Zootaxa 3827 (2): 187–213
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3827.2.4
http://zoobank.org/urn:lsid:zoobank.org:pub:50240E21-1E2C-4F26-B5C8-20FD63B7C0EA

A survey of East Palaearctic Gnaphosidae (Araneae). 1. On the *Berlandina* Dalmas, 1922 (Gnaphosinae) from Mongolia and adjacent regions

YURI M. MARUSIK[1,2], ALEXANDER A. FOMICHEV[3,4] & MIKHAIL M. OMELKO[5,6]

[1]*Institute for Biological Problems of the North, RAS, Portovaya Str. 18, Magadan RF-685000, Russia. E-mail: yurmar@mail.ru*
[2]*Zoological Museum, University of Turku, FI-20014 Turku, Finland*
[3]*Altai State University, Lenina Pr., 61, Barnaul, RF-656049, Russia. E-mail: a.fomichov@mail.ru*
[4]*Institute for Systematics and Ecology of Animals, SB RAS, Frunze Str., 11, Novosibirsk 91, RF-630091, Russia.*
[5]*Gornotaezhnaya Station FEB RAS, Gornotaezhnoe Vil., Ussuriysk Dist., Primorski Krai 692533, Russia. E-mail: omelkom@gmail.com*
[6] *Far Eastern Federal University, Sukhanova 8, Vladivostok 690950, Russia*

Abstract

Five new species of *Berlandina* Dalmas, 1922 are described from Mongolia: *B. koponeni* **sp. n.** (♂), *B. mishenini* **sp. n.** (♂), *B. nakonechnyi* **sp. n.** (♂), *B. ovtsharenkoi* **sp. n.** (♂♀) and *B. yakovlevi* **sp. n.** (♂♀). Nine other species occurring in Mongolia and adjacent Russia, China and Kazakhstan are illustrated: *B. caspica* Ponomarev, 1979; *B. hui* Song, Zhu & Zhang, 2004; *B. nabozhenkoi* Ponomarev& Tsvetkov, 2006; *B. nenilini* Ponomarev& Tsvetkov, 2006; *B. potanini* (Schenkel, 1963); *B. saraevi* Ponomarev, 2008; *B. schenkeli* Marusik & Logunov, 1995; *B. spasskyi* Ponomarev, 1979 and *B. ubsunurica* Marusik & Logunov, 1995. The female of *B. ubsunurica* is described for the first time. Fourteen species occurring in northern Asia (Kazakhstan-Mongolia) are split into 5 species groups.

Key words: Araneae, Gnaphosinae

Introduction

Berlandina Dalmas, 1922 is a relatively large genus of Gnaphosinae with 31 species distributed in the Palaearctic (25 species) and northern half of the Afrotropical Region (6 species) (Platnick 2014). Within the Palaearctic most of the species are known from the Mediterranean, the Caucasus and Central Asia. Only four species are known to occur east of 90°E: *B. hui* Song, Zhu & Zhang, 2004 (China), *B. potanini* (Schenkel, 1963) (China and Tuva, Russia), *B. spasskyi* Ponomarev, 1979 (from Kalmykia east to central Mongolia) and *B. ubsunurica* Marusik & Logunov, 1995 (Mongolia and Tuva, Russia) (Song *et al.* 2004; Marusik & Logunov 2006). The genus has never been revised on a broad scale, and there are only a few regional revisions. Two central European species were revised by Grimm (1985). Three Chinese species were surveyed by Song *et al.* (2004). Six *Berlandina* species were recently described from South Russia and Kazakhstan by Ponomarev (Ponomarev & Tsvetkov 2006; Ponomarev 2008a). Three species and one subspecies of *Berlandina,* were described from Afghanistan: *B. afghana* Denis, 1958; *B. afghana spinitarsis* Denis, 1958; *B. denisi* Roewer, 1961; *B. propinqua* Roewer, 1961. Two former species were, it seems, incorrectly synonymised with *B. plumalis* (O.P.-Cambridge, 1872) by Levy (1995).

During two expeditions to Mongolia in 1997 and 2012 we collected five species that did not fit any known species. Therefore we decided to provide a revision of the species known from the Central Palaearctic (from Northern Caucasus to China). This study reveals that five species found in Mongolia are new to science. The main goals of this study are as follows: (1) to describe the new species, (2) to redescribe all of the species known in South Russia, Kazakhstan and China and (3) delimit the species groups occurring in the Central Palaearctic.

Accepted by M. Ramirez: 26 May 2014; published: 3 Jul. 2014

Material and methods

Most of the material treated here was collected either by Alexander A. Fomichev (AF) or by Yuri M. Marusik (YM). We also used material deposited in Zoological Museum (University of Turku) and Natural History Museum (Budapest). Because names of aimags, the largest administrative units of Mongolia, have very different spelling on different maps here we follow the usage in Wikipedia: http://en.wikipedia.org/wiki/Districts_of_Mongolia. While providing labels for the material collected by the senior author in Mongolia we kept all data, including numbers in square brackets "[]" which refer to original field numbers and localities described in Marusik & Logunov (1999). Photographs were taken in dishes of different sizes with paraffin at the bottom. Specimens were photographed using an Olympus Camedia E-520 camera attached to an Olympus SZX16 stereomicroscope and the SEM JEOL JSM-5200 scanning microscope at the Zoological Museum, University of Turku. Digital images were prepared using "CombineZP" image stacking software. Illustrations of epigynes were made after maceration in 20% potassium hydroxide aqueous solution. While describing species we provide spination for leg IV only, because it has more spines than other legs, and legs I have reduced spination. Apical spines on metatarsus are not counted. All measurements are given in mm.

Abbreviations

ISEA	Institute for Systematics and Ecology of Animals (Novosibirsk).
HUB	College of Life Science, Hebei University (Baoding, China).
КП	Personal collection of A.V. Ponomarev (Rostov on Don, Russia).
NHMB	Natural History Museum, Budapest.
ZISP	Zoological Institute, St. Petersburg.
ZMUT	Zoological Museum, University of Turku.
ZMMU	Zoological Museum of the Moscow State University.

Collectors: AF Alexander A. Fomichev; YM Yuri M. Marusik.
Leg segments: Fe—femur, Mt—metatarsus, Pa—patella, Ta—tarsus, Ti—tibia.
Spination: d—dorsal, p—prolateral, r—retrolateral, v—ventral.

Taxonomic survey

Berlandina Dalmas, 1922

Type species: *Gnaphosa plumalis* O. Pickard-Cambridge, 1872 from Palestine.

Diagnosis. *Berlandina* differs from *Gnaphosa* (the only other genus of Gnaphosinae in the region) by having larger posterior median eyes, a thick embolus (filamentous or at least tapering near tip in *Gnaphosa*) and in having no epigynal scape (present in *Gnaphosa*). From all other Gnaphosidae genera occurring in East Palaearctic, *Berlandina* can be easily distinguished by having a serrated keel on the chelicerae (Figs 61–62).

Comments. Although the genus encompasses 31 species, it was never subdivided into subgenera or species groups. Here we divide the 14 species from Central Palaearctic into five species groups according to the shape of male palp and epigyne. Subdivision to species groups are provisional. Diagnoses of these groups are given below in the text.

The *ubsunurica* group

Diagnosis. Members of this group can be recognized by (1) shape of the tibial apophysis: wide, with sharply pointed tip directed dorsally, (2) S-shaped diagonal course of seminal duct, (3) short and wide embolus starting from 9–10 o'clock, (4) epigyne lacking septum and (5) small outgrowths (*Op*) of lateral pockets of epigyne (Figs 12, 15, 18, 47).

Composition. We place six species in this group: *B. hui* Song, Zhu & Zhang, 2004, *B. koponeni* **sp. n.**, *B. mishenini* **sp. n.**, *B. nenilini* Ponomarev & Tsvetkov, 2006, *B. ovtsharenkoi* **sp. n.**, *B. ubsunurica* Marusik & Logunov, 1995.

Berlandina ubsunurica Marusik & Logunov, 1995

Figs 1–12

B. u. Marusik & Logunov, 1995b: 181, f. 8–10 (♂).
B. u.: Logunov *et al.* 1998: 237.
B. u.: Marusik & Logunov 1999: 131.
B. u.: Marusik *et al.* 2000: 24.
B. u.: Marusik & Logunov 2006: 49.

Material examined: RUSSIA, ***Tuva***: 3♀ 8♂ (ZMMU), SE Tuva, NE bank of Ubsunur Lake, 50º04'N; 92º58'E, dry *Nanophyton erinaceus* stony steppe, 750 m, 14.06.1995 (D.V. Logunov); 2♂ 1♀ (ZMUT), same locality, salt meadow at shore, 14–16.06.1995 (S.Koponen). MONGOLIA, ***Bayankhongor*** Aimag: 2♂ 1♀ (ZMMU), [08], Bayanlig Somon, Bor-Tolgoi, 44°06'N 100°56'E, 1400 m, 2–4.06.1997 (YM); 1♀ (ZMMU), [09], Bayanlig Somon, Bogd Somon, Ikh-Bogd Mt. Range, Ikh-Bogd Pass, 44°43'N 100°52'E, 2000–2100 m, 4.06.1997 (YM); 1♀ (Nr.872 NHMB), Žinst ul Gebirge, ca. 10 km O von Somon Schine žinst, 2000 m, Plateau mit eintxniger Vegetation. Geeinzelt unter Steinen, vom Boden und von den Pflanzen 30.VI.1967 (Z.Kaszab). ***Dundgovi*** Aimag: 4♂ (Nr.786, NHMB), Delgerchangaj ul, 6 km S von Somon Delgerchangaj, 1650–1700 m, eingegraben neben einem Wasserriss zwischen *Caragana* und *Amygdalus*, 11.06.–10.07.1967 (Z.Kaszab). ***Ömnögovi*** Aimag: 12♂♀ (Nr.792, NHMB), Tachilga ul Gebirge, zwischen Somon Zogt-Ovoo und Somon Dalanzadgad, 68 km S von Zogt-Ovoo, 1550 m, 12.06.1967 (Z.Kaszab); 1♀ (Nr.806. NHMB), Ostrand von Zöölön ul Gebirge, 58 km WSW von Somon Bagandalaj, 1500 m, Unterwegs nach Somon Sevrej, am "Beel" des Gebirges, in einem Sajr (trockenes Flussbett), mit vielen *Caragana*, *Zygophyllum*, *Artemisia*, usw., geeinzelt unter Steinen und von den Planzen 16.VI.1967 (Z.Kaszab).

Diagnosis. Males of *B. ubsununrica* differ from sibling *B. mishenini* **sp. n.** by a broader embolus, profile of the tibial apophysis (cf. Figs 3 & 24). Females of *B. ubsununrica* are similar to these of *B. nenilini*, *B. hui* and *B. spasskyi*. They differ from *B. nenilini* by the narrower peak and shape of lateral pockets. From *B. hui* they differ by the wider peak, widely spaced receptacles and wide fovea. Females of *B. ubsunurica* differ from *B. spasskyi* by having a smaller peak and larger oval shaped receptacles (round and very small in *B. spasskyi*).

Comments. The male of this species is well described in Marusik & Logunov (1995) and here we provide detailed figures of the male palp and describe the previously unknown female.

