

BLACK FLIES¹ OF FLORIDA
I. GEOGRAPHIC AND SEASONAL DISTRIBUTION²

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ABSTRACT

Eighteen species of black flies (Diptera: Simuliidae) were represented in collections from 192 locations in 50 Florida counties. Two genera, *Simulium* Latreille and *Cnephia* Enderlein, and 6 subgenera, *Cnephia* Enderlein, *Byssodon* Enderlein, *Eusimulium* Roubaud, *Phosterodoros* Stone and Snoddy, *Psilozia* Enderlein, and *Simulium* Latreille, were included. Some species such as *S. slossonae* Dyar and Shannon and *S. tuberosum* (Lundström) were widely distributed about the State. Other species such as *S. dixiense* Stone and Snoddy and *S. notiale* Stone and Snoddy were found at only a small number of sites. Many species were collected all year while others such as *C. ornithophilia* Davies, Peterson and Wood and *S. con-gareenarum* (Dyar and Shannon) were not found during the warm summer months. Recent records for *S. meridionale* Riley indicated that this species occurred only in the counties bordering the Apalachicola River and was present only during April and May.

Interest in the family Simuliidae (Diptera, Nematocera) often stems from their importance as disease vectors. A number of anthropophilic simuliid species are known to transmit human onchocerciasis in Latin America and Africa (Travis et al. 1974, Raybould and Grunewald 1975). The viruses of both Venezuelan Equine Encephalitis and Eastern Equine Encephalitis have been recovered from black flies which may be involved in the transmission of these diseases (Sudia et al. 1975, Anderson et al. 1961). Simuliids also transmit parasites to wild and domestic animals including *Leucocytozoon smithi* to turkeys and *L. simondi* to ducks (Skidmore 1931, Noblet et al. 1972, Fallis and Bennett 1966).

The list of publications dealing with the systematics of the Simuliidae from the southeastern United States has been growing slowly. Snow et al. (1958) discussed the black flies of the Tennessee River Valley. Stone (1965) listed black flies from the Southeastern States as well as from other sections of the United States and Canada. Stone and Snoddy (1969) worked comprehensively with the Alabama species while Snoddy and Beshear (1968) and Snoddy (1971, 1976) described new simuliid species from the southeastern United States.

Brief mention was made of black flies from Florida in Dyar and Shannon (1927) and Jamnback and Stone (1957). Stone (1965) and Stone and Snoddy (1969) presented more complete records of black flies reported

1. Diptera: Simuliidae.

2. Taken in part from a dissertation presented to the Graduate School of the University of Florida by the senior author in partial fulfillment of requirements for the degree of Doctor of Philosophy.

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4. Florida Agricultural Experiment Station Journal Series Number 719.

from Florida. A total of 9 species were recorded from Florida by the time of the latter paper. The present authors undertook a comprehensive investigation of the black flies of Florida in mid 1973. The data included here concern the species present in the State and information on their seasonal occurrence and distribution.

MATERIALS AND METHODS

The Simuliidae inhabiting streams and rivers in Alachua County and adjacent counties were sampled frequently. Some streams were checked ca. once per month during the 3 year investigation. Streams in more distant counties were visited at least 4 times each year to determine species present during each season. At each collection site larvae and pupae were removed with forceps from grass, leaves, rocks, concrete and other objects in the flow or were left attached to a small piece of the substrate and placed into 4-dram lip vials containing collection data labels and 80% ethanol. Pupae also were placed alive onto a strip of stream-moistened paper toweling inside a 4-dram screw-cap vial; these specimens were retained for adult emergence. Ecological information on stream dimensions, pH, temperature, velocity, and substrates present, as well as black fly population data were recorded on preprinted 4x6 inch cards. Vials and cards were transported to the laboratory where species determinations were made. Some black fly adults were netted or aspirated off mammalian and avian hosts. Others were captured in blackout box (Anderson and DeFoliart 1961), Manitoba (Thorsteinson et al. 1965), or ramp-type traps. Representative specimens have been deposited in the Florida State Collection of Arthropods and the U.S. National Museum of Natural History.

