

**CHTHONIUS (CHTHONIUS) MAKIRINA (CHTHONIIDAE, PSEUDOSCORPIONES),  
A NEW SPECIES FROM CROATIA**

B. P. M. ĆURČIĆ<sup>1</sup>, R. N. DIMITRIJEVIĆ<sup>1</sup>, T. RAĐA<sup>2</sup>, and M. MILINČIĆ<sup>3</sup>

<sup>1</sup> Institute of Zoology, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia

<sup>2</sup> Speleological Society "Špiljar", 21000 Split, Croatia

<sup>3</sup> Faculty of Geography, University of Belgrade, 11000 Belgrade, Serbia

**Abstract** — The pseudoscorpion sample discovered under a stone in Dalmatia (Croatia) was studied. A new species is described herein: *Chthonius (Chthonius) makirina* n. sp. This taxon is considered endemic to Dalmatia and the Balkan Peninsula. Along these lines, the diagnostic characters of the analyzed species are thoroughly described and figured. Taxonomic interrelationship and geographic distribution are briefly discussed.

**Key words:** Pseudoscorpions, *Chthonius (Chthonius) makirina* n. sp., endemism, Dalmatia (Croatia), Balkan Peninsula.

INTRODUCTION

In the present study, material of pseudoscorpions collected in 2005 by one of us (TR) is examined. The sample from the Uvala Makirina Inlet, nr. Tisno in Dalmatia, consists of a previously undescribed species, *Chthonius (Chthonius) makirina* n. sp. The taxon described here is probably an endemic and relict form inhabiting epigeal habitats along the Adriatic Coast.

Setal designations follow Beier (1963).

SYSTEMATIC PART

CHTHONIIDAE DADAY, 1888

CHTHONIUS C. L. KOCH, 1843

*CHTHONIUS (CHTHONIUS) MAKIRINA*

B. ĆURČIĆ & RAĐA, NEW SPECIES

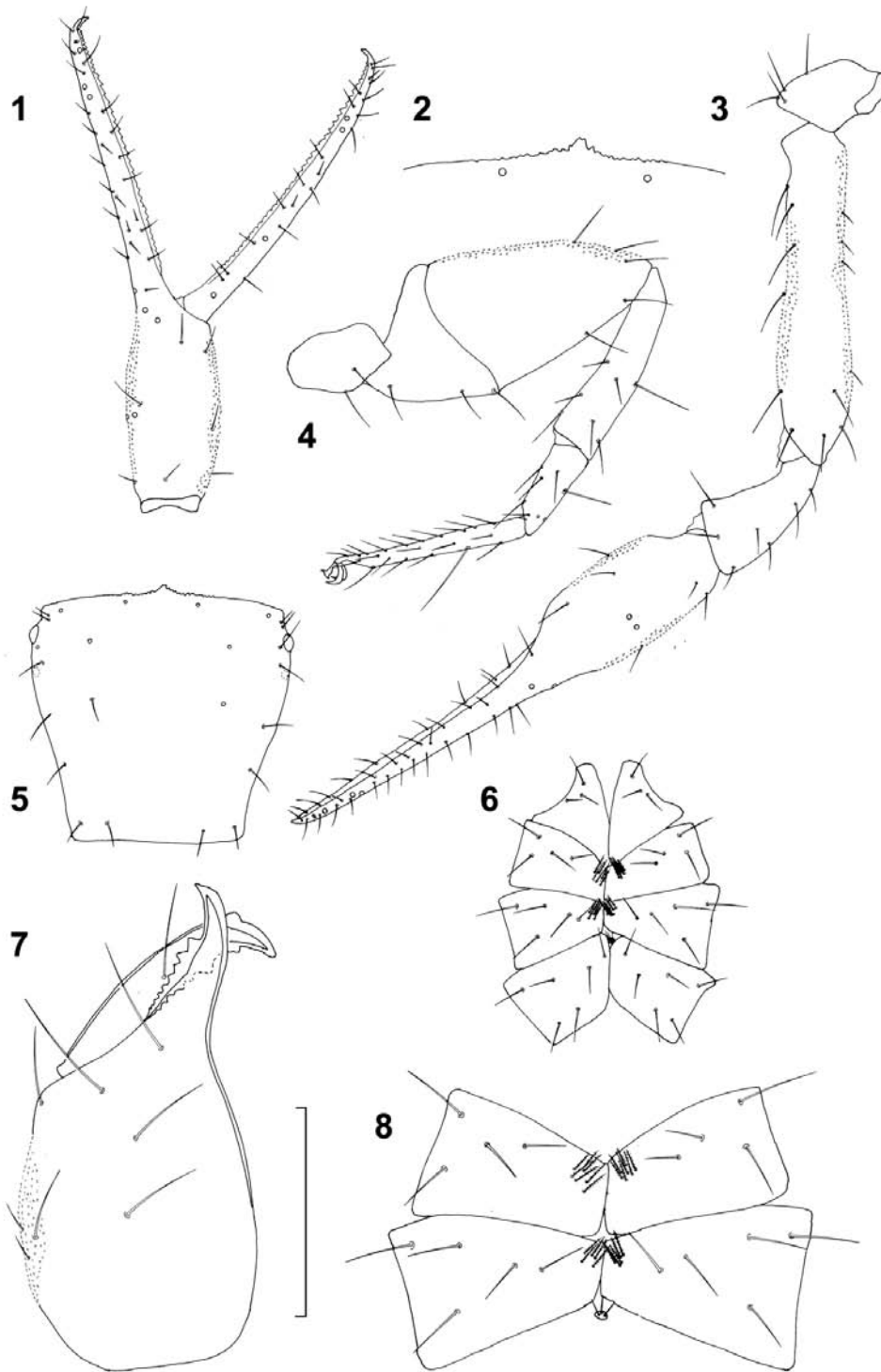
(Figs. 1-8, Table 1, Map 1)

