

A redescription of *Raveniola fedotovi* (Charitonov, 1946), with first description of the female (Aranei: Nemesiidae)

Переописание *Raveniola fedotovi* (Charitonov, 1946) и первое описание самки этого вида (Aranei: Nemesiidae)

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КЛЮЧЕВЫЕ СЛОВА: Пауки, Araneae, Mygalomorphae, Средняя Азия, Узбекистан.

ABSTRACT. The poorly known mygalomorph *Raveniola fedotovi* (Charitonov, 1946) is redescribed based on the lectotype and paralectotypes (designated herein) and an additional material from Uzbekistan; the female of this species is described for the first time. It can be distinguished from other known Central Asian congeners by the presence of a triangular keel on the embolus and by a specific shape of the Y-shaped spermathecae, as well as the complete lack of posterior median spinerets.

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РЕЗЮМЕ. Малоизвестный мигаломорфный паук *Raveniola fedotovi* (Charitonov, 1946) переописывается по лектотипу и паралектотипам (обозначены здесь), и дополнительному материалу из Узбекистана; впервые описывается самка этого вида. От других известных среднеазиатских видов рода *R. fedotovi* отличается наличием треугольного киля на эмболюсе и строением Y-образных сперматек, а также полной редукцией заднемедиальных паутиных бородавок.

Introduction

The Asian nemesiid spider genus *Raveniola* Zonstein, 1987 is currently known to include 43 species [WSC, 2023]. The genus range spreads from the Marmara Region of Turkey in the west to the northeastern and southeastern provinces of China in the east. During the last decade, the genus has been rather intensively studied, with 26 newly described species. In addition, all the currently known Western Palearctic congeners were revised [Zonstein *et al.*, 2018]. Nevertheless, only half of *Raveniola* spp. are known from both sexes

(exactly 21 species). In a few cases, some long-described species remain poorly known and neglected since their original description.

Raveniola fedotovi (Charitonov, 1946), described from a few syntype males, has never been studied in depth. In addition to the original description, the species was then only once (and erroneously) reported from Turkmenistan [Mikhailov, Fet, 1994]. Zonstein *et al.* [2018] depicted the carapace of a conspecific male from Uzbekistan. These two publications exhaust all additional data on the considered species.

The present work with a goal to restudy *R. fedotovi* is based on two components. First, we have examined the type series of this species including the preparations deposited in the Perm State University. Second, we obtained and studied all available collection material related to *R. fedotovi*, including one certainly conspecific female. A diagnosis, a detailed redescription of the newly established male lectotype, the first description of the female, as well as the corresponding illustrations are provided herein.

Material and methods

Depositories: MCSN — Museo Civico di Storia Naturale, Genoa, Italy; MNHN — Muséum national d'histoire naturelle, Paris, France; PSU — Chair of Zoology, Perm State University, Russia; SMNH — Steinhardt Museum of Natural History, Tel Aviv, Israel; ZISP — Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia; ZMMU — Zoological Museum, Moscow State University, Russia.

Comparative material used in the study: *Raveniola caudata* Zonstein, 2009: holotype ♂ (SMNH) from Panj Karatau Mts., Tajikistan; *R. concolor* Zonstein, 2000: holotype ♂ (MCSN AR18) and paratype ♀ (MCSN AR19) from northwestern Himalayas, India; *R. kopetdaghensis* (Fet, 1984), holotype ♂ and paratype ♀ (both in ZISP) from southwestern Kopetdagh, Turkmenistan; *R. redikorzevi* (Spassky, 1937), holotype ♂ (ZISP) from Badkhyz Plateau,

Turkmenistan; *R. virgata* (Simon, 1891), lectotype ♂ and paralectotype ♀ (MNHN B361) from Fergana Valley, Uzbekistan; *R. vonwicki* Zonstein, 2000: holotype ♂ and paratype ♀ (MCSN AR19) from Bogrovdagh Mts., Iran; *R. zaitzevi* (Charitonov, 1948): males and females (SMNH) from Zakataly Reserve, Azerbaijan.

