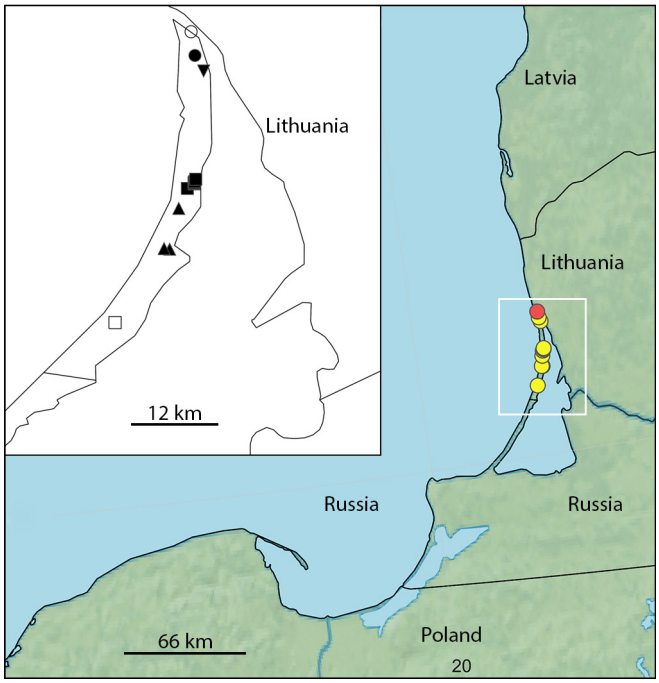

Fig. 1: The sampling sites (red and yellow circles) in the Curonian Spit National Park, Lithuania (red circle represents the locality of *Dinocheirus panzeri*). Detail: open and solid circles: Smiltynė (open circle: the locality of *D. panzeri*), inverse triangle: Alksnynė, solid triangle: Nagliai Reserve, solid square: Juodkrantė, open squares: Nida. The map was produced with SimpleMappr (Shorthouse 2010)

Katarína KRAJČOVIČOVÁ, Jana CHRISTOPHORYOVÁ: Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, Ilkovičova 6, SK-842 15 Bratislava, Slovakia; E-mails and ORCIDs: krajcovic.katarina@gmail.com, https://orcid.org/0000-0003-1303-2434; christophoryova@gmail.com, https://orcid.org/0000-0002-3746-1367
Povilas IVINSKIS, Jolanta RIMŠAITĖ: Nature Research Centre, Akademijos 2, LT-084 12 Vilnius, Lithuania; E-mails: ivinskis@ekoi.lt; jolanta.rimsaite@gamtc.lt

Academic editor: Konrad Wiśniewski

submitted 27.5.2022, accepted 19.11.2022, online 28.12.2022

Fig. 2: Sampling sites. **a.** Great cormorant colony in the old forest; **b.** the old part of the cormorant colony in the old forest; **c.** white sand dune with *Leymus arenarius*

mentioned, newly established colony of Great cormorants, and to provide a summary of the species known from this valuable, protected area.

Material and methods

Pseudoscorpions were collected by Povilas Ivinskis and Jolanta Rimšaitė in the Curonian Spit National Park, Lithuania (Figs 1-2). A part of the material was collected during the research on long-term changes in vegetation affected by nesting of the Great cormorants and their influence on ground-dwelling predatory arthropods (Fig. 2). During the research pitfall traps were selected as the sampling method (Machač et al. 2022). The rest of the material was collected during the study of the insect fauna across the national park using window traps.

Pseudoscorpions were preserved in 75% ethanol. They were studied as temporary slide mounts, prepared by immersing specimens in lactic acid for clearing. After the study, they were rinsed in water and returned to 75% ethanol. The digital photograph (Fig. 3) was 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. Pseudoscorpion species were identified using the key in Christophoryová et al. (2011). The nomenclature follows WPC (2022). The material is deposited in the zoological collections of Dr. Povilas Ivinskis at the Nature Research Centre, Vilnius, Lithuania. The newly recorded species *Dinocheirus panzeri* is deposited in the Kaunas T. Ivanauskas Zoological Museum (KZM), Kaunas, Lithuania.

