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NOTES ON *NEMOPHORA* IN VIETNAM, WITH DESCRIPTION OF A NEW SPECIES (LEPIDOPTERA: ADELIDAE)

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ABSTRACT.– *Nemophora tanakai* **n. sp.**, which is a close relative of *N. fluorites* (Meyrick, 1907), is described from Tam Dao, Vietnam. *N. fluorites* is also recorded from Vietnam and Myanmar for the first time and given descriptive notes. *Nemotois takamukuella* Matsumura, 1932, which was described based on a single male from "Japan," is synonymized with *N. fluorites* (Meyrick). The former was considered to be erroneously recorded from Japan.

KEY WORDS: Asia, India, Japan, Myanmar, nectaring, *Nemophora*, ***Nemophora tanakai*** n. sp., Oriental, Southeast Asia, Taiwan, Tam Dao, taxonomy.

The adelid fauna of Vietnam has been poorly investigated. In May 1998, the author participated in a field survey project in northern Vietnam conducted by Yutaka Arita of Meijo University, Japan. During the survey, at one of the peaks (1230m) of Tam Dao, the author and Ban Tanaka (Toyota, Japan) collected two *Nemophora* species. One is *Nemophora fluorites* (Meyrick, 1907), which was known from India and Taiwan, and the other represents a new species, which is externally similar to *N. fluorites*.

Though many adelid species from Vietnam await to be described or recorded, the two species obtained in Tam Dao are treated here as an introduction to a taxonomic study of the Adelidae of Vietnam.

MATERIALS AND METHODS

Most of the materials used in this study were obtained in Tam Dao, northern Vietnam in May 1998 by the author. For comparing eye size, horizontal eye diameter (hd) and minimum distance between eyes (md) are measured for calculating "eye size index" (hd/md) (Hirowatari, 1997). Antennal length (al) and forewing length (fl) are measured, and ratio of antennal length to forewing length (al/fl) are calculated. Terminology used here follows Nielsen (1980).

Abbreviations for institutions and collections:

BMNH	The Natural History Museum, London
USNM	National Museum of Natural History, Smithsonian Institution, Washington DC, USA
SEHU	Laboratory of Systematic Entomology, Hokkaido University, Sapporo, Hokkaido, Japan
OPU	Entomological Laboratory, Osaka Prefecture University, Sakai, Osaka, Japan

Nemophora fluorites (Meyrick)

(Fig. 1, 2-C,D, 3-C,D, 5-A,B, 6, 7)

Nemotois fluorites Meyrick, 1907, J. Bombay Nat. Hist. Soc. 17(4): 992. [Lectotype examined: Fig.1A] BMNH. Meyrick, 1912, 9; Meyrick, 1914, 61.
Nemotois takamukuella Matsumura, 1932, Ins. Mats. 6(3): 125, pl.4, fig.18, [Holotype examined] SEHU. **Syn. nov.**
Nemophora takamukuella: Moriuti, 1982, 56.

The following descriptions refer to the representatives of *N. fluorites* from Tam Dao, Vietnam.

Description.– MALE: Forewing 10.00 ±0.58 mm (mean ±SD, n = 30). *Head*: with raised light yellow hairs, set with black between eyes; face with whitish yellow hairs, sparsely mixed with black. Eyes large, very close to each other dorsally; horizontal eye diameter (hd)/ minimum distance between eyes (md): 4.28 ±0.47 (mean ±SD, n = 30). Labial palpus long, beyond vertex; 2nd longest, densely covered with raised golden brown hairs; 3rd shortest with dark brown scales. Antenna moderate in length, 27.02 ±1.67mm (mean ±SD, n = 30), al/fl 2.70 ±0.10 (mean ±SD, n = 30); basal 1/4 dark bronzy, distal 3/4 silvery white.
Thorax: purplish bronzy, with sparse long black hairs. Tegula yellow, usually with purplish bronzy scales. Legs dark bronzy with purple luster, fore and mid tarsi with basal yellow ring; hind tibia yellow, apical 1/5 dark bronzy, with long ocherous curled hairs dorsally; hind tarsus dark bronzy with basal yellow rings. *Forewing*: lanceolate, rather narrow; R3 and R4 stalked; yellow, base to basal half with three (subcostal, median and subdorsal) longitudinal black-margined leaden fascia, subcostal and median fascia being connected basally; the median fascia being shorter and narrower; a pair of black-margined leaden transverse fascia approximated and dividing yellow at middle to form an X-shaped mark at postdiscal area. *Hindwing*: rounded-triangular, dark brown with a small yellowish patch at costa near apex; cilia ocherous to dark brown. *Male genitalia*: Uncus short with a weak median keel. Vinculum very long, about 2.7 times as long as valva. Valva nearly triangular in mesal view; ventro-posterior corner acutely angled; sacculus produced anteriorly to form suspensorium for aedeagus. Posterior median process of transtilla conical. Aedeagus long and slender; median portion weakly curved dorsally; vesica with two rows of spine-like cornuti dorsally. Juxta arrow-shaped; head narrow with prominent barbs.
FEMALE: *Forewing*: 8.54 ±0.37mm (mean ±SD, n = 5). *Head* with raised yellow hairs, mixed with black; face with short whitish yellow hairs, sparsely mixed with black. Eyes small, horizontal eye diameter (hd)/ minimum distance between eyes (md): 0.65 ±0.04mm (mean ±SD, n = 5). Antenna short, 10.70 ±0.27mm (mean ±SD, n = 5), al/fl 1.25 ±0.06mm (mean ±SD, n = 5); basal 2/3 with rough bronzy black scales; apical 1/3 white and smooth. *Thorax*: segments and tegula yellow (Fig. 3-D). *Forewing*: shorter and broader than male, R3 and R4 separate; basal half uniformly yellow, a pair of black-margined leaden transverse fascia forming an X-shaped mark at postdiscal area as in male. *Hindwing*: rounded-trapezoidal, markings as in male. *Female genitalia*: Apophyses posteriores and anteriores subequal in length. Vestibulum relatively large; postero-dorsal portion well sclerotized to form vestibular lamella (Hirowatari, 1997), which is nearly wedge-shaped with a median keel in dorsal view. 7th sternite rather broad. Apical process of ovipositor as in Fig. 7-F.

