REVIEWS AND ABSTRACTS

MALARIOLOGY: A comprehensive survey of all aspects of this group of diseases from a global standpoint. By 65 contributors and edited by Mark F. Boyd. Two volumes, 1643 pages, published by the W. B. Saunders Company of Philadelphia, Pa. 1949. Price $35.00. Indeed it is a comprehensive survey of all aspects concerning the several malarias from a global standpoint! There are 70 chapters which are discussed under 5 sections: I, Introduction, a historical review by Dr. Boyd closing with this pertinent observation. "Although military exigencies of the last five years stimulated a great intensification of malaria research which has been highly productive, there still remain many opportunities for investigation which may yield significant contributions to the solution of the global problem;" II, Parasitology, 8 chapters on the species of the genus *Plasmodium*, an index of their hosts, life cycles of the malaria parasites, a photographic atlas of human plasmodia, a laboratory diagnosis of malaria infections, *in vitro* methods for study and the cultivation of plasmodia; III, Definitive hosts, 15 chapters in which insect vectors, the morphology, life history, physiology, and ecology of anophelines are discussed by prominent entomologists: IV, Intermediate host, 25 chapters on the epidemiology of malaria, distribution of malaria, malaria incidence, immunity to the malaria infections, symptomatology, chapters on *falciparum*, *quartan*, *vivax*, and *ovale* malaria, and others; V. Control and eradication, 21 chapters dealing with the several phases of controlling the disease by established practices in several regions of the globe.

Section III and V will be of greatest interest to the readers of "Mosquito News" for it is in these sections that the mosquito abatement officials will obtain the information so frequently sought on the species of anophelines of the nearctic, the neotropical, the palearctic, the Ethiopian, the Oriental and the Australasian regions, and their control. Some of these chapters are written by authorities whose names frequently appear in "Mosquito News" and most of them are members of our Association. F. C. Bishopp, E. F. Knipling, G. H. Bradley, W. V. King, Marston Bates, Luis Vargas, Arnoldo Gabaldon, Fred L. Soper, Justin M. Andrews and Alan Stone are included.

Such well known experts from over the world as P. A. Buxton, V. B. Wigglesworth, Botha de Meillon, I. M. Puri, Wilbur G. Downs, Colin S. Pittendrigh, Ernest C. Faust, L. W. Hackett, D. Bagster Wilson, Sir Gordon Covell, Herbert C. Clark, James J. Sapero, Sir Malcom Watson, Fred W. Knipe, and General James Stevens Simmons also have contributed additional chapters.

It is difficult to express any opinion other than one of profound admiration for a treatise so all-inclusive and exhaustive as Boyd's Malariology. It is well illustrated and is abundantly supplied with references. I feel that we must consider it unique in its field for, in its publication, Mark F. Boyd has initiated a monumental climax to his years of study on malaria and means for controlling the disease.

The work of preparing the outline, of organizing the chapters, and of obtaining the subject matter from a large group of scientists to meet deadlines must in itself have been an arduous task but in so doing the editor has accumulated authentic information from all over the world. Boyd maintains that it is his intention to make this publication, "A working manual of malariology, a comprehensive and adequate review or factual survey of all available knowledge relating to malaria objectively presented and brought down to date." Again, he has succeeded admirably.

In a compendium such as Boyd's "Malariology," there is one section that this reviewer would like to have seen included. It is intriguing to imagine a section on "Opportunities for investigation toward a solution of the global problem." Chapters might have been authored by a dozen contributors and the whole leavened by Boyd in the same able manner he fitted the existing 70 chapters into a masterpiece.—H. H. Stage.

MEDICAL ENTOMOLOGY. By Robert Matheson. 2nd Edition. 612 pp. 4 plates, 242 figs. Publication date January 16, 1950. Comstock Publishing Company, Ithaca, N. Y. Price, $7.50. Since its publication 18 years ago, Professor Matheson's first edition of Medical Entomology has been a popular standard text and a valuable source of reference to all interested in insects and other arthropods that affect the health and comfort of man.

During the years that have elapsed since the printing of the first edition, great advances have been made in the knowledge of insect- and arthropod-borne diseases and of the vectors and pest species and methods of controlling them. This extension of knowledge was greatly accelerated during World War II when the need of protecting the armed forces and civilian populations from insect-borne diseases became paramount, and unprecedented opportunities for research and development in this field were provided.

The publication of a revised edition of Professor Matheson's book that includes this new knowledge is an event of great importance and one that has been eagerly awaited by workers in the field. His task in reviewing the voluminous literature that has been published on this subject since his first edition appeared must have been an extremely arduous and difficult one. His objective was to present an authoritative survey of present knowledge of value as a source of instruction and reference "to the physician, the entomologist, the public health worker, the student, and the layman." This was a truly formidable task, but one that Professor Matheson is exceptionally well equipped to carry out.

