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Title	THE NIGRA GROUP OF PEGOMYA, WITH DESCRIPTIONS OF SIX NEW SPECIES FROM NEPAL (DIPTERA : ANTHOMYIIDAE)
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Citation	Insecta matsumurana. New series : journal of the Faculty of Agriculture Hokkaido University, series entomology., 53, 1-26
Issue Date	1997-03
Doc URL	https://hdl.handle.net/2115/9879
Type	departmental bulletin paper
File Information	53_p1-26.pdf



**THE NIGRA GROUP OF PEGOMYA, WITH DESCRIPTIONS
OF SIX NEW SPECIES FROM NEPAL
(DIPTERA : ANTHOMYIIDAE)**

By MASA AKI SUWA

Research Trips for Agricultural and Forest Insects in the Subcontinent of India,
Scientific Report No. 51.

Abstract

SUWA, M. 1997. The *nigra* group of *Pegomya*, with descriptions of six new species from Nepal (Diptera : Anthomyiidae). *Ins. matsum. n. s.* 53 : 1-26, 50 figs.

Pegomya nigra Suwa and its allies, nine species in total, are dealt with. *P. nigra* is known from East Asia (Japan and NE China) and North America. Two others, *P. emeinigra* Deng et Li and *P. dictenata* Deng et Li, both described from Sichuan, China, are newly recorded from Nepal. The remaining six species from Nepal are new to science. These species form a close group, here called the *nigra* group of *Pegomya*. This is closely related to the *versicolor* group of *Pegomya* widely distributed in the Holarctic region. The taxonomic position of the *nigra* group is discussed, and a cladogram for the members is given. It is suggested that the group originated and radiated in the Himalayan region, and that a part of the group has expanded through East Asia to North America.

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INTRODUCTION

Pegomya nigra Suwa, 1974, was originally described from Japan, and is now known from NE China (Fan et al., 1988) and North America (Griffiths, 1982). In my recent study I have recognized eight species from Nepal which should form a close group together with *nigra*. This is here called the *nigra* group of *Pegomya*. Two of the eight species, *P. emeinigra* Deng et Li, 1987, and *P. dictenata* Deng et Li, 1988, were described from Sichuan, China, and are here recorded from Nepal for the first time. The other six are new to science including the species formerly misidentified as *P. nigra* by Suwa (1977). In China, another species belonging to the *nigra* group, *P. aurivillosa* Fan et Chen, 1984, is known from Chinghai. However, no specimens of this species have been available for my study. No host plant of the group has been known except for the record of *Polygonum viviparum* L. for *Pegomya nigra* in Canada (Griffiths, l.c.). I have not yet succeeded in combining the female specimens at hand with the males except in the case of *P. nigra*, which is the only species of the group found in Japan. A study on the females will be given in another paper.

The specimens used here were mostly obtained in connection with the Research Trips for Agricultural and Forest Insects in the Subcontinent of India, 1983, and on my private trip, 1988. The specimens are deposited in the collection of the Laboratory of Systematic Entomology, Hokkaidô University, except for some duplicates in the Entomology Division, Agricultural Department, Nepal (EDAN).

THE NIGRA GROUP OF PEGOMYA

As pointed out by Griffiths (1982), *P. nigra* is placed close to the *versicolor* group of *Pegomya* (*Pegomya versicolor* superspecies after Griffiths, l.c.) in having some common characters, e.g., the surstyli with a pilose lobe at inner base, the postgonites with no distinct setae, and the distiphallus with strongly curled long paraphalli. The other species here recognized as members of the *nigra* group do not contradict but support his opinion.

This group is separated from the *versicolor* group in the male by the cercal plate distinctly narrowing caudad and not evenly bulged laterally, by the postgonites broadened on basal area and distinctly narrowing apicad, and by the 5th sternite with a group of long setae on each lateral side medially. Most of the known species of the *nigra* group have the 5th sternite with processes bare and club-shaped on apical part, and are easily determined as members of the group. In certain species of the group, the processes of the 5th sternite are only a little protruded apically, each being armed with a subapical tuft of setae. It is not easy to distinguish them from the *versicolor* group unless their genital structures are examined. It may, however, be worth mentioning that these species of the *nigra* group have the 5th sternite with outer setae well developed and much exceeding the tip of the processes and have the body not very densely pollinose. On the other hand, the members of the *versicolor* group have the 5th sternite with outer setae much less developed and not distinctly exceeding the processes, and have the body very densely pollinose.

The species of the *nigra* group are generally described as follows:

♂. Wing-length mostly 4-5 mm. Body including appendages blackish in ground colour with the exception of one species, *P. dictenata*, in which the mid and

hind femora are largely yellow. Head partly brownish in ground colour in some cases (probably due to teneral condition); haustellar mentum more or less pollinose. Mesonotum rather thinly to densely grey pollinose and barely to strongly tinged with brown, rarely with sharp vittae. Abdomen pale grey to brownish grey pollinose, with median vitta various in width; 5th sternite with processes shining on apical part. Wings tinged with dark brown, a little to much darker basally; calyptrae tinged with yellow, more or less brownish in some cases; halteres with knob yellow.

Eyes sparsely haired; frons narrower to wider than anterior ocellus, less than twice as wide as the ocellus even in the widest case; interfrontalia linear caudad, or interrupted by contiguous parafrontals, without *if* but with a few or some minute setulae scattered; some (3-5) strong and a few or some weak *ori*, mingled with a few or some fine or minute setulae; no *ors*; A_3 (3rd antennal segment) a little less to slightly more than twice as long as wide; arista distinctly pubescent, with longest hairs slightly shorter to a little longer, occasionally distinctly shorter, than basal diameter of arista; orbits at parafrontal angle slightly narrower to distinctly wider than A_3 ; cheeks up to about 0.3 times as high as eye, with genal setae usually arranged in 2 rows; epistoma in profile situated behind frons at lunule.

Mesonotum usually with 3 pairs of *pre-acr*, the rows being separated by a distance shorter than that to adjacent *dc*-rows, rarely with 1-2 setulae between the rows; posterior *ph* mostly well developed; *pra* well developed, usually as long as or longer than anterior *ntpl*; mesopleuron without a distinct anterior *mpl*; *stpl* 1:2, an additional fine or weak seta often discernible below the anterior and also below the posteriors; scutellum bare on dorsal surface medially, with a few or some setulae scattered towards lateral margins.

Abdomen depressed except on caudal segments, nearly parallel-sided or long-ovoid, and about twice as long as wide; 6th tergite not setose; 5th sternite with processes strongly protruded at apex inwards and club-shaped except in a few species, in which the processes are only a little protruded; with outer setae mostly well developed and concentrated medially, and with inner setae all short and grouped into basal patches and subapical tufts, although the subapical tufts of setae suppressed in the species with club-shaped processes; genital pouch with a small chitinized papilla medially and with a pair of membranous or chitinized sack-shaped processes by the side of the papilla; cercal plate expanded anterolaterally and distinctly narrowing distad; surstyli with a pilose lobe at inner base, and a setulose finger-like process on ventral side; distiphallus with acrophallus broadening apicad and with paraphalli strongly curled; pregonites basically a little constricted medially and obtuse-angled dorsoapically, always with a distinct seta ventroapically; postgonites broadened basally, with no distinct setae, at most with a few or some minute or micro setulae discernible by careful examination.

Mid femur with some distinct or strong *pv* on basal half, the basalmost one usually the longest though usually not the strongest, and with or without a small preapical *a* (or rather *ad*); f_3 with a row of some strong *av* except near base, usually mingled with a few or some weak ones, and with a few or some *pv* on basal half or two-thirds, 1 or a few near middle being strong; t_1 with 1 *ad* and 1 or sometimes 2 *pv*, the *ad* being short and weak, sometimes indistinguishable from anterodorsal ground setulae on apical fourth or third; t_2 with 1 *ad* (sometimes indiscernible), 1 (rarely 2) *pd* and usually 2 *p-pv*; t_3 with 1-2 (sometimes 3) *av*, usually 2 *ad* and

usually 2 *pd*, and with apical *pd* scarcely to a little developed and hardly to easily distinguishable from posterodorsal ground setulae on apcal fourth or third. Wings with costal thorns always shorter than *h*-vein, and only a little to distinctly stronger than costal spicules; *dm-cu* nearly straight or a little sinuate.

