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TABANIDAE OF MEXICO, CENTRAL AMERICA AND
THE WEST INDIES

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There is a tendency at present to multiply the genera of Tabanidae of the world by splitting well-known genera into two or more. Dr. A. Lutz, working in Brazil, has proposed many new names in his work on the family and quite recently Dr. G. Enderlein, in an attempt to give a systematic classification of the Tabanidae of the world, considers it desirable to propose more than fifty new generic names and several new subfamilies. It appears that much of this work has been done without full consideration of previous studies made by earlier authors, the result being that many priority tangles are presented and many questions of synonymy are raised for solution. The main trouble seems to be that no one has assembled in any one place an adequate collection of the Tabanidae of the world on which to base an exhaustive study of generic characters. South America and Africa, especially, have numerous species which exhibit interesting specializations, and attempts to place many of these species, by authors working with limited collections for comparison, have complicated classification in the family unduly.

In this paper it is not intended to give an exhaustive study of the species known from the region indicated by the title, but to record notes and descriptions which, it is hoped, will facilitate further studies.

The material used has been derived from several sources. The United States National Museum has loaned me numerous specimens taken by various collectors. Some material has been procured from the American Museum, from the Museum of Comparative Zoology and from the Academy of Natural Sciences of Philadelphia. The Museum of Zoology of the University of Michigan contributed some interesting collections made in 1922-23 by F. M. Gaige in Panama and T. H. Hubbell in Honduras. The collections made by the latter were in connection with work done for the United Fruit Co., which company supported Mr. Hubbell's investigations in the region and generously allowed the depositing of the accrued material in the Museum of Zoology of the University of Michigan and the publication of the records in the following pages. These two collections are the basis for this paper, but it is considered desirable to include material from other sources in order that the notes presented may be more comprehensive and, it is hoped, more useful. My own contributions to the material used consist of a collection made in Guatemala in 1904-5 and in Cuba in 1923.

I wish to express my appreciation of aid given me by Dr. M. Bezzi, who is so situated that he has access to the types of Bellardi. At different times I have sent him specimens of *Pangonius* and *Chrysops* for comparison. Some of his report came to hand after this paper was in manuscript and his notes are added at the end of the treatment of a species in a few cases.

PANGONINAE

Species of this subfamily have a notable development in the tropical and subtropical regions of the Americas, but there has been no extended attempt to work out the limits of genera with the numerous species of the world under careful

consideration. Until sufficient material has been collected and the matter of genera carefully worked out a stable generic classification is impossible. The following key is offered as an aid in separating the genera of Pangoninae from North America. Some changes in generic names have been found necessary in order to be in harmony with recent publications and there appears to be plenty of evidence that the results of studies in the future will be the addition of some new generic names and the supersedure of others.

Key to Genera

1. Eyes distinctly hairy..... 2
Eyes bare or with a few short scattered hairs..... 6
2. First posterior cell of the wing open.....*Osca* Walker
First posterior cell of the wing closed..... 3
3. Fourth posterior cell of the wing closed.....*Scione* Walker
Fourth posterior cell of the wing open..... 4
4. Third antennal segment branched..... 5
Third antennal segment not branched.....*Erephopsis* Rond.
5. Third antennal segment branched both dorsally and ventrally
Pityocera G. Tos.
Third antennal segment branched dorsally only.....*Elaphella* Bezzi.
6. First posterior cell of the wing closed.....*Pangonius* Latr. 1802
First posterior cell of the wing open..... 7
7. Third antennal segment composed of at least seven rings, the first
of which is only slightly longer than the following ones..... 8
Third antennal segment composed of five rings, the first of which
is much longer than the following ones..... 10
8. Eyes of the female acutely angulate, wings of both sexes dark on
the anterior part, hyaline behind.....*Goniops* Aldrich
Eyes of the female not acutely angulate above, wings nearly uni-
form in color or hyaline..... 9
9. Front of the female wide, wider below than above, ocelli present,
proboscis only a little longer than the palpi
Apatolestes Williston
Front of the female of normal width or narrow, its sides usually
parallel, proboscis often elongate.....*Buplex* Austen
10. Second segment of the antenna only half as long as the first
Silvius Meigen
Second segment of the antenna distinctly more than half as long
as the first.....*Chrysops* Meigen

PANGONIUS Latrielle

Under this generic name the species with bare eyes and closed first posterior cell are included. All the American species I have observed have ocelli. Pangonia is the more usual spelling in literature. *P. proboscidius* Fabricius, which is the same as *P. maculata* Fabricius, from Europe, is the genotype.

Key to Pangonius

1. Base of the wing to the axillary incision intense black or brown in striking contrast to the remainder of the wing, which is yellowish to hyaline 2
Color of the wing base not contrasting with that of other parts of the wing 6
2. First abdominal segment black 3
First abdominal segment pale..... *wiedemanni* Bell
3. Antenna black with red tip..... *pavida* Wills.
Antenna pale 4
4. Entire leg very dark brown, almost black..... 5
Tibiae and tarsi rufous..... *caustica* O. S.
5. Thorax black, clothed with very dark brown hair..... *semiflava* Wd.
Thorax pale brown, clothed with golden yellow hair..... *melanopus* Hine
6. Legs black or dark brown..... 7
Legs in large part pale in color..... 10
7. Wings plainly infuscated..... 8
Wings grayish hyaline, costal margin only, opaque..... 9
8. Disk of thorax and scutellum black, palpi unusually long and slender *filipalpis* Wills.
Disk of thorax and scutellum yellowish brown, palpi of ordinary length *translucens* Macq.
9. Large robust species; thorax conspicuously yellowish gray pilose
seminuda Coq.
Abdomen short, quite regularly narrowed posteriorly; modest colored species, thorax sparsely dull gray pilose..... *delta* Hine
10. Wings practically hyaline..... 11
Wings opaque yellowish or grayish, or partially infuscated..... 12
11. Total length about 12 mm.; legs in the main pale yellow (Mexico)
nigronotata Macq.
Total length at least 16 mm.; legs brown to nearly black (Arizona)
delta Hine
12. All femora basally dark colored, nearly black, wing infuscated basally and along fore border..... *saussurei* Bell.

- Part or all the femora wholly yellow, wing nearly uniformly colored
all over 13
13. Abdomen plainly green in well preserved specimens
prasiniventris Macq.
Abdomen not green..... 14
14. Whole body pale yellowish brown with the first abdominal segment
plainly gray pollinose.....*illota* Will.
Body in part fuscous..... 15
15. Hind borders of abdominal segments pale dorsally, with golden yellow
hair (Southwestern United States).....*incisuralis* Say
Hind borders of abdominal segments not pale dorsally (Mexico)
flavohirta Bell.

Pangonius flavohirta Bell.

P. flavohirta Bell., female, Saggio I, 49. *P. sallei* Bell., male, Saggio I, 50. *P. tenuirostris* Wk., Tr. Ent. Soc. London, V (1860), 272.

Dr. M. Bezzi of Italy, sent me a letter from which the following is quoted: "I am now returning from the University Museum, where (with the permission of Prof. Rosa) I have examined in Bellardi's collection the types of *Pangonia flavohirta* and *P. sallei*. There are three specimens fairly well preserved, one female of the first and two males of the second (all by Salle, Mexico). They evidently are the two sexes of the same species, not having other differences than sexual ones. I think that Bellardi has distinguished two species only on account of different color of wings; these are fuscous (but very faintly) in *flavorhirta*, and yellowish in *sallei*; but this different coloration of wings is frequently met with in the two sexes of several *Pangonias*."

