

## Contribution to the pseudoscorpion fauna of Transylvania and the Eastern and Southern Carpathians, Romania (Arachnida: Pseudoscorpiones)

János NOVÁK<sup>1\*</sup>, Daniel JABLONSKI<sup>2</sup> and Jana CHRISTOPHORYOVÁ<sup>2</sup>

1. Department of Systematic Zoology and Ecology, Eötvös Loránd University, Pázmány Pétersétány 1/C, H-1117 Budapest, Hungary.

2. Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, Ilkovičova 6, SK-842 15 Bratislava, Slovakia.

\*Corresponding author, J. Novák, E-mail: novakjanos01@gmail.com

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**Abstract.** New records for the pseudoscorpion fauna of Transylvania and the Eastern and Southern Carpathians (Romania) are presented, based on material in the Hungarian Natural History Museum (HNHM) and the Bakony Museum of the HNHM, along with material collected by the authors. Eighteen species of five families are recorded; one of the species, *Chthonius carinthiacus* Beier, 1951, is new for the fauna of Romania. New data concerning the recently described *Neobisium tothi* Novák, 2017 are presented. The number of pseudoscorpion species recorded for Romania is raised to 77. *Neobisium blothroides* (Tömösváry, 1882) is removed from the fauna of Croatia.

**Keywords:** Carpathians, new records, pseudoscorpions, Romania, Transylvania.

### Introduction

Romania covers a great variety of geographical areas and natural habitats, from the coasts of the Black Sea across the arc of the Carpathians to the Pannonian and Carpathian basins. The oldest pseudoscorpion data originate from the northwestern part of the country, namely from the Transylvanian Plateau, the Western Transylvanian Mountains, and the Southern and Eastern Carpathians (Frivaldszky 1865, Tömösváry 1882, Daday 1889a, 1889b). Besides Dobrogea, on the coast of the Black Sea (Dumitresco & Orghidan 1964, Ćurčić et al. 1993), these regions are the best investigated parts of the country in terms of the pseudoscorpion fauna.

The first data from these regions were reported by Frivaldszky (1865), when he described *Neobisium (Blothrus) brevipipes* Frivaldszky, 1865. This was followed by other notable publications in the late 19<sup>th</sup> century, with descriptions of new species such as *Chthonius heterodactylus* Tömösváry, 1882 and *Neobisium blothroides* (Tömösváry, 1882), and numerous faunistic records (Tömösváry 1882, Daday 1889a, 1889b). In the first half of the 20<sup>th</sup> century, Beier (1928, 1935, 1939) reported new occurrences and species new to science, like *Roncus transsilvanicus* Beier, 1928 from the Southern Carpathians and *Neobisium (Blothrus) leruthi* Beier, 1939 from the Western Transylvanian Mountains.

In the second half of the last century, Dumitresco & Orghidan (1969, 1970) described several new species in the Southern Carpathians, and Cırdei et al. (1970) published faunistic data for the Rarău (Ráró) Mts in the Eastern Carpathians. In the 21<sup>st</sup> century, new faunistic and taxonomic data on the pseudoscorpion fauna of Transylvania and the Southern and Eastern Carpathians were published. Ćurčić et al. (2006a, 2006b) described five new *Roncus* species from the Southern Carpathians. More recently, Novák (2014, 2015, 2017b) added faunistic data for Sălaj (Szilágy) County in Transylvania, redescribed *Neobisium (Blothrus) brevipipes* (J. Frivaldszky, 1865) and *N. (B.) minutum*, elevated *N. (B.) brevipipes montanum* Beier, 1939 to full species rank, and reported a new species, *Neobisium tothi* Novák, 2017, from northeastern Hungary and Transylvania. Novák & Harvey (2015) synonymised *Diplotennus vachoni* Dumitresco & Orghidan, 1969, previously considered an endemic taxon of the South-

ern Carpathians (Dumitresco & Orghidan 1969), with *D. balcanicus* (Redikorzev, 1929). Gardini (2014) synonymised two species, *Chthonius diophthalmus* Daday, 1889, described from 'Mehádia' (southern Carpathians) (Daday 1889a), and *C. leruthi* Beier, 1939, described from several parts of Transylvania (Beier 1939), with *C. heterodactylus*. Furthermore, he reported *Chthonius hungaricus* Mahnert, 1981 and *Mundochthonius carpaticus* Rafalski, 1948 from Transylvania, both additions to the fauna of Romania (Gardini 2014). Another species formerly considered endemic to Transylvania, *Neobisium biharicum* Beier, 1939, was synonymised with *N. polonicum* Rafalski, 1936 by Novák & Hörweg (2017). The first record of *Chernes hahnii* (C. L. Koch, 1839) was reported from the country by Opatova & Šťáhlavský (2018). Two species from Transylvania and the Southern Carpathians, *M. decoui* and *Roncus transsilvanicus*, were subjects of recent karyological studies by Šťáhlavský & Král (2004) and Šťáhlavský et al. (2013).

