

MULLA, M. S., and CHAUDHURY, M. F. B. 1968. Ovicidal activity of aliphatic amines and petroleum oils against two species of mosquitoes. *J. Econ. Entomol.* 61(2):510-515.

SMITH, E. H., and SALKELD, E. H. 1966. The use and action of ovicides. *Annual Rev. Ent.* 11: 331-368.

WILTON, D. P., CLINE, R. E., and FAY, R. W. 1968. Two formulations effective in the laboratory as ovicides for *Aedes aegypti* (L.). *Mosq. News* 28(4):602-606.

WILTON, D. P., and FAY, R. W. 1969. Action of amine ovicides on *Aedes aegypti* mosquitoes. *Mosq. News* 29(3):361-365.

## SEASONAL DISTRIBUTION OF MOSQUITOES OF HANCOCK COUNTY, MISSISSIPPI, 1964-1968

FREDERICK W. HARDEN AND B. J. POOLSON<sup>1</sup>

There are many references to the mosquitoes of Mississippi, based primarily on work done during World War II by the Malaria Control in War Areas (MCWA): Anon. (1946), Young (1944), Peterson (1945), Michener (1947), Rings (1953), and Richmond (1962). Carpenter *et al.* (1955) and King *et al.* (1960) refer to many of these publications.

Mosquito studies of Hancock County, Mississippi, per se, are quite limited. T. H. D. Griffiths (1928, unpublished) referred to flights of *Aedes sollicitans*, *Anopheles crucians*, and *Culex salinarius* occurring in annoying numbers. Fehn *et al.* (1963), in a brief observation of the mosquito problem at the National Aeronautics and Space Administration's (NASA) Mississippi Test Facility (MTF) Site in Hancock County, estimated that during June 1963, the massive mosquito invasion consisted of approximately 74 percent *Aedes sollicitans*, 14 percent *Aedes taeniorhynchus*, and 9 percent *Aedes vexans*.

In 1964, following Fehn's evaluation of the infestation, General Electric Company, the support contractor to NASA, employed an entomologist for MTF, who established a control program directed toward abating the mosquito problem. Harden *et al.* (1965, 1967 and 1968) pub-

lished on the problem and mosquitoes of the area, but an evaluation of the overall mosquito population and distribution had not been done. It is the purpose of this paper to fill that gap.

Surveillance of the mosquitoes of Hancock County was conducted over the period May 1964 through December 1968. This study reflects the seasonal distribution and relative abundance based on collections taken in New Jersey light traps, Communicable Disease Center (CDC) miniature light traps, truck traps, larval samples, biting and resting observations.

Of the 53 species recorded by King *et al.* (1960) from Mississippi, 45 were taken during this period. Heretofore only 20 species had been reported from Hancock County. (Anon., 1946).

The study centered around the Mississippi Test Facility, latitude 30°22'N., longitude 89°35'W. MTF consists of two principal areas: the Fee Area and the Buffer Zone. The Fee Area includes approximately 13,500 acres of pine forest and hardwood swamps. This is the area where the Saturn Rocket is tested and all work activity concentrated. The Buffer Zone is an unpopulated area consisting of approximately 128,500 acres of pine forest, river swamp and transitional salt marsh. The study included the 485 square miles of Hancock County. Bordered to the west by the Pearl River and to the east by the Jordan River, Hancock County has almost 18 miles of salt marsh coastline overlook-

<sup>1</sup> General Electric Company, Mississippi Test Support Department, Bay Saint Louis, Mississippi.

TABLE I.—Methods by which mosquitoes were collected in Hancock County, Mississippi 1964–1968.

