The horse flies, deer flies, and yellow flies of Florida (Diptera: Tabanidae): A checklist and illustrated keys

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From the Editor – Welcome to the latest *Fly Times Supplement*! I am very please to present our second issue dedicated to identification of Tabanidae!

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AUTHOR BIOGRAPHIES

Anthony Thomas studied blackflies and mosquitoes at McMaster University (Ontario) and tabanids at the University of Alberta (Edmonton). Subsequently he moved to New Brunswick and worked on Spruce Budworm. Since retirement he has continued his interest in tabanids and published articles on Canadian tabanids east of the Rockies, and on tabanids of the Pacific Northwest. Currently, he is dissecting moths and has many images of moth genitalia; several hundred on Tom Murray's PBase pages (Moths Identified with Genitalia Pictures Photo Gallery by Tom Murray at pbase.com), several hundred on both BugGuide (BugGuide.Net) and Moth Photographers Group (Moth Photographers Group -- Genitalia Index Page at msstate.edu).

Gary Steck has conducted research primarily on Tephritidae at the University of Texas, Texas A&M University, USDA-Systematic Entomology Laboratory, and the Florida Department of Agriculture. Major research activities have included exploration for biological control agents for Mediterranean fruit fly in West Africa, population genetics of Mediterranean fruit fly and South American fruit fly cryptic species complex, tephritid and other Diptera fauna of Great Smoky Mountains National Park, and description and identification of fruit fly larvae. He was curator of Diptera at the Florida State Collection of Arthropods from 1991 to 2022.

Luc Leblanc has many years of experience in the fields of insect taxonomy, specializing on Tephritidae, and managing insect collections. Originally from Canada, he resided many years abroad, implementing plant protection-related projects and research in Africa (1989-1994), the South Pacific Islands (1994-2002), and Hawaii (2003-2015). He is currently the curator and manager of the William F. Barr Entomological Museum, at the University of Idaho.

Bruce Sutton has long been involved in the taxonomy of Diptera, particularly cryptic species complexes in the Tabanidae and Tephritidae. After many years as Chief of the Diagnostics Section, Division of Plant Industry, Florida Department of Agriculture & Consumer Services, he retired in 2015, but continues research as an associate of the Department of Entomology, National Museum of Natural History, Smithsonian Institution and the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida. Primary research focus continues resolving fruit fly cryptic species complexes in the New World..

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The HORSE FLIES, DEER FLIES, and YELLOW FLIES of FLORIDA (DIPTERA: TABANIDAE): A CHECKLIST and ILLUSTRATED KEYS

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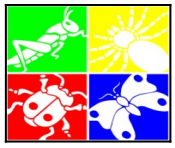
Abstract. A current checklist of the species of Tabanidae known to occur and possibly occurring in Florida includes three subfamilies with genera and numbers of species as follows. Pangoniinae: *Asaphomyia* Stone – 1 species. Chrysopsinae: *Merycomia* Hine – 2 species; *Chrysops* Meigen – 42 species and subspecies, 2 possible species, 2 undescribed species. Tabaninae: *Agkistrocerus* Philip – 2 species; *Anacimas* Enderlein – 1 species; *Chlorotabanus* Lutz – 2 species; *Diachlorus* Osten Sacken – 1 species; *Haematopota* Meigen – 1 species; *Hamatabanus* Philip – 4 species; *Hybomitra* Enderlein – 4 species; *Leucotabanus* Lutz – 1 species; *Microtabanus* Fairchild – 1 species; *Stenotabanus* (*Aegialomyia*) Philip – 2 species; *Tabanus* Linnaeus – 59 species and subspecies, 10 possible species; *Whitneyomyia* Bequaert – 2 species and subspecies.

Changes to earlier checklists include: removal of *Chrysops calvus* Pechuman & Teskey as a Florida species and recognition of specimens identified as "*calvus* – Fla. form" as *Chrysops* species A, undescribed; recognition of *Chrysops fuliginosus* "inland form" as *Chrysops* species B, undescribed; addition of *Chrysops impunctus* Krober as possible; removal of *Tabanus fuscopunctatus* Macquart from earlier lists and acceptance of *Tabanus fuscopunctatus pechumani* Philip as *Tabanus pechumani* Philip; removal of *Tabanus fusconervosus* Macquart as a Florida species; rejecting *Tabanus catenatus* Walker, *Tabanus fuscicostatus* Hine, and *Tabanus sagax* Osten Sacken as possible Florida species. We treat *Tabanus cheliopterus* Rondani and *Tabanus fronto* Osten Sacken as *Tabanus cheliopterus-fronto* complex. We reject the subspecies status of *Tabanus melanocerus lacustris* and treat *T. melanocerus* as a polymorphic species. We change *Tabanus wilsoni* Pechuman from possible to confirmed presence in Florida. We give reasons for these changes.

Illustrated keys for females are provided to subfamilies, genera, and species of each genus. Individual species pages usually show four views of each taxon: dorsal habitus, lateral habitus, frontal view of head, and a lateral view of head. We also include images of a male *Chrysops* species B, undescribed and compare them with images of a male *C. fuliginosus* which further confirms that these are two different taxa. A county distribution map is shown for each confirmed Florida species and distribution data by State is listed for each species that is known to occur or possibly occurs in Florida.



Florida State Collection of Arthropods

Introduction

This is the fourth in a series of publications on the tabanid fauna of North America. Each provides a checklist and illustrated key to the species present in the designated area. The first and second dealt with Canada east of the Rocky Mountains (Thomas and Marshall, 2009; Thomas, 2011). The third covered the Pacific Northwest (Thomas *et al*., 2022). The present study covers the fauna of Florida, which overlaps extensively with that of the southeastern USA. Here we provide a checklist and keys to the three subfamilies that occur there: Pangoniinae, Chrysopsinae, and Tabaninae and their corresponding genera and species.

Previous studies

The earliest accountings of Florida Tabanidae were those of Johnson and Coquillett (1895) and Johnson (1913) in which 40 and 50 species were listed, respectively. Subsequent publications recorded a total of 66 species (Fairchild, 1937a,b), 120 species and subspecies (Bargren, 1961), 118 species and subspecies (Jones and Anthony, 1964), and most recently 124 species and subspecies with an additional 15 species listed as likely to occur in Florida (Nalen *et al*., 2015).

Notable previous keys to all of the Tabanidae of Florida or a neighboring state include Bargren (1961), Jones and Anthony (1964), and Tidwell (1973).

Other checklists and keys to various subfamilies of Tabanidae occurring in Florida or other southeastern states or taxonomic works that incrementally expanded the list of species occurring or likely to occur in Florida and were especially useful in the preparation of the checklist and keys presented here include: Brennan (1935), Fairchild (1935, 1978, 1980), Stone (1938), Philip (1955), Goodwin (1976), Pechuman and Teskey (1981), Burger *et al.* (1990), Fairchild and French (1999), and Baier (1999).

Objectives

The aim of this study is to facilitate the identification of tabanids that are known to occur in Florida plus some additional species that have not been recorded in Florida but possibly occur there based on known presence in nearby areas. They include three subfamilies and their corresponding genera: Pangoniinae: *Asaphomyia*; Chrysopsinae: *Merycomia*, *Chrysops*; Tabaninae: *Agkistrocerus, Anacimas, Chlorotabanus, Diachlorus, Haematopota, Hamatabanus, Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia), Tabanus,* and *Whitneyomyia.* Identification is based on dichotomous keys, supplemented here with color images. Identification is a two-step process: first key a specimen to the correct genus; next key the specimen to the correct species within the genus.

Specimens and imaging

Most of the specimens photographed are in the collection of AWT and were collected at The Wedge Plantation in South Carolina, a few were collected in Florida and some were donated by Mac Tidwell and Verne Pechuman. AWT used a Nikon D810 camera mounted on a vertical stand. Mounted on a bellows, in reverse, was an enlarger lens, either a Schneider APO-Componon or an El-Nikkor. Five enlarger lenses were available, 40 mm, 45 mm, 50 mm, 63 mm, and 80 mm (the 40 mm gave the greatest and the 80 mm the least magnification). For the largest *Tabanus* species a 105 mm Micro-NIKKOR was used. Several images (frames) of each specimen were taken, each at a different focal plane, and combined into one stacked image using Zerene Stacker. Lighting was provided by four remote Nikon SB-R200 Speedlights diffused through a styrofoam cup. Other specimens were chosen from the Florida State Collection of Arthropods and were imaged by GJS using a Leica Z6 APO lens, Leica DMC600 digital camera and LAS-X 3.7.9.0979 software to create extended depth of focus

images. Adobe Photoshop CS6 was used for final image preparation, saved as 16-bit 300 ppi RGB tif files.

Distribution maps

Distribution maps, showing counties in which each species has been recorded, were compiled by LL using information from four sources, in the following order of priority. All counties cited in Jones and Anthony (1964) are shaded blue. Additional counties, cited in various literature records (Goodwin, 1976; Fairchild, 1978, 1980; Nalen *et al*., 2015; Philip *et al.,* 1973), are shaded in red. Museum specimen records, shaded in green, were sourced from digitized museum specimen label data records available online on the Symbiota Collections of Arthropods Network (SCAN) [https://scan-bugs.org/]. To compile "observations" records, LL assessed records (images) posted on BugGuide [https://bugguide.net] and iNaturalist [https://www.inaturalist.org/], and selected those judged credible, shaded in yellow. For those species cited as widespread throughout Florida by Jones and Anthony (1964), the remaining counties are shaded in brown. Lastly, North American distribution data, by State, on each map was gleaned from Burger (1995).

Author contributions

The senior author (AWT) conceived the project, determined the publication format, created the checklist and keys, and produced most of the images. GJS wrote the remaining text, which was reviewed, edited, and discussed jointly with AWT and LL. GJS imaged numerous species not in AWT's collection and examined the Florida State Collection of Arthropods (FSCA) for county records. LL checked the literature and on-line sources for county locality records and produced the maps. BDS contributed a paragraph on the *Tabanus lineola* and *T. nigrovittatus* complexes and distribution maps for the *T. nigrovittatus* complex.

Most images are © Anthony W. Thomas except those for the following species, which were provided by GJS using specimens in the FSCA: *Anacimas annularis, Chlorotabanus mexicanus, Asaphomyia floridensis* female, *Chrysops dorsopunctus, C. ifasi, C. niger, C. obsoletus, C. sandyi, Chrysops* species A, *Chrysops* species B, *C. tidwelli, C. tumidicornis, Merycomyia microcera,* some *M. whitneyomyia, Haematopota punctulata, Microtabanus pygmaeus, Stenotabanus* (*Aegialomyia*) *psammophilus, Tabanus abdominalis, T. aranti, T. birdiei, T. cayensis, T. cheliopterus, T. coarctatus, T. colon, T. cymatophorus, T. daedalus, T. fulvilineis, T. longiusculus, T. maculipennis, T. melanocerus, T. nefarius, T. proximus, T. sparus* and *T. s. milleri, T. turbidus* (dark form), *T. vittiger guatemalanus*, *T. yucatanus*, and *Whitneyomyia beatifica* and *W. b. atricorpus.*

Acknowledgments

AWT thanks Dr. Bruce Ezell for facilitating his collecting over several years at the Wedge Plantation, South Carolina, where most of the specimens were taken, and especially to Tatiana Dominick for her gracious hospitality at the Wedge Plantation. Thanks also to Dr. Mac Tidwell and Dr. Verne Pechuman for sending him several specimens. GJS thanks the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS-DPI) for its support of this work. We thank Louis A. Somma, Florida State Collection of Arthropods, Gainesville, for his critical review. Dave Serrano and his students at Broward College, Davie FL and John Leavengood (USDA, Tampa) tested parts of the key and provided useful feedback. We thank Jeanne R. Tinsman, Nevada, for the cover image of a live *Tabanus americanus,* Jung W. Kim (USDA) for the male *Asaphomyia floridensis,* and Greg Brown for the 'fresh' images of *Chrysops* species B, undescribed. We also thank Steve Gaimari for his editorial expertise.

Checklist of Florida Tabanidae

The taxa in **red type** are included in the key, and have images, but are not yet known from Florida; they are listed as possible in the Nalen *et al*. (2015) checklist. Strikethrough species are in one or both recent Florida lists (Fairchild and French, 1999; Nalen *et al.,* 2015) but are removed here - see Taxonomy and distribution notes, page 12.

	Species page
Subfamily PANGONIINAE	
Genus ***Asaphomyia*** Stone, 1953	
floridensis Pechuman, 1974	39
Subfamily CHRYSOPSINAE	
Genus ***Merycomyia*** Hine, 1912	key 41
microcera (Walker, 1848)	41
whitneyi (Johnson, 1904)	42
Genus ***Chrysops*** Meigen, 1803	key 53
A (undescribed) [1]	83
abatus Philip, 1941c	85
amazon Daecke, 1905	86
atlanticus Pechuman, 1949	87
B (undescribed) [2]	89
beameri Brennan, 1935	97
bistellatus Daecke, 1905	99
brimleyi Hine, 1904	100
brunneus Hine, 1903	101
callidus Osten Sacken, 1875	103
~~*calvus* Pechuman & Teskey, 1967~~	
carbonarius Walker 1848	104
celatus Pechuman, 1949	105
cincticornis Walker, 1848	106
cincticornis nigropterus Fairchild, 1937a	107
cursim Whitney, 1879	108
dacne Philip, 1955	109
dimmocki Hine, 1905	110
divisus Walker, 1848	111
dixianus Pechuman, 1974	112
dorsopunctus Fairchild, 1937a	114
dorsovittatus Hine, 1907	115
flavidus Wiedemann, 1821	116
floridanus Johnson, 1913	117
fuliginosus Wiedemann, 1821	118
fulvistigma Hine, 1904	119
geminatus Wiedemann, 1828	120
hinei Daecke, 1907	121

[1] A**:** previously identified as *C. calvus*
[2] B: previously identified as "inland form" of *C. fuliginosus*

(continued) **Checklist of Florida Tabanidae**

Genus ***Chrysops*** (continued)
- *hyalinus* Shannon, 1924 — 122
- *ifasi* Fairchild, 1978 — 123
- *impunctus* Krober, 1926 — 124
- *macquarti* Philip, 1961 — 125
- *moechus* Osten Sacken, 1875 — 126
- *montanus* Osten Sacken, 1875 — 127
- *niger* Macquart, 1838 — 128
- *nigribimbo* Whitney, 1879 — 129
- *obsoletus* Wiedemann, 1821 — 130
- *parvulus* Daecke, 1907 — 131
- *pikei* Whitney, 1904 — 132
- *pudicus* Osten Sacken, 1875 — 133
- *reicherti* Fairchild, 1937a — 134
- *sandyi* Baier, 1999 — 135
- *tidwelli* Philip & Jones, 1962 — 136
- *tumidicornis* Baier, 1999 — 137
- *univittatus* Macquart, 1855 — 138
- *upsilon* Philip, 1950a — 139
- *vittatus* Wiedemann, 1821 — 140

Subfamily TABANINAE

Genus ***Agkistrocerus*** Philip, 1941b — key 142
- *finitimus* (Stone, 1938) — 142
- *megerlei* (Wiedemann, 1828) — 143

Genus ***Anacimas*** Enderlein, 1923
- *limbellatus,* Enderlein, 1923 — 144

Genus ***Chlorotabanus*** Lutz, 1913 — key 145
- *crepuscularis* (Bequaert, 1926) — 145
- *mexicanus* (Linnaeus, 1758) — 146

Genus ***Diachlorus*** Osten Sacken, 1876
- *ferrugatus* (Fabricius, 1805) — 147

Genus ***Haematopota*** Meigen, 1803
- *punctulata* Macquart, 1838 — 148

Genus ***Hamatabanus*** Philip 1941b — key 149
- *annularis* (Hine, 1917) — 150
- *carolinensis* (Macquart, 1838) — 151
- *exilipalpis* (Stone, 1938) — 152
- *floridensis* (Hine, 1912) — 153

(continued) **Checklist of Florida Tabanidae**

Genus ***Hybomitra*** Enderlein, 1922	key 154
cincta (Fabricius, 1794)	154
difficilis (Wiedemann, 1828)	155
hinei (Johnson, 1904)	156
trispila (Wiedemann), 1828	154
Genus ***Leucotabanus*** Lutz, 1913	
annulatus (Say, 1823)	157
Genus ***Microtabanus*** Fairchild, 1937a	
pygmaeus (Williston, 1887)	158
Genus ***Stenotabanus*** Lutz, 1913	
(*Aegialomyia*) Philip, 1941b	key 159
magnicallus (Stone, 1935)	159
psammophilus (Osten Sacken, 1876)	160
Genus ***Tabanus*** Linnaeus, 1758	key 167
aar Philip, 1941a	213
abdominalis Fabricius, 1805	214
acutus (Bigot, 1892)	215
americanus Forster, 1771	216
aranti Hays, 1961	217
atratus Fabricius, 1775	218
atratus fulvopilosus Johnson, 1919	218
birdiei Whitney, 1914	219
bishoppi Stone, 1933	220
calens Linnaeus, 1758	221
~~*catenatus* Walker, 1848~~	
cayensis Fairchild, 1935	222
cheliopterus Rondani, 1850 [3]	223
coarctatus Stone, 1935	225
colon Thunberg, 1827	226
conterminus Walker, 1850	227
cymatophorus Osten Sacken, 1876	228
daedalus (Stone, 1938)	229
endymion Osten Sacken, 1878	230
equalis Hine, 1923	231
fairchildi Stone, 1938	232
fronto Osten Sacken, 1876 [3]	223
fulvilineis Philip, 1957	233
fulvulus Wiedemann, 1828	234

[3] *T. cheliopterus*: complex with *T. fronto*, see Taxonomy and distribution notes, page 17

(continued) **Checklist of Florida Tabanidae**

Genus ***Tabanus*** (continuing)

fumipennis Wiedemann, 1828	235
~~*fusecicostatus* Hine, 1906~~	
~~*fusconervosus* Macquart, 1838~~	
~~*fuscopunctatus pechumani* Philip, 1960b~~ [4]	
gladiator Stone, 1935	236
gracilis Wiedemann, 1828	237
hinellus Philip 1960a	238
imitans Walker, 1848	239
johnsoni Hine, 1907	240
kisliuki Stone, 1935	241
limbatinevris Macquart, 1847	242
lineola Fabricius, 1794	243
longiusculus Hine, 1907	244
maculipennis Wiedemann, 1828	245
melanocerus Wiedemann, 1828 [4]	246
~~*melanocerus lacustris* Stone, 1935~~	
mixis Philip, 1950c	248
moderator Stone, 1938	250
molestus Say, 1823	251
mularis Stone, 1935	252
nefarius Hine, 1907	253
nigrescens Palisot de Beauvois, 1809	254
nigripes Wiedemann, 1821	255
nigrovittatus Macquart, 1847	256
pallidescens Philip, 1936a	257
pechumani Philip, 1960b [5]	258
petiolatus Hine, 1917 [4]	259
proximus Walker, 1848	260
pumilus Macquart, 1838	261
quinquevittatus Wiedemann, 1821	262
reinwardtii Wiedemann, 1828	263
rufofrater Walker, 1850	264
sackeni Fairchild, 1934	265
~~*sagax* Osten Sacken, 1876~~	
sparus Whitney, 1879	266
sparus milleri Whitney, 1914	267
stygius Say, 1823	268
sublongus Stone, 1938	269
subsimilis Bellardi, 1859	270
sulcifrons Macquart, 1855	271

[4, 5] see Taxonomy and distribution notes, page 15

(continued) **Checklist of Florida Tabanidae**

Genus ***Tabanus*** (continued)
superjumentarius Whitney, 1879 272
texanus Hine, 1907 273
trijunctus Walker, 1854 274
trimaculatus Palisot de Beauvois, 1806 275
turbidus Wiedemann, 1828 276
venustus Osten Sacken, 1876 278
vittiger guatemalanus Hine, 1906 279
wiedemanni Osten Sacken, 1876 281
wilsoni Pechuman, 1962 282
yucatanus Townsend, 1897 283
zythicolor Philip, 1936b 284

Genus ***Whitneyomyia*** Bequaert, 1933 key 161
beatifica (Whitney, 1914) 161
beatifica atricorpus Philip, 1950b 162

Morphological characters and terminology
The structural characters used for the identification of species are shown below and are indicated (arrows) on some of the species images.

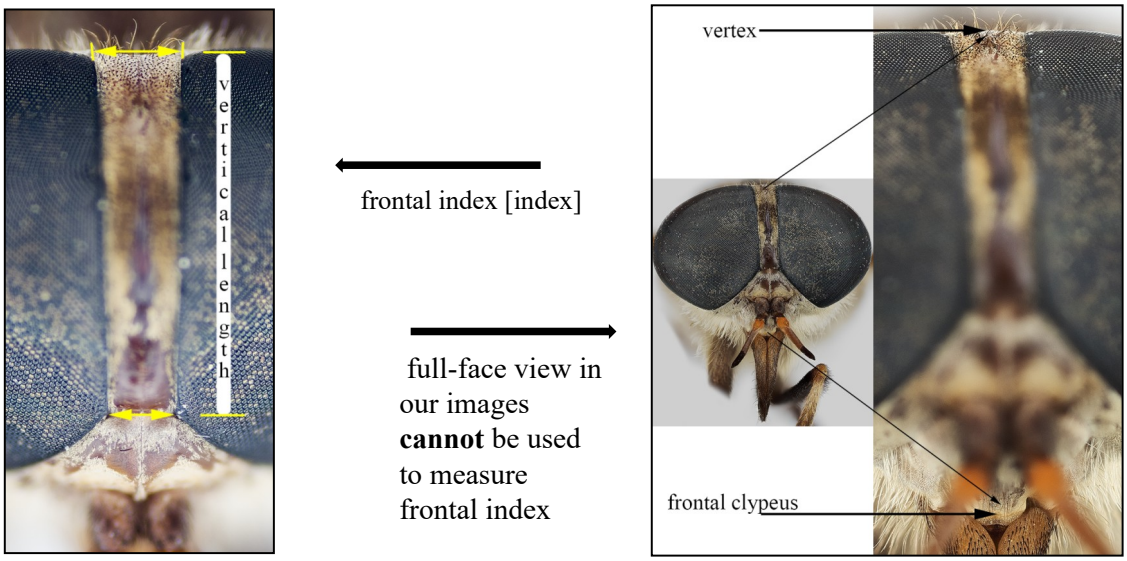
Head:
Fairchild and French (1999) included a copyrighted figure showing 'general horse fly morphology.' Similar, less detailed, figures are in Pechuman *et al*. (1983) and are copied here on pages 10-12. Additional comments include:

Vertex: smooth top of the head, but often bearing three ocelli (in the Pangoniinae) or a tubercle (in some Tabaninae); region below the vertex and above the basal callus is termed 'frons'.

Antenna: 3-segmented, 1st = scape. 2nd = pedicel, 3rd = flagellum which is composed of up to 8 annuli; the basal 4 or more may be fused into a **basal plate** leaving the apical annuli referred to as a '**style**'. Antenna shape is often a useful character in defining a genus (Figs. 20, 23-31, pages 10, 11).

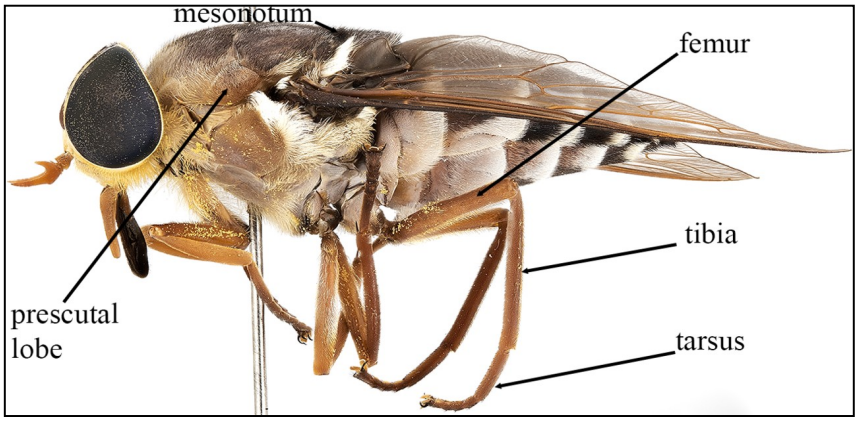
The proportions of the antenna are often used to separate taxa, *e.g., Microtabanus*. Measurements usually refer to the antenna seen in lateral (profile) view. In most Tabaninae the antenna is laterally flattened, *i.e.,* narrower in width than depth. **Length** is unambiguous; not so with the other standard measurement. Referred to as "thick" by Jones and Anthony (1964), "broad" by Tidwell (1973) and Fairchild and French (1999), "wide" by Pechuman and Teskey (1981) and Thomas *et al.* (2022), and as either "thick", "vertical thickness" or "wide" by Stone (1938). The most appropriate term is "**depth**" (=vertical thickness of Stone,1938), the maximum distance from the dorsal to ventral surfaces as seen in profile. However, in the subfamily Haematopotini the antenna is more cylindrical such that width and depth of the scape are approximately equal.

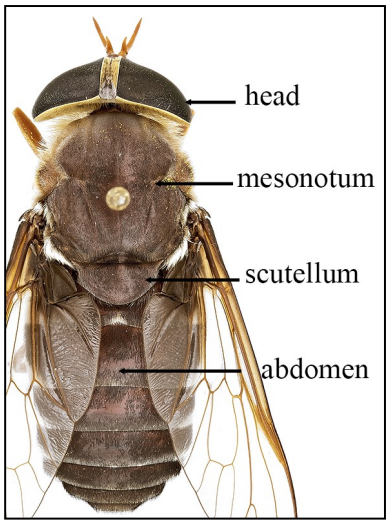
Frontal Index [index]: vertical length of the frons divided by its width at the base below the basal callus. When measuring the frontal index it is critical that the base of the frons be at the same focal plane as the frons at its vertex.
NOTE: full-face images in this study cannot be used to measure frontal index ratio. The orientation is such that the vertex is at the same focal plane as the frontal clypeus.



Morphological characters and terminology (continued)

Mesonotum: major anterior dorsal surface of the thorax bearing the wings, followed posteriorly by the **Scutellum,** a small sclerite overlapping the abdomen.





Prescutal lobe: a small sclerite on the lateral thorax immediately anterior to the base of the wing. Either the same color as immediate area of thorax or differently colored; often useful for specific identification.

Wing: membrane can be glass-clear (**Hyaline**) or weakly/strongly shaded/colored (**Infuscated)**. See Figs. 21 and 22 (pages 10, 12) for cells and veins. Where the upper branch and lower branch of the third longitudinal vein diverge is the **Fork**. The fork often is surrounded by a dark spot or dark cloud. The fork also may have a sort vein (**Spur)** into the membrane.

lightly infuscated wing with both spot and spur at fork

Tergites: the dorsal surface of an abdominal segment, usually six or seven visible and designated T1-T7 anterior to posterior.

Color: formed by a combination of the exoskeleton color, a covering of a powder-like substance (**Pollinosity**) and the color of short or long variously-shaped hairs (**Pilosity)**. The exoskeleton is often termed **Integument**, and the pollinosity and pilosity together termed the **Vestiture.**

Note that in some specimens the vestiture can be worn (absent) thereby changing the fly's appearance; e.g., unworn *Tabanus stygius* have a white mesonotom due to white pilosity, which when worn off the mesonotum shows the red color of the exoskeleton. The keys here are for specimens in a reasonably complete and undamaged condition.

Morphological characters and terminology (continued)

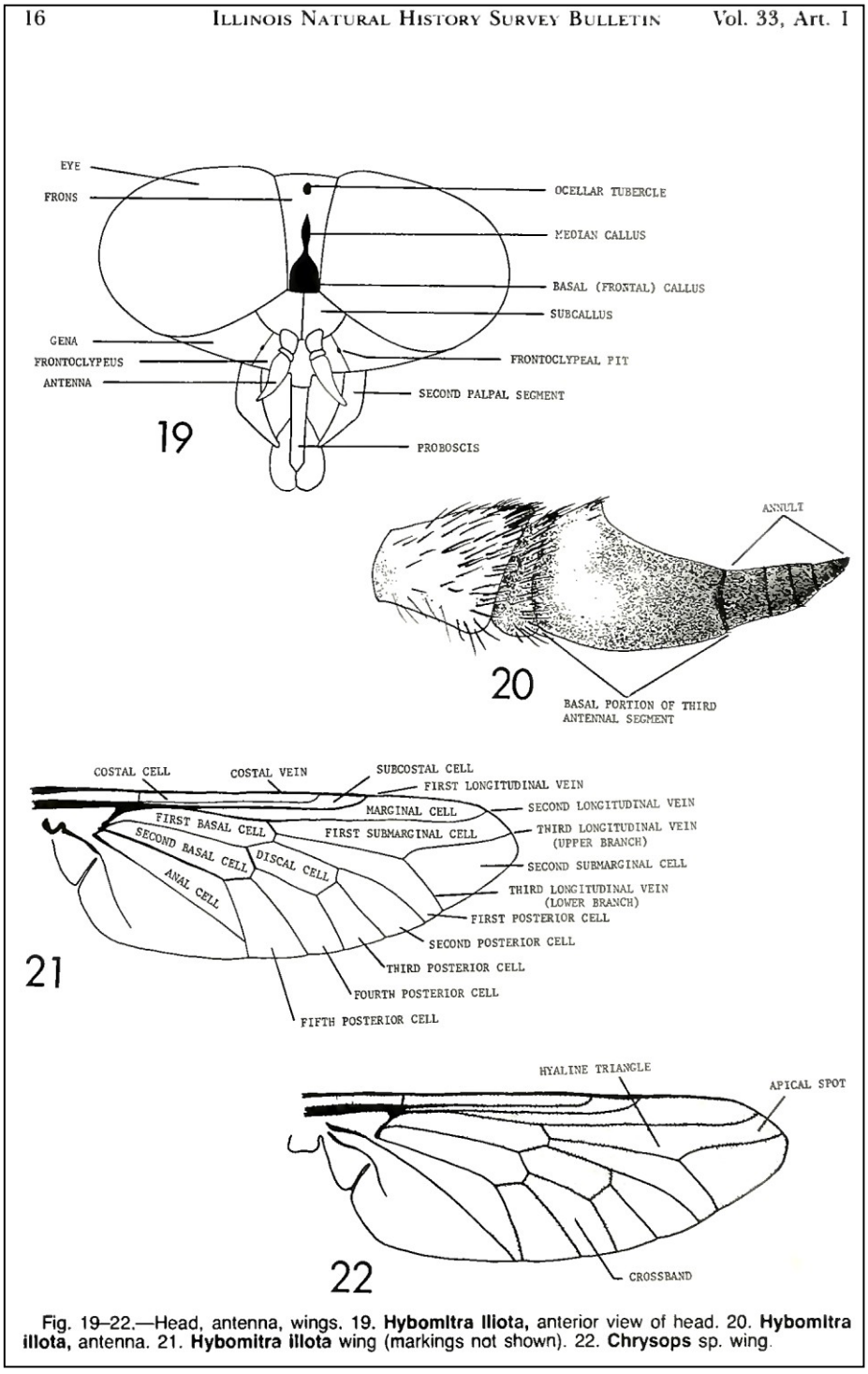


Fig. 19–22.—Head, antenna, wings. 19. **Hybomitra illota**, anterior view of head. 20. **Hybomitra illota**, antenna. 21. **Hybomitra illota** wing (markings not shown). 22. **Chrysops** sp. wing.

Alternate terminology

second palpal segment [palpus]

annuli [style]

basal portion of third antennal segment [antenna basal plate, or basal plate]

wing enlarged on page 12

Pechuman, L. L., Webb, D. W., and Teskey, H. J. (1983). The Diptera, or True Flies, of Illinois: I. Tabanidae. Illinois Natural History Survey Bulletin, 33(1-4), 1–122. https://doi.org/10.21900/j.inhs.v33.137.

Morphological characters and terminology (continued)

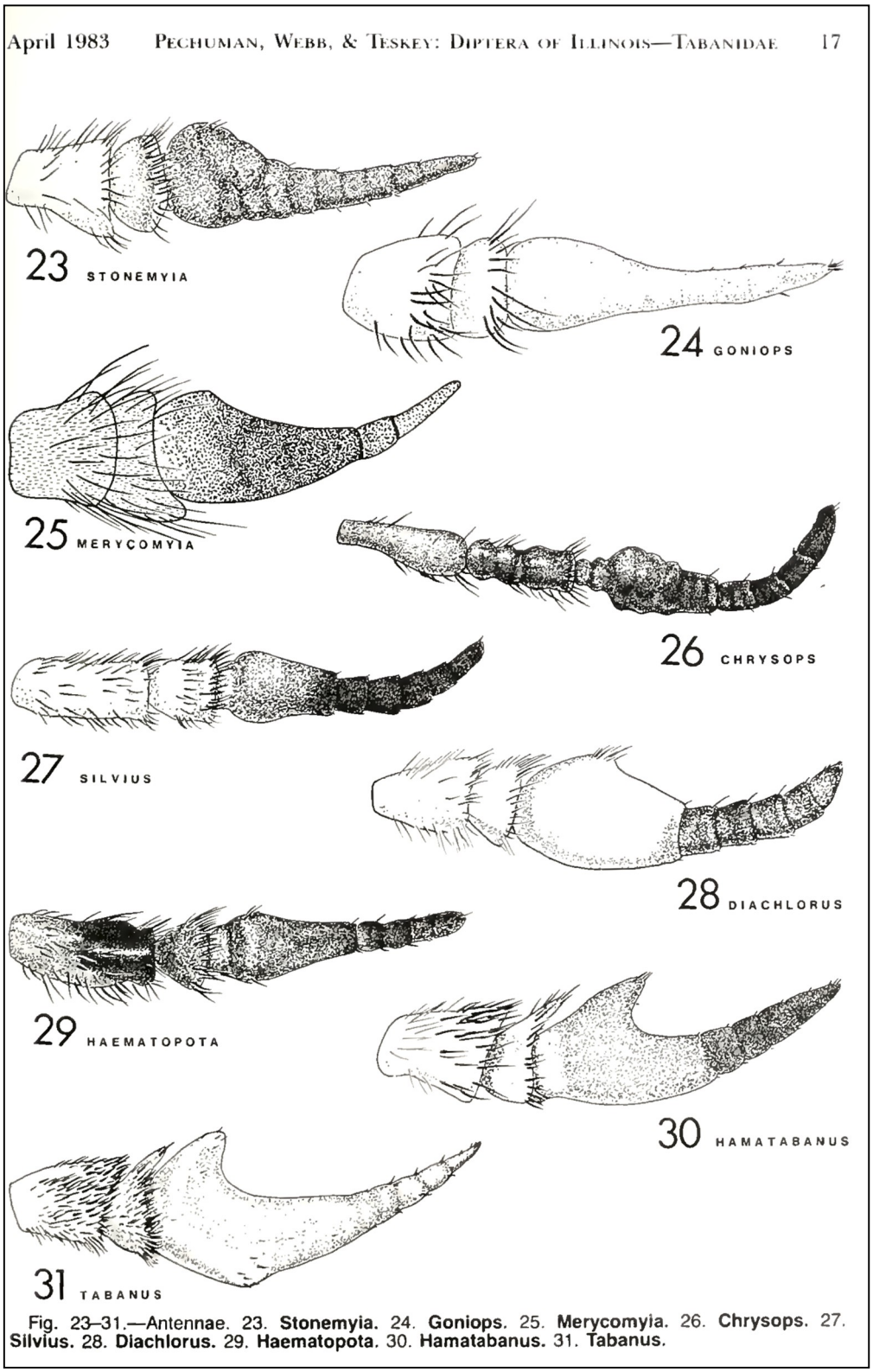
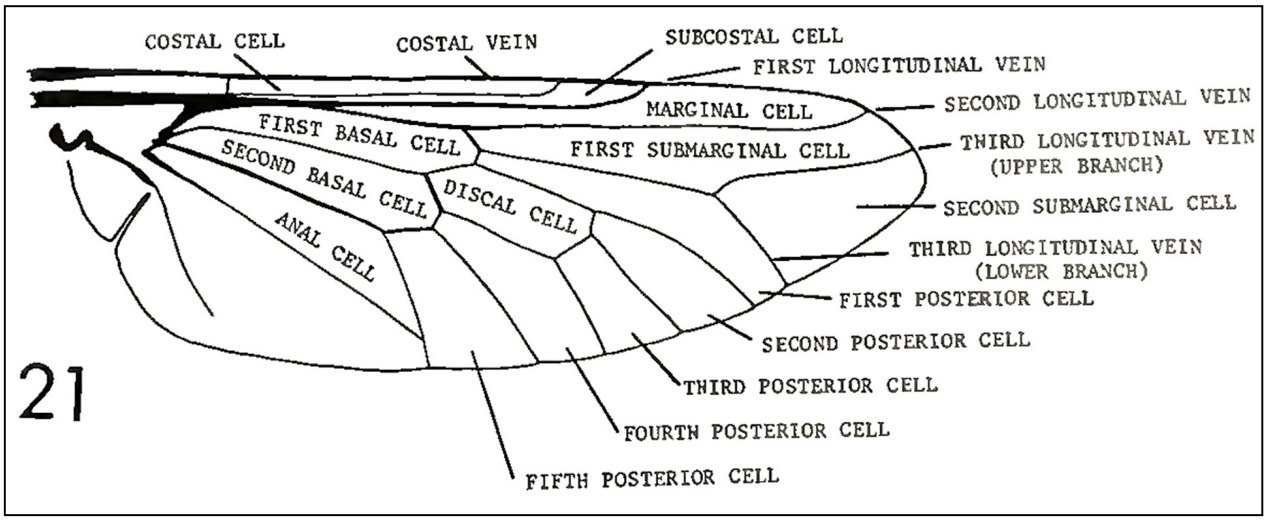


Fig. 23–31.—Antennae. 23. **Stonemyia.** 24. **Goniops.** 25. **Merycomyia.** 26. **Chrysops.** 27. **Silvius.** 28. **Diachlorus.** 29. **Haematopota.** 30. **Hamatabanus.** 31. **Tabanus.**

Tabanid antennae. Pechuman, L. L., Webb, D. W., and Teskey, H. J. (1983). The Diptera, or True Flies, of Illinois: I.Tabanidae. Illinois Natural History Survey Bulletin, 33(1-4), 1–122. https://doi.org/10.21900/j.inhs.v33.137. (CC BY 4.0 License).

Morphological characters and terminology (continued)



Tabanid wing. Pechuman, L. L., Webb, D. W., and Teskey, H. J. (1983). The Diptera, or True Flies, of Illinois: I. Tabanidae. Illinois Natural History Survey Bulletin, 33(1-4), 1–122. https://doi.org/10.21900/j.inhs.v33.137. (CC BY 4.0 License).

Taxonomy and distribution notes

Both Fairchild and French (1999) and Nalen *et al*. (2015) commented on the difficulty of assigning the correct species name to certain taxa. Several species of ***Chrysops*** are superficially very similar and have been placed in "species' pairs, groups or complexes". Individuals in these groups need a close examination to determine species. Our illustrated key emphasizes the differentiating characters for the individual species in each of these groups.

The genus ***Tabanus*** is notoriously difficult for its groups of sibling species whose true identities are unclear. Two of these complexes, *T. lineola* and *T. nigrovittatus* have been relatively well-studied, whereas others have had little study but are suspected of being complexes. In no case has the problem been resolved.

In general, we follow the names in Burger (1995), Fairchild and French (1999), and Nalen *et al*. (2015) and provide comments for various taxa as follows.

Chrysops abatus.

Considered a "species pair" with *C. dorsovittatus* (Nalen *et al.*, 2015); see *Chrysops* key, couplet 15 for differentiating characters.

Chrysops calvus.

There are 38 specimens in the FSCA identified as "*calvus* – Fla. form" which suggests that they do not match nominate *C. calvus*. However, in their description of *C. calvus,* Pechuman and Teskey (1967) included one specimen from Torreya State Park, Liberty Co., as a paratype. We photographed two of the FSCA females and compared them with true *C. calvus* and conclude that the "*C. calvus* Florida form" is an undescribed species and treat it here as ***Chrysops* A, undescribed.**

Chrysops calvus is mostly a northern species that in the southeastern USA occurs no further south than extreme northern Georgia (distribution map Fig.119, Pechuman *et al*., 1983). We remove *C. calvus* from the Florida list, but compare it to *Chrysops* A, undescribed in a plate following the *Chrysops* A, undescribed plate (*Chrysops* species plate 2).

Chrysops dacne.
Considered a "species pair", with *C. parvulus,* in the FSCA collection (Nalen *et al.*, 2015); see *Chrysops* key, couplet 38 for differentiating characters.

Chrysops dorsovittatus.
Considered a "species pair" with *C. abatus* (Nalen *et al.*, 2015); see *Chrysops* key, couplet 15 for differentiating characters

Chrysops flavidus species group.
Nalen *et al.*, (2015) followed Baier (1999) by including eight Florida species in this group including *C. pudicus*. In our minds, the coloration of *C. pudicus* in no way resembles the other members of the *C. flavidus* group and we key it with *C. cursim* and *C. dimmocki* following Pechuman *et al*. (1983); see *Chrysops* key, couplet 31. We agree with Nalen et al. (2015) that *C. sandyi*, known from the Gulf coast of Alabama (Mobile County), is likely to occur in the northwestern Gulf coast area of Florida and we include it in our key. There will be specimens in this group that will be difficult to identify to species due to the often large intraspecific variation and interspecific similarities. See *Chrysops* key, couplet 39 etc. for differentiating characters.

Chrysops floridanus.
Considered a "species pair" with *C. vittatus* (Nalen *et al.*, 2015); see *Chrysops* key, couplet 22 for differentiating characters.

Chrysops fuliginosus.
A rather uniform gray, coastal-marsh species. In the FSCA there is a tray of specimens with patches of orange integument from inland sites labeled as an "inland form of *C. fuliginosus*". Because of the habitus, orange vs. gray, and habitat, inland prairie vs. coastal saltmarsh, as well as differences between males we treat the "inland form" as an undescribed species: ***Chrysops* B, undescribed**.
In addition to the species pages for females we include pages for the males of each species, which further illustrate the "inland form of *C. fuliginosus*" as specifically distinct. Locality data for the 48 specimens of species B in the FSCA are: Alachua Co., Paynes Prairie, 46; Marion Co., Ocala National Forest 1; Orange Co., Winter Gardens 1. See *Chrysops* key, couplet 17 and *Chrysops* B species plate for differentiating characters.

Chrysops impunctus.
It was originally described as a variety of *C. geminatus*, then later considered a subspecies of *C. geminatus* (Brennan, 1935; Philip, 1955); it was again listed as a variety in Philip's (1965) catalog. Tidwell (1973) thought that *C. g. impunctus* "may simply represent a genetic variation of *geminatus*", but added "the possibility also exists that the two forms may actually represent distinct species". More recently these two taxa have been considered distinct (Drees *et al*., 1980; Pechuman *et al*., 1983; Beshear and Howell, 1985; Goodwin *et al*., 1985; Burger, 1995). *Chrysops impunctus* is not known from Florida. A distribution map for this species showed it occurring in Alabama very close to the northwest corner of Florida (Pechuman *et al*.,1983); also listed as occurring in Georgia and Louisiana (Burger, 1995). Not included in Nalen *et al.* (2015); we include it as possibly occurring in Florida. See *Chrysops* key, couplet 34 for differentiating characters.

Chrysops niger.
Appears to be a very rare Florida species. There are just four females and one male in the FSCA from Liberty Co. and Gladsden Co. These are in a tray labeled "*niger taylori* Phil[ip]". We photographed two of the females. Burger (1955) examined long series of specimens from throughout the range of *C. niger.* He found that "all the characters listed by Philip [1955] are so variable that *taylori*, even as a variety, has no special utility and is thus synonymized with the nominate form, NEW SYNONOMY." Listed as a Florida species (Burger, 1995, Nalen *et al.,* 2015), and therefore we include it as a Florida species based on those and the FSCA records. See *Chrysops* key, couplet 8.

Chrysops parvulus.
Considered a "species pair", with *C. dacne,* in the FSCA collection (Nalen *et al.*, 2015); see *Chrysops* key, couplet 38 for differentiating characters.

Chrysops vittatus.
Considered a "species pair" with *C. floridanus* (Nalen *et al.*, 2015); see *Chrysops* key, couplet 22 for differentiating characters.

Tabanus catenatus.
Included as possibly occurring in Florida (Fairchild and French, 1999) but not listed in Nalen *et al*. (2015). *Tabanus catenatus* is a northern species and most unlikely to occur in Florida. We removed it from the Florida checklist.

Tabanus conterminus.
See "*Tabanus nigrovittatus".*

Tabanus cymatophorus.
Recorded from Florida by Johnson (1913). The distribution map in Pechuman *et al*. (1983) includes western Georgia, all of Alabama (not Florida) and west to Texas. Burger (1995) did not include Florida in the distribution. Fairchild and French (1999) included it as possibly occurring in Florida. Nalen *et al*. (2015) listed this species as possible in Florida but noted that two specimens were captured near St. Augustine, Florida, in the late 1990's. There are no Florida specimens in the FSCA; there are specimens from AR, GA, KY, MS, OK, TN, and TX. We tentatively accept this species as a confirmed Florida species although we expected it from the extreme northwest corner of Florida rather than the Atlantic coast.

Tabanus fulvilineis.
Fairchild (1978) commented "I conclude that *fulvilineis* probably represents a paler, more yellowish moiety of a more yellowish southern population of *nigrovittatus*, which I, at least, cannot consistently separate." However, it was listed as a species and included in a key as a confirmed Florida species (Fairchild and French, 1999). Also listed as a Florida species by Nalen *et al*. (2015). We include it here as a Florida species. Part of the *T. nigrovittatus* complex

Tabanus fuscicostatus.
Initially identified among specimens of *T. nigrovittatus* from Florida but later removed as a Florida species (Jones and Anthony, 1964). Burger (1995) gave its distribution as " Kansas to North Carolina, south to Texas and Mississippi", therefore not Florida. However, it was included in Fairchild and French (1999) as a Florida species but removed by Nalen *et al.* (2015) based on a hand-written comment by Fairchild on specimens in the FSCA collection. We agree that *T. fuscicostatus* does not occur in Florida.

Tabanus fusconervosus.
Listed as occurring in Florida (Philip, 1965; Burger, 1995; Fairchild and French, 1999; Nalen *et al*., 2015). However, there appears to be no actual specimens of this species from Florida. There are no Florida specimens in the FSCA in Gainesville (there are specimens from South Carolina, North Carolina, Delaware, and New Jersey). Jones and Anthony (1964) listed *T. fusconervosus* from Florida, but even after their extensive study of Florida tabanids they stated "The authors of this bulletin did not collect this species in Florida." Burger (1995) listed three taxa as junior synonyms of *T. fusconervosus* viz., *T.confusus* Walker, *T. recedens* Walker, and *T. fur* Williston. Stone (1938) noted that *T.confusus, T. recedens,* and *T. fur* were the same species with the type localities as Georgia for *T. confusus* and Florida for the latter two; and further commented "[these] are further south than the locality of any specimens seen by the writer with the possible exception of the *Tabanus fur* [Holo]type." Although the type locality for *T. fur* is listed as Florida the specimen bears the label "Conn. [ecticut] Williston" (Stone, 1938). Stone (1938) listed *T. fusconervosus* as a "? junior synonym" of *Tabanus turbidus* Wiedemann, 1828. Our conclusion is that *T. fusconervosus* is not a Florida species and occurs no further south than South Carolina.

Tabanus fuscopunctatus.
This species was included in Nalen *et al*. (2015) as occurring in Florida, perhaps following Burger (1995), who listed it as a Florida species. However, it was not included in keys to Florida *Tabanus* species (Jones and Anthony, 1964; Fairchild and French, 1999); although, strangely, it was in the check list as a confirmed species (Fairchild and French, 1999). We believe Stone (1938) and Philip (1965) were correct in considering *T. fuscopunctatus* a junior synonym of *Tabanus imitans* Walker, 1848. We remove *T. fuscopuntatus* as a Florida species. We include *T. imitans* as a Florida species.

Tabanus fuscopunctatus pechumani.
Originally described as a variety of *Tabanus imitans* by Philip (1960b) but later listed as a subspecies of *T. fuscopunctatus* (Burger, 1995) and by Nalen *et al*. (2015). French added this subspecies to the check list and key even though Fairchild treated it as a species (draft, in Fairchild and French, 1999); we concur with Fairchild and treat this taxon as ***Tabanus pechumani*** Philip.

Tabanus hinellus.
See "*Tabanus lineola".*

Tabanus lineola.
A complex of species (Fairchild, 1983). Most are Neotropical with four species listed from Florida: *T. hinellus, T. lineola , T. subsimilis ,* and *T. vittiger guatemalanus* (Fairchild and French, 1999; Nalen *et al*., 2015). The complex has not been fully described or resolved; preliminary biochemical and molecular analysis indicates that in the Gulf/Atlantic coastal plains of North America the current concepts of *T. lineola* is not well defined due to the presence of yet undescribed taxa that might overlap. We treat the four species as separate taxa; see *Tabanus* key, couplet 17.

Tabanus melanocerus.
A complex of taxa (*melanocerus, petiolatus, lacustris*) that are not well-defined. *T. lacustris* Stone, 1935 was later treated as a subspecies (Jones and Anthony, 1964) and as a variety (Philip, 1965; Burger, 1995; Fairchild and French, 1999; Nalen *et al.,* 2015). Tidwell (1973) noted the "intergradation of characters between both species [*melanocerus*, *petiolatus*]" and suggested that "these nominal species are probably conspecific."

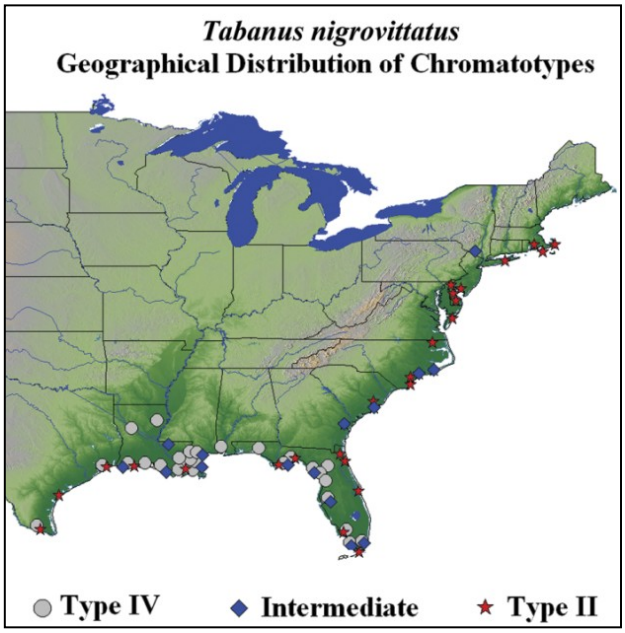
Separation of *melanocerus* from *melanocerus lacustris* is even more problematic. Fairchild wrote (in, Fairchild and French, 1999) "This group (*melanocerus*, *petiolatus*, *lacustris*) will need revision. I [GBF] think as of now (V-90) that there are 3, maybe 4, sibling species. All females have black, unbanded eyes in life, and males have [the] area of large facets pale with a dark band, like *nigripes* and many Old World species, but unlike the other banded-eye species included in the group." Their key (Fairchild and French, 1999) exemplified the problem:

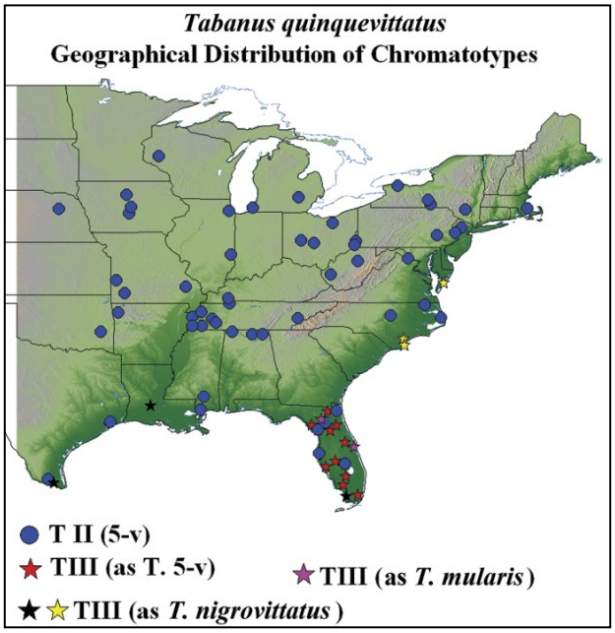
...Wings generally without an appendix or cloud at fork or [*sic*] (of ?) third vein .....*melanocerus*
...Wings with a small dark cloud at fork, and usually a short appendix .....*melanocerus* var. *lacustris*

We treat *T. petiolatus* as a species and consider *T. melanocerus* as a polymorphic taxon.

Tabanus mularis.
See "*Tabanus nigrovittatus".*

***Tabanus nigrovittatus*.**
A complex of species that has been studied rather extensively, relative to other tabanids, in the northern States (see Sakolsky *et al*., 1999 for references) and in Louisiana (Davis, 2022) but has not been fully described/resolved. Preliminary biochemical and molecular analysis indicates that in the Gulf/Atlantic coastal plains of North America the current concept of *T. nigrovittatus-conterminus-fulvileneis-mularis-quinquevittatus* is not well defined due to the presence of yet undescribed taxa that might overlap. We include images of *T. conterminus, T. fulvilineis, T. mularis, T. nigrovittatus,* and *T. quinquevittatus*; see *Tabanus* key, couplet 20. BDS has produced two maps showing the distribution of the "*T. nigrovittatus*-types" in eastern North America:





Tabanus pechumani.
See "*Tabanus fuscopunctatus pechumani*".

Tabanus petiolatus.
See *"Tabanus melanocerus".*

Tabanus pumilus.
Fairchild and French (1999) included three taxa (*T. pumilus, T. sparus*, and *T. sparus milleri*) in their Group V. They commented "This group needs further detailed study; there are probably more than one species going under one or both of these names, or possible geographic subspecies, but so far no one has discovered characters allowing separation of the last 2 forms [*T. sparus*, *T. sparus* var. *milleri*] when fresh or relaxed, or males of all 3 species when dead and dry." We treat *T. pumilus* and *T. sparus* as species, and *milleri* as a subspecies of *T. sparus* following Nalen *et al*. (2015); Burger (1995) and Fairchild and French (1999) treated it as a "variety"; see *Tabanus* key, couplet 49.

Tabanus quinquevittatus.
Nalen *et al*. (2015) stated [erroneously] that Burger (1995) and Fairchild and French (1999) "do not consider *T. quinquevittatus* sensu stricto to have a Florida distribution". *Tabanus quinquevittatus* is an inland species, not occurring in peninsular Florida. An undescribed species which resembles *T. nigrovittatus* and *T. quinquevittatus* is known from peninsular Florida. We include *T. quinquevittatus* as a tentative Florida species; see *Tabanus* key, couplet 25.

Tabanus sagax.
Although listed as a possible Florida species (Fairchild and French, 1999; Nalen *et al*., 2015) its presence seems improbable. It was reported to occur in Louisiana by Burger (1995) but a putative *T. sagax* from Louisiana was found to be *T. zythicolor* (Tidwell, 1973). The distribution of *T. sagax* was shown to occur no further south than extreme north-central Georgia (Pechuman *et al*., 1983). We delete it 'as possible'.

Tabanus sparus, T. sparus* var *milleri.
See *"Tabanus pumilus".*

Tabanus subsimilis.
See "*Tabanus lineola*".

Tabanus vittiger guatemalanus.
See "*Tabanus lineola*".

Tabanus wilsoni.
Listed as possible (Fairchild and French, 1999; Nalen *et al*.,2015); we now report it as a confirmed Florida species.

Tabanus cheliopterus-fronto complex.
The taxon *T. fronto* was considered a junior synonym of *T. cheliopterus* by Stone (1938) and as a variety by Jones and Anthony (1964) who stated "the variety *fronto* is more troublesome in Florida than the typical species." Tidwell (1973) described the variety *fronto* as a "slightly larger, darker form [of *T. cheliopterus*]." He examined 42 specimens in the U.S. National Museum and his own collection and stated "there is intergradation in both leg and body coloration, and it may be that the varietal status of the darker form [*fronto*] is unwarranted." Pechuman, in a personal communication to Burger, determined that this taxon [*fronto*] was specifically distinct from *T. cheliopterus* (Burger 1995, p. 9) by being "larger and having dark brown maxillary palpi, legs, and ventral surface of the abdomen." [These are light reddish brown in *cheliopterus*]. As of 1995 these two taxa have been recognized as distinct species (Burger, 1995; Fairchild and French, 1999; Nalen *et al*., 2015).

The key couplet that separates *T. fronto* from *T. cheliopterus* (Fairchild and French, 1999):

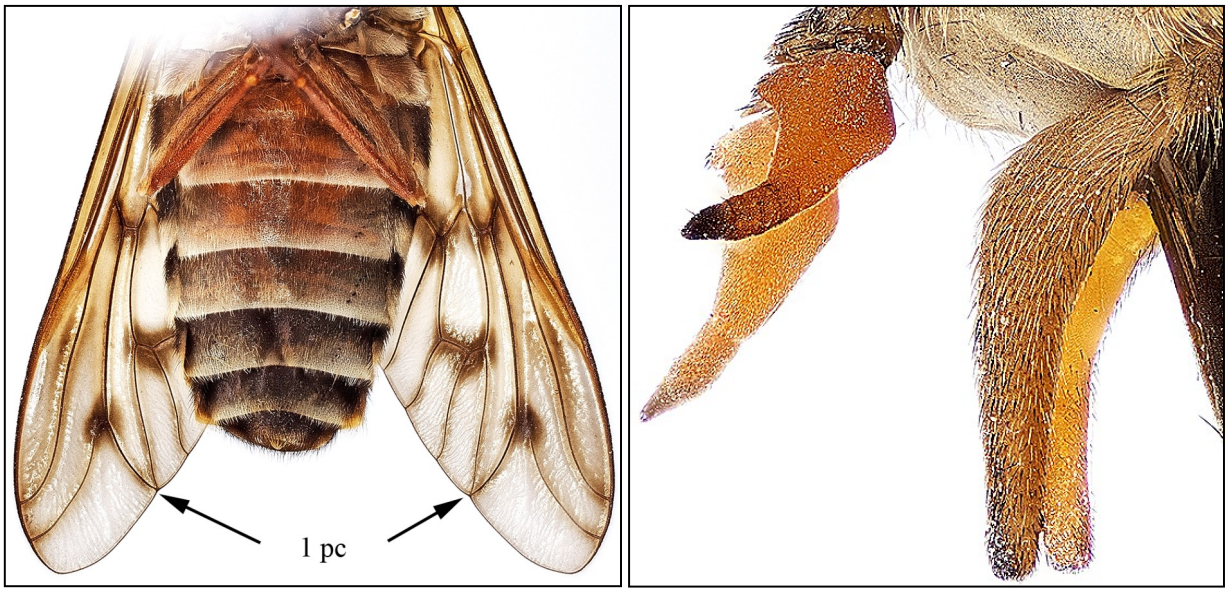
1. Abdomen beneath strikingly banded, the anterior half of each sternite dark, the posterior half light, pale pilose 2
-- Abdomen beneath unicolorous or nearly so, white to reddish pollinose 3

2. .....>*fronto*
-- .....>*cheliopterus*

Further characters listed by Fairchild and French (1999) include:
Wing – 1st posterior cell strongly narrowed occasionally closed, at margin .....*fronto*
1st posterior cell at most narrowed towards wing margin .....*cheliopterus*
Legs - all femora dark brown to black basally, lighter apically .....*fronto*
uniformly yellowish to pale brown, fore femora sometimes dark .....*cheliopterus*

AWT has one specimen from Highlands Co., Florida identified by L.L. Pechuman as *Tabanus cheliopterus fronto* which we show. AWT has also seen images, also shown, of a specimen in the FSCA identified as *Tabanus cheliopterus.*

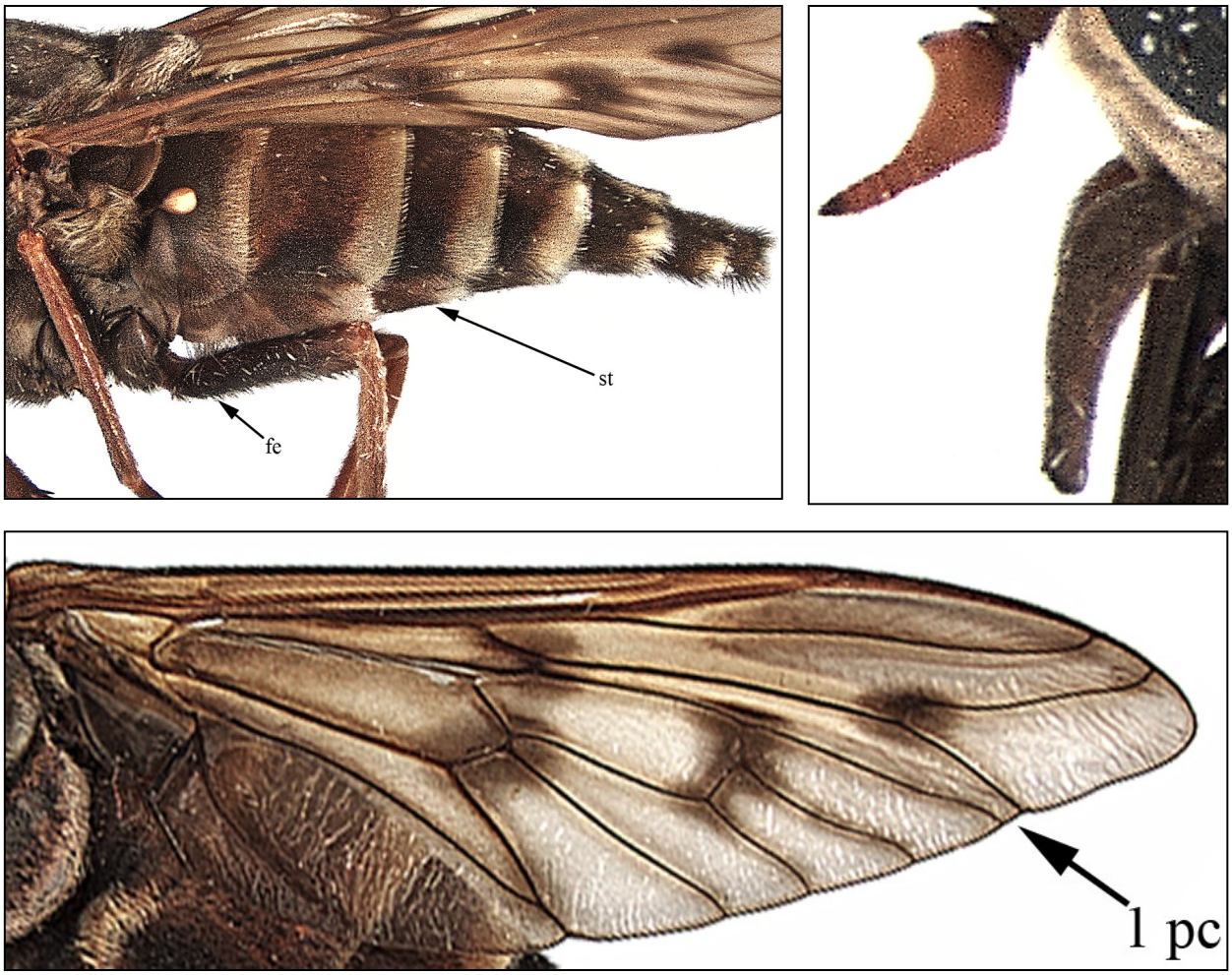
Neither specimen matches the putative characters for the species.



As *Tabanus cheliopterus fronto* identified by L.L. Pechuman

Ventral view of abdomen (sternites) and palpus of specimen from Highlands Co., FL identified by L.L. Pechuman as *Tabanus cheliopterus fronto.*

Note the sternites are relatively unicolorous red; certainly not “strikingly banded”. 1st posterior cell (1 pc) closed at margin. Legs more brown than black.



as *Tabanus cheliopterus* in FSCA

Note the sternites (st) appear to be banded, dark anteriorly and pale posteriorly. Femur (fe) black. 1st posterior cell (1 pc) narrowed but open at margin.

Summary:
One dark specimen in FSCA fits description for *T. fronto* but identified as *T. cheliopterus*; one pale specimen identified, by L.L. Pechuman, as *T. cheliopterus fronto* possesses characteristics of both taxa, *i.e*., pale sternites, pale palpus (= *cheliopterus*), 1st posterior cell closed (= *fronto*). As we are unable to unequivocally separate these two taxa (if indeed they are separate) we refer to them as the *Tabanus cheliopterus-fronto* complex.

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Subfamilies and genera plate

SF: **Pangoniinae**

Asaphomyia

SF**: Chrysopsinae**

Merycomyia

Chrysops

SF: **Tabaninae**

Agkistrocerus

Anacimas

Chlorotabanus

Diachlorus

Haematopota

Hamatabanus

Hybomitra

Leucotabanus

Microtabanus

Stenotabanus (*Aegialomyia*)

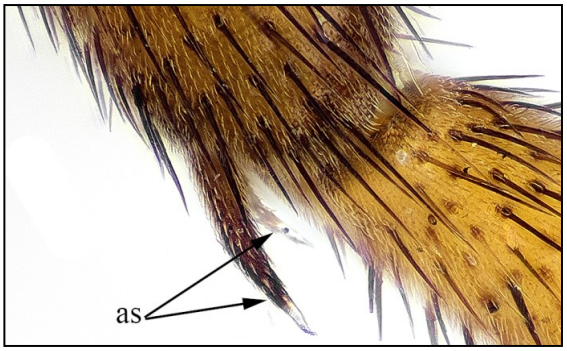
Tabanus

Whitneyomyia

Key to Subfamilies and Genera
Species in all three North American subfamilies, Pangoniinae, Chrysopsinae, Tabaninae, are found in Florida.

1 Hind tibia with two apical spurs (as). Three ocelli (oc) on vertex ....subfamily **Pangoniinae,** subfamily **Chrysopsinae 2**

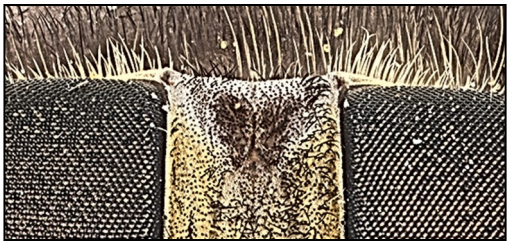
-- Hind tibia lacking spurs. No ocelli. (A single distinct ocellar tubercle in *Leucotabanus* and *Hybomitra*, and very weak indications of a single ocellar tubercle in one *Hamatabanus* and *Microtabanus*) .....subfamily Tabaninae 4



Chrysopsinae (*Chrysops*) showing location of apical spurs (as) on hind tibia

Chrysopsinae (*Chrysops*) showing location of 3 ocelli (oc) on vertex.

Tabaninae (*Tabanus*), no ocelli on vertex.

