

The Schistopterinae of Indonesia and New Guinea (Tephritidae: Diptera)

D. ELMO HARDY^{1,2}

ABSTRACT

The subfamily Schistopterinae is revised for Indonesia including all of Borneo and for New Guinea and adjacent islands of the Bismarcks and Solomons. Three genera and 10 species are treated, *Pararhabdochaeta* is described as a new genus and *P. albolineata* as a new species. *Pararhabdochaeta convergens* (Hardy) is a new combination.

Subfamily Schistopterinae

This subfamily is characterized by the distinctive wing features: having a deep cleft in costa at end of vein Sc, and with a prominent lobe bearing the 2 costal bristles at end of 2nd costal section; the wing markings consisting of radiating dark lines extending to costa along anterior and usually apical margins (Fig. 6b); center of wing brown with reddish bullae (shining areas) in cells R₅ & M₂; cell Sc very short, usually higher than long with vein R₁ ending before level with r-m crossvein; no distinct lobe at apex of cell Cu; head with pale yellow-white, flattened, scalelike ocellar, postocellar and outer vertical bristles and (except in *Schistopterum* Becker and *Pararhabdochaeta* n. genus) with flattened interfrontal bristles and with some flattened, modified, inferior fronto-orbital bristles.

Parallel evolution of the distinctive schistopterine wing markings has occurred in the Tephritinae genera *Acrotaeniacantha* Hering; *Neorhabdochaeta* Malloch; *Paracantha* Coquillett and *Noeeta* Robineau-Desvoidy in the new world and Palaearctic regions and a new genus of Trypetinae from New Britain (Hardy, in press).

The subfamily is of African origin, with 10 genera occurring in the Ethiopian region. One of these, *Rhabdochaeta* de Meijere is widespread over the tropics of the world except for the Neotropical region, 1 species of *Schistopterum* is now known from New Guinea (Hardy 1982) and 1 new genus, *Pararhabdochaeta* is herein described. Three genera and 10 species are presently known from Indonesia-New Guinea.

Apparently all breed in the flowerheads of Compositae.

KEY TO GENERA AND SPECIES OF SCHISTOPTERINAE KNOWN FROM INDONESIA AND NEW GUINEA

1. Veins R₄₊₅ and M₁₊₂ only slightly diverging or nearly parallel at apices; vein R₂₊₃ ending near apical ¼ of wing; cell Sc longer than high; with brown rays through apex of wing (Fig. 7b); ocellar bristles situated outside ocellar triangle, slightly anterior to median ocellus 2
- R₄₊₅ and M₁₊₂ widely diverging at apices; R₂₊₃ ending at middle of wing; cell Sc extremely narrow; no brown rays in apex of wing (Fig. 1); Ocellar bristles situated in the margins of the triangle posterior to median ocellus *Schistopterum ismayi*

¹Journal Series No. 2848 of the Hawaii Institute of Tropical Agriculture and Human Resources.

²Senior Professor of Entomology, Emeritus, University of Hawaii, Honolulu, Hawaii, 96822.

- 2(1). Third antennal segment slender, 3 or more times longer than wide and drawn out into a slender point at apex; front femur not with a row of posteroventral spines; interfrontal bristles present; upper inferior fronto-orbital bristles usually flattened, often lanceolate. *Rhabdochaeta* 3
 Third antennal short, not much longer than wide and with an acute point at upper apex (Fig. 3b); front femur with a row of 6-11 short black posteroventral spines before apex; wings with 4 black marks through cell R_1 in addition to the marks at base and apex of cell and with seven pale, subhyaline lines extending longitudinally across wing at level with cell Sc (Fig. 2b); no flattened bristles on front. *Pararhabdochaeta* n. genus 8
- 3(2). The radiating rays along anterior margin of wing are broad, consisting of a white streak through middle bordered by brown on each side (Fig. 7b) 4
 The dark rays to wing margin consist of narrow brown to black streaks 5
4. With 2 complete brown rays through 2nd costal cell, no bulla in cell 2nd M_2 and vein M_{1+2} only slightly convex beyond m crossvein (Fig. 8); apical $\frac{1}{2}$ of 5th tergum of ♂ polished black. Timor. *tribulosa*
 With only 1 ray through 2nd costal; with a large reddish bulla in upper basal portion of cell 2nd M_2 and with vein M_{1+2} sharply curved upward above the bulla (Fig. 7b); abdomen entirely opaque brownish yellow. Java. *pulchella*
- 5(3). One pair of dorsocentral bristles situated near the suture; only 1 ray through middle of cell R_1 ; vein M_{1+2} strongly upcurved just beyond m crossvein and with a red bulla in basal portion of cell 2nd M_2 6
 Two pairs of dorsocentrals, 1 presutural and 1 postsutural; 2 rays through R_1 ; vein M_{1+2} only slightly upcurved and no red bulla in 2nd M_2 (Fig. 9c). Indonesia, New Guinea, Southeast Asia *venusta*
- 6(5). Brown ray in apex of cell R_5 incomplete, isolated (Fig. 4b); only 1 pair of interfrontal bristles 7
 With a long, complete ray through middle of R_5 (Fig. 5b); 2 pairs of interfrontal bristles. Solomon Islands, New Britain, New Guinea *cockeri*
- 7(6). Only 1 brown ray through middle of cell R_3 (Fig. 4b); with a brown mark on upper parafacial. Widespread over Oriental region, Japan, Ryuku Islands *asteria*
 Two rays through cell R_3 and face all pale yellow. Thailand, Philippines, Malaysia Barat and Sarawak *multilineata*
- 8(2). Wing lacking longitudinal lines of white through middle; abdomen entirely gray pollinose 9
 With longitudinal white lines through basal cell R_1 and R_3 , basal radial and 1st M_2 (Fig. 2b); 5th tergum of ♂ and 6th in ♀ polished black, the latter 2× longer than 5. Irian Jaya *albolineata* n. sp.

- 9(8). Cell R_1 with 1 narrow and 1 broad brown band; apex of cell R_5 hyaline except for brown rays along apices of veins R_{4+5} and M_{1+2} (Hardy, 1974:213, Fig. 121a). Philippines *brachycera*
 Cell R_1 with 2 narrow brown rays and with 2 in R_3 ; R_5 with a short incomplete brown ray in middle at apex and with converging rays not extending along veins R_{4+5} and M_{1+2} (Fig. 3c). Philippines, Sabah, Java. *convergens*

Genus *Schistopterus* Becker

Schistopterus Becker, 1903, Mitt. Zool. Mus. Berlin 2:137. Type-species, *moebiusi* Becker.

