

NEW FOR THE ASIAN PART OF RUSSIA TAXA OF SPIDERS
(ARACHNIDA: ARANEI)

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Summary. Subfamily Nephilinae (Araneidae), genus *Trichonephila* Dahl, 1911 and *T. clavata* (L. Koch, 1878) as well as family Zoropsidae, genus *Takeoa* Lehtinen, 1967 and *T. nishimurai* (Yaginuma, 1963) are recorded from Asian part of Russia for the first time. Both widely distributed in Eastern Asia species were collected in Primorsky krai. Redescriptions, diagnosis, photographs and distribution maps are provided for these species.

Key words: biodiversity, Araneidae, Nephilinae, *Trichonephila*, Zoropsidae, *Takeoa*, new records, Primorsky krai.

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Резюме. Впервые для азиатской части России указываются подсемейство Nephilinae (Araneidae), род *Trichonephila* Dahl, 1911 и вид *T. clavata* (L. Koch, 1878), а также семейство Zoropsidae, род *Takeoa* Lehtinen, 1967 и вид *T. nishimurai* (Yaginuma, 1963). Оба вида найдены в Приморском крае и широко распространены в Восточной Азии. Приводятся описания, диагнозы, фотографии и карты распространения этих видов.

INTRODUCTION

All available data on spiders of Asian part of Russia was summarized recently (Marusik & Kovblyuk, 2011). These authors recorded 38 families from Siberia and Russian Far East. Since the publication of this monograph, many new species of spiders have been described or recorded in Northern Asia. However, not any families or subfamilies new to the fauna of the Asian part of Russia were found. Here we find such taxa in the Russian Far East.

The specimens examined were photographed with an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope at the Altai State University (Barnaul, Russia) and a

Nikon DSRi2 camera attached to a Nikon SMZ25 stereomicroscope at the Far Eastern Federal University (Vladivostok, Russia). Photographs were taken in dishes filled with alcohol, with soft white paper of cotton at the bottom. Live specimens and habitats were photographed using a Canon PowerShot SX620 HS and by Nikon D850 DSLR camera with Tamron SP 90mm f/2.8 Di Macro 1:1 VC USD macro lens. Digital images were montaged using Zerene Stacker (<https://zerenesystems.com/cms/stacker>) software package. Epigynes were cleared in a KOH/water solution. Distributional maps were produced using SimpleMappr (Shorthouse, 2010). All measurements are in millimeters. Length of leg segments were measured on the dorsal side, and are shown as total length (femur, patella, tibia, metatarsus (absence in the palp), tarsus). All examined material is deposited in 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). The terminology and the format of description follow Li *et al.* (2015) and Harvey *et al.* (2007) with modifications.

Abbreviations: Eyes: ALE – anterior lateral eye, AME – anterior median eye, PLE – posterior lateral eye, PME – posterior median eye; Palp and legs segments: Fe – femur, Mt – metatarsus, Pa – patella, Ta – tarsus, Ti – tibia; Spination: d – dorsal, p – prolateral, r – retrolateral, v – ventral; Copulatory organs: *CD* – copulatory duct, *DS* – dorsal part of scape, *Fo* – fovea, *HL* – handle of lip of epigyne, *Li* – lip of epigyne, *Re* – receptacle, *RH* – receptacle head, *Sc* – scape, *VS* – ventral part of scape.

RESULTS

Family Araneidae Clerck, 1757

Subfamily Nephilinae Simon, 1894

REMARKS. The status of this taxon is controversial. The family Nephilidae was described by Simon (1894). Recently it was reconsidered as subfamily of Araneidae (Dimitrov *et al.*, 2017), then elevated to family again (Kuntner *et al.*, 2019), and anew downgraded to subfamily (Hormiga *et al.*, 2023). Here Nephilinae is recorded for Russia for the first time.

Genus *Trichonephila* Dahl, 1911

REMARKS. *Trichonephila* with 26 species and subspecies is a relatively small genus of Araneidae, distributed in tropical and subtropical regions around the world with greatest diversity in sub-Saharan Africa (WSC, 2024). During long time *Trichonephila* was considered as a subgenus of *Nephila* Leach, 1815 but recently raised to genus rank (Kuntner *et al.*, 2019).

