

***Chthonius hungaricus* and *Larca lata* new to the fauna of Slovakia (Pseudoscorpiones: Chthoniidae, Larcidae)**

Jana Christophoryová, Peter Fend'a & Ján Krištofik

doi: 10.5431/aramit4101

Abstract: *Chthonius (Chthonius) hungaricus* Mahnert, 1980 and *Larca lata* (Hansen, 1884) were recorded for the first time from Slovakia. The finding of *C. hungaricus* in Slovakia is the second known record since its description and the finding of *L. lata* is the first record of the family of Larcidae in Slovakia. The descriptions of the species offer an update on the variability of morphologic and morphometric characters. Indications about the habitats of *C. hungaricus* are also given for the first time.

Key words: Central Europe, faunistics, new records, taxonomy

The updated list of Slovak pseudoscorpion species comprises 51 species in 7 families (CHRISTOPHO-
RYOVÁ 2010), including the first record of the species *Chthonius (Chthonius) hungaricus* Mahnert, 1980 and *Larca lata* (Hansen, 1884). Until now *C. hungaricus* was recorded only from the Hortobágy National Park in Hungary (MAHNERT 1980, 1983). The present discovery of *L. lata* in Slovakia represents the first record of the family Larcidae in Slovakia. *L. lata* is spread across only a few countries in Central and Northern Europe (HARVEY 2009) and appears to be a rare and vulnerable European species (JUDSON & LEGG 1996, RANIUS & WILANDER 2000). This species is characterised by relatively high inter-population variability (TOOREN 2001). The aim of the present study was to describe the new finds in detail and to update our knowledge of the variability of morphological and morphometric characteristics in these two, little-known species in Europe.

Material and Methods

Chthonius hungaricus: Slovakia. Sifted from leaf litter and soil of *Fagus* trees, at Tachty Village – dolina Gortvy Valley, Cerová vrchovina Mts. (48°08'N, 19°54'E, 340 m a.s.l.), 2 October, 2007, 5 females, 8 males, leg. P. Fend'a; sifted from fallen wood in an oak forest, at Hajnáčka Village, Ragáč Mt. (southern slopes), Cerová vrchovina Mts. (48°13'N, 19°59'E, 450

m a.s.l.), 3 October, 2007, 2 females, leg. P. Fend'a; sample of leaf litter and soil in an oak-hornbeam-beech forest, at Hajnáčka Village, Natural Reserve Pohanský hrad (Veľké Šurické kamenné more), Cerová Vrchovina Mts. (48°12'N, 19°54'E, 520 m a.s.l.), 3 October, 2007, 3 males, leg. P. Fend'a; sifted from leaf litter and soil from *Alnus* trees, at Šiatorská Bukovinka Village, Natural Reserve Šomoška (Bukovinský Brook alluvium), Cerová Vrchovina Mts. (48°10'N, 19°51'E, 370 m a.s.l.), 4 October, 2007, 3 females, 2 males, leg. P. Fend'a; sifted from leaf litter in a deciduous forest, at Muráň Village, Natural Reserve Poludnica, Muránska planina Plateau (48°45'N, 20°01'E, 400 m a.s.l.), 30 June, 2008, 3 females, leg. K. Necpálová. All specimens det. J. Christophoryová, vid Mahnert.

Larca lata: Slovakia. Collected in a tree hollow containing a tawny owl nest (*Strix aluco* Linnaeus, 1758) (the nest was composed of powdery material and undigested food remains and was collected immediately after fledging of the chicks), at Sobotište Village, Myjavská pahorkatina Hills (48°44'N, 17°24'E, 252 m a.s.l.), 14 May, 1992, 2 males, 2 tritonymphs, leg. J. Krištofik, det. J. Christophoryová.

The specimens were studied as temporary slide mounts, and were photographed using a Leica DM1000 stereoscopic microscope with a ICC50 Camera Module (LAS EZ application, 1.8.0) and measured from photographs using the AxioVision 40LE application (v. 4.5). Figures were illustrated using a Leica drawing tube and morphometry is based only on undamaged specimens. MAHNERT (1980, 2004), JUDSON & LEGG (1996) and TOOREN (2001) were used for species determination. The material is deposited in the Comenius University, Bratislava.

