



## The genus *Manota* Williston (Diptera: Mycetophilidae) in Thailand, with the description of seven new species

HEIKKI HIPPA & LÁSZLÓ PAPP

Heikki Hippa, Swedish Museum of Natural History, PO Box 50007, SE-104 05 Stockholm, Sweden. E-mail: heikki.hippa@nrm.se  
László Papp, Department of Zoology, Hungarian Natural History Museum and Animal Ecology Research Group of the Hungarian Academy of Sciences, PO, Box 137, H-1431 Budapest, Hungary. E-mail: lpapp@nhmus.hu

### Abstract

Seven new species of *Manota* Williston are described from Thailand: *M. bifida*, *M. dentata*, *M. forceps*, *M. inusitata*, *M. mirifica*, *M. occulta*, and *M. secreta*. Nine *Manota* species, which were recently described from West Malaysia, are here recorded as new for the fauna of Thailand: *M. heptacantha* Hippa, *M. oligochaeta* Hippa, *M. ovata* Hippa, *M. pectinata* Hippa, *M. perpusilla* Hippa, *M. plusiochaeta* Hippa, *M. procera* Hippa, *M. roslii* Hippa, and *M. ulu* Hippa. *M. biunculata* Hippa, which was recently described from New Guinea, is also recorded from Thailand. The number of the Oriental species of *Manota* now stands at 37.

**Key words:** Mycetophilidae, *Manota*, taxonomy, new species, Oriental region, Thailand

### Introduction

It has become clear in recent years that *Manota* Williston (type-species *M. defecta* Williston) is a very species-rich genus. While the number of described species was about 30 in Bechev's (2000) list, it is now about 100. The greatest increase in the number of species has been in the Australian region (Melanesia and Oceania) (14 species, Hippa 2007), Neotropical region (27 species, Jaschhof and Hippa 2005) and the Oriental region (29 species, Papp 2004, Hippa 2006). A few new species have also been described from the Afrotropical (Jaschhof and Mostovski 2006) and Palearctic (Ševčík 2002, Papp 2004) regions. Hippa et al. (2004) inferred the phylogenetic position of *Manota* within the Manotinae, but relationships among its constituent species, particularly at the global level, are largely unresolved.

In the Oriental region, the genus *Manota* was known for many years from only *M. orientalis* Senior-White (Senior-White 1922), which was described, and is only known, from Sri Lanka. The original description was based on the female, but Edwards (1928) described the hypopygium of a male from Sri Lanka. Edwards' (1928) interpretation of *M. orientalis* was followed by Hippa (2006, 2007). The above-mentioned recent additions to the Oriental fauna include two species from Taiwan (Papp 2004) and the 27 species from Peninsular Malaysia (Hippa 2006).

The aim of the present work is to report on 17 species of *Manota* found in recently collected material from Thailand (Papp & al. 2006) and to describe the seven new species that it contains.

### Material and methods

Specimens were selected from a large material of flies collected in 2004 in Thailand (see Papp et al. 2006). The specimens were mounted in the Hungarian Natural History Museum on 0.15 mm minuten pins through

11x5 mm white cards. In the course of our study, each abdomen was removed, macerated in potassium hydroxide, and placed in glycerol in a microvial. The abdomen was later washed with alcohol and mounted in "Euparal" between two pieces of cover glass, which enables the specimen to be studied from both sides with a compound microscope. Each mount is now attached to a glass slide with adhesive tape, which can be easily removed or cut. The slides bear the hand-written name of the species and are numbered "Bud 1-38" etc (see below). Other parts of the specimens (head + thorax) are still pinned. Holotype/paratype specimens are labelled with red-bordered 18x10 mm card labels with printed "Holotypus" or "Paratypus" in red and with the hand-written name "Manota x-a [male] HIPPA & PAPP". The underside of these labels has a hand-written reference "gen. prep. Bud 1-38" etc, referring to the slide mounts, and is also recorded for the type specimens in the text below. All the types and other specimens are in the Department of Zoology, Hungarian Natural History Museum, Budapest.

Because the specimens are dry and pinned, except for the abdomen, some characters could not be observed with certainty. These include the number of curved sensilla on palpomere 3 and, in most cases, the chaetotaxy of preepisternum 2 (katepisternum) and episternum 3. Even the setae on the wing surface may have been overlooked, especially if only the sockets are left.

The illustrations were made with a drawing tube attached to a Leitz Diaplan compound microscope.

The terminology follows mostly Jaschhof & Hippa (2005) and Hippa (2006). Jaschhof and Hippa (2005) described the dorsomesial chaetotaxy of the gonocoxa by using rough positions I–IV for the setae or groups of setae: I at the middle of the dorsomesial margin, II subapically on the same margin, III like position II but slightly more posterior and more ventral, and IV more posterior than the two latter. This division is practical in many cases but can also be confusing when setae are absent from one or more positions. Furthermore, the setae in one position are not necessarily homologous, except for those in position III as previously used. In this paper, we describe the chaetotaxy without reference to the earlier positions and the setae/megasetae in the former position III are termed *juxtagonostylar setae/megasetae*. These setae are homologous and are apparently always present in *Manota* even if there are some species in which they have not been observed with certainty. The number of the setae is one or two, and they vary from fine setae to strong megasetae and not infrequently are flattened or more complicated in structure, for example being branched or lobed. The juxtagonostylar seta/e usually arise from a basal body, which varies from a low dome to a long lobe or apophysis. We use the term *paraapodemal lobe* of the gonocoxa for a lobe-like widening on the ventral mesial side of the gonocoxal apodeme, at the base of its narrower distal part, which crosses the apodeme of the tegmen (Fig. 1A). In many cases, the sclerite is distinct and prominent and well exposed when the hypopygium is viewed ventrally (Figs 1B, 6B, 7B, 8B), but in other cases it is absent as a distinct lobe or is hard to localize as it may be covered by the ventral mesial part of the gonocoxa (Figs 2B, 3B, 4B, 5B, 9B, 10B). We use the collective term hypoproct for the dorso-medial, more or less distinctly paired and variously setose sclerite ventrad of the cerci, which probably even includes parts of sternite 10. The morphological terminology used for the hypopygium is explained in Figs 1, 2, 3, 5, 6, 7, 8, 9 and 10.

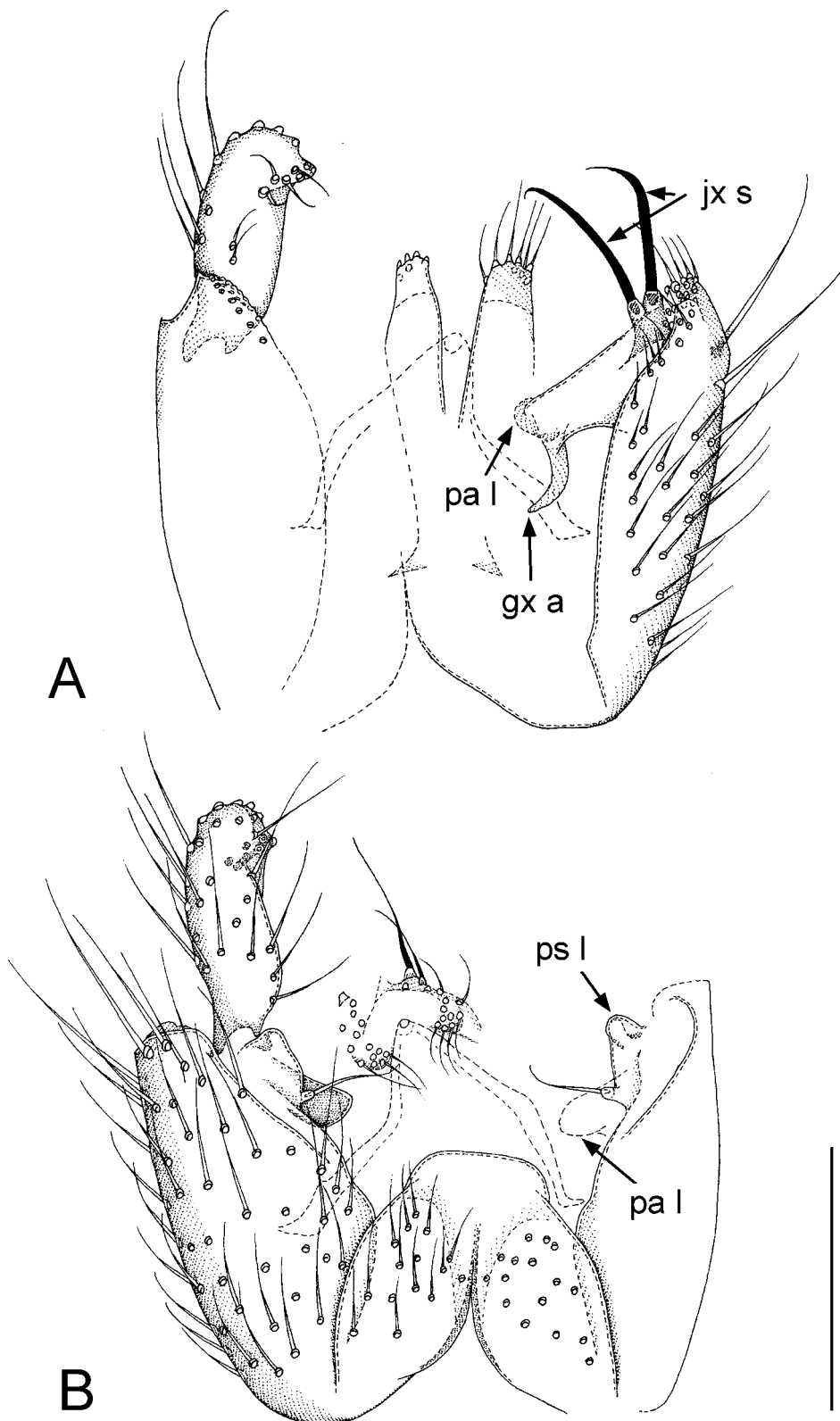
The following abbreviations for parts of the hypopygium are used in the Figures: cr = cercus, dm l = dorsomesial lobe of gonocoxa, gs = gonostylus, gx = gonocoxa, gx a = gonocoxal apodeme, gx l = apicolateral lobe of gonocoxa, gx d = dorsal mesial margin of gonocoxa, gx v = ventral mesial margin of gonocoxa, hpr = hypoproct, jx s = juxtagonostylar seta/megaseta, pa l = paraapodemal lobe, ps l = parastylar lobe, st 9 = sternite 9, tg 9 = tergite 9, tm = tegmen, tm a = apodeme of tegmen.

