

REVIEWS AND ABSTRACTS

RICE FIELD MOSQUITO CONTROL BY PELLET-BORNE INSECTICIDES. By F. E. Whitehead. Published and distributed by the Agricultural Experiment Station, University of Arkansas College of Agriculture, Fayetteville, Arkansas, 1951. This pamphlet reports on extensive experiments carried on by the author in the use of pellet-carried insecticides in the rice fields of Arkansas for the control of *P. discolor* and *P. confinnis*, they being the dominant species.

Conclusions of these experiments were:

1. Penetration of the foliage was an important factor and the pellets being heavier than sprays or dusts were better able to reach the water where the insecticide would be released by the dissolving of the pellet.

2. Applications made after mosquito larvae were present were more effective than applications made previous to hatching.

3. The pellet form of carrier is inexpensive, easy to prepare, has excellent handling qualities, stores well, and small dosage required (approx. 2 lbs. per acre) is economical to apply by airplane.

4. Dieldrin was more toxic and retained its toxicity better when exposed to weathering in the field than the other insecticides, although DDT was effective when used in the water where larvae were present.

This bulletin contains very valuable information for anyone connected with mosquito control in rice-growing areas.—Thomas M. Sperbeck, Mgr. Sutter-Yuba Mosquito Abatement District, Yuba City, California.

A BIBLIOGRAPHY ON THE RELATIONS OF MOSQUITOES TO VEGETATION IN THE EURASIAN ARCTIC AND SUBARCTIC. By Rev. Artheme Dutilly. Environmental Protection Section, Report No. 162. Research and Development Branch, Military Planning Division, Office of the Quartermaster General, 1950. The bibliography has been prepared by the Rev. Artheme Dutilly of Catholic University. It is an unique list of 408 publications concerning the breeding habits, control, and relationship of the environment to mosquitoes in the Eurasian arctic and subarctic. In the back of the report is a list of 240 scientific names of mosquitoes that appear in the citations.

Most of the references are not available to mosquito workers and are in languages such as Scandinavian, Finnish, and Russian which are not ordinarily read by American workers. The report is in two parts, 128 references other than Russian and 280 Russian references. A special effort was made to list all references for 1930 to 1949 and those of unusual importance prior to 1930. A general abstract of the subject-matter is included with most of the citations.

Although the citations do not strictly follow

the title, they constitute an important contribution to our general mosquito information; and of course, emphasis is given to the environmental relationships. It is most helpful in summarizing mosquito work that is being conducted in Eurasia. The report is processed and therefore is not as available as one appearing in a standard periodical.—B. V. Travis, Cornell University Agricultural Experiment Station, Ithaca, N. Y.

THE MOSQUITOES OF CALIFORNIA. Bulletin of the California Insect Survey, University of California Press, Berkeley, Calif., 1(2):25-78. Stanley B. Freeborn and R. M. Bohart, 1950. Price, 50 cents. This paper is a "must" for anyone studying Californian or West Coast mosquitoes. It will also be very useful to anyone studying mosquitoes elsewhere in the United States. It includes keys to adults, larvae and males of 41 species of mosquitoes occurring in California. The discussion of each species includes notes on biology and distribution, separation from closely allied species, and a listing of accepted California records. The keys include many new taxonomic characters, particularly in the genus *Culex*. The authors have presented good characters separating such closely allied species as *Culex apicalis*, *boharti*, *reevesi* and *territans* in the subgenus *Neoculex*; and *thriambus*, *erythrothorax* and *restuans*, and *tarsalis* and *stigmatosoma*, in the subgenus *Culex*.

The distribution records included are not complete for California. To quote the authors: "Unless otherwise stated, we have included only records for which we have been able to see the actual specimens personally. Existing published records of well-qualified investigators are not always trustworthy, largely because of nomenclatorial changes caused by a more complete understanding of the mosquito fauna."