There are many endemic species known from Romania, e.g. *Dactylochelifera marlausicola* Dumitresco & Orghidan, 1969, *Allochernes mahnerti* Georgescu & Căpușe, 1996, *Chthonius decoui* Georgescu & Căpușe, 1994, *Ephippiochthonius scythicus* (Georgescu & Căpușe, 1994), *Mundochthonius decoui* Dumitresco & Orghidan, 1970, and *Neobisium bucegeticum* Beier, 1964 (Beier 1964, Dumitresco & Orghidan 1969, 1970, Georgescu & Căpușe 1994, 1996). Of these, *D. marlausicola*, *M. decoui* and *N. bucegeticum* were reported from the Southern Carpathians (Beier 1964, Dumitresco & Orghidan 1969, Georgescu & Căpușe 1994). It is worth mentioning, that the pseudoscorpion fauna of the northern continuation of the Eastern Carpathians in Ukraine has also been recently investigated (Novák 2017a).

Despite the long history of pseudoscorpion research in Transylvania and in the Eastern and Southern Carpathians (as 'studied regions' in the following), some of its minor areas were still inadequately known or had no records at all. The aim of the present study is to provide new faunistic data for the studied regions.

### Material and Methods

The specimens were collected by hand, by sifting and by pitfall traps.

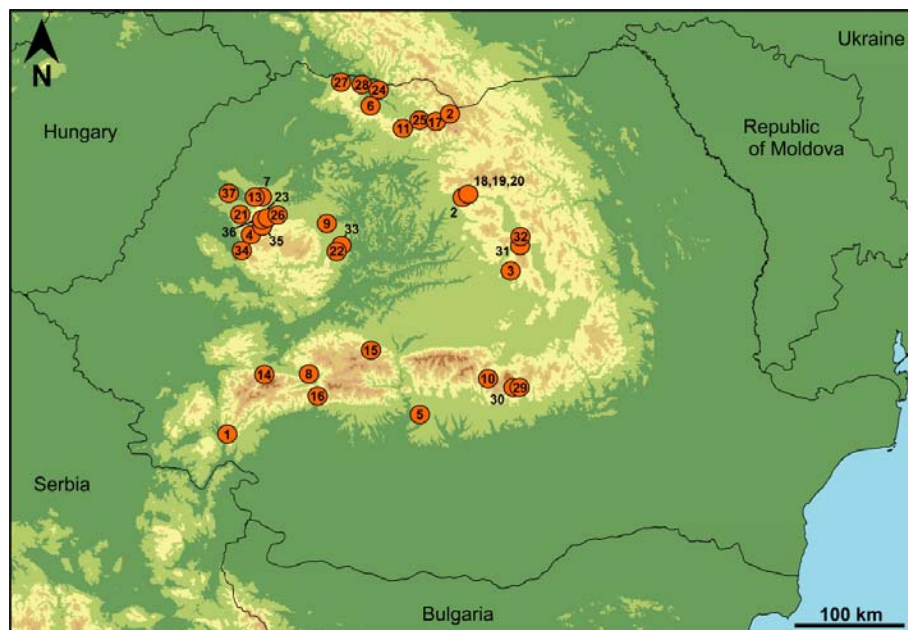


Figure 1. Sampling localities (see Material and methods section for corresponding numbers).

The material deposited in the Collection of Soil Zoology of the Hungarian Natural History Museum (HNHM) and the Bakony Museum of the Hungarian Natural History Museum (NHMB) was studied. Further specimens were collected by the authors and deposited in the HNHM and the Department of Zoology, Comenius University, Bratislava, Slovakia. The initials of the collectors cited in the text correspond to the following: AG – Aranka Grabant, APd – Attila Podlussányi, API – András Palánki, AS – Attila Szabó, BPG – Barna Páll-Gergely, BS – Béla Szelenczey, BT – Béla Tallósi, CC – Csaba Csuzdi, CK – Csaba Kutasi, DJ – Daniel Jablonski, DM – Dávid Murányi, EH – Edit Horváth, ENL – Éva Noémi Lorentz, GL – Gábor Lengyel, GP – György Pettermann, GR – György Rozner, IL – Imre Loksa, JCH – Jana Christophoryová, JK – Jenő Kontschán, JNa – Judit Nagy, JNo – János Novák, KK – Katalin Kocsis, LB – Lajos Bíró, LD – László Dányi, LM – László Móczár, MF – Mihály Földvári, MS – Mónika Schvarcz, NR – Nicola Rahmé, OM – Ottó Merkl, TK – Tímea Kosárkó, TN – Tamás Németh, TS – Tímea Szederjesi, VV – Viktória Vácz, VVP – Victor V. Pop, ZG – Zoltán György. The material was examined using stereo and compound microscopes. The specimens were cleared in lactic acid and studied as temporary slide mounts. Some adult specimens are without gender identification due to the state of the material. Measurements were carried out using the Olympus Soft Imaging analysis work 5.0 software and the Zeiss AxioVision 40LE application (v. 4.6). Drawings were made with the aid of a Zeiss Axioskop 2 microscope from computer images. Measurements basically follow Chamberlin (1931), with the modification that, in the case of the measurements of chela length and chelal hand length, the pedicel also was taken into account. Nomenclature for taxa follows Harvey (2013), Novák & Harvey (2015), Novák & Hörweg (2017) and Zaragoza (2017). The samples are stored in 70% ethanol. Each item is accompanied with an inventory number ('HNHM Pseud-Nr.' in the case of Hungarian Natural History Museum, 'NHMB' in the case of Bakony Museum of the HNHM and 'PK' in the case of Department of Zoology, Comenius University, Bratislava, Slovakia). Unfortunately, in the case of the older material, the collecting data are sometimes incomplete. To facilitate comparisons with older papers, we give, where relevant, the Hungarian (H) and German (G) names used for localities, in parentheses after the modern Romanian name.