Trichonephila clavata (L. Koch, 1878)

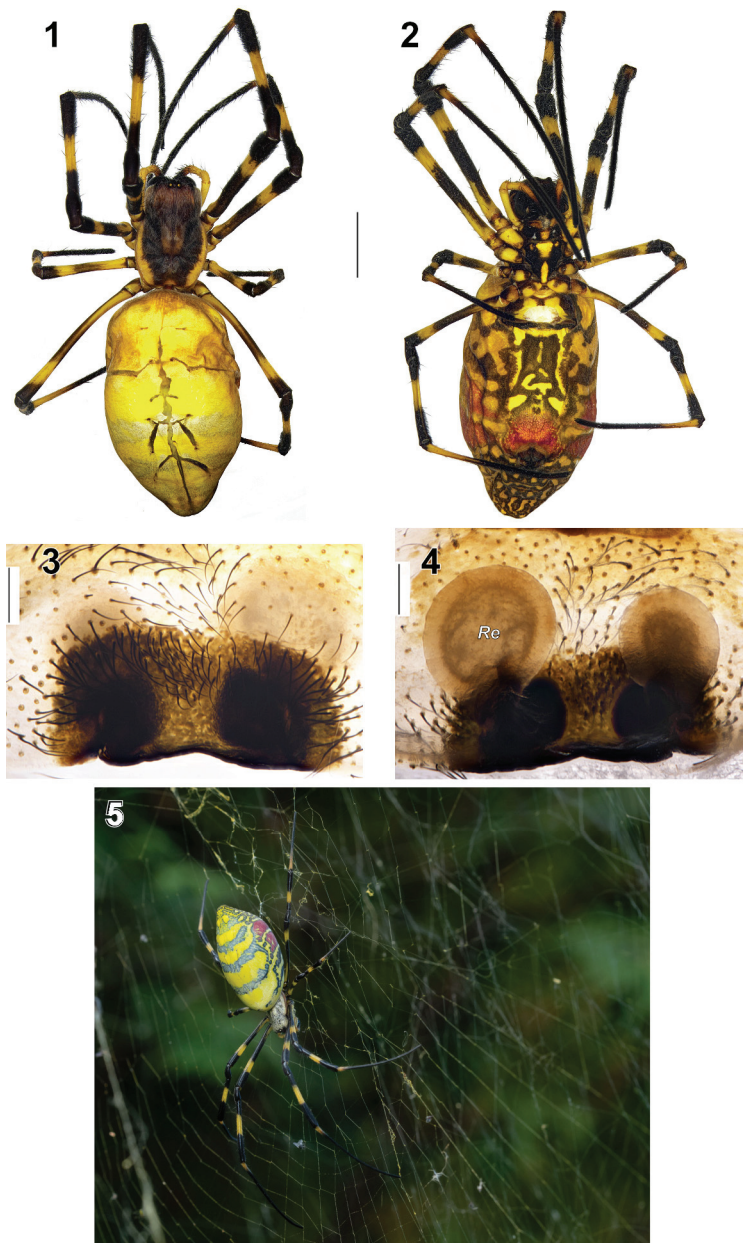
Figs 1–5

Nephila clavata Koch, 1878: 741, pl. 15, f. 4 (♀); Bösenberg & Strand, 1906: 190, pl. 3, f. 11, pl. 11, f. 217 (♂♀).

Trichonephila clavata Kuntner *et al.*, 2019: 557.

MATERIAL EXAMINED. **Russia:** Primorsky krai, Vladivostok, Botanical Garden-Institute, 43°13'23.22''N, 131°59'53.61''E, webs on trees, 90 m, 1.X 2023, 1♀, 1♀ juv., M.M. Omelko (FEFU).