Differentiated from *Rhabdochaeta* by having veins R_{4+5} and M_{1+2} widely diverging at apices; vein R_{2+3} ending at middle of wing and 4th costal section unusually short, about $\frac{1}{4}$ as long as 5th; vein R_1 ending just beyond apex of vein Sc, the 2 scarcely separated at apices so cell Sc is extremely narrow, scarcely discernible; only 4 brown rays in wing, and none in apical portion; head with frontal bristles not modified and only ocellar, postocellar and outer vertical bristles flat and white; lacking interfrontal bristles; ocellar bristles small, and arising in triangle slightly posterior to median ocellus; palpi broad, expanded and not fringed with short black setae and prescutellar bristles normal in position, situated opposite postalar.

Three known species, 1 widespread over Africa and Israel, 1 from Kenya and 1 from Papua New Guinea.

Biology. The larvae infest the flowerheads of Compositae.

For a more detailed discussion of the genus and key to known species refer to Hardy (1982).

Schistopterus ismayi Hardy

Fig. 1

Schistopterus ismayi Hardy, 1982, Proc. Hawaii. Entomol. Soc., 24:88. Type-locality: 27 km SE Port Moresby, Papua New-Guinea. Type ♂ in BPBM.

Differentiated from other known species of the genus by having the clypeus black; the Y-shaped mark in apical portion of wing with a broad stem, extending through upper portion of cell 1st M_2 ; by having only 5–6 small hyaline spots in posterobasal portion of wing (Fig. 1) and spur at apex of mid tibia dark brown to black rather than pale brownish yellow. For more descriptive details and figure of head and ♂ and ♀ reproductive structures refer to Hardy (1982).

Distribution. Papua New Guinea.

Specimens examined. Type-series.

Pararhabdochaeta n. genus

Differing from *Rhabdochaeta* by having the 3rd antennal segment short, about as wide as long; arista bare or only microscopically pubescent; no interfrontal bristles; palpi lacking flat black scalelike setae along posterodorsal and posteroventral margins; upper inferior fronto-orbital bristles normal in shape, not broad and flattened; front femur with a row of 6–11 short, black, preapical, posteroventral spinules; prescutellar bristles approximately in line with dorsocentrals; apical scutellars moderately developed and with a pair of small white dorsal bristles situated near middle of disc; cleft in costa at end of vein Sc less distinct and with less prominent lobe than in *Rhabdochaeta*; vein M_{1+2} only slightly convex beyond m crossvein, and

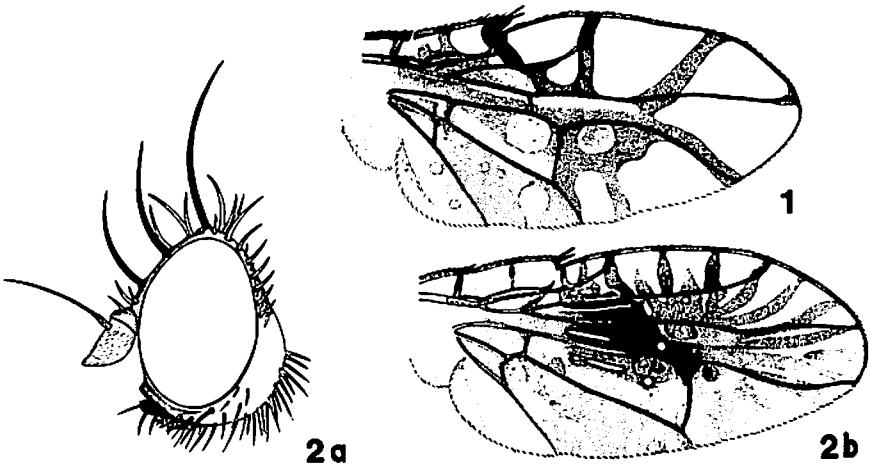


FIGURE 1. *Schistopterum ismayi* Hardy, wing.

FIGURE 2. *Pararhabdochaeta albolineata* n. sp.: a, head; b, wing.

cell Cu terminating in a short acute lobe at lower apex (Fig. 2b). Otherwise fitting characteristics of *Rhabdochaeta*.

Type of genus *Rhabdochaeta convergens* Hardy.

Three known species.

The generic epithet is from the Greek *para*, equals by or near, combined with *Rhabdochaeta*.

Pararhabdochaeta albolineata n. sp.

Fig. 2a-b

Readily differentiated from other known species by having white longitudinal lines extending through basal cells R₁, R₃, basal radial and cell 1st M₂; by having a complete brown band through middle of cell Sc and other details of wing markings as in Fig. 2b; by having brown spots at bases of dorsocentral and prescutellar bristles; 5th tergum of ♂ and 6th of ♀ polished black with the latter 2× longer than 5th segment.

♂. *Head*: Shaped as in Fig. 2a. With 2 pairs moderately strong, yellow-brown, inferior fronto-orbital bristles and 2 pairs rather small, erect, white bristles situated side by side, arranged transversely in line with upper basal margins of antennae; latter represent lower inferior fronto-orbital with 1st bristle slightly displaced. Inner vertical bristles brown at bases, yellow, slightly tinged with brown apically and genal bristles black, all other head bristles white. Superior fronto-orbitals, ocellars, and postorbital bristles slightly flattened, Tephritinae-like and with a few short black setae interspersed among occipitals. Lower superior fronto-orbitals situated just slightly above a line drawn between upper inferior fronto-orbitals. Front about as wide as long and subequal in width to 1 eye. Third antennal segment about as wide as long, shaped as in Fig. 2a. Palpi small, about 3× longer than wide, mostly yellowish, tinged with brown over ventral portion and with scattered, short, black setae over posterior margin and mostly pale yellow-white setae on anterior margin. *Thorax*: Black in ground color except for yellow on lower portion of each humerus, over notopleura and tinged yellow to rufous around margins of scutellum, densely gray pollinose and yellow-white setose. Prescutellar bristles situated about $\frac{2}{3}$ dis-

