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NEOBISIUM YOZGATI N. SP., AND *N. ANAISAE* N. SP. (NEOBISIIDAE, PSEUDOSCORPIONES), FROM TURKEY AND MACEDONIA (FYROM), RESPECTIVELY

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Abstract — Two new species of endemic and relict cave-dwellers of genus *Neobisium* Chamberlin, have been described from Turkey and Macedonia (FYROM), respectively. From its phenetically close congener, *N. granulatum* Beier, *N. yozgati* n. sp. (from Yozgat, Turkey) is distinguished in many important respects. In addition, *N. anaisae* n. sp. (from a cave in Krapa, FYROM) differs from its closest forms (*N. korabense* Ćurčić, *N. ohridanum* Hadži, and *N. vladimirpantici* Ćurčić) by many morphological characters and form of different body parts. Both species are illustrated, diagnosed, and thoroughly described. They both represent endemic and relict forms.

Key words: Pseudoscorpions, *Neobisium*, *N. yozgati* n. sp., *N. anaisae* n. sp., caves, endemism, Turkey, Macedonia

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INTRODUCTION

In 2006, a sample of soil- and litter-dwelling two false scorpions was collected in Yozgat, Province of Yozgat, Turkey. A thorough analysis has shown that both specimens belong to the genus *Neobisium* Chamberlin, 1930, representing a new taxon, *N. yozgati* n. sp. During biological investigations in Macedonia (FYROM), the third author received a single pseudoscorpion specimen belonging to the genus *Neobisium*, which belongs to *Neobisium anaisae* n. sp., relict and endemic form to the area studied.

Here are the results of the study of *N. yozgati* n. sp. and *N. anaisae* n. sp.

SYSTEMATIC PART

NEOBISIUM CHAMBERLIN, 1930

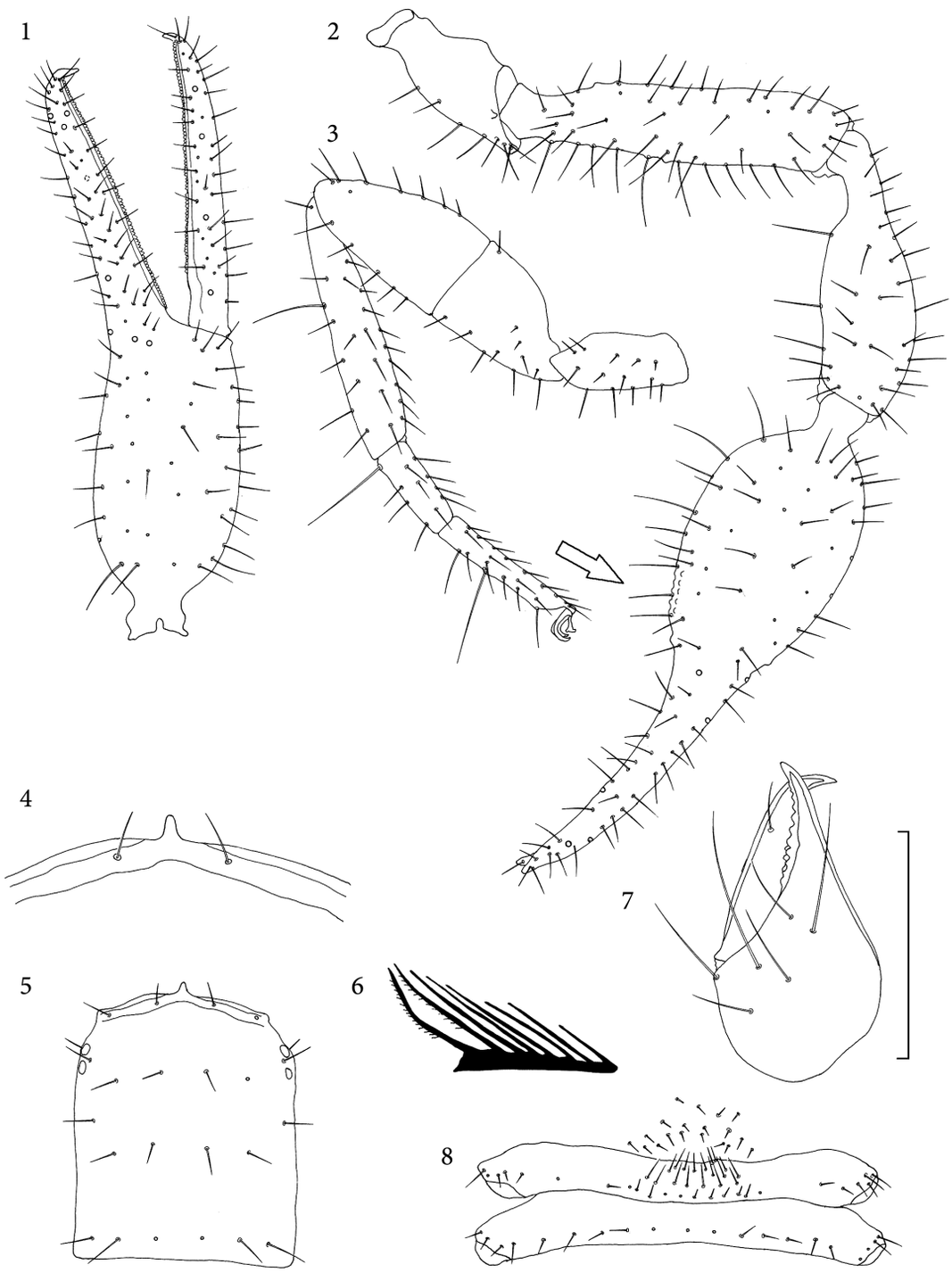
NEOBISIUM YOZGATI ĆURČIĆ & SEYYAR, NEW SPECIES (Figs. 1-8; Table 1)

