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**NOTES ON THE GENUS ANTHOMYIA MEIGEN  
IN THE ORIENTAL REGION (DIPTERA: ANTHOMYIIDAE)**

By MASA AKI SUWA

*Abstract*

SUWA, M., 2024. Notes on the genus *Anthomyia* Meigen in the Oriental region (Diptera: Anthomyiidae). *Ins. matsum. n. s.* 80: 83–146, 223 figs.

Oriental species of the genus *Anthomyia* Meigen are reviewed. Four species of the *Anthomyia punctipennis* section and 12 species of the *Anthomyia pluvialis* section are recognized. One species of the *punctipennis* section, *Anthomyia tamilensis*, and one species of the *pluvialis* section, *Anthomyia luculentella*, are described as new to science. Two species of the *pluvialis* section, *Anthomyia imbrida* Rondani, 1866 and *Anthomyia tempestatum* Wiedemann, 1818, are added to the Oriental fauna of the genus. A key to the species is given.

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## INTRODUCTION

Michelsen (1985) proposed to expand the generic concept of *Anthomyia* Meigen to include *Craspedochoeta* Macquart and *Chelisia* Rondani. Griffiths (2001) accepted this proposal and recognized six sections in *Anthomyia*, namely the *Anthomyia cannabina* section, *A. mimetica* section, *A. xanthopus* section, *A. punctipennis* section, *A. monilis* section, and *A. pluvialis* section.

According to Ackland (2001) the genus *Anthomyia* of currently enlarged sense contains approximately 84 species worldwide. Most of the species belong to the *A. punctipennis* section or to the *A. pluvialis* section. The *A. punctipennis* section has mainly been found in North and South Americas, and only some in the Old World. On the other hand the *A. pluvialis* section has mainly been found in the Old World and only some species in North America and Australia, and none in South America.

In the Oriental region 3 species of the *A. punctipennis* section and 9 species of the *A. pluvialis* section have been recorded (Ackland, 1967; Ackland, 1986; Ackland, 1987), and none of the other sections known. In the present study I have examined specimens of the genus *Anthomyia* collected in this region, and found 3 species of the *punctipennis* section and 10 species of the *pluvialis* section. Of them 2 species of the *punctipennis* section and 7 species of the *pluvialis* section are those already recorded from the region. In total 4 species of the *A. punctipennis* section and 12 species of the *A. pluvialis* section are now recognized in the Oriental region. These are dealt with as a taxonomic work in the following lines. One species of the *punctipennis* section and one species of the *pluvialis* section are described as new to science.

## MATERIAL AND METHODS

This study is mainly based on specimens collected by S. Shinonaga and H. Kurahashi in connection with the Research Trips in various countries in the Oriental region, and partly on specimens collected by myself in India, Nepal and Taiwan, and on those from Burma and India by the courtesy of D.M. Ackland.

The specimens used are preserved in dried condition. Male and female terminalia were macerated in 10% KOH solution. Male terminalia were observed and photographed in glycerin or terpeneol. Ovipositors were mounted on microscope slides with Canada balsam for photographing.

The holotypes of the new species described in this paper are preserved in the Hokkaido University Museum.

Abbreviations in terminology are as follows: – Head: *A*<sub>3</sub>, 3rd antennal segment; *if*, interfrontal seta; *ori*, frontal seta; *ors*, orbital seta. Thorax: *ac*, acrostichal seta; *dc*, dorsocentral seta; *ial*, intraalar seta; *mpl*, mesopleural seta; *ntpl*, notopleural seta; *ph*, posthumeral seta; *post-dc*, postsutural dorsocentral seta; *pra*, prealar seta; *pre-acr*, presutural acrostichal seta; *pre-dc*, presutural dorsocentral seta; *prst*, presutural seta; *pstg*, prostigmatal seta; *sal*, supraalar seta; *stpl*, sternopleural seta. Legs: *f*<sub>1</sub>, *f*<sub>2</sub>, *f*<sub>3</sub>, fore, mid and hind femur respectively; *t*<sub>1</sub>, *t*<sub>2</sub>, *t*<sub>3</sub>, fore, mid and hind tibia respectively. Wings: *dm-cu*, discal medial-cubital crossvein; *h*, humeral crossvein; *r-m*, radial-medial crossvein. Terms of genital structures of both sexes are as in Suwa and Darvas (1998) except for the usage of "pregonite" and "postgonite" instead of "gonopod" and "paramere", respectively.

## Genus *Anthomyia* Meigen

*Anthomyia* Meigen, 1803: 281. Type species: *Musca pluvialis* Linnaeus, 1758.

*Craspedochoeta* Macquart, 1851: 241. Type species: *Anthomyia punctipennis* Wiedemann, 1830.

A full list of synonyms of the genus is seen in Griffiths (2001: 2184).

The genus *Anthomyia* is characterized by some features in the male terminalia: Pregenital sclerite polished (pollinose in some species of the *punctipennis* section found in North and South Americas, probably reversal condition); 6th sternite with a process developed centrally (rudimentary, small, or completely absent in some species, probably secondarily); distiphallus with a short process dorsally (secondarily lost in some species); surstylus cleft inside near apex, with a few or some spine-like setae on inner lobe (in a few species the inner lobe shortened and with only weak setae).

Up to the present no sections of *Anthomyia* other than the *A. punctipennis* and *A. pluvialis* sections have been recorded in the Oriental region. On the basis of the Oriental species the genus *Anthomyia* is described as follows: -

♂. Frons narrower to a little wider than anterior ocellus; parafrontals contiguous to each other or separated by linear interfrontalia, with or without 1 minute *ors*; vestigial to rather distinct *if* present or not; epistoma projecting forward around level of tip of parafrontal angle in lateral view; occiput setulose on postocular plains.

Mesonotum usually with 3 pairs of *pre-acr*; posterior *ph* barely or weakly differentiated from ground setulae, or completely suppressed; *pra* present, shorter to longer than posterior *ntpl*; mesopleuron with 1 or sometimes 2 fine to distinct anterior *mpl* discernible; pteropleuron, hypopleuron and prosternum bare. Mid tibia normally without *av*. Wing with costa setulose ventrally; lower calypter not larger than the upper. Abdomen depressed dorsoventrally on anterior segments in most species; 6th tergite much narrowed and bare, often linear.

♀. Frons as wide as or wider than one-third of head width at level of *if*; interfrontalia with a pair of distinct *if*; parafrontals usually with 1 proclinate and 2 reclinate *ors*.

### KEY TO THE ORIENTAL SPECIES OF *ANTHOMYIA*

#### Males

1. Propleuron bare; mesonotum not strongly patterned, at most with brownish vittae discernible in certain angles of light. .... (*punctipennis* section) ... 2
- Propleuron setulose; mesonotum strongly patterned with dark markings and pale grey or silvery grey surroundings. .... (*pluvialis* section) ... 5
2. Body entirely dark brownish grey pollinose (Figs 37–39);  $t_3$  with apical *pv* small, distinctly shorter than the tibial diameter; distiphallus weakly upcurved distally (Fig. 51). .... 4. *taprobanensis* (Ackland)
- Body mainly pale grey pollinose, even though weakly tinged with brown in part. .... 3
3. Hind tibia with apical *pv* as long as or a little longer than the tibial diameter; distiphallus weakly upcurved distally (Fig. 6). .... 1. *confusanea* Michelsen
- Hind tibia with apical *pv* distinctly shorter than the tibial diameter, or indiscernible; distiphallus almost rectangularly bent upwards distally (Fig. 29) ..... 4
4. Fifth sternite with processes distinctly projecting dorsally at outer apices (Figs 17–19). .... 3. *tamilensis* sp. nov.

- Fifth sternite with processes scarcely projecting dorsally at outer apices (cf. Ackland, 1967: Figs 4–5). ..... 2. *hamata* (Ackland)
- 5. Mesonotum on postsutural area with some discrete dark markings. .... 6
- Mesonotum on postsutural area with a continuous dark band between wing bases even if deeply indented along *dc*-rows. .... 9
- 6. Abdomen with median vitta on 2nd tergite distinct and much wider than tibial diameter (Fig. 181). .... 7
- Abdomen with median vitta on 2nd tergite indistinct and much narrower than tibial diameter (Fig. 107) or represented only by a small dark spot on hind margin (Fig. 73). .... 8
- 7. Mesonotum with supraalar dark markings very small and restricted just near wing bases (Fig. 179); scutellum with a pair of lateral dark markings to leave median grey area from base to apex (Fig. 177); 5th sternite with processes distinctly lobated innerapically (Fig. 183). .... 14. *pluvialis* Linnaeus
- Mesonotum with supraalar dark markings larger and extending to *sal* and *pra* (Fig. 193), sometimes confluent with postsutural lateral spots (Fig. 194); scutellum with lateral dark markings fused with each other to divide median grey area into narrow basal and apical parts (Fig. 192); 5th sternite with processes scarcely lobated innerapically (Figs 197–199). .... 15. *tempestatum* Wiedemann
- 8. Mesonotum with supraalar dark markings separated from postsutural lateral dark markings (Fig. 71); postgonite with an expanded seta (Fig. 82). .... 6. *benguellae* Malloch
- Mesonotum with supraalar dark markings confluent with postsutural lateral dark markings (Fig. 103); postgonite with setae at most slightly dilated (Figs 120–121). .... 8. *imbrida* Rondani
- 9. Mesonotum with postsutural band protruded forward medially and scarcely (Fig. 210) or distinctly (Fig. 54) indented on anterior margin along *dc*-rows. .... 10
- Mesonotum with postsutural band nearly straight on anterior margin (Fig. 85). .... 13
- 10. Mesonotum with presutural dark markings much enlarged, fused with each other anteriorly and also fused with postsutural dark band near *ial*-rows (Fig. 145). .... 11. *malaisei* Ackland
- Mesonotum with presutural dark markings small to large, separated from each other and also from postsutural dark band. .... 11
- 11. Thorax and legs in ground colour orange brown; mesonotum with presutural dark markings extending to anterior margin of thorax (cf. Ackland, 1987: Fig. 46). .... 12. *perlucida* Ackland
- Thorax and legs in ground colour dark brown to blackish; mesonotum with presutural dark markings not extending to anterior margin of thorax. .... 12
- 12. Mesonotum with postsutural dark band deeply indented on anterior margin along *dc*-rows much beyond 1st *post-dc* (Fig. 54). .... 5. *alishana* Ackland and Suwa
- Mesonotum with postsutural dark band weakly indented on anterior margin along *dc*-rows at most to 1st *post-dc* (Fig. 210). .... 16. *vittiventris* Ackland
- 13. Scutellum darkened on basal half or less. .... 14
- Scutellum darkened on more than basal half ..... 15
- 14. Large species, wing length 8.0 mm; 6th sternite without central process; surstylus with no spine-like setae (cf. Ackland, 1987: Figs 70–71). .... 9. *luculenta* Ackland
- Smaller species, wing length less than 6.0 mm; 6th sternite with central process (Fig. 95); surstylus with spine-like setae on inner lobe (Figs 96–97). .... 7. *illocata* Walker
- 15. Abdomen with fore-marginal bands on 3rd to 5th tergites not extending posteriorly on lateral sides (Figs 129–130); 6th sternite without central process (Fig. 136); surstylus with no spine-like setae; distiphallus without dorsal process (Fig. 140). .... 10. *luculentella* sp. nov.
- Abdomen with fore-marginal bands on 3rd to 5th tergites extending posteriorly on lateral sides (Fig. 165); 6th sternite with central process (Fig. 170); surstylus with spine-like setae on inner lobe; distiphallus with dorsal process basally (Fig. 173). .... 13. *plumiseta* Stein

## Females

(Females of *hamata*, *taprobanensis*, *luculenta* and *perlucida* unknown)

1. Propleuron bare; mesonotum not strongly patterned, at most with brownish vittae discernible in certain angles of light; two spermathecae. .... (*punctipennis* section) ... 2
- Propleuron setulose; mesonotum strongly patterned with dark markings and pale grey or silvery grey surroundings; three spermathecae. .... (*pluvialis* section) ... 3
2. Hind tibia with apical *pv* as long as or a little longer than the tibial diameter. .... 1. *confusanea* Michelsen
- Hind tibia with apical *pv* distinctly shorter than the tibial diameter. .... 3. *tamilensis* sp. nov.
3. Mesonotum on postsutural area with some discrete dark markings. .... 4
- Mesonotum on postsutural area with a continuous dark band between wing bases even if deeply indented along *dc*-rows. .... 9
4. Mesonotum with supraalar dark markings very small and restricted just near wing bases (Figs 180, 211). .... 5
- Mesonotum with supraalar dark markings larger and extending to *sal* (Fig. 72), sometimes confluent with postsutural lateral markings (Figs 55, 104, 195). .... 6
5. Scutellum with lateral dark markings separated from each other to leave median grey area from base to apex (Fig. 178). .... 14. *pluvialis* Linnaeus
- Scutellum with lateral dark markings fused with each other to divide median grey area into narrow basal and apical parts (Fig. 211). .... 16. *vittiventris* Ackland
6. Arista with longest hairs about 3 times as long as basal diameter of arista; mesonotum with postsutural lateral dark markings confluent with supraalar dark markings (Fig. 55); scutellum largely darkened dorsally, with grey pollinose areas at lateral bases and apex. .... 5. *alishana* Ackland and Suwa
- Arista with longest hairs at most a little longer than basal diameter of arista. .... 7
7. Occiput dark brownish pollinose on postocular plains and looking black in dorsal angle of view; mesonotum with supraalar markings confluent with postsutural lateral markings (Fig. 195). .... 15. *tempestatum* Wiedemann
- Occiput densely pale grey pollinose and hardly looking black in any angles of view. .... 8
8. Mesonotum with postsutural lateral markings not extending to *pra* and widely separated from supraalar markings (Fig. 72). .... 6. *benguellae* Malloch
- Mesonotum with postsutural lateral markings extending to *pra* (Fig. 106), or around *pra* with additional markings separated from postsutural lateral markings (Fig. 105), or with postsutural lateral markings confluent with supraalar markings (Fig. 104). .... 8. *imbrida* Rondani
9. Scutellum darkened on basal half or less. .... 7. *illocata* Walker
- Scutellum darkened on more than basal half. .... 10
10. Mesonotum with postsutural dark band protruded anteriorly at middle and indented along *dc*-rows especially on anterior margin (Fig. 146). .... 11. *malaisei* Ackland
- Mesonotum with postsutural dark band nearly straight on both anterior and posterior margins. .... 11
11. Larger species, wing length 6.2–7.1 mm;  $t_3$  with 4 *ad*; ovipositor shorter than preabdomen (Fig. 143). .... 10. *luculentella* sp. nov.
- Smaller species, wing length 4.4–5.5 mm;  $t_3$  with 5–8 *ad*; ovipositor as long as preabdomen (Fig. 175). .... 13. *plumiseta* Stein

## DESCRIPTIONS

### *Anthomyia punctipennis* section

Propleuron bare; mesonotum not strongly patterned, at most with brownish vittae discernible in certain angles of light. Hind tibia with apical *pv* developed in various degrees, sometimes hardly discernible. Wings narrowly darkened around anterior and posterior cross-veins (*r-m* and *dm-cu*), the dark suffusion around *dm-cu* sometimes hardly discernible; costal thorns as long as or longer than *h*-vein. In the females, only two spermathecae present as far as known.

#### 1. *Anthomyia confusanea* Michelsen, 1985 (Figs 1–8)

"*Craspedochoeta pullula* (Zetterstedt, 1845)": Hennig, 1966: 44, *partim*; Ackland, 1967: 110; Ackland and Pont, 1977: 441.

*Anthomyia confusanea* Michelsen in Michelsen and Báez, 1985: 285; Suwa and Blasco-Zumeta, 2003: 45.

Material examined. THAILAND. Doi Inthanon, alt. 2600 m, Chiangmai Prov., 2♂, 15.vii.1989 (H. Kurahashi). PAKISTAN. Begrote, alt. 2700 m, 15 km E of Gilgit, 1♂, 29.vii.1987 (T. Inaoka); Karam, alt. 2200 m, 1♂, 9.viii.1987 (S. Shinonaga), 1♂, 9.viii.1987 (K. Kanmiya); Tandani [= Thandiani], alt. 2400 m, 26 km N of Abbottabad, 1♂, 1.viii.1988 (S. Shinonaga); Ayubia National Park, alt. 2200 m, Kashmir, 1♀, 25–30.vii.1988 (S. Shinonaga).

Distribution. Europe; Pakistan; India; Thailand. New to Thailand.

♂. Wing length 4.2–5.5 mm. Body including appendages dark brown to blackish in ground colour, and pale grey and slightly brownish in pollinosity. Mid and hind tibiae paler, brownish to dark yellow on basal two-thirds. Wings narrowly darkened around anterior and posterior cross-veins (*r-m* and *dm-cu*).

Parafrontals with no *ors*; arista with longest hairs 3–5 times as long as basal diameter of arista. Mesonotum with posterior *ph* barely or weakly differentiated from adjacent setulae; *pra* shorter than posterior *ntpl*. Mid tibia with 1 *ad*, 2 *pd* and 2 *pv* (2 *ad* on left  $t_2$  and 3 *pd* on both  $t_2$  in 1 specimen from Thailand), the *ad* distinctly less than half as long as mid metatarsus;  $t_3$  with apical *pv* distinct and as long as or a little longer than the tibial diameter. Sixth sternite with central process spatulate (Fig. 4); distiphallus weakly upcurved distally (Fig. 6).

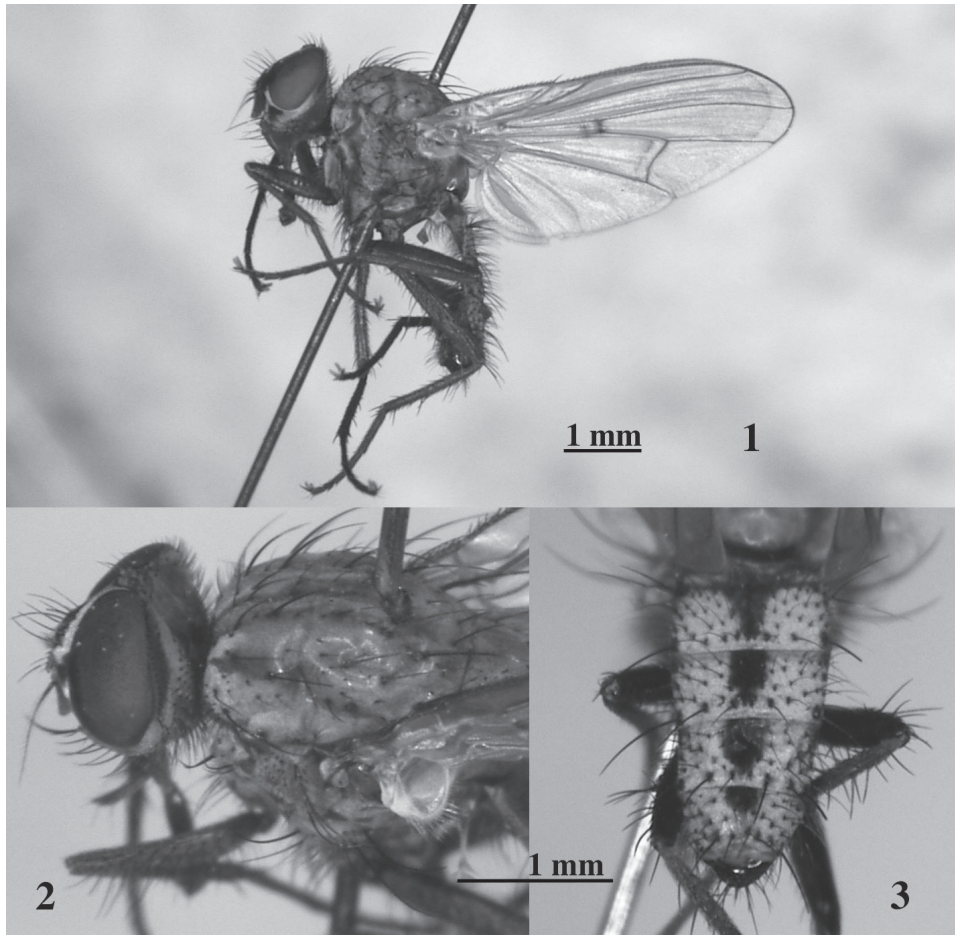
♀. Legs largely yellowish on mid and hind tibiae;  $t_2$  with *ad* about half as long as mid metatarsus.

Remarks. This species had been confused with *Anthomyia liturata* (Robineau-Desvoidy, 1830) (= *Aricia pullula* Zetterstedt, 1845) until it was described as a distinct species in Michelsen and Báez (1985). According to them *A. liturata* is widely distributed in Europe, and the other *A. confusanea* is also distributed in Europe and eastwards it reaches Kashmir.

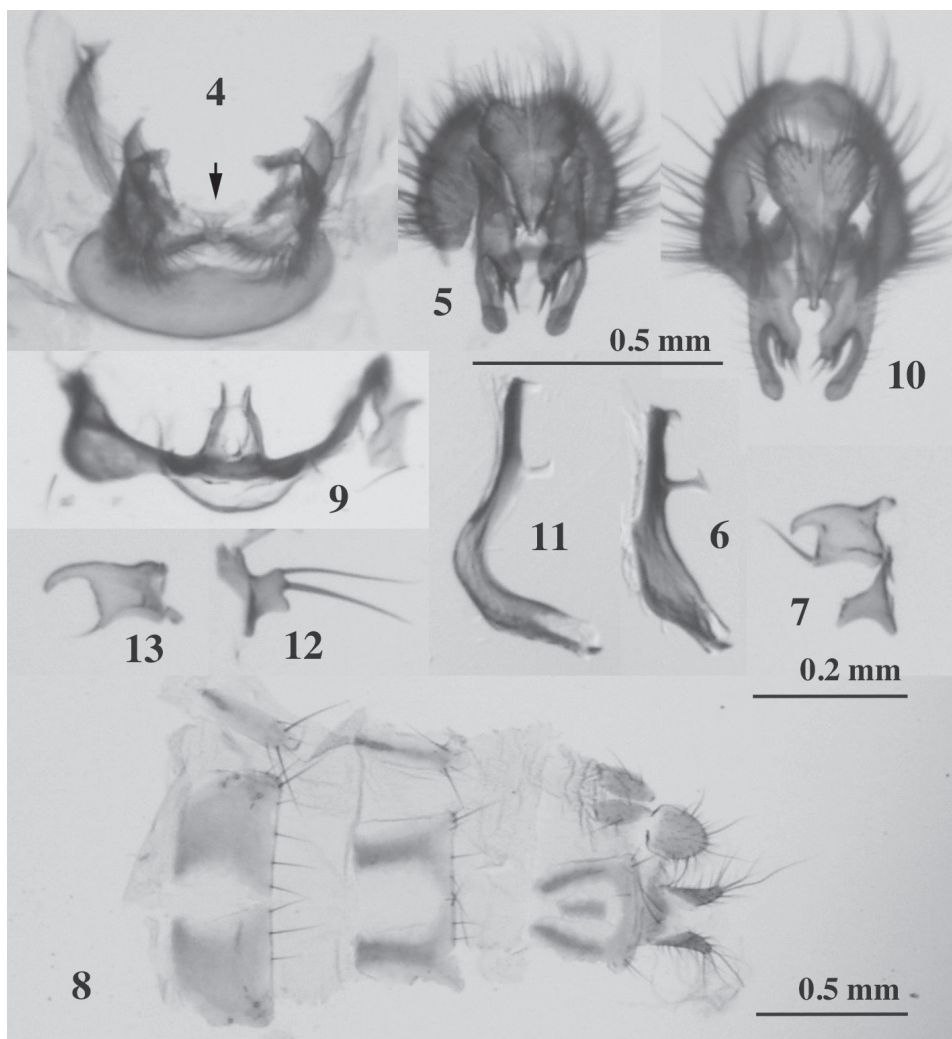
Ackland (1967) and Ackland and Pont (1977) already gave India as a locality of "*Craspedochoeta pullula* (Zetterstedt, 1845)." Later, at the suggestion of V. Michelsen (*in litt.*), Ackland (1986) realized that the material from India determined as "*pullula*" almost

certainly refers to the species confused with the true *A. liturata* for a long time in Europe. *Anthomyia confusanea* may widely be distributed also in the Oriental region.

The related species *Anthomyia liturata* (Figs 9–13) is distinguished from *A. confusanea* by the following aspects: - Parafrontals in male with a minute *ors* discernible. Mesonotum with *pra* as long as or a little longer than posterior *ntpl*. Mid tibia with *ad* nearly equal to half length of mid metatarsus in male, and distinctly longer than that in female. Male terminalia with distiphallus almost rectangularly bent upwards distally (Fig. 11); surstylus with broader membranous area along cercal plate (Fig. 10); 6th sternite with central process divided into a pair of long arms (Fig. 9).



Figs 1–3. *Anthomyia confusanea*, ♂. 1, lateral habitus; 2, head and thorax, dorsolateral view; 3, abdomen, dorsocaudal view. Tandani, Pakistan.



Figs 4–8. *Anthomyia confusanea*, ♂ (4–7) and ♀ (8). 4, 5th and 6th sternites, posteroventral view, arrow indicating spatulate central process of 6th sternite; 5, hypopygium, dorsal view; 6, distiphallus; 7, right pregonite (setae missing) and postgonite; 8, ovipositor. Magnification same for Figs 4–5, and for Figs 6–7. Doi Inthanon (4–5; 7), Thailand; Tandani (6), Pakistan; Greece (8).

Figs 9–13. *Anthomyia liturata*, ♂. 9, 6th sternite; 10, hypopygium, dorsal view; 11, distiphallus; 12, left pregonite; 13, right postgonite. Magnification same for Figs 9–10, and for Figs 11–13. Sweden (9); England (10–13).

2. *Anthomyia hamata* (Ackland, 1967)  
(cf. Ackland, 1967: Figs 1–6)

*Craspedochoeta hamata* Ackland, 1967: 110.

*Anthomyia hamata* (Ackland, 1967); Evenhuis and Pape, 2024: <http://www.diptera.org/Nomenclator/Details/222000> (version 5.1. updated: 7 March 2024).

Material examined. No specimen available for this study.

Distribution. India; Nepal.

This species was described on the basis of a male specimen from India, and a male specimen from Nepal. According to the original description of the species: –

♂. Wing length 6.0 mm. Wing membrane very slightly pale brownish tinged, not darkened at base. A pair of rather strong *if*; 7–8 *ori*; arista long pubescent, with longest hairs about twice as long as basal diameter of arista. *Pra* about two-thirds as long as posterior *ntpl*. Mid femur with no distinct *av*, 5–6 long basal *pv*;  $f_3$  with *av* and *pv* on whole length;  $t_2$  with 1 *ad*, 2 *pd*, 1–2 *p* and 1 *pv*;  $t_3$  with apical *pv* very small or absent. 5th sternite with processes scarcely projecting dorsally at outer apices; distiphallus almost rectangularly bent upwards distally; postgonite with posterodorsal arm much shorter than width of the gonite.

♀. Unknown.

Remarks. In having the distiphallus almost rectangularly bent upwards distally, this species is more similar to *A. liturata* than to *A. confusanea*. *A. liturata* is, however, different from *A. hamata* in the following aspects: - Mesonotum with *pra* as long as or a little longer than posterior *ntpl*;  $t_3$  with apical *pv* distinct, as long as or slightly longer than the tibial diameter; 5th sternite with processes distinctly projecting dorsally at outer apices (cf. Ackland, 1967: Fig. 10, as *Craspedochoeta pullula*); postgonite with posterodorsal arm nearly as long as median width of the gonite (Fig. 13 in the present paper).

