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New records of Mycetophilidae (Diptera: Bibionomorpha) from Ulleung Island in South Korea

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Ulleung Island, characterized by its distinctive geological traits, has a unique array of fauna and flora. Although numerous studies have been conducted on insect fauna of this island. Mycetophilidae has never been investigated. Therefore, we conducted field investigations at three sampling locations on Ulleung Island from 2022 to 2024, utilizing sweeping and Malaise traps. As a result, we document seven species across six genera, including two previously recorded species (*Boletina nitida* and *Monoclona laosilvatica*) and five new country records (*Allodia fuliginosa*, *Allodia laccariae*, *Clastobasis serrulate*, *Mycomya tridens*, and *Mycetophila assimilis*) from Ulleung Island. Diagnosis, photographs of morphological characters, and habitat information are provided.

Keywords: checklist, fungus gnats, Korean fauna, taxonomy, volcanic island

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Introduction

Ulleung Island is a volcanic island of South Korea, situated in the East Sea (N 37°28′53.48″, E 130°54′34.91″). Spanning an area of 72.857 km^2, it is located 130.3 km from the Korean Peninsula at its closest point through Uljin, Gyeongsangbuk-do (Lim and Lee, 2012). The island hosts a unique ecosystem influenced by an oceanic climate, a result of its geological detachment from the mainland. Numerous studies have focused on the faunistic diversity of insects in Ulleung Island. The family Mycetophilidae represents one of the largest groups within the infraorder Bibionomorpha in Diptera, encompassing eight subfamilies, 230 genera, and nearly 4,500 species that have been described globally (Kaspřák *et al*., 2019). They have a mycophagous larval stage, and adults act as pollinators in nature. The adults are typically found in moist environments, such as under tree roots and on rocks covered in mosses near aquatic systems. Despite their great diversity, Mycetophilidae had not previously been documented in Ulleung Island, even though its insect fauna includes 18 orders, 179 families, and a total of 1,177 species (Cho, 1929; Kim *et al*., 1971; Lee and Kwon, 1981; Kwon *et al*., 1996; Lee and Jung, 2001; Lim *et al*., 2013). Thus, this study aims to document the fauna of Mycetophilidae species in Ulleung Island for the first time. In this research, six genera and seven species of Mycetophilidae were identified, including five newly recorded species. Further investigations on this island are necessary to fully understand the fauna of Mycetophilidae in this unique volcanic island.

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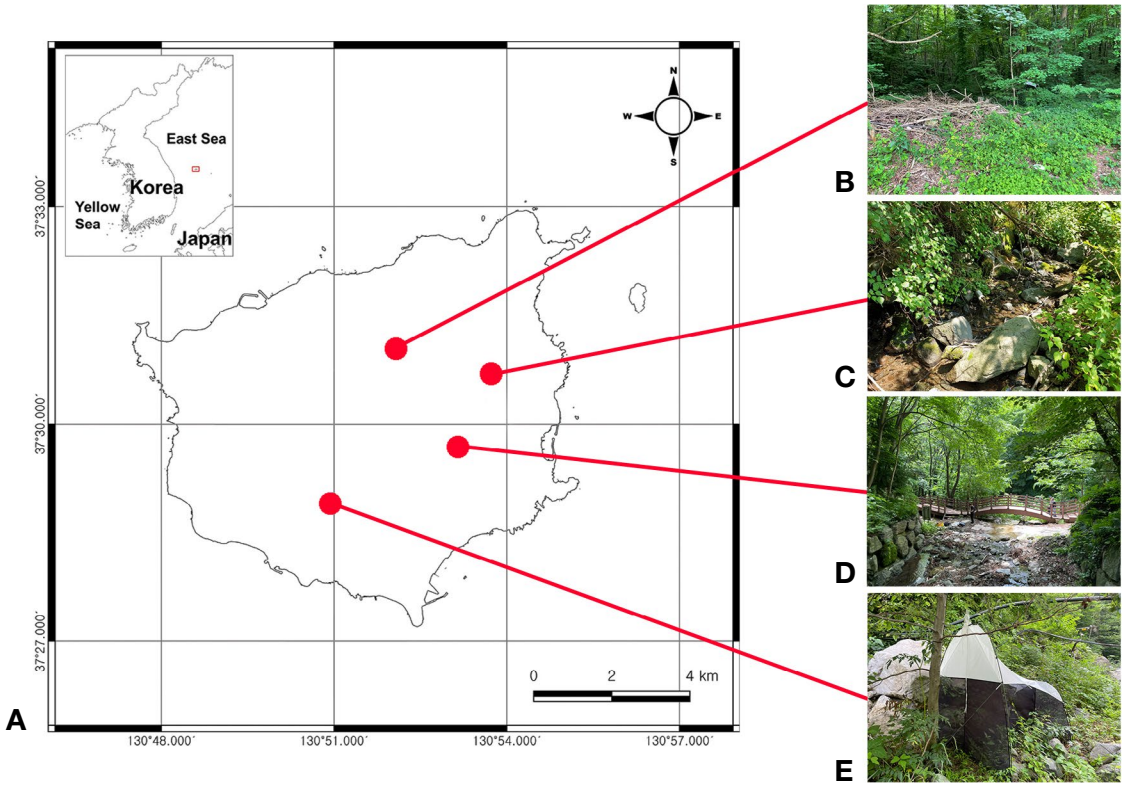


