

A New Rare Representative of *Microchthonius* Hadži (Pseudoscorpiones: Chthoniidae) from Dalmatia, Croatia

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Abstract: A new eyeless troglobitic pseudoscorpion, *Microchthonius dernisi* n. sp., is described from inside an underground ecosystem, i.e. the Škarin Samograd Cave, Dalmatia. The analyzed pseudoscorpion proves to differ from all other congeners. The possibility suggested that the subterranean false scorpions belonging to *M. dernisi* are relicts of an old north tropical pattern of the Mediterranean.

Key words: Pseudoscorpions, Chthoniidae, new species, *Microchthonius dernisi*, caves, karst fauna, Dalmatia, Mediterranean

Introduction

Running parallel with the Dalmatian coast is an area of higher ground with mountains averaging 2500 feet in altitude. They stretch 300 miles north to south from Montenegro to Istria. The slope of the coastal side of the ranges is comparatively gentle, but farther inland they become more rugged and more dissected by valleys and peaks. To the south, in the arid Montenegro, the mountains attain dramatic proportions with spectacular coloring and deep rifts and faults. Syntheses of regional tectonic data led to the conclusion that the deep basins of the Mediterranean have evolved to a stage quite similar to their present configuration before the Late Miocene, when the salinity crisis began. Of the five major Mediterranean basins, the Levantine and Ionian basins may be relic Tethys of Mesozoic age; the Balearic and Tyrrhenian were formed during the Early and Middle Miocene, after the culmination of the Alpine Orogeny. Perhaps only the Aegean has undergone significant Plio-Quaternary subsidence (Hsü 1977).

Dalmatia is a large karstic region: 80% of the territory is built of limestone and dolomites. The

Mediterranean coast drops steeply to the sea; corresponding to the coastal anticline followed by a coastal syncline. A chain of mountains, arranged in the Dinaric direction, extends along the boundary with the coastal region. An inner mountain chain faces the central depression.

The recent (2008) discovery of some pseudoscorpions new to science revealed a peculiar underground ecosystem, that of Jbkarin Samograd, in mid-Croatia. The troglobitic false scorpions discovered there included a population of a rarely occurring taxon, otherwise restricted to the area studied. This has been described as *Microchthonius dernisi* n. sp. It is interesting to note that only two more species of *Microchthonius* Hadži have been known so far: *M. rogatus* (from the island of Brač, Croatia) and *M. karamani* from a cave of Sv. Filip i Jakov, Marina, Trogir (Dalmatia).

Here is the exact study of the newly found species that belongs to a new taxon – *M. dernisi* n. sp. (Fig. 1-8, Table 1).

Systematic Part

Chthoniidae Daday, 1888

Microchthonius Hadži, 1933

Microchthonius dernisi B. Ćurčić & Rađa, New Species

(Fig. 1-9; Table 1)

Etymology: This new species is named after the nearby town of Drniš, located in inland Dalmatia, half-way between Šibenik and Knin. It comes from a cave Škarin Samograd, village Mirlović Zagora, which is situated on a plateau (average height of about 250 m a. s. l.) at the foot of Mideno Brdo Hill (465 m).

Material examined: Holotype female from the cave Škarin Samograd, village Mirlović Zagora, 11 km NE of Drniš, Dalmatia, Croatia; 23 December 2008, collected by Tonći Rađa.

Description: The dorsal surface of the cephalothorax reaches its maximum breadth at the level behind the 'ocular' setal row (or at the place where the missing posterior eyes would be otherwise developed) and is in general longer than wider (Fig. 6; Table 1). The anterior margin of the carapace is broader than the posterior and the carapace resembles a regular trapezium. The anterior abdominal segments are comparatively small, breadth equal to that of the cephalothorax is attained by the posterior sclerites (7th-9th tergites). The epistome is absent or only slightly inconspicuous; the serrations are obvious between the anterior median setae, although denticulations can be seen on the margin almost up to the lateral anterior setae; the form of the epistomal denticulations is variable. Neither eyes nor eyespots are developed (Fig. 6).

The carapace bears 17 setae and these lie in five rows. Four setae constitute the anterior row, six setae belong to the ocular series, two to the median row, three to the intermedian row and only two setae constitute the posterior series. No preocular setae are developed in each preocular recess (Fig. 6).

The setal formula of abdominal tergites I-X can be expressed as 2-2-4-4-4-6-6-6-6 and is remarkable for the low number of setae on tergites I and II. Sternite II of the female has nine setae arranged in the form of a triangle. Sternite III carries eight posterior setae and two suprastigmal microsetae on either side. The fourth sternite has seven marginal setae and a single microseta along each stigma. The fifth sternite bears seven setae and the sternites VI-X carry 6-6-7-7-7 posterior setae (Fig. 8).