Walker's description of *tenuirostris* answers well for specimens of *flavohirta* and I believe it should be included in the synonymy also.

Pangonius prasiniventris Macq.

P. prasiniventris Macq., Dipt. Exot., Supl. I, 29. *P. prasiniventris* Hunter, Tr. Am. Ent. Soc., XXVII, 134. *P. semiviridis* Ricardo, Ann. Mag. Nat. Hist., VIII (1900), 181.

Hubbell secured more than a dozen specimens at Progreso, Honduras, March 22, 1923. The green or greenish abdomen,

with yellowish thorax, yellowish gray wings and yellow legs and antennae suggest the species. I procured a specimen from a cow, where it was sucking blood, at Los Amates, Guatemala. *P. semiviridis* Ricardo is given as a synonym by Surcouf. There must have been some mistake about the habitat of Miss Ricardo's specimens, as they were supposed to be from Spain when the description was written.

Pangonius filipalpis Wills.

P. filipalpis Wills., Ks. Univ. Quart., III, 190.

Of especial interest is a record of a specimen of this species from Costa Rica. Williston's type is reported as having been taken in Paraguay. Miss Ricardo reports a questionable record from the Amazons. The species is easily known by the black legs, elongate and slender, arched palpi, rather elongate body and black and yellow banded abdomen. Total length about 17 mm.

Pangonius delta Hine

P. delta Hine, O. Jr. Sci., XX, 313.

Length of the male 18 mm. A pale brown species. Body clothed with black and white hair. Wings very pale yellowish, legs largely dark brown.

Eyes black, frontal triangle and face light brown, proboscis dark brown, palpi yellowish, slender, projecting forward, antenna largely bright yellow, first two segments thinly gray pollinose and pale haired, beard very pale yellowish. Thorax pale brown, sparsely gray pollinose, not striped, dark brown haired dorsally and pale haired on the sides. Wing pale yellowish, veins yellow, first posterior cell closed and petiolate, second submarginal cell appendiculate. Legs brown, femora darker than the other parts, everywhere dark haired. Scutellum with a marginal row of long, pale hairs. Abdomen pale yellowish brown, slightly darker towards the apex, first segment gray pollinose all over and with numerous pale hairs,

following segments pale brown, thinly dark haired, with conspicuous long white hairs on the posterior margin of each, most numerous toward each side.

Three male specimens from Arizona.

This is a difficult species to characterize because it has no contrasting markings, but it is very different in appearance, nevertheless, from other North American species of the genus known to me. In my paper on Diptera of Western United States and Canada, this species was mentioned under the name of *P. saussurei*, but since this was published additional material proves that my determination was wrong.

Pangonius saussurei Bell.

P. saussurei Bell., Saggio I, 49, tab. II, fig. 4.

Williston recognized this species and published a note regarding it (Biol. Cent. Am., Dipt., I, 254). It is quite possible that *P. planiventris* Macq. is an older name for the same species. I have no proof of this latter possible synonymy, but Macquart's rather full description (Dipt. Exot., suppl. 4, 26) is quite satisfactory for my specimens of *saussurei*.

If the synonymy is accepted the species would be known as *Pangonius planiventris* Macq.

Pangonius translucens Macq.

P. translucens Macq., Dipt. Exot., Sup. I, 26. *P. fusciformis* Walker, Ins. Saund., Dipt., I, 19.

Thorax plain brown, wings uniformly nearly black, legs, antennae, palpi and proboscis very dark colored, nearly black. First two segments of the abdomen above pale, segments three, four and five black, usually with a sparse fringe of white hairs on the posterior margins of segment three, and following segments are pale. Segment two is marked with an elongate, more or less triangular spot in the middle of the dorsum.

Pangonia fusciformis Walker is considered as a synonym. Miss Gertrude Ricardo had redescribed Walker's type in *Annals and Magazine of Natural History*, Series 7, Volume V, page 170.

Seven specimens, all females, from Ecuador, Canal Zone, Panama and Guatemala show sufficient variation to include both *translucens* and *fusiformis*.

Pangonius melanopus Hine

P. melanopus Hine, Ohio Jr. Sci., XX, 312.

No additional specimens have come to hand since the species was described. The key above uses the best characters for distinguishing it from its near relatives.

Closely related to *Pangonia caustica* Osten Sacken, which has the thorax clothed with black hair, instead of yellow, the tibia and tarsi rufous instead of black, and the abdomen quite differently colored, besides other differences. *Pangonia pavidata* Williston has much in common with *melanopus* also.

Pangonius seminuda Coq.

P. seminuda Coq., Jr. N. Y. Ent. Soc., X, 137.

This is a large robust species. Wing nearly hyaline, costal border narrowly brown, legs entirely dark colored, nearly black; thorax, scutellum and first abdominal segment pale yellow pruinose and pilose, remainder of abdomen shining black with sparse black hair. Total length 22 mm.; both sexes colored alike. Specimens collected by Townsend at Sierra Madre, Chihuahua, Mexico, from the type material.

Pangonius atrifera Walker

P. atrifera Wk., Tr. Ent. London, V (1860), 272.

In Annals and Magazine of Natural History, V (1900), 170, Miss Ricardo, apparently from studies of the type, makes it plain where this species should be located. The species has bare eyes, the first posterior cell of the wing is closed and the anterior branch of the third vein has an appendix. However, among the material I have studied I do not recognize it and no records, aside from that of the type, have come to my attention. Reported from Mexico.

SCIONE Walker

The type of the genus is *Scione incompleta* Macq. from Colombia. The first and fourth posterior cells of the wing are closed. *Diclisa* Schiner has the same genotype and therefore is a synonym. *S. incompleta* Macq. was given its specific name because the vein between second and third posterior cells is incomplete apically, at least in some specimens. This is true also of other species of the genus, but the character does not seem to have much weight, for it is common for some specimens of some of the species to show it and others of the same species not to show it. Some specimens have the vein incomplete in one wing and fully complete in the other. I consider the character entirely inadequate for separating genera, although attempts have been made to use it for this purpose.

Scione maculipennis Schiner

S. maculipennis Schin., Novora Reise, 102.

Gaige found this species to be quite common at Boquete, Chiriqui Province, Panama, in March, 1923, and procured more than a dozen specimens. It is easily identified among Central American Tabanidae by the closed first and fourth posterior cells, hairy eyes and maculate wings. The whole body is a clear brown, the thorax has three narrow gray stripes dorsally, and the cross veins of the wings are conspicuously margined with fuscous, producing the character from which the specific name is derived. There are a few silver white hairs on the posterior margin of each abdominal segment, giving the appearance of a middorsal row of very small white spots. Total length nearly 14 mm.

Scione aurulans Wied.

Pangonia aurulans Wd., Auss. Zweifl., II, 620. *Pangoni rostrifera* Bell., Saggio I, 47. *Diclisa misera* O. S., Biol. Cent. Am., Dipt., I, 47.

A study of a long series of specimens from various localities in Mexico and Central America seems to bear out the

above synonymy. *S. aurulans* was not recognized by Bellardi, Osten Sacken and Williston in their contributions to the Tabanidae. Hubbell procured a number of specimens at Progreso and Tela, Honduras, in March, 1923. The body is yellowish brown in general coloration, the legs are pale yellow and the wings dilute yellowish all over. It is a rather inconspicuous insect but quite a pest to animals in the localities where it abounds. It has hairy eyes and the first and fourth posterior cells of the wings are closed. Total length usually about 12 mm., but some specimens are larger.

