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Revision of the Oriental Genus *Pararhinoleucophenga* Duda (Diptera: Drosophilidae)

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Hua-Zhi Cao and Hong-Wei Chen (2009) Revision of the Oriental genus *Pararhinoleucophenga* Duda (Diptera: Drosophilidae). *Zoological Studies* **48**(1): 125-136. The Oriental genus *Pararhinoleucophenga* is reviewed, with a supplementary description of the type species: *P. maura* (de Meijere), a discovery of a new combination of *P. meichiensis* (Chen and Toda) comb. nov., and descriptions of 6 new species from the Oriental region: *P. brunnea*, *P. alafumosa*, *P. furcila*, *P. setifrons*, *P. setipes*, and *P. minutobscura* spp. nov. Based on morphological characters, the species of this genus are divided into 3 species groups. A key to all species of this genus is provided. http://zoolstud.sinica.edu.tw/Journals/48.1/125.pdf

Key words: Diagnosis, China, New combination, New species, Taxonomy.

The genus *Pararhinoleucophenga* was established by Duda (1924) for the single species *Drosophila maura* de Meijere, 1911 from Java, Indonesia; it was further mentioned by Okada (1988) who added another species from Taiwan to this genus. Chen and Toda (1994) reported 1 species: *Stegana* (*Oxyphortica*) *meichiensis* from China, as they overlooked the relevance of this species to the genus *Pararhinoleucophenga*. The previous diagnosis of the genus *Pararhinoleucophenga* given by Okada (1988) is incomplete, e.g., the descriptions, "arista plumose, ventral branches not very short, scutellum without exceptional setae, aedeagal apodeme long", are not definite since they are widely present in the subfamily Steganinae, and were merely proposed to distinguish *Pararhinoleucophenga* from *Paraleucophenga*. Revised diagnoses are herein proposed after examining of all the species found so far: facial carina broadly prominent below (Fig. 10); 2nd and 3rd vibrissa slightly shorter than 1st (Fig. 10); costal vein with 2-4 heavily sclerotized hooked peg-like spines on ventral surface between R_{2+3} and R_{4+5} (Figs. 1-3); M_1 weakly curved to R_{4+5} distally (Figs. 1-3); hypandrium laterally with 1 pair of large, vertical flaps bearing minute setulae (Figs. 13, 14, 19, 22, 23, 33, 34); and cercus with ventral processes (Figs. 18, 21, 25, 27, 29, 32), except for *P. maura* (Fig. 12).

In this study, we examined 3 known and 6 new species of *Parahinoleucophenga*, which were then assigned to 3 species groups based on morphological characters: the *maura* group is composed of *P. maura* (de Meijere) and *P. brunnea* sp. nov., and is based on R_{4+5} with 5 or 6 setae on basal section, C3F = 1 (Fig. 1), epandrium with small setae near anteroventral corners (Figs. 11, 17), paramere with pubescence, and aedeagus (namely basiphallus) finely serrated (Figs. 13, 14, 19); the *nuda* group is composed of 6 species: *P. meichiensis* (Chen and Toda), *P. nuda* Okada, *P. alafumosa* sp. nov., *P. furcila* sp. nov., *P. setifrons* sp. nov., and *P. setipes* sp. nov., and is based on palpus with dense, thin setae, C3F = 0.60-0.85 (Fig. 2), aedeagus robust, with many wrinkles (Fig. 22), and hypandrium posterolaterally with pubescence

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Figs. 1-9. 1-3. Wings. **1.** *Pararhinoleucophenga maura* (de Meijere); **2.** *P. setipes* sp. nov.; **3.** *P. minutobscura* sp. nov. **4-9.** Fore tarsi of males. **4.** *P. maura* (de Meijere); **5.** *P. meichiensis* (Chen and Toda); **6.** *P. alafumosa* sp. nov.; **7.** *P. furcila* sp. nov.; **8.** *P. setifrons* sp. nov.; **9.** *P. setipes* sp. nov. Scale bars = 1.0 mm in figures 1, 2; scale bars = 0.5 mm in figures 3-9.

(Fig. 23); the *minutobscura* group is composed of a single species, and is based on black body color, small body size, and C3F < 0.5 (Fig. 3).

MATERIALS AND METHODS

Most of the specimens examined were collected on tree trunks. The specimens are deposited in the following institutions: Institute of Genetics, Fudan University, Shanghai, China (IGFU); Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, China (KIZ); Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB); National Science Museum, Tokyo, Japan (NSMT); Department of Entomology, South China Agricultural University, Guangzhou, China (SCAU); Systematic Entomology Department, Hokkaido University Museum, Sapporo, Japan (SEHU); and Zoological Museum Amsterdam, Netherlands (ZMA). The morphological terminology and indices follow Chen and Toda (2001).

Abbreviations

BL, body length; ThL, thorax length; WL, wing length; WW, wing width; arb, dorsal branches/ ventral branches of arista; avd, longest ventral branch/longest dorsal branch of arista in length; adf, longest dorsal branch of arista/width of first flagellomere; flw, length/width of first flagellomere; FW/HW, frontal width/head width; ch/o, maximum width of gena/maximum diameter of eye; prorb, proclinate orbital/posterior reclinate orbital in length; rcorb, anterior reclinate orbital/posterior reclinate orbital in length; vb, subvibrissal/vibrissa in length; dcl, anterior dorsocentral/posterior dorsocentral in length; presctl, prescutellar/ posterior dorsocentral in length; sctl, basal scutellar/apical scutellar in length; sterno, anterior katepisternal/posterior katepisternal in length; orbito, distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital; dcp, length distance between ipsilateral dorsocentrals/cross distance between anterior dorsocentrals; sctlp, distance between ipsilateral scutellars/cross distance between apical scutellars; C, second costal section between subcostal break and R_{2+3}/ third costal section between R_{2+3} and R_{4+5}; 4c, third costal section between R_{2+3} and R_{4+5}/ M_1 between r-m and dm-cu; 4v, M_1 between dm-cu and wing margin/ M_1 between r-m and dm-cu; 5x, CuA_1 between dm-cu and wing margin/dm-cu between M_1 and CuA_1; ac, third costal section between R_{2+3} and R_{4+5}/ distance between distal ends of R_{4+5} and M_1; M, CuA_1 between dm-cu and wing margin/ M_1 between r-m and dm-cu; C3F, length of heavy setation in third costal section/ (length of heavy setation in third costal section + length of light setation in third costal section).

SYSTEMATIC ACCOUNT

Genus *Pararhinoleucophenga* Duda

Pararhinoleucophenga Duda 1924: 185. Type species: *Drosophila maura* de Meijere, 1911.
Pararhinoleucophenga: Okada 1988: 618.

