

Ann. Naturhist. Mus. Wien	97 B	131 - 138	Wien, November 1995
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On the identity of some cave representatives of *Roncus* L. KOCH, 1873, from the Balkan Peninsula

(Chelicerata: Pseudoscorpiones: Neobisiidae)

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Abstract

The type of *Roncus cyclopius* BEIER (Neobisiidae, Pseudoscorpiones) is redescribed. Three new synonymies are established: *Roncus anophthalmus* (ELLINGSEN) = *R. cyclopius* = *R. vulcanius vulcanius* BEIER = *R. vulcanius crassimanus* BEIER. In addition, a supplementary description of *R. parablothroides* HADŽI has been presented, based on specimens of "*R. parablothroides pittionii*" (Beier, unpublished).

Key words: Neobisiidae, *Roncus*, taxonomy, biogeography, evolution, revision, synonymy, cave fauna, Balkan Peninsula.

Zusammenfassung

Der Typus von *Roncus cyclopius* BEIER (Neobisiidae, Pseudoscorpiones) wird redeskribiert. Drei Namen werden neu synonymisiert: *Roncus anophthalmus* (ELLINGSEN) = *R. cyclopius* = *R. vulcanius vulcanius* BEIER = *R. vulcanius crassimanus* BEIER. Zusätzlich wird eine ergänzende Beschreibung von *Roncus parablothroides* HADŽI basierend auf drei Exemplaren von "*R. parablothroides pittionii*" (Beier, unveröffentlicht) präsentiert.

Introduction

During the study of some Balkan pseudoscorpions in the collections of the Naturhistorisches Museum in Vienna, we have examined the type of *Roncus cyclopius* BEIER and specimens of "*R. parablothroides pittionii*" (Beier, unpublished). The type of the former species is a female, collected by K. Absolon in the Vučija Pećina Cave (near Bihovo), in Hercegovina; the latter lot is represented by a series comprising a single male and two females, collected in a cave near Cerovo, Bulgaria.

The aim of the present paper is to present a redescription of both taxa, to define their precise taxonomic status, and to offer additional details on the external morphology of the species of *Roncus*. Furthermore, some taxonomic and biogeographic features of these species are discussed in view of the evolution of their subterranean populations.

All studied pseudoscorpion specimens were mounted on slides in Swan's fluid (gum chloral medium) and deposited in the collections of the Naturhistorisches Museum in Vienna (NMW).

All abbreviations of setal names are in accordance with BEIER (1932).

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Acknowledgements

Our sincere thanks are due to J. Gruber (Naturhistorisches Museum, Vienna) for the loan of the specimens considered herein and for the help with literature. Our gratitude is also extended to V. Mahnert (Museum d'Histoire Naturelle, Geneva) for his useful suggestions and valuable comments on the taxonomy of *Roncus*.

Roncus anophthalmus (ELLINGSEN, 1910)

(Figs. 1 - 6, Table 1)

Obisium (*Roncus*) *anophthalmum* ELLINGSEN, 1910: 395.

Roncus (*Parablothrus*) *cyclopius* BEIER, 1938: 8 (also on a label in a vial); BEIER, 1939: 76.

Roncus (*Parablothrus*) *vulcanius vulcanius* BEIER, 1939: 76, **syn.n.**

Roncus (*Parablothrus*) *vulcanius crassimanus* BEIER, 1939: 78, **syn.n.**

Specimen examined. – One female (NMW 17.456) from the Vučija Pećina Cave in Gluha Smokva (near Bihovo), Hercegovina, 1917; K. Absolon leg. (Biospeleologica balcanica, No. 704).

Description. – Epistome rounded (Fig. 4); neither eyes nor eye spots present. Anterior row with 4, ocular with 6, median and intermedian rows with 8, and posterior row with 6 setae (Fig. 1). Setal formula of carapace: 4 - 6, 24 (♀).

Tergites I and II each with 6 setae, tergite III with 10 setae; subsequent tergites (IV - X) each with 11 setae. Male genital area: unknown. Female genital area: sternite II with 11 small, irregularly clustered setae; sternite III with 14 setae and 3 microsetae along each stigma; sternite IV with 9 setae and 3 small suprastigmatic setae on either side. Setation of sternites V - X: 14 - 15 - 14 - 15 - 13 - 13.

