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# *NEOBISIUM RAJKODIMITRIJEVICI* N. SP. (NEOBISIIDAE, PSEUDOSCORPIONES), A NEW FALSE SCORPION FROM A CAVE IN EASTERN SERBIA

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*Abstract* – A new cave-dwelling species of pseudoscorpion belonging to the family Neobisiidae – *Neobisium rajkodimitrijevici* n. sp. – is described from the Rajkova Pećina Cave near Majdanpek in Eastern Serbia. A diagnosis of the new species is presented. This taxon is a relict and endemic to the area studied. Additionally, some taxonomic, biogeographical, and phoretic traits of the new species are discussed in the light of evolution of the karst relief of the Balkan Peninsula.

Key words: Pseudoscorpions, Neobisiidae, *Neobisium rajkodimitrijevici*, endemism, phylogeny, phoresy, Serbia.

UDC 595.47(497.11-11 Rajkova Pećina Cave)

## INTRODUCTION

After thoroughly examining a sample of pseudoscorpions collected in 1980, we conclude that the two studied specimens (a male and a tritonymph) from the Rajkova Pećina Cave near Majdanpek in Eastern Serbia belong to a new endemic and troglophilic species, *Neobisium rajkodimitrijevici* n. sp., which is described below.

## MATERIAL AND METHODS

The type specimens of this new taxon (both the holotype male and the paratype tritonymph) were dissected and mounted on slides in 40% glycerol for further study; afterwards, they were transferred to permanent slides and kept in Swan's fluid (gum chloral medium).

Both the holotype male and the paratype tritonymph are deposited in the collection of the Center for Biospeleology, Institute of Zoology, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia and Montenegro (IZB 174-175).

## SYSTEMATIC PART

### NEOBISIIDAE J. C. CHAMBERLIN

### *NEOBISIUM* J. C. CHAMBERLIN

### *NEOBISIUM RAJKODIMITRIJEVICI* ĆURČIĆ, NEW SPECIES (Figs. 1-15; Table 1)

*Etymology*. — Named after Prof. Dr. Rajko Dimitrijević, our colleague and a well-known biospeleologist and ecologist.

*Specimens examined*. — Holotype male and paratype tritonymph from the Rajkova Pećina Cave near Majdanpek in Eastern Serbia, collected on 13 April 1980 by B.P.M. Ćurčić.

*Description*. — Carapace considerably longer than broad; epistome small and knob-like (Figs. 4, 5, 12, 13). The midregion of the anterior carapacal margin is slightly concave. Eyes reduced, posterior ones almost spot-like; preocular setae absent (Fig. 5). Carapacal setal formulae: 4 + 6 + 6 + 6 = 22 (male) and 4 + 6 + 6 + 6 = 22 setae (tritonymph).

Tergite I-X setation: 6-7-9-9-9-10-9-9-9-9 (male) and 6-7-9-10-10-9-9-10-9-9 (tritonymph). Male genital area: sternite II with eight median and posterior setae, sternite III with seven anterior, 16 posterior and two microsetae on either side; sternite IV with 13 posterior setae and two or three microsetae along each stigma. Sternites V-X with 14-13-12-11-11-10 posterior setae each. Female genital area: unknown.

Table 1. Linear measurements (in millimetres) and morphometric ratios in *Neobisium rajkodimitrijevici* n. sp. (from East Serbia). Abbreviations: M = male, T = tritonymph).

