

New data on the pseudoscorpion family Chthoniidae (Arachnida: Pseudoscorpiones) from Hungary

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Abstract. *Chthonius submontanus* Beier, 1963, *Ephippiochthonius romanicus* (Beier, 1935) and *Occidenchthonius parmensis* (Beier, 1963) are firstly recorded from Hungary. The genus *Occidenchthonius* Zaragoza, 2017 is new for the country. A brief description and the relative figures are reported for each species. Fifty-seven species are currently recorded from Hungary.

Keywords. Central Europe, *Chthonius*, *Ephippiochthonius*, *Occidenchthonius*, faunistics, new records.

INTRODUCTION

Pseudoscorpions are small-sized terrestrial arthropods that range from 1 mm to 1 cm in body size (Harvey 2002). They superficially resemble scorpions but lack a sting and a tail and are smaller. With more than 3500 (Harvey 2013) described species and 25 extant families (Benavides *et al.* 2019) they represent one of the four meso-diverse orders of Arachnida (Harvey 2002) and inhabit almost all terrestrial habitats.

The family Chthoniidae comprises twenty-nine genera and more than 600 species (Harvey 2013; Zaragoza 2017) and belongs to the superfamily Chthonioidea, alongside with Pseudotyranochthoniidae (Benavides *et al.* 2019). Tridenchthoniidae and Lechtyiidae, two former families of the superfamily, were reduced recently to subfamilies of Chthoniidae as Tridenchthoniinae and Lechtyiinae (Benavides *et al.* 2019).

Although investigated from the second half of the 19th century, the pseudoscorpion fauna of Hungary is still poorly known. Occurrence data of 54 species belonging to eight families is known to date from the country (Novák 2012, 2015, Novák & Harvey 2015, Harivey *et al.* 2018), of which 13

belong to three genera of Chthoniidae: *Chthonius* C.L. Koch, 1843 (9 species), *Ephippiochthonius* Beier, 1930 (3) and *Mundochthonius* J.C. Chamberlin, 1929 (1).

The aim of the present study is to report the first occurrences of *Occidenchthonius parmensis* (Beier, 1963), *Chthonius submontanus* Beier, 1963, and *Ephippiochthonius romanicus* (Beier, 1935) in Hungary, with brief descriptions of the specimens found.

MATERIAL AND METHODS

All specimens were collected by hand sampling, sifting or using pitfall traps. Representative specimens were cleared in lactic acid and examined with a stereo- and a Zeiss Axioskop 2 compound light microscope. Drawings were made with the aid of a Zeiss Axioskop 2 microscope. Measurements were made with the Olympus Soft Imaging analysis work 5.0 software.

The specimens are stored in 70% ethanol and deposited at the Hungarian National History Museum (HNHM). All specimens are accompanied and registered with an inventory number (HNHM Pseud-Nr).

RESULTS

Chthonius submontanus Beier, 1963

(Figures 1A–C)

Material examined. HNHM Pseud-1882: 1 ♂, Dobogókő, leaf litter of beech forest, sifting, 11.07.2013. leg. Klára Dózsa-Farkas & János Novák; HNHM Pseud-1891: 1 ♂, Szakonyfalu, 04.1958 leg. ???.

