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THE GENUS ANTHOMYIA IN THE ORIENTAL REGION (DIPTERA : ANTHOMYIIDAE)

By D.M. ACKLAND

Abstract

ACKLAND, D.M. 1987. The genus *Anthomyia* in the Oriental region (Diptera: Anthomyiidae). *Ins. matsum. n. s.* 36 : 39-60, 77 figs.

Nine species of the genus *Anthomyia* occurring in the Oriental region are reviewed. Five species are described as new to science, namely *A. vittiventris, A. malaisei, A. alishana, A. perlucida* and *A. luculenta.* A key to the species is given.

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Contents

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INTRODUCTION

This paper deals with species of black and grey patterned flies generally included in the genus *Anthomyia*, but not species earlier placed in *Craspedochoeta*. Three species, *A. illocata, inda* and *plumiseta* were recorded in the catalog of Oriental Diptera (Ackland and Pont, 1977 : 439) ; an additional species, *pluvialis* is recorded, and five new species are described. As in the above mentioned catalog, areas east of Weber's line are excluded.

Dr M. Suwa, to whom I am very grateful for some interesting correspondence and suggestions, has drawn attention, in an introduction to his paper on the Asian Palaearctic species of *Anthomyia*, to many of the characters likely to be of importance in clarifying the phylogenetic position of these species to each other and to related groups.

The position of *Anthomyia fumipennis* Stein, described from New Guinea (not included in this paper) is problematical. It is a typically black and grey patterned fly and has hairs on the propleuron. But the genitalia are more primitive in structure ; the surstyli are simple and without stronger inner setae, the cercal plate is without specialised flattened apical setulae, the distiphallus is without a dorsal projection (sometimes apparently secondarily absent in typical *Anthomyia*), sternite VI is without a median process, and sternite V is without a ventrally directed membranous lobe. Two further as yet undescribed species from New Guinea show even further divergence from typical *Anthomyia* species in structure of head and general appearance, but possess all the above characters of *fumipennis* ; the female ovipositors of all three species are very similar to each other, being short and quite unlike those of any species of *Anthomyia* that I have examined. These species are probably larviparous and are closely related, forming a monophyletic group which perhaps has been isolated for some considerable time. These species will be dealt with in a later paper.

The recent discovery of a new and very interesting species from Sulawesi, described in this paper as *luculenta*, shows some connection with this New Guinea group. The postgonite, distiphallus without projection, sternite VI without processes, and surstylus with only a moderately developed inner lobe with weakly developed inner setulae are all characters which show a connection. Unfortunately the female of this species is unknown. I include *luculenta* in *Anthomyia* (in the sense of this paper) on the basis of the apomorphic character of specialised flattened apical setulae on the cercal plate, a character which is present in all the species included in this paper, and also in Dr Suwa's paper on the Asian Palaearctic species of *Anthomyia*.

This paper is based mainly on material in the British Museum (Natural History) (=BMNH). The Burmese material is part of a large collection of Anthomyiidae collected by Dr R. Malaise in 1934. This collection will eventually be divided between the British Museum, the Naturhistoriska Riksmuseet, Stockholm (=RMS), and the Zoological Museum, University of Helsinki (=ZMUH). Dr Suwa very kindly supplied me with some material collected in Nepal in 1968, India in 1978, and Taiwan. This material is deposited in the Entomological Institute, Hokkaido University (=EIHU).

DESCRIPTIONS OF THE SPECIES

1. *Anthomyia illocata* Walker, 1856
(Figs. 1-5, 38)

Anthomyia illocata Walker, 1856 : 129. *Anthomyia illocata* : Suwa, 1974 : 50 ; Suwa, 1977 : 19 ; Ackland and Pont, 1977 : 439 ; Suh and Kwon, 1985 : 169 ; Ackland, 1986 : 42.

Material examined. *Borneo.* (W.W. Saunders). Holotype ♀ (BMNH), see Ackland, 1986 : 42. *India.* Mhow, 8 ♂, 11-16. iv. 1905 ; Calcutta, 1♂, 28. iv. 09 ; S. India, Chota Nagpur, Goilkera, 1♀, 9-15. vi. 1926 (A. Senior-White). *Buru.* No locality, 6♂, 1♀, 1921 (L.J. Toxopeus). *Bengal N.* Bhogaon, Purneah Dist., 1♂, 1♀, 22. iii. 09 (C. Paiva, det. as *Limnophora bisetosa* Thoms.). *Malaya.* Kedah Peak, 11♂, 4♀, 11-18. iii. 1928, 3000-3500 ft. (H.M. Pendlebury) ; Selangor, Kuala Lumpur, 1♀, ix. 1929 (H.M. Pendlebury) ; Cameron Highlands, 1♂, 22. vi. 1935, 4800 ft., 1♀, 12. vi. 1935, 5000-5500 ft. (H.M. Pendlebury) ; Frasers Hill, 3♀, 4000 ft. (B.A.R. Gater). *Christmas Island.* 5♂, 7♀, 1939-40 (Dr C.A. Gibson-Hill), 1♂, i-iv. 1933. *Sumatra.* Fort de Kock, 2♂, 7♀, 1925, 920 m (E. Jacobson). *Hong Kong.* 5♂, 1♀, 1939 (Malaria Bureau). *New Caledonia.* Puebo, coast, 2♀, x. 1949 (L.E. Cheeseman). *Thailand.* Bangkok, 1♀, 15. i. 1930 (W.R.S. Ladell). *Japan.* No locality, 3♀, 1. viii. 1919, 15. v. 1919, 21. v. 1919 (S. Yamada) (all above material in BMNH ; for material from Sri Lanka, see Ackland 1986 : 45). *Taiwan.* Alishan, Chiai Hsien, 2300 m, 1♂, 4. vi. 1970 (H. Kurahashi) ; 1♀, 8. vii. 79 (M. Suwa) ; Nanshanchi, Nantou Hsien, 1♂, 1♀, 22-23. iv. 1981 (K. Ôhara) (in Coll. DMA).

♂♀. Arista with total width of hairing 0.5-0.75 times width of A_3. Occiput whitish grey dusted. Mesonotum (Fig. 38) with posterior band brownish and with hind margin not reaching level of 2nd *post dcs.* Scutellum only brownish at base and on disc, margins grey.

♂ terminalia : distiphallus without a basal dorsal projection (Fig. 4), postgonite with a narrowly or moderately expanded seta (Fig. 3).

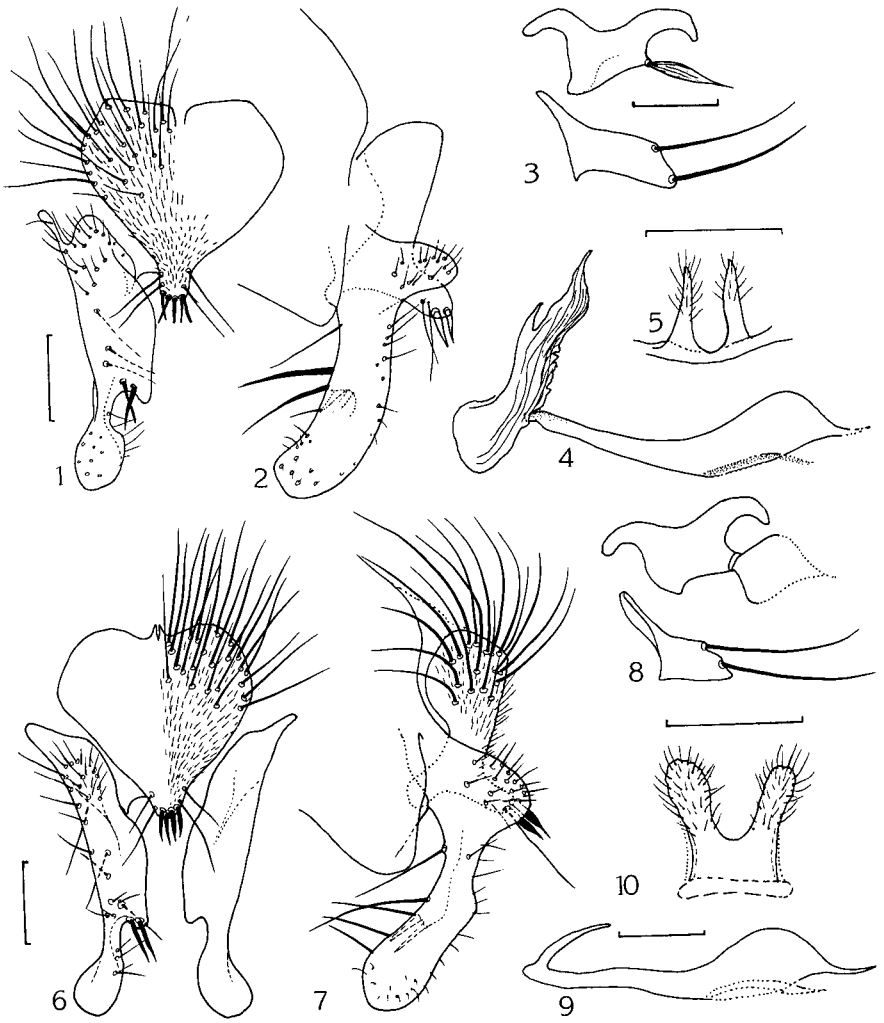
Distribution. Widespread in Oriental and Eastern Palaearctic regions.

