A Revision of the Uranotaenia of Panama with Notes on Other American Species of the Genus

(Diptera, Culicidae)

By

PEDRO GALINDO, FRANKLIN S. BLANTON
AND E. L. PEYTON

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A REVISION OF THE URANOTAENIA OF PANAMA WITH NOTES ON OTHER AMERICAN SPECIES OF THE GENUS

(Diptera, Culicidae)[1]

PEDRO GALINDO,[2] FRANKLIN S. BLANTON,[3] AND E. L. PEYTON[4]

During the course of a light-trap mosquito survey in Panama, we had the opportunity of examining over nine thousand specimens of *Uranotaenia* and became impressed with the difficulties involved in the identification of the different species due to the inadequacy of the available treatises on the American species of the genus.

Dyar (1928) published the last truly comprehensive work on the New World species of this interesting group of culicine mosquitoes and since that date only scattered descriptions of new species have appeared in the literature with the exception of Lane's (1943) attempt to bring up to date the information on South American species and the excellent publication by Pratt (1946) on the three species known to occur in Puerto Rico. At present, Dyar's work is completely out of date due to the addition of many new species since its publication, to the inaccuracy of his descriptions and figures of the male terminalia and to the almost complete lack of information on the immature stages, and Lane's publication is incomplete and has the disadvantage of lacking keys for the separation of the different species. Thus the American species of *Uranotaenia* are evidently in need of a complete revision in the light of present day knowledge of the genus.

The present work was originally planned as a revision of the American species of the genus, but in view of our inability to obtain adequate South American material, it was decided to publish it as a revision of the *Uranotaenia* of Panama, with additional notes on other species which became available to us during the study. Although our work is far from complete, it is hoped that publication of it at this time may serve to stimulate further taxonomic investigations on the subject.

Lane (1939) records six species of *Uranotaenia* from Panama, namely: *calosomata* D. & K., *coatzacoalcos* D. & K., *geometrica* Lutz, *hystera* D. & K., *lowii* Theobald and *pulcherrima* Lynch Arribalzaga. In the present publication we add eight new records for the country and describe four new species. For reasons that will be discussed under the species, we have come to the conclusion that *coatzacoalcos* does not occur in Panama, and that what has gone under that name in this country are in reality two species: *typhlosomata* Dyar and Knab

[1]Cost of publication is paid by the Gorgas Memorial Laboratory.

[2]Entomologist, Gorgas Memorial Laboratory, Panama, R. de P.

[3]Lt. Colonel, MSC, Entomologist, United States Army Caribbean, Ft. Clayton, C. Z.

[4]Sergeant First Class, Preventive Medicine Technician, 25 Medical Dt.

and *trapidoi* n. sp. The name *Uranotaenia socialis* Theob. has been revived to designate what has gone under the name of *Uranotaenia sapphirina* Osten Sacken in Middle America. We have also included in this paper a key to all the known American species of *Uranotaenia*.

While we feel that little can be added in the way of new species or new records of *Uranotaenia* for Panama, our knowledge of the immature forms of many of the species remains fragmentary and much arduous field work is still required to reveal the breeding habits of them.

METHODS

The importance of the male terminalia in any taxonomic work on *Uranotaenia* cannot be overemphasized. The dististyle, phallosome and ninth tergite offer excellent characters for the separation of almost all the known species, but it is absolutely necessary to have adequate mounts in order to interpret correctly the different parts of the terminalia. We have obtained excellent results with the following method modified after Fairchild and Hertig (1948).

The terminal abdominal segments are clipped with a pair of fine scissors between the seventh and eighth segments. The last segments with the terminalia are boiled in 20% KOH for fifteen to twenty seconds, then passed through a weak solution of HCL to neutralize the alkali and dropped into pure fresh phenol. The specimen is stained in a weak solution of acid fuschin in phenol for one to two hours and dissected in a small drop of the staining solution. In dissecting the specimen we separate first the eighth segment from the rest of the terminalia, then remove the styles and carefully tease the phallosome away from the ninth tergite; this last operation is very delicate and should be done with extreme care as the lobes of the ninth tergite have a tendency to come off with the phallosome, resulting in a poor specimen.

To mount the terminalia we place very small dropplets of copal-phenol on a clean slide and place each part of the terminalia on an individual drop of the mounting medium. The eighth segment is mounted on a central uppermost drop followed by the two styles facing each other. Care should be taken that the styles are oriented in a true lateral position as a number of species are characterized by the distended ventral border of the dististyle and this condition can only be seen in a true lateral view of the specimen. The styles are followed by the phallosome which may be mounted whole, in a dorso-ventral position, or the plates split apart and each mounted in lateral view. When more than one specimen are available it is better to have both dorsal and lateral views of the phallosome as some species have a number of teeth on the tergal arm of the phallosome that are obscured in dorsal view. The ninth tergite follows the phallosome; this sclerite should be mounted flat with the lobes pointing toward the phallosome so as to appreciate properly the shape of the lobes and of the emargination of the basal border of the sclerite; this can be accomplished by separating the ninth tergite from the sternite through cuts on each side of the tergite. Four small pieces of cover-slip glass are then placed around the mounted parts to act as supports for the cover-slip and thus avoid crushing of the specimen.

Once the parts are properly mounted, the slide is placed in an oven at 40° C until all the phenol is driven off. A small drop of balsam is then placed on top of the copal and allowed to dry before putting on the cover-slip. This last step prevents movement and disorientation of the different parts of the terminalia.

With this method excellent mounts are obtained in which all the parts can be adequately studied. We must emphasize on the necessity of dissecting the specimen, as whole mounts are totally inadequate since neither the phallosome nor the ninth tergite can be interpreted correctly in them.

Uranotaenia Lynch Arribalzaga

Uranotaenia Lynch Arribalzaga, 1891. Rev. Mus. La Plata, 1: 375. Type: *pulcherrima* Lynch Arribalzaga.
Anisecheleomyia Theobald, 1905. Ent., 38: 52. Type: *nivipes* Theobald.
Pseudouranotaenia Theobald, 1905. Jour. Econ. Biol., 1: 33. Type: *rowlandi* Theobald.
Pseudoficalbia Theobald, 1912. Trans. Linn. Soc. Zool., 15: 89. Type: *pandani* Theobald.

GENERAL CHARACTERISTICS

Small to very small mosquitoes with the following characteristics: very short R_2 cell, much shorter than its petiole; anal vein ending at the same level of the fork of the cubitus; extremely fine microtrichia of the wing membrane, usually only visible under the compound microscope.

Head: Proboscis almost always swollen at its apex; palpi short to very short in both sexes. Clypeus and tori varying in color from yellow to dark brown according to the species. Antennae rather long in the females, usually, though not always, shorter and densely plumose in the males. Occiput clothed with flat ovoid scales and a few erect ones varying in color and arrangement according to the species.

Thorax: Anterior pronotal lobes set wide apart, always with a patch or broad stripe of light scales in the known American species. Mesonotum with a vestiture of narrow, curved, dark scales and in the New World species with a line of broad, flat, bluish or white scales in the supraalar region, which in some species extends to the anterior margin of the scutum. Dorsocentral bristles numerous, very long and strong; achrosticals smaller and weaker but also numerous. Mid-lobe of scutellum with a patch of light scales in some species. Pleura mostly glabrous, with a stripe of light scales across the upper third of the sternopleuron in most American species. Pleural chaetotaxy as follows: three anterior pronotals, two above and one below; one or two propleurals, occasionally absent; one or two posterior pronotals; one to three spiraculars, occasionally absent in some specimens; no postspiraculars; one or two prealars; one to four upper sternopleurals; six or more lower sternopleurals; one to three upper mesepimerals, one lower mesepimeral. Suture between sternopleuron and prealar region quite marked. Paratergite always bare. Legs extensively marked with white in some species. Tibiae and tarsi showing secondary sexual modifications in the male of some African (Edwards, 1941) and Indian (Barraud, 1934) species and in at least two American species

(Root, 1937, and see under *nataliae* in the present paper). Tarsal claws equal and simple except for midtarsal claws of the males of most New World species which are markedly subequal. Pulvilli absent. Wing-scales varying in color according to the species, mostly dark; a line of light scales along the stem vein and the bases of the costa, first and fifth vein in some species. Squamae bare. Abdominal scales varying in color and arrangement according to the species.

Male terminalia: Basistyles conical, rather short; basal lobe present but rather obsolete in some species, usually triangularly projected in American species. Dististyle short and simple, with the ventral margin conspicuously distended in some American species, usually glabrous except for some small, fine hairs, but definitely pilose in at least five neotropical species. Appendiculate spine usually simple, sometimes bifurcate at tip. Phallosome composed of two lateral plates united by a bridge; each plate usually divided into two arms, one tergal and one sternal, which bear teeth of varying numbers, shape and size according to the species. Ninth tergite forming an elevated plate with an emargination at the base and with knob-like or horn-like lobes at the shoulders in all American species. Tenth sternites completely membranous, paraprocts not developed.

Larva: Head often elongate; dorsal head hairs Nos. 5 and 6 (terminology of Belkin, 1950) usually, though not always, single, often spine-like. Eighth abdominal segment with a pair of sclerotized lateral plates which bear a number of comb-scales arranged in a single row on its posterior border. Air-tube rather short, with a number of pecten teeth and a single pair of subventral tufts.

Pupa: The genus *Uranotaenia* is rather ill defined in the pupal stage. The trumpets and chaetotaxy vary greatly in the different species showing no characteristic peculiar to all the species of the genus. The paddles are usually inflated on the inner border and bear spinules on the apical half.

THE HIGHER CATEGORIES OF THE GENUS

The species of *Uranotaenia* are quite homogeneous. Despite the fact that there are over 100 valid species throughout the world, all attempts to split the genus subgenerically have failed. Theobald (1912) first attempted it creating *Pseudoficalbia* to include *pandani* Theobald and related species. Edwards (1912) was of the opinion that *Pseudoficalbia* should not be retained as a subgenus as he could find no important structural characters to distinguish the species included in that subgenus from the rest. However, he later changed his mind (Edwards, 1916; Edwards *in* Schwetz, 1927) and revived the subgeneric division basing it mainly on larval characters. Philip (1931) pointed out that the separation proposed by Edwards did not hold in the case of the larva or *U. mashonaensis* Theob. and *U. bilineata* var. *fraseri* Edw. and Edwards (1932) because of these discrepancies decided to relegate *Pseudoficalbia* to group rank, basing the separation on the presence or absence in the adult of a supraalar strip of broad flat scales. In 1941, he abandoned this arrangement because ". . . it was not very natural, especially as it did not take sufficient account of the considerable diversity in the Pseudoficalbia group." In its

place he proposed a division of the African species into four groups which he denominated A, B, C and D with the following characteristics:

"GROUP A.—Scutal scales mostly narrow, but with a supraalar stripe of broad scales; *apn* scaly; wings usually with some white scales in lines. Terminalia (where known) with tergite bare, its lateral corners produced into pointed processes or rounded knobs; style short and rather stout; *lp* with strong spines."

"GROUP B.—Scutal scales all narrow (except *montana*) but *apn* scaly; wing-scales dark. Terminalia (where known) with tergite bare, neither middle nor corners produced; style short but less stout than in group A; *lp* with very small hooks."

"GROUP C.—Scutal scales all narrow. *apn* devoid of scales. Terminalia with tergite bare, more or less produced in middle but not at corners; style long and slender; *lp* with small spines."

"GROUP D.—Scutal scales all broad; *apn* and pleurae also with broad scales. Terminalia with tergite hairy without processes."

According to this classification all the known species of the New World would fall into group A, a fact which emphasizes the close relationship that exists between these species. It is evident, however, after consideration of adult and male terminalia characters, that some species appear more related to one another than to the rest of the species of the group and naturally fall into a number of series which can be characterized as follows:

Pulcherrima-series.—Occiput largely dark-scaled centrally. Mesonotum with a median line of bluish scales or with a spot of bluish scales on antescutellar space; a patch of blue scales on midlobe of scutellum; a short supraalar line of bluish scales. Wings dark-scaled with a line of bluish scales arising on the stem vein and running along the base of the fifth vein. Hind tibiae with a conspicuous apical white spot; tarsi extensively and variously marked with white (except in *sapphirina* and *socialis*). Antennae of male plumose with the segments shorter than in the female, except for the last two which are markedly longer. Midtarsal claws of the male distinctly subequal. Dististyle not pilose. *Pulcherrima, sapphirina, apicalis, geometrica* and *socialis.*

Pallidoventer-series.—As in the pulcherrima-series except for the absence of blue markings along the midline of mesonotum or midlobe of scutellum. Wings dark-scaled with a line of pale scales along the base of first and/or fifth veins. Hind tibiae with or without apical white spots. Hind tarsi dark or with the last two or three segments entirely white. *Pallidoventer, coatzacoalcos, calosomata, typhlosomata, cooki, ditaenionota, mathesoni, davisi, trapidoi* n. sp. and *incognita* n. sp.

Leucoptera-series.—Occiput almost entirely clothed with white scales. Mesonotum dark along the midline and with the sides extensively clothed with white scales (*hystera*) or with a short supraalar line of white scales. Wings extensively pale-scaled. Male with pronounced secondary sexual characters as in the *pulcherrima*-series. Dististyle not pilose. *Leucoptera, hystera* and *nataliae.*

Lowii-series.—Occiput largely dark-scaled centrally. Mesonotum and scutellum dark-scaled except for a short supraalar line of blue or white scales. Wings dark-scaled with a line of pale scales arising on the stem vein and running along the base of fifth vein, except for *telmatophila* n. sp. which has the wing-scales mostly pale. Legs dark or with the last two segments entirely white. Male with secondary

sexual characters of antennae and midtarsi entirely absent or markedly reduced. Dististyle pilose. *Lowii, orthodoxa, briseis, paludosa* n. sp. and *telmatophila* n. sp.

Anhydor-series.—As in *pallidoventer*-series, except for complete absence of pale scales on the wings. Head hairs Nos. 5 and 6 of larva double or triple instead of the simple spines. *Anhydor* and *syntheta.*

STRUCTURAL PATTERNS OF SPECIATION IN URANOTAENIA

Like in other genera of the Culicidae speciation in *Uranotaenia* is reflected in changes along certain general structural patterns. However, it must be borne in mind that these changes are sometimes restricted to only one of the stages in the life-cycle of a species, so that the case may present itself where two closely related species may be separated with certainty only by characters present in one of the immature stages, giving rise to so-called "larval" or "pupal" species. The presence of such forms in the genus—as in the case of *coatzacoalcos* D. & K. and *trapidoi* n. sp and of *sapphirina* O. S. and *socialis* Theob. discussed in this paper—makes it increasingly important to study all the stages of a form from different points in its territory before arriving at definite nomenclatorial conclusions, particularly in the case of "species" with a very wide geographical distribution, such as *lowii, geometrica, calosomata,* etc., as defined at present.

In the adult stage the most important of the structural patterns affected by speciation is that of the color and arrangement of certain specialized body scales which give a bright blue or silvery reflection under daylight illumination. The most important groups of these metallic scales are: (a) the occipital scales which form characteristic patterns in many of the species; (b) the line of supraalar scales which in some species, like in *lowii,* is very short and bluish, while in others, like in *calosomata* and *davisi* extends all the way to the anterior border of the scutum and is white in color; (c) specialized scales along the midline of the mesonotum and on the scutellum, present in the species of the *pulcherrima* series which form a characteristic blue line or spot in this area; (d) the patch of scales across the upper third of the sternopleuron which is absent in at least three American species; (e) the wing scales which in some species become partly modified, giving rise to characteristic patterns or lines of white or blue scales; (f) the tarsal scales which may be modified to form groups of white scales originating various and specific tarsal markings.

In the male terminalia specific changes appear to occur principally in three structures: (a) the dististyle, whose shape, the presence or absence of pile and the structure of the appendiculate spine characterize many American species; (b) the phallosome with its intricate arrangement of teeth, spines and other processes; (c) the ninth tergite, particularly the shape of the basal emargination as well as the shape and position of the lobes.

The immature stages of *Uranotaenia* are very poorly known so it appears too risky to venture generalizations on the structures that are modified in the different species. However, it is known that pigmentation patterns of the head capsule of the larva and of the

integument of the pupal case can be used to separate a number of species. Other characters that seem to be important in the separation of the species are the quality and branching of the dorsal and ventral head hairs, particularly hairs Nos. 4, 5, 6, 7, 9, 11, and 13; the place of insertion of the antennal hair; the quality and number of branches of prothoracic hairs Nos. 3, 4, 5, 7, and 14; the number of branches of lateral abdominal hair No. 6 on segments I and II; the number, shape and size of teeth on the lateral plate of the eighth abdominal segment; the structure and number of the pecten teeth; the place of insertion of the siphon tuft; the shape of the pupal trumpets and the quality and branching of some of the dorsal abdominal hairs of the pupa, particularly hairs Nos. 2 and 5 (terminology of Knight and Chamberlin, 1948).

BIONOMICS

Little is known of the bionomics of the adult *Uranotaenia*. Most of the specimens studied by us have been taken in light traps or reared from larvae. The scant observations we have made on the adults of a few species will be discussed under the individual species.

Of the eighteen species of *Uranotaenia* known to occur in Panama, thirteen have been taken as larvae. Of these, nine are known to occur in large open swamps with abundant growth of different types of aquatic vegetation, namely, *apicalis*, *briseis*, *geometrica*, *leucoptera*, *lowii*, *nataliae*, *pulcherrima*, *socialis* and *telmatophila*. One, *typhlosomata*, occurs frequently in stream bed pools from sea level to 2,000 ft. in elevation. *Calosomata* seems to favor partly shaded boggy springs or marshy pastures, *trapidoi* is a highland species found mainly in cold mountain springs between 2,000 and 6,000 ft. elevation, and *pallidoventer* favors shaded ground pools in marshy forests.

Of the six species whose larvae remain unknown to us, four are consistently captured in light traps operated in or near large open swamps; these are: *ditaenionota*, *hystera*, *incognita* and *paludosa*. The other *orthodoxa* has been captured only in light traps placed deep within the tropical rain forests of Bocas del Toro Province at least twelve miles from the nearest large open swamp.

A year-long study of the species breeding in large open swamps was conducted to determine by means of weekly collections the annual cycle of larval abundance. These species can be grossly divided into three groups according to the time of year when the immature stages reach a peak of abundance.

a) Species that reach a peak of abundance during the dry season: *telmatophila*, *briseis* and *geometrica*. Of these three, *telmatophila* and *briseis* are found only in cool water among the matted roots of sedges in drying out swamps, while *geometrica* favors pools and ponds in full sunlight, particularly in the presence of *Spirogyra* algae.

b) Species that reach a peak of abundance soon after the onset of the rains: *lowii* and *nataliae*.

c) Species that reach a peak of abundance at the height of the rainy season: *leucoptera*, *apicalis*, *pulcherrima* and *socialis*.

KEY TO AMERICAN SPECIES OF URANOTAENIA[5]

Adults

1. Hind tarsi dark 2
   Hind tarsi extensively marked with white 17
2. Mesonotal integument markedly bicolor. Central part bronzy brown, bordered by a pale yellowish band which extends from the roots of the wings around the anterior border of the scutum. Pleura concolorous with this band. Mesonotal scales dark on bronzy brown integument, white on pale yellowish band ..... **hystera**
   Mesonotum otherwise 3
3. Wing-scales all dark 4
   Wings with at least a short line of bluish or white scales at the base of one of the veins 5
4. With a conspicuous line of iridescent bluish scales extending on each side from the scutal angle almost to the anterior margin of the scutum .. **syntheta**
   Line of iridescent bluish scales less conspicuous and much shorter, ending much before the anterior margin of the scutum, sometimes completely obsolete ..... **anhydor**
5. Mesonotum with a long line of white scales on each side extending from above the root of the wing all the way to anterior border of the scutum ... 6
   Mesonotum with a short line of pearly blue or white scales on each side extending at most to the scutal angle 7
6. Abdominal tergites with very broad basal bands of white scales ..... **ditaenionota**
   Abdominal tergites with very narrow basal bands of white scales .. **mathesoni**
7. Mesonotum with a narrow median line of bluish scales 8
   Mesonotum without such a median line of bluish scales 9
8. Median line of bluish scales extending all the way back to the scutellum. Line of blue scales along the stem of the fifth wing-vein occupying more than half the distance from the base to the fork ..... **sapphirina**
   Median line of bluish scales interrupted at antescutellar space. Line of blue scales along the stem of the fifth vein occupying half the distance or less from the base to the fork ..... **socialis**
9. Occiput almost completely white-scaled 10
   Occiput with abundant dark scales centrally 11
10. Wings with several conspicuous large spots of white scales. Sternopleuron with a band of bluish white scales ..... **nataliae**
    Wing-scales mostly white with a large spot of dark scales extending along the basal two-thirds of the costa and involving the subcosta and first vein. Sternopleuron bare ..... **leucoptera**
11. Hind tibiae with a conspicuous large spot of white scales at apex ..... **cooki**
    Hind tibiae entirely dark-scaled 12
12. Sternopleuron without scales 13
    Sternopleuron with a broad stripe of bluish, white or nearly transparent scales across the upper third 14
13. A spot of white scales in the center of the vertex. No eye border. Medium sized species ..... **orthodoxa**
    Center of vertex with a spot of pearly blue scales joined by a line of concolorless scales which arises on each side above the anterior pronotal lobes and borders the eye for some distance from the vertex. Very small species ..... **briseis**
14. White scales on occiput broadly bordering the eyes from the vertex to the mentum, so that the outside corners of the head appear almost completely white scaled. Pleura dark brown concolorous with mesonotum on upper third; pale yellowish on lower two-thirds ..... **incognita**
    Pearly blue or white scales on occiput bordering the eyes for only half the distance or less from the vertex to the mentum, so that the outside corners of the head appear dark-scaled. Pleura otherwise 15

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[5] *U. syntheta* D. and S., *mathesoni* Lane, *sapphirina* O.S., *cooki* Root, and *davisi* Lane are not discussed at length in this paper, but are included in the keys for the sake of completeness.

