

New Oriental species of Gnoristinae with pectinate antennae (Diptera: Mycetophilidae)

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Abstract. Two new species of Mycetophilidae (Diptera), tentatively placed in *Dziedzickia* Johannsen, 1909, are described – *D. bifida* sp. nov. (India, Thailand, Malaysia, Indonesia) and *D. pectinata* sp. nov. (Thailand). A brief discussion of the relationships among some genera of Gnoristinae is also presented.

Key words. Diptera, Sciaroidea, *Dziedzickia*, fungus gnats, taxonomy, new species, new records, Oriental Region

Introduction

The subfamily Gnoristinae is one of the least known groups of fungus gnats (Diptera: Mycetophilidae) in the Oriental Region, from the point of view of both species representation and phylogenetic relationships. Its delimitation is based mainly on European taxa (VÄISÄNEN 1986), although this group is well represented but understudied in the tropics.

COLLESS & LIEPA (1973) listed in the Oriental catalogue only 5 species of Gnoristinae belonging to the genera *Boletina* Staeger, 1840 and *Coelosia* Winnertz, 1863. BECHEV (2000) stated 14 species in 5 genera of Gnoristinae from the Oriental Region, including an undescribed female of *Dziedzickia* Johannsen, 1909 reported by MATILE (1992) from Sulawesi. ŠEVČÍK (2010) added one species of *Docosia* Winnertz, 1863 which forms a possible morphological transition between the subfamilies Gnoristinae and Leiinae. ŠEVČÍK & HIPPA (2010) recently summarized the data on Oriental species of Metanepsiinae, a subfamily closely related to the Gnoristinae.

Studying extensive samples of fungus gnats collected within the ‘Thailand Inventory Group for Entomological Research (TIGER)’ project in Thailand and specimens collected by Ignac Sivec in Thailand and Malaysia, we found a rather numerous material of various

species of Gnoristinae. In this paper, two remarkable new species are described. They are tentatively placed in the genus *Dziedzickia* pending a generic revision of the Gnoristinae which is beyond the scope of this paper. In addition to the species described in this paper, we have seen material of at least ten additional undescribed species of *Dziedzickia* s. l. from the Oriental Region but they will be treated elsewhere.

Material and methods

The morphological terminology principally follows that used by SØLI (1997). The material is preserved in the following collections:

| | |
|------|---|
| DBPC | Dimitar Bechev, University of Plovdiv, Bulgaria; |
| JSOC | Jan Ševčík private collection, Ostrava, Czech Republic; |
| MBBJ | Museum Zoologi, Bogor, Indonesia; |
| NHRM | Swedish Museum of Natural History, Stockholm, Sweden; |
| QSBG | Queen Sirikit Botanic Garden, Chiang Mai, Thailand. |

Taxonomy

Dziedzickia bifida sp. nov.

