

TOXOMERUS (DIPTERA:SYRPHIDAE) OF ECUADOR

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ABSTRACT

A taxonomic study of the genus Toxomerus (Diptera:Syrphidae) of Ecuador was made. Species were identified by use of published keys and descriptions, comparisons with holotypes, allotypes, and paratypes, and through examination of specimens determined by other syrphid workers.

Comparisons were made by removing the genitalia of unknown and determined specimens. The unknown specimens were identified to species and the genitalia of both sexes were drawn and described. Artificial keys were prepared utilizing external morphology excluding genitalic features as well as a key to each sex utilizing genitalic features.

Twenty species, including one suggested new species, of Toxomerus from Ecuador were identified. The genitalia of the holotypes of T. eurydice, T. ultimus, and T. cyrillus were identical to the genitalia of the T. idalius holotype, T. sylphus allotype, and T. productus holotype, respectively. Three species are presumed to be represented by these 6 specimens.

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INTRODUCTION

Species of the genus Toxomerus (Diptera:Syrphidae) have been differentiated in keys and described mainly by use of abdominal color patterns and morphological features of the head and thorax. Unfortunately, these features are often quite variable within one species, subject to differences in human interpretation, or simply impossible to discern in dried specimens.

More recent research has tended to emphasize the importance of the genitalia in separating species. Therefore, the main objectives of this investigation were the differentiation of the species of Toxomerus of Ecuador by descriptions and figures of the genitalia of both sexes and the use of this information to construct keys to the genitalia.

REVIEW OF THE LITERATURE

Taxonomic Literature

A search of the taxonomic literature has revealed that 15 species have been named from Ecuador.

Curran (1930) has named Toxomerus productus from a male holotype and female allotype only labelled as being from Ecuador.

Hull (1942) has named the following 3 species. T. claracuneus was described from a female holotype from Rio Margajitas, Rio Pastaza. T. nymphalius was described from a male holotype and a male paratype from Rio Margajitas, Rio Pastaza; a female allotype from Sucua; one male and 2 female paratypes from Puyo, Oriente; and a female paratype from Rio Mapeto. T. tubularius was described from a male holotype from Banos.

Hull (1943a) has named the following 4 species. T. arcturus was described from a female allotype and a female paratype from Pichincha. T. brevifacies was described from a male holotype from Runtun Trail, Banos. T. ecuadoreus was described from a male holotype from Hacienda San Rafael, Rio San Pedro, Pichincha, and an allotype from Cuenza, Azuay. T. steatornis was described from a male holotype from Sucua, Rio Blanco and Rio Upano, and a female allotype from Puyo, Oriente.

Hull (1943b) has named the following 2 species. T. sylphus was described from a male holotype and female allotype from Banos. T. sylphus is probably a synonym for T. nasutus, described by Sack (1941).

T. sylvaticus was described from a male holotype from Banos.

Hull (1951) described the following 5 species. T. antiopae was described from a male holotype from Urbina, Cerro Chimborazo, and a female allotype and 2 male paratypes from Hacienda Talahua, Bolivar. T. cyrillus was described from a male holotype, female allotype, and male paratype from Macas, Rio Upano. T. eurydice was described from a male holotype from San Francisco, Rio Pastaza. T. idalius and T. idalius subsp. lede were described from male holotypes from Puyo, Oriente, and 4 male paratypes of the latter from San Francisco, Rio Pastaza. T. ultimus was described from a female holotype from Pichincha, Uyumbicho.

The other species involved in this study were named from other Neotropical and Nearctic areas. They have been discussed by Curran (1930) and Hull (1943a). The original descriptions for these species are cited with the reference to those species listed below the species names.

Morphological Literature

1. Segmentation

The abdomen consists of 5 visible segments, the preabdomen, immediately behind the thorax, and 6 other modified segments, the post-abdomen, which includes the genitalia (Crampton, 1942). The emphasis will be on the genitalia for their taxonomic value.

Metcalf (1921) considered the first visible segment behind the thorax as the 2nd segment, the actual first segment having fused with

the thorax, while Cole (1927), Crampton (1942), and Tuxen (1970), called the first visible segment the first actual segment. The latter system is used in this paper.

Crampton (1942) restricts the term genitalia to the parts in the immediate vicinity of the genital opening in both sexes and considers the true genital segment of the male to be segment 9 and of the female segment 8.

2. Male Postabdomen

Before discussing the genitalia proper the change in position of the postabdominal segments in the male should be clarified. According to Metcalf (1921) the caudal part of the abdomen became bent underneath so the sternites of the last few segments apposed those immediately preceding. Second, the segments after the 6th were displaced to the right, curling in a semicircle from left to right. Third, segments 5 through 7 were crowded to the left of the apex of the preabdomen to accommodate the enlarged tip of the abdomen, segment 8. Fourth, there occurred a clockwise rotation on the long axis for about 90 degrees on segment 6 and progressively more on segments 7 and 8. This has resulted in living species having the apex of the postabdomen pointing cephalad and sternite 9 lying dorsad of tergite 9. This has resulted in what Crampton (1942) calls a circumversion of segment 9. The genital pouch created on the left of segments 6 and 7 received the genitalia when not in use (Metcalf, 1921).

Tergite 9 forms the epandrium and styli, and sternite 9 forms the hypandrium (Crampton, 1923), or penis sheath (Metcalf, 1921). The

epandrium is a trough-shaped structure, whose distal margin articulates with 2 styli (figures 1 and 2), which serve as powerful clasping organs and show great specific variation (Tuxen, 1970). The styli are of some value in differentiating species.

The mesal appendages of segment 9 have united to form the aedeagus or intromittent organ (Tuxen, 1970), or according to Cole (1927) the aedeagus represents the fused appendages of segment 9 and arises from the caudo-ventral part of the segment. However, Metcalf (1921) believes the aedeagus, or penis as he calls it, represents "the fused appendages of segment nine" but he would consider this to be segment 8 of Cole and Crampton.