| Character | *N. rajkodimitrijevici* | |
|---|---|---|
| | M | T |
| Body | | |
| Length (1) | 2.90 | 2.61 |
| Cephalothorax | | |
| Length (2) | 0.68 | 0.61 |
| Breadth (2a) | 0.59 | 0.53 |
| Ratio 2/2a | 1.12 | 1.15 |
| Abdomen | | |
| Length | 2.22 | 2.00 |
| Chelicerae | | |
| Length (3) | 0.53 | 0.43 |
| Breadth (4) | 0.23 | 0.22 |
| Length of movable finger (5) | 0.315 | 0.275 |
| Ratio 3/5 | 1.68 | 1.56 |
| Ratio 3/4 | 2.12 | 1.95 |
| Pedipalps | | |
| Length with coxa (6) | 4.96 | 3.27 |
| Ratio 6/1 | 1.71 | 1.25 |
| Length of coxa | 0.63 | 0.48 |
| Length of trochanter | 0.52 | 0.38 |
| Length of femur (7) | 1.08 | 0.67 |
| Breadth of femur (8) | 0.20 | 0.18 |
| Ratio 7/8 | 5.40 | 3.72 |
| Ratio 7/2 | 1.59 | 1.10 |
| Length of patella (tibia) (9) | 0.76 | 0.48 |
| Breadth of patella (tibia) (10) | 0.24 | 0.20 |
| Ratio 9/10 | 3.17 | 2.40 |
| Length of chela (11) | 1.97 | 1.26 |
| Breadth of chela (12) | 0.38 | 0.32 |
| Ratio 11/12 | 5.18 | 3.94 |
| Length of chelal palm (13) | 0.77 | 0.62 |
| Ratio 13/12 | 2.03 | 1.94 |
| Length of chelal finger (14) | 1.20 | 0.64 |
| Ratio 14/13 | 1.56 | 1.03 |
| Leg IV | | |
| Total length | 3.41 | 2.22 |
| Length of coxa | 0.42 | 0.33 |
| Length of trochanter (15) | 0.40 | 0.275 |
| Breadth of trochanter (16) | 0.16 | 0.14 |
| Ratio 15/16 | 2.50 | 1.96 |
| Length of femur + patella (17) | 0.94 | 0.62 |
| Breadth of femur + patella (18) | 0.22 | 0.20 |
| Ratio 17/18 | 4.27 | 3.10 |
| Length of tibia (19) | 0.78 | 0.50 |
| Breadth of tibia (20) | 0.11 | 0.11 |
| Ratio 19/20 | 7.09 | 4.545 |
| Length of metatarsus (21) | 0.37 | 0.21 |
| Breadth of metatarsus (22) | 0.09 | 0.08 |
| Ratio 21/22 | 4.11 | 2.625 |
| Length of tarsus (23) | 0.50 | 0.285 |
| Breadth of tarsus (24) | 0.08 | 0.08 |
| Ratio 23/24 | 6.25 | 3.56 |
| TS ratio - tibia IV | 0.35 | 0.45 |
| TS ratio - metatarsus IV | 0.15 | 0.14 |
| TS ratio - tarsus IV | 0.39 | 0.32 |

In the tritonymph, sternite II with only two median and posterior setae, sternite III with nine posterior setae and two or three microsetae along each stigma, and sternite IV with 12 posterior setae and two or three suprastigmatic microsetae on either side. Sternites V-X with 12-12-13-13-12-11 posterior setae each. Twelfth abdominal segment with two pairs of small setae. Pleural membranes granulostriate.

The galea is a low hyaline convexity (Figs. 8, 15). Fixed cheliceral finger with six setae, movable finger with a single seta (in both male and tritonymph; Figs. 8, 15). Galeal seta inserted slightly proximal to level of large tooth on movable finger. Cheliceral dentition as in Figs. 8 and 15. Flagellum seven-bladed; only two distalmost blades are pinnate along their anterior margins (Figs. 6, 14). Other blades short and acuminate, diminishing in size from distal to proximal.

Apex of pedipalpal coxa with five (male) and four (tritonymph) long and acuminate setae. Trochanter with one to three minute interior tubercles. Pedipalpal articles smooth and slender (Figs. 1, 2, 9, 10); femur and tibia dilated distally; chelal palm ovate (almost parallel-sided in lateral view; Figs. 1, 9), chelal fingers elongated, slightly bent inwards. Pedipalpal femur with a tiny exterior and lateral tubercle. Fixed chelal finger with 100 (male) or 89 teeth (tritonymph); these are subtriangular and somewhat pointed distally, but proximally they are close-set, narrower, and lower. A number of the most basal teeth are square-topped. Movable chelal finger with 87 (male) and 78 small teeth (tritonymph); these are pointed and subtriangular. Teeth of the movable finger do not reach the level of trichobothrium ***b***. Chelal fingers considerably longer than chelal palm. Pedipalpal femur shorter than chelal fingers, but longer than carapace (Table 1).

