

Spiders of the family Zodariidae from Mongolia (Arachnida: Araneae)

With 31 figures

YURI M. MARUSIK & SEppo KOPONEN

Abstract. Two species from Mongolia are described: *Zodariellum schmidtii* sp. n. (♂ ♀) and *Z. mongolicum* sp. n. (♂), and Mongolo-Kazakhstan *Z. nenilini* (ESKOV in ESKOV & MARUSIK, 1995) comb. n. (ex *Acanthinozodium* n.) is redescribed. Genus *Acanthinozodium* DENIS, 1952 was found to be a *nomen nudum* and therefore *Zodariellum* ANDREEVA & TYSHCHENKO, 1968 was removed from the synonymy of *Acanthinozodium*. Diagnosis for the genus is given and following Central Asian species are transferred from *Zodarium* to *Zodariellum*: *proszynskii* (NENILIN & FET, 1985) comb. n., *sychevskajae* (NENILIN & FET, 1985) comb. n., *bekuzini* (NENILIN, 1985) comb. n., *continentalis* (ANDREEVA & TYSHCHENKO, 1968) comb. n., *asiaticum* (TYSHCHENKO, 1970) comb. n., *chaoyangense* (ZHU & ZHU, 1983) comb. n., *furcum* (ZHU, 1988) comb. n. In addition, two species from Central Asia with uncertain position, *Zodarium raddei* SIMON, 1885, and *Z. denisi* SPASSKY, 1938, are illustrated.

Key words Araneae, Zodariidae, *Zodariellum*, *Acanthinozodium*, new species, new combinations, taxonomy, Mongolia, Central Asia

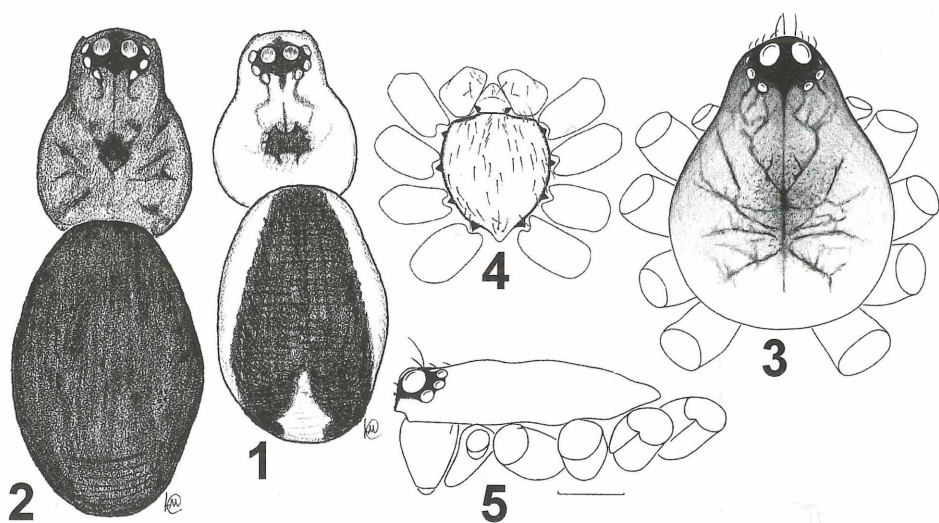
Introduction

Until recent time spiders of the family Zodariidae were not known in Mongolia. A single record of zodariids was made by JOCQUÉ (1991) who mentioned an undescribed species of *Acanthinozodium* from Mongolia. During a collecting trip of the first author to Central Mongolia two species of Zodariinae spiders were collected. In addition to this material Rudy JOCQUÉ kindly send us specimens collected by Z. KASZAB in Mongolia and reported in his generic revision of zodariids (JOCQUÉ 1991).

During this study we faced the problem of placing species into right genus because palpal and epigynal conformation of Mongolian and other Central Asian species is rather different from European *Zodarium* revised by BOSMANS (1994, 1997) and from the type species of the genus and family *Z. nitidum* (AUDOUIN, 1826) illustrated by LEVY (1992). *Acanthinozodium* DENIS, 1952 in which JOCQUÉ (1991) placed Mongolian species was found to be a dubious genus, and therefore goal of this paper became wider than description of new taxa and redescription of poorly known species.

