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ANOPHELES CLARKI, A NEW SPECIES OF NYSSORHYNCHUS
OF WIDE DISTRIBUTION IN SOUTH AMERICA.
(DIPTERA: CULICIDAE).

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The observations of many workers in South America, particularly those of Gabaldon (1, 2), Ayroza Galvão (3), and Rozeboom and Gabaldon (4), have shown that the species of *Anopheles* of the subgenus *Nyssorhynchus* are much more numerous than has hitherto been suspected. The purpose of this paper is two-fold, first, to describe a new species of this complex, and second, to re-emphasize the necessity for careful systematic work in separating the many closely similar species of this subgenus.

The description of the new species is based on material received from several widely separated localities, indicating either a wide over-all distribution of the species, or the existence of peculiar ecological conditions which favor its propagation. Many years ago a single male was obtained from Bahia, State of Bahia, Brazil, through the kindness of Dr. Mark F. Boyd of the Rockefeller Foundation, unfortunately without data as to time of collection. Four males and four females were received from Dr. Carlos A. Alvarado, Director of the anti-malaria campaign in northern Argentina, from Monteros, which is a town of about 5,000 lying south of Tucuman, the capital of the province of that name, in northern Argentina. Two males of this species, which were sent for identification, were obtained through the kindness of Dr. O. R. Causey, at the time with the Rockefeller Foundation in Fortaleza, Ceará, Brazil, which were collected in Guaramiray, Ceará, and Maceio, Alagoas, Brazil, respectively. These were labeled "oswaldoi?". Lastly, a single male terminalia of the new species was found in the slide collection of the late F. M. Root, at the School of Hygiene and Public Health of Johns Hopkins University. The slide is labeled "'*A. tarsimaculatus*," Concepción, Argentina. Dr. N. C. Davis." This slide has three male terminalia mounted under one cover-glass. The terminalia farthest from the label are those of *A. clarki*. Concepción is a town some miles south of Monteros, in the province of Tucuman, Argentina.

The adult females from Monteros, Argentina, are apparently very similar in appearance to most of the other species of the series *tarsimaculatus* of Edwards (5). The males are likewise indistinguishable from other members of this series, except on the basis of the terminalia. The short, straight, truncate,

¹ From the Gorgas Memorial Laboratory, Panama City, Rep. de Panama.

heavily sclerotized mesosome of the terminalia of this species is quite distinct from that of any other known species, and so far is the best means of distinguishing it from its congeners. It is hoped that more abundant material may be obtained from South America, so that all stages of this interesting, widespread and hitherto overlooked species may be described.

Description of *Anopheles (Nyssorhynchus) clarki*, new species.

(Here described.)

Adult female: Of the usual facies of the series *tarsimaculatus* of Edwards. The palpi have the last two segments white, with narrow black rings at the apex and base of the penultimate segment, and a white ring at the apex of the ante-penultimate segment. A few white scales are mixed with the dark brown scales of the antepenultimate segment, and there is an indistinct white ring at the joint between the antepenultimate segment and the next basal segment. The mesonotum has three dark spots in the integument, two on each side behind the lateral fossae, and one larger spot covering the antescutellar space. The dorsum of the abdomen is clothed with creamy scales, more numerous along the median line, and there are prominent lateral scale tufts on the second to sixth segments. The cerci are clothed with brown and white scales, the white scales predominating.

The fore legs have white apical bands on the first, second, and third tarsal segments, broadest on the third segment. The fourth and fifth segments are all dark. The mid legs are likewise with white rings on the first, second, and third tarsal segments, much narrower than on the fore legs. The first hind tarsal segment is dark, with a narrow white apical ring. The second hind tarsal segment is variable in amount of white, specimens from Argentina having this segment about 25 per cent black, while the two specimens from northeastern Brazil have the black portion much reduced, to about one-sixth the length of the segment, therein approaching the condition found in *A. oswaldoi*. The third and fourth hind tarsal segments are all white, and the fifth segment is white with a narrow black basal ring. On all legs there is a small white spot at the tip of the femora, and a narrow white apical ring on the tibiae.

Wings. Of the usual *Nyssorhynchus* facies, with no apparent distinguishing features. Spot B 2 of Root is larger than the preceding black spot, and the light wing scales vary in color from white to creamy.

MALE: With the coloration of the female, the wing-markings similar, but with the scaling much reduced.