SPECIES	N. J. LIGHT TRAP	MINIATURE LIGHT TRAP	LARVAE	BITING	RESTING	TRUCK TRAP
<i>Aedes</i>						
<i>aegypti</i>			X			
<i>atlanticus</i>	X	X	X	X		X
<i>canadensis canadensis</i>	X	X	X			X
<i>dupreei</i>	X	X	X	X		
<i>fulvus pallens</i>	X	X		X		
<i>infirmatus</i>	X	X	X	X		
<i>mitchellae</i>	X		X			X
<i>sollicitans</i>	X	X	X	X		X
<i>sticticus</i>		X				
<i>taeniorhynchus</i>	X	X	X	X		X
<i>thibaulti</i>	X	X	X			
<i>triseriatus</i>	X	X	X	X		
<i>vexans</i>	X	X	X	X		X
<i>Anopheles</i>						
<i>atropos</i>	X					
<i>barberi</i>		X	X			
<i>bradleyi</i>			X			
<i>crucians</i>	X	X	X	X	X	X
<i>pseudopunctipennis</i>	X					
<i>punctipennis</i>	X	X				X
<i>quadrimaculatus</i>	X	X	X		X	X
<i>walkeri</i>	X					
<i>Culex</i>						
<i>erraticus</i>			X			
<i>nigripalpus</i>	X	X	X			
<i>pilosus</i>			X			
<i>pipiens quinquefasciatus</i>	X	X	X	X	X	
<i>restuans</i>	X	X	X			
<i>salinarius</i>	X	X	X	X	X	X
<i>tarsalis</i>			X			
<i>territans</i>	X		X			X
<i>Culiseta</i>						
<i>inornata</i>	X	X	X	X	X	X
<i>melanura</i>	X	X				
<i>Mansonia</i>						
<i>perturbans</i>	X	X		X		X
<i>Orthopodomyia</i>						
<i>alba</i>			X			
<i>signifera</i>	X		X			
<i>Psorophora</i>						
<i>ciliata</i>	X	X	X	X		
<i>confinnis</i>	X	X	X	X		
<i>cyanescens</i>	X					X
<i>discolor</i>	X	X				
<i>ferox</i>	X	X	X	X		
<i>horrida</i>		X				
<i>howardii</i>	X	X	X	X		
<i>varipes</i>		X		X		
<i>Toxorhynchites</i>						
<i>rutilus septentrionalis</i>			X		X	
<i>Uranotaenia</i>						
<i>lowii</i>	X	X	X			
<i>sapphirina</i>	X	X	X			
Total species - 45	34	31	33	18	6	15

ing the Mississippi Sound. The poorly-drained area ranges in elevation from 0' in the marsh to 75' in the northeast corner of the county. The topography varies from flat to gently rolling and consists principally of acid sandy silt and clay.

The climate is mild, with a low mean temperature of 53.2° F. in January and a high mean of 82.1° F. in July and August. Annual rainfall is approximately 61 inches, July representing peak rainy season, with 7.86 inches. Lowest rainfall occurs in the fall.

Defining relative abundance of mosquitoes in a given area apparently depends greatly on the collecting method. (Table 1)

Based on a study by Loomis *et al.* (1959) an average of 20 New Jersey light traps were operated 4 nights per week, rather than the customary twice per week. During the period April 1965 through December 1968, 6,667 trappings were made with a total collection of 486,485 adults.

Light traps were employed, taking into consideration their numerous variables as described by Provost (1959) and Bidlingmayer (1963), the most important one being that some species are not light-attracted. *Anopheles crucians* and *Culex salinarius* were the dominant species, accounting for 59 percent of all collections. *Aedes sollicitans* was third with 14 percent. (Table 2)

Adult landing rate counts were used to determine diurnally active mosquitoes attracted to humans. Counts were taken at 80 permanent observation sites, on a regular schedule at approximately the same time of day, 3 days per week. These observations indicated that *Aedes sollicitans* was the principal problem even 10 to 12 miles from the coast. *Aedes vexans*, *Psorophora confinnis*, *Aedes atlanticus*, and *Psorophora ferox* were also a problem but in a miniscule amount compared to *Aedes sollicitans*. During this period 40,846 counts were made, yielding 67,266 mosquitoes.

Truck traps were operated as described

by Bidlingmayer (1966). Runs were 2 miles in length and the first run did not begin until 90 minutes after sunset so as to miss the crepuscular peak. *Culex salinarius* totaled 60.8 percent of the collections, *Anopheles crucians* 15.5 percent, *Aedes vexans* 4.6 percent and *Aedes sollicitans* 2.7 percent. (Table 3)

CDC miniature light traps were operated using CO<sub>2</sub> supplement as discussed by Newhouse *et al.* (1966). The primary reason for using the CDC miniature light trap was to determine if there was any arbovirus activity in the area. This was implemented as a cooperative effort with the CDC Arbovirus Lab in Atlanta, Georgia. (Table 4)

*Culex salinarius* was again high, with 34.9 percent; *Anopheles crucians* with 16.2 percent; and *Aedes sollicitans* with 7.2 percent of the catches.