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Figs 1–5: *Zodariellum nenilini* (Eskov) (1), *Z. schmidtii* sp. n. (2) and *Z. mongolicum* sp. n. (3–5). 1, 2 – female body, dorsal view; 3, 5 – male carapace, dorsal and lateral view respectively; 4 – male sternum, coxae and labium. – Scale = 0.5 mm.

Material and methods

All figures except fig. 24 and 27–31 are from Mongolian specimens. Figures 3–5 & 9 were made by R. JOUQUÉ. Material treated here has been deposited in HMNH – Hungarian Museum of Natural History, Budapest; IBPN – Institute for Biological Problems of the North, Magadan; ISEA – Institute for Systematics and Ecology of Animals, Novosibirsk; JWC – Jörg WUNDERLICH coll., later probably in Senckenberg Museum; ZISP – Zoological Institute, St. Petersburg; ZMMU – Zoological Museum of the Moscow University. Abbreviations used in text and figures are as follows: TA – tegular apophysis, RTA – retrolateral tibial apophysis. All measurements are given in millimeters.

Zodariellum ANDREEVA & TYSHCHENKO, 1968

Acanthinozodium DENIS, 1951: 156 *nomen nudum* (suggestion to describe new genus).

Acanthinozodium DENIS, 1952: 58 *nomen nudum* (formal description of genus without specifying that it is a new genus, but *contra* with referring to year of description as 1950, and without selecting or indicating type species within 2 species described, required by Article 13.3 of ICZN).

Zodariellum ANDREEVA & TYSHCHENKO, 1968: 688, figs 7–8 (D of genus and ♂).

Type species: *Zodariellum surprisum* ANDREEVA & TYSHCHENKO, 1968 by original designation.

Note. According to BRIGNOLI's (1983) catalogue and CODDINGTON's (1992) bibliography, paper of DENIS with the description of *Acanthinozodium* had appeared in 1950, while JOUQUÉ (1991), and Zoological Record – "Index to Organism Names" gives another year – 1952.

Diagnosis. From *Zodarion* WALCKENAER, 1847 can be easily separated by conformation of male palp and epigyne, as well as by presence of dorsal spines on femora and declining carapace with very flat thoracic part. Tegular apophysis (TA) greatly enlarged (fig. 21), spine-like "bill" of

TA directed down and placed near base of embolus, retrolateral portion of TA elongate, turned and extend into cymbium. Cymbium modified and has thick tutaculum (figs 6–8, 14–15, 17, 19), kind of conductor of extend part of TA (fig. 21). Tutaculum separated from rest of cymbium by thin furrow (fig. 19). Embolus long and thin, base of it is in retrolateral-basal portion of tegulum (figs 7–8, 20). Conductor long, lamellate, fused with tegulum almost along whole course with only two free portions, one is directed to the base of embolus (cf. figs 7, 22), and another support apical part of embolus. Tibia with well developed retrolateral apophysis. RTA with modified apical portion: flattened and turning dorsally and carrying claw. Epigyne with long spiraled spermathecae corresponding to long embolus.

