

***CHTHONIUS (CHTHONIUS) ONAEI* N. SP. (CHTHONIIDAE, PSEUDOSCORPIONES),
A NEW EPIGEAN SPECIES FROM CROATIA**

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Abstract – A new epigean pseudoscorpion, *Chthonius (Chthonius) onaei* n. sp. is erected from Podašpilje, nr. Omiš, Mt. Omiška Dinara, Dalmatia, Croatia. Its interrelations with two close congeners, *Chthonius (C.) litoralis* Hadži, 1933 and *Chthonius (C.) dalmatinus* Hadži, 1930 are briefly discussed.

Key words: Pseudoscorpions, *Chthonius*, *Chthonius onaei* n. sp., Dalmatia, Croatia

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INTRODUCTION

The investigation of the pseudoscorpion fauna in Croatia has a long history; the first data on pseudoscorpion species from Croatia date back to the first half of the XIX century (Ozimec, 2004) but is characterized by an uneven intensity which depended on the sporadic interest of various foreign arachnologists and the available pseudoscorpion material for study. The papers of Tömösvary and Daday contributed to a better knowledge of this group in Croatia (Daday 1888, 1889; Tömösvary 1884). Studies carried out by Beier and Hadži in the first half of the XX century, shed new light on the biodiversity of this arachnid group in Croatia (Dalmatia) (Beier 1928, 1929, 1939; Hadži 1930, 1932, 1933). In the past twenty five years investigations carried out by Ćurčić have resulted in the establishment of a significant number of new pseudoscorpion taxa (genera, subgenera and species), both epigean and cave-dwelling forms (Ćurčić, 1974, 1984, 1987, 1988; Ćurčić et al. 2004; Dimitrijević and Radja 2008). Thus, the number of known pseudoscorpions from Croatia has risen to 109 species.

The most numerous pseudoscorpion family in Croatia is the Neobisiidae with 84 known species

and subspecies. The genus *Chthonius* C. L. Koch, 1843 and its three subgenera are represented with 27 species and subspecies in Croatia (Ćurčić, 1974; Harvey, 1990). The vast majority of known species pertaining to this genus are cavernicolous, populating different structures of the well-developed karst relief in Croatia (caves, pot-holes, sink-holes). Bearing in mind the estimated number of caves in Croatia (7000-8000, Tvrtković and Veen, 2006), the number of known cave-dwelling pseudoscorpions is far from definitive. Further biospeological investigations will, without doubt, reveal many more pseudoscorpion taxa new to science.

MATERIAL AND METHODS

A careful examination of a small sample of pseudoscorpions collected by Tonći Radja on 22 June 2006 from Podašpilje, Dalmatia, Croatia, revealed the presence of a new taxon: *Chthonius (Chthonius) onaei* n. sp. All studied specimens were carefully dissected and mounted on slides in gum-chloral medium (Swan's fluid) and are deposited in the collections of the Institute of Zoology, Faculty of Biology, University of Belgrade, Serbia.

SYSTEMATIC PART

CHTHONIIDAE DADAY

CHTHONIUS C. L. KOCH

CHTHONIUS (CHTHONIUS) ONAEI,

NEW SPECIES

Etymology. – The new chthoniid species is named after its type-locality, Omiš (Onaeum in Latin).

Specimens examined. – Holotype male and allotype female from Podašpilje (under stones), nr. Omiš, Mt. Omiška Dinara, Dalmatia, Croatia, collected by Tonći Radja on 22 June 2006. Mt. Omiška Dinara is a small mountain, 16 km long extending from Omiš to Dubac in the direction west-east, with its highest peak Kula (846 m a.s.l.) and a width of about 1 km from Borak to Podašpilje in the direction south-north.

Description. – Holotype male. Carapace slightly longer than broad, anterior carapacial border longer than posterior one (Figs. 1-8; Tab. 1.) Epistome small. Between two median setae small denticulations developed. Two pairs of eyes present. A pair of short preocular microsetae present on each side of the carapace. Carapacial setal formula: 4+6+6+4= 20. Carapace reticulate throughout.