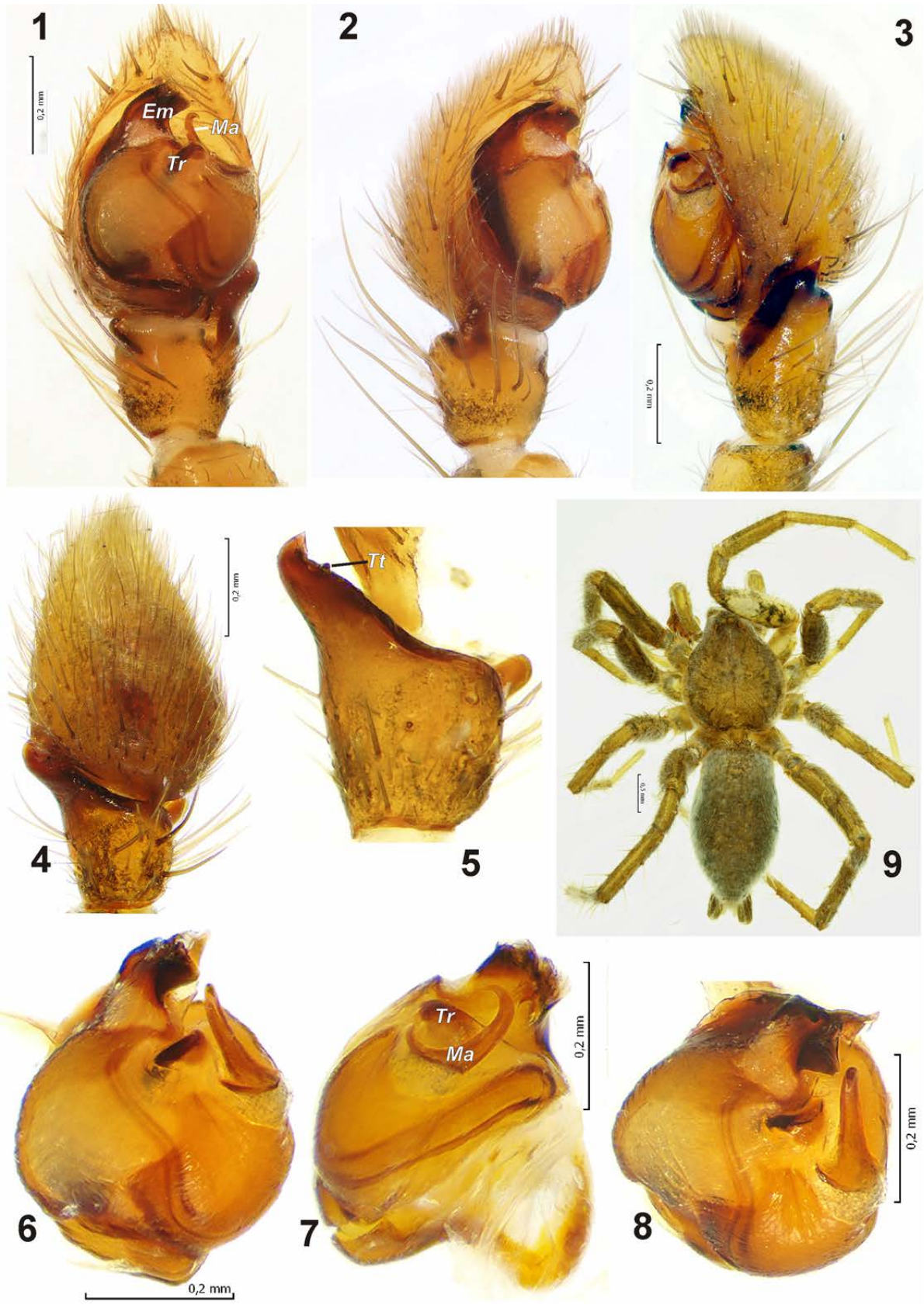
Description. Female. Total length 3.25–4.25. Carapace: 1.71 long, 1.36 wide. Spination of leg IV: femur: d1-0-1, p0-0-1, r0-0-1; patella: r1; tibia: d1-0-1, p1-0-1, r1-0-1, v2-2-2; metatarsus: d2-2-2, p0-1-0, r0-1-0, v2-2-2.

Leg article length.

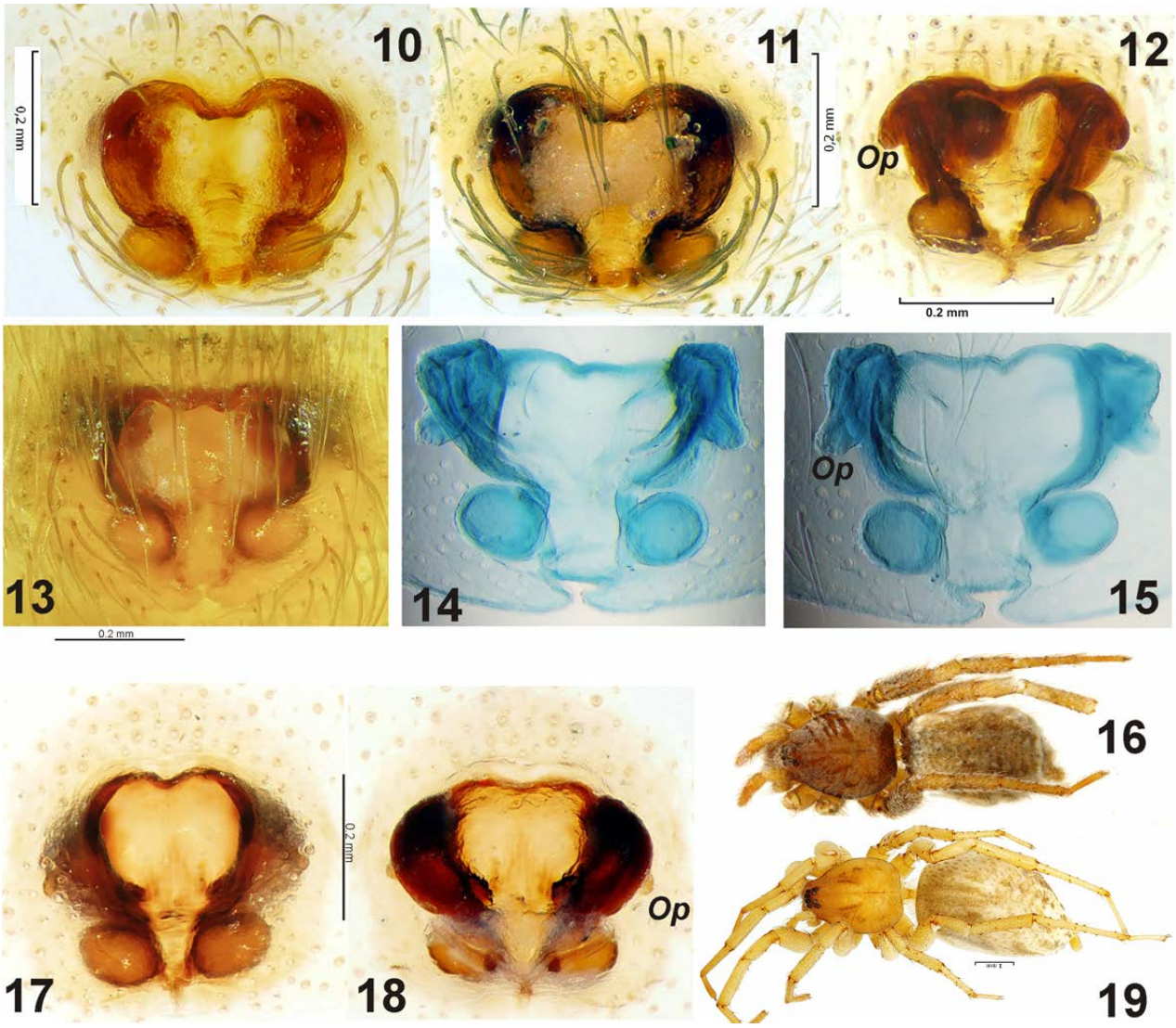
	Fe	Pt	Ti	Mt	Ta	Total
I	1.33	0.62	0.95	0.88	0.75	4.53
II	1.2	0.62	0.83	0.8	0.75	4.2
III	1.1	0.6	0.68	1.0	0.8	4.18
IV	1.63	0.75	1.25	1.7	0.9	6.23

Epigyne as in Figs 10–12, fovea heart like, wider than high, with small peak, receptacles oval, spaced about their height.

Distribution. Although Platnick (2014) lists this species only from Russia it has also been reported from Mongolia (Marusik & Logunov 1999, 2006). So far, it is known from Southern Tuva (Marusik *et al.* 2000), Bayankhongor, Ömnögovi and Dundgovi Aimags of Mongolia.



FIGURES 1–9. Male palp and habitus of *Berlandina ubsunurica*. 1–4 palp, ventral, prolateral, retrolateral and dorsal; 5 palpal tibia, dorsal; 6–8 bulbus, ventral, retrolateral and apical; 9 habitus. Abbreviations: *Em* embolus, *Ma* median apophysis, *Tr* tegular ridge, *Tt* tooth of RTA.



FIGURES 10–19. Epigyne of *Berlandina ubsunurica* (10–12), epigyne and habitus of *B. nenilini* (13–16) and *B. hui* (17–19). 10–11, 13, 15, 17 epigyne, ventral; 12, 14, 18 epigyne, dorsal; 16, 19 habitus. Abbreviation: *Op* outgrowths of lateral pocket.

Berlandina nenilini **Ponomarev & Tsvetkov, 2006**
Figs 13–16

B. n. Ponomarev & Tsvetkov, 2006: 7, f. 3 (♀).

Material examined: Holotype ♀ (ZMMU), KAZAKHSTAN, ***Guryev*** (=Atyrau) Area, 10 km SE of Makhambet Village, left bank of Ural River, thick herb meadow, 17.06.1986 (A.V. Ponomarev).

Diagnosis. This species is most similar to *B. ubsunurica* from which it can be distinguished by the larger size, wider peak of epigynal fovea.

Comments. The species was well described by Ponomarev & Tsvetkov (2006). Body 5.2 long, carapace 2.3 long and 1.8 wide.

Distribution. This species is known from the type locality only.

***Berlandina hui* Song, Zhu & Zhang, 2004**
Figs 17–19

B. potanini: Hu & Wu 1989: 251, f. 206.1–4 (♀♂, misidentified).
B. potanini: Zhao 1993: 116, f. 51a–b (♀♂, misidentified).
B. potanini: Hu 2001: 227, f. 122.1–4 (♀♂, misidentified).
B. h. Song *et al.* 2004: 26, 309, f. 13A–D (♀♂).

Material examined: CHINA: ***Qinghai***: 1♀ (HUB), Golmud City, 28.07.2002 (Mingsheng Zhu).

Diagnosis. This species is similar to *B. ubsunurica* from which it can be distinguished by its lighter coloration (cf. Figs 9 & 19), longer tibial apophysis (cf. fig. 13D in Song *et al.* 2004), narrow peak of epigynal fovea and closely spaced receptacles.

Comments. This species was well described by Song *et al.* (2004). Here we provide figures only of the female. Male specimens are known by the description in Hu & Wu (1989). In all later papers authors used figures made by Hu & Wu (1989).

Distribution. This species is known from Xinjiang and Qinghai, China.

***Berlandina mishenini* sp. n.**
Figs 20–29

Material: MONGOLIA, ***Khovd*** Aimag: holotype ♂ and paratype 1♂ (ISEA), foothill of Muchar-Ula Mt., 47º09'N, 92º11'E, rubbly semidesert, 1800 m, 6.05.2012 (AF).

Etymology. The specific name is a patronym in honour of Sergei I. Mishenin (Novosibirsk, Russia) a teacher of AF.

Diagnosis. This new species differs from other members of the group by a relatively long embolus, and the bent-upward tip of embolus.

Description. Male (holotype). Total length 5.25. Carapace: 2.35 long, 1.95 wide. Coloration: carapace and all limbs light brown. Legs brown-gray. Abdomen brown gray dorsally with light longitudinal stripe, venter yellow. Spination of leg IV: femur: d1-1-1(0), p0-0-1, r0-0-1; patella: p1-0, r1-0; tibia: d1-0-1, p1-1-1, r1-1-1, v2-2-2; metatarsus: d1-2-0, p1-1-0, r1-1-0, v2-0-2.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	1.75	0.85	1.35	1.3	1.0	6.25
II	1.65	0.85	1.15	1.2	1.0	5.85
III	1.3	0.8	1.0	1.6	1.05	5.75
IV	2.25	1.05	1.55	2.5	1.05	8.4

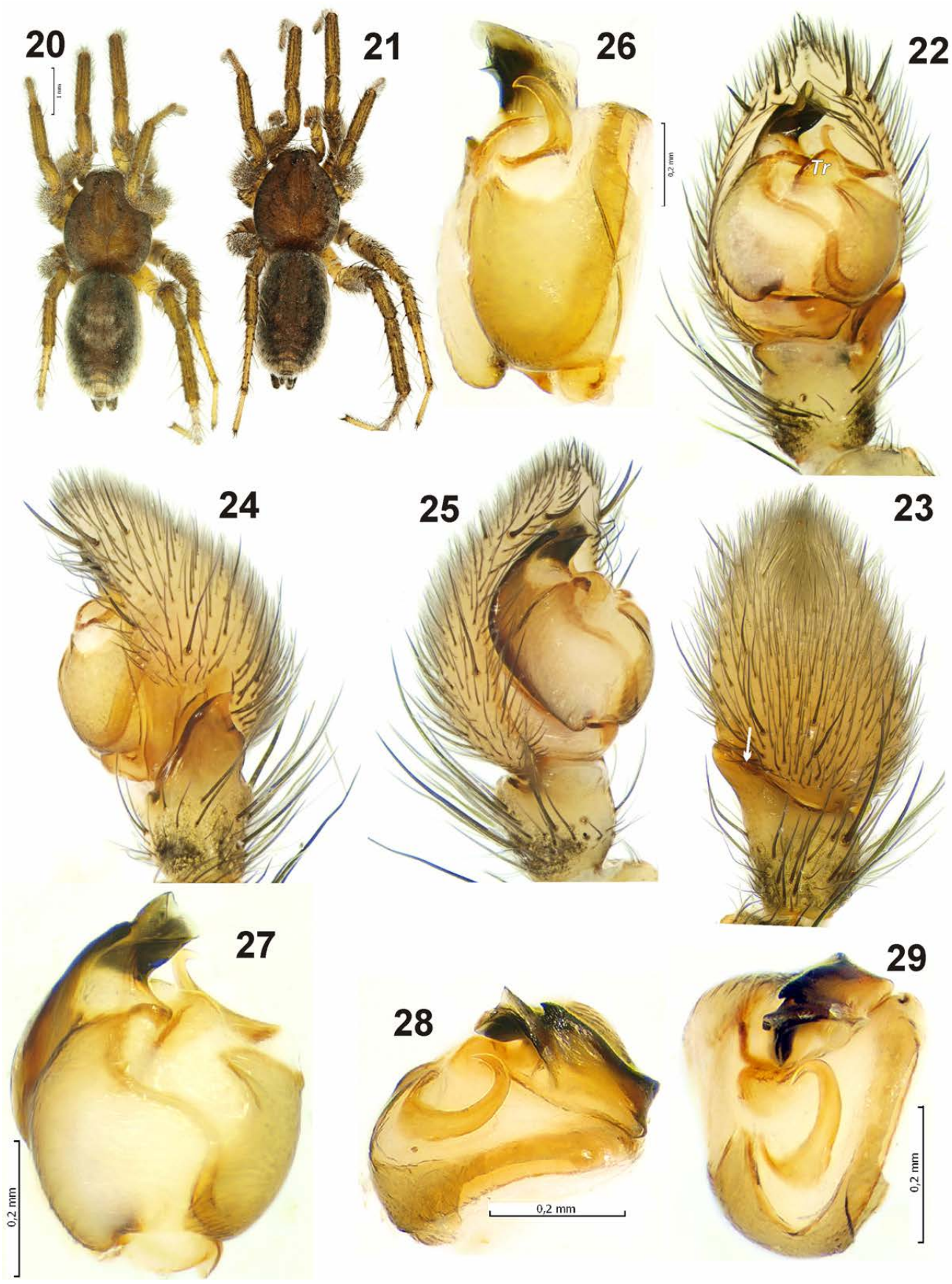
Palp as in Figs 22–29; tibial apophysis broad, as long as wide, with small tooth (not visible in figures, but location arrowed on Fig. 23); embolus longer than wide, bent in upper 1/3; embolus with sclerotized ridge terminating by strong spine, both well visible in apical view (Figs 28–29).