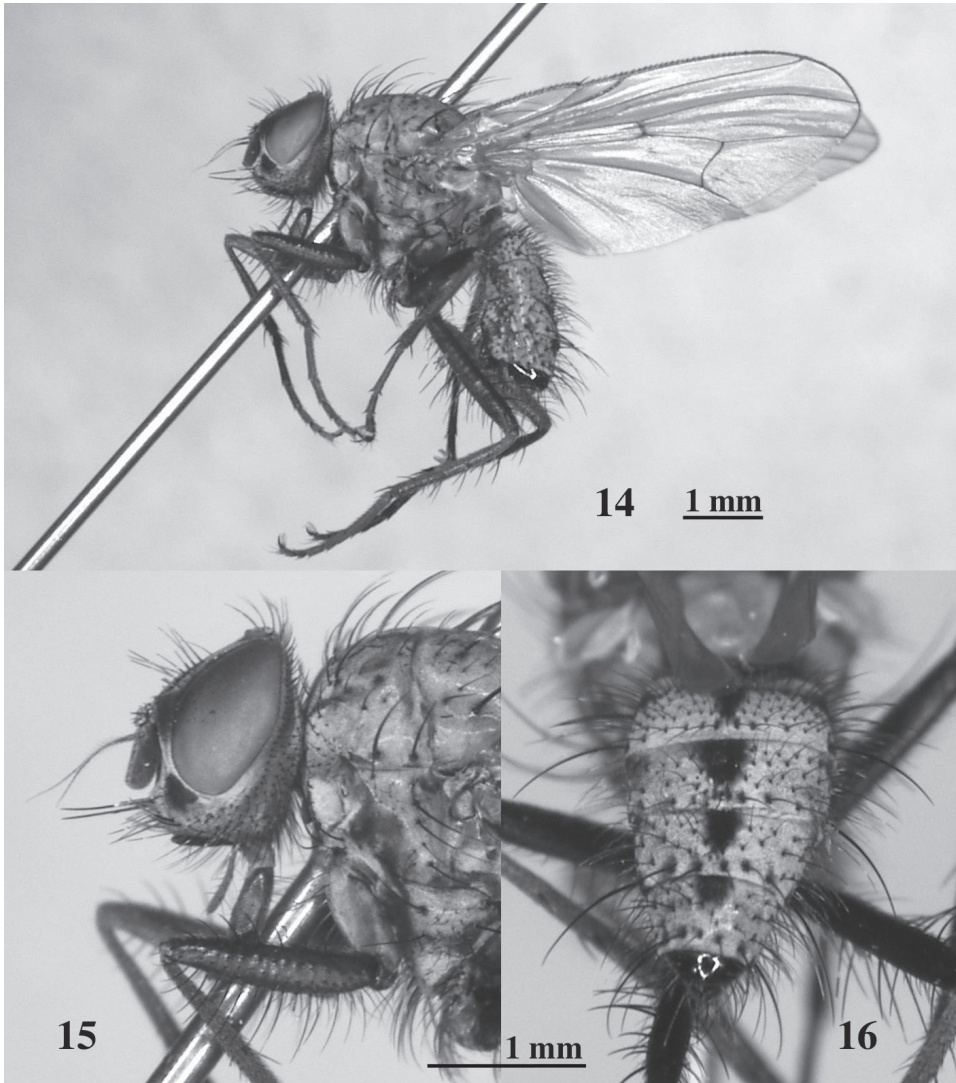
3. *Anthomyia tamilensis* sp. nov.  
(Figs 14–36; cf. Suwa, 1981: Figs 1–8)

“*Craspedochoeta hamata* Ackland”: Suwa, 1981: 19 (India); Ackland, 1986: 45 (Sri Lanka).

Type material. INDIA. Mt. Dodapetta, alt. 2500 m, Tamil Nadu, 3♂ (one the holotype), 1♀, 8.x.1993 (H. Kurahashi); Uthagamandalam (= Ooty), Tamil Nadu, 1♂, 1♀, 29.vii.1987 (E. Sugiyama).

Distribution. India; Sri Lanka.

♂. Wing length 4.9–5.8 mm. Body including appendages dark brown to blackish in ground colour, densely pale grey pollinose, tinged with brownish yellow in pollinosity especially on dorsum. Antennae slightly brownish on the 2nd segment apically; haustellar mentum pollinose. Mesonotum in caudal angle of view with dark markings obscurely discernible: narrow and short median vitta and presutural lateral patches, and with or without postsutural sublateral vittae. Wings weakly tinged with brown, very slightly darkened around *r-m* and hardly darkened around *dm-cu*; calypteres pale, weakly tinged with brownish yellow; halteres pale brownish yellow apically. Abdomen (Fig. 16) with median vitta interrupted on each tergite posteriorly, and wedge-shaped; epandrium thinly

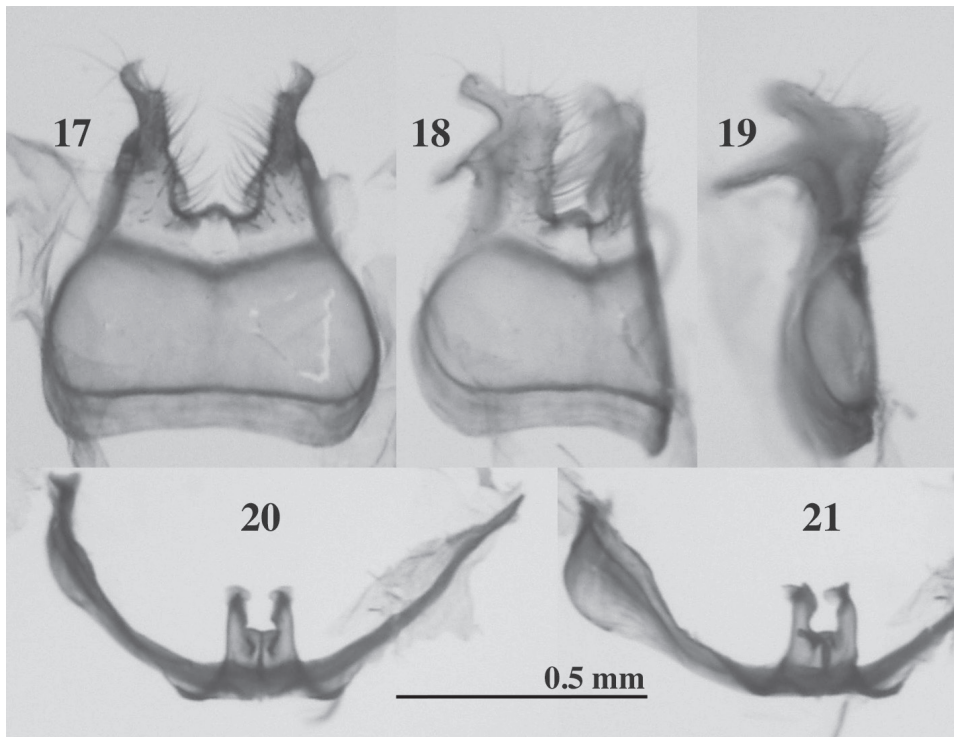


Figs 14–16. *Anthomyia tamilensis*, ♂. 14, lateral habitus; 15, head, lateral view; 16, abdomen, dorsocaudal view. Dodapetta (holotype), India.

pollinose.

Head 1.4–1.5 times as high as long; frons narrower than anterior ocellus; parafrontals contiguous to each other; 4–7 *ori*, mingled with some minute setulae; a vestigial *ors* discernible; a pair of rather distinct *if* (in 1 specimen an additional setula discernible below the *if*);  $A_3$  2.0–2.2 times as long as wide; arista with longest hairs 3–4 times as long as basal diameter of arista; orbits at parafrontal angle 0.8–1.0 times as wide as  $A_3$ ; genae 1.3–1.4 times as high as  $A_3$ -width, with 2–3 genal setae in a row; epistoma situated as far as or slightly behind tip of parafrontal angle in lateral view.

Mesonotum with 3 pairs of *pre-acr* in rows closer together than to adjacent *dc*-

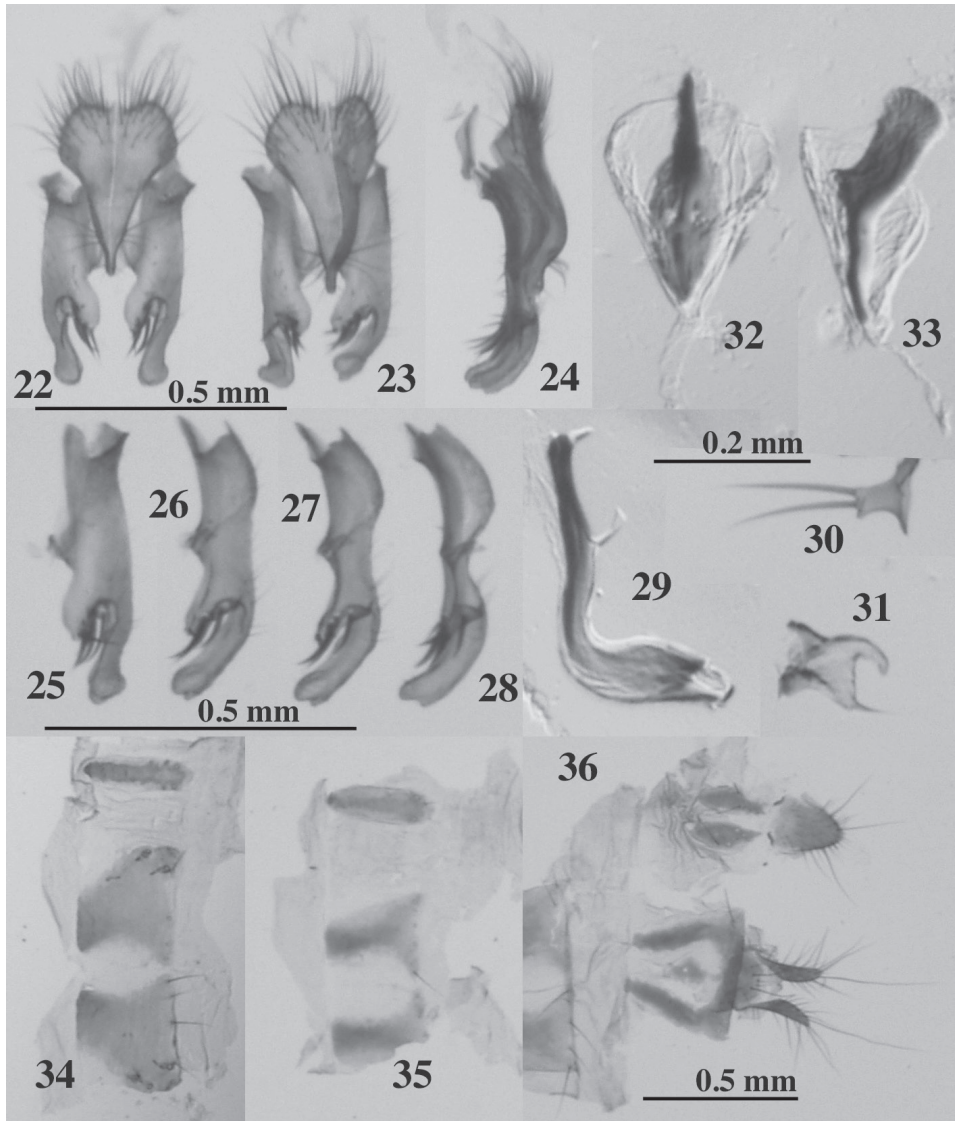


Figs 17–21. *Anthomyia tamilensis*, ♂. 17–19, 5th sternite, ventral to lateral views; 20, 6th sternite; 21, ditto, different angle of view. Dodapetta (17–19, paratype; 20–21, holotype), India.

row, no setulae in between; posterior *ph* barely or weakly differentiated from adjacent setulae; *pra* shorter than posterior *ntpl*; 1 distinct anterior *mpl*; 1 strong and 1 weak *pstg*, associated with 1–2 fine setulae; *stpl* 2:3, lower anterior and lowest posterior much weaker than the uppers though distinctly differentiated from adjacent setulae; scutellum bare dorsally, only 1 or 2 setulae discernible around basal setae.

Mid femur with no or 1 short *av* near basal fifth and 4–5 longer *pv* on basal half;  $f_3$  with a row of about 10 *av*, of them 1 or a few *av* near base and a few *av* around distal fourth being fine or short, the longest about twice as long as height of the femur, and with 1 weak *pv* near base, 2–4 strong *pv* on median third and 1 distinct *pv* near apex, the longest distinctly shorter than the longest *av*;  $t_1$  with 1 small *ad* and 1 strong *pv*;  $t_2$  with 1 *ad*, 2 *pd* (3 *pd* on right  $t_2$  in 1 specimen) and 2 *pv*, the *ad* less than half as long as mid metatarsus;  $t_3$  with 2 *av* (3 *av* on right  $t_3$  in 1 specimen), 4 *ad*, 3–4 *pd*, 3–5 *p/pv* on basal half and 1 *pv* around distal 4th to 6th, and with apical *pv* small and shorter than the tibial diameter. Wings with costal thorns distinct, as long as or a little longer than *h*-vein; *dm-cu* rather distinctly sinuate.

Abdomen long-ovoid in dorsal view, 1.7–1.9 times as long as wide, a little depressed anteriorly; 6th tergite indiscernible, probably much reduced and fused with pregenital sclerite; right 6th spiracle at anteroventral corner of pregenital sclerite, right 7th spiracle a little posterior to the 6th; 4th sternite wider than long; 5th sternite (Figs



Figs 22–36. *Anthomyia tamilensis*, ♂ (22–33) and ♀ (34–36). 22–24, hypopygium, dorsal to lateral views; 25–28, right surstylus, dorsal to inside lateral views; 29, distiphallus; 30, right pregonite; 31, left postgonite; 32, ejaculatory apodeme, frontal view; 33, ditto, lateral view; 34, 6th segment; 35, 7th segment; 36, 7th tergite (posterior part), 8th segment and oviscapt. Magnification same for Figs 22–24, for Figs 25–28, for Figs 29–33, and for Figs 34–36. Dodapetta (22–33, holotype; 36, paratype), and Ooty (34–35, paratype), India.

17–19; cf. Suwa, 1981: Figs 5–6) projecting dorsally at apices of processes, rather densely setose along inner margins, and sparsely setose on lateral areas and on apical dorsal projections, a few setae on the projections being rather long; 6th sternite (Figs 20–21; cf. Suwa, 1981: Figs 7–8) with central process divided into a pair of lateral arms and a shorter median protrusion; cercal plate (Figs 22–24) 1.5–1.6 times as long as wide, tapering on distal two-thirds, distinctly convex around distal third in lateral view, pilose except on distal fourth, and rather densely setose on basal third, with some pairs of short setae around apex; surstylus (Figs 25–28) distinctly concave near middle on dorsal side in lateral view, with 5 spine-like setae on inner lobe (2 specimens dissected); distiphallus (Fig. 29) almost rectangularly bent upwards distally; pregonite (Fig. 30) with 2 long and flattened setae; postgonite (Fig. 31) with dorsal arm much shorter than width of the gonite, and with a short setula at ventral corner.

♀. Wing length 4.3–5.4 mm. Head 1.1–1.2 times as high as long; frons 0.43–0.44 times as wide as head; interfrontalia 0.54–0.57 times as wide as frons; parafrontals with 1–2 strong *ori* and a few associated minute setulae. Mid femur with 1 *av* near base and 3–4 *pv* on basal half;  $f_3$  with a row of 6 *av*, and with no *pv* except for a strong preapical one;  $t_1$  with 1 strong *ad* and 1 strong *pv*;  $t_2$  with 1 *ad*, 2 *pd* and 2 *pv*, the *ad* about half as long as mid metatarsus;  $t_3$  with no *p/pv*.

Remarks. A single male specimen collected from Nilgiris District, Tamil Nadu, India, was identified by Suwa (1981) with *Craspedochoeta hamata* Ackland, 1967. As pointed out by Ackland (1986) *C. hamata* in the sense of Suwa (1981) is different from the true *C. hamata* in some male features of the 5th sternite and genitalia, and is here described as new to science under the genus *Anthomyia*.

According to the original description *Anthomyia hamata* (Ackland, 1967) differs from the present *A. tamilensis* in the male as follows:- Larger in size (wing length 6 mm); male 5th sternite with processes scarcely projecting dorsally at outer apices (cf. Ackland, 1967: Fig. 5); cercal plate less prolonged apically (cf. Ackland, 1967: Fig. 1); postgonite with posterodorsal arm thicker, and with ventral seta longer (cf. Ackland, 1967: Fig. 3).

A male specimen from Sri Lanka was recorded as *C. hamata* by Ackland (1986), though he was aware that the specimen is identical to *C. hamata* in the sense of Suwa (1981) and not to the true *C. hamata*. This specimen is here recognized as *A. tamilensis*.

At a glance *A. tamilensis* is similar to *A. confusanea*, from which it is distinguished by the following aspects: parafrontals with vestigial *ors* discernible in male;  $t_3$  with apical *pv* shorter than the tibial diameter; male 6th sternite with central process composed of 3 projections and not spatulate; aedeagus with distiphallus almost rectangularly bent upwards distally. Judging from the almost rectangularly bent distiphallus *A. tamilensis* may be more closely related to *A. liturata*, from which it is, however, distinguishable by the *pra* shorter than posterior *ntpl*,  $t_3$  with shorter apical *pv*, male 6th sternite with different central process (composed of 2 projections in *liturata*, Fig. 9), and male hypopygium with cercal plate in profile convex near distal third (Fig. 24) (convex near middle in *liturata*, cf. Michelsen and Báez, 1985: Fig. 29).

4. *Anthomyia taprobanensis* (Ackland, 1986)  
(Figs 37–53)

*Craspedochoeta taprobanensis* Ackland, 1986: 46.

*Anthomyia taprobanensis* (Ackland, 1986): Evenhuis and Pape, 2024: <http://www.diptera.org/Nomenclator/Details/245388> (version 5.1. updated: 7 March 2024).

Material examined. SRI LANKA. Mt. Pidurutalagala, alt. 2524 m, 3♂, 25.ix.1987 (H. Kurahashi).

Distribution. Sri Lanka.

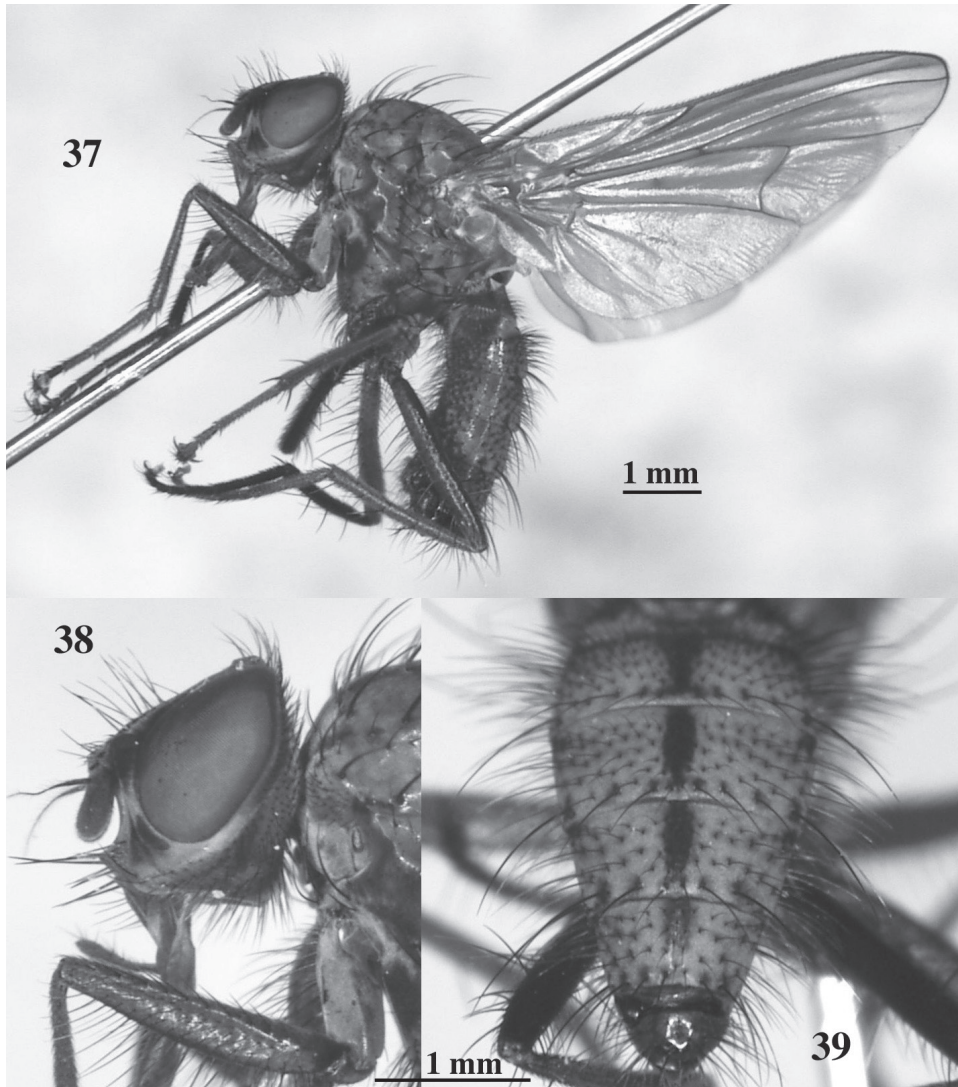
♂. Wing length 5.9–6.8 mm. Body including appendages blackish in ground colour and dark brownish grey pollinose. Mesonotum in caudal angle of view with dark markings obscurely discernible: presutural median vitta (narrowly continuing a little beyond suture) and presutural lateral patches, and with or without postsutural lateral patches. Wings distinctly tinged with brown, with dark suffusion weakly discernible around *r-m*, scarcely so around *dm-cu*; upper calypter distinctly tinged with brownish yellow, lower calypter mainly whitish, yellow marginally; halteres yellow at knobs. Abdomen with median vitta (Fig. 39) almost continuous on whole length, ceasing a little before hind margin of 5th tergite; pregenital sclerite shining though very thinly pollinose dorsally, polished laterally; epandrium thinly pollinose.

Head about 1.3 times as high as long; frons narrower than anterior ocellus; parafrontals contiguous to each other; 4–6 *ori*, mingled with some minute setulae; *ors* indiscernible; a pair of rather distinct *if*;  $A_3$  1.8–2.0 times as long as wide; arista with longest hairs about 3 times as long as basal diameter of arista; orbits at parafrontal angle about as wide as  $A_3$ ; genae 1.3–1.5 times as high as  $A_3$ -width, with a few genal setae in a row, and with or without a few shorter setulae above the row; epistoma projecting forward as far as or slightly beyond tip of parafrontal angle in lateral view.

Mesonotum with 3 pairs of *pre-acr* in rows closer together than to adjacent *dc*-row, no setulae between the rows; posterior *ph* weakly differentiated from adjacent setulae; *pra* a little shorter to a little longer than posterior *ntpl*; 1–2 distinct anterior *mpl*; 1 strong and 1 weak *pstg*, associated with 1 fine setula; *stpl* 2:3, lower anterior and lowest posterior much weaker than the uppers though distinctly differentiated from adjacent setulae; scutellum bare dorsally, only 1 or 2 setulae discernible around basal setae.

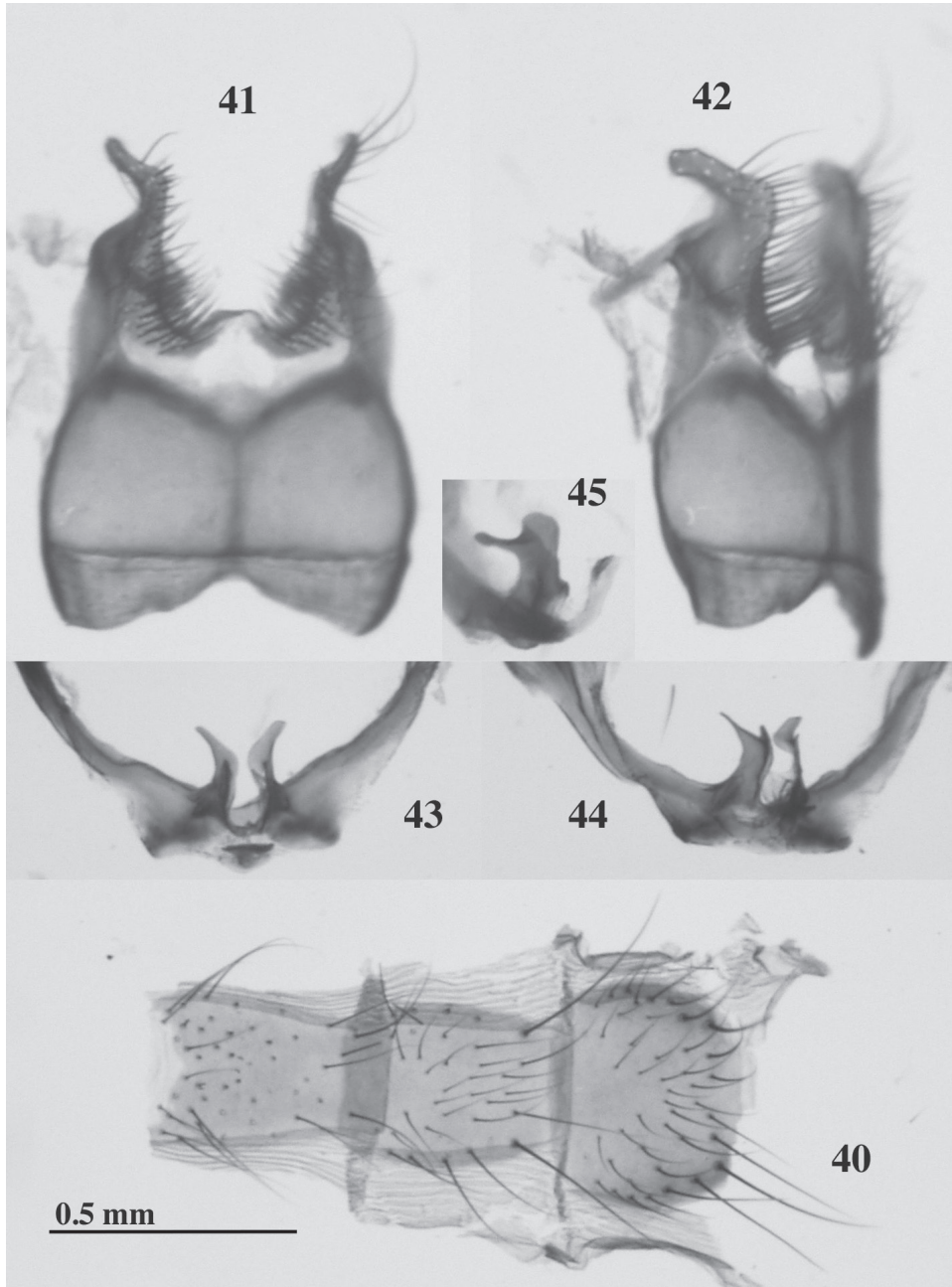
Mid femur with no or 1 short *av* near base and 6–7 longer *pv* on basal half;  $f_3$  with a row of about 7–10 distinct *av*, the longest about twice as long as height of the femur, and with no or 1 weak *pv* near base, 2–4 distinct *pv* on median third and 1 distinct *pv* near apex, the longest much weaker than the longest *av*;  $t_1$  with 1–2 small *ad* weakly differentiated from adjacent setulae, and with 1 strong *pv* (1 additional *pv* discernible on right  $t_1$  in 1 specimen);  $t_2$  with 1 *ad* (shorter than half length of mid metatarsus), 2 *pd* and 2 *pv* (in addition, with 1 small *av* on left  $t_2$  and 1 *p* on both  $t_2$  in 1 specimen);  $t_3$  with 3–4 *av*, 4–5 *ad*, 3 *pd* and 7–9 *pv*, and with apical *pv* small and distinctly shorter than the tibial diameter. Wings with costal thorns distinct, as long as *h*-vein; *dm-cu* sinuate.

Abdomen long-ovoid in dorsal view, 1.9–2.0 times as long as wide, slightly depressed anteriorly; 6th tergite much reduced and linear, firmly fused with pregenital sclerite laterally; right 6th and 7th spiracles on lateral margin of pregenital sclerite; 4th sternite wider than long (Fig. 40); 5th sternite (Figs 41–42) with processes protruded dorsally in apical part, two long setae discernible there; central process of 6th sternite

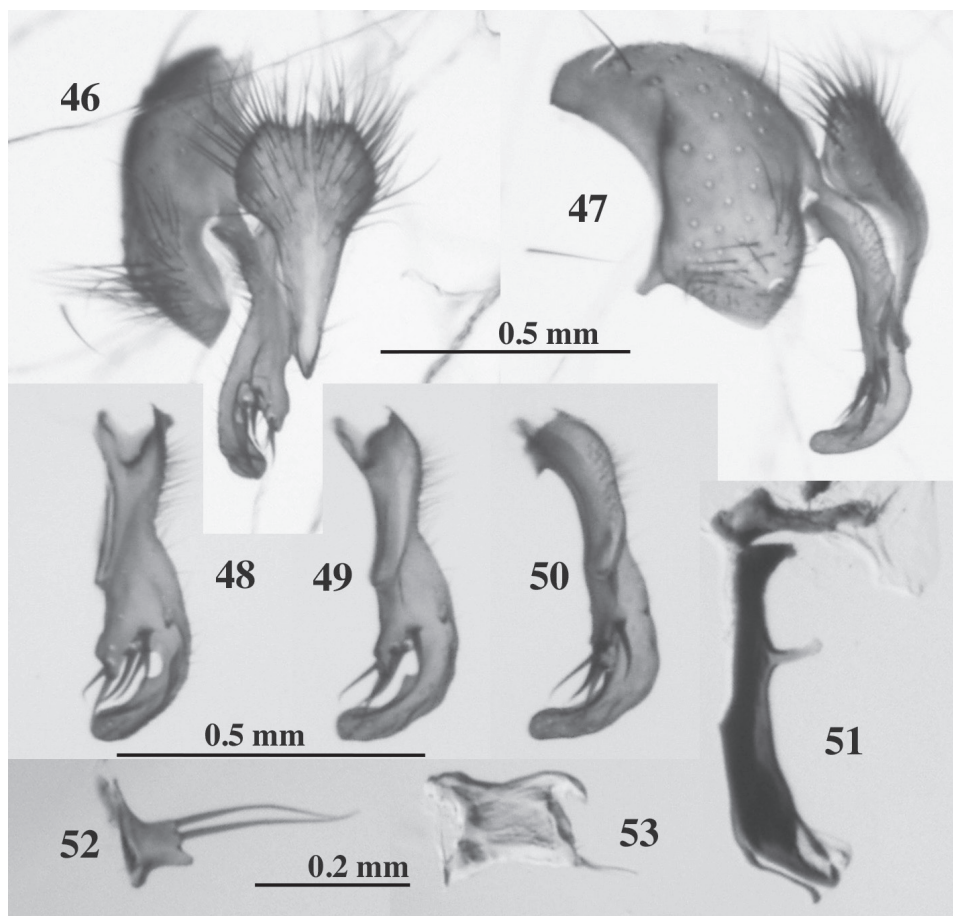


Figs 37–39. *Anthomyia taprobanensis*, ♂. 37, lateral habitus; 38, head, lateral view; 39, abdomen, dorsocaudal view. Mt. Pidurutalagala, Sri Lanka.