The cheliceral spinneret is represented by a small and distinct sclerotic knob on the movable finger (Fig. 4, 5). Immediately below, on the inner margin, there is an isolated tooth. The other large teeth are contiguous, with a row of smaller teeth that end in the region well below the insertion site of galeal seta. On the fixed cheliceral finger the teeth are larger, particularly the first two, and they extend proximally, diminishing abruptly in size, below those on the movable finger (Fig. 4, 5).

The pedipalpal coxae carry five long setae: two at the anterior end (manducatory process) and three on the posterior border of the trochantic foramen. The femur is 6.79 times longer than its breadth and 1.54 times longer than the carapace (Table 1). The patella (tibia) is tulip-like; at its distal end it is broader than the femur (Fig. 3); the ratio of patellar length-to-breadth is 2.29 (Table 1). The flagellum is nine-bladed.

Eight trichobothria are carried on the fixed and four on the movable chelal fingers (Fig. 1, 3). A single accessory seta lies immediately in front of the most distal trichobothrium, while *it* and *est* on the fixed finger are distal to the level of *t* and *st* on the movable finger (Fig. 1). The two basal trichobothria (*isb* and *ib*) lie near the middle of the palm, on the dorsal side, at its maximum breadth. Both chelal fingers are apically curved inwards (Fig. 1, 3).

The chelal palm is 2.555 times as long as the chela; the ratio of the pedipalpal length-to-breadth is 6.11 (Table 1). The teeth of the fixed finger (21) are triangular, interspaced, and occupy almost the whole length of the finger; proximal and distal teeth of this finger are smaller (17) and basal teeth merge into a dental lamella (Fig. 1).

Pedal coxa I has 3 or 4 setae, coxa II – 5, coxa III – 6, and coxa IV – 6 setae (Fig. 7). Only pedal coxae II and III carry spines medially in a distant group, 14 – 16 on coxa II and 6 on coxa III. The intercoxal tubercle is absent (Fig. 7).

The measurements and morphometric ratios of the different structures, as well as the tactile setae ratios, are presented in Table 1. The tibia IV, metatarsus IV and tarsus IV each carry a long tactile seta (Fig. 2; Table 1).

Remarks: The new species is easily distinguished from its congener *Microchthonius rogatus*, inhabiting Ješkalovica Cave on the Island of Brač (Croatia), by the number of setae on carapacal