tance between postalars and supraalars and dorsocentrals situated in line with suture. With a distinct brown pollinose mark at base of each bristle on median portion of dorsum. Acrostichals not conspicuously developed. *Legs*: Predominantly yellow, tinged with brown to blackish on basal halves of mid and hind femora. Six-7 short, brown, preapical, posteroventral spinules on each front femur and with a row of about 4 yellow-white posteroventral bristles along basal $\frac{2}{3}$ of segment. Apical spur of mid tibia brownish yellow, almost $\frac{2}{5}$ as long as basitarsus. *Wings*: As noted above as in Fig. 2b: with 2 complete + 2 incomplete brown rays in cell R_1 ; 2 complete rays in middle of cell R_3 ; 1 short ray in middle of apex of cell R_5 connected with lower of converging rays through cell R_5 from apices of vein R_{4+5} and M_{1+2} ; with a broad brown ray extending along vein M_{1+2} into upper apical portion of cell 2nd M_2 ; with 1 rather narrow and 1 broad ray extending to margin through middle of 2nd M_2 ; last sections of veins R_{4+5} and M_{1+2} slightly converging in apex of wing and M_{1+2} only gently convex beyond m crossvein; with 3 reddish bullae in middle of wing + a small reddish bulla in lower basal portion of cell 1st M_2 ; apex of cell Cu extended into a short acute lobe on lower margin; vein R_{4+5} sparsely setose to level about half way to r-m crossvein. *Abdomen*: Mostly rufous in ground color over terga 1+2 with brown to blackish discoloration over median portion, 3rd tergum narrowly rufous on basal margin, otherwise opaque black and 4th tergum opaque black. Fifth tergum polished black and about equal in length to terga 2-4. Yellow setose over 1st two terga and over sides of terga 3-4 and with moderately strong yellow-white bristles around margin of 5th tergum, with short black setae over middle of terga 2-3 and over all of tergum 5. Genitalia not dissected for study, *in situ* predominantly dark brown to black with short thick surstyli.

Length: body 2.5 mm; wings 2.2 mm.

♀. Fitting description of ♂ except apical ray through middle of cell R_5 not joined with converging rays (Fig. 2b). Terga 1-5 densely gray pollinose, tergum 6 polished black. First 3 terga entirely white setose, 4-5, and 6 with short black setae except for a row of moderately strong white bristles at apex of 6th. Sixth tergum 2× longer than 5th. Basal segment of ovipositor predominantly rufous, tinged with brown to black at apex and about equal in length to 6th tergum. Ovipositor not relaxed for study.

Length, body, excluding ovipositor, 2.56 mm; wings 3.36 mm.

Holotype ♂ (BPBM), IRIAN JAYA: Guega, W Swart val, 1200 m, 15.XI.1958, J.L. Gressitt. Allotype ♀ (BPBM), IRIAN JAYA: Wisselmeren, Enarotadi, 14.VII-4.VIII.1962, J. Sedlacek.

The specific epithet is from the Latin *albus*, equals white, combined with *lineatus*, equals lined; alluding to the white longitudinal lines through middle of wings.

Pararhabdochaeta convergens (Hardy), New Combination Fig. 3a-c

Rhabdochaeta convergens Hardy, 1974, Pac. Insects Monogr. 32:214. Type locality: Abatan, Luzon, Philippines. Type ♀ in BPBM.

Differentiated from other known species by the characters given in the key above and as discussed under *albolineata* n. sp.

Head slightly higher than long with face gently concave in lateral view and with a weak carina extending down upper median portion. Bristles all yellow-white except for brownish yellow upper inferior fronto-orbitals and inner verticals. With 4 pairs inferior fronto-orbital bristles and with lower superior fronto-orbitals situated just slightly posterior to a line drawn between upper inferior bristles. Ocellar bristles situated distinctly outside, and slightly anterior to, ocellar triangle. Front entirely bare. Antennae yellow with a faint tinge of brown on apical portion of 3rd segment.

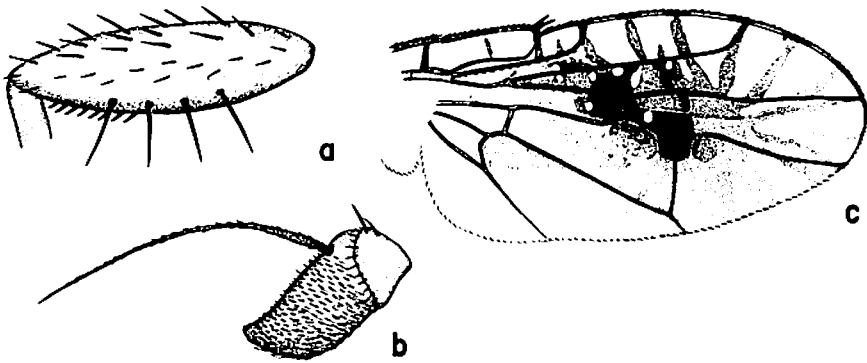


FIGURE 3. *Pararhabdochaeta convergens* Hardy: a, front femur, posterior view; b, antenna, lateral view; c, wing.

Third segment just slightly longer than wide, straight on dorsal margin, rounded on ventral margin and terminating in an obtuse point at upper apex (Fig. 3b). Palpi rather small, with inconspicuous scattered yellow and black setae around margins. Thorax mostly brown to blackish in ground color, yellow on humeri, notopleura and broad margins of scutellum. Densely gray pollinose and yellow-white setose and with bristles predominantly yellow, tinged with brown at bases. Prescutellars situated about $\frac{1}{2}$ distance from postalar to supraalar bristles and approximately in line with dorsocentrals. Dorsocentrals situated on suture.

With 4 scutellar bristles, apical pair about $\frac{1}{2}$ as long as basal pair and with a pair of erect white setae in middle of disc. Legs yellow. Front femur with a row of 7–9 preapical dark brown to black posteroventral spinules (Fig. 3a). Wings very similar to some species of *Rhabdochaeta*. With narrow brown rays extending to margin: 2 in middle portion of cell R_1 , 2 in cell R_3 , and 1 interrupted ray in apex of cell R_5 . Cell R_5 with 2 converging brown lines extending from apices of veins R_{4+5} and M_{1+2} , joining together in brown marking of middle of wing (Fig. 3c). Vein M_{1+2} only slightly convex beyond m crossvein. With 3 shining brown bullae in middle of wing and with other markings as in Fig. 3c. Cell Cu extending as a short acute lobe at apex. Abdomen predominantly yellow in ground color rather densely gray pollinose and with paired submedian brown spots on terga 4–5. Fifth sternum of ♂ about 2× longer than wide and with a broadly U-shaped concavity in middle of hind margin. ♂ genitalia as in Hardy, 1974:215, Fig. 122 d-f, with surstyli short and broad, blunt at apex. ♀ with 6th tergum about equal in length to 5th and basal segment of ovipositor about 2× longer than wide, shining dark brown to black in color and as seen *in situ* just slightly longer than terga 5+6. Spiracular openings situated near basal $\frac{2}{5}$ of 7th segment. Piercer slender, tapered to a sharp point at apex and with no preapical setae (Hardy 1974:215, Fig. 122b).

