REVIEWS AND ABSTRACTS

EXPERT COMMITTEE ON INSECTICIDES, FOURTH REPORT, WORLD HEALTH ORGANIZATION. WHO Tech Rep't Series No. 54. Geneva, December 1952. $0.65.

This report sets forth specifications for certain common insecticides and their formulations. DDT, BHC, methoxychlor, chlordane and dieldrin are described as technical, water-dispersible and emulsion concentrates. Aerosols are defined and new aerosol formulations are given. Protective measures for the prevention of insecticide deterioration are presented. Particle size and shape in relation to biological efficacy are discussed. Diluents, solvents and emulsifiers are recommended. The report is concluded with several suggestions for sampling, testing aerosols and solvent-pressurized dispensers, aerosol test methods for flying insects and a chart of weights and measures. The contents of this report are practical, workable and complete. The data are unique in that they can be applied to insecticides on an international basis.

Although the report is prefaced with the statement that its contents do not necessarily represent the decisions or the stated policy of the World Health Organization, we were impressed by the character and the international recognition of the committee members which is reflected by every part of the report.

The members of the committee are Dr. R. A. E. Galley, Office of the Lord President of the Council, London, United Kingdom of Great Britain and Northern Ireland, chairman; Dr. H. L. Haller, assistant chief, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C., U. S. A., vice-chairman; Dr. H. Mazzari, Chief, Chemical Laboratory, Division of Malariology, Ministry of Health and Social Welfare, Maracay, Venezuela; Dr. Rajindar Pal, Assistant Director, Malaria Institute of India, New Delhi, India; and, Dr. J. Treboux, Laboratoire de Recherches, J. R. Geigy, S. A., Basle, Switzerland. Dr. F. P. Coyne, Pest Control Development and Technical Services, Imperial Chemical Industries, Ltd., Randle, Runcorn, Cheshire, United Kingdom of Great Britain and Northern Ireland is reported present as an observer. Mr. J. W. Wright of the Malaria Section WHO served as secretary.

Buyer-seller agreement on insecticides during procurement dealings is stressed as necessary for efficiency and satisfaction. The committee sets forth certain definitions, for example:

	Particle size
Coarse spray	400 microns and above
Fine spray	100–400 microns
Mists	50–100 microns
Aerosols	0.1–50 microns

The definitions are not exactly as some of us have been using but are worth much toward uniformity of understanding.

An excellent discussion concerning the use of aerosols on board aircraft is given by the committee. Among their important observations their report states that

1. Size of particles: (a) not more than 20% by weight of the aerosol shall consist of particles of diameter greater than 30 microns; (b) not more than 1% by weight of the aerosol shall consist of particles of diameter greater than 50 microns.
2. The valve shall not dribble before, during or after release of the aerosol.

In aircraft, for quarantine purposes, the ventilation system of the aircraft must be stopped and all openings to the outside kept closed during the time the insecticide is being released and for a period of at least 5 minutes, and preferably 10 minutes, thereafter. The insecticide solution must be dispersed at a rate of not less than 10g per 28 cubic meters (1,000 cu. ft.) of enclosed space in the aircraft, and must be released evenly throughout all compartments accessible from inside the aircraft.

Those who will find this report valuable will be interested in the recommendations of this Expert Committee. From their recommendations it is interesting to note the paucity of certain data most necessary to good formulating, accurate testing and biological efficiency.—John M. Hirst, LCDR MSC USN, Alameda, California.

(The Editor of Reviews and Abstracts calls attention to the fact that in the United States, World Health Organization publications may be obtained from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y., and in Canada from The Ryerson Press, 299 Queen Street West, Toronto, Ontario.

The names and addresses of agents in other countries may be obtained from the Editor of Reviews and Abstracts, or orders may be sent to the World Health Organization, Sales Section, Palais des Nations, Geneva, Switzerland.)

INSECT PHYSIOLOGY, Kenneth D. Roeder (Editor), New York, John Wiley & Sons, Inc., 1100 pp., 1953. This is the first comprehensive book on *Insect Physiology* to be published in this country. It is the result of a group effort by fifteen authors, led by the editor, to "summarize and evaluate the major trends in experimental research on insects." The discussion in the text relates to the following areas: integument and cuticle, respiration and metabolism, blood and circulation, the alimentary system, nutrition, excretion, neural activity and the nervous system, sensory reception, flight, behavior and social activities, embryonic and postembryonic development, regeneration, hormones in molting and metamorphosis. Anatomical details are included only as would seem to

an author necessary to elucidate function. The text is supported by 56 tables and 237 figures. There are 59 pages of index and about 107 pages of references to literature. With each reference are numbers indicating the text pages on which the citations are made.