Photographs were taken using either an Olympus SZX16 stereomicroscope with a Canon EOS 80D camera, or an Olympus OMD EM-10 digital camera with a Panasonic Lumix H-H025 25 mm f/1.7 lens mounted on a Zeiss microscope, and prepared using the Helicon Focus 7.6.2 Pro (<http://www.heliconsoft.com>) and Photoshop CS6 image stacking software. An illustration of the dissected vulva placed into a small Petri dish filled with a solution of 85% lactic acid was made after maceration of the dissected structures in 10% potassium hydroxide aqueous solution.

Measurements were taken through the above-mentioned stereomicroscopes to an accuracy of 0.01 mm. All measurements are given in millimetres. Total body length includes chelicerae but not spinnerets. The diameter of the AME is usually given as the diameter of a sharply edged AME circle (the “pupil”). When the AME cornea was well-separated and elevated, and its diameter could be measured, the corresponding data follow between brackets. Any eye interdistances counting this parameter are also given between brackets. The length of the sternum was measured along the straight line between the posterior tip of the sternum and the hindmost part of the labium. Lengths of leg and palp segments were measured on the dorsal side, and lengths of spinneret segments on the ventral side, from the midpoint of the anterior margin to the midpoint of the posterior margin. These measurements are presented as: total length (length of femur, patella, tibia, metatarsus and tarsus in the parentheses). Spine counts are taken from both sides of the body (i.e., from the same segments on the corresponding left and right palp or leg); when they differ from one another, the bracketed fewer number follows the larger one.

The abbreviations used in text are: ALE — anterior lateral eye(s), AME — anterior median eye(s), d — dorsal, M — megaspine(s) (= copulatory spurs), PLE — posterior lateral eye(s), PLS — posterior lateral spinneret(s), PME — median lateral eye(s), PMS — posterior median spinneret(s), p — prolateral, pd — prodorsal, pv — proventral, r — retrolateral, rd — retrodorsal, rv — retroventral, v — ventral.

Taxonomic survey

Raveniola fedotovi (Charitonov, 1946) Figs 1–14

- Brachythele fedotovi* Charitonov, 1946: 19, fig. 2 (♂).
Brachythele fedotovi: Charitonov, 1969: 65.
Brachythele fedotovi: Brignoli 1983: 123.
Brachythele fedotovi: Zonstein, 1985: 158.
Raveniola fedotovi: Zonstein, 1987: 1015.
Raveniola fedotovi: Platnick, 1989: 91.
Raveniola fedotovi: Mikhailov, Fet, 1994: 502. Misidentification.
Raveniola fedotovi: Mikhailov, 1997: 20.
Raveniola fedotovi: Zonstein *et al.* 2018: 66, fig. 100 (♂).
 TYPES: LECTOTYPE ♂ (ZMMU; designated here), Uzbekistan, Hissar Mt. Ridge (northern slope), mountain slopes south of Ishkent Village, 38°49' N, 66°58' E, 1100–1300 m, 25–28.03.1942, D.M. Fedotov. PARALECTOTYPES 3♂♂ (PSU; designated here): 1♂, body with one palp, collected together with the lectotype; 1♂

(body absent), the same locality, 25.03.1942, D.M. Fedotov, deposited as the preparations of the legs III and IV, abdomen, chelicerae and carapace (slides 01-24, 01-26, 01-27, 01-29, 01-30, 01-31); 1♂ (body absent), the same locality, 25.03.1942, D.M. Fedotov, deposited as the preparations of palp, chelicerae and carapace (slides 01-23, 01-25, 01-28).

ADDITIONAL MATERIAL EXAMINED: 1♂ (SMNH), Uzbekistan, Zeravshan Mts., Kitab Reserve, Khodzhaqurgan Canyon, 1600 m, 39°11' N, 67°17' E, 29.04.1992, S. Zonstein; 1♀ (SMNH), the same locality but 1400 m, 4.05.2022, S. Zonstein.