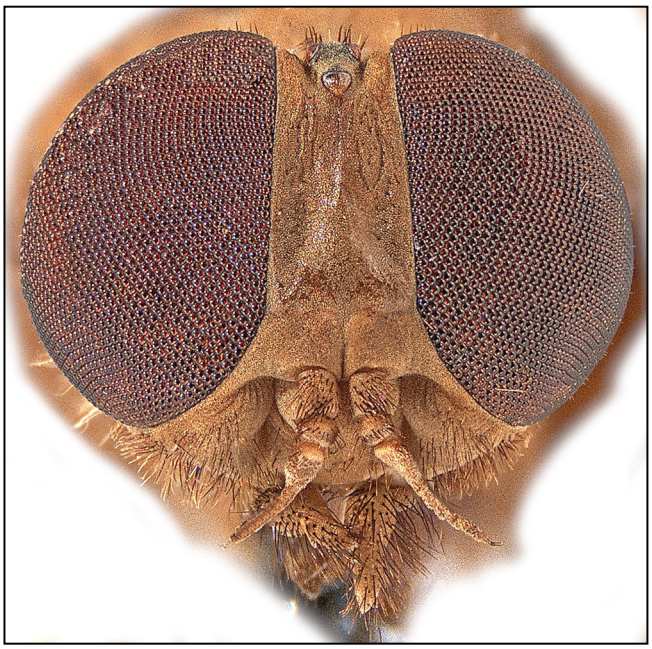


Tabaninae (*Hybomitra*), no ocelli but an ocellar tubercle

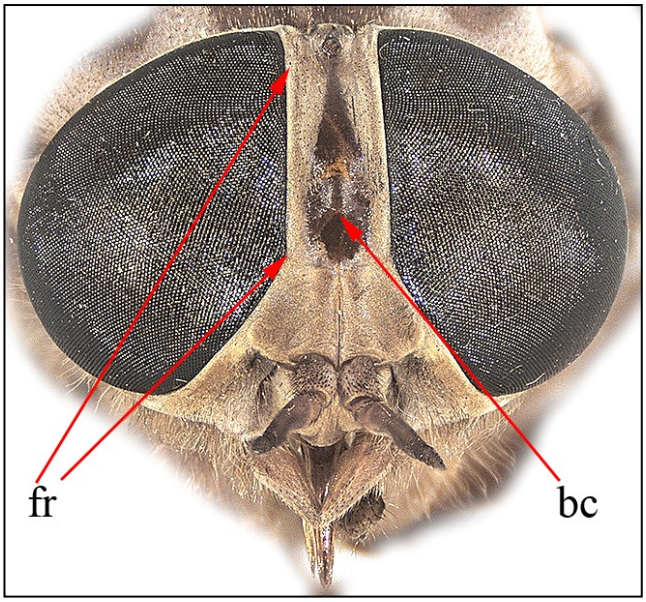
(continued)	**Key to subfamilies and genera**

2(1) Frons entirely pollinose [1 species] .....subfamily: **Pangoniinae** *Asaphomyia floridensis*

-- Frons (fr) with a distinct basal callus (bc) .....subfamily: **Chrysopsinae 3**



Pangoniinae
Asaphomyia floridensis

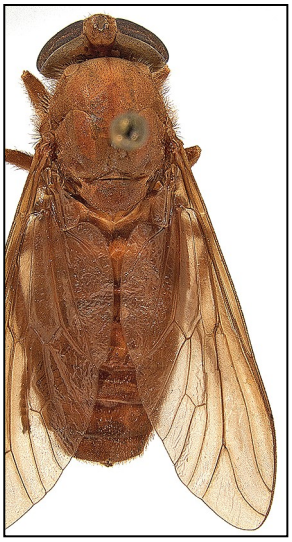


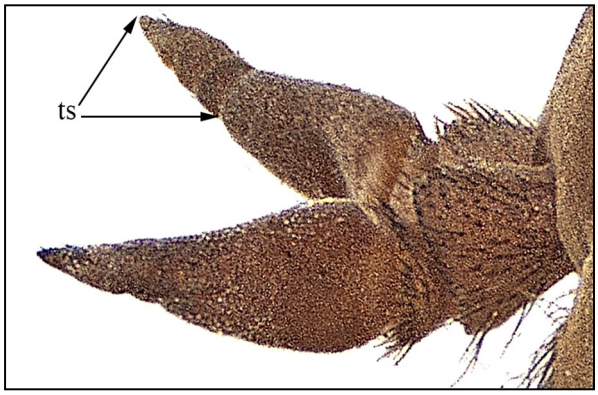
Chrysopsinae
Merycomyia *Chrysops*

(continued) **Key to subfamilies and genera**

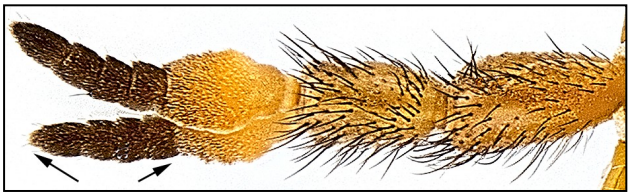
3(2) Species 12 mm or greater in length. Antenna style (ts) with two or three annuli. (2 species) ..... *Merycomyia*

-- Species less than 12 mm. Style with four annuli (40+ species) ..... *Chrysops*





Merycomyia



also see page 11 for antennae shapes

Chrysops

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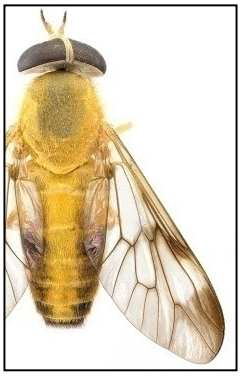
(continued)	**Key to subfamilies and genera**

Subfamily Tabaninae, includes *Agkistrocerus, Anacimas, Chlorotabanus, Diachlorus, Haematopota, Hamatabanus, Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia), Tabanus, and Whitneyomyia.* Each genus is well defined and keys out in a single couplet, except for *Hamatabanus* (4 species) which requires three couplets. Burger (1995) commented "*Unfortunately, all of the features used to define Hamatabanus also occur in other genera, but not in combination, and a thorough study of the species in this genus is needed*." *Hamatabanus annularis* and *H. carolinensis* key out in one couplet; *H. exilipalpis* was transferred from *Tabanus* by Burger (1995) and keys out in one couplet; *H. floridensis* was transferred from *Stenotabanus* by Burger (1995) and keys out in one couplet.

Agkistrocerus

Anacimas

Chlorotabanus



Diachlorus

Haematopota

Hamatabanus

Hybomitra

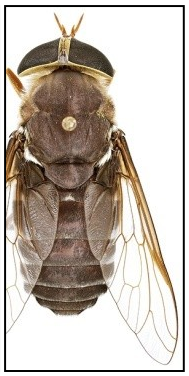
Leucotabanus

Microtabanus

Stenotabanus (*Aegialomyia*)

Tabanus

Tabanus



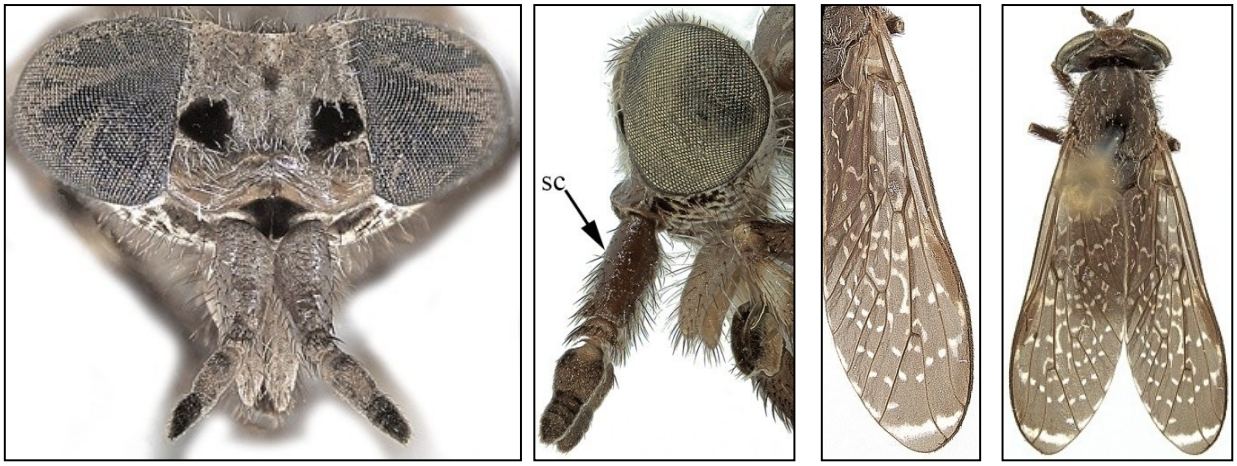
Tabanus

Whitneyomyia

(continued) **Key to subfamilies and genera**

4(1) Frons, at base, wider than eye width and narrower at vertex. Scape (sc) as wide as deep (round in cross section), and significantly longer than deep. Wing pattern composed of gray and white maculations ..... *Haematopota punctulata*

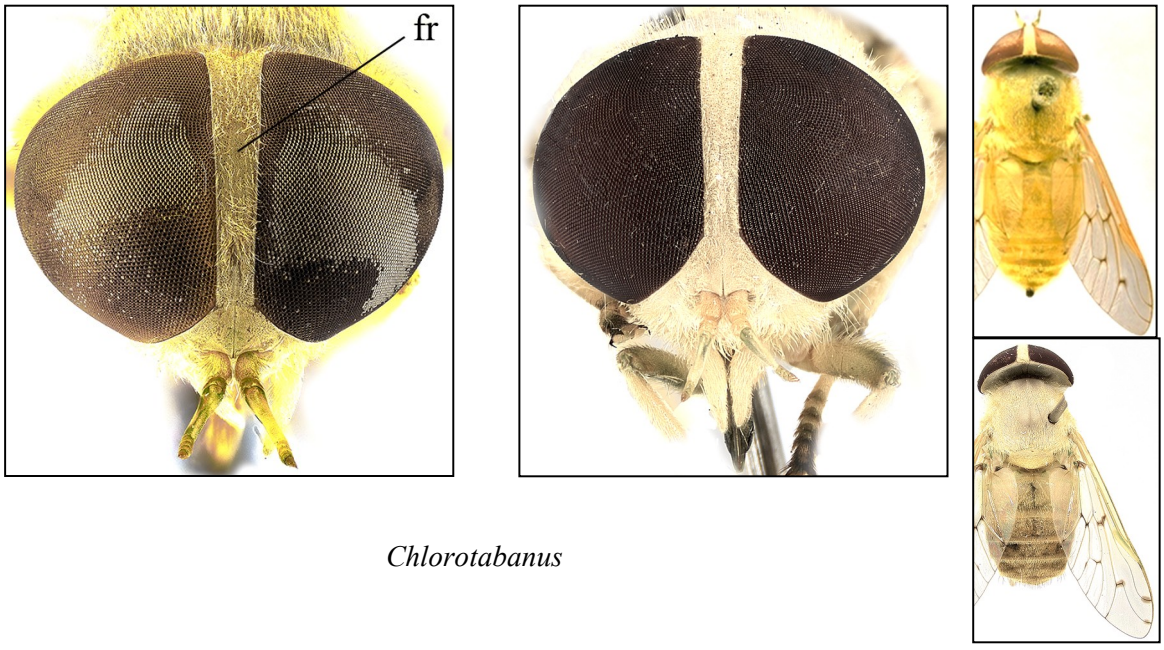
-- Frons less wide than eye, parallel-sided or wider at apex. Scape deeper than wide (laterally flattened), and barely longer than deep. Wing markings not matching the above [*Agkistrocerus, Anacimas, Chlorotabanus, Diachlorus, Hamatabanus, Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia*), *Tabanus, Whitneyomyia*] **5**



Haematopota punctulata showing wide frons; long scape (sc), about 2-2.5 x as long as deep; and distinctive wing pattern.

5(4) Frons (fr) lacking calli, totally covered with hair (2 species) ..... *Chlorotabanus*

-- Frons with at least a basal callus and usually with a median callus [*Agkistrocerus, Anacimas, Diachlorus, Hamatabanus, Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia*), *Tabanus, Whitneyomyia*] **6**



Chlorotabanus

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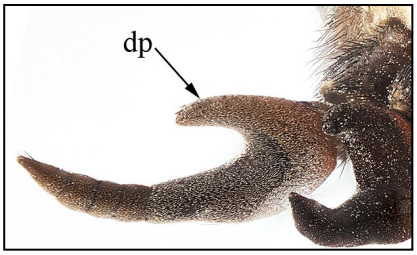
(continued)	**Key to subfamilies and genera**

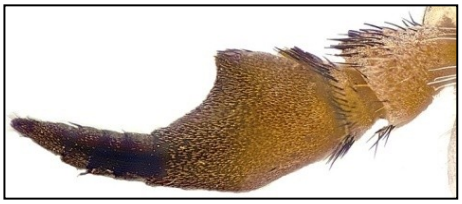
6(5) Basal plate of third antennal segment with a long dorsal forward-projection process (dp). Antenna not totally orange or not totally black [*Agkistrocerus, Hamatabanus* (in part)] **7**

-- Basal plate without such a long process (some *Tabanus* have a shorter process but antenna either totally orange or totally black) **8**



Agkistrocerus

Hamatabanus

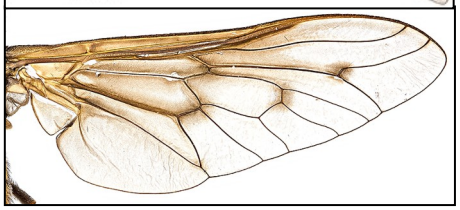


couplet 6--

couplet 6 -- some *Tabanus* spp.

7(6) Wing spotted. Body length 15-30 mm (2 species) .....*Agkistrocerus*

-- Wing entirely hyaline. Body length 10-17 mm (in part, 2 species) .....*Hamatabanus*



Agkistrocerus

Hamatabanus annularis

Hamatabanus carolinensis

(continued) **Key to subfamilies and genera**

8(6) Mesonotum and scutellum with bright yellow hair. Abdomen dorsally with a wide middorsal yellow stripe. Wing as figured .....*Diachlorus ferrugatus*

-- Not with the above combination of characters [*Anacimas, Hamatabanus* (in part), *Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia*), *Tabanus, Whitneyomyia*] **9**

Diachlorus ferrugatus

Anacimas

Hamatabanus

Hybomitra

Leucotabanus

Microtabanus

Stenotabanus (*Aegialomyia*)

Tabanus

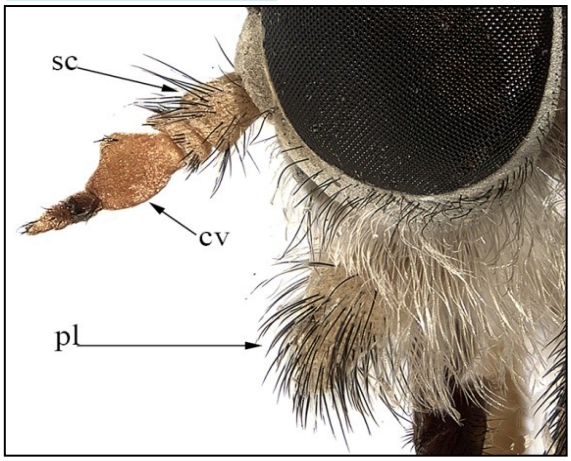
Whitneyomyia

9(8) Antenna scape (sc) and palpus (pl) with long erect black hair. Antenna basal plate ventrally convex (cv) distally. Small, length 13 mm, stout brown fly (images next page) .....*Anacimas limbellatus*

-- No long erect black hair on antenna or palpus. If basal plate convex ventrally (*Microtabanus*) it is over entire length [*Hamatabanus* (in part), *Hybomitra, Leucotabanus, Microtabanus, Stenotabanus* (*Aegialomyia*), *Tabanus, Whitneyomyia*] **10**

(continued) **Key to subfamilies and genera**

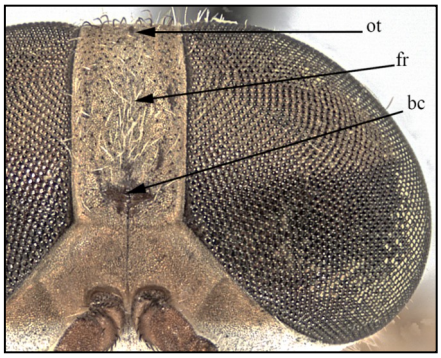
couplet 9 continued

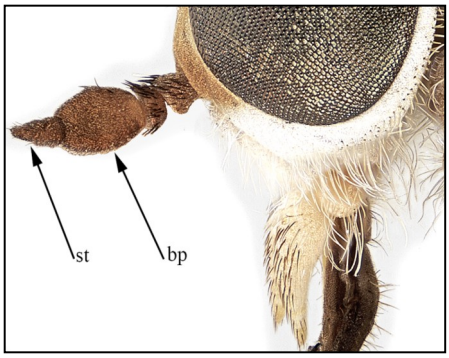


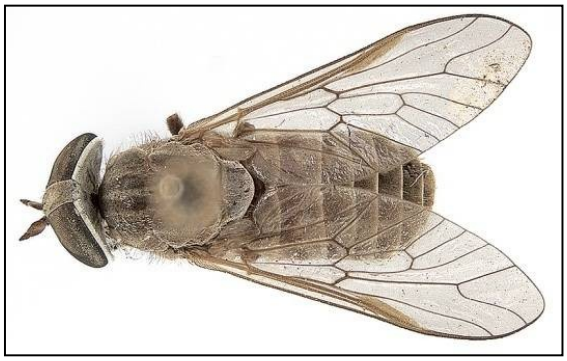
Anacimas limbellatus

10(9) Basal plate (bp) of antenna oval, only slightly longer than deep; stylus (st) very short with only three annuli. Frons (fr) dark brown, almost 3x as high as wide and almost parallel-sided. No median callus. Basal callus (bc) small, sometimes entirely covered with pollen. Rarely a small ocellar tubercle (ot) at vertex. A small brownish species, length 7-9 mm .....*Microtabanus pygmaeus*

-- Basal plate of antenna much longer than deep, stylus with four annuli. Median callus present. Basal callus large [*Hamatabanus* (in part)*, Hybomitra, Leucotabanus, Stenotabanus* (*Aegialomyia*)*, Tabanus, Whitneyomyia*] **11**





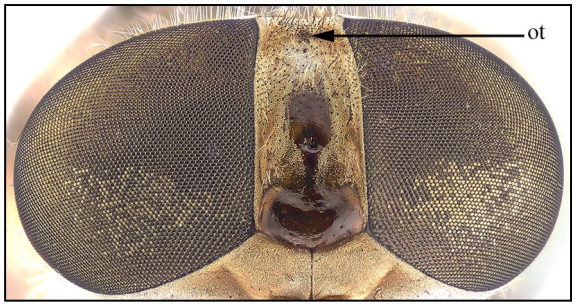


Microtabanus pygmaeus

(continued)	**Key to subfamilies and genera**

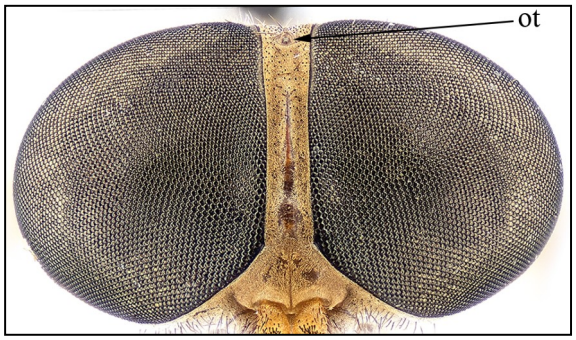
11(10) Vertex with a distinct ocellar tubercle [*Hamatabanus* (in part), *Hybomitra, Leucotabanus*] **12**

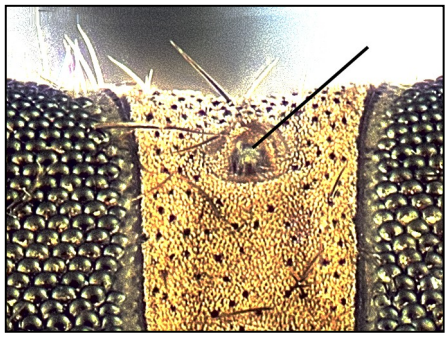
-- Vertex without an ocellar tubercle [*Hamatabanus* (in part), *Stenotabanus* (*Aegialomyia*), *Tabanus, Whitneyomyia*] **14**



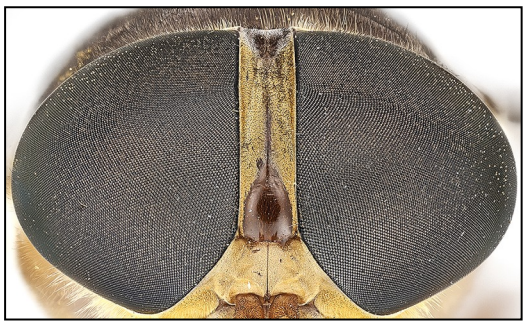
Hamatabanus floridensis

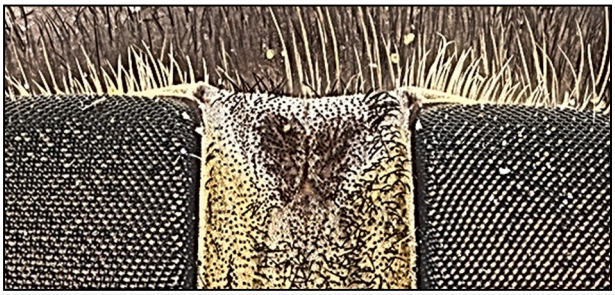
Hybomitra





Leucotabanus annulatus





couplet 11--, e.g., *Tabanus*

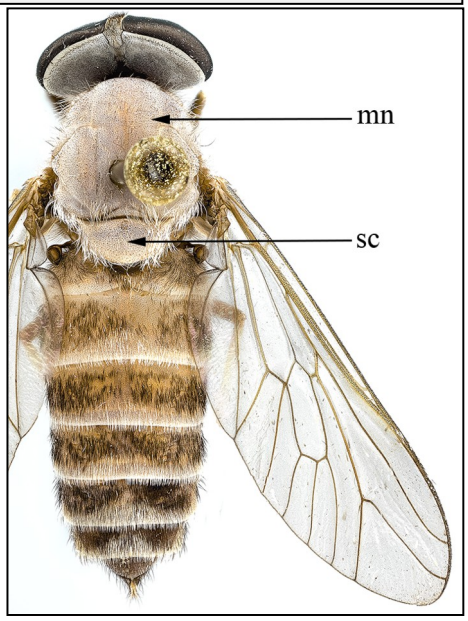
(continued) **Key to subfamilies and genera**

12(11) Mesonotum (mn) and scutellum (sc) pale with white hair .....*Leucotabanus annulatus*

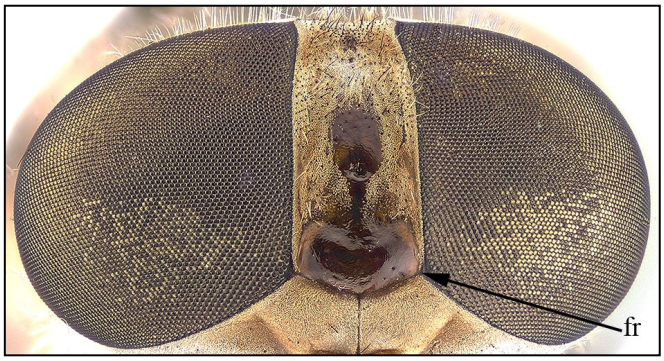
-- Entire thorax dark [*Hamatabanus floridensis*, *Hybomitra* (4 species)] **13**

13(12) Frons (fr) widened below, narrower at vertex (1 species) .....*Hamatabanus floridensis*

-- Frons not widened below, parallel-sided or wider at vertex (vt) (4 species) .....*Hybomitra*



Leucotabanus annulatus



Hamatabanus floridensis

Hybomitra

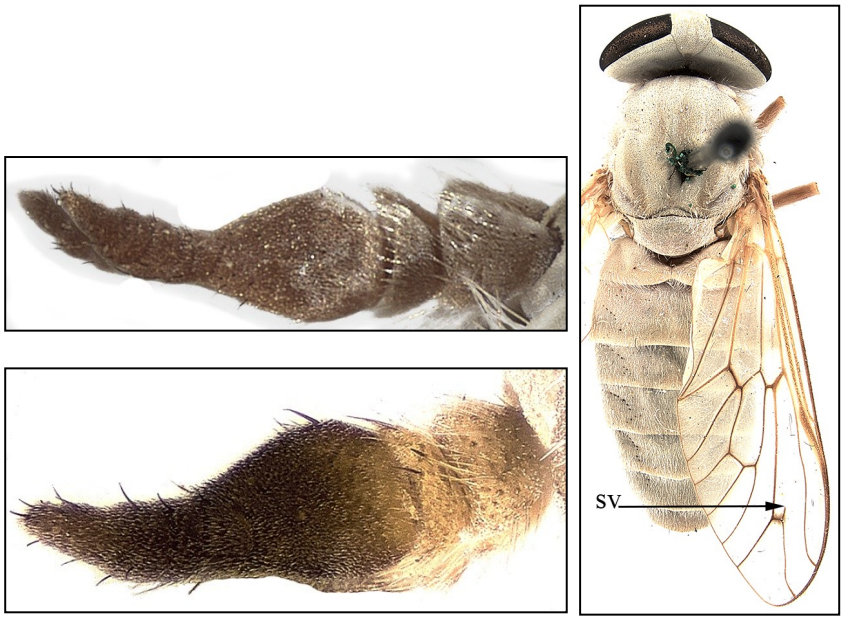
Hamatabanus floridensis

Hybomitra

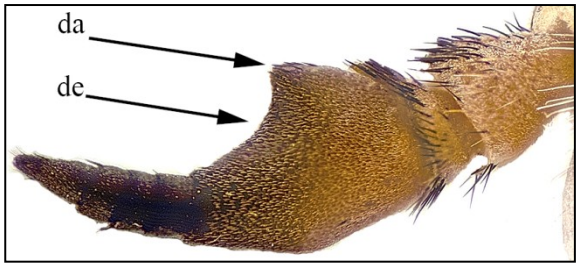
(continued) **Key to subfamilies and genera**

14(11) Almost no dorsal angle and no dorsal excision on the basal plate of antenna. Spur vein (sv) present at wing fork (2 species) .....*Stenotabanus* (*Aegialomyia*)

-- Dorsal angle (da) of antenna basal plate and dorsal excision (de) distinct when spur vein present, otherwise fork without spur vein [*Hamatabanus* (in part), *Tabanus, Whitneyomyia*] **15**



Stenotabanus (*Aegialomyia*)



couplet 14--

15(14) General appearance is all black, including wing. Basal callus (bc) and subcallus (sc) greatly swollen, protruding and shiny (especially obvious in profile view of head). Gena (gn) completely denuded and shiny, (1 species + 1 subspecies, images next page) .....*Whitneyomyia beatifica*

-- General appearance is not all black, except for two species of *Tabanus*. In the two similar black *Tabanus* species the basal calli and subcalli are not swollen and do not protrude. Gena never completely denuded, always sparsely or fully pollinose [*Hamatabanus* (in part), *Stenotabanus* (*Aegialomyia*), *Tabanus*] **16**

(continued) **Key to subfamilies and genera**

couplet 15

couplet 15--

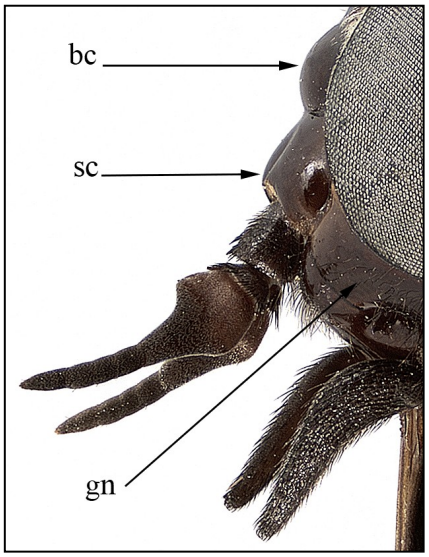
Whitneyomyia beatifica

Whitneyomyia beatifica atricorpus

aranti

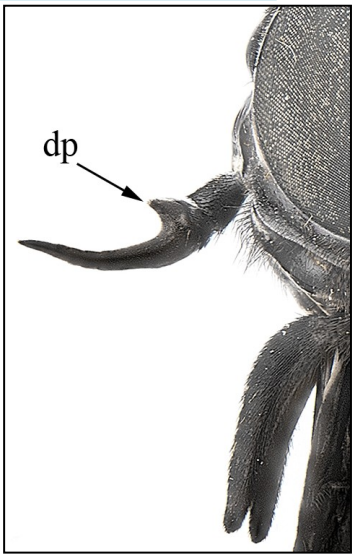
atratus

the 2 black *Tabanus* species



Whitneyomyia

aranti



atratus

note the protruding basal callus (bc) and protruding subcallus (sc) in *Whitneyomyia*

calli not protruding in *Tabanus aranti* and *Tabanus atratus;* also, *T. atratus* has a dorsal projection (dp) on the antenna basal plate (lacking in *Whitneyomyia)*

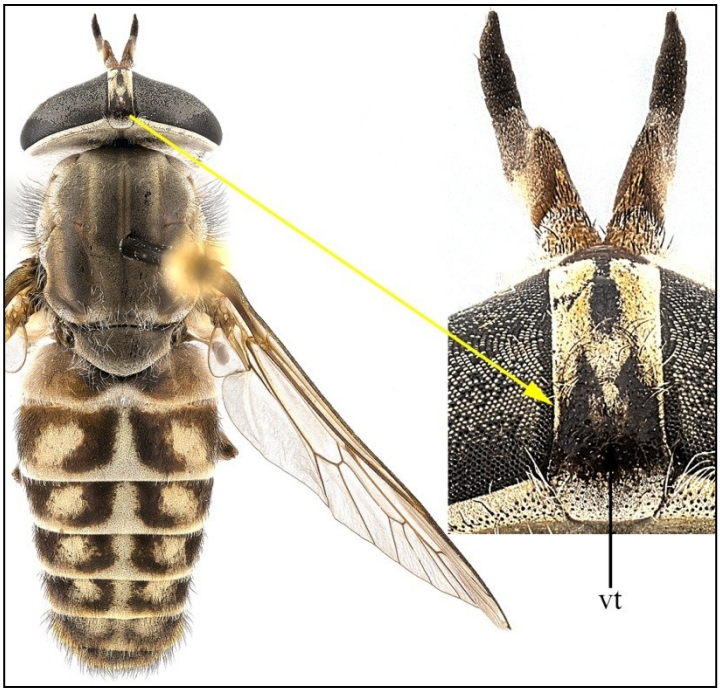
16(15) At vertex (vt) a flat shiny area which extends downwards as shiny acute triangles. Abdomen with a pale middorsal stripe composed of triangles, and roundish sublateral pale spots. Frons yellowish brown, darkened at level of median callus (mc). Small, length 11 mm, dark brownish ..... *Hamatabanus exilipalpis*

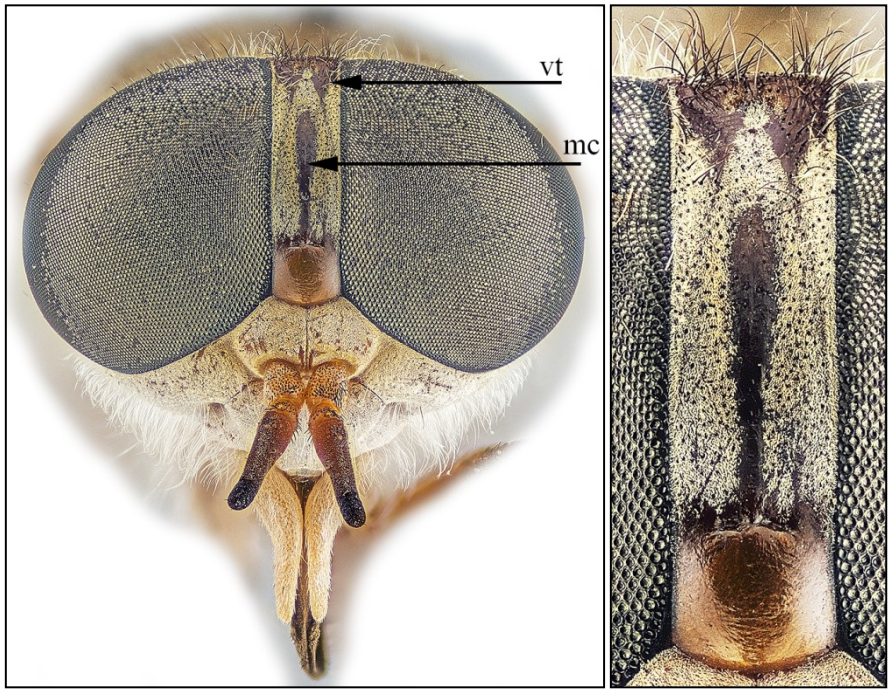
-- No Florida *Tabanus* has this pattern on the vertex. Not with the above combination of characters. The most speciose genus of Florida Tabanidae ..... *Tabanus*

(continued)	**Key to subfamilies and genera**

couplet 16

Previously *Tabanus exilipalpis* Stone, 1938. Transferred to *Hamatabanus exilipalpis* (Burger, 1995) who further commented " *Hamatabanus exilipalpis* is most problematic." We believe he was referring to the correct placement (genus) for this taxon.





Hamatabanus exilipalpis

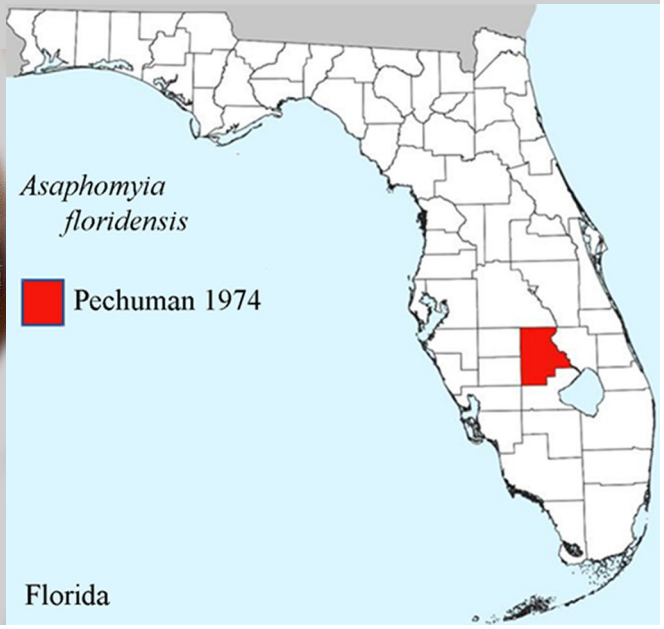
Keys to species, followed by species pages

Asaphomyia: one species in Florida **Pangoniinae**

Asaphomyia floridensis Pechuman female

male

length ♀ 11 mm



(continued)	**Keys to species, followed by species pages**

(continued)

Asaphomyia floridensis Pechuman male

(continued)	**Keys to species, followed by species pages**

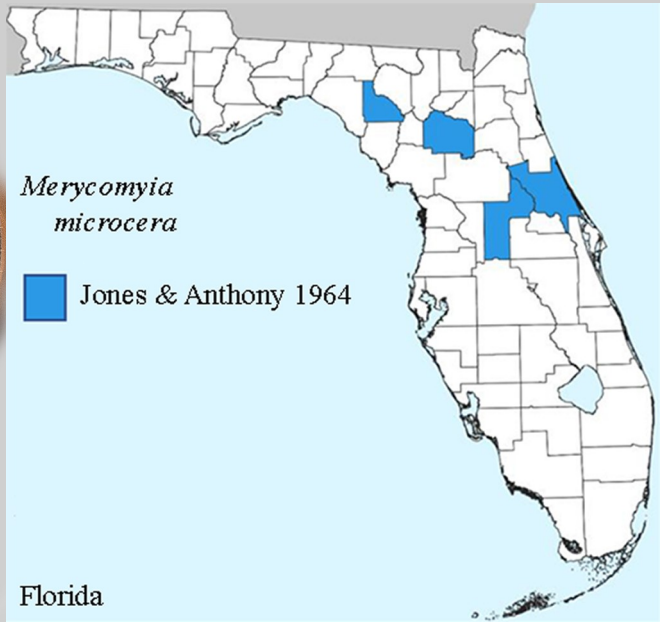
Merycomyia: two species in Florida **Chrysopsinae**

1 Entire body uniformly brown .....*microcera*

-- Abdomen with large white patches laterally on at least tergites 4 and 5 .....*whitneyi*

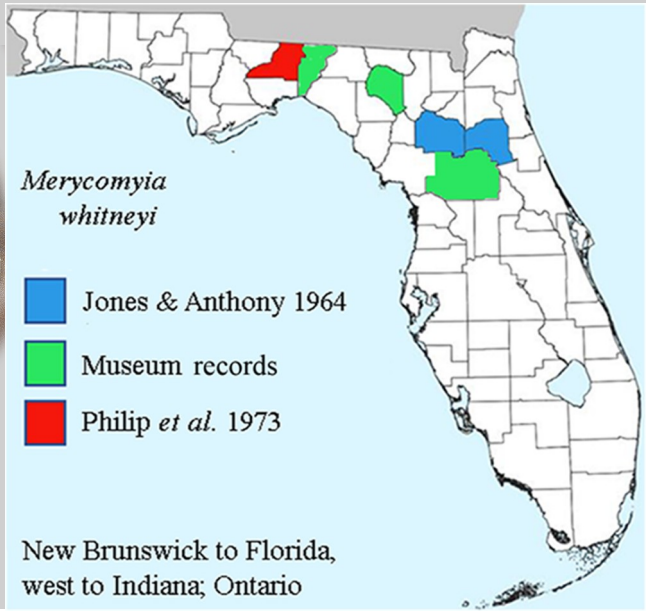
Merycomyia microcera (Walker)

length ♀ 12 mm



(continued)	**Keys to species, followed by species pages**

Merycomyia whitneyi (Johnson)



(continued)	**Keys to species, followed by species pages**

(continued) ***Merycomyia whitneyi*** (Johnson)

identification plate 1	***Chrysops* wings**	**Chrysopsinae**

species A, undescribed

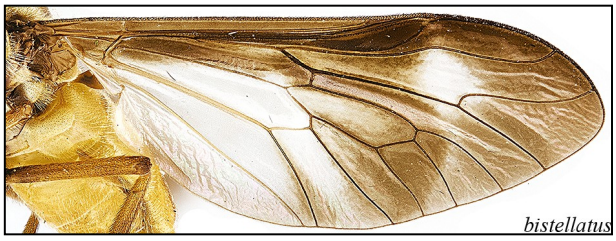
abatus

amazon

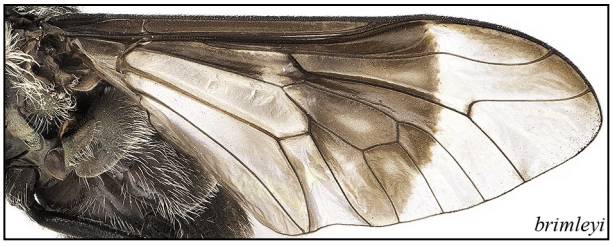
atlanticus

species B, undescribed

beameri

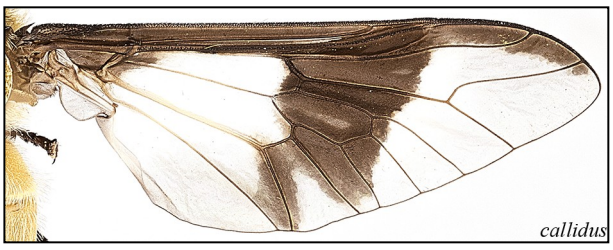


bistellatus



brimleyi

brunneus



callidus

identification plate 1 (continued) | ***Chrysops* wings** | **Chrysopsinae**

carbonarius

celatus

cincticornis

cincticornis nigropterus

cursim

dacne

dimmocki

divisus

dixianus

dorsopunctus

identification plate 1 (continued) | ***Chrysops* wings** | **Chrysopsinae**

dorsovittatus

flavidus

floridanus

fuliginosus

fulvistigma

geminatus

hinei

hyalinus

ifasi

impunctus

identification plate 1 (continued) | ***Chrysops* wings** | **Chrysopsinae**

macquarti

moechus

montanus

niger

nigribimbo

obsoletus

parvulus

pikei

pudicus

reicherti

identification plate 1 (continued) | ***Chrysops* wings** | **Chrysopsinae**

sandyi

tidwelli

tumidicornis

univittatus

upsilon

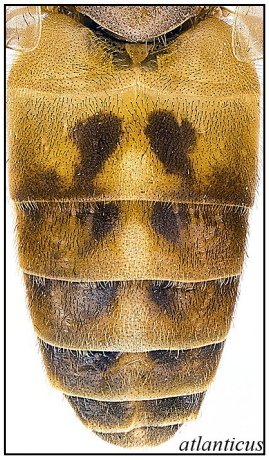
vittatus

identification plate 2	***Chrysops* abdomens**	**Chrysopsinae**

species A, undescribed

abatus

amazon



atlanticus

species B, undescribed

beameri

bistellatus

brimleyi

brunneus

callidus

carbonarius

celatus

identification plate 2 (continued) ***Chrysops* abdomens** **Chrysopsinae**

cincticornis &
cincticornis nigropterus

cursim

dacne

dimmocki

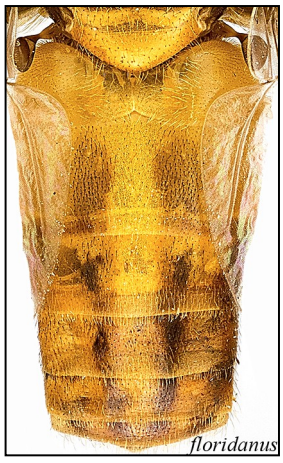
divisus

dixianus

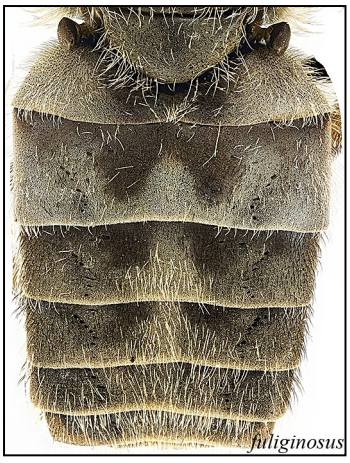
dorsopunctus

dorsovittatus

flavidus



floridanus



fuliginosus

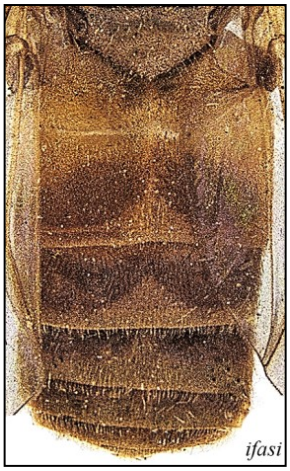
fulvistigma

identification plate 2 (continued) ***Chrysops* abdomens** **Chrysopsinae**

geminatus

hinei

hyalinus



ifasi

macquarti

moechus

montanus

niger

nigribimbo

obsoletus

parvulus

pikei

identification plate 2 (continued) ***Chrysops* abdomens** **Chrysopsinae**

pudicus

reicherti

tidwelli

tumidicornis

univittatus

upsilon

vittatus

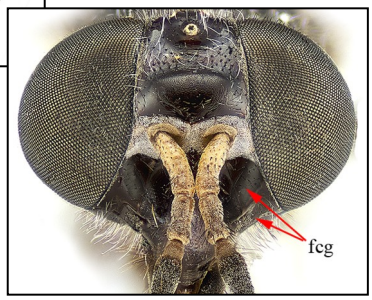
impunctus

sandyi

***Chrysops*, key to females, followed by species pages**	**Chrysopsinae**

1 Wing hyaline, no infuscation. Face below region of antennal sockets (frontoclypeus and gena, fcg), glossy black ..... *hyalinus*

-- Wing with infuscation, a crossband (cb), with or without an apical spot (as); infuscation sometimes very faint. Face below antennal sockets never completely black **2**

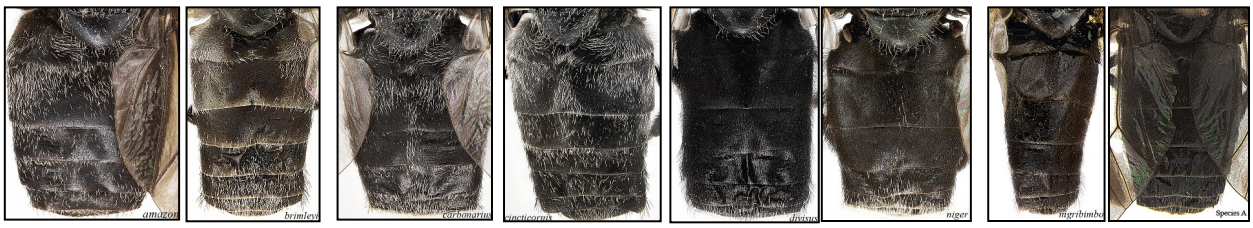


hyalinus

couplet 1--

2(1) Abdomen integument entirely black dorsally, may be patches of pale hairs [*amazon, brimleyi, carbonarius, cincticornis, cincticornis nigropterus, divisus, niger, nigribimbo,* species A (undescribed)] **3**

-- Abdomen not entirely black [majority of species] **11**



couplet 2

(continued) **_Chrysops_, key to females**

3(2) Wing crossband black, no apical spot [*carbonarius, cincticornis, cincticornis nigropterus, divisus, niger,* species A (undescribed)] **4**

-- Wing crossband very pale OR if black with an obvious apical spot [*amazon, brimleyi, nigribimbo*] **9**

carbonarius *cincticornis* *cincticornis nigropterus*

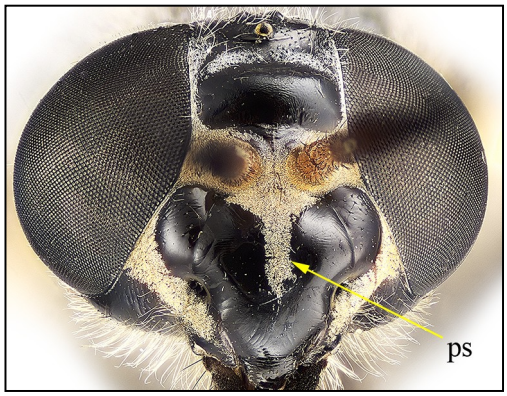
divisus *niger* A, undescribed

NB: black wing infuscation tends to fade to red, over time, in museum specimens

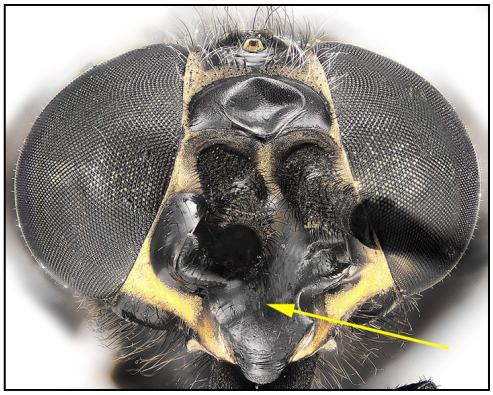
amazon *brimleyi* *nigribimbo*

4(3) Face with a median pollinose stripe (ps) [*carbonarius, cincticornis, cincticornis nigropterus*] **5**

-- Face lacking median pollinose stripe [*divisus, niger,* species A (undescribed)].....**7**



couplet 4

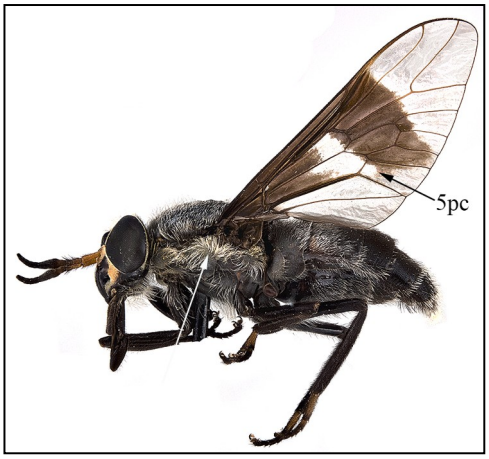


couplet 4--

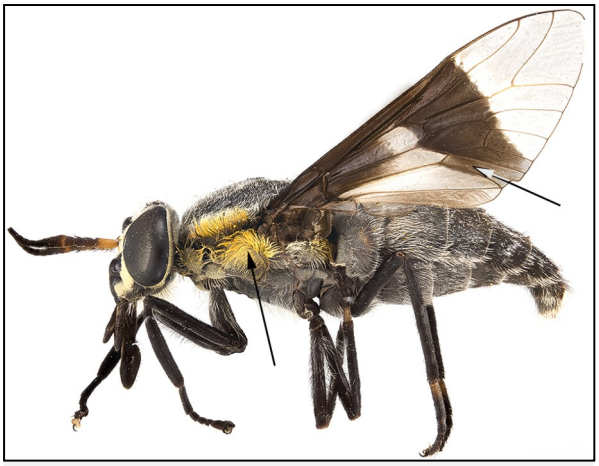
(continued) **_Chrysops_, key to females**

5(4) Sides of thorax with pale yellow or white hairs. 5th posterior cell (5pc) with a hyaline spot at base ..... *carbonarius*

-- Sides of thorax with dense tufts of orange hairs. 5th posterior cell infuscated throughout **6**



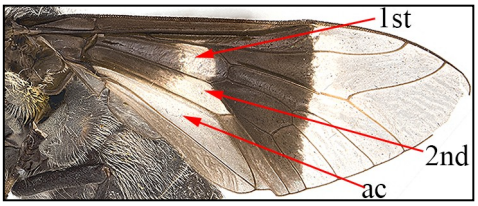
carbonarius



cincticornis

6(5) Wing first (1st) and second (2nd) basal cells about two-thirds infuscated; anal cell (ac) hyaline ..... *cincticornis*

-- Wing more infuscated, 1st and 2nd basal cells about three-quarters infuscated; anal cell infuscated at base ..... *cincticornis nigropterus*



cincticornis

cincticornis nigropterus

7(4) Entire basal two-thirds of wing completely infuscated ..... *divisus*

-- Basal two-thirds of wing not completely infuscated [*niger;* species A (undescribed)] **8**

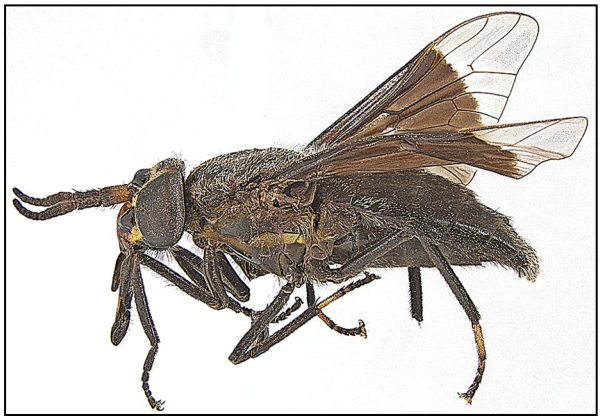
divisus

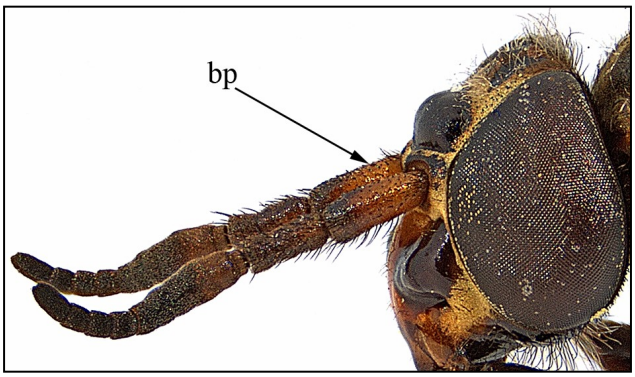
couplet 7--

(continued)	***Chrysops*, key to females**

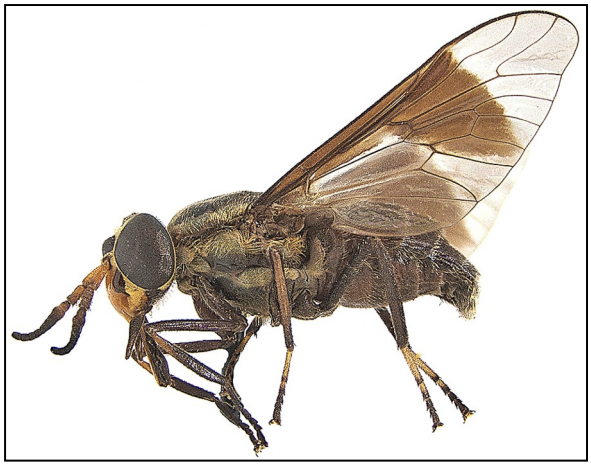
8(7) Basal portion of scape (bp) orange. Legs mostly black, mid tarsus and hind tarsus yellow. Back of vertex with a pollinose band separating the dorsal glossy area from the ventral glossy triangle ..... *niger*

-- Antenna scape and pedicel yellow. Mid tibia orange. Back of vertex lacking such a pollinose band, entire surface glossy ..... species A, undescribed

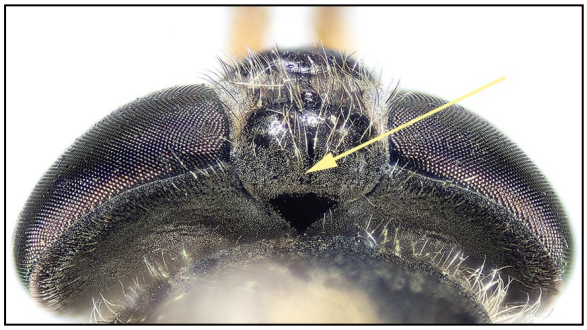




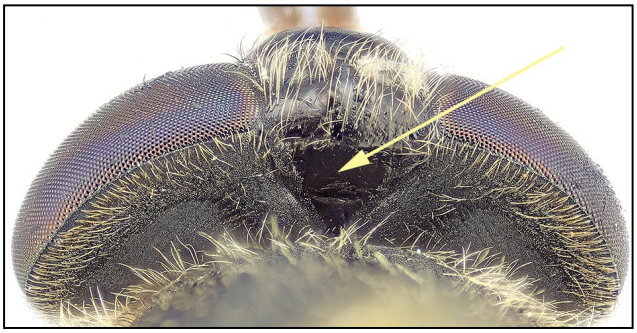
niger [in FSCA collection as *Chrysops niger taylori*]



species A, undescribed [in FSCA collection as "*calvus* – Fla. form"]



niger



species A, undescribed

(continued) **_Chrysops_, key to females**

9(3) Tuft of bright yellow-orange hairs on side of thorax ..... *amazon*

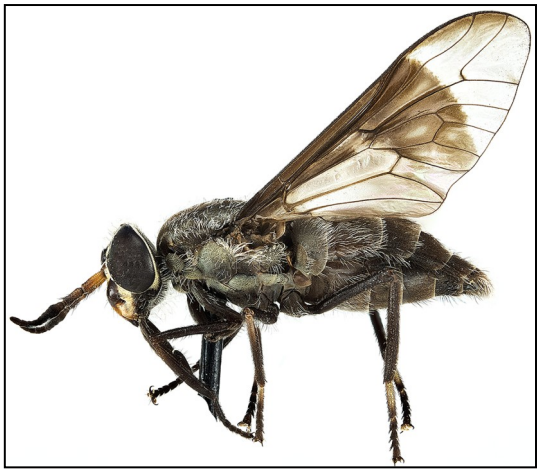
-- Thoracic hairs white [*brimleyi, nigribimbo*] **10**

amazon

couplet 9--

10(9) Wing infuscation dark ..... *brimleyi*

-- Wing infuscation very pale ..... *nigribimbo*



brimleyi

nigribimbo

11(2) Wing infuscation very weak; crossband narrow and inconspicuous [*dorsopunctus, fulvistigma*] **12**

-- Wing infuscation more saturated, crossband conspicuous [many species] **13**

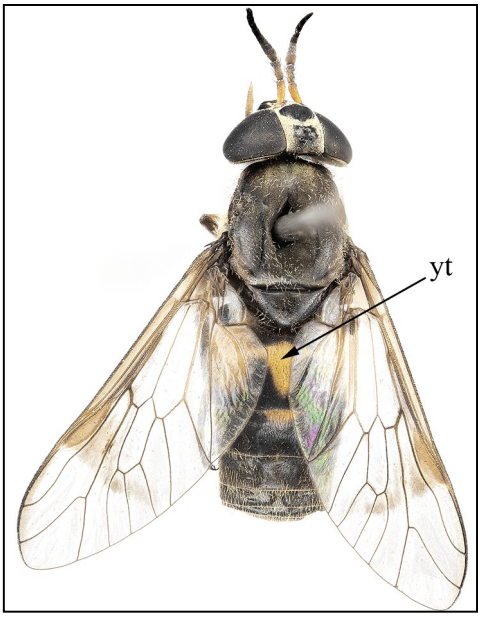
couplet 11

couplet 11--

(continued) **_Chrysops_, key to females**

12(11) A black and yellow fly. Median inverted yellow triangle (yt) on tergite 2 bordered laterally by two black triangles .....*fulvistigma*

-- A brown and orange fly. Median figure on tergite 2 a dark brown solid truncated triangle bordered laterally by orange-brown patches .....*dorsopunctus*



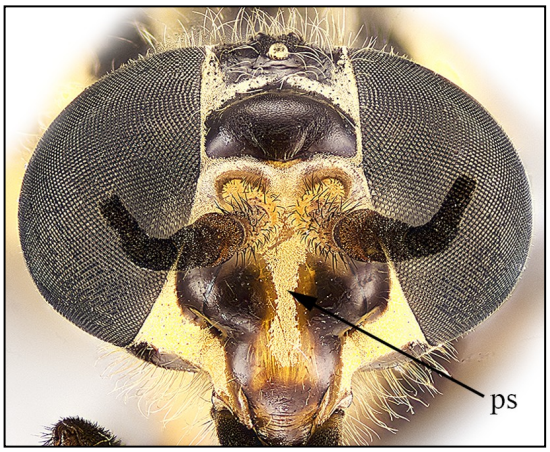
fulvistigma

dorsopunctus

13(11) Face with a median pollinose stripe (ps); 'T-shaped' in *upsilon* [*abatus, dorsovittatus, upsilon*] **14**

-- Face lacking median pollinose stripe [majority of Florida *Chrysops*] **16**

abatus



dorsovittatus

couplet 13--

(continued) **_Chrysops_, key to females**

14(13) Abdomen middorsal stripe yellow .....*upsilon*

-- Middorsal stripe black [*abatus, dorsovittatus*] **15**

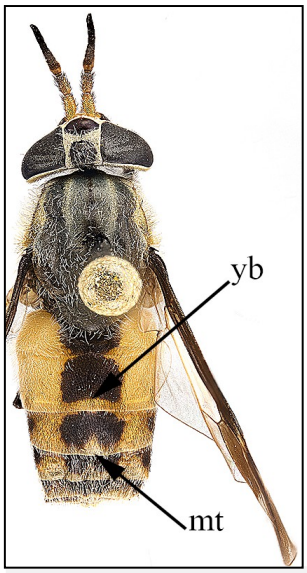
upsilon

upsilon
T-shaped frontal stripe

15(14) Abdomen middorsal black stripe complete, uninterrupted. Apex (ap) of hyaline triangle narrow. Lateral thoracic stripes (ts) bright contrasting black and yellow. Fore coxa (fc) bright yellow .....*dorsovittatus*

-- Middorsal black stripe incomplete, interrupted at posterior border of each tergite by a yellow band (yb) which often extends anteriorly to form a small median triangle (mt). Apex of hyaline triangle broader. Lateral thoracic stripes duller. Fore coxa variable, dull yellow and brown or black .....*abatus*

dorsovittatus



abatus

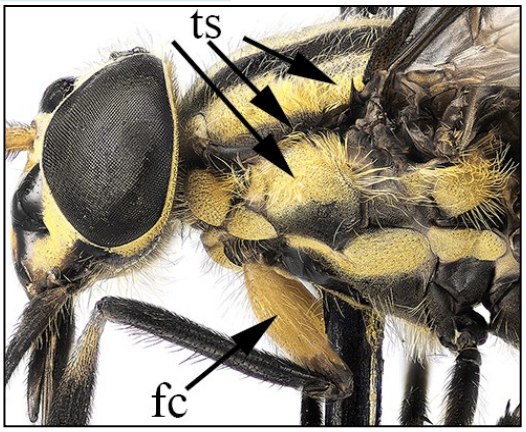
top: *dorsovittatus*

bottom: *abatus*

thorax

(continued) **_Chrysops_, key to females**

couplet 15 continued



dorsovittatus

note bright yellow thoracic stripes (ts)
and bright yellow fore coxa (fc)

abatus

16(13) Fork (f) of wing with a spot that is darker than the immediate surrounding area [*fuliginosus,* species B (undescribed)] **17**

-- Area of wing adjacent to fork either hyaline or infuscated but no dark spot at fork **18**

fuliginosus

species B, undescribed

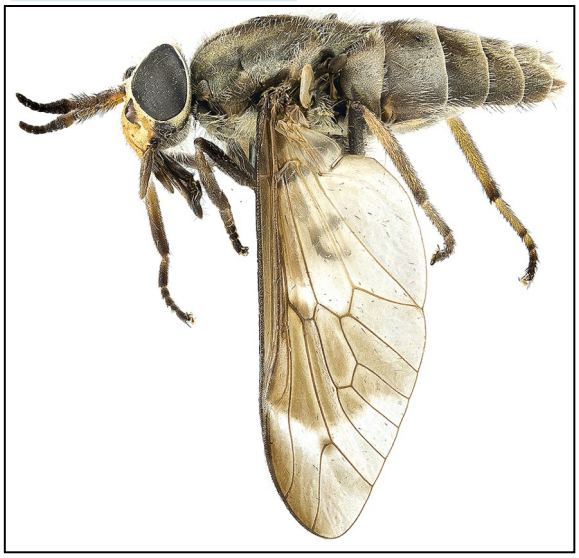
couplet 16--

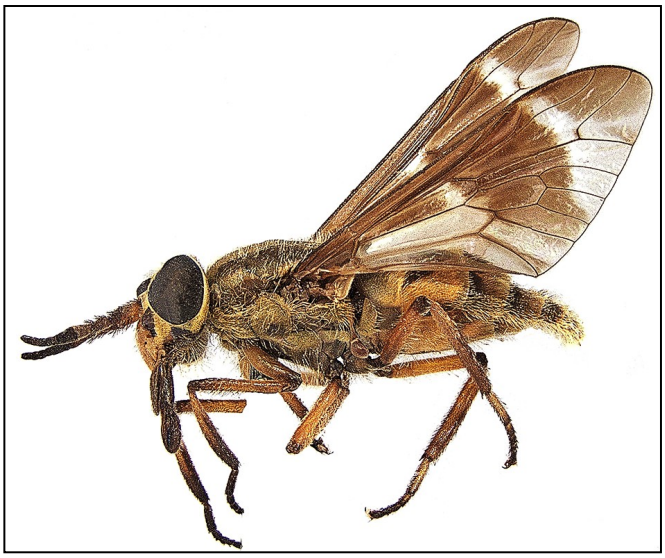
17(16) Entire fly a mixture of light and dark gray including wing infuscation. Coastal (images next page) .....*fuliginosus*

-- Mostly brown but with orange patches laterally on tergites 1 and 2. Inland (images next page) .....species B, undescribed

(continued) **_Chrysops_, key to females**

couplet 17 continued





fuliginosus

species B, undescribed

in the FSCA as "inland form of *C. fuliginosus*"

18(16) Abdomen with a wide continuous middorsal yellow stripe [*beameri, bistellatus, floridanus, hinei, macquarti, moechus, pikei, univittatus, vittatus*] **19**

Abdomen without a continuous middorsal yellow stripe [*atlanticus, brunneus, callidus, celatus, cursim, dacne, dimmocki, dixianus, flavidus, geminatus, ifasi, montanus, obsoletus, parvulus, pudicus, reicherti, tidwelli, tumidicornis, impunctus, sandyi*] **27**

couplet 18, example

all couplet 18 and 18-- images

couplet 18--, example

(continued) **_Chrysops_, key to females**

beameri

bistellatus

floridanus

hinei

macquarti,

moechus

pikei

univittatus

vittatus

couplet 18

atlanticus

brunneus

callidus

celatus

cursim

dacne

dimmocki

dixianus

flavidus

geminatus

ifasi

impunctus

montanus

obsoletus

parvulus

pudicus

reicherti

sandyi

tidwelli

tumidicornis

couplet 18--

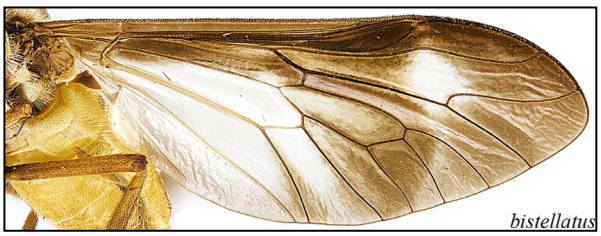
(continued) ***Chrysops*, key to females**

19(18) Wing first basal cell (1st bc) hyaline .....*univittatus*

-- Wing first basal cell mostly infuscated [*beameri, bistellatus, floridanus, hinei, macquarti, moechus, pikei, vittatus*] **20**

univittatus

beameri



bistellatus

floridanus

hinei

macquarti

moechus

pikei

vittatus

(continued) **_Chrysops_, key to females**

20(19) Hyaline triangle (ht) reduced to an isolated spot not reaching posterior margin .....*bistellatus*

-- Hyaline triangle reaches posterior margin of wing [*beameri, floridanus, hinei, macquarti, moechus, pikei, vittatus*] **21**

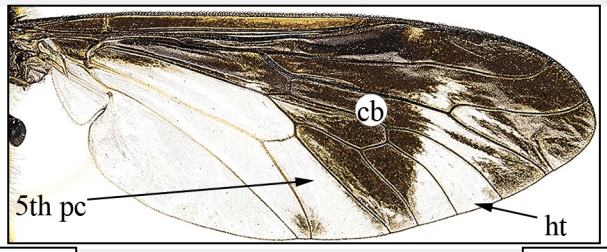
bistellatus

21(20) Crossband (cb) extends into fifth posterior cell (5th pc) [*floridanus, vittatus*] **22**

-- Crossband does not enter fifth posterior cell [*beameri, hinei, macquarti, moechus, pikei*] ..**23**

22(21) Crossband extends to outer margin of first posterior cell (1st pc). Abdominal stripes pale on tergite 2 (t2) .....*floridanus*

-- Crossband with only a narrow spur (sp) extending to outer margin of first posterior cell. Abdominal stripes black on tergite 2 .....*vittatus*



couplet 20--, & 21--

floridanus

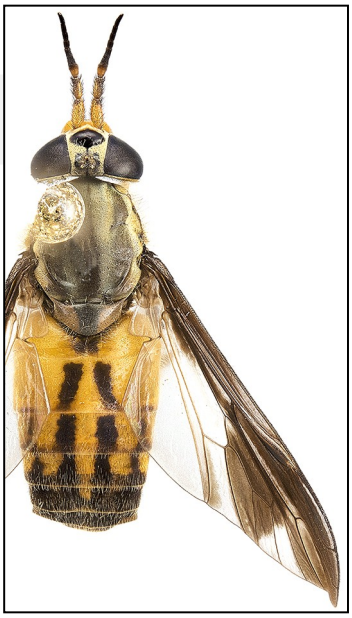
vittatus

(continued) **_Chrysops_, key to females**

23(21) Hyaline triangle (ht) small not reaching the wing fork .....*moechus*

-- Hyaline triangle reaching at least the wing fork [*beameri, hinei, macquarti, pikei*] **24**

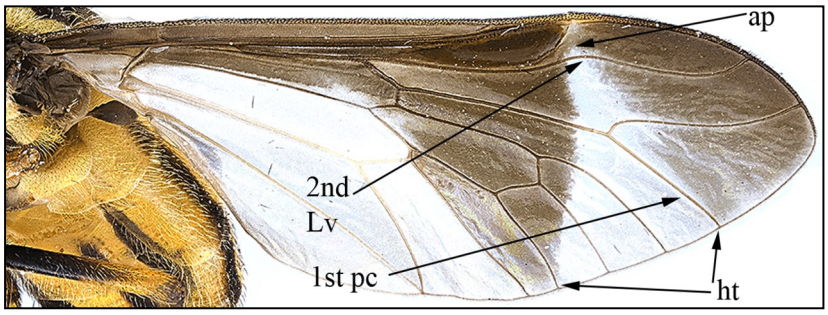
moechus



moechus

24(23) Hyaline triangle with a wide base (ht arrows), its apex (ap) extends beyond second longitudinal vein (2nd Lv). Apical spot triangular, not entering first posterior cell (1st pc) .....*beameri*

-- Base of hyaline triangle narrow due to apical spot extending into first posterior cell (1st pc). Apex of hyaline triangle does not extend beyond second longitudinal vein [*macquarti, pikei*], or barely enters marginal cell (mc) as a diffuse spot [*hinei*] **25**



beameri

beameri

couplet 24--, e.g., *hinei*

(continued) **_Chrysops_, key to females**

25(24) Outer margin of crossband (om) convex, resulting in a sickle-shaped hyaline triangle (ht) ..... *hinei*

-- Outer margin of crossband straight [*macquarti, pikei*] **26**

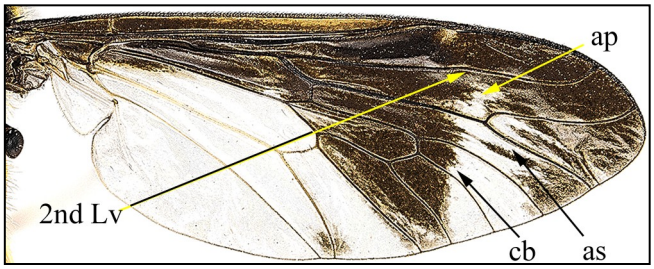
hinei

couplet 25--, e.g. *pikei*

hinei

26(25) Outer margin of the crossband (cb) and the inner edge of the apical spot (as) are irregular especially at the apex of the hyaline triangle (ap) which never reaches the second longitudinal vein (2nd Lv). Habitus variable; most constant characters include the black stripes on either side of the wide middorsal yellow stripe that widen into blotches on tergites 3-5 (t3-5) ..... *macquarti*

-- Outer margin of crossband smoother. Hyaline triangle may reach second longitudinal vein, its apex a rather uniform round spot. Median black stripes widest on tergite 2 (t2), tapering on tergites 3-5. Middorsal yellow stripe narrower. Lateral stripes may be complete on tergites 1-5 giving the abdomen a quadristriate appearance or partial and very faint as lateral spots (ls) as in this specimen ..... *pikei*



macquarti

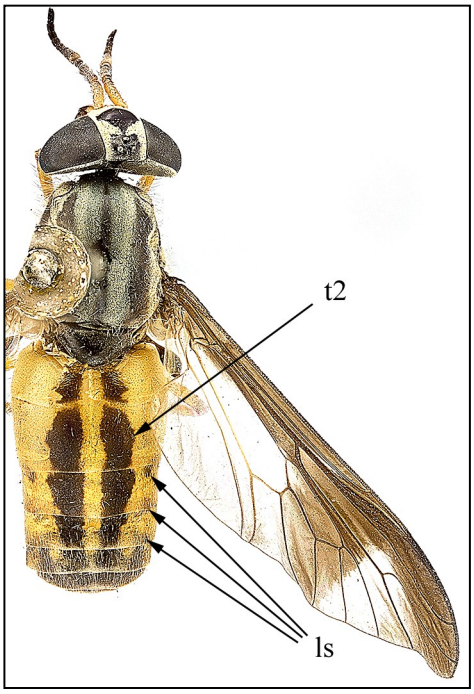
pikei

abdomens

(continued) **_Chrysops_, key to females**

couplet 26 continued

macquarti



pikei

27(18) Abdomen strongly contrasting black and pale yellow/orange, wide black chevron (inverted V) on tergite 2 [*callidus, cursim, dimmocki, montanus, pudicus*] **28**

-- Abdomen markings not so strongly contrasting. If black marks on tergite 2 they do not form a chevron but are in the form of oblique dashes, geminate spot* (gs) [*atlanticus, brunneus, celatus, dacne, dixianus, flavidus, geminatus, ifasi, obsoletus, Parvulus, reicherti, tidwelli, tumidicornis, impunctus, sandyi*] **32**

callidus

cursim

dimmocki

montanus

pudicus

couplet 27-- images

* “a figure composed of two more or less divergent variously shaped angulate spots more or less broadly joined near the anterior margin of a segment” (Brennan, 1935).