Female unknown.

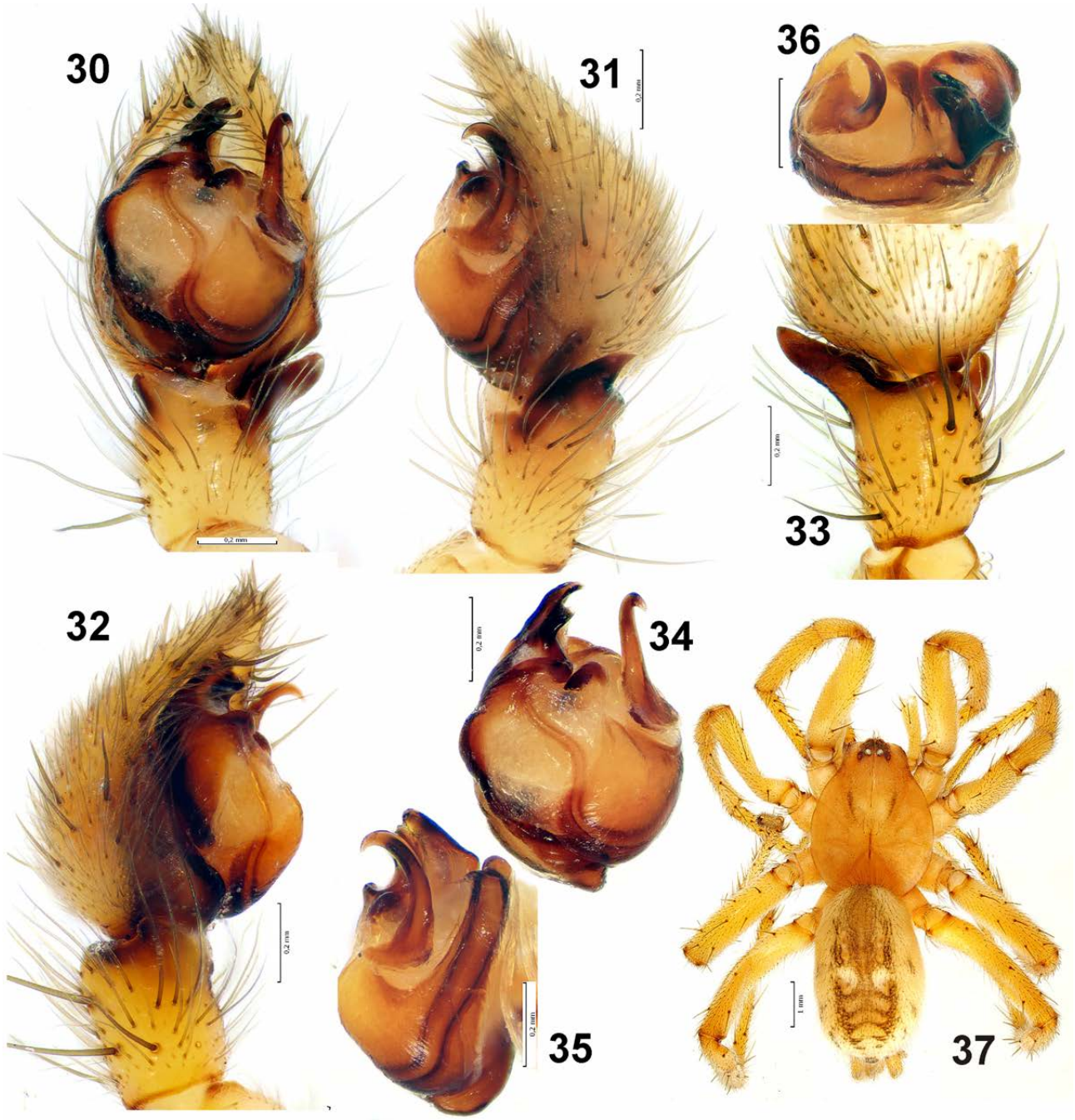
Distribution. Known from the type locality only.

***Berlandina koponeni* sp. n.**
Figs 30–37

Material: MONGOLIA, ***Ömnögovi*** Aimag: holotype ♂ (ZMMU), unknown locality, sand dune, 1.06.1997 (YM). Paratypes: ***Bayankhongor*** Aimag: 9♂ (Nr.878, NHMB), 8 km OSO von Somon Bajanleg, 1350 m, Sandwüste auf Schotterboden, mit altem *Haloxylon*-Bestand, hie und da mit grossen *Nitraria* und *Lasiagrostis*-Stellen. Geeinzelt vom Boden vom den Pflanzen, unter trockenem Mist und aus dem Sand herausgegraben. 2.VII.1967 (Z.Kaszab).



FIGURES 20–29. Habitus and male palp of *Berlandina mishenini* **sp. n.** 20–21 habitus; 22–25 palp, ventral, dorsal, retrolateral and prolateral; 26–29 bulbus, retrolateral, ventral, apical and dorso-apical. Abbreviation: *Tr* tegular ridge; arrow indicate position of small tooth hidden by tibial apophysis.



FIGURES 30–37. Habitus and male palp of *Berlandina koponeni* **sp. n.** 30–33 palp, ventral, retrolateral, prolateral and dorsal; 34–36 bulbus, ventral, retrolateral and apical; 37 habitus.

Etymology. The specific name is a patronym in honour of our friend and colleague Seppo Koponen (University of Turku).

Diagnosis. This species differs from other members of the group by the large median apophysis and thin and straight embolus. *B. koponeni* **sp. n.** can be also distinguished by two whitish spots in the mid part of abdomen (Fig. 37).

Description. Male (holotype). Total length 7.0. Carapace: 3.2 long, 2.65 wide. Coloration: carapace and all limbs yellow. Carapace without pattern, but only with two diverging stripes running from fovea. Abdomen light cream coloured with gray dorsal pattern: three longitudinal stripes connected by transversal stripes and two whitish spots in mid part.

Spination of leg IV: femur: d1-1-1(0), p0-0-1, r0-0-1; patella: p1-0, r1-0; tibia: d1-0-1, p1-1-1, r1-1-1; v2-2-2; metatarsus: d0(1)-2-0, p1-1-0, r1-1-0, v2-1-3.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	2.8	1.45	2.1	1.95	1.45	9.75
II	2.6	1.4	1.9	2.0	1.5	9.4
III	2.6	1.3	1.75	2.75	1.7	10.1
IV	3.5	1.4	2.5	3.9	2.15	13.45

Palp as in Figs 30–36; tibial apophsysis wide, sharply pointed; median apophysis large, longer than embolus; embolus relatively thin, longer than wide.

Female unknown.

Distribution. Known from the type locality only.

***Berlandina ovtsharenkoi* sp. n.**
Figs 38–48

Material: MONGOLIA: ***Govi-Altai*** Aimag: holotype ♂ (ISEA) and paratypes 1♂ 4♀♀ (ISEA), 2 km NEE from Alag-Nur Lake, 45º10'N, 94º28'E, rubbly desert, 1060 m, 11.05.2012 (AF); 1♀ (ISEA), foothills of Huvchiyn-Nuru Mt. Range, NW shore of Alag-Nur Lake, 45º09'N, 94º24'E, gruss-rubbly slope on the erosion terrace, 1050 m, 12.05.2012 (AF). ***Khovd*** Aimag: 1♀ (ZMMU), 36 km SW from Altai Village, Bodonchiyn-Gol River Valley, 45º45'N, 92º11'E, stony desert, 1300 m, 7–8.05.2012 (AF). ***Ömnögovi*** Aimag: 1♂ 1♀ (Nr.834, NHMB), 100 km W von der Grenzposten Ovot Chuural, 22 km W von Sajryn chudag, 1250 m, Sammeln nachts bei Lampenlicht in 3 Stellen zvischen den Sandhügeln. 22.06.1967 (Z.Kaszab).

Etymology. The specific name is a patronym in honour of our friend and colleague Vladimir I. Ovtsharenko (New York).

Diagnosis. Males of the new species are similar to these of *B. ubsunurica* from which they can be easily distinguished by the tibial apophysis lacking a small tooth, the larger median apophysis and by having a triangle shaped outgrowth near the tip of embolus. Females of *B. ovtsharenkoi* **sp. n.** are most similar to *B. hui* from which they differ by having no peak of the fovea and larger receptacles.

Description. Male (holotype). Total length 6.8. Carapace: 3.15 long, 2.45 wide. Coloration: carapace, legs, palps, chelicerae, maxillae and labium yellow. Carapace dorsally with pattern formed by gray hairs (Fig. 45). Abdomen gray dorsally and yellow ventrally. Spination of leg IV: femur: d1-1-1, p0-0-1, r0-0-1; patella: p1-0, r1-0; tibia: d1-0-1, p1-1-1, r1-1-1, v2-2-2; metatarsus: d1-2-0, p1-1-0, r1-1-0, v3(2)-1-2.

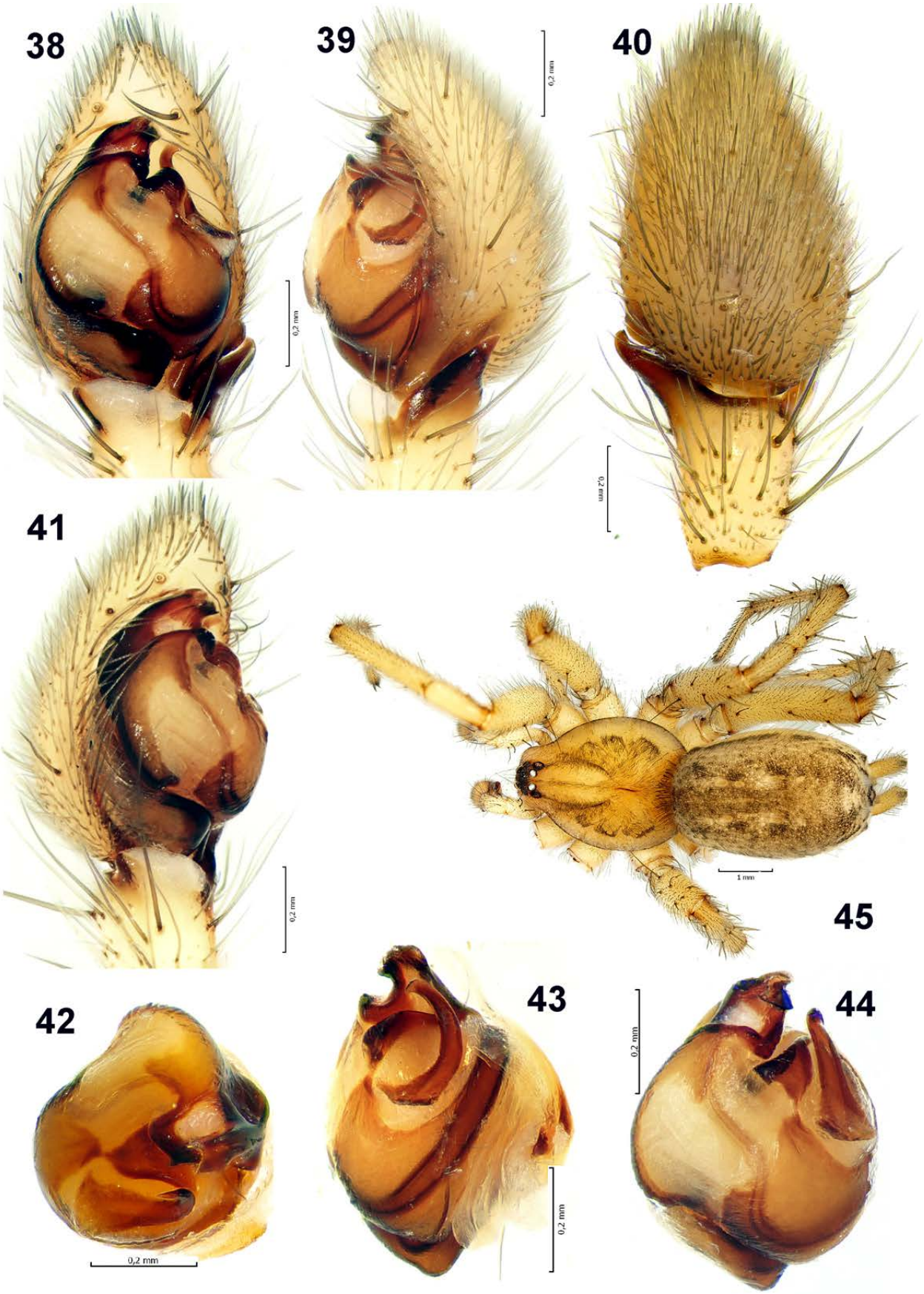
Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	2.7	1.35	2.o	2.05	1.5	9.6
II	2.6	1.3	1.85	2.25	1.5	9.5
III	2.55	1.4	1.7	2.7	1.6	9.95
IV	3.45	1.4	2.55	4.0	2.0	13.4