## ***Manota* species new for the fauna of Thailand**

### ***Manota biunculata* Hippa, 2007**

*Records.* 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 38, Nov 19, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from New Guinea (Hippa 2007). Despite the considerable geographic separation of these localities, the hypopygium of the Thailand specimen (Figs 1A, B) is identical with that of the holotype (Hippa 2007: Fig. 13).



**FIGURE 1.** *Manota biunculata* Hippa: hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

***Manota heptacantha* Hippa, 2006**

*Records.* 1 male, Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

***Manota oligochaeta* Hippa, 2006**

*Records.* 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 38, Nov 19, 2004, leg. L. Papp & M. Földvári; 1 male, Trang Prov., Khao Chong Botanic Garden, along a forest path, No. 41, Nov 20, 2004, leg. M. Földvári; 2 males, Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

***Manota ovata* Hippa, 2006**

*Records.* 1 male, Trang Prov., Khao Chong Botanic Garden, along the stream below waterfall, No. 30, Nov 14, 2004, leg. L. Papp & M. Földvári; 2 males, *ibid.*, rainforest, No. 43, Nov 22, 2004.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

***Manota pectinata* Hippa, 2006**

*Records.* 1 male, Trang Prov., Khao Chong Botanic Garden, along the stream below waterfall, No. 30, Nov 14, 2004, leg. L. Papp & M. Földvári; 1 male, Ban Liphang, over a shaded slow brook, No. 34, Nov 16, 2004, leg. L. Papp & M. Földvári; 1 male: Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

***Manota perpusilla* Hippa, 2006**

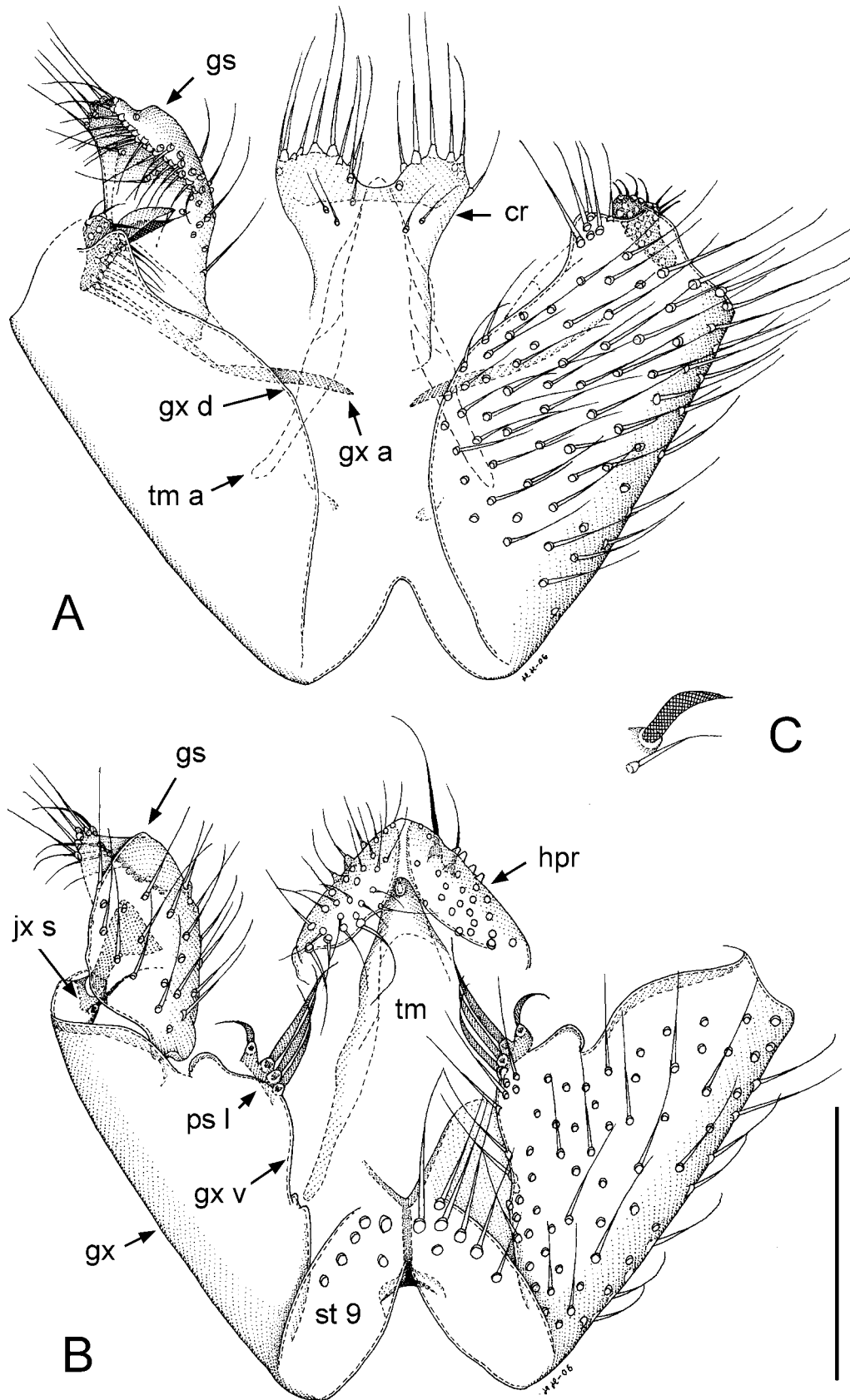
*Records.* 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 28, Nov 12, 2004, leg. L. Papp & M. Földvári; 1 male, *ibid.*, No. 38, Nov 19, 2004; 1 male, Trang Prov., Khao Chong Botanic Garden, along a forest path, No. 41, Nov 20, 2004, leg. M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