CDC miniature light traps with CO<sub>2</sub> were excellent for rapid collection of many species of mosquitoes, especially for the apparently uncommon species of the area such as *Aedes fulvus pallens*, *Aedes thibaulti*, *Aedes sticticus* and *Psorophora horrida*. Thirty species were collected by this method in August 1967.

Larval samples were obtained from numerous localities: ponds, swamps, roadside ditches, flooded marshes, temporary rain pools, pot holes, tree holes, and artificial containers. Thirty-three species were collected as larvae.

Adult *Aedes triseriatus* and *Orthopodomyia signifera* were found as often in artificial containers as in tree holes. Much of the adult and larval data collected in our survey are a replication of Mitchener's (1947) data at Camp Shelby, especially in the species collected and their breeding areas, except of course that along the coast *Aedes sollicitans* constitutes by far the major pest mosquito. Hancock County data are about equally represented by both larval and adult records. No record was made of total larvae collected, but a minimum of 500,000 adults were collected or observed by the four major sampling methods.

The following 18 species were observed biting man in Hancock County: *Aedes atlanticus*, *Aedes dupreei*, *Aedes fulvus pallens*, *Aedes infirmatus*, *Aedes sollicitans*, *Aedes taeniorhynchus*, *Aedes triseriatus*, *Aedes vexans*, *Anopheles crucians*, *Culex salinarius*, *Culex pipiens quinquefasciatus*, *Culiseta inornata*, *Mansonia perturbans*, *Psorophora ciliata*, *Psorophora confinnis*,

*Psorophora ferox*, *Psorophora howardii* and *Psorophora varipes*. (Table 1)

The following adult species were found more often in the winter (January-March and October-December) than at any other time: *Culiseta inornata*, *Culex restuans*, *Anopheles punctipennis*, *Anopheles pseudopunctipennis* and *Anopheles walkeri*.

For several years *Uranotaenia lowii* and

TABLE 2.—Summary of New Jersey light trap collections in Hancock County, Mississippi April 1965–December 1968.

SPECIES	TOTAL COLLECTIONS	PERCENT OF COLLECTIONS	PEAK PERIOD	PEAK MONTH	# MONTHS OCCURRING
<i>Anopheles crucians</i>	165,019	33.92	April - Oct.	August	12
<i>Culex salinarius</i>	124,125	25.51	May - Dec.	October	12
<i>Aedes sollicitans</i>	70,220	14.43	May - Oct.	July	12
<i>Aedes vexans</i>	37,584	7.72	April - Oct.	June	12
<i>Culiseta inornata</i>	26,894	5.52	Jan. - March Oct. - Dec.	December	11
<i>Uranotaenia</i> ssp. *	18,489	3.80			12
<i>Anopheles quadrimaculatus</i>	12,996	2.67	May - Oct.	August	12
<i>Psorophora confinnis</i>	8,649	1.77	May - Oct.	August	9
<i>Aedes taeniorhynchus</i>	7,988	1.64	June-Sept.	August	8
<i>Aedes atlanticus</i>	6,019	1.23	May - June Sept. - Oct.	September	7
<i>Culex restuans</i>	3,285	0.67	Jan. - March Oct. - Dec.	December	10
<i>Aedes canadensis canadensis</i>	1,303	0.26	March - June	April	6
<i>Psorophora ciliata</i>	927	0.19	May - Oct.	August	8
<i>Aedes triseriatus</i>	846	0.17	May - Sept.	September	8
<i>Culex Melanoconion</i> ssp.	426	0.09	Jan. - Sept.	September	10
<i>Culex territans</i>	363	0.07	May - Dec.	June	9
<i>Anopheles pseudopunctipennis</i>	328	0.07	Jan. - Feb.	January	2
<i>Anopheles punctipennis</i>	273	0.06	Jan. - Feb. Sept. - Nov.	January	8
<i>Psorophora ferox</i>	156	0.03	May - Oct.	May	6
<i>Culex quinquefasciatus</i>	134	0.03	May - Sept.	June	6
<i>Aedes mitchellae</i>	90	0.02	May - Oct.	May	9
<i>Psorophora howardii</i>	77	0.02	July - Sept.	July	7
<i>Aedes infirmatus</i>	62	0.01	May, June and September	September	3
<i>Anopheles atropos</i>	53	0.01	Jan. - June	May	6
<i>Mansonia perturbans</i>	52	0.01	April - Aug.	May	5
<i>Aedes dupreei</i>	53		June & Sept.	September	2
<i>Culex nigripalpus</i>	28		April & July	April	2
<i>Aedes fulvus pallens</i>	17		May, June and Sept.	May	3
<i>Anopheles walkeri</i>	14		Jan. & May Sept. & Nov.	September	4
<i>Aedes thibaulti</i>	5		May	May	1
<i>Culiseta melanura</i>	3		June & Aug.	August	2
<i>Orthopodomyia signifera</i>	1		May	May	1
<i>Psorophora cyanescens</i>	1		June	June	1
TOTAL MOSQUITOES COLLECTED	486,485				
* <i>U. lowii</i>			June - Oct.	August	
<i>U. sapphirina</i>			July - Oct.	September	