EREPHOPSIS Rondani

This genus admits species with hairy eyes and closed first posterior cell. Ricardo and some others have used Erepopsis, due to error perhaps. *Pangonia fulvithorax* Wiedemann is the genotype designated by Coquillett in 1910. Many South American species belong to the genus. A half dozen specimens from Mexico and Central America are before me, but it is not easy to determine them from the work of previous authors. Bellardi named *Pangonia rhinophora* in Saggio and described it with hairy eyes and open first posterior cell. Osten Sacken described *Pangonia pyrausta* in the Biologia, stating that it has hairy eyes and narrowed first posterior cell and gives the impression that it may be the same as *rhinophora*. Williston reports four specimens of *pyrausta* from Mexico, but appends the statement that he finds the first posterior cell closed. The status of *rhinophora* and *pyrausta* therefore is somewhat involved. No specimens of *rhinophora*, except the single type, have been reported. Although the descriptions of both give the first posterior cell open, a character which would locate them in the genus *Osea*, it is difficult to remove them from Erepopsis on account of other characters.

Erephopsis niger Ricardo

Erephopsis niger Ricardo, Ann. and Mag. of Nat. Hist., Series 7, Vol. VI, p. 292.

In Transactions American Entomological Society, XLIII, 292, I referred a specimen of *Erephopsis* from Peralta Station, Costa Rica (Calvert), to *niger*. This specimen agrees well with *niger* but it is close to the specimens which Williston called *pyrausta*. It is evident, therefore, that full consideration of the status of *rhinophora* and *pyrausta* should include *niger* also.

Erephopsis fulvithorax Wiedemann

Pangonia fulvithorax Wd., Auss. Zweif., I, 89.

This species is the type of the genus and has been reported from Cuba as well as from South America. It is a robust species, close to 20 mm. in total length, with the dorsum of the thorax densely closed with fulvous hairs, dark colored wings and legs, and shining dark brown abdomen with patches of fulvous hairs located on the sides of the segments beyond the second. The species is reported from Cuba by Bigot, but if the record is correct it must be of very unusual occurrence on that island.

Erephopsis schildi, new species

Female. Total length 13 mm., width of head about 6 mm., width of front at vertex nearly .75 mm., length of proboscis 6 mm. A shining black species with bright yellow antennae and hyaline wings, infuscated basally and in the costal cells.

Eyes pilose, ocelli present, frons black, with parallel sides, face and palpi pale brown, antennae bright yellow, proboscis black except at extreme base where it is pale. Beard dark brown, nearly black, occiput mostly with silky white pile, but with bristly black hairs at the outer margin. Thorax black, mostly with black hair, an inconspicuous patch of white hair on each humerus and occasional white hairs mixed with the

black in front of the wings. Legs dark brown, nearly black, wings hyaline, infuscated at extreme base and along the costal margin to the apex of the costal cells, veins brown, first posterior cell closed and short petiolate. Abdomen dorsally shining black, mostly with black hairs, although there are patches of sparsely arranged white hairs at the posterior outer corners of the second segment and scattered white hairs on the last three segments, in fact the posterior margins of the last three or four segments each are furnished with a more or less complete transverse row of fine white bristles; ventrally all the segments have white bristly hairs on the posterior margins.

Holotype female from La Suiza de Turrialba, Costa Rica, collected August 26 by Pablo Schild. One paratype with the same data, except that it bears the date of August 21. Both specimens were furnished by Dr. A. L. Melander of Pullman, Washington.

This is an interesting species and rather small for an Erephopsis, but its characters place it in that genus. The paratype presents some points of special interest, for in one wing the first posterior cell is closed at the wing margin and in the other this cell is very narrowly open. The holotype has the first posterior cell closed and petiolate in both wings.

CHRYSOPS Meigen

The species of this genus are widely distributed over the world. Walton, Szilady, Enderlein and others recently have proposed new genera to include species which formerly would have been placed under Chrysops. I have not used any of these new names here, although some of our species would line up under some of them. The European species *caecutiens* of Linnaeus is the genotype.

Key to Chrysops

1. Third division of the antenna shorter than the first..... 2
 Third division of the antenna longer than the first..... 5
2. Third division of the antenna about as long as the second, first
 division decidedly enlarged.....*virgulatus* Bellardi

- Third division of the antenna much shorter than the second, first division slender or only slightly enlarged..... 3
3. First division of the antenna decidedly longer than the second.... 4
First and second divisions of the antenna of about equal length
megaceras Bellardi
4. Whole body, including the wings and legs, uniformly black or dark brown*melanopterus* Hine
Body brown, abdominal segments with apical gray margins which expand on the middorsal line into small gray triangles, legs mostly yellow, wing hyaline with the cross veins and furcation of the third vein margined with brown.....*tanyceras* Osten Sacken
5. Body in the main pale yellowish to brown, wing pale brown and hyaline 6
Body in the main black, wing black or dark brown and hyaline..... 8
6. A hyaline spot in the discal cell.....*costatus* Fabricius
No hyaline spot in the discal cell..... 7
7. Abdomen with a middorsal stripe which is abbreviated before and followed by brown.....*crucians* Wiedemann
Abdomen pale yellowish without definite markings
flavidus Wiedemann
8. Side of the second abdominal segment with a conspicuous pale marking 12
Side of the second abdominal segment unmarked..... 9
9. Cross band of the wing much broken up.....*colopterus* Hine
Cross band of the wing uniformly black or dark brown..... 10
10. The apical spot of the wing separated from the cross band by hyaline*altivagus* Osten Sacken
The apical spot of the wing united with the cross band..... 11
11. Wing dark with four light spots.....*frontalis* Macquart
Wing with base, cross band and costal margin dark, remainder hyaline*willistoni* Hine
12. First basal cell at least half infuscated..... 13
First basal cell hyaline or with only a small infuscation basally..... 15
13. Abdomen with uniform black and yellow stripes
striatus Osten Sacken
Abdomen not striped..... 14
14. Cross band of the wing reaching the posterior border
subcaecutiens Bellardi
Cross band of the wing not reaching the posterior border
affinis Bellardi
15. Thorax plain, not striped..... 16
Thorax with yellow stripes..... 18
16. Hyaline marking of the cross band all in the fifth posterior cell
latifasciatus Bellardi

- Hyaline marking of the cross band wholly or in part outside of the fifth posterior cell..... 17
17. Hyaline marking of the cross band in the form of a small spot wholly within the fourth posterior cell: from South America
leucospilus Wiedemann
Hyaline marking of the cross band partly in each of the fourth and fifth posterior cells.....*melaenus* Hine
18. Tibiae black, each enlarged.....*pachynemius* Hine
Tibiae yellow to brown, slender..... 19
19. Abdomen with three longitudinal rows of conspicuous yellow spots
lateralis Wiedemann
Abdomen with only a middorsal row of spots..... 20
20. Apical margin of the cross band straight.....*incisus* Wiedemann
Apical margin of the cross band notched.....*frazari* Williston

Chrysops megaceras Bellardi

C. megaceras Bell., Saggio I, 74. *C. ceras* Townsend, Psyche, VIII, 38.

In a former paper (Trans. Am. Ent. Soc., XLIII, 292), I gave a key for the separation of the species of *Chrysops* with elongate first and second antennal segments and abnormally short third antennal segment. Enderlein has proposed a new genus, *Kleineana*, with the African species *Chrysops longicornis* Macquart as type. Our species of the group mentioned have some characters in common with this latter species. In my former paper I attempted to separate *megaceras* and *ceras* but there is good evidence that they are the same. I have studied specimens which have been compared with the type of *ceras* and labelled as that species. These agree so well with Bellardi's description of *megaceras*, and come from so nearly the same locality, that I am inclined to consider the two names as referring to the same species.

