

NOTES ON TABANIDAE (DIPTERA) FROM PANAMA.
III. THE GENUS CHRYSOPS MEIGEN.¹

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Genus CHRYSOPS Meigen.

1803, Illiger's Mag. f. Insectenk., II, p. 267. (Type, *Tabanus caecutiens* Linn.). Kröber, 1925, Konowia, IV, 3-4, pp. 210-375, Pl. 1-5. Bequaert, 1930. The African Republic of Liberia. etc., Vol. II, p. 889.

Heterochrysops Kröber, 1920, Zool. Jahrb., Abt. f. Syst., XLIII, p. 55. Bequaert, 1924, Psyche, XXXI, No. 1, p. 31. (Type *C. flavipes* Meig., 1804.)

Bequaert (l. c. 1930) has given a full generic synonymy, which there seems no necessity to repeat here.

The flies of this genus are generally small black or yellow insects with mottled wings. Spurs are present on the hind tibiae, the vertex bears three well developed ocelli, and the eyes are generally green in life, with purple spots. The antennae are very long, the first two segments together never less than two-thirds as long as the third segment, which is composed of a more or less cylindrical basal part made up of fused annuli, and a terminal flagellum of four movable annuli. The subepaulet bears no macrotrichia, and the anal cell is often open.

Five species have been recorded previously from the Republic of Panama, and three more are added in the present paper. When compared to areas of comparable size and diversity of habitat in North America, this seems a very meagre fauna, but Tropical America as a whole is very poor in species of *Chrysops*. Bequaert in a recent paper (1940) lists five species from Trinidad, three from the Republic of Honduras, and only four from the whole of the West Indies. Kröber (1925) includes but 27 species in the fauna of Brazil, with an area comparable to that of the United States.

¹ Parts I and II of this series appeared in the Revista de Entomologia, II, fasc. 3, Dec. 1940 and the Annals of the Entomological Society of America, 33, No. 4, Dec. 1940.

Of the eight species here included, only one, *C. alleni*, has not been so far taken elsewhere. *C. variegata* occurs throughout the Neotropical region, *C. incisa*, *soror*, and *calogastra* were previously known from South America, while *C. melaena*, *chiriquensis* and *mexicana* have been taken in other Central American republics.

KEY TO FEMALES.

1. Discal cell hyaline, or with a prominent hyaline spot in the middle 2
 Discal cell entirely infuscated 3
2. Antennae much longer than fore femora, the third segment shorter than the first and second together. Cross-band of the wing well developed; apex infuscated. Whole insect predominantly yellowish brown *variegata* de Geer.
 Antennae but little longer than fore femora, the third segment slightly longer than the first and second together. Cross-band obsolete; apex of wing with only costal infuscation. Whole insect blackish grey *alleni* Fairch.
3. Fronto-clypeus with a median pollinose stripe. Apical spot drop shaped; fifth posterior cell fully infuscated *chiriquensis* Fairch.
 Fronto-clypeus entirely shining. Apical spot slender, or filling most of apex of wing. Fifth posterior cell always partly hyaline 4
4. Apical spot consisting of a narrow stripe along the costa, not extending beyond apex of wing 5
 Apical spot filling most of apex of wing, at least to the second posterior cell 6
5. Sides of thorax with a prominent yellow pollinose stripe. Hyaline area in fourth and fifth posterior cells extensive, reaching nearly to the discal cell. A small hyaline spot at the base of the first submarginal cell. First and second abdominal tergites extensively yellowish on sides, no yellow mid-dorsal triangle on the second tergite *incisa* Macq.
 Sides of thorax blackish. Hyaline area in fourth and fifth posterior cells barely reaching the middle of the fourth posterior cell. No hyaline spot in first submarginal cell. Yellow on sides of first two tergites less extensive, and a prominent yellow triangle present on the second tergite *melaena* Hine.
6. Body altogether black, with at most faint indications of mid-dorsal abdominal triangles. Spot on fork of third vein unconnected with cross-band *soror* Kröb.
 At least some yellow markings on abdomen and a spot of yellow tomentum on pleura 7
7. Abdomen with a transverse yellowish white band anteriorly on the second tergite, widening to the full width of the tergite at the sides. This tergite also bears a prominent, narrow, yellow, mid-dorsal triangle; remainder of abdomen black. Spot on fork of third vein may be either connected or unconnected with cross-band *mexicana* Kröb.
 Abdomen as above, but the third to fifth tergites have yellow hind margins. Spot on fork of third vein always connected with cross-band by a narrow spur *calogastra* Schin.