The book is well written, well organized, and contains a vast amount of information in readily accessible form. It presents details of the classification, morphology, life-histories and bionomics of the various insects and other arthropods, and the role they play in the dissemination of human diseases or as pests of man, and the materials and methods used in combating them. Keys are given to the various systematic groupings including keys to genera or species for the medically important forms.

The first chapter contains a brief historical survey of arthropods and human disease and the last (Chapter 20) deals with methods of collecting, preserving and mounting insects. The chapters in between discuss in detail the pests that affect human health and happiness; namely, the mites, ticks, lice, true bugs, psychodid flies, mosquitoes, black flies, punkies, tabanids, snipe flies, tsetse flies, the house fly and its allies, myiasis-producing flies, fleas, and poisonous and urticating arthropods. One-quarter of the book is devoted to mosquitoes: a reflection of their enormous importance to human health and welfare.

The book is profusely illustrated with excellent drawings and photographs. At the end of each chapter a selected bibliography is provided. The references in these lists which themselves provide long bibliographies are marked with asterisks for the information of the reader. In addition, an extremely useful feature, at the end of Chapter 1, is a list of journals, textbooks, and other publications that students and investigators should consult if they wish to obtain the latest information and keep abreast of advancing knowledge.

In preparing and publishing this revision of his book on Medical Entomology, Professor Matheson has performed an outstanding public service and has earned the gratitude of all whose activities or interests are connected with this field of endeavour.—C. R. Twinn.

EFFECTS OF DDT MOSQUITO LARVICIDING ON WILDLIFE.. IV. THE EFFECTS ON TERRESTRIAL INSECT POPULATIONS OF ROUTINE LARVICIDING BY AIRPLANE. By Scudder, H. I., and Tarzwell, C. M. Pub. Hlth. Repts. 65(3):71–87. 1950. Mosquitoes, deer flies, and sand flies were reduced in numbers by the routine larvicidal treatments; however, for other than these forms, no over-all effect of the treatments was observed. Observations in check and treated areas showed only those differences in general insect numbers and activity which could be considered to be due to differences in the respective ecological situations. Grasshoppers, ants, dragon-flies, wasps, bees, and other common forms appeared in usual abundance during the first season of treatment.

Examination of water areas shortly after treatment disclosed considerable numbers of dead insects, especially may flies, damsel flies, certain beetles *(Donacia)*, and dolichopodid and acalyptrate flies; however, during the first season there was no evidence of any general diminution of damsel flies and dragonflies on the wing or of aquatic insects in general. Aphid colonies in treated and check areas showed no significant differences in vigor or in the occurrence and number of parasites and predators.

Experimental beehives kept under observation during the first season of treatment showed no over-all adverse effects and produced a crop of honey normal for the year. During the two succeeding years of treatment, beekeepers kept many colonies in treated areas with no reported adverse effect, indicating that routine DDT mosquito larviciding is not detrimental to honey production.

Light-trap catches in treated and check areas during two seasons' treatment showed no significant over-all reduction in the insect population of areas adjoining those routinely larvicided with DDT at 0.1 pound per acre with the possible exception of the Trichoptera.—Authors' Conclusions. (Editor's note: The above studies were made in 1946 and 1947 in Jasper County, Ga., at the Savannah Migratory Waterfowl Refuge, which lies "within the lower Savannah River tidal bottoms, which are generally brackish." According to the authors, "the areas studied were protected from tidal fluctuation and brackish water by a system of dikes.")

THE MOSQUITOES OF BWAMBA COUNTY, UGANDA. VII.—INTENSIVE CATCHING ON TREE-PLATFORMS, WITH FURTHER OBSERVATIONS ON AEDES (STEGOMYIA) AFRICANUS, THEOBALD. By A. J. Haddow, and A. F. Mahaffy. Bull. Ent. Res. 40(2):169–178. 1949. In an attempt to isolate yellow fever virus from *Aedes (Stegomyia) africanus,* Theo., an intensive series of catches was carried out during 11 weeks of 1945 in 2 forest areas in Bwamba County, Uganda. Most of the work was carried out on platforms in trees during the sunset period, since the main biting activity of *A. africanus* occurs in the forest canopy just after sunset. Virus was not obtained during the course of this work.

