

HORSE AND DEER FLIES
OF ARKANSAS
(INSECTA: DIPTERA: TABANIDAE)



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INTRODUCTION

Horseflies of Arkansas (Schwardt, 1936) was the first publication of its kind in the region. Forty-seven species among four genera were reported in the family Tabanidae. Many of the records were based on specimens reared to maturity from eggs and collected larvae (Schwardt, 1931a, 1931b, 1932, 1934; Schwardt and Hall, 1930).

Little effort was made in the intervening years to update knowledge of the Tabanidae of the state, although specimens were gradually added to the University of Arkansas Arthropod Museum collection. In 1961, while engaged in an anaplasmosis transmission study in Desha County, 15 species were identified in a collection of 552 specimens made over the summer season (J.L. Lancaster, unpublished data). Everett and Lancaster (1968) reported 19 species from a total collection of 1567 specimens taken in St. Francis County over the period March 30, 1967, through September 28, 1967. Specimens from Benton County were also added to the collection in 1972.

No concerted effort has been made to collect from first to last flights in any location. It is, therefore, probable that some early and late season species may have been missed.

We have relied heavily on the published work of others including Philip (1947); Andrews and Wingo (1975); Tidwell (1973); Goodwin et al. (1985);

Pechuman et al. (1983); and Wright et al. (1986). Correspondence with workers in states adjoining Arkansas, curators' lists of Arkansas specimens, and examinations of museum specimens in the Texas A&M University Insect Collection (Edward Riley, Curator), Wilbur Enns Entomology Museum, University of Missouri (Robert Sites, Curator), K. C. Emerson Entomological Museum, Oklahoma State University (Robert Arnold, Curator), Louisiana State University Insect Collection (Vicky Moseley, Curator), and Mississippi Entomological Museum, Mississippi State University (Terrence Shieffer, Curator) have been helpful.

On the basis of accumulated evidence we are reporting 10 genera and 80 species of Tabanidae from Arkansas or that probably occur in Arkansas from neighboring counties of adjacent states. Keys to females of these species were compiled from published keys covering various other parts of the country. Illustrations of major anatomical features referred to in the key may be found in Andrews and Wingo (1975) and Goodwin et al. (1985).

PHYSICAL SETTING

Arkansas has a total area of 53,104 square miles with 52,675 square miles as land and the remaining in lakes and streams. The average annual temperatures range from 58°F in the northwest to 65°F in the southeast. Winter low temperatures may dip to -10°F in the northwest to well below freezing in the southeast. Normal annual precipitation varies from 39 to 56 inches and is greatest in the east and southern section. Rainfall can be heavy at times, resulting in flooding, or there may be prolonged periods of little or no rainfall. Generally, rains are most numerous and heavy in the early spring, tapering off to little or no rain in the summer months and resuming in the fall.

There are two principal physiographic regions in Arkansas. The Gulf Coastal Plain, subdivided into the Mississippi River Alluvial Plain and the West Gulf Coastal Plain, covers the eastern and southern sections of the state. The northern and western sections are part of the Interior Highlands, consisting mainly of the Ozark and Ouachita Mountains, which are divided by the Arkansas River Valley (Fig. 1). For a detailed discussion of Arkansas physiography see Stroud et al. (1969).

COLLECTION RECORDS

The museum and collection records from which this report is derived show one or more species from 44 of the 75 Arkansas counties. Counties from which 10 or more species are recorded are: Arkansas, Benton, Cross, Desha, Jefferson, Little River, Lonoke, St. Francis and Washington. Distribution of the recorded collections is shown on Figure 2.