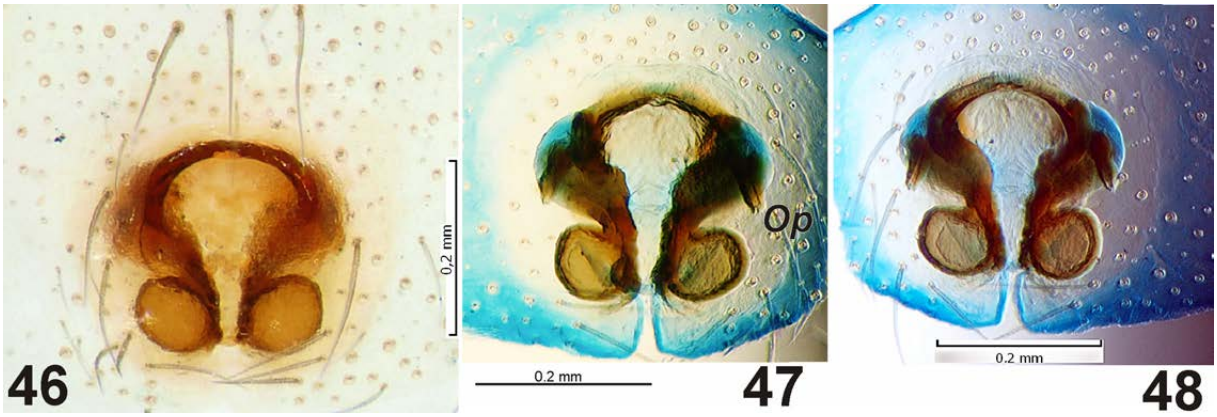
Palp as in Figs 38–44; tibia with small sharply pointed tibial apophysis; median apophysis long, longer than embolus, embolus short, with triangle-shaped outgrowth near tip (Fig. 44).

Female. Total length 4.85. Carapace: 2.3 long, 1.75 wide. Coloration as in male.

Spination of leg IV: femur: d1-1-0, p0-0-1, r0-0-1; patella: r1-0; tibia: d1-0-0(1), p1-1-1, r1(2)-1-1, v2-2-2; metatarsus: d1-2-0, p1-1-0, r1-1-0, v2(3)-2(1)-0(2).



FIGURES 38–45. Habitus and male palp of *Berlandina ovtsharenkoi* **sp. n.** 38–41 palp, ventral, retrolateral, dorsal and prolateral; 42–44 bulbus, apical, retrolateral and ventral; 45 habitus.



FIGURES 46–48. Epigyne of *Berlandina ovtsharenkoi* **sp. n.** 46, 48 ventral; 47 dorsal. Abbreviation: *Op* outgrowths of lateral pocket.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	1.8	0.95	1.25	1.15	1	6.15
II	1.5	0.9	1.0	1.1	0.95	5.45
III	1.35	0.75	0.85	1.35	0.95	5.25
IV	2.1	1.0	1.5	2.2	1.2	8.0

Epigyne as in Figs 46–48; peak absent, fovea droplet shaped (upside down); receptacles large oval shaped, spaced by less than one radius, width of fovea less than two diameters of receptacle.

Distribution. Known from the type locality only.

The *caspica* group

Diagnosis. Members of this group can be recognized by (1) the claw like outgrowth below embolus, (2) the almost straight diagonal course of seminal duct, (3) the short and wide embolus starting from 9–10 o'clock, and (4) the wide semicircular epigynal fovea lacking septum.

Composition. We place two species in this group: *B. apscheronica* Dunin, 1984 and *B. caspica* Ponomarev, 1979. It is very likely that these two species are synonyms.

Berlandina caspica Ponomarev, 1979

Figs 49–56

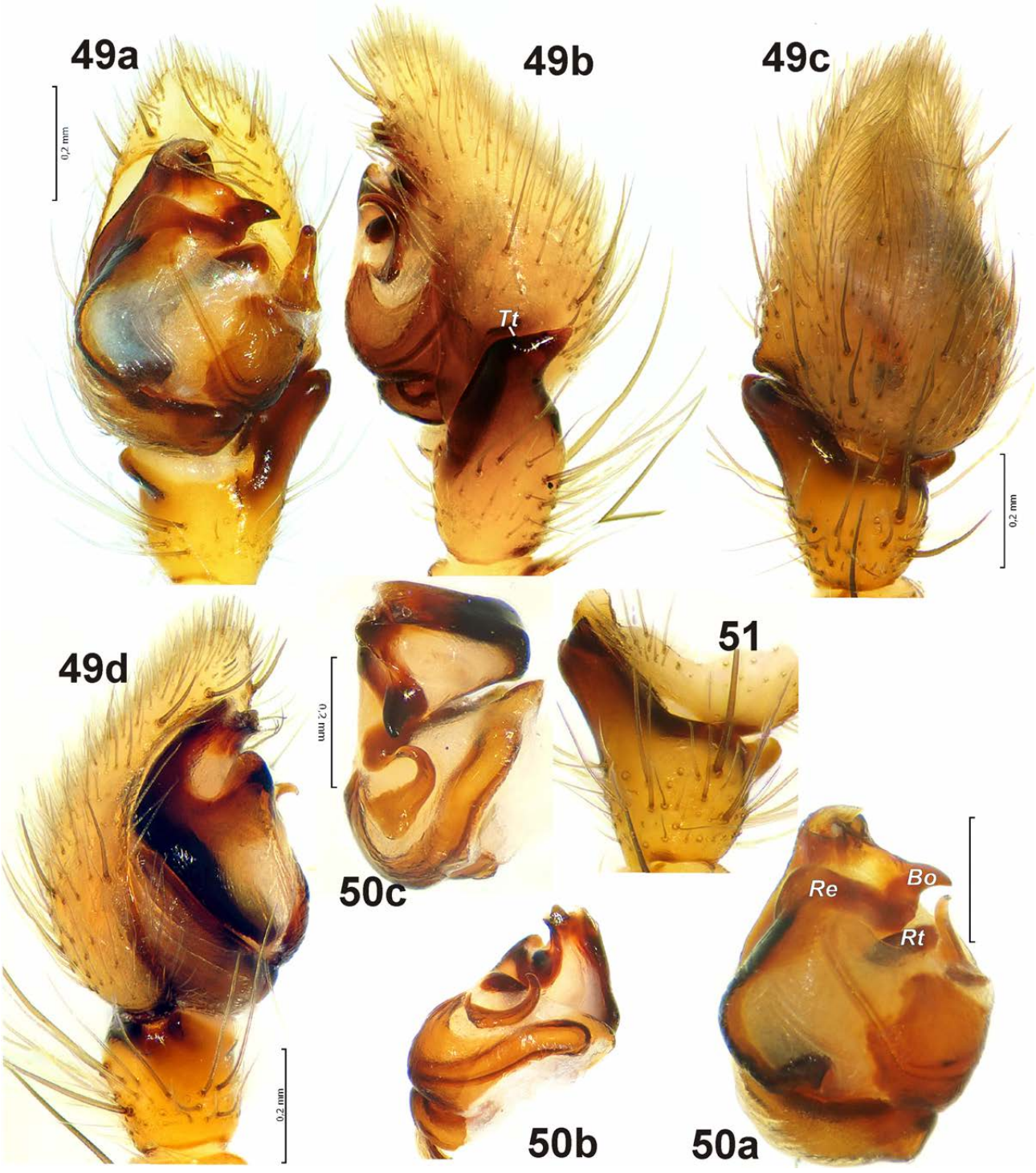
B. c. Ponomarev 1979a: 921, f. 1–3 (♂♀).
B. apscheronica: Tuneva 2005: 327, f. 26–27 (♀), misidentified.
B. apscheronica: Ponomarev *et al.* 2011: 128, f. 3a–b (♂).

Material: RUSSIA: ***Daghestan***: 1♂ (КП: 18.11.9/4), Tyuleniy Island, 22–26.06.2011 (S.V.Aliyeva); 9♂ 2♀ (КП: 18.11.9/5), Chechen' Island, 43°57′52"N 47°38′38″E, 6.06.2011 (S.V.Aliyeva). 1♀ (ISEA), ***Astrakhan'*** area, Aksaraiskyi Village, 46°47′36"N 48°00′21″E, 28.05.1996 (V.V.Dubatolov). KAZAKHSTAN: ***Guryev*** (=Atyrau) Area: 1♀ (ZMMU), 32 km S of Inderborski Village (48°33′N 51°47′E), left bank of Ural River, 9.06.1987 (A.V.Ponomarev); 1♂ (ZMMU), 1.5 km E of Mokhambet Village, Ural River left bank, Ural River floodplain valley, 13.06.1986 (A.V.Ponomarev). MONGOLIA, ***Bayankhongor*** Aimag: 1♂ (ZMMU), [08], Bayanlig Somon, Bor-Tolgoi, 44º06'N, 100º56'E, 1400 m, 2–4.06.1997 (YM).

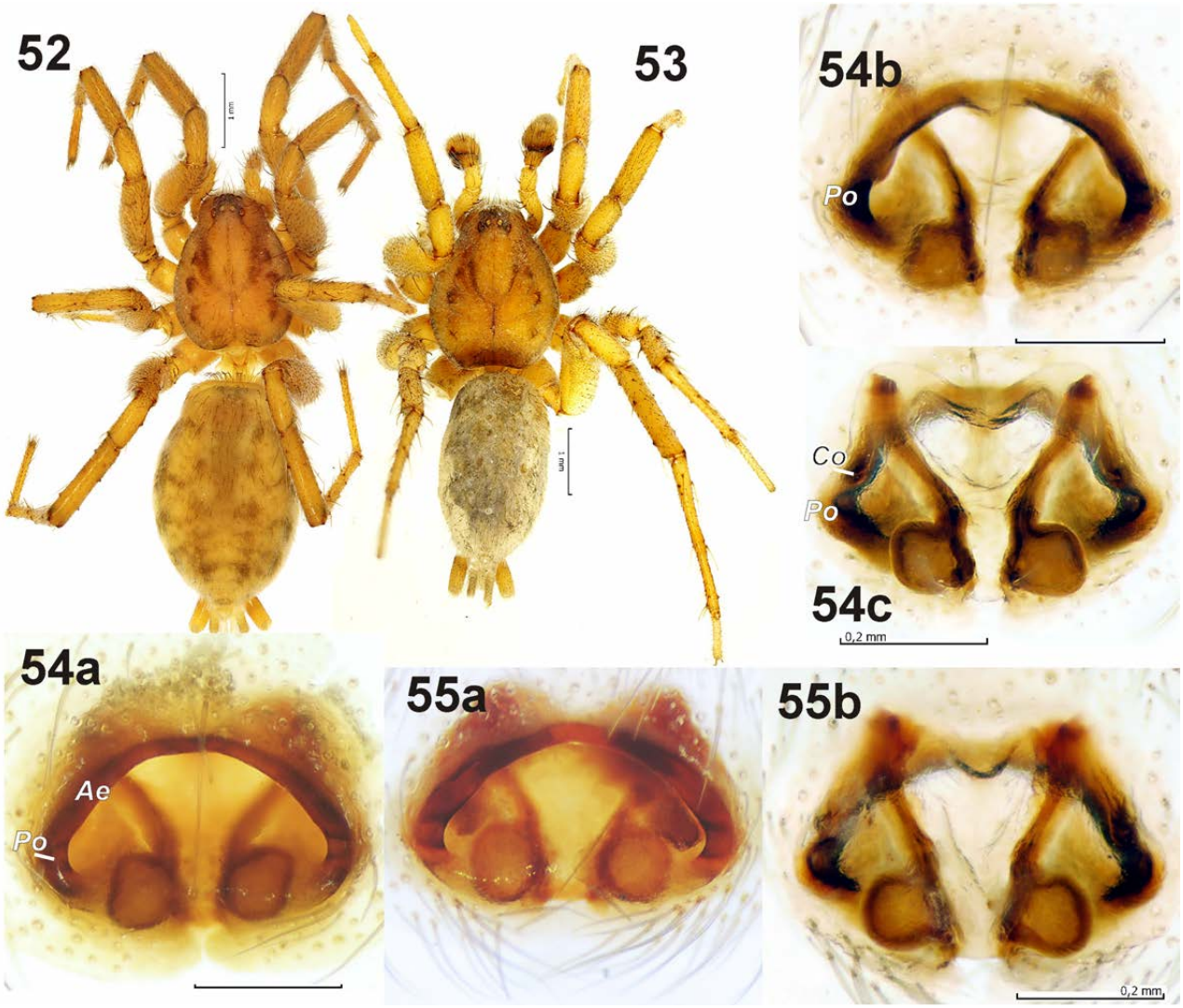
Diagnsosis. Males of this species can be easily distinguished because of a bill-like outgrowth of the embolic division. The fovea of female *B. caspica* is, uniquely, wider than high.

