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PROF. DR. E. HANDSCHIN
STUDIENREISE AUF DEN SUNDAINSELN UND IN NORDAUSTRALIEN
1930-1932

Crane-flies (Tipulidae, Diptera) from the Malayan Islands and Northern Australia

by

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With 16 Textfigures.

I am very deeply indebted to Dr. Edward HANDSCHIN for the privilege of examining the interesting *Tipulidæ* that he secured upon his recent trip to the Malayan Islands and to Northern and Eastern Australia. The types and uniques of all included species are preserved in the Naturhistorisches Museum at Basel, through the interest of Dr. HANDSCHIN.

TIPULINAE.

1. *Ischnotoma rubriventris* (Macquart).

1846. *Tipula rubriventris* Macquart; Dipt. exot., suppl. 1: 14.
1890. *Ischnotoma rubriventris* Skuse; Proc. Linn. Soc. New South Wales, (2) 5: 118-119.

Widely distributed in Eastern Australia, from New South Wales to Tasmania. One male, Jinderbayne, Cooma, Australian Alps, New South Wales, September 6, 1930. One of SKUSE's specimens was likewise from Jinderbayne, altitude 3,000-3,500 feet, collected by HELMS.

2. *Ctenacroscelis umbrinus* (Wiedemann).

1828. *Tipula umbrina* Wiedemann; Aussereur. zweifl. Ins., 1: 49.

Widely distributed throughout the Malayan Islands. One male, Tjisaroea, West Java, altitude 1,000 meters, January 1931.

3. *Tipula (Tipulodina) pedata* Wiedemann.

1821. *Tipula pedata* Wiedemann; Diptera Exotica, 1: 23.

Apparently confined to Java. One male, one broken specimen, Tjibodas, Mount Gedeh, West Java, August 1931. The following biological notes by Dr. HANDSCHIN are of great interest.

"This species, together with *Trentepohlia (Anchimongoma) niveipes* Edwards, are forms inhabiting the real bush. They are often met hanging by the fore legs on threads of spider's webs or on little branches, forming long strings of animals. By a quite peculiar movement of vibration, the body moves up and down very quickly so that only the white parts of the legs may be seen oscillating in the air."

The above records are of unusual interest in that they add the subgeneric groups *Tipulodina* and *Anchimongoma* to the already extensive list of white-footed *Tipulidae* that are intimately associated with the webs of spiders.

4. *Tipula (Indotipula) gedehicola* Alexander.

1915. *Tipula gedehicola* Alexander; Proc. U.S. Nat. Mus., 49: 189-190.

Described from Tjibodas, Mount Gedeh, West Java, altitude 5,000 feet, collected April 20, 1909, by OWEN BRYANT. One female, Tjisaroea, West Java, altitude 1,000 meters, January 1931.

5. *Tipula (Oreomyza) gedehana* de Meijere.

1911. *Tipula gedehana* de Meijere; Tijd. voor Ent., 56: 66-67.

The types were from the crater of Mount Gedeh, West Java, collected in November 1893 by BÜTTIKOFER. Later (Proc. U. S. Nat. Mus., 49: 185-186; 1915) I recorded the species from Tjibodas, Mount Gedeh, at altitudes of from 4,000 to 9,000 feet, collected in September 1909 by OWEN BRYANT. In the present collection, one male, one female, Tjibodas, altitude 2,600 to 3,000 meters, August 1931.

The female specimen has an ovipositor that is quite different from that of *Vestiplex* and the species would appear to be more correctly placed in the subgenus *Oreomyza.*

6. *Nephrotoma tenggerensis* spec. nov.

General coloration light sulfur-yellow; occipital brand dull dark brown, sending a broad spur to the eyes; mesonotal praescutum with three dull brown stripes, the lateral pair straight; scutellum light brown, parascutella yellow; mediotergite yellow, the posterior border darkened; pleura sulfur-yellow, indistinctly variegated by more reddish areas; knobs of halteres light sulfur-yellow; femora blackened, with about the proximal third yellow; wings yellow, the stigma conspicuous, dark brown, virtually without trichia; abdominal tergites dull brownish yellow, with three uninterrupted black stripes; sternites yellowish brown, blackened laterally.

F e m a l e. — Length, about 15mm; wing, 14mm,5.

Frontal prolongation of head yellow, the nasus and adjoining portions of prolongation black; palpi black. Antennae with scape reddish; pedicel brown; flagellum black, the verticils slightly longer than the segments. Head light sulfur-yellow; occipital brand dull dark brown, sending an antero-lateral spur to the broad orbital area, the color almost uniform in intensity throughout.

Pronotum yellow medially, weakly darkened on sides. Mesonotal praescutum light yellow, with three dull brown stripes, the lateral pair straight; median area of the central stripe insensibly darker, but the entire surface dull and unpolished; scutum yellow, each lobe with two confluent dull brown areas; scutellum light brown, parascutella sulfur-yellow; mediotergite pale yellow, with paired light brown spots on posterior border; a few erect pale setae on mediotergite. Pleura sulfur-yellow, with very indistinct pale reddish areas on anepisternum, ventral sternopleurite, ventral meron and very indistinctly on ventral pleurotergite. Halteres yellow, the knobs clear light sulfur-yellow. Legs with the coxae and trochanters orange-yellow; femora chiefly blackened, with approximately the basal third yellow; tibiae brown, the tips weakly darkened; tarsi passing into brownish black. Wings (fig. 1) chiefly clear yellow; stigma oval, brown, conspicuous; centers of the cells slightly clearer yellow than the vicinity of the veins; cord narrowly seamed with brown; veins chiefly yellow, with *M*, the cord and veins enclosing cell *1st* M_2 darker. Stigma almost without macrotrichia; in the type, with a single trichium on one wing, lacking on the other.

Venation: Sc_2 ending opposite origin of Rs; cell M_1 narrowly sessile; basal section of M_4 perpendicular or nearly so.

Abdominal tergites dull brownish yellow, conspicuously trivittate with black, the stripes entire; sternites yellowish brown, blackened laterally; genital shield polished black.

H a b.: East Java.

H o l o t y p e: ♀, Ranoe Kembolo, Tengger, altitude 2,500 meters, February 1931.

Nephrotoma tenggerensis is very different from all described regional species of the genus, being most nearly allied to the fly next described as *N. effrena* spec. nov. The conspicuous occipital brand, dull brown praescutal stripes, yellow wings with brown stigma, and the uninterrupted abdominal stripes furnish well-marked specific characters.

7. *Nephrotoma effrena* spec. nov.