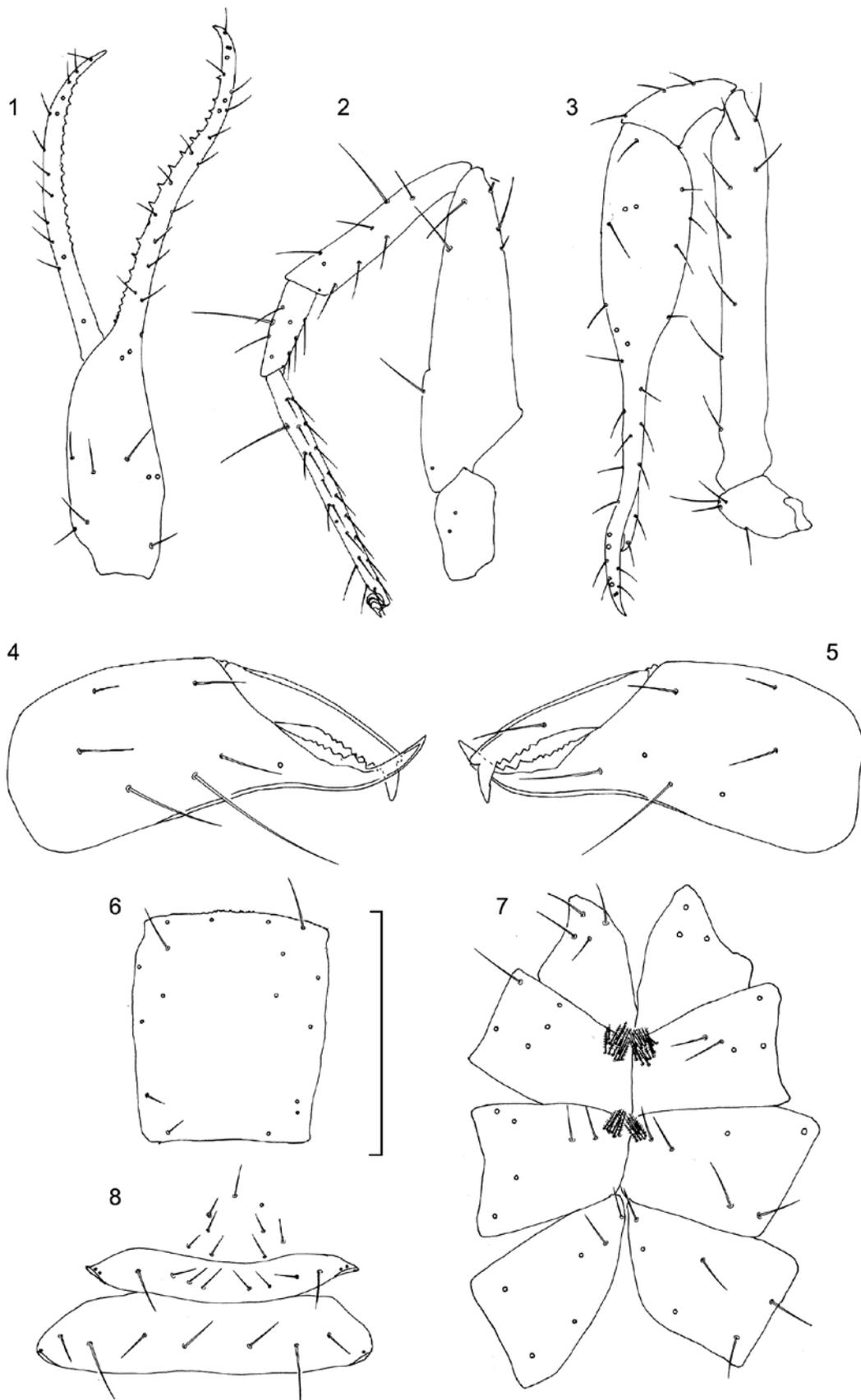


Fig. 1-8. *Microchthonius dernisi* n. sp., holotype female from Dalmatia (Croatia). 1 – pedipalpal chela, 2 – leg IV, 3 – pedipalp, 4 – left chelicera, 5 – right chelicera, 6 – carapace, 7 – coxal area (I – IV), 8 – female genital area. Scale lines = 0.25 mm (Figs. 4, 5, 7, and 8) and 0.50 mm (Figs. 1-3, and 6).

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

Character	<i>M. dernisi</i> ♀	<i>M. rogatus</i> ♀♀	<i>M. karamani</i> ♀♂
Body			
Length (1)	1.45	1.70-2.00	1.40
Cephalothorax			
Length (2)	0.53	-	0.425
Breadth (2a)	0.43	-	0.36
Ratio 2/2a	1.23	-	1.18
Abdomen			
Length	0.93	-	1.00
Chelicerae			
Length (3)	0.41	-	0.36
Breadth (4)	0.16	-	0.16
Length of movable finger (5)	0.18	-	-
Ratio 3/5	2.28	-	-
Ratio 3/4	2.56	-	2.25
Pedipalps			
Length with coxa (6)	2.81	-	2.50
Ratio 6/1	1.94	-	1.79
Length of coxa	0.38	-	-
Length of trochanter	0.24	-	0.20
Length of femur (7)	0.815	0.84	0.75
Breadth of femur (8)	0.12	0.13	0.09
Ratio 7/8	6.79	6.50 (6.46)	8.33
Ratio 7/2	1.54	-	1.76
Length of patella (tibia) (9)	0.275	0.31	0.28
Breadth of patella (tibia) (10)	0.12	0.13	0.14
Ratio 9/10	2.29	2.30 (2.38)	2.00
Length of chela (11)	1.10	1.27	1.08
Breadth of chela (12)	0.18	0.16	0.165
Ratio 11/12	6.11	7.80 (7.94)	6.55
Length of chelal palm (13)	0.46	0.51	0.42
Ratio 13/12	2.555	3.19	2.55
Length of chelal finger (14)	0.64	0.71	-
Ratio 14/13	1.39	1.39	-
Leg IV			
Total length	2.355	-	2.02
Length of coxa	0.275	-	0.18
Length of trochanter (15)	0.22	-	0.15
Breadth of trochanter (16)	0.12	-	0.115
Ratio 15/16	1.83	-	1.30
Length of femur + patella (17)	0.67	-	0.58
Breadth of femur + patella (18)	0.20	-	0.21
Ratio 17/18	3.35	-	2.76
Length of tibia (19)	0.45	-	0.41
Breadth of tibia (20)	0.09	-	0.05-0.08
Ratio 19/20	5.00	-	5.125-8.20
Length of metatarsus (21)	0.21	-	0.20
Breadth of metatarsus (22)	0.07	-	0.07
Ratio 21/22	3.00	-	2.86
Length of tarsus (23)	0.53	-	0.50
Breadth of tarsus (24)	0.04	-	0.045
Ratio 23/24	13.25	-	1.12
TS ratio – tibia IV	0.38	-	-
TS ratio – metatarsus IV	0.48	-	-
TS ratio – tarsus IV	0.21	-	-