Chrysops lateralis Wied.

C. lateralis Wd., Auss. Zweif., I (1828), 209. *C. scalaratus* Bell., Saggio I (1859), 72. *C. latifasciatus* Will., Biol. Cent. Am., Dipt., I, 256.

Chrysops lateralis was described by Wiedemann without a definite locality being stated. Walker reported it from Hon-

duras in 1854. Miss Ricardo (Ann. Mag. Nat. Hist., VIII, 1901, 304), after studying specimens in the British Museum, considered it probable that *scalaratus* Bell. is the same species. From what I gather from the study of a series of specimens containing both sexes and reading carefully the descriptions of Wiedemann and Bellardi, there is scarcely a doubt of the above synonymy. The species is entirely distinct from others of its locality. The thorax is plainly yellow striped, the extreme sides of the abdomen are yellow on basal segments, there is a middorsal yellow triangle on posterior margin of each of segments two, three and four, and a yellow, more or less rounded, spot on either side of the middorsal line on each of the first four or five segments. Male colored like the female. Bellardi's figure of *scalaratus* is good.

Hubbell procured two specimens at Tela, Honduras, one March 7, and the other May 10, 1923. I have about 30 specimens from Puerto Barrios and Panzos taken in March, 1905. Reported from various Mexican localities and from South America.

***Chrysops willistoni*, new species**

Female. Total length 9 mm. Ground color of body dark, mostly black, all over; thorax with gray stripes and abdomen with three rows of gray spots over the black ground, legs dark, antennae reddish basally, black apically.

Front densely gray, pollinose, ocelli located on a black spot which passes over the vertex, frontal callosity pale brown with the superior margin nearly black, antenna of ordinary length, first segment reddish brown, not much enlarged, furnished with short, sparse black hair; second segment darker colored and distinctly shorter than the first, also black haired; third segment about as long as the other two, very narrowly reddish at extreme base, otherwise black. Face pale, facial tubercles shining yellowish, palpi brown, proboscis black. Thorax black with greenish gray stripes separated by black intervals, wing black and hyaline, base to the axillary incision, costal

border and cross band black, both basal and anal cells nearly entirely hyaline. The anterior border of the cross band occupies the extreme apices of first and second basal cells and enters the anal cell along the posterior branch of the fifth vein, the outer border extends nearly straight from the tip of the first vein to the tip of the posterior branch of the fifth vein. Much of the apical half of the fifth posterior cell is nearly hyaline. Legs black, middle and hind tarsi pale basally. Abdomen mostly black above with three longitudinal rows of gray spots on the black ground. The gray marking on each side of the second segment is quite extensive, but there is no pale color beneath it as there is in many well known species.

Holotype female from Puerto Barrios, Guatemala, March 5, 1905, and 22 paratype females from the same locality in the author's collection. Two paratype females in the U. S. National Museum from Puerto Barrios, Guatemala, February 24, 1905, collected by C. C. Deam.

This species may have been the one figured by Bellardi as *Chrysops latifasciatus*, but his description surely does not answer. Dr. M. Bezzi reports in a letter that this species is not represented in Bellardi's collection.

Chrysops latifasciatus Bell.

C. latifasciatus Bell., Saggio I, 71. *C. neglectus* Will., Biol. Cent. Amer., Dipt., I, 256.

There appears to be some mistake regarding this species. Dr. Williston published a note on *latifasciatus* just before his description of *neglectus*. If one reads the original descriptions of Bellardi and Williston carefully it must become evident that they had the same species under consideration, but with the figures it is different and I believe Bellardi figured a different species from that figured by Williston. The explanation seems to be that Bellardi described one species and figured another. His figure is rather poor, however, and leaves one in doubt as to the species intended. In a collect-

ing trip to Guatemala, some years ago, long series of the three species that I am considering as concerned in the settlement of the question, were procured. I take it that Bellardi's description should be followed rather than his figure. The discrepancy between Bellardi's and Williston's descriptions of *latifasciatus* is quite evident in their treatment of the abdomen. What Williston called *latifasciatus* most likely is *scalaratus* Bell., which Miss Ricardo believes is a synonym of *lateralis* Wied.

Body quite black, somewhat shining, thorax lightly gray pollinose anteriorly, not striped. Abdomen black, a rather extensive pale spot on each side of the second segment, second, third and fourth segments each with a pale middorsal triangle before the posterior margin, occasionally a very small marking in the same location on the fifth segment. Cross band of the wing quite regular, outer side straight, reaching the posterior margin. A hyaline area located entirely within the fifth posterior cell.

Hubbell collected five specimens at Tela, Honduras, April 6 and May 27, 1923. I have a half dozen specimens from Los Amates, Guatemala, taken in January and February, 1905, and a dozen or more taken at Puerto Barrios, Guatemala, in March of the same year. Known also from several places in Mexico.

A specimen of the species here considered was sent to Dr. M. Bezzi, who compared it with Bellardi's type and reported in a letter that it is *latifasciatus*. The correctness of the above statement, therefore, is further emphasized.

***Chrysops melaenus*, new species**

Small black species, with yellow on each side of the second abdominal segment and a small yellow triangle on the mid-dorsum of each of abdominal segments two, three and four. Crossband of the wing black and quite regular, practically reaching the posterior margin. Nearly the apical half of fifth posterior cell and an extension into the fourth posterior cell hyaline. Total length 7 mm.

Front yellowish gray pollinose, ocelli surrounded by a black area, frontal callosity pale, infuscated on superior margin, antennae largely pale, apical three fourths of the third segment nearly black, face and palpi pale, proboscis black. Thorax black with short sparse gray hair, anterior end of the usual stripe on either side of the middorsal line quite apparent, not evident beyond the transverse suture. Whole base of wing to axillary incision dark, costal margin and crossband also dark. Crossband regular, the two sides parallel, inner margin runs back from the base of the first submarginal cell, a short distance from the apices of the basal cells across apical third of anal cell to posterior margin, outer margin runs from apex of first vein to apex of the last branch of the fifth vein. Apical triangle large, not reaching the costa, apical spot at no place wider than the distance between the first and second veins at the outer margin of the crossband. Hind legs practically black with basal tarsal segments pale, other legs brown with tips of tibiae and tarsi darkened. The legs are paler in some specimens than others. Abdomen black above and below, sides of second segment pale and a row of three or four yellow spots on the middorsum.

Holotype female from Progreso, Chiriqui Province, Panama, April 7, 1923, collected by F. M. Gaige: in the University of Michigan Museum of Zoology. Two female paratypes with the same date, one female paratype from La Fria Tachira, Venezuela, collected by E. B. Williamson, three female paratypes from Higuito, San Mateo, Costa Rica, collected by Pablo Schild, and one female paratype from Tabernilla, Canal Zone, Panama, June 14, 1907, collected by August Busck. The last four are in the U. S. National Museum.