Jana CHRISTOPHORYOVÁ, Peter FENĎA, Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-1, SK - 842 15 Bratislava, Slovak Republic
e-mails: christophoryova@gmail.com, fenda@fns.uniba.sk
Ján KRIŠTOFIK, Institute of Zoology, Slovak Academy of Sciences, Dúbravská cesta 9, SK - 845 06 Bratislava, Slovak Republic, e-mail: jan.kristofik@savba.sk

Results

Chthonius (Chthonius) hungaricus Mahnert, 1980

Description:

Adults (Fig. 1): Carapace (Fig. 1A): smooth, with small, distinctly serrated epistome on its anterior margin (Fig. 1A); two pairs of eyes present, anterior eyes well-developed with lenses, posterior eyes flattened and indistinct, often as eyespots; chaetotaxy of carapace: 18 long setae plus one microchaeta in front of each anterior eye (Fig. 1A), anterior margin with 4 and posterior margin with 2 setae, setae long and slender; 3 pairs of slitlike lyrifissures present on carapace – the first pair within anterior part of carapace behind the epistome, the second pair near anterior eyes and the third posteriorly near the two setae of the posterior carapace margin (Fig. 1A).

Chelicerae (Fig. 1C): relatively large and strongly sclerotized, 7 setae on cheliceral hand, one on cheliceral movable finger; movable cheliceral finger with conspicuous spinneret (Fig. 1C) well-developed in both sexes; cheliceral rallum of 11 blades; 10–13 teeth situated on fixed cheliceral finger, 2 to 4 of them distinctly larger, 8–10 teeth on movable cheliceral finger, the first one larger, isolated subdistal tooth on movable cheliceral finger present (Fig. 1C).

Palps (Fig. 1B): smooth, in lateral view the dorsum of palpal hand clearly rounded; movable chelal finger slightly shorter than fixed finger, with normal number of trichobothria (8 on fixed chelal finger and 4 on movable chelal finger) (Fig. 1B); fixed chelal finger with 34–40 teeth, 13–17 of them situated between fixed chelal finger tip and trichobothrium *est* (Fig. 1B), distally clearly separated teeth present and isolated by gap with a longer distance than tooth basal width, basally with smaller and more close-set teeth; movable chelal finger with 28–36 teeth; movable chelal finger with sensillum between trichobothria *st/sb*.

Coxae II with 5–8 coxal spines and coxae III with 4–6 coxal spines (Fig. 1D); long tactile seta on metatarsus and tarsus IV present and situated in basal third of the segments. Tergites I–IV bearing 4 setae, tergites V–IX 6 setae, tergite X 4 and tergite XI 6 setae (the 2 submedial of ones represent tactile setae); female genital operculum anterior with 10–11 setae and 2 lyrifissures, operculum posterior with 9–10 setae and 2 lyrifissures.

Both sexes of species were measured; all data are summarised in Tables 1 and 2.

Larca lata (Hansen, 1884)

Description:

Adults (Fig. 2): Carapace (Fig. 2A): granulate and triangular with cucullus, epistome absent, anterior margin of the carapace straight; two pairs of well developed eyes with lenses present, anterior eyes distinctly removed from anterior margin of carapace, posterior eyes raised on a tubercle; chaetotaxy of carapace: 36 setae situated on

