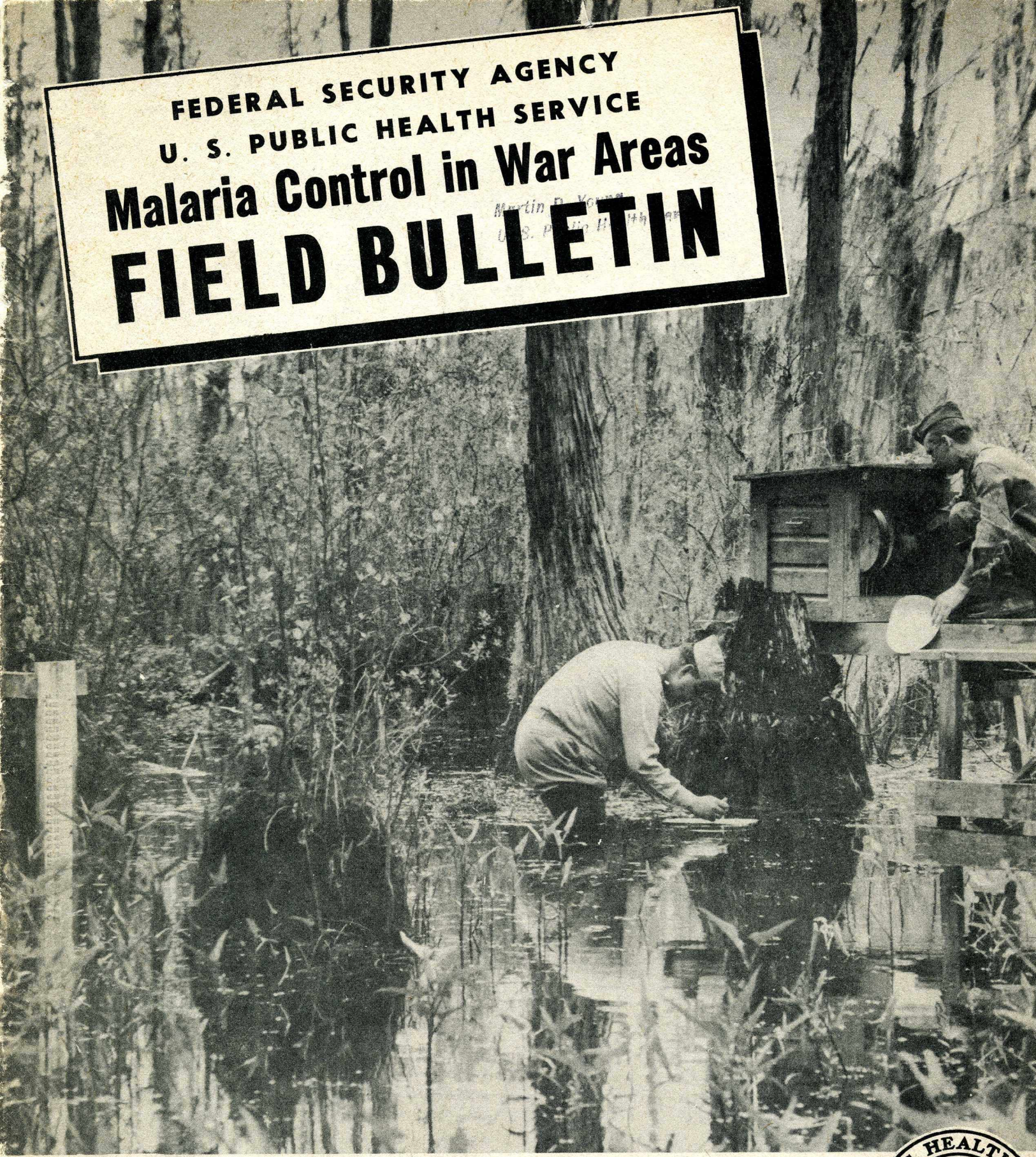
FEDERAL SECURITY AGENCY

U. S. PUBLIC HEALTH SERVICE

Malaria Control in War Areas

FIELD BULLETIN



MALARIA INVESTIGATIONS AT THE EMORY UNIVERSITY FIELD STATION

ATLANTA, GEORGIA

FEBRUARY, 1945

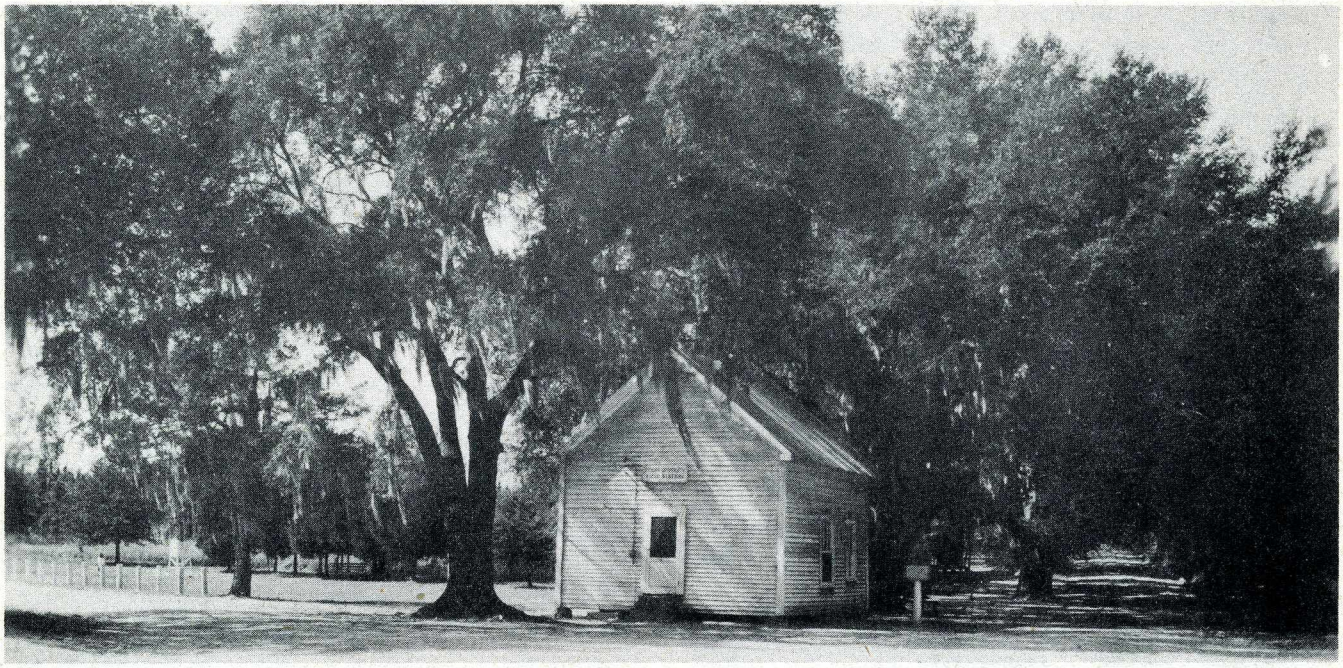
TABLE I

MCWA LARVICIDE, MINOR & MAJOR DRAINAGE WORK

JANUARY 1 - 31, 1945

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK				DRAINAGE OPERATIONS												Total Men Hours
			Larvicide Used		Surfaces Treated Acres		Clearing		Cleaning Hundred Sq. Ft.	New Ditching				Ditch Lining Placed		Underground Drainage Lin.Ft.	Fill C.Y.	Water Surf. Eliminated Acres	
			Oiled Gals.	Paris Green Lbs.	Oiled	Dusted	Removal Surf.Veg. Acres	Stumping Grubbing Acres		Hand	Lin.Ft. Mach.	Dynamite	Total Cu.Yds.	Lin.Ft.	Sq.Ft.				
Alabama	5	92	---	---	---	---	60	---	6,350	4,230	---	---	668	---	---	---	---	7	5,702
Arkansas	14	92	---	---	---	---	134	---	5,530	18,717	---	1,800	2,652	721	7,067	---	---	21	30,058
California	4	30	---	---	---	---	32	---	476	6,400	4,400	---	13,315	---	---	---	---	16	3,940
Florida	15	111	79	---	3	---	16	2	6,030	45,656	---	615	6,375	2,897	6,380	318	8,523	19	26,905
Georgia	14	103	---	27	---	20	25	5	1,518	29,815	---	---	2,681	762	1,157	434	2,346	26	23,690
Louisiana	8	86	220	---	8	---	48	4	7,237	64,174	---	820	6,074	---	---	---	556	37	42,522
Maryland	1	32	---	---	---	---	3	---	---	---	---	---	---	---	---	---	---	---	2,716
Mississippi	12	58	---	---	---	---	55	2	3,066	42,428	---	---	5,042	282	3,642	---	868	14	20,084
Missouri	3	22	---	---	---	---	12	---	---	3,050	---	---	208	---	---	160	---	1	1,882
North Caroline	9	80	---	---	---	---	904	6	10,905	35,920	---	2,990	7,816	---	---	---	2,377	12	25,338
Oklahoma	4	62	---	---	---	---	115	---	---	5,125	---	---	1,419	---	---	---	---	5	9,075
Puerto Rico	7	22	1,186	4,635	107	3,271	13	---	11,374	22,795	---	---	5,565	---	---	24	---	---	50,162
South Carolina	18	114	---	---	---	---	54	16	12,242	32,081	---	---	9,228	750	1,500	488	299	27	54,912
Tennessee	3	67	---	---	---	---	18	---	467	8,604	---	---	2,294	1,635	3,515	81	393	3	11,267
Texas	13	178	30	---	3	---	89	12	8,926	50,791	9,000	---	12,272	321	1,926	---	81	41	38,326
Virginia	3	93	---	---	---	---	5	9	2,755	8,325	---	---	1,164	---	---	---	---	---	14,345
Total	133	1,222	1,515	4,662	121	3,291	1,583	56	76,876	378,311	13,400	6,225	76,773	7,368	25,187	1,505	15,443	229	360,924
December Total	130	1,253	2,966	6,600	155	3,953	482	17	60,542	257,370	3,500	10,348	54,148	4,599	20,343	2,104	15,247	123	311,963

MALARIA INVESTIGATIONS
at the Emory University Field Station



Investigations at the Emory University Field Station are a cooperative endeavor of Emory University, the Georgia Department of Public Health, the U. S. Geological Survey and the U. S. Public Health Service. This program is unique in that an attempt is made to deal intensively with practically every phase of naturally occurring malaria. In consideration of the implications of this work in the overall malaria picture and of the future activities related to the Extended Malaria Control Program, it seems advisable to present briefly an illustrated account of the program for the information of Malaria Control in War Areas personnel.