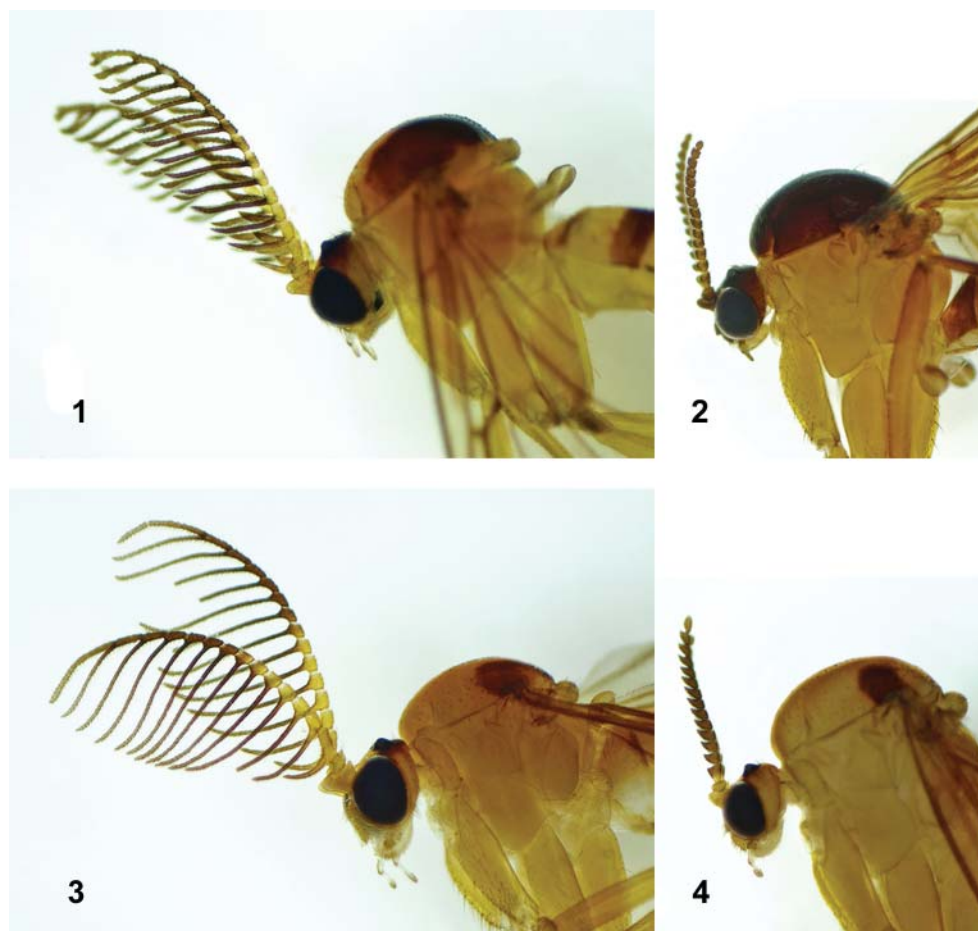
(Figs. 1–2, 5, 10–11)

Type material. HOLOTYPE: ♂, **THAILAND: NAKHON SI THAMMARAT:** Namtok Yong NP, TV aerial, 8°14.262'N 99°48.289'E, 966 m, Malaise trap, 11.–18.viii.2008, Paiboon leg., T3109 (QSBG). PARATYPES: **THAILAND:** the same data as holotype, 3 ♂♂ 1 ♀ (JSOC, QSBG). **CHANTHABURI:** Khao Khitchakut NP, 300 m from forest base to Khao Prabaht peak, 12°50.4'N 102°9.85'E, 927 m, Malaise trap, 27.iii.–3.iv.2009, Suthida & Charoenchai leg., T4067, 1 ♂ (JSOC). **CHIANG MAI:** Chiang Dao Wildlife Research Station, 12.–13.v.2004, Sivec & Horvat leg., 1 ♂ (DBPC); Chiang Dao, 10.–14.vi.2003, I. Sivec leg., 1 ♂ (in DBPC). **NAKHON NAYOK:** Khao Yai NP, Lum Ta Kong View Point, 14°25.82'N 101°23.754'E, 744 m, Malaise trap, 19.–26.iv.2007, Wirat Sukho leg., T2129, 1 ♂ 1 ♀ (JSOC); Khao Yai NP, Lum Ta Kong View Point, 14°25.82'N 101°23.754'E, 744 m, Malaise trap, 26.iv.–2.v.2007, Pong Sandao leg., T2132, 2 ♂♂, 1 ♀ (QSBG, JSOC). **SAKON NAKHON:** Phu Phan NP, dry evergreen near house no. 1567, 16°48.628'N 103°53.591'E, 522 m, Malaise trap, 16.–22.vi.2007, Winlon Kongnara leg., T2499, 1 ♂ (QSBG). **MALAYSIA:** **PERAK:** Hulu, Perak Belum Expedition, B. Camp, 5°30'07"N 101°26'21"E, 250 m, 21.iii.–14.iv.1994, I. Sivec leg., light trap, 1 ♂ (DBPC). **SELANGOR:** Ulu Gombak, University of Malaya Field Study Centre, 800 ft, Malaise trap, 22.ii.–21.iii.1997, H. Hippa, M. Jaschhof and B. Viklund leg., 1 ♂ (NHRM). **INDONESIA: SUMATRA:** Aceh, Gunung Leuser Nat. Park, Ketambe Res. Sta., 1.–28.ii.1990, DC Darling, IIS 900011, 1° rainforest, young forest, Terrace 3, closed canopy, 350 m, 3°41'N 97°39'E, Malaise trap head, 2 ♂♂ (MBBJ, JSOC).