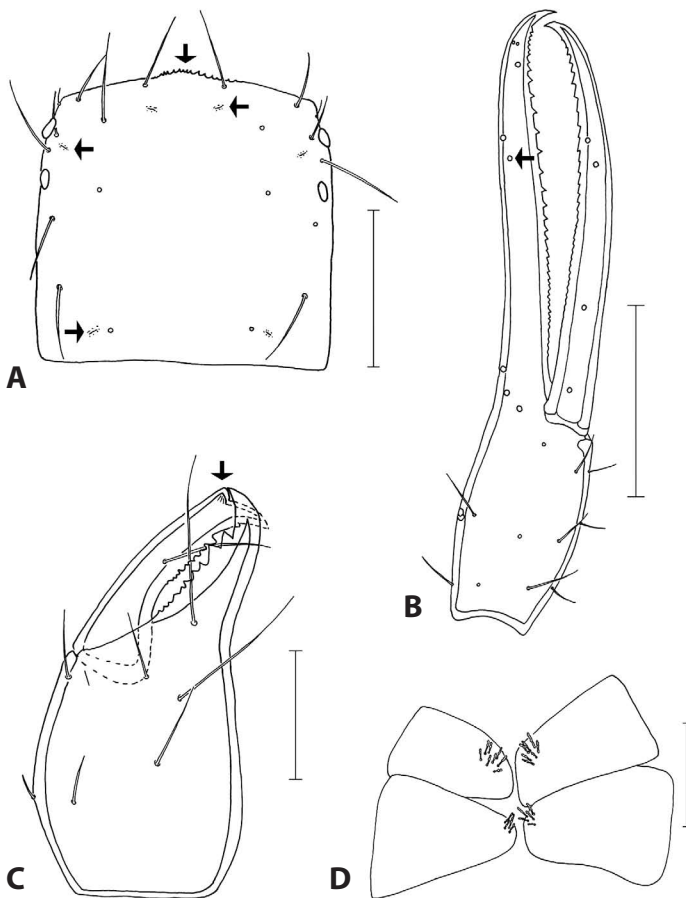


Fig. 1: Adult of *Chthonius hungaricus*. A. Carapace (dorsal view). Arrows point to the epistome and lyrifissures. B. Left palpal chela with the trichobothrial pattern (lateral view). Arrow points to the *est* – exterior subterminal trichobothrium. C. Left chelicera (dorsal view). Arrow points to the spinneret. D. Coxal spines on coxae II and III (ventral view). Scales: 0.1 (C, D) and 0.2 (A, B) mm.

Tab. 1: Morphometric data for males of *Chthonius hungaricus* (measurements in mm)

Characteristics	x	M	SD	Min	Max	n
Body, length	1.18	1.18	0.06	1.06	1.26	8
Carapace, length	0.37	0.38	0.01	0.35	0.39	12
Carapace, width	0.36	0.38	0.03	0.31	0.39	11
Carapace, length/width ratio	1.02	1.00	0.05	0.97	1.16	11
Distance of anterior eyes of anterior carapace margin	0.04	0.04	0.01	0.03	0.04	13
Chelicera, length	0.33	0.33	0.02	0.30	0.36	12
Chelicera, width	0.17	0.17	0.01	0.16	0.18	12
Chelicera, length/width ratio	1.95	1.94	0.08	1.83	2.12	11
Cheliceral movable finger, length	0.17	0.18	0.01	0.16	0.18	12
Palpal femur, length	0.42	0.42	0.01	0.41	0.44	12
Palpal femur, width	0.09	0.09	0.00	0.08	0.09	12
Palpal femur, length/width ratio	4.90	4.78	0.33	4.56	5.50	12
Palpal patella, length	0.19	0.19	0.01	0.17	0.19	13
Palpal patella, width	0.10	0.10	0.01	0.09	0.10	11
Palpal patella, length/width ratio	1.93	1.90	0.07	1.89	2.11	11
Palpal hand, length	0.21	0.21	0.01	0.20	0.24	13
Palpal hand, width	0.13	0.13	0.00	0.12	0.14	13
Palpal hand, length/width ratio	1.64	1.62	0.08	1.54	1.77	13
Palpal finger, length	0.45	0.45	0.01	0.43	0.47	13
Palpal chela, length	0.66	0.65	0.02	0.63	0.69	13
Palpal chela, length/palpal hand width	5.09	5.00	0.15	4.86	5.33	13

Tab. 2: Morphometric data for females of *Chthonius hungaricus* (measurements in mm)