Specimens examined.– VIETNAM: 4 ♂ 1 ♀,Tam Dao 1230m, Vinh Phu Prov., 4 May 1998, B. Tanaka, OPU; 15 ♂ 2 ♀, same locality, 5 May 1998, T. Hirowatari, OPU; 12 ♂, 6 May 1998, same locality, T. Hirowatari, OPU; 1 ♂, same label, USNM; 4 ♂ 2 ♀, 8 May 1998, same locality, T. Hirowatari, OPU; 1 ♀, same label, USNM.

MYANMAR: 1 ♂, Tazondum-Ghawann (alt. 1100-1300m), Kachin State, Y. Watanabe, OPU.

TAIWAN: 1 ♂, Tattaka [Sungkang], 7 Jun 1943, S. Issiki, USNM; 1 ♂, Nantou Hsien, Jenai, Kuantaoshan, 23 Mar 1994, Y. Arita, OPU; 2 ♂, Musya [Wushe (= Jenai)], 27 Mar 1943, S. Issiki, USNM; 1 ♂, Rantaisan

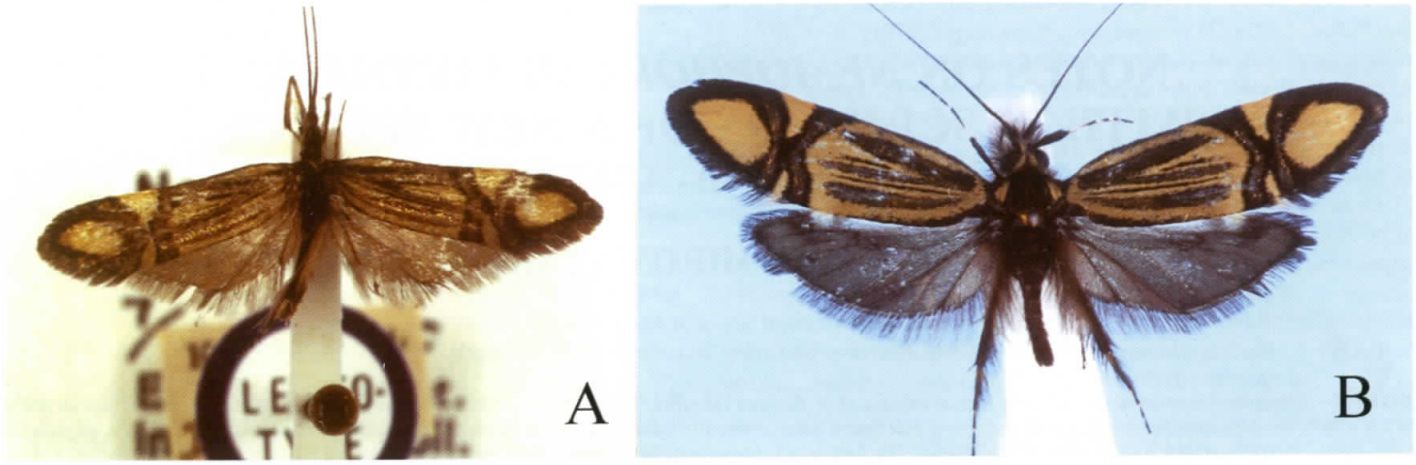

Fig. 1. *Nemophora fluorites* (Meyrick): A) Lectotype ♂ from India (BMNH); B) ♂ from Taiwan collected by Y. Arita (OPU).

