

# NOTES ON TABANIDAE (DIPT.) FROM PANAMA

## II. THE GENUS DICHELACERA MACQUART AND RELATED GENERA<sup>1</sup>

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The horseflies considered in the present paper belong to a group whose greatest development seems to have taken place in the Neotropical region. They are characterized by the presence of a long dorsal spur or spine on the basal part of the third antennal segment, the absence of macrotrichiae upon the subepaulet, and the presence in the great majority of species of shiny chitinized plates in the labellae. The numerous genera which have been described are for the most part not well characterized, and the whole group is badly in need of revision.

The species occurring in Panama fall, according to the latest classification of Kröber (1934), into two subfamilies and five genera. I retain these genera in the present paper, not because I am satisfied that they represent the best possible grouping of the species, but because I feel that a paper dealing with a limited fauna is not the place for drastic generic revision. I believe, however, that the subfamily *Bellardiinae* is superfluous, and that all the present species belong in the old subfamily *Tabaninae*, which includes all species without hind tibial spurs.

### KEY TO GENERA

1. Palpi markedly inflated, stout. Tibiae more or less inflated, and at least the hind pair with a fringe of long hairs. Antennae much shorter than frons, rather stout, the tooth long and blunt. Generally rather thick-set hairy species. . . . . *Stibasoma*
- Palpi slender to very slender. Tibiae slender, never long ciliate. Antennae may be longer than frons, the tooth slender and often pointed. Generally rather slender bare species. . . . . 2
2. Eyes densely pilose under a hand lens. Labellae pollinose, about one-third the length of the proboscis. Antennae with the tooth reaching the second annulus, rather blunt. . . . . *Dicladocera*
- Eyes bare. Labellae with at least some shiny areas. . . . . 3

<sup>1</sup>The present paper is the second in a proposed series on the Tabanidae of Panama. The first paper entitled "Notes on Tabanidae (Dipt.) from Panama. I. The Genera *Chlorotabanus* Lutz and *Cryptotylus* Lutz" is to appear in the December number of the *Revista de Entomologia*, Rio de Janeiro.

3. Labellae large, about half the length of proboscis, mostly pollinose, but with a small shiny plate near the base. (In the sole Panamanian species, the body is black, the wings black at base and with a broad black discal band),  
 Labellae small, hardly one-third the length of the proboscis, completely shiny and chitinized. . . . . **Catachlorops** 4
4. Frons narrow, the callus not as wide as the frons. Thorax and abdomen without transverse markings. Species generally 15 mm. or larger. . . . . **Psalidia**  
 Frons moderate to broad, the callus as wide as the frons. Thorax and abdomen (in all our species) with prominent transverse markings. Species generally less than 12 mm. . . . . **Dichelacera**

### Genus *Stibasoma* Schiner

1867, Verh. z. b. Ges. Wien., XVII, p. 310; Reise Novara, Zool. Theile, Dipt., pp. 93-94 (Type *Tabanus theotaenia* Wied.). Lutz, 1915, Mem. Inst. Osw. Cruz, VII, p. 100. Kröber, 1932, Stett. Ent. Zeit., XCIII, p. 241. Knab, 1913, Proc. U. S. Nat. Mus., XLVI, pp. 407-412.

Four species of the genus are thus far known from Panama, and all seem to be rather rare. I have taken but one of them personally. Dunn (1934) describes the flight of *chionostigma* as noisy and clumsy; the single specimen of *apicimacula* n. sp. buzzed loudly about my head.

#### KEY TO FEMALES OF STIBASOMA

1. Wings largely black. . . . . 3  
 Wings largely hyaline or yellow. . . . . 2
2. Wings entirely yellowish and grayish hyaline; sides of thorax rufous; abdomen with all tergites transversely banded. . . . . **fulvohirtum**  
 Wings yellowish with a black apical spot; sides of thorax black; abdomen with light transverse markings on first and second tergites only. . . . . **apicimacula**
3. Wings blackish with a yellowish hyaline patch behind the stigma and including the discal cell, and with the apex hyaline; abdomen all black above, the sternites with conspicuous yellow hind margins. . . . . **chionostigma**  
 Wings deep black, the apical and hind margins somewhat paler; abdomen pale yellow on first two segments, reddish and with rufous hair on succeeding ones. . . . . **theotaenia** var. **panamensis**

### *Stibasoma chionostigma* (Osten-Sacken)

(Figs. 5, 5a, 5b)

1886, Biol. Centr. Amer., Dipt. I, p. 54, Pl. I, fig. 11, ♀ (Guatemala) (*Tabanus*). Williston, 1901, Op. Cit., Suppl. 1, p. 259. (Mexico) (*Tabanus*). Kertész, 1900, Cat. Tab., p. 45, (*Tabanus*). Knab, 1913, Proc. U. S. Nat. Mus. XLVI, No. 2033, p. 411 (= *pachycephalum* Big. 1892). Surcouf, 1921, Gen. Insect., p. 53. Enderlein, 1925, Mitt. Mus. Berlin, XI, 2, p. 387 (= *pachycephalum* Big.).

*Stibasoma pachycephalum* Bigot, 1892. Mem. Soc. Zool. France, V, p. 636 (Mexico). Kertész, loc. cit. p. 34. Ricardo, 1904, Ann. Mag. Nat. Hist., (7), XIV, p. 361. (Types 2 ♂, antennae defective). Knab, loc. cit., pp. 408, 411. Surcouf, loc. cit. p. 53. Enderlein, loc. cit. p. 387. Kröber, 1932, Stett. Ent. Zeit., XCIII, p. 251 (with *chionostigma* O. S. as syn.); 1934, Rev. Ent., IV, 2, p. 263.

*Stibasoma flavistigma* Hine, 1912, Ohio Nat., VII, No. 7, p. 516 (♀, Vera Cruz, Mexico). Knab, loc. cit., p. 409. Hine, 1917, Trans. Amer. Ent. Soc., XLIII, No. 3, p. 171 (Costa Rica). Surcouf, loc. cit., p. 53. Enderlein, loc. cit., p. 387. Kröber, 1932, loc. cit., p. 245; 1934, loc. cit., p. 262. Dunn, 1934, Psyche, XLI, No. 3, p. 171 (Chiriqui, Panamá).

A specimen before me collected by Dunn in Chiriqui was determined by Hine as *flavistigma*, and agrees perfectly with

Osten-Sacken's description and figure. Furthermore, Dr. Bequaert informs me that in Hine's MS. notes he found a statement to the effect that *flavistigma* Hine was the same as *chionostigma* O. S. I am unable to find any justification for the use of *pachycephalum* Big. by Knab and others. The species seems to be uncommon.

Distribution: Mexico, Guatemala, Costa Rica, Panama.

