

REVIEWS AND ABSTRACTS

THE PLACE OF DDT AS AN ANOPHELINE LARVICIDE. By G. Macdonald. Inst. de Med. Trop. An. 4:391-411, 1947. Although much attention has been devoted to DDT as an adulticide, the potentialities of it as an anopheline larvicide have not been fully explored. The author believes it possible that in most European countries the breeding of *Anopheles maculipennis* Meig. could be terminated in one season, at small cost by the full utilization of DDT as a larvicide.

After a brief review of the application of DDT larvicides in various parts of the world, he gives a few examples of the use of oils, with a high spreading coefficient, in India, Iran, and Portugal. In one instance in Iran the use of a 5 per cent DDT-resin-oil solution (0.25 mixture of resin in crude gas or fuel oil) in a date palm irrigation system (70 x 82 metres) reduced the time of application from 1 day to less than 10 minutes. Previously the process called for 4 laborers, a supervisor, 108 litres of oil, spraying machines which had to be transported in a vehicle with a driver, plus a service station and a staff to keep the equipment in order. However, under the new system one man who could apply a small amount of DDT in a fraction of the former time, was sufficient. In Assam, the author sprayed a 5 per cent DDT solution, in a few seconds, over a water covered hyacinth swamp containing larvae of *Anopheles hyrcanus* (Pallas) and *A. barbivastri* V. d. Wulp with the result that the next day larval destruction was complete. Other swamp areas in Assam were treated similarly. Previously this extensive series of swamps had been considered untreatable as the cost of the oil method was prohibitive and the use of paris green was difficult and dangerous owing to the irregularities in the bottom of the swamp. Control measures would have necessitated a supervisor with a large crew of men with rafts to reach the center of the breeding places but through the use of the DDT-resin-oil solution, one man could treat whole areas in an hour.

By the application of 5 per cent DDT in spreading oils to a single spot and by taking advantage of the distribution provided by running water, Dr. Macdonald feels that anopheline breeding in swamps, rice fields, irrigation channels, and streams can be made so easy that it can be universally and cheaply carried out.—Helen Sollers, U. S. Bureau of Entomology and Plant Quarantine.

A PRELIMINARY EVALUATION OF SOME INSECTICIDES AGAINST IMMATURE STAGES OF BLACKFLIES (DIPTERA: SIMULIIDAE). By B. Hocking, C. R. Twinn, and Wm. C. McDuffie. Scientific Agriculture 29(2):69-80, 1949. DDT, gamma-benzene hexachloride, a pyrethrum-piperonyl butoxide preparation, toxaphene, and chlordane,

were evaluated as insecticides against immature stages of blackflies. Two airplane applications and 16 hand applications were made to streams in the vicinity of Churchill, Manitoba, Canada, in June and July 1947. The predominating species of blackfly in all experiments was *Simulium venustum* Say.

The application of DDT in oil solution by airplane at dosages of 0.26 pound and 0.48 pound of DDT to the acre, early in the season, controlled blackfly species in streams up to 1½ feet deep which flowed through the sprayed area, and prevented reinfestation throughout the remainder of the season.

Direct hand applications were made with DDT in fuel oil and as a wettable powder and an emulsion. All the DDT formulations gave good control at 0.1 p.p.m., applied for a period of 15 minutes. None of the other materials compared favorably with DDT.

Eggs of *S. venustum* appeared to be unaffected by DDT in fuel oil at a dosage of 0.1 p.p.m. applied over a period of 30 minutes. Pupae in treated streams showed no obvious ill effects from the insecticidal applications, except for gamma-benzene hexachloride at 0.1 p.p.m. applied for a period of 15 minutes. This material gave a 70 per cent reduction in emergence from treated pupae of *S. venustum*.—C. C. Deomer, Bureau of Entomology and Plant Quarantine, Orlando, Fla.