Note. This species is similar to *B. apscheronica* Dunin, 1985, described on the basis of the holotype female from Azerbaijan and it is very likely that these two names are synonyms.

Description. Male. Total length 4.75–5.4. Carapace: 1.95–2.25 long, 1.6–1.85 wide. Coloration: carapace yellow-brown with gray lateral stripes on cephalic part. Legs yellow. Abdomen cream coloured with dorsal gray pattern (Fig. 53). Spination of leg IV: femur d1-1-0, p0-0-1, r0-0-1; patella: p0(1)-0, r1-0; tibia d1-0-0, p1-1-1, r1-1-1; v2-2-2; metatarsus d1-2-0, p1-1-0, r1-1-0, v2-2-0.



FIGURES 49–51. Male palp of *Berlandina caspica*. 49a–d palp, ventral, retrolateral, dorsal and prolateral; 50a–c bulbus, ventral, retrolateral and from above; 51 tibia, dorsal. Abbreviations: *Bo* bill like outgrowth, *Re* ridge of embolic division, *Rt* tegular ridge, *Tt* tooth of RTA.



FIGURES 52–55. Habitus and epigyne of *Berlandina caspica*. 52–53 habitus, female and male; 54a–b, 55a epigyne, ventral; 54c, 55b epigyne, dorsal. 54 from Kazakhstan. 55 from Daghestan. Abbreviations: *Co* copulatory opening, *Po* pocket.

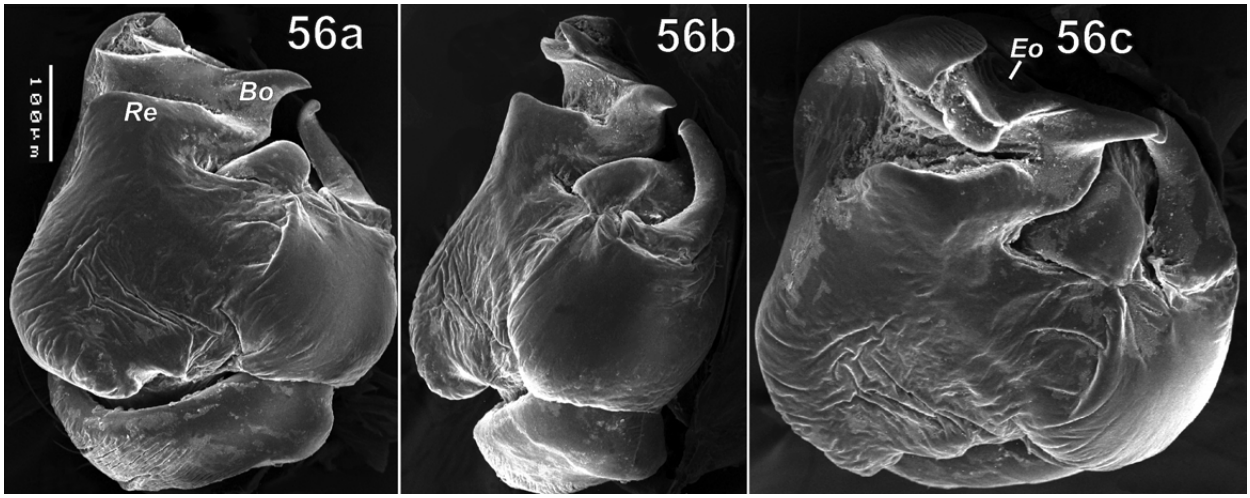


FIGURE 56. Bulbus of *Berlandina caspica* from Daghestan. a ventral; b retrolateral, c from above. Abbreviations: *Bo* bill like outgrowth, *Eo* opening of embolus, *Re* ridge of embolic division.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	1.65	0.85	1.15	1.15	0.95	5.75
II	1.4	0.75	1.0	1.1	0.9	5.15
III	1.35	0.7	0.9	1.4	0.9	5.25
IV	1.9	0.9	1.4	2.25	1.25	7.7

Palp as in Figs 49–51, 56; tibial apophysis massive, bent dorsally, with small tooth (*Tt*); median apophysis relatively short; seminal duct straight, embolus complex with strongly developed ridge terminating by strong claw like outgrowth (*Bo*); ridge of embolic division (*Re*) wider than embolus proper; embolic opening (*Eo*, Fig. 56c) large and round, directed dorsally.

Female. Total length 5.45. Carapace 2.1 long, 1.6 wide. Coloration as in males. Spination of leg IV: femur d1-1-0, p0-0-1, r0-0-1; patella r1-0; tibia d1-0-0, p 1-1-1, r1-1-1, v 2-2-0; metatarsus d 1-2-0, p1-1-1, r1-1-1, v2-2-0.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	1.55	0.85	1.2	1.0	0.8	5.4
II	1.35	0.75	0.95	0.95	0.85	4.85
III	1.25	0.7	0.9	1.2	0.8	4.85
IV	1.9	0.95	1.5	2.1	1.1	7.55

Epigyne as in Figs 54–55; fovea about twice wider than long; anterior edge (*Ae*) of fovea (or pocket) wide semicircular, terminating in two small pockets (*Po*); copulatory openings (*Co*) located close to pockets; receptacles almost square shaped, separated by less than one diameter, diameter of receptacle – about ¼ of fovea; insemination duct long, first going anteriorly and then posteriorly, course of duct triangle shaped (Figs 54c, 55b).

Note. When we first found one male of this species in Mongolia we thought that it was new to science and close to *B. caspica.* Subsequent side by side comparison with specimens from Daghestan, Astrakhan and western Kazakhstan revealed no differences.

Distribution. This species is known from the west shore of Caspian Sea to Central Mongolia. It was found in Mongolia and in Astrakhan Area of Russia for the first time.

The *spasskyi* group

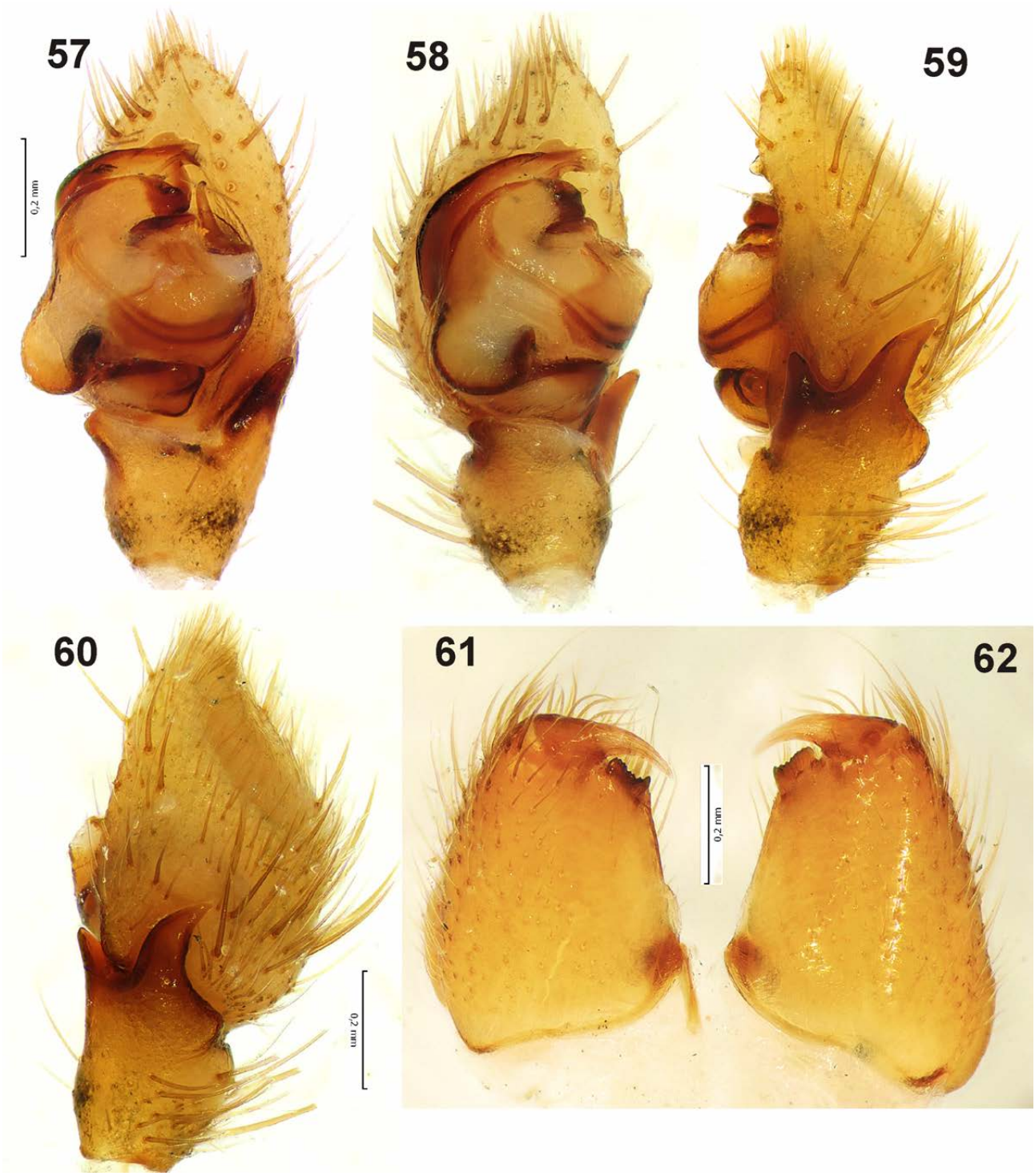
Diagnosis. This monotypic group can be easily recognized by (1) two tibial apophyses, (2) the dorsal lobe of tibia, (3) the short septum of epigyne, (4) very small receptacles and (4) arch-like thin insemination ducts (lacking in other congeners).

Composition. *Berlandina spasskyi* Ponomarev, 1979.

Berlandina spasskyi Ponomarev, 1979

Figs 57–68

B. s. Ponomarev 1979: 922, f. 7 (♀).
B. xinjiangensis Hu & Wu 1989: 253, f. 207.1–4 (♂♀).
B. s.: Eskov & Marusik 1995: 70.
B. xinjiangensis: Song *et al.* 2004: 30, f. 15A–E (♂♀).
B. s.: Tuneva 2005: 327, f. 28–29 (♀).
B. xinjiangensis: Marusik & Logunov 2006: 49.
B. s.: Ponomarev & Tsvetkov 2006: 7, f. 4–5 (♂).



FIGURES 57–62. Male palp and chelicerae of *Berlandina spasskyi*. 57–58 palp, ventro-retrolateral and ventral; 59–60 palp, retrolateral, and dorso-retrolateral; 61–62 chelicerae, ventral and dorsal.