General coloration yellow; occipital brand of moderate size, not reaching the orbits; praescutal stripes dull, the lateral pair straight; scutellum brown, parascutella yellow; mediotergite yellow, with pale brown paired areas on posterior margin; femora extensively blackened; wings tinged with yellow, stigma pale, without trichia; abdominal tergites yellow, with three continuous black stripes.

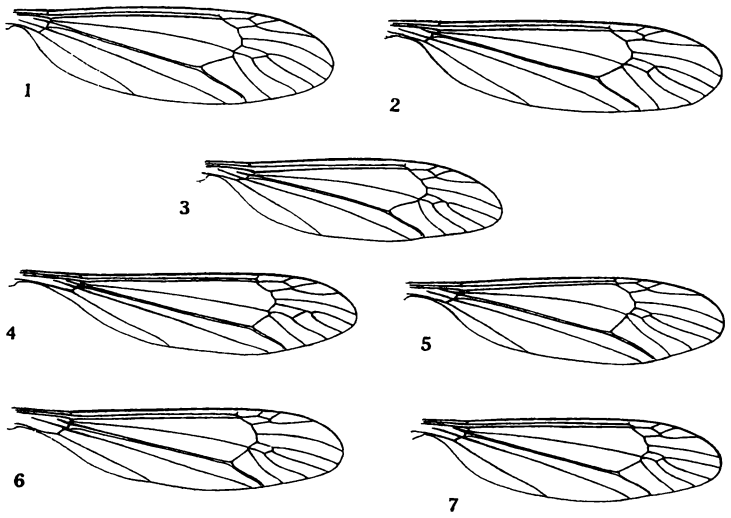
M a l e: Length, about 11mm; wing, 12mm.

F e m a l e: Length, 14-15mm; wing, 12.5-13mm.

Frontal prolongation of head yellow, the dorsal surface, including nasus, restrictedly blackened; palpi black. Antennae with scape reddish brown; pedicel darker brown; flagellum black throughout; flagellar segments moderately incised. Head yellow; occipital brand of moderate size, its caudal half parallel-sided, thence extended cephalad into an acute point; posteriorly, the brand extends ventrad on the occiput; orbital darkenings diffuse, quite disconnected from the brand.

Pronotum yellow medially, very weakly darkened on sides. Mesonotal praescutum sulfur-yellow, with three brown or brownish black stripes, the surface dull or very little polished; lateral stripes straight; median stripe very insensibly divided by a more blackish line; scutum yellow, each lobe with two entirely confluent dull

black areas; scutellum brown, parascutella yellow; mediotergite yellow, with weak, pale brown, paired areas on posterior border; setae of postnotum long but pale and relatively inconspicuous. Pleura yellow, with reddish areas, larger and more conspicuous on the ventral sternopleurite and meron, less conspicuous on the anepisternum and pleurotergite. Halteres dusky, the knobs yellow.



FIGS. 1-7.

Wing-venation of *Nephrotoma*-species.

FIG. 1. *Nephrotoma tenggerensis* spec. nov.
» 2. *N. effrena* spec. nov.
» 3. *N. baliana* spec. nov.
» 4. *N. nigrocostalis* spec. nov.
» 5. *N. handschiniana* spec. nov.
» 6. *N. kelimotoensis* spec. nov.
» 7. *N. floresensis* spec. nov.

Legs with the coxae and trochanters obscure yellow; femora chiefly black, the bases yellow, narrowest on the fore legs, where only the proximal fifth is included, much more extensive on the posterior legs, where nearly the basal half is brightened; tibiae dark brown; tarsi black. Wings (fig. 2) strongly tinged with yellow; stigma only a little darker yellow to pale brownish yellow; veins dark brown. No stigmal trichia. Venation: Sc_2 ending opposite or just beyond origin of *Rs*, Sc_1 represented by a spur; cell M_1 barely sessile to very short-petiolate; *m-cu* just beyond origin of M_4.

Abdominal tergites light yellow, brighter on basal segments, more obscured outwardly; three continuous black stripes, the median one beginning at base of second tergite, the stripes becoming wider outwardly, embracing all of segments seven and eight; segment nine and appendages of hypopygium reddish yellow. Male hypopygium with the lateral horns of the tergite (fig. 8, *9t*) unusually slender, blackened, with two or three spines on mesal face; median tergal notch relatively small. Outer dististyle (fig. 9, *od*) pale, only moderately attenuated. Inner dististyle, *id*, with a low dorsal crest, the margin thick and blackened. Eighth sternite (fig. 8, *8s*) with the caudal margin convex or with a very slight median emargination, the setae somewhat larger and mesally directed on either side of the midline. Gonapophyses small and nearly circular in outline.

H a b: East Java.

H o l o t y p e: ♂, Penandjaan, Tengger, altitude 2,700 meters, February 1931. A l l o t o p o t y p e, ♀. P a r a t y p e, ♀, Ranoe Kembolo, Tengger, altitude 2,500 meters, February 1931.

The nearest ally appears to be *Nephrotoma tenggerensis* spec. nov., which differs conspicuously in the pattern of the head, praescutum and wings. The paratype has the median abdominal tergal stripe somewhat more interrupted at posterior borders of segments and with the orbital darkening less evident, but seems to be conspecific.

There are now more than 100 described species of the genus *Nephrotoma* in Eastern Asia and it is certain that this number will be greatly increased as a result of further collecting. The chief characters for separating the various species lie in the coloration of the frontal prolongation of the head; length, color and structure of the antennae; shape and color of the occipital brand; presence or absence of orbital darkenings; whether or not the lateral praescutal stripes are straight or outcurved at their anterior ends; pattern of the postnotal mediotergite; coloration of the legs; pattern of the wings, together with details of venation and distribution of the stigmal trichia; pattern of abdomen; details of structure of the male hypopygium, more especially of the ninth tergite, inner and outer dististyles, eighth sternite and gonapophyses.

8. *Nephrotoma parascutellata* Alexander.

1935. *Nephrotoma parascutellata* Alexander; Philippine Journ. Sci., 58 (in press).

One paratype female, Buitenzorg, December 1930 (HANDSCHIN). The remainder of the type series were from Mount Malang, West Java, altitude 3,000 feet, August 1933 (M. E. WALSH).

9. *Nephrotoma scurroides* (de Meijere).

1904. *Pachyrrhina scurroides* de Meijere; Bijd. tot de Dierkunde, 18: 90-91.

The types were from Tosari, East Java, collected by J. D. KOBUS. Two additional specimens in the present series from the type-locality, Tosari, Tengger, altitude 1,700 meters, February 1931; Sempol, Mount Idjen, altitude 2,000 meters, February 1931. I have also seen the species from West Java (Mount Malang, altitude 3,000 feet, August 1933 (M. E. WALSH).

10. *Nephrotoma baliana* spec. nov.

