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NOTES ON GEOGRAPHIC DISTRIBUTION

Occidenchthonius Zaragoza, 2017 (Pseudoscorpiones, Chthoniidae): first record from the Czech Republic

Jana Christophoryová[1], **Pavel Krásenský**[2]

1 Department of Zoology, Faculty of Natural Sciences, Comenius University in Bratislava, Ilkovičova 6, SK-842 15 Bratislava, Slovakia
2 Regional Museum and Gallery in Most, Čsl. armády 1360, CZ-434 01 Most, Czech Republic

Corresponding author: Jana Christophoryová (christophoryova@gmail.com)

Abstract. The genus *Occidenchthonius* Zaragoza, 2017 is reported for the first time from the Czech Republic. Specimens of *Occidenchthonius parmensis* (Beier, 1963) were collected using a subterranean tube trap placed at the edge of an overgrowing clay slope in Čejkovice. Diagnostic characters distinguishing *Occidenchthonius* from other chthoniid genera known in the country are discussed.

Key words. Distribution, Europe, *Occidenchthonius parmensis*, soil fauna, subterranean trap

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Introduction

Members of the family Chthoniidae are small-bodied pseudoscorpions occurring primarily in soil and leaf litter, although they may also inhabit deeper soil layers (Gardini 2013). Zaragoza (2017) provided a taxonomic revision of the subgenus *Chthonius* (*Ephippiochthonius*), utilizing new and previously understudied characters, including chelal lyrifissures patterns, chaetotaxy, and the condylar complex. Based on these characters, the study concluded that all subgenera of *Chthonius* C.L. Koch, 1843 merit elevation to full generic rank. Consequently, three former subgenera were raised to genus level: *Ephippiochthonius* Beier, 1930, *Globochthonius* Finnegan, 1932, and *Hesperochthonius* Browning, 1970, and two new genera were described, *Cantabrochthonius* Zaragoza, 2017 and *Occidenchthonius* Zaragoza, 2017 (Zaragoza 2017).

In the Czech Republic, 10 species of the family Chthoniidae representing three genera have so far been recorded: six species of the genus *Chthonius*, and two species each of *Ephippiochthonius*, and *Mundochthonius* Chamberlin, 1929 (Červená et al. 2020).

Currently, a survey of pseudoscorpions is being conducted across various biotopes and habitats in north-western Bohemia, Czech Republic. Several chthoniid specimens were collected that, based on their morphological characters, could not be assigned to any of the genera previously known from the Czech Republic. The present study aims to provide a morphological assessment of these specimens and to clarify their taxonomic position.

Methods

Pseudoscorpions were collected using a subterranean tube trap installed at the edge of an overgrowing clay slope in Čejkovice, Czech Republic (Figures 1, 2). The trap measured 60 cm in length and 8 cm in diameter and was perforated with circular openings approximately 1 cm in diameter over its entire surface. An 8% fermented vinegar solution was used as the preservative medium and was placed at the bottom of the trap in a 250 ml plastic cup. The collected material was partially degraded due to frequent disturbance by wild boars, which allowed debris to enter the trap and accelerated decomposition. Specimens were later preserved in 75% ethanol.

Individuals were cleared in lactic acid and examined on temporary slide mounts. After examination, they were rinsed in water and returned to ethanol. Observations were carried out using a Leica

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Figure 1. Locality Čejkovice, where *Occidenchthonius parmensis* occurs. Photograph by Petr Veselý.