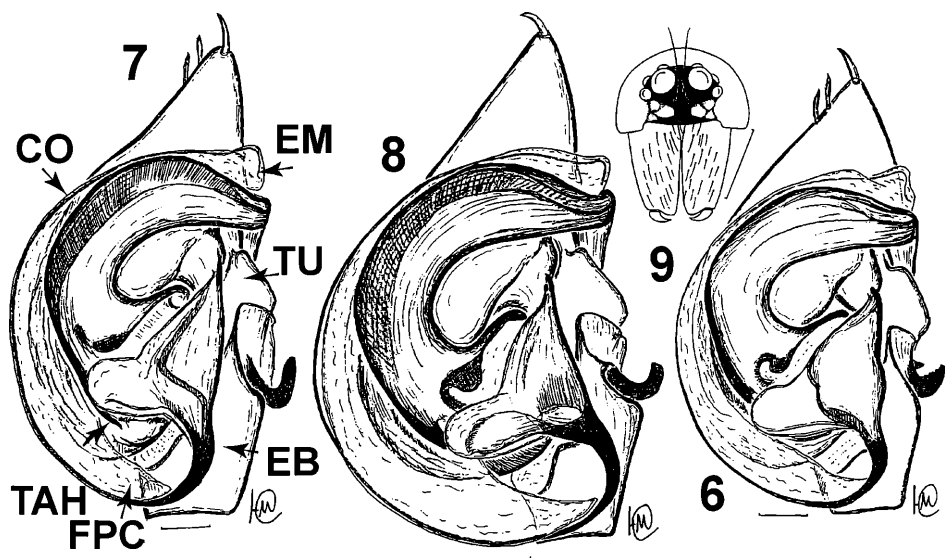
Discussion Besides the description of *Acanthinozodium* does not correspond to the required rules of ICZN, type species fixed by JOCQUÉ (1991) namely *cirrusulcatum* DENIS, 1952 is a rather obscure species, because syntypes, female and two subadult males, seem to be lost and not available for study.

While type species of *Zodariellum* is somewhat obscure too, generotype was fixed, and it is known that it is deposited like other ANDREEVA's types in Zoological Institute of the Polish Academy of Sciences (LOGUNOV, personal communication) but not in ZISP as indicated in the paper. While bulbus was not illustrated it was said, "copulatory organ is complicated, with long and thin embolus, like in many species of *Zodarium* (cf. fig. 5)" Figure 5 in ANDREEVA & TYSHCHENKO (1968) corresponds to *Zodariellum continentalis* (ANDREEVA & TYSHCHENKO). The authorship of both species and genus is somewhat dubious because of different assignment through the text: in Russian abstract – *Zodariellum surprisum* TYSTSHENKO gen. et. sp. n.; in generic description heading – *Lodariellum* (lapsus calami) ANDREEVA & TYSTSHENKO; type species indicated as *Zodariellum surprisum* ANDREEVA & TYSTSHENKO gen. et sp. n.; heading of species description – *Zodariellum surprisum* TYSTSHENKO, and in English summary – *Zodariellum surprisum* ANDREEVA & TYSHCHENKO gen. et. sp. n. Here we use authorship as in ANDREEVA 1976 (while in text several times ANDREEVA & TYSTSHENKO was repeated, in the legend to the figures again *Z. surprisum* TYSTSHENKO) and spelling of late V. P. TYSHCHENKO, we use the same as in his latest papers published in 1980s.

Composition. Besides type species the following species can be included to *Zodariellum*: *proszynskii* (NENILIN & FET, 1985) **comb. n.**, *sychevskajae* (NENILIN & FET, 1985) **comb. n.**, *bekuzini* (NENILIN, 1985) **comb. n.**, *continentalis* (ANDREEVA & TYSHCHENKO, 1968) **comb. n.**, *asiaticum* (TYSHCHENKO, 1970) **comb. n.**, *chaoyangense* (ZHU & ZHU, 1983) **comb. n.**, *furcum* (ZHU, 1988) **comb. n.** (all ex *Zodarion*).

Judging from conformation of male palp of species placed in *Zodarion*, it seems that this genus is polyphyletic. Until now only somatic characters have been used for distinguishing genera within *Zodariidae*. Arachnologists in some respects are afraid to use copulatory organs for supraspecific taxonomy outside some araneoids, namely Nesticidae (cf. LEHTINEN & SAARISTO 1980) and Linyphiidae (MILLIDGE 1977; SAARISTO & TANASEVITCH 1996, 2000). There is a trend in zoosystematics: to create more supraspecific taxa for large-sized species, and less for small-sized within a family (Yu. I. STAROBOGATOV, personal communication). To our mind *Zodarion* is a rather small genus which includes besides the type species *Z. luctuosum* (O.P.-CAMBRIDGE, 1872), *Z. lutipes* (O.P.-CAMBRIDGE, 1872), ?*Z. granulatum* KULCZYNSKI, 1908, ?*Z. cyprium* KULCZYNSKI, 1908, and all Near East *Trygetus* spp. All these species have modified TA with several outgrowths and long embolus.