15. With a very short line of bluish scales at the extreme base of the wings over the inner aspect of the costa (seen only when illuminated from above under daylight illumination). Pleura brown with a darker spot on sternopleura. Medium-sized species..... **pallidoventer**
    All scales at base of wing dark. Pleura with no darker spot on sternopleura. Very small species..... 16
16. Supraalar line of white scales extending beyond the level of the anterior margin of the paratergite. Mesonotal integument very dark brown to black. Scales across the upper third of sternopleura snowy white in color..... **telmatophila**
    Supraalar line of white scales very short, not reaching the level of the anterior border of the paratergite. Mesonotal integument yellowish brown. Sternopleural scales almost transparent..... **paludosa**
17. All the hind tarsal segments marked with white at least at the joints..... 18
    Terminal hind tarsal segments white. First and second joints entirely dark-scaled..... 20
18. Hind tarsi with fourth and fifth segments entirely white. Mesonotum with a median spot of bluish scales just before the antescutellar space. Large species..... **geometrica**
    Fourth hind tarsal segment with a black ring around the middle. Mesonotum variable. Medium sized species..... 19
19. Mesonotum with a narrow median line of blue scales extending from the anterior margin of the scutum to antescutellar space..... **pulcherrima**
    Mesonotum with a small spot of blue scales in front of antescutellar space..... **apicalis**
20. Mesonotum with a long line of white scales on each side extending from above the root of the wing all the way to the anterior margin of the scutum. Third hind tarsal segment entirely white..... 21
    Mesonotum with a short line of pearly blue or white scales on each side extending from above the root of the wing half the distance or less to the anterior margin of the scutum. At least the basal third of third hind tarsal segment dark..... 22
21. First abdominal tergite largely clothed with creamy yellow scales. Second to seventh tergites with conspicuous large U-shaped apical bands of creamy yellow scales bordering a central spot of dark brown scales..... **calosomata**
    First abdominal tergite entirely clothed with dark scales. Second to seventh tergites with apical spots of white scales..... **davisi**
22. Line of light scales above the root of the wing not reaching the level of the anterior margin of the paratergite. Mesonotal integument yellow with a broad median dark brown band and two large dark brown spots above the roots of the wings. Small species..... **lowii**
    Line of light scales above the root of the wing extending well beyond the anterior margin of the paratergite. Mesonotal integument not as above. Medium sized species..... 23
23. Wing with a long line of white scales along the base of the first vein. Fifth vein dark. Mesonotal integument dark brown in color. Knee spots on hind legs quite conspicuous..... **trapidoi**
    coatzacoalcos
    Wing with a long line of pearly blue to white scales along the base of the fifth vein. First vein dark Mesonotal integument light brown. Knee spots on hind legs much less conspicuous..... **typhlosomata**

Male Terminalia

1. Dististyle clothed with short, fine pile..... 2
   Dististyle without pile, with only scattered hairs from conspicuous circular insertions..... 6
2. Dististyle with a clump of four or more short, heavy teeth at apex..... 3
   Dististyle without such a clump of heavy teeth at apex..... 4
3. Dististyle with only four teeth at apex..... **orthodoxa**
   Dististyle with over fifteen teeth at apex..... **lowii**
4. Sternal arm of the lateral plates of the phallosome bearing subapically a heavy, claw-like tooth directed outwardly. Tergal arm a quadrate plate bearing at its apex a long, heavy, sharply curved tooth which points

inwardly and basally and a smaller, curved, claw-like tooth directed outwardly and basally. Pile on dististyle rather sparse..... **telmatophila**

Sternal arm of the lateral plates of the phallosome without a claw-like subapical tooth. Tergal arm not as above. Pile on dististyle dense.... 5

5. Sternal arm of the lateral plates of the phallosome with a heavily sclerotized, curved, claw-like tooth inserted before the middle. Tergal arm with a heavy closely appressed tooth on outer aspect and an elongated crown of nine smaller teeth arising from the inner surface..... **briseis**

Sternal arm of the lateral plates of the phallosome with a small, narrow, bud-like tooth inserted slightly beyond the middle. Tergal arm a plate with an outer membranous pocket; apical border of the plate developed into a long, narrow, sharply pointed tooth..... **paludosa**

6. Basal border of the ninth tergite very shallowly emarginate; apical surface on which the lobes are inserted very deeply concave; lobes slender, horn-like. Sternal arm of the lateral plates of the phallosome ending in a long, straight, acutely pointed spine. Tergal arm narrow, curved, U-shaped, developing apically into a heavy tooth..... **calosomata**

Basal border of the ninth tergite deeply emarginate; apical surface on which the lobes are inserted straight or shallowly concave. Phallosome otherwise..... 7

7. Tergal arm of the lateral plates of the phallosome developed into straight sclerotized rods which fuse medianly..... **anhydor**
..... **syntheta**

Tergal arms of the lateral plates of the phallosome not as above, never fused medianly..... 8

8. Apex of sternal arm of the lateral plates of the phallosome serrate or denticulate, or developing laterally into a comb of several small, appressed teeth..... 9

Apex of sternal arm of the lateral plates of the phallosome smooth, sometimes bearing laterally a single, large, clawlike tooth, but never a comb of small appressed teeth..... 14

9. Sternal arm of lateral plates of the phallosome with serrate or denticulate apex, and bearing subapically and laterally a heavy claw-like tooth..... 10

Sternal arm of lateral plates of the phallosome with the apex developed laterally into a comb of several small appressed teeth..... 13

10. Lobes of the ninth tergite set close together; interlobar space smaller than the combined width of the two lobes..... 11

Lobes of the ninth tergite set far apart..... 12

11. Tergal arm of the lateral plates of the phallosome a plate with two claw-like teeth inserted near the apex, a clump of three or four smaller claw-like teeth arising medianly and six to nine straight, small teeth near the outer border..... **apicalis**

Tergal arm of the lateral plates of the phallosome with two claw-like teeth near the apex, but with no clump of smaller teeth medianly. Small, straight teeth near the outer border of the tergal plate usually absent and when present, much reduced in numbers..... **pulcherrima**

12. Tergal arm of the lateral plates of the phallosome with three subequal teeth inserted apically on the plate. Apex of sternal arm denticulate....
..... **typhlosomata**

Tergal arm of the lateral plates of the phallosome with two subequal curved teeth inserted apically on the plate; apex of sternal arm serrate..... **leucoptera**

13. Ventral margin of dististyle markedly swollen distally..... **incognita**

Ventral margin of dististyle not swollen..... **ditaenionota**

14. Tergal arm of the lateral plates of the phallosome bearing a single large tooth..... 15

Tergal arm of the lateral plates of the phallosome bearing more than one tooth..... 16

15. Sternal arm of the lateral plates of the phallosome bending sharply outwardly at apex and developing into a long, fine, acutely pointed tooth..... **hystera**

Sternal arm of the lateral plates of the phallosome a slightly curved, broad, sheath-like plate, which appears like a straight tubular structure in dorso-ventral view..... **pallidoventer**

16. Tergal arm of the lateral plates of the phallosome bearing two large blunt teeth ..... **nataliae**
Tergal arm with more than two teeth 17
17. Tergal arm bearing four rather small pointed teeth ..... **coatzacoalcos**
..... **trapidoi**
Tergal arm bearing two heavy teeth and four to eight smaller straight ones 18
18. Subapical tooth of the sternal arm of the lateral plates of the phallosome nearly straight, beak-like. Tergal arm with two heavy teeth and eight smaller straight ones ..... **sapphirina**
..... **socialis**
Subapical tooth of the sternal arm of the lateral plates of the phallosome curved, claw-like. Tergal arm with two heavy teeth and four smaller straight ones ..... **geometrica**
We have seen no material of *mathesoni* Lane, *cooki* Root and *davisi* Lane.

Larvae

1. Lateral abdominal hair No. 6 on segments I and II double 2
Lateral abdominal hair No. 6 on segments I and II triple 8
2. Prothoracic hair No. 14 a multiple tuft 3
Prothoracic hair No. 14 single 4
3. Pecten reaching nearly to the tip of the air tube. Siphon tuft inserted beyond the middle of the tube ..... **trapidoi**
Pecten teeth barely reaching the middle of the air-tube. Siphon tuft inserted at or before the middle ..... **coatzacoalcos**
4. Head hair No. 5 double or triple, No. 6 single or double; antennal hair inserted on dorsal surface of antenna near the inner border ..... **anhydor**
..... **syntheta**
Head hairs Nos. 5 and 6 always single; antennal hair inserted on outer border of antenna 5
5. Prothoracic hair No. 3 a relatively short and weak tuft, one-half or less the length of hair No. 1. Air tube with a conspicuous dark spot on dorsal surface or with two dark bands, one located just before the middle and the other preapically 6
Prothoracic hair No. 3 a long, strong tuft, appreciably more than one-half as long as hair No. 1. Air-tube uniform in color, without dark spots or bands 7
6. Ventral head hair No. 13 a long multiple tuft, as long or longer than dorsal head hair No. 6. Air-tube with two dark bands, one located just before the middle and the other just before the tip ..... **leucoptera**
Ventral head hair No. 13 a very small inconspicuous tuft, one-third or less the length of dorsal head hair No. 6. Air-tube with a large dorsal dark spot interrupted near the apex ..... **telmatophila**
7. Head capsule golden brown in color ..... **cooki**
Head capsule dark brown to black ..... **lowii**
8. Air-tube with a broad dark brown ring on basal half and a dorsal dark brown spot at apex ..... **pallidoventer**
Air-tube uniformly colored 9
9. Prothoracic hair No. 14 single. Head capsule yellowish in color (except *apicalis*) 10
Prothoracic hair No. 14 with three or more branches. Head capsule dark brown to black 14
10. Ventral head hair No. 13 a long, strong, conspicuous tuft, as long as dorsal head hair No. 6 11
Ventral head hair No. 13 a small, weak, inconspicuous tuft much less than one-half as long as dorsal head hair No. 6 12
11. Head capsule yellowish. Dorsal head hair No. 9 with 6 or 7 branches. Ventral head hair No. 13 with 7 or 8 branches. A very small larva .. **briseis**
Head capsule golden brown. Dorsal head hair No. 9 with four branches. Ventral head hair No. 13 with four or five branches. A medium sized larva ..... **apicalis**
12. Antennae smooth, without spicules. Prothoracic hair No. 5 triple .....
..... **geometrica**
Antennae with spicules. Prothoracic hair No. 5 single 13

13. Lateral plate of eighth abdominal segment bearing eleven to thirteen fringed, acutely triangular teeth. Length of air-tube about four times its basal width. Prothoracic hair No. 3 a long tuft, over half as long as hair No. 1 ..... **typhlosomata**
Lateral plate of eighth abdominal segment bearing six or seven unfringed, broadly triangular teeth. Length of air-tube barely three times its basal width. Prothoracic hair No. 3 a short tuft, much less than half as long as hair No. 1 ..... **nataliae**
14. Dorsal head hair No. 4 double, rarely triple. Dorsal head hair No. 7 four- or five-branched. Prothoracic hair No. 14 with 6 or 7 branches.... 15
Dorsal head hair No. 4 with four or five branches. Dorsal head hair No. 7 with 7 or 8 branches. Prothoracic hair No. 14 with three to five branches ..... **pulcherrima**
15. Lateral plate of eighth abdominal segment bearing seven to ten comb-scales. Air-tube with twelve to fifteen pecten teeth ..... **sapphirina**
Lateral plate of eighth abdominal segment with five or six comb-scales. Air-tube with eight to ten pecten teeth ..... **socialis**

We have no material available of *calosomata* D. & K. and *ditaenionota* Prado, and the larvae of *davisi* Lane, *hystera* D. & K., *incognita* n. sp., *mathesoni* Lane, *orthodoxa* Dyar and *paludosa* n. sp. are unknown.

Uranotaenia aequatorianna Levi Castillo

Uranotaenia aequatorianna Levi Castillo, 1953. Rev. Ecuat. Ent. Parasit., 1: 14.

The identity of this mosquito described from Ecuador, remains in doubt. It was described from two males and one female which unquestionably belong to the *pulcherrima*-series but which seem to differ from the other species of the series by the presence of a black basal ring on the fifth hind tarsal segment. The figures of the male terminalia published by the describer are totally inadequate and his statement that the species had been declared to be new by Dr. Alan Stone of the U.S.N.M. is not confirmed by Dr. Stone, who in a letter to the senior author states: "The specimens that I saw of this species and of the species of *Culex* that he describes there consisted of two very poorly mounted slides of male genitalia. . . . I sent these two slides back to him determined as *Uranotaenia* sp. and *Culex* sp. with no suggestion that they were new species. . . . " The senior author has made repeated attempts to obtain as a loan the types which were deposited in the describer's collection, or additional material, but has been totally unsuccessful. In view of these facts we are provisionally considering *aequatorianna* Levi Castillo as unrecognizable, until additional material is obtained for study.

Uranotaenia anhydor Dyar

Uranotaenia anhydor Dyar, 1907. Proc. U. S. Nat. Mus., 32: 128.

The authors have examined small series of *U. anhydor* and *U. syntheta* obtained through the courtesy of Drs. Alan Stone, Edward Ross, W. C. Reeves and B. Brookman. The male terminalia of the Texas and California forms are identical. The differences in the phallosome pointed out by Yamaguti and La Casse (1951) do not really exist as can be seen in specimens where the phallosome has been dissected out (see fig. 17). The larvae of these two forms also appear to be identical, but the adult character brought out by Dyar and Shannon (1924) does seem to hold, as in *synthera* the white line on the anterior fossae of the scutum is quite marked, while in *anhydor* this line is rather diffused, sometimes being completely obsolete. We concur with the opinion

of Brookman and Reeves (1953) that when material from the intermediate area is examined it may be found that we are dealing with two subspecies or even with a single species.

Uranotaenia apicalis Theobald

Uranotaenia apicalis Theobald, 1903. Mon. Cul., 3, p. 298.
Uranotaenia pulcherrima, Howard, Dyar and Knab, 1917 (in part). Mosq. No. Cent. Am. & W. I., 4, p. 908.
Uranotaenia pulcherrima, Dyar, 1928 (in part). Mosq. Amer., p. 422.
Uranotaenia apicalis, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia apicalis, Lane, 1939. Cat. dos Mosq. Neot., p. 33.
Uranotaenia apicalis, Lane, 1943. Rev. Ent., 14: 142.

Female.—Head: Proboscis longer than fore-femur, swollen toward tip, with a vestiture of brown scales. Palpi barely as long as the clypeus, concolorous with the proboscis. Clypeus brown, bare. Tori yellowish. Antenna longer than the proboscis, dark-scaled except for base of third segment which is yellow. Occiput covered with dark brown ovoid flat scales with very slight metallic reflection. There are three large round spots of bright blue scale, one on vertex and one on each side of this bordering the eyes.

Thorax: Anterior pronotal lobes clothed with bright blue scales. Mesonotal integument yellowish brown except for a broad darker central line which may be restricted to posterior half or totally absent. Vestiture of narrow ligulate brown scales except for a small spot of blue scales in front of antescutellar space and two short lines of blue scales that extend from above the roots of the wings half way to the anterior margin of the scutum. Scutellum with a spot of bright blue scales on the midlobe. Pleura uniformly yellowish brown except for paratergite which is dark brown, and for a brown spot on sternopleura which is covered with a broad band of bright blue scales. Coxae and trochanters pale yellowish. Femora dark brown above, extensively pale-scaled below; tip with a dorsal spot of snowy white scales. Tibiae uniformly dark-scaled except for a dorsal white spot at apex. Fore and midtarsi with evanescent white apical rings which tend to fade out on the last tarsal segments. Hind tarsi marked as follows: first segment with an apical white ring, second and third segments with both basal and apical white rings, those at apex being larger than the basal ones; fourth segment white with a brown ring in the middle; fifth segment entirely white-scaled. Claws simple. Wing-scales brown except for a line of bluish scales extending from the stem of vein along the base of the fifth vein.

Abdomen: Dorsum of abdomen dark-scaled except for two large triangular central spots of white scales on the third and fifth segments and with broad triangular apical spots on the sides of segments II, III, V and VI. Venter light-scaled.

Male.—As in the female, except for following characteristics: Antennae heavily plumose; antennal segments shorter with the exception of the last two which are longer. Midfemora swollen. Midtarsal claws unequal, one very long and stout, the other shorter and slender.

Terminalia (Plate I): Basistyle conical, longer than wide, clothed with long hairs on outer border, basal lobe triangularly projected, bearing a group of four to six subequal hairs from sclerotized bases.

Dististyle (fig. 6) about as long as basistyle with more or less parallel sides on basal two-thirds and gradually tapering on outer third to a small, curved, beak-like point, bearing on outer half about twelve small fine hairs from rather conspicuous circular insertions. Appendiculate spine inserted just below the tip, short and blunt. Ninth tergite (fig. 7) with basal border triangularly emarginate, lateral corners of the sclerite produced into two knob-like, approximate lobes. Lateral plates of the phallosome (figs. 8 and 9) divided into two arms. Sternal arm with two processes, outer one a sclerotized, heavy, claw-like tooth, inner one a membranous lobe closely attached to the tooth bearing a few fine spinules at apex. Tergal arm a plate with rounded apex bearing on its inner border and near the apex two equal claw-like teeth about half as long as the tooth of the sternal arm, and a clump of three or four smaller teeth at about the middle; outer border of the plate bearing a group of small straight teeth that vary in number from six to nine.

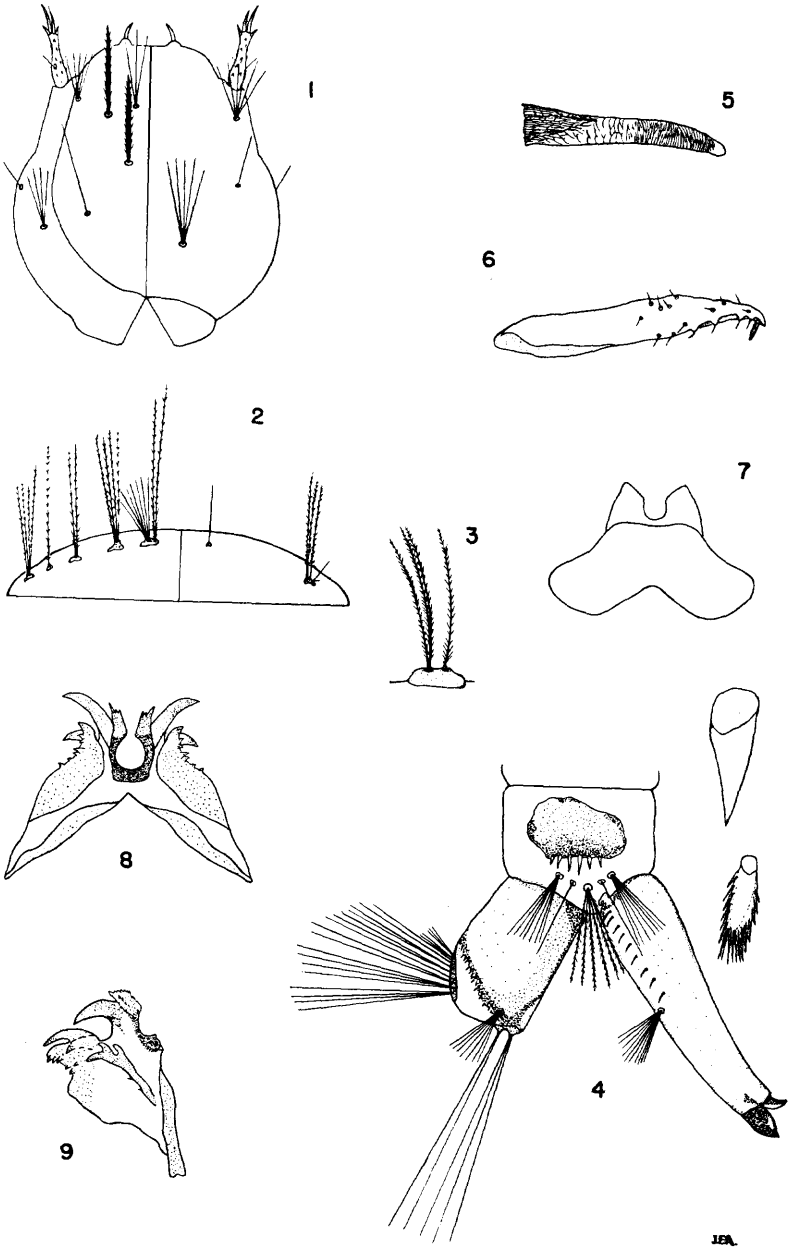
Larva (Plate I).—Head capsule golden brown in color. Antennae gradually and slightly tapered from base to apex, sparsely spiculate. Antennal hair inserted on outer border on basal half. Head hairs (fig. 1) as follows: No. 4 a rather weak but long three-haired tuft about as long as hair No. 6; No. 5 and No. 6 the usual thick, single, frayed spines; No. 7 a long five-branched tuft; No. 8 single and very long; No. 9 quadruple; No. 10 single or double; No. 11 a six-haired tuft; No. 12 single; No. 13 a long and strong five-haired tuft, as long as hair No. 6. Prothoracic hairs (fig. 2) as follows: Nos. 1 and 2 single and long; No. 3 a multiple tuft about half as long as No. 1; Nos. 4 and 7 quadruple; No. 5 double; No. 6 single; No. 9 single; No. 10 double, slightly longer than No. 9; No. 14 single. Abdominal hair No. 6 on segments I and II triple (fig. 3). Lateral plate of the eighth abdominal segment bearing on its posterior border, five or six apparently unfringed spines, one or two being much longer than the rest. Air tube (fig. 4) four times as long as its basal width, bearing around nine pecten teeth which do not reach the middle of the tube and are followed by a multiple tuft. Anal segment somewhat longer than wide, ringed by the plate which is fringed along its posterior border. Anal hair No. 1 multiple.

Pupa (Plate I).—Integument uniformly pale. Trumpets (fig. 5) slightly shorter than the length of the paddles, moderately flared at tip; tracheoid area occupying slightly less than half the length of the trumpet; pinna V-shaped, between one-third and one-half the length of the trumpet. Outstanding abdominal setae as follows: Hair No. 2

EXPLANATION OF PLATE 1

Uranotaenia apicalis Theobald

FIG. 1. Larva. Dorsal and ventral views of head. FIG. 2. Larva. Dorsal and ventral views of prothorax. FIG. 3. Larva. Lateral hairs of abdominal segment I. FIG. 4. Larva. Lateral view of terminal abdominal segments. FIG. 5. Pupa. Trumpet. FIG. 6. Male terminalia. Lateral view of the dististyle. FIG. 7. Male terminalia. Ninth tergite. FIG. 8. Male terminalia. Dorsal view of the phallosome. FIG. 9. Male terminalia. Lateral view of the phallosome.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a moderately long, conspicuous multiple tuft on segments II, III and IV, becoming gradually shorter, weaker and with fewer branches on segments V, VI and VII. Hair No. 5 a four-haired tuft, as long as No. 2 on segment IV; with three branches and appreciably longer than No. 2 on segments V and VI; shorter and weaker, about as long as No. 2, on segment VII. Paddles rather globose, inflated on inner border; midrib prominent for two-thirds the length of the paddle, nearly obsolete at tip; apical half of paddle serrate, serrations more numerous on outer border.

Variations.—Adult: The coloration of the mesonotal integument varies a great deal. Some specimens appear much darker showing two large dark spots on the anterior fossae. As usual in the *pulcherrima*-series, the extent of white on the hind tarsal segments shows much variation but with no apparent significance as to geographical distribution. The fourth abdominal tergite shows, in some specimens, a small, median triangular white spot.

Male terminalia: The number and size of the teeth inserted near the outer border of the tergal plate of the phallosome show variations, but again with no apparent significance. The emargination of the basal border of the ninth tergite which is usually deeply triangular, may appear in some specimens shallower and with a more rounded apex.

Larva: As in other Culicidae, the chaetotaxy of the head and thorax has to be used with discretion as the number of branches of the hairs of the head and thorax show a degree of variation. The same can be said for the number of comb-scales on the lateral plate of the eighth abdominal segment and the pecten teeth on the air-tube.

Distribution.—The species has been reported from Northern Mexico to Argentina, and some of the Antilles, and it apparently occurs together with *pulcherrima* throughout its range. In Panama and Honduras, *apicalis* greatly outnumbers the latter species, being one of the commonest *Uranotaenia* of the lowlands. Our records for Panama show the species to be present along the marshlands of both coasts, in the provinces of Darien, Panama, Colon, Cocle, Herrera, Veraguas and Chiriqui and in the Canal Zone.

Bionomics.—Little is known on the bionomics of the adults. They are known to be strongly and positively phototropic, representing almost one-half of all *Uranotaenia* taken in light traps in Panama. Nothing is known of their feeding habits, but we have never observed females engorged with blood. Adults may be found throughout the year but they become particularly abundant late in the rainy season and early in the dry season. The larvae prefer large, open swamps with abundant aquatic vegetation; we have found them among floating

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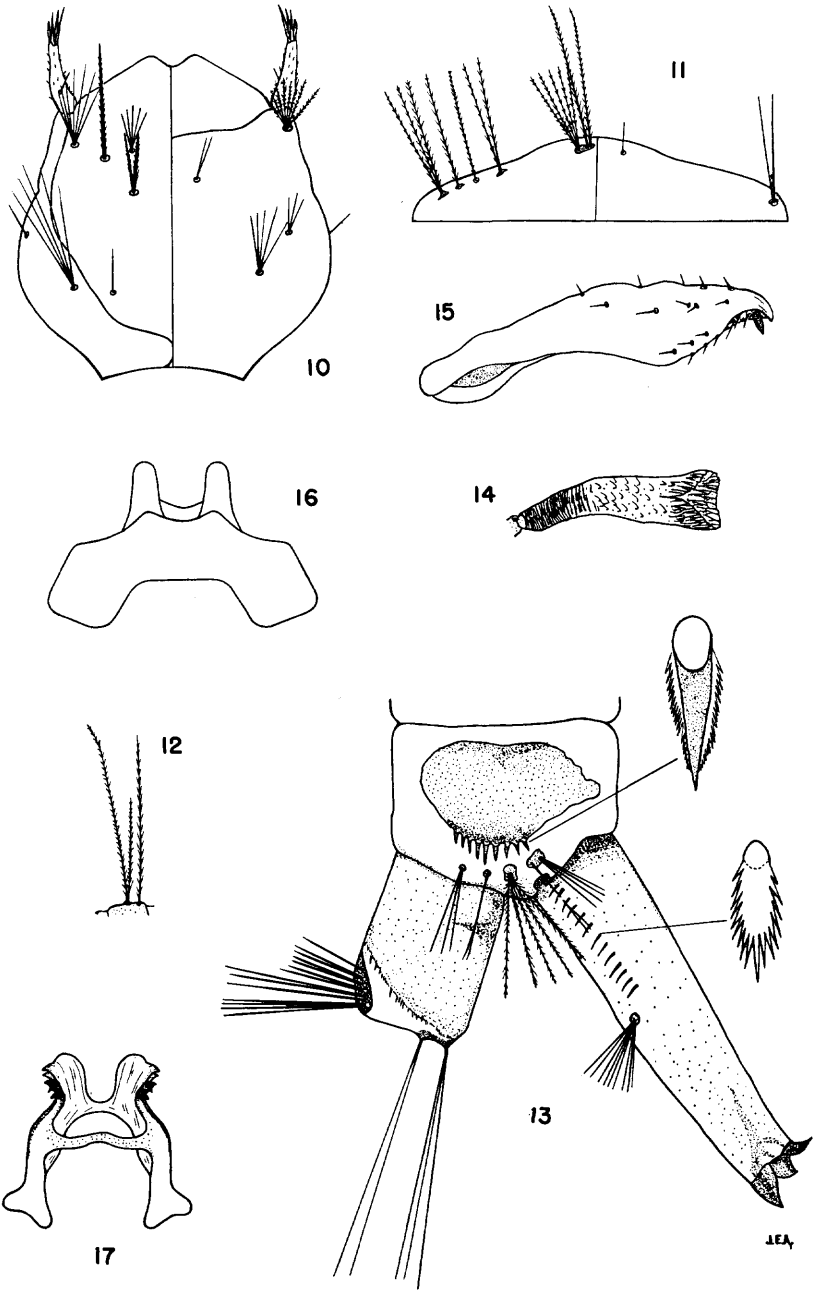
EXPLANATION OF PLATE II

Uranotaenia anhydor Dyar

FIG. 10. Larva. Dorsal and ventral views of head. FIG. 11. Larva. Dorsal and ventral views of prothorax. FIG. 12. Larva. Lateral hairs of abdominal segment I. FIG. 13. Larva. Lateral view of terminal abdominal segments. FIG. 14. Pupa. Trumpet. FIG. 15. Male terminalia. Lateral view of the dististyle. FIG. 16. Male terminalia. Ninth tergite. FIG. 17. Male terminalia. Dorsal view of the phallosome.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masses of *Pistia stratiotes*, as well as in swamps covered with vertical aquatic vegetation such as rushes and sedges. The larvae begin to appear in the month of July, after the onset of the rains, and gradually build in numbers until they reach a peak at the height of the rainy season in the month of October. Once the peak is reached the larvae decline gradually in numbers, so that by the month of January, at the onset of the dry season, none are to be found, despite the fact that their breeding places never dry up.