Fig. 1. The map of sampling sites and its habitat in Ulleung Island. A: Map, B: Nari Basin, C: Naesujeoncheon Stream, D: Bongrae waterfall, E: Namyangcheon stream.

Materials and Methods

Adult fungus gnats were collected from four sampling locations, primarily well-preserved forests, using sweeping nets and Malaise traps from May to September (spring to autumn) 2024 (Fig. 1). Additional specimens collected in 2022, which are deposited in the Korea University Entomological Museum (KUEM), were also used. All specimens were preserved in 80% ethanol. Male genitalia were dissected and placed overnight in 10% KOH to clear and remove tissues. Subsequently, genitalia were mounted on slide glass with Hoyer's solution and examined under a dissecting microscope (Olympus SZX7, Japan). Photographs of the specimens were taken with a digital camera (Nikon Z7 with NIKKOR 105 mm macrolens, Japan). All specimens examined in this study were deposited in KUEM.

The terminology of adult morphological features generally follows Kirk-Spriggs and Sinclair (2017a; 2017b), and Zaitzev (1994; 2003). The distribution of each species is provided according to Bechev (2000).

Taxonomic Accounts

Order Diptera Linnaeus, 1758 파리목
Infraorder Bibionomorpha Hennig, 1954 털파리하목
Superfamily Sciaroidea Billberg, 1820 버섯파리상과
Family Mycetophilidae Newman, 1834 버섯파리과
Genus *Allodia* Winnertz, 1863 등줄버섯파리속 (신칭)

1. *Allodia fuliginosa* Wu, Zheng & Xu, 2003 (Fig. 2A)
노란등줄버섯파리 (신칭)
Allodia fuliginosa Wu, Zheng & Xu, 2003: 349.

Material examined. 2♂ (No. NIBRIN0001073532, No. KUEM DIP 200012 preserved in 80% ethanol), Bongrae waterfall, Dodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsang-buk-do, South Korea, 37°29′51.11″N 130°53′12.53″E, 27−31.V.2024, malaise trap, Coll. C Lim, SH Park, W Kim.
Diagnosis. Mesoscutum yellowish brown without discal bristles; Sc ends on R, apical part of R_5 almost straight, r-m 0.8−1.0 times as long as m-stalk. Tergites 2−4 lighter markings at anterior angles. Gonostylus complex; dorsal branch flat; medial branch with small black collar-like setae; ventral branch curved and sharp.
Distribution. South Korea (new record), China.

2. *Allodia laccariae* Sasakawa & Ishizaki, 2003 (Fig. 2B)
등줄버섯파리 (신칭)
Allodia laccariae Sasakawa & Ishizaki, 2003: 104.