Results

A list of the taxa is given below with locality name, habitat, sampling method, date and the number of developmental stages (A – adult with unidentified sex, TN – tritonymph, DN – deutonymph, PN – protonymph).

Chernetidae Menge, 1855
Chernes Menge, 1855
Chernes cimicoides (Fabricius, 1793)

Material examined. LITHUANIA. Curonian Spit NP: Juodkrantė, 55.51898°N, 21.11149°E, 14 m a.s.l., old part of Great cormorant colony in an old forest, window trap: 1 ♂, 9.–27. Jul. 2012.

Remarks. *Chernes cimicoides* is widespread in Eurasia with the majority of its occurrence in northern Europe (Beier 1960, WPC 2022). Beier (1963) characterized the species as a typical inhabitant of old forests predominantly found under tree bark, and occasionally in anthills. During the current research, a single specimen of *C. cimicoides* was collected using a window trap in an old forest. Records of the species in flight intercept traps have been documented in previous studies.

Christophoryová & Krumpál (2010) and Krajčovičová & Christophoryová (2014) collected *C. cimicoides* in Malaise traps in Slovakia. Sammet et al. (2016) recorded it as the most common species in window traps during research in Estonia. In Lithuania, *C. cimicoides* was recorded from three localities. In all cases it was found under the bark of decaying trees (Krajčovičová et al. 2018b).

***Dinocheirus* Chamberlin, 1929**
***Dinocheirus panzeri* (C. L. Koch, 1836)** (Fig. 3)

Material examined. LITHUANIA: Curonian Spit NP: Smiltynė, 55.70726°N, 21.10775°E, 15 m a.s.l., meadow at the edge of the *Pinus* forest, pitfall trap: 1 ♂, 3 TN, 3 DN, 3 PN, 4. Oct. 2020 (KZM_ ZB22-042).
Remarks. *Dinocheirus panzeri* is newly recorded here from Lithuania. The species is widespread in Europe with records also from Azerbaijan, Iran and Turkey (WPC 2022). Beier (1963) and Drogla & Lippold (2004) recorded its presence in various habitats, such as tree hollows, under tree bark, in bird nests, litter of coniferous and deciduous forests, manure heaps and from farm buildings. Beier (1929) observed the presence of *D. panzeri* in an ant nest in Austria and Lohmander (1939) published a record from beehives in Sweden. Rafalski (1967) found the species in mammal burrows in Poland. The presence inside farm buildings, chicken houses and pigeon lofts was recorded mostly in the northern areas of the species range (Lohmander 1939, Legg & Jones 1988) while in Central Europe, the majority of *D. panzeri* findings concerned tree hollows (Šťáhlavský 2001, Krajčovičová & Christophoryová 2014, Christophoryová et al. 2017). During the current research, all specimens were found in a pitfall trap installed at the edge of the meadow and *Pinus* forest.

Fig. 3: *Dinocheirus panzeri*, male. Arrow indicates the pseudotactile seta on the tarsus of leg IV. Scale line: 1 mm