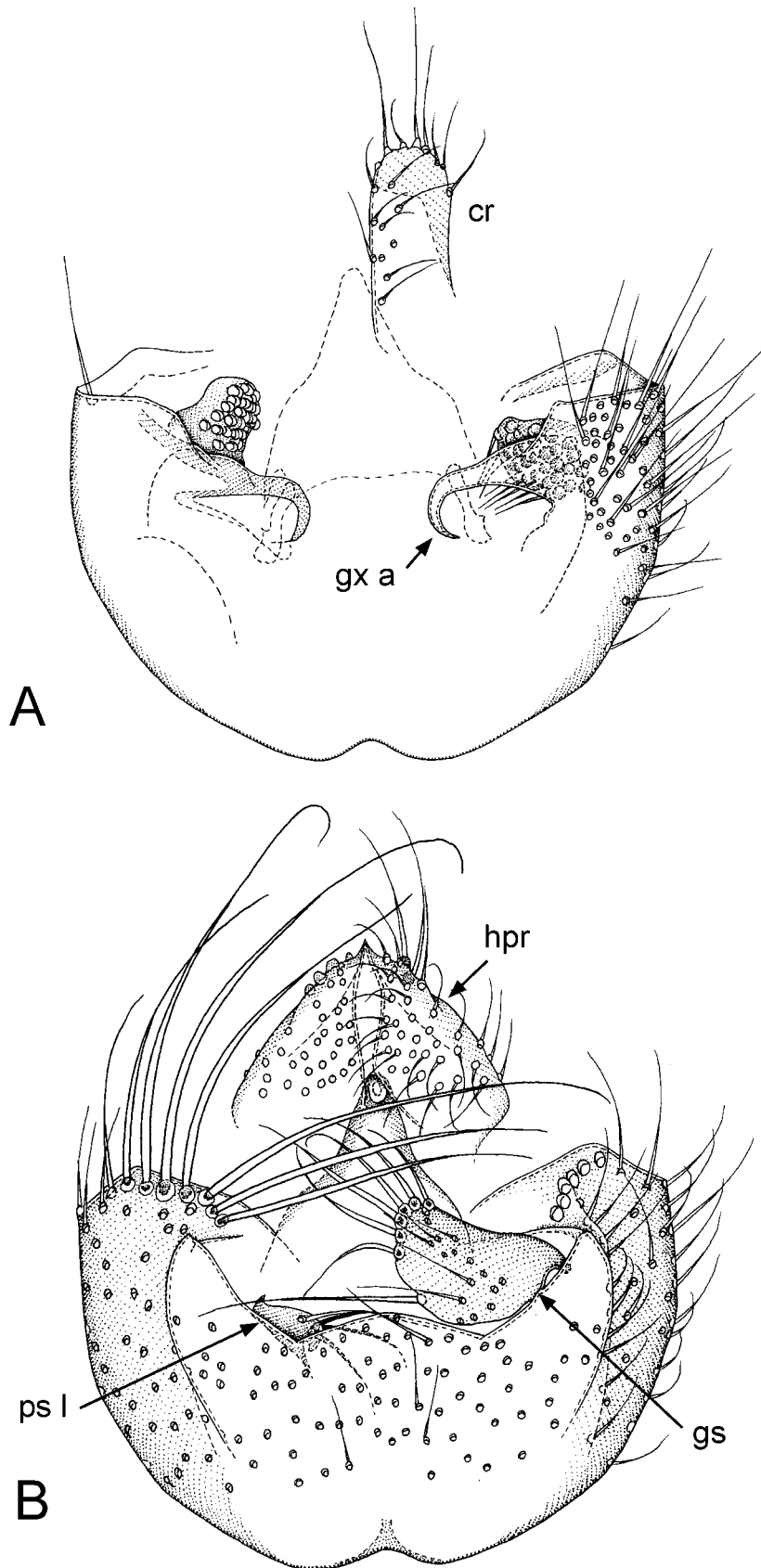
***Manota plusiochaeta* Hippa, 2006**

*Records.* 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 38, Nov 19, 2004, leg. L. Papp & M. Földvári; 1 male, Phattalung Wildlife Breeding Research Centre, along a forest brook, No. 39, Nov 20, 2004, leg. L. Papp & M. Földvári; 1 male, Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).



**FIGURE 2.** *Manota roslii* Hippa: hypopygium in dorsal (A) and in ventral (B) view, and juxtagonostylar setae in ventral view (C). Scale 0.1 mm.



**FIGURE 3.** *Manota ulu* Hippa: hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

### ***Manota procera* Hippa, 2006**

*Records.* 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, along the "Nature Trail", No. 29, Nov 13, 2004, leg. L. Papp & M. Földvári; 1 male, Trang Prov., Khao Chong Botanic Garden, rainforest, No. 36, Nov 18, 2004, leg. L. Papp & M. Földvári; 1 male, Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 38, Nov 19, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006).

### ***Manota roslii* Hippa, 2006**

*Records.* 1 male, Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006). In the original description (Hippa 2006), the parastylar lobe was mentioned as absent. In the present Thailand specimen, however, the parastylar lobe is distinct even though it is partly covered by the ventral mesial margin of the gonocoxa. It has a characteristic pattern of 4 strong setae (Fig. 2B). This has now been observed even in the type specimens, which are mounted with the dorsal side upwards and were not correctly interpreted at the time of description. In the Thailand specimen, the juxtagonostylar megaseta is flattened and apically expanded, which is clearly seen on the right side (Fig. 2C). In the original description it was mentioned as "apparently non-flattened".

### ***Manota ulu* Hippa, 2006**

*Records.* 1 male, Trang Prov., Khao Chong Botanic Garden, rainforest, No. 36, Nov 18, 2004, leg. L. Papp & M. Földvári; 1 male, Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári.

*Remarks.* The species was recently described from Selangor, Malaysia (Hippa 2006). The male from Nam Tok Nam Pan has the hypopygium unusual (Figs 3A, B), with the gonocoxites appearing short and compact as if compressed in an anterior–posterior direction. The specimen is apparently teratological rather than damaged during the mounting process. It cannot be ruled out that it may represent a new species.

### ***Manota* sp.**

1 male, Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári.

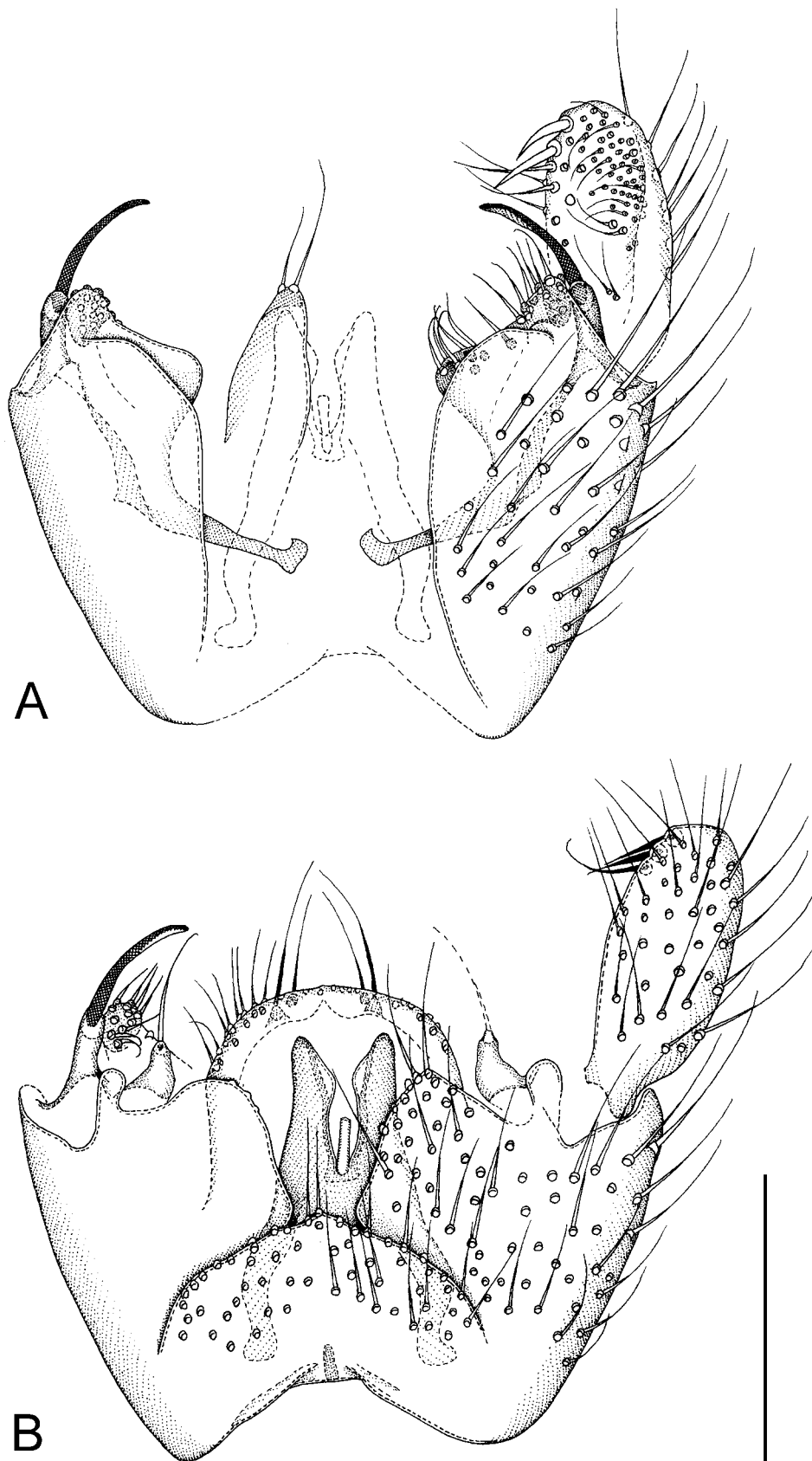
*Remarks.* The species is probably *M. oligochaeta* or *M. plusiochaeta*, but since its hypopygium is missing it is impossible to make an exact identification.

## **Description of the new species**

### ***Manota bifida* sp. n.**

(Figs 4A, B)

Body yellow, scutellum and abdomen darker (brown), body length ca. 2.0 mm, wing length 1.55 mm.



**FIGURE 4.** *Manota bifida* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

Male. **Head.** Flagellomere 4 as long as broad with 0.03 mm trichia. Postocular setae black, rather short. **Thorax.** Anepisternum setose. Anterior basalare non-setose. Setae of preepisternum 2 not observed. Laterot-



ergite setose. Setae of episternum 3 not observed. Legs all yellow. **Wing.** Wing membrane brownish, dorsally with few setae at posterior margin, veins light brown. Sc distally of h very short, non-setose. Ratio of visible sections of veins M1 and M2 32/72. A1 indicated by a few indistinct setae.