Key to males of all species of the genus *Pararhinoleucophenga*

1. R_{4+5} with 5 or 6 setae on basal section, C3F = 1, epandrium with small setae near anteroventral corners, paramere with pubescence, aedeagus finely serrated (*maura* species group). 2
- R_{4+5} without setae basally; C3F ≤ 0.85, epandrium without small setae near anteroventral corners, paramere not pubescent, aedeagus not finely serrated. 3
2. Epandrium with both longer and shorter, dense setae on anteroventral corners; surstylus with 10-13 prensisetae on inner margin; cercus with fringe-like setae, lacking ventral process. ..... *P. maura* (de Meijere)
- Epandrium with about 10 small setae near anteroventral corners; surstylus with 8 or 9 prensisetae on inner margin; cercus without fringe-like setae, with developed ventral processes. ..... *P. brunnea* sp. nov.
3. Body color black; body size smaller than 2.0 mm; palpus with a few small setae; C3F < 0.5; hypandrium posterolaterally without pubescence; aedeagus glabrous, with 2 small sclerotized projections ventromedially (minutobscura species group). .... *P. minutobscura* sp. nov.
- Body color yellow to brown; body size larger than 3.0 mm; palpus with dense, thin setae; C3F = 0.60-0.85; hypandrium posterolaterally with pubescence; aedeagus with many wrinkles on lateroventral surface and 1 pair of sclerotized projections dorsomedially (*nuda* species group). 4
4. Fore tarsus with long suberect setae on anterior surface, at least some of them distinctly longer than tarsomere width. 5
- Fore tarsus with small (as long as 1/2 of tarsomere width) suberect setae on anterior surface..... 8
5. Fore tarsomere I apically with only 1 long suberect seta on anterior surface. 6
- Fore tarsomere I with 4 or 5 long suberect setae on anterior surface. 7
6. Fore tarsomere II with 1 and tarsomeres III and IV each with 2 subequal suberect setae on anterior surface; thorax yellow, without patches, slightly brown pollinosity; scutellum brown. ..... *P. alafumosa* sp. nov.

- Fore tarsomeres II to IV each with 1 longer and 1 or 2 shorter suberect setae on anterior surface; thorax and scutellum yellow, with brown patches and sporadic, silvery pollinosity. ..... *P. setifrons* sp. nov.

7. Fore tarsomere I with 4 and tarsomeres II to IV each with 2 long suberect setae on anterior surface. .... *P. furcila* sp. nov.
- Fore tarsomere I with 5 and tarsomeres II to V each respectively with 8 or 9, 6, 5, 4 long suberect setae at most on anterior surface. .....*P. setipes* sp. nov.

8. Fore tarsomeres II to IV each with 2 shorter, suberect setae on anterior surface. .... *P. meichiensis* (Chen and Toda)
- Fore tarsomeres II to IV each with 1 shorter, suberect setae on anterior surface. ..... *P. nuda* Okada

I. The *maura* species group

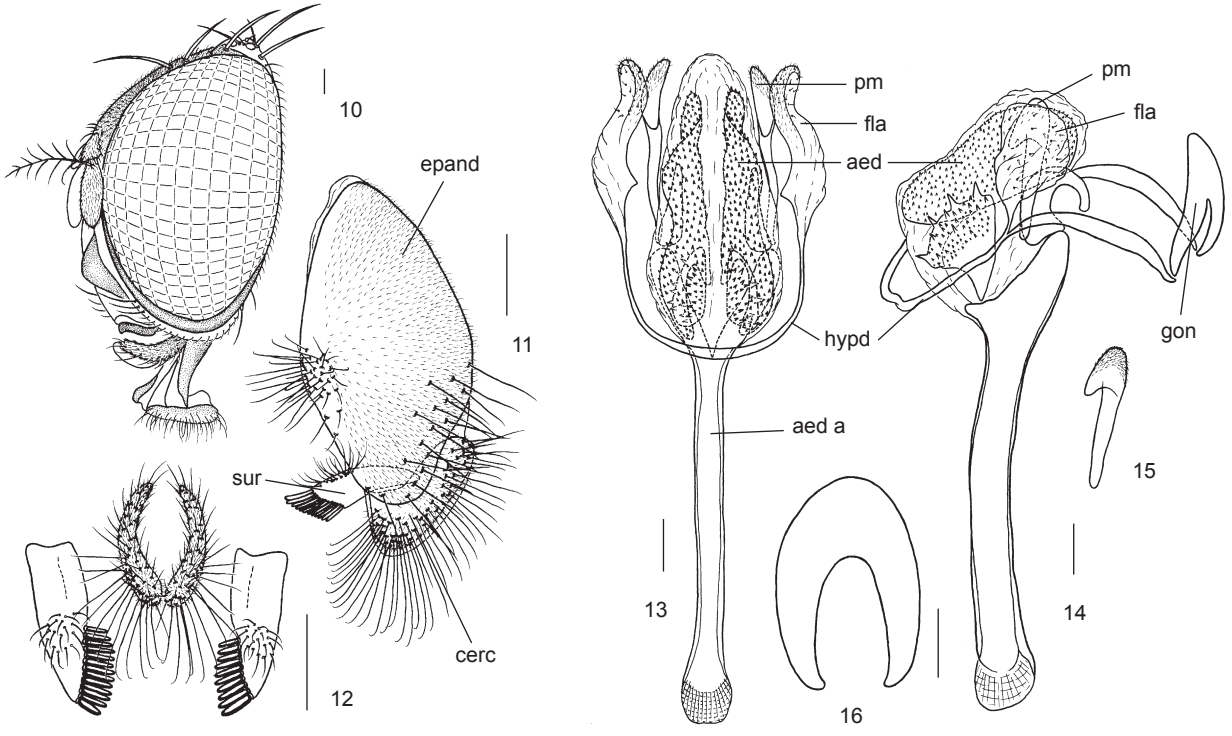
Pararhinoleucophenga maura (de Meijere)

(Figs. 1, 4, 10-16)

Drosophila maura de Meijere 1911: 406.
Pararhinoleucophenga maura: Duda 1924: 185; Bächli 1987: 86.

Diagnosis: Epandrium with both longer and shorter, dense setae on anteroventral corners (Fig. 10); surstylus with 10-13 prensisetae on inner margin (Fig. 12); cercus with fringe-like setae, lacking ventral process (Figs. 11, 12).