Length: body 2.4–2.6 mm; wings 2.75–3.0 mm.

Distribution. Philippines, North Borneo (Sabah), Java.

Specimen examined. Type-series; ca. 20 specimens SABAH: Tenopok, 48 km E Jesselton, 1460 m, 10–31.I, 10–19.II.1959., T.C. Maa. JAVA: Bogor, 27–28.IV.1954, collected at light, A.H.G. Alston.

Genus *Rhabdochaeta* de Meijere

Rhabdochaeta de Meijere, 1904, Bijdr. Dierk. 18:109. Type-species, *pulchella* de Meijere.

Readily characterized from all other fruit flies from the Oriental or Australasian regions by the subfamily characters given above. Differentiated from *Schistopterum* Becker by having veins R_{4+5} and M_{1+2} parallel or nearly so; vein R_{2+3} extending to apical 1/4 or 1/5 of wing and with numerous brown rays extending to costa around margin of wing; vein R_1 ending well beyond Sc and cell Sc longer than high; by having the head bristles mostly or entirely flattened and yellow-white and with inferior fronto-orbitals strong and usually flattened; ocellar bristles strong and situated distinctly outside of ocellar triangle; palpi slender, fringed with short black setae on margins and prescutellar bristles anterior to postalar and almost in line with dorsocentrals.

Head nearly quadrate in shape. Arista comparatively short and thick, short pubescent. Front broad, equal or wider than eye with 1 or 2 pairs of interfrontals. Third antennal segment drawn out to a slender point at apex, 3 or more \times longer than wide. Vein R_{4+5} setose above at least to r-m crossvein and sometimes beyond m. Cell Cu variable, from straight, subacute at lower apex to drawn out to short acute lobe. Front femur with about 5 posteroventral bristles extending over length of segment. Thorax and abdomen predominantly densely gray pollinose and white setose except for polished black apical portion of abdomen in *venusta* de Meijere. Four to 6 scutellar bristles present and 1 or 2 pairs of dorsocentrals, if with 1 pair, bristles situated in line with suture, if 2 pairs, anterior situated in line with presuturals. Sixth tergum of ♀ variable in length from slightly shorter than to 2 or more \times longer than 5th (*venusta*). ♀ piercer slender, sharp pointed and lacking preapical setae and with 2 oval to oblong spermathecae. Vanes of ♂ aedeagal apodeme widely forked. For a detailed description of genus refer to Shiraki (1933:483).

Twenty-seven species and 1 subspecies have been recorded to date, 7 species and 1 subspecies are Afrotropical and the remainder are widespread over the Oriental and Australasian regions. Six species are presently known from the regions treated in this study.

Rhabdochaeta asteria Hendel

Fig. 4a-b

Rhabdochaeta asteria Hendel, 1915, Ann. Hist. Nat. Mus. Natl. Hung. 13:462.

Type-locality: Tainan, Taiwan. Type ♂ in TMB.

Fitting in a complex of species near *multilineata* Hering by having marginal rays brown, a prominent red bulla in upper basal portion of cell M_2 and vein M_{1+2} strongly convex just distad of m crossvein; having only 1 complete ray thru middle

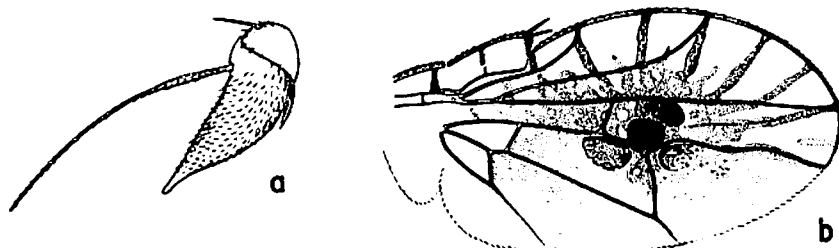


FIGURE 4. *Rhabdochaeta asteria* Hendel: a, antenna; b, wing.

of cell R_1 ; only 1 pair of interfrontal bristles; and with 1 pair of dorsocentrals, situated on suture. It is differentiated from *multilineata* by having only 1 brown ray thru middle of cell R_3 , rather than 2; by having a short streak of brown on each parafacialia, just opposite lower margin of antennal base and by having a pale brown preapical ring on each femur.

Otherwise fitting description of *multilineata* with antennae as in Fig. 4a and wing as in Fig. 4b. Two upper inferior fronto-orbital bristles only slightly flattened, not as broad as in some species. Apical scutellars tiny, setaelike, pale yellow-brown in color, preapical white dorsal bristles moderately strong, about $3/5$ as long as basal bristles. With faint rings of brown on femora and near bases of hind tibiae. Abdomen pale brown thru median portion of terga, with a narrow yellow longitudinal vitta extending longitudinally down middle. Entirely gray pollinose except with apical $1/3$ of ♂ 5th tergum polished reddish yellow and 6th tergum of ♀ polished reddish brown except for gray pollinose basal corners. ♂ genitalia not studied. ♀ ovipositor predominantly shining yellow, reddish brown on basal $1/3$, $2\times$ longer than wide and approximately equal in length to terga 4–6. Ovipositor not extended for study. Sixth tergum about equal in length to 5th.

Length: Body and wing 2.4–3.0 mm.

Distribution. Widespread over Oriental region, Japan and Ryukyu Islands, as recorded by Hardy 1973:289.

Specimens examined. Numerous specimens from over range of species. One ♀ PNG: NEW GUINEA (NE): Kandangei, Sepik Riv, 2.III.1964, D.H. Colless.

Biology. Breeds in flower heads of *Wedelia* and *Blumea*.