(Figs 43–45) composed of a pair of blade-like projections, each projection divided into two lobes apically; cercal plate (Fig. 46) on distal half sharply narrowing toward apex, barely pubescent there; surstylus (Figs 48–50) deeply cleft apically, with some (5 in the specimen dissected) stout setae discernible on inner lobe; distiphallus (Fig. 51) weakly upcurved distally; pregonite (Fig. 52) with 2 long setae; postgonite (Fig. 53) more or less



Figs 40–45. *Anthomyia taprobanensis*, ♂. 40, 2nd (leftmost) to 4th sternites; 41, 5th sternite, ventral view; 42, ditto, ventrolateral view; 43–45, central process of 6th sternite, ventral to lateral views. Mt. Pidurutalagala, Sri Lanka.



Figs 46–53. *Anthomyia taprobanensis*, ♂. 46, hypopygium, dorsal view; 47, ditto, lateral view; 48–50, right surstylus, dorsal to inside lateral views; 51, basiphallus and distiphallus; 52, left pregonite; 53, left postgonite. Magnification same for Figs 51–53. Mt. Pidurutalagala, Sri Lanka.

emarginated at ventral base of dorsal projection, with a short seta at ventral corner.

♀. Unknown.

Remarks. In having the distiphallus weakly upcurved distally the present species may be placed close to *A. confusanea*, from which it is, however, quite different in the body with larger size and much darker pollinosity and in the cercal plate with sharply narrowing apex.

### *Anthomyia pluvialis* section

Propleuron setulose; thorax and abdomen strongly patterned dorsally with dark markings and pale grey or silvery grey surroundings. Hind tibia without apical *pv*. Wings without dark patches or suffusions around anterior and posterior cross-veins; costal thorns small and much shorter than *h*-vein in most species. In the males, cercal plate with a few or some short and flattened apical setae (in *luculentella* sp. nov. these setae longer and less flattened, probably secondarily); 6th sternite with central process lost in a few species; distiphallus with dorsal process lost in a few species. In the females, three spermathecae present; oviparous in most species (larviparous in *luculentella*).

#### 5. *Anthomyia alishana* Ackland and Suwa, 1987 (Figs 54–70)

*Anthomyia alishana* Ackland and Suwa in Ackland, 1987: 46.

Material examined. TAIWAN. Tsiufeng [Tsuifeng], Nantou Hsien, 2♂ (holotype and paratype), 1♀ (paratype), 28.v.1970 (R. Kano); Alishan, alt. 2300 m, Chiayi Hsien, 1♂ (paratype), 5.vi.1970 (H. Kurahashi); Alishan, Chiayi Hsien, 1♂ (paratype), 5.vi.1970 (K. Nishida).

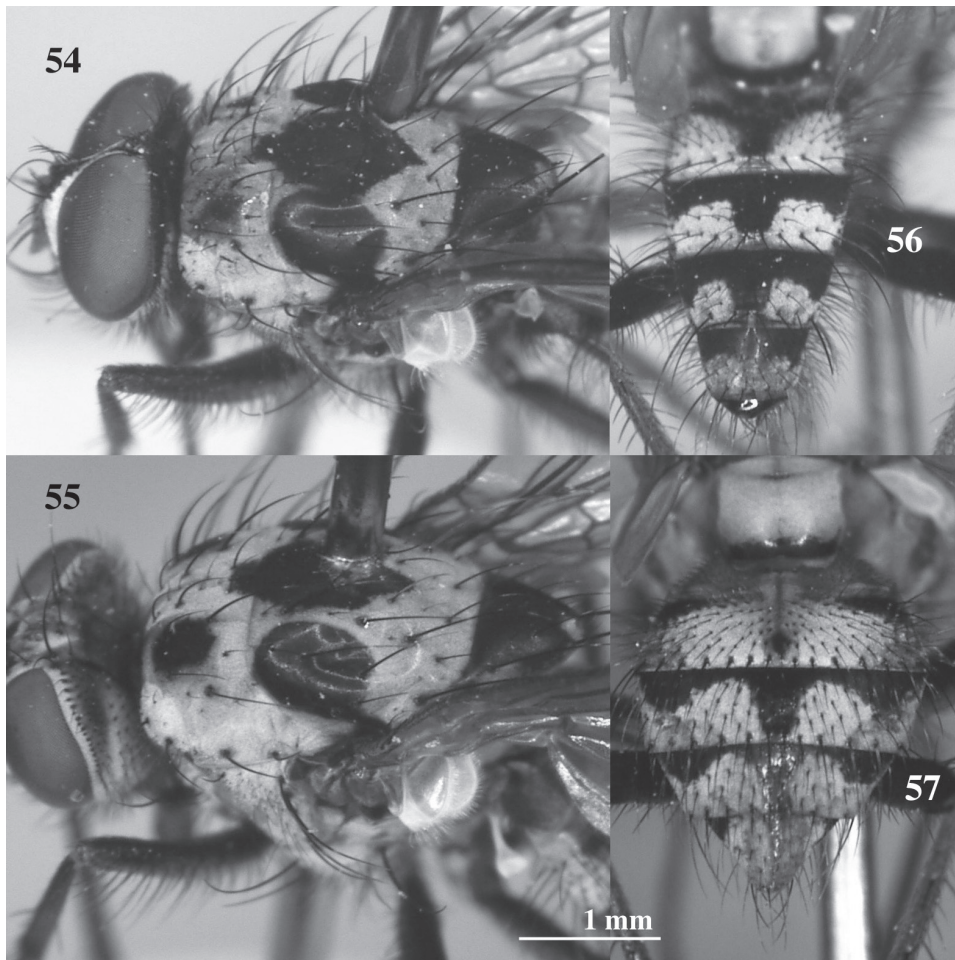
Distribution. Taiwan.

♂. Wing length 5.6–6.2 mm. Body including appendages dark brown to blackish in ground colour, and pale grey and more or less bluish in pollinosity; legs very narrowly brownish on femora apically. Occiput dark brownish pollinose on postocular plains. Mesonotum (Fig. 54) with sharp dark markings: a pair of small presutural spots and 3 large postsutural spots narrowly joined to each other near 2nd *post-dc*, the lateral spots extending laterally to form a continuous transverse band between wing bases; scutellum mainly black and narrowly grey at base laterally and at apex. Abdomen with dark markings sharp (Fig. 56); fore-marginal bands occupying anterior fourth of 2nd tergite and anterior third or half of 3rd to 5th tergites, extending posteriorly on each lateral side; median vitta nearly as wide as  $f_3$ -height on 3rd tergite; 5th sternite with processes brownish and shining.

Frons narrower than anterior ocellus; parafrontals contiguous to each other, with 5–6 *ori* and with or without a vestigial *ors*; minute or short *if* discernible; arista with longest hairs about 3 times as long as basal diameter of arista.

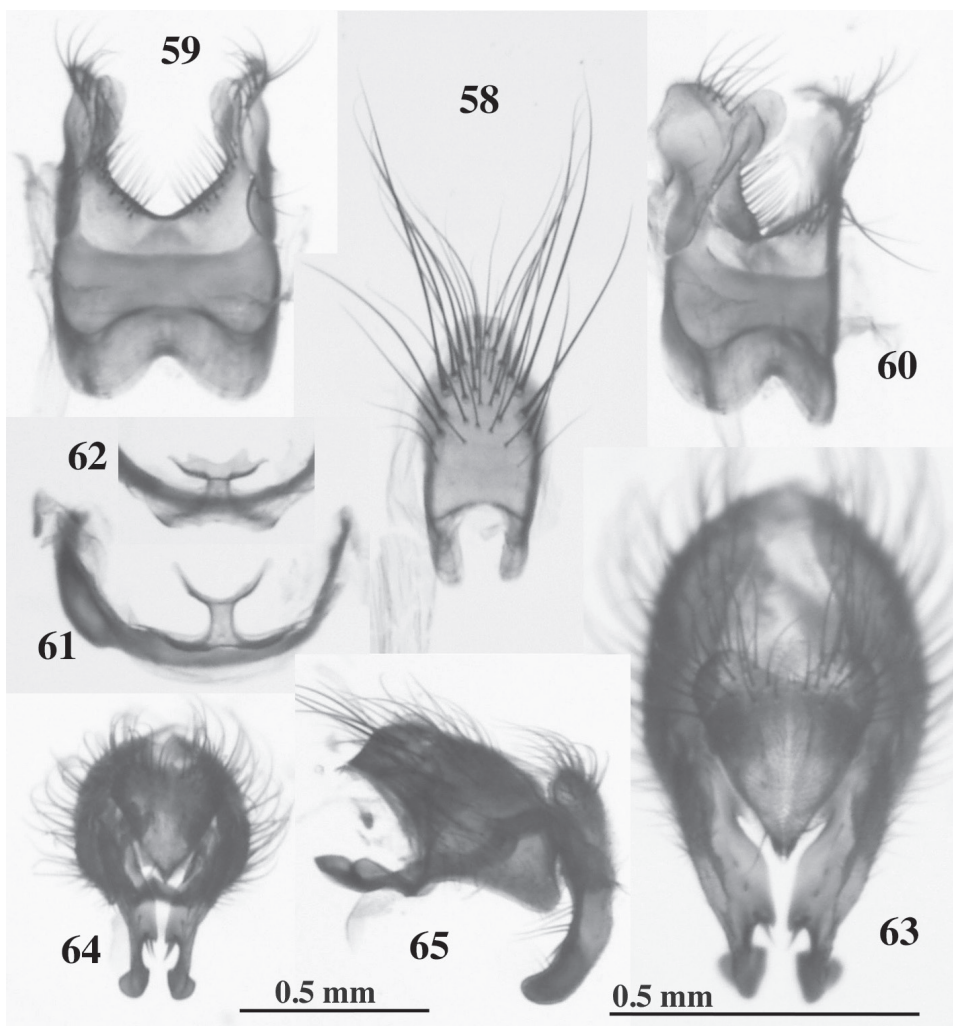
Mesonotum with 3 pairs of *pre-acr* in rows separated by about distance from each to adjacent *dc*-row, and with some (3–6) setulae in between; posterior *ph* fine, not differentiated from ground setulae; posterior presutural *ial* well differentiated from ground setulae; *pra* longer than posterior *npl* and as long as or a little shorter than anterior *npl*; 1 strong and 1 weak *pstg*, some (2–6) associated setulae discernible.

Mid femur with no *av* and some (6–8) *pv* on basal half, the longest *pv* a little longer than height of the femur;  $f_3$  with a row of *av*, of the setae a few near base being short and fine and most of others longer than height of the femur, with a row of weaker *pv* on distal two-thirds, of the setae some on median third longer than  $f_3$ -height and a few around distal fourth shorter than others, and on basal fourth or third with some slender *p/pv* discernible;  $t_1$  with no *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 2–3 *pd* and 2–4 *pv*;  $t_3$  with 1 (2 on left  $t_3$  in holotype) *av*, 2 strong and 8–11 shorter *ad*, 2 *pd* and 7–10 *pv*. Wings with costal thorns small though stronger than costal spinules; *dm-cu* oblique and sinuate.



Figs 54–57. *Anthomyia alishana*, ♂ (54, 56) and ♀ (55, 57). 54–55, head and thorax, dorsolateral view; 56–57, abdomen, dorsocaudal view. Alishan (54, 56, paratype) and Tsuifeng (55, 57, paratype), Taiwan.

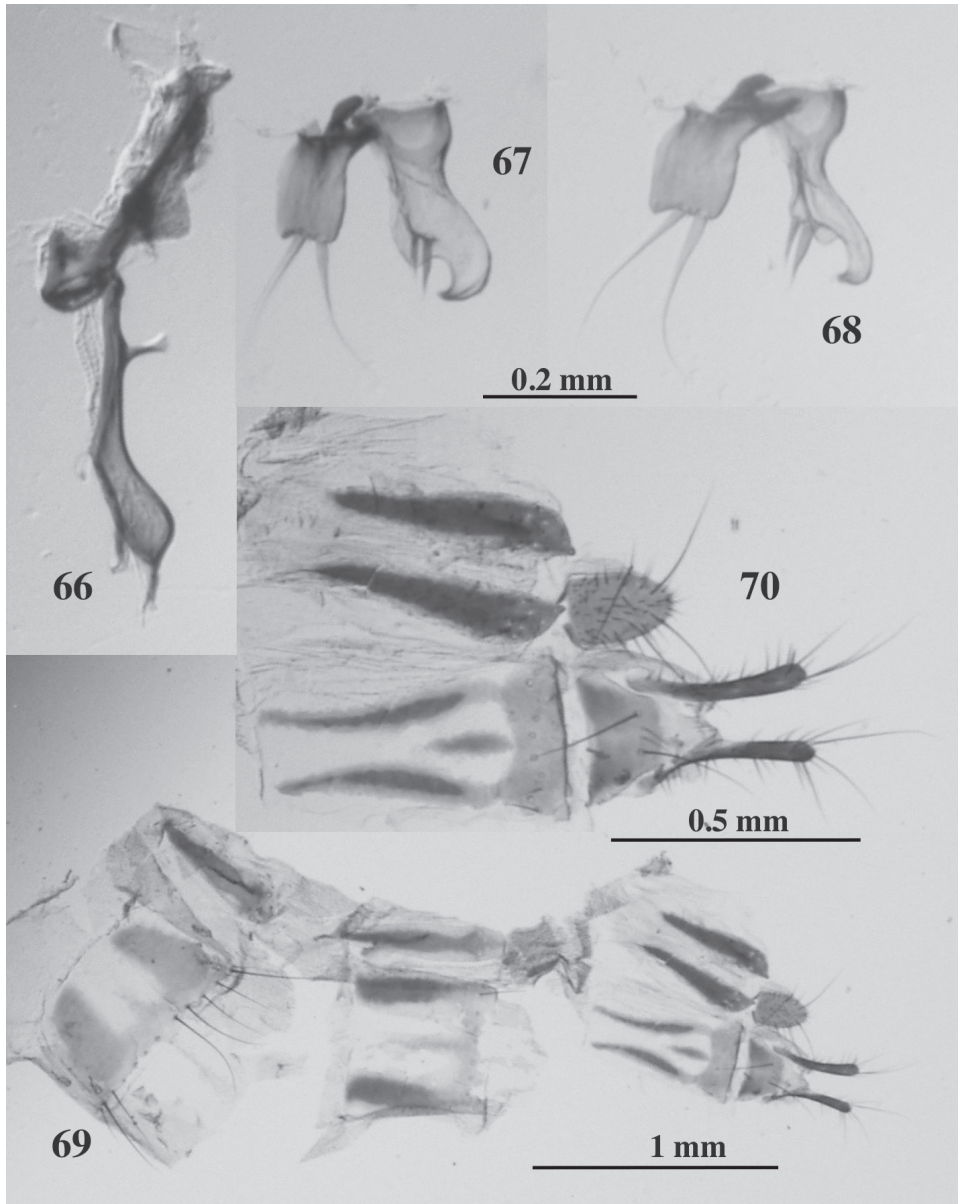
Abdomen depressed on basal half, about twice as long as wide; 6th tergite much narrowed, and linear laterally; both 6th spiracles in membrane and touching lateral ends of 6th tergite; right 7th spiracle at anterolateral corner of pregenital sclerite; 4th sternite (Fig. 58) longer than wide and narrowing caudad on posterior third, rather densely armed with long setae on posterior half; 5th sternite processes (Figs 59–60) well lobated innerapically, with distinct unsetose gap between distal and inner series of setae, and with some outer lateral setae basally, posteriormost one of the setae well developed and longer than any others on the sternite; central process of 6th sternite (Figs 61–62) with distinct stem and divergent lobated arms; hypopygium (Figs 63–65) with cercal plate only a little longer than wide; surstylus weakly concave dorsally around basal third in lateral view, with 2 spine-like setae on inner lobe; distiphallus (Fig. 66) with dorsal process around basal fourth; pregonite with 2 marginal setae, dorsal one longer; postgonite lobated on



Figs 58–65. *Anthomyia alishana*, ♂. 58, 4th sternite; 59, 5th sternite, ventral view; 60, ditto, ventrolateral view; 61, 6th sternite; 62, ditto, different angle of view; 63, hypopygium, dorsal view; 64, ditto, dorsocaudal view; 65, ditto, lateral view. Magnification same for Figs 58–62 and 64–65. Tsuifeng (paratype), Taiwan.

posteroventral corner, inside with a few short setae a little distant from the corner, the dorsalmost seta rather stout and more or less dilated (Figs 67–68).

♀. Mesonotum (Fig. 55) with postsutural spots separated from each other, lateral spots more narrowly extending to the wing bases than in male. Abdomen (Fig. 57) with median vitta represented by an obscure linear line and a small posterior spot on 2nd tergite, and by a wedge-shaped triangle on 3rd to 5th tergites, that on 5th tergite small; fore-marginal bands represented by a pair of lateral triangles narrowly united with median vitta on 3rd to 5th tergites.



Figs 66–70. *Anthomyia alishana*, ♂ (66–68) and ♀ (69–70). 66, basiphallus and distiphallus; 67, left pregonite and postgonite; 68, ditto, different angle of view; 69, ovipositor; 70, 8th segment and proctiger. Magnification same for Figs 66–68. Tsuifeng (66–68, paratype; 69–70, paratype), Taiwan.

Frons about one-third as wide as head at level of *if*; interfrontalia a little less than two-thirds as wide as frons at level of *if*; parafrontals with 2 *ori* and 3 *ors*. Thorax with 1 strong and 1 weak *pstg*, and only 1 associated setula discernible in the specimen examined.

Mid femur with 2 *av* near base and 4 *pv* on basal half, these *av* and *pv* setae shorter than height of the femur;  $f_3$  with *av* shorter than height of the femur except for 1 or 2 long preapicals, and with 1 fine *pv* near base, 1 or 2 fine *pv* near middle, and a few rather distinct preapical *pv*;  $t_1$  with 1 *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 2 *pd* and 2 *pv*;  $t_3$  with no distinct *pv*, at most 1 or a few fine ones barely differentiated from adjacent setulae.

Abdomen ovoid, 1.24 times as long as wide in the specimen examined; ovipositor (Figs 69–70) with 6th and 7th sternites each represented by an elongated narrow plate, and 8th sternite by a pair of narrow plates; 6th and 7th tergites rather weakly sclerotized across dorsum posteriorly, and divided anteriorly into pairs of lateral plates and short central strips; 8th tergite distinctly sclerotized across dorsum posteriorly and divided anteriorly into a pair of elongated lateral plates and a short central strip; 8th sternite a little more than twice as long as hypoproct; cerci lengthened, about twice as long as epiproct.

Remarks. The male 4th sternite armed with long setae on posterior half, male 6th sternite with divergent arms on central process, and postgonite with setae on the inner surface, these indicate that the present species, together with *A. imbrida*, *A. malaisei* and *A. vittiventris*, belongs to the *Anthomyia ornata* superspecies proposed by Ackland (2001) on the basis of Afrotropical species. *A. alishana* much differs from the others of the superspecies in the mesonotal colour pattern and in some features of the male terminalia (4th sternite densely setose and postgonite well lobated posteroventrally).

#### 6. *Anthomyia benguellae* Malloch, 1924 (Figs 71–84)

*Anthomyia indica* Malloch, 1924: 269 (primary homonym of *Anthomyia indica* Walker, 1853 = *Dichaetomyia indica*, Muscidae).

*Anthomyia benguellae* Malloch, 1924: 272; Pont and Ackland, 1980: 715; Michelsen, 1997: 40; Ackland, 2001: 22.

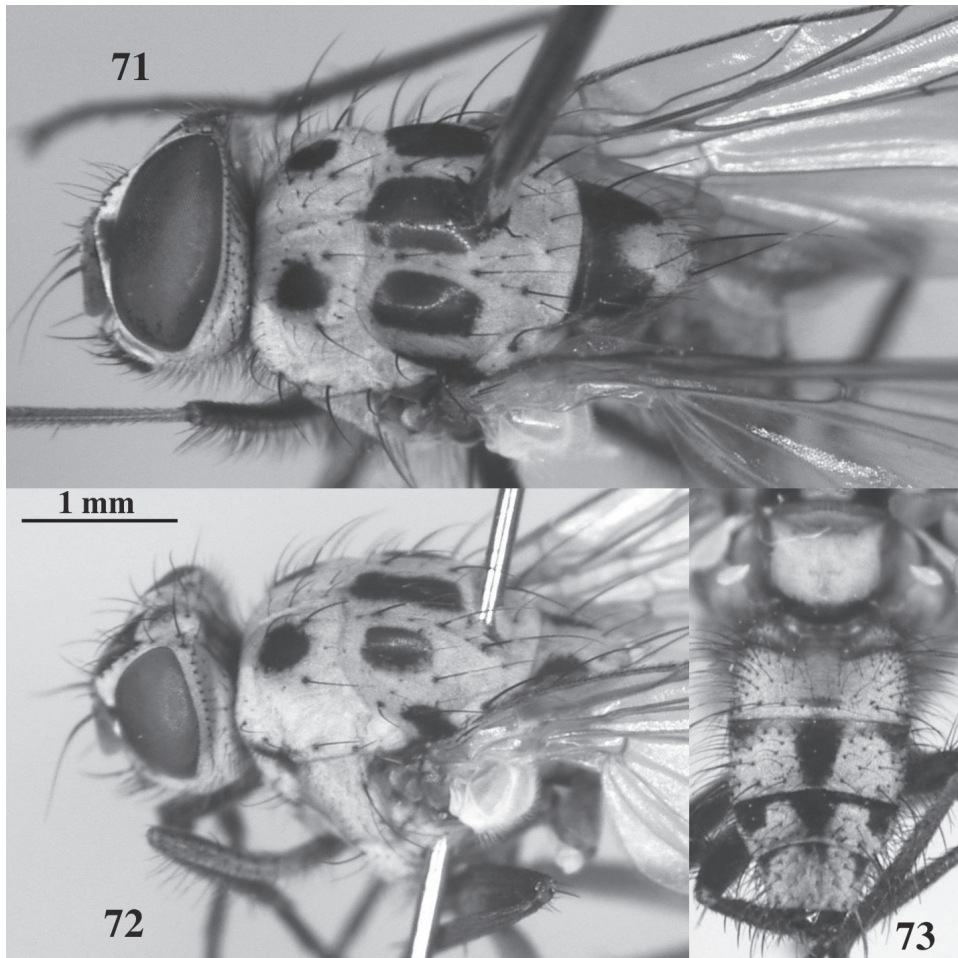
“*Anthomyia quinquemaculata* Macquart, 1839”: Michelsen, 1980: 287, *partim*.

*Anthomyia inda* Ackland and Pont, 1977: 439, new name for *Anthomyia indica* Malloch, 1924; Ackland, 1987: 43. Synonymy after Ackland, 2001: 22.

Material examined. NEPAL. Tukucha, Palpa, 2♀, 6.v.1968 (T. Kumata); Latamarang, alt. 2400–2500 m, Marsyandi Valley, Gandaki, 2♀, 21.vi.1988 (M. Suwa); Bagarchap, alt. ca. 2100 m, Marsyandi Valley, Gandaki, 3♀, 22.vi.1988 (M. Suwa); Tal–Dharapani, alt. 1700–1900 m, Marsyandi Valley, Gandaki, 1♀, 23.vi.1988 (M. Suwa). PAKISTAN. Nathiagali, alt. 2400 m, 10 km N of Murree, 2♂, 1♀, 17–18.vii.1987 (H. Kurahashi), 4♂, 18.vii.1987 (S. Shinonaga); Ayubia National Park, alt. 2200 m, Kashmir, 2♂, 1♀, 25–30.vii.1988 (S. Shinonaga); Tandani [= Thandiani], alt. 2400 m, 26 km N of Abbottabad, 2♂, 1♀, 1.viii.1988 (S. Shinonaga).

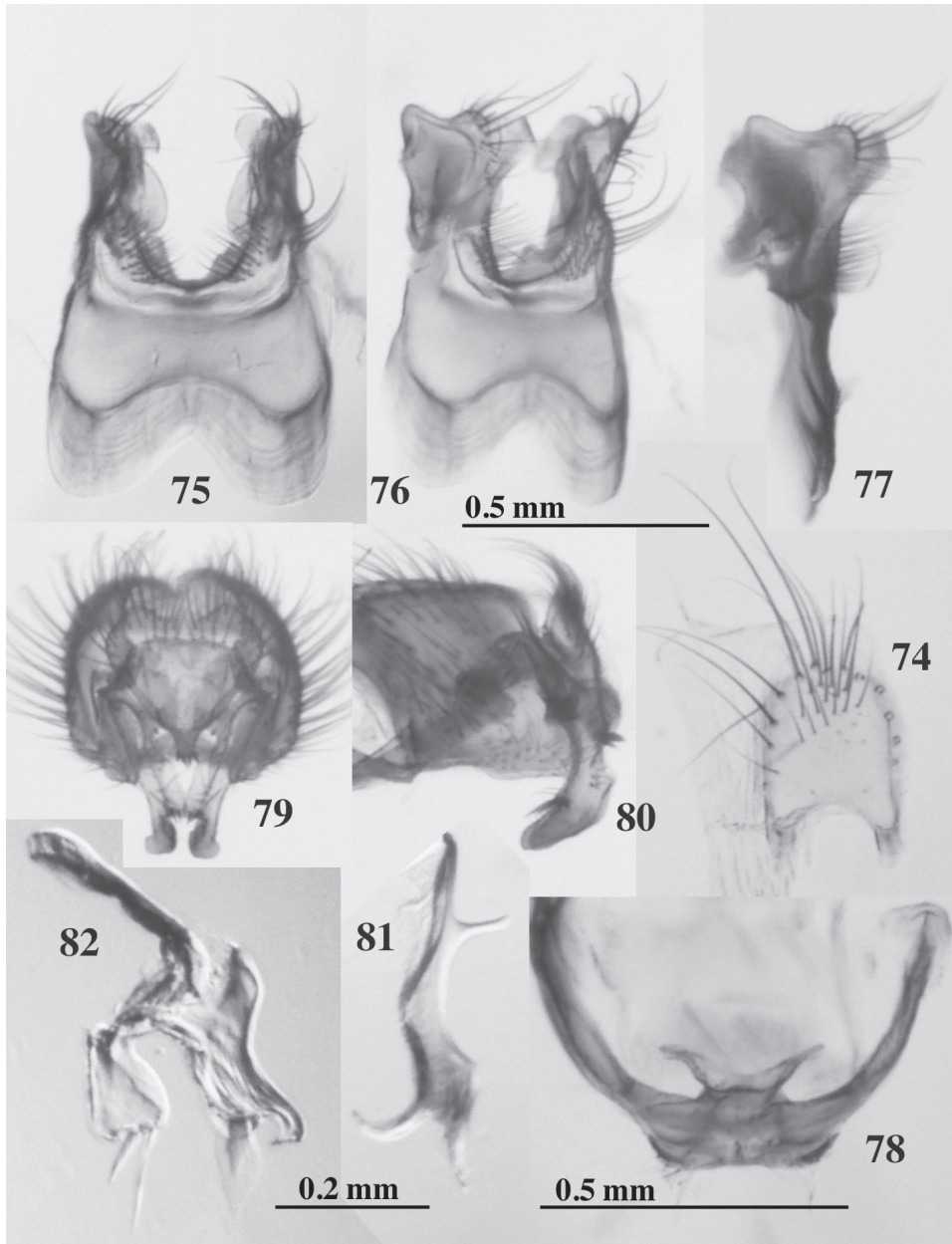
Distribution. Afrotropical region; Middle East; India; Nepal; Pakistan. New to Pakistan.

