

A New Cave Pseudoscorpion from the Adriatic Isle of Šolta (Dalmatia): *Microchthonius solentanus* n.sp. (Pseudoscorpiones: Chthoniidae)

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Abstract: A new eyeless pseudoscorpion, *Microchthonius solentanus* n. sp., from inside an underground system, i.e. Piškera Jama Pit in the village of Nečujam, Isle of Šolta (Croatia), is described. The new taxon is considered a relict originating from the tropical pre-Miocene fauna of Tethys. Morphometric ratios, figures, and linear measurements of the new taxon are presented in detail.

Key words: pseudoscorpions, Chthoniidae, *Microchthonius*, *M. solentanus* n. sp., caves, karst fauna, Isle of Šolta, Dalmatia.

Introduction

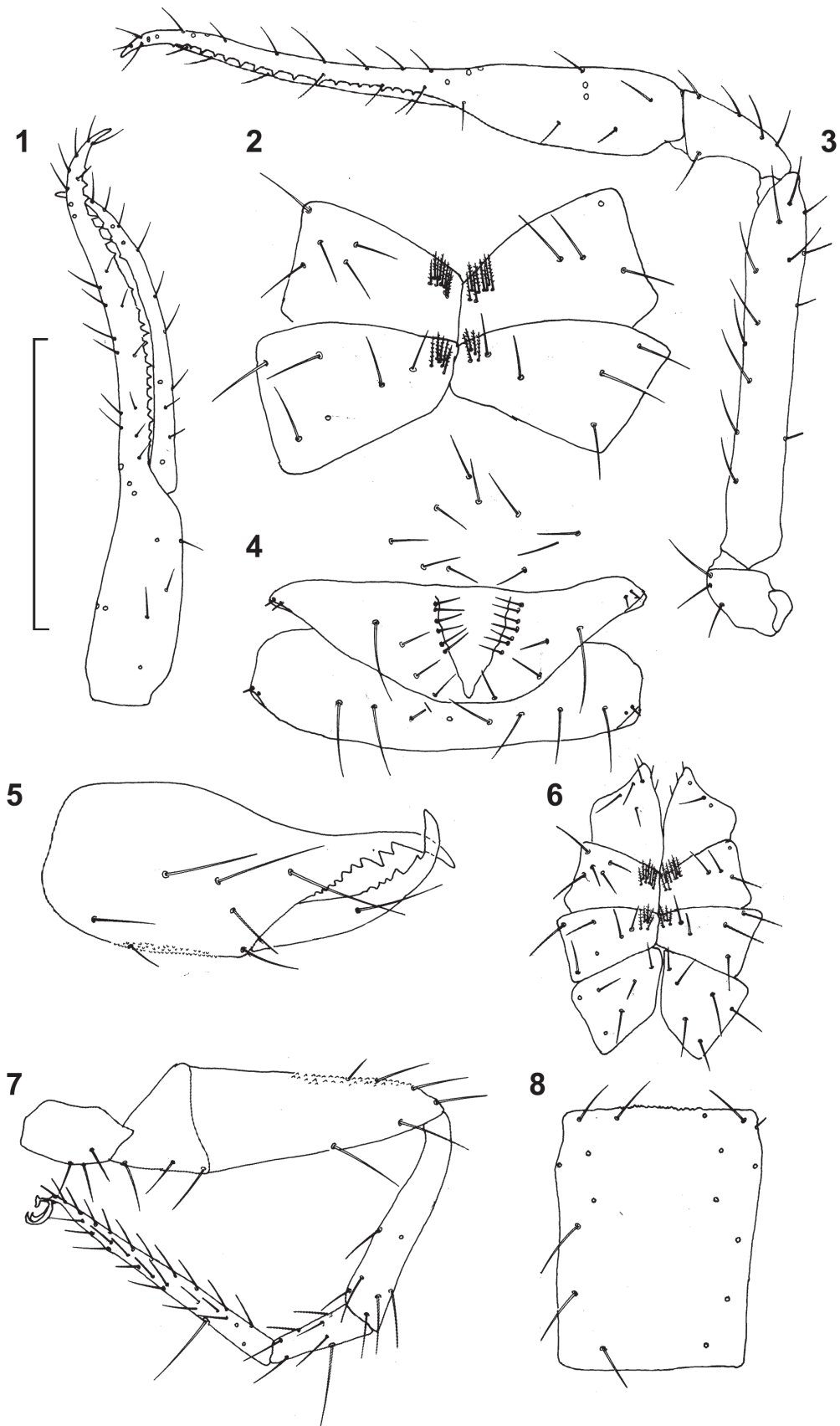
The subterranean domain consists of four main terrestrial habitats (soil, networks of microspaces between rock fragments, networks of small fissures, and caves). Of these, it is the cave habitat that has been the subject of most evolutionary studies on the Balkan Peninsula. Recent studies (ĆURČIĆ *et al.* 2010a, b, c, d, e, f; 2011a, b, c, d, e, f; 2012a, b, c; 2013) have also been concerned with both edaphic fauna and that inhabiting the network of microspaces within the layer developed between the edaphic habitat and calcareous and non-calcareous bedrock. The faunistic regions or habitats were delimited according to the distribution of presumed old endemic troglitic taxa and according to edaphobitic endemisms. These provinces presumably correspond to paleogeographic zones of Tertiary or pre-Tertiary isolation. Consequently, studies of cave and edaphic elements have proven to be remarkably important in interpreting Dinaric paleogeography. These elements provide evidence for the existence of the main Miocene geographical barriers and (implicitly) for the constrain-