THE PUPAE OF THE MOSQUITOES OF NEW GUINEA. George Henry Penn. Pacific Science III (1):3-85, 58 fig. 1949. This, the first comprehensive work on mosquito pupae of New Guinea, embraces 68 species, or slightly over a third of the species now known of that fauna. Thirty-six species are fully described and illustrated for the first time, and the dorsal setae of all abdominal segments are illustrated for 45 species. Keys to thirteen genera and 24 subgenera of Culicinae are presented, as well as keys to the included species. The species of *Megarhinus* are reserved for a future paper, and the author did not have material of *Hodgesia* or *Mansonia*. *Bironella* is not separated from *Anopheles*. The keys are preceded by a five page discussion of features of taxonomic importance. The author presents a table comparing the nomenclature of the dorsal abdominal setae of Macfie (1920), Senevet (1930), Baisas (1936 and 1938), and Rozeboom and Knight (1946), and his slight adaptation of the terminology of Baisas (1938). He wisely did not adopt the numerical system of Rozeboom and Knight, but the reviewer believes that the numerical system proposed by Knight and Chamberlain (1948, in Proc. Helminth. Soc., Washington), will be welcomed by most workers in the field.

Because of the general neglect of pupae by sys-

tematists, it is well to point out the author's statement: "... the pupae of most species of the genera *Aedes* and *Culex* are more readily grouped into their respective subgenera than into their respective genera. On the other hand, specific differences seem to have been accentuated, and pupae of (some) very closely related species ... are more easily separated than are the adults."

The author is to be congratulated on this work. It is well organized and arranged. The keys and descriptions are in great part original, and complete enough for subsequent workers to use as a basis for comparison. A brief diagnosis is given of the salient features of most genera, subgenera and species, and this further enhances the usefulness of the work. The drawings of the abdomen are very carefully executed, but many workers would like to see figures included for the trumper of each species. Fifty references are cited.—Harold R. Dodge, Communicable Disease Center, Public Health Service, Atlanta, Georgia.

CHRONICLE OF THE WORLD HEALTH ORGANIZATION. 3(1):1-22. Jan. 1949. WHO, Palais des Nations, Geneva, Switzerland. 1949 subscription \$2.00. (U. S. Address: Columbia Univ. Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) This is one of a series of attractive booklets published monthly, in English, French, Russian, Spanish, and Chinese. Information is set forth in an interesting manner, often in some detail. The reports of the Expert Committees, abstracts of important WHO publications, news notes, and general activities are included. The "Chronicle," however, calls attention to the fact that it does not claim to be an authoritative record of the Organization's views, such as may be found in the "Official Records." The first 15 pages consist of the following: "First Session of the Expert Committee on International Epidemiology and Quarantine," "Malaria in Europe, 1938-1947," "Influenza in Europe," "Eastern Mediterranean Conference," "Serology of Syphilis," and "Penicillin in Venereal Diseases."—H. L. T.

THE MOSQUITOES OF BWAMBA COUNTY, UGANDA. VI. MOSQUITO BREEDING IN PLANT AXILS. Haddow, A. J. Bull. Ent. Res. 39(2):185-212, 7 plates. Aug. 1948. This paper is one of a series reporting studies on mosquitoes in an area of endemic yellow fever in western Uganda, northwest of Lake Victoria, in west central Africa. The principal vector of yellow fever in the inhabited area is *Aedes simpsoni* Theo., which was found naturally infected. This mosquito breeds in the water held in the leaf-axils of many cultivated food-plants, and the adults are "semi-domestic," daybiting, and prefer human blood.

The plants studied include wild and cultivated bananas (including plantains), colocasias ("elephant-ears," *Xanthosoma* spp.); pineapples; *Sansevieria* or "bowstring-hemp"; *Pandanus*, or "screw-pine"; *Dracaena* spp.; and *Canna* sp. The

most important of these from the standpoint of mosquito breeding were the colocasias, the pineapples and the "gonja" group of large cultivated bananas. Leaf-axils containing 4 to 8 cc. of water were the most favorable for *A. simpsoni*. Twelve consecutive monthly surveys of colocasia plants showed that *simpsoni* larvae were constantly present in their leaf-axils; fluctuations in numbers of larvae depended on the state of maturity and the harvesting of plants, rather than on rainfall. Collections of pupae from colocasias gave an estimate of 10 adults per plant per month, under favorable conditions. Predatory mosquito larvae seemingly reduce considerably the numbers of *simpsoni* larvae. The paper is an excellent account of much meticulous, well-planned work on the ecology of a semi-domestic mosquito.—W. H. W. Komp, N. I. H. Bethesda, Maryland.