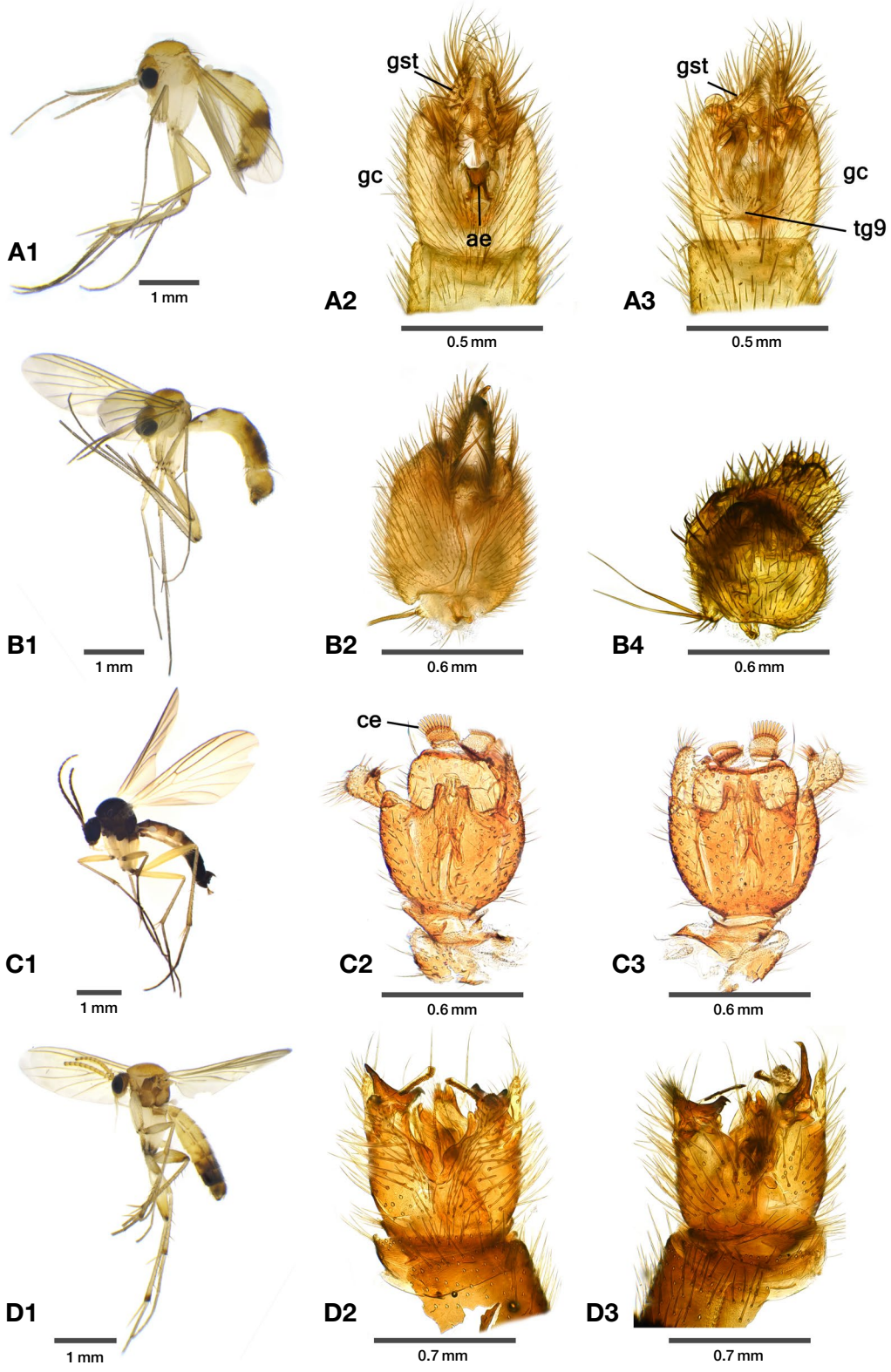


Fig. 2. Male habitus and terminalia. 1: habitus, 2: terminalia ventral view, 3: terminalia dorsal view. 4: terminalia lateral view. A: *Allodia fuliginosa*, Wu, Zheng & Xu, 2003, B: *Allodia laccariae* Sasakawa & Ishizaki, 2003, C: *Boletina nitida* Grzegorzek, 1885, D: *Clastobasis serrulata* Sasakawa, 2005. Abbreviations: ae, aedeagus; ce, cercus; gc, gonocoxite; gst, gonostylus; tg9, tergites9.

