



## A new pseudoscorpion genus from western Georgia (Pseudoscorpiones: Neobisiidae: *Cornuroncus* n. gen.), with a key to all Neobisiinae genera

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### Abstract

A new genus and species of epigeal pseudoscorpions belonging to the subfamily Neobisiinae Chamberlin, 1930, is described from western Georgia and its diagnostic characters are illustrated. *Cornuroncus* n. gen. resembles the genus *Roncus* L. Koch, 1873 in several characters but differs by having a short dorso-distal spine on tarsus IV, and the presence of a ventral tooth on one of the claws of tarsus IV. An identification key for all valid Neobisiinae genera is provided.

**Key words:** Arachnida, Caucasus, pseudoscorpions, new species, taxonomy

### Introduction

The pseudoscorpion family Neobisiidae Chamberlin, 1930 has a Holarctic distribution and comprises 32 valid genera in two subfamilies, the Microcreagrinae Balzan, 1892 (22 genera) and the Neobisiinae Chamberlin, 1930 (10 genera) (Harvey 2013; Hughes & Moore 2018). The subfamily Neobisiinae differs from the Microcreagrinae by the knob-like shape of the galea and the rather distal position of trichobothrium *ist* of the fixed chelal finger (Harvey 1992). However, the latter character is questionable (Harvey & Volschenk 2007; Zaragoza 2008) and the shape of the cheliceral galea (reduced to a sclerotized knob in Neobisiinae or elongated, simple or branched in Microcreagrinae) is more often used although even this character is variable (Hughes & Moore 2018; Murienne et al. 2008; Zaragoza 2008).

So far, three genera of the Neobisiinae have been reported from Georgia: *Microbisium* Chamberlin, 1930, *Neobisium* Chamberlin, 1930, and *Roncus* L. Koch, 1873 (Harvey 2013). Here, we add a new genus *Cornuroncus* n. gen. to this fauna that differs from the closely-related *Roncus* L. Koch, 1873 in a number of diagnostic characters, such the presence of a short dorso-distal spine on tarsus IV, and the presence of a ventral tooth on one the claws of tarsus IV. We also provide an identification key to the genera of the subfamily Neobisiinae which is prepared based on diagnostic characters previously published in literature.

### Material and methods

The specimens are from the western part of Georgia (Fig. 1) and were collected by hand from soil and leaf litter. All specimens were permanently mounted in Swan's fluid, examined with an Olympus CH-2 compound microscope, illustrated with a drawing tube attached to the microscope, and measured with an ocular graticule. Photographs were made using a digital camera (Canon PC1468). All specimens are deposited in the collection of Acarology Laboratory, Ilia State University, Tbilisi, Georgia (ISUTG). Measurements are expressed in millimeters (mm). The given

ratios are length/width for individual articles and the length/depth for legs; when two articles are compared, the ratio is the length/length index. Morphological terminology and measurements follow Chamberlin (1931), Harvey (1992), Harvey *et al.* (2012) and Judson (2007). Terminology of the chelal lyrifissures follows Zaragoza (2017).

*Abbreviations:* Trichobothriotaxy as in Chamberlin (1931); D: depth; *dds*: dorso-distal spine; *fa*: retrolateral lyrifissure of fixed chelal finger; *fb*: dorso-retrolateral lyrifissure of fixed chelal finger; *fd*: dorso-distal lyrifissure of fixed chelal finger; *fp*: prolateral lyrifissure of fixed chelal finger; L: length; *ma*<sub>1</sub>, *ma*<sub>2</sub>, *ma*<sub>3</sub>: retrolateral lyrifissures of movable chelal finger; *se*: sensillum; T: tactile seta; *vat*: ventral accessory tooth; W: width.