Short description of the main characteristics of the found males. Carapace, tergites, chelicerae and pedipalps pale brown. Hispid granulation on lateral surfaces of carapace and on cheliceral palm. Carapace subquadrate, epistome absent, anterior margin dentate (Fig. 1B). Anterior eyes with convex lens, posterior eyes with flat lens. Carapace with 20 macrosetae and 2+2 microsetae laterally, before the eyes; chaetotaxy: mm4mm: 6:4:2:4 (24). Four lyrifissures present, two at the ocular region and two near the posterior margin of carapace. Tergal chaetotaxy (I–X): 4-4-4-4-6-6-6-6-6-6. Sternal chaetotaxy (II–X): 10:(3)9(3):(2)8 (2):6:6:6:6:6:6. Genital opening flanked by 6–7 setae on each side. Cheliceral palm with 6 setae, one seta on movable finger (Fig. 1A). Fixed cheliceral finger with 10–11, movable with 6–8 teeth and with an isolated apical tooth (*di*); *gl* ratio 0.56–0.59×. Spinneret prominent and apically rounded; rallum with 11 pinnate blades. Serrula exterior with 11–15 blades, serrula interior not seen. Pedipalpal coxa with 5 setae, including 2 on manducatory process; coxa I–IV: 2–3 + 3 marginal microsetae; 4; 5; 5–6; coxa II with 5–8, coxa III with 3–5 spines; intercoxal tubercle bisetose. Fixed chelal finger with 32, movable with 22–24 teeth (Fig. 1C). Dental line of movable finger ending between trichobothria *b* and *sb*. Trichobothria *est-it* at the level of *st-t*. Disto-paraxial seta of fixed finger sinuous. Coupled trichobothria *pc* closer to *sb* than to *b*.

Measurements (in mm) and ratios (in parentheses). Body 1.20–1.60. Carapace length 0.40, width at posterior margin 0.34–0.37, width at the level of the eyes 0.42. Cheliceral palm with fixed

finger 0.31–0.32/0.18 (1.72–1.78 ×); movable finger 0.17–0.18. Palpal femur 0.44–0.48/0.10 (4.40–4.80 ×), patella 0.24/0.12 (2.00 ×); chela 0.73–0.74 (0.52–0.53 ×); hand 0.27–0.28/0.14, depth 0.14–0.15; fixed finger 0.46–0.49.

Remarks. *Chthonius submontanus* was described by Beier (1963a) from the Austrian Alps, where it was found in leaf litter and grass branches, and subsequently reported from Italy (Beier 1963b), Romania (Cîrdei *et al.* 1970), Switzerland (DeVore-Scribante 1999), and Germany (Droglá 2004). The species was redescribed by Gardini and the Romanian and Italian data were referred as dubious (Gardini 2009, Mahnert 2009). The characters of the new specimens from Hungary correspond well with the redescription of *C. submontanus* (Gardini 2009) therefore, I have no doubts about its identity. The species is new for the fauna of Hungary.

Ephippiochthonius romanicus Beier, 1935

(Figures 2A–C)

Material examined. HNHM Pseud-1894: 1 ♂, Tatabánya, 14.06.1960, leg. Imre Loksa. HNHM Pseud-1896: 1 ♂, 2 ♀♀, Tenkes Hill, 29.09.1960, leg. Imre Loksa.

Short description of the main characteristics of the found males and females. Carapace, tergites, chelicerae and pedipalps yellowish-brown. Hispid granulation on lateral surfaces of carapace and on cheliceral palm. Carapace subquadrate, epistome absent, anterior margin dentate (Fig. 3B). Anterior eyes having convex lens, posterior eyes with flat lens. Carapace with 18 macrosetae and 1+1/2+2 microsetae laterally, before the eyes; chaetotaxy: m4m/mm4mm:6:4:2:2 (20/22). Tergal chaetotaxy (I–X): 4:4:4:4:6:6:6:6:6:6. Sternal chaetotaxy (II–X): 10–11:(2–3)8(2–3):(1–2)8–10(1–2):6:4–6:4–6:4–6:4–8. Male genital opening flanked by 6–7 setae on each side. Cheliceral palm with 6 setae and 1–2 microsetae laterally (Fig. 3A). Fixed cheliceral finger with 8–11, movable with 5–8 teeth and without an isolated apical tooth (*di*); *gl* ratio 0.53–0.57 ×. Spinneret prominent and

