

PREPRINT

Author-formatted, not peer-reviewed document posted on 13/01/2022

DOI: <https://doi.org/10.3897/arphapreprints.e80488>

First record of the genus *Beris* Latreille (Diptera, Stratiomyidae) from Korea, with description of a new species

 Junho Lee, Sang Jae Suh

Disclaimer on biological nomenclature and use of preprints

The preprints are preliminary versions of works accessible electronically in advance of publication of the final version. They are not issued for purposes of botanical, mycological or zoological nomenclature and **are not effectively/validly published in the meaning of the Codes**. Therefore, nomenclatural novelties (new names) or other nomenclatural acts (designations of type, choices of priority between names, choices between orthographic variants, or choices of gender of names) **should NOT be posted in preprints**. The following provisions in the Codes of Nomenclature define their status:

International Code of Nomenclature for algae, fungi, and plants (ICNafp)

Article 30.2: "An electronic publication is not effectively published if there is evidence within or associated with the publication that its content is merely preliminary and was, or is to be, replaced by content that the publisher considers final, in which case only the version with that final content is effectively published." In order to be validly published, a nomenclatural novelty must be effectively published (Art. 32.1(a)); in order to take effect, other nomenclatural acts must be effectively published (Art. 7.10, 11.5, 53.5, 61.3, and 62.3).

International Code of Zoological Nomenclature (ICZN)

Article: 21.8.3: "Some works are accessible online in preliminary versions before the publication date of the final version. Such advance electronic access does not advance the date of publication of a work, as preliminary versions are not published (Article 9.9)".

First record of the genus *Beris* Latreille (Diptera, Stratiomyidae) from Korea, with description of a new species

Junho Lee[‡], Sang Jae Suh^{‡,§}

[‡] School of Applied Biosciences, Kyungpook National University, Daegu, Republic of Korea

[§] Institute of Plant Medicine, Kyungpook National University, Daegu, Republic of Korea

Corresponding author: Sang Jae Suh (sjsuh@knu.ac.kr)

Abstract

Background

The subfamily Beridinae of the family Stratiomyidae contains about 280 known species globally, and distributed all over the biogeographical areas except polar region. In the Korean peninsula, the species diversity of this subfamily has been poorly known so far, in accordance with National species list of Korea by National Institute of Biological Resources.

New information

In this paper, the soldier fly genus *Beris* Latreille is reported for the first time from Korea based on following three species: *B. fuscipes* Meigen, *B. hirotoi* Ôuchi, and *B. tigris* Lee and Suh, **sp. nov.** Among them, *B. tigris* Lee and Suh, **sp. nov.** was confirmed to be newly discovered. Consequently, three species within this genus have been identified from the Korean peninsula. The identification key, description, external photographs, and taxonomic notes of these Korean species are presented herein.

Keywords

Beridinae, *Beris*, Korea, new species, Stratiomyidae, Taxonomy.

Introduction

The genus *Beris* Latreille is a representative group of soldier flies belonging to the subfamily Beridinae within the family Stratiomyidae (Rozkosný 1998). Latreille (1802) proposed this genus based on the type species *Stratiomys sexdentata* [= *Beris chalybata*

(Forster, 1771)] from England (Forster 1771, Rozkosný and Nartshuk 1988). To date, approximately 50 described members of the genus *Beris* Latreille have been recorded throughout the world. In the Palearctic realm, nearly 27 species are currently known, according to world catalogs by Woodley (2001) and Yang et al. (2014).

The larvae are saproxylic and terrestrial. They usually spend their life cycle under decaying organic matter, wet moss, compost, and wood debris (Woodley 1995). The adults are normally found in foliage near mountain valleys, marshes, or damp places (Rozkosný 1973).

As a result of a taxonomic study of the Korean Beridinae, two species, *Beris fuscipes* Meigen, 1820, and *Beris hirotoi* Ôuchi, 1943, were recorded for the first time in the inventory of Korean fauna. Furthermore, the authors identified an additional third species, namely *Beris tigris* Lee and Suh, **sp. nov.** which was determined to be new species. Accordingly, these three species are added to the biodiversity of Korean soldier flies. The morphological characteristic features for discriminating the taxon as well as external images of each of the species are documented herein. A key for the separation of Korean *Beris* is also provided to allow for an accurate identification process.

Materials and methods

The voucher and type specimens of *Beris* in this study were based on collections obtained from domestic localities in the Korean peninsula using a sweeping method and malaise trap, which have been deposited in the Laboratory of Systematic Entomology at Kyungpook National University, Daegu, Korea. The terminology used for describing the morphological external features and genital structures generally follows Cumming and Wood (2017) and Yang et al. (2014), respectively.

To investigate the male genital complex, the dissected distal abdomen was macerated in 10 % KOH solution and mounted on glycerin jelly. The genital structures were then visualized using either a stereoscopic microscope (Olympus SZX16) or a compound microscope (Olympus BX50). Consecutive images were acquired using an Olympus digital camera (DP 71) and converted into a single in-depth figure using Helicon Focus 7.0.2 software (Son and Suh 2020, Lee and Suh 2020).

Taxon treatments

Beris Latreille, 1802

Nomenclature

Beris Latreille, 1802 - *Latreille 1802*: 447 (Type-species: *Stratiomys sexdentata* Fabricius).

Hexacantha Meigen, 1803 - Meigen 1803: 264 (Type-species: *Musca clavipes* Linnaeus).

Octacantha Lioy, 1864 - Lioy 1864: 586 (Type-species: *Beris fuscipes* Meigen).

