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THE ANOPHELINE MOSQUITOES
OF THE CARIBBEAN REGION



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4. eiseni Coq.
5. pseudopunctipennis Theob.

Series **CYCLOLEPPTERON**

6. grabhamii Theob.
7. vestitipennis D. & K.

Group **ARRIBALZAGIA**

8. apicimacula D. & K.
9. punctinacula D. & K.
10. neomaculipalpus Curry
11. mediopunctatus Theob.

Subgenus **NYSSORHYNCHUS**

Group **NYSSORHYNCHUS**

Series **ARGYRITARSIS**

12. argyritarsis R.-D.
13. albitarsis Arrib.
14. darlingi Root

Series **TARSIMACULATUS**

15. albimanus Wied.
16. triannulatus Neiva & Pinto
17. strodei Root
18. aquasalis Curry
19. oswaldoi Peryassú
20. anomalophyllus Komp

Subgenus **KERTESZIA**

21. bellator D. & K.
22. neivai H., D. & K.

THE ANOPHELINE MOSQUITOES OF THE CARIBBEAN REGION¹

INTRODUCTION

This paper is an attempt to set forth our present knowledge of the anopheline mosquitoes of the Caribbean region, both from the literature, and from the personal observations of the author. It deals with their known geographic distribution, their status as vectors of malaria, but more particularly with their classification and identification. It is written primarily from the point of view of the systematic entomologist, but the needs of the field man engaged in malaria control have been kept in mind; for this reason there have been incorporated numerous illustrations and keys, the latter in both Spanish and English, together with a list of entomological terms in English, Spanish, and Portuguese, for the convenience of Latin-American workers.

The reasons for restricting this work to the Caribbean region are the following: In this region is found the majority of tropical American anopheline species of economic importance; the region is, geographically and climatically considered, a convenient unit; the writer's own studies have been confined mainly to this region, where he has had the opportunity to collect material of every species treated in this work and to discover or describe several new species.

Most of the anopheline species found in the Caribbean area are well known, but the literature concerning them is scattered in many publications, some now difficult to obtain. There are several articles on the *Anopheles* of various parts of the Neotropical region, such as Shannon's *The Anophelines of the Amazon Valley* (43), which are useful, but incomplete, not giving descriptions of all stages of the species. The excellent papers of the late F. M. Root on the larvae, male terminalia, and females of our American species are scattered in several publications. The latest comprehensive treatment of the American anophelines is the late H. G. Dyar's *The Mosquitoes of the Americas* (12), now out of print. In this volume Dyar drew largely on the work of Root, who was the authority on the Neotropical anophelines at the time of his death. Dyar's treatment of the anophelines is rather superficial. His descriptions are inadequate, his keys are difficult to use and contain

¹ From the Gorgas Memorial Laboratory, H. C. Clark, Director, Panama City, R. de P.

grave errors, while his figures of the male terminalia are drawn on too small a scale to show the parts distinctly, and his figures of the larval head and terminal segments are useless for differential purposes. Since the publication of Dyar's monograph, several new species of *Anopheles* have been found, the larvae and males of other known species have been discovered, and new facts concerning the distribution and malaria-carrying powers of some of the species have been ascertained. The terminology of many of the structural characters used in classification has now been more or less standardized, and useful new characters have been found. The publication of Edwards' catalog of the *Culicidae* (13) has given us a comprehensive treatment of the vexed problems of specific nomenclature, and contains the latest authoritative work on the classification of the anopheline mosquitoes.