(continued) **_Chrysops_, key to females**

couplet 27-- continued

atlanticus

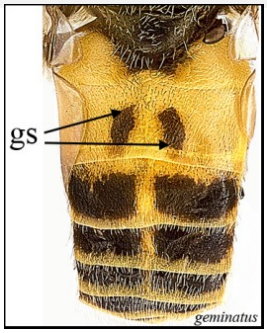
brunneus

celatus

dacne

dixianus

flavidus



geminatus

ifasi

obsoletus

parvulus

reicherti

tidwelli

tumidicornis

impunctus

sandyi

(continued)	***Chrysops*, key to females**

28(27) Black markings on tergites 3-5 form lateral (ls) and median stripes (ms) stripes .....*montanus*

-- Black marking on tergites 3-5 form horizontal bars [*callidus, cursim, dimmocki, pudicus*] **29**

montanus

callidus *cursim*

couplet 28--

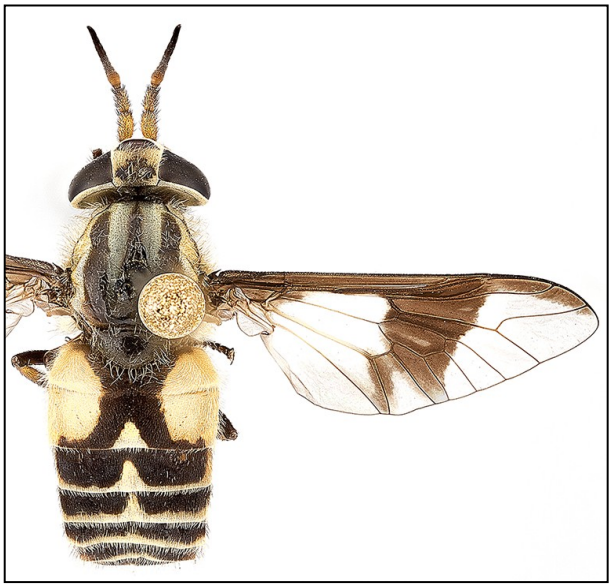
dimmocki *pudicus*

29(28) Wing apical spot (as) narrow, not expanding distally .....*callidus*

-- Apical spot expands distally [*cursim, dimmocki, pudicus*] **30**

callidus

couplet 29--



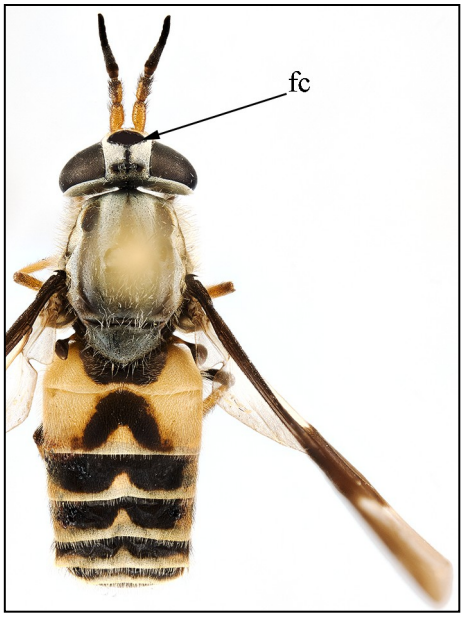
callidus

(continued)	***Chrysops*, key to females**

30(29) Hyaline triangle (ht) does not reach second longitudinal vein (2Lv). Frontal callus (fc) black ..... *dimmocki*

-- Hyaline triangle reaches or crosses second longitudinal vein. Frontal callus mostly yellow, but often brown in *pudicus* [*cursim, pudicus*] **31**

dimmocki



dimmocki

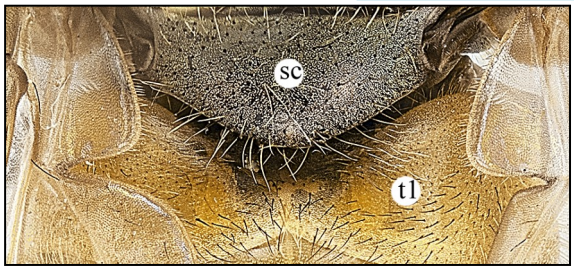
couplet 30--

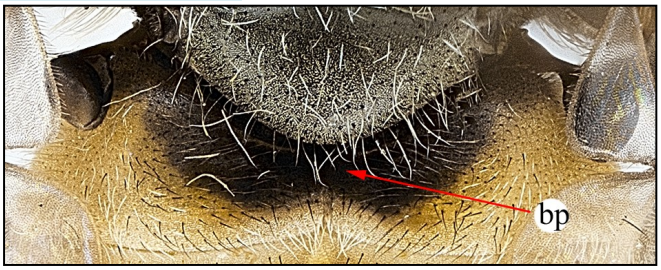
(continued)	***Chrysops*, key to females**

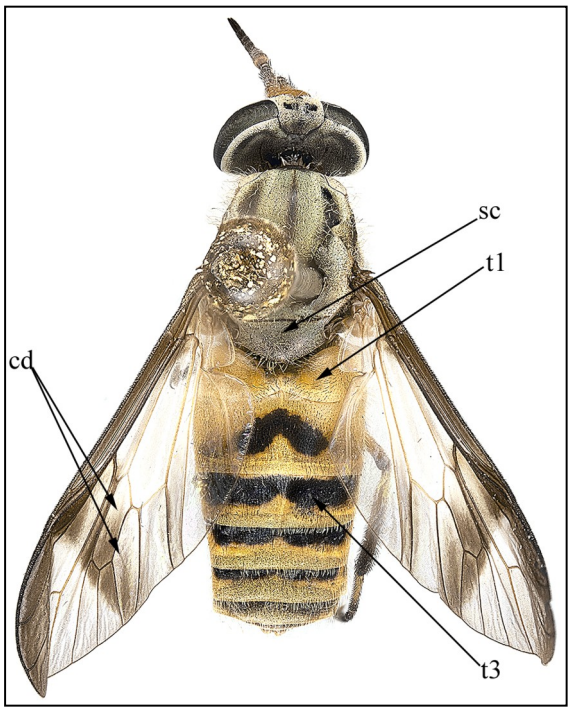
31(30) Small dark spot beneath scutellum (sc) on tergite 1 (t1). Tergite 3 (t3) about 50% black. Hind femur (hf) yellow. Wing crossband dilute (cd) ..... *cursim*

-- Black patch (bp) beneath scutellum large. Tergite 3 about 95% black. Hind femur dark brown. Crossband saturate ..... *pudicus*

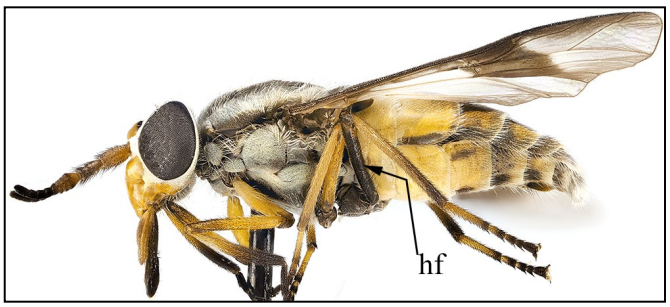
see also couplet 30– for wing images







cursim



pudicus

some specimens of *cursim* (?) have a dark saturate crossband; we suspect these are an undescribed species

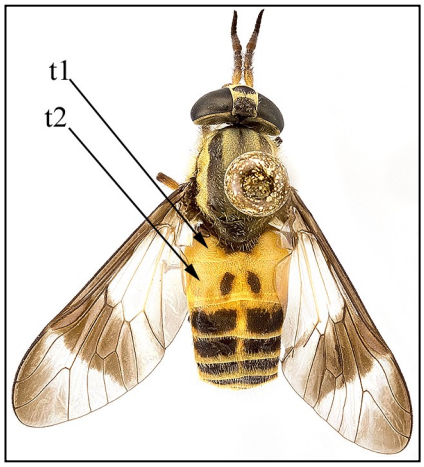
(continued)	***Chrysops*, key to females**

32(27) Abdomen contrasting bright yellow on tergites 1 and 2, black on posterior tergites [*geminatus, tidwelli, impunctus*] **33**

-- Abdomen less contrasting; either paler yellow with less black markings or tergites brown [*atlanticus, brunneus, celatus, dacne, dixianus, flavidus, ifasi, obsoletus, parvulus, reicherti, sandyi*] **35**

33(32) Tergites 3-5 black, small yellow middorsal patch on anterior of tergite 3 ..... *tidwelli*

-- Tergites 3-5 mostly black with yellow posterior borders and a yellow middorsal stripe [*geminatus, impunctus*] **34**



couplet 32, 33, 33-- *geminatus*

tidwelli

impunctus

atlanticus

brunneus

celatus

dacne

dixianus

flavidus

ifasi

obsoletus

parvulus

reicherti

sandyi

couplet 32--

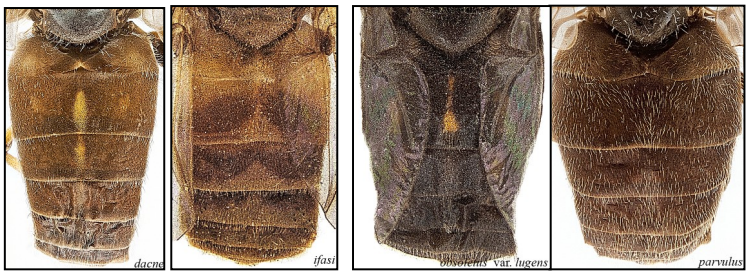
(continued)	***Chrysops*, key to females**

34(33) Divergent angulate spots (geminate spot) on ether side of the midline of tergite 2 (t2) (see couplet 32 for image) .....*geminatus*

-- Tergite 2 lacking black geminate spot (see couple 32 for image) .....*impunctus*

35(32) Abdomen dark brown with indistinct markings [*dacne, ifasi, obsoletus, parvulus*] **36**

-- Abdomen much paler, markings more obvious (*C. flavidus* group) [*atlanticus, brunneus, celatus, dixianus, flavidus, reicherti, sandyi, tumidicornis*] **39**



couplet 35 *dacne* *ifasi* *obsoletus* *parvulus*

atlanticus *brunneus* *celatus* *dixianus* *flavidus* *reicherti* *tumidicornis* *sandyi*

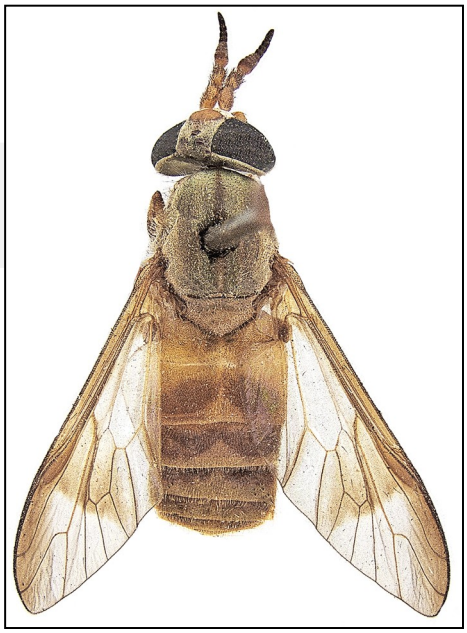
couplet 35--

36(35) Wing first basal cell (1st bc) mostly hyaline, apical spot fills only one-half of second submarginal cell (2nd smc) .....*ifasi*

-- Wing first basal cell infuscated, apical spot (sc) fills all of second submarginal cell [*dacne, obsoletus, parvulus*] **37**

couplet 36– images on next page

ifasi



(continued) **_Chrysops_, key to females**

couplet 36-- continued

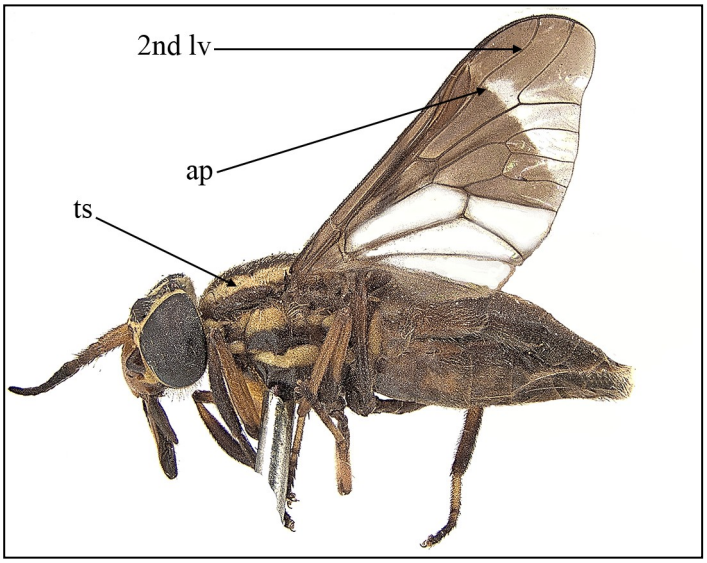
dacne

obsoletus

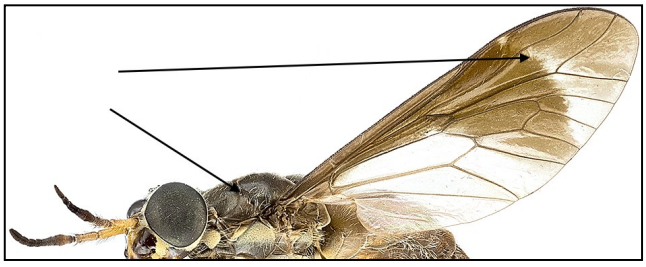
parvulus

37(36) Conspicuous yellow thoracic stripe (ts) above wing base. Apex of hyaline triangle (ap) obvious and clearly reaches second longitudinal vein (2nd lv) .....*obsoletus*

-- No stripe above wing base. Apex of hyaline triangle very diffuse [*dacne, parvulus*] **38**



obsoletus



dacne

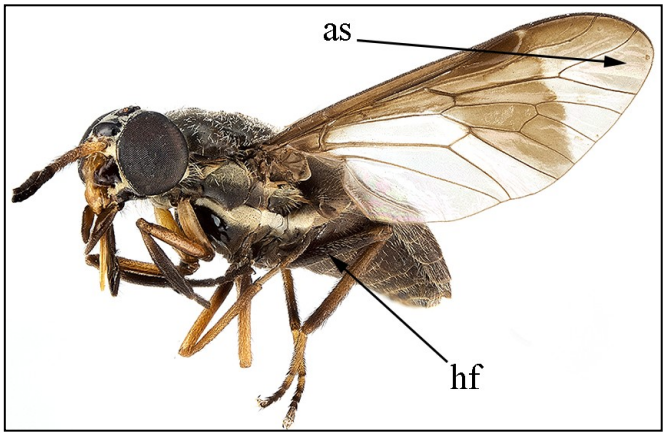
couplet 37--

parvulus

(continued)	***Chrysops*, key to females**

38(37) Abdomen entirely brown; patches of white–gray hairs. Apical spot (as) does not extend into 1st posterior cell (1st pc). Hind femur (hf) and much of legs dark brown .....*parvulus*

-- Abdomen with incomplete middorsal and lateral yellow stripes. Apical spot extends into first posterior cell (1st pc). Hind femur and much of legs yellow .....*dacne*



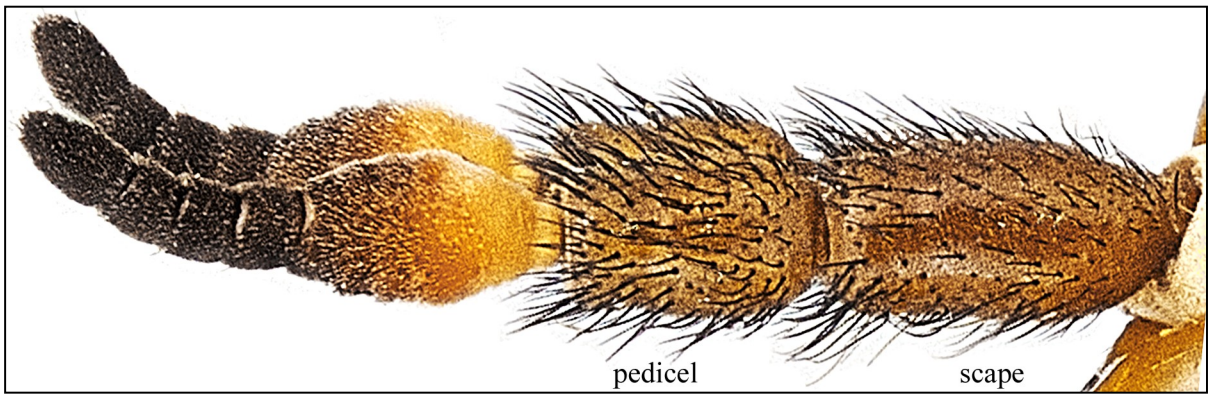
parvulus *dacne*

The eight species in couplet 39(35) [next page] are included in the ***Chrysops flavidus* group** of Baier (1999). Some in this complex have proved difficult to identify. At the time of the first keys that included Florida *Chrysops* species (Philip, 1955; Jones and Anthony, 1964), three species (*dixianus, sandyi, tumidicornis*) were undescribed. Even then (1964) *C. reicherti* was considered a subspecies of *C. flavidus,* and *C. celatus* was not recognized as a Florida species (Jones and Anthony, 1964). Pechuman (1974) described *C. dixianus* and provided a key to separate it from *C. celatus, C. flavidus*, and *C. reicherti*. A revision of the group, based on 13 critical characters (4,843 specimens), which included the description of two new species, (*sandyi, tumidicornis*) put species identification on a more solid footing (Baier, 1999). However, identification to species is still difficult. Baier's (1999) key is the only complete key for this complex of species; his paper should be consulted for detailed species accounts including the intraspecific color and pattern variations, and North American distribution for each species.

(continued)	***Chrysops*, key to females**

39(35) Scape (sc) and pedicel (pd) distinctly swollen [*brunneus, tumidicornis*] **40**

-- Scape and pedicel far less swollen [*atlanticus, celatus, dixianus, flavidus, reicherti, sandyi*] **41**



brunneus

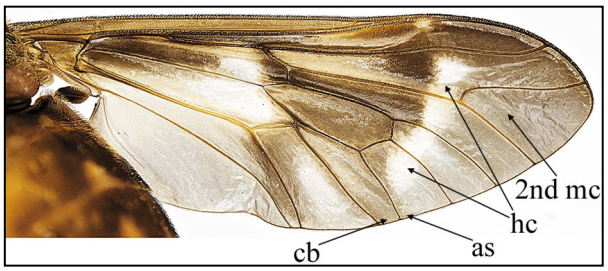
tumidicornis

couplet 39--, e.g. *atlanticus*

(continued)	***Chrysops*, key to females**

40(39) Wing pattern with extensive apical spot (as) filling second marginal cell (2nd mc), reaching crossband at wing margin (cb) and enclosing hyaline triangle which becomes a hyaline crescent (hc). Abdomen as imaged ..... *brunneus*

-- Wing pattern with smaller apical spot extemding half way into second submarginal cell and then fading along hind margin of wing until reaching crossband. Hyaline triangle not crescent-shaped. Abdomen as imaged ..... *tumidicornis*



brunneus

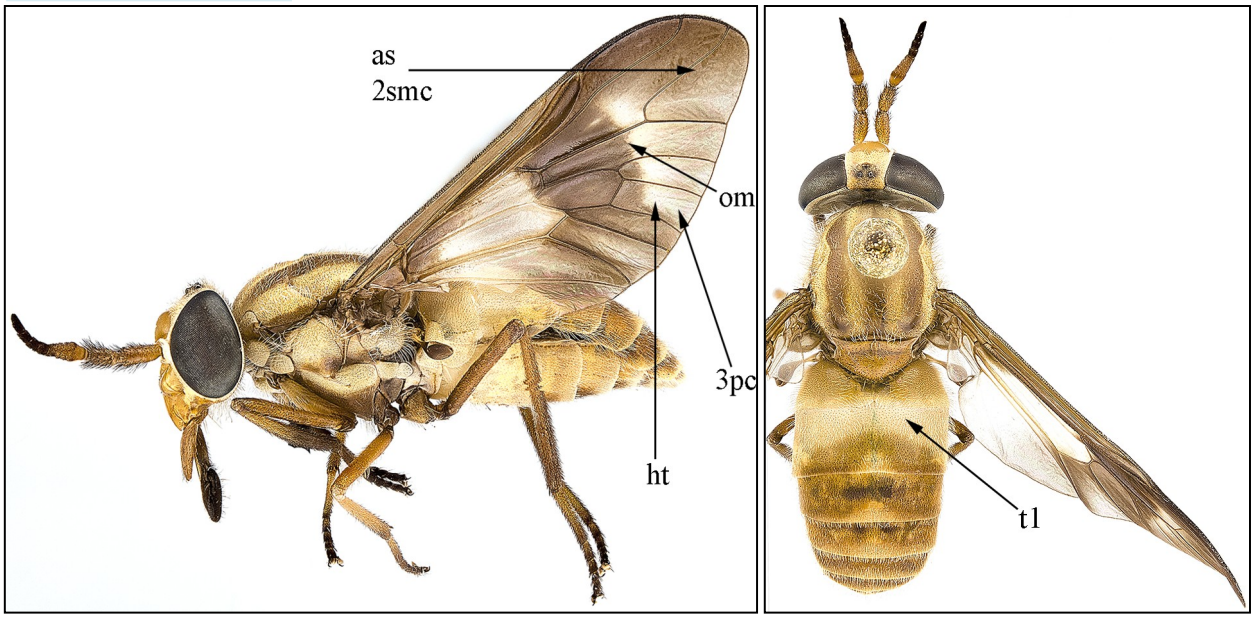
tumidicornis

41(39) Outer margin of wing crossband (om) convex. Apical spot (as) broad, filling second submarginal cell (2smc) and fading into third posterior cell (3pc). Hyaline triangle (ht) barely reaching hind margin of wing. First tergite (t1) very pale yellow anteriorly. Dorsal and lateral patterns as shown ..... *reicherti*

-- Outer margin of crossband sinuous, straight, or slightly concave. Abdomen not as above [*atlanticus, celatus, dixianus, flavidus*, *sandyi*] **42**

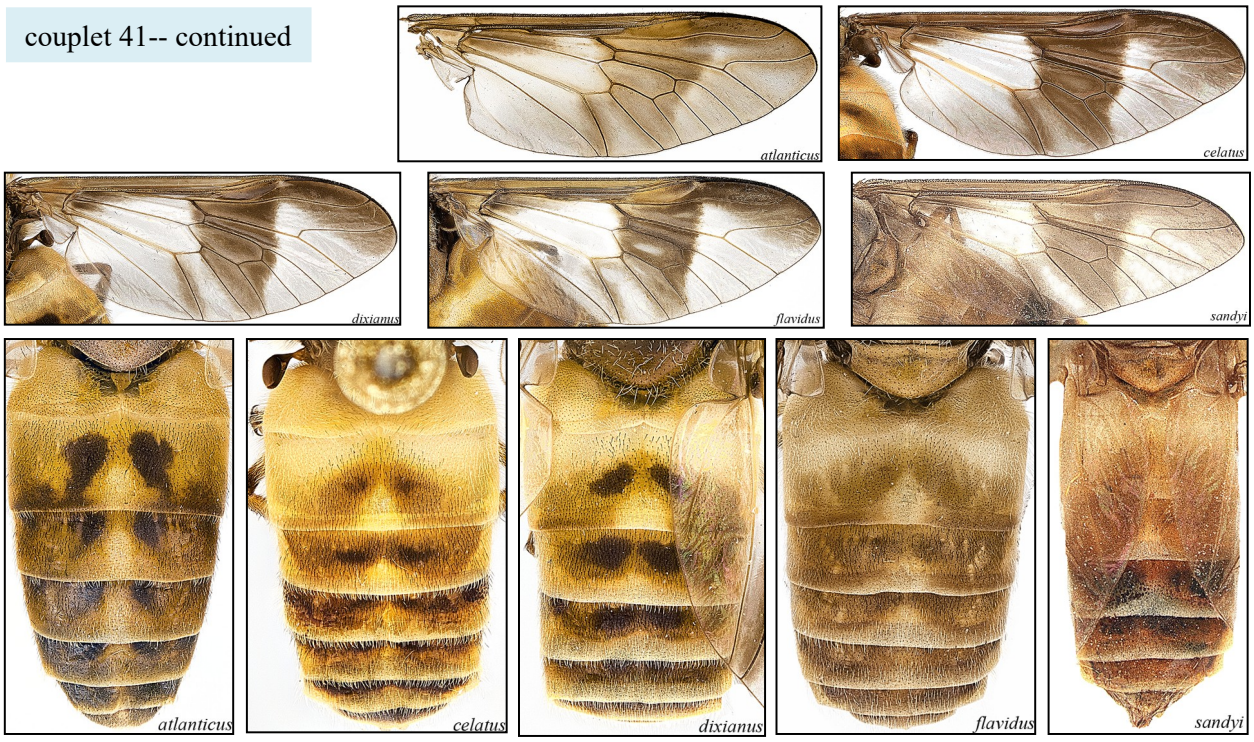
(continued) **_Chrysops_, key to females**

couplet 41 continued



reicherti

couplet 41-- continued



Couplet 42, next page, keys *dixianus* in which the crossband has a sinuous (wavy) outer margin. Baier's (1999) key and wing description of *C. dixianus* is in error: "outer margin of crossband straight or convex." Pechuman (1974) showed a photograph of the wing, outer margin obviously sinuous, as in our image.

(continued) **_Chrysops_, key to females**

42(41) Outer margin (om) of wing crossband sinuous [*celatus, dixianus*] **43**

couplet 42

-- Outer margin of crossband either straight or slightly concave [*atlanticus, flavidus, sandyi*] **44**

couplet 42--

43(42) Tergite 2 yellow brown, a darker median marking in the form of a wide-based inverted "V" that extends to the anterior border of the segment (t2). Crossband extends into the 5th posterior cell (5th pc) (although this cell does have a hyaline center). Frontal callus yellow with a dark shiny dorsal border that extends as a narrow shiny band (sb) to the ocelli that divides the frons .....*celatus*

Anterior half of tergite 2 translucent yellow, posterior half with a geminate spot (gs*) that does not extend to the anterior half of the segment. Crossband does not extend into 5th posterior cell. Frontal callus yellow separated from ocelli by pollinose frons .....*dixianus*

celatus

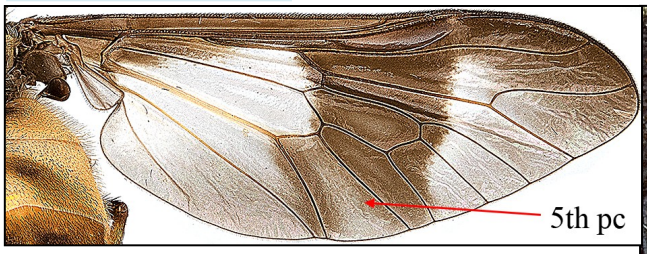
dixianus paratype

* see *Chrysops* key couplet 27 for definition

more images

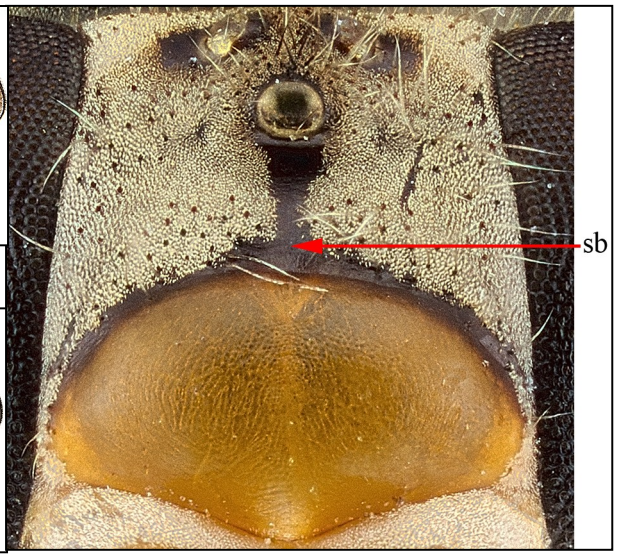
(continued) **_Chrysops_, key to females**

couplet 43 continued

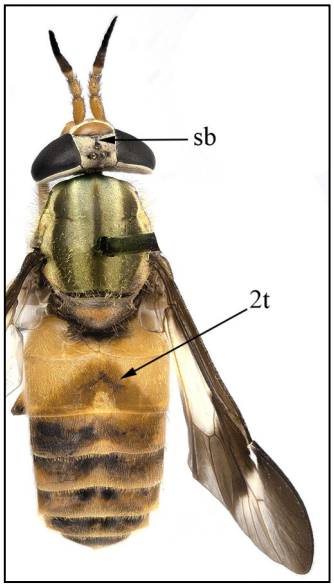


celatus

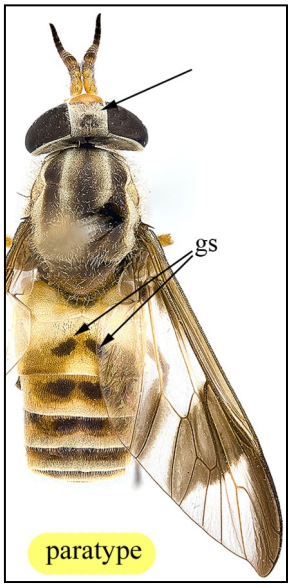
dixianus



celatus



celatus



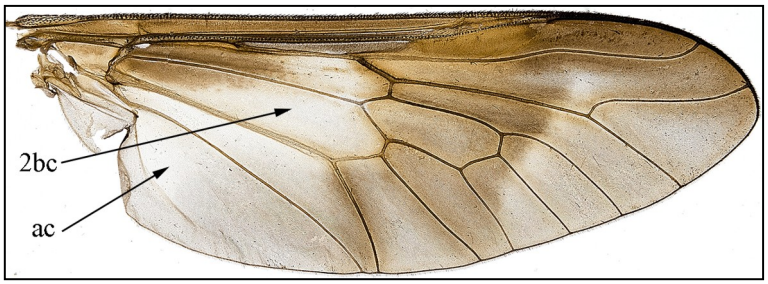
dixianus

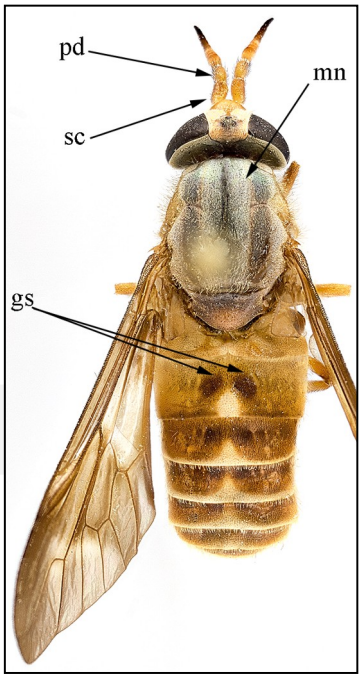
dixianus

(continued) **_Chrysops_, key to females**

44(42) Mesonotum (mn) grayish-green especially anteriorly. Second tergite with a geminate dark spot (gs), the two portions of which do not touch any margin of the segment. Ground color of the tergite pale below geminate spot giving the appearance of a pale triangle. Third and fourth tergites with similar but smaller geminate spots, with pale yellow posterior borders that expand into midline triangles. Normal hyaline areas of wing smoky except for the second basal cell (2bc) and the basal portion of the anal cell (ac). Scape (sc) moderately swollen, pedicel (pd) less so .....*atlanticus*

-- Mesonotum yellow-brown. Without the above combination of characters [*flavidus, sandyi*] **45**





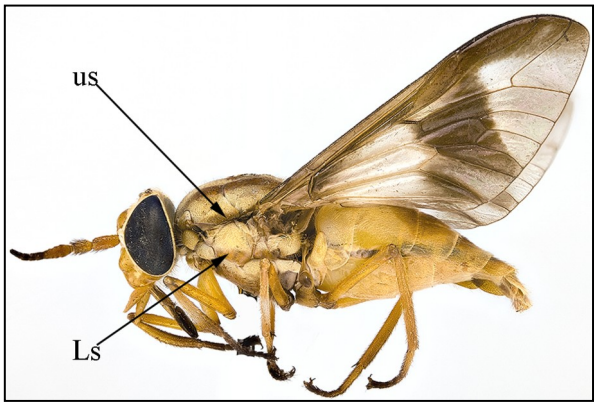
atlanticus

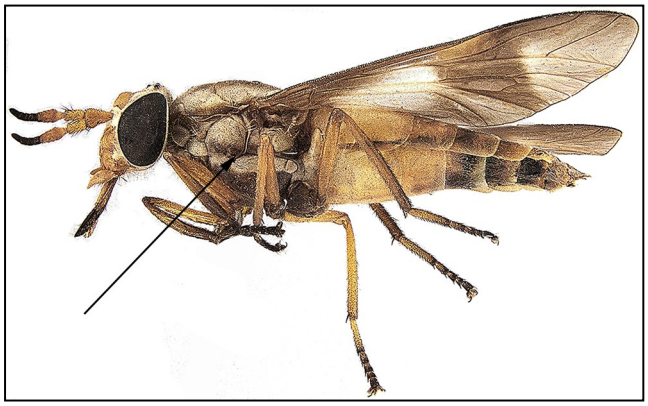
couplet 44-- *flavidus* *sandyi*

(continued)	***Chrysops*, key to females**

45(44) Yellowish color of mesonotum continues laterally on the thorax, interrupted by two horizontal stripes, upper stripe (us) brown, lower (Ls) yellow. Legs yellow. Apical spot comparatively narrow, crossband narrow resulting in a large hyaline triangle ..... *flavidus*

-- Both lateral stripes dark brown. Legs brown. Apical spot larger, crossband wider resulting in a smaller hyaline triangle ..... *sandyi*

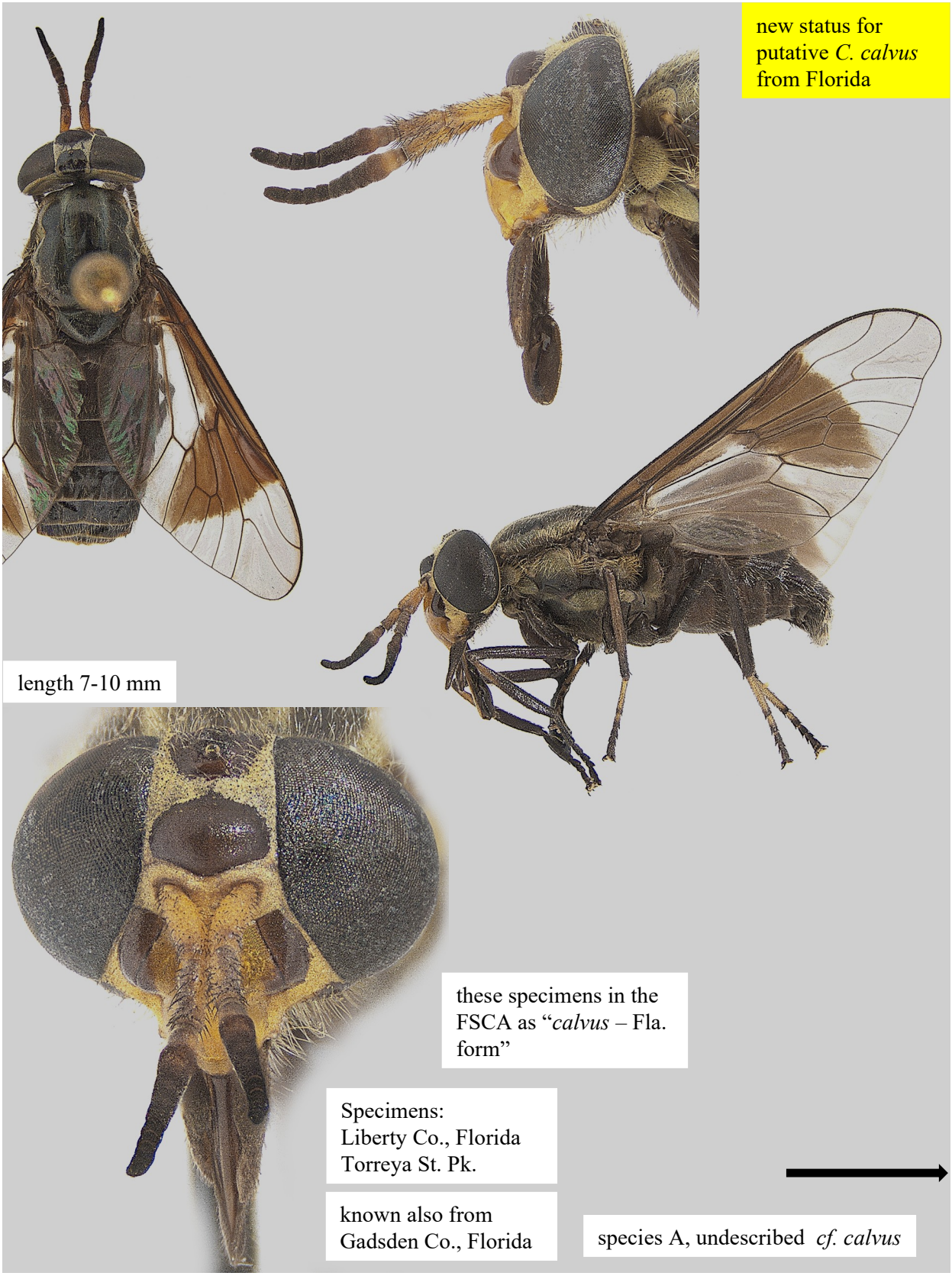




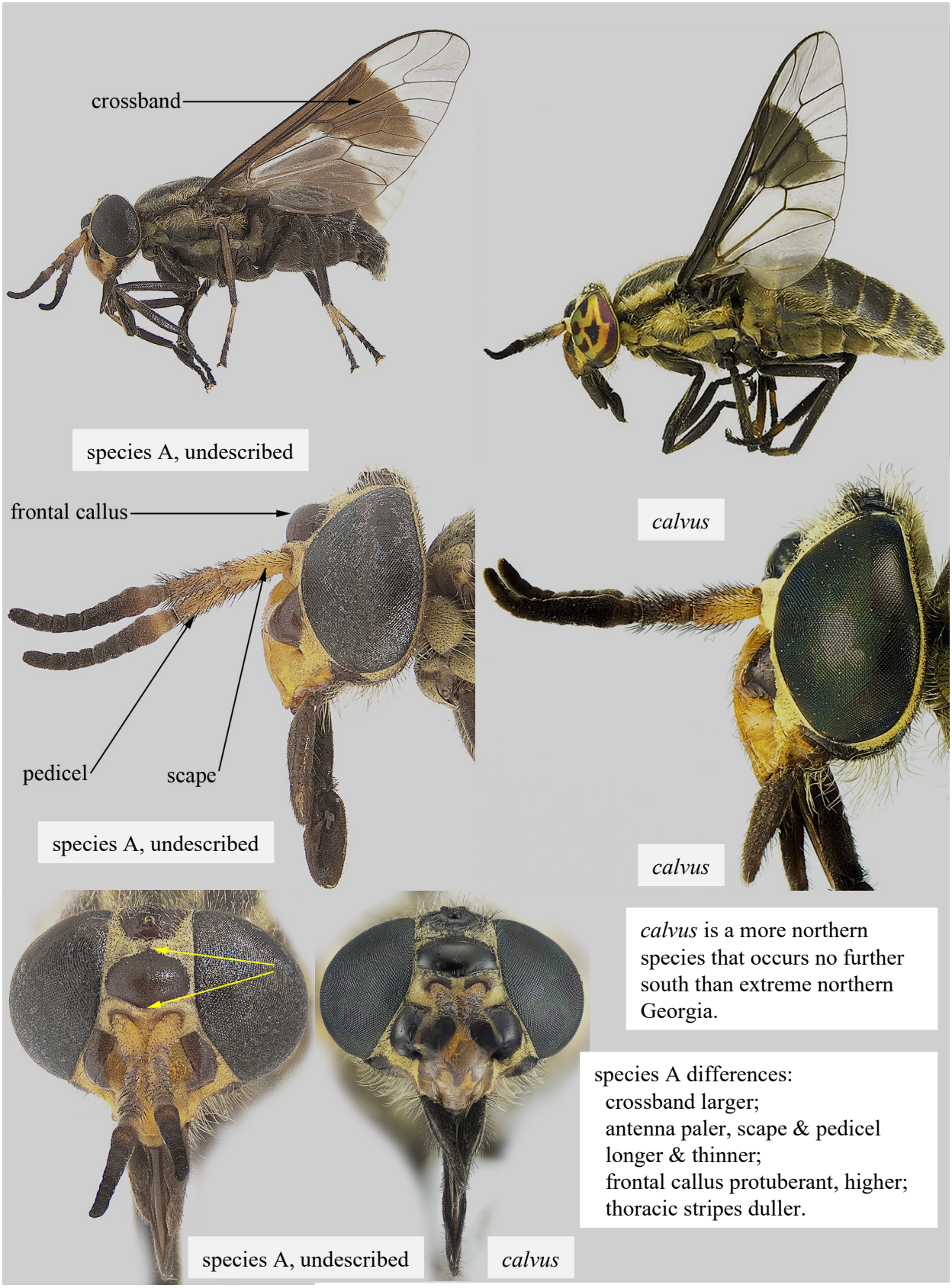
flavidus

sandyi

***Chrysops* species A**, undescribed

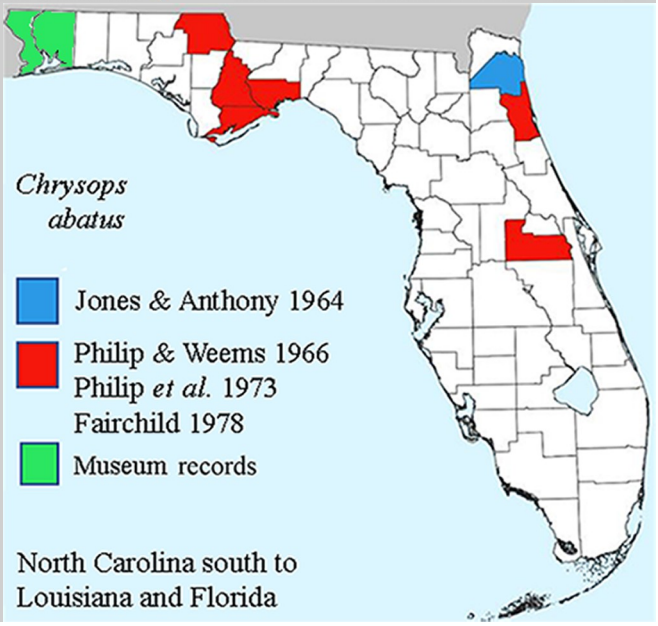


(continued) ***Chrysops* species A,** undescribed *cf.* ***Chrysops calvus*** Pechuman and Teskey



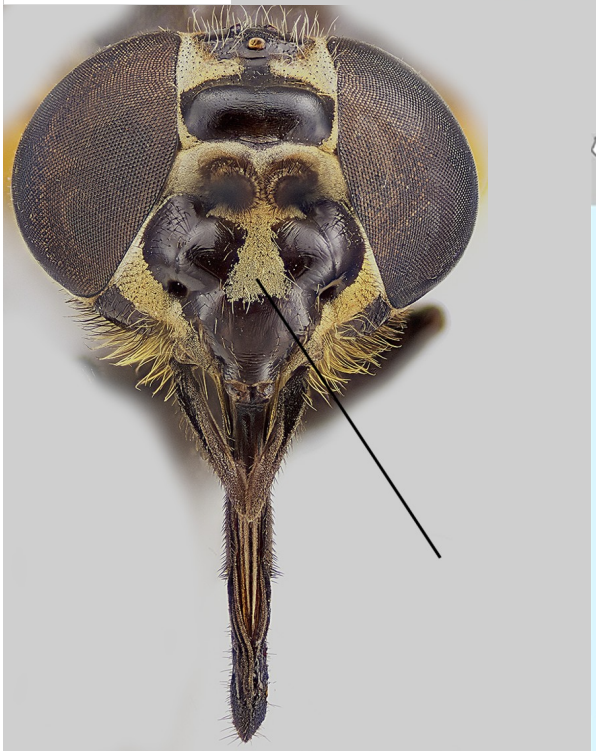
Chrysops abatus Philip

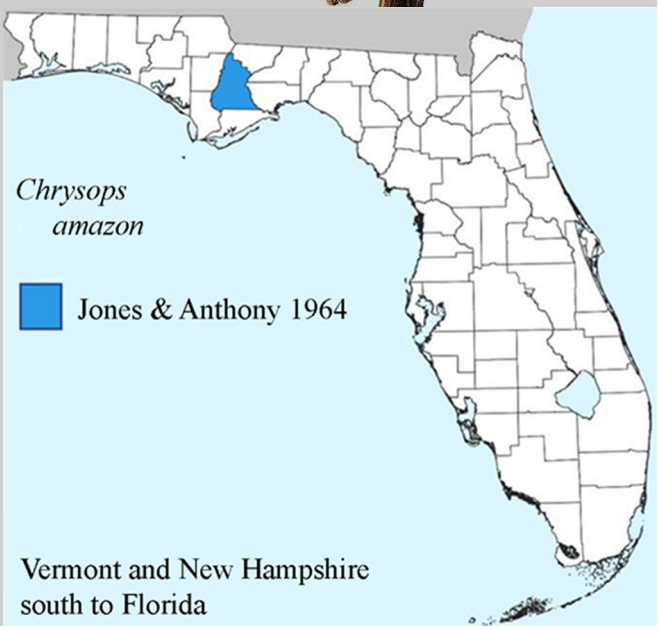
length 6.5-7.0 mm



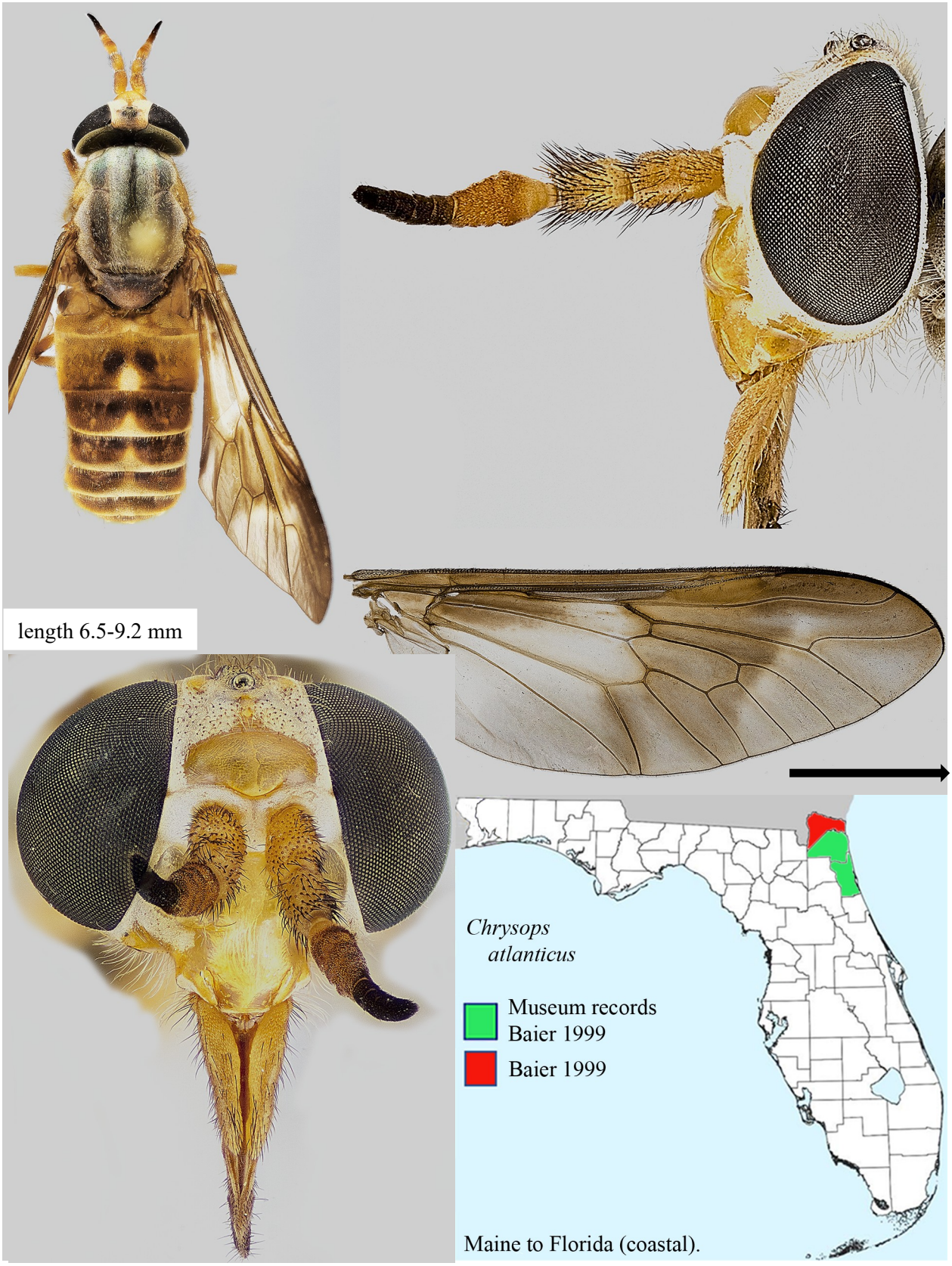
Chrysops amazon Daecke

length 9-12 mm



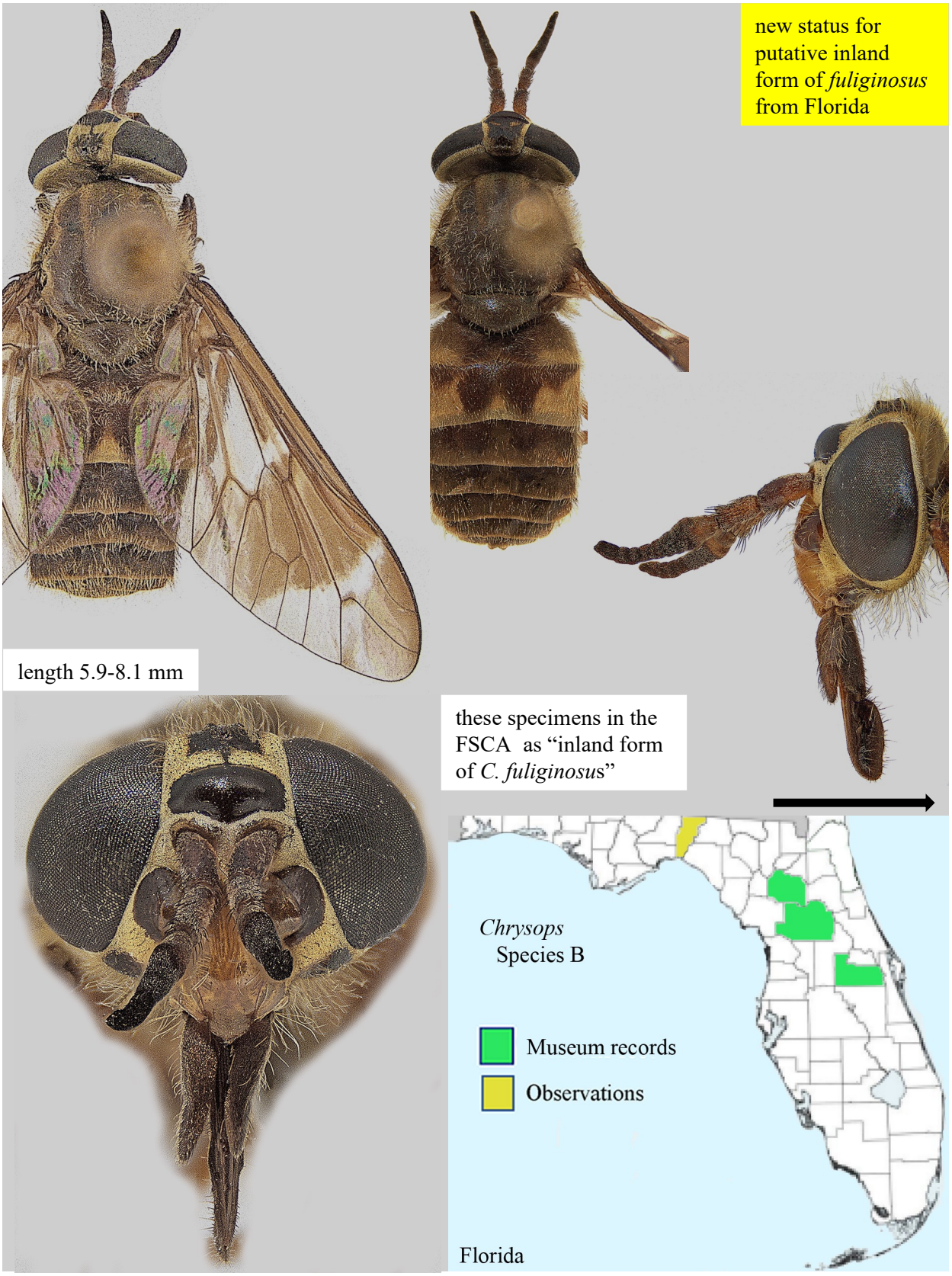


Chrysops atlanticus Pechuman



(continued) ***Chrysops atlanticus*** Pechuman

***Chrysops* species B,** undescribed female



(continued) ***Chrysops* species B,** undescribed females

Jefferson Co., FL.
Pinhook River Basin
Floodplain woodlands
24 March 2020
Greg Brown.

(continued) ***Chrysops* species B,** undescribed females

Jefferson Co., FL.
Pinhook River Basin
Floodplain woodlands
24 March 2020
Greg Brown.

