AN ANNOTATED CHECKLIST OF THE CERATOPOGONIDAE (DIPTERA) OF FLORIDA WITH A NEW SYNONYMY

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ABSTRACT

We record 211 species of biting midges (Diptera: Ceratopogonidae) from 64 of the 67 Florida counties. Approximately 40% of all described Nearctic species occur in Florida, represented among 25 of the 37 North American genera. Florida county records are presented for each species based upon information gleaned from adult specimens in collections and from published and unpublished records.

Recorded from Florida as new to the United States are: *Culicoides jamaicensis* Edwards (from Dade County) and *Monohelea multilineata* (Lutz) (from Lee County).

Reported from Florida for the first time are: *Forcipomyia baueri* Wirth, *Forcipomyia crinita* Saunders, *Forcipomyia johannseni* Thomsen, *Dasyhelea pollinosa* Wirth, *Johannsenomyia annulicornis* Malloch, *Mallochohelea caudellii* (Coquillett), *Mallochohelea spinipes* Wirth, and *Monohelea macfiei* Wirth.

Stilobezzia punctipes Wirth, 1953 was found to be a junior subjective synonym of *Stilobezzia kiefferi* Lane, 1947 (NEW SYNONYMY).

RESUMEN

Nosotros registramos 211 especies de moscas enanas picadoras (Diptera: Ceratopogonidae) en 64 de los 67 condados de la Florida. Aproximadamente el 40% de todas las especies neárticas descritas ocurren en la Florida, representando a 25 de los 37 géneros norteamericanos. Se presentan registros en los condados de la Florida de cada especie, basados sobre información de muestras de adultos de colecciones y de registros publicados y sin publicar.

Registrados de la Florida como nuevos en los Estados Unidos son: *Culicoides jamaicensis* Edwards (del condado de Dade) y *Monoheleamultilineata* (Lutz) (del condado de Lee).

Reportados de la Florida por primera vez son *Forcipomyia baueri* Wirth, *Forcipomyia crinita* Saunders, *Forcipomyia johannseni* Thomsen, *Dasyhelea pollinosa* Wirth, *Johannsenomyia annulicornia* Malloch, *Mallochohelea caudelli* (Coquillet), *Mallochohelea spinipes* Wirth, y *Monohelea maefiei* Wirth.

Stilobezzia punctipes Wirth, 1953 fue encontrado ser un sinónimo subjetivo junior de *Stilobezzia kiefferi* Lane, 1947 (Sinónimo Nuevo).

The biting midges (Diptera: Ceratopogonidae) comprise a group of very common nematoceran flies which are distributed and studied worldwide. Morphologically, adult Ceratopogonidae most closely resemble midges of the family Chironomidae, and the larvae of these 2 families occur in many of the same aquatic and semiaquatic habitats. Larvae of Ceratopogonidae have been found in the mud and sand of river and stream

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banks, lakeshores, estuaries, saltmarshes, swamps and bogs; in leaf litter and rotting fruit, cacti and other decomposing vegetation; under wet or damp bark, wood or rocks; in wet algae-covered soil; in tree holes and sap flows; in bromeliads and the axils of other water-holding plants; and in fungi, dung, and crabholes (Linley 1976, Wirth et al. 1977).

Adult biting midges occupy a variety of ecological niches. A number of genera are exclusively nectar feeders; several species of *Dasyhelea* and *Forcipomyia* are commanding increasing attention in the tropics as important pollinators of tropical crop plants such as cacao (Bystrak and Wirth 1978, Soria and Wirth 1974, Wirth and Waugh 1976). Some *Atrichopogon* and *Forcipomyia* are ectoparasitic on other insects, obtaining haemolymph by piercing the cuticle of many species of adult Phasmatodea, Odonata, Neuroptera, meloid Coleoptera, and the larvae of Lepidoptera and diprionid Hymenoptera (Wirth 1956, 1971a, 1972a,b, 1980). Other genera such as *Bezzia* and *Palpomyia* are predaceous on small Nematocera and Ephemeroptera (Downes 1978). Ecological interest in the Ceratopogonidae, however, has traditionally focused on the haematophagous genera *Culicoides* (known as sand flies, punkies, no-see-ums) and *Leptoconops* (known as black gnats). Species of these 2 genera, along with those of *Austroconops* and *Forcipomyia* (subgenus *Lasiohelea*), are the only Ceratopogonidae known to suck vertebrate blood. *Culicoides* and *Leptoconops* are notorious pests to people who inhabit or frequent coastal areas and mountain resort regions which support high populations of these biting flies. In Florida, these insects are second only to mosquitoes in the amount of direct human discomfort inflicted by their disproportionately painful bites. Populations of *Culicoides* and *Leptoconops* have a direct impact upon land utilization policies in many countries, and upon local economies as well (Linley and Davies 1971). Several species of *Culicoides* are either intermediate hosts or vectors of a variety of filarial, protozoan, and viral agents of diseases of man and animals. The most important diseases include Oropouche virus of man (Linley et al. 1983) and Bluetongue Virus (BTV) of sheep and cattle. The International Symposium on Bluetongue and Related Orbiviruses recently conducted in Asilomar, California (January 1984), illustrates the increasing attention being focused by researchers from many fields upon this disease and its *Culicoides* vectors.

Blanton and Wirth's (1979) detailed treatment of the Florida *Culicoides* greatly facilitated further investigations which have generated many new county records. The remaining ceratopogonid fauna of the state, however, has not been comprehensively documented. The purpose of this paper, therefore, is to: (1) systematically list the described species of Ceratopogonidae known to occur in Florida, and (2) document the known distribution of each species within the state by lists of county records.

Materials and Methods

Data for county records were obtained from the published literature indicated in Table 1, and from unpublished records and adult specimens in the following museum and private collections: (1) the Florida State Collection of Arthropods, c/o Division of Plant Industry (FSCA, DPI), Florida Department of Agriculture and Consumer Services, Gainesville; (2) the United States National Museum (USNM), Washington, D.C.; (3) the private collections of Dr. Franklin S. Blanton, Professor Emeritus, Entomology and Nematology Department, University of Florida, Gainesville; (4) collections made by Drs. Wayne L. Kramer and Ellis C. Greiner, Department of Preventive Medicine, College of Veterinary Medicine, University of Florida; (5) collections of the USDA Insects Affecting Man and Animals Research Laboratory, Gainesville, and (6) light trap collections made available by individuals acknowledged later in this paper.

The systematic arrangement of the checklist follows Wirth et al. (1974) who included the Leptoconopinae, although separate familial status for this group has been proposed several times by other workers (Krivosheina 1969, Downes 1977). Tribal and generic arrangements follow the most recently published revisions cited in Table 1.

The 211 species listed are consecutively numbered and alphabetically arranged within each genus, subgenus, or species group. Authors and dates of publication are

TABLE 1. PUBLISHED LITERATURE SOURCES OF COUNTY RECORDS OF THE 25 GENERA OF BITING MIDGES (DIPTERA: CERATOPOGONIDAE) RECORDED FROM FLORIDA.

GENERA (arranged alphabetically)	COUNTY RECORD SOURCES
Alluaudomyia Kieffer	Glick and Mullen (1982); Wirth (1952a)
Atrichopogon Kieffer	Wirth (1952b, 1980)
Bezzia Kieffer	Dow and Turner (1976); Wirth (1983a, 1983b, 1983c); Wirth and Grogan (1983); Wirth et al. (1984)
Brachypogon Kieffer	Downes (1976); Wirth and Blanton (1970)
Ceratoculicoides W. & R.	Wirth and Ratanaworabhan (1971)
Clinohelea Kieffer	Grogan and Wirth (1975)
Culicoides Latreille	Beck (1952, 1958); Blanton and Wirth (1979)
Dasyhelea Kieffer	Waugh and Wirth (1976); Wirth and Williams (1957); Spinelli and Wirth (1984)
Echinohelea Macfie	no published Florida records
Forcipomyia Meigen	Bystrak and Wirth (1978); Dow and Wirth (1972); de Meillon and Wirth (1979); Utmar and Wirth (1976); Wirth (1976); Wirth and Dow (1971); Wirth and Messersmith (1971); Wirth and Ratanaworabhan (1978)
Heteromyia Say	Wirth and Grogan (1977)
Jenkinshelea Macfie	Grogan and Wirth (1977a); Wirth (1962b)
Johannsenomyia Malloch	Wirth (1962a)
Leptoconops Skuse	Wirth (1951b); Wirth and Atchley (1973)
Macropeza Meigen	Wirth and Ratanaworabhan (1972b)
Mallochohelea Wirth	Wirth (1962a)
Monohelea Kieffer	Khalaf (1969); Wirth (1953a); Wirth and Grogan (1981); Wirth and Williams (1964)
Nilobezzia Kieffer	Wirth (1962a)
Palpomyia Meigen	Grogan and Wirth (1979)
Parabezzia Malloch	Grogan and Wirth (1977b)
Phaenobezzia Haeselbarth	Wirth and Grogan (1982)
Probezzia Kieffer	Wirth (1951a, 1971b)
Rhynchohelea W. & B.	Wirth and Blanton (1970)
Sphaeromias Curtis	Wirth (1962a)
Stilobezzia Kieffer	Wirth (1953b); Wirth and Grogan (1981)

cited for each taxon. References to the earlier literature can be found in Stone et al. (1965) and in Atchley et al. 1981). A list of the Florida counties in which each species has been collected, and additional comments follow the name. When type material contributed to one or more county records, this fact is noted parenthetically in the list. The word "types" in these instances indicates that the holotype (or its designated equivalent) as well as additional paratypes were collected in that county.