A large table is presented in which county records of California mosquitoes are listed alphabetically by counties and by genus and species of mosquitoes. Those counties from which the authors have examined specimens are marked with an "X". Those counties where a record exists in the literature are marked with ".". Plates 2 through 8 illustrate important taxonomic structures of the larvae or male used in identifying mosquitoes. The excellent drawings in plates 7 and 8, showing details of *Culex* larvae and male genitalia, are distinct contributions to the literature on North American mosquitoes.

The booklet has been printed by the offset method on 8½" x 11" paper making it somewhat larger and more cumbersome to use than bulletins of the usual size.—Harry D. Pratt, Communicable Disease Center, Atlanta, Georgia.

OBSERVATIONS ON MOSQUITO BEHAVIOR IN NATIVE HUTS. A. B. Hadaway. Bull. Ent. Res. 41(1):

63-78. May 1950. Mosquitoes continue to enter occupied, untreated native huts throughout the night, with peak periods of entry at dusk and dawn. Early morning mosquito catches do not give a true picture of the numbers entering and leaving huts during the night. In a series of catches 63 per cent of 5,576 mosquitoes and 79 per cent of 506 *Anopheles gambiae* were caught resting on the underside of the thatch roof. By using 5 traps inserted in apertures one foot below the top of the wall, the numbers of mosquitoes attempting to leave a hut were determined. Of 1,014 mosquitoes entering huts before 10 p.m. 63 per cent remained inside until 6:30 a.m., that is, for 8½ hours. Catches to estimate numbers entering and leaving at different times during the night were also made.

Treatment of huts with DDT wettable powder and DDT-kerosene solution did not interfere with the normal behavior of mosquitoes as far as entry was concerned. Biting occurred in the treated huts. The DDT wettable powder appeared to be more effective than the DDT-kerosene solution.

Some mosquitoes entered the treated huts, fed and then left before acquiring a lethal dose. After making contact with treated surfaces, mosquitoes became restless but, under the conditions existing in the huts during the experiments, activation did not result in more leaving the treated huts than the untreated one. Unfortunately there were few *A. gambiae* and the predominant species entering the huts was *Taeniorhynchus fuscopennatus*.

Some of the female *A. gambiae* released into unoccupied DDT-treated huts escaped into the traps before acquiring a lethal dose. Although there was a tendency for more to enter the traps of a DDT-treated hut than those of an untreated hut, the data are insufficient to show a significant difference.

The majority of mosquitoes entering the traps did so within one hour of their release. No mosquitoes were still alive 12 hours after their release in huts treated 17 weeks previously with DDT wettable powder or DDT-kerosene solution, or in the hut treated 12 weeks previously with "Gammexane" wettable powder.—Author's summary.

(Editor's note: The above research is reported from Uganda, Africa.)

SOBRE A CAPTURA DO "ANOPHELES DARLINGI" E DO "ANOPHELES ALBITARIS" NAS PAREDES EXTERNAS DE CASAS DEDEITZADAS EM ENGENHEIRO DOLABELA, MINAS GERAIS. (Concerning the Capture of *Anopheles darlingi* and *Anopheles albitarsis* on the Outside Walls of Houses Which Have Been Treated With DDT in Engenheiro Dolabela, Minas Gerais.) By Fernando M. De Bustamante, Olympio da Silva Pinto, Arino S. Guedes, S. H. Xavier, and J. R. Freitas. Rev. Brasileira Malariol. e Doenças Trop. 3(1):122-129. 1951.

The finding of many specimens of *Anopheles darlingi* and *Anopheles albitarsis* resting on the outside of walls of a group of houses at Engenheiro Dolabela and Lagoa Grande, county of Bocayuva, State of Minas Gerais, is reported. The interior of the houses has been sprayed regularly with DDT since 1946-1947. The fact is discussed that *albitarsis* was found in greater quantities resting inside the DDT-sprayed houses than *darlingi*, although *albitarsis* is known to be less domestic and shows a lower density in the area than *darlingi*. Possible explanations for this occurrence are given.—Authors' summary.

