

REVIEWS AND ABSTRACTS

EXPERT COMMITTEE ON INSECTICIDES, SEVENTH REPORT. World Health Organization Technical Reports Series, 1957, No. 125. 31 pp. Price: 1/9, \$0.30, Sw.fr.l.— Available in English, French, and Spanish. Columbia Univ. Press, International Documents Service, 2960 Broadway, New York 27, N. Y. The diseases transmitted by arthropods, and in particular the insect-borne diseases, constitute one of the most important problems with which national health administrations are confronted. The initial result obtained with modern insecticides gave rise to the hope that most of these diseases could be successfully controlled, and even completely eradicated, within a more or less short period. However, the resistance to chlorinated hydrocarbon insecticide which has appeared in various vector species, has somewhat changed this outlook. Resistance, which has developed much more rapidly than the measures available to combat it, at present represents the main obstacle in the fight against arthropod-borne diseases. Thus the Expert Committee on Insecticides devoted its 7th session more particularly to a study of the present problem of resistance and to pointing out the international measures called for.

Summarizing the present status of the question, the Committee's report stresses that resistance is now universal in the house fly, that it is frequently found in the louse and that it has been reported in various species of mosquito (*Anopheles*, *Aedes aegypti*, *Culex*) as well as in at least 27 other insect species. An inquiry by WHO with the aim of determining what research is under way on the resistance problem has shown the inadequacy of the work being undertaken in this field. The report indicates the broad outline of an international co-ordinated research program on resistance, which should include in particular the collection and diffusion of information, the promotion of research, the increase of personnel and financial means devoted to this work, the adoption of standard test methods, the testing of new insecticides, the establishment of satisfactory liaison between research workers and laboratories, and the convening of meetings and conferences.

The report adopts, with certain amendments, the definition of resistance formulated during the symposium on the Control of Vectors of Disease, held in Rome in 1953; and puts forward recommendations on the means to be used to detect and measure resistance. It discusses, in particular, the various applications of a standard test method, which would make it possible to obtain data on the appearance of resistant insect strains. It also mentions a certain number of problems connected with the biological aspects of resistance, which should be studied without delay.

A second part of the report, devoted to the disinsectization of aircraft, contains revised specifications for aerosols and aerosol dispensers accom-

panied by a description of suitable test methods, as well as new recommendations concerning the method of carrying out disinsectization for quarantine purposes.—WHO review.

STUDIES ON THE INCIDENCE OF BANCRÓFTIAN FILARIASIS AND THE NATURAL INFECTION OF MOSQUITOES IN WESTERN KYUSHU, JAPAN. II. ON THE NATURAL INFECTION OF MOSQUITOES. By Oshima, M. Jap. J. san. Zool. 7(1):9-18. 1956. (In Japanese, with references, tables, titles, and summary in English.) This is a report dealing with the natural infection of mosquitoes collected by various methods during the period 1951-1954 in 15 filarioid villages in Western Kyushu, Japan. Of the 15 species (2431 individuals) of mosquitoes collected in human dwellings or by human-baited-trap and in cattle sheds, or by goat-trap at or near infested households, two species only, *Culex pipiens pallens* and *Aedes togoi* were found infected with filaria.

C. pipiens pallens is the most predominant and is attracted most to humans for feeding; its natural infection rate is the highest (41 in 1214, or 3.38%). *Aedes togoi* is common especially in the villages in the rocky coastal region, but is less numerous entering houses or cattlesheds than the other predominant species. It is no more attracted to humans than to cattle, and only one mosquito of 106 dissected was infected.

The other species collected were not infected. They were: *Anopheles hyrcanus sinensis*, *An. sineroides*, *Culex bitaeniorhynchus*, *C. pallidothorax*, *C. sinensis*, *C. tritaeniorhynchus*, *C. vishnui*, *C. vorax*, *Aedes albopictus*, *Ae. japonicus*, *Ae. vexans nipponii*, *Armigeres subalbatus*, and *Tripteroides bambusa*.—Excerpts from author's text and summary.

A CRITICAL REVIEW OF THE TECHNIQUES FOR TESTING INSECTICIDES. By J. R. Busvine. Commonwealth Institute of Entomology, London, 208 pages, 1957.—This important, authoritative, and lucidly written review and guide to the techniques for testing insecticides (up to the spring of 1957) should be read and studied by everyone with an interest in mosquitoes. Its great usefulness would be hard to overestimate for it is at once impartial, direct, and filled with an abundance of the most pertinent details, unusually functional illustrations, and an excellent bibliography of 551 references. Explanations of the abundant, and often complex, formulae are presented with admirable clarity. The chapter on toxicological statistics may well be a masterpiece. Although the book does not possess an index, the detailed table of contents and the arrangement of the 12 chapters are such that much information can be readily located. This reviewer, however, felt that a general and species index would have proved especially useful. The book is

attractively bound and nicely printed.—Jack Colvard Jones, N.I.H., Bethesda, Md.