♂. Wing length 5.1–6.0 mm. Body dark brown to blackish in ground colour and whitish grey in pollinosity; legs dark brownish, more or less yellowish on femora

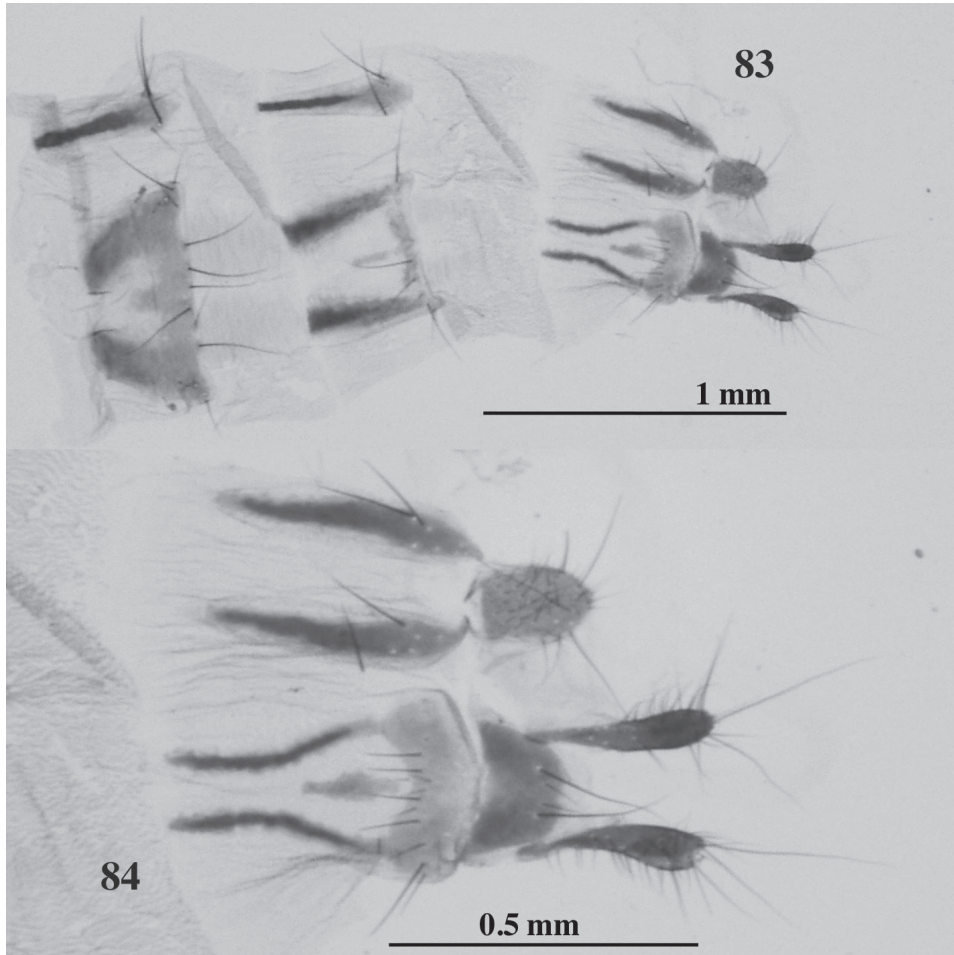


Figs 71–73. *Anthomyia bengueliae*, ♂ (71, 73) and ♀ (72). 71–72, head and thorax, dorsolateral view; 73, abdomen, dorsocaudal view. Tandani (71; 72) and Nathiagali (73), Pakistan.

apically and on tibiae basally. Occiput wholly grey pollinose. Mesonotum (Fig. 71) with sharp dark markings: a pair of presutural spots and 5 postsutural spots; each presutural spot smaller than the space surrounded by *pre-dc*, anterior *ph* and *prst*; supraalar postsutural spots extending to *ial*, often to *pra*; scutellum dorsally with a pair of lateral dark spots on basal two-thirds, the spots often fused with each other basally, and on ventral surface with a pair of lateral dark markings usually separated from dorsal spots by lateral marginal grey area, but the markings sometimes fused with the spots leaving a grey area basally. Abdomen (Fig. 73) with median vitta entire and narrowing posteriorly on 3rd and 4th tergites, represented by a small posterior spot on 2nd tergite, and by a small anterior spot on 5th tergite; fore-marginal bands narrowly discernible on 2nd and 4th tergites, usually hidden anteriorly under preceding tergites on 3rd and 5th tergites, and extending posteriorly on each lateral side of 3rd to 5th tergites.



Figs 74–82. *Anthomyia benguellae*, ♂. 74, 4th sternite; 75–77, 5th sternite, ventral to lateral views; 78, 6th sternite; 79, hypopygium, dorsal view; 80, ditto, lateral view; 81, distiphallus; 82, aedeagal apodeme, and left pregonite and postgonite. Magnification same for Figs 74–77 and 79–80. Nathiagali (74–80; 81–82), Pakistan.



Figs 83–84. *Anthomyia benguellae*, ♀. 83, ovipositor; 84, 8th segment and proctiger. Bagarchap, Nepal.

Frons narrower than anterior ocellus; parafrontals contiguous to each other, and with 3–4 *ori* and a vestigial *ors*; minute *if* usually discernible; arista with longest hairs about as long as basal diameter of arista.

Mesonotum with 3 pairs of *pre-acr* in rows closer together than to adjacent *dc*-row, usually no setulae in between; posterior *ph* not differentiated from ground setulae; *pra* shorter than posterior *ntpl*; 1 strong and 1 weak *pstg*, 2–3 associated setulae discernible.

Mid femur with no distinct *av*, at most 1 or 2 fine *av* near base barely differentiated from ground setulae, and on basal half with 6–8 *pv*, the longest being as long as or slightly longer than height of the femur; *f*<sub>3</sub> with a row of about 10 *av* except near base, the longest a little longer than height of the femur, and with some weak *pv* on median third and a few or some weak *pv* near apex; *t*<sub>1</sub> with no *ad* and 1 *pv*; *t*<sub>2</sub> with 1 *ad*, 2 *pd* and

2–3 *p/pv*;  $t_3$  with 1 or rarely 2 *av*, 9–13 unequal *ad*, 2 *pd* and some (3–7) weak *pv*. Wings with costal thorns small and hardly differentiated from costal spinules; *dm-cu* oblique and sinuate.

Abdomen depressed on basal half, about twice as long as wide; 6th tergite much narrowed, and linear laterally; 4th sternite (Fig. 74) a little longer than wide and rounded on posterior margin, with posterior setae longer than the sternite; 5th sternite processes (Figs 75–77) well lobated innerapically, usually with unisetose gap between distal and inner series of setae; central process of 6th sternite (Fig. 78) with distinct stem and divergent arms; 6th and 7th spiracles enlarged; hypopygium (Figs 79–80) with cercal plate only a little longer than wide; surstylus weakly concave dorsally around basal third in lateral view, with 2 spine-like setae on inner lobe; distiphallus (Fig. 81) with dorsal process around basal fourth; pregonite with 2 marginal setae, dorsal one longer; postgonite lobated on posteroventral corner, inside with an expanded seta a little distant from the corner (Fig. 82).

♀. Mesonotum (Fig. 72) with dark markings less developed than in male; scutellum with ventral lateral dark markings not fused with dorsal dark spots. Abdomen with median vitta narrow and faint on 2nd tergite, entire and triangulate on 3rd and 4th tergites, and represented by a small anterior spot on 5th tergite.

Frons slightly wider than one-third of head width at level of *if*; interfrontalia a little less than two-thirds as wide as frons at level of *if*; parafrontals with 2 *ori* and 3 *ors*, upper *ori* often weakened and sometimes minute.

Mid femur with 1 *av* near base and 4–6 *pv* on basal half;  $f_3$  with some *av* on distal two-thirds (a few around distal fourth much weakened) and with 1 basal, 0–1 median and 1–2 preapical *pv*;  $t_3$  with 6–9 *ad* and usually no *pv* discernible.

Abdomen with ovipositor (Figs 83–84) about as long as preabdomen; cerci lengthened, nearly twice as long as epiproct.

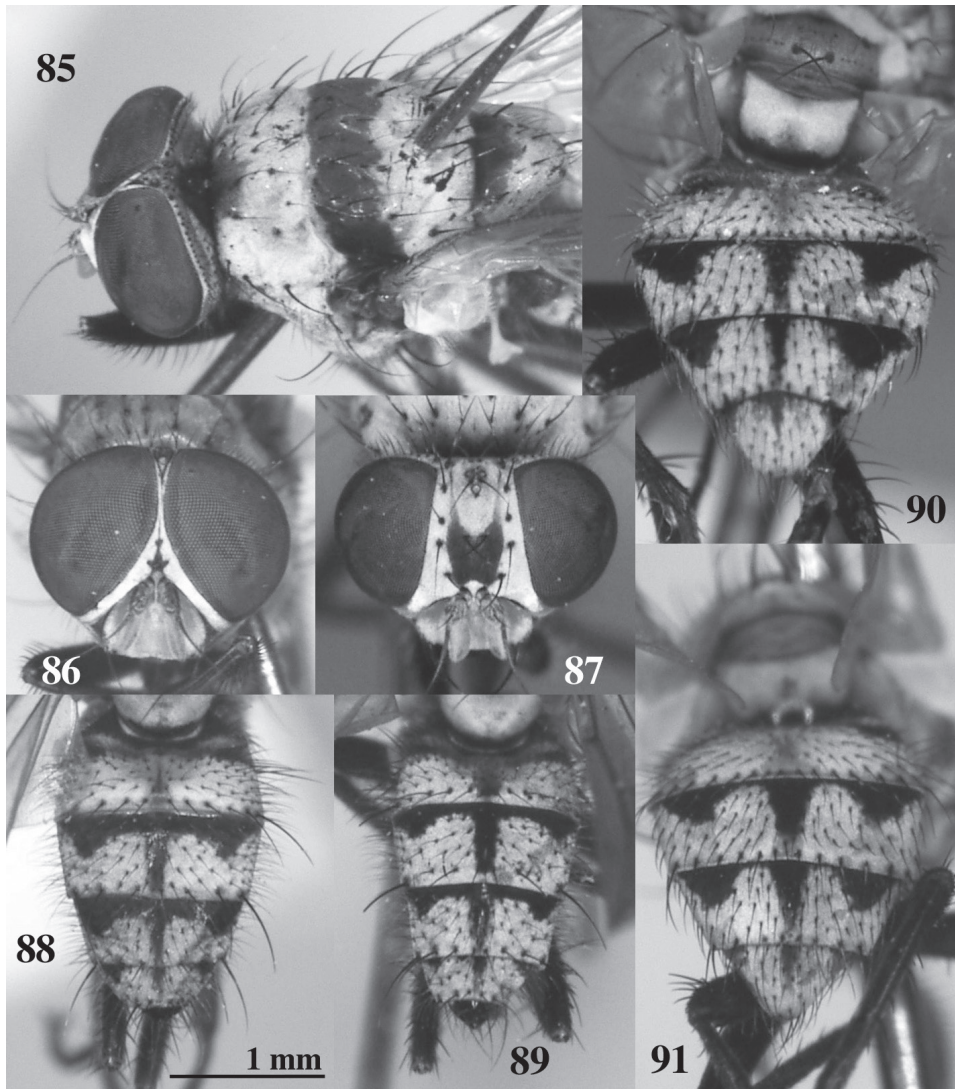
Remarks. *Anthomyia benguellae* Malloch, 1924 and *Anthomyia indica* Malloch, 1924 (= *A. inda*) were described as distinct from each other. Ackland (2001) gives a note as follows: "The male genitalia of *benguellae* are in fact the same as those of *inda*. In spite of the rather different appearance of the scutal black pattern (five smaller discrete spots postsuturally in *inda* from northern India; three discrete or narrowly joined spots in *benguellae* from southern Africa), material I have seen from intermediate localities suggests that *benguellae* is a widely distributed species ranging from the Indian subcontinent to South Africa." And Ackland (l.c.) synonymized *A. inda* with *A. benguellae*. His opinion is here accepted.

In having the enlarged 6th and 7th abdominal spiracles in the male the present species belongs to the *Anthomyia pluvialis* superspecies in the sense of Ackland (l.c.) together with *A. pluvialis* and *A. tempestatum*. *Anthomyia benguellae* is distinguishable from the allied species by the 2nd abdominal tergite with reduced median vitta, mesonotum with postsutural lateral spots not extending to *pra* and separated from supraalar spots, and occiput densely grey pollinose on postocular plains.

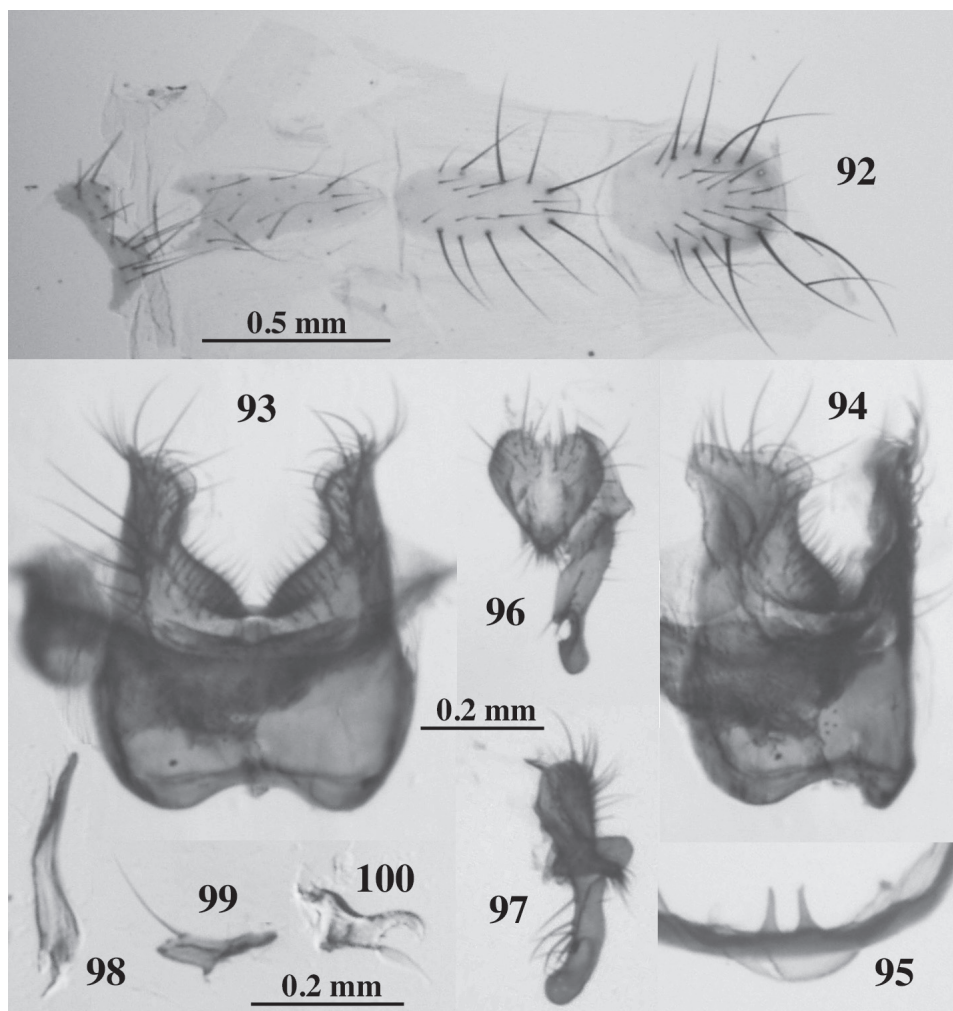
The male of this species has the postgonite with an expanded seta in common with that of *A. pluvialis*. The seta is, however, situated on the inner surface of the postgonite a little distant from the posteroventral corner in *A. benguellae*, and the seta situated at the posteroventral corner of the gonite in *A. pluvialis*.

7. *Anthomyia illocata* Walker, 1856  
(Figs 85–102)

*Anthomyia illocata*: Ackland, 1986: 42; Suwa, 1987: 35; Ackland, 1987: 41; Wei et al., 1998: 648; Vikhrev, 2022: 316.

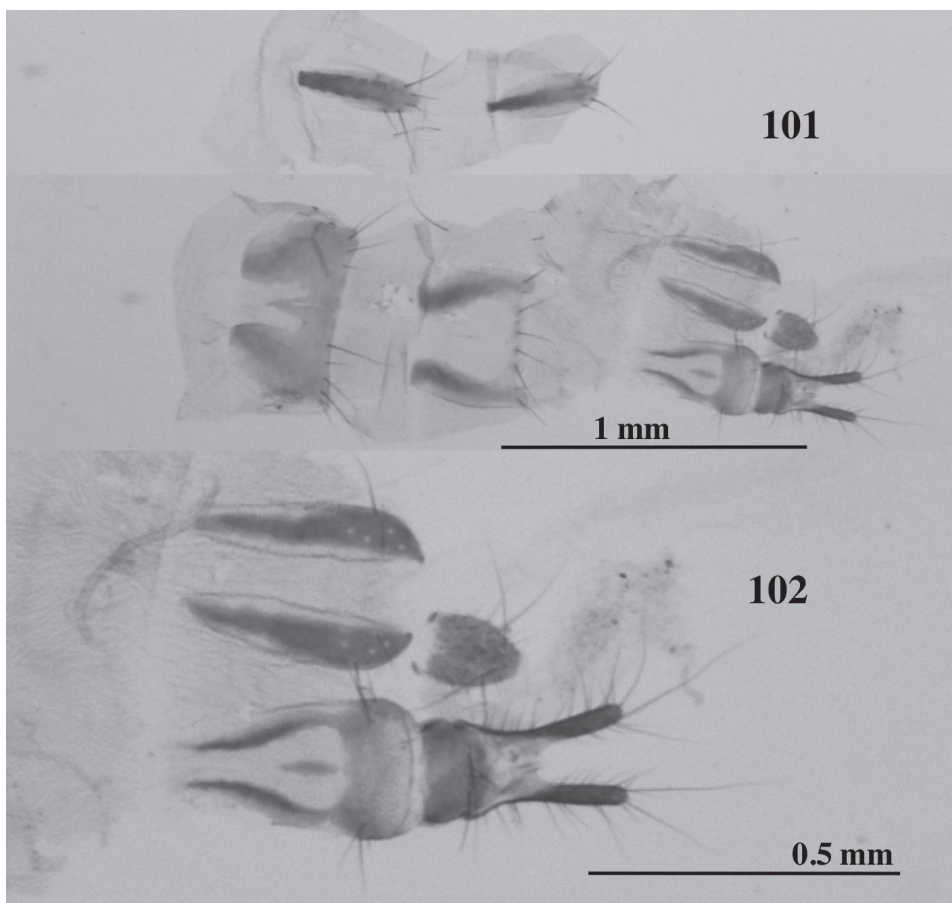


Figs 85–91. *Anthomyia illocata*, ♂ (85–86, 88–89) and ♀ (87, 90–91). 85, head and thorax, dorsolateral view; 86–87, head, anterodorsal view; 88–91, abdomen, dorsocaudal view. Taichun (85–86, 88) and Tungpu (89), Taiwan; Bao Loc (87, 90), Vietnam; Tapah (91), Malaysia.



Figs 92–100. *Anthomyia illocata*, ♂. 92, 1st (leftmost) to 4th sternites; 93, 5th sternite, ventral view; 94, ditto, ventrolateral view; 95, 6th sternite, showing central process; 96, cercal plate and right surstylus, dorsal view; 97, ditto, lateral view; 98, distiphallus; 99, right pregonite, lower marginal seta missing; 100, left postgonite. Magnification same for Figs 93–94 and 96–97, and for 95 and 98–100. Berastagi (92), Indonesia; Taichun (93–94, 96–100), Taiwan; Kandy (95), Sri Lanka.

Material examined. TAIWAN. Yangmei, Taoyuan, 1♀, 20.v.1972 (R. Kano); Chilan, Taoyuan, 1♀, 23.v.1972 (R. Kano); Ssuehchungchi, Pingtung Hsien, 1♀, 11.vi.1972 (R. Kano); Nanshanchi, alt. 600 m, Nantou Hsien, 2♀, 22–23.iv.1981 (K. Ôhara), 1♀, 30.v.1972 (H.M. Lin); Puli, alt. 600 m, Nantou Hsien, 1♀, 23.vi.1979 (M. Suwa); Jihyuetan, alt. 900 m, Nantou Hsien, 1♀, 24.vi.1979 (M. Suwa); Lushan, alt. 1200 m, Nantou Hsien, 1♀, 26–28.vi.1979 (M. Suwa); Tungpu, Chiayi Hsien, 2♂, 1♀, 14–17.vii.1976 (H. Takizawa); Fenchifu, alt. 1400 m, Chiayi Hsien, 1♂, 3♀, 31.v–3.vi.1970 (H. Kurahashi); Alishan, alt. 2300 m, Chiayi Hsien, 1♂, 6.vi.1970 (H. Kurahashi); Chulu, Taichung Hsien, 1♂, 15.v.1971 (K. Kanmiya); Meilung-shan, Hualien Hsien, 1♀, 6.iv.1984 (K.



Figs 101–102. *Anthomyia illocata*, ♀. 101, ovipositor; 102, 8th segment and proctiger. Karla Cave, India.

Ôhara); Chihpen-chi, Taitung Hsien, 1♀, 16.v.1971 (K. Kanmiya); Liukuei, Kaohsiung Hsien, 1♂, 21.v.1971 (K. Kanmiya); Kuanzuling, Tainan Hsien, 1♂, 23.v.1971 (K. Kanmiya); Kuantsuling, Tainan Hsien, 2♂, 8.vi.1970 (H. Kurahashi), 2♂, 7.vi.1972 (R. Kano); Tachi, 1♂, 18.vi.1972 (R. Kano); Taichung, 1♂, 22.vi.1979 (M. Suwa). INDONESIA. Berastagi, alt. 1400 m, Sumatra, 3♂, 1♀, 21–22.xi.1973 (H. Kurahashi); Sembelia, alt. 300 m, Lombok, 1♀, 22.xii.1973 (H. Kurahashi); Andonuhu, Kendari, Sulawesi, 1♀, 3.xii.1974 (K. Kusigemati). VIETNAM. Danbri, alt. 800 m, 15 km NW of Bao Lok, 1♂, 29.v–1.vi.2002 (S. Shinonaga); Bao Loc, Lam Dong, 1♀, 18.iv.2014 (K. Harusawa). MALAYSIA. 14–20 miles N of Tapah, alt. 300–600 m, 4♀, 28.x.1975 (S. Shinonaga). SRI LANKA. Kandy, 1♀, 27.vii.1953 (F. Keiser), 1♂, 8♀, 29.vii.1953 (F. Keiser). INDIA. Karla Cave, 10 km NE of Lonavala, Maharashtra, 1♂, 5.vi.1989 (H. Kurahashi); Top Slip, Anaimalai, alt. 550–800 m, Tamil Nadu, 1♀, 3.xii.1978 (JAP-IND CO TR). NEPAL. Pokhara, 1♀, 16.v.1968 (T. Kumata).

Distribution. Eastern Palaearctic region; Oriental region; Australasian and Oceanian regions.

♂. Wing length 3.8–5.3 mm. Body dark brown to blackish in ground colour and densely whitish grey pollinose. Abdomen in ground colour usually more or less yellowish on basal two or three segments especially on ventral side, often more broadly yellowish except on terminal segments. Legs dark brown; femora very narrowly paler apically. Occiput evenly grey pollinose and not blackish. Mesonotum with or without a pair of small dark spots around 1st *pre-dc*, and with postsutural dark band very slightly away from transverse suture anteriorly and extending at most around 2nd *post-dc* posteriorly. Scutellum darkened on less than basal half. Abdomen (Figs 88–89) with median vitta narrow, usually obscure on 2nd tergite; fore-marginal bands triangularly extending posteriorly near each lateral margin on 3rd to 5th tergites, anteriorly hidden under preceding tergite on 5th and sometimes also on 4th tergite.

Head 1.5–1.7 times as high as long; frons narrower than anterior ocellus; parafrontals contiguous to each other; 2 or sometimes 3 *ori*, lower or lowest one strong; 1 vestigial *ors* discernible; single minute *if* sometimes discernible;  $A_3$  2.4–2.9 times as long as wide; arista short plumose, with longest hairs about 4 times as long as basal diameter of arista; orbits at parafrontal angle a little narrower than or at most as wide as  $A_3$ ; genae 1.6–2.3 times as high as  $A_3$ -width, with 1 strong upcurved genal seta, sometimes 1 fine setula associated; epistoma situated a little behind tip of parafrontal angle.

Mesonotum with ground setulae sparse; 3 pairs of *pre-acr* in rows closer to each other than to adjacent *dc*-row, with no setulae in between; posterior *ph* suppressed; *pra* at most as long as posterior *ntpl*; mesopleuron with a distinct anterior *mpl*; 1 strong and 1 weaker *pstg*, and no associated setulae; *stpl* 2:2, the lower anterior much weaker than the upper, in addition below the posteriors 1 or 2 setulae differentiated from adjacent setulae.

Mid femur with 3–6 *pv* on basal half, the longest as long as or a little shorter than height of the femur, and rarely with 1 or 2 short *av* near base;  $f_3$  with a row of sparse (6–9) *av*, the longest as long as or a little longer than height of the femur, and with 1 *v* near base and a few or some *pv* near apex;  $t_1$  with 1 *pv*;  $t_2$  with 2 *pd* and 2–3 *p/pv*, and usually 1 small *ad* discernible;  $t_3$  with 1 *av*, 5–8 *ad* of unequal length and 2 *pd*, and usually with a few or some weak *pv* discernible. Wings with costal thorns small though stronger than costal spinules; *dm-cu* oblique and sinuate.

Abdomen long ovoid, 1.3–1.7 times as long as wide; 4th sternite (Fig. 92) about 1.5 times as long as wide; 5th sternite processes (Figs 93–94) weakly lobated innerapically, with some lateral setae on basal half, 1 or a few of the setae longer than distal setae; 6th sternite with central process (Fig. 95; cf. Suwa, 1987: Fig. 210) represented by a pair of minutely pilose and membranous projections; cercal plate with apex turned dorsally (Fig. 97); surstylus maintained in width in profile beyond dorsobasal swelling; distiphallus (Fig. 98) without dorsal process; pregonite (Fig. 99) with 2 long marginal setae; postgonite (Fig. 100) with a dilated seta at posteroventral corner.

♀. Frons (Fig. 87) becoming wider ventrad, 0.31–0.37 times as wide as head at level of *if*; interfrontalia slightly to rather distinctly wider than half width of frons at level of *if*; parafrontals with 1 strong and occasionally 1 minute *ori* and 3 *ors*; orbits at parafrontal angle distinctly wider than  $A_3$ .

Thorax with *stpl* 2:2, both lower anterior and lower posterior much weaker than the uppers. Mid femur with 0–2 (usually 1) *av* near base and 2–3 (rarely 1) *pv* on basal third;  $f_3$  with 4–8 *av*, and 1 or a few preapical *pv*;  $t_1$  with 1 *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 2 *pd* and 2–3 *p/pv*;  $t_3$  with 1 *av*, 4–7 unequal *ad*, 2 *pd* and no *pv*.

Remarks. In having the 6th sternite with minutely pilose central process, cercal plate

with upturned apex and postgonite with a dilated seta in the male this species, together with *A. plumiseta*, belongs to the *Anthomyia amoena* superspecies proposed by Ackland (2001) on the basis of Afrotropical species. *A. illocata*, however, differs from the others of the superspecies in the male distiphallus without a dorsal process and the male 6th sternite with central process completely divided into a pair of narrow projections.

The male distiphallus without a dorsal process is seen also in some other species of *Anthomyia*, e.g. the Afrotropical *A. subabyssinica* Ackland, 2001 and the Oriental *A. luculenta* Ackland, 1987. The present *A. illocata* is much different from these species in other characters, and the loss of the dorsal process may be understood as an independent phenomenon.

#### 8. *Anthomyia imbrida* Rondani, 1866 (Figs 103–123)

*Anthomyia imbrida*: Michelsen, 1980: 283; Fan et al., 1988: 92; Wei et al., 1998: 648; Suwa and Blasco-Zumeta, 2003: 45.

Material examined. PAKISTAN. Naran, alt. 2000 m, Kagan Valley, 4♀, 22.vii.1987 (S. Shinonaga); Begrote, alt. 2700 m, 15 km E of Gilgit, 1♂, 1♀, 29.vii.1987 (S. Shinonaga); Ultar glacier, alt. 2500 m, Hunza, 1♀, 31.vii.1987 (S. Shinonaga); Ayubia National Park, alt. 2200 m, Kashmir, 1♀, 25–30.vii.1988 (S. Shinonaga).

Distribution. Europe; North Africa; Middle East; China; Pakistan. New to Pakistan.

