

# Two new *Spariolenus* Simon, 1880 species from Pamir Mountains in Tajikistan – the first representatives of Heteropodinae in Central Asia

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## Abstract

Two new species of *Spariolenus* Simon, 1880, *S. badakhshanicus* sp. n. (♂♀) and *S. darvazicus* sp. n. (♀), are described from Pamir Mountains in eastern Tajikistan. They represent the first records of Heteropodinae in Central Asia. The type localities of new species in West Pamir are remote approximately 500 km north from the closest known locality of the subfamily, represented by *S. lindbergi* (Roewer, 1962), in Afghanistan. Both new species were collected at night in rocky habitats. Detailed descriptions, digital photographs of the new species, and a distributional map of all known *Spariolenus* species are provided.

## Keywords

Araneae, biodiversity, large huntsmen spiders, zoogeography

## Introduction

Sparassidae Bertakou, 1972, commonly known as “large huntsmen spiders” is a large family comprising 1472 species in 97 genera (World Spider Catalog 2024).

Large huntsmen spiders are distributed all over the world in different habitats, from tropical forests to deserts (Moradmand & Jäger 2011). However, the vast majority of Sparassidae occur in tropical and subtropical regions between 40°N and 40°S (Jocqué & Dippenaar-Schoeman 2006). One of the subfamilies of Sparassidae, namely Heteropodinae, represents the largest araneomorph spiders in the world (Jäger 2001a). The subfamily was diagnosed by Jäger (1998), and to date, it comprises twelve genera (Jäger 2002). Two sparassid subfamilies are known from Central Asia: Eusparassinae Järvi, 1912, and Sparassinae Bertkau, 1972 (Mikhailov 2021). Eusparassinae is represented by *Eusparassus* Simon, 1903, whereas Sparassinae represented by *Cebrennus* Simon, 1880, *Micrommata* Latreille, 1804 and *Olios* Walckenaer, 1837. All of the listed genera, except *Micrommata*, are adapted to arid or semi-arid conditions (Jäger 2006). *Micrommata*, within Central Asia, is represented by transpalearctic species, *M. virescens* (Clerck, 1757), which dwells near water bodies (Logunov et al. 2012) and recently described *M. biggi* Jäger, 2023 which habitats are unknown (Jäger 2023). Until now, members of Heteropodinae have not been recorded in Central Asia. Recently, the author of this paper had an opportunity to participate in an expedition to Pamir Mountains in Tajikistan, from where he collected several specimens of Heteropodinae belonging to *Spariolenus* Simon, 1880. During the detailed study of these specimens, it turned out that they belong to two undescribed species. The aims of the present paper are to describe these new *Spariolenus* species and to report the subfamily Heteropodinae for Central Asia for the first time.

## Materials and methods

Spiders were collected by hand at night with the use of a headlamp. The specimens were photographed using an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope at the Altai State University (Barnaul, Russia). Photographs were taken in an alcohol-filled dish with white cotton at the bottom. Photographs of the cephalic part were made by using slightly dried material. Epigynes were cleared in KOH/water solution until soft tissues were dissolved. Live specimens were photographed using a Canon PowerShot SX620 HS camera. Digital images were montaged using Zerene Stacker software. The distributional map was produced using the online mapping application SimpleMappr (Shorthouse 2010). All measurements are in millimeters. Lengths of leg segments were measured from prolateral side. Leg measurements are shown as: femur, patella, tibia, metatarsus, tarsus (total length). The terminology and format of description follows Moradmand et al. (2023) with modifications. All examined material is deposited in the Institute of Systematics and Ecology of Animals SB RAS, Novosibirsk, Russia (ISEA; curator G.N. Azarkina).

Abbreviations: ALE – anterior lateral eye, AME – anterior median eye, BRB – basal retrolateral bulge of cymbium, C – conductor, CO – copulatory opening, d – dorsal, dRTA – dorsal part of retrolateral tibial apophysis, EF – epigynal field, ET – embolic tip, FC – first coil of vulva, FD – fertilization duct, Fe – femur, MEP

– margin of epigynal pit, MS – median slit of epigyne, Mt – metatarsus, p – pro-lateral, Pa – patella, PET – prolateral part of embolus, PLE – posterior lateral eye, PME – posterior median eye, r – retrolateral, RET – retrolateral part of embolus, SC – second coil of vulva, SP – spermophore, T – tegulum, TC – third coil of vulva, Ti – tibia, v – ventral, vRTA – ventral part of retrolateral tibial apophysis.

## Result

### Family Sparassidae Bertkau, 1872

#### Genus *Spariolenus* Simon, 1880

**Comments.** *Spariolenus* Simon, 1880, comprising 18 species, is a relatively small genus of Sparassidae, distributed from Iran to Sumatra Island (World Spider Catalog 2024). The genus includes very large spiders with a leg span of up to about 15 cm (Moradmand & Jäger 2011). *Spariolenus* is represented by the largest number of species in Iran, (9 out of 18 spp. or 50%) (Moradmand et al. 2023; World Spider Catalog 2024). Members of the genus are active hunters, usually living in caves or close to the cave entrances in karstic regions (Moradmand 2017). *Spariolenus* can be considered a comparatively well-studied genus, thanks to several revisions and smaller papers published in recent years (Jäger 2006; Moradmand & Jäger 2011; Zamani 2016; Moradmand 2017; Moradmand et al. 2023).