DIAGNOSIS: This species differs from most *Raveniola* species in lacking PMS; only one pair of the spinnerets (i.e., PLS) is present. The structure of the male palpal bulb in *R. fedotovi* somewhat resembles that in *R. caudata* and *R. redikorzevi*. However, the former species possesses a small and acute embolic keel, as well as a moderately short, narrow and twisted distal part of the embolus, while males of the two latter species have a broadly tipped embolus provided with a large and gently elevated embolic keel (Figs 6–8 cf. Zonstein, 2009, Figs 6, 8, 9). The shape of the spermathecae in *R. fedotovi* shows some similarity to the variants known in some Western Asian *Raveniola* spp. (e.g. in *R. vonwicki* and *R. zaitzevi*). However, it clearly differs in details from the latter structures: in the restudied species, a proximal part of the inner spermathecal branch is considerably wider than that in *R. vonwicki*, while its distal portion is much narrower than the corresponding section of the spermathecae in *R. zaitzevi* (Fig. 14 cf. Zonstein *et al.*, 2018, figs 208–210). It is also easily distinguishable from all known variants of the spermathecae observed in Central Asian congeners (see Zonstein, 1984, figs 6, 12; 2000, fig. 6; 2021, figs 13–18).

MALE (lectotype): Habitus as shown in Fig. 1. Body length 6.90.

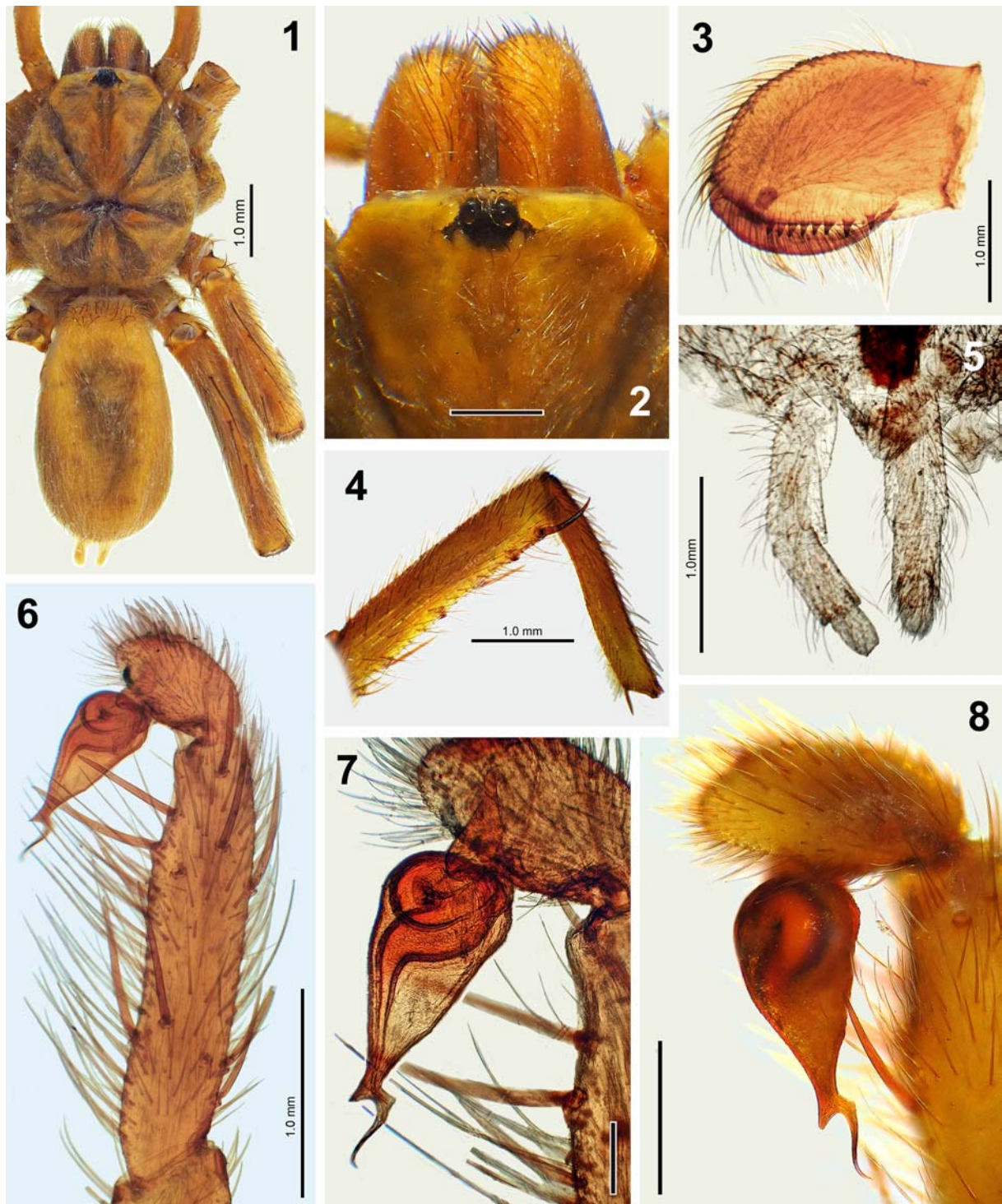
Color in alcohol: Carapace, palps and legs light brownish orange (femur, patella and tibia I noticeably darker than the corresponding segments of legs II–IV); eye tubercle blackish brown; chelicerae light reddish brown; sternum, labium and maxillae yellow; abdomen uniformly greyish white without distinct dorsal pattern.