KEY TO THE SPECIES OF THE GROUP (MALES)

1. Fifth sternite with processes only a little protruded at apex inwards, and with a tuft of setae near apex of each process (cf. Fig. 40); surstyli with a conspicuously long twiggy projection developed just near the joining point of intercalary rod (cf. Figs. 41-42). 2
 - Fifth sternite with processes strongly protruded at apex inwards, and with no setae on apical half of each process (cf. Fig. 1); surstyli without a twiggy projection near the joining point of intercalary rod. 3
2. Legs largely yellow on mid and hind femora. 9. *dictenata* Deng et Li
 - Legs wholly blackish. 8. *ramularis* sp. nov.
3. Orbits with pollinosity wholly visible with head in dorsal view; mesonotum with posterior *ph* scarcely to a little developed and much weaker than the anterior, at most as long as ocellar setae. 4. *syabruui* sp. nov.
 - Orbits with pollinosity only partly visible with head in dorsal view, if largely visible, mesonotum with posterior *ph* well developed and as strong as the anterior. 4
4. Abdomen with median vitta broadly obsolescent on 2nd and 3rd, sometimes also on 4th, tergites posteriorly, and triangulate on these tergites anteriorly, sometimes entirely indiscernible on the 2nd; terminalia as in Figs. 12-16. 3. *acutangulata* sp. nov.
 - Abdomen with median vitta complete, at most narrowly interrupted near hind margins of tergites. 5
5. Frons narrower than anterior ocellus; parafrontals contiguous to each other; terminalia as in Figs. 23-27. 5. *kali* sp. nov.
 - Frons slightly narrower to distinctly wider than anterior ocellus; parafrontals separated from each other by linear interfrontalia. 6
6. Interfrontalia rather distinctly tinged with brown in pollinosity; surstyli with a setose oblique ridge developed dorsally. 7
 - Interfrontalia not or hardly tinged with brown in pollinosity; surstyli without a setose oblique ridge dorsally. 8
7. Terminalia as in Figs. 7-11; surstyli in dorsal view with inner process convex on inner margin; epiphallus arising from posterior end of basiphallus. 2. *subnigra* sp. nov.
 - Terminalia as in Figs. 1-6; surstyli in dorsal view with inner process straight on inner margin; epiphallus situated a little distant from posterior end of basiphallus. 1. *nigra* Suwa
8. Fore tibia with *pv* slightly more than three times as long as the tibial diameter at insertion point of the seta. Abdomen with median vitta narrower than tibial diameter; terminalia as in Figs. 28-33; surstyli with a horn-like projection developed dorsobasally. 6. *ceratostylata* sp. nov.
 - Fore tibia with *pv* less than three times as long as the tibial diameter at insertion point of the seta. Abdomen with median vitta wider than tibial diameter; terminalia as in Figs. 34-39; surstyli without a horn-like projection dorsobasally. 7. *emeinigra* Deng et Li

DESCRIPTIONS OF THE SPECIES

1. *Pegomya nigra* Suwa

(Figs. 1-6)

Pegomya nigra Suwa, 1974 : 201 ; Griffiths, 1982 : 40 ; Fan et al., 1988 : 341.

Material examined*. Japan. Nagano-ken : Mt. Yatsugatake, 8♂, 4♀, 19.vii.1970, & 1♂, 20.vii.1970 ; Tengu-dake, 2,400-2,600 m, Mt. Yatsugatake, 8♂, 1♀, 27. vi. 1989 ; Mikaburi-yama, 2,500-2,600 m, Mt. Yatsugatake, 1♂, 26.vi.1989 ; Mt. Senjō, 1♂, 10.vii.1971. Yamanashi-ken : Kusasuberi, 2,500-2,800 m, Mt. Kitadake, 3♂, 5-8. vii. 1989. Canada. Alberta : Mt. Cavell, 1,750 m, Jasper National Park, 1♂, ex larva in leaf-mine on *Polygonum viviparum* L., 18. viii. 1971 (G.C.D. Griffiths), emerged 1.v.1972. The Canadian specimen and one male from Mt. Yatsugatake (20. vii.1970) are preserved under the care of G.C.D. Griffiths, University of Alberta.

The Canadian specimen agrees well with the Japanese ones at hand. A redescription based on the Japanese material is given as follows :

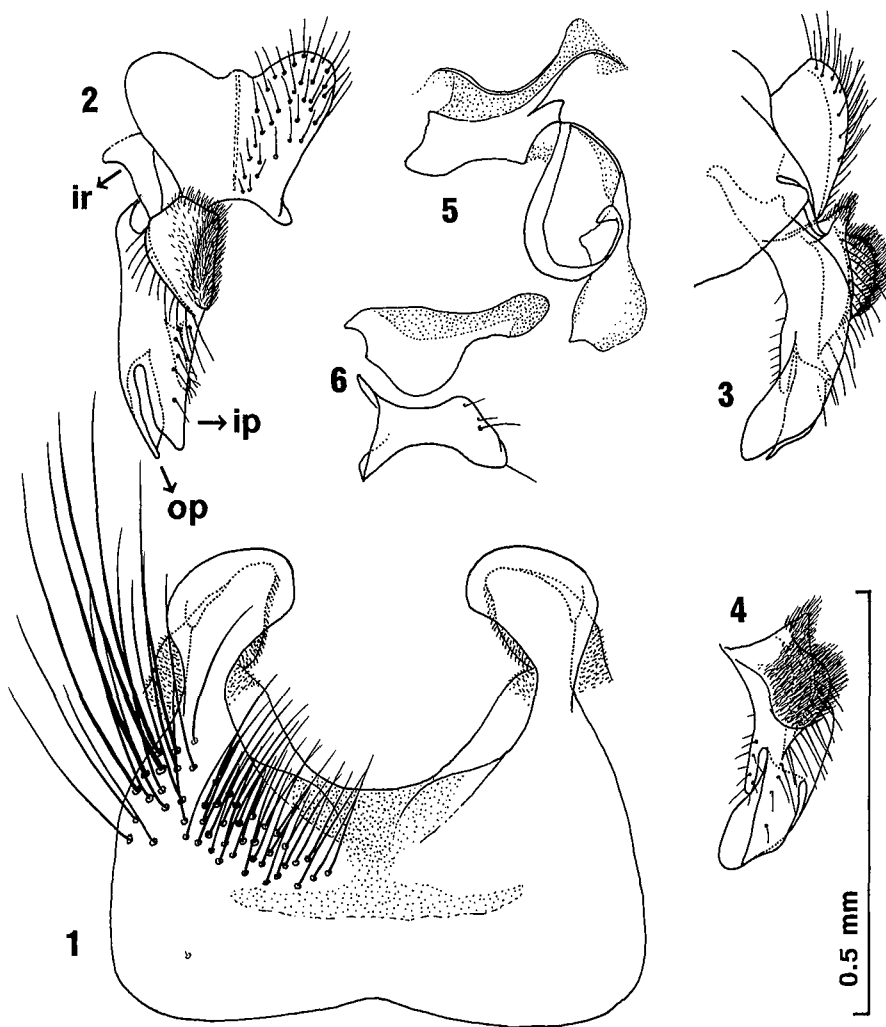
♂. Wing-length 4.1-5 mm. Interfrontalia and cheeks pale brownish grey pollinose ; orbits (parafrontals and parafacials) black in most angles of view, with brownish pollinosity discernible in some lights, paler on parafacials. Mesonotum rather thinly pale bluish grey pollinose, slightly or faintly tinged with brown ; obscurely vittate, in frontal angle of view darkened laterally, often with broad and obscure paramedian vittae discernible between rows of *dc* and *acr* behind suture ; in caudal angle of view broadly and obscurely darkened laterally, with a rather broad median vitta visible, sharply margined before suture, and with sublateral vittae scarcely to rather distinctly visible between rows of *dc* and *ia* behind suture. Abdomen dull grey pollinose, a little to strongly tinged with brown ; median vitta narrow, less than tibial diameter, rarely wider than that ; 5th sternite with processes shiny black. Wings tinged with dark brown, much darkened basally ; calyptrae tinged with yellow, strongly on margin.

Head 1.2-1.3 times as high as long ; frons slightly narrower to a little wider than anterior ocellus ; interfrontalia linear caudad, not interrupted ; parafrontals with some (3-5) strong and a few or some weaker *ori*, usually mingled with a few or some very fine or minute setulae ; A_3 1.7-2.1 times as long as wide ; arista with longest hairs as long as, or slightly shorter than, basal diameter of arista ; orbits (measured at parafrontal angle) as wide as to a little wider than A_3 ; cheeks a little higher than orbital width, and 0.25-0.32 times as high as eye, with genal setae arranged in 2 or 3 rows.

Mesonotum with usually 3 pairs of *pre-acr*, distance between the rows at 1st pair shorter than that to adjacent *dc*-rows, sometimes half of the latter ; posterior *ph* well developed ; *pra* usually longer than anterior *ntpl* ; *stpl* 1 : 2, if 2 : 3, the lower anterior being fine and the lowest posterior much weaker than the uppers.

Abdomen with terminalia as in Figs. 1-6 ; 5th sternite with processes strongly protruded at apex inwards and club-shaped, and with no setae on apical half of each

* The specimens were collected by myself unless otherwise stated.



Figs. 1-6. *Pegomya nigra* Suwa, ♂. 1, 5th sternite; 2, hypopygium, dorsal view, ip, inner process, ir, intercalary rod, op, outer process; 3, ditto, lateral view; 4, right surstylus, inside view; 5, basiphallus and distiphallus; 6, pregonite and postgonite. Mt. Yatsugatake.

process; genital pouch with sack-shaped processes membranous; surstyli with an oblique ridge developed on dorsal surface, deeply sunk outside the ridge, with a series of setae arising from underside of the brim of ridge, and with a pilose lobe developed at inner base, this pilose lobe expanded dorsally, then declining and stretching outwards to the ridge; epiphallus situated at a short distance from posterior end of basiphallus.

Mid femur with 4-7 *pv* on basal half, longest one 1.3-1.8 times as long as height of the femur, and with preapical *a* weak, sometimes indistinguishable from adjacent setulae; f_3 with 5-8 strong *av* except near base, and with some (4-5) *pv* on basal half

or more, a few *pv* near middle being strong, the longest one 1.5-2 times as long as height of the femur ; t_1 with 1 small *ad* and 1 or sometimes 2 *pv* ; t_2 with 1 *ad*, 1 or rarely 2 *pd* and 2 or sometimes 3 *p-pv* ; t_3 with 1 or often 2 (rarely 3) *av*, 2 *ad* and 2 *pd*, and with apical *pd* rather well developed. Wings with costal thorns slightly to distinctly stronger than costal spicules, often more than 1.5 times, yet less than twice, as long as the latter.

♀. Head yellow to orange yellow in ground colour and whitish in pollinosity on interfrontalia, lower half of parafrontals, face, parafacials, cheeks and parastomal area, being darker on interfrontalia near ocellar triangle and on face. Other parts of the body blackish in ground colour and densely covered with bluish grey and slightly brownish pollen. Mid and hind femora yellow, with apical fifth darkened. Wings yellowish at base.