Panama records: 1 ♀ Camp Pital, Chiriqui Prov., R. P. July 11, 1928 (L. H. Dunn coll.), 1 ♀ Cano Saddle, Gatun, C. Z. July, 1923 (Greene Coll. U. S. N. M.).

### *Stibasoma fulvohirtum* (Wied.)

(Figs. 4, 4a, 4b)

1828, Auss. Zweifl. Ins., I, p. 155 (♀, Brazil) (*Tabanus*). Walker, 1854, List. Dipt. Brit. Mus., V, p. 150 (*Dichelacera*). Schiner, 1868, Reise Novara, Zool., II, Abt. 1, Vol. B, Dipt., p. 94 (♀, Colombia). Osten Sacken, 1886, Biol. Centr. Amer., Dipt., I, p. 57 (Panamá). Kertész, 1900, Cat. Tab., p. 34. Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 137. Ricardo, 1904, Ann. Mag. Nat. Hist., (7), XIV, pp. 360-361. Knab, 1913, Proc. U. S. Nat. Mus., XLVI, pp. 408 and 411 (♀, Trinidad). Lutz, 1915, Mem. Inst. Osw. Cruz, VII, p. 108, Pl. XXI, fig. 23 (♀, Marajó, mouth of Amazon. Erroneously called *dives* Wlk. on plate). Surcouf, 1921, Gen. Insect., Taban., p. 53. Enderlein, 1925, Mitt. Mus. Berlin, XI, 2, p. 387. Kröber, 1932, Stett. Ent. Zeit., XCIII, p. 255, fig. 5; 1934, Rev. Ent., IV, 2, p. 263 (Colombia, Venezuela, Panamá, Trinidad, Brazil, Georgia (U. S. A.)).

*Tabanus compactus* Walker, 1854, List. Dipt. Brit. Mus., V, p. 222 (♀ Ega, Amazon River, Brazil). Osten Sacken, loc. cit., p. 57 (= *fulvohirtum*. Types seen).

*Fulvohirtum* appears to be the commonest species of the genus in Panama, but seems to be limited to the Atlantic side of the Isthmus. The species is said to attack man readily, though I have not taken it personally.

Distribution: Northern Brazil, Trinidad, Venezuela, Colombia and Panama. Kröber's (1934) record of "Georgia" (U. S. A.) is certainly erroneous.

Panama records: 3 ♀, Ft. Randolph, C. Z. December 20, 1929 (L. H. Dunn coll.); February 11, 1930 (J. B. Shropshire coll.); January 23, 1929 (C. H. Curran coll.); 1 ♀ Barro Colorado Is., C. Z. (W. C. Allee coll.) 2 ♀ Barro Colorado Is., C. Z. Dec., 1928 (C. H. Curran).

### *Stibasoma theotaenia* (Wiedemann)

1828, Auss. Zweifl. Ins., I, p. 136 (♀, Montevideo) (*Tabanus*). Walker, 1854, List. Dipt. Brit. Mus., V, Suppl. 1, p. 200 (*Tabanus*). Schiner 1868, Reise Novara, Zool., II, Abt. 1, Vol. B, Dipt., p. 94, Pl. II, fig. 6 (♀). Kertész, 1900, Cat. Tab., p. 34. Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 137. Ricardo, 1904, Ann. Mag. Nat. Hist., (7), XIV, pp. 360-361. Brèthes, 1907, An. Mus. Nac. Buenos Aires, XVI, p. 284. Knab, 1913, Proc. U. S. Nat. Mus., XLVI, pp. 408-409. Surcouf, 1921, Gen. Insect., Taban., p. 53. Kröber, 1934, Rev. Ent., IV, 2, p. 263.

*Stibasoma thioetaeniata* Williston, 1895, Kansas Univ. Quart. Journ. III, p. 194.

*Stibasoma thioetaenia* Lutz, 1907, Centralbl. Bakt. Parasitenk., Abt. 1, Orig., XLIV, p. 143 (♂, ♀); 1915, Mem. Inst. Osw. Cruz, VII, p. 103, Pl. XXI, fig. 20.

Lutz and Neiva, 1909, Mem. Inst. Osw. Cruz, I, 1, p. 32; 1914, loc. cit., VI, p. 73.  
 Kröber, 1932, Stett. Ent. Zeit., XCIII, p. 253, fig. 4.

*Stibasoma theotaenia panamensis* Curran, 1934, Fam. Gen. N. A. Dipt., p. 153, fig. 23 (head; no description).

Dr. Bequaert has kindly furnished me with some notes on this species, which I have not seen personally. Typical *theotaenia* from southern Brazil, Uruguay, and Paraguay, has the third to terminal abdominal tergites wholly black haired, as figured by Lutz (loc. cit. 1915), while Schiner's Venezuelan material, and the single specimen from Panama, have these tergites reddish and russet haired. Until examination of more ample material can be made, it would seem best to regard this form as a variety of *theotaenia*, for which the name *panamensis* may be used. This name was apparently placed on Curran's specimen by Bequaert, and Curran later used it when the figure in his book was made, without knowing that the name had not been published.

Distribution: Typical form: southern Brazil, Uruguay, Paraguay, and Argentina. Var. *panamensis*: Venezuela and Panama.

Panama records: 1 ♀, Barro Colorado Is., C. Z., January 3, 1929 (Curran).