Description: Head (Fig. 10). Eye large, brown. Postvertical setae present, at vertex ridge. Ocellar triangle dark brown, with 1 pair of small setae above ocellar setae. Frons dark brown, with gray pollinosity and dense interfrontal setulae. Frontal vitta brown. Proclinate orbital setae somewhat nearer to ptilinal fissure than to inner vertical setae. Pedicel and 1st flagellomere yellowish-brown, arista plumose. Face dark brown; facial carina brown. Clypeus black, narrow. Palpus long, rod-shaped, black, with several stout setae on lateral margin. Gena dark brown, narrow and linear. Postgena black. Occiput black, deeply depressed. Thorax yellowish-brown, with dark brown patches and sporadic, silvery pollinosity. Postpronotal lobe with 1 long humeral seta and ca. 4 or 5 small setae. Acrostichal setulae in ca. 10 irregular rows. Anepisternum lacking setulae. Katepisternal setae



Figs. 10-16. *Pararhinoleucophenga maura* (de Meijere) ♂. **10.** Head; **11.** epandrium (epand), surstylus (sur), and cercus (cerc) (lateral view); **12.** surstyli and cerci (posterior view); **13.** hypandrium (hypd), vertical flaps of hypandrium (fla), parameres (pm), gonopods (gon), aedeagus (aed), and aedeagal apodeme (aed a) (ventral view); **14.** ditto (lateral view); **15.** paramere (lateral view); **16.** gonopods (ventral view). Scale bars = 0.1 mm.

3. Scutellum dark brown and flat; basal scutellar setae divergent; apicals cruciate. Wing (Figs. 1-3) dark brown anteriorly, brown posteriorly, with sporadic, silvery pollinosity. C_1 setae 2, poorly differentiated. Basal medio-cubital crossvein absent. R_{4+5} with 6 setae on basal section. C3F = 1 (Fig. 1). Halters white. Legs mostly yellow, black on distal 1/2 of all femora and basal and distal 1/3 of all tibiae, pale on all tarsi. Apical setae present on fore and mid tibiae; preapical setae present on all tibiae. Fore femur with 2 or 3 longer setae on posterior surface; tarsomere without distinct long suberect setae on anterior surface (Fig. 4). Mid tarsomere with 2 rows of minute cuneiform setulae on underside. Tarsomere I of foreleg slightly shorter than remaining tarsomeres combined; tarsomere I of mid and hindlegs slightly longer than remaining tarsomeres combined. Abdominal tergites I to IV yellow except for black bands on posterior margins of tergites II to IV; tergites V and VI nearly entirely black. Abdominal sternites grayish-brown, longer than broad. Male terminalia. Epandrium pubescent except for anterior margin, with several setae near posterior margin on each side of body, dense setae on anteroventral corner and ca. 18 setae near posterior margin on each side of body (Fig. 11). Surstylus separated from epandrium, with several setae submedially and 10-13 prensisetae on inner margin of distal part (Fig. 12). Cercus separated from epandrium, entirely pubescent, with long suberect setae, lacking ventral process (Fig. 12). Membrane between epandrium and cercus pubescent. Hypandrium narrow, arched, laterally with 1 pair of large, vertical flaps, each bearing setulae and pubescence distally, posterolaterally without pubescence (Figs. 13, 14). Gonopods forming vaulted, posteromedian plate, posterolaterally contiguous with posterior ends of hypandrium and anteroventral corners of epandrium (Figs. 14, 16). Parameres sclerotized, but not black, basally contiguous with aedeagal apodeme, distally pubescent and curved in lateral view (Figs. 13-15). Aedegus robust, densely but finely serrated, bearing 1 pair of densely and more strongly serrated lobe-like processes ventrobasally and 1 projection dorsobasally (Figs. 13, 14). Aedeagal apodeme long and thick, rod-like, apically bifurcate in ventral view (Figs. 13, 14).

Measurements: BL = 3.28 mm in lectotype (3.75 mm in MZB); ThL = 1.73 (1.88) mm; WL = 2.84 (3.50) mm; WW = 1.30 (1.65) mm. Indices. arb = 5/4 (6/5), avd = 0.95 (0.93), adf = 1.13 (1.07), flw = 1.76 (1.86), FW/HW = 0.40 (0.33), ch/o = 0.05 (0.04), prorb = 1.02 (damaged), rcorb = 0.92 (0.80), vb = 0.63 (0.65), dcl = 0.43 (0.42), presctl = 0.68 (0.63), sctl = 1.10 (damaged), sterno = 1.00 (0.95), orbito = 2.33 (2.20), dcp = 0.31 (0.26), sctlp = 1.09 (1.03), C = 3.62 (3.55), 4c = 0.55 (0.59), 4v = 1.50 (1.47), 5x = 1.40 (1.29), ac = 2.49 (2.19), M = 0.43 (0.46), C3F = 1.00 (1.00).

Specimens examined: Lectotype ♂ (ZMA), labeled "E. Jacobson Wonosobo; Java, Mei 1909; *Drosophila maura* det. De Meijere. Type/G. Bächli vidit 1967 No. 4564". 1 ♂ (MZB), labeled "Probolinggo, East Java, INDONESIA, 29 Dec. 2003, coll. MJ Toda".

Distribution: Indonesia (Java, Sumatra).

***Pararhinoleucophenga brunnea* sp. nov.**

(Figs. 17-19)

Diagnosis: Epandrium with about 10 small setae near anteroventral corners (Fig. 17); surstylus with 8 or 9 prensisetae on inner margin (Figs. 17, 18); cercus without fringe-like setae, with developed ventral processes (Figs. 17, 18).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male. Eye brownish-red. Frons, frontal vitta, face, and facial carina brown. Pedicel and 1st flagellomere yellow. Clypeus dark brawn. Palpus with several stout setae on lateral margin. Gena brown. Postgena dark brown. Thorax yellowish-brown, with dark brown patches and sporadic, silvery pollinosity. Scutellum dark brown. Wing. R_{4+5} with 5 setae on basal section; C3F = 1. Legs yellow, black on distal 1/2 of all femora and basal and distal 1/3 of all tibiae, pale on all tarsi. Fore tarsus without distinct long suberect setae on anterior surface. Abdominal tergites I to IV yellow, but black on posterior margins of tergites II to IV; tergites V and VI nearly entirely black. Sternites grayish-brown. Male terminalia. Epandrium with about 10 small setae near anteroventral corner and about 15 setae near posterior to ventral margin on each side of body (Fig. 17). Surstylus elongate, with 8 or 9 prensisetae on inner margin of distal part (Fig. 18). Ventral process of cercus with setae distally (Fig. 18). Hypandrium posterolaterally without pubescence; vertical flap of hypandrium with dense pubescence and setulae (Fig. 19). Posteromedian plate of gonopod very narrow, arcuate (Fig. 19). Paramere basally rod-like, distally flap-like and pubescent on distal 1/2 of flap (Fig. 19). Aedeagus with a few fine denticles and pubescence, trefoil-like apically (Fig. 19).