Those who have contributed to the thirty-two sections or chapters of this book are: Raimon L. Beard, Dietrich Bodenstein, John B. Buck, Leigh E. Chadwick, Max F. Day, V. G. Dethier, George A. Edwards, Darcy Gilmour, Sam C. Munson, Robert L. Patton, A. Glenn Richards, Kenneth D. Roeder, Theodore C. Schneirla, William Trager, and Douglas F. Waterhouse.

The preface points out that this volume covers the literature up to but, in general, not later than 1951 and that much published work has not been included in the discussions because of limited space; hence, the sections are intended as critical rather than complete reviews. Information on mode of action of enzyme inhibitors, drugs, and other chemical agents has been included to provide a closer link between physiology, biochemistry, and entomology. The editor, in this preface, also emphasizes that insect physiology is not an isolated area of knowledge, that the insect physiologist is also a comparative physiologist, and that the physiologist's viewpoint has much to contribute to problems of insect control. Finally, the hope is expressed that this book may interest both undergraduate and graduate students of physiology, as well as other physiologists, insect morphologists, systematists, and applied entomologists.

It is not possible to review in a short space, in detail and critically, a book of this size and complexity. It is evident that this volume is intended more as a reference book, more as a survey of the field, than as a classroom textbook. An insect physiology textbook really suitable for classroom purposes has not yet come to the reviewer's attention; yet it would seem that this volume might be more suitable for this purpose than any book the reviewer has yet seen.

In a volume of this kind made up of contributions from different authors, some difference in quality and quantity of the sections is to be expected. Undoubtedly different readers will find various sections of more interest to themselves than others and may not believe that some portions of the book cover a particular area as critically or as completely as they would wish. Dr. Roeder, however, assisted by his collaborators, seems to have accomplished much in coordinating the various subject matter areas and in molding them into an interesting and useful volume. The reviewer feels that this first attempt on the part of a group of investigators in this field is a good one and that this volume represents a significant step forward in the field of insect physiology in this country.

A further contribution that undoubtedly would be of great assistance would be a smaller and simpler, and less expensive, classroom textbook suitable for courses in insect physiology currently being offered in entomology or other departments in colleges and universities in this country, often by teachers who are not primarily physiologists, to students, many of whom are likely to enter entomological areas other than insect physiology. Such a simplified text, together with the present volume for more detailed references, would make a combination extremely useful to many teachers. Perhaps some day one of the contributors to the book reviewed here will see fit to undertake such a task.

This book on *Insect Physiology* is recommended to all who are interested in the various aspects of this developing field.—J. Franklin Yeager, National Institutes of Health, Bethesda 14, Maryland.

BIOLOGIE D'ANOPHELES GAMBIAE. RECHERCHES EN AFRIQUE-OCCIDENTALE FRANCAISE. By M. H. Holstein. World Health Organ. Monogr. Ser. 9, 176 pp., 388 refs. French. English Summary, $2.00. 1952. The author condenses into an excellent book not only the previous studies conducted by other workers on *Anopheles gambiae* Giles but also his own work in French West Africa. He covers the distribution of this species in the Ethiopian region and French territories, seasonal variation, climatological information, and keys to fourth instar larvae, male and female adults of French West Africa, and morphological study of each stage. Two extensive chapters are devoted to the biology of the early stages and adults.

As the former classification of breeding places proved unsatisfactory, the author has suggested a division into two large categories—inorganic and organic breeding places according to the fauna and anopheline associations. The shortest life cycle was found in breeding places where temperatures were high and the content of the organic matter was less than 1.25 mg., viz. residual rain pools during a rainy season.

Holstein found that under laboratory and field conditions female *A. gambiae* are able to survive the long dry season in the Sudan by aestivating. Dark corners of native huts, destroyed huts, crevices in rocks, and tree holes are among the places of aestivation listed. In the laboratory females were found to aestivate up to 156 days. Females become active when the relative humidity is kept above 80 percent.

A. gambiae is responsible for epidemic outbreaks or high endemicity of malaria within certain limited zones while *A. funestus* was found to cause the average endemic state of the disease.

The author, after studying chiefly the geographical variations of *A. gambiae melas* along the coast of French West Africa, gives an account of his work on the differentiation between the zoophilic and anthropophilic forms of *A. gambiae*. —Helen Sollers, U. S. Dept. Agriculture, Washington, D. C.