Additional material examined. The following material (mostly specimens without antennae and/or legs) is not included in the type series: **MALAYSIA: SELANGOR:** Ulu Gombak, University of Malaya Field Study Centre, 800 ft, Malaise trap, 22.ii.–21.iii.1997, H. Hippa, M. Jaschhof and B. Viklund leg., 10 ♂♂ (NHRM, JSOC). **INDIA: MEGHALAYA:** Balpakram, 1996, 1 ♂ (JSOC).

Description. Male. Body length 4.2 mm. Wing length 3.65 mm (holotype).

Head yellowish, parietal area dark brown. Three ocelli, almost in one line. Lateral ocellus little broader than the median, separated from eye margin for distance about 1.2 times, and from median ocellus by about 0.5 times their diameter. Antennae bipectinate. Scape and pedicel yellowish. Scape prolonged forwards. Flagellomeres 1 to 3 yellowish, rest mostly brown. Flagellar projections brownish. Flagellomeres 2 to 13 with a pair of long anterolaterally directed projections (Fig. 1), flagellomere 14 single, elongated, bifid only at its apex (not bifid in the Indian specimen). Projections covered by thin setae, little longer than the diameter of

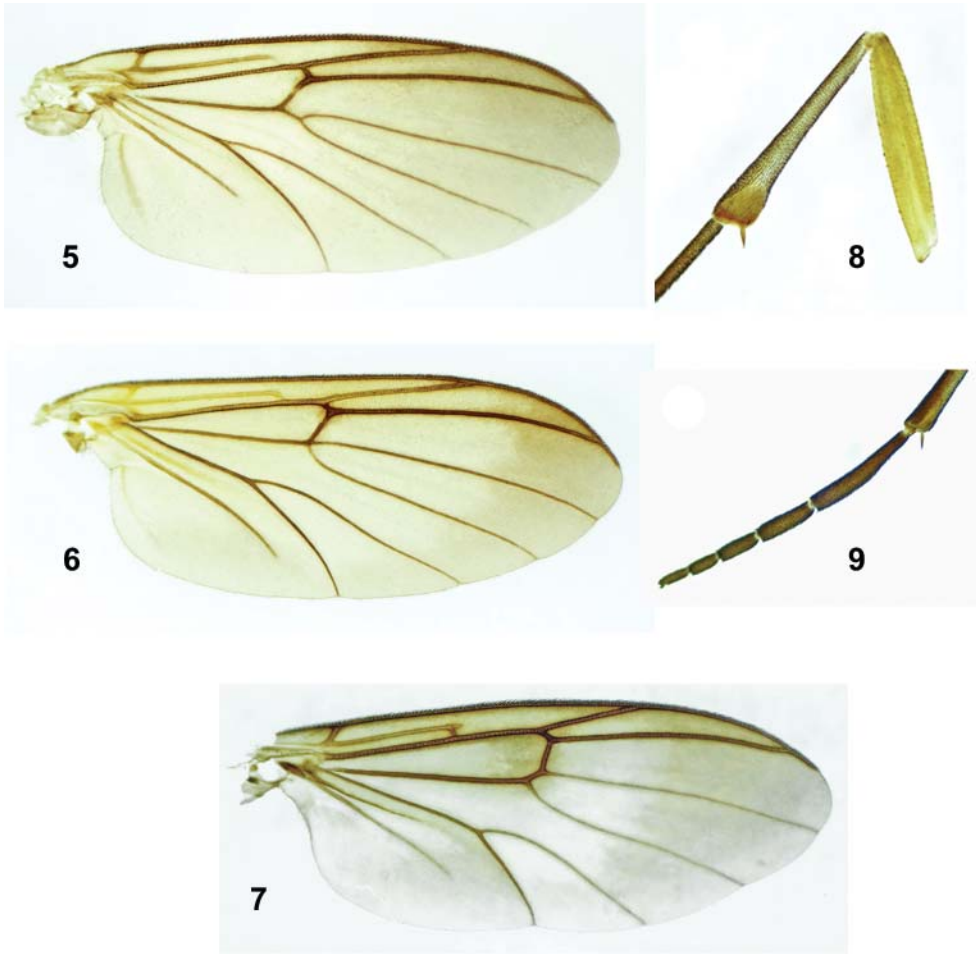


Figs. 1–4. 1–2 – *Dzedzickia bifida* sp. nov., head and thorax in lateral view (1 – male, holotype; 2 – female, paratype). 3–4 – *D. pectinata* sp. nov., head and thorax in lateral view (3 – male, holotype; 4 – female, paratype).

the projection. Clypeus ovate. Mouthparts yellowish, short, palpus brownish yellow, with four palpomeres, the first one is the shortest, the apical one the longest.

Thorax. Scutum yellow with brown lateral stripes of variable size in posterior two thirds (all dark brown in the Indian specimen). Scutellum and pleura yellow. Scutum with acrostichal and dorsocentral setae, and somewhat longer laterals; areas in-between bare. Scutellum with an anterior transverse row of short setae and with a group of longer setae (as long as scutellum) laterally. Anterior parapsidal suture distinct. Proepisternum with some small setae. All pleura and mediotergite bare.

Wing (Fig. 5) hyaline, unmarked, membrane covered only with microtrichia, without macrotrichia. Costa produced beyond R_5 to $2/3$ of the distance between the tips of R_5 and M_1 . Sc long, bare, ending in R_1 before R_s . Apical part of Sc may be indistinct or interrupted. R-M