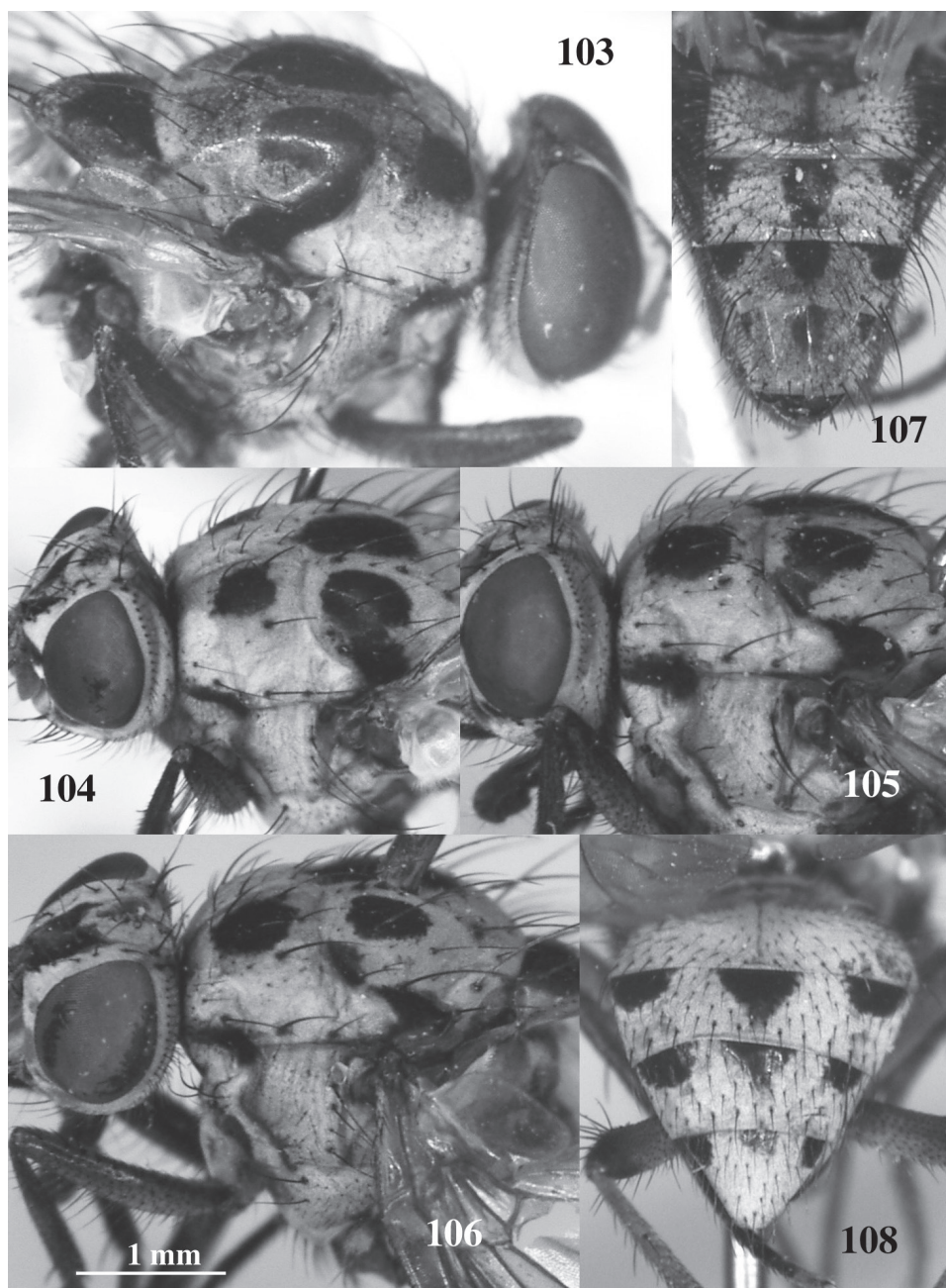
♂. Wing length 6.1 mm. Body including appendages dark brown to blackish in ground colour, and pale grey and more or less bluish in pollinosity. Occiput more or less darkened on postocular plains in certain angles of view though grey pollinose. Mesonotum (Fig. 103) with dark markings: a pair of large presutural spots and 3 large postsutural spots; presutural spots expanded to anterior *ph* and 1st and 2nd *pre-dc* and to near *prst*; lateral postsutural spots including *pra* and *sal* and extending to wing bases; scutellum largely black and narrowly grey at base laterally and at apex. Abdomen (Fig. 107) with median vitta very narrow and a little dilated posteriorly on 2nd tergite, wedge-shaped on 3rd to 5th tergites; fore-marginal bands narrowly discernible on 2nd tergite, mainly hidden under preceding tergites and represented by a pair of lateral triangular spots on succeeding tergites; 5th sternite partly brown and polished on processes.

Frons narrower than anterior ocellus; parafrontals contiguous to each other, with 3 *ori* and a vestigial *ors*; minute *if* discernible; arista with longest hairs about as long as basal diameter of arista.

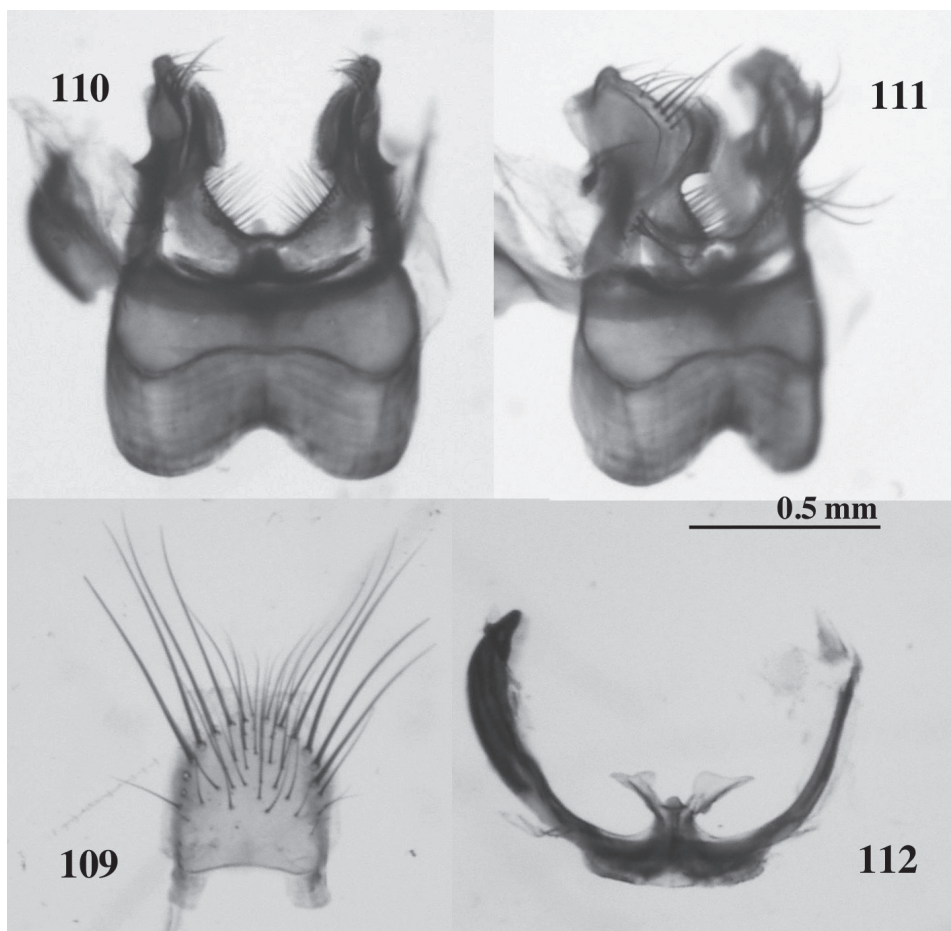
Mesonotum with 3 pairs of *pre-acr* in rows separated by about distance from each to adjacent *dc*-row, 1 setula discernible in between; posterior *ph* weakly differentiated; *pra* shorter than posterior *ntpl*; 1 strong and 1 weak *pstg*, 5 associated setulae discernible.

Mid femur (right *f*<sub>2</sub> unobservable) with no *av* and 8 *pv* on basal half; *f*<sub>3</sub> with a row of *av*, those on distal two-thirds rather strong and probably as long as or a little longer than height of the femur (not good in condition of the specimen), and with 1 weak *pv* near base, some weak *pv* on median third and a few weak *pv* near apex; *t*<sub>1</sub> with no *ad* and 2 *pv*; *t*<sub>2</sub> with 1 *ad*, 1 *pd* and 3 *p/pv*; *t*<sub>3</sub> with 1 *av*, 13–14 unequal *ad*, 2 *pd* and some *pv*. Wings with costal thorns small and barely differentiated from costal spinules; *dm-cu* oblique and sinuate.

Abdomen depressed basally, twice as long as wide; 6th tergite narrow, weakly

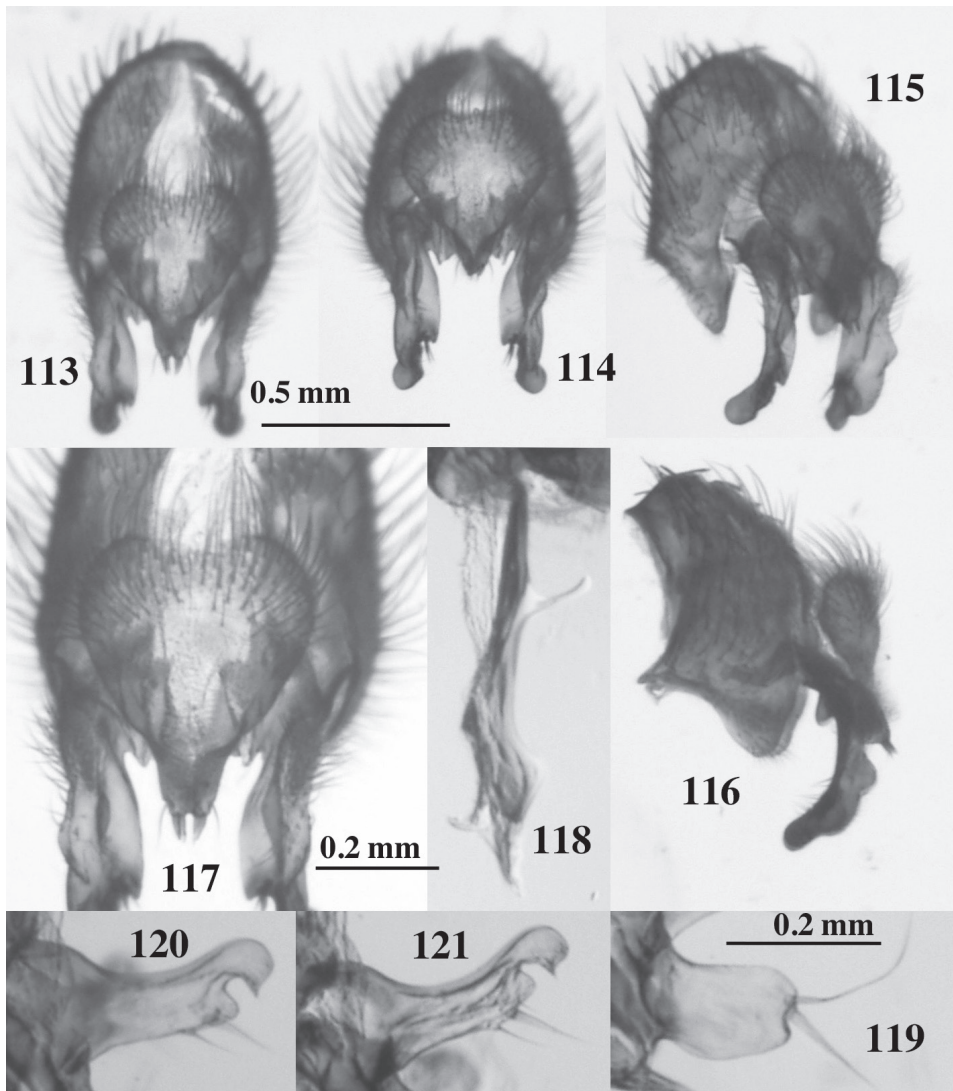


Figs 103–108. *Anthomyia imbrida*, ♂ (103, 107) and ♀ (104–106, 108). 103–106, head and thorax, dorsolateral view; 107–108, abdomen, dorsocaudal view. Begrote (103, 107), Ayubia National Park (104) and Naran (105, 108; 106), Pakistan.



Figs 109–112. *Anthomyia imbrida*, ♂. 109, 4th sternite; 110, 5th sternite, ventral view; 111, ditto, ventrolateral view; 112, 6th sternite. Begrote, Pakistan.

sclerotized, linear laterally, not fused with pregenital sclerite; 4th sternite (Fig. 109) nearly as long as wide and rounded posteriorly, with some long setae along posterior margin; 5th sternite processes (Figs 110–111) well lobated innerapically, with distinct unsetose gap between distal and inner series of setae, and with some outer lateral setae basally, a few of the setae well developed and longer than any others on the sternite; 6th sternite (Fig. 112) with central process divided into a pair of lateral blades and a short median protrusion; hypopygium (Figs 113–117) with cercal plate 1.2 times as long as wide, rather broadly protruded apically, bearing 2 pairs of short and flattened setae, and outside the setae with a pair of unspecialized short setae discernible; surstylus strongly concave dorsally around basal third in lateral view; distiphallus (Fig. 118) with dorsal process situated around basal third; pregonite (Fig. 119) with 2 adjoining setae on outer margin, dorsal one much longer; postgonite (Figs 120–121) beak-shaped on posterodorsal lobe apically, and inside with 1 slightly dilated seta, 1 fine setula and 1 or 2



Figs 113–121. *Anthomyia imbrida*, ♂. 113, hypopygium, dorsal view; 114, ditto, dorsocaudal view; 115, ditto, dorsolateral view; 116, ditto, lateral view; 117, cercal plate; 118, distiphallus; 119, left pregonite; 120, left postgonite; 121, ditto, different angle of view. Magnification same for Figs 113–116, and for Figs 118–121. Begrote, Pakistan.

minute setulae a little distant from posteroventral corner.

♀. Wing length 5.2–5.6 mm. Thorax and abdomen with dark markings less developed than in male. Mesonotum on each side postsuturally with rather large spot around 1st *ial*, small spot around *pra* and small spot around *sal* to wingbase in the form with most divided spots (Fig. 106), the *ial*-spot often fused with *pra*-spot (Fig. 105), and these spots sometimes fused into one large marking (Fig. 104); scutellum with a



Figs 122–123. *Anthomyia imbrida*, ♀. 122, ovipositor; 123, 8th segment and proctiger. Begrote, Pakistan.

pair of dark spots widely separated from each other, the spots sometimes fused basally. Abdomen (Fig. 108) with median vitta represented by a triangular spot on 3rd to 5th tergites, often indiscernible on 5th tergite; fore-marginal bands represented by a pair of lateral triangular spots on 3rd to 5th tergites.

Frons 0.38–0.42 times as wide as head at level of *if*; interfrontalia rather distinctly more than half as wide as frons at level of *if*; parafrontals usually with 2 *ori* and 3 *ors*. Mesonotum with 3 or occasionally 4 pairs of *pre-acr*, usually 1 or 2 setulae discernible between the rows; 1 strong and 1 weak *pstg*, and 1–3 associated setulae.

Mid femur with 1 *av* near base and 5–7 *pv* on basal half;  $f_3$  with some (5–7) rather strong and a few or some (2–5) weak *av* on distal two-thirds, the longest about as long as height of the femur, and 1 weak *pv* near base and a few weak *pv* near apex;  $t_1$  with 1 *pv*,

and sometimes 1 small *ad* discernible;  $t_2$  with 1 *ad*, 1 *pd*, 1 *p* and 2 *pv*;  $t_3$  with 1 *av*, 6–12 unequal *ad*, 2 *pd* and no *pv*.

Abdomen with ovipositor (Figs 122–123) about as long as preabdomen; cerci lengthened, nearly twice as long as epiproct.

Remarks. Four males from Hungary (2♂), Spain (1♂) and Morocco (1♂) are available for this study. These specimens have a single *pv* on the fore tibia. It may be exceptional that the present male specimen from Pakistan has 2 *pv* on the fore tibia. In the males from Hungary the scutellum is largely black as in the present male specimen from Pakistan. On the other hand, in the males from Spain and Morocco the scutellum has a pair of black markings separated from each other by a median grey area from base to apex. It is uncertain that the variation in colour pattern of the scutellum is individual or geographical.

This species belongs to the *Anthomyia ornata* superspecies as mentioned earlier in the remarks of *A. alishana*. *Anthomyia imbrida* is much different from others of the superspecies in the mesonotal colour pattern and in some features of the male terminalia (4th sternite nearly as long as wide, cercal plate with rather broadly protruded apex, surstylus narrowed apically in lateral view, pregonite with setae adjoining to each other).

9. *Anthomyia luculenta* Ackland, 1987  
(cf. Ackland, 1987: Figs 70–77)

*Anthomyia luculenta* Ackland, 1987: 55.

Material examined. No specimen available for this study.

Distribution. Indonesia.

This species was described on the basis of a male specimen from Sulawesi, Indonesia. According to the original description of the species: –

♂. Large species. Wing length 8.0 mm. Occiput entirely grey pollinose; palpi dirty yellow, slightly darkened apically. Thorax mainly densely whitish grey pollinose, translucent yellowish on humeral calli; mesonotum without presutural spots, and with black postsutural band from suture to 2nd *post-dc*; scutellum black on basal half. Coxae yellow; femora largely yellow, with distal fourth or third black; knees yellowish; tibiae and tarsi black. Abdomen in ground colour somewhat transparent yellow basally at sides of tergites and sternites; pregenital sclerite shining brownish, no trace of pollen; epandrium orange yellow, weakly pollinose; 5th sternite largely orange yellow.

Head nearly twice as high as long; parafrontals contiguous to each other, with 2 *ori*; *if* apparently absent; arista plumose, with longest hairs as long as  $A_3$ -width.

Mesonotum with 3 pairs of *pre-acr* in rows separated by about distance from each to adjacent *dc*-row; *pra* longer than posterior *ntpl*.

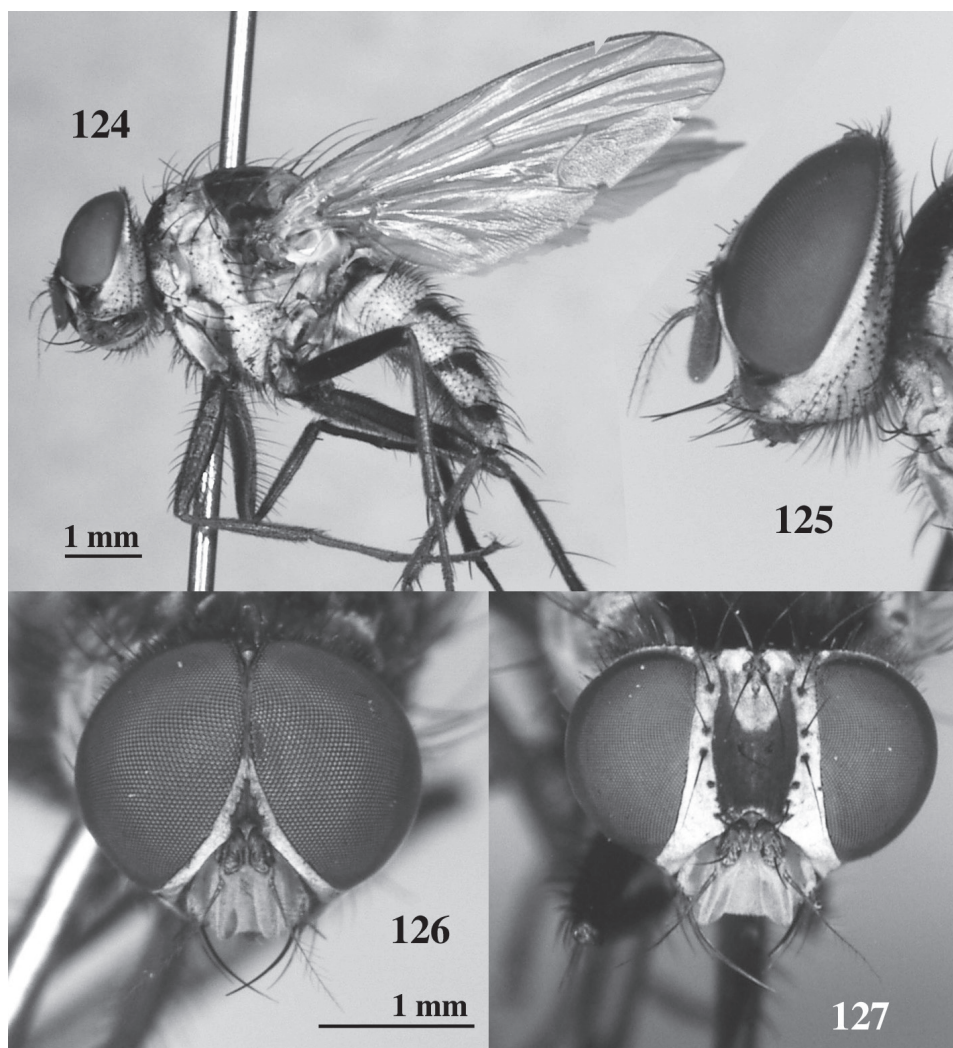
Mid femur with no *av*, and 3–4 weak *pv* in basal half;  $f_3$  with a row of rather short and fine *av* and *pv*;  $t_1$  with 1 very short *ad* and 1 longer *pv*;  $t_2$  with 1 *ad* longer than the tibial diameter, 2 *pd* and 2 *pv*;  $t_3$  with 3–4 *av*, 6–7 *ad* of unequal length, 2 *pd* and 6–7 *pv*. Wings with costal thorns small and not differentiated.

Abdomen about 3 times as long as wide; 4th sternite long, nearly 3 times as long as wide (estimated from the figure in Ackland 1987); 5th sternite processes blade-like, not

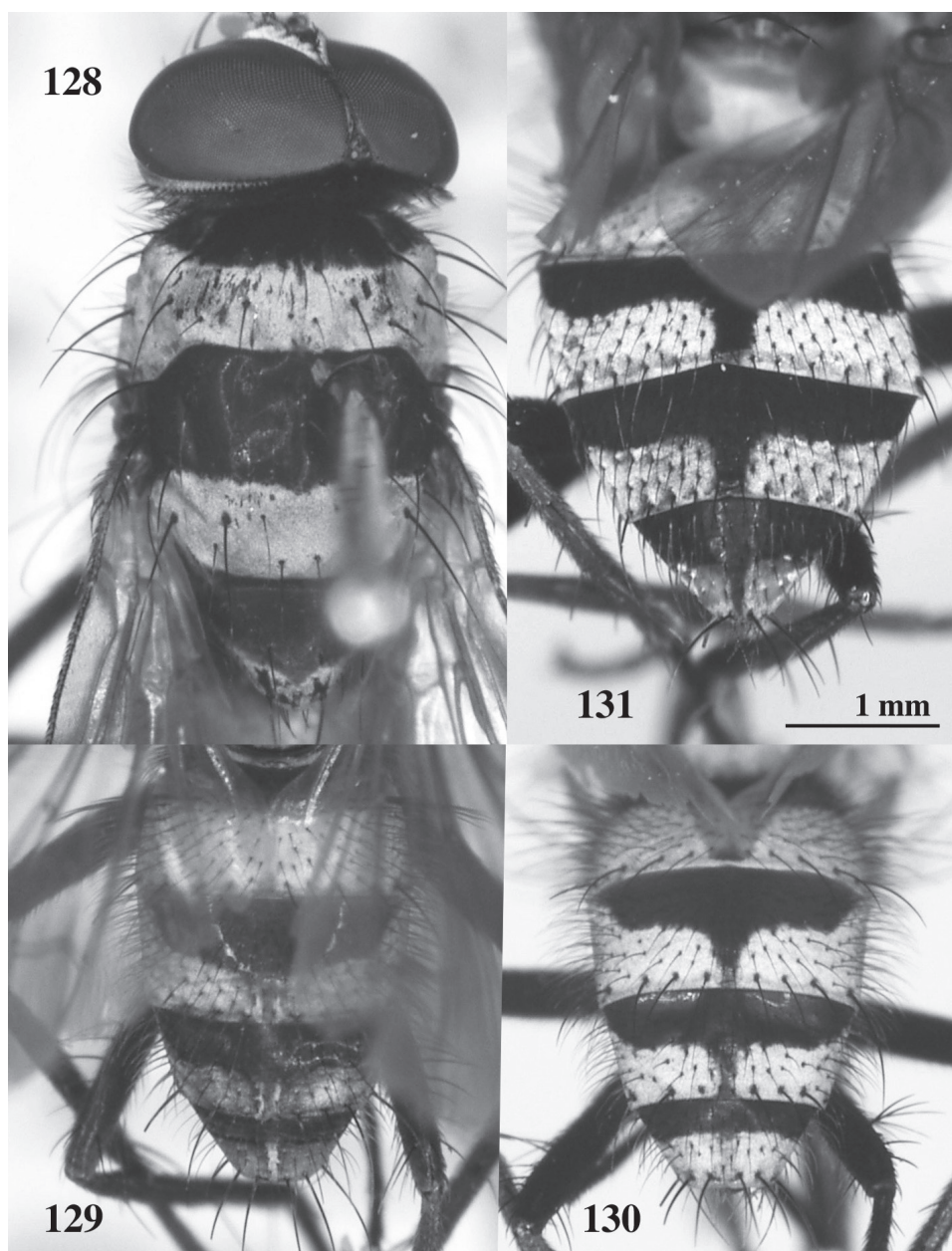
lobated innerapically; 6th sternite without central process; cercal plate as wide as long and bluntly rounded apically, rather densely with long setae anteriorly and with 2 pairs of flattened setae apically; surstylus with inner lobe weakly produced and with no spine-like setae; distiphallus without dorsal process; postgonite narrowing apically and with posteroventral swelling not developed.

♀. Unknown.

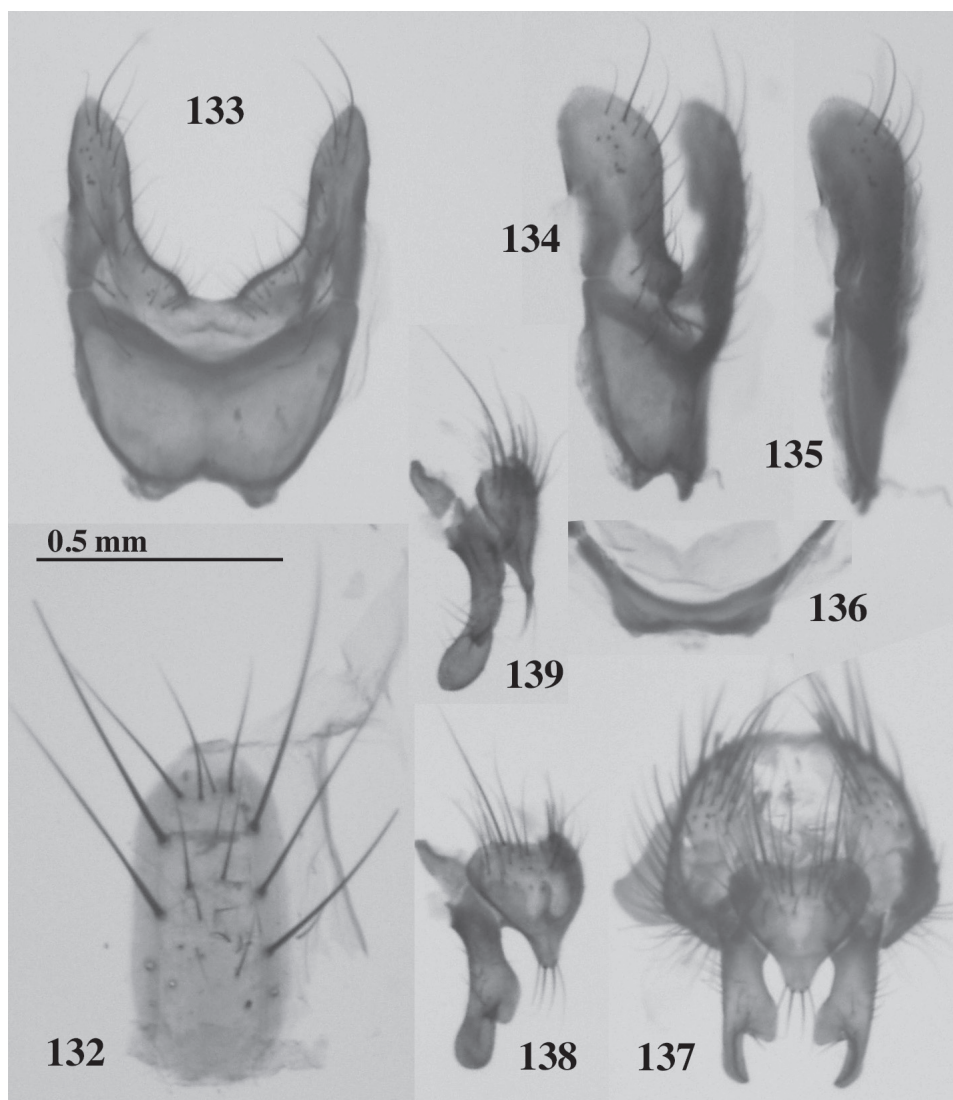
Remarks. As pointed out by Ackland (1987) the inclusion of this species in *Anthomyia* may be warranted by the possession of flattened setae at the apex of the cercal plate and the development (though weak) of an inner lobe on the surstyli.



Figs 124–127. *Anthomyia luculentella*, ♂ (124–126) and ♀ (127). 124, lateral habitus; 125, head, lateral view; 126–127, ditto, anterodorsal view. Magnification same for Figs 125–127. Sulawesi (124–126, holotype; 127, paratype), Indonesia.



Figs 128–131. *Anthomyia luculentella*, ♂ (128–130) and ♀ (131). 128, head and thorax, dorsal view; 129, abdomen, anterodorsal view; 130–131, ditto, dorsocaudal view. Sulawesi (128–130, holotype; 131, paratype), Indonesia.