DIAGNOSIS. Three species of *Trichonephila* are known to occur in Asia: *T. antipodiana* (Walckenaer, 1841), *T. clavata*, and *T. plumipes* (Latreille, 1804). These entire species exhibit



Figs 1–5. *Trichonephila clavata*. 1– body, dorsal view; 2 – same, ventral view; 3 – epigyne, dorsal view; 4 – same, ventral view; 5 – living specimen. Abbreviation: *Re* – receptacle. Scale bars = 5 mm (1, 2), 0.2 mm (3, 4).

relatively similar copulatory organs but are well-distinguished by their external morphology. Males of *T. clavata* can be easily differed from those of *T. antipodiana* by the coloration of the abdomen and carapace with pattern (vs. uniformly colored; cf. Namkung, 2003: fig. 18 and Harvey *et al.*, 2007: figs. 3, 6). It also differs from *T. plumipes* in having a smooth tip of the conductor (vs. with subdistal triangular protuberance; cf. Yin *et al.*, 2012: fig. 217d and Harvey *et al.*, 2007: fig. 39). Females of *T. clavata* can be easily distinguished from females of both other Asian species by the coloration of the dorsal surface of the abdomen, featuring alternating bright yellow and gray transverse stripes (vs. without transverse stripes; cf. Harvey *et al.*, 2007: figs 3, 6, 8).

REDESCRIPTION. Female. Total length 24.20. Carapace: 8.49 long, 5.85 wide. Abdomen: 21.54 long, 10.76 wide. Coloration. Carapace almost black with dark brown median part and head area, lateral bands yellow, humps ascent. Chelicerae, labium and endites almost black. Sternum black with three yellow spots anteriorly and yellow stripe posteriorly. Palps: Fe–Ti yellow, Ta brown. Legs: Fe I–II black with yellow ring medially and yellow stripe ventro-proximally, Fe III–IV yellow with black ring medially and black distally; Pa I–IV black; Ti I–IV black with yellow ring medially; Mt I–IV black, yellow proximally; Ta I–IV black. Abdomen dorsally with alternating bright yellow and gray transverse stripes; lateral sides with stripes extending from dorsal surface and two large red spots posteriorly, ventral surface yellow with black irregular spots and red spot posteriorly, next to spinnerets. Spinnerets black. Eye sizes and interdistances: AME 0.27, ALE 0.24, PME 0.27, PLE 0.25; AME–AME 0.42, AME–ALE 0.85, PME–PME 0.46, PME–PLE 0.92, AME–PME 0.50, ALE–PLE 0.22. Clypeus height at AME 0.13. Chelicerae with 3 promarginal and 3 retromarginal teeth. Legs and palp measurements: Palp: 8.63 (2.72, 1.32, 1.53, –, 3.06); I: 52.27 (14.83, 3.27, 12.88, 17.96, 3.33); II: 43.69 (12.82, 3.07, 10.07, 14.61, 3.12); III: 22.21 (7.25, 1.81, 4.02, 6.99, 2.14); IV: 36.82 (12.51, 2.11, 7.39, 12.15, 2.66).

Epigyne as in Figs 3–4. Epigyne almost black, barely visible on the abdomen, twice wider than long, posterior margin slightly concaved. Receptacles (*Re*) large, round (right receptacle of studied specimen underdeveloped).

DISTRIBUTION. Widely distributed in East, Southeast and South Asia, from India to Japan and Russia (Fig. 13).

REMARKS. The discovery of *T. clavata* in the Russian Far East represents one of the most northernmost records for this species, genus and subfamily Nephilinae in general. The closest known localities are in South Korea (ca. 650 kilometers to the south) and in Japan (ca. 500 km to the northeast). Both these locations have considerably warmer climate than southern part of the Russian Far East. On the one hand, this shift in the distribution range can be attributed to the overall climate warming in the region. On the other hand, the find of *T. clavata* in the Botanical Garden of Vladivostok can be explained by unintentional introduction with seedlings. Finally, there may be another reason. Nephilinae are known to have the ability to spread over vast distances using ballooning (Lee *et al.*, 2015). In any case, Nephilinae have a high dispersal ability both with the help of people and independently. It is important to note that exactly *T. clavata* in recent years was introduced to USA, where it subsequently spread relatively widely (Hoebeke *et al.*, 2015).