**Hypopygium** (Figs 4A, B). Tergite 9 about half the ventral length of gonocoxa, lateral margin anteriorly fused with gonocoxa, posterolateral and apical margins forming a contiguous broad arch, anterior margin with a rather shallow incision, the setae similar to ventral setae of gonocoxa. The ventral mesial margin of gonocoxa subapically strongly angled, the apical margin at middle with a prominent lobe. Parastylar lobe well exposed, conical, directed posteriad, with one strong apical seta. Paraapodemal lobe indistinct, not visible in ventral view. Dorsal mesial margin of gonocoxa simple, apically with a slightly bilobate setose lobe partly lying on a more ventral level, the latter covering a small ventrally setose plate-like lobe on a still more ventral level. One juxtagonostylar seta present: a stout curved megaseta arising from a basal body, which is nearly as long as the megaseta. Gonostylus simple, elongate-oval, laterally (and ventrally) with rather long setae, mesially with shorter setae, subapically at ventral margin with two megasetae. Tegmen unusual, apically bifid or with a long apical branch on both sides of the medial tube, with weak lateral shoulders. Hypoproct short and broad, posteriorly extending to half the length of gonostylus, with ca. 15 marginal or sub-marginal setae on each half. Cerci medially separate.

Female unknown.

**Discussion.** In its hypopygium, *Manota bifida* differs from all other described *Manota* by the apically bifid tegmen. Otherwise it somewhat resembles *M. roslii* Hippa, and to a lesser extent also *M. pollex* Hippa and *M. yongi* Hippa, but differs e.g. by having the posterior margin of tergite 9 convex, not notched, by having distinct parastylar lobes, by having the basal body of the juxtagonostylar megaseta nearly as long as the megaseta, not less than half of that length, and by having the hypoproct unusually broad, with a semicircular posterior margin and with all the setae pushed to the marginal area.

**Types.** *Holotype.* Male, Thailand: Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 35).

### ***Manota dentata* sp. n.**

(Figs 5A, B)

Body brown, length ca. 2.0 mm (holotype), 2.0–2.2 mm (paratypes), wing length 1.65 mm (holotype), 1.70–1.80 mm (paratypes).

Male. **Head.** Flagellomere 4 1.5 times as long as broad with 0.03 mm long trichia. Postocular setae (7–8) rather long, thick and black. **Thorax.** Anepisternum setose. Anterior basalare setose. Setae of preepisternum 2 not observed. Laterotergite setose. Setae of episternum 3 not observed. Mid and hind trochanters, bases of mid and hind femora as well as apical 1/3 of hind femur darkened. **Wing.** Wing membrane light brownish, dorsally without setae at posterior margin, veins light brown. Sc distally of h setose. Ratio of visible sections of veins M1 and M2 32/80 (holotype) 41/84, 40/82 (paratypes). A1 indicated by a few setae. **Hypopygium** (Figs 5A, B). Tergite 9 extending posteriorly as far as the ventral part of gonocoxa, laterally fused with gonocoxa except at extreme apex, anterior margin with a rather shallow incision, the setae similar to those on gonocoxa. Parastylar lobe very large, almost the size of gonostylus, with 3–4 posteriorly directed setae. Paraapodemal lobe indistinct, not visible in ventral view. Dorsal mesial margin of gonocoxa sigmoid, partly covering a large lobe with ca. 10 blunt-ended megasetae on margin. One juxtagonostylar seta present: it is a normal seta arising from a basal body, which is broad and shorter than the seta. Gonostylus rather small, with long setae, apically with a few stronger setae arising from a weak lobe. Tegmen elongate-triangular, with sloping lateral shoulders. Hypoproct large, parallel-sided, extending posteriorly almost as far as gonostylus, with ca. 30 scattered setae. Cerci medially separate.

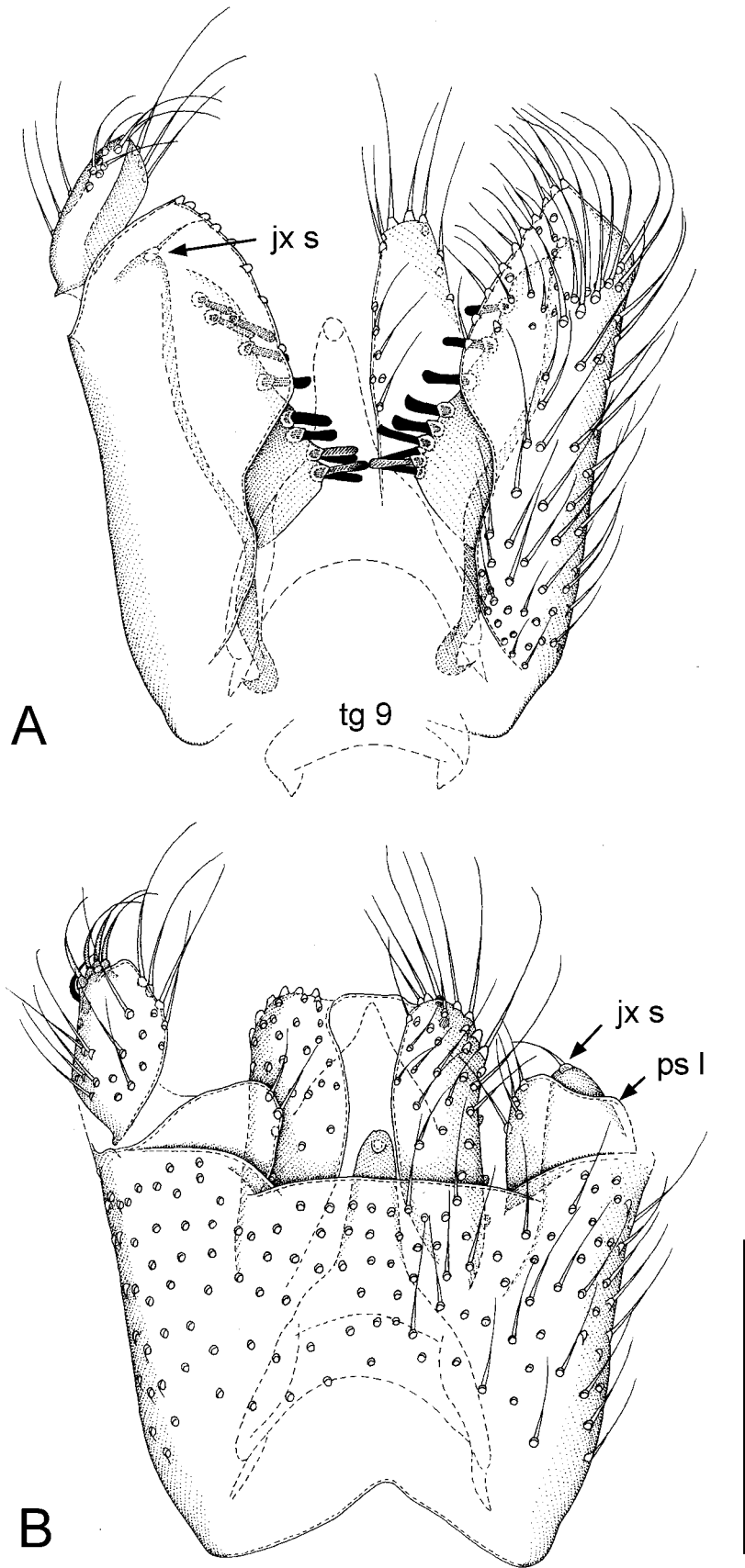


FIGURE 5. *Manota dentata* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

Female unknown.

**Discussion.** In the Oriental fauna, *M. dentata* is similar to *M. heptacantha* Hippa, but differs e.g. by having the megasetae mesially on the dorsal side of gonocoxa shorter, flattened from base to tip and not only at tip, and about twice as broad as in *M. heptacantha*. In addition, the lobe bearing the megasetae is more pronounced than in *M. heptacantha*. *M. dentata* is also similar to some Afrotropical species, especially *M. serrata* Söli and *M. sespinea* Söli. These two species differ from *M. dentata* by having the megasetae not flattened but narrow and pointed, and they have a flattened juxtagonostylar megaseta on the gonocoxa, unlike *M. dentata* which has only an unmodified normal seta in the homologous position.

**Types.** *Holotype.* Male, Thailand: Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 30). *Paratypes.* 3 males, Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 16, 26, 27).