Specific distributions defined by political boundaries often prove unsatisfactory from a zoogeographical perspective because of the general independence of such boundaries from relevant topographical regions and features. However, we feel that a list of county records is a sensible and cost-effective approach in studies such as ours where the biological information necessary for the elucidation of a specific habitat or range is lacking for all but a few species. We refer the reader to Blanton and Wirth (1979) for a concise discussion of the physiography and biogeographic divisions of Florida relative to *Culicoides*.

The relatively small size of most biting midges renders them inherently difficult to study, and although they are a common component of light trap and malaise trap catches, they are often overlooked and seldom recorded. A substantial amount of material collected in Florida awaits processing and identification.

The description of many new species of Ceratopogonidae over the past 2 decades has stimulated several major taxonomic revisions at higher levels of rank. Older determined specimens and corresponding published records were frequently invalidated by these revisions. It was therefore necessary to redetermine older material within revised groups. However, despite the dynamic state of ceratopogonid taxonomy over the years, a substantial portion of existing collections we studied contain undescribed species, and several genera such as *Atrichopogon*, *Brachypogon*, *Dasyhelea*, and *Probezzia* merit reexamination and contemporary systematic treatment.

CHECKLIST OF THE CERATOPOGONIDAE OF FLORIDA

Subfamily *LEPTOCONOPINAE* Noé, 1907

genus LEPTOCONOPS Skuse, 1889

subgenus *Holoconops* Kieffer, 1918

1. *L. linleyi* Wirth and Atchley, 1973.
   Indian River, Lee, Levy, Monroe, Okaloosa, Palm Beach, Pinellas, St. Lucie (holotype). This coastal species bites man and ranges north to Massachusetts. All published records of *Leptoconops bequaerti* (Kieffer) from Florida are based upon misidentification. *L. bequaerti* does not occur in Florida. Published Florida records for this species actually refer to *L. linleyi*.

subgenus *Megaconops* Wirth and Atchley, 1973

2. *L. floridensis* Wirth, 1951.
   Escambia (holotype), Levy. This man-biting species is the only species in this subgenus. Specimens also have been collected from Colombia and Jamaica.

Subfamily *FORCIPOMYIINAE* Lenz, 1934

genus ATRICHOPOGON Kieffer, 1906

This genus is in need of comprehensive study and revision. There are at least 30 undescribed Nearctic species in the collections of the USNM alone. We suspect that the majority of specimens in collections belong to undescribed species.

subgenus *Atrichopogon*

3. *A. fusculus* (Coquillett, 1901).
   Alachua, Hillsborough. This species ranges from Canada to Brazil and throughout the United States. This species is common in light trap collections.
4. *A geminus* Boesel, 1973.
   Alachua, Levy.
5. *A. gilvus* (Coquillett, 1905).
   Dade (holotype), Highlands, Monroe, Orange. This species is known only from Florida.
6. *A. levis* (Coquillett, 1901).
   Alachua, Dade, Leon, Levy. This is the type species of the genus (as *Ceratopogon exilis* Coquillett, 1902). Known as the "grass punkie", adults of this species are commonly found in grassy areas such as lawns, parks, and pastures (Boesel and Snyder 1944). It is widely distributed throughout the United States.

7. *A. maculosus* Ewen in Ewen and Saunders, 1958.
   Levy.
8. *A. warmkei* Wirth, 1956.
   Dade (paratypes). This species pollinates *Hevea* rubber in Puerto Rico where it is one of the commonest biting midges. Its known distribution is limited to Puerto Rico and Florida.
9. *A. websteri* (Coquillett, 1901).
   Dixie, Levy, Monroe.

subgenus *Meloehelea* Wirth, 1956

Adults of the 7 described Nearctic species in this subgenus are parasitic on blister beetles (Coleoptera: Meloidae) and undescribed species probably occur in Florida. Florida material in this subgenus has not been studied and we have no records.

genus FORCIPOMYIA Meigen, 1818

Saunders revised this genus in 1956 and based his subgenera largely upon larval characters and larval biologies. Correlations exist between larval habitats and taxonomic groups within this genus.

subgenus *Blantonia* Wirth and Dow, 1971

10. *F. caribbea* Wirth and Dow, 1971.
    Indian River, Lee, Monroe (all paratypes). This is the only species described in this subgenus. It ranges south through the West Indies.

subgenus *Caloforcipomyia* Saunders, 1956

11. *F. glauca* Macfie, 1934.
    Alachua, Baker, Calhoun, Collier, Dade, Escambia, Franklin, Gilchrist, Gulf, Hardee, Highlands, Hillsborough, Indian River, Jefferson, Leon, Levy, Liberty, Marion, Orange, Putnam, St. Lucie, Wakulla. This species was first reported from Florida (as *F. splendida* Wirth) by Mead (1954). It is common and widespead throughout the Holarctic and Neotropical regions.

subgenus *Euprojoannisia* Brèthes, 1914

Larvae in this subgenus are usually found in semiaquatic environments such as algae-covered rocks or mud, in wet moss or leaves, in mats of decaying aquatic vegetation, and in the leaf axils of water-holding plants.

12. *F. blantoni* Soria and Bystrak, 1975.
    Alachua, Baker, Dade, Escambia, Gilchrist, Hardee, Highlands, Hillsborough, Indian River, Jefferson, Leon, Levy, Liberty, Marion, Orange, Putnam. This species is widely distributed from Virginia south to Brazil.
13. *F. calcarata* (Coquillett, 1905).
    Alachua, Baker, Collier, Dade, Gilchrist, Hardee, Indian River, Lee, Monroe, Orange, Putnam, Sarasota, St. Lucie. This species has also been recorded from South Carolina, Virginia, and Mexico.
14. *F. dowi* Bystrak and Wirth, 1978.
    Collier (paratypes), Indian River (holotype). This species is also known from Mexico.
15. *F. fuscicalcarata* Bystrak and Wirth, 1978.
    Alachua (holotype), Dade, Highlands, Lee, Leon, Monroe, Orange (paratypes from all counties). This species is apparently restricted to Florida.
16. *F. mortuifolii* Saunders, 1959.
    Dade. This tropical species is distributed throughout the Caribbean. Southern Florida represents the northern limit of its range.
17. *F. navaiae* Bystrak and Wirth, 1978.
    Dade (paratypes), Hillsborough (paratypes), Indian River (types). This species is known only from Florida.

18. *F. quasiingrami* Macfie, 1939.
Alachua, Collier, Dade, Gulf, Hardee, Jefferson, Leon, Monroe, Orange, Sarasota. This species is primarily Neotropical, ranging south to Brazil.
19. *F. unica* Bystrak and Wirth, 1978.
Alachua (holotype), Dade, Orange, Putnam, Sarasota. This species is restricted to Florida and the Bahamas.

subgenus *Forcipomyia*

20. *F. beckae* Wirth, 1976.
Dade (types), Indian River (paratypes). This species is known only from Florida.
21. *F. bipunctata* (Linnaeus, 1767).
Jackson, Jefferson, Putnam. This is undoubtedly the commonest species in the genus and is distributed throughout the Holarctic region. It is, however, local in Florida.
22. *F. brevipennis* (Macquart, 1826)
Baker, Collier, Hardee, Jackson, Jefferson, Orange, Putnam, Santa Rosa. The larvae of this very common Holarctic species are often found under cow dung.
23. *F. bystraki* Grogan and Wirth, 1975.
Alachua, Baker, Charlotte, Franklin, Gilchrist, Hardee, Highlands, Hillsborough, Indian River, Jackson, Jefferson, Lee, Leon, Levy, Liberty, Marion, Orange, Putnam, Sarasota (paratypes from all counties). Common in the eastern United States, this species ranges north to Maryland, west to Michigan and Arizona.
24. *F. cinctipes* (Coquillett, 1905).
Alachua, Baker, Dade (holotype), Indian River, Jackson, Jefferson, Leon, Liberty, Putnam.
25. *F. fimbriata* (Coquillett, 1901).
Franklin, Jackson, Jefferson, Liberty.
26. *F. genualis* (Loew, 1866).
Collier, Dade, Highlands, Hillsborough, Indian River, Monroe, Orange, Putnam, St. Lucie. This species is distributed from the southeastern United States and Bermuda south to southern Brazil. It has also been collected from São Tomé off the west coast of Africa.
27. *F. pergandei* (Coquillett, 1901).
Alachua, Jefferson, Liberty, Putnam.
28. *F. pictoni* Macfie, 1938.
Alachua, Duval, Escambia, Hardee, Indian River, Jefferson, Leon, Liberty, Manatee, Monroe, Orange, Palm Beach, Putnam, Sarasota. This species is primarily Neotropical, ranging from the southern United States south to Brazil.
29. *F. quatei* Wirth, 1952.
Alachua, Collier, Escambia, Jackson, Jefferson, Lee, Leon, Liberty, Monroe, Orange, Putnam, Sarasota. This species ranges from the southern United States through Central America south to Brazil.
30. *F. seminole* Wirth, 1976.
Indian River (types). This uncommon species is known only from Florida.
31. *F. townesi* Wirth, 1952.
Alachua, Franklin, Gilchrist, Highlands, Leon, Putnam, Santa Rosa.