Tergites uniseriate and smooth. Tergal formula: 4-4-4-4-6-6-6-6-6-6. Male genital area : Sternite II with ten setae. Sternite III with eleven and ten setae on each side of the median V shaped groove, whilst eleven setae are present on the posterior sternal border. Two or three small setae along each stigma. Sternite IV with eight setae and one to two microsetae along each stigma. Sternites V-X with 9-6-6-6-6-7 setae, respectively.

Galea inconspicuous (Fig. 3). Cheliceral palm with 6 setae and 2 small additional microsetae (Fig. 3). Movable cheliceral finger carries one seta. Seven and five teeth of uneven size are carried on the fixed cheliceral finger. Flagellum of 11 blades.

Manducatory process with two long acuminate setae. Tiny granulations developed on both exterior and interior side of the chelal palm and femur. Other pedipalpal articles smooth and elongated (Figs. 1 and 2). Fixed and movable chelal fingers straight, with 37 and 32 close-set teeth respectively. Chelal finger longer than chelal palm (Tab. 1). Pedipalpal femur considerably longer than carapace and also longer than chelal finger (Tab. 1).

Coxa I bears 6, coxa II 4, coxa III 5 and coxa IV 6 setae. Nine or eight spines are carried on coxa II and 7 or 6 spines on coxa III. Coxal spines are finely pinnate on both sides. Intercoxal tubercle with two setae (Fig. 5).

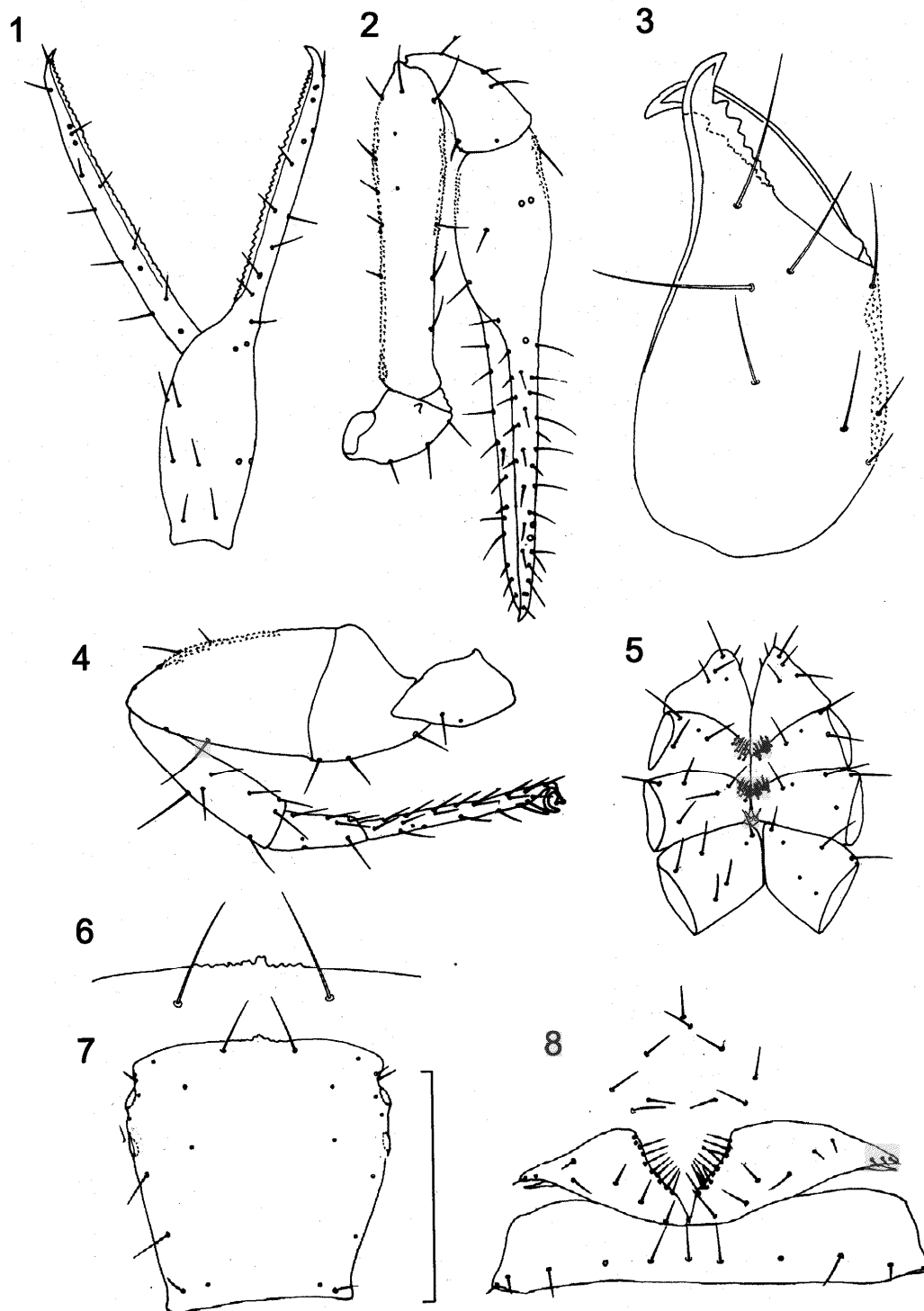
Leg IV: tibia, metatarsus and telotarsus carry a single sensitive seta each (Fig. 4). Linear measurements (in mm) and morphometric ratios are presented in Table 1.