Family Zoropsidae Bertkau, 1882

REMARKS. Zoropsidae is a relatively small spider family with 180 extant species belonging to 27 genera distributed almost worldwide (WSC, 2024) but only three are found in the Palaearctic region: *Akamasia* Bosselaers, 2002, *Takeoa*, and *Zoropsis* Simon, 1878. The former genus is endemic to Cyprus (Bosselaers, 1997). Two centers of diversity are known for *Zoropsis*. Most species are described from the Mediterranean and another hotspot

of diversity is China (Li *et al.*, 2015; Wang *et al.*, 2020). Only one species, *Z. kirghizicus* Ovtchinnikov et Zonstein, 2001, is known from Central Asia (Ovtchinnikov & Zonstein, 2001). However, this species may belong to an undescribed genus judging by the unique very broad and deeply concave retrolateral tibial apophysis and the scape almost reaching the epigastral groove. Here the family Zoropsidae is recorded for the Russian Far East for the first time.

Genus *Takeoa* Lehtinen, 1967

REMARKS. *Takeoa* is represented by four species distributed in East Asia (Tang *et al.*, 2004). This genus is new for the fauna of the Russian Far East.

Takeoa nishimurai (Yaginuma, 1963)

Figs 6–12

Zoropsis nishimurai Yaginuma, 1963: 1, 3, pl. I, pl. III, f. 1–12 (♂♀).

Takeoa nishimurai Lehtinen, 1967: 266, f. 403, 405; Ono, 2009: 141, f. 1–6; Kim, 2021: 184, f. 80A–I, pl. 38.

MATERIAL EXAMINED. **Russia:** Primorsky krai, Krounovka River valley, 43°39.342'N, 131°33.853'E, rocks and screes in oak forest, 200 m, 10.VII 2022, 1♀ (ISEA, 001.9082), 1♀ (ISEA, 001.9083) A.A. Fomichev.

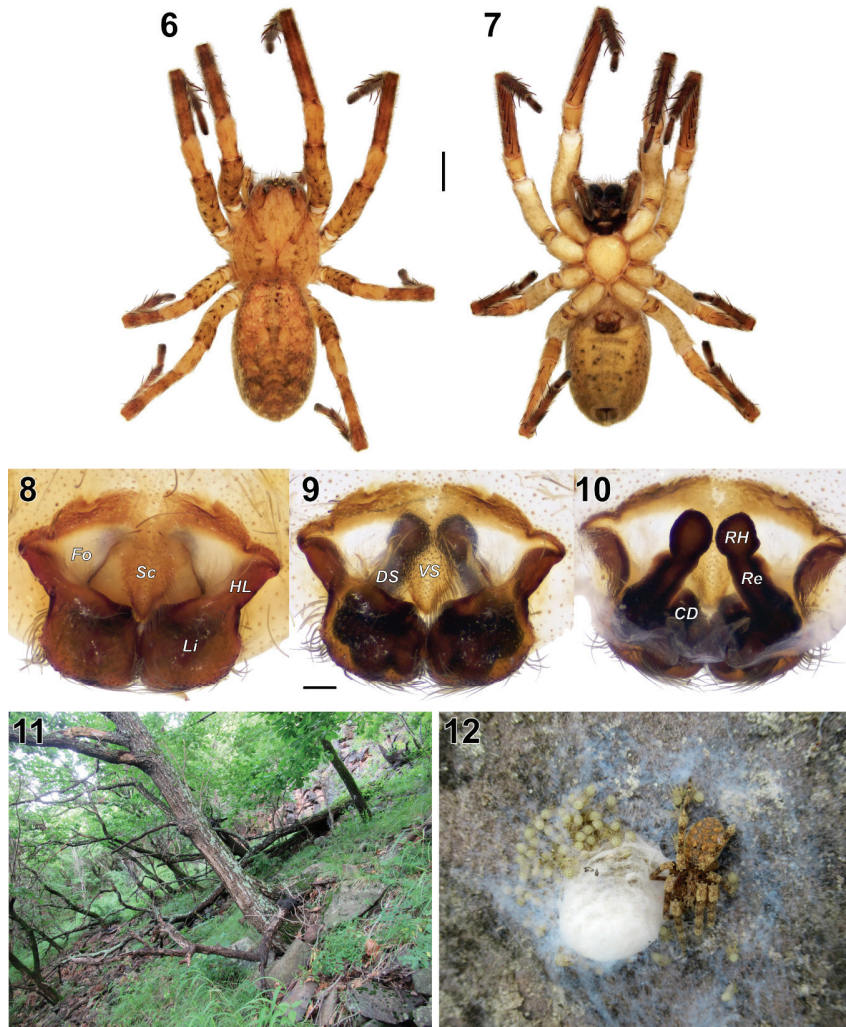
DIAGNOSIS. The female of *Takeoa nishimurai* differs from that of all known species of *Zoropsis*, the only other East Palaearctic genus of Zoropsidae, by short scape (*Sc*) not reaching epigastral furrow (*vs.* long scape, reaching epigastral furrow) and by converging receptacles (*Re*) with almost touching heads (*RH*) (diverging or parallel receptacles with widely separated heads) (*cf.* Figs 8–10 *vs.* Marusik & Kovblyuk, 2004: figs 5–6). The male of *T. nishimurai* can be distinguished from that of *Zoropsis* by wide retrolateral tibial apophysis with blunt tip (*vs.* narrow, sharply pointed retrolateral tibial apophysis), triangular retrolateral marginal bump of cymbium (*vs.* elliptical) and by triangular bulging proximal part of tegulum (*vs.* circular; *cf.* Bosselaers, 2002: fig. 1A–B and Griswold & Ubick, 2001: figs 2, 5). Additionally, the male of *T. nishimurai* differs from that of *T. huangshan* Tang, Xu et Zhu, 2004 by non-bifurcated distal part of embolus (*vs.* bifurcated; *cf.* Bosselaers, 2002: fig. 1A and Tang *et al.*, 2004: fig. 4). The female of *T. huangshan* is unknown.