## Key to adult specimens of the Neobissinae genera

1. Chelal fingers with normal number of trichobothria (8 in fixed and 4 in movable chelal finger) . . . . . 2
- Chelal fingers with reduced number of trichobothria (6–7 in fixed and 2–3 in movable chelal finger) . . . . . 10
2. Movable chelal finger with some accessory teeth on the retrolateral face . . . . . *Roncobisium* Vachon, 1967
- Movable chelal finger without any accessory teeth on the retrolateral face . . . . . 3
3. Trichobothrium *t* located at same level as *st* . . . . . *Occitanobisium* Heurtault, 1978
- Trichobothrium *t* located distinctly distal to *st* . . . . . 4
4. Chelal hand with a sickle-shaped process at base of fixed chelal finger; most distal blade of rallum with 3–4 branchlets on its proximal branches . . . . . *Ernstmayria* Čurčić and Dimitrijević, 2006
- Chelal hand without a sickle-shaped process; most distal blade of rallum with some denticles or smooth . . . . . 5
5. Cheliceral rallum with 7–11 blades, only 2 distal blades denticulate, rarely all blades of rallum smooth . . . . . 6
- Cheliceral rallum with 7–9 blades, at least 4 distal blades denticulate . . . . . 7
6. Rallum with 11 blades, most of them on a high hyaline mound; metatarsus IV with 3–4 long tactile setae . . . . .
- . . . . . *Protoneobisium* Čurčić, 1988
- Rallum with 7–9 blades, only distal blades on a high hyaline mound; metatarsus IV with 1–2 long tactile setae . . . . .
- . . . . . *Neobisium* Chamberlin, 1930
7. Apex of pedipalp coxa with 3 long acuminate setae . . . . . *Trisetobisium* Čurčić, 1982
- Apex of pedipalp coxa with 4 or more acuminate setae . . . . . 8
8. 4–5 distal blades of rallum serrate, the others smooth and acuminate . . . . . *Novobisium* Muchmore, 1967
- All blades of rallum denticulate or the 2 most proximal blades simple and acuminate but the others denticulate . . . . . 9
9. Tarsus IV with a short dorso-distal spine; one of the claws of tarsus IV with a ventral tooth . . . . . *Cornuroncus* **n. gen.**
- Tarsus IV without a dorso-distal spine; claws of tarsus IV without a ventral tooth . . . . . *Roncus* L. Koch, 1873
10. Fixed chelal finger with 7 and movable chelal finger with 3 trichobothria . . . . . *Microbisium* Chamberlin, 1930
- Fixed chelal finger with 6 and movable chelal finger with 2 trichobothria . . . . . *Paedobisium* Beier, 1939

Note that the genera *Balkanoroncus* Čurčić, 1975 and *Parobisium* Chamberlin, 1930, listed by Harvey (2013) within the Neobisiinae are not included here. Some authors have placed *Balkanoroncus* in the Microcreagrinae (Čurčić 1975, 1987; Gardini 1982, 1998; Zaragoza 2008) and we agree with this decision. *Parobisium* has recently been transferred to the Microcreagrinae based on the results of molecular phylogenetic analyses (Hughes & Moore 2018).