Specimens examined. – Holotype male, from Yozgat, Province of Yozgat, Turkey, 11 October 2006, collected by Ayşe Toluk (from piny mixed litter and soil, 1540 m); and paratype male, same collecting data.

Etymology. – After the Province of Yozgat, its *terra typica*.

Description. – Anterior carapacal margin slightly convex; epistome small, tubercular (Figs. 4, 5). Two pairs of eye-spots are presented. Setal carapacal formula: 4 + 8 + 6 + 6 = 24 setae (Fig. 5). Carapace reticulate throughout. Tergite setation: 8-9-9-11-11-11-10-10-9-8. Sternite II with 19 median and posterior setae (Fig. 8). Sternite III with 18 anterior, 14 posterior and five suprastigmatic microsetae on either side (Fig. 8). Sternite IV with 12 posterior setae and four small setae on either side of stigma. Sternites V-X with 14-14-13-13-13-11 setae. Twelfth abdominal segment with two pairs of small setae. Pleural membranes granulostriate.

Cheliceral galea rounded and barely visible (Fig. 7). Fixed chelicelar finger with six long setae, mov-



Figs. 1-8. *Neobisium yozgati* n. sp., from Turkey. Holotype male: 1 - pedipalpal chela, 2 - pedipalp, 3 - leg IV, 4 - epistome, 5 - carapace, 6 - flagellum, 7 - chelicera, 8 - male genital area. Please note the open arrow (Fig. 2) indicating pedipalpal chelal palm granulations. Scale = 0.25 (Figs. 4, 6, and 8) and 0.50 mm (Figs. 1-3, 5, and 7).

Table 1. Linear measurements (in millimetres) and morphometric ratios in *Neobisium yozgati* n. sp., from Turkey. Abbreviations: MM = males.

Character/sex	MM
Body	
Length (1)	3.86-4.00
Cephalothorax	
Length (2)	1.13-1.25
Breadth (2a)	0.87-0.99
Abdomen	
Length	2.61-2.87
Chelicerae	
Length (3)	0.65-0.66
Breadth (4)	0.35-0.36
Length of movable finger (5)	0.42-0.43
Ratio 3/5	1.53-1.55
Ratio 3/4	1.83-1.86
Pedipalps	
Length with coxa (6)	6.215-6.64
Ratio 6/1	1.61-1.66
Length of coxa	0.845-0.88
Length of trochanter	0.77-0.815
Length of femur (7)	1.40-1.54
Breadth of femur (8)	0.295-0.36
Ratio 7/8	4.53-4.745
Ratio 7/2	1.23-1.24
Length of patella (tibia) (9)	1.20-1.31
Breadth of patella (tibia) (10)	0.39-0.42
Ratio 9/10	3.08-3.12
Length of chela (11)	2.435-2.67
Breadth of chela (12)	0.65-0.73
Ratio 11/12	3.66-3.73
Length of chelal palm (13)	1.17-1.345
Ratio 13/12	1.80-1.84
Length of chelal finger (14)	1.25-1.32
Ratio 14/13	0.98-1.07
Leg IV	
Total length	4.73-4.90
Length of coxa	0.60-0.65
Length of trochanter (15)	0.57-0.58
Breadth of trochanter (16)	0.23-0.24
Ratio 15/16	2.375-2.52
Length of femur + patella (17)	1.27-1.33
Breadth of femur + patella (18)	0.43-0.44
Ratio 17/18	2.95-3.02
Length of tibia (19)	1.18-1.24
Breadth of tibia (20)	0.20-0.23
Ratio 19/20	5.39-5.90
Length of metatarsus (21)	0.43-0.44
Breadth of metatarsus (22)	0.13-0.15
Ratio 21/22	2.87-3.38
Length of tarsus (23)	0.66-0.68
Breadth of tarsus (24)	0.11
Ratio 23/24	6.00-6.18
TS ratio - tibia IV	0.40-0.43
TS ratio - metatarsus IV	0.12-0.17
TS ratio - tarsus IV	0.37-0.39