COLLECTION OF CULICINE MOSQUITOES (DIPTERA, CULICIDAE) IN TAIWAN (FORMOSA), CHINA, WITH DESCRIPTION OF A NEW SPECIES. By C. Y. Chow. 1950. Quarterly Jour. Taiwan Museum 3(4):281-287. *Aedes (Finlaya) sinensis* n. sp. is described. During past four years' collection of culicine mosquitoes in Taiwan, 34 species belonging to 7 genera were found. Among them, 4 species: *Harpagomyia jacobsoni*, *Uranotaenia maculipleura*, *Armigeres (L.) omissus*, and *Aedes (S.) albolineatus* are new records to China; 3 genera: *Harpagomyia*, *Uranotaenia*, and *Orthopodomyia*, and 19 species belonging to the 7 genera are reported for the first time in Taiwan.—Author's summary.

DA APLICACÃO DE DDT APENAS EM FAIXAS PINTADAS NAS PAREDES INTERNAS DAS CASAS, EM ZONA DE TRANSMISSÃO DE MALARIA POR ANOFELINOS DO SUBGÊNERO "KERTESZIA": PRIMEIRAS PROVAS EXPERIMENTAIS. (The Application of DDT on Painted Stripes on the Interior Walls of Houses in the Zone of Malaria Transmitted by Anophelines of the Subgenus *Kerteszia*: First Experimental Tests.) By Rene G. Rachou and Milton Moura, Lima. 1951. Rev. Brasileira Malariol. e Doenças Trop. 3(1):36-47. The anophelines of the sub-genus *Kerteszia*, *cruxii* and *bellator*, have a marked preference for resting on painted stripes of the walls; the rate of specimens resting on these stripes is about 80 to 85% of the total ones captured in the rooms which have the stripes. Based on this preference the authors applied a 5% DDT oil solution on the stripes of two rooms of a house (with 5 rooms) in Caiacanga (Santa Catarina); they reduced by 80.2% the mosquito density in this house. In 2 control houses of the same locality this density increased 80.4 and 158.3%. These preliminary results are encouraging and the authors suggest a test in a locality, applying the insecticide only on painted stripes of the walls of every house.—Authors' summary.

ATTEMPTS TO UTILIZE MOSQUITO LARVAE IN A BIOASSAY METHOD FOR INSECTICIDE RESIDUES IN ANIMAL PRODUCTS. By R. C. Bushland. 1951. Jour. Econ. Ent. 44(3):421-423. A method

of detecting insecticide contamination of milk and meat by bioassay with mosquito larvae is described. Tests were made with butter-fat containing one of the chlorinated hydrocarbon insecticides—DDT, TDE, methoxychlor, lindane, chlordane, and toxaphene—against fourth-instar larvae of *Aedes aegypti* (L.). Some constituent of emulsified butter-fat rendered all these insecticides nontoxic to the larvae. Treating butter-fat with sulfuric acid did not remove all the substances that interfered with the toxicity of DDT and TDE, but did eliminate the ingredient that reduced the toxicity of lindane. Toxaphene and chlordane were not sufficiently toxic to *Aedes aegypti* larvae to be detected by the method that was effective for lindane.

In the tests with beef fat it appeared that acid treatment of larger quantities of chlordane-contaminated beef fat might be utilized in a bioassay with *Anopheles quadrimaculatus* larvae.—Author's summary.

ANNUAL REPORT MALARIA ERADICATION SCHEME MAURITIUS. 1950. 25 pages. This report is the second annual report released by the Malaria Eradication Scheme on the Island of Mauritius. The direction of the scheme remains in the hands of Dr. M. A. C. Dowling who is ably assisted by a chemist, an entomologist, and a group of field officers. The scheme is under the general direction of C. B. Symes, Officer in Charge of Colonial Insecticides Research. It was originally devised to determine whether *Anopheles gambiae* and *A. funestus*, introduced from Africa about 100 years ago, could be eradicated from the island by DDT and BHC residual sprays. The use of benzene hexachloride residual sprays was abandoned in 1949.