2. *Anthomyia plumiseta* Stein, 1918
(Figs. 6-10, 37)

Anthomyia plumiseta Stein, 1918 : 158. *Anthomyia plumiseta* : Ackland and Pont, 1977 : 440 ; Ackland, 1986 : 40 ; *Anthomyia* sp. A, Suwa, 1974 : 51 ; 1981 : 17.

Material examined. *Taiwan.* Chip-Chip, iii. 1909 (H. Sauter), Neotype ♂ (in DEI), see Ackland, 1986 : 40. *India.* Tamil N., Coonoor, 1700-1900 m, 1♂, 3♀, 23-26. ix. 1978 (JAP-IND-CO-TR). *Taiwan.* Chiayi, Alishan, 2300-2500 m, 1♀, 8. vii. 79 (M. Suwa) (EIHU). For additional material examined from Sri Lanka, see Ackland, 1986 : 40-41.

♂♀. Arista with longest hairs nearly or as long as width of A_3. Upper part of occiput black. Mesonotum (Fig. 37) with postsutural band blackish and with hind margin passing level of 2nd *post dc* ; scutellum mainly black, only apex grey. ♂ terminalia : distiphallus (Fig. 9) with a dorsal basal projection, postgonite (Fig. 8) with a wide expanded seta.



Figs. 1-5. *Anthomyia illocata* Walker, ♂ : 1, cercal plate and surstylus, dorsal view ; 2, *ditto*, lateral view ; 3, pregonite and postgonite ; 4, distiphallus ; 5, median processes of sternite VI. India.

Figs. 6-10. *Anthomyia plumiseta* Stein, ♂ : 6, cercal plate and surstylus, dorsal view ; 7, *ditto*, lateral view ; 8, pregonite and postgonite ; 9, distiphallus ; 10, median processes of sternite VI. N.E. Burma. Scale 0.1 mm (same in succeeding figures except where otherwise stated).

Distribution. Taiwan, Japan, India, Sri Lanka, Malaya, Philippines, Borneo, Burma.

Remarks. The median processes on sternite VI in the male are small, hairy and papillae-like structures in *plumiseta* and *illocata*. They differ slightly, *plumiseta* (Fig. 10) has lobes united in basal half, in *illocata* they are separated to base (Fig. 5).

3. *Anthomyia inda* Ackland and Pont, 1977
(Figs. 11-17, 27-33)

Anthomyia indica Malloch, 1924 : 269. Primary homonym of *Anthomyia indica* Walker, 1853 : 252.

Anthomyia inda Ackland and Pont, 1977 : 439.

Material examined. *India*. N.W. India, Kasauli (F. Wyville-Thomson), Holotype ♂, 3♀ paratypes. Naini-tal, 7000 ft., 2♀ paratypes, May, 1900 (G.M. Giles) (in BMNH). Mussoorie, 7000 ft., 1♂, 1♀, 20-26. v. 1905 (Brunetti) ; 2♂, vi. 1909 (Brunetti) ; Kasauli, 6000 ft., 1♀, 29. vi. 1927 (BMNH). *Nepal*. Tukucha, Palpa, 2♀, 6. v. 1968 (T. Kumata) (EIHU).

♂. Arista with short hairs, longest not longer than diameter at base. Mesonotum with dark *prst* spots small, roundish, grey dusting surrounding spots not shifting. Postsutural spots five in number, supra-alar spots reaching from wing base to *sa* (or even *pra*), and the dividing grey area between the lateral and supra-alar spots lying between *sa* and *ia* seta (Figs. 28, 29), in male from Mussoorie these spots slightly joined in this region. Scutellum (Fig. 30) with two lateral basal dark spots more or less joined in middle, extreme base and apical half grey, as are lower lateral margins. Mesonotal setae rather weak and sparse. *pra* seta as long as *post npl*. Pleura only darkened above anterior spiracle. Lower anterior *stpl* weak and fine. t_2 with a short *ad*. Sternite IV (Fig. 13) with basal apodemes short, rounded apically. Sternite V (Figs. 13, 14) with large and rounded membranous apical projection ; inner basal part of lobes not dilated, with about 3 rows of setae ; sternite VI (Fig. 17) with median processes similar to *pluvialis* and *quinquemaculata*.

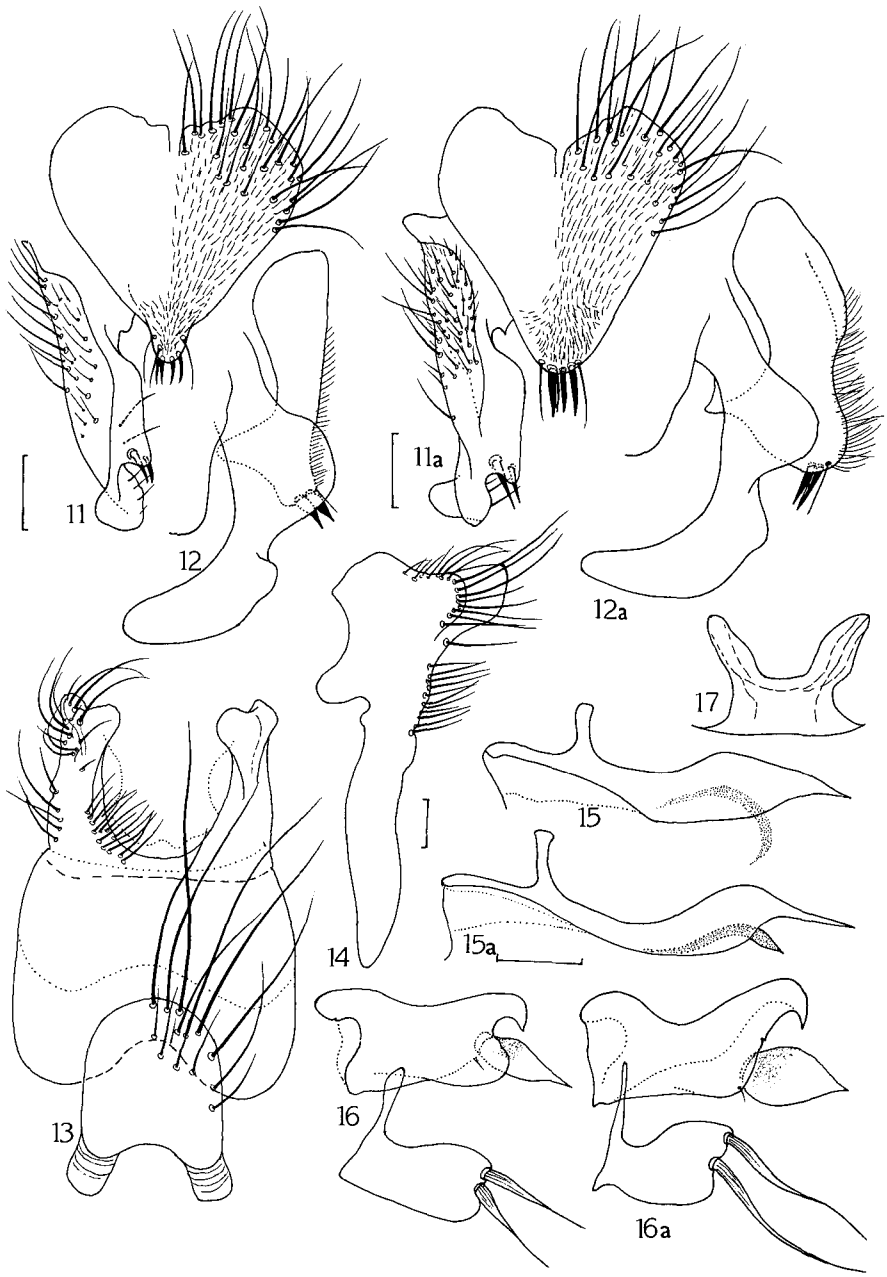
♂ terminalia : cercal plate (Fig. 11) as long as wide at base, produced into a narrow apex. Surstylus (Fig. 11) excavated basally inside at base, in profile constricted in middle, pregonite and postgonite similar to *pluvialis* and *quinquemaculata*, but postgonite (Fig. 16) with the expanded seta inserted well behind the projecting lower lobe-like corner of postgonite ; pregonite longer than either of these two species, setae shorter than *quinquemaculata* but similar to *pluvialis*.

♀. Mesonotal pattern (Figs. 31, 32) very similar to male, spots a little smaller. Scutellum (Fig. 33) with the 2 lateral spots not joined in middle, though the grey area between is sometimes brownish-grey suffused.

Distribution. Known only from N. India and Nepal.

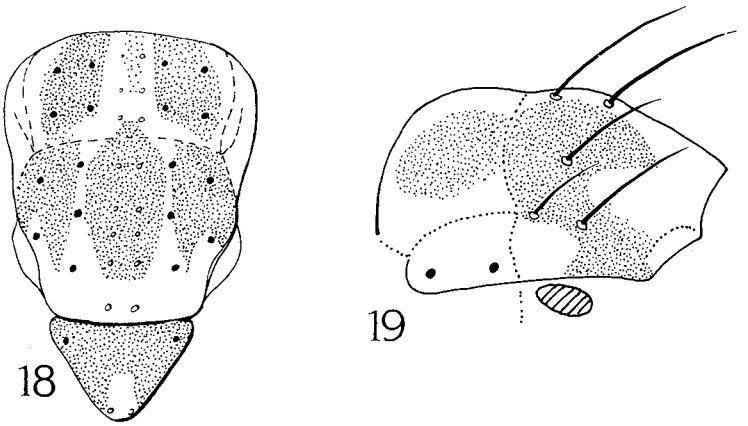
Remarks. Closely related to the widespread *A. pluvialis* (L.) which also occurs in N. India (1♂, Mussoorie, BMNH). *A. inda* is also very closely related to the southern European species *A. quinquemaculata* Macq., described from the Canary Isles. Michelsen (1980 : 287) redescribed *quinquemaculata* and synonymised it with *benguellae* Malloch, described from S. Africa. I have examined a ♂ of *quinquemaculata* from the Canary Isles (Tenerife, Bajamer, 5. iii. 1975, A.E. Stubbs, BMNH) and find some small but important differences in the ♂ genitalia in addition to the different mesonotal pattern. For the present I regard *inda* as a distinct species ; further study of a larger range of material may show that *inda* is only entitled to subspecific rank.