Taxonomic Notes.—Uranotaenia apicalis was described by Theobald in 1903 from a series of males and females taken in the island of Antigua in the Lesser Antilles. Howard, Dyar and Knab (1917) sank *apicalis* in the synonymy of *pulcherrima* Lynch Arribalzaga, stating: "*Uranotaenia pulcherrima* varies in the thoracic ornamentation. One of our specimens, instead of the median line of metallic blue scales, shows only a patch of scales in front of the scutellum and the dark integumentary stripe is also absent. This is the form described by Theobald from the island of Antigua under the specific name *apicalis*." Edwards (1932) raised the name again to specific rank and Lane (1943) pointed out what he thought were significant differences in the male terminalia of these two species, *apicalis* having a number of serrations on the outer border of the tergal arm of the lateral plates of the phallosome, which were apparently absent in *pulcherrima*.

In Panama we have collected large numbers of both *apicalis* and *pulcherrima*. Examination of hundreds of specimens have led us to conclude that the two species are unquestionably distinct. We have found no integradation in the mesonotal markings, *pulcherrima* having always a long median line of blue scales, while in *apicalis* this line is reduced to a small spot in front of the antescutellar space.

In regards to the male terminalia character brought out by Lane (*loc. cit.*) we cannot agree with him as to the reliability of the presence or absence of "serrations" (these are actually teeth) on the extreme border of the tergal arm of the phallasome to separate these two species. While it is true that these teeth are always present in *apicalis*, they are by no means always absent in *pulcherrima*, although, when present, they are always reduced in numbers. In 57 preparations of the terminalia of *pulcherrima* in which the phallosome had been split and the plates mounted in lateral view, we found 29 specimens which showed at least one tooth in one or both of the plates. In 17 of these, there were only one or two teeth present, sometimes showing one or two teeth on one of the plates and none on the other. The great reduction in the number of teeth in *pulcherrima* makes it practically impossible

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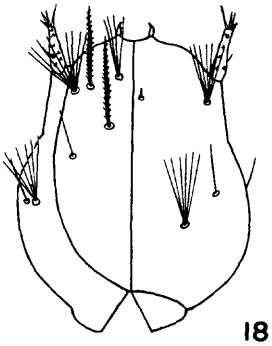
EXPLANATION OF PLATE III

Uranotaenia briseis Dyar

FIG. 18. Larva. Dorsal and ventral views of head. FIG. 19. Larva. Dorsal and ventral views of prothorax. FIG. 20. Larva. Lateral hairs of abdominal segments I and II. FIG. 21. Larva. Lateral view of terminal abdominal segments. FIG. 22. Pupa. Trumpet. FIG. 23. Male terminalia. Lateral view of dististyle. FIG. 24. Male terminalia. Ninth tergite. FIG. 25. Male terminalia. Dorsal view of the phallosome. FIG. 26. Male terminalia. Lateral view of the phallosome.



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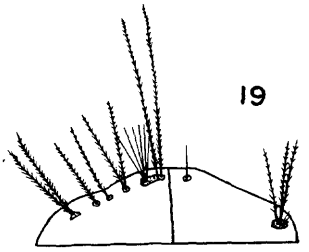

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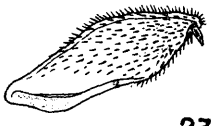

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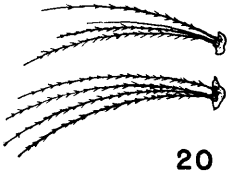

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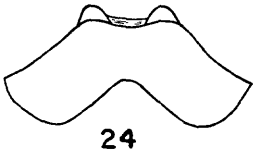

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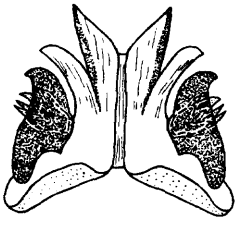

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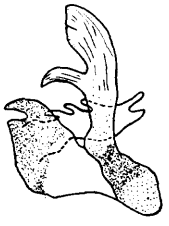

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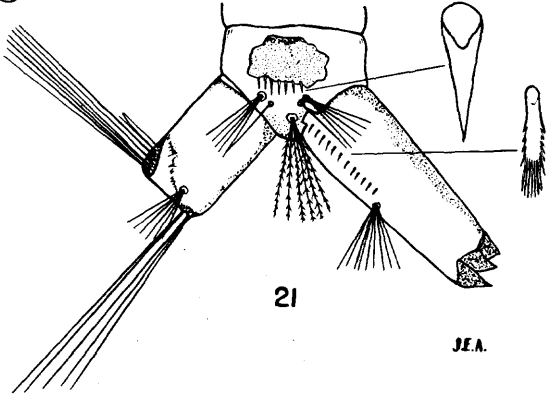

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to see them in whole mounts of the phallosome which may well be the reason why Lane reported them as always absent.

We have found a very reliable character in the phallosome to separate *apicalis* from *pulcherrima*, but this character cannot be seen except when the phallosome is dissected out and the plates split and mounted in lateral view. In *apicalis* there is a clump of three or four small teeth at about the middle of the tergal arm which is totally absent in *pulcherrima*. The larvae of these two species are also abundantly different.

Uranotaenia briseis Dyar

Uranotaenia briseis Dyar, 1925. Ins. Ins. Mens., 13: 216.
Uranotaenia briseis, Dyar, 1928. Mosq. Amer., p. 419.
Uranotaenia briseis, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia briseis, Lane, 1939. Cat. dos Mosq., Neotr., p. 33.

Female.—Head: Proboscis slightly longer than fore femur, swollen toward tip, dark. Palpi barely as long as the clypeus, dark-scaled. Clypeus and tori yellowish brown. Antennae longer than the proboscis, dark. Occiput clothed with bronzy brown scales and a stripe of bluish scales on each side that arises above the inner angle of the anterior pronotal lobe and cuts diagonally across the head meeting a conspicuous patch of bluish scales at the center of the vertex.

Thorax: Anterior pronotal lobes light brown in color with a large patch of bluish scales. Mesonotal integument yellowish with a sparse vestiture of narrow curved dark scales and a short line of broad, flat, bluish scales arising on each side above the root of the wing and extending forward almost to the level of the anterior border of the paratergite. Scutellum dark-scaled. Pleura concolorous with mesonotum with no outstanding markings and without scales. Coxae and trochanters yellowish. Legs dark-scaled. Wing-scales dark, darker and more numerous along costa, subcosta and first vein. A line of broad, flat, bluish scales arising on the stem vein and extending along the basal half of the stem of the fifth vein.

Abdomen: Abdominal tergites entirely dark brown. Venter pale-scaled.

Male.—Coloration of the female with no secondary sexual modifications on antennae or tarsal claws. Terminalia hidden from view, so that separation of the sexes is difficult even under the dissecting scope.

Male terminalia (Plate III): Basistyle conical, almost as wide as long. Basal lobe with a group of four strong hairs from sclerotized bases and two or three smaller ones on inner border, projected toward the

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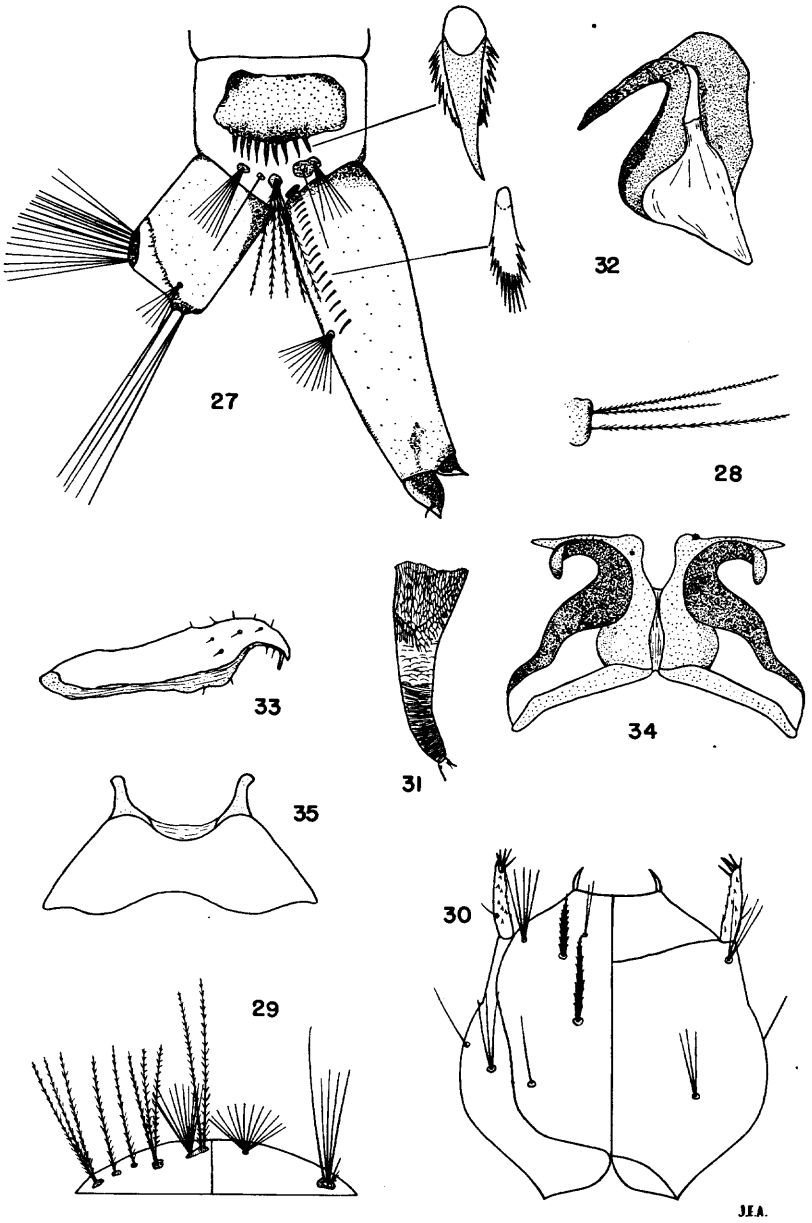
EXPLANATION OF PLATE IV

U. coatzacoalcos D. and K. and *U. calosomata* D. and K.

FIG. 27. *U. coatzacoalcos*. Larva. Lateral view of terminal abdominal segments. FIG. 28. *U. coatzacoalcos*. Larva. Lateral hairs of abdominal segment II. FIG. 29. *U. coatzacoalcos*. Larva. Dorsal and ventral view of prothorax. FIG. 30. *U. coatzacoalcos*. Larva. Dorsal and ventral views of head. FIG. 31. *U. coatzacoalcos*. Pupa. Trumpet. FIG. 32. *U. calosomata*. Male terminalia. Lateral view of the phallosome. FIG. 33. *U. calosomata*. Male terminalia. Lateral view of the dististyle. FIG. 34. *U. calosomata*. Male terminalia. Dorsal view of the phallosome. FIG. 35. *U. calosomata*. Male terminalia. Ninth tergite.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outer border in a triangular strap bearing scattered hairs. Dististyle (fig. 23) about two-thirds the length of the basistyle, fusiform, clothed with abundant pile and a few scattered hairs from rounded insertions. A small stout pointed appendiculate spine. Plate of the phallosome (figs 25 and 26) divided. Sternal arm a broad, curved, smooth plate, bearing before the middle a curved, claw-like tooth. Tergal arm with one strong, curved, heavily sclerotized tooth on the outer aspect and a crown of spines on the inner aspect consisting of some nine small rather heavy, subequal teeth. Nine tergites (fig. 24) with the basal emargination acutely triangular. Lobes knob-like, small, approximate.

Larva (Plate III).—Head capsule yellowish. Antennae very short, tapering gradually from base to apex, sparsely spiculate. Antennal hair inserted on outer border and at basal third. Head hairs (fig. 18) as follows: No. 4 with four to six branches about three-fourths as long as No. 6; Nos. 5 and 6 the usual thick, single, frayed spines; No. 7 a multiple tuft; No. 8 single; No. 9 with about seven branches; No. 10 single; No. 11 with seven to ten branches; No. 12 single; No. 13 a long and strong five to seven-haired tuft, as long as No. 6.

Prothoracic hairs (fig. 19) as follows: No. 1 and 2 single and long; No. 3 a six-haired tuft less than half as long as No. 1; Nos. 4 and 7 double; Nos. 5 and 6 single; No. 9 double; No. 10 single and slightly shorter; No. 14 single. Lateral abdominal hairs (fig. 20) on segments I and II triple.

Lateral plate of the eighth abdominal segment bearing on its posterior border from six to ten acutely pointed, slightly subequal, unfringed spines. Air tube (fig. 21) with almost straight sides, three times as long as its basal width, bearing eight to eleven pecten teeth along the basal half. Tuft inserted just beyond the pecten at about the middle of the tube. Anal segment long and narrow, ringed by the saddle which is fringed along its posterior border. Hair 1 with six branches, long.

Pupa.—Pupal integument uniformly pale. Trumpets (fig. 22) tubular and very narrow, slightly tapering at apex, about four-fifths the length of the paddles; tracheoid area occupying slightly less than half the length of the trumpet; pinna inconspicuous, narrowly and acutely V-shaped, about one-fifth the length of the trumpet. Outstanding abdominal setae as follows: Hair No. 2 a moderately long

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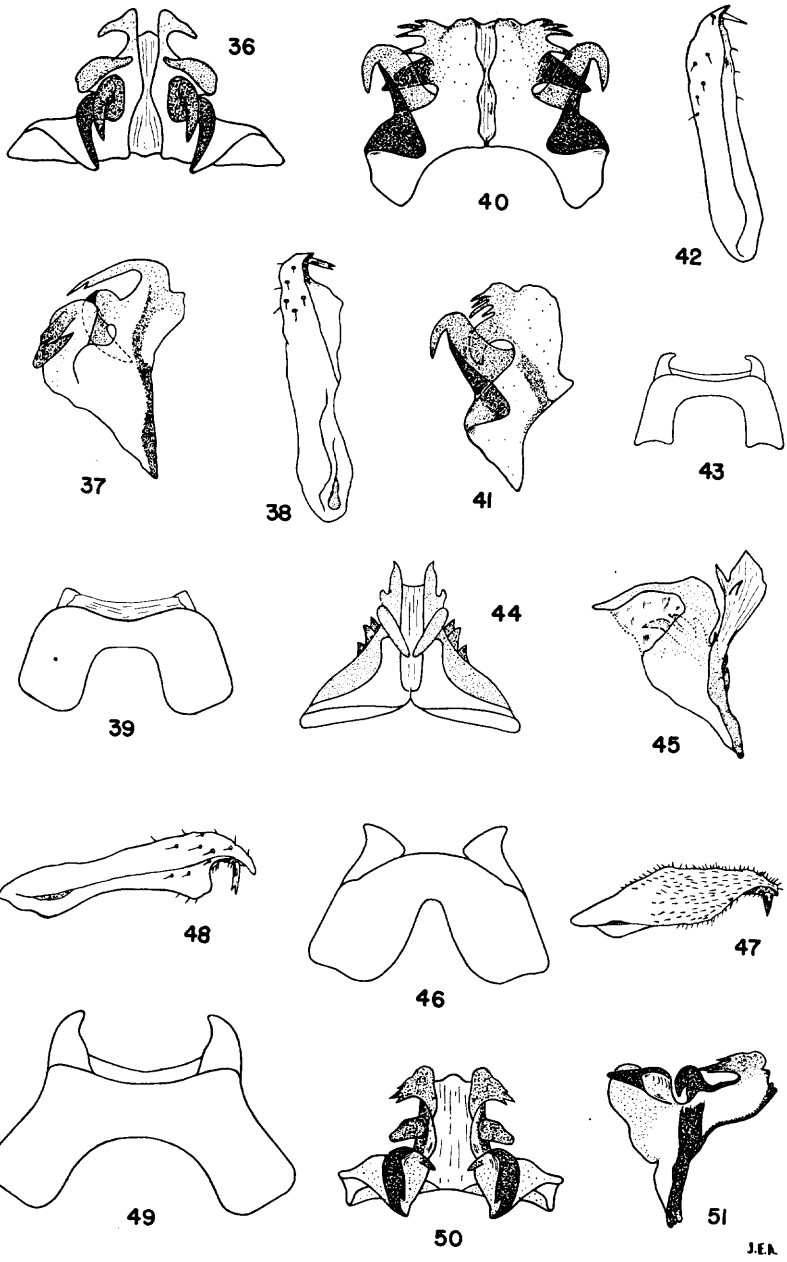
EXPLANATION OF PLATE V

Male terminalia of *U. hystera* D. and K., *U. ditaenionota* Prado, *U. paludosa* n. sp. and *U. incognita* n. sp.

FIG. 36. *U. hystera.* Dorsal view of the phallosome. FIG. 37. *U. hystera.* Lateral view of the phallosome. FIG. 38. *U. hystera.* Lateral view of the dististyle. FIG. 39. *U. hystera.* Ninth tergite. FIG. 40. *U. ditaenionota.* Dorsal view of the phallosome. FIG. 41. *U. ditaenionata.* Lateral view of the phallosome. FIG. 42. *U. ditaenionota.* Lateral view of the dististyle. FIG. 43. *U. ditaenionota.* Ninth tergite. FIG. 44. *U. paludosa.* Dorsal view of the phallosome. FIG. 45. *U. paludosa.* Lateral view of the phallosome. FIG. 46. *U. paludosa.* Ninth tergite. FIG. 47. *U. paludosa.* Lateral view of the dististyle. FIG. 48. *U. incognita.* Lateral view of the dististyle. FIG. 49. *U. incognita.* Ninth tergite. FIG. 50. *U. incognita.* Dorsal view of the phallosome. FIG. 51. *U. incognita.* Lateral view of the phallosome.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multiple tuft on segments II, III, and IV, with less branches and smaller on segments V, VI, and VII. Hair No. 5 a four-haired tuft as long as No. 2 on segment IV; double or triple and about equal in size to No. 2 on segments V, VI, and VII. Paddles inflated on inner border so that inner part is larger than outer; midrib pronounced on basal two-thirds, nearly obsolete toward apex. Apical half of paddles weakly serrate.

Distribution.—The species has only been reported from Venezuela and Panama, but probably occurs throughout the Caribbean area. In Panama we have taken it along both coasts, but it is particularly abundant in the large swamps formed by meandering streams that empty into the Pacific Ocean. We have records of the species from the Provinces of Darien, Panama, Cocle, Herrera, Chiriqui and Bocas del Toro and from the Canal Zone.

Bionomics.—Nothing is known of the feeding habits of the adults. Flight range appears to be quite restricted and we have repeatedly observed the adults on the wing among the heavy vegetation which covers the breeding places, in jerky *Phlebotomus*-like flights, always staying close to the breeding area.

We have encountered heavy breeding of the species in large swamps choked with the large sedge, *Fuirena umbellata* Rottb. and in lesser numbers among floating masses of *Pistia*. Larvae begin to appear in numbers late in the rainy season, in the month of November, and reach a peak of abundance in the middle of the dry season in the months of February and March, virtually disappearing after the onset of the rains.

Taxonomic Discussion.—*Uranotaenia briseis* was described from a single female taken by L. H. Dunn in the Catatumbo River, Venezuela, and no additional specimens have been reported since.

Since 1948 we have collected abundant material in the marshlands of Panama of a species that was provisionally identified as *U. briseis*. Two females were sent to Dr. Alan Stone to compare with the type, which Dr. Stone kindly did, answering as follows: "*Uranotaenia briseis*. Female type from Catatumbo R., Venezuela, L. H. Dunn. In not as good condition as the two specimens you sent, but I find no means of separating your specimens from the type."

Adults of *briseis* can be separated from all other species of American *Uranotaenia*, except *orthodoxa* and *leucoptera*, by the lack of scales on the sternopleura. It differs from *orthodoxa* in the occipital markings and in size, *orthodoxa* being much larger, and from *leucoptera* by the wing and occipital markings. In male terminalia characters the species

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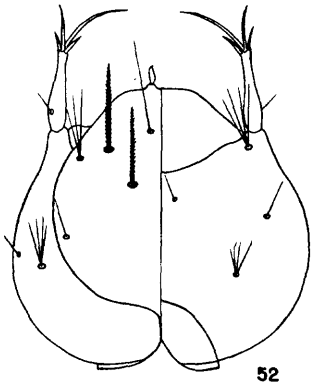
EXPLANATION OF PLATE VI

Uranotaenia geometrica Lutz

FIG. 52. Larva. Dorsal and ventral view of head. FIG. 53. Larva. Dorsal and ventral view of prothorax. FIG. 54. Larva. Lateral hairs of abdominal segment I. FIG. 55. Larva. Lateral view of terminal abdominal segments. FIG. 56. Pupa. Trumpet. FIG. 57. Male terminalia. Ninth tergite. FIG. 58. Male terminalia. Dorsal view of the phallosome. FIG. 59. Male terminalia. Lateral view of the phallosome. FIG. 60. Male terminalia. Lateral view of the dististyle.



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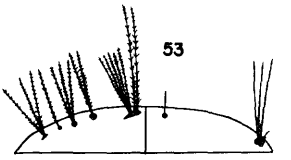

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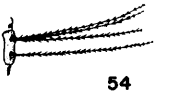

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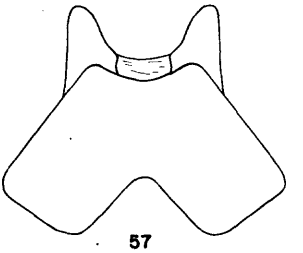

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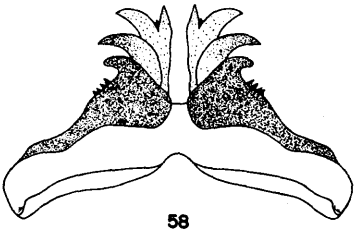

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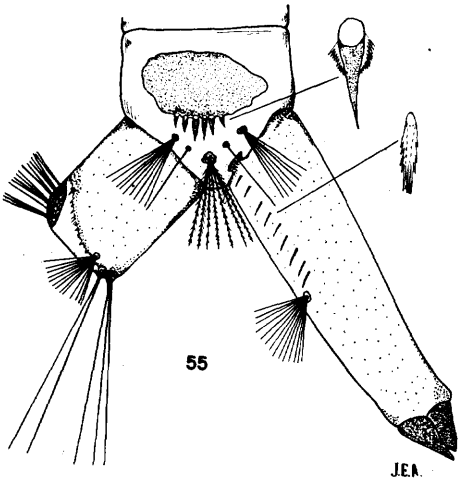

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comes closest to *lowii, orthodoxa, paludosa* n. sp. and *telmatophila* n. sp., since they all have the dististyle clothed with pile; it may be separated from them by the phallosomal and dististyle characters mentioned in the key.

Uranotaenia calosomata Dyar and Knab

Uranotaenia calosomata D. & K., 1907. Jour. New York Ent. Soc., 15: 200.
Uranotaenia calosomata, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4: 922.
Uranotaenia calosomata var. *albitarsis* Gordon & Evans, 1922. Ann. Trop. Med. & Parasit., 16: 355.
Uranotaenia calosomata, Dyar, 1928. Mosq. Amer., p. 423.
Uranotaenia calosomata, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia calosomata, Lane, 1939. Cat. dos Mosquit. Neotr., p. 33.
Uranotaenia calosomata, Lane, 1943. Rev. Ent., 14: 155.

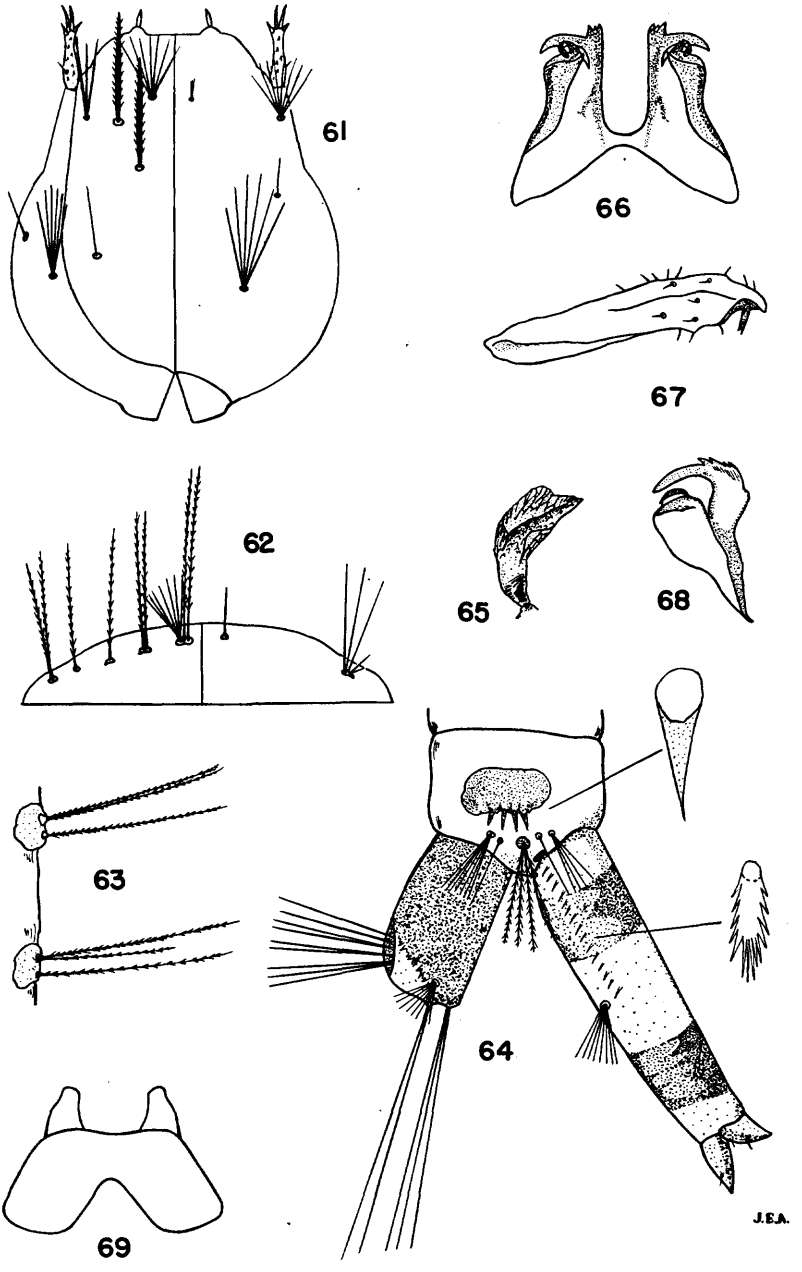
Female.—Head: Proboscis shorter than fore femur, slightly swollen at apex, dark-scaled. Palpi very short, hardly longer than the clypeus. Clypeus and tori brown. Antennae longer than the proboscis, dark except for base of third segment which is white. Occiput clothed with broad flat scales which give a slight greenish reflection, and some erect narrow dark ones; a line of pure white scales arises on each side above the anterior pronotal lobes and meets a tuft of long erect white scales on the center of the vertex.