The three species of Chrysops, *latifasciatus* Bell., *melaenus* Hine and *leucospilus* Wied., are of unusual interest for comparison. All three are colored almost alike but they vary in size and in the extent of hyaline in the posterior part of the crossband in the region of the fifth posterior cell.

C. leucospilus Wied., from Brazil, is the largest of the three and has an oblong spot in the fourth posterior cell en-

tirely cut off from the wing margin. The fifth posterior cell is wholly infuscated. *C. latifasciatus* Bell. from Mexico, Guatemala and Honduras, is intermediate in size and has a large hyaline spot in the fifth posterior cell in contact with the posterior margin of the wing. There is no hyaline at all in the fourth posterior cell. *C. melaenus* Hine from Costa Rica, Panama and Venezuela, is smallest of the three and has hyaline in both the fourth and fifth posterior cells of the wing. The hyaline marking in this species is exactly equal to the hyaline in the other two species combined. These characters are very uniform in all my specimens.

Chrysops leucospilus Wied.

C. leucospilus Wied., Auss. Zweif., I, 202.

Wiedemann described this species from Brazil and my specimens were taken in Brazil and determined by Dr. A. Lutz, of Sao Paulo. The species is mentioned here in order to compare it with its near relatives of Mexico and Central America. Under *C. melaenus* such a comparison is given and the reader is referred to it for further notes concerning characters.

Chrysops apicalis Bell.

C. apicalis Bell., Saggio I, 73.

I have no information regarding Bellardi's *apicalis*, except his original description. In many respects this description answers for *C. virgulatus* Bell., so well in fact that a careful study should be made of *apicalis* with this in mind.

Chrysops flavidus Wiedemann

C. flavidus Wd., Aus. Zweif., I, 199. *C. pallidus* Bell., Saggio I, 73. *C. canifrons* Walker, List I, 197.

This synonymy for *C. flavidus* was published in Osten Sacken's 1878 catalog and is generally accepted. The species is common in the south and numerous specimens from Cuba and other southern localities stand as *flavidus* in my collec-

tion. Recently, in Bulletin of Entomological Research, XIII, 401, Brunetti has described *Chrysops guiterasi* from Cuba. I have not seen his types but the description establishes close relationship with *flavidus*.

Chrysops striatus Osten Sacken

C. striatus O. S., Prodrome 1, 39. *C. vittatus* Bell. (not Wiedemann), Saggio I, 74.

Chrysops striatus O. S. does not appear to be common in Mexico. It is generally accepted that Bellardi's *vittatus* is this species. I can find no other records of its occurrence outside of the United States and Canada.

Chrysops subcaecutiens Bellardi

C. subcaecutiens Bell., Saggio I, 69.

The status of this species is not very evident. Bellardi described and figured a male specimen, as was the case with his *Chrysops affinis* which is nearly related. The females of neither have ever been associated with the males.

I have before me three females from Boquete, Chiriqui Province, Panama, taken March 1 to 8, 1923, by Gaige, and a female from Guatemala taken in 1906. All these agree with my conception of the females of the species in question. The Guatemalan specimen is much lighter colored than the others, however, and the crossband of the wing is abbreviated behind, while in the other specimens the crossband all but reaches the posterior margin of the wing in full intensity.

All four of these specimens could be considered easily the same species, for they agree in size and general appearance and in all structural details, but more specimens are desirable if a decision is to be reached regarding the value of the color differences exhibited.

TABANINAE

This subfamily has representatives in all parts of the world and many of the species are well-known pests on account of

their persistent blood sucking habits. The following key to American genera is partly adapted from Surcouf. Many generic names that have been proposed by various authors are not included.

Key to Tabininae

1. Third segment of the antenna terminated by two or three divisions 2
 Third segment of the antenna terminated by four divisions..... 4
2. Third segment of the antenna terminated by two divisions
 Merycomyia Hine
 Third segment of the antenna terminated by three divisions..... 3
3. Wings variously marked and spotted with light and dark colors
 Chrysozona Meigen
 Wings hyaline (Chile and Australia).....Dasybasis Macquart
4. First segment of the antenna enlarged, globose or produced downward 5
 First segment of the antenna not globose or produced downward... 6
5. First antennal segment globose.....Bolbobomyia Bigot
 First antennal segment produced downward.....Snowiellus Hine
6. Third antennal segment without a dorsal prominence near its base 7
 Third antennal segment with a dorsal prominence or tooth..... 9
7. All tibiae slender.....Diachlorus Osten Sacken
 All tibiae, especially the front ones, distinctly swollen..... 8
8. Small species, antenna yellow, body furnished with metallic scales
 Lepidoselaga Macquart
 Medium sized species, antenna dark colored, body shining but without metallic scales.....Selasoma Macquart
9. Wasp-like species, antenna elongate.....Acanthocera Macquart
 Not wasp-like, antenna of normal length..... 10
10. Hind tibia ciliate with long hairs.....Stibosoma Schiner
 Hind tibia not ciliate..... 11
11. Rather small species, basal process of third antennal segment unusually long, usually reaching the third annulus of the segment
 Dichelacera Macquart
 Mostly medium to large sized species, basal process of the third antennal segment often short, usually not reaching beyond the first annulus of the segment.....Tabanus Linnaeus

TABANUS Fabricius

This is one of the earliest generic names of its family. The genotype is *T. bovinus* Linnaeus of Europe, Asia and Africa

Kertesz places nearly fourteen hundred species under it, but more recent authors have proposed new generic names for various species and groups of species. The fact is, trustworthy characters of proper significance on which to base these names are rather scarce and consequently there is difference of opinion as to whether or not they should be accepted. There is no doubt but that some of them deserve acceptance, but in the following key we prefer to follow some of the previous authors and treat the genus *Tabanus* in its broad sense.

Tabanus clarensis, new species

A dark colored species with somewhat the aspect of and about the same size as the common *Tabanus nigrescens* of the United States. Total length 21 mm., width of head 7 mm. Width of front at vertex slightly more than .5 mm.

Sides of the front to the inferior angles of the eye parallel, frontal callosity below nearly one third as wide as the front, very slightly narrowed above and reaching nearly to the vertex, shining black in color. Front, face, cheeks and parts of the antennae and palpi brown pollinose. First antennal segment much enlarged anteriorly, black, hairy and somewhat produced above, third segment wholly dark brown, quite wide basally and with large but short and blunt basal prominence. Thorax dark brown, mostly with brown hair; scutellum black with a gray posterior margin. The black spot on the scutellum extends forward slightly and includes the adjacent margin of the mesothorax. Before the scutellar black spot are two small diagonal chalk white spots which approach one another near the middorsal line. The scutellar black spot therefore lacks a little before of being entirely surrounded with the light color and differs in this respect from *oculus*, *jilamensis* and others; wings uniformly dark fumose, legs largely black, although the tibiae are better described as dark brown basally. Abdomen black both above and below.

Holotype female taken on Rio Claura, Honduras, April 13, 1923. Five paratypes with the same data except that one

specimen was taken a day later than the others. All collected by T. H. Hubbell. Holotype and three paratypes in the Museum of Zoology of the University of Michigan, and two paratypes in the collection of the author.