Figs. 5–9. 5–7 – wing venation (5 – *Dziedzickia bifida* sp. nov., holotype; 6 – *D. pectinata* sp. nov., holotype; 7 – *Schnusea* sp., male from Peru). 8–9 – *Dziedzickia pectinata* sp. nov., paratypes (8 – male fore tibia; 9 – female fore tarsus).

about 4 times as long as R_s , and twice as long as stem of M-fork. Base of Cu-fork before the base of M-fork. CuP weak, shorter than A_1 . Very small setulae present on upper side of R, R_1 and R_5 . Other veins bare. Halteres yellow, with knobs slightly darker.

Legs. Coxae, femora and fore tibiae yellow, mid and hind tibiae brownish, all tarsi brown. Tibial trichia irregularly arranged. Some longer apical setae on tibia 1 to 3. Tibial spurs formula 1 : 2 : 2. Anteroapical depressed area of fore tibia poorly developed. Mid tibia apically swollen. Ratio fore tibia : tarsomeres 1 to 5 = 5 : 3.5 : 2 : 1.5 : 1 : 1.

Abdomen yellow with dark bristles. Tergites 1 to 7 with brown posterior bands and 4 to 7 also with brownish marks in anterior part. Sternites without median sclerotized concave fold.

Terminalia. Tergite 9 short, transverse, about twice as broad as long (Fig. 11). Cerci about as long as tergite 9, placed caudally to tergite 9. Gonocoxites touching ventrally but not fused, with a deep ventral excavation reaching to about middle of the gonocoxites (Fig. 10). Gonocoxite apically narrowing, forming a small posterior projection. Aedeagal complex apically rounded. Gonostylus with proximal lobe subtriangular, apically pointed. Distal lobe of gonostylus prolonged medially, apically rounded (with a small hook apicodorsally), with a distinct narrow ventral subapical projection (Figs. 10–11).

Female. Body length 5.7 mm. Wing length 5.35 mm. Similar to male in most respects. Head all dark brown, including palpi (Fig. 2). Flagellomeres simple, only slightly prolonged anteriorly, dark brown (Fig. 2). Scutum all dark brown. Scutellum, all pleura and mediotergite yellow. Abdominal tergite 1 dark, tergites 2 to 7 with dark posterior halves and darkened laterally. Tergite 8 and terminalia dark brown.