able finger with one such seta (Fig. 7). Flagellum of eight blades, only two distal blades pinnate anteriorly; other flagellar setae smooth and acuminate, diminishing in side from distal to proximal. Dentition of cheliceral finger as in Fig. 7.

Manducatory process (apex of pedipalpal coxa) with five long setae. Pedipalpal trochanter with a single tubercle, almost all pedipalpal articles smooth and elongated (Figs. 1, 2). Pedipalpal femur and tibia dilated distally; pedipalpal chelal palm widest at its mid-line (Fig. 2; dorsal view). Some tiny granulations occur on chelal palm, at its interior and distal part (Fig. 2: note the open arrow). Pedipalpal fingers as long as chelal palm (Table 1). Fixed chelal finger with 79 asymmetrical, small and contiguous teeth; movable chelal finger with 71 small and close teeth, which eventually become rounded, low and small. Fixed chelal finger with eight trichobothria, and movable finger with four such setae. Trichobothriotaxy as in Fig. 1.

Tibia IV with a single seta, metatarsus IV with one, and tarsus IV with two long setae (Fig. 3; Table 1). The disposition of these setae is subject of some variation.

Morphometric ratios and linear measurements are presented in Table 1.

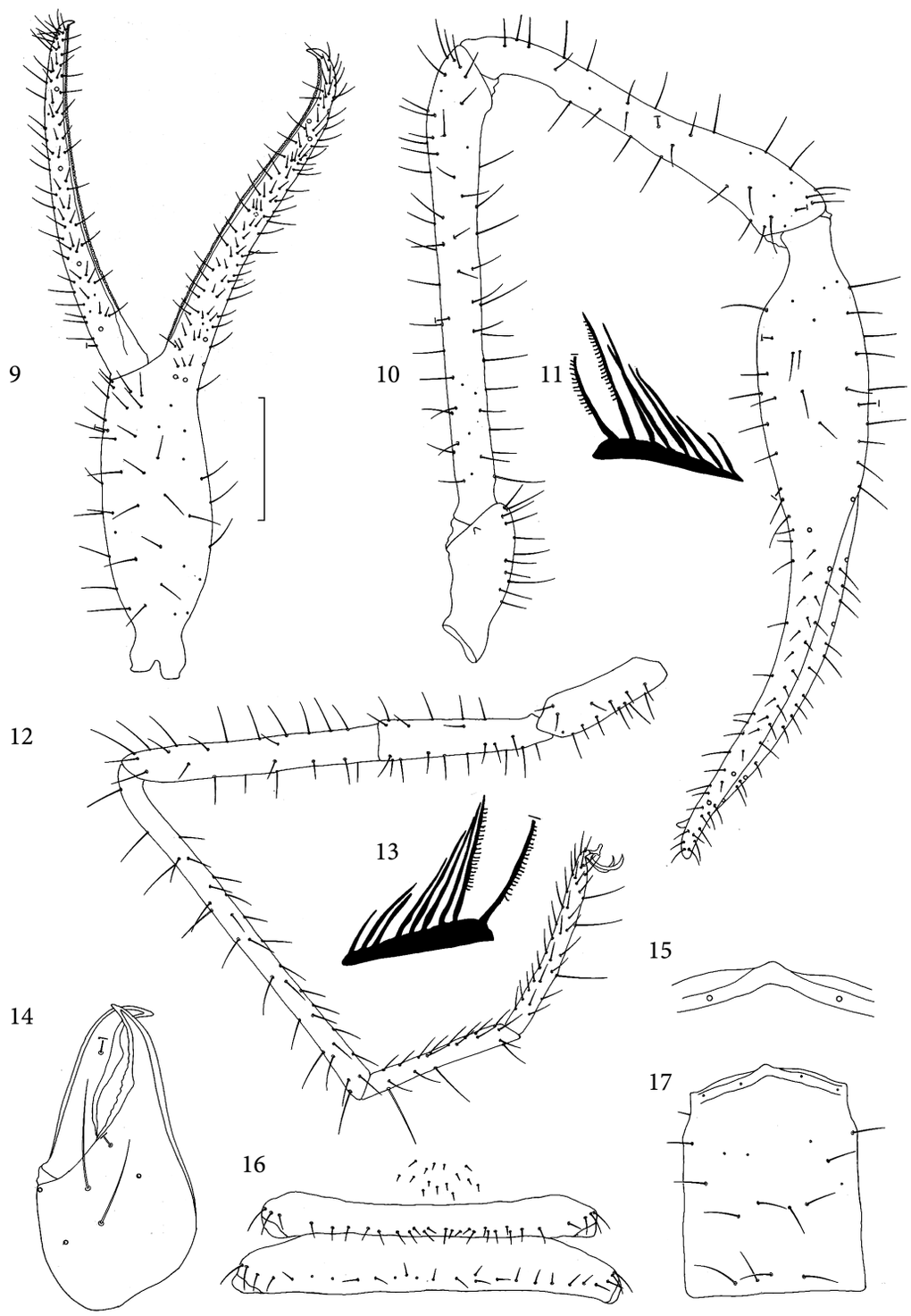
Differential diagnosis. – Compared to *N. granulatum* Beier, the new species differs in body form, form of pedipalpal articles, the presence/absence of granulations on the pedipalpal femur, the presence/absence of granulations on pedipalpal chelal palm, and in many morphometric ratios and linear measurements (Table 1; Ćurčić, 1984).