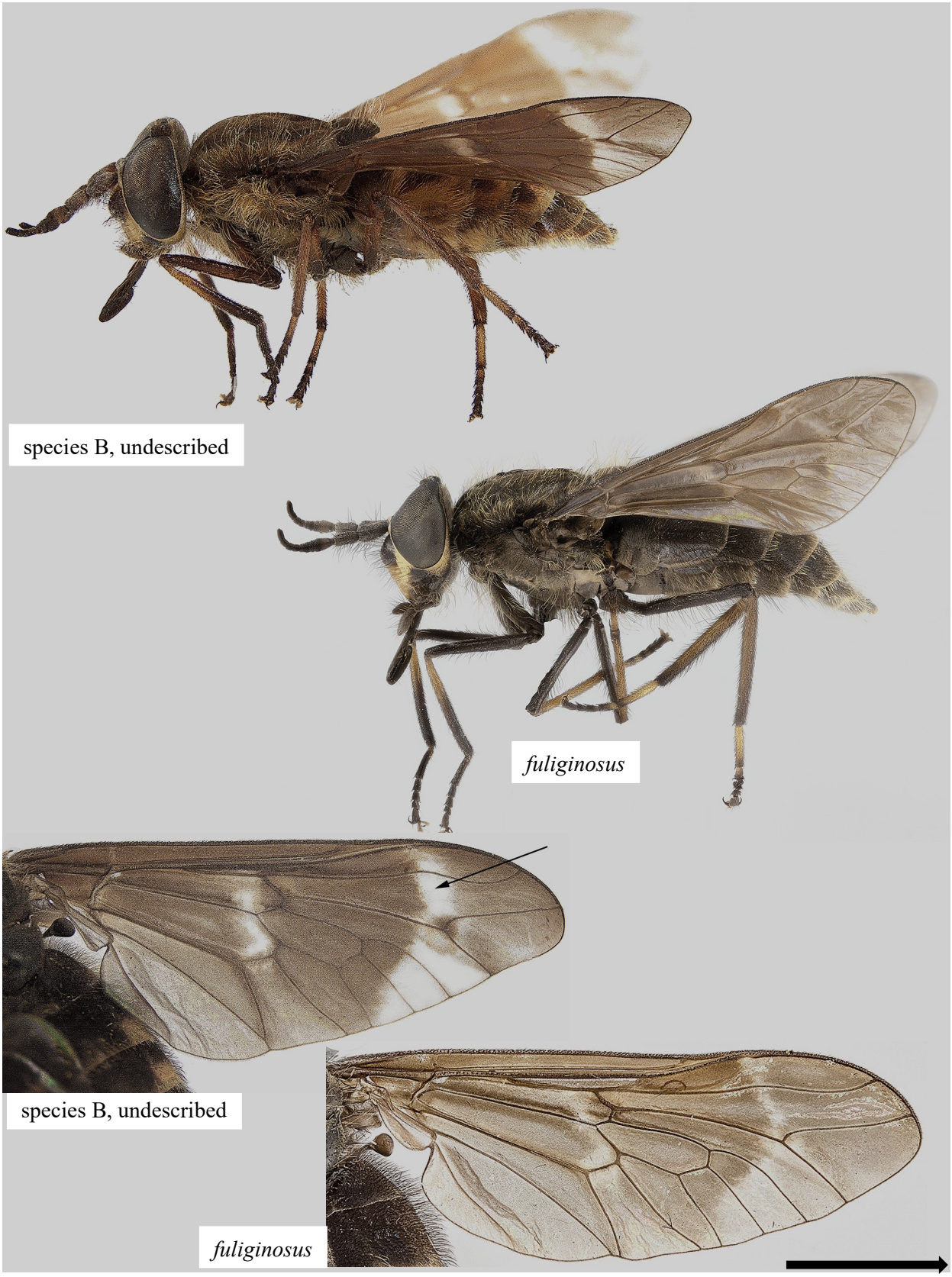
cf. fuliginosus

(continued) ***Chrysops* species B,** undescribed *cf.* ***Chrysops fuliginosus*** Wiedemann females

(continued) ***Chrysops* species B,** undescribed *cf.* ***Chrysops fuliginosus*** Wiedemann females

(continued) ***Chrysops* species B,** undescribed *cf.* ***Chrysops fuliginosus*** Wiedemann males

(continued) ***Chrysops* species B,** undescribed *cf.* ***Chrysops fuliginosus*** Wiedemann males

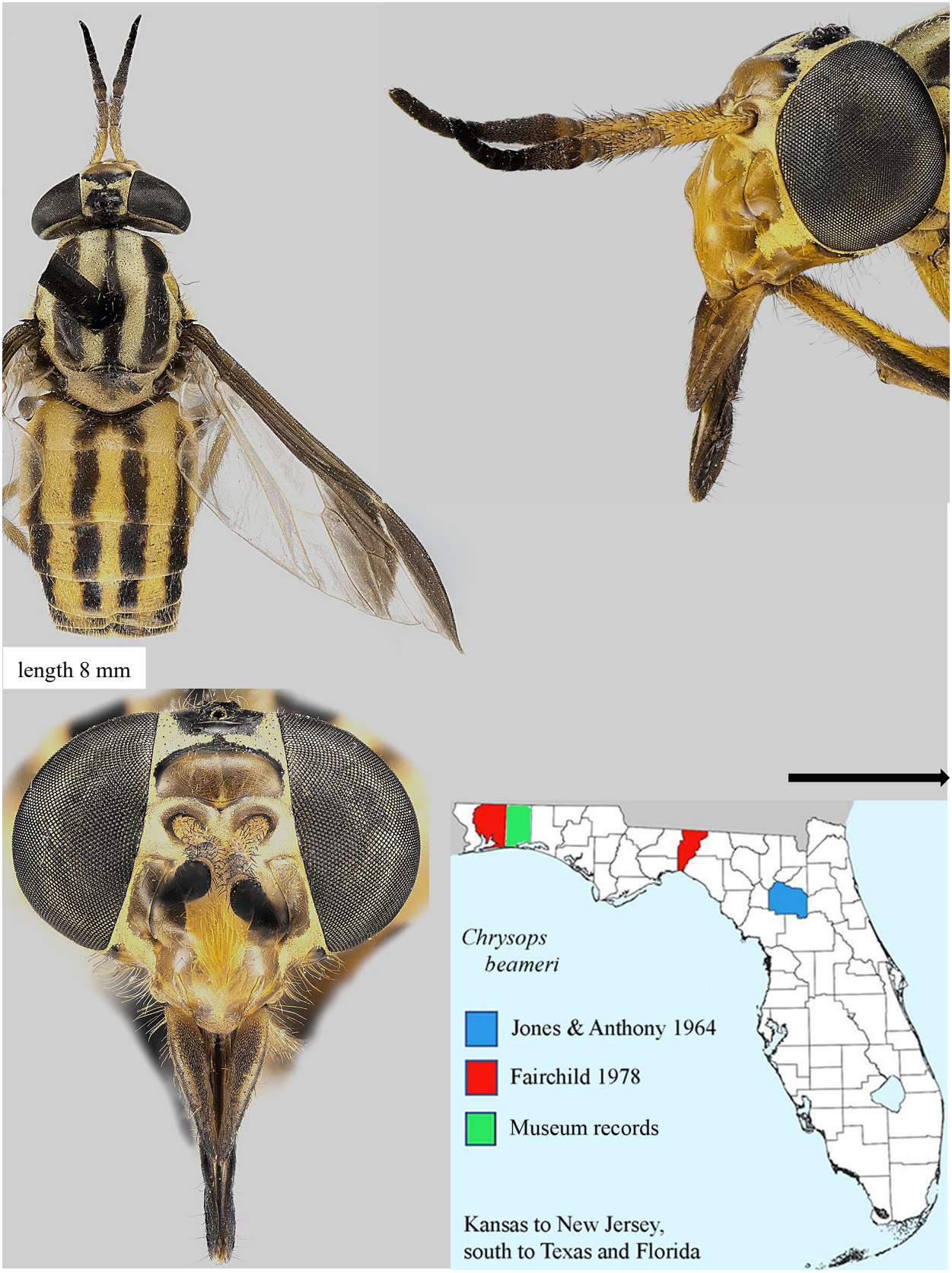


(continued) ***Chrysops* species B,** undescribed *cf.* ***Chrysops fuliginosus*** Wiedemann male

species B, undescribed

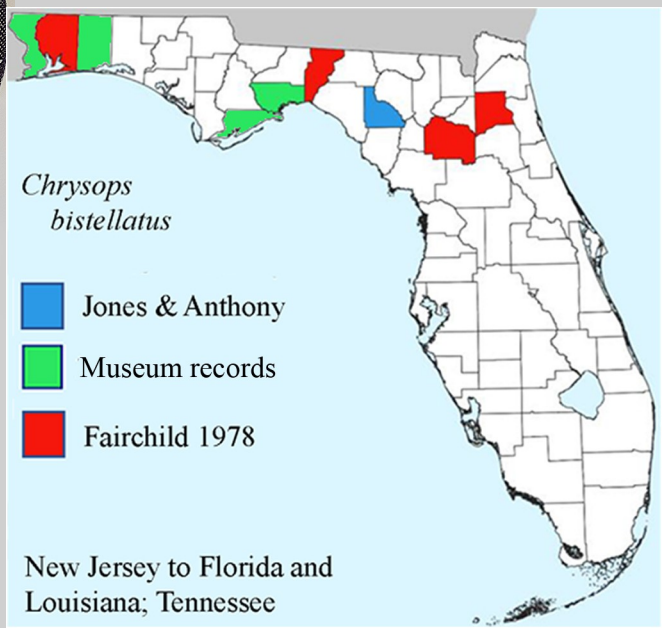
fuliginosus

Chrysops beameri Brennan

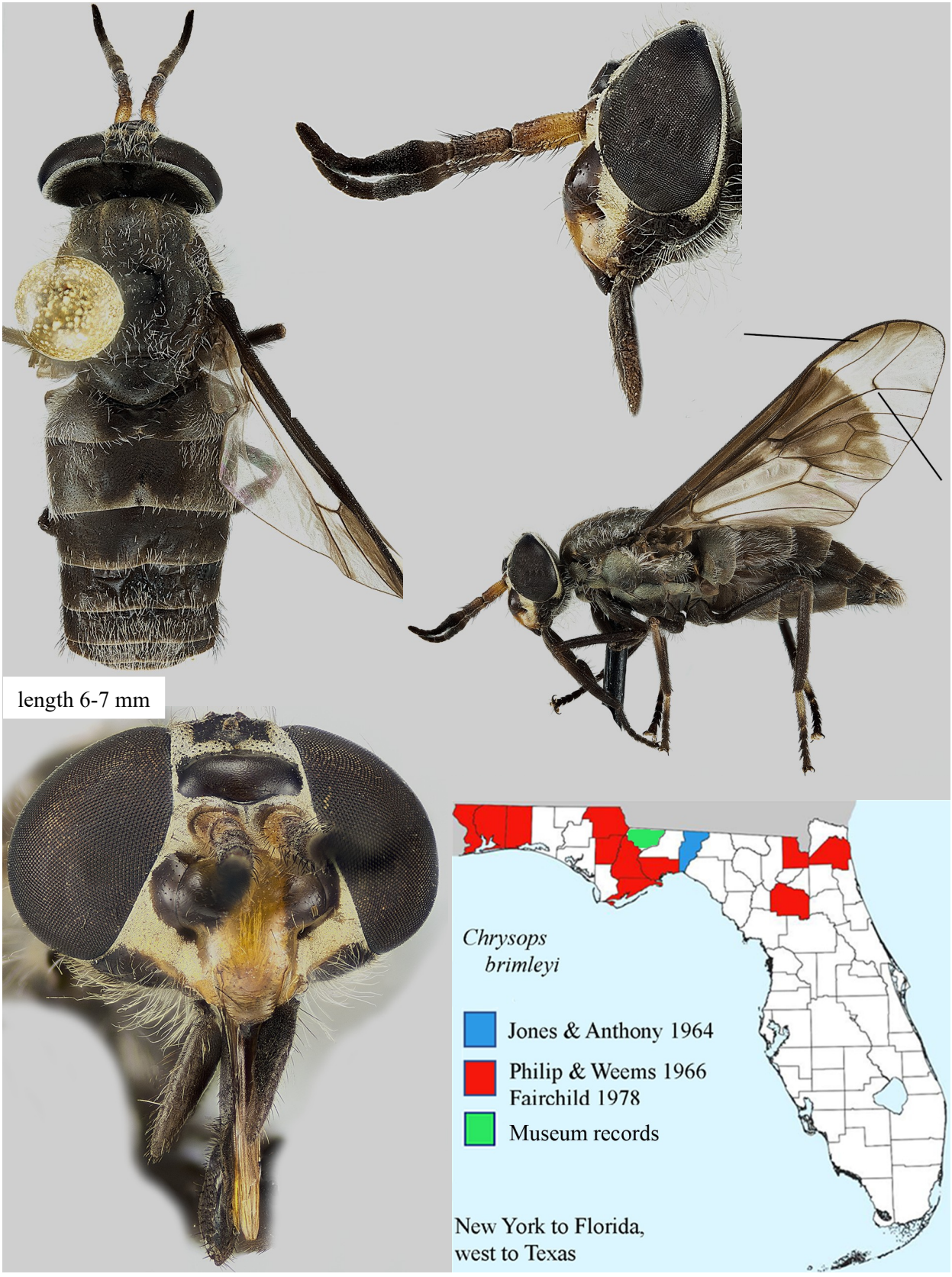


(continued) ***Chrysops beameri*** Brennan

Chrysops bistellatus Daecke

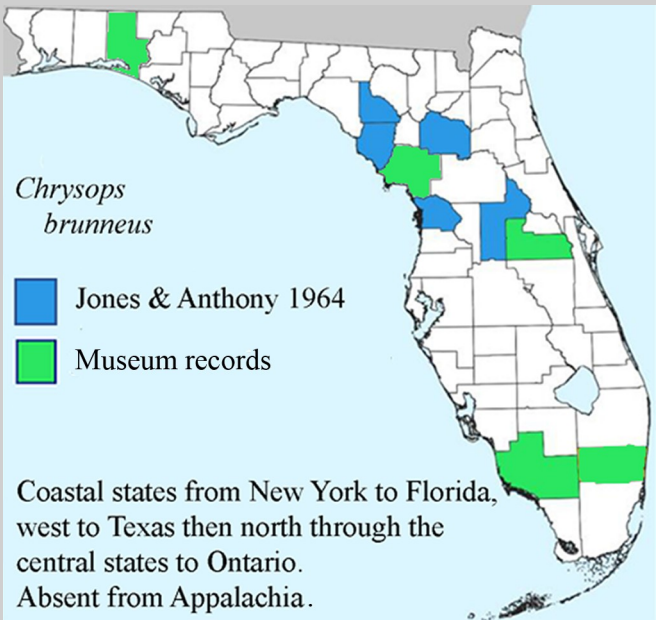


Chrysops brimleyi Hine



Chrysops brunneus Hine

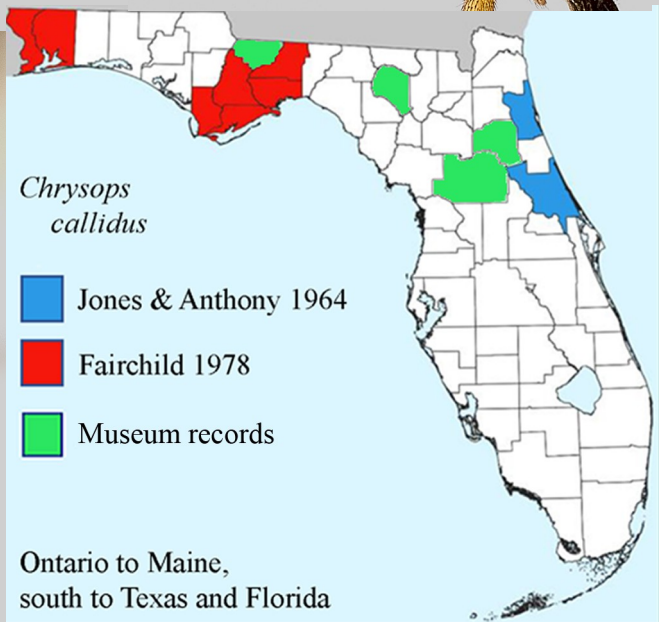
length 8-10 mm



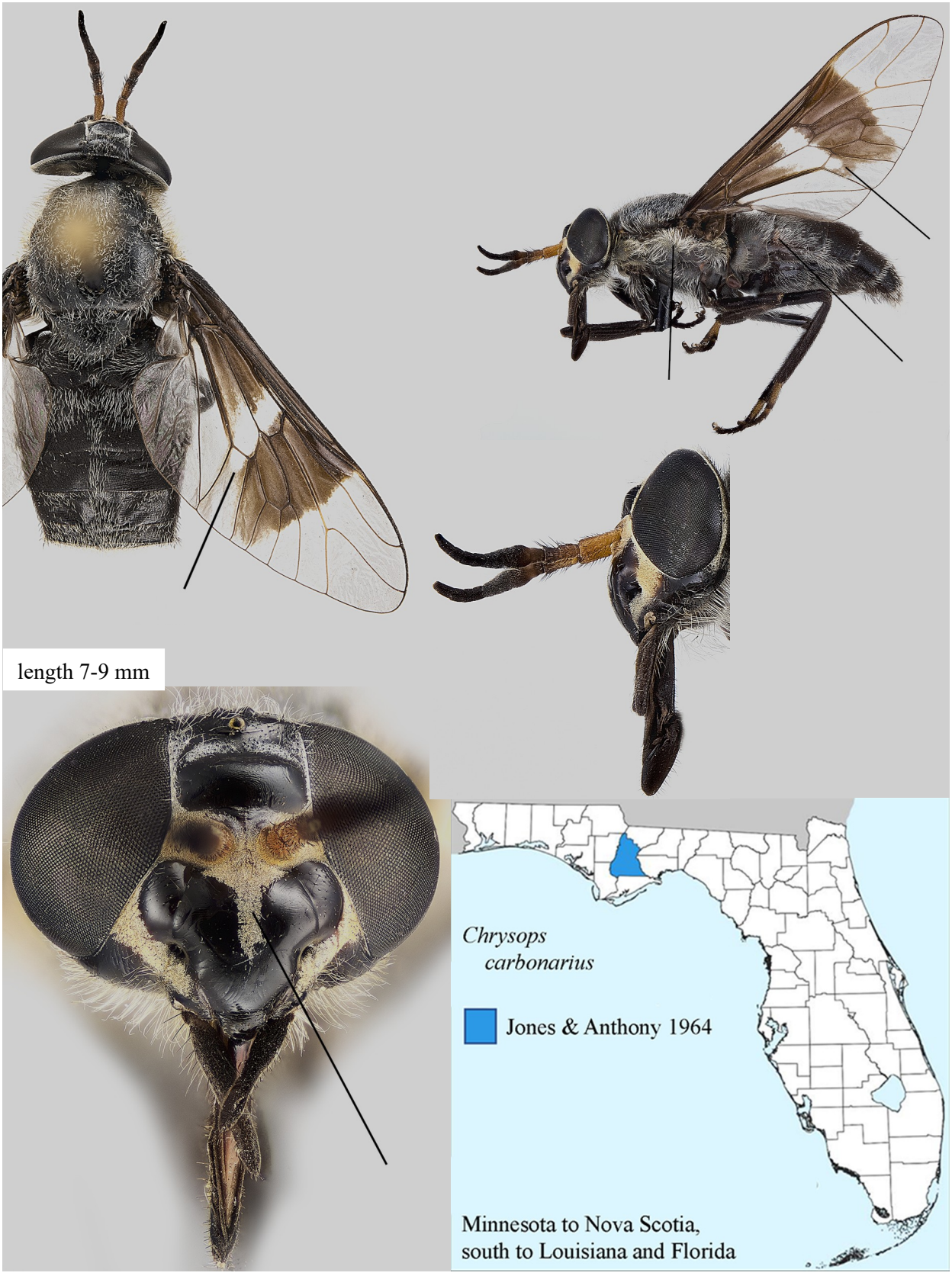
(continued) ***Chrysops brunneus*** Hine

Chrysops callidus Osten Sacken

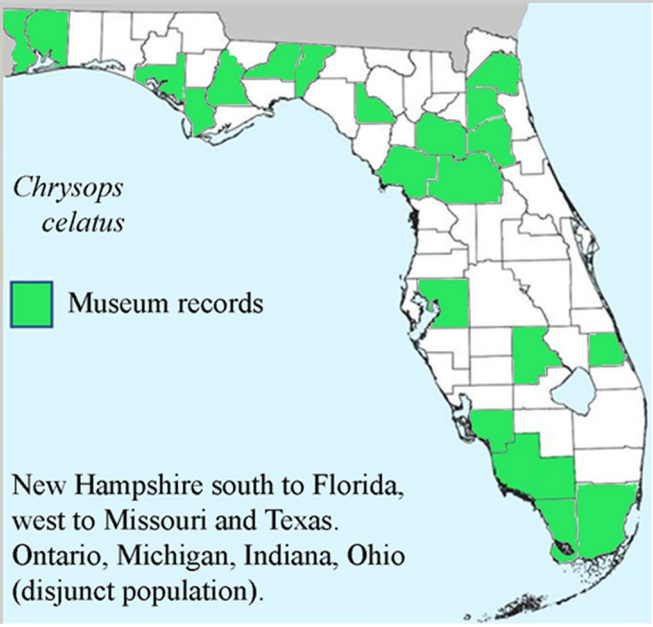
length 7-10 mm



Chrysops carbonarius Walker



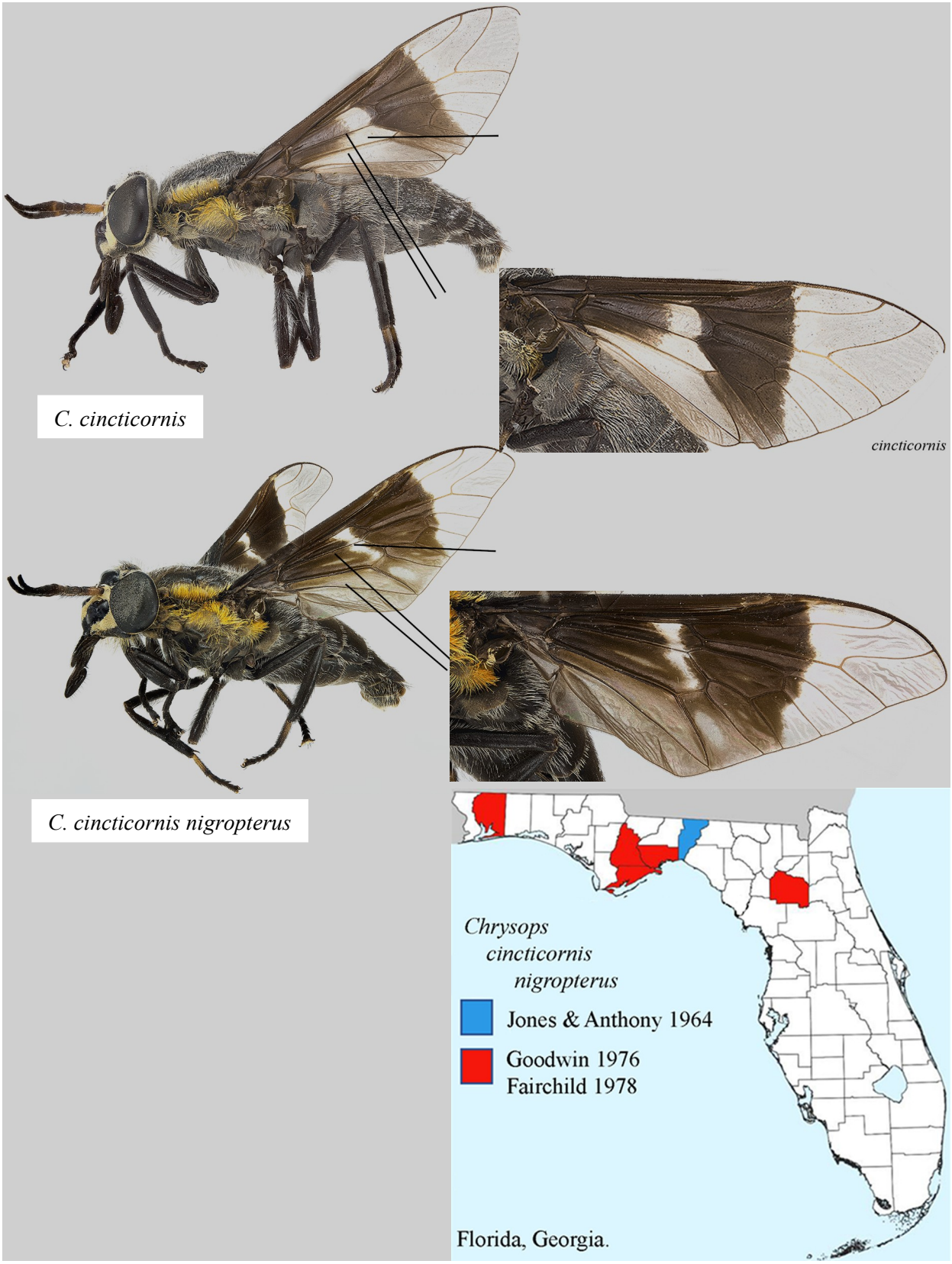
Chrysops celatus Pechuman



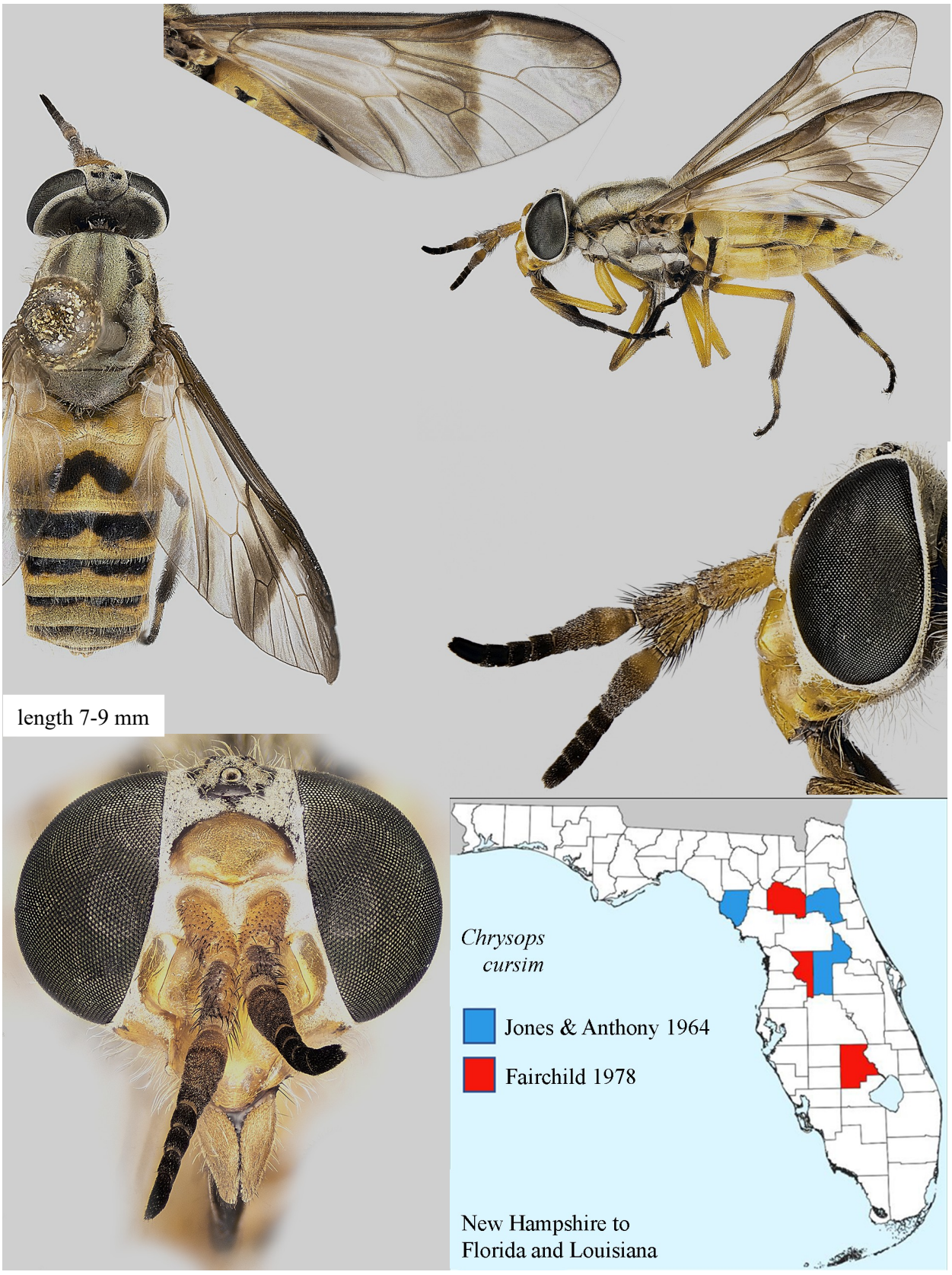
Chrysops cincticornis Walker

length 8-12 mm

Chrysops cincticornis Walker *cf.* ***C. cincticornis nigropterus*** Fairchild

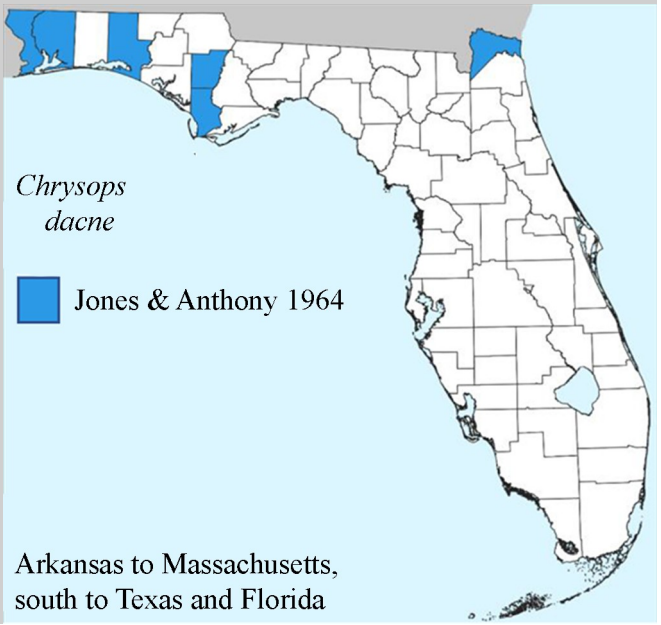


Chrysops cursim Whitney

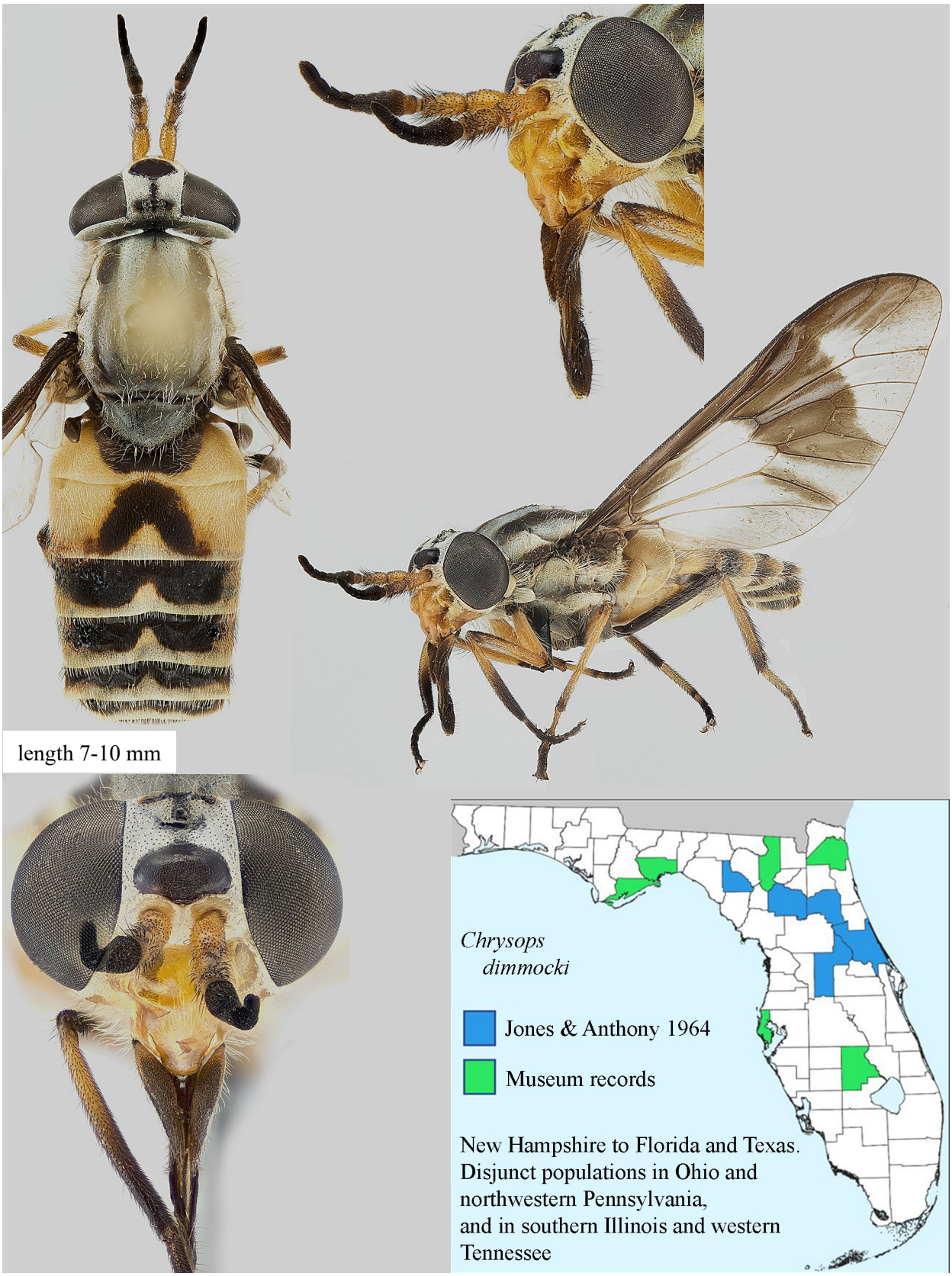


Chrysops dacne Philip

length 6-8 mm

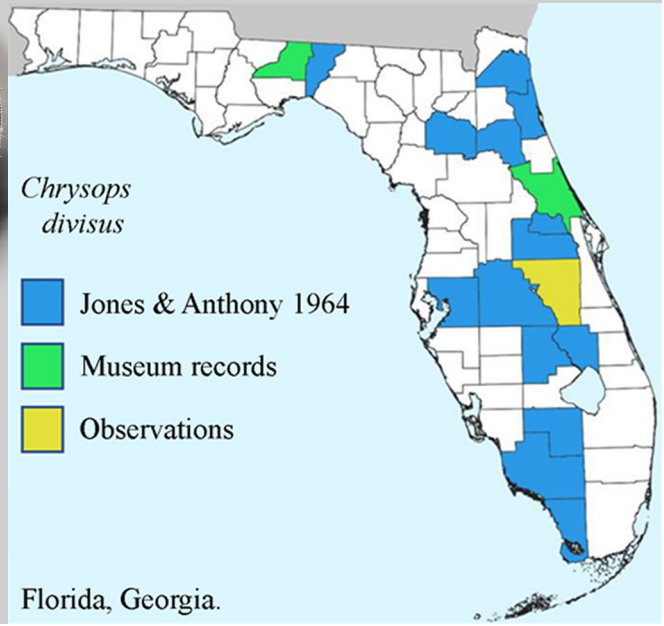


Chrysops dimmocki Hine

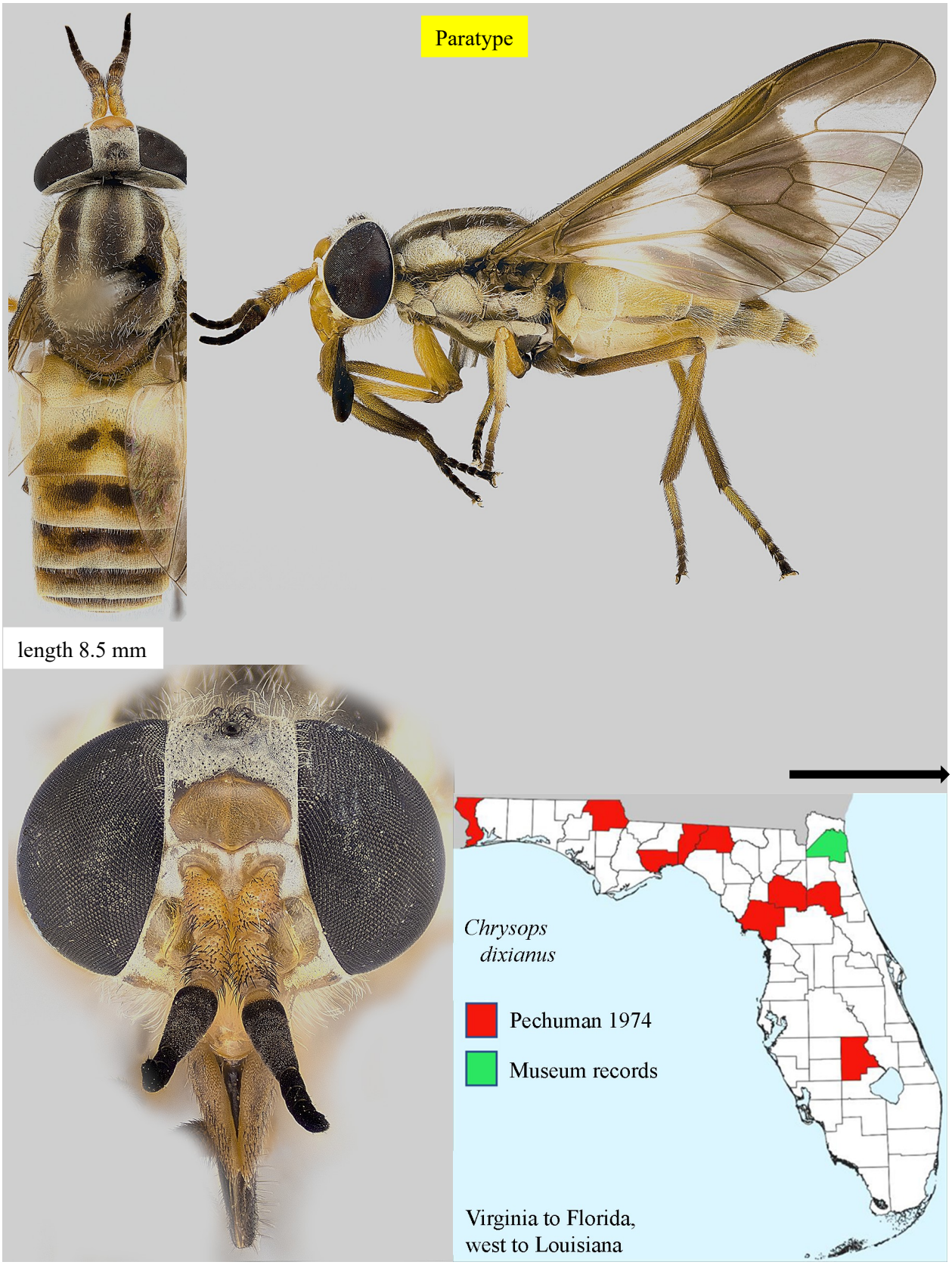


Chrysops divisus Walker

length 8-10 mm



Chrysops dixianus Pechuman

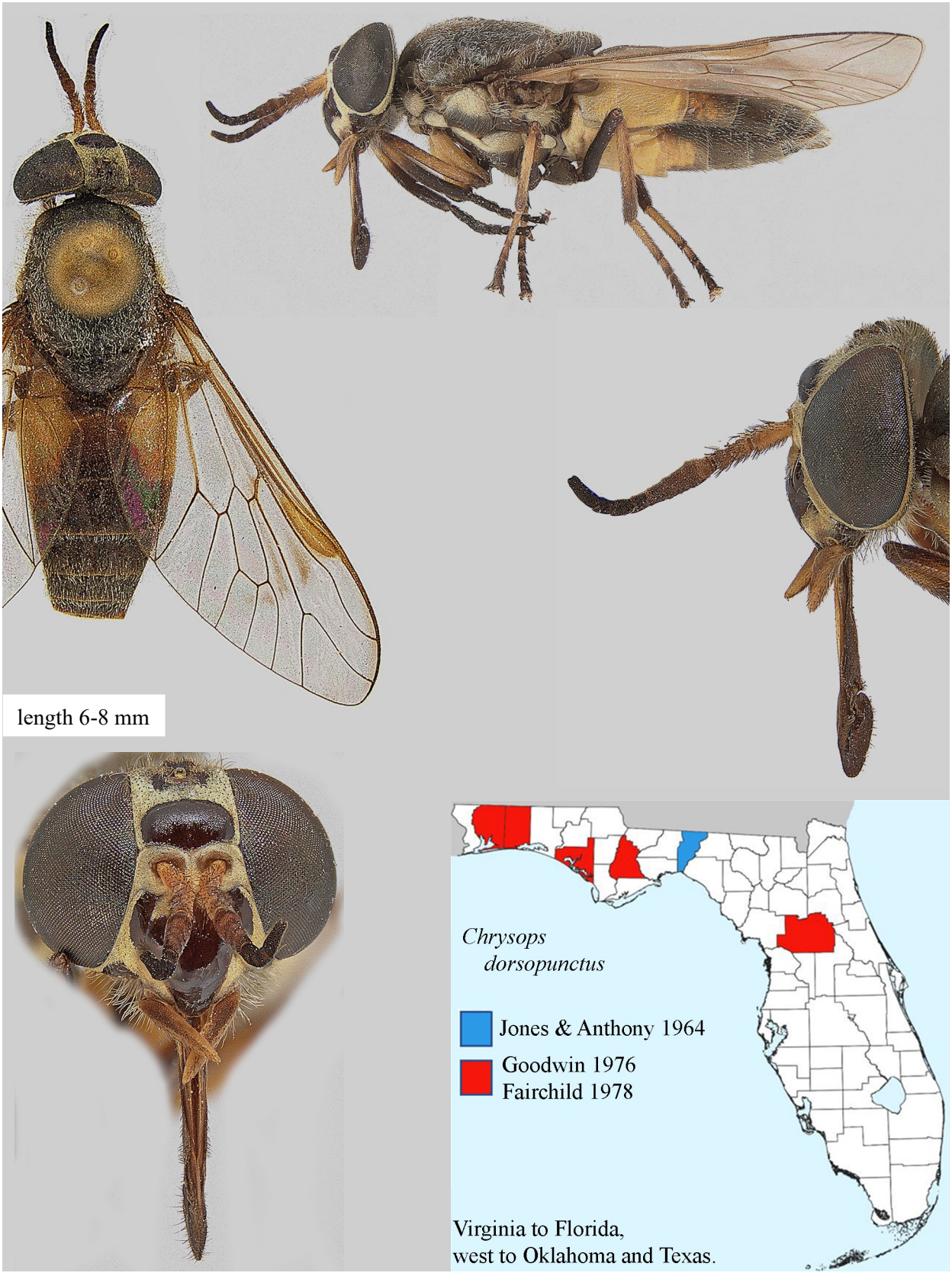


(continued) ***Chrysops dixianus*** Pechuman

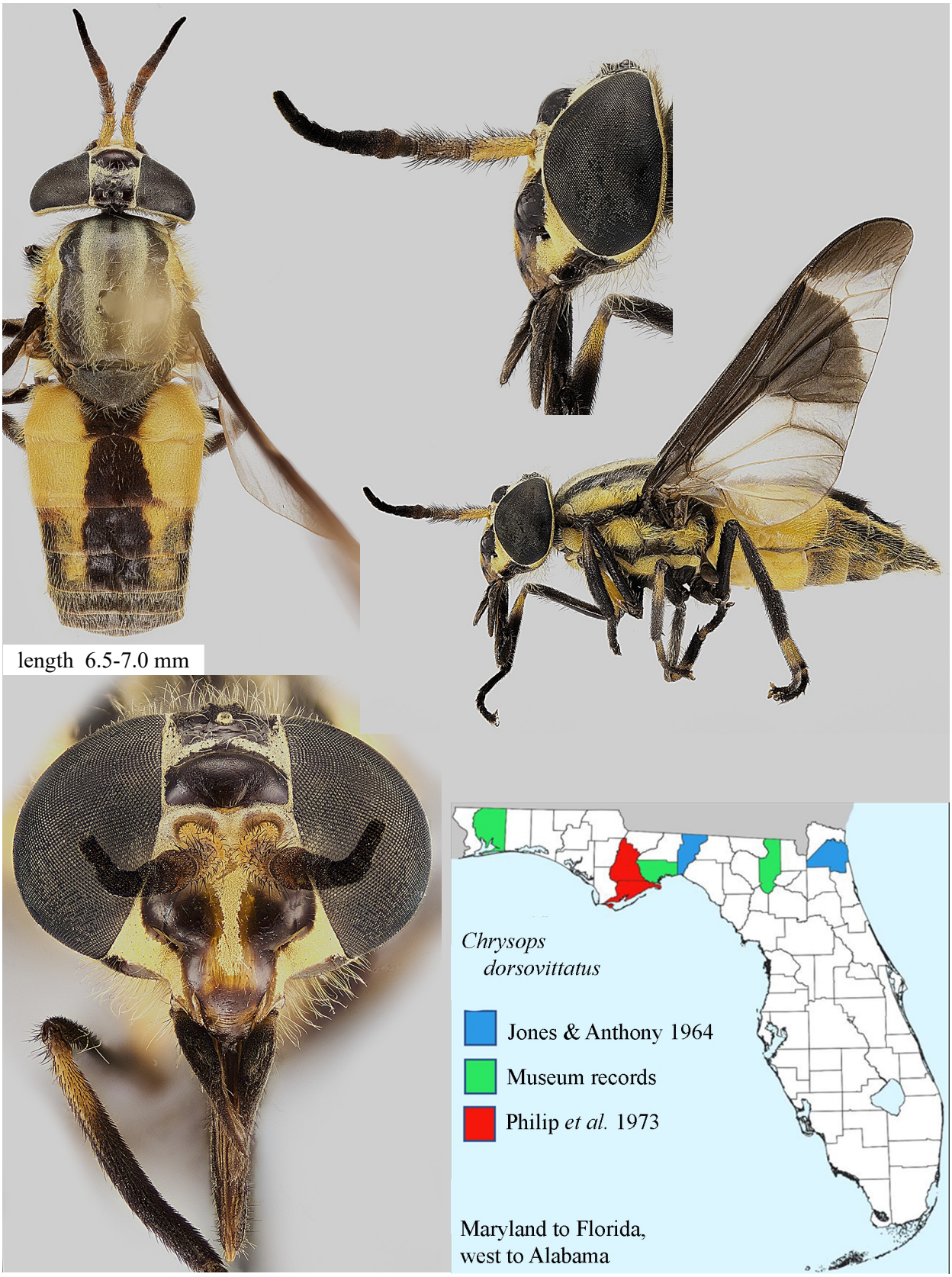
Baier (1999) described outer margin of crossband straight or convex. In the original description the crossband (photo) is definitely sinuous (Pechuman, 1974). In my 1 paratype and 17 topotypes the crossband is sinuous.

Note: the crossband does not enter the 5th posterior cell; *cf.* with *C. celatus*