COMBATE ESPECIFICO AO VETOR DE MALÁRIA, EM ZONA DE TRANSMISSÃO POR ANOFELINOS DO SUB-GÊNERO "KERTESZIA." Ferreira, Mária O. Resumos de Malariologia e Doenças Tropicais 1(1):17. 1948. (Brazil.) The principal anopheline vectors of malaria along the coasts of three Brazilian states, Paraná, Santa Catarina and Rio Grande do Sul, are species of the subgenus *Kerteszia*, which breed in water in arboreal bromeliads. Small towns in forested areas suffer severely from malaria. Application of herbicides to kill the bromeliads is impracticable, owing to the great height of the trees on which they grow. Removal of the bromeliads by hand was tried, but proved costly and dangerous. Removal of the forest about a town, followed by planting of cultivated crops in an inner zone, and reforestation of the outer zone with trees, especially *Eucalyptus*, which do not harbor bromeliads, is believed to be the method of choice in control of urban malaria transmitted by the *Kerteszia* species.—W. H. W. Komp.

MOSQUITO CONTROL AT ROSEMERE. Mimeo-graphed circular of Anti-Mosquito Committee, Rosemere Citizens Assoc. Inc., R. C. Gardiner, Chairman. 5 pp. 1948. Rosemere, Quebec, Canada. An interesting report has come from Canada. It tells the story of the struggle by a small community to fight the hordes of flood-water mosquitoes, with a less-than-minimum budget and volunteer labor.

Mosquito control has been in progress at Rosemere, near Montreal, since 1943. In that year, an Anti-Mosquito Committee organized crews of voluntary workers. They poured waste crank case oil on swamp areas and spread it with brooms; a method that has some effect in the deeply flooded swamplands in the North. The committee studied its mosquito problem carefully and was alert to the current developments in mosquito control elsewhere in Canada and in the United States. In 1945, a large size stirrup pump was acquired and fuel oil was used. In

1946, six small hand dusters were purchased and some 3 per cent DDT dust was applied at the rate of 1 lb. per acre. This gave excellent results on the spring brood of mosquitoes, but there was some hatching of other species when severe floods occurred later in the season. In 1947, the committee purchased five 4 gallon sprayers. It also had the use of a Buffalo Turbine duster. In addition to DDT dust a quantity of 25 per cent emulsifiable DDT was used. Good results were obtained using the equivalent of 3 gallons per acre of 1 per cent DDT spray in a single application. The Buffalo Turbine blower proved somewhat of an asset in dusting areas where flood waters were too deep for wading. In 1948, six more 4 gallon sprayers were purchased with \$50 granted by the Municipality of Rosemere. The committee divided Rosemere into 9 districts and appointed an organizer for each. These organizers were charged with the duties of arranging volunteer working parties of 6 to 12 volunteers, for checking breeding areas twice weekly and determining where spraying should be done. The program called for one application of 1 lb. of DDT per acre, with a further treatment if necessary. Plans were also made for fall treatment with DDT.—Robert L. Armstrong, East Middlesex Mosquito Control Project, Cambridge, Mass.

(A recent personal communication from Mr. Gardiner gives additional information. Unfortunately there was insufficient labor, and the 1948 results were about 50 per cent effective. This shortage of volunteer labor also made it impossible to carry out the fall program. This year (1949) the committee plans to use oil on the large open areas and DDT on the remainder. It plans to finish all work by May 1. An attempt is being made to establish a permanent organization with an advisory committee. They hope to obtain worthwhile financial support from Municipal authorities.—R. L. A.)

PROCEEDINGS OF THE 4TH INTERNATIONAL CONGRESSES ON TROPICAL DISEASES AND MALARIA. Dept. of State Publication 3246. 1948. Two attractive volumes carrying the proceedings of the 4th International Congresses on Tropical Medicine and Malaria came from the Government (U. S.) Printing Office in March (1949). The 1810 pages of these volumes are full of up-to-date information on all aspects of tropical medicine presented by the world's leading authorities.

As would be expected, a considerable part of these volumes deals with malaria and mosquito problems (pp. 601-946 in Vol. 1, and 1563-1608 in Vol. 2) with numerous references in many sections.

In addition to the material in these sections of the proceedings one article deals with new insecticides, one with the toxicology of the newer insecticides, one with the chemistry and formulation of insecticides and one with equipment for dispersing insecticides.