THE OXIDATIVE ACTIVITY OF PARTICULATE FRACTIONS FROM MOSQUITOES. By Gonda, O., Traub, A., and Avi-Dor, Y. *Biochem. Journal* 67(3): 487-493. 1957.—The authors describe in some detail procedures for preparing mosquitoes for enzyme analysis (crushing in the cold, adding standard extraction medium, squeezing through gauze, centrifuging, washing, and suspension of cell particulates). Conventional Warburg techniques were used for measuring oxygen uptake.

From one gram of mosquitoes (*aegypti*) they obtained approximately 35 mg. of "respiratory" particles (mostly sarcosomes or mitochondria from thoracic muscles). Their paper shows that all of the citric acid-cycle intermediates (acetate, pyruvate, citrate, isocitrate, oxoglutarate, L-glutamate, reduced diphosphopyridine nucleotide, succinate, fumarate, L-malate, and oxaloacetate) are oxidized and that respiration is linked to phosphorylation. To obtain maximal oxidation they found it necessary to regulate the tonicity of the medium and to add protective agents (e.g., serum albumin). Undamaged particles (sarcosomes) required only adenosine triphosphate and magnesium ions, whereas injured particles needed phosphate, diphosphopyridine nucleotide, and increased amounts of both adenosine triphosphate, magnesium, and coenzyme A.

The authors state that phosphorylation is more affected by DDT than respiration. They do not stress the fact that this effect was observed with quite high concentrations of DDT (3×10^{-4} and 10^{-4}), nor do they mention whether acetone controls were performed with these experiments. It is unfortunate that they did not do so, for acetone alone readily and markedly decreases phosphorylation.—Jack Colvard Jones, N.I.H., Bethesda, Md.

PHYSIOLOGICAL EFFECTS OF CARBOHYDRATES IN THE NUTRITION OF A MOSQUITO, *Aedes aegypti* AND TWO FLIES, *Sarcophaga bullata* AND *Musca domestica*. By Galun, Rachel and Fraenkel, G. *J. Cell. & Comp. Physiol.* 50(1):1-23. 1957.—In this interesting paper the authors show that young adult *aegypti* females survive for long periods (39 to 67 days) when fed *ad libitum* at 28° C. on 5 percent solutions of the following sugars: glucose, fructose, sucrose, maltose, raffinose, melezitose, and sorbitol (all but the last two are found in nectars). The adults did not survive on xylose, arabinose, ribose, rhamnose, sorbose, cellobiose, inulin, *a*-methylmannoside, dulcitol, or inositol.

The authors demonstrate that the larval gut in *aegypti* possesses carbohydrases for sucrose, maltose, trehalose, melezitose, dextrin, starch, and glycogen. The pupae possess an additional carbohydrase (for raffinose). Adults apparently have no enzymes for hydrolyzing either starch or glycogen.

Survival of *aegypti* adults was drastically reduced when they were given ribose, arabinose, rhamnose, sorbose, *a*-methylglucoside, and glycerol; less drastically when given xylose, mannitol, dulcitol, and inositol; all of these sugars being incorporated in 5 percent sucrose.—Jack Colvard Jones, N.I.H., Bethesda, Md.

THE MALARIAL INFECTIVITY OF AN AFRICAN VILLAGE POPULATION TO MOSQUITOES (*Anopheles gambiae*). By Muirhead-Thomson, R. C. *Amer. J. trop. Med. Hyg.* 6(6):971-979. 1957. 13 refs. The malarial infectivity of an African village community with particular reference to *Plasmodium falciparum* has been tested by selecting subjects at random, irrespective of their blood picture, and feeding batches of laboratory-bred *Anopheles gambiae* on them. The degree of infectiveness has been judged by the number and identity of oöcysts found in the stomach of the engorged mosquitoes after varying periods of incubation. Random tests on 347 subjects of all ages indicate that for every 100 individuals in the African village population of average age composition there are at any one time about 10 or 11 individuals capable of infecting mosquitoes with malaria parasites, mainly *P. falciparum*. All age groups contribute to this infective reservoir, the actual numbers observed being 4.2 infants and toddlers (under 5 years), 3.0 school children (5 to 14 years) and 3.3 adolescents and adults (15 years and over). Most of the infections picked up in this random survey had a low infectivity to mosquitoes. There is no indication that unusually high infectivity is necessarily associated with the lower age groups. It is considered that under these conditions of "hyperendemic" malaria, adolescents and adults form at least 30 percent of the total reservoir of malaria infection in the human population.—Author's summary.