CONVERSION TABLES AND EQUIVALENTS FOR USE IN WORK RELATING TO INSECT CONTROL. R. H. Nelson. U. S. Dept. Agric. Bureau of Entomology and Plant Quarantine Circular E-517, revised.

21 pp. May 1952. The opening paragraphs and the table of contents of this publication speak for themselves.

"In the literature on economic entomology the weights and measures used in expressing concentrations and dosages of insecticides may be in one or more of three systems—the United States, the imperial (British), and the metric. Since information on the relationships and equivalents in these systems is not always readily available to entomologists in the field, it has been assembled here for their benefit. The data on equivalents are taken principally from publications of the National Bureau of Standards and the International Critical Tables. A comparative discussion of United States and British units by Bearce and a paper by Irwin were sources of valuable information.

"Tables of equivalents for use in diluting insecticides, methods of calculating concentrations on the basis of active ingredients, and certain other miscellaneous information useful to entomologists working with insecticides have also been included.

"The measurement equivalents are carried out to sufficient decimal places to furnish accurate figures for precise laboratory work. They can be rounded out at the decimal place best suited for the equipment of the individual worker. The concentration equivalents have been carried out one to three places. In recommendations for practical use it is suggested that values be given as whole numbers or in steps of one-half wherever possible without gross error."

The major headings in the Contents are: Mass; Capacity—liquid measure; Capacity—dry measure; Linear, square and cubic measure; Diluting insecticidal chemicals; Dosage equivalents and relationships; Fumigation; Miscellaneous; Literature cited.

Examples are given of some of the problems which might arise in the field; and these are solved in the text by means of simple formulae and arithmetic and the use of tables.—H. L. T.

EXPERIMENTAL USE OF A HELICOPTER AS A LARVICIDAL AIRCRAFT FOR THE CONTROL OF *Anopheles quadrimaculatus*. By W. F. Wilson, E. A. Philen, and C. W. Kruse. Proc. New Jersey Mosquito Exterm. Assoc. 1952. pp. 117–131. Studies were made to compare the Bell helicopter, Model 47-D, with a fixed-wing Vultee BT-13 plane as a larvicidal aircraft for the dispersal of sprays for the control of *A. quadrimaculatus*. The two types of aircraft produced similar spray spectra and similar effective swath widths. Certain large areas were treated in approximately the same time by the Vultee flying at 120 miles per hour and the helicopter flying at 60 miles per hour; this was due to the difference in turn time involved (43 sec., Vultee, and 17 sec. helicopter). Reservoir treatment-time studies showed that the total time involved for each type of ship was within such limits that completion of a daily larvicidal operation could be easily accomplished before atmospheric conditions became unfavorable. General observations indicated that spray particles settled at similar rates with the Vultee flying at 120 miles per hour and the helicopter flying at 40 and 60 miles per hour, but below 40 miles per hour the downwash of the helicopter appeared greater, and at hovering, this factor was difficult to measure due to the very high velocities of the spray particles. All factors considered, spray speeds of 40 to 60 miles per hour were considered more favorable for routine treatment with the helicopter than slower speeds. The helicopter, when in good mechanical condition and flown by a skilled pilot, can be expected to handle the routine larvicidal load of a single reservoir as effectively as the fixed-wing Vultee. The investigation and field demonstration led to the general conclusion that the helicopter equaled or in some instances, because of superior maneuverability, slightly exceeded the performance of the Vultee as a larvicidal aircraft for the control of *A. quadrimaculatus*.—Authors' summary.

INTERIM REPORT OF THE DISTRIBUTION OF THE MOSQUITOES OBTAINED IN THE NORTHERN INSECT SURVEY. T. N. Freeman, 1952, Environmental Protection Technical Report No. 1, Defence Research Board, Ottawa, 45 pp. This is a preliminary report of the distribution of the mosquitoes of northern Canada. It is based on those species that have been reared by the Northern Insect Survey parties from 1947 to 1950 inclusive. Information was obtained on 43 species at 29 Arctic and Subarctic localities. Only four species occur in the tundra regions, two of which, *Aedes nigripes* (Zett.) and *Aedes pullatus* (Coq.), occupy similar habitats in northern Europe and Asia. *Chaoborus, Eucorethra,* and *Mochlonyx* are included in the 43 species. Distributional maps are given for each species.—H. H. Stage.

