

A new species of *Acantholycosa* Dahl, 1908 (Aranei: Lycosidae) from the highlands of Sikhote-Alin Mountains, Maritime Territory of Russia

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A new species of wolf spider, *Acantholycosa voronoi* sp. nov., collected among isolated screes in the highlands of Sikhote-Alin Mountains, is diagnosed, illustrated and described based on both sexes. The new species is related to *A. irinae* Fomichev & Omelko, 2020, a species recently described from a neighboring mountain; the two species differ in the conformation of copulatory organs and number of ventral spines on tibia I. A distribution map of all known *Acantholycosa* species in south of Maritime Territory is provided.

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Keywords

Araneae, biodiversity, endemism, Far East of Russia, taxonomy, wolf spiders.

Introduction

Acantholycosa Dahl, 1908 is a medium-sized genus of wolf spiders containing 37 nominal species (WSC 2022). Almost all representatives of the genus live in mountain screes (Marusik et al. 2004). Despite the fact that the genus is widespread throughout the Holarctic, from Rocky Mountains to Kolyma River, most of the species from this group are restricted to the mountains of the South Siberia and to the Russian Far East (Marusik et al. 2004, Fomichev and Omelko 2020, Fomichev 2021). The majority of the species belonging to *Acantholycosa* have very limited geographic ranges (Marusik et al. 2004). Consequently, each expedition to high mountains of South Siberia and Russian Far East yields new species. Nevertheless, this genus is already well studied due to the

existence of one global (Marusik et al. 2004) and several regional revisions (Fomichev and Marusik 2018, Fomichev and Omelko 2020, Fomichev 2021). Recently, the authors undertook a new expedition to the highlands of Sikhote-Alin Mountains. As a result, several specimens of *Acantholycosa* were collected. Examination of this specimens revealed that they belong to an undescribed species. The goal of this paper is to provide the description of this new species.

Material and methods

Specimens were photographed using a Nikon DSRI2 camera attached to a Nikon SMZ25 stereomicroscope at the Far Eastern Federal University (Vladivostok, Russia) and an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope at the Altai State University (Barnaul, Russia). Photographs were taken in dishes with soft white paper or cotton at the bottom, filled with alcohol. Living specimen was photographed by Nikon D850 DSLR camera with 105mm F2.8 EX DG OS HSM macro lens. Habitat was taken with POCO X4 Pro smartphone camera. Digital images were montaged using Zerene Stacker software (<http://zerenesystems.com/cms/stacker>). Epigyne was cleared in a KOH/water solution for a couple of days. Distribution map was produced using SimpleMappr web application (Shorthouse 2010). All measurements are in millimeters. Length of leg segments were measured on the dorsal side, and are shown as: femur, patella, tibia, metatarsus, tarsus (total length). Apical spines on metatarsus were not counted. All the examined material is deposited in the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU; curator: K.G. Mikhailov), the Institute of Systematics and Ecology of Animals SB RAS, Novosibirsk, Russia (ISEA; curator: G.N. Azarkina) and Far Eastern Federal University (FEFU; curator: M.M. Omelko).

Abbreviations used in the text and figure plates and the format of description follow Fomichev and Omelko (2020): Leg segments: Fe – femur, Pa – patella, Mt – metatarsus, Ti – tibia. Spination: d – dorsal, p – prolateral, r – retrolateral, v – ventral. Copulatory organs: Ap – apical pocket, Cd – copulatory duct, Em – embolus, Et – embolic tooth, Fo – fovea, Le – lips of the epigyne, Lm – lateral margins of the fovea, Pa – paleal apophysis, Pl – palea, Re – receptacle, Sb – septal base, Ss – septal stem, Ta – tegular apophysis, Te – terminal apophysis, Tg – tegulum.

Results

Species survey

Acantholycosa irinae Fomichev & Omelko, 2020

Figures 3–4, 10–13, 17–19, 23–25, 28–29

Acantholycosa irinae Fomichev & Omelko, 2020: 264, figs 1–2, 7–8, 13–15, 22–24, 48–49 (♂♀).

Material examined. RUSSIA: Maritime Territory: **holotype** ♂ (ZMMU), Sikhote-Alin Mt. Range, Alekseevskiy Mountain Range, Ol'khovaya Mt., 43°20.432'N, 133°39.441'E, scree, 1460–1600 m, 3.07.2019 (M.M. Omelko, A.A. Fomichev); paratypes: 1♀ (ZMMU), 1♀ (ISEA, **001.8416**), together with the holotype.