#### List of collecting sites (Fig. 1)

Where collection data were insufficient, certain possibly outdated locality names could not be identified. Coordinates not taken from the original label are given in square brackets and represent approximations.

1. Băile Herculane (H: Herkulesfürdő, G: Herkulsebad), Caraş-Severin County (H: Krassó-Szörény), Domogled, beech forest, [44°53'36"N, 22°26'02"E].
2. Băile Borşa (H: Borsabánya, G: Pfefferfeld), Maramureş County (H: Máramaros), spruce forest over the village, 981 m a.s.l., 47°41'20"N, 24°49'52"E.
3. Băile Homorod (H: Homoródfürdő), Harghita County (H: Hargita), [46°20'38"N, 25°27'51"E].
4. Bazarul Someşului (H: Szamos-Bazár), Bihor County (H: Bihar), 1246 m a.s.l., [46°38'07"N, 22°42'57"E].
5. Burluşi, Argeş County, village, under bark of *Quercus* sp., 398 m a.s.l., 45°07'33"N, 24°32'37"E.
6. Călineşti (H: Felsőkálvinfalva), Maramureş County, Lapusului (H: Lápos) Mts., La Secatura, mixed spruce and beech forest, 600 m a.s.l., [47°47'07"N, 23°58'02"E].
7. Ciucea (H: Csucs, G: Tschötsch), Cluj County (H: Kolozs), oak forest, 454 m a.s.l., [46°56'58"N, 22°48'41"E].
8. Corbeoni, Argeş County, village, under bark of *Betula* sp., 719 m a.s.l., 45°27'15"N, 23°17'46"E.
9. Cluj-Napoca (H: Kolozsvár, G: Klausenburg), Cluj County, Bükk, oak forest, 528 m a.s.l., [46°43'51"N, 23°32'40"E].
10. Dealul Sasului, Argeş County, slope near the road, under bark of *Picea* sp., 1117 m a.s.l., 45°24'54"N, 25°14'06"E.
11. Dragomireşti (H: Dragomérfalva, G: Dragomir), Maramureş County, Polena valley, stream in a beach forest, 901 m a.s.l., 47°32'34"N, 24°18'54"E.
12. Iod (H: Jódtelep), Mureş County (H: Maros), [46°58'08"N, 24°58'10"E].
13. Negreni (H: Körösfeketető), Cluj County, beech forest along a left tributary of the Sebes-Körös river, 505 m a.s.l., [46°56'53"N, 22°44'56"E].
14. Cărníc, Hunedoara County (Hunyad), Retezat (H: Retyezát) Mountains, Cabana Cascada, mixed forest of spruce and beech, 1005 m a.s.l., [45°26'23"N, 22°53'32"E].
15. Păltiniş (H: Szebenjuharos; G: Hohe Rinne), Sibiu County (Szeben), Cindrel Mountains (Szebeni havasok), spruce forest, 1426 m a.s.l., [45°38'51"N, 23°55'45"E].
16. Mănăstirea Lainici, Hunedoara County, 1.5 km before Lainici, beech forest, 45°16'22"N, 23°22'06"E.
17. Pietrosul Rodnei, Maramureş County, Borsa, Rodnei (H: Radnai) Mountains, subalpine zone, 1800 m a.s.l., [47°36'23"N, 24°39'45"E].
18. Răstoliţa (H: Ratosnya), Mureş County, [46°58'17"N, 24°59'34"E].
19. Răstoliţa (H: Ratosnya), Mureş County, Tihu-hec,

[46°58'17"N, 24°59'34"E].

20. Răstolița (H: Ratosnya), Mureș County, Papláb Mount, [46°58'17"N, 24°59'34"E].

21. Remeți (H: Jădremete), Maramureș County, Neresin, beech forest, 600 m a.s.l., [46°50'36"N, 22°39'14"E].

22. Rimetea (H: Torockó, G: Eisenburg), Alba County (H: Fehér), Székelykő Mount, oak forest, 784 m a.s.l., [46°27'27"N, 23°35'12"E].

23. Rogojel (H: Havasrogoz), Cluj County, mixed beech and spruce forest, 933 m a.s.l., [46°47'34"N, 22°50'11"E].

24. Rona de Sus (H: Felsőrona, G: Oberrohnen), Maramureș County, Hera Hill, beech forest, 580 m a.s.l., [47°53'53"N, 24°02'20"E].

25. Săcel (H: Izaszacsal), Maramureș County, Rodnei (H: Radnai) Mounts, Iza Gorge, Iza stream in mixed forest, limestone rocks, 946 m a.s.l., [47°36'34"N, 24°31'48"E].

26. Sâncraiu (H: Kalotaszentkirály, G: Heilkönig), Cluj County, Háromkő Mount, oak forest, 960 m a.s.l., [46°48'00"N, 22°55'39"E].

27. Săpânța (H: Szaplonca), Maramureș County, Piatra, Mires, stream valley, 500 m a.s.l., [47°55'15"N, 23°40'34"E].

28. Sighetu Marmăției (H: Máramarossziget, G: Maramureschsigeth), Maramureș County, Piatra, Sorâmpău, beech forest, 1000 m a.s.l., [47°55'14"N, 23°53'34"E].

29. Sinaia, Prahova County, Bucegi Mts., near the railway station, mixed beech and spruce forest, 809 m a.s.l., [45°20'11"N, 25°33'21"E].