#### *Spariolenus badakhshanicus* sp. n.

Figs 1–4, 7–18, 22–24, 26–29

**Type material. Holotype** ♂ (ISEA, 001.9075), TAJIKISTAN: Gorno-Badakhshan Region, Rushan Mountain Range, 25 km E from Rushon Village, 37°58.617'N, 71°50.343'E, rocky-clayey cliff, 2200–2300 m, 07–08.07.2023 (A.A. Fomichev & Y.V. Dyachkov); **paratypes:** 7♂ (ISEA, 001.9076), 1♀ (ISEA, 001.9077), same data as for holotype.

**Etymology.** The specific name derived from Badakhshan - a historical region comprising parts of modern-day north-eastern Afghanistan, eastern Tajikistan, and Taxkorgan Tajik Autonomous County in China.

**Diagnosis.** In having a bifurcated embolic tip (ET), the male of *S. badakhshanicus* sp. n. is similar to that of *S. bakasura* Moradmand, Wesal & Kulkarni, 2023, *S. fathpouri* Moradmand, 2017, *S. mansourii* Moradmand, 2017, *S. omidvarbrothers* Moradmand, Wesal & Kulkarni, 2023 and *S. zagros* Moradmand & Jäger, 2011. The male of new species can be distinguished from all aforementioned species by prolateral part of embolus (PET) as long and as wide as retrolateral part of embolus (RET) (vs. RET generally longer and partially wider than PET) (cf. Fig. 12 and figs 30 in Moradmand & Jäger 2011; 1D, 4D in Moradmand 2017; 1C, 3C in Moradmand et

al. 2023). The female of new species differs from all congeners, except *S. darvazicus* sp. n. and *S.omidvarbrothers*, by widened and extended longitudinally median slit of epigyne (MS) (vs. MS narrow and barely visible). The female of *S. badakhshanicus* sp. n. can be differed from that of *S. darvazicus* sp. n. and *S.omidvarbrothers* by copulatory openings (CO) poorly visible in ventral view (vs. clearly visible) (cf. Figs 16–17 and 19–20 and fig. 2A in Moradmand et al. 2023). Additionally, the female of *S. badakhshanicus* sp. n. differs from that of *S.omidvarbrothers* by second coils of vulva (SC) significantly wider than third coils of vulva (TC) (vs. second coils of vulva narrower than third coils of vulva) (cf. Fig. 18 and fig. 2B in Moradmand et al. 2023). The females of *Spariolenus badakhshanicus* sp. n. and *S. darvazicus* sp. n. can be distinguished by the second coils of vulva oriented forward in the former species (vs. second coils of vulva oriented backwards) (cf. Figs 18 and 21). In addition, *S. badakhshanicus* sp. n. differs from all others species of *Spariolenus*, except *S. darvazicus* sp. n., *S. hormozii* Moradmand, 2017 and *S. zagros*, by monochromatic carapace and abdomen without any pattern and legs without annulations (vs. carapace and abdomen with pattern and annulated legs) (cf. Figs 22–24 and figs 16–17 in Jäger 2006; 39–42 in Moradmand & Jäger, 2011; 3A in Moradmand 2017; 9G, 11A–B, D, 12 A–B in Moradmand et al. 2023). *Spariolenus darvazicus* sp. n. and *S. zagros* have monochromatic coloration too, whereas the coloration of *S. hormozii* is unknown.

**Notes.** The male palps of *Spariolenus* species are very uniform. The most important diagnostic character is the shape of the embolic tip. Species of the genus can be divided into two groups based on the shape of the embolic tip: 1) species with non-bifurcated embolic tip; 2) species with bifurcated tip. The first group comprises the following species: *S. iranomaximus* Moradmand & Jäger, 2011 (Iran), *S. lindbergi* (Roewer, 1962) (Afghanistan), and *S. tigris* Simon, 1880 (India). The second group is more diverse comprising six species: *S. badakhshanicus* sp. n. (Tajikistan), *S. bakasura* (India), *S. fathpouri*, *S. mansourii*, *S.omidvarbrothers*, and *S. zagros* (all four from Iran). Geographically, the species of these two groups are intermixed. Species from both groups are found in Iran and India. These groups probably have no taxonomic value.