General coloration yellow, the praescutum with three polished black stripes, the lateral pair straight; no occipital brand; orbital spots brown, conspicuous; scutellum brown, parascutella yellow; mediotergite yellow, the posterior third more brownish orange; pleura yellow, the ventral anepisternum variegated by two more brownish black areas, the ventral sclerites more reddish; fore femora black medially, pale at both ends; wings subhyaline, cell *Sc* dark brown; stigma more yellowish brown, without trichia; cell M_4 unusually wide at base; abdominal tergites black, the more proximal ones with orange bases.

F e m a l e: Length, about 15^{mm}; wing, 11^{mm}.

Frontal prolongation of head yellow, the nasus and entire dorsal surface of the prolongation black; palpi brown. Antennae with scape and pedicel light yellow; flagellum black. Head yellow; occipital brand lacking; orbital spots conspicuous, brown; vertical tubercle entire.

Pronotum medially broadly light yellow, black on sides. Mesonotal praescutum yellow, with three polished black stripes that are very narrowly and insensibly bordered by more velvety-black; lateral stripes straight; scutum yellow, each lobe with two confluent, polished black areas that extend laterad and suffuse the outer ends of the suture; scutellum brown, parascutella yellow; mediotergite light yellow, the posterior third more brownish orange but otherwise undarkened; a few scattered erect setae on lateral

portions of sclerite. Pleura yellow, the ventral anepisternum variegated by two brownish black areas, one lying along the posterior suture; entire dorsal edge of pleurotergite conspicuously black; a small black spot beneath the wing-root on dorsal-cephalic portion of pteropleurite; ventral sternopleurite and meron more reddish. Halteres dusky, the apices of knobs yellow. Legs with the coxae orange, the posterior pair darkened basally; trochanters orange; fore femora orange at both ends, the intermediate portion black, the apex more obscure orange than the base; middle femora chiefly orange; hind legs broken; tibiae reddish brown, the tips narrowly blackened; tarsi reddish brown. Wings (fig. 3) subhyaline; cell *Sc* and that portion of stigma in cell Sc_1 brownish black; posterior portion of stigma more yellowish brown; a poorly evident dark seam along vein *Cu*. Stigma without trichia. Venation: *Rs* short, subequal to and a little straighter than basal section of vein R_{4+5}; cell M_1 petiolate; cell *1st* M_2 small; *m-cu* at base of vein M_4; cell m_4 with the base unusually wide, due to the length of *m-cu*, the cell being approximately twice as wide at base as at narrowest point, just before outer end.

Basal tergite black; second tergite of abdomen with basal half orange, the outer ring black; tergites three to five with bases orange, the posterior portions more broadly black; segments six and seven entirely black; genital shield and ovipositor orange; basal sternites yellow, the caudal borders of sternites two and three black.

H a b.: South Bali.

H o l o t y p e: ♀, January 1932 (HANDSCHIN).

The present species bears some resemblance to *Nephrotoma javana* (Wiedemann), but is very different. The small size of cell *1st* M_2, in conjunction with the lack of stigmal trichia, is suggestive of *N. doleschalli* (Osten Sacken) and several other species in the same group, but the details of coloration are quite distinct from all described regional species.

11. *Nephrotoma nigrocostalis* spec. nov.

Mesonotal præscutum orange with three opaque brown stripes, the lateral pair straight; antennæ relatively short; occipital brand disconnected from the darkened orbital areas; mediotergite yellow;

femora black, the bases narrowly yellow; wings tinged with dusky, cells *C* and *Sc*, with the stigma, uniformly blackish; abdomen with basal segments brownish yellow, the outer segments and hypopygium blue-black; inner dististyle of male hypopygium of peculiar conformation.

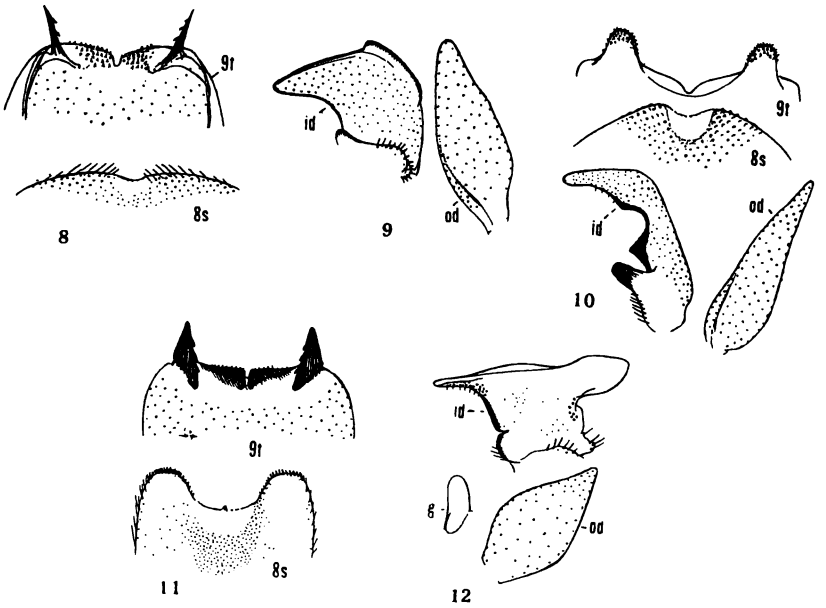
Male: Length, about 13mm; wing, 12mm; antenna, about 3mm,5.

Frontal prolongation of head yellow, the nasus and an area surrounding it brownish black; palpi black. Antennæ relatively short, as shown by the measurements; scape dark brown above, obscure yellow on lower face; pedicel brownish black; flagellum black; flagellar segments scarcely incised; verticils subequal in length to or a trifle longer than the segments. Front light yellow; posterior portion of head more orange; occipital brand pale and inconspicuous, strongly narrowed at anterior end and sending a point almost to summit of vertical tubercle; orbital darkenings large, not connected with the occipital brand.

Pronotum narrowly dark brown on median portion, the sides orange. Mesonotal præscutum orange, with three opaque, bright brown stripes, the lateral pair straight; scutum with the lobes orange, the median area more yellow, each lobe with two confluent opaque brown areas; lateral ends of suture darker brown; scutellum orange, the parascutella yellow; mediotergite yellow, with scattered black setæ on lateral portions of posterior half. Pleura orange, without clearly defined darkenings. Halteres dark brown, the apex of knob paling to obscure yellow. Legs with the coxæ orange-yellow, the fore coxæ very insensibly darkened at extreme base; trochanters yellow; femora black, the bases obscure yellow, the amount subequal on all legs and involving about the basal fourth or fifth; tibiæ brownish black, more brownish basally; tarsi black. Wings (fig. 4) with a strong dusky tinge; cells *C* and *Sc*, with the stigma, uniformly blackish; cord, extreme tip of wing, and vein *Cu* a little more suffused; veins brownish black. Stigmal trichia only three in number, in cell R_1. Venation: Sc_1 present; *Rs* arcuated; cell M_1 short-petiolate; a short basal fusion of vein M_{3+4}; *m–cu* a short distance beyond origin of M_4; cell *2nd A* relatively narrow.