THE TRANSMISSION OF MALARIA IN MALAYA. By Hodgkin, E. P. *Stud. Inst. med. Res. Malaya*, 27:1-98. 38 refs. 51 tables. 1956. A well-written, authoritative report, this study reflects the experience and industry of the author. In the Foreword, Dr. J. W. Field, Director of the Institute, says in part:

"This Study is a record of ten years' work on the Malayan vectors of malaria. The work done by my former colleague, E. P. Hodgkin, Entomologist of this Institute between 1931 and 1941, makes an impressive record. Based on mosquito dissections made on a scale hitherto without precedent in Malaya—over 90,000 in the course of ten years—it presents a convincing picture of the malaria vectors in Malaya and of their relative importance."

A ten-page introduction reviews topography, climate, population, malaria prevalence, anopheline species, and the history of malaria in Malaya. The terrain varies from mountainous to coastal plain, the water from fresh to brackish. Except in certain well-controlled urban and plan-

tation areas, malaria is general, with *Plasmodium falciparum*, *P. vivax*, and *P. malariae* present throughout. There are about thirty species of *Anopheles*, all but ten of which are common and suspect as vectors.

"The Investigations" is a chapter of 29 pages, including one section on experimental methods, but devoted primarily to a discussion of each of sixteen areas investigated. The survey of each area included studies on malaria in humans and in the mosquitoes collected, the season for transmission in the area, and the periodicity of the vectors.

"Vector Status of the Malayan *Anopheles*," is a 12-page chapter opening with a discussion of the prerequisites for an efficient vector of malaria. This is followed by detailed observations on each of the vector and "non-vector" species. *A. maculatus*, both through epidemiological investigations and mosquito gut and gland dissections, appears to be the principal vector in the hill plantations and in the rice-growing valleys. *A. umbrosus*, *A. letifer*, and *A. barbirostris* are the principal vectors on the coastal plains with fresh water. When *A. sundiacus* attacks man in large numbers it is an efficient vector in the brackish water fringe area. In the same area

A. baezai exhibits a high infection rate, but is not regarded definitely as a vector because of the absence of epidemiological evidence and of the possibility that the infections were not of human origin. *A. barbirostris* and *A. "hyrcanus"* (*nigerrimus* and *sinensis*) have been associated with outbreaks of malaria in the lowlands. The species which probably do not transmit malaria are: *A. aikeni*, *aconitus*, *karwari*, *kochi*, "*leucosphyrus*" (a complex), *philippinensis*, *roperi*, *separatus*, and *vagus*.

"The Topography of Transmission," is a 7-page review of transmission in the mountains, the jungle covered hills, the plantation cultivation in the hills, narrow valleys with rice fields, broad valleys with urban areas, the coastal plain with fresh water, and the brackish water fringe.

A one-page summary is followed by a two-page bibliography, and the 51 tables which conclude the report present the results of mosquito collecting, parasite and spleen examinations in man, and gland and gut dissections in mosquitoes.

This is a good-looking book, well bound, with durable, well-printed pages, and conveniently arranged information. I enjoyed reading it.—H. L. Trembley Durkee.

TOP THIS ONE!*

Early in January 1958 personnel of the East Boston Post Office sent out an SOS because mosquitoes were numerous and thirsty in that building. I visited at noon on that cold windy day when outside temperatures ranged from the teens to low twenties. In the warm basement furnace room a couple of Post Office employees were eating lunch—and also providing lunch for at least a score of hungry *Culex pipiens* (?). There were many more mosquitoes in other parts of the basement.

The source of these mosquitoes was a large sump beneath the furnace room floor where storm and wash drain water collected and was intermittently pumped up into the city storm drains at higher elevation. The only apparent cold weather exit for mosquitoes coming from this source was a very small opening around the edge of the manhole cover above the pump.

* From Bob Armstrong, who hopes the publication of this incident will stimulate a flow of anecdotes and incidental bits of interesting information that can be classified under this heading. Perry Ruth reported some incidents of this type, and there must be many more. Send your contribution to the Editor.