Galea almost absent (Fig. 2). Cheliceral palm with 6 setae, movable finger with only 1 seta. Flagellum with 1 short proximal blade and 7 longer blades distally, characteristic of the genus *Roncus* (Fig. 3).

Right apex of pedipalpal coxa with 3, and left one with 4 setae. A small exterolateral tubercle on femur not visible; femur and tibia smooth; only chelal palm with few, almost inconspicuous and flattened tubercles on its interolateral side (Fig. 5). A single tiny tubercle present on laterodistal side of chelal palm. Group of microsetae proximal to trichobothria *eb* and *esb* not developed. Fixed chelal finger with 72, and movable chelal finger with 81 teeth. Sensillum between 33rd and 34th tooth (distal to *sb*).

Chelal fingers slightly shorter than chelal palm and shorter than pedipalpal femur. Trichobothrial pattern: *ist* slightly closer to *isb* than to *est*; *sb* closer to *b* than to *st*; *st* closer to *t* than to *sb*. Distribution of trichobothria as illustrated in Fig. 6.

Tibia IV, basitarsus IV, and telotarsus IV each with a long sensitive seta. Morphometric ratios and linear measurements are presented in Table 1.

Distribution. – Endemic species of Hercegovina (Vučija Pećina Cave).

Remarks. – This species was described by ELLINGSEN (1910) as *Obisium anophthalmum*, based on a single specimen of unknown sex, from south Hercegovina (but without the precise locality).

Since Ellingsen's description of *O. anophthalmum* was inadequate, BEIER (1932) re-described the species and transferred it into the genus *Roncus* L. KOCH, 1873; this rede-

scription was presumably based on some specimens (sex unknown!) other than the type, since the linear measurements of different body regions in the specimen examined by Beier are different than those given by ELLINGSEN (1910). Additionally, BEIER (1938) established a new species of *Roncus*, *R. cyclopius* BEIER, 1938, from the Vučija Pećina Cave in Hercegovina. Later, BEIER (1939) synonymized *R. cyclopius* with *R. anophthalmus* and redescribed the latter species after the single female (holotype of *R. cyclopius*), collected in 1917 in the Vučija Pećina Cave (near Bihovo, Hercegovina), by K. Absolon. However, since some variation in linear measurements was presented in that paper, it is evident that BEIER (1939) had analyzed more than a single specimen of *R. anophthalmus*. This is further supported by the fact that the pedipalps of *R. anophthalmus*, as figured by BEIER (1932: Fig. 155; 1939: Fig. 97), belong to different specimens, since these appendages differ in size, form, and setation. Finally, a subsequent description of the species (BEIER 1963) was based mostly on that by BEIER (1939).

One further item is worth mentioning. BEIER (1939) described *R. vulcanius* BEIER, 1939; the nominal subspecies of this cave species inhabits some caves in Hercegovina. However, the troglobitic subspecies *R. vulcanius crassimanus* BEIER, 1939, inhabits some caves on the Adriatic islands of Mljet (Meleda) and Šipun (Giuppana), now in Croatia. The comparative analysis of *R. anophthalmus* and *R. vulcanius vulcanius* (BEIER 1939, 1963) has shown a single character which might be used for distinguishing between the two taxa, i.e. the presence/absence of tiny granulations on the middle of the interolateral side of the pedipalpal femur (present in *R. vulcanius vulcanius* vs. absent in *R. anophthalmus*). However, since different characters (including surface sculpturing) in cave species of *Roncus* vary considerably (ĆURČIĆ & al. 1993), it is clear that *R. vulcanius vulcanius* is synonymous with *R. anophthalmus*. In addition, *R. vulcanius crassimanus* and *R. anophthalmus* show only slight distinctions in the form of the interior surface of their pedipalpal femora (Fig. 5; BEIER 1939: Figs. 95 - 97). In view of the noted intraspecific variability of the form and size of the pedipalpal articles in cave representatives of *Roncus* (ĆURČIĆ & al. 1993), we propose that *R. vulcanius crassimanus* is also synonymized with *R. anophthalmus*.