Body, length	1.38	1.36	0.12	1.19	1.57	12
Carapace, length	0.40	0.40	0.01	0.38	0.42	13
Carapace, width	0.40	0.40	0.02	0.36	0.43	13
Carapace, length/width ratio	0.99	1.00	0.03	0.95	1.08	13
Distance of anterior eyes of anterior carapace margin	0.04	0.04	0.00	0.03	0.04	13
Chelicera, length	0.35	0.35	0.01	0.33	0.37	12
Chelicera, width	0.19	0.19	0.01	0.18	0.21	12
Chelicera, length/width ratio	1.86	1.87	0.08	1.74	2.00	12
Cheliceral movable finger, length	0.19	0.19	0.01	0.18	0.21	12
Palpal femur, length	0.45	0.45	0.01	0.44	0.47	12
Palpal femur, width	0.10	0.10	0.00	0.10	0.10	12
Palpal femur, length/width ratio	4.49	4.50	0.11	4.40	4.70	12
Palpal patella, length	0.20	0.20	0.01	0.19	0.21	13
Palpal patella, width	0.11	0.11	0.00	0.10	0.12	13
Palpal patella, length/width ratio	1.87	1.82	0.10	1.73	2.10	13
Palpal hand, length	0.23	0.23	0.01	0.22	0.24	13
Palpal hand, width	0.14	0.14	0.01	0.13	0.15	12
Palpal hand, length/width ratio	1.63	1.64	0.07	1.53	1.77	12
Palpal finger, length	0.48	0.48	0.02	0.46	0.50	13
Palpal chela, length	0.70	0.70	0.01	0.68	0.73	13
Palpal chela, length/palpal hand width	4.98	5.00	0.17	4.67	5.38	12

Abbreviations: x – arithmetic mean, M – median, SD – standard deviation, Min – minimum, Max – maximum, n – number of individuals measured

carapace plus one pair of short setae under the eyes, anterior margin with 9, and posterior margin with 4 setae; 3 pairs of slitlike lyrifissures present on carapace – first pair behind eyes, remaining two pairs behind posterior furrow (Fig. 2A).

Chelicerae: small, slightly sclerotized, 5 setae on cheliceral hand, one on cheliceral movable finger (Fig. 2A); movable cheliceral finger with slender galea, main stalk with 3 short terminal rami (Fig. 2B); cheliceral rallum of 4 blades, anterior one longest, posterior one shortest; small, largely unsclerotized teeth situated on both movable and fixed finger of chelicera.

Palps: slender, strongly and markedly granulate with clavate vestitural setae; movable chelal finger with a reduced number of two trichobothria, fixed chelal finger with a normal complement of 8 trichobothria; fixed chelal finger with 34 and movable with 31 to 33 equally long teeth.

Arolia of tarsi distinctly longer than tarsal claws (Fig. 2C); tergites II–VIII divided, tergite IX partly divided, chaetotaxy of tergites I–IX: 4: 7: 10: 10: 12: 11–12: 12: 10–11: 9–11, tergite X with 5–6 setae and with a pair of relatively long tactile setae (Fig. 2D), number of lyrifissures on tergites I–X: 2–5: 5–6: 6–10: 9–12: 9–12: 11–12: 10–11: 10: 10: 4. Sternites V–VIII undivided, chaetotaxy of sternites IV–X: 9: 8–10: 8–10: 7–8: 7–9: 8: 6–7, number of lyrifissures on sternites IV–X: 7–9: 10: 10–11: 9–10: 8–11: 8–10: 5–7; abdominal pleural membrane weakly and irregularly plicate.

Measurements (in mm): Total length of body 1.76–1.82; carapace length 0.50–0.52, anterior width 0.21–0.22, posterior width 0.69–0.70, length/width ratio 0.72–0.74; anterior eyes 0.07 mm from anterior margin of carapace. Chelicerae: length 0.17–0.18, width 0.09, length/width ratio 1.89–2.00; movable cheliceral fin-

ger length 0.11; galea length 0.03–0.04. Palps: Femur length 0.72–0.75, width 0.16–0.17, length/width ratio 4.41–4.50; patella length 0.59–0.60, width 0.17–0.18, length/width ratio 3.28–3.53; hand length 0.52–0.54, width 0.22, length/width ratio 2.36–2.45; hand without pedicel length 0.47–0.48; finger length 0.43–0.44; chela length 0.94–0.95, length/width ratio 4.27–4.32. Leg I: femur I length 0.23, width 0.08, length/width ratio 2.88; femur II length 0.18, width 0.09, length/width ratio 2.00; tibia length 0.20, width 0.06, length/width ratio 3.33; tarsus I length 0.15, width 0.05, length/width ratio 3.00. Leg IV: Femur length 0.50–0.51, width 0.11, length/width ratio 4.55–4.64; tibia length 0.35, width 0.08, length/width ratio 4.38; tarsus I length 0.19, width 0.05, length/width ratio 3.80; tarsus II length 0.18–0.20, width 0.04, length/width ratio 4.50–5.00.