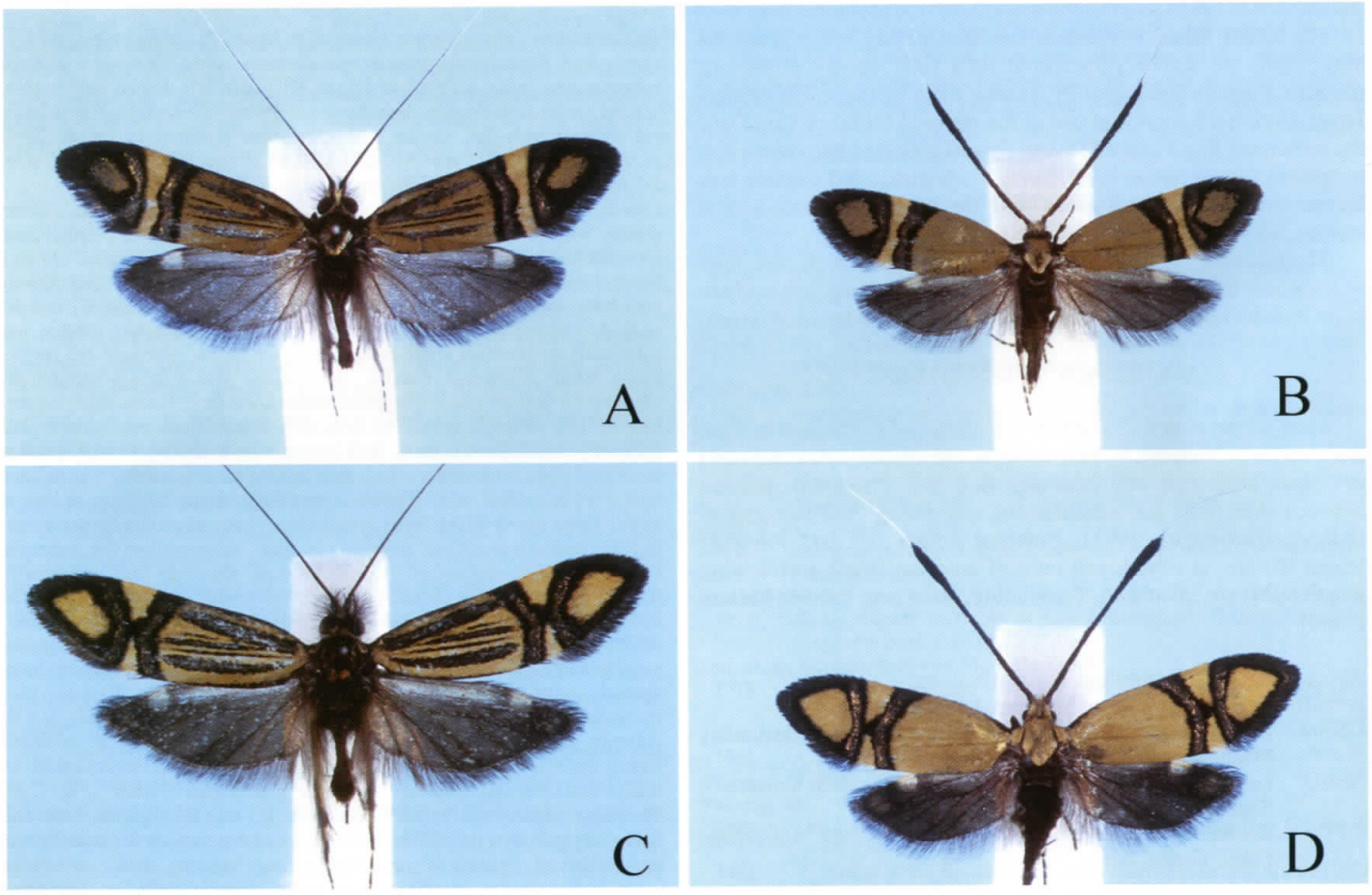

Fig. 2. *Nemophora* spp. from Vietnam: A-B) *N. tanakai* n. sp., A. holotype ♂, B. Paratype ♀; C-D) *N. fluorites* (Meyrick), C. ♂, D. ♀.

[Lantashan], 21 May 1928, S. Issiki, USNM; 1 ♂, Tyokakurai, 27 Mar 1944, S. Issiki, USNM; 1 ♀, 26 Mar 1944, same locality and collector, USNM; 1 ♂, Rengwati, 29 Mar 1927, S. Issiki, USNM; 1 ♀, 22 Mar 1943, same locality, S. Issiki, USNM.

Distribution.– India, Myanmar, Vietnam, Taiwan.

Remarks.– Matsumura (1932) described *Nemotois takamukuella* based on a single male from "Japan." Examination of the holotype in SEHU revealed that *N. takamukuella* is synonymous with *N. fluorites* Meyrick which was originally described from Khasi Hills, India.

The holotype of *N. takamukuella*, in SEHU, is fixed with three labels: white paper "Takamuku/Yanaga?", red paper "Holotype/ Matsumura", and red paper "Holotype/Nemotois/takamukuella/ Matsumura". Matsumura (1932) regarded the collecting locality of the specimen as "Yanagawa" (Fukuoka Pref., Kyushu, Japan), however, since its description, the species (*N. fluorites*) has never been recorded from Japan. It seems that Matsumura erroneously recorded it from Japan being based on the specimen probably from Taiwan. This is a first record of *N. fluorites* from Vietnam and Myanmar.