### ***Manota forceps* sp. n.**

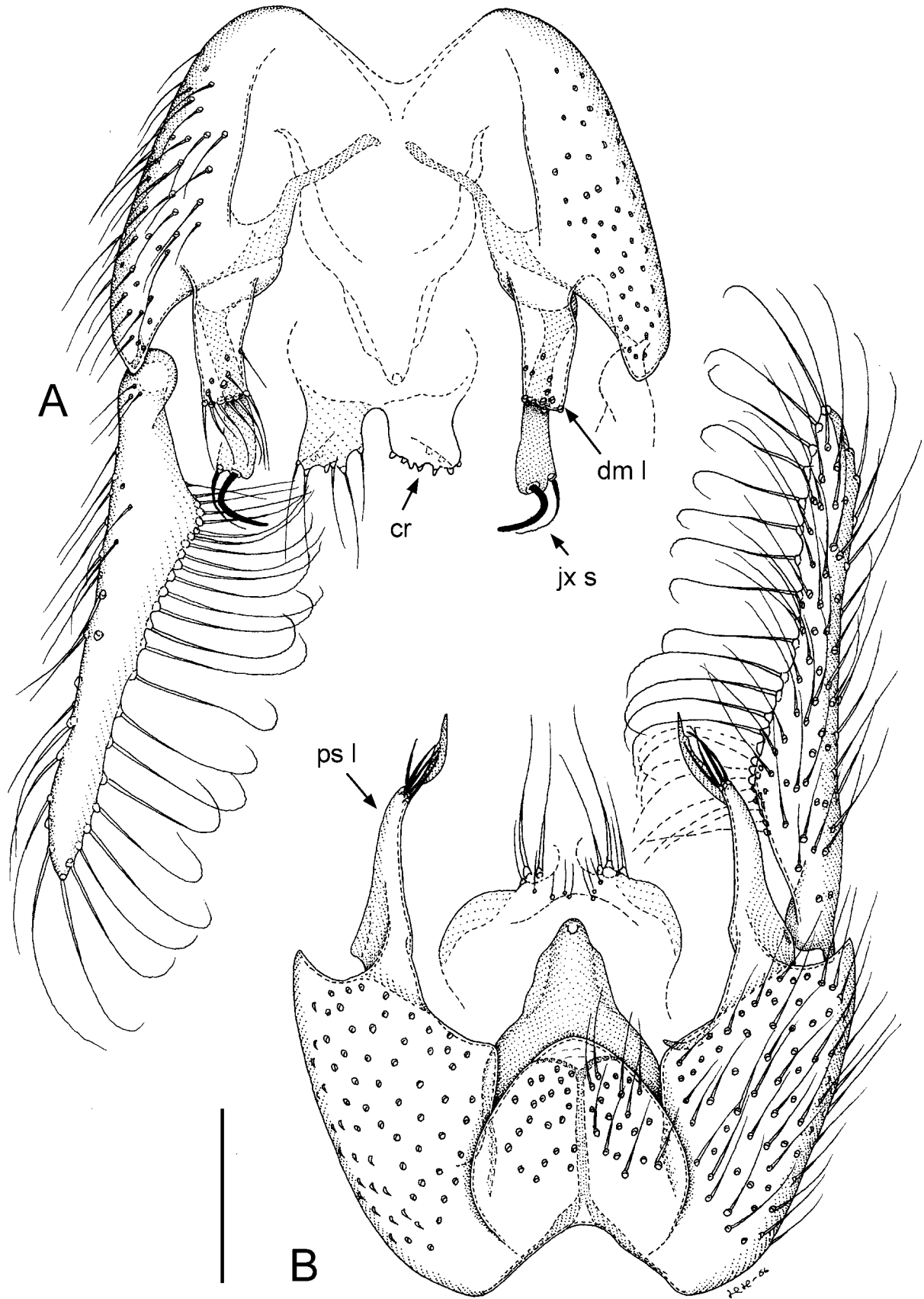
(Figs 6A, B)

Body dark brown, almost black, length ca. 2.9 mm, wing length 2.24 mm.

**Male. Head.** Flagellomere 4 1.6 times as long as broad with 0.03 mm long trichia. Postocular setae (11) black, moderately long but rather thick. **Thorax.** Anepisternum non-setose. Anterior basalar non-setose. Setae of preepisternum 2 not observed. Laterotergite non-setose. Setae of episternum 3 not observed. Scutellum with 5 evenly long (0.20 mm) black marginal setae. Mid and hind femora black, all tibiae and tarsi darkened. **Wing.** Wing membrane brown, particularly darkened on the radial section, dorsally without setae at posterior margin. Sc distally of h very short, non-setose. Ratio of visible sections of veins M1 and M2 65/136. **Hypopygium** (Figs 6A, B). Sternite 9 sub-oval, about half the ventral length of gonocoxa, laterally sharply demarcated, basally with a shallow emargination, setae similar to ventral setae of gonocoxa. Gonocoxa with angulate mesial margin. Parastylar lobe well exposed, almost as long as gonocoxa and directed posteriad, basally weakly separated from gonocoxa, with a group of subapical setae. Paraapodemal lobe very small, only partly exposed in ventral view. Dorsal mesial margin of gonocoxa with a broad posteriorly directed, apically angulate setose lobe. Two juxtagonostylar setae present: a curved megaseta and a thinner seta arising from a flattened, unusually long basal body, which is ca. four times as long as the megaseta. Gonostylus unusually long, longer than gonocoxa, ventrally setose, dorsally almost non-setose, the setae on the mesial margin forming a conspicuous fringe. Tegmen elongate-triangular, with sloping lateral shoulders. Hypoproct large and broad, extending slightly more posteriad than gonocoxa, with only 3–4 ventral setae on each side. Cerci short, medially united near base.

Female unknown.

**Discussion.** *Manota forceps* is distinguished from all other previously described *Manota* in which the male is known by its gonostylus, which is longer than the gonocoxa instead of being much shorter. The unusually long, posteriorly directed parastylar lobe is also unique. The dorsal armature of the gonocoxa has a resemblance to the New Zealand *M. maorica* Edwards by having a similar, very long basal body to the juxtagonostylar megasetae and by having a similar large setose lobe in a more dorsal position. *M. maorica* differs by having the gonostylus short, scarcely more than half the length of the gonocoxa, and which is composed of several lobes, and by having a short parastylar lobe. *M. forceps* differs from most species of *Manota* by lacking the thumb-like apicommesial extension on palpomere 3 as well as the curved sensilla located on that extension. One species that is similar in this respect, *M. whiteleyi*, was recently described from South Africa by Jaschhof and Mostovski (2006), but its hypopygium is abundantly different and resembles that of the Afrotropical *M. furcata* Söli, *M. serrata* Söli and *M. sespinea* Söli. The non-setose anepisternum of *M. forceps* is



**FIGURE 6.** *Manota forceps* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

also a rare character in *Manota*. *M. maorica* (New Zealand), *M. taedia* Matile (New Caledonia), *M. ctenophora* Matile (New Caledonia) and *M. unifurcata* Lundström (Europe) are similar in this respect, but there are several species in the Afrotropical region and a few species in the Neotropical region in which this character has not been studied.

**Types.** *Holotype*. Male, Thailand: 8 km E of Doi Anh Kang, over a rocky brook, No. 17, Nov 2, 2004, leg. L. Papp & M. Földvári (beside Road no. 1249) (gen. prep. Bud 34).

***Manota inusitata* sp. n.**

(Figs 7A, B)

Body yellow, length ca. 2.3 mm, wing length 1.78 mm.

Male. **Head.** Flagellomere 4 slightly longer than broad, with 0.03 mm long trichia. Postocular setae (8–9) long, yellow. **Thorax.** Anepisternum setose. Anterior basalare setose. Setae of preepisternum 2 not observed. Laterotergite setose. Setae of episternum 3 not observed. Legs all yellow. **Wing.** Wing membrane light brownish, dorsally without setae at posterior margin, veins brown. Sc distally of h non-setose. Ratio of visible sections of veins M1 and M2 34/87. A1 indicated by a few setae. **Hypopygium** (Figs 7A, B). Tergite 9 about half the ventral length of gonocoxa, laterally sharply delimited, posterior margin transverse, anterior margin deeply incised, setae similar to ventral setae of gonocoxa. Ventral mesial margin of gonocoxa sigmoid. Parastylar lobe well exposed, with 1–3 transversely directed setae. Paraapodemal lobe distinct and well exposed in ventral view. Dorsal mesial margin of gonocoxa simple, curved, apically with a small lobe with four strong marginal setae one of which is unusually modified (Fig. 7A). Two long, apically curved juxtagonostylar megasetae present, arising from a basal body which is short, about one-fourth as long as the megasetae. Gonostylus simple, elongate-oval, laterally with long normal setae, mesially largely non-setose, except at apical margin with a transverse zone of strong setae the mesial-most of which are prominent megasetae. Tegmen broadly subtriangular with rather weak lateral shoulders. Hypoproct rather small, extending posteriorly just beyond the level of the base of the gonostylus, with ca. 20 scattered setae on each half. Cerci medially separate.

Female unknown.