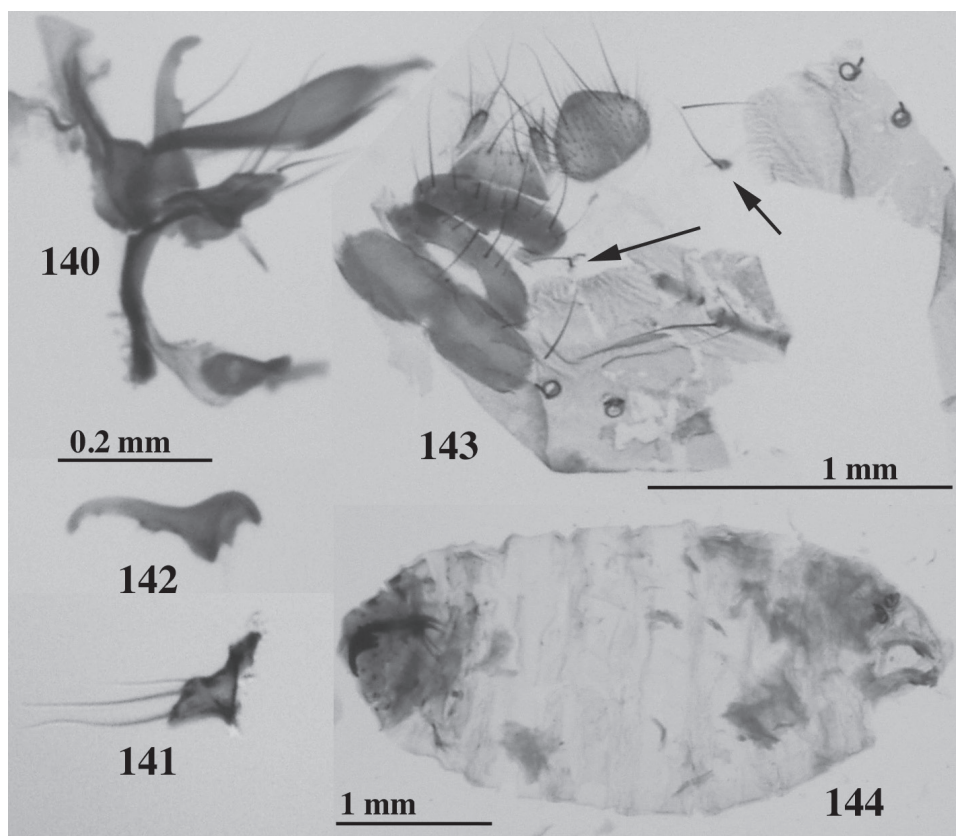
Figs 132–139. *Anthomyia luculentella*, ♂. 132, 4th sternite; 133–135, 5th sternite, ventral to lateral views; 136, 6th sternite; 137–139, hypopygium, dorsal to lateral views. Sulawesi (holotype), Indonesia.

10. *Anthomyia luculentella* sp. nov.  
(Figs 124–144)

Type material. INDONESIA. Noongan, alt. 1200 m, 50 km south of Manado, Sulawesi, 1♂ (holotype), 4♀, 2–10.xii.1973 (H. Kurahashi), 3♀, 2–10.xii.1973 (H. Shima).

Distribution. Indonesia (Sulawesi).

♂. Wing length 6.4 mm. Head blackish in ground colour, densely whitish grey pollinose; occiput dark brownish pollinose on upper half; antennae dark brown, paler



Figs 140–144. *Anthomyia luculentella*, ♂ (140–142), ♀ (143) and larva (144). 140, aedeagus; 141, right pregonite; 142, right postgonite, ventral seta missing; 143, ovipositor, arrows indicating 8th sternite; 144, 2nd instar larva. Sulawesi (140–142, holotype; 143, paratype; 144, larva), Indonesia.

on  $A_3$  and arista; haustellar mentum dark brown, thinly pollinose. Thorax blackish in ground colour, densely pale grey pollinose, with a weak brownish yellow tinge in pollinosity especially on dorsum; mesonotum (Fig. 128) with sharp black markings: a broad presutural marking and a broad postsutural band; presutural marking occupying anterior area of mesonotum from anterior margin to 2nd *pre-acr*, and a little past 1st *pre-dc* and anterior *ph*, including anterior halves of humeral calli; postsutural band extending posteriorly to 2nd *tal* and a little past 2nd *post-dc*; scutellum broadly black, with narrow v-shaped grey area from lateral base to apex. Abdomen (Figs 129–130) in ground colour mainly yellowish, narrowly black along hind margins of 2nd to 4th tergites, and dark brownish under fore-marginal bands and median vitta though yellow under median vitta on 2nd tergite, and in pollinosity rather thinly whitish grey; fore-marginal bands rather broad, that on 3rd tergite ceasing near lateral margins of the tergite, and those on 4th and 5th tergites narrowly extending to ventral sides; median vitta broad on 2nd tergite, much narrowing on the succeeding tergites; pregenital sclerite blackish, shining. Legs

dark brown. Wings tinged with brownish yellow; calypteres whitish, weakly yellow marginally; halteres yellowish at knobs.

Head (Figs 125–126) about 1.6 times as high as long; frons narrower than anterior ocellus; parafrontals contiguous to each other, with 3 *ori* and a vestigial *ors* discernible; *if* indiscernible;  $A_3$  2.8 times as long as wide; arista with longest hairs a little shorter than  $A_3$ -width; orbits at parafrontal angle distinctly narrower than  $A_3$ ; genae 1.7 times as high as  $A_3$ -width; epistoma situated behind tip of parafrontal angle.

Mesonotum with ground setulae hardly discernible; 3 pairs of *pre-acr* in rows closer to each other than to adjacent *dc*-row (1 setula discernible between the rows of *pre-acr* in the present specimen); posterior *ph* suppressed; *pra* a little longer than posterior *ntpl*; scutellum broadly bare dorsally, only with a few setulae discernible laterobasally; mesopleuron with a distinct anterior *mpl*; 1 strong and 1 weaker *pstg*, associated with 1 fine setula; *stpl* 2:2, lower anterior much weaker than the upper, a few weakly differentiated setulae discernible below the posteriors.

Mid femur with no *av* and 3 *pv* on basal third;  $f_3$  with a row of about 10 *av*, 1 *pv* near base and a few *pv* near apex;  $t_1$  with 1 *pv* and no *ad*;  $t_2$  with 1 *ad*, 2 *pd* and 2 *pv*;  $t_3$  with 1 *av*, 5–7 *ad*, 2 *pd* and 3 *pv*. Wings with costal thorns small, a little stronger than costal spinules; *dm-cu* oblique and sinuate.

Abdomen long ovoid, 1.8 times as long as wide; 6th tergite much narrowed, linear; 4th sternite (Fig. 132) a little more than twice as long as wide; 5th sternite processes (Figs 133–135) blade-like, without a membranous lobe at inner apex; 6th sternite (Fig. 136) without central process; hypopygium as in Figs 137–139; cercal plate slightly constricted subapically and not turned dorsally at apex, with 2 pairs of rather long setae apically, inner setae somewhat stronger than outers; surstylus with some weak setae on ventral surface near crotch, with no spine-like setae; distiphallus (Fig. 140) without dorsal process; pregonite (Fig. 141) with 3 setae, the dorsalmost much shorter than the others; postgonite (Figs 140, 142) gradually narrowing toward apex, with a long seta near middle ventrally.

♀. Wing length 6.2–7.1 mm. Thorax in ground colour often yellowish on humeral calli and on pleural regions; mesonotum with presutural dark marking paler on humeral calli and often indiscernible there. Legs dark brown to blackish, sometimes yellowish on coxae, on fore femur basally and on basal two-thirds of mid and hind femora. Abdomen in ground colour variously darkened, in dark case almost blackish, only yellowish near base ventrally, and in paler case largely yellowish on ventral side and partly yellow on 2nd and 5th tergites dorsally (Fig. 131).

Frons 0.34–0.39 (0.31 in 1 specimen) times as wide as head at level of *if*; interfrontalia about two-thirds (0.62–0.71 times) as wide as frons at level of *if*; parafrontals with 2–3 *ori* (one of them sometimes much weakened), and 3 *ors*;  $A_3$  2.5–3 times as long as wide; arista with longest hairs a little shorter to slightly longer than  $A_3$ -width; orbits at parafrontal angle 1.2–1.4 times as wide as  $A_3$ ; genae as high as or a little higher than orbital width at parafrontal angle; epistoma projecting forward nearly as far as tip of parafrontal angle.

Mesonotum with 0–3 setulae discernible between rows of *pre-acr*; *pra* slightly longer to a little shorter than anterior *ntpl*; *pstg* with no or occasionally 1 associated setula; *stpl* 2:2, lower anterior and lower posterior much shorter than the upper, often much weakened and scarcely differentiated from adjacent setulae.

Mid femur with 1–3 *av* on basal third or half, and 0–3 *pv* on basal fourth or third;

$f_3$  with 4–9 *av*, 1 *pv* near base (sometimes indistinct), 0–3 weak *pv* on median third, and 1 *pv* near apex;  $t_1$  with 1 *ad* and 1 *pv*;  $t_2$  with 1 (2 on left  $t_2$  in 1 specimen) *ad*, 2 *pd* and 2 (sometimes 1) *pv*;  $t_3$  with 1–3 *av*, 4 *ad*, 2 *pd* and 1–5 (rarely no) *pv*.

Abdomen with ovipositor (Fig. 143) shortened; 6th and 7th spiracles in membrane; 6th to 8th tergites entire; 8th sternite represented by a pair of small fragments.

Remarks. The 5th sternite with blade-like processes, 6th sternite without central process, surstylus with weakly produced inner lobe and no spine-like setae, distiphallus without dorsal process, and postgonite without posteroventral swelling, these features in the male indicate a close relationship of the present species with *A. luculenta* Ackland, 1987, also described from Sulawesi. The latter species, however, much differs from *A. luculentella* in the following aspects of the male: Larger in size, wing length 8.0 mm. Thorax without presutural dark marking; scutellum with dark marking restricted on basal half; 5th sternite with processes pilose and pointed apically; cercal plate evenly narrowing apically, and rather densely armed with longer setae on basal half.

This species is larviparous. Three of the four dissected female specimens were found to contain a larva of 1st or 2nd instar (Fig. 144).

11. *Anthomyia malaisei* Ackland, 1987  
(Figs 145–162)

*Anthomyia malaisei* Ackland, 1987: 52.

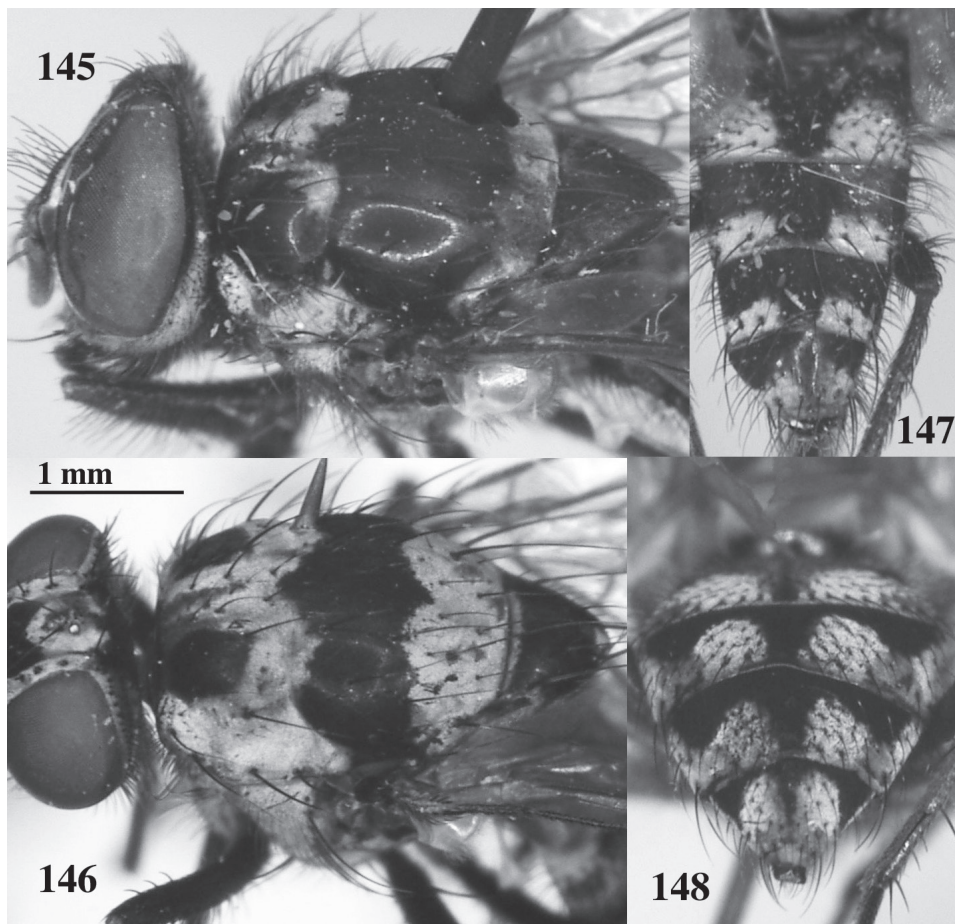
Material examined. BURMA. Kambaiti, alt. 2000 m, 2♂ (paratypes), 1♂ (non-type), 1♀ (paratype), 25.iv.1934 (Malaise). PAKISTAN. Natiagali, alt. 2400 m, 10 km N of Murree, 1♀, 18.vii.1987 (S. Shinonaga); Ayubia Nat. Park., alt. 2200 m, Kashmir, 1♂, 1♀, 25–30.vii.1988 (S. Shinonaga). NEPAL. Gandaki: Marsyandi Valley: Dharapani–Latamarang, alt. 1900–2400 m, 1♀, 9.vi.1988 (M. Suwa); Latamarang–Chame, alt. 2400–2700 m, 2♀, 10.vi.1988 (M. Suwa); Manang, alt. ca. 3500 m, 1♀, 14.vi.1988 (M. Suwa); Chame–Bratang, alt. 2700–2900 m, 1♀, 18.vi.1988 (M. Suwa).

Distribution. Burma (Myanmar); Pakistan; Nepal. New to Pakistan and Nepal.

♂. Wing length 5.5–5.7 mm. Body including appendages dark brown or blackish in ground colour. Occiput blackish on postocular plains, dark brownish pollinosity discernible in certain angles of view. Mesonotum (Fig. 145) largely blackish, and narrowly grey pollinose on the areas as follows: a pair of inverted L-shaped areas around 2nd and 3rd *pre-acr* and 2nd *pre-dc*, humeral calli, notopleura, and prescutellar area behind 3rd *post-dc* and between posterior calli inclusive; scutellum almost blackish, only grey pollinose at apex narrowly. Abdomen (Fig. 147) with broad dark markings; fore marginal bands occupying anterior third to half on 2nd tergite and more than anterior half on 3rd to 5th tergites, a little extending posteriorly on each lateral side; median vitta slightly wider than  $f_3$ -height on 2nd tergite posteriorly.

Frons narrower than anterior ocellus; parafrontals contiguous to each other, with 6–8 *ori* and a vestigial *ors*; short and fine *if* discernible or not; arista with longest hairs about 3 times as long as basal diameter of arista.

Mesonotum with 3 pairs of *pre-acr* in rows separated by a distance nearly equal to or a little more than that from each to adjacent *dc*-row, some (4 in specimen from Pakistan, 9–10 in specimens from Burma) setulae discernible in between; posterior *ph* not differentiated from ground setulae; *pra* as long as to rather distinctly longer than

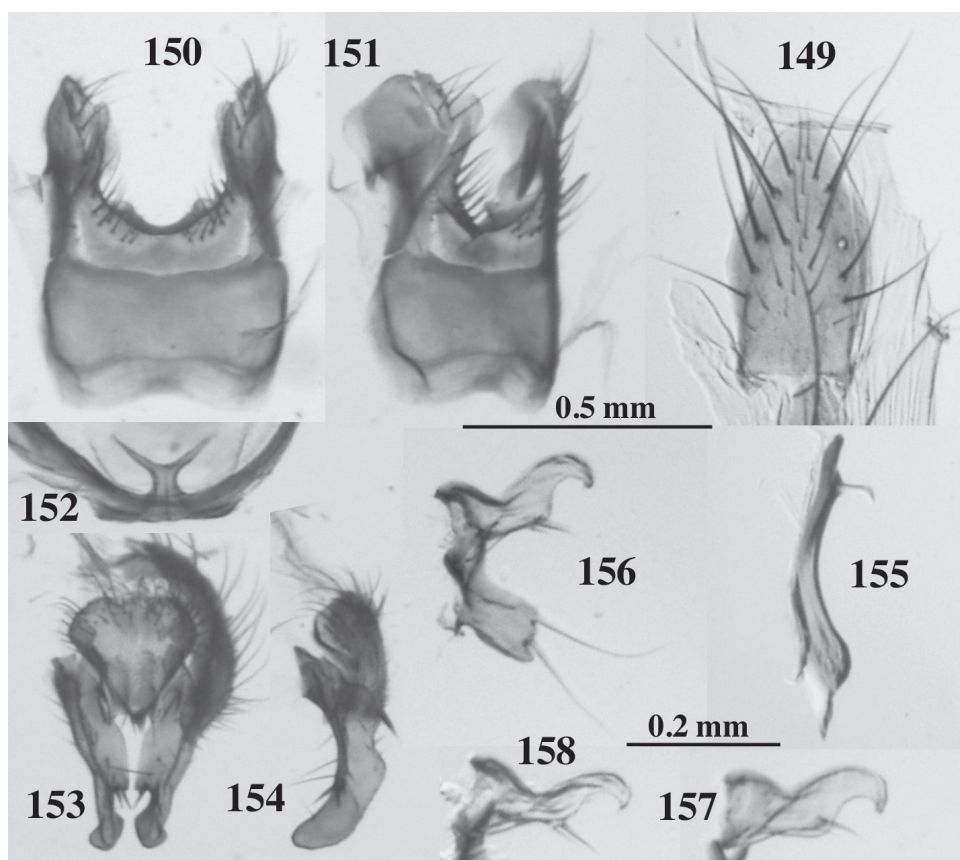


Figs 145–148. *Anthomyia malaisei*, ♂ (145, 147) and ♀ (146, 148). 145–146, head and thorax, dorsolateral view; 147–148, abdomen, dorsocaudal view. Kambaiti (145, 147, paratype), Burma; Chame–Bratang (146, 148), Nepal.

posterior *ntpl*; 1 strong and 1 weak *pstg*, about 10 short associated setulae discernible.

Mid femur with no *av* and some (5–8) *pv* on basal half, the longest a little longer than height of the femur; *f*<sub>3</sub> with about 10 *av* except near base, longest one distinctly longer than height of the femur, with 1 short *v* near base, 2–4 rather weak to distinct *pv* on median third and a few or some rather weak *pv* near apex, and on basal fourth or third with some slender *p/pv* discernible; *t*<sub>1</sub> with no *ad* and 1 *pv*; *t*<sub>2</sub> with 1 *ad*, 2 *pd* and 2–3 *p/pv*; *t*<sub>3</sub> with 1 *av*, 7–12 *ad* of unequal length, 2 *pd* and a few or some short *pv*. Wings with costal thorns small though stronger than costal spinules; *dm-cu* oblique and sinuate.

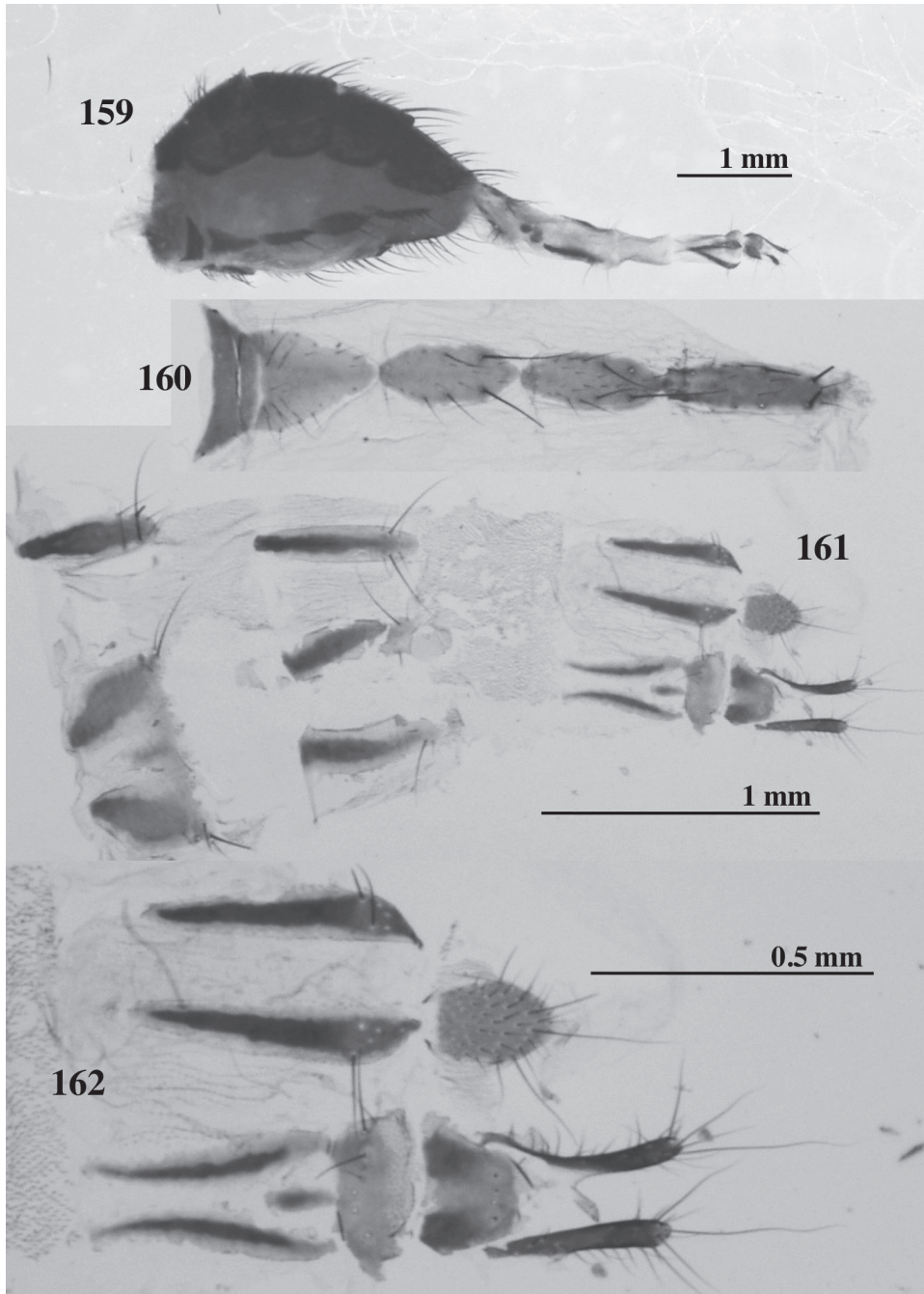
Abdomen mainly depressed, about twice as long as wide; 6th tergite much narrowed and linear laterally; 4th sternite (Fig. 149) longer than wide and narrowing caudad on posterior third, rather sparsely armed with long setae on posterior half; 5th sternite processes (Figs 150–151) rather well lobated innerapically, with distinct or indistinct unisetose gap between distal and inner series of setae, and with some outer lateral setae



Figs 149–158. *Anthomyia malaisei*, ♂. 149, 4th sternite; 150, 5th sternite, ventral view; 151, ditto, ventrolateral view; 152, 6th sternite, showing central process; 153, hypopygium, dorsal view; 154, ditto, lateral view; 155, distiphallus; 156, left pregonite and postgonite; 157–158, left postgonite, different angles of view. Magnification same for Figs 149–154, and for Figs 155–158. Kambaiti (paratype), Burma.

basally, posteriormost one of the setae longer than any others on the sternite; central process of 6th sternite (Fig. 152) with distinct stem and divergent arms; hypopygium (Figs 153–154) with cercal plate about as long as wide; surstylus weakly concave dorsally around basal third in lateral view, with 2 spine-like setae on inner lobe; distiphallus (Fig. 155) with dorsal process situated around basal sixth; pregonite (Fig. 156) with 2 marginal setae, dorsal one longer; postgonite (Figs 156–158) weakly lobated on posteroventral corner, inside with 1 distinct seta and 1 or 2 short or minute setulae a little distant from the corner, the longer seta rather stout and more or less dilated.

♀. Mesonotum (Fig. 146) with a pair of large presutural black spots and complete postsutural black band; presutural spots expanded to include anterior *ph* and 1st and 2nd *pre-dc*; postsutural band a little protruded both anteriorly and posteriorly at middle, indented at 1st *post-dc* on anterior margin and often also at 2nd *post-dc* on posterior margin; scutellum with grey pollinose areas narrowly discernible laterobasally and



Figs 159–162. *Anthomyia malaisei*, ♀. 159, abdomen; 160, 1st (leftmost) to 5th sternites; 161, ovipositor; 162, 8th segment and proctiger. Magnification same for Figs 160–161. Chame-Bratang, Nepal.

apically, and usually also along basal margin. Abdomen (Fig. 148) with median vitta narrow and occasionally indiscernible on 2nd tergite, rather broad and narrowing posteriorly on each of 3rd to 5th tergites; fore-marginal bands well discernible on 3rd to 5th tergites and extending posteriorly on each lateral side; 2nd tergite with fore-marginal band weakly extending posteriorly on lateral sides and occasionally reduced to a pair of small lateral fragments.

Frons 0.35–0.4 times as wide as head at level of *if*; interfrontalia about two-thirds as wide as frons at level of *if*; parafrontals with 2–3 *ori* and 3 *ors*. Mesonotum with some (4–8) setulae discernible between rows of *pre-acr*; some (3–6) associated setulae around *pstg*.

Mid femur with 1–2 *av* near base and some (3–5) *pv* on basal half;  $f_3$  with some (5–9) *av*, the longest slightly shorter to a little longer than height of the femur, and no distinct *pv* discernible on median third;  $t_1$  with 1 *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 1 *pd*, 1 *p* and 2 *pv*;  $t_3$  with 1 or rarely 2 *av*, 7–12 *ad* of unequal length, 2 *pd* and 0–5 short *pv*.

Abdomen with ovipositor (Figs 159, 161–162) nearly as long as preabdomen; 6th and 7th sternites each represented by an elongated narrow plate, and 8th sternite by a pair of narrow plates; 8th tergite distinctly sclerotized across dorsum posteriorly and divided anteriorly into a pair of elongated lateral plates and a short central strip; cerci lengthened, about twice as long as epiproct.

Remarks. In having the largely blackish mesonotum in the male this species much differs from any other Oriental species of the genus. It is, however, quite similar to *A. vittiventris* in the male terminalia, though slight differences are seen in the postgonite with a little broader posterodorsal arm and in the central process of 6th sternite with a narrower stem.

12. *Anthomyia perlucida* Ackland, 1987  
(cf. Ackland, 1987: Figs 46, 63–69)

*Anthomyia perlucida* Ackland, 1987: 53.

Material examined. No specimen available for this study.

Distribution. Malaysia (Malaya).

This species was described on the basis of a male specimen from Tanah Rata, Malaysia. According to the original description of the species: –

♂. Wing length 6.0 mm. Thorax reddish to orange brown in ground colour, partly translucent, with rather thin, and partly shifting greyish to orange brown pollen. Mesonotum with large squarish presutural spots and continuous postsutural band, the postsutural band indented along *post-de* rows on both fore and hind margins; scutellum mainly darkened, only extreme apex pale. Legs orange brown.

Head with *if* about two-thirds as long as upper *ori*. Mesonotum with *pra* as long as posterior *ntpl*. Wing with lower calypter (squama) only half as long as wide at base. Hind femur with no *pv*. Abdominal 4th sternite with rounded posterior margin; pregonite much longer than wide; postgonite with a dilated seta and a fine setula.

♀. Unknown.

Remarks. In having the complete postsutural dark band with indented fore and hind margins and the postgonite with setae on the inner surface this species resembles *A. vittiventris*. The latter is, however, different from *A. perlucida* in the thorax and legs

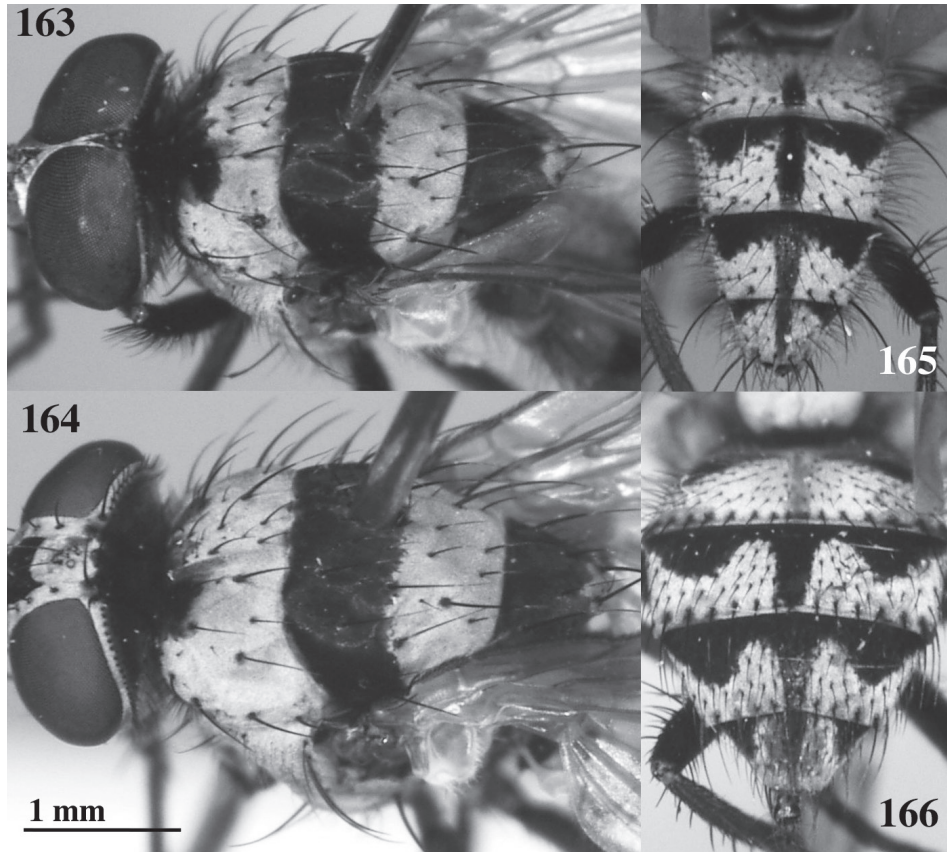
blackish and not orange yellow in ground colour, postgonite without a dilated seta, and 5th sternite with lateral setae much longer than innerbasal setae.