Tabanus oculus Walker

T. oculus Walker, List I, 157. *T. bipartitus* Walker, List I, 158. *T. albonotatus* Bell., Saggio Dit. Mes. I, 56.

Osten Sacken is responsible for the synonymy of this species and states that he has seen the Walker types in the British Museum. The species is easily known from other recognized species, having the pale encircled black spot on the scutellum by the closed first posterior cell. There is a distinct appendage on the anterior branch of the third vein. My smallest specimen measures 15 mm. in total length and the largest just slightly under 20 mm. Specimens from Frontera Tobasco (Townsend), Vera Cruz (Crawford), and from Morales, Guatemala, March 8, 1905.

Tabanus deflippi Bellardi

T. deflippi Bell., Saggio Dit. Mes. I, 57.

This is the largest species of the group. The smallest specimen in my possession measures 21 mm. in total length while the largest measures 25. Specimens from Vera Cruz (Crawford), Coatzacoalcos (Townsend), Mexico, and from Bengulviego, British Honduras, collected by W. A. Stanton. The latter specimen is somewhat teneral and therefore a little abnormal in coloration.

The first posterior cell is wide open, the anterior branch of the third vein is without an appendage and normally the legs are wholly reddish brown.

Tabanus jilamensis, new species

Female: a brown species with nearly hyaline wings. In well preserved specimens a narrow pale, almost obscure, mid-dorsal stripe from scutellum to apex of the abdomen. Total

length 16 mm., width of head 5.5 mm., width of front at vertex about .75 mm.

Front narrowed slightly to inferior angle of the eyes, brown pollinose frontal callosity slightly shining brown, below nearly as wide as the front, gradually narrowed for nearly a millimeter and then more rapidly to a line which can be followed about half way to vertex, front and face surrounding the antennae yellowish pollinose, margin of the mouth, cheeks and rear of the head gray pollinose, beard nearly white; antenna bright yellowish brown, first segment swollen, gradually enlarged from base to apex, somewhat produced above and furnished with numerous short black hairs, second segment small with some black hairs, third segment with annulate portion black, basal prominence not much more than an angle and with a few short black hairs at the extreme apex; palpi only slightly enlarged, very pale yellowish with sparse short black hairs, narrowed below to a rather blunt point, not quite reaching the extent of the proboscis, which is black and prominent.

Thorax yellowish brown pollinose above with short golden hairs and some black ones, especially before the wing insertions; scutellum with a black spot on the middle part of the anterior border surrounded by a pale ring, nearly half of which is on the posterior border of the mesothorax and the remainder on the margin of the scutellum, plurae and sternum gray pollinose and white pilose; anterior femur and tarsus black, tibia brown at base and black at apex, the change from one color to the other taking place rather gradually near the middle of its length, middle and hind legs brown with dark colored tarsi, in some specimens these femora are slightly darkened basally; wings hyaline with just a slight brownish tinge, narrow costal border pale yellowish, wing veins brown, first posterior cell wide open, no appendage on the anterior branch of the third vein.

Abdomen brown above, last three segments slightly darker, venter colored almost exactly like the dorsum.

Holotype female taken by T. H. Hubbell at Jilamo Farm, Tela, Honduras, May 27, 1923, in the Museum of Zoology,

University of Michigan. Fourteen paratypes taken at the same place by the same collector May 27 and 28, 1923.

***Tabanus bifloccus*, new species**

T. rufiventris Macquart, Dipt., Exot., I, 1-141.

Total length, female 16 mm., male 14 mm., width of head, female 6 mm., male 5 mm., width of front, female, less than .5 mm.

General color reddish brown, wings reddish hyaline, venation normal, no appendage on the anterior branch of the third vein, thorax somewhat darker than the abdomen, scutellum dark on the disk, posterior margin lighter in color, just before the scutellum on each side of the middle line is a small tuft of fine white hairs, which suggested the specific name. In well preserved specimens the abdomen shows suggestions of a middorsal row of gray triangles and a row of faint, rounded gray spots on either side.

Female: front narrow, sides almost exactly parallel, frontal callosity very small, scarcely shining, somewhat higher than broad, narrowed above; antenna reddish brown, first segment enlarged, produced forward on dorsal side, second segment small, pointed above, third segment rather narrow with a distinct angular dorsal prominence at base, annulate portion dark, mostly black, shorter than the basal portion. Palpi pale, somewhat enlarged basally, sharply pointed apically. Legs reddish brown, front and middle tarsi darker.

Male: eyes contiguous for some distance, all facets of nearly uniform size, head rather small and somewhat depressed, palpi pale, last segment nearly oval and directed forward.

Holotype female and allotype male both labelled Cuba, O. Sacken, in the collection of the Museum of Comparative Zoology. One female paratype from Isle of Pines, West Indies (S. H. Scudder), in the U. S. National Museum. Three female paratypes from San Domingo in the American Museum of Natural History. A female paratype from San Domingo and a male and female from Cuba in the author's collection.

Specimens of this species have been in the Museum of Comparative Zoology at Cambridge, Massachusetts, for many years, although none of them bear date labels. The specific name, supposedly, was given by Loew, but I find no record of a description ever having been published. Specimens under the same name are in the Gundlach Collection in Havana, Cuba. The species answers the description of *T. rufiventris* Macquart quite in detail. Macquart's name is not available for the species, however, because of a much older *T. rufiventris* by Fabricius from the East Indies.

Dr. Williston once suggested that *T. rufiventris* Macq. may be a synonym of his *T. filiulus* but questioned it. Macquart's description seems to fit *bifloccus* much better than it does *filiulus* and besides Macquart's specimen was taken in Cuba, while *filiulus* was described from Yucatan.

There is variation among the ten specimens studied. The disk of the thorax is darker in some than others, the front femora are dark brown in some and reddish brown in others, the tufts of white hair before the scutellum, and the gray markings of the abdomen are easily rubbed off and specimens without these characteristics appear quite different from those that have retained them. The length varies from 14 to 18 mm.

***Tabanus gracilicornis*, new species**

Total length, male and female 12 mm., width of head, male 4.5 mm., female 4 mm., width of front, female, one half mm. General color, pale brown abdomen with three rows of pale spots, wings very pale reddish hyaline, disk of the scutellum dark surrounded by a gray margin.

Female: form somewhat slender, head comparatively small, front of medium width, brownish gray pollinose, sides parallel, frontal callosity pale brown, somewhat narrower than the front, slightly produced dorsally, but with no disconnected spot above and no denuded area at vertex, face gray pollinose, beard white, palpi pale yellowish white, pointed at apex, nearly as long as the proboscis; antenna slender, first and

second segments pale brown with short black hairs above, third segment brown basally, darker apically, annulate portion only about half as long as basal, superior basal prominence minute. Thorax brown above with longitudinal gray stripes faintly evident; legs pale brown, apex of front tibia and its tarsus darker; wing pale reddish hyaline, all posterior cells open, anterior branch of the third vein without an appendage, anal cell closed and petiolate. Abdomen pale brown, a middorsal row of gray contiguous triangles and a row of small gray spots on either side.

Male: colored like the female, head large, eyes contiguous, a large area of enlarged facets with a narrow margin of small facets. The whole area occupied by the enlarged facets is pale while that occupied by the small ones is nearly black. End segment of palpus nearly oval and directed forward.

Holotype female, allotype male, one male and three female paratypes in the author's collection. All collected by Baker at Cayamas, Cuba.

