

## EFFECTS OF DROUGHT ON THE COMPOSITION OF RURAL MOSQUITO POPULATIONS AS REFLECTED BY LIGHT TRAP CATCHES

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**INTRODUCTION.** Adult mosquito collections are made routinely in Baker County, Georgia, as part of a study of the ecology of mosquito vectors of diseases being conducted at the Newton Field Station. Prior to 1952, collections were made irregularly and were concerned primarily with the occurrence and abundance of *Anopheles* spp. Since 1952, collections have been made at weekly intervals and have been directed toward the collecting of a complete sample of the mosquito fauna. Fortunately a sufficient number of collections were made at the same locations during the two periods to permit some comparisons of species composition. The data contained in the present report compare catches during a year of normal precipitation with catches from the same locations following several successive dry years. The purpose of the note is to indicate the extent to which this species composition may vary within a comparatively few years and hence the obvious implications regarding the prevalence of diseases carried by particular species.

**METHODS.** Records from New Jersey type light traps situated near two breeding areas which are of a permanent type in years of normal rainfall were utilized in making these comparisons. Since only anopheline mosquitoes were studied intensively at the Newton Field Station prior to 1952, continuous records on culicine mosquitoes from these locations are available only for the months of August, September, and October for one year of normal rainfall, 1942. This particular year was fairly typical of those centrally located within a period of years with normal precipitation (approximately 56 inches), as a total of 61.46 inches was recorded accord-

ing to official U. S. Weather Bureau records for Hoggard's Mill (Emory University Field Station), Georgia. The total rainfall for the months considered measured 6.64 inches, 5.51 inches, and 1.17 inches respectively. The recent year chosen for comparison was 1955, the sixth in a series of so-called drought years (1949-44.4 inches, 1950-46.2, 1951-40.8, 1952-42.7, 1953-58.8, 1954-27.1, 1955-39.6). The slightly greater than normal rainfall in 1953 failed to relieve the drought conditions. Rainfall for August, September, and October 1955 was 2.36 inches, 2.65 inches, and 3.65 inches.

Comparisons were made between the mosquito species known to breed chiefly in permanent ponds and those known to breed in temporary water. The species of mosquitoes considered to be permanent pool breeders are *Anopheles quadrimaculatus*, *A. crucians*, *A. punctipennis*, *Culex territans*, *C. erraticus*, *Mansonia perturbans*, and *Uranotaenia sapphirina*. All 13 species of *Aedes* and *Psorophora* which occur in the area were considered to be temporary or intermittent pool breeders. Other species caught in the light traps were omitted from the tabulations of permanent versus temporary pool studies (tables 1 and 2) since they were chiefly *Culex (Melanoconion)* spp. females which could not be assigned to either category.

The 1942 records presented are based upon a small number of collections (2) in August, and representative numbers of collections in September (11) and October (22) made from a single light trap at the 6-foot level in each of the two locations. The 1955 records are based upon catches from the same locations; a single trap at 6-foot height being used for one location

and the combined catches from three traps at the 6-, 25-, and 40-foot levels being used at the other location.

In the area where a single light trap was operated under similar conditions during August, September, and October of

TABLE 1.—Number of nights light traps operated, and numbers and percentages of permanent pool mosquitoes caught during August, September, and October of 1942 and 1955: Baker County, Georgia

	1942	1955
Number nights traps operated	35	27
<i>Anopheles spp.</i>		
Number specimens caught	789	78
Percent of permanent pool mosquitoes	17.8	44.3
Percent of total catch	17.4	1.0
<i>Uranotaenia sapphirina</i>		
Number specimens caught	3,615	95
Percent of permanent pool mosquitoes	81.6	54.0
Percent of total catch	80.0	1.2
<i>Other Permanent Pool Mosquitoes</i>		
Number specimens caught	24	3
Percent of permanent pool mosquitoes	0.6	1.7
Percent of total catch	0.5	0.04
Total number permanent pool mosquitoes	4,428	176
Percent of total catch	98.2	2.2

TABLE 2.—Numbers and percentages of temporary pool mosquitoes caught in light traps during August, September, and October of 1942 and 1955: Baker County, Georgia

	1942	1955
<i>Aedes spp.</i>		
Number specimens caught	55	7,712
Percent of temporary pool mosquitoes	66.3	96.7
Percent of total catch	1.2	94.6
<i>Psorophora spp.</i>		
Number specimens caught	28	269
Percent of temporary pool mosquitoes	33.7	3.4
Percent of total catch	0.6	3.3
Total number temporary pool mosquitoes	83	7,973
Percent of total catch	1.8	97.8

both 1942 and 1955, total numbers of mosquitoes caught were compared. Monthly averages and an average number of mosquitoes per trap night during the study period were computed (table 3).

