NOTES ON NEOTROPICAL TABANIDAE (DIPTERA) WITH DESCRIPTIONS OF NEW SPECIES[1]

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The species discussed here have mostly been taken in Panama as a by-product of work on the ecology of forest mosquitoes being carried on by members of this laboratory, or by survey units working under Lt. Col. F. S. Blanton in connection with his studies of biting midges. The new species or new records for Panama raise the number of species now definitely known from the Republic to 117. The description of a new species from Surinam and revised keys to some genera are also included.

Chrysops laeta Fabricius

1805, Syst. Antl., p. 112. Kröber, 1925, Konowia, 4(3–4): 338–341, and figs.; 1934, Rev. Ent., 4(2): 227. Stone, 1947, Bol. Ent. Venezolana, 3(3): 126 (Venezuela). Carrera and Lane, 1945, Arq. Mus. Paranaense, 4(4): 129 (Parana, Brasil). Bequaert and Rengifo, 1946, Psyche, 53(3–4): 57 (Colombia). Anduze, Vogelsang and Pifano, 1947, Bol. Ent. Venezolana, 6, extra number, p. 7 (Venezuela).

A single female specimen from Almirante, Bocas del Toro Province, Panama, 2 Oct. 1951, taken in a Shannon trap at ground level. Krober (1925 *l.c.*) listed this species from Costa Rica, a record which long seemed to me dubious in view of the South American distribution of the species, but a number of both animals and plants of South American species seem to occur in Costa Rica with no evidence of their presence in Panama. The specimen differs from Colombian examples (Villavicencio) before me, and from Kröber's figures, in having the apical spot quite dilute and not sharply marked off from the adjacent hyaline wing apex. Kröber (1934 *l.c.*) has given complete references, and I add only those subsequent to 1934.

Chrysops melaena Hine

Fairchild, 1942, Proc. Ent. Soc. Washington, 44(1): 3, fig. 2 (♀; full references). Woke, 1947, Am. J. Trop. Med., 27(3): 368 (Nicaragua).

The male appears to be so far undescribed. Eyes bare, holoptic, but the line of contact short, the frontal triangle elongate. Eyes not greatly enlarged, the area of large facets about half the total eye area, clearly demarkated from the small facets. Antennae about as in female, though the second and third joints a little more slender and darker. Frontoclypeus and genae shiny yellow, the subantennal tuberosities strongly inflated. Palpi black. Thorax and legs as in female, the former wholly black and with sparser vestiture. Wings as in female, except that the basal cells are almost wholly black, with only a small clear spot at apex, and the anal cell is black with a small clear area in the middle. The abdomen is as in the female, except

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that the lateral yellow patches and the median yellow triangle on the second tergite are much reduced in size, and the triangles on succeeding tergites smaller than in female.

Neoallotype male, Hermita, Panama, 18 Sept., 1952, in mosquito light trap. F. S. Blankton, coll.

Fidena trapidoi sp. nov.

Plate I, fig. 1

Female.—Length 17—18 mm., of wing 15—17 mm. Frons rather broad, parallel sided, about three times as high as wide, brownish black pollinose and with rather dense short black hairs. Ocelli prominent. Eyes densely short-black-pubescent, the hairs longer and paler towards the lower margin. Subcallus pollinose, concolorous with the frons. Frontoclypeus black, conically produced, blackish pollinose above, shiny below and at the sides, without prominent erect hairs. Antennae black, the first two segments with very short and sparse black hairs, almost nude, but black pollinose, the third segment with the basal annuli quite wide and flattened, the terminal annuli rather short and thick. Second palpal segment black, flattened, broad basally, the apex drawn out into a slender point. First palpal segment nearly as long as the second, slender and cylindrical. Proboscis black, slender, hardly as long as abdomen, the labella slender, sclerotized and fused with the theca. Beard dense and long, creamy white.

Thorax black and mostly black pollinose and densely black haired. There are a few scattered creamy hairs on the anterior margin of the mesonotum and before the wing bases, a small tuft of creamy hairs below the squamulae, and a large prominent tuft of snow white hairs on each side of the black scutellum. The legs are wholly black and black haired, the hairs denser on the femora. The tarsi are dark brown, golden rufous pubescent beneath. The wings have the first posterior cell generally open, usually narrowed, occasionally closed at the margin, the third vein with or without a short appendix. The wings are nearly black at base, heavily fumose in the basal cells and anal area, brownish in costal, marginal and first submarginal cells in the region of the slender yellowish brown stigma, the cross veins with well defined blackish clouds, and the remainder of the wing greyish hyaline or faintly fumose.

The abdomen is black in ground color, the first tergite black haired. The second tergite bears a large median, roughly triangular patch of shiny golden hairs which reaches the anterior border of the segment and the sides are broadly golden haired. The third tergite is more extensively golden haired, having but two dorsolateral anterior patches of black hairs. The remaining tergites are almost wholly

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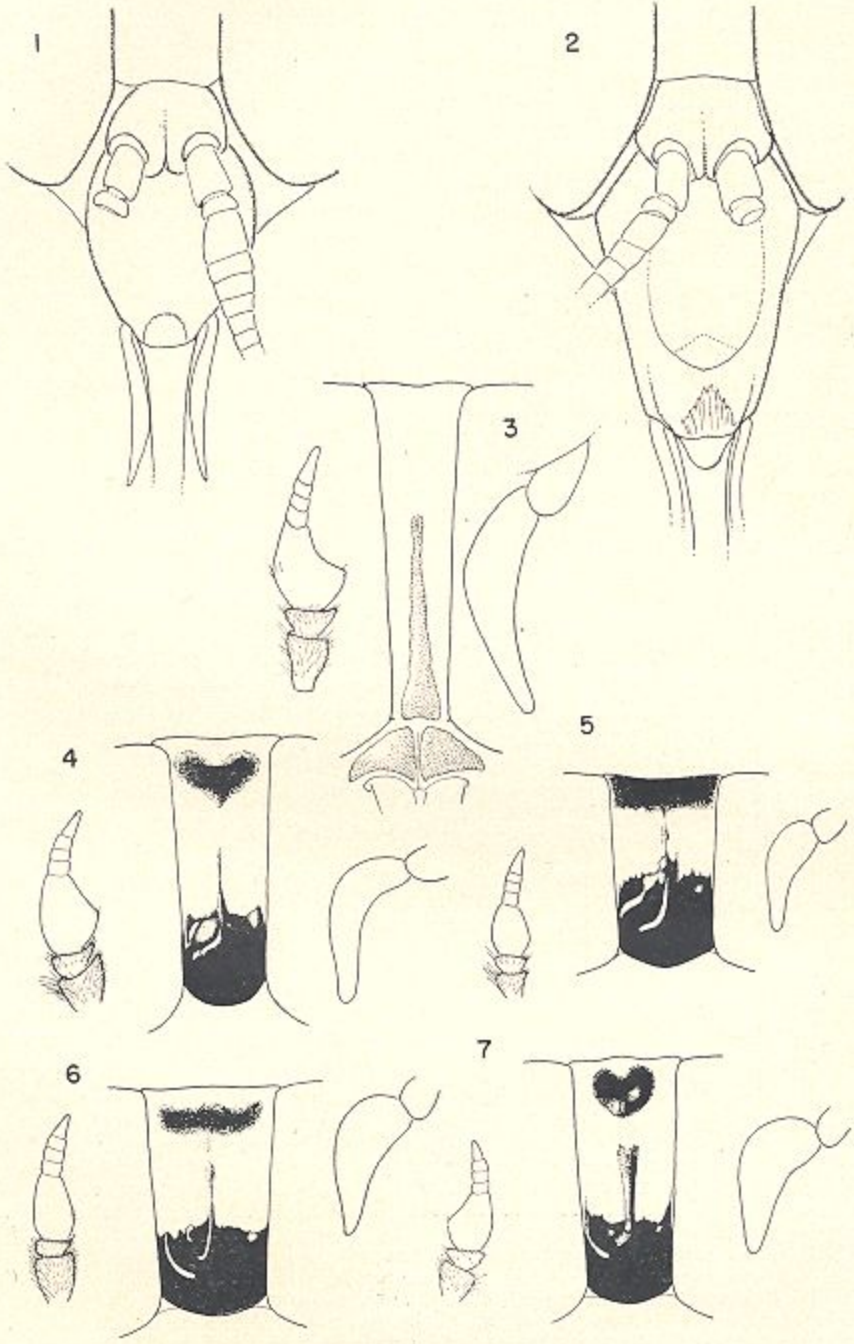
EXPLANATION OF PLATE I

FIG. 1. *Fidena trapidoi* n. sp., lower part of frons and frontoclypeus. FIG. 2. *Fidena howardi* Fchld., same structures. FIG. 3. *Stenotabanus atopus* n. sp. Holotype: frons, antenna and palp. FIG. 4. *St. pompholyx* n. sp. Holotype: frons, antenna and palp. FIG. 5. *St. blantoni* n. sp. Holotype: frons, antenna and palp. FIG. 6. *St. littoreus* Hine, frons, antenna and palp. FIG. 7. *St. geijskesi* n. sp. Holotype: frons, antenna and palp.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golden haired. Beneath, the first sternite and anterior margin of the second are black haired, the remainder of the sternites wholly pale golden haired.