Apparently *A. funestus* has been eradicated but in view of the less pronounced effect of DDT on *A. gambiae*, it was decided to utilize "Malaria-riol," high spread larvicide containing DDT, in a more strenuous effort at species eradication. A total of 48,090 houses were sprayed during 1950 with 75,852 gallons of DDT wettable powder and DDT kerosene.—H. H. Stage.

ANNUAL REPORT OF THE MALARIA DIVISION, TRINIDAD GOVERNMENT, BRITISH WEST INDIES, 1950. 57 pages (processed). We were much interested again in seeing this annual report on work which was carried out under the direction of Dr. H. P. S. Gillette, Malariologist, and so ably assisted by Major R. A. Senior White, Entomologist, and Dr. F. R. S. Kellett, Medical Officer of the Malaria Division, Health Department of Trinidad and Tobago. Evidence that the work was ably directed is contained in the statement that, "there has been no epidemic of malaria in any part of the colony of Trinidad and Tobago during the year and there was an appreciable fall in malaria transmission." It was noted that DDT was effective against *Anopheles aquasalis*

for 8 months whereas under similar conditions Gammexane lasted 14 weeks. The control of mosquitoes still presents serious obstacles in rice and vegetable patches. Drainage is inadequate and oil cannot be applied in sufficient concentration. The use of high spreading oil with DDT is sometimes satisfactory but an insufficient staff makes regular treatment impossible. There were 14,957 homes treated with DDT residual sprays in Tobago and 23,795 in Trinidad during the year. The *Aedes aegypti* problem was surveyed and of 19,088 premises inspected, 3,441 were found to have been breeding in containers. Control operations against *A. aegypti* were begun in December 1950.—H. H. S.

LUTTE ANTIPALUDIQUE PAR LES INSECTICIDES A ACTION REMANENTE. Résultats des grandes campagnes. By Dr. E. J. Pampana, Chief, Malaria Section, World Health Organization. World Health Organization: Monograph Series, No. 3, 72 pp., price 5/-, \$1.00, Sw. fr. 4.00. A study by Dr. Pampana entitled "Lutte antipaludique par les insecticides à action rémanente" has just been published as No. 3 in the Monograph Series of the World Health Organization. Since the discovery of residual insecticides, such as DDT and HCH (hexachlorocyclohexane or BHC), malaria control has developed considerably throughout the world. In several countries where it was an historic scourge, malaria has ceased to be a public-health problem. This is the case, for instance, in Italy, Greece and Argentina.

In this well documented study, Dr. Pampana reviews the various malaria-control campaigns in progress in some thirty countries in four continents, the often dramatic results of which have been communicated to the World Health Organization. In general, they have been followed by a marked decline in malaria endemicity shown by a fall in the morbidity and mortality rates for this disease or by a fall in the malaria indices.

The information on dosages of insecticides used, period of treatment, number of persons or habitations protected, and cost of control per head of population will be useful to health authorities and all those taking part or interested in modern methods of malaria control.

This general survey is the first document based on statistical data to give a picture of the success of malaria control using residual insecticides on a world scale. In it can be followed the gradual regression of a very deadly endemic disease. This study will certainly be read with interest by all those concerned with problems of public health.—WHO Review.

MALARIA IN EQUATORIAL AFRICA. Report on the WHO Malaria Conference in Equatorial Africa. World Health Organization: Technical Report Series, No. 38, 72 pp., price 3/6, \$0.45, Sw. fr. 1.80. (Available also in a French edition.) The report on the Malaria Conference in

Equatorial Africa is now available as No. 38 of the World Health Organization: Technical Report Series. This conference, held at Kampala, Uganda, under the joint auspices of WHO and the Commission for Technical Co-operation in Africa South of the Sahara, brought together experts on malaria from all parts of the world. The report on their discussions gives a comprehensive picture of the prevalence and effects of malaria on the continent of Africa and suggests methods for the control, and possible eradication, of what an earlier conference termed an "insidious" disease.