## Systematics

### Superfamily Neobisioidea Chamberlin, 1930

#### Family Neobisiidae Chamberlin, 1930

#### Subfamily Neobisiinae Chamberlin, 1930

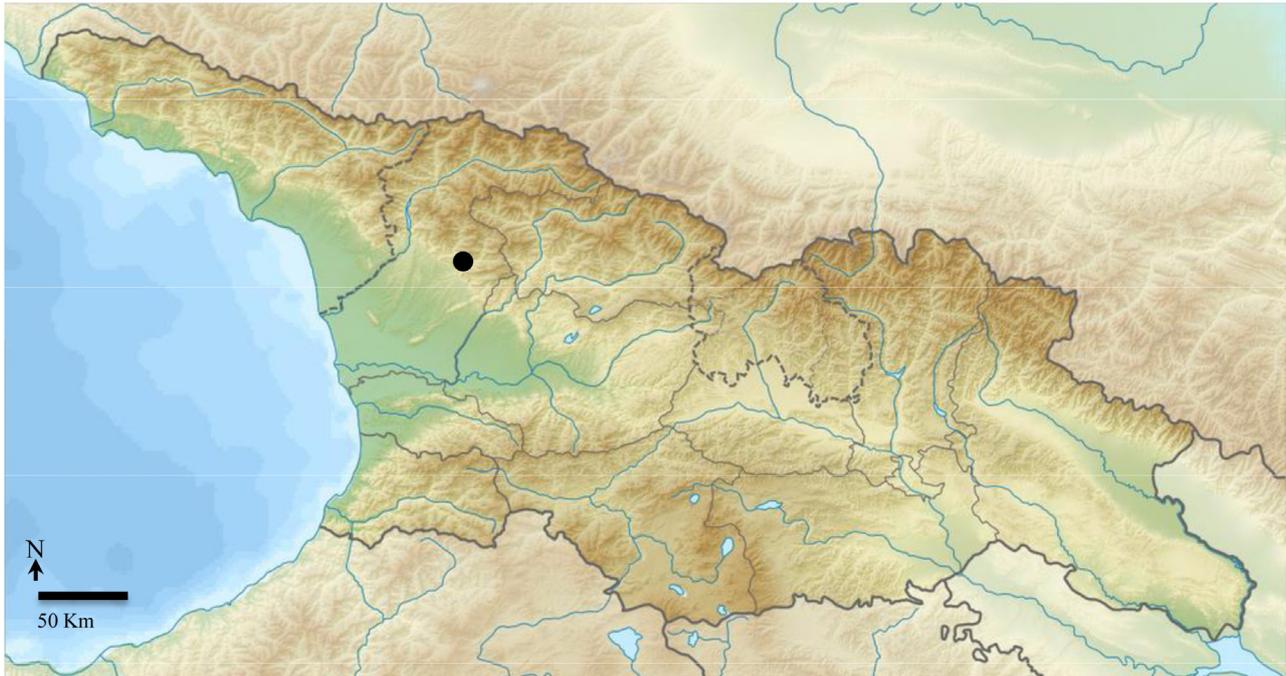
#### *Cornuroncus* Nassirkhani, Zaragoza & Mumladze **n. gen.**

**Diagnosis.** *Cornuroncus* can be distinguished from all other genera of the subfamily Neobisiinae by the following combination of characters: rallum with 7–8 denticulate blades that increase in length from proximal to distal and are located on a low hyaline base, the lack of processes on the chelal hand, chelal fingers without accessory teeth, trichobothrium *t* positioned distinctly distal to *st*, presence of a short dorso-distal spine on tarsus IV, and leg IV with an accessory tooth in ventral position on one of the claws.

**Type species.** *Cornuroncus chavchavadzei* Nassirkhani, Zaragoza & Mumladze **n. sp.**

**Etymology.** The generic name refers to the presence of a horn-like projection on the dorso-distal surface of tarsus IV, and the strong resemblance to *Roncus* (*Cornuroncus*, cornu + *Roncus*, Latin, cornu means “horn-shaped”).

**Description.** Carapace sub-quadrate, entirely smooth, with a distinct triangular epistome and one pair of eyes, posterior transverse furrow more or less visible. Tergites and sternites undivided and with smooth cuticle; sternites III–XI with marginal setae, without discal setae in both sexes, except in sternites II–III of males. Chaetotaxy of genital area: anterior genital operculum with 8–9 and posterior operculum with 12–14 short setae in females; anterior and posterior opercula with 31 setae in males. Pleural membrane granulate. Cheliceral rallum comprising one row of 7–8 denticulate blades on a low hyaline base, most proximal blade shortest. Pedipalp robust, dorsal face of trochanter without spiniform setae, trichobothria *eb*, *esb*, *ib*, and *isb* located at base of fixed chelal finger, trichobothrium *ist* situated proximal to middle of the finger. Tarsus IV with a short dorso-distal spine. One of the claws of leg IV with a ventral accessory tooth, the other claw smooth and without processes (Figs 14–16).