Rhabdochaeta cockeri Curran

Fig. 5a-e

Rhabdochaeta cockeri Curran, 1936, Proc. Cal. Acad. Sci. 22(1):28. Type-locality: Matema Island, Solomon Islands. Type ♀ CAS.

Fitting in species group characterized by having the 3rd antennal segment slender, 3 or more \times longer than wide and drawn out into a slender point at apex and the dark rays on anterior margin of wing consisting of narrow brown to black streaks as in Fig. 5b. By having vein M_{1+2} strongly curved upward around the red bulla just distad of m crossvein in upper basal portion of cell 2nd M_2 and only 1 brown ray through middle of R_1 , it fits in a complex of species with *multilineata* Hering. It is differentiated by having the brown ray through middle of cell R_3 long and complete and by having 2 pairs of interfrontal bristles.

Head shaped as in Fig. 5a, with front gently sloping, antennae situated near upper $2/3$ of head and face comparatively short, concave in middle and with epistomal margin protruding. All bristles and setae white or yellow-white except for dark brown to blackish 2nd and 4th inferior fronto-orbitals, genal, bases of inner vertical, some short black setae in occipital row and a fringe of black setae on posterodorsal and posteroventral margins of palpi. Four pairs inferior fronto-orbitals with 2nd and 4th pairs modified, flattened, at least $2\times$ wider than other bristles. Two pairs superior fronto-orbitals with lower pair situated at level with or slightly anterior to upper inferior fronto-orbitals. With 2 pairs of interfrontal bristles. Third antennal segment almost straight on dorsal margin, convex on ventral and tapered to a sharp point (Fig. 5a). Palpi pale yellow-white, slender, almost straight sided, about $4\times$ longer than wide, with white setae on anterior surface and with short black setae on posterodorsal and posteroventral surfaces, also a thin line of brown along each ventral margin. Dorsum of thorax dark brown to black in ground color except for

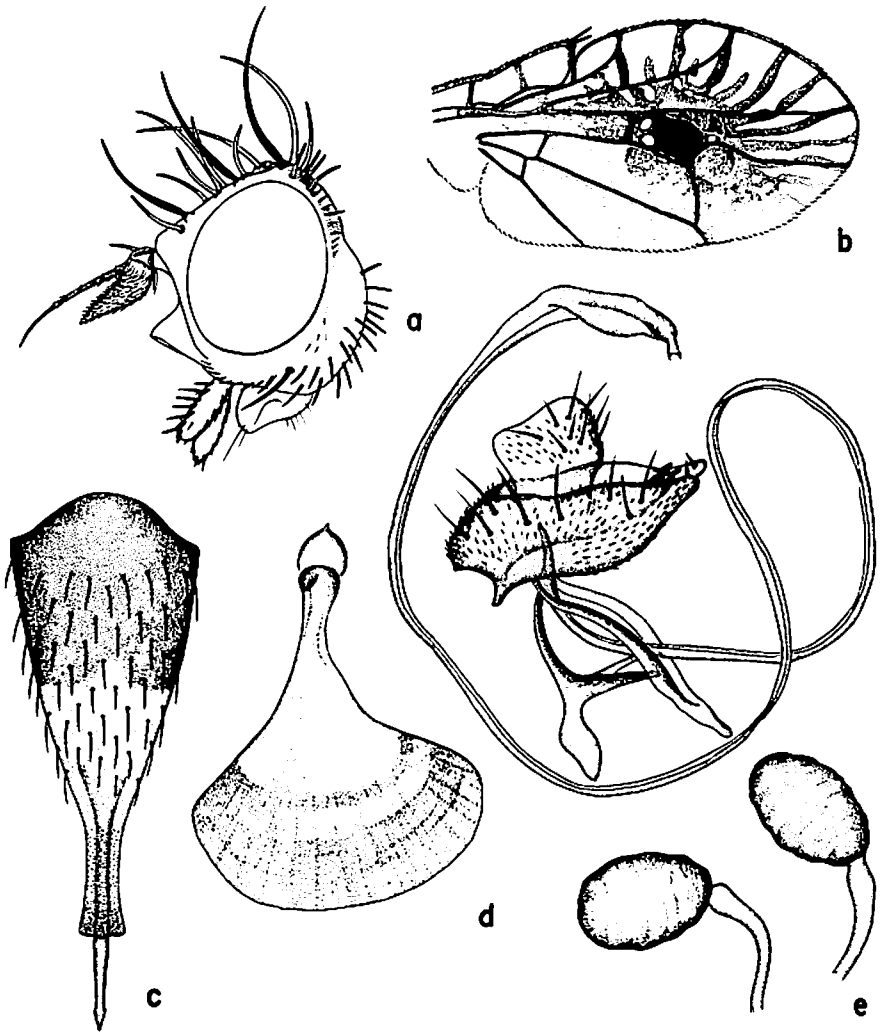


FIGURE 5. *Rhabdochaeta cockeri* Curran: a, head; b, wing; c, ♀ ovipositor; d, ♂ genitalia; e, ♀ spermathecae.

pale yellow humeri, notopleura and sides of suture. Pleura mostly yellow with dark brown to black markings on mesopleura, pteropleura, metapleura and hypopleura. Pleuroterga, metanotum and postscutellum brown to blackish in ground color. Entire thorax densely gray pollinose obscuring ground color. All setae white or yellow-white except for a few scattered, slightly flattened and moderately well developed, brown setae on mesonotum, some almost bristlelike. Bristles of pleura white, those of dorsum mostly brown at bases, yellow-white, tinged with brown at apices. Prescutellar bristles situated halfway between postalar and supraalar and dorsocentrals in line with suture. Apical scutellars white. Scutellum with 6 bristles, 1 small apical pair and 1 moderately large preapical dorsal pair. Legs entirely yellow, lacking brown bands on femora. Front femur with a row of about 5 moderately

strong yellow-white posteroventral bristles extending full length of segment. Mid tibia with a short brownish yellow apical spine. Wings as in Fig. 5b, with 3 shining bullae in middle. One brown ray in middle of cell R_1 , 2 in middle of cell R_3 and 1 complete ray through middle of cell R_5 . Vein M_{1+2} strongly convex just distad of m crossvein. Abdomen mostly brown to blackish in ground color with irregular yellow mottling in middle of terga 2-4 and densely gray pollinose except for subshining apex of 5th tergum in ♂ and broadly shining dark brown to black medium portion of 6th tergum of ♀. ♂ genitalia as in Fig. 5d, with surstyli tapered, sharply pointed at apex and with teeth at apex of 10th sternum plainly visible from lateral view. Distiphallus slender, straight sided, terminating in a thin appendage. Ejaculatory apodeme broad, fan shaped. Sixth tergum of ♀ slightly shorter than 5th. Basal segment of ovipositor predominantly yellow, brown to blackish on basal $\frac{1}{3}$. Spiracular openings situated at basal $\frac{2}{5}$ of 7th segment. Piercer slender, sharp pointed (Fig. 5c). Two oval spermathecae (Fig. 5e).