The addresses by Maj. Gen. Raymond Bliss, Dr. Fred L. Soper and Dr. Philip S. Hench at the exercises commemorating the demonstration by Walter Reed of mosquito transmission of yellow fever are of special interest and historic value.

The addresses presented at the evening meeting in commemoration of the 50th anniversary of the discovery by Ronald Ross of the method of transmission of malaria are also of much interest and value. They were presented by Professor George MacDonald, Dr. Paul F. Russell and Sir Malcolm Watson.

The contributions contained in these proceedings, reviewing as they do the accomplishment in preventive medicine during a period of unprecedented progress in that field, are of great value to medical men, sanitary engineers, entomologists and in fact to all those concerned with public health matters.

The articles are mainly in English with a few in Spanish and French. Discussion on the various papers is included. The books are illustrated with numerous charts and photographs with several plates in color, the typography is excellent and the bibliographies cover most of the important literature in the many fields treated.

The general secretary, Dr. Wilber A. Sawyer and the editors, Carolyn Whitlock and Gertrude Henderson are to be congratulated on a difficult job well and promptly done.

The volume can be purchased from the Supt. of Documents, Government Printing Office, Washington, D. C.; Volume 1 is \$5.00 and Volume 2 \$6.00.—F. C. Bishop.

SPECIES ERADICATION. THE ERADICATION OF ANOPHELES GAMBIAE FROM UPPER EGYPT 1942-1945. By Sir Aly Tewfik Shousha, Pasha, M.D., Under-Secretary of State, Ministry of Public Health, Cairo, Egypt. Bulletin of the World Health Organization, Vol. 1, No. 2, 1948, pp. 309-352. A severe epidemic of malaria, 71.5 per cent of the population of four villages, in the Lower Egyptian Nubia district in March 1942 heralded the presence of *Anopheles gambiae* in Egypt. The vector's presence was recorded at Aswan in July 1942. The northern limit was determined to be just north of the city of Asyut in September. The area invaded was a narrow strip of land 4,270 square kilometers, having a population of 3,000,000 people. The number of deaths from malaria in this area from 1942 through 1945 was estimated to be 11,889. The total number of deaths in 1945 and 1946 was 31.

The Gambiae-Eradication Service was created in July 1944 and from this date until 19 February 1945, the date the last *gambiae* was found in Egypt, an intensive and well organized campaign was waged. Extensive control measures were continued for a period of six months following the collection of the last *gambiae*, terminating at the end of August. The next three months, those most favorable to *gambiae*, were

used as a test period. During the test period 1,200 daily-paid workers, whose job depended on finding the vector, were engaged in extensive survey. Yet, no *gambiae* was found.

It was an excellent organization which carried out the eradication work. The Rockefeller Foundation representatives, Dr. T. L. Soper, Dr. J. A. Kerr, and Dr. D. Bruce Wilson helped organize the work along the lines used in the eradication of *A. gambiae* in Brazil. Dr. Kerr became Director of the Gambiae-Eradication Service and Dr. Wilson, Field Director in 1944.

The unit of the organization was the zone (darak) which was an area that one man, and a laborer, could cover in a week. The man in charge (mulahez) was responsible for larviciding only. Five zones comprised a district (magmoua) with a foreman (morakeb) in charge. His duties were to train and supervise the men in the zones and to make routine and systematic larval checks. Both the mulahez and the morakeb were required to record in detail all the work they performed and the materials they used.

A variable number of districts made up one post (dairah) which had a doctor or engineer in charge. Aside from the districts and zones under the dairah chief, there were mobile survey units for collecting and checking larvae and adults. These were called imago kashshafin and larva kashshafin. At the height of the campaign there were 612 kashshafins checking the work of 1,000 Paris-green mולהezin.

The post was responsible to the Division (moutikah) which had an experienced malaria doctor in charge. Field headquarters and laboratory was located at Asyut. At the peak of the campaign there were 10 divisions, 44 posts and 641 zones engaged in the eradication work.

A therapeutic service was established at Luxor in 1944 to treat the thousands of malaria patients. The area was divided into 16 therapeutic divisions with a chief malaria inspector and 80 doctors. There were 62 treatment posts with 117 chief inspectors, and 856 inspectors in the treatment zones.