Aedeagal apodeme slender (Fig. 19).

Holotype: ♂ (NSMT), labeled "Sri Lanka: Kandy, 18-20 Aug. 1971, H. Kurokawa". Paratype: 1 ♂ (NSMT), labeled "India: June 1982, Gupta".

Etymology: From the Greek word: *brunneus*, referring to the brown body.

Distribution: India, Sri Lanka.

Remarks: These specimens were examined and considered to be *P. maura* by Okada (1988) because the original description of *P. maura* (de Meijere, 1911) was insufficient. Herein, they were compared in detail and are regarded as a different species.

II. The *nuda* species group

Remarks: In this group, we were unable to find distinct differences in male terminalia among the 6 species, so the entire structure is figured only in *P. alafumosa* sp. nov. (Figs. 20-24); on the other hand, we found distinct differences in the fore tarsus (Figs. 4-9) and some subtle differences in the surstyli, cerci, and parameres (Figs. 25-30).

Pararhinoleucophenga nuda Okada

Pararhinoleucophenga nuda Okada 1988: 619.

Diagnosis: Fore tarsomeres II to IV each with 1 shorter suberect seta on anterior surface.

Specimens examined: *Holotype* ♂ (NSMT), labeled "Alishan, Formosa, 14 Aug. 1967, coll. L.H. Throckmorton".

Distribution: Taiwan.

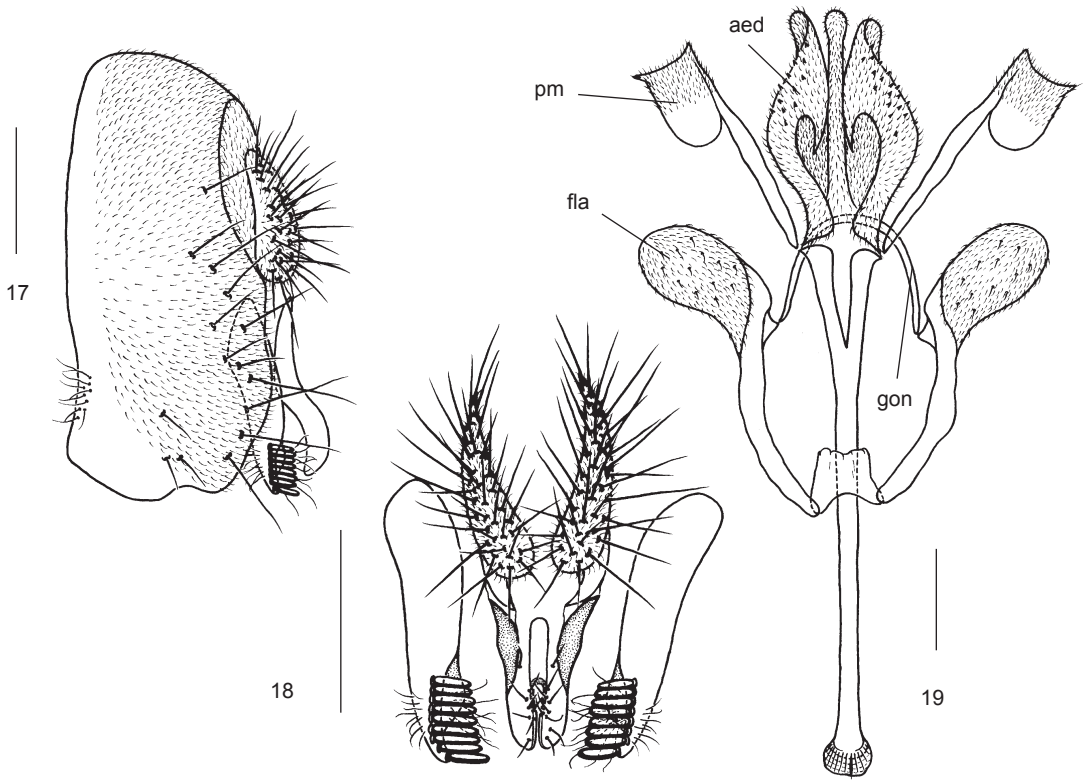
Pararhinoleucophenga meichiensis (Chen and Toda) comb. nov.

(Fig. 5)

Stegana (*Oxyphortica*) *meichiensis* Chen and Toda 1994: 538.

Diagnosis: Fore tarsomeres II to IV each with 2 shorter, suberect setae on anterior surface (Fig. 5).

Specimens examined: *Holotype* ♂ (IGFU), labeled "Meichi, Litingwu, Zhejiang, CHINA, 14-17 May. 1991, coll. HZ Chen"; 1 ♂ (SCAU, no. 120095), labeled "Wuyishan, Fujian, CHINA,



Figs. 17-19. *Pararhinoleucophenga brunnea* sp. nov. ♂. **17.** Epandrium, surstylus, and cercus; **18.** surstyli and cerci; **19.** hypandrium, parameres, gonopods, aedeagus, and aedeagal apodeme. Scale bars = 0.1 mm.

27°43'N, 117°57'E, elev. 800 m, 16 Aug. 2001, on tree trunk, coll. HW Chen".

