

## REVIEWS AND ABSTRACTS

**MALARIA. THE BIOGRAPHY OF A KILLER.** By Leon J. Warshaw, M.D. 348 pp. Cloth. Price, \$3.75. Published in November, 1949. Rinehart & Company, Inc., New York and Toronto. A New York City cardiologist, finding himself unable to answer a patient's questions about malaria, consulted the libraries of the Academy of Medicine and of the Surgeon General. He became so interested that he continued to delve into malaria literature for a period of some two and a half years. Then another patient, a book publisher, encouraged the preparation of a manuscript and this has become the book under review—an excellent informal sketch of malariology which should prove attractive not only to laymen but to physicians and also to those specializing in any branch of the subject. The author's style is clear and effective and his account, with a few exceptions, is accurate and well founded. There are no illustrations, but there is a short bibliography and a brief index. The book is well edited, printed, and bound.

The author traces some of the known or presumed effects of malaria on the course of history, from the fatal attack suffered by Alexander the Great in 323 B. C. to the control of malaria in the South Pacific Theater in World War II (under the exceptionally capable direction of Captain J. J. Saperro, USN, who commanded and integrated both Army and Navy units and whose name might well have been mentioned).

The Laveran, Manson, Ross, Grassi, Watson, and Gorgas stories are all included and there are several chapters dealing with cinchona, quinine, and the newer synthetic drugs. *Gambiae* eradication from Brazil is described (but not the similar project in Egypt) and there are brief accounts of DDT, repellents, nets and other malaria control agents. Finally, there are short chapters on therapeutic malaria and on "Unsolved Problems."

Dr. Warshaw has obviously given painstaking care to a study of his references and he has produced a very good book. But an author not actively acquainted with his subject may sometimes be misled by the literature and this no doubt accounts for the totally erroneous picture on page 6 of the present status of malaria in the United States. The author estimates "that throughout the country there is an average of 4,000,000 cases every year." As a matter of fact, it is doubtful if there were 4,000 indigenous cases of malaria in all the continental U.S.A. in either 1948 or 1949. The situation has changed dramatically in the past 25 years and the author might well have given much attention to this aspect of the malaria story. There is scarcely any mention of the outstanding malaria control work of the USPHS, in cooperation with state and county health departments, now culminating in the drive of the Communicable Disease Center which aims to

eradicate malaria within the next few years as an endemic disease in the U.S.A.

Also neglected are the current vector eradication projects in Cyprus, Sardinia, and Mauritius and the outstanding national malaria control programs of Venezuela and Italy. On page 5, the author refers to "almost universal infection with malaria" in the Roman Campagna, yet the fact is that malaria has been completely defeated in that area. Thanks to a program of the Allied Military Government in 1944-1945, UNRRA in 1946-1947, and of the Italian government in 1948 and 1949, malaria is now rare both in the Roman Campagna and the Pontine Marshes, classical homes of the "Marsh Dragon."

Minor criticism may be directed at the resurrection of Campbell's thoroughly discredited "bat hotel" (pp. 133-134), the interchangeable use of "larvacide" (p. 145) and "larvicide" (p. 299), "chloroguanide" for chlorguanide (p. 281); "metacrine" for mepacrine (p. 267), and the implication that DDT kills flies "instantly" (p. 161).

Incidentally, the author makes the interesting statement (p. 307) that during World War II the German High Command sent a "malariologist" to the Pontine Marsh area to give an opinion "as to how the flooding could be done with the least damage from the malaria standpoint." In the reviewer's opinion (based on experience and observation during active service in the area in 1944) the word should be "most," not "least."

These criticisms should not be given too much weight because the text as a whole is excellent and is remarkably free from mistakes. The reviewer heartily recommends this book as an unusually good account of the story of malaria—"how it has influenced man through the ages" and "how our present knowledge of it was acquired" (p. 327).—Paul F. Russell, Rockefeller Foundation, New York City.

**REPORT ON THE THIRD SESSION, EXPERT COMMITTEE ON MALARIA,** Held 10-17 August, Palais des Nations, Geneva. World Health Organization, United Nations. 47 pp. Processed, Aug. 19, 1949. Members of the Expert Committee on Malaria in attendance at this session were Afridi of Pakistan, Covell of the United Kingdom, Gabaldon of Venezuela, Russell of USA, Singh of India, Swellengrebel of Holland, Vaucel of France and Wilson of Tanganyika, with Pampana of WHO as secretary.