***Roncus parablothroides* HADŽI, 1937**

(Figs. 7 - 17, Table 1)

Roncus (Roncus) parablothroides HADŽI, 1937: 14.

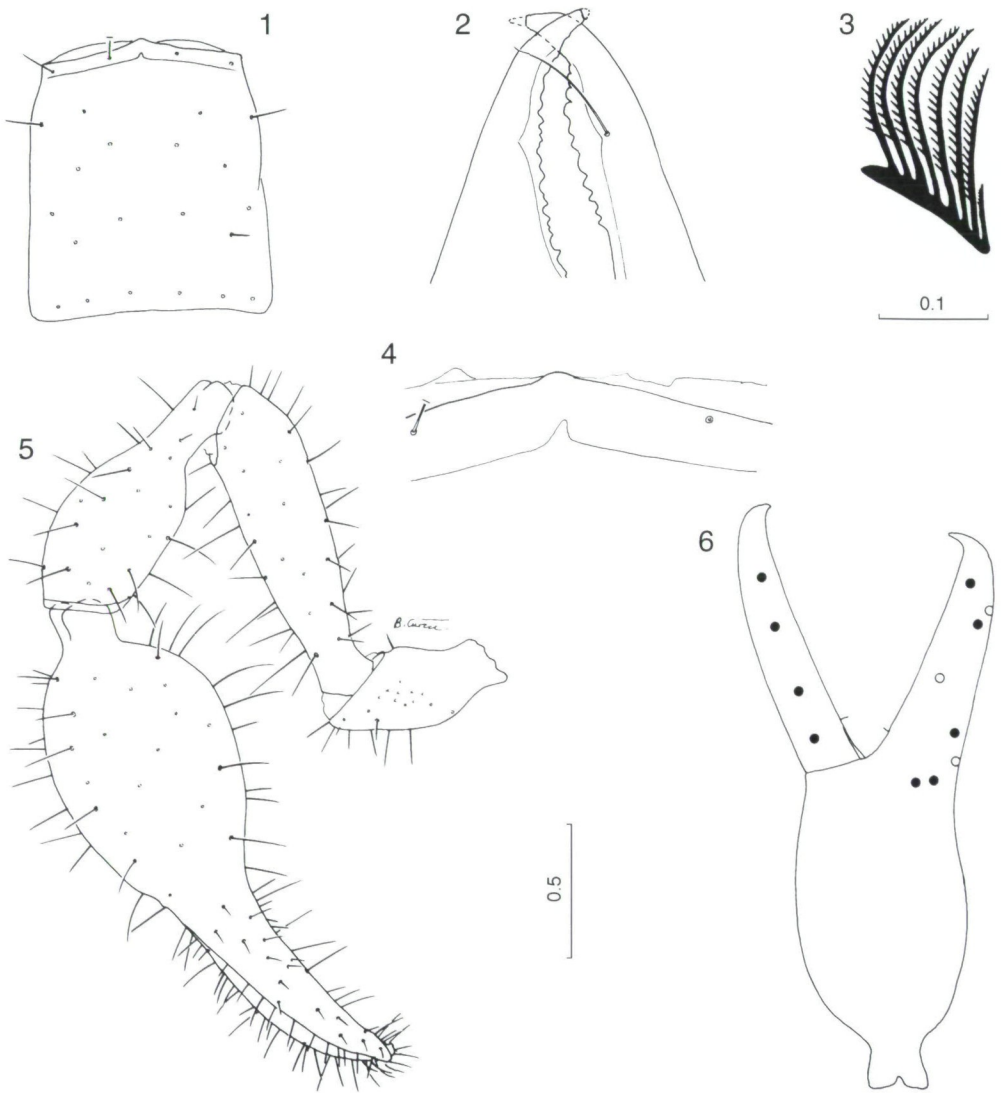
Roncus (Parablothrus) parablothroides pittionii (Beier, unpublished, on a label in a vial).

Roncus (Parablothrus) parablothroides: BEIER 1949: 6.