Thorax: Anterior pronotal lobes dark brown, with a conspicuous broad band of snowy white scales. Mesonotum dark brown, clothed with narrow curved dark scales and a narrow continuous line of white scales extending from the roots of the wings around the anterior border of the scutum. Scutellum concolorous with mesonotum. Pleural integument dark brown except for a broad light stripe across the lower portion of the mesepimera directly in line with a narrow band of pure white scales across the upper third of sternopleura. Coxae creamy white stained with brown on upper border. Trochanters pale. Femora and tibiae dark-scaled with white apices. Fore and midtarsi usually entirely dark, but sometimes with extensive white markings which may cover from the third segment to the apex. Hind tarsi with third, fourth and fifth segments entirely white-scaled. Wing-scales dark except for two long lines of white scales involving the stem vein and base of the first and fifth wing-veins. Abdominal tergites with conspicuous, large U-shaped apical bands of creamy yellow scales bordering a central spot of dark brown scales. First tergite largely light-scaled except for a small central spot of dark brown scales. Sternites basally dark, apically light-scaled.

EXPLANATION OF PLATE VII

Uranotaenia leucoptera Theobald

FIG. 61. Larva. Dorsal and ventral views of head. FIG. 62. Larva. Dorsal and ventral views of prothorax. FIG. 63. Larva. Lateral hairs of abdominal segments I and II. FIG. 64. Larva. Lateral view of terminal abdominal segments. FIG. 65. Pupa. Trumpet. FIG. 66. Male terminalia. Dorsal view of the phallosome. FIG. 67. Male terminalia. Lateral view of the dististyle. FIG. 68. Male terminalia. Lateral view of the phallosome. FIG. 69. Male terminalia. Ninth tergite.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Male.—Coloration of the female, with pronounced secondary sexual modifications. Antennae heavily plumose; antennal segments shorter than in the female, except for the last two which are appreciably longer. Mid-femora swollen. Mid-tarsi with a single very long and stout claw.

Male terminalia (Plate IV): Basistyle conical, somewhat longer than wide, clothed with many long hairs and a few deciduous ribbed scales. Basal lobe well defined, triangularly projected toward outer border of basistyle. A clump of four strong hairs along its inner margin and a few weaker hairs toward the triangular projection. Dististyle (fig. 33) two-thirds as long as the basistyle, apex curved and pointed, beak-like; ventral margin conspicuously swollen on outer third; vestiture of several fine hairs from rather conspicuous rounded insertions. Appendiculate spine fine and simple. Ninth tergite (fig. 35) somewhat narrower at apex than at base; basal margin very shallowly and obtusely emarginate; apical border deeply concave; lateral corners produced into two very narrow, horn-like processes. Lateral plates of the phallosome (figs. 32 and 34) divided, sternal arm without any processes, sharply bending outwardly at its apex and developing into a long, straight, acutely pointed spine. Tergal arm heavily sclerotized, narrow, curved, U-shaped, without any processes and developing apically—at the same level of the spine of the sternal arm—into a heavy tooth.

Immature Stages.—We have collected larvae of this species on several occasions but at present lack adequate material from which to make an appropriate description.

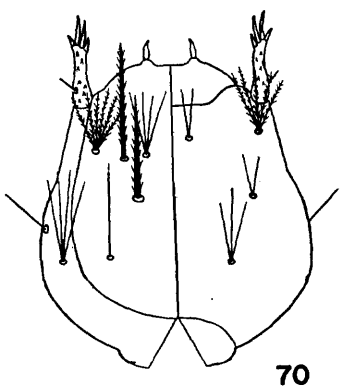
Distribution.—This species has been found from Costa Rica all the way to southern Brazil. In Panama we have taken it in the provinces of Panama, Darien, Cocle, Los Santos, Chiriqui, Bocas del Toro and the Canal Zone in every month of the year from sea-level to 3,500 feet elevation.

Bionomics.—Little is known of the bionomics of this species. Adults appear rather frequently in light trap collections but are never very common. Occasionally adults may be taken by sweeping under the banks of forest streams. The larvae, according to Busck (in Howard, Dyar and Knab, 1917), ". . . are very elongate, with reddish body, deep black head and comparatively short tube; they are easily overlooked, as they go down at the least disturbance and remain at the bottom for a long time, burrowing in the mud." We have found the larvae in forested hills breeding in shaded side-pools of cool water along streams and in shaded shallow, murky springs where the larvae may be seen buried in the loose mud at the bottom. Lane (1943)

EXPLANATION OF PLATE VIII

Uranotaenia lowii Theobald

FIG. 70. Larva. Dorsal and ventral views of head. FIG. 71. Larva. Dorsal and ventral views of prothorax. FIG. 72. Larva. Lateral hairs of abdominal segments I and II. FIG. 73. Larva. Lateral view of terminal abdominal segments. FIG. 74. Pupa. Trumpet. FIG. 75. Male terminalia. Dorsal view of the phallosome. FIG. 76. Male terminalia. Lateral view of the dististyle. FIG. 77. Male terminalia. Lateral view of the phallosome. FIG. 78. Male terminalia. Ninth tergite.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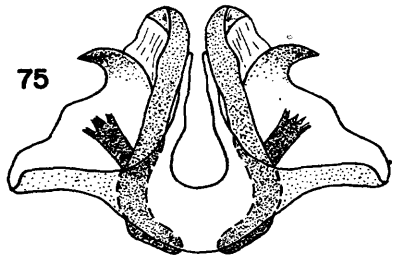
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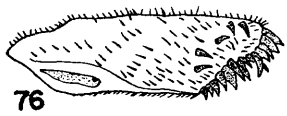
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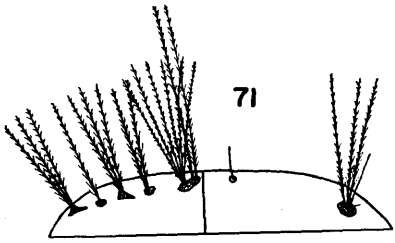
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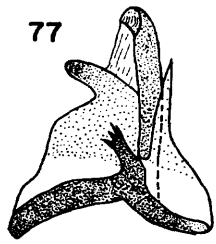
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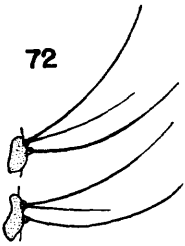
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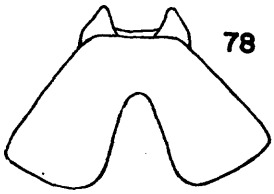
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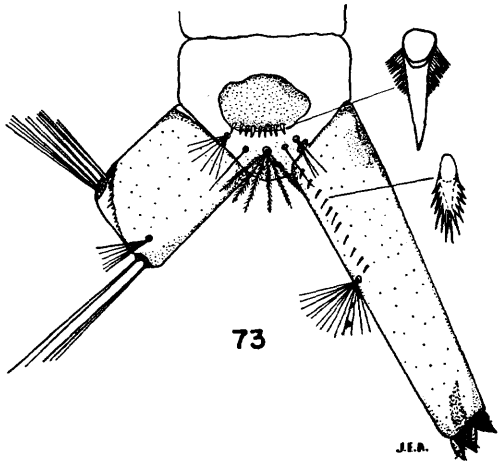
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also reports the larvae from bamboo stumps, but as mentioned in the taxonomic discussion he may have been dealing with a different species.

Taxonomic Discussion.—*Uranotaenia calosomata* was described from Tabernilla, Canal Zone, from five adult specimens bred from larvae.

We agree with Lane (1943) in that var. *albitarsis* Gordon and Evans should not be maintained as it is based on the extent of white on the tarsi which actually is a very variable character.

. The male terminalia as described and figured by Lane (1943) for specimens from Brazil checks closely with our topotypical material except for the presence of numerous spicules on the sternal arm of the phallosome which are totally absent in Panama males, and which possibly indicates specific differences between *calosomata* and the Brazilian form.

Uranotaenia coatzacoalcos Dyar and Knab

Uranotaenia coatzacoalcos D. & K., 1906. Jour. New York Ent. Soc., 14: 186.
Uranotaenia coatzacoalcos, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 916.
Uranotaenia basalis Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 917.
Uranotaenia coatzacoalcos, Dyar, 1923. Ins. Ins. Mens., 11: 71.
Uranotaenia coatzacoalcos, Dyar and Shannon, 1924 (in part). Ins. Ins. Mens., 12: 191.
Uranotaenia coatzacoalcos, Dyar, 1928 (in part). Mosq. Amer., p. 424.
Uranotaenia coatzacoalcos, Edwards, 1932 (in part). Gen. Insect., fasc. 194, p. 98.
Uranotaenia coatzacoalcos, Lane, 1939 (in part). Cat. dos Mosq. Neotr., p. 34.

Female.—As in *Uranotaenia trapidoi* n. sp., except for venter of abdomen which in the two undamaged specimens examined (one from Tenosique, Mex., and one from San Jose, Costa Rica) appears uniformly pale-scaled, while in *trapidoi* n. sp. it shows broad, basal, segmental dark bands. This character, however, may not be constant, as abdominal coloration tends to show variations in the genus.

Male.—As in *Uranotaenia trapidoi* n. sp.

Larva (Plate IV, figs. 27, 28, 29 and 30).—As in *trapidoi* n. sp. except for characters in the air-tube mentioned in the key.

Distribution.—The species occurs from Mexico to Costa Rica. We have examined typical larvae of this species from Mexico, Salvador and Costa Rica. The published records of it south of Costa Rica refer in reality to *typhlosomata* Dyar and Knab, a lowland species, and to *trapidoi* n. sp., a highland species.

Bionomics.—Larvae of this species prefer partly shaded waters and have been found in a reedy ditch (Mexico, F. Knab, coll.), rocky pools in a stream bed (Mexico, F. Knab, coll.), internodes of cut bamboo

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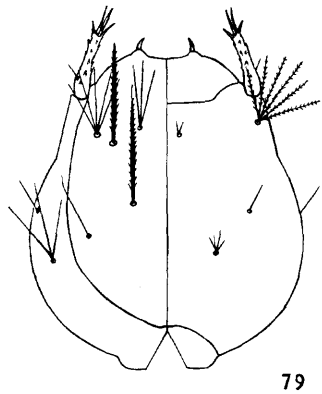
EXPLANATION OF PLATE IX

Uranotaenia nataliae Lynch Arribalzaga

FIG. 79. Larva. Dorsal and ventral views of head. FIG. 80. Larva. Dorsal and ventral views of prothorax. FIG. 81. Larva. Lateral hairs of abdominal segments I and II. FIG. 82. Larva. Lateral view of terminal abdominal segments. FIG. 83. Pupa. Trumpet. FIG. 84. Male terminalia. Lateral view of dististyle. FIG. 85. Male terminalia. Ninth tergite. FIG. 86. Male terminalia. Dorsal view of the phallosome. FIG. 87. Male terminalia. Lateral view of the phallosome.



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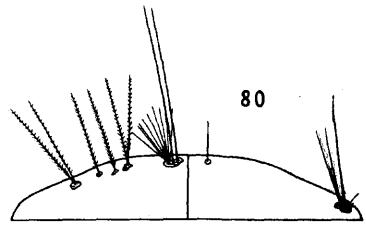

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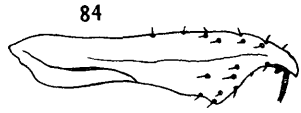

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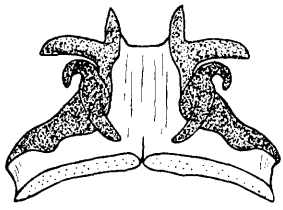

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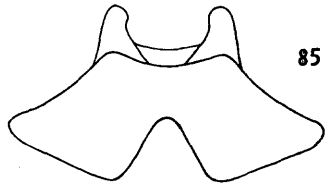

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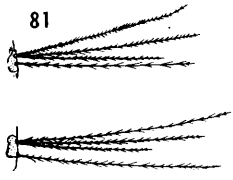

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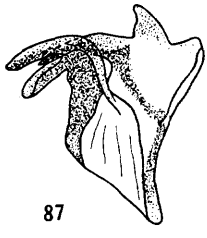

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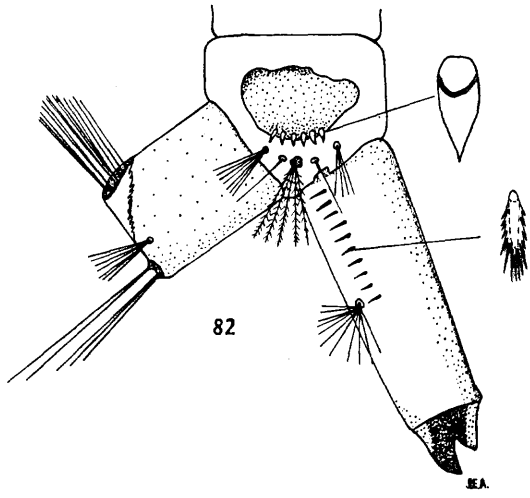

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(El Salvador; P. Galindo and H. Trapido, coll.) and in a water trough full of dead leaves and other vegetable debris (Costa Rica; P. Galindo and H. Trapido, coll.).

Taxonomic Discussion.—The taxonomic status of *coatzacoalcos* D. & K. is fully discussed under *trapidoi* n. sp. and *typhlosomata* D. & K. The true identity of it remains in doubt as the type consists of two larval skins in very poor condition which Dyar (1923) considered to be third instar.

The species *U. basalis* H. D. & K., of which adequate type material exists in the United States National Museum, was sunk in the synonymy of *coatzacoalcos* D. & K. by Dyar (*loc. cit.*) and until good series of reared and associated specimens are studied from the type localities of both *coatzacoalcos* and *basalis*, we are accepting Dyar's opinion, so that typical "*basalis*" material from Middle America is hereby treated under the name *coatzacoalcos* D. & K.

Uranotaenia ditaenionata Prado

Uranotaenia ditaenionata Prado, 1931. Mem. Inst. Butantan, 6: 209.
Uranotaenia burkii Lane, 1936. Rev. Mus. Paulista, 20: 194.
Uranotaenia burkii, Lane, 1939. Cat. dos Mosq. Neotr., p. 33.
Uranotaenia ditaenionota, Lane, 1939. Cat. dos. Mosq. Neotr., p. 34.
Uranotaenia ditaenionota, Lane, 1943. Rev. Ent., 14: 158.

Female.—Head: Proboscis slightly shorter than fore-femur, dark. Palpi barely as long as clypeus, dark-scaled. Clypeus and tori brown. Antennae dark, longer than the proboscis. Occiput clothed with broad, flat, dark scales, some erect dark ones and a broad band of snowy white scales on each side which arises in front of the anterior pronotal lobe and then proceeds anteriorly bordering the eye to the center of the vertex where it meets a small tuft of moderately long, snowy white scales.

Thorax: Anterior pronotal lobes brown, clothed with a band of snowy white scales. Mesonotal integument bronzy brown with a slightly darker patch on each side extending from the root of the wing to anterior border of the scutum. Vestiture of narrow, curved, brownish scales and a line of broad, flat, white scales on each side, arising above the root of the wing and extending as far as the anterior border of the scutum. Pleura bronzy with a light-colored band across the mesepimera directly in line with a broad band of white scales across the

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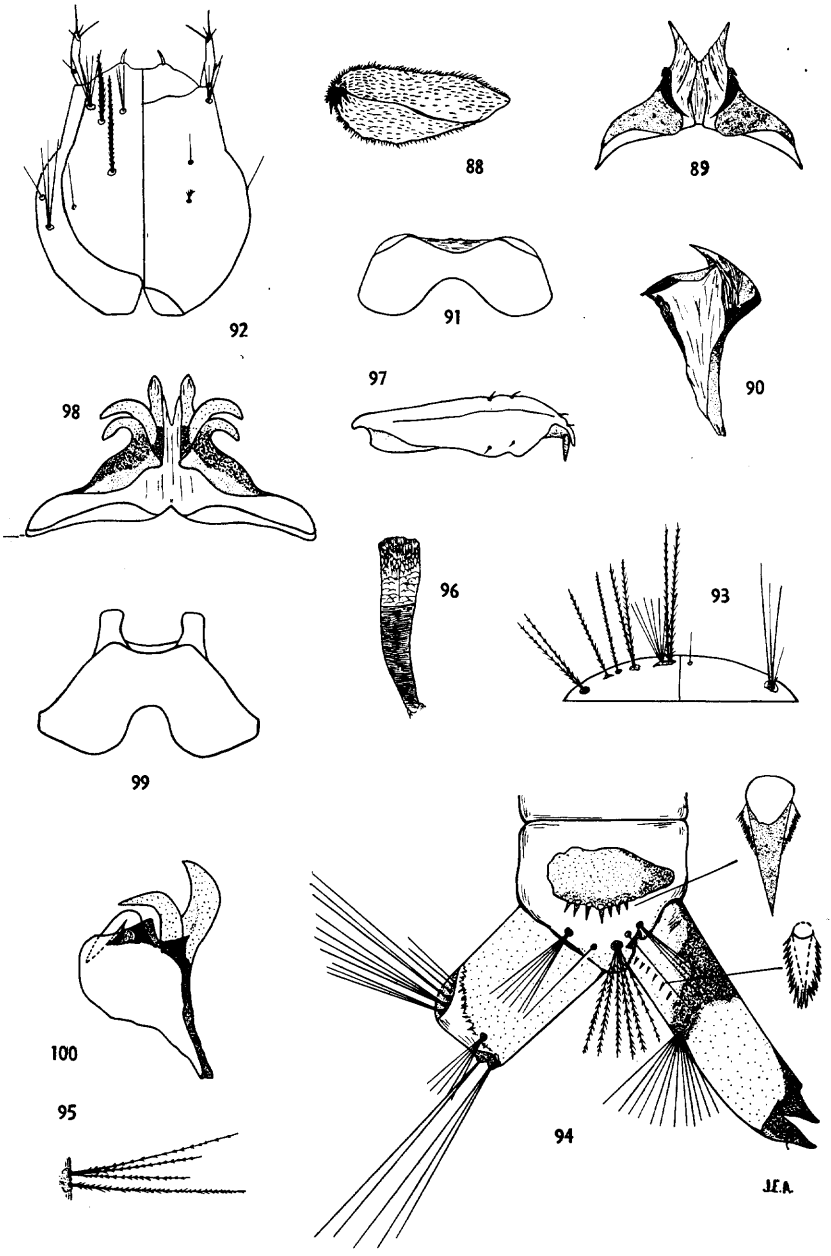
EXPLANATION OF PLATE X

U. orthodoxa Dyar and *U. pallidoventer* Theobald

FIG. 88. *U. orthodoxa*. Male terminalia. Lateral view of the dististyle. FIG. 89. *U. orthodoxa*. Male terminalia. Dorsal view of the phallosome. FIG. 90. *U. orthodoxa*. Male terminalia. Lateral view of the phallosome. FIG. 91. *U. orthodoxa*. Male terminalia. Ninth tergite. FIG. 92. *U. pallidoventer*. Larva. Dorsal and ventral views of head. FIG. 93. *U. pallidoventer*. Larva. Dorsal and ventral views of prothorax. FIG. 94. *U. pallidoventer*. Larva. Lateral view of the terminal abdominal segments. FIG. 95. *U. pallidoventer*. Larva. Lateral hairs of apdominal segment II. FIG. 96. *U. pallidoventer*. Pupa. Trumpet. FIG. 97. *U. pallidoventer*. Male terminalia. Lateral view of the dististyle. FIG. 98. *U. pallidoventer*. Male terminalia. Dorsal view of the phallosome. FIG. 99. *U. pallidoventer*. Male terminalia. Ninth tergite. FIG. 100. *U. pallidoventer*. Male terminalia. Lateral view of the phallosome.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upper third of sternopleura. Meron and coxae yellowish with some light colored scales on coxae. Legs dark. Tarsal claws equal, small and unarmed. Wing scales mostly dark; a long line of white scales at the base of the first vein.

Abdomen: Abdominal tergites dark with very broad basal bands of white scales. Venter pale.

Male.—Coloration of the female. Secondary sexual characters pronounced; antennae densely plumose, antennal segments shorter than in the female except for the last two which are longer. Mid-femora swollen. Mid tarsal claws subequal, one very long and stout, the other shorter and slender.

Male terminalia (Plate V): Basistyle conical, longer than wide. Basal lobe well defined and triangularly projected toward outer border of basistyle, bearing a clump of four or five hairs from heavily sclerotized bases on the inner border of the lobe and a few smaller scattered hairs on outer projection. Dististyle (fig. 42) shorter than basistyle with more or less parallel edges for most of its length, with the dorsal border curving gradually toward apex and ending in a small beak-like point; vestiture of a few scattered fine hairs from rather conspicuous rounded insertions. Appendiculate spine inserted just below the beak, short and stout and with a blunt point. Lateral plates of the phallosome (figs. 40 and 41) divided; sternal arm a smooth plate ending in a comb of five of six subequal, finely pointed, appressed teeth, and bearing at about the middle and on its outer edge a very stout, curved, heavily sclerotized tooth. Tergal arm heavily sclerotized, conical, ending in an acutely pointed, sharply curving tooth. Ninth tergite (fig. 43) with basal edge deeply and quadrately emarginate. Lateral borders developed into two sharply curved, widely separated horn-like lobes.

Immature Stages.—Partly described and figured by Lane (1943), but no material has been available to us.

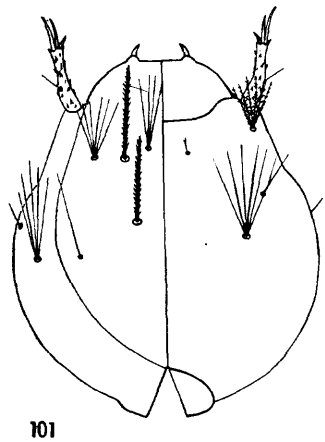
Discussion.—The species was described from the State of Sao Paulo, Brasil, and its synonym, *burkii* Lane has the State of Matto Grosso as its type locality. All further published records of the species are from southern Brasil.

The material from Panama in front of us appears to belong here, as it checks in every detail with the excellent description and figures given by Lane (1943). The species is very rare in Panama and only occasional specimens have been taken near the large coastal marshes of the Province of Panama and one female from Almirante, in Bocas del Toro Province.

EXPLANATION OF PLATE XI

Uranotaenia pulcherrima Lynch Arribalzaga

FIG. 101. Larva. Dorsal and ventral views of head. FIG. 102. Larva. Dorsal and ventral views of prothorax. FIG. 103. Larva. Lateral abdominal hairs of segments I and II. FIG. 104. Larva. Lateral view of terminal abdominal segments. FIG. 105. Pupa. Trumpet. FIG. 106. Male terminalia. Dorsal view of the phallosome. FIG. 107. Male terminalia. Lateral view of the dististyle. FIG. 108. Male terminalia. Ninth tergite. FIG. 109. Male terminalia. Lateral view of the phallosome.