Everything needed to control malaria in 1942 was scarce. The service chose Paris green dust (1 to 100) for the larvicide. Oil was used only until it could be replaced by Paris green. Pyrethrum was used for adult spraying and to facilitate adult checking. DDT was used as a residual spray in trains, boats and aeroplanes to prevent the spread of *gambiae*.

The figures on amounts of insecticide are given since it is a useful index of the amount of work performed. During the campaign 138 tons of Paris green were used, 718 tons of malariol, 146,173 liters of pyrethrum and 4,773 liters of (5%-10%) DDT were used.—A. B. Weathersby, Naval Medical Research Institute, Bethesda, Md.

A PRELIMINARY ACCOUNT OF THE BITING FLIES AT CHURCHILL, MANITOBA. By C. R. Twinn, B. Hocking, Wm. C. McDuffie, and H. F. Cross.

Can. J. of Res. 26(6):334-357. Dec., 1948. Published by Natl. Res. Coun., Ottawa, Canada. The observations on which this paper were based were made during the spring and summer of 1947 as a joint project of the Canadian Division of Entomology and the U. S. Bureau of Entomology and Plant Quarantine. The authors in a footnote name and acknowledge the valuable assistance rendered by other members of the party. The following abstract presented at the beginning of this article is a concise statement of the scope and content.

"The occurrence is recorded at Churchill, Manitoba, of 5 genera and 11 species of *Culicidae*, 2 genera and 12 species of *Simuliidae* (3 and possibly 4 of which may be new to science), and 2 genera and 10 species of *Tabanidae*. Data are presented on their habitats, life histories, habits, species association and succession, and relative abundance and distribution. Observations on the relationships of these insects to other organisms are recorded, including notes on their status as pests and their influence on human activities in the locality. Evidence is presented that female mosquitoes feed on the nectar of flowers and are efficient pollinators of northern orchids. A brief general picture of the ecology of the locality is given; also details of weather conditions during the period of the survey, and some microclimate data. Illustrations from photographs showing typical habitats of many of the species dealt with are included."

The article is well organized, carefully prepared and interestingly presented. The description of the area, accompanied by 12 photographs, clearly illustrate the different types of situations investigated. Perhaps the most valuable contribution is the specific data presented for each species. This consists, for most of the major species, of exact dates on development, emergence, abundance, feeding habits, seasonal duration, and is accompanied by some specific meteorological data. In addition, information on the area or species involved obtained from other sources, is frequently cited throughout the article. The most unfortunate circumstances pertaining to the investigation is the recognized inability to identify with accuracy "flown" adult female specimens of certain dark-legged species of mosquitoes. This invalidated the use of much data in its application to specific species. The article is highly commendable and in recognition of the importance of "species sanitation," contains valuable information concerning the biting flies of subarctic North America.—Don M. Rees, U. of Utah, Salt Lake City, Utah.

REPORTS FROM MOSQUITO CONTROL DISTRICTS — H. L. T.

SUMMARY OF THE ANNUAL REPORT OF THE SALT LAKE CITY MOSQUITO ABATEMENT DISTRICT FOR 1948. Prepared by Don M. Rees, 401 City

and County Bldg., Salt Lake City, Utah. During the past year, an area of 182 sq. miles was supervised by the District. The tax levy was .3 of one mill for 1948 and will be the same for 1949. The Report states that during 1948, control work "was effective but the results were not as satisfactory as they were in 1947." Public complaints were more numerous than in the past, and this is attributed to the increase in numbers of mosquitoes and the change in dominant species. Prior to 1948, *Culex tarsalis*, a timid, night biter, was the dominant species. According to light trap data, this species decreased by 48 per cent, whereas an aggressive, vicious biter, *Aedes dorsalis*, increased by 28 per cent. *Aedes vexans*, with similar habits, increased 6 per cent. It was late in the season when some black gnat control was begun; a residual spray and "knock-down" adulticide were used.

