




On a small collection of linyphiid spiders from mountain Phoenix, Liaoning Province, China, with the description of a new species (Linyphiidae)

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Abstract

A small series of spiders collected from a low mountain Phoenix in Liaoning Province of China, contains five linyphiid species, one of which, *Platyspira scissa* **sp. nov.** (♂, ♀), is described as new. The new species is similar to *P. tanasevitchi* Song & Li, 2009, known from caves in Guizhou Province, China. Habitus and copulatory organs of both sexes are illustrated for the new species, as well as for “*Doenitzius*” *pruvus* Oi, 1960. The taxonomic position of the genus *Doenitzius* Oi, 1960 is discussed. Distribution of each species is commented on.

Key words: Taxonomy, dwarf-spiders, mountain fauna, Palearctic

Introduction

Presently, the spider fauna of People’s Republic of China is relatively well studied. According to recent survey, 6344 species belonging to 75 families are known from the country (Li & Lin 2024). The spider fauna of India, the second most diverse in Asia, contains only 1966 species (Li & Lin 2024).

The second largest family in the globe, Linyphiidae (4846 species, see WSC 2024) is represented in China by 533 species (Tanasevitch 2024), which is much less than in Russia with 877 linyphiid species (Mikhailov 2022). The recent studies of linyphiid spiders in China are focused mainly on the southern regions of the country: Yunnan Province (Zhao *et al.* 2014, Irfan *et al.* 2021, Irfan *et al.* 2022, etc) and Chongqing Region (Irfan *et al.*, 2023a,b). The northern provinces of China are not studied as intensively, and this paper is a small contribution to the study of linyphiid spiders in Liaoning Province.

The second author had an opportunity to collect spiders during a short visit to Phoenix (= Fenghuangshan, 凤凰) Mountain in the eastern part of Liaoning Province. Phoenix Mt. is a low mountain range close to the border with North Korea. It covered predominantly with deciduous trees, with some steep treeless slopes and cliffs.

The collected material contains five species of Linyphiidae, one of which is new to science. Descriptions of the new species, as well as illustrations of previously known species, are the subject of this paper.

Material and methods

This paper is based on material collected by Yuri Marusik in 2017 in Liaoning Province, China. The male holotype and a female paratype of the new species are deposited in the Institute of Zoology, Chinese Academy of Sciences in Beijing (IZCAS), the paratypes, as well as non-type material are in the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU). Spiders were collected by sifting litter and mosses, preserved in 70%

ethanol, and were studied using an MBC-9 stereo microscope; a Levenhuk C-800 digital camera was used for taking photographs. SEM photographs were taken using a SEM JEOL JSM-5200 scanning microscope at the Zoological Museum, University of Turku, Finland. Leg chaetotaxy is presented in a formula: 1.1.1.1, which refers to the number of dorsal spines on tibiae I–IV. The sequence of leg segment measurements is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. The terminology of copulatory organs mainly follows that of Merrett (1963) with later modifications referred to below.

Abbreviations. a.s.l.—above sea level; WSC—Word Spider Catalog. **Morphology:** m—mastidion; TmI—relative position of trichobothrium on metatarsus I. **Male copulatory organs:** bp—break point of embolus; ct—chitinous tunic of embolus sensu Tanasevitch (2014); d—duct; dsa—distal suprategular apophysis sensu Hormiga (2000); e—embolus; ep—embolus proper; fg—Fickert’s gland; me—edge membrane of embolus; lc—lamella characteristic; mm—median membrane sensu van Helsdingen (1965) = embolic membrane sensu van Helsdingen (1986) and Hormiga (2000); pe—entrance point of duct; r—radix, = tailpiece, auct.; ra—radical apophysis; su—suprategulum. **Female copulatory organs:** o—opening of seminal duct. **Museum acronyms:** IZCAS—Institute of Zoology, Chinese Academy of Sciences in Beijing; ZMMU—Zoological Museum of the Moscow State University, Moscow, Russia.

Results

Taxonomy

Class Arachnida Cuvier, 1812

Order Araneae Clerck, 1757

Family Linyphiidae Blackwall, 1859

Doenitzius Oi, 1960

Type species: *Doenitzius peniculus* Oi, 1960, by original designation.

Remarks. This micronetine genus was established to accommodate two new species from Japan: *D. peniculus* Oi, 1960 and *D. pruvus* Oi, 1960. Recently one more species, *D. minutus* Seo, 2018, was described from South Korea based on the female holotype, the epigyne of which resembled that of *D. pruvus* (Seo, 2018).

The generotype *D. peniculus* is known only from non-detailed drawings of poor quality, but even from them it is quite obvious that *D. pruvus* and, apparently, *D. minutus* are not congeneric to it. The general appearance of the palp and epigyne show that *D. peniculus* is probably a representative of *Arcuphantes* Chamberlin and Ivie, 1943 or *Fusciphantes* Oi, 1960 (Tanasevitch & Marusik, in preparation).

“*Doenitzius*” *pruvus* Oi, 1960

Figs 1–4, 9B

Doenitzius pruvus Oi, 1960: 196, figs 221–224 (♂♀).

Doenitzius pruvus: Lee *et al.* 2004: 100 (♂♀).

Doenitzius pruvus: Ono *et al.* 2009: 310, figs 716–719 (♂♀).

For the complete list of 14 taxonomic references see WSC (2024).

Remarks. There are quite a few papers with illustrations of *D. pruvus*, but most of them are photos of the habitus or drawings of the general appearance of the copulatory organs of both sexes. Illustrations showed the structure of the male palp without details. We decided to fill this gap: see Figs 1–4.

The embolic division of the male palp of *D. pruvus* is characterized by a complete set of the micronetine sclerites (sensu Saaristo & Tanasevitch 1996): boat-shaped radix, terminal apophysis, lamella characteristic and embolus.