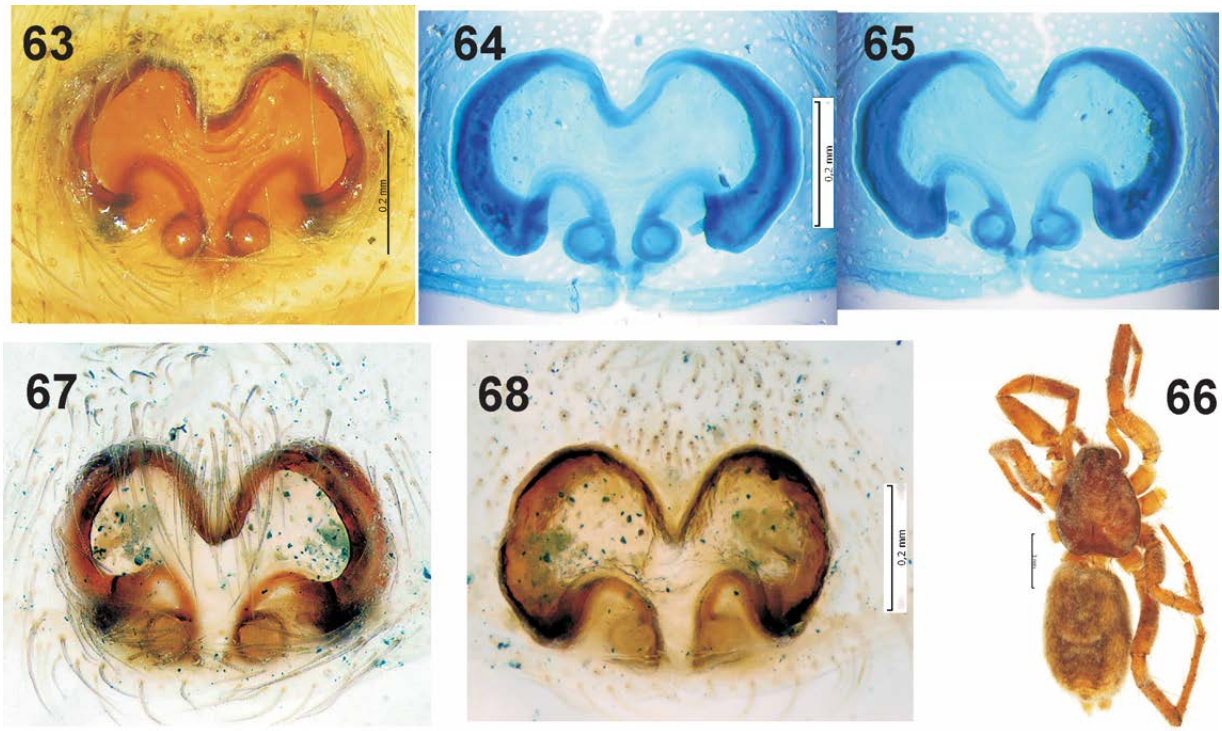
Material examined: RUSSIA, ***Kalmykia***: Holotype ♀ (ZISP № 17), Chernozemelski Distr., Rybachiy Village (ca. 44°59′28″N 45°50′56″E), plain semidesert with *Artemisia*-herb vegetation, 20.06.1974 (A.V. Ponomarev). CHINA, ***Xinjiang***: allotype ♂ & paratype ♀ of *B. xinjiangensis* (HUB), Urumqi City, 20.05.1984 (Zhibing Liu).

Diagnosis. Males of this species differ from all other congeners in East Palaearctic by having two tibial apophyses. Females of *B. spasskyi* differ from all other species by the characteristic shape of epigynal fovea and very small receptacles separated by one radius.

Comments. This species is well described in above mentioned papers and here we provide only comparative

figures. We are not absolutely sure if *B. spasskyi* and *B. xinjiangensis* were synonymisied correctly by Tuneva (2005). She had not studied types or topotypes of these two species (type localities are over 2500 km apart). Side by side comparison of the holotype female of *B. spasskyi* and paratype female of *B. xinjiangensis* reveals small differences in the course of insemination duct (cf. Figs 63–65 & 67–68). Unfortunately we had no opportunity to compare males from distant populations.

Distribution. This species has the widest range and known from two distant areas (Map 1): Kalmykia and West Kazakhstan and East Kazakhstan to Central Mongolia.



FIGURES 63–68. Epigyne and habitus of *Berlandina spasskyi*. 63, 64, 67 epigyne, ventral; 65, 68 epigyne, dorsal; 66 habitus. 63–66 holotype; 67–68 specimen from Xinjiang (paratypes of *B. xinjiangensis*).

The *shnitnikovi* group

Diagnosis. Members of this group can be recognized by the following characters: (1) tip of tibial apophysis blunt, slightly bent ventrally, (2) subtegulum hidden by tegulum, (3) tegulum height lower than the height of embolus, (4) seminal duct horizontal, (5) embolus spiraling, (6) embolus starting at about 4 o'clock, (7) tegular ridge absent, (8) epigyne with wide septum and (9) vulva with two pairs of accessorial glands (*Ag*).

Composition. This group encompasses the following species: *B. nakonechnyi* **sp. n.**, *B. saraevi* Ponomarev, 2008, *B. shnitnikovi* (Spassky, 1934) and *B. yakovlevi* **sp. n.** Taxonomic status of *B. saraevi* requires further investigation (see below).

Berlandina saraevi Ponomarev, 2008

Figs 69–73

B. s. Ponomarev 2008a: 55, f. 23–24 (♂).

Material examined: KAZAKHSTAN, ***Atyrau*** Region, holotype ♂ and paratype ♂ (ZMMU), 65–71 km from Kul'sary Village, plain with *Artemisia lercheana* and *Anabasis ramosissima*, night, on light, 16.05.1987 (F.A. Saraev).

FIGURES 69–73. Paratype male of *Berlandina saraevi*. 69–72 palp, ventral, retrolateral, prolateral and dorsal; 73 habitus.

Comments. This species is well described by Ponomarev (2008a). It is a large (body length 8.2; carapace 3.7 long) light colored species. Here we provide figures of the pattern and male palp. Recently (Ponomarev & Dvadnenko 2012) this species was synonymised with *B. shnitnikovi* (Spassky, 1934), a species known from the type locality in SE Kazakhstan. *Berlandina shnitnikovi* (originally placed in *Pterotricha*) is known by original description only, which was supplied with schematic drawings. Accounting that (1) Ponomarev & Dvadnenko (2012) have not compared types of two species, (2) the large distance between type localities of *B. saraevi* and *B. shnitnikovi*, and (3) the occurrence of sibling species in Mongolia, it seems possible that *B. saraevi* might be a separate species.

Distribution. *Berlandina saraevi* is known from the type locality only. If it was correctly synonymised with *B. shnitnikovi*, this species is distributed from West to East Kazakhstan.

***Berlandina nakonechnyi* sp. n.**
Figs 74–82

Material: MONGOLIA, ***Khovd*** Aimag: holotype ♂ (ISEA), 33 km SW from Altai Village, Bodonchiyn-Gol River Valley, 45º46'17"N, 92º12'52"E, stony desert, 1300 m, 6–7.05.2012 (AF). Paratype: 1♂ (ISEA), 36 km SW from Altai Village, Bodonchiyn-Gol River Valley, 45º45'N, 92º11'E, stony desert, 1300 m, 07–08.05.2012 (AF).

Etymology. The specific name is a patronym in honour of our friend Alexandr N. Nakonechnyi (Novosibirsk, Russia), an entomologist who helped to organize an expedition to Mongolia in which some new species of *Berlandina* were collected.

Diagnosis. The new species is similar to *B. saraevi* and *B. yakovlevi* **sp. n.** From the former species it differs by having a stronger ventral lobe of the palpal tibia (cf. Figs 70 and 75) and abrupt tip of the embolus (gradually tapering in *B. saraevi*). The two sibling species *B. nakonechnyi* **sp. n.** and *B. yakovlevi* **sp. n.** differ by having a distinct tooth (spine) on the retrolateral tibial apophysis in the former species (Figs 75, 78) which is lacking in the latter (represented as ridge, Fig. 89); proportions of embolus (wider and shorter in *B. nakonechnyi* **sp. n.**, cf. Figs 74, 79 and 83, 87) and also by the tip of the embolus, which has a bifurcate outgrowth in *B. nakonechnyi* **sp. n.**(Fig. 81), lacking in *B. yakovlevi* **sp. n.** (Fig. 86). *Berlandina nakonechnyi* **sp. n.** and *B. yakovlevi* **sp. n.** differ also by the darker abdomen and less distinct long dense stretching hairs on tibiae-tarsi I and II in the former species (cf. Figs 82 and 90).

Description. Male. Total length 5.9. Carapace: 2.9 long, 2.25 wide. Coloration: carapace dirty-yellow. Chelicerae brown. Sternum, maxillae, labium, palps and legs yellow. Abdomen grey dorsally and yellow ventrally. Spination of leg IV: femur: d1-1-0(1), p0-1-1, r0-0-1; patella: p1-0, r1-0; tibia: d1-0-1, p1-1-1, r1-1-1, v2-2-2; metatarsus: d1-2-0, p1-1-0, r1-1-0, v2-1-2.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	2.5	1.25	1.9	1.9	1.3	8.85
II	2.35	1.1	1.75	1.9	1.3	8.4
III	2.2	1.1	1.6	2.35	1.4	8.65
IV	2.95	1.05	2.25	3.4	1.7	11.35

Palp as in Figs 74–81; tibia with well developed ventral lobe and two tibial apophyses: one large, as long as tibia, and second small, tooth-like hidden by larger apophysis; tibia with three dorsal spines; embolus long and massive with two small lobes near tip (Fig. 81) and ridge on the dorsal side (Fig. 80).

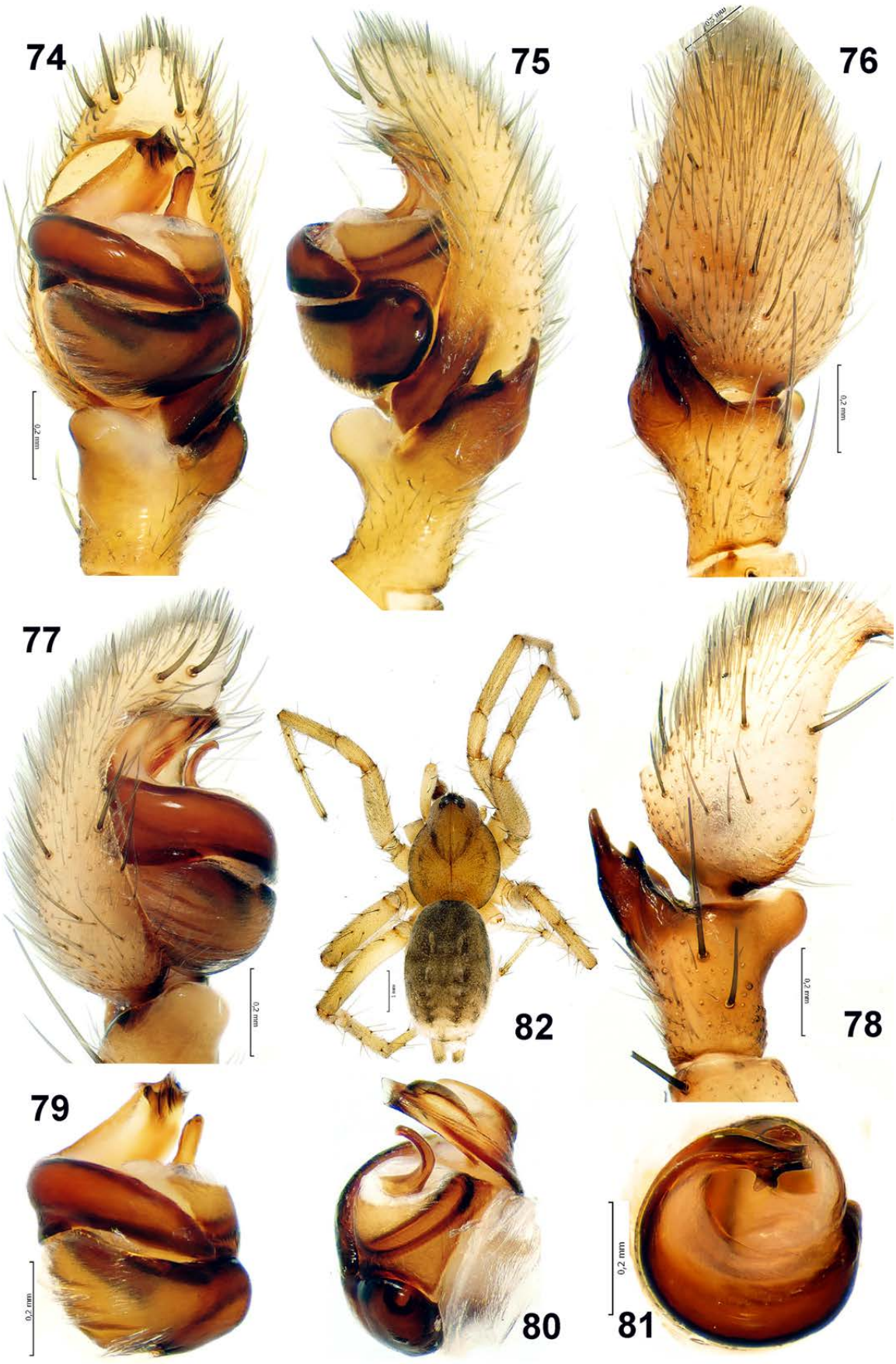
Female unknown.

Distribution. Known from the type locality only.