13. *Anthomyia plumiseta* Stein, 1918  
(Figs 163–176)

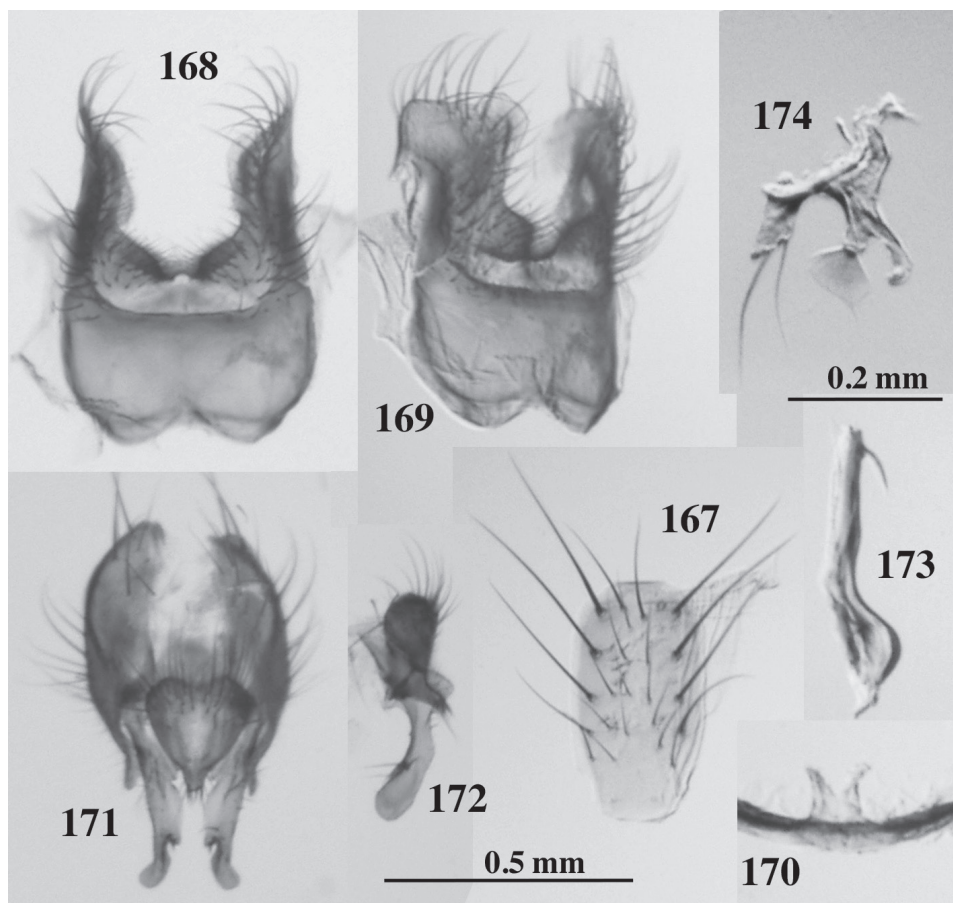
*Anthomyia* sp. A: Suwa, 1974: 51; Suwa, 1981: 17.

*Anthomyia plumiseta*: Ackland and Pont, 1977: 440; Ackland, 1986: 40; Suwa, 1987: 32; Ackland, 1987: 41; Wei et al., 1998: 648.

Material examined. TAIWAN. Alishan, alt. 2300–2500 m, Chiayi Hsien, 1♀, 8.vii.1979 (M. Suwa). VIETNAM. Lao Cai: Lao Cai – Sapa, 800–1200 m, 1♀, 6–7.x.1995 (H. Kurahashi); Sapa, alt. 1700–1900 m, 38 km northeast of Lao Cai, 1♂, 17–22.vi.2002 (S. Shinonaga); Trung Chai, alt. 1000 m, 14 km southeast of Sapa, 1♂, 27–28.x.2001 (H. Kurahashi). Vinh Phuc: Mt. Tam Dao,



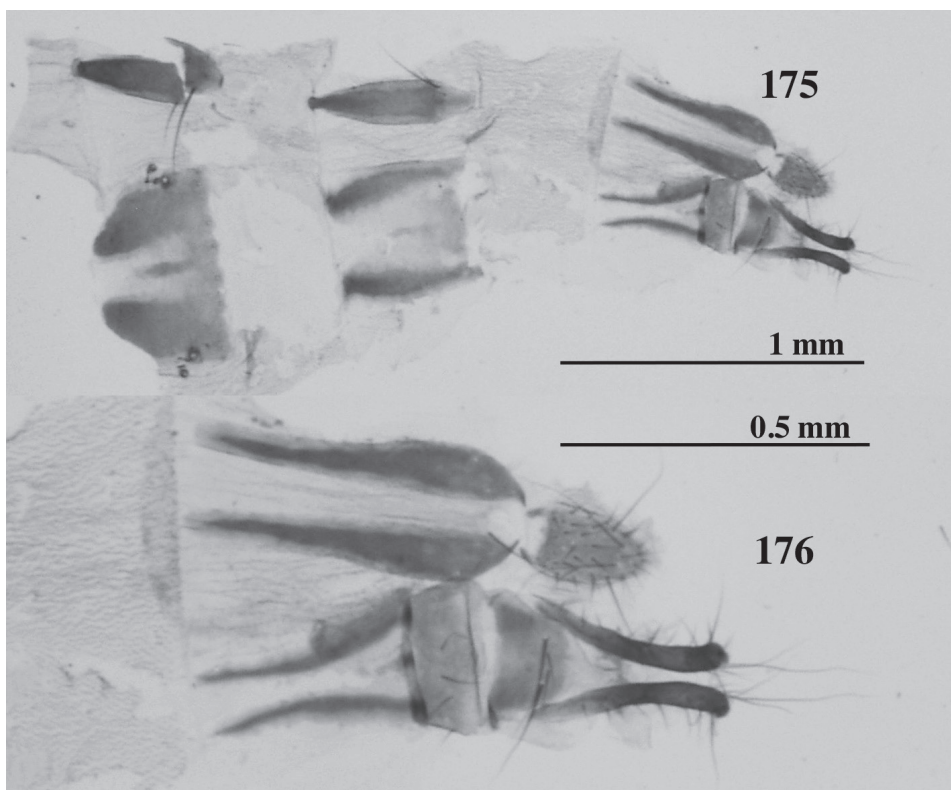
Figs 163–166. *Anthomyia plumiseta*, ♂ (163, 165) and ♀ (164, 166). 163–164, head and thorax, dorsolateral view; 165–166, abdomen, dorsocaudal view. Darora (163, 165), Pakistan; Mt. Pia Oac (164) and Mt. Tam Dao (166), Vietnam.



Figs 167–174. *Anthomyia plumiseta*, ♂. 167, 4th sternite; 168, 5th sternite, ventral view; 169, ditto, ventrolateral view; 170, central process of 6th sternite; 171, hypopygium, dorsal view; 172, ditto, lateral view, epiandrium and right surstylus removed; 173, distiphallus; 174, left pregonite and postgonite. Magnification same for Figs 167–169 and 171–172, and for 170 and 173–174. Bach Ma (167–169, 171–172, 174), Vietnam; Darora (170; 173), Pakistan.

930–1230 m, 1♀, 2–4.vii.1997 (H. Kurahashi). Cao Bang: Mt. Pia Oac, 1320 m, 2♂, 1♀, 23–27.v.1999 (H. Kurahashi). Thva Thien-Hue: Bach Ma, 1000–1200 m, 4♂, 1♀, 7–11.vi.2002 (Tah Huy Thinh). THAILAND. Chiang Mai: Queen Sirikit Botanic Garden, alt. 1011 m, 1♀, 7–10.xi.2017 (S. Sanit); Ban Yang, alt. 1400 m, Doi Inthanon, 1♀, 17.ix.1975 (H. Kurahashi). INDONESIA. Flores: Maumere, alt. 10 m, 1♀, 16–19.xii.1973 (R. Kano). INDIA. Tamil Nadu: Coonoor, alt. 1700–1900 m, 1♂, 3♀, 23–26.xi.1978 (JAP-IND CO TR). Karnataka: Nandi Hills, alt. 1490 m, 60 km north of Bangalore, 1♀, 14.x.1993 (H. Kurahashi). SRI LANKA (Ceylon). Nuwara Eliya, 1♀, 28.v.53 (F. Keiser); Hakgala, 1800–1900 m, 1♂, 31.v.53 (F. Keiser). PAKISTAN. Darora, 20 km south of Dir, 3♂, 12.viii.1987 (S. Shinonaga), 6♂, 12.viii.1987 (K. Kanmiya); Begroto, 15 km east of Gilgit, 1♂, 29.vii.1987 (T. Inaoka).

Distribution. East Palaearctic region; Oriental region.



Figs 175–176. *Anthomyia plumiseta*, ♀. 175, ovipositor; 176, 8th segment and proctiger. Flores, Indonesia.

♂. Wing length 4.6–6.2 mm. Body including appendages in ground colour mainly blackish or dark brown, more or less yellowish on basal 2 or 3 segments of abdomen ventrally or also dorsally, and in pollinosity densely whitish grey. Occiput black on postocular plains, there with dark brownish pollinosity in contrast to grey pollinose lower occiput. Mesonotum (Fig. 163) with a pair of presutural black spots along anterior margin and a postsutural black band between wing bases; presutural black spots usually fused with each other anteriorly, and occupying anterior *ph* and 1st *pre-dc*; postsutural black band extending posteriorly to 2nd *post-dc*, almost straight on its anterior margin and scarcely or slightly waving on posterior margin; scutellum largely black, with a grey area restricted around apical scutellar setae, rarely extending to discal scutellar setae. Abdomen (Fig. 165) with median vitta incomplete and fading out anteriorly on 2nd tergite, complete and narrowing posteriorly on 3rd to 5th tergites; fore-marginal bands narrow, often incomplete and fading out medially on 2nd tergite, and complete and extending posteriorly on each lateral side of 3rd to 5th tergites. Wings weakly tinged with brown; calypteres whitish, faintly tinged with yellow; halteres pale yellow at knobs.

Parafrontals with 2–4 *ori* and often 1 vestigial *ors*; minute *if* sometimes discernible;  $A_3$  2.5–3.0 times as long as wide; arista short plumose, longest hairs 5–6 times as long as

basal diameter of arista, total width of hairing nearly equal to  $A_3$ -width.

Mesonotum with 3 pairs of *pre-acr* in rows a little closer together than to adjacent *dc*-row, usually with no setulae in between; posterior *ph* suppressed; *pra* as long as or a little shorter than posterior *ntpl*; 1 strong and 1 weak *pstg*, usually with no associated setulae; *stpl* 2:2, the lower anterior much weaker than the upper, below the posteriors 1 or 2 fine setulae more or less differentiated from adjacent setulae.

Mid femur with no *av* and some (4–7) *pv* on basal half, the longest slightly shorter to a little longer than height of the femur;  $f_3$  with a row of some to about 10 *av* on distal two-thirds, longest one as long as to distinctly longer than height of the femur, a few short *av* sometimes differentiated on basal third, and with 1 short *v* near base and 1 or a few weak *pv* near apex;  $t_1$  with no *ad* and 1–2 or rarely 3 *pv*;  $t_2$  with 1 *ad*, 2 *pd* and 3–4 *p/pv*;  $t_3$  with 1 *av*, 6–9 *ad* of unequal length, 2 (rarely 3) *pd* and a few or some short and fine *pv*.

Abdomen depressed or half-depressed and long-ovoid, 1.6–2 times as long as wide; 4th sternite (Fig. 167) 1.6–1.8 times as long as wide, with some (3–5) pairs of strong setae laterally and shorter setae scattered; 5th sternite (Figs 168–169) with innerapical lobe rather well developed, without unsetose gap between distal and inner series of setae; 6th sternite with central process (Fig. 170) barely sclerotized, bifurcated on distal half and minutely pilose; cercal plate (Figs 171–172) constricted near apex and turned dorsally; surstylus strongly constricted near middle in lateral view (Fig. 172); distiphallus (Fig. 173) with dorsal process near base; pregonite with 2 long marginal setae; postgonite (Fig. 174) with a much expanded seta at protruded posteroventral corner.

♀. Wing length 4.4–5.5 mm. Abdomen variable in ground colour, often largely yellow on both dorsal and ventral sides.

Frons about one-third (0.32–0.36 times) as wide as head at level of *if*; interfrontalia at most two-thirds as wide as frons at level of *if*; parafrontals with 1 strong and 1 vestigial to fine *ori* and 3 *ors*. Thorax with *stpl* 2:2 or 2:1, lower anterior much shorter than the upper and often very fine, lower posterior fine and often indiscernible.

Mid femur with 1 or sometimes 2 *av* near base and 2–3 *pv* on basal third or half;  $t_1$  with 1 *ad* and 1 or rarely 2 *pv*;  $t_2$  with 1 *ad*, 2 *pd* and usually 2 *p/pv*;  $t_3$  with 1 *av*, 5–8 *ad* of unequal length, 2 *pd* and no *pv*.

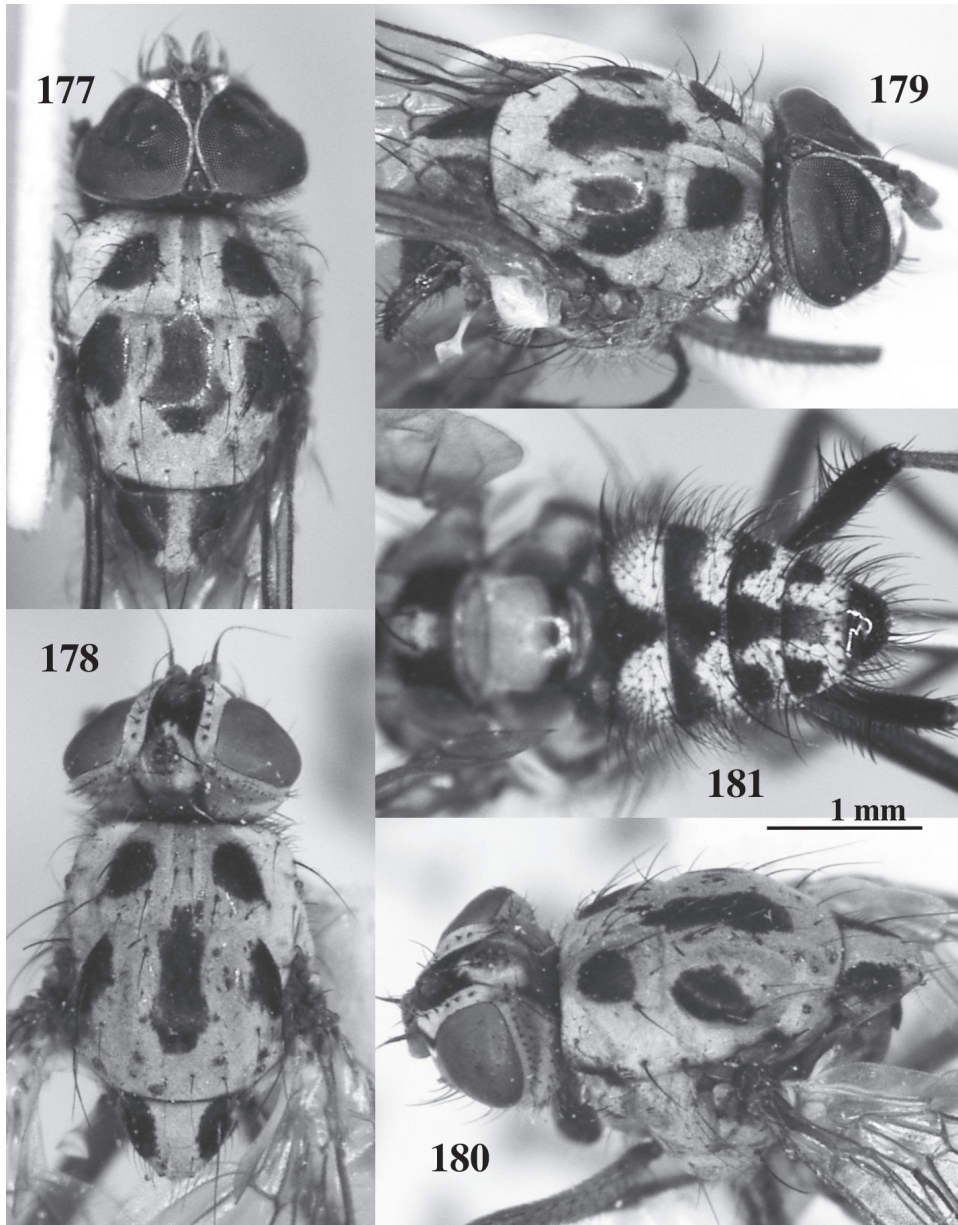
Abdomen with ovipositor (Figs 175–176) nearly as long as preabdomen; cerci elongated, about twice as long as epiproct.

Remarks. According to Ackland (2001) *A. plumiseta* is probably a synonym of *Anthomyia amoena* (Macquart, 1851) widely distributed in the Afrotropical region. Judging from the figures given in Ackland (2001: 58) the male 4th sternite is shorter and as long as wide, and the distiphallus is narrower and more strongly sinuate in *amoena* than in *plumiseta*. At present *A. plumiseta* is recognized as distinct from *A. amoena*.

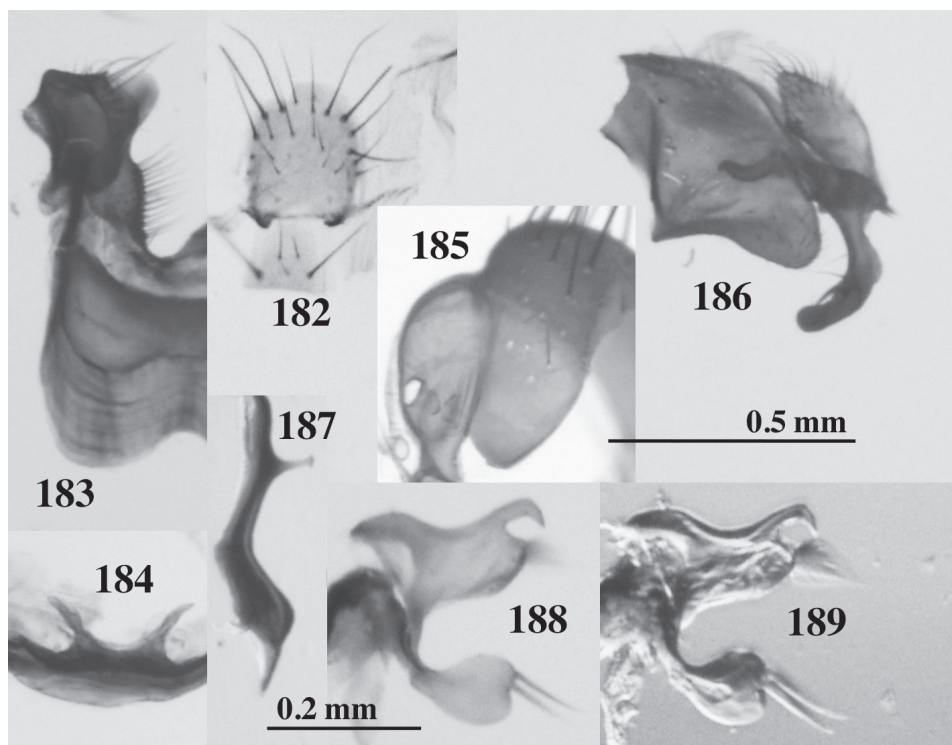
#### 14. *Anthomyia pluvialis* (Linnaeus, 1758) (Figs 177–191)

*Anthomyia pluvialis*: Michelsen, 1980: 285; Colless, 1982: 88; Suwa, 1987: 8; Ackland, 1987: 45; Wei et al., 1998: 650; Griffiths, 2001: 2275; Suwa and Blasco-Zumeta, 2003: 45.

Material examined. PAKISTAN. Naran, alt. 2000 m, Kagan Valley, 2♀, 22.vii.1987 (S. Shinonaga); Gilgit, alt. 1500 m, 1♀, 26.vii.1987 (S. Shinonaga); Naltar, alt. 3000 m, 20 km N of



Figs 177–181. *Anthomyia pluvialis*, ♂ (177, 179, 181) and ♀ (178, 180). 177–178, head and thorax, dorsal view; 179–180, ditto, dorsolateral view; 181, abdomen, dorsocaudal view. Kalam (177, 179) and Naltar (178, 180), Pakistan; Spain (181).



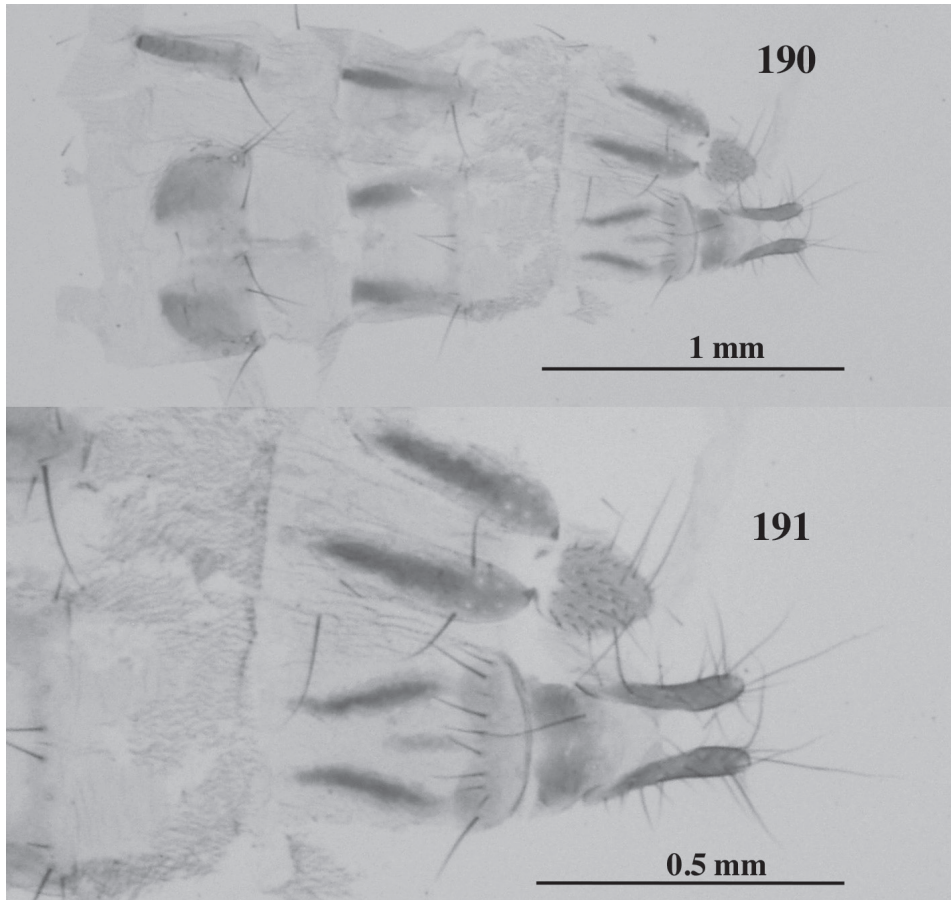
Figs 182–189. *Anthomyia pluvialis*, ♂. 182, 3rd (posterior part) and 4th sternites; 183, 5th sternite, left half, ventrolateral view; 184, central process of 6th sternite; 185, pregenital sclerite, left half, oblique view; 186, hypopygium, lateral view; 187, distiphallus; 188, left pregonite and postgonite; 189, ditto, different lighting. Magnification same for Figs 182–186. Naltar (182–183, 186–187; 184, 188–189) and Kalam (185), Pakistan

Gilgit, 3♂, 1♀, 28.vii.1987 (S. Shinonaga); Karam, alt. 2200m, 1♀, 9.viii.1987 (K. Kanmiya); Kalam, alt. 1800 m, Swat, 1♂, 9.viii.1987 (H. Kurahashi); Daroa, alt. 1800 m, 34 km S of Dir, 2♀, 12–13.viii.1987 (H. Kurahashi).

Distribution. Palaearctic region; India; Pakistan; Australia (introduced); N America (introduced). New to Pakistan.

♂. Wing length 4.0–4.6 mm. Body including appendages blackish in ground colour and whitish grey in pollinosity. Mesonotum (Figs 177, 179) with dark markings: a pair of large presutural spots, 3 large postsutural spots and 2 small supraalar spots; supraalar spots restricted just near wing bases, not extending to *sal* or *pra* and separated from postsutural lateral spots; scutellum with lateral markings separated from each other by median grey area. Abdomen (Fig. 181) with median vitta sharply discernible on 2nd to 5th tergites, narrowing posteriorly on each tergite; fore-marginal bands extending posteriorly on each lateral side of 3rd to 5th tergites, often hidden under preceding tergite anteriorly on 5th (sometimes also on 4th) tergite, and 3 separate triangular markings discernible there.

Frons as wide as or a little narrower than anterior ocellus; parafrontals contiguous to



Figs 190–191. *Anthomyia pluvialis*, ♀. 190, ovipositor; 191, 8th segment and proctiger. Naran, Pakistan.

or very narrowly separated from each other, with 3–4 *ori* and 1 vestigial *ors*; minute or short *if* discernible; arista with hairs shorter than basal diameter of arista.

Mesonotum with 3 pairs of *pre-acr* in rows closer together than to adjacent *dc*-row, and with no setulae in between; posterior *ph* not differentiated from ground setulae; *pra* as long as or a little shorter than posterior *ntpl*; 1 strong and 1 weak *pstg*, and about 5 associated setulae; *stpl* 1:2, a weakly differentiated setula discernible below the anterior and also below the posteriors.

Mid femur with some (6–8) *pv* on basal half or two-thirds;  $f_3$  with a row of about 10 *av* on distal two-thirds, 3–4 *pv* on median third and a few *pv* near apex;  $t_1$  with no *ad* and usually 1 *pv*;  $t_2$  with 1 *ad*, 1–2 *pd* and 2–3 *p/pv*;  $t_3$  with usually 1 *av*, some (5–7) unequal *ad*, 2 *pd* and some (3–6) short *pv*. Wings with costal thorns small and at most only a little stronger than costal spinules; *dm-cu* oblique and sinuate.

Abdomen depressed on basal half; 4th sternite (Fig. 182) as long as or a little longer than wide; 5th sternite (Fig. 183) with unsetose gap between distal and inner series of

setae; central process of 6th sternite (Fig. 184) with divergent arms on wide base; 6th tergite much reduced and membranous dorsally, with lateral areas discernible as very narrow sclerites, a linear fragment being discernible dorsally or not; 6th and 7th spiracles enlarged (Fig. 185); 6th spiracles in membrane, just near lateral ends of 6th tergite; right 7th spiracle on anterior margin of pregenital sclerite near anterolateral corner of the sclerite; surstylus (Fig. 186) distinctly constricted medially in lateral view; distiphallus (Fig. 187) rather distinctly flexed dorsally near middle, with dorsal process removed from its base by a distance greater than length of the process; pregonite (Figs 188–189) constricted basally, with 2 flattened setae near posterodorsal corner; postgonite with an expanded seta at posteroventral corner.

♀. Mesonotum (Figs 178, 180) with dark markings less developed than in male. Abdomen with median vitta often obscure and sometimes indiscernible on 2nd tergite; fore-marginal bands often hidden under preceding tergite anteriorly on 3rd to 5th tergites and 3 separate triangular markings discernible there.

Frons 0.39–0.42 times as wide as head; interfrontalia a little more than half (0.52–0.6 times) as wide as frons at level of *if*; parafrontals with 1–2 (occasionally 3) *ori* and 3 *ors*. Mesonotum often with 1 or 2 setulae discernible between rows of *pre-acr*; *stpl* 1:1, a weakly differentiated setula discernible below the anterior and often also below the posterior.

Mid femur with 1 *av* near base and some (3–5) *pv* on basal half;  $f_3$  with 6–8 *av*, usually 1 *v* near base and 1–2 *pv* near apex;  $t_1$  with 1 *pv*, and no *ad* discernible;  $t_2$  with 1 *ad*, 2 *pd* and 2 *p/pv*;  $t_3$  with 1 *av*, 4–5 (usually 5) *ad*, 2 *pd* and no *pv*.