Head 1.1-1.2 times as high as long ; frons 0.41-0.45 times as wide as head ; interfrontalia about 0.6 times as wide as frons, without *if* ; 3 *ors* (2 on left parafrontal in one specimen) ; 2-3 strong *ori*, mingled with 1 or a few fine or minute setulae ; orbits 1.2-1.3 times as wide as A_3 ; cheeks slightly higher than orbital width, and as high as or slightly higher than one-third eye-height, with genal setae much weaker than in male, in 1 or 2 rows.

Mesonotum with posterior *ph* fine to rather well developed ; *stpl* 1 : 2, the lower posterior less developed than in male.

Femora with setae weaker than in male ; f_2 with preapical *a* distinct ; t_1 and t_2 with *ad* much stronger than in male. Wings with costal thorns distinctly stronger than costal spicules.

Remarks. This species has been recorded from mountainous areas in Japan (central Honshū), NE China (Jilin), and NW North America (Alberta, British Columbia, Yukon Territory, and Alaska), where no other species of the *nigra* group are known to occur. In most external features *P. nigra* is very similar to the succeeding *subnigra*. If specimens are not given their localities, it is not easy to identify them unless their genital structures are examined. The costal thorns may be helpful to recognize *nigra* when the thorns are small and less than 1.5 times as long as the adjacent costal spicules.

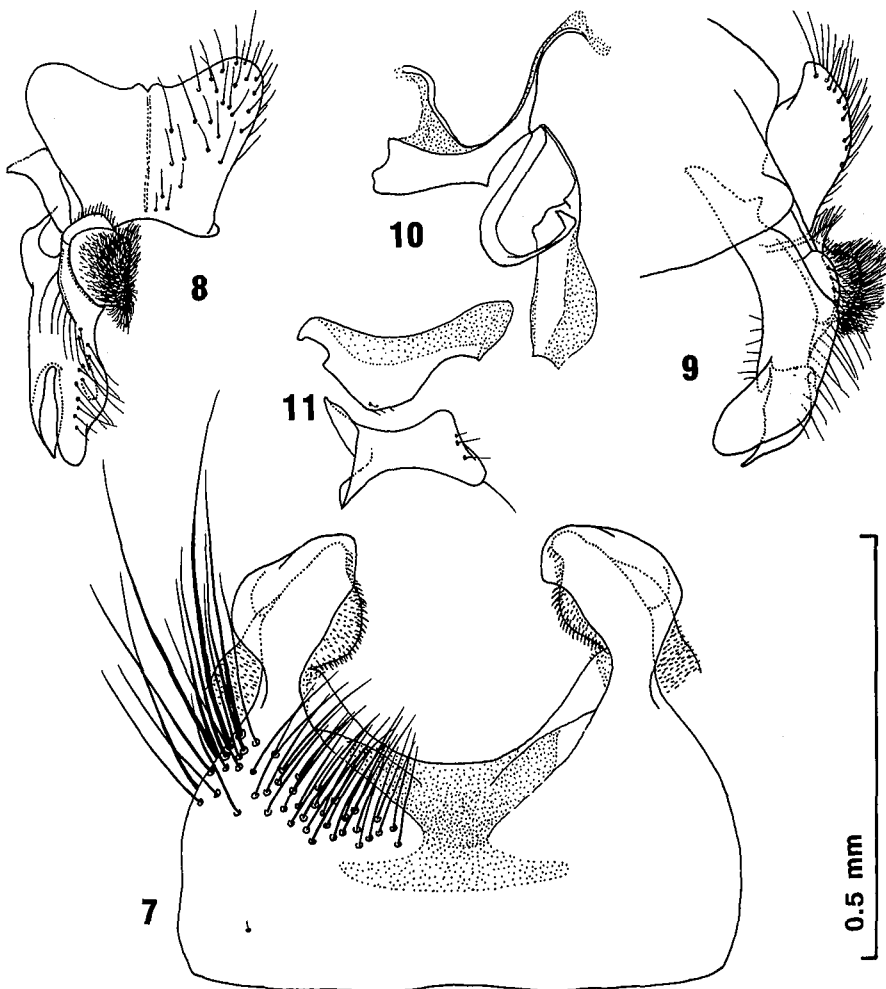
2. *Pegomya subnigra* sp. nov.

(Figs. 7-11)

"*Pegomya nigra* Suwa, 1974" : Suwa, 1977 : 47

Type material. Nepal. Bagmati : Sing Gompa - Gosainkund, 3,700-4,300 m, 1♂, 24.v.1988 ; Gosainkund, 4,300 m, 1♂, 4.vi.1968 (T. Kumata) ; Ghopte - Gosainkund, 3,500-4,000 m, 7♂ (one the holotype), 25.v.1988 ; Thare Pati, Gosainkund Lekh, 5♂, 6.vi.1968 (T. Kumata) ; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 2♂, 27.v.1988. Two paratypes from Ghopte - Gosainkund are deposited in EDAN.

♂. Similar to *nigra*. Wing-length 3.9-4.7 mm. Mesonotum in caudal angle of view with sublateral vittae almost always visible between rows of *dc* and *ia* behind suture.



Figs. 7-11. *Pegomya subnigra* sp. nov., ♂. 7, 5th sternite; 8, hypopygium, dorsal view; 9, ditto, lateral view; 10, basiphallus and distiphallus; 11, pregonite and postgonite. Holotype from Ghopte - Gosainkund (Figs. 8-11), and paratype from Thare Pati (Fig. 7).

Frons distinctly wider than anterior ocellus in most specimens; interfrontalia usually more than half as wide as anterior ocellus; orbits 1.1-1.4 times as wide as A_3 . Mesonotum with rows of *pre-acr* separated from each other at 1st pair by a distance about half as long as that to adjacent *dc*-rows, or sometimes by a slightly longer distance.

Abdomen with terminalia as in Figs. 7-11; surstyli in dorsal view with inner process convex on inner margin, and with another ridge developed inside the setose oblique ridge and demarcating the pilose inner basal lobe; epiphallus arising from posterior end of basiphallus.

Mid femur with longest *pv* 1.4-1.9 times as long as height of the femur; f_3 with longest *pv* 1.4-1.9 times as long as height of the femur; t_1 with 1 small *ad* and 1 *pv*;

t₂ with 1 *ad* (sometimes indiscernible), 1 *pd* and 2 (rarely 1) *p-pv*; t₃ with 1 or sometimes 2 *av*, 2 *ad* (only 1 on right leg in one specimen), and 2 *pd* (3 on left leg in one specimen). Wings with costal thorns distinctly stronger than costal spicules, and more than 1.5 times, sometimes twice or more, as long as the latter.

Remarks. In general appearance *P. subnigra* is very similar to the preceding *nigra*, and the resemblance in the surstyli indicates the close relationship between the two. In having the epiphallus at posterior end of the basiphallus, *subnigra* is similar to the succeeding *acutangulata* rather than to *nigra*.

3. *Pegomya acutangulata* sp. nov.

(Figs. 12-16)

Type material. Nepal. Bagmati: Ghopte - Gosainkund, 3,500-4,000 m, 2♂ (one the holotype), 25.v.1988; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 4♂, 27.v.1988. One specimen from Magen Gotha - Thare Pati is deposited in EDAN.

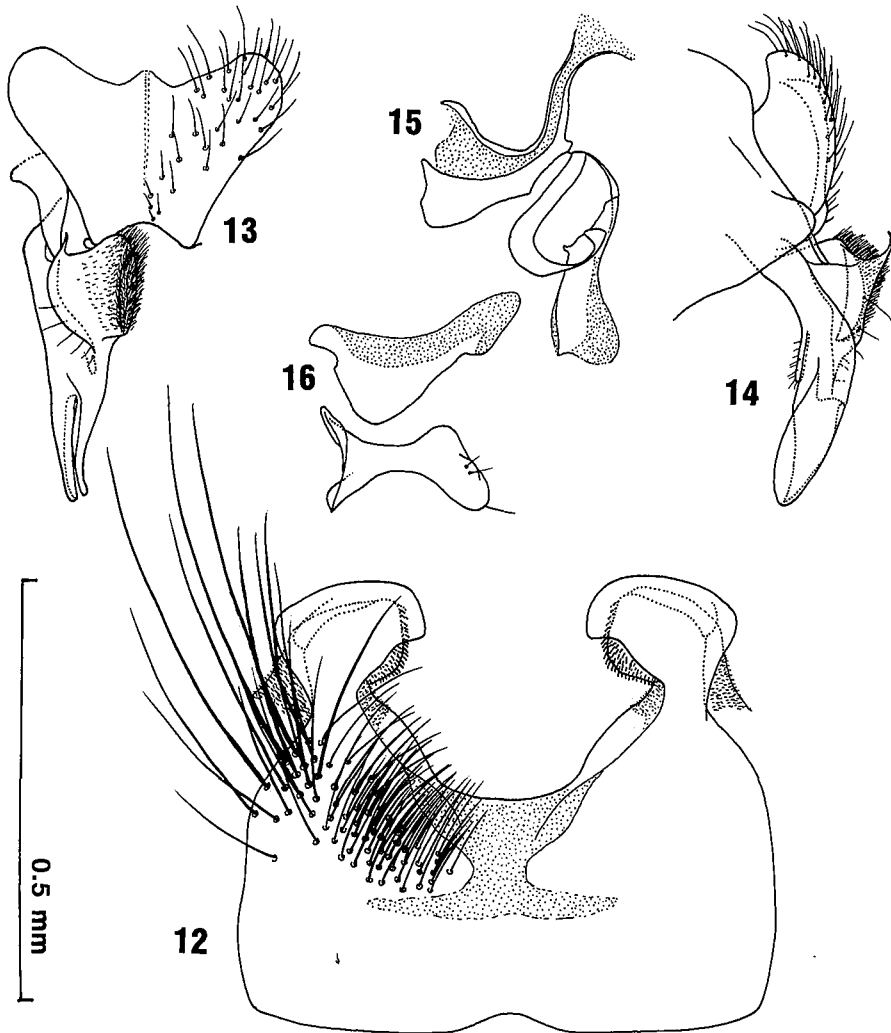
♂. Resembling *subnigra*. Wing-length 4.3-4.7 mm. Interfrontalia and cheeks pale to dull grey or pale brownish grey in pollinosity; parafacials pale brownish grey to brownish grey in pollinosity. Abdomen with median vitta broadly obsolete on 2nd and 3rd, or also on 4th, tergites posteriorly, and triangulate on these tergites anteriorly, sometimes entirely indiscernible on the 2nd; almost complete on 5th, usually also on 4th, tergite, and moderate in width, not narrower than tibial diameter.

