

## REVIEWS AND ABSTRACTS

**MALARIA IN BRAZIL.** By Mário Pinotti, A Folla Medica 28(12). June-July, 1947.

The National Malaria Service, created on April 2, 1941, is the director agency for the control of malaria in Brazil. It is composed of central, technical, administrative services and field laboratories. The central services are divided respectively into the following sections: section of epidemiology; section of organization and control; section of hydraulics; section of administration and Institute of Malariology. The whole country is divided into seven regions. Each region is subdivided into smaller areas for administrative purposes.

The National Malaria Service has 5 sanitary doctors, 53 medical malariologists, 3 entomologists, 4 engineers, 34 technicians and 13 experts in topography.

The study of the geographic distribution of malaria in Brazil is still incomplete. Judging by the present available data, malaria is endemic in about 930 counties of Brazil. It is more prevalent in the coast and the valleys of the larger rivers.

The malaria problems differ according to the local topographic and climatic conditions. The large area of the country, the difficulties of transportation (especially during the war), the urgent need of solution for the various problems of different States, the still deficient number of specialized technicians make the work of visiting the whole country a task still unfinished. The geographic distribution of the anophelines is therefore incompletely known. According to the author, the anophelines which have been found in Brazil are of two genera: *Chagasia* and *Anopheles*. Fifty-four different species have been found in Brazil, including the *A. gambiae*. This species invaded the Northeast from the African continent, but is now eradicated.

Eight species have been found naturally infected: *A. darlingi*, *A. tarsimaculatus*, *A. albitarsis*, *A. cruzii*, *A. bellator*, *A. homunculus*, *A. strodeii*, and *A. noroestensis*. However, the last two have little if any epidemiological importance.

The most dangerous is the *A. darlingi* because of its habits and widespread geographic distribution. It has been found infected many times in 8 States. The coast of Santa Catarina, Paraná and Rio Grande do Sul is the zone of influence of the *Kerteszia*.

The control of malaria consists of measures against the parasite and the mosquito. Until recently the campaign was empiric but now it is based on scientific and epidemiological data.

The drugs are administered to the patients in fixed units by the federal, regional and ecclesiastic authorities. In 1944, 1945 and 1946, the National Malaria Service examined 977,631 blood samples from suspected cases. The laboratory has confirmed the diagnosis in 489,433 cases. The consumption of 10,670,464 tablets of antimalarial drugs was reported.

Sometimes pyrethrum insecticides were used against adult mosquitoes. Now DDT is the agent used and 62 small villages have been DDT sprayed.

In combating the larval stage the author points out that small hydrographic works are made (drainage, filling, etc.) and larvicidal agents are used (Paris green, larvicide oil, etc.).

Up to 1946 the National Malaria Service has built 80,877 meters of underground drains and 345,504 meters of lined ditches.

Special reference is made to the work which is going on in the South of the country. In this region malaria is transmitted by an anophelis of the subgenus *Kerteszia* which breeds in plants called "gravatás" (Bromeliaceae).

These mosquitoes transmit the disease in and outdoors, the reason why the attack on the imaginal stage has not been made. The author also discusses the methods of killing the plant, its removal by hand and the destruction of woods in the suburban areas with subsequent planting of vegetables and flowers. The latter method is more satisfactory and the one which seems to the author to give the best results.

The paper includes a large list of the geographic distribution of malaria in Brazil. It is also illustrated with a few interesting photographs.—FERNANDO BUSTAMANTE, Serviço Nacional de Malária, Rio de Janeiro, Brazil.

**MALARIA CONTROL IN VILLAGES OF QUETTA (BALUCHISTAN) WITH DDT.** by M. K. Afridi and M. L. Bhatia. Indian J. Malariology, 1(2): 279-287, 1 map. June 1947.

An emulsion containing 2.5% DDT was sprayed in the villages of Quetta (Baluchistan, W. Pakistan), with a total population of about 20,000. The malaria was highly endemic and the vectors were *Anopheles superpictus*, *A. culicifacies* and *A. stephensi*. The dosage of DDT applied was unusually low (25-38 mg. per sq. ft.). The first round of DDT spraying done in July was applied only outdoors in the three regions of the villages, but after 4 weeks the second round application was: Region A—outdoor and indoor, B—indoor only, and C—outdoor only.

Malaria was effectively controlled in the Regions B and C as shown by the drop of spleen rates. However in the Region A (with both outdoor and indoor spraying) it had a contrary result with a significant increase of both the parasite and spleen rates. This unexpected finding was explained as most probably due to the fact that the controlled population contracted malaria infection during visits to the neighboring unsprayed villages. Unfortunately, owing to the small staff, no record was taken on the density and the dissections of the anopheline adults.