Other species of *Zodarion* from the Near East (cf. LEVY 1992) and *Ranops expers* (O.P.-CAMBRIDGE, 1876) by conformation of male palp are very similar to European *Zodarion* revised by BOSMANS (1994, 1997) and might represent a monophyletic group, which has the same structure of TA, short embolus and corresponding to it short conductor.



Figs 6–9: Males of *Zodariellum nenilini* (Eskov) (6), *Z. schmidtii* sp. n. (7) and *Z. mongolicum* sp. n. (8–9). 6–8 – palp, ventral view; 9 – carapace, frontal view. – CO – conductor, EB – embolic base, EM – embolus, FEP – free portion of conductor, TA – tegular apophysis, TAH – tegular apophysis hook, TU – tutaculum. – Scale for figs 6–8 = 0.1 mm, and 0.5 mm for fig. 9.

Zodarion [sensu us] in some way is intermediate between *Zodariellum* with strongly modified and enlarged TA, and European “*Zodarion*”. Besides three Palaearctic *Zodariinae* groups (genera) already mentioned (*Zodarion*, *Zodariellum* and “*Zodarion*”) there are at least two undescribed supraspecific taxa for *Zodarion raddei* SIMON, 1885 (Fig. 27) and *Z. denisi* SPASSKY, 1938 (Figs. 28–31).

Distribution From Uzbekistan in the West, eastward to Central-East China.

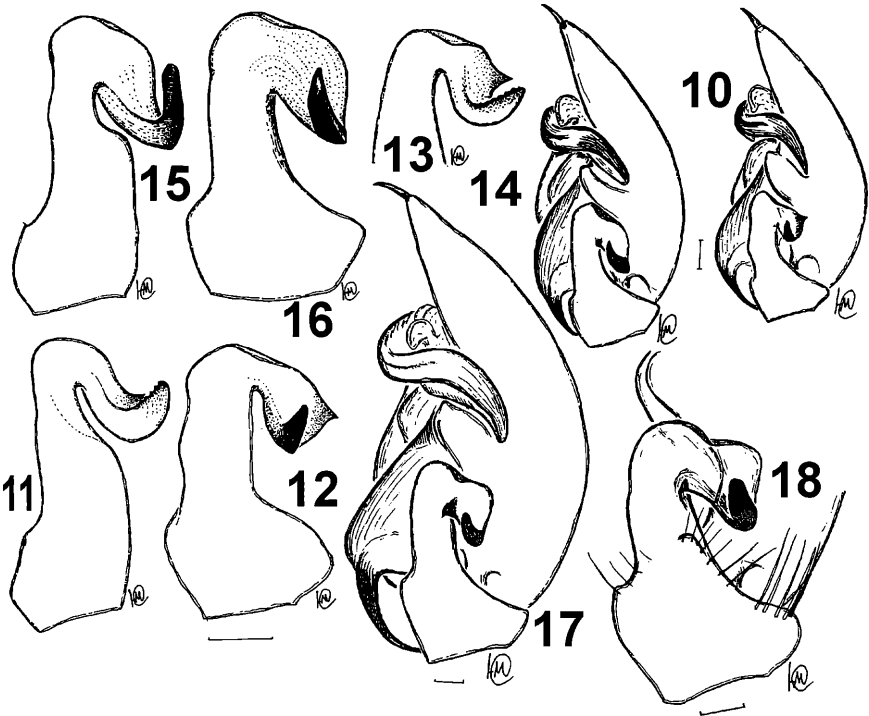
***Zodariellum nenilini* (Eskov, 1995) (figs 1, 6, 10–13, 19–24)**

Zodarion nenilini ESKOV in ESKOV & MARUSIK, 1995: 62, figs 27–29.

Acanthinozodium nenilini: MARUSIK & LOGUNOV, 1998: 253. (T from *Zodarion*).