The axial system (figure 3) of the penis includes 5 easily discernible parts: ejaculatory hood, chitinous box, sustentacular apodeme, ejaculatory sac, and ejaculatory apodeme (Metcalf, 1921).

The ejaculatory hood is a modification of the apex of the aedeagus (Cole, 1927) and often has lateral lobes and a distal portion of some taxonomic value.

The chitinous box is located near the base of the ejaculatory hood, is variously shaped and of taxonomic value, and typically rests on the apex of the sustentacular apodeme (Metcalf, 1921).

The sustentacular apodeme is a single rod, whose base is in segment 8 and supports apically the chitinous box. It is held in place by muscles and supports, reinforces, and directs the chitinous box and ejaculatory hood during copulation. It is commonly expanded at its base and bears thin dorsal and ventral keels (Metcalf, 1921). It is

of less taxonomic value.

The ejaculatory sac is an expansion of the ejaculatory duct near its proximal end and is often flask-shaped. Muscles extend from it to the ejaculatory apodeme, which varies in shape (Cole, 1927). The latter part is of some taxonomic value but more difficult to discern. The muscles contract to force the apodeme into the bottom of the sac, expelling its contents (Metcalf, 1921).

The peripheral system (figure 2) of the penis includes 3 easily discernible parts: penis sheath and superior lobes (Metcalf, 1921).

The penis sheath is heavily chitinized, surrounds the base of the aedeagus, and has a heavy basal rim by which it is articulated and rotated (Metcalf, 1921).

The superior lobes are located on the lateral sides of the ejaculatory hood and vary greatly in shape, size, and vestiture, making them of great taxonomic value (Metcalf, 1921).

Segments 10 through 12 are very reduced and often termed the proctiger (Tuxen, 1970). Segment 10 bears 2 appendages of segment 11, the cerci, which are the least variable of the appendages. They surround the anus and lie in a depression in the caudal part of the epandrium (Metcalf, 1921). The triangular process may be equivalent to the sternal cornua and post-anal hood caudad of the cerci, "which are continuous with the distal margin of sternite ten and which are possibly the much modified sternite of the eleventh [tenth] urite" (Metcalf, 1921). Segment 12 has been reduced to the anal opening (Aczel, 1948).

3. Female postabdomen

The terminal abdominal segments 8 and 9 form an ovipositer, the functional unit in female copulation (Tuxen, 1970). This is a much simpler structure than the male copulatory structure and therefore does not exhibit the diversity which makes the male genitalia of such taxonomic importance. The female genitalia are not rotated as in the male but have retained the primitive position. Segments 6 and 7 are not asymmetrical as in the male.

Tergite 8 forms the epigynium and sternite 8 forms the hypogynium (Crampton, 1942). The epigynium is a smooth trough-shaped structure that laterally overlaps the sides of the hypogynium. A sclerotized spot on the epigynium and the shape of the hypogynium are of taxonomic value (figures 4 and 6).

The mesal appendages of segment 8 form the ventral valves, or first valvulae, and the mesal appendages of segment 9 form the dorsal valves, or 2nd valvulae (figure 4) of the ovipositer (Snodgrass, 1935). These valves are also called the egg-guides (Tuxen, 1970).

The gonopore is located between sternites 8 and 9 but much of the cavity is contained in segment 8, which is therefore the true genital segment (Crampton, 1942).

The subanal plate of Crampton (1942) is the ventral plate of the proctiger (Tuxen, 1970) and may represent the genital plate (figure 5).

Habitat Location

Twenty species of the genus Toxomerus, including one suggested

new species, were identified from Ecuador. This country lies on the equator and straddles the Andes Mountains. Brown (1941) has described Ecuador as follows:

Faunal zones in the equatorial regions are much more erratic than in the temperate parts of the globe. In Ecuador this is especially true in the interandean valleys. The majority of these have altitudes and climatic conditions that would place them in the subtropical faunal zone yet the insects found there are typical of the temperate zone.

According to Brown (1941) specimens described in this thesis were from various climatic zones and altitudes in Ecuador, including subtropical forest (Abitagua), a semi-arid temperate zone (Banos), a humid tropical zone (Napo), an arid temperate zone (Uyumbicho), and humid tropical jungle (Sarayacu).

MATERIALS AND METHODS

The genitalia were removed from dried specimens which had been relaxed for 24 hours in a relaxing chamber containing water and paradichlorobenzene. They were cleared in a 10 percent solution of potassium hydroxide for 24 hours, then neutralized for a few minutes in a 10 percent solution of acetic acid. The genitalia could then be studied or stored in microvials containing glycerine. The microvial was placed on the pin holding the remainder of the specimen.

The genitalia were studied while supported by glycerine in a spotting dish. The male axial system was studied while mounted in glycerine on a microscope slide after dissecting away the peripheral system with minuten pins. General features of the genitalia, the female genitalia, and the male peripheral system were studied with a Bausch and Lomb dissecting scope at 7X to 30X magnification. The fine structure of the genitalia and the male axial system were studied with an American Optical microscope at 40X and 100X magnification.

The drawings of the male peripheral system and the female genitalia were made at 30X with the aid of a camera lucida. The male axial system was drawn at 40X with the aid of a camera lucida. The scale shown in the drawings was obtained by calibrating the ocular micrometer with a stage micrometer readable to 0.01 mm. The abdominal patterns were drawn with the dissecting scope and the aid of a camera lucida.

Specimens examined in this study have been listed after the species

descriptions. Male specimens were listed first. The country of capture was given in upper case letters, below which was listed the locations of capture. On the same line with the location, there was listed in the following order the number of specimens captured, the collector, the date of capture, the institution where the specimens were stored, and in parentheses the identifier. If the specimens from a location were captured on more than 2 dates, only inclusive dates were given. Often all the specimens were captured by the same person or stored in the same place and identified by the same person. If one or both cases apply, the information was given on the same line with the country to prevent needless repetition. Western Illinois University was represented by the letters WIU and the American Museum of Natural History by AMNH.