The Emory University Field Station for malaria research was established in Baker County near Newton, Georgia in 1939. The primary objective of this undertaking is to study the natural occurrence of malaria for the purpose of accumulating data on the natural history of the disease. Need for comprehensive information on the relation of natural phenomena and biology of the insect vectors to malaria morbidity has been felt by malariologists for a long time. But little attention has been given to these problems, investigations of malaria usually being confined to the laboratory or clinical phases and conducted in places removed from the field. Field information on malariology has been obtained only from periodic surveys or fragmentary data assembled from various places at different times. The Emory Field Station was intended to partially satisfy the need for continuous data and for facilities to investigate malaria problems which could not be handled under laboratory or clinical conditions.

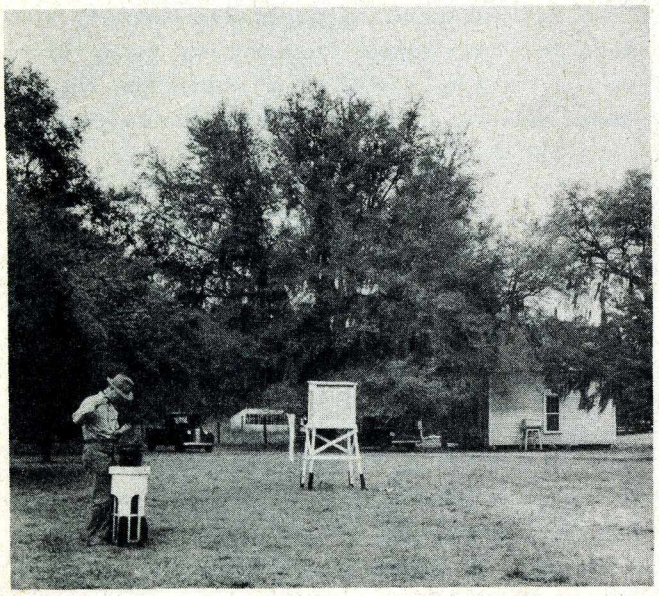
TYPES OF INVESTIGATIONS

Information on the natural history of disease is much more significant in malaria than in other maladies. Malaria is a disease of place, in most cases being regionally or locally confined to areas of specific physiography. In the southeastern United States most malaria occurs in the Atlantic and Gulf Coastal Plains area which is characterized by solution topography (See Boyd & Ponton, 1933). The area of Field Station operation is within this

region, and has always had a comparatively high malaria rate. No malaria control activities have ever been conducted in the area, so conditions are undisturbed in this respect. In 1939 a program was outlined to measure systematically the occurrence of malaria and as many attendant biological and physical factors as possible in the same area. It was recognized that it would be impossible to make accurate measurements intensively over a large area without an unreasonably large staff. Consequently, widespread, usually qualitative measurements are made over a fairly large area and precise intensive measurements are made in a much smaller area. The latter section is designated as the "Experimental Area." Observations in the small area serve as a check on those conducted in the larger one; comparison of data collected in the two areas indicates the degree of precision necessary to furnish the desired information on a larger scale and gives an indication of the practicability of application of the methods used. Thus observations in the two areas are supplementary.

Basic observations are of three general types:

1. Those pertaining to the measurement of malaria in man.
2. Those concerned with determination of *Anopheles* density, both larval and adult.
3. The measurement of hydrological and meteorological factors related to the occurrence of malaria.



Collecting Meteorological Data

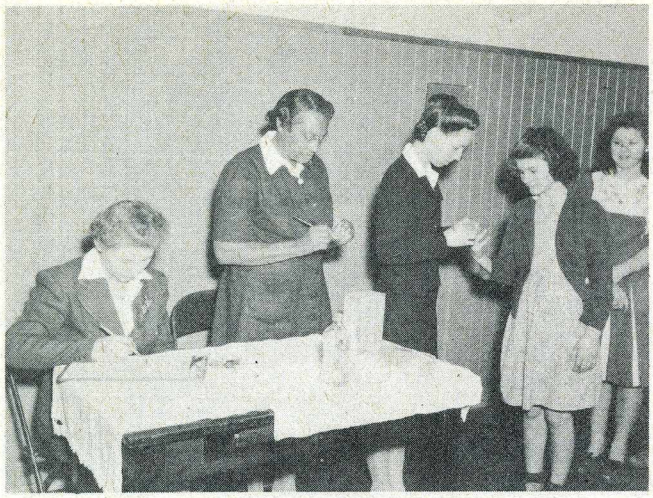
MEASUREMENT OF MALARIA IN MAN

Morbidity data on malaria, as usually obtained from clinical records or by selective surveys, are notoriously inaccurate, even within the limits of accuracy of diagnostic methods. It is not known to what extent school or other surveys reflect the actual malaria morbidity of a community. The unreliability of blood examination in detecting subacute malaria is well recognized. Spleen examinations are limited to children and the relationship of such examinations to current malaria morbidity has not been clearly established.