Abdomen with basal five segments brownish yellow, unmarked; remaining segments, including hypopygium, entirely blue-black, the outer dististyle pale. Male hypopygium relatively large; ninth tergite (fig. 10, *9t*) convex, the caudal margin with an U-shaped

median emargination, the borders castaneous; a sublateral lobe on either side set with conspicuous blackened points; lateral borders with similar spines and setæ. Outer dististyle, *od*, slender, narrowed



FIGS. 8-12.
Male hypopygia of *Nephrotoma* — species; details.
(Symbols: *g* = gonapophysis; *id* = inner dististyle; *od* = outer dististyle; *s* = sternite; *t* = tergite.)

FIGS. 8, 9. *Nephrotoma effrena* spec. nov.
» 10. *N. nigrocostalis* spec. nov.
» 11, 12. *N. handschiniana* spec. nov.

to a nearly acute point. Inner dististyle, *id*, of somewhat peculiar form, as illustrated. Eighth sternite, *8s*, moderately sheathing, with a median pale area, the border on either side with setæ of moderate length, directed caudad and mesad.

H a b.: Flores.

H o l o t y p e, ♂, Kelimotoe, altitude 1,400 meters, December 1931. P a r a t o p o t y p e, ♂.

Nephrotoma nigrocostalis is very different from the previously described members of the genus. It is most generally similar to the species next described, *N. handschiniana* spec. nov., likewise from the mountains of Flores, but the relationship between the two is not

particularly close. Several features in the present fly point to an affinity with the members of the Papuan *melanura* group but the species is quite distinct.

12. *Nephrotoma handschiniana* spec. nov.

General coloration yellow, variegated by dull black; antennæ (male) relatively elongate; occipital brand small, not connected with the orbital darkenings; lateral praescutal stripes straight; postnotum and pleura entirely orange; femora black, the bases rather narrowly yellow; wings with a faint brown tinge; cell *Sc* pale brown; stigma darker brown, with numerous trichia; basal abdominal segments orange, segments six to nine, inclusive, black; male hypopygium with the outer dististyle short and broad; inner dististyle with a long, flattened, caudal blade; eighth sternite sheathing, its distal end bilobed, the median area with pale membrane.

M a l e: Length, about 13^{mm}; wing, 12^{mm}; antenna, about 5^{mm},5.

Rostrum obscure brownish yellow, the nasus and adjoining portions of the prolongation brownish black; sides infuscated; palpi brown. Antennæ (male) relatively elongate, as shown by the measurements; scape yellow, weakly infuscated on dorsal surface; pedicel brownish yellow; flagellum black; flagellar segments strongly incised, with verticils that are shorter than the segments. Head with the front sulfur-yellow, deepening to orange behind; occipital brand small, triangular, sending a very delicate impressed median line to the bifid summit of the vertical tubercle; orbital darkenings extensive, but not connected with the brand, pale brown.

Pronotum orange. Mesonotal præscutum yellow, with three dull black stripes, the lateral pair straight and well-separated from the relatively narrow median vitta; scutum yellow, each lobe with a large, dull black area; scutellum and parascutella brownish orange; mediotergite entirely orange. Pleura orange throughout. Halteres brown, the base of stem restrictedly orange; apex of knob yellow. Legs with the coxæ and trochanters orange; femora black, the bases rather narrowly yellow; fore and middle tibiæ black, the posterior tibiæ yellowish brown, with the tip conspicuously blackened; basitarsi brown, the remainder of tarsi passing

into black. Wings (fig. 5) with a faint brown tinge, cell *C* more brownish yellow, cell *Sc* pale brown; stigma darker brown; a brown seam along vein Cu_1 in cell *M*; cord and wing-tip very insensibly darkened; veins black. Stigma with from 25 to 30 trichia in cell R_1. Venation: Sc_2 ending a short distance beyond origin of *Rs*, Sc_1 preserved; *Rs* straight or even gently convex, subequal to the basal section of R_{4+5}; cell M_1 sessile; *m-cu* shortly beyond origin of M_4.

Basal abdominal tergites orange, the lateral borders vaguely and indistinctly darkened; segments six to nine, inclusive, uniformly black. Male hypopygium with the ninth tergite (fig. 11, *9t*) produced into lateral black horns; median notch narrow. Outer dististyle (fig. 12, *od*) unusually broad for its length, the apex short. Inner dististyle, *id*, with the apical beak slender; caudal end of style produced into a conspicuous flattened blade, the surface thin and microscopically reticulate. Gonapophyses (fig. 12, *g*) short and obtuse, about twice as long as wide, and from one-third to one-fourth as long as the ædeagus. Eighth sternite (fig. 11, *8s*) relatively large and sheathing, the distal end bilobed, with the median area filled with pale membrane; a tiny blackened median point at base of emargination; lateral lobes relatively stout and blunt, with abundant, very short, but dense, black setæ; median region of sternite behind the pale membrane with long, dense, erect, yellow setæ.

H a b.: Flores.

H o l o t y p e, ♂, Kelimotoe, altitude 1,400 meters, December 1931.

I take great pleasure in naming this very distinct species in honor of the collector, Dr. Edward HANDSCHIN, who has made such notable additions to our knowledge of the distribution of the Austromalayan insects. Superficially, the present fly is most like *Nephrotoma nigrocostalis* spec. nov., but differs in all details of coloration, and in the structure of the antennæ and male hypopygium. The four species of the genus *Nephrotoma* now known from the island of Flores may be separated by the accompanying key:

1. Mesonotal mediotergite unmarked; orbital darkenings not connected with occipital brand; basal segments of abdomen orange, the outer segments black or blue-black. 2.

Mesonotal mediotergite variegated with black; orbital darkenings broadly interconnected with the occipital brand; basal segments of abdomen banded with black and yellow. 3.

2. Wings with cells *C* and *Sc* uniformly darkened; no stigmal trichia; antennæ (male) short; praescutal stripes opaque brown; pronotum narrowly darkened medially. *N. nigrocostalis* spec. nov.

Wings with cell *C* undarkened; abundant stigmal trichia; antennæ (male) elongate; praescutal stripes opaque black; pronotum uniformly orange. *N. handschiniana* spec. nov.

