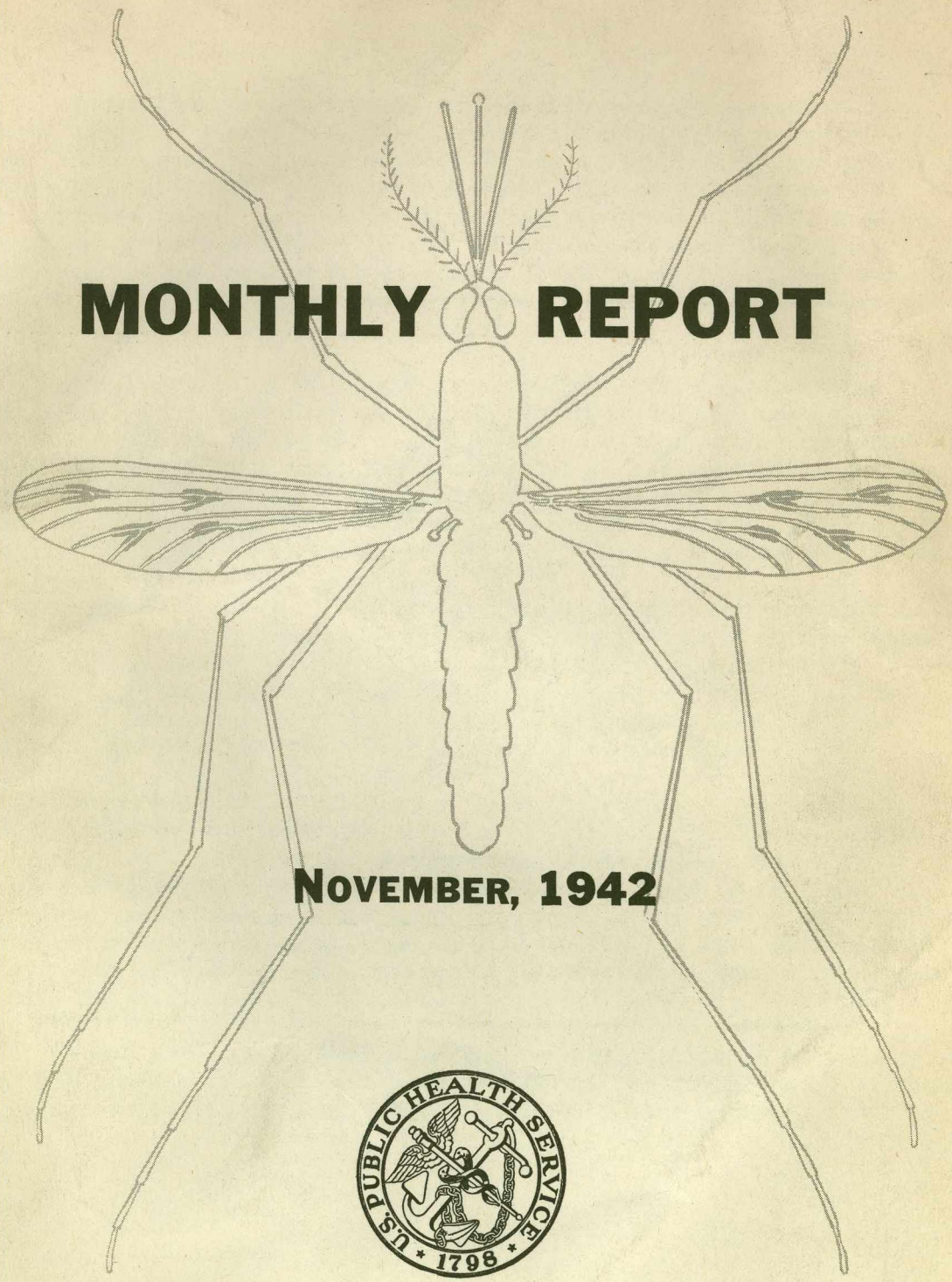
Duplicates

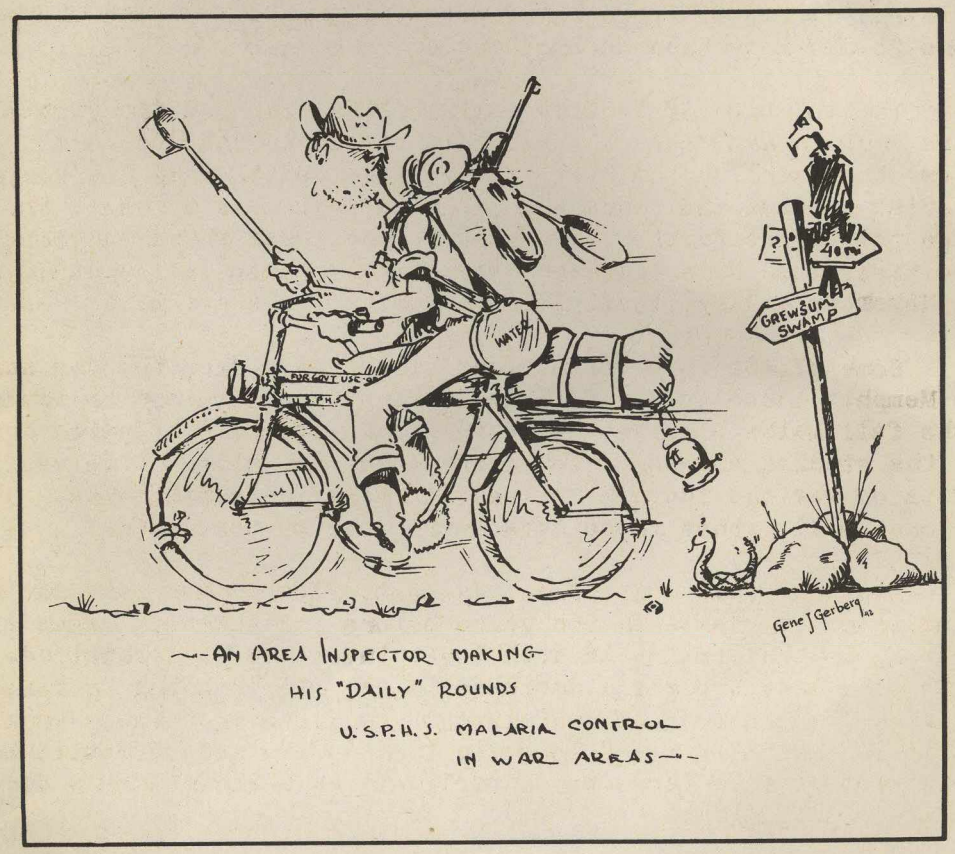
MALARIA CONTROL IN WAR AREAS



MONTHLY REPORT

NOVEMBER, 1942

FEDERAL SECURITY AGENCY
U. S. PUBLIC HEALTH SERVICE
ATLANTA, GEORGIA



—AN AREA INSPECTOR MAKING
HIS "DAILY" ROUNDS
U.S.P.H.S. MALARIA CONTROL
IN WAR AREAS—

MONTHLY REPORT
Malaria Control in War Areas
November, 1942

SYLLABUS

Larvicidal work continued to diminish during November as the mosquito breeding season came to an end in all except the most southerly states. At the end of the month only 35 areas required regular treatment. Emphasis has shifted to drainage work and by the end of November, 22 major projects were in operation in as many war areas. In addition, minor drainage work continued in most of the areas where larviciding had stopped and no major drainage work had yet begun. The total number of employees on the MCWA program decreased by about 100 and the payroll was some $8,000 less than during October.

The shortage of trained engineers has delayed inauguration of drainage work in a number of areas. It was impossible to take these men from other work during the larvicidal season to make the necessary engineering surveys and plans for drainage work. As a result the winter drainage program is farthest advanced in the areas where larviciding stopped earliest. Nine engineers were commissioned in the USPHS reserve during November and applications from some 40 more are being considered.

Some 22,404 thick film blood slides were received and stained at the Memphis laboratory, and 3,454 slides were examined in connection with the fall malaria survey. Instructions have been prepared for making the studies necessary for correlating the blood slide results with data on various factors influencing malaria transmission. Area inspectors will gather these data during the winter months.

Aedes aegypti control at Key West, Florida has reduced the breeding index to one-tenth its value before control work began and at Charleston, South Carolina an even lower index has been obtained. As lower temperatures brought a decrease in aegypti breeding in Texas labor crews were reduced to the strength required for winter work. Phenothiazine has been found to be an inexpensive and effective larvicide for treatment of fire barrels. Experiments have shown that a doseage of 14 p.p.m. is sufficient.