Hemiberis Enderlein, 1921 - Enderlein 1921: 209 (Type-species: *Beris quadridentata* Walker).

Diagnosis

Compound eyes touching in males, separated in females, densely pilose in both sexes. Face, frons, and vertex with long hairs present in males. Lower face sclerotized with lateral pits. Maxillary palpus invisible. Antennal flagellum almost longer than scape and pedicel combined, comprised of 8 flagellomeres; scape and pedicel subequal in relative length. Scutellum with 4–8 metallic green spines posteriorly. Hind tarsomere 1 slightly swollen. M_3 evanescent; R_{2+3} arising before crossvein r-m. Abdomen relatively elongate, somewhat flattened (Nagatomi and Tanaka 1972, Rozkosný 1982, Yang and Nagatomi 1992, Yang et al. 2014).

***Beris fuscipes* Meigen, 1820**

Nomenclature

Beris fuscipes Meigen, 1820 - Meigen 1820: 8 (Type-locality: England).

Beris quadridentata Walker, 1848 - Walker 1848:127 (Type-locality: Canada).

Oplacantha annulifera Bigot, 1887 - Bigot 1887: 21 (Type-locality: USA).

Actina canadensis Cresson, 1919 - Cresson 1919: 174 (Type-locality: Canada).

Beris sachalinensis Pleske, 1926 - Pleske 1926: 408 (Type-locality: Russia).

Beris fuscotibialis Pleske, 1926 - Pleske 1926: 409 (Type-locality: Russia).

Beris sychuanensis Pleske, 1926 - Pleske 1926: 411 (Type-locality: China).

Beris mongolica Pleske, 1926 - Pleske 1926: 414 (Type-locality: Mongolia).

Beris petiolata Frey, 1961 - Frey 1961: 80 (Type-locality: Japan).

Materials

- a. scientificName: *Beris fuscipes*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Jinbu-myeon, Jangjeon-ri, Mt. Gariwangsan, 37°28'29"N, 128°31'59"E; samplingProtocol: malaise trap; eventDate: 05/30/2020; individualCount: 1; sex: 1 male; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

- b. scientificName: *Beris fuscipes*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Daegwallyeong-myeon, Hoenggye-ri, Seonjaryeong, 37°41'45"N, 128°45'15"E; samplingProtocol: malaise trap; eventDate: 06/04/2021; individualCount: 4; sex: 4 males; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

Description

Male: Body length (excluding antennae): 6.5–7.4 mm; Wing length: 5.5–6.1 mm. *Head*. Elliptical shaped in anterior view, semi-globular shaped in lateral view. Compound eye holoptic and dark brown, densely pilose with short pale brownish hairs, facets absent. Frons black and subshiny; upper part very narrowly triangular with few minute pale hairs; lower part widely triangular with short dark brown to black hairs; pale erect hairs scarcely present on touching area of eye immediately above upper margin of lower frons. Face black with long black hairs; hairs on adjacent part of lower face pale brown; mid-lower part swollen; lateral margin of face with a pair of pits. Ocellar tubercle black with few erect black hairs; ocellus reddish brown. Occiput and vertex black with pale brown recumbent hairs, seldom covered with pale pollens along the postocular areas to lower margin of eye. Maxillary palpus vestigial; proboscis yellowish brown with pale yellow hairs. Antenna short and mostly black, but extreme apex of pedicel slightly tinged yellowish brown; scape and pedicel covered with black hairs; extreme apex of flagellum contains few short black hairs. Flagellum 1.3-1.4 times as long as scape and pedicel combined; flagellomere 1 abruptly swollen, nearly 1.6-1.8 times wider than pedicel; flagellomeres 2-7 pale, dusted with small grayish spots (Fig. 1B). *Thorax*. Mainly metallic green. Short erect pale brown hairs on scutum tomentose; hairs on lateral margin of scutum fairly long. Postpronotal lobe tinged with brown, postalar callus somewhat faint. Mesopleuron with partly erect hairs; anepisternum except anterior and posterior part, lower part of katepisternum and anepimeron except anterior part roughly glabrous and lustrous. Hairs on katepimeron and meron relatively short. Scutellum with 6 posterior scutellar spines, outermost one relatively short; yellow piles densely haired between the spines. *Leg*. Mainly yellowish brown, but the following parts tinged dark brown to black: all coxae, extreme apex of mid femur, apical half of hind femur except extreme apex, mid tibia except base, middle portion of hind tibia (except base and apex) and tarsi (base of fore tarsus slightly light). All coxae and femora densely pilose with long yellowish brown piles. Apical spur of mid tibia unnoticeable. Hind tarsomere 1 fairly swollen, nearly 1.8-1.9 times wider than hind tibia (Fig. 1A). *Wing*. Tinged dark brown rather than yellowish brown. Stigma and subcostal cell significantly infuscated. Base of M_1 and M_2 convergent; M_3 lacking (Fig. 1C). Squama brown. Halter knob yellowish brown, base and stem fuscus. *Abdomen*. Dark brown to black, with metallic tinge on abdomen nearly absent. Lateral margin of terga with prominently long yellowish brown to brown hairs; middle of dorsum with short pale hairs sparsely. Venter partly intermixed with recumbent dense pale yellow to yellowish brown hairs; sternite 1 with considerably long hairs on middle. Epandrium broad, anterior margin semicircular-shaped, posterior margin practically even; surstylus present posteriorly, feebly curved inward; cercus parallel-sided and straight; proctiger nearly triangular-shaped, posterior margin somewhat rounded (Fig. 1E). Gonocoxite wider than length; median projection

not well-developed, slightly protuberant; gonostylus blunt, not tapering (Fig. 1D). Aedeagus complex slender, tripartite distally; lateral lobe slightly divergent outward, slightly longer than median lobe (Fig. 1F, G).