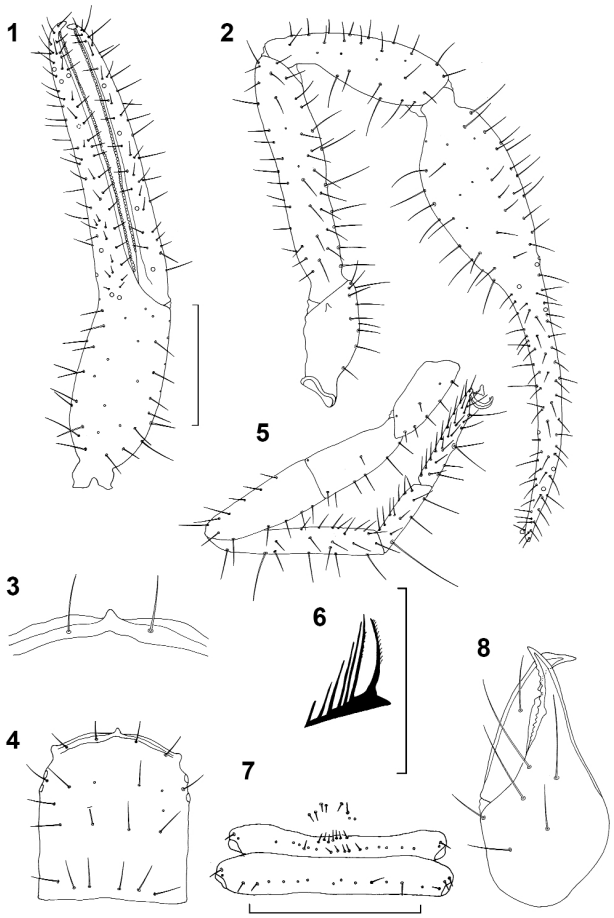
Disposition of trichobothria as presented in Figs. 1 and 9.

Anterior and median rim of coxa I with a protuberance carrying a few small chitinous points. Trochanteral foramen small and transparent apically. Articles of leg IV attenuated (Figs. 3, 11). Tibia IV, basitarsus IV, and telotarsus IV each with a single sensitive seta. Subterminal tarsal setae furcate, each branch with a few spinules (Table 1).

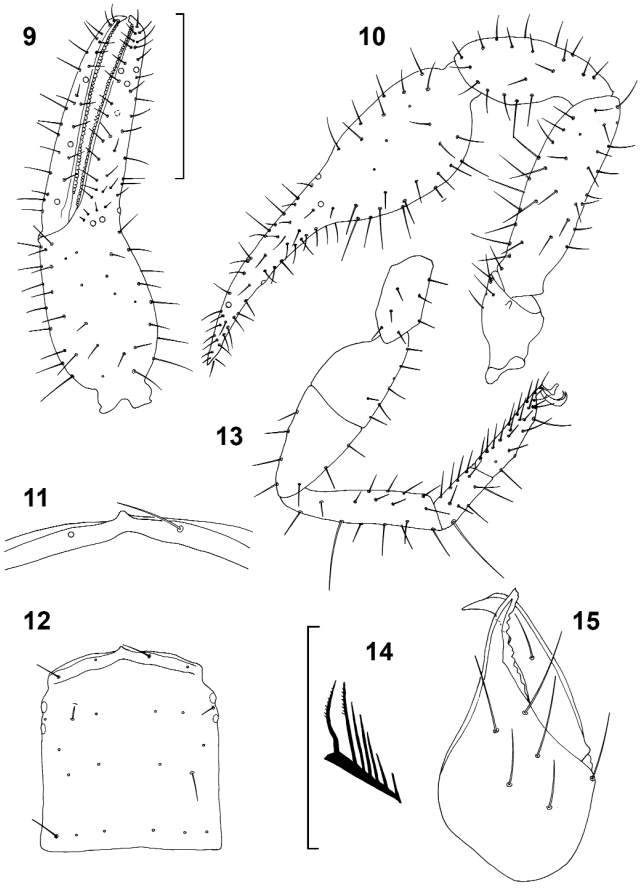
Morphometric ratios and linear measurements (in *mm*) are presented in Table 1.