Tritonymphs (Fig. 3): Tritonymphs differ from adults by the following characteristics (except for the morphometric characteristics): 27–28 setae situated on carapace (Fig. 3A), plus one pair of short setae under the eyes; anterior margin of carapace with 7 and posterior margin with 4–5 setae (Fig. 3A); galea on cheliceral movable finger longer and more distinct than by adults, main stalk with 3 short terminal rami (Fig. 3C); 7 trichobothria present on fixed chelal finger and 2 on movable chelal finger; fixed chelal finger with 29–30 and movable with 28–29 teeth (Fig. 3B); chaetotaxy of tergites I–IX: 4: 5: 6–8: 9: 9: 10: 9–10: 9–10: 8–9, tergite X with 4 setae and one pair of long tactile setae (Fig. 3D); chaetotaxy of sternites III–X: 6–8: 4: 7: 6: 5–6: 7: 6–7: 6.

Measurements (in mm): Total length of body 1.47–1.56; carapace length 0.45, anterior width 0.20, posterior width 0.57–0.58, length/width ratio 0.78–0.79; anterior eyes removed by 0.05–0.06 mm from anterior margin of carapace. Chelicerae: length 0.15, width 0.09, length/width ratio 1.67; movable cheliceral finger length 0.10; galea length 0.05–0.06. Palps: Femur length 0.60–0.61, width 0.14, length/width ratio 4.29–4.36; patella length 0.45, width 0.15, length/width ratio 3.00; hand length 0.42–0.45, width 0.18–0.22, length/width ratio 2.05–2.33; hand

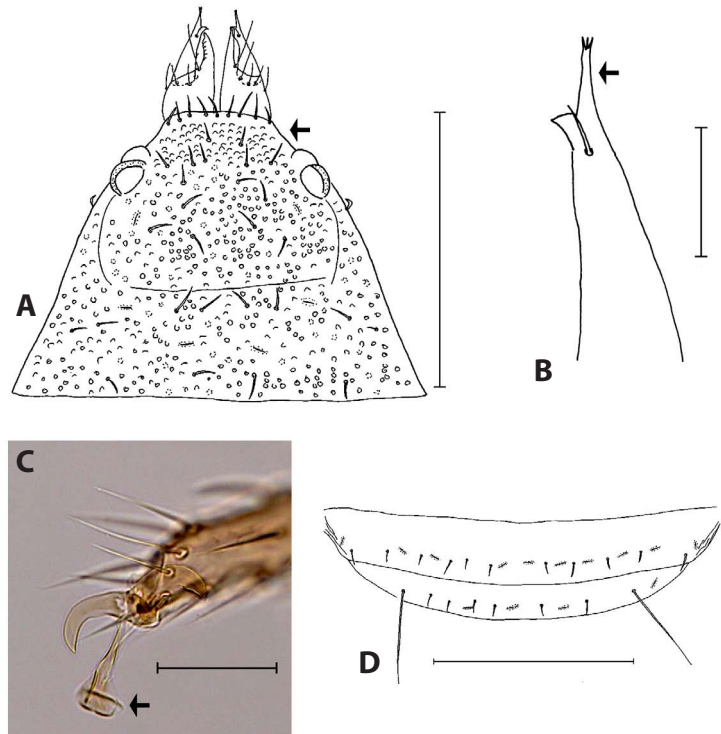


Fig. 2: Male of *Larca lata*. A. Carapace with chelicerae (dorsal view). Arrow points to the cucullus. B. Detail of movable cheliceral finger (dorsal view). Arrow points to the galea. C. Detail of pedal tarsus IV (lateral view). Arrow points to the arolium. D. Tergite IX and tergite X (dorsal view). Scales: 0.05 (B, C) and 0.5 (A, D) mm.