SACRAMENTO COUNTY-YOLO COUNTY MOSQUITO ABATEMENT DISTRICT. First annual report. July 1, 1947-June 30, 1948. 24 pp. 5 plates. George Umberger, Sup. Rm. 216-D, Court House, Sacramento, Calif. This district covers 2,013 sq. miles, including valley, foot-hill, and delta sections. Malaria is endemic, and encephalitis an ever-present threat. Fourteen species of mosquitoes are listed, the most prevalent, *Anopheles freeborni* and *Culex tarsalis* being vectors of malaria and encephalitis respectively. The tax rate for the year was set at 2¢ per \$100.00 assessed valuation.

DADE COUNTY ANTI-MOSQUITO DISTRICT 14TH ANNUAL REPORT. 1948. 13 pp. Fred H. Stutz, Director; James H. Heidt, Entomologist. Rm. 1909 Dade Co. Court House, Miami, Fla. No *Anopheles albimanus* were collected in the County in 1948. Mosquito light traps yielded 19 species of mosquitoes. *Psorophora confinnis* was more annoying during the year than salt marsh species. Airplane spraying by a commercial firm covered approximately 15,580 acres. The cost per acre averaged .254¢ (excluding truck servicing, mixing, and supervision). A laboratory has been set up, and preliminary field work on the difficult project of sand fly abatement was started during the year.

EIGHTH ANNUAL REPORT OF THE VIRGINIA BEACH-PRINCESS ANNE COUNTY MOSQUITO CONTROL COMMISSION. July 1, 1947-June 30, 1948. 6 pp. R. E. Dorer, Vice-Chairman; Richard Carter, Superintendent. The Commission personnel used one jeep equipped with a pressure sprayer and a fogger. With a new larvicide and this jeep, a greater efficiency has been obtained. As many as 58 miles of roadside ditch have been sprayed in one day. All inspectors carry "pocket-size" pressure sprayers, holding enough larvicide to

treat about 150 feet of ditch or numerous small breeding areas. The most perplexing problem is control of *Mansonia perturbans* breeding in a State Park.

ANNUAL REPORT WARWICK COUNTY MOSQUITO CONTROL COMMISSION. July 1, 1947-June 30, 1948. 3 pp. S. Gibson and J. C. Morris, Commissioners; N. S. Beaton, Sec.-Supt., Hilton Village, Va. The cost of mosquito abatement in the county (est. pop. 35,000) was about 32.9¢ per capita. A new mixture, fuel oil, DDT, and a spreader called Triton B-1956, was used as a larvicide, with a noticeable decrease in expenditure because of the efficiency of the spreader. Of 2,789 backyards inspected, only 7 per cent revealed mosquito breeding places; this good record is attributed to the fine cooperation of the property owners who aided in the elimination of such sources of infestation. To date, there are approximately 30 miles of concrete-lined ditches in the county.

ANNUAL REPORT ELIZABETH CITY COUNTY MOSQUITO CONTROL COMMISSION. July 1, 1947-June 30, 1948. 3 pp. S. M. Gibson and W. R. Freeman, Jr., Commissioners. N. S. Beaton, Supt. Mosquito abatement in this county (est. pop. 54,000) was carried on at a cost of 23.7¢ per capita. A solution of DDT, D-30, and Triton B-1956 was added to the fuel oil used for larviciding; the spreading power of the larvicide was greatly increased. For example, 710 gallons covered 1,062,900 lineal feet of ditch. Concrete ditch liners were installed during the year; projects call for a continuation of this installation in the future, several thousand more lineal feet being planned.

ANNUAL REPORT OF THE TOLEDO AREA SANITARY DISTRICT, YEAR 1948. 27 pp. H. A. Crandell, Supt., P. Bruce Brockway, Jr., Field Supervisor. 5015 Stickney Ave., Toledo 12, Ohio. This second annual report devotes the first 5 pages to a history, description, and mosquito control problems of the District. Chapters on entomological data, control operations, etc., follow. During 1948, 25 species of mosquitoes were collected. A large-scale experimental pretreatment program for the control of early spring or woodland breeders was undertaken; the results exceeded expectations. In the course of this project, wettable and dry DDT dusts were compared; and "repeated checks and larval counts indicated there was no observable or significant difference" between them in larvicidal effectiveness. For most effective adult control, the District added 4 per cent DDT by weight to a Gulf Spray "Insect Killer" (wartime formula) containing 3.55 organic thiocyanates. Plans for 1949 include construction of a 50 ft. propagating pond for *Gambusia*.