TABLE 3.—Numbers of mosquitoes caught in light traps at Springfield Pond, Baker County, Georgia, in August, September, and October 1942 and 1955

	1942			
	Aug.	Sept.	Oct.	Total
Number nights traps operated	2	10	11	23
Total number mosquitoes	54	321	98	473
Average number per trap night	27.0	32.1	8.9	20.6
	1955			
	Aug.	Sept.	Oct.	Total
Number nights traps operated	5	4	4	13
Total number mosquitoes	677	572	164	1,413
Average number per trap night	135.4	143.0	41.0	108.7

RESULTS. In table 1, it is notable that the *Anopheles* spp. (chiefly *crucians* and *quadrifasciatus*) and *U. sapphirina* composed more than 98 percent of the permanent pool mosquitoes, while *Culex territans* and *C. erraticus*, the other permanent pool mosquitoes, composed less than 2 percent of the catch in either of the years considered. In the year of normal rainfall, 1942, *U. sapphirina* greatly exceeded the *Anopheles* (81.6 percent to 17.8 percent), while in the drought year it exceeded *Anopheles* spp. by only a little less than 10 percent. Totals for the three months indicate that in a normal year catches of permanent pond mosquitoes constituted 98.2 percent of the total mosquitoes, while in the drought year they constituted only 2.2 percent of the catch.

The *Aedes* spp. are shown by table 2 to comprise more than nine-tenths of the light trap catch of intermittent pool mosquitoes taken during the three months of the drought year. In a normal year, they exceeded the *Psorophora* spp. by approxi-

mately 33 percent. The intermittent pool mosquitoes constituted only 1.8 percent of the total mosquito catch in the normal year, and 97.8 percent during the drought year. There was an almost complete reversal in the composition of the light trap catches with reference to the species which breed in permanent and temporary situations.

Monthly averages of total mosquitoes caught per trap night during the three-month period of 1942 and 1955 are shown in table 3. It is to be noted that slightly more than four times as many mosquitoes were attracted to the light traps during the drought year as in the normal year, and that this proportion remained relatively stable from month to month in the study period.

**DISCUSSION.** Six successive drought years in rural southwestern Georgia, 1949 through 1955, have changed the numerous permanent and lime-sink ponds successively into intermittent and temporary pools, then into dry basins covered by sparse annual vegetation and organic remains of aquatic plants. The composition of the mosquito fauna of the region has changed to adapt itself to these drought conditions. The data presented indicate that the chief species concerned in this change in the area studied are *Anopheles* spp. and *Uranotaenia sapphirina* which are dominant in years of normal rainfall, and *Aedes* spp. and *Psorophora* spp. which comprise most of the light trap catches in a drought year.

It is a common belief that a succession of dry years greatly reduces mosquito populations. This hypothesis has been re-

futed by data presented here. It is demonstrated in table 3 that many more mosquitoes may be caught in light traps at the same location during a drought year than in a year of normal rainfall. It is true that great changes take place in the abundance of the mosquito species which compose the population of a region, the species most favored by environmental changes becoming most abundant. Since the mosquito species vary greatly in their ability to act as reservoirs and to transmit diseases of man and other animals, and to affect the general health of the human population by their activities, it is expedient that the effects of the most common environmental factors upon their abundance and distribution be investigated and understood.

**SUMMARY.** A comparison of light trap catches of mosquitoes was made from the vicinity of two permanent pool environments in rural southwestern Georgia during the months of August, September, and October in a year of normal rainfall (1942) and a year of drought (1955). An almost complete reversal of species composition was noted. Anopheline species, chiefly *A. quadrimaculatus* and *A. crucians*, and *Uranotaenia sapphirina* composed 98.2 percent of the catch in the normal year, while in the drought year *Aedes* and *Psorophora* species, chiefly *A. vexans*, composed 97.8 percent of the light trap catches considered.

Approximately 80 percent more mosquitoes were taken per night of light trapping during the drought year than in the normal year.

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