In the Field Station area morbidity data are collected by a variety of methods. School blood surveys as usually employed on malaria programs are conducted throughout the area. In the Experimental Area these surveys are supplemented by more comprenensive studies. A group of over 1,000 persons is visited at weekly or biweekly intervals, depending upon the amount of malaria occurring, and a careful clinical history is taken on each individual. Any possible symptoms of malaria are indicated on a symptom check sheet. Upon the manifestation of any malaria symptom thick and thin blood films are collected.

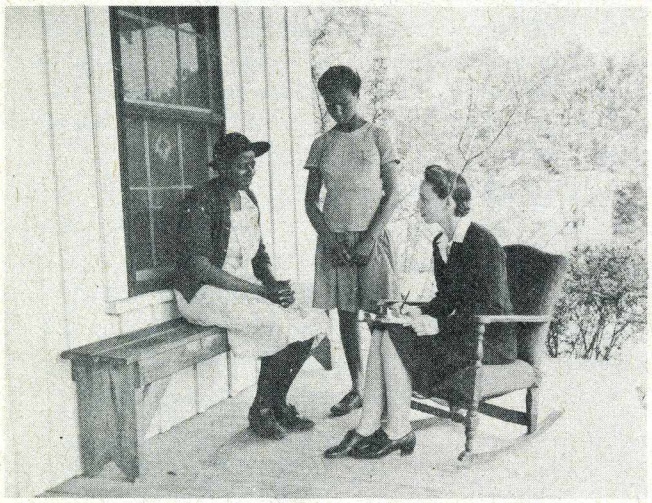
Persons are not encouraged to take antimalarial drugs because of the danger of obscurring the laboratory diagnosis. A complete, effective treatment is promised if the blood smear is positive. By following this procedure, information is obtained on the amount of malaria which occurs in the whole population, not just in selected age groups. An indication of the relation of malaria symptoms to positive blood films is also obtained. If several cases occur in proximity to each other a survey of all persons in that immediate vicinity is made to detect subclinical or newly developing cases.

With these techniques it is possible to know fairly accurately the amount of malaria which is actually occurring and even that which people believe they have. After long experience in apprehending malaria the nurses who take the clinical histories have become very proficient at recognizing malaria symptoms. This record of symptoms is valuable in obtaining an indication of alleged clinical malaria which is not confirmed by laboratory diagnosis.

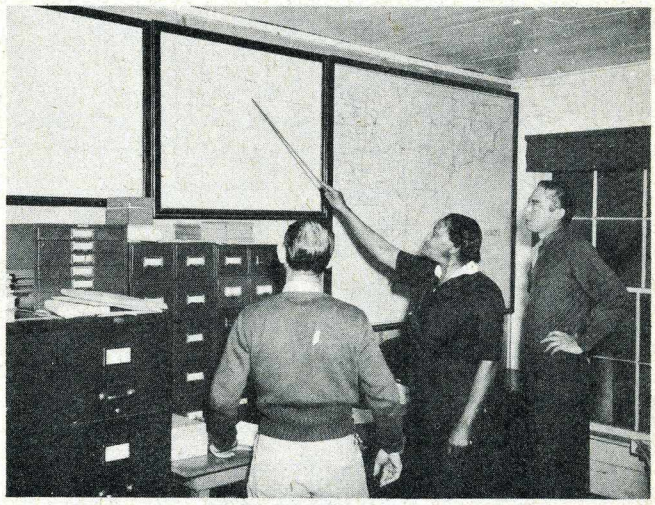


Parasitemia Survey in an Elementary School

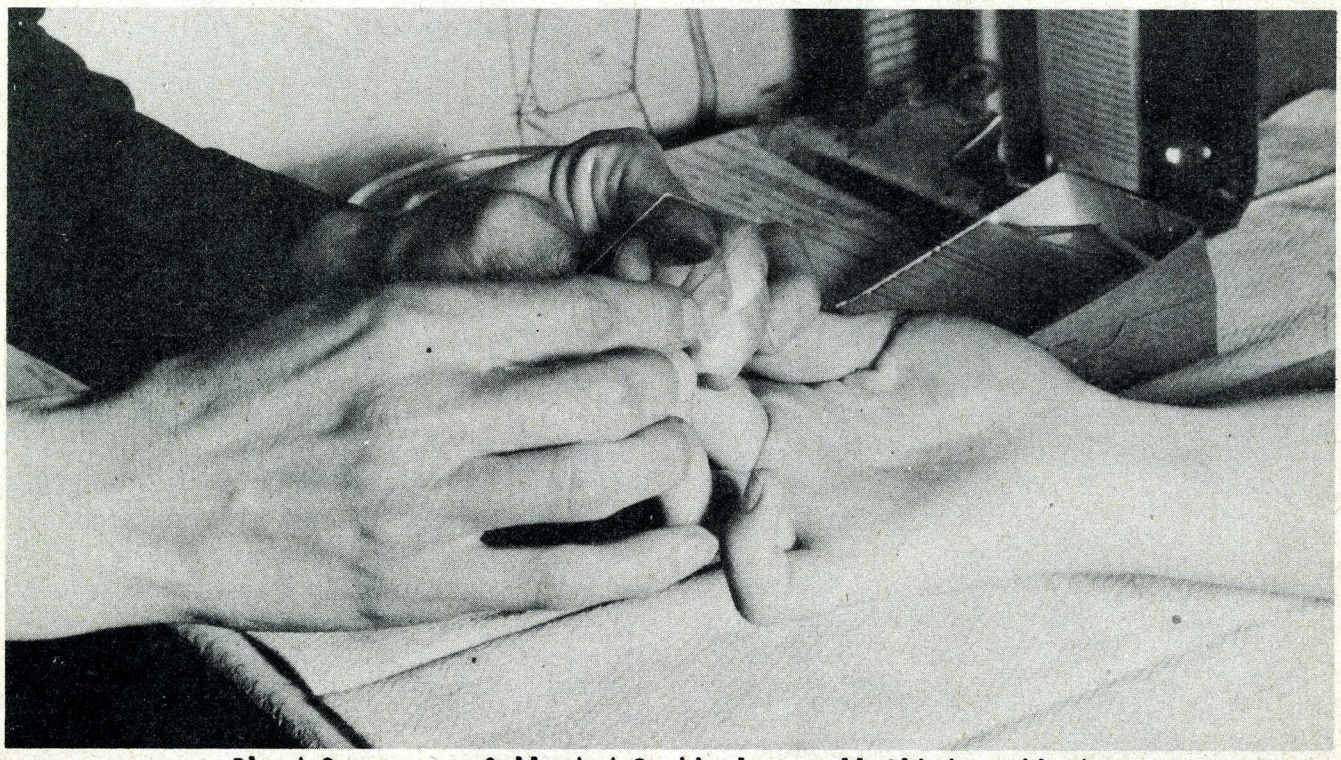
General Parasitemia Survey



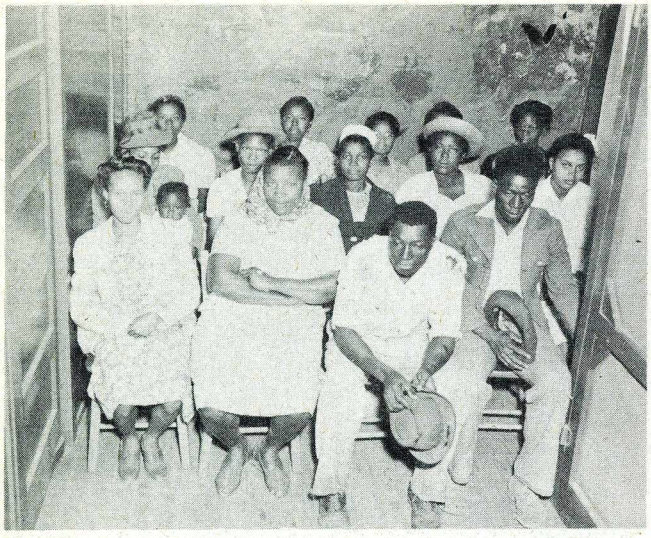
Home Interview to Collect Morbidity Data