Frons a little narrower than anterior ocellus, and parafrontals contiguous, but in one specimen, frons slightly wider than anterior ocellus and interfrontalia linear caudad; arisal hairs shorter than basal diameter of arista; orbits as wide as to a little wider than A₃. Mesonotum with rows of *pre-acr* separated from each other at 1st pair by a distance 0.5-0.8 times as long as that to adjacent *dc*-rows; *pra* as long as or longer than anterior *ntpl*.

Abdomen with terminalia as in Figs. 12-16; surstyli with an additional dorsal ridge not developed, the area between pilose inner lobe and dorsal oblique ridge much broadened and acutely hooked anterolaterally, and apical (inner and outer) processes almost contiguous to each other, and with a sparse series of short setae along oblique ridge and no setae beyond the ridge.

Mid femur with 6-8 *pv* on basal half, longest one 1.4-1.7 times as long as height of the femur; f₃ with longest *pv* 1.1-1.6 (1.9 in one specimen) times as long as height of the femur; t₂ with no *ad* (a small one discernible in two specimens), 1 *pd* and 2 (only 1 in one specimen) *p-pv*; t₃ with 1 or 2 *av*, 2 *ad* and 2 *pd*, and with apical *pd* weak. Wings with costal thorns hardly stronger than costal spicules.

Remarks. This species is rather easily distinguishable from others by having the unique median vitta on the abdomen. Judging from the setose oblique ridge on the surstyli and the similar shape of the aedeagus, *P. acutangulata* may be most closely related to *subnigra* among the known species of the group. The surstyli with an acute hook on the anterior end of the oblique ridge are unique to *acutangulata*.



Figs. 12-16. *Pegomya acutangulata* sp. nov., ♂. 12, 5th sternite; 13, hypopygium, dorsal view; 14, ditto, lateral view; 15, basiphallus and distiphallus; 16, pregonite and postgonite. Paratypes from Magen Gotha - Thare Pati (12-14), and Ghopte - Gosainkund (15-16).

4. *Pegomya syabru* sp. nov.

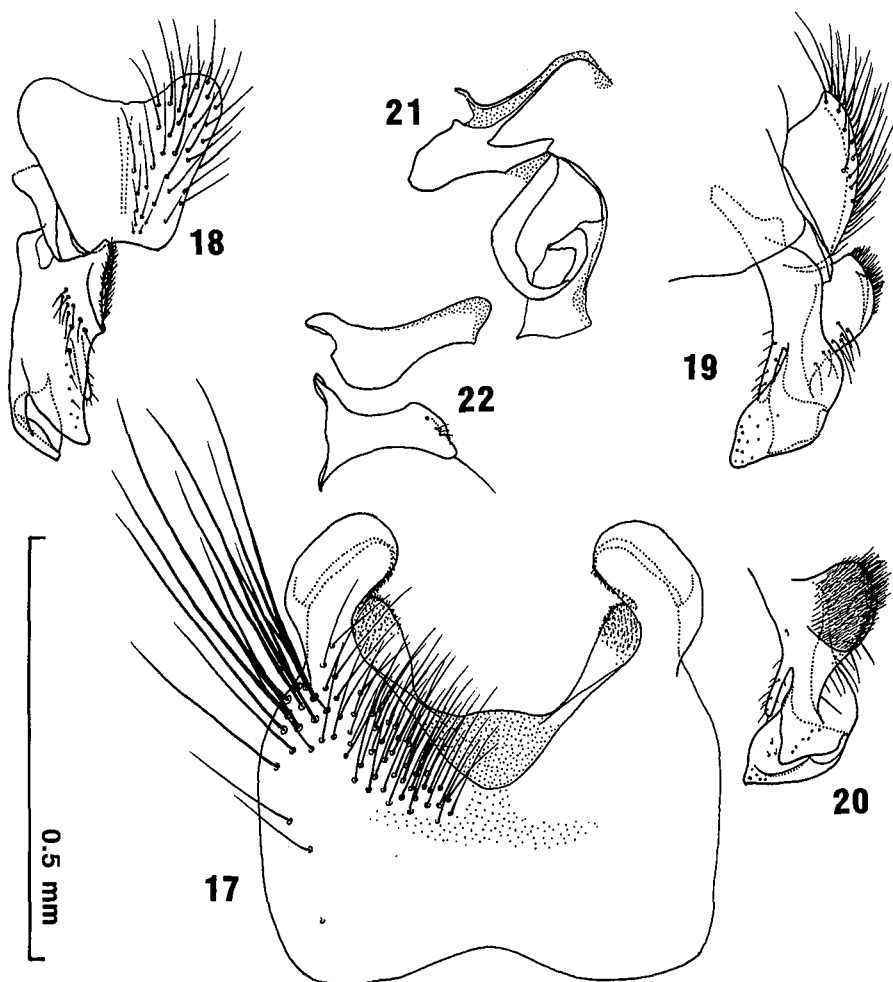
(Figs. 17-22)

Type material. Nepal. Bagmati: Dunche - Syabru, 1,800-2,300 m, Gosainkund Lekh, 3♂ (one the holotype), 10.ix.1983; Syabru - "Lama Hotel", 1,700-2,500 m, Langtang Valley, 2♂, 11 & 20.ix.1983. One paratype from Dunche - Syabru deposited in EDAN.

Much differing from *subnigra* in having the body densely pollinose and sparsely

setulose.

♂. Wing-length 4.5-5 mm. Interfrontalia in ground colour brownish near lunule (in one specimen) to entirely blackish, and in pollinosity whitish grey, with or without a faint brownish tinge; orbits partly dark brown to entirely blackish in ground colour, and densely pale grey pollinose though brownish pollinose on parafrontals above the lowest *ori*; cheeks brown to dark brown in ground colour, and densely pale grey pollinose. Thorax on pleura densely covered with pale grey and more or less bluish pollen, which is slightly tinged with brown; mesonotum densely brownish grey pollinose, paler peripherally; obscurely vittate, in frontal angle of view darkened behind suture laterally; in caudal angle of view, before suture with a rather narrow median vitta along rows of *acr*, and broad lateral patches outside



Figs. 17-22. *Pegomya syabru* sp. nov., ♂. 17, 5th sternite; 18, hypopygium, dorsal view; 19, ditto, lateral view; 20, right surstylus, inside view; 21, basiphallus and distiphallus; 22, pregonite and postgonite. Holotype from Dunche - Syabru.

rows of *dc*, and behind suture with a broad median vitta between rows of *dc*, rather narrow sublateral vittae between rows of *dc* and *ia*, and broad lateral patches outside rows of *ia*. Abdomen brownish grey pollinose, darkening caudad, with median vitta rather broad and obscurely margined, wider than tibial diameter. Legs dark brown rather than black. Wings tinged with dark brown, not much darkened basally; calyptrae tinged with brown.

Head 1.27-1.38 times as high as long; frons slightly narrower (slightly wider in one specimen) than anterior ocellus; interfrontalia linear caudad, or interrupted by contiguous parafrontals; some (3-5) strong and a few or some weaker *ori*, mingled with a few fine or minute setulae; A_3 1.8-1.9 times as long as wide; arista with the longest hairs as long as, or slightly longer than, basal diameter of arista; orbits as wide as A_3 ; cheeks distinctly higher than orbital width, and 0.21-0.24 times as high as eye, with genal setae arranged in 1 or 2 rows.

Mesonotum with 3 pairs of *pre-acr* (4 setae on left row in one specimen), the rows separated from each other by a short distance at most half as long as that to adjacent *dc*-rows; posterior *ph* scarcely to a little developed, at most as long as ocellar setae; *pra* as long as to distinctly longer than anterior *ntpl*; *stpl* 2:3, the lower anterior being fine and the lowest posterior much weaker than the uppers.

Abdomen with terminalia as in Figs. 17-22; genital pouch with sack-shaped processes membranous; surstyli with oblique ridge not developed, and without a hook-like or horn-like projection dorsobasally; epiphallus rather distant from posterior end of basiphallus.

Mid femur with 3-4 strong *pv* on basal third, and with or without 1 or a few weak *pv* in basal half, the longest one as long as or a little longer than height of the femur, and with preapical *a* distinct (absent on left leg in two specimens); f_3 with 3-5 strong *av* except near base, mingled with a few or some weak ones, and with 1 rather weak *pv* near base and 1 strong *pv* near basal third (1 more strong *pv* visible near middle on right leg in one specimen), and with or without 1 or a few rather weak *pv* in basal third or half, the longest one 1.1-1.5 times as long as height of the femur; t_1 with 1 small *ad* and 1 *pv*; t_2 with 1 *ad*, 1 *pd* and 2 *p-pv*; t_3 with 2 (only 1 on one leg in two specimens) *av*, 2 (3 in one specimen) *ad* and 2 *pd*, a rather strong *p* present on right leg in one specimen, and with apical *pd* fine or weak. Wings with costal thorns distinctly stronger than costal spicules.