Differential diagnosis. This species differs from all species described up to now in *Dziedzickia* in having bipectinate antennae. The antennae of *D. pectinata* sp. nov. (described below) are also pectinate but with only a single projection on each flagellomere.

Etymology. From the Latin adjective *bifidus* (= split), referring to the shape of male flagellomeres.

Distribution. India (Meghalaya), Thailand (Chanthaburi, Chiang Mai, Nakhon Nayok, Nakhon Si Thammarat, Sakon Nakhon), Malaysia (Perak, Selangor), Indonesia (Sumatra).

Comments. The peculiar male antennae with two projections on each flagellomere is a distinct feature of this species, hitherto known within the family Mycetophilidae only in the Afrotropical species *Metanepsia pectinatissima* Matile, 1980 (see MATILE 1980). Single projections on the male flagellomeres are typical for three mycetophilid genera of the subfamily Metanepsiinae – *Chalastonepsia* Söli, 1996, *Metanepsia* Edwards, 1927 and *Pectinepsia* Ševčík & Hippa, 2010 (see KALLWEIT 1998, ŠEVČÍK & HIPPA 2010). Interestingly, MATILE (1981) mentioned an undescribed Oriental genus of Gnoristini with pectinate antennae but it is unclear which taxon he meant.

Such bifid projections on flagellomeres are known within Diptera also in some genera of Tipulidae (e.g. *Ctenophora* Meigen, 1803, *Dicthenidia* Brullé, 1833) and Limoniidae (*Rhipidia* Meigen, 1818).

Dziedzickia pectinata sp. nov.

(Figs. 3–4, 6, 12–13)

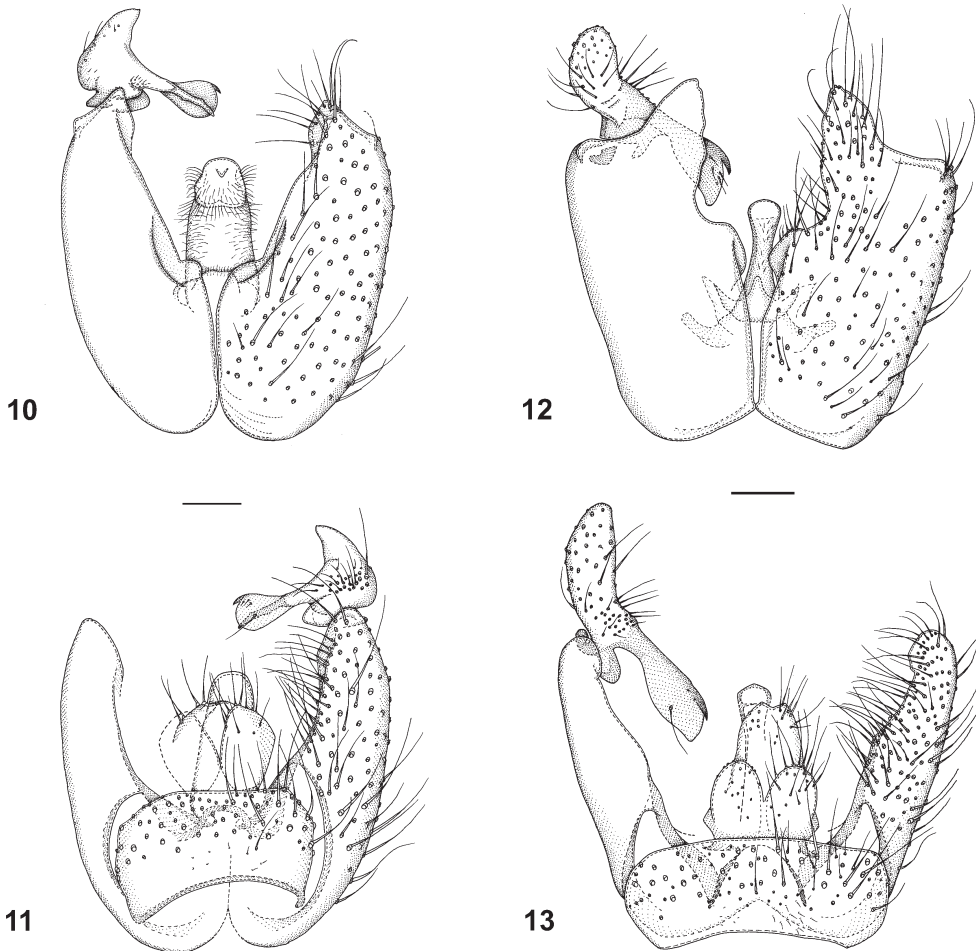
Type material. HOLOTYPE: ♂, **THAILAND: NAKHON NAYOK:** Khao Yai NP, behind Training Center, 14°27.119'N 101°21.482'E, 699 m, Malaise trap, 12.–19.v.2007, Wirat Sukho leg., T2268 (QSBG). PARATYPES: **THAILAND:** the same data as holotype, 5 ♂♂ 1 ♀ (QSBG, JSOC); **NAKHON NAYOK:** Khao Yai NP, Lum Ta Kong View Point, 14°25.82'N 101°23.754'E, 744 m, Malaise trap, 19.–26.iv.2007, Wirat Sukho leg., T2129, 7 ♂♂ 1 ♀ (QSBG, JSOC); Khao Yai NP, entrance of Hnong Pak Chee Trail, 14°27.115'N 101°21.951'E, 733 m, pan traps, 11.–12.v.2007, Pong Sandao leg., T2262, 1 ♂ 2 ♀♀ (QSBG); Khao Yai NP, evergreen forest near Hnong Pakchee, 14°27.119'N 101°21.482'E, 699 m, Malaise trap, 5.–12.v.2007, Pong Sandao leg., T2265, 4 ♂♂ 1 ♀ (QSBG, JSOC); Khao Yai NP, PA TABAK, 17.–28.iv.2001, 1 ♂ (DBPC); Khao Yai NP, Khao – Kheo, 17.–28.iv.2001, 5 ♂♂ 1 ♀ (DBPC); Khao Yai NP, Tao Tapoo, 14.–24.v.2001, 5 ♂♂ (DBPC).