Recorded and/or Probable Tabanid Species of Arkansas

1. *Esenbeckia incisuralis* (Say)
No Arkansas records but reported to be widely distributed in eastern Oklahoma (Wright et al., 1986).
2. *Goniops chrysocomus* (Osten Sacken)
Montgomery and Washington cos.
3. *Silvius quadrivittatus* (Say)
No Arkansas records but reported to be widely distributed in eastern Oklahoma (Wright et al., 1986).
4. *Chrysops aestuans* Wulp
No Arkansas records but reported in western Oklahoma (Wright et al., 1986).
5. *Chrysops beameri* Brennan
Washington Co. Also reported from Missouri and Louisiana (Andrews and Wingo, 1975; Tidwell, 1973).
6. *Chrysops brunneus* Hine
No Arkansas records but widely distributed in Oklahoma (Wright et al., 1986).
7. *Chrysops callidus* Osten Sacken
Calhoun, Crittenden, Mississippi, Pulaski, St. Francis and Washington cos.
8. *Chrysops celatus* Pechuman
No Arkansas records but reported from Louisiana by Tidwell (1973).
9. *Chrysops cincticornis* Walker
Washington Co. Reported from adjacent states (Andrews and Wingo, 1975; Goodwin et al., 1985; Tidwell, 1973; Wright et al., 1986).
10. *Chrysops dacne* Philip
No Arkansas records. Apparently uncommon in Louisiana and Oklahoma (Tidwell, 1973; Andrews and Wingo, 1986).
11. *Chrysops dorsopunctatus* Fairchild
No Arkansas records. Reported in central Oklahoma by Wright et al. (1986).
12. *Chrysops flavidus* Wiedemann
Arkansas, Crittenden, Cross, Drew, Hempstead, Lee, Little River, Lonoke, Mississippi, St. Francis, Stone and Washington cos.
Widely distributed.
13. *Chrysops fulvistigma* Hine
No Arkansas records but reported in Louisiana by Tidwell (1973).
14. *Chrysops geminatus* Wiedemann
Little River and Washington cos.

15. *Chrysops macquarti* Philip
Washington Co.
16. *Chrysops moechus* Osten Sacken
Benton and Washington cos.
17. *Chrysops montanus* Osten Sacken
Prairie Co. Probably more widespread in Arkansas based on its common occurrence in Louisiana, Mississippi, Missouri, Oklahoma, and Tennessee (Andrews and Wingo, 1975; Goodwin et al., 1985; Hoffman, 1963; Tidwell, 1973; Wright et al., 1986).
18. *Chrysops niger* Macquart
Washington Co. Goodwin et al. (1985) note that this species is one of the most common deer flies in Tennessee.
19. *Chrysops parvulus* Daecke
Washington Co. Reported from Louisiana (Tidwell, 1973).
20. *Chrysops pikei* Whitney
Little River, Nevada, Sevier and Washington cos.
21. *Chrysops pudicus* Osten Sacken
No Arkansas records. Reported from Tennessee by Goodwin et al. (1985) and Louisiana by Tidwell (1973).
22. *Chrysops reicherti* Fairchild
Crittenden Co. Reported by Goodwin (1985) as occasionally abundant in western Tennessee.
23. *Chrysops separatus* Hine
Calhoun Co. Found in western Tennessee, eastern Oklahoma, and Louisiana (Goodwin et al., 1985; Tidwell, 1973; Wright et al., 1986).
24. *Chrysops sequax* Williston
Washington Co. Reported from Missouri, Oklahoma, and Tennessee (Andrews and Wingo, 1975; Goodwin et al., 1985; Wright et al., 1986).
25. *Chrysops univittatus* Macquart
Washington Co. Reported by Goodwin et al. (1985) to be widely distributed in Tennessee.
26. *Chrysops upsilon* Philip
Philip (1949) lists a paratype from Almyra, Arkansas. Tidwell (1973) discusses difficulties in distinguishing this species from *C. univittatus*.
27. *Chrysops vittatus* Wiedemann
Howard and Washington cos. Reported from Oklahoma and Missouri (Andrews and Wingo, 1975; Wright et al., 1986).
28. *Diachlorus ferrugatus* (Fabricius)
No Arkansas records. Probably eastern Arkansas. Reported from wet habitats in Louisiana (Tidwell, 1973).
29. *Chlorotabanus crepuscularis* (Bequaert)
Arkansas, Ashley, Pulaski, St. Francis and Sevier cos.