ing effects on the faunal distribution of many of the antecedent transverse valleys. Moreover, owing to the long time span that has elapsed since their arrival, these troglobites represent real biogeographical indicators (DECU and NEGREA 1969, ĆURČIĆ 1988).

Located centrally and to the west of the Balkan Peninsula, the Croatian Adriatic islands lie at the convergence of a large tectonic unit, the main mountain system that belongs to the Dinaric massif. The islands are typical of the Mediterranean region (DOVE POR and DIMENTMAN 2006), but also a specific category of oceanic bodies of water.

The origin of the rich endemic and relict troglitic fauna of the Dinarides, including arachnids and pseudoscorpions (in particular) has been largely affected by many different factors (ĆURČIĆ 1988, SAVIĆ 2008).

The Dinaric karst of Croatia, including that of its islands, can be divided into four regions: lowlands, highlands, the Mediterranean coast, and the islands of the Adriatic Sea. The Mediterranean coast



Figs. 1-8. *Microchthonius solentanus* n. sp. Holotype male from the Piškera Jama Pit, village of Nečujam, Isle of Šolta, Dalmatia, Croatia. 1 – pedipalpal chela, 2 – coxae II and III, 3 – pedipalp, 4 – male genital area, 5 – chelicera, 6 – coxae I – IV, 7 – leg IV, 8 – carapace. Scale lines = 0.25 mm (Figs. 2, 4, and 5) and 0.50 mm (Figs. 1, 3, 6-8)

and Adriatic islands are well known as home to the majority of the region's invertebrates, particularly cave-dwelling insects, arachnids and other invertebrates that live underground.

In this study, a single male specimen of a new species of the genus *Microchthonius* Hadži was found by one of us (Tonći Rađa), carefully dissected and thoroughly analyzed.

The aim of this study is to present a description of the mentioned taxon and to discuss its probable origin and interrelationships with its congeners.

Materials and Methods

We examined material from a sample collected in the Piškera Jama Pit from the Isle of Šolta, near the Dalmatian city of Split. The specimen found is a male and represents a cave-dwelling endemic form.

Setal designations are as described by BEIER (1963).

Systematic Part

Chthoniidae Daday, 1888

Microchthonius Hadži, 1933

Microchthonius solentanus B. Čurčić & Rađa, New Species

(Figs. 1-9, Table 1)

Etymology: After the adjective "solentanus" (of Solentae, which is the Latin name for the Island of Šolta).

Material examined: Holotype male from the Piškera Jama Pit on the Adriatic Island of Šolta, v. Nečujam, Dalmatia (Croatia), 15 November 2012, collected by Tonći Rađa.