Length: Body and wings 2.25-2.5 mm.

Distribution. New Britain, New Guinea and Solomon Islands.

Specimens examined. 13 from the following: SOLOMON ISLANDS: Gizo: Gizo, XII.1976, 0-150 m, N.L.H. Krauss; Santa Cruz: Graciosa Bay, XII.1976, 0-50 m, N.L.H. Krauss; and Bougainville (S), Kieta, 27.XI.1959, T.C. Maa. NEW BRITAIN: Gazelle Pen, Baininga: St Paul's, 8.IX.1935, 350 m, J.L. Gressitt. IRIAN JAYA: Biak I: Strand, 24.VI.1959, T.C. Maa. PNG: NEW GUINEA (SE): Central P, 20 km SE Port Moresby, 18.VII.1981, collected on stream bank, J.W. Ismay.

Rhabdochaeta multilineata Hering

Fig. 6a-b

Rhabdochaeta multilineata Hering, 1941, Arb. Morphol. Taxon. Entomol. Berlin-Dahlem 8(1):44. Type-locality: Rana Mese, Flores, Nusa Tenggara. Type ♀ was in ZIUH. 1 ♂, 1 ♀ paratypes in ZMHB 2 ♂, 2 ♀ paratypes BMNH.

Closely related to *asteria* Hendel by having narrow brown rays in margin of wing, ray in apex of cell R_5 incomplete, with only 1 pair of interfrontal bristles and vein M_{1+2} sharply convex just beyond m crossvein. It is differentiated from *asteria* by having 2 rays extending through cell R_3 , not 1 and with a moderately large pair of white apical scutellar bristles, about $\frac{1}{2}$ - $\frac{2}{3}$ size of white preapical setae.

Head shape and bristling typical of most *Rhabdochaeta* and as in *cockeri*. Antennae shaped as in Fig. 6a. One pair of strong interfrontal bristles located in median portion of front. Palpi pale yellow, with a faint tinge of brown on lower margin and with short black setae rather densely placed along posteroventral and posterodorsal margins. Thorax mostly reddish brown in ground color of dorsum, yellow on humeri, sides of mesonotum, scutellum and over pleura and densely gray

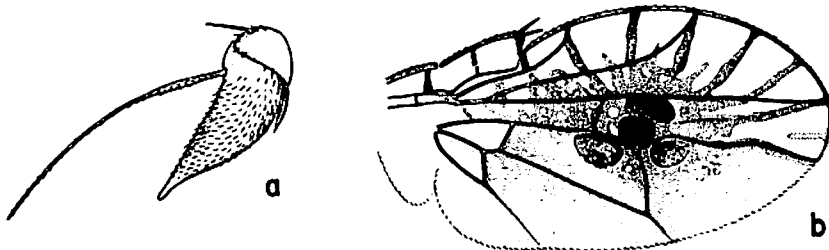


FIGURE 6. *Rhabdochaeta multilineata* Hering: a, antenna; b, wing.

pollinose, with rather abundant large, erect white setae. Prescutellar bristles situated slightly in front of a line drawn between postalars and dorsocentrals situated in line with suture. Apical scutellars brownish yellow, comparatively large, $\frac{1}{2}$ - $\frac{2}{3}$ size of large, white, preapical, dorsal bristles. Preapical dorsals about $\frac{3}{5}$ as long as basal bristles. Legs entirely pale yellow. Wings as noted above as in Fig. 6b. Vein R_{4+5} sparsely setose almost to level with m crossvein. Abdomen brown on sides, broadly yellow medianly. Fifth sternum of ♂ about $\frac{1}{2}$ longer than wide, with hind margin straight. ♂ surstyli rather short, gradually tapered and subacutely pointed at apices. Other details of ♂ genitalia as in Hardy, 1973:292, Fig. 142e. Sixth tergum of ♀ shorter than 5th and ovipositor similar to that of *cockeri*, with basal segment yellow to rufous, about 2× longer than wide and about equal in length to terga 4-6.

Length: Body 2.0-2.5 mm; wings 2.4-2.6 mm.

Distribution. Flores, Nusa Tenggara; Malaysia; Philippines; Thailand.

Specimens examined. Paratype series; and specimens from the Philippines, Thailand and Malaysia Barat as recorded by Hardy (1973:293, 1974:219). Also specimens have been seen from SARAWAK: Sarikei Dist, Rejang Delta, 15-26.VII.1958, T.C. Maa.

Biology. Reared from flowerheads of *Wedelia biflora* in Malaysia.

Rhabdochaeta pulchella de Meijere

Fig. 7a-b

Rhabdochaeta pulchella de Meijere, 1904, Bijdr. Dierk. 18:109. Type-locality: Pasuruan, Java. Lectotype ♀ in ZMUA.

Fitting in the complex of species characterized by having the radiating rays in anterior margin of wing broad, consisting of a white streak through middle, bordered by brown on each side and vein M_{1+2} convex just beyond m crossvein. It appears to fit nearest to *tribulosa* Hering, from Timor, Nusa Tenggara and is differentiated by having only 1 brown ray extending to margin through 2nd costal cell, not 2; having a large shining red bulla in upper basal portion of cell 2nd M_2 just distad of m crossvein and last section of vein M_{1+2} distinctly convex above bulla, rather than lacking such a bulla and M_{1+2} only slightly convex; brown ray through middle of apex of cell R_5 incomplete, isolated, rather than joined with the brown ray extending along vein M_{1+2} ; abdomen entirely yellow to pale brownish yellow in ground color, densely covered with gray pollen, not brown to blackish in ground color with 5th tergum (♂) polished black on apical $\frac{1}{2}$; also 3rd antennal segment comparatively elongate, gradually tapered to a slender sharp point (Fig. 7a), rather than egg shaped at base and rather abruptly tapered to a slender point at apex.