A. inda differs from *pluvialis* in having a larger supra-alar spot which reaches



Figs. 11-17. *Anthomyia inda* Ackland and Pont, ♂ : 11, cercal plate and surstylus, dorsal view ; 12, *ditto*, lateral view ; 13, sternite IV and V ; 14, sternite V, lateral view ; 15, distiphallus ; 16, pregonite and postgonite ; 17, median processes of sternite VI. Holotype ♂ from N.W. India, Kasauli.

Figs. 11a, 12a, 15a, 16a. *Anthomyia quinquemaculata* Macq., ♂ : 11a, cercal plate and surstylus, dorsal view ; 12a, *ditto*, lateral view ; 15a, distiphallus ; 16a, pregonite and postgonite. Canary Isles.



Figs. 18, 19. *Anthomyia quinquemaculata* Macq., ♂ : 18, mesonotum, dorsal view : 19, *ditto*, lateral view. Canary Isles.

to *sa* seta (Figs. 28, 29 ; *pluvialis* Fig. 35) ; the presutural spots are smaller and more rounded (Figs. 27, 31 ; *pluvialis* Fig. 34) ; the lateral spots on scutellum not reaching over sides (Figs. 30, 33 ; *pluvialis* Fig. 36). Sternite V without a basal inner dilation of lobes (Fig. 13 ; *pluvialis* Fig. 25). Postgonite with a projecting lobe over seta (Fig. 16 ; *pluvialis* Fig. 22).

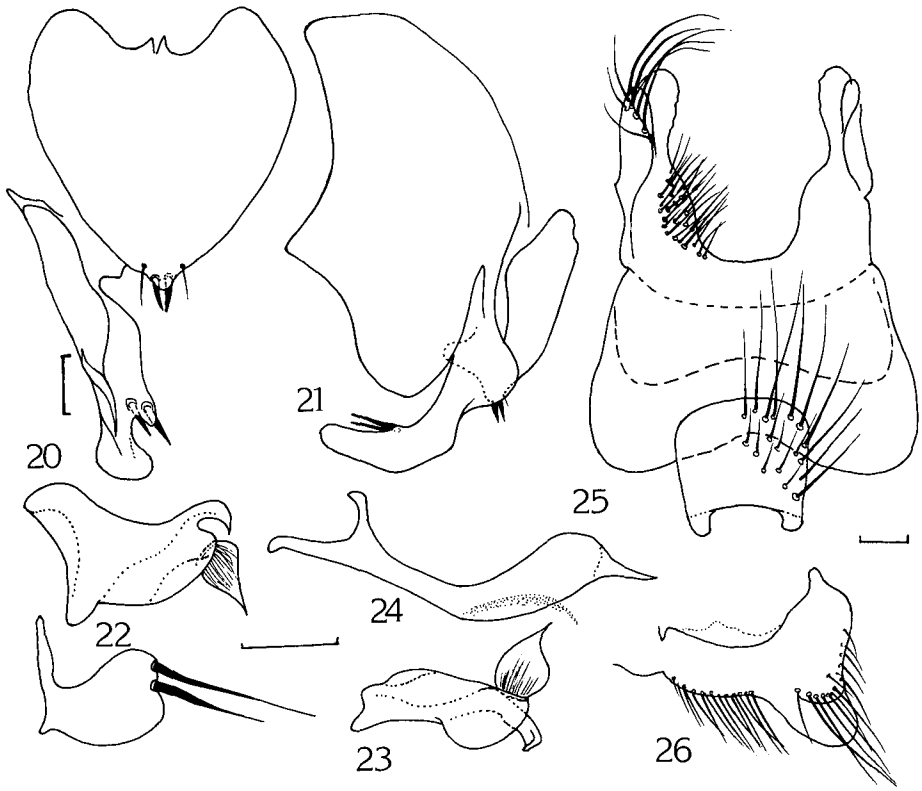
A. inda differs from *quinquemaculata* in having smaller mesonotal spots, the supra-alar spot separated from the lateral spots (Figs. 28, 29 ; *quinquemaculata* Fig. 19). Cercal plate produced into a narrow apex (Fig. 11 ; *quinquemaculata* Fig. 11a), in profile with apical setae placed immediately below the concave lower part of plate, and directed posteroventrally ; the apex is hidden behind the swollen lobe on the upper part of the surstylus (Fig. 12) ; in *quinquemaculata* (Figs. 11a, 12a) the cercal plate in dorsal view is more rounded at apex, in profile the flattened setae at apex placed below the rounded apex and directed ventrally, not hidden by surstylus. Postgonite (Fig. 16) with a swollen projecting lobe on lower posterior corner ; in *quinquemaculata* (Fig. 16a) the slightly wider seta is placed lower down, just inside a non-projecting lower posterior corner. Pregonite in *inda* (Fig. 16) longer than in *quinquemaculata* (Fig. 16a) and setae shorter and placed closer together ; distiphallus in *inda* (Fig. 15) more swollen, and acrophallus longer (*quinquemaculata* Fig. 15a).

4. *Anthomyia pluvialis* (Linn., 1758)
(Figs. 20-26, 34-36)

Musca pluvialis Linnaeus, 1758 : 597.
Anthomyia pluvialis (L.) : Michelsen, 1980 : 285.

Material examined. *India*. Mussoorie, 1♂, June, 1909 (Brunetti) (BMNH).

♂. Arista with longest hairs shorter than basal diameter. Mesonotum (Fig. 34) with presutural spots large and squarish. Supra-alar spot small and not reaching *sa* seta (Fig. 35), the grey area dividing lateral and supra-alar spots lying between the wing base and the *sa* seta. Scutellum (Fig. 36) with only central stripe grey, lateral spots continuing onto sides of scutellum. Sternite V (Fig. 25) with inner basal part



Figs. 20-26. *Anthomyia pluvialis* (L.), ♂ : 20, cercal plate and surstylus, dorsal view ; 21, *ditto*, lateral view ; 22, pregonite and postgonite ; 23, postgonite, ventral view ; 24, distiphallus ; 25, sternite IV and V ; 26, sternite V, lateral view. India, Mussoorie.

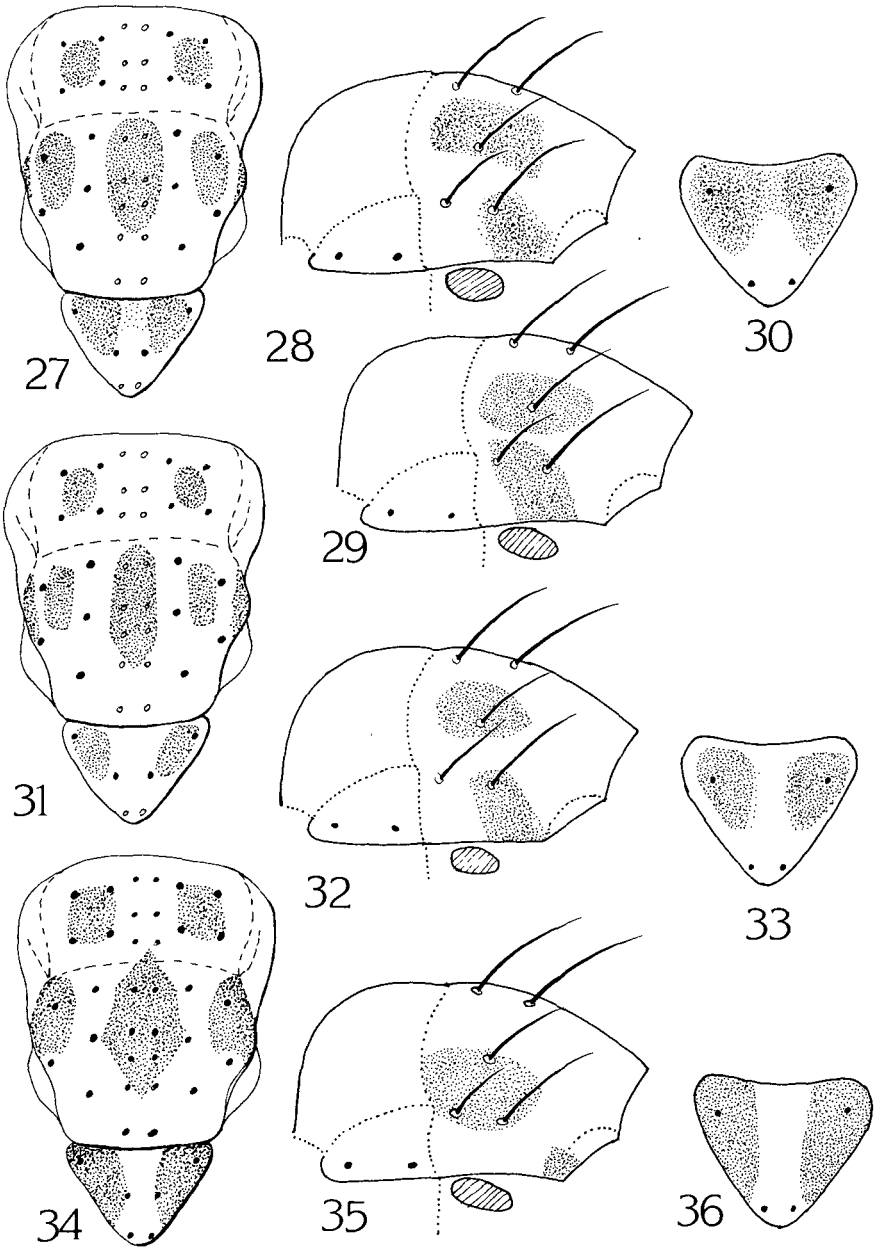
of lobes dilated.