Fig. 3. *Nemophora* spp. from Vietnam: A-B) *N. tanakai* n. sp., A. holotype ♂, B. Paratype ♀; C-D) *N. fluorites* (Meyrick), C. ♂, D. ♀. Arrows indicate the differently colored tegula scales.

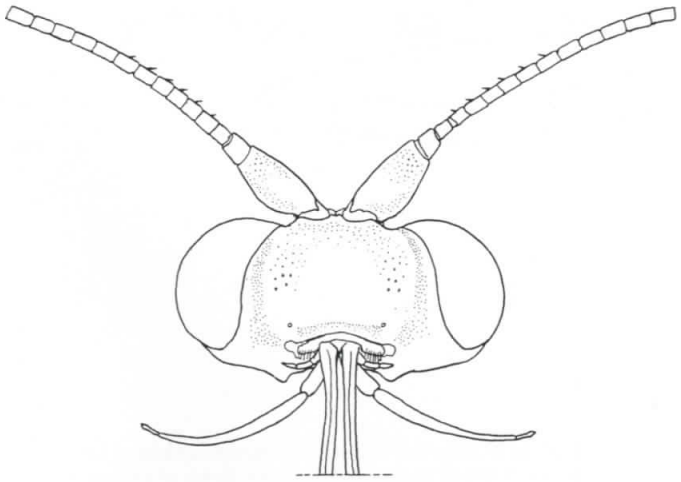

Fig. 4. Head of *Nemophora tanakai* n. sp., paratype ♂.

Nemophora tanakai Hirowatari, n. sp.

(Fig. 2-A,B, 3-A,B, 4, 5-C,D, 8, 9)

Description.– MALE: Forewing 8.5mm in holotype, 9.06 ±0.46mm (mean ±SD, n = 9). *Head*: with raised light yellow hairs, with sparse black hairs between eyes; face with whitish yellow hairs, sparsely mixed with black. Eyes large, but set further apart dorsally than in *N. fluorites*; horizontal eye diameter (hd)/ minimum distance between eyes (md): 2.67 in holotype, 2.75 ±0.10 (mean ±SD, n = 9) in paratypes. Labial palpus long, beyond vertex; 2nd longest, densely covered with raised golden brown hairs, dorsally with short whitish yellow hairs; 3rd shortest with dark brown scales. Antenna moderate in length, 22.0mm in holotype, 22.72 ±0.80mm (mean ±SD, n = 9), al/fl 2.59 in holotype, 2.51 ±0.13 (mean ±SD, n = 9) in paratypes; basal 1/4 dark bronzy, distal 3/4 silvery white. Second to 7th flagellomeres with inwardly projecting spine-like pegs, which is one of generic characters of *Nemophora*. *Thorax*: golden bronzy with sparse long black hairs. Tegula bronzy with metallic blue scales distally (Fig. 3-A). Legs dark bronzy with purple to bluish luster, fore and mid tarsi with basal yellow ring; hind tibia yellow mixed dorsally with bronzy scales, apical 1/3 dark bronzy, with long ocherous curled hairs dorsally; hind tarsus dark bronzy with basal yellow rings. *Forewing*: lanceolate, somewhat broader than in *N. fluorites*; R3 and R4 stalked; yellow, basal half with 3 (subcostal, median and subdorsal) longitudinal, weakly black-margined leaden fascia; subcostal and median fascia being connected basally; similar leaden scales at basal half of costa; a pair of black-margined leaden transverse fascia approximated at middle,

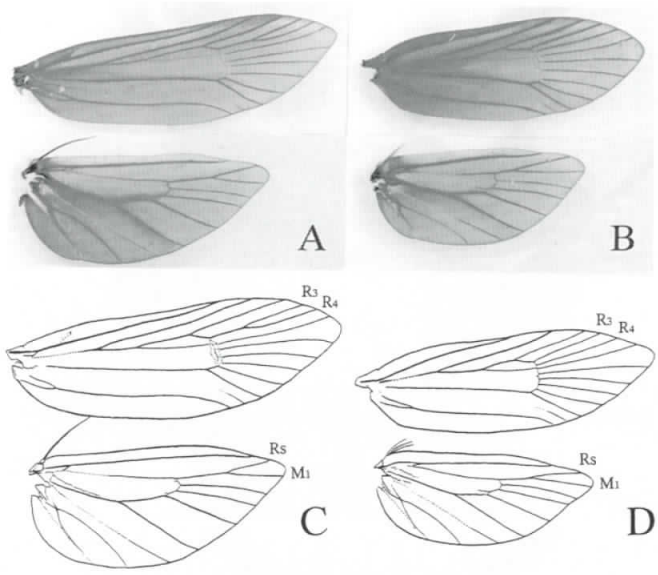

Fig. 5. Wing venations of *Nemophora* spp.: A-B) *N. fluorites* (Meyrick) from Vietnam, A. ♂. B. ♀; C-D) *N. tanakai* n. sp., C. Paratype ♂, D. Paratype ♀.

but not dividing yellow band between the fascia. *Hindwing*: dark brown with a rather distinct small yellowish patch at costa near apex; cilia ocherous to dark brown. *Male genitalia*: Similar to those of *N. fluorites*, but differ in the following points: Vinculum distinctly short, about 2.1x as long as valva; posterior median process of transtilla relatively shorter and blunt-ended; aedeagus shorter; juxta also shorter, head rather broader.