without pedicel length 0.39–0.41; finger length 0.36–0.38; chela length 0.77–0.81, length/width ratio 3.68–4.28. Leg I: femur I length 0.18–0.20, width 0.06–0.07, length/width ratio 2.86–3.00; femur II length 0.13–0.14, width 0.07–0.08, length/width ratio 1.75–1.86; tibia length 0.16, width 0.05–0.06, length/width ratio 2.67–3.20; tarsus I length 0.10–0.11, width 0.05, length/width ratio 2.00–2.20; tarsus II length 0.14, width 0.04, length/width ratio 3.50. Leg IV: Femur length 0.39–0.40, width 0.10–0.11, length/width ratio 3.64–3.90; tibia length 0.26–0.27, width 0.07–0.08, length/width ratio 3.38–3.71; tarsus I length 0.13–0.15, width 0.05, length/width ratio 2.60–3.00; tarsus II length 0.17, width 0.04, length/width ratio 4.25.

Natural History

Larca lata can be found only in a few countries of Central and Northern Europe – Austria, the Czech Republic, Denmark, the Netherlands, Germany, Latvia, Poland, Romania, Sweden and Great Britain (HARVEY 2009). It is restricted to dry, shadowy and humid habitats with a rich content of detritus or bird

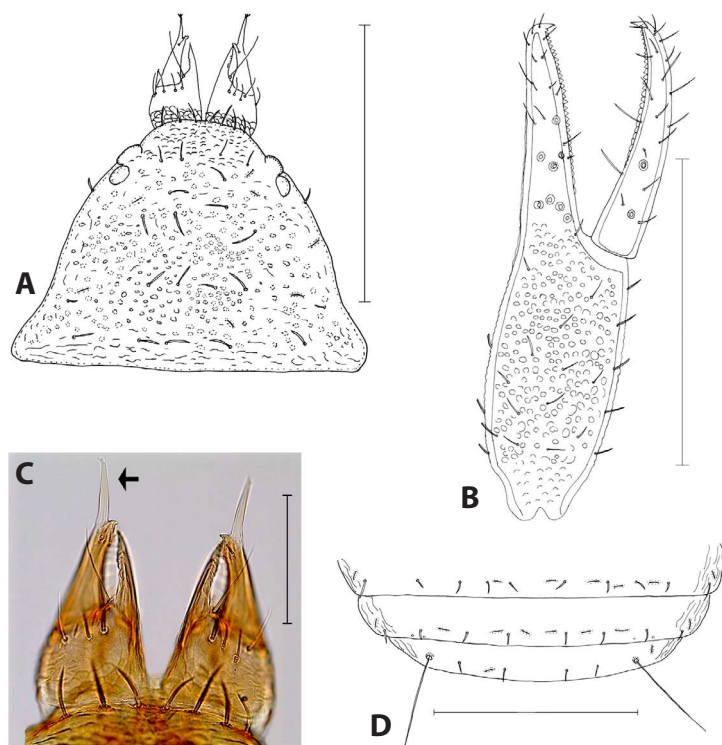


Fig. 3: Tritonymph of *Larca lata*. A. Carapace with chelicerae (dorsal view). B. Left palpal chela with the configuration of trichobothria (lateral view). C. Chelicerae and chaetotaxy of anterior margin of carapace (dorsal view). Arrow points to the galea. D. Tergite IX and tergite X (dorsal view). Scales: 0.1 (C) and 0.5 (A, B, D) mm.

and rodent excrement (RESSL & BEIER 1958, BEIER 1963, RESSL 1963, JUDSON & LEGG 1996, TOOREN 2001). *L. lata* is often confined to the oldest oak-tree hollows with large amounts of wood moult. In some countries it is considered to be a stenotopic species living exclusively in the hollows of oak-trees (RAFALSKI 1953, 1967, DUCHÁČ 1993a, 1993b, RANIUS & WILANDER 2000). It also occurs in old, abandoned bird nests (RESSL 1963, RANIUS & WILANDER 2000). The finding of *L. lata* in Slovakia corresponds to the known ecological records of the species, except for the fact that the species was found for the first time in a nest that was examined immediately after the fledging of the chicks. The main taxonomic characters correspond to the published descriptions from other countries, despite registering greater variability in morphometric characteristics, chaetotaxy of carapace, tergites and sternites and in the number of lyrifissures recorded. Compared to the description of the male by TOOREN (2001) our specimens were smaller and their palpal femur, patella, chela and finger were shorter. The palpal femur of specimens mentioned by MAHNERT (2004) was also longer than the palpal femur of our males.