Chrysops melaena Hine. (Fig. 2.)

1925, Occ. Papers Mus. Zool. Univ. Michigan, No. 162, p. 147 (♀; Panama, Costa Rica, Venezuela). Kröber, 1925, Konowia IV, pp. 373-374; 1934, Rev. Ent. IV, p. 228 (= *leucospilus* Wied.). Bequaert, 1931, Journ. N. Y. Ent. Soc. XXXIX, p. 535. Dunn, 1934, Psyche, XLI, No. 3, p. 172 (Chiriqui, Panama) Curran, 1934, Fam. Gen. N. A. Diptera, Pl. 152, fig. 19 (Wing).

Chrysops incisa Kröber, (in part, nec. Macq.), 1925, Konowia, IV, pp. 215, 225, 229 and 344, Pl. I, fig. 13, Pls. III, IV (♂, ♀).

This seems to be the most abundant species of the genus, at least on the Pacific side of Panama, where it has been taken nearly everywhere collecting has been done, though it appears not to occur above about 2,000 ft. It bites man readily, especially when abundant. Kröber's (1925) record of *leucospila* from Costa Rica probably refers to the present species.

Distribution: Costa Rica, Panama, Venezuela, Colombia (1 ♀, Jazmin, L. H. Dunn).

Panama records. Progreso, Chiriqui, R. P. IV-7 (Holotype and 2 paratypes); Tabernilla, C. Z. VI-14 (Paratype); Arraijan, R. P. I-21-30 (Dunn); Miraflores, C. Z. I-10-30 on horse (Dunn); Summit, C., XII-21-29 on horse (Dunn) Camp Pital, Chiriqui, VII-12 to 20-29, on ears of mule (Dunn); Escobal, V-4-31 (Dunn); Corozal, C. Z. I-21-29 (Curran); Barro Colorado Is., C. Z., V-22-26 (Greene), Jan. 29 (Curran); Paraiso, C. Z., I-10 to II-7-11 (Busck); Argas, R. P., IV-28-11 (Busck); Rio Trinidad, C. Z., V-2-11 (Busck); Garun, C. Z., VIII-4-23 (Dyar); El Valle, Coclé Prov., XII-8-38, VI-18-39, VII-9-39, XII-10-39, XII-17-39 (Fairchild); Rio Las Lajas, R. P., II-5-39 (Fairchild) Ft. Clayton, C. Z., I-23-39 (Shropshire); Vacamonte Point, R. P., I-23-40 (Fairchild). Paja, R. P., V-11-41 (Fairchild).

Chrysops incisa Macquart. (Fig. 3.)

1845, Mem. Soc. Sci. Lille (1844) p. 176, Pl. IV, figs. 12, 12 a (♀; Temperate Regions of Columbia); 1844 Dipt. Exot., Suppl. I, p. 44, Pl. IV, figs. 12, 12 a. Walker, 1854, List. Dipt. Brit. Mus., V, Suppl. I, p. 285. Schiner, 1868, Reise Novara, Zool., II, Abt. 1, Vol. B, Dipt., p. 104 (♂, ♀). Hunter, 1900 Trans. Amer. Ent. Soc. XXVII, p. 135. Kertész, 1900, Cat. Tab., p. 8. Ricardo, 1901, Ann. Mag. Nat. Hist. (7), VIII, pp. 310, 312 (♂, ♀). Kertész, 1908, Cat. Dipt., III, p. 188. Surcouf, 1921, Gen. Insect., Taban., p. 152. Hine, 1925, Occ. Papers Mus. Zool. Univ. Michigan, No. 162, p. 14. Bequaert, 1932, Journ. N. Y. Ent. Soc. XXXIX (1931), p. 535. (Mexico); 1933, The Peninsula of Yucatan, Carnegie Inst. Pub. No. 431, p. 560.