Material examined. 1♂ (No. NIBRIN0001073531, preserved in 80% ethanol), Naesujeoncheon Stream, Jeodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′41.6″N 130°54′00.9″E, 05.VII.2022, sweeping, Coll. J Kim, W Lee. 1♂ (No. KUEM DIP 200013, preserved in 80% ethanol), Bongrae waterfall, Dodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°29′51.11″N 130°53′12.53″E, 24.V−10.IX.2024, Malaise trap, Coll. C Lim, SH Park, W Kim.
Diagnosis. Mesoscutum supra-alar and post-alar bristles long; Sc very short, R_1 as long as R, r-m as long as M fork, with two to four microtrichia on distal part, base of cubital fork usually before that of M fork. Tergite 9 very small, with two long apical bristle. Gonocoxites slightly united with each other on ventral side; gonostylus with dorsal and ventral stylomeres.
Distribution. South Korea (new record), Japan.

Genus *Boletina* Staeger, 1840 꼬리버섯파리속

3. *Boletina nitida* Grzegorzek, 1885 (Fig. 2C)
밝은꼬리버섯파리
Boletina nitida Grzegorzek, 1885: 204.

Material examined. 3♂ (No. KUEM DIP 200014−200016, preserved in 80% ethanol), Namyangcheon stream, Namyang-gil, Seo-myeon, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°28′50.1″N 130°51′11.6″E, 24.VI−10.IX.2024, Sweeping, Coll. J Lee, S Mok, SH Park.
Diagnosis. Mediotergite black and bare; laterotergite with three long setae; C extending beyond R_5, Sc complete and reaching C, R_1 longer than r-m at less four times, M_1 and M_2 forked at Rs; legs entirely yellow with black setae. Tergites 2−4 brown and yellow, 5−8 black, 9 with two cerci; cerci with long pectinate seta. Gonocoxites wider than tergite 9; gonostylus club shape with setose; inner side and three strong setae.
Distribution. Czech Republic, Georgia, Hungary, South Korea, United Kingdom.
Remarks. This species was first reported by Lee and Bae in 2022.

Genus *Clastobasis* Skuse, 1890 숲버섯파리속(신칭)

4. *Clastobasis serrulata* Sasakawa, 2005 (Fig. 2D)
노란숲버섯파리(신칭)
Clastobasis serrulata Sasakawa, 2005: 279.

Material examined. 1♂ (No. NIBRIN0001073530, preserved in 80% ethanol), Naesujeoncheon Stream, Jeodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′41.6″N 130°54′00.9″E, 04.VII.2022, Sweeping, Coll. J Kim, W Lee.
Diagnosis. Mesoscutum shiny except for whitish pollinose lateral margin and yellowish humeral area, and posterolateral corner; Sc ending on C, R_1 almost as long as r-m, M-petiole as long as or slightly shorter than r-m, CuA_1 not connected to CuA_2 at base. Tergites 2 brown posterior section on 1/3 poin. Gonocoxite well-projected posteriorly ventral lobe.
Distribution. South Korea (new record), Japan.

Genus *Monoclona* Mik, 1886 민날개버섯파리속

5. *Monoclona laosilvatica* Ševčík, 2001 (Fig. 3A)
굵은엄지버섯파리
Monoclona laosilvatica Ševčík, 2001: 158.