**Etymology** — After its type locality.

**Material examined** — Holotype male, from Uvala Makirina Inlet, nr. Tisno, Dalmatia (Croatia), 29 December 2005, collected by Tonći Rađa.

**Description** — Anterior carapacial margin wider than the posterior border. Carapace longer than broad. Anterior eyes with somewhat flattened lenses, posterior eyes smaller and spot-like (Fig. 5). Anterior carapacial border slightly convex, and with a small differentiated epistome (Fig. 2); there are also tiny denticulations, particularly between the two median setae. The carapace bears 20 setae (Fig. 5): four anterior, six ocular, six median and intermediary, and four posterior setae. In addition, two or three pre-ocular setae are carried on either side (Fig. 5).

Tergites and sternites IV – X uniseriate, smooth and entire. Tergites I – X with 4 – 4 – 4 – 4 – 6 – 6 – 6 – 6 – 6 setae.



**Figs. 1 – 8.** *Chthonius (Chthonius) makirina* n. sp., holotype male, from Dalmatia (Croatia); 1 – pedipalpal chela, 2 – epistome, 3 – pedipalp, 4 – leg IV, 5 – carapace, 6 – coxae I – IV, 7 – chelicera, 8 – coxal spines on coxae II and III. Scale lines: 0.50 mm (Figs. 1, 3, 4, 5, and 6) and 0.25 mm (Figs. 2, 7, and 8).

Male genital area: sternite II with 12 median and posterior setae, sternite II is grooved medially in the form of a V and on the interior side carries 15 setae (7 or 8 on each side). In addition, there is a transverse row of 12 setae on the posterior border of this sternite, of which the median pair is placed at the base of the V-shaped opening. Anterior to each stigma are 3 microsetae; sternite IV has 9 setae posteriorly and 3 microsetae anterior to each stigma. Sternites V – X carry 7, 6, 6, 6, 6, 6 setae, respectively. Twelfth abdominal segment with two pairs of small setae. Pleural membranes are granulostriate.

Female genital area: unknown.

The galea is a low hyaline convexity. Cheliceral palm with 6 setae and two small additional setae; movable finger with two distal and larger teeth, followed by a row of 7 or 8 small and rounded teeth which diminish proximally (Fig. 7). Movable cheliceral finger with a small distal isolated tooth, one large tooth and a row of 8 small triangular teeth, which decrease in size proximal (Fig. 7). Flagellum ten-bladed, one small blade proximally and nine blades twice this length, more or less in pairs, distally. The most distal members of the series are curved but all, to some extent, are pinnate on two sides.

Manducatory process (apex of pedipalpal coxa) with two long and acuminate setae. Trochanter small; other pedipalpal articles somewhat elongated. Chelal palm slenderly ovate (Fig. 1). Fixed chelal finger with 44 small and contiguous teeth, which extend from the fingertip to the level of **ist**. Distal teeth are small and triangular; proximally these are gradually replaced by the retroconical and triangular teeth that eventually become round and very small. Movable chelal finger with 39 small and contiguous teeth that do reach the level of **b**. Distal teeth are triangular and retroconical and these are replaced by the median rounded teeth, which eventually become lower and narrower (Fig. 1).

Disposition of trichobothria: **ib** and **isb** on the palm of the chela; the fixed chelal finger carries 6 tri-



Map 1. Distribution of *Chthonius (Chthonius) makirina* n. sp. in Croatia.

chobothria (**et**, **est**, **esb**, **eb**, **it**, and **ist**) and a pair of accessory setae nearer to **eb** than to the tip of the finger; the movable chelal finger bears 4 trichobothria (**t**, **st**, **sb**, and **b**). Seta **esb** distal to **eb**; **ist** closer to **esb** than to **eb**; **sb** closer to **b** than to **st**; **st** obviously nearer to **t** than to **sb**. Distance **sb** – **st** twice as long as **b** – **sb** and six or eight times as long as **t** – **st**. Seta **b** at the level of **ist** (Fig. 1).