**FIGURE 1.** Type locality of *Cornuroncus chavchavadzei* n. sp. in western Georgia (black circle).

### *Cornuroncus chavchavadzei* n. sp.

(Figs 2–17)

**Material examined.** Holotype ♀, GEORGIA: Samegrelo-Zemo Svaneti region, 7 km north-east from the village Kurzu long near Tekhuri River, 42°36'N 42°20'E, 450 m; 20 July 2014; L. Mumladze leg. ISUPS2H; Paratypes: 2♀, 1♂ same data and repository as holotype (ISUPS2P1 – ISUPS2P2 – ISUPS2P3).

**Etymology.** This species is named in honor of Ilia Chavchavadze (1837–1907), who was the leader of the National Liberation Movement of Georgia.

**Description.** Female adults including holotype; male, when different, in square brackets.

Carapace (Fig. 2): brown, anterior half distinctly lighter in colour than posterior half; posterior border partially not sclerotized and pale; entirely smooth; slightly wider than long, widest at the middle, 0.88–0.95x longer than broad; with one pair of small eyes, lenses not flattened but lightly convexe, distance from anterior margin 0.087–0.093 mm, diameter of eyes 0.062–0.067 mm [0.050 mm]; with 24–26 setae, anterior margin with 4 and posterior margin with 6 setae, chaetotaxy: 4:8:6–8:6; a low posterior transverse furrow more or less distinct; epistome prominent but small, triangle-shaped and tip slightly rounded (length 0.017–0.020 mm, width 0.025–0.027 mm); glandular pores present, 3 on each side of ocular area; anterolateral corners without protuberances; with 5 lyrifissures, one pair situated in ocular zone and close to the eyes, one located in median zone, distal to posterior margin, and one pair located at the posterior margin.

Tergites: light brown with yellowish brown borders; without median suture line; slightly sclerotized; X with 4

tactile setae, lateral setae slightly shorter than lateromedian setae; chaetotaxy: 6:7-9:9-10:9-10:10-11:11:11:11:10-11:1T1T1T1T1:T1T1T1T:2 [6:5:9:9:11:11:11:11:9:1T1T1T1T1:T1T1T1T:2].