? *Chrysops auroguttata* Kröber, 1930, Zool. Anz., XC, 3-4, p. 71-72, figs. 6-8 (♀; Columbia; Trinidad); 1934, Rev. Ent., IV, 2, p. 225. Bequaert, 1940, Rev. Ent., XI, 1-2, p. 272 (Trinidad); 1940, Bull. Ent. Res., XXX, 4, p. 448.

? *Chrysops auroguttata* var. *pallidifemorata* Kröber, 1930, Zool. Anz., XC, 3-4, p. 72, figs. 9-10 (♀; Trinidad); 1934, Rev. Ent., IV, 2, p. 225. Pechuman, 1937, Rev. Ent., VII, 2-3, p. 136 (♀; Panama).

As pointed out by Bequaert (1932), Kröber's *incisa* (1925, *Konowia*, IV, pp. 215, 225, 229 and 344, Pl. I, fig. B, Pl. III, figs., and Pl. IV, figs., ♂, ♀) seems not to be the species described by Macquart nor the species discussed by Hine (1925), but a mixture of *melaena* Hine and *latifasciata* Bell. Kröber later (1930) described *C. auroguttata* and a var. *pallidefemorata* which agree very closely with Hine's and Bequaert's interpretations of *incisa*, differing only in the absence of a yellow triangle upon the second abdominal tergite. Bequaert (l. c., p. 536) notes that Macquart's figure of his Columbian specimen shows a smaller hyaline area in the fourth and fifth posterior cells than do Central American specimens. It seems highly probable, therefore, that *auroguttata* Kröber is the same as *incisa* Macq., and that *pallidefemorata* Kröber, if really distinct, must be placed as a variety or race of *incisa*.

All the specimens I have seen from Panama and Central America have the hyaline area in the cross-band extensive, nearly touching the discal cell, in this agreeing with *pallidefemorata*. It is apparently not a common species here, being confined to the Atlantic side of the Isthmus.

Distribution: Colombia, ? Trinidad, Panama, Yucatan.

Panama records: Trinidad River, May, 1911, June 1912 (Busck). Mohinga Swamp, Gatun, C. Z. VIII-26-40 (Fairchild).

Chrysops variegata (de Geer). (Fig. 1.)

1776, Mem. pour Servir a l'Hist. des Ins., VI, p. 230, Pl. XXX, figs. 7, 8, (♀, Surinam) (*Tabanus*). Bequaert, 1926, Med. Rep. Hamilton Rice Exped. Amazon, p. 220; 1931, Journ. N. Y. Ent. Soc., XXXIX, pp. 533-535. Kröber, 1934, Rev. Ent. IV, 2, p. 224. (*Heterochrysops*). Bequaert, 1940, Rev. Ent., XI, 1-2, pp. 276-279.

Tabanus costatus Fab., 1794, Ent. Syst., IV, p. 373. Dunn, 1929, Am. Journ. Trop. Med., IX, 6, p. 502. (*Chrysops*) (Medellin, Colombia).

Chrysops vulneratus Rond., 1848, in Baudi and Truquii, Stadi Ent., I, p. 104 (Brasil).

Chrysops molestus Guerin, 1835 (nec. Wied. 1828) Icon. Regne Animal Insectes, VII, Pl. XCVII, fig. 3.

Chrysops amazonius Rond., 1863, Arch. Zool. Modena, III, p. 81 (Porto Rico).

Chrysops lynchii Brethes, 1910, An. Mus. Buenos Aires, XIII, p. 474. Kröber 1934, Rev. Ent., IV, 2, p. 224. (*Heterochrysops*.)

Chrysops subfascipennis Macq., 1855, Dipt. Exot., Suppl. V, p. 35 (Banks of Amazon River).