30. *Leucotabanus annulatus* (Say)
Franklin, Sevier and Washington cos.
31. *Tabanus aar* Philip
St. Francis (unconfirmed). Reported from extreme western Tennessee (Shelby Co.) (Goodwin et al., 1985). This species and *T. turbidus* are easily confused.
32. *Tabanus abactor* Philip
Washington Co. Common in southern Missouri (Andrews and Wingo, 1975).
33. *Tabanus abdominalis* Fabricius
Cross, Little River, Lonoke, St. Francis and Washington cos. Statewide. This species is highly variable. Determinations should be based on clean, preferably fresh, specimens.
34. *Tabanus americanus* Forster
Craighead, Desha, Jefferson, Lonoke, Polk, St. Francis, Sevier and Washington cos. Statewide.
35. *Tabanus aranti* Hays
Washington Co. Has been frequently mistaken for *T. atratus* Fabricius. Reported from Tennessee and Louisiana (Goodwin et al., 1985; Tidwell, 1973).
36. *Tabanus atratus* Fabricius
Arkansas, Franklin, Lonoke, Hot Spring, Prairie, St. Francis, Union and Washington cos. Statewide.
37. *Tabanus calens* Linnaeus
Arkansas, Franklin, Hot Spring, Lonoke, Prairie, St. Francis, Union and Washington cos. Statewide.
38. *Tabanus colon* Thunberg
Washington and Sevier cos. Reported from Mississippi, Louisiana and Oklahoma (Tidwell, 1973; Wright et al., 1986).
39. *Tabanus cymatophorus* Osten Sacken
Desha, Jefferson, Lee, Lincoln, Little River, Lonoke and Washington cos. Statewide.
40. *Tabanus equalis* Hine
Benton, Little River, Lonoke, St. Francis and Washington cos. Statewide.
41. *Tabanus fairchildi* Stone
Benton and Washington cos. Reported from Louisiana, Oklahoma, Missouri and Tennessee (Andrews and Wingo, 1975; Goodwin et al., 1985; Tidwell, 1973; Wright et al., 1986).
42. *Tabanus fulvulus* Wiedemann
Arkansas, Benton, Little River, Lonoke, St. Francis and Washington cos.
43. *Tabanus fuscicostatus* Hine
Little River Co. Southern and eastern Arkansas. Reported

from western Tennessee with some uncertainty by Goodwin (1985) and Louisiana by Tidwell (1973).

44. *Tabanus gladiator* Stone
No Arkansas records. Reported by Pechuman (in Goodwin et al., 1985) from Tennessee.
45. *Tabanus limbatinevris* Macquart
Crittenden, Mississippi and St. Francis cos. Only recently separated from *T. sulcifrons* Macquart (Burger, 1980). Probably statewide.
46. *Tabanus lineola* Fabricius
Arkansas, Calhoun, Crittenden, Desha, Hempstead, Lee, Little River, Lonoke, Mississippi, Montgomery, Ouachita, Pope, Pulaski, St. Francis, Pulaski, Sevier, Stone and Washington cos. Statewide.
47. *Tabanus longus* Osten Sacken
Little River Co. Reported from eastern Tennessee (Goodwin et al., 1985). This species and *T. sublongus* Stone are easily confused.
48. *Tabanus melanocerus* Wiedemann
Calhoun, Hempstead, Little River and St. Francis cos. Statewide.
49. *Tabanus moderator* Stone
Cross, Hot Spring, Sevier and Washington cos.
50. *Tabanus molestus* Say
Cross, Johnson, Lonoke, Nevada, Ouachita, Pulaski and Washington cos. Statewide.
51. *Tabanus mularis* Stone
Arkansas, Benton, Calhoun, Conway, Cross, Drew, Franklin, Hempstead, Little River, Lonoke, St. Francis and Washington cos. Statewide.
52. *Tabanus nigripes* Wiedemann
Calhoun and Washington cos. Probably statewide.
53. *Tabanus pallidescens* Philip
Little River, Lonoke, Newton, Pulaski, Sevier and St. Francis cos. Statewide.
54. *Tabanus petiolatus* Hine
No Arkansas records. Reported from Louisiana, Oklahoma and Tennessee (Goodwin et al., 1985; Tidwell, 1973; and Wright et al., 1986).
55. *Tabanus proximus* Walker
Arkansas, Cross, Lawrence, Lee, Lincoln, Little River, Lonoke, Mississippi, Prairie and Washington cos. Statewide.
56. *Tabanus pumulus* Macquart
Franklin, Nevada and Washington cos.
57. *Tabanus quinquevittatus* Wiedemann
Arkansas, Benton, Conway, Cross, Little River, Lonoke, St. Francis, Sevier and Washington cos. Statewide.