RESULTS AND DISCUSSION

Fig. 1 illustrates black fly collection records in 50 Florida counties. Most sites represent collections made during this study. A few locations represent records of black flies collected by other individuals. The Everglades region and the Atlantic coast strip were not sampled extensively for black flies due to the general absence of black fly habitats with flowing water. Table 1 presents the 18 species recorded from Florida and lists the number of counties and sites at which each species was found. Two genera and 6 subgenera are represented. Ten species are new State records. *Cnephia pecuarum* (Riley) was listed from Florida in Stone (1965) and Stone and Snoddy (1969); however, only *C. ornithophila* Davies, Peterson and Wood was located in Florida in this study. Specimens collected from a number of locations in the State were examined by D. E. Shewell of the Canadian Biosystematics Research Institute and identified by him as *C. ornithophila*. Table 2 lists the 50 counties for which black fly collections are recorded and the species found in each county.

Species such as *Simulium dixiense* Stone and Snoddy, *S. haysi* Stone and Snoddy, *S. notiale* Stone and Snoddy, and *S. nyssa* Stone and Snoddy were collected at only 1 or a few sites in the entire State (Fig. 2). Other species such as *S. congareenarum* (Dyar and Shannon), *S. decorum* Walker, and *S. jonesi* Stone and Snoddy were collected at a greater number of locations but were limited to the upper part of the State (Figs. 3-5) *Simulium slossonae*

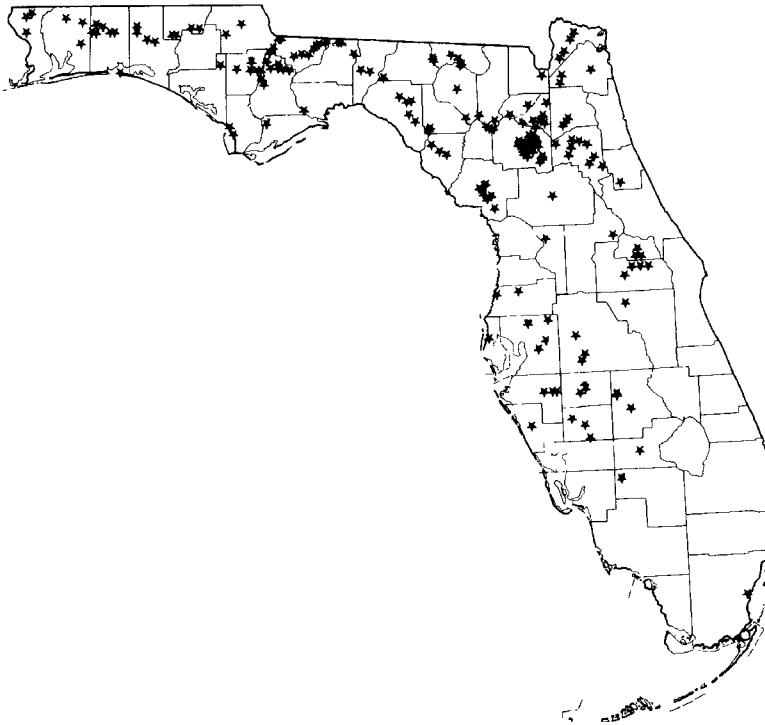


Fig. 1. Collection sites for black flies in 50 Florida counties.