3. Mediotergite with more than the posterior half transversely black, the anterior portion uniformly yellow; a black median dash on front before antennal bases. *N. floresensis* spec. nov.

Mediotergite yellow, divided longitudinally by a broad, hourglass-shaped black mark, the lateral portions restrictedly yellow; no darkened area on front before antennal bases. *N. kelimotoensis* spec. nov.

13. *Nephrotoma kelimotoensis* spec. nov.

General coloration yellow; head with the orbital darkenings broadly connected with the occipital brand by pale washes; mesonotal præscutum with three polished black stripes, the lateral pair straight; scutellum black, parascutella yellow; mediotergite yellow, with a broad, longitudinal, black stripe shaped more or less like an hour-glass; pleura yellow, variegated by more reddish areas; fore femora black in central portion, the base yellow, the apex slightly paler; wings subhyaline, cell *Sc* dark brown, a little darker than the stigma; no stigmal trichia; cell M_1 broadly sessile; abdominal tergites with broad black lateral margins; segments two to five with the posterior borders extensively black.

F e m a l e: Length, about 15mm; wing, 12mm.

Frontal prolongation of head light yellow above, more infumed on sides; nasus and a contiguous patch on dorsum of prolongation black, the latter area U-shaped, with the arms directed caudad;

Antennae with scape obscure orange; pedicel brownish black; flagellum black. Head yellow; occipital brand relatively small, black, but with an even more extensive, somewhat paler brown area extending to base of vertical tubercle; orbital areas relatively small but dark and conspicuous, connected with the central darkened portions by pale brown washes.

Pronotum light yellow, the sides black. Mesonotal præscutum light yellow, with three polished black stripes that are very narrowly and indistinctly bordered by somewhat more opaque black; lateral stripes straight but with a paler brown wash laterad of most of their length; scutum yellow, each lobe with two confluent black areas; scutellum black, the parascutella yellow; mediotergite yellow, with a broad, black, central area the entire length, this shaped more or less like an hour-glass; setæ on mediotergite sparse, white. Pleura yellow, rather indistinctly variegated by more reddish areas on the anepisternum, ventral sternopleurite, ventral meron and cephalic portion of the pteropleurite; pleurotergite with the entire dorsal portion broadly blackened, the ventral edge more narrowly so. Halteres dusky. Legs with the coxae obscure yellow; trochanters orange; fore femora black on more than central half, the base narrowly yellow, the outer end paling to more brownish black; hind femore brown, passing into black at tip, the base brighter; tibiæ dark brown, the tips black; tarsi black. Wings (fig. 6) subhyaline, cell *Sc* dark brown; stigma slightly paler brown; cord and a very vague seam along vein *Cu* darker; veins brownish black. Stigmal trichia lacking. Venation: Sc_2 ending opposite origin of *Rs*, Sc_1 present; cell M_1 broadly sessile; *m-cu* just beyond origin of M_4; cell M_4 at proximal end very broad, strongly narrowed before apex.

Abdominal tergites obscure yellow, with a broad, conspicuous, lateral, black stripe; dorsum of first tergite blackened; tergites two to five with the posterior margins broadly black, including a little less than one-half of each segment; segments six to eight black; ovipositor and genital shield reddish orange.

Hab.: Flores.

Holotype: ♀, Kelimotoe, altitude 1,400 meters, December 1931.

The peculiar pattern of the head, together with the area on the mediotergite, separates the present fly as being amply distinct

from all other regional species. It bears a slight resemblance to the Javanese *Nephrotoma fallax* (de Meijere) but the relationship is not particularly close.

14. *Nephrotoma floresensis* spec. nov.

General coloration yellow; frontal prolongation of head blackened above; front light yellow, with a median dash before the antennal bases; occipital brand broadly connected with extensive orbital darkenings; pronotum broadly sulfur-yellow medially, black on sides; three præscutal stripes, the lateral pair outcurved; extreme lateral border of præscutum black; scutellum and parascutella black; mediotergite with more than the posterior half black; pleura yellow, variegated with black on dorsal sclerites, with chestnut on the ventral portions; femora and tibiæ yellow; wings with stigma and cell *Sc* brownish black; cord narrowly seamed with darker; abdomen orange-yellow, tergites two to five with broad black posterior borders.

F e m a l e: Length, about 21mm; wing, 15mm,5.

Frontal prolongation of head yellow, more reddish brown on sides; nasus and a dorsal disk on prolongation black; palpi light brown. Antennæ with the scape reddish yellow; pedicel brown, paler apically; flagellum black. Front light yellow, with a black linear median dash before the level of the antennæ; occipital brand brownish black, with an apiculate point at anterior end; orbital darkenings broad and conspicuous, connected with the brand, on anterior portion shading into paler brown.

Pronotum broadly sulfur-yellow medially, black on sides. Mesonotal præscutum pale yellow, with three polished black stripes that are very insensibly bordered by darker; lateral stripes outcurved, but somewhat paler, more brownish black, on lateral portions and becoming confluent with a narrow blackish margin to the sclerite; scutum yellow, with a V-shaped black mark on the transverse suture; lateral portions and central areas of scutal lobes black; scutellum, including parascutella, black, the former highly polished; mediotergite black on posterior half, the anterior half yellow, except for very narrow dark lateral borders; scattered erect setæ on lateral portions of mediotergite. Pleura yellow, variegated with polished black on anepisternum, cephalic portion of ptero-

pleurite and dorsal pleurotergite; chestnut brown on ventral sternopleurite, meron and ventral pleurotergite. Halteres brownish yellow, the apex of knob a little more yellowish. Legs with the coxæ cheatnut-brown, the bases of the fore and hind coxæ more blackened; trochanters orange-yellow; a single leg (posterior) remains; femora and tibiæ yellow, the extreme tips darkened; basitarsi obscure yellow, its outer end and remainder of tarsi black. Wings (Fig. 7) with a faint darker tinge; cell *Sc* and the stigma brownish black; anterior and posterior cords, together with cell Cu_1 and wing-tip, weakly darkened; veins brownish black. No stigmal trichia. Venation: Sc_2 ending shortly beyond origin of *Rs*, Sc_1 represented by a basal spur; cell M_1 short-sessile; *m-cu* shortly beyond the origin of vein M_4.

Abdominal tergites orange-yellow; basal tergite polished black; segment two with caudal border broadly black, together with a narrower band on basal ring; tergites three to five with more than the posterior half black, the cephalic margin of the darkened area nearly transverse, except for a slight median point; tergites six and seven uniformly black; genital shield dull orange; sternites similarly patterned, yellow, with the posterior borders of the segments more weakly darkned.

H a b.: Flores.

H o l o t y p e: ♀, Badjava, altitude 1,200 meters, December 1931.