58. *Tabanus reinwardtii* Wiedemann
Washington Co. Reported from Shelby Co., Tennessee and Louisiana (Goodwin et al., 1985; Tidwell, 1973).
59. *Tabanus sackeni* Fairchild
Polk and Washington cos. Reported from eastern Tennessee (Goodwin, 1985).
60. *Tabanus sagax* Osten Sacken
No Arkansas records. Reported from eastern Tennessee (Goodwin, 1985).
61. *Tabanus similis* Macquart
No Arkansas records. Reported from eastern Tennessee and Missouri (Andrews and Wingo, 1975; Goodwin, 1985).
62. *Tabanus sparus* Whitney
Benton, Cleveland, Franklin, Miller, Newton and Washington cos. Probably statewide.
63. *Tabanus stygius* Say
Arkansas, Cross, Lonoke, St. Francis and Washington cos. Statewide.
64. *Tabanus sublongus* Stone
Yell Co. Reported from western Tennessee, Louisiana, Missouri and Oklahoma (Andrews and Wingo, 1975; Goodwin et al., 1985; Tidwell, 1973; Wright et al., 1986).
65. *Tabanus subsimilis* Bellardi
Arkansas, Benton, Conway, Crittenden, Desha, Drew, Franklin, Hempstead, Howard, Johnson, Lincoln, Little River, Lonoke, Mississippi, Prairie, Pulaski, St. Francis, Sevier and Washington cos. Most widely distributed species in the state.
66. *Tabanus sulcifrons* Macquart
Arkansas, Benton, Cross, Desha, Johnson, Lonoke, Mississippi, St. Francis, Washington and Yell cos. Statewide. See Burger (1980) for a discussion of the taxonomy of this and related species in the *T. sulcifrons* complex.
67. *Tabanus superjumentarius* Whitney
Washington Co. Reported from western Tennessee and Missouri (Andrews and Wingo, 1975; Goodwin, 1985).
68. *Tabanus trimaculatus* Palisot de Beauvois
Crittenden, Cross, Johnson, Mississippi, Polk, St. Francis and Washington cos. Statewide.
69. *Tabanus turbidus* Wiedemann
Desha Co. Seldom collected. Reported from Louisiana and easily confused with *T. aar* and *T. equalis* (Tidwell, 1973).
70. *Tabanus venustus* Osten Sacken
Mississippi, St. Francis and Washington cos. Statewide.
71. *Tabanus wilsoni* Pechuman

- Desha and Polk cos. Reported from Oklahoma (Wright et al., 1986).
72. *Tabanus zythicolor* Philip
Polk Co. Recorded from Louisiana (Tidwell, 1973).
73. *Hamatabanus carolinensis* (Macquart)
Logan and Washington cos. Reported from eastern Oklahoma (Wright et al., 1986).
74. *Hamatabanus exilipalpus* (Stone)
No Arkansas records. Reported as uncommon in Tennessee (Goodwin et al., 1985). This species and *H. quaesitus* were included in *Tabanus* until recently and are still included in the *Tabanus* key in the present work.
75. *Hamatabanus quaesitus* (Stone)
Grant Co. Reported from Louisiana and Oklahoma (Tidwell, 1973; Wright et al., 1986).
76. *Hybomitra difficilis* (Wiedemann)
Johnson, Scott and Washington cos. The Washington Co. specimen was reared by Schwardt. Goodwin et al. (1985) reported that this species is a serious pest of livestock and humans in eastern Tennessee.
77. *Hybomitra lasiophthalma* (Macquart)
Benton, Crittenden, Logan, Polk, St. Francis, Washington and Yell cos. Statewide. Most prevalent *Hybomitra* species.
78. *Hybomitra nigricans* (Wiedemann)
Johnson Co. Also present along eastern Oklahoma border with Arkansas (Wright et al., 1986) and western Mississippi (Goodwin et al., 1985).
79. *Hybomitra sodalis* (Williston)
No Arkansas records. Reported from Oklahoma adjacent to Arkansas and eastern Tennessee (Goodwin et al., 1985; Wright et al., 1986).
80. *Hybomitra trispila* (Wiedemann)
No Arkansas records. Reported from Tennessee, uncommon (Goodwin et al., 1985).

KEYS TO ARKANSAS TABANIDAE

Key to Genera

(modified from Pechuman et al., 1983; Goodwin et al., 1985; and Burger, 1974).

- 1a. Hind tibia with a pair of apical spurs (fig. 3) 2
- 1b. Hind tibia lacking apical spurs (subfamily Tabaninae)
(figs. 4, 5) 5
- 2a. Third segment of antenna with at least eight,
often indistinct annuli (fig. 9) (subfamily Pangoniinae) 3