BIBLIOGRAPHY

1. Barraud, P. J., and Covell, G.: The Morphology of the Buccal Cavity in Anopheline and Culicine Mosquitoes. *Ind. Jour. Med. Res.*, 15, 3, 671, 1928.
2. Christophers, S. R.: The Male Genitalia of Mosquitoes. *Ind. Jour. Med. Res.*, 3, 2, 1915.
3. Christophers, S. R.: *Fauna of British India*, Vol. IV, Diptera, Anophelini. Taylor & Francis, London, 1933.
4. Costa Lima, A. da: Sobre algunas Anofelinas encontradas no Brazil. *Suppl. Mem. Inst. Osw. Cruz*, No. 3, 91-113, 1928.
5. Cova-García, P.: Notas sobre los Anofelinos de Venezuela y su Identificación. *Public. de la Div. de Malariol. (Venezuela)*, No. 2, Jan. 1939.
6. Curry, D. P.: *Anopheles (Anopheles) neomaculipalpus*, a New Species of the Arribalzagaita Group of *Anopheles* from Panama. *Amer. Jour. Hyg.*, 13, 2, 643, 1931.
7. Curry, D. P.: Some Observations on the Nyssorhynchus Group of the Anopheles (Culicidae) of Panama. *Amer. Jour. Hyg.*, 15, 2, 566-572, 1932.
8. Davis, N. C.: Notes on the Female Hypopygia of Anopheline Mosquitoes, with Special Reference to some Brazilian Species. *Amer. Jour. Hyg.*, 6, March supplement, 1-22, 1926.
9. Davis, N. C.: A Consideration of Variability in the Nyssorhynchus Group of the Genus *Anopheles*. *Amer. Jour. Hyg.*, 8, 4, 539, 1928.
10. De Leon, J. R.: Los Anofeles de la Ciudad de Guatemala. *Bol. Sanitario de Guatemala*, 4, 40, 778-827, 1933.
11. De Leon, J. R.: El Anophelismo de Altura en Guatemala. *Bol. Sanitario de Guatemala*, 9, 46, 411-424, 1938.
12. Dyar, H. G.: *The Mosquitoes of the Americas*. Carnegie Institution of Washington, Publ. 387, 1928.
13. Edwards, F. W.: *Diptera, Family Culicidae. Genera Insectorum*, Fascicle 194, L. Desmet-Verteneuil, Brussels, Belgium, 1932.
14. Evans, A. M.: *Mosquitoes of the Ethiopian Region*, II. Anophelini. British Museum (Natural History), 1938.
15. Gabaldón, A.: Primer Informe Anual (1937) de la División de Malariología. *Public. de la Div. de Malariol. (Venezuela)*, No. 1, Apr. 1938.
16. Gabaldón, A.: Segundo Informe Anual (1938) de la División de Malariología. *Public. de la Div. de Malariol. (Venezuela)*, No. 4, Oct. 1939.
17. Galvão, A. L. A.: Observações sobre algumas Especies do Subgenero Nyssorhynchus com especial Referencia a Morfologia dos Ovos. *Rev. Biol. e Hyg. (São Paulo)*, 9, 1, 51-60, 1938.
18. Galvão, A. L. A., and Lane, J.: Notas sobre os Nyssorhynchus de S. Paulo. II. Descrição de uma Nova Especie, *Anopheles pessoai*. *Rev. Biol. e Hyg. (São Paulo)*, 7, 2, 67-79, 1936.
19. Hill, R. B.: Classification of Certain *Anopheles* of the Nyssorhynchus Group by Immediate Examination of the Male Genitalia. *Amer. Jour. Hyg.*, 11, 3, 711, 1930.
20. Hoffman, C. C.: La Formación de Razas en los *Anopheles* Mexicanos. II. *Anopheles albimanus* y sus Variedades en la República Mexicana. *Anales del Inst. Biol. (Mexico)*, 9, 1 and 2, 167-180, 1938.