30. Sinaia, Prahova County, Bucegi Mts., mixed beech and spruce forest, 930 m a.s.l., [45°19'48"N, 25°31'05"E].

31. Szenéte, Harghita County, Görgényi Mounts, barn, 771 m a.s.l., [46°37'31"N, 25°35'11"E].

32. Szenéte, Harghita County, Görgényi Mounts, mixed beech and spruce forest, 1084 m a.s.l., [46°34'58"N, 25°35'15"E].

33. Turda's gorge, Turda (H: Torda, G: Thorenburg), Cluj County, mixed forest of linden and ash, 523 m a.s.l., [46°31'28"N, 23°39'12"E].

34. Ursilor Cave, Bihor County, 485 m a.s.l., [46°33'13"N, 22°34'10"E].

35. Vărfuraș Cave, Cluj County, Vlădeasa Mountains, tourist halt, [46°43'38"N, 22°48'34"E].

36. Vlădeasa (H: Vigyázó) Mount, Bihor County, pine forest, 1680 m a.s.l., [46°46'33"N, 22°47'52"E].

37. Zichy Cave, Bihor County, Pădurea Craiului (H: Király-erdő) Mounts, 357 m a.s.l., [46°57'46"N, 22°30'42"E].

## Results

### *Chthoniidae* Daday, 1889

#### *Chthonius carinthiacus* Beier, 1951 (Figs 2A&C)

Locality. HNHM Pseud-1958: 1♂, No. 27, sifted, 04.06.2006, leg. AG, APd, OM, TN.

Short description of Romanian specimen. Carapace, chelicerae and chelal hands brown, other body parts yellowish-brown.

Carapace (Fig. 2A). Approximately as long as broad, laterally with small denticles, epistome serrated. Two pairs of eyes present, anterior pair with lenses, posterior pair flattened. Setal formula: 4:6:4:2:2 (18), preocular microsetae absent. Two pairs of slit-like lyrifissures situated near ocular region, one pair near posterior margin.

Coxal area. Pedipalpal coxa with 5 setae, coxa I 4, II 4, III 6, IV 6 setae. Coxa II with 8–9, III with 5 coxal spines.

Chelicerae (Fig. 2B). Hand with 6 setae, spinneret flattened. Fixed finger with 8 small and distally 2 large teeth; movable finger with 4 small, basal teeth, one medium tooth and an isolated distal tooth. Rallum with 11 blades.

Pedipalps (Fig. 2C). Fixed finger with 34 contiguous, triangular and slightly backwards-inclined teeth; movable fin-

ger with 18 teeth, the distal teeth flattened triangular, slightly backwards-inclined, proximal teeth flattened. Coupled sensilla *pc* situated between subbasal trichobothrium *sb* and subterminal trichobothrium *st*, close to *sb* (Fig. 2C). Disto-paraxial seta of fixed finger sinuous (arrowed in Fig. 2C).

Opisthosoma. Male genital opening flanked by 8 setae on each side; 4+4 internal genital setae. Chaetotaxy of tergites I–X: 4:4:4:4:6:6:6:6:4. Tergite XI with 4 normal and 2 long tactile setae. Anal cone with 2 ventral and 2 dorsal microsetae. Chaetotaxy of sternites IV–X: 8:4:4:4:6:6.

Measurements (in mm) and ratios (in parentheses). Body length: 1.30. Carapace length 0.37, width at posterior margin 0.33, width at the level of the eyes 0.40. Cheliceral palm with fixed finger length/width 0.28/0.16 (1.75x); movable finger length 0.16. Palpal femur 0.43/0.09 (4.78x); patella 0.16/0.10 (1.63x); chela length 0.60 mm (4.83x); hand length 0.22, width 0.12 (1.83x), depth 0.12; fixed finger length 0.37; movable finger length 0.38.

Remarks. This species is recorded for the first time in Romania. *Chthonius carinthiacus* was described from Austria (Beier 1951) and later found in Slovenia (Čurčić 1974), Italy (Callaini 1980, under the synonymous name *Chthonius bacchetti*), the Czech Republic (Růžička et al. 1995), Croatia (Gardini 2004), Slovakia (Christophoryová et al. 2011a) and Hungary (Novák 2012). The morphological and morphometric characters of the Romanian specimen mostly correspond with the previously published data (Beier 1951, Callaini 1980, Christophoryová et al. 2011a). However, the chelal length of Romanian specimen is shorter (0.60 mm, as opposed to 0.81 mm [inferred from hand and finger length] in Beier's description [sex of the measured specimen not mentioned in the description], 0.74–0.77 in that of Callaini and 0.67–0.72 mm in that of Christophoryová et al.), and the length of chelicera (0.25 mm) is also shorter than in the descriptions of Callaini (0.38–0.41 mm) and Christophoryová et al. (0.30–0.35 mm) (Beier 1951, Callaini 1980, Christophoryová et al. 2011a). Christophoryová et al. (2011a) described the carapace as smooth, but the Romanian specimen has small denticles laterally. The sinuous disto-paraxial seta of fixed chelal finger of Romanian specimen has not been described previously.