- 2b. Third segment of antenna with a basal plate-like area and four or fewer distinct terminal annuli (fig. 13) (subfamily Chrysopsinae, tribe Chrysopsini) 4
- 3a. Mouthparts slender, elongate, labella small (tribe Pangoniini).....*Esenbeckia* Rondani (1 species, *E. incisuralis* (Say))
- 3b. Mouthparts stout, labella large (fig. 6) (tribe Scionini). *Goniops* Aldrich (1 species, *G. chrysocomus* (Osten Sacken))
- 4a. First antennal segment about three times the length of the 2nd segment (fig. 12); wings faintly spotted.....
.....*Silvius* Meigen (1 species, *S. quadrivittatus* (Say))
- 4b. First and 2nd antennal segments subequal (fig. 10); wings banded.....*Chrysops* Meigen (25 species, key page 16)
- 5a. Body uniformly greenish-yellow, fading to cream-colored in preserved specimens, frontal calli absent from frons of female (tribe Diachlorini).....*Chlorotabanus* Lutz (1 species, *C. crepuscularis* (Bequaert))
- 5b. Body never uniformly greenish-yellow (rarely yellow), frontal calli present or absent 6
- 6a. Basal part of 3rd antennal segment without a dorsal angle, bearing at most a small rounded tubercle (fig. 11).....
.....*Diachlorus* Osten Sacken (1 species, *D. ferrugatus* (Fab.))
- 6b. Basal part of 3rd antennal segment expanded dorsally to a distinct angle or anteriorly directed hook-like process (figs. 14-22)..... 7
- 7a. Frons narrow; frontal callus narrow, ridge-like, well removed from eyes (fig. 41).....*Leucotabanus* Lutz (1 species, *L. annulatus* (Say))
- 7b. Frons and callosities, if present, variable but not ridge-like (figs. 45-61) 8
- 8a. Basal part of 3rd antennal segment with an anteriorly directed hook-like process that nearly reaches base of annulate portion of segment; eyes sparsely hairy in females, densely hairy in males.....*Hamatabanus* Philip (3 species, *H. carolinensis* (Macquart) keys here; *H. exilipalpus* and *H. quaesitus* are included in the *Tabanus* key).
- 8b. Basal part of 3rd antennal segment rarely with anteriorly directed hook-like process; if hook-like process present, eyes bare 9
- 9a. Vertex with distinct bare ocellar tubercle in female (figs. 45-46), male with elevated anteriorly shining tubercle.....*Hybomitra* (5 species, key page 22)
- 9b. Vertex without bare or shining ocellar tubercle; if elevated

tubercle present in male, then completely pollinose
(figs. 47-61).....*Tabanus* L. (41 species, key page 23)

Key to Females of *Chrysops*

(modified from Goodwin et al., 1985;

Pechuman et al., 1983; and information provided by Fairchild, 1937)

- 1a. Apex of wing beyond crossband hyaline, at most an occasional, indefinite trace of infuscation along costa (fig 23) 2
- 1b. Apex of wing beyond crossband definitely infuscated to varying extents (fig. 24-32) 5
- 2a. Frontoclypeus with a broad pollinose stripe on midline (fig. 42)*Chrysops cincticornis* Walker 2b. Frontoclypeus lacking pollinose stripe (figs. 43-44) 3
- 3a. Wing picture with crossband saturate and complete to hind margin (fig. 23).....*Chrysops niger* Macquart
- 3b. Wing picture dilute, crossband fading well before hind margin 4
- 4a. Abdomen with two black triangles on either side of the midline of tergite 2, their bases lying along the posterior margin and their apices extending 3/4 the distance to the anterior margin.....*Chrysops fulvistigma* Hine
- 4b. Abdomen with a single, black, median triangle on tergite 2 with apex reaching the anterior margin.....*Chrysops dorsopunctatus* Fairchild
- 5a. Apical spot dilutely extended around wing, reducing hyaline triangle to a subhyaline area not reaching hind margin of wing (fig. 24); large brown species with swollen 1st antennal segment (fig. 13); little or no trace of abdominal markings.....
.....*Chrysops brunneus* Hine
- 5b. Without the above combination of characters 6
- 6a. First basal cell almost completely infuscated; if there is a hyaline spot in the cell apex, it does not plainly cross the cell (figs. 25-28) 7
- 6b. First basal cell with at least a subapical hyaline spot crossing the cell, sometimes almost entirely hyaline (figs. 29-32) (in *C. montanus* a spur occasionally reaches apex but does not plainly cross the cell) 15
- 7a. Hyaline triangle small but clear and distinct, restricted to 2nd and 3rd posterior cells (fig. 25).....*Chrysops moechus* Osten Sacken 7b. Hyaline triangle extends toward costal margin at least beyond the fork (figs. 26-28) 8