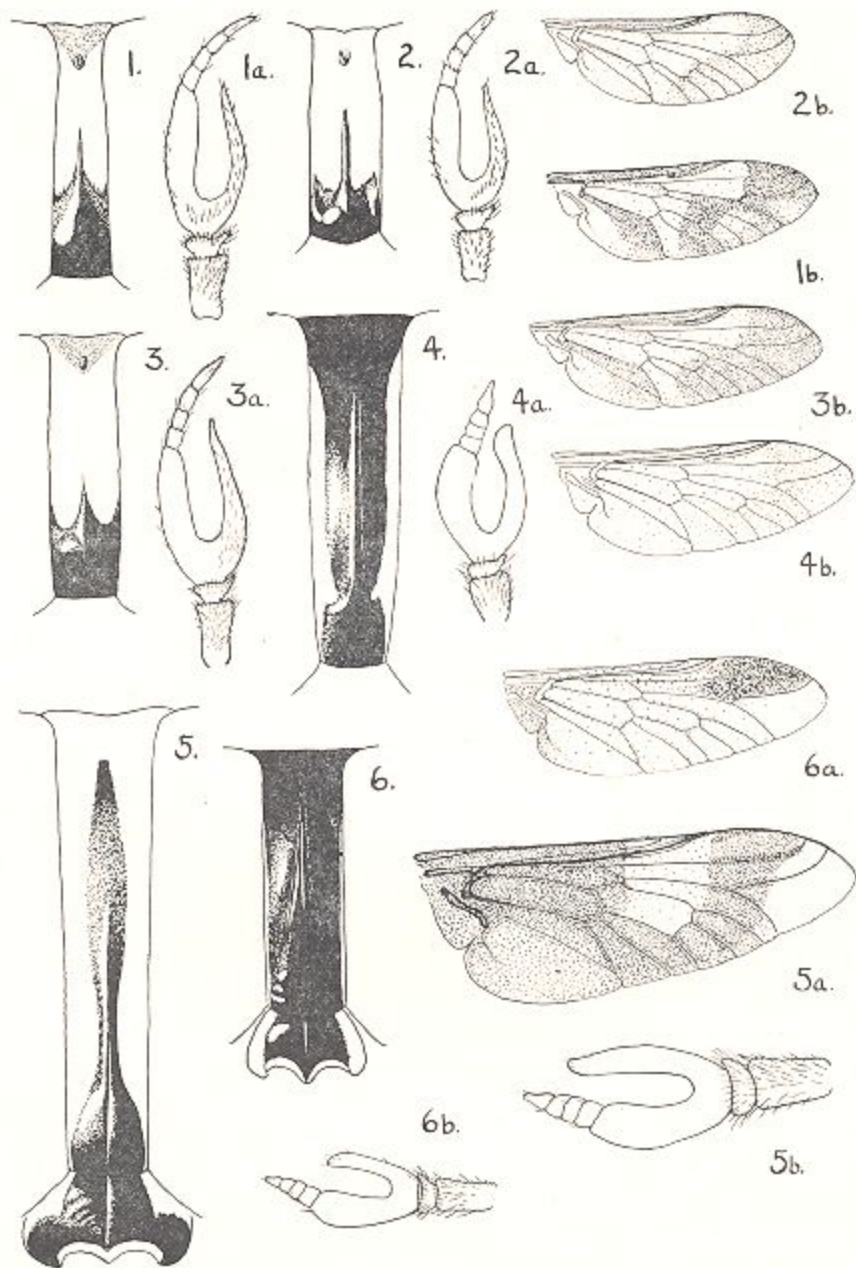
#### *Stibasoma apicimacula* n. sp.

(Figs. 6, 6a, 6b)

*Female*.—Length 13 mm., of wing 12 mm. Frons about 4 times as high as basal width, slightly narrowed below. The whole frons is shiny black, due to the enlargement and spreading of the calli, and only a thin line of gray tomentum remains along the eye-margin. Under proper illumination indications of a rounded basal callus and a spindle-shaped median callus may be seen. There is no vertexal tubercle.

Eyes bare, black with a slight greenish reflection in life. Subcallus denuded, black, shiny and with a deep median groove. Antennae black and black-haired on the first two segments, the third dark brown with golden pollinosity. The basal part of the third segment is more than twice as long as the annulate portion, and bears a long, stout, forward-pointing tooth which just reaches the first annulus. Annulations not well marked, the terminal longer than the others, sharply pointed. Palpi black, rather stout, sharply pointed, and shorter than the proboscis. Proboscis shorter than head height, black; the black shiny labella at least half as long as whole proboscis. Frontoclypeus and genae black, light gray pollinose, and with sparse black hairs.

Thorax and scutellum black, sparsely gray pollinose above. The prescutal lobe is conspicuously silvery pollinose. Pleura black, abundantly black-haired, except a tuft of silver white hairs just before the wing bases. Wings with the costal, basal, and bases of first and second submarginal cells orange yellow, and with a conspicuous brown spot



Figs. 1, 1a, 1b. *Dichelacera analis* Hine.  
 Figs. 2, 2a, 2b. *Dichelacera marginata* Macq.  
 Figs. 3, 3a, 3b. *Dichelacera regina* n. sp. Paratype.  
 Figs. 4, 4a, 4b. *Stibasoma fulvohirtum* (Wied.).  
 Figs. 5, 5a, 5b. *Stibasoma chionostigma* (O. S.).  
 Figs. 6, 6a, 6b. *Stibasoma apicimacula* n. sp. Holotype.

filling the apices of the first and second submarginal cells beyond the stigma. Rest of wing hyaline. Subepaulet without macrotrichia. All cells but anal open; no appendix on third vein.

Legs entirely black and black-haired, except that the bases of all tibiae bear sparse white hairs. The usual dense fringes of the tibiae are much reduced in this species, only a rather sparse row of long hairs on the hind tibiae being present. All tibiae somewhat swollen, the fore pair markedly so.

Abdomen black, for the most part shiny. The first tergite bears a median transverse patch of long pale yellow hairs on its hind margin, and the second tergite bears a complete transverse band of similar but shorter hairs on its hind margin. The remainder of the abdomen is wholly black. Beneath, all the sternites bear narrow yellowish hind-marginal bands.

*Holotype* ♀, El Valle, Coclé Province, Republic of Panama, 2,500 ft. elev., June 22, 1940. To be deposited in the Museum of Comparative Zoology, Cambridge, Mass.

This species is abundantly distinct from any *Stibasoma* known to me. The sparse pilosity and peculiar wing markings made me hesitant at first of its generic allocation, but there seems no structural difference which would warrant its separation. Its nearest relative in the Panama fauna seems to be *S. fulvohirtum* Wied.

### Genus *Di cladocera* Lutz

1909, Instituto Oswaldo Cruz em Manguinhos, p. 29 (7 Neotropical species; no type designated); 1911, Inst. Hyg. Ausst., Dresden, p. 34; 1913, Brasil Medico, No. 45, pp. 4, 5 (in key, no species); 1914, Mem. Inst. Osw. Cruz, VI, 2, pp. 165, 166 (in key only); 1922, Zoologia Medica, Publ. Sep. da Folha Medica, pp. 8, 11. J. Bequaert, 1924, Psyche, XXXI, 1, p. 28 (Type *D. unicolor* Lutz 1912). Enderlein, 1925, Mitt. Mus. Berlin, XI, 2, p. 384 (Type *T. guttipennis* Wied. 1828). Kröber, 1931, Rev. Ent., I, 3, pp. 284, 286; 1932, Rev. Ent., II, 2, pp. 191, 199. Borgmeier, 1933, Rev. Ent., III, 3, p. 291. Kröber, Rev. Ent., 1934, IV, 2, p. 267. Stone, 1938, U. S. Dept. Agric., Misc. Pub., No. 305, p. 14.

Of the seven species originally included by Lutz, all but *guttipennis* Wied. and *macula* Macq. have been placed elsewhere by Enderlein and Kröber, while the latter has added a considerable number of species, his catalogue (1934) listing 27 Neotropical forms. The genus was established by Lutz for species with dark unicolorous eyes, long antennal tooth, slender palpi, and slender abdomen. Enderlein (1925) and Kröber (1932) separate it from related genera on the long antennal tooth, hairy eyes, and stout build. Stone (1938), following Enderlein and Kröber, has included a number of North American species in the group on the basis of hairy eyes and a long antennal tooth. The relatively broad frons and inflated palpi of these North

American forms arouses the suspicion that they are not closely related to the Neotropical members of the group.