#### *Chthonius heterodactylus* Tömösváry, 1882

Localities. HNHM Pseud-1403: 1♂, No. 29, sifted, 14.06.2014, leg. ENL, JNo; HNHM Pseud-1405: 1♂, No. 22, sifted, 08.06.2014, leg. JNo, TK; HNHM Pseud-1406: 1♀, No. 22, sifted, 08.06.2014, leg. JNo, TK; HNHM Pseud-1409: 1♂, No. 23, sifted, 20.04.2014, leg. JNo, TS; HNHM Pseud-1411: 1♀, No. 9, sifted, 05.05.2014, leg. JNo; HNHM Pseud-1415: 1♀, 14.06.2015, No. 30, sifted, leg. ENL, JNo; HNHM Pseud-1419: 1♂, 1♀, No. 22, sifted, 21.05.2014, leg. API, AS, JNo, KK, MS; HNHM Pseud-1420: 1♀, No. 36, sifted, 20.05.2014, leg. API, AS, JNo, KK, MS; HNHM Pseud-1422: 2♂♂, No. 7, 10.05.2014, leg. JNo; HNHM Pseud-1425: 1♀, No. 14, sifted, 23.05.2014, leg. API, AS, JNo, KK, MS; HNHM Pseud-1426: 3♂♂, No. 14, sifted, 23.05.2014, leg. API, AS, JNo, KK, MS; HNHM Pseud-1428: 4♂♂, 2♀♀, No. 32, sifted, 14.05.2014, leg. JNa, JNo; HNHM Pseud-1922: 1♂, No. 19, 12.05.1944, leg. IL; HNHM Pseud-1925: 2♂♂, 3♀♀, No. 18, 07.05.–14.05.1944, leg. IL; HNHM Pseud-1951: 1♂, No. 34, 10.08.2007, leg. BPG, GL.

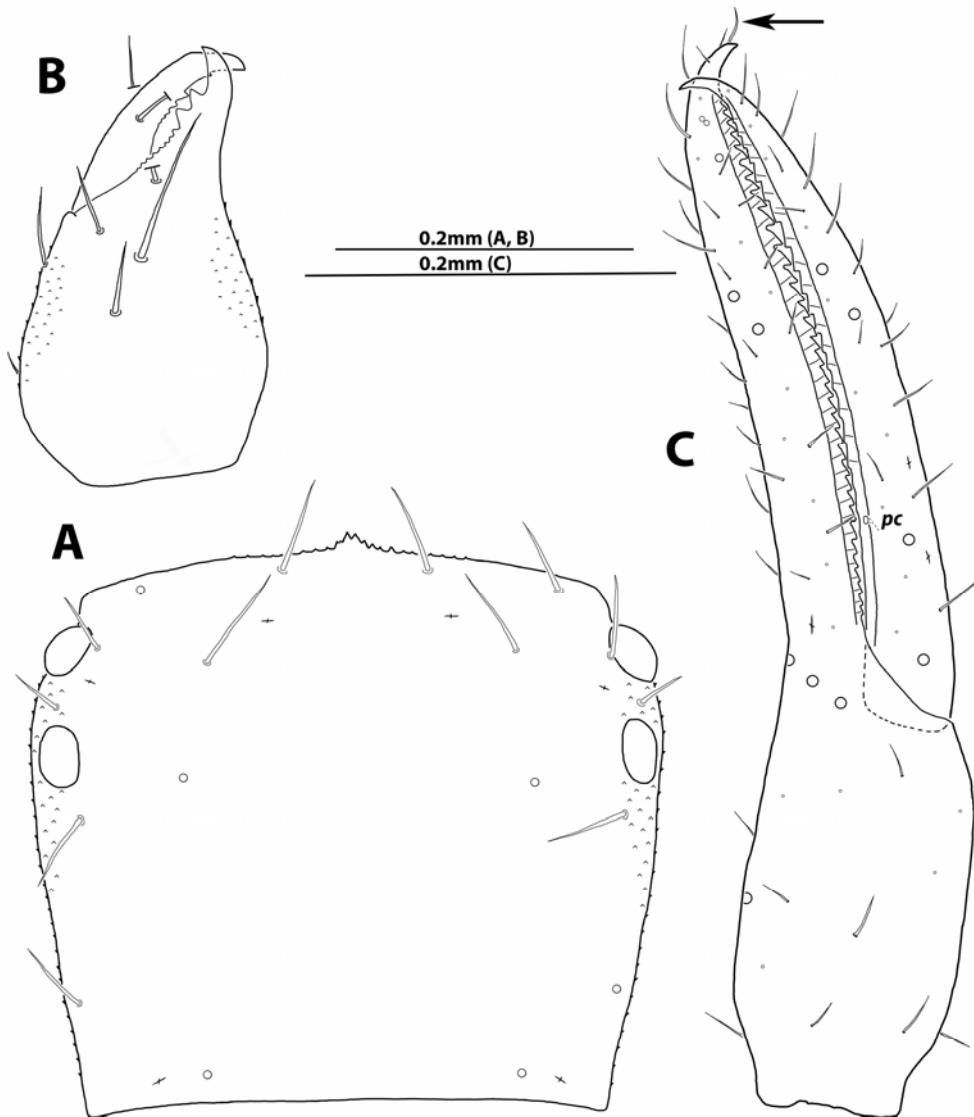


Figure 2. *Chthonius carinthiacus* male (HNHM Pseud-1958). A. Carapace. B. Left chelicera, dorsal view. C. Right chela, lateral view (arrow showing the disto-paraxial seta; pc: coupled sensilla).

