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NEOBISIUM CRUCIS N. SP. AND *N. PLUZINENSIS* N. SP., TWO NEW CAVE-DWELLERS FROM MONTENEGRO (NEOBISIIDAE, PSEUDOSCORPIONES)

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Abstract. — The cave-dwelling forms of the genus *Neobisium* L. Koch comprise many phyletic lines, some less specialized and others highly adapted to cave life. To trace their origin, biogeography and evolution, it is necessary to compare the evidence about troglobitic species with that of the epigean forms from different European habitats, especially in the Mediterranean or Dinaric regions.

In this study, descriptions of *Neobisium crucis* n. sp. and *N. pluzinensis* n. sp., both from caves in Montenegro, are presented, with some details on the comparative morphology and morphometric ratios.

Key words: Pseudoscorpiones, Neobisiidae, *Neobisium crucis* n. sp., *N. pluzinensis* n. sp., evolution, biogeography, biospeleology, development, Montenegro.

INTRODUCTION

The Dinarides are closely associated to the great range of the Rhodope Mts. that occupy the central part of the Balkan Peninsula. Beier (1929, 1931, 1932, 1939) made the first unexpected discoveries and found many endemic arachnids, especially pseudoscorpions. The biogeographical importance of these findings was soon recognized by the Serbian zoologist Hadži (1928, 1930, 1931, 1933, 1937, 1940, 1941, 1957, 1961). However, the organized biospeleological study of the Dinaric caves and their inhabitants only started mid-century (from the 1960s onwards), uncovering an extraordinary wealth of endemic pseudoscorpions (especially of Neobisiidae), greater than in any other European region. This abundance is unique in Europe and comparable only to that of tropical rain forests (Ćurčić, 1974, 1977, 1984, 1988, 2002; Ćurčić and Dimitrijević, 1984, 1986, 2009; Ćurčić et al., 2004, 2010a, b, c, d, e, 2012a, b, c, d, e, f; 2013a, b).

Caves represent the "ephemeral" existence of the majority of underground habitats and their scattered and isolated distribution. Caves and other forms of the underground karst relief are therefore transitory incidents in the history of the Earth, spasmodic phenomena in time and space.

DESCRIPTIVE PART

NEOBISIIDAE J. C. CHAMBERLIN, 1930

NEOBISIUM J. C. CHAMBERLIN, 1930
NEOBISIUM CRUCIS, NEW SPECIES
(Figs. 1 – 7, Table 1)

Etymology — According to some explanations, the name Krstac is derived from "krst" (*crux* in Latin).

Material examined — Holotype male, from the Pećina u Krstacu Cave, near Kotor, Bay of Kotor, Montenegro; collected by Egon Pretner, 22 August 1945.

Description — Carapace reticulate throughout; epistome small and apically rounded (Fig. 5). Neither eyes nor eyespots are developed (Fig. 5). No preocular microsetae present. Setal carapacal formula: 4 + 4 + 4 + 4 = 16. Tergites I – X and sternites IV – X uniseriate, smooth and entire. Setal formula of tergites I – X is 5 – 5 – 5 – 6 – 9 – 9 – 8 – 8 – 9 – 8; setation of posterior carapacal row equal to the number of setae on either of the tergites I – III. Male genital area: sternite II with 20 microsetae, sternite III with 14 anterior and 21 posterior setae and 3 suprastigmal microsetae on either side. Sternite IV with 14 posterior setae and 3 small setae along each stigma (Fig. 6). Sternites V – X with 15 – 13 – 14 – 13 – 12 – 10 setae. Twelfth abdominal segment with two pairs of small setae. Pleural membranes granulostriate.

Cheliceral spinneret low and rounded (Fig. 7). Movable cheliceral finger with one seta, cheliceral palm with six setae (Fig. 8). Flagellum eight-bladed; only two distal blades are pinnate anteriorly. Other blades are smooth and acute and diminish proximally (Fig. 2).