Male terminalia: Of the usual *Nyssorhynchus* type, with fused ventral lobes of the claspette produced to form two long hairy basal lobules (Fig. 3). The terminal hairs of these lobules are long, sometimes recurving upwards over the lobules, as in *A. oswaldoi*. The hairs on the median portion of the lobules are shorter, and show a tendency to radiate. On the inner aspect, between the lobules, the long hairs are seemingly considerably more dense, and recurve upwards toward the preapical plate. These inner long hairs are curved, not straight as in the similar hairs of *A. rangeli* Gabaldon,

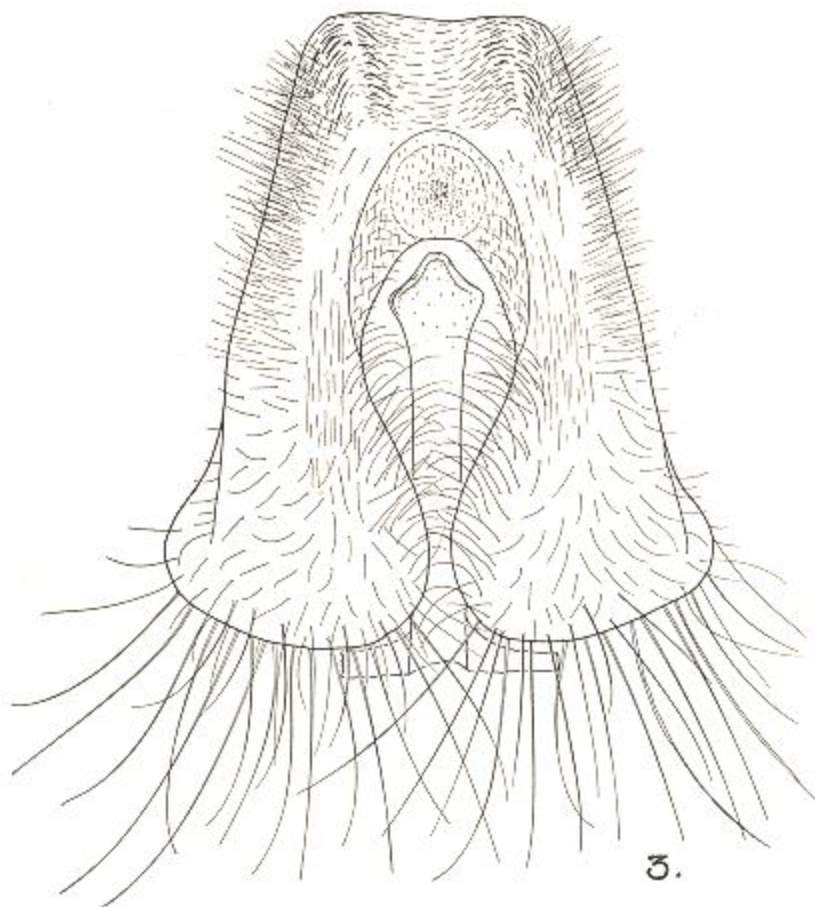


Fig. 3. Claspette lobes of *A. clarki*.

et al., and form a less dense tuft. The preapical plate is very large and nearly circular. The apex of the fused claspette lobes is rugose, with long laterally-directed hairs on the sides. The apex is somewhat narrowed, not being as wide as the basal lobules.

The mesosome (Figs. 1 and 2) is very characteristic, and forms the most easily accessible character to differentiate the species. The mesosome is short, slightly curved, incompletely tubular, and the sides (lateral faces) are nearly straight, and very heavily sclerotized. A cross-section of the mesosome below the tip would be approximately square. The apex of the mesosome departs greatly from the appearance as found in the other species of *Nyssorhynchus*, as it is very short, almost square, and blunt. In the great majority of the other species, the apex of the mesosome is somewhat spoon-shaped, with a rounded tip. In *A. clarki* the apex of the mesosome

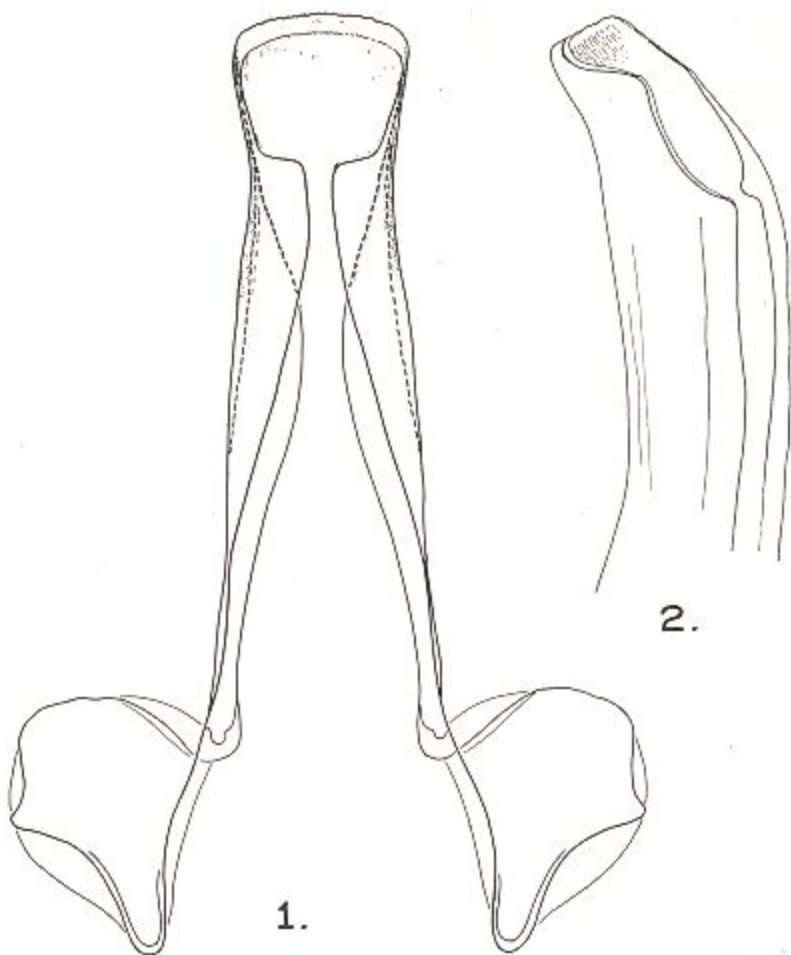


Fig. 1, Mesosome of *A. clarki*, n. sp.