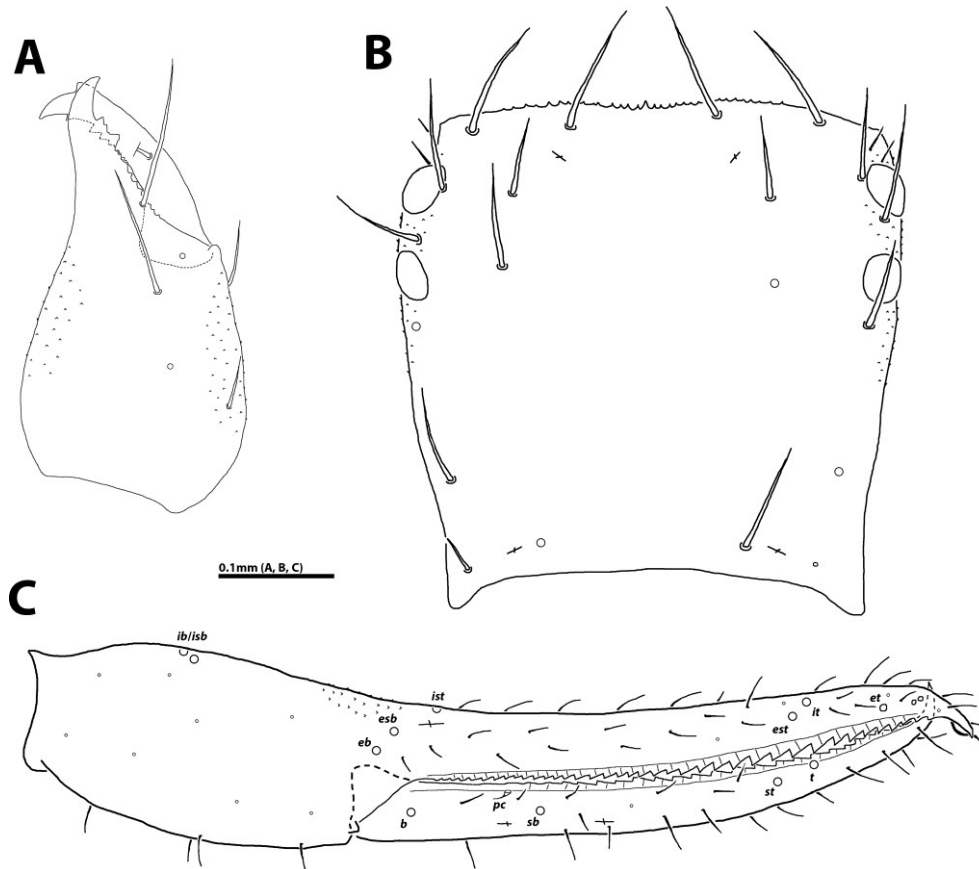


Figure 1. *Chthonius submontanus* (HNHM Pseud-1882). A: right chelicera, male, dorsal view; B: carapace, male, dorsal view; C: right chela, male, lateral view.

apically conical. Rallum with 8–11 blades. Serrula exterior with 12–14 blades, serrula interior not seen. Pedipalpal coxa with 5 setae, including 2 on manducatory process; coxa I–IV: 3 + 2 marginal microsetae; 4–5; 4–5; 6–7; coxa II with 5–8, coxa III with 2–4 spines; intercoxal tubercle bisetose. Hand of chela dorsally depressed at the level of *ib–isb*, with a hump distal to *ib–isb*. Fixed chelal finger with 16–18, movable with 9–13 teeth (Figs. 3C–D). Dental line of movable finger ending between trichobothria *st* and *sb*. Coupled trichobothria *pc* closer to *sb* than to *b*.

Measurements (in mm) and ratios (in parentheses). *Male*. Body 1.2. Carapace length 0.38, width at posterior margin 0.35, width at the level of the eyes 0.39. Cheliceral palm with fixed finger 0.26/0.15 (1.73 ×); movable finger 0.15. Palpal femur 0.44–0.49/0.07–0.08 (6.13–6.29 ×), patella

0.20/0.10 (2.00 ×); chela 0.66–0.68/0.12 (5.00–5.67 ×); fixed finger 0.38–0.40.