Additional material examined. The following material (mostly specimens without antennae and/or legs) is not included in the type series: **THAILAND: NAKHON NAYOK:** Khao Yai NP, evergreen forest near Hnong Pakchee, 14°27.119'N 101°21.482'E, 699 m, Malaise trap, 5.–12.v.2007, Pong Sandao leg., T2265, 12 ♂♂ (QSBG, JSOC);

Khao Yai NP, behind Training Center, 14°27.119'N 101°21.482'E, 699 m, Malaise trap, 12.–19.v.2007, Wirat Sukho leg., T2268, 16 ♂♂ 1 ♀ (QSBG, JSOC); Khao Yai NP, entrance of Hnong Pak Chee Trail, 14°27.115'N 101°21.951'E, 733 m, Malaise trap, 19.–26.v.2007, Pong Sandao leg., T2270, 10 ♂♂ (QSBG, JSOC).

Description. Male. Body length 5.9 mm. Wing length 4.65 mm (holotype).

Head yellow, dark brown near the ocelli. Three ocelli, almost in one line. Lateral larger than the median, separated from eye margin for distance about 1.3 times, and from median ocellus by about 0.5 times their diameter. Eyes oval, slightly emarginated near base of the antennae, with row of dark setulae near posterior eye margin. Antenna strongly pectinate (Fig. 3). Scape and pedicel yellowish. Scape prolonged anteriorly. Basal parts of flagellomeres 1 to 5 yellowish, those of F6 and F7 apically brown, those of F8 to F13 mostly brown and that of



Figs. 10–13. 10–11 – *Dziedzickia bifida* sp. nov., holotype, male terminalia (10 – ventral view; 11 – dorsal view). 12–13 – *D. pectinata* sp. nov., holotype, male terminalia (12 – ventral view; 13 – dorsal view). Scale bars: 0.1 mm.