Cephalic portion of carapace and chelicerae as shown in Fig. 2. Carapace 3.38 long, 2.85 wide. Eye diameters and interdistances: AME 0.08(0.12), ALE 0.13, PLE 0.09, PME 0.06, AME–AME 0.08(0.05), ALE–AME 0.05(0.04), ALE–PLE 0.02, PLE–PME 0.02, PME–PME 0.16. Chelicerae as in Fig 3; intercheliceral tumescence absent. Each cheliceral furrow with 7 promarginal teeth and 4–5 mesobasal denticles. Sternum 1.78 long, 1.51 wide. Labium 0.28 long, 0.60 wide. Maxillae with 7 cuspules each.

Palp and leg structures. Tibia and metatarsus I as shown in Fig. 4. Scopula: entire and distal on metatarsi I–II; entire on tarsus I; narrowly divided with setae on tarsus II; widely divided on tarsus III; rudimentary on tarsus IV. Trichobothria: 2 rows of 7 each on tibiae, 10–12 on metatarsi, 7–10 on tarsi, 6 on cymbium. Paired claws on tarsi I–IV with 6–7 and 5 teeth on outer and inner margins, respectively.

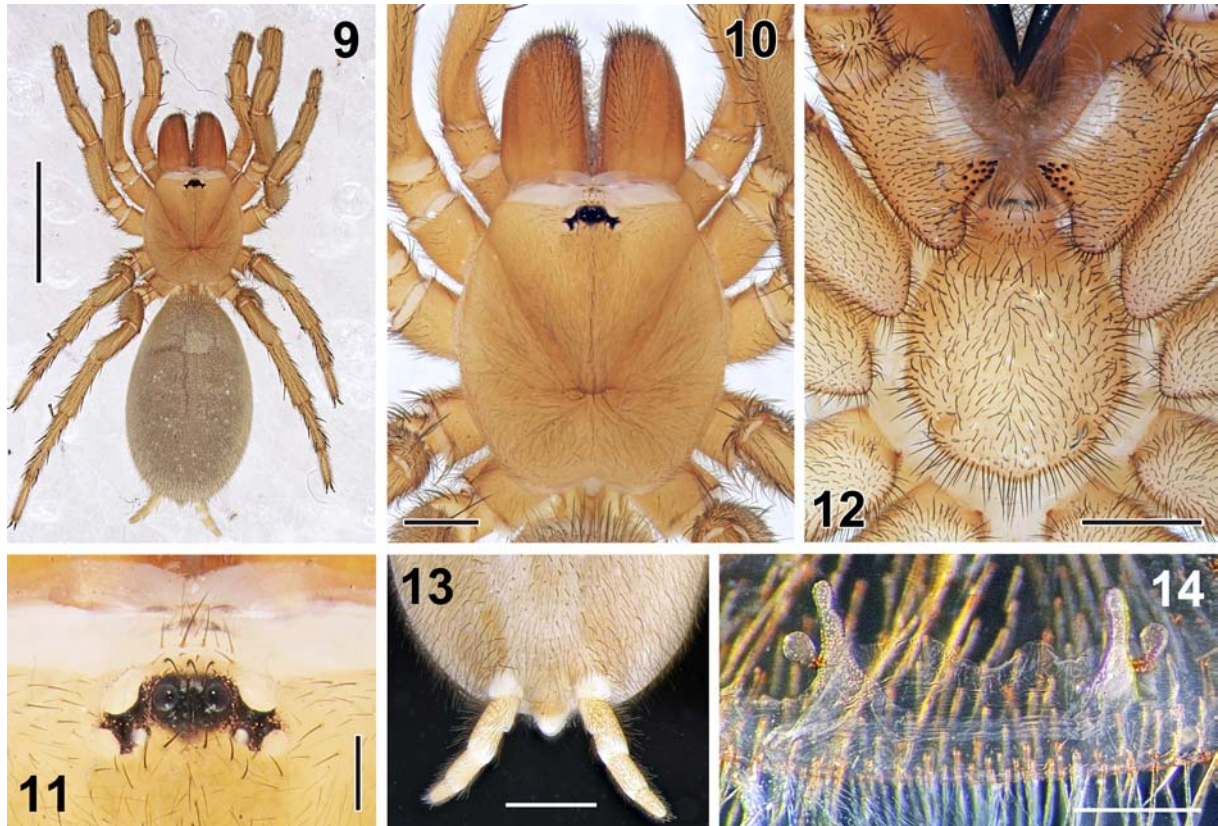
Palp and leg measurements. Palp: 5.08 (1.93, 1.07, 1.43, –, 0.65). Leg I: 11.40 (3.20, 1.78, 2.43, 2.54, 1.45). Leg II: 10.23 (2.98, 1.50, 2.18, 2.14, 1.43). Leg III: 9.95 (2.57, 1.43, 1.89, 2.60, 1.46). Leg IV: 13.57 (3.51, 1.48, 2.76, 3.75, 2.07).