SINTESE DAS ATIVIDADES DO SERVIÇO NACIONAL DE MALÁRIA DO BRASIL NO DECÊNIO 1942–1951—CAMPANHA CONTRA A MALÁRIA, A DOENÇA DE CHAGAS E A FILARIOSE. By F. M. De Bustamante. Rev. Brasileira de Malariologia e Doenças Tropicais 4(3):231–244. Rio de Janeiro 1952. The author has written an abbreviated report of the activities of the National Service of Malaria between 1942 and 1951. Before 1950, the combat against malaria constituted the main objective of the Service, but from then on a program of control of American trypanosomiasis (Chagas' disease) was started, to comply with an executive order issued in December of that year. In August 1951, the Minister of Health directed the N.S.M. to take up the task of studying the incidence of bancroftiasis in Brazil and to carry out adequate control measures wherever indicated by already known or future findings. The work against bancroftiasis was begun in that same year with the realization of two surveys. Before the advent of DDT, the fight against malaria was mainly based on the classical methods of

antilarval measures (hydraulic sanitation work and application of larvicides) in the area where the disease is transmitted by species of the subgenus *Nyssorhynchus (darlingi, tarsimaculatus* and *albitarsis)* and by the picking up of bromeliaceae and the destruction of woods infested by these epiphytes in the districts where the vectors are of the subgenus *Kerteszia (cruzii* and *bellator).*

At present, the malaria control is based essentially in the spraying of DDT inside the dwellings, this method having been applied, during the year 1950 in 2,603,023 houses distributed in about 50 thousand localities of almost 900 counties, with an approximate aggregate population of 25 million. The paper is illustrated with data demonstrating the excellence of the results obtained through the use of DDT. The reduction of the incidence of the disease in the sprayed areas is in general very good (90 per cent and up).

The campaign against Chagas' disease was begun in the second semester of 1950. . . . The first stage of the campaign against bancroftiasis includes epidemiological surveys, already begun in several cities of the country, and the combat against this disease in the city of Belem, state of Para consisting mainly in introdomiciliary application of BHC. 43,000 houses of the city will be sprayed, quarterly, with an average dose of 300 milligrams of the gamma isomer per square meter in each application. The known carriers of microfilariae will be treated with Hetrazan, aiming at the reduction of the source of contamination of *Culex fatigans,* by far the principal mosquito vector of the disease.—Author's English summary.

STUDIES ON THE BIONOMICS OF *Anopheles aquasalis* CURRY, 1932. Senior-White, R. A. Indian J. Malariol. 5:294–403; 5:465–512; 6:29–72; 1951–2. This is one of the most extensive accounts of a mosquito species which has appeared for many years. Although it relates to a single species or species group and mainly to Trinidad, it contains much information and comment of wider import.

The paper is divided into three parts and nine sections as follows. Section I: Introductory, 6 pages of review. Section II: Races in *A. aquasalis;* 8 pages, in which it is suggested that residual DDT applications in houses have led to the evolution of a primarily zoophilic race, by selectively killing females with low maxillary index. Section III: one page on Distribution in Trinidad. Section IV: General breeding ecology, 3 pages covering egg production and larvel requirements. Section V: Duration of a complete generation, 6 pages; the duration is estimated from laboratory observations, and periodical sampling of larval populations. Section VI: Detailed breeding area studies, 20 pages on typical plant associations, predators, and other ecological factors. These sections, with 55 references, 38 tables, and a chart make up part I. Part II consists of Section VII: Adult bionomics, 31 pages, with 24 references, 10 tables and 2 charts, and deals with such matters as daytime resting places; predators and mortality during the gonotrophic cycle; activities in relation to microclimate and time of day; swarming, mating, and flight range; and seasonal density fluctuations. Part III consists of the last two sections, 23 references, and 7 tables. Section VIII: Adult feeding habits, 18 pages, gives the results of precipitin tests on blood fed females and describes experiments on blood preferences and on multiple feeding in one gonotrophic cycle. It also includes some of the very few published observations on flower feeding by *Anopheles spp.* Section IX deals directly with the transmission of malaria. In seven pages, the previous work on this subject is discussed, some data on the incidence of mosquito infections in various stages are given, and the densities required for transmission in various circumstances are calculated.

The author concludes that an extremely high population density of this species is necessary for malaria transmission, but that such a density does exist. It is suggested that an increase in the cattle population would have the double advantage of attracting blood-hungry females away from man and of reducing the vegetation which provides resting sites for females after feeding. A strong plea for more dissections to determine the oöcyst and especially the sporozoite rate in this and other neotropical species of *Anopheles* is advanced.

Some proof reading errors, difficult to avoid when an author is so widely separated from his publisher, are corrected in errata sheets; the change in Table XI however should not have been made. In places the results could have been more concisely expressed, nevertheless, this is a most valuable contribution and represents a tremendous amount of field and laboratory work.—B. Hocking, Department of Entomology, University of Alberta.