FEEDING PATTERNS OF *CULEX SALINARIUS* COQUILLETT IN JEFFERSON PARISH, LOUISIANA

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ABSTRACT. Blood engorged *Culex salinarius* collected in light and animal-baited traps from various locations in Jefferson Parish, Louisiana, were analyzed by capillary precipitin tests to determine host source. Of a total of 328 mosquitoes examined over a 16-month period, general preferences for avian (45%), equine (17%) and canine (15%) hosts were noted. Multiple feedings occurred at a rate of 13%. No distinct seasonal trends in host selection were noticeable though a large number of mosquitoes collected in the late fall and winter months had taken bloodmeals from avian sources.

INTRODUCTION. *Culex salinarius* is widely distributed over southeastern Canada and the eastern United States, extending as far westward as Utah and Idaho (Carpenter and LaCasse, 1955; Gjullin and Eddy, 1972). Because of its ubiquitous nature and frequent occurrence in lentic habitats that also support avian hosts of endemic eastern equine encephalitis virus, this species has been suggested as a possible vector in Maryland (Saugstad et al. 1972). Circumstantial evidence also indicates that *C. salinarius* might possibly serve as a vector in epidemic cycles of EEE (Muul et al. 1975), though Chamberlain et al. (1954) found this mosquito to be relatively refractive to infection in laboratory studies. Seeley and Bickley (1974) suggest that over part of its range, *C. salinarius* is a potential vector of *Dirofilaria immitis*, the causative agent of dog heartworm.

Since *C. salinarius* is an important pest species in many areas along the Gulf Coast, blood-engorged specimens were routinely collected in Jefferson Parish, La., over a 16-month period (Jan. 1973–April, 1974) and host source identified. The determination of feeding patterns and possible vector significance of this species is discussed in this paper.

MATERIALS AND METHODS. Mosquitoes with obvious bloodmeals were collected from 7 regularly operating New Jersey type light traps located on the periphery of major urban-suburban areas in Jefferson Parish. Specimens were also taken during a 3-month period (March, May, June, 1973) in a single dog-baited trap similar to that used in a previous study (Cupp and Stokes 1973). Following taxonomic determination, all specimens were stored at −20°C until testing.

Host blood sources were identified by the capillary precipitin method described by Tempelis and Lofy (1963). Two broadly reacting reference antisera, avian and mammalian, were used for initial screening. While no further specific avian tests were made, mammalian positive bloodmeals were reacted with human, horse, dog and bovine antisera. Positive, negative, and cross reaction controls were routinely run as described by Edman and Downe (1964).

RESULTS AND DISCUSSION. A total of 328 blood-engorged mosquitoes were tested (Table 1). Avian hosts were most utilized, particularly in the late fall and early winter months (Table 2). In terms of general preference for the 16-month period, avian hosts ranked first (45%), equine sources second (17%) and canines third (15%). Human bloodmeals made up 5% of the total. A large percentage (18%) of the bloodmeals was not identifiable. Some portion of these may have been due to reptilian or amphibian sources since neither of these antisera was available for general screening. Of the 328 mosquitoes

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Table 1. Identification of bloodmeal sources from *Culex salinarius* collected in Jefferson Parish, Louisiana, during 1973–1974

	HOST					
	Avian	Human	Horse	Dog	Bovine	Unident.
No. of feedings*	171	18	64	58	3	70
% of total	45	5	17	15	<1	18

* The bloodmeals of 328 mosquitoes were tested; multiple feedings had occurred in 41 or 13% of the total.

examined, 41 (13%) had taken more than one bloodmeal.

In a detailed review of feeding patterns of mosquitoes, Tempelis (1975) noted that *C. salinarius* exhibited a rather general host preference, utilizing large mammals as well as birds. This pattern was apparent in the present study when considering the variety of host selection by *C. salinarius* in Jefferson Parish. In an earlier investigation on the feeding habits of 15 mosquito species collected during the summer in both light and dog-baited traps in Jefferson Parish, *C. salinarius* fed readily on birds as well as human, horse, and canine hosts (Cupp and Stokes 1973). Crans (1964) also identified a variety of hosts for this mosquito in New Jersey whereas Muul et al. (1975) reported that *C. salinarius* fed largely on bovine and avian hosts in and around the Pocomoke swamp of Maryland. In a previous study concerning the ecology of arboviruses in that freshwater swamp, Le Duc et al. (1972) noted that *C. salinarius* fed readily on domestic livestock in areas adjacent to the swamp as well as on avian hosts that served as endemic hosts of EEE.