Specimens examined. – One male, and two females (NMW 17.457), from a cave near Cerovo, Bulgaria, "5.XI. 1940, 50m Tiefe, unter Steinen in der Nähe von Fledermausguano, leg. Pittioni" (labelled by Max Beier).

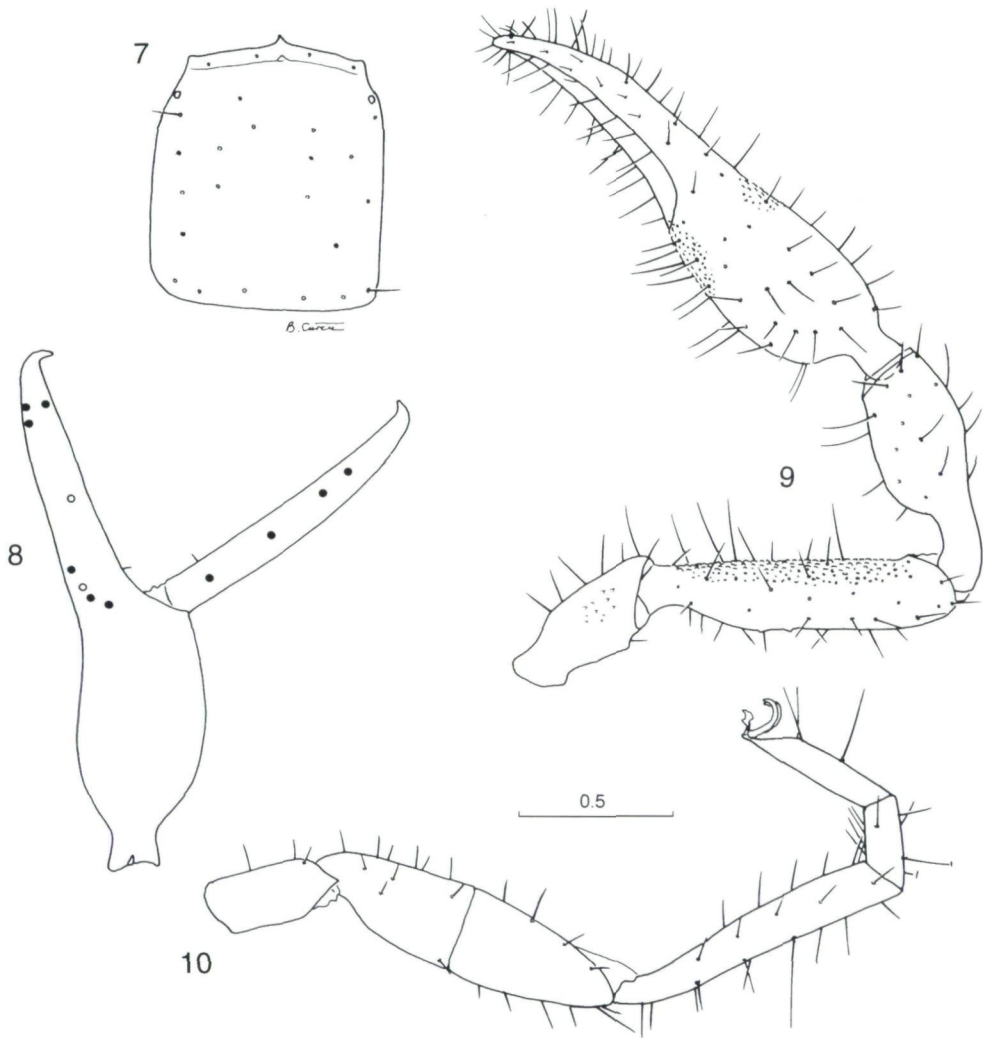
Description. – With 2 eye spots (Figs. 7, 11). Epistome triangular. Setal formulae: 4 + 5 + 4 + 4 + 2 + 6 = 25 (♂), 4 + 4 + 4 + 4 + 7 = 23 and 4 + 2 + 4 + 2 + 4 + 2 + 6 = 24 (♀); the basic pattern is probably: 4 + 6 + 2 + 4 + 2 + 6 = 24 setae.