The male genitalia were described in their primitive non-rotated state, with the styli dorsal to the superior lobes and the ejaculatory hood caudal. When comparing the lengths of the triangular process and the styli, the triangular process was measured from a line connecting the bases of the styli.

Unless stated otherwise descriptions of the head, thorax, and abdomen applied to both sexes.

OBSERVATIONS AND RESULTS

A Brief Description of the Genus

Toxomerus Macquart1855. Toxomerus Macquart, Mem. Soc.

Sci. Agric. Lille 1854:25-156.

Generally small flies with black and yellow markings on the head, thorax, and abdomen, and short bristles or thinly pilose areas on these parts.

Head. Face usually yellow, though in some species medially black; and medially produced (figures 7, 117), seldom beyond the antennae (Hull, 1949). Front generally yellow in the male; yellow laterally, black medially in the female. Antennae short, with bare basal arista on 3rd segment (Williston, 1886). Eyes bare, slightly contiguous in the male, separated in the female. Vertex dark, often shining violet posterior to the ocelli.

Thorax. Scutum vittate, though pattern often obscure. Scutellum usually yellow to brown, in some species black on the disk. Humeri usually yellow or black. Pleurae black (figure 8), usually with yellow areas on the propleurae, mesopleurae, and sternopleurae. Anterior 2 pairs of legs usually unicolored, yellow to black; each posterior leg often with one to 4 dark bands.

Abdomen. First 5 segments generally with brown to black and

yellow to orange markings in various patterns, though some species are predominately black. The pattern of spots and vittae varies considerably in some species or is obscure in many specimens (Hull, 1949), making species determinations sometimes difficult. "The species are very variable in the coloring of the abdomen, and caution should be used in founding new species on such differences" (Williston, 1886). Examples of this variation, both interspecific and intraspecific, have been drawn by Hull (1943a). The abdomen is usually long oval, with various species ranging from subcircular to spatulate (Hull, 1949).

Descriptions of the Species of Toxomerus
of Ecuador

Toxomerus anthrax (Schiner)

1868. Mesogramma anthrax Schiner,
Reise Novara, Dipt. p. 350.

Head. Face medially black, yellow laterally. Antennae orange. Front yellow in male; medially black, laterally yellow in female. Face little produced, ending at about end of 2nd antennal segment. Cheeks black. Vertex shining violet behind ocelli.

Thorax. Humeri yellow. Margin of scutum black. Scutellum black; distal margin sometimes narrowly yellow. Posterior one-third or less of mesopleuron and dorsal sternopleural spot, yellow; propleuron black. All femora black except for yellow basal and apical tips; posterior tibiae similar though often dark brown; other tibiae often with medial

dark bands.

Abdomen. Slender, sides parallel; shining black; lateral edges often narrowly yellow.

Male genitalia (figures 9, 26, 43). In the complete specimen the triangular process and cerci will usually appear yellow against otherwise black genitalia. Superior lobe evenly rounded on ventral, basal, and disto-dorsal margins, with no lateral protuberance; dorsal margin concave, rising to a rounded projection dorso-basally and a rounded tip dorso-distally; cluster of large bristles on baso-ventral margin and lateral surface; a few long hairs on medio-dorsal margin; a few short hairs on baso-dorsal projection. Styli with rounded lateral margins; furthest distal extension as rounded medial protuberance. Triangular process with rounded point; less than one-half length of styli. Epanandrium rectangular in dorsal view; two-thirds length of styli. Ejaculatory hood ending in more heavily sclerotized, sharp, distal tip; rounded ventro-lateral lobes; pointed, baso-ventral, lateral lobes, covered with very fine hair. Ejaculatory apodeme narrow; about two-fifths length of sustentacular apodeme. Chitinous box with large, triangular, basal extension.

Female genitalia (figures 60, 79, 98). Hypogynium in ventral view with large rounded notch on disto-medial margin; lateral sides curve basad, then continue as straight edges to basal tips; more heavily sclerotized, flattened, triangular area basad. In side view dorsal valve one-half length of ventral valve, which is concave on dorsal margin and convex ventrad. In ventral view genital plate triangular

with baso-medial incision. In dorsal view epigynum with continuously rounded distal and lateral margins; basal margin straight; no heavily sclerotized spot; distal area often unsclerotized, appearing as 2 fused lobes; in side view dorsal margin fairly straight.

Male specimens examined:

ECUADOR.

Abitagua Oriente. 1, Velastiqui, 20-III-1965, WIU(Gerdes).

Banos. 1, F. M. and H. H. Brown, 20-XI-1938, WIU(Fluke). 27,

Velastiqui, 9-VII-1938 to 7-V-1965, WIU(Gerdes).

Cerro Obitahua. 7, Velastiqui, 2 on 3-IV-1967, 5 on 4-IV-1967, WIU (Gerdes).

Conquista. 7, Velastiqui, 19-V-1967, WIU(Gerdes).

Naguazo. 1, Velastiqui, 27-VIII-1963, WIU(Gerdes).

Napo Oriente. 1, Velastiqui, 9-V-1965, WIU(Gerdes).

Obitahua Oriente. 5, Velastiqui, 18-III-1965 to 13-IV-1967, WIU(Gerdes).

Rio Blanco. 4, Velastiqui, 2 on 20-VII-1963, 2 on 21-V-1965, WIU (Gerdes). 1, Velastiqui, 20-VII-1964, WIU(Sedman).

Rio Negro. 2, Velastiqui, 1 on 27-III-1965, 1 on 10-VI-1965, WIU (Gerdes).

Runtun. 6, Velastiqui, 16-VIII-1963 to 29-XI-1966, WIU(Gerdes).

Sanqay Oriente. 13, Velastiqui, 5-III-1966 to 10-III-1966, WIU(Gerdes).

Santana. 4, Velastiqui, 2-V-1966, WIU(Gerdes).

Sarayaco. 1, Velastiqui, 17-III-1965, WIU(Gerdes).

Sasayaco Oriente. 3, Velastiqui, 2 on 16-I-1965, 1 on 28-II-1965, WIU(Gerdes).