♂ terminalia. Cercal plate (Fig. 20) with apex not distinctly produced ; postgonite (Figs. 22, 23) with lower corner not produced into a lobe over insertion of expanded seta.

Distribution. Michelsen (1980 : 285) records this species, as restricted by him in the same paper, from Denmark, Germany, Austria, Roumania, Yugoslavia, Corsica, Italy, Spain, Greece, Morocco. I can add Britain, France, Mongolia and India. All records prior to 1980 need verification. Suwa (1974 : 48) recorded *pluvialis* from Japan, but this is a distinct species which he will describe elsewhere.

5. *Anthomyia alishana* Ackland and Suwa, sp. nov.
(Figs. 39, 40, 47-55)

Type material. Holotype ♂, *Taiwan*. Tsuifeng, 28. v. 1972 (R. Kano) (EIHU). Paratypes, *Taiwan*. Tsuifeng, 1♂, 1♀, 28. v. 1972 (R. Kano) ; Alishan, 2300 m, Chiai Hsien, 1♂, 5. vi. 1970 (H. Kurahashi) ; Alishan, Chiayi-Hsien, 1♂, 15. vi. 1970 (K. Nishida) (EIHU) ; Meifeng-Tsuifeng, 2200-2300 m, Nantou Hsien, 1♂, 1♀, 27. iv. 1981 (K. Ôhara) (BMNH).



Figs. 27-33. *Anthomyia inda* Ackland and Pont : 27, ♂ mesonotum, dorsal view ; 28, 29, *ditto*, lateral view ; 30, scutellum ; 31, ♀ mesonotum, dorsal view ; 32, *ditto*, lateral view ; 33, scutellum.

Figs. 34-36. *Anthomyia pluvialis* (L.), ♂ : mesonotum, dorsal view ; 35, *ditto*, lateral view ; 36, scutellum. India, Mussoorie.

Diagnosis. ♂. Arista with longest hairs at least twice as long as basal diameter. Presutural spots on mesonotum (Fig. 39) small, postsutural spots narrowly joined at *dcs*, forming continuous cross band with very irregular margins. Scutellum pale only on basal lateral margins and at extreme apex. Sternite IV (Fig. 51) with numerous long setae. Surstylus (Figs. 47, 48) densely hairy at base, pregonite

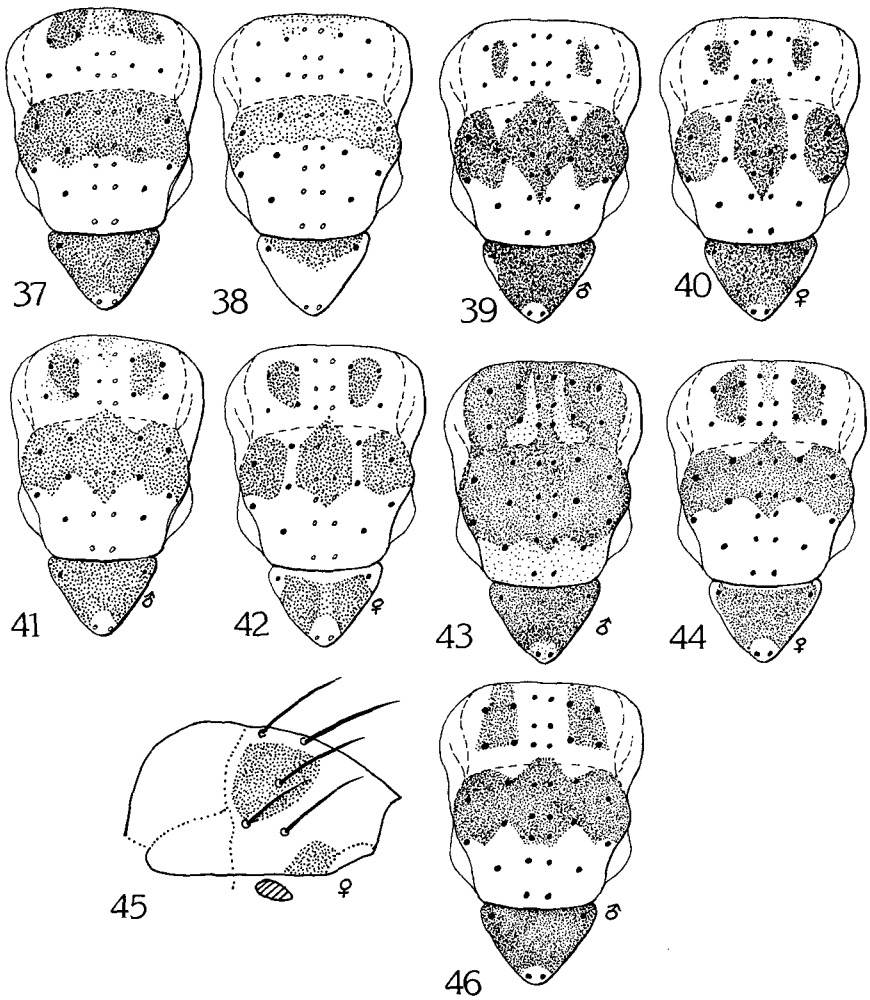
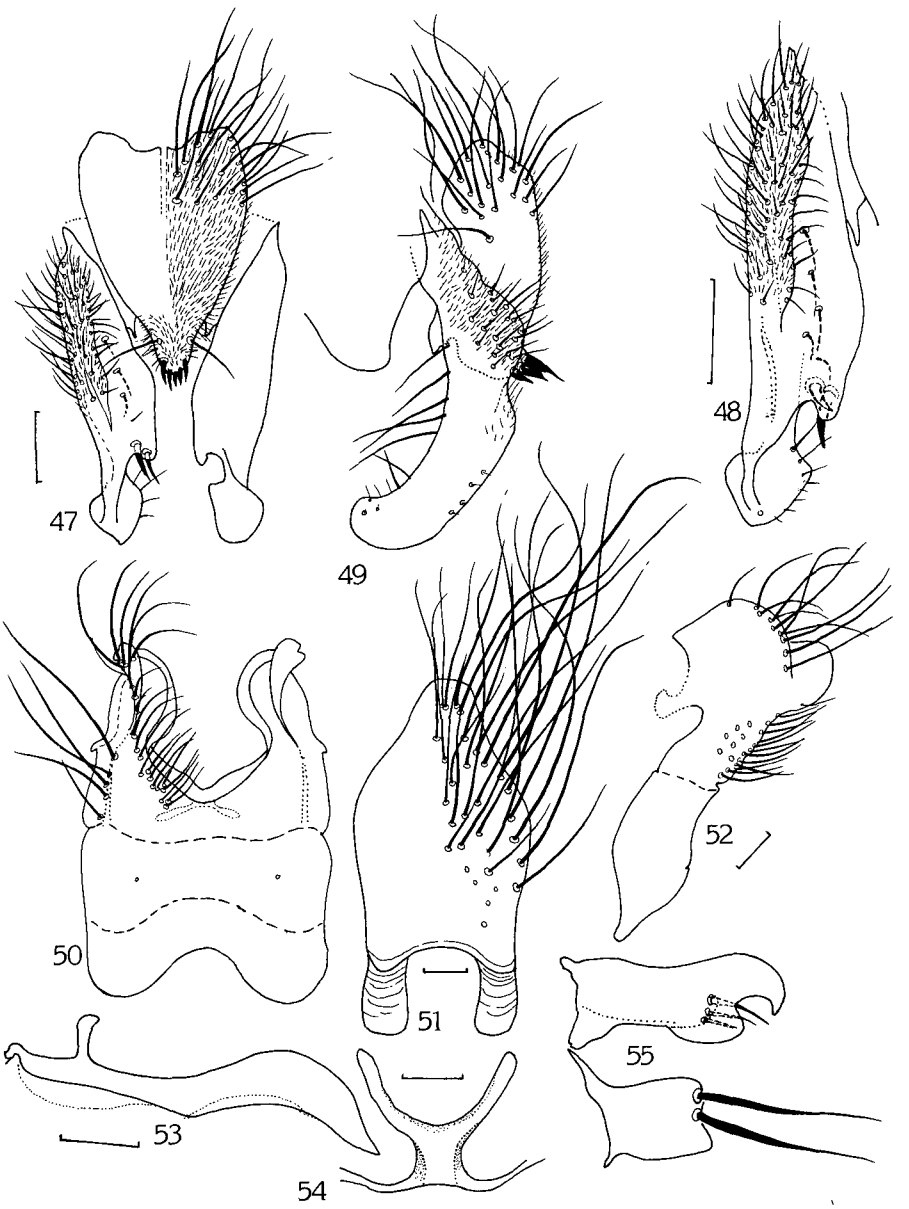


Fig. 37. *Anthomyia plumiseta* Stein, ♂ ♀ : mesonotum, dorsal view. India.
Fig. 38. *Anthomyia illocata* Walker, ♂ ♀ : mesonotum, dorsal view. Taiwan.
Figs. 39-40. *Anthomyia alishana* sp. nov. : 39, ♂ mesonotum, dorsal view ; 40, ♀ *ditto*. Taiwan.
Figs. 41-42. *Anthomyia vittiventris* sp. nov. : 41, ♂ mesonsotum, dorsal view, India, Simla ; 42, ♀ *ditto*, India, Solan.
Figs. 43-44. *Anthomyia malaisei* sp. nov. : 43, ♂ mesonotum, dorsal view ; 44, ♀ *ditto*. Burma.
Fig. 45. *Anthomyia vittiventris* sp. nov., ♀ mesonotum, lateral view. India, Solan.
Fig. 46. *Anthomyia perlucida* sp. nov., ♂ mesontum, dorsal view. Holotype, Malaya, Tanah Rata.