About $428,400 of Public Health Service funds were encumbered during the month, of which more than 80 percent was for personal services. This is about $45,000 less than was encumbered during October.

TABLE I

MALARIA CONTROL IN WAR AREAS

USPHS LARVICIDE AND MINOR DRAINAGE PROJECTS

November 1 - 30, 1942

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK				OTHER WORK			Total Man Hours
			Larvicide Used		Surfaces Treated		Ditching & Cleaning Lin.Ft.	Clearing		
			Oil Gals.	Paris Green Lbs.	Ditches Lin.Ft.	Ponds Sq.Ft.		Ditches Lin.Ft.	Ponds Sq.Ft.	
Alabama	5	25	48	---	---	---	9,851	13,800	116,050	5,790
Arkansas	10	36	1,123	98	558,966	5,669,677	44,738	32,310	3,046,008	20,611
California	2	4	1,789	---	2,110	531,600	147,848	147,300	3,487,645	2,458
D. C.	1	17	---	---	---	---	7,812	3,810	---	3,408
Florida	10	58	524	4,686	23,071	24,141,020	308,400	72,139	441,222	29,617
Georgia	10	57	60	18,917	770,856	105,415,200	237,180	42,310	2,258,349	19,311
Illinois	1	10	---	---	---	---	5,060	---	236,590	1,604
Indiana	1	4	---	---	---	---	---	---	156,587	970
Kentucky	3	16	---	---	---	---	700	---	94,761	2,206
Louisiana	8	42	101,968	260	12,397,158	260,338,348	28,515	54,280	700,070	57,536
Maryland	2	7	---	---	---	---	22,210	---	148,920	3,536
Mississippi	6	9	395	---	63,132	8,520	38,345	192,853	1,727,879	11,952
Missouri	5	14	---	---	---	---	20,570	830	642,599	6,505
North Carolina	6	48	80	---	9,100	39,000	271,830	610,120	1,274,711	18,837
Oklahoma	3	10	150	---	---	443,612	21,220	1,500	852,540	5,640
Puerto Rico	6	17	2,575	16,196	3,122,277	161,962,985	222,320	58,994	53,526	55,738
South Carolina	13	43	160	---	186	35,100	371,910	178,034	10,257,935	53,558
Tennessee	9	40	695	---	142,458	95,800	30,674	23,800	600,743	11,466
Texas	14	153	36,544	70	5,686,707	54,346,558	374,486	512,627	3,527,014	51,983
Virginia	4	21	99	---	16,000	304,920	65,649	1,667,524	1,076,590	20,551
Total	118	631	146,210	40,227	22,792,021	613,332,340	2,229,318	3,612,231	30,699,739	383,277