NEOBISIUM ANAISAE ĆURČIĆ & LEMAIRE, NEW SPECIES (Figs. 9-17; Table 2)

Specimen examined. – Holotype male from the cave Krapa 1, near village of Krapa (-150 m) Macedonia (FYROM), collected by Anaïs Carlin, 20 August 2008.

Etymology. – After the name of its collector.

Description. – Frontal carapacal margin only slightly convex; epistome small, tubercular and rounded



Figs. 1-8. *Neobisium anaisae* n. sp., from Macedonia (FYROM). Holotype female: 9 - pedipalpal chela, 10 - pedipalp, 11 - flagellum, 12 - leg IV, 13 - flagellum, 14 - chelicera, 15 - epistome, 16 - female genital area, 17- carapace. Scale = 0.25 (Figs. 11, 13, 15, and 16) and 0.50 mm (Figs. 9, 10, 12, 14, and 17).

Table 2. Linear measurements (in millimeters) and morphometric ratios in *Neobisium anaisae* n. sp. (ALA), *N. princeps* Ćurčić (PRI), *N. karamani* (Hadži) (KAR), *N. korabense* Ćurčić (KOR), *N. maksimtodorovici* Ćurčić, Dimitrijević & Mihajlova (MAK), *N. golemanskyi* Ćurčić & Dimitrijević (GOL), *N. tzarsamueli* Ćurčić & Dimitrijević (TZA), *N. vladimirpantici* Ćurčić (VLA), and *N. ohridanum* Hadži (OHR). Abbreviations: FH = holotype female, TH = holotype tritonymph, and MH = holotype male.