Holotype female, Almirante, Bocas del Toro Province, Panama, 9 June, 1951. Taken at ground level at Yellow Fever station D.

Paratypes, 34 females, same locality as holotype taken in June (26) and July (1) 1951 and May (7) 1952. Of these, 16 specimens were taken in the forest canopy at platforms built in the trees from 36 to 54 feet above ground level, while 18 were taken attacking man at ground level or in a Shannon trap.

This very striking species is not likely to be confused with any other in Panama, its closest relative being *F. howardi* Fchld. From this it differs in the much broader third antennal segment, in lacking erect hairs on the clypeus, in broader palpi, less produced face, darker wings and in having prominent tufts of white hairs on each side of the scutellum. Named for my colleague, Dr. Harold Trapido, through whose efforts this and many other fine tabanids have been secured.

I give below a key to the Central American species of *Fidena*. I have seen all species except *fulvosericea* Kröber and have seen Central American specimens of all but *fulvosericea* and *gracilis*. These two species probably enter Central America, if at all, only in eastern Panama. There seem no stable characters to separate *rhinophora* Bell and *pyrausta* O.S. Osten Sacken himself (1886) noted that the two were separable only on color of the vestiture, and with the finding of intermediate specimens (Fairchild 1951, p. 441) it seems unnecessary to retain the later name.

KEY TO CENTRAL AMERICAN SPECIES OF *FIDENA*

1. Legs essentially unicolorous, either black or yellowish 4
   Legs bicolored, the femora dark, the tibiae pale 2
2. Beard white. Sides of mesonotum with a fine line of white hair from shoulder to scutellum. Abdomen black, the second to fourth tergites with small white mid-dorsal triangles; the second, fifth and sixth with white tufts on the posterior lateral angles. Wings with basal cells quite strongly infuscated ..... **gracilis** Kröb.
   Beard dark, brown to black 3
3. Abdomen reddish in ground color, entirely golden yellow haired above, except the first tergite. Thorax wholly dark haired. Wings with basal cells infuscated ..... **fulvosericea** Kröb.
   Abdomen blackish in ground color on at least the first three tergites. Second tergite with a tuft of white hairs laterally. Fourth or fifth to last segments brown or yellow in ground color, clothed with yellow, brown or orange rufous hairs. Sometimes small middorsal tufts of white hairs are present on second or third to fourth tergites ..... **rhinophora** Bell. (=*pyrausta* O. S.)
4. Legs wholly pale yellowish brown. Beard, pleura, sternum and abdomen beneath wholly pale pollinose and creamy haired. Mesonotum and abdomen above dark brown, black haired, the abdominal tergites with small median tufts of pale hairs. Wings uniformly lightly fumose, not darker basally ..... **columbiensis** Kröb.
   Legs wholly black, only the tarsi sometimes brownish 5
5. Wings hyaline or greyish fumose, the bases blackish and at least the apices of the basal cells darkened around the cross veins 6
   Wings strongly and uniformly yellowish, only the extreme bases darker 8
6. Beard black. Antennae and palpi bright orange yellow. Thorax black and black haired. Abdomen black, with sparse white hairs on sides of second and hind margins of fifth to seventh tergites ..... **schildi** Hine
   Beard white or cream colored. Abdomen extensively golden haired. Antennae and palpi blackish 7

7. Clypeus produced, as long or longer than frons. Hairs of mesonotum all dark. Apices of basal cells slightly darker than rest of wing. Second to last abdominal segments clothed with yellow or orange rufous hairs. ..... **howardi** Fchld.
   Clypeus much less produced, shorter than frons. A large conspicuous tuft of white hairs on each side of the scutellum. Basal cells, extreme base of wing and anal area quite strongly blackish. Second tergite with a median and lateral patches of yellow hair, third yellow haired with a pair of dorsolateral black haired patches, remaining tergites densely yellow haired ..... **trapidoi** n. sp.
8. Abdomen dark brown to black, shiny, mainly sparsely black haired, but with tufts of silvery white hairs on sides of second, fifth and sixth tergites. Beard black or dark brown ..... **isthmiae** Fchld.
   Abdomen pale yellowish, except black first segment, shiny, clothed entirely with rather short appressed golden hairs. Beard pale yellowish brown. ..... **bicolor** Krob.

Dichelacera (Dichelacera) crocata sp. nov.

Plate II, fig. 10

Female.—Length 9.5–12 mm., of wing, 10–12 mm. Eyes bare, in life green with a broad transverse median purple band and the greater part of upper half of eye purple. Frons about 2.5 times as high as basal width, distinctly narrower at vertex than at base, bright yellow pollinose. Frontal callus black, as wide as frons, with a median triangular prolongation above. Vertex with a blackish or discolored triangle bearing black hairs, the small tubercle at its apex, but without visible vestiges of ocelli. Subcallus, genae and frontoclypeus bright yellow pollinose, the last rather thinly clothed and with a tendency to become denuded and subshiny. Beard sparse, yellow. Antennae dull yellowish brown, black haired, the annulate portion and most of the apical half to two-thirds of the lower branch of the basal portion black. Palpi long and very slender, dull yellowish, mostly yellow haired, but with a few scattered black hairs. Proboscis somewhat exceeding palpi, nearly equalling head height, theca yellow, labella black, both sclerotized and shiny.

Mesonotum dark brown in ground color, the anterior half to the transverse sutures bright yellow pollinose and yellow haired. Posteriorly to this is a black pollinose and black haired transverse band between the wing bases. The remainder of the mesonotum is yellow pollinose and yellow haired, while the scutellum is again black pollinose and black haired. The interalar black band is quite narrow, not wider than the succeeding yellow area and generally markedly narrower. Wings with subepaulet without macrotrichiae, costa, subcosta and first vein setose above. Wings intense yellow, costal cell, and apical halves of cells Cu_2 and An_1 smoky brown. Dark band of wing filling apex to fork of third vein, and including apex of discal cell and apical half of fifth posterior cell, where its inner margin joins the posterior wing margin at apex of cell Cu_2. The inner margin of the band is quite even and the dark infuscation fills the whole apical and posterior margin of the wing evenly, without lighter areas. Legs yellow, yellow haired, except apices of fore tibiae, fore tarsi, and hind tibiae and tarsi, which are darker and black haired.

Abdomen dull yellowish brown in ground color, the first two or three segments paler. The abdomen is mainly densely yellow haired

and yellow pollinose, but the fore borders of the second to fifth tergites and all of the six and seventh are black haired. Or the abdomen may be described as having the first tergite wholly yellow haired, the remainder black haired, with on the second a very wide posterior yellow border covering three-fourths the width of the segment, on the third and fourth a somewhat narrower yellow border, wider in the middle and at the sides, covering about two-thirds the width of the segment, on the fifth a broad median yellow triangle reaching nearly to the anterior border of the segment, but sides of the segment black haired. Sixth and seventh tergites black haired. Beneath, the abdomen is dull yellowish brown, subshiny, clothed with short yellow hairs.

Holotype female, Almirante, Bocas del Toro Province, Panama, 19 June, 1952, Yellow Fever Station D. Taken attacking man at a platform in the trees 36 feet above ground level.

Paratypes: 37 females from same locality as holotype taken in May (2), June (8), July (3), and Dec. (2) 1951, and May (6), June (4), July (2), August (6) and September (4) 1952. Of these specimens 32 were taken at platforms in the forest canopy from 36 to 54 feet above ground level, and only 5 were taken at ground level.