July 1 - November 30, 1942										
Alabama	--	--	11,503	---	141,970	18,824,750	105,856	84,577	1,181,250	41,263
Arkansas	--	--	31,304	5,244	11,258,231	241,306,269	476,925	283,575	14,300,931	121,928
California	--	--	6,068	---	104,510	6,673,125	154,134	190,170	3,697,515	6,156
D. C.	--	--	1,750	---	159,611	522,366	35,622	32,605	19,391	14,795
Florida	--	--	43,171	33,802	3,206,782	345,495,148	2,001,922	445,475	3,315,398	153,110
Georgia	--	--	303	84,782	3,398,696	423,735,159	507,297	543,611	14,507,293	97,554
Illinois	--	--	7,339	1,281	1,449,125	17,483,716	6,305	11,655	2,958,694	14,553
Indiana	--	--	3,088	2,294	69,000	4,212,825	890	170,978	895,731	10,469
Kentucky	--	--	23,699	---	1,758,275	83,781,011	17,734	146,140	2,779,607	38,646
Louisiana	--	--	578,472	6,125	71,018,900	1,326,659,304	111,521	534,033	1,882,777	337,742
Maryland	--	--	---	---	---	---	41,057	58,418	200,800	5,208
Mississippi	--	--	45,384	7	7,922,247	10,501,519	420,209	1,055,343	11,842,316	100,486
Missouri	--	--	8,451	458	198,765	45,225,369	26,720	95,970	2,158,491	28,162
North Carolina	--	--	88,438	---	19,312,320	87,285,069	1,337,777	3,145,293	11,301,191	143,512
Oklahoma	--	--	15,237	164	743,217	38,327,446	93,830	233,813	2,973,946	36,387
Puerto Rico	--	--	5,346	36,865	12,113,559	688,238,882	765,933	359,594	1,791,858	233,433
South Carolina	--	--	175,673	2,266	19,045,270	399,082,317	2,446,681	2,715,665	88,933,363	403,401
Tennessee	--	--	49,149	53	6,786,714	59,106,585	167,936	130,552	1,646,075	63,770
Texas	--	--	196,761	2,220	26,750,270	309,237,424	1,496,361	1,392,761	35,941,195	272,445
Virginia	--	--	49,541	62,645	5,010,615	62,230,315	296,112	7,870,714	3,884,110	103,264
Total	--	--	1,340,677	238,206	190,448,077	4,167,928,599	10,510,822	19,500,942	206,368,519	2,232,254

TABLE II

MALARIA CONTROL IN WAR AREAS

NUMBER OF PERSONNEL ON DUTY ON NOVEMBER 30, 1942 AND TOTAL PAYROLL FOR MONTH OF NOVEMBER

STATE	TYPE OF PERSONNEL										Total		Percent of Total	
	Commissioned		Prof. & Sci.		Sub-Prof(1)		C. A. F.		Custodial					
	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay
Alabama	---	---	7	1,566	2	285	1	135	98	9,350	108	11,336	3.1	3.2
Arkansas	1	236	6	1,150	11	1,800	4	562	154	14,541	176	18,289	5.3	5.0
California	---	---	2	333	5	892	2	337	18	3,360	27	4,922	0.8	1.4
D. C.	1	284	1	275	3	406	2	345	17	1,752	24	3,062	0.8	0.9
Florida	1	284	9	1,943	20	2,797	4	604	173	17,327	207	22,955	6.0	6.3
Georgia	---	---	6	978	28	4,201	4	577	84	8,482	122	14,238	3.5	4.0
Illinois	---	---	4	500	5	692	3	456	15	1,540	27	3,188	0.8	0.9
Indiana	---	---	3	625	1	83	1	120	6	584	11	1,412	0.4	0.4
Kentucky	---	---	4	1,006	9	1,249	3	457	57	5,042	73	7,754	0.2	0.3
Louisiana	3	842	8	1,447	35	4,876	4	577	399	40,884	449	48,626	12.9	13.2
Maryland	---	---	1	271	5	701	2	337	22	2,252	30	3,561	0.9	1.0
Mississippi	2	483	3	1,008	12	2,059	2	337	65	7,086	84	10,973	2.4	3.0
Missouri	1	362	6	1,267	4	633	3	457	32	3,223	46	5,942	1.4	1.7
North Carolina	---	---	9	2,189	9	1,576	3	457	277	27,456	298	31,678	8.6	8.6
Oklahoma	---	---	4	892	4	573	1	120	37	3,923	46	5,508	1.4	1.5
Puerto Rico	1	*	4	*	10	*	7	*	436	*	458	22,209	13.1	6.1
South Carolina	---	---	7	1,625	26	2,611	3	457	413	44,286	449	48,979	13.0	13.3
Tennessee	---	---	6	1,155	6	1,033	2	337	66	6,497	80	9,022	2.3	2.5
Texas	---	---	16	2,933	42	7,683	5	549	277	28,846	340	40,011	10.0	11.0
Virginia	---	---	4	1,016	7	817	2	337	171	13,521	184	15,691	5.3	4.3
Aedes aegypti														
Florida	---	---	1	267	44	6,386	3	299	32	3,572	80	10,524	2.3	3.0
South Carolina	---	---	1	167	14	1,766	1	120	---	---	16	2,053	0.6	0.7
Texas	---	---	4	798	9	1,575	1	120	2	40	16	2,533	0.6	0.7
H. Q. & Dist. (2)	20	6,977	13	2,356	40	6,552	67	8,198	9	769	149	24,852	4.3	7.0
Total	30	9,467	129	25,768	351	51,249	130	16,292	2860	244,333	3500	369,318	100.0	100.0
Percent of Total	0.9	2.7	3.7	7.4	10.0	14.8	3.7	4.7	81.7	70.4	100.0	100.0		

* Figures not available

(1) Includes Entomological Inspectors

(2) Includes Headquarters and District offices, malaria survey, special investigations and employees temporarily attached to Headquarters pending assignment to States.

Monthly Report
Malaria Control in War Areas
November, 1942

Anopheline breeding during November had tapered off sufficiently to permit cessation of larvicidal work in most of the war areas except in California, Florida, Louisiana, Texas and Puerto Rico. A small amount of larvicide was used in some of the other states but, by the end of the month, only 35 areas showed enough breeding to warrant regular treatment. The amount of oil used during November was about 60 percent of the amount used during October. Paris green consumption was only slightly lower during November than during October. The number of man hours used on larvicidal and minor drainage work decreased from 488,000 in October to 381,000 in November. Table I shows data on the program for the month and cumulative figures for the period July 1 - November 30. Table II shows data on the number of employees, and the total payroll for November. Table III is a list of the areas in which larvicidal work continued after November 30.