Chrysops dorsopunctus Fairchild

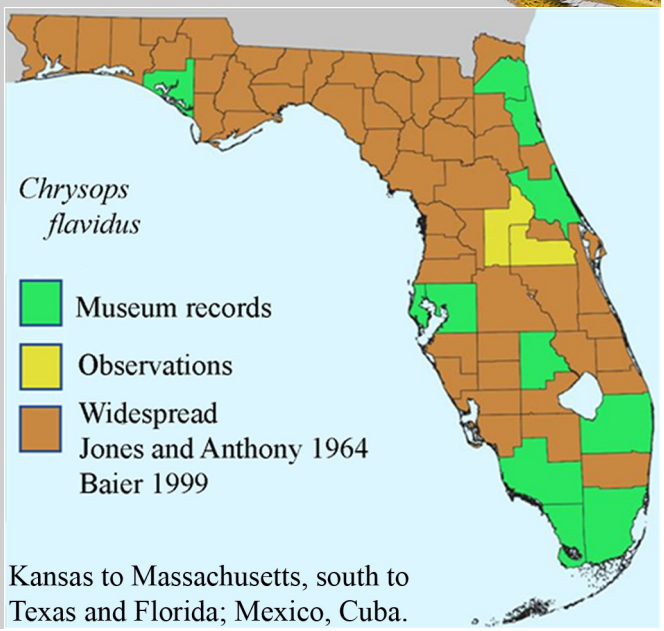


Chrysops dorsovittatus Hine

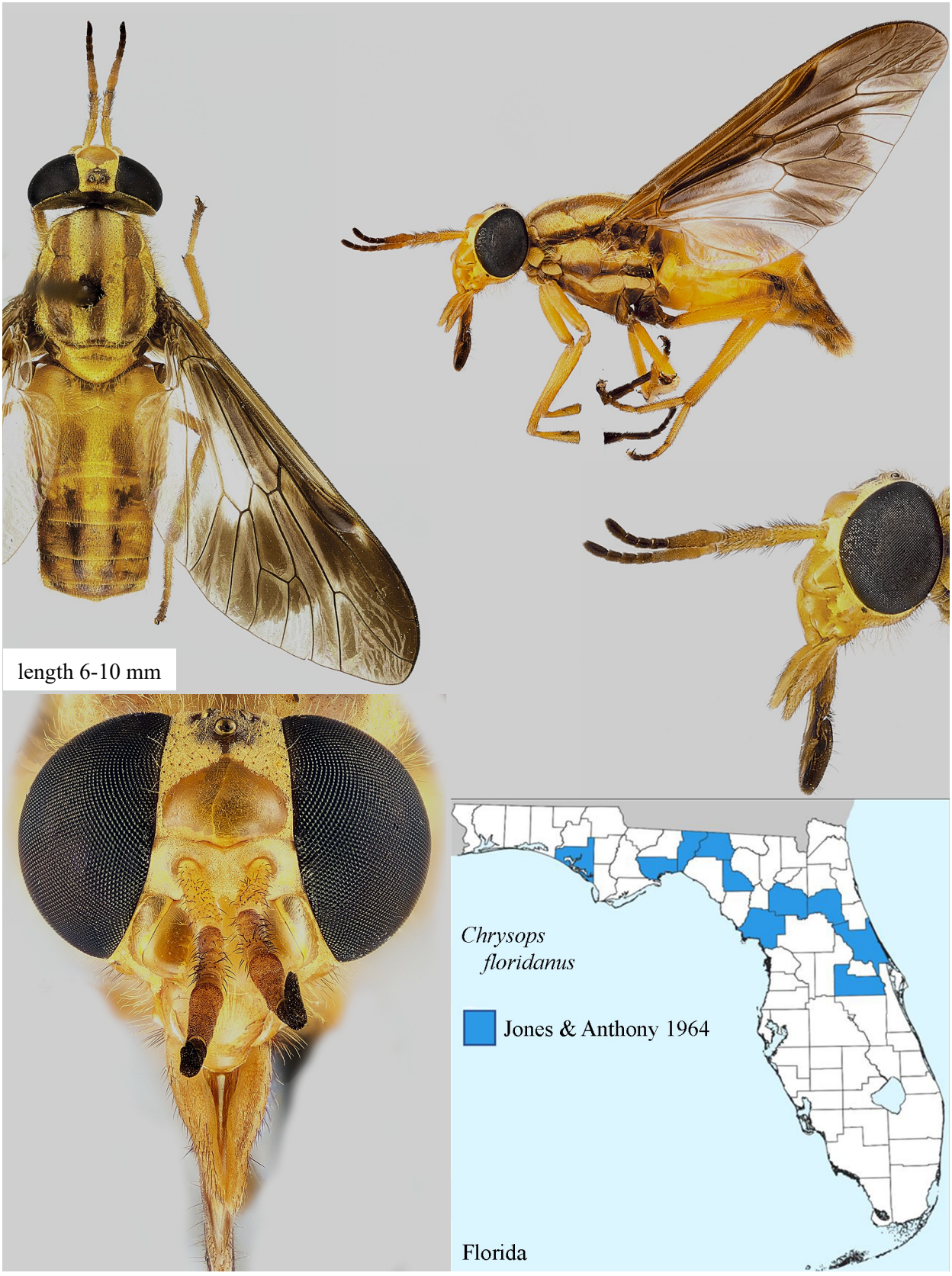


Chrysops flavidus Wiedemann

length 8-10 mm



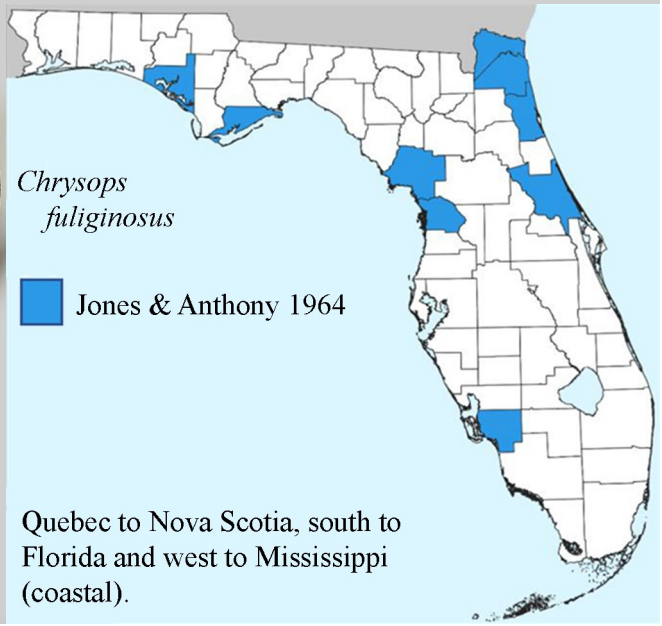
Chrysops floridanus Johnson



Chrysops fuliginosus Wiedemann

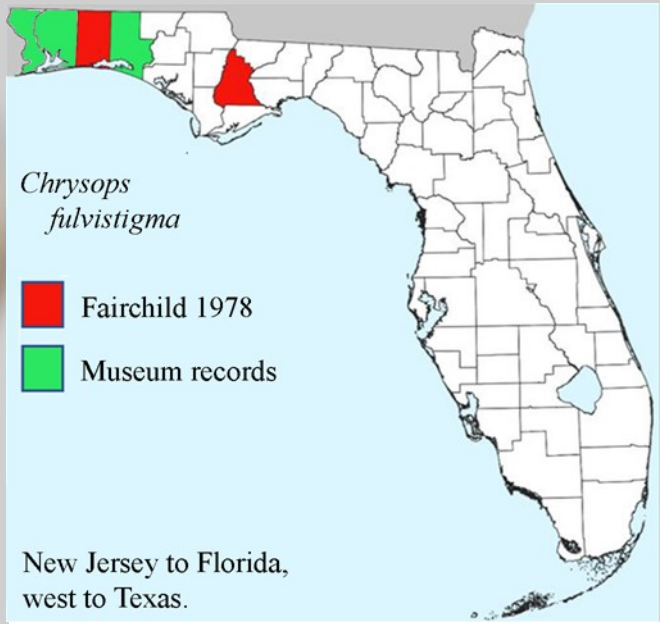
length 5.3-7.9 mm

see species B, undescribed for comparison with *fulginosus*, page 92

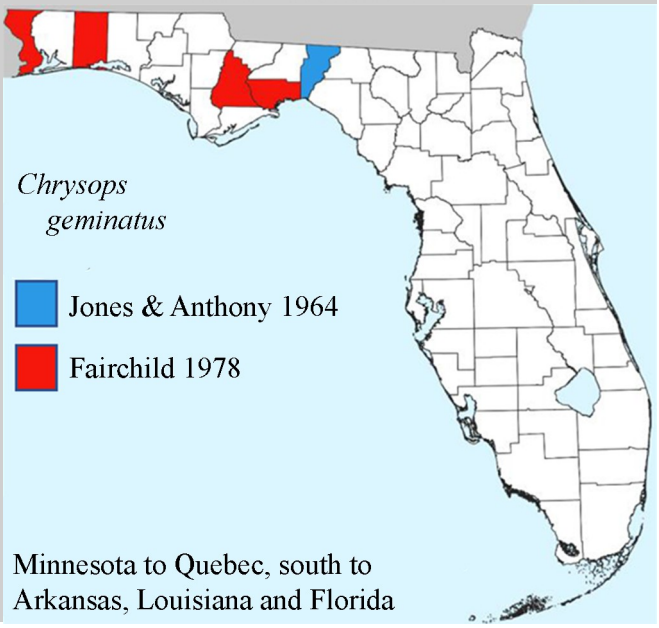


Chrysops fulvistigma Hine

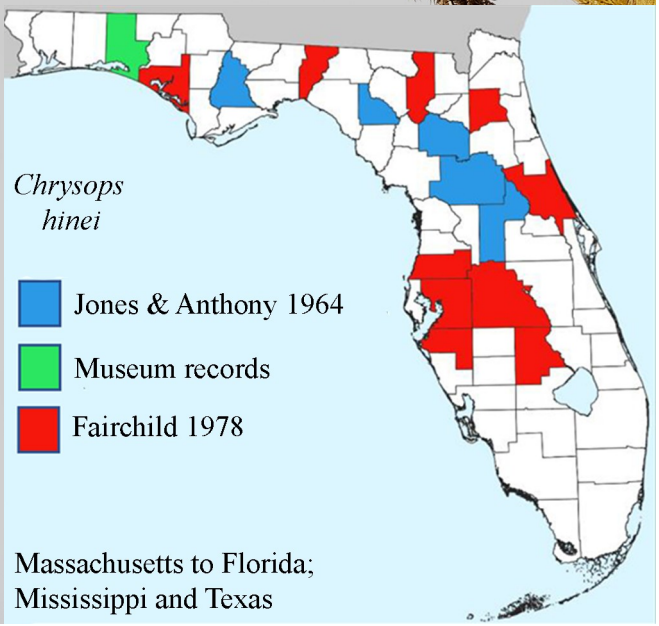
length 6-8 mm



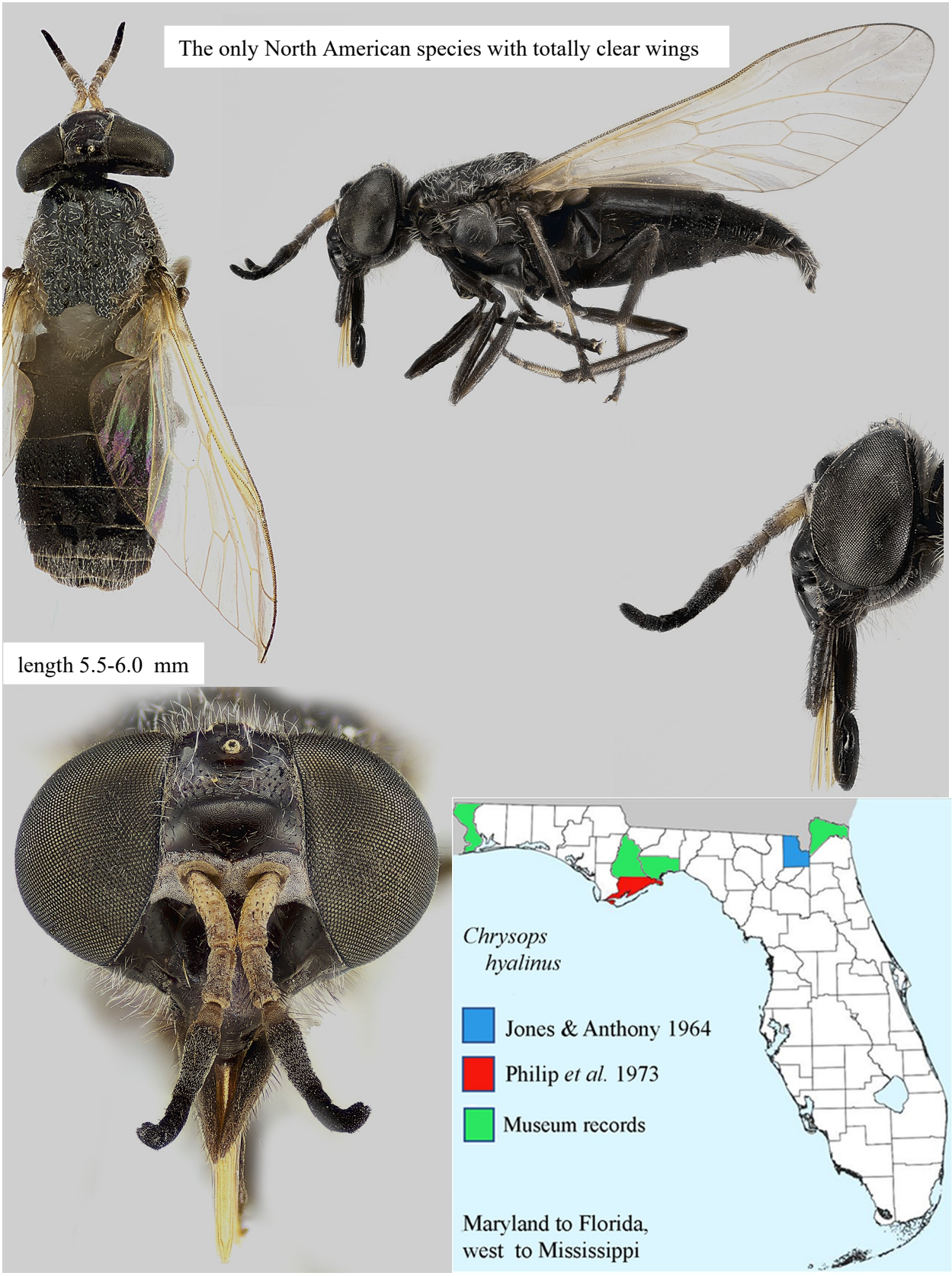
Chrysops geminatus Wiedemann



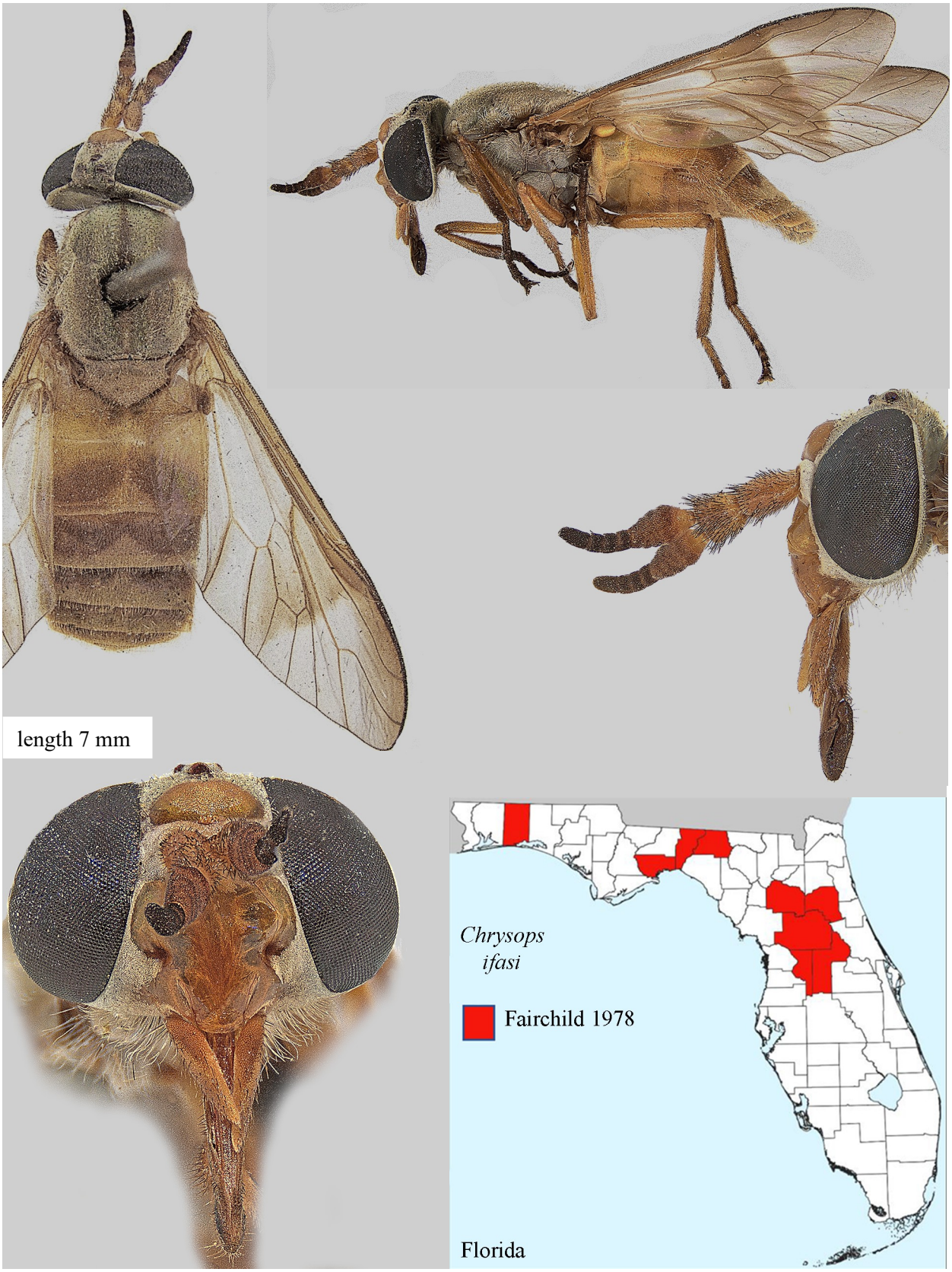
Chrysops hinei Daecke



Chrysops hyalinus Shannon

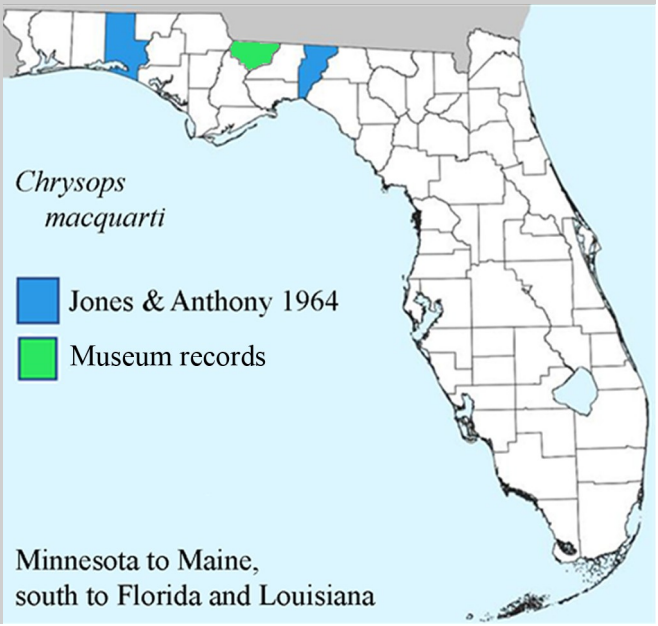


Chrysops ifasi Fairchild



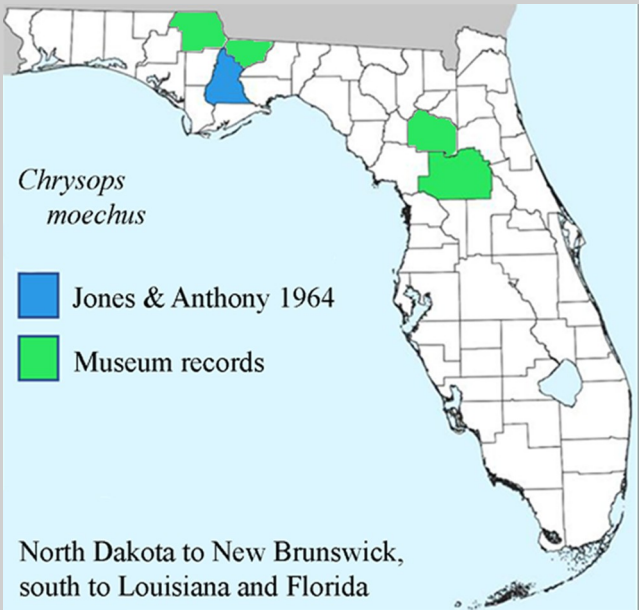
Chrysops impunctus Krober

Chrysops macquarti Philip

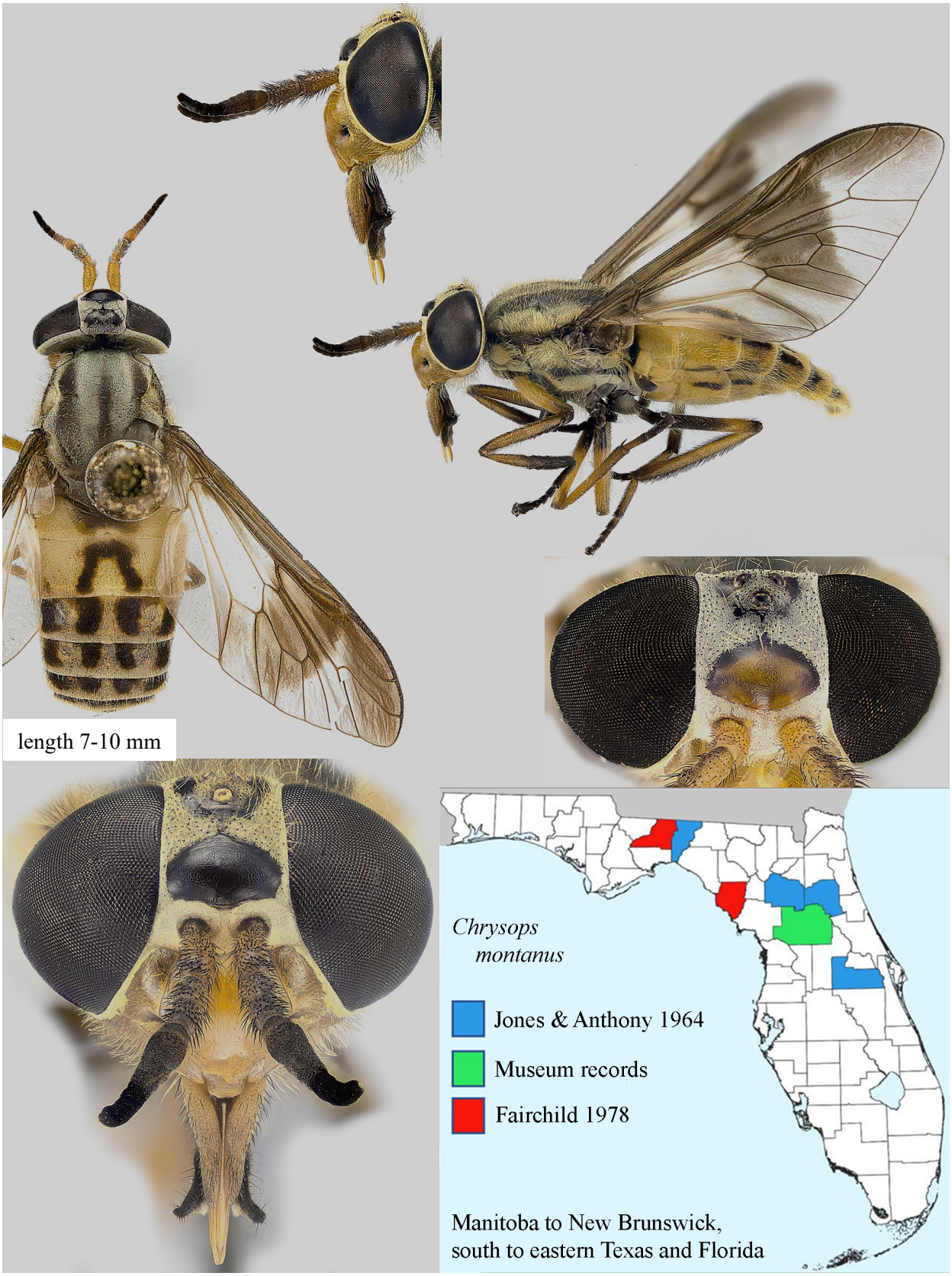


Chrysops moechus Osten Sacken

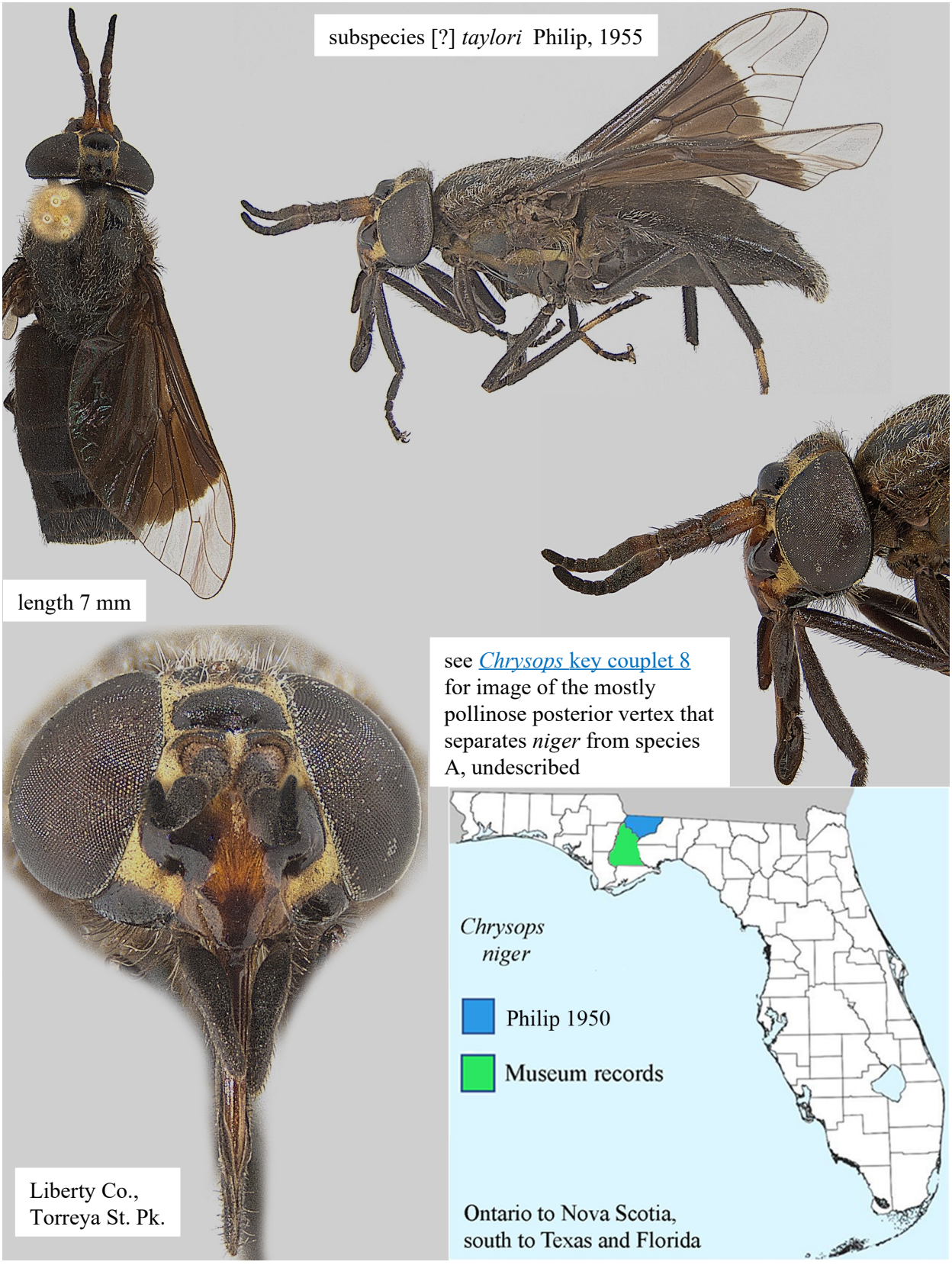
length 7-10 mm



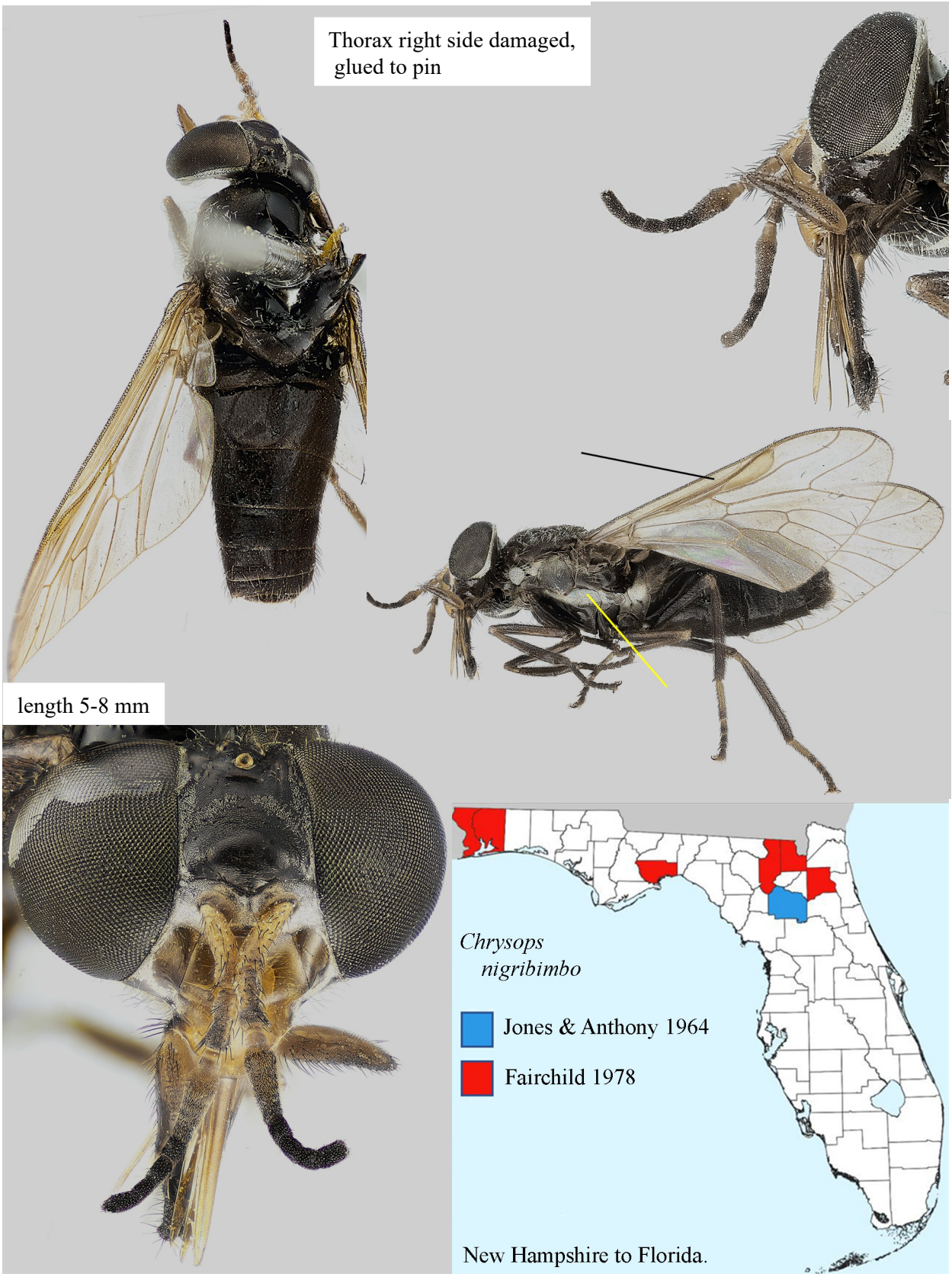
Chrysops montanus Osten Sacken



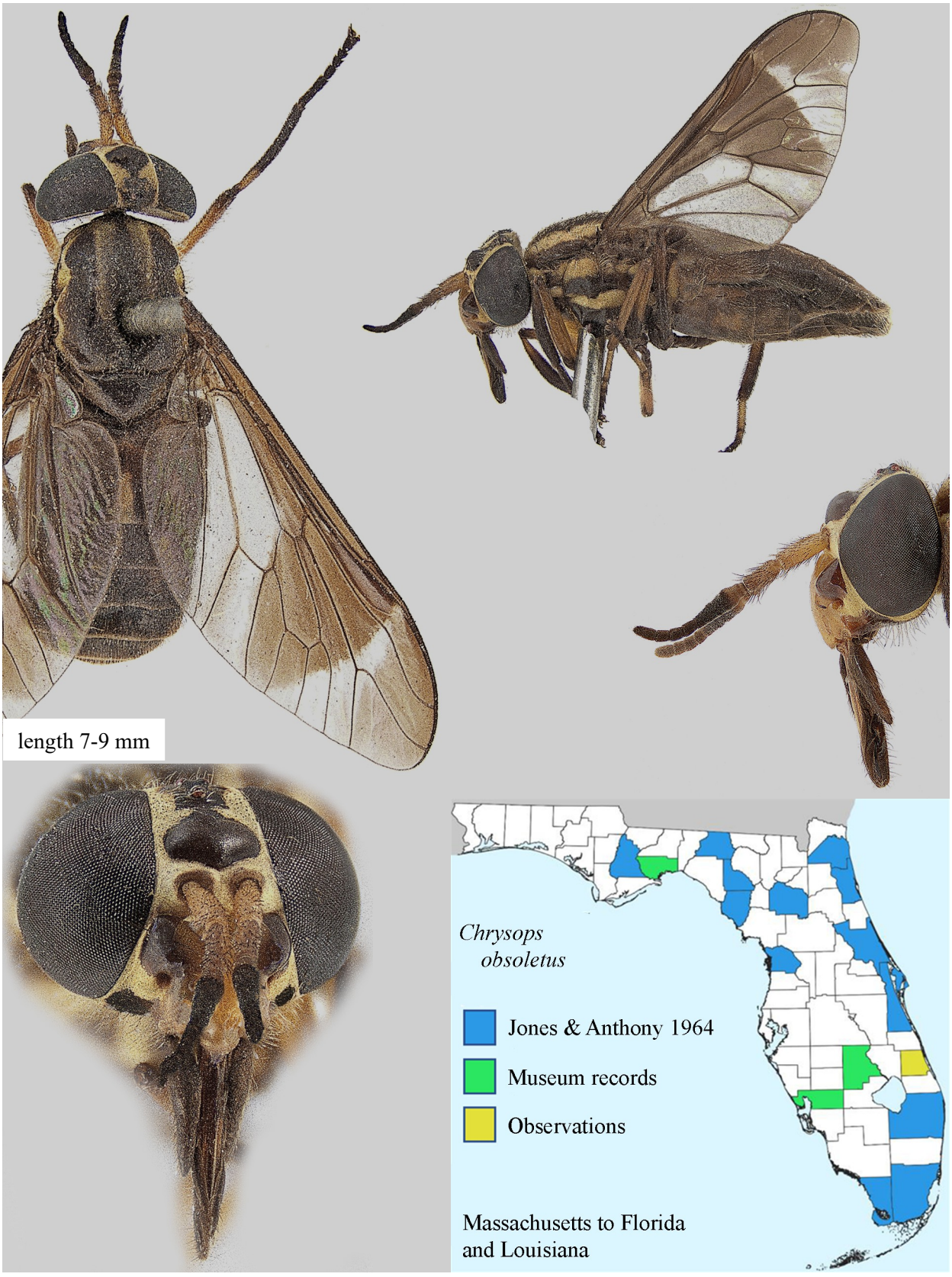
Chrysops niger Macquart



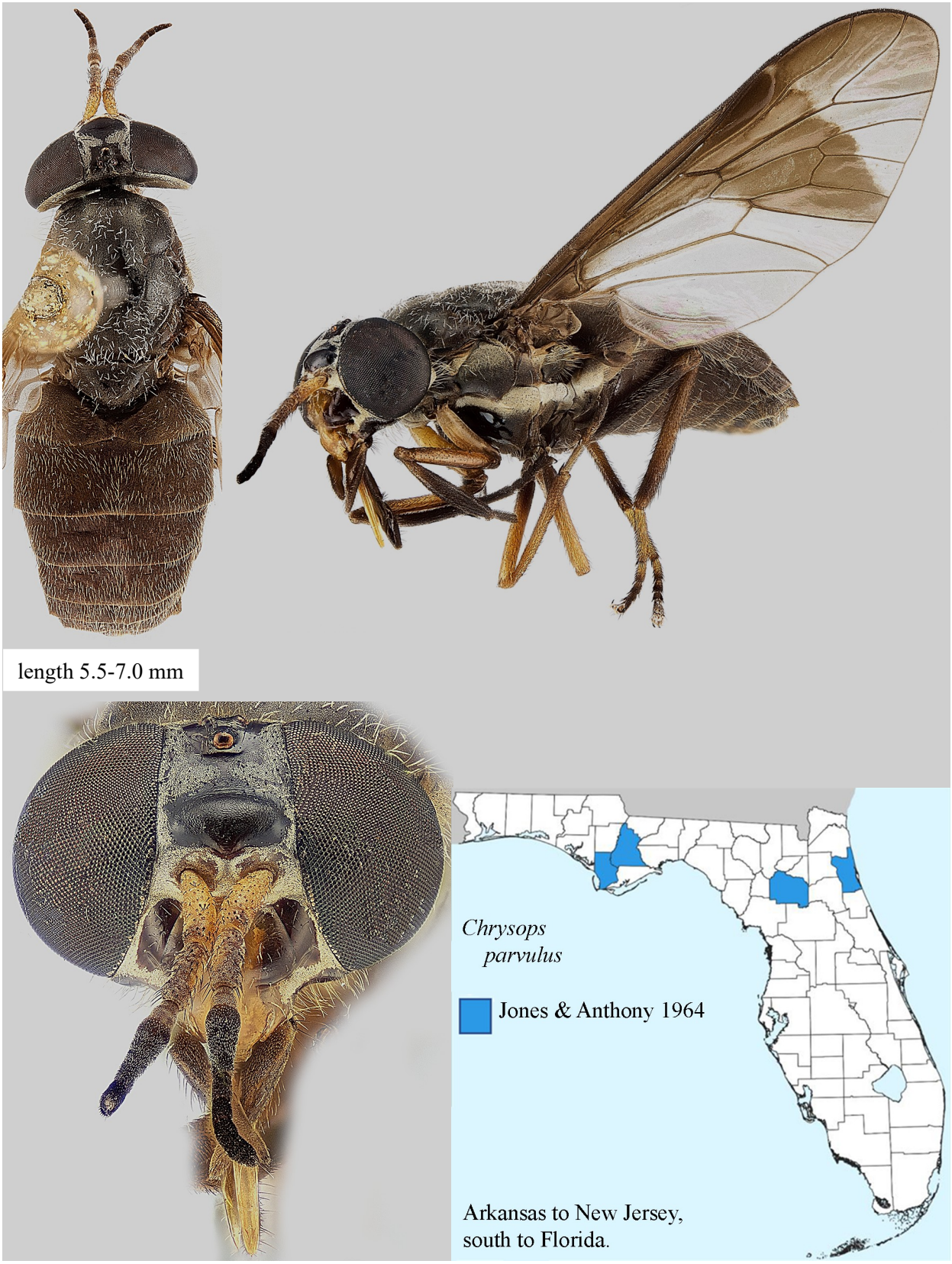
Chrysops nigribimbo Whitney



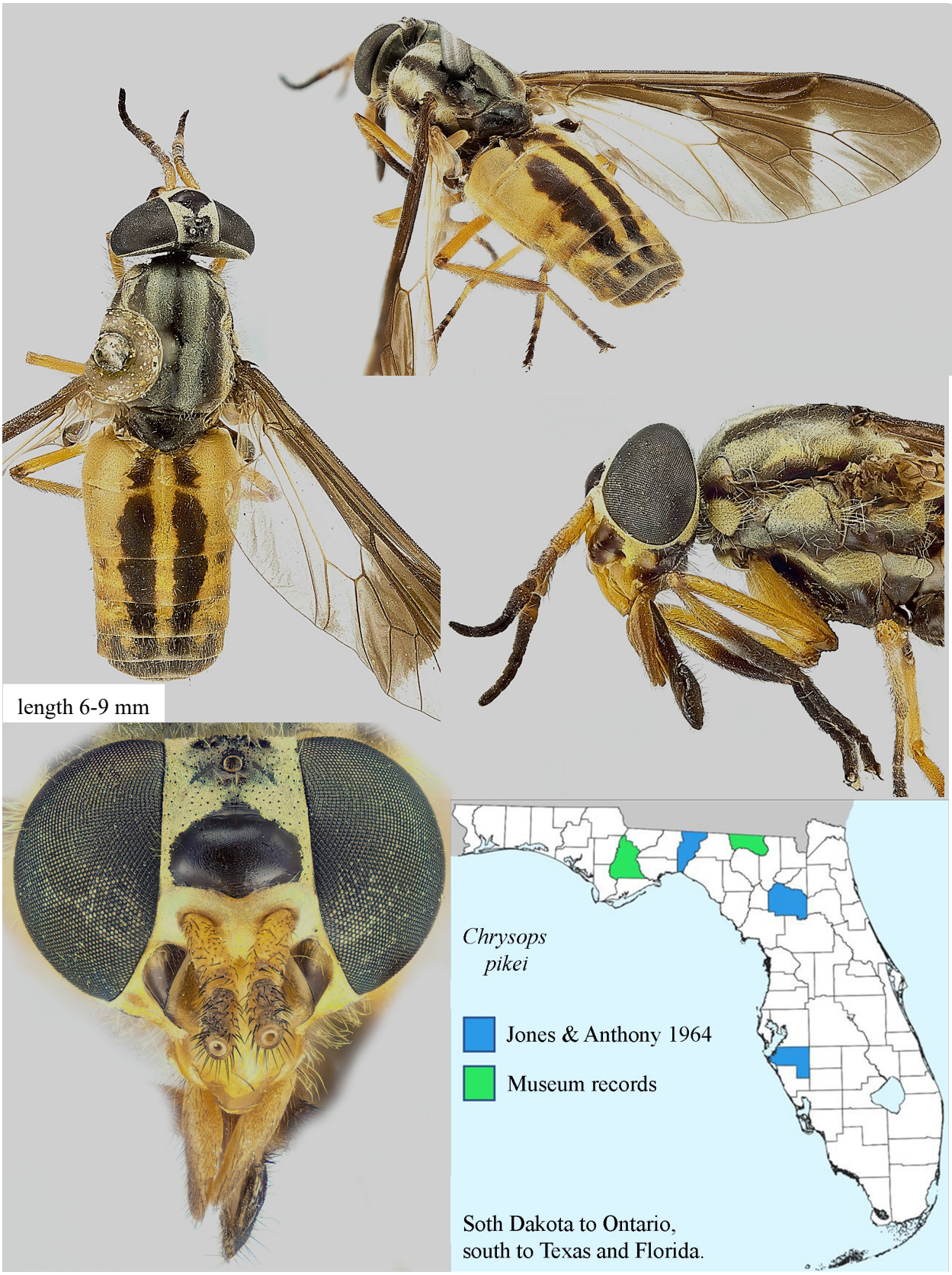
Chrysops obsoletus Wiedemann



Chrysops parvulus Daecke

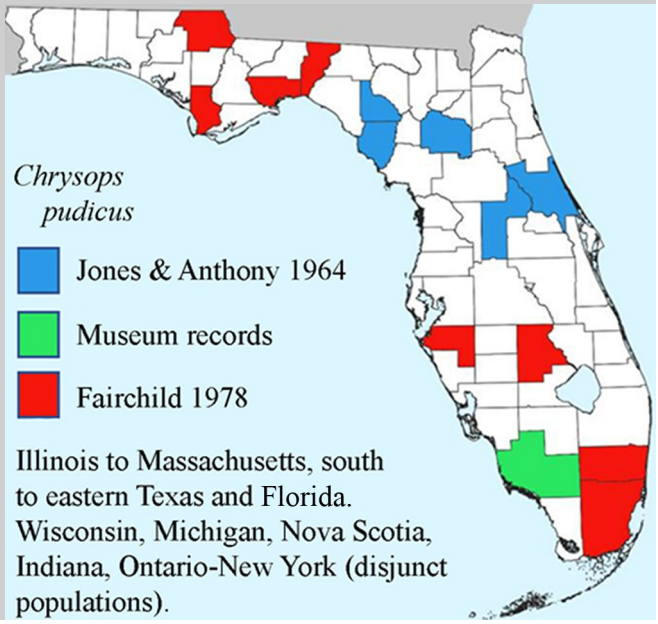


Chrysops pikei Whitney

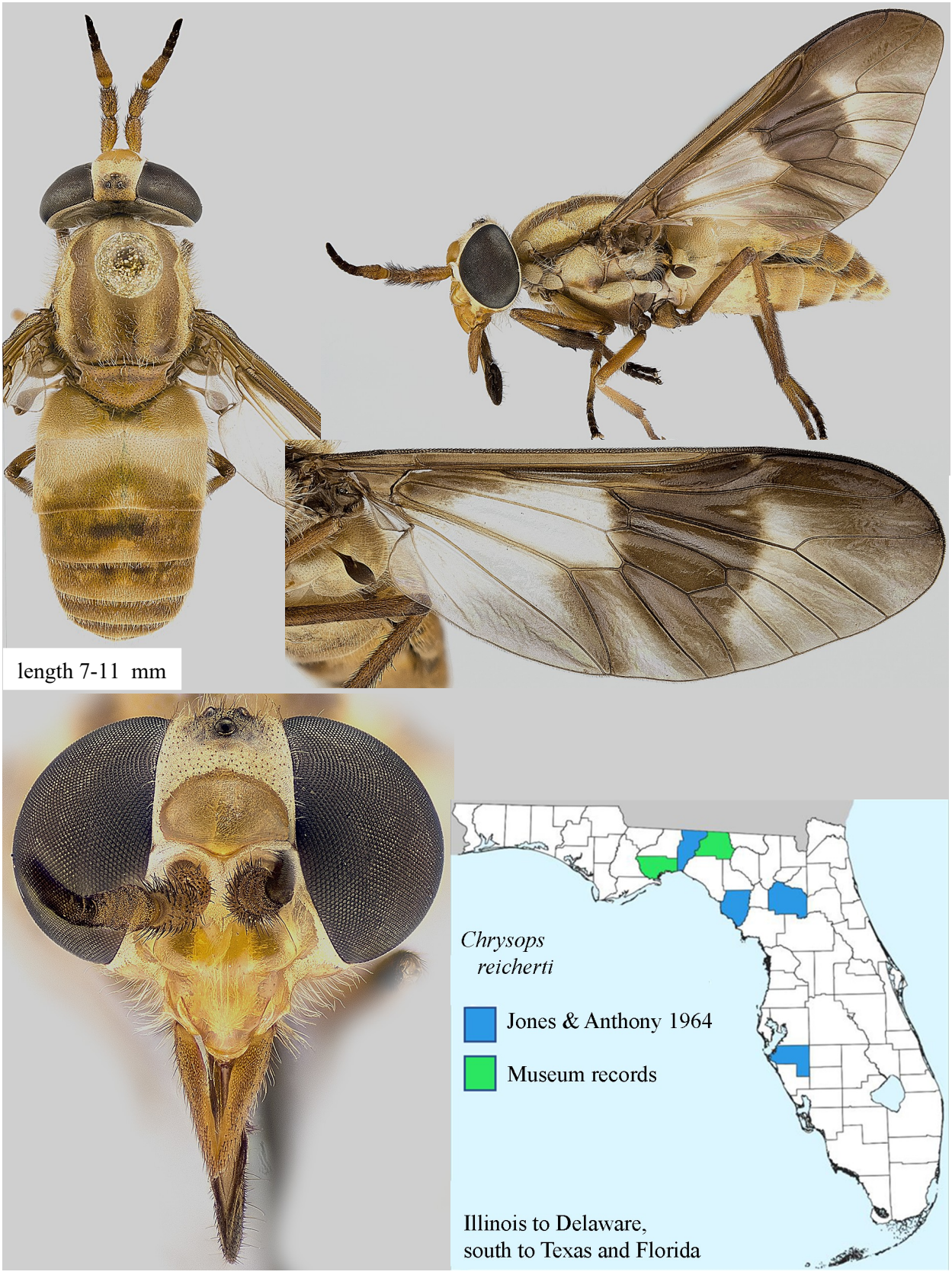


Chrysops pudicus Osten Sacken

length 7.0-8.5 mm

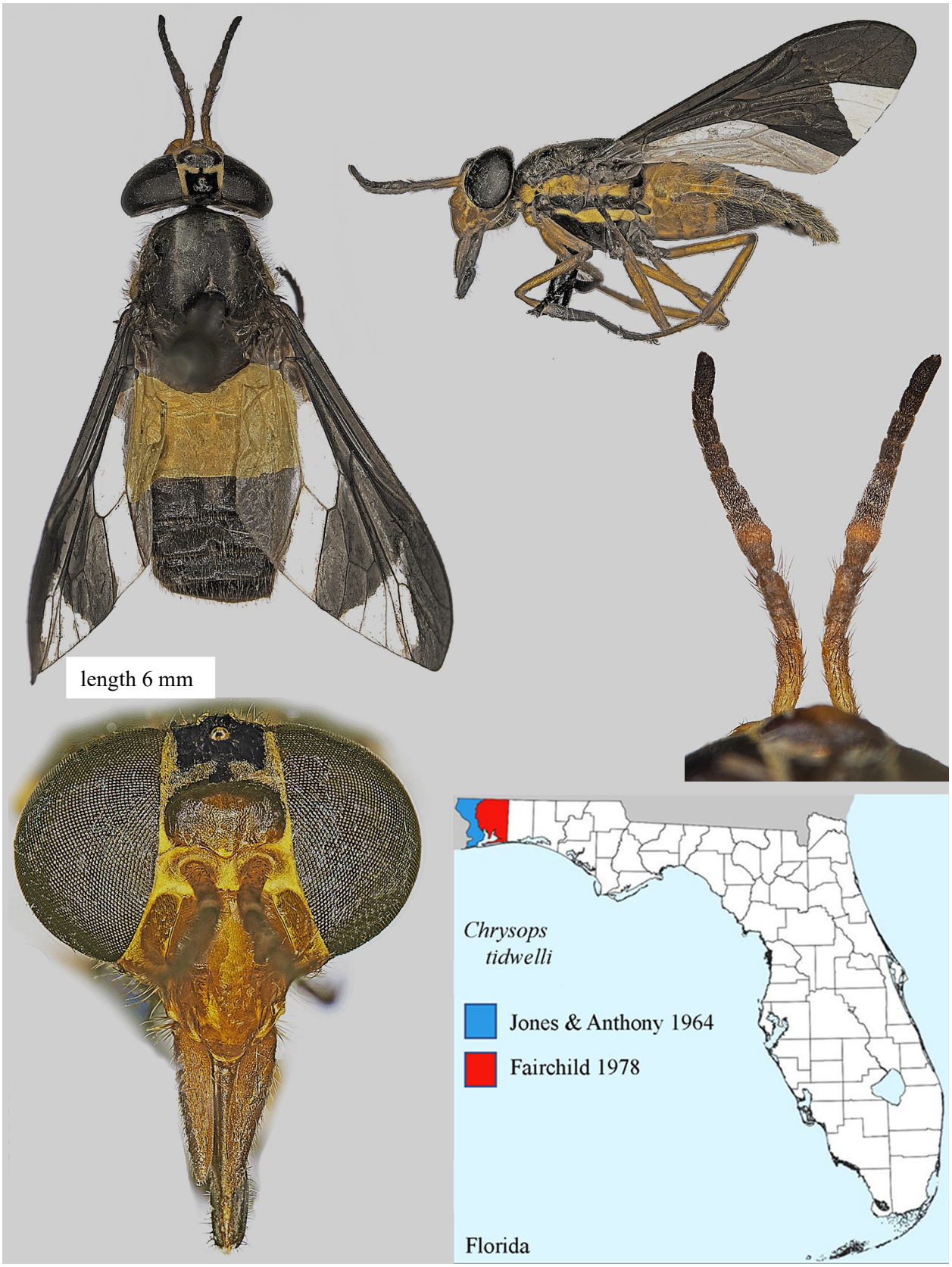


Chrysops reicherti Fairchild



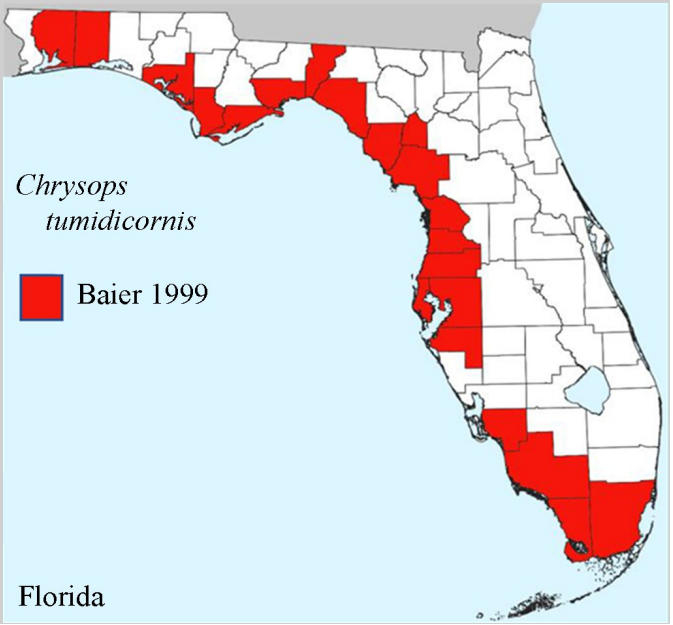
Chrysops sandyi Baier

Chrysops tidwelli Philip & Jones



Chrysops tumidicornis Baier

length 5.8-8.0 mm

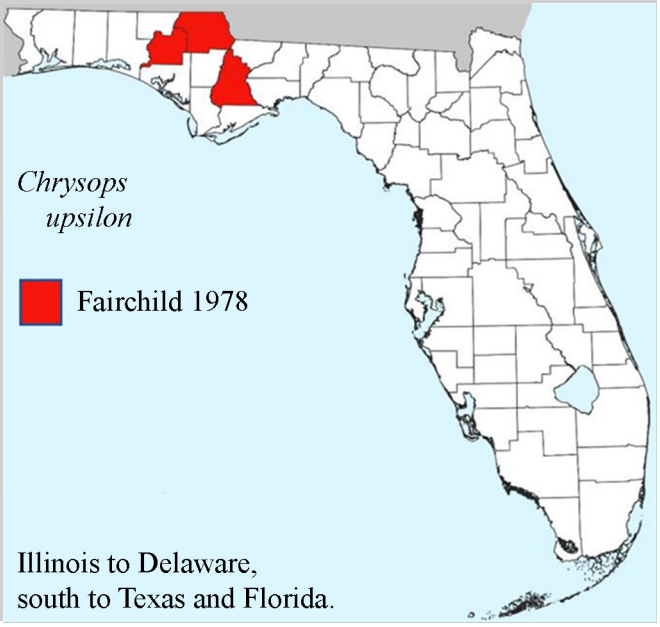


Chrysops univittatus Macquart

length 6.0-8.5 mm

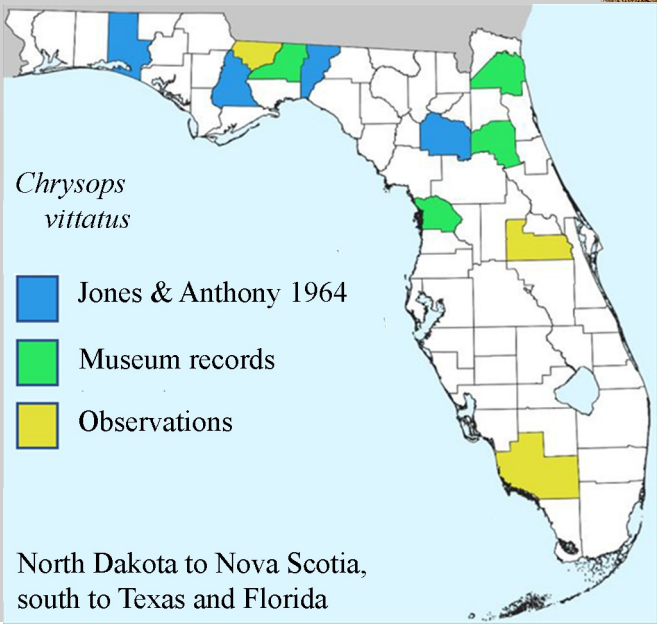
Chrysops upsilon Philip

length 7-9 mm



Chrysops vittatus Wiedemann

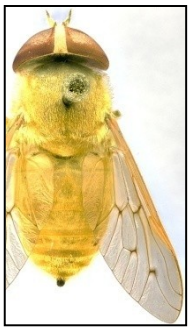
length 6-10 mm



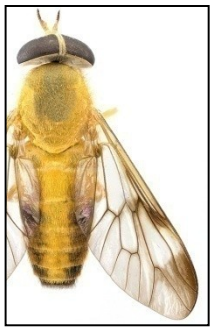
Tabaninae: Genus identification plate

Agkistrocerus

Anacimas



Chlorotabanus



Diachlorus

Haematopota

Hamatabanus

Hybomitra

Leucotabanus

Microtabanus

Stenotabanus (*Aegialomyia*)

Tabanus →

Whitneyomyia

Tabaninae, keys to females, followed by species pages

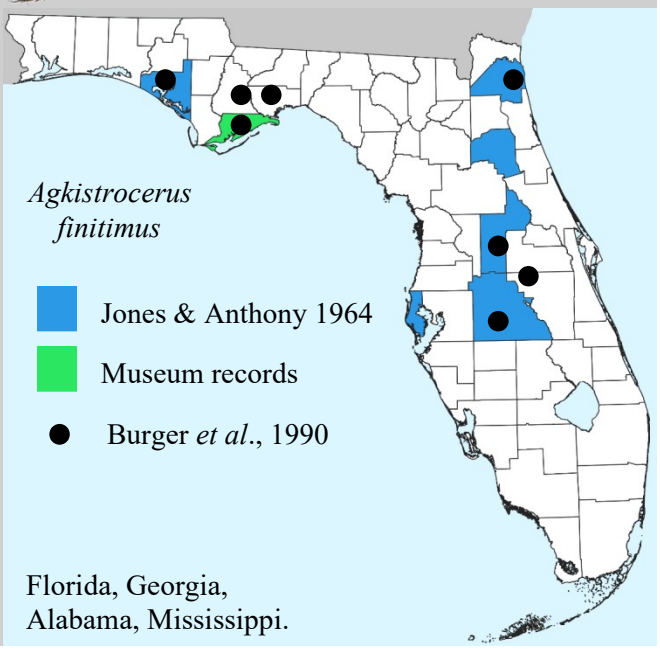
Agkistrocerus: two species in Florida. **Tabaninae**

1 Median callus a very slender line. Hair on lateral margins of tergite 4 white. Wing base hyaline .....*finitimus*

-- Median callus broad. Hair on lateral margins of tergite 4 entirely black. Wing base infuscated .....*megerlei*

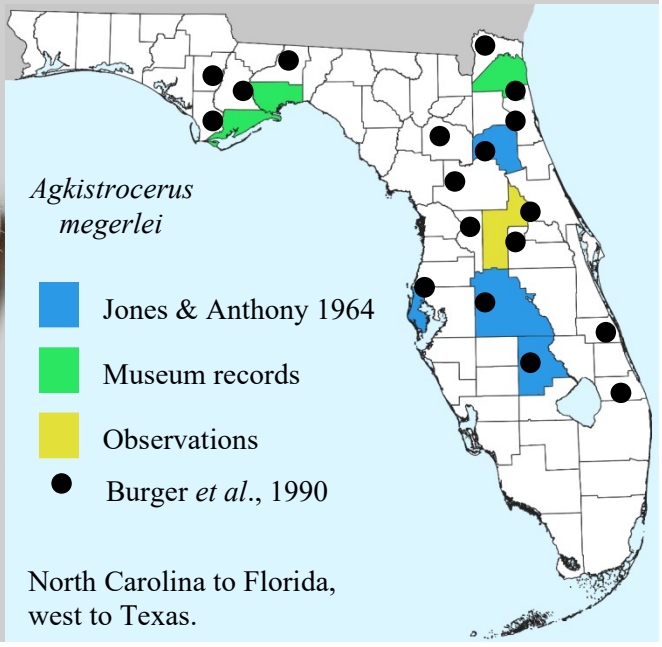
Agkistrocerus finitimus (Stone)

length 18 mm



Agkistrocerus megerlei (Wiedemann)

length 16-20 mm

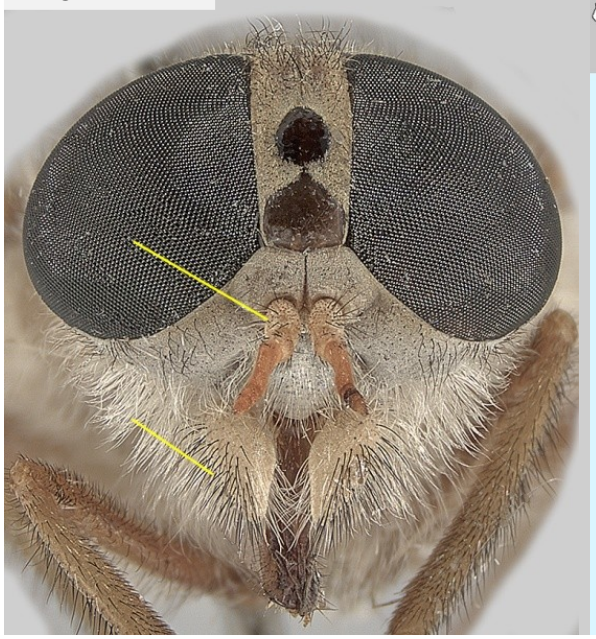


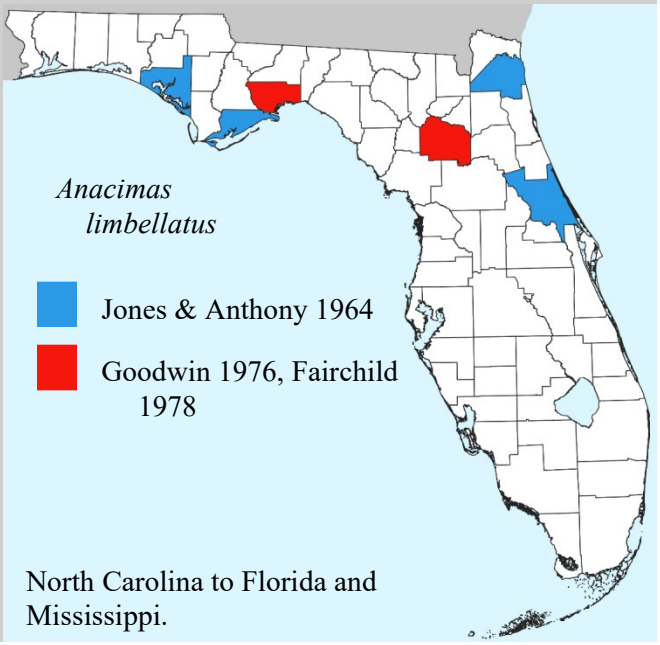
(continued)	**Keys to females, followed by species pages**

Anacimas: one species in Florida. **Tabaninae**

Anacimas limbellatus Enderlein

length: 13 mm





(continued)	**Keys to females, followed by species pages**

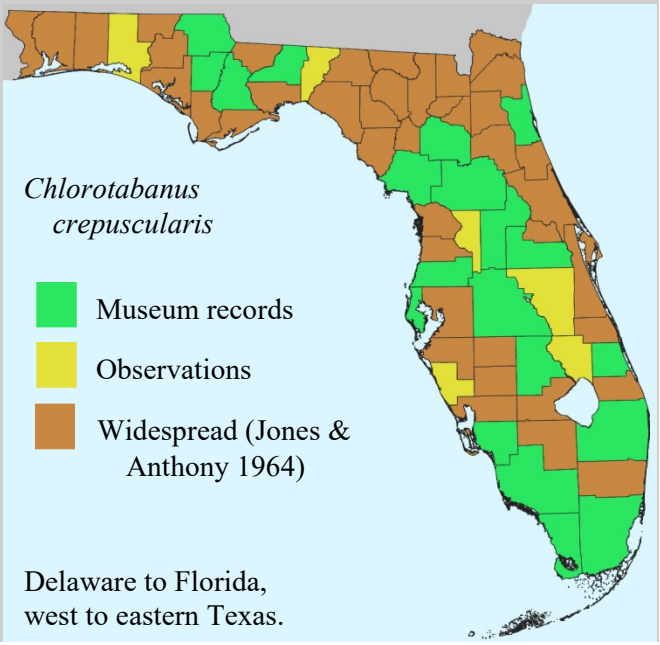
Chlorotabanus: two species in Florida **Tabaninae**

1 Wing lightly spotted, no spots at margins of 2nd and 3rd longitudinal veins .....*crepuscularis*

-- Wing with heavier spots, spots at margins of 2nd and 3rd longitudinal veins .....*mexicanus*

Chlorotabanus crepuscularis (Bequaert)

length 13-16 mm



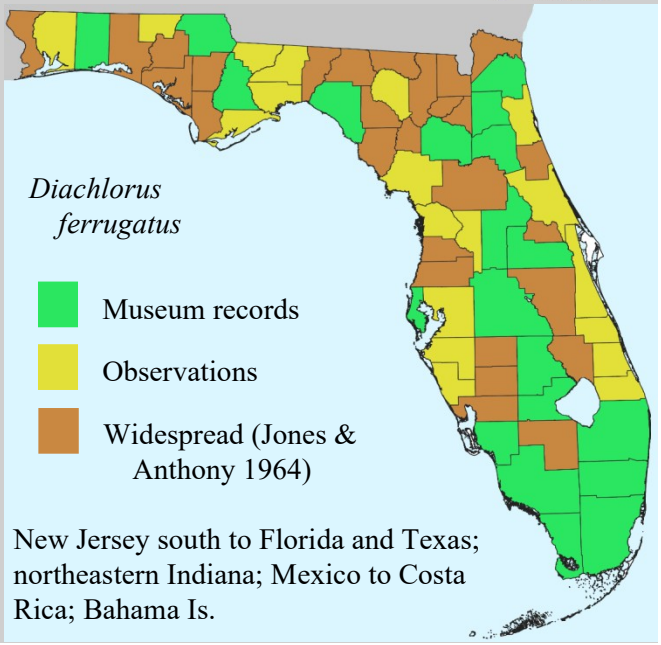
Chlorotabanus mexicanus (Linnaeus)

(continued)	**Keys to females, followed by species pages**

Diachlorus: one species in Florida. **Tabaninae**

Diachlorus ferrugatus (Fabricius)

length 7-10 mm

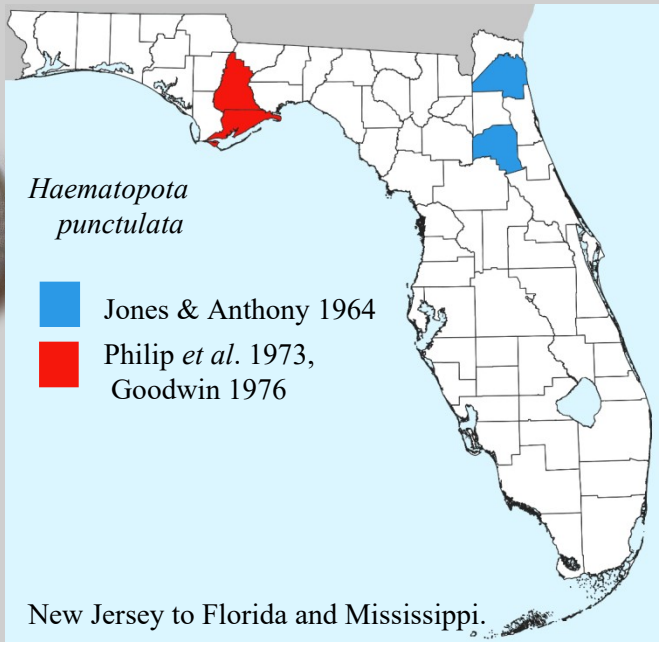


(continued)	**Keys to females, followed by species pages**

Haematopota: one species in Florida. **Tabaninae**

Haematopota punctulata (Macquart)

length 6-7 mm

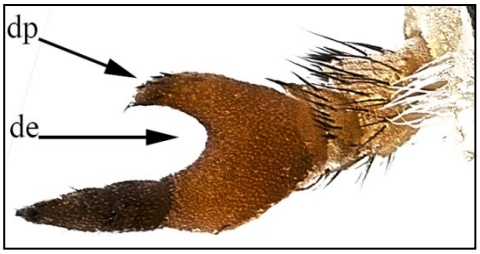


(continued)	**Keys to females, followed by species pages**

Hamatabanus: four species in Florida. **Tabaninae**

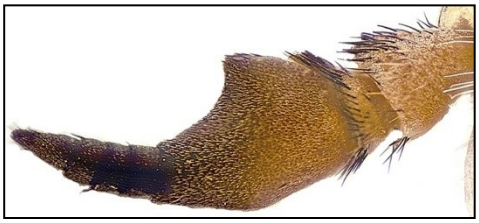
1 Antenna basal plate with a long dorsal process (dp) resulting in a deep dorsal excavation (de) [*annularis, carolinensis*] **2**

-- Antenna basal plate with an obvious dorsal angle but which does not form a long dorsal process, dorsal excavation shallow or lacking [*exilipalpis, floridensis*] **3**



annularis

carolinensis



exilipalpis

floridensis

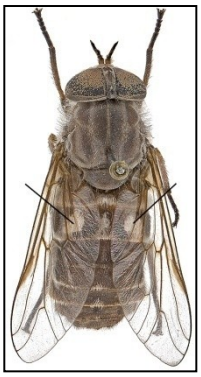
2(1) Abdomen boldly marked in orange and black .....*annularis*

-- Abdomen uniformly grayish brown with sublateral gray patches on tergite 2 .....*carolinensis*

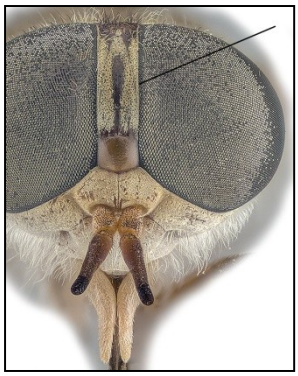
3(1) Frons nearly parallel-sided, about 4x as high as wide at base. Antenna basal plate with prominent dorsal angle, dorsal excision shallow (image couplet 1--) .....*exilipalpis*

-- Frons narrowed at vertex, just over 2x as high as wide. Dorsal angle of antenna basal plate more rounded and obtuse, no dorsal excision (image couplet 1--) .....*floridensis*

annularis



carolinensis

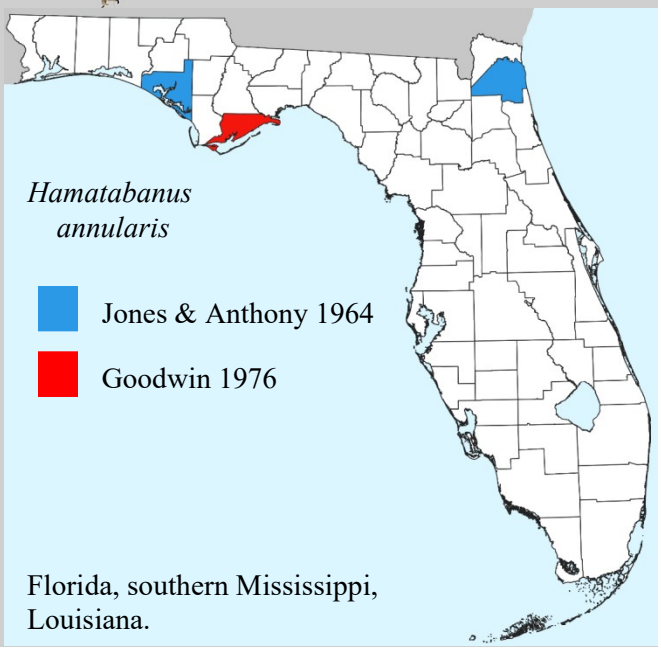


exilipalpis

floridensis

Hamatabanus annularis (Hine)

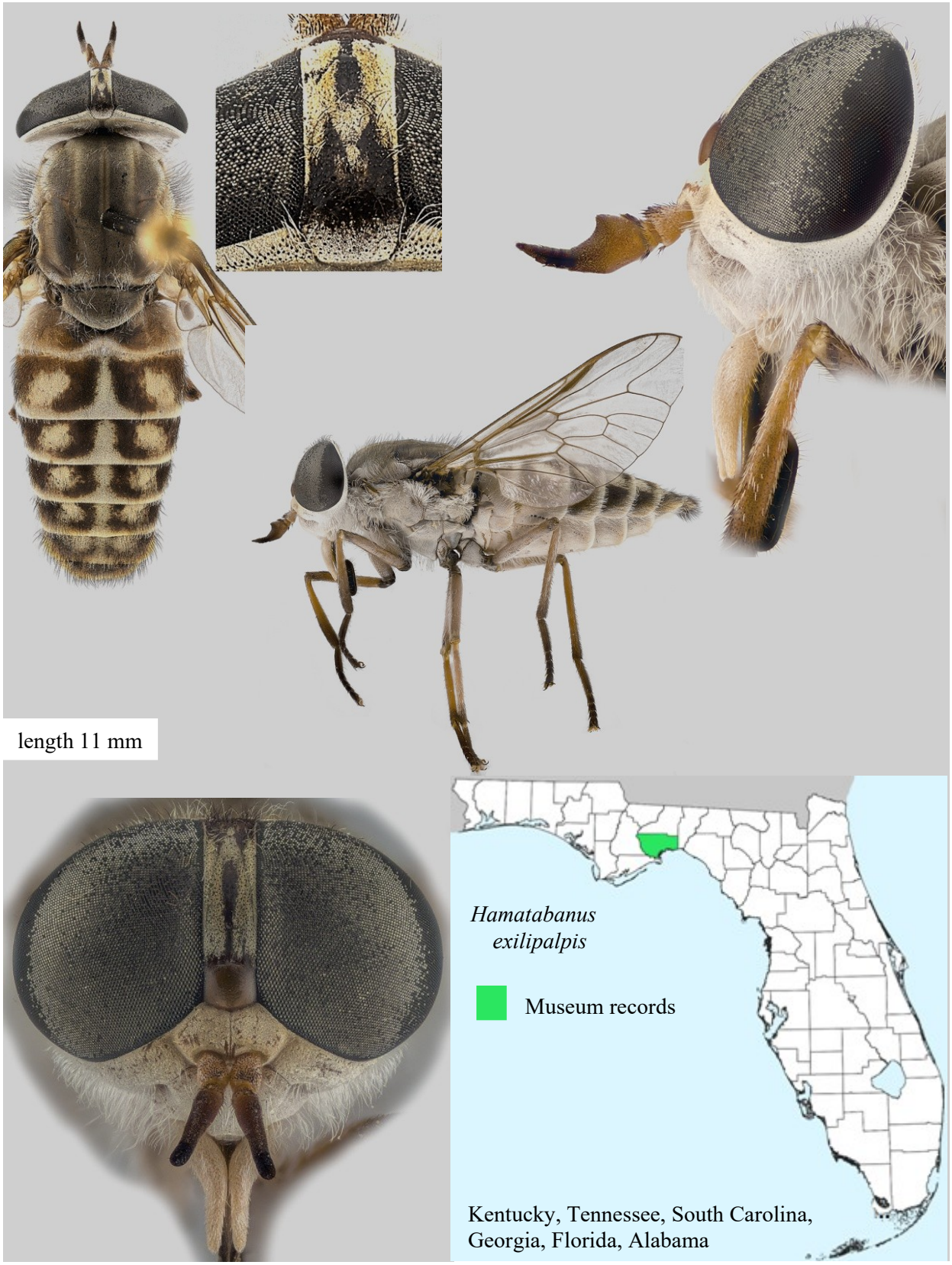
length 10-12 mm



Hamatabanus carolinensis (Macquart)

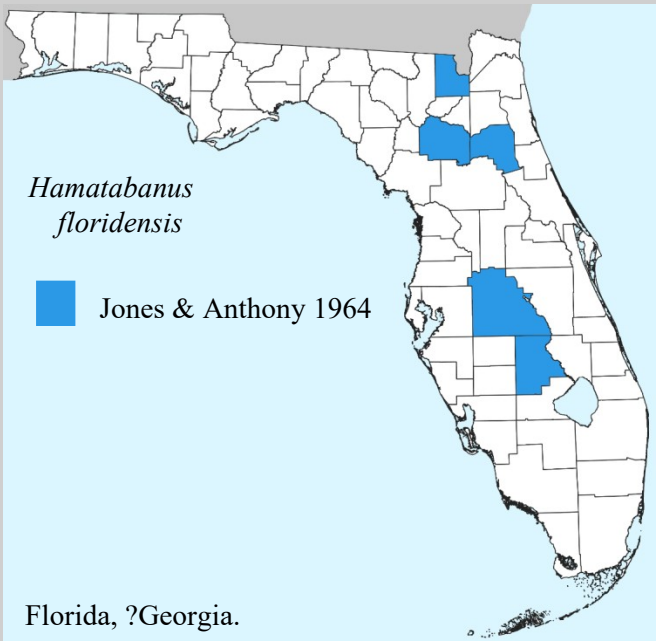
length 13-17 mm

Hamatabanus exilipalpis (Stone)



Hamatabanus floridensis (Hine)

length 10-12 mm



(continued)	**Keys to females, followed by species pages**

Hybomitra: four species in Florida. **Tabaninae**

1 Abdomen dorsally black and yellow. Unique in FL ..... *cincta*

-- Abdomen not black and yellow **2**

2(1) Abdomen black with white median triangles. Wing heavily infuscated. Unique in FL ..... *trispila*

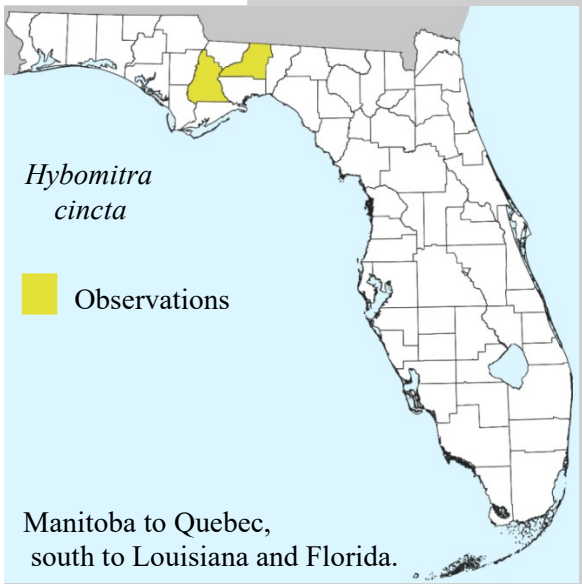
-- Not as above **3**

3(2) Frontal calli shiny black. Lower cheeks shiny black. Basal five-sixths of wings infuscated ..... *hinei*

-- Frontal calli brown. Lower cheeks with pale hairs. Wing hyaline ..... *difficilis*

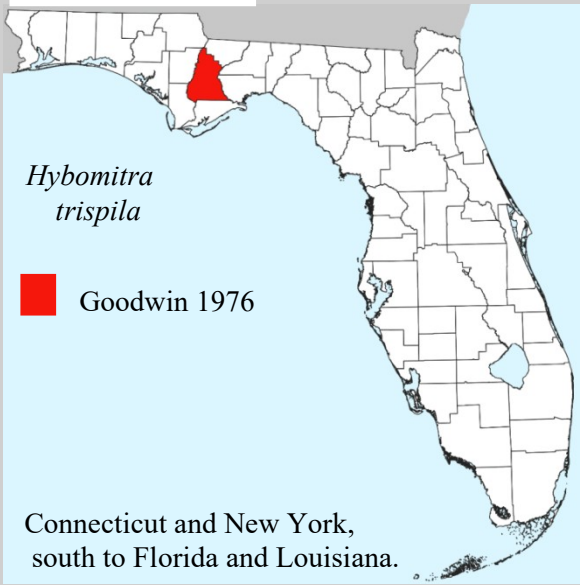
Hybomitra cincta (Fabrius)

length 19-22 mm



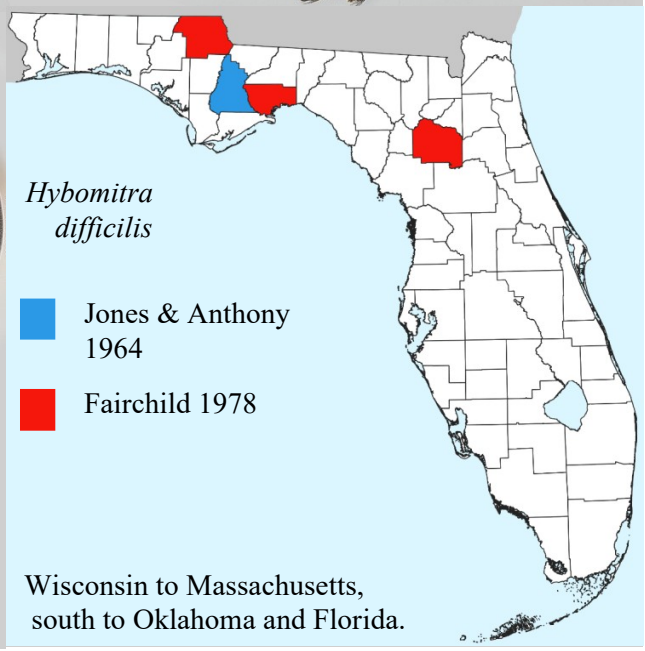
Hybomitra trispila (Wiedemann)

length 13-16 mm

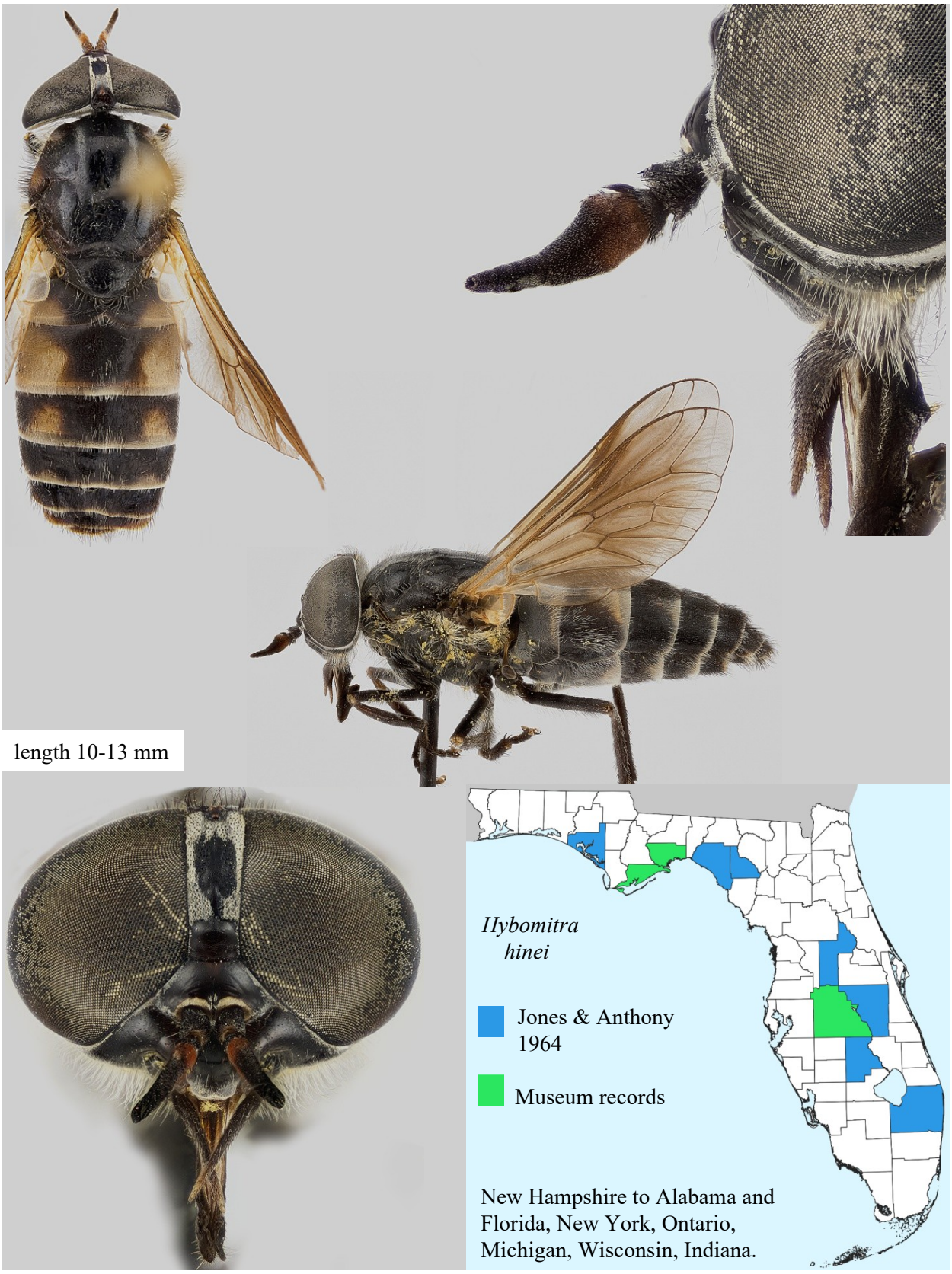


Hybomitra difficilis (Wiedemann)

length 12-15 mm



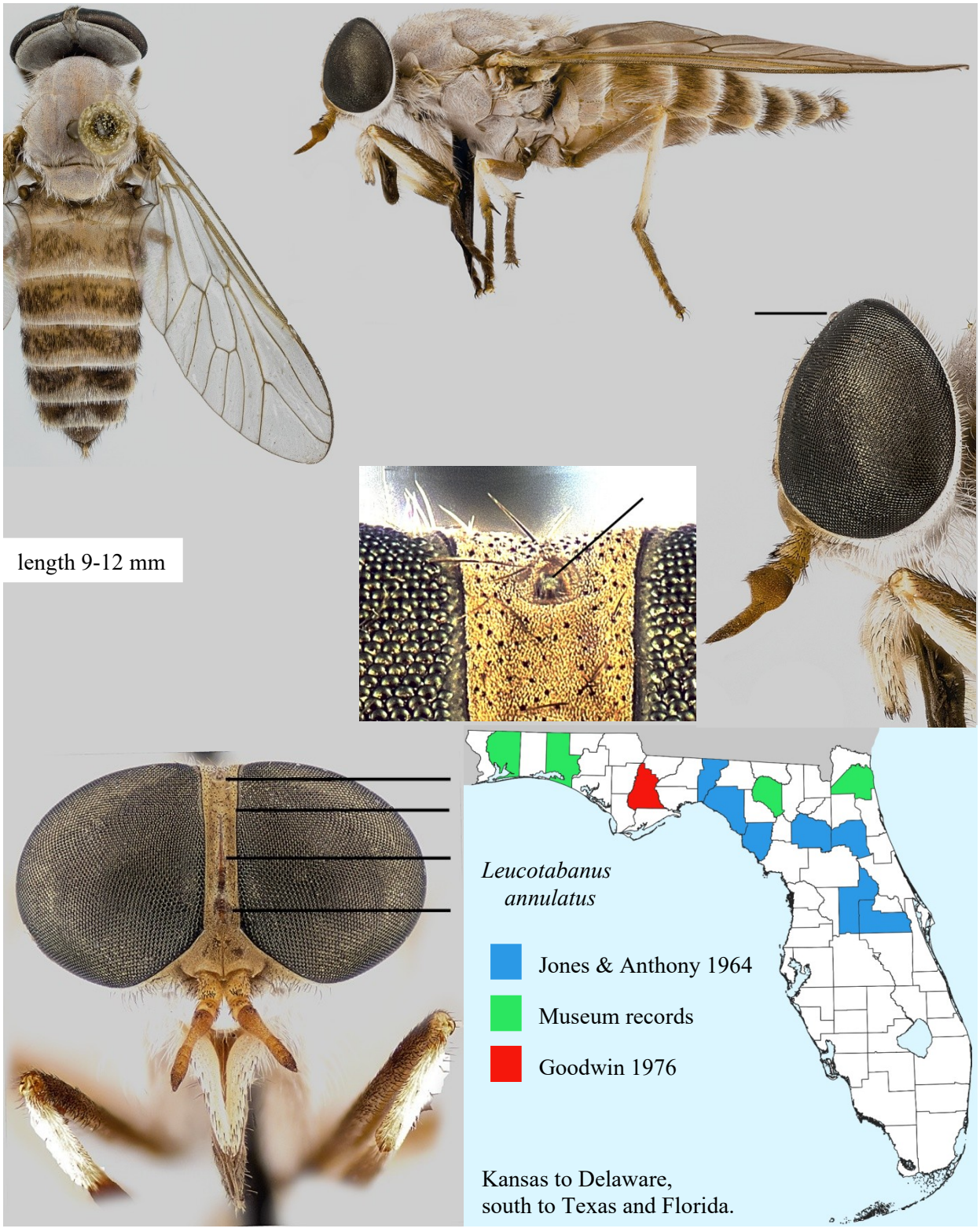
Hybomitra hinei (Johnson)



(continued)	**Keys to females, followed by species pages**

Leucotabanus: one species in Florida. **Tabaninae**

Leucotabanus annulatus (Say)



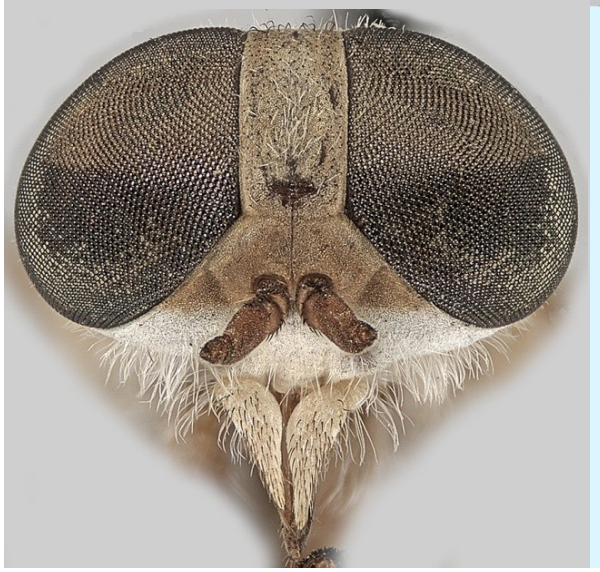
(continued)	**Keys to females, followed by species pages**

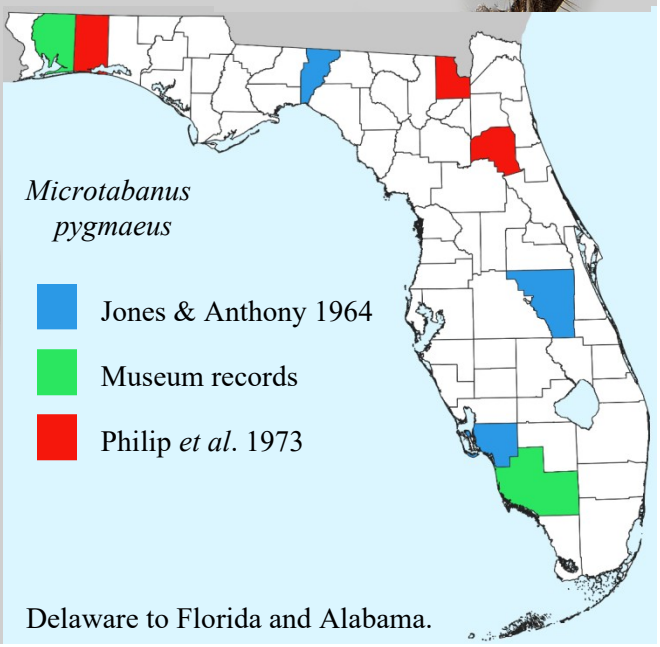
Microtabanus: one species in Florida

Tabaninae

Microtabanus pygmaeus (Williston)

length 7-9 mm





(continued)	**Keys to females, followed by species pages**

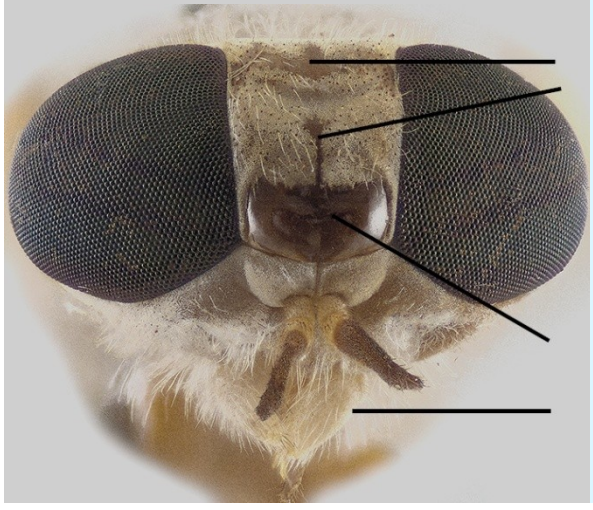
***Stenotabanus* (*Aegialomyia*)**: two species in Florida. **Tabaninae**

1 Frons <2x as high as wide. Median callus present.
Vertex with horizontal shiny band .....*magnicallus*

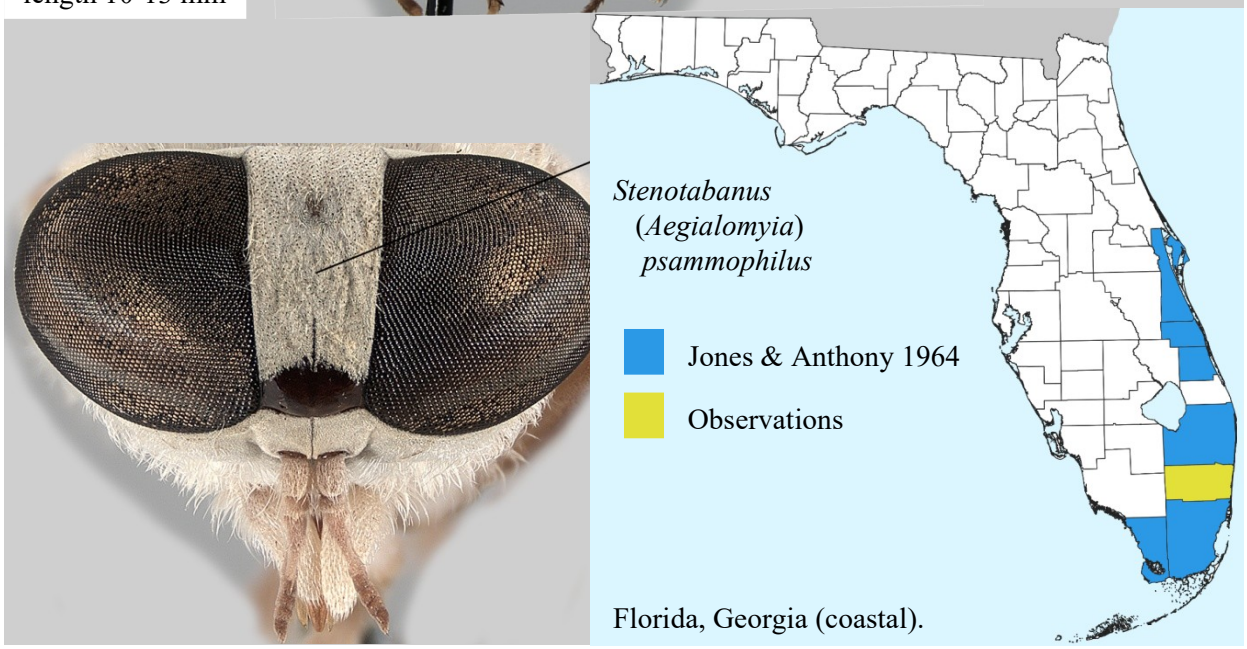
-- Frons >2x as high as wide. No median callus. Vertex lacking shiny band .....*psammophilus*

Stenotabanus* (*Aegialomyia*) *magnicallus (Stone)

length 11-14 mm



Stenotabanus* (*Aegialomyia*) *psammophilus (Osten Sacken)



(continued)	**Keys to females, followed by species pages**

Whitneyomyia: one species in Florida, with one subspecies. **Tabaninae**

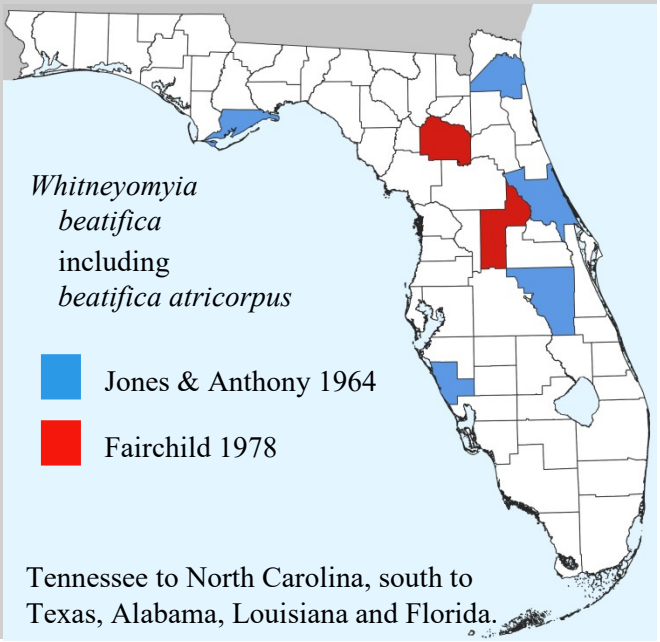
1 Abdomen with a wide middorsal black band and black hairs, bordered laterally with wide paler bands with pale hairs. Antenna basal plate with reddish basal half ..... *beatifica*

-- Abdomen all black, lacking pale lateral bands. Antenna basal plate unicolorous black ..... *beatifica atricorpus*

Whitneyomia beatifica (Whitney)

Whitneyomia beatifica atricorpus Philip

length 13-16 mm



Described as a subspecies by Philip (1950b) but later reduced to varietal status (Philip, 1965) and kept as a variety by Burger (1995) and by Nalen *et al.* (2015). It differs from *W. beatifica* in having a totally black abdomen, totally black antenna with a differently-shaped basal plate, a frons that widens in the center and narrows at the vertex, and truncated palpus. Jones and Anthony (1964) collected this taxon each year in Florida, making it more common than *W. beatifica.* Tidwell (1973) recorded *W. beatifica atricorpus* from Louisiana, but did not record *W. b. beatifica.* We believe these differences are worthy of subspecific ranking, if not specific.