subgenus *Lasiohelea* Kieffer, 1921

32. *F. fairfaxensis* Wirth, 1951.
Alachua, Gulf, Highlands, Liberty, Monroe, Orange. This eastern Nearctic species is haematophagous on frogs.

subgenus *Metaforcipomyia* Saunders, 1956

33. *F. pluvialis* (Malloch, 1923).
    Alachua, Gulf, Indian River, Levy, Monroe.

subgenus *Microhelea* Kieffer, 1917

Adults in this subgenus are haematophagous on insects. Both species listed are eruciphagous.

34. *F. eriophora* (Williston, 1986).
    Collier, Dade, Jackson, Monroe. This species also occurs throughout the West Indies and Central America.
35. *F. fuliginosa* (Meigen, 1818).
    Alachua, Baker, Bay, Calhoun, Collier, Dade, Glades, Highlands, Indian River, Jefferson, Lee, Leon, Monroe, Orange (TL of the synonymous *F. erucicida* Knab), Putnam, St. Lucie, Sarasota. This common, cosmopolitan species is apparently distributed throughout North, Central, and South America, Eurasia, Indonesia, and many islands of the South Pacific.

subgenus *Phytohelea* Remm, 1971

36. *F. oligarthra* Saunders, 1956.
    Highlands. This species breeds in the leaf axils of bromeliads and pineapples and has been recorded from Guyana, Singapore and Micronesia. The Florida record is from a pineapple plant (de Meillon and Wirth 1979).

subgenus *Pterobosca* Macfie, 1932

37. *F. fusicornis* (Coquillett, 1905).
    Brevard, Charlotte, Dade (types), Gulf, Highlands, Indian River, Levy, Putnam. Adults are parasitic on Odonata, obtaining haemolymph by piercing the veins of dragonfly wings. This species is distributed from Louisiana through Florida, into Bermuda and Puerto Rico.

subgenus *Saliohelea* Wirth and Ratanaworabhan, 1978

38. *F. leei* Wirth and Ratanaworabhan, 1978.
    Alachua, Jefferson, Leon, Marion, Orange. This widespread species ranges through the eastern United States north to New York, and south through the Caribbean to southern Bazil.

subgenus *Synthyridomyia* Saunders, 1956

39. *F. floridensis* Dow and Wirth, 1972.
    Monroe (types). This species is known only from southern Florida.

subgenus *Thyridomyia* Saunders, 1925

40. *F. frutetorum* (Winnertz, 1852).
    Monroe. This species is widespread throughout North America, Eurasia, and Africa.
41. *F. johannseni* Thomsen, 1935.
    Dade. This is the first published Florida record of this rare species. It was previously recorded only from New York.
42. *F. rugosa* Chan and LeRoux, 1970.
    Indian River. This species is distributed throughout Europe and eastern North America.
43. *F. tenuichela* Dow and Wirth, 1972.
    Dade, Indian River, Monroe, St. Lucie (paratypes from all counties). This species is restricted to the southern United States.

subgenus *Trichohelea* Goetghebuer, 1920

Species in this subgenus are ectoparasitic on insects. They have been recorded from diverse groups such as Coleoptera, Orthoptera, Ephemeroptera, Diptera, adult Lepidoptera, and from phalangid Arachnida.

44. *F. baueri* Wirth, 1956.
Alachua, Escambia, Putnam. These are the first published Florida records for this species. It is also known from Maryland, Arizona, and Mexico.
45. *F. crinita* Saunders, 1964.
Alachua. This species has not been previously reported from Florida. It is widely distributed north to Quebec, west to Alaska and Oregon.
46. *F. mcateei* Wirth, 1956.
Alachua, Hillsborough, Liberty, Monroe. This species ranges north to Quebec, west to Montana.
47. *F. veroensis* Wirth and Messersmith, 1971.
Alachua, Indian River (types). This uncommon species has also been recorded from Maryland and Virginia.

subgenus *Warmkea* Saunders, 1956

Adults of this primarily tropical subgenus have been taken repeatedly at flowers of cacao.

48. *F. fishi* Wirth and Soria, 1980.
Broward (paratypes), Indian River (types), Monroe (paratypes). This species was reared from *Tillandsia utriculata* L. and is known only from Florida.

Subfamily *DASYHELEINAE* Lenz, 1934

genus DASYHELEA Kieffer, 1911

Material from Florida was, for the most part, excluded from the revisional study of the eastern species in this genus undertaken by Waugh and Wirth (1976). Collections from Florida in the USNM and in the DPI contain numerous undescribed species.

cincta group

49. *D. aegealitis* Spinelli and Wirth, 1984.
Monroe (paratypes). This species is presently known only from Florida and Jamaica.
50. *D. bahamensis* (Johnson, 1908).
Collier, Lee, Monroe. This species has been recorded from the Bahamas, Cuba, Florida, Jamaica, and Puerto Rico.
51. *D. cincta* (Coquillett, 1901).
Baker, Brevard, Collier, Dade, Gulf, Highlands, Indian River, Levy, Marion, Monroe, Palm Beach (holotype). This species is common and widespread throughout the United States south to the West Indies and Argentina.
52. *D. maculata* Macfie, 1943.
Collier, Dade, Highlands, Indian River, Liberty, Monroe, St. Lucie. Described from the Bahamas, this species also has been recorded from Belize, Dominica, Jamaica, Mexico, Panama, and Trinidad.
53. *D. major* (Malloch, 1915).
Alachua, Dade, Gulf, Highlands, Indian River, Liberty, Monroe. This species ranges north to Connecticut and Wisconsin.

grisea group

54. *D. grisea* (Coquillett, 1901).
Alachua, Dade, Gulf, Highlands, Indian River, Lee, Liberty, Marion, Monroe, Palm Beach (paratypes), Putnam, Santa Rosa. This very common species appears to be widespread throughout North America, north to Quebec.
55. *D. luteogrisea* Wirth and Williams, 1957.
Dade, Levy, Monroe, Palm Beach. Described from Bermuda, this species is known from the Bahamas and coastal areas of Florida.

56. *D. oppressa* Thomsen, 1935.
    Alachua, Liberty. This tree-hole species is widespread and common north to Quebec and west to Louisiana and Wisconsin.
57. *D. pollinosa* Wirth, 1952.
    Alachua, Liberty, Orange. These are the first published records of this species from Florida. Described from California, it appears to be widespread throughout the United States, although it is not common.
58. *D. pseudoincisurata* Waugh and Wirth, 1976.
    Jackson (paratypes). This species ranges north to New Hampshire. Larvae are common in rock holes and rain gutters.
59. *D. stemlerae* Waugh and Wirth, 1976.
    Alachua (paratypes). This species ranges north to New York and Michigan.

leptobranchia group

60. *D. scutellata* (Meigen, 1830).
    Liberty. This is a common and widespread Holarctic species. Northern Florida apparently represents the southernmost limit of its range in North America.

mutabilis group

61. *D. ancora* (Coquillett, 1902).
    Alachua, Dade (holotype). This species ranges north to Connecticut, west to California.
62. *D. atlantis* Wirth and Williams, 1957.
    Indian River. Described from Bermuda, this rare species is also known from New York.
63. *D. mutabilis* (Coquillett, 1901).
    Alachua, Duval (paratypes), Levy, Monroe. This very common species occurs throughout North America.

Subfamily *CERATOPOGONINAE* Newman, 1834

Tribe CULICOIDINI Kieffer, 1911

genus CULICOIDES Latreille, 1809

Supplemental information on the Florida species in this medically and economically important genus of biting flies may be found in Blanton and Wirth (1979).

subgenus *Avaritia* Fox, 1955

Larvae of species in this subgenus typically occur in habitats characterized by active fungal decay, such as compost heaps, rotting manure, wet leaves, as well as in fungi itself.