TABLE III

AREAS IN WHICH LARVICIDING CONTINUED AFTER NOVEMBER 30

ARKANSAS	GEORGIA	PUERTO RICO	TEXAS (Con'd)
Texarkana	Augusta	Camp Tortuguero	Corpus Christi
El Dorado	Savannah	Losey Field	Gulf Health
Helena	Douglas	Fort Buchanan	Houston
		Vieques Island	Port Arthur
CALIFORNIA	LOUISIANA	Ceiba	San Antonio
Tulare	New Orleans	Camp O'Reilly	Killeen
Merced	Shreveport		Fort Worth-Dallas
	Lake Charles	TEXAS	Bastrop
FLORIDA	Lafayette	Valley	West Texas
Tallahassee		Caddo Lake	Wichita Falls
Jacksonville	MISSISSIPPI	Texarkana	El Paso
	Meridian		

Major Drainage - Twenty-two major drainage projects were in operation during November. The majority of these were new projects which started during the month. Some 23,000 linear feet of ditching was done as well as incidental clearing, ditch cleaning, etc., and 54 acres of water surface were eliminated. Table IV shows the work accomplished under major drainage projects during November and cumulative figures on major drainage work from July 1 - November 30.

TABLE IV

MALARIA CONTROL IN WAR AREAS

USPHS MAJOR DRAINAGE PROJECTS

November 1 - 30, 1942

STATE	No. of Projects	Clearing Brushing Acres	Channel or Ditch Cleaning Lin. Ft.	New Ditching		Fill	Ditch Lining		Underground Drains Lin.Ft.	Water Surf. Eliminated Acres	Total Man Hours
				Lin.Ft.	Cu.Yds.	Cu.Yds.	Sq.Ft.	Lin.Ft.			
Alabama	3	3.5	---	5,750	2,620	---	---		---	5.7	9,468
Arkansas	1	8.6	---	---	---	---	---		---	---	2,263
Illinois	3	7.3	1,655	350	---	---	---		---	2.5	1,456
Kentucky	2	2.0	---	1,300	869	8	---		---	---	4,860
North Carolina	4	17.50	34,836	12,188	4,097	4,085	---		---	33.4	19,036
Oklahoma	1	---	1,105	---	---	---	---		---	---	2,056
Puerto Rico	2	2.2	1,000	1,200	3,949	133	---		---	---	14,957
South Carolina	8	18.2	12,061	2,340	582	236	---		---	12.2	12,504
Total	24	59.3	50,657	23,128	12,117	4,462	---		---	53.8	66,901

July 1 - November 30, 1942											
Alabama	--	13.95	3,600	23,510	17,536	1,100	---		---	21.1	55,949
Arkansas	--	8.6	---	---	---	---	---		---	---	2,263
Illinois	--	7.3	1,655	350	---	---	---		---	2.5	1,456
Kentucky	--	2.0	---	2,250	1,072	8	---		---	---	5,925
North Carolina	--	249.68	770,215	85,670	15,524	8,151	---		---	112.75	101,914
Oklahoma	--	---	1,105	---	---	---	---		---	---	2,056
Puerto Rico	--	4.4	2,600	1,600	121,727	133	---		---	---	22,173
South Carolina		18.2	12,061	2,340	582	236	---		---	12.2	12,504
Total	--	304.13	791,236	115,720	156,441	9,628	---		---	148.55	204,240

During November, 32 major drainage project proposals totalling $725,806 were approved by the headquarters office and the states were authorized to start operations. This makes a total of 45 major drainage project proposals which have been approved. The total estimated cost of these is $834,959.

Inauguration of major drainage work has been delayed considerably by the lack of technically trained personnel capable of making the necessary surveys, plans and cost estimates for such work. The shortage of engineers made it impossible, during the larvicidal season, to detail men to the job of preparing drainage plans, and the time required to make surveys, plans and estimates has prevented immediate inauguration of some of the more important drainage projects. In the states where larvicidal work was stopped earliest the major drainage program is farthest advanced.

Dynamite will be used on a number of the major drainage projects. Such work has already been done at Pine Bluff, Arkansas and Dam Neck, Virginia. Areas where ditching with dynamite is planned include Platte City, Missouri, Camden, Arkansas, Jerome, Arkansas, and Fort Bragg, North Carolina. Work has just been completed on a large, important drainage project at Huntsville, Alabama on which dragline equipment was used. Heavy equipment also is being used on a project at Walterboro, South Carolina.

The major drainage program will expand considerably during the next three months. It is particularly important that as much drainage work as possible be completed this winter due to the expected increased difficulty of maintaining adequate labor crews for larvicidal work during the 1943 season. Any major drainage work completed this winter while man power is available will reduce the amount of larvicidal work to be done during the 1943 breeding season when man power may be less available.

Entomology - Except in the few areas where anopheline breeding was continuing, entomological work during November consisted of initiating studies of the hibernation of Anopheles quadrimaculatus; bringing maps up to date, and identifying the accumulated light trap collections. In only one state, Alabama, have the season's identifications been completed. A special report shows that a total of 30 species of mosquitoes were taken during the year, two of which, Aedes bimaculatus and A. canadensis, have never before been reported from that state. A comparison of the numbers of A. quadrimaculatus taken by light trap with those collected at nearby natural resting places, shows that in two of the three areas reported, more quadrimaculatus per collection were taken in the traps than in the resting places. In both of these areas the quadrimaculatus density was light. In the third comparison, which was made in an area of slightly higher density, the trap took half as many quads per collection as were taken at nearby resting places. It appears that the traps gave a satisfactory index of anopheline abundance in Alabama.

Personnel - The shortage of engineering personnel for the preparation of major drainage plans has been mentioned as one of the most important deterrents to prompt inauguration of major drainage work during the winter. The recent executive order eliminating all deferments for government employees will probably result in a further loss of engineering personnel to the armed services or to other war work where this restriction does not apply. Although it may be possible to train non-technical men for larvicidal work, the problems involved in major drainage work are ordinarily so complex as to require professionally trained personnel.

During November nine engineers on the Malaria Control in War Areas program were commissioned in the USPHS Reserve Corps, and about 40 other applications from engineers and entomologists at present employed on the program are under consideration by the Reserve Board. Efforts to recruit new men have been less

successful than during previous months. For all practical purposes the recruiting effort is being confined to men over 38 years old because of the impossibility of obtaining deferments for younger men.