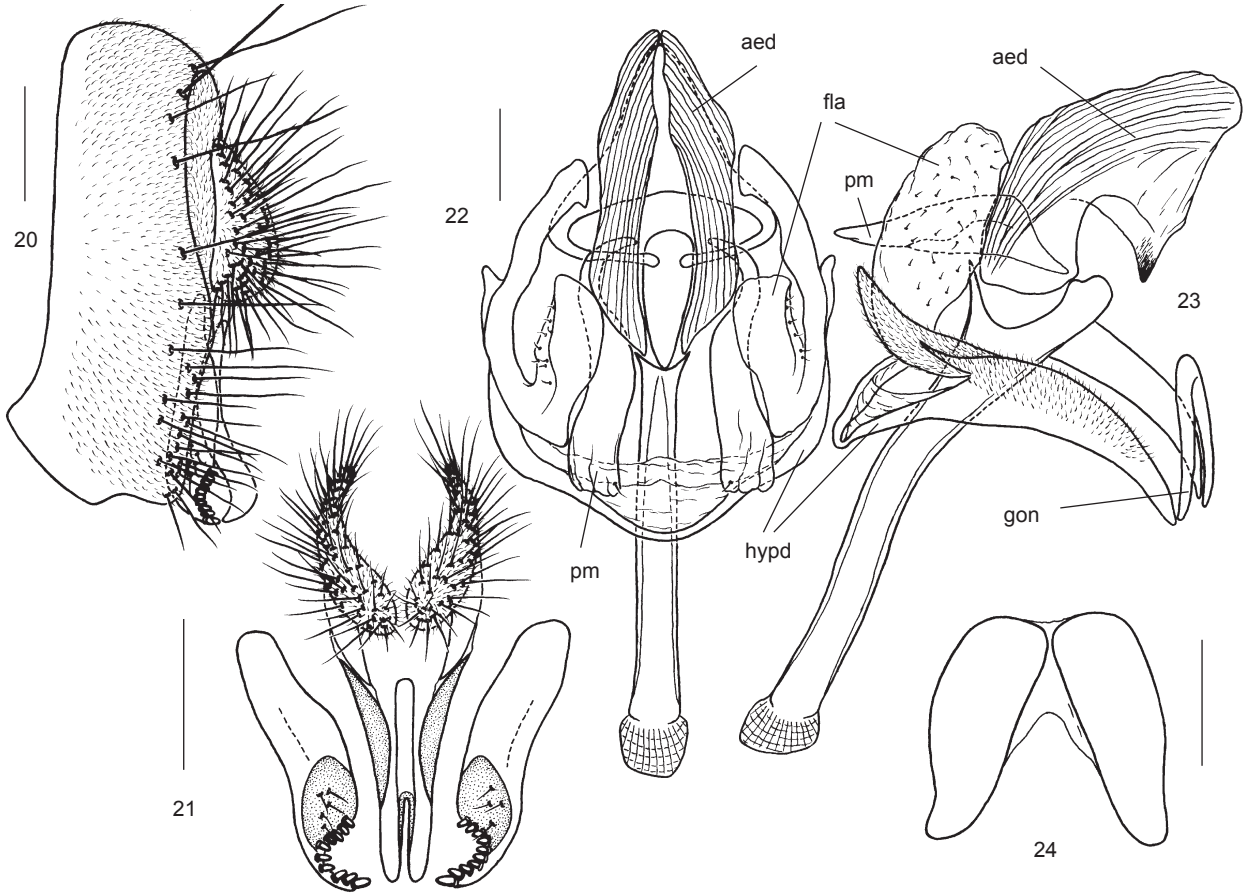
Distribution: China (Zhejiang, Fujian).

Pararhinoleucophenga alafumosa **sp. nov.**

(Figs. 6, 20-24)

Diagnosis: Fore tarsomeres I and II apically each with only 1 and tarsomeres III and IV each with 2 subequal suberect setae on anterior surface (Fig. 6).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male and female. Eye brown. Frons brown. Pedicel and 1st flagellomere grayish-yellow. Face yellow; facial carina brown. Clypeus yellow. Palpus yellow, with dense thin setae. Thorax yellow, slightly brown, pollinose, without patches or silvery pollinosity. Scutellum brown. Wing nearly entirely dark brown. R_{4+5} without setae on basal section. Legs mostly yellow except for grayish-yellow on all tarsi. Abdominal tergite I yellow; tergites II to IV yellow except for dark brown bands on posterior margins; tergites V and VI yellow laterally, black medially. Sternites grayish-yellow. Male terminalia. Epandrium with about 23 setae near posterior to ventral margins on each side of body, lacking setae near anteroventral corners (Fig. 20). Surstylus distally narrowed, with ca. 10 prensisetae on inner margin (Fig. 21). Ventral process of cercus without setae distally (Fig. 21). Hypandrium posterolaterally with pubescence; vertical flap of hypandrium with dense pubescence basally and setulae distally (Figs. 22, 23). Posteromedian plate of gonopod deeply notched basally (Fig. 24). Paramere pointed apically in lateral view, with 1 setula (Fig. 23). Aedeagus robust, bilobed ventrally, with many wrinkles on lateroventral surfaces and 1 pair of somewhat triangular projections dorsobasally (Fig. 23).



Figs. 20-24. *Pararhinoleucophenga alafumosa* sp. nov. ♂. **20.** Epandrium, surstylus, and cercus; **21.** surstyli and cerci; **22.** hypandrium, parameres, gonopods, aedeagus, and aedeagal apodeme; **23.** ditto; **24.** gonopods. Scale bars = 0.1 mm.

Measurements: BL = 3.25 mm in holotype (3.80 mm in 1 ♀ paratype), ThL = 1.55 (1.90) mm, WL = 2.92 (3.60) mm, WW = 1.22 (1.60) mm. Indices. arb = 6/5 (6/4), avd = 1.15 (1.13), adf = 1.00 (1.20), flw = 2.82 (2.00), FW/HW = 0.41 (0.45), ch/o = 0.07 (0.06), prorb = 0.94 (1.00), rcorb = 0.77 (0.64), vb = 0.77 (0.80), dcl = 0.50 (0.48), presctl = 0.83 (0.64), sctl = 1.14 (1.18), sterno = 0.88 (0.91), orbito = 2.11 (1.90), dcp = 0.39 (0.37), sctlp = 1.07 (1.20), C = 4.85 (5.51), 4c = 0.46 (0.50), 4v = 1.46 (1.69), 5x = 1.21 (1.13), ac = 4.22 (3.76), M = 0.40 (0.38), C3F = 0.69 (0.75).

Holotype: ♂ (SCAU, no. 120096), labeled "Foping, Shaanxi, CHINA, 32°41'N, 107°45'E, elev. 600 m, 19 July 2005, on tree trunk, coll. MF Xu". Paratype: 1 ♀ (SCAU, no. 120097), same data as for holotype.

Etymology: A combination of the Latin words: *ala* and *fumeus*, referring to the brown wing.

Distribution: China (Shaanxi).

Pararhinoleucophenga furcila **sp. nov.**

(Figs. 7, 25, 26)

Diagnosis: Fore tarsomere I with 4 and tarsomeres II to IV each with 2 long suberect setae on anterior surface (Fig. 7).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male. Eye brownish-red. Frons brown. Pedicel, 1st flagellomere, face, facial carina, clypeus, palpus, gena, and postgena yellow. Palpus with dense thin setae. Thorax yellow, without patches or pollinosity. Scutellum yellow. Wing brown anteriorly, otherwise pale gray. R_{4+5} without setae on basal section. Abdominal tergites I and II yellow; tergites III to V yellow except for dark brown bands on posterior margins; tergite VI yellow laterally, black medially. Sternites grayish yellow. Male terminalia. Surstylus distally with ca. 10 or 11 prensisetae on inner margin (Fig. 25). Ventral process of cercus round apically, dehiscent part about 2/5 as long as full length (Fig. 25). Paramere distally slightly narrowed, roughly triangular in lateral view (Fig. 26).