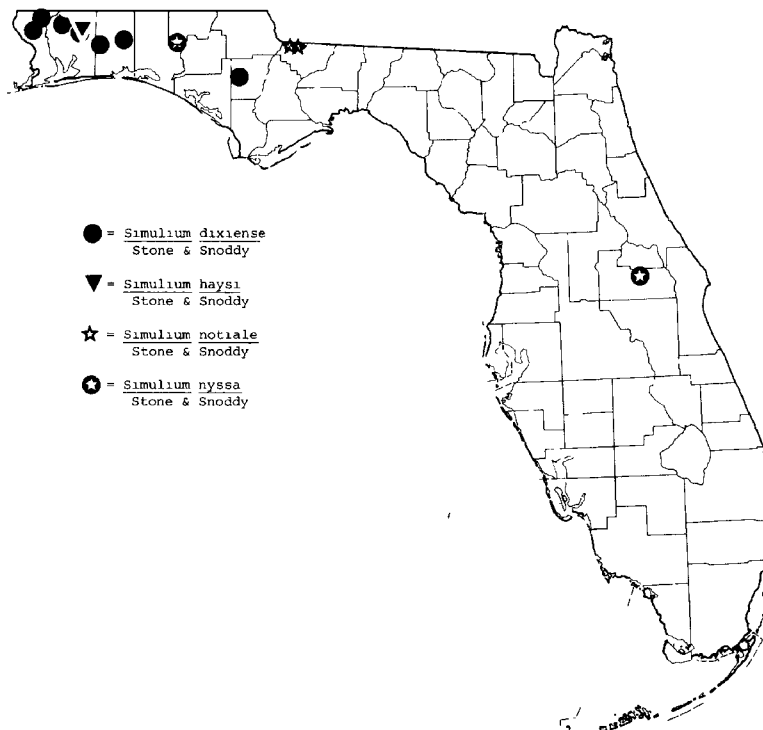


Fig. 2. Collection locations for rarely collected Florida black flies.

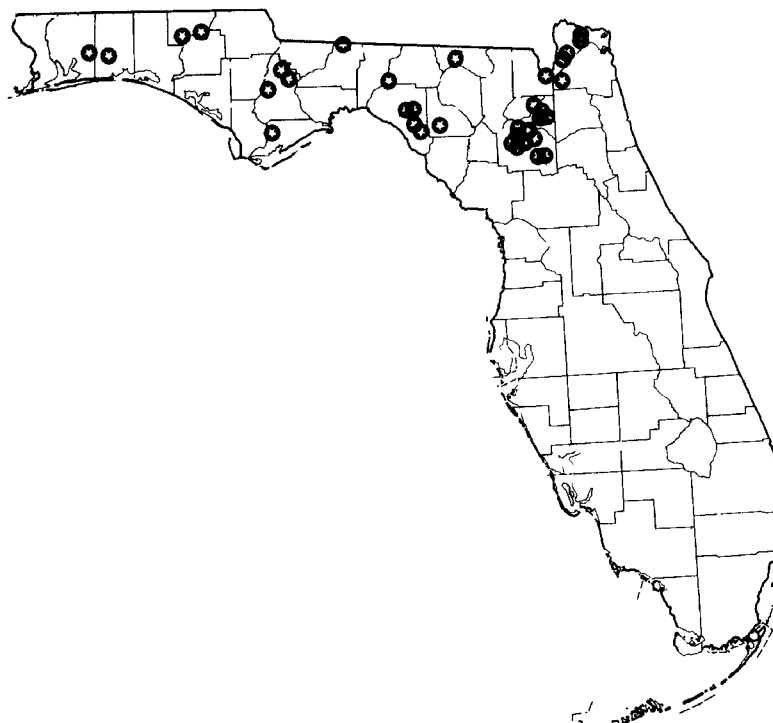


Fig. 3. Collection sites for *Simulium congareenarum* (Dyar and Shannon) in Florida.

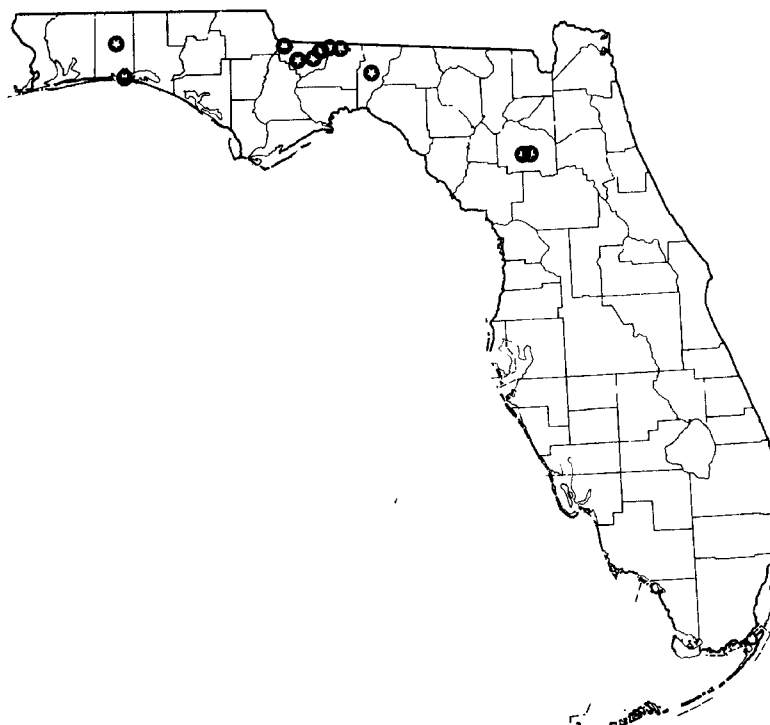


Fig. 4. Collection sites for *Simulium decorum* Walker in Florida.