Predominantly pale yellow to rufous species with metanotum brown in ground color. Head shaped as in other species of genus with upper inferior fronto-orbital

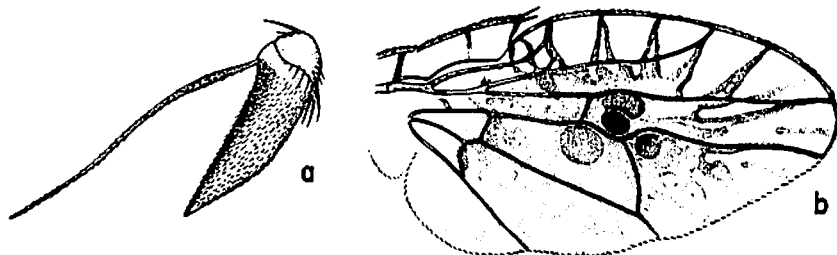


FIGURE 7. *Rhabdochaeta pulchella* de Meijere: a, antenna, b, wing.

bristles broad, flat, lanceolate. Upper 2 pairs of inferior fronto-orbitals, inner verticals, and genal bristles brown, other bristles yellow-white. Antennae long and slender, as noted above, and as in Fig. 7a. Palpi slender, tapered to a point at apex and narrowly tinged with brown along dorsal and ventral margins. Two pairs of moderately strong scutellar bristles, apical pair white and basal bristles brownish yellow. Legs mostly pale yellow, mid and hind femora each with a brown to blackish prebasal band and a similar band near middle of segment. Wings as noted above and as in Fig. 7b, with brown rays in anterior margin cone shaped enclosing a white area, with 2 rays each through middle of cells R_1 and R_3 , with an isolated streak of brown in middle of apex of R_5 , and with 3 short rays through apex of cell 2nd M_2 . With 3 shining reddish bullae in middle of wings and 1 prominent opaque dark brown to black spot in middle just basad of upcurved portion of vein M_{1+2} . It should be noted that de Meijere's Fig. 23 is apparently not correct. He shows no brown ray in apex of cell R_5 , none in apex of cell 2nd M_2 and 3 narrow, complete, brown rays to margin in anal cell. Lectotype ♀ (Fig. 7b) as described above. One specimen from Irian Jaya is atypical in having ray through middle of cell R_5 complete. Abdomen mostly yellow-rufous with faint bands of brown across terga 3-5. Basal segment of ovipositor comparatively short and broad, shining brownish yellow, narrowly blackened at apex.

Length: Body and wings 2.5 mm.

♂ unknown.

Distribution. Java, Borneo, New Guinea and Maluku.

Specimens examined. Lectotype and 11 syntype specimens from JAVA (ZMUA). Also 4 specimens from following: IRIAN JAYA: Star Mts, Sibil Val, 1245 m, 18.X-8.XI.1964, L.W. Quate. PNG: NEW GUINEA (SE): Larat Isl. 1904, F. Muir. MALAYSIA: Sabah, Forest Camp, 19 km N of Kalabakan, 31.XI.1962, K.J. Kuncheria.

Biology. Breeds in flower heads of *Blumea lacera* (Compositae).

Rhabdochaeta tribullosa Hering

Fig. 8

Rhabdochaeta tribullosa Hering, 1940, Siruna Seva 1:14, Type-locality: Timor Island, Nusa Tenggara. Type ♂ in SMNS.

Closely related to *melanura* Bezzi from the Philippines and differentiated by having a large shining reddish bulla in upper apical portion of cell 1st M_2 , rather than lacking such a bulla and abdomen mostly brownish black in ground color with apical $\frac{1}{2}$ of 5th tergum of ♂ polished black, rather than predominantly pale, yellowish gray. Also the type ♂ of *tribullosa* has the brown ray in apicomedian portion of cell R_5 connected with the brown band which extends along apex of vein M_{1+2} . The lectotype of *melanura* (MSNM) has the apical ray isolated, not connected. It should be noted that Hering in his wing Fig. of *tribullosa* (*op. cit.*: 9, Fig. 3) shows the apical ray in R_5 incomplete, isolated, fitting the situation in *melanura*. This is not the case in the type specimen (Fig. 8).

Fitting characteristics of *pulchella* in most respects, as noted under that species. With legs yellow, a mark of brown on posterior surface of each front femur near apical $\frac{2}{3}$ of segment and mid and hind femora with markings of brown on prebasal portions and near apical $\frac{2}{3}$, also with an incomplete ring of brown at basal 3rd of mid and hind tibiae. For more complete description refer to original.

Distribution. Timor, Nusa Tenggara.

Specimens examined. Type; 1 ♂, paratype BMNH.

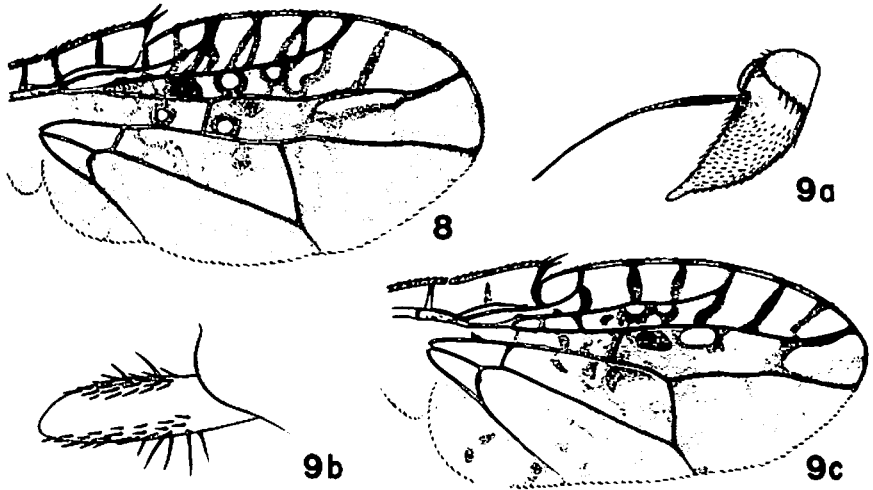


FIGURE 8. *Rhabdochaeta tribullosa* Hering, wing.

FIGURE 9. *Rhabdochaeta venusta* de Meijere: a, antenna; b, palpus; c, wing.