Among the subjects treated in this report are: (1) the general distribution and prevalence of malaria in Africa, and the morbidity and mortality which it causes; (2) the species of plasmodia and characteristics of their strains, *Plasmodium falciparum* being named as the parasite most widely and evenly distributed throughout Equatorial Africa; (3) the species and subspecies of the vectors, including their bionomics; (4) hyperendemic malaria and its relation to immunity; (5) the economic importance of malaria in Africa; (6) methods of malaria control; (7) therapeutics; (8) research on malaria in Africa, including a list of the malaria-research projects now in progress; (9) organization and training of malaria-control personnel; and (10) international planning for malaria-control in Africa. Annexes to the report give suggestions for uniform reporting of field research in malaria control and a list of the conventional symbols for the representation of anopheles of the Ethiopian region.

Among the conclusions of the conference that may well re-shape public health policy in Africa south of the Sahara, are two on which agreement has been achieved between two contrasting schools of thought: first, the advisability of carrying out malaria control even in areas where the adult population has developed tolerance against the disease; and, secondly, the efficiency of residual-insecticide methods in controlling African malaria.

In addition to presenting valuable technical information, the report on the Malaria Conference in Equatorial Africa shows the importance of international cooperation in large-scale malaria-control programmes. For, as Sir John Hathorn Hall, Governor of Uganda, pointed out in his opening address: "Where there are no natural boundaries preventing the spread of an insect-borne disease, its eradication from a continental area will clearly require the most coordinated form of human effort."—WHO Review.

SUMMARY OF THE ANNUAL REPORT OF THE SALT LAKE CITY MOSQUITO ABATEMENT DISTRICT

FOR 1950. Don M. Rees, Board of Trustees Publication. 1951. This report is a summary of the twenty-first annual report of the Salt Lake City Mosquito Abatement District. The report contains an account of the 1950 mosquito abatement program including: entomological investigation conducted by the Department of Invertebrate Zoology and Entomology of the University of Utah; the report of Robert A. Wilkens, Manager of the district; and a report on the audit conducted by Lincoln G. Kelly and Company, Auditors. News items include a review of the third annual meeting of the Utah Mosquito Abatement Association, held at Weber College, Ogden, Utah, on February 17-18, 1950. Proceedings of the meeting were prepared and are available on request.

The 1950 program was a continuation of the revised methods initiated in 1949. After this year's trial the 1950 program was conducted on (1) an expansion and intensification of the inspection and treatment program in the controlled area, (2) an increased flexibility of daily work assignments of the field personnel to provide for the necessary labor requirements to insure the most effective control under constantly changing field conditions, and (3) the control program to be directed more specifically toward preventing large broods of *Aedes dorsalis* from emerging and migrating into the city. This program was adhered to throughout the seasons with very satisfactory results.

Light traps were operated in Salt Lake City each Tuesday and Friday night from May 29 to October 27, 1950. Each trap was operated for approximately forty nights. Comparisons of the average number of mosquitoes collected in each trap per night are made with the past five years beginning in 1945. The average in 1950 was 3.8, a total average lower than in any year since 1942. *Culex tarsalis* was the dominant species collected during 1950, constituting over 50 per cent of the total number collected. *C. pipiens* and *Aedes dorsalis* represented approximately 45 per cent with *Culiseta inornata* and *A. vexans* completing the list.

Accomplishments list a description of mosquito source treated and the number of inspections and fish planted, larvicides used and drainage. The report on cooperative drainage will be of interest to all mosquito workers. The Salt Lake M.A.D., Salt Lake City and Salt Lake County contribute an equal sum of money for this purpose. Funds are administered by a committee composed of representatives from each group. This committee approved expenditures of \$29,387.08 for dredging, leveling and filling.—T. G. Raley, Consolidated Mosquito Abatement District, Selma, Calif.