Blood Survey - Collection of thick films was continued during November with personnel of the headquarters office taking part in collecting slides in Virginia and conducting the entire blood slide survey in the State of Tennessee. Parallel spleen examinations were made in a number of areas in Tennessee. During the month, 22,404 slides were stained and 3,454 slides were examined in the Memphis laboratory, as follows:

SLIDES STAINED DURING NOVEMBER

Kentucky	4,742	Virginia	672
Oklahoma	680	Mississippi	345
Florida	7,394	Maryland	238
Louisiana	995	Tennessee	1,277
Alabama	1,246	D. C.	1,293
Missouri	3,516		
	Total	22,404	

Slides examined during November were as follows:

SLIDES EXAMINED DURING NOVEMBER

Mississippi	3,112
Missouri	135
Louisiana	207

Instructions have been prepared for making the studies necessary for correlating the blood survey data with various factors which influence malaria transmission. Such factors as the proximity to known anopheline breeding places, the effectiveness of the past season's control work as indicated by anopheline densities, the extent of mosquito proofing of homes, the density of population, and the economic status of the people will be considered. Forms to be used for description of these factors have been prepared and plans made for presenting the material to various states so that during the next few months men already engaged on the Malaria Control in War Areas program can furnish the descriptive material necessary for correlating blood slide findings with these pertinent data.

Educational Program - Preliminary work has been done toward assembling all visual material available in the Public Health Service malaria offices and toward collecting all available motion picture films for a conference to be held in December. At that time these materials will be reviewed and recommendations made as to their possible use in future Malaria Control in War Areas activities.

Aedes aegypti Control - In Key West, Florida, by the end of November the breeding index had been reduced to 2.93: that is, on only 2.93 percent of the premises inspected was Aedes aegypti breeding found. In June, 1942, after the Aedes aegypti program had been in operation for one month, the breeding index for this dengue and yellow fever-carrying mosquito was 29.3.

Charleston, South Carolina, achieved the very low breeding index of 0.36 for the third week of November. This breeding index was yielded from 4,442 inspected premises inside of the city. Since the inception of Aedes aegypti control program in Charleston, the highest breeding index reported inside the city was 5.22. This was established during the last week of

August two weeks after inaugurating Aedes aegypti control.

During November, as lower temperatures reduced mosquito breeding in Texas, routine inspections were made less frequently or discontinued altogether and the working force was cut to the strength required for the winter program.

Phenothiazine has been found to be an inexpensive and effective larvicide in the treatment of fire barrels. Several concentrations of phenothiazine were tested, and quantities of three grams were found to be sufficient to treat 55-gallon barrels. This is the equivalent of 14 parts phenothiazine to one million parts of water.

Many cisterns and similar places in which mosquitoes might live through the winter were permanently corrected. Most of them were sealed while others were destroyed. In Houston, negro school children aided the control work materially. After the principals of the negro schools were visited and their interest aroused, sixty-five previously undiscovered cisterns were reported to the inspectors.

A comparison of the Aedes aegypti breeding index with that of other container-breeding mosquitoes was made in Galveston and Houston. In both cities approximately one-fifth of the larvae were Aedes aegypti.

In Texas a great deal of emphasis has been placed on publicizing the work of the Aedes aegypti control program in order to obtain the cooperation of the local residents. Radio talks, lectures and demonstrations to school children, clubs and other organizations, movie "trailers", newspaper articles and even announcements from church pulpits have been used with considerable success. Public cooperation has been very encouraging. Boy Scouts, school children, church groups, and service clubs have actively aided the program by collecting or destroying water containers and otherwise eliminating breeding places of the dengue and yellow fever mosquito.

In Florida and South Carolina greater emphasis has been placed on actual control operations and less on enlisting voluntary aid.

Expenditures - About $428,400 of Public Health Service funds were encumbered during November. The approximate amounts were as follows:

.01 Personal Services	$347,100
.02 Travel	18,370
.04 Communication Services	1,220
.05 Rents and Utility Services	1,440
.07 Other Contractual Services	8,750
.08 Supplies and Materials	47,900
.09 Equipment	3,620
Total	$428,400

Human malaria in the Southeastern United States is transmitted almost exclusively by one species of mosquito, Anopheles quadrimaculatus, and malaria can be controlled by measures directed specifically against this mosquito at a much lower cost than would be required for general mosquito control. In order to accomplish this selective control work, attention must be given to the habits of the malaria vector. This has been done in setting up the entomological procedures which are used in guiding control operations and in determining the effectiveness of the work on the Malaria Control in War Areas program.

Anophelines rest during the day in such haunts as barns, privies, culverts, hollow trees and the like where cool, dark and quiet conditions exist. (See illustrations inside back cover). The number of resting anophelines in these places gives a reliable index of their density in the surrounding area and the effectiveness of the control work can thus be gauged; therefore, counts of anophelines are made periodically in these resting places to furnish this index. Mechanical light traps have also been found useful for gauging density in some areas.

The flight range of Anopheles quadrimaculatus is limited to about one mile under ordinary conditions. All actual or potential breeding areas within a one mile radius from a protected area, therefore, are searched out, sampled and located on maps so that they can be found easily and treated by control crews. Although quadrimaculatus is essentially a pond breeder, preferring rather quiet, neutral or alkaline waters in which an abundance of protection exists, it has not been found advisable to attempt to classify the waters for control purposes on the basis of environmental factors. The breeding areas have been determined by intensively searching for larvae in waters of all kinds, identifying the larvae found and classifying the breeding places as to whether or not they are sources of anopheline production. This is done not once, but continuously in order to make certain that all active anopheline breeding places are treated.

On active control projects, entomological work is done by inspectors who routinely gather data on adult abundance from a series of resting places, and on the efficiency and sufficiency of larvicidal work as determined by examinations of the waters for anopheline mosquito breeding.