Manducatory process (apex of pedipalpal coxa) bears four long setae. Trochanter with no tubercle, pedipalpal articles smooth and attenuated, femur and tibia slightly dilated distally (Figs. 1 and 3). Chelal palm ovate. Fixed chelal finger with 107 small and contiguous teeth that are triangular and apically pointed. The teeth of the fixed finger reach the level of trichobothrium *ib* (Fig. 1). Movable chelal finger with 105 small teeth; distal members are triangular and low; basal to *t*, the teeth gradually become retroconical, wider and lower, but not reaching the level of *b*. Chelal fingers longer than chelal palm, pedipalpal femur longer than chelal fingers (Table 1).

Trichobothriotaxy as presented in Figs. 1 and 4.

Anterior and median rim of coxa I with numerous small chitinous points. Trochanteral foramen elongate and transparent. Tibia IV, basitarsus IV and tarsus IV each with a single sensitive seta (Fig. 4). Subterminal tarsal setae furcated, each branch with few spinules. Morphometric ratios and measurements are presented in Table 1.

Remarks — From its phenetically close congener, *Neobisium montdori* Ćurčić from middle Dalmatia, *N. crucis* n. sp. is easily distinguished by the absence/presence of preocular microsetae, the setation of tergites I – III, number of setae of sternites II and III, number of teeth on fixed and movable chelal fingers, body length, pedipalpal length-to-breadth ratio, leg IV tibia length-to-breadth ratio, and by the leg IV femur length-to-breadth ratio.

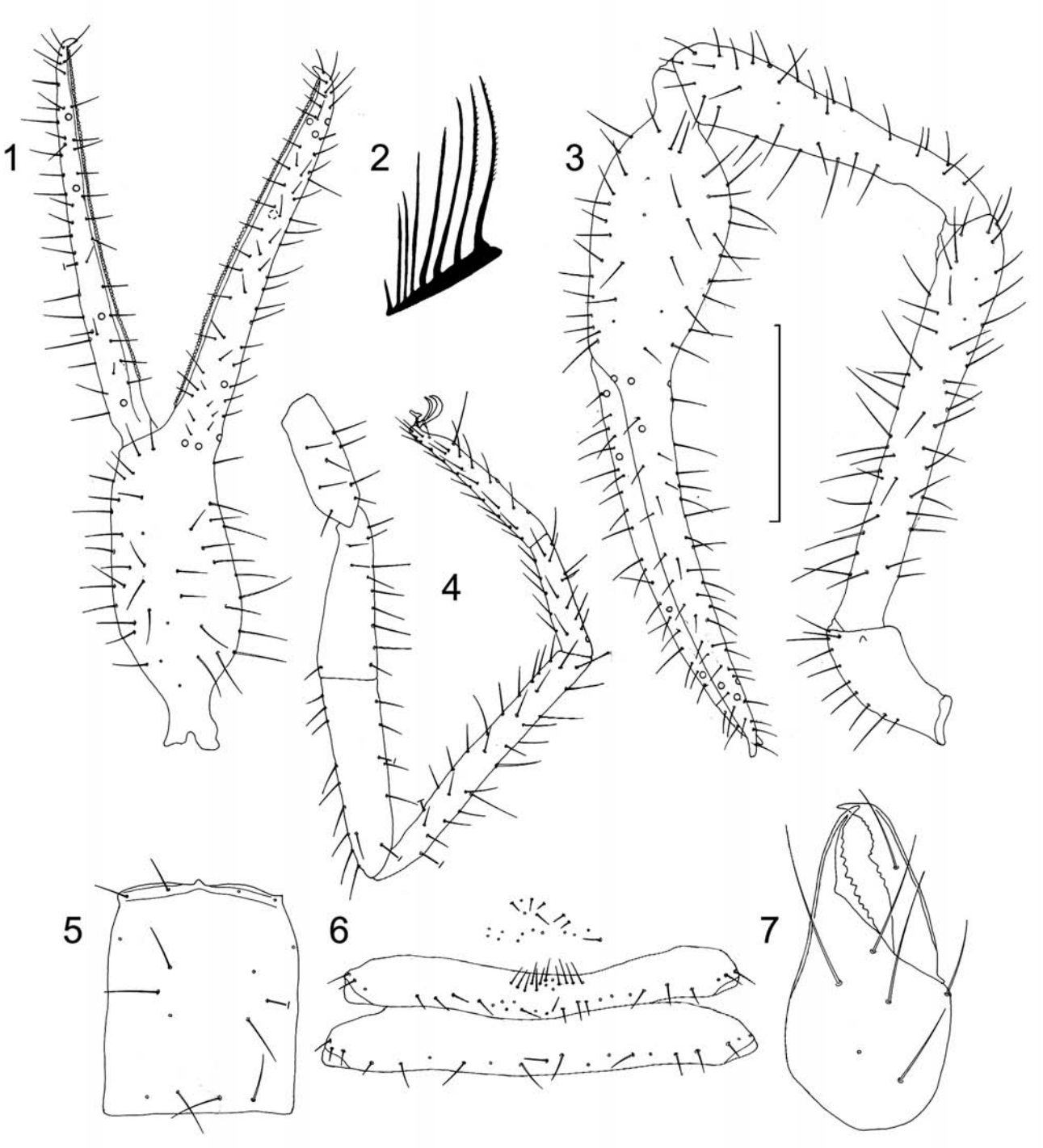
Distribution — In caves, Bay of Kotor, Montenegro. This species seems to be endemic and confined to the Montenegrin karst only.