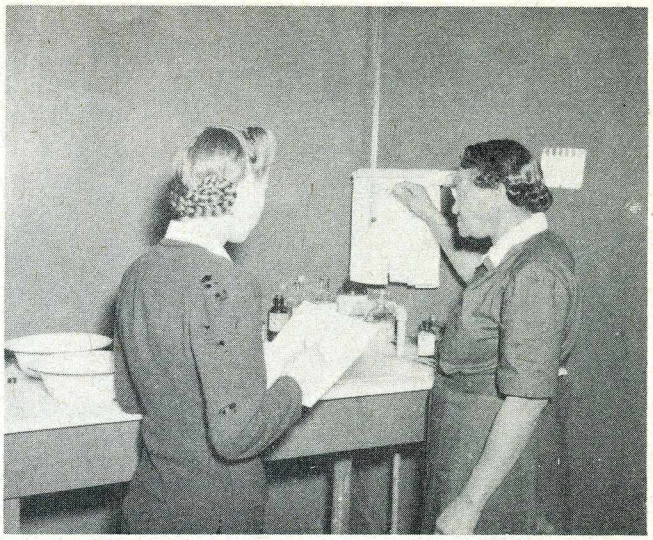
Map Summary of Epidemiological Information



Blood Smears are Collected Routinely on all Clinic Patients



Patients Awaiting Treatment at Clinic

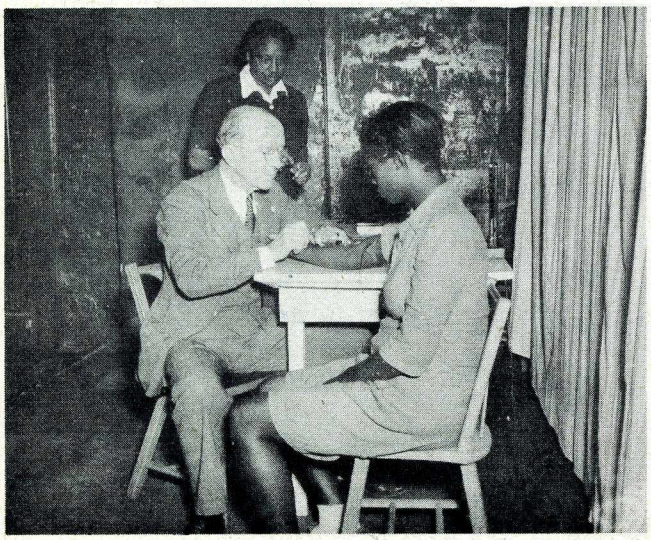


Nurses Perform Laboratory Tests

GENERAL PUBLIC HEALTH WORK

In order to obtain complete cooperation of the persons in the area, a nominal amount of general public health work is done. In this way an additional entree is provided to the homes, a confidence is placed in the nurses since they are able to supply other services not related to malaria, and the inhabitants are much more willing to permit collection of frequent blood smears than if these services were not provided. In addition, valuable data are collected on various diseases of public health significance, including hookworm, typhus, tuberculosis, and febrile diseases of unknown etiology.

By keeping in close touch with the inhabitants, it is possible to apprehend malaria as soon as it occurs. Thus a fairly accurate indication of the malaria picture is obtained and a comparison is made of the various methods of determining malaria rates.



Physician Conducts Health Clinic

In addition to routine morbidity measurements, an area is under observation where prophylactic drug control programs have been conducted for several years. A comparison of malaria morbidity rates in this area and adjacent areas will be made in the event that malaria morbidity increases.

At the present time, malaria is at an extremely low ebb in all areas under Field Station observation, as well as elsewhere. In the Experimental Area, however, malaria has disappeared almost completely while under close observation, and in the absence of any control measures. In view of the spontaneous recession of the disease, it is not unreasonable to look for an equally spectacular return.

A constant effort is made to improve methods of malaria detection and to collect blood films at times when they are most likely to show malaria parasites. The need of more accurate methods for diagnosing malaria is acute. Until such methods are available, it is believed that precise studies of malaria symptoms supplemented by blood examinations offer the best possibility of reliable information. It is recognized that the correlation between positive blood and clinical malaria is very low when the occurrence of the disease is low. This is especially true in benign cases and in populations long subjected to repeated malaria infections.

DETERMINATION OF ANOPHELES DENSITIES

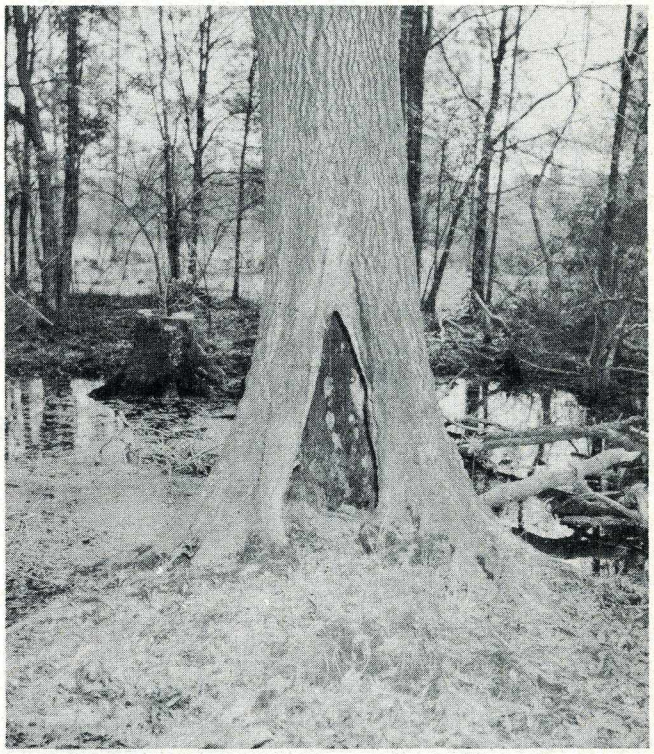
The solution of many very important problems in malaria depends upon the determination of actual mosquito densities. Unfortunately, efforts to make precise measurements of mosquito densities have been only partially successful. Ordinary qualitative measurements are useful only in obtaining information on distribution. Repeated observations of natural resting places under the same circumstances provide a reasonably reliable means of roughly determining gross changes in population density. In the Field Station area attempts are being made to determine *Anopheles* populations, including the actual number of mosquitoes which can effect malaria transmission under optimum conditions.

Adult Densities

Recognized methods of repeatedly sampling *Anopheles* populations in resting places have been employed on a fairly wide scale. In the Experimental Area standard size artificial resting places have been employed to eliminate some of the variations encountered in the use of natural resting places, thereby increasing comparability of the various stations.