The results confirmed that *A. africanus* is the dominant arboreal Culicine of the sunset period. In catches carried out actually in the canopy it formed 69 per cent of the total Culicines taken. Other species particularly common in the canopy in the sunset period were *Taeniorhynchus (Mansonioides) africanus,* Theo., *Anopheles (Myzomyia) gambiae,* Giles, and the Tabanid, *Chrysops centurionis,* Aust.

A result of particular interest was the capture of 2 *Aedes (Stegomyia) aegypti,* L. in the trees of one study area, and of 13 actually in the forest canopy of the other. Both areas are primary rainforest, and native huts are very scarce in the vicinity. It is pointed out that *A. africanus* is peculiarly susceptible to the influence of weather conditions, and that low temperatures may partly or even completely inhibit its biting activity in the sunset period. The methods of feeding *A. africanus* on rhesus monkeys in captivity are described. The remarkable speed with which this species engorges is discussed.

The close relationship between *A. africanus* and

A. (S.) luteocephalus is discussed. The writers believe that the differences between these mosquitoes do not warrant full specific rank for *A. luteocephalus,* more particularly as intermediate forms have been found.

The methods of inoculating triturated mosquitoes into laboratory animals in the field are described.—Authors' Summary.

STUDIES ON WEST AFRICAN FOREST MOSQUITOS. PART I.—THE SEASONAL DISTRIBUTION, BITING CYCLE AND VERTICAL DISTRIBUTION OF FOUR OF THE PRINCIPAL SPECIES. By P. F. Mattingly. Bull. Ent. Research 40(1):149–168. 1949. The present paper is the first of two dealing with the seasonal distribution, hourly variation in biting activity, and vertical distribution of certain Southern Nigerian mosquitos. The technique employed in the studies under discussion resembled that used by Haddow (1947) in Uganda. Human bait was used in both cases and the agreement between the results obtained in the two localities is felt to be such as fully to justify the employment of such methods. Over 50 species of mosquitos were taken in all and 14 of these proved to be sufficiently abundant to yield significant figures. Four of these are discussed and the remainder will be dealt with in the second paper.

The most remarkable feature of the seasonal distribution was the very restricted period during which *Anopheles gambiae* was present in any abundance. This species occurred in large numbers only during the heavy rains of June and July and, to a less extent, in association with the small rains of September–October. During the dry season it almost disappeared. *Aedes africanus* showed a similar distribution to that of *gambiae* but *Taeniorhynchus africanus* and *Anopheles hargreavesi* were most numerous during the dry season. It is suggested that in the area under consideration the latter species may well be a more important malaria vector than *gambiae* owing to its greater abundance and more uniform seasonal distribution.

As in Uganda *Aedes africanus* proved to be mainly a tree-top biter with a well-marked peak period of biting activity associated with evening twilight while *A. gambiae* and *A. hargreavesi* bit mainly on the ground and had their peak period in the morning. The biting cycle (hourly variation in biting activity) of *hargreavesi* showed considerable differences from that of *gambiae* but on analysis these proved to be superficial and to be due mainly to a difference of about one hour in the times of occurrences of their peak biting periods and a corresponding change in the vertical distributions with which these were associated. The occurrence of peak activity in the early morning in *A. gambiae* is considered to have an important bearing on the question of personal precautions against malaria.

The biting cycle of *T. africanus* differed from that of any other species studied in that the period of peak activity occurred during the middle part of the night, the exact time varying quite widely on the various occasions on which observations were made. It is suggested that this may have been due to the occurrence of both morning and evening peak periods within the same species.

Details are given of the variations in temperature and humidity encountered during the experiments together with meteorological observations made at a neighboring airfield but a full discussion of the relation of these factors to the activity of the mosquitos is reserved for the second paper when all the data will have been presented. —Author's Summary.

DIURNAL MOSQUITOES IN AN AREA OF SMALL RESIDUAL FORESTS IN BRAZIL. By Causey, O. R., and Dos Santos, G. V. Ann. Ent. Soc. Amer. 42(4):471–482. Observations on diurnal mosquitoes in residual forests in the region of Passos, Minas Gerais, were undertaken as a part of a study of a region that had been invaded by jungle yellow fever 10 years previously. Specimens were collected on human bait at ground and tree-platform levels at 4 stations in 4 different forests, during 4 days a week over a continuous period of 120 weeks. Hourly, weekly, monthly, and seasonal records were made. Parallel meteorological data was assembled. A total of 73,321 mosquitoes, including 9,788 *Haemagogus spegazzinii,* were taken. The highest monthly rate per man hour was 17.1 for all mosquitoes, and 5.0 for *H. spegazzinii* in January, 1946. *H. spegazzinii* and other tree-hole breeders were fewer in number during the second rainy season, and showed evidence of being still further reduced during the first half of the third wet season, when this study was terminated. This may indicate that there exists a cycle of several years' duration in the Haemagogus population in addition to the usual seasonal cycle, and that these studies were undertaken on the low side of this large cycle. —Authors' Summary.