**Description.** Male (holotype). Total length 13.6. Carapace: 7.2 long, 6.5 wide. Abdomen: 7.2 long, 5.0 wide. Coloration (Figs 22–23). Carapace, chelicerae, labium, endites, sternum and coxae pale yellow. Palps pale yellow with light brown cymbium. Legs pale yellow, metatarsi and tarsi light brown. Eye sizes and interdistances: AME 0.29, ALE 0.64, PME 0.41, PLE 0.71, AME–AME 0.27, AME–ALE 0.06, PME–PME 0.39, PME–PLE 0.61, AME–PME 0.7, ALE–PLE 0.6. Clypeus height at AME 0.8. Clypeus height at ALE 0.36. Leg measurements: I: 11.4, 4.3, 12.4, 12.0, 3.1 (43.2); II: 13.0, 4.6, 14.0, 13.2, 3.0 (47.8); III: 10.6, 3.9, 10.5, 9.7, 2.5 (37.2); IV: 10.8, 3.6, 10.5, 10.6, 2.6 (38.1). Leg spination: I: Fe d2 p4 r3; Pa p1 r1; Ti d3 p5 r4 v2-1-2-2-2-2; Mt p1 r1 v2-2. II: Fe d2 p3 r3; Pa p1 r1; Ti d3 p2 r4 v2-2-2-2-2-2; Mt p1 r1 v2-2. III: Fe d2 p3 r3; Pa r1; Ti d1 p1 r2 v2-2-2-2-2-2; Mt p2 r1 v2-2. IV: Fe

d2 p3 r1; Ti d2 p3 r4 v2-2-2; Mt p4 r4 v2-2. Chelicerae with 3 promarginal and 4 retromarginal teeth (Fig. 2).

Palp as in Figs 7–15. Tibia with 2 dorsal, 3 pro- and 1 retrolateral strong spines. Dorsal part of retrolateral tibial apophysis (dRTA) longer than its ventral part (vRTA), sharply pointed. Tip of vRTA rounded. Cymbium 1.6 times longer than tibia. Basal retrolateral bulge of cymbium (BRB) well developed. Tegulum (T) 1.5 times longer than wide. Spermophore (SP) sinusoidal. Conductor (C) extending beyond embolic tip (ET). ET smoothly expanding, relatively short, not reaching the median part of tip of cymbium. Prolateral part of embolus (PET) and retrolateral part of embolus (RET) are the same size and shape.

Female. Total length 16.7. Carapace: 8.0 long, 7.0 wide. Abdomen: 11.0 long, 7.6 wide. Coloration as in male, but labium and endites light brown and chelicerae dark brown (Fig. 24). Eye sizes and interdistances: AME 0.3, ALE 0.79, PME 0.43, PLE 0.84, AME–AME 0.31, AME–ALE 0.06, PME–PME 0.43, AME–PME 0.71, PME–PLE 0.61, ALE–PLE 0.71. Clypeus height at AME 0.89. Clypeus height at ALE 0.41. Leg measurements: I: 9.5, 4.2, 10.3, 8.5, 2.1 (34.6); II: 10.8, 4.4, 11.2, 9.1, 2.1 (37.6); III: 9.3, 3.8, 9.1, 7.5, 2.0 (31.7); IV: 9.8, 3.7, 9.1, 8.7, 2.1 (33.4). Leg spination: I: Fe d2 p3 r4; Ti p1 r4 v2-2-1-2-2-2-2; Mt r1 v2-2. II: Fe d2 p3 r3; Ti d1 p4 r5 v2-2-2-2-2-2; Mt p1 r1 v2-2. III: Fe d2 p3 r3; Ti d2 p1 r5 v2-2-2-2-2-2; Mt p2 r1 v2-2. IV: Fe d2 p3 r1; Ti d2 p3 r3 v2-2-2; Mt p4 r4 v2-2. Chelicerae with 3 promarginal and 5 retro-marginal teeth (Fig. 4).

Epigyne as in Figs 16–18. Epigynal field (EF) as long as wide. Anterior bands of epigynal field absence. Copulatory openings (CO) small, poorly visible in ventral view. Margins of epigynal pit (MEP) diagonally stretched. First coils of vulva (FC) almost parallel to each other. Second coils of vulva (SC) oriented forward, extending laterad beyond FC and third coil of vulva (TC). Fertilization ducts (FD) small.

**Biology.** Specimens were collected at night, during the early hours after dark. In most cases they sat on the rocks (Figs 22, 24). They were oriented with the cephalic part facing downwards. The males actively moved and went beyond the rocks, crossing a dirt road that passed under the rocks (Fig. 23).