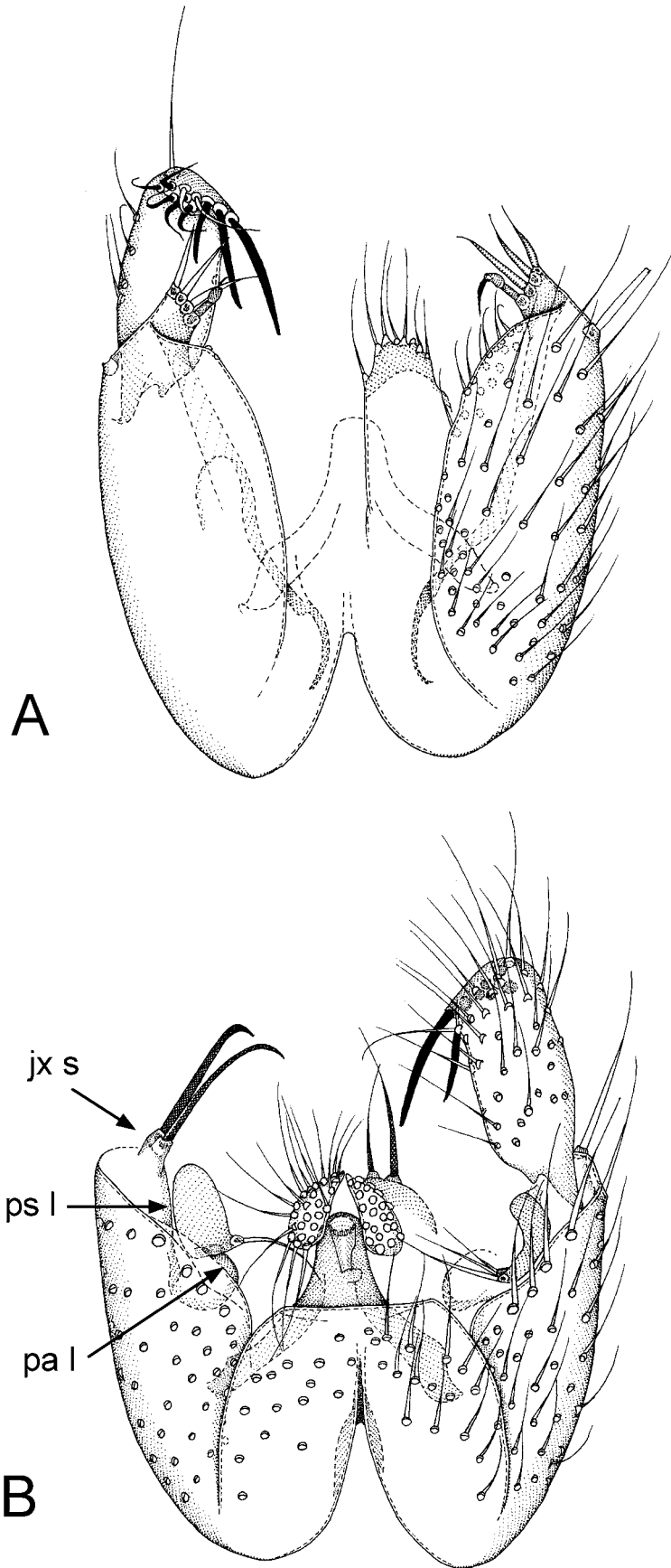
**Discussion.** *Manota inusitata* is similar to *M. horrida* Hippa. It differs by having the gonostylus broader, about one-third of its length instead about one-fourth, not curved, and with the apical setae/megasetae stouter and shorter; and by having the lobe apically at the dorsal mesial margin of gonocoxa with four setae, of which the most mesial or anterior one is unusually modified and geniculate (Fig. 7A), instead of having three normal setae.

**Types.** *Holotype*. Male, Thailand: Khao Pu-Khao Ya N. P., along a forest brook below the (Pak Yam) waterfall, No. 42, Nov 21, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 20).

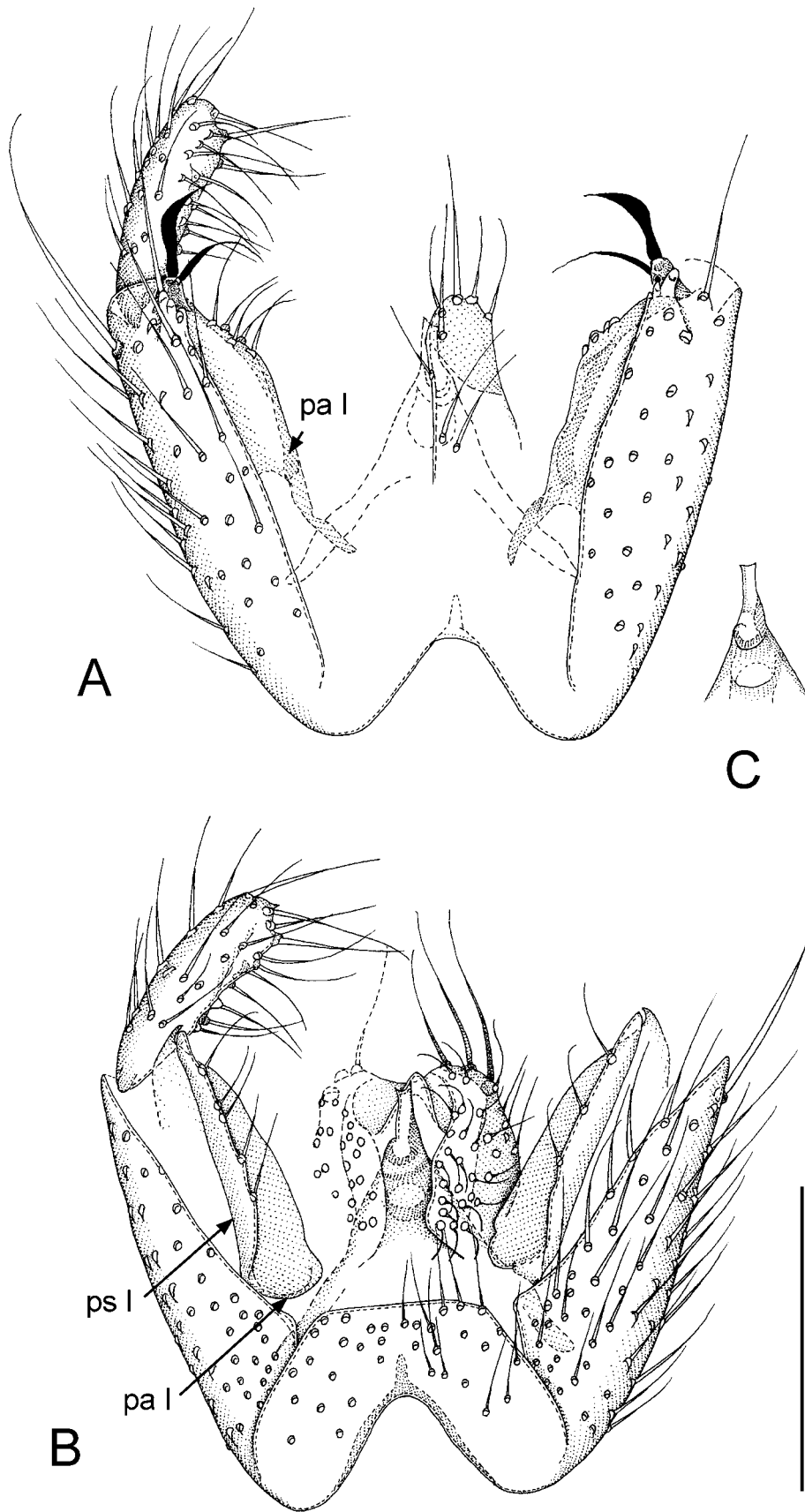
***Manota mirifica* sp. n.**

(Figs 8A, B, C)

Body light brown, length ca. 2.1 mm (holotype), ca. 2.1–2.5 mm (paratypes), wing length 1.57 mm (holotype), 1.55–1.65 mm (paratypes).



**FIGURE 7.** *Manota inusitata* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.



**FIGURE 8.** *Manota mirifica* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view, and the apex of tegmen (C) in ventral view. Scale 0.1 mm.

Male. **Head.** Flagellomere 4 1.3 times as long as broad with 0.03 mm long trichia. Postocular setae brown, comparatively short and thick. **Thorax.** Anepisternum setose. Anterior basalare non-setose. Setae of preepisternum 2 not observed. Laterotergite with scattered setae. Setae of episternum 3 not observed. Legs yellow but apex of hind femur and base of hind tibia brown and tarsi slightly darkened. **Wing.** Wing membrane brownish, dorsally without setae at posterior margin. Sc distally of h setose. Ratio of visible sections of veins M1 and M2 40/78 (holotype), 38/70 (paratype). A1 indicated by a few setae. **Hypopygium** (Figs 8A, B, C). Tergite 9 about one-third of the ventral length of gonostylus, laterally sharply delimited, anterior margin deeply incised, the setae similar to the ventral setae of the gonocoxa. Ventral mesial margin of gonocoxa slightly angled at the level of the posterior margin of tergite 9. Parastylar lobe unusually large, long and narrow, extending from the base of gonostylus to near the apex of sternite 9, with a few to many setae at margin and directed obliquely posteriad. Paraapodemal lobe distinct, well exposed in ventral view. Dorsal mesial margin of gonocoxa simple, with a small setose subapical lobe. Two juxtagonostylar setae present: one flattened megaseta and a strong seta arising from a common basal body the length of which is about half the length of the megaseta. Gonostylus simple, narrowly elongate-oval with rather long unmodified setae. Tegmen subtriangular with the apex narrow and asymmetrical, the lateral shoulders weak. Hypoproct large, extending posteriorly scarcely more than to the base of gonostylus, with ca. 25 setae on each half. Cerci medially separate.

