tion of each species in each of these stages. The morphology of the male genitalia and a similar laboratory guide is given for the males. The eggs and pupae are discussed more briefly with no laboratory guide. Excellent keys as well as a summary of characters in tabular form are given for the adults, the larvae, and the male genitalia. All of the stages are well-illustrated, and, while there is no key given for eggs, there are 11 plates showing the eggs of the known species and the variations within the species. The only stage not thoroughly covered is the pupal, and it is probable that too little is known about the specific characters in the species treated to permit complete descriptions and a key.

Following the first section, which permits the identification and assists the training for identification of the Anophelini of Venezuela in most of the stages, are 3 smaller sections. The first of these defines the tribes Megarhinini and Culicini and shows how they may be distinguished from the Anophelini. The second is a general discussion of the Anophelini including the history of the study of the tribe in Venezuela, distribution by state of the Venezuelan species, the position of the tribe in the animal kingdom, and of the Venezuelan species in the tribe, and a section on classification, nomenclature, and the preparation and use of keys. The last section deals with the internal anatomy and with the techniques of preparation, preservation, and the handling of living material in the laboratory.

Any person wishing to identify *Anopheles* from northern South America should find this book of immense value, and a student, knowing the Spanish language, wishing to train for laboratory work on these *Anopheles* can find here an invaluable study manual.—ALAN STONE, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C.

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NOTAS SOBRE LOS ANOFELINOS DE VENEZUELA Y SU IDENTIFICACION. Por Pablo Cova García. XII Conferencia Sanitaria Panamericana, Cuadernos Amarillos No. 1. Publicación de la Comisión Organizadora. 208 páginas, 52 láminas sin numerar, 42 figuras. Editorial Grafolit. Caracas, Venezuela. 1946.

De las varias consideraciones a base regional de los mosquitos anofelinos, que han visto la luz durante los últimos años, es ésta una de las mejores. Combina en sí los mejores factores de una tesis sobre la taxonomía y las características fáunicas de 30 especies de anofelinos en Venezuela, con un bien concebido manual de laboratorio para la formación de personal de salubridad pública y estudiantes de la entomología médica en la identificación y el manejo de estos mosquitos.

El libro está bien ordenado. Los huevos, las larvas, la ninfas, los adultos y las genitalias masculinas han sido consideradas en secciones por separado, en el orden dado a continuación. Respecto a las larvas y los adultos, hay una discusión de su morfología y biología, seguido de un guía de laboratorio para demonstrar a los estudiantes los caracteres esenciales que se requiéren en la determinación de cada especie en estas etapas. Se presenta la morfología de las genitalias masculinas y un guía de laboratorio parecido sobre los machos. Se discute más brevemente los huevos y las ninfas, sin guía de laboratorio. Hay excelentes claves, como también un resumen de caracteres en forma de tabla sobre los adultos, las larvas y las genitalias masculinas. Vienen bien ilustradas todas las etapas y, aun que non se presenta clave para los huevos, hay 11 láminas dando a conocer los huevos de las especies conocidas, con sus variaciones dentro de la especie. La única etapa a la cual no se da un trato completo, es la ninfal y es probable que tan poco se sabe respecto a los caracteres específicos de las especies tratadas que no fueron posibles descripciones completas y de una clave.

A continuación de la primera sección, la cual hace posible la identificación de los anofelinos de Venezuela y es una ayuda en el entrenamiento para su identificación en la mayoría de sus etapas, hay 3 secciones más reducidas. La primera de éstas define los tribus Megarhinini y Culicini en indica cómo se pueden distinguir de los Anophelini. La segunda es una discusión generalizada de los Anophelini, incluso una historia del estudio del tribu en Venezuela, distribución por estados de las especies venczolanas, el lugar que ocupa el tribu en el reino animaly las especies venczolanas dentro del tribu, y una parte dedicada a la clasificación, la nomenclatura, y la preparación y la aplicación de claves. La última sección trata de la anatomía interna y de las técnicas para la preparación, conservación y manejo de material viviente en el laboratorio.

Para cualquiera persona que se interese en identificar los *Anopheles* de la parte norte de Sur América, este libro debe ser de inestimable valor, y un estudiante quien domina la lengua castellana y desea especializarse para trabajos de laboratorio sobre estos *Anopheles,* hallará aquí un manual de estudio de inapreciable útilidad.—Translation of a review in English by Alan Stone, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C.

3556

A STUDY OF THE MIGRATORY HABITS OF SALT MARSH AND ANOPHELINE MOSQUITOES. Frank Brescia, Irwin D. Wilson, John Rowell, and Kenneth C. Hodges. Ann Ent. Soc. Am. 40(1):69–74, March, 1947.