Material examined. 2♂ (No. KUEM DIP 200017−200018, preserved in 80% ethanol), Naesujeoncheon Stream, Jeodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′41.6″N 130°54′00.9″E, 04.VII.2022, Sweeping, Coll. J Kim, W Lee. 1♂ (No. KUEM DIP 200019, preserved in 80% ethanol), Namyangcheon Stream, Namyang-gil, Seo-myeon, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°28′50.1″N 130°51′11.6″E, 24.VI−10.IX.2024, Sweeping, Coll. J Lee, S Mok, SH Park.
Diagnosis. Mesonotum yellow, densely covered with short darker setae and with three indistinct brownish longitudinal stripes; M_1+M_2 half length of r-m. Abdomen dark brown and yellow; tergites 3−5 with broad dark brown bands, not reaching to anterior, posterior and lateral margins of tergites; all tergites covered with dark setae. Gonostylus narrow, shorter than gonocoxites, internal processus of a gonostylus simple, almost straight, bearing two setae, subapical one being longer and more distinct, and a dark apical tooth.
Distribution. Laos, South Korea.
Remarks. This species was first reported by Lee and Bae in 2023.

Genus *Mycomya* Rondani, 1856 가시버섯파리속

6. *Mycomya tridens* Lundstrom, 1911 (Fig. 3B)
낫발꼬리버섯파리(신칭)
Mycomya tridens Lundstrom, 1911: 394.

Material examined. 1♂ (No. NIBRIN0001073529, preserved in 80% ethanol), Nari Basin, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′59.2″N 130°52′09.4″E, 26.V.2024, Sweeping, Coll. C Lim, SH Park, W Kim. 1♂ (No. KUEM DIP 200020, preserved in 80% ethanol), Bongrae waterfall, Dodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°29′51.11″N 130°53′12.53″E, 24.V−10.IX.2024, Malaise trap, Coll. C Lim, SH Park, W Kim.
Diagnosis. Antenna with yellow pale scape and pedicel;