This species may be distinguished from *D. regina* Fchld. by the considerably broader frons, more even wing band, and much greater proportion of yellow in the body vestiture. From *D. rex* Fchld. it can be separated by the fact that the inner margin of the wing band is never proximal to the fork of the third vein, and the body is much more extensively and brighter yellow. All three species occur together at Almirante. *D. regina* is also an arboreal species: of the 29 specimens from Almirante, 19 were taken in the forest canopy, but it is less confined to this habitat. *D. rex* has only been taken at ground level at Almirante, 20 specimens, though elsewhere an occasional specimen is taken in tree-top catches. All the specimens of *crocata* are uniform in their characters and show no tendency to intergrade with either *regina* or *rex*.

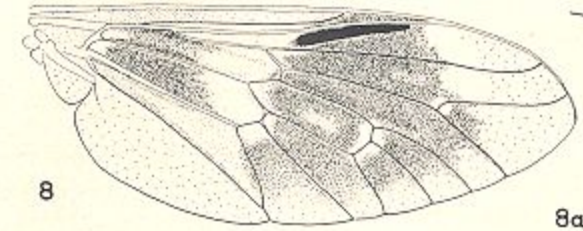
Stibasoma stilbium sp. nov.

Plate II, fig. 11

Female.—Length 19–20 mm., of wing 18.5–19.5. Eyes bare, in life dark blackish above, dull greenish below, the colors sharply separated along a line extending from the inner angle transversely across the middle of the eye, but less distinctly separated at the outer angle. Frons about 5.5 times as high as basal width, wholly black and black haired, the basal callus poorly marked, merging into a seamed and wrinkled median stripe which joins the poorly delimited vertical triangle. There is a weekly defined tubercle at vertex and vestiges of an anterior ocellus.

EXPLANATION OF PLATE II

FIG. 8, a, b, c. *Tabanus* (*Philipotabanus*) *nigrinubilus* n. sp. Holotype: wing, frons, palp and antenna. FIG. 9, a, b, c. *T.* (*Ph.*) *grassator* n. sp. Holotype: wing, palp, antenna and frons. FIG. 10, a, b, c. *Dichelacera crocata* n. sp. Holotype: wing, frons, palp and antenna. FIG. 11, a, b. *Stibasoma stilbium* n. sp. Holotype: frons, palp and antenna. FIG. 12, a, b. *Leucotabanus aurarius* n. sp. Holotype: frons, palp and antenna.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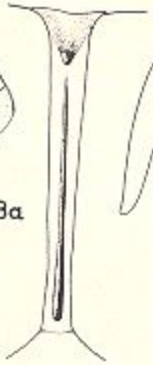
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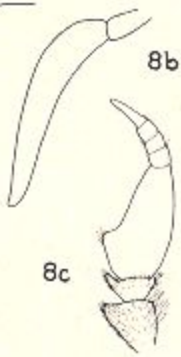
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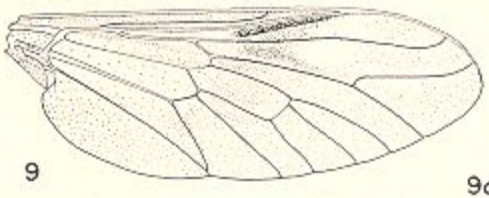
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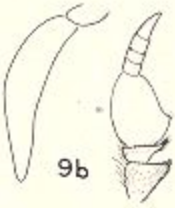
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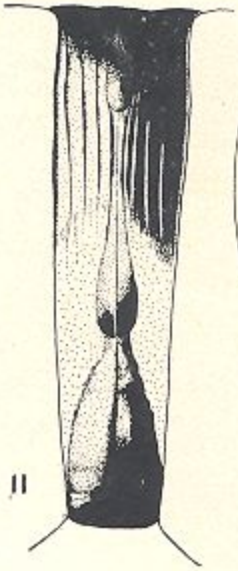
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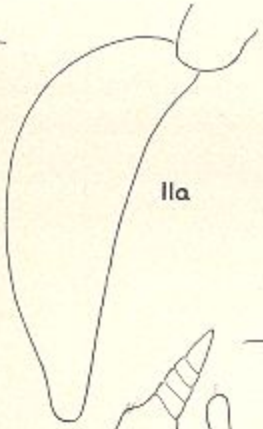
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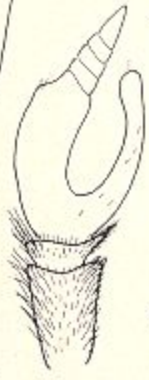
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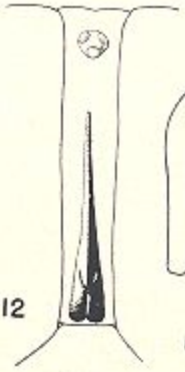
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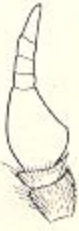
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Subcallus, frontoclypeus and genae shining pearl grey pollinose, changing from whitish to nearly black with changing light incidence, the last two rather densely beset with black hairs. Beard black. Antennae black, somewhat pearly pollinose, black haired except for some silvery hairs at base of first segment above. Dorsal tooth long, reaching beyond the first annulus with a tendency for its tip to be clubbed. Palpi quite strongly inflated, black and black haired. Proboscis black, less than head height and not much exceeding palpi, the theca and labella well sclerotized, the latter shiny.

Mesonotum and scutellum black to dark brown, dark brown pollinose, densely black haired. Pleura and sternum black and rather densely black haired. Legs black, black haired, except for a small patch of silvery white hairs on outside of base of each tibia. Fore tibiae markedly swollen, hind tibiae with both an external and internal fringe of long hairs, all legs quite densely hairy. Wings with subepaulet bare, costa and first vein setose above, subcosta with a single row of macrotrichiae above, densely setose below; venation normal, no appendix on third vein, first posterior cell (R_5) somewhat narrowed. Wings black at extreme base to the arculus, the rest deeply yellowish tinged fading to faintly dusky at apex; costal cell brown, and in some specimens a tendency for the centers of the cells to be more hyaline, so that the veins appear yellowish to brownish margined.

Abdomen dark reddish brown to nearly black in ground color, the first tergite wholly black haired or with a posterior fringe of sparse yellow hairs mixed with the black. Succeeding segments clothed with dense short shiny coppery red hairs basally, bright shiny yellow hairs on the posterior margins. The proportions of red and yellow hairs varies, some specimens having the tergites mostly yellow haired. In two specimens there is some admixture of black hairs with the coppery ones, and in all the fifth to last tergites are almost wholly yellow haired and much telescoped into the preceding segments. Beneath, the first sternite is black haired, the second with some yellow at sides of posterior margins, the remainder with increasingly complete and increasingly broad yellow haired hind margins, otherwise the sternites are black haired.

Holotype female, Almirante, Bocas del Toro Province, Panama, 4 June, 1952, taken at Yellow Fever station C, 54 feet above ground level in the forest canopy.

Paratypes, 3 females, same locality as holotype, 23 May, 1951, 2 and 10 June, 1952, all taken at platforms in the forest canopy from 36 to 54 feet above ground level.

This species will run to *St. sulfurotaeniatum* Kröb. in Kröber's (1932) key to the genus. In this key the abdomen is said to have the second and third tergites shining sulfur yellow banded, but the original description (1931 p. 338) states that tergites 2 to 7 have broad pure sulfur yellow hind marginal bands. The present species differs from the original description in having the abdomen darker in ground color, with copper red hairs basally on the tergites and in lacking a prealar tuft of silver white hairs. Kröber gives no figure of his species, nor any description of the shape of the antennae, so until specimens from near the type locality (Para, Rio Acara) can be compared, it seems

better to describe the Panama material, although it may later prove but a geographical race.

Stibasoma panamensis Curran

Stibasoma theotaenia panamensis Curran, 1934. Fam. Gen. N. A. Dipt., p. 153, fig. 23 (head, no description). Fairchild, 1951, Ann. Ent. Soc. Amer., 44: 451, figs. 3, 3a, 3b.

Stibasoma theotaenia var. *panamensis* Curran. Fairchild, 1940, Ann. Ent. Soc. Amer., 33: 685–686.

I have now had the opportunity of examining specimens of true *theotaenia* from Sao Paulo, Brasil and find that it differs very considerably from Panama specimens. Aside from the color of the vestiture of the abdomen, the color of the integument of the abdomen in *theotaenia* is black, orange yellow in *panamensis*. *Theotaenia* also has much stouter palpi, a pollinose subcallus, and the third antennal segment has a long arched dorsal spine reaching to the third annulus, much as in *St. fulvohirtum* Wied. *Panamensis* thus is a distinct and not very closely allied species. Whether the Venezuelan specimens mentioned by Schiner are the same is uncertain.