TABLE 3.—Summary of mosquitoes collected by truck trapping in Hancock County, Mississippi 1966-1967.

<u>SPECIES</u>	<u>TOTAL</u>	<u>% OF COLLECTION</u>
<i>Culex salinarius</i>	1,502	60.8
<i>Anopheles crucians</i>	384	15.5
<i>Psorophora confinnis</i>	204	8.2
<i>Aedes vexans</i>	115	4.6
<i>Anopheles quadrimaculatus</i>	72	2.9
<i>Aedes sollicitans</i>	67	2.7
<i>Aedes canadensis canadensis</i>	52	2.1
<i>Uranotaenia sapphirina</i>	29	1.1
<i>Anopheles punctipennis</i>	14	0.57
<i>Aedes atlanticus</i>	13	0.53
<i>Mansonia perturbans</i>	5	0.20
<i>Aedes mitchellae</i>	4	0.16
<i>Culiseta inornata</i>	4	0.16
<i>Aedes taeniorhynchus</i>	2	0.08
<i>Aedes fulvus pallens</i>	1	0.04
<i>Culex territans</i>	1	0.04
TOTAL MOSQUITOES COLLECTED	2,469	

TABLE 4.—Summary of mosquitoes collected by CDC miniature light traps in Hancock County, Mississippi 1965-1967.

<u>SPECIES</u>	<u>TOTAL</u>	<u>% OF COLLECTION</u>
<i>Culex salinarius</i>	7,766	34.9
<i>Anopheles crucians</i>	3,604	16.2
<i>Aedes atlanticus</i>	2,300	10.3
<i>Culiseta inornata</i>	1,885	8.0
<i>Aedes sollicitans</i>	1,611	7.2
<i>Aedes vexans</i>	1,506	6.7
<i>Psorophora ferox</i>	971	4.0
<i>Culex Melanoconion ssp.</i>	592	2.2
<i>Aedes infirmatus</i>	479	2.1
<i>Aedes dupreei</i>	202	0.9
<i>Anopheles quadrimaculatus</i>	175	0.7
<i>Psorophora confinnis</i>	174	0.7
<i>Aedes thibaulti</i>	142	0.6
<i>Psorophora varipes</i>	119	0.5
<i>Culex restuans</i>	101	0.4
<i>Mansonia perturbans</i>	94	0.4
<i>Aedes taeniorhynchus</i>	93	0.4
<i>Aedes fulvus pallens</i>	87	0.3
<i>Anopheles punctipennis</i>	76	0.3
<i>Aedes sticticus</i>	76	0.3
<i>Aedes triseriatus</i>	61	0.2
<i>Culiseta melanura</i>	30	0.1
<i>Aedes canadensis canadensis</i>	27	0.1
<i>Uranotaenia sapphirina</i>	18	0.08
<i>Psorophora horrida</i>	16	0.07
<i>Culex pipiens quinquefasciatus</i>	11	0.05
<i>Psorophora howardii</i>	8	0.04
<i>Psorophora ciliata</i>	3	0.01
<i>Uranotaenia lowii</i>	3	0.01
<i>Culex nigripalpus</i>	2	0.01
<i>Psorophora discolor</i>	1	0.005
<i>Anopheles barberi</i>	1	0.005
TOTAL MOSQUITOES COLLECTED	22,234	

TABLE 5.—Seasonal distribution of mosquito adults and larvae of Hancock County, Mississippi 1964-1968.