- 8a. Hyaline triangle extends to costal margin thus isolating apical spot (fig. 26); black species, abdomen without pattern; frontoclypeus black with median pollinose stripe *Chrysops separatus* Hine
- 8b. Apical spot distinctly united with crossband anteriorly (figs. 27-28); species color variable; if abdomen unicolorous, frontoclypeus yellowish-brown ventrally 9
- 9a. Predominantly black or brown species with paler abdominal markings absent or inconspicuous 10
- 9b. Coloration variable but abdomen always conspicuously black and yellow 11
- 10a. Hind leg predominantly yellowish to brown; abdomen usually with one to three faint to distinct gray or yellow stripes; apical spot crossing into 1st posterior cell at least as a shadow *Chrysops dacne* Philip
- 10b. Hind leg predominantly fuscous; abdomen dark, occasionally with obscure pattern on tergite 2; apical spot usually fading in second submarginal cell..... *Chrysops parvulus* Daecke
- 11a. Apex of hyaline triangle reaches or exceeds 2nd longitudinal vein (figs. 27-28) 12
- 11b. Apex of hyaline triangle not reaching 2nd longitudinal vein 14
- 12a. Hyaline triangle terminating broadly at 2nd longitudinal vein (fig. 27); frontal callus dark brown to black; lateral dark stripes of abdominal dorsum extending anteriorly only to the posterior margin of tergite 2..... *Chrysops pikei* Whitney
- 12b. Hyaline triangle pointed apically, distinctly exceeding 2nd longitudinal vein (fig. 28); either frontal callus yellow or lateral dark stripes extending onto and usually crossing tergite 2 13
- 13a. Frontal callus black; 5th posterior cell predominantly infuscated (fig 28)..... *Chrysops sequax* Williston (the variety *C. Var. tau* Philip should key here and may be distinguished by the presence of a narrow, sometimes broken, pollenose stripe on the frontoclypeus)
- 13b. Frontal callus yellow; 5th posterior cell essentially hyaline..... *Chrysops beameri* Bennis
- 14a. Abdomen with four more or less complete dark longitudinal stripes (fig. 65); thorax yellow with distinct black stripes..... *Chrysops vittatus* Wiedemann
- 14b. Abdomen with a prominent median yellow stripe bordered by black of varying width, sides yellow (fig. 66); thorax fuscous with indistinct stripes..... *Chrysops macquarti* Philip
- 15a. Abdomen brownish black dorsally with a median yellowish

stripe, although it may be faint	16
15b. Abdomen otherwise marked, always with distinct yellowish or pale areas	17
16a. Frontoclypeus usually with a median pollinose T-shaped mark (fig. 43); costal cell with infuscation lighter than crossband..... <i>Chrysops upsilon</i> Philip	
16b. Frontoclypeus without such a mark, essentially non-pollinose; costal cell same color as crossband (fig. 44)..... <i>Chrysops</i> <i>univittatus</i> Macquart	
17a. Abdomen quadristriate or vittate, usually with a median, inverted “V” on tergite 2 (fig. 67); apical spot drop-shaped, usually filling 2 nd submarginal cell, apex of the hyaline triangle often reaching or even crossing 2 nd longitudinal vein; frontal callosity and scutellum typically black but the former occasionally with yellowish shades	<i>Chrysops</i> <i>montanus</i> Osten Sacken
17b. Without this combination of characters	18
18a. Apical spot narrow, usually not noticeably widened beyond base, entering only into extreme apex of 2 nd submarginal cell (figs. 29-30)	19
18b. Apical spot broad, covering at least apical 3 rd of upper branch of 3 rd longitudinal vein and obviously widened beyond base (figs. 31-32)	21
19a. Apical spot just beyond crossband slightly wider than marginal cell (fig. 29); frontal callus usually yellow, often bordered with black or brown, occasionally black..... <i>Chrysops pudicus</i> Osten Sacken (in part)	
19b. Apical spot at base narrower or just as wide as marginal cell (fig. 30); frontal callosity black	20
20a. Second abdominal segment with sublateral black triangles which join median figure along posterior border of segment (fig. 68); 4 th posterior cell usually hyaline at apex, 5 th posterior cell with considerable infuscation, especially basally; pale markings grayish yellow; apical spot very narrow..... <i>Chrysops aestuans</i> Wulp	
20b. Second abdominal segment without sublateral black triangles (fig. 69); 4 th posterior cell usually entirely infuscated, 5 th posterior cell often mostly hyaline (fig. 30); pale markings yellow..... <i>Chrysops</i> <i>callidus</i> Osten Sacken	
21a. Hyaline triangle distinctly crosses 2 nd longitudinal vein, nearly separating apical spot from crossband (fig. 31).....	