The palpal structure of *D. pruvus* slightly resembles that in, for example, *Drapetisca socialis* (Sundevall, 1833). The elongated and hardly sclerotized integuments of the epigyne in the female also resembles that in the Palearctic *D. socialis*, as well as that in East Asian *Epigyphantes epigynatus* (Tanasevitch, 1988) and *Vagiphantes vaginatus* (Tanasevitch, 1983). The genus *Doenitzius* is a rather peculiar representative of micronetines, the taxonomy, composition and relationships of which require further study.

Material examined. 8♂12♀ (ZMMU), CHINA: Liaoning Prov., env. of Fengcheng City, Mt. Phoenix, ca 40°23'N, 124°05'E, 280–550 m a.s.l., 16–18.X.2017, Y.M. Marusik leg.

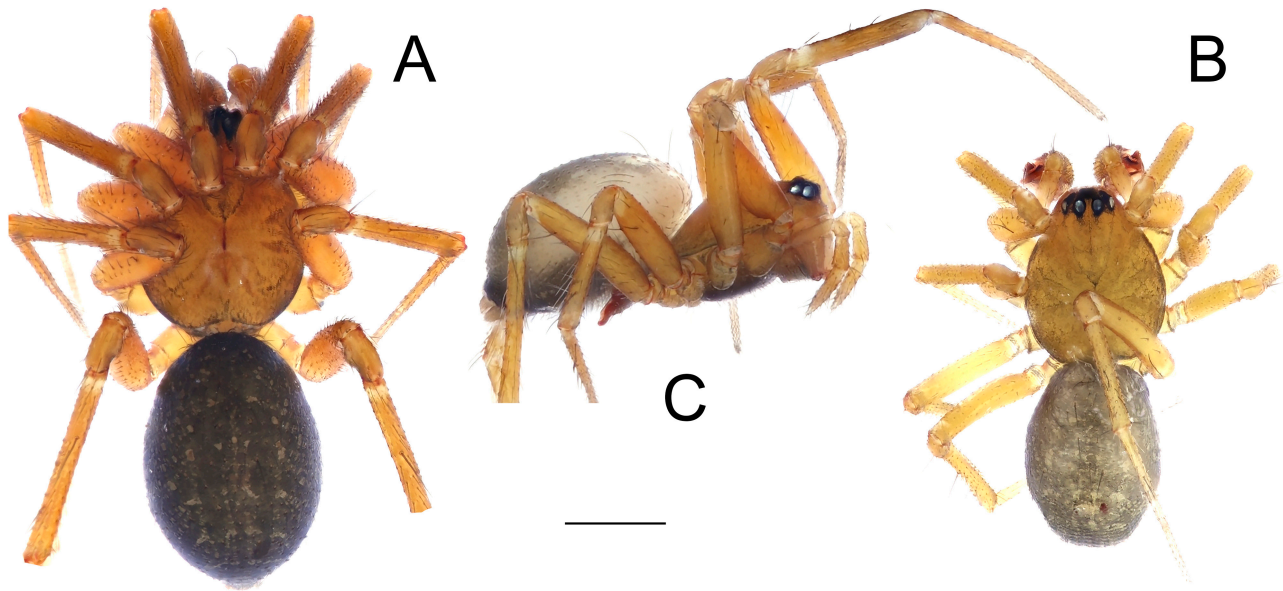


FIGURE 1. Photographs of habitus of *Doenitzius pruvus* Oi, 1960, males (A–B) and female (C). A–B, dorsal view; C, lateral view. Scale bar: 0.5 mm.

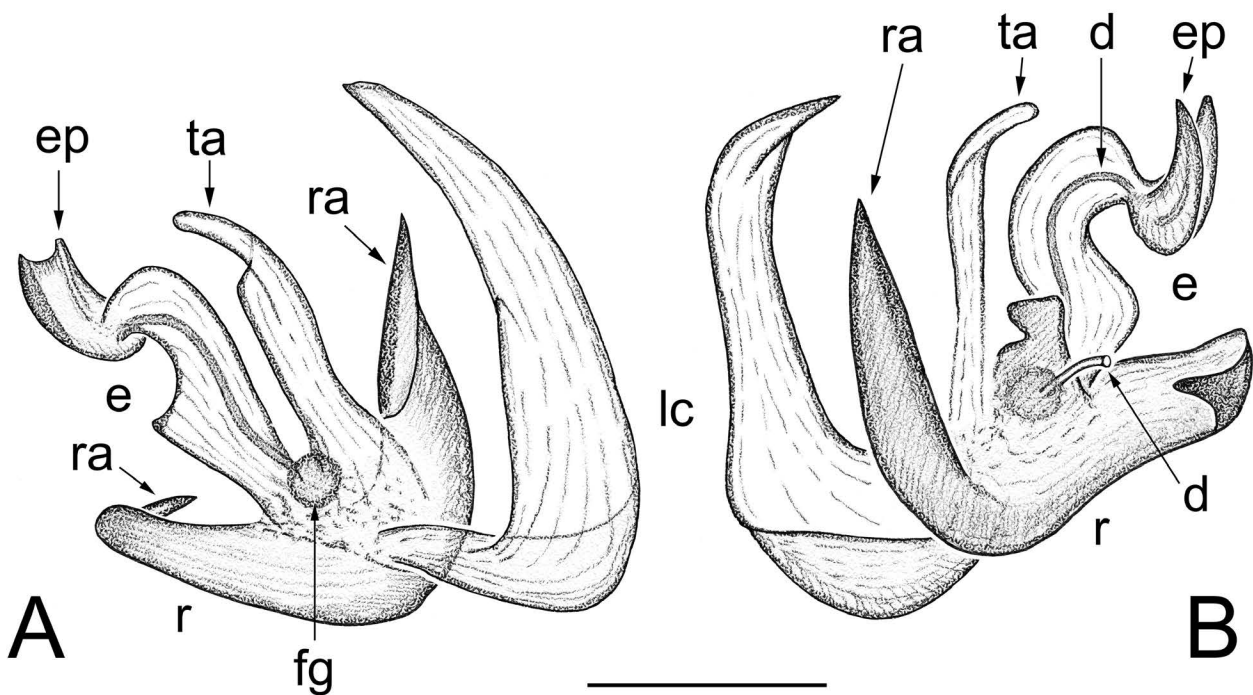


FIGURE 2. Embolic division of *Doenitzius pruvus* Oi, 1960, left palp. **A** ventro-lateral view; **B** ventro-retrolateral view. Abbreviations: d—duct, e—embolus, ep—embolus proper, lc—lamella characteristic, r—radix, ra—radical apophysis, ta—terminal apophysis. Scale bar: 0.1 mm.