**Distribution.** Known only from the type locality in Rushan Mt. Range, West Pamir (Figs 26–29).

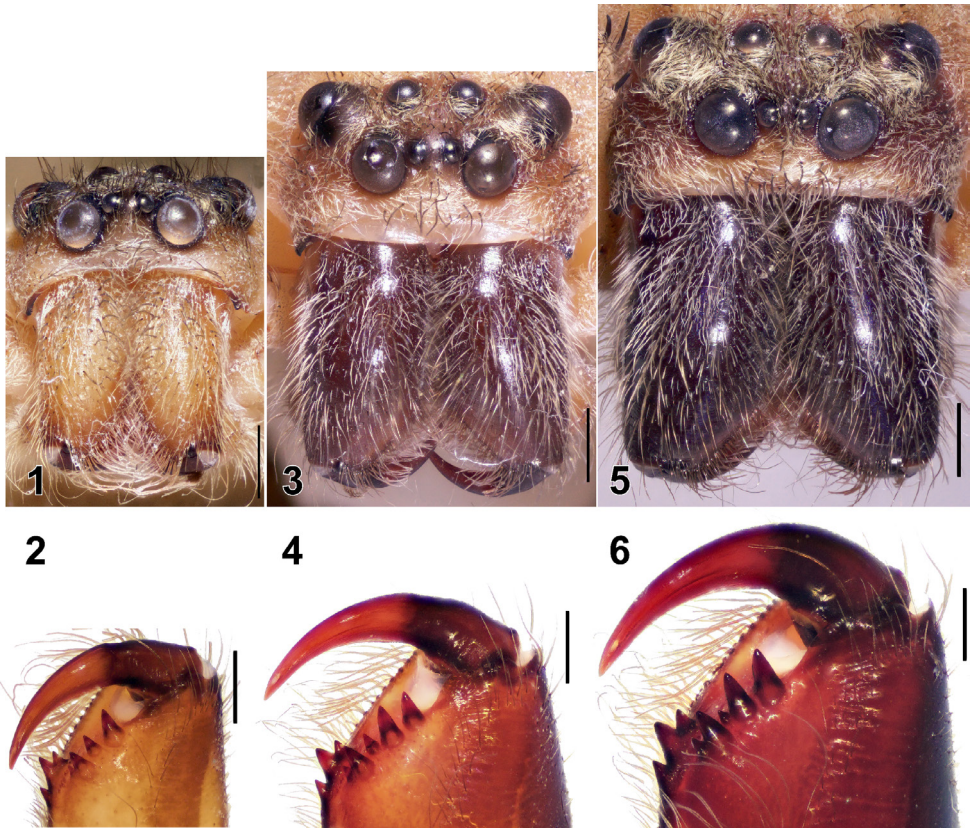
### *Spariolenus darvazicus* sp. n.

Figs 5–6, 19–21, 25, 29

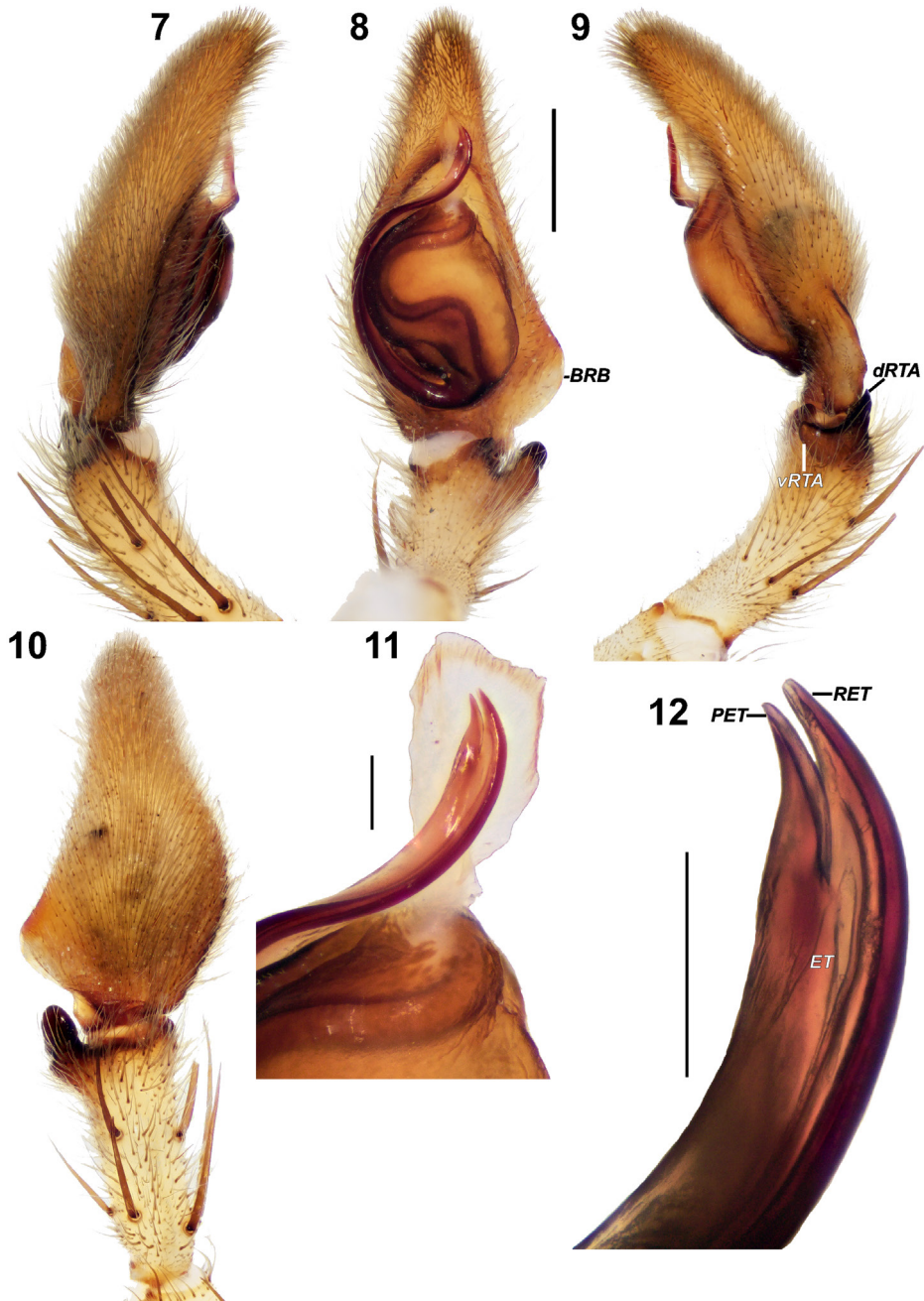
**Type material.** **Holotype** ♀ (ISEA, 001.9078), TAJIKISTAN: Gorno-Badakhshan Region, Darvoz Mountain Range, 24 km W from Vanj Village, 38°21.875'N, 71°11.085'E, stony shiblyak shrubland with rocks, 1600 m, 07.07.2023 (A.A. Fomichev); **paratypes**: 3♀ (ISEA, 001.9079), same data as for holotype.