Topo. 1, Velastiqui, 2-IV-1965, WIU(Gerdes).

COLUMBIA.

Cali. Western Cordillera. 1, J. Aranibar, 1935, WIU(Sedman).

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Abitagua. 1, 20-III-1965.

Banos. 9, 25-VII-1963 to 2-I-1967.

Cerro Obitahua. 7, 1 on 3-IV-1967, 6 on 4-IV-1967.

Chaupi. 2, 1 on 2-VIII-1963, 1 on 26-VIII-1963.

Conquista. 1, 19-V-1967.

Napo Oriente. 6, 11-VII-1963 to 28-III-1965.

Obitahua Oriente. 2, 1 on 8-III-1965, 1 on 13-III-1965.

Rio Blanco. 3, 1 on 20-VII-1963, 2 on 21-V-1965.

Runtun. 4, 15-VII-1963 to 7-V-1965.

Sanqay Oriente. 6, 2 on 5-III-1966, 4 on 10-III-1966.

Santana. 1, 2-V-1966.

Ulvilla. 1, 3-V-1965.

Toxomerus basilaris (Wiedemann)

1830. Syrphus basilaris Wiedemann, Ausser.

Zweif. Ins. 2:143.

Head. Face, front, and antennae yellow in male. In female, face medially black, laterally yellow; front mainly black, narrowly yellow on margins [anterior] ocelli; antennae dark orange. In both sexes

face shorter than antennae; vertex shining violet behind ocelli; cheeks black.

Thorax. Humeri yellow. Anterior margin of scutum black. Scutellum black and densely covered with fine hair; posterior margin may be thinly yellow. Posterior one-third to one-half of mesopleuron and dorsal, sternopleural spot, yellow; propleuron black. In female subapical dark-brown band on posterior femur; diffuse subbasal band on posterior tibia; subbasal femoral band and subapical tibial band may be present; front 4 femora and tibiae yellow, with femoral bases sometimes brownish. In male all femora black except basal and distal ends; posterior tibiae black except basad and distad; posterior tarsi black.

Abdomen. Slender, sides parallel; dark red to black; geminate yellow spots sometimes noticeable on 2nd to 5th segments.

Male genitalia (figures 10, 27, 44). Superior lobe in side view broadly rounded on ventro-basal margin; broadly concave on dorso-basal margin; bristles on ventro-distal margin point ventro-basad; shorter bristles above these point basad to dorso-basad. In dorsal view styli with slightly undulate medial margins and very slightly pointed on medio-distal margins; scattered dorsal hairs; group of hairs on ventro-distal surface. Triangular process about two-thirds length of styli; distal tip bluntly pointed. Distance between lateral sides of epandrium twice that from basal to distal sides. Ejaculatory hood in side view pointed ventro-distad and more heavily sclerotized on distal tip; dorsal margin with prominent depression above superior lobes; ventro-distal projection covered with very fine hair. Sustentacular apodeme narrow;

slightly expanded cephalad. Ejaculatory apodeme widest mediad, bluntly pointed distad. Ejaculatory sac large with disto-lateral pointed knobs in dorsal view.

Female genitalia (figures 61, 80, 99). In ventral view hypogynium narrowed distad and bilobate. Dorsal valve in side view narrow and less than one-half length of ventral valve, which is slightly concave on dorsal margin. Genital plate in ventral view roundly triangular; in side view linear. Epigynum roundly rectangular in dorsal view with no sclerotized plate; in ventral view with lateral sides slightly curved under.

Male specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Banos. 3, 25-VII-1963.

Napo Oriente. 11, 8-VIII-1963 to 11-VIII-1963.

Rio Blanco. 1, 20-VII-1963.

MEXICO.

Jalapa, Veracruz. 1, R. and K. Dreisbach, August 1961, WIU(Sedman).

Female specimens examined:

ECUADOR.

Napo Oriente. 3, Velastiqui, 2 on 8-VIII-1963, 1 on 11-VIII-1963, WIU(Gerdes).

UNKNOWN COUNTRY.

Rio. 1, T. Borgmeier, October 1929, WIU(Fluke).

Toxomerus brevifacies (Hull)

1943a. Mesogramma brevifacies Hull,

Entomol. Am. 23:20.

Head. Face yellow; produced to about end of antennae. In male front yellow; in female medially black, laterally yellow. Antennae orange; distal segment dark orange on distal one-half in male and dark brown in female. Vertex immediately behind ocelli shining violet; more posterior area golden-brown pollinose.

Thorax. Humeri yellow. Margin of scutum yellow; often darker posteriorly. Scutellum yellow to brown, often with brownish disk; long, erect, black hair. Obscure, tiny, propleural spot; posterior one-half of mesopleuron; and dorsal sternopleural spot, yellow. Posterior femora and tibiae yellow with black hair. Posterior tarsi brown with black hair.

Abdomen. Elongate oval. Black on yellow to orange background. Typically, one pair of spots on 3rd segment, unconnected to black posterior fascia; one pair of spots on 4th segment, loosely connected to black posterior fascia. Oval basal spot on 5th segment.

Male genitalia (figures 11, 28, 45). Superior lobe in side view with long dorsal extension, bifurcate apically; rounded ventro-distal and ventral margins; baso-medial lateral protuberance; short bristles on ventro-distal and ventral margins; smaller bristles and hairs continuing up distal margin; scattered hairs on lateral surface; a few hairs on dorsal extension and lateral protuberance. In side view styli

wide; in dorsal view with parallel sides and truncate distad; sparse scattered hairs dorsad; short scattered hairs on disto-ventral surface. Triangular process short; one-third length of styli; small apical tip with rounded point. Epandrium three-fourths length of styli. Ejaculatory hood in dorsal view with small, medial projection on distal margin, which flares slightly as 2 lateral lobes; in side view ventro-medial lobes and a rounded keel ventro-basad. Sustentacular apodeme with no dorsal keel and small ventral keel. Ejaculatory apodeme enlarged apically, with peripheral area unsclerotized on apical one-half. Ejaculatory sac in side view narrow and extending apically as a rounded extension. Chitinous box with distal extension inside ejaculatory hood.