Figs. 47-55. *Anthomyia alishana* sp. nov., ♂ : 47, cercal plate and surstylus, dorsal view ; 48, surstylus ; 49, *ditto*, lateral view ; 50, sternite V ; 51, sternite IV ; 52, sternite V, lateral view ; 53, distiphallus ; 54, median processes of sternite VI ; 55, pregonite and postgonite. Holotype ♂, Taiwan.

(Fig. 55) with setae close together, postgonite with 2-3 simple setae inserted well behind produced lower posterior corner. ♀ mesonotal markings (Fig. 40) similar to ♂ but postsutural band narrowly interrupted along *dcs*.

♂. Arista with the longest hairs at least twice as long as diameter of base.

Frons at narrowest part equal to diameter of *a* ocellus, parafrontals touching for a short distance. 6 frontal setae, 1 pair of fine *if*. Parafacials at narrowest part about 0.5 times width of A_3. Occiput darkened on upper third.

Mesonotum (Fig. 39) with presutural spots small, elongated but equally narrow, only occupying about half area between *dcs* and *ph*. Postsutural spots joined very narrowly along *dcs* and broadly joined to supra-alar spot, anterior and posterior margins very indented, especially anteriorly at *dcs*. Scutellum mainly black with only base laterally and extreme apex pale. Area between hind *ph* and *npl* with 4-6 fine hairs. *prst acr* with 1-2 hairs between rows. *pra* about 1.4 times length of *post npl*, and more robust. *stpl* 2+2, lower *a* seta half length of upper.

Wing veins yellowish brown. Costal spine hardly differentiated from anterior costal spicules.

Legs. t_1 with 1 median *pv*. t_2 with 1 short *ad*, not longer than diameter of tibia, and 2 *pd*, distal one inserted above *ad* and nearly twice as long, 2-3 *pv*. f_3 with complete row of *av*, shorter basally, some long *pv* from middle to apex. t_3 with 1 *av*, about 12 *ad*, 2 *pd*, about 9 *pv*.

Abdomen. Basal third of tergites black, extending to half at margins, and forming a complete mid stripe in centre, this stripe being as wide as femur. Sternite IV (Fig. 51) with large basal apodemes, narrowing apically, and with numerous long setae. Sternite V (Figs. 50, 52) with ventral apical processes wide, rounded, and fairly prominent. Median processes of sternite VI as in Fig. 54.

♂ terminalia. Cercal plate (Fig. 47) longer than wide, surstylus with rather dense setulae and hairs on basal outer margins. Pregonite (Fig. 55) with the two strong setae on posterior margin inserted close together; postgonite with one stronger seta and two weak setulae which are inserted on inner surface behind projecting lower posterior corner.

Body length 6-6.5 mm, wing length 6 mm.

♀. Presutural spots larger than in the ♂ but outer posterior corners not reaching hind *ph*; postsutural spots narrowly separated along *dcs*, but laterally narrowly joined to supra-alar spot. Scutellum as in ♂. t_2 with stronger *ad* than in ♂, as long as or longer than distal *pd*. f_3 with shorter *v* setae. t_3 with 1 *av*, about 10 *ad*, 2 *pd* but no *pv*.

Distribution. Known only from the type series from Taiwan.

This species was first recognised as distinct by Dr M. Suwa, and I am very grateful to him for sending me the whole of his material to include in this paper. The species should be cited under joint authorship.

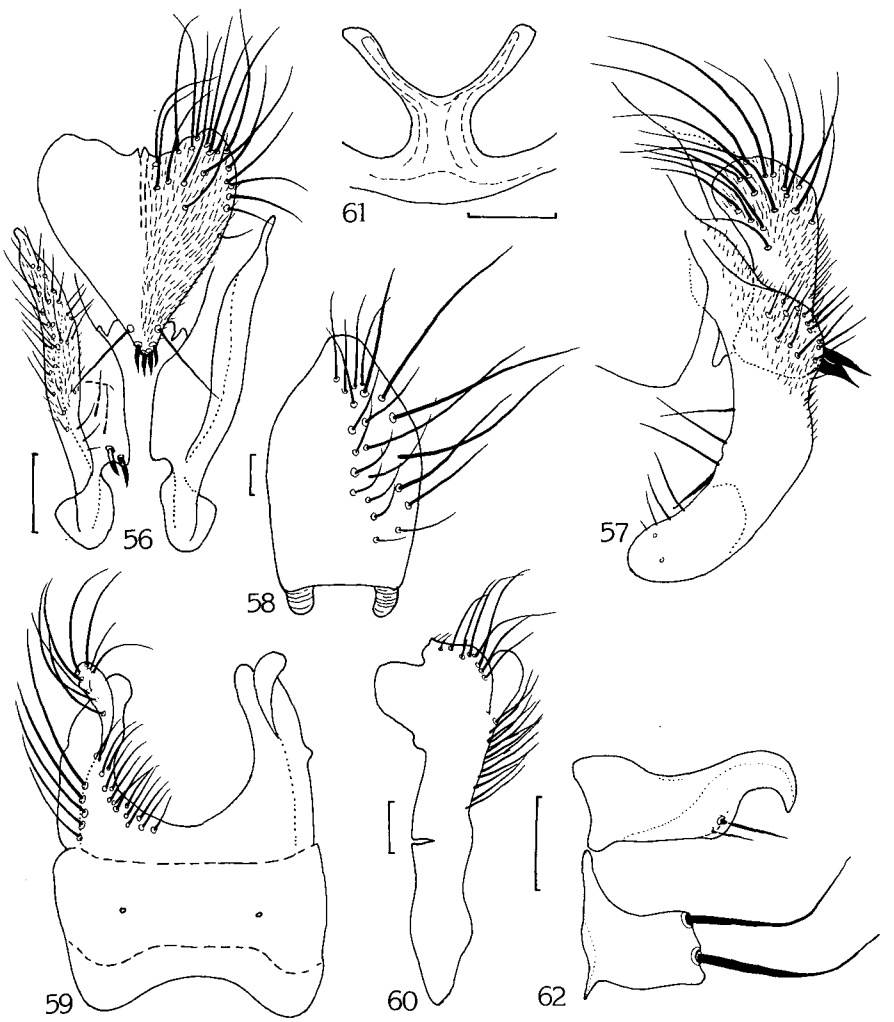
6. *Anthomyia vittiventris* Ackland, sp. nov.
(Figs. 41-42, 45, 56-62)

Anthomyia sp. B, Suwa, 1981: 17, ♂.
Anthomyia sp. C, Suwa, 1981: 18, ♀.

Type material. Holotype ♂, *India*. Simla, 18. viii. 1918 (Brunetti) (BMNH). Paratypes, same locality, 5♂, 7. vii. 1918; 11♂, 20-28. vii. 1918; 18♂, 18. viii. 1918 (Brunetti); 1♂, 12-13. v. 1913, 7000 ft. (Annandale); Himachal Pradesh, Solan, ca. 1500 m, 1♂, 28-30. x. 1978, 1♀, 24-27. x. 1978 (JAP-IND-CO-TR); Theog, Simla

Hills, 8000 ft., 1♀, 13. v. 09 (Annandale) (in BMNH, EIHU and Coll. DMA).

Diagnosis. ♂. Arista with longest hairs at least twice diameter of arista at base. Mesonotum (Fig. 41) with presutural spots large, diamond shaped and surrounded by sparse shifting grey dust, which in some directions becomes dark grey causing the border of the dark spot to become indistinct; postsutural dark spots widely joined along *dcs*, foremargin only weakly sinuate. Scutellum pale at apex only. Sternite IV (Fig. 58) with shorter, less numerous setae. Pregonite (Fig. 62) with setae not close together, postgonite with 2 unequal setae, inserted on inner surface, lower posterior corner of gonite not produced in a lobe. ♀. Postsutural band on mesonotum (Fig. 42) broken into 5 spots, narrowly separated along *dcs* and at *sa* seta. Scutellum pale at extreme base, laterally and at apex.



Figs. 56-62. *Anthomyia vittiventris* sp. nov., ♂ : 56, cercal plate and surstylus, dorsal view ; 57, *ditto*, lateral view ; 58, sternite IV ; 59, sternite V ; 60, *ditto*, lateral view ; 61, median processes of sternite VI ; 62, pregonite and postgonite. India, Simla.

♂. Very similar to *alishana*, only differing as follows: mesonotum (Fig. 41) with presutural spots larger and diamond shaped; postsutural spots widely joined at *dcs*, hence forming a continuous band with foremargin less indented and almost following suture, hind margin more indented. Scutellum pale at apex only. Rather numerous hairs (8-12) between hind *ph* and notopleuron. *pra* hardly longer than *post npl* and not stronger.