Females. Body 1.2–1.6. Carapace length 0.39, width at posterior margin 0.36, width at the level of the eyes 0.40. Cheliceral palm with fixed finger 0.26–0.28/0.15 (1.73–1.86 ×); movable finger 0.15–0.16. Palpal femur 0.48/0.10 (4.80 ×), patella 0.20/0.11 (1.82 ×); chela 0.68–0.74/0.14 (4.86–5.29 ×); fixed finger 0.39–0.40.

Remarks. *Ephippiochthonius romanicus* was described from Comana (in the former county of Vlaşca), Southern Romania (Beier 1935). Later, the species was reported from the other side of the Carpathians (Transylvania, Romania) (Beier 1939), Turkey (Beier 1963c), Rhodos (Greece) (Beier 1966), and Iran (Beier 1971). The Hungarian specimens were collected in the southern part of the country. The characteristics of the new

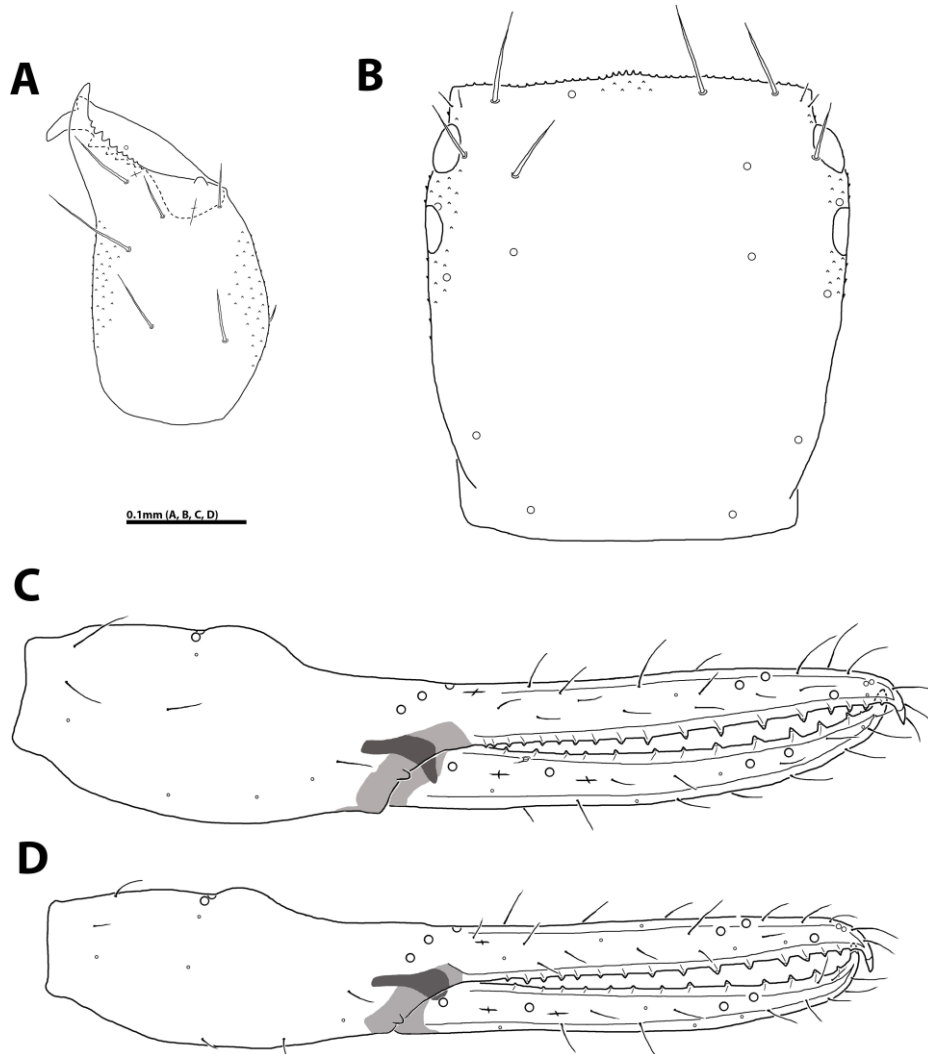


Figure 2. *Ehippochthonius romanicus* (HNHM Pseud-1896). A: right chelicera, female dorsal view; B: carapace, female, dorsal view; C: right chela, female, lateral view; D: right chela, male, lateral view.

specimens correspond well with the original description (Beier 1935). However, as the whereabouts of the type material is unknown, some modern characteristics of the species, e.g. setation of male genital opening and the situation of coupled sensilla *pc* could not be compared to them.

