

**BOLITOPHILIDAE (DIPTERA) FROM TAIWAN:  
A FAMILY NEW TO THE ORIENTAL REGION**

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Two new species of Bolitophilidae, *Bolitophila (B.) antennata* sp. n. and *Bolitophila (Cliopisa) taihybrida* sp. n., are described from Taiwan. *Bolitophila (B.) japonica* (OKADA, 1934), previously known only from Japan, is recorded from Taiwan and redescribed. The family Bolitophilidae is for the first time recorded from the Oriental region.

Key words: Bolitophilidae, Sciaroidea, *Bolitophila*, fungus gnats, new species, taxonomy, zoogeography, Taiwan, Oriental region

**INTRODUCTION**

The family Bolitophilidae (Diptera: Sciaroidea) comprises only one genus *Bolitophila* MEIGEN, 1818, with about 40 Palearctic and some 20 described Nearctic species (PLASSMANN 1988, VOCKEROTH 1981, BECHEV 2000). The family has so far been known only from the Holarctic region.

The genus is divided into two subgenera, *Bolitophila* s. str. with vein  $R_4$  ending in costal vein, and *Cliopisa* ENDERLEIN, 1936, with  $R_4$  ending in  $R_1$ . The former subgenus contains 13 Palearctic species, the latter about twice this number.

In this paper, two new species of *Bolitophila* are described and one species, previously known from Japan, is recorded as new for Taiwan and redescribed. All these species were collected quite recently in mountainous areas of Taiwan and represent the first record of the family Bolitophilidae from the Oriental region.

**MATERIAL AND METHODS**

The morphological terminology used here principally follows SØLI *et al.* (2000). The type material is deposited in the Hungarian Natural History Museum, Budapest (HNHM) and in the Hokkaido University, Sapporo, Japan (HUSJ). Holotypes of the new species are dried and pinned, their terminalia have been cleared in KOH and placed in glycerol in a microvial below the specimen. The measurements of *Bolitophila japonica* have been taken from the paratype specimen, which is whole macerated and placed in a microvial filled with glycerol.

## SYSTEMATIC PART

***Bolitophila (Bolitophila) antennata* sp. n.**

(Figs 1, 5–6)

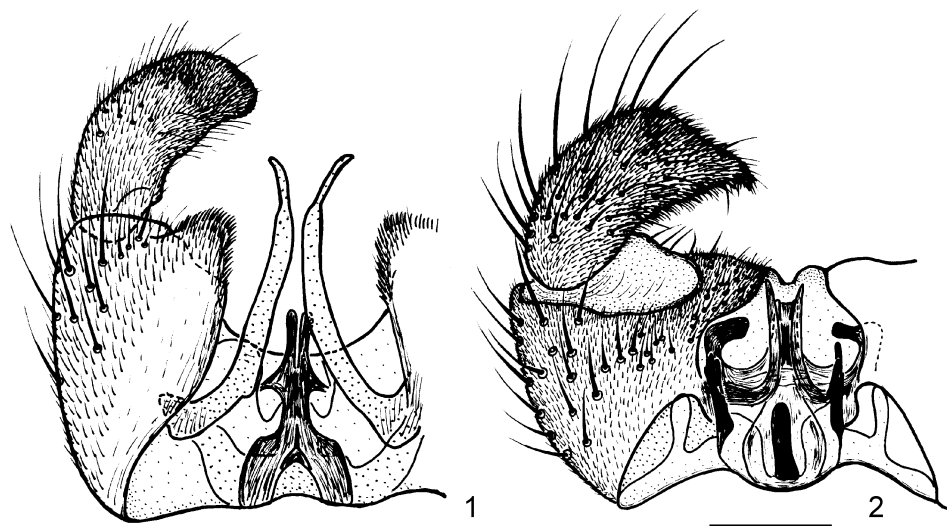
Holotype, male (HNHM): Taiwan: Taichung Hsien, Anmashan Mts, 2090–2550 m, April 5–6, 2003, leg. M. Földvári, L. Papp, Ch.-M. Fu & H.-R. Tzuoo, No. 23, UV light traps.