Legs. t_2 with *pd* setae shorter.

Abdomen. Sternite IV (Fig. 58) with shorter and less numerous setae, basal apodemes smaller.

♂ terminalia. Cercal plate (Fig. 56) about as long as wide. Surstylus on outer upper part less hairy. Pregonite (Fig. 62) with setae more widely separated. Postgonite with lower corner not produced as a lobe over point of insertion of setae, one stronger and one finer seta present.

Body length 6-6.5 mm, wing length 6 mm.

♀. Arista as in ♂. Mesonotum with presutural spots diamond shaped, grey surrounding dust denser and not shifting, hence spots more distinct than in ♂. Postsutural band broken along lines of *dcs* and around *sa*, consisting of 5 separate areas. No darker area around anterior part of mesopleuron. Scutellum with extreme base pale, as are lateral margins and apex. *stpl* 2+2, lower anterior seta as long as lower posterior. t_2 with a strong *ad*, 2 *pd*. t_3 with 1 *av*, about 6 *ad*, 2 *pd* and no distinct *pv*.

Distribution. Known only from India.

Remarks. Suwa (1981: 18) compared the ♀ of his species C (♂ unknown) with *inda* Ackland and Pont, because the postsutural band is broken up into five spots. *A. inda* ♀ (q.v.) has however an almost bare arista (as has *pluvialis*) and the grey dividing area between the lateral and supra-alar spots lies between the *ia* and *pra* (or *sa*), not on either side of the *sa* seta. Dr Suwa kindly sent me the specimen from Solan, which I consider to be the ♀ of *vittiventris* in spite of the discontinuity of the postsutural band. Its capture at Solan at the same time as a ♂ of *vittiventris*, and agreement in other characters (especially longer haired arista) suggest that it is correctly associated. The ♀ listed from Theog, Simla Hills, agrees in every respect with Solan ♀. More material, especially females, may indicate the variation in the continuity or otherwise of the postsutural band.

This species was recognised many years ago by the late Dr van Emden of the Commonwealth Institute of Entomology. The name *vittiventris* was used by him as a MS name on specimens, and in his notes.

7. *Anthomyia malaisei* Ackland, sp. nov.

(Figs. 43, 44)

Type material. Holotype ♂, *Burma*. Kambaiti, 7000 ft., 12. iv. 1934 (R. Malaise) (Riksmuseum, Stockholm). Paratypes, same locality, 5♂, 6. iv. 1934; 12♂, 1♀, 8. iv. 1934; 2♂, 12. iv. 1934; 5♂, 1♀, 18. iv. 1934; 29♂, 4♀, 25. iv. 1934; 3♂, 26. iv. 1934; 4♂, 28. iv. 1934; 6♂, 30. iv. 1934; 2♂, 5. v. 1934; 3♂, 7. v. 1934; 1♀, 8. v. 1934; 2♂, 11. v. 1934; 1♂, 12. v. 1934; 1♀, 20. v. 1934; 1♀, 23. v. 1934; 1♂, 24. v. 1934; 3♂, 1. vi. 1934; 5♂, 4. vi. 1934 (BMNH, EIHU, RMS, ZMUH, Coll. DMA).

Diagnosis. ♂. Structurally identical to *vittiventris*, but strikingly different in appearance due to pattern and dusting of throax. Mesonotum (Fig. 43) viewed from in front at a low angle almost entirely brownish black, the grey dusted areas disappearing; from an oblique angle the presutural spots are joined laterally to the postsutural band, and also reach the sides and anterior margin of mesonotum; the only grey areas are therefore a pair of boomerang-shaped patches close together, rather like a pair of inverted golf clubs with the shafts lying along the lines of the *prst acr*. The postsutural band reaches to the 3rd *post dc*, the small remaining posterior part of the mesonotum is translucent brownish, and from a low angle almost disappears. Scutellum completely black, or only a minute apical area weakly paler. Viewed in profile sides of thorax in oblique anterior view mainly brownish black translucent, including notopleuron, mesopleuron and sternopleuron; viewed from the side obliquely, the humerus and sternopleuron become grey dusted, but the mesopleuron remains dark. Mesonotum viewed from behind: the pale grey *prst* boomerang shapes become brilliantly whitish and stand out from the remaining dark areas, the posterior grey area in front of scutellum is also very contrasted; viewed directly from above these pale areas become darker and less contrasted, as in Fig. 43.

Body length 6.5-7 mm, wing length 5.5-6 mm.

♀. Differs from the ♂ in that the grey areas of thorax (Fig. 44) are not shifting, the black and grey pattern remaining distinct from all points of view. Presutural spots large and squarish, continuing anteriorly to front of thorax. Postsutural band emarginate on anterior and posterior margins. Scutellum black except for a basal lateral area and at apex. Pleura grey dusted from all points of view.

Distribution. Known only from the type series from Burma.

Remarks. The ♀ of *malaisei* differs from the ♀ of *vittiventris* and *alishana* in having a complete postsutural band on mesonotum. I name this species after Dr R. Malaise, who collected many interesting species of Diptera in Burma in the 1930's.

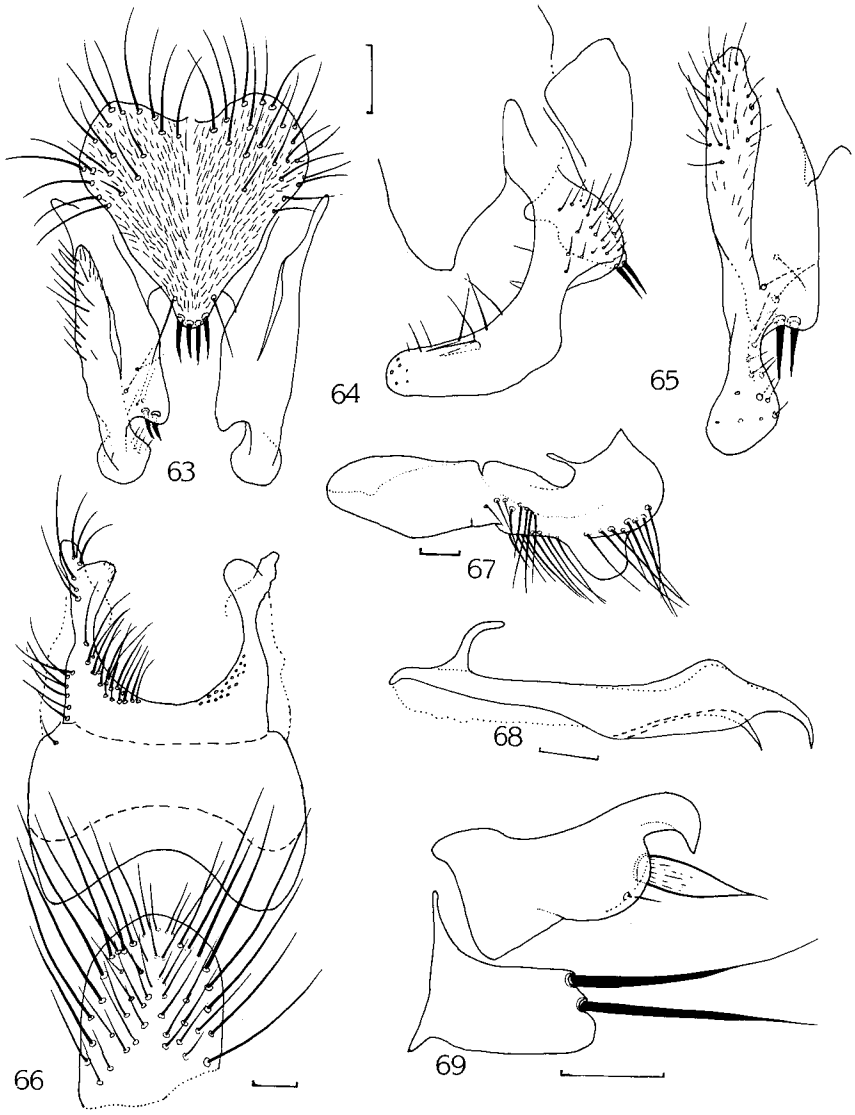
8. *Anthomyia perlucida* Ackland, sp. nov.
(Figs. 46, 63-69)

Type material. Holotype ♂, *Malaya*. Tanah Rata, 10. v. 1934 (H.T. Pagden), caught on the back of a pig (BMNH).

Diagnosis. ♂. Ground colour of thorax reddish to orange brown, partly translucent, with rather thin and partly shifting greyish to orange brown dust. Mesonotum (Fig. 46) with large squarish presutural spots and continuous postsutural band. *pra* not longer than *post npl*. Lower squama shorter, only 1/2 to 2/3 as long as width at base. Postgonite (Fig. 69) with a narrowly expanded seta, and pregonite much longer than in *alishana, vittiventris* and *malaisei* (referred to as 'other species' in the following).

♂. Head with *if* setae about 2/3 length of upper frontals (shorter in other species).

Mesonotum (Fig. 46) with ground colour slightly translucent brownish showing through greyish or golden brown dust in places, especially pleura. Presutural spots large, squarish, continued to front of thorax. Postsutural band very similar to *vittiventris*, but more brownish black due to the brownish dust. *pra* as long as *post*



Figs. 63-69. *Anthomyia perlucida* sp. nov., ♂ : 63, cercal plate and surstylus, dorsal view ; 64, *ditto*, lateral view ; 65, surstylus ; 66, sternite IV and V ; 67, sternite V, lateral view ; 68, distiphallus ; 69, pregonite and postgonite. Holotype ♂ from Malaya, Tanah Rata.

npl. Accessory hairs of mesonotum and pleura sparser and finer than in the other species. Scutellum mainly brownish black, only extreme apex pale, viewed from a low angle from in front with light golden brown dusting.