The device usually employed as a diurnal resting place is a one foot cube wooden box, with one open side, painted red. Extensive observations with larger resting devices indicated that these did not attract significantly larger numbers of *Anopheles* and were much more difficult to handle. Collections from diurnal resting places are intended to supply information on variations in density or are for strictly qualitative measurements. In either case presence of hugh numbers of *Anopheles* serves no useful purpose; consequently attempts were not made to develop resting devices which would attract excessively large numbers of individuals.

Collecting from Artificial Resting Place



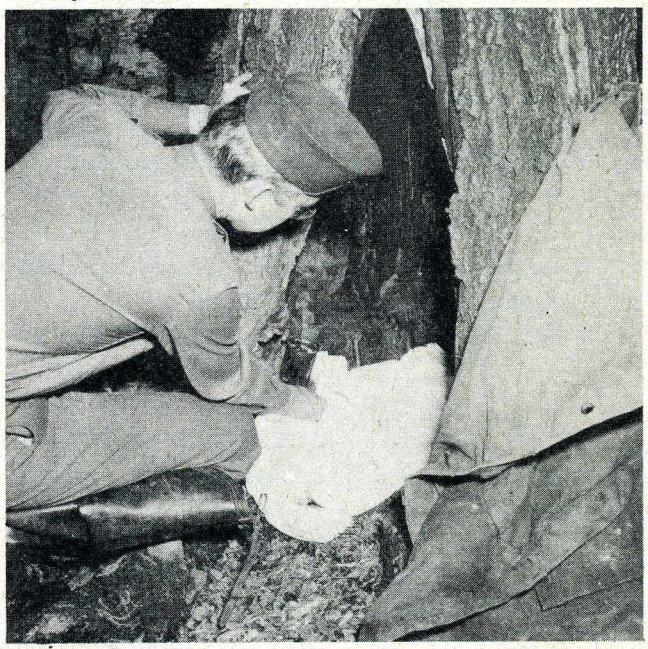
Natural Resting Place in Hollow Tree

The maximum number of specimens of *Anopheles quadrimaculatus* taken from the foot cube box at a single collection is well over a thousand. This is not an isolated experience but has been repeated many times. Such numbers are large enough to permit reliable statistical treatment and are not so large that maximum upswings in population cannot be adequately sampled. If significant samples of populations cannot be obtained by employing a device of this size, in a proper location, experience has shown that the population density is unmeasurably low. An artificial resting device does not usually compete quantitatively with intrinsically attractive natural resting places. Hence, attractive natural resting places are more useful in obtaining large numbers of wild caught mosquitoes for experimental work.

By employing the standard size resting device, some indication of variations and comparative abundance of *Anopheles* populations is obtained. Measurement of absolute density as related to area is much more difficult. Critical field tests are under way to investigate the usefulness and practicability of staining and recapture techniques in evaluating *Anopheles* population densities. Large numbers of adult "quads" are collected and stained and subsequently released. After the stained individuals have had time to become thoroughly mingled with the population in that area, large numbers of specimens are collected and examined for evidence of stain. Provided the population was homogeneous with regard to stained and unstained individuals when the recaptures were made, the sample originally stained will bear the same relationship to the total population as the stained specimens recovered bear to the sample originally stained. Thus, it is possible to determine actual density of *Anopheles quadrimaculatus* in an area.

Precise measurements of "quad" densities provide an intermediate factor for correlating other types of data collected on the program. It is hoped that continued accumulation of data will provide some means of determining a quantitative relationship between malaria morbidity and "quad" densities; and that the individual and cumulative effect of hydrological and meteorological phenomena on "quad" populations can be determined.

The correlation of precise data on *Anopheles* adult densities with other factors involved in the measurement of malaria is not contemplated immediately, but many significant facts concerning the execution of *Anopheles* adult surveys have become evident. For example, by daily collections over a long period from artificial and natural resting places, the significance of periodic examinations in this area has been determined. Indications are that the prediction of seasonal trends on the basis of weekly inspections may be extremely hazardous. An opportunity was afforded to evaluate the comparative efficiency of light traps, animal bait traps, artificial resting places and natural resting places. As was indicated, natural resting places are preferred for qualitative studies, and for obtaining large numbers of specimens. Light traps collect appreciable numbers of "quads" when located near breeding places but do not compare favorably with natural or artificial resting places in the area. Animal bait traps are not at all useful under our conditions. In connection with the work on staining, interesting incidental information is obtained on flight range and longevity.



Winter Collecting of Quads by Fumigation

Winter Habits

Another problem currently under investigation is concerned with the winter habits of *A. quadrimaculatus* in this region. An effort has been made to seek out the winter resting places and collect as many "quads" as possible by fumigation. Examination is made of the condition of feeding, of fat accumulation, and of ovarian development. Specific data have not been available heretofore to confirm the impression that there is no true hibernation of *Anopheles quadrimaculatus* in the southern portion of its range nor is any detailed account available on winter activities. The observations recently conducted tend to confirm the impression that "quads" do not hibernate and also give an interesting insight into the activity of *A. quadrimaculatus* during the winter months.

Larval Densities

Precise measurements of larval densities are equally as difficult as adult measurements. Quantitative observations are made in the Experimental Area to supplement the qualitative information obtained from wide-spread observations. Various standard size measuring devices have been employed which relate the number of larvae collected to the area of water surface examined. Such methods are not applicable in all situations. Repeated examinations of one meter quadrats have been more successful. The quadrats are permanently staked out in the aquatic situation. Enough quadrats are established to give representative coverage of the entire area. Adequacy of coverage may be calculated on the basis of cumulative number of plant species encountered. When the cumulative total remains constant for several quadrats an adequate number of quadrats has been located. The individual quadrats are evaluated botanically with regard to species and cover. Since the quadrats established are representative of the entire situation, and the relative species abundance and cover has been determined in the various quadrats, the relative abundance and cover for the entire area may be calculated.

When inspections are made, all *Anopheles* larvae are collected from each quadrat. Assuming a relation between plant types, plant cover and larval density, an estimation of the total larval population can be made.

Attempts are made to relate larval production to persistence of ponds, pond levels, and volumes which are determined in the course of hydrological observations.

In addition to density measurements, related investigations are conducted on various problems in *Anopheles* biology. Particular attention has been given to investigating the problem of non-occurrence of "quad" larvae in situations which are apparently suitable for their development. An insectary has been maintained to conduct experiments under controlled conditions and to provide adequate material for types of work requiring large numbers of mosquitoes.

Quantitative Larval Collection in Quadrats

Oviposition Studies

Oviposition preference studies have been done under experimental conditions in small cages in an effort to determine the preference of ovipositing females for various media. Waters of varying hardness, of different turbidity, of varying salinity, of different chemical content, of different pH, etc., were used. The only preference observed was for water in light containers versus water in dark containers.