Character/species	ALA FH	PRI FH	KAR FH	KOR FH	MAK TH	GOL FH	TZA FH	VLA FH	OHR MH
Body									
Length (1)	**5.75**	4.42	3.68	4.23-4.425	3.45-3.63	3.64	4.50	6.16	3.55
Cephalothorax									
Length (2)	**1.885**	1.30	1.28	1.21-1.27	0.845-0.85	1.15	1.18	1.32	1.00
Breadth (2a)	**1.46**	0.93	0.98	0.96-1.00	0.68-0.72	0.88	0.89	1.05	0.75
Abdomen									
Length	**3.86**	3.12	2.40	3.02-3.155	2.60-2.78	2.49	3.32	4.84	2.55
Chelicerae									
Length (3)	**1.28**	0.89	0.93	0.75-0.85	0.60-0.62	0.825	0.835	0.97	0.60
Breadth (4)	**0.66**	0.425	0.42	0.42-0.425	0.30-0.315	0.41	0.40	0.46	-
Length of movable finger (5)	**0.75**	-	0.57	0.56-0.62	0.38-0.42	0.55	0.51	0.65	0.38
Ratio 3/5	1.71	2.09	2.21	1.76-2.02	1.48-1.58	1.50	1.64	1.49	-
Ratio 3/4	1.94	-	1.63	1.34-1.435	1.87-2.00	2.01	2.09	2.11	1.58
Pedipalps									
Length with coxa (6)	**15.475**	12.565	9.65	8.63-8.485	6.52-6.68	9.25	10.785	11.37	5.40
Ratio 6/1	2.69	2.84	2.62	1.95-2.025	1.84-2.08	2.60	2.40	1.84	1.52
Length of coxa	**1.345**	0.99	0.65	0.93-0.97	0.59-0.62	0.73	0.87	0.98	-
Length of trochanter	**1.42**	0.93	0.91	0.93-0.95	0.61-0.65	0.74	0.825	1.50	0.69
Length of femur (7)	**3.88**	3.05	2.35	1.85-1.98	1.49-1.55	2.19	2.58	2.63	1.60
Breadth of femur (8)	**0.46**	0.27	0.25	0.35-0.36	0.19-0.20	0.20	0.24	0.295	0.25
Ratio 7/8	8.43	11.30	9.40	5.14-5.66	7.45-8.16	10.95	10.75	8.915	6.40
Ratio 7/2	2.06	2.35	1.835	1.53-1.56	1.41-1.82	1.90	2.19	1.99	1.60
Length of patella (tibia) (9)	3.30	2.76	2.00	1.605-1.68	1.21-1.26	1.98	2.30	2.27	1.20
Breadth of patella (tibia) (10)	0.54	0.32	0.38	0.40-0.41	0.23-0.24	0.24	0.285	0.40	0.32
Ratio 9/10	6.11	8.625	5.26	4.01-4.10	5.25-5.35	8.25	8.07	5.675	3.75
Length of chela (11)	**5.53**	4.835	3.74	3.09-3.13	2.60	3.60	4.21	4.49	2.75
Breadth of chela (12)	**0.96**	0.41	0.70	0.64-0.75	0.40-0.41	0.60	0.40	0.68	0.55
Ratio 11/12	5.76	11.79	5.34	4.57-4.89	6.34-6.50	6.00	10.525	6.60	5.00
Length of chelal palm (13)	**2.36**	1.955	1.50	1.37-1.43	0.98-1.00	1.47	1.74	1.71	1.05
Ratio 13/12	**2.46**	4.77	2.14	2.12-2.14	2.44-2.45	2.45	4.30	2.51	1.91
Length of chelal finger (14)	**3.17**	2.88	2.24	1.67-1.76	1.60-1.62	2.13	2.465	2.78	1.70
Ratio 14/13	1.34	1.47	1.49	1.17-1.28	1.60-1.65	1.45	1.42	1.625	1.62
Leg IV									
Total length	**11.73**	8.915	6.21	5.41-5.54	4.26-4.28	6.745	7.62	8.005	3.51
Length of coxa	**1.00**	0.65	0.48	0.63-0.69	0.37-0.40	0.59	0.70	0.56	-
Length of trochanter (15)	**1.14**	0.82	0.59	0.36	0.46	0.71	0.78	0.87	-
Breadth of trochanter (16)	0.35	0.26	-	0.60-0.64	0.16-0.17	0.22	0.21	0.28	-
Ratio 15/16	3.26	3.15	-	0.22	2.71-2.875	3.23	3.71	3.11	-
Length of femur + patella (17)	**3.62**	2.71	1.88	2.73	1.24-1.26	1.97	2.35	2.35	-
Breadth of femur + patella (18)	**0.34**	0.20	-	1.52	0.18	0.23	0.20	0.275	-
Ratio 17/18	10.65	13.55	-	0.25-0.28	6.89-7.00	8.55	11.75	8.545	-
Length of tibia (19)	**3.05**	2.455	1.72	5.43-6.08	1.09-1.10	1.905	2.08	2.19	-
Breadth of tibia (20)	**0.23**	0.16	-	1.42-1.45	0.10-0.11	0.12	0.13	0.14	-
Ratio 19/20	13.26	15.34	-	0.17	10.00-10.90	15.875	16.00	15.64	-
Length of metatarsus (21)	**1.40**	0.93	0.74	8.35-8.53	0.43	0.65	0.67	0.825	-
Breadth of metatarsus (22)	**0.17**	0.14	-	0.49-0.52	0.04	0.11	0.12	0.13	-
Ratio 21/22	**8.235**	6.64	-	0.13	4.78	5.81	5.58	6.35	-
Length of tarsus (23)	**1.52**	1.35	0.80	3.77-4.00	0.64-0.66	0.93	1.04	1.21	-
Breadth of tarsus (24)	**0.16**	0.12	-	0.72-0.75	0.10	0.09	0.10	0.11	-
Ratio 23/24	9.50	11.25	-	0.125-0.13	6.40-6.60	10.33	10.40	11.00	-
TS ratio - tibia IV	0.25	-	-	5.54-6.00	0.25-0.35	0.33	0.32	0.31	-
TS ratio - metatarsus IV	0.19	-	-	0.33-0.39	0.15-0.17	0.13	0.40	0.11	-
TS ratio - tarsus IV	**0.20**	-	-	0.13-0.17	0.44-0.45	0.23	2.039	0.16	-
	0.375			0.35-0.37		0.54		0.59	