TABLE 1. A LIST OF 18 SPECIES OF BLACK FLIES (DIPTERA: SIMULIIDAE) FOUND IN FLORIDA PLUS A SUMMARY OF THE NUMBERS OF COUNTIES AND COLLECTING SITES WHERE PARTICULAR SPECIES WERE TAKEN.

Species	Counties	Sites
<i>Cnephia</i> (<i>Cnephia</i>) <i>ornithophilia</i> Davies, Peterson, and Wood*	14	31
<i>Simulium</i> (<i>Byssodon</i>) <i>meridionale</i> Riley	5	10
<i>Simulium</i> (<i>Byssodon</i>) <i>slossonae</i> Dyar and Shannon	46	113
<i>Simulium</i> (<i>Eusimulium</i>) <i>congarreenarum</i> (Dyar and Shannon)	16	34
<i>Simulium</i> (<i>Phosterodoros</i>) <i>dixiense</i> Stone and Snoddy*	4	7
<i>Simulium</i> (<i>Phosterodoros</i>) <i>haysi</i> Stone and Snoddy*	1	1
<i>Simulium</i> (<i>Phosterodoros</i>) <i>jenningsi</i> Malloch	21	33
<i>Simulium</i> (<i>Phosterodoros</i>) <i>jonesi</i> Stone and Snoddy	19	57
<i>Simulium</i> (<i>Phosterodoros</i>) <i>lakei</i> Snoddy*	24	45
<i>Simulium</i> (<i>Phosterodoros</i>) <i>notiale</i> Stone and Snoddy*	1	2
<i>Simulium</i> (<i>Phosterodoros</i>) <i>nyssa</i> Stone and Snoddy	2	2
<i>Simulium</i> (<i>Phosterodoros</i>) <i>taxodium</i> Snoddy and Beshear*	23	39
<i>Simulium</i> (<i>Psilozia</i>) <i>vittatum</i> Zetterstedt*	21	44
<i>Simulium</i> (<i>Simulium</i>) <i>decorum</i> Walker	5	11
<i>Simulium</i> (<i>Simulium</i>) <i>tuberosum</i> (Lündström)	30	97
<i>Simulium</i> (<i>Simulium</i>) <i>verecundum</i> Stone and Jamnback*	22	48
<i>Cnephia</i> species undetermined No. 1*	1	1
<i>Simulium</i> species undetermined No. 1*	1	1

*New Florida records

Dyar and Shannon and *S. tuberosum* (Lündström) were collected in most areas of the State (Figs. 6, 7) although *S. tuberosum* was conspicuously absent from collections close to the Gulf of Mexico. The Dade County record for *S. slossonae* represents specimens gathered many years ago by Mrs. A. T. Slosson; collection dates were not recorded with the Slosson specimens observed.

Larvae of *Cnephia* species undetermined No. 1 were collected at 1 location on 13 March 1969 in Alachua County by Mr. L. Goldman. Each of these larvae has a tiny, v-shaped gular notch and a narrow, linear arrangement of cephalic head spots. There are more than 20 filaments in each respiratory histoblast, the abdominal tubercles are large, and the anal crosspiece is elongate but has short anterior and posterior arms. This species resembles *C. mutata* (Malloch). On 19 January 1975 a pupal exuvium, cocoon, and possibly a 3rd instar larva of *Simulium* species undetermined No. 1 were collected from a tributary to Pine Barrens Creek in Escambia County. This species has pupal respiratory organs each with 4 long, thin filaments which rise in pairs off short petioles. The cocoon has concave anterolateral margins and bears a short, narrow, anterodorsal projection. This species resembles *S. clarkei* Stone and Snoddy. These 2 undetermined species are unlike any other black flies collected in Florida and do not fit any previously described