Tabanus identification plate (red text, not known from Florida, but possible)

aar

abdominalis

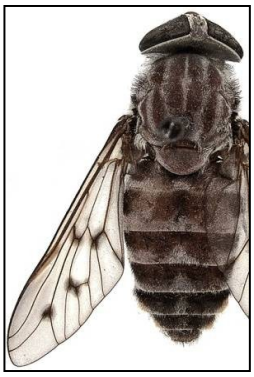
acutus

americanus

aranti

atratus

atratus fulvipilosus



birdiei

bishoppi

calens

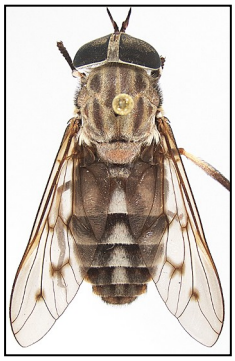
cayensis

cheliopterus-fronto complex

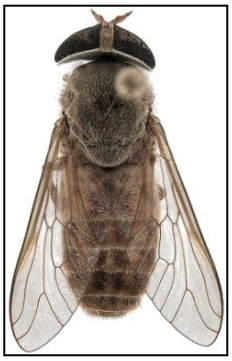
coarctatus

colon

conterminus



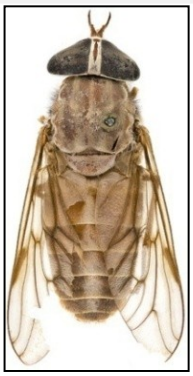
cymatophorus



daedalus

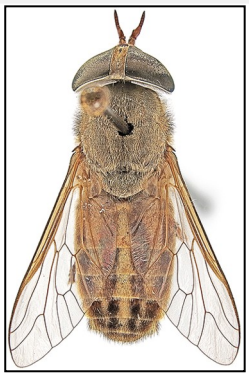
(continued) **_Tabanus_ identification plate**

endymion



equalis

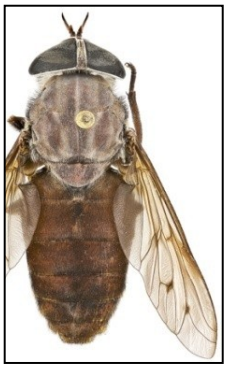
fairchildi



fulvilineis

fulvulus

fumipennis



gladiator

gracilis

hinellus

imitans

johnsoni

kisliuki

limbatinevris

lineola

longiusculus

maculipennis

melanocerus

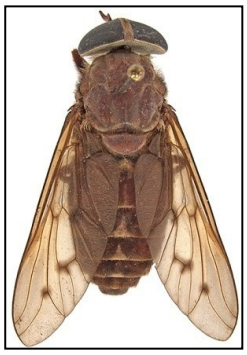
(continued) **_Tabanus_ identification plate**

mixis

moderator

molestus

mularis



nefarius

nigrescens

nigripes

nigrovittatus

pallidescens

pechumani

petiolatus

proximus

pumilus

quinquevittatus

reinwardtii

rufofrater

sackeni

(continued) **_Tabanus_ identification plate**

sparus

sparus milleri

stygius

stygius (worn)

sublongus

subsimilis

sulcifrons

superjumentarius

texanus

trijunctus

trimaculatus

turbidus

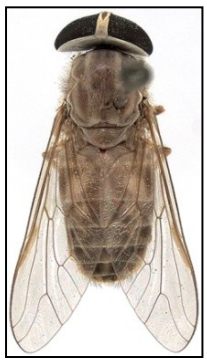
turbidus

venustus

vittiger guatemalanus

wiedemanni

wilsoni



yucatanus

zythicolor

***Tabanus*, key to females, followed by species pages** Red text: not known from Florida, but possible.	**Tabaninae**

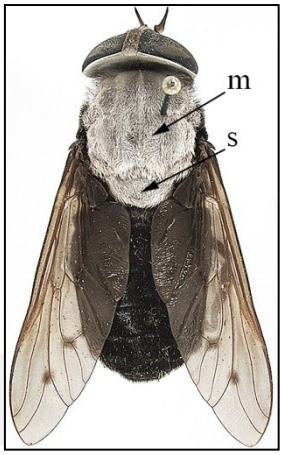
1 Large flies, abdomen unicolorous black or very dark brown dorsally without markings but often bluish pruinose (a fine powder-like covering); mesonotum concolorous with abdomen, except dense white hairs in *stygius*. Some coastal *atratus* have patches of yellow/orange hairs (*atratus fulvopilosus*) [*aranti, atratus, colon, proximus, stygius, wiedemanni, nigrescens*] **2**

-- Large or small flies. Abdomen not unicolorous, very small to large markings dorsally and/or dorsolaterally and/or laterally **8**

aranti *atratus* *colon* *proximus* *stygius* *wiedemanni* *nigrescens*

couplet 1

atratus fulvopilosus



stygius

2(1) Mesonotum (m) and scutellum (s) integument red, covered with dense white hairs strongly contrasting with black abdomen; (specimen in couplet 1 with most of white hairs worn off) ..... *stygius*

-- Mesonotum and scutellum dark with dark hairs, not contrasting with abdomen **3**

3(2) Wing uniformly infuscated, dark brown/black or dark orange, lacking spots ..... *atratus*

-- Wing either dark brown, black, or pale with at least a dark spot (sp) at fork [*aranti, colon, proximus, wiedemanni, nigrescens*] **4**

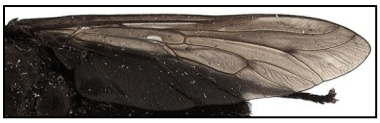
atratus ←

aranti

couplet 3 images continued →

(continued) **_Tabanus_, key to females**

atratus



colon

proximus

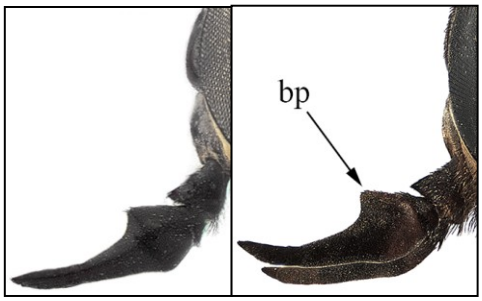
wiedemanni

nigrescens

couplet 3--

4(3) Antenna totally or mostly black, rarely some red areas on basal plate (bp) [*aranti, wiedemanni*] **5**

-- Antenna predominantly orange [*colon, proximus, nigrescens*] **6**

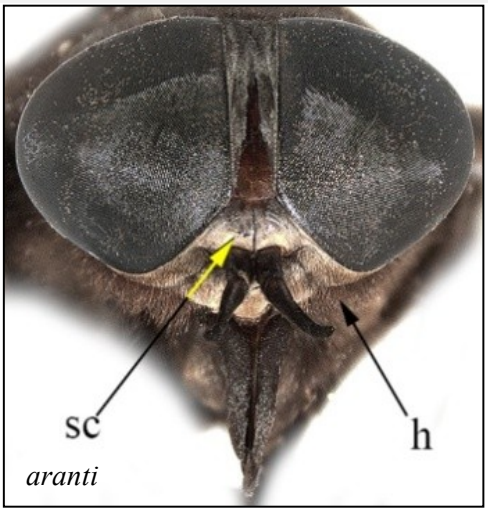


couplet 4

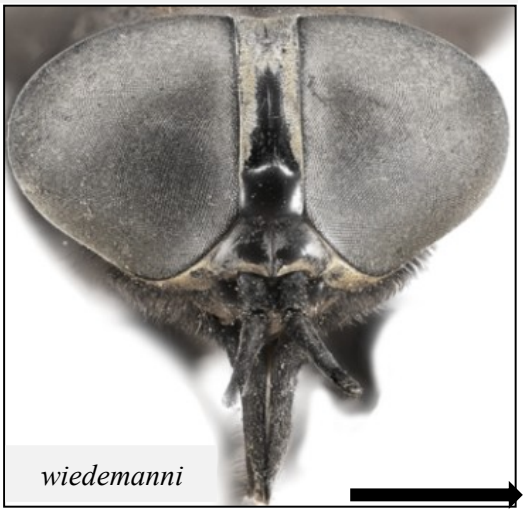
couplet 4--

5(4) Subcallus (sc) pollinose, hairs (h) on lower face dark brown .....*aranti*

-- Subcallus partially denuded, hairs on lower face black .....*wiedemanni*



aranti



wiedemanni

(continued) **_Tabanus_, key to females**

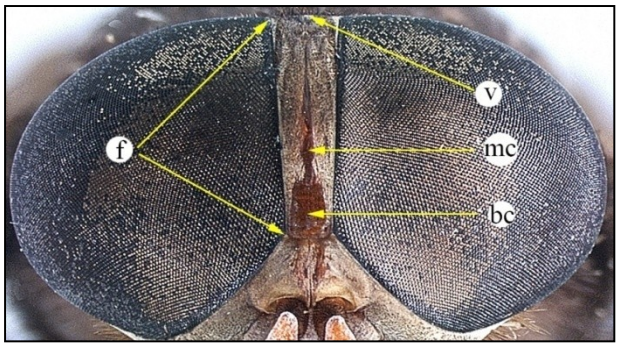
couplet 5, 5--

aranti

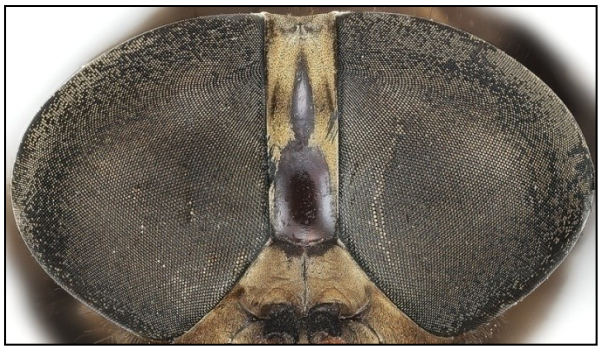
wiedemanni

6(4) Frontal index about 6, frons (f) about 2x as wide at vertex (v) as at base. Basal callus (bc) reddish brown, narrow, connected to a spindle-shaped median callus (mc) becoming very narrow and reaching nearly to vertex ..... *proximus*

-- Frontal index 5 or less, frons parallel-sided. Basal callus dark brown, wide, connected to a wider median callus [*colon, nigrescens*] **7**



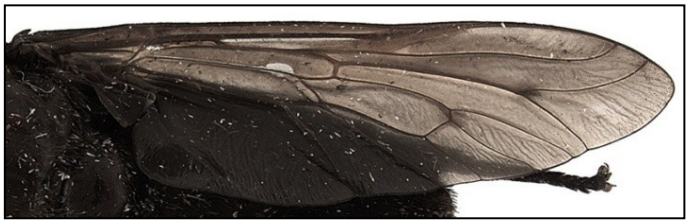
proximus



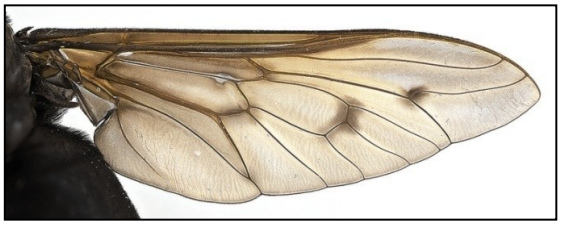
couplet 6--

7(6) Wing membrane evenly light brown to black ..... *colon*

-- Basal third of wing membrane tinted, nearly clear at distal one-third ..... *nigrescens*



colon



nigrescens

(continued) **_Tabanus_, key to females**

colon

nigrescens

8(1) Abdomen dark brown/black or reddish with small median white triangle on one or more tergites. No dorsolateral markings (white triangles laterally on hind margins of tergites in *americanus*). Mesonotum dark, reddish or black and not contrasting with abdomen [*americanus, imitans, maculipennis, pechumani*, *calens*] **9**

-- Abdomen either paler with only large median markings or with both dorsolateral and median markings. Mesonotum may contrast strongly with abdomen **13**

couplet 8

couplet 9

couplet 8--

couplet 9--

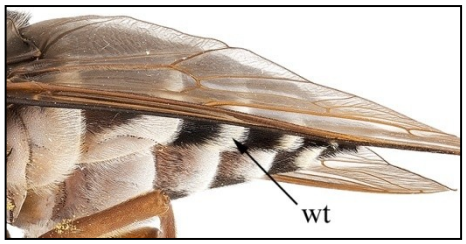
9(8) Wing lacking spots [*americanus, calens*] **10**

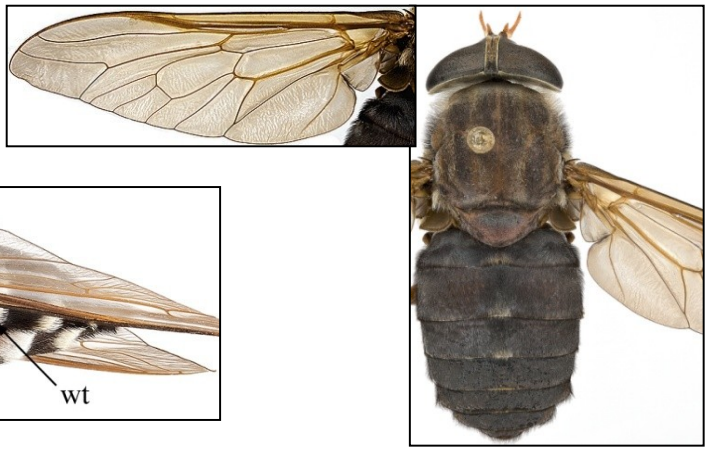
-- Wing heavily spotted [*imitans, maculipennis, pechumani*] **11**

(continued)	***Tabanus*, key to females**

10(9) Wing glass clear. White triangles (wt) laterally on hind margins of tergites .....*americanus*

-- Wing infuscated, light orange. No lateral white triangles .....*calens*





americanus

calens

11(9) Antenna lacking forward-pointing dorsal process. Palpus short.
Wing spots very large .....*maculipennis*

-- Antenna with a long forward-pointing dorsal process. Palpus longer.
Wing spots smaller [*imitans, pechumani*] **12**

maculipennis

imitans

pechumani

(continued)	***Tabanus*, key to females**

12(11) Median abdominal spots (white hairs) small but conspicuous. Palpus with few fine black hairs. Basal callus higher than wide, convex at top ..... *pechumani*

-- Median abdominal spots very faint. Palpus with many coarse black hairs. Basal callus more square ..... *imitans*

pechumani

imitans

13(8) Abdomen with a pale median stripe, either almost parallel-sided or of connected triangles. Wings lacking strong spots or clouds around cross veins or at fork **14**

-- Abdomen without a median stripe, may have median triangles or dark spots but these not connected to form a stripe (somewhat subjective); wings with or without spots **37**

couplet 13

couplet 13--

(continued) **_Tabanus_, key to females**

14(13) Abdomen with an almost parallel-sided median pale stripe and at least indications of sublateral pale stripes [*acutus, bishoppi, cayensis, conterminus, hinellus, lineola, mularis, nigrovittatus, quinquevittatus, subsimilis*, *vittiger guatemalanus,* undescribed species] **15**

-- Abdomen with a median pale stripe which is interrupted or widened at the posterior border of each tergite to form a row of triangles; a dorsolateral row of pale spots either side of the median stripe [*daedalus, fulvulus, gracilis, longiusculus, pallidescens, wilsoni, yucatanus, zythicolor*, *sackeni, sublongus, texanus*] **27**

acutus

bishoppi

cayensis

conterminus

hinellus

lineola

mularis

nigrovittatus

quinquevittatus

subsimilis

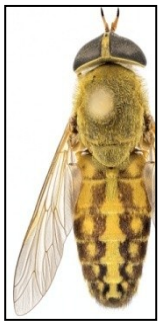
vittiger guatemalanus

couplet 14

couplet 14--

(continued) **_Tabanus_ key to females**

daedalus



fulvulus

gracilis

longiusculus

pallidescens

wilsoni

yucatanus

zythicolor

sackeni

sublongus

texanus

couplet 14--

15(14) Warm-brown species with wide pale middorsal stripe. Wing tinted brown, fork with a small dark spot .....*acutus*

-- Much darker species with narrower middorsal stripe. Wing hyaline, fork without a dark spot [*bishoppi, cayensis, conterminus, hinellus, lineola, mularis, nigrovittatus, quinquevittatus, subsimilis*, *vittiger guatemalanus,* undescribed species] **16**

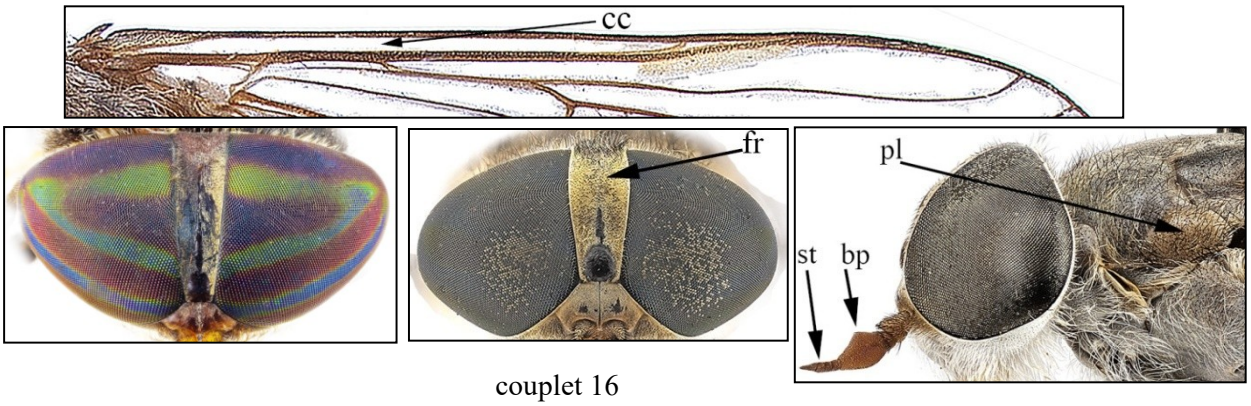
acutus

Fairchild and French, 1999 keyed *T. acutus* in their Group VII, 'warm-brown species': *aar, fumipennis, johnsoni*.

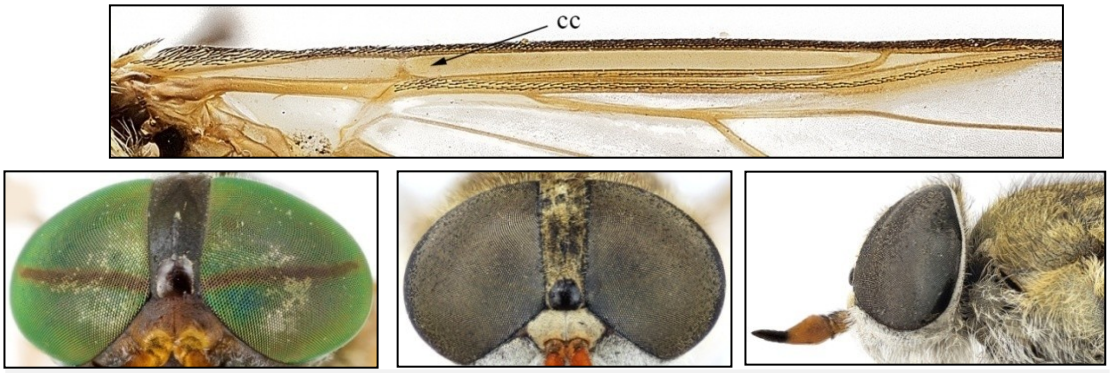
(continued) ***Tabanus*, key to females**

16(15) Costal cell (cc) entirely hyaline. Eye pattern, in fresh and hydrated condition, complex green and purple. Frons (fr) widened above. Style (st) of antenna shorter than basal plate (bp). Prescutal lobe (pl) usually paler than adjacent thorax [*hinellus, lineola, subsimilis, vittiger guatemalanus*] **17**

-- Costal cell (cc) infuscated, light yellow to brown; sometimes faintly. Eye pattern green with a single purple stripe. Frons almost parallel-sided. Style of antenna longer than basal plate. Prescutal lobe often concolorous with adjacent thorax [*bishoppi, cayensis, nigrovittatus* complex] **20**



couplet 16



couplet 16--

17(16) Integument of scutellum (sc) entirely dark [*hinellus, lineola*] **18**

-- Posterior tip of scutellum red [*subsimilis, vittiger guatemalanus*] **19**

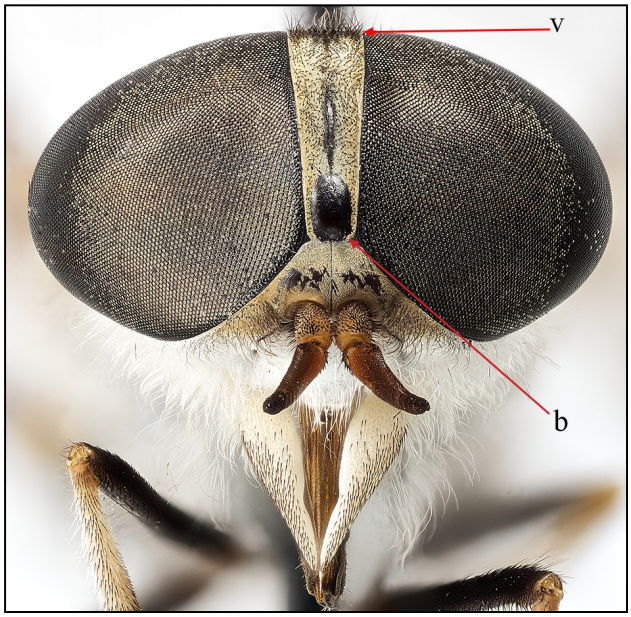
couplet 17

couplet 17--

(continued)	***Tabanus*, key to females**

18(17) Median abdominal stripe white, narrower than dark interval between it and the dorsolateral stripes. Frons narrow at base (b), widens evenly to vertex (v). An inland species ..... *lineola*

-- Median abdominal stripe yellowish, as broad as the dark interval between it and the dorsolateral stripes. Apical half of frons slightly convergent. A coastal species ..... *hinellus*



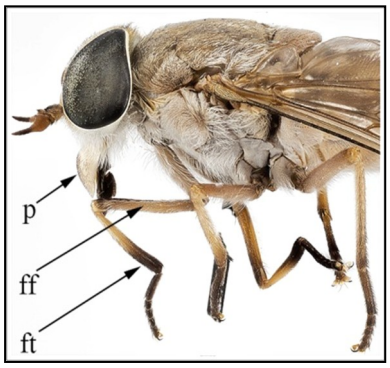
lineola

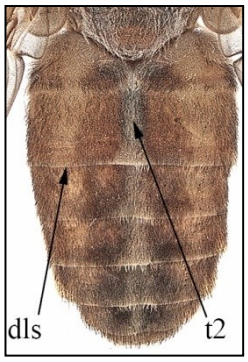
hinellus

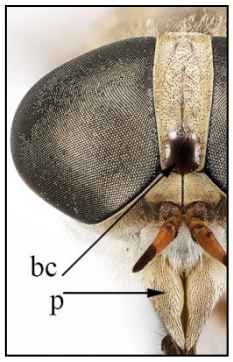
(continued)	***Tabanus,* key to females**

19(17) Fore femur (ff) pale, distal one-third of fore tibia (ft) dark gray. On tergite 2 (t2) the median stripe is gray on a black background and the pale dorsolateral stripe (dls) is weakly contrasting and in-line with that on tergite 3. Basal callus (bc) brown. Palpus (p) short and swollen basally ..... *vittiger guatemalanus*

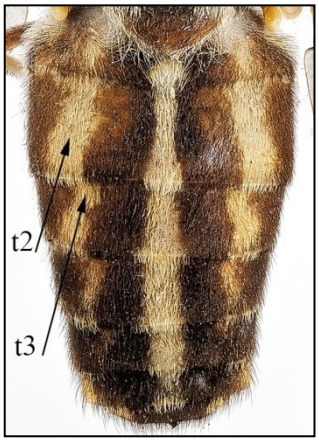
-- Fore femur black, distal one-third of fore tibia black. Median stripe on tergite 2 (t2) yellow. The pale dorsolateral stripe on tergite 2 is strongly contrasting and off-set from that on tergite 3 (t3). Basal callus black. Palpus longer and not swollen basally ..... *subsimilis*







couplet 19 *vittiger guatemalanus*



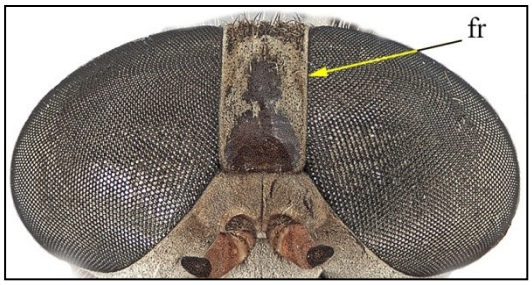
couplet 19-- *subsimilis*

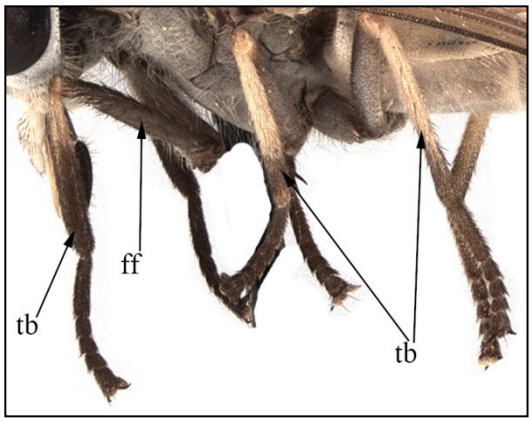
vittiger guatemalanus *subsimilis*

(continued)	***Tabanus*, key to females**

20(16) Small, wing length generally less than 10 mm. Wing slightly tinted, the veins (v) narrowly brown-margined. Frons (fr) broad, frontal index less than 3. Fore femur (ff) largely black. All tibia (tb) dark distally, pale basally. A salt marsh species ..... *cayensis*

-- Larger species with clear wings. Frontal index 4 or greater. Includes salt marsh species [*bishoppi, conterminus, fulvilineis, mularis, nigrovittatus, quinquevittatus*] **21**

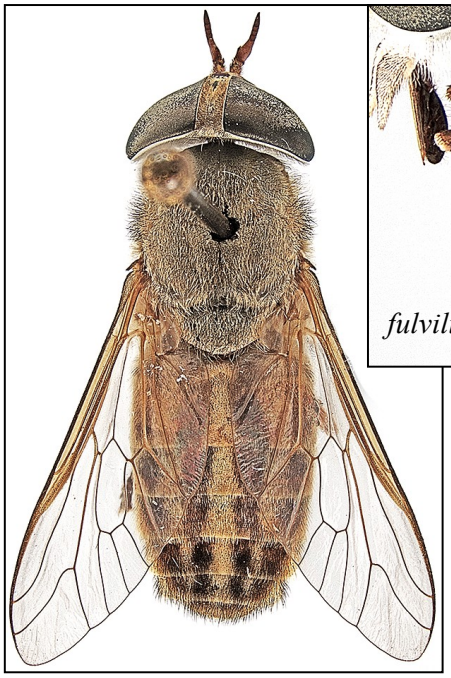




cayensis

21(20) Base of leg (coxa, trochanter, femur) largely pale, at most the mid and hind coxae and femora slightly infuscated basally ..... *fulvilineis*

-- Base of leg (c, t, f) largely black, at most distal third of mid and hind femora pale, yellowish [*bishoppi, conterminus, mularis, nigrovittatus, quinquevittatus*] **22**



fulvilineis

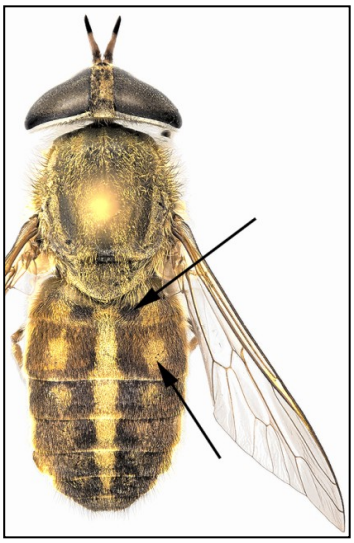
fulvilineis

couplet 21--

(continued)	***Tabanus*, key to females**

22(21) Abdominal median pale stripe bordered by incomplete black stripes. Dorsolateral pale markings in form of squarish spots, largest on tergite 2 and reduced on more posterior tergites. Isolated black spot on either side of pale abdominal median stripe on tergite 1 ..... *bishoppi*

-- Median pale stripe bordered by complete black stripes. Dorsolateral pale markings elongated and forming a complete stripe at least on tergites 2 and 3. Black spots on tergite 1 are continuations of the black stripes [*conterminus, mularis, nigrovittatus*, *quinquevittatus*] **23**



bishoppi

couplet 22--

23(22) Abdomen mostly dark with a wide pale middorsal stripe. Dorsolateral pale stripes reduced to a row of vague paler elongate spots, often absent ..... *mularis*

-- Abdomen paler with a narrower middorsal stripe. Dorsolateral pale stripes broad and conspicuous [*conterminus, nigrovittatus, quinquevittatus,* undescribed species] **24**

mularis

couplet 23--

(continued)	***Tabanus*, key to females**

24(23) Hairs on thorax, both dorsally and laterally, golden yellow and black. Inland species, rarely seen on the coast [*nigrovittatus-quinquevittaus* complex (in part)] **25**

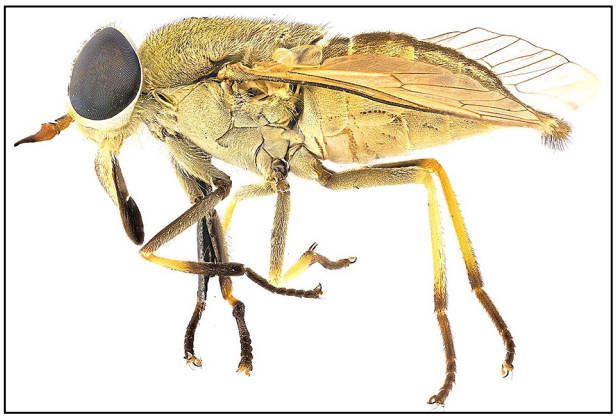
-- Thorax hairs grey to white. Strictly coastal species [*nigrovittatus-quinquevittaus* complex (in part)] **26**

couplet 24

couplet 24--

25(24) Specimens from peninsular Florida with palpus creamy/white to light yellow .....undescribed species

-- Specimens from elsewhere .....*quinquevittatus*



quinquevittatus

no images of the undescribed species

26(24) Atlantic coast to mid-Florida [*conterminus, nigrovittatus*] **27**

-- Gulf Coast, peninsular Florida and Keys .....*nigrovittatus* complex

Includes at least one undescribed species; no image for 26--

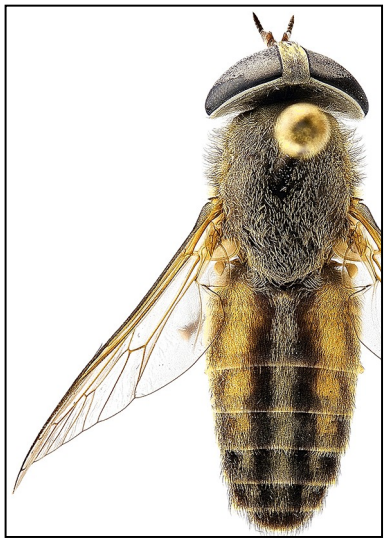
27(26) Total body length (not including antenna) less than 14 mm .....*nigrovittatus*

-- Length 14 mm or greater .....*conterminus*

couplet 27 images

(continued) **_Tabanus_, key to females**

couplet 27 continued



nigrovittatus

conterminus

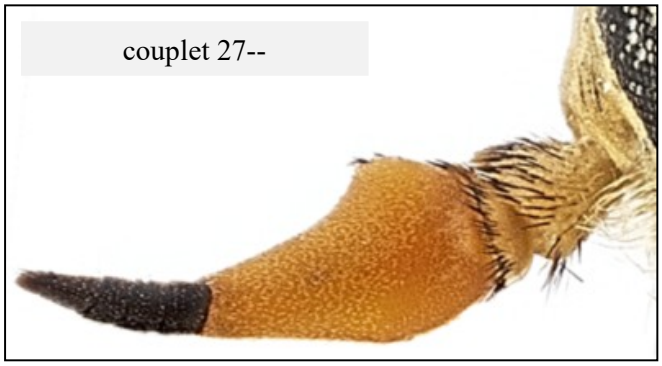
Small females (<14 mm) can be confidently identified as *nigrovittatus,* those 14 mm or larger as *conterminus.* Males are unequivocally separated by eye structure (Freeman and Thomas, 1999).

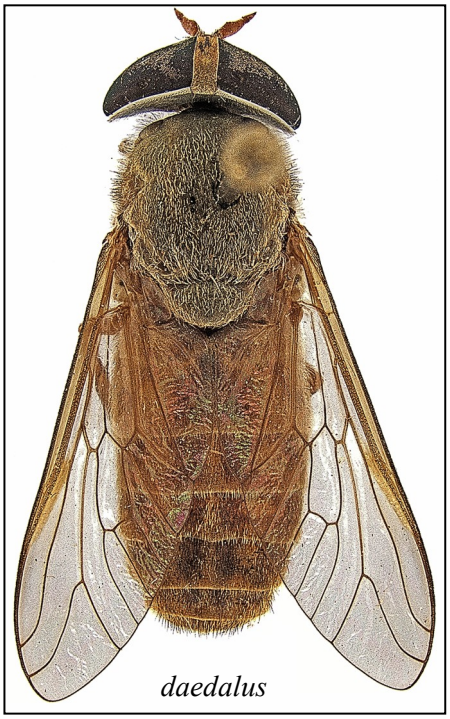
27(14) Style (st) of antenna very short with only 2 or 3 annuli.
A small dark brown species with faint markings dorsally ..... *daedalus*

-- Antenna normal, style with 4 annuli. Larger species, either yellow, light brown or almost black with conspicuous dorsal markings [*fulvulus, gracilis, longiusculus, pallidescens, wilsoni, yucatanus, zythicolor, sackeni, sublongus, texanus*] **28**

daedalus

couplet 27--





daedalus

(continued) **_Tabanus._, key to females**

28(27) Overall appearance yellow. Thoracic hairs yellow. Abdomen with a broad yellow median stripe that expands laterally at the posterior edge of each tergite [*fulvulus, pallidescens*] **29**

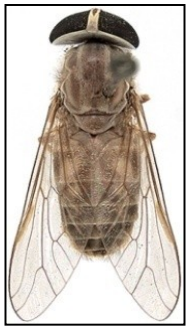
-- Overall appearance brown. No yellow hairs. Median abdominal stripe narrow [*gracilis, longiusculus, wilsoni, yucatanus, zythicolor, sackeni, sublongus, texanus*] **30**

couplet 28

gracilis

longiusculus

wilsoni



yucatanus

zythicolor

sackeni

sublongus

texanus

couplet 28--

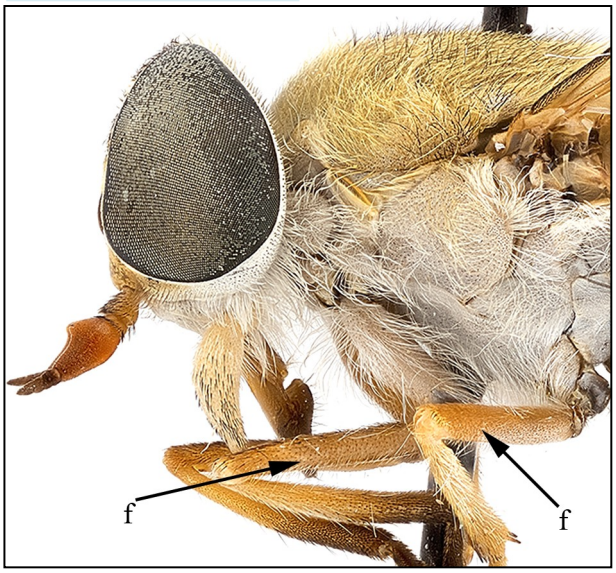
29(28) Third antenna segment (3rd) entirely orange, style (st) slightly darker. Femora (f) yellow .....*pallidescens*

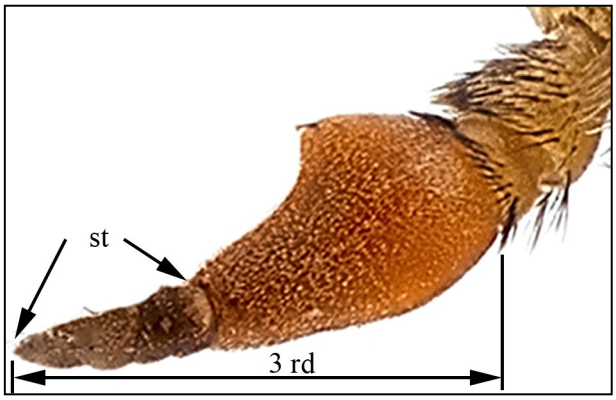
-- Antenna style black. Femora bicolored, dark gray proximally, yellow distally .....*fulvulus*

couplet 29 images →

(continued) **_Tabanus_, key to females**

couplet 29 continued





pallidescens

fulvulus

(continued)	***Tabanus*, key to females**

30(29) Wing costal cell (cc) hyaline, not contrasting with other wing cells [*wilsoni, yucatanus, sackeni, sublongus*] **31**

-- Costal cell infuscated, contrasting with other hyaline wing cells [*gracilis, longiusculus, zythicolor, texanus*] **34**

wilsoni

yucatanus

sackeni

sublongus

gracilis

longiusculus

zythicolor

texanus

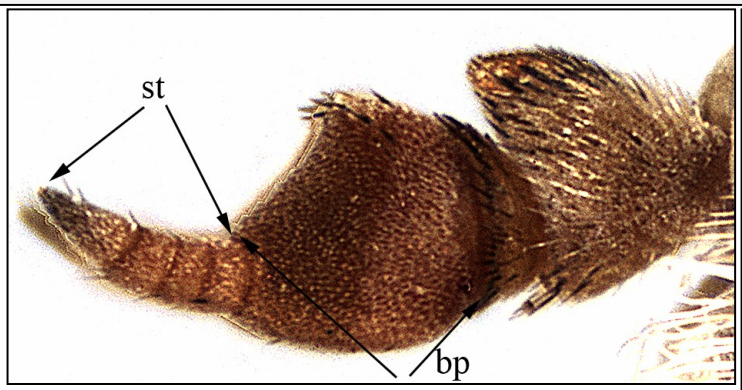
31(30) Antenna style (st) paler than basal plate (bp) .....*yucatanus*

-- Style darker than basal plate [*wilsoni, sackeni, sublongus*] **32**

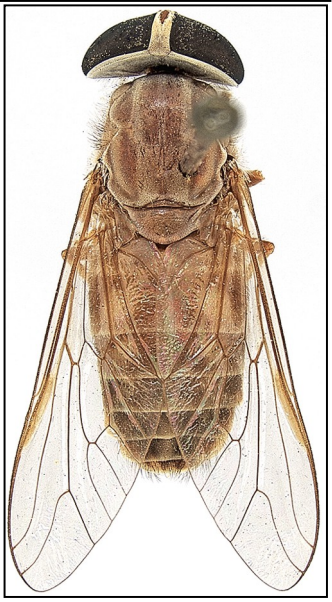
couplet 31 images

(continued) **_Tabanus_, key to females**

couplet 31 continued



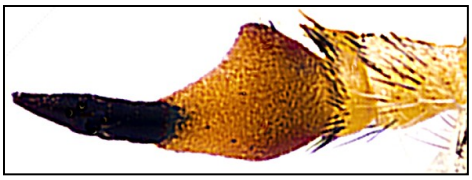
yucatanus



yucatanus

wilsoni

sackeni



sublongus

32(30) Dorsolateral row of spots (dls) wide and oblique, their posterior bases broadly confluent with pale posterior borders of tergites. Frons parallel-sided .....*sublongus*

-- Dorsolateral spots round, not touching posterior borders of tergites. Frons widens at vertex [*wilsoni, sackeni*] **33**

sublongus

wilsoni

sackeni

(continued) **_Tabanus_, key to females**

couplet 32 continued

sublongus

sublongus

sackeni

wilsoni

33(32) Dorsal thorax dark brown/black. Middorsal abdominal stripe broad, sublateral spots large ..... *wilsoni*

-- Thorax brown. Abdominal stripe narrow, sublateral spots small ..... *sackeni*

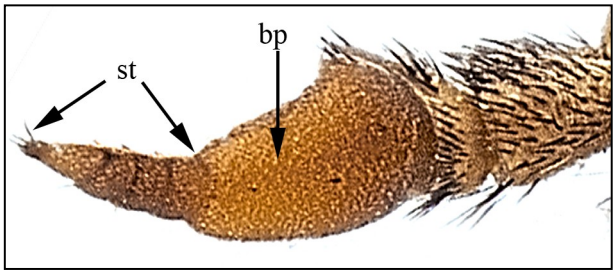
wilsoni

sackeni

(continued)	***Tabanus*, key to females**

34(30) Antenna stylus (st) brown, not strongly contrasting with basal plate (bp) .....*zythicolor*

-- Stylus black, strongly contrasting with basal plate [*gracilis, longiusculus*, *texanus*] **35**



zythicolor

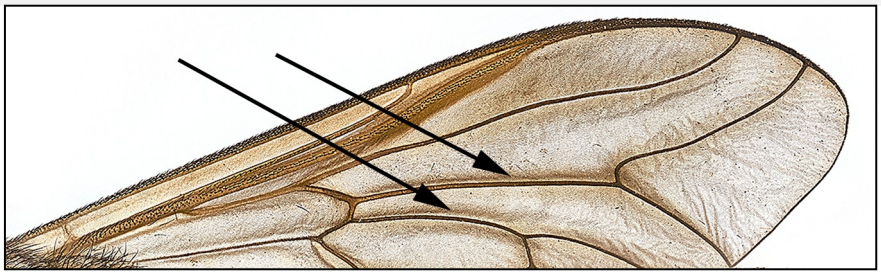
couplet 34--

zythicolor

35(34) Wing longitudinal veins margined with brown .....*gracilis*

-- Margins of longitudinal veins hyaline (clear) [*longiusculus*, *texanus*] **36**

gracilis



couplet 35--

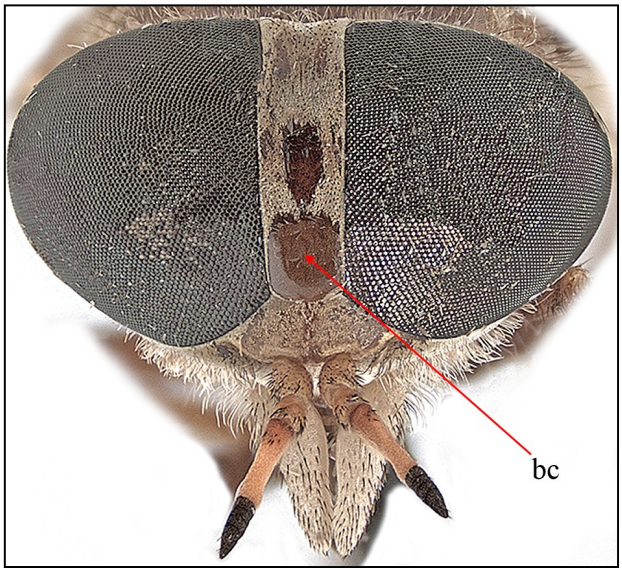
(continued) **_Tabanus_, key to females**

couplet 35 continued

gracilis

36(35) Basal callus (bc) brown, higher than wide .....*longiusculus*

-- Basal callus round, black, and not higher than wide .....*texanus*



longiusculus

texanus

couplet 36

(continued) **_Tabanus_, key to females**

couplet 36 continued

longiusculus *texanus*

37(13) Scutellum hairs (sc) pale, strongly contrasting with dark background color of abdomen (but not contrasting with median triangles) [*coarctatus, cymatophorus, mixis, moderator, molestus, trimaculatus, turbidus* (light and dark forms), *superjumentarius, venustus*] **38**

-- If scutellum has pale hairs they do not strongly contrast with abdomen [25 spp., most similar *nigripes* and *petiolatus,* next page] 46

coarctatus *cymatophorus* *mixis* *moderator* *molestus*

sc

trimaculatus *turbidus* *superjunentarius* *venustus*

(continued) **_Tabanus_ key to females**

couplet 37 continued

nigripes

petiolatus

38(37) Abdomen black with large white triangles on only tergites 3-5 (t3-5) ..... *trimaculatus*

-- Abdominal triangle present on tergite 2 (t2) (small in *superjunentarius*) [*coarctatus, cymatophorus, mixis, moderator, molestus, turbidus, superjunentarius, venustus*] **39**

trimaculatus

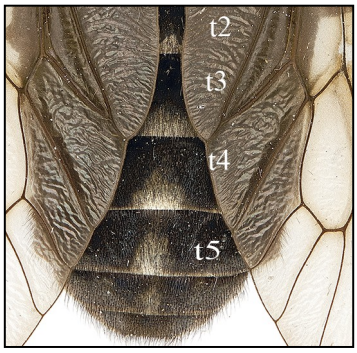
coarctatus

cymatophorus

mixis

moderator

molestus



superjumentarius

turbidus

superjunentarius

venustus

(continued) **_Tabanus_, key to females**

39(38) Wing membrane clear but with several unique dark patches Abdomen with a sublateral row of pale round spots on tergites 3-6 .....*venustus*

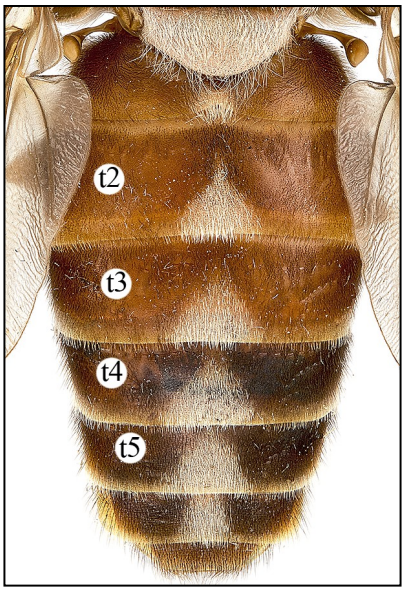
-- Wing not with this pattern of patches. Abdomen without sublateral round spots [*coarctatus, cymatophorus, mixis, moderator, molestus, turbidus, superjunentarius*] **40**

venustus

40(39) Pale median triangle on tergite 2 distinctly smaller than those on tergites 3 and 4 [*mixis, moderator, molestus, superjunentarius*] **41**

-- Triangle on tergite 2 (t2) not distinctly smaller than those on tergites 3 and 4 [*coarctatus, cymatophorus, turbidus*] **44**

couplet 40



couplet 40--

(continued)	***Tabanus*, key to females**

41(40) Abdomen black, all middorsal triangles very small .....*superjumentarius*

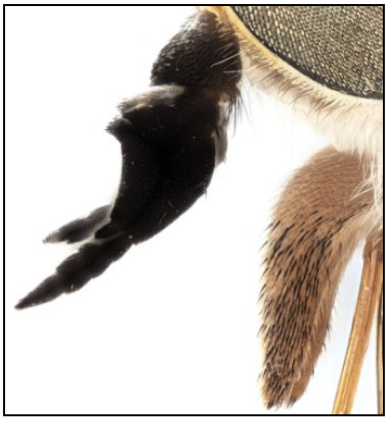
-- Abdomen brown, triangle on tergite 3 (t3) large [*mixis, moderator, molestus*] **42**

superjumentarius

mixis *moderator* *molestus*

42(41) Frons gray tinged, distinctly widened above, index 7.0-8.5. Antenna black. Palpus with coarse black hair. (dorsal view and wing next page) .....*moderator*

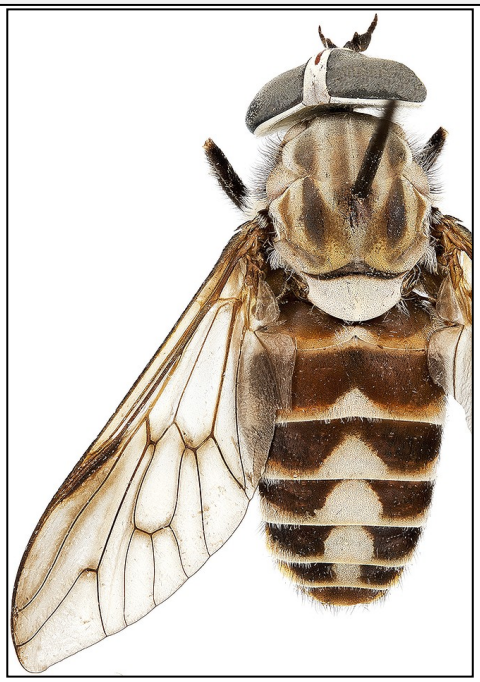
-- Frons orange brown, slightly widened above, index 3.8-4.5. Antenna orange brown tending towards a darker style. Palpus with fine black hair [*mixis, molestus*] **43**



moderator *mixis* *molestus*

(continued) **_Tabanus_, key to females**

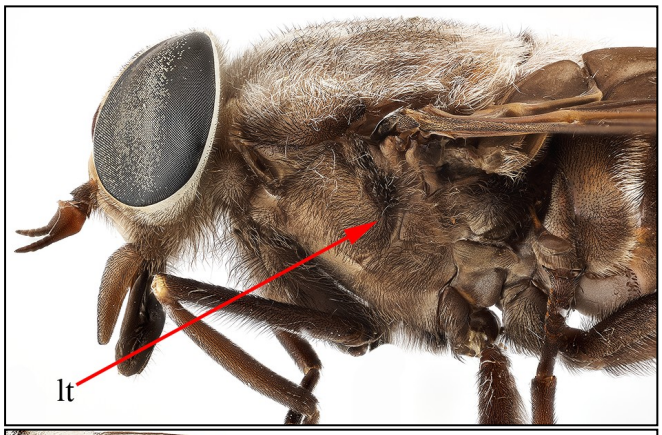
couplet 42 continued

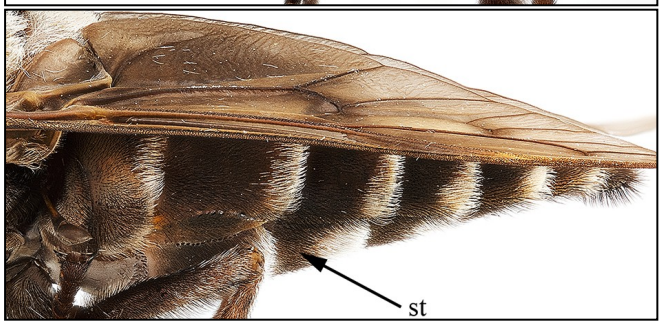


moderator

43(42) Hairs on lateral thorax (lt) chocolate. Sternites (st) dark anteriorly, pale posteriorly. Dorsal median triangles on abdomen small (next page) ..... *mixis*

-- Hairs laterally on thorax pale. Sternites all white. Median triangles larger ..... *molestus*





mixis

molestus

(continued) **_Tabanus_, key to females**

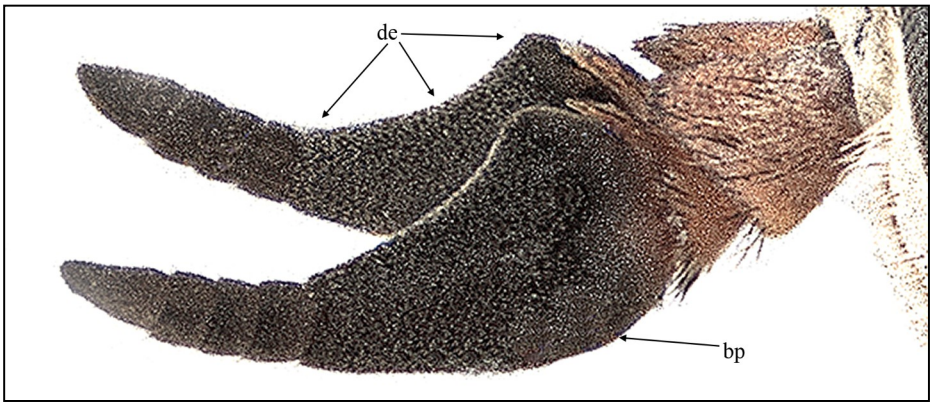
couplet 43 continued

mixis

molestus

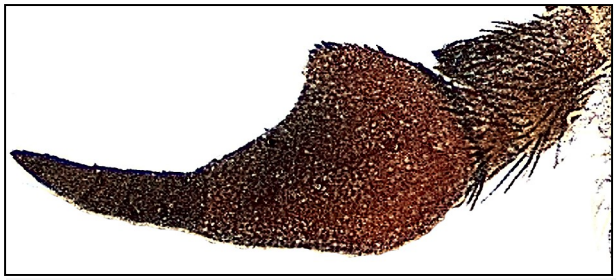
44(40) First two antennal segments (scape, pedicel) reddish brown with black hair. Basal plate (bp) black with a shallow dorsal excision (de). Face mostly gray .....*coarctatus*

-- Antenna brown with stylus darker (*cymatophorus*) or uniformly orange (*turbidus*). Dorsal excision deep. Face brownish/orange **45**



coarctatus

dorsal, face ➡



couplet 44--

(continued) **_Tabanus_, key to females**

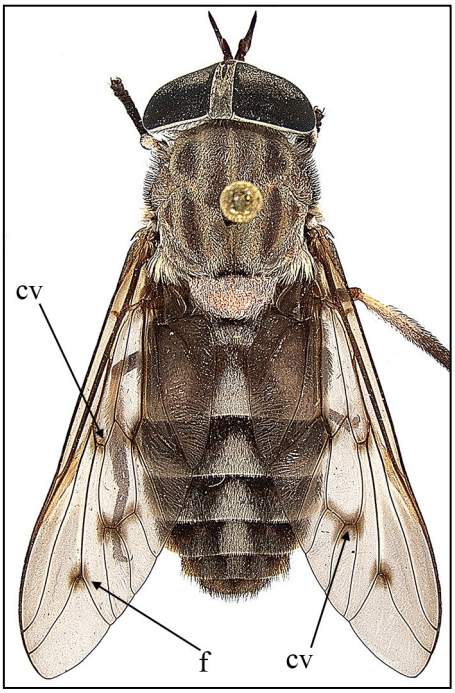
couplet 44 continued

coarctatus

couplet 45 for faces of *cymatophorus* and *turbidus*

45(44) Wing with distinct spots at fork (f) and crossveins (cv), veins lack dark shading. Antenna and palpus brown ..... *cymatophorus*

-- Wing without distinct spots, veins bordered with dark shading. Antenna and palpus orange ..... *turbidus*

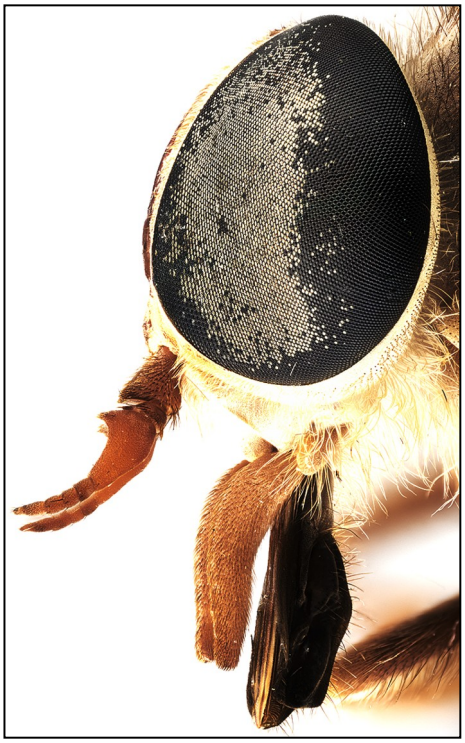


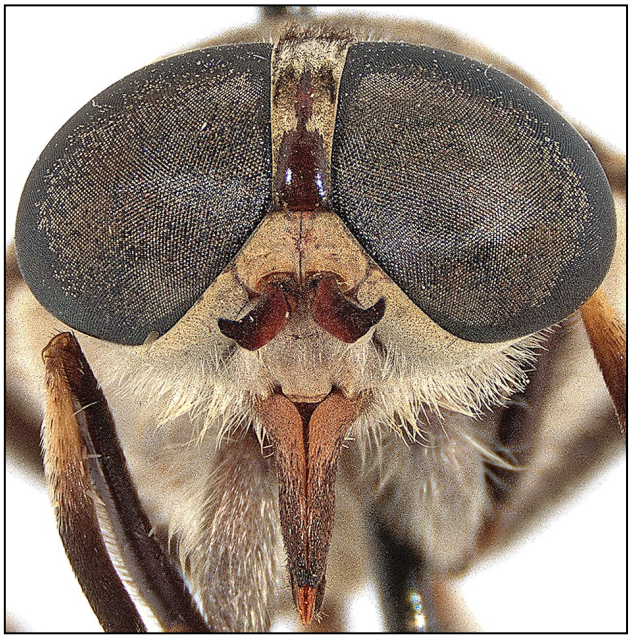
cymatophorus

turbidus

(continued)	***Tabanus*, key to females**

couplet 45 continued





cymatophorus

[frontal index](#) about 4.5

turbidus

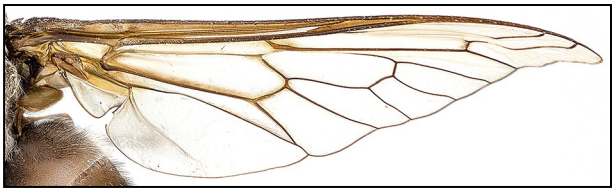
frontal index about 6.0

(continued)	***Tabanus* key to females**

46(37) Wing membrane clear and without spots (costal cell infuscated in *kisliuki*, and *rufofrater* has a very faint cloud at fork (f) and cross vein (cv)) [*fairchildi, kisliuki, nigripes, petiolatus, pumilus, rufofrater, sparus, sparus milleri*] **47**

-- Wing with at least one dark spot and/or membrane infuscated (infuscation bordering veins in *equalis*) [*aar, abdominalis, birdiei, cheliopterus-fronto* complex*, endymion, fumipennis, gladiator, johnsoni, melanocerus, reinwardtii, sulcifrons, trijunctus, equalis, limbatinevris, nefarius*] **53**

fairchildi



kisliuki

nigripes

petiolatus

pumilus

rufofrater

sparus

aar

abdominalis

couplet 46-- images

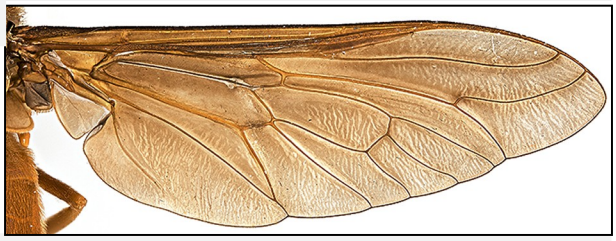
(continued) **_Tabanus_ key to females**

couplet 46-- continued

birdiei

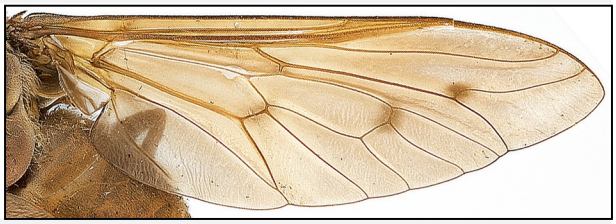
endymion

cheliopterus-fronto complex



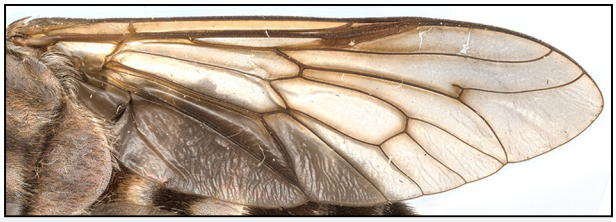
fumipennis

gladiator



johnsoni

melanocerus



melanocerus

reinwardtii

sulcifrons

trijunctus

equalis

(continued) **_Tabanus_ key to females**

couplet 46-- continued

limbatinevris

nefarius

47(46) Abdomen dorsolaterally with a pale spot on at least tergites 2-5 [*fairchildi, pumilus, sparus, sparus milleri*] **48**

-- Abdomen dorsolaterally lacking pale spots [*kisliuki, nigripes, petiolatus, rufofrater*] **50**

fairchildi

pumilus

pumilus

sparus

sparus milleri

kisliuki

nigripes

petiolatus

rufofrater

48(47) Antenna black. Body length 13-18 mm .....*fairchildi*

-- Antenna dark brown-orange. Length 9-11 mm [*pumilus, sparus, sparus milleri*] **49**

fairchildi

pumilus

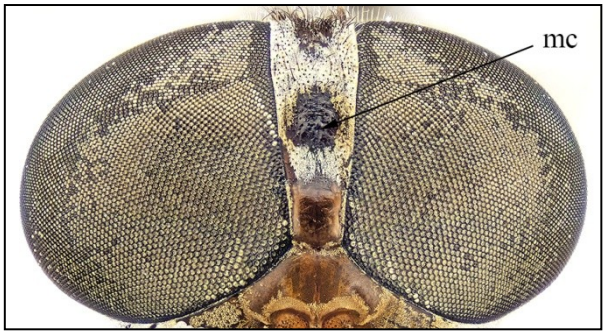
sparus

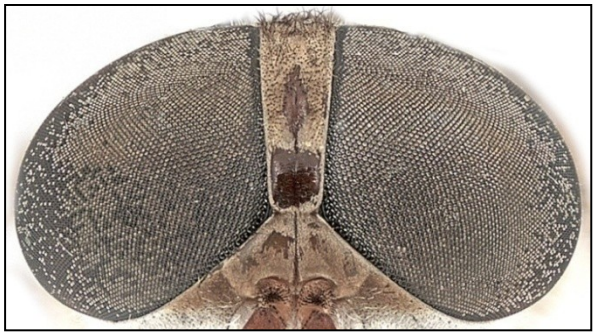
sparus milleri

(continued)	***Tabanus* key to females**

49(48) Median callus (mc) broad, irregular, surrounded by dark stained area. Eye in life with 2 parallel green horizontal bands ..... *pumilus*

-- Median callus slender. Eye in life either lacking a band.…..... *sparus* or with a single horizontal band ..... *sparus milleri*



