

provide a reliable index to the relative number of flies in the congregation. An empirically justified index based on the average size of a constant number of the highest counts has been used as a guide for timing fly control activities in both individual establishments and in city-wide campaigns. It can also be adapted for use with blow flies (Calliphoridae).—W. M. UPHOLT.

~~28664 C.A. Holway #618~~
 PRELIMINARY STUDIES ON THE CONTROL OF BLOW FLIES WITH DDT. By W. C. Baker and L. G. Schwartz (U. S. P. H. S., Communicable Disease Center, Technical Development Division, Savannah, Ga.). Public Health Rpts. (Abstract.)

Preliminary tests were made with DDT for the control of blow flies (esp. *Cochliomyia* sp. and *Lucilia* sp.), at a fish market, an abattoir, a hide processing plant, and a seafood plant, using 5 per cent DDT-xylene-Triton X-100 emulsion applied at the rate of 200 and 300 mg. DDT per square foot. By means of the grill method of measuring the fluctuation in fly populations, the variation in the degree of control achieved was found to be dependent to a large extent upon the relationship between the night resting places of the flies and the extent to which such places were treated. When only the area about the daytime breeding places of the blow flies was treated, control was obtained for a 2 to 3 week period. When night resting places were treated in addition to the daytime feeding places, the control obtained was greater and lasted effectively for periods up to 3 months.—W. C. BAKER.

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EFFECTS OF DDT MOSQUITO LARVICIDING ON WILDLIFE. Part I. The Effects on Surface Organisms of the Routine Hand Application of DDT Larvicides for Mosquito Control. By Clarence M. Tarzwell (Technical Development Division, Communicable Disease Center, U. S. P. H. S.). Public Health Reports 62(15):525-554. 1947. (Abstract.)

Quantitative sampling of the surface forms and counts of dead organisms on the water surface 24 hours after treatment were the methods used in this study. Routine applications of DDT as a dust caused little apparent damage to the surface organisms as indicated by gross observations. Paired square-foot surface samples taken before and 48 hours after treatment indicated few significant changes due to treatment. The seasonal trend of the population of surface organisms was somewhat affected by routine treatments with dust at the rate of 0.1 pound of DDT per acre, but the changes were not as great as those caused by treatments with solutions of DDT in fuel oil. DDT-fuel oil solutions killed the large surface insects such as Dytiscidae, Gyrimidae, Hydrophilidae and Corixidae at concentrations as low as 0.025 pound of DDT per acre. However, the kills resulting from applications of 0.05 or 0.025 pound of DDT per acre were proportionately much less than those resulting from applications

at the rate of 0.1 pound per acre. The seasonal effects of routine DDT treatments as indicated by a comparison of the population of surface organisms in the treated and check ponds were quite marked. There was an increase in the number of Oligochaeta, Nematoda, and Copepoda, and a decrease in the Chironomidae, Hemiptera, Coleoptera and Ephemeroptera. Insects as a group decreased in number in the treated ponds with the largest decrease occurring among the Chironomidae. The net results of these changes are difficult to evaluate, but it appears that there is some reduction in the available supply of fish food. Reductions noted to date, however, have not been sufficient to affect the breeding stock; and since treatment is in localized areas, it is probably not sufficient to limit seriously the fish population by restriction of the food supply.—Author's Abstract.

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 THE AUSTRALASIAN ANOPHELINES AS VECTORS OF MALARIA. By I. M. Mackerras. Med. Jour. Australia 1(1):1-8. Jan. 4, 1947.

Dr. I. M. Mackerras presents some of the data accumulated during and since the war concerning the Australasian malaria vectors. Studies on the "vector qualities" were carried out in so far as possible, an attempt being made to judge susceptibility to infection, abundance, association with man, avidity for human blood, and longevity.

Since all Australasian species were found to be apparently highly susceptible to malaria infection, that criterion is not a limiting one. Abundance, although a basic vector quality, must be weighed with the other factors because some species are very abundant yet not important transmitters, e.g., *Anopheles bancrofti* at Cairns and *A. longirostris* in parts of New Guinea. None of the Australasian anophelines are "domesticated" but *A. punctulatus punctulatus* and *A. p. farauti* show a tendency to concentrate near native villages in New Guinea, a habit not shown by other anopheline species, either there or on the mainland of Australia.

Avidity for human blood, based on precipitin tests, has been hard to evaluate because a true picture is not presented if specimens are collected from native huts, an unnatural resting place for Australasian species. Collections of recently engorged specimens from their natural resting places were desirable and significant, but often difficult to obtain. In evaluating the evidence, however, Dr. Mackerras concludes that *A. punctulatus punctulatus*, at least in the Milne Bay population, is strongly anthropophilic, *A. p. farauti* associates with man and his domestic animals but has no particular feeding preferences between them, and a few species strongly prefer other animals.

Nothing is known of survival rates and duration of life of Australasian anophelines in nature, so the author obtained longevity data from laboratory colonies maintained at Cairns. The percentage of 4 species studied surviving to 17 days

are as follows: *A. p. punctulatus*, 53 per cent; *A. annulipes*, 38 per cent; *A. p. farauti*, 23 per cent; and *A. amictus amictus*, 1 per cent.