(Figs. 15, 17). Neither eyes nor eye-spots are developed. Setal carapacal formula: 4 + 6 + 4 + 4 = 18 setae. One or two preocular microsetae are found on either carapacal side.

Tergite setation 5-4-4-4-6-6-5-6-8-7-7. Sternite II with 15 median and posterior setae (Fig. 16). Sternite III with 23 posterior setae and three suprastigmatic microsetae along each side (Fig. 16). Sternite IV with 20 posterior setae and three microsetae on either side. Sternites V-X: 21-21-18-17-15-14 setae. Twelfth abdominal segment with two pairs of small setae. Pleural membranes granulostriate.

Cheliceral galea only barely visible (Fig. 14). Cheliceral dentition as in Fig. 14. Cheliceral palm with six long setae, movable finger with one such seta. Flagellum eight- or nine-bladed (Figs. 11, 13). Only two distal blades are pinnate anteriorly; other flagellar setae smooth and acuminate, diminishing in size from distal to proximal.

Apex of pedipalpal coxa (manducatory process) with five long setae. All pedipalpal articles smooth and elongated (Figs. 9, 10). Pedipalpal femur and tibia dilated distally, pedipalpal chelal palm widest at its mid-line (Figs. 9, 10). Pedipalpal fingers considerably longer than chelal palm (Table 2). Fixed chelal finger with 159 asymmetrical, small and contiguous teeth; movable chelal finger with 121 small and close teeth which eventually become rounded, lower and smaller. Fixed chelal finger with eight trichobothria and movable chelal finger with four such sensitive setae. Trichobothriotaxy as in Fig. 9.

Tibia IV with a single seta, metatarsus IV with one and tarsus IV with two such long setae (Table 2).

Morphometric ratios and linear measurements are presented in Table 2.

Differential diagnosis. – From Table 2, it is clear that *N. anaisae* n. sp. is close to *N. ohridanum* Hadži, *N. korabense* Ćurčić, and *N. vladimirpantici* Ćurčić, all from different caves in Macedonia. The mentioned species complex share a common character: presence of two sensitive setae on tarsus IV (instead of one). However, these species are distinguished by many morphometric ratios and linear measurements (Table 1). Other Macedonian species of *Neobisium*, *N. princeps* Ćurčić, *N. karamani* (Hadži), *N. golemanskyi* Ćurčić & Dimitrijević, *N. maksimtodorovici* Ćurčić, Dimitrijević & Mihajlova, and *N. tzarsamueli* Ćurčić & Dimitrijević, differ significantly from *N. anaisae* n. sp. (Table 2) (Ćurčić et al., 2004, 2006).

Bold numbers in Table 2 represent character values of *N. anaisae* n. sp. which differ from those of all other cave *Neobisium* from Macedonia.

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NEOBISIUM YOZGATI N. SP. И *N. ANAISAE* N. SP. (NEOBISIIDAE, PSEUDOSCORPIONES) ИЗ ТУРСКЕ И МАКЕДОНИЈЕ (FYROM)

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Две нове врсте ендемичних и реликтних пећинских псеудоскорпија које припадају роду *Neobisium* Chamberlin су описане из Турске и Македоније (FYROM). Обе описане врсте су илустроване, дијагностификоване и детаљно описане. Оне представљају ендемичне и реликтне форме.