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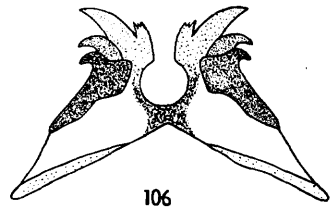

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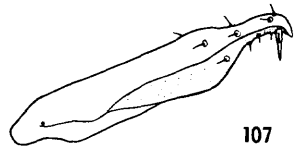

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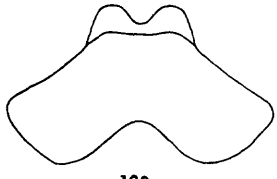

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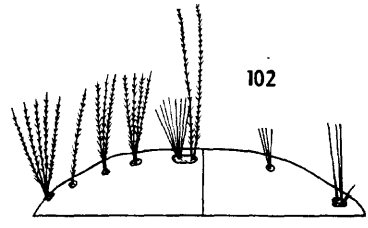

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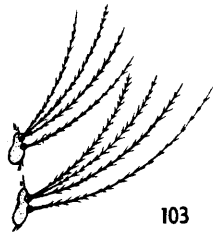

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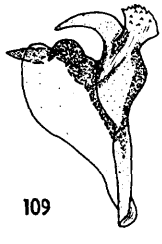

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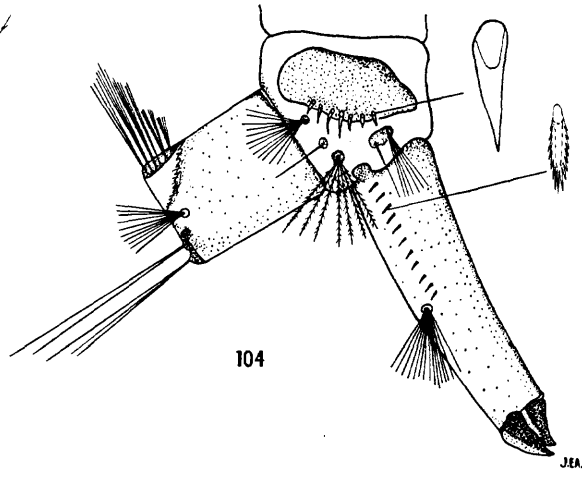

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Uranotaenia geometrica Lutz

Uranotaenia geometrica Lutz, 1901. (In Theobald) Mon. Cul., 2, p. 247.
Uranotaenia geometrica, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 918.
Uranotaenia geometrica, Dyar, 1928. Mosq. Amer., p. 421.
Uranotaenia geometrica, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia geometrica, Lane, 1939. Cat. dos Mosq. Neotr., p. 34.
Uranotaenia geometrica, Lane, 1943. Rev. Ent., 14: 144.

Female.—Head: Proboscis longer than fore-femur, swollen toward tip, dark. Palpi very short, barely as long as clypeus, dark. Clypeus brown. Tori yellow. Antennae shorter than the proboscis. Occiput clothed with dark flat scales with faint metallic reflection except for a broad stripe of scales on each side that gives a strong silvery reflection and which extends from above the anterior pronotal lobe to the eye. Vertex with a large patch of scales with a bluish silvery reflection.

Thorax: Anterior pronotal lobes with a vestiture of bluish silvery scales. Mesonotum uniformly bronzy brown with a vestiture of narrow dark scales, a spot of silvery bluish scales in front of antescutellar space and a line of bluish scales on each side arising above the root of the wing and extending beyond the anterior border of the paratergite. Scutellum with a large patch of silvery blue scales on the midlobe. Pleura uniformly pale yellow with a large band of blue scales cutting across the upper third of sternopleura. Coxae and trochanters yellow. Femora and tibiae dark with prominent apical white spots. Fore and midtarsi dark, with evanescent basal and apical white rings on first and second joints. Hind tarsi marked as follows: First segment with small apical white ring; second segment with small basal and apical white rings; third segment with small basal and large apical white rings; fourth and fifth segments entirely white-scaled. Wing-scales dark except for a line of bluish scales occupying one-half of the stem of the fifth vein and continuing back along the stem vein. Abdominal tergites dark with three triangular silvery spots on each segment, one on the midline and two on the sides. Venter pale.

Male.—Coloration of the female. Secondary sexual modifications quite strongly developed. Antennae densely plumose with segments shorter than in the female except for last two which are longer. Mid-femora swollen. Midtarsal claws unequal.

Male terminalia (Plate VI): Basistyle conical, longer than wide. Basal lobe triangularly produced, with a clump of long hairs from sclerotized bases on its inner margin and some small hairs towards the outer margin. Dististyle (fig 60) about three-fifths the length

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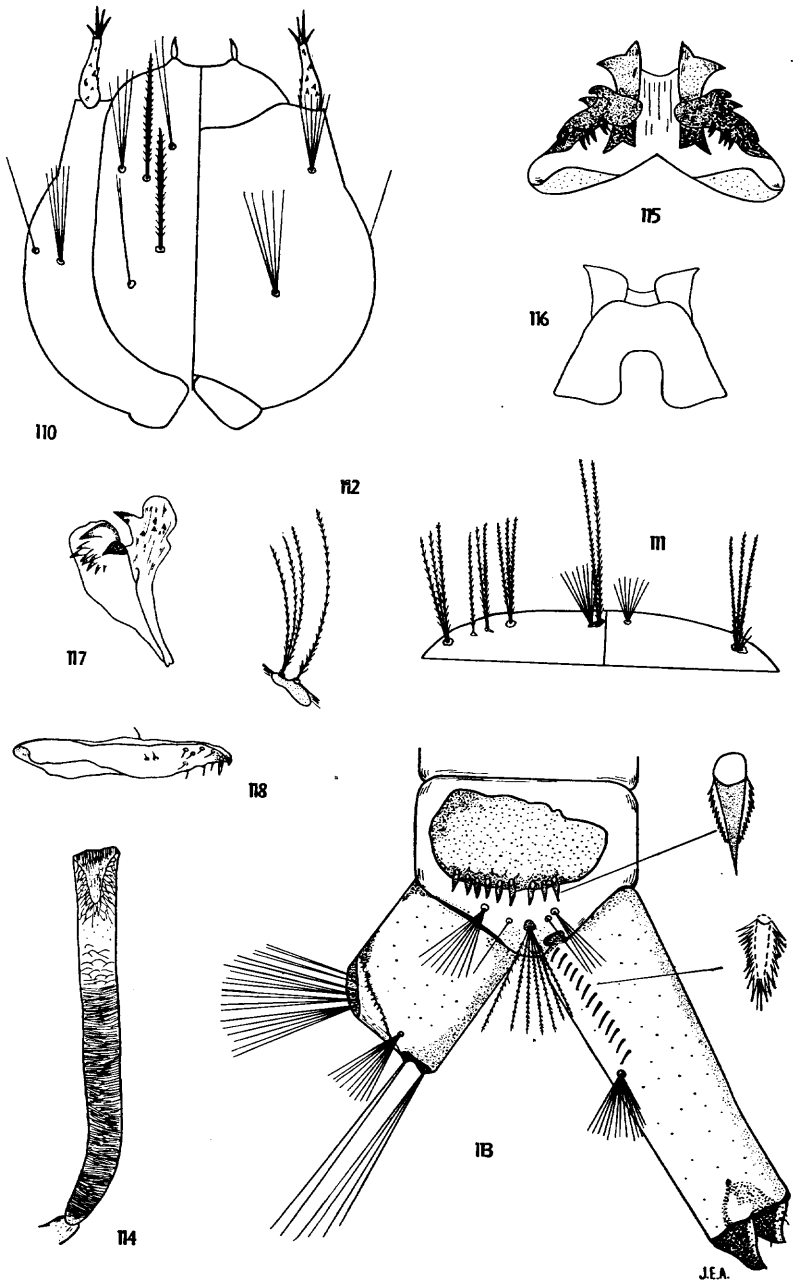
EXPLANATION OF PLATE XII

Uranotaenia sapphirina (Osten Sacken)

FIG. 110. Larva. Dorsal and ventral views of head. FIG. 111. Larva. Dorsal and ventral views of prothorax. FIG. 112. Larva. Lateral hairs of abdominal segment I. FIG. 113. Larva. Lateral view of terminal abdominal segments. FIG. 114. Pupa. Trumpet. FIG. 115. Male terminalia. Dorsal view of the phallosome. FIG. 116. Male terminalia. Ninth tergite. FIG. 117. Male terminalia. Lateral view of the phallosome. FIG. 118. Male terminalia. Lateral view of the dististyle.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of the basistyle, gradually tapering from base to apex, clothed with a few minute hairs from conspicuous circular insertions. Appendiculate spine fine and simple. Ninth tergite (fig. 57) much narrower at apex than at base, nearly triangular; basal margin deeply and obtusely emarginate. Lateral corners produced into two long knob-like approximate processes. Lateral plates of the phallosome (figs. 58 and 59) divided into two arms. Sternal arm a flat plate with rounded apex, bearing one heavy, long, claw-like tooth at about the middle and a few small teeth on inner surface. Tergal arm a broad plate bearing two heavy claw-like teeth on its inner apical margin and several smaller, straight teeth toward the outside.

Larva (Plate VI).—Head capsule yellowish. Antennae smooth, gradually tapering from base to apex; antennal hair No. 2 (apical group) much longer than the others; antennal hair inserted well before the middle. Head-hairs (fig. 52) as follows: No. 4 single or double as long as No. 6 but much weaker; Nos. 5 and 6 the usual thick simple spines; No. 7 a three or four haired tuft; No. 8 single; No. 9 in fours; No. 11 a long four-haired tuft; No. 13 a very small and inconspicuous tuft. Prothoracic hairs (fig. 53) as follows: Nos. 1 and 2 single and long; No. 3 a long tuft, well over half as long as No. 1; No. 4 double or triple; Nos. 5 and 7 triple; No. 6 single. Abdominal hair No. 6 on segments I and II triple (fig. 54). Lateral plate of the eighth abdominal segment bearing six or seven acutely pointed spines weakly fringed at base, the middle ones being longer than the others. Air tube (fig. 55) slightly over three times as long as its basal width, bearing seven to nine pecten teeth not reaching the middle of the tube and followed by a multiple tuft. Anal segment not much longer than wide, ringed by the plate which is fringed along its posterior border. Hair No. 1 multiple, long.

Pupa.—Pupal integument yellowish brown with diffused darker spots at the base of the abdominal segments. Trumpets (fig. 56) tubular, long, much longer than the length of the paddles. Tracheoid area occupying well over half the length of the trumpets. Pinna rounded with a small elliptical slit toward the base of the trumpet. Distance from tip of trumpet to base of slit about one-fifth the length of the trumpet. Outstanding abdominal setae as follows: No. 2 a long and conspicuous multiple tuft on segments II and VII; No. 5 a long, conspicuous multiple tuft on segments IV and VII, similar to No. 2. Paddles inflated on inner border, so that inner part is actually larger than outer; midrib quite pronounced to tip.

Bionomics.—Lutz (in Theobald, 1901) reports the species as biting

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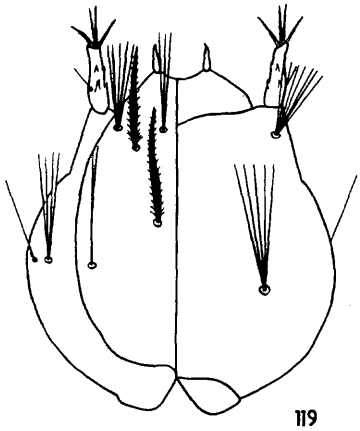
EXPLANATION OF PLATE XIII

Uranotaenia socialis Theobald

FIG. 119. Larva. Dorsal and ventral views of head. FIG. 120. Larva. Dorsal and ventral views of prothorax. FIG. 121. Larva. Lateral hairs of abdominal segments I and II. FIG. 122. Larva. Lateral view of terminal abdominal segments. FIG. 123. Pupa. Trumpet. FIG. 124. Male terminalia. Lateral view of the dististyle. FIG. 125. Male terminalia. Ninth tergite. FIG. 126. Male terminalia. Dorsal view of the phallosome. FIG. 127. Male terminalia. Lateral view of the phallosome.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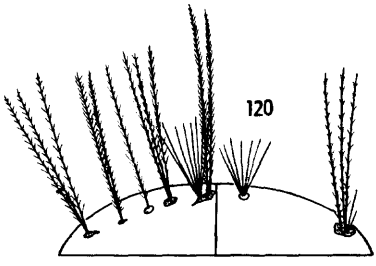
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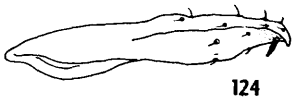
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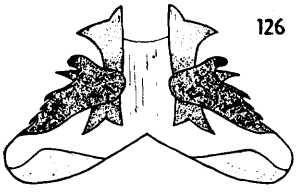
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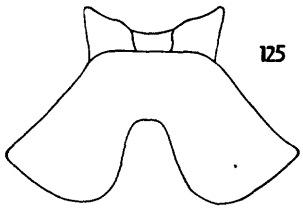
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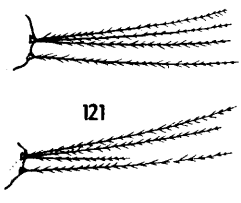
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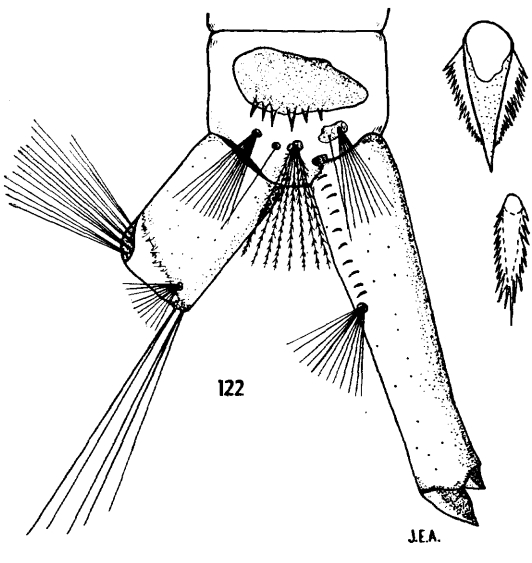
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man severely during the day although not particularly inclined to do so. Lane (1943) in commenting Dr. Lutz's observations states that he has never observed the species biting man and goes on further to say that in his opinion, this as well as other species of the genus only rarely suck the blood of warm blooded animals.

We have never taken this species biting man, but on one occasion the senior author took over fifty females freshly engorged with blood from a large burrow inhabited by a "Conejo Pintado" (*Cuniculus paca virgatus* Bangs).

The larvae prefer open, sunlit bodies of water with abundant aquatic vegetation, particularly algae of the genus *Spirogyra*. They are frequently found associated with anopheline larvae, especially with *A. albimanus* and *A. pseudopunctipennis* and reach a peak of abundance late in the rainy season and early in the dry season.

Taxonomic Discussion.—As Howard, Dyar and Knab (1917) and Lane (1943) have pointed out, the tarsal white markings of this species, as in other related species of the *pulcherrima*-series, are quite variable. The extent or white on the third hind tarsal segment varies a great deal and the fourth hind tarsal segment occasionally shows a black ring as in *apicalis* and *pulcherrima*. The phallosome as figured by Lane (1943) for Brasilian males of *geometrica*, appears to differ from the phallosome of Panama males, which would seem to indicate that the northern form is a distinct species. However, we prefer to maintain the name *geometrica* for our species until given the opportunity to examine South American material.

Uranotaenia hystera Dyar and Knab

Uranotaenia hystera Dyar and Knab, 1913. Ins. Ins. Mens., 1: 76.
Uranotaenia hystera, Dyar, 1928. Mosq. Amer., p. 417.
Uranotaenia hystera, Edwards, 1932. Gen. Insect., 194, p. 98.
Uranotaenia bicolor, Martini, 1935 (nec. *Uranotaenia bicolor* Leicester, 1908). Mosq. de Mex., p. 29.
Uranotaenia bicolor, Lane, 1939. Cat. dos Mosq. Neotr., p. 33.
Uranotaenia hystera, Lane, 1939. Cat. dos. Mosq. Neotr., p. 35.
Uranotaenia martinii, Lane, 1943. Rev. Ent., 14: 152.

Female.—Head: Proboscis shorter than fore-femur, slightly swollen toward tip, dark. Palpi barely longer than the clypeus, dark. Tori and clypeus brown. Antennae longer than the proboscis, dark. Vertex and occiput densely clothed with broad, flat, straw-colored scales.

Thorax: Anterior pronotal lobes pale, clothed with pale scales. Mesonotal integument bronzy brown with three darker median lines which coalesce posteriorly to form a broad median dark band, all this

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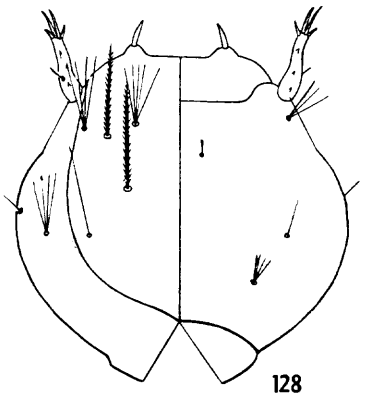
EXPLANATION OF PLATE XIV

Uranotaenia telmatophila n. sp.

FIG. 128. Larva. Dorsal and ventral views of head. FIG. 129. Larva. Dorsal and ventral views of prothorax. FIG. 130. Larva. Lateral hairs of abdominal segment II. FIG. 131. Larva. Lateral view of terminal abdominal segments. FIG. 132. Pupa. Trumpet. FIG. 133. Male terminalia. Ninth tergite. FIG. 134. Male terminalia. Lateral view of the dististyle. FIG. 135. Male terminalia. Dorsal view of the phallosome. FIG. 136. Male terminalia. Lateral view of the phallosome.



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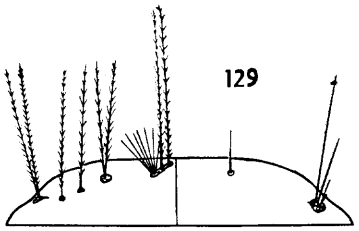

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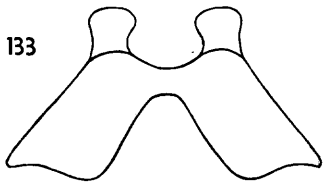

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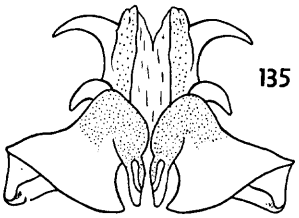

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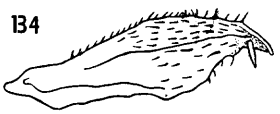

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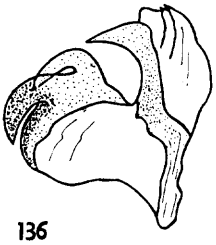

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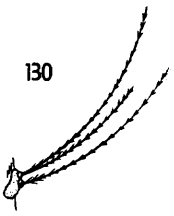

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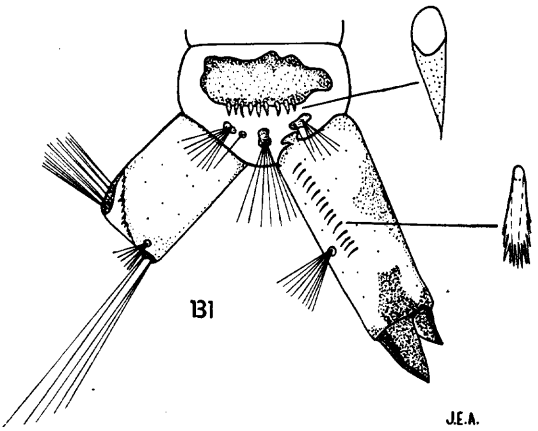

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bordered by a broad pale yellowish band which extends from the roots of the wings around the anterior margin of the scutum; vestiture of narrow, curved scales which are dark on the brown integument and white on the pale yellowish border. Pleura, coxae and trochanters pale yellow throughout, concolorous with pale mesonotal border. A few light, almost transparent, scales on upper third of sternopleura. Postnotum dark brown. Legs dark. Wing-scales scanty and somewhat pale, nearly transparent, except those on costa, subcosta and first vein which are abundant and very dark, giving the appearance of a large dark spot on the upper border of the wing extending from the wing base nearly to the tip of the first vein; a line of snowy white scales arising on the stem-vein and extending along the base of the fifth vein.

Abdomen: Abdominal tergites dark brown, except for small median, white apical triangular spots on segments III, V, VI and VII, a broad apical white band on segment IV and small apical lateral white spots on segments IV, V and VI. Venter pale-scaled.

Male.—Coloration of the female. Secondary sexual characters quite pronounced. Antennae pulmose; antennal segments shorter than in the female, except for last two which are longer. Midfemora swollen. Midtarsal claws markedly unequal.

Male terminalia (Plate V): Basistyle conical, somewhat longer than wide. Basal lobe triangularly produced with only four prominent hairs, one long, one moderate and one small at the inner border and a moderate one outwardly. Dististyle (fig. 38) about four-fifths as long as the basistyle with curved, pointed, beak-like tip; ventral margin conspicuously swollen toward the apex; vestiture of several small hairs from conspicuous insertions. Appendiculate spine bifurcate. Ninth tergite (fig. 39) almost as wide at apex as at base, nearly quadrate; basal margin deeply and quadrately emarginate; apical margin shallowly concave with the lateral corners produced into two small mound-like lobes. Lateral plates of the phallosome (figs. 36 and 37) divided, sternal arm a plate ending in a sickle-shaped acutely pointed tooth and bearing medianly a heavy, curved tooth. Tergal arm a highly convoluted heavily sclerotized tooth with the tip directed basally.

Immature Stages.—Unknown.

Distribution.—*Uranotaenia hystera* has been reported from Northern Central America through French Guiana (Floch et Abonnenc, 1947), but Lane (1943) failed to find it in Brasil. The species was first taken in Panama by Komp (in Dyar, 1928) who collected a female in Almirante, Bocas del Toro Province. We have found it along the

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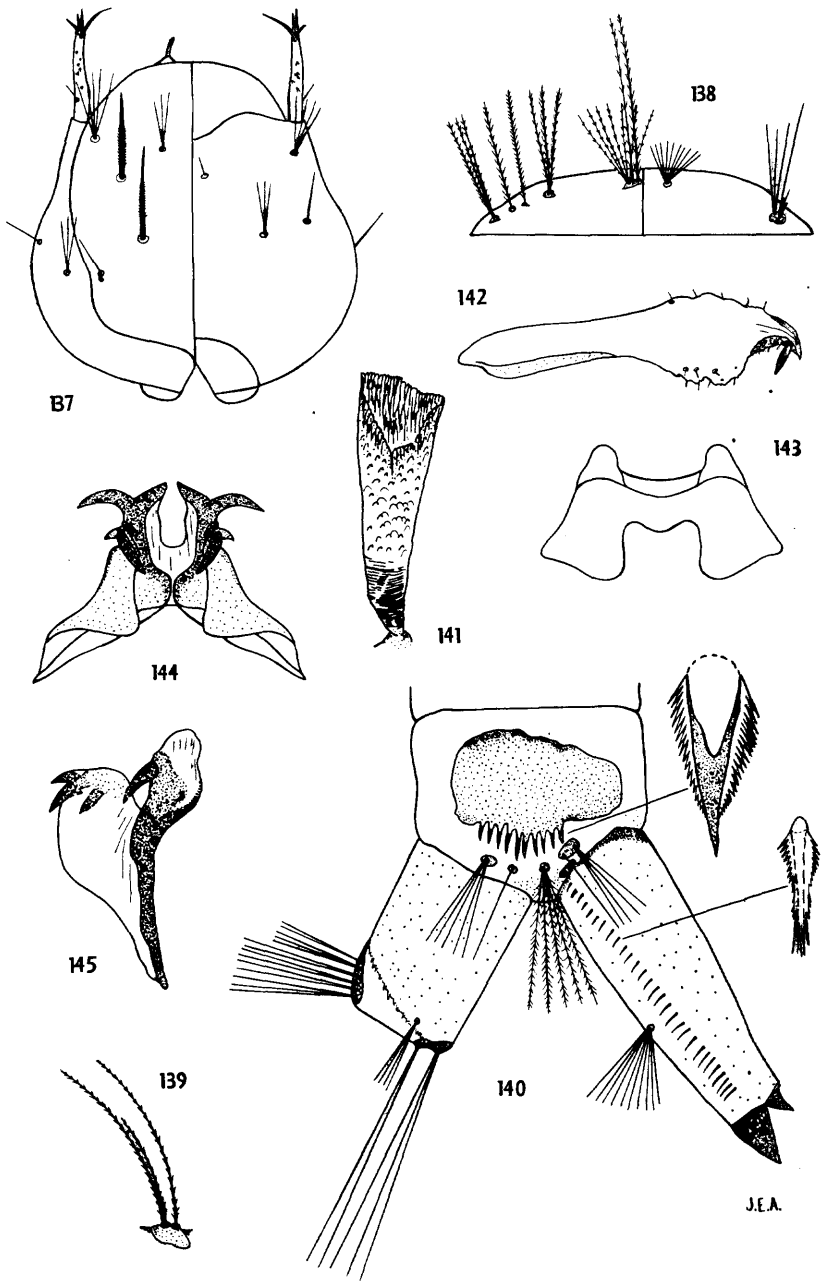
EXPLANATION OF PLATE XV

Uranotaenia trapidoi n. sp.

FIG. 137. Larva. Dorsal and ventral views of head. FIG. 138. Larva. Dorsal and ventral views of prothorax. FIG. 139. Larva. Lateral hairs of abdominal segment II. FIG. 140. Larva. Lateral view of terminal abdominal segments. FIG. 141. Pupa. Trumpet. FIG. 142. Male terminalia. Lateral view of the dististyle. FIG. 143. Male terminalia. Ninth tergite. FIG. 144. Male terminalia. Dorsal view of the phallosome. FIG. 145. Male terminalia. Lateral view of the phallosome.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marshlands of both coasts but never in large numbers. Our records show it to be present in the provinces of Panama, Darien, Cocle, Bocas del Toro and the Canal Zone.

Bionomics.—Nothing is known of the habits of the species and the immature stages remain unknown. Except for a single female collected inside the Airport building at Changuinola, Bocas del Toro Province, all our specimens have been taken in light traps. The male is described and figured in this paper for the first time.

Taxonomic Discussion.—In 1935 Martini described what he considered a new species of *Uranotaenia* from British Honduras which he named *bicolor*. As the generic name *Pseudoficalbia* Theobald, 1905, had been sunk in the synonymy of *Uranotaenia* Lynch Arribalzaga, 1891, the species *Pseudoficalbia bicolor* Leicester, 1908, had become *Uranotaenia bicolor* (Leicester, 1908) and *Uranotaenia bicolor* Martini, 1935, immediately created a homonym. Lane (1943) proposed the name *Uranotaenia martinii* to replace *bicolor* Martini.