Female genitalia (figures 62, 81, 100). Hypogynium constricted basad; flared slightly at basal tip; with small disto-medial notch. Dorsal valve one-half length of ventral valve, which in side view is slightly convex on dorsal margin and more convex ventrad. Genital plate in ventral view concave basad with rounded distal point; in side view continuing dorsad to dorsal margin of ventral valves. Epigynium in dorsal view concave on basal margin with continuously rounded lateral and distal margins; large oval to rectangular spot mediad, which is slightly concave on distal edge; in side view slight hump extending from basal end of spot to near distal margin.

Male specimens examined:

ECUADOR.

Banos. 17, Velastiqui, 24-VII-1963 to 3-VII-1965, WIU(Gerdes).

Banos, Runtun Trail. Holotype of T. brevifacies, F. M. and H. H. Brown,

26-XI-1938, AMNH(Hull).

Chaupi. 1, Velastiqui, 25-VIII-1963, WIU(Sedman).

Conquista. 3, Velastiqui, 19-V-1967, WIU(Gerdes).

Obitagua. 3, Velastiqui, 2 on 8-III-1965, 1 on 18-III-1965, WIU(Gerdes).

Rio Blanco. 2, Velastiqui, 1 on 21-VII-1963, 1 on 10-IV-1965, WIU
(Gerdes).

Rio Negro. 5, Velastiqui, 27-III-1965 to 10-VI-1965, WIU(Gerdes).

Runtun. 2, Velastiqui, 18-VIII-1963, WIU(Gerdes).

Sanqay Oriente. 1, Velastiqui, 10-III-1966, WIU(Gerdes).

Sarayaco. 1, 17-III-1965, WIU(Gerdes).

Sasayaso Oriente. 2, Velastiqui, 28-II-1965, WIU(Gerdes).

Topo. 1, Velastiqui, 5-V-1965, WIU(Gerdes).

Ulvilla. 4, Velastiqui, 15-V-1965, WIU(Gerdes).

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Abitagua Oriente. 1, 23-VI-1967.

Banos. 5, 27-VII-1963 to 15-V-1965.

Chaupi. 1, 25-VIII-1963.

Conquista. 2, 19-V-1967.

Naguazo. 2, 26-VIII-1964.

Rio Negro. 4, 1 on 27-III-1965, 3 on 6-IV-1965.

Runtun. 1, 5-III-1965.

Santana. 1, 22-V-1965.

Sasayaso. 2, 18-II-1965.

Ulvilla. 4, 15-V-1965.

Unknown location. Allotype of T. productus, unknown collector and date, AMNH(Curran).

Toxomerus claracuneus (Hull)

1942. Mesogramma claracunea Hull,

Psyche 49:106.

Head. Face yellow. Antennae orange-yellow; 3rd segment brown. Front yellow with dark brown medial area. Face not produced much beyond 2nd antennal segment. Vertex behind ocelli shining violet. Cheeks dark brown; dark area not extended onto lateral sides of face.

Thorax. Humeri, margins of scutum and scutellum, posterior one-half of mesopleuron, and dorsal sternopleural spot, all yellow. No yellow propleural spot. Scutellar disk shining black. Posterior femur with subapical dark brown band and ventral long black hair. Posterior tibia with diffuse subbasal and diffuse subapical brown bands. Posterior tarsus orangish on first segment; brown distad.

Abdomen. Elongate and spatulate with long 2nd segment. Pattern similar to T. nasutus but without medial yellow vitta on 2nd segment, which in T. claracuneus is mostly yellow with a dark posterior fascia.

Male genitalia (figures 12, 29, 46). In side view superior lobe rather squarish with small sharp projection at baso-dorsal corner; baso-lateral projection covered with hair; slightly concave ventral margin; about 6 bristles as long as the lobe emanating from disto-basal corner; cluster of bristles on disto-dorsal area; small cluster of

hairs on medio-basal area. In dorsal view stylus rounded and gradually widened dorsad; dorsal surface covered with hair except on distal margin; a few small hairs on disto-ventral surface. Triangular process one-half length of styli. Ejaculatory hood in side view with concave disto-dorsal margin; disto-dorsal tip; ventro-lateral flaps which are very closely spaced in ventral view and are just distal to a rounded ventro-basal margin. Sustentacular apodeme narrow with thin dorsal and ventral keels. Ejaculatory apodeme wider distad; distal margins less sclerotized. Ejaculatory sac gradually enlarged apically. Chitinous box with small medio-distal extension inside ejaculatory hood.

Male specimens examined:

ECUADOR. Both, Velastiqui, WIU(Gerdes).

Conquista. 1, 17-V-1967.

Santana. 1, 2-V-1966.

No female specimens were identified.

Toxomerus duplicatus (Wiedemann)

1830. Syrphus duplicatus Wiedemann,

Ausser. zweif. Ins. 2:142.

Head. Face yellow. Front in female medially black, laterally yellow; shining black just anterior to base of antennae. Antennae yellow-orange; brown on dorsal part of 3rd segment. Face not produced beyond distal end of 2nd antennal segment. Small violet area behind ocelli. Cheeks narrowly dark brown, but this coloration is not extended

onto the lateral sides of the face.

Thorax. Humeri, margin of scutum, scutellum, obscure spot on propleuron, posterior one-half or more of mesopleuron, and dorsal sternopleural spot, all yellow. Black hair on scutellum. Subapical dark brown band on posterior femur. A more diffuse, subbasal dark brown band on posterior tibia. Posterior tarsi brownish-orange. Anterior 2 pairs of legs completely yellow.

Abdomen. Wide and oval. Brown spots and fasciae on yellow to orange background. Variable pattern of slightly discernible spots, completely unconnected to basally connected, to the posterior fasciae on the 3rd and 4th segments.