Tergites I - X bearing 6 - 9 - 11 - 11 - 11 - 11 - 12 - 11 - 11 - 11 (♂), 8 - 10 - 10 - 11 - 11 - 11 - 11 - 11 - 11 (♂), and 6 - 8 - 10 - 11 - 11 - 10 - 11 - 10 - 10 - 9 setae (♀♀). Male genital area: sternite II with 22 small setae (of these, 12 setae in the form of a tri-



Figs. 1 - 6. *Roncus anophthalmus* (ELLINGSEN, 1910), female, from the Vučija Pećina Cave in Hercegovina. (1) carapace, (2) cheliceral fingers, (3) flagellum, (4) epistome, (5) pedipalp (trichobothria omitted), (6) pedipalpal chela (trichobothrial pattern). Scales in mm.

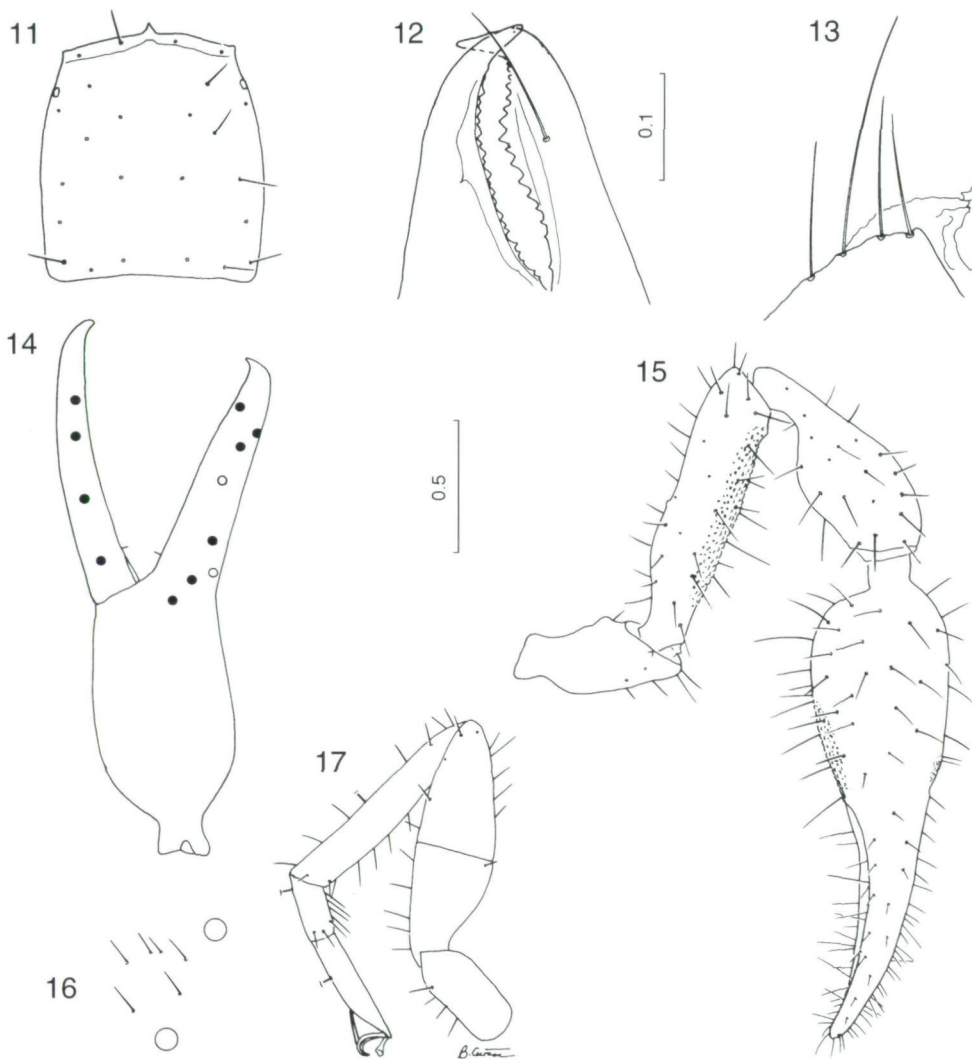
angle, and 10 setae along the posterior sternal border); sternite III with 5 anterior and 9 posterior setae and 3 suprastigmal microsetae on each side; sternite IV with 9 posterior setae and 2 or 3 small setae along each stigma. Female genital area: sternite II with 14 - 16 small setae (in form of an inverted T); sternite III with 13 posterior setae and 3 or 4 microsetae on each side; sternite IV with 10 or 11 posterior setae and 2 or 3 microsetae along each stigma. Sternites V - X each with 13 - 14 - 15 - 15 - 13 - 13 (♂), and with 14 - 15 - 14 - 13 - 13 - 13 and 12 - 13 - 13 - 13 - 12 - 11 setae (♀♀).