The single Panamanian species has the following characters: Frons rather narrow, callus more or less linear and ridge-like. Ocelli and vertexal tubercle absent; subcallus pollinose. Eyes densely pilose. Antennae shorter than frons, the tooth long and slender, blunt at tip, and reaching beyond the second annulus. Annulate portion unusually short, less than one third the length of the basal portion. Fronto-clypeus pollinose. Palpi very slender, fully as long as antennae. Proboscis at least as long as fore femora, the labellae about one-third the length of the proboscis and pollinose. Subepaulet without macrotrichiae, wing venation normal. General habitus normal, neither as slender as *Dichelacera* nor as stout as *Stibasoma*.

### *Di cladocera badia* Kröber

(Figs. 7, 7a, 7b)

1931, Rev. Ent., I, 4, p. 402, fig. 2 (♀, Bocas del Toro, Panamá); 1934, Op. cit., IV, 2, p. 268.

*Female*.—Length 13 mm., of wing 13 mm. General color cinnamon brown. Legs yellowish brown. Pleura grey haired. Wings hyaline, with a broad pale brownish discal band, reaching from the stigma nearly to the hind margin. Abdomen with a large triangle of pale hairs on the fourth tergite.

*Tabanus umbratus* of Hine agrees very well with this species, except that the eyes are said to be bare.

Distribution: Known only from Panama.

Panama records: Bocas del Toro (Kröber). Porto Bello, March 3, 1911 (Busck).

### Genus *Catachlorops* Lutz

1909, Inst. Osw. Cruz em Mangueiras, p. 29 (5 species, no type); 1911, Int. Hyg. Ausst., Dresden, p. 34; 1913, Brasil Medico, XXVII, No. 45, pp. 4, 6 (in key, no species); 1914, Mem. Inst. Osw. Cruz, VI, 3, pp. 165, 166 (reprinting of 1913 paper); Lutz and Neiva, 1914, Mem. Inst. Osw. Cruz, VI, 2, p. 21 (in list). Bequaert, 1924, Psyche, XXXI, 1, p. 27 (Type, *Dichelacera fuscipennis* Macq.). Enderlein, 1925, Mitt. Mus. Berlin, XI, 2, p. 404 (= *Di cladocera* Lutz). Kröber, 1931, Ann. Mus. Hung., XVIII, p. 340; 1932, Rev. Ent., II, 2, pp. 192, 200 (Subgenus of *Gymnochela* End.). Borgmeier, 1933, Rev. Ent., III, 3, p. 289. Kröber, 1934, Rev. Ent., IV, 2, p. 272.

*Stictotabanus* Lutz and Neiva, 1914, Mem. Inst. Osw. Cruz, VI, 2, p. 72 (with *St. maculipennis* Macq.). Bequaert, 1924, Psyche, XXXI, 1, p. 30 (Type *T. maculipennis* Macq.).

The original spelling was *Katachlorops* and Lutz used *Gatachlorops* also, but the above is the variant he used most often. Enderlein introduced *Catochlorops*. The group was

founded by Lutz for Tabanids with a long antennal tooth having the eyes bicolored. Kröber (1932) separates it from other *Dichelacera* genera mainly on general habitus and tinctorial characters.

The genus is doubtfully distinct from *Dichelacera*, with which it is connected by such forms as *D. melanosoma* Hine. However, I retain the name for the time being for the single species found in the region under discussion.

### *Catachlorops transposita* (Walker)

(Figs. 8, 8a, 8b)

1854. List Dipt. Brit. Mus., V, p. 151 (♀; Colombia) (*Dichelacera*). Kertész, 1900, Cat. Tab., p. 36. Ricardo, 1904, Ann. Mag. Nat. Hist., N. S. (7) XIV, p. 376. Surcouf, 1921, Gen. Insect., p. 93.

*Catachlorops transposita* Kröber, 1931, Ann. Mus. Hung., XVII, p. 341, (in key only); 1934 Rev. Ent., IV, 2, p. 273.

*Female*.—Length 13 mm., of wing 11.5 mm. Frons about five times as high as the basal width, callus black and shiny, practically as wide as frons and prolonged above nearly to vertex. Vertexal tubercle small and indistinct. Subcallus and face greyish pollinose. Eyes bare, unicolorous, blackish in life. Palpi black, very slender, slightly longer than antennae. Proboscis blackish, longer than palpi, the labellae about half the total length of proboscis, largely membranous and with but a small shiny plate near the apex.

Thorax black, grey pollinose, scutellum reddish, pleura greyish white. Legs black, except the basal halves of fore and, to a less extent, the mid tibiae, which are white. Wings with subepaulet bare, all cells but anal open and a mere stub of an appendix on the upper branch of the third vein. Wings hyaline, with the base, costal cell, and a broad discal band black. Abdomen black above, sparsely black-haired, and with a large, prominent white middorsal triangle on the fourth tergite. The extreme sides of the first to fourth segments are white haired, while all the sternites bear white hind margins.

The generally black color and the wing markings will easily separate the species from any in our fauna.

Distribution: Colombia and Panama.