Female genitalia (figures 63, 82, 101). Hypogynium in ventral view constricted basad; produced disto-laterad into 2 blunt triangular processes, that border a medio-distal depression with a straight medial edge at the bottom; in side view with slightly undulate ventral margin. Dorsal valve two-thirds length of ventral valve, which has straight dorsal margin and convex ventral margin in side view. In ventral view genital plate concave basad with rounded distal tip. Epigynium in dorsal view with slightly concave basal margin; large, baso-medial, rectangular, sclerotized spot; in side view with dorsal protuberance above sclerotized spot with same protuberance gradually more elevated from caudal to cephalic end.

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Napo Oriente. 4, 6-VIII-1963 to 10-VIII-1963.

No male specimens were identified.

Toxomerus ecuadoreus (Hull)

1943. Mesogramma ecuadorea Hull,
Entomol. Am. 23:19.

Head. Face yellow. Antennae orange; 3rd segment brown dorsad. Front yellow in male; in female black with very narrow, yellow, lateral margins; tiny black spot between bases of antennae in male. Face produced slightly beyond antennae; many specimens have a central brownish smudge on the face. Black of cheeks extends for a short distance onto lateral area of face in side view. Small violet area behind ocelli, but not as conspicuous as in many species.

Thorax. Humeri yellow. Margin of scutum darker yellow. Scutellum dark yellow to brown with long black hair; distal margin often lighter in color. Posterior one-half or less of mesopleuron yellow to yellowish-brown. Dorsal sternopleural area may be yellow. No yellow propleural spot. Posterior femora and tibiae yellow to brown; covered with black hair. Posterior tibiae brown. Anterior 2 pairs of legs generally yellow to brown. In female legs often lighter in color.

Abdomen. Long and oval. Variable pattern of black to dark brown on a yellow to orange background. Usually a thin, medially-divided, basal, dark fascia on 3rd and 4th segments. Male with tiny, baso-medial, dark spot on 5th segment; female with no spot on basal margin of 5th segment.

Male genitalia (figures 13, 30, 47). Superior lobe in side view with dorsal projection, bifurcate apically; baso-medial lateral protuberance; ventral margin covered with bristles; scattered hairs on lateral surface and baso-medial lateral protuberance. Styli rounded laterad and close together mediad in dorsal view; each with scattered hairs on dorsal surface and longer hairs on distal one-third of ventral surface. Triangular process one-third length of styli and with a rounded tip. Epandrium three-fourths length of styli. Ejaculatory hood in dorsal view concave on distal margin; in side view concave on disto-dorsal margin, which is produced into a rounded disto-dorsal tip, which is flared moderately into lateral rounded flap on both sides; with larger ventral flaps that have a peculiar, pitted, lateral surface and serrate ventral margin. The ventral flaps are unlike those of any other species examined. Sustentacular apodeme in side view with ventral keel larger than dorsal keel; medial margins of keels parallel but slightly flared cephalad. Ejaculatory sac narrow in side view and possessing narrow lateral extensions in dorsal view. Chitinous box in side view with rounded medial extension inside ejaculatory hood.

Female genitalia (figures 64, 83, 102). Hypogynium in ventral view slightly constricted basad, with rounded lobes on each lateral side on distal margin. Dorsal valve in side view thick and one-third length of ventral valve, which has slightly convex dorsal margin and more convex ventral margin. Genital plate in ventral view concave on basal margin, with fairly straight disto-lateral margins that merge into a rounded distal tip. Epigynium in dorsal view constricted

baso-laterad; with slightly concave basal margin and rounded lateral and distal margins; with medial, triangular, sclerotized spot, the tip pointing basad; in side view moderate depression above entire sclerotized spot, with rest of dorsal margin slightly convex.

Male specimens examined:

ECUADOR.

- Aloag, Pichincha. 7, Velastiqui, 23-VI-1967 to 27-VI-1967, WIU(Gerdes).
 Banos. 1, Velastiqui, 19-VIII-1963, WIU(Gerdes).
 Banos, San Pablo. Paratype of T. ecuadoreus, unknown, 15-X-1938, WIU (unknown).
 Cuenza, Azuay. Allotype of T. ecuadoreus, F. M. and H. Brown, 22-II-1939, AMNH(Hull). Paratype of T. ecuadoreus, F. M. and H. Brown, 22-II-1939, WIU(Fluke). 1, F. M. and H. Brown, 22-II-1939, WIU(Sedman).
 Obitagua. 1, Velastiqui, 8-III-1965, WIU(Gerdes).
 Pichincha, Hda. San Rafael, Rio San Pedro. Holotype. F. Martin Brown, 5 to 8-XI-1938, AMNH(Hull).
 Rio Blanco. 1, Velastiqui, 20-VII-1963, WIU(Gerdes).
 Rio Negro. 4, Velastiqui, 1 on 27-III-1965, 3 on 6-IV-1965, WIU(Gerdes).
 Runtun. 5, Velastiqui, 15-VIII-1963 to 7-V-1965, WIU(Gerdes).

Female specimens examined:

ECUADOR.

- Chaupi. 1, Velastiqui, 25-VIII-1963, WIU(Gerdes).
 Pichincha, Uyumbicho. Paratype of T. ecuadoreus, F. Martin Brown, 4 to 13-XI-1938, WIU(unknown).
 Rio Negro. 2, Velastiqui, 10-VI-1965, WIU(Gerdes).

Runtun. 2, Velastiqui, 1 on 15-VIII-1963, 1 on 18-VIII-1963, WIU (Gerdes).

Ulvilla. 1, Velastiqui, 15-VI-1965, WIU(Gerdes).

Toxomerus elongatus (Hull)

1941a. Mesogramma elongata Hull,

Psyche 48:46.

Head. Face in male yellow; in female with brown spot mediad, yellow laterad. Antennae orange to brown. Front in male yellow; in female mainly black, narrowly yellow laterad. Face produced to about end of 2nd antennal segment. Vertex behind ocelli shining violet to blue; in male vertex white pollinose in front of ocelli. Brown area of cheeks not extending onto face laterad.