Description: Dorsal side of carapace with maximum breadth at level behind 'ocular' setal row, much longer than wide (Fig. 8, Table 1). Neither eyes nor eyespots developed (Fig. 8). Anterior margin of carapace somewhat broader than posterior margin, thus carapace resembling trapezium (Fig. 8); tiny serrations present between anterior median setae (Fig. 8). Carapace carrying 16 setae arranged in five rows. Four setae situated in anterior row, six setae in 'ocular' row, two setae in median row, two setae intermedian row, and only two setae in posterior series. Single small seta present in each preocular recess (Fig. 8).

Setal formula of abdominal tergites I-X as follows: 2 – 2 – 2 – 4 – 4 – 4 – 4 – 6 – 6 – 6, with remarkably low number of setae on tergites I-III.

Sternite II with 10 setae arranged in trian-

gle. Sternite III with 6 or 7 setae on either side of V-shaped opening, 8 posterior setae and 2 microsetae along each stigma (Fig. 4). Fourth sternite with 8 posterior setae and 2 suprastigmal microsetae on each side (Fig. 4). Sternites V-X with 9 – 7 – 7 – 7 – 6 – 7 posterior setae, respectively.

Galea (Fig. 5) indistinct. Isolated tooth present immediately below movable cheliceral. Other large teeth contiguous with row of small teeth ending in region below insertion site of galeal seta. Teeth larger, particularly first two, on fixed cheliceral finger; extending proximally and diminishing abruptly in size below those on movable finger (Fig. 5).

Flagellum nine-bladed, with characters typical for the genus.

Eight trichobothria on fixed and four on movable chelal finger (Figs. 1, 3). No small setae below trichobothria eb and esb (Fig. 1). Both chelal fingers apically curved inwards (Figs. 1, 3). Teeth of fixed chelal finger (25) triangular, interspaced, occupying almost entire length of finger; on movable chelal finger, teeth (20) smaller and merge basally into dental lamella (Fig. 1).

Pedal coxae with 8 or 10 spines on coxa II and 4 spines on coxa III (Figs. 2, 6). Intercoxal tubercle absent (Figs. 2, 6).

Tibia IV, metatarsus IV and tarsus IV, each with long tactile seta (Fig. 7).



Fig. 9. Distribution of the genus *Microchthonius* Hadži in Dalmatia, Croatia. 1 – *M. rogatus* (Isle of Brač), 2 – *M. karamani* (Sveti Filip i Jakov), 3 – *M. dernisi* (Škarin Samograd Cave, nr. Drniš), 4 – *M. elegantissimus* (Kladnjske), 5 – *M. solentanus* n. sp. (Isle of Šolta)

Table 1. Linear measurements (in millimeters) and morphometric ratios in *Microchthonius solentanus* n. sp., *M. elegantissimus* Ćurčić & Rađa, *M. dernisi* Ćurčić & Rađa, *M. rogatus* Beier, and *M. karamani* Hadži. Abbreviations: ♂ = male, ♀ = female, ♀♀ = females, ♀♂ = female, male