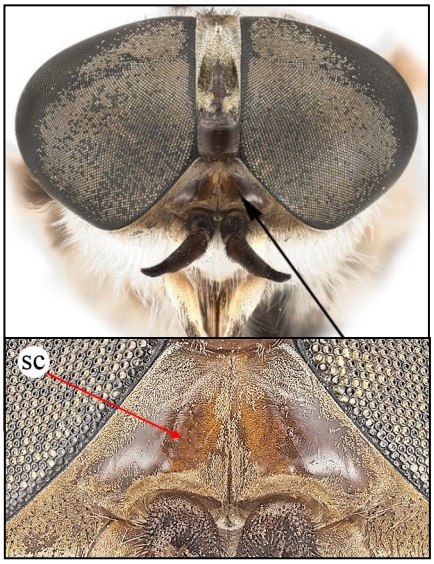


pumilus

sparus and *s. milleri*

50(47) Subcallus (sc) at least partly bare and shiny ..... *nigripes*

-- Subcallus pollinose [*kisliuki, petiolatus, rufofrater*] **51**



nigripes

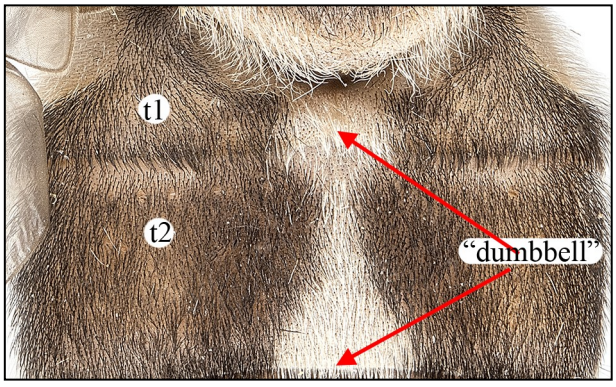
couplet 50--

(continued) **_Tabanus_ key to females**

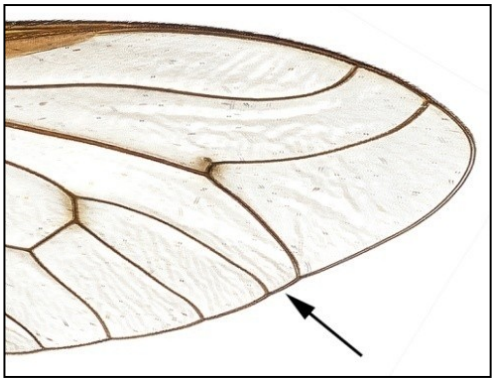
51(50) First posterior cell (1st pc) closed at wing margin or closed before margin with a stalk (st) (petiole), cell is petiolate. White triangle on tergite 2 becomes parallel-sided anteriorly to join white spot on tergite 1 giving a dumbbell-shaped figure .....*petiolatus*

-- 1st pc open at margin, sometimes narrowly. White triangle on tergite 2 is not parallel-sided anterioly [*kisliuki*, *rufofrater*] **52**

petiolatus



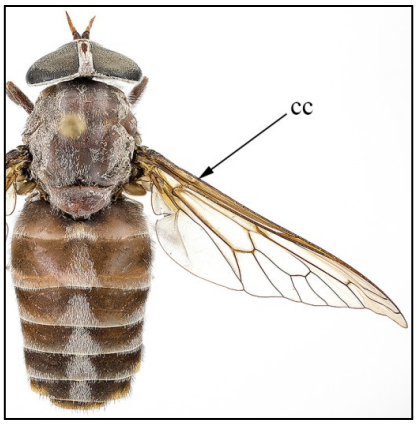
petiolatus



couplet 51--

52(51) Costal cell (cc) of wing strongly pigmented, contrasting with rest of hyaline wing .....*kisliuki*

-- Costal cell glass clear .....*rufofrater*



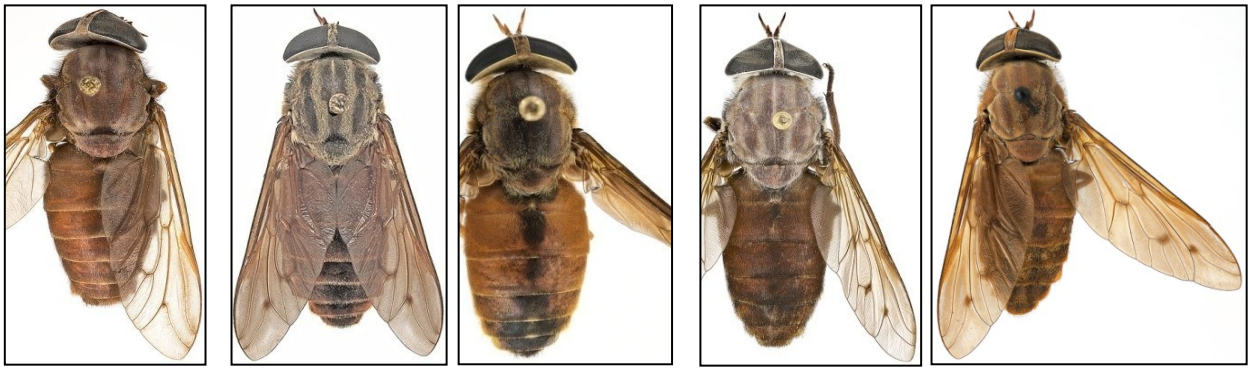
kisliuki

rufofrater

(continued)	***Tabanus* key to females**

53(46) Dorsally, abdomen yellowish/dark brown lacking obvious pale markings but with a dark median line [*aar, abdominalis, fumipennis, gladiator, johnsoni*] **54**

-- Abdomen light brown to black with pale median markings conspicuous [*birdiei, cheliopterus-fronto* complex*, endymion, melanocerus, reinwardtii, sulcifrons, trijunctus, equalis, limbatinevris, nefarius*] **58**



aar *abdominalis* *fumipennis* *gladiator* *johnsoni*

birdiei *cheliopterus-fronto* complex *endymion* *melanocerus*

reinwardtii *sulcifrons* *trijunctus* *equalis* *limbatinevris* *nefarius*

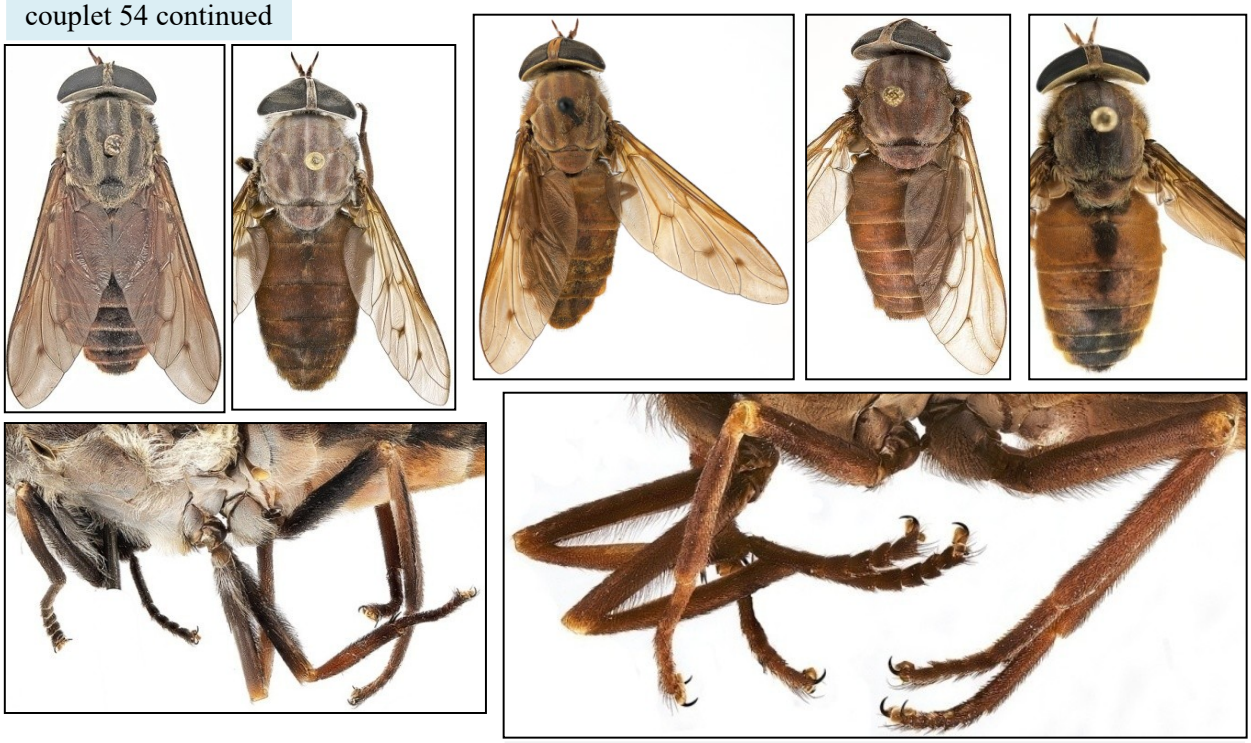
54(53) Mesonotum with pale-haired stripes that contrast with the dark median stripe on abdomen. Rarely, very weak small pale spots on tergites 1 and 2 or tergites with pale hind borders. Legs obviously bicolored [*abdominalis, gladiator*] **55**

-- Mesonotum concolorous or darker than abdomen. No pale spots on abdomen. Legs nearly unicolorous light to dark brown, none sharply bicolored [*aar, fumipennis, johnsoni*] **56**

couplet 54 images ➡

(continued) **_Tabanus_ key to females**

couplet 54 continued

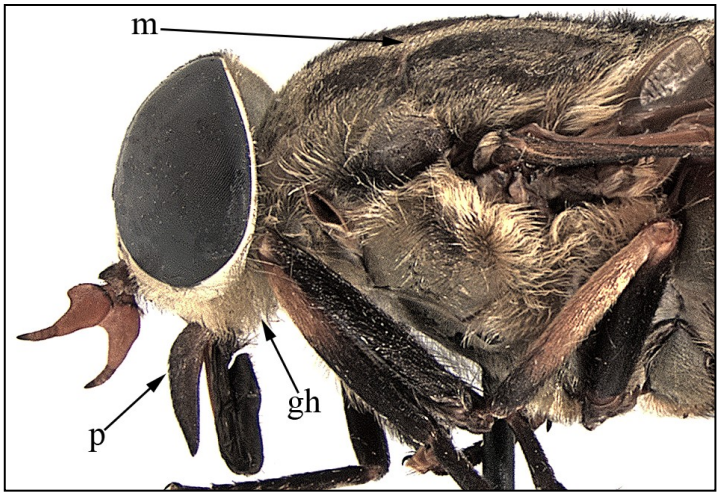


couplet 54

couplet 54--

55(54) Palpus (p) stout, dark with black hair. Genal hairs (gh) brownish. Mesonotum (m) black with pale stripes. Thorax laterally with dark hairs .....*abdominalis*

-- Palpus paler, long and narrow. Genal hairs white. Mesonotum purplish with pale stripes. Thorax laterally with pale hairs .....*gladiator*



abdominalis

gladiator

dorsal views

(continued) **_Tabanus_ key to females**

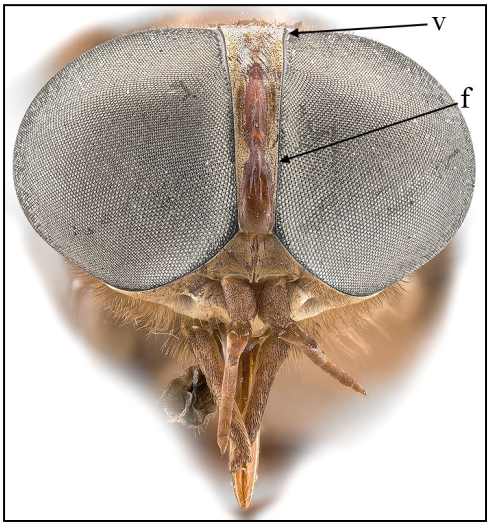
couplet 55 continued

abdominalis

gladiator

56(54) Frons (f) diverges, widens towards vertex (v), index 4-5 .....*aar*

-- Frons broad parallel-sided, index about 3 [*fumipennis, johnsoni*] **57**



aar

couplet 56--

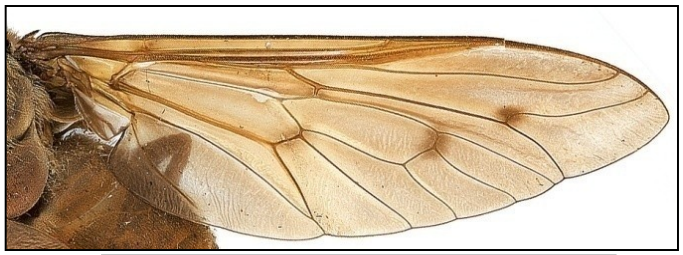
57(56) Wing heavily brown tinted slightly paler towards apex, with weak spots. Mesonotum dark brown to black. Palpus, and antenna scape and pedicel, orange with fine black hairs .....*fumipennis*

-- Wing lightly brown tinted with strong spots. Mesonotum brown. Palpus, and antenna scape and pedicel, orange with coarse black hairs .....*johnsoni*

couplet 57 images ➡

(continued) **_Tabanus_ key to females**

couplet 57 continued



fumipennis

johnsoni

(continued) **_Tabanus_, key to females**

58(53) Wing heavily spotted [*birdiei, cheliopterus-fronto* complex] **59**

-- Wing spots less dense [*endymion, melanocerus, reinwardtii, sulcifrons, trijunctus, equalis, limbatinevris, nefarius*] **60**

birdiei

cheliopterus-fronto complex

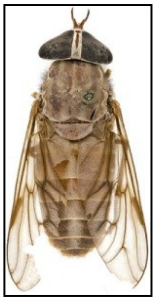
endymion

melanocerus

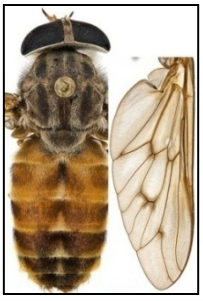
reinwardtii

sulcifrons

trijunctus



equalis



limbatinevris

nefarius

59(58) Wing membrane hyaline, lightly infuscated (if) (less than 50%). Abdomen with dorsal median (m) and sublateral (L) gray spots broadly confluent along posterior margins (p) of tergites. Facial hairs white. Antenna predominantly black .....*birdiei*

-- Wing heavily infuscated, greater than 50%. Not with the above abdominal pattern. Facial hairs brown. Antenna predominantly orange .....*cheliopterus-fronto* complex (see Taxonomy and distribution notes, page 17)

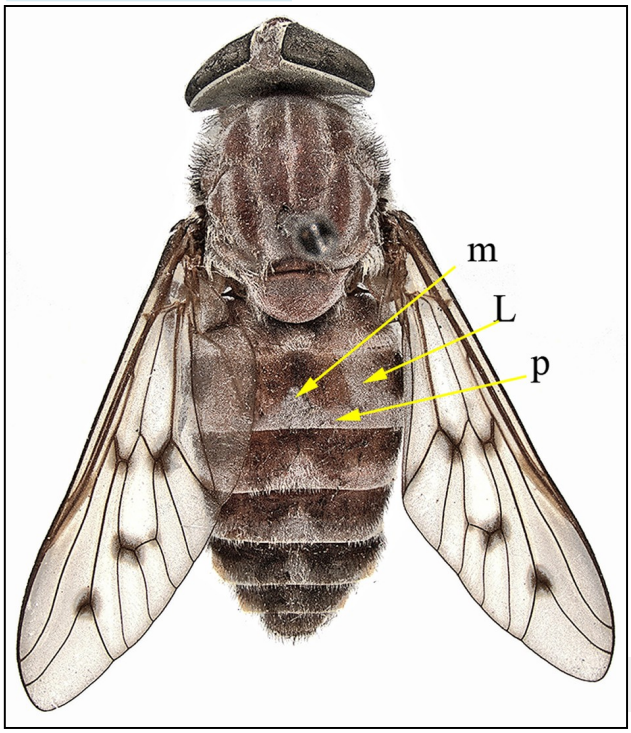
birdiei

cheliopterus-fronto complex

couplet 59 images →

(continued) **_Tabanus_, key to females**

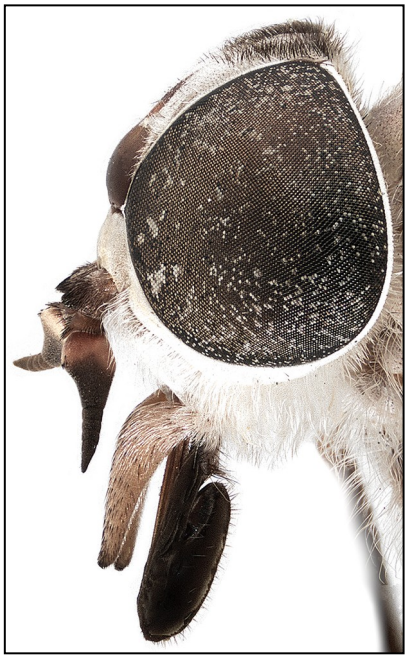
couplet 59 continued



birdiei

cheliopterus-fronto complex

as *cheliopterus:* FSCA collection



birdiei

cheliopterus-fronto complex

as *cheliopterus*: FSCA collection

cheliopterus- fronto complex

as *cheliopterus fronto,* det: L.L. Pechuman. Highlands Co., Florida

(continued)	***Tabanus* key to females**

60(58) Abdomen boldly patterned dorsally with large median white triangles confluent with white hind borders of tergites. Wing heavily infuscated, orange .....*trijunctus*

-- Not so boldly marked. Wing not so heavily infuscated [*endymion, melanocerus, reinwardtii, sulcifrons, equalis, limbatinevris, nefarius*] **61**

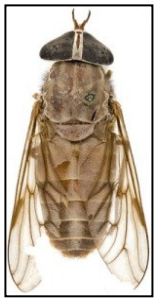
trijunctus

endymion

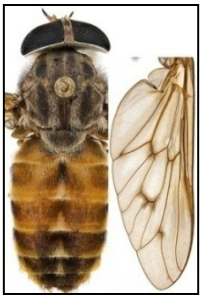
melanocerus

reinwardtii

sulcifrons



equalis



limbatinevris

nefarius

61(60) Abdomen black with median row of small white triangles; sublaterally with broad oblique gray patches most prominent on tergite 2 .....*reinwardtii*

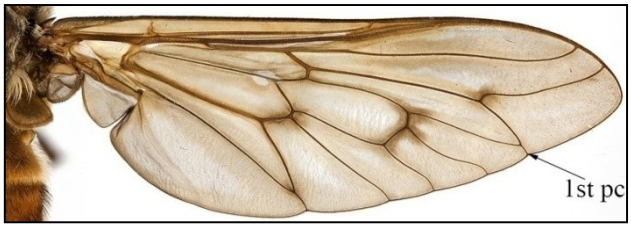
-- Abdomen not as above [*endymion*, *melanocerus, sulcifrons, equalis, limbatinevris, nefarius*].....**62**

reinwardtii

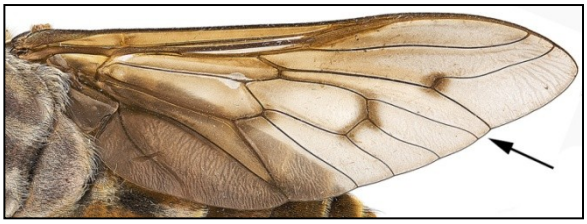
(continued)	***Tabanus* key to females**

62(61) First posterior cell (1st pc) of wing closed at margin and usually petiolate (with a stalk) [*limbatinevris, nefarius*] **63**

-- 1st pc open at wing margin [*endymion, melanocerus, sulcifrons, equalis*] **64**



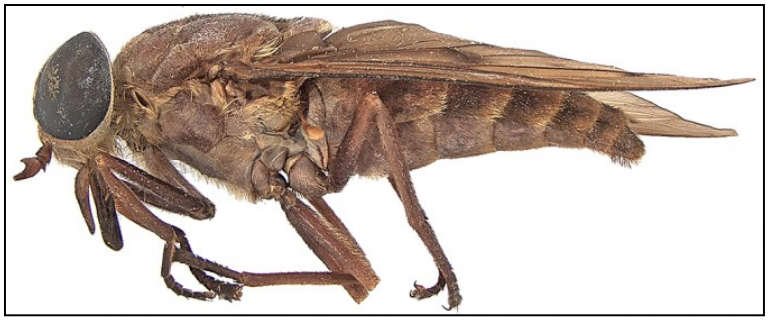
couplet 62



couplet 62--

63(62) Legs bicolored, black and yellow. Mesonotum black with gray lines. Abdomen orange .....*limbatinevris*

-- Legs uniformly brown. Mesonotum brown. Abdomen brown .....*nefarius*



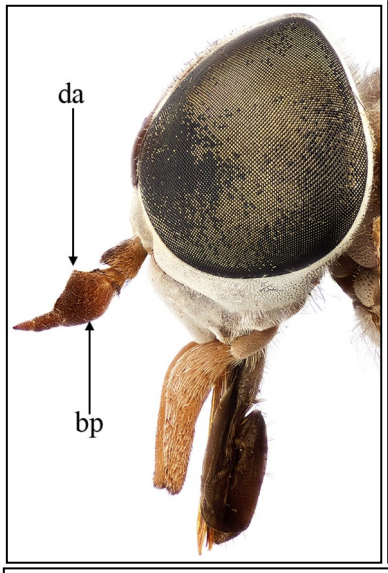
limbatinevris

nefarius

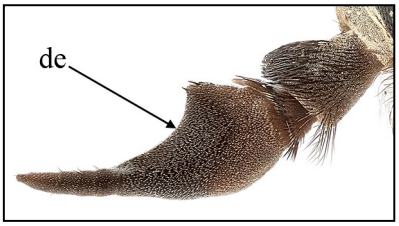
(continued)	***Tabanus* key to females**

64(63) Antenna basal plate (bp) almost oval with an acute dorsal angle (da) but no dorsal excision. Second abdominal tergite with a pair of faint oblique sublateral spots (s) ..... *endymion*

-- Basal plate not oval, longer than deep and with a deep dorsal excision (de). No sublateral spots on second tergite [*equalis, melanocerus, sulcifrons*] **65**



endymion



melanocerus

sulcifrons

endymion

equalis

65(64) Palpus (p) pale reddish or yellowish brown. Wing first posterior cell wide open at wing margin (m) ..... *equalis*

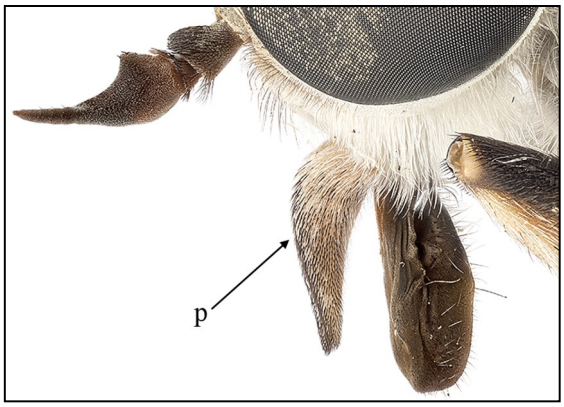
-- Palpus pale cream colored or dark brown/black. First posterior cell narrowed, or closed, at wing margin. If first posterior cell not noticeable narrowed at wing margin, in some *sulcifrons,* wing has obvious spots [*melanocerus, sulcifrons*] **66**

(continued) **_Tabanus_ key to females**

couplet 65 continued

equalis

equalis



melanocerus

sulcifrons

melanocerus

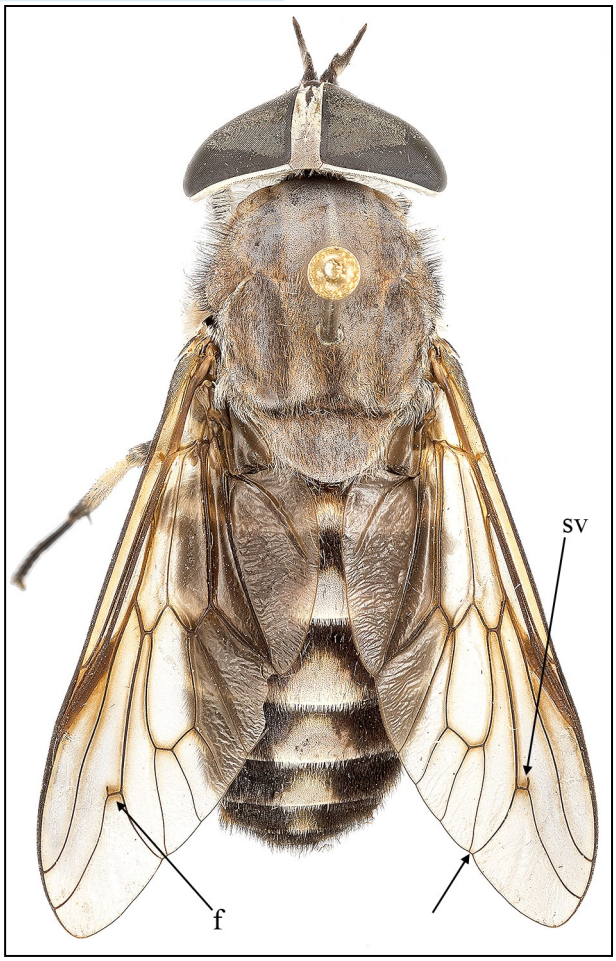
sulcifrons

66(65) Palpus (p) pale cream. Wing clear or infuscated with diffuse spot at fork (f); spur vein (sv) may be present at fork ..... *melanocerus*

-- Palpus dark brown/black. Wing with obvious spots, spur vein never present ..... *sulcifrons*

(continued) **_Tabanus_ key to females**

couplet 66 continued



melanocerus

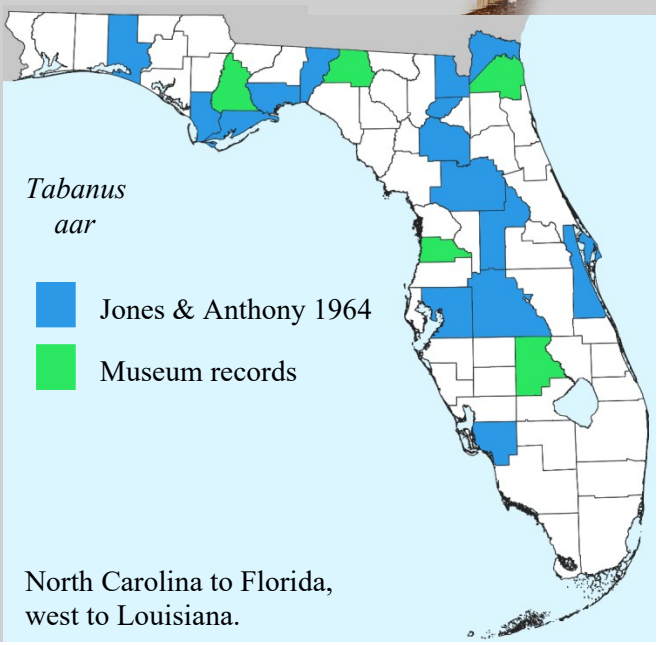
sulcifrons

melanocerus

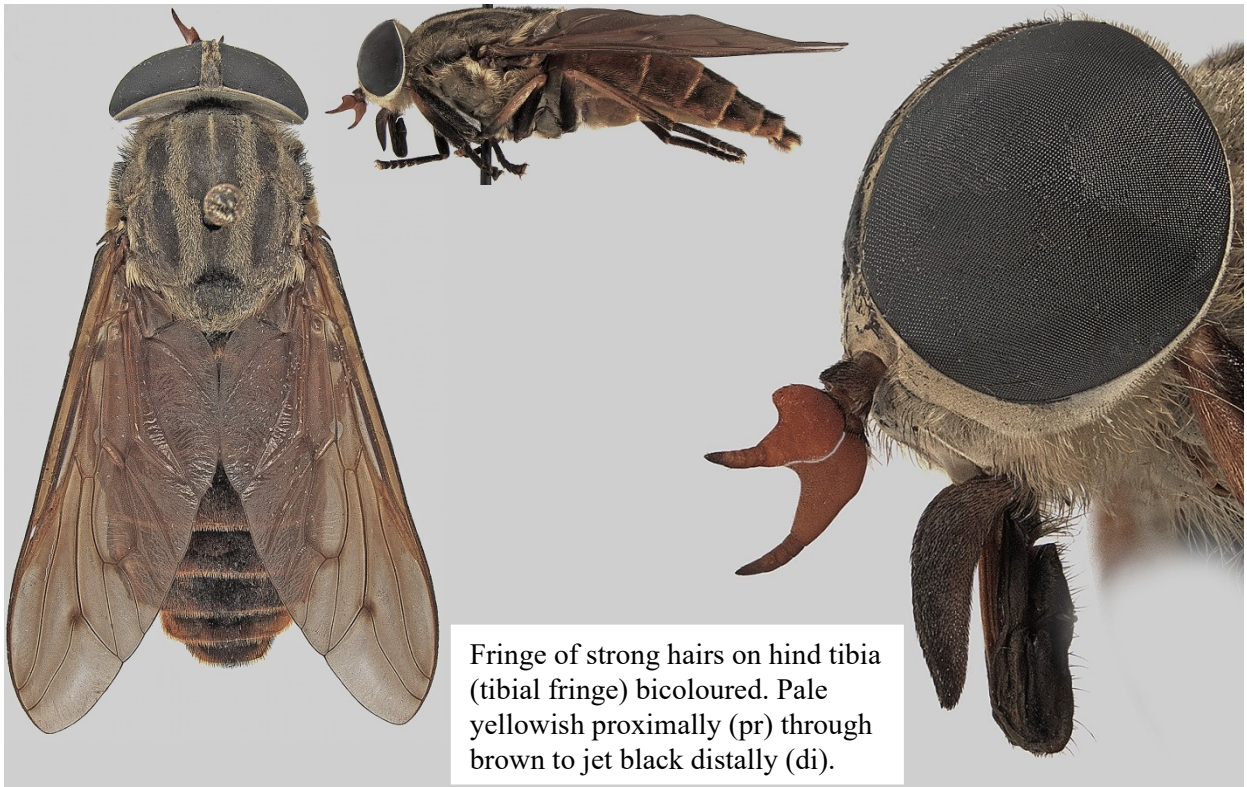
Tabanus species pages

Tabanus aar Philip

length 18-25 mm

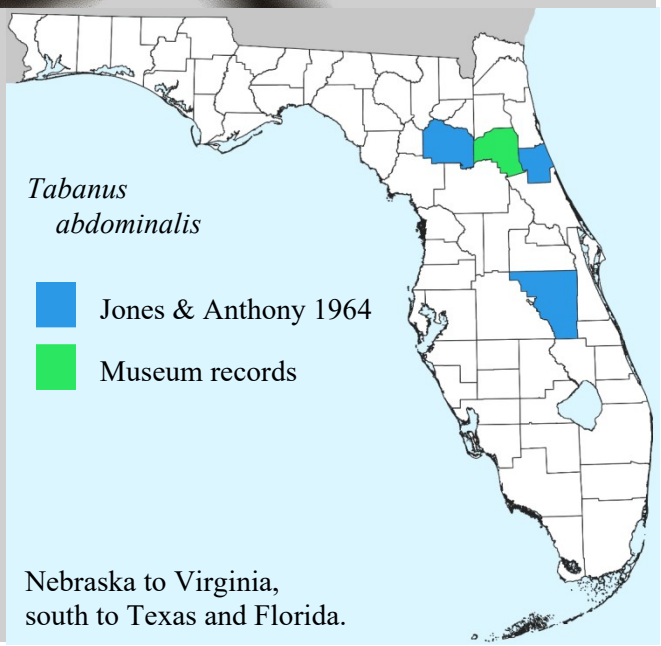


Tabanus abdominalis Fabricius



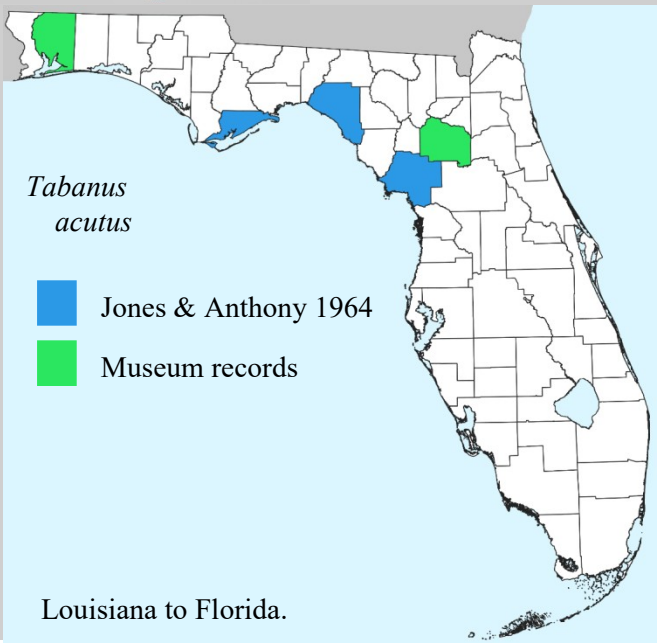
Fringe of strong hairs on hind tibia (tibial fringe) bicoloured. Pale yellowish proximally (pr) through brown to jet black distally (di).

length 18-25 mm

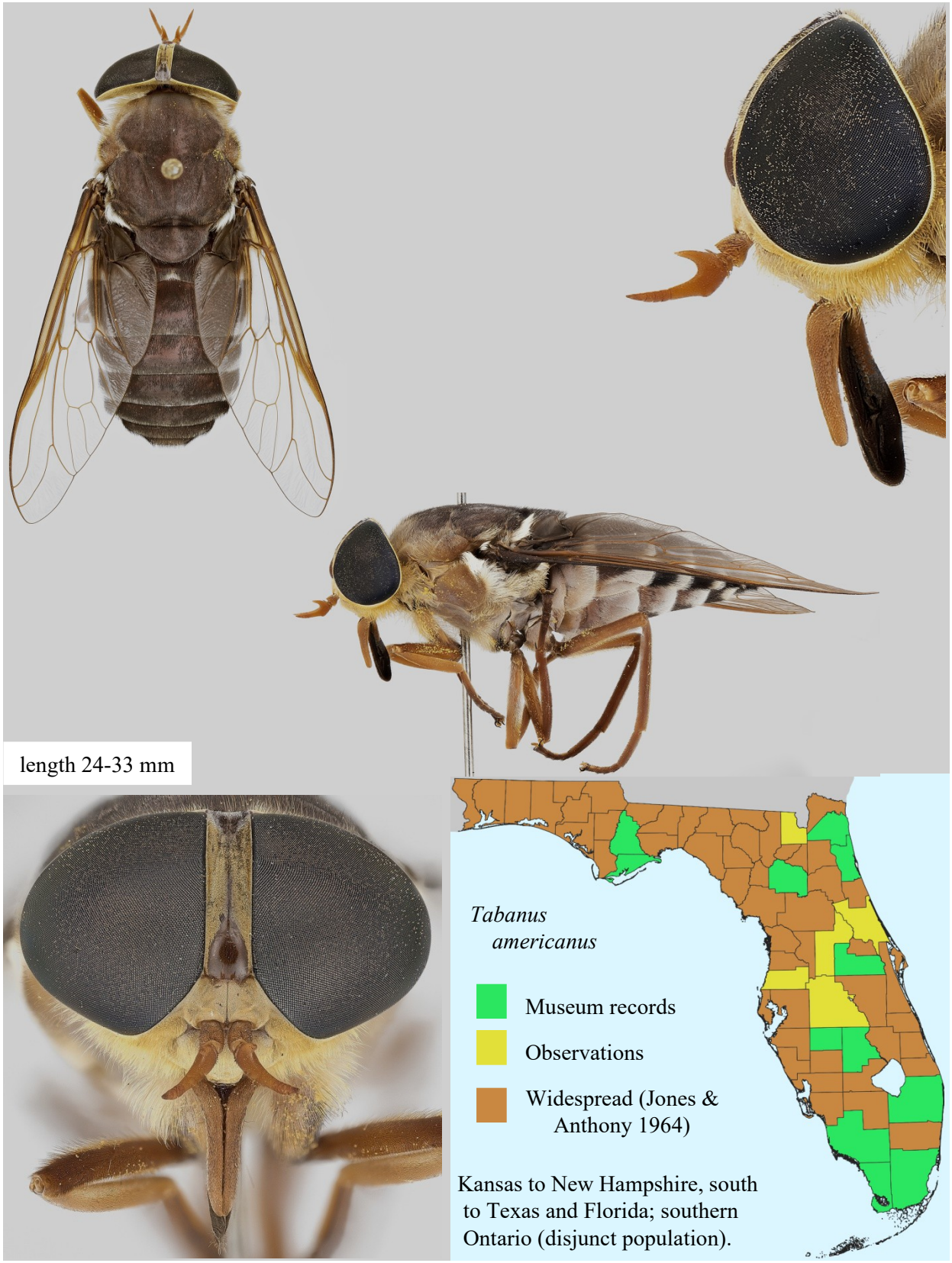


Tabanus acutus (Bigot)

length 16-21 mm

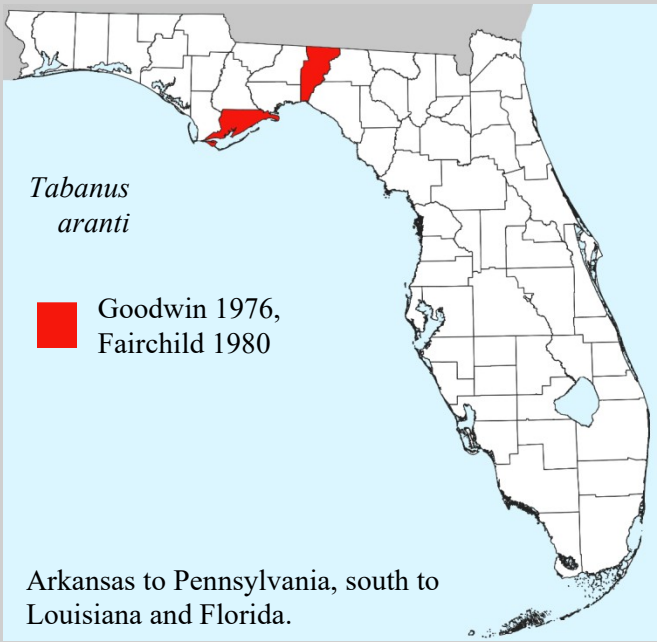


Tabanus americanus Forster

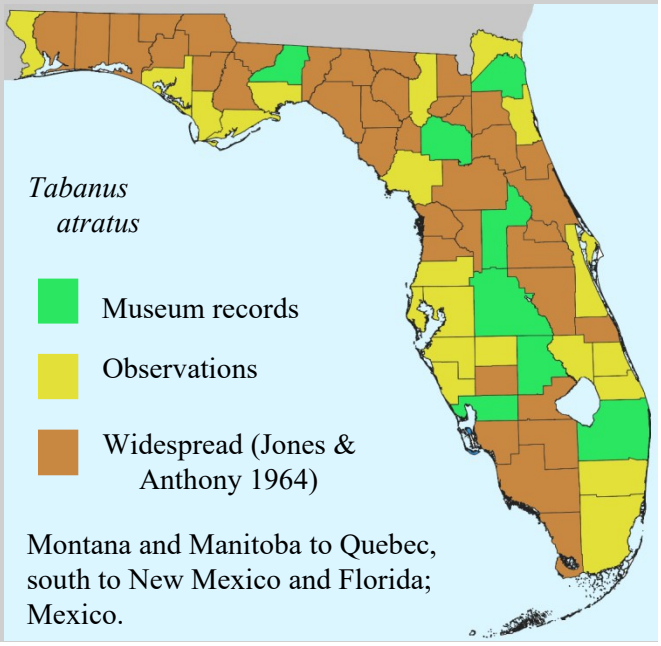


Tabanus aranti Hays

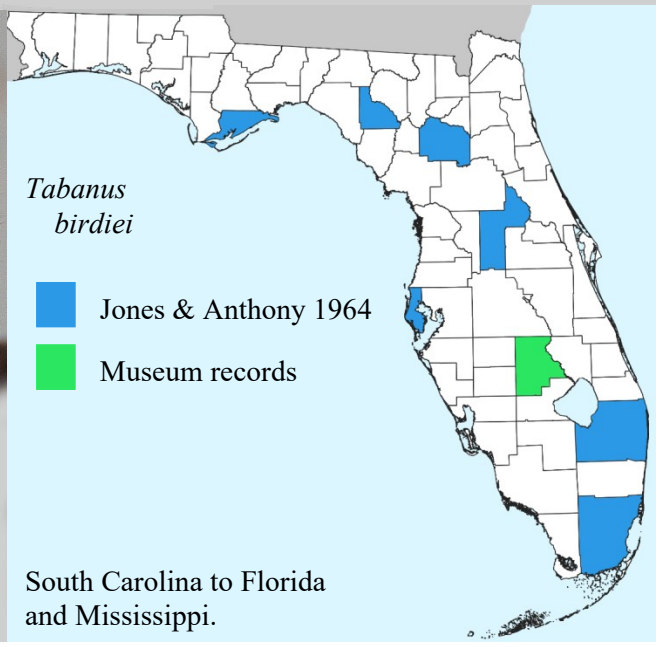
length 15-22 mm



Tabanus atratus Fabricius

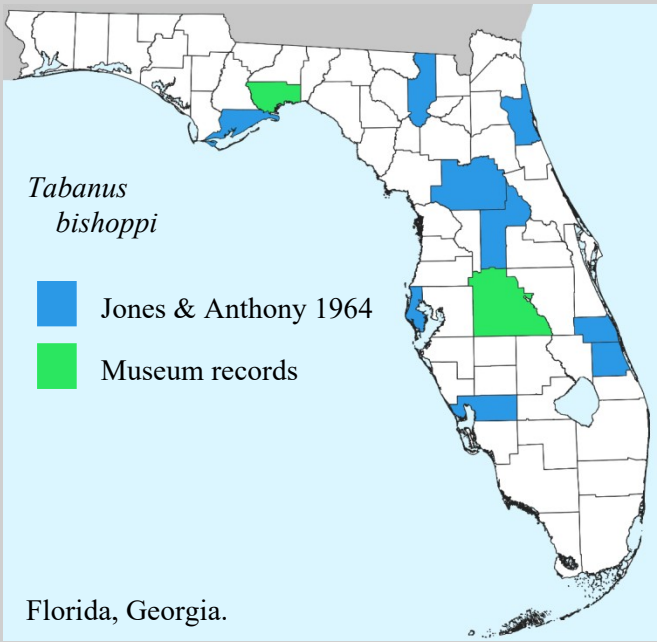


Tabanus birdiei Whitney



Tabanus bishoppi Stone

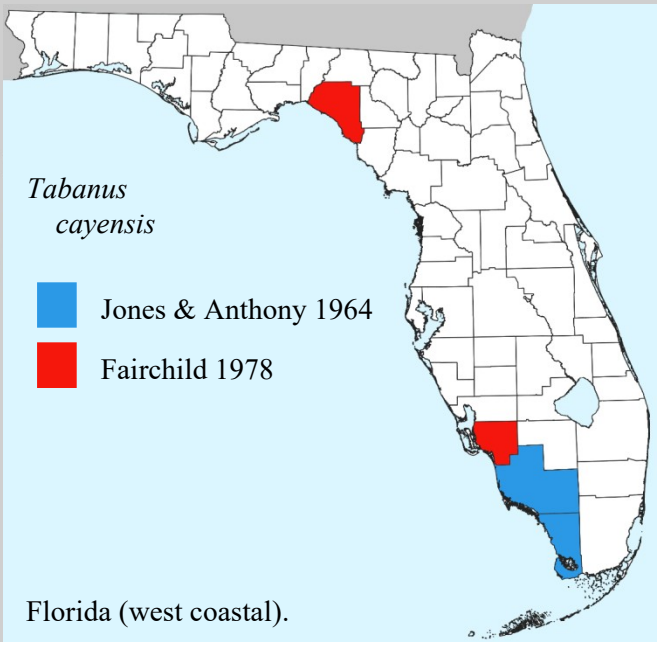
length 11-13 mm



Tabanus calens Linnaeus

Tabanus cayensis Fairchild

length 10-13 mm

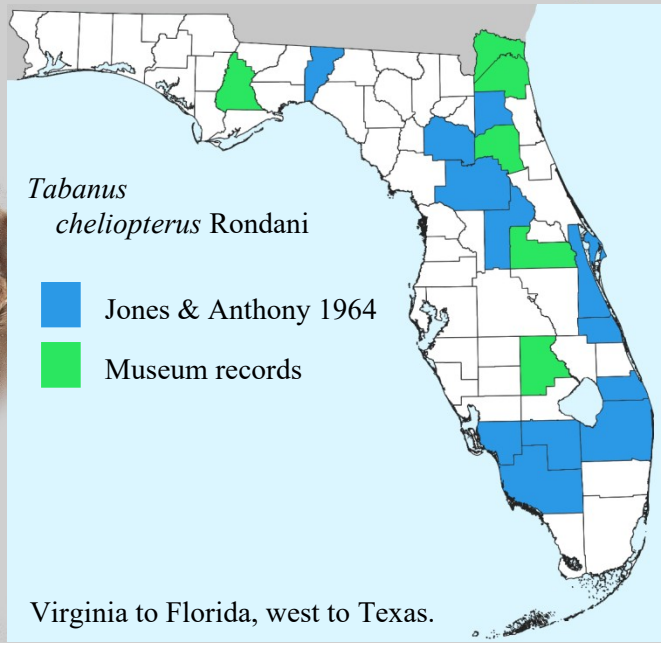


Tabanus cheliopterus-fronto complex

as *cheliopterus:* FSCA collection

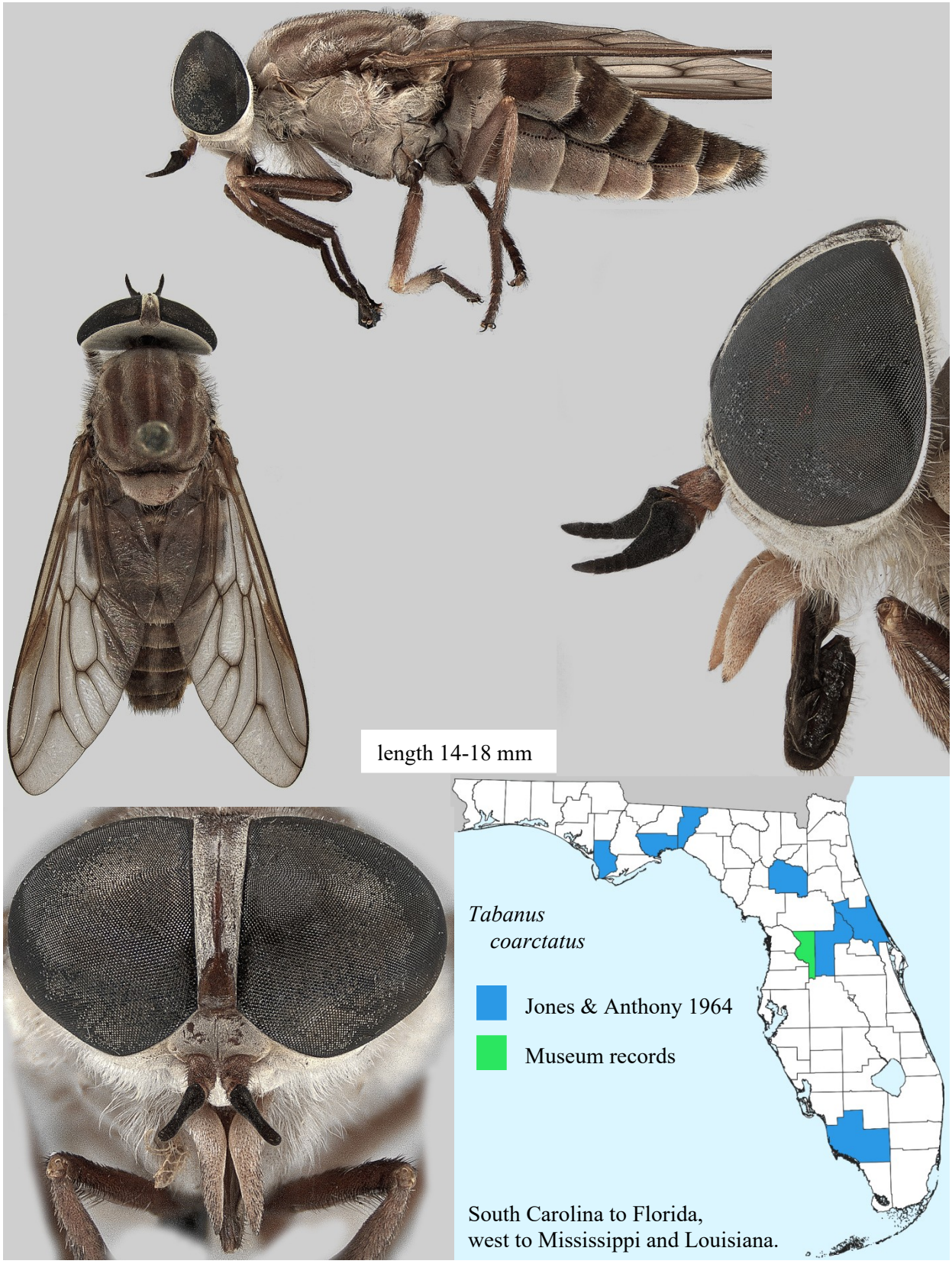
see discussion, page 17

length 15-21 mm

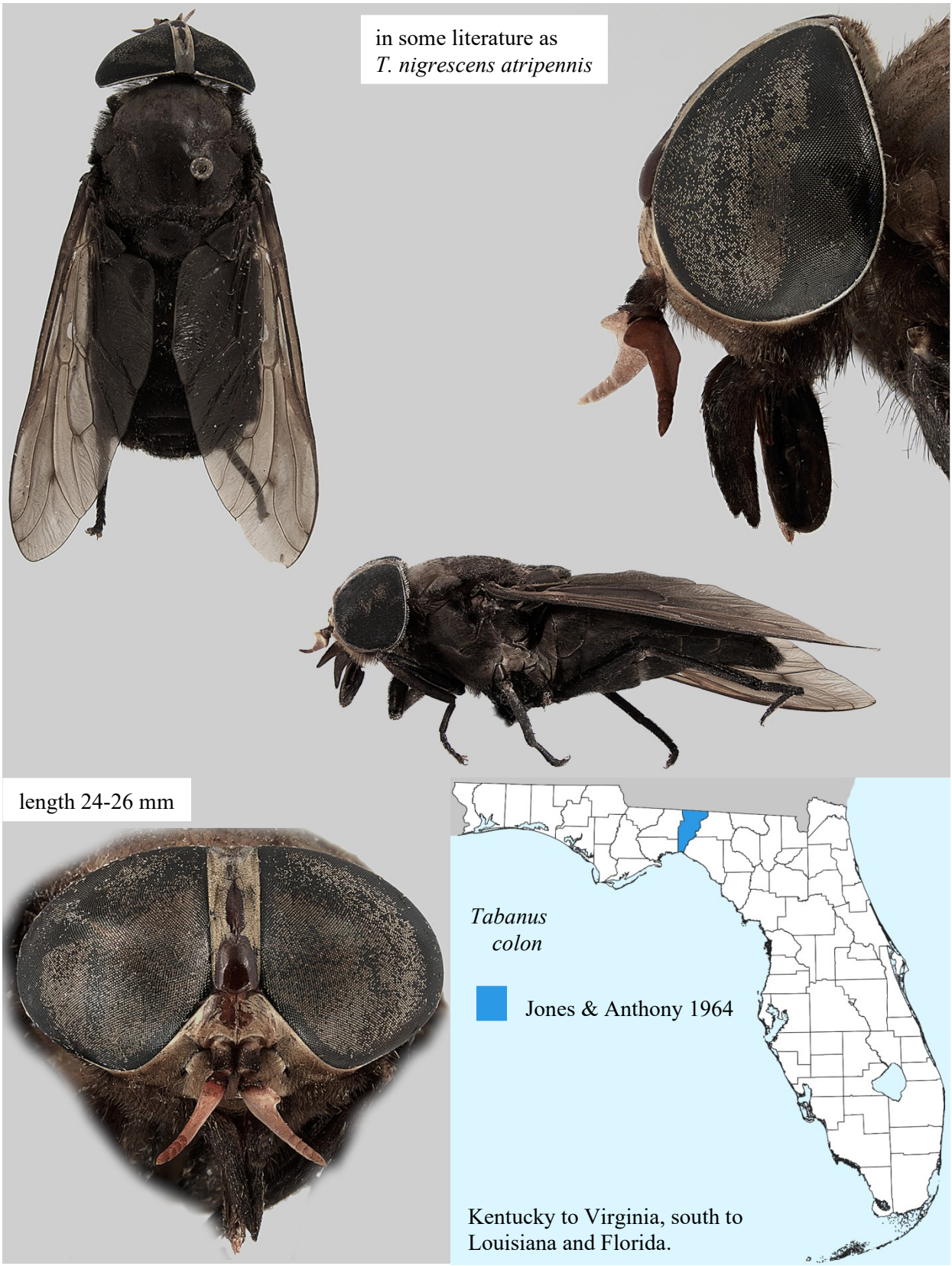


(continued) ***Tabanus cheliopterus- fronto*** complex

Tabanus coarctatus Stone



Tabanus colon Thunberg

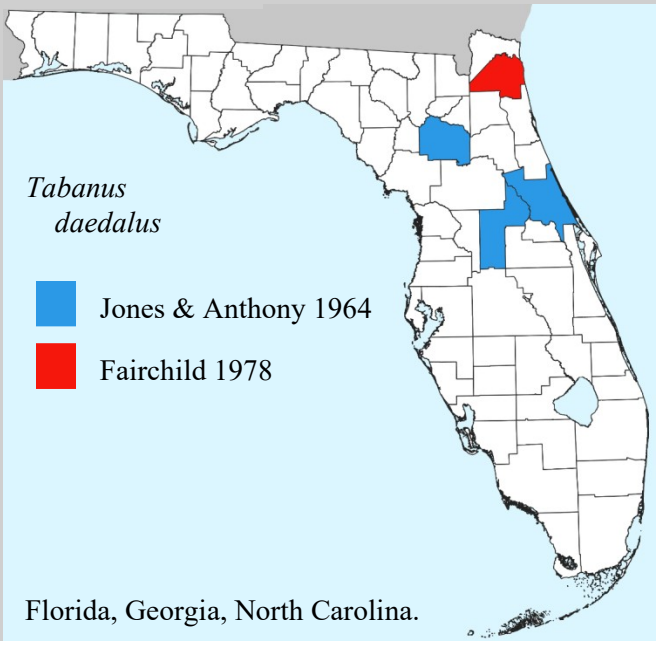


Tabanus conterminus Walker

Tabanus cymatophorus Osten Sacken

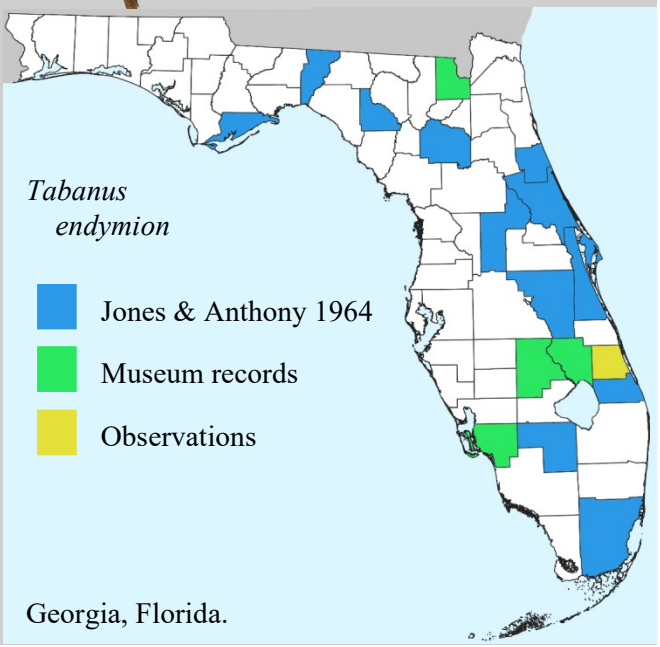
Tabanus daedalus (Stone)

length 9 mm



Tabanus endymion Osten Sacken

length 13-18 mm



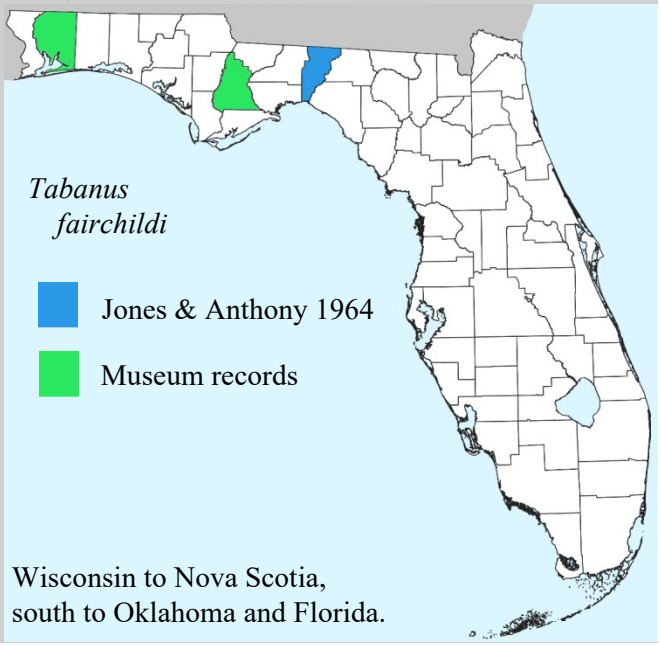
Tabanus equalis Hine

length 17-22 mm

Kansas to Indiana, south to Texas and Georgia.

Tabanus fairchildi Stone

length 13-18 mm



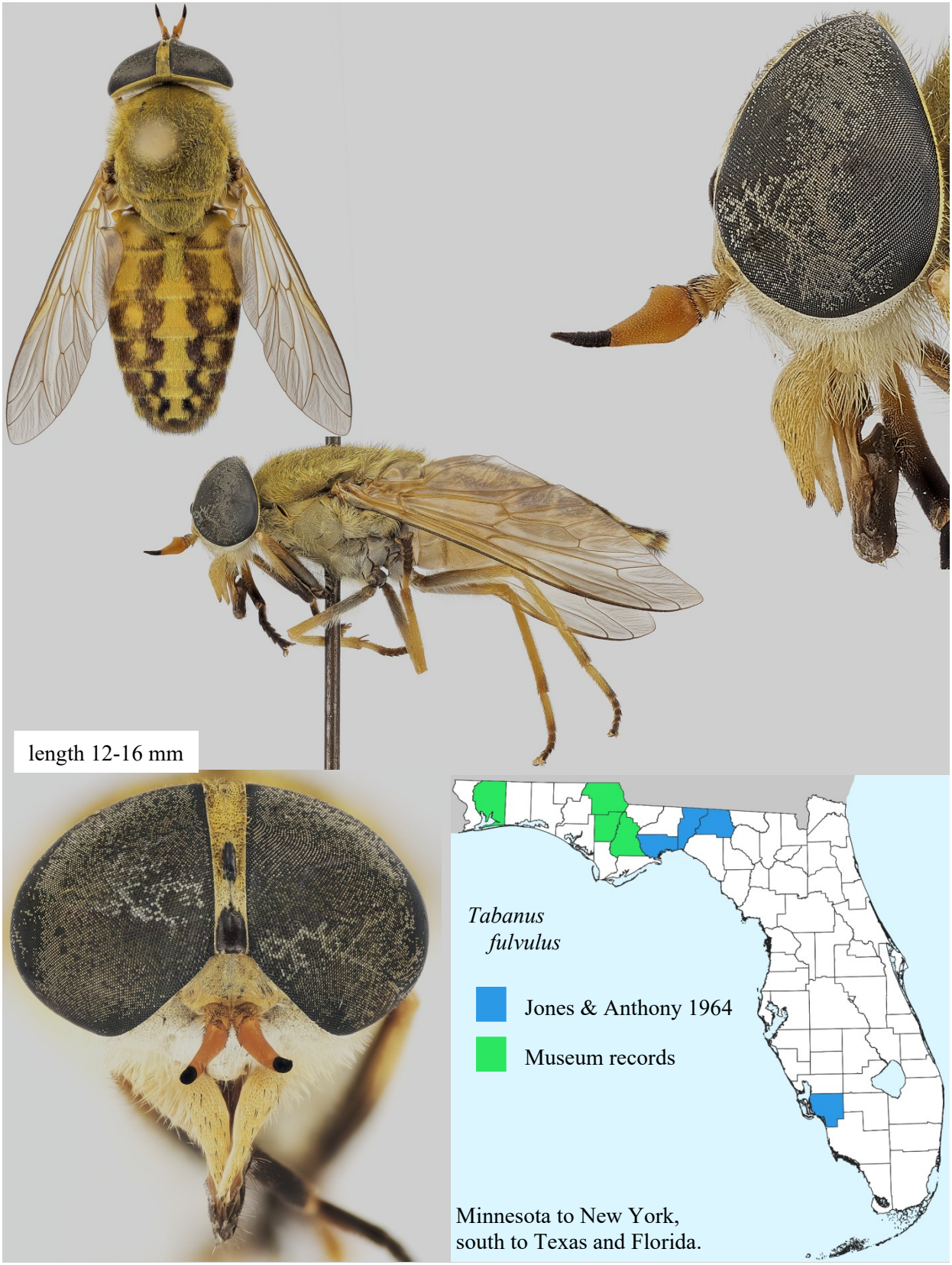
Tabanus fulvilineis Philip

length 10.5 mm

member of the '*nigrovittatus*-complex'; listed from these Florida counties : Brevard Co., Hernando Co., Hillsborough Co., Monroe Co. (Philip, 1957) but exact distribution uncertain.

Mississippi, Florida.

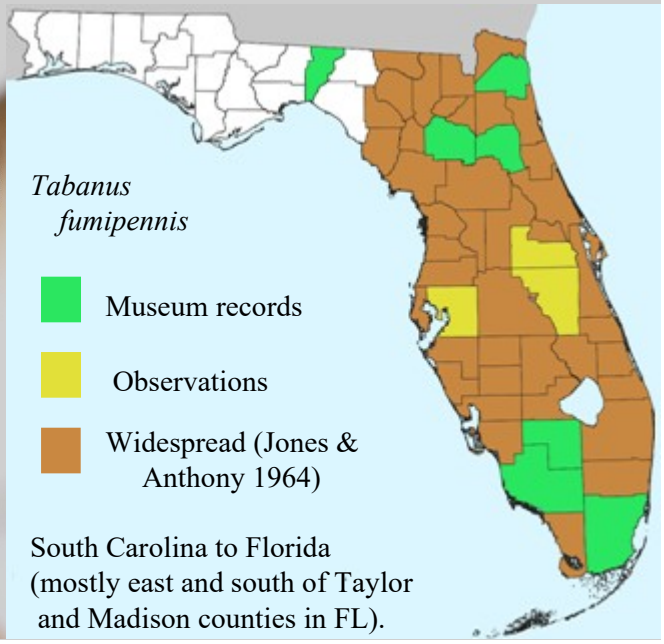
Tabanus fulvulus Wiedemann



Tabanus fumipennis Wiedemann

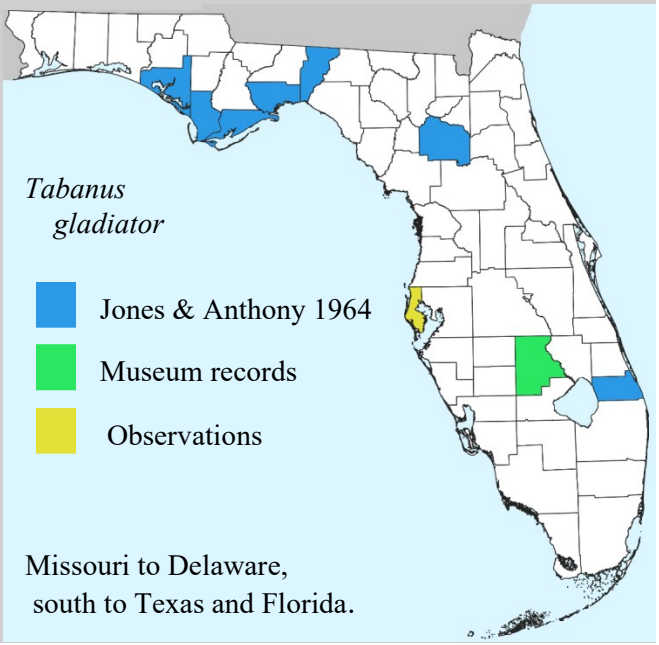
Eye coppery, with three narrow, bluish diagonal bands (Stone. 1938).

length 20-26 mm



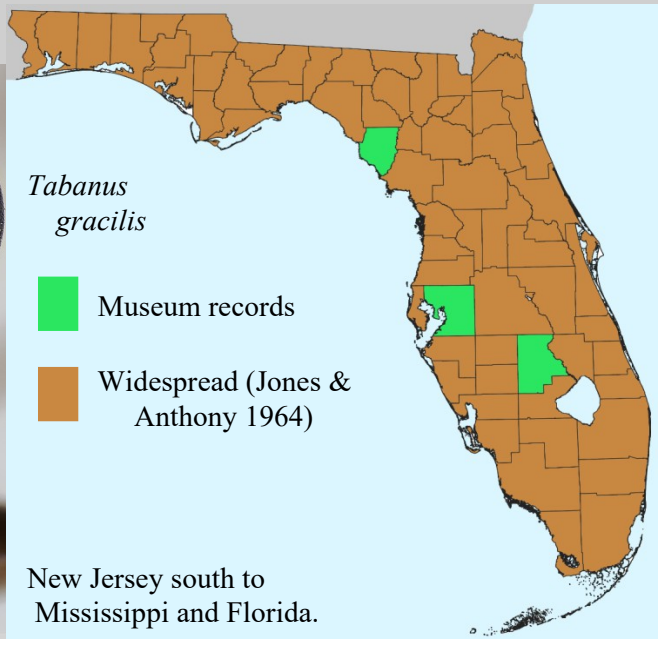
Tabanus gladiator Stone

length 22-25 mm

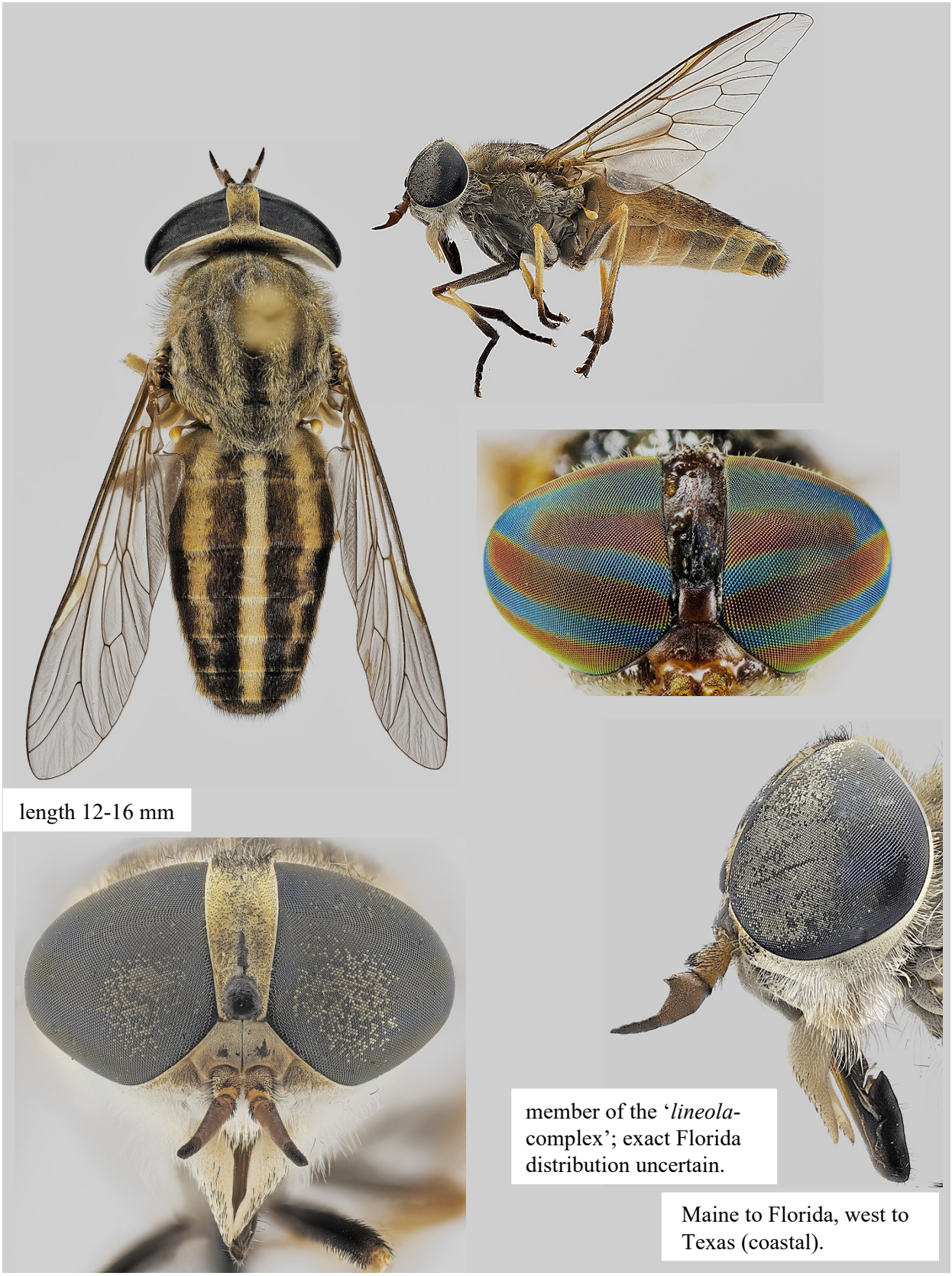


Tabanus gracilis Wiedemann

length 11-16 mm



Tabanus hinellus Philip



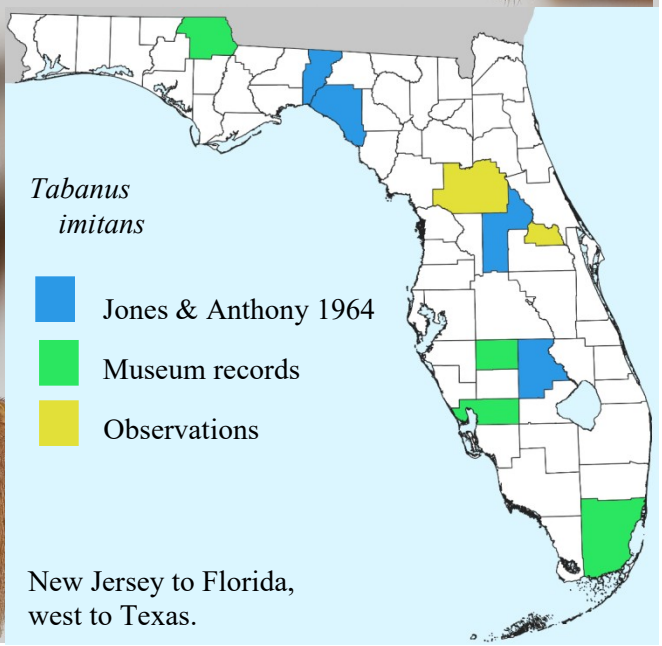
length 12-16 mm

member of the '*lineola*-complex'; exact Florida distribution uncertain.