Material examined **Mongolia**: 5 ♂♂ 2 ♀♀ (IBPN), [08] BAYANKHONGOR Aimak, Bayanlig Somon, Bor-Tolgoi, 44°06'N 100°56'E, 1400 m, 2–4.06.1997 (Yu. M. MARUSIK). 1 ♂ (HMNH), [591] GOBI-ALTAI Aimak, Zachuj Gobi, 10 km N von Chatan chajrchan Gebirge, 1150 m, 27.VI.1966 (Z. KASZAB). – Von *Saxaul*, *Nitraria*, *Tamariscus* gekätschert (Oase in der Wüste), sowie vom blühenden Unkraut eines gross ausgedehnten Ackerfeldes (*Lepidium*, *Plantago*, *Artemisia*, etc.) gekätschert. **Kazakhstan**: (holotype) and ?(paratype) (ZMMU), EAST-KAZAKHSTAN Area, Zaisan Distr., Saur Mt. Range, Akkolka River Valley, stony steppe, 26.06.1990 (K. Yu. ESKOV).

Description. Male. Total length 3.10–3.60. Carapace 1.45 long, 1.20 wide. Cymbium 0.87 long. Carapace yellow with blackish eye area, and dark median spot, clypeus yellow. Sternum yellowish. Dorsum of abdomen red-brownish with yellow median band in posterior $\frac{1}{4}$ – $\frac{1}{5}$ th of abdomen. Femoral organs distinct, with 5–3–3–3 hairs. Palp as in figs 6, 10–13, 19–23.



Figs 10–18: Male palp of *Zodariellum nenilini* (Eskov) (10–13), *Z. schmidt* sp. n. (14–16) and *Z. mongolicum* sp. n. (17–18). 10, 14, 17 – retrolateral view; 11–12, 15–16 – tibia, view from different angles; 13 – tibial apophysis, ventral view; 18 – tibia and part of cymbium, retrolateral view. – Scale = 0.1 mm.

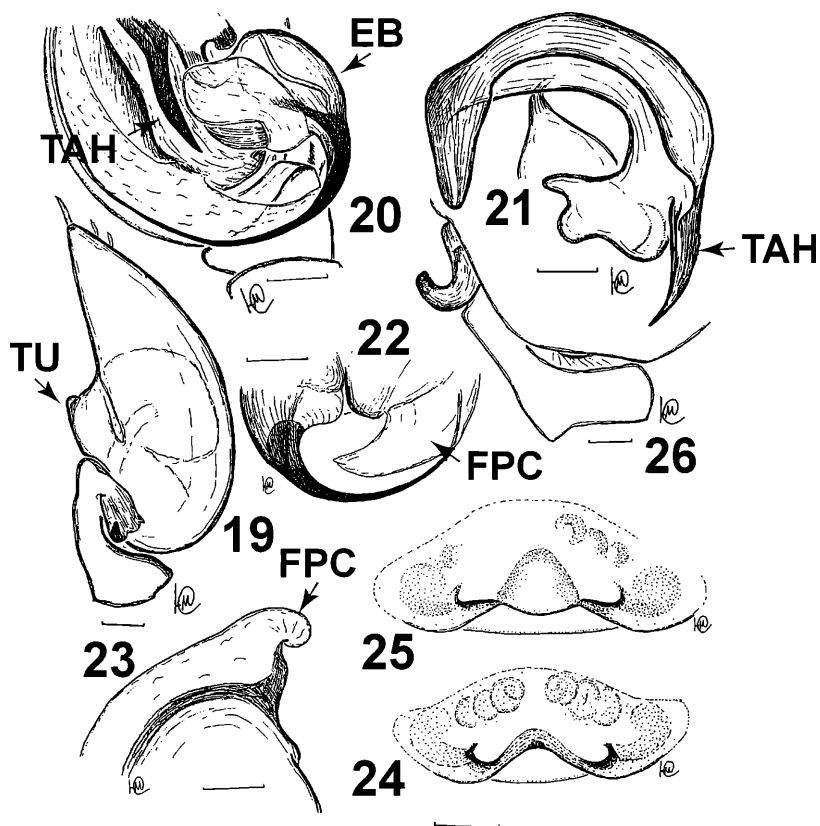
Female. Total length 2.80–3.20. Carapace 1.31 long, 1.00 wide. Coloration (fig. 1) as in male. Femoral spines 2-1-1-1. Epigyne as in fig. 24.