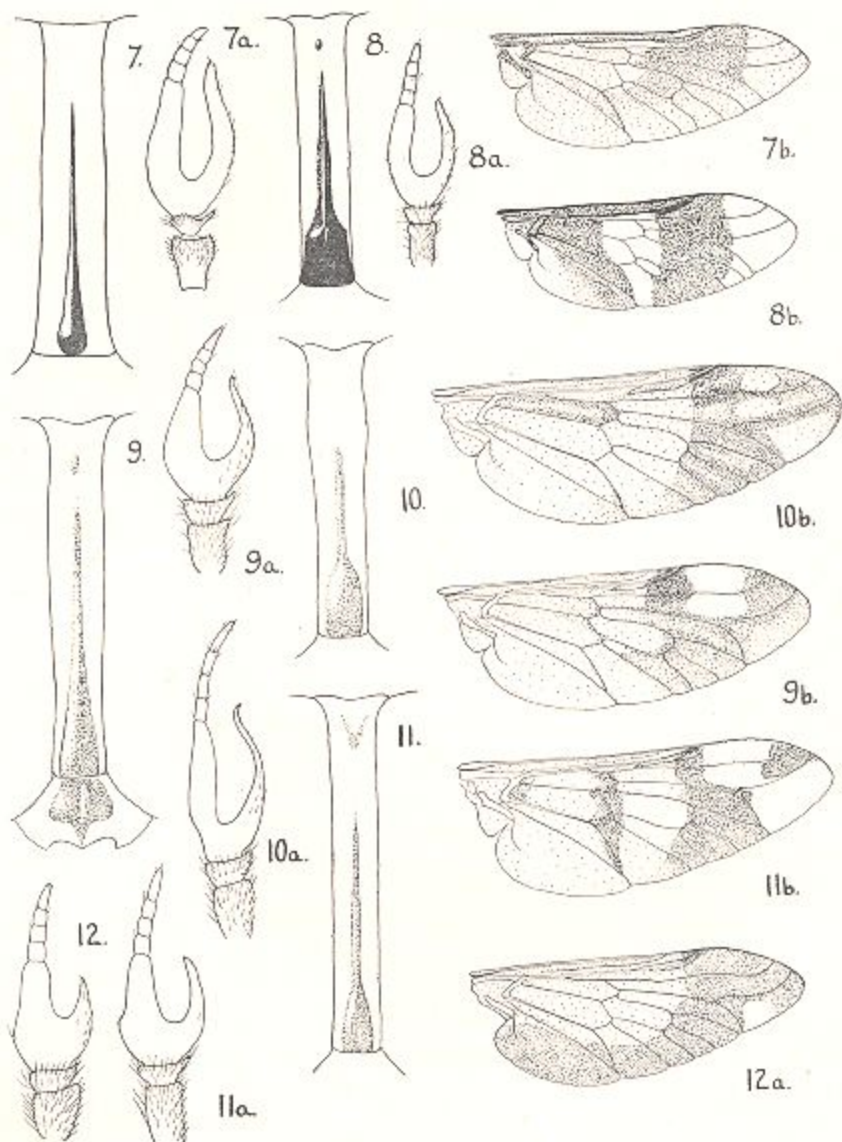
Panama records: 2 ♀, Camp 3, upper Pequeni River, R. P., March 27, 1909. (A. H. Jennings; in U. S. N. M.) 1 ♀, Police Station, Pequeni River, R. P., April 10, 1940 (J. O. Barnes).

### Genus *Psalidia* Enderlein

1922, Mitt. Mus. Berlin, X, 2, p. 344. (Type *Pangonia furcata* Wied. 1828); 1925, Op. cit., XI, 2, p. 393. Kröber, 1932, Rev. Ent., II, 2, p. 198; II, 3, p. 290. Borgmeier, 1933, Rev. Ent., III, 3, p. 299. Kröber, 1934, Rev. Ent., IV, 2, p. 260.

Enderlein erected this genus to include *Dichelacera*-like species with a closed first posterior cell, and included it in his subfamily *Bellardiinae*, a highly artificial group also based





Figs. 7, 7a, 7b. *Di cladocera badia* Kröb.  
Figs. 8, 8a, 8b. *Catachlorops transposita* (Walk.).  
Fig. 9, 9a, 9b. *Psalidia ocellata* End.  
Figs. 10, 10a, 10b. *Psalidia bahiana* n. sp. Holotype.  
Figs. 11, 11a, 11b. *Psalidia victoria* n. sp. Holotype.  
Figs. 12, 12a, ? *Psalidia victoria* (supposed ♂).

The figures of all frons and antennas were drawn on squared paper using an ocular micrometer disc ruled in squares and are all to the same scale. The wings were drawn from specimens mounted in balsam, using a projection apparatus, and are all on the same, but considerably smaller, scale. All figures except 12 and 12a are females.

almost entirely on this one character. Kröber (1934) includes four species in the genus, *festiva* Hine, *fulminea* Hine, *furcata* Wied. and *ocellata* End. Of these, *festiva* Hine is the same as *ocellata* End., though unfortunately Hine's name is preoccupied, and *fulminea* Hine is probably but an extreme variant of the same species. *Furcata* Wied. is quite a different appearing insect, though the structure of the antennae and frons is quite similar to *ocellata*. Lutz (1909) included *furcata* Wied. in his genus *Di cladocera*, but subsequent authors have restricted that name to species with hairy eyes.

The "Genera" *Amphichlorops* Lutz, *Catachlorops* Lutz, *Di cladocera* Lutz, *Chelommia* End. *Psalidia* End. and *Dichelocera* Macq., are all very close, all having a bare subepaulet and a long dorsal tooth or spine on the third antennal segment. Lutz' genera were based mainly on difference in eye coloration, while Enderlein and Kröber used the presence of a closed first posterior cell, the relative length of the antennal tooth, and bareness or hairiness of the eyes to separate the groups. These characters do not seem to correlate very well in this section of the family, and it is my opinion that most of these names will have to be dispensed with or retained only in a subgeneric sense. For the present, however, *Psalidia* forms a convenient heading under which to discuss a small group of similar appearing insects.

The species of this group are medium-sized (15 to 20 mm. long) tabanids with strongly marked wings. The frons is very narrow, from 5 to 7 times as high as wide, the frontal callus is elongate, ridge-like, and a good deal narrower than the frons. The eyes are bare, bright green or dark greenish black with or without a median stripe. The antennae bear a long slender tooth on the basal part of the third antennal segment which reaches at least to the first annulus. The palpi are quite slender, and the long proboscis bears shiny labellae. *Furcata* is black, with heavily black marked wings, but the other species are orange-yellow with a rather characteristic brown and yellow wing pattern. The first posterior cell is closed and petiolate in the females of *furcata*, *ocellata* and *victoria* n. sp., narrowly open in the males of *ocellata* and *victoria*, and but slightly narrowed towards the margin in *bahiana* n. sp.

Although but one species of the group occurs in Panama it seems advisable to take this opportunity to give a key to the known forms and to describe two new species which have recently turned up in Brazil and Mexico.

KEY TO FEMALES OF *PSALIDIA*

1. Body black. Wings heavily black marked.....*furcata* (Brasil)  
Body largely orange-yellow. Wings brown and yellow..... 2
2. Antennae very slender, longer than frons. Orange discal area of wing strongly demarcated from distal brown area, its outer border smoothly curved. Discal cell entirely hyaline.....*bahiana* (Brasil)  
Antennae much shorter than frons. Outer border of yellow discal area irregular, discal cell infuscated at apex..... 3
3. Wing yellowish hyaline, with a narrow dark band at the apices of the basal cells, another in the region of the stigma which broadens posteriorly to include the first to fourth posterior cells, and a third dark patch in the apex of the first submarginal cell. Subcallus pollinose.....*victoria* (Mexico)  
Wings largely smoky, yellowish in the proximal and discal areas, dark brown distally, and with more or less distinct hyaline spots in the discal, marginal, and first submarginal cells. Subcallus bare in the middle...*ocellata* (Panama)

*Psalidia ocellata* Enderlein

(Figs. 9, 9a, 9b)

1925, Mitt. Mus. Berlin, XI, 2, p. 393 (♀; Colombia, Bogota, Muzo). Kröber, 1931, Stett. Ent. Zeit., XCII, p. 91 (♂; Mexico, Chiapas); 1932, Rev. Ent., II, 3, pp. 292-293 (♀; Venezuela, Colombia, Panama, Costa Rica and Honduras); Rev. Ent., IV, 2, p. 261 (Mexico to Venezuela).