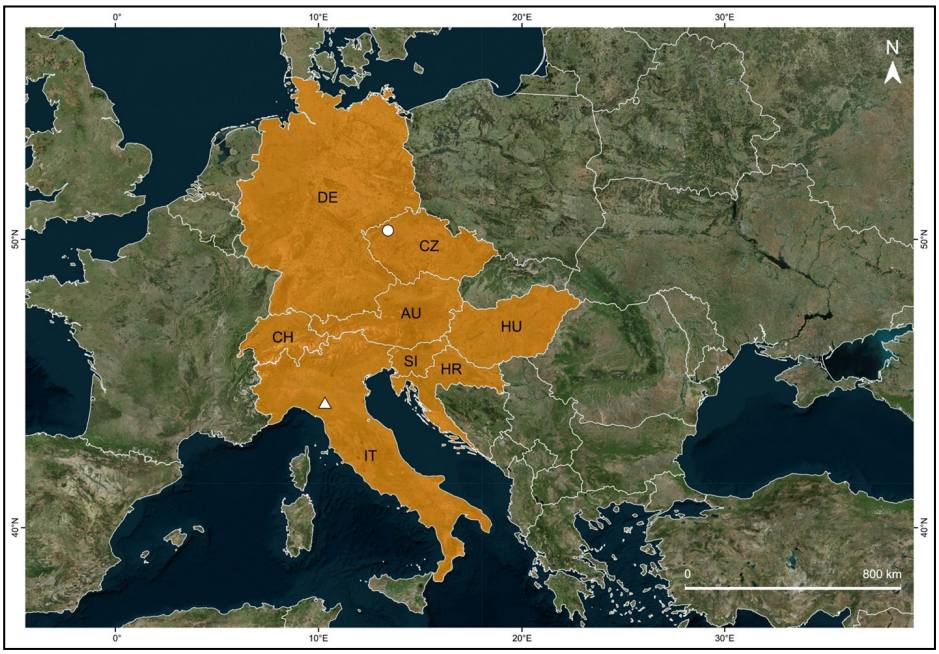

Figure 2. Distribution of *Occidenchthonius parmensis* (marked in orange). The white circle indicates the newly recorded locality in the Czech Republic, while the white triangle marks the type locality (WPC 2026). Country abbreviations: AU – Austria, CH – Switzerland, CZ – Czech Republic, DE – Germany, HR – Croatia, HU – Hungary, IT – Italy, SI – Slovenia.

DM1000 compound microscope equipped with an ICC50 camera module (LAS EZ v. 3.4.0). Measurements were taken from digital images using AxioVision 40LE (v. 4.6.3.0). Selected body segments and morphological details were documented with a Zeiss Axio Imager.M2 microscope, with Zeiss Axiocam 208 attached. Image stacks were created manually and merged using Zerene Stacker (v. 1.4). Identification followed Gardini (2013), Zaragoza (2017), Zaragoza and Reboleira (2018), and Krajčovičová et al. (2022).

Spatial data used for the distribution map were converted from original coordinates and visualized in QGIS (v. 3.36.2). Figures were edited using Adobe Photoshop CC (v. 25.6.0).

The specimens are deposited in the zoological collection of the Regional Museum and Gallery in Most, Czech Republic (E-004438).

Abbreviation used in text: *ap* – apodeme; *di* – isolated subapical tooth; *ict* – intercoxal tubercle; *ip* – intercondylar protuberance; ma_1, ma_2 – antiaxial lyrifissures of movable chelal finger; *mt* – modified tooth; ph_1, ph_2, ph_3, ph_4 – proximal setae row of chelal hand; *sp* – subdistal protuberance; *vh* – ventral hollow in chelal hand.

Palpal trichobothriotaxy: *b* – basal, *dx* – duplex, *eb* – external basal, *esb* – external sub-basal, *est* – external sub-terminal, *et* – external terminal, *ib* – internal basal, *isb* – internal sub-basal, *ist* – internal sub-terminal, *it* – internal terminal, *sb* – sub-basal, *st* – sub-terminal, *t* – terminal trichobothria.

Results

Family Chthoniidae Daday, 1889
Genus *Occidenchthonius* Zaragoza, 2017

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

New records. CZECH REPUBLIC • Čejkovice; 50.3111°N, 13.4083°E; 252 m a.s.l.; 15.III–19.VII.2025; Pavel Krásenský leg.; edge of an overgrowing clay slope; subterranean tube trap; 4 ♀♀, E-004438.