Seven females from Almirante, Bocas del Toro Province, Panama, taken in January (1), May (1), June (1), July (3) and September (1), all collected at platforms in the tree-tops from 36 to 54 feet above ground level.

The comparative scarcity of flies of the Genus *Stibasoma* in collections may be due to the predominantly arboreal habitats which many of them seem to prefer. Of the species occurring in Panama all except *chionostigma* O.S. are predominantly arboreal, and that species has not been taken at all since tree-top collections were initiated. Thus of the 59 specimens of *fulvohirtum* at hand from various localities in Panama, all but 3 were taken at platforms in the forest canopy. A single specimen from Wachope, Limon Prov., Costa Rica, 9 Aug. 1951 extends the range of the species somewhat. Of the 7 specimens of *St. apicimacula* Fchld. now known, 5 were taken at forest canopy platforms. Of the 12 specimens of *St. panamensis* known to me the above 7 and possibly one other were taken in the tree-tops, and all the known specimens of *St. stilbium* n. sp. came from tree-top collections.

A key to the known Central American species in given below, omitting *venenatus* O.S. which belongs in *Rhabdotylus* Lutz.

KEY TO CENTRAL AMERICAN SPECIES OF *STIBASOMA*

1. Wings almost wholly black with purple reflections. Subcallus shiny. Abdomen with first two tergites bright yellow haired, the remainder copper red haired. (Panama) ..... **panamensis** Curr.
   Wings not wholly black, with at least a large light area below the stigma. Abdomen not so marked 2
2. Wings with an extensive black pattern or a black subapical patch. Subcallus at least shiny in the middle 3
   Wings yellowish or greyish subhyaline, not contrastingly marked. Subcallus silvery grey pollinose 4
3. Wings black or dark brown with the apex and a large patch from stigma to discal cell yellowish hyaline. Frons largely pollinose. Abdomen largely reddish brown, black haired. (Mexico to Colombia). ..... **chionostigma** O. S.
   Wings largely hyaline, yellowish along costa and with a blackish patch in apex of marginal and first submarginal cells. Frons largely black and denuded. Abdomen black with narrow yellow bands on hind margins of tergites 1 and 2. (Panama) ..... **apicimacula** Fchld.

4. Large species, usually over 19 mm. Thorax wholly black; abdominal tergites coppery haired basally, yellow haired on the margin. Legs including tarsi predominantly black. (Panama).....**stilbium** n. sp.
Smaller, 15 mm. or less. Thorax with at least some rufous orange hair or white hair tufts at sides; abdominal tergites black with narrow yellowish posterior margins. Legs extensively white marked, the tarsi and mid-tibiae yellowish. (Northern Brazil to Costa Rica).....**fulvohirtum** Wied.

Stenotabanus (Aegialomyia) geijskesi sp. nov.

Plate I, fig. 7

Female.—Length 11 mm., of wing 8.5 mm. Eyes bare, the sketch accompanying the specimen showing a single broad median transverse stripe not reaching the outer margin and the lower margin stippled, labelled "lower indistinct"; presumably the eyes were greenish, the band purple or dark reddish and the lower margin broadly greenish-purple. Frons broad, about 2.7 times as high as basal width, yellowish grey pollinose. Basal callus as wide as frons, dark brown, protuberant, extended above to an indistinct median callus. Vertex with a large round shiny brown boss but without any vestiges of ocelli. Subcallus, fronto-clypeus and genae pale grey pollinose, the first slightly tinged with yellowish, the last with sparse white hairs. Antennae pale yellowish brown, black haired, the third segment rather broad and with a well marked angle above. Palpi stout, curved and inflated, white and white pollinose beset with mixed black and white hairs. Proboscis brown, hardly longer than palpi, labella large and membranous.

Mesonotum light brown, obscurely striped, light greyish brown pollinose and beset with sparse black and white hairs. Scutellum concolorous. Pleura and sternum pale grey pollinose, sparsely white haired. Wings with subepaulet bare, costa, subcosta and first vein setose above, venation normal, a short appendix on upper branch of third vein, stigma pale yellow, wings entirely hyaline. Legs pale brown, the femora mostly pale haired, the tibiae and tarsi with mostly dark hairs. Fore tibiae dusky at apex and the fore tarsi darker than the others.

Abdomen pale brown in ground color, the pollinosity of two shades of brown forming the following pattern. First tergite pale at base and narrowly so on hind margin, between the two a narrow band of darker brown parallel to hind margin. Second to sixth tergites with a pale hind margin, obscure pale median triangles which reach the anterior margin, and a large round dorsolateral spot on each side separated from both anterior and posterior margins. Seventh tergite pale at apex. Otherwise the abdomen is a darker brown. The pale areas are beset with pale yellowish white hairs, the dark areas with dark reddish brown to black hairs. Beneath, the abdomen is entirely pale pollinose, sparsely pale haired.

Holotype female, Matappica strand, Suriname, 20 Oct., 1940, Geijskes coll. In the collection of Dr. C. B. Philip.

This species is close to *littoreus* Hine, from which it differs in differently proportioned frons, broader and more angled third antennal segment, blunter and stouter palpi and in lacking the well marked middorsal abdominal stripe of *littoreus*.

Stenotabanus (Aegialomyia) blantoni sp. nov.

Plate I, fig. 5

Female.—Length 8–9 mm., of wing 7.5–8 mm. Eyes bare, in life purple with two broad green bands, the lower of which crosses the middle of the eye from the angle of the frons and face to the outer margin. The upper purple area at the occipital margin is somewhat dilute and suffused with greenish. Or the eye may be described as green with the upper and lower margins purple and a narrow transverse purple band above the middle. Frons very broad, about twice as high as basal width, yellowish grey pollinose. Frontal callus black, very protuberant, as wide as frons, prolonged above to a vestigial median callus. Vertex dusky yellowish, shiny the full width of frons but without swelling, tubercle or vestiges of ocelli. Subcallus and upper angles of genae yellowish grey pollinose, frontoclypeus and genae below level of antennae steel grey. Beard rather sparse, whitish. Antennae dull yellowish, the setae black. Third antennal segment without prominent angle above, the style about as long as the basal plate. Palpi whitish, pale pollinose with long white hairs on first and base of second segment, shorter appressed black hairs on remainder, rather inflated basally but with slender apices. Proboscis short, hardly exceeding the palpi, brown, the labella large and membranous.

Mesonotum and scutellum dark brown, greyish brown pollinose, very faintly striped, beset with rather sparse shiny pale hairs. Pleura and sternum pale brownish grey pollinose, beset with long sparse whitish hairs. Wings with venation normal, subepaulet bare, costa, subcosta and first vein setose above; hyaline, the veins very narrowly and faintly brown margined, the upper fork of third vein with a moderate to rather long appendix, stigma narrow, yellow. Legs dusky yellowish brown, the femora pale haired, the tibiae and tarsi dark haired, fore tibiae somewhat darkened distally.

Abdomen dark brown with a pattern of pale brownish grey and dark brown pollinosity. First tergite pale on anterior and lateral borders, dark in the middle and with a pale hind border. Second to fifth or sixth tergites with pale hind and lateral borders, pale narrow median triangles which may or may not quite reach the fore border, and pale, somewhat rectangular dorsolateral spots which are joined to the hind marginal pale band on the second tergite, but may be more or less clearly separated from it on the succeeding segments. Seventh tergite dark, obscurely pale margined behind. Beneath, the abdomen is wholly pale greyish pollinose and pale haired.

Holotype female, Jaque, Darien Prov., Panama, 26 July, 1952, in mosquito light trap. F. S. Blanton leg.

Paratypes, 2 females, same locality, 24 and 25 July, 1952.

This species seems rather closely related to *geijskesi* n. sp., *littoreus* Hine, *paitillensis* Fchld., and a number of other small coastal marsh or beach inhabiting species. It is the second of this group to be taken on the Pacific coast of Panama and differs from *paitillensis* in larger size, broader frons, more denuded vertex, and in having but two green bands on the eye. Named in honor of Lt. Col. F. S. Blanton, M. S. C., whose enthusiastic collecting of biting Diptera is very materially increasing our knowledge of the Panama fauna.