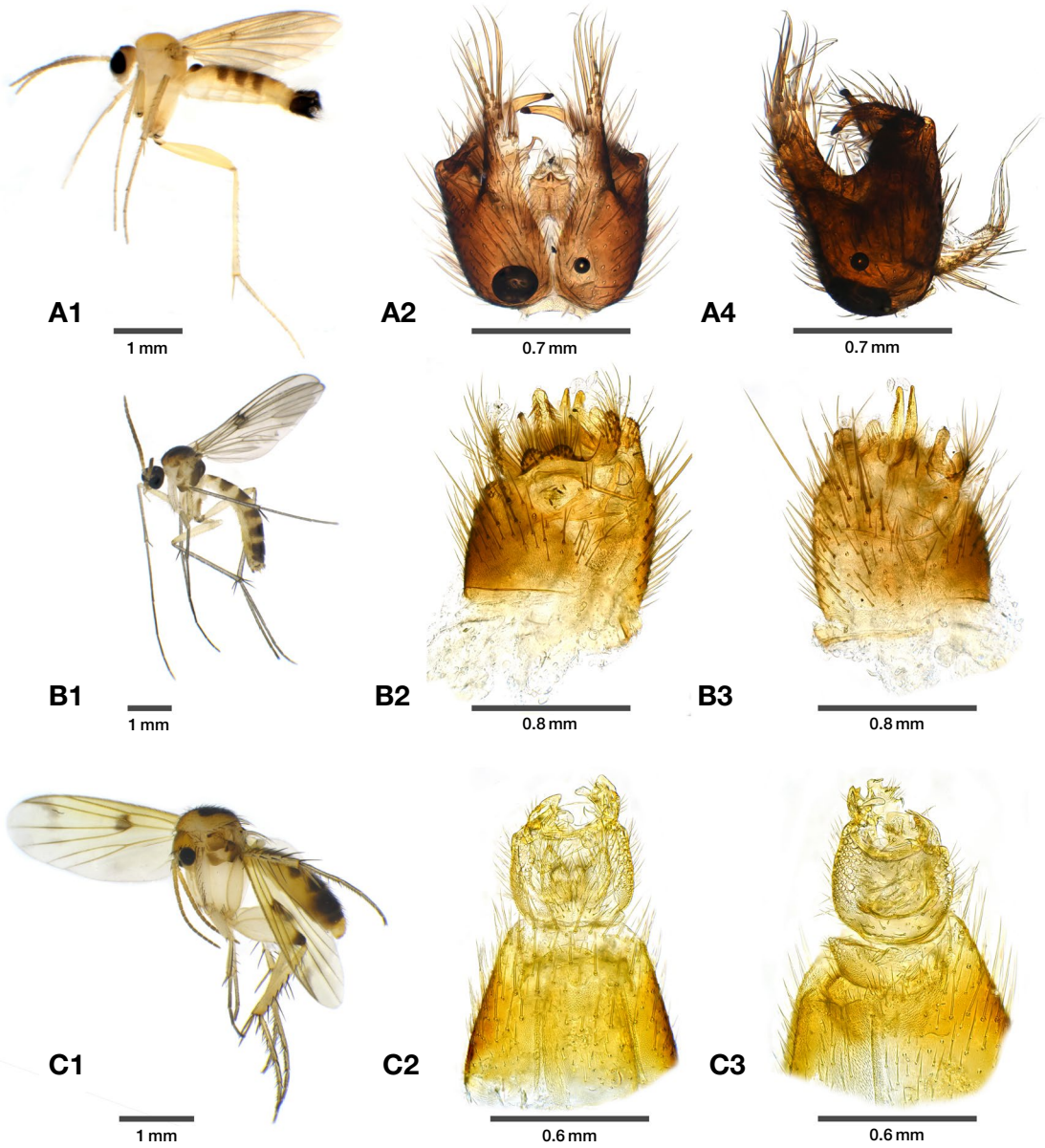


Fig. 3. Male habitus and terminalia. 1: habitus, 2: terminalia ventral view, 3: terminalia dorsal view. 4: terminalia lateral view. A: *Monoclona laosilvatica* Sevcik, 2001, B: *Mycomya tridens* Lundstrom, 1911, C: *Mycetophila assimilis* Matile, 1967.

flagellomeres brown. Sc ending on C, Sc_2 ending on R_1 distally to between Rs and R_4, Cu fork below M fork; legs uniformly yellow. Abdomen yellow with brown patterns.
Distribution. South Korea (new record), Austria, France, Georgia, Germany, Hungary, Poland.

Genus *Mycetophila* Meigen, 1803
물가버섯파리속(신칭)

7. *Mycetophila assimilis* Matile, 1967 (Fig. 3C)
여섯점버섯파리(신칭)
Mycetophila assimilis Matile, 1967: 212.

Material examined. 1♂ (No. NIBRIN0001073533, preserved in 80% ethanol), Naesujeoncheon Stream, Jeodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′41.6″N 130°54′00.9″E, 04.VII.2022, Sweeping, Coll. J Kim, W Lee. 2♂ (No. KUEM DIP 200021–200022, preserved in 80% ethanol), Bongrae waterfall, Dodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°29′51.11″N 130°53′12.53″E, 27.V.2024, Sweeping, Coll. C Lim, SH Park, W Kim. 1♂ (No. KUEM DIP 200023, preserved in 80% ethanol), Nari Basin, Bukmyeon, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°30′59.2″N 130°52′09.4″E, 28.V.2024, Sweeping, Coll.

C Lim, SH Park, W Kim. 1♂ (No. KUEM DIP 200024, preserved in 80% ethanol), Bongrae waterfall, Dodong-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, South Korea, 37°29′51.11″N 130°53′12.53″E, 25.VI.2024, Sweeping, Coll. C Lim, SH Park.

Diagnosis. Mesonotum with three dark longitudinal stripes, middle stripe more distinct than lateral stripes; R located before Rs with 11 setulae below. Tergites 1 yellow, tergites 2–4 yellow with dark brown bands.

Distribution. South Korea (new record), France, Germany, Russia.

Conflicts of Interest

The authors of this paper have no affiliation with any interests and are solely responsible for the paper.

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