Remarks. There are numerous published data concerning this species from the studied regions of the present paper (Tömösváry 1882, Daday 1889a, Beier 1939, Gardini 2014, Novák 2015). *Chthonius heterodactylus* also occurs in the Carpathians in Ukraine (Hadži 1939), Hungary (Kárpáthegyi 2006), the Czech Republic and Slovakia (Christophoryová et al. 2011b). The species was recently redescribed by Gardini (2014).

#### Neobisiidae Chamberlin, 1930

##### *Neobisium blothroides* (Tömösváry, 1882)

Locality. HNHM Pseud-1917: 1 adult, **No. 16**, 27.10.2007, leg. CC, JK, VVP.

Remarks. This species was described from “Mehádia” and “Herkulesfürdő” in the Southern Carpathians (Tömösváry 1882) and later found at other localities in the Southern Carpathians (Daday 1889a). *Neobisium blothroides* was later reported from northwest Bulgaria (Petrov & Šťáhlavský 2007), which is somewhat south of the type locality but con-

nected by mountain ranges. The new localities given here are also situated in the Southern Carpathians. Čurčič (1974) and Ozimec (2004) mentioned the occurrence of this species from Dalmatia, Croatia, but this is an erroneous interpretation of the old records of Daday (1889a), who reported the species only from “Szelistye”, “Mehádia” and “Rumunysty”, all of which are situated in the Southern Carpathians (Daday 1889a). The species must therefore be removed from the faunal list of Croatia.

##### *Neobisium brevidigitatum* (Beier, 1928)

Localities. HNHM Pseud-1976: 2 adults, **No. 19**, 12.05.1944, leg. IL; HNHM Pseud-1977: 1♂, 1♀, **No. 18**, 07.05–14.05.1944, leg. IL; HNHM Pseud-1926: 1♂, 1♀, **No. 26** sifted, 19.04.2014, leg. JNo, TS; HNHM Pseud-1927: 2♂♂, 3♀♀, **No. 33**, 02.05.2014, leg. GP, JNo; HNHM Pseud-1929: 1♂, **No. 23**, 20.04.2014, sifted, leg. JNo, TS; HNHM Pseud-1932: 6♀♀, **No. 22**, sifted, 22.05.2014, leg. API, AS, JNo, KK, MS; HNHM Pseud-1935: 1♀, **No. 30**, sifted, 14.06.2014, leg. ENL, JNo;

HNHM Pseud-1939: 5 adults, **No. 32**, sifted, 14.05.2014, leg. JNa, JNo; HNHM Pseud-1940: 1♂, 1♀, **No. 7**, sifted, 10.05.2014, leg. JNo.

Remarks. This species was described from "Kronstadt" (Braşov), situated on the northeastern edge of the Southern Carpathians (Beier 1928). Later, it was also found in Georgia (Kobakhidze 1965), Poland (Rafalski 1967), Slovakia (Krumpál 1980) and Hungary (Novák 2015). It seems to be widespread in the hereby-studied regions.

#### *Neobisium carcinoides* (Hermann, 1804)

Localities. HNHM Pseud-1915: 5 adults, **No. 20**, 10.05.1944, leg. IL; HNHM Pseud-1937: 1♀, **No. 36**, sifted, 20.05.2014, leg. AP, AS, JNo, KK, MS.

Remarks. This species is widespread in Europe, including Romania (Harvey 2013).

#### *Neobisium carpaticum* Beier, 1935

Localities. HNHM Pseud-1974: 1 adult, **No. 17**, hand collected, 05.08.2009, leg. AG, OM, TN, ZG; HNHM Pseud 1975: 7 adults, **No. 17**, hand collected, 05.08.2009, leg. AG, OM, TN, ZG.

Remarks. This species was originally described from the Bucegi Mts., which are part of the Southern Carpathians (Beier 1935). Later, it was recorded for Transylvania (Beier 1939, 1964), the Northeastern Carpathians in Ukraine (Hadži 1939), Poland (Rafalski 1967), the Serbian part of the Carpathians (Ćurčić 1976) and Slovakia (Krumpál 1980).

#### *Neobisium erythroductylum* (L. Koch, 1873)

Localities. HNHM Pseud-1947: 2♀♀, **No. 1**, sifted, 01.07.2008, leg. BS, NR, TN; HNHM Pseud-1948: 1♂, **No. 24**, sifted, 06.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1960: 2 adults, **No. 27**, sifted, 15.06.2006, leg. AG, AP, OM, TN.

Remarks. This species occurs in Middle and Eastern Europe, and in the Near East (Harvey 2013). It has been recorded several times before from Transylvania (Tömösváry 1882, Daday 1889a, Cîrdei & Guţu 1959).

#### *Neobisium fuscimanum* (C. L. Koch, 1843)

Localities. HNHM Pseud-1916: 2 adults, **No. 12**, 11.05.1944, leg. IL; HNHM Pseud-1918: 1♂, **No. 3**, 07.07.1997, leg. AP, EH, GR; HNHM Pseud-1921: 1 adult, **No. 19**, 12.05.1944, leg. IL; HNHM Pseud-1924: 1♂, **No. 18**, 07.05.-14.05.1944, leg. IL; HNHM Pseud-1923: 1♂, **No. 9**, sifted, 12.06.2014, leg. JNo; HNHM Pseud-1931: 3 adults, **No. 22**, sifted, 22.05.2014, leg. AP, AS, JNo, KK, MS; HNHM Pseud-1936: 1 adult, **No. 30**, sifted, 14.06.2014, leg. ENL, JNo; HNHM Pseud-1938: 1♀, **No. 32**, sifted, 14.05.2014, leg. JNa, JNo; HNHM Pseud-1941: 2♀♀, **No. 14**, sifted, 23.05.2014, leg. AP, AS, JNo, KK, MS; HNHM Pseud-1949: 1♀, **No. 24**, sifted, 06.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1954: 1♂, **No. 6**, sifted, 06.08.2009, leg. AG, AP, OM, TN; HNHM Pseud-1957: 2♂♂, 1♀, **No. 27**, sifted, 04.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1959: 1 adult, **No. 27**, sifted, 15.06.2006, leg. AG, AP, OM, TN.