FEMALE: Forewing 7.2-7.5mm (n = 2). *Head*: with raised yellow hairs, mixed with black posteriorly; face with short whitish yellow hairs, sparsely mixed with black. Eyes small, horizontal eye diameter (hd)/ minimum distance between eyes (md): 0.61-0.62 (n = 2). Antenna short, 8.3-8.5mm (n = 2) al/fl 1.13-1.15 (n = 2); basal 2/3 with rough bronzy black scales, basally tinged with tastaceous; apical 1/3 white and smooth. *Thorax*: yellow; tegula basally yellow and apically metallic blue (Fig. 3-B). *Forewing*: shorter and broader than male, but R3 and R4 separate; basal half yellow with somewhat greenish tinge, a pair of black-margined leaden transverse fascia approximated at middle, but not dividing yellow band between the fascia as in male. *Hindwing*: rounded- trapezoidal, markings as in male. *Female genitalia*: Similar to those of *N. fluorites*, but differ as follows: Apophyses posteriores and anteriores subequal in length as in *N. fluorites*, but rather shorter. Vestibuller lamella rather indistinct, without median keel. Seventh sternite relatively slender. Apical process of ovipositor shorter, as in Fig. 9-F.

Specimens examined.– *Holotype* ♂, VIETNAM: Tam Dao 1230m, Vinh Phu Prov., 6 May 1998, T. Hirowatari. In OPU.

Paratypes: 4 ♂ 1 ♀, same label as holotype, OPU; 5 ♂, 5 May 1998, same locality, T. Hirowatari, OPU; 1 ♂, same label, USNM; 2 ♂,1 ♀, 8 May 1998, same locality, T. Hirowatari, OPU; 1 ♂, same label, BMNH.

Distribution.– Vietnam.

Etymology.– The specific name is dedicated to Ban Tanaka, a distinguished Japanese lepidopterologist. He first collected *N. fluorites* at Tam Dao and graciously allowed the author to describe the new species.

Remarks.– This species was collected on one of the peaks (1230m) of Tam Dao, northern part of Vietnam. The moths were observed nectaring on flowers of the *Castanopsis fissa*-group (probably *Castanopsis sclerophylla* (Lindl.) Schotthy) and actively flying over the flowers during daytime (0900-1300h), together with *N. fluorites*, except during cloudy or foggy weather condition.

Judging from the genital structure, this species is considered to be related to *N. fluorites*, but easily distinguished from it by the difference of forewing marking: the post discal yellow band is not divided by leaden transverse fascia in *N. tanakai* n. sp., while the yellow band is divided by the leaden fascia to form X-shaped marking in *N. fluorites*. They are also separable by the different coloration of tegula scales shown in Fig. 3.