Leg joints (male/female):

	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.21/0.87	0.47/0.39	1.10/0.71	1.03/0.79	0.71/0.61
II	1.17/0.87	0.43/0.41	0.96/0.64	1.07/0.80	0.65/0.60
III	1.14/0.86	0.46/–	0.93/–	1.14/–	0.54/–
IV	1.62/1.23	0.51/0.47	1.43/0.99	1.57/1.16	0.83/0.70

Diagnosis *Z. nenilini* can be easily distinguished from other Mongolian species by unique coloration: dark dorsum with triangle band in the posterior part, tibial apophysis with apicated angle in terminal portion, and by the shape of epigyne. Palp of this species is almost indistinguishable from that of *Z. bekuzini* (type series in ZISP, examined) while it is easy to separate these species due to size difference (*nenilini* is about twice larger) and by color (*bekuzini* is uniformly yellow). *Z. nenilini* is also rather close to *Z. sytshevskajae* (type series in ZISP, examined), especially by conformation of tibial apophysis, while can be easily separated.

Distribution (map 1). East-Kazakhstan Area and Central Mongolia only.



Figs 19–26: *Zadariellum nenilini* (Eskov) (19–24), *Z. schmidtii* sp. n. (25) and *Z. mongolicum* sp. n. (26). 19 – male palpal tibia and cymbium, bulb removed, retrolateral view; 20 – basal part of male palp, ventral view; 21 – tegular apophysis and base of embolus, dorsal view; 22 – base of embolus, part of tegulum and proximal part of conductor; 23 – apical part of tegulum with distal part of conductor, ventral view; 24–25 – epigyne, ventral view; 26 – male palpal tibia and part of cymbium, dorsal view. 24 – female allotype from East-Kazakhstan Area. – Scale = 0.1 mm.

Zadariellum schmidtii sp. n. (figs 2, 7, 14–16, 25)

Material examined. **Mongolia:** Holotype ♂ (ZMMU) together with paratypes 2 ♂♂ (ISEA, teratological male with one bulbous, other palp as in female, & JWC) & 1 ♀ (ZMMU), [05] OMNOGOV Aimak, Bayandalai Somon, Zoolen uul (Mt. Range), 43°21'N 103°11'E, 1700 m a.s.l., 27–30.05.1997 (Yu. M. MARUSIK). Paratypes: 1 ♂ (HMNH), [902], SÜDGOBI (= OMNOGOV) Aimak, [902] Tachilga ul Gebirge, zwischen Somon Zogt-Ovoo und Dalanzadgad, 68 km S von Zogt-Ovoo, cca 1550 m, 8.VII.1967 (Z.KASZAB). – Sammeln nachts bei Lampenlicht. 1 ♀ (HMNH), [786] MITTELGOBI Aimak: Delgerchangaj ul, 6 km S von Somon Delgerchangaj, 1650–1700 m, 11.VI.1967 (Z. KASZAB). – 10 Ethylenglycol-Bodenfallen, eingegraben neben einem Wasserriss zwischen *Caragana* und *Amygdalus*. Aufgenommen am 10.VII.1967. 1 ♂ (HMNH), [845] BAJANCHONGOR Aimak, Grenzposten Caganbulag im Gebirge Cagan Bogd ul, 1550 m, 24.–25.VI.1967 (Z.KASZAB). – O von der Quelle ein grosses, breites Sajr (trockenes Flussbett), welches bis zur chinesischen Grenze zieht. Talgrund *Tamariscus*, *Zygophyllum* und wenige *Caragana*; die Berge sind sehr steinig und fast ohne Pflanzenwuchs. Unter Steinen, vom Boden und von *Tamariscus* geeinzelt.

Derivatio nominis The specific name is a patronym in honor of Mr. Brian SCHMIDT, Smithsonian Institution, Washington D.C., partner of Yu. M. in expedition to Mongolia.

