SALT MARSH AND ANOPHELINE MOSQUITO FIELD CONTROL TESTS WITH THE HOCHBERG-LAMER INSECTICIDAL GENERATOR USING OIL-DDT AEROSOLS. Victor K. LaMer, Frank Brescia, Irwin B. Wilson, Kenneth C. Hodges, and John C. Rowell. National Defense Research Committee, Office of Scientific Research and Development Report No. 5731. September 18, 1945. Processed 70 pp. The control of adult mosquitos by toxic aerosols involves the dissemination of a toxic agent into the air, in the form of minute particles, and allowing the wind to carry the particles over the area in which the insects are located. The toxic agent used in the tests reported herein is an oil solution of DDT.

The diameter of the particles is very important. If they are too small, as in the "screening smoke" size range (0.6–1.0 mu), only a very small portion contact the insects, whether the insect is at rest or flying around. The greater part is carried around the insects with the air in which they are suspended. If the particles are too large, as in the "spray" size range (40 mu or greater), they fall to the ground a short distance from the point of dispersal. It must be realized that to control large areas, the dispersed particles must remain airborne for large distances downwind and must remain within the space wherein the insects are resting or flying.

The most efficient particle size diameter for adult kill is about 10 microns. Such particles possess sufficient inertia to give appreciable vertical and horizontal deposition and have little tendency to follow the streamlines around an insect. Yet they are also small enough to remain airborne for considerable distances.

The original Inventors' Model No. 1 of the Hochberg-LaMer Insecticide Aerosol Generator, capacity of only 20 gallons of emulsion per hour, was used in all of the field tests reported herein. Later experiments are reported elsewhere on larger models.

The field tests with the inventors' model have shown that for adult mosquito control downwind to distances of 5,000 feet in open country and 1,000 feet in forested areas, an output of 15 gallons of emulsion (50 parts of oil–50 parts water by volume—DDT content being 10 per cent of the oil by weight) per 1,000 feet of front will suffice. This corresponds to a dosage, in terms of solid DDT, of 5 pounds of DDT per 1,000 feet of front. Front is the distance covered by the aerosol generator. For the same output, mosquito larvae are killed to distances of 1,500 to 2,000 feet in open country and 500 to 1,000 feet in forested areas. Thus about 60 pounds of DDT disseminated in the form of aerosol will treat one square mile of open country for larvae mosquitoes and 2 square miles for adults. This corresponds to an expenditure of about 0.1 pound DDT per acre of open country for larval control and about 0.05 pound DDT per acre for adult control. For forested areas, about 0.2 pound DDT per acre will be required for larval and adult control.

Conclusions: Aerosols formed by dispersing oil containing DDT can be effectively employed in the field for mosquito control operations. Aerosol treatment will kill adult *Anopheles* in tree holes, hollow logs and other natural resting places.

A dosage of 15 gallons, of 50 oil–50 water emulsion by volume and containing an amount of DDT equal to 10 per cent of the weight of the oil, per 1,000 feet of front will obtain effective adult control up to about a mile downwind in open country and to about 1,000 feet in forested areas.

This same dosage will obtain practical larval control up to about 2,000 feet in open country and from 500 to 1,000 feet in forested areas.

For adult control, a 10 micron diameter aerosol can be used regardless of wind velocity and terrain. For larval control, however, the particle size should be increased for winds of 3 or greater miles per hour (except, of course, for larval control in forested areas where 10 mu must be used to obtain penetration).

Operations should be carried out under meteorological conditions wherein the cloud remains close to the ground since insects to be controlled are to be found, in general, within 15 feet from the ground.

The time and mode of treatment should be selected with reference to the habits of the particular species to be controlled.

Residual effects are negligible for the recommended output of 15 gallons per 1,000 feet given above but a significant protective period may be obtainable with short flight mosquitoes.

The lethal dosage varies considerably for different insects and the above recommended dosage will *not* kill "all insects." The recommended dosage did not harm the fish of Sykes Creek, Florida.—Authors' Abstract and Conclusions.

MOSQUITO CONTROL. State of California Department of Public Health, Bulletin No. 44. (Revised 1945.) 55 pp.—In 55 pages of carefullly selected facts the entire mosquito control problem is considered, and much specific information is presented which is of value not only in California, but elsewhere where mosquito control is practiced or contemplated. According to a note on page 55, the original manuscript for this Bulletin was prepared by Harold F. Gray, which in itself assures an authoritative presentation. This presentation is made, in general, along the lines followed in the book *Mosquito Control* by by W. B. Herms and H. F. Gray (comprehensively reviewed in MOSQUITO NEWS, Vol. 4, No. 4, Dec. 1944, pp. 142–144), although necessarily much more condensed and omitting or barely mentioning many details that are discussed at length in the book.