I can find no close ally of the present fly, which is well-distinguished by the diagnostic features listed, especially the pattern of the head, the peculiar darkening of the mediotergite and pleura, and the wing and leg patterns. A comparison with the other species of the genus known to occur in the island of Flores will be found under the account of *Nephrotoma handschiniana* spec. nov.

LIMONIINÆ.

Limoniini.

15. *Limonia (Libnotes) alexanderi* (Edwards).

1915. *Libnotes* sp., Alexander; Proc. U.S. Nat. Mus., 49: 165; pl. 43, fig. 11 (wing).
1925. *Libnotes alexandri* Edwards; Treubia, 6: 162.

The specimens that I had earlier examined (l.c.) were from Tjibodas, Mount Gedeh, W. Java, taken at 8,000 feet, August 26,

1909, by Mr. OWEN BRYANT. EDWARDS's type was from Kadang Badak, Java, altitude 2,405 meters, August 23, 1921, taken by a native collector.

One female, Kadang Badak, Tjibodas, August 1931 (HANDSCHIN).

16. *Limonia (Libnotes) oralis* (Edwards).

1928. *Libnotes oralis* Edwards; Journ. Fed. Malay St. Mus., 14: 80-81.

Widely distributed in the Austromalayan region, from Perak to Buru. One male, Buitenzorg, Java, March 1932.

17. *Limonia (Libnotes) samoensis* (Alexander).

1921. *Libnotes samoensis* Alexander; Bull. Brooklyn Ent. Soc., 16: 9-10.

The confusion in the nomenclature of the so-called *nervosa* group of *Libnotes* has been discussed in various papers by EDWARDS and myself.[1]

The name *nervosa* de Meijere (Tijd. voor Ent., 54: 36-37; 1911) is invalidated by a prior use in the genus and the next available name for a member of this particular group is *samoensis* Alexander. Confusion resulting from a very marked sexual dimorphism in members of the group is further complicated by an unusual range in size and coloration within either sex of what seems to represent a single species or race. EDWARDS found that small males tend to resemble the females in venation and stigmal size, rather than the larger and more highly developed males of what seem unquestionably to be the same species. Members of the group have a wide range in the Indo-Malayan region and until more extensive series of specimens become available, it seems best to consider the flies in the present series as being races of *samoensis* rather than distinct species.

18. *Limonia (Libnotes) samoensis baliensis* subspec. nov.

M a l e: Length, about 9mm; wing, 11mm,5.

Praescutal stripes black, the median one indistinctly divided by a pale vitta; median stripe becoming obsolete some distance

[1] ALEXANDER, 1931. Archiv für Hydrobiol., Suppl. Bd. 9. *Tropische Binnengewässer*, 2: 160-161. — ALEXANDER, 1935. *Crane-flies of New Britain.* Proc. Linn. Soc. New South Wales (in press). — EDWARDS, 1928. *Insects of Samoa, Nematocera.* Part VI, fasc. 2: 80.

before the suture; lateral stripes crossing the suture and including the outer portions of the scutal lobes; mediotergite darker on sides than on central portion. Knobs of halteres dark brown. Femora with the tips slightly clearer yellow than the remainder of the segment, but without evident dark subterminal rings. Wings with the stigmal area extensive, chiefly yellow in cell Sc_1; cell R_1 and outer portions more darkened; free tip of Sc_2 broadly seamed with dark brown. Venation: Free tip of Sc_2 lying far before R_2, the distance equal to or exceeding the length of cell *1st* M_2; terminal spur of R_{1+2} elongate; basal section of R_{4+5} and *r-m* strongly arcuated; *m-cu* opposite midlength of cell *1st* M_2; *m* and basal section of M_3 equal and straight.

Abdominal tergites with the pale caudal margins broad and conspicious on segments two to four, the succeeding segments uniformly darkened.

H a b.: Bali.

H o l o t y p e: ♂, Kintomani, altitude 1,400 meters, January 1932.

The species described as *nervosa* de Meijere, proccupied as indicated above, and which is intentionally left nameless until further information concerning the status of the group becomes available, has the distance between the free tip of Sc_2 and R_2 (second section of vein R_2) much shorter, only about twice R_2 alone and with a short spur of R_{1+2} persisting. In large sized males of this form, the coloration of the wing is quite as described by DE MEIJERE and entirely different from the present fly.

19. *Limonia (Libnotes) samoensis idjensis* subspec. nov.

M a l e: Length, about 8mm; wing, 9mm,5.

Characters as in the typical form, differing as follows:

Praescutal stripes poorly defined, especially the posterior half of the median vitta; outer lateral portions of scutal lobes heavily blackened; mediotergite dark brown. Pleura yellow, conspicuously variegated by dark, brown on anepisternum and ventral sternopleurite. Femoral dark rings distinct. Wings with the very large stigmal area almost uniformly infumed from the cord to beyond the outer spur of R_{1+2}. Venation: Distance between free tip of Sc_2 and R_2 very long, exceeding the long second section of vein M_{1+2}

(cephalic face of cell *1st* M_2); R_{1+2} of moderate length, about twice R_2; *m* considerably longer than the basal section of M_3 and strongly arcuated, so cell *2nd* M_2 is considerably longer than cell M_3.

Abdominal tergites dark brown, without paler caudal margins, only the posterior and lateral portions of tergites two and three somewhat brightened.

Hab.: East Java.

Hototype, ♂, Sempol, Mount Idjen, altitude 2,000 meters, February 1931.

Hexatomini.

20. *Hexatoma (Eriocera) timorensis* spec. nov.

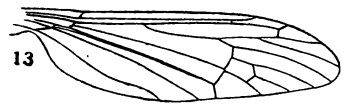
Belongs to the *verticalis* group; allied to *verticalis*; antennæ (male) elongate, flagellum black, flagellar segments with relatively few weak spines; knobs of halteres darkened; femora yellow, the tips very narrowly blackened; wings strongly infumed, the stigma conspicuous, darker brown, R_{2+3+4} distinctly shorter than R_{2+3} and R_3 combined; *m-cu* at or very close to fork of M; male hypopygium with the outer dististyle notched before apex.

Male: Length, about 10mm; wing, 11mm,5; antenna, about 39mm.

Rostrum brownish yellow; palpi with basal segment yellow, the remainder black. Antennæ (male) nearly four times as long as entire body; scape tumid, brownish yellow, darker dorsally; pedicel brownish yellow; flagellum black, the segments long-cylindrical, with relatively few spinous setæ, on the basal segment there being about four or five; these setæ are weaker than in *verticalis*, with intermixed smaller setæ of the same type. Vertical tubercle large and bulbous, brown; head brown.