Rhabdochaeta venusta de Meijere

Fig. 9a-c

Rhabdochaeta venusta de Meijere, 1914, Tijdschr. Entomol. 57:215. Type-locality: Salatiga, Java. Type ♀ ZMUA.

Fitting in the species group characterized by having narrow brown rays along anterior margin of wing and in a species complex with *seniorwhitei* Bezzi, from Sri Lanka, by having an extra, presutural pair of dorsocentral bristles; only 1 pair of interfrontal bristles; with upper inferior fronto-orbitals broad, flat, lanceolate; no red bulla in cell 2nd M_2 and last section of vein M_{1+2} only gently upcurved beyond m crossvein; the apico-median portion of 5th tergum of ♂ and 6th tergum of ♀ polished and 6th tergum of ♀ distinctly longer than 5th. It differs from *seniorwhitei* by having the abdomen predominantly rufous except for the entirely polished black 5th tergum of ♂ and 6th tergum of ♀ and more elongate ovipositor, with basal segment about 2× longer than wide and about equal in length to terga 4–6, rather than basal segment short, scarcely longer than wide and about equal in length to 6th tergum.

It is possible that 2 or more species may be represented in the present concept of *venusta*. Considerable color variation and variations in wing markings have been seen in specimens examined and it will be necessary to study further specimens from Java in order to more clearly define the concept.

Except as noted above fitting general characteristics of other species of genus. Third antennal segment rather broad at base and abruptly tapered into a short point at apex (Fig. 9a). De Meijere described 3rd segment as egg-shaped, produced into a sharp point at apex. Palpi as in Fig. 9b. Thorax mostly black in ground color, densely gray pollinose. Scutellum with a pair of small, cruciate, white, apical bristles, a pair of moderately large, white, preapical, dorsal bristles and with basal bristles brown at bases yellow-brown apically. Prescutellar bristles situated slightly in front of a line drawn between postalars and slightly inside a line drawn longitudinally with dorsocentral bristles. Two pairs dorsocentrals, 1 situated slightly closer to

supraalars than to suture and with 1 smaller presutural pair situated in line with presutural bristles. With moderately large, erect, white, acrostichal setae on posterior portion of mesonotum. Scutellum almost entirely yellow, only faintly tinged with brown. Wings as in Fig. 9c, with 1 brown ray through middle of 2nd costal section, 2 rays through middle of cell R_1 , 2 through middle of R_3 and 1 short ray in apicomedian portion of cell R_3 , connected with brown ray along last section of vein M_{1+2} in typical specimens, in other specimens apical ray isolated. With 2 shining red bullae in middle of wing, 1 in cell R_5 just beyond r-m crossvein and 1 in upper apical portion of cell 1st M_2 and vein M_{1+2} only gently convex beyond m crossvein. Typical specimens have a series of irregular, round, white spots basad of r-m crossvein, some specimens from Irian Jaya have 2 white streaks basad of r-m crossvein, this may represent a different species. Legs mostly yellow with a spot of brown on posterior surface of front femur near apical 4/5 of segment and with 2 incomplete rings of brown on mid and hind femora, 1 prebasal and 1 near apical $\frac{2}{3}$. Also hind femur with a prebasal brown ring. Abdomen as noted above, with 5th tergum of ♂ unusually large, about equal in length to remainder of abdomen. Genitalia not relaxed for study, predominantly yellow as seen in situ with a brown to black mark over base of epandrium. ♀ ovipositor as noted above and as in Hardy, 1973:294, Fig. 143a.

Length: Body and wings. 2.5–3.0 mm.

Distribution. Nusa Tenggara, Java, Laos, Thailand, Vietnam.

Specimens examined. Type: 2 ♂, 2 ♀ INDONESIA: Sunda Island, (BMNH); 1 ♂ Poeloe Endeh, Flores Island, II.VI.1927, recorded by Hering 1941:45. (DEI); 1 ♂ Maluku, Amboina, XI.09, F. Muir. MALAYSIA: 2 ♂, 1 ♀ Sabah, Tenompok, 10–19.II.1959 T.C. Maa and Runau, 25.I.1959, T.C. Maa. PNG: NEW GUINEA (SE): Eilogo, Central P, 21.XII.1980, J.W. Ismay. 2 ♂, 2 ♀ IRIAN JAYA: Karubaka, Swart Val, 10.XI.1958, J.L. Gressitt may represent a separate species as noted above. Also specimens from Thailand, Vietnam and Laos as recorded by Hardy, 1973:293.

ACKNOWLEDGMENTS

This study was supported by National Science Foundation Grant No. DEB 8019307. The art work was done by Miss Marianne Early, Department of Entomology, University of Hawaii.

ACRONYMS FOR INSTITUTIONS WHERE COLLECTIONS ARE LOCATED

- ANIC Australian National Insect Collection, CSIRO, Canberra.
- BPBM Bernice P. Bishop Museum, Honolulu.
- CAS California Academy of Sciences, San Francisco.
- MSNM Museo Civico di Storia Naturale, Milano.
- SMNS Staatliches Museum für Naturkunde, Stuttgart (Ludwigsburg).
- TMB Termesztudományi Museum, Budapest.
- ZIUH Zoologisches Institut der Universität Halle am Saale, DDR.
- ZMHB Zoologisches Museum, Humboldt Universität Berlin.
- ZMUA Zoologisch Museum, Universiteit van Amsterdam.

REFERENCES CITED

- Hardy, D.E. 1973. The fruit flies of Thailand and bordering counties. Pac. Insects Monogr. 31:1-353, 8 pls.
- , 1974. The Fruit Flies of the Philippines. Pac. Insects Monogr. 32:1-266, 6 pls.
- , 1982. The genus *Schistopterus* Becker (Schistopterinae: Tephritidae: Diptera). Proc. Hawaii. Entomol. Soc. 24:87-90.
- , in press. The acanthonevra aggregation of fruit fly genera of Indonesia, New Guinea and adjacent Islands of the Bismarcks and Solomons (Diptera: Tephritidae: Trypetinae: Acanthonevrini). Pac. Insects Monogr.
- Hering, E.M. 1941. Dipteren von den Kleinen Sunda-Inseln. Arb. Morph. Taxon Ent. Berlin 8(10):24-45.
- Shiraki, T. 1933. A systematic study of Trypetidae in the Japanese Empire. Mem. Fac. Sci. Agric. Taihoku Imp. Univ. 8:1-509, 14 pl.