MAHNERT (1980) mentioned only localities in Hungary for *Chthonius hungaricus* without specifying particular habitat types. In Slovakia, it occurred at altitudes from 280 to 525 m a.s.l., in deciduous forests in the leaf litter and the upper part of the soil and also in the leaf litter with fallen dead wood. The original description of *C. hungaricus* was based on seven adults (MAHNERT 1980, 1983). According to the higher number of collected specimens from Slovakia, in comparison with the description of Hungarian specimens by MAHNERT (1980), a higher variability of body length and length of palpal femur, patella, hand, finger and chela in both sexes – and in chaetotaxy of female genital operculum – was observed.

Acknowledgements

The authors would like to thank Prof. Volker Mahnert for checking and confirming the identification of specimens of *Chthonius hungaricus*. The project was financially supported by VEGA 1/0176/09 and EDIT-ATBI+M Gemer.

References

- BEIER M. (1963): Ordnung Pseudoscorpionidea (Afterskorpione). Bestimmungsbücher zur Bodenfauna Europas. Lieferung 1. Akademie-Verlag, Berlin. 313 S.
- CHRISTOPHORYOVÁ J. (2010): Štúriky (Pseudoscorpiones) Slovenska. PhD thesis. Department of Zoology, Faculty of Natural Sciences, Comenius University, Bratislava. 174 S.
- DUCHÁČ V. (1993a): Zwei neue Afterskorpion-Arten aus der Tschechischen Republik. – *Arachnologische Mitteilungen* 5: 36-38
- DUCHÁČ V. (1993b): Štírky (Pseudoscorpionidea) ze stromových dutin na Treboňsku. – *Sborník Jihočeského muzea v Českých Budějovicích, přírodní vědy* 33: 65-69
- HARVEY M. (2009): Pseudoscorpions of the world. Version 1.2. – Western Australian Museum, Perth. – Internet: <http://wamuseum.com.au/arachnids/pseudoscorpions> (accessed 2010 Oct. 21)
- JUDSON M. L. I. & G. LEGG (1996): Discovery of the pseudoscorpion *Larca lata* (Garypoidea, Larcidae) in Britain. – *Bulletin of the British arachnological Society* 10: 205-210

- MAHNERT V. (1980): *Chthonius (C.) hungaricus* sp. n., eine neue Afterskorpion-Art aus Ungarn (Arachnida). – *Folia Entomologica Hungarica* 41: 279-282
- MAHNERT V. (1983): Pseudoscorpiones from the Hortobágy National Park (Arachnida). In: The fauna of the Hortobágy National Park. Akadémiai Kiadó, Budapest. S. 361-363
- MAHNERT V. (2004): Die Pseudoskorpione Österreichs (Arachnida, Pseudoscorpiones). – *Denisia* 12: 459-471
- RAFALSKI J. (1953): Fauna of arachnids in the National Park of the Wolin island in the light of the previous studies. – *Ochrona Przyrody* 21: 217-248
- RAFALSKI J. (1967): Zaleszczotki. Pseudoscorpionidea. In: Katalog Fauny Polski 32(1). Państwowe Wydawnictwo Naukowe, Warszawa. S. 1-34
- RANIUS T. & P. WILANDER (2000): Occurrence of *Larca lata* H. J. Hansen (Pseudoscorpionida: Garypidae) and *Allochernes wideri* C. L. Koch (Pseudoscorpionida: Chernetidae) in tree hollows in relation to habitat quality and density. – *Journal of Insect Conservation* 4: 23-31 – doi: [10.1023/A:1009682722905](https://doi.org/10.1023/A:1009682722905)
- RESSL F. (1963): Können Vögel als passive Verbreiter von Pseudoscorpioniden betrachtet werden? – *Vogelwelt* 84: 114-119
- RESSL F. & M. BEIER (1958): Zur Ökologie, Biologie und Phänologie der heimischen Pseudoskorpione. – *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere* 86: 1-26
- TOOREN D. VAN DEN (2001): First record of the pseudoscorpion *Larca lata* in the Netherlands (Pseudoscorpiones: Garypoidea: Larcidae). – *Nederlandse Faunistische Mededelingen* 15: 33-39