Maine to Florida, west to Texas (coastal).

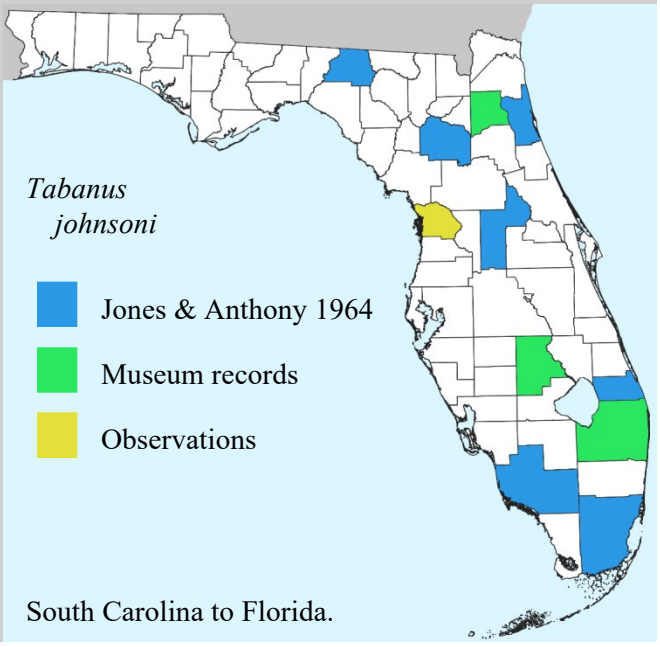
Tabanus imitans Walker

length 20-24 mm



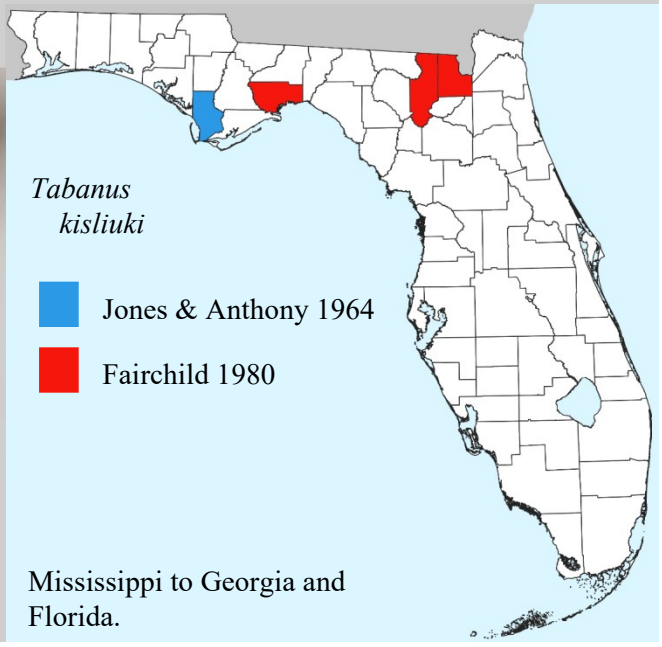
Tabanus johnsoni Hine

length 16-20 mm

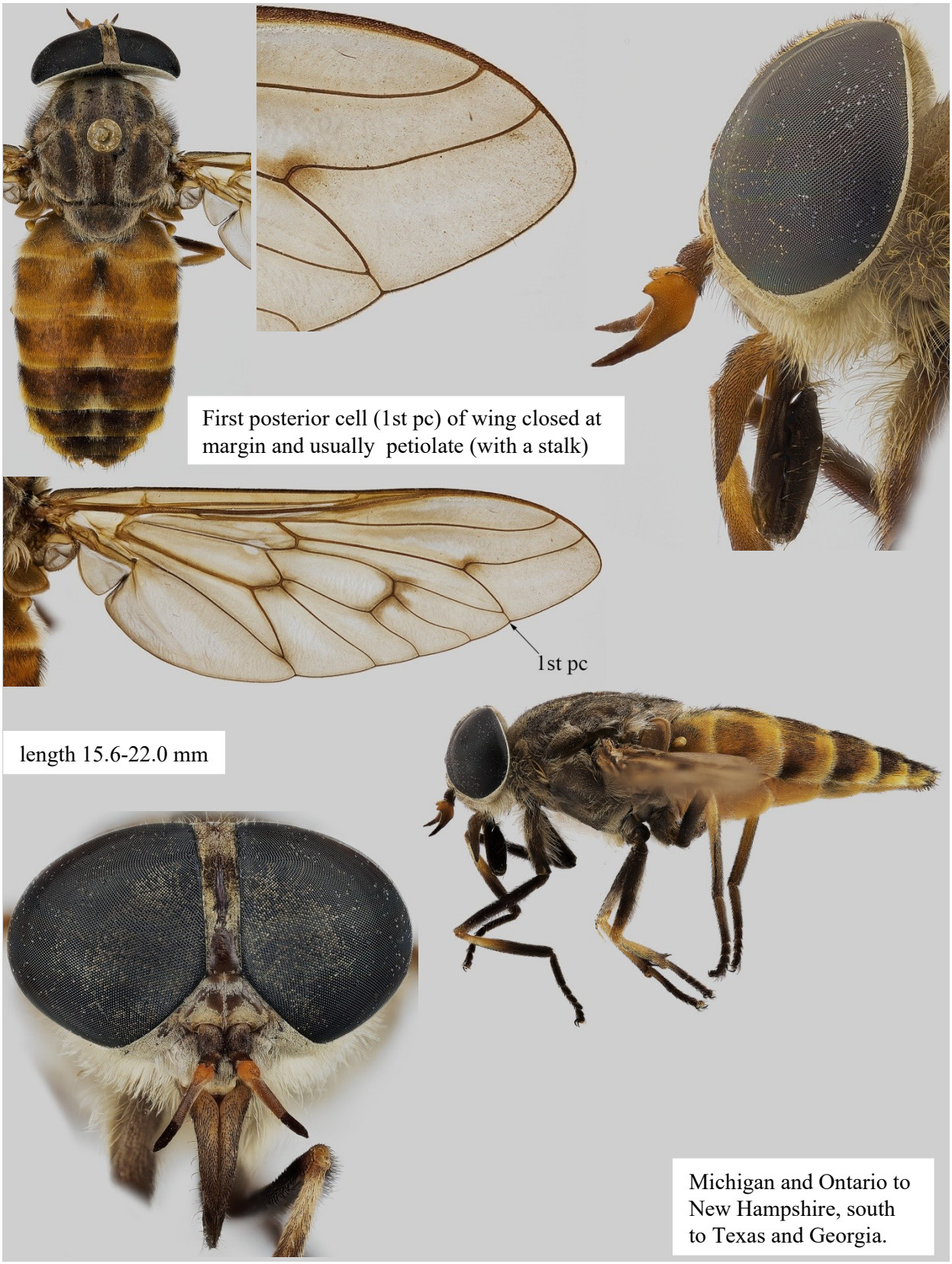


Tabanus kisliuki Stone

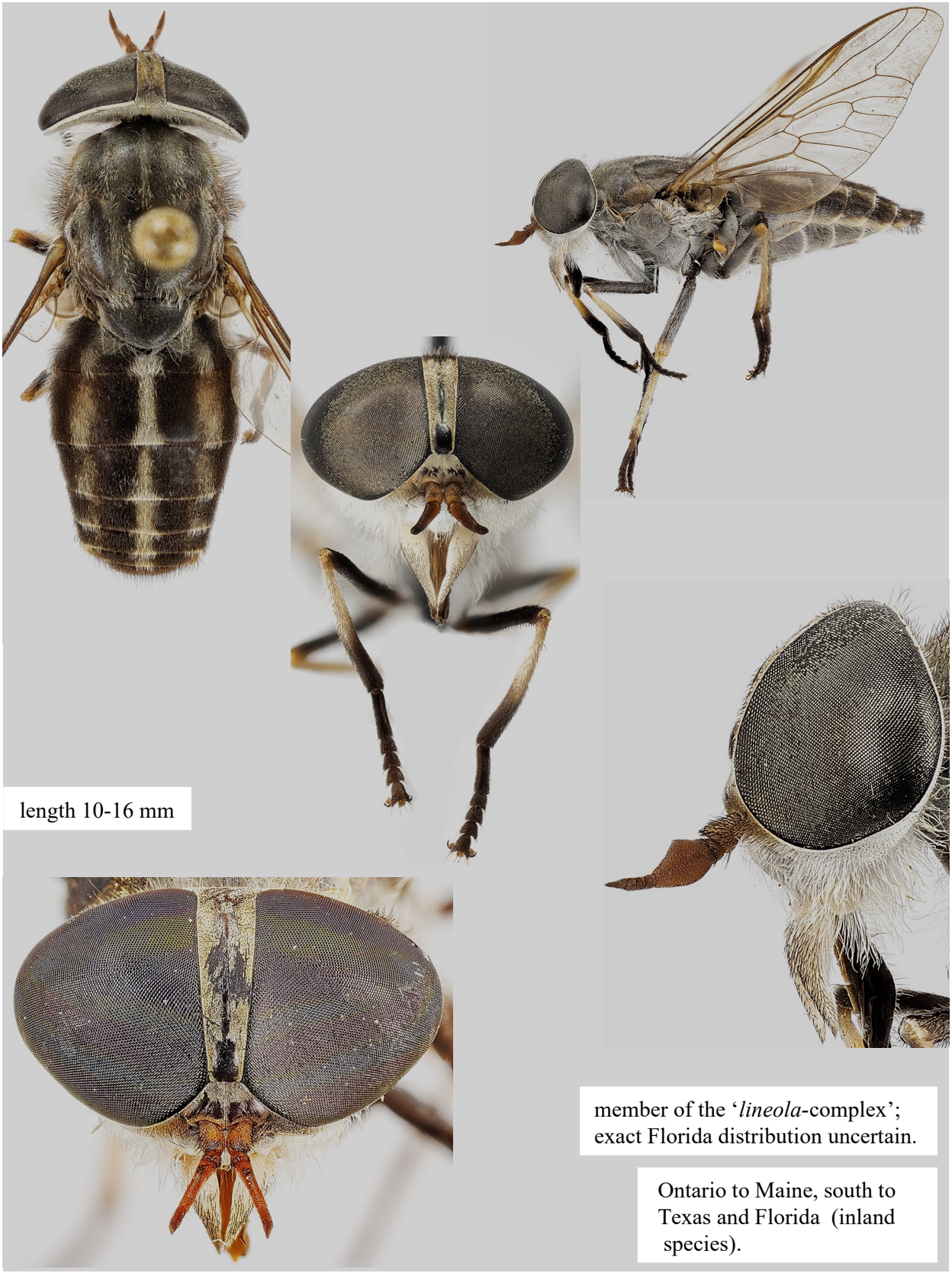
length 20 mm



Tabanus limbatinevris Macquart



Tabanus lineola Fabricius



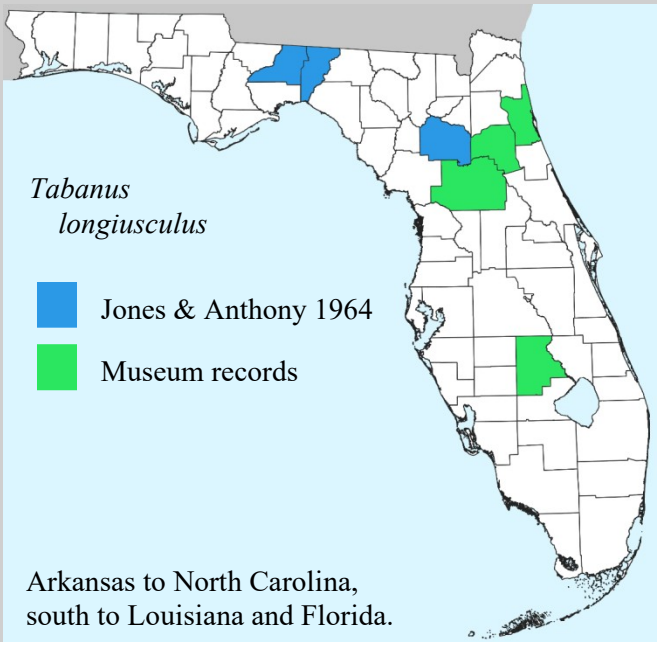
length 10-16 mm

member of the '*lineola*-complex'; exact Florida distribution uncertain.

Ontario to Maine, south to Texas and Florida (inland species).

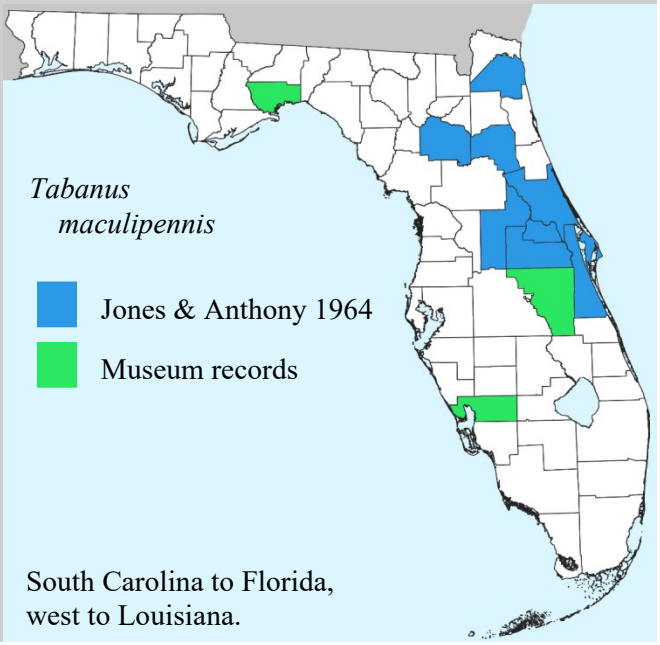
Tabanus longiusculus Hine

length 10-13 mm



Tabanus maculipennis Wiedemann

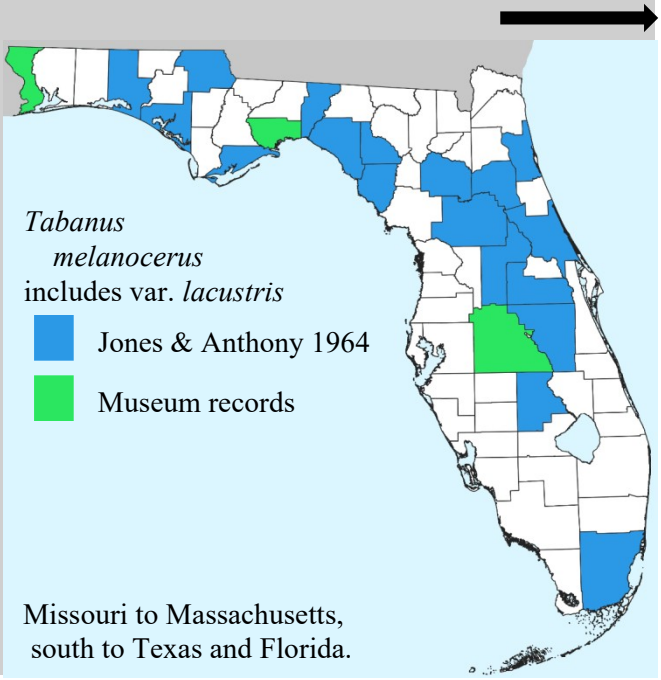
length 17-23 mm



***Tabanus melanocerus* Wiedemann**

length 14-20 mm

T. melanocerus is polymorphic in color and wing venation. Body color varies between black and brown; wing venation with/without a spur vein at fork and dense/less dense spot at fork.

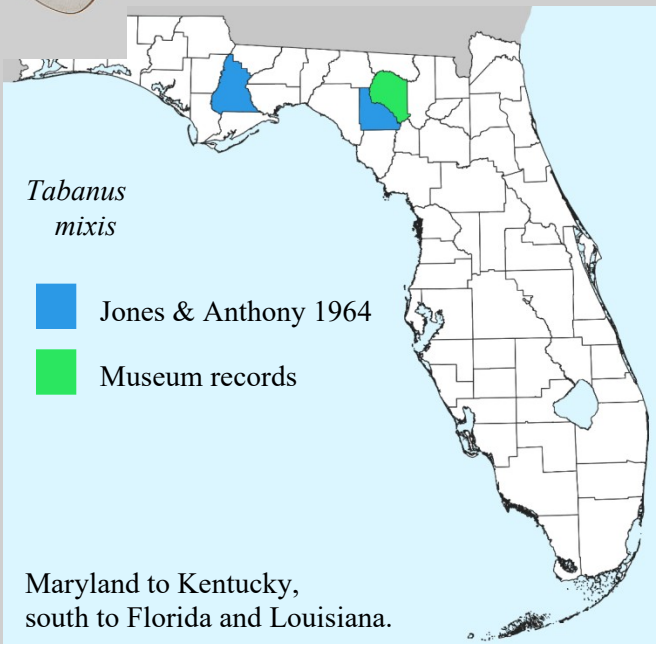


(continued) ***Tabanus melanocerus*** Stone

See Taxonomy and distribution notes, page 15

Tabanus mixis Philip

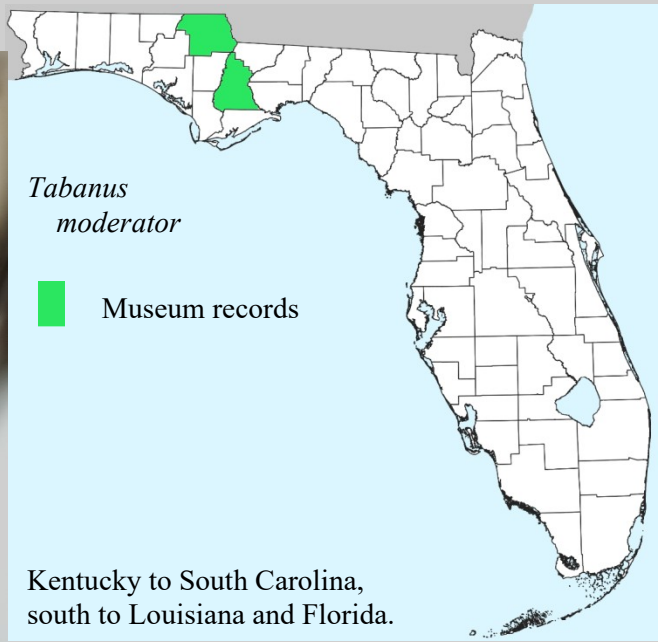
length 14-22 mm



(continued) ***Tabanus mixis*** Philip

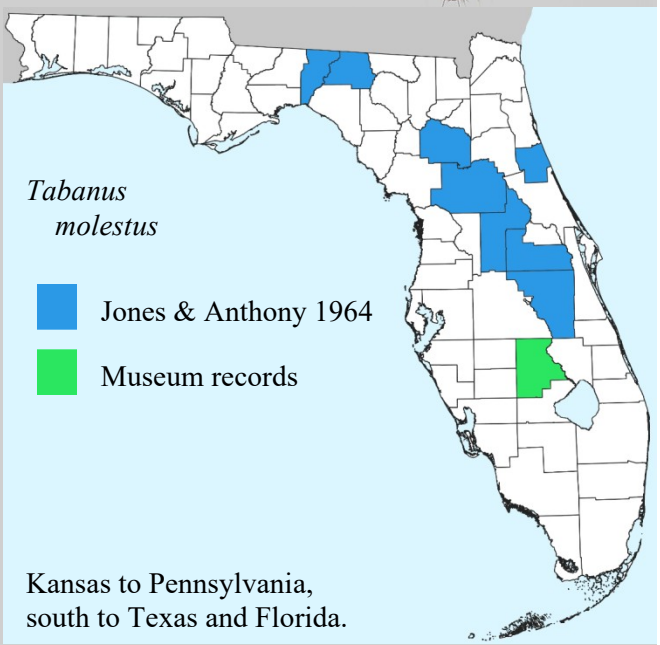
Tabanus moderator Stone

length 17-21 mm



Tabanus molestus Say

length 14-22 mm



Tabanus mularis Stone

length 10-12 mm

member of the '*nigrovittatus*-complex'; exact Florida distribution uncertain.

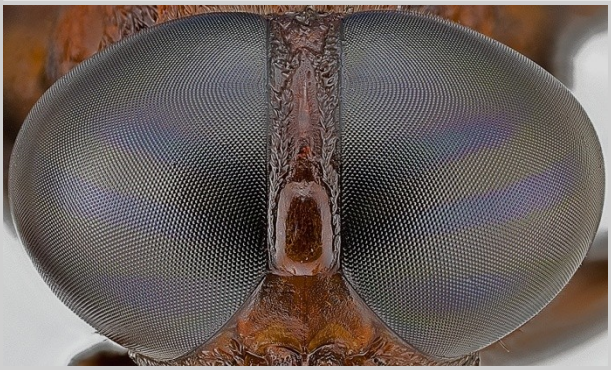
Kansas to Maryland, south to Texas and Florida.

Tabanus nefarius Hine

Tabanus nigrescens Palisot de Beauvois

length 20-24 mm

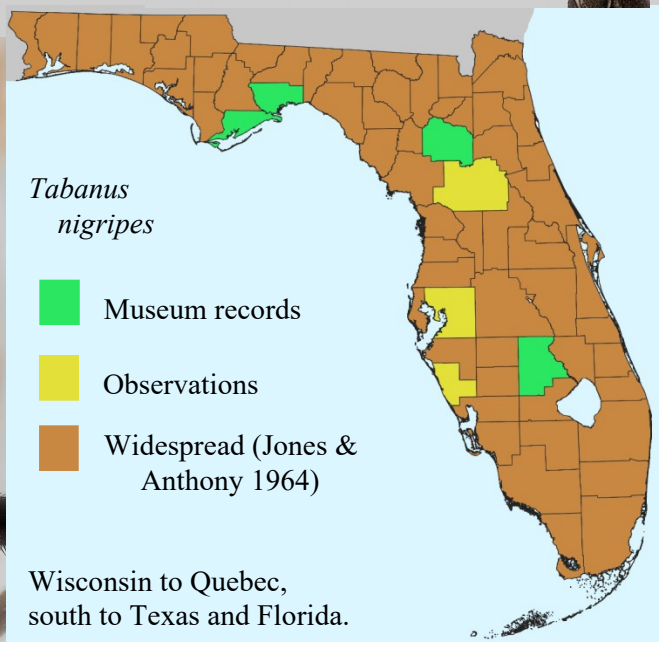
Eye dark, dull green, with three narrow purple bands, the upper one indistinct outwardly (Stone, 1938).



Wisconsin to Massachusetts, south to Louisiana and Georgia

Tabanus nigripes Wiedemann

length 11-16 mm



Tabanus nigrovittatus Macquart

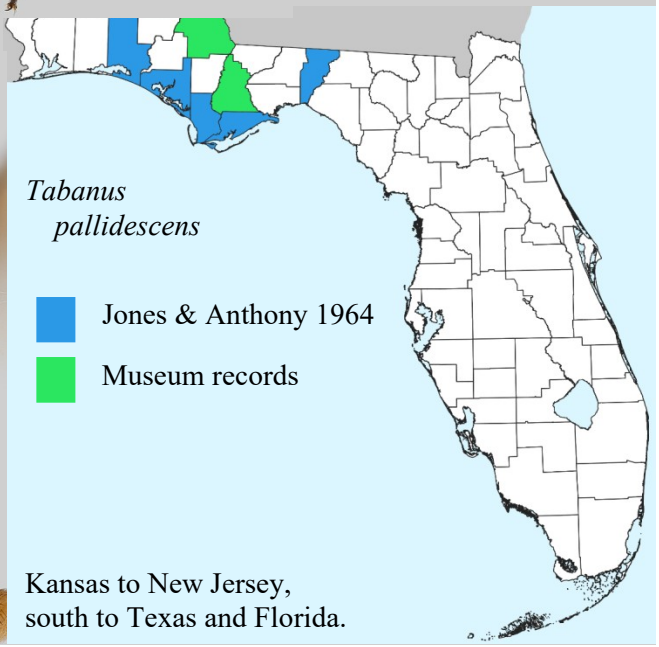
length 9-13 mm

member of the '*nigrovittatus*-complex'; exact Florida distribution uncertain.

Quebec to Texas, coastal.

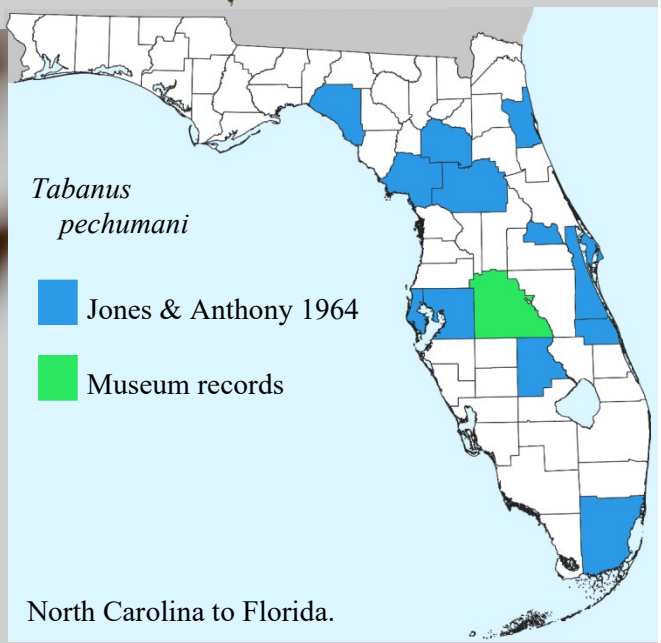
Tabanus pallidescens Philip

length 12-16 mm



Tabanus pechumani Philip

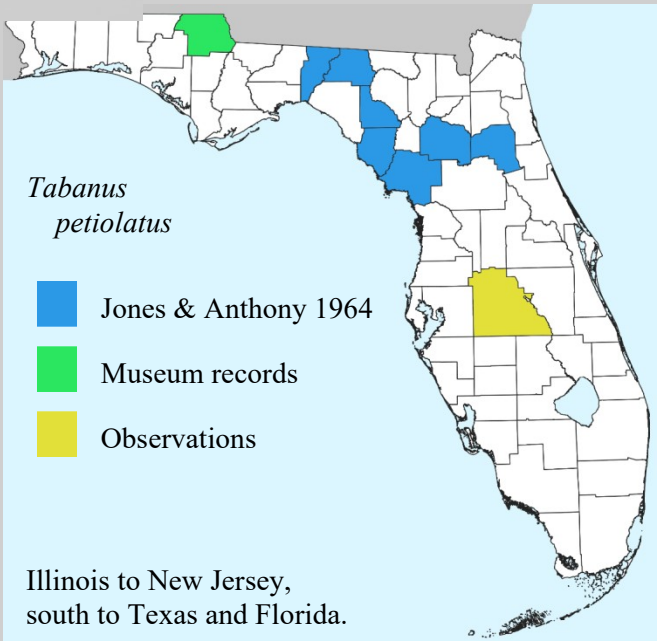
length 17-23 mm



Tabanus petiolatus Hine

First posterior cell (1st pc) of wing closed at margin and petiolate (with a stalk).

length 13-17 mm

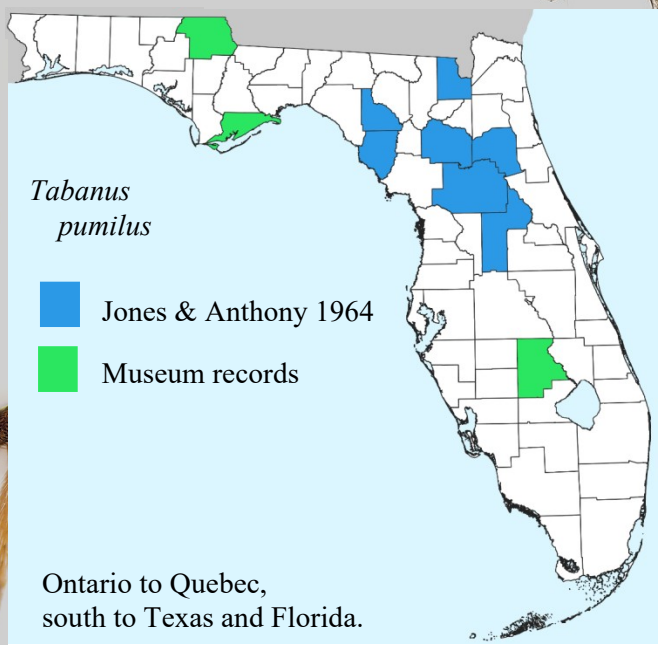


Tabanus proximus Walker

length 19-29 mm

Tabanus pumilus Macquart

length 13-18 mm



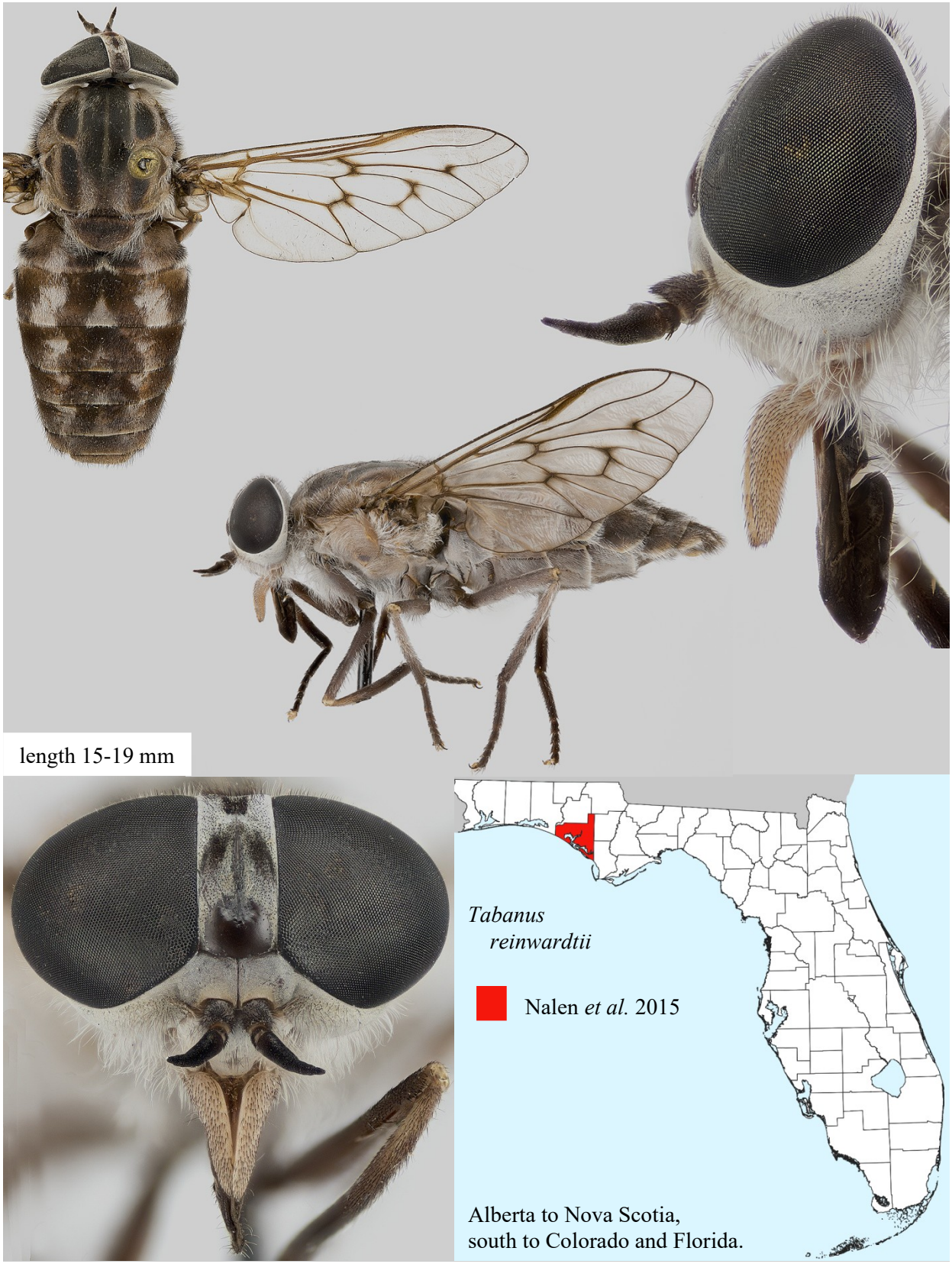
Tabanus quinquevittatus Wiedemann

length 10-13 mm

member of the '*nigrovittatus*-complex'; exact Florida distribution uncertain.

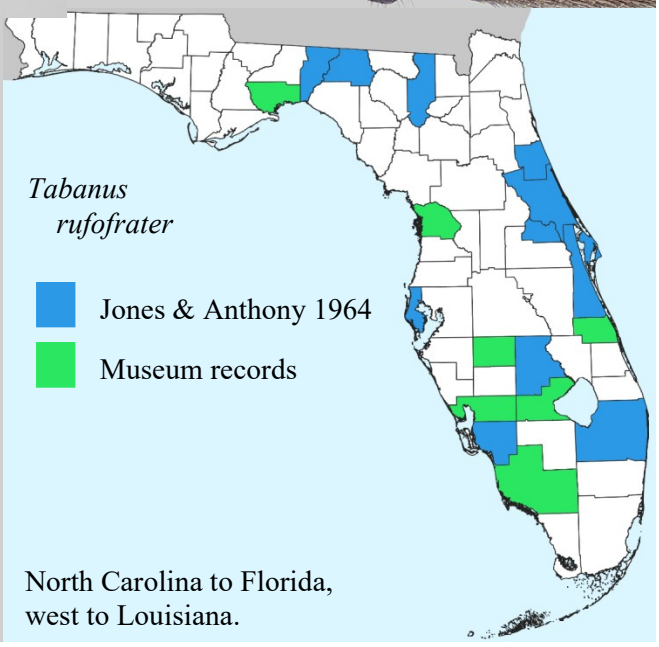
Colorado to Quebec, south to northern Texas and Florida

Tabanus reinwardtii Wiedemann



Tabanus rufofrater Walker

length 15-22 mm

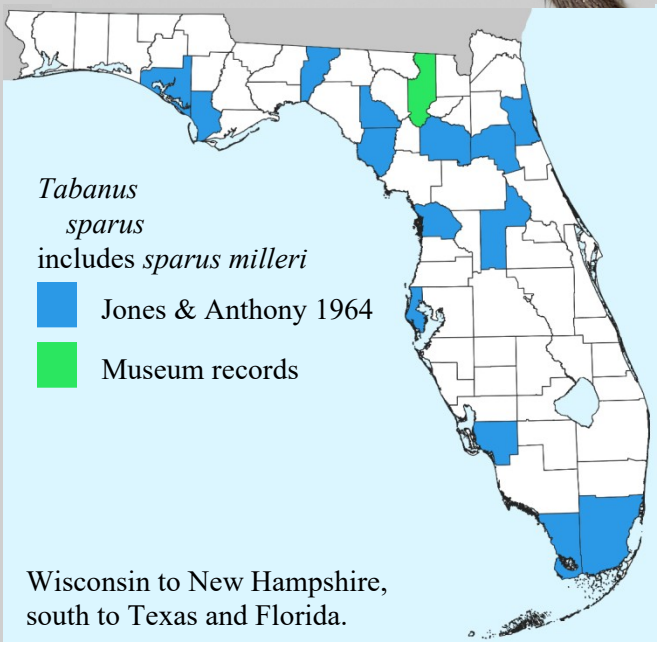


Tabanus sackeni Fairchild

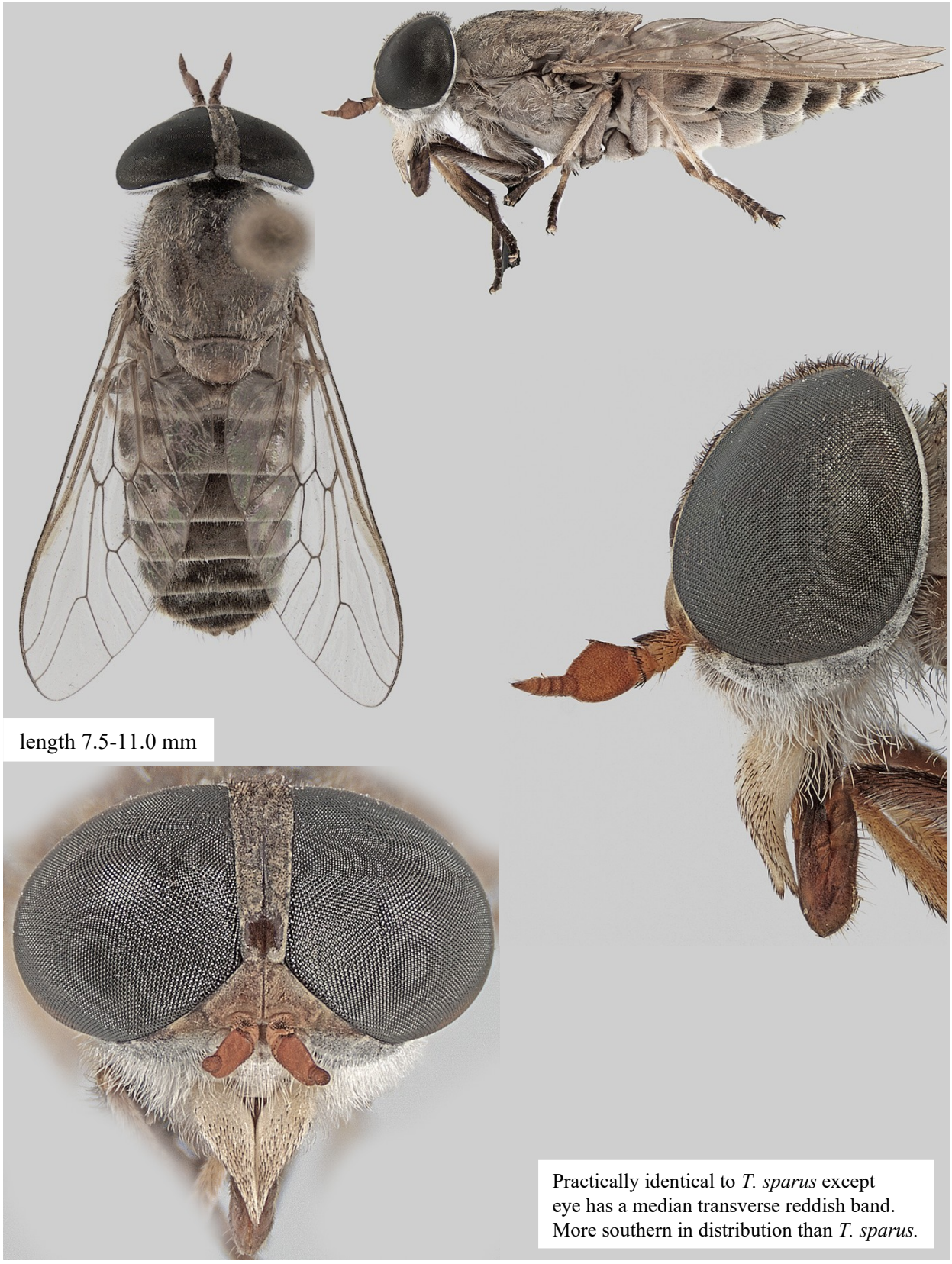
Tabanus sparus Whitney

length 7.5-11.0 mm

Eye lacks a median transverse stripe, *cf. sparus milleri*



Tabanus sparus milleri Whitney



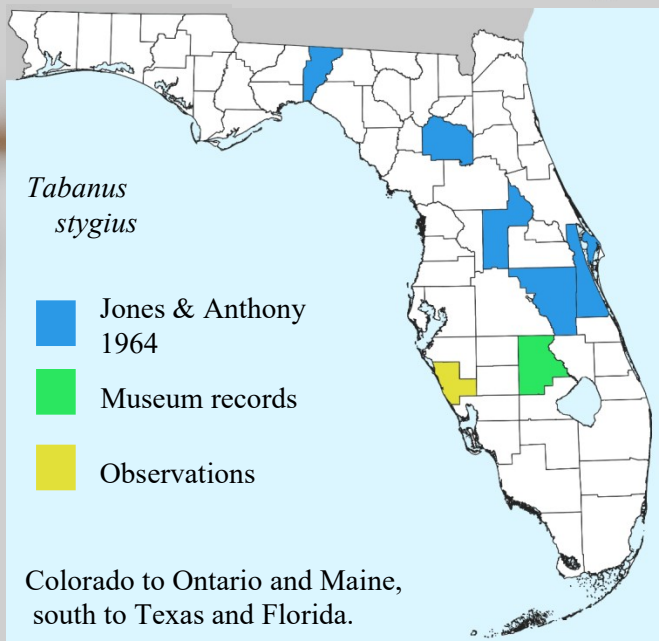
length 7.5-11.0 mm

Practically identical to *T. sparus* except eye has a median transverse reddish band. More southern in distribution than *T. sparus.*

key

Tabanus stygius Say

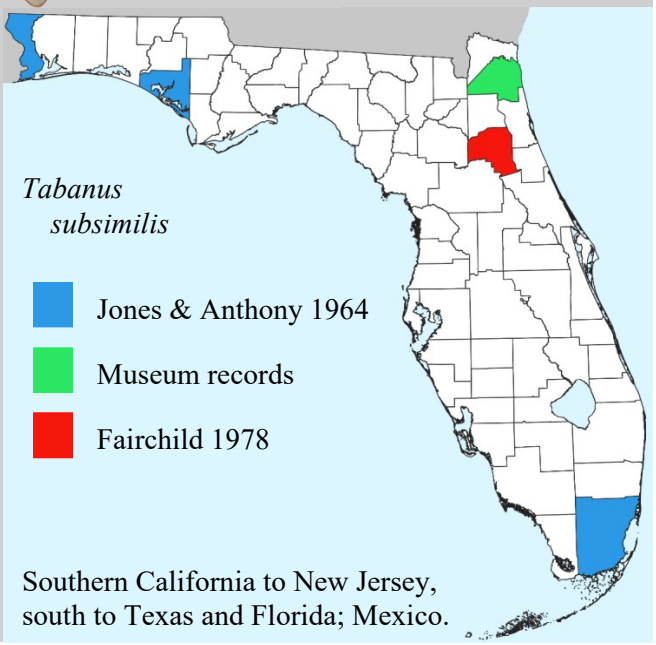
length 20-23 mm



Tabanus sublongus Stone

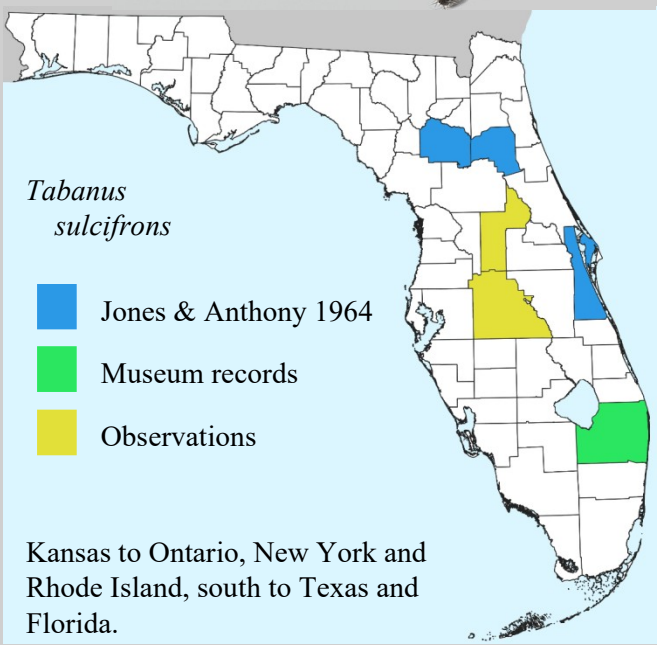
Tabanus subsimilis Bellardi

length 10-16 mm



Tabanus sulcifrons Macquart

length 14-24 mm

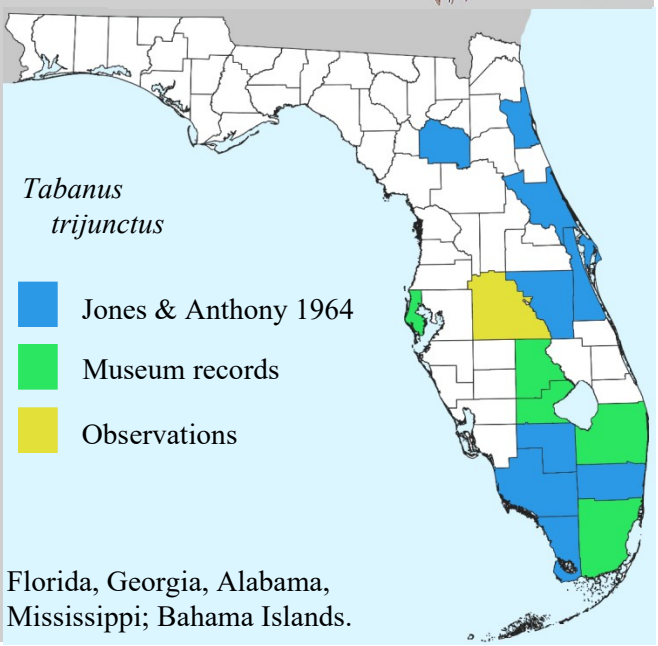


Tabanus superjumentarius Whitney

Tabanus texanus Hine

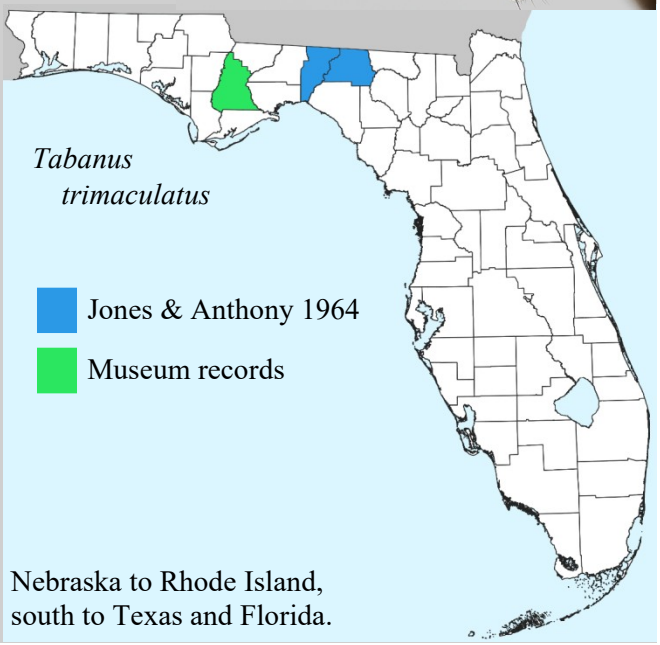
Tabanus trijunctus Walker

length 15-21 mm

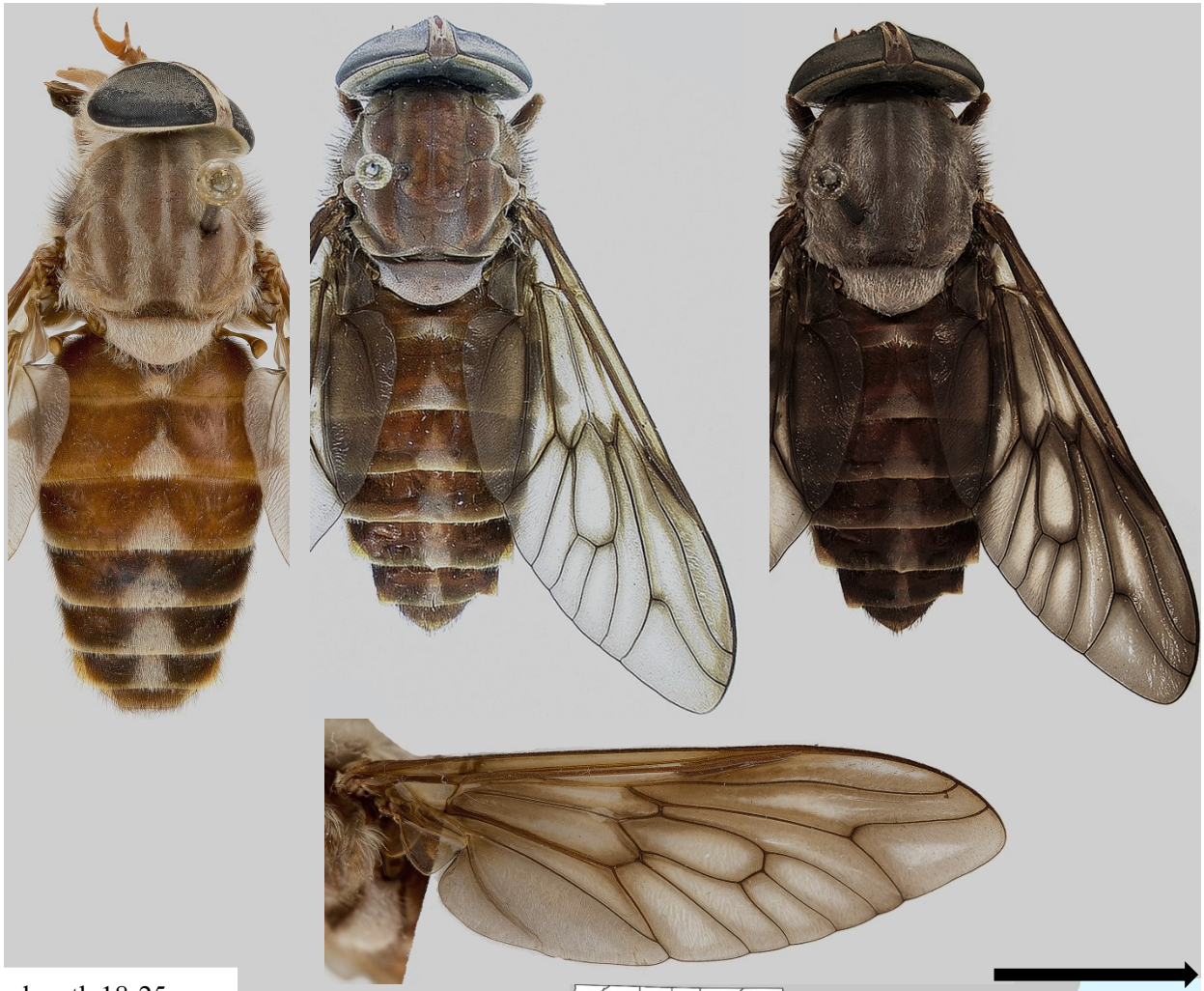


Tabanus trimaculatus Palisot de Beauvois

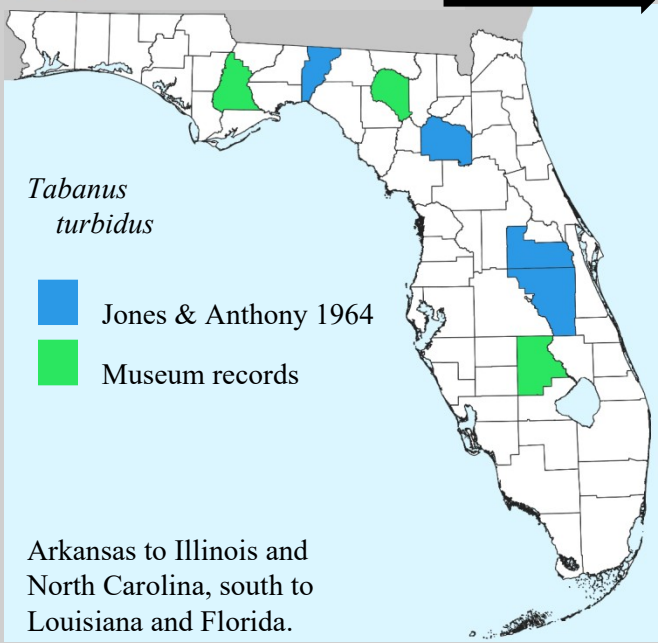
length 15-18 mm



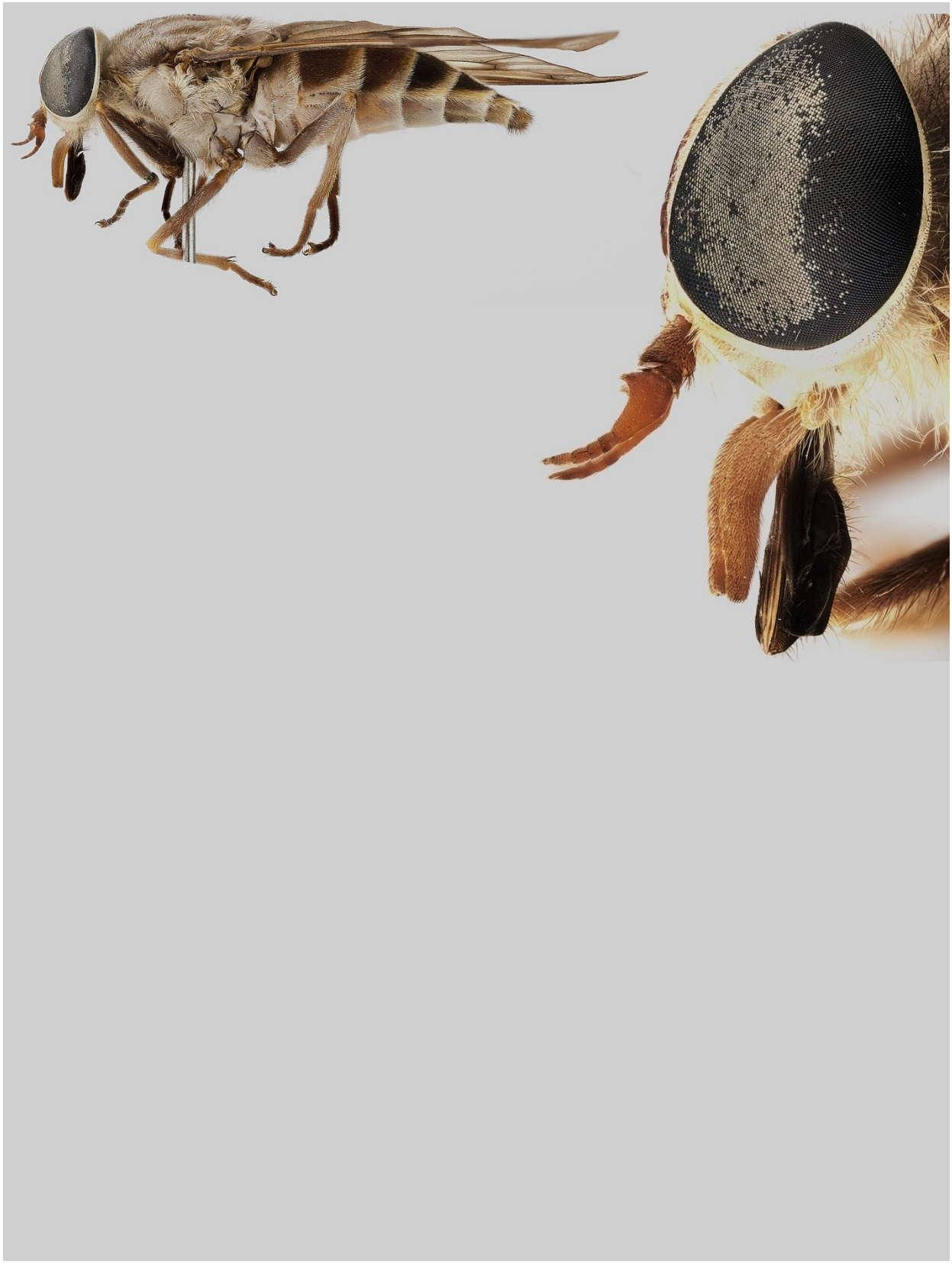
Tabanus turbidus Wiedemann



length 18-25 mm



(continued) ***Tabanus turbidus*** Wiedemann



Tabanus venustus Osten Sacken

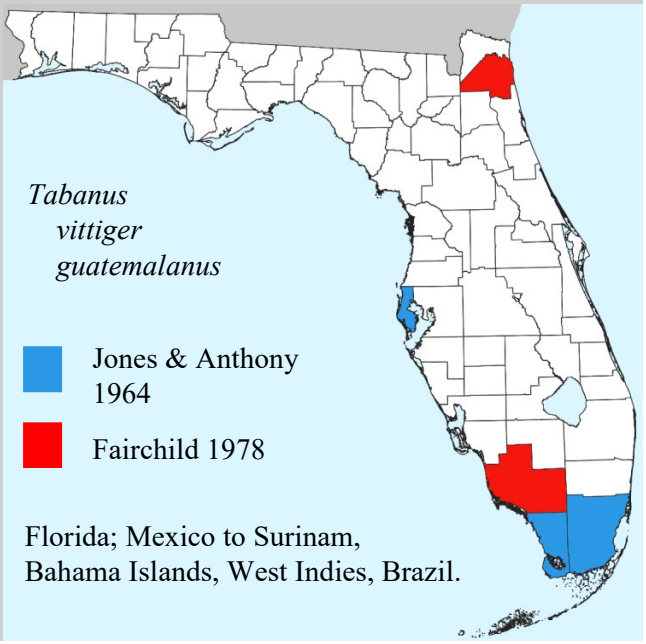
length 16-20 mm

unmistakable, distinctive

Nebraska to Ohio, south to Texas and Mississippi.

Tabanus vittiger guatemalanus Hine

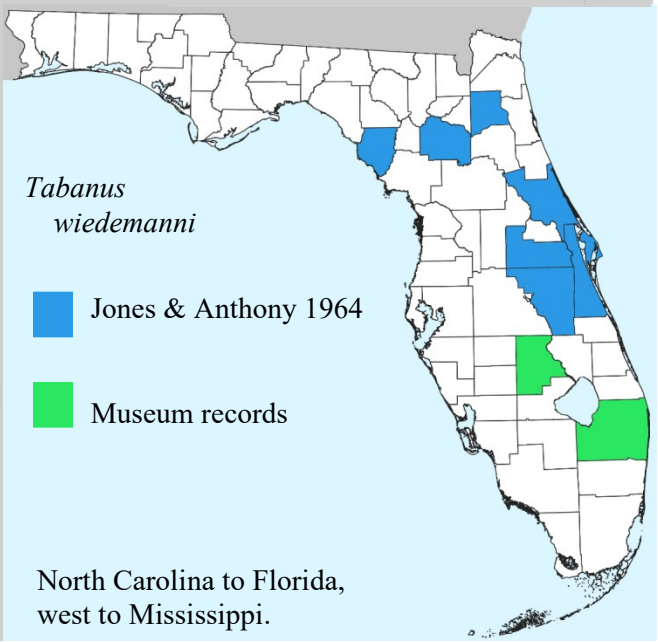
length 10-16 mm



(continued) ***Tabanus vittiger guatemalanus*** Hine

Tabanus wiedemanni Osten Sacken

length 17-20 mm

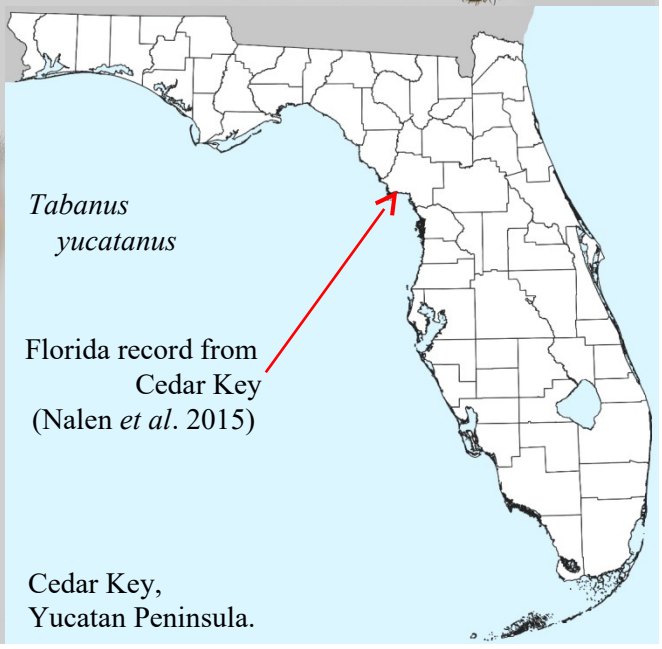


Tabanus wilsoni Pechuman

length 10-15 mm

Tabanus yucatanus Townsend

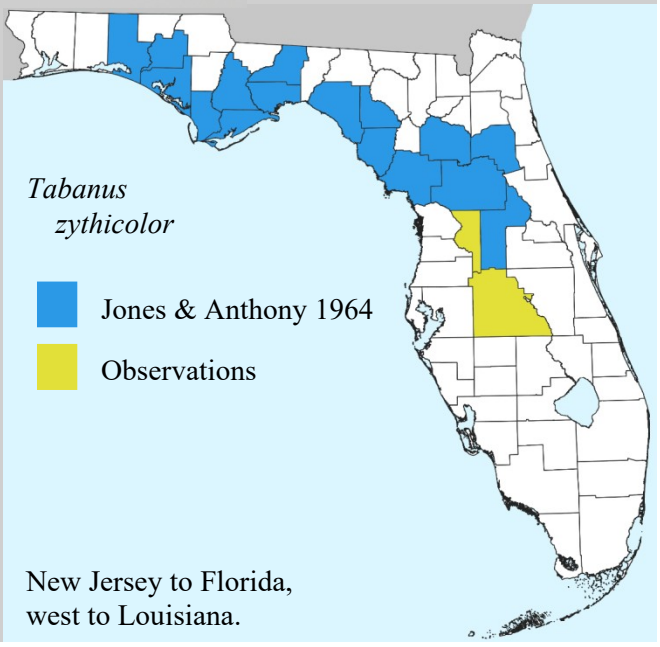
length 9-12 mm

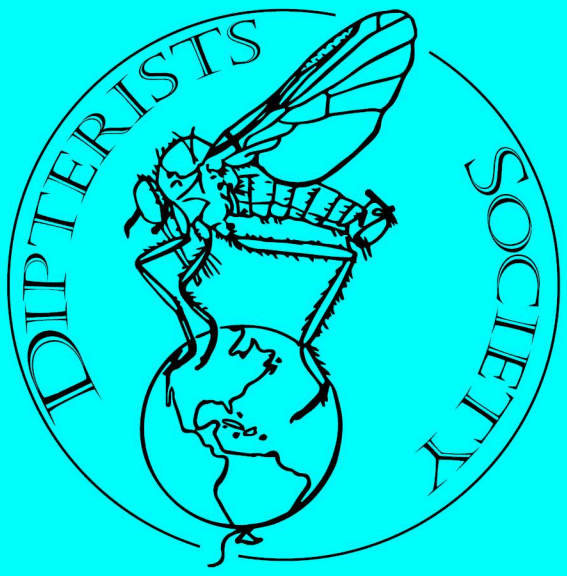


Tabanus zythicolor Philip

Eye in life dull purplish green with two green bands bordered by three purple bands (Tidwell, 1973). Differs from Stone (1938): "eye green with two purple bands."

length 11-14 mm





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