The section on "Special Mosquito Control Problems" includes reference to and short descriptions of control measures for such special areas as rice fields, duck clubs, reservoirs and ponds, intermittent streams, garden pools, cisterns, barrels, tin cans, cesspools, septic tanks, privies,

defective plumbing, and dairy drains. These and the information on DDT will be of special value to persons who may have individual control problems in areas where there are no publicly supported mosquito control programs, as well as in areas where the intelligent co-operation of individuals can be of great assistance to officially constituted control agencies.

The other information on specific control measures is classified under the headings "Fresh Water Mosquito Control" and "Salt Marsh Mosquito Control." There are also sections headed "Malaria and Other Diseases Transmitted by Mosquitoes," "The Control of Malaria," "The Mosquitoes of California," "Finding Mosquito Breeding Places," "Control of Mosquitoes," "Mosquito Control Agencies," and "Insects Sometimes Mistaken for Mosquitoes." D. L. COLLINS

EXPERIMENTS TO DETERMINE POTENTIAL MOSQUITO VECTORS OF WUCHERERIA BANCROFTI IN THE CONTINENTAL UNITED STATES.—Walter L. Newton, Willard H. Wright, and Ivan Pratt. Amer. Jour. Trop. Med., May 1945.—It is apparent from the number of dissections made and the care exercised in evaluating the development of the larvae recovered that the authors have made an intensive study of this problem. In view of the limited and fragmentary information available in the literature prior to this study, the results reported upon give the first conclusive data on the potentiality of some of our more common species of mosquitoes as vectors of *Wuchereria bancrofti*.

While the likelihood of the filarjid's becoming established in this country is a subject for considerable discussion, the fact remains that a focus of infection presumably brought from Africa by slaves persisted in Charleston, South Carolina, for several years, only recently dying out. In addition, it is a well-known fact that many of our armed and civilian personnel have been and will be stationed abroad in filarious foci. Although the chances of their reintroducing the parasite in sufficient concentration in one area to establish a focus are admittedly slight, nevertheless, past experience has proven the existence of such a possibility.

The data presented by the authors support the following conclusions:

1. *Culex quinquefasciatus, C. tarsalis, Psorophora confinnis,* and *Anopheles albimanus* could become excellent vectors of *Wuchereria bancrofti* should the proper conditions for its spread prevail.
2. *Culex nigripalpus, Aedes aegypti,* and *A. triseriatus* might spread the filaria, although their low infectibility rates preclude their becoming major vectors.
3. *Aedes sollicitans, A. taeniorhynchus, A. vexans, Anopheles punctipennis,* and *A. quadrimaculatus* apparently could not serve as vectors.

Extra significance may be attached to this information when it is realized that at the present time there is no effective treatment known for the parasite and that the only recourse is, therefore, the control of the mosquito vectors.

A. D. HESS

HOUSE SPRAYING WITH D.D.T. AND WITH PYRETHRUM EXTRACT COMPARED: First Results. By R. Senior White 1945. Malaria Inst. India, Jour. 6(1):83-87, June, 1945.

Comparative tests of house spraying with DDT and pyrethrum in highly malarious villages in the Jeypore Hills region in India were conducted by the author, December 1944 to April 1945. This is a preliminary report on work which is being continued. The village Jimidiguda with about 50 houses and a spleen rate of 87.8 percent was sprayed with DDT while the village of Chatikona (spleen rate 98.0 percent) and adjacent railway colony were sprayed with pyrethrum extract. The village of Bariguda (spleen rate of 92.7 percent) was used as a check.

The *Anopheles* present were *fluviatilis, varuna, minimus, culicifacies, aconitus* and *jeyporiensis,* the first three being the local malaria vectors.

In 1942 expensive antilarval measures, carried out with indifferent results for several years in the railway colony, were entirely abandoned in favor of pyrethrum spraying 6 days a week. Pyrethrum supplies were too short to permit daily spraying of the houses in the larger program. Therefore the applications were made twice a week, first skipping two and then three days between sprayings and employing 50 percent more of the pyrethrum extract. In the earlier work ½ ounce of pyrethrum extract (strength not given) was applied per 1000 cubic feet. Results of the earlier work indicated that mosquitoes might be coming into the railroad colony from the village of Chatikona, ¼ mile away, and it was therefore thought necessary to extend the spraying operations to that village.

The 48 houses in the village of Jimidiguda were sprayed with a 5 percent solution of DDT in grade III kerosene by means of a De Vilbiss paint gun, set to give as coarse a spray as possible. About 1 quart of solution was applied per 1000 square feet. The wall surface, outdoor verandahs, roofs as far as accessible from below, but not the floors, were sprayed till wet. Two spray guns served by hand pressure sprayers covered the 48 houses in 3 days on the first round and one spray outfit took 7½ days to spray 50 houses on the second treatment, including the spraying of the string cots which, with their *Cimex,* were removed by the natives at the first treatment. The houses apparently have mudded and whitewashed walls and many have bamboo floored lofts.

Each week mosquito catches and dissections were made. These showed that the DDT residual spraying prevented infection in the important vector species for 8 weeks and materially reduced their density. Pyrethrum spraying 6 days each week reduced density and longevity