Remarks. The densely pale grey pollinose orbits and the fine or weak posterior *ph* are characteristic of *P. syabruui*. The surstyli without an oblique dorsal ridge and the shapes of the pregonites and postgonites of this species might be suggestive of a closer relationship to the succeeding *kali* than to others.

5. *Pegomya kali* sp. nov.

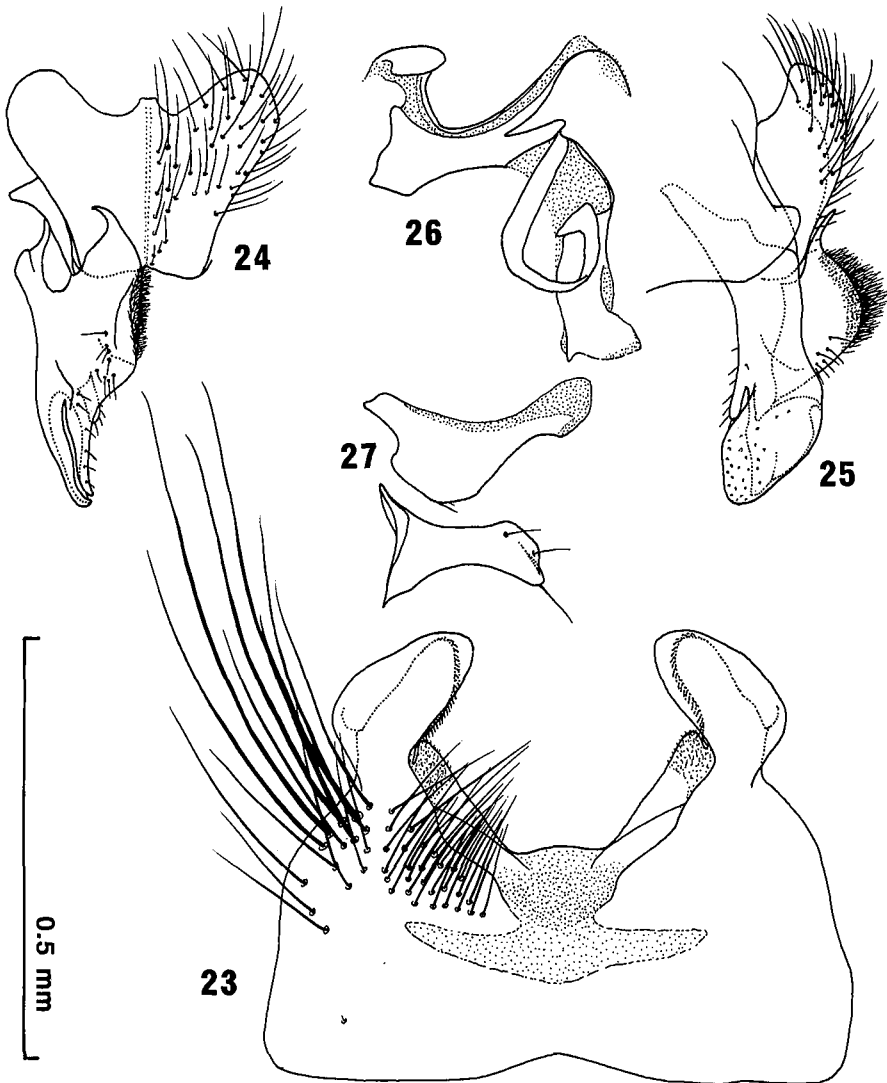
(Figs. 23-27)

Type material. Nepal. Bagmati: Sing Gompa - Gosainkund, 3,300-3,700 m, 1♂, 24.v.1988; Dadakharka - Ghopte, 3,300-3,600 m, Gosainkund Lekh, 56♂ (one the holotype), 26.ix.1983; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 11♂, 27.v.1988. Five paratypes from Dadakharka - Ghopte are preserved in EDAN.

♂. Resembling *subnigra*. Wing-length 4.1-4.9 mm. Interfrontalia whitish

grey to pale brownish grey pollinose; cheeks dull grey or pale brownish grey in pollinosity, rarely whitish. Abdomen brownish grey pollinose, darker caudad; median vitta usually broad and wider than tibial diameter.

Frons narrower than anterior ocellus, about half width of the latter in most specimens; interfrontalia usually interrupted by contiguous parafrontals; orbits at most as wide as, usually a little narrower than, A_3 ; cheeks 0.2-0.25 times as high as eye. Mesonotum with 3 or rarely 4 pairs of *pre-acr*, distance between the rows at 1st pair usually a little longer than a half of that to adjacent *dc*-rows.



Figs. 23-27. *Pegomya kali* sp. nov., ♂. 23, 5th sternite; 24, hypopygium, dorsal view; 25, ditto, lateral view; 26, basiphallus and distiphallus; 27, pregonite and postgonite. Holotype from Dadakharka - Ghopte.

Abdomen with terminalia as in Figs. 23-27; genital pouch with sack-shaped processes chitinized; surstyli with oblique ridge not developed, with a horn-like projection dorsobasally, with apical processes close to each other, and with inner basal lobe pilose only along dorsal margin inside; epiphallus more or less distant from posterior end of basiphallus, with lamella swollen anteriorly.

Mid femur with 5-8 *pv* on basal half, the longest *pv* 1.1-1.5 times as long as height of the femur; f_3 with longest *pv* 1-1.4 times as long as height of the femur; t_1 with 1 small *ad* and 1 or sometimes 2 *pv*; t_2 with 1 *ad* (small, and sometimes hardly discernible), 1 (rarely 2) *pd* and 2 (sometimes 3) *p-pv*; t_3 with 1 or 2 (rarely 3) *av*, 2 *ad*, and 2 (rarely 3) *pd*. Wings with costal thorns slightly to distinctly stronger than costal spicules, rarely twice as long as the latter.

Remarks. At a glance this species is similar to *subnigra*. The narrow frons, contiguous parafrontals, narrow orbits, and broad abdominal median vitta are useful to identify *P. kali*. The dorsobasal horn-like projection on the surstyli is common to *kali* and the following *ceratostylata*, from which the former is, however, much different in the structure of the aedeagus.

6. *Pegomya ceratostylata* sp. nov.

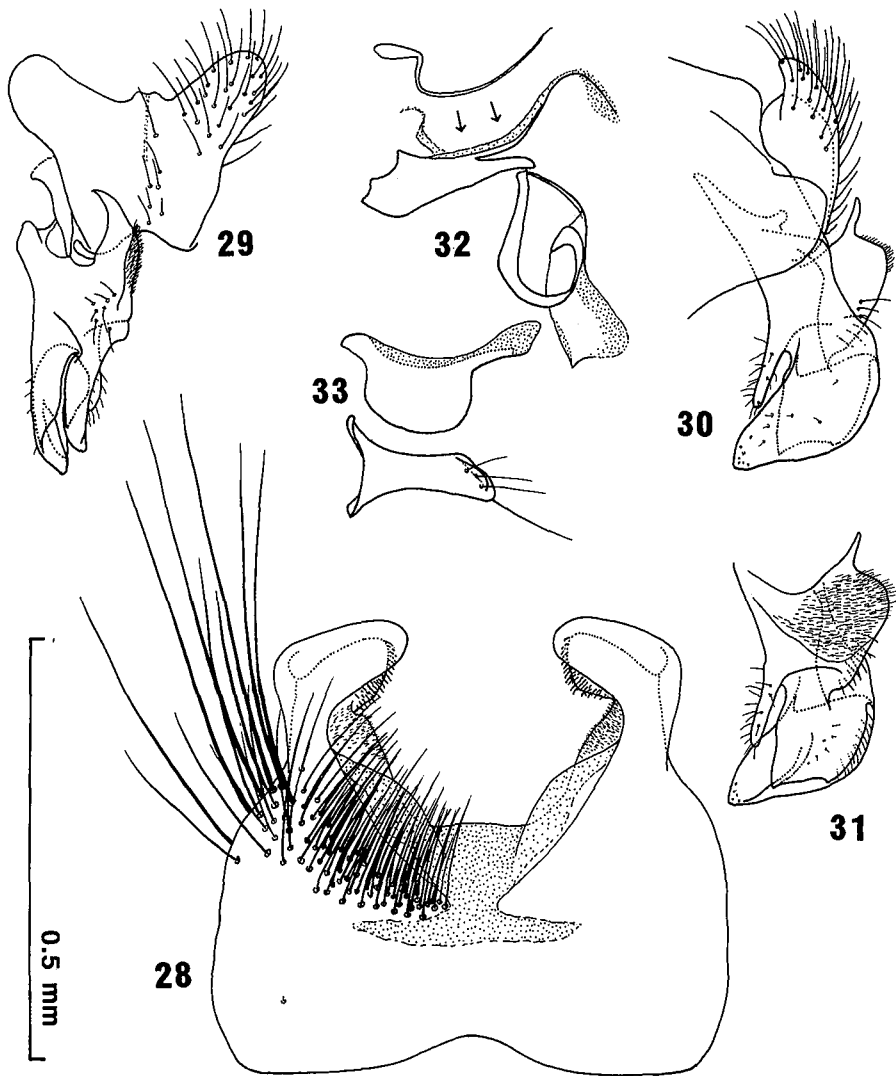
(Figs. 28-33)

Type material. Nepal. Bagmati: Ghopte - Gosainkund, 3,500-4,000 m, 1♂ (holotype), 25.v.1988; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 1♂, 27.v.1988.