	<i>M. solentanus</i> n. sp.	<i>M. elegantissimus</i>	<i>M. dernisi</i>	<i>M. rogatus</i>	<i>M. karamani</i>
Character	♂	♀	♀	♀♀	♀♂
Body					
Length (1)	1.19	1.41	1.45	1.70 – 2.00	1.40
Cephalothorax					
Length (2)	0.44	0.44	0.53	-	0.425
Breadth (2a)	0.35	0.315	0.43	-	0.36
Ratio 2/2a	1.26	1.14	1.23	-	1.18
Abdomen					
Length	0.75	0.97	0.93	-	1.00
Chelicerae					
Length (3)	0.35	0.43	0.41	-	0.36
Breadth (4)	0.14	0.17	0.16	-	0.16
Length of movable finger (5)	0.18	0.20	0.18	-	-
Ratio 3/5	1.94	2.15	2.28	-	-
Ratio 3/4	2.50	2.53	2.56	-	2.25
Pedipalps					
Length with coxa (6)	2.37	2.77	2.81	-	2.50
Ratio 6/1	1.99	1.96	1.94	-	1.79
Length of coxa	0.39	0.47	0.38	-	-
Length of trochanter	0.12	0.21	0.24	-	0.20
Length of femur (7)	0.64	0.75	0.815	0.84	0.75
Breadth of femur (8)	0.10	0.10	0.12	0.13	0.09
Ratio 7/8	6.40	7.50	6.79	6.50 (6.46)	8.33
Ratio 7/2	1.45	1.70	1.54	-	1.76
Length of patella (tibia) (9)	0.23	0.26	0.275	0.31	0.28
Breadth of patella (tibia) (10)	0.09	0.10	0.12	0.13	0.14
Ratio 9/10	2.555	2.60	2.29	2.30 (2.38)	2.00
Length of chela (11)	0.99	1.08	1.10	1.27	1.08
Breadth of chela (12)	0.14	0.17	0.18	0.16	0.165
Ratio 11/12	7.07	6.35	6.11	7.80 (7.94)	6.55
Length of chelal palm (13)	0.35	0.43	0.46	0.51	0.42
Ratio 13/12	2.785	2.93	2.555	3.19	2.55
Length of chelal finger (14)	0.60	0.65	0.64	0.71	-
Ratio 14/13	1.54	1.51	1.39	1.39	-
Leg IV					
Total length	2.14	2.13	2.355	-	2.02
Length of coxa	0.23	0.25	0.275	-	0.18
Length of trochanter (15)	0.20	0.22	0.22	-	0.15
Breadth of trochanter (16)	0.10	0.11	0.12	-	0.115
Ratio 15/16	2.00	2.00	1.83	-	1.30
Length of femur + patella (17)	0.64	0.53	0.67	-	0.58
Breadth of femur + patella (18)	0.17	0.19	0.20	-	0.21
Ratio 17/18	3.76	2.80	3.35	-	2.76
Length of tibia (19)	0.41	0.41	0.45	-	0.41
Breadth of tibia (20)	0.07	0.08	0.09	-	0.05 – 0.08
Ratio 19/20	5.86	5.125	5.00	-	5.125 – 8.20
Length of metatarsus (21)	0.20	0.22	0.21	-	0.20
Breadth of metatarsus (22)	0.05	0.05	0.07	-	0.07
Ratio 21/22	4.00	4.40	3.00	-	2.86
Length of tarsus (23)	0.46	0.50	0.53	-	0.50
Breadth of tarsus (24)	0.03	0.04	0.04	-	0.045
Ratio 23/24	15.33	12.50	13.25	-	1.12
TS ratio – tibia IV	0.45	0.365	0.38	-	-
TS ratio – metatarsus IV	0.35	0.41	0.48	-	-
TS ratio – tarsus IV	0.27	0.265	0.21	-	-

For measurements and morphometric ratios, see Table 1.

Remarks: Apart from *M. solentanus* n. sp., four more species of *Microchthonius* are known up to now: *M. rogatus* (from the Isle of Brač, Croatia), *M. karamani* (from nr. Sveti Filip i Jakov, Dalmatia), *M. dernisi* (from a cave near Drniš, Croatia), and *M. elegantissimus* (from nr. Kladnjice, Croatia) (Fig. 9) (ĆURČIĆ *et al.* 2012a, ĆURČIĆ *et al.* 2013). From all known congeners, the new species is easily distinguishable by its minute body size and all other measurements and ratios (Table 1).

Distribution: It is likely that the distinctions of the subterranean *Microchthonius* pseudoscorpions

are part of a pre-Miocene area of the tropical Tethys (ĆURČIĆ 1988). It is therefore probable that the existence of the analyzed taxa in the Croatian Dinarides (including islands) presents the old constellation and is therefore in line with contemporary worldwide records (BEIER 1963, ĆURČIĆ 2008, ĆURČIĆ *et al.* 2004, 2010a, b, c, d, e, f, 2011a, b, c, d, e, f, 2012a, b, c; ĆURČIĆ *et al.* 2013, HADŽI 1937).

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