Measurements: BL = 3.10 mm in holotype; ThL = 1.66 mm; WL = 3.08 mm; WW = 1.28 mm. Indices. arb = 7/5, avd = 0.93, adf = 1.15, flw = 2.00, FW/HW = 0.43, ch/o = 0.08, prorb = 1.75, rcorb = 0.63, vb = 0.75, dcl = 0.51, presctl = 0.72, sctl = 1.18, sterno = 0.83, orbito = 1.65, dcp = 0.30, sctlp = 1.06, C = 4.55, 4c = 0.49, 4v = 1.57, 5x = 1.14, ac = 3.15, M = 0.39, C3F = 0.70.

Holotype: ♂ (SCAU, no. 120098), labeled "Pianma, Lushui, Yunnan, CHINA, 26°01'N, 101°25'E, elev. 700 m, 18 Aug. 2000, on tree trunk, coll. HW Chen".

Etymology: From the Latin word: *furca*, referring to the cercus with fork-like process ventrally.

Distribution: China (Yunnan).

Pararhinoleucophenga setifrons **sp. nov.**

(Figs. 8, 27, 28)

Diagnosis: Fore tarsomere I with 1 and tarsomeres II to IV each with 1 longer and 1 or 2 shorter suberect setae on anterior surface (Fig. 8).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male and female. Eye brownish-red. Pedicel brown; 1st flagellomere grayish-yellow. Face and facial carina brown. Clypeus brown. Palpus yellowish-brown, with dense thin setae. Thorax and scutellum yellow, with brown patches and sporadic, silvery pollinosity. R_{4+5} without setae on basal section. Legs mostly yellow, slightly grayish-yellow on all tarsi. Abdominal tergites II to VI yellow except for broad black bands on posterior margins. Male terminalia. Surstylus distally with ca. 9 prensisetae on inner margin (Fig. 27). Ventral process of cercus apically slightly acute, dehiscent part about 1/3 as long as full length (Fig. 27). Paramere distally slightly rounded in lateral view (Fig. 28).

Measurements: BL = 4.15 mm in holotype (range in 2 ♂♂, 2 ♀♀ paratypes: 3.10-4.10 mm), ThL = 1.95 (1.65-2.25) mm, WL = 3.68 (3.08-4.00) mm, WW = 1.52 (1.18-1.68) mm. Indices. arb = 7/6 (6-7/6), avd = 0.88 (0.88-1.00), adf = 1.31 (1.16-1.48), flw = 2.15 (1.93-2.11), FW/HW = 0.45 (0.42-0.46), ch/o = 0.09 (0.08-0.11), prorb = 1.17 (0.93-1.26), rcorb = 0.85 (0.70-0.91), vb = 0.74 (0.69-0.75), dcl = 0.48 (0.41-0.54), presctl =0.65 (0.62-0.72), sctl = 1.10 (1.11-1.18), sterno = 0.82 (0.72-0.90), orbito = 1.63 (1.53-1.90), dcp = 0.28 (0.27-0.35), sctlp = 1.11 (1.12-1.22), C = 4.70 (4.07-5.11), 4c = 0.48 (0.45-0.57), 4v = 1.56 (1.50-1.67), 5x = 1.08 (0.93-1.14), ac = 2.58 (2.63-3.25), M = 0.38 (0.34-0.42), C3F = 0.60 (0.60-0.68).

Holotype: ♂ (SCAU, no. 120099), labeled "Ailaoshan, Jingdong, Yunnan, CHINA, 24°32'N, 101°01'E, elev. 1200 m, 31 Aug. 2006, on tree trunk, coll. HZ Cao". Paratypes: 2 ♂♂, 2 ♀♀, same data as for holotype except for: colls. HL

Cao, HZ Cao, and T Li (SCAU, nos. 120100-3).

Etymology: A combination of the Latin words: *seta* + *frons*, referring to the dense interfrontal setulae.

Distribution: China (Yunnan).

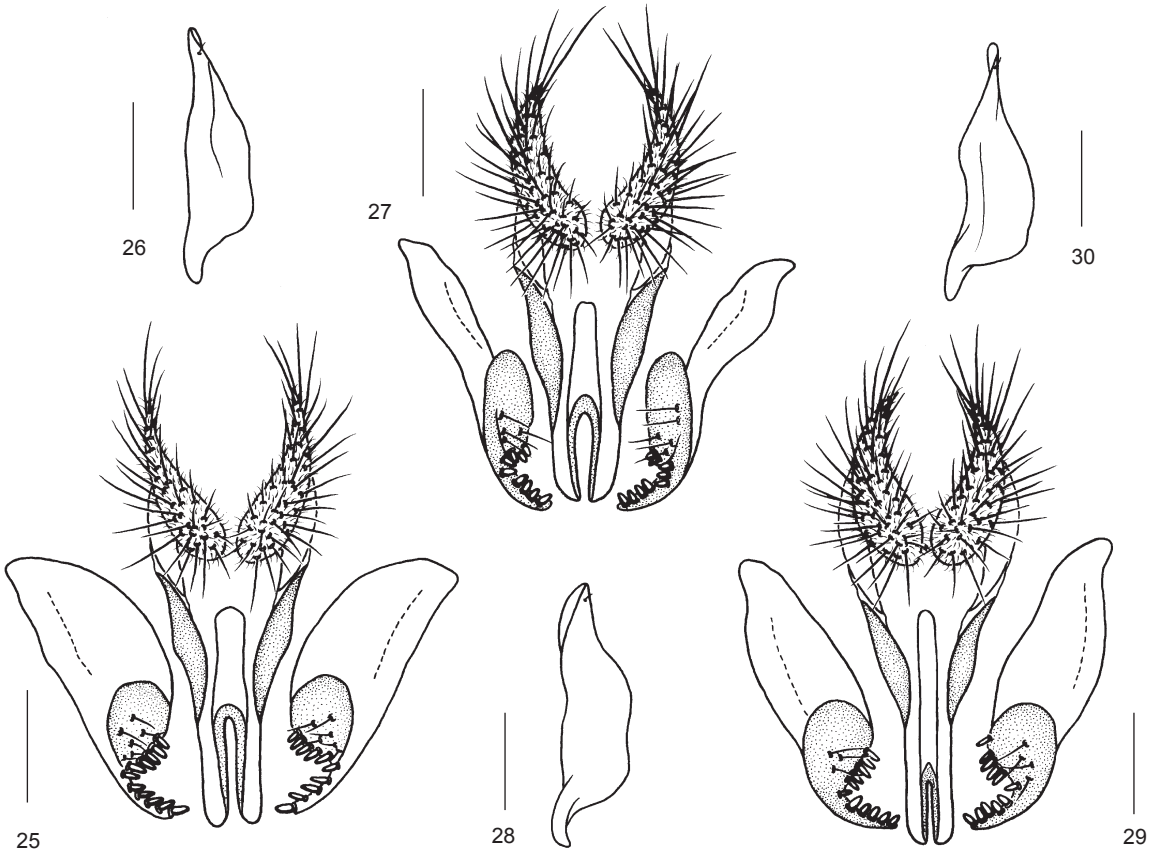
***Pararhinoleucophenga setipes* sp. nov.**