Martini's species was described from a single female and separated from *hystera* on the basis of abdominal coloration, but the describer noted the close similarity of the two species and called attention to the possibility that his species could well represent but a mere variety of *hystera*.

In our material of *hystera* from Panama we note marked variations in the color pattern of the abdominal tergites and until males from the type locality of *Uranotaenia martinii* Lane are obtained we prefer to consider *martinii* a synonym of *hystera*.

Uranotaenia incognita n. sp.

Female.—Head: Proboscis about the size of fore-femur, slightly swollen toward the apex, dark. Palpi very short, barely as long as the clypeus, dark-scaled. Clypeus and tori dark brown. Antennae longer than the proboscis, dark. Occiput clothed with flat, round, brown scales with some metallic luster, a few erect narrow ones on the nape and a line of snowy white scales broadly bordering the eyes on each side from the vertex to the mentum so that the outside corners of the head appear white-scaled.

Thorax: Anterior pronotal lobes clothed with pure, white scales. Mesonotum dark brown with a vestiture of curved, narrow dark scales and with a line of white scales on each side, arising above the root of the wings and extending forward to the level of the anterior margin of the paratergite. Scutellum and postnotum concolorous with the mesonotum. Pleura dark brown (concolorous with mesonotum) on upper third, pale yellowish on the lower two-thirds. A line of white

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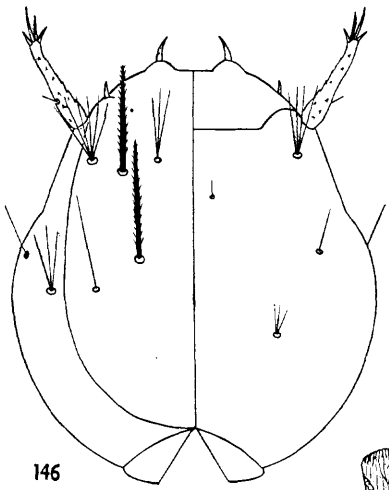
EXPLANATION OF PLATE XVI

Uranotaenia typhlosomata Dyar and Knab

FIG. 146. Larva. Dorsal and ventral views of head. FIG. 147. Larva. Dorsal and ventral views of prothorax. FIG. 148. Larva. Lateral hairs of abdominal segment II. FIG. 149. Larva. Lateral view of terminal abdominal segments. FIG. 150. Pupa. Trumpet. FIG. 151. Male terminalia. Lateral view of the dististyle. FIG. 152. Male terminalia. Ninth tergite. FIG. 153. Male terminalia. Dorsal view of the phallosome. FIG. 154. Male terminalia. Lateral view of the phallosome.



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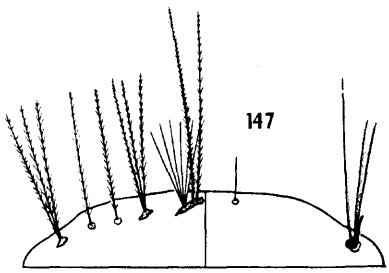

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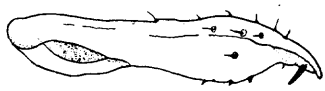

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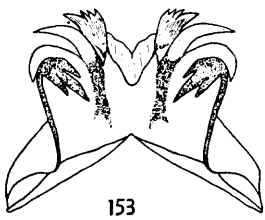

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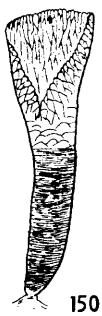

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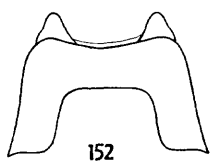

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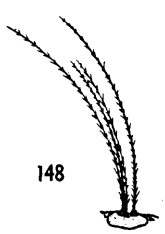

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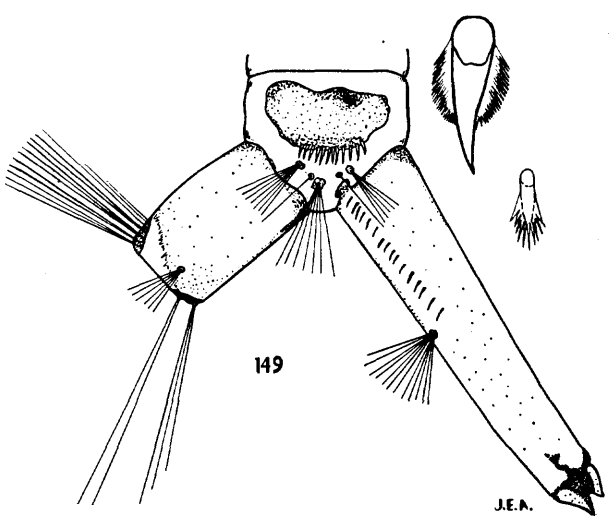

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scales cutting across the upper third of the sternopleura. Coxae yellowish with patches of white, almost transparent scales. Trochanters yellowish, rest of the legs uniformly dark brown. Wing-scales dark on costa, subcosta and first vein, pale, almost transparent, on other veins, except for a line of pure white scales along the bases of the fifth vein.

Abdomen: Dark brown above, pale below.

Male.—Coloration of the female. Secondary sexual characters quite pronounced; antennae plumose, shorter than the proboscis, individual segments shorter than in the female, except for the last two which are longer. Midfemora swollen. Midtarsal claws unarmed and unequal, one very long and stout, the other much shorter and slender.

Male terminalia (Plate V): Basistyle conical, longer than wide. Basal lobe triangularly produced toward outer border, with a clump of three long hairs on inner border, one long hair on upper border and a few smaller ones along the triangular projection. Dististyle (fig. 48) about three-fifths the length of the basistyle ending in a heavy beak-like point; ventral border conspicuously swollen on outer half; vestiture of a few small hairs from conspicuous rounded insertions; appendiculate spine inserted just before the tip, bifurcate at apex. Lateral plates of the phallosome (figs. 50 and 51) divided, sternal arm a plate bent sharply outwardly at apex, ending in a narrow comb of three sharp teeth, the middle one being heaviest and longest; the arm bears at about the middle a curved, heavily sclerotized, broad, claw-like tooth directed sternally and outwardly. Tergal arm a deeply excavated semi-cylindrical plate. Ninth tergite (fig. 49) with the basal margin quadrately emarginate, apical margin shallowly concave, lobes wide apart, horn-like, curved, pointed.

Immature Stages.—Unknown.

Type Material.—*Holotype* male: David, Province of Chiriqui, Republic of Panama, XII.13.52. *Allotype* female: El Real, Province of Darien, R. de P., 11.19.53. *Paratypes:* seven males with the following data: Patino Point, Darien, R. de P., VII.10.52; Tocumen, Province of Panama, R. de P., IX.23.52; David, Chiriqui, R. de P., XII.15.52; El Real, Darien, R. de P., VII.20.52, VII–20–52; VII.21.52; II.19.53. All type material captured in light traps and to be deposited in the United States National Museum.

Taxonomic Discussion.—This species is characterized in the adult stage by the large eye border of white scales on each side of the head, which extends from the vertex to the mentum and by the coloration of the pleura. It belongs in the *pallidoventer*-series discussed in the introduction. It may be separated from all the species of the series by the occipital and pleural markings described above, and by the male terminalia characters brought out in the key.

Uranotaenia leucoptera (Theobald)

Anisochelomyia leucoptera Theobald, 1907. Mon. Culic., 4, p. 575.
Uranotaenia leucoptera, Bonne & Bonne-Wepster, 1923. Ins. Ins. Mens., 11: 127.
Uranotaenia leucoptera, Dyar, 1928. Mosq. Amer., p. 416.
Uranotaenia leucoptera, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia leucoptera, Martini, 1935. Mosq. Mex., p. 29.

Female.—Head: Proboscis slightly longer than fore-femur, dark. Palpi very small, barely as long as the clypeus, dark. Tori yellowish brown, darker on inner border. Antennae longer than the proboscis, dark. Occiput and vertex largely covered with snowy white scales, except for two dark spots bordering the eye at the extreme corners of the head. A tuft of long white scales projects over the head from the center of the vertex.

Thorax: Anterior pronotal lobes with a vestiture of snowy white scales. Mesonotal integument dark brown with two narrow light stripes that extend from above the roots of the wings to the anterior border of the scutum; vestiture of narrow, curved, dark scales and a line of broad, flat white scales arising on each side above the root of the wing and extending forward to the scutal angle. Scutellum dark-scaled. Pleura dark brown, scaleless. Coxae and trochanter brownish, rest of the legs dark-scaled. Wings white scaled, except for a large spot of dark scales extending along the basal two-thirds of the costa and involving the subcosta and first vein. There is also a short line of white scales at the extreme base of the costa.

Abdomen: Abdominal tergites dark-scaled with the following markings of white scales: First and second tergites with very large, median, quadrate patches; third and fourth with large, median, triangular patches, the apex of the triangle pointing anteriorly, and a small round dark spot at the base of the triangle; fifth and sixth with small, median basal patches; seventh largely white-scaled except for a small apical median triangle of dark scales. Venter pale-scaled.

Male.—Coloration of the female. Secondary sexual characteristics quite pronounced; antennae plumose, shorter than the proboscis; individual segments smaller than in the female, except the last two which are longer. Midfemora swollen, midtarsal claws unarmed and unequal, one very long and stout, the other very short, almost obsolete.

Male terminalia (Plate VII): Basistyle conical, longer than wide. Basal lobe narrowly and triangularly produced toward outer border, bearing a clump of four hairs from sclerotized bases at inner margin and a few scattered ones along triangular projection. Dististyle (fig. 67) about four-fifths the length of the basistyle, ending in a small beak-like tip; ventral margin not conspicuously swollen; appendiculate spine inserted just below the beak with shallowly forked apex. Lateral plates of the phallosome (figs. 66 and 68) divided, sternal arm a weakly sclerotized lobe with frayed apex, bearing subapically a narrow, long, heavily sclerotized claw-like tooth directed outwardly. Tergal arm a rounded plate, bearing apically two short curved teeth which differ widely in appearance in different preparations according to the orientation of the specimen. Ninth tergite (fig. 69) with the basal margin quadrately emarginate, apical margin shallowly concave; lobes knob-like, set wide apart.

Larva (Plate VII).—Head capsule dorsally yellowish, ventrally with a broad median dark stripe and with dark spots on the postero-lateral corners. Antennae sparsely spiculate, antennal hair inserted on outer border, below the middle. Head hairs (fig. 61) as follows: No. 4 a multiple tuft (over six-haired) about two-thirds the length of No. 6; Nos. 5 and 6 the usual thick, simple spines; No. 7 a thick, stiff,

three-branched tuft; No. 8 single; No. 9 a long five-branched tuft; No. 10 single and small; No. 11 a multiple tuft; No. 13 a long, multiple tuft, longer than No. 6.

Prothoracic hairs (fig. 62) as follows: Nos. 1 and 2 long and single; No. 3 a multiple tuft, slightly less than half as long as No. 1; Nos. 4 and 7 double; Nos. 5 and 6 single; No. 15 single. Lateral abdominal hair No. 6 on segments I and II double (fig. 63). Lateral plate of eighth abdominal segment bearing on its posterior border four subequal, acutely pointed, very weakly fringed spines. Air tube (fig. 64) four times as long as its basal width, very slightly tapering from base to apex, with two dark brown bands, one subbasal and one subapical and bearing from eight to twelve nearly obsolete pecten teeth running on basal half of tube and followed by a multiple tuft. Anal segment long and narrow; plate ringing the segment and fringed on posterior border; hair No. 1 in six.

Pupa (Plate VII).—Pupal integument yellowish brown with broad, darker bands across abdominal segments II and VII. Pupal trumpets (fig. 65) short, cup-shaped, greatly flared at tip; slightly over one-half the length of the paddles; tracheoid area rather obsolete, occupying about one-fifth the total length of the trumpet; pinna large, about one-third the length of the trumpet; trumpet with an additional small triangular opening or "window" just below the pinna. Outstanding abdominal setae as follows: Hair No. 2 a moderately long, conspicuous multiple tuft on segments II, III and IV, becoming gradually weaker, shorter and with fewer branches on segments V, VI and VII. Hair No. 5 a multiple tuft as long as No. 2 on segment IV; on segments V and VI it is also multiple and of same size as No. 2. On segment VII hairs Nos. 4 and 5 appear as very dark and multiple tufts, much more prominent than the same hairs on segment VI. Paddles globose, inflated on inner border; midrib prominent for two-thirds the length of the paddle, nearly obsolete at tip; apical half of paddle serrate, serrations more numerous on outer border.

Distribution.—This species was described from British Guiana and has been found as far North as Southern Mexico (Martini, 1935) but Lane (1943) failed to find it in Brasil. In Panama it is rather rare, appearing in collections made near the marshlands of both coasts. Our records show it to be present in the provinces of Darien, Panama, Colon, Bocas del Toro and the Canal Zone.

Bionomics.—All the adults taken by us have been captured in light traps set near extensive fresh water marshes. Larvae have been found at the extreme edges of these marshes both in the open or in the presence of aquatic vegetation such as the sedge *Fuirena umbellata.* The larvae, although never abundant, appear to reach a peak during the rainy season.

Taxonomic Discussion.—The presence of numerous white scales on the occiput places this species close to *nataliae* and *hystera* from which it may be separated by the characters given in the keys. The larva of *leucoptera* is peculiar in that the pecten teeth are very weak so that they can hardly be made out even under the compound microscope.

Uranotaenia lowii Theobald

Uranotaenia lowii Theobald, 1901. Mon. Cul., 2, p. 339.
Uranotaenia continentalis Dyar and Knab, 1906. Jour. New York Ent. Soc., 14: 187.
Uranotaenia minuta Theobald, 1907. Mon. Cul., 4, p. 559.
Uranotaenia lowii, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 911.
Uranotaenia continentalis, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 914.
Uranotaenia monilis Shannon and Del Ponte, 1927. Rev. Inst. Bact. Buenos Aires, 5: 84.
Uranotaenia lowii, Dyar, 1928. Mosq. Amer., p. 425.
Uranotaenia lowii, Edwards, 1932. Gen. Insect., fasc. 194, p. 99.
Uranotaenia lowii, Lane, 1939. Cat. dos Mosq. Neotr., p. 35.
Uranotaenia lowii, Lane, 1943. Rev. de Ent., 14: 149.
Uranotaenia lowii, Pratt, 1946. Ann. Ent. Soc. Amer., 39: 581.

Female.—Head: Proboscis about the same length of fore femur swollen toward apex, dark. Palpi very short, barely as long as the clypeus, dark-scaled. Tori and clypeus dark brown. Antennae longer than the proboscis, dark except for base of third antennal segment which is yellow. Occiput clothed with dark flat scales which give a slight metallic greenish-blue reflection and a band of bluish scales on each side, that arises above the anterior pronotal lobes and meets the eye at about the center of its dorsal surface, continuing along the eye border to the center of the vertex.

Thorax: Anterior pronotal lobes with a broad stripe of bluish scales. Mesonotum ochre-yellow, except for three central dark bands which coalesce on posterior half, and two dark spots above the roots of the wings; vestiture of narrow dark scales and two short lines of bluish white scales that arise above the roots of the wings and do not exceed the anterior margin of the paratergite. Pleura yellowish except for dark spots which cover the upper half of the sternopleura and which appear crossed by a stripe of bluish scales. Coxae pale with bluish white scales. Femora and tibiae with small white spots at apices. Fore and midtarsi with evanescent white markings on third, fourth and fifth segments; hind tarsi with half of the third, all of the fourth and fifth segments white. Wing-scales dark, except for short lines of bluish white scales along the stem vein and the base of the fifth vein.

Abdomen: Dark, except for large lateral triangular apical spots of bluish scales on segments III, V and VI.

Male.—Coloration of the female. Secondary sexual characters reduced: antennae as in the female; midtarsal claws unequal.

Male terminalia (Plate VIII): Basistyle conical, somewhat longer than wide. Basal lobe well defined and without the long, narrow, triangular projection toward the outer border so commonly seen in other Panamanian species of the genus; vestiture of some ten to fourteen long, subequal hairs arising from heavily sclerotized bases. Dististyle (fig. 76) short and broad, between one-half and two-thirds the length of the basistyle, with rounded tip, covered with fine pile and bearing a clump of short, stout, heavily sclerotized teeth on distal third, particularly concentrated on inner border. Ninth tergite (fig. 78) with basal border deeply emarginate; lateral corners produced into two knob-like processes. Lateral plates of the phallosome (figs. 75 and 77) divided; sternal arm a simple, narrow, acutely pointed rod, barely

reaching the outer third of the capitate appendage of the tergal arm; latter with two appendages, a long rod-like one with capitate tip, arising from the ventral inner margin and a shorter curved process arising from the upper inner margin and bearing near the base a few small, straight, hardly discernible spines.

Larva (Plate VIII).—Head capsule dark brown to black. Antenna short, slightly tapering from base to apex, spinulate. Antennal hair inserted well before the middle and on the outer aspect of antenna. Head hairs (fig. 70) as follows: No. 4 a three- to four-branched, rather weak tuft about two-thirds as long as No. 6; Nos. 5 and 6 the usual thick, frayed, single spines; No. 7 a four- to six-branched tuft; No. 8 single; No. 9 a three- to four-branched tuft; No. 10 single; No. 11 a six- to eight-haired tuft; No. 13 with three or four branches, and short, about half as long as No. 6.

Prothoracic hairs (fig. 71) as follows: Nos. 1 and 2 single and long; No. 3 a six-haired tuft well over half the length of No. 1; No. 4 double or triple; No. 5 in threes; No. 6 single; No. 7 with three or four branches; No. 14 single. Abdominal hair No. 6 of segments I and II double (fig. 72). Lateral plate of eighth abdominal segment bearing from seven to nine fringed, very slightly subequal teeth. Air tube (fig. 73) about four times as long as its basal width, with nearly straight sides and bearing from 10 to 17 pecten teeth not reaching the middle of the tube; subventral tuft inserted just beyond the pecten and before the middle of tube. Anal segment not much longer than wide; anal plate ringing the segment; fringed along posterior border. Hair I a six-haired tuft.

Pupa (Plate VIII).—Integument light colored except for darker spots along the border of the cephalothorax and along the midline of the abdomen on segments III, IV and V. Pupal trumpets (fig. 74) tubular, slightly flared at tip, slightly over two-thirds the length of the paddles; tracheoid area occupying slightly less than half the length of the trumpets; pinna V-shaped, about one-third as long as the trumpet. Outstanding abdominal setae as follows: No. 2 a moderately long, conspicuous multiple tuft on segments II, III and IV, with fewer branches but of same length in segments V, VI and VII. Hair No. 5 a four-haired tuft of same length as No. 2 on segments IV and V and somewhat shorter than No. 2 on segments VI and VII. Paddles as in *U. apicalis* but somewhat more elongate.

Taxonomic Notes.—Uranotaenia lowii Theob. is closely related to *orthodoxa* Dyar, *briseis* Dyar, *paludosa* n. sp. and *telmatophila* n. sp., as shown by the reduced secondary sexual characters in the antennae and midtarsi of the male and by characters in the dististyle.

Distribution.—The species occurs throughout tropical America as far north as the Gulf States of the United States and as far south as Argentina. In Panama it is widespread in the lowlands where at times it is one of the commonest culicines found in larval and light trap collections.

Bionomics.—The adults have never been observed in Panama biting warm blooded animals; they are readily attracted to light, constituting one of the commonest *Uranotaenia* in light trap collections. Pratt (1946) reports finding adults *in copula* end to end resting on

Lemna fronds and other aquatic vegetation on the surface of its breeding place. Larvae are commonly found in bodies of water fully exposed to the sun, usually with some aquatic vegetation, particularly in the large lowland swamps of both coasts, where they are commonly associated with the larvae of *Anopheles albimanus* Wied. The larvae may be found throughout the year but show two peaks of abundance, one—which is the highest—at the beginning of the rainy season, and one toward the end of the rainy season.

Uranotaenia nataliae Lynch Arribalzaga

Uranotaenia nataliae Lynch Arribalzaga, 1899. Rev. Mus. La Plata, 2: 164.
Uranotaenia nataliae, Theobald, 1901. Mon. Cul., 2, p. 252.
Pseudouranotaenia rowlandi Theobald, 1905. Jour. Econ. Biol., 1: 33.
Uranotaenia noctivaga Neiva e Pinto, 1922. Braz. Med., 36: 374.
Uranotaenia argentina Petrocchi, 1923. Rev. Inst. Bact. Buenos Aires, 3: 9.
Uranotaenia capitis Shannon and Del Ponte, 1927. Rev. Inst. Bact. Buenos Aires, 5: 85.
Uranotaenia nataliae, Dyar, 1928. Mosq. Amer., p. 417.
Uranotaenia nataliae, Edwards, 1932. Gen. Insect., fasc. 194, p. 99.
Uranotaenia nataliae, Lane, 1939. Cat. dos Mosq. Neotr., p. 36.
Uranotaenia nataliae, Lane, 1943. Rev. de Ent., 14: 147.
Uranotaenia nataliae, Floch et Abonnenc, 1947. Pub. no. 148, Inst. Past. de la Guy.

Female.—Head: Proboscis longer than fore femur, swollen toward tip, dark. Palpi barely as long as the clypeus, dark. Tori yellow; clypeus brown. Antennae slightly shorter than the proboscis, dark. Occiput and vertex solidly clothed with broad flat snowy white scales, except for three small spots of dark scales, one in the center of the occiput near the nape, and one each at the extreme outer corners of the upper surface of the head bordering the eye.

Thorax: Anterior pronotal lobes with a vestiture of flat broad, pearly blue scales. Mesonotum dark brown, clothed with narrow, curved, dark scales and a stripe of pearly blue scales on each side, arising above the root of the wing and extending just beyond the level of the anterior border of the paratergite. Pleural integument dark brown except for large light color spots on the posterior pronotum and mesepimeron in line with a broad stripe of pearly blue scales which cuts across the upper third of sternopleura. Scutellum dark-scaled. Legs entirely dark except for coxae and trochanters which are yellowish. Wings dark-scaled except for the following markings of pearly blue scales: a spot at the middle of the wing involving the costa, subcosta and first vein; a second spot involving the costa, the tip of the first vein and both branches of the second vein; a third spot involving the base of the third vein; a fourth spot involving the base of the upper branch of the fifth vein; a line of pearly blue scales extending over more than half the length of the main stem of the fifth vein; a line of pearly blue scales covering the basal two-thirds of the sixth vein; a line of pearly blue scales covering the basal four-fifths of the lower branch of the fifth vein; a line of blue scales at the tip of both branches of the fourth vein and slightly more than the apical third of the third vein; a few pearly blue scales on the stem vein.

Abdomen: Dark-scaled above, pale below.

Male.—Coloration of the female. Secondary sexual characters quite pronounced; antennae densely plumose; antennal segments

shorter than in the female, except for the last two which are longer. Mid femora swollen, fourth midtarsal segment shorter than the fifth; midtarsal claws unarmed and markedly unequal, one very long and stout, the other very short, almost obsolete; hind tibiae with several rows of very long, stiff, outwardly directed hairs on distal half which begin at about the middle of the segment and continue almost to tip.

Male terminalia (Plate IX): Basistyle conical, longer than wide. Basal lobe broadly and triangularly produced toward outer border, with four hairs on inner border and a few scattered ones along the triangular projection. Dististyle (fig. 84) short and stout about three-fifths the length of the basistyle ending in a beak-like point; ventral border conspicuously swollen on outer third; vestiture of a few small hairs from conspicuous rounded insertions; appendiculate spine inserted just below the tip with bifurcate apex. Lateral plate of the phallosome (figs. 86 and 87) divided; sternal arm a sclerotized, erect, narrow, pointed plate bearing at about the middle a heavy, claw-like tooth, directed outwardly. Tergal arm bearing two heavily sclerotized, curved, claw-like teeth from a long and narrow base. Ninth tergite (fig. 85) with the basal margin deeply emarginate; lobes wide apart, slenderly knob-like.

Larva (Plate IX).—Head capsule yellowish. Antennae with spicules; antennal hair inserted on outer border and at basal third. Head hairs (fig. 79) as follows: No. 4 a very weak three-haired tuft, about two-thirds the length of No. 6; Nos. 5 and 6 the usual strong, single, frayed spines; No. 7 with five branches; No. 8 single; No. 9 triple; No. 10 single; No. 11 a six-haired tuft; No. 12 single; No. 13 a very small, inconspicuous four-haired tuft.

Prothoracic hairs (fig. 80) as follows: Nos. 1 and 2 long and single; No. 3 a multiple tuft less than half as long as No. 1; Nos. 4 and 7 double; Nos. 5 and 6 single; No. 14 single, rarely double. Abdominal hair No. 6 on segments I and II triple (fig. 81). Lateral plate of the eighth abdominal segment bearing a row of six or seven very broad, acutely pointed, unfringed spines. Air-tube (fig. 82) three times the length of its basal width, bearing nine to eleven pecten teeth which run along basal half of tube and are immediately followed by a multiple subventral tuft. Anal segment somewhat longer than wide, ringed by the plate which is fringed along its posterior border; hair No. 1 multiple.

Pupa (Plate IX).—Integument yellowish except for abdominal segments VI and VII and parts of V and VIII as well as the borders of the cephalothorax which are dark brown. Trumpets (fig. 83) short and stumpy, three-fourths the length of the paddles, with very irregular apex, the inner side being evenly rounded and the outer face ending in a broad spur. Tracheoid area occupying slightly less than one-third the greatest length of the trumpet; pinna very large, almost two-thirds the length of the trumpet. Outstanding abdominal hairs as described for *apicalis* except for hairs Nos. 2 and 5 on segments IV to VII which are less conspicuous, hair No. 5 being multiple on segment VII. Paddles as in *apicalis*.