Taking the above vector qualities into consideration, the Australasian anophelines are placed into the following groups:

Proven dangerous vectors: *Anopheles p. punctulatus* Don. and *A. p. farauti* Lav.

Potential vectors under locally favorable conditions: *A. annulipes* Walk., *A. bancrofti bancrofti* Giles, *A. subpictus* Grassi, *A. amictus hilli* W. and L., and *A. a. amictus* Edw.

Unknown, but at most locally significant: *A. meraukensis* Venh. and *A. novaguensis* Venh.

The primary vectors of New Guinea and the islands are the races of *Anopheles punctulatus*, the vector of Northeastern Queensland is *Anopheles p. farauti*, and the presumptive vector of sporadic malaria in the South is *Anopheles annulipes*. The vectors of the Northern Territory, however, are still undetermined. No permanent change in the distribution and amount of malaria on the mainland of Australia is expected unless a new vector is introduced. The possibility of introduction of *A. punctulatus punctulatus* into the tropical parts of the mainland cannot be taken lightly.—ROY W. CHAMBERLAIN, The Johns Hopkins University, Baltimore, Md.

THE EXPERIMENTAL USE OF DDT SPRAYS AS MOSQUITO LARVICIDES. By E. H. Arnold, Frederick F. Ferguson, and William M. Upholt (Malaria Control in War Areas, U. S. Public Health Service). Public Health Rpts. Suppl. 186:66-79. 1945.

Studies to determine the usefulness of DDT when substituted in part for fuel oil in anopheline larviciding are reported. Applications were with hand equipment, both compressed air sprayers and knapsack sprayers, and results were checked by dipping for larvae before and after treatment. Several types of application were tried: (1) a tight emulsion of No. 2 fuel oil containing DDT and water; (2) a quick-breaking emulsion of the same type (referred to as surface application); (3) a suspension produced by dissolving the DDT in ethyl alcohol and then diluting with water; and (4) bottom applications obtained by dissolving the DDT in a heavier-than-water solvent. Solvents tested included pine oil, sulfonated pine oil, xylene, kerosene, and a gas condensate liquor, as well as No. 2 fuel oil. In the tight emulsion, Triton X-100 was used as emulsifier; and in the quick-breaking emulsions, B1956 or Arvic Syntex A was used as emulsifier. Intracol was used as a dispersing agent in the alcoholic suspensions.

The bottom application was impractical to apply, but all of the other types of applications resulted in good control of mosquito larvae when applied at the rate of 0.1 pound DDT per acre. No appreciable residual effects were noted at

dosages that were not obviously harmful to wildlife. Laboratory evidence supported the field observation that the distribution of the DDT, and thus its toxic action, was limited to the distribution of the solvent.

Further laboratory investigations indicated that one important factor in the failure to obtain residual effectiveness in field application was the inactivation (without decomposition) of the DDT by some factor in the bottom-mud complex.

Limited dosage-mortality and time-mortality studies in the field indicated that good larval control could be obtained with dosages as low as 0.006 pound per acre with some types of application.—W. M. UPHOLT.

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TECHNIQUES AND APPARATUS USED IN EXPERIMENTAL STUDIES ON DDT AS AN INSECTICIDE FOR MOSQUITOES. By S. W. Simmons and Staff (Malaria Control in War Areas, U. S. Public Health Service). Public Health Rpts. Suppl. 186:3-20. 1945.

Window traps can be used for the determination of the subsequent kill of mosquitoes leaving rooms treated with DDT. The greatest difficulty has been experienced in determining effective kills and in keeping the mortality in check cages at a minimum. Humidity, wind, and temperature are factors of outstanding importance in the well-being of mosquitoes held in cages. Mortality due to natural causes or to handling should be kept below 20 per cent. Experiments should be conducted in areas having large mosquito populations in order to secure significant catches in the window cages.

The wall-cage test is a biological method of determining the residual toxicity of treated walls. Insects placed in glass chambers were exposed to treated walls for specific time intervals and then held 48 hours for observation of mortality.

The wall-cage test has been used successfully with both house flies and mosquitoes and undoubtedly could be adapted for testing other insects. The accuracy of the results, particularly when testing mosquitoes, depends to a large extent on the careful handling of the specimens both during and after the test.

A rapid, uniform, accurate, and widely applicable laboratory technique has been devised for testing the effect on adult mosquitoes of spray residues on various surfaces. Panels having a total surface of 1 square foot are fitted into a wooden framework and adult mosquitoes are introduced into the exposure chamber formed by the panels. After known periods of time they are removed and held for 48 hours to determine mortality. Transfer of adult mosquitoes from chambers to cages is accomplished by air currents. Each complete test requires approximately 15 minutes and no injury to mosquitoes or spray residues is evident. Uniform comparable results have been attained in replicated tests and good correlation with field results has been obtained.

The techniques employed in the laboratory test-