Female unknown.

**Discussion.** The hypopygium of *M. mirifica* is not similar to that of any other described species. It is distinguished by the asymmetrical apical part of the tegmen and by the long stripe-like parastylar lobe, which parallels the ventral mesial margin of the gonocoxa. This type of long parastylar lobe is quite different from the long one in *M. forceps* because here it is actually the base of the lobe which is unusually wide.

**Types.** *Holotype.* Male, Thailand: Trang Prov., Thung Khai Botanic Garden, primary lowland rainforest, No. 28, Nov 12, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud. 14). *Paratypes.* 1 male with the same data as holotype (gen. prep. Bud 11); 1 male, Phattalung Wildlife Breeding Research Centre, along a forest brook, No. 39, Nov 20, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 15); 1 male, Trang Prov., Khao Chong Botanic Garden, rainforest, No. 43, Nov 22, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 2).

### *Manota occulta* sp. n.

(Figs 9A, B)

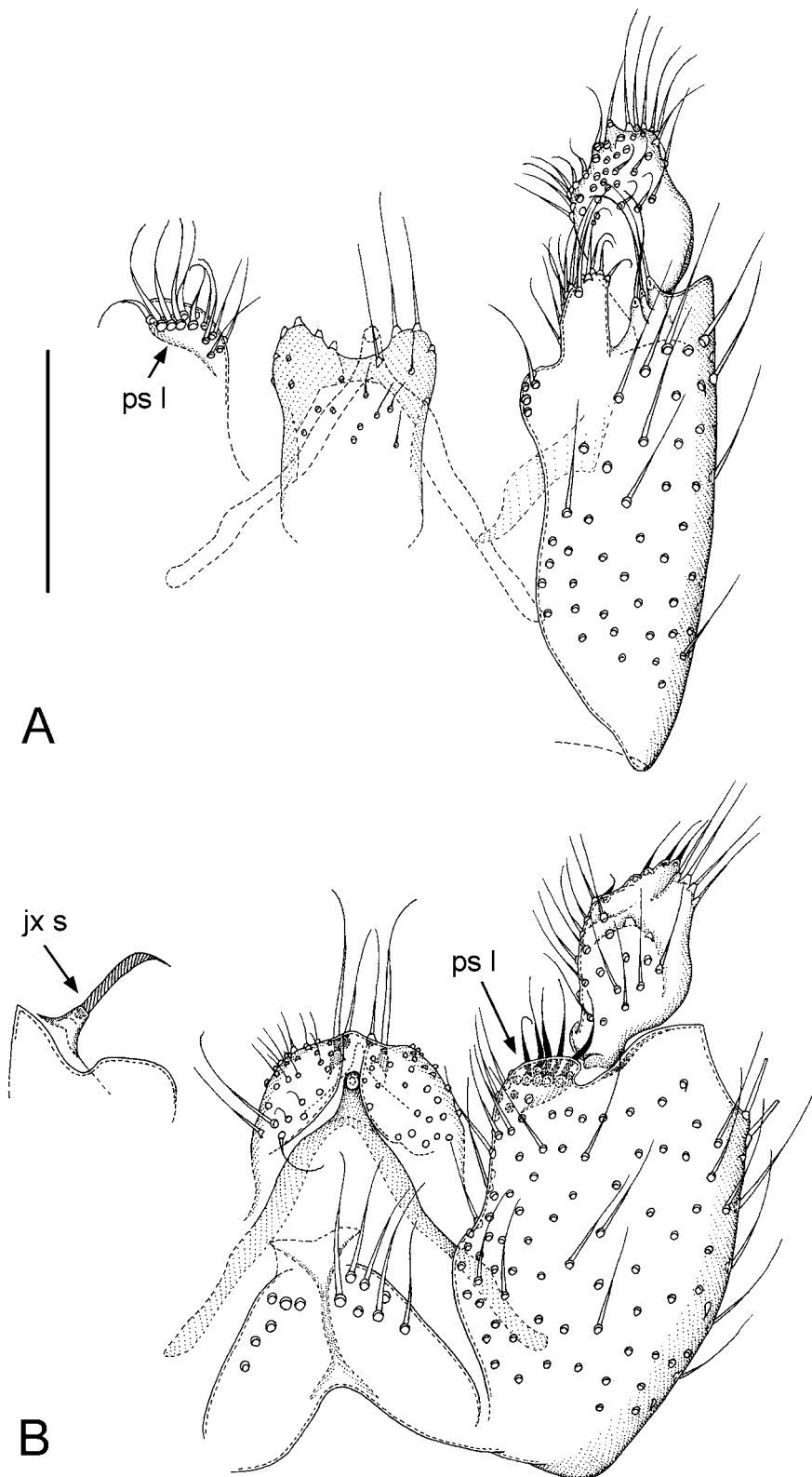
Body dark brown, length ca. 2.7 mm, wing length ca. 2.10 mm (defective).

Male. **Head.** Flagellomere 4 as long as broad, its trichia 0.04 mm. Postocular setae (8) medium-long, black. **Thorax.** Anepisternum setose. Anterior basalare setose. Setae of preepisternum 2 not observed. Laterotergite setose. Setae of episternum 3 not observed. Mid and hind trochanters, basal ¼ of mid and hind femora dark, ventral surface of fore femur fumose, tarsi brown. **Wing** (right wing lost, left wing damaged). Membrane dorsally without setae at posterior margin, veins brown. Sc distally of h non-setose. Ratio of visible sections of veins M1 and M2 48/ca. 105. A1 indicated by a few setae.

**Hypopygium** (Fig. 9A, B). Tergite 9 subtriangular, posteriorly scarcely extending to half length of gonocoxa, laterally sharply demarcated, anteriorly deeply incised, apically not distinctly separated from more posterior membranous structures, the setae stronger than on gonocoxae. Mesial margin of gonocoxa sigmoid, with a small apicomesial lobe. Parastylar lobe not exposed but covered by the apicomesial lobe of gonocoxa, weakly sclerotized, with ca. 10 posteriorly directed setae. Paraapodemal lobe indistinct, not visible in ventral view. Dorsal mesial margin of gonocoxa subapically with a rounded lobe with a few setae and more apically with a larger posteriorly directed lobe, which is setose apically and along the mesial margin; apically on gonocoxa at the base of the gonostylus with a few setae arising from large basal bodies. One juxtagonostylar seta present: a stout, possibly flattened, megaseta arising from a basal body which is about a third of the length of



the megaseta. Gonostylus about twice as long as broad, broadest at middle, apically slightly bilobate on ventral side, setosity moderately long, rather unmodified. Tegmen triangular, with weak lateral shoulders. Hypoproct rather large, posteriorly extending as far as gonocoxa, with ca 20 scattered ventral setae. Cerci medially fused.



**FIGURE 9.** *Manota occulta* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view. Scale 0.1 mm.

Female unknown.

**Discussion.** *Manota occulta* is similar to *M. secreta*. It is distinguished by the juxtagonostylar megaseta which is simple, not flattened, by having the ventral mesial margin of gonocoxa sigmoid, not almost straight, by having the lobe at the ventral apicomesial corner of gonocoxa more pronounced, by having the more anterior of the lobes on the dorsal mesial margin of the gonocoxa more pronounced, by having the apical margin of the gonostylus oblique, not transversely emarginated, and by having the gonostylus apicolaterally bilobed. Furthermore, the parastylar lobe has ca. 10 setae instead of ca. 5. Both species are similar to *M. roslii*, *M. yongi* and *M. pollex*. They differ from *M. roslii* e.g. by having a prominent lobe at the dorsal apicomesial corner of the gonocoxa. This lobe is setose on its margin and to a variable extent on the dorsal surface. In *M. roslii* the homologous place is only slightly produced lobe-like and bears setae on the ventral surface. *M. occulta* and *M. secreta* differ from *M. pollex* and *M. yongi* e.g. by lacking a long and strong seta at the dorsal mesial margin of the gonocoxa, situated on a lobe which is apparently homologous with the more anterior of the two lobes in these species.

**Types.** *Holotype*. Male, Thailand: Doi Pui, over a forest trail, No. 10, Oct 31, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 22).