♂. Wing-length 4.8-4.9 mm. Head brownish in ground colour largely on interfrontalia and cheeks and anteriorly on orbits (probably due to the rather teneral condition); interfrontalia and cheeks whitish or pale grey pollinose; orbits with brownish pollinosity visible in some lights. Mesonotum rather thinly pale bluish grey pollinose, scarcely tinged with brown; obscurely vittate, in frontal angle of view broadly darkened behind suture between rows of *dc* and *acr* and laterally; in caudal angle of view, before suture with a short median vitta anteriorly and broad patches laterally, and behind suture with a median vitta, sublateral vittae and lateral patches discernible at low angle of view. Abdomen pale bluish grey pollinose, slightly tinged with brown; median vitta sharp, and narrower than tibial diameter. Wings tinged with dark brown, much darkened basally; calyptreae tinged with yellow, strongly on margin.

Head about 1.2 times as high as long; frons as wide as or a little wider than anterior ocellus; interfrontalia linear caudad, not interrupted; parafrontals with 3-4 strong and some weaker *ori*, mingled with a few or some fine setulae; A_3 about twice as long as wide; arista with the longest hairs slightly shorter than basal diameter of arista; orbits as wide as or a little wider than A_3 ; cheeks a little higher than orbital width, and 0.28-0.29 times as high as eye, with genal setae arranged in 2 rows.

Mesonotum with 3 pairs of *pre-acr* (2 setae on left row in the paratype), distance between the rows at 1st pair about 0.6 times as long as that to adjacent *dc*-rows; posterior *ph* well developed; *pra* longer than anterior *ntpl*; *stpl* 1:2, additionally with 1 or 2 fine setae discernible below the anterior and 1 rather distinct seta below



Figs. 28-33. *Pegomya ceratostylata* sp. nov., ♂. 28, 5th sternite; 29, hypopygium, dorsal view; 30, ditto, lateral view; 31, right surstylus, inside view; 32, basiphallus and distiphallus; 33, pregonite and postgonite. Paratype from Magen Gotha - Thare Pati.

the posteriors.

Abdomen with terminalia as in Figs. 28-33; genital pouch with sack-shaped processes membranous; surstyli with oblique ridge not developed, and with a horn-like projection developed dorsobasally; basiphallus in lateral view constantly narrowing distad, with ventral margin nearly straight in main part; pregonite nearly parallel-sided on dorsal and ventral lines, with a few rather distinct setae apart from a distinct seta on ventral apex; postgonite much broadened on main part, with much narrowed apex.

Mid femur with about 5 *pv* on basal half, longest one 1.6 times as long as height of the femur (holotype), and with preapical *a* weak, easily or barely distinguishable from adjacent setulae; f_3 with a row of 5 strong and a few weaker *av* except near base, and with 1 *pv* near base and 2-3 *pv* on median third, the longest one 1.4 times as long as height of the femur; t_1 with 1 small *ad* (hardly discernible on left leg in paratype) and 1 long *pv*, the latter slightly more than three times as long as the tibial diameter at insertion point of the seta; t_2 with 1 *ad*, 1 *pd* and 2 *p-pv*, the *ad* being rather well developed; t_3 with 1-2 *av*, 2 *ad* and 2 *pd*, and with apical *pd* fine. Wings with costal thorns small though distinctly stronger than costal spicules.

Remarks. The aedeagus of this species is quite similar to, though, of course, differing in some details from, that of *emeinigra*, and distinctly different from those of any other known species. The two species are undoubtedly closely related to each other. Only a few specimens are now available for each species. If the *pv* on the fore tibiae is stable in the degree of development, the length of the seta may be a good character in identification.

7. *Pegomya emeinigra* Deng et Li

(Figs. 34-39)

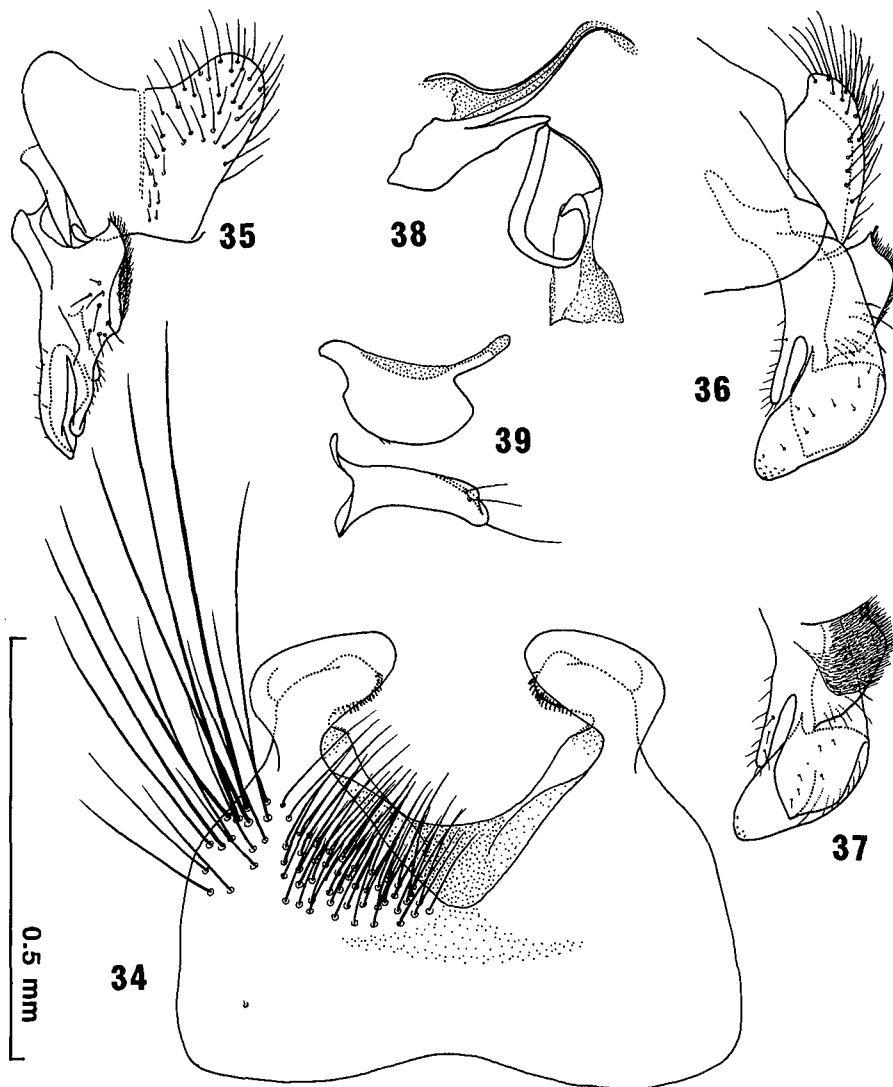
Pegomya emeinigra Deng et Li in Deng et al., 1987: 93.

Material examined. Nepal. Bagmati: Ghora Tabela - Langtang, 3,000-3,400 m, 1♂, 19.v.1988; Dadakharka - Ghopte, 3,300-3,600 m, Gosainkund Lekh, 1♂, 26. ix.1983; Dadakharka - Kutumsang, 3,000-3,200 m, Helambu, 1♂, 26.ix.1983.

♂. Wing-length 4.8-5.3 mm. Resembling the preceding *ceratostylata*, a little more densely pollinose. Interfrontalia and cheeks whitish or pale grey pollinose; orbits brownish pollinose, becoming paler ventrad. Mesonotum rather densely pale bluish grey pollinose, faintly to rather distinctly tinged with brown; in frontal angle of view obscurely or rather sharply darkened laterally especially behind suture, and with or without a pair of broad dark patches covering rows of *dc* and *acr* on posterior third of postsutural area; in caudal angle of view, before suture with a median vitta almost entirely and broad patches laterally, and behind suture hardly vittate or with a broad and obscure median vitta, narrow and sharp sublateral vittae and obscure lateral patches. Abdomen pale bluish grey pollinose, more or less tinged with brown, darker caudad; median vitta sharp and moderate in width, wider than tibial diameter. Wings tinged with dark brown, much darkened basally; calyptres tinged with yellow.

Head about 1.3 times as high as long; frons as wide as or a little narrower than anterior ocellus; interfrontalia linear caudad; parafrontals with 3-4 strong and some weak *ori*, mingled with some fine setulae; A_3 1.8-2 times as long as wide; arista with the longest hairs as long as or slightly longer than basal diameter of arista; orbits as wide as or slightly wider than A_3 ; cheeks distinctly higher than orbital width, and 0.3 times as high as eye, with genal setae arranged in 2-3 rows.

Mesonotum with 3 (4 in one specimen) pairs of *pre-acr*, distance between the rows at 1st pair about half as long as that to adjacent *dc*-rows; posterior *ph* well developed; *pra* as long as or longer than anterior *ntpl*; *stpl* 1:2, additionally with 1



Figs. 34-39. *Pegomya emeinigra* Deng et Li, ♂. 34, 5th sternite; 35, hypopygium, dorsal view; 36, ditto, lateral view; 37, right surstylus, inside view; 38, basiphallus and distiphallus; 39, pregonite and postgonite. Dadakharka - Kutumsang

or 2 fine setae discernible below the anterior and 1 or 2 distinct setae below the posteriors.

Abdomen with terminalia as in Figs. 34-39; genital pouch with sack-shaped processes membranous; surstyli with dorsobasal horn-like projection hardly developed, and with inner basal lobe densely pilose; epiphallus situated near anterior end of basiphallus.