*Tabanus festivus* Hine, 1920, Ohio Journ. Sci., XX, 6, p. 187 (♀; Gatun, Canal Zone). Dunn, 1934, Psyche, XLI, 3, p. 174 (♀; Chiriqui, Panama). Not *T. festivus* Wied., 1828.

*Psalidia festiva* Kröber 1934 Rev. Ent., IV, 2, p. 260.

? *Tabanus fulmineus* Hine, 1920, Ohio Journ. Sci., XX, 6, p. 186 (♀; Gatun, Canal Zone).

? *Psalidia fulminea* Kröber, 1934, Rev. Ent., IV, 2, p. 260.

If, as seems highly probable, *fulminea* Hine should prove to be but an extreme variant of *ocellata* End., the former name must be used, as it has five years priority, but it seems better to await until Hine's types can be studied before making the change.

The wing pattern is quite variable, the oval hyaline spots in the marginal and submarginal cells sometimes being nearly obsolete, and the basal yellowish infuscation varying much in intensity. Kröber (1931) describes the male as having essentially the same wing pattern as the female, but with the first posterior cell open. The large facets of the eye occupy about two-thirds the eye area, but are not sharply marked off from the small facets. His specimen came from Chiapas, Mexico, the most northerly record for the species.

Distribution: Venezuela and Colombia to Southern Mexico.

Panama records: Gatun (D. E. Harrower) and Lion Hill (Busck), Canal Zone (Types); France Field, C. Z., June 25, 1929 (L. H. Dunn); Camp Pital, Chiriqui, R. P., July 13, 1929 (Dunn); Guabito, R. P., May (Kröber); Barro Colorado Is., C. Z., July 17, 1924 (Banks); Ancon, C. Z. (Dunn); El Valle, Coclé Prov., R. P., 2500 ft., May 20, 1939, July 9, 1939, June

16, 1940; Gatun, C. Z., August 4, 1923 (Dyar); Changuinola Dist., Bocas del Toro, R. P.; Moja Pollo, R. P., May 27, June 12, 1940. Rio Pequeni, R. P., August 20, 1940.

***Psalidia bahiana* n. sp.**

(Figs. 10, 10a, 10b)

*Female*.—Length 17 mm., of wing 15 mm. Frons about six times as high as basal width, parallel sided, and clothed with orange yellow pollen. Vertex without any tubercle or shiny area. Antennae exceedingly slender, the tooth on the third segment thread-like and recurved at the tip. Face and subcallus yellow pollinose. Palpi thread-like, orange, about as long as antennae. Proboscis black, slender, longer than fore coxae; the labellae less than one third the total length of the proboscis, black and shiny. Eyes (relaxed) dull green, with a narrow median transverse dark stripe.

Thorax, abdomen, and legs, except the last tarsal joints, rufous orange. It is possible that in quite fresh material there may be a lighter broad middorsal abdominal band, but in my material this does not show.

Wings with subepaulet bare, the first posterior cell open but narrowed toward the margin, and the upper branch of the third vein with a very short spur or none. The costal and first basal cells are deep orange in color, the discal area below and including the basal half of the stigma, the discal and second basal cells, and the basal parts of the marginal, first submarginal, and first, fourth and fifth posterior cells, is clear yellow. The apical part of the wing is brown, more intense along the veins, and with an oval hyaline spot in the marginal and first submarginal cells, and a roughly triangular subhyaline area in the second submarginal cell. The inner margin of the wing is somewhat grayish.

*Holotype* ♀, Ilheus, Bahia, Brasil, October 11, 1934. To be deposited in the Museum of Comparative Zoology, Cambridge, Mass. There is also at least one other specimen in the M. C. Z. with the same data, but which is unfortunately not before me.

This species is quite similar in most respects to *Ps. ocellata* End., from which it differs mainly in the shape of the frons and antennae, the presence of a dark stripe on the eye, in details of the wing pattern, and the open first posterior cell. It may be said to represent *ocellata* in Southern South America.

***Psalidia victoria* n. sp.**

(Figs. 11, 11a, 11b)

*Female*.—Length 18 mm., of wing 15 mm. Frons about seven times as high as the basal width, parallel sided, pale orange brown pollinose. Frontal callus yellow, slender, club-shaped, prolonged above two-thirds of the distance to the vertex, the latter with an oval yellowish denuded area. Antennae yellow, the tooth on the third segment barely reaching

the first annulus, and the basal part of the third segment with a distinct angle below. Subcallus and face pollinose. Palpi yellowish brown, slender, but not excessively so. Proboscis slender, the labellae black and shiny, the basal part yellow. Eyes bare, unicolorous, probably green in life.

Thorax, abdomen and legs pale yellowish red, the thorax somewhat grayish pubescent, the abdomen apparently darker, and immaculate, though it is somewhat crushed and rubbed.

Wings with subepaulet bare, the first posterior cell closed and petiolate, and the upper branch of the third vein without an appendage. The wings are hyaline, yellowish along the costa and below the stigma, and with the following brown markings. A patch occupying the apices of the basal and anal cells and base of the fifth posterior cell. Another larger patch occupies the apical halves of the first and fourth posterior cells, all of the second and third posterior cells, the extreme base of the second submarginal cell, the extreme apex of the discal cell, and extends to the costa as a narrow band between the stigma and fork of the third vein. There is, finally, a small patch in the apex of the marginal and first submarginal cells.

*Holotype* ♀, Compostela, Nyarit, Mexico (no date). To be deposited in the M. C. Z.

This species shows a wing pattern clearly derived from *ocellata* by a considerable reduction in the dark areas. I have also a male before me (Vic. Compostela, Nyarit, Mexico, June, 1934) which, in spite of its great differences in wing pattern, I thought might well be the male of *victoria*. However, Kröber's remarks on the male of *ocellata* have made me doubtful. I have, however, included a figure of the wing and antenna of this supposed male (figs. 12 and 12a). The eyes are bare, holoptic, and with the large and small facets not abruptly demarcated, and there is a small tubercle between the eyes at the vertex. The tarsi and apices of the tibiae are blackish, but otherwise the specimen agrees well in structure and habitus with *victoria*.