Distribution. Known only from the type locality on Ol'khovaya Mt. (Fig. 28).

Notes. The type locality of this species lies only 10 kilometers northwest of Lysaya Mt. where *Acantholycosa voronoi* sp.n. was found. Thus, even a small distance and an additional isolation factor such as Alekseevka River valley is sufficient for the formation of two separate species. We do not redescribe this species here as it was described and illustrated very recently (Fomichev and Omelko 2020); we have provided images only for a better comparison with the new species.

***Acantholycosa voronoi* sp. nov.**

<http://zoobank.org/685BEDB8-7D71-4415-943E-51BBF1BEB748>

Figs 1–2, 5–9, 14–16, 20–22, 26–29

Type material. **Holotype** ♂ (ISEA, **001.8968**), RUSSIA: Maritime Territory, Sikhote-Alin Mountains, Partizanskiy Mountain Range, Lysaya Mountain, 43°15.103'N, 133°42.898'E, scree, 600–1400 m, 20–21.07.2022 (A.A. Fomichev, M.M. Omelko, Y.V. Dyachkov). **Paratypes:** 1♀ (ISEA, **001.8969**), 1♀ (ZMMU), 3♂ (ISEA, **001.8970**), 2♂ (FEFU), together with the holotype.

Etymology. The specific epithet is a patronym in honour of our friend and well-known Russian writer Oleg N. Voronoi (Kishinevka, Maritime Territory of Russia), who helped in organizing an expedition to Sikhote-Alin Mountains, during which the types of this new species were collected.

Diagnosis. The new species is closely related to *Acantholycosa irinae* Fomichev et Omelko, 2020 described from adjacent Ol'khovaya Mountain. Both species have the embolic tip bent up, tegular apophysis lacking an apical arm and similar epigynal conformation. Male and female of *A. voronoi* sp. nov. can be distinguished from those of the latter species by larger size (4.5 vs. 4.14, 4.9 vs. 4.22 in males and females; cf. Figs 1–2 and 3–4). The male of the new species differs by the flattened anterior edge of tegular apophysis (*Ta*) (vs. rounded in *A. irinae*), straight retrolateral side of the palea (*Pl*) (vs. concave in *A. irinae*) and rounded tip of the palea (*Pa*) (vs. sharp in *A. irinae*) (cf. Figs 7 and 11). Additionally, the male of *A. voronoi* sp. nov. can be diagnosed from that of *A. irinae* by the embolus (*Em*) widened in distal part (vs. almost the same thickness along its entire length in *A. irinae*) and by short and rounded embolic tooth (vs. long and pointed in *A. irinae*) (cf. Figs 14 and 17). The female of *A. voronoi* sp. nov. can be distinguished from that of *A. irinae* by the number of ventral spines on tibia I (six pairs and one unpaired spine vs. five pairs of spines in *A. irinae*), by anterior pocket (*Ap*) consisting of one hood in intact epigyne (vs. two clearly visible hoods in *A. irinae*) (cf. Figs 20 and 23) and by receptacles (*Re*) being more widely separated (two of their diameter vs. one; cf. Figs 22 and 25).

Description. Male (holotype measured). Carapace: 4.5 long, 3.55 wide. Total length 8.2. Coloration. Carapace dark brown, eye field black (Fig. 1). Clypeus, chelicerae, labium, endites and sternum dark brown. Coxae gray with yellow spots. Palps dark brown, cymbium black. Legs brown with yellow stripes and spots. Abdomen dark gray dorsally, with brown cardiac mark. Venter of the abdomen brown. Spinnerets dark gray. Leg measurements: I: 4.65, 1.9, 4.6, 4.5, 1.9 (17.55). II: 4.55, 1.85, 4.25, 4.5, 1.8 (16.95). III: 4.35, 1.7, 3.75, 5.25, 1.8 (16.85). IV: 5.3, 1.8, 4.75, 7.85, 2.4 (22.1). Spination of leg I: Fe 3d 2p 3r; Pa 1p 1r; Ti 1p 1r 7-6v; Mt 2p r2 2-2v.