Mid femur with 3-4 *pv* on basal half, longest one 1.2-1.3 times as long as height of the femur, and with preapical *a* indiscernible, or small even if distinguishable from

adjacent setulae; f_3 with 4-6 strong and a few weak *av* except near base, and with 1 *pv* near base and 1-2 (3 on right leg in one specimen) *pv* around basal third, the longest one 1-1.5 times as long as height of the femur; t_1 with 1 small *ad* and 1 *pv* (1 more weak *pv* present on left leg in one specimen), the *pv* 2.3-2.6 times as long as the tibial diameter at insertion point of the seta; t_2 with 1 *ad*, 1 *pd* and 2-3 *p-pv*; t_3 with 2 (3 on right leg in one specimen) *av*, 2 *ad* and 2 *pd*, and with apical *pd* fine or rather distinct. Wings with costal thorns small though stronger than costal spicules.

Remarks. *P. emeinigra* was originally described on the basis of male specimens from Mt. Emei, Sichuan, China. The surstylus in profile and the pregonite and postgonite figured in the original description agree well with those of the present specimens from Nepal, which may, therefore, correctly be referred to the species. As mentioned above, this species is closely related to *ceratostylata*, from which it is, however, different in the surstyli without a well-developed horn-like projection dorsobasally. The horn-like projection on the surstyli is commonly found in *ceratostylata* and *kali*. This may suggest that the less development of the projection in *emeinigra* is due to the secondary reduction.

8. *Pegomya ramularis* sp. nov.

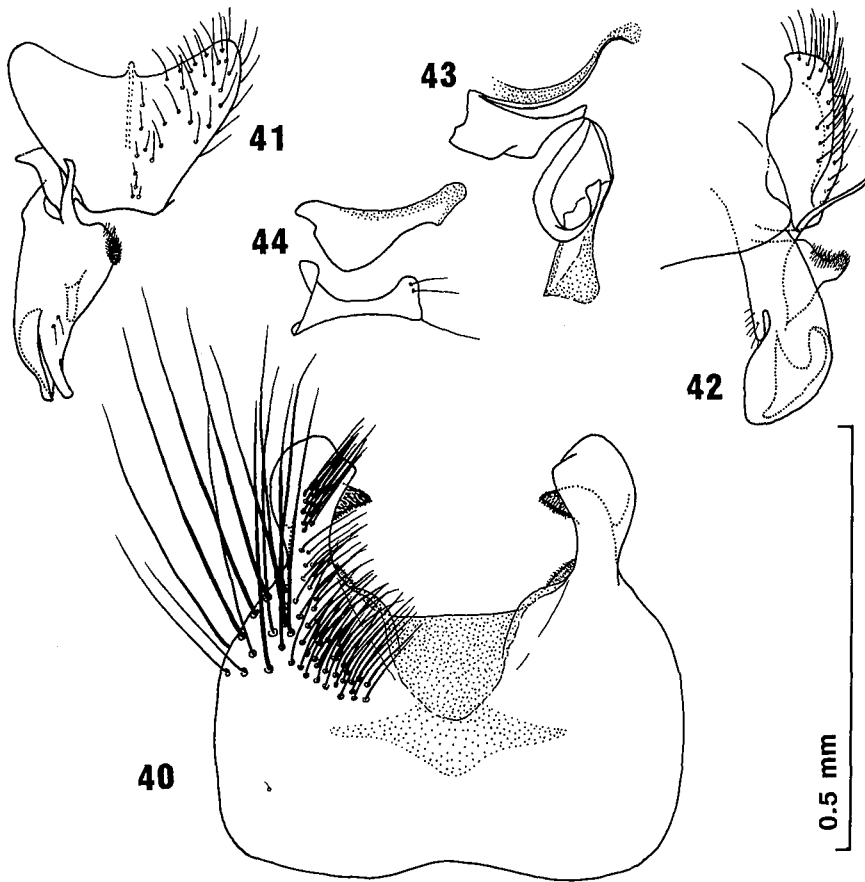
(Figs. 40-44)

Type material. Nepal. Bagmati: Ghopte - Gosainkund, 3,500-4,000 m, 1♂, 25.v.1988; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 5♂ (one the holotype), 27.v.1988. One paratype from Magen Gotha - Thare Pati is deposited in EDAN.

♂. Wing-length 3.7-4 mm. Interfrontalia pale to dull grey pollinose; cheeks dull grey pollinose; orbits brownish pollinose, becoming paler ventrad. Mesonotum rather thinly pale grey pollinose, faintly or slightly tinged with brown; in frontal angle of view, before suture with narrow lateral patches, and behind suture with a broad median patch between rows of *dc* on posterior two-thirds of postsutural area and broad lateral patches on lateral declivities, the median patch protruding medially to suture; in caudal angle of view, before suture with a median vitta and lateral patches, and behind suture with submedian vittae between rows of *dc* and *acr* anteriorly, sublateral vittae between rows of *dc* and *ia*, and lateral patches. Abdomen largely pale bluish grey to wholly brownish grey pollinose; median vitta sharp and narrow to moderate on 2nd and 3rd tergites, much broadened on 4th tergite and covering large dorsal surface of 5th tergite. Wings tinged with dark brown, much darkened basally; calyptrae tinged with yellow to brownish yellow.

Head about 1.2 times as high as long; frons narrower than anterior ocellus; parafrontals contiguous to each other, with 3-4 strong and a few weak *ori*, mingled with a few or some fine setulae; A_3 1.8-2 times as long as wide; arista with the longest hairs as long as or slightly shorter than basal diameter of arista; orbits about as wide as A_3 ; cheeks a little higher than orbital width, and 0.21-0.26 times as high as eye, with genal setae arranged in 2 rows.

Mesonotum with 3 pairs of *pre-acr* (an additional seta present in one paratype), distance between the rows at 1st pair three- to four-fifths as long as that to adjacent *dc*-rows; posterior *ph* well developed; *pra* slightly shorter to distinctly longer than



Figs. 40-44. *Pegomya ramularis* sp. nov., ♂. 40, 5th sternite; 41, hypopygium, dorsal view; 42, ditto, lateral view; 43, basiphallus and distiphallus; 44, pregonite and postgonite. Holotype from Magen Gotha - Thare Pati.

anterior *ntpl*; *stpl* 1:2, below the posteriors an additional seta discernible.

Abdomen with terminalia as in Figs. 40-44; genital pouch with sack-shaped processes weakly chitinized; 5th sternite with processes only a little protruded at apex inwards, with a subapical tuft of short setae in addition to inner patch of short setae and outer group of long setae; surstyli with a conspicuously long twiggy projection developed just near the joining point of intercalary rod, with inner basal lobe narrowly pilose, and on dorsal surface with only a few short setulae visible; epiphallus arising from anterior end of basiphallus; pregonites strongly constricted medially.

Mid femur with 5-6 *pv* on basal half (some setae on apical half being a little developed and forming a row of *pv* in one paratype), the longest one 1.2-1.4 times as long as height of the femur, and with preapical *a* weakly developed, and in a few cases hardly distinguishable from adjacent setulae; *f*₃ with 4-7 strong and a few or some weak *av* except near base, and with 0-1 weak *pv* near base and 2-4 strong *pv*

on median third, the longest *pv* 1.2-1.5 times as long as height of the femur ; t_1 with 1 small *ad* (indiscernible in a few cases) and 1 *pv* ; t_2 with no (1 in one paratype) *ad*, 1 *pd* and 2 (only 1 in a few cases) *p-pv* ; t_3 with 1 (2 on left leg in one paratype) *av*, 2 *ad* and 2 (only 1 on right leg in one paratype) *pd*, and with apical *pd* fine and hardly distinguishable from adjacent ground setulae. Wings with costal thorns minute and only a little stronger than costal spicules.

Remarks. *P. ramularis* is remarkably different from all of the preceding species in the processes of the 5th sternite only weakly protruded at apex inwards, with a subapical tuft of setae, and in the surstyli having a conspicuously long twiggy projection dorsobasally. However, it should belong to the *nigra* group so far as based on the outer groups of long setae on the 5th sternite and the basally broadened postgonites.

9. *Pegomya dictenata* Deng et Li

(Figs. 45 - 49)

Pegomya dictenata Deng et Li, 1988 : 197.

Material examined. Nepal. Bagmati : Ghopte - Gosainkund, 3,500-4,000 m, 1♂, 25.v.1988.