The species is about the same size as and looks much like *T. gracilis* Wd., but the dark spot on the scutellum, the slender antennae and coloration of the wings are distinctive. The specimens at hand vary in total length from 10 to 12 mm. There is some variation also in the frontal callosity of the female, it being nearly square in some and slightly elongated in others.

THE OCULUS GROUP OF TABANUS

Several species of *Tabanus* from middle America have a black spot on the scutellum with a white ring around it. Walker noted this rather unusual character when he described *oculus* and other authors have called attention to it. The known species having this character are tabulated below. Some of them are known only from South America. From consideration of characters aside from the one mentioned above, some of the species do not appear to be very closely related.

Key to the *Oculus* Group of *Tabanus*

1. Anterior branch of the third vein with an appendage..... 2
Anterior branch of the third vein without an appendage..... 3
2. First posterior cell closed and petiolate.....*oculus* Wk.
First posterior cell open.....*albocirculus* Hine
3. Wings hyaline, frontal callosity a single spot, not at all or but slightly produced above by an appendage; Cuban species..... 4
Wings in large part brown or fumose, sometimes approaching hyaline; frontal callosity with a distinct appendage above reaching at least half way to the vertex..... 5
4. Small, slender species, 10-12 mm. in total length; abdomen brown with three longitudinal rows of gray spots.....*gracilicornis* Hine
Larger robust species 14 mm. or more in total length; front narrow, of uniform width throughout, with a very small, nearly round frontal callosity*bifloccus* Hine
5. Abdomen brown in general coloration, legs in large part brown..... 6
Abdomen uniform black, legs black or very dark brown
clawensis Hine
6. Third antennal segment bright yellowish brown, rather wide basally, tip usually black..... 7
Third antennal segment black or dull brown, unusually slender and somewhat elongate 8
7. Front femora reddish or brownish.....*defilippi* Bellardi
Front femora black or fuscous.....*jilamensis* Hine
8. Palpi slender, an elongate plain brown species with uniform brown wings*unipunctatus* Bigot
Palpi distinctly thickened basally, wings with the veins plainly fumose margined. From Brazil.....*fumomarginatus* Hine

Tabanus unistriatus Hine

T. unistriatus Hine, The Ohio Nat., VII, 28.

The type of this species was taken at San Carlos, Costa Rica. Mr. Hubbell procured three specimens at Jilamo Farm, Tela, Honduras, May 27, 1923.

The small size, 7-9 mm., dark, unistriate abdomen, dark, nearly black palpi, narrow front, narrowest below, denuded subcallus and dark, nearly black palpi are specific characters.

Tabanus subruber Bellardi

T. subruber Bell., Saggio I, 55, 1. *T. ruber* Macq., Dipt. Exot., Supl. 1, 42. *T. sumischraсти* Bell., Saggio I, 56, 2. *Bellardia rubribarbis* Bigot., Mem. Soc. Zool. France, V, 630.

Macquart named this species *T. ruber* in 1845 but as there was an older *T. ruber* by Thunberg, Bellardi changed it to *subruber* in 1858. Bellardi's name *T. sumischraсти* quite evidently refers to the same species. Total length from 15–18 mm. Body brown, legs darker, wings pale brown, lighter apically. Front quite narrow, sides parallel; frontal callosity quite long, black or dark brown, widest below, gradually narrowed above and nearly reaching the vertex. Base of the third antennal segment with a dorsal prominence, moderately elongate and pointed. First posterior cell of the wing usually closed and petiolate, but in some specimens only narrowed; anterior branch of the third vein angular near base and sometimes with a very short appendage.

Four females from Morales and Panzos, Guatemala, one female from Omealca, Mexico (Knab), and one from Tela, Honduras (Hubbell), have the first posterior cell closed. A male from Mexico and a female from Honduras have the first posterior cell plainly open but narrowed at apex.

Bellardia rubribarbis Bigot, described from a specimen without the third antennal segments, evidently is this species.

Tabanus bigoti Bellardi

T. bigoti Bell., Saggio I, 58. *T. apicalis* Macq., Dipt. Exot., II, 1–20. *T. macquarti* Schiner, Novara Reise, 89.

Macquart named this species *apicalis* in 1841 but as there is an older *apicalis* by Wiedemann, Bellardi changed it to *bigoti* in 1859 and Schiner, evidently not knowing of Bellardi's action, proposed the name *macquarti* in 1868 to replace the same.

It is related to *subruber*, but may be known easily by the reddish yellow abdomen with the last three segments intensely black. The first posterior cell of the wing is open but slightly

narrowed apically and the anterior branch of the third vein is without an appendage. Total length 17–20 mm.

Hubbell collected more than a dozen specimens of the species at Jilamo Farm, Tela, Honduras, May 27, 1923. Specimens have been taken in Mexico, Nicaragua and Colombia.

Tabanus caliginosus Bellardi

T. caliginosus Bell., Saggio I (1859), 68, tab. II, fig. 10. *T. alteripennis* Walker, Trans. Ent. Soc. London, V (1860), 274. *T. ebrius* O. S., Biol. Cent. Am., I (1886), 49.

This synonymy has been suggested by Osten Sacken and Williston and I believe it should not be questioned. From various sources twenty-three specimens, evidently one species, have been assembled. They vary in size from 7 to 16 mm. in total length and from pale yellowish brown to black in general coloration, but the wing pattern is the same although some specimens have these markings less intense than others and in some specimens the margins of the dark areas are more or less faded. In the Transactions of the American Entomological Society, XLIII, 295, this species is treated as *T. alteripennis* Walker.

The wing is brown with a large hyaline spot including the apical half of both basal cells and parts of other cells in that region, another hyaline spot includes the apex of the discal cell and the bases of the second and third posterior cells and a third begins just before the furcation of the third vein. The apex and posterior margin of the wing are hyaline.

By admitting the above synonymy an unusually variable species is conceded, but the variations are so gradual that the series of specimens available for study cannot be separated into groups that can be characterized as species satisfactorily.

The material studied consists of four specimens, 7–9 mm. in length, from Juan Vinas, Costa Rica, collected by Calvert; four specimens, 7 to 11 mm., from Higuito, San Mateo, Costa Rica, collected by Pablo Schild; six specimens, 7 to 9 mm., from Boqueron River, Panama, May, 1907, collected by Busck;

one specimen 11 mm., Cabina, Panama, May 25, 1911, collected by Busek; two specimens 12 to 14 mm., La Suiza, Costa Rica, collected by Pablo Schild; one specimen 9 mm., Livingston, Guatemala, collected by Schwarz and Barber; four specimens, Boquete, Chiriqui Province, Panama, May 15, 1923, collected by F. M. Gaige. The last four specimens are especially variable in coloration, one has wholly black body and legs and the size ranges from 12 to 14 mm. In addition to the specimens mentioned above I have one from Atoyac, Vera Cruz, Mexico, collected by Schumann, measuring 13 mm. in length.

Tabanus haemagogus Williston

T. haemagogus Will., Biol. Cent. Am., Dipt., I, 261. *T. filiolus* Will., Biol. Cent. Am., Dipt., I, 261.

After studying several specimens, some of them the same ones which Williston studied when he proposed the two names given above, and reading the two descriptions carefully with the specimens in hand, I fail to get any definite distinctions of consequence. It is evident from the labels on the specimens that what Williston called *haemagogus* and *filiolus* are both represented in my material. The general color ranges from light brown to almost black and the size is variable. I believe that these two names refer to one species. I would hesitate to make this latter statement were it not that Dr. Williston, in a letter, once gave me the impression that he felt quite undecided about the status of a few of the descriptions coming near the end of his paper on Tabanidae in the Biologia.