Description. Male. Total length 2.65-3.00. Carapace 1.45 long, 1.25 wide, light brown with dark median spot, clypeus dark. Abdomen uniformly red-brownish (violet-brownish) with whitish book lungs, genital opening and spinnerets. Sternum as abdomen. Legs yellow. Cymbium 0.91. Palp as in figs 7, 14-16.

Female. Total length 3.50. Carapace 1.50 long, 1.10 wide. Coloration (fig. 2) as in male. Dorsal femoral spines 2-1-1-1. Epigyne as in fig. 25.

Note In poor alcohol became pale.

Leg joints (male/female):

	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.23/1.01	0.43/0.47	1.04/0.83	1.14/0.89	0.71/0.64
II	1.21/1.01	0.43/0.43	1.00/0.77	1.17/0.93	0.71/0.60
III	1.21/1.03	0.43/0.50	0.93/0.77	1.26/1.01	0.70/0.59
IV	1.57/1.36	0.46/0.53	1.37/1.14	1.64/1.39	0.87/0.66

Diagnosis From other Mongolian species can be easily separated by uniformly colored abdomen, dark sternum and carapace. By the shape of palp *Z. schmidtii* sp. n. can be easily separated from *Z. nenilini* by unserrated tibial apophysis and lacking of apicated portion of TA. From *Z. mongolicum* sp. n. it can be distinguished by smaller size of palp and body, as well as by proportions of palp (see. figs 7, 14-16) and direction of embolic base (downward in *schmidtii* sp. n. and down-retrolaterally in *mongolicum* sp. n.).

Distribution (map 1). Type localities only.

***Zodariellum mongolicum* sp. n.** (figs 3-5, 8-9, 17-18, 26)

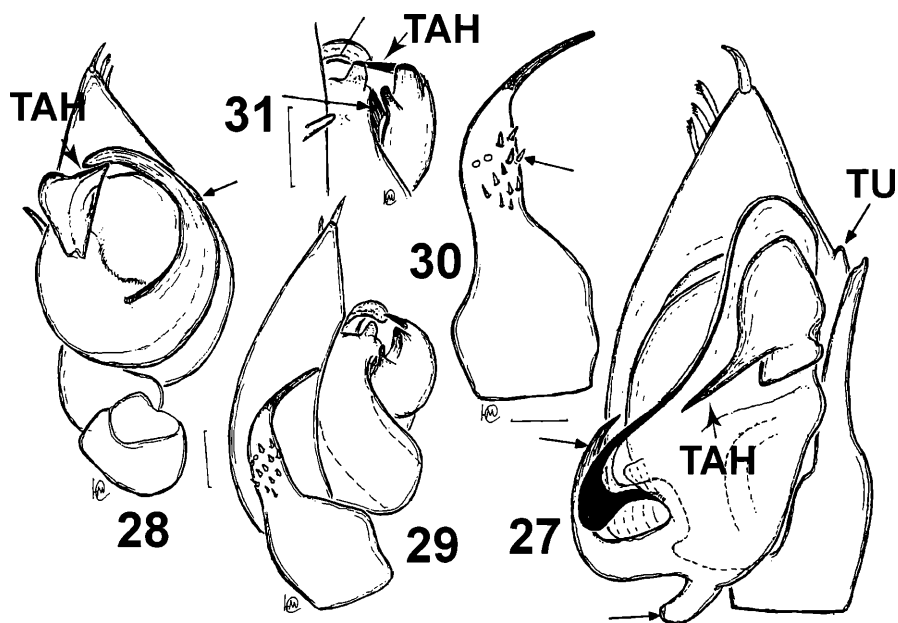
Material examined **Mongolia:** Holotype ♂ together with 3 ♂♂ paratypes (HMNH), [580] GOBI ALTAJ Aimak, zwischen dem See Beger nuur und Somon Beger, 1400 m, 25.VI.1966 (Z. KASZAB). – Sammeln nachts bei Lampenlicht, 2 km S vom See, am Rand der *Lasiagrostis*- und *Nitraria* Bestände. Paratypes: 1 ♂ (ZMMU), [566] GOBI ALTAJ Aimak, Schargyn Gobi, SO Ecke, 1130 m, 23.06.1966 (Z. KASZAB). – Sammeln nachts bei Lampenlicht, bei Neumond. 1 ♂ (HMNH), [834.] SÜDGOBI (= OMNOGOV) Aimak, 100 km W von dem Grenzposten Ovot Chaural, 22 km W von Sajryn chudag, 1250 m, 22.VI.1967 (Z. KASZAB). – Sammeln nachts bei Lampenlicht in 3 Stellen zwischen den Sandhügeln.