NEOBISIUM PLUZINENSIS NEW SPECIES
(Figs. 8 – 15, Table 1)

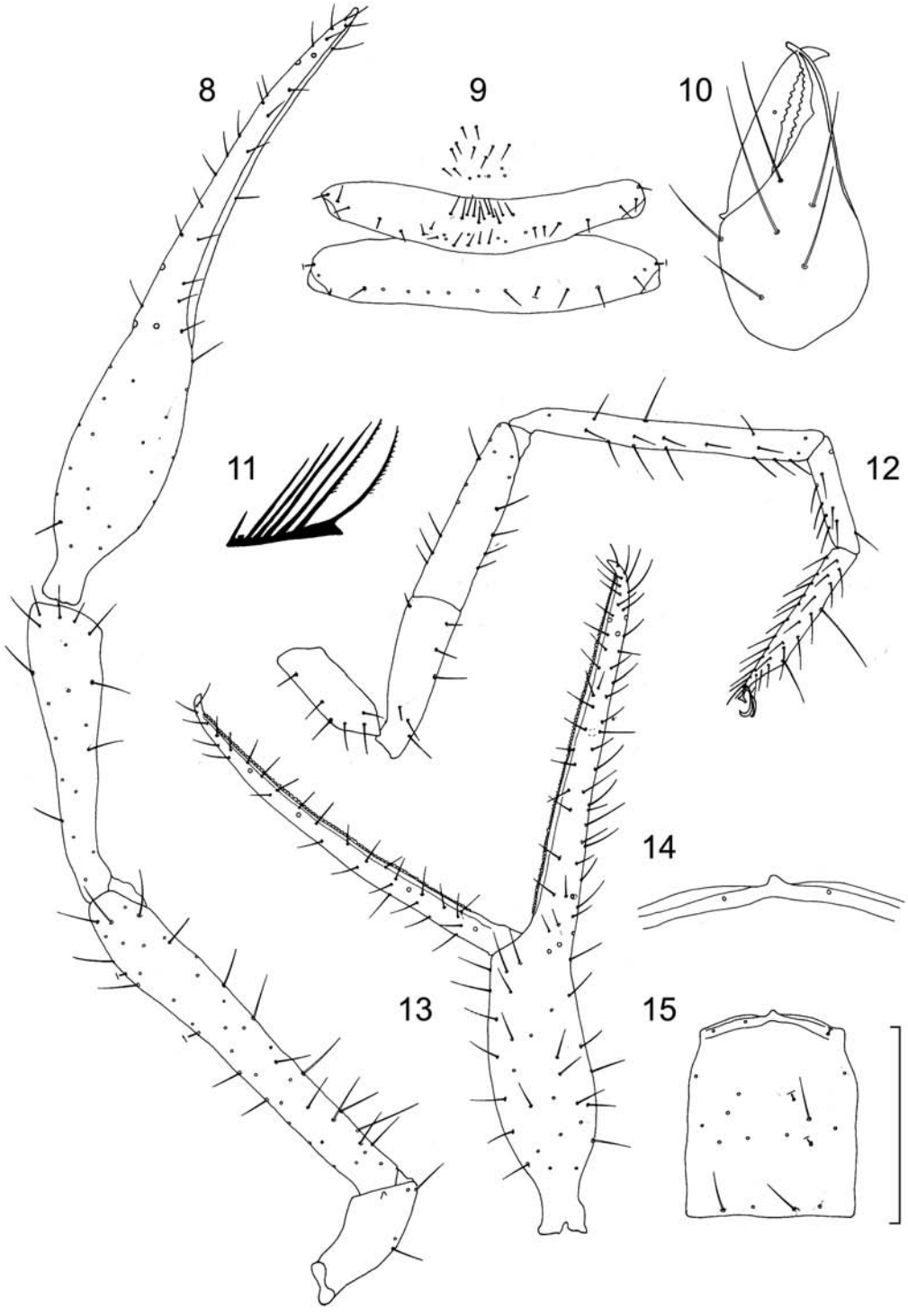
Etymology — After its *terra typica,* the city of Nikšić, Montenegro.