F14 yellowish brown. Flagellar projections mostly brown, their apical parts yellowish brown. Flagellomeres 1 to 13 with a long anterior projection covered by thin setae maximally twice as long as the diameter of the projection. Projection on F1 about half as long as the height of head, those on F2 to F13 about as long as the height of head or slightly longer. The apical flagellomere elongated, without distinct projection. Clypeus ovate, setose. Mouthparts short, labellum large, palpus with four palpomeres (the first one very short).

Thorax. Scutum yellow with brown lateral spot above wing base. Scutellum and pleura yellow. Scutum with dark acrostichal, dorsocentral and longer lateral setae; areas between them bare. Scutellum covered with setae as long as its length. Anterior parapsidal suture distinct. Proepisternum with some small setae. All pleura and mediotergite bare.

Wing (Fig. 6) hyaline, unmarked, membrane covered only with irregularly arranged microtrichia, without macrotrichia. Setulae present on upper side of R, R₁ and R₅. Other postcostal veins bare. Costa produced beyond R₅ to about 1/3 of the distance between the tips of R₅ and M₁. Sc long, ending in R₁ before Rs. R-M about 3 times as long as Rs. Stem of M-fork absent or very short. Base of Cu-fork before the base of M-fork. CuP weak, shorter than A₁. Haltere yellow, with a slightly darkened knob.

Legs. Coxae and femora yellow, tibiae yellowish with trichia irregularly arranged, tarsi brown. Fore coxa with setae mainly in the anterior part, mid coxa mainly in the apical part, hind coxa along its posterior margin. Mid tibia with some short anterodorsal and posterodorsal setae, hind tibia with some short anterior and dorsal setae. Some longer apical setae on tibia 1 to 3. Anteroapical depressed area of fore tibia large (Fig. 8). Spurs yellow, tibial spurs formula 1 : 2 : 2. Ratio of fore tibia to tarsomeres 1 to 5 = 4 : 3 : 1.5 : 1 : 0.8 : 0.5.

Abdomen yellow with dark bristles. Tergites 2 to 6 with brown posterior bands. Tergites 1 and 7 darkened only narrowly along their posterior margin, tergite 8 short, all yellow. Sternites without median sclerotized concave fold.

Terminalia. Tergite 9 short, transverse, almost thrice as broad as long (Fig. 13). Cerci about as long as tergite 9, placed caudally to tergite 9. Hypoproct remarkably longer than cerci (Fig. 13). Gonocoxites basally yellow and apically brown, ventrally separated (Fig. 12). Gonocoxite dark, apically narrowing, protruding into a distinct posterior projection. Aedeagus narrow, club-shaped. Gonostylus with proximal lobe apically rounded. Distal lobe of gonostylus directed inwards, subapically with a distinct tooth and several setae (Fig. 13).

Female. Body length 7.4 mm. Wing length 6.45 mm. Similar to male in coloration, but with brown posterior bands on tergites wider. Scape and pedicel yellow, flagellum mostly brown (Fig. 4). Terminalia yellowish. Flagellomeres 1 to 13 with a small anterior projection, as long as the diameter of the flagellomere. Flagellomere 14 simple. Fore tarsomeres 1 to 4 widened from below, with a bare medial stripe enclosed with a row of short setae, more distinct in tarsomeres 1 and 2 (Fig. 9). Ratio fore tibia : tarsomeres 1 to 5 = 4 : 3 : 1.5 : 1 : 0.8 : 0.5.

Differential diagnosis. The strongly pectinate male antennae are diagnostic for this species, at least within the species currently included in *Dziedzickia*; *D. bifida* sp. nov. (described above) differs mainly in having two projections on each flagellomere.

Etymology. From the Latin *pectinatus* (= comb-like), referring to the structure of the male antennae.

Distribution. Thailand (Khao Yai NP).

Comments. The absence of the stem of M-fork is noteworthy. This character state is typical for the Nearctic genus *Schnusea* Edwards, 1933 (see LANE & COHER 1950). This genus is, however, considered by OLIVEIRA & AMORIM (2010) as a monophyletic subgroup within *Dziedzickia* s. lat. and thus its junior synonym, in order to retain the entire *Dziedzickia* as monophyletic. In one undescribed Nearctic species of *Schnusea*, the vein R-M even terminates at the anterior branch of M-fork (= M1). We have seen 35 males and 2 females of this species and in all specimens (except one male) R-M is ending at M1 (see Fig. 7).