Distribution.—The species was described from Argentina and has been found as far north as Honduras (Galindo, Trapido and Boshell, coll.). In Panama it is regularly picked up in light traps throughout

the year in the lowlands of both coasts. We have records from the provinces of Darien, Panama, Colon, Cocle, Chiriqui, Bocas del Toro and the Canal Zone.

Bionomics.—Nothing is known of the habits of the adult. The larva is described here for the first time. It occurs in large, open swamps among abundant growth of aquatic vegetation, such as *Pistia* and different species of sedges. It may be found sporadically throughout the year but reaches a peak of abundance soon after the onset of the rains.

Taxonomic Discussion.—This is one of the most striking and interesting of the American *Uranotaenia.* Lane (1943) described the male for the first time and noted secondary sexual characters in the mid-tarsi, which have the fourth segment shorter than the fifth; besides this, we have also noted additional secondary sexual characters on the hind tibiae of the male which bear several rows of very long, stiff, outwardly directed hairs arising at about the middle of the segment and continuing almost to the apex.

The color pattern of the wing is quite variable, a fact which has given rise to a number of synonyms, since these color variations cannot be associated with other morphological characters nor with geographical distribution.

Uranotaenia orthodoxa Dyar

Uranotaenia oxthodoxa Dyar, 1921. Ins. Ins. Mens.. 9: 118.
Uranotaenia orthodoxa, Dyar, 1928. Mosq. Amer., p. 420.
Uranotaenia orthodoxa, Edwards, 1932. Gen. Insec., fasc. 194, p. 99.
Uranotaenia orthodoxa, Lane, 1939. Cat. dos Mosq. Neotr., p. 36.
Uranotaenia orthodoxa, Martini, 1935. Mosq. de Mex., p. 28.

Female.—Head: Proboscis about the size of fore femur, slightly swollen toward tip, dark. Palpi short, about the length of clypeus, dark-scaled. Clypeus and tori yellowish. Antennae dark, longer than the proboscis. Occiput uniformly clothed with flat round brownish scales with some metallic luster and with a conspicuous rounded spot of white scales on the center of the vertex.

Thorax: Anterior pronotal lobes with a patch of silvery scales. Mesonotal integument bronzy brown with two darker spots above the roots of the wings, clothed with narrow, curved, dark scales and a line of silvery scales on each side arising above the root of the wing and extending forward almost to the level of the anterior margin of the paratergite. Scutellum and postnotum concolorous with mesonotum. Pleura pale brown, scaleless. Coxae yellowish with patches of white, almost transparent scales. Trochanters yellowish, rest of the legs uniformly dark brown. Wing-scales dark except for a line of whitish scales which arises on the stem-vein and extends for a very short distance along the base of the fifth vein.

Abdomen: Dark brown above, pale below.

Male.—Coloration of the female and with no secondary sexual modifications on antennae or tarsal claws. Terminalia hidden from view, so that separation of the sexes is difficult even under the dissecting scope.

Male terminalia (Plate X): Basistyle conical, somewhat longer than wide; basal lobe with a row of stiff hairs on its inner margin and

triangularly projected toward outer border of basistyle. Dististyle (fig. 88) short and stout, about three-fifths the length of the basistyle; inner border greatly distended; vestiture of short, fine pile and scattered small hairs from conspicuous circular insertions; a clump of four heavy teeth at apex. Phallosome (figs. 89 and 90) simple; sternal arm ending in a beak-like point, tergal arm a plate bearing near its apical border a fine, closely appressed tooth. Basal border of the ninth tergite (fig. 91) with a rather deep, rounded emargination; lobes nearly obsolete, flat, closely appressed to the tergite.

Immature Stages.—Unknown.

Taxonomic Notes.—The male is described here for the first time. It shows undoubted relationship with *lowii* Theob., *briseis* Dyar, *paludosa* n. sp., and *telmatophila* n. sp. as shown by the marked reduction in secondary sexual modifications and by characters in the dististyle.

Distribution.—This species was described from Costa Rica from two females. Martini (1935) reported it from Mexico. Our material consists of six males and five females taken in light traps in the vicinity of Almirante, Bocas del Toro Province, Republic of Panama. The immature stages remain unknown.

Uranotaenia pallidoventer Theobald

Uranotaenia pallidoventer Theobald, 1903. Mon. Cul., 3, p. 300.
Uranotaenia pallidoventer, Bonne and Bonne-Wepster, 1925. Mosq. Sur., p. 451.
Uranotaenia pallidoventer, Dyar, 1928. Mosq. Amer., p. 419.
Uranotaenia pallidoventer, Edwards, 1932. Gen. Insect., fas. 194, p. 99.
Uranotaenia pallidoventer, Lane, 1939. Cat. dos Mosq. Neotr., p. 37.
Uranotaenia pallidoventer, Floch et Abonnenc, 1937. Inst. Past Guy. et Terr. Inini, pub. no. 148.

Female.—Head: Proboscis dark, somewhat longer than the fore femur, slightly swollen toward tip. Palpi dark, very short, barely as long as the clypeus. Tori yellowish brown. Antennae dark, longer than the proboscis. Occiput clothed with flat, round bronzy brown scales with some greenish reflection and a few erect narrow ones. There is a stripe of bluish white scales which arises on each side above the anterior pronotal lobes, cuts across the upper surface of the head meeting the eye-border at about half the distance from the vertex to the mentum, and joins a spot of concolorous scales on the vertex.

Thorax: Anterior pronotal lobes clothed with pearly blue scales. Mesonotum yellowish brown with a vestiture of narrow, curved, dark scales and a line of pearly blue ones which arises on each side above the root of the wing and extends forward to the level of the anterior margin of the paratergite. Scutellum concolorous with the mesonotum. Pleura brown with a darker spot on the upper third of sternopleuron, centered by a stripe of pearly blue scales. Coxae pale with a vestiture of flat bluish almost transparent scales. Trochanters pale; rest of the legs uniformly dark brown. Wing-scales dark except for a very short line of bluish scales on the inner aspect and at the extreme base of the costa (at the root of the wing) and a second line of bluish scales which arises on the stem-vein, before the humeral cross-vein, and extends along the basal half of the stem of the fifth vein.

Abdomen: Dark brown above, pale below.

Male.—Coloration of the female. Secondary sexual characters quite

pronounced; antennae plumose, antennal segments shorter than in the female, except for the last two which are longer. Mid femora swollen. Midtarsal claws unarmed and unequal, one very long and stout, the other much shorter and slender.

Male terminalia (Plate X): Basistyle conical, longer than wide. Basal lobe with a triangular projection toward the outer border and bearing a clump of four strong hairs at its inner margin and several smaller ones on the projection. Dististyle (fig. 97) almost as long as the basistyle, very slightly swollen on outer half, ending in a beak-like point; vestiture of several small hairs; appendiculate spine a simple pointed tooth. Lateral plates of the phallosome (figs. 98 and 100) divided; sternal arm a smooth narrow, slightly curved, sheath-like plate, which looks like a straight tubular structure in dorso-lateral view, bearing a sharply-curving claw-like tooth inserted near the base. Tergal arm a plate bearing at its apex a long claw-like tooth directed basally. Ninth tergite (fig. 99) deeply and triangularly emarginate, lobes elevated, knob-like.

Larva (Plate X).—Head capsule mostly golden brown in color, except for a broad mid ventral stripe, small spots behind the antennae and large spots behind the eyes of dark brown color. Antennae dark brown, spiculate. Head hairs (fig. 92) as follows: No. 4 with two or three branches, weak but rather long, about two-thirds as long as No. 6; Nos. 5 and 6 the usual thick, frayed, simple spines; No. 7 with five branches; No. 8 and No. 10 single; No. 9 long, with three branches; No. 11 with about five branches; No. 13 a very small and inconspicuous tuft. Prothoracic hairs (fig. 93) as follows: Nos. 1 and 2 single and long; No. 3 a multiple tuft slightly less than one-half as long as No. 1; No. 4 and No. 7 double; No. 5 and No. 6 single. Lateral abdominal hair No. 6 triple on segments I and II (fig. 95). Lateral plate of eighth abdominal segment bearing on its posterior border six or seven acutely pointed, very weakly fringed, subequal teeth. Air-tube (fig. 94) short, scarcely three times as long as the basal width, with a dark band on basal half which narrows abruptly toward the ventral border of the tube and a dorsal dark spot at apex; pecten consisting of some ten teeth running on basal half of tube; subventral tuft inserted just before the middle. Anal segment rather broad; anal saddle ringing the segment and bearing a fringe of spinules on its posterior border; anal hair No. 1 a five-branched tuft.

Pupa (Plate X).—Pupal integument yellowish except for the last three abdominal segments which appear darker. Trumpets (fig. 96) tubular, very slightly flared at tip, about as long as the paddles; tracheoid area occupying more than one-half the length of the trumpet; pinna broadly V-shaped, one-sixth the length of the trumpet with a narrow slit running all the way down into the tracheoid area. Outstanding abdominal setae as follows: Hair No. 2 with about five branches and moderately long on segment III, with about three branches but stronger on segments IV and V, weaker and shorter and usually double on segments VI and VII; hair No. 5 similar to No. 2 on segments IV and V, stronger and longer than No. 2 on segments VI and VII. Paddles as in *apicalis*.

Distribution.—From Panama south to Brasil. In Panama the

species has been collected in the province of Bocas del Toro, in light traps set in deep forest some 12 kms. northwest of Almirante. The larvae were found breeding near the Tocumen International Airport in ground pools formed in a recently flooded marshy forest.

Taxonomic Notes.—This species was described from a single female in poor condition taken at Para Brasil. Besides our Panama material we have examined several specimens from Paramaribo, Surinam, kindly sent to us by Dr. Alan Stone of the U. S. National Museum. All this material checks very closely with Theobald's original description, including the presence of a short line of bluish scales at the extreme base of the costa which is characteristic for this species and serves to differentiate it from all other American *Uranotaenia* except *leucoptera* Theob. This character was clearly described by Theobald as follows: ". . . thorax deep bright brown, with a patch of azure blue scales in front and *over the roots* of the wings" (the italics are ours), but it has been overlooked by subsequent workers. These bluish scales are difficult to see unless examined under the right incidence of light and illuminated directly from above, which may account for the fact that they were missed by the Bonnes and by Dyar in the Surinam specimens in front of us.

Our colleague, Dr. Graham B. Fairchild, has recently compared our material from Panama with Theobald's type in the British Museum and has written to the senior author as follows: "Due to complete lack of wings on type, comparison of this critical point is impossible. In all other ways, so far as I can see, your specimen and the Type agree. The type is the only specimen standing under this name in British Museum."

The species described by Lane (1943) from Matto Grosso under the name *pallidoventer* does not appear to belong here, since the pale scales in Lane's species are white instead of azure blue, and since in Lane's species the occiput is clothed with a large patch of white scales which extends from the vertex to the mentum, as in *incognita* n. sp., while in *pallidoventer* this marking is a small patch above the eyes which does not extend much beyond half the distance from the vertex to the mentum.

Uranotaenia paludosa n. sp.

Female.—Head: Proboscis slightly longer than fore femur, somewhat swollen toward tip, uniformly clothed with dark brown scales. Palpi very short, shorter than the length of the clypeus, dark. Tori and clypeus yellowish. Antennae dark, longer than the proboscis. Occiput clothed with dark, flat scales; a line of pearly blue scales arising on each side above the inner angle of the anterior pronotal lobe, cutting diagonally across the head and joining a spot of concolorous scales on the vertex.

Thorax: Anterior pronotal lobes clothed with flat, pearly blue scales. Mesonotal integument yellowish brown, with a vestiture of narrow, curved, dark scales and with a line of pearly blue scales arising on each side above the root of the wing and not reaching the level of the anterior margin of the paratergite. Scutellum and postnotum concolorous with mesonotum. Pleura yellowish, bare except for a

spot of pearly blue, almost transparent scales, on the upper third of the sternopleura. Wings dark-scaled with a line of pearly blue scales which arises on the stem vein and extends along the basal third of the fifth vein. Legs dark except for the coxae and trochanters which are yellowish.

Abdomen: Dark brown above, pale below.

Male.—Coloration of the female and with no secondary sexual characters.

Male terminalia (Plate V): Basistyle conical, longer than wide. Basal lobe prominent, triangularly projected toward outer border, clothed with a clump of four or five hairs on inner border and two or three on the outer projection. Dististyle (fig. 47) somewhat fusiform and ending in a small beak-like point, clothed with abundant pile, particularly dense on outer third; appendiculate spine a short pointed tooth. Lateral plates of the phallosome (figs. 44 and 45) divided; sternal arm narrowly shield-shape with a notch on inner border at about the middle and a bud-like spine on outer border at slightly before the middle. Tergal arm a plate with an outer subapical membranous pocket and with its apical border developed into a long, narrow, sharply pointed tooth; this plate bears at about the middle a row of subequal, curved teeth. Basal margin of ninth tergite (fig. 46) deeply and triangularly emarginate; lobes rather large, knob-like, far apart.

Immature Stages.—Unknown.

Type Material.—*Holotype* male: Almirante, Bocas del Toro, R. de P., IV.17.53. *Allotype* female: Cocle, province of Cocle, R. de P., XI.20.52. *Paratypes:* four males from Tocumen, R. de P., I.29.53 and II.4.53; two females, one from Pedregal, province of Chiriqui, R. de P., XII.13.52; and one from Camaron, province of Panama, R. de P., VII.23.52. All types taken in light traps; to be deposited in the U. S. National Museum.

Taxonomic Notes.—This small mosquito can be easily confused with *briseis* Dyar to which it is closely related. Adults may be separated from the latter species by the presence of a line of almost transparent scales across the upper third of the sternopleura, *briseis* having the sternopleura bare. The male terminalia of *paludosa* is quite characteristic as can be appreciated in the figures.

Uranotaenia pulcherrima Lynch Arribalzaga

Uranotaenia pulcherrima Lynch-Arribalzaga, 1891. Rev. Mus. La Plata, 2: 165.
Uranotaenia pulcherrima, Howard, Dyar and Knab, 1917 (in part). Mosq. No. Cent. Amer. & W. I., 4, p. 908.
Uranotaenia urania Shannon and Del Ponte, 1928 (in Dyar). Mosq. Amer., p. 421.
Uranotaenia pulcherrima, Dyar, 1928 (in part). Mosq. Amer., p. 422.
Uranotaenia pulcherrima, Edwards, 1932. Gen. Insect., fasc. 194, p. 98.
Uranotaenia pulcherrima, Lane, 1939. Cat. dos Mosq. Neotr., p. 37.
Uranotaenia pulcherrima, Lane, 1951. Proc. Ent. Soc. Washington, 53: 334.

Female.—Essentially as in *Uranotaenia apicalis* Theob., except for the mesonotal integument which usually appears darker and with a darker median line, and for the presence of a long median line of bluish scales on the mesonotum which extends from the anterior border to the antescutellar space and which in *apicalis* is reduced to a small bluish spot in front of the antescutellar space.

Male terminalia: (Plate XI): As in *apicalis* except for the tergal arm of the lateral plates of the phallosome which lacks the clump of three or four teeth at about the middle of the plate present in *apicalis*, and for the spinules or serrations on the outer edge of the tergal arm of the lateral plates of the phallosome (figs. 106 and 109) which are less abundant and frequently absent in *pulcherrima*.

Larva (Plate XI).—Head capsule black. Antennae short, slightly tapering from base to apex, sparsely spiculate; insertion of antennal hair quite variable, usually well before the middle. Head hairs (fig. 101) as follows: No. 4 four- to six-branched; Nos. 5 and 6 the usual thick, simple, frayed, spines; No. 7 six- to eight-branched; Nos. 8 and 10 single; No. 9 with five branches; No. 11 with six to eight branches; No. 13 five- to eight-haired, fan-shaped.

Prothoracic hairs (fig. 102) as follows: Nos. 1 and 2 long and single; No. 3 a multiple tuft less than one-half the length of No. 1; Nos. 4 and 5 triple; No. 6 single; No. 7 with four or five branches; No. 14 a three- to six-haired tuft. Hair No. 6 of abdominal segments I and II triple (fig. 103). Lateral plate of the eighth abdominal segment with five to eight unfringed, acutely pointed spines, the central ones being much longer than the others. Air-tube (fig. 104) slightly over three times the greatest width with nearly straight sides, bearing nine to eleven pecten teeth, not reaching middle of tube. A multiple subventral tuft inserted beyond the middle of the tube and just beyond the pecten. Anal segment almost as broad as it is long; fringed on posterior border; hair No. 1 with nine to eleven branches.

Pupa (Plate XI).—Integument light colored, except for segmental basal dark brown stains on abdominal segments II to V which gradually decrease in size apically. Trumpets (fig. 105) tubular and very long, about as long or slightly longer than the paddles, hardly flared at apex; tracheoid area occupying over half the length of the trumpet; pinna discreet, prolonged into a very narrow slit basally, measured from tip of trumpet to tip of slit it is less than one-fourth the length of the trumpet. Abdominal chaetotaxy and paddles as in *apicalis*.

Distribution.—The species has a wide distribution in the American Tropics; it has been reported from Mexico south to Argentina. In Panama it occurs together with *apicalis* throughout the marshlands of both coasts, but it is a much rarer species.

Taxonomic Discussion.—This species was described by Lynch Arribalzaga from three specimens taken by Dr. E. L. Holinbert on the shores of the Lujan River, Province of Buenos Aires, Argentina. It is close to *apicalis* Theobald with which it has been confused. The detailed relationship of these two species is fully discussed in this paper under *Uranotaenia apicalis* Theobald. Lane (1951) has recently published a synonymy of neotropical mosquitoes in which he considers *Uranotaenia urania* Shannon and Del Ponte a synonym of *pulcherrima* L-A.

Uranotaenia socialis Theobald

Uranotaenia socialis Theobald, 1901. Mon. Cul., 2, p. 340.
Uranotaenia socialis, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., p. 905.

Uranotaenia sapphirinus var. *socialis*, Dyar and Shannon, 1924. Ins. Ins. Mens., 12: 190.
Uranotaenia sapphirina, Dyar, 1928 (in part). Mosq. Amer., p. 420.
Uranotaenia sapphirina, Edwards, 1932 (in part). Gen. Insect., fasc. 194, p. 99.
Uranotaenia sapphirina, Lane, 1939 (in part). Cat. dos Mosq. Neotr., p. 37.
Uranotaenia sapphirina, Floch et Abonnenc, 1947. Inst. Past. Guy. et Terr. Inini, pub. no. 148.

Female.—Head: Proboscis about same length as fore femur, swollen toward tip, dark. Palpi short, barely longer than the clypeus, dark. Tori yellowish; clypeus brown. Antennae about as long as the proboscis, dark, except for the base of the third segment which is yellow. Occiput with a vestiture of flat dark brown scales; a broad line of blue scales on each side arising above the anterior pronotal lobes, proceeding anteriorly to the center of the dorsal surface of the eyes, bending sharply inward along the eye border and coalescing with a large spot of blue scales on the center of the vertex.

Thorax: Anterior pronotal lobes clothed with blue scales. Mesonotal integument yellowish brown with a darker central line; vestiture of small, narrow, dark scales, except for a central narrow line of blue scales which extends from the anterior border of the scutum to the antescutellar space, and a short line of blue scales on each side, arising above the root of the wing and extending forward half the distance to the anterior border of the scutum. Scutellum with a large patch of blue scales on the mid lobe. Pleura yellowish, except for a dark broad stripe cutting across the upper third of the sternopleura, partly covered by a narrower band of bluish scales. Coxae and trochanters yellowish; rest of the legs dark, except for a large white apical spot on all femora and tibiae particularly prominent on hind legs. Wing mostly dark, with a short line of blue scales along the basal half of the main stem of the fifth vein and a spot of blue scales on the stem vein.

Abdomen: Abdominal tergites dark, except for narrow apical white bands on segments III and V. Venter pale.

Male.—Coloration of the female. Secondary sexual characters quite pronounced; antennae plumose, antennal segments shorter than in the female except for the last two which are longer; mid femora swollen; mid tarsal claws unequal.

Male terminalia (Plate XIII): Basistyle conical, longer than wide. Basal lobe triangularly produced toward outer border, with a group of four large and a few smaller hairs on the inner border and a few scattered small hairs on triangular projection. Dististyle (fig. 124) almost as long as basistyle, stout, ending in a beak-like point; ventral border slightly to moderately swollen on outer half; vestiture of scattered, small, fine hairs from rounded insertions; appendiculate spine inserted just before the tip, with pointed apex. Lateral plates of the phallosome (figs. 126 and 127) divided; sternal arm ending in a membranous rounded bulb bearing subapically a stout, heavily sclerotized, beak-like tooth directed outwardly. Tergal arm a roundedly rectangular plate bearing on the inner surface two short heavy teeth, one inserted at the sternal upper corner and the other arising from the sternal border at about the middle; on the outer surface of the place there are some eight or nine short, straight, heavy teeth. Ninth tergite (fig. 125) with the basal border deeply and tri-

angularly emarginate; lobes set close together, large, nearly rectangular, with flat, oblique upper surfaces; interlobar space smaller than width of the lobes.

Larva (Plate XIII).—Head capsule dark brown to black. Antennae short, tapering from the base to apex, spiculate; insertion of antennal hairs variable, usually well before the middle, but occasionally near the middle. Head hairs (fig. 119) as follows: No. 4 double or occasionally triple, almost as long as hair No. 6; Nos. 5 and 6 the usual thick, simple, frayed spines; No. 7 four- or five-branched; Nos. 8 and 10 single, rarely double; No. 9 with four or five branches; No. 11 a six- to eight-branched tuft and very long; No. 13 four- or five-branched, as long as No. 6, fan-shaped.

Prothoracic hairs (fig. 120) as follows: Nos. 1 and 2 long and single; No. 3 with eight or ten branches, less than half the length of No. 1; No. 4 double or triple; No. 5 double; No. 6 single; No. 7 triple; No. 14 with six or seven branches. Abdominal hair No. 6 of segments I and II triple (fig. 121). Lateral plate of eighth abdominal segment with five or six fringed spines on posterior border, those at the center longest. Air tube (fig. 122) four times as long as its basal width; eight to ten pecten teeth not reaching the middle of the tube, followed by a subventral tuft inserted before the middle. Anal segment almost as wide as it is long, with saddle fringed on posterior border; hair No. 1 a six- to eight-haired tuft.

Pupa (Plate XIII).—Integument uniformly light colored. Trumpets (fig. 123) tubular, not flared at tip but tapering rather abruptly on outer third; tracheoid area occupying slightly more than one-half the length of the trumpet; pinna discreet, narrowly U-shaped, one-fifth the length of the trumpet. Outstanding abdominal setae as follows: No. 2 a conspicuous multiple tuft on segments II to IV, gradually decreasing in size on segments V, VI and VII; No. 5 a very long two- or three-haired tuft, longer than No. 2, on segments V, VI and VII. Paddles as in *U. apicalis*.

Taxonomic Discussion.—Uranotaenia sapphirina was described by Osten Sacken in 1868 as *Aedes sapphirinus*, from material collected in Washington, D. C., and Brooklyn, N. Y. In describing the mesonotum of his species, Osten Sacken said: ". . . a metallic blue longitudinal line along the middle of the thorax reaches the scutellum."

In 1901, Theobald described a similar species from Jamaica under the name *socialis* and in describing the thorax of his species said: ". . . a median row of small flat blue scales ending before the bare space in front of the scutellum."

Howard, Dyar and Knab (1917) recognized the two species as distinct, separating them in their key as follows:

"3. Blue line extending the whole length of mesonotum.....
.....*sapphirinus* Osten Sacken
Blue line ending an antescutellar space.....*socialis* Theobald"

Dyar and Shannon (1924), in discussing the American species of *Uranotaenia*, stated under *Uranotaenia sapphirinus* Osten Sacken: "The form *socialis*, with the median mesonotal blue line broken, we consider to be of not more than varietal rank," but gave no reasons for

their opinion. Dyar (1928) abandoned the name *socialis* including it as a straight synonym of *sappharina* O. S.

In comparing reared material of "*sapphirina*" from Panama with reared specimens collected by Dr. W. C. Reeves and the senior author in Norfolk, Nebraska, U.S.A., we were impressed by the marked difference in the size and shape of the pupal trumpets, the Panama specimens showing a short trumpet abruptly tapering toward the tip, while Nebraskan pupae have a long trumpet slightly flared at the apex, similar to the pupa of *sapphirina* illustrated by Howard, Dyar and Knab (1912). A careful examination of Panamanian adults showed that all 42 specimens in our collection have the median blue mesonotal stripe interrupted at the antescutellar space, while specimens examined from Nebraska, New York, Maryland, the District of Columbia and Louisiana, kindly furnished by Dr. Alan Stone, all show this median stripe reaching the scutellum. There also appears to be a difference in the extent of the blue marking along the stem of the fifth wing-vein. In northern specimens the blue scales run along well over half the distance between the base and the fork of the vein, while in southern specimens these scales occupy half or less of this space. The larvae of the two forms also appear to differ, northern specimens showing seven to ten comb-scales on the eighth abdominal segment and twelve to fifteen pecten teeth on the air-tube, while southern larvae only have five or six comb-scales and eight to ten pecten teeth.

An examination of 28 adults collected by Galindo, Trapido and Boshell in Lake Yojoa, Honduras, shows that all these specimens have the median blue mesonotal stripe interrupted at the antescutellar space and a short line of blue scales along the fifth wing-vein, thus resembling Panamanian specimens and differing from northern *sapphirina*.