The report outlines the origin of this advisory committee to the WHO and the actions taken to date. It then deals briefly but forcefully with the problem of malaria in underdeveloped areas of the world, pointing out "while each year malaria in one area after another is retreating dramatically as a result of the effective use of such new insecticides as DDT, yet the disease still has high

incidence in large areas, causing hundreds of millions of cases and millions of deaths. Malaria still holds back, or makes impossible, food production in underdeveloped areas; it still interferes seriously with industrial and agricultural activities in much of the tropics and subtropics; and it still takes a high toll of victims in infancy and early childhood;" and continuing, "the committee in the reports on its first and second sessions stressed the fact that by virtue of insecticides developed since 1940 it is now possible to obtain a degree of malaria control, amounting in some cases to actual eradication, formerly unattainable. During the past year, numerous additional examples of the successful application of residual insecticides have abundantly confirmed this fact. But the great need for effective governmental antimalaria organizations and for overcoming the critical shortages of trained personnel, remains almost unchanged."

The situation with reference to antimalarial drugs is reviewed at length with an appraisal of the value of quinine, mepacrine, chloroquine and other 4-aminoquinolines, proguanil, pamaquin and other 8-aminoquinolines in the treatment and prophylaxis of malaria, with usual dosages. Procedures are advised for obtaining further accurate information on chemotherapeutic agents through field and hospital trials.

In response to an earlier recommendation by this committee an expert committee on insecticides was set up to deal with various insecticide problems.

The report under review gives attention to means of preventing the importation of *Anopheles* and deals at length with the relative merits of residual spraying and species eradication. It is difficult to understand why the committee should consider these as methods to be contrasted since in species eradication residual spraying would appear to be one of the most important procedures.

The cooperation of the United Nations International Children's Emergency Fund and the Food and Agriculture Organization in antimalarial work is recognized and suggestions on organizational and procedural plans are presented including the training of malaria teams and the choosing of fields of operation.

In its recommendations to governments the committee set forth an excellent and well-balanced program looking toward the accomplishment of one of the ultimate objectives of WHO—the eradication of malaria. In these recommendations it is stated that "while therapeutic and prophylactic antimalarial drugs should be available to those who require them (regardless of ability to pay for such treatment), it must be emphasized strongly that in numerous rural areas throughout the world the use of residual sprays has in two or three seasons made mass chemotherapy and mass chemoprophylaxis of malaria unnecessary and obsolete."

In its summary of recommendations emphasis is placed on residual spraying with insecticides, and larval control is referred to as follows: "The Committee recommends that larval control should be abandoned in rural areas where residual insecticides are found to be effective and are extensively applied." In the writer's opinion this is too strong a statement even though it may be generally true.

Despite the great emphasis put on the value of entomological measures in combating malaria it is noted that not a single entomologist has a place among the Expert Committee membership. It is the opinion of the writer that the committee has not stressed sufficiently the need for continued research on the development of additional cheap, safe and effective insecticidal materials and methods for obtaining maximum efficiency in their use. The need for intensifying entomological and chemical research in the field is emphasized by the fact that insects, including mosquitoes, tend to develop resistance to insecticides and we do not know when substitutes for a given malaria-control insecticide will be required.—F. C. Bishopp.

CONTRIBUTIONS TO THE KNOWLEDGE OF THE DANISH AND FENNOSCANDIAN MOSQUITOES. CULICINI SUPPL. I. By Lief B. Natvig. Norsk Entomologisk Tidsskrift, pp. 148, fig., 12 plates, 1 folding map. 1948. In English. Available from A. W. Brøgger's Boktrykkeren A/S, Karl Johans gt. 12, Oslo, Norway. Price: Norway Kr. 50.00 (U. S. \$10.00). This is an exceedingly comprehensive taxonomic and biological study of the culicine mosquito species of Denmark, Norway, Sweden, and Finland. Included within the volume are the following: A discussion of the morphology of all the stages of the mosquito, general notes on the life histories of the included species, a classification of the Culicini of northern Europe, a history of previous investigations, keys and descriptions of the species, the distribution (also shown on outline maps) and biology of each, and an important discussion of the zoogeography of the culicine species of northern Europe and Asia. Figures of the male genitalia and larva are included for each species. Extensive quotations from the literature are used throughout and all of the involved languages except German have been translated into English. This book will have much value and interest for the North American workers because of the Holarctic distribution of much of the included fauna. Of the 35 species treated, 19 are definitely known to occur within the Nearctic region.