Thorax. Humeri and margin of scutum yellow. Margin of scutellum yellow; disk brownish. Posterior one-half to two-thirds of mesopleuron and dorsal sternopleural spot yellow; no yellow propleural spot. Large, slightly diffuse, brown, subapical band on posterior femur, often extending more basad on ventral surface of leg; in male only ventral surface of femur covered with black hair. Basal one-half of posterior tibia mainly brown. All tarsi brownish.

Abdomen. Slender, parallel-sided. Generally, the 3rd segment has no medial yellow vitta, while the 4th segment has a thin, obscure, medial, yellow vitta.

Male genitalia (figures 14, 31, 48). Superior lobe in side view

thickly covered with bristles along distal and ventral margins; dorso-basal lobe flared distad into smaller extensions having a few small hairs; lateral surface with a few scattered hairs. Stylus greatly curved downwards on disto-lateral surface in dorsal view; disto-medial margins of both styli touching or overlapping; well-covered with very long hairs distad and mediad, longer than any other species examined; a few hairs disto-laterad on ventral surface. Triangular process bluntly pointed; a little less than one-half length of styli. Epandrium three-fourths length of styli. Ejaculatory hood convex mediad on dorsal margin in side view; disto-dorsal protuberance that curves basad as it proceeds along distal margin and ventrally flares into lateral flap on both sides. Sustentacular apodeme with well-developed keels just behind caudal end of apodeme and continuing with fairly straight edges to cephalic end of apodeme. Ejaculatory apodeme elongate; one-half length of sustentacular apodeme; base and a small ventral extension more heavily sclerotized. Ejaculatory sac globose in side view; dorso-lateral extensions in dorsal view. Chitinous box with sharply produced extension on distal margin pointing toward convex margin of ejaculatory hood in side view.

Female genitalia (figures 65, 84, 103). Genitalia highly compressed laterad. In ventral view hypogynium one and a half times as long as wide; slightly concave on lateral margins toward base; in side view fairly rectangular and larger than epigynium. In side view dorsal valve one-half length of ventral valve, which has slightly convex dorsal margin and rounded ventral margin. In side view distal tip of genital

plate curves upward to ventral valves; bow-shaped. Epigynum in side view triangular; very slight depression on dorsal margin behind middle; no heavily sclerotized spot; in dorsal view slightly wider distad. Two pairs of small sclerotized areas visible in side view; they appear as one pair in dorsal view.

Male specimens examined:

ECUADOR. All, Velastiqui.

Banos. 3, 27-VIII-1963, WIU(Gerdes).

Napo Oriente. 13, 5-VII-1963 to 1-V-1964, WIU(Gerdes). 1, 1-V-1964, WIU(Sedman).

Ulvilla. 1, 7-V-1965, WIU(Gerdes).

Female specimens examined:

ECUADOR. All, Velastiqui.

Abitagua. 1, 20-III-1965, WIU(Gerdes).

Banos. 2, 27-VIII-1963, WIU(Gerdes).

Napo Oriente. 8, 5-VIII-1963 to 11-VIII-1963, WIU(Gerdes). 1, 5-VIII-1963, WIU(Sedman).

Sasayaso. 4, 2 on 20-I-1965, 2 on 8-III-1965, WIU(Gerdes).

Ulvilla. 1, 7-V-1965, WIU(Gerdes).

Toxomerus flaviplurus (Hall)

1927. Mesogramma flaviplura Hall,

Entomol. News 38:239.

Head. Face brown mediad, yellow laterad. Front in male brown

above bases of antennae and yellow laterad; in female black mediad, yellow laterad. Antennae yellowish-brown. Face produced to about distal end of 2nd antennal segment. Vertex behind ocelli shining violet; in male white pollinose in front of ocelli. Black area of cheeks extends onto small baso-lateral area of face.

Thorax. Humeri yellow. Margin of scutum black anteriorly; yellow posteriorly, which is confluent with thin, yellow, scutellar margin. Scutellar disk black. Posterior one-half or less of mesopleuron yellow. Dorsal yellow spot sometimes present on sternopleuron. No yellow propleural spot. All femora black except distal ends; posterior tibiae black except basad; other tibiae yellow; posterior tarsi brownish. Wings brownish.

Abdomen. Wide and oval. Segments with obscure dark pattern on yellow background; first 2 segments may be all black.

Male genitalia (figures 15, 32, 49). Superior lobe in side view with disto-dorsal and dorso-medial rounded projections; dorso-basal lateral projection; bristles along ventral margin generally pointed ventrad; short hairs medio-ventrad on lateral surface; 10 or more hairs along margin of dorso-basal lateral projection. Styli about one and a half times as long as epandrium; in dorsal view undulate mediad, convex laterad, widest just distad to middle, gently concave laterad toward distal margins. Triangular process three-fourths length of styli; sides parallel but slightly undulate. Ejaculatory hood with disto-dorsal up-turned tip, which flares into ventro-lateral flaps. Sustentacular apodeme twice length of ejaculatory hood; large rounded

keels in side view. Ejaculatory apodeme enlarged distad; narrowed at articulation to ejaculatory sac; ventral one-half more sclerotized; in dorsal view markedly compressed laterad. Ejaculatory sac bulbous with dorso-lateral rounded projections. Chitinous box with rounded medio-distal projection inside ejaculatory hood.

Female genitalia (figures 66, 85, 104). Hypogynium in ventral view broadly rounded laterad; with small disto-medial depression; basal margin straight. Dorsal valve two-thirds length of ventral valve, which is convex on dorsal and ventral margins in side view. Genital plate in ventral view blunt on disto-medial tip. Epigynium in dorsal view with large sclerotized spot, which is concave on distal surface and one-third length of epigynium; in side view depression on dorsal margin basal to spot. In ventral view sclerotized plate bilobate; in side view lobes enlarged dorsad.

Male specimens examined:

ECUADOR.

Cerro Obitahua. 1, Velastiqui, 1967, WIU(Gerdes).

