REVIEWS AND ABSTRACTS

INSECTICIDES—MANUAL OF SPECIFICATIONS FOR INSECTICIDES AND FOR SPRAYING AND DUSTING APPARATUS. By The Expert Committee of Insecticides of the World Health Organization. 1953. This is the excellent beginning of what will no doubt be a very useful handbook for all workers in Entomology who are responsible for procurement of insecticides and equipment. Detailed resumes of current standard methods for the chemical analysis of insecticides are given, together with suggested criteria for acceptability in regard to particle size, stability of emulsions, suspensibility of wettable powders, the marking of packages, etc.

A second section includes data on specifications for insecticide dispersal apparatus. This section contains some valuable criteria for judging whether dispersal equipment will be suitably efficient and long lasting. Some of the criteria are set forth without qualification, although they are actually matters of opinion and preference, about which there is not as yet general agreement among field workers. In some instances characteristics appear to be stated in terms of recommendations. The methods of testing strength of the various materials appear to be based upon the excellent, but very rigid tests procedures developed at the laboratories of the U. S. Public Health Service in Savannah. These tests are believed to represent measurements of the highest quality found in commercial practice. Many users may not have facilities for so exacting tests and in practice it may be advisable to provide a wider range of tolerance for some details of construction. The list of definitions for types of sprayers and dusters and for their parts is of great value. It is to be hoped that this long needed publication will be expanded to include definitions of types of "sprays" (smokes, aerosols, fogs, mists, etc.) and similar matters on which there is now little uniformity.

The third section contains excellent figures illustrating some of the analytical apparatus mentioned. These illustrations will no doubt be expanded in future editions. Although the membership of the Expert Committee which compiled the information is of the highest calibre it should be reviewed and perhaps expanded so as to represent a wider field of interest.

The book is loose-leaf and provision is made for the owner to receive additions and amendations, and to make deletions, thus keeping it current as a manual and adding greatly to its usefulness. The material has largely been issued before in separate releases, but is here brought together in readily referable form—W. D. Reed, Office of the Chief of Engineers, Dept. of the Army, Washington, D. C.

(Note: The manual may be purchased for $8.50 from the Columbia University Press, International Document Service, 2960 Broadway, New York 27, N. Y.)

SUSPENSIBILITY OF WATER-DISPERSIBLE POWDER CONCENTRATES USED FOR MALARIA HOUSE-SPRAYING PROGRAMS IN INDONESIA. By Johnson, Donald R. J. Indonesian Medical Assoc., Djakarta, Indonesia 3(5):14 pp. 1953. The testing of water-dispersible powder insecticides for residual spraying in malaria control campaigns is described. The suspensibility of some shipments received in Indonesia has been undesirable because (1) the material was not finely pulverized (2) the formulation may have been inferior, or (3) the product had deteriorated. The writer suggests that the failure of insect control using water-dispersible powder concentrates in various parts of the world, in some instances may have been due to the failure of those doing the work to recognize the poor suspensibility of the products used.

Tests which will enable a person to judge the suspensibility properties in relation to spraying operations are described. Two tests are principally to observe whether or not a water-dispersible powder has good suspensibility. The third test, simulating field operations, will show the relative amounts of wettable powder which are discharged from a sprayer during each minute of spraying time for any particular insecticide used.

Suggestions are made as to how certain unsatisfactory materials can be reconstituted to again make them usable: i.e., by regrinding, by the addition of a wetting agent, or by the use of a knapsack sprayer containing an agitator. Proper storage conditions such as keeping the material in a cool, dry place and the avoidance of excessive pressure on the stored product is emphasized.—Author's summary.