### Genus *Dichelacera* Macquart

1838, Dipt. Exot., I, p. 112. Kertész, 1900, Cat. Tab., p. 35. Coquillett, 1910, Proc. U. S. Nat. Mus., XXXVII, p. 533 (Type, *D. unifasciata* Macq.). Lutz, 1915, Mem. Inst. Osw. Cruz, VII, 1, p. 71. Enderlein, 1922, Mitt. Zool. Mus. Berlin, X, 2, p. 346 (Type, *D. cervicornis* Fab.). Bequaert, 1924, Psyche, XXXI, 1, p. 38. Borgmeier, 1933, Rev. Ent., III, 3, p. 290. Kröber, 1934, Rev. Ent., IV, 2, p. 264.

*Dichelocera* Enderlein, 1925, Mitt. Zool. Mus. Berlin, XI, 2, p. 383 (Type *D. cervicornis* Fab.).

*Rhamphis* Enderlein, 1922, Mitt. Zool. Mus. Berlin, X, 2, p. 346; 1925, Op. cit. XI, 2, p. 391 (Type *Dichelacera bifascies* Walk.). Kröber, 1931, Rev. Ent., I, 3, p. 387 (subgenus of *Dichelacera*).

*Neorhamphis* Kröber, 1931, Rev. Ent., I, 3, p. 415; 1932, Op. cit., II, 2, p. 199 (Type, *T. varius* Wied.).

This genus as here understood contains rather small and slender flies, with mottled wings and generally with rather contrastingly marked bodies. The eyes are bare in all the Panamanian species, green with a single dark transverse stripe, or dark with two green stripes in life. In the male, the eyes are holoptic, the large facets occupying less than half the total eye area, and but little larger than the small facets, with no sharp line of demarcation between the two types. There is a small vertexal tubercle between the eyes. The frons of the female is medium to broad, generally with a well marked frontal callus, and, in our species, with a vertexal tubercle. The antennae are very long, generally longer than the frons, and bear a long forward pointing spine on the dorsum of the third segment which generally reaches at least to the first annulus. The palpi are slender, and the proboscis bears shiny labellae. The subpaulet is bare and the venation normal.

Four species of the genus have been recorded from Panama in the literature, but two of these, *D. cervicornis* F. and *D. submarginata* Lutz were apparently based on misidentifications. A third, apparently new, species is added in the present paper. All our species are primarily inhabitants of heavy forest, where they are on the wing throughout the day, and attack man very readily.

#### KEY TO FEMALES OF *DICHELACERA*

1. Distal dark fascia of wing of two more or less distinct dark patches; its proximal border step-like; second abdominal tergite without a posterior border of light hairs; prescutellar light area very narrow; mesonotum with a pair of brown patches anteriorly.....  **analis**  
Distal dark fascia of wing uniform, its proximal margin rather regular; prescutellar light area at least half as wide as preceding dark band..... 2
2. Wing markings quite indistinct; all abdominal tergites broadly margined with yellow hairs; prescutellar yellow band as broad as the interalar dark band preceding it.....  **marginata**  
Wing markings prominent; first to fourth abdominal tergites margined with yellow, rest black; prescutellar yellow band about half as wide as preceding dark band.....  **regina**

#### *Dichelacera analis* Hine

(Figs. 1, 1a, 1b)

1920, Ohio Journ. Sci., XX, 8, pp. 316-317, fig. 2 (♂ ♀; Costa Rica, Panama); 1925, Occ. Pap. Mus. Comp. Zool., Univ. Michigan, No. 162, p. 35 (Key). Dunn, 1934, Psyche, XLJ, 3, pp. 172-173. Kröber, Rev. Ent., IV, 2, p. 263. Curran, 1934, North Amer. Dipt., p. 152, figs. 14 (wing) and 24 (head).

? *Dichelacera cervicornis* Osten Sacken (nec. Fab.) 1886, Biol. Cent. Amer., Dipt., I, p. 58 (Chiriquí, Panama). Ricardo, 1904, Ann. Mag. Nat. Hist., (7) XIV, pp. 366, 369 (♂ ♀).

? *Dichelacera costaricensis* Kröber, 1931, Rev. Ent., I, p. 411, fig. 12 (♀; San Mateo, Costa Rica; Colombia).

The species is darker than either *marginalata* or *regina*, and varies from 10 to 12 mm. in length. The eyes in life are blackish, with two narrow green transverse stripes. The thorax is yellowish brown on the anterior half, with two indistinct brownish shoulder patches. The transverse interalar band is very broad and black, and separated from the black scutellum by a narrow yellowish stripe. The legs are yellowish, but with the apices of fore and hind femora and all the tibiae extensively dusky. The wing has the discal dark band broken into two patches, while the hyaline areas are only faintly yellowish.

*D. analis* is very closely related to *D. cervicornis* Fab., and it is possible that it may eventually be relegated to the status of a northern race of that species. It differs from *cervicornis* chiefly in being darker. The interalar band in *cervicornis* is narrower, it lacks the brown shoulder spots, and the abdomen is lighter and with light transverse bands on segments 1 to 4. *Analis* lacks the light band on the second segment, though occasional specimens show a small median patch of light hairs.

Osten Sacken's record should almost surely be this species, and Ricardo's reference was perhaps based on the same material. I can find no distinctions of value in the original description or figure to separate Kröber's *costaricensis* from *analis*, and in fact his species was described from almost the same locality as *analis*, San Mateo, Costa Rica.

*D. analis* is the most abundant species of the genus in most parts of Panama, and at times becomes a serious nuisance by its persistent attacks on man and beast, especially in forested areas during the rainy season. The bite is sharp and painful, but leaves little after-effect.

Distribution: Panama and Costa Rica.

Panama records: Camp Pital, Chiriqui, R. P., July 11 to 29, 1929. (L. H. Dunn). Alajuela, R. P., November 8, 1929, August 13, 1929 (Dunn). El Valle, Coclé Prov., R. P., June 18, 1939, July 9, 1939. Juan Diaz, R. P., October 15, 1939. Barro Colorado Is., C. Z., June, July, August, October, November (various collectors). Changuinola District, Bocas del Toro, R. P. Also numerous other records from various localities in the Canal Zone with dates from May to November.