Female: Specimen unavailable.

Diagnosis

(Based on males) Flagellum short and swollen basally; surstylus on epandrium slightly curved inward; gonostylus thick and blunt apically; aedeagus long and slender with three lobes; lateral lobes slightly curved outward apically.

Distribution

Korea (new record: Central), China (Sichuan, Ningxia, Gansu), Japan (Hokkaido, Honshu), Russia (Far East), Mongolia, Europe, Canada, and USA.

Taxon discussion

This species has been reported to have several intraspecific variations regarding the ground color of antennal segments, hairs on head and thorax appendage, leg segments, wing venation and shape of surstylus. The external features of the Korean specimens regarding these variations are as follows: antenna black but extreme apex of pedicel yellowish brown; hairs on frons, face and scutum mainly pale brown to black; M_1 and M_2 touching proximally, M_3 invisible; basal part of femora and tibiae tinged with yellow; surstylus on epandrium not straight but curved inward.

Notes

This species is considered to be Holarctic species, that is largely distributed in extensive regions of the Palearctic, Western Europe to Central, and East Asia, and Nearctic realms, North America.

Beris hirotui Ôuchi, 1943

Nomenclature

Beris hirotui Ôuchi, 1943 - Ôuchi 1943: 487 (Type-locality: Japan).

Beris hisotui (sic): Ôuchi 1943: 487.

Beris hirotsui (sic): Nagatomi and Tanaka 1972: 98; Nartshuk and Rozkosný 1975: 85; Rozkosný and Nartshuk 1988: 46; Yang and Nagatomi 1992: 167; Li et al. 2009: 130.

Materials

- a. scientificName: *Beris hirotui*; country: Republic of Korea; stateProvince: Gyeongsangbuk-do; locality: Gunwi-gun, Bugye-myeon, Dongsan-ri, Mt. Palgongsan, 36°01'46"N,

- 128°40'28"E; samplingProtocol: sweeping; eventDate: 05/27/2020; individualCount: 3; sex: 3 males; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2020; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- b. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Yeongwol-gun, Yeongwol-eup, Samok-ri, Donggang River, 37°13'57"N, 128°30'55"E; samplingProtocol: malaise trap; eventDate: 05/29/2020; individualCount: 1; sex: 1 male; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2020; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- c. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Yeoryang-myeon, Gujeol-ri, Mt. Sangwonsan, 37°32'18"N, 128°39'15"E; samplingProtocol: sweeping; eventDate: 05/30/2020; individualCount: 4; sex: 3 males, 1 female; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2020; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- d. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Jinbu-myeon, Jangjeon-ri, Mt. Gariwangsan, 37°27'59"N, 128°32'18"E; samplingProtocol: malaise trap; eventDate: 05/30/2020; individualCount: 1; sex: 1 male; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2020; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- e. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Daegwallyeong-myeon, Hoenggye-ri, Seonjaryeong, 37°41'45"N, 128°45'15"E; samplingProtocol: sweeping; eventDate: 05/31/2020; individualCount: 31; sex: 8 males, 23 females; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2020; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- f. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Yeoryang-myeon, Gujeol-ri, Mt. Nochusan, 37°31'08"N, 128°46'42"E; samplingProtocol: sweeping; eventDate: 05/20/2021; individualCount: 1; sex: 1 male; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- g. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Yeoryang-myeon, Yeoryang-ri, Mt. Banryusan, 37°27'05"N, 128°44'08"E; samplingProtocol: sweeping; eventDate: 05/21/2021; individualCount: 2; sex: 2 males; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- h. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Jinbu-myeon, Jangjeon-ri, Mt. Gariwangsan, 37°27'59"N, 128°32'18"E; samplingProtocol: sweeping; eventDate: 05/22/2021; individualCount: 1; sex: 1 female; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- i. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Daegu-si; locality: Gachang-eup, Jeongdae-ri, Mt. Biseulsan, 35°43'54"N, 128°32'53"E; samplingProtocol: sweeping; eventDate: 05/30/2021; individualCount: 14; sex: 10 males, 4 females; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- j. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Jinbu-myeon, Duil-ri, Mt. Odaesan, 37°41'09"N, 128°34'25"E; samplingProtocol: sweeping; eventDate: 06/04/2021; individualCount: 3; sex: 2 males, 1 female; lifeStage: adult; identifiedBy: J Lee; datelIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

- k. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Daegwallyeong-myeon, Hoenggye-ri, Seonjaryeong, 37°41'45"N, 128°45'15"E; samplingProtocol: sweeping; eventDate: 06/04/2021; individualCount: 22; sex: 7 males, 15 females; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- l. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Daegwallyeong-myeon, Yongsan-ri, Mt. Barwangsang, 37°38'18"N, 128°40'09"E; samplingProtocol: sweeping; eventDate: 06/05/2021; individualCount: 2; sex: 2 males; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- m. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Hwaam-myeon, Morun-ri, Mt. Gwangdaesan, 37°18'52"N, 128°49'10"E; samplingProtocol: sweeping; eventDate: 06/09/2021; individualCount: 5; sex: 4 males, 1 female; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- n. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Nam-myeon, Mureung-ri, Mt. Duwibong, 37°14'05"N, 128°45'35"E; samplingProtocol: sweeping; eventDate: 06/10/2021; individualCount: 3; sex: 3 males; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- o. scientificName: *Beris hirotoi*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Sabuk-eup, Sabuk-ri, Mt. Baekunsan, 37°11'23"N, 128°48'38"E; samplingProtocol: sweeping; eventDate: 06/10/2021; individualCount: 6; sex: 5 males, 1 female; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