Figs. 7 - 10. *Roncus parablothroides* HADŽI, 1937, male, from a cave near Cerovo, Bulgaria. (7) carapace, (8) pedipalpal chela (trichobothrial pattern), (9) pedipalp (trichobothria omitted), (10) leg IV. Scale in mm.

Galea low and flattened (Fig. 12). Cheliceral palm with 7 or 8 setae (♂), or with 6 or 7 setae (♀♀); movable finger with one seta. Flagellum with 1 short proximal blade and 6 (or 7) longer blades distally, characteristic of the genus.

Apex of pedipalpal coxa with 4 long setae (Fig. 13). Femur with a small exterolateral tubercle and some interior and dorsal granulations; tibia tulip-shaped and smooth. Chelal palm with almost inconspicuous exterolateral granulations and well-developed interolateral ones (Figs. 9, 15). Fixed chelal finger with 67 (♂) and 65 - 70 teeth (♀♀). Movable chelal finger with 73 (♂) and 66 - 72 teeth (♀♀). Patch of microsetae proximal to *eb* and *esb* absent; some tiny setae distal to *eb-esb* present (Fig. 16). Single tubercle



Figs. 11 - 17. *Roncus parablothroides* HADŽI, 1937, female, from a cave near Cerovo, Bulgaria. (11) carapace, (12) cheliceral fingers, (13) apex of pedipalpal coxa, (14) pedipalpal chela (trichobothrial pattern), (15) pedipalp (trichobothria omitted), (16) microsetae distal to *eb-esb*, (17) leg IV. Scales in mm.

on laterodistal side of chelal palm present. Sensillum at level of 23rd tooth (♂), or at level of 21st to 24th tooth (♀♀), distal to *sb*.

Chelal palm elongate in dorsal view; its exterolateral side flattened and interolateral side convex. Chelal finger slightly longer than chelal palm, but shorter than pedipalpal femur. Pedipalpal femur almost as long as (or slightly shorter) than carapace. Trichobothrial pattern: *ist* closer to *est* than to *isb* (♀), or closer to *isb* than to *est* (♂); *sb* equidistant from *b* and *st*; *st* closer to *t* than to *sb* (Figs. 8, 14).

Table 1. Linear measurements (in mm) and morphometric ratios in *Roncus anophthalmus* (ELLINGSEN) from the Vučija Pećina Cave (Hercegovina), and in *R. parablothroides* HADŽI, from a cave near Cerovo (Bulgaria).