Napo Oriente. 6, Velastiqui, 8-VIII-1963 to 10-VIII-1963, WIU(Gerdes).

Puyo Oriente. 1, F. M. and H. H. Brown, 3 to 15-XII-1938, WIU(Fluke).

Sanqay Oriente. 2, Velastiqui, 8-III-1966, WIU(Gerdes).

Female specimens examined:

ECUADOR.

Sanqay Oriente. 1, Velastiqui, 10-III-1966, WIU(Gerdes).

TRINIDAD.

Cumuto. 1, J. G. Rozen, 14-11-1965, WIU(Sedman).

Toxomerus flavus (Hull)

1941c. Mesogramma flava Hull,

J. Wash. Acad. Sci. 31:432.

Head. Face in male yellow; in female medially black, laterally yellow. Antennae orange; 3rd segment dark brown dorsad. Front in male yellow; in female black mediad, narrowly yellow laterad. Face not produced beyond distal end of 2nd antennal segment. Vertex behind ocelli shining violet. Cheeks yellow unlike most other species.

Thorax. Humeri, margin of scutum, and margin of scutellum yellow. Scutellar disk black. Propleural spot, posterior one-half of mesopleuron, and dorsal sternopleural spot, yellow. Posterior femur yellow to orange-brown; posterior tibia brown dorsad; basal part of first tarsal segment on hind leg yellow; rest of hind tarsi and other tarsi brown.

Abdomen. Slender, parallel-sided. Fairly distinct basal yellow areas on 3rd and 4th segments, medially interrupted on 3rd segment; and medial yellow vitta on 4th segment, which may interrupt the basal yellow areas.

Male genitalia (figures 16, 33, 50). In side view superior lobe oval with dorso-basal protuberance; baso-lateral bulge; ventral margin thickly covered with bristles; distal margin of baso-lateral bulge well covered with hair. Styli in dorsal view pointed distad, more than any other species examined; both slightly convex on disto-lateral margin; scattered long hairs, especially along baso-lateral and

disto-medial margins. Triangular process with concave lateral sides produced into a narrow distal end and rounded tip; a little more than one-third length of styli. Epandrium with small basal indentation on left side in dorsal view. Ejaculatory hood in dorsal view deeply notched at disto-dorsal edge and flared laterad into flaps on both sides; in side view disto-ventral margin produced into lateral flap, which has a basal ridge at union to remainder of ejaculatory hood and fine striations directed disto-ventrad from ridge; this structure of the disto-ventral flaps is unlike any other species studied. Sustentacular apodeme trumpet-shaped; ventral keel larger than narrow dorsal keel. Ejaculatory apodeme narrow; one-third length of sustentacular apodeme. Ejaculatory sac bulbous.

Female genitalia (figures 67, 86, 105). Hypogynium in ventral view with gently curved lateral margins; slight medio-distal depression; constricted on baso-lateral margins. Dorsal valve in side view over one-half length of ventral valve, which has straight dorsal margin and convex ventral margin. Genital plate in ventral view with straight basal margin that turns disto-laterad toward the lateral edges; slightly concave on disto-lateral margins, which meet in a rounded tip. Epigynium triangular in side view; basal margin concave in dorsal view; disto-medial, rectangular, sclerotized area with triangular distal tip in dorsal view.

Male specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Banos. 1, 27-VII-1963.

Conquista. 1, 17-V-1967.

Rio Blanco. 3, 2 on 2-IX-1966, 1 on 13-VII-1968.

San Jose. 8, 28-III-1966 to 28-XI-1966.

Female specimens examined:

ECUADOR.

Banos. 1, W. C. Macintyre, 12-IV-1939, WIU(Fluke). 1, Velastiqui, 30-VII-1963, WIU(Sedman).

Piedrancha. 10, Velastiqui, 7 on 16-IV-1966, 3 on 18-IV-1966, WIU (Gerdes).

Rio Blanco. 11, Velastiqui, 2-IX-1968 to 13-VI-1968, WIU(Gerdes).

Runtun. 2, Velastiqui, 1 on 19-VIII-1963, 1 on 29-IX-1966, WIU(Gerdes).

San Jose. 26, Velastiqui, 1 on 28-III-1966, 25 on 28-XI-1966, WIU (Gerdes).

Sasayaso. 1, Velastiqui, 20-L-1965, WIU(Gerdes).

Soledad. 2, Velastiqui, 6-VI-1968, WIU(Gerdes).

Toxomerus floralis (Fabricius)

1798. Scaeva floralis Fabricius, Suppl.

Entomol. Syst. p. 563.

Head. Face yellow with dark spot mediad. Antennae yellow-orange. Front shining black mediad, bright yellow laterad. Face short in side view. Vertex shining violet behind ocelli. Anterior half of cheeks yellow, posterior half black.

Thorax. Humeri, margins of scutum and scutellum, posterior

one-third of mesopleuron, propleural spot, and dorsal sternopleural spot, all yellow. Disk of scutellum shining black. Subapical brown band on posterior femur. Tibiae yellow. Posterior tarsi brown.

Abdomen. Oval and wide. Third and 4th segments each with a medial pair of spots, loosely connected to posterior fascia, which is produced baso-laterad three-fourths length of segment.

Female genitalia (figures 68, 87, 106). Hypogynium in ventral view very wide compared to length, widest mediad; quickly constricted distad and formed into laterally pointed distal tips, bordering a rounded medio-distal depression; basal margin slightly concave. Dorsal valve two-fifths length of ventral valve, which has concave dorsal margin and convex ventral margin in side view. Genital plate in ventral view triangular with straight baso-medial margin and straight disto-lateral margins. Epigynum in dorsal view short with depression in baso-medial margin; in side view dorsal margin slightly convex; no sclerotized spot.

Female specimens examined:

ARGENTINA.

Aconquija, Tucuman. 1, A. Ares, 18-XII-1949, WIU(Fluke).

ECUADOR.

Napo Oriente. 1, Velastiqui, 6-