Material examined — Holotype male from the Kostina Pećina Cave in Bajovo Polje, en route Plužine – Nikšić, nr. Nikšić; collected by B. Ćurčić on 9 February 1974.

Description — Carapace reticulate throughout; epistome small and apically rounded (Figs. 14 and 15). Anterior carapacal margin only slightly convex medially. Neither eyes nor eyespots are developed (Fig. 15). Setal formula: 4 + 6 + 6 + 4 = 20. Preocular microsetae absent (Fig. 15). Abdominal tergites entire, smooth and uniseriate. Setation of tergites I – X: 4 – 4 – 6 – 6 – 6 – 9 – 7 – 8 – 8 – 8. Sternite II with 15 setae, sternite III with 11 anterior and 19 posterior setae and 3 setae along each of the stigma (Fig. 9). Sternite IV with 10 posterior setae and 3 microsetae along each stigma. Sternites V – X with 14 – 12 – 14 – 13 – 12 – 12 setae. Female genital area unknown.



Figs. 1 – 7. *Neobisium crucis* n. sp., holotype male, from the Pećina u Krstacu Cave, near Kotor, Bay of Kotor, Montenegro; 1 – pedipalpal chela, 2 – flagellum, 3 – pedipalp, 4 – leg IV, 5 – carapace, 6 – male genital area, 7 – chelicera. Scale lines = 0.50 mm (Figs. 2, 6, and 7) and 0.25 mm (Figs. 1, 3, 4, and 5).



Figs. 8 – 15. *Neobisium pluzinensis* n. sp., holotype male from the Kostina Pećina Cave in Bajovo Polje, nr. Nikšić, Montenegro; 8 – pedipalp, 9 – male genital area, 10 – chelicera, 11 – flagellum, 12 – leg IV, 13 – pedipalpal chela, 14 – epistome, 15 – carapace. Scale lines = 0.50 mm (Figs. 9, 10, 11, and 14) and 0.25 mm (Figs. 8, 12, 13, and 15).

Table 1. Linear measurements (in millimeters) and morphometric ratios in *Neobisium crucis* n. sp., *N. pluzinensis* n. sp., and *N. montdori* B. Ćurčić from Montenegro and Croatia. Abbreviations: M = male, F = female.