REDESCRIPTION. Female. Total length 12.3. Carapace: 5.9 long, 4.5 wide. Abdomen: 7.4 long, 4.2 wide. Coloration. Carapace yellow brown with yellow median band. Chelicerae, labium and endites dark brown, almost black. Sternum and coxae yellow. Palps: Fe–Pa yellow, Ti–Ta brown. Legs: Fe–Pa dirty yellow with gray spots, Ti–Ta brown, darker distally. Abdomen dirty yellow with gray spots. Spinnerets yellow gray. Eye sizes and interdistances: AME 0.21, ALE 0.3, PME 0.3, PLE 0.27; AME–AME 0.24, AME–ALE 0.13, PME–PME 0.19, PME–PLE 0.49, MOA long 0.73, MOA front width 0.64, MOA back width 0.76. Clypeus height at AME 0.21. Chelicerae with 3 promarginal and 3 retromarginal teeth. Legs and palp measurements: Palp: 5.8 (1.95, 1.0, 1.1, –, 1.75); I: 17.25 (4.8, 2.3, 4.9, 4.05, 1.2); II: 14.95 (4.25, 2.15, 3.95, 3.5, 1.1); III: 12.15 (3.6, 1.75, 2.8, 2.9, 1.1); IV: 16.7 (4.75, 1.95, 4.05, 4.6, 1.35). Legs and palp spination: Palp: Fe d3; Pa p1; Ti d2 p3; Ta p2. I: Fe d3 p3 r4; Ti p2 r2 v2-2-2-2-2-2-2; Mt p2 r2 v2-2-2-2-2-2-2. II: Fe d3 p2 r4; Ti p2 r2 v2-2-2-2-2-2-2-2; Mt p2 r1 v2-2-2-2-2. III: Fe d3 p3 r4; Pa p1 r1; Ti d1 p2 r2 v2-2-2-2; Mt d3 p3 r3 v2-2-1. IV: Fe d3 p2 r1; Pa p1 r1; Ti d1 p2 r2 v2-2-2-2; Mt d3 p3 r3 v2-1-2-1.