Female (Figs. 9-16): Carapace somewhat longer than broad, anterior carapacial border wider than the posterior one. Epistome triangular. Two pairs of eyes present on each carapacial side. Posterior pair of eyes reduced, spot-like. Carapacial formula: 4+6+6+4 = 20.

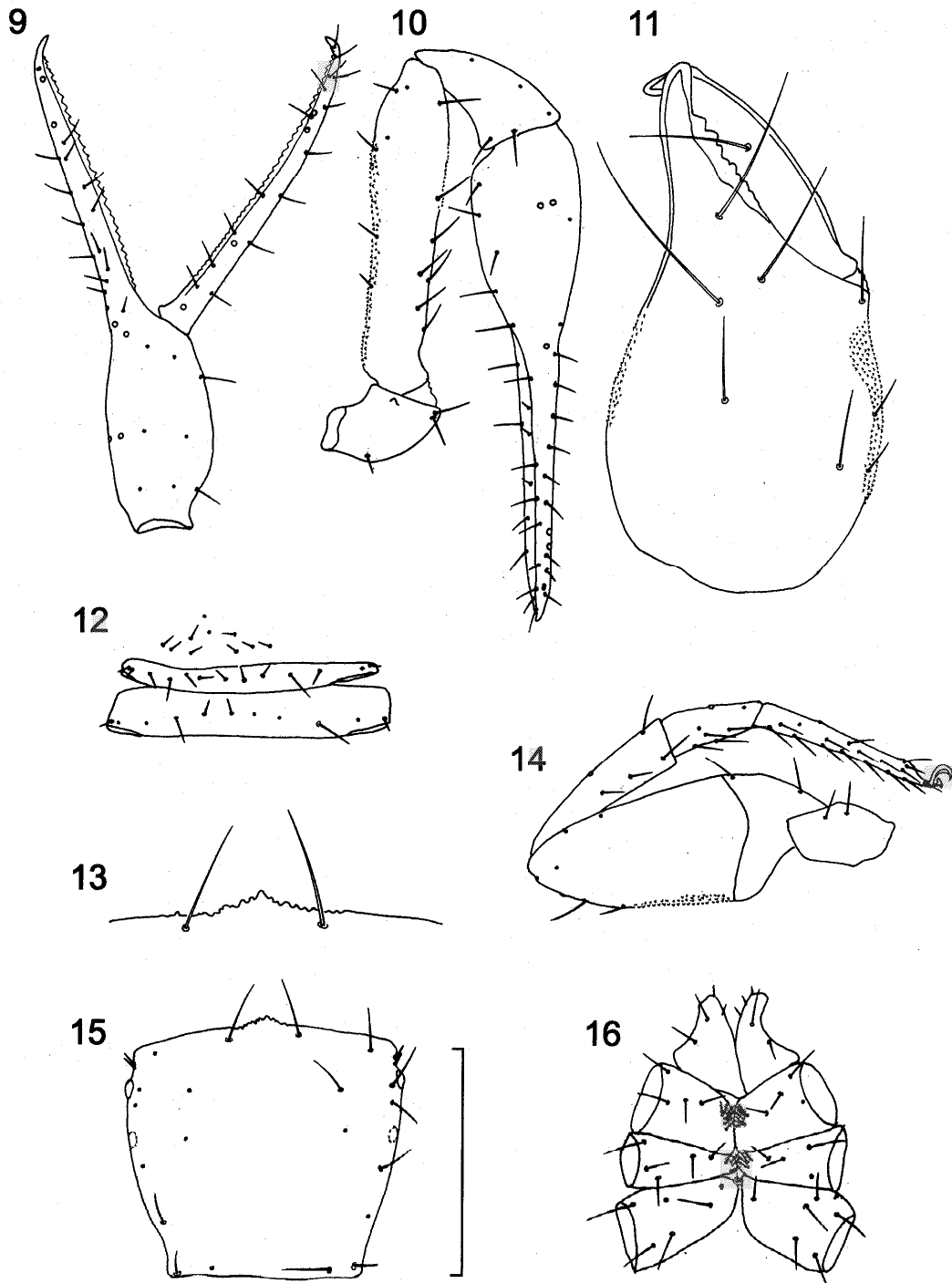
Tergal setation (I-X): 4-4-4-4-6-6-6-6-6-6. All tergites are uniseriate and smooth. Female genital area: sternite II with 10 setae. Sternite III carries 9 setae and two small microsetae along each stigma. Seven setae are carried on sternite IV and two short suprastigmatic setae.

Galea inconspicuous (Fig. 11). Cheliceral palm and movable cheliceral finger with 6 and one seta respectively. Two short microsetae present on the cheliceral palm (Fig. 11). Cheliceral dentition as illustrated in Fig. 11. Flagellum 10-bladed.