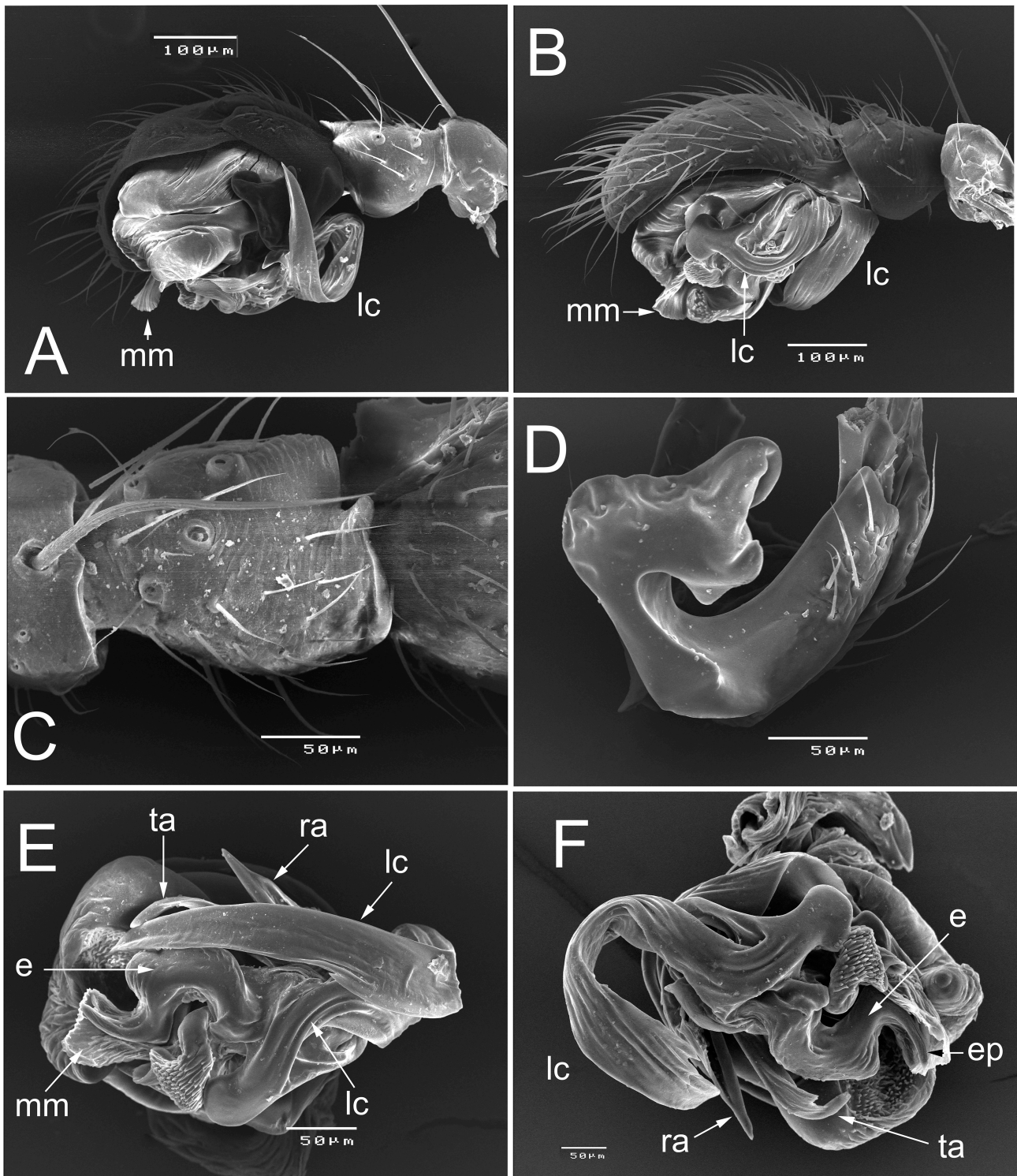


FIGURE 3. Details of the male palp (A–F) of *Doenitzius pruvus* Oi, 1960. **A–B** left palp, prolateral and retrolateral view; **C** palpal tibia, dorsal view; **D** paracymbium, antero-lateral view; **E–F**, embolic division, ventral view, different aspects. Abbreviations: e—embolus, ep—embolus proper, lc—lamella characteristica, mm—median membrane, ra—radical apophysis, ta—terminal apophysis.

Distribution. Occurs in southern part of the Maritime Province of Russia (pers. data), Korea, and Japan (WSC 2024) (Fig. 9B). In China the species was known only from the Jilin Province (Li & Lin 2016). New record for the Liaoning Province and westernmost in the entire range.