MÉTODO DE LUCHA ANTI-*Aedes* APLICADO EN IQUIQUE (CHILE). Drs. A. Neghme, R. Montero, J. Villalón and J. Gutiérrez, and H. Albi and A. Reyes. Bol. Inform. Parasitarias Chilenas, Vol. IV, No. 2, pp. 4–6. Apr.–June 1949.

This paper reports an unusual and apparently very successful method of controlling *Aedes aegypti,* by treating the public water supply with DDT before it is used by the people.

Iquique (which is about 75 miles south of the Peru-Chile border, on the Pacific) is a port town of about 48,000 people and 9,000 houses. It is in desert country, and rain is almost unknown. The water-supply is brought from an oasis upcountry to several large tanks, and from these is distributed in pipes to the houses. This water stands in the tanks for about 24 hours before being distributed. The only breeding-places of *aegypti* were household water-containers of various sorts.

The water in the tanks was treated with a suspension of DDT, to a final dilution of 1 part in one million. This dose is lethal to the larvae of *aegypti,* but innocuous to humans. "The

results were spectacular." Larvae of *Aedes aegypti* and of *Culex* practically disappeared in less than 24 hours. Dead larvae were found in the bottom of containers of treated water. The *aegypti* house index of adults, which was initially 10.7 percent, dropped to zero in a few weeks.

The authors hope that a second application of DDT four or five months after the first will completely eradicate *Aedes aegypti* from Iquique. They plan to use this ingenious method of mass treatment of the water-supply in other places where conditions are favorable. W. H. W. Komp, National Institutes of Health, Bethesda, Md.

1. *Aedes (Stegomyia) pseudoafricanus* SP. NOV.: A NEW SPECIES OF *Aedes* FROM THE COAST OF NIGERIA (BRITISH WEST AFRICA). Chwatt, L. J. Nature 167:808. May 1949. This mosquito is closely related to *Aedes (S.) africanus* Theo., and the main difference between the two "lies in the structure of the male terminalia." Both are tree-hole breeders.

2. A NEW VARIETY OF *Anopheles aitkeni* FROM BORNEO. McArthur, J. Bull. Ent. Res. 40(1): 49–52, 2 figs. May 1949. *Anopheles aitkeni* var. *borneensis,* nov. differs principally from *A. aitkeni bengalensis* Puri in the structure of the male terminalia. The larvae of the known varieties of *A. aitkeni* can be separated on the basis of variations in the anterior clypeal hairs. A summary of these variations is given.

3. THE *Anopheles* OF TAMBUNAN, NORTH BORNEO. McArthur, J. Bull. Ent. Res. 40(1): 53–60. May 1949. Accounts are given of the habits and characteristics of twelve species or varieties of *Anopheles.* The data resulted from surveys conducted during 1939–42. *A. leucosphyrus* Dönitz, the most important malaria vector, breeds in small seepages in dense jungle, is widespread and abundant, but is difficult to collect. *A. maculatus* Theobald is widespread but is not a vector in Tambunan. although it is important elsewhere in Malaya. The most widely breeding species in Tambunan Plain was *A. barbirostris* Wulp., but the adults are rarely seen; it is of little importance as a malaria vector.

4. CULICINE MOSQUITOES COLLECTED IN WESTERN YUNNAN, CHINA DURING 1940–42. Chow, C. Y. Proc. Ent. Soc. Wash. 51:127–132. June 1949. Collections were made at Chefang and vicinity, a subtropical region near the Burma border. Among the forty-four species found, all but one are newly recorded for Yunnan province, and 19 species are new to China. Their breeding places and known geographical distribution in other provinces of China are given. Eleven genera are represented.

5. THE IDENTIFICATION AND DISTRIBUTION OF CHINESE ANOPHELINE MOSQUITOES. Chow, C. Y. Journ. Nat. Mal. Soc. 8:121–131. June 1949. A table shows the distribution of 38 species or varieties of anophelines by provinces. Twelve species have been added to the records since 1938. Keys to adult females and full grown larvae are given. There is an annotated list of species with emphasis on habits of larvae and relation to malaria.—Wm. E. Bickley, U. of Maryland, College Park, Md.