***Pselaphochernes* Beier, 1932**
***Pselaphochernes scorpioides* (Hermann, 1804)**

Material examined. LITHUANIA: Curonian Spit NP: Juodkrantė, 55.51898°N, 21.11149°E, 30 m a.s.l, old part of Great cormorant colony in an old forest, window trap: 3 ♀♀, 7.–25. Jun. 2012; pitfall trap: 1 ♀, 8.–27. Jul. 2012; 55.51781°N, 21.11151°E, 38 m a.s.l., Great cormorant colony in an old forest, pitfall trap: 5 ♀♀, 7.–16. Jun. 2020; 22 ♀♀, 8.–16. Jun. 2020. Nagliai Reserve, 55.43638°N, 21.08111°E, 13 m a.s.l., white sand dunes with *Leymus arenarius* (L.) Hochst., pitfall trap: 1 ♀, 8.–27. Jul. 2012. Nida, 55.34504°N, 21.01328°E, 9 m a.s.l., meadow at the forest edge, pitfall trap: 2 ♀♀, 8.–17. Jun. 2020. Smiltynė, 55.70726°N, 21.10775°E, 14 m a.s.l., meadow at the *Pinus* forest edge, pitfall trap: 1 ♂, 2 ♀♀, 1 PN, 7.–16. Jun. 2020.
Remarks. *Pselaphochernes scorpioides* is a common species widespread throughout the Palearctic (WPC 2022), occurring in various habitats, even those affected by human activity (Lohmander 1939, Beier 1963, Drogla & Lippold 2004, Christophoryová et al. 2016). During the current research, most of the specimens were collected using pitfall traps. Three specimens were found in a window trap. Phoretic records and the species occurrence in Malaise traps or window traps have been previously documented and could explain the wide range of its distribution (Beier 1948, Legg & Jones 1988, Drogla & Lippold 2004, Krajčovičová & Christophoryová 2014, Sammet et al. 2016). In Lithuania, *P. scorpioides* was previously known only from one locality in the Nagliai reserve (Krajčovičová et al. 2018b).

Neobisiidae Chamberlin, 1930
***Neobisium* Chamberlin, 1930**
***Neobisium carcinoides* (Hermann, 1804)**

Material examined. LITHUANIA: Curonian Spit NP: Alksnynė, 55.65840°N, 21.12334°E, 23 m a.s.l, *Pinus sylvestris* forest fragment on dunes, pitfall trap: 1 ♂, 7.–26. Jun. 2019; 1 ♂, 12.–23. Jun. 2019; 1 ♀, 5.–18. Aug. 2019. Juodkrantė, 55.51781°N, 21.11151°E, 38 m a.s.l., edge of Great cormorant colony in old forest, pitfall trap: 1 A, 8.–27. Jul. 2012; 55.52045°N, 21.11205°E, 15 m a.s.l., an old observation platform in Great cormorant colony in old forest, pitfall trap: 1 ♀, 9.–27. Jul. 2012; 55.52352°N, 21.11356°E, 11 m a.s.l., a natural, climax forest, pitfall trap: 1 ♀, 1 A, 8.–27. Jul. 2012. Nagliai Reserve, 55.48719°N, 21.09246°E, 5 m a.s.l, *Pinus sylvestris* forest on dunes, pitfall trap: 3 ♀♀, 1 TN, 5.–19. Aug. 2019; 1 ♀, 7.–16. Jun. 2020; 1 ♀, 2.–16. Jul. 2020; 6 ♂♂, 5 ♀♀, 1 A, 10.–21. Sep. 2020; 1 ♂, 4.–22. Oct. 2020. Nida, 55.34504°N, 21.01328°E, 7 m a.s.l, meadow at the forest edge, pitfall trap: 1 ♂, 8.–17. Jun. 2020. Smiltynė, 55.67771°N, 21.11253°E, 18 m a.s.l, *Pinus sylvestris* forest on dune, pitfall trap: 1 ♂, 9.–22. Jul. 2019; 8 ♂♂, 3 ♀♀, 10.–21. Sep. 2019; 55.70726°N, 21.10775°E, 13 m a.s.l, meadow at the *Pinus* forest edge, pitfall trap: 1 ♀, 6.–26. May 2020; 1 ♂, 7.–17. Jun. 2020; 1 ♀, 8.–17. Jun. 2020.
Remarks. *Neobisium carcinoides* is an abundant and frequent species, widespread throughout the Palearctic with records

also from Kenya and India (WPC 2022). It is an epigean species mostly found in leaf litter, but its presence has been noted in various habitats even those strongly affected by human activity (Beier 1963, Legg & Jones 1988, Drogla & Lippold 2004). Krajčovičová et al. (2018b) collected the species across Lithuania from coniferous forests by sifting moss and litter. All specimens presented in this paper were sampled using pitfall traps.