Tabanus luteoflavus Bellardi

T. luteoflavus Bell., Saggio I (1859), 60. *T. purus* Walker, Tr. Ent. Soc. London, V (1860), 274. *T. mexicanus* var. *limonius* Towns., Ann. & Mag. Nat. Hist., Ser. 6 (1897), 20-21. *T. luteoflavus* Knab, Insec. Insci. Menstruus, 4, 100.

There is good reason for believing that *purus* is a synonym of *luteoflavus*, while Knab placed Townsend's *limonius* in

the same synonymy. All the specimens used for these descriptions were procured in Mexico. Townsend's specimen was a male, the others were females. Two females are before me, one taken at Morales, Guatemala, and another at Progreso, Honduras. Neither Osten Sacken nor Williston mention the species in their studies of Central American Tabanidae.

Total length 12-14 mm. Bellardi's name well describes the color, which is quite uniform all over, even the wings are only just a little lighter in color than the body. First posterior cell wide open, anterior branch of the third vein with an appendage. Head rather small, sides of the front parallel, frontal callosity elongate and very narrow above but quite abruptly widened below to a little more than half the width of the front.

Tabanus punctipennis Macquart

T. punctipennis Macq., Dipt. Exot., I, 2, 185.

The type of this species was taken in Brazil and I have a specimen named by Dr. A. Lutz from that country and others from British Guiana. There is in the U. S. National Museum a specimen from Higuito, San Mateo, Costa Rica, collected by Pablo Schild. General color dark, second segment of the abdomen dorsally white pollinose with a dark spot on either side of the middle, other segments black above, each with three gray spots; wings hyaline, cross veins and furcation of the third vein margined with black. The two sexes colored alike. Total length 15 mm.

Tabanus hyalinipennis Hine

T. hyalinipennis Hine, Can. Ent., XXXV, 244.

The type was taken in Arizona. Specimens are at hand from Tapachula, Chiapis, Mexico, collected by Crawford, and from Santa Lucia, Guatemala. The species has the aspect of *T. trimaculatus*, but is smaller, wings hyaline, without dark markings to the cross-veins, a white spot beneath the tip of

the scutellum on the first abdominal segment and white triangular spots on the third and fourth segments. Length 15-16 mm.

Tabanus quinquepunctatus, new name

T. quinquemaculatus Hine, Ohio Naturalist, VIII, 224.

In Bulletin 44, U. S. Division of Entomology, 1904, page 58, the name *Tabanus quinquemaculatus* Wied. was used unintentionally for *T. quinquevittatus* Wied., and the synonymy has been indicated in Kertész (Catal. Dipt., III, 273).

This use of the name *quinquemaculatus* antedates the use of the same specific name for a Mexican species of *Tabanus* given by myself in 1907. I find it to be the opinion of some entomologists that the Mexican species cannot hold the name properly, so I propose *Tabanus quinquepunctatus* for it.

Tabanus carneus Bellardi

T. carneus Bell., Saggio I, 62. *T. fur* Will., Biol. Cent. Amer., Dipt., I, 261.

Tabanus carneus belongs to the group of the genus having a middorsal stripe. It is described as a flesh colored species with pale, nearly hyaline wings, with a fuscous stigma. First posterior cell closed, anterior branch of the third vein without an appendage. Length 13 mm.

Williston has described two species as *T. fur*, one, a Florida insect 17 mm. in length is closely related to the common *T. fronto* described by Osten Sacken, the other is a smaller species 13 mm. in length from Misantla, Mexico. The latter is described as having a middorsal stripe and several other characters of *carneus*, so I believe it is proper to consider it the same as that species.

Several specimens collected in Mexico and Guatemala have been determined as *T. carneus*.

Tabanus albiscutellatus Macquart

T. albiscutellatus Macq., Dipt. Exot., Supl. 4, 34, Tab. II, 9.

I know of no record of this species having been collected since Macquart described and figured it in 1850 from a specimen taken in Mexico. Osten Sacken, Bellardi and Williston, all of whom have published on Mexican and Central American Tabanidae, failed to mention it. There are in the collection of the U. S. National Museum two somewhat rubbed females, and in my own collection a male and female, which I consider the species in question and which are labelled as having been collected in Arizona and Guatemala.

Total length 15–18 mm. Macquart gives the length as 5 lines but he indicates the total length on the plate with his figure as a trifle under 15 mm.

Female dark in ground color, thorax white pollinose all over. Second and fourth abdominal segments above with the posterior margins conspicuously white pilose and pollinose, posterior margins of other abdominal segments narrowly white pollinose. Legs black with the basal two thirds or more of all the tibiae clear white. Male like the female except that the white pollinosity of the abdomen is much more extensive. The size and snow white tibiae are distinctive for the species. Only one other Mexican species known to me has similar tibiae and that is the much smaller *T. leucaspis*. The male bears the label, Huachuca Mts., Arizona, and a female is from Cayuga, Guatemala, collected by Wm. Schaus.

Tabanus leucaspis Wiedemann

T. leucaspis Wd., Auss. Zweif. Ins., I, 179.

This species is much like *albiscutellatus* in coloration but is much smaller, being only 11–13 mm. in total length. The whole body is black in ground color, with the sides of the thorax above uniting behind and including the scutellum white pilose and white pollinose, dorsally posterior margins of the second and fourth abdominal segments white, legs black

with all the tibiae partly yellowish white, wings hyaline. Not previously reported from Mexico, but specimens are at hand from Vera Cruz (Crawford), from Tela, Honduras (Hubbell), from Ancon, Canal Zone (Dunn), as well as from British Guiana and Brazil. The various specimens are quite uniform in both size and coloration even though coming from a wide range.

DICHELACERA Macquart

In Transactions American Entomological Society, XLIII, 293, are given some notes on some Mexican and Central American species of this genus and a key to the then known species of that region. In Ohio Journal of Science, XX, 316-319, I described three more species from Mexico and Costa Rica. The key below is offered as an aid for the separation of the eight species reported as occurring north of Panama.

Key to *Dichelacera*

- | | |
|--|--------------------------|
| 1. General color of the body dark, nearly black..... | 2 |
| Body largely yellow..... | 6 |
| 2. Thorax banded | 3 |
| Thorax not banded..... | 5 |
| 3. Median thoracic band shining black..... | <i>scapularis</i> Macq. |
| Median thoracic band opaque brown..... | 4 |
| 4. A subhyaline marking crosses the first, second and third posterior cells | <i> analis</i> Hine |
| No subhyaline in these cells..... | <i>caloptera</i> Hine |
| 5. Thorax uniform dark above..... | <i>melanosoma</i> Hine |
| Thorax black with two golden pollinose spots on the anterior half | <i>pulchra</i> Williston |
| 6. Smaller species, usually not over 9 mm., apex and inner border of the wing nearly uniformly infuscated..... | <i>marginata</i> Macq. |
| Larger species, 12 mm. or more, a subhyaline marking crosses the first three posterior cells..... | 7 |
| 7. Band of the wing as two half bands..... | <i>cervicornis</i> Fabr. |
| Band of the wing as one continuous band..... | <i>grandis</i> Ricardo |