Identification. The genus can be distinguished from other chthoniid genera known from the Czech Republic by the following combination of morphological characters (Gardini 2013; Zaragoza 2017; Zaragoza and Reboleira 2018; Krajčovičová et al. 2022).

Mundochthonius differs from the examined specimens by the presence of coxal spines exclusively on pedal coxae II; in the remaining genera, coxal spines are present on both pedal coxae II and III (Figure 3F).

Chthonius differs from both *Ephippiochthonius* and *Occidenchthonius* by a chelal hand lacking a dorsal depression; in lateral view, the hand is distinctly bulbous, with the dorsum clearly rounded and not

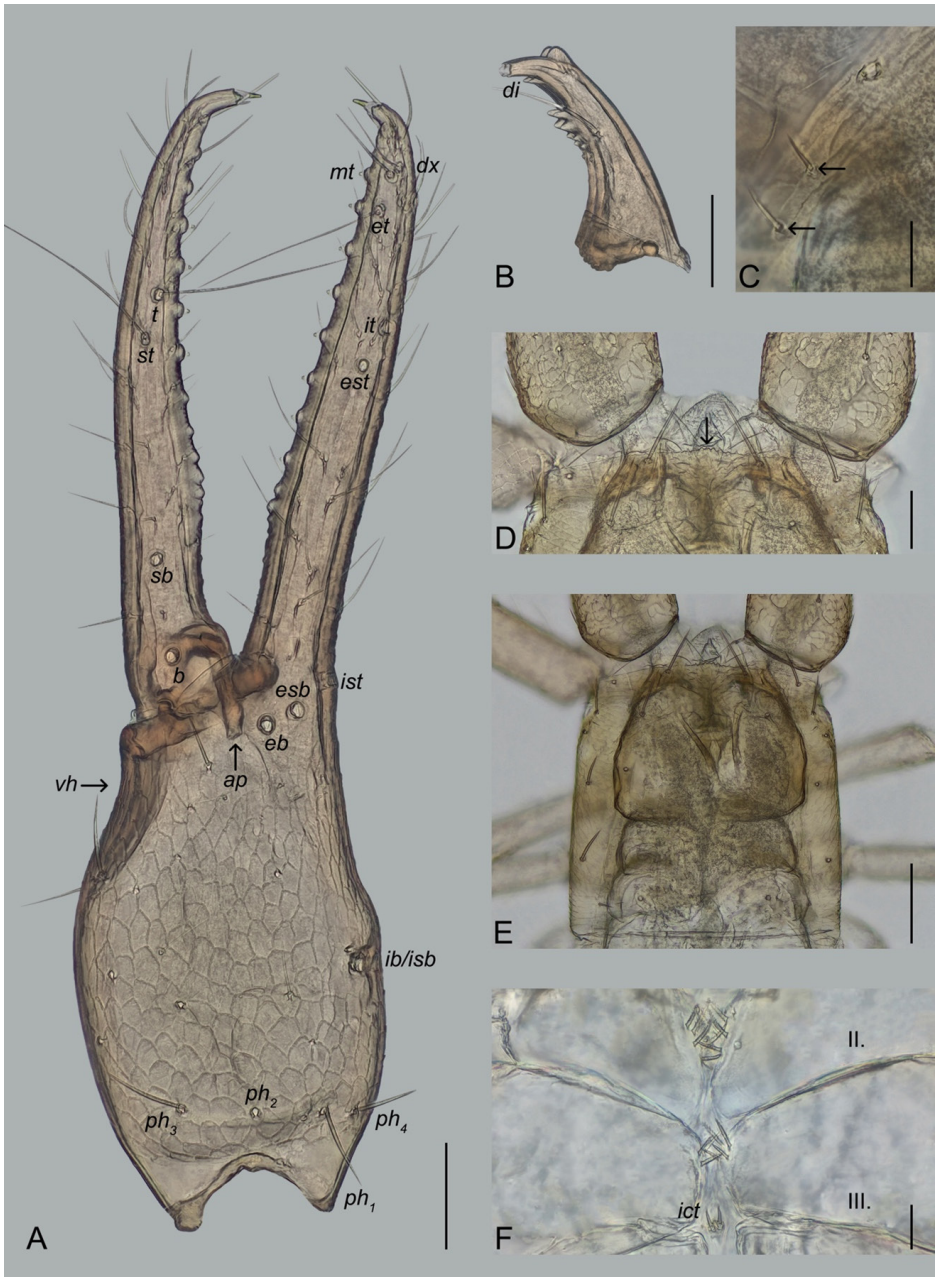

Figure 3. Main diagnostic characters of *Occidenchthonius parmensis*. **A.** Palpal chela. **B.** Movable cheliceral finger. **C.** Detail of microsetae (indicated by arrows) on the anterior carapacal margin. **D.** Detail of the anterior carapacal margin (arrow). **E**. Carapace. **F.** Pedal coxae II and III. For abbreviations, see Methods section. Scale bars: C, F = 20 µm, A, B, D = 50 µm, E = 100 µm.

level with the chelal fingers. The base of the movable chelal finger lacks a reinforced internal apodeme (*ap*) or bears only a poorly developed one. The chelal fingers usually bear more or less close-set teeth that are distinctly reclined backwards.

Ephippiochthonius and *Occidenchthonius* differ from *Chthonius* by the presence of a distinct dorsal depression on the chelal hand, situated distad of the trichobothria *ib*/*isb* (Figure 3A). In the lateral view, the distal part of the hand dorsum is almost level with the chelal fingers and not rounded. The base of the movable chelal finger bears a reinforced internal apodeme (*ap*), which is usually well developed and strongly sclerotized (Figure 3A). The chelal fingers possess upright and well-spaced teeth (Figure 3A).

Occidenchthonius differs from *Ephippiochthonius* by the presence of four setae on the proximal portion of the chelal hand in adults and tritonymphs, with seta ph_3 present (Figure 3A), and by the absence of a medial protuberance (*ip*) between the chelal condyles; in contrast, *Ephippiochthonius* has only three setae (seta ph_3 absent) and possesses a distinct medial protuberance (*ip*) between the chelal condyles.