***Neobisium crassifemoratum* (Beier, 1928)**

Material examined. LITHUANIA: Curonian Spit NP: Juodkrantė, 55.51210°N, 21.10317°E, 9 m a.s.l, *Pinus sylvestris* forest on dunes, pitfall trap: 2 ♀♀, 12.–23. Jun. 2019; 1 A, 9.–22. Jul. 2019; 55.51781°N, 21.11151°E, 38 m a.s.l, Great cormorant colony in an old forest, pitfall trap: 1 ♂, 7.–16. Jun. 2020; 1 ♀, 8.–16. Jun. 2020; 55.51898°N, 21.11149°E, 34 m a.s.l, old part of Great cormorant colony in an old forest, window trap: 2 ♂♂, 7.–25. Jun. 2020. Nagliai Reserve, 55.48719°N, 21.09246°E, 5 m a.s.l, *Pinus sylvestris* forest on dunes, pitfall trap: 1 ♀, 8.–16. Jun. 2020; 55.43714°N, 21.07421°E, 6 m a.s.l, *Alnus glutinosa* forest on dunes, pitfall trap: 1 A, 9.–27. Jul. 2012. Smiltynė, 55.67771°N, 21.11253°E, 18 m a.s.l, *Pinus sylvestris* forest on dunes, pitfall trap: 2 ♀♀.

Remarks. Records of the species distribution were predominantly published from the east of Europe and the Balkans (WPC 2022). The presence of *N. crassifemoratum* in the Curonian Spit is the northernmost record of the species which has been known in the area from a previous study (Krajčovičová et al. 2018b). It is an epigean species associated with forest habitats (Beier 1963, Novák 2012, 2015, Krajčovičová et al. 2018b). During the current research, most of the specimens were collected using pitfall traps. Two males were sampled using window traps. The authors did not find any information on the presence of this species in flight intercept traps in previous studies.

Discussion

The discovery of *Dinocheirus panzeri* in the Curonian Spit NP brings the pseudoscorpion species number in Lithuania to ten, within seven genera and three families. The genus *Dinocheirus* Chamberlin, 1929 contains 27 species with the highest diversity and distribution in North America. Only three species are known to occur outside the American continent (WPC 2022). *Dinocheirus bulbipalpis* (Redikorzev, 1949) and *D. transcaspius* (Redikorzev, 1922) have been recorded from Central Asia (WPC 2022) with an isolated finding of *D. transcaspius* in the European part of Russia (Krajčovičová et al. 2018a). Besides the single record of *D. transcaspius* in Moscow (Krajčovičová et al. 2018a), *D. panzeri* is the only known species of the genus that is widespread in Europe (WPC 2022). Among the main diagnostic characters of the genus are the female spermathecae with a pair of long tubes each ending with terminal bulb and relatively long pseudotactile seta situated distally on the tarsus of leg IV (Fig. 3) (Beier 1963).

Dinocheirus panzeri can be distinguished from *D. transcaspius* by the presence of a pair of long tactile setae on tergite XI, which is absent in *D. transcaspius* (Schawaller 1986, Christophoryová et al. 2011, Krajčovičová et al. 2018a). The affiliation of the species with the presence of a pair of long tactile setae on tergite XI, versus species with the absence of those, to one genus was questioned by Schawaller (1986). Recently, a study based on DNA barcoding (Muster et al. 2021) split *D. panzeri* into two deeply diverged clades; specimens from synanthropic sites were restricted to one clade, while specimens from the mould of trees were distributed across both clades. The existence of two separate species, namely *D. panzeri* and *D. rufeolus* (Simon, 1879), was discussed in Muster et al. (2021). The current synonymy of the two species was justified by the presence of transitional morphotypes in the males and the indistinguishability of the females (Mahnert 1978, Ressl 1983). However, the abovementioned study by Muster et al. (2021) revealed mitochondrial variation in analysed specimens and supported the hypothesis that *D. panzeri* and *D. rufeolus* might be two separate species (Muster et al. 2021).

The *Neobisium carcinoides* complex represents a unique case. The study of Muster et al. (2021) included 36 European pseudoscorpion morphospecies and revealed the highest intraspecific diversity within this species among all those analysed. Muster et al. (2021) showed that there are potentially 10–20 cryptic species within the *N. carcinoides* complex. In future, taxonomic revisions following an integrative approach combining molecular, karyological, morphometric data and including consideration of type material will be needed to discover the true pseudoscorpion species diversity here.