Pedipalpal articles elongated and smooth. Some tiny granulations are developed on the interior and exterior side of the pedipalpal femur (Fig. 10). Chelal finger 1.48 times longer than chelal palm. Pedipalpal femur considerably longer than carapace (Tab. 1). Trichobothrial disposition as illustrated in Figs. 1 and 9.



Figs. 1-8. *Chthonius (Chthonius) onaei* n. sp., from Dalmatia. Holotype male: 1 – pedipalpal chela, 2 – pedipalp, 3 – chelicerae, 4 – leg IV, 5 – coxae, 6 – epistome, 7 – carapace, 8 – male genital area. Scales = 0.50 mm (Figs. 1, 2, 4, 5 and 7) and 0.25 mm (Figs. 3, 6 and 8).



Figs. 9-16. *Chthonius (Chthonius) onaei* n. sp., from Dalmatia. Allotype female: 9 – pedipalpal chela, 10 – pedipalp, 11 – chelicerae, 12 – female genital area, 13 – epistome, 14 – leg IV, 15 – carapace, 16 – xoxae I-III. Scales = 0.50 mm (Figs. 9, 10, 12, 14, 15 and 16) and 0.25 mm (Figs. 11 and 13).

Table 1. Linear measurements (in millimeters) and morphometric ratios in *Chthonius (Chthonius) onaei* n. sp. from Croatia. Abbreviations: M = male, F = female.