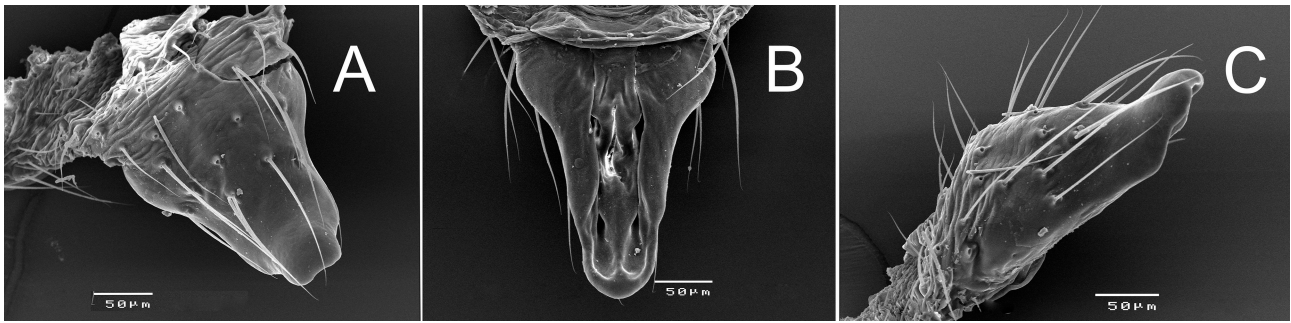


FIGURE 4. Epigyne of *Doenitzius pruvus* Oi, 1960. A–C, ventral, dorsal and lateral views.

Erigomicronus Tanasevitch, 2018

Erigomicronus Tanasevitch, 2018: 46.

Collis Seo, 2018: 279 (homonym of *Collis* Koroleva, 1959, Trilobita, and junior subjective synonym of *Erigomicronus*).

Type species: *Oreonetides longembolus* Wunderlich & Li, 1995, by original designation.

Remarks. This small micronetine genus with five species restricted to the Far East Asia: Korea, Japan, northeastern China and adjacent Russia (WSC 2024).

Erigomicronus longembolus (Wunderlich & Li, 1995)

Fig. 9B

?*Oreonetides longembolus* Wunderlich & Li, 1995: 338, figs 18–22 (♂).

Oreonetides longembolus: Song *et al.* 1999: 199, figs 114A–B (♂♀).

“*Oreonetides*” *longembolus*: Marusik *et al.* 2016: 5, figs 10–23 (♂♀).

Erigomicronus longembolus: Tanasevitch 2018: 246, figs 1–4, 6–9 (♂♀).

For the complete list of references see WSC (2024).

Material examined. 11 ♂3♀ (ZMMU), CHINA: Liaoning Prov., env. of Fengcheng City, Mt. Phoenix, ca 40°23’N, 124°05’E, 280–550 m a.s.l., 16–18.X.2017, Y.M. Marusik leg.

Remarks. *Oreonetides longembolus* Wunderlich & Li, 1995 was originally described from the male holotype collected in the Liaoning Province of northeastern China (Wunderlich & Li 1995). Marusik *et al.* (2016) discovered and described the female of this species and correctly noted that the long and whip-shaped embolus in the male palp is typical of neither *Oreonetides* Strand, 1901 nor the subfamily Micronetinae *sensu* Saaristo & Tanasevitch (1996) as a whole. The structure of the epigyne does resemble the “micronetine” pattern (see Saaristo & Tanasevitch 1996) and is even similar to that of some species of *Maro* O. Pickard-Cambridge, 1906. Two years later, Tanasevitch (2018) established a new genus, *Erigomicronus* Tanasevitch, 2018, with *O. longembolus* as the type species, and included *Erigomicronus longembolus* (Wunderlich & Li 1995), and *Maro lautus* Saito, 1984.

Distribution. Known from the Liaoning Province of northeastern China (Wunderlich & Li 1995, and new data), and from the southern part of the Maritime Province, Russia (Marusik *et al.* 2016; Tanasevitch 2018) (Fig. 9B).

Nippononeta coreana (Paik, 1991)

Macrargus coreanus Paik, 1991: 2, figs 30–38 (♀).

Nippononeta coreana: Yan *et al.* 2015: 104, figs 4A–H, 5A–D, 6A–H (♂♀).

Nippononeta coreana: Irfan *et al.* 2022: 201, figs 235A–D, 236A–D, 237A–F (♂♀).

For complete list of references see WSC (2024).

Material examined. 4♂7♀ (ZMMU), CHINA: Liaoning Prov., env. of Fengcheng City, Mt. Phoenix, ca 40°23'N, 124°05'E, 280–550 m a.s.l., 6–18.X.2017, Y.M. Marusik leg.

Distribution. Described from Korea (Paik, 1991); known from Kunashir Island (Eskov 1992), and from Jilin, Hubei, Hunan, and Guangxi provinces of China (Li & Lin 2016).

Platyspira Song & Li, 2009

Type species: *Platyspira tanasevitchi* Song & Li, 2009, by original designation.

Remarks. Until recently the genus was considered to be monotypic, known from the generotype described from both sexes, from two caves in Guizhou Province (Song & Li 2009).

Platyspira scissa sp. nov.

Figs 5–8

Type material. Holotype ♂ (IZCAS), CHINA: Liaoning Prov., env. of Fengcheng City, Mt. Phoenix, ca 40°23'N, 124°05'E, 280–550 m a.s.l., 16–18.X.2017, Y.M. Marusik leg.