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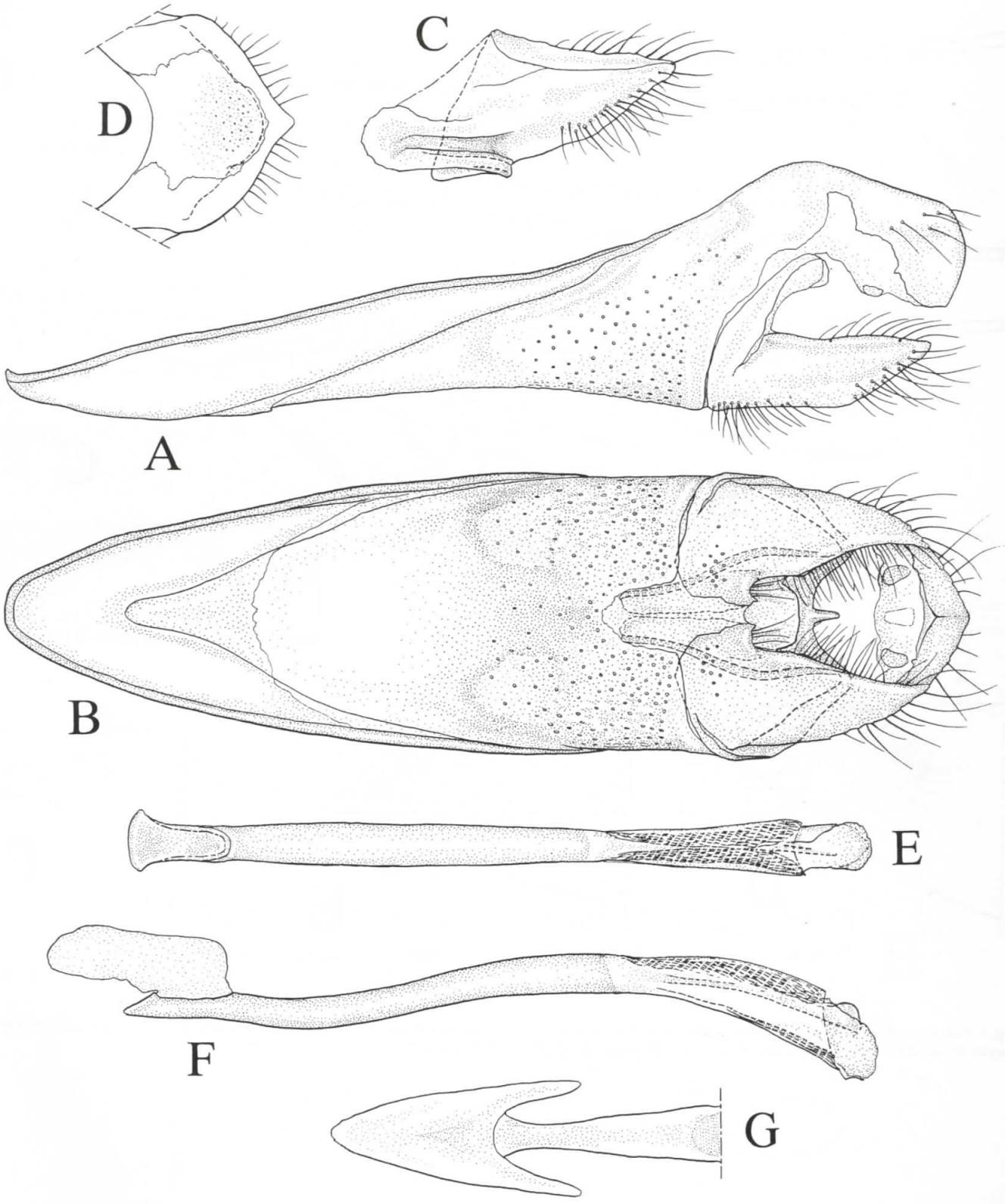

Fig. 6. Male genitalia of *Nemophora fluorites* (Meyrick) from Vietnam: A) Genitalia except aedeagus in lateral view; B) Ditto, ventral view; C) Right valva in internal view; D) Dorsum in dorsal view; E) Aedeagus in dorsal view; F) Ditto, in lateral view; G) Juxta in ventral view.