The author brings to this very considerable task the experience of 18 years of field mosquito investigations in Norway. In addition he has had the opportunity of studying most of the principal mosquito collections of northern Europe.

As a compilation of the enormous literature and as a revision of existing collections, this book admirably serves as a basic foundation for the

detailed studies that are still so badly needed for most of the northern culicines. From the standpoint of the taxonomist it is to be regretted that larval-pupal skin associated adults were not prepared throughout the years of work since it is largely such material that will be needed for the problem of determining whether or not intra-specific populations and races occur. Also, the lack of such material made impossible the acquiring of much new data on the separation of the females of the very important acedine subgenus *Ochlerotatus*. However, the use of Peus' key to the females, with its employment of the pleural scale patches, in naming the material studied has resulted in a valuable confirmation of the value of these characters.

The author is to be congratulated for the accomplishment of such a difficult and important task.—Kenneth L. Knight, Naval Medical Research Institute, Bethesda 14, Maryland.

*Additional comments from a review received later than that of Dr. Knight:* . . . Of special interest is a chapter reviewing the accounts of explorers and others of their experiences with the very serious mosquito pest in the Far North.

The distribution of the species is given for other parts of the world as well as for Denmark and Fennoscandia. One list of the species recorded in Scandinavia indicates which of them also occur in Siberia and North America.

The monograph is profusely illustrated, most of the figures depicting points in the anatomy of larvae and adults of taxonomic significance. There are also a number of maps showing the distribution of many of the species, and several plates of photographs showing typical breeding places.

Dr. Natvig's book is an important and valuable contribution to a knowledge of the northern mosquitoes, and should be in the possession of all who are interested in the study of these serious pest insects. The author proposes shortly to take up work on a monograph on the Anophelini of the same region.—C. R. Twinn.

UN CASO DE ELIMINACIÓN LOCAL DE *Anopheles darlingi* POR OBRAS DE INGENIERÍA SANITARIA. By A. L. Berti. Jour. Inter-American Assoc. San. Eng. 2(2):103-110. 1948. In Spanish, with additional 3 page summary in English. In this engineering publication, it seems appropriate to describe how drain and fill methods were successfully applied to control *A. darlingi* within and around the twin towns of Acarigua-Araure (See Fig. 1, Page 104). In these towns, *A. darlingi* was the only malaria vector among the 15 anopheline species discovered, and the engineering methods mentioned above were the only control measures applied. It is the first example we know of local elimination of *A. darlingi* by such means.

In order to obtain some idea of the malaria picture in Acarigua before the project, communications dating from 1937 and sent by the original senior malaria inspector and the senior engineer

were consulted. These records indicated there were 381 malaria cases within the town in 1939 when the project started. Table 1 (see page 105) lists breeding places existing in 1939, including those of *A. darlingi*. This table as well as Fig. 1 points to the ponds being the chief problem because of their numbers, extensiveness, the presence of *A. darlingi*, and cost of their elimination. Therefore, first steps were directed towards their drainage. The control project was initiated in 1939.

Since the population of Acarigua-Araure is 12,000 the per capita protective measures taken, broken down in terms of volume of the total work performed, were 12 cu. m. of excavation, 7 cu. m. of fill, and 2 lineal meters of lined ditch. Cost per capita was \$5.52, higher than in any other town where malaria control has been accomplished by the same methods. The cheapest per capita cost was registered in Guama (Yaracuy). Other local costs range from \$1.50 to \$5.52. An area of 13,730 acres was drained at a cost of \$661,000.00, or at an average figure of \$48.90 per acre for eradication of *A. darlingi*.