*Differential diagnosis.* — From its phenetically close congener, *Neobisium carpaticum* Beier, 1934, *N. rajkodimitrijevici* n. sp. differs considerably in many important respects, such as: pedipalpal length in the male (4.18-4.72 *mm vs.* 4.96 *mm*) and the pedipalpal femur length to breadth ratio in the male (3.50-4.36 *vs.* 5.40) (B e i e r , 1963; Ć u r č i ć , 1977, 1982); the pedipalpal femur length to carapace length ratio in the male (1.31-1.36 *vs.* 1.59) and pedipalpal chela length to breadth ratio in the male (3.00-4.05 *vs.* 5.18) (B e i e r , 1963; Ć u r č i ć , 1977, 1982); and pedipalpal chelal palm length to breadth ratio of the male (1.48-1.72 *vs.* 2.03), the chelal finger length of the male (0.92-1.04 *mm vs.* 1.20 *mm*; B e i e r 1963; Ć u r č i ć 1977, 1982), the leg IV length in the male (2.905-3.32 *mm vs.* 3.41 *mm*), the femur IV + patella IV length to breadth ratio (2.87-3.35 *vs.* 4.27), and the tibia IV length to breadth ratio (4.63-6.00 *vs.* 7.09).

Additionally, the new species differs from *N. carpaticum* in the presence/absence of preocular setae (absent *vs.* present), in the number of setae on sternite II of the male (eight *vs.* 13-16), number of anterior setae on sternite III of the male (seven *vs.* 15-20), and number of teeth on the fixed (100 *vs.* 89) and movable (87 *vs.* 53-62) fingers of the male (B e i e r , 1963); in form of the chelal palm (lateral view) of the male (ovate *vs.* almost parallel-sided) and the presence/absence of smaller and larger teeth on the fixed finger of the male (absent *vs.* present) (B e i e r , 1963; Ć u r č i ć , 1977, 1982); and in the distribution area (Eastern Serbia *vs.* Romania) (B e i e r , 1963). We add that the opinion of B e i e r (1963) to the




Figs. 1-8. *Neobisium rajkodimitrijevici* n. sp., holotype male from the Rajkova Pećina Cave near Majdanpek in Eastern Serbia. 1 – pedipalpal chela; 2 – pedipalp; 3 – leg IV; 4 – epistome; 5 – carapace; 6 – flagellum; 7 – male genital area; 8 – chelicera. Scale lines = 0.50 *mm* (Figs. 1-3, 5, 7) and 0.25 *mm* (Figs. 4, 6, 8).




Figs. 9-15. *Neobisium rajkodimitrijevici* n. sp., paratype tritonymph from the Rajkova Pećina Cave near Majdanpek in Eastern Serbia. 9 – pedipalpal chela; 10 – pedipalp; 11 – leg IV; 12 – epistome; 13 – carapace; 14 – flagellum; 15 – chelicera. Scale lines = 0.50 *mm* (Figs. 9-11, 13) and 0.25 *mm* (Figs. 12, 14, 15).

effect that *N. carpaticum* lives in "South Serbia" (i.e. in the present-day Republic of Macedonia) is probably incorrect.

*Remarks.* — It is interesting to note that rhabditid nematodes were found attached to the bodies of both the holotype male and the paratype tritonymph. To our knowledge, this is the first report of nematode phoresy on cave pseudoscorpions, and its discovery will be treated in detail in the following paper.

*Distribution.* — Troglophilic; probably a Tertiary form endemic to the Carpathian Range in Serbia and therefore to the Balkan Peninsula.

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## *NEOBISIUM RAJKODIMITRIJEVICI* N. SP. (NEOBISIIDAE, PSEUDOSCORPIONES) НОВА ПЕЋИНСКА ПСЕУДОСКОРПИЈА ИЗ ИСТОЧНЕ СРБИЈЕ

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У овој студији описана је и дијагностификована нова пећинска врста необизидних псеудоскорпија - *Neobisium rajkodimitrijevici*, и то на основу анализе узорка из Рајкове пећине у околини Мајданпека, источна Србија. Ова форма је реликт и ендемит истраживаног подручја. даље, у раду су разматране неке таксономске, биогеографске и фаунистичке особености нове врсте у светлу еволуције карсног рељефа на Балканском полуострву.