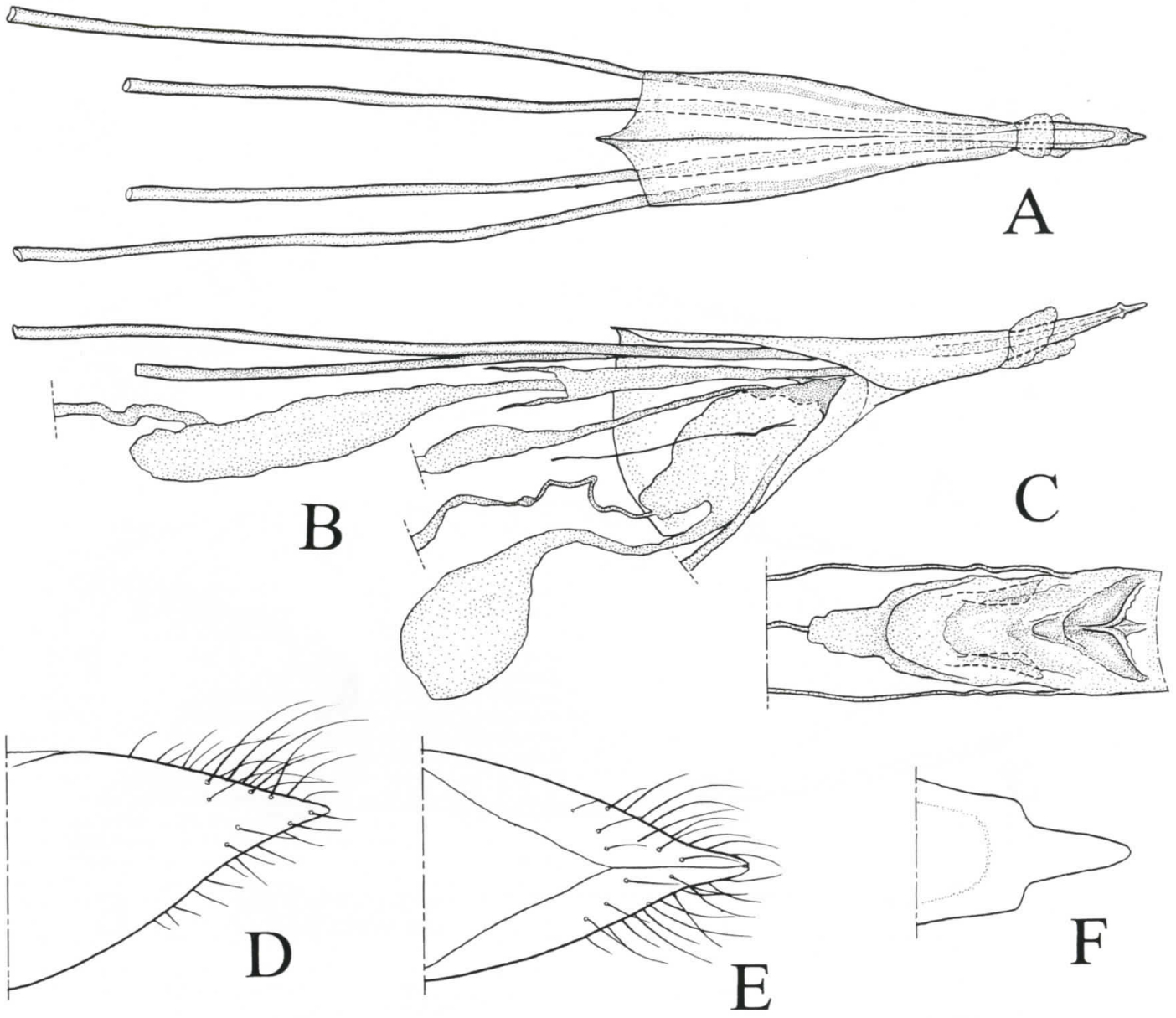

Fig. 7. Female genitalia of *Nemohora fluorites* (Meyrick) from Vietnam: A) Terminalia in dorsal view; B) Ditto, lateral view; C) Vestibulum in dorsal view; D) 7th sternite in latelal view; E) Ditto, in dorsal view; F) Apical portion of Ovipositor in dorsal view.