Spines. Palp: femur d3, pd2; tibia d2, p3, r1, v4; cymbium d4. Leg I: femur d4, pd3, rd3; patella p1; tibia p2, pv2, rv2+2M; metatarsus v1. Leg II: femur d4, pd3; patella p1; tibia p3, v6; metatarsus v6. Leg III: femur d4, pd3, rd3; patella p1, r1; tibia d2, p2, r2, v6; metatarsus d1, p3, r3, v7.



Figs. 1–8. *Raveniola fedotovi*, paralectotype male (PSU): 1 — habitus, dorsal aspect; 2 — chelicerae and the cephalic portion of carapace, dorsal; 3 — right chelicera, prolateral; 4 — tibia and metatarsus I, retrolateral; 5 — spinnerets, ventral; 6 — distal segments of palp, showing bulb and embolus, prolateral; 7 — close up of bulb and embolus, prolateral; 8 — same, proventral. Scale bars for Figs 1, 3–6 — 1 mm, for 2, 8 — 0.5 mm, for 7 — 0.25 mm.

Рис. 1–8. *Raveniola fedotovi*, самец паралектотип (PSU): 1 — общий вид сверху; 2 — хелицеры и головной отдел карапакса сверху; 3 — правая хелицера сбоку (с внутренней стороны); 4 — голень и предлапка I сбоку (снаружи); 5 — паутинные бородавки снизу; 6 — дистальные сегменты педипальпы, бульбус и эмболюс сбоку (с внутренней стороны); 7 — бульбус и эмболюс сбоку (с внутренней стороны) при большем увеличении; 8 — то же, снизу-сбоку. Масштаб для рис. 1, 3–6 — 1 мм, для 2, 8 — 0,5 мм, для 7 — 0,25 мм.



Figs. 9–14. *Raveniola fedotovi*, female from Kitab Reserve (SMNH): 9 — habitus, dorsal aspect; 10 — cephalothorax and chelicerae, dorsal; 11 — clypeus and eye tubercle, dorsal; 12 — cephalothorax, ventral; 13 — spinnerets, ventral; 14 — spermathecae, dorsal. Scale bars for Fig. 9 — 5 mm, for 10, 12, 13 — 1 mm, for 11, 14 — 0.25 mm.

Рис. 9–14. *Raveniola fedotovi*, самка из Китабского заповедника (SMNH): 9 — общий вид сверху; 10 — головогрудь и хелицеры сверху; 11 — наличник и глазной бугорок сверху; 12 — головогрудь снизу; 13 — паутинные бородавки снизу; 14 — сперматеки сверху (с внутренней стороны). Масштаб для рис. 9 — 5 мм, для 10, 12, 13 — 1 мм, для 11, 14 — 0,25 мм.