The actual cost *per capita* for two sprayings was 2.4 annas (U. S., \$0.05) but effective control could

be secured by indoor spraying applied once a year with DDT suspension at 50 mg. per sq. ft. with a cost of 1.4 annas (U. S., \$0.03) exclusive and 2.0 annas (U. S., \$0.04) inclusive of supervision by a medical officer.—C. Y. CHOW, Malaria Laboratory, National Institute of Health, Nanking, China. At this writing, at Department of Entomology, Cornell University, Ithaca, N. Y.

A BRIEF ACCOUNT OF THE *Anopheles* (MALARIA) ERADICATION IN KARPAS—CYPRUS, 1946. By M. Aziz, 1947. Roy. Sanit. Inst. Jour. 67(5):498-509.

Cyprus has swung into the spotlight of the mosquito world with its program for the eradication of malaria by a total war on anophelines. During an intensive 9-months' campaign the island has eliminated all *Anopheles* from an area approximately 800 square miles. The last anopheline in this section was found during the week of November 23, 1946, and through January 31, 1947, no others had been seen. As the report does not continue beyond the latter date, we will look forward to further details concerning the outcome of the undertaking. Dr. Aziz and his coworkers deserve great credit for the success gained in the first round of their campaign.

The plan of eradication was based on that used in Brazil and Egypt but modified to suit local conditions. Wisely, the staff attempted elimination on a small scale at first and chose the Karpas Peninsula which is bounded on two sides by the sea. In order to fully protect the peninsula from mosquito infiltration, about 250 square miles on the landward side was included. The *Anopheles* encountered in Cyprus are *superpicus* Grassi—responsible for 95% of the malaria there—*bifurcata* Meig., and *elutus* Edw.

As a starting point the island had at its disposal a well-trained staff of anti-malarial workers who were ready for immediate action. One interesting feature of the project was the division of the whole area into blocks, and the results of weekly findings were plotted on a chart. At first practically every block showed mosquito infestations but both the graphs and the maps vividly demonstrate the rapid decline in mosquito populations. By September nearly all the anophelines had been killed.

Almost all of this work was accomplished on foot, by men using flit-type hand sprayers with modified long tubes to prevent the operator from bending over. The insecticide employed was 4 to 5% DDT in gas oil. Although destruction of the larvae was the main objective in the program, residual DDT was applied to outbuildings in October.

So successful has this campaign been that work was initiated during the winter months of 1947 to eradicate anophelines from the entire island. It appears that H. H. Stage's prediction (Nat. Malaria Soc. Jour. 5(2):101, 1946) that species eradication might be accomplished by DDT on a small island, will shortly be realized.—HELEN

SOLLERS, U. S. Bureau of Entomology and Plant Quarantine.

THE IMPORTANCE OF COVERAGE IN DDT RESIDUAL HOUSE SPRAYING FOR THE CONTROL OF *Anopheles quadrimaculatus* MOSQUITOES. By R. H. McCauley, Jr., R. W. Fay, and S. W. Simmons. Pub. Hlth. Rpts. 63(13):401-407. 1948.

Tests made by releasing *Anopheles quadrimaculatus* mosquitoes in rooms in which a hand sprayer had been used to apply 5% DDT-xylene emulsion as a residual spray at the rate of 200 mg. of DDT per square foot indicated that (1) satisfactory control of this mosquito cannot be expected from a spot treatment in which only the predictable resting places in a room (such as corners and angles of walls and ceiling, undersides and backs of furniture) are sprayed; (2) coverage of the predictable resting places plus the walls and ceilings in a room is a more effective method of application than that in which only the walls and ceilings are sprayed; (3) the amount of total area covered with DDT not only affects the initial knockdown efficiency of the treatment of the room, but the residual quality as well; (4) based on the criterion of 4-hour knock-down, complete treatment is experimentally more effective than the regular treatment; (5) efficient application is necessary for the greatest residual effect of DDT spray.—R. H. McCAULEY, JR., C.D.C., U. S. Public Health Service, Savannah, Ga.

THE MOSQUITOES OF ILLINOIS (DIPTERA, CULICIDAE). By Herbert H. Ross. Bulletin of the Illinois Natural History Survey. Vol. 24, Art. 1, pp. 1-96, frontispiece and 184 figures. Urbana, Illinois. August 1947.