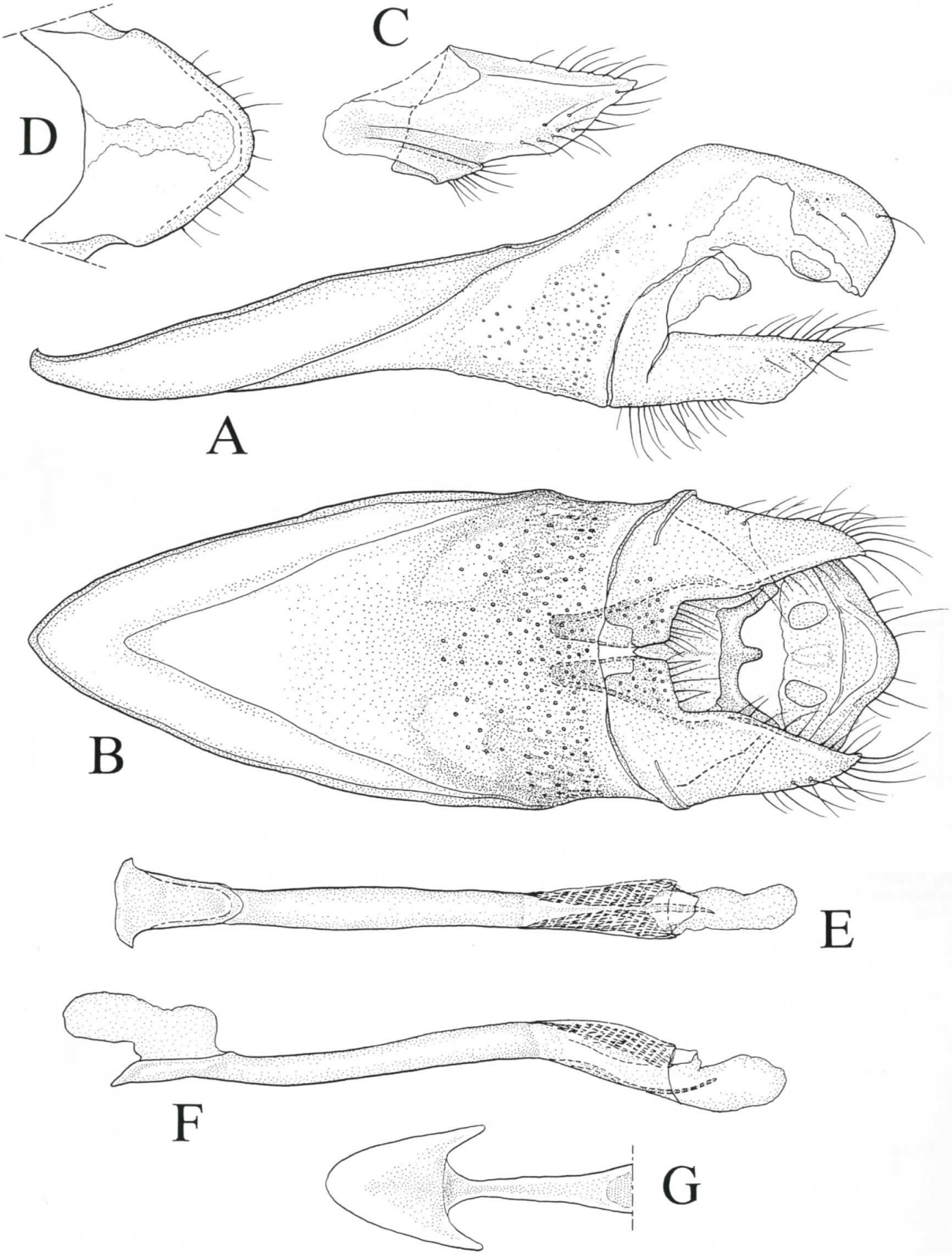

Fig. 8. Male genitalia of *Nemophora tanakai* n. sp., holotype: A) Genitalia except aedeagus in lateral view; B) Ditto, ventral view; C) Right valva in internal view; D) Dorsum in dorsal view; E) Aedeagus in dorsal view; F) Ditto, in lateral view; G) Juxta in ventral view.

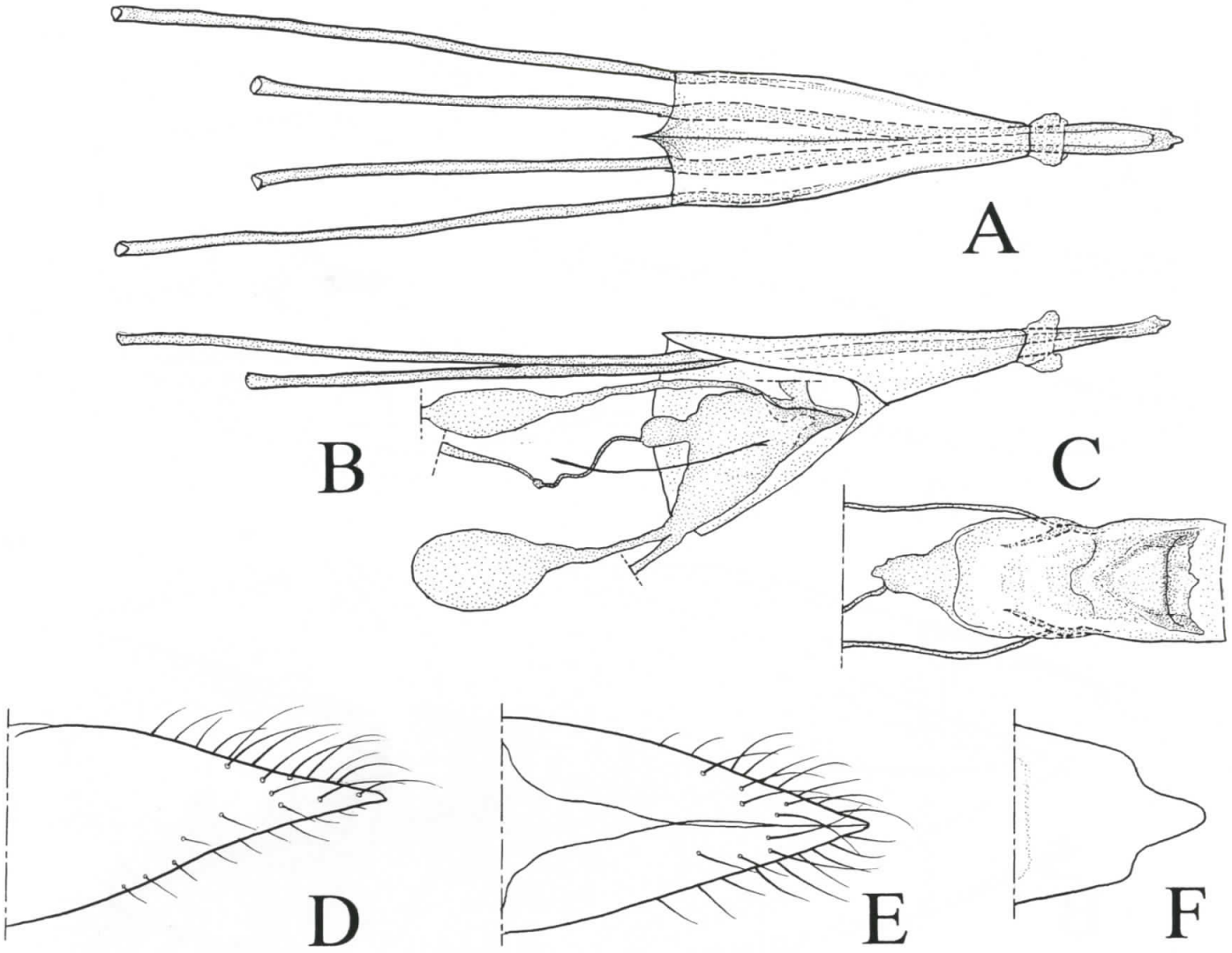

Fig. 9. Female genitalia of *Nemohora tanakai* n. sp., paratype: A) Terminalia in dorsal view; B) Ditto, lateral view; C) Vestibulum in dorsal view; D) Seventh sternite in latelal view; E) Ditto, in dorsal view; F) Apical portion of Ovipositor in dorsal view.