64. *C. alachua* Jamnback and Wirth, 1963.
    Alachua, Gilchrist, Highlands, Jefferson, Lake, Liberty, Marion, Orange, Putnam.
65. *C. chiopterus* (Meigen, 1830).
    Alachua, Hardee, Jefferson, Liberty.
66. *C. juddi* Cochrane, 1974.
    Jefferson.
67. *C. pechumani* Cochrane, 1974.
    Marion.
68. *C. pusillus* Lutz, 1913.
    Alachua, Dade, Glades, Hardee, Hendry, Hillsborough, Indian River, Marion, Okeechobee, Palm Beach, Volusia.

subgenus *Beltranmyia* Vargas, 1953

69. *C. bermudensis* Williams, 1956.
Collier, Dade, Dixie, Duval, Escambia, Gulf, Indian River, Levy, Monroe, Volusia, Walton.
70. *C. crepuscularis* Malloch, 1915.
Alachua, Baker, Bay, Charlotte, Citrus, Clay, Duval, Escambia, Gilchrist, Gulf, Hardee, Hernando, Highlands, Hillsborough, Holmes, Indian River, Jackson, Jefferson, Lake, Lee, Leon, Levy, Liberty, Manatee, Marion, Monroe, Orange, Pasco, Pinellas, Polk, Putnam, St. Johns, Santa Rosa, Sumter, Taylor, Walton, Washington.
71. *C. hollensis* (Melander and Brues, 1903).
Duval, Martin, Nassau, St. Johns, Volusia.
72. *C. knowltoni* Beek, 1956.
Brevard, Citrus, Glades, Hardee, Hendry, Highlands, Indian River, Palm Beach, Polk, St. Lucie, Sarasota, Taylor. This species is restricted to Florida.
73. *C. mississippiensis* Hoffman, 1926.
Bay, Charlotte, Citrus, Collier, Dade, Escambia, Franklin, Gulf, Hardee, Hernando, Hillsborough, Lee, Levy, Manatee, Monroe, Pinellas, Sarasota, Santa Rosa, Taylor, Wakulla, Walton.

subgenus *Diphaeomyia* Vargas, 1960

74. *C. baueri* Hoffman, 1925.
Alachua, Duval, Escambia, Jackson, Hardee, Hendry, Hernando, Levy, Liberty, Marion, Orange, Polk, St. Johns, Taylor, Wakulla.
75. *C. edeni* Wirth and Blanton, 1974.
Alachua, Brevard, Charlotte, Citrus, Collier, Duval, Escambia, Gilchrist, Glades, Gulf, Hardee, Hendry, Hernando, Highlands, Hillsborough, Indian River, Lafayette, Lake, Lee, Levy, Manatee, Marion, Martin, Monroe, Orange, Palm Beach, Pasco, Pinellas, Putnam, Sarasota, Volusia, Wakulla, Walton. This species is restricted to central and southern Florida.
76. *C. footei* Wirth and Jones, 1956.
Liberty.
77. *C. haematopotus* Malloch, 1915.
Alachua, Baker, Calhoun, Escambia, Franklin, Gilchrist, Hardee, Holmes, Jackson, Jefferson, Leon, Levy, Liberty, Marion, Putnam, Santa Rosa, Wakulla, Walton, Washington.

subgenus *Drymodesmyia* Vargas, 1960

78. *C. hinmani* Khalaf, 1952.
Alachua, Glades, Hardee, Jackson, Lafayette, Leon, Levy, Liberty, Marion, Orange, Putnam.
79. *C. jamaicensis* Edwards, 1922.
Dade. This species is reported as new to United States: Naranja, Joan Felsen Farm, 10.VIII.1982, E. Greiner, 1 female, det. W. W. Wirth (USNM); Homestead, 10.VIII.1982, 1 female, E. Greiner, det. W. W. Wirth (collection of E. Greiner). This primarily Neotropical species is distributed throughout the West Indies into Mexico, Panama, and Venezuela. Aitken et al. (1975) and Williams (1964) reported rearing this species from rotting calabash, *Crescentia cujete* (Bignoniaceae).
80. *C. loughnani* Edwards, 1922.
Brevard, Collier, Duval, Flagler, Lee, Levy, Manatee, Martin, Monroe, Pinellas, St. Johns, St. Lucie, Sarasota, Volusia.

subgenus *Hoffmania* Fox, 1947

81. *C. insignis* Lutz, 1913.
Alachua, Baker, Brevard, Charlotte, Citrus, Collier, Dade, Duval, Gilchrist,

Glades, Hardee, Hendry, Hernando, Highlands, Hillsborough, Indian River, Lafayette, Lee, Levy, Liberty, Manatee, Marion, Monroe, Orange, Palm Beach, Polk, Putnam, St. Lucie, Sarasota, Taylor, Walton. Blanton and Wirth (1979) doubted the Taylor Co. and Walton Co. records of Beck (1952). Recent collections of this species from Lafayette and Liberty Counties indicate that it ranges through northern Florida. Greiner et al. (1985) report that BTV Serotype II has been isolated from Hardee County populations of this species.

82. *C. venustus* Hoffman, 1925.
Alachua, Baker, Escambia, Hernando, Jackson, Jefferson, Liberty, Marion, Pasco, Santa Rosa, Taylor, Wakulla, Walton, Washington.

subgenus *Monoculicoides* Khalaf, 1954

83. *C. variipennis* (Coquillett, 1901).
Alachua, Calhoun, Escambia, Gilchrist, Glades, Hendry, Hernando, Highlands, Jackson, Jefferson, Lafayette, Leon, St. Lucie, Walton.

subgenus *Oecacta* Poey, 1851

biguttatus group

84. *C. biguttatus* (Coquillett, 1901).
Alachua, Baker, Bay, Escambia, Franklin, Holmes, Jackson, Jefferson, Lafayette, Leon, Levy, Liberty, Marion, Putnam, Santa Rosa, Taylor, Wakulla, Walton.
85. *C. loisae* Jamnback, 1965.
Gulf, Jackson, Santa Rosa.
86. *C. mulrennani* Beck, 1957.
Escambia, Gulf, Jackson, Liberty, Taylor.
87. *C. spinosus* Root and Hoffman, 1937.
Alachua, Baker, Calhoun, Escambia, Franklin, Gulf, Highlands, Indian River, Jackson, Liberty, Marion, Orange, Taylor, Volusia, Wakulla, Walton.

debilipalpis group

88. *C. debilipalpis* Lutz, 1913.
Alachua, Calhoun, Collier, Dade, Hardee, Hernando, Highlands, Jackson, Jefferson, Leon, Levy, Liberty.
89. *C. paraensis* (Goeldi, 1905).
Alachua, Highlands, Jackson, Leon, Levy, Liberty, Orange, Putnam.
90. *C. torreyae* Wirth and Blanton, 1971.
Liberty, Marion, Orange. This species is known only from Florida.

furens group

91. *C. barbosai* Wirth and Blanton, 1956.
Collier, Dade, Duval, Indian River, Lee, Levy, Monroe, Palm Beach, St. Lucie, Sarasota.
92. *C. furens* (Poey, 1851).
Bay, Brevard, Broward, Charlotte, Citrus, Collier, Dade, Dixie, Duval, Escambia, Franklin, Gilchrist, Gulf, Hardee, Hernando, Hillsborough, Indian River, Lafayette, Levy, Manatee, Marion, Martin, Monroe, Palm Beach, Pasco, Pinellas, St. Johns, St. Lucie, Santa Rosa, Sarasota, Taylor, Volusia, Wakulla, Walton.
93. *C. stellifer* (Coquillett, 1901).
Alachua, Baker, Calhoun, Citrus, Duval, Escambia, Franklin, Gilchrist, Glades, Gulf, Hardee, Hendry, Hernando, Highlands, Holmes, Jackson, Jefferson, Lafayette, Leon, Levy, Liberty, Marion, Martin, Orange, Palm Beach, Putnam, St. Lucie, Santa Rosa, Sarasota, Wakulla, Walton, Washington.

guttipennis group

94. *C. arboricola* Root and Hoffman, 1937.
Alachua, Baker, Collier, Citrus, Dade, Escambia, Flagler, Franklin, Gilchrist, Glades, Hamilton, Hardee, Hernando, Holmes, Indian River, Jackson, Jefferson, Leon, Levy, Liberty, Marion, Monroe, Orange, Palm Beach, Putnam, Taylor, Wakulla, Washington.
95. *C. beckae* Wirth and Blanton, 1967.
Alachua, Baker, Escambia, Gulf, Holmes, Liberty, Wakulla.
96. *C. guttipennis* (Coquillett, 1901).
Alachua, Baker, Franklin, Jefferson, Liberty, Marion, Wakulla.
97. *C. ousairani* Khalaf, 1952.
Alachua, Escambia, Hernando, Jackson, Leon, Levy, Liberty, Putnam, Taylor, Volusia.
98. *C. villosipennis* Root and Hoffman, 1937.
Alachua, Highlands, Hillsborough, Jackson, Liberty, Marion, Sumter, Taylor, Walton.