Character/Sex	M	F
Body		
Length (1)	1.86	2.30
Cephalothorax		
Length (2)	0.54	0.63
Breadth	0.53	0.60
Abdomen		
Length	1.32	1.67
Chelicerae		
Length (3)	0.49	0.56
Breadth (3a)	0.24	0.295
Length of movable finger (4)	0.275	0.315
Ratio $\frac{3}{4}$	1.78	1.78
Ratio $\frac{3}{3a}$	2.04	1.90
Pedipalps		
Length with coxa (5)	2.92	2.845
Ratio 5/1	1.57	1.24
Length of coxa	0.48	0.40
Length of trochanter	0.25	0.285
Length of femur (6)	0.76	0.76
Breadth of femur (7)	0.16	0.16
Ratio 6/7	4.75	4.75
Ratio 6/2	1.57	1.21
Length of tibia (8)	0.34	0.36
Breadth of tibia (9)	0.15	0.14
Ratio 8/9	2.27	2.57
Length of chela (10)	1.09	1.04
Breadth of chela (11)	0.20	0.24
Ratio (10/11)	5.45	4.33
Length of manus (12)	0.40	0.42
Ratio 12/11	2.00	1.75
Length of finger (13)	0.69	0.62
Ratio 13/12	1.725	1.48
Leg IV		
Total length	2.26	2.25
Length of coxa	0.275	0.275
Length of trochanter (14)	0.285	0.22
Breadth of trochanter (15)	0.13	0.13
Ratio 14/15	2.19	1.69
Length of femur (16)	0.64	0.66
Breadth of femur (17)	0.25	0.26
Ratio 16/17	2.56	2.54
Length of tibia (18)	0.43	0.43
Breadth of tibia (19)	0.11	0.11
Ratio 18/19	3.91	3.91
Length of basitarsus (20)	0.22	0.23
Breadth of basitarsus (21)	0.08	0.08
Ratio 20/21	2.875	2.875
Length of telotarsus (22)	0.41	0.41
Breadth of telotarsus (23)	0.05	0.05
Ratio 22/23	8.20	8.20
TS ratios:		
TS ratio - tibia IV	0.50	0.48
TS ratio - basitarsus IV	0.18	0.22
TS ratio - telotarsus IV	0.30	0.30

Coxa I bears 4 and 5 setae; coxa II 4 setae; coxa III 4 and 5 setae and coxa IV 6 setae. Six and four finely pinnated coxal spines are carries on coxae II and III. Intercostal tubercle with two small setae.

Leg IV: tibia, metatarsus and telotarsus carry a single sensitive seta each (Fig. 14). Linear measurements (in mm) and morphometric ratios are presented in Table 1.

Differential diagnosis. – The newly established chthoniid species, *Chthonius onaei* can easily be distinguished from its close congeners *Chthonius (Chthonius) litoralis* Hadži, 1933 and *Chthonius (Chthonius) dalmatinus* Hadži, 1930 by many quantitative and qualitative characteristics.

The males of *C. onaei* and *C. litoralis* from Baretina pećina Cave, island of Čiovo, Dalmatia, differ in carapacial setation (18 setae in *C. litoralis* vs. 20 setae in *C. onaei*); a different number of preocular microsetae (1 pair in *C. litoralis* vs. 2 pairs in *C. onaei*); the setation of sternites II, III, and IV (see Table 1); the number of flagellar blades (8-9 in *C. litoralis* vs. 11 in *C. onaei*); the number of teeth on both movable and fixed chelal fingers (44-39 in *C. litoralis* vs. 37-32 in *C. onaei*); the number of coxal spines on coxae II and III respectively (10-11 and 5 in *C. litoralis* vs. 8-9 and 6-7 in *C. onaei*); the overall dimensions of all body parts (larger in *C. litoralis* vs. smaller in *C. onaei* Table 1)