*Diagnostic characters.* Vein  $R_4$  ending in  $R_1$ . Posterior fork separated from the vein above by a distinct crossvein. Anterior vein of posterior fork basally thin, but distinct. Stigma dark grey. No dark central spot on wing. Hairs on antennae remarkably long, about five times as long as the diameter of flagellomere. Parameres very long. Dark line between cerci.

*Male.* Body length 5.9 mm. General coloration brownish grey, legs yellowish brown, coxae yellow.

Head dark brown. Antennae with remarkably long hairs, about five times as long as the diameter of flagellomere (Fig. 6). Scape and pedicel brownish yellow, about as long as wide, setose. Base of first flagellomere yellowish brown. Mouthparts and palpi brownish yellow.

Thorax about as long as high. Mesonotum dark brown, with two thin lighter longitudinal stripes and humeral areas yellowish. Scutellum brown, posterior margin yellow, with several short apical setae. Lateral sclerites and mediotergite bare. Halteres as long as thorax, brown, the stalk basally lighter.



**Figs 1–2.** *Bolitophila* spp., males, dorsal view of terminalia (tergite 9 and cerci removed). 1 = *B. antennata* sp. n.; 2 = *B. taihybrida* sp. n. Scale bar: 0.1 mm

Wings (Fig. 5) hyaline, membrane only with microtrichia. Wing length 5.6 mm. Costa slightly produced beyond  $R_5$ . Vein  $R_4$  ending in  $R_1$ . Stigma dark grey. No distinct central spot, at most a faint grey cloud visible. Posterior fork separated from the vein above by a distinct crossvein. Anterior vein of posterior fork in basal fourth faint, but traceable.

Legs yellowish brown, covered with dark trichia and setae. All coxae subequal in length, with several setae laterally. Femora cylindrical, narrow, covered with short black setae. Tibiae densely covered with dark trichia and several irregularly arranged short setae.

Abdomen brownish, all tergites and sternites covered with dark setae.

Terminalia (Fig. 1) brown. Length of terminalia 0.4 mm. Ventral caudal margin of gonocoxites medially with a broad U-shaped depression. Gonostylus apically broadly rounded, without distinct appendages. Parameres remarkably long, hooked (from lateral view), with thin apical part, but rather blunt, not aculeated on apex. Aedeagal complex in the shape of turned-up Y, dark. Cerci narrow, rhomboid, tapered, with a dark longitudinal line between them.

*Female* unknown.

*Biology* unknown.

*Etymology.* The specific name refers to the pubescence of the antennae.

**Discussion.** The new species is characterized by unusually long pubescence on antennae, combined with peculiar terminalia. The long hairs on antennae are typical also for the European species *B. saundersi* (CURTIS, 1836), which has relatively short parameres, and for *B. spinigera* EDWARDS, 1925, with a distinct central spot on wing.

*Bolitophila (Bolitophila) japonica* (OKADA, 1934)  
(Figs 3–4)

*Bolitophilella japonica* OKADA, 1934: 16.

Holotype ♂ (HUSJ): Japan, Hokkaido, Sapporo, 22.10.1933, I. Okada, Type No. 88–1174.  
Paratype ♀ (HUSJ): same data as holotype.

Additional material examined: Japan, Hokkaido, Sapporo, I. Okada: 20.10.1938, 1 ♂, 9.10.1938, 1 ♀; Honshu, 20.4.1938, I. Okada, 1 ♂ (all HUSJ). Taiwan (HNHM): 1 ♂: Nantou Co., Yuanfeng, 2760 m, 24°07'24''N, 121°14'55''E, 2 April 2000, leg. A. Kun & L. Peregovits, at light; 1 ♂: Taichung Hsien, Piluchi, TFRI site, 2200 m, 26–28. December 2001, leg. L. Ronkay & A. Kun; 1 ♂: ibid., Anmashan Mts, UV light traps, 2090–2550 m, April 5–6, 2003, M Földvári, L. Papp, Ch.-M. Fu & H.-R. Tzuoo, No. 23.

