

THE IDENTIFICATION OF THE ANOPHELINE
MOSQUITOES OF PORTO RICO

SOUTH EAST ASIA MOSQUITO PROJECT
DEPARTMENT OF ENTOMOLOGY
SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
WASHINGTON, D. C. 20560

BY
CLIFFORD W. WELLS

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THE IDENTIFICATION OF THE ANOPHELINE MOSQUITOES OF PORTO RICO^{1, 2}

CLIFFORD W. WELLS

The field worker in malaria, while he may be interested in the more detailed morphological characteristics of the anopheline mosquitoes with which he has to deal, sooner or later limits the features upon which his identification is based to a few outstanding structures and peculiarities.

Three anopheline mosquitoes have been found in the island of Porto Rico; *A. albimanus*, *A. grabhamii*, and *A. vestitipennis*. The first of these, *A. albimanus*, is a known vector; for the remaining two species this point has yet to be determined; consequently the malaria worker in the Island must be familiar with the principal morphological characteristics of each species in order to identify them readily.

The task of identification, as far as Porto Rico is concerned, is greatly simplified by the limitation of the anopheline mosquitoes to three species, and further by the fact that each one of these possesses certain outstanding markings and peculiarities which are sufficient to permit identification of the adult mosquito by the naked eye.

The anophelines of Porto Rico, *A. albimanus*, *A. grabhamii* and *A. vestitipennis*, have all received more or less satisfactory treatment in the literature, although a few additional features are contributed herein. It is not the purpose of this paper to report new or important findings in respect to these species, but rather to

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² The writer is indebted to Dr. Walter C. Earle for suggestions and for much of the information included in this paper. He is also under obligations to the Commissioner of Health of Porto Rico and to the Insular Department of Health for their cooperation.

TABLE I
Larval characteristics

	A. ALBIMANUS	A. GRABHAMII	A. VESTIFENNIS
Inner anterior clypeal hairs (fig. 2)	Long, slender, with few fine distal branches. Origin, far apart. Tend to diverge	Long and slender, fewer branches. Arise close together, converge towards tip	Similar to preceding, but arise closer together than in <i>A. albimanus</i>
Outer anterior clypeal hairs (fig. 2)	Long and slender, with few fine branches on distal half (Root (2))	<i>Thick dichotomous branching, forming a flat, fan-shaped tuft with twenty or more branches (Root (2))</i>	<i>Thin dichotomous branching with six to ten branches, and main stem longer than in A. grabhamii</i>
Antennal hairs (fig. 3)	Short and insignificant, with several short branches	Also short and not prominent, with several short branches	Arise at junction of inner and middle thirds. <i>They are prominent, about three times the length of the other two species, with greater number of branches</i>
Anterior sub-median thoracic hairs	<i>Median and inner hairs profusely branched, outer hair short and unbranched</i>	Inner hairs have two or three short branches, median hair large but not as profusely branched as in <i>A. albimanus</i>	Similar to those of <i>A. grabhamii</i>
Palmate hairs	Present on <i>thorax and first to seventh abdominal segments. Sharply pointed. Notching absent</i>	Found only on third to seventh abdominal segments. Leaflets are lanceolate and notched	Similar to <i>A. grabhamii</i>
Lateral hairs on fourth to sixth abdominal segments (fig. 5).	<i>Long, slender and unbranched (Root (2))</i>	Long, slender and <i>bifurcated</i> near base (Root (2))	Similar to <i>A. grabhamii</i>

gather in a comprehensive manner comparative data which will facilitate ready identification.

ADULT CHARACTERISTICS

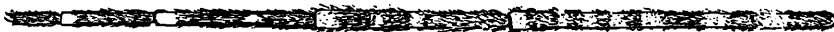
A. albimanus. The palpi are white tipped. The distal half of the second, and all of the third and fourth tarsi of the hind legs are snow white, while the fifth tarsi are black in their proximal two-thirds, the tip being white. The wings show two black



A. albimanus



A. grabhamii



A. vestitipennis

FIG. 1. MARKINGS ON THE TARSI OF THE HIND LEGS OF *A. ALBIMANUS*, *A. GRABHAMII*, AND *A. VESTITIPENNIS*

blotches at the middle and outer thirds of the costa, with one smaller spot on the costa basally and a small one apically.

Hoffman (1) has called attention to the habit of this species, of frequently elevating the hind legs while at rest, and waving them leisurely in the air.

A. grabhamii. The palpi are entirely black and are heavily tufted. The legs are brownish throughout and have no distinct markings. The wings have a number of black blotches along