### ***Manota secreta* sp. n.**

(Figs 10A, B, C)

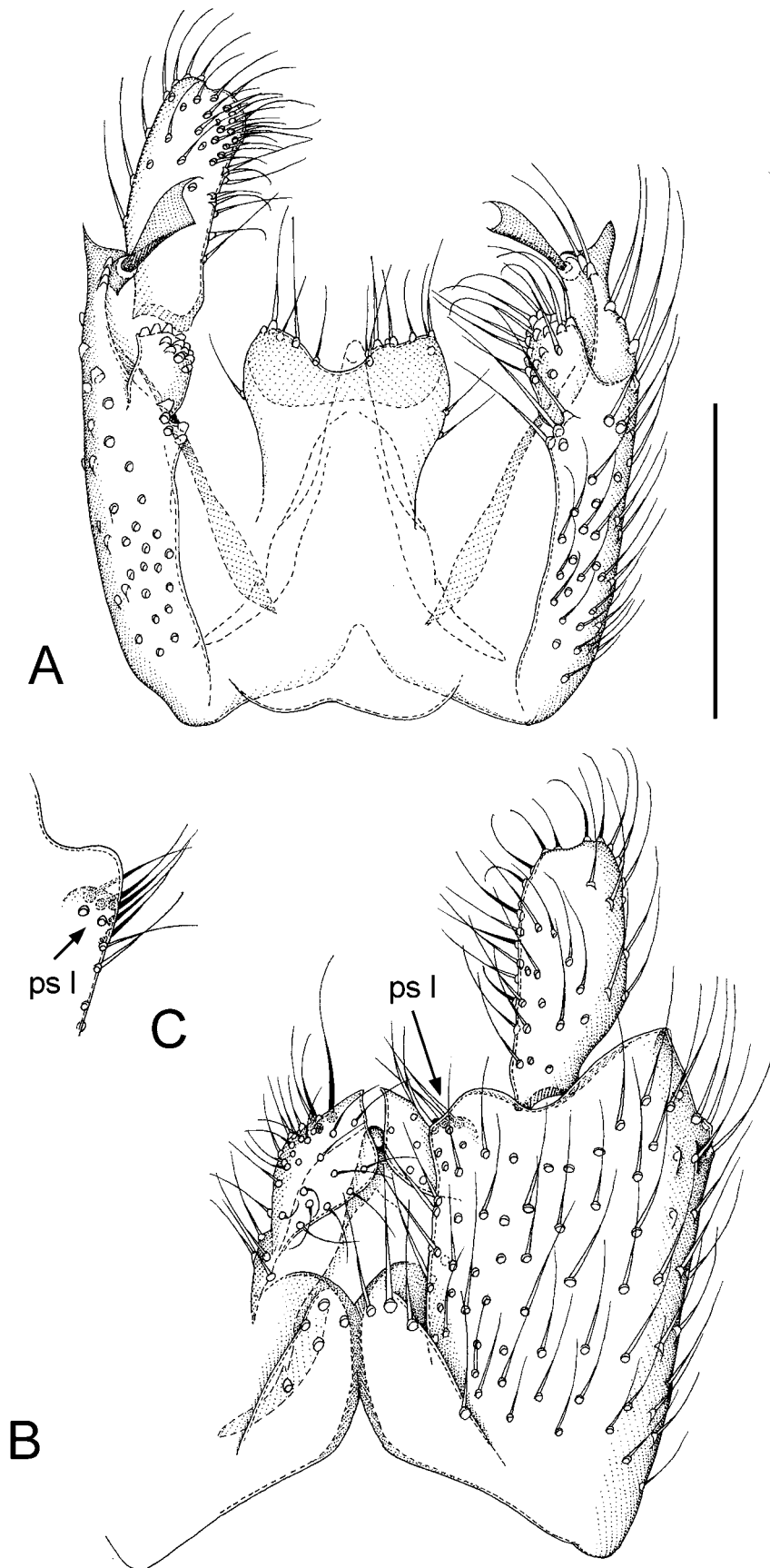
Body yellow, only flagellomeres and tarsi brown, body length ca. 2.0 mm, wing length ca. 1.70 mm.

Male. **Head.** Flagellomere 4 as long as broad with 0.02 mm long trichia. Postocular setae rather short, black. **Thorax.** Anepisternum setose. Anterior basalare non-setose. Setae of preepisternum 2 not observed. Laterotergite setose. Setae of episternum 3 not observed. Legs all yellow. **Wing.** Wing membrane darkened, dorsally with some setae at posterior margin, veins brown. Sc distally of h non-setose. Ratio of visible sections of veins M1 and M2 38/ca. 86 (not precisely measurable on damaged wing). A1 indicated by a few setae. **Hypopygium** (Figs 10 A, B, C). Tergite 9 subtriangular, posteriorly scarcely extending to half length of gonocoxa, laterally sharply demarcated, anteriorly deeply incised, apically not distinctly separated from more posterior membranous structures, the setae stronger than on gonocoxae. Mesial margin of gonocoxa straight, with an apicomesial lobe. Parastylar lobe not exposed but covered by the apicomesial lobe of gonocoxa, weakly sclerotized, with ca. 5 posteriorly directed setae. Paraapodemal lobe indistinct, not visible in ventral view. Dorsal mesial margin of gonocoxa submedially with an indistinct lobe with a few setae and more apically with a larger posteriorly directed lobe, which is rather broadly setose apically and on the mesial side. One juxtagonostylar seta present: a megaseta which is flattened and widens towards the apex and arises from a low basal body which is scarcely one-fourth of the length of megaseta. Gonostylus about two-and-a-half times as long as broad, evenly broad beyond the narrower base, apical margin slightly emarginate, setosity moderately long, rather unmodified. Tegmen triangular, with weak lateral shoulders. Hypoproct rather large, posteriorly extending as far as gonocoxa, with ca 20 scattered ventral setae. Cerci medially fused.

Female unknown.

**Discussion.** *Manota secreta* is similar to *M. occulta*, and also to *M. pollex*, *M. roslii* and *M. yongi*. For further discussion, see under *M. occulta*.

**Types.** *Holotype*. Male, Thailand, Trang Prov., Palian District, Nam Tok Nam Pan Forest Park, over streams & vegetation around waterfalls, No. 35, Nov 17, 2004, leg. L. Papp & M. Földvári (gen. prep. Bud 29).



**FIGURE 10.** *Manota secreta* sp. n. (holotype): hypopygium in dorsal (A) and in ventral (B) view, and part of the ventral mesial margin of gonocoxa with the parastylar lobe (C) in ventral view. Scale 0.1 mm.

## Acknowledgements

L. Papp's study was supported by the Hungarian National Scientific Research Fund (OTKA, No. T 042540 and K 60593). The English text was kindly checked by Dr. Adrian Pont, Oxford.

## References

- Bechev, D. (2000) World distribution of the genera of fungus gnats (Diptera: Sciaroidea, excluding Sciaridae). *Studia dipterologica*, 7, 543–552.
- Edwards, F.W. (1928) Nematocera. In: British Museum (Natural History), *Insects of Samoa and other Samoan Terrestrial Arthropoda*, Part VI, Diptera, 23–108.
- Hippa, H. (2006) Diversity of *Manota* Williston (Diptera: Mycetophilidae) in a Malaysian rainforest: description of twenty-seven new sympatric species. *Zootaxa*, 1161, 1–49.
- Hippa, H. (2007) The genus *Manota* Williston (Diptera: Mycetophilidae) in Melanesia and Oceania. *Zootaxa*, 1502, 1–44.
- Hippa, H., Jaschhof, M. and Vilkamaa, P. (2004) Phylogeny of the Manotinae, with a review of *Eumanota* Edwards, *Paramanota* Tuomikoski and *Promanota* Tuomikoski (Diptera, Mycetophilidae). *Studia dipterologica*, 11, 405–428.
- Jaschhof, M. and Mostovski, M. (2006) First record of *Manota* (Diptera: Mycetophilidae: Manotinae) from southern Africa, with the description of two new species. *African Invertebrates*, 47, 237–242.
- Papp, L. (2004) Seven new species of Manotinae (Diptera: Mycetophilidae) from Asia and Papua New Guinea. *Acta Zoologica Academiae Scientiarum Hungaricae*, 50 (3), 227–244.
- Papp, L., Merz, B. & Földvári, M. (2006) Diptera of Thailand. A summary of the families and genera with references to the species representations. *Acta Zoologica Academiae Scientiarum Hungaricae*, 52 (2), 97–269.
- Senior-White, R. A. (1922): New species of Diptera from the Indian region. *Memoirs of the Department of Agriculture of India (ent. ser.)*, 7 (9), 107–169.
- Ševčík, J. (2002): *Manota chinensis* sp. n., a second Palearctic species of Manotinae (Diptera: Mycetophilidae). *International Journal of Dipterological Research*, 13(1), 23–26.
- Söli, G. E. E. (1993): New East African species of *Manota* (Diptera, Mycetophilidae). *Journal of African Zoology*, 107, 451–465.