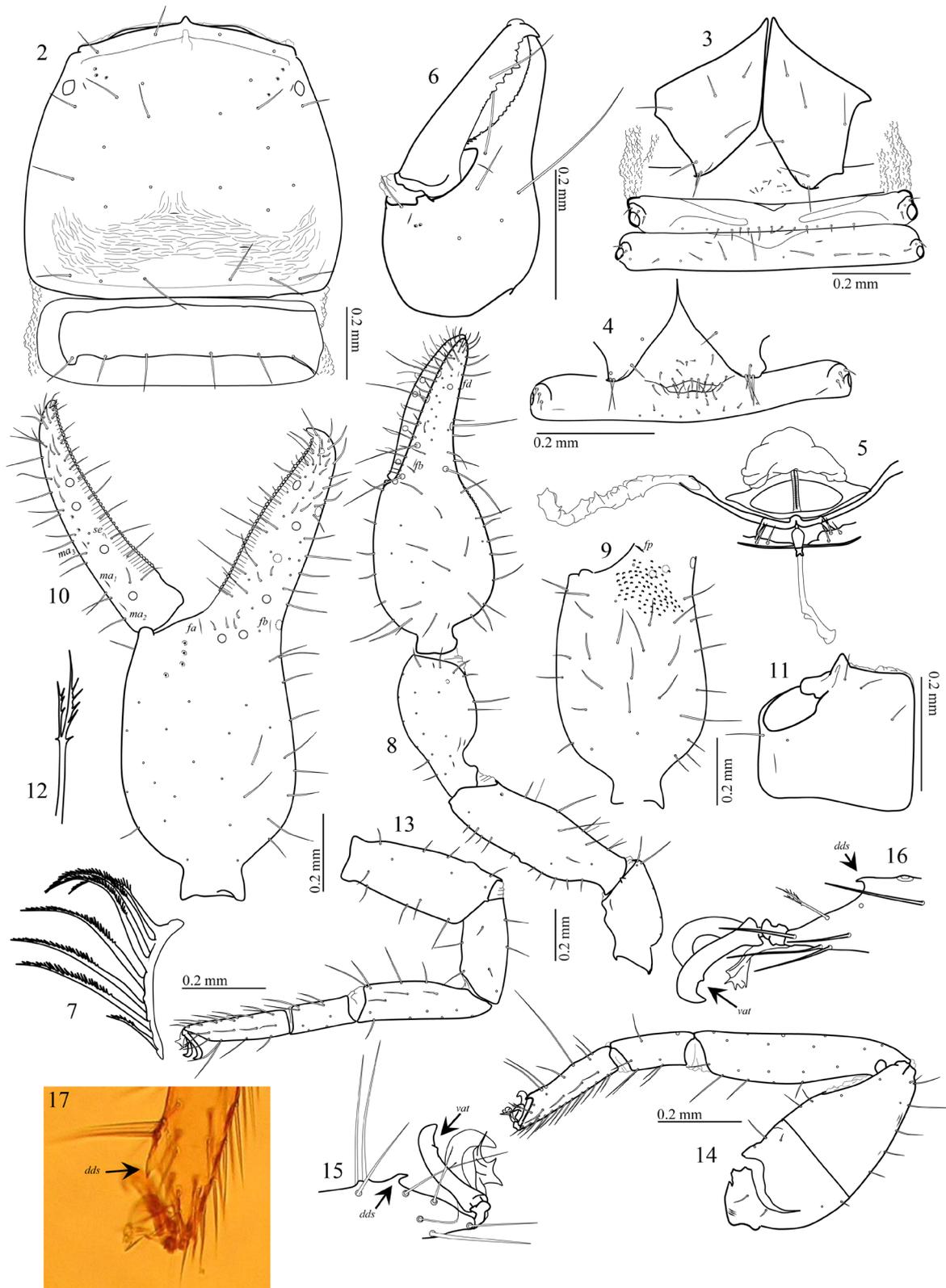
Sternites: lighter in colour than tergites, III-IV (Fig. 3) not uniformly coloured; entirely smooth; without median suture line; slightly sclerotized; in females, anterior genital operculum with 8-9 tiny microsetae mostly arranged in median zone, posterior operculum with 12-14 short setae in one row at posterior margin; in male, anterior and posterior opercula with 31 setae, 16 setae located around genital aperture (Fig. 4); cribriform plate of females extended from one side to the other side of sternite II along genital aperture; male genitalia damaged during mounting and not clearly visible, lateral genital sacs longer than median genital sac, genital opening with 3+3 internal setae (Fig. 5); chaetotaxy: 8-9:(3)12-14(3):(2-3)11-12(2):14:15:12-14:12:13-14:4T1T4-5T1T4:1T1T1-T2T:2 [3 microsetae on each stigmata of sternites III and IV, chaetotaxy IV-XII: 11:14:13:13:13:14:4T1T4:T1T:2].

Pleural membrane: granulate.

Chelicera: brown; hand with 6 acuminate setae; galea knob-shaped and with a distinct hyaline convexity in both sexes; subgaleal seta situated distal to middle (0.61-0.66), proximal to large median tooth; hand entirely smooth; fixed finger with 19-20 minute teeth reaching to base; movable finger with 11-13 teeth reaching to middle of the segment, median tooth distinctly larger than others (Fig. 7); serrula interior with 15-18 and serrula exterior with 21-26 blades; rallum with 7-8 denticulate blades on a low hyaline base, most proximal blade shortest (Fig. 7).