**Diagnostic characters.** Vein  $R_4$  ending in  $R_1$ . Posterior fork separated from the vein above by a distinct crossvein. Anterior vein of posterior fork basally very faint. Stigma faint. Pubescence of antennae short, about as long as their diameter. Gonostylus with a large dark mediadorsal L-shaped process.

**Redescription. Male.** Body length 5.1 mm. General coloration brownish grey, legs yellowish brown, coxae yellow.

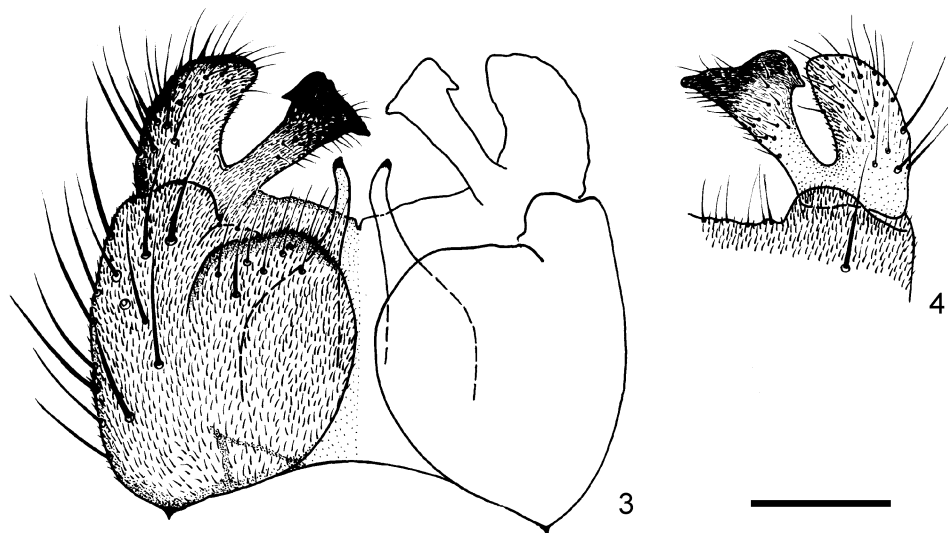
Head dark brown. Three ocelli, almost in one line. Lateral ocelli somewhat larger than the median, and touching eye margin. Length of antenna 4.6 mm, length of flagellum 4.4 mm. Scape and pedicel yellowish, about as long as wide, setose. Flagellum brown, cylindrical, tapering towards apex, densely covered with erect setae, not longer than the diameter of flagellomeres. Base of the first flagellomere (= F1) yellowish. Length of F1 0.4 mm. Ratio of length to width for F2 is 7.5. Relative lengths of flagellomeres 1 to 14: 1:0.8:0.9:0.9:0.9:0.8:0.7:0.7:0.6:0.6:0.5:0.5: 0.4:0.6. Mouthparts and palpi brownish yellow. Palpus with 5 palpomeres, palpomere 1 inconspicuous. Relative lengths of palpomeres 2 to 5: 1:1.6:1.2:2.2.

Thorax about as long as high. Mesonotum brown, with indistinct longitudinal stripes. Scutellum brown, posterior margin yellow, with several apical setae. Lateral sclerites and mediotergite bare, except anepisternum, which bears 5 setae near upper margin. Halteres as long as thorax, yellowish brown, with dark knob.

Wings hyaline, membrane only with microtrichia. Wing length 5.0 mm. Ratio of length to width 3.4. Costa slightly produced beyond  $R_5$ . Vein  $R_4$  ending in  $R_1$ . Stigma faint, grey. No central spot. Posterior fork separated from the vein above by a distinct crossvein. Anterior vein of posterior fork in basal fourth very faint.