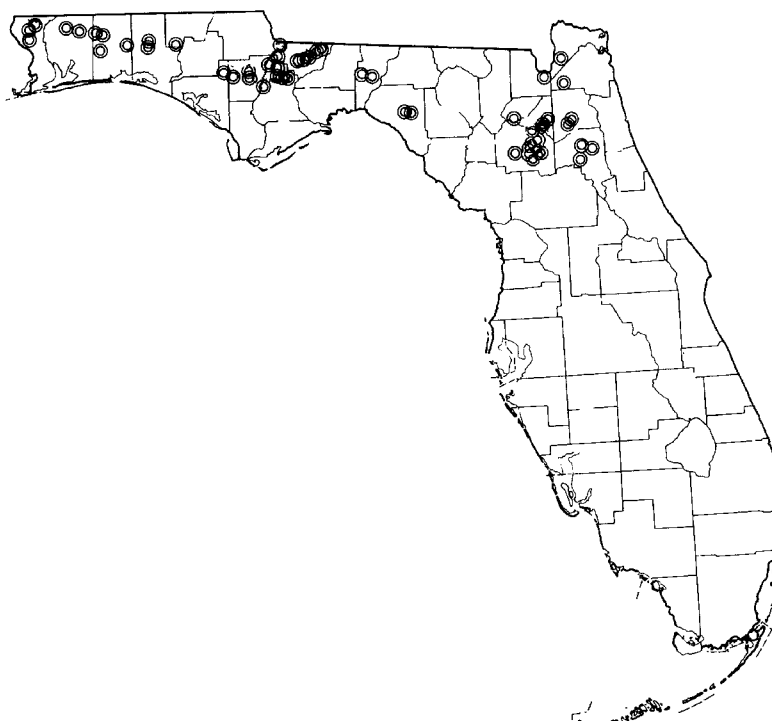


Fig. 5. Florida collection sites for *Simulium jonesi* Stone and Snoddy.

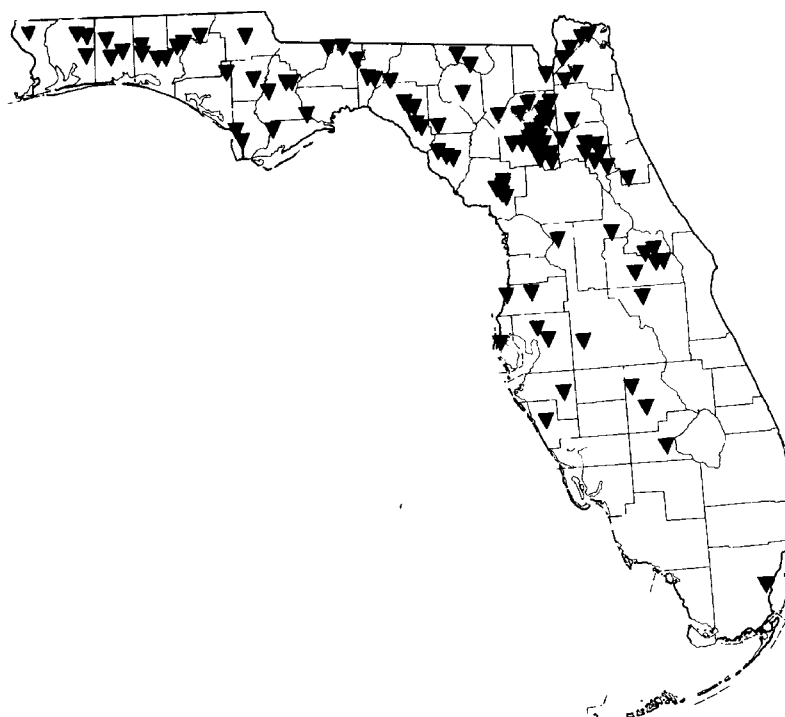


Fig. 6. Florida collection sites for *Simulium slossonae* Dyar and Shannon.