heliophilus group

99. *C. niger* Root and Hoffman, 1937.
Alachua, Baker, Citrus, Escambia, Franklin, Gadsden, Gilchrist, Glades, Gulf, Hardee, Hernando, Highlands, Jackson, Jefferson, Lafayette, Leon, Levy, Liberty, Marion, Orange, Putnam, Santa Rosa, Taylor, Volusia, Wakulla, Walton.
100. *C. tissoti* Wirth and Blanton, 1966.
Alachua, Duval, Lake, Levy, Marion, Orange, Putnam, Wakulla.

odibilis group

101. *C. travisi* Vargas, 1949.
Franklin, Jackson, Liberty, Taylor, Wakulla.

piliferus group

102. *C. bickleyi* Wirth and Hubert, 1962.
Hernando, Highlands, Marion, Orange, Wakulla.
103. *C. husseyi* Wirth and Blanton, 1971.
Alachua, Jackson, Jefferson, Leon, Liberty, Santa Rosa.
104. *C. parapiliferus* Wirth and Blanton, 1974.
Jackson.
105. *C. piliferus* Root and Hoffman, 1937.
Alachua, Gulf, Highlands, Jackson, Liberty, Orange, Santa Rosa, Walton.
106. *C. scanloni* Wirth and Hubert, 1962.
Alachua, Escambia, Gulf, Highlands, Jackson, Jefferson, Liberty, Marion, Orange, Polk, Putnam, Santa Rosa, Wakulla.
107. *C. snowi* Wirth and Jones, 1956.
Alachua, Franklin, Liberty, Walton.
108. *C. testudinalis* Wirth and Hubert, 1962.
Alachua, Jackson, Liberty, Santa Rosa.

Unplaced *Oecacta*

109. *C. floridensis* Beck, 1951.
Alachua, Broward, Dixie, Duval, Highlands, Indian River, Levy, Marion, Martin, Sarasota (types), Volusia.
110. *C. melleus* (Coquillett, 1901).
Bay, Citrus, Collier, Dade, Escambia, Gulf, Hernando, Hillsborough, Lee, Levy, Monroe, Okaloosa, Palm Beach, St. Johns, St. Lucie, Sarasota, Volusia, Wakulla, Walton.

111. *C. nanus* Root and Hoffman, 1937.
Alachua, Escambia, Flagler, Highlands, Jackson, Levy, Liberty, Orange, Putnam.

Tribe CERATOPOGONINI Newman, 1934

Predaceous larvae as well as predaceous adults are characteristic of this tribe and all following tribes.

genus ALLUAUDOMYIA Kieffer, 1913

112. *A. bella* (Coquillett, 1902).
Alachua, Bay, Baker, Citrus, Collier, Dade, Escambia, Franklin, Hardee, Hernando, Hillsborough, Indian River, Jackson, Jefferson, Lee, Leon, Levy, Liberty, Marion, Putnam, St. Lucie, Santa Rosa, Sarasota, Walton. This very common species occurs throughout all of North America, from Alaska to California east to Nova Scotia and the Bahamas. It is probably to be found in every Florida county.
113. *A. footei* Wirth, 1952.
Alachua, Collier (types), Escambia (paratypes), Putnam, Walton (paratypes). This eastern species ranges north to Michigan and Ontario.
114. *A. megaparamera* Williams, 1956.
Alachua, Escambia, Liberty, Santa Rosa. This species is distributed throughout eastern North America, north to Quebec.
115. *A. needhami* Thomsen, 1935.
Alachua, Liberty. This species is widespread throughout North America, but is rare in Florida.
116. *A. paraspina* Wirth, 1952.
Alachua, Collier, Hillsborough, Indian River, Jefferson, Leon, Levy, Putnam, Sarasota. This species also is distributed throughout North America.
117. *A. parva* Wirth, 1952.
Alachua, Bradford, Citrus (types), Escambia (paratypes), Glades, Gulf, Highlands, Hillsborough, Levy, Liberty, Orange. This common species is found throughout North America.
118. *A. variegata* Glick and Mullen, 1982.
Alachua, Baker, Gulf, Holmes, Jackson, Jefferson, Leon, Liberty. This recently described species apparently is restricted to the southeastern United States.

genus BRACHYPOGON Kieffer, 1899

119. *B. canadensis* Downes, 1976.
Alachua, Bradford, Escambia, Franklin, Gulf, Leon, Liberty, Orange, Putnam, Santa Rosa. Paratypes were designated from all counties listed except Escambia. This primarily northern species is associated with bogs and swampy forested areas from Florida to western Quebec.
120. *B. fuscivenosus* (Lutz, 1914).
Collier, Indian River, Lee, Manatee, Monroe, Palm Beach. Florida represents the northernmost limit to the range of this Neotropical species. It is known from the Caribbean and Central America, south to Brazil.

genus CERATOCULICOIDES Wirth and Ratanaworabhan, 1971

121. *C. longipennis* (Wirth, 1952).
Liberty. This species occurs locally north to Quebec and has also been collected in Washington and California.

122. *C. virginianus* (Wirth, 1951).
Alachua, Liberty, Marion, Putnam. This species ranges west to Texas, north to New York.

genus ECHINOHELEA Macfie, 1940

123. *E. lanei* Wirth, 1951.
Alachua, Gulf, Highlands, Jackson, Jefferson, Liberty, Marion, Orange, Putnam. This is the only Nearctic species in this genus. It is distributed west to Mississippi, north to Michigan and Massachusetts, and also has been collected in Panama and Trinidad.

genus MONOHELEA Kieffer, 1917

subgenus *Allohelea* Kieffer, 1917

124. *M. johannseni* Wirth, 1953.
Alachua, Baker, Bay, Escambia (paratypes), Franklin, Gulf, Highlands, Hillsborough, Indian River, Jefferson, Leon, Liberty, Marion, Orange, Putnam, Santa Rosa, Sarasota, Wakulla, Walton (paratypes). This species ranges west to Kansas, North to Michigan and Maryland. It also is known from Panama.
125. *M. multilineata* (Lutz, 1914).
Lee. This is the first published North American record of this neotropical species: Sanibel Island, 8.IX.1963, G. Quinn, 1 female, det. W. W. Wirth (USNM).
126. *M. nebulosa* (Coquillett, 1901).
Alachua, Baker, Bay, Escambia, Gulf, Highlands, Jackson, Jefferson, Leon, Liberty, Marion, Orange, Santa Rosa, Wakulla. This species ranges west to Texas, north to Massachussetts.
127. *M. stonei* Wirth, 1953.
Alachua, Baker, Bay (paratypes), Citrus (paratypes), Collier (paratypes), Dade, Escambia (paratypes), Glades, Gulf, Highlands, Indian River, Jackson, Jefferson, Lee (paratypes), Leon, Levy, Liberty, Marion, Monroe (paratypes), Orange, Palm Beach, Putnam, St. Lucie, Santa Rosa, Sarasota, Wakulla, Walton (paratypes). This common eastern species is distributed north to Ontario and Massachusetts and southward through the Bahamas and into Panama.

subgenus *Monohelea*

128. *M. bifurcata* Wirth and Williams, 1964.
Alachua, Calhoun, Liberty, Santa Rosa, Wakulla. This eastern species ranges north to New York.
129. *M. floridensis* Wirth and Williams, 1964.
Alachua, Hillsborough, Levy, Putnam, St. Lucie (types). This uncommon species also occurs in Maryland and Mississippi.
130. *M. hirsuta* Wirth and Grogan, 1981.
Escambia (paratype). This rare species is known only from two females; the holotype is from Maryland.
131. *M. knighti* Wirth and Williams, 1964.
Alachua, Duval (holotype), Martin, Putnam. This species is known only from Florida.
132. *M. lanei* Wirth, 1953.
Collier (paratype), Dade (types), Highlands, Hillsborough, Indian River, Levy, Palm Beach, Putnam (paratypes). This species also occurs in the Bahamas.
133. *M. macfiei* Wirth, 1953.
Indian River. This uncommon species is reported from Florida for the first time. It is distributed west to Mississippi, northward to Virginia and Wisconsin.