Fig. 2, Lateral view of mesosome of *A. clarki*, showing short, truncate tip.

appears to be beveled off, giving a truncate appearance, and is heavily sclerotized (Fig. 4). The mesosome is entirely dissimilar to that of *A. goeldii* Rozeboom and Gabaldon, in which the apex is short and rounded, and in which small spinelike mesosomal leaflets are usually present.

Larvae.—The larvae of *A. clarki* will not be described at this time, as the material from Monteros, Argentina, is not definitely known to be associated with the males. However, these larvae are similar to the others of the subgenus, resembling closely those of *A. orwaldoi* observed in the Canal Zone.

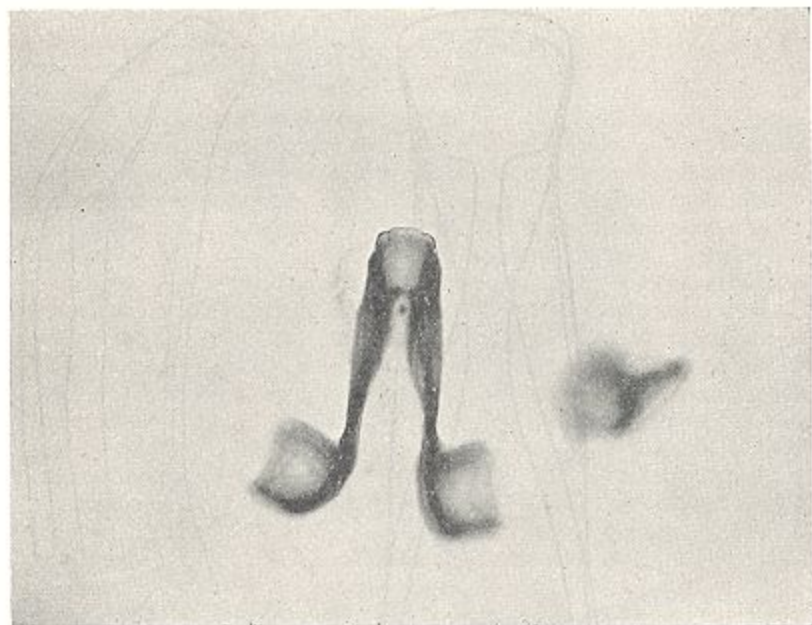


Fig. 4, Micrograph of mesosome of type male.

Type.—One male, the terminalia dissected and mounted on a separate slide.

Type locality: Monteros, Prov. of Tucuman, Rep. of Argentina.

Date of collection: June, 1940. Obtained through the courtesy of Dr. C. A. Alvarado. Type No. 56476 deposited in the U. S. National Museum.

Paratypes: 1 male, 1 female, from Monteros, Argentina, July 1940. 1 female from Monteros, Argentina, June 1940.

Additional material deposited in the U. S. National Museum, Washington, D. C.: 1 male from Guaramiray, Ceara, Brazil, through Dr. O. R. Causey (no date of collection). There is also one male terminalia from Concepción, Tucumán, Argentina, N. C. Davis, collector (no date), in the collection of the late F. M. Root, now in the School of Hygiene and Public Health of Johns Hopkins University Baltimore, Maryland, U. S. A. The writer has retained the remainder of the material mentioned in his private collection. He takes pleasure in naming the new species in honor of Dr. H. C. Clark, Director of Gorgas Memorial Laboratory, Panama, Republic of

Panama, with whom his long association has been pleasant and profitable.

DISCUSSION.

The new species here described is a distinct species of the subgenus *Nyssorhynchus* of *Anopheles*. It is apparently of widespread distribution in South America, material being available from two localities in northwestern Argentina, and from three localities in northeastern Brazil.

All studies of the vector ability, biology, and ecology of the *Nyssorhynchus* species in these and other areas of South America should be reconsidered in the light of the presence of this new species. The excellent work of N. C. Davis on the variability of the species of *Nyssorhynchus* is invalidated to a large degree, owing to his failure to recognize accurately the species with which he dealt. Present conclusions as to the vector ability of the numerous species "lumped" under the name "*tarsimaculatus*" by uncritical workers must be revalidated, taking into consideration the possible role of *A. clarki*.

The discovery of this new species again calls attention to a fact which should now be well known, but is often neglected by field workers. Any investigation of malaria and its Anopheline vectors, which pretends to have scientific accuracy, must have as its firm basis a sound knowledge of Anopheline taxonomy.

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