**Etymology.** The specific name derived from Darvaz – independent Pamir principality existing before 1878. Today the territory of principality is divided between Tajikistan and Afghanistan.

**Diagnosis.** The female of *S. darvazicus* sp. n. differs from all congeners, except *S. badakhshanicus* sp. n. and *S. amidvarbrothers*, by widened and extended longitudinally median slit of epigyne (MS) (vs. MS narrow and barely visible). The female of *S. darvazicus* sp. n. can be differed from that of *S. badakhshanicus* sp. n. by copulatory openings (CO) clearly visible in ventral view (vs. copulatory openings poorly visible in ventral view) (cf. Figs 19–20 and 16–17) and by the second coils of vulva (SC) oriented backwards (vs. forward) (cf. Fig. 21 and 18). The females of *S. darvazicus* sp. n. and *S. amidvarbrothers* can be distinguished by width of SC, which is significantly wider than third coils of vulva (TC) in the former species (cf. Fig. 21 and fig. 2B in Moradmand et al. 2023). *Spariolenus darvazicus* sp. n. differs from all others species of the genus, except *S. badakhshanicus* sp. n., *S. hormozii* and *S. zagros*, by monochromatic carapace and abdomen without any pattern and legs without annulations (vs. carapace and abdomen with pattern and annulated legs) (cf. Fig. 25 and figs 16–17 in Jäger 2006; 39–42 in Moradmand & Jäger, 2011; 3A in Moradmand 2017; 9G, 11A–B, D, 12 A–B in Moradmand et al. 2023).



**Figures 1–6.** Cephalic part (1, 3, 5) and chelicera (2, 4, 6) of *Spariolenus badakhshanicus* sp. n. (1–4) and *S. darvazicus* sp. n. (5–6). 1–2 – male; 3–6 – female; 1, 3, 5 – anterior; 2, 4, 6 – posterior. Scale bars: 1, 3, 5 = 1 mm; 2, 4, 6 = 0.2 mm.



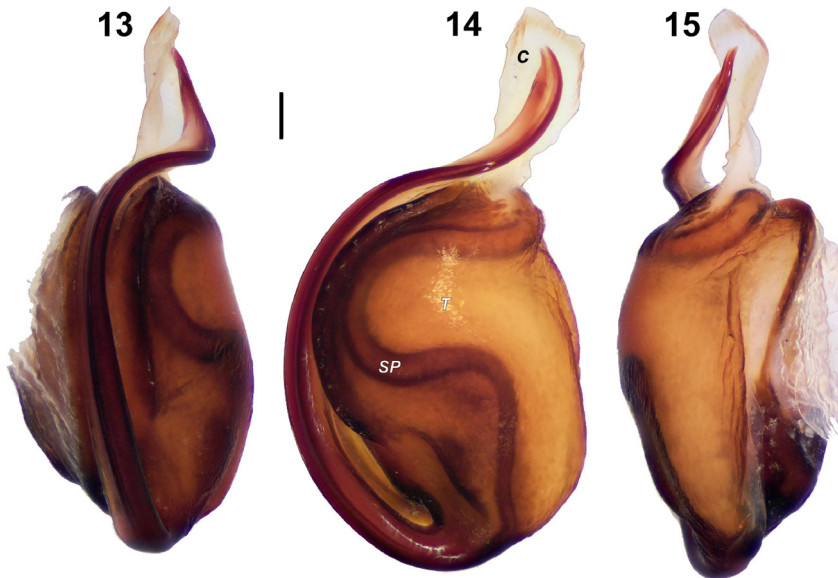
**Figures 7–12.** Male palp (7–10), embolus and conductor (11) and distal part of embolus (12) of *Spariolenus badakhshanicus* sp. n. 7 – prolateral; 8, 11–12 – ventral; 9 – retrolateral; 10 – dorsal. Scale bars: 7–10 = 1mm; 11–12 = 0.2 mm. Abbreviations: BRB – basal retrolateral bulge of cymbium, dRTA – dorsal part of retrolateral tibial apophysis, ET – embolic tip, PET – prolateral part of embolus, RET – retrolateral part of embolus, vRTA – ventral part of retrolateral tibial apophysis.