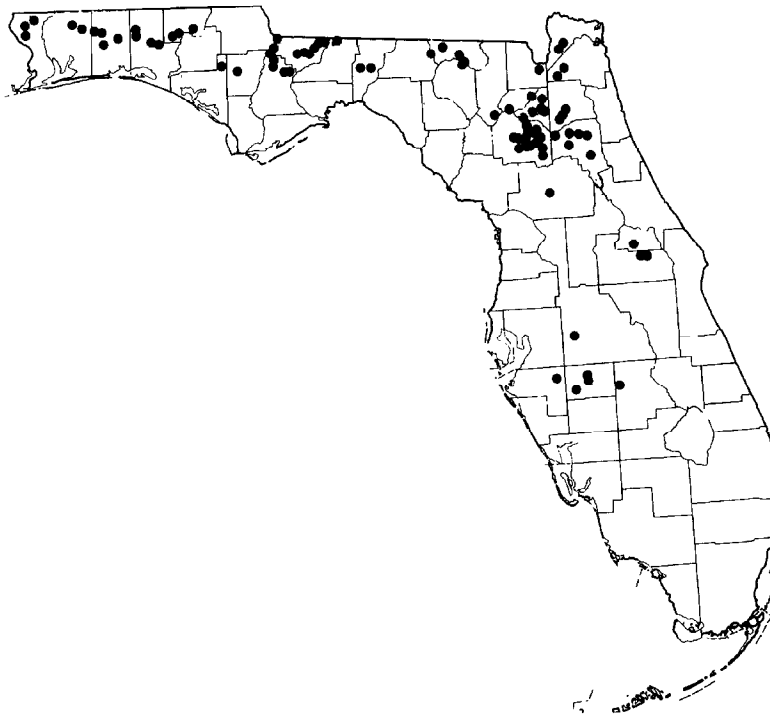


Fig. 7. Florida collection sites for *Simulium tuberosum* (Lündström).

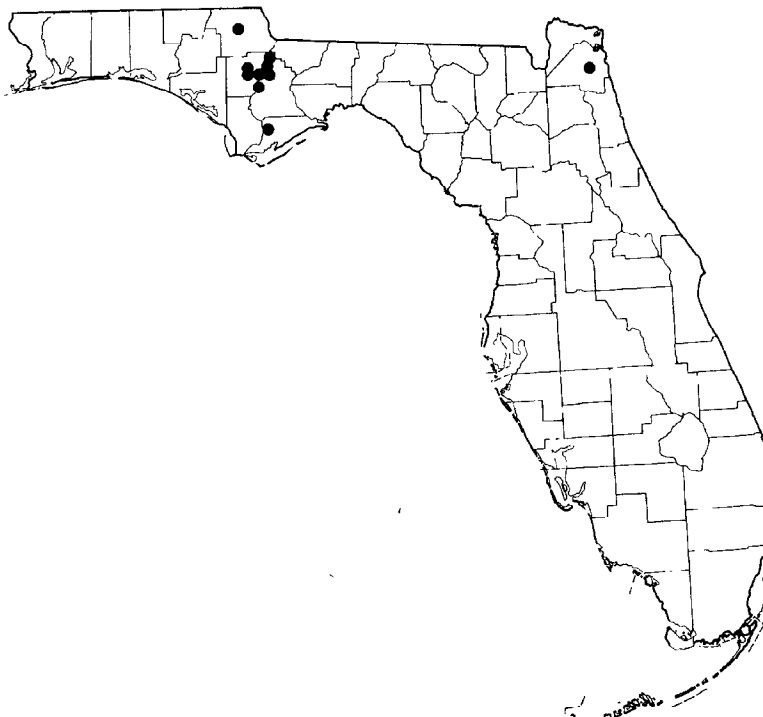


Fig. 8. Collection sites for *Simulium meridionale* Riley in Florida.

species from adjacent regions. Further collections of other life stages including adults would aid in making specific determinations.

Immature or adult specimens of *Simulium decorum*, *S. dixiense*, *S. jenningsi* Malloch, *S. jonesi*, *S. lakei* Snoddy, *S. slossonae*, *S. taxodium* Snoddy and Beshear and *S. tuberosum* were collected throughout the year (Fig. 9).