Wings. Lower squama shorter than in the other species, only 1/2 as long as wide at base, probably covered by upper squama when wing is in normal resting position ; in the other species distinctly projecting beyond upper squama.

Legs orange brown. f_3 without *pv*. t_3 with about 7 *ad*, 2 *pd* and 2*pv* (in other

species 10-13 *ad*, 2 *pd*, 5-9 *pv*).

Abdomen. Sternite IV with a rounded posterior margin (Fig. 66). Sternite V with shorter outer basal setae on lobes (Fig. 66); in profile (Fig. 67) with a moderately large projecting membranous lobe which is set back a little distance from end of sternite.

♂ terminalia. Cercal plate (Fig. 63) about as long as greatest width, similar to *vittiventris* but apex wider and blunter. Surstylus in profile (Fig. 64) more strongly curved, basal posterior swelling larger than in other species. Distiphallus (Fig. 68) with dorsal basal projection strongly curved towards apex. Postgonite (Fig. 69) with a narrowly expanded seta, inserted slightly behind a not projecting lower posterior corner, pregonite (Fig. 69) longer than in other species, with lower seta inserted about middle of posterior margin (*vittiventris* below middle (Fig. 62), *alishana* at middle but gonite shorter (Fig. 55)).

Body length 6.5 mm, wing length 6 mm.

♀ unknown.

Distribution. Known only from the holotype from Malaya.

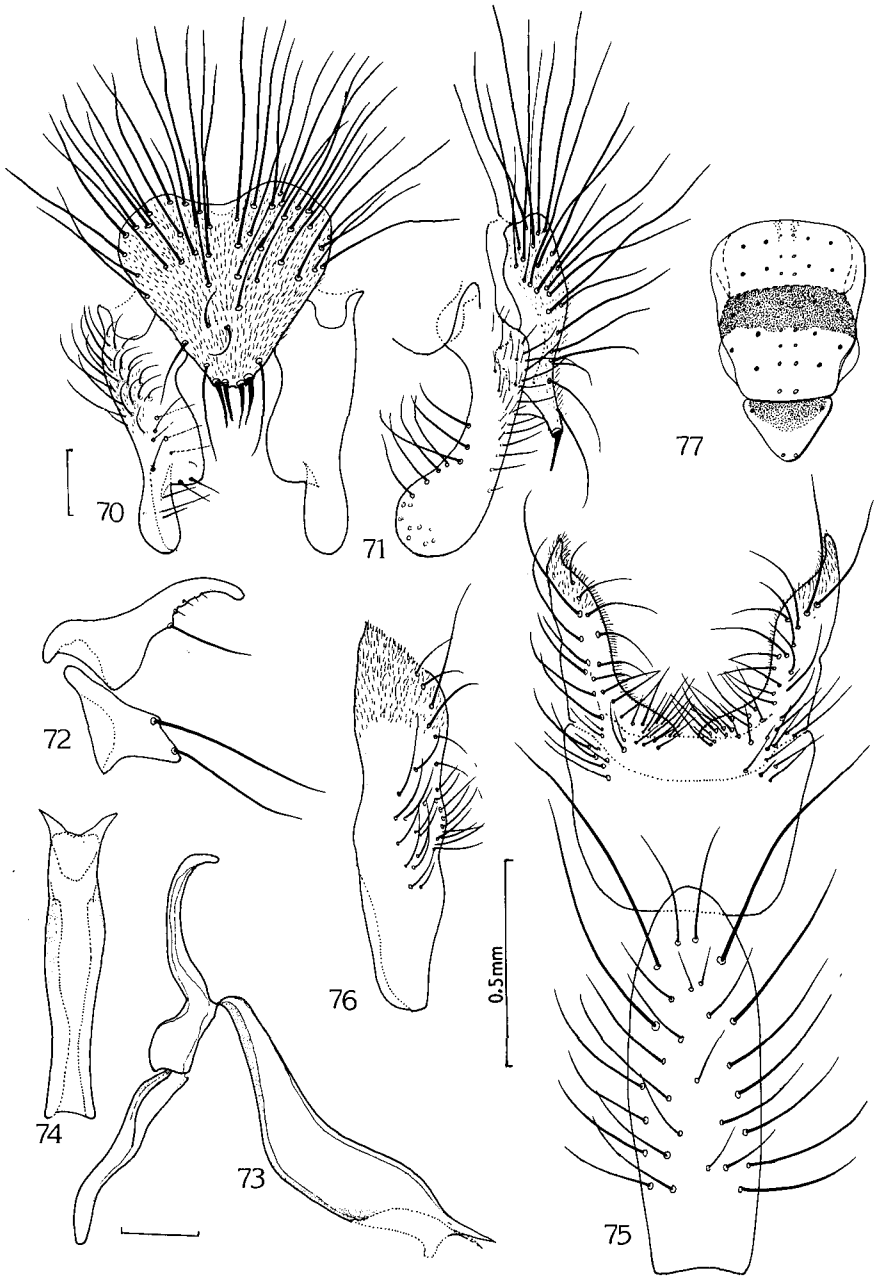
9. *Anthomyia luculenta* Ackland, sp. nov.
(Figs. 70-77)

Type material. Holotype ♂, *Indonesia*. Sulawesi Utara, 1780 m, 7-8. xi. 1985 (G. Musjat) (R. Ent. Soc. Lond., Project Wallace) (in BMNH).

Diagnosis. ♂. Large species, body length 8.5 mm. Palpi, humeri, femora and abdomen partly translucent yellow. Presutural spots on mesonotum absent. Sternite V (Figs. 75, 76) with pointed lobes and without a membranous projection on inner margins of lobes. Sternite VI without processes. Terminalia: surstylus (Fig. 70) with only weak setulae on inner lobe. Postgonite (Fig. 72) with simple seta; distiphallus (Fig. 73) without dorsal projection.

♂ head. Arista plumose, longest hairs on dorsal surface as long as width of A_3. Antennal segments dark grey, A_{1+2} very indistinctly orange in ground colour. A_3 long, reaching mouth margin. Head in profile nearly twice as high as long. Ocellar tubercle very small and with only minute, equally short hairs, no long setulae. Eyes on frons nearly touching, separated by diameter of *a* ocellus; the black interfrontalia obsolescent for a considerable distance, i.e. the black upper part consists of a minute black triangle not longer than ocellar tubercle, the lower part is also very constricted and hardly longer than lunule. Parafrontalia at level of lunule equal to width of A_3, white grey dusted. Only 2 pairs of frontal setae present, *if* apparently absent. Face flat, mouthmargin not projecting. Palpus dirty yellow, apex slightly darkened. Mentum of proboscis slightly longer than palpus, shining blackish brown. Jowls below eyes slightly wider than A_3. Occiput entirely grey dusted.

Thorax mainly densely whitish grey dusted, humerus translucent yellowish. Mesonotum (Fig. 77) with a narrow, black postsutural band reaching from suture to 2nd *post dcs*, margins hardly indented, laterally (viewed in profile) the crossband becomes indistinct between *pra, sa* and wing base. Pleura completely grey dusted, no darker areas. Scutellum with basal half black, this area not reaching lateral margins except at extreme base; about 8 lateral setulae. Presutural *acr* 3 pairs, weak, middle pair longer, rows almost as widely separated from each other as they



Figs. 70-77. *Anthomyia luculenta* sp. nov., ♂ : 70, cercal plate and surstylus, dorsal view ; 71, *ditto*, lateral view ; 72, pregonite and postgonite ; 73, aedeagus, lateral view ; 74, distiphallus, ventral view ; 75, sternite IV and V ; 76, sternite V, lateral view ; 77, mesonotum, dorsal view. Holotype ♂ from Indonesia, Sulawesi.

are from *dcs* rows. *pra* 1.4 times length of *post npl* and stronger. Propleuron hairy. Mesopleuron without stronger *a* setula. *stpl* 1+2.

Wings rather long in relation to body. Costal setulae very short, C.S. not differentiated, costa with *v* hairs. Squamae whitish, upper one with pale fringe, lower squama not projecting beyond upper.

Legs. All coxae, and approximately basal 2/3 to 3/4 of all femora yellow, contrasting with black apices, knees yellowish. Tibiae and tarsi black. t_1 with very short *ad* at middle, a longer *pv* slightly more distal. f_2 with 1 *a* seta at middle, and another *a* seta towards apex, no *av* ; 3-4 weak *pv* in basal half, longest at base. f_3 with a row of rather short and fine *av* and *pv*, not very differentiated from some long *v* and *pv* hairs. t_2 with a long strong *ad* at apical 2/3, this seta is longer than diameter of tibia ; 2 *pd* equally strong, 2 *pv*. t_3 with 3-4 *av*, 6-7 *ad* of unequal length, 2 *pd*, 6-7 *pv* of which 2-3 basal ones are longer than the rest.