	N. crucis n. sp.	*N. pluzinensis* n. sp.	*N. montdori*
	M	M	F
Character			
Body			
Length (1)	4.14	3.485	4.45
Cephalothorax			
Length (2)	1.27	1.05	1.05
Breadth (2a)	0.98	0.91	0.79
Ratio 2/2a	1.30	1.15	1.33
Abdomen			
Length	2.87	2.435	3.40
Chelicerae			
Length (3)	0.825	0.77	0.69
Breadth (4)	0.41	0.36	0.37
Length of movable finger (5)	0.52	0.47	0.50
Ratio 3/5	1.59	1.64	1.38
Ratio 3/4	2.01	2.14	1.86
Pedipalps			
Length with coxa (6)	9.535	9.01	7.23
Ratio 6/1	2.30	2.585	1.62
Length of coxa	0.95	1.04	0.90
Length of trochanter	0.835	0.79	0.75
Length of femur (7)	2.30	2.13	1.56
Breadth of femur (8)	0.35	0.305	0.295
Ratio 7/8	6.57	6.98	5.29
Ratio 7/2	1.81	2.03	1.485
Length of patella (tibia) (9)	1.80	1.65	1.26
Breadth of patella (tibia) (10)	0.41	0.33	0.36
Ratio 9/10	4.39	5.00	3.50
Length of chela (11)	3.65	3.40	2.76
Breadth of chela (12)	0.68	0.52	0.59
Ratio 11/12	5.37	6.54	4.68
Length of chelal palm (13)	1.46	1.40	1.14
Ratio 13/12	2.15	2.69	1.93
Length of chelal finger (14)	2.19	2.00	1.62
Ratio 14/13	1.50	1.43	1.42
Leg IV			
Total length	6.515	6.44	4.62
Length of coxa	0.74	0.76	0.53
Length of trochanter (15)	0.71	0.69	0.55
Breadth of trochanter (16)	0.25	0.25	0.20
Ratio 15/16	2.84	2.76	2.75
Length of femur + patella (17)	1.895	1.80	1.31
Breadth of femur + patella (18)	0.305	0.26	0.305
Ratio 17/18	6.21	6.92	4.295
Length of tibia (19)	1.60	1.67	1.20
Breadth of tibia (20)	0.17	0.16	0.14
Ratio 19/20	9.41	10.44	8.57
Length of metatarsus (21)	0.68	0.63	0.40
Breadth of metatarsus (22)	0.14	0.14	0.12
Ratio 21/22	4.86	4.50	3.33
Length of tarsus (23)	0.89	0.89	0.63
Breadth of tarsus (24)	0.12	0.12	0.10
Ratio 23/24	7.42	7.42	6.30
TS ratio - tibia IV	0.46	0.40	0.35
TS ratio - metatarsus IV	0.13	0.145	0.13
TS ratio - tarsus IV	0.41	0.40	0.435

Pleural membranes granulostriate. Twelfth abdominal segment with two pairs of small setae.

Galea of a hyaline convexity, low and rounded (Fig. 10). Cheliceral palm with six setae, movable finger with one seta (Fig. 10). Fixed cheliceral finger with 13 teeth, movable cheliceral finger with 11 small distal teeth, which diminish from distal to proximal. ending in a dental lamella. Flagellum of eight blades, only two distalmost blades pinnate anteriorly (Fig. 11). The remaining blades decrease in size from distal to proximal. The two most proximal flagellar blades are the smallest.

Apex of pedipalpal coxa (manducatory process) carries four acuminate setae. Pedipalpal trochanter elongated, femur, tibia and pedipalpal chela elongated and smooth (Figs. 8 and 13). Fixed chelal finger with 108 small contiguous and asymmetrically pointed teeth. Movable chelal finger with 90 closeset teeth; only a few distal members are asymmetrically pointed and the remainder belong to the square cusped or rounded teeth which do not reach as far as the level of *b* (Fig. 13). Trichobothriotaxy as in Table 1. Chelal fingers longer than chelal palm and shorter than pedipalpal femur (Table 1).

Coxa I: anterior and median rim with few transparent chitinous points, trochanteral foramen acute. Tibia IV, basitarsus IV, and tarsus IV each with a single tactile seta (Fig. 12). Subterminal tarsal seta furcated, each ramus with a few spinnules.

Morphometric ratios and linear measurements are presented in Table 1.

Differential diagnosis — The new species is easily distinguished from its phenetically close congener, *Neobisium montdori* Ćurčić (from middle Dalmatia) in many important aspects, such as the carapacal setation, the tergites I – X setation, sternite IV – X setation, number of teeth on the chelal fingers, the pedipalpal tibia length-to-breadth ratio, leg IV tibia length-to-breadth ratio, and by the leg IV tarsus length-to-breadth ratio (Table 1).

Distribution — This is a cave inhabitant that lives in underground habitats around the village of Bajovo Polje, nr. Nikšić, Montenegro. It is probably endemic to the Balkan Peninsula and relict to the Dinaric karst in Montenegro.

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