Pedipalps: reddish brown, chela slightly darker in colour than femur and patella; trochanter and patella entirely smooth, prolateral surface of distal half of femur finely granulated, prolateral surface of chelal hand distinctly granulated at base of fixed finger (Figs 8-9); coxa including manducatory process with 10-11 setae, manducatory process with 4 acuminate setae, seta located at base of manducatory process longest; trochanter with dorsal tubercle, L/W 1.81-1.91 [1.95]; femur with a short pedicel, one tubercle located medially at the retrolateral margin, one glandular pore located dorso-distally and another located ventro-distally; some long setae without enlarged alveoli located in basal half of the segment (Fig. 8), L/W 3.32-3.40 [3.40]; patella with short and stout pedicel, L = 0.18-0.19 mm; patella distinctly shorter than femur, with 3 lyrifissures situated basally and one lyrifissure more distally, one glandular pore located dorso-distally, L/W 1.90-2.07 [1.96]. Chela with pedicel L/W 2.56-2.73 [2.74], without pedicel 2.27-2.54 [2.48]; movable finger slightly shorter than hand with pedicel and slightly longer than hand without pedicel; hand with pedicel 1.12-1.16x [1.07x] longer than movable finger; movable finger 1.05-1.13x [1.11x] longer than hand without pedicel; hand with pedicel L/W 1.53-1.59 [1.59]; 4-5 microsetae located distal to trichobothria *eb-esb* [3] (Fig. 10); microsetae below trichobothria *eb-esb* absent; fixed finger with 3 lyrifissures: one (*fb*) located at same level as *ib*, one (*fa*) close to base in retrolateral view and one (*fd*) at same level of *et* in dorsal view; movable finger with 3 lyrifissures in retrolateral view: one (*ma*<sub>2</sub>) located at same level as trichobothrium *b*, one (*ma*<sub>1</sub>) between *b* and *sb*, and one (*ma*<sub>3</sub>) slightly distal to *sb*; one sensillum (*se*) located distal and very close to *sb*; fixed finger with 46-47 contiguous teeth, 4-5 distal teeth triangular in shape and the others rounded, reaching proximal of trichobothrium *isb*, all teeth with dental canal; movable finger with 46-49 contiguous rounded teeth slightly reduced in size from tip of the finger to its base, not reaching to the level of trichobothrium *b*, all teeth with dental canal; nodus ramosus of venom duct in fixed chelal finger short and situated distinctly distal to *et*. Trichobothriotaxy: fixed finger with 8 and movable finger with 4 trichobothria (Fig. 10); fixed finger with trichobothrium *it* located approximately midway between *et* and *est*, all three distal of the middle of finger, *ist* situated proximal to middle of the finger (0.39-0.40) and midway between *it* and *ib*, *isb* on retrolateral face, *ib* situated basally, *eb* and *esb* located slightly proximad to *ib*; movable finger with trichobothrium *st* situated distinctly closer to *t* than to *sb*, trichobothrium *sb* midway between *b* and *st*, distance *sb-st* distinctly longer than distance *st-t*.

Legs: light brown, smooth; coxa I with short, triangular, sclerotized and pointed anterolateral process, medial process not produced, mediolateral face with rounded membranous layer (Fig. 11); coxal chaetotaxy: 4-5:4-6:4:7-8; sub-terminal setae bifid, both branches distinctly denticulate (Fig. 12); claws of legs I-III symmetric; claws of leg IV ventrally asymmetric either with one small accessory tooth, the other smooth; arolia simple and shorter than claws. Leg I (Fig. 13): femur L/D 2.33-2.57 [2.28]; patella L/D 2.27-2.45 [2.60]; femur 1.33-1.40x [1.23x] longer than patella; tibia L/D 3.55-3.66 [3.33]; metatarsus L/D 2.28-2.42 [2.50]; tarsus L/D 4.00-4.17 [3.83]; tarsus 1.47-1.56x [1.53x] longer than metatarsus. Leg IV (Fig. 14): femur L/D 1.20 [1.19]; patella L/D 1.33-1.48 [1.48]; femur + patella L/D 2.08-2.72 [2.61]; tibia with a long tactile seta situated distal to middle (T=0.58-0.61), L/D 4.38-4.42 [4.38]; metatarsus with a long tactile seta situated basally (T=0.19-0.23), L/D 2.44-2.62 [2.55]; tarsus with a tactile seta situated proximal to middle (T=0.33-0.37), with a short dorso-distal spine (Figs 15-17), L/D 4.00-4.57 [4.00].