Palp as shown in Figs 5–6, 7–9, 14–16. Cymbium with two claws. Tegulum (*Tg*) strongly protruding (Fig. 6). Tegular apophysis (*Ta*) relatively small, without an apical arm, with flattened anterior edge (Figs 5, 7). Terminal apophysis (*Te*) long, claw-shaped. Palea (*Pl*) with a large triangular apophysis (*Pa*, Fig. 7). Tip of *Pa* rounded. Embolus (*Em*) large, significantly widened distally, with a small, rounded tooth at its base (*Et*, Fig. 14) and sharply abrupt tip.

Female. Carapace: 4.9 long, 4.0 wide. Total length 10.5. Coloration. Carapace dark brown, eye field black (Fig. 2). Clypeus, chelicerae and sternum dark brown. Labium and endites yellow brown. Coxae dirty yellow. Legs and palps brown with yellow stripes and spots. Abdomen dark gray dorsally, with brown-gray cardiac mark and blurry pale pattern. Venter of the abdomen yellow gray. Spinnerets dark gray. Leg measurements: I: 4.65, 2.1, 4.5, 4.0, 1.8 (17.05). II: 4.6, 2.1, 4.15, 4.0, 1.8 (16.65). III: 4.4, 1.85, 3.75, 4.7, 1.85 (16.55). IV: 5.4, 2.0, 4.85, 7.3, 2.45 (22.0). Spination of leg I: Fe 3d 2p 2r; Pa 1p 1r; Ti 1p 1r 7-6v; Mt 2p 2r 2-2v.

Epigyne as shown in Figs 20–22. Fovea (*Fo*) and septal base (*Sb*) diamond-shaped (Fig. 20). Fovea longer than wide. Septum with a distinct stem (*Ss*), as long as the septal base. Lips of the epigyne

(*Le*) almost contiguous posteriorly. Apical pocket (*Ap*) large, with one hood (seems like two closely located hoods in macerated epigyne). Receptacles (*Re*) droplet-shaped, widely spaced, their diameter slightly larger than that of copulatory ducts (*Cd*). Copulatory ducts twice as long as receptacles (Fig. 22).

Distribution. Known only from the type locality (Fig. 27–29).



Figure 1. Figures 1–4. Habitus of *Acantholycosa voronoi* sp. nov. (1–2) and *A. irinae* (3–4): 1, 3 – males; 2, 4 – females. Scale bars: 2 mm.



Figure 2. Figures 5-13. Palps and bulbs of *Acantholycosa voronoi* sp. nov. (5-9) and *A. irinae* (10-13): 5, 10 - palps, ventral; 6 - ditto, prolateral; 7, 11 - bulbs, ventral; 8, 12 - ditto, anterior; 9, 13 - ditto, retrolateral. Abbreviations: Em - embolus, Et - embolic tooth, Pa - paleal apophysis, Pl - palea, Ta - tegular apophysis, Te - terminal apophysis, Tg - tegulum. Scale bars: 0.2 mm.