-*Chrysops geminatus* Wiedemann
- 21b. Hyaline triangle at most reaches 2nd longitudinal vein (fig. 32) 22
- 22a. Hyaline triangle reaches 2nd longitudinal vein
(fig. 29).....*Chrysops pudicus* Osten Sacken (in part)
- 22b. Hyaline triangle does not reach 2nd longitudinal vein 23
- 23a. Outer margin of crossband usually rather straight; thorax typically yellowish with brown stripes; inverted "V" on tergite 2 not especially flattened and sides of this tergite brownish yellow (fig. 70); hind femora yellow.....
.....*Chrysops flavidus* Wiedemann
- 23b. Outer margin of crossband usually sinuous; differing in one or more of remaining characters 24
- 24a. Thorax with yellow and brown stripes; tergite 2 with median inverted "V" flattened to about one-half the length of the tergite leaving an anterior pale greenish-yellow area (fig. 63).....*Chrysops reicherti* Fairchild
- 24b. Thorax grayish-green with fuscous stripes; tergite 2 not as above (fig. 64).....*Chrysops celatus* Pechuman

Key to Females of *Hybomitra*
(modified from Goodwin et al., 1985)

- 1a. Subcallus predominantly denuded and shining (fig. 45) 2
- 1b. Subcallus pollinose (fig. 46) 4
- 2a. Abdomen reddish-brown laterally; all crossveins spotted with brown.....*Hybomitra lasiophthalma* (Macquart)
- 2b. Abdomen not extensively reddish-brown laterally; wings not conspicuously spotted 3
- 3a. Basal plate of 3rd antennal segment predominantly orange (fig. 14); abdomen dull brown with median triangles and large sublateral spots, all indistinct; basal callus brownish, especially in center; femora reddish-brown.....
Hybomitra difficilis (Wiedemann)
- 3b. Basal plate with orange restricted to basal 3rd (as in fig. 15); abdomen black, without sublateral spots, but with pale posterior borders that expand laterally (and sometimes medially as triangles); basal callus black; femora black*Hybomitra nigricans* (Wiedemann)
- 4a. Third antennal segment sharply bicolored, basal plate entirely orange, annuli black; wing heavily and rather

- uniformly darkened.....*Hybomitra trispila* (Wiedemann)
 4b. Basal plate of 3rd antennal segment partly black (fig. 16);
 infuscation of wing not uniform and not very dark.....
*Hybomitra sodalis* (Wiedemann)

Key to Females of *Tabanus*
 (modified from Goodwin, 1985; and Tidwell, 1973)

- 1a. Abdomen dorsally with a median longitudinal blackish area or row of blackish spots, the area or spots broader on posterior tergites and separating the contrasting orange to reddish-brown lateral portions of tergites (fig. 71); wing spotted, a distinct spot at fork; femora black; subcallus pollinose; mesonotum dark; sublateral abdominal spots absent; 2nd palpal segment distinctly swollen basally and not exceptionally elongate; 1st posterior cell decidedly narrowed, sometimes closed at wing margin; length usually exceeds 18 mm; frons narrow, five or more times as high as wide basally.....*Tabanus abdominalis* Fab.
- 1b. Abdomen either with distinct median pale spots or triangles on one or more tergites, or unicolorous dorsally, or tergites predominantly unicolorous but some with narrow pale posterior transverse band (figs. 72-81); usually disagreeing with at least one additional character in 1a 2
- 2a. Abdomen either unicolorous or tergites with narrow pale posterior pollinose bands 3
- 2b. Abdominal tergite 2 or 3, and usually other succeeding tergites, with a middorsal pale triangle or spot, with or without pale sublateral spots 12
- 3a. Color uniform black or extremely dark brown; wing uniformly dark brown and virtually opaque; size 20 mm or greater.....
*Tabanus atratus* Fab.
- 3b. Color not black and usually not uniform; wing hyaline or obviously translucent, often patterned; size variable 4
- 4a. Mesonotum whitish pollinose (fig. 62)..*Tabanus stygius* Say
- 4b. Mesonotum brown to black 5
- 5a. Fork without a distinct dark cloud (fig. 33-34) 6
- 5b. Fork with a distinct dark cloud (figs. 35-37) 7
- 6a. Wing hyaline, costal cell brown (fig. 33); abdominal tergites usually with narrow grayish-white posterior bands
*Tabanus americanus* Forster