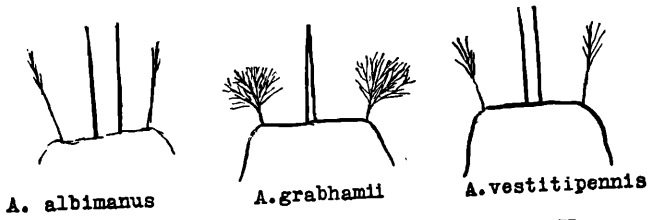


FIG. 2. INNER AND OUTER ANTERIOR CLYPEAL HAIRS

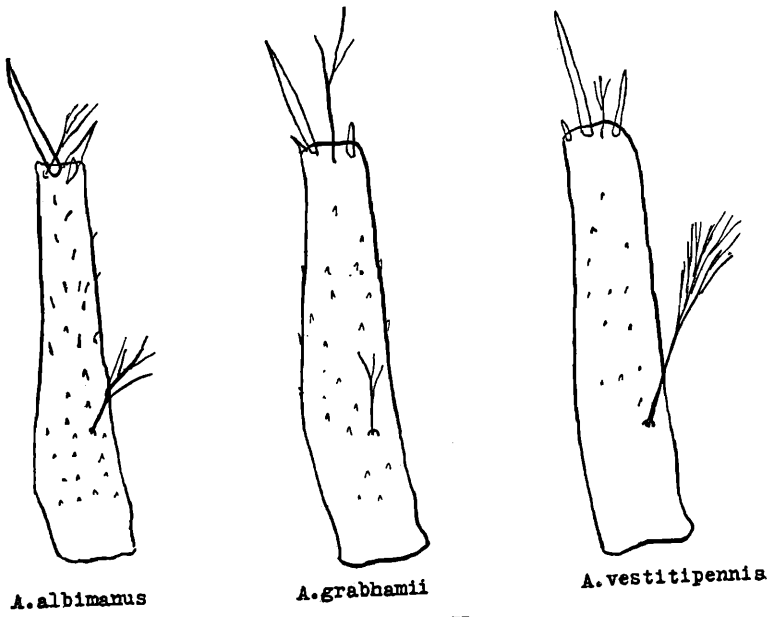


FIG. 3. ANTENNAL HAIRS

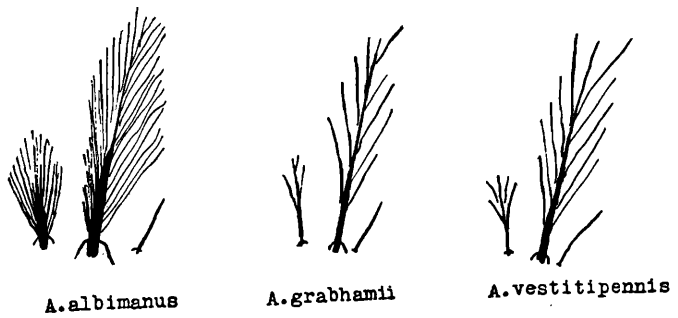


FIG. 4. ANTERIOR SUB-MEDIAN THORACIC HAIRS

the apical half of the costa but are much less prominent than in *A. albimanus*. This species may be readily identified by the large, inflated, broadly elliptical and conspicuous scales on the wings, as seen under the microscope.

We are again indebted to Hoffman (1) for pointing out a striking peculiarity in the resting position assumed by *A. grabhamii*, in which the body projects almost at right angles to the surface and the second and third pairs of legs are held close together providing a picture which is characteristic.

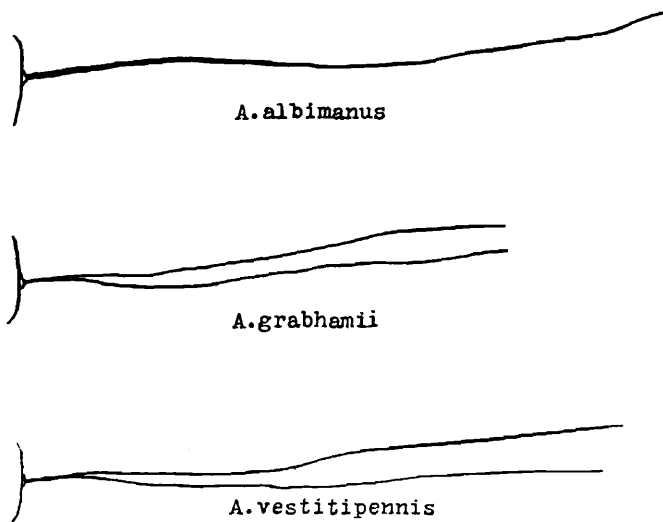


FIG. 5. LATERAL HAIRS OF FOURTH TO SIXTH ABDOMINAL SEGMENTS

A. vestitipennis. The palpi are black and heavily tufted, but less so than in *A. grabhamii*. The mosquito as a whole appears to be much darker than *A. grabhamii*, and lacks the leg and palpi markings observed in *A. albimanus*. The wings are heavily scaled throughout; dark brownish blotches cover the apical half, and there are two or three dark spots along the apical half of the costa. The hind legs show a number of small distinct white bands which are apparent to the naked eye (fig. 1).

SUMMARY

Because of certain well defined characteristics and peculiarities it is usually possible to identify the adults of the anopheline mosquitoes of Porto Rico with the naked eye. The position assumed by the living *A. grabhamii* when at rest is unmistakable; *A. albimanus* alone has the distinct snow white markings on the terminal four tarsi of the hind legs, and the tip of the palpi; while the general darker appearance of *A. vestitipennis*, with the white bands on the tarsi of the hind legs and the absence of the markings characteristic of the other two species, is adequate for identification.

For the identification of the larvae, one finds that *A. albimanus* alone has heavily branched, inner and median, sub-median thoracic hairs, palmate hairs on the thorax and on the first and second abdominal segments, and unbranched lateral abdominal hairs on the fourth to sixth segments. The peculiar fan shaped branching of the outer anterior clypeal hairs are characteristic of *A. grabhamii*; the difference in distance between the inner anterior clypeal hairs at point of origin is likewise of importance. In the larva of *A. vestitipennis* the large antennal hair and the structure of the outer anterior clypeal hairs differ distinctly from similar structures in the other two species and are sufficient for identification.

REFERENCES

- (1) HOFFMAN, W. A.: Resting position of Haitian anopheles. Amer. Jour. Trop. Med., September, 1926, vi, no. 5.
- (2) ROOT, FRANCIS M.: The larvae of American mosquitoes, in relation to classification and identification. Amer. Jour. Hyg., 1922, ii.