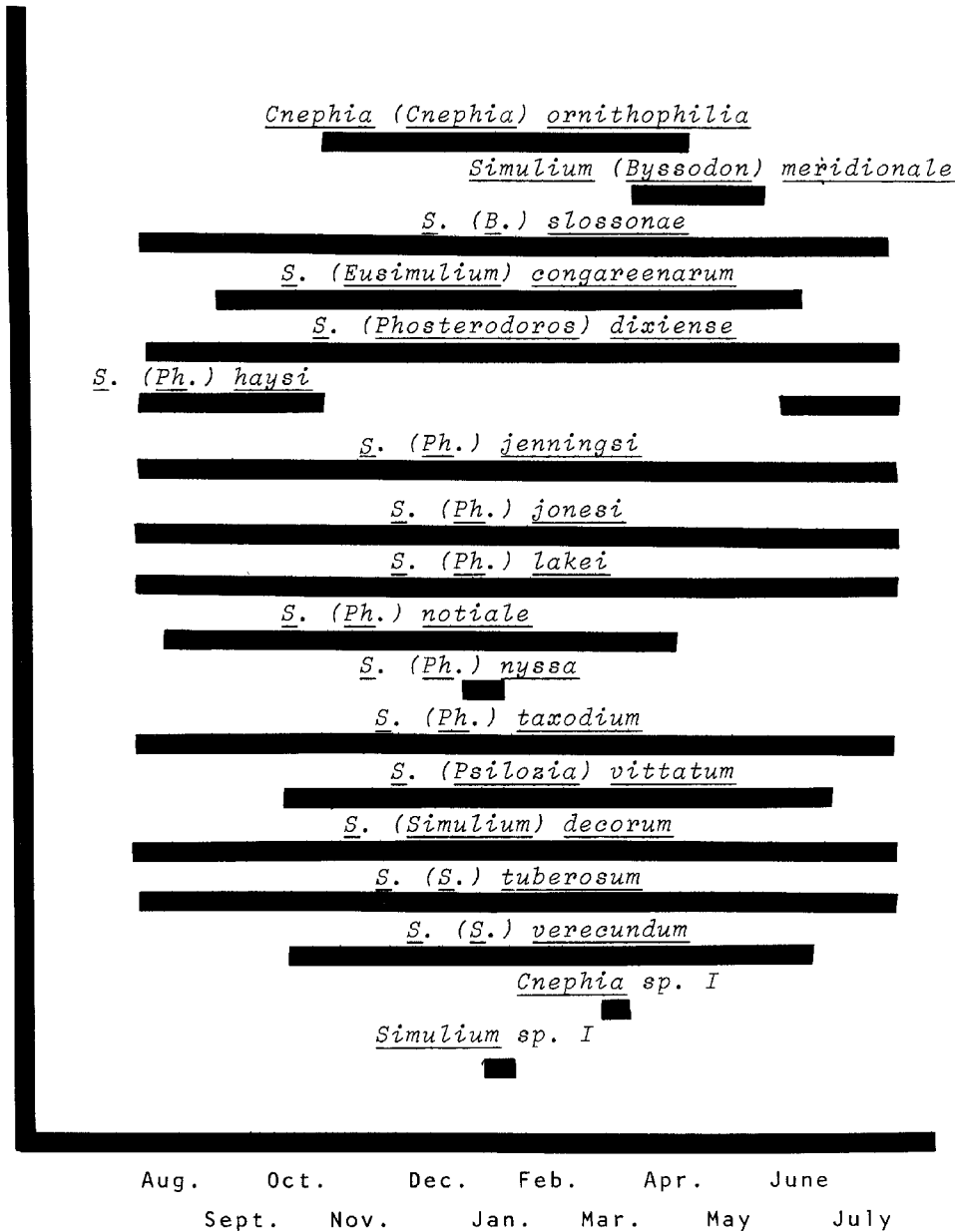


Fig. 9. Seasonal occurrence of 18 species of black flies in Florida.

TABLE 2. FLORIDA BLACK FLY (DIPTERA: SIMULIIDAE) DISTRIBUTION RECORDS BY COUNTY.