Description

Male: Body length (excluding antennae): 5.9–7.4 mm; Wing length: 5.0–6.0 mm. *Head*. Elliptical shaped in anterior view, semi-globular shaped in lateral view. Compound eye holoptic and reddish brown, densely pilose with short pale yellow hairs, facets absent. Frons black and glossy; upper part very narrowly triangular shaped, practically bare; lower part widely triangular shaped with short black hairs; pale hairs felt on touching area of eye immediately above upper margin of lower frons. Face black with long black hairs; hairs on adjacent part of lower face yellowish brown; mid-lower part swollen; lateral margin of face with a pair of pits. Ocellar tubercle black with few dark brown hairs; ocellus orange brown. Occiput and vertex black with white recumbent hairs, somewhat covered with pale pollens along postocular areas to lower margin of eye. Maxillary palpus vestigial; proboscis yellow with yellowish brown hairs. Antenna short, mostly black, but apex of pedicel and inner surface of flagellomeres 2-6 tinged with pale yellow; scape and pedicel covered with black hairs, extreme apex of flagellum with few short black hairs. Flagellum 1.1-1.2 times as long as scape and pedicel combined; flagellomeres 3-6 relatively swollen, nearly 1.5-1.6 times wider than pedicel; all flagellomeres, except flagellomere 8, with small grayish spots on both surfaces (Fig. 2 C). *Thorax*. Mainly metallic green. Short erect pale yellow hairs on scutum tomentose; hairs on lateral margin of scutum fairly long. Postpronotal lobe and postalar callus slightly tinged with yellow. Mesopleuron with partly erect hairs; central part of

anepisternum, katepisternum except upper part and meron roughly glabrous and lustrous. Scutellum with 6 posterior scutellar spines, outermost one relatively short; yellowish brown piles densely haired between spines. *Leg.* Chiefly yellowish brown, but the following parts tinged dark brown: fore and hind coxa except apex, apical portion of hind femur except extreme apex, hind tibia except base, apex of tarsomere 1 (but hind one slightly pale), and tarsomeres 2-5. Base of hind femur slightly pale. All coxae and femora densely pilose with long pale piles. Apical spur of mid tibia unnoticeable. Hind tarsomere 1 distinctly swollen, nearly 2.4-2.6 times wider than hind tibia (Fig. 2A). *Wing*. Tinged yellowish brown rather than hyaline. Stigma and subcostal cell significantly infuscated. Base of M_1 and M_2 convergent; M_3 lacking (Fig. 2E). Squama yellowish brown. Halter yellowish brown including base and stem. *Abdomen.* Dark brown to black, somewhat tinged reddish brown to metallic violet. Lateral margin of terga with prominently long pale yellow hairs; middle of dorsum with short pale hairs sparsely; proximal part of tergite 1 and tergites 5-6 covered with semi-erect pale yellow hairs. Venter wholly covered with recumbent pale yellow hairs densely; sternite 1 with remarkably long hairs. Epandrium long, medial margin quite concave; anterior margin semicircular-shaped, posterior margin concave; long surstylus present posteriorly, extensively curved inward; cercus nearly parallel-sided and straight; proctiger narrow and triangular-shaped (Fig. 2G). Gonocoxite longer than width; median projection incise rather than protuberant, subquadrate-shaped; gonostylus clearly bent inward. Aedeagus complex comparatively thick, bifurcate; lateral lobe fairly divergent outward, three dorsal process present (Fig. 2F, H).

Female: Similar to males, except for the following characteristics: Body length (excluding antennae): 5.0–6.2 mm; Wing length: 4.4–5.8 mm. *Head.* Compound eye dichoptic, hairs relatively shorter and fewer than in males. Frons, face, ocellar tubercle, vertex and occiput with short recumbent pale yellow hairs sparsely. Frons wider than in males, relatively parallel-sided. Occiput not adequately visible from anterior view. Antenna mostly dark brown to black, but inner surface of flagellum except apex tinged with brown to orange brown. Flagellum nearly 1.3-1.4 times as long as scape and pedicel combined (Fig. 2D). *Thorax.* Hairs on side of scutum shorter than in males. *Leg*. Distal part of hind tibia paler rather than dark brown. Hind tarsomere 1 less swollen than in males (Fig. 2B). *Abdomen.* Hairs on lateral margin of terga shorter than in males.

Diagnosis

(Based on males) Leg bicolored; hind tarsomere 1 predominantly stout, more than 2 times broader than hind tibia; surstylus on epandrium extensively curved inward; gonostylus L-shaped; aedeagus thick with two lobes; lateral lobes distinctly curved outward apically.

Distribution

Korea (new record: Central, South), China (Hubei, Sichuan), Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russia (Far East), and Taiwan.

Beris tigris, sp. n.