From a faunistic point of view, the known pseudoscorpion species composition of Lithuania is comparable to that of other Baltic countries (WPC 2022), but there is still a large gap in the knowledge of pseudoscorpions in this country. For example, no representatives from the Chthoniidae Daday, 1889, Cheiridiidae Hansen, 1894 or Larcidae Harvey, 1992 have been discovered in Lithuania so far. Future, systematic pseudoscorpion research focusing on different habitats would probably reveal new discoveries for the country.

Acknowledgments

We wish to thank the Authority of the Curonian Spit National Park for the help in performing the investigations. We are grateful to Alica Christophoryová for technical assistance with the figure of *Dinocheirus panzeri*. We would like to thank Giulio Gardini and an anonymous reviewer for valuable and constructive comments, which improved the quality of the paper. The study was supported by the projects "Climate Change and Human Impact" No. LEK-03/2012 and "VEGA" grant No. 1/0704/20.

References

Beier M 1929 Die Pseudoskorpione des Wiener Naturhistorischen Museums. II. Panctenodactyli. – Annalen des Naturhistorischen Museums in Wien 43: 341-367

Beier M 1948 Phoresie and Phagophilie bei Pseudoscorpionen. – Österreichische Zoologische Zeitschrift 1: 441-497

Beier M 1960 *Chernes cimicoides* (F.) und *Chernes hahni* (C. L. Koch), zwei gut unterschiedene Arten. – Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 12: 100-102

Beier M 1963 Ordnung Pseudoscorpionidea (Afterskorpione). Bestimmungsbücher zur Bodenfauna Europas. Akademie Verlag, Berlin. 313 pp.

Christophoryová J & Krumpál M 2010 Šťúriky (Pseudoscorpiones) PR Šúr [Pseudoscorpions (Pseudoscorpiones) of NR Šúr]. In: Majzlan O & Vidlička Ľ (eds) Príroda rezervácie Šúr [Nature of NR Šúr]. Ústav zoológie SAV, Bratislava. pp. 105-114 [in Slovak, English summary]

Christophoryová J, Šťáhlavský F & Fedor P 2011 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

Christophoryová J, Krajčovičová K & Kaňuchová A 2016 Pseudoscorpions (Arachnida: Pseudoscorpiones) collected in cemeteries in Slovakia. – Klapalekiana 52: 33-41

Christophoryová J, Jajcayová D & Krajčovičová K 2017 Pseudoscorpions (Arachnida: Pseudoscorpiones) living in tree microhabitats in Slovakia. – Klapalekiana 53: 283-297

Drogla R & Lippold K 2004 Zur Kenntnis der Pseudoskorpion-Fauna von Ostdeutschland (Arachnida, Pseudoscorpiones). – Arachnologische Mitteilungen 27/28: 1-54 – doi: 10.5431/aramit2701

Krajčovičová K & Christophoryová J 2014 Faunistic survey of pseudoscorpions (Arachnida: Pseudoscorpiones) collected from trees and using Malaise traps in Slovakia and the Czech Republic. – Klapalekiana 50: 167-180

Krajčovičová K, Matyukhin AV & Christophoryová J 2018a First comprehensive research on pseudoscorpions (Arachnida: Pseudoscorpiones) collected from bird nests in Russia. – Turkish Journal of Zoology 42: 480-487 – doi: 10.3906/zoo-1801-47

Krajčovičová K, Tamutis V, Ivinskis P, Machač O & Christophoryová J 2018b First records of pseudoscorpions (Arachnida: Pseudoscorpiones) from Lithuania. – Entomologica Fennica 29: 49-53 – doi: 10.33338/ef.71011

Krajčovičová K, Ivinskis P, Rimšaitė J & Christophoryová J 2020 *Chernes similis* (Beier, 1932) (Pseudoscorpiones, Chernetidae) new to the fauna of Lithuania. – Check List 16: 707-710 – doi: 10.15560/16.3.707

Legg G & Jones RE 1988 Synopses of the British fauna (new series). 40. Pseudoscorpions (Arthropoda; Arachnida). Keys and notes for the identification of the species. Brill/Backhuys, Leiden. 159 pp.