Remarks. *Neobisium fuscimanum* occurs in Central Europe, Italy, the Balkans and the Near East (Harvey 2013). It was previously reported from Transylvania by Beier (1939).

#### *Neobisium macroductylum* (Daday, 1889)

Locality. HNHM Pseud-1946: 1♂, 1♀, **No. 1**, sifted, 01.07.2008, leg. BS, NR, TN.

Remarks. *Neobisium macroductylum* was described by Daday (1889a) from two type localities: "Mehádia" in the Southern Carpathians and the Greek island of Corfu. It has since been recorded from the Balkans, the Carpathian Basin and from the Caucasus (Harvey 2013). The new occurrence is close to the type locality of the species in the South Carpathians.

#### *Neobisium polonicum* Rafalski, 1937

Localities. HNHM Pseud-1914: 1♀, **No. 11**, 24.05.2006, leg. DM, JK, LD, MF; HNHM Pseud-1920: 1 adult, **No. 19**, 12.05.1944, leg. IL; HNHM Pseud-1923: 6 adults, **No. 19**, 07.05.-14.05.1944, leg. IL; HNHM Pseud-1934: 1 adult, **No. 37**, 14.10.1894, leg. LB; HNHM Pseud-1942: 2♂♂, **No. 2**, 26.09.2006, leg. DM, JK, LD; HNHM Pseud-1943: 1♀, **No. 13**, 05.10.2006, leg. DM; HNHM Pseud-1944: 1 adult, **No. 35**, 07.08.2007, leg. BPG, GL; HNHM Pseud-1950: 1♂, **No. 28**, sifted, 14.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1953: 3 adults, **No. 21**, sifted, 04.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1955: 1♂, 2♀♀, **No. 6**, sifted, 06.08.2009, leg. AG, AP, OM, TN; HNHM Pseud-1956: 1♂, 1♀, **No. 25**, leg. CC, DM, JK, LD; HNHM Pseud-1961: 1 adult, **No. 27**, sifted, 15.06.2006, leg. AG, AP, OM, TN; HNHM Pseud-1962: 1♀, **No. 25**, leg. CC, DM, JK, VVP; HNHM Pseud-1963: 1♂, 1♀, **No. 4**, 08.08.2007, leg. BPG, GL; HNHM Pseud-1986: 1♂, 1♀, near to the **No. 37**, 07.1944, leg. LM.

Remarks. Recently, *N. biharicum* Beier, 1939 has been shown to be a junior synonym of *N. polonicum* (Novák & Hörweg 2017). The species occurs in the Eastern, Northern and Northeastern Carpathians (Poland, Romania, Slovakia, Ukraine) (Rafalski 1937, Beier 1939, Hadži 1939, Szent-Ivány 1941, Dumitrescu 1976, Krumpál 1979) and in Transylvania (Romania) (Beier 1939, Novák 2015). *Neobisium polonicum* was also reported from caves in Dobrogea (Romania) (Ćurčić et al. 1993) and the Pilis Mts (Hungary) (Novák 2013).

#### *Neobisium tothi* Novák, 2017

Locality. HNHM Pseud-1986: 2♂♂, **No. 27**, sifted, 04.06.2006, leg. AG, AP, OM, TN.

Remarks. This species was recently described from northeastern Hungary and northwestern Romania (Novák 2017b). The characters of the new male specimens correspond well with the original description. However, they slightly extend the variation range of some characters: carapacial setal formula m4m:6:6:4-5; fixed cheliceral finger with 12-15 and movable with 8-11 teeth; fixed chelal finger with 64-66, movable with 56-58 teeth. Both of the new specimens have a rudimentary epistome, like that of the male paratype of the species.

Measurements (in mm) and ratios (in parentheses). Body 1.8-2.00. Carapace 0.51-0.55/0.46-0.52 (1.06-1.11x). Cheliceral palm with fixed finger length/width 0.29/0.17 (1.71x); movable finger length 0.19-0.21. Palpal femur 0.62-0.64/0.16 (3.87-3.98x); patella 0.43/0.18 (2.39x). Chela length 1.06-1.10 (chela length/hand width: 3.93-4.08x); hand length 0.43-0.46, width 0.26-0.28 (length/width: 1.64-1.65x), depth 0.26-

0.31; fixed finger length 0.62–0.68; movable finger length: 0.62–0.70.

**Roncus lubricus L. Koch, 1873**

Locality. NHMB Pseud-009: 1♂, **No. 15**, 25.07.–31.07.2011, leg. BT, CK.

Remarks. There are known numerous previous records of this species from Transylvania (Tömösváry 1882, Daday 1889a, Beier 1939).