Adult abundance in the resting places is reported by the inspector on the form illustrated by Figure 1. This is a report of one day's inspection and represents only part of the mosquito index stations of the zone. The first column gives the number of each observation station together with a letter, A, B, C, D, or E, which designates the station location in relation to the protected war activity. "A" stations are those inside or within 1/4 mile of the activity; "B", 1/4 to 1/2 mile; "C", 1/2 to 3/4 mile; "D", 3/4 to 1 mile; and "E", over 1 mile distant. (See schematic map on back cover).

State SAMPLE ADULT MOSQUITO COLLECTIONS—*Field Record*

Area 3 Jackson Date 7-1-42 Collector C. Jones Identifier C. Jones

Notes

Station Number	Location or Remarks	ANOPHELES quad. M	quad. F	cruc. M	cruc. F	punct. M	punct. F	Total M	Total F	CULICINES M	CULICINES F	Species
	Zone 1 - Camp Quad											
Q1-A	NRP		0			1			1		3	P. columbiae A. vexans
Q2-A	NRP		1						1		0	
Q3-B	NRP		3			7			10		5	P. columbiae A. vexans C. quinque.
Q4-A	NRP		0						0			
Q5-C	NRP		8			2	18		2 26		10	P. columbiae A. vexans
Q6-A	ARP		1						1		0	
Q7-B	NRP		5						5		2	P. columbiae
Q8-C	NRP		10				8		18	1	10	P. columbiae A. vexans C. quinque.
Q9-D	NRP		20						20		8	Culex sp.
Q10-E	NRP	8	45					8	45	2	15	P. columbiae
Q11-E	NRP	3	30					3	30			
LT-A	LT		1						1		10	A. vexans

MCWA-102 U. S. P. H. S. Malaria Control in War Areas FORM M-2

Figure 1

Figure 1

The letters in the second column refer to the type of the station; "NRP" indicates that the station

is a natural resting place. Barns, stables, privies, underneath bridges, under houses, etc., are the types most frequently used. When a good natural resting location cannot be found, artificial resting places such as boxes or kegs, suitably located, are used for this purpose and are designated as "ARP". Light trap collections are designated as "LT".

Upon receiving a report of adult densities similar to that illustrated, the control supervisor should interpret it to mean that adequate control is being maintained. The adult stations within a quarter-mile of the protected area (stations 1, 2, 4, 6) have very few adults, while the increasing densities at distances (B, C, D, and E) from the protected zone indicate what conditions might be if a control program was not in operation. When high quadrimaculatus counts occur in "A" stations, the larval report should show whether or not it is due to inefficient larvicidal work. If this is not the case, undiscovered breeding places exist which must be searched out and controlled.

Breeding place inspections are reported on the form shown in Figure 2. The numbers in the left column are those which designate individual breeding places. The letter following the station number indicates the distance of the station from the protected area as previously mentioned. The second column is used for any specific information about a station showing a condition other than normal, such as "dry", "flooded", etc. Station descriptions are not placed on each report as a list of these is kept on file for reference. The third column shows the last date when larvicide was applied in each place. The larval collections made while examining the breeding areas are recorded in the remaining columns of the form. As the inspections are made 2 to 3 days after treatment, small larvae usually can be found at each active breeding place. If large larvae or pupae are found, the larvicide work has not been altogether effective and a retreatment should be made. It is the inspector's duty to cover adequately the area being examined, reporting his findings in multiples of ten dips in order to allow uniform summarization of records.

State SAMPLE **LARVAL MOSQUITO COLLECTION—*Field Record***

Area 3 Jackson Date July 7, 1942 Collector C. Jones Identifier C. Jones

Notes

Station Number	Location or Remarks	Last Date Larvicide Applied	No. Dips	ANOPHELES							OTHERS	
	Zone 1-Camp Quad			Total	Small	Large	Pupae	quad.	cruc.	punc.	Total	Identified Species
Q1-A		7/4	10	40	30	5	5				25	Psorophora
Q2-A		7/4	30	0							0	
Q3-C		7/4	30	4	4						8	"
Q4-B		6/13	30	20	20						10	"
Q5-D	Dry	7/4	0									
Q6-A		6/20	10	25	15	5	5				25	Culex
Q7a-A		7/4	30	25	10	3					8	Culex
Q7b-B		7/3	30	0							6	"
Q8-B	Dry	-	0									
Q9-C		7/3	30	0							3	Culex
Q10-C		7/3	30	15	15						5	"
Q11-E		-	10	50	25	15	10				15	"

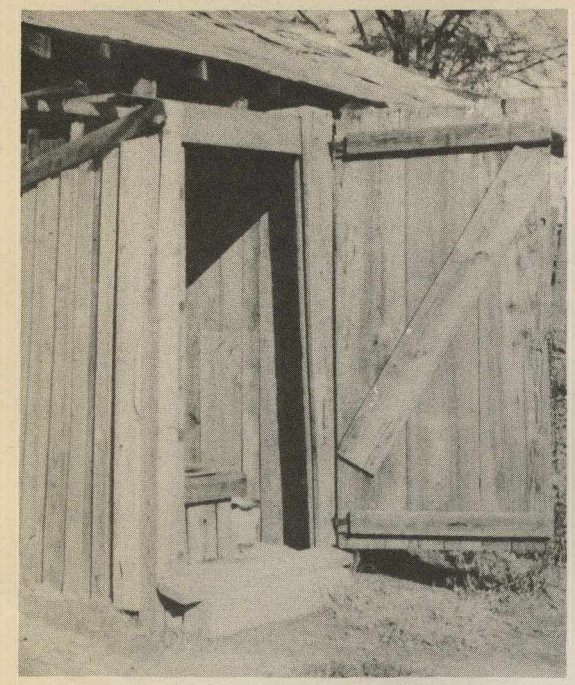
MCWA-101 Figure 2 U. S. P. H. S. Malaria Control in War Areas FORM M-1