Abdomen with ovipositor as in Figs 190–191; 7th spiracles within posterolateral corners of 6th tergite, 6th spiracles in membrane just near lateral margins of 6th tergite and a little anterior to 7th spiracles.

Remarks. *Anthomyia pluvialis* is widely distributed in the Palaearctic region (Michelsen, 1980; Suwa, 1987; Wei et al., 1998) and also known from India (Ackland, 1987). Colles (1982) recorded the species as an introduction in Australia (vicinity of Sydney). According to Griffiths (2001) this species has only recently been introduced to North America (Nova Scotia and Prince Edward Island).

This species has the enlarged 6th and 7th abdominal spiracles in the male in common with *A. benguellae* and *A. tempestatum*, from which it is, however, distinguished by the mesonotum with supraalar spots restricted just near wing bases without examination of the terminalia.

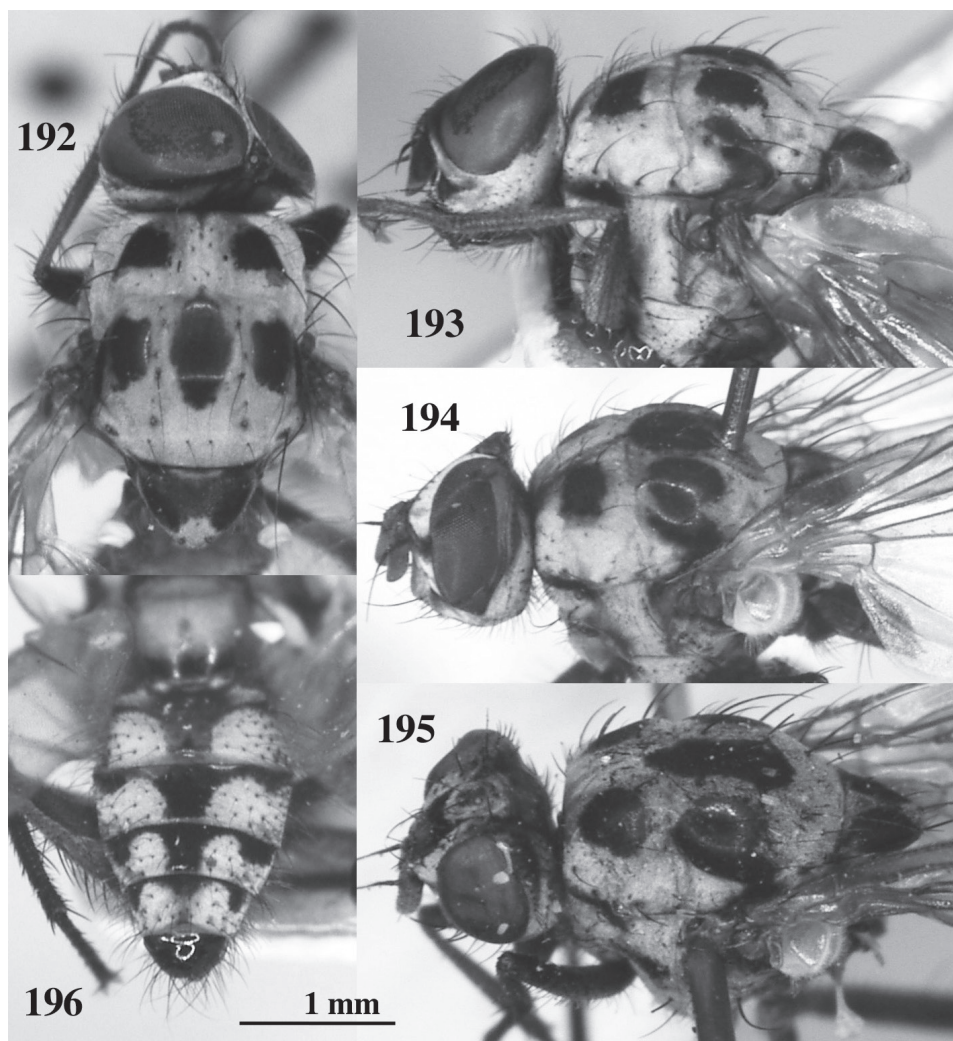
#### 15. *Anthomyia tempestatum* Wiedemann, 1818 (Figs 192–209)

*Anthomyia tempestatum*: Hennig, 1968: 213; Ackland, 1977: 207; Pont and Ackland, 1980: 715; Michelsen, 1997: 39; Ackland, 2001: 31.

Material examined. PAKISTAN. Nathiagali, alt. 2400 m, 10 km N of Murree, 1♂, 17–18.vii.1987 (H. Kurahashi); Karam, alt. 2200 m, 1♂, 9.viii.1987 (S. Shinonaga).

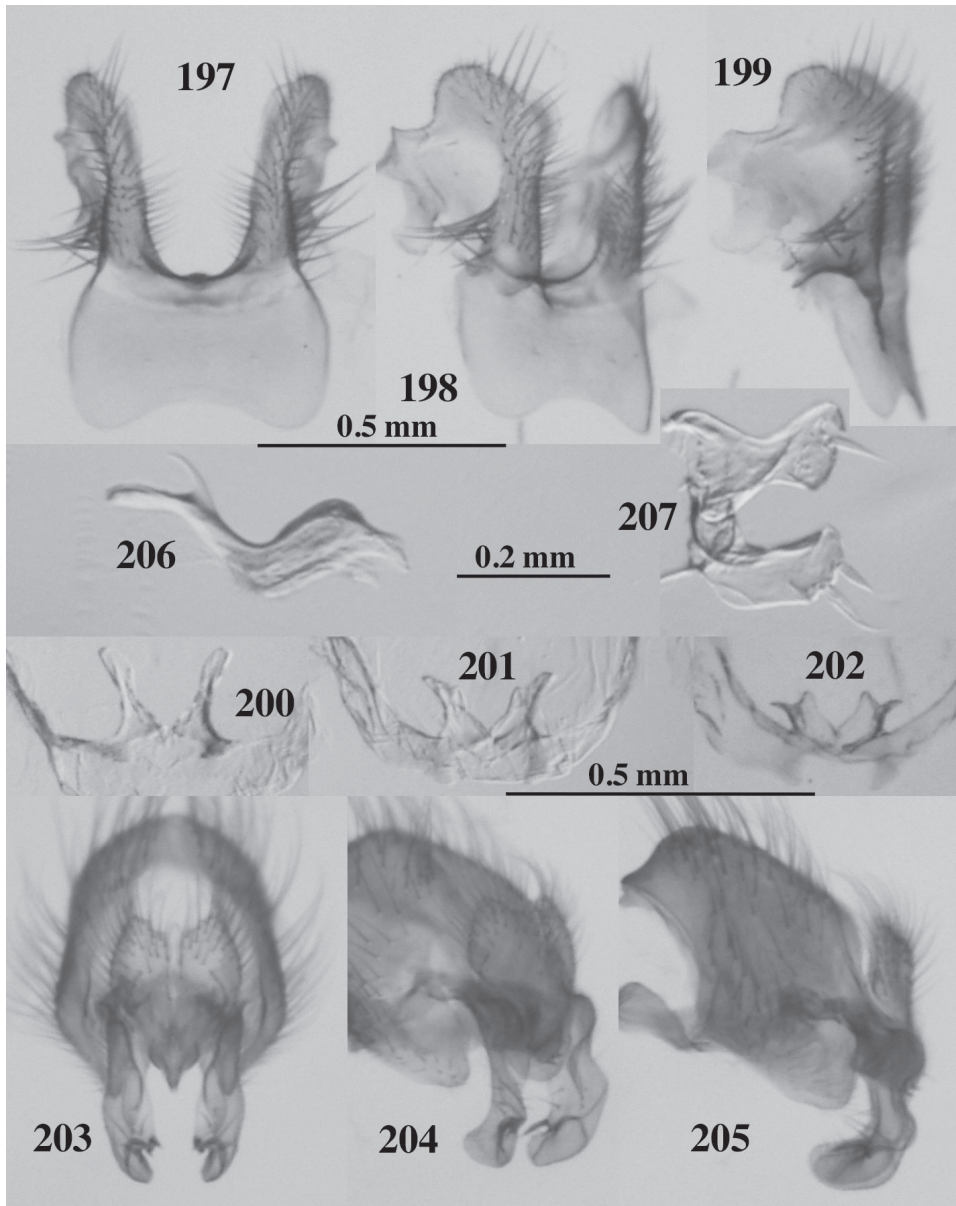
Distribution. Afrotropical region; North Africa; Spain; Mediterranean region; Middle East; Pakistan. New to Pakistan.

♂. Wing length 4.4–4.7 mm. Body blackish in ground colour and whitish grey in pollinosity; legs dark brownish. Occiput blackish on postocular plains in certain angles

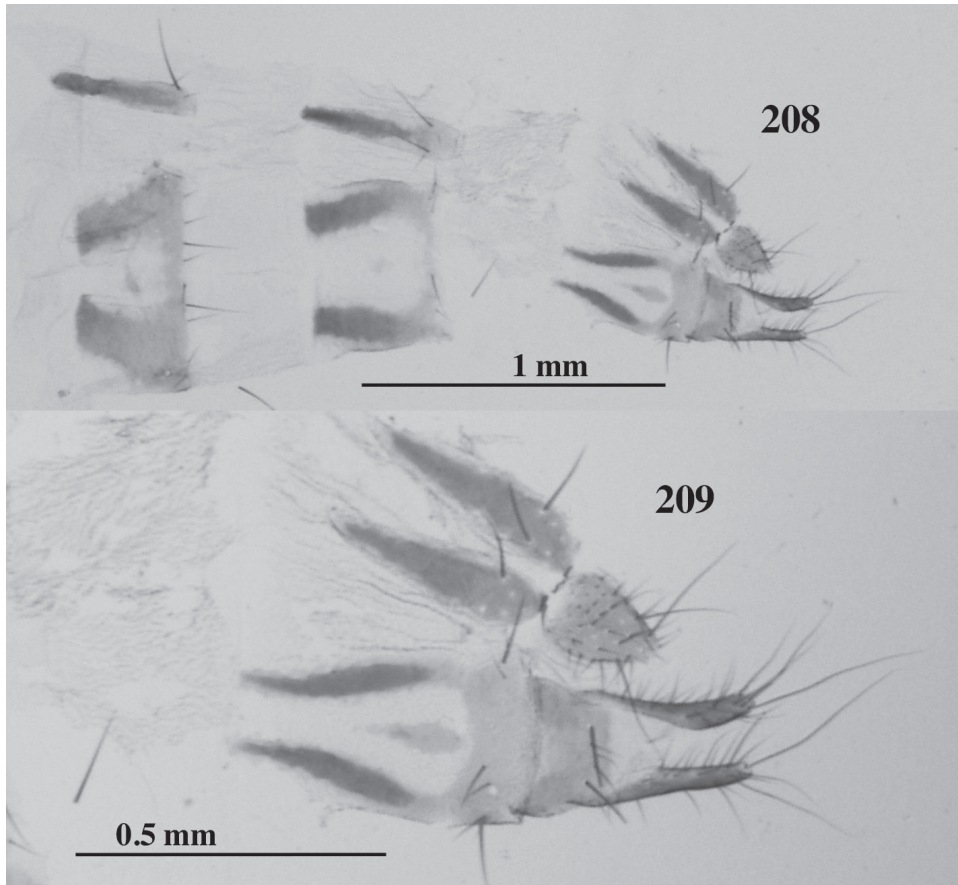


Figs 192–196. *Anthomyia tempestatum*, ♂ (192–194, 196) and ♀ (195). 192, head and thorax, dorsal view; 193–195, ditto, dorsolateral view; 196, abdomen, dorsocaudal view. Nathiagali (192–193, 196) and Karam (194), Pakistan; Morocco (195).

of view, and dark brownish pollinose there. Mesonotum (Figs 192–194) with sharp dark markings: a pair of large presutural spots and 3 or 5 discrete postsutural spots, in the case of 5 postsutural spots (Fig. 193) the supraalar spot separated from lateral spot by a grey area between *sal* and *ial* on each lateral side; scutellum largely black laterally, the lateral black markings broadly and firmly or rather obscurely fused with each other medially. Abdomen with black markings sharp (Fig. 196); median vitta broad on 2nd to 4th tergites, shortened on 5th tergite; fore-marginal bands narrowly discernible on 2nd to 5th tergites, or hidden under preceding tergites on 3rd to 5th tergites, and extending posteriorly on each lateral side of 3rd to 5th tergites.



Figs 197–207. *Anthomyia tempestatum*, ♂. 197–199, 5th sternite, ventral to lateral views; 200–202, central process of 6th sternite, different angles of view; 203–205, hypopygium, dorsal to lateral views; 206, distiphallus; 207, right pregonite and postgonite, inside view. Magnification same for Figs 197–199 and 203–205, for Figs 200–202, and for Figs 206–207. Karam (197–202, 206–207) and Nathiagali (203–205), Pakistan.



Figs 208–209. *Anthomyia tempestatum*, ♀. 208, ovipositor; 209, 8th segment and proctiger. Morocco.

Frons as wide as or a little narrower than anterior ocellus; parafrontals contiguous to each other, and with 3 *ori* and 0–1 vestigial *ors*; short *if* discernible or not; arista with longest hairs shorter than basal diameter of arista.

Mesonotum with ground setulae fine and sparse; 3 pairs of *pre-acr* in rows closer to each other than to adjacent *dc*-row, and with no setulae in between; posterior *ph* not differentiated; *pra* shorter than posterior *ntpl*; 1 strong and 1 weak *pstg*, 1–2 associated setulae discernible; *stpl* 1:2, the anterior much weaker than the posteriors.

Mid femur with no *av* and some (6–7) *pv* on basal half, the longest shorter than height of the femur; *f*<sub>3</sub> with rows of *av* and *pv* except near base, the longest *av* longer than and the longest *pv* shorter than 1.5 times of the femur height; *t*<sub>1</sub> with 1–2 *pv* and no *ad*; *t*<sub>2</sub> with 1 *ad*, 1 *pd* and 2 *p/pv*; *t*<sub>3</sub> with 3–4 *av*, 8–10 *ad* of unequal length, 2–3 *pd* and some (4–6) *pv*. Wings with costal thorns small and hardly differentiated from costal spinules; *dm-cu* oblique and sinuate.

Abdomen long ovoid; 6th tergite much narrowed, and linear laterally; 6th and 7th spiracles enlarged; both 6th spiracles at lateral ends of 6th tergite, or in membrane and

touching the tergite; right 7th spiracle at anterolateral corner of pregenital sclerite; 4th sternite about 1.5 times as long as wide; 5th sternite (Figs 197–199) with processes poorly lobated innerapically; central process of 6th sternite (Figs 200–202) with divergent lobated arms; hypopygium as in Figs 203–205; cercal plate a little longer than wide, narrowly protruded apically, with two pairs of small apical setae; surstylus strongly downcurved on apical half, with 2 spine-like setae on inner lobe; distiphallus (Fig. 206) strongly sinuate, with dorsal process situated around basal fourth and directed basally; pregonite (Fig. 207) deeply concave dorsally, with 2 short flattened marginal setae; postgonite hook-like on dorsoapical lobe, and rather broadened on posterior area, with a short flattened seta on the broadened area dorsally.

♀. No Oriental material available. A female from Morocco examined. Wing-length 4.7 mm. Mesonotum (Fig. 195) with suparaalar spots fused with lateral spots; scutellum with lateral markings only narrowly touching to each other near middle.

Frons 0.38 times as wide as head; 1–2 *ori* and 3 *ors*. *Stpl* 1:1, a weakly differentiated setula discernible below the anterior and also below the posterior. Mid femur with 1–2 *av* near base and 5 *pv* on basal half;  $f_3$  with sparse row of some *av*, 1 *v* near base, a few *pv* near middle and a few *pv* near apex;  $t_1$  with 1 *pv* and no *ad*;  $t_2$  with 1 *ad*, 2 *pd* and 2 *p/pv*;  $t_3$  with 1 *av*, 5 *ad*, 2 *pd* and no *pv*.

Abdomen with ovipositor (Figs 208–209) about as long as preabdomen; 8th sternite about twice as long as hypoproct; cerci lengthened, nearly twice as long as epiproct.

Remarks. According to Ackland (2001) the postsutural markings on the mesonotum are united into a continuous transverse band in the Afrotropical form, and maintained in 3 or 5 discrete spots in the Moroccan material. The Oriental form represented by the present Pakistan material has discrete postsutural spots on the mesonotum in common with the Moroccan material. In the male terminalia there are found no significant differences between the Afrotropical and the Oriental forms.

#### 16. *Anthomyia vittiventris* Ackland, 1987 (Figs 210–223)

*Anthomyia* sp. B: Suwa, 1981: 17.

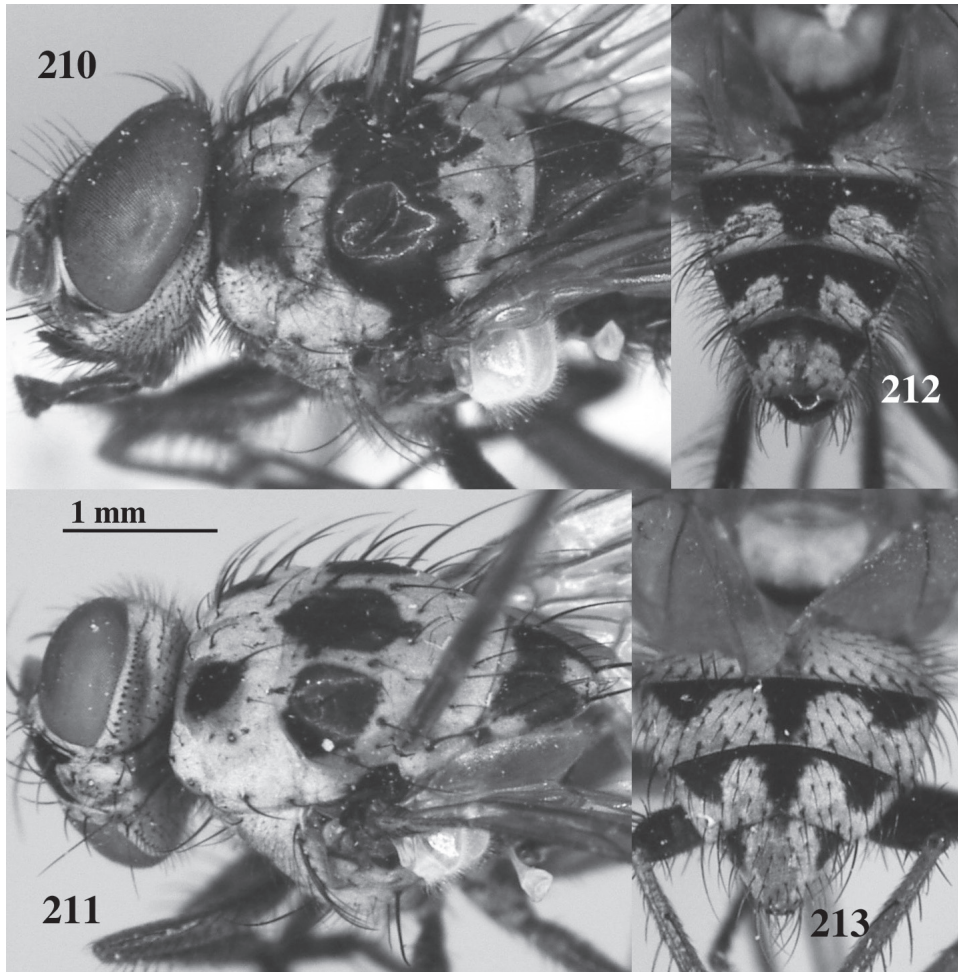
*Anthomyia* sp. C: Suwa, 1981: 18.

*Anthomyia vittiventris* Ackland, 1987: 50.

Material examined. INDIA. Simla, 3♂ (including 2 paratypes), 18.viii.1918 (Brunetti); Solan, alt. ca 1500 m, Himachal Pradesh, 1♂ (paratype), 28–30.x.1978, 1♀ (paratype), 24–27.x.1978 (JAP-IND CO TR). PAKISTAN. Natiagali, alt. 2400 m, 10 km N of Murree, 1♂, 18.vii.1987 (S. Shinonaga); Ayubia National Park, alt. 2200 m, Kashmir, 1♂, 25–30.vii.1988 (S. Shinonaga).

Distribution. India; Pakistan. New to Pakistan.

♂. Wing length 5.2–5.9 mm. Body including appendages blackish in ground colour and densely pale grey in pollinosity; legs very narrowly brownish on femora apically. Occiput blackish on postocular plains in dorsocaudal angle of view, dark brownish pollinose there. Mesonotum (Fig. 210) with sharp dark markings: a pair of presutural spots occupying anterior *ph* and 1st and 2nd *pre-dc*, and a continuous transverse postsutural band with indented anterior and posterior margins; scutellum almost black, and only grey at apex. Abdomen with dark markings sharp (Fig. 212); fore-marginal



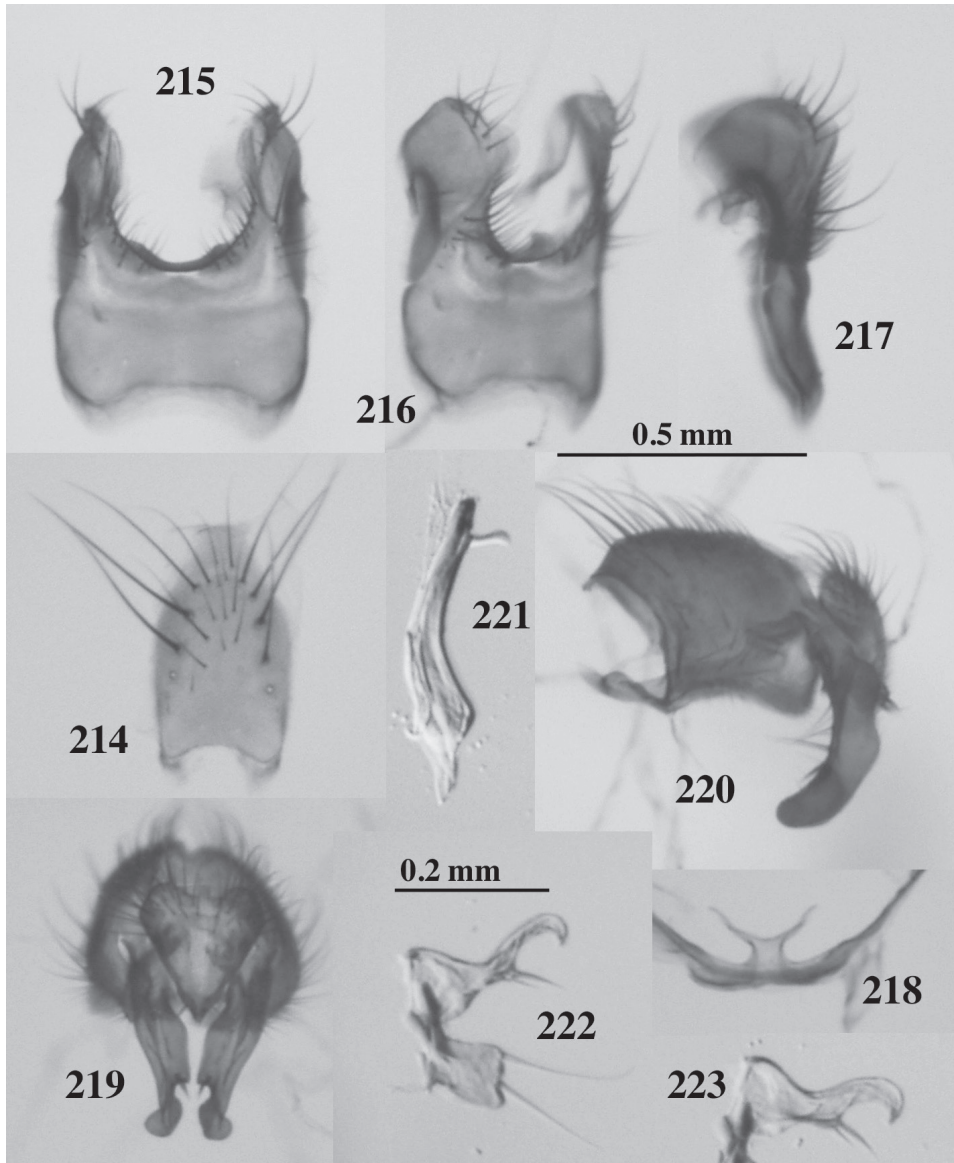
Figs 210–213. *Anthomyia vittiventris*, ♂ (210, 212) and ♀ (211, 213). 210–211, head and thorax, dorsolateral view; 212–213, abdomen, dorsocaudal view. Natiagali (210, 212), Pakistan; Solan (211, 213, paratype), India.

bands narrow on 2nd tergite, broader and occupying anterior third or half on 3rd to 5th tergites, extending posteriorly on each lateral side; median vitta nearly as wide as  $f_3$  height on 3rd tergite; 5th sternite brownish and shining on processes.

Frons narrower than anterior ocellus; parafrontals contiguous to each other, with 5–6 *ori* and a minute *ors*; single or paired minute or small *if* discernible; arista with longest hairs about 3 times as long as basal diameter of arista.

Mesonotum with some (3–8) setulae discernible between rows of *pre-acr*; posterior *ph* not differentiated; *pra* a little or distinctly longer than posterior *ntpl*; 1 strong and 1 weak *pstg*, some (5–11) short associated setulae discernible.

Mid femur with no *av* and some (6–8) *pv* on basal half, the longest a little longer



Figs 214–223. *Anthomyia vittiventris*, ♂. 214, 4th sternite; 215–217, 5th sternite, ventral to lateral views; 218, 6th sternite, showing central process; 219, hypopygium, dorsal view; 220, ditto, lateral view; 221, distiphallus; 222, left pregonite and postgonite; 223, left postgonite, different angle of view. Magnification same for Figs 214–220, and for Figs 221–223. Ayubia National Park, Pakistan.

than height of the femur;  $f_3$  with a row of about 10 *av* longer than height of the femur, with 1 short *v* near base, 1–4 rather weak or distinct *pv* on median third and a few or some rather weak *pv* near apex, and on basal fourth or third with some slender *p/pv* discernible;  $t_1$  with no *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 1 or usually 2 *pd* and 2 or sometimes 3 *p/pv*;  $t_3$  with 1 *av*, 2 strong and 7–12 weaker *ad*, 2 *pd* and 4–7 *pv*. Wings with costal thorns small though stronger than costal spinules; *dm-cu* oblique and sinuate.

Abdomen mainly depressed and long-ovoid, about twice as long as wide; 6th tergite much narrowed and linear laterally; both 6th spiracles on lateral ends of 6th tergite; right 7th spiracle at anterolateral corner of pregenital sclerite; 4th sternite (Fig. 214) longer than wide and narrowing caudad on posterior third, rather sparsely armed with long setae on posterior half; 5th sternite processes (Figs 215–217) rather well lobated innerapically, with distinct unsetose gap between distal and inner series of setae, and with some outer lateral setae basally, posteriormost one of the setae longer than any others on the sternite; central process of 6th sternite (Fig. 218) with distinct stem and divergent arms; hypopygium (Figs 219–220) with cercal plate a little longer than wide; surstylus weakly concave dorsally around basal third in lateral view, with 2 spine-like setae on inner lobe; distiphallus (Fig. 221) with dorsal process situated around basal eighth; pregonite (Fig. 222) with 2 marginal setae, dorsal one longer; postgonite (Figs 222–223) weakly lobated on posteroventral corner, inside with 1 distinct seta and 1 or 2 short or minute setulae a little distant from the corner, the longer seta rather stout and a little dilated.

♀. Mesonotum (Fig. 211) with 5 discrete postsutural spots, lateral spots broadly separated from supraalar spots; scutellum broadly black, and narrowly grey along anterior margin, on anterolateral corners and on apex. Abdomen (Fig. 213) with median vitta narrow and pale on 2nd tergite, wedge-shaped on 3rd to 5th tergites, that on 5th tergite small; fore-marginal bands represented by a pair of lateral triangles narrowly united with median vitta on 3rd to 5th tergites.

Frons slightly wider than one-third of head width at level of *if*; interfrontalia about two-thirds as wide as frons at level of *if*; parafrontals with 2 *ori* and 3 *ors*. Thorax with 1 strong and 1 weak *pstg*, and 4 associated setulae discernible.

Mid femur with 2 *av* on basal third and 3–4 *pv* on basal third;  $f_3$  with 6 *av* on distal two-thirds, 1 *v* near base, no *pv* near middle and 2 *pv* near apex;  $t_1$  with 1 *ad* and 1 *pv*;  $t_2$  with 1 *ad*, 2 *pd* and 2 *pv*;  $t_3$  with 1 *av*, 2 strong and 7 shorter *ad*, 2 *pd* and no *pv*.

Abdomen ovoid, 1.25 times as long as wide in the specimen examined; 6th and 7th sternites lengthened, more or less broadened posteriorly; cerci lengthened, about twice as long as epiproct.

Remarks. The shield-shaped male 4th sternite and the male terminalia of the same type indicate a close relationship of the present species with *A. malaisei*, from which it is, however, easily distinguished by the differences in the mesonotal colour pattern.

#### ACKNOWLEDGEMENTS

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