Murphey et al. (1967), using a variety of birds, mammals and reptiles in baited traps to collect mosquitoes in Delaware, reported that *C. salinarius* was a general feeder that readily sought bloodmeals from warm blooded hosts with little discrimination. This pattern was generally repeated in a similar kind of investigation

Table 2. Annual pattern of host preference exhibited by *Culex salinarius* collected in Jefferson Parish, Louisiana.[1]

Date	Host[2]					
1973	Avian	Human	Horse	Dog	Bovine	Unident.
Jan.	–	–	4	1	–	4
Feb.	–	–	3	2	–	1
March	3	–	12	7	–	1
April	4	1	7	1	1	1
May	4	2	5	–	–	–
June	2	–	–	–	–	–
Aug.	6	–	5	6	1	–
Sept.	14	–	3	–	–	1
Oct.	10	–	2	1	–	1
Nov.	13	6	3	7	–	23
Dec.	5	–	–	–	–	1
1974						
Jan.	55	3	5	6	–	3
Feb.	26	4	4	3	–	19
March	–	–	–	–	–	–
April	14	–	1	2	–	6

[1] Blooded mosquitoes were collected from 7 light traps.
[2] A total of 289 bloodmeals were identified.

in Wisconsin (Wright and Defoliart 1970).

C. salinarius thus appears to be highly opportunistic in its feeding habits. The increased incidence of avian feeding noted in this study during the late fall and winter months apparently reflects host selection on the basis of availability rather than preference, since it is during this time that large numbers of migrant birds pass through Jefferson Parish. Schaefer and Steelman (1969) repeatedly identified cattle (77%), rabbits (8%), horses (6%), and birds (3%) as blood sources for *C. salinarius* collected in salt marsh areas of southwestern Louisiana. This feeding pattern generally reflected relative abundance of these hosts since many of the birds had migrated before mosquito collection. A similar array of hosts was given for *C. salinarius* collected in selected sites in the southwestern U.S.A., though no information was given concerning the relative host availability (Suyemoto et al. 1973). Edman (1974) noted that ruminants, rabbits, and ciconiiform birds were routinely utilized by *C. salinarius* as hosts in a swamp habitat near Vero Beach, Fla., while engorgement on mammalian hosts was more prevalent in the Tampa area. He attributed this difference to the lessened number of birds in the latter location.

Multiple feeding occurred at a rate of 13% (41 of 328). Edman and Downe (1964) reported that 29 of 79 *C. salinarius* (36.7%) examined in a Kansas survey had taken more than one bloodmeal. The reasons for multiple feeding, aside from differences in identification techniques and antisera quality, have been discussed by Tempelis (1975), who suggests that high host density and variety within the flight range of the mosquito contribute significantly. These reasons adequately explain the broad feeding range of *C. salinarius* in Jefferson Parish, since there is a complex milieu of avian and mammalian hosts living within close proximity of each other (Cupp and Stokes, 1973).

Because of the general feeding habits of *C. salinarius* on donors of such zoonotic pathogens as arboviruses and filariae, the vector potential of this species appears to be quite high. While Chamberlain et al. (1954) demonstrated that *C. salinarius* was relatively refractive to EEE virus, this mosquito was capable of transmitting St. Louis encephalitis virus under laboratory conditions and could therefore be involved in sylvan transmission to wild birds and fowl (Chamberlain 1958). In light of the 1975 outbreaks of this group B arbovirus in the southern, north central, and eastern United States, further examination of *C. salinarius* as a possible SLE vector in rural-peridomestic habitats is perhaps warranted. Finally, with continued reports of human pulmonary and cardiac lesions caused by *Dirofilaria immitis* (cf. Welch and Dobson 1974), more attention should be focused on this mosquito, as well as other domestic culicine species, in inadvertently transmitting infective stage larvae to human hosts.

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