Character	<i>R. anophthalmus</i>	<i>R. parablothroides</i>	
	♀	♀♀	♂
Body			
Length (1)	3.09	3.53 – 3.625	3.04
Cephalothorax			
Length (2)	1.03	1.015 – 1.06	0.98
Breadth	0.91	0.84 – 0.88	0.795
Abdomen			
Length	2.06	2.47 – 2.61	2.06
Breadth	1.23	1.30 – 1.37	0.89
Chelicerae			
Length (3)	0.67	0.60 – 0.63	0.53
Breadth (4)	0.35	0.31 – 0.34	0.28
Length of movable finger (5)	0.49	0.39 – 0.46	0.36
Length of galea	0.003	0.01	0.01
Pedipalps			
Length with coxa (6)	5.97	5.395 – 5.655	4.905
Ratio 6/1	1.93	1.53 – 1.56	1.61
Length of coxa	0.82	0.75 – 0.81	0.74
Length of trochanter	0.70	0.65 – 0.69	0.59
Length of femur (7)	1.24	1.13 – 1.19	1.04
Breadth of femur (8)	0.33	0.27 – 0.29	0.24
Ratio 7/8	3.76	4.10 – 4.185	4.33
Ratio 7/2	1.20	1.07 – 1.17	1.06
Length of tibia (9)	1.02	0.91 – 0.95	0.83
Breadth of tibia (10)	0.41	0.36 – 0.38	0.31
Ratio 9/10	2.49	2.50 – 2.53	2.68
Length of chela (11)	2.19	1.955 – 2.015	1.705
Breadth of chela (12)	0.68	0.52 – 0.56	0.41
Ratio 11/12	3.22	3.60 – 3.76	4.16
Length of chelal palm (13)	1.14	0.94 – 0.98	0.80
Ratio 13/12	1.68	1.75 – 1.81	1.95
Length of chelal finger (14)	1.05	1.015 – 1.035	0.905
Ratio 14/13	0.92	1.06 – 1.08	1.13
Leg IV			
Total length	3.335	3.51 – 3.67	3.36
Length of coxa	0.58	0.51 – 0.53	0.51
Length of trochanter (15)	0.445	0.425 – 0.47	0.37
Breadth of trochanter (16)	0.22	0.205 – 0.23	0.18
Ratio 15/16	2.02	2.04 – 2.07	2.055
Length of femur (17)	0.98	0.95 – 0.96	0.90
Breadth of femur (18)	0.27	0.30 – 0.32	0.28
Ratio 17/18	3.63	3.00 – 3.17	3.21
Length of tibia (19)	0.55	0.85 – 0.92	0.84
Breadth of tibia (20)	0.14	0.14 – 0.15	0.14
Ratio 19/20	3.93	6.07 – 6.13	6.00
Length of basitarsus (21)	0.30	0.30 – 0.305	0.27
Breadth of basitarsus (22)	0.11	0.11 – 0.12	0.11
Ratio 21/22	2.73	2.50 – 2.77	2.45
Length of telotarsus (23)	0.48	0.47 – 0.49	0.47
Breadth of telotarsus (24)	0.11	0.10 – 0.11	0.10
Ratio 23/24	4.36	4.27 – 4.90	4.70
TS ratio – tibia IV	0.54	0.55 – 0.61	0.57
TS ratio – basitarsus IV	0.23	0.16 – 0.18	0.23
TS ratio – telotarsus IV	0.36	0.32 – 0.35	0.37

Tibia IV, basitarsus IV, and telotarsus IV each with a long tactile seta (Figs. 10, 17). Morphometric ratios and linear measurements are presented in Table 1.

Distribution. – Serbia, Macedonia, Greece, Bulgaria, Turkey, and Azerbaijan, epigean and in caves.

Remarks. – The specimens of *R. parablothroides* studied from Bulgaria differ from those inhabiting the type locality in the form of the chelal palm, in the degree of granulation of the pedipalpal articles, and in some morphometric ratios and measurements. Furthermore, ČURČIĆ & BERON (1981) noted that cave specimens of *R. parablothroides* from Bulgaria and Turkey exhibit more slender articles and greater number of teeth on pedipalpal chelae than the epigean individuals of the species.

However, all these differences represent the result of intraspecific variation, as was already pointed out by ČURČIĆ & BERON (1981).

Concluding remarks

From the biogeographical point of view, it is clear that *R. anophthalmus* and *R. parablothroides* originated from the old Balkanic fauna of pseudoscorpions. Both taxa are autochthones, and they probably represent relict forms. This supports the view that the Balkan Peninsula (including Hercegovina and Bulgaria) represents the main refugium of a previously existing and varied fauna of Mediterranean pseudoscorpions (ČURČIĆ 1988, ČURČIĆ & al. 1994).

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Zeitschrift/Journal: [Annalen des Naturhistorischen Museums in Wien](#)

Jahr/Year: 1995

Band/Volume: [97B](#)

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Artikel/Article: [On the identity of some cave representatives of Roncus L. Koch, 1873, from the Balkan Peninsula \(Chelicerata: Pseudoscorpiones: Neobisiidae\). 131-138](#)