**Description.** Total length 24.0. Carapace: 10.1 long, 8.5 wide. Abdomen: 14.8 long, 10.5 wide. Coloration (Fig. 25). Carapace yellow grey. Eye field and chelicerae dark brown. Labium and endites brown. Sternum yellow. Palps yellow, tarsi brown. Legs yellow, metatarsi and tarsi brown. Abdomen and spinnerets yellow grey. Eye sizes and interdistances: AME 0.36, ALE 0.93, PME 0.5, PLE 0.93, AME–AME 0.31, AME–ALE 0.04, PME–PME 0.5, PME–PLE 0.86, AME–PME 0.8, ALE–PLE 0.81. Clypeus height at AME 1.0. Clypeus height at ALE 0.47. Leg measurements: I: 12.3, 5.2, 12.8, 10.9, 2.7 (43.9); II: 13.9, 5.8, 14.3, 11.8, 3.0 (48.8); III: 12.0, 4.5, 11.5, 9.7, 2.5 (40.2); IV: 12.3, 4.5, 11.5, 11.1, 2.7 (42.1). Leg spination: I: Fe d2 p3 r3; Pa r1; Ti d1 p3 r4 v3-2-2-2-2-2; Mt r1 v2-2. II: Fe d2 p3 r3; Pa p1 r1; Ti d1 p4 r4 v2-2-2-2-2-2; Mt p1 r1 v2-2. III: Fe d2 p3 r3; Pa p1 r1; Ti d2 p2 r2 v2-2-1-2-2-2; Mt p2 r1 v2-2. IV: Fe d2 p3 r1; Ti d2 p3 r6 v2-2-2; Mt p4 r4 v2-2. Chelicerae with 3 promarginal and 5 retromarginal teeth (Fig. 6).

Epigyne as in Figs 19–21. Epigynal field (EF) as long as wide. Anterior bands of epigynal field absence. Copulatory openings (CO) large, clearly visible in ventral view. Margins of epigynal pit (MEP) diagonally stretched, humpy. First coils of vulva (FC) strongly curved, converging posteriorly. Second coils of vulva (SC) oriented backwards, extending laterad beyond FC and third coil of vulva (TC). Fertilization ducts (FD) small.

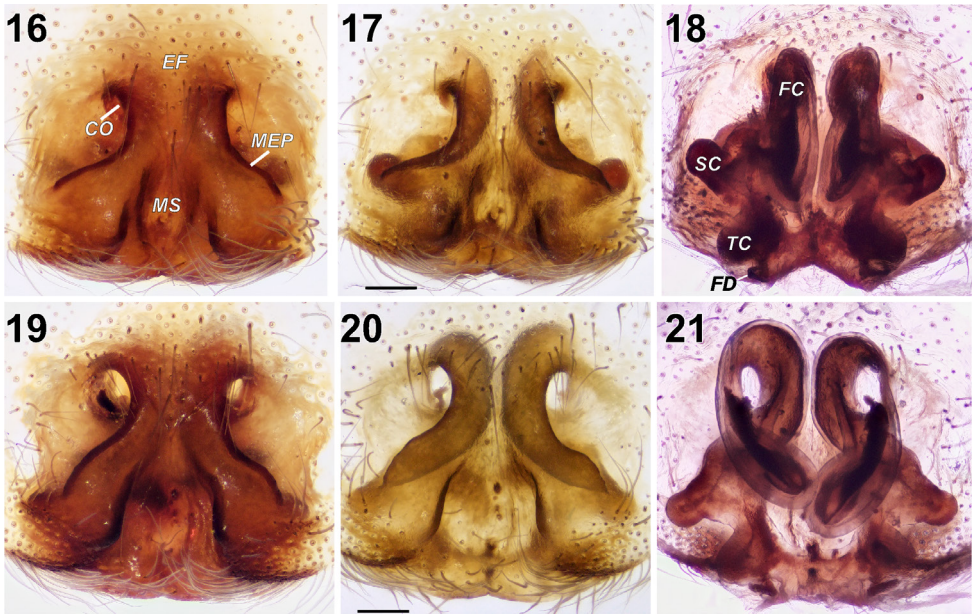
**Biology.** As in *S. badakhshanicus* sp. n. *Spariolenus darvazicus* sp. n. dwells at lower altitudes than *S. badakhshanicus* sp. n. in a place with richer vegetation.

**Distribution.** Known only from the type locality in Darvoz Mt. Range, West Pamir (Fig. 29).



**Figures 13–15.** Bulb of *Spariolenus badakhshanicus* sp. n. 13 – prolateral; 14 – ventral; 15 – retrolateral. Scale bar: 0.2 mm. Abbreviations: C – conductor, SP – spermphore, T – tegulum.