Chrysops (Heterochrysops) variegata var. *subfascipennis* Kröber, 1934, Rev. Ent., IV, 2, p. 224.

Chrysops variegata var. *lynchii* Pechuman, 1937, Rev. Ent., VII, 2-3, pp. 140-141.

The synonymy of, and references to, this common and widespread Neotropical species are very extensive. Bequaert (1926,

1931, 1940) and Kröber (1934) give full references, which I see no need to repeat here. As with many abundant and widespread forms, this species shows considerable variation in minor characters, especially in the color of the wings, and aside from those listed above, Kröber (1925, *Konowia*, IV, p. 235) has described a var. *peruviensis* and a var. *venezuelensis*. I am not in a position to discuss the status of these names for lack of material, but Bequaert (l. c. 1940) has cast considerable doubt on their utility.

I have not found the species to be as abundant as *melana* in Panama, at least in areas where most of my collecting has been done.

Distribution: Southern Mexico and the West Indies to Chile and Argentina.

Panama records: Escobal, R. P. V-4-31 (Dunn); Summit, C. Z. X-24-29, XII-21-29 (Dunn); France Field, C. Z. XII-27-29 (Dunn) Ft. Clayton, C. Z. I-23-39 (Shropshire); Juan Mina Sta., C. Z. XII-5, 21-38 (Fairchild); La Venta, R. P. I-22-39 (Fairchild); Venado Beach, C. Z. VI-22-39 (Fairchild); Ft. Sherman, C. Z. VII-3-24 (Banks) also specimens in U. S. N. M. from Rio Trinidad, Barro Colorado Is., Gatun, Tabernilla, Mt. Hope, Ft. Davis in the Canal Zone, and Porto Bello, R. P. with dates from April to November.

Chrysops alleni Fairchild.

1939, Proc. Ent. Soc. Washington, XLI, No. 9, pp. 257-258, fig. 1.

This species, quite distinct from anything else in the region, has been taken so far only in brackish mangrove swamps on the Pacific side of the Isthmus. It seems to be most abundant at the end of the dry season in May, but probably flies throughout the year.

Distribution: Pacific coast of Panama.

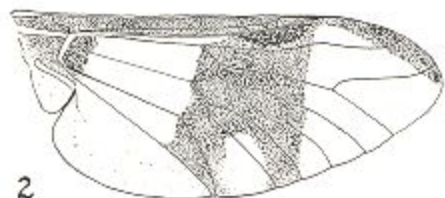
Panama records: Old Panama, R. P. V-1-39, XII-24-39, III-16-40, I-2-41; Matutela Swamp, C. Z. V-20-39; Bejuco, R. P. VI-18-39; Venado Beach, C. Z. X-16-39. Paitilla Point, R. P., VII-7-40.

Chrysops chiriquensis Fairchild.

1939, Proc. Ent. Soc. Washington, XLI, No. 9, p. 259, figs. 2, 3.

Chrysops subcaucutiens Hine, 1925 (nec. Bell., in part), Occ. Papers Mus. Zool. Univ. Michigan, No. 162, p. 20. (Boquete, Chiriqui.)

The large size and median pollinose stripe on the frontoclypeus should serve to distinguish this species from any other in the Panama fauna. Dr. C. B. Philip writes me that he has recently received specimens of this species from the State of Chiapas, Mexico. I have seen Hine's specimens.



Distribution: Western Panama to Guatemala and Southern Mexico.

Panama records: Boquete, Chiriqui Prov., R. P., 3-4000 ft. elev., V-7-39. (Fairchild); III-1, 3, 8-23 (Gauge coll., in Hine coll.).