Stenotabanus (Aegialomyia) littoreus Hine

Plate I, fig. 6

Tabanus littoreus Hine, 1907, Ohio Nat., 8(2): 227–228 (♀, ♂; Puerto Barrios, Guatemala). Surcouf, 1921, Genera Insect, Tab., p. 73. Bequaert, 1925, 13th Ann. Rep. Med. Dept. United Fruit Co., p. 206 (Puerto Cortez, Honduras); 1931, J. New York Ent. Soc., 39: 543 (Northern Quintana Roo, Mexico); 1938, Carnegie Inst. Washington, Pub. No. 499, p. 226 (Puerto Barrios, at light). Kröber, 1934, Rev. Ent., 4(3): 300.

A single female of what I believe to be this species was taken biting man on the beach near Pina, Colon Prov., Panama, 12 Nov., 1950. This specimen was compared with specimens determined by Dr. Bequaert as *littoreus* and with notes taken on Hine's types by me in 1940. My specimen agrees very well with Hine's description, except that the median abdominal stripe is better defined than he indicates. The subepaulet is bare, costa and first vein setose above, subcosta setose below but apparently bare above. Since the species of this group are all very similar in color and markings, a figure of frons, antennae and palpus is here included. The eye pattern of this specimen was not recorded in life but enough remains to indicate two broad light bands on a dark ground, as figured by Bequaert (*l.c.* 1931).

Stenotabanus (Stenotabanus) fulvistriatus (Hine)

Tabanus fulvistriatus Hine, 1912, Ohio Nat., 12(7): 515 (♀; Chiapas, Mexico). Surcouf, 1921, Gen. Insect., Tab., p. 69. Kröber, 1934, Rev. Ent., 4(3): 309.
Tabanus unistriatus Dunn, 1934, Psyche, 41(3): 174 (in part; Panama).
Stenotabanus (Stenotabanus) fulvistriatus Fairchild, 1942, Ann. Ent. Soc. Amer., 35(3): 303, fig. 11 (♀; Panama, Costa Rica).

Specimens of both sexes from Costa Rica (Palmar, Puntarenas Prov., P. & D. Allen, no date) and from Dampf's collection through Dr. Philip (labelled M.F. 4321 and M.F. 4238, presumably Mexico) enables the male to be described, while female specimens from Guatemala (San Juan, Sinacapa, Esquintla, 13 June, 1950, J. M. Brennan; Antigua, no date, J. R. de Leon; Yepocapa, Chimaltenango, 26 Dec., 1949, H. Dalmat) and Nicaragua (Rio Majase, Cañas Gordas, N. of Rivas, probably July, 1952, J. Boshell) fill the gap in distribution between Panama and Mexico. The species has been taken in Panama so far only on the Pacific side in Chiriqui Province, near the Costa Rican border.

Male.—Length 9–10 mm., of wing 7.5–8 mm. Head enlarged, eyes holoptic, bare, the area of enlarged facets extensive, about three-fourths of total eye area, the two types of facets very clearly demarcated and differentiated. Vertical tubercle present and well developed, not deeply sunk between eyes. Frontal triangle yellow pollinose with a brown transverse pollinose stripe at the level of the junction of the two types of eye facets and another brown band at level of antennae. Palpi orange yellow, inflated, the tip attenuated and turned down, clothed with long golden hair and yellow pollen. Thorax and legs as in female, wing as in female though more dilute brownish. Abdomen slender and pointed, orange yellow pollinose, the median stripe defined only by having yellow hairs while the sides have black hairs. In the female the stripe is pale yellow pollinose, the sides dark brown pollinose and hence much more distinct.

Neoallotype male, Palmar, Dept. Puntarenas, Costa Rica, no date, P. and D. Allen coll.

Stenotabanus atopus sp. nov.

Plate I, fig. 3

Female.—Length 12.5–14 mm., of wing 11–12 mm. Eyes bare, green in life, no bands or other pattern. Frons about six times as high as basal width, widest at vertex, dull orange yellow pollinose with sparse black hairs. Basal callus yellow, narrower than frons, gradually narrowed into a ridge or keel which reaches about two-thirds the distance to vertex. No tubercle or denuded area at vertex, nor any vestiges of ocelli. Subcallus slightly inflated, bare and shiny, yellow. Frontoclypeus and genae light yellowish brown pollinose; beard sparse, yellowish. Antennae orange brown, the first two segments black haired, the third quite wide with a prominent dorsal angle. Annulate portion of third segment a little darker than basal portion. Palpi orange brown, dark grey pollinose, beset with mostly black hairs, but a scattered few yellow hairs towards base. Proboscis less than head height, not greatly exceeding palpi in length, brown, the labella largely pollinose with only a small strip of shiny sclerotization. Theca short, pollinose.

Mesonotum blackish brown in ground color, clothed with yellowish grey pollinosity, more yellowish anteriorly, in the suture and on scutellum, the whole beset with short black hairs and longer yellow hairs around the margins and anteriorly. Pleura and sternum lighter yellowish grey, beset with long golden yellow hairs. Fore legs blackish brown, bases of tibiae a little lighter, all black haired except the pale pollinose and yellow haired coxae. Mid-legs dusky yellowish brown, the tibiae and tarsi darker, femora with considerable yellow hair posteriorly, tibiae and tarsi black haired. Hind legs with paler femora with much yellow hair, tibiae and tarsi blackish and black haired. Subepaulet bare, pointed; costa, subcosta and first vein setose above; a long to very long appendix on upper branch of third vein. Wings yellowish basally, especially the costal cell, the area beyond stigma distinctly smoky. In some specimens the veins are faintly brown margined with suggestions of clouds around the cross veins.

Abdomen light yellowish to dirty greyish brown in ground color, very thinly brownish pollinose, clothed with moderately dense short black hairs. There is a quite broad and rather even yellow haired middorsal stripe from the first to fifth or sixth tergite and the integument beneath this stripe is more thickly and paler yellow pollinose. The sides of all tergites except the last one or two are also yellow haired. Beneath, the sternites are subshiny, thinly clothed with short yellow hairs.

Holotype female. Almirante, Bocas del Toro Province, Panama, 5 July, 1951. Taken in a Shannon trap at Yellow Fever station B, ground level.

Paratypes, 3 females, same locality as holotype, 5 June, 12 July and 22 August, 1951, all taken in a Shannon trap at ground level.

This species is obviously and closely related to what I have been calling *Cryptotylus luteoflavus* Bell., the structure of head, antennae

and wing venation being almost identical. Its discovery confirms certain doubts which I have entertained for some time as to the placement of *luteoflavus* in *Cryptotylus*. The two species differ from *Cryptotylus* in lacking the developed antennal tooth, in relatively unsclerotized labella, in well developed frontal callus and shiny subcallus and in having the male eye facets, at least in *luteoflavus* but slightly differentiated. They do not fit well into current interpretations of *Stenotabanus* either, lacking the enlarged eye facets in the male and being larger and with broader antennae than most species placed therein. However, the bare subepaulets rule them out of *Tabanus* and as *Stenotabanus* is currently somewhat of a catch-all for *Tabanus*-like species with bare subepaulet and no other obvious characteristics, they may as well be placed here for the time being, although I refrain from placing them in any specific subgenus.

I am inclined to suspect that the small, relatively unspecialized species of *Stenotabanus* may represent the stock from which a good many of the more specialized groups of Neotropical *Tabaninae* originated Such genera as *Diachlorus*, *Leptapha* and even *Dichelacera* in the broadest sense contain species which are quite *Stenotabanus*-like. The Neotropical *Tabaninae* are an exceedingly diversified group, but the bulk of the odd and specialized forms have the subepaulet bare, and I believe are ultimately derivable from simpler forms like *Stenotabanus*. The more typically *Tabanus*-like forms, with setose subepaulet, have been derived I believe, at least in part, from more recent Nearctic immigrants. It is of interest in this connection to note that the majority of the more strictly Neotropical elements are confined to a forest environment, while the forms showing Nearctic affinities tend to be more widespread and to be dominant in open and cultivated areas. The position of the Chilean-Patagonian forms, *Dasybasis* and allies, seems rather different, and they do not appear to have played any important role in the development of the Neotropical fauna as a whole. As Mackerras and Fuller (1942 p. 42) have shown for Australia, the more strictly Antartic groups, such as *Dasybasis* and *Pelecorhynchus* tend to be confined to the cooler areas in the south of that continent, extending north mainly along the eastern highlands. The Chilean-Patagonian elements in South America are rather similar structurally, several genera being common to both continents, and they also seem to extend into the geographic tropics only along the cool Andean chain. The ultimate origin of the more strictly Neotropical fauna is, of course, highly speculative, but I believe the available evidence suggests derivation from some unspecialized Antarctic group rather than from any existing Nearctic stock. Such a form as *Scaptiodes* shows many of the characters one would expect in such a stem-form, bare subepaulet, unmodified proboscis and antennae, hairy eyes and a well developed verticle tubercle with vestiges of ocelli. Except for the hairy eyes, it could fit fairly well into *Stenotabanus*. Incidentally, the marked tendency for species from cold climates, due either to high altitude or high latitude, to have hairy eyes seems to me more than coincidence, and I doubt if it is as fundamental a character as has been believed, at least in the *Tabanidae*.