6b. Wing uniformly and dilutely brown, costal cell yellow; occasionally with faint traces of middorsal abdominal triangles (fig. 34).....	<i>Tabanus calens</i> L.	
7a. Palpi dark brown to black		8
7b. Palpi pale to reddish-brown		10
8a. Frons narrow, height 6-7 times basal width (fig. 47).....	<i>Tabanus proximus</i> Walker	
8b. Frons of moderate width, height 3.5-4.5 times basal width (fig. 48)		9
9a. Wing with dark spots but membrane mostly hyaline (fig. 35)	<i>Tabanus colon</i> Thunberg	
9b. Wing membrane uniformly dark or with veins broadly outlined with dark infuscations (fig. 36).....	<i>Tabanus aranti</i> Hays	
10a. All femora black; 1 st posterior cell narrowed at wing margin (fig. 37); basal plate of 3 rd antennal segment lacking a strong dorsal tooth; thorax with a lavender cast.....	<i>Tabanus gladiator</i> Stone	
10b. Legs mostly yellowish or brown; 1 st posterior cell not obviously narrowed (fig. 38), or if so, the basal plate of antenna bears a strong dorsal tooth; thorax otherwise colored		11
11a. Clypeus, gena, and pleura brownish with concolorous hair	<i>Tabanus aar</i> Philip	
11b. Clypeus, gena, and pleura gray to grayish-brown.....	<i>Tabanus turbidus</i> Wiedemann	
12a. Abdomen with a middorsal longitudinal pale stripe that may or may not be widened over posterior third of tergites (figs. 72-76)		13
12b. Abdomen with a longitudinal series of middorsal isolated pale triangles or spots (fig. 77-81)		28
13a. Middorsal abdominal pale stripe nearly parallel sided; lateral pale spots usually forming a shorter, often irregular stripe paralleled to median stripe on each side but these stripes sometimes are obsolete or broken into a series or separate spots (fig. 72-74)		14
13b. Middorsal stripe obviously and regularly widened on posterior third of tergites; lateral pale markings a series of separate, often roundish spots (fig. 75).....		19
14a. Prescutal lobe paler than mesonotum; frons widened above (fig. 49); basal plate typically longer than annulate portion		15
14b. Prescutal lobe concolorous with rest of mesonotum; frons nearly parallel sided (fig. 50); basal plate usually shorter than annulate portion		17
15a. Scutellum concolorous with thorax.....	<i>Tabanus lineola</i> Fab.	

15b. Scutellum reddish, sometimes faintly, on posterior margin	16
16a. Legs predominantly reddish; sublateral abdominal stripes nearly parallel (fig. 73).....	<i>Tabanus similis</i> Macquart
16b. Femora of at least fore and hind legs darkened; sublateral stripes offset between 2 nd and 3 rd tergites (fig. 74).....	<i>Tabanus subsimilis</i> Bellardi
17a. Palpus, pleura, and costal cell yellow.....	<i>Tabanus quinquevittatus</i> Wiedemann
17b. Palpus white, pleura grayish, costal cell dark yellow to brown	18
18a. Costal cell dark brown; pleura very pale, strongly contrasting with dark thoracic dorsum; frons 4-4.5 times as high as basal width.....	<i>Tabanus fuscicostatus</i> Hine
18b. Costal cell dark yellow; pleura scarcely contrasting with thoracic dorsum; frons 3.5-4 times as high as basal width.....	<i>Tabanus mularis</i> Stone
19a. Eye sparsely pilose; body length 10-14 mm; second palpal segment slender; wing hyaline	20
19b. Eye non-pilose or otherwise not agreeing entirely with above	21
20a. Frons 2.5-3.5 times as high as basal width, the basal callus usually transverse (fig. 51); base of 3 rd antennal segment slender (fig. 17).....	<i>Hamatabanus quaesitus</i> (Stone)
20b. Frons about four times as high as basal width, the basal callus higher than wide (fig. 52); base of 3 rd antennal segment rather stout (fig. 20).....	<i>Hamatabanus exilipalpus</i> (Stone)
21a. Dorsum of thorax covered with yellow hairs; longitudinal stripes lacking; abdominal stripes yellow; frons very narrow; antennal plate broad; costal cell colored	22
21b. Without this combination of characters	23
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Scale Bars equal 1 mm

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