SPECIES	J	F	M	A	M	J	J	A	S	O	N	D
<b>Aedes:</b>												
aegypti								L				
atlanticus			L	L	A	AL	AL	A	AL	AL		
canadensis canadensis	L	L	AL	AL	A	A		A	AL	A		L
dupreii					A	A		A	A	L		
fulvus pallens					A	A		A	A	A		
infirmatus					A	A	L	A	A			
mitcheilae	A		L	AL	AL	AL	A	A	AL	AL	L	AL
solicitans	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
sticticus					A							
taeniorhynchus				AL	AL	AL	AL	AL	AL	AL	AL	
thibaulti	L				A							
triseriatus	L	L	L	AL	A	A	AL	A	A	A		AL
vexans	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
<b>Anopheles:</b>												
atropis	A		A		A	A						
barberi					AL							
bradleyi				L								
crucians	AL	A	AL	A	AL	A	A	A	A	A	A	AL
pseudopunctipennis	A	A	A	A	A	A	A		A	A	A	A
punctipennis	A	A	A	A	A	A			A	A	A	A
quadrimaculatus	A	A	A	A	A	A	A	A	A	A	AL	A
walkeri	A				A			A			A	
<b>Culex:</b>												
erraticus	L	L	L				L			L	L	L
nigripalpus				A			A			AL	AL	AL
pilosus										L		L
pipiens quinquefasciatus	L	L	L	L	AL	AL	AL	AL	AL	AL	L	AL
restuans	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
salinarius	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
tarsalis										L		
territans	AL	AL	AL	A	A		A	A	A	AL	AL	AL
<b>Culiseta:</b>												
inornata	AL	AL	AL	A	A		A	A	A	AL	AL	AL
melanura					A	A		A				
<b>Mansonia:</b>												
perturbans				A	A	A	A	A	A			
<b>Orthopodomyia:</b>												
alba					L							
signifera	L				AL	L					L	L
<b>Psorophora:</b>												
ciliata				L	AL	AL	AL	AL	A	A	A	
confinis			L	AL	AL	AL	AL	AL	AL	AL	AL	A
cyanescens								A				
discolor								A				
ferox				L	AL	AL	AL	AL	AL	AL		
horrida					A							
howardii	L			L		AL	AL	A	AL	A		
varipes					A	A	A					
<b>Toxorhynchites:</b>												
rutilus septentrionalis									AL			AL
<b>Uranotaenia:</b>												
lowii			A		A		AL	A	A	AL	AL	L
sapphirina	A		A		A	A	A	A	AL	A		
TOTAL SPECIES - 45												

*U. sapphirina* data were grouped together as *Uranotaenia* ssp., hence all New Jersey light trap data (Table 2) are listed as *Uranotaenia* ssp. At the end of the table the 2 years in which the species were separated are listed, showing monthly distribution.

*Aedes fulvus pallens* is generally considered to be a rare mosquito, yet a total of 105 specimens were collected either by New Jersey light traps, CDC miniature light traps, truck traps or biting. Evidently *Aedes fulvus pallens* is fairly widely distributed over the county in small numbers.

*Culiseta inornata* were found as larvae only in January, February, March, October, November and December, yet scattered adults were found every month of the year except June.

*Culex restuans* are usually closely associated with *Culiseta inornata*, yet *Culex restuans* adults and larvae were found during every month except August. (Table 5)

*Culex nigripalpus*, questioned by some authorities as not occurring in Mississippi or Louisiana, was collected as adults during 5 months and larvae during 3. (Table 5)

Six species were found either as adults or larvae every month of the year: *Aedes sollicitans*, *Aedes vexans*, *Anopheles crucians*, *Anopheles quadrimaculatus*, *Culex pipiens quinquefasciatus* and *Culex salinarius*.

**SUMMARY.** Forty-five of the 53 species of mosquitoes were collected as either adults and/or larvae in Hancock County, Mississippi, during the period 1964-1968. Five basic surveillance methods were used indicating that *Culex salinarius*, *Anopheles crucians*, *Aedes sollicitans*, and *Aedes vexans* appeared to be most numerous. However, each collecting method is subject to its own bias and to the many individual species variables; therefore any one observation technique would not necessarily yield a realistic evaluation of density or distribution.

We found that few mosquitoes are

actually rare, but that their frequently obscure niches are missed if inadequate sampling techniques are used.

CDC miniature light traps with CO<sub>2</sub> supplement proved to be the best one method for yielding numerous species over a brief collecting period.