21. Komp, W. H. W.: *Anopheles* (*Nyssorhynchus*) *anomaloxyllus*, a New Species of *Anopheles* from Panama and Costa Rica. Proc. Ent. Soc. Wash., 38, 7, 160, 1936.
22. Komp, W. H. W.: The Species of the Subgenus *Kerteszia* of *Anopheles*. Ann. Ent. Soc. Amer., 30, 3, 492-529, 1937.
23. Komp, W. H. W.: The Nomenclature of the Thoracic Sclerites in the Culicidae, and their Setae. Proc. Ent. Soc. Wash., 39, 9, 241, 1937.
24. Komp, W. H. W.: The Occurrence of *Anopheles darlingi* Root in British Honduras and Guatemala. Pub. Health Rep., 55, 16, 693-694, 1940.
25. Komp, W. H. W.: Methods for Staining, Dissecting, and Mounting the Male Terminalia of Mosquitoes. In press. (1942.) Pub. Health Rep.
26. Kumm, H. W., Komp, W. H. W., and Ruiz, H.: The Mosquitoes of Costa Rica. Amer. Jour. Trop. Med., 20, 3, 385-422, 1940.
27. Martini, E.: Ueber einige für das System bedeutungsvolle Merkmale der Stechmücken. Zoologische Jahrb. Abt. für Syst., Geog. u. Biol. der Tiere, Band 46, Heft 6, 1923.
28. Martini, E.: Los Mosquitos de México. Depto. de Salubridad Pública de México, Boletines Técnicos, Serie A, No. 1, 1935.
29. Matheson, R. and Hurlbut, H. S.: Notes on *Anopheles walkeri* Theobald. Amer. Jour. Trop. Med., 17, 234-243, 1937.
30. Pinto, C.: Dissertação da malária pela aviação: biologia do *Anopheles gambiae* e outros anofelinos do Brasil. Mem. Inst. Osw. Cruz, 34, 3, 293-430, 1939.
31. Puri, I. M.: Larvae of Anopheline Mosquitoes, with Full Description of Those of the Indian Species. Ind. Med. Res. Memoir No. 21, 1931.
32. Root, F. M.: The Larval Pilosity of *Anopheles quadrimaculatus* and *Anopheles punctipennis*. Amer. Jour. Hyg., 4, 6, 710, 1924.
33. Root, F. M.: Studies on Brazilian Mosquitoes. I. The Anophelines of the *Nyssorhynchus* Group. Amer. Jour. Hyg., 6, 5, 684, 1926.
34. Root, F. M.: Studies on Brazilian Mosquitoes. II. *Chagasia fajardoi*. Amer. Jour. Hyg., 7, 4, 470, 1927.
35. Root, F. M.: In Animal Parasitology, Hegner, Root, and Augustine. Century Co., New York, 1929.
36. Root, F. M.: The Pleural Hairs of American Anopheline Larvae. Amer. Jour. Hyg., 15, 3, 777, 1932.
37. Rozeboom, L. E.: The Egg of *Anopheles pseudopunctipennis* in Panama. Jour. Parasit., 23, 5, 538-539, 1937.
38. Rozeboom, L. E.: On *Anopheles albiparvus* in Panama. South. Med. Jour., 30, 9, 950-951, 1937.
39. Rozeboom, L. E.: The Eggs of the *Nyssorhynchus* Group of *Anopheles* (*Culicidae*) in Panama. Amer. Jour. Hyg., 27, 1, 95-107, 1938.
40. Senevet, G.: Contribution à l'Étude des Nymphes de Culicidés. Compte-rend. du 2^e Congrès Internat. du Paludisme, 1, 69, 1930.
41. Senevet, G.: Contribution à l'Étude des Nymphes d'Anophelines (2^e Mémoire). Arch. Institut. Pasteur Algérie, 9, 1, 17, 1931.
42. Shannon, R. C.: On the Classification of Brazilian Culicidae with Special Reference to those Capable of Harboring the Yellow Fever Virus. Proc. Ent. Soc. Wash., 33, 6, 125, 1931.
43. Shannon, R. C.: Anophelines of the Amazon Valley. Proc. Ent. Soc. Wash., 35, 7, 117, 1933.
44. Sinton, J. A., and Covell, G.: The Relation of the Morphology of the Buccal Cavity to the Classification of Anopheline Mosquitoes. Ind. Jour. Med. Res., 15, 2, 301, 1927.

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