Identifying Larvae in the Laboratory

MEASUREMENT OF HYDROLOGICAL AND METEOROLOGICAL FACTORS

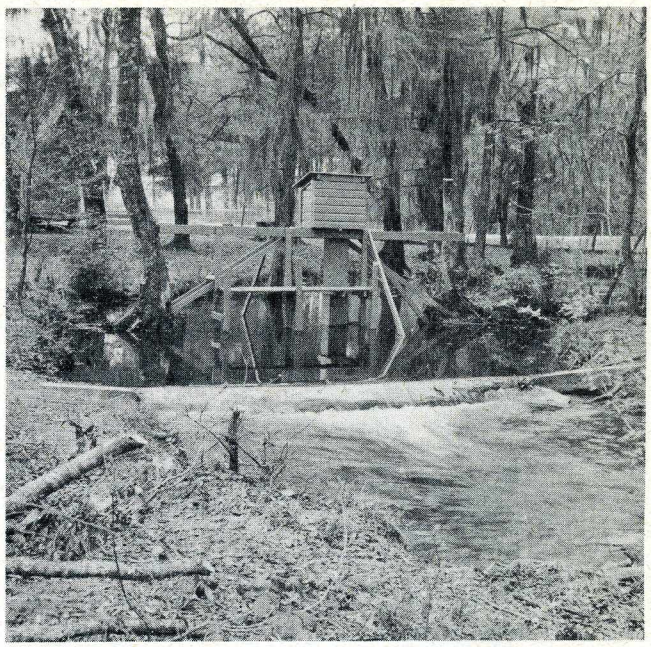
Hydrological measurements are designed primarily to determine the factors responsible for the existence of *Anopheles* producing ponds at the time when they will be important breeding places of malaria vectors. It is well established that no single factor, such as rainfall or temperature, alone determines satisfactory conditions for *Anopheles* breeding. It is more likely a time and intensity relationship dependent upon a complexity of factors.

Measurements of this type are more easily and accurately made than those involving biological material. The analyses and interpretations, however, are no less difficult. Comparatively little is known of the hydrology of limestone terrain, and no other comprehensive investigations are in progress to accumulate pertinent data. In addition to the relationship of these data to malaria, they also have important applications in the fields of agriculture, water resources, and the science of hydrology *per se*. It is hoped that by extending this program over a period of several years, information may be obtained concerning the alleged cyclic variations of malaria morbidity.

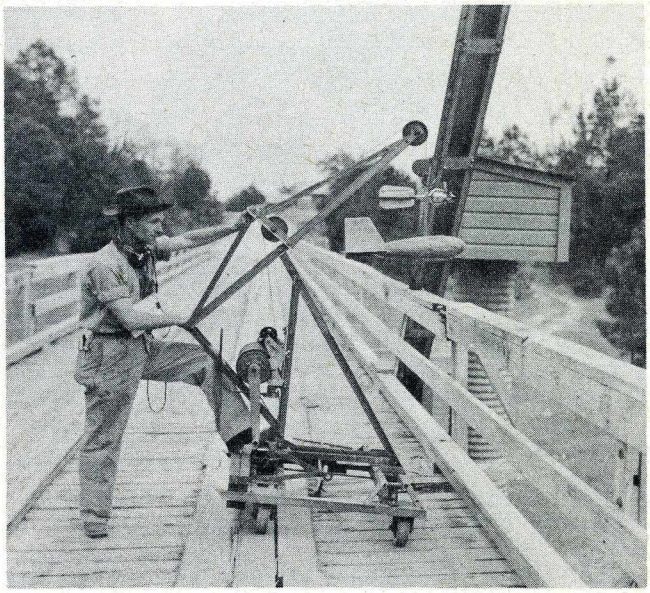
Extent of Hydrological Observations

The geographic extent of hydrological observations was determined by the boundaries of the drainage basins in which the investigations are conducted. (See map on back cover). Stream gaging stations are established on the major streams, and on many minor tributaries, at points where suitable discharge measurements can be made. Continuous water-level recorders are installed in stilling wells. After numerous stream discharge measurements have been made, a "rating curve" is constructed which shows the relationship between height of water in the stream and amount of water being discharged. With these data it is possible to calculate the run-off per unit land area, such as inches per acre or square mile. The resulting information may be applied to individual rains, or annual, seasonal, and monthly periods.

Gage House and V-notch Wier



Recorder Shelter and Artificial Control



Current Meter and Crane

Precipitation

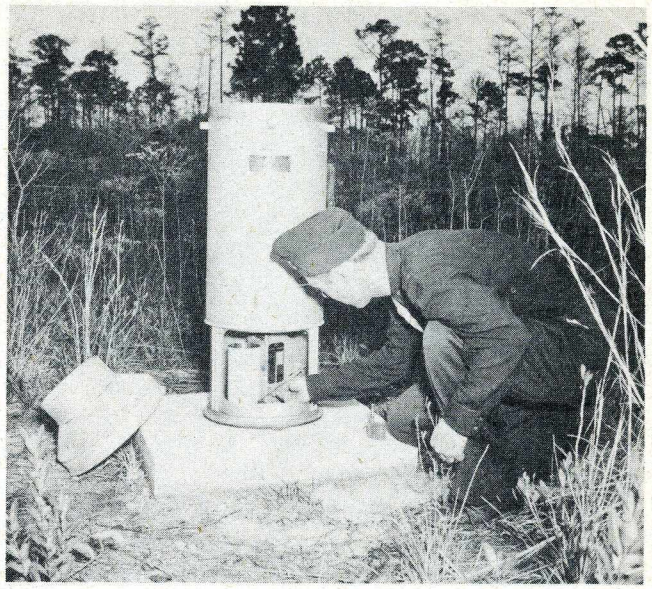
Water reaching the drainage basin as rain is measured by precipitation gages distributed over the area. Recording gages measure the frequency and intensity of rainfall. This is a very important factor in analysis since heavy rains of short duration effect torrential run-off and do not add significantly to sub-surface storage. It is necessary that rainfall be measured at several points since there is a wide variation in the amount recorded at gages fairly close together. In the area covered by the present observations there is usually 10 inches variation in the maximum and minimum amounts recorded at different stations.

For the current investigation annual figures are of little value since seasonal conditions profoundly influence the amount of rainfall which reaches ponds, streams, or ground water. Rains during the "growing season" add very little to the ground water increment or to ponds. On the other hand rains which occur in other seasons, when ground water is at its maximum height, cause great increase in pond levels.

Ground Water

Ground water levels are measured at numerous points over the entire area by using observation wells especially constructed for this purpose. In the Experimental Area much more intensive measurements are made. From these observations it is possible to follow closely changes in the amount of subsurface water and to anticipate levels in terms of subsequent rainfall. Draughts during the growing season cause great reductions in the amount of stored ground water and consequently reduce the amount available for surface reservoirs, such as ponds.

In some instances there is a loss of ground water to the streams and under other conditions streams flow into water reservoirs. The map on the back cover illustrates how such determinations are made. The two large streams, Ichawaynotchaway and Chickasawhatchee Creeks, are measured before and after their convergence. Difference in the drainage areas of the lower station and the combined area of the two

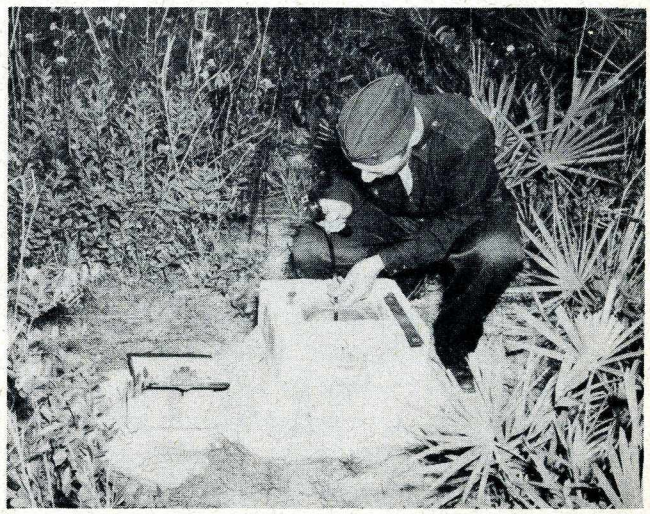


Recording Rain Gage

above, gives a small area where the amount of water reaching and leaving it can be determined and, hence, loss or gains in surface discharge can be measured. Evaporation is of consideration in this connection and installations are being made to obtain this information.