In view of the fact that the differences in mesonotal and wing markings between neotropical and nearctic material appear to be constant and that they are associated with differences in the larva and the pupa, we consider the neotropical form specifically distinct from *sapphirina* O. S. despite the fact that we have been unable to find any male terminalia characters to separate them. Since adults from Honduras and Panama fit very closely the description given by Theobald for *socialis*, we are provisionally reviving the name *socialis* Theobald to designate what has gone under the name of *sapphirina* O. S. in Middle America, until larvae and pupae are obtained from the type locality of *socialis* to compare them with material from Panama.

Dr. G. B. Fairchild has recently examined, at the request of the senior author, the types of *socialis* Theobald, as well as other material labelled "*sapphirina* O. S." in the British Museum and writes as follows: "*Uranotaenia socialis* Theob. Types: one male and one female. Both labelled as follows: Red circled type label. Printed label: 111. Jamaica, Dr. Grabham. Theobald's hand label, *Uranotaenia socialis* (Type) Theobald. There are 2 males and one female in B. M. coll. with same locality label, but without det. or Type labels, and no other specimens. Condition: female lacks hind legs; male has genitalia apparently uncleared in a drop of gum on a bit of cellulose pinned below the labels. Comparison: Type. Blue mid-line extends from near

front of mesonotum to within about a distance equal to the two basal flagellar segments of antennae, to the blue patch on scutellum. Unfortunately pin goes thru this area, but the blue line can be seen to stop naturally some way before scutellum. Line seems bluer and broader in Types than in your panamanian specimen. Topotypes agree. Scales on vein 5 about one-half length of vein to end of cell in yours, a little less in Types. Two females H. W. Kumm collector, Turrialba and Finca Canada, Costa Rica, are the only specimens under the name "*sapphirina*" in B. M. coll. Both are like yours in rather slender median blue stripe. Actually there is little appreciable difference in the length of scaling on vein 5 in Types or any others including yours. I would say your female agreed very well with the Type."

It appears at present that *Uranotaenia sapphirina* Osten Sacken is mainly a nearctic species, it being replaced in the neotropical region by *socialis* Theobald. It is possible that both species may occur together in the West Indies, as *socialis* has been reported from Jamaica, Cuba and St. Thomas, while the descriptions and figures of Pratt (1943) of the species present in Puerto Rico, show it to be typical *sapphirina*.

Uranotaenia telmatophila n. sp.

Female.—Head: Proboscis about as long as fore femur, very dark. Palpi very short, barely as long as the clypeus. Clypeus dark brown to black. Tori pale outside, dark on inner border. Antennae dark, longer than the proboscis. Occiput clothed with dark ovoid, flat scales with a faint metallic reflection; a stripe of silvery white scales arising on each side above the anterior pronotal lobes, cutting forward across the head, then bordering the eye for about half the length of its dorsal surface and joining a spot of silvery white scales on the center of the vertex.

Thorax: Anterior pronotal lobes clothed with silvery white scales. Mesonotum dark brown to black, clothed with curved, ligulate, very dark scales and a line of ovoid, flat, silvery white scales arising on each side above the root of the wing and extending almost to the scutal angle. Scutellum concolorous with mesonotum, dark-scaled. Pleura greyish on upper half, paler below; a band of silvery white scales across the upper third of the sternopleura. Coxae and trochanters pale. Femora dark above, extensively pale below; rest of legs uniformly dark-scaled. Wing-scales dark along costa, subcosta and first vein, mostly pale—nearly transparent—along the other veins, except for a line of pure white scales along the base of the fifth vein.

Abdomen: Dark brown to black above, pale below.

Male.—Coloration of the female. Secondary sexual characters markedly reduced; antennae as in the female; mid tarsal claws unequal.

Male terminalia (Plate XIV): Basistyle conical, almost as broad as it is long; basal lobe prominent, with a triangular projection toward outer border, bearing a clump of stiff hairs on inner border and a few scattered ones on outer projection. Dististyle (fig. 134) short and very broad, about two-thirds the length of the basistyle, sparsely pilose; dorsal border curving toward the apex to end in a prominent beak-like point, ventral border distinctly swollen at about the middle; appendicu-

late spine rather narrow, pointed. Lateral plates of the phallosome (figs. 135 and 136) divided, sternal arm tubular, with jagged apex, bearing subapically a heavy, sickle-shaped tooth; tergal arm a quadrate plate bearing at apex, on inner corner, a long, heavy, sharply curving tooth which points inwardly and basally and a smaller curved, claw-like tooth which is directed outwardly and basally. Ninth tergite (fig. 133) with basal margin deeply and triangularly emarginate, apical margin narrower, slightly concave, with the lateral corners produced into two rather broad, prominent, rounded lobes.

Larva (Plate XIV).—Head capsule dark brown, slightly paler at outer angles. Antennae sparsely spiculate, short and stumpy, somewhat swollen on basal half, antennal hair inserted at about the middle at the point where the antenna begins to narrow. Head hairs (fig. 128) as follows: No. 4 a weak three- or four-haired tuft, about two-thirds the length of No. 6; Nos. 5 and 6 the usual simple, thick, frayed spines; No. 7 three- or four-haired; Nos. 8 and 10 single; No. 9 with three to five branches; No. 11 triple; No. 13 a very small and weak, inconspicuous four-haired tuft, much less than half as long as No. 6.

Prothoracic hairs (fig. 129) as follows: Nos. 1 and 2 single and long; No. 3 very small and weak five- to eight-haired tuft, about one-fifth the length of No. 1; No. 4 double; Nos. 5 and 6 single; No. 7 double or triple; No. 14 single. Abdominal hair No. 6 on segments I and II double (fig. 130). Lateral plate of the eighth abdominal segment with seven to nine slightly subequal, unfringed teeth. Air tube (fig. 131) scarcely three times as long as its basal width, bearing twelve to fifteen pecten teeth which run to the middle of the tube and exceed the insertion of the subventral tuft; dorsal surface of tube dark brown except for a pale interruption on distal third. Anal segment about twice as long as it is wide, fringed on posterior border; hair 1 a very small and weak tuft with four or five branches.

Pupa (Plate XIV).—Integument of cephalothorax light-colored centrally, dark brown on the sides, that of abdomen dark brown on segments II, III and IV, lighter on others. Trumpets (fig. 132) short, about three-fifths the length of the paddles, somewhat tapered at tip; tracheoid area occupying about one-fourth the length of the trumpet; pinna discreet, barely one-eighth the length of the trumpet. Outstanding abdominal setae as follows: Hair No. 2 a multiple but rather small tuft on segments II and III; with two or three branches on segments IV to VII; No. 5 with two to four branches and about as long as No. 2 on segments IV to VII. Paddles very broad, inner part inflated and larger than outer part; midrib prominent for two-thirds the length of the paddle. Apex serrate.

Type Material.—Holotype male with associated larval and pupal skins, Tocumen, province of Panama, R. de P., March, 1953. *Allotype* female with associated larval and pupal skins, Tocumen, R. de P., February, 1953. *Paratypes:* three males with associated larval and pupal skins from Tocumen, R. de P., February and March, 1953; one male from Mojinga Swamp, Canal Zone, XI.28.52; one male from Tocumen, R. de P., XII.19.51; one male from El Real, Darien Province, R. de P., II.19.53; four females with associated larval and pupal skins from Tocumen, R. de P., February and March, 1953;

one female from Tocumen, R. de P., XII.19.53; one female from Mandinga River, Canal Zone, II.28.52. All associated material reared from larvae collected in a large, open swamp among the matted roots of the large sedge *Fuirena umbellata* Rottb., rest of the material taken in light traps. Types to be deposited in the U. S. National Museum.

Taxonomic Discussion.—This species belongs to the *lowii*-series as indicated mainly by male characters, but it shows some affinities with members of the *leucoptera*-series, since it has most of the wing-scales pale as in *hystera* and *leucoptera*. Adults can be separated from those of the *lowii*-series by the very dark, nearly black, mesonotal integument, as well as by the wing-veins which are mostly pale in *telmatophila* and nearly all dark in other members of the series. It may be separated from members of the *leucoptera*-series by the color of the occipital scales, which are mostly white in *leucoptera* and allied species and mostly dark—with only the eye-border pale—in the *telmatophila*. The male terminalia and immature stages are quite characteristic as shown in the descriptions and figures.

Bionomics.—All the adults of this species have been taken in light traps near extensive fresh water swamps. Larvae are found in relative abundance during the dry season in large swamps choked with vertical vegetation, particularly the large sedge, *Fuirena umbellata* Rottb., these larvae virtually disappear from the breeding places during the rainy season months.

Uranotaenia trapidoi n. sp.

Uranotaenia coatzacoalcos, Dyar, 1928 (in part). Mosq. Amer., p. 424.

Female.—Head: Proboscis dark brown, slightly shorter than fore femur, swollen toward tip. Palpi very short, barely longer than clypeus, clothed with dark brown scales. Clypeus black. Tori yellowish brown in front and outer margins, dark brown on inner margin. Occiput clothed with flat, large, dark brown scales with slight bluish reflection and some erect, narrow, dark brown ones. Vertex with a large band of white scales which borders the eye on each side for about half the distance from the center of the vertex to the mentum.

Thorax: Anterior pronotal lobes with a large patch of broad, flat, snowy white scales. Mesonotum dark brown with a vestiture of brownish ligulate scales. A narrow line of snowy white scales extends forward from above the roots of the wings to about half the distance to the anterior border of the scutum. Scutellum concolorous with mesonotum, dark-scaled. Pleura dark brown, with a band of snowy white scales extending horizontally across the upper third of the sternopleura, and a vertical narrow line of silvery almost transparent scales bordering the posterior margin of this sclerite below the level of the upper border of the meron. Sternopleural integument uniformly dark brown; mesepimeral integument dark brown with a basal denuded silvery band on lower third. Coxae and trochanters yellowish, clothed with some silvery, almost transparent, ovoid scales; femora and tibiae with apical white spots, more pronounced on hind legs; fore and mid tarsi with fourth and fifth joints clothed with evanescent white scales;

hind tarsi with apical half of third and all fourth and fifth segments clothed with white scales. Wing-veins dark, except for a long line of white scales which arises on the stem vein and continues along the base of the first vein.

Abdomen: Dorsum with a vestiture of dark brown scales and small, basal segmental white spots. Venter largely pale-scaled, with broad, basal, segmental bands of dark scales.

Male.—Coloration of the female. Secondary sexual characters well developed; antennae densely plumose, antennal segments shorter than in the female, except last two which are longer. Mid femora swollen; midtarsal claws unequal.

Male terminalia (Plate XV): Basistyle conical, longer than wide. Basal lobe broadly and triangularly produced toward outer border, bearing three long hairs and a few smaller ones on the triangular projection. Dististyle (fig. 142) shorter than the basistyle, very stout, ending in a small beak-like point; ventral border swollen on outer half; vestiture of scattered small hairs from rounded insertions; appendiculate spine inserted just before the tip, with blunt apex. Lateral plates of the phallosome (figs. 144 and 145) divided, sternal arm a flat plate with rounded smooth apex, bearing subapically a long, acutely pointed, claw-like tooth directed outwardly; tergal arm a roundedly quadrate plate bearing at its apex four heavy, curved teeth. Ninth tergite (fig. 143) with basal border deeply and quadrately emarginate, lobes knob-like, set far apart.

Larva (Plate XV).—Head capsule dark brown to black. Antennae scarcely tapered, sparsely spiculate, antennal hair inserted well toward the base. Head hairs (fig. 137) as follows: No. 4 double or triple and rather weak, about three-fourths as long as hair No. 6; Nos. 5 and 6 the usual thick, simple, frayed spines; No. 7 with four to six branches; Nos. 8 and 10 single, No. 11 four-branched; No. 13 three-haired, about as long and as strong as No. 4.

Prothoracic hairs (fig. 138) as follows: Nos. 1 and 2 single and long; No. 3 a multiple tuft about half as long as No. 1; No. 4 double or triple; Nos. 5 and 6 single; No. 7 three- or four-branched; No. 14 a strong, conspicuous, multiple tuft. Abdominal hair 6 on segments I and II double (fig. 139); lateral plate of eighth abdominal segment with 9 to 12 fringed, slightly subequal spines. Air tube (fig. 140) about three times as long as its basal width, bearing from 25 to 29 pecten teeth running almost to the tip of the siphon; individual tooth very long, fringed at tip; subventral tuft inserted slightly beyond the middle, well within the pecten. Anal segment somewhat longer than wide, ringed by the saddle which is fringed on posterior border; hair No. 1 a four-branched tuft.

Pupa (Plate XV).—Pupal integument yellowish brown except for darker spots bordering the cephalothorax and at the bases of abdominal segments II to VII. Trumpets (fig. 141) moderate in length, about three-fifths the length of the paddle, markedly flared at tip; tracheoid area occupying slightly over one-third the length of the trumpet; pinna broadly U-shaped, one-third the length of the trumpet. Outstanding abdominal setae as follows Hair No. 2 a long three-haired tuft on segments IV and V becoming double on segments VI and VII.

Hair No. 5 a three-haired tuft on segment IV, of same size as No. 2; double and longer than No. 2 on segments V and VI; double and as long as No. 2 on segment VII. Paddles globose, markedly serrate on apical half; midrib prominent and pronounced to tip of paddle.

Type Material.—Holotype male with larval and pupal skins, El Hato, 4,500 ft., Chiriqui Province, R. de P., V.17.50. *Allotype* female with larval and pupal skin, same data as holotype. *Paratypes:* five males with two larval and five pupal skins, same data as holotype; one male and one female from Nueva Suiza, 5,000 feet, Chiriqui Province, R. de P., V.25.46; one male from Cerro Punta, 6,200 feet, Chiriqui Province, R. de P., XII.10.52; two larval and two pupal skins from Cerro Campana, 3,000 feet, Panama Province, R. de P., III.13.50. All material reared from larvae collected in partly shaded, cold, mountain springs.

Distribution.—The species has only been found in Panama. It does not occur in Costa Rica, where it is replaced by *coatzacoalcos* D. & K. It is strictly a highland species, it being replaced in the lowlands by *typhlosomata* D. & K.

Taxonomic Notes.—In 1906 Dyar and Knab described a new species of *Uranotaenia* from larvae taken near Santa Lucrecia on the Isthmus of Tehuantepec, in southern Mexico and named it *coatzacoalcos*. In 1917, Howard, Dyar and Knab described *Uranotaenia basalis* from a male accompanied by its larval skin, bred by Dr. Knab from a single larva taken near Cordoba, also in southern Mexico. The describers separated the new species from *coatzacoalcos* D. & K., on the basis of the branching of the "upper lateral head hairs," but Dyar (1923) brought out convincing arguments that no such differences existed and included *basalis* Howard, Dyar and Knab in the synonymy of *coatzacoalcos* D. & K.

Since the year 1950, we have been repeatedly rearing a species of *Uranotaenia* from the highlands of Panama which appears identical in adult and male terminalia characters with *coatzacoalcos*, as determined by actual comparison with material from Mexico, Salvador and Costa Rica. However, Panamanian larvae differ strikingly from the descriptions of the larvae of both *coatzacoalcos* and *basalis*, as well as from "*coatzacoalcos*" larvae collected by Galindo and Trapido in Salvador and Costa Rica. The main differences are in the air tube which in Panama specimens has the pecten teeth running nearly to the tip of the tube and the subventral tuft inserted beyond the middle, while in *coatzacoalcos* the pecten runs only to the middle of the tube and the tuft is inserted at or before the middle. Larval skins from Panama were sent to Dr. Alan Stone for comparison with the types of *coatzacoalcos* and *basalis* which Dr. Stone kindly did, answering as follows: "*Uranotaenia coatzacoalcos*—The only original material that we have consists of two larval skins in poor condition, only one of them showing the terminal abdominal structures and that very poorly." "*Uranotaenia basalis*—Type from Cordoba, Mexico, January 6, 1908. Knab No. 417.32. The larval skin in rather poor condition but showing the pecten teeth stopping at the level of the siphon tufts, the siphon tufts slightly basal of the middle of the siphon. In the larvae you sent the pecten extends far beyond the siphon tuft and this tuft is

distad of the middle of the siphon. I find no other distinct differences, but there is no doubt that your specimen is not *basalis*."

In view of the profound differences found between the larvae of the Panamanian species and those of *coatzacoalcos* and *basalis*, we have not hesitated in describing the former as a new species, despite the fact that we have found no certain characters to separate the adults or the male terminalia.

Uranotaenia typhlosomata Dyar and Knab

Uranotaenia typhlosomata Dyar and Knab, 1907. Jour. New York Ent. Soc., 15:200

Uranotaenia typhlosomata, Howard, Dyar and Knab, 1917. Mosq. No. Cent. Amer. & W. I., 4, p. 924.

Uranotaenia coatzacoalcos var. *typhlosomata*, Dyar and Shannon, 1924. Ins. Ins. Mena., 12: 191.

Uranotaenia typhlosomata Bonne-Wepster & Bonne, 1925. Mosq. Surinam, p. 454.

Uranotaenia coatzacoalcos, Dyar, 1925 (*nec* Dyar and Knab, 1906). Ins. Ins. Mens., 13: 185.

Uranotaenia coatzacoalcos, Dyar, 1928 (in part). Mosq. Amer., p. 428.

Uranotaenia coatzacoalcos, Edwards, 1932 (in part). Gen. Insect., fasc. 194, p. 98.

Uranotaenia coatzacoalcos, Lane, 1939 (in part). Cat. dos Mosq. Neotr., p. 34.

Uranotaenia coatzacoalcos, Arnett, 1948 (*nec* Dyar and Knab, 1906). Jour. New York Ent. Soc., 56: 175.

Female.—Head: Proboscis shorter than fore femur, dark brown, slightly swollen toward tip. Palpi variable in size from about same size of clypeus in most Pacific side specimens to two and one-half times longer than the clypeus in most Atlantic side specimens. Tori dark brown on inner border, yellowish brown outside, with a few erect curved scales. Antennae about as long as the proboscis, dark, except for base of third segment which is lighter. Occiput clothed with broad flat, dark scales, and a line of white scales on each side arising above the anterior pronotal lobes, bordering the eyes for half the distance from the vertex to the mentum and joining a concolorous spot on the center of the vertex.

Thorax: Anterior pronotal lobes with a broad band of silvery white scales. Mesonotum chestnut brown, with a darker spot above the paratergite, clothed with narrow, curved, dark scales. A broad line of silvery white scales extending on each side from the root of the wing half way to the anterior border of the scutum. Pleura yellowish brown with a darker band across the upper third of the sternopleura clothed with a line of silvery scales. Scutellum and postnotum concolorous with mesonotum. Femora and tibiae white-tipped, particularly noticeable on hind legs; fore and midtarsi with evanescent white scales from third to fifth segments; hind tarsi with apical third of third segment, all of fourth and fifth white-scaled. Wing-scales dark, except for a line of white scales on stem vein and at base of fifth vein.

Abdomen: Dorsum dark-scaled; venter pale.

Male.—Coloration of the female. Secondary sexual characters well developed, antennae plumose, antennal segments shorter than in the female, except for the last two which are longer; mid femora swollen; mid tarsal claws unequal, one very long and stout, the other much shorter and very slender.

Male terminalia (Plate XVI): Basistyle somewhat longer than wide, clothed with long hairs all around. Basal lobe with a triangular projection toward outer border, bearing a clump of three or four long hairs arising from heavily sclerotized insertions on its inner margin and a few weaker hairs scattered on its outer margin. Dististyle (fig. 151) three-fourths the length of the basistyle rather stout, with ventral margin slightly swollen on outer third and with the apex acutely pointed; vestiture of several small hairs from conspicuous rounded insertions; appendiculate spine simple. Ninth tergite (fig. 152) almost as wide at apex as at the base, basal border deeply and quadrately emarginate; lateral corners produced into two smooth membranous finger-like knobs. Lateral plates of the phallosome (figs. 153 and 154) divided into two arms, sternal arm heavily sclerotized, with a long stout, subapical, outwardly pointing tooth and ending in a clump of closely appressed small, outwardly pointing denticles; tergal arm quadrate and smooth, bearing three or four curved unequal teeth which arise from its upper outer border and point inwardly.

Larva (Plate XVI).—Head capsule yellowish. Antennae gradually tapering from base to apex, heavily spiculate, antennal hair inserted before the middle. Head hairs (fig. 146) as follows: No. 4 double or triple, about three-fourths the length of No. 6; Nos. 5 and 6 the usual thick, single, frayed spines; No. 7 a four- to six-branched hair; Nos. 8 and 10 single; No. 9 triple; No. 11 a four-haired tuft; No. 13 a very small and inconspicuous three- to five-haired tuft. Prothoracic hairs (fig. 147) as follows: Nos. 1 and 2 single and long; No. 3 a multiple tuft over half as long as No. 1; Nos. 4 and 7 triple; Nos. 5 and 6 single; No. 14 single. Abdominal hair No. 6 on segments I and II triple (fig. 148). Lateral plate of eighth abdominal segment bearing eleven to thirteen fringed, acutely pointed, very slightly subequal spines. Air tube (fig. 149) four times the length of its basal width, bearing fourteen to twenty pecten teeth not reaching the middle of the tube, immediately followed by a multiple subventral tuft. Anal segment somewhat longer than wide, ringed by the saddle which is fringed on posterior border; hair No. 1 a five- to six-haired tuft.

Pupa (Plate XVI).—Integument light-colored. Trumpets (fig. 105) tubular, broadly flared at tip, slightly shorter than the paddles; tracheoid area occupying most of the meatus, between one-half and two-thirds the length of the trumpet; pinna slightly less than one-third the length of the trumpet, U-shaped, with a narrow slit at base. Outstanding setae as follows: Hair No. 2 a moderately long, conspicuous, multiple tuft on segments II, III and IV, becoming gradually shorter on segments V and VI. This hair is single and very long on segment VII, it being longer than No. 5. Hair No. 5 a four-haired tuft, as long as No. 2 on segment IV; with three branches and appreciably longer than No. 2 on segments V and VI. Paddles as in *apicalis*.

Taxonomic Notes.—As was pointed out in discussing *trapidoi* n. sp., in 1906 Dyar and Knab described *coatzacoalcos* from Mexico from a larva that died before pupation. In 1907, the same authors described *typhlosomata* from a single male taken in Taboga Island, Panama. Howard, Dyar and Knab (1917) gave a full description of all the stages of *typhlosomata* recognizing this species as distinct from *coatzacoalcos;*

in addition they described another related species from Mexico under the name *basalis*, basing the description on a single bred male with its larval skin. Dyar (1923) sank *basalis* in the synonymy of *coatzacoalcos* pointing out that the differences in the larvae of these two forms brought out by Howard, Dyar and Knab did not really exist. In the same publication he implicitly recognized the specificity of *typhlosomata*—described previously from Panama—when he said: "This species (*coatzacoalcos*) appears to be confined to Mexico and Central America, no specimens having appeared in Panama as yet." Dyar and Shannon (1924), in discussing the American species of *Uranotaenia*, included *typhlosomata* in the synonymy of *coatzacoalcos*, considering it a mere variety, but giving no reasons for their opinion. Dyar (1928) continued to treat *typhlosomata* as a synonym of *coatzacoalcos*, but in a description of the species said: "Northern specimens (*coatzacoalcos—basalis*) generally have the first vein lengthly white-scaled, the fifth not; southern specimens (*typhlosomata*) have the proportions reversed, the fifth being white scaled, the first not."

The authors have carefully compared reared topotypical specimens of *typhlosomata* from Panama, with *coatzacoalcos* material from Mexico, Salvador and Costa Rica and found the following differences: *Adult.*—General coloration of *typhlosomata* much lighter; base of first wing-vein largely white-scaled in *coatzacoalcos*, dark in *typhlosomata;* base of fifth wing-vein dark in *coatzacoalcos*, white-scaled in *typhlosomata;* apical white spot on hind tibiae quite pronounced in *coatzacoalcos*, much less so in *typhlosomata. Male terminalia.*—The shape and characteristics of the phallosome and dististyle differ widely in the two species as can be appreciated in the figures. *Larva.*—The larvae of the two species differ in the color of the head capsule, *coatzacoalcos* having the head dark-brown to black, and *typhlosomata* yellowish. The two species also differ in the quality and branching of head hair No. 13, prothoracic hair No. 14 and lateral abdominal hair No. 6 on abdominal segments I and II, as well as on the number of scales on the lateral plate of the eighth abdominal segment. *Pupa.*—The shape of the trumpets and the abdominal chaetotaxy is different in these two species.

Based on these facts we have revived the specific name *typhlosomata* D. & K. to designate the lowland species from Panama.

Distribution.—We have seen *typhlosomata* material from Panama only, but suspect that the *coatzacoalcos* records from Ecuador, Venezuela and Trinidad, refer to this species rather than to *coatzacoalcos* or *trapidoi*.

In Panama the species is widely distributed along the lowland of both coasts. Female specimens from the Atlantic side have much longer palpi than topotypical material from the Pacific side, the palpi being almost two and one-half times longer than the clypeus, while the palpi in the great majority of females from the Pacific side do not reach one and one-half times the length of the clypeus. It is quite possible that the long palpi form from the Atlantic side may be entitled to nomenclatorial status, but we have hesitated to name it as we could not find any differential characteristics in the male and we have no immature stage specimens from the Atlantic side for comparison.

Bionomics.—The larvae of this species is commonly found in stream-bed pools and in side pools along streams, preferably in the shade, from sea-level to 2,000 feet in elevation. Root (in Dyar, 1928) reports finding the larvae of what is presumably this species in a tree-hole in Venezuela.

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