(Figs. 2, 9, 29, 30)

Diagnosis: Fore tarsomeres I to V respectively each with 5, 8 or 9, 6, 5, and 4 long suberect setae on anterior surface (Fig. 9).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male and female. Eye brownish-red. Face and facial carina brown. Palpus yellowish-brown, with dense thin setae. Thorax and scutellum yellowish-brown, with thin brown pollinosity, without dark patches. R_{4+5} without setae on basal section. Legs mostly yellow. Abdominal tergites II to VI yellow laterally, brown medially. Male terminalia. Surstylus distally with ca. 11 prensisetae on inner margin (Fig. 29). Ventral process of cercus rounded apically, dehiscent part slightly shorter than 1/3 as long as full length (Fig. 29). Paramere distally narrowed, round lobe-like (Fig. 30).

Measurements: BL = 3.24 mm in holotype (range in 4 ♂♂, 5 ♀♀ paratypes: 3.10-3.55 mm in ♂, 3.56-4.15 mm in ♀), ThL = 1.85 mm (1.70-1.93 mm in ♂, 1.78-1.85 mm in ♀), WL = 3.44 mm (3.20-3.76 mm in ♂, 3.48-3.84 mm in ♀), WW = 1.50 mm (1.41-1.65 mm in ♂, 1.45-1.65 mm in ♀). Indices. arb = 5/5 (6/4-5), avd = 1.00 (0.80-1.00), adf = 1.00 (1.00-1.23), flw = 1.93 (1.77-2.14), FW/HW = 0.42 (0.42-0.44), ch/o = 0.08 (0.07-0.09), prorb = 1.13 (1.05-1.24), rcorb = 0.79 (0.68-0.79), vb = 0.70 (0.68-0.77), dcl = 0.51 (0.49-0.64), presctl = 0.62 (0.64-0.71), sctl = 1.20 (1.10-1.33), sterno = 0.80 (0.74-0.83), orbito = 1.86 (1.55-1.90), dcp = 0.32 (0.26-0.38), sctlp = 1.19 (1.05-1.25), C = 4.18 (3.93-4.41), 4c



Figs. 25-30. 25, 26. *Pararhinoleucophenga furcila* sp. nov. ♂. **27, 28.** *P. setifrons* sp. nov. ♂. **29, 30.** *P. setipes* sp. nov. ♂. **25, 27, 29.** Surstyli and cerci. **26, 28, 30.** Parameres. (For orientation and scale lines see figures 10-16).

= 0.54 (0.52-0.58), 4v = 1.66 (1.51-1.69), 5x = 1.21 (0.96-1.26), ac = 2.94 (2.70-3.43), M = 0.43 (0.35-0.44), C3F = 0.78 (0.70-0.83).

Holotype: ♂ (SCAU, no. 120103), labeled "Wuliangshan, Nanjian, Yunnan, CHINA, 24°41'N, 101°25'E, elev. 1300 m, 26 July 2006, on tree trunk, HZ Cao". Paratypes: 7 ♂♂, 4 ♀♀, same data as for holotype except for: 25-28 July 2006, colls. HL Cao, HZ Cao, and T Li (2 ♂♂, 2 ♀♀ in KIZ; 5 ♂♂, 2 ♀♀ in SCAU, nos. 120104-10).

Etymology: A combination of the Latin words: *seta* and *pes*, referring to the tarsus of the foreleg with its long suberect setae.

Distribution: China (Yunnan).

III. The *minutobscura* species group

Pararhinoleucophenga minutobscura sp. nov.
(Figs. 3, 31-35)

Diagnosis: Body color black; body size smaller than 2.0 mm; palpus with a few small setae; C3F < 0.5; epandrium evidently expanded posteromedially (Fig. 31); cercus narrowed, with small ventral process, apically not notched (Fig. 32); aedeagus basally round and distally nearly triangular in lateral view, glabrous, with 2 small sclerotized projections ventromedially (Figs. 33, 34).

Description: Some characters commonly seen in *P. maura* are not referred to in the following description. Male. Eye dark brown. Frons, frontal vitta, pedicel, 1st flagellomere, face, facial carina, clypeus, palpus, gena, and postgena black. Palpus with several short setae lateroventrally. Thorax and scutellum black, with dense gray pollinosity. R_{4+5} without setae on basal section. Halteres black. Legs entirely black; fore tarsus without distinct long suberect setae on anterior surface. All abdominal tergites and sternites nearly entirely black. Male terminalia. Epandrium with ca. 20 setae near posterior to ventral margin on each side of body, lacking setae near anteroventral corners (Fig. 31). Surstylus expanded submedially, with 5 prensisetae on inner margin of distal part, lacking setae on outer surface (Fig. 32). Hypandrium posterolaterally without pubescence; vertical flaps of hypandrium distally with a few wrinkles and sporadic setulae (Figs. 33, 34). Posteromedian plate of gonopod somewhat rounded distally (Fig. 35). Paramere expanded subapically in lateral view, with a few pits (Figs. 33, 34). Aedeagal apodeme curved dorsad in lateral view (Fig. 34).

Measurements: BL = 1.83 mm in holotype; ThL = 0.97 mm; WL = 1.78 mm; WW = 0.80 mm. Indices. arb = 4/4, avd = 0.85, adf = 1.62, flw = 2.00, FW/HW = 0.40, ch/o = 0.03, prorb = 0.62, rcorb = 0.71, vb = 0.75, dcl = (damaged), presctl = (damaged), sctl = (damaged), sterno = (damaged), orbito = 1.09, dcp = (damaged), sctlp = (damaged), C = 2.58, 4c = 0.95, 4v = 2.05, 5x = 2.32, ac = 4.64, M = 0.74, C3F = 0.45.

Holotype: ♂ (SCAU, no. 120111), labeled "Diaoluoshan, Lingshui, Hainan, CHINA, 18°10'N, 108°52'E, elev. 1000 m, 18 May 2005, on tree trunk, coll. HW Chen".

Etymology: A combination of the Latin words: *minutus* + *obscurus*, referring to the small body and black color.

Distribution: China (Hainan).