***Occidenchthonius parmensis* (Beier, 1963)**

(Figures 3A–C)

Material examined. HNHM Pseud-1895: 1♂, Nagykovácsi: oak forest, leaf litter, sieving 06.

11.2014, leg. János Novák; HNHM Pseud-1897: 3 ♀♀, Tenkes Hill: 29.09.1960, leg. Imre Loksa.

Short description of the main characteristics of the found male and females. Carapace, tergites, chelicerae and pedipalps yellowish-brown. Hispid granulation on lateral surfaces of carapace and on cheliceral palm. Carapace subquadrate, epistome absent, anterior margin dentate (Fig. 3B). Anterior eyes with convex lens, posterior eyes with flat lens. Carapace with 20 macrosetae and 2+2 microsetae laterally, before the eyes; chaetotaxy: mm4mm:6:4:2:4 (24). Two lyrifissures near

porsterior margin of carapace. Tergal chaetotaxy (I–X): 4:4:4:4:6:6:6:6:4. Sternal chaetotaxy (II–X): 6-8: (3)8(3): (2)8–10(2):8:6:6:6:6:8. Male genital opening flanked by 7 setae on each side. Cheliceral palm with 5–6 setae and 1–2 microsetae laterally, movable finger with one seta (Fig. 3A). Fixed cheliceral finger with 5–6, movable with 6–8 teeth and an isolated apical tooth (*di*); *gl* ratio 0.52–0.56 ×. Spinneret prominent and apically rounded. Rallum with 11 blades; serrula exterior with approximately 12 blades, serrula interior not seen. Pedipalpal coxa with 5 setae, 2 of them on manducatory process; coxa I–IV: 3 + 3

marginal microsetae; 4; 5; 6; coxa II with 5, coxa III with 2 spines; intercoxal tubercle bisetose. Fixed chelal finger with 13–15 teeth, 2–5 of which being partially fused and forming an elevation at the proximal one third of the finger. Movable finger with 10–11 teeth, 2–5 of which being partially fused and forming an elevation at the proximal one third of the finger (Figs. 3C–D). On movable finger dental line ending between trichobothria *b* and *sb*. Trichobothria *est-it* at the level of *st-t*. Disto-paraxial seta of fixed finger sinuous. Coupled trichobothria *pc* situated distad to *sb*, at the level of fused teeth.