Legs yellowish brown, covered with dark trichia and setae. All coxae subequal in length, with several setae laterally. Femora cylindrical, narrow, covered with short black setae, tending to form longitudinal rows. Tibiae densely covered with dark trichia and several irregularly arranged short setae, most numerous on hind tibiae. Relative lengths of coxa, femur (including trochanter), tibia and tarsus for particular legs: 1:3.2:4.5:7.5; 1:3.1:4.6:5.4; 1:4.3:5.6:6.5. Ratio of tibia to the first tarsomere for particular legs: 0.96; 1.38; 1.29. Relative lengths of tarsomeres 1 to 5 are 1:0.3:0.2: 0.1:0.1; 1:0.3:0.2:0.1:0.1; 1:0.2:0.1:0.1:0.1.

Abdomen brownish, all tergites and sternites covered with long dark setae. Length of tergite 1 is 0.45 mm. Relative lengths of tergites 1 to 8 are 1:1.3:1.4:1.4:1.3:1:0.9:0.6.



**Figs 3–4.** *Bolitophila japonica* (OKADA, 1934) male terminalia. 3 = dorsal view of terminalia; 4 = ventral view of gonostylus. Scale bar: 0.1 mm

Terminalia (Figs 3–4) brown. Length of terminalia 0.3 mm. Gonostylus apically rounded, bearing a large dark L-shaped process, almost as long as gonostylus (Fig. 3). Parameres slightly longer than gonocoxites, tapering towards apex, which is black.

*Female* similar to male in most characters.

*Biology.* Type material was reared from the fungus *Hypholoma sublateritium* (SCHAEFF.) QUÉL. (OKADA 1934).

*Discussion.* The male terminalia of this species, especially the peculiar process on gonostylus, are different from all hitherto known species of *Bolitophila*. The short pubescence of antennae and distinct crossvein M-Cu are characters common with the widespread *Bolitophila cinerea* MEIGEN, 1818, which has, however, quite different terminalia with simple gonostyli. The weak basal part of anterior branch of Cu-fork is present also in *Bolitophila miki* (MAYER, 1950), a little known European species. *B. japonica* is for the first time recorded outside the type locality in Japan.

### ***Bolitophila (Cliopisa) taihybrida* sp. n.**

(Figs 2, 7)

Holotype, male (HNHM): Taiwan: Taichung Hsien, Anmashan Mts, 2090–2550 m, April 5–6, 2003, leg. M. Földvári, L. Papp, Ch.-M. Fu & H.-R. Tzuoo, No. 23, UV light traps.

*Diagnostic characters.* Vein  $R_4$  ending in C. Anterior vein of posterior fork basally thin, but distinct. Stigma faint, grey. No conspicuous central spot on wing. Mesonotum yellow, with three dark brown longitudinal stripes. Gonostylus broad, tapered, apically with 2–3 short triangular denses, parameres short.

*Description. Male.* Body length 6.1 mm. General coloration brownish grey, legs yellowish brown, coxae yellow.

Head dark brown. Antennae with short hairs, about as long as the diameter of flagellomere. Scape and pedicel brownish yellow, about as long as wide, setose. Base of the first flagellomere yellowish. Mouthparts and palpi brownish yellow.

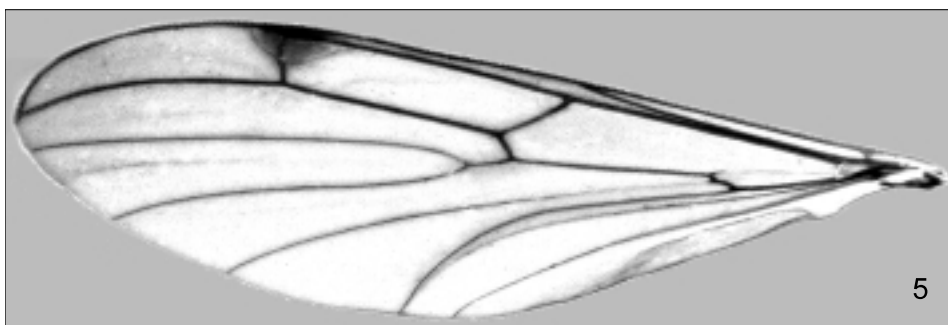
Thorax. Mesonotum yellow, with three sharply marked dark brown longitudinal stripes. Scutellum brownish yellow, with several short apical setae. Lateral sclerites and mediotergite bare, dark brown. Halteres as long as thorax, brown, the stalk basally lighter.