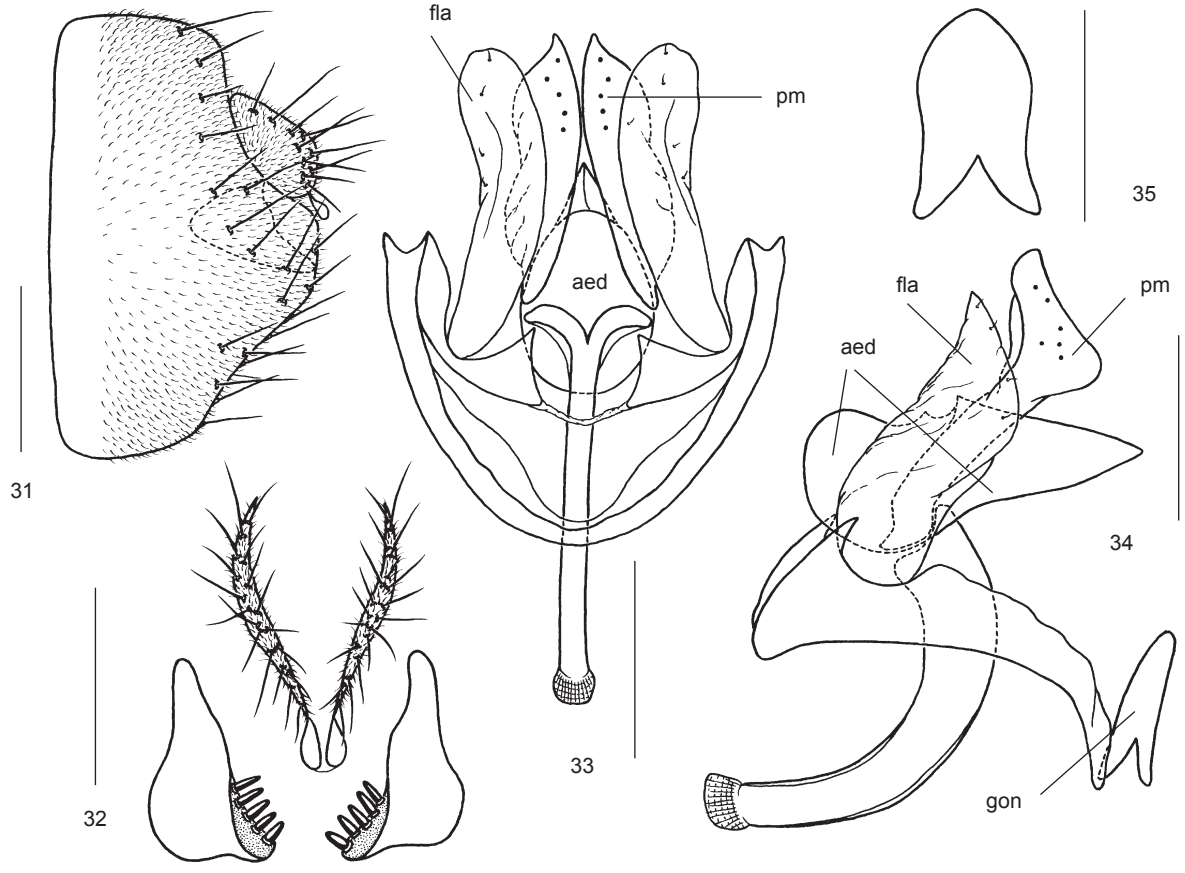
DISCUSSION

Morphological link of *Pararhinoleucophenga* to allied genera

Okada (1989) proposed subdividing the family Drosophilidae into 7 tribes based on taximetric analysis of 14 morphological characters. As a result, 2 tribes, i.e., Steganini and Leucophengini, were established in the subfamily Steganinae. Among those genera assigned to the latter tribe, *Pararhinoleucophenga* was recorded from the Oriental region and *Rhinoleucophenga* Hendel, 1917 from the Neotropical and Nearctic regions. However, Grimaldi (1990) placed *Pararhinoleucophenga* in the tribe Gitonini (without designating a subtribe), although he studied no material of this genus. Nevertheless, Grimaldi (1990) also noted at the same time that "the bilobed, brushy distiphallus, plus the presence of pegs on the distal part of the costal vein, indicate placement of this genus in tribe Steganini, perhaps in subtribe Leucophengina". Actually, *Pararhinoleucophenga* shows great morphological affinities to the genus *Leucophenga*, particularly in that the genera share the following characters: narrow and parallel frons, plumose arista, slender palpus, narrow gena (Fig. 10), bm-cu crossvein absent (Figs. 1-3); costal vein with a few heavily sclerotized hooked peg-like spines on ventral surface between R_{2+3} and R_{4+5} (Figs. 1-3); and aedeagal apodeme long (Figs. 13, 14, 19, 22, 23, 33, 34).

Relationships within the genus *Pararhinoleucophenga*

Based on the morphological characters (see the key to species for details), the 9 species of the genus *Pararhinoleucophenga* were assigned to 3 species groups: the *P. maura*, *P. minutobscura*, and *P. nuda* species groups. Among these 3 groups, the *maura* group has the southernmost distribution range, is characterized by the presence of setae on the basal section of the wing R_{4+5} vein, and C3F = 1. The minutobscura group with a single species is distinct from the others in its black body color and small body size. The *nuda* group appears to be a compact assemblage with respect to almost indistinguishable male terminalia among the 6 species of this group, although they can be separated by the morphology of the fore tarsus (Figs. 4-9), cercius, and paramere (Figs. 25-30). Among the 6 species of this group, *P. meichiensis* resembles *P. nuda* in the fore tarsus with small (as long as 1/2 tarsomere width) suberect setae on the anterior surface. But in *P. meichiensis*, the fore tarsomeres II to IV each has 2 shorter suberect setae (Fig. 5); in *P. nuda*, fore tarsomeres II to IV each has 1 shorter suberect setae. The new species, *P. alafumosa* sp. nov., is somewhat similar to *P. meichiensis* and *P. nuda* in body color, but can be distinguished from them by fore tarsomeres III and IV having 2 subequal, suberect setae on the anterior surface. On the other hand, *P. alafumosa* is also similar to *P. setifrons* sp. nov. in the fore tarsomere I apically having 1 and tarsomeres III and IV distally each having 2 suberect setae. The new species, *P. furcila* sp. nov., resembles another new species, *P. setipes* sp. nov., in the fore tarsomere I having 4 or 5 suberect setae basally to apically on the anterior surface, but can be distinguished from it by the fore tarsomeres II and IV; in *P. furcilla*, fore tarsomeres II to IV each have 2 suberect setae; in *P. setipes*, fore tarsomeres II to V respectively have 8 or 9, 6, 5, and 4 suberect setae.



Figs. 31-35. *Pararhinoleucophenga minutobscura* sp. nov. ♂. **31.** Epandrium, surstylus, and cercus; **32.** surstyli and cerci; **33.** hypandrium, parameres, gonopods, aedeagus, and aedeagal apodeme; **34.** ditto; **35.** gonopods. Scale bars = 0.1 mm.

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