Field use of the Insecticidal Aerosol Generator necessitated the study of migratory habits of the natural mosquito population in the test area. Daily migratory habits of *Aëdes sollicitans* and *A. taeniorhynchus* were determined by recording the number of mosquitoes landing per minute in various locations about an open

marsh land near Cocoa, Florida, at various times of the day over a 24-hour period. Counts were made over complete body of personnel after one minute of immobility in the following typical locations:

a. Laurel tree (good canopy) on road.

b. Palm tree (fair canopy) on road.

c. Middle of bridge (open conditions) over creek.

d. Laurel tree on marsh land but dry under tree.

e—Open pickle weed grounds on marsh land.

f—Mangrove tree (fair canopy) on marsh land with water under it.

Data derived from these counts indicated that:

a. Migration starts about dawn from open into shaded areas, in or about the open marshes, over 1-hour period with the minimum count at 8 A.M. and then increases in the hot sun of late afternoon.

b. Full migration starts about dusk from shaded into open marshes. It should be noted, however, that landing rates of over 100 were obtained during the night in jungle areas.

c. Dawn flights decrease population in the open marshes but not to zero. Fairly high counts obtained in open marshes under bright sunlight.

d. There was increased activity in open marshes before dawn and after dusk.

e. Evidence points to dawn and dusk migration.

f. For practical control, open marshes should be treated in the "predawn" and forested areas after dawn.

Migratory habits of *Anopheles quadrimaculatus* were studied in swamp areas near Decatur, Alabama. The data indicated that:

a. This species is completely inactive during periods of sunlight (resting periods).

b. It does not land or bite under sunlight conditions or when in flight near resting places.

c. Between sunrise and dark, this species rests in some dark, cool, damp place such as a tree hole, hollow log, or empty keg.

d. They leave their resting place during the hour following sunset.

Since the anopheline adults had practically a zero landing rate in the vicinity of their resting places over a 24-hour period, it was concluded that the adults in this particular location have acquired a definite preference for specific locales in which blood meals are daily sought.

It was concluded that control of the adult by aerosol treatment is feasible.

a. During the day while they are resting in tree holes.

b. At dusk when they are leaving tree holes.

c. In early morning when they are returning to tree holes.—LEO KARTMAN, University of Hawaii, Honolulu, T. H.

29429 Ca

BIOLOGICAL CHARACTERISTICS OF LABORATORY-REARED *Aëdes atropalpus*. H. L. Trembley. J. Ec. Ent. 40(2):244–250. 1947.

Aëdes atropalpus, a species of rock-hole mosquito, has been added to that small group of mosquitoes which are autogenous. The females do not require blood meals, or, in fact, any food at all, in order to deposit viable eggs. A colony in which the females were fed only a sugar solution was reared in the laboratory for more than a year, and in its 26th generation continued with no apparent loss of vigor. A colony in which the females received only distilled water for several generations was thriving at the time the article went to press. A comparison of the life-cycles of individuals from the colony routinely offered blood and those denied blood showed no marked differences. The females of this species may be induced to bite when blood meals are offered, but subsequent oviposition results in comparatively few viable eggs. *Aëdes atropalpus* may mate in small spaces, has no seasonal period of comparative inactivity, and does not exhibit a decrease in the number of females with the increase in successive generations.—Author's abstract.

1599

RESISTANCE OF MOSQUITO LARVAE AND PUPAE TO EXPERIMENTAL DROUGHT. George H. Bick and George H. Penn. Ann. Ent. Soc. Am. 40(1):82–86. 1947.

Random field observations in New Guinea showed that numerous late stage anopheline larvae were present in rain puddles which had evaporated to the damp mud stage and subsequently reflooded. Fourth instar larvae of *Anopheles punctulatus* survived approximately 120 hours on damp filter paper flooded for 30 minutes at 24 hour intervals.

Experiments are described which attempted to determine the effects of varying periods of drought and of periodic flooding on the larvae of *Anopheles walkeri*, which breeds in the shady, grassy margins of swamps and lakes; *Aëdes vexans*, which breeds in temporary pools; and *Wyeomyia smithii*, which finds its breeding water in pitcher plants.

Oversized filter paper was placed on the bottoms of petri dishes and sufficient water from the collection source was allowed to dampen the paper without showing a free liquid. Control dishes were flooded to a depth of ¼ inch. Experimental dishes were covered for maximum humidity, and control dishes were kept uncovered. Temperature ranged from 21° C. to 28° C.

Five 4th instar larvae of *Aëdes vexans* were added to each of 30 dishes and examined as follows: 15 each after 24 and 48 hours, and 30 each after 72, 96, 120, and 144 hours of continuous drought. Maximum survival time was 96 hours (17 per cent), while survival at 48 and 72 hours was not significantly different (13 per cent and 17 per cent). Third instar larvae of *A. vexans*, treated as above, gave a maximum survival time of 120 hours (20 per cent) when examined as follows: 30 larvae each after 24, 48, 72, 96, and 120 hours of continuous drought. One dish of 14 first and second instar larvae of