Among additional diagnostic characters of *Occidenchthonius* are the following: marked ventral hollow (*vh*) with thicker cuticle before base of movable chelal finger (Figure 3A); both chelal fingers mostly straight; dental margin of the movable chelal finger more or less undulated in the basal half (Figure 3A); dental rows homodentate, bearing spaced, upright teeth; first two distal teeth small and pointed (Figure 3A); third tooth of the normal tooth row (*mt*) of the fixed chelal finger modified in shape and orientation; basal half of the movable chelal finger with rounded, partially fused, vestigial teeth, without canals, on a raised lamina (Figure 3A); absence of a subdistal protuberance (*sp*) in the fixed chelal finger of males and tritonymphs; movable chelal finger lacking lyrifissures ma_1 and ma_2; anterior margin of the carapace more strongly dentate between the median macrosetae, usually strongly prominent (Figure 3D, E), rarely produced into a true epistome; and a bisetose intercoxal tubercle (*ict*) present between coxae III and IV (Figure 3F).

Gardini (2013) revised *Ephippiochthonius*, which at that time was treated as a subgenus, based on material from Italy. In the same study, he also revised *Occidenchthonius parmensis*, based on abundant material, with the type locality likewise situated in Italy. Based on this revision, he identified the following diagnostic characters: movable cheliceral finger with isolated subapical tooth (*di*) (Figure 3B); carapace with two preocular microsetae on each side (Figure 3C) and six macrosetae in ocular series (Figures 3D, E); posterior margin of carapace with two macrosetae and two lateral macro- or microsetae (Figure 3E); pedipalpal hand, in lateral view, with a rounded hump distad of trichobothria *ib*/*isb* and a marked hollow just before the base of the movable finger (Figure 3A); proximal half of the movable chelal finger with a thick marginal lamina, and with 2–5 rounded teeth fused in an evident rise of the marginal lamina (Figure 3A); length of chela 0.45–0.55 mm in males and 0.50–0.61 mm in females (in Czech females 0.55–0.56 mm), and movable chelal finger length 0.27–0.33 mm in males and 0.28–0.35 mm in females (in Czech females 0.31–0.32 mm).