The application of the species sanitation principle by which measures were mainly directed against the responsible mosquito *A. darlingi* permitted the preservation of the lakes El Veladero and Los Muertos, which have much importance for their wild life conservation, tourist and historical values. The Los Muertos pond was the Araure battle field during the War of Independence. Restriction of control measures to the vector species also permitted saving the expense of draining these ponds.

At Acarigua-Araure the only mosquito control measures applied were drainage, fill and scraping activities. Insecticides were never used. The results pointed to the efficiency of such a program in the permanent protection of localities. From Table 2 (see page 107) a striking comparison can be made between malaria indices before 1940 and those for 1947. Today Acarigua is a prosperous industrial center. The reclamation of 1,000 acres for agricultural and industrial developments is an added benefit. Instead of 2 or 3 saw-mills there are over 10 in operation today.

Applied engineering practices in malaria control pay for themselves in reducing the mortality rate, saving man-days lost due to disease, and above all, in increasing the value of land through drainage and fill operations, and roads, bridges, culverts and other structures built.—Excerpts from author's English summary.

COLONIZACION EN EL LABORATORIO, DE *Anopheles aztecus* HOFFMAN. By W. G. DOWNS, E. BORDAS, and A. ARIZMENDI. Rev. del Inst. de Salub. y Enferm. Trop. 9(3): 2 pp. Sept. 1948. Mexico, D. F. In Spanish. This report is based on a colony of *Anopheles aztecus* Hoffman 1935, currently maintained in a laboratory in the vicinity of Xochimilco, Mexico. At least 11 generations have been raised since the colony was

started from eggs deposited by locally-caught females.

The larvae were reared in white enamelled pans, 18 x 40 cms. A thin layer of algae and water (not over 1 cm. deep) covered the bottom of the pans. Crushed dog food was fed twice daily; and the algae inhibited excessive fungus growths. The water in the pans was not changed during the larval period. Pupae were removed daily.

Adults were kept in screen-wire cages 90 cm. on a side (or 3 x 3 x 3 feet). They had constant access to sugar or honey solutions, and were offered a blood-meal daily. At first, only human blood was acceptable, but later, guinea pigs could be used if the surface for feeding were first shaved and moistened. For oviposition, the adults preferred open water to wet filter paper.

The temperature range was 22° to 26° C. (approximately 70° to 80° F.) and relative humidity 75% to 95%. The entire life-cycle required 29 to 30 days—egg stage, 3 to 4 days; larva, 17 to 18 days; pupae, 2 to 3 days; and preoviposition, 5 days.—H. L. T.

AN EPIDEMIC OF MALARIA IN THE KENYA HIGHLANDS TRANSMITTED BY *Anopheles funestus*. By R. B. Heisch and J. O. Harper. Journ. Trop. Med. and Hyg. 52(9):187-190. 1949. (1) An epidemic of malaria is described which occurred in the Kericho District of Kenya Colony, and was thought to have been transmitted by *A. funestus*. (2) During the epidemic *A. funestus* was the

predominant anopheline with an infectivity rate of 2.5 per cent. A few *A. gambiae* were also taken but all were negative for sporozoites. (3) The parasite rate of 300 natives examined in May towards the end of the epidemic was 36 per cent; by August it had dropped to 19.5 per cent. The predominant parasite was *P. falciparum* and only a few infections with *P. malariae* and *vivax* were seen. The crescent rate after the epidemic was 3.6 per cent which is low for an epidemic area.—Authors' summary.

THE ANOPHELINE MOSQUITOES OF TAIWAN (FORMOSA), CHINA. By C. Y. CHOW. Quarterly Journal of the Taiwan Museum. Vol. II (1):1-8. 1949. Topographical variation of Taiwan, an island of 35,061 sq. km. of which 57.6% is lowland; 21.4% hilly; and 21% mountainous, supply habitats for sixteen species of *Anopheles*. Distribution of the species is summarized by "Hsien" (Prefectures). Identification keys to both adult females and larvae are presented with notes on the morphological variations and biology of each species. *A. hyrcanus sinensis* Wied, 1828 is considered to be the most predominant species of the island and is probably the chief vector of malaria in the plains, while *A. minimus* Theob., 1901 is probably the chief malaria vector in the hilly regions. The author has prepared an informative paper in an interesting and concise style.—Ernestine B. Thurman, Bureau of Vector Control, Berkeley, California.