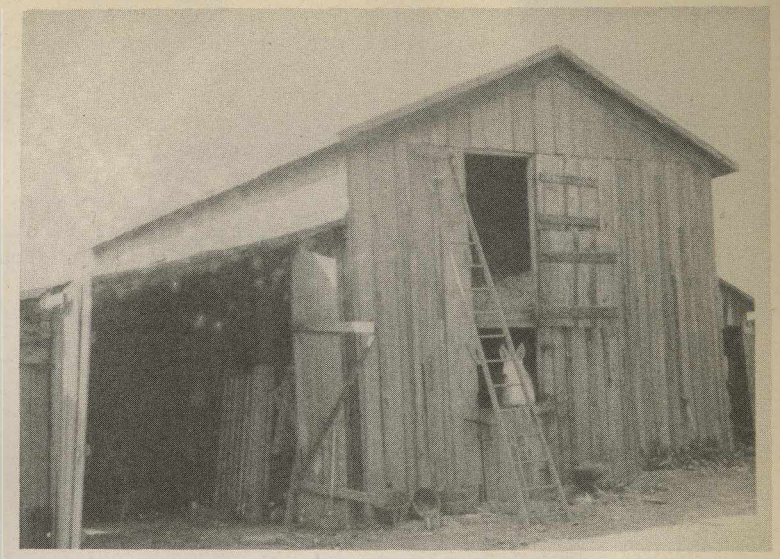
Figure 2

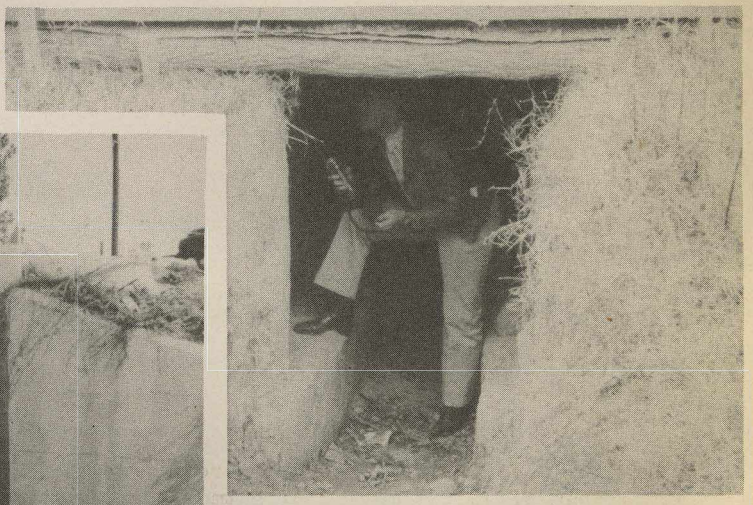
In determining the need for anopheline control around war areas in the states which comprise the malaria belt, the presence of even moderate numbers of Anopheles quadrimaculatus in and about the war establishments is taken as justification for control. When such justification exists, the entomologist's task is to locate the breeding places and direct the attention of the control unit to them. In areas where only a few quadrimaculatus can be found, it is usually recommended that the area be kept under observation but that no work be undertaken unless justified later by important increases in quadrimaculatus abundance.

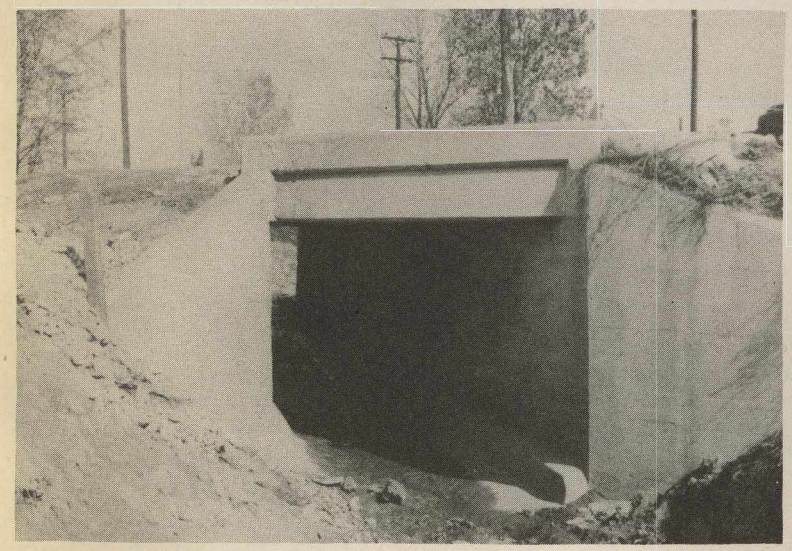
Control work also has been recommended in war areas adjacent to the normal malaria belt where quadrimaculatus are present by the hundreds in natural resting places and there is a possibility that malaria may become epidemic should carriers be among incoming troops or workers. In most cases of this nature, however, surveys are made in order to have information available on which to base intelligent control work, should conditions arise which indicate the need for control.

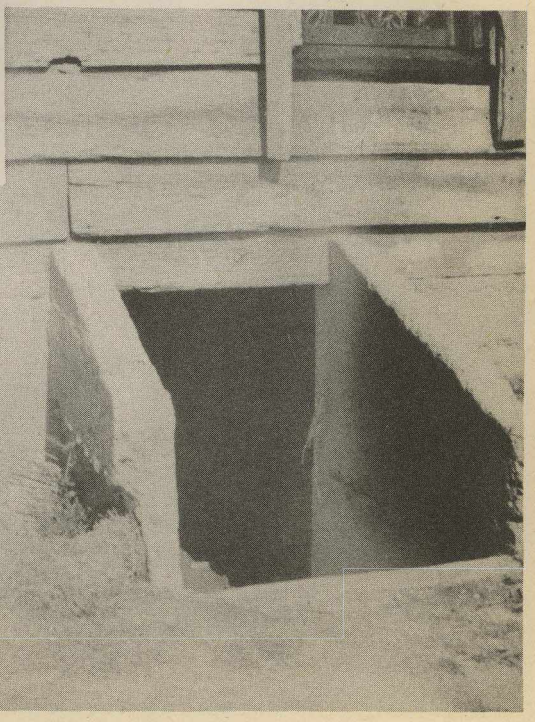
Types of Daytime Resting Places of Anophelines