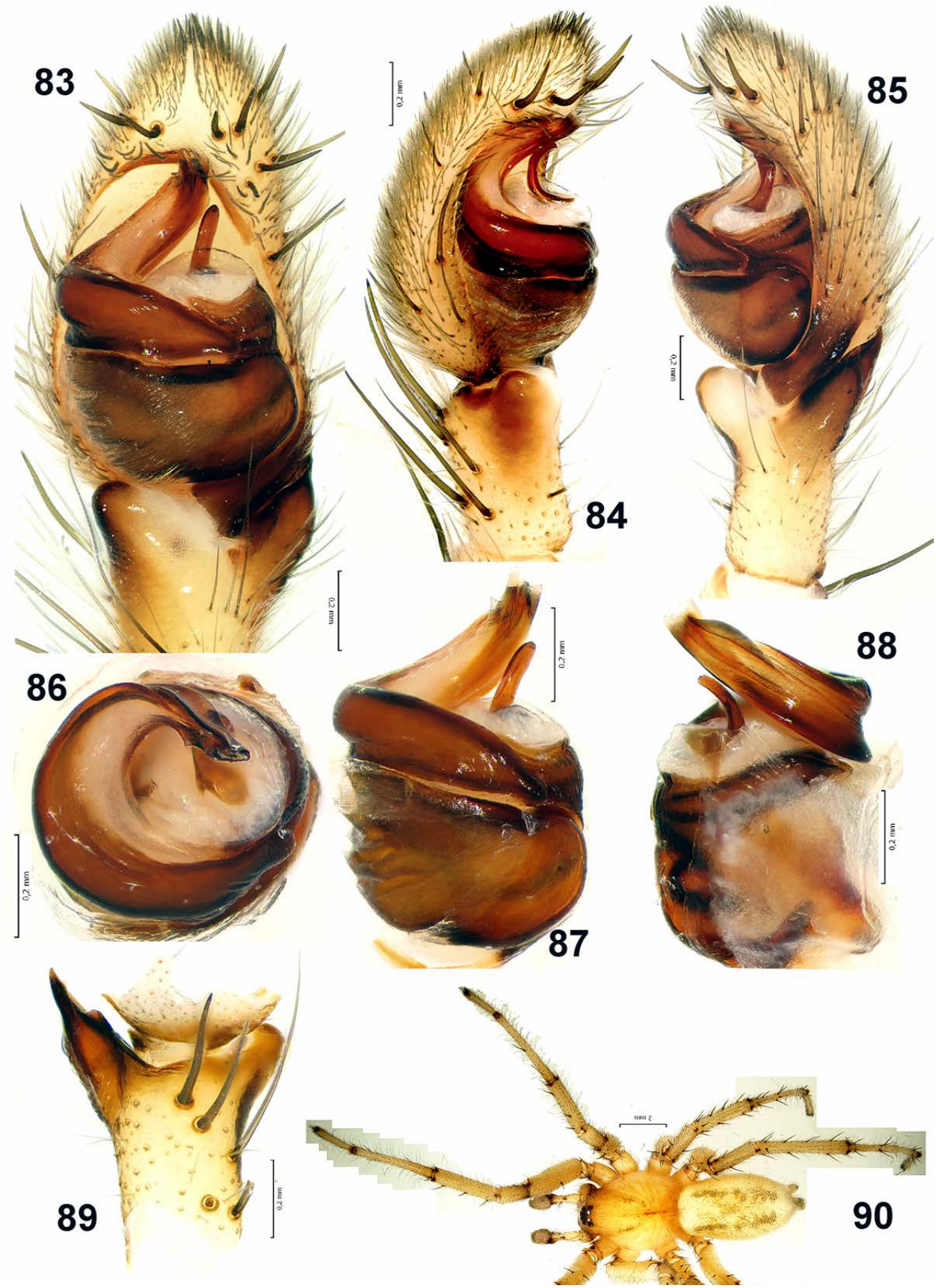
***Berlandina yakovlevi* sp. n.**
Figs 83–93

Material: MONGOLIA, ***Khovd*** Aimag: holotype ♂ (ISEA) and paratypes 16♂♂ 1♀ (ISEA), 23 km SW from Uench Village, Uenchiyn-Gol River Valley, 45º54'N, 91º50'E, sandy desert, night, attracted by light, 1200 m, 13–14.05.2012 (AF); 1♂ (ZMMU), 33 km SW from Altai Village, Bodonchiyn-Gol River Valley, 45º46'17"N, 92º12'52"E, stony desert, 1300 m, 6–7.05.2012 (AF).

Etymology. The specific name is a patronym in honour of our friend, entomologist Roman V. Yakovlev (Barnaul, Russia) who organized an expedition to Mongolia in which new *Berlandina* species were collected.



FIGURES 74–82. Habitus and male palp of *Berlandina nakonechnyi* **sp. n.** 74–77 palp, ventral, retrolateral, dorsal and prolateral; 78 palp with removed bulbus, dorsal; 79–81 bulbus, ventral, retrolateral and apical; 82 habitus.



FIGURES 83–90. Habitus and male palp of *Berlandina yakovlevi* **sp. n.** 83–85 palp, ventral, prolateral and retrolateral; 86–88 bulbus, apical, ventral and retrolateral; 89 tibia, dorsal; 90 habitus.

FIGURES 91–93. *Berlandina yakovlevi* **sp. n.** 91 epigyne, ventral; 92 epigyne, dorsal; 93 male, habitus in nature; 91b–92 after maceration. Abbreviation: *Ag* accessorial gland.

Diagnosis. This species is larger than all congeners in Asia. The new species is most similar to *B. saraevi* and *B. nakonechnyi* **sp. n.** From the former species it differs by having a distinct abdominal pattern (Figs 73 and 90), and abrupt tip of the embolus. For differences with the latter species see the diagnosis in *B. nakonechnyi* **sp. n.**

Description. Male. Total length 10.7. Carapace: 5.3 long, 4.1 wide. Coloration: carapace yellow with gray stripes formed by gray hairs on the sides of cephalic part. Legs and palps yellow. Tibiae-tarsi of legs I and II with long hairs (Fig. 90). Labium, maxillae and sternum brown. Chelicerae dark brown. Abdomen and spinnerets beige. Abdomen with gray cardiac mark dorsally and two longitudinal gray stripes.

Spination of leg IV: femur: d1-1-1, p0-1-1, r0-1-1; patella: p1-0, r1-0; tibia: d1-0-0, p1-3(1)-1, r1(2)-1-1, v2-2-2; metatarsus: d1-2-0, p1-1-0, r1-1-0, v2-1(0)-2.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	5.25	2.4	3.95	4.05	2.35	18.0
II	4.8	2.35	3.5	4.25	2.35	17.25
III	4.7	2.2	3.05	5.35	2.65	17.95
IV	6.05	2.55	4.35	6.7	2.95	22.6

Palp as in Figs 83–89; tibia with ventral lobe and two tibial apophyses: one large, as long as tibia, and second small, poorly pronounced and hidden by the larger one; dorsal part of tibia with 5 strong spines; embolus relatively thin; tip of embolus with small triangle lobe (Fig. 86), dorsal side with two ridges (Fig. 88).

Female. Total length 11.15. Carapace: 4.9 long, 3.65 wide. Coloration as in male.

Spination of leg IV: femur: d1-1-1, p0-1-1, r0-0-1; patella: p1-0, r1-0; tibia: d1-0-0, p1(2)-1-1(2), r1-1-1(2), v2-2-2; metatarsus: d1-2-0, p2(1)-1-0(2), r1-1-0, v2-1-2.

Leg article length.

	Fe	Pt	Ti	Mt	Ta	Total
I	3.75	1.85	2.6	2.5	1.75	12.45
II	3.6	1.85	2.35	2.65	1.8	12.25
III	3.45	1.85	2.0	3.4	2.0	12.7
IV	4.45	2.1	3.1	4.6	2.25	16.5

Epigyne as in Figs 91–92; with round fovea, wide septum; receptacles closely spaced. Vulva with two pairs of accessorial glands (*Ag*).

Distribution. Known from the type locality only.

The *potanini* group

Diagnosis. Members of this group can be recognized by the following characters: (1) large tibial apophysis (1/2 of length of cymbium), (2) transversal seminal duct (in ventral view), (3) long embolus starting at 6–7 o'clock and (4) epigynal fovea with septum tapering anteriorly.

Composition. Only two species belong to this group: *B. potanini* (Schenkel, 1963) and *B. schenkeli* Marusik & Logunov, 1995.

Berlandina potanini (Schenkel, 1963)

Figs 94–100

Berlandia plumalis: Schenkel 1936: 264, f. 86 (♀, misidentified).
Berlandia p. Schenkel, 1963: 97, f. 56 (♀).
B. p.: Marusik & Logunov 1995: 179, f. 1–3 (♀).
B. p.: Song *et al.* 1999: 446, f. 259A (♀).
B. p.: Song *et al.* 2004: 28, 310, f. 14A–E (♂♀).
B. p.: Marusik & Logunov 2006: 49.

Material examined: MONGOLIA, ***Töv*** Aimag: 1♀ 2 juv. [02], Bayankhangai Somon, 47°20'N 105°24'E, 1200 m, 21–25.05.1997 (YM). ***Khentii*** Aimag: 1♂ (ZMMU), 65 km NNW Öndörchaan, 4 km W Cangingol, Bodenfalle, 16.06.1980 (Zs.Peregi). CHINA: 1♂ (HUB), ***Inner Mongolia***, Alxa Leaue, Helan Mt., 2.04.1992 (Yongwen Zhao).

Diagnosis. From the similar *B. schenkeli* it can be easily distinguished by the posteriorly bent tip of embolus, the shorter median apophysis and "heart" shaped fovea.

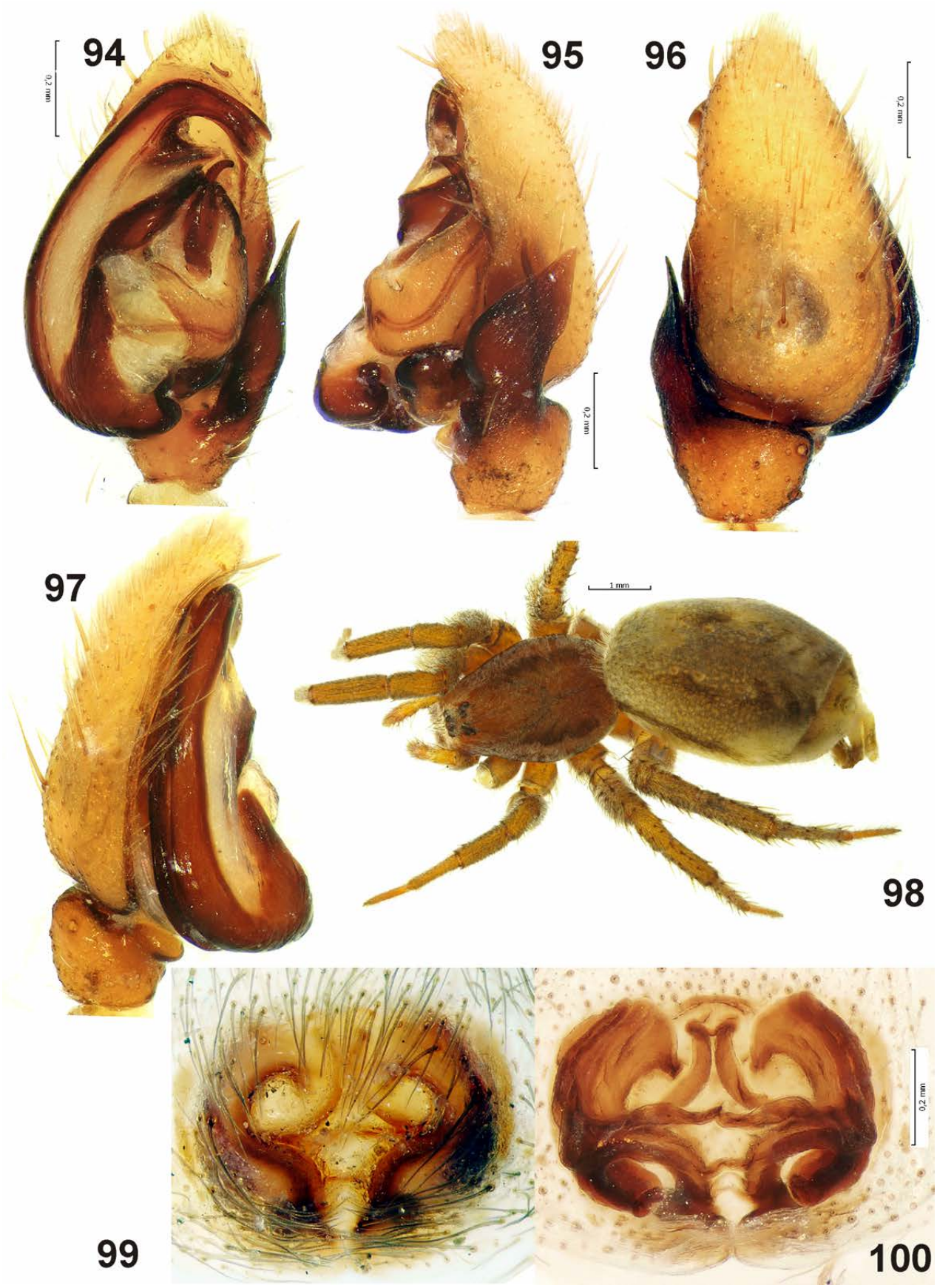
Comments. This species is well described in above mentioned papers.