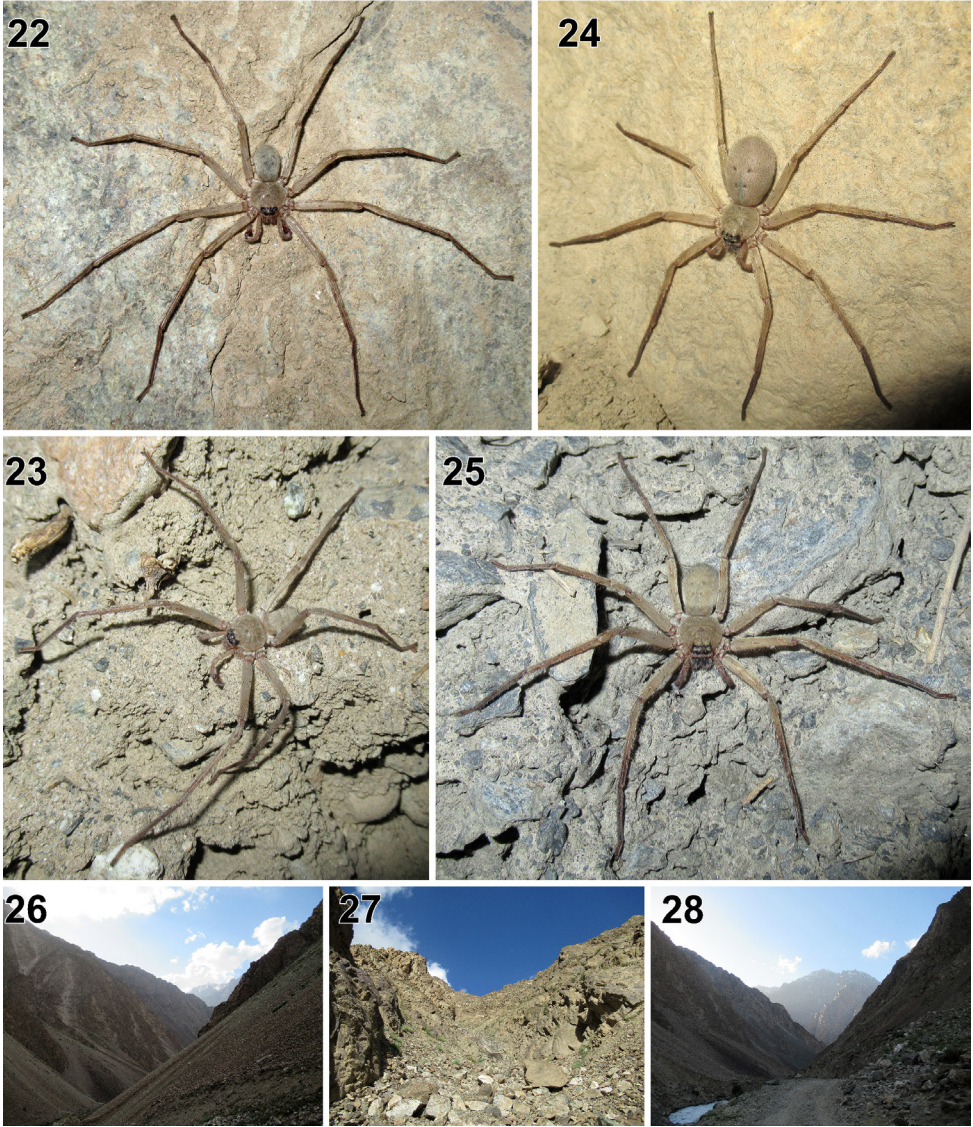


**Figures 16–21.** Epigyne of *Spariolenus badakhshanicus* sp. n. (16–18) and *S. darvazicus* sp. n. (19–21). 16, 19 – intact, ventral; 17, 20 – macerated, ventral; 18, 21 – macerated, dorsal. Scale bars: 0.2 mm. Abbreviations: EF – epigynal field, CO – copulatory opening, FC – first coil of vulva, FD – fertilization duct, MEP – margin of epigynal pit, MS – median slit of epigyne, SC – second coil of vulva, TC – third coil of vulva.