#### *Dichelacera marginalata* Macquart

(Figs. 2, 2a, 2b)

1847, Dipt. Exot., Suppl. II, p. 14 (♀; Cayenne). Walker, 1854, List. Dipt. Brit. Mus., V, Suppl. 1, p. 152. Kertész, 1900, Cat. Tab., p. 35; 1908, Cat. Dipt.,

III, p. 216. Hunter, 1901, *Trans. Amer. Ent. Soc.*, XXVII, p. 137. Ricardo, 1904, *Ann. Mag. Nat. Hist.*, (7) XIV, pp. 367-369 and 370. Lutz, 1907, *Centr. bl. Bakt. Parasitenk.*, Abt. 1, XLIV, p. 144; 1915, *Mem. Inst. Osw. Cruz*, VII, p. 86, Pl. XX, fig. 7 (♀; Pará); 1928, *Est. Zool. Parasit. Venezolanas*, p. 56, Pl. 9, fig. 5 (♀; Venezuela). Hine, 1917, *Trans. Amer. Ent. Soc.*, XLIII, pp. 293 (Key), 294 (Misspelled *emarginata*); 1925, *Occ. Papers Mus. Zool. Univ. Michigan*, No. 162, p. 35 (Key). Surcouf, 1921, *Gen. Insect.*, Taban., p. 92. Bequaert, 1926, *Med. Rep. Harvard Exped. Amazonas*, p. 235 (♀; Northern Amazonas). Kröber, 1934, *Rev. Ent.*, IV, 2, p. 266.

*Dichelacera himmulus* Walker, 1850, *The Zoologist*, VIII, Appendix, p. CXXII (♀; Pará, Brasil); 1854, *List. Dipt. Brit. Mus.*, V, Suppl. 1, p. 153.

*Dichelacera submarginata* Dunn (nec Lutz) 1934, *Psyche*, XLI, 3, p. 173 (Chiriqui, Panama).

This is the smallest species of the genus occurring in Panama, the females seldom exceeding 10 mm. in length. The face is entirely yellowish pollinose, the frons rather broad. The eyes in life are bright green, with a narrow purple transverse median stripe, and with purple reflections along the upper and lower borders. The thorax is yellow, with a transverse dark band between the wings. The abdomen is yellowish brown, lighter on the first segment, and with broad yellow haired transverse bands on the hind margins of all tergites. The wings are faintly yellowish, with the apex and distal area as far as the fifth posterior cell lightly brownish. The anal cell is also lightly infuscated. The legs are entirely yellow, except for the tarsi and the hind tibiae, which are brownish black.

The male is practically identical with the female in coloration, but the body hairs are much longer. The eyes are holoptic, bare, and with the large facets but little differentiated from the small in size, and with no sharp line of demarcation between the two types. The vertex bears a prominent tubercle between the eyes. The antennae are more slender than in the female, and the dorsal tooth is relatively shorter.

Macquart's description is, as usual, poor, but I follow Lutz and others in the application of the name. Specimens from South America seem to almost lack the transverse dark thoracic band, according to Lutz's figures. Material before me from the Canal Zone area has the band somewhat blurred, while Dunn's material from Chiriqui has a very black and prominent band. Some of the Chiriqui specimens also show indications of a bare facial callus.

The species is not so abundant as *analis*, but has similar habits, and seems to be on the wing only during the rainy season.

Distribution: Northern Brazil to Southern Mexico.

Panama records: Camp Pital, near Pto. Armuelles, Chiriqui Prov., Panama, July 19 to 29, 1929 (L. H. Dunn). Tabernilla,



C. Z. (A. Busck). Gatun, C. Z., June, 1923 (Close). Bohio, C. Z., May 11, 1909 (Jennings). Taboga Is., June 9, 1911 (Busck). Barro Colorado Is., C. Z., July 3, 1933 (Hood); July 30, 1924 (Banks); May 12, 1939 (Fairchild); Mt. Hope, C. Z., October 30, 1939 ( $\sigma$ ). New San Juan, R. P., September, 1939. Rio Pequeni, May 16, 1940.

*Dichelacera regina* n. sp.

(Figs. 3, 3a, 3b)

*Female*.—Length 12–13 mm., of wing 11–12 mm. Frons about four and one half times as high as wide, parallel sided and clothed with golden yellow pollen. Frontal callus black, somewhat higher than wide and as wide as frons, with a short to medium slender prolongation above. Vertexal tubercle present, and vertex clothed with black pubescence. Subcallus, fronto-clypeus and genae clothed with whitish yellow pollen, without bare callosities. Antenna long, about two-thirds length of fore femur. First and second segments brown, clothed with black hair, third segment reddish basally, black at apex. Antennal tooth long and slender, reaching well beyond the first annulus. Annulate portion more than half the length of the basal portion. Palpi orange yellow, yellow haired, slender, and nearly as long as the proboscis. Proboscis slender, about as long as fore tarsi, the labella large, black, and shiny. Eyes bare, in life dull green with a narrow median transverse purplish band, and the upper and lower margins somewhat empurpled.

Mesonotum and pleura golden yellow, the former crossed by a velvety black band between the wing bases. The yellow area between this band and the black scutellum is about half the width of the band.

Fore coxae and femora whitish yellow, the femora brownish at apex. Tibia whitish yellow, brown at apex. Tarsi black. Mid coxae, femora, and tibiae entirely yellow, tarsi black. Hind coxae and femora, except the brown apices, yellow, tibiae and tarsi entirely black.

Wings yellow and blackish brown. Costal cell, anal cell and anal area, and a wide uninterrupted distal band dark. The distal dark area begins just beyond the stigma, and includes the major parts of all the submarginal and posterior cells, fading out to leave a narrow spur of yellow just anterior to the fifth vein ( $Cu_1 + 1A$ ). The proximal margin of the dark area passes through the fork of the third vein and the apex of the discal cell. The areas not included in the above are intensely yellow hyaline.

The first abdominal tergite is whitish yellow, entirely yellow haired; the second is also yellow, but densely black haired, except the hind border, which is yellow haired. The third and fourth tergites are black and black haired, with yellow and yellow haired hind margins, while the remaining tergites are wholly black. Beneath the abdomen is clear yellow.

*Holotype* ♀, El Valle, Coclé Province, Panama, 2,500 ft., June 22, 1940. 1 ♀ paratype, same data, but a teneral specimen. 1 ♀ paratype, El Valle, June 16, 1940. In addition, I have one

specimen from the same locality, taken in May, 1939, but of which only the wings remain after a visitation of ants. Holotype to be deposited in the Museum of Comparative Zoology, Cambridge, Mass.

This species seems most closely related to *D. cervicornis* F., *D. submarginata* Lutz, and *grandis* Ric. From the two former, it may be separated by the entire and uniform distal dark fascia of the wing, and from the latter by the absence of a dark facial callosity. The characters in the key should serve to separate it from the other Panamanian species. Like other species of the genus, it will readily attack man.

For the sake of completeness, mention should be made of *Tabanus venenatus* Osten Sacken. This species was described (1886, Biol. Cent. Amer., Dipt., I, p. 54) from Guatemala and the Volcan de Chiriqui, Panama, but I have never seen it. It is stated to be a greenish insect with smoky wings and a long, blunt tooth on the third antennal segment. Kröber (1932, Rev. Ent., II, p. 92, fig. 32) places it in the genus *Amphichlorops* Lutz. He also describes the male, and mentions having seen material from Costa Rica, Ecuador, Venezuela and Bolivia.