Stenotabanus pompholyx sp. nov.

Plate I, fig. 4

Female.—Length 12 mm., of wing 10 mm. Eyes bare, the pattern (revived) consisting apparently of two narrow green bands separated by a narrow purple band, the rest of the eye being purple. Frons broad, a little over three times as high as basal width, clothed with yellowish grey pollinosity and with a diffuse, broad, transverse band of dark brown pollinosity between basal callus and vertex. Basal callus as wide as frons, black, shiny and protuberant, like a bubble of tar, extended above on each side and in the middle by a slender short raised line. Vertex with a raised rounded triangular area which is black and shiny, but without vestiges of ocelli. Subcallus light yellowish pollinose, pale grey on genae and frontoclypeus. At the level of the antennae a transverse band of darker, dusky pollinosity separates the two colors. Beard whitish. Antennae dusky yellowish, black haired, the annulate portion black except for extreme tip, which is yellow. Palpi yellowish, pale pollinose, with short black hairs and longer white hairs, the latter mostly at base. Proboscis blackish, short, the labella membranous.

Mesonotum dark brown, subshiny, very obscurely striped, sparsely clothed with short shiny silvery or brassy hairs. Scutellum dark at base, reddish at apex, also sparsely pale haired. Pleura and sternum steel grey, sparsely white haired. Subepaulet bare, costa, subcosta and first vein setose above and a short appendix on upper branch of third vein. Wings hyaline, the costal cell very faintly yellowish, stigma yellow and rather weak brownish clouds around all cross veins, fork of third vein and anterior border of wing from stigma to apex. Legs brown, the femora mainly pale haired, the tibiae and tarsi black haired. Fore tibiae a little darker apically. Abdomen subshiny, perhaps somewhat rubbed, blackish in ground color, but the first two segments extensively or largely reddish, especially at sides, and remaining segments with decreasingly distinct diffuse reddish dorsolateral patches. The hind margins of all tergites are narrowly paler, especially marked on the second, where there are indications of a pale pollinose median triangle. The tergites are clothed with black hair except for pale haired lateral margins and a mid-dorsal row of rather diffuse contiguous pale-haired triangles on first to fifth tergites and a few pale hairs in middle of sixth tergite. Beneath, the abdomen is dark in ground color, pale pollinose and pale haired.

Holotype female, Patiño airfield, Patiño Point, Darien, Panama, 15 July, 1952, F. S. Blanton leg. Taken in a mosquito light trap.

Paratype, one female, same locality as holotype, but 18 July, 1952, in a light trap. The specimen lacks the abdomen and posterior legs, but agrees perfectly in head structures, wing color, etc.

This species is one of those indefinite forms which make the generic classification of the Tabanidae so difficult. In general fascies, body color, presence of a shiny boss at vertex and a wide protuberant basal callus the species resembles closely some of the Andean species placed by others in *Dasybasis* (= *Agelanius*) or *Hybomitra* (= *Therioplectes*), except that the eyes are wholly bare. The bare subepaulet rules it

out of *Tabanus* and *Hybomitra*, though some species of *Dasybasis* appear to have nearly bare eyes. In other respects it is not dissimilar to *Aegialomyia*, though the frons is narrow and callus more protuberant and the color and general appearance rather different. For the present it seems best to leave it in *Stenotabanus* on account of the bare subepaulets and lack of any other marked characteristics.

Leucotabanus aurarius sp. nov.

Plate II, fig. 12

Female.—Length 12 mm., of wing 10 mm. Frons about 5.5 times as high as basal width, dark brownish grey pollinose. Callus a little over half as wide as frons below, evenly tapering to a blunt point two-thirds the distance to the vertex, black, as figured. Vertical tubercle prominent, with well marked vestiges of ocelli. Subcallus subshiny, probably secondarily denuded, the sides, frontoclypeus and genae very dark yellowish grey pollinose. Scattered black hairs are present below the antennae and the beard is jet black. Eyes bare, probably unicolorous blackish in life. Antennae wholly light orange brown, the basal segments black haired, as figured. Palpi moderately stout, black and black haired, as figured. Proboscis a little longer than palpi, the labella large and membranous.

Mesonotum blackish brown, clothed in the center with rather dense, short, black hairs; the anterior margin including the humeri, a narrow strip above the wing insertions and the scutellum clothed with longer dark golden hairs, the line of demarkation between the colors very sharp. Pleura and sternum black, thinly dark greyish pollinose and sparsely black haired. Legs wholly black and black haired. Wings hyaline, the costal cell and to a less extent the basal two-thirds of the wing dilute yellowish. Stigma yellow. Subepaulet, costa, subcosta and first vein with macrotrichiae; no appendix on upper branch of third vein.

Abdomen above black and black haired, the second tergite with a patch of white hairs at the sides, the fourth tergite with a narrow posterior border of white hairs, slightly widened in the middle. Beneath, the first sternite bears a small median patch of white hairs, the second is wholly white haired and the fourth bears a narrow white haired hind margin; otherwise the venter is black and black haired.

Holotype female, Almirante, Bocas del Toro Province, Panama, 5 July, 1951, taken in a Shannon trap during the day at Yellow Fever Station B. Quiñones coll.

With the addition of the above species, the genus *Leucotabanus* now includes 15 species, so that a new key to the known forms to replace that published eleven years ago (Fairchild 1941) seems in order.

KEY TO SPECIES OF *LEUCOTABANUS*

1. Thorax clothed wholly or partly with yellow, orange or yellowish grey tomentum; legs entirely black or brown, not bicolored 2
   Thorax not yellow, generally with more or less white tomentum; legs not entirely dark, the tibiae more or less white 4
2. Mesonotum wholly rich lemon yellow. Abdomen above, legs, and palpi entirely jet black. Subcallus bare and shiny. (Costa Rica to Brasil), ... **flavinotum** Krōb.
   Mesonotum not wholly lemon yellow. Abdomen above with second and fourth tergites with at least some white or yellowish hairs 3