The morphometric ratios of numerous body parts display significant differences between the males of these two species, such as: femur length to breadth ratio (5.235 in *C. litoralis* vs. 4.75 in *C. onaei*); tibia length to breadth ratio (2.00 in *C. litoralis* vs. 2.27 in *C. onaei*); chelal length to chelal palm breadth ratio (5.61 in *C. litoralis* vs. 5.45 in *C. onaei*); chelal finger to chelal palm length ratio (1.69 in *C. litoralis* vs. 1.725 in *C. onaei*); total leg IV length (2.63 mm in *C. litoralis* vs. 2.26 mm in *C. onaei*); leg IV femur length to breadth ratio (2.23 in *C. litoralis* vs. 2.56 in *C. onaei*); leg IV tibia length to breadth ratio (3.42 in *C. litoralis* vs. 3.91 in *C. onaei*).

The *onaei* females also differ from females of *C. (C.) dalmatinus*, from Pišurka pećina Cave, Korčula

village, island of Korčula, Dalmatia, in many aspects: in the male sex, the female of *C. onaei* is characterized by overall smaller body dimensions when compared to the corresponding characters of the female of *C. dalmatinus* (Table 1).

Further differences between the females of these two species comprise: carapacial setation (22 setae in *C. dalmatinus* vs. 20 setae in *C. onaei*); the differentiation of the epistome (not differentiated in *C. dalmatinus* vs. differentiated in *C. onaei*); the number of preocular microsetae (one pair in *C. dalmatinus* vs. 2 pairs in *C. onaei*); setation of sternite II (11 setae in *C. dalmatinus* vs. 9 setae in *C. onaei*); the number of teeth on both fixed and movable chelal fingers (33-41 in *C. dalmatinus* vs. 30-36 in *C. onaei*); the number of flagellar blades (11 in *C. dalmatinus* vs. 10 in *C. onaei*); the number of coxal spines on coxa II (9 in *C. dalmatinus* vs. 7 in *C. onaei*).

The morphometric ratios of several body structures exhibit clear differences in the female sex of these two species. Pedipalpal length to total body length ratio (1.37 in *C. dalmatinus* vs. 1.24 in *C. onaei*); femur length to breadth ratio (4.58 in *C. dalmatinus* vs. 4.78 in *C. onaei*); femur length to carapacial length ratio (1.32 in *C. dalmatinus* vs. 1.21 in *C. onaei*); tibia length to breadth ratio (1.90 in *C. dalmatinus* vs. 2.57 in *C. onaei*); chelal length to breadth ratio (5.00 in *C. dalmatinus* vs. 2.625 in *C. onaei*); chelal finger to chelal palm length (1.89 in *C. dalmatinus* vs. 1.48 in *C. onaei*). For differences in morphometric ratios of leg IV articles see Table 1.

REMARKS

The finding of a new epigeal pseudoscorpion species *Chthonius onaei* n. sp. on Mt. Dinara in Dalmatia which is part of the well-developed Dinaric Karst, supports the view that this region is rich in endemic and relict representatives of this arachnid group. Bearing in mind the fact the estimated number of caves in Croatia (7000-8000, Tvrtković and Veen, 2006), and that there are no continuous intensive investigations of epigeal pseudoscorpion fauna in Croatia, the number of known epigeal and cave-

dwelling pseudoscorpion species is far from a definitive one. Further investigations will, without doubt, reveal the presence of many more pseudoscorpion taxa new to science.

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CHTHONIUS (CHTHONIUS) ONAEI N. SP. (CHTHONIIDAE, PSEUDOSCORPIONES), NOVA EPIGEJSKA VRSTA PSEUDOSKORPIJA IZ HRVATSKЕ

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У раду је дијагностификована нова епигејска врста псеудоскорпија *Chthonius onaei* n. sp. са планине Омишка Динара у близини Омиша, Далмација (Хрватска). Разматрани су и интер-

специјски односи новоописане врсте са два сродним епигејским врстама, *Chthonius litoralis* Хаџи, 1933 и *Chthonius dalmatinus* Хаџи, 1930 из Хрватске.