Mesonotal praescutum brown, with four very slightly darker brown stripes; pale erect setæ conspicuous; posterior sclerites of notum almost black, sparsely pruinose. Pleura dark brown, sparsely pruinose. Halteres obscure yellow, the knobs infuscated. Legs with the coxae and trochanters brownish yellow; femora obscure yellow, the tips very narrowly blackened; tibiæ and basitarsi brown, passing into black. Wings (fig. 13) with the ground-color much darker than in *verticalis*; stigma oval, conspicuous, darker brown; certain of the longitudinal veins vaguely seamed with darker; veins brown, the

radial veins darker. Venation: R_{2+3+4} distinctly shorter than the combined R_{2+3} and R_3; R_2 distinctly shorter than R_{2+3}, subequal to R_{1+2}; *m-cu* at or very close to the fork of *M*.



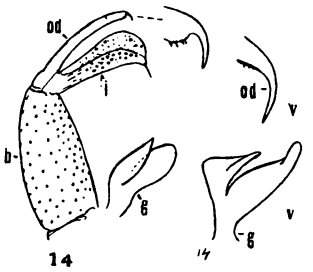


FIG. 13. — *Hexatoma (E) timorensis* spec. nov.; wing-venation.

FIG. 14. — The same; male hypopygium. (symbols: *b* = basistyle; *g* = gonapophysis; *od* = outer dististyle.)

FIG. 14 v. — Comparison of hypopygial structures of *H (E.) verticalis* (Wiedemann); symbols, *g* and *od*, as above.

Abdomen dark brown, the hypopygium a little paler. Male hypopygium (fig. 14) with the outer dististyle, *od*, distinctly notched on lower face before apical spine; in *verticalis* (fig. 14, v) the spine merges gradually with the remainder of style, without notch. The gonapophyses are differently formed in the two species (*verticalis*, fig. 14, v.).

Hab.: Timor.

Holotype, ♂, Koepang, December 1931.

By EDWARDS's key to the Old World species of *Eriocera* (Ann. Mag. Nat. Hist., (9) 8: 70-78; 1921), the present species runs to *verticalis* (Wiedemann), which is its nearest ally. Compared with Javanese specimens that agree closely with the original description of *verticalis*, the present fly differs in the diagnostic features indicated above, especially the nature of the male hypopygium.

21. *Hexatoma (Eriocera) verticalis* (Wiedemann).

1828. *Megistocera verticalis* Wiedemann; Aussereurop. zweifl. Ins., 1: 56.
1886. *Eriocera verticalis* Osten Sacken; Berlin. Ent. Zeitschr., 30: 158.

One female, Buitenzorg, West Java, August 1931.

22. *Hexatoma (Eriocera) acrostacta* (Wiedemann).

1821. *Limnobia acrostacta* Wiedemann; Dipt. exot., 1: 14.
1869. *Eriocera acrostacta* Osten Sacken; Mon. Dipt. N. Amer., 4: 248.

Hitherto recorded from Java (type-locality) and Bengal.

Bali, January 1932 (HANDSCHIN).

23. *Hexatoma (Eriocera) basilaris* (Wiedemann).

1821. *Limnobia basilaris* Wiedemann; Dipt. exot., 1: 15.
1869. *Eriocera basilaris* Osten Sacken; Mon. Dipt. N. Amer., 4: 248.

One male, Puntjak, Buitenzorg, West Java, November 16, 1930. Two females, Tjibodas, Mount Gedeh, altitude 1,400-1,600 meters.

24. *Hexatoma (Eriocera) cingulata* (de Meijere).

1911. *Eriocera cingulata* de Meijere; Tijd. voor Ent., 54: 58-59.

Described from Western Java. One specimen, in poor condition, Goenoeng Pantjar, West Java, altitude 1,200 meters, August 1931.

25. *Hexatoma (Eriocera) lunigera* (Walker).

1857. *Pterocosmus lunigera* Walker; Proc. Linn. Soc. London, 1: 107.
1896. *Eriocera lunigera* van der Wulp; Cat. Dipt. South Asia, p. 45.

Two males, three females, Buitenzorg, West Java, February, October, November, 1931.

26. *Hexatoma (Eriocera) pænulata* (Enderlein).

1912. *Eriocera pænulata* Enderlein; Zool. Jahrb., Syst., 32: 43-44, fig. Z.

Described from Sumatra. Reported by EDWARDS from Mount Idjen, East Java. One male, Buitenzorg, West Java, November 1931. One male, Bali, January 1932.

27. *Gynoplistia (Gynoplistia) bella* (Walker).

1835. *Ctenophora bella* Walker; Ent. Mag., 2: 470.
1835. *Gynoplistia bella* Westwood; London & Edinburgh phil. Mag., 6: 280.

Widely distributed throughout Australia and Tasmania.
Bredbo R., Australian Alps, New South Wales, October 6, 1930.

28. *Gynoplistia (Gynoplistia) forceps* (Alexander).

1931. *Gynoplistia (Gynoplistia) forceps* Alexander; Ann. Mag. Nat.Hi st., (10) 8: 162-163.

The unique type and hitherto only known specimen was a male, taken at Wentworth Falls, Blue Mts., New South Wales, October 20-30, 1930, by F. E. WILSON.

A female specimen from the type-locality, October 19, 1930, taken by Dr. HANDSCHIN, is herewith defined as allotype.

Allotopotype. — Female. Length, about 8mm; wing, 6mm.

Characters as in the male, differing especially in sexual characters, as follows:

Antennæ 16-segmented, with seven branched segments, the formula being 2+2+5+7; longest branch (about flagellar segments two to four) about twice the length of the segment; branch of the seventh flagellar segment shorter than the segment; terminal simple segments subequal, the outer three becoming progressively larger, especially the last which is one-half longer than the penultimate. Ovipositor with the cerci unusually long and straight, totalling more than one-fourth the total length of the abdomen.

29. *Gynoplistia (Gynoplistia) nigripennis* Alexander.

1923. *Gynoplistia fumipennis* Alexander; Proc. Hawaiian Ent. Soc., 5: 253 (preoccupied).
1926. *Gynoplistia nigripennis* Alexander; Ann. Mag. Nat. Hist., (9) 17: 530.

One male, Kiandra, Mount Kosciusko.

30. *Gynoplistia (Gynoplistia) obscurivena* Skuse.

1890. *Gynoplistia obscurivena* Skuse; Proc. Linn. Soc. New South Wales, (2) 4: 867-868.

One female, Blundell's, Canberra, C. F. T., October 10, 1930.

31. *Elephantomyia (Elephantomyodes) handschini* spec. nov.

General coloration black, the sternopleurite and sternum heavily gray pruinose; legs, including tarsi, black; wings with anterior half brown, the cells of posterior portion paler; cells of radial and medial field variegated by conspicuous whitish areas; abdominal tergites black, segments three to five with a narrow obscure yellow ring on anterior border of segments.