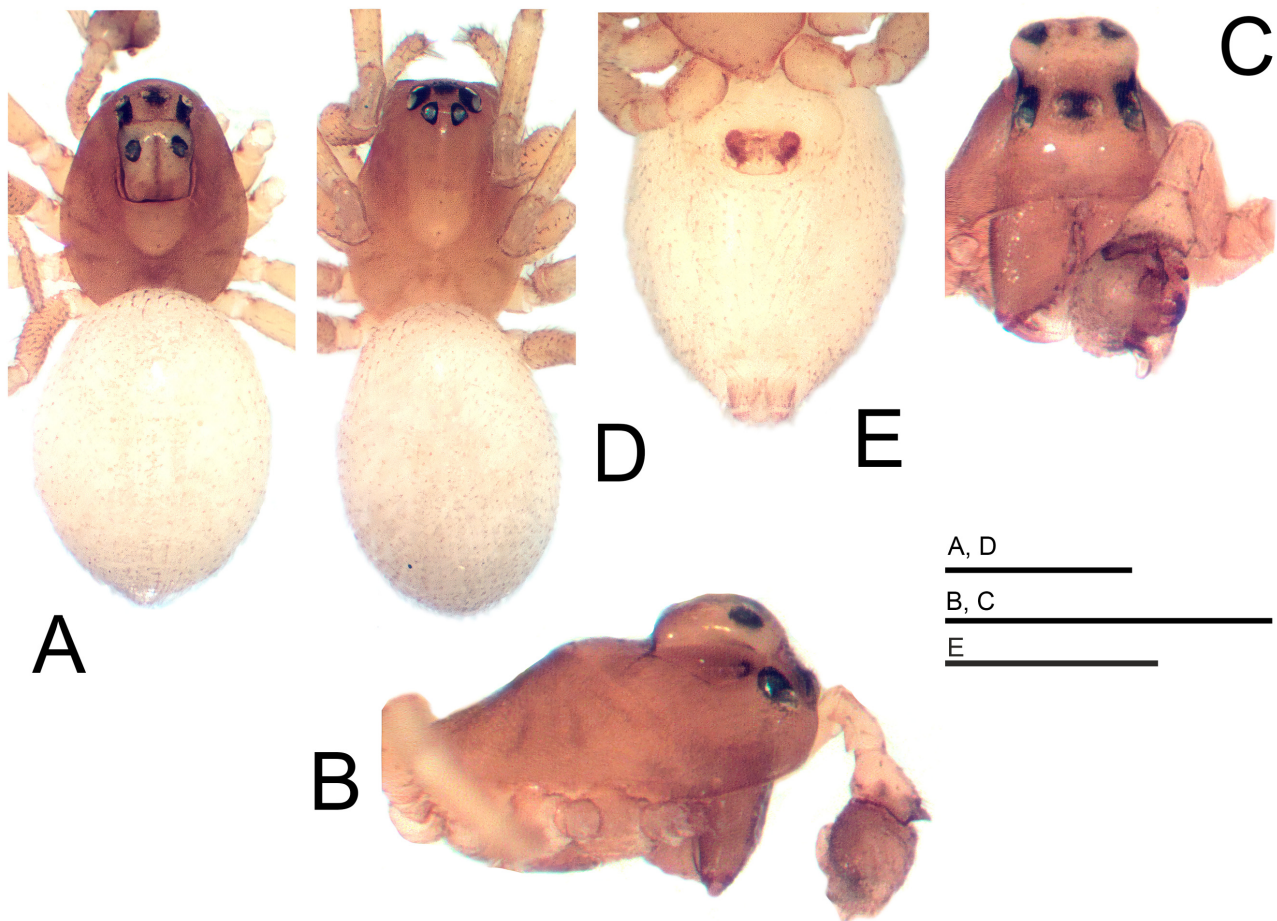


FIGURE 5. Photographs of *Platyspira scissa* sp. nov., male (A–C) and female (D–E) paratypes. A, D habitus, dorsal view; B, C prosoma, lateral and frontal view; E, abdomen, ventral view. Scale bars: 0.5 mm.

Paratypes. 2♂ 1♀ (ZMMU), 1♀ (IZCAS): collected together with holotype.

Etymology. The specific epithet “*scissa*” is a Latin adjective meaning “break”, referring to the break of a chitinous tunic on the embolus in the male palp.

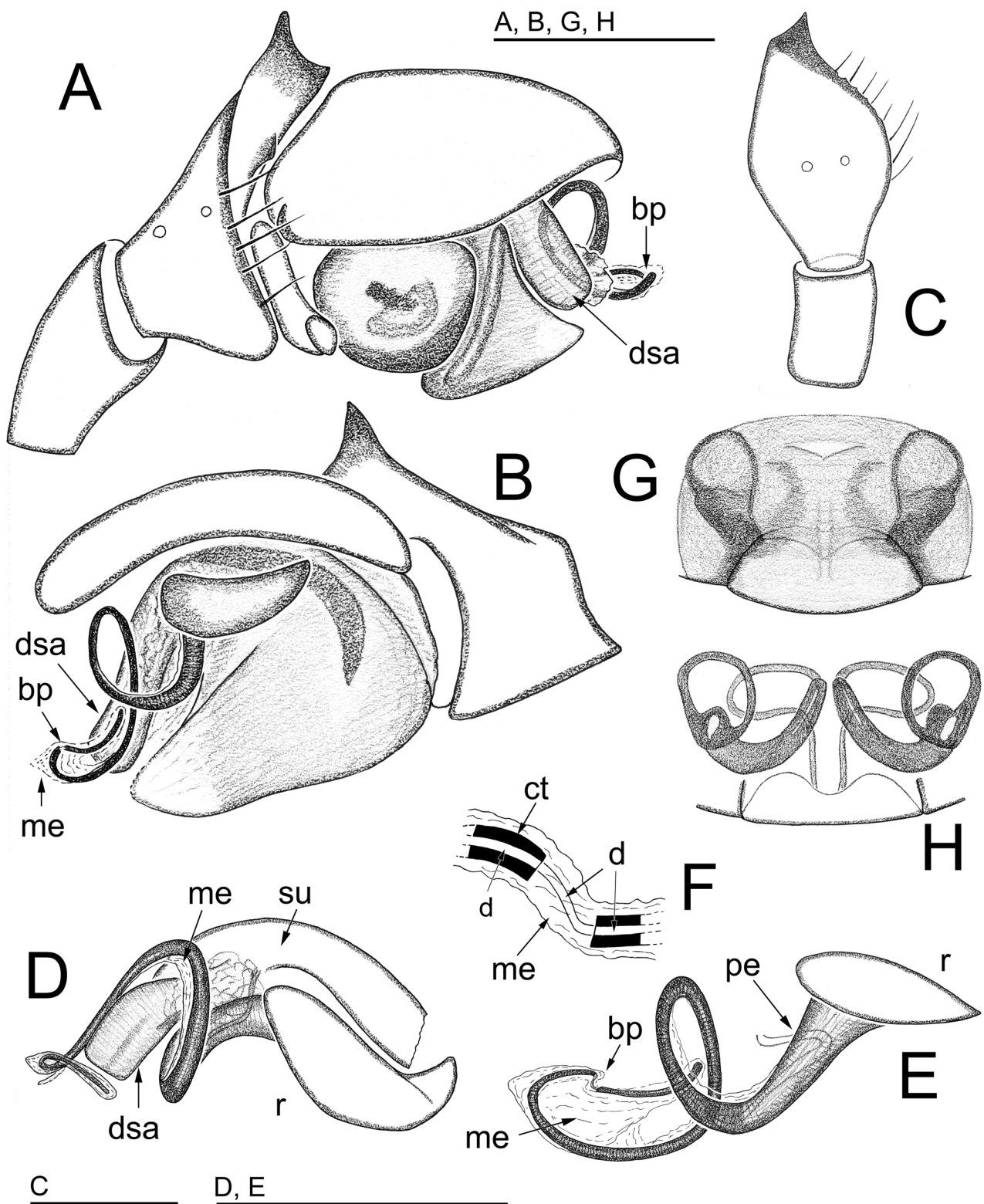


FIGURE 6. Details of male palp (A–E) and epigyne (G–H) of *Platyspira scissa* sp. nov., paratypes. A–B right palp, retrolateral and prolateral, respectively; C patella and palpal tibia, dorsal view; D distal supratregular apophysis and embolus, lateral view; E embolus, lateral view; F sketch of break point; G epigyne, ventral view; H cleared epigyne, dorsal view. Abbreviations: bp—break point of embolus, dsa—distal supratregular apophysis, me—edge membrane of embolus, pe—entrance point of duct, ct—chitinous tunic of embolus, d—duct, su—supratregulum. Scale bars: 0.1 mm. F not to scale.

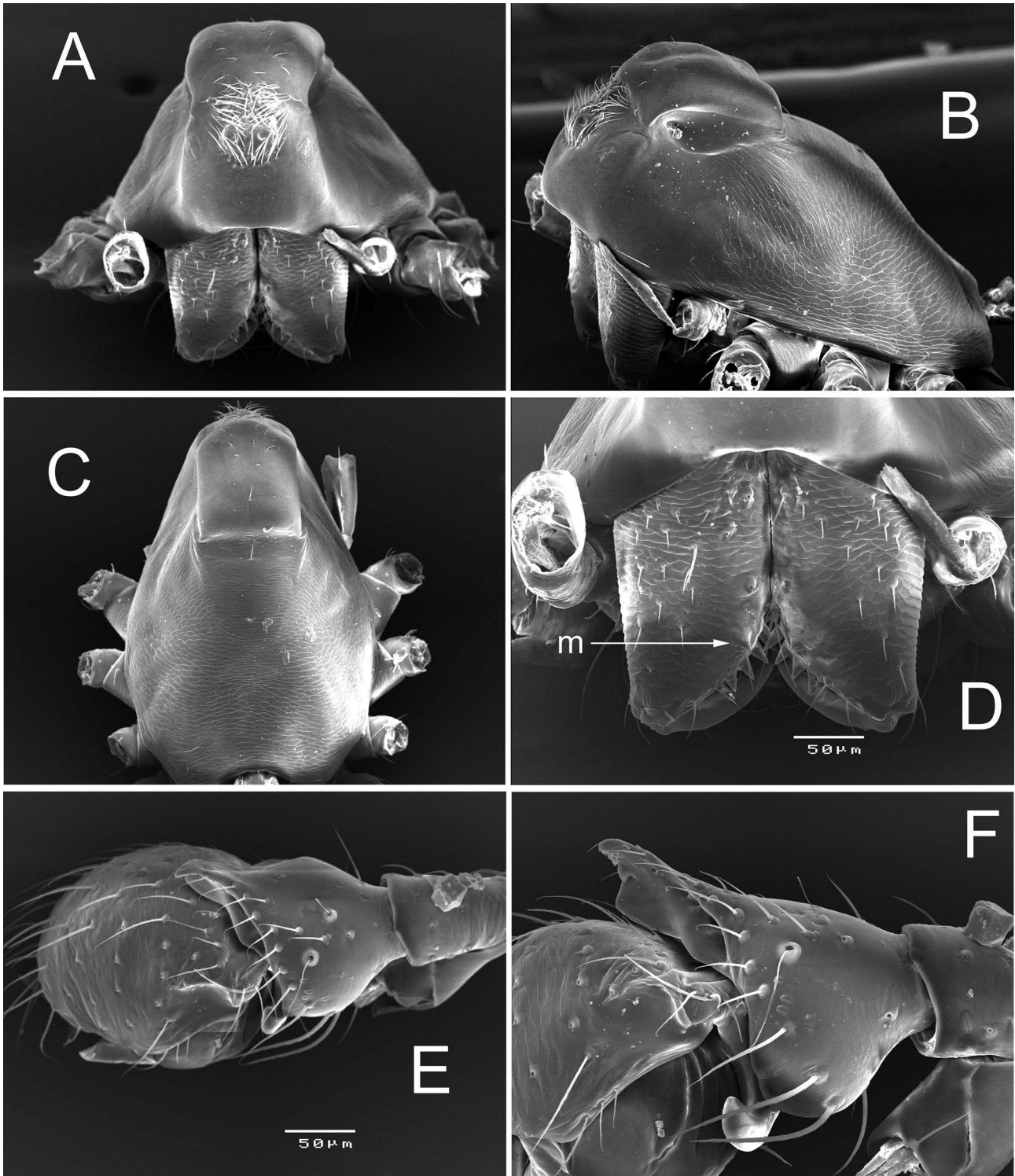


FIGURE 7. Details of male prosoma and palpal tibia of *Platyspira scissa* **sp. nov.**, paratype. **A–C** prosoma, frontal, lateral and dorsal views; **D** chelicerae, frontal view. **E–F**, palpal tibia, dorsal and prolateral view. Abbreviation: m—mastidion. **A–C** not to scale.

Diagnosis. The male of *Platyspira scissa* **sp. nov.** is distinguished from the type species by the strongly reduced median membrane and by certain details in the palp (Figs 6–8 cf. figs 1–11 in Song & Li (2009)). The main difference lies in the structure of the distal part of the embolus. In the new species the distal part of the embolus is abruptly turned proximally and separated from the rest embolus with a break: the chitinous tunic at the break point (BP in Figs 6B, E–F, 8C–D) is absent and the two parts of the embolus are connected to each other with the duct and the edge membrane only. The female of the new species differs by the trapeziform shape of the ventral plate vs rectangular, the subspherical receptacles vs reniform, as well as by the arrangement of the seminal ducts.

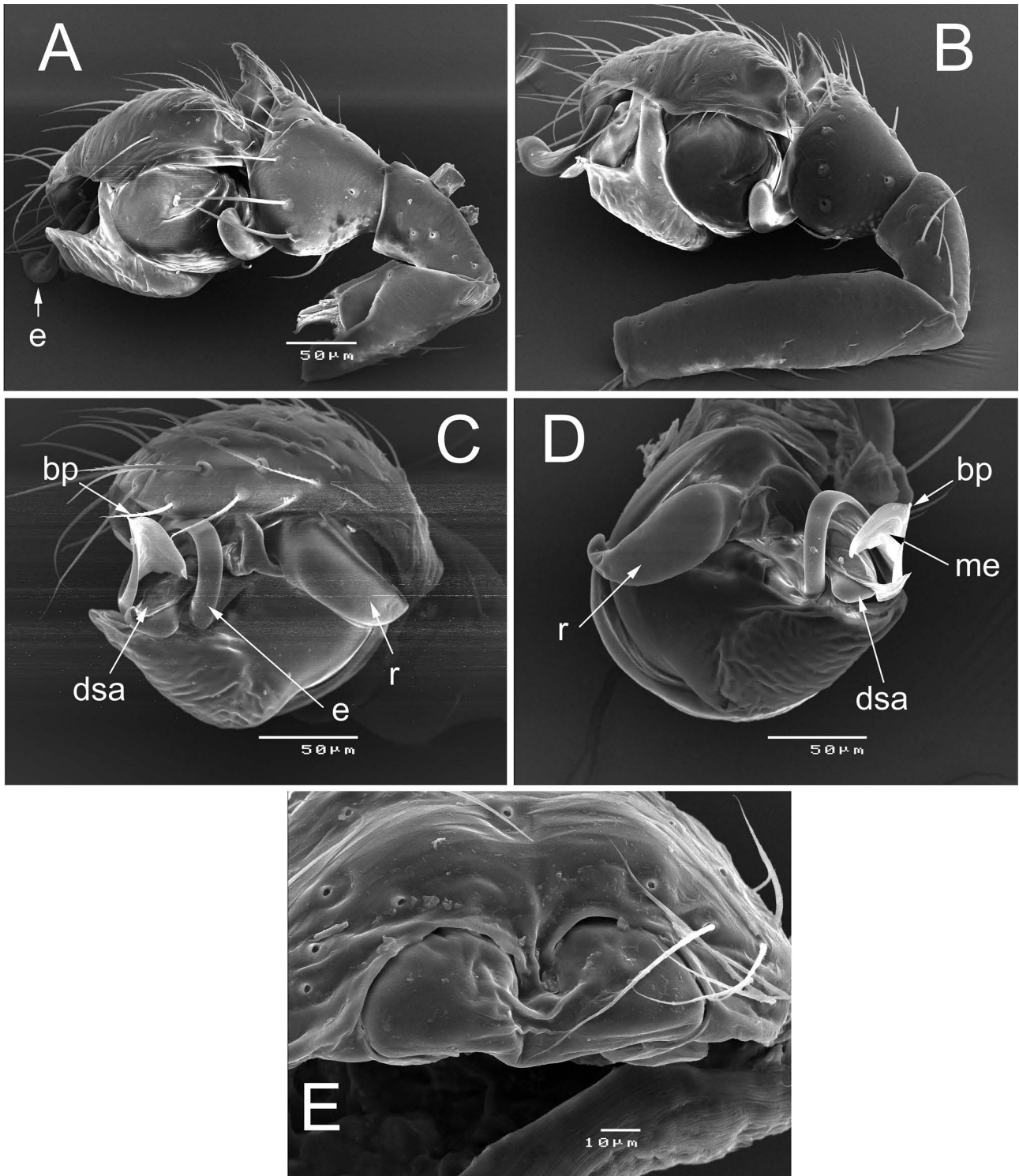


FIGURE 8. Details of male palp (A–D) and epigyne (E) of *Platyspira scissa* **sp. nov.**, paratypes. A–B left palp, lateral view, different aspects; C–D, embolic division, retrolateral and ventral, respectively; E epigyne, antero-ventral view. Abbreviations: bp—break point of embolus, e—embolus, dsa—distal suprategular apophysis, me—edge membrane of embolus, r—radix. B not to scale.

Remarks. The new species is assigned to *Platyspira* due to similarity to the generotype in small size, the same chaetotaxy (1.1.1.1) and trichobothriotaxy (I–III), the shape of the modified male carapace and palpal tibia, as well as the presence of the fusiform embolic division, with a long and coiled embolus.

Description. Male (paratype). Habitus as in Fig. 5A. Total length 1.47. Carapace modified, 0.69 long, 0.53 wide, pale brown. Cephalic part of carapace with bipartite elevation as shown in Figs 5A–C, 7A–C), each part carrying a posterior median eye. Eyes not enlarged, normal, ocular area covered with short adpressed setae. Sulci large, elongated. Chelicerae unmodified, 0.24 long, with small mastidion like denticle at distal part of chelicera (Fig. 7D). Legs yellow to pale brown. Leg I 1.50 long (0.44 + 0.15 + 0.38 + 0.28 + 0.25); leg IV 1.58 long (0.48 + 0.15 + 0.40 + 0.30 + 0.25). Chaetotaxy 1.1.1.1, spines weak, poorly visible, 0.5–1 times as long as diameter of corresponding leg segment. Metatarsi I–III each with trichobothrium. TmI 0.50. Abdomen 0.92 long, 0.68 wide, pale grey, almost white. Palp (Figs 6A–F, 7E–F, 8A–D): femur and patella not modified. Tibia elongated, ca. 1.8 times longer than maximal width in dorsal view, tapers anteriorly, with a shallow concavity distally. Paracymbium small, narrow, uncinately distally. Distal suprategular apophysis (dsa) thin and straight, with almost parallel sides. Median membrane small, poorly visible. Embolic division fusiform. Embolus (e) long, coiled, whip-shaped, supplied with an edge membrane (me). Distal part of embolus abruptly turned proximally and separated from rest of embolus with short break: chitinous tunic (ct) at break point absent, and two parts of embolus connected only by duct (d) and edge membrane (me). Radix (r) elongated, ending with hook proximally.

Female (paratype). Habitus as in Fig. 5D. Total length 1.44. Carapace unmodified, 0.66 long, 0.51 wide. Eyes size as in male. Chelicerae unmodified, 0.30 long. Legs yellow to pale brown. Leg I 1.46 long (0.42 + 0.18 + 0.32 + 0.27 + 0.27); leg IV 1.56 long (0.48 + 0.16 + 0.38 + 0.29 + 0.25). Chaetotaxy as in male. TmI 0.51. Abdomen (Figs 5D–E) 0.90 long, 0.60 wide, pale grey, almost white. Epigyne as in Figs 5E, 6G, H, 8E. Median plate (= ventral plate, *auct.*) trapeziform, receptacles large, subspherical, spaced into two their diameters. Copulatory ducts long, initially thick, gradually tapering, curved.

Distribution. Known only from the type locality (Fig. 9A).

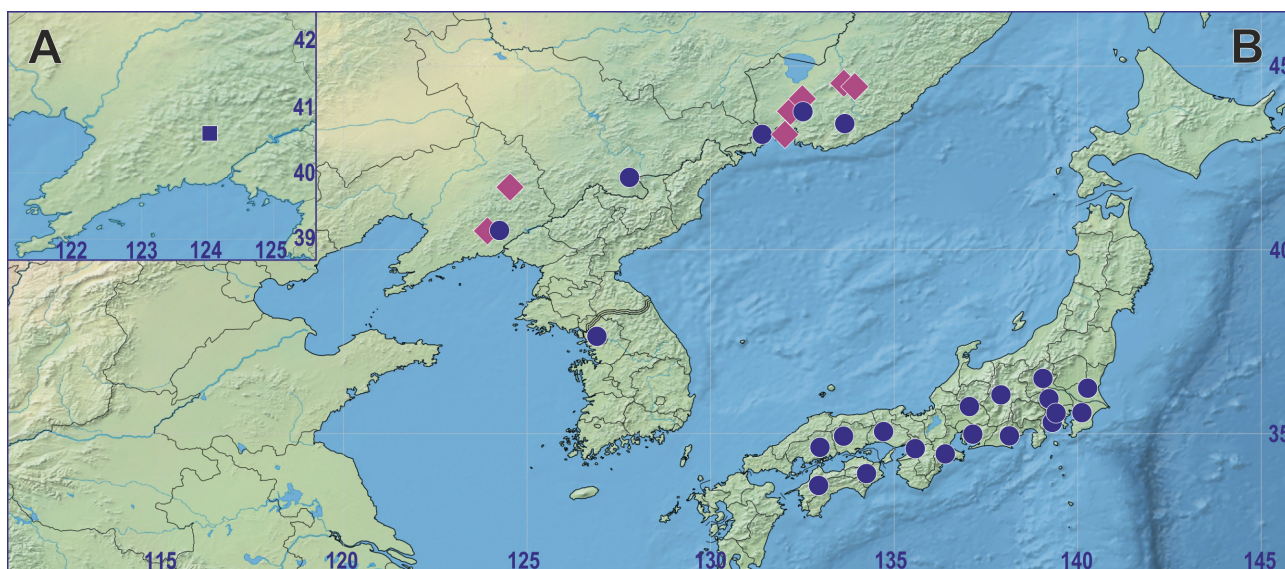


FIGURE 9. Collecting locality: Mt. Phoenix (A) and distribution records (B) of *Doenitzius pruvus* (dot) and *Erigomicronus longembolus* (diamond).

Walckenaeria ferruginea Seo, 1991

Walckenaeria ferruginea Seo, 1991: 36, figs 1–6 (♂).

Walckenaeria ferruginea: Song & Li 2011: 184, figs 6A–G, 7A–G (♂♀).

For the complete list of taxonomic references see WSC (2024).

Material examined. 2♂ (ZMMU), CHINA: Liaoning Prov., env. of Fengcheng City, Mt. Phoenix, ca 40°23'N, 124°05'E, 280–550 m a.s.l., 16–18.X.2017, Y.M. Marusik leg.

Remarks. This species is very similar to *W. orientalis* (Oligier, 1985), known from the Russian Far-East. The differences between the species are described in details by Song and Li (2011: 184). Our two males somewhat differ from a specimen from Qingyuan County, Liaoning Prov., China depicted by Song and Li (2011) in that their embolus is somewhat longer, makes a short loop, vs straight.

Distribution. Originally described from Korea (Seo 1991), in China known from Liaoning (Song & Li 2011) and Jilin provinces (Li & Lin 2016).

Acknowledgements

YM thanks Seppo Koponen and Ilari Sääksjärvi (Turku, Finland) for arranging his stay in Turku and allowing him to use museum facilities. Yuri Marusik although thank Guo Zheng (Shenyang, China) who arranged and supported his trip to Mt. Phoenix. We thank Don Buckle (Saskatoon, Canada) for editing English in the final draft.

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