Leg IV: femur d4, pd3, rd3; patella p1; tibia d2, p3, r3, v7; metatarsus d1, p3, r2, v9(8). Palpal patella and tarsi I–IV aspinose.

Spinnerets (Fig. 5). PMS absent. PLS: maximal diameter 0.37; length of basal, medial and apical segments 0.60, 0.42, 0.27, respectively; total length 1.29; apical segment shortly digitiform.

Copulatory organs. Palp and palpal bulb as shown in Fig. 6. Embolus with widely tapering basal portion bearing a small triangular keel and twisted apical part (Figs 7, 8).

FEMALE (from Kitab Reserve): Habitus as shown in Fig. 9. Body length 15.05.

Color in alcohol: mostly as in male except for light brownish gray abdomen, light scarlet red chelicerae and uniformly coloured legs, without difference between leg I and legs II–IV.

Carapace and chelicerae as shown in Fig. 10. Carapace 4.22 long, 3.91 wide. Clypeus and eye group as in Fig. 11. Eye diameters and interdistances: AME 0.13(0.17), ALE 0.24, PLE 0.15, PME 0.07, AME–AME 0.13(0.09), ALE–AME 0.09(0.07), ALE–PLE 0.09, PLE–PME 0.06, PME–PME 0.40. Each cheliceral furrow with 10 promarginal teeth and 5–6 mesobasal denticles. Sternum, labium and maxillae as shown in Fig. 12. Sternum 2.15 long, 2.06 wide. Labium 0.41 long, 0.87 wide. Maxillae with 13–14 cuspules each.

Palp and leg structures. Scopula: entire and distal on

metatarsi I–II, entire on palpal tarsus, narrowly divided on tarsus I, widely divided by setae on tarsus II, absent on metatarsi and tarsi III and IV. Trichobothria: 2 rows of 9–10 each on tibiae, 13–15 on metatarsi; 11–13 on tarsi; 9–10 on palpal tarsus. Palpal claw with 4 promarginal teeth widely separated from each other. Paired claws on tarsi I–II and III–IV with 6–7 and 6–8 teeth on each margin, respectively.

Palp and leg measurements. Palp: 7.24 (2.68, 1.45, 1.69, –, 1.42). Leg I: 10.78 (3.23, 2.09, 2.35, 1.77, 1.34). Leg II: 10.13 (2.96, 1.89, 2.08, 1.84, 1.36). Leg III: 9.59 (2.63, 1.54, 1.78, 2.25, 1.39). Leg IV: 13.04 (3.54, 1.92, 2.66, 3.31, 1.61).

Spines. Palpal femur and femora I–II with 4 thin and long dorsal spiniform setae; femora III–IV with one thin basodorsal spine and 3 dorsal spiniform setae alongside midline; palpal patella, patellae I–II and tarsi I–IV aspinose. Palp: femur pd1; tibia v10(7); tarsus v4(3). Leg I: femur pd1; tibia v5; metatarsus v6. Leg II: femur pd1; tibia p3, v7; metatarsus p1, v7(6). Leg III: femur pd3, rd2; patella p1, r1; tibia d1, p2, r2, v7; metatarsus d2, p3, r3(2), v7. Leg IV: femur rd1; patella r1; tibia d1, p2, r3, v7; metatarsus d1, p3, r3, v10(9).

Spinnerets (Fig. 13). PMS absent. PLS: maximal diameter 0.45; length of basal, medial and apical segments 0.84, 0.55, 0.53, respectively; total length 1.92; apical segment shortly digitiform.

Copulatory organs. Spermathecae Y-shaped. Each of paired spermathecae with moderately narrow and long conical base bearing a short club-shaped outer branch (Fig. 14).

DISTRIBUTION: Uzbekistan (Kashkadarya Region). The record in Kopetdagh Mts., Turkmenistan [Mikhailov, Fet, 1994] is based on misidentified material.

ECOLOGY: The spiders inhabit midland mountain zone where they occur under rocks in open woods of *Juniperus* spp. and in riverside forests dominated with walnut (*Juglans regia* L.).

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