Surface Water

The amount of water remaining on the surface in the form of ponded and swamp areas is of primary concern in malaria investigations. The levels of these are measured by stage gages or water level recorders. Bench levels have been run to all measuring devices and all readings are reduced to the same datum for easy comparison. In some cases it is necessary to



Groundwater Measurement at Observation Well

Contour Mapping of Pond

secure data on the actual volume of water contained in the ponds. Where this is required accurate contour maps are made of the ponds and their drainage areas.

From the information accumulated an effort is made to determine under what conditions or combination of conditions suitable breeding places for *Anopheles* are created. An intimate association exists between the hydrological and biological observations.

Conditions in the various drainage basins offer widely different types of situations. In one basin, large surface reservoirs up to 600 acres in area are the predominant feature. In another case, spring fed streams are the source of most of the run-off. Small intermittent streams which depend entirely on surface or subsurface drainage are significant in another area. All of these types are being studied in the Field Station area.

In addition to these measurements which are very closely interrelated, other observations are conducted in restricted areas on a small scale. At some breeding places a continuous record is kept of atmospheric temperature and humidity. When collections of such data are indicated; continuous temperature records are kept on breeding places. All of the data which have been collected have a bearing on many problems other than the primary ones which have been indicated here. To mention only one, the importance of sustained *Anopheles* longevity is well known. Measurements of precipitation and other meteorological phenomena furnish information as to the possibility of "quads" living long enough to develop malaria infection.

ACTIVITIES CONCERNED WITH THE EXTENDED MALARIA PROGRAM

The backlog of data available from six years of Field Station work provides an ideal situation for evaluating operational procedures on malaria control programs. Observations will be conducted in three different sections:

1. The present Experimental Area will be used as an untreated check area.
2. North of the Experimental Area a portion of Calhoun County will be observed as an operations project, since this area is included in the Georgia Department of Public Health residual spray program.
3. An area in Early County west of the Experimental Area will be used for experimental spraying procedures. Complete premise spraying will be done in some sections as well as selective spraying.

All three sections are superficially similar in regard to *Anopheles* breeding and population density. Experimental spraying will not be done in the Early County area until adult and larval densities are appreciable and measurable in order that a satisfactory evaluation can be made.

An effort will be made in all three areas to measure malaria rates and mosquito population densities. Information will be obtained on feeding habits of "quads" in the different areas by employing precipitin tests. Marking techniques will be used to compare activity and longevity in the different sections.

SUMMARY

Activities at the Emory University Field Station are designed to investigate diverse but intimately related factors concerned with the natural history of malaria. The data being collected will apply not only to malaria but to other endemic diseases in the area.

The data accumulated in these areas since 1939 provide a sound basis for evaluating the entomological phases of the residual spray program.

HEADQUARTERS NOTES

DDT FIELD CONFERENCES AT SAVANNAH

Three field conferences on the technic of DDT residual house spray application were held at the Carter Laboratory, Savannah, Ga., during the weeks of January 29, February 5, and February 12. The purpose of the conferences was to familiarize selected representatives of each Extended Program State and MCWA District personnel with details concerning the Extended Malaria Control Program. Approximately 25 persons were in attendance at each conference. Highlight of each conference was the individual practice in spraying on test walls and the preparation of houses and actual spraying of walls with DDT residual spray in Savannah.

DECENTRALIZED TRAINING IN THE STATES

Based upon training received at Savannah, each Extended Program State set up a training program of its own, thus avoiding a great deal of travel and yet bringing the details of the Extended Program to the operations personnel. To facilitate this decentralized training two mobile units were set up with an engineer officer prepared to attend each State meeting. State meetings were attended by field personnel in the inspector and supervisor grades.

MCWA DELIVERY SYSTEM

As a partial solution to the congested war-time transportation system, a delivery line has been established with regular routes covering the principal areas of operation of the MCWA program. Based in Atlanta, the truck covers the following four routes in succession: 1) To New Orleans, La., via Montgomery, Ala.; and Jackson, Miss.; 2) to Memphis, Tenn.; via Little Rock, Ark.; 3) to Jacksonville, Fla.; via Macon, Ga.; and 4) to Savannah, Ga., via Columbia, S. C.

SANTEE-COOPER SURVEY COMPLETED

The formal project at the Santee-Cooper Impoundment in South Carolina has been completed and a detailed report has been submitted in cooperation with the South Carolina State Board of Health. Epidemiological studies will continue for another year and certain entomological studies will be continued.

PROFESSIONAL PERSONNEL

Two officers have been newly commissioned during the past month: P. A. San. (R) Oscar L. Cartwright, assigned to the South Carolina State Board of Health and Asst. San. (R) Will S. DeLoach, assigned to the Carter Memorial Laboratory, Savannah, Ga.

Transfers include Sanitarian (R) Frank W. Fisk from Memphis, Tennessee to Savannah, Ga.; Asst. Eng. (R) Clarence H. West, Jr. From Walterboro, South Carolina to Little Rock, Ark.; Asst. Eng. (R) H. Melvin Giges from temporary duty at Jacksonville, Fla. to New York (Dist. #1); Asst. Eng. (R) Clarence C. Brown from temporary duty at Headquarters to Rome, Ga.; Asst. Eng. (R) James Turnbull from Atlanta, Ga. to Alexandria, La.; Asst. San. (R) P. G. Cranford from Atlanta Headquarters to Austin, Texas; Asst. San. (R) Victor Tiship from temporary duty in Atlanta to Indianapolis, Ind.; Asst. San. (R) Willis V. Mathis from Greenville, Miss. to Savannah, Ga.; Jr. Asst. Eng. (R) Leonard Melberg from Headquarters to Austin, Texas; and Jr. Public Health Engineers Lloyd C. Leslie from Jackson, Miss. to Yazoo, Miss.; and R. G. Hastings, Jr.; from Jackson, Miss. to Greenwood, Miss.

TRAVEL REDUCTION AND COORDINATION

In response to an urgent appeal from the Office of War Mobilization and Reconversion, railway passenger travel has been significantly reduced throughout the MCWA program. Total mileage for February 1945 was reduced to about two thirds of the rail travel performed in January. This reduction has been accomplished by coordination of necessary travel through State, District, and Headquarters offices. By planning necesasry trips as far in advance as possible, travel coordinators have been able to direct several persons over the same route. Utilizing vehicular travel, this doubling up results in a substantial reduction in railway passenger travel.

DIVISION NOTES

AEGYPTI CONTROL AND GENERAL SANITATION

The *Aedes aegypti* program in San Antonio, Texas is being integrated with the general sanitation program of the city. Five city employees and five PHS inspectors comprise a single crew working from house to house. In addition to *Aedes aegypti* control and general sanitation the men are assisting in experimental work dusting in rat runs as a possible means of controlling typhus.

DENGUE CONTROL IN HAWAII

The dengue control program in Hawaii has been testing a different system for routine coverage of the city of Honolulu. A foreman and his crew now work as a group in one zone. When that zone has been completed the men move as a unit to the next zone in the assigned territory. In this manner it is possible for the foreman to maintain closer supervision of his men. Formerly each zone was assigned to a single inspector.