This study increases the number of species of mosquitoes from Hancock County, Mississippi from the 20 previously listed, to 45.

**ACKNOWLEDGMENTS.** The authors wish to express their appreciation for the contributions and cooperation of the following: M. L. Burrow, L. W. Bennett and R. C. Gaskin, General Electric Company, M.T.S.D., Bay St. Louis, Miss.; C. Elmore and staff, Gulf Coast Mosquito Control Commission, Gulfport, Miss.; Members of the staff of the National Communicable Disease Center, U. S. P. H. S., Atlanta, Ga.

#### Literature Cited

- ANON. 1946. Malaria Control in War Areas. F.S.A., U.S.P.H.S., Atlanta, Ga. 172 pp.
- BIDLINGMAYER, W. L. 1963. Effects of moonlight on mosquito behavior and collection. 34th Annual Report of the Florida Anti Mosquito Assoc. pp. 62-70.
- BIDLINGMAYER, W. L. 1966. Use of the truck trap for evaluating adult mosquito populations. Mosq. News 26(2):139.
- CARPENTER, S. J., and LACASSE, W. J. 1955. Mosquitoes of North America (North of Mexico). University of California Press. 360 pp.
- FEHN, C. F., and BEADLE, L. D. 1963. Study of mosquito problems—NASA Mississippi Test Operations, Bay Saint Louis, Mississippi, December, 1963. U.S.P.H.S., 10 pp.
- HARDEN, F. W. 1965. Mosquito control at NASA's Mississippi Test Operation. Mosq. News 25(2):126-128.
- HARDEN, F. W., HEPBURN, H. R., and ETHRIDGE, B. J. 1967. A history of mosquitoes and mosquito borne diseases in Mississippi 1699-1965. Mosq. News 27(1):60-65.
- HARDEN, F. W., and ETHRIDGE, B. J. 1968. Unique problems in insect and pest control of NASA's Mississippi Test Facility. Mosq. News 28(2):141-143.
- KING, W. V., BRADLEY, G. H., SMITH, C. N., and McDUFFIE, W. C. 1960. A Handbook of the Mosquitoes of the Southern United States.
- LOOMIS, E. C., and HANKS, S. G. 1959. Light trap indices of mosquito abundance: a comparison of operation for four and seven nights a week. Mosq. News 19:168-171.

NEWHOUSE, V. F., CHAMBERLAIN, R. W., JOHNSON, J. C., and SUDIA, W. D. 1966. Use of dry ice to increase mosquito catches of the CDC Miniature Light Trap. *Mosq. News* 26(1):30-35.

MICHENER, C. D. 1947. Mosquitoes of a limited area in South Mississippi. *The American Midland Naturalist* 37. pp. 325-374.

PETERSON, A. G., and SMITH, W. W. 1945. Occurrence and distribution of mosquitoes in Mississippi. *Journal of Economic Entomology* 38: 378-383.

PROVOST, M. W. 1959. The influence of moon-

light on light trap catches of mosquitoes. *Annual of Entomological Society of America* 52(3):261-270.

RICHMOND, A. E. 1962. The Fauna and Flora of Horn Island, Miss. Gulf Research Report, Ocean Springs, Mississippi. Vol. 2.

RINGS, R. W., and RICHMOND, A. E. 1953. Mosquito survey of Horn Island, Miss. *Mosq. News* 13(4):252-255.

YOUNG, F. N., and CHRISTOPHER, W. N. 1944. Unusual breeding places of mosquitoes in the vicinity of Kessler Field, Miss. *American Journal of Tropical Medicine* 24:379.

## CALIFORNIA MOSQUITO CONTROL ASSOCIATION, INC.

1737 West Houston Avenue, Visalia, California 93277



President: James St. Germaine, Santa Clara County Health Department, San Jose

Secretary-Treasurer: W. Donald Murray, Delta MAD, Visalia

38th Annual Conference, Sacramento Inn, Sacramento  
January 26-28, 1970

For Sale by Secretary:

California Field Guide Series No. 1 Mosquitoes	Price \$1.00
California Field Guide Series No. 2 Gnats	Price \$1.00
California Field Guide Series No. 3 Domestic Flies	Price \$1.00
Anatomy of Adult Chironomidae (Saul Frommer)	Price \$1.50
Proceedings of Annual Conferences	Price \$2.50