3. Mesonotum black haired on the disc, orange haired on the margins and scutellum. Second tergite with lateral white haired patches, fourth with a narrow transverse white haired band. (Panama) ..... **aurarius** n. sp.
Mesonotum grey or yellowish grey. Second and fourth tergites with yellowish or white transverse bands. Subcallus pollinose. (Mexico), ... **itzarum** Beq.
4. Palpi black or nearly so, black haired 5
Palpi pale, yellowish or brownish, black or pale haired 6
5. Thorax dark to light grey on the disc, unstriped, the sides and scutellum prominently white haired. At least the second and fourth abdominal tergites, and often the third, fifth and sixth with narrow white hind margins, which may be incomplete. Stigma blackish, narrow. (Mexico to Paraguay) ..... **leucaspis** Wied.
Thorax with a median and sublateral white stripes; pleura and scutellum white haired, second and fourth abdominal tergites rather broadly white. Stigma black, unusually broad and prominent. (Brasil). ..... **sebastianus** Fchld.
6. Antennae black 7
Antennae brown or yellowish 10
7. Small species, less than 10 mm. long. Mesonotum unstriped, blackish, the sides and scutellum white haired. Abdomen black, with all tergites pale margined behind, but only the first, second and fourth with white hairs. (Brasil) ..... **pauculus** Fchld.
Larger species, over 13 mm. Mesonotum prominently striped 8
8. Mesonotum dark chocolate brown, black haired and with a median and two dorsolateral white haired stripes, obsolete posteriorly and tending to coalesce. Sides of thorax and scutellum white haired. Abdomen chocolate brown, black haired; first tergite with white hairs laterally, second with a median triangular and extensive lateral white haired patches and fourth with a complete white hind marginal band, widened in the middle and covering about two-thirds of the tergite. Beneath, the second and fourth sternites bear white hind margins. (Mexico to Colombia) ..... **canithorax** Fchld.
Mesonotum with four white stripes. Abdomen otherwise marked 9
9. Frontal callus hardly more than a slender line with a small oval enlargement below. Second and fourth tergites with complete white transverse hind marginal bands, very broad on the fourth, third with a little white hair posteriorly. Venter dark haired, only the second and fourth sternites white haired. (Southwestern U. S.) ..... **ambiguus** Stone
Frontal callus more than half as wide as frons below, gradually tapering towards vertex. First tergite white haired at sides, second with a broad middorsal triangle and lateral white patches, fourth with a broad continuous band, third, fifth and sixth with small mid-dorsal triangles and lateral white patches. Sternites wholly pale haired. (Ecuador, Peru) ..... **weyrauchi** Fchld.
10. Subcallus denuded, shiny. Frons rather broad, the frontal callus an inverted "T." Whole insect light brown, the thorax white haired and all abdominal tergites with white haired hind margins. (Bolivia), ... **pallidus** Kröb.
Subcallus pollinose 11
11. Frontal callus well developed, nearly as wide as, or nearly filling whole frons. All tergites extensively white haired 12
Frontal callus narrowly drop-shaped to ridgelike. Abdomen not so marked 13
12. Frontal callus reaching about half-way to vertex, appreciably narrower than frons. Thorax pale brown, white pollinose and white haired, obscurely striped. All tergites broadly white haired behind, the first two nearly wholly white, the remainder with broad white haired triangles. (Argentina to Brasil) ..... **albibasis** Brethes
Frontal callus filling most of frons, reaching nearly to vertex. Coloration about as in *albibasis*. (Brasil) ..... **leucogaster** Fchld.
13. Small 10–12 mm., pale brown species, the thorax white haired, the abdomen with all tergites white margined. (Southern U. S.) ..... **annulatus** Say
Larger, 14–16 mm., the abdomen otherwise marked 14

14. Whole insect black in ground color. Annulate portion of third antennal segment as long or longer than basal portion. Thorax uniformly grey. Abdomen with all tergites white margined, but the second and fourth with much broader bands than the others. Legs prominently bicolored. (Mexico, Guatemala) ..... **nigriventris** Kröb.
Whole insect light to dark chocolate brown. Annulate portion of third antennal segment shorter than basal portion. Thorax distinctly striped. Abdomen with second and fourth tergites broadly white behind, the band expanded into a mid-dorsal triangle; first tergite dark, third, fifth and succeeding tergites with a white mid-dorsal triangle and with or without a narrow white hind margin. Legs obscurely bicolored. (Br. Guiana, Brasil) ..... **leuconotum** Fchld.

Subgenus **Philipotabanus** Fchld.

Very considerable additional material in this group has not helped greatly in clarifying the rather confusing situation outlined previously (Fairchild 1942), but recent type comparisons have settled the status of two heretofore doubtful names.

Tabanus (Philipotabanus) caliginosus Bell.

Tabanus caliginosus Bellardi, 1859, Saggio Ditt. Mess. Pt. I, p. 68, Tab. II, fig. 10 (♀: Mexico).
Phaetobanus intermedius Kröber, 1930, Zool. Anz., 90(3–4): 81 (♀; Suiza de Turrialba, Costa Rica).
Tabanus (Phaeotabanus) pallidetinctus Kröber, 1930, Zool. Anz., 86: 297–298, fig. 19, 19a (Chiriquicito, Panama); 1934, Rev. Ent., 4(3): 305.
Tabanus (Phaeotabanus) medius Kröber, 1934, Rev. Ent., 4(3): 305.
Tabanus (Philipotabanus) medius Fairchild, 1942, Ann. Ent. Soc. Amer., 35(4): 458–459, fig. 16 (♀; Panama).

Dr. J. Bequaert was able recently to examine the types of Bellardi's Tabanidae in the Zoological Museum of the University of Turin and to compare specimens from Panama sent him by Dr. C. B. Philip. He found that specimens of *T. (P.) medius* Kröber determined by me, corresponded exactly with the types of *T. caliginosus* Bell., so that if my determination was correct, the species will take Bellardi's name. Among specimens of several species sent recently to the British Museum, Mr. Oldroyd found that a specimen of *caliginosus* from Almirante agrees very closely with the Type of *pallidetinctus* Kröber, and that this specimen was labelled "perhaps *T. caliginosus* Bell." by Kröber.

Aside from the material discussed in 1942, I now have a considerable series from near Almirante, Bocas del Toro Province which agrees with those previously reported. The species is quite variable in body color, specimens from Almirante ranging from rather light yellowish brown to dark cinnamon brown. The abdominal tergites seem always to be pale margined behind and in unrubbed material there is usually a more or less distinct triangle of pale hairs at least on the second to fourth tergites. A male and female from Esquinas, Golfito, Costa Rica and females from Palo Santo, Sta. Clara and Boquete in Chiriqui Province are considerably darker, nearly black, with slightly broader frons and a tendency for the pale triangles of the abdomen to be limited to the third and fourth tergites, or even the fourth only, where it is much enlarged. A single specimen from Sta. Fe, Veraguas Province, 23 May, 1950, is quite black, the frons even broader and the wing markings rather different, the clear areas around the distal end of the discal

cell and at the fork of the third vein being quite large and sharp, while there is an unusually dark brownish infuscation of the hind margin and apex of the wing. The triangles on third and fourth tergite are silvery white haired and the frons is the broadest of any specimens of this group so far seen. This last specimen was taken in company with another black species, described below, in which the same basic wing pattern is developed in the opposite direction towards reduction of the clear areas, and the frons is exceedingly narrow. Although quite different appearing from *caliginosus* from Almirante and the Canal Zone area, this specimen from Sta. Fe is connected by the Chiriqui specimens, and I believe it to be but an extreme development.

Three males of this species have been examined, from El Valle, Cocle Province Panama, 1948 (2), and Golfito, Puntarenas Province, Costa Rica, no date. They are like the females in coloration and wing pattern and easily associated with them. The eyes are holoptic, bare, the large facets well differentiated and demarkated from the small facets and occupying somewhat over half the total eye area. There is no vertical tubercle. The palpi are erect, carried close to the frontoclypeus, the terminal segment cylindrical, acutely pointed and bearing long erect hairs. The proboscis is slender, especially the theca of the labellum, less than head height, the labella less than half total length of proboscis, and without shiny plates. The subepaulet is more sparsely setose than the adjoining costa, as is also often the case in the females.

Tabanus (Philipotabanus) elviae Fchld.

1942, Ann. Ent. Soc. Amer., 35(4): 460, fig. 12 (♀; Buena Vista, Chiriqui, Panama).

A single additional specimen from Almirante, Bocas del Toro Province, Panama, 28 June, 1951, agrees perfectly with the type in the reduced wing pattern, long antennal tooth and body color.

Tabanus (Philipotabanus) pterographicus Fchld.

1942, Ann. Ent. Soc. Amer., 35(4): 459, fig. 15.

One female from Albrook Field, Canal Zone, 8 Dec., 1949 in horse baited mosquito trap, and 8 females from Almirante, Bocas del Toro Province. The latter were taken 7 July, 1951 (1), 18 Aug., 1944 (1), 16 Oct., 1951 (4), and 13 Nov., 1951, the last at a platform in the tree tops, the others at ground level, mostly in a Shannon trap. The species is taken in company with *caliginosus* but appears to be more abundant later in the season than that species, though there are too few specimens to be very significant.

Tabanus (Philipotabanus) chrysothrix Fchld.

1942, Ann. Ent. Soc. Amer., 35(4): 459–460, fig. 17.

Two females, El Valle, Cocle Prov., 26 April, 1952 and 16 May, 1948 are like the type in being very pale with pale reduced wing picture. Five additional females, Cerro Jefe, Panama Province, 20 May, 1946 taken at light, are a little darker. Both series have the very narrow frons and relatively broad third antennal segment which serves to separate the species from *pterographicus*.

Tabanus (Philipotabanus) keenani Fchld.

1946, Ann. Ent. Soc. Amer., 39(4): 547, fig. 2; 1951, Ann. Ent. Soc. Amer., 44(3): 455.