Wings hyaline, membrane only with microtrichia. Wing length 5.0 mm. Costa slightly produced beyond  $R_5$ . Vein  $R_4$  curved (S-shaped), ending in C very close to the end of  $R_1$ . Stigma faint, grey. No conspicuous central spot. Posterior fork separated from the vein above by a distinct crossvein. Anterior vein of posterior fork basally thin, but distinct. Posterior branch of posterior fork normal, not strongly curved at tip.

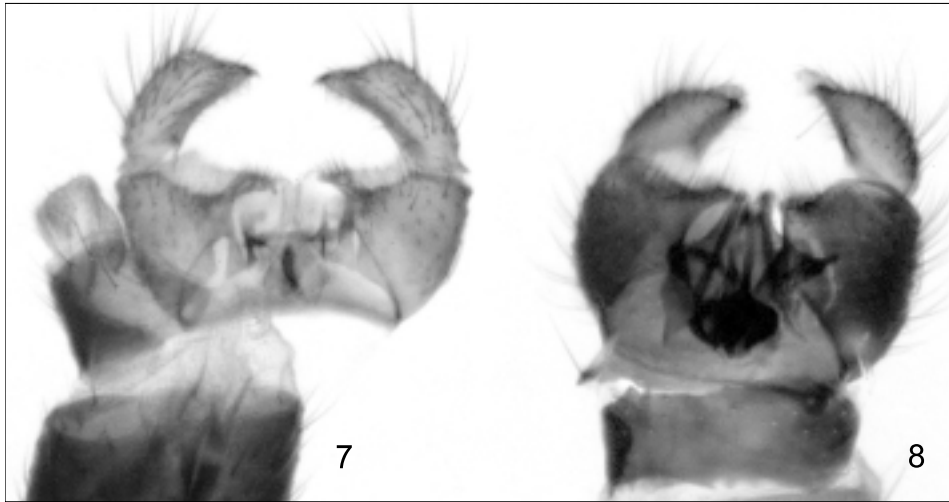
Legs yellowish brown, covered with dark trichia and setae. All coxae subequal in length, with several setae laterally. Femora cylindrical, narrow, covered with short black setae. Tibiae densely covered with dark trichia and several irregularly arranged short setae.

Abdomen dark brown, all tergites and sternites covered with dark setae.

Terminalia (Figs 2, 7) brown. Length of terminalia 0.38 mm. Ventral caudal margin of gonocoxites medially with a small incision. Gonostylus broad, tapered, apically with 2–3 short triangular denses. Aedeagus apically bifid, parameres short. Cerci short, rounded.



**Figs 5–6.** *Bolitophila antennata* sp. n., holotype male. 5 = left wing; 6 = pubescence of antennae



**Figs 7–8.** *Bolitophila* spp., male terminalia in dorsal view. 7 = *B. taihybrida* sp. n., holotype; 8 = *B. hybrida* (MEIGEN, 1804), Czech Republic

*Female unknown.*

*Biology unknown.*

*Etymology.* Derived from *Taiwan* (type locality) and *hybrida* (related species).

*Discussion.* This species belongs to the *B. hybrida* (Meigen) group. The male terminalia are most similar to those of *B. hybrida* (for a comparison see Figs 7 and 8) and of *B. nigrolineata* Landrock, 1912.

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