Discussion

The name *Dziedzickia* was proposed by JOHANNSEN (1909) as a replacement name for the original genus *Hertwigia* established by DZIEDZICKI (1885) for the single European species *Dziedzickia marginata* (Dziedzicki, 1885). However, JOHANNSEN (1909) and some subsequent authors placed in this genus a rather heterogeneous group of species, apparently belonging to different genera. Since that time, New World workers have tended to treat *Dziedzickia* in somewhat broader sense than the European ones (see HUTSON 1979). *Hadroneura* Lundström, 1906 and *Palaeodocosia* Meunier, 1904 were not included in the work by JOHANNSEN (1909). Both the latter genera are very similar to *Dziedzickia*, the first one being almost identical, differing mainly in slightly prolonged head and the male terminalia. *Palaeodocosia* is usually considered as a senior synonym of *Heteropygium* Dziedzicki, 1923, with the type species *H. janickii* Dziedzicki, 1923 (= *Palaeodocosia vittata* (Coquillett, 1923)). This generic synonymy is, unfortunately, difficult to confirm as the type species of *Palaeodocosia*, *P. brachyzeoides* Meunier, 1904, is based on a female type (MEUNIER 1904). EDWARDS (1940) synonymized *Palaeotrichonta* Meunier, 1904 with *Palaeodocosia* but the type species of *Palaeotrichonta*, *P. brachycamptites* Meunier, 1904 is also known only from a female holotype.

As pointed out by many previous authors (e.g. HUTSON 1979, VOCKEROTH 1980, VÄISÄNEN 1986, BAXTER 1989, MATILE 1992, ŠEVČÍK & CHANDLER 2008), *Dziedzickia* in its present broad sense is most probably a polyphyletic group comprising several distinct genera. The only non-European species clearly belonging to *Dziedzickia* s. str. is the Nearctic *D. pentastylobia* Baxter, 1989. It shares with *D. marginata* several characters not present in this combination in other species of *Dziedzickia* s. l. – vein R₄ forming a trapezoidal radial cell about twice as long as broad, Sc reaching behind Rs, laterotergite haired, tergite 9 about as long as gonocoxites. None of these character states are present in either of the new Oriental species described here. On the other hand, *D. pectinata* sp. nov. shares several characters (mainly of wing venation) with the Nearctic genus *Schnusea*, considered by OLIVEIRA & AMORIM (2010) as a synonym of *Dziedzickia* (see above).

The situation is further complicated by the fact that various gnoristine genera related to *Dziedzickia* are well represented in the fossil record (e.g. BLAGODEROV 1997, 1998; BLAGODEROV & GRIMALDI 2004). All these genera have one distinct common feature – vein Sc ending in R. From this point of view, the genera *Acomopterella* Zaitzev, 1989, *Docosia* Winnertz, 1863 and *Syntemna* Winnertz, 1863 should also be taken into account although they have traditionally been placed in three different subfamilies (Gnoristinae, Leiinae and Sciophilinae,

respectively). The last genus is distinct in having macrotrichia on wing membrane, which is, however, considered as a plesiomorphic character in the Mycetophilidae.

As the phylogeny and delimitation of the genera included in the Gnoristinae is currently far from being clarified, we prefer not to create a further new genus for the new species described in this paper. We place them tentatively in *Dziedzickia* although we are aware of all the differences from its type species (*D. marginata*), mainly the strongly pectinate antennae in males, bare laterotergites, the absence of R_{4+5} , and short (transverse) tergite 9. If we take into account also fossil genera, both the new species described here may be close to *Gaalomyia* Blagoderov & Grimaldi, 2004, *Ipsaneusidalys* Blagoderov, 1998, *Metahadroneura* Blagoderov, 1998 and others, but this is hard to decide as many of the characters on these fossil taxa are difficult to ascertain.

Acknowledgements

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