MORPHOLOGICAL STUDIES ON THE COMPOUND EYE IN MOSQUITOES. COMPOUND EYES OF *Culex pipiens* VAR. *pallens* COQUILLETT (No. I); DEVELOPMENT OF THE COMPOUND EYE OF *Culex pipiens* VAR. *pallens* COQUILLETT (No. II); STRUCTURE AND DEVELOPMENT OF THE COMPOUND EYES OF *Aedes (Finlaya) japonicus* THEOBALD (No. III); STRUCTURE AND DEVELOPMENT OF THE COMPOUND EYE OF *Anopheles hyrcanus sinensis* WIEDEMANN (No. IV). By Shôzô Satô. Sci. Repts. Tohoku University (Biol.) 18(3):331–341 (1950); *Ibid* 19(1):23–28 (1951); *Ibid* 20(1):33–44 (1953); *Ibid* 20(1):45–53 (1953). (In English.) These four admirable papers constitute the most complete study we possess of the development of the imaginal eyes in mosquitoes and permit interesting comparisons between three important genera. In *Culex*, *Aedes*, and *Anopheles* the compound

eye develops in either 7 (*Anopheles*) or 9 stages (*Culex* and *Aedes*). In *Culex* the compound eye begins forming in the second instar while in *Aedes* and *Anopheles* it begins development in the third instar. In the first stage of development, the hypodermis thickens and mitotic figures are abundant. The cells thus formed become arranged into groups (stage 2). These groups (future retinula) are surrounded by smaller cells (future iris pigment or accessory pigment cells) in stage 3. Crystal cells form in the center of the future retinula cells and pigment granules appear in the latter (stage 4). In *Culex* and *Aedes,* as pigmentation increases a vacuole-like chamber develops between retinula and crystal cells (stage 5). Most of the iris is occupied by this chamber in *Culex* but not in *Aedes*. There is no vacuole-like chamber in *Anopheles*. Distal and proximal portions of the retinula differentiate into rhabdoms in stage 6. As the vacuole-like chamber enlarges the nuclei of the crystal cells are flattened (stage 7). Stages 1–7 occur in larvae. During the pupal period the eye facets form, the crystal cells enlarge, and the pigment cells thicken (stage 8). In *Aedes* and *Anopheles* oil droplets are present in the retinula. Finally, after adult emergence the lens is completed and the crystal cells form a cone (stage 9). In *Culex* the compound eyes are structurally complete 6–12 hours after emergence but in *Aedes* and *Anopheles* it is not complete for around 24 hours.

Satô found significant differences in the distances between the eyes of adult male and female *Culex* and *Anopheles,* the greatest distance being found in the males. The head width in *Anopheles* was found to be less than in *Culex* or *Aedes*. In the three species studied, the surface area and number of corneal facets were greatest in females. The largest eye facets in all three genera were found on the ventral part of the eye and the smallest facets were found either on the postero-lateral or postero-dorsal surfaces.

Satô compares light-adapted with dark-adapted eyes. In *Culex* as the eye becomes dark-adapted the pigment enters the iris, the lens thickens, the pigment disappears from around the rhabdom, the proximal portion of the retinula narrows. The pupil of the ommatidium becomes greatly enlarged. He found that while the movement of the pigment in both light- and dark-adapted eyes occurs in 10–20 minutes, changes in lens, iris, and retinula were not completed for 2–3 hours (*Culex*). He observed that the pigment in the *Aedes* eye moves outward in the dark-adapted state much less than in *Culex* or *Anopheles*.—Jack Colvard Jones, National Institutes of Health, Bethesda, Md.