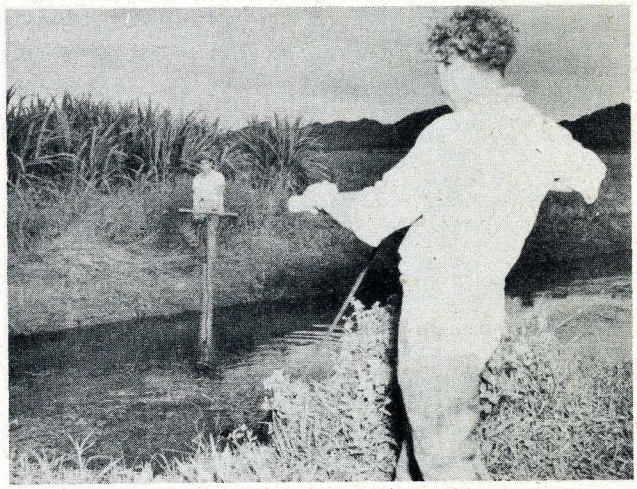
MCWA AIRPLANES ASSIGNED TO TVA

The Engineering Division announces a cooperative investigation with TVA on methods for the dispersal of dusts and sprays from airplanes. Two PT-17s are being assigned to TVA with MCWA agreeing to employ a pilot. In addition to furthering the work of TVA on thermal aerosols, at least one of these planes will serve as a standby plane for control of difficult or unusually extensive breeding areas in the Upper Mississippi Valley.

CANAL CLEARING IN PUERTO RICO

Heavy growths of aquatic vegetation, such as pond lily, pond weed, and *Ceratophyllum*, in drainage ditches, have been a difficult control problem in Puerto Rico. The vegetation not only impedes the flow of water, but also prevents the efficient application of larvicides.

A ditch clearing device was recently developed and constructed by MCWA personnel to remove this vegetation. It consists of a 30 foot piece of 5/8 inch cable to which is attached a 3 inch strip of galvanized metal with sawtooth notches on both edges. The cable is placed across the bottom of the ditch and then moved forward along the ditch, and also cross-wise, so that it acts like a saw in cutting the vegetation. This clearing device has drastically reduced the time required for clearing ditches.



Ditch Clearing Device in Operation

NEW FILMS NOW AVAILABLE FOR DISTRIBUTION

The Training Aids Section announces that release prints of the following films are now available: Oil Larviciding, 16 mm., color motion picture, 427 ft., 17 min. 46 sec.; Spraytime, black and white film strip, 82 frames, 15 minutes; Hand Spraying of DDT, black and white film strip, 110 frames, 18 minutes; Mixing of DDT Emulsions, black and white film strip, 65 frames, 13 minutes; Safe Practices in Handling DDT, black and white film strip, 37 frames, 8 minutes.

NEW QUARTERS FOR DRAFTING AND REPORTS

The Reports Section has joined with the Drafting Section in occupying quarters on the second floor of the Forsyth Building across from the Volunteer Building and the Rialto Building. Mapping and Drafting now has adequate space and suitable facilities for the present personnel. Included in the space allotted to the Reports Section is a conference room. This room will also serve as a study or reading room for visitors and others who may wish to utilize the reference books and periodicals that will be available there.

TABLE II

MCWA EXPENDITURES AND LIQUIDATIONS BY MAJOR ITEMS

JANUARY 1945

	Continental U. S.	Percentage of Total	Puerto Rico	Percentage of Total
.01 Personal Services	$ 394,141.58	52.20	19,383.00	91.09
.02 Travel	22,908.36	3.04	47.25	.22
.03 Transportation of Things	3,898.97	.52	-----	-----
.04 Communication Services	1,226.15	.16	13.80	.06
.05 Rents and Utilities	2,271.03	.30	-----	-----
.06 Printing and Binding	4,430.92	.58	-----	-----
.07 Other Contractual Services	4,447.97	.59	-----	-----
.08 Supplies and Materials	49,742.38	6.59	1,825.88	8.59
.09 Equipment	271,906.17	36.02	9.00	.04
Total	754,973.53	100.00	21,278.93	100.00
Expenses Other Than Personal Services	360,831.95	47.80	1,895.93	8.91

TABLE III

MCWA PERSONNEL ON DUTY AND TOTAL PAYROLL

JANUARY 1945

State	Commissioned		Prof. & Sci.		Sub-Prof. (1)		C. A. F.		Custodial and Per Hour		Total		Percent of Total	
	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay
Alabama	4	1,140	1	264	3	547	1	183	24	3,168	33	5,302	1.21	1.34
Arkansas	8	2,417	5	1,406	31	5,686	4	769	156	16,946	204	27,224	7.50	6.91
California	4	1,104	---	---	4	852	3	622	18	2,765	29	5,343	1.07	1.36
Dist. of Columbia	1	333	---	---	1	203	1	233	---	---	3	769	.11	.19
Florida	8	2,436	6	1,742	26	4,903	6	1,093	139	18,388	185	28,562	6.81	7.25
Georgia	8	2,439	2	527	36	6,942	6	1,006	85	11,254	137	22,168	5.04	5.62
Illinois	4	1,164	---	---	---	---	1	164	---	---	5	1,328	.18	.34
Indiana	---	---	---	---	---	---	---	---	1	16	1	16	.04	.02
Kentucky	2	570	2	547	2	416	1	164	3	176	10	1,873	.36	.47
Louisiana	10	2,873	4	1,246	44	8,624	6	987	200	26,578	264	40,308	9.72	10.23
Maryland	2	533	---	---	2	385	2	438	12	1,692	18	3,048	.66	.77
Mississippi	7	2,024	5	1,206	9	1,901	4	718	81	9,671	106	15,520	3.90	3.94
Missouri	1	333	---	---	11	2,012	1	158	15	1,756	28	4,259	1.03	1.08
North Carolina	5	1,522	4	1,297	7	1,446	4	732	124	15,975	144	20,972	5.30	5.32
Oklahoma	5	1,500	1	274	11	2,428	1	164	43	4,728	61	9,094	2.24	2.31
Oregon	---	---	---	---	1	203	---	---	---	---	1	203	.04	.05
Puerto Rico	8	2,528	1	297	3	679	5	1,101	312	14,778	329	19,383	12.12	4.92
South Carolina	6	1,953	6	1,693	29	6,042	6	884	283	33,369	330	43,941	12.14	11.14
Tennessee	5	1,573	2	638	8	1,308	3	584	57	6,294	75	10,397	2.77	2.64
Texas	6	1,719	4	1,316	25	5,576	6	1,071	174	22,685	215	32,367	7.92	8.21
Virginia	2	619	2	696	10	2,024	3	602	105	14,128	122	18,069	4.49	4.58
AEDES AEGYPTI														
Alabama	1	285	---	---	9	1,319	1	146	---	---	11	1,750	.41	.44
Florida	1	285	1	274	28	5,155	2	292	---	---	32	6,006	1.18	1.52
Georgia	---	---	---	---	6	1,092	---	---	---	---	6	1,092	.23	.28
Louisiana	1	285	1	274	9	1,746	1	164	---	---	12	2,469	.44	.63
South Carolina	1	285	---	---	9	1,572	1	164	---	---	11	2,021	.40	.51
Texas	4	1,140	---	---	30	4,376	2	310	6	791	42	6,617	1.54	1.68
Hq. & Dist. (2)	78	24,508	8	2,367	40	7,312	129	22,025	34	4,395	289	60,607	10.64	15.38
Mobile Units	6	1,813	3	669	1	182	2	440	2	329	14	3,433	.51	.87
Total	188	57,381	58	16,733	395	74,931	202	35,214	1,874	209,882	2,717	394,141	100.00	100.00
Percent of Total	6.94	14.57	2.13	4.24	14.52	19.01	7.43	8.93	68.98	53.25	100.00	100.00		

(1) Includes Entomological Inspectors
(2) Includes Headquarters and District Offices, malaria survey, Imported malaria control, special investigations, and employees temporarily attached to Headquarters pending assignment to states.