Male: Length, excluding rostrum, about 6mm,5; wing 7mm; rostrum, 5mm,8.

Rostrum black, only a little shorter than the remainder of body. Antennæ black throughout; basal flagellar segment cylindrical; the

elongate flagellar verticils begin on the second segment and continue to end of organ. Head dark gray; front lighter gray; anterior vertex subequal in diameter to the first flagellar segment.

Pronotum and mesonotum uniformly black, the surface subnitidous. Pleura black, the sternopleurite, sternum and meron very heavily pruinose with silvery gray. Halteres brown, the knobs brownish black. Legs with the coxae and trochanters brown; femora black, the bases restrictedly obscure yellow; tibiæ and tarsi black. Wings (fig. 15) with cells of anterior half, cephalad of vein *M*, brown, those behind vein *M* more buffy to grayish; conspicuous whitish areas in cells of radial and medial fields, as follows: In prearcular field, two in cell *R*, one before origin of *Rs*, the second, larger and more rectangular, beneath *Rs* in outer third of cell; a quadrate area in cell R_1 above *Rs*; other similar pale areas in cells R_4, R_5, *1st* M_2 and, more diffusely, in cells M_3 and M_4; veins brown. Venation: R_5 in direct alignment with *Rs*; *mc-u* at near midlength of lower face of cell *1st* M_2, the latter subequal in length to the longest veins beyond; cell *2nd A* relatively narrow.

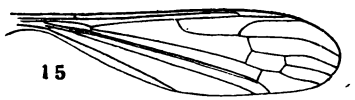


FIG. 15.
Elephantomyia (Elephantomyodes) handschini spec. nov.; wing-venation.

Abdominal tergites black, segments three to five each with a narrow, obscure yellow ring at base; outer tergites and hypopygium black; sternites with pale coloration of bases of segments scarcely evident.

Hab.: Flores.

Holotype, ♂, Kelimotoe, altitude 1,400 meters, December 1931.

This handsome *Elephantomyia* is named in honor of the collector, Dr. Edw. HANDSCHIN. The species is allied to *Elephantomyia (Elephantomyodes) delectata* (Walker) of north Ceram, differing in the coloration of the thorax and in the wing-pattern. The fly is more remotely allied to the Javan *E. (E.) egregia* de Meijere.

Eriopterini.

32. *Conosia irrorata* (Wiedemann).

1828. *Limnobia irrorata* Wiedemann; Aussereurop. zweifl. Ins., 1: 574.
1880. *Conosia irrorata* van der Wulp; Tijd. voor Ent., 23: 161.

Widely distributed in the tropical and subtropical portions of the Old World.

Buitenzorg, West Java, November, December 1930. Darwin, North Australia, June 1931. Marrakai, North Australia, May 1931. Burnside, North Australia, May 1931.

Dr. HANDSCHIN notes that the species often comes to light, where he observed its peculiar resting position, which somewhat resembles that of a *Ploiaria (Emesidae, Heteroptera)*. The sketches provided by the collector show that when at rest, the body is held at a strong angle (about 70°) to the support, the fore legs directed ahead, the posterior pair straight behind, with the intermediate legs strongly bent at the knees.

33. *Trentepohlia (Mongoma) amphileuca* spec. nov.

General coloration rich brown, the præscutum unmarked; legs black, the outer fourth of tibia and proximal fourth of basitarsus snowy-white; wings subhyaline; stigma very small and narrow; apical fusion of veins Cu_1 and *1st A* relatively extensive.

M a l e: Length, about $4^{mm},5$; wing, $5^{mm},2$.

F e m a l e: Length, about 5^{mm}; wing, $5^{mm},4$.

Rostrum light brown; palpi black. Antennæ with scape and pedicel brown; flagellum black; flagellar segments long-oval to subcylindrical, with short verticils. Head dark brown; anterior vertex narrow.

Mesonotum rich brown, without markings, the pleura more testaceous brown. Halteres short, dark brown, the extreme base of stem pale. Legs with the coxæ and trochanters yellow; femora black, the extreme bases yellow; tibiæ black, the tips abruptly snowy-white, the amount involving a little less than one-fourth the length of the segment; basitarsi with more than the proximal third snowy-white, the remainder of the segment and other tarsal segments dark brown; the degree of whitening on the tibia and tarsus is subequal; only the posterior leg remains; femora unarmed basally; tibiæ at distal end with two or three powerful black setæ. Wings

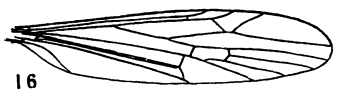


FIG. 16.
Trentepohlia (Mongoma) amphileuca spec. nov.; wing-venation.

(fig. 16) subhyaline; stigma brown, very small and narrow, not or scarcely passing caudad beyond vein R_1; veins dark brown. Outer veins virtually without trichia, excepting a series of about ten on distal section of vein R_5. Venation: R_3 oblique; *Rs* about two and one-half times the length of the basal section of R_5; inner end of cell M_3 lying far basad of other outer cells, at near midlength of cell *1st* M_2; *m-cu* before fork of M; apical fusion of veins Cu_1 and *1st A* relatively extensive, from one-half to two-thirds *m-cu*.

Abdominal tergites dark brown, the sternites obscure yellow.

Hab.: West Java.

Holotype, ♂, Depok, November 1930. Allotopotype, ♀, pinned with the type.

The peculiar pattern of the legs, with the white coloration about equally distributed on both tibia and basitarsus, in conjunction with the degree of fusion of veins Cu_1 and *1st A*, readily separates the present fly from all other described members of the subgenus.

34. *Trentepohlia (Mongoma) auricosta* Alexander.

1934. *Trentepohlia (Mongoma) auricosta* Alexander; Philippine Journ. Sci., 54: 462-463.

The type was from Bibidjilan, Djampangs, West Java, altitude 2,000 feet, September 1933 (WALSH).

One female, Tjisaroea, West Java, altitude 1,000 meters, July 1931. Venation much as in the type but vein R_3 more oblique.

Female: Length, about 12mm; wing, 9mm,2.

35. *Trentepohlia (Anchimongoma) niveipes* Edwards.

1927. *Trentepohlia (Anchimongoma) niveipes* Edwards; Treubia, 9: 368.

The type was from Mount Tjibodas, West Java, altitude 1,400 meters, collected by KARNY.

One broken specimen, Salak, West Java, altitude 1,000 meters, December 18, 1930. The ecological notes concerning this species as made by Dr. HANDSCHIN should be consulted [under *Tipula (Tipulodina) pedata* Wiedemann].