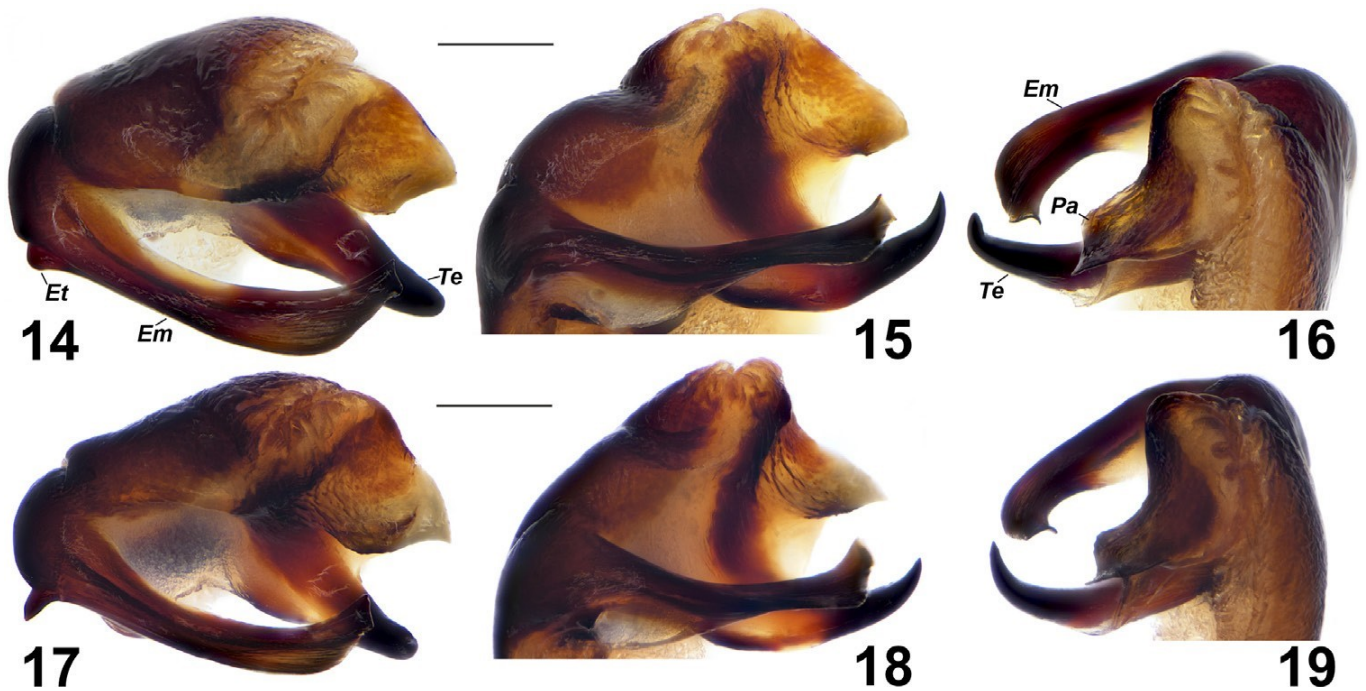


Figure 3. Figures 14-19. Embolic divisions of *Acantholycosa voronoi* sp. nov. (14-16) and *A. irinae* (17-19): 14, 17 - anterior; 15, 18 - ventral; 16, 19 - retrolateral. Abbreviations: Em - embolus, Et - embolic tooth, Pa - paleal apophysis, Pl - paleal apophysis, Te - terminal apophysis. Scale bars: 0.2 mm.