**FIGURES 2–17.** *Cornuronus chavchavadzei* n. sp., holotype ♀: 2–3, 6–15, 17, paratype ♂: 4–5, 16: 2. carapace, dorsal view; 3. coxae IV and sternites II–IV, ventral view; 4. sternites II–III, ventral view; 5. internal genitalia, in part; 6. left chelicera, dorsal view; 7. rallum; 8. left pedipalp, dorsal view; 9. right chelal hand, prolateral view; 10. right chela, retrolateral view; 11. right coxa I, ventral view; 12. Sub-terminal seta, magnified; 13. right leg I (trochanter omitted), retrolateral view; 14. right leg IV, retrolateral view (trochanter omitted); 15. distal part of tarsus of left leg IV, prolateral view; 16. distal part of tarsus of right leg IV, retrolateral view; 17. distal part of tarsus of right leg IV, retrolateral view (microscopic picture). See Material and methods for abbreviations.

*Measurements (mm)*: holotype ♀, body length: 2.50. Carapace: 0.75/0.85. Pedipalp: trochanter 0.42/0.22; femur 0.70/0.22; patella 0.60/0.29; chela (with pedicel) 1.20/0.44; chela (without pedicel) 1.12; hand (with pedicel) L. 0.70; hand (without pedicel) 0.62; movable finger L. 0.62. Leg I: femur 0.35/0.15; patella 0.25/0.11; tibia 0.32/0.09; metatarsus 0.16/0.07; tarsus 0.25/0.06. Leg IV: femur 0.30/0.25; patella 0.32/0.24; femur + patella 0.52; tibia 0.53/0.12; metatarsus 0.21/0.08; tarsus 0.30/0.07.

Paratypes ♀, body length: 2.73–2.80. Carapace: 0.76/0.80. Pedipalp: trochanter 0.40–0.42/0.22; femur 0.73/0.22; patella 0.55/0.29; chela (with pedicel) 1.15/0.45; chela (without pedicel) 1.02; hand (with pedicel) L.0.69–0.70; hand (without pedicel) 0.56–0.60; movable finger L. 0.59. Leg I: femur 0.36/0.14; patella 0.27/0.11; tibia 0.32–0.33/0.09; metatarsus 0.17/0.07; tarsus 0.24/0.06. Leg IV: femur 0.31/0.25; patella 0.37/0.25; femur + patella 0.68; tibia 0.57/0.13; metatarsus 0.22–0.23/0.09; tarsus 0.32/0.07–0.8.

Paratype ♂, body length: 2.55. Carapace: 0.71/0.77. Pedipalp: trochanter 0.41/0.21; femur 0.68/0.20; patella 0.55/0.28; chela (with pedicel) 1.07/0.39; chela (without pedicel) 0.97; hand (with pedicel) L.0.62; hand (without pedicel) 0.52; movable finger L. 0.58. Leg I: femur 0.32/0.14; patella 0.26/0.10; tibia 0.30/0.09; metatarsus 0.15/0.06; tarsus 0.23/0.06. Leg IV: femur 0.31/0.26; patella 0.37/0.25; femur + patella 0.68; tibia 0.57/0.13; metatarsus 0.23/0.09; tarsus 0.32/0.08.

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