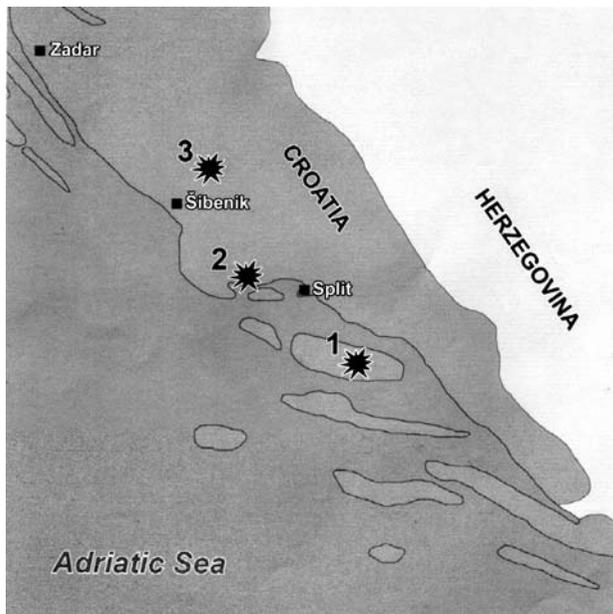


Fig. 9. Distribution of the genus *Microchthonius* Hadži in Dalmatia, Croatia: 1 – *M. rogatus* (Isle of Brač), 2 – *M. karamani* (Sv. Filip i Jakov), 3 – *M. dernisi* (Škarin Samograd Cave, nr. Drniš).

tergites (17 vs. 16), by the number of setae on abdominal tergites I – X (2-2-4-4-4-6-6-6-6-6 vs. 2-2-2-2-4-4-4-4-6-6-6), the form of the pedipalpal chela (Fig. 1 vs. Beier; 1939: Fig. 14), body length (1.45 mm vs. 1.70-2.00 mm), pedipalpal femur length-to-breadth ratio (6.79 vs. 6.46), pedipalpal chelal length to breath ratio (6.11 vs. 7.94), chelal palm length-to-breadth ratio (2.555 vs. 3.19), and in many other morphometric ratios and linear measurements (Table 1, Fig. 9).

From *Microchthonius karamani*, *M. dernisi* n. sp. differs in many important respects, such as the number and disposition of carapacial setae (18, vs. 17, vs. actually 16), the setation of tergites I-X (2-2-2-4-4-4-4-6-6-6-4 vs. 2-2-4-4-4-4-6-6-6-6-6), the form of teeth on the pedipalpal chela (Fig. 1 vs. Hadži; 1933: Fig. 9), the cheliceral length-to-breadth ratio (2.25 vs. 2.56), pedipalpal length (2.50 mm vs. 2.81 mm), pedipalpal femur length-to-breadth ratio (2.00

vs. 2.29), chelal length-to-breadth ratio (6.55 vs. 6.11), leg IV length (2.02 mm vs. 2.355 mm), leg IV femur + patella length-to-breadth ratio (2.76 vs. 3.35), etc. (Table 1, Fig. 9).

Distribution: The rugged relief influences the climate of Dalmatia much more than does its geographical position in Southern Europe (STANKOVIĆ 1960). Mediterranean climate is felt in Greco-Aegean region and along the Adriatic Coast, as well as on the islands. However, most of Balkan Peninsula is largely open to the influence of Central European climate. The result is a series of climatic wheels, where different climatic influences prevail.

Not all parts of Balkans are of equal zoogeographical importance in both the scientific and conservation sense. The various zones are usually inhabited by a unique and difficult to understand mixture of animal diversity. Such is the exact case with the pseudoscorpion genus *Microchthonius* and its three species. It is clear that these taxa represent endemic forms or a case of adaptive radiation, but in mid-Dalmatia only this implies that the ancestors of the genus *Microchthonius* are of remote age, while its species are much younger. They all represent remainders of an old faunistic stock that is probably of the Tertiary age (ĆURČIĆ and DECU 2008).

Finally, it is probable that the distribution of the subterranean *Microchthonius* pseudoscorpions is considered to be a relict of the Miocene northern area of the tropical Tethys (Ćurčić 2008). It is also possible that the existence of the analyzed species, deep down in Dalmatia, preserves the old constellation and is therefore in line with contemporary worldwide records (BEIER 1939, ĆURČIĆ 1972, 1988, 2008, ĆURČIĆ and DECU 2008, ĆURČIĆ *et al.* 1993, 1997a, b, 1999, 2004, 2009, 2010, 2011a, b, c, HADŽI 1937).

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