**Cheiridiidae Hansen, 1894**

***Apocheiridium ferum* (Simon, 1879)**

Locality. PK 1/28: 1♀, **No. 5**, hand collected, 19.06.2016, leg. DJ, JCH.

Remarks. This species typically lives under tree bark (Beier 1963), as is the case for the present finding. The occurrence of the species was previously mentioned by Dumitresco & Orghidan (1964) in Dobrogea. That record was interesting because several specimens were collected in a cave. The species occurs in most parts of Europe and in Azerbaijan, Turkey and Uzbekistan in Asia (Harvey 2013).

**Cheliferidae Risso, 1827**

***Chelifer cancroides* (Linnaeus, 1758)**

Localities. HNHM Pseud-1933: 1 adult, **No. 31**, from barn, 15.05.2014, leg. JNo, VV; HNHM Pseud-1985: 1♂, near to **No. 37**, 07.1944, leg. LM.

Remarks. The species is known from several locations in the hereby-studied region (Tömösváry 1882, Daday 1889a). It has a near-cosmopolitan distribution (Harvey 2013).

**Chernetidae Menge, 1855**

***Allochernes wideri* (C. L. Koch, 1843)**

Locality. PK 1/28: 2 deutonymphs, 3 tritonymphs, **No. 5**, hand collected, 19.06.2016, leg. DJ, JCH.

Remarks. Harvey (2013) did not mention this species in Romania, apparently overlooking Daday's (1918) record from Românești (as "Rumunjest"). *Allochernes wideri* occurs mostly in Europe, but there are also records from Asia and North Africa (Harvey 2013).

***Chernes cimicoides* (Fabricius, 1793)**

Localities. HNHM Pseud-1945: 1♀, **No. 1**, 19.07.–22.07.2007, leg. TN; PK 3/28: 3♂♂, 3♀♀, 1 tritonymph, **No. 10**, hand collected, 19.06.2016, leg. DJ, JCH.

Remarks. Tömösváry (1882) and Daday (1889b) have earlier reported the species from several localities in Transylvania, the Eastern and Southern Carpathians. *Chernes cimicoides* is widespread in Europe and has also been reported from some parts of western Asia (Harvey 2013).

***Chernes hahnii* (C. L. Koch, 1839)**

Localities: PK 2/28: 1♀, **No. 8**, hand collected, 17.06.2016, leg. JCH; PK 1/28, 1♂, 3♀♀, 1 tritonymph, **No. 5**, hand collected, 19.06.2016, leg. DJ, JCH.

Remarks. *Chernes hahnii* has recently been reported from the Southern Carpathians in Romania (Opatova & Štáhlavský 2018). This species occurs across Europe and has also

been reported from several countries in Asia (Harvey 2013).

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

Locality. HNHM Pseud-1928: 1♀, **No. 33**, sifted, 02.05.2014, leg. GP, JNo.

Remarks. The species is widespread in Europe (Harvey 2013) and it has previously been recorded in Transylvania (Tömösváry 1882, Daday 1889a, Beier 1939).

**Discussion**

During the investigation of the material collected from the Transylvanian, Eastern and Southern Carpathian regions of Romania, 18 species of five pseudoscorpion families were identified. One of them, *Chthonius carinthiacus*, is new for the fauna of Romania. Two new male specimens of the recently described *Neobisium tothi* have also been found near to the locality of the Romanian paratype (Tusa).

The known distribution of certain species shows a zoogeographically interpretable pattern. *Chthonius heterodactylus*, *Neobisium carpaticum* and *Neobisium polonicum* have a Carpathian distribution, although *C. heterodactylus* also occurs in the Sudetes, close to the Carpathians. According to our present knowledge of their distributions (Harvey 2013), *Chthonius carinthiacus* can be characterised as an Alpine-Carpathian, *Neobisium fuscimanum* as a Trans-Aegean, and *Chernes cimicoides* as a European species. *Neobisium tothi* seems to be a Pannonian-Carpathian endemic and *Neobisium blothroides* endemic to the Southern Carpathians. *Chernes hahnii* and *Neobisium carcinoides* are Palearctic elements, while *Neobisium erythrodactylum*, *Apocheiridium ferum* and *Pselaphochernes scorpioides* have a Turano-European distribution.

One reason for the relatively high level of endemism could be the presence of a large number of separated high mountain ranges and valleys. A high proportion of endemic species in the studied regions is also observed for other groups, like Gastropoda (Deli & Subai 2011, Subai & Neubert 2016), lumbricid earthworms (Pop et al. 2010), Chilopoda (Matic 1966) and Collembola (Dányi & Traser 2008).

The online catalogue of Harvey (2013) lists 71 pseudoscorpion species for Romania. However, it overlooks the records of *Neobisium seminudum* (Daday & Tömösváry, 1880) (Novák 2012), *Allochernes wideri* (Daday 1918) and *Chernes cimicoides* (Tömösváry 1882). Novák (2012) has pointed, that *Roncus euchirus* (Simon, 1879) reported by Tömösváry (1882) from "Mehádia" also belongs to the Romanian fauna now, but he overlooked, that this data was later proved to be a misidentification of *R. lubricus* (Daday 1889a). Taking into consideration the clarifications made in the Introduction and the new record of *Chthonius carinthiacus* given here, the number of pseudoscorpion species recorded for Romania is elevated to 77. Despite these results, the exploration of the pseudoscorpion fauna of Romania is far from complete and further investigations are necessary.

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