134. *M. maculipennis* (Coquillett, 1905).
Alachua, Calhoun, Citrus, Collier, Dade, Duval (holotype), Glades, Highlands, Indian River, Jefferson, Lee, Levy, Liberty, Marion, Monroe, Orange, Putnam, St. Lucie, Sarasota.
135. *M. ornata* Wirth, 1953.
Alachua, Clay, Escambia (holotype), Flagler, Highlands, Indian River, Jefferson, St. Lucie, Wakulla, Walton.
136. *M. texana* Wirth, 1953.
Alachua, Levy, Orange.
137. *M. wirthi* Khalaf, 1969.
Alachua, Glades.

genus PARABEZZIA Malloch, 1915

alexanderi group

138. *P. alaxanderi* Wirth, 1965.
Alachua, Jefferson, Leon, Orange. This species ranges north to Massachusetts.

uncinata group

139. *P. bystraki* Grogan and Wirth, 1977.
Alachua, Franklin, Liberty (paratypes from all 3 counties). This species also is known from Maryland.
140. *P. horvathi* Grogan and Wirth, 1977.
Alachua (types), Escambia (paratypes), Liberty (paratypes). This uncommon species is known only from Florida.
141. *P. huberti* Grogan and Wirth, 1977.
Liberty (paratypes). This species is rare in Florida and is also known from Maryland and Virginia.

genus RHYNCHOHELEA Wirth and Blanton, 1970

142. *R. monilicornis* Wirth and Blanton, 1970.
Liberty (holotype), Marion. This is the only species in this unusual genus. It is known from only 3 adult females; the third specimen was collected in California.

genus STILOBEZZIA Kieffer, 1911

subgenus *Neostilobezzia* Goetghebuer in Goetghebuer and Lenz, 1934

143. *S. lutea* (Malloch, 1918).
Alachua, Escambia, Jackson, Liberty, Marion, Santa Rosa. This fairly common species ranges westward into Texas, north to Michigan and Nova Scotia.
144. *S. stonei* Wirth, 1953.
Alachua, Bay (types), Escambia, Franklin, Gulf, Highlands, Indian River, Jefferson, Levy, Liberty, Marion, Orange, Putnam, Santa Rosa, Wakulla. This eastern species is very common in Florida and ranges north to Nova Scotia.

subgenus *Eukraiohelea* Ingram and Macfie, 1921

145. *S. elegantula* (Johannsen, 1907).
Alachua, Bay, Citrus, Dade, Hillsborough. This is a poorly-known, yet distinctive species. It has been collected as far north as Maryland and specimens also have been recorded from French Guiana.

subgenus *Stilobezzia*

146. *S. antennalis* (Coquillett, 1901).
Escambia, Jackson, Liberty. This fairly common species is distributed west to Texas, north from British Columbia to Ontario.

147. *S. beckae* Wirth, 1953.
Alachua, Calhoun, Citrus, Escambia, Gilchrist, Glades, Indian River, Levy, Monroe, Santa Rosa, Wakulla, Walton (types). This common species appears to be widespread. Described from Florida, it also has been collected in Mississippi, Maryland, Panama, and Peru.
148. *S. bulla* Thomsen, 1935.
Alachua, Baker, Citrus, Franklin, Gulf, Highlands, Jefferson, Leon, Liberty, Orange, Santa Rosa. This strictly eastern species occurs north to Ontario and Quebec.
149. *S. coquilletti* Kieffer, 1917.
Alachua, Jefferson, Liberty, Orange, St. Lucie. This common species occurs from Illinois and Maryland south to Central America and the West Indies.
150. *S. diversa* (Coquillett, 1901).
Alachua. This species is rare in Florida and ranges north to New Jersey.
151. *S. glauca* Macfie, 1939.
Alachua, Gulf. This primarily Neotropical species occurs as far north as Virginia.
152. ***Stilobezzia kiefferi* Lane**
Stilobezzia kiefferi Lane, 1947:205.
(female: Brazil; fig. wing, fig. 9, not 8).
Stilobezzia (*Stilobezzia*) *punctipes* Wirth, 1953b:79.
(female: Florida: fig. male genitalia) NEW SYNONYMY.
Alachua, Citrus, Glades, Lake, Levy, Marion, Sarasota. One of us (WW) reexamined Lane's paratypes of *Stilobezzia kiefferi* in the USNM and compared them with the type series of what was described from Florida by Wirth (1953b) as *Stilobezzia punctipes*. Significant adult morphological differences between *kiefferi* and *punctipes* do not exist; the 2 are apparently conspecific. The latter name must therefore fall in synonymy to *Stilobezzia kiefferi* Lane, 1947, which remains available as the senior objective synonym.
153. *S. pallidiventris* (Malloch, 1915).
Alachua, Gulf, Highlands, Jefferson, Liberty, Marion, Orange, Putnam, Sarasota, Wakulla. This species ranges north to New York, west to Illinois.
154. *S. pruinosa* Wirth, 1952.
Alachua, Indian River, Wakulla, Walton. This species is also known from California, Arizona, and Virginia.
155. *S. rabelloi* Lane, 1947.
Alachua, Bay, Escambia, Highlands, Indian River, Jefferson, Lake, Leon, Marion, Orange, Putnam, Santa Rosa, Sarasota. This primarily Neotropical species has been collected as far north as Maryland.
156. *S. thomsenae* Wirth, 1953.
Alachua, Calhoun, Citrus, Collier (holotype), Dade, Gilchrist, Glades, Gulf, Indian River, Jefferson, Liberty, Orange, Wakulla. This species is known only from Florida where it is fairly abundant.
157. *S. sybleae* Wirth, 1953.
Alachua, Liberty, Marion, Orange. Outside of Florida, this species is known from Michigan, Virginia, Tennessee, and California.
158. *S. viridis* (Coquillett, 1901).
Alachua, Escambia, Indian River, Lake, Leon, Liberty, Wakulla. This poorly-known species ranges west to Texas, north to New Jersey.

Tribe HETEROMYIINI Wirth, 1962

genus CLINOHELEA Kieffer, 1917

bimaculata group

159. *C. bimaculata* (Loew, 1861).
Alachua, Baker, Bay, Calhoun, Collier, Columbia, Duval, Escambia, Glades, Gulf, Hardee, Highlands, Indian River, Jefferson, Lake, Leon, Levy, Liberty, Marion, Orange, Palm Beach, Putnam, Sarasota, Suwannee, Wakulla, Walton. This is the commonest of the 7 North American species in this genus. It occurs west to Texas, north to Michigan and New Hampshire.
160. *C. longitheca* Grogan and Wirth, 1976.
Santa Rosa (types). This species is known from only 2 females collected in Florida.

unimaculata group

161. *C. curriei* (Coquillett, 1905).
Alachua. This species is primarily northern in distribution, occurring from Alaska and California to Newfoundland. Only a single female is presently known from Florida.
162. *C. nubifera* (Coquillett, 1905).
Alachua, Duval (holotype), Highlands, Santa Rosa. This rare species is known outside of Florida from only a single female from New York. The male of this species is presently known only from genitalia attached to a female from Santa Rosa County (USNM).

genus HETEROMYIA Say, 1825

163. *H. fasciata* Say, 1825.
Alachua, Baker, Duval, Putnam, Santa Rosa, Wakulla. This is the type species of the genus. This poorly-known eastern species occurs from Florida to Massachusetts.
164. *H. prattii* Coquillett, 1902.
Hardee, Highlands, Wakulla. This is the only other species in this genus from North America. Also an eastern species, its range is more extensive than *fasciata*, occurring farther south in Florida and north to Ontario, west to Illinois.

Tribe SPHAEROMIINI Newman, 1834

genus JENKINSHELEA Macfie, 1934

albaria group

165. *J. albaria* (Coquillett, 1895).
Alachua, Gilchrist, Glades, Hardee, Highlands, Jefferson, Putnam (holotype), Sarasota. This species is commonly found around lakes and streams and ranges west to Texas and Illinois, northwards to Ontario.
166. *J. stonei* Grogan and Wirth, 1977.
Fscambia, Jackson (holotype), Leon, Orange. Paratypes were collected from all 4 counties. This species is apparently restricted to lowlands along the Gulf of Mexico and presently is known only from Texas and Florida.

magnipennis group

167. *J. blantoni* Grogan and Wirth, 1977.
Polk, Putnam (holotype), Santa Rosa, Wakulla. Paratypes were collected from all 4 counties. This species is known only from Florida.

genus JOHANNSENOMYIA Malloch, 1915

168. *J. annulicornis* Malloch, 1918
Baker, Jackson. This species has not previously been reported from Florida. It ranges north to Ontario and west to Illinois and Michigan.
169. *J. argentata* (Loew, 1861).
Calhoun, Jackson, Orange, Santa Rosa. This species ranges north to Ontario, west to North Dakota.

genus MACROPEZA Meigen, 1818

170. *M. blantoni* Wirth and Ratanaworabhan, 1972.
Jackson (holotype), Leon. This very large biting midge species is one of only 2 New World representatives of this primarily African genus. This species is known from only 2 females collected in Florida.

genus MALLOCHOHELEA Wirth, 1962

171. *M. atripes* Wirth, 1962.
Alachua, Baker, Jackson, Jefferson, Leon, St. Johns (paratypes), Santa Rosa. This common eastern species ranges north to Ontario.
172. *M. caudellii* (Coquillett, 1905).
Jackson. Described from British Columbia, this species is predominantly western and is rare in Florida. This is the first published Florida record of this species.
173. *M. smithi* (Lewis, 1956).
Jackson, Franklin, Marion, Orange, Wakulla. This common eastern species ranges north to Quebec.
174. *M. spinipes* Wirth, 1962.
Gilchrist, Suwannee. This rare species previously was known only from Georgia. Males of *spinipes* remain undiscovered.

genus NILOBEZZIA Kieffer, 1921

175. *N. schwarzii* (Coquillett, 1901).
Alachua, Collier, Dade, Duval, Escambia, Glades, Gulf, Highlands, Lee, Leon, Levy, Monroe, Orange, Palm Beach, Polk, Santa Rosa, Seminole, Volusia, Wakulla. This is a large and common species. It is predominantly Neotropical and has been collected from South Carolina to Texas, through Central America and the West Indies, south to Brazil.

genus PROBEZZIA Kieffer, 1906

176. *P. albiventris* (Loew, 1861).
Santa Rosa. This species occurs in the eastern and midwestern United States north to New Brunswick.
177. *P. nigra* Wirth, 1971.
DeSoto, Jackson, Liberty, Santa Rosa. This species is restricted to the southeast, known only from Florida, Louisiana, and Georgia.
178. *P. pallida* Malloch, 1914.
Franklin, Jackson. This species has been recorded numerous times from stream margins and is distributed west to Arizona, northward from North Dakota to Ontario.