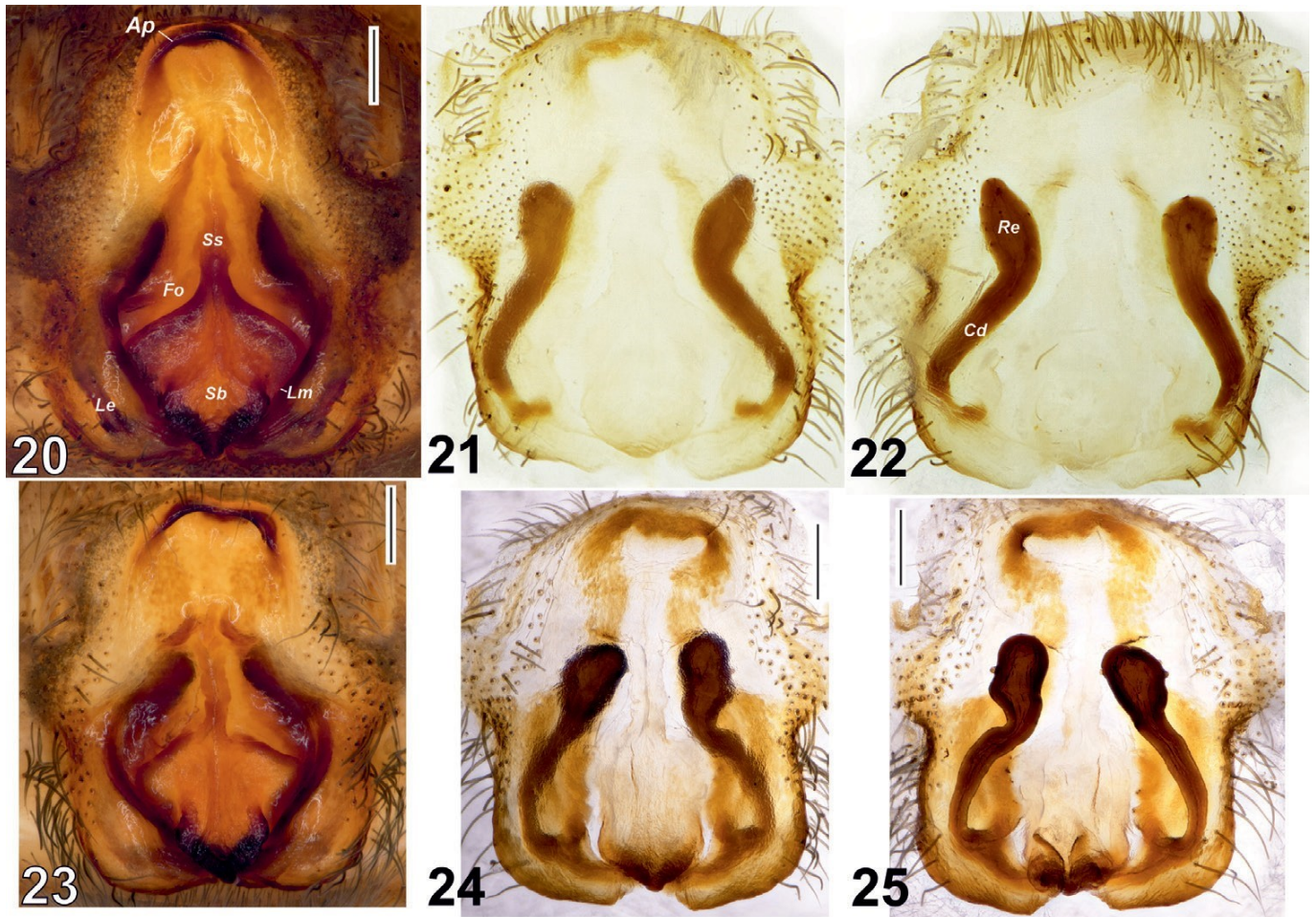


Figure 4. Figures 20-25. Epigynes of *Acantholycosa voronii* sp. nov. (20-22) and *A. irinae* (23- 25): 20, 23 - intact, ventral; 21, 24 - macerated, ventral; 22, 25 - macerated, dorsal. Ap - apical pocket, Cd - copulatory duct, Fo - fovea, Le - lip of the epigyne, Lm - lateral margin of the fovea, Re - receptacle, Sb - septal base, Ss - septal stem. Scale bars: 0.2 mm.



Figure 5. Figures 26-27. Male live specimen of *Acantholycosa voronii* sp. nov. (26) and the habitat of the species on Lysaya Mountain (27).

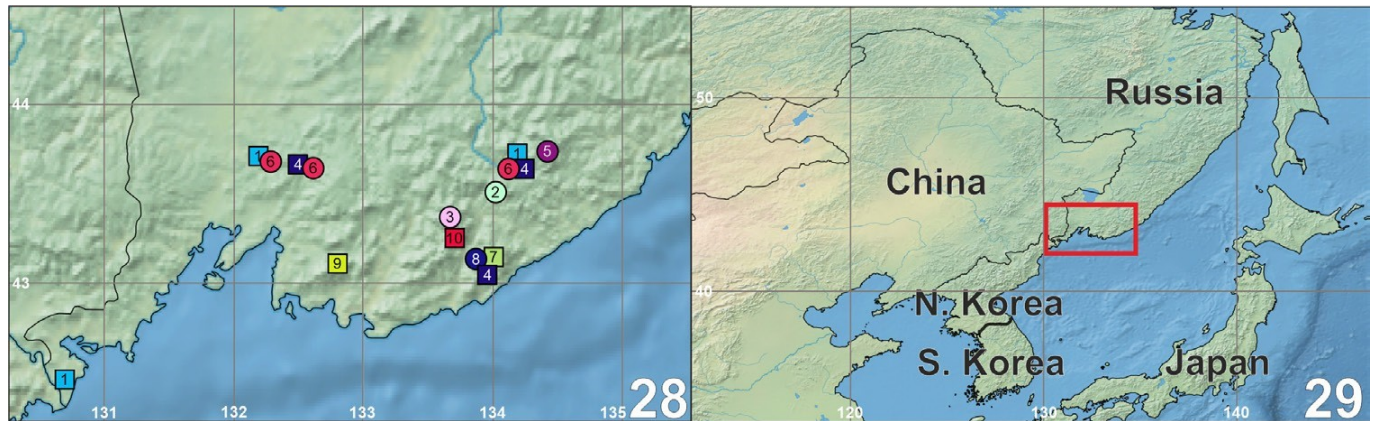


Figure 6. Figures 28–29. Distribution records of *Acantholycosa* spp. in south of Maritime Territory, Russia: 1 - *A. aborigenica*, 2 - *A. azarkinae*, 3 - *A. irinae*, 4 - *A. lignaria*, 5 - *A. marusiki*, 6 - *A. norvegica*, 7 - *A. oligerae*, 8 - *A. sundukovi*, 9 - *A. valeriae*, 10 - *A. voronoi* sp. nov.

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