An additional female, Mojinga Swamp, nr. Ft. Sherman, C. Z., 27 Nov., 1951 in light trap and a male, Rio Suarez, Santander, Colombia, 900 m. alt., 11–28 Aug., 1946, L. Richter coll. The last is in the collection of Dr. C. B. Philip, to whom I am indebted for the privilege of describing it, and may be designated as *Neoallotype*. The area of enlarged eye facets occupy about one-half the eye area and the large facets are well differentiated and demarkated from the small facets. Antennae yellow, more slender than in female. Thorax and abdomen dingy brownish, lighter than in female. Fourth tergite with a dorsal triangle of silvery hairs, otherwise abdomen black haired above. Wings as in female, the dark markings a little paler and a little less extensive than in female.

Tabanus (Philipotabanus) magnificus Kröber

Tabanus (Phaeotabanus) formosus Kröber, 1930, Zool. Anz., 86(11–12): 299, figs. 21, 21a (♀; Costa Rica, Colombia, Ecuador, Santo Domingo). Bequaert, 1940, Rev. Ent., 11(1–2): 291.
Tabanus (Phaeotabanus) magnificus Kröber, 1934, Rev. Ent., 4(3): 305.
Tabanus (Philipotabanus) magnificus Fairchild, 1942, Ann. Ent. Soc. Amer., 35(4): 456–458, fig. 13 (Guatemala, Costa Rica, Panama, Ecuador); 1946, Ann. Ent. Soc. Amer., 39(3): 574.

I have now seen specimens of this species from the provinces of Darien, Panama, Colon, Bocas del Toro, Veraguas and Cocle, as well as the Canal Zone. Specimens from Ecuador, from several localities in the Choco area of Colombia, Golfito, Costa Rica, and San Luis, Peten, Guatemala have also been studied. Night catches made from 6 to 9 p.m. in an area of heavy forest near Almirante, Bocas del Toro Province, show the species to be on the wing at night, and it is much more abundant in these night catches than in the day catches made at the same place. It is also taken with fair frequency at platforms in the forest canopy, and is the commonest species taken in light traps. The latter have yielded a series of six males, taken at Mojinga Swamp, nr. Ft. Sherman, C.Z., 20–21 May, 1952, and since this sex is undescribed a description is here included.

Male.—Head enlarged, eyes bare, holoptic, the large facets occupying fully two-thirds eye area, strongly differentiated from the small facets, but the line of demarkation between the two types not sharp. Vertical tubercle a slender process deeply sunk between the eyes. Subepaulet setose. Palpi porrect, inflated. Proboscis more slender than in female, the labella small, without shiny plates. Antennae as in female, but the median triangles on abdomen less evident.

Neoallotype male, Mojinga swamp, nr. Ft. Sherman, C. Z., 21 May, 1952, in mosquito light trap, F. S. Blanton coll. Five additional males from the same locality, 20 and 21 May, 1952; one male Almirante, Bocas del Toro, Panama, 30 May, 1951 and one male Esquinas, nr. Golfito, Puntarenas Dept., Costa Rica, P. & D. Allen, no date.

Tabanus (Philipotabanus) grassator sp. nov.

Plate II, fig. 9

Female.—Length 9.5 mm., of wing 10.5 mm. Eyes bare, dull bronzy in life. Frons dark grey pollinose, about 7.5 times as high as

basal width, as figured. Callus slender, club shaped, brown below, blackish above. Vertex shiny, slightly raised, but no true tubercle nor any vestiges of ocelli. Subcallus and fronto clypeus yellowish brown pollinose, genae darker, greyish. Beard yellowish brown. First two antennal segments yellowish with darker hairs, third segment wholly jade green, though this color will probably fade on long preservation. Palpi yellowish brown, black haired, rather stouter and more tapered than usual in this group. Proboscis greenish black, but little longer than palpi, the labella fleshy.

Mesonotum and scutellum light yellowish brown in ground color, obscurely striped, thinly clothed with yellowish pollen. Anteriorly the mesonotum is clothed sparsely with yellow hairs to the level of the transverse suture, except in the middle where a tongue of black hairs extends forward. Black hairs cover the posterior half of the scutum to the scutellar border, with a few yellow hairs at the lateral margins. Scutellum with yellow hairs. A denser tuft of black hairs before and above wing bases. Pleura and sternum yellowish brown, thinly pollinose and thinly pale haired. Wing with subepaulet thin, acutely pointed and with but a very few setae. Costa, subcosta and first vein setose above. Wing hyaline, slightly yellow brown tinged. Area below stigma, base of first submarginal cell (R_3) and, more faintly, base of first posterior cell (R_5) and middle of discal cell (1st M_2) brownish infuscated. There is a slight cloud along vein Cu_1 and the costal cell is quite yellow. The whole wing picture is faint, dilute. The veins, especially proximal to the stigma, are yellowish with a green tinge. Fore coxae brown, femora black, tibia black, but somewhat paler basally, tarsi black. Mid and hind legs dusky brown, the apices of femora and tibiae, and tarsi, darker.

Abdomen dull pale horn-colored with a slightly greenish cast, the third to fifth segments considerably darker. First tergite and anterior border of second, posterior border of fifth and all of remaining tergites clothed with pale straw-colored hairs. Major part of second, all of third and fourth and most of fifth tergites black haired. Lateral posterior angles of all but the third and fourth tergites with pale hairs. Sternites wholly pale haired. When first collected, the whole insect had a greenish tinge, probably due to green blood such as is found in a number of Tabanidae.

Holotype female, Almirante, Bocas del Toro Prov., Panama, 30 July, 1952, taken at a mosquito catching platform 39 feet above ground level between 5 and 9 p.m.

This species is placed here on the basis of the very narrow frons, unicolorous eyes, and pictured wings. The nearly bare subepaulets and greenish tinge are unusual features, but the male of *caliginosus* shows rather sparse setae on the subepaulet also.

Tabanus (Philipotabanus) nigrinubilus sp. nov.

Plate II, fig. 8

Female.—Length 10.5–12 mm., of wing 11–13 mm. Eyes bare, unicolorous, probably greenish black or bronzy in life. Frons very narrow, about 10.7 times as high as basal width, steel grey pollinose, the callus black, slender, ridge-like. Vertex with a slightly raised subshiny patch, sometimes with a vestige of the anterior ocellus. Sub-

callus yellowish grey, frontoclypeus and genae dark steel grey pollinose. Beard sparse, of black and pale grey hairs intermixed. First two and more or less of the base of third antennal segments dusky yellowish brown, remainder of third segment including style black. Palpi dusky yellowish brown, densely black haired. Proboscis slightly longer than palpi, blackish, the labella large and membranous.

Mesonotum and scutellum dark cinnamon brown to practically black, obscurely striped, thinly greyish pollinose and sparsely black haired. Pleura and sternum pale grey pollinose, sparsely pale haired. Wings with subepaulet acutely pointed, densely black setose. Wing pattern as in *caliginosus*, but more intensely black, the hyaline fenestrae about the fork of third vein and end of discal cell very small, and the black band extending practically to the ends of the basal cells. Fore legs practically black, mid and hind femora basally black, the apices and tibiae and tarsi lighter, dusky yellowish brown.

Abdomen black or nearly so, subshiny, the first tergite thinly greyish pollinose. The first tergite bears sparse white hairs as do the extreme sides of second and third tergites and the fourth tergite bears a small and rather indistinct triangle of silvery white hairs, otherwise the the tergites are clothed with rather sparse black hairs. Beneath, the abdomen is subshiny, sparsely grey pollinose, the first three tergites clothed with sparse pale hairs, the remainder largely with black hairs.

Holotype female, Almirante, Bocas del Toro Prov., Panama, 4 July, 1951. Taken in a Shannon trap at Yellow Fever station A, ground level.

Paratypes, 1 female same data as holotype; 1 female same locality as holotype, 16 June, 1951, attacking man at Yellow Fever station D, ground level; 6 females Santa Fe, Veraguas, 18–23, 24, 26 and 31, May, 1950, 5 Aug., 1950 (2), all attacking man at Yellow Fever station C, ground level.

This species is closest to *caliginosus*, but differs in narrower frons, more slender antennae, and greater extent of black wing markings. It occurs with *caliginosus* at Almirante, with no intergrading, and at Sta. Fe with a very distinct dark form of *caliginosus*.

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