179. *P. sabroskyi* Wirth, 1951.
Santa Rosa. This species is distributed north to New Brunswick, westward into Oregon.
180. *P. smithii* (Coquillett, 1901).
Jackson, Leon, Santa Rosa. This eastern species ranges north to New Jersey.

genus SPHAEROMIAS Curtis, 1829

181. *S. longipennis* (Loew, 1861).
Alachua, Franklin, Highlands, Leon, Orange, Putnam. This species usually is found around a wide variety of aquatic habitats and can be quite abundant. It is one of 2 species in the genus from North America and ranges north to Minnesota and Ontario, westward through Texas with scattered records also from California.

Tribe PALPOMYIINI Enderlein, 1936

genus BEZZIA Kieffer, 1899

subgenus *Bezzia*
bivittata group
182. *B. bivittata* (Coquillett, 1905).
Alachua, Liberty. This species ranges throughout North America from Alaska to California, east as far north as Ontario.
183. *B. gibbera* (Coquillett, 1905).
Monroe. This species ranges through the Caribbean and Panama, north to southern Arizona, Texas, and Florida.
184. *B. gibberella* Wirth and Grogan, 1983.
Alachua (paratypes). This uncommon species is distributed north to Michigan and Quebec.
185. *B. setosinotum* Wirth and Grogan, 1983.
Alachua (paratype). This species has been collected as far north as New Jersey.
expolita group
This group of species is presently under revision. The species listed below are all known to occur in Florida, but definitive county records are not presently available for some of them.
186. *B. expolita* (Coquillett, 1901).
Records not available for this species.
187. *B. flavitarsis* Malloch, 1914.
Collier.
188. *B. laciniastyla* Dow and Turner, 1976.
Alachua, Glades (types), Wakulla.
189. *B. perplexa* Dow and Turner, 1976.
Alachua (holotype), Hillsborough, Indian River, Liberty. Paratypes from all 4 counties.
190. *B. pulverea* (Coquillett, 1901).
Records not available for this species.
191. *B. punctipennis* (Williston, 1896).
Dade, Palm Beach.
192. *B. spicata* Dow and Turnner, 1976.
Alachua (paratypes), Indian River (paratypes), Wakulla (holotype).
193. *B. uncistyla* Dow and Turner, 1976.
Records not available for this species.

nobilis group

194. *B. nobilis* (Winnertz, 1852).
Alachua, Glades, Gulf, Highlands, Indian River, Jackson, Levy, Liberty, Marion, Orange, Palm Beach, Putnam, St. Lucie, Santa Rosa, Wakulla. This is one of the commonest and most widespread species of *Bezzia* in the world, ranging throughout Eurasia and North America, south to the islands of the Greater Antilles and Central America, with southernmost specimens collected from Brazil and Uraguay. Some Florida material has been previously recorded under the synonyms *B. setulosa* (Loew) and *B. atlantica* Wirth and Williams.

subgenus *Homobezzia* Macfie, 1932

annulipes group

195. *B. fascispinosa* Clastrier, 1962.
Alachua, Leon, Wakulla. This is primarily a northern Holarctic species.

196. *B. pseudobscura* Wirth, 1951.
Alachua. This rare species is known only from a few females collected in Florida, Maryland, and Virginia.

197. *B. solstitialis* (Winnertz, 1852).
Alachua, Jackson, Levy, Marion, Santa Rosa, Walton. This species is widely distributed throughout Europe and North America.

198. *B. varicolor* (Coquillett, 1902).
Alachua, Orange, St. Lucie. This species is widely distributed throughout North America.

bicolor group

199. *B. coloradensis* Wirth, 1952.
Indian River. This species has also been collected in California and the Greater Antilles.

200. *B. fairchildi* Wirth, 1983.
Alachua, Glades, Gulf, Highlands, Hillsborough, Leon, Levy, Liberty, Marion, Orange, Putnam, Santa Rosa (holotype), Wakulla. All records listed are from the type series except Levy Co. This species is restricted to Florida.

201. *B. glabra* (Coquillett, 1902).
Alachua, Bay, Citrus, Collier, Dade (lectotype), Gilchrist, Glades, Gulf, Hardee, Highlands, Jackson, Jefferson, Lee, Leon, Levy, Marion, Orange, Palm Beach, Polk, Putnam, Sarasota, Suwanee. This common species occurs throughout North America and also has been recorded from Belize.

dorsasetula group

202. *B. dorsasetula* Dow and Turner, 1976.
Wakulla. This eastern species is 1 of only 2 North American species in the group and ranges northward into Canada. It has been reared from sphagnum bogs in the northeast.

genus PALPOMYIA Meigen, 1818

distincta group

203. *P. plebeia* (Loew, 1861).
Alachua, Jefferson, Levy, Liberty. This common species occurs near small streams in swampy, wooded areas in the northern part of the state and is distributed north to Newfoundland and west to Utah, Washington, and British Columbia.

204. *P. pseudorufa* Grogan and Wirth, 1975.
Alachua, Baker, Bay, Escambia, Jefferson, Liberty, Marion. This is a fairly common inhabitant of swampy areas of the southeastern coastal plain. It ranges north to Maryland.

205. *P. rufa* (Loew, 1861).
Alachua, Baker, Jefferson, Liberty, Santa Rosa. This is a fairly common eastern species.

flavipes group

206. *P. hastata* Grogan and Wirth, 1975.
Alachua, Jefferson, Liberty. This is an uncommon species limited in distribution to the extreme eastern portion of the United States and Canada as far north as New Brunswick. In Florida, it has been collected in only the northern part of the state.

lineata group

207. *P. lineata* (Meigen, 1818).
Alachua, Jefferson. This is a widespread Holarctic species. It has been found throughout most of North America from Florida north to Quebec, westward into Alaska just below the Arctic circle.

tibialia group

208. *P. subaspera* (Coquillett, 1901).
Alachua, Collier, Dade, Escambia, Gilchrist, Glades, Hardee, Indian River, Jackson, Jefferson, Levy, Martin, Monroe, Orange, Palm Beach, Santa Rosa, Sarasota, Suwanee. This very common species inhabits streams and ponds. It is very widely distributed, ranging from southern Canada, throughout the United States into northern Mexico.

209. *P. weemsi* Grogan and Wirth, 1979.
Baker, Duval, Highlands, Jackson (holotype), Levy, Liberty, Manatee, Sarasota, Wakulla. All records are from the type series. This eastern species ranges northward to Maryland with isolated records from Missouri.

genus PHAENOBEZZIA Haeselbarth, 1965

210. *P. opaca* (Loew, 1861).
Alachua, Bay, Bradford, Broward, Citrus, Columbia, Dade, Glades, Gulf, Highlands, Hillsborough, Indian River, Levy, Liberty, Marion, Monroe, Orange, Palm Beach, Putnam, Sarasota, Wakulla. This species ranges north to Canada and westward to the Rocky Mountains.

211. *P. sabroskyi* Wirth and Grogan, 1982.
Alachua, Dade, Glades, Gulf, Hardee, Highlands, Lee, Leon, Marion, Sarasota. All records are from the type series except Dade, Lee, Marion, and Sarasota counties. This is strictly an eastern species.

Discussion

The state of Florida stretches over 700 km north-south, extending through approximately 6°30′ of latitude. It encompasses areas of temperate, subtropical, and even tropical climates in parts of Monroe County. Bridging the gap between the Nearctic and Neotropical faunal realms, Florida contains both Nearctic or Holarctic species whose southern limits extend into the northern part of the state as well as primarily Neotropical species whose Florida populations represent the northern limits of their species' ranges. In addition, we have noted that at least 21 species of biting midges are presently known only from Florida. As a result, Florida apparently is richer in ceratopogonid species than many other areas of North America. We have specimens or records comprising 211 species in 25 genera from 64 of Florida's 67 counties. Downes and Wirth (1981) recorded 498 species of Ceratopogonidae from North America, Greenland, and Bermuda, and more recent contributions by several authors have increased this number to well over 510. Known Florida material therefore contains approximately

40% of the described Nearctic species, with 12 Nearctic genera unrepresented in present collections from the state (Table 2).