***Chrysops calogastra* Schiner.** (Fig. 4.)

1868, Reise Novara, Zool., II, Abt. I, Vol. B, Dipt. p. 103 (♀; South America). Hunter, 1900, Trans. Amer. Ent. Soc., XXVII, p. 135. Ricardo, 1901, Ann. Mag. Nat. Hist., (7) VIII, p. 310. Kertész, 1900, Cat. Tab., p. 6. Surcouf, 1921, Gen. Insect., Taban., p. 150. Kröber, 1925, Konowia, IV, pp. 214, 222 and 246, Pl. II, (Wing, ♀) Pl. IV (abdomen, ♀); 1934, Rev. Ent., IV, 2, p. 225. Dunn, 1934, Psyche, XLI, No. 3, p. 172.

This and the two following species form what appear to be a rather closely related group. *Calogastra* has yellow transverse bands on all the tergites, and the spot on the furcation of the third vein seems nearly always to be connected with the cross-band, *mexicana* has yellow only on the second tergite, and the spot on the furcation is sometimes connected with the cross-band, though more often not; while *soror* lacks all yellow on the abdomen and the spot on the furcation seems never to be connected with the cross-band. In addition, I have seen a specimen in Dr. Bequaert's collection from British Guiana which is like *calogastra*, except that the spot on the furcation of the third vein is unconnected with the cross-band.

Distribution: Brasil, (Kröber, the Type ?); Columbia, Restrepo, Muzo, and Villeta (in Coll. J. Bequaert); Panama, at least to the Costa Rican border.

Panama records: Camp Pital, Chiriqui, VII-11-29 (Dunn). Cerro Campana, Panama Prov., VI-11-39, VII-2-39. El Valle, Coclé Prov., VII-9-39; XII-10-39. Rio Pequeni, VIII-21-40. Barro Colorado Is., C. Z., V-10-26 (Greene, U. S. N. M.); I-30-29 (Frost, U. S. N. M.). Cano Saddle, Gatun, C. Z., V-16-23 (Shannon, U. S. N. M.).

***Chrysops soror* Kröber.** (Fig. 5.)

1925, Konowia, IV, p. 245, Pl. II, (♀; wing), (Venezuela); 1934, Rev. Ent. IV, 2, p. 229. Lutz, 1928, Est. Zool. Parasit. Venezolanas, p. 56.

This member of the *calogastra* group is the only entirely black species in Panama. It has been taken only at elevations above 2000 ft., and is not very common. Some specimens show a faint greyish indication of mid-dorsal triangles on the second and third tergites. There is a ♀ labelled Trece Aguas, Guatemala 19-IV (Schwarz and Barber) in the Hine Collection.

Distribution: Venezuela, Panama, Guatemala.

Panama records: El Valle, Coclé Prov., XII-8-38; V-20-39; VII-9-39; VI-16-40. Cerro Campana, Panama Prov., VI-II-39. Cerro Azul, Panama Prov., V-17-41.

***Chrysops mexicana* Kröber.** (Figs. 6 and 7.)

Chrysops calogaster var. *mexicana* Kröb., 1925, Konowia, IV, p. 248, Pls. II, IV, ♂, ♀; wing, abdomen) (Volcan Colima, Mexico); 1934, Rev. Ent., IV, 2, p. 225.

In many respects this species is intermediate between *calogastra* and *soror*, but I believe it to be distinct from both. Most of my specimens agree perfectly with Kröber's description and figures, except that the abdomens are always entirely black from the third tergite on. In two specimens, however, the tibiae are all black, the hyaline crescent is reduced to a series of short streaks, and the spot on the fork of the third vein is broadly connected with the cross-band.

Distribution: Mexico (Kröber), Panama.

Panama records: Cerro Campana, Panama Province, VI-11-39, VII-2-39, 2500-3000 ft. El Valle, Coclé Province, VII-9-39, XII-10-39, 2000-2500 ft. Rio Pequeni, VIII-21-40.

EXPLANATION OF FIGURES.

Fig. 1. *Chrysops variegata* (de Geer).

Fig. 2. *C. melaena* Hine.

Fig. 3. *C. incisa* Macq.

Fig. 4. *C. calogastra* Schin.

Fig. 5. *C. soror* Kröb.

Fig. 6. *C. mexicana* Kröb.

Fig. 7. *C. mexicana* Kröb.

All figures were drawn from female specimens and are all to the same scale.