The purpose of this work, as stated by the author, "is to provide means for making mosquito control programs more effective, first by furnishing illustrated keys and descriptions for the identification of mosquito species that occur in Illinois and states similar in climate, and second by summarizing information regarding the distribution, biology and habitat preferences of the species." In the opinion of this reviewer this object has been attained most admirably. The first sixteen pages are devoted to the subject in general, with the biology of the eggs, larvae, pupae and adults, hibernation, habitat preferences, seasonal distribution, distribution pattern within the state, economic importance, control considerations, and the techniques of collecting, preserving, study and rearing treated. This is followed by a section on classification and a listing of the species. All ten Nearctic genera of Culicinae are found in Illinois, and the 52 species are distributed among them as follows: *Aedes* 23, *Anopheles* 5, *Culex* 8, *Culiseta* 2, *Mansonia* 1, *Megarhinus* 1, *Orthopodomyia* 2, *Psorophora* 8, *Uranotaenia* 1, and *Wyeomyia* 1. Generic keys to the larvae, adults, male genitalia, and female genitalia are given with excellent illustrations accompanying them so that the characters are

clearly depicted and close at hand. These generic keys are followed by a treatment of the separate genera and their included species, with keys to the species where these are necessary. This section is also very fully illustrated and the drawings of the various aspects of the male and female genitalia being particularly valuable. A key to the subgenera of *Aedes* based upon the female genitalia is also given. The larva, female and male of each species is described, there is a brief statement on its biology and habitat preference, and the Illinois records are listed alphabetically by town. The work is commendable in every way, but particularly for the quality and originality of its keys, and the abundance and excellence of its illustrations. It should be in the hands of anyone wishing to identify mosquitoes of the Mississippi drainage.—ALAN STONE, Div. Insect Identification, E. E. P. Q., U. S. D. A.

THE OLFACATORY RESPONSES OF FEMALE MOSQUITOES. By Edwin R. Willis. Jour. Ec. Ent. 40(6):769-778, 1947.

This report gives the results of experiments planned to give an answer to the question of whether mosquitoes will respond to odor given off by the human body. In order to test the responses of these insects to odor without interference from other stimuli such as temperature, light, humidity, etc., the author resorted to the use of an insect olfactometer. The apparatus used is a modification of a model known to entomologists as the Hoskins insect olfactometer. It is provided with a chamber in which the test animals are given a choice of responding to the inflow of two currents of air. The flow of air through one circuit in the apparatus has passed over the arm of a man while the other circuit is free of human odor. All factors other than odor are identical in the two currents of air. A diagram of the author's apparatus is given.

Females of *Anopheles quadrimaculatus* and *Aedes aegypti* were used as test animals. A complete description is given of the experiments with each species of mosquito and the results are presented in 4 separate tables. During the tests the inflow of air was maintained at 34° C. and a relative humidity of 70 to 85%. Mosquitoes were used in lots of 50 for each test. Results of some 250 tests are presented. The data show conclusively that females of both species respond to human odor in the olfactometer.

Since it had been suggested by other workers

that carbon dioxide eliminated by breathing might be a factor in attracting mosquitoes to a host, the author tested responses to this gas. It was found that carbon dioxide in concentrations of 1, 10, and 50% in air was not an attractant to females of either species when tested in the olfactometer.—WM. E. OWEN, The University of Wyoming, Laramie, Wyo.

THE USE OF AIRCRAFT IN THE CONTROL OF MOSQUITOES. American Mosquito Control Association Bulletin No. 1, 1948. 46 pp. (Price \$1.25 to members, \$1.50 to non-members.)

This is a factual, up-to-date report on the use of aircraft in the control of mosquitoes. The first in a series, to cover all aspects of mosquito control, this "hand book" was prepared by a group selected from organizations active in control work. An accumulated total of about 1,000,000 acres treated by airplane, served as a source of practical information. The editorial board, Russell, Bradley, Hess, Mulrennan, and Stage, ably screened the wealth of information presented by the various working committees.

Prepared and presented to serve as a day to day guide for both novice and expert, no detail on the use of aircraft for mosquito control has been overlooked. Supplemented with 45 illustrations (including halftones and diagrams) graphically portraying every step from field operations to detailed diagrams of equipment, the bulletin fills a long standing need for all health and pest control agencies.

A brief history of the use of aircraft in mosquito control is given as well as suggestions for future research. There are chapters on types of aircraft and dispersal equipment, DDT formulations and specifications, operational procedures, situations in which aircraft are useful, the appraisal of results, sample record forms for ground inspectors and pilots, and a guide for the analysis of expenditures. The precautions to be taken against injurious effects on wildlife, beneficial insects, and animal and vegetable products are outlined. Public relations are discussed as are legislation, liability, insurance, and contracts; and civil air regulations are given together with a list of regional offices. Finally, there are lists of sources of equipment and supplies and of aircraft spraying and dusting services. The selected bibliography contains 68 references.—T. G. RALEY, Consolidated Mosquito Abatement District, Selma, California.