Derivatio nominis The species is named after the area of distribution.

Description Total length 3.90-4.00. Carapace 2.00 long, 1.80 wide, light brown, with black ocular area, dark median spot and radial stripes. Dorsum and sides of abdomen dark brown, venter yellowish with wide dark median band. Legs and sternum yellow. Cymbium 1.20 long. Dorsal femoral spines 2-1-1-1. Palp as in figs 8, 17-18, 26.

Leg joints:

	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.57	0.63	1.39	1.49	1.00
II	1.50	0.66	1.29	1.64	0.97
III	1.57	0.65	1.29	1.76	0.97
IV	2.00	0.69	1.71	2.29	1.09



Figs 27–31: Male palp of *Zodarion raddei* SIMON (27, “topotype”) and *Z. denisi* SPASSKY (holotype, 28–31). 27, 28 – ventral view; 29 – retrolateral view; 30 – tibia, retrolateral view; 31 – apical portion of bulb. – Scale = 0.1 mm

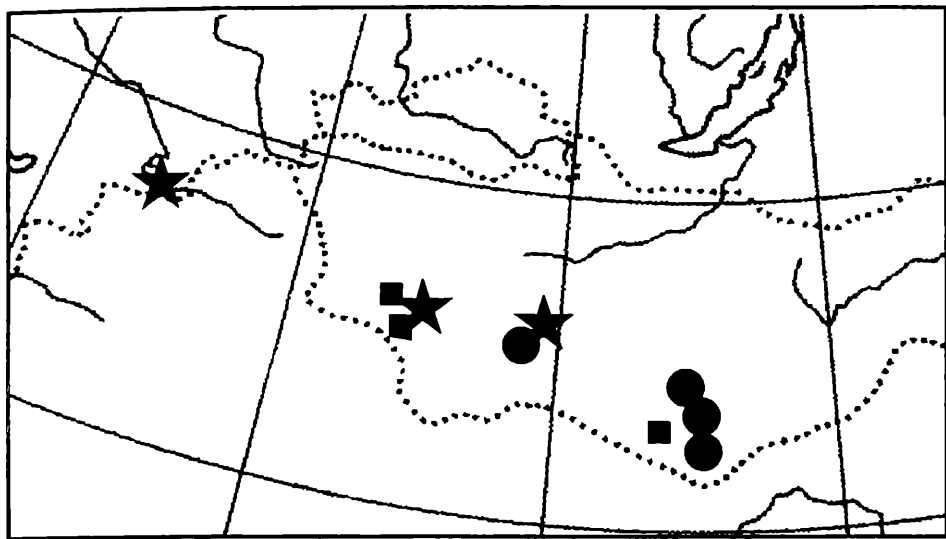
Diagnosis Can be easily separated from other Mongolian species by larger size and coloration: abdomen dark colored on dorsum and sides, with dark ventral band. The shape of palp can distinguish it from both Mongolian congeners by relatively wider bulb and direction of the embolic base.

Distribution (map 1). Gobi-Altai and South-Gobi Aimaks of Mongolia only.

Comments While two Mongolian species are rather similar to two known Chinese species, they can be separated from *Z. chaoyangense* (3.9–5.6 mm) by smaller size, or by having 2 tarsal claws, or by direction of the embolic base. From another Chinese species, namely *Z. furcum* they can be distinguished by bigger size, longer embolus and different shape of the embolic base as well as by longer spermathecae. Coloration and pattern in original descriptions of Chinese species was not indicated in English text.

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Map 1: Distribution of *Zodariellum nenilini* (Eskov) (★), *Z. schmidtii* sp. n. (●) and *Z. mongolicum* sp. n. (■).

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