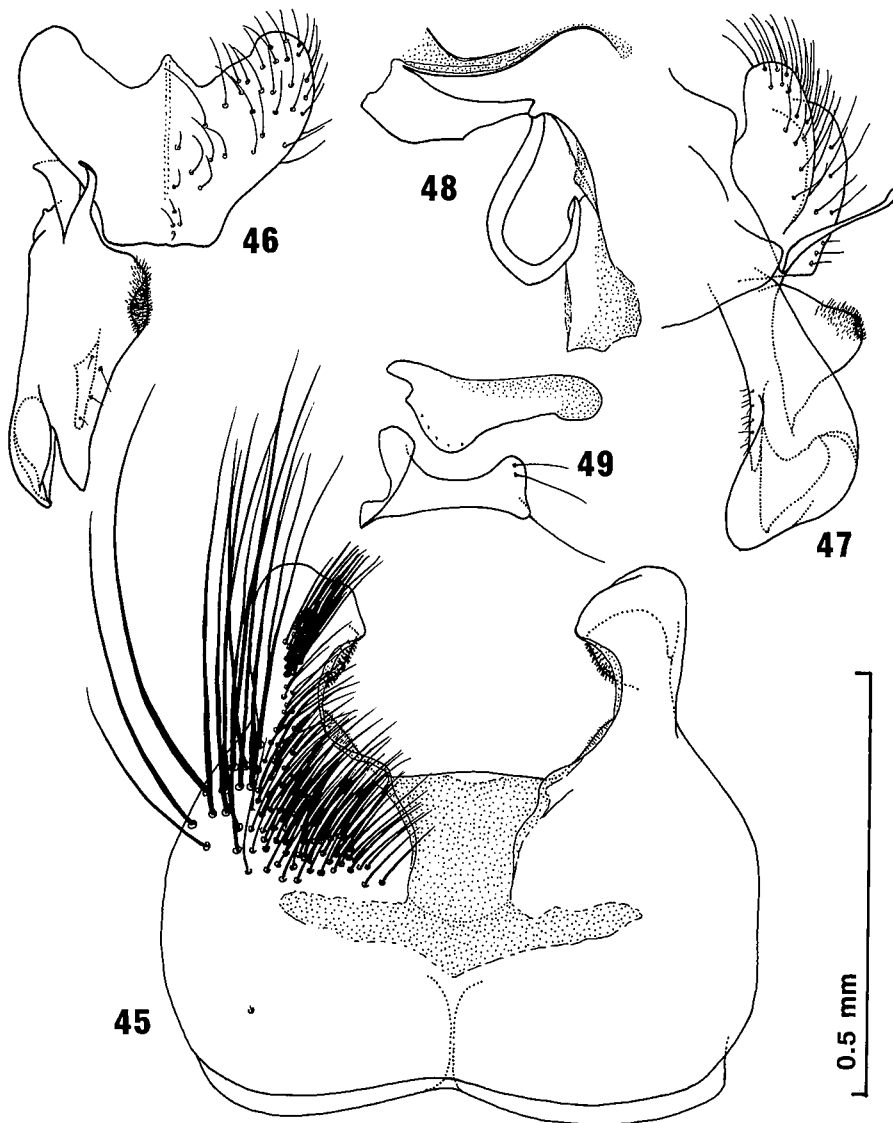
♂. Wing-length 5.2 mm. Interfrontalia and cheeks pale grey pollinose, the latter slightly darker ; orbits black in most angles of view, with grey pollinosity visible in some lights. Mesonotum rather densely pale bluish grey pollinose, barely tinged with brown ; in frontal angle of view, obscurely darkened on lateral declivities narrowly before suture and broadly behind suture ; in caudal angle of view, broadly and obscurely darkened laterally before and behind suture, and with a sharp and narrow median vitta before suture ; in oblique angle of view, with a narrow, sharp and nearly entire vitta appearing along the row of *acr* on the viewing side. Abdomen pale bluish grey pollinose ; median vitta narrow and obsolescent, on each tergite broadened anteriorly. Mid and hind femora yellow, with apical fourth and apical sixth blackish, respectively. Wings tinged with dark brown, much darkened basally ; calyptrae tinged with yellow to brownish yellow.

Head about 1.3 times as high as long ; frons slightly wider than anterior ocellus ; interfrontalia about half as wide as anterior ocellus ; parafrontals with 5 strong and 3-4 weak *ori*, mingled with a few or some fine setulae ; A_2 2.1 times as long as wide ; arista with the longest hairs slightly shorter than basal diameter of arista ; orbits 1.25 times as wide as A_3 ; cheeks a little higher than orbital width, and 0.3 times as high as eye, with genal setae arranged in 2-3 rows.

Mesonotum with 3 pairs of *pre-acr*, distance between the rows at 1st pair about half as long as that to adjacent *dc*-rows ; posterior *ph* well developed ; *pra* slightly longer than anterior *ntpl* ; *stpl* 1 : 2, below the posteriors an additional seta discernible.

Abdomen with terminalia as in Figs. 45-49 ; genital pouch with sack-shaped processes membranous ; cercal plate distinctly swollen anterolaterally and strongly carinated medially ; surstyli with apical processes divergent.

Mid femur with a row of 8-9 strong or rather weak *pv* on basal half, basal one



Figs. 45-49. *Pegomya dictenata* Deng et Li, ♂. 45, 5th sternite; 46, hypopygium, dorsal view; 47, ditto, lateral view; 48, basiphallus and distiphallus; 49, pregonite and postgonite. Ghopte - Gosainkund.

being the longest, 1.5 times as long as height of the femur, and with preapical *a* indiscernible; f_3 with 6 strong and a few weak *av* except near base, and with 1 rather weak *pv* near base and 3 strong and 1 weak *pv* on median third, the longest *pv* 1.4 times as long as height of the femur; t_1 with 1 small *ad* and 1 *pv*; t_2 with 1 *pd* and 2 *p-pv*, and without *ad*; t_3 with 2 *av*, 2 *ad* and 2 *pd*, and with apical *pd* fine and hardly distinguishable from adjacent ground setulae. Wings with costal thorns minute and only a little stronger than costal spicules.

Remarks. *P. dictenata* was originally described from 2 male specimens collected at Mt. Emei, Sichuan, China. The present specimens from Nepal agree well with the description of the species in the characters of the terminalia except for the presence of a twiggy projection on the surstyli. The projection is very narrow and may easily be broken in the process of dissection. The absence of the projection on the surstyli figured in the original description may be due to the broken condition of the material. *P. dictenata* is very closely related to the preceding *ramularis* in having the male terminalia of the same type. The largely yellow mid and hind femora in the male are unique to the present species.

PHYLOGENETIC RELATIONSHIPS AMONG THE NIGRA GROUP

A cladogram for the nine species dealt with in this paper is given in Fig. 50. This is made on the basis of the male characters alone. *P. aurivillosa* Fan et Chen, 1984, known from Chinghai, China, belongs to the *nigra* group, yet I am not sure where it should be placed in this cladogram. The characters corresponding to the numbers in the cladogram will be explained as follows:

1. Fifth sternite with inner setae grouped into a subapical tuft and a basal patch on each process. Surstyli with a pilose lobe developed innerbasally. Postgonites with seta suppressed.
2. Cercal plate strongly and evenly bulged laterally. Surstyli with a small process developed on outer process inside. Postgonites with apical part expanded and as broad as basal area.
3. Fifth sternite with outer setae well developed, much exceeding the tip of processes; processes with a tendency to protrude at apex inwards.
4. Surstyli with a conspicuously long twiggy projection developed dorsobasally. Epiphallus shifted to anterior end of basiphallus.
5. Mid and hind femora becoming largely yellow. Cercal plate with median carina strongly developed.
6. Surstyli with inner basal lobe constricted dorsoapically.
7. Fifth sternite with subapical tuft of setae suppressed; processes strongly protruded at apex inwards and club-shaped.
8. Surstyli with a horn-like projection developed dorsobasally.
9. Basiphallus in lateral view constantly narrowing distad, with ventral margin becoming straight in main part. Pregonites nearly parallel-sided on dorsal and ventral lines. Postgonites much broadened in main area, with much narrowed apex.
10. Surstyli with horn-like projection reduced.
11. Fore tibia with *pv* lengthened to exceed three times of the tibial diameter at insertion point of the seta.
12. *P. syabruai* may be most closely related to *kali*, but I have not yet found any synapomorphic characters for the two species.
13. Genital pouch with sack-shaped processes chitinized. Epiphallic lamella swollen anteriorly.
14. Mesonotum with posterior *ph* reduced. Surstyli with horn-like projection reduced.
15. Surstyli with a setose oblique ridge developed dorsally.
16. Any apomorphic characters not yet found.

17. Epiphallus shifted to posterior end of basiphallus.
18. Surstyli with another ridge developed inside the oblique one and demarcating the pilose inner basal lobe.
19. Surstyli narrowed in profile, with apical processes close to each other, with setae weakened and reduced in number, and with an acute hook developed at anterior end of oblique ridge.

The setose oblique ridge on the surstyli is also found in a species of the *versicolor* group, *P. haemorrhoea* (Zetterstedt, 1838) (Suwa, 1971 ; Hennig, 1973 ; cf. Griffiths, 1982 : 39). This is here considered as parallelism. The presence of the ridge in the *nigra* group might be a reversal, but, even if this is the case, it does not affect the cladogram. The subapical tufts of setae on the 5th sternite found in *ramularis* and *dictenata* are common to the *versicolor* group, and are here supposed plesiomorphic in the *nigra* group. If the presence of the ridge on the surstyli in the *nigra* group is plesiomorphic, and if the presence of the subapical tufts of setae on the 5th sternite in the *nigra* group is due to reversal or parallelism, the real relationships among the group would be much different from this cladogram.

In any case, it seems certain that the *nigra* group originated in the Himalayan region interpreted in a broad sense and radiated there, and that a part of the group migrated north through East Asia to North America. This pattern of origin and distribution is also represented by the *alticola* group of *Pegomya* (Suwa, 1984) and by the *lobata* and *morula* groups of *Phorbia* (Suwa, 1994, as *lobatoides* and *morula* subgroups of the *morula* group, respectively).

ACKNOWLEDGEMENTS

I am deeply grateful to Dr. S. Takagi, Professor Emeritus, Hokkaido University, the leader of our research trip in Nepal, and Dr. K.C. Sharma, Agricultural Department of Nepal, the chief Nepalese partner of the trip, for their kind help in various ways during the trip. Thanks are also due to Dr. V.K. Thapa, Tribhuvan University, for giving me a great support during my stay in Nepal, 1983 and 1988.

I am thankful also to Prof. G.C.D. Griffiths, University of Alberta, Canada, for his kindness in giving me the chance to examine a Canadian specimen of *P. nigra*.

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