Lohmander H 1939 Zur Kenntnis der Pseudoskorpionfauna Schwedens. – Entomologisk Tidskrift 60: 279-323

Machač O, Ivinskis P, Rimšaitė J, Horňák O & Tuf IH 2022 In the shadow of cormorants: Succession of avian colony affects selected groups of ground dwelling predatory arthropods. – Forests 330: 1-13 – doi: 10.3390/f13020330

Mahnert V 1978 Die Pseudoskorpiongattung *Toxochernes* Beier, 1932. – Symposia of the Zoological Society of London 42: 309-315

Motiejūnaitė J, Iršėnaitė R, Adamonytė G, Dagys M, Taraškevičius R, Matulevičiūtė D & Koreivienė J 2014 Pine forest lichens under eutrophication generated by a great cormorant colony. – The Lichenologist 46: 213-228 – doi: 10.1017/S0024282913000820

Muster C, Spelda J, Rulik B, Thormann J, von der Mark L & Astrin JJ 2021 The dark side of pseudoscorpion diversity: The German Barcode of Life campaign reveals high levels of undocumented diversity in European false scorpions. – Ecology and Evolution 11: 13815-13829 – doi: 10.1002/ece3.8088

Nikitina AD, Knyazeva SV, Gavrilyuk EA, Tikhonova EV, Eydlina SP & Koroleva NV 2019 Vegetation cover dynamics mapping of the curonian spit national park using ALOS and SENTINEL-2 satellite imagery – Forest Science 2 (3): 1-21 – doi: 10.31509/2658-607x-2020-3-1-1-14

Novák J 2012 New records of pseudoscorpions for the fauna of the Bükk Mts., Northeast Hungary (Arachnida: Pseudoscorpiones). – Opuscula Zoologica, Budapest 43: 57-65

Novák J 2015 New data on the pseudoscorpion fauna of Sălaj County, Romania (Arachnida: Pseudoscorpiones). – Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii 25: 203-205

Ostrovsky A 2020 On the fauna of false scorpions (Arachnida: Pseudoscorpiones) of south-eastern Belarus. – Ecosystem Transformation 3 (2): 11-21

Rafalski J 1967 Zaleszczotki. Pseudoscorpionidea. – Katalog fauny Polski 32 (1): 1-34 [in Polish]

Ressl F 1983 Die Pseudoskorpione Niederösterreichs mit besonderer Berücksichtigung des Bezirkes Scheibbs. In: Ressl F (ed.) Naturkunde des Bezirkes Scheibbs. Die Tierwelt des Bezirkes Scheibbs 2. Rudolf und Fritz Radinger, Scheibbs. pp. 174-202

Sammet K, Talvi T, Süda I & Kurina O 2016 Pseudoscorpions (Arachnida: Pseudoscorpiones) in Estonia: new records and an annotated checklist. – Entomologica Fennica 27: 149-163 – doi: 10.33338/ef.60259

Schawaller W 1986 Pseudoskorpione aus der Sowjetunion, Teil 2 (Arachnida: Pseudoscorpiones). – Stuttgarter Beiträge zur Naturkunde, Serie A Biologie 396: 1-15

Shorthouse DP 2010 SimpleMappr, an online tool to produce publication-quality point maps. – Internet: https://www.simplemappr.net (26. May 2022)

Šťáhlavský F 2001 Štírci (Arachnida: Pseudoscorpiones) Prahy [Pseudoscorpions (Arachnida: Pseudoscorpiones) of Prague]. – Klapalekiana 37: 73-121 [in Czech, with English abstract and summary]

WPC 2022 World Pseudoscorpiones Catalog. Natural History Museum, Bern. – Internet: https://wac.nmbe.ch/order/pseudoscorpiones/3 (2. Nov. 2022)