Distribution. Platnick's catalogue (Platnick 2014) indicates its occurrence in Russia and China, although it was also reported from Mongolia (Marusik & Logunov 1999, 2006). So far, this species is known from Tuva (Russia), Mongolia and northern China (Song *et al.* 2004): from Xinjiang to Hebei.

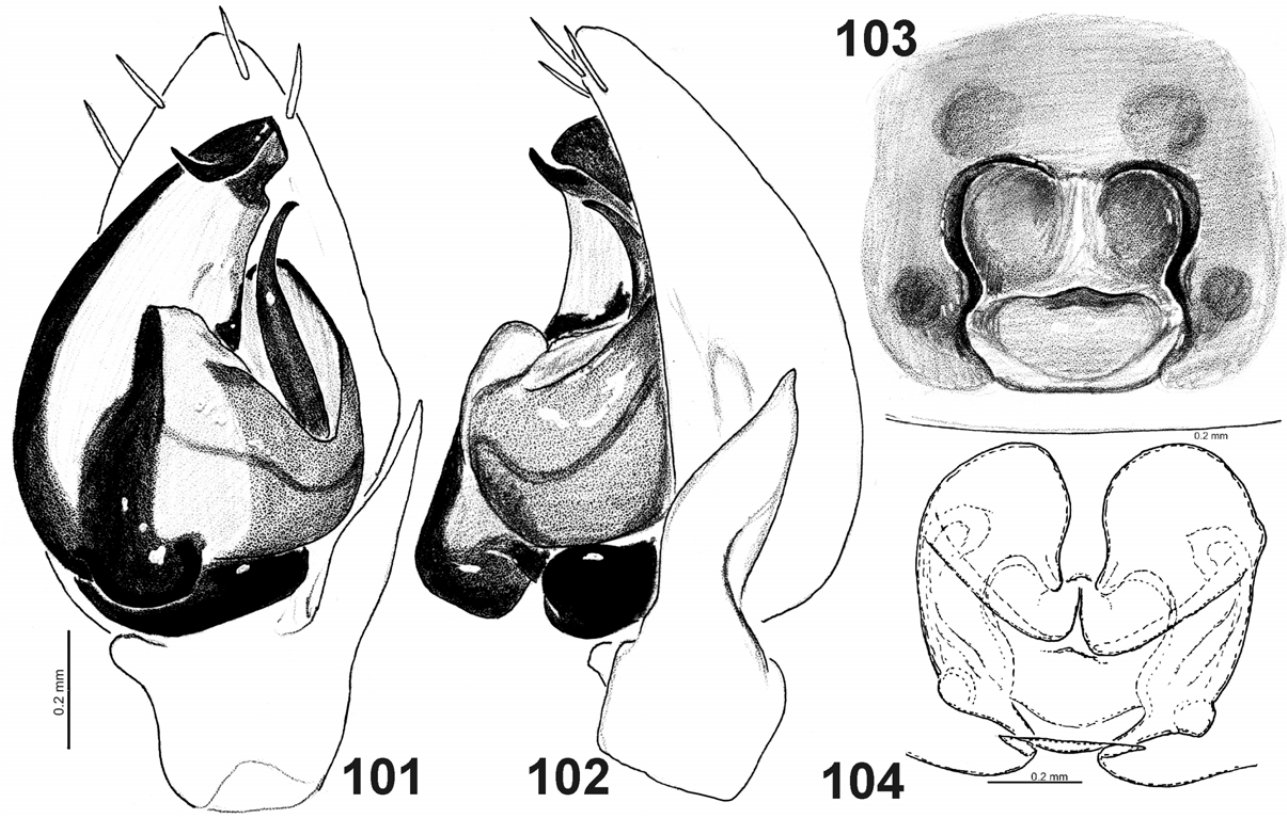
Berlandina schenkeli Marusik & Logunov, 1995

Figs 101–104

B. s. Marusik & Logunov, 1995: 180, f. 4–7 (♂♀).



FIGURES 94–100. *Berlandina potanini*. 94–97 male palp, ventral, retrolateral, dorsal and prolateral; 98 female, habitus; 99–100 epigyne, ventral and dorsal. Male from China, female from Mongolia.



FIGURES 101–104. *Berlandina schenkeli* after Marusik & Logunov (1995). 101–102 male palp, ventral and retrolateral; 103–104 epigyne, ventral and dorsal.

Diagnosis. This species is similar to *B. potanini* from which it can be distinguished by a shorter embolus, not bent in the terminal part, a claw-like outgrowth of embolic tip, and square shaped fovea with large septal base.

Comments. The species was well described by Marusik & Logunov (1995).

Distribution. It is known from three localities in Tuva.

The *nabozhenkoi* group

Diagnosis. This is a monotypic group, possibly related to the *shnitnikovi* group. This group can be recognized by (1) the large tibial apophysis with the tip bent dorsally, (2) seminal duct making a right angle, (3) the small median apophysis, (4) the embolus starting at about 7.30–8.00 o'clock, (5) the embolus thin and bent at right angle near tip and (5) the epigyne with trapezoidal fovea and septum.

Comment. According to Ponomarev (personal communication) this species is related to the type species of the genus and therefore the correct name can be *plumalis* group.

Berlandina nabozhenkoi Ponomarev & Tsvetkov, 2006

Figs 105–110

B. n. Ponomarev & Tsvetkov 2006: 5, f. 1–2 (♂).
B. n.: Ponomarev 2008b: 79, f. 1–2 (♂♀).

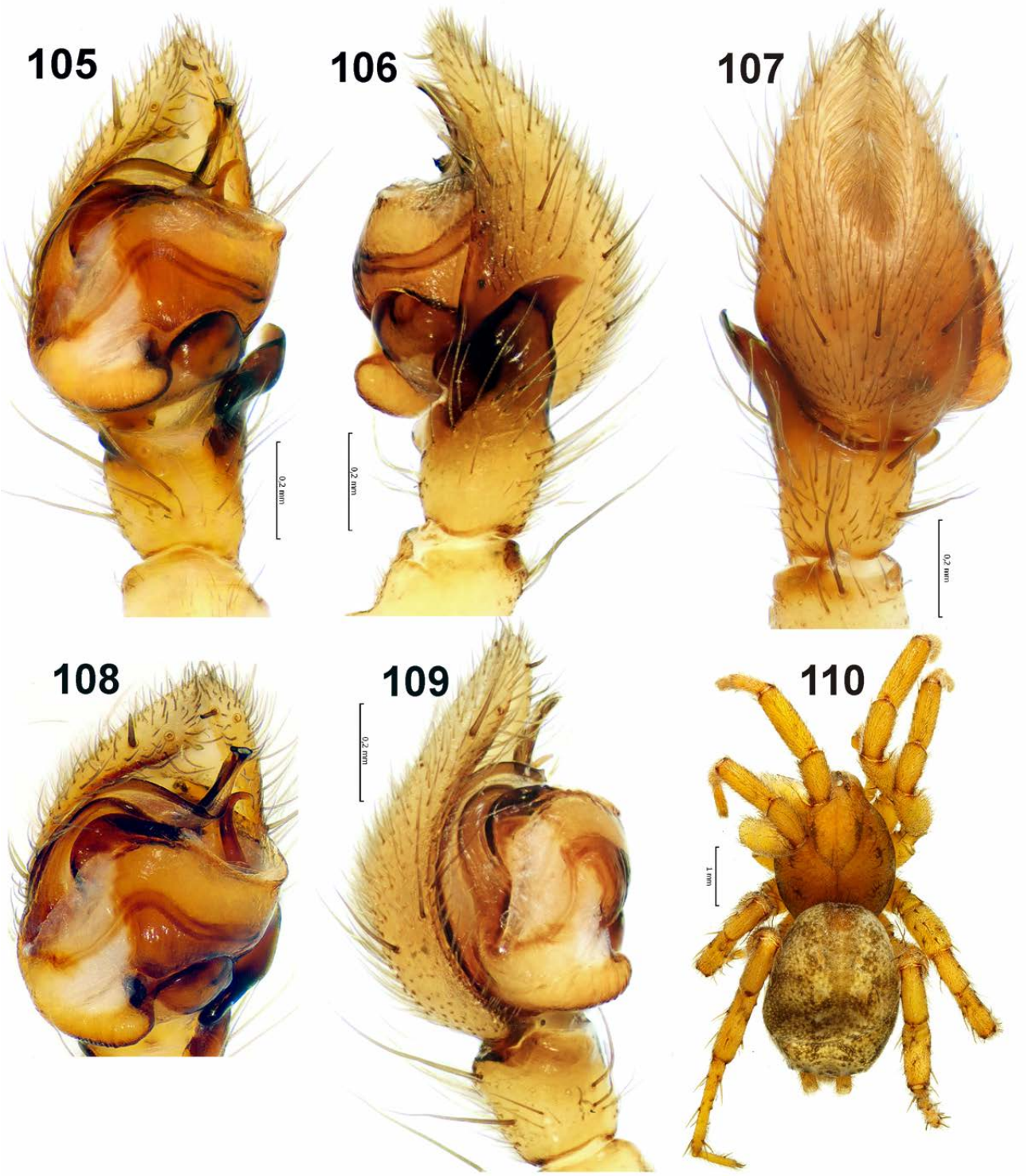
Material examined: RUSSIA, ***Astrakhan'*** Area: holotype ♂ (ZMMU), Ikryaninskiy Dist., environs of Kapitanskiy Ilmen' (47°07'N, 47°42'E), 29.04.2006 (M.V.Nabozhenko).

Diagnosis. Males of this species differ from other congeners except *Berlandina cinerea* (Menge, 1872) by the large tibial apophysis (1/2 of cymbial length), the long and thin embolus starting at 8 o'clock with a strongly (90°)

bent tip. From *B. cinerea* it differs by the thin and bent embolus. The female of *B. nabozhenkoi* is similar to that of *B. yakovlevi* **sp. n.**, from which it can be distinguished by the thinner septum.

Comments. The species is well described in above mentioned papers. We were not able to study and to illustrate the female of this species.

Distribution. It is known from two localities in Astrakhan' Region and Kalmykia.



FIGURES 105–110. Habitus and male palp of *Berlandina nabozhenkoi*. 105–107 male palp, ventral, retrolateral and dorsal; 108 bulbus and cymbium, ventro-apical; 109 palp, prolateral; 110 habitus.

MAP 1. Known records of 14 *Berlandina* species in Central Palaearctic. ✦ *caspica,* ✚ *hui,* ① *koponeni* **sp. n.**, ● *mishenini* **sp. n.**, ★ *nabozhenkoi,* ▲ *nakonechnyi* **sp. n.**, ◆ *nenilini,* ▼ *ovtsharenkoi* **sp. n.**, ✖ *potanini,* ⬟ *saraevi,* ❋ *schenkeli,* **O** *spasskyi,* ✱ *ubsunurica,* ■ *yakovlevi* **sp. n.**

Conclusions

This study of *Berlandina* from Mongolia and adjacent Tuva and Xinjiang, chiefly based on only two expeditions, reveals amazing species diversity. Eight species were found in Mongolia, and 12 species in the region (Mongolia and adjacent regions), or over one third of all the known species in the genus. The highest species diversity per country was five species in the European part of Russia (Helsdingen 2010). All these five species were reported from the Ciscaspian region: Northern Caucasus, Kalmykia and Astrakhan Area. The whole of Europe has only nine species of *Berlandina* (Helsdingen 2010). Given that *Berlandina* species are mostly restricted to arid habitats like steppe, semideserts and deserts, and that these habitats are widespread in poorly investigated Central Asia, it is very likely that real number of species will be much higher.

Acknowledgements

We thank R.V. Yakovlev (Barnaul, Russia), A.N. Nakonechnyi (Novosibirsk, Russia), A.I. Shmakov (Barnaul, Russia), G.G. Khabiev (Aktash, Russia), U. Beket (Bayan-Ölgii, Mongolia) for organizing and undertaking an expedition to Mongolia, in which the part of material treated in this paper was collected. Comparative and type material was kindly provided by K.G. Mikhailov (ZMMU, Moscow and ZISP, St. Petersburg), A.V. Ponomarev (Rostov on Don, Russia), S. Mahunka (NHMB, Budapest) and Zhang Feng (HUB, Baoding). Also, we thank S. Koponen (University of Turku) and R.Yu. Dudko (ISEA) for providing museums facilities. Special thanks are to editor and reviewers Vladimir V. Ovtsharenko (New York) and Mykola M. Kovblyuk (Simferopol, Ukraine). English of the earlier draft was kindly checked by Donald Buckle (Saskatoon, Canada). English of the final draft was corrected by Brian Patrick (Mitchell, South Dakota). This work was supported in part by the Russian Foundation for Basic Research (grant 12-04-01548).

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