County	Sites	Species															C. sp. undetermined No. 1	S. sp. undetermined No. 1	
		<i>C. ornithophila</i>	<i>S. meridionale</i>	<i>S. slossonae</i>	<i>S. congaerenarum</i>	<i>S. dixiense</i>	<i>S. haysi</i>	<i>S. jenningsi</i>	<i>S. jonesi</i>	<i>S. lakei</i>	<i>S. notiale</i>	<i>S. nyssa</i>	<i>S. tarodidum</i>	<i>S. vittatum</i>	<i>S. decorum</i>	<i>S. tuberosum</i>			<i>S. verecundum</i>
Alachua	36	x	x	x				x	x	x			x	x	x	x	x	x	
Baker	1			x	x				x							x	x		
Bay	1			x					x							x			
Bradford	7	x		x	x				x	x			x	x		x	x		
Calhoun	5		x	x		x			x				x			x			
Clay	3			x					x							x			
Columbia	5			x					x		x		x			x			
Dade	1			x					x										
Desoto	3								x		x		x						
Dixie	3	x		x					x		x		x	x				x	
Duval	3	x	x	x	x					x			x	x		x	x		
Escambia	3			x		x				x						x	x		x
Flagler	1			x					x		x		x						
Franklin	1			x	x	x													
Gadsden	10				x					x		x			x	x	x	x	
Glades	1				x				x		x		x						
Gulf	2				x														
Hamilton	3	x			x	x			x		x		x	x		x	x		
Hardee	3										x		x	x		x			
Hendry	1								x		x								
Highlands	3				x												x		
Hillsborough	4				x				x		x		x	x					
Holmes	4	x			x	x				x			x	x	x		x	x	
Jackson	2			x	x														
Jefferson	2				x					x	x					x	x	x	
Lafayette	2				x	x				x		x		x				x	
Lake	1				x					x		x							
Leon	3	x			x	x								x		x	x	x	
Levy	7	x			x					x		x		x	x			x	
Liberty	10	x	x		x	x				x							x	x	
Madison	3				x	x				x		x		x	x		x	x	
Manatee	3				x					x		x					x		
Marion	1																x		
Nassau	4	x			x	x				x				x			x	x	

TABLE 2. CONTINUED

County	Sites	Species														
		<i>C. ornithophilia</i>	<i>S. meridionale</i>	<i>S. slossonae</i>	<i>S. congaerenarum</i>	<i>S. dixiense</i>	<i>S. haysi</i>	<i>S. jenningsi</i>	<i>S. jonesi</i>	<i>S. lakei</i>	<i>S. notiale</i>	<i>S. nyssa</i>	<i>S. taxodium</i>	<i>S. vittatum</i>	<i>S. decorum</i>	<i>S. tuberosum</i>
Okaloosa	7	x	x	x	x				x					x	x	x
Orange	4		x									x				x
Osceola	1		x													
Pasco	2		x											x		
Pinellas	1		x													
Polk	3		x					x		x			x	x		x
Putnam	9		x					x	x	x				x		x
Santa Rosa	3			x	x	x	x		x					x		x
Sarasota	1			x												
Seminole	3	x	x					x		x			x	x		x
Sumter	1		x							x						
Suwannee	3			x				x		x			x			x
Taylor	5	x	x	x				x	x	x			x	x		x
Union	2	x		x	x			x	x	x			x			x
Wakulla	1			x												
Walton	4			x					x							x

Sampling for *S. notiale* was not attempted during May, June, and July. Since *S. notiale* was collected prior to and following these months, this species also was probably present in the streams throughout the year. Recognizable immature specimens of *S. haysi* were recovered from June through October. Collection records for *S. nyssa* show that it occurred only as pupae in January. *Cnephia ornithophilia*, *S. congaerenarum*, *S. verecundum* Stone and Jamnback and *S. vittatum* Zetterstedt first appeared in the streams each year in September or October but were no longer recoverable in the larval, pupal or adult stages by spring or early summer. Immatures of *S. meridionale* Riley were collected during April and adults were collected during April and May. Except for an old record from Duval County, this species occurred exclusively in counties bordering the Apalachicola River (Fig. 8).

ACKNOWLEDGMENTS

Sincere thanks are extended to D. E. Shewell and E. L. Snoddy for rendering identifications and confirming determinations of submitted black

fly specimens. The authors acknowledge the opportunity to study simuliid specimens in the Florida State Collection of Arthropods and the U. S. National Museum of Natural History. Grateful acknowledgement is due the individuals who provided this study with additional Florida black fly specimens, especially W. Beck, Jr., G. B. Fairchild, D. H. Habeck, J. I. Glick and D. G. Young. The senior author thanks the Air Force Institute of Technology for the opportunity to pursue graduate studies at the University of Florida.

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