Florida is one of the few areas in North America which has been intensively sampled for biting midges and other Nematocera, largely through adult trap surveys conducted by personnel of the Florida State Board of Health, personnel of the DPI, and by Dr. Franklin S. Blanton, University of Florida. Nevertheless, of the 67 Florida counties, 36 have fewer than 20 recorded species (Fig. 1). Distributions within the state are best known for species in the genus *Culicoides*, a reflection of the effort invested in this medically and economically important group. There are no specimens or records presently available from Madison, Osceola, or Union Counties. A clear need exists for further surveys in many counties, particularly those in the northern part of the state at the base of the "panhandle."

ACKNOWLEDGEMENTS

Dr. Frank W. Mead and Dr. Howard V. Weems, Jr., DPI, Florida Department of Agriculture and Consumer Services, Gainesville, gave generously of their time in helping us locate specimens, records, and literature during a period when building construction, renovation, and reorganization of facilities sometimes rendered access to material quite difficult. Dr. Franklin S. Blanton provided helpful information and made available to us his personal collection, now in part incorporated in the FSCA. Drs. Ellis C. Greiner and Wayne L. Kramer, Department of Preventive Medicine, College of Veteri-

TABLE 2. NEARCTIC GENERA OF CERATOPOGONIDAE (DIPTERA) UNRECORDED FROM FLORIDA.

TRIBES AND GENERA (all Ceratopogoninae)	COMMENTS*
Culicoidini	
Paradasyhelea Macfie	1 sp., *olympiae* Wirth and Blanton from Washington
Ceratopogonini	
Ceratopogon Meigen	4 spp., North America
Isohelea Kieffer	3 spp., widespread
Schizohelea Kieffer	1 sp., *leucopeza* (Meigen) from northern North America
Serromyia Meigen	3 spp., widespread
Heteromyiini	
Neurobezzia W. & R.	1 sp., *granulosa* Wirth from California and Oregon
Neurohelea Kieffer	2 spp., western North America
Pellucidomyia Macfie	1 sp., *wirthi* (Lane) from Texas
Palpomyiini	
Amerohelea Grogan & Wirth	1 sp., *frontispina* (Dow and Turner) from western North America, neotropical
Pachyhelea Wirth	1 sp., *pachymera* (Williston) from Texas, neotropical
Stenoxenini	
Paryphoconus Enderlein	1 sp., *sonorensis* W. & R. from Oklahoma, Neotropical
Stenoxenus Coquillett	1 sp., *johnsoni* (Coquillett) from southeastern United States

*Information is from Downes and Wirth (1981), Grogan and Wirth (1981), and from Wirth and Ratanaworabhan (1972a).

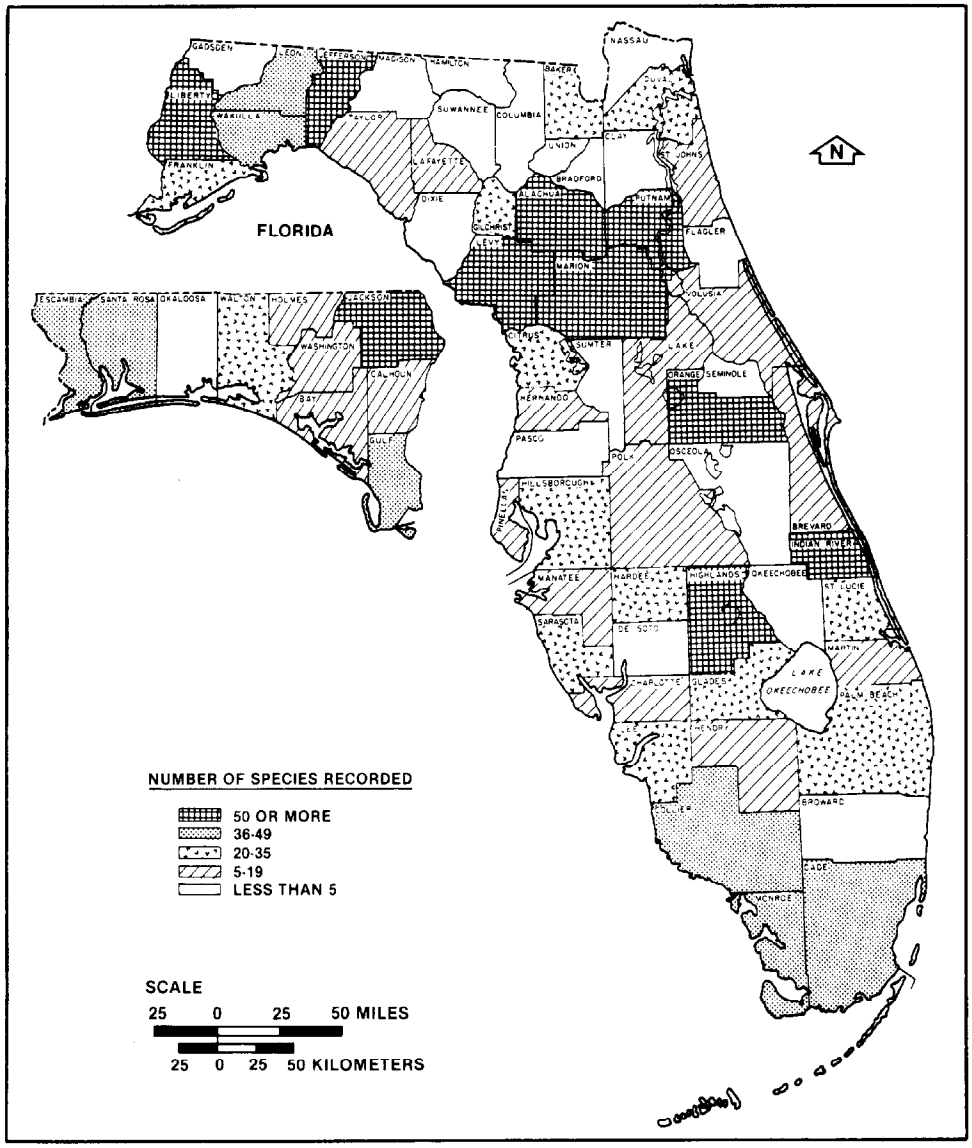

Fig. 1. County map of Florida (USA) indicating the number of biting midge (Diptera: Ceratopogonidae) species recorded from each county. The number of records from each county reflects primarily collection and survey effort rather than underlying ceratopogonid ecology. Although counties with fewer than 5 recorded species exist throughout the state, northern Florida at the base of the "panhandle" is the region most poorly represented in collections. No biting midge species have been recorded from Madison, Osceola, or Union counties.

nary Medicine, University of Florida, Gainesville, kindly shared with us their distributional data for Florida *Culicoides* which included many new county records. In addition, they made available to us specimens collected throughout the state during the course of their research into BTV transmission. Carol Morris and Paul Choate provided us with many collections from new localities. Barbara Lamont prepared Figure 1.

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BAETIDAE FROM SRI LANKA WITH SOME GENERAL REMARKS ON THE BAETIDAE OF THE ORIENTAL REGION (INSECTA: EPHEMEROPTERA)

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ABSTRACT

The nymphs of nine species of baetid mayflies from Sri Lanka are described in detail. These include *Baetis frequentus* sp.n., *B. acceptus* sp.n., *B. conservatus* sp.n., *B. collinus* sp.n., *B. geminatus* sp.n., *B. pulchellus* sp.n., *B. ordinatus* sp.n., and *Procloeon regularum* sp.n. A single nymph of *Cloeon* appears closely related to *Cloeon bimaculatum* Eaton. The first four species mentioned do not fit in any known species-group. *Baetis geminatus* sp.n. and *B. pulchellus* sp.n. are associated with the Oriental *molawinensis* species-group (which corresponds to the European *atrebatinus* species-group and to the North American *propinquus* species-group). The *sumigarensis* subgroup is proposed within the *molawinensis* species-group. The nymphs described herein are the first nymphs to be described in the family Baetidae from Sri Lanka. The genus *Procloeon* is recorded from the Oriental Region for the first time. A key to the baetid nymphs of Sri Lanka is included.

RESUMEN

Se describen en detalle las ninfas de nueve especies de efemerópteros de Sri Lanka. Se incluyen *Baetis frequentus* sp.n., *B. acceptus* sp.n., *B. conservatus* sp.n., *B. collinus* sp.n., *B. geminatus* sp.n., *B. pulchellus* sp.n., *B. ordinatus* sp.n., y *Procloeon regularum* sp.n. Una ninfa de *Cloeon* paraece estar cercamente relacionada a *Cloeon*