Discussion

At present, the genus *Occidenchthonius* comprises 50 species (WPC 2026), most of which are distributed in the southern Iberian Peninsula, particularly in mainland Portugal and mainland Spain (Zaragoza and Reboleira 2018). They are predominantly associated with hidden subterranean ecosystems, occurring in endogean microcavities within the soil as well as in hypogean meso- and macrocaverns beneath the surface, and they exhibit a high level of endemicity. Occasional records from surface habitats are known, but these remain rare (Zaragoza 2017). Their small body size may partly explain why *Occidenchthonius* is rarely detected in surface habitats. (Zaragoza and Reboleira 2018).

Occidenchthonius parmensis is distributed across Central and southern Europe, with records from Germany, Switzerland, Austria, Slovenia, Croatia, Hungary, and Italy, and is newly recorded from the Czech Republic (Gardini 2013; Novák 2020; present study) (Figure 2). The species inhabits a wide range of habitats, occurring mainly in deciduous and mixed forests, where it is found in leaf litter, soil, and in decaying wood. Additional records originate from riparian woodlands, scree slopes, Mediterranean scrub, cave entrances, and anthropogenic habitats such as gardens and quarries, across an altitudinal range from near sea level to about 1500 m a.s.l. Specimens were collected primarily by pitfall trapping, litter sifting, and individual collecting (Gardini 2013). An interesting Italian record concerns specimens collected from nests of the European Mole, *Talpa europaea* Linnaeus, 1758 (Inzaghi 1981). Outside Italy, the species has been recorded, for example, from xerothermic forests in Austria, where it was

collected using pitfall traps (Mahnert and Horak 1994), from oak-forest leaf litter in Hungary (Novák 2020), and from beech leaf litter in an urban park in Germany (Drogla 1990).

The present Czech record originates from a subterranean tube trap placed at the edge of an overgrowing clay slope. This record contributes new data on the species' distribution and documents its occurrence in a subterranean microhabitat, which is consistent with its known association with soil.

The newly examined Czech specimens correspond well with the published descriptions of the species (Gardini 2013; Zaragoza 2017; Novák 2020); however, Zaragoza (2017) mentioned a strong modification in the shape and orientation of the third tooth of the normal tooth row (*mt*) on the fixed chelal finger as a diagnostic character (Figure 3A). This feature is absent in the examined Czech specimens and was also not reported by Gardini (2013) in his revision based on the most extensive material available.

With the addition of *O. parmensis*, the Czech pseudoscorpion fauna currently comprises 40 species belonging to 21 genera. To date, 39 pseudoscorpion species representing seven families have been documented from the Czech Republic (Červená et al. 2020, Šťáhlavský and Krejčí 2021). In comparison with neighboring countries—Germany (51 species), Austria (71 species), Slovakia (58 species), and Poland (38 species)—as well as the slightly more distant Hungary (49 species), this number remains relatively low (Červená et al. 2020; Muster et al. 2021; Christophoryová et al. 2023, 2025; Novák 2024). This discrepancy likely reflects both insufficient sampling effort in the Czech Republic and biogeographical differences, as several Western European, Alpine, and Carpathian species occur in neighbouring regions but are absent from the country.

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Additional information

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualization: JC. Funding acquisition: JC. Investigation: PK, JC. Visualization: JC. Project administration: JC. Writing – original draft: JC. Writing – review and editing: JC, PK.

Author ORCID iDs

Jana Christophoryová https://orcid.org/0000-0002-3746-1367
Pavel Krásenský https://orcid.org/0009-0004-1302-2433

Data availability

All data that support the findings of this study are available in the main text.

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