Epigyne as in Figs 8–10. Epigynal plate 1.2 times wider than long. Fovea (*Fo*) elliptical, 2.7 times wider than long. Lips of epigyne (*Li*) almost square-shaped, with rectangular

handle (*HL*). Scape (*Sc*) divided into two parts: trapezoidal smooth dorsal part (*DS*) and fusiform haired ventral one (*VS*). Copulatory ducts (*CD*) located posteriorly, irregularly twisted. Receptacles (*Re*) rod-shaped, with globular heads (*RH*).

DISTRIBUTION. This species is widely distributed in East Asia: China (Zhejiang), South Korea and Japan (Song *et al.*, 1999) but firstly recorded from Russia (Fig. 14).



Figs 6–12. *Takeoa nishimurai*. 6 – body, dorsal view; 7 – same, ventral view; 8, 9 – epigyne, dorsal view; 10 – same, ventral view; 11 – habitat; 12 – living specimens. Abbreviations: *CD* – copulatory ducts, *DS* – dorsal part of scape, *Fo* – fovea, *HL* – handle of lip of epigyne, *Li* – lip of epigyne, *Re* – receptacle, *RH* – receptacle head, *Sc* – scape, *VS* – ventral part of scape. Scale bars = 2 mm (6, 7), 0.2 mm (8–10).

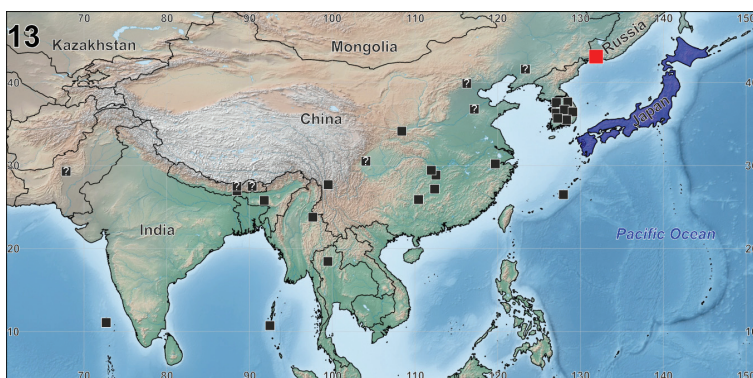


Fig. 13. Distribution map of *Trichonephila clavata*. Red square – new record, black squares – previous records, black squares with question marks – records without precise location.

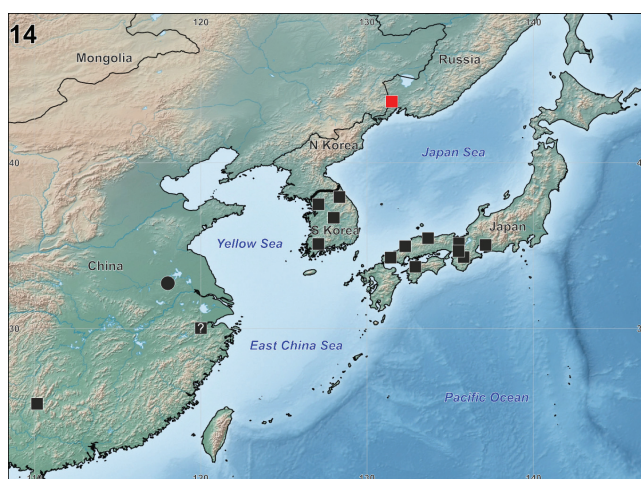


Fig. 14. Distribution map of *Takeoa* spp. Squares – *T. nishimurai* (red symbol – new record, black symbols – previous records); circle – *T. huangshan*.

CONCLUSION

Spiders are currently represented in the Asian part of Russia by 39 families (Marusik & Kovblyuk, 2011; Mikhailov, 2021; present data). Thirty-four families are recorded from Primorsky krai, of them six ones (Atypidae, Ctenidae, Leptonetidae, Oonopidae, Theridiosomatidae, and Zoropsidae) are known from this region only. Marusik & Kovblyuk (2011) predicted the future discovery of two more families in Primorsky krai, viz. Oecobiidae and Segestriidae, although these have not been found yet. Additionally, Scytodidae probably may be discovered here because this family is well represented in China, and a number of species are dispersed by human activities (Fomichev & Omelko, 2023).

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