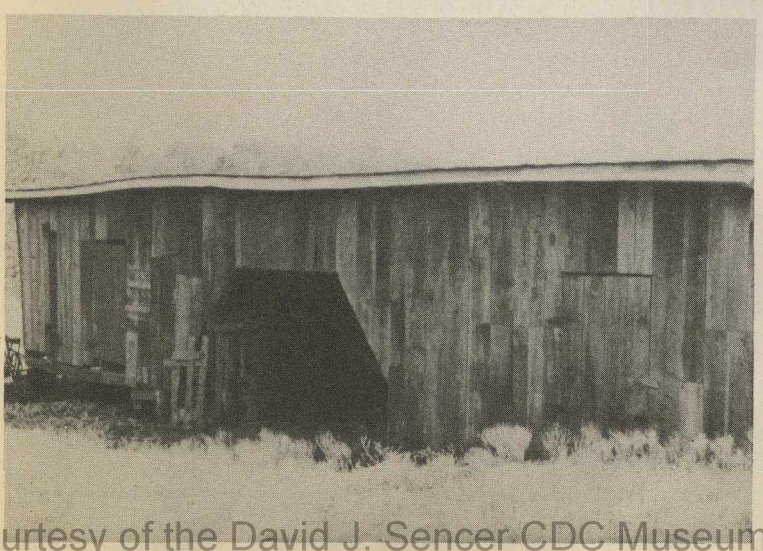








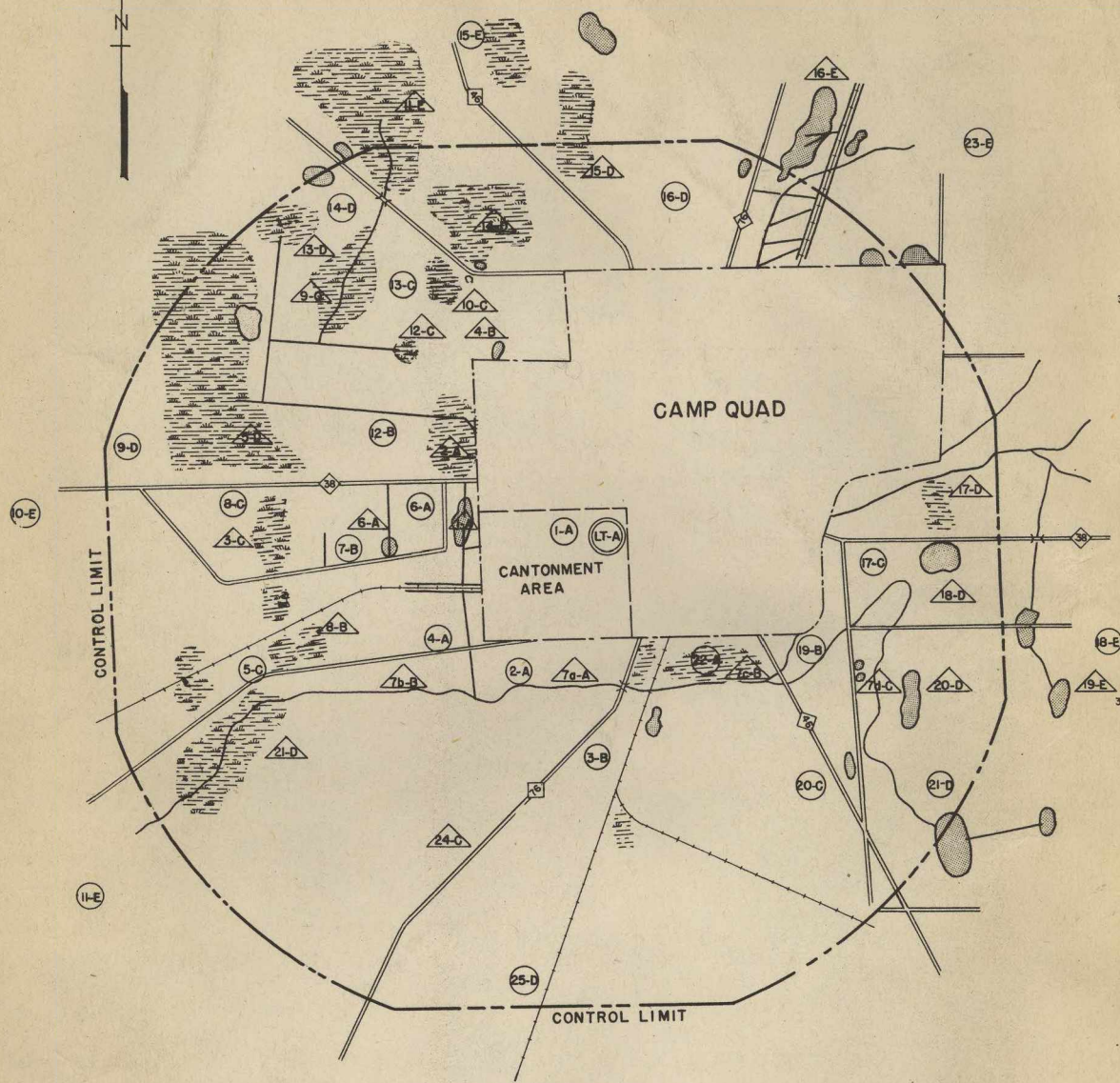




SCHEMATIC MAP

SHOWING

ENTOMOLOGICAL INDEX STATIONS



LEGEND

- CONTROL LIMIT
- LIMITS OF CANTONMENT OR POPULATED AREA
- RESERVATION AREA
- NARROW STREAM OR CREEK
- DRAINAGE DITCH
- LAKE OR POND
- SWAMP OR MARSH
- FEDERAL OR STATE ROAD (41, 76)
- SECONDARY ROAD
- RAILROAD
- ADULT CATCHING STATION (1-A)
- LARVAL COL. STATION (3-C)
- LIGHT TRAP (LT-A)

MALARIA CONTROL IN WAR AREAS

SAMPLE DEPARTMENT OF PUBLIC HEALTH AND U.S. PUBLIC HEALTH SERVICE

AREA NO. 3 — ZONE NO. 1.

JACKSON — CAMP QUAD

WASHINGTON COUNTY, SAMPLE

SCALE OF MILES

0 1/4 1/2 1 MI.

DEC. 1942