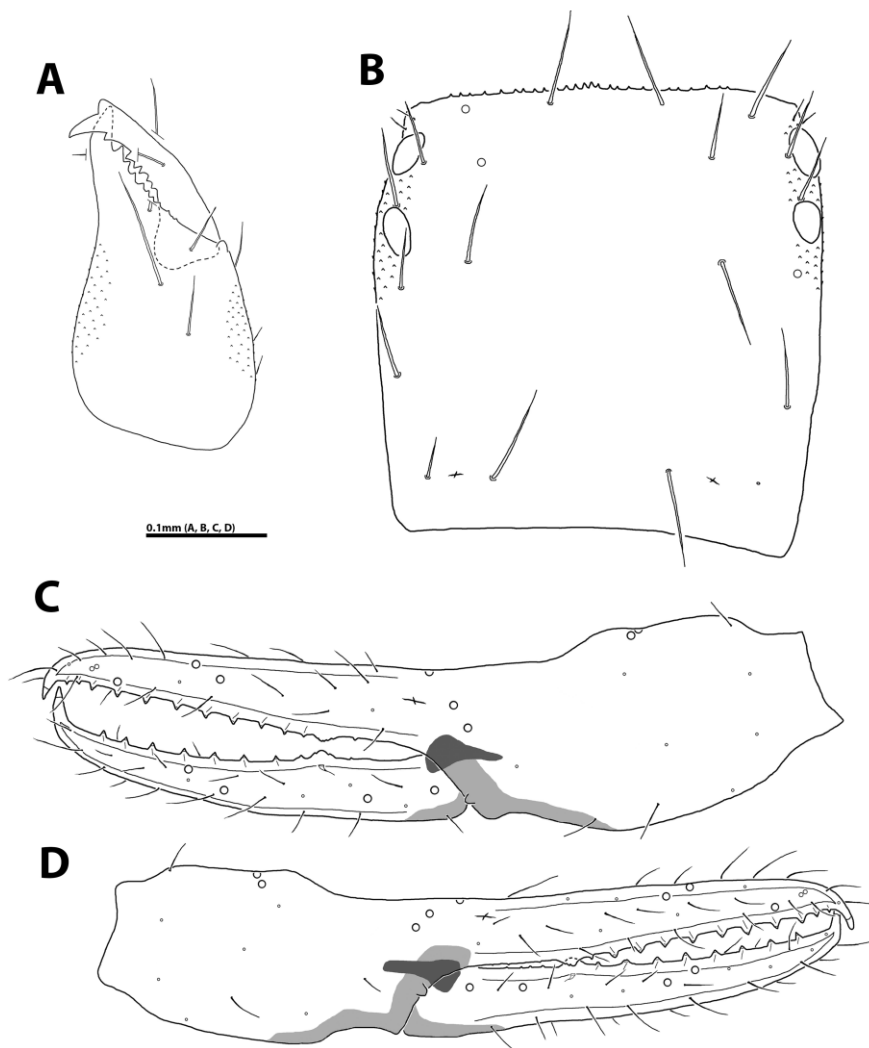


Figure 3. *Occidenchthonius parmensis* (HNHM Pseud-1895, HNHM Pseud-1897). A: right chelicera, female, dorsal view; B: carapace, female, dorsal view; C: left chela, female, lateral view; D: right chela, male, lateral view.

Measurements (in mm) and ratios (in parentheses). *Male*. Body 1.00. Carapace length 0.30, width at posterior margin 0.23, width at the level of the eyes 0.27. Cheliceral palm with fixed finger 0.23/0.12 (1.95 ×); movable finger 0.11. Palpal femur 0.31/0.07 (4.43 ×), patella 0.15/0.08 (1.89 ×); chela 0.54/0.13 (4.15 ×); movable finger 0.31.

Females. Body length 1.10. Carapace 0.35–37, width at posterior margin 0.30–0.32, width at the level of the eyes 0.32–0.34. Cheliceral palm with fixed finger 0.25/0.13 (1.92 ×); movable finger 0.13–0.14. Palpal femur 0.29–0.31/0.07 (4.14–4.43 ×), patella 0.15/0.08 (1.89 ×); chela 0.55–0.56/0.12–0.13 (4.31–4.58 ×); movable finger 0.30–0.31.

Remarks. The species was described from Sasso di Neviano, Emilia, northern Italy (Beier 1963b). It has also been reported from Croatia, Slovenia, Austria, Germany and Switzerland (Gardini 2013). *Occidenchthonius parmensis* was found in Hungary in leaf litter of an oak forest, in the Buda Mts (Nagykovácsi) and in the Villányi Mts (Tenkes Hill, SW part of Hungary).

The species was recently transferred to the genus *Occidenchthonius* Zaragoza, 2017 by having movable chelal finger with proximal teeth rounded and partially fused (Zaragoza 2017).

DISCUSSION

With the three species new for Hungary (*Chthonius submontanus*, *Ephippiochthonius romanicus* and *Occidenchthonius parmensis*) the number of the pseudoscorpion species recorded for Hungary has raised to 57. Furthermore, the genus *Occidenchthonius* is new for the country. According to our present knowledge, the following four genera of Chthoniidae are reported from Hungary: *Chthonius*, *Ephippiochthonius*, *Occidenchthonius* and *Mundochthonius*.

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