Coxa I carries 3 setae, II – 4, III – 5, and coxa IV – 6 setae. Coxa II bears 9 and coxa III bears 6 spines which are pinnate on two sides. The intercoxal tubercle carries 3 setae (Fig. 6 and 8).

Leg IV: tibia, basitarsus and telotarsus each with a single sensitive seta (Fig. 4).

*Remarks* — The new taxon is clearly different from its phenetically close congener, *C. (C.) littoralis* Hadži from Dalmatia in many important respects (Table 1), particularly in the form of different body parts, setation, and morphometric ratios (Ćurčić, 1988).

**Table 1.** Linear measurements (in millimeters) and morphometric ratios in *Chthonius (Chthonius) makirina* n. sp., and *C. (C.) litoralis* Hadži from Dalmatia (Croatia). The distinctive traits of *Chthonius (Chthonius) makirina* n. sp. are in bold numbers. Abbreviations: M = male. This distinctive traits of *R. makirina* n. sp. are in bold numbers.

	<i>C. (C.) makirina</i> n. sp.	<i>C. (C.) litoralis</i>
	M	M
Character		
Body		
Length (1)	<b>2.18</b>	2.355
Cephalothorax		
Length (2)	0.61	0.64
Breadth (2a)	0.59	0.62
Ratio 2/2a	1.03	1.03
Abdomen		
Length	<b>1.57</b>	1.715
Chelicerae		
Length (3)	<b>0.56</b>	0.60
Breadth (4)	0.25	0.28
Length of movable finger (5)	<b>0.28</b>	0.315
Ratio 3/5	2.00	1.90
Ratio 3/4	<b>2.24</b>	2.14
Pedipalps		
Length with coxa (6)	<b>3.07</b>	3.45
Ratio 6/1	1.41	1.46
Length of coxa	<b>0.44</b>	0.555
Length of trochanter	<b>0.275</b>	0.315
Length of femur (7)	<b>0.845</b>	0.89
Breadth of femur (8)	0.17	0.17
Ratio 7/8	<b>4.97</b>	5.235
Ratio 7/2	1.385	1.39
Length of patella (tibia) (9)	0.35	0.40
Breadth of patella (tibia) (10)	0.16	0.20
Ratio 9/10	<b>2.19</b>	2.00
Length of chela (11)	<b>1.16</b>	1.29
Breadth of chela (12)	0.23	0.23
Ratio 11/12	<b>5.04</b>	5.61
Length of chelal palm (13)	0.43	0.48
Ratio 13/12	<b>1.87</b>	2.09
Length of chelal finger (14)	0.73	0.81
Ratio 14/13	1.70	1.69
Leg IV		
Total length	<b>2.405</b>	2.63
Length of coxa	0.305	0.36
Length of trochanter (15)	0.23	0.28
Breadth of trochanter (16)	0.15	0.185
Ratio 15/16	1.53	1.46
Length of femur + patella (17)	0.70	0.78
Breadth of femur + patella (18)	0.34	0.35
Ratio 17/18	<b>2.06</b>	2.23
Length of tibia (19)	0.47	0.48
Breadth of tibia (20)	0.12	0.14
Ratio 19/20	<b>3.92</b>	3.43
Length of metatarsus (21)	0.24	0.26
Breadth of metatarsus (22)	0.09	0.09
Ratio 21/22	<b>2.67</b>	2.89
Length of tarsus (23)	0.46	0.48
Breadth of tarsus (24)	0.05	0.06
Ratio 23/24	<b>9.20</b>	8.00
TS ratio - tibia IV	0.565	0.58
TS ratio - metatarsus IV	0.38	0.45
TS ratio - tarsus IV	0.29	0.36

Edaphism, or more precisely euedaphism (strict adaptation to the life under stones, in soil, and leaf-litter) is not characteristic of a single morphological or taxonomic group, but is rather the adaptive response of epigeal and humicolous species of many groups to survival in the Mediterranean climate (Ćurčić, 1972, 1988; Ćurčić et al., 1993, 2004, 2010a, b, c, d, e, f, g; 2011a, b, c, d, e, f, g, h; Hadži, 1937). It is clear that these species originated from regions or geological ages with a more constant climate, especially with regard to humidity. This shows the fundamental importance of water in the environment in the phenomenon of edaphism and also in the changes of the strict adaptation to life in soil, and to a more cryptic way of life (in caves). Euedaphism is therefore the result of historical (climatic and vegetational changes) and contemporary factors (Mediterranean climate, topography).

*Distribution* - Dalmatia (Croatia) (Map 1), under stones; this species is probably an endemic and relict taxon.

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