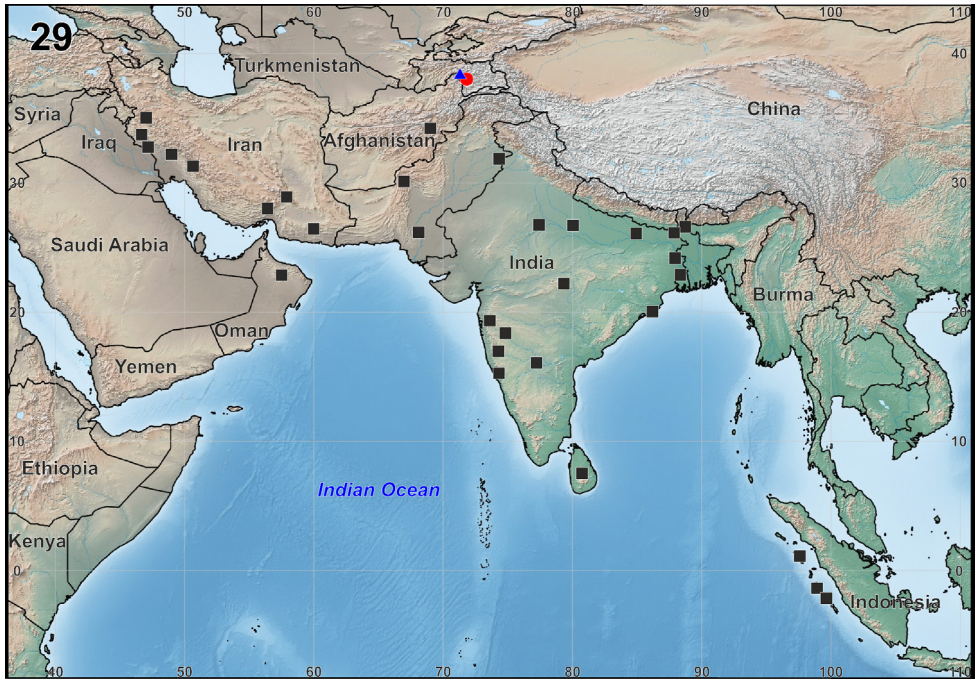
## Discussion

Representatives of Heteropodinae are typically found in humid habitats within subtropical and tropical regions (Jäger 2006). Due to this, Heteropodinae exhibit an example of Afroasian disjunction and restricted to Equatorial Africa, India, Southeast Asia and northern Australia (Jäger 2001b). Only a few exceptions, belonging to *Heteropoda* Latreille, 1804, and *Spariolenus*, are known to date to occur in dry areas. *Heteropoda variegata* (Simon, 1874) is distributed in Eastern Mediterranean, and *H. afghana* Roewer, 1962 from Afghanistan. Both species inhabit caves and in others dark, humid places (Roewer 1962; Levy 1989). Among Heteropodinae occurring outside the tropical forests only *Spariolenus* is quite diverse. This genus is distributed in subtropical and tropical latitudes from Zagros Mountains in western Iran to Eastern India (Moradmand et al. 2023). The record of the genus from Sumatra Island (Thorell 1890) is doubtful (M. Moradmand personal communication). Most of the Iranian *Spariolenus* were collected in caves (Moradmand & Jäger 2011; Moradmand 2017). *Spariolenus secundus* Jäger, 2006 from Oman, the only

species of the genus found on the Arabian Peninsula, also inhabits in a cave (Jäger 2006). Thus, everywhere outside tropical rainforests, Heteropodinae inhabit in humid caves with a stable climate, serving as a kind of refugium. In a few cases where specimens were not collected in caves, they were usually found in other wet habitats in such as oasis in the valley, the surroundings of the waterfall, in rock crevices near riverbank (Moradmand & Jäger 2011; Moradmand et al. 2023). Most of the Pamir Mountains have a climate that is dry and cold (Normatov et al. 2022). At first glance, the Pamirs, being the highest mountain systems in Central Asia, with maximum altitudes up to 7649 meters, may seem poorly situated to the role of such a refugium. However, the West Pamirs are dissected by deep gorges, at the bottom of which there is a warm and humid climate. The average annual temperature in Rushon Village, located 25 km from the type locality of *S. badakhshanicus* sp. n. in the Rushan Mt. Range and at similar altitudes, is 9.6°C. Additionally, the average annual precipitation in Rushon Village is 209.6 mm (Kurbansho et al. 2014). The temperature is even higher in the type locality of *S. darvazicus* sp. n.: the average yearly temperature in Vanj (=Rocharv) Village, located 24 km from the type locality of *S. darvazicus* sp. n. is 9.9°C (Kurbansho et al. 2014). Along the bottom of the gorges in which *S. badakhshanicus* sp. n. and *S. darvazicus* sp. n. live, permanent rivers flow, fed by glaciers located high in the mountains. This increases humidity even more. Moradmand and Jäger (2011) proposed that the ancestral lineage of *Spariolenus* inhabited the ancient tropical rainforest belt that existed in the Miocene in the area from the Arabian Peninsula to the Indian Peninsula. During the fragmentation and disappearance of these forests, places such as caves served as shelters for *Spariolenus* (Moradmand & Jäger 2011). It can be assumed that the deep gorges of the West Pamirs serve as a similar refugium and *S. badakhshanicus* sp. n. and *S. darvazicus* sp. n. are a relict endemic of warm and humid pre-glacial times. The type localities of *S. badakhshanicus* sp. n. and *S. darvazicus* sp. n. are situated approximately 500 km NE from the closest known locality of *Spariolenus* in Afghanistan. The type localities of newly described species and *S. lindbergi* are separated by the Hindu Kush Mts reaching heights of 5000 m a.s.l. It is surprising that such a large and noticeable spiders as *S. badakhshanicus* sp. n. and *S. darvazicus* sp. n., with a leg span ca. 10 cm, have not been discovered before. This indicates a lack of knowledge about the spider fauna of Pamir Mountains. It is possible to predict the discovery of more similar elements in the Pamir spider fauna, including additional *Spariolenus* species, in the future. Moreover, such findings have already been made in another region of Tajikistan. Recently Marusik and Fomichev described a new genus of Oedignathinae Thorell, 1897 (Liocranidae), and a new species of *Trachelas* L. Koch, 1872 (Trachelidae) from Khatlon Region of Tajikistan (Marusik & Fomichev 2020a; 2020b). Both groups, Oedignathinae and *Trachelas*, have a primarily tropical distribution.



**Figures 22–28.** Live specimens of *Spariolenus badakhshanicus* sp. n. (22–24), *S. darvazicus* sp. n. (25) and habitat of *S. badakhshanicus* sp. n. (26–28). 22 – male, ambushing prey; 24–25 – ditto, female; 23 – male, crossing a dirt road.



**Figure 29.** Collecting localities of *Spariolenus* species. Circle – *S. badakhshanicus* sp. n., triangle – *S. darvazicus* sp. n., square – literature derived data.

## Acknowledgements

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