MALARIA, PARASITES, TRANSMISSION AND TREATMENT. The London Cinchona Bureau, 10 Storey's Gate, London, S.W. 1. This booklet, chapter 4 of which was published in the Dutch "Manual of Tropical Medicine" in 1951, is one of the most valuable publications in this field for use by the professional and the layman who work with this disease. On behalf of all those who are unfamiliar with the Dutch language, the London Cinchona Bureau asked the author of the chapter "Treatment of Malaria" and the editors of the Manual for permission to distribute this translation among members of the medical profession in those countries where treatment of malaria constitutes a substantial part of daily routine. The result, a most valuable pocket size booklet about malaria. All pathologists in tropical medicine and especially the malariologists will find the contents to be up-to-date reports which deal with the examination of blood and the treatment of malaria. These data are condensed into a few chapters of pertinent information, illustrated with several excellent plates and accompanied by a Table of Characteristics of different Malaria Parasites in Stained Films. Most interesting to those whose efforts are directed to entomological studies and mosquito biology is Chapter 3 "Malaria Vectors." Malaria vectors of the world are described in relation to various biotypes. Outstanding quality is noted in the full page water colored plates of 24 mosquito adults which are included in this chapter. The colored plates in the chapter on blood examination as well as the tinted plates of mosquitoes are the work of Mrs. B. Bayens who deserves her share of credit for the value of this booklet along with Professor P. B. van Steenis, Professor of Tropical Medicine at the University of Amsterdam, Dr. C. W. F. Winckel, Fellow of the Institute of Tropical Medicine and Geographical Pathology in Amsterdam, and Dr. P. H. van Thiel, Professor of Parasitology at Leyden University whose authority as an expert in the field of malaria vectors is well known. This booklet is highly recommended for use as a ready reference text in the study and teaching of Malariology, not only in the treatment of malaria due to the valuable contents of chapter 4 and the recent developments in malaria treatment, but also to those who are pledged to prevent and control this disastrous disease.—John M. Hirst, U. S. Naval Air Station, Alameda, Calif.

THE ANOPHELINE MOSQUITOES OF THE INDO-AUSTRALIAN REGION. By J. Bonne-Wepster in collaboration with N. H. Swellengrebel. 504 pp. 176 figs. 21 distribution maps. In English. J. H. de Bussy, Amsterdam, Netherlands. Price not given. This is a profusely illustrated and documented descriptive study of the anopheline mosquito species of the Oriental and Australasian Regions. Included within the volume are the following: A description of all morphological characters used in classification, a section on collection and preservation techniques, keys and descriptions of the species, and the distribution (also shown on outline maps) and biology of

each. Figures of adult and larval characters are included for each species.

The authors bring to this considerable task the experience of nearly 35 years of field and laboratory studies in Indonesia. This book is the fourth edition of a work which was first published by Dr. Swellengrebel in 1916.

As a compilation of the enormous literature and as a revision of existing Netherlands' collections this book will admirably serve, as stated by the authors, "the needs of the medical man who has to be a malariologist in out of the way places." From the standpoint of the mosquito taxonomist it is to be regretted that such significant works as Dr. W. V. King's treatment of the Australasian anophelines and Dr. I. M. Puri's account of the Oriental anophelines in volume I of Boyd's Malariology, 1949, were entirely omitted; and that a number of anopheline species from the treated area (*acaci* Baisas, 1946; *nataliae* Belkin, 1945; *solomonis* Belkin, Knight, and Rozeboom, 1945, among others) were not included. None of this is meant to minimize the vast volume of detailed material that *has* been included.—Kenneth L. Knight, CDR, MSC, USN, U. S. Navy Preventive Medicine Unit No. 1, NAS, Jacksonville, Florida.

UTILIZAÇÃO DE MOSQUITOS RADIOATIVOS NA AVALIAÇÃO DO RAIO DE VÔO. By Aragao, Mario B. Rev. Brasileira de Malariologia e Doenças Trop. 5(2):137–143. 1953. The author describes a previous experience to verify the possibility of the use of the method of mosquito marking with thorium in the study of the dispersion of the *Anopheles (Kerteszia) spp.* in the forest. The larvae were bred in a 1:10,000 thorium nitrate solution. The abdomen of the mosquitoes that were caught was taken out and burned. The identification of the marked mosquitoes was made, on those ashes, with G5 (Ilford) nuclear track plates.

Radioactive mosquitoes were caught in all capture stations. The longest distance in the forest was 800 m.—Author's summary.