Abdomen. Densely light grey dusted on tergites dorsally, ground colour basally at sides of tergites and sternites somewhat transparent yellow with thinner dust. Tergites III-V with a dark brownish black basal crossband, about 1/3 as long as tergites, middle produced caudad into a fainter narrow tapering point, viewed from behind almost reaching hind margin of tergites, but in dorsal and lateral view this mid stripe almost disappears. Side margins of basal bands not reaching sides of abdomen in dorsal view, except on tergite V. Pregenital sclerite shining brownish in ground colour, no trace of dust, and contrasting strongly with the densely dusted grey tergite V. Tergite VI hidden. Epandrium orange yellow, weakly dusted. Sternite V (Figs. 75, 76) largely orange yellowish in ground colour. Abdomen in dorsal view about 3 times as long as width at hind margin of tergites I+II ; tergites III and IV hardly narrower than tergites I+II, hence nearly parallel sided. Sternite IV (Fig. 75) long, narrowing to apical margin, no basal apodemes. Sternite V with long lobes, pointed at apices, no ventrally directed membranous projections, setae on inner margins more numerous near base of lobes.

♂ terminalia : cercal plate (Figs. 70, 71) as wide as long, apex bluntly rounded, with 4 flattened setulae ; setae on upper part rather long. Surstylus short, not much longer than cercal plate, inner lobe not very developed and with only weak setae. Distiphallus (Fig. 73) without dorsal projection. Postgonite (Fig. 72) drawn out into a long narrow apex, one simple seta at middle of hind margin ; pregonite with two long setae.

Body length 8.5 mm, wing length 8 mm.

♀ unknown.

Distribution. Known only from the holotype.

Remarks. This species seems to be most closely related to the *illocata* group, having a long sternite IV without basal apodemes. Sternite VI does not, however, have any median processes, which are present in *illocata* and *plumiseta*. The possession of flattened setulae at the apex of the cercal plate and the development of an inner lobe on the surstyli warrant its inclusion in *Anthomyia*.

Key to the species of Anthomyia in the Oriental Region

Males

1. Mesonotum with postsutural dark markings divided into separate spots, with a wide

greyish dusted area along lines of *dcs*. Arista with longest hairs not longer than diameter of base. Scutellum grey dusted medially, or at most (♂ *inda*) lateral dark spots weakly joined at base. ..... 2.

— Mesonotum with postsutural dark markings joined up into a continuous cross band, sometimes (*alishana*) strongly indented at line of *dcs* and only narrowly joined. Arista with hairs at least twice as long as basal diameter of arista, to nearly width of A_3. Scutellum either nearly all dark, or dark at base only, never with two lateral spots. ..... 3.

2. Mesonotum with lateral spots covering the area between *ia* seta and *pra* and *sa* setae (Fig. 35); supra-alar dark spot very small and not reaching to *sa* seta; presutural spots squarish (Fig. 34). Sternite V (Fig. 25) with inner basal margin of lobes dilated. Terminalia: cercal plate (Fig. 20) with apex hardly narrowed. Postgonite (Fig. 22) with widely expanded seta, inserted only slightly behind lower posterior angle of postgonite. ..... 4. *pluvialis* (L).

— Mesonotum with lateral spots with lower margin not reaching *pra* and *sa* setae, and supra-alar spot reaching to *sa* (or even *pra*) (Figs. 28, 29, 32); the grey area between these spots therefore lies between the *ia* and *sa* setae. Presutural spots roundish (Fig. 27). Sternite V (Fig. 13) with inner margin of lobes not dilated, concave. Terminalia: cercal plate (Fig. 11) with apex narrowly produced. Postgonite (Fig. 16) with less widely expanded seta set inside and well behind the produced lower posterior corner. ..... 3. *inda* Ackland and Pont

3. Palpi, humeri and femora largely yellow. Large species, 8.5 mm body length. Mesonotum (Fig. 77) with hardly discernible presutural markings. Sternite VI without processes. ..... (Indonesia, ♂ only known) 9. *luculenta* sp. nov.

— Palpi, humeri and femora dark. Smaller species, not more than 6.5 mm. Sternite VI with processes (Figs. 5, 10, 54, 61). ..... 4.

4. Mesonotum with foremargin of postsutural band straight, more or less following line of suture, and hind margin only slightly sinuate (Figs. 37, 38). Arista with hairing half to as wide as A_3. Sternite VI with median processes small and hairy (Figs. 5, 10). ..... 5.

— Mesonotum with foremargin of postsutural band indented, or most of mesonotum dark (Figs. 39, 41, 43, 46); hind margin strongly sinuate, or if not then reaching level of 3rd *post dcs*. Arista with hairs shorter, about twice width of arista at base. Sternite VI with median processes larger, not hairy (Figs. 54, 61). ..... 6.

5. Mesonotum with postsutural band brownish, hind margin not reaching to level of 2nd *post dcs* (Fig. 38). Scutellum only dark at base. Occiput below upper postocular setae grey dusted. Terminalia: distiphallus (Fig. 4) without basal dorsal projection; postgonite with a narrowly expanded seta. ..... 1. *illocata* Walker

— Mesonotum with postsutural band blackish, hind margin reaching to or past level of 2nd *post dcs* (Fig. 37). Scutellum mainly dark, only apex grey. Occiput blackish. Terminalia: distiphallus with a basal dorsal projection (Fig. 9); postgonite with a wide expanded seta. ..... 2. *plumiseta* Stein

6. Mesonotum (Fig. 43) viewed from above mainly blackish, postsutural band reaching to level of 3rd *post dcs*; presutural area mainly dark, with two pale boomerang shaped areas along lines of *prst acr*. Terminalia: as in *vittiventris*, see Figs. 56-62. ..... 7. *malaisei* sp. nov.

— Mesonotum (Fig. 41) with presutural dark patches surrounded by paler areas; postsutural band only reaching to level of 2nd *post dcs*. ..... 7.

7. Ground colour of thorax and legs orange brown, partly translucent, thorax with shifting thin greyish to orange brown dust. Presutural spots on mesonotum (Fig. 46) squarish and continuing to front of thorax. *pra* seta equal in length to *post npl*. Lower squama shorter, at most 2/3 as long as width at base. Terminalia: postgonite (Fig. 69) longer, with narrowly expanded seta. ..... 8. *perlucida* sp. nov.

— Ground colour of thorax and legs black with greyish dust. Presutural spots on mesonotum small (Fig. 39) or larger but not squarish (Fig. 41). Lower squama longer, as long as width at base. Terminalia: postgonite shorter (Figs. 55, 62), with only a simple seta. ..... 8.

8. Presutural spots of mesonotum small, narrow and elongated (Fig. 39); postsutural band

strongly indented, only narrowly joined at *dcs*. Scutellum pale at sides as well as apex. *pra* seta about 1.4 times as long as *post npl*. Sternite IV narrowing at apex (Fig. 51), with more numerous longer setae. Terminalia: surstylus (Figs. 47, 48) more densely hairy at base. Postgonite with lower posterior corner projecting as a lobe over insertion of 2-3 simple setae (Fig. 55); pregonite (Fig. 55) with the two setae inserted close together, lower one at middle of posterior margin. ..... 5. *alishana* sp. nov.

— Presutural spots of mesonotum larger, diamond shaped (Fig. 41); postsutural band not so strongly indented on fore and hind margins (Fig. 41). Scutellum with sides dark. *pra* seta about as long as *post npl*. Sternite IV (Fig. 58) with shorter, less numerous setae. Terminalia: postgonite (Fig. 62) with lower posterior corner not projecting, pregonite with the two setae not so close together, lower one below middle of posterior margin. ..... 6. *vittiventris* sp. nov.

Females*

1. Mesonotum with postsutural band divided into separate spots (Figs. 31, 40, 42). .... 2.
— Mesonotum with postsutural band continuous, not divided into spots. ..... 5.
2. Postsutural spots on mesonotum smaller (Fig. 28). Scutellum with central area pale from base to apex (Fig. 31). Arista with hairs not longer than diameter of base. ..... 3.
— Postsutural spots on mesonotum larger (Figs. 40, 42), scutellum mainly dark, only apex and lateral margins pale. Arista with hairs at least twice as long as diameter at base. ..4.
3. Scutellum (Fig. 31) with two small lateral dark roundish spots on disc. Presutural mesonotal spots (Fig. 31) small and round. Supra-alar spot above wing base (Fig. 32) larger, reaching to *sa* seta. ..... 3. *inda* Ackland and Pont
— Scutellum with lateral dark spots larger (as in Fig. 34 for ♂). (♀ *pluvialis* not known from India, key based on other material.) ..... 4. *pluvialis* (L.)
4. Presutural spots on mesonotum smaller (Fig. 40), posterior corners not reaching 2nd *prst dcs*. ..... 5. *alishana* sp. nov.
— Presutural spots on mesonotum larger (Fig. 41), posterior corners reaching to 2nd *prst dcs*. ..... 6. *vittiventris* sp. nov.
5. Arista with longest hairs about twice diameter of arista at base. Postsutural band emarginate on anterior and posterior margins (Fig. 44). ..... 7. *malaisei* sp. nov.
— Arista with total width of hairing at least half width of A_3. Postsutural band with foremargin straight (Figs. 37, 38). ..... 6.
6. Mesonotum with presutural spots larger and more distinct, postsutural band wider, reaching to or past level of 2nd *post dcs*, and black (Fig. 37). Scutellum mainly dark. Occiput black. ..... 2. *plumiseta* Stein
— Mesonotum with presutural spots absent, or very small and faint (Fig. 38). Postsutural band narrower, not reaching to level of 2nd *post dcs*, and brown (Fig. 38). Scutellum only dark at base. Occiput grey dusted. ..... 1. *illocata* Walker

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* ♀♀ of *perlucida* and *luculenta* unknown.

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