LABORATORY BREEDING OF *Anopheles punctulatus punctulatus* Dönitz. By M. J. Mackerras, and T. H. Lemerle. Bul. Ent. Res. 40(1):27–41. May 1949. This is the first complete report on the management of a laboratory colony of *Anopheles punctulatus punctulatus* Dönitz. The observations were made during the war at Cairns, North Queensland, Australia. The mosquitoes used in establishing the colony were obtained from New Guinea. The paper describes methods of rearing and records observations on the life cycle and behavior.

The adults of this species require a relatively high temperature, space for mating and oviposition, high humidity and a rhythm of light conditions corresponding to day and night. The insectary and cages were designed to meet these basic needs. The insectary was maintained at a temperature of approximately 27° C. and provided with a number of windows to furnish natural illumination. The cages were 3′ x 2′ x 2′ and constructed of compressed wood. Two sides of each cage were made of glass in order to admit light. A relative humidity of 90% was maintained in the cages.

The adults were fed on fresh slices of apple and offered a blood meal as necessary. The arm of a human volunteer was found more satisfactory as a source of blood than the use of an animal.

The larvae were reared in shallow enamel dishes and fed "Farex" a proprietary brand of baby food. A routine plan was followed in the feeding and care of larvae. Oviposition dishes containing soil and water were removed from the cages daily. The larvae were kept in these dishes until 3 days of age and then transferred to rearing dishes containing sand and water. These bowls were 7½″ in diameter and 1½″ deep and would accommodate 300 or more larvae. As the pupae appeared they were removed from the culture, washed thoroughly and transferred to clean water. The emergence rate of adults reared under this plan varied from 95 to 100%.

Duration of the various stages in the life cycle, under insectary conditions, was normally: egg, 42 hours; larval, 5–8 days; pupal, 30–40 hours; emergence to first blood-meal, 2 days; first blood meal to oviposition, 3 days; total from egg to adult, 13 days.

The breeding cycle and behavior of this species follows a definite rhythmic pattern. Adults begin to emerge in the late afternoon and continue throughout the night. Biting activity is usually restricted to the hours of darkness and mating occurs at twilight. Mating is accomplished while the two sexes are in flight. Oviposition occurs during a hovering dance over the water and takes place in the early evening. Hatching begins in

the afternoon and pupation is confined to a few hours during the afternoon.

This is a highly factual report and represents a significant contribution to our knowledge of one of the most important malaria vectors in the Australasion region.—William B. Owen, University of Wyoming, Laramie, Wyo.

OBSERVATIONS OF MOSQUITOES BREEDING IN PLANT CONTAINERS IN YUNNAN. By Chow, C. Y. Ann. Ent. Soc. Amer. 42(4):465–470. 1949. The object of the paper is to summarize observations on mosquito species with specialized larval habitats in plant containers. These observations were made during the mosquito faunal survey of the Chefang region in western Yunnan, carried out during 1940 to 1942.

The author describes a survey of "water container" breeding sites in which 36 species were found. Tree holes produced 11 species, bamboo stumps 18, leaf bases of bananas one, pineapple plants one, an unidentified aroid 2, a native plant called "tun-tun" 2, and an Agave-like plant called "Mou-in-ka", one species. These mosquitoes belonged to the genera Megarhinus, Tripteroides, Topomyia, Harpagomyia, Uranotaenia, Orthopodomyia, Aedes (Stegomyia and Finlaya) Heizmannia, Armigeres and Culex (Neoculex, Lophoceratomyia and Culiciomyia).

Studies on hibernation in tree holes and bamboo stumps are also described. Bamboo stumps were collected and later filled with water. Material from tree holes was brought in and immersed. Hatching occurred and 7 species, all of the genus Aedes were identified.—William E. Beckel, Defense Research Northern Laboratories, Churchill, Canada.

"A MESSAGE TO ALL MEMBERS OF THE AMCA.

The American Mosquito Control Association has during the past few years made very fine progress in gaining new members and in improving the quality of its journal, 'MOSQUITO NEWS'. It has begun truly to represent the interests of mosquito workers in the Americas and is also gradually coming to serve the needs of countries outside the western hemisphere.

President Lester W. Smith has appointed a new committee on membership, to take up the important task of acquainting non-member mosquito workers with the advantages of participation in the association, and this committee will do all it can to discharge its responsibilities, to bring in new members, and to increase the revenue of the association, which in turn may be expected to permit the publication of a still larger and better 'MOSQUITO NEWS'. But the committee cannot possibly canvass all potential new members.

On behalf of the Association, every present member is urged to try to get at least one new member, before July 1. A blank is included in this number of MOSQUITO NEWS. Will YOU use it to try to get a new member?

For the Membership Committee:
CHESTER T. ROBINSON, Chairman
(P.O. Box 1023 Modesto, Calif.)"