Materials

Holotype:

- a. scientificName: *Beris tigris*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Samcheok-si, Hajang-myeon, Galjeon-ri, Mt. Jungbongsan, 37°24'04"N, 128°53'51"E; samplingProtocol: sweeping; eventDate: 07/26/2018; individualCount: 1; sex: 1 male; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

Paratypes:

- a. scientificName: *Beris tigris*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Jeongseon-gun, Yeoryang-myeon, Gujeol-ri, Mt. Sangwonsan, 37°32'18"N, 128°39'15"E; samplingProtocol: sweeping; eventDate: 08/10/2021; individualCount: 6; sex: 1 male, 5 females; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen
- b. scientificName: *Beris tigris*; country: Republic of Korea; stateProvince: Gangwon-do; locality: Pyeongchang-gun, Jinbu-myeon, Jangjeon-ri, Mt. Gariwangsan, 37°28'29"N, 128°31'59"E; samplingProtocol: sweeping; eventDate: 08/12/2021; individualCount: 5; sex: 5 females; lifeStage: adult; identifiedBy: J Lee; dateIdentified: 2021; language: en; institutionCode: KNU; basisOfRecord: PreservedSpecimen

Description

Male: Body length (excluding antennae): 5.2–6.1 mm; Wing length: 4.2–5.1 mm. *Head*. Elliptical shaped in anterior view, semi-globular shaped in lateral view. Compound eye holoptic and reddish brown, densely pilose with short black hairs, facets absent. Frons black and glossy; upper part very narrowly triangular shaped, short pale yellow hairs present; lower part widely triangular shaped with short pale hairs sparsely; hairs barely present on touching area of eye immediately above upper margin of lower frons. Face shiny black, mixed with long yellow and black hairs; hairs on adjacent part of lower face pale yellow; mid-lower part swollen, lateral margin of face with a pair of pits. Ocellar tubercle black with few yellowish brown to brown hairs; ocellus brown. Occiput and vertex black with few white recumbent hairs, slightly covered with pale yellow hairs along postocular areas to lower margin of eye. Maxillary palpus vestigial; proboscis pale yellow with pale hairs. Compound eye 2.0-2.2 times as long as width of lower frons immediately above antennal socket; 1.9-2.0 times as long as width of face immediately below antennal socket; 3.2-3.3 times as long as width of vertex. Antenna moderately long, black, but extreme apex of pedicel tinged yellowish brown; both surfaces of flagellomeres 2-4 and inner surface of flagellomeres 5-6 tinged orange brown and pale brown, respectively; scape and pedicel covered with black hairs, extreme apex of flagellum with few short pale black hairs and slightly pale dusted. Flagellum 1.7-1.9 times as long as scape and pedicel combined; basal flagellomeres not abruptly swollen; flagellum with small grayish spots on both surfaces, except flagellomere 8. Relative ratio of each antennal segment (scape: pedicel: flagellum): 34 (33-35): 19 (18-20): 67 (65-69) (Fig. 3C). *Thorax*. Mainly metallic green. Long erect

yellow hairs on scutum, including lateral margin tomentose. Postpronotal lobe and postalar callus tinged with yellowish brown. Mesopleuron with partly erect hairs; proepimeron, central part of anepisternum, katepisternum except upper part, posterior part of anepimeron, katepimeron and meron roughly glabrous and lustrous. Scutellum with 6 posterior scutellar spines, outermost one relatively short; yellow piles densely haired between spines; mid length of base to posterior margin of scutellum from dorsal aspect 1.1-1.2 times longer than longest spine on scutellum. *Leg.* Mainly yellow, but the following parts tinged dark brown: all coxae except extreme apex, fore and mid tarsomeres 2-5, hind tarsomeres 3-5. All trochanters and basal half of femora pale. All coxae and femora pilose with long pale yellowish piles. Apical spur of mid tibia unnoticeable. Hind tarsomere 1 fairly swollen, width of central part 1.8-2.0 times wider than apex of hind tibia. Relative ratio of each hind leg segment (coxa: trochanter: femur: tibia: tarsomere 1: tarsomeres 2-5 including claw): 30 (28-33): 14 (11-16): 105 (100-111): 76 (72-80): 52 (50-54): 48 (46-50) (Fig. 3A). *Wing.* Tinged with brown rather than hyaline. Stigma and subcostal cell significantly infuscated. Base of M_1 and M_2 separated, M_1 1.2-1.3 times as long as M_2 ; M_3 lacking (Fig. 4A). Squama brown. Halter yellowish brown, including base and stem. *Abdomen.* Dark brown and matt, but side of abdomen somewhat glossy. Lateral margin of terga mixed with prominently long pale yellow and black hairs; middle of dorsum with short black hairs very sparsely; proximal part of tergite 1 and tergites 5-6 covered with very short yellowish brown to black hairs, respectively. Venter fuscus but anterior and lateral margin of sternite 1 slightly tinged with yellowish brown; sterna wholly covered with recumbent yellowish brown hairs densely; sternite 1 with considerably long hairs. Epandrium broad, anterior margin triangular-shaped, posterior margin even; surstylus invisible; cercus parallel-sided and straight; proctiger equilateral triangular-shaped (Fig. 4C). Gonocoxite wider than length; median projection on gonocoxite well-developed, bilobate with deep incision; gonostylus clearly curved inward, tapering apically (Fig. 4D). Aedeagus complex comparatively stout, tripartite; lateral lobe fairly divergent outward, apex straight and pointed, somewhat longer than median lobe; median lobe dilated proximally, slender and curved distally rather than straight (Fig. 4E, F).

Female: Similar to males, except for the following characteristics: Body length (excluding antennae): 5.0–5.8 mm; Wing length: 4.0–5.0 mm. *Head.* Compound eye dichoptic, hairs relatively shorter and fewer than in males. Frons, face, vertex and occiput with short recumbent pale to pale yellow hairs moderately. Ocellar tubercle with slightly long suberect pale hairs. Pale pruinosity distinctly present along postocular areas to lower margin of eye. Frons wider than in males, relatively parallel-sided. Compound eye 1.1-1.2 times as long as width of lower frons immediately above antennal socket; 1.1-1.2 times as long as width of face immediately below antennal socket; 1.1-1.4 times as long as width of vertex. Antenna mostly tinged orange brown, flagellomeres 6-8 dark brown to black. Flagellum 1.7-2.0 times as long as scape and pedicel combined; terminal flagellomere more pointed apically. Relative length of scape, pedicel and flagellum 20 (19-21), 21 (20-22), and 76 (72-80), respectively (Fig. 3D). *Thorax.* Hairs on side of scutum shorter than in males. *Leg.* All coxae completely pale to pale yellow. Hind tarsomere 1 less swollen than in males, width of central part

subequal with apex of hind tibia. Relative ratio of each hind leg segment (coxa: trochanter: femur: tibia: tarsomere 1: tarsomeres 2-5 including claw): 29 (25-33): 10 (9-12): 106 (97-114): 86 (80-92): 54 (49-58): 41 (38-44) (Fig. 3B). *Wing*. Tinged pale yellow rather than brown. Infuscated spots on stigma and subcostal cell evanescent, nearly same as general color of wing. Base of M_1 and M_2 sometimes convergent (variation type) (Fig. 4B). Squama pale yellow. *Abdomen*. Yellow to yellowish brown and generally glossy. Hairs on lateral margin of terga shorter than in males, pale yellow to yellow; dorsum with recumbent pale hairs densely. Posterior margin of tergites 2-6 with conspicuous, transverse black stripes; middle of tergites 2-6 tinged with brown. Venter normally pale yellow, but middle part of sternites 2-5 sometimes dark brown; sterna wholly covered with recumbent pale yellow hairs densely (Fig. 3E).

Diagnosis

(Based on males) Thoracic hairs yellow, densely covered on scutum; hind coxa tinged with dark brown except apex; median projection on gonocoxite short and thick with deep emargination, height of one of the bilobate lobes nearly 4 times as long as wide; aedeagus tripartite, lateral lobes slightly longer than median lobe with apex pointed, median lobe dilated basally and divergent apically.

Etymology

The specific epithet is derived from the Latin, “tigris (= tiger),” corresponding to their yellowish-brown abdomen and black stripes on posterior margin of tergites 2–6 in females.

Distribution

Korea (new record: Central).

Taxon discussion

The females of this new species show some intraspecific variation on their wing venation, color of antennal segments and presence of black stripes on abdomen. M_1 and M_2 generally well-separated proximally, but sometimes these veins touch together in some individuals. Additionally, ground color of antenna, except apical flagellomeres, tinged orange-brown. However, the following variations occasionally noted in some individuals: scape and pedicel tinged velvety-brown and yellowish brown, respectively; extreme base of scape dark brown to black; flagellomere 6 orange brown, not darkened like flagellomeres 7-8. Tergites 2-6 and sternites 2-5 usually brown to dark brown, but sometimes these tinges are faint, absent or fully yellowish brown.

Notes

B. tigris sp. nov. shows close affinity with *Beris liaoningana* Cui, Li and Yang, 2010 from China but is distinguished from the latter by the combination of the following

characteristics in males: thoracic hairs significantly yellow; lateral lobe slightly longer than median lobe, acute tip of lateral lobe more developed than in *B. liaoningana*, median lobe dilated proximally and divergent apically. While in *B. liaoningana*, thoracic hairs pale; lateral lobe shorter than median lobe, acute tip of lateral smaller than in *B. tigris* sp. nov., median lobe uniformly straight (Cui et al. 2010). Moreover, this new species fairly aligned with *B. hildebrandtae* Pleske, 1930 and *B. angustifacies* Nagatomi and Tanaka, 1972 from Russia and Japan, respectively. However, it can be easily distinguished from the latter two species by the combination of the following characteristics in males: hind coxa, except extreme apex, dark brown; median projection relatively short and thick, height of one of the bilobate lobes nearly four times as long as wide; gonocoxite without lateral concave margin; aedeagus structure tripartite, lateral lobe conspicuously curved outward and acute tip present. Furthermore, the females of *B. tigris* sp. nov. is easily differentiated from *B. hildebrandtae* by ground color of antennal and leg segment: scape, pedicel and flagellum except flagellomeres 6-8 normally tinged orange brown; fore and mid coxae including base wholly pale to pale yellow (Nagatomi and Tanaka 1972, Nartshuk and Rozkosný 1975).

Identification keys

Key to the Korean <i>Beris</i> species (based on males)		
1	Hind femur and tibia mixed with yellow and black (bicolored); anterior margin of epandrium with semicircular-shaped emargination; epandrium with surstylus	2
–	Hind femur and tibia completely yellow (unicolored); anterior margin of epandrium with triangular-shaped emargination; epandrium without surstylus	<i>B. tigris</i> sp. nov.
2	Surstylus extremely curved inward; gonostylus strongly bent; aedeagus thick and bifurcate; lateral lobes strikingly curved outward apically	<i>B. hirotui</i>
–	Surstylus curved smoothly inward; gonostylus thick and partially rounded distally; aedeagus slender and tripartite; lateral lobes slightly curved outward apically	<i>B. fuscipes</i>

Discussion

Prior to this study, altogether 3 species of the subfamily Beridinae had been recorded in Korean fauna. In the course of the present research on the stratiomyid flies of Korea, the genus *Beris* Latreille is recorded for the first time in Korea, based on two unrecorded species, *B. fuscipes* Meigen and *B. hirotui* Ôuchi, and one new species, *B. tigris* Lee and Suh, **sp. nov.** Keys, descriptions, diagnosis and external illustrations of all taxa of genus *Beris* from Korea are provided herein. The new species, *B. tigris* Lee and Suh, **sp. nov.** is

readily distinguishable from other related species of the genus *Beris* by the combination of following morphological characters of males: 1) the scutum densely clothed with yellow thoracic hairs; 2) hind coxa except apex tinged with dark brown; 3) median projection on gonocoxite short and thick with deep emargination, height of one of the bilobate lobes nearly 4 times as long as wide; 4) aedeagus tripartite, lateral lobes slightly longer than median lobe with apex pointed, median lobe dilated basally and divergent apically.

References

- Bigot JMF (1887) Diptères nouveaux ou peu connus. 31^e partie. XXXIX. Descriptions de nouvelles espèces de Stratiomyidi et de Conopsidi. Annales de la Société Entomologique de France. 6^e Série 7 (1): 20-46.
- Cresson ET (1919) Dipterological notes and descriptions. Proceedings of the Academy of Natural Sciences of Philadelphia 71: 171-194.
- Cui WN, Li Z, Yang D (2010) Five new species of *Beris* (Diptera: Stratiomyidae) from China. Entomotaxonomia 32: 277-283.
- Cumming JM, Wood DM (2017) Adult morphology and terminology. In: Kirk-Spriggs AH, Sinclair BJ (Eds) Manual of Afrotropical Diptera. Vol. 1. Introductory chapters and keys to Diptera families. South African National Biodiversity Institute, Pretoria, 89-133 pp.
- Enderlein G (1921) Über die phyletisch älteren Stratiomyiidensubfamilien (Xylophaginae, Chiromyzinae, Solvinae, Beridinae, und Coenomyiinae). Mitteilungen aus dem Zoologischen Museum in Berlin 10 (1): 151-214.
- Forster JR (1771) Novae species insectorum. Centuria I. Davies & White, London, 100 pp.
- Frey R (1961) Orientalische Stratiomyiden der Subfamilien Beridinae und Metoponiinae (Dipt.). Notulae Entomologicae 40 (3): 73-85.
- Latreille PA (1802) Histoire naturelle, generale et particuliere, des crustaces et des insects. Ouvrage faisant suite a l'histoire naturelle generale et particuliere, compose de Leclerc de Buffon, et redigee par C. S. Sonnini, member de plusieurs societies savantes. Familles naturelles des genres, Tome troisieme. Dufart, Paris, 467 pp.
- Lee J, Suh SJ (2020) Taxonomic revision of the subfamily Stratiomyinae (Diptera: Stratiomyidae) from Korea. Journal of Asia-Pacific Biodiversity 13 (4): 559-576. <https://doi.org/10.1016/j.japb.2020.07.007>
- Lioy P (1864) I ditteri distribuiti secondo un nuovo metodo di classificazione naturale. Atti dell'i R. Istituto Veneto di Scienze, Lettere ed Arte, Serie Terza 9: 569-604.
- Li Z, Luo CM, Yang D (2009) Two species of *Beris* Latreille (Diptera: Stratiomyidae) from Hubei. Entomotaxonomia 31 (2): 129-131.
- Meigen JW (1803) Versuch einer neuen Gattungs Eintheilung der europaischen zweiflugligen Insekten. Magazin der Insektenkunde 2: 259-281.
- Meigen JW (1820) Systematische Beschreibung der bekannten Europaischen zweiflügeligen Insekten. Bei Friedrich Wilhelm Forstmann, Aachen, 363 pp.
- Nagatomi A, Tanaka A (1972) The Japanese *Beris* (Diptera, Stratiomyidae). Memoirs of the Faculty of Agriculture, Kagoshima University 8 (2): 87-113.
- Nartshuk EP, Rozkosný R (1975) New distributional data on Palearctic Beridinae with redescription of some little known species (Diptera, Stratiomyidae). Scripta Facultatis Scientiarum Naturalium Universitatis Purkynianae Brunensis, Biologia 5 (2): 81-90.

- Ôuchi Y (1943) Contributions ad Congnitionem Insectorum Asiae Orientalis 13. Notes on some dipterous insects from Japan and Manchoukuo. Shanghai Sizenkagaku Kenkyûsyô Ihô 13 (6): 483-492. [In Japanese].
- Pleske T (1926) Études sur les Stratiomyidae de la région paléarctique (Dipt.). Revue des espèces paléarctiques des sousfamilles Sarginae et Berinae. Eos 2 (4): 385-420.
- Rozkosný R (1973) The Stratiomyioidea (Diptera) of Fennoscandia and Denmark. Vol. 1. Fanua Entomologica Scandinavia. Scandinavian Science Press, Gadstrup, 151 pp.
- Rozkosný R (1982) A biosystematics study of the European Stratiomyidae (Ditera). Vol. I. Introduction, Beridinae, Sarginae and Stratiomyinae. Dr. W. Junk, The Hague, 401 pp.
- Rozkosný R, Nartshuk EP (1988) Family Stratiomyidae. In: Soos A, Papp L (Eds) Catalogue of Palaearctic Diptera. Vol. 5. Athericidae – Asilidae. Akadémiai kiado, Budapest, 42-96 pp.
- Rozkosný R (1998) Family Stratiomyidae. In: Papp L, Darvas B (Eds) Contributions to a Manual of Palaearctic Diptera. Vol. 2. Science Herald, Budapest, 387-411 pp.
- Son Y, Suh SJ (2020) Taxonomic review of the genus *Pherbellia* Robineau-Desvoidy (Diptera: Sciomyzidae) from Korea. Journal of Asia-Pacific Biodiversity 13 (4): 577-582. <https://doi.org/10.1016/j.japb.2020.09.003>
- Walker F (1848) List of the specimens of dipterous insects in the collection of the British Museum. Part I. British Museum, London, 229 pp.
- Woodley NE (1995) The genera of Beridinae (Diptera: Stratiomyidae). Memoirs of the Entomological Society of Washington 16: 1-231.
- Woodley NE (2001) A world catalog of Stratiomyidae (Insecta: Diptera). Backhuys Publishers, Leiden, 475 pp.
- Yang D, Nagatomi A (1992) A study on the Chinese Beridinae (Diptera: Stratiomyidae). South Pacific Study 12 (2): 129-177.
- Yang D, Zhang TT, Li Z (2014) Stratiomyoidea of China. China Agricultural University Press, Beijing, 870 pp. [In Chinese].

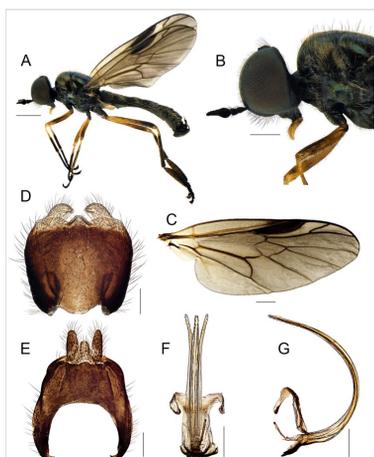


Figure 1.

Beris fuscipes Meigen, 1820: **A.** Male habitus, lateral view; **B.** Male head, lateral view; **C.** Male wing; **D.** Genital capsule, dorsal view; **E.** Epandrium, cerci and proctiger, dorsal view; **F.** Aedeagus, dorsal view; **G.** Ditto, lateral view. Scale bars: A = 1.0 mm; B, C = 0.5 mm; D–G = 0.1 mm.

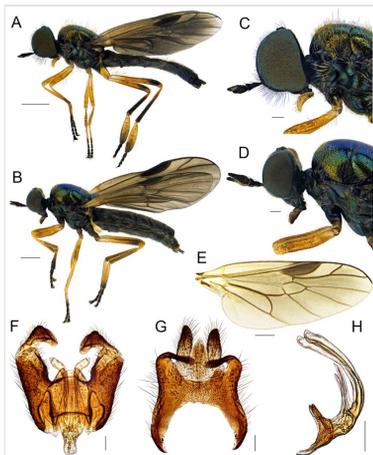


Figure 2.

Beris hirotoi Ôuchi, 1943: **A** Male habitus, lateral view **B** Female habitus, lateral view **C** Male head, lateral view **D** Female head, lateral view **E** Male wing **F** Genital capsule, dorsal view **G** Epandrium, cerci and proctiger, dorsal view **H** Aedeagus, lateral view. Scale bars: A, B = 1.0 mm; C, D = 0.2 mm; E = 0.5 mm; F–H = 0.1 mm.

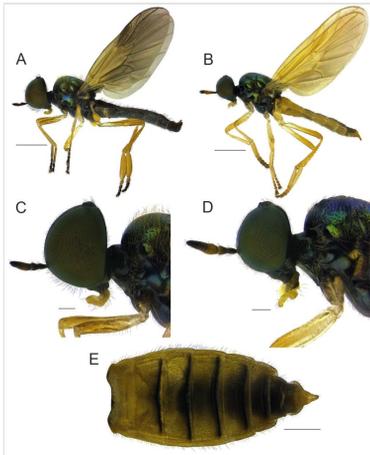


Figure 3.

Beris tigris sp. nov., external morphology: **A** Male habitus, lateral view **B** Female habitus, lateral view **C** Male head, lateral view **D** Female head, lateral view **E** Female abdomen, dorsal view. Scale bars: A, B = 1.0 mm; C, D = 0.2 mm; E = 0.5 mm.

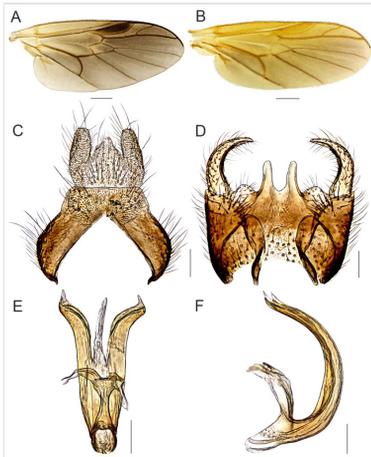


Figure 4.

Beris tigris sp. nov., wing and male genital structure: **A** Male wing **B** Female wing **C** Epandrium, cerci and proctiger, dorsal view **D** Genital capsule, dorsal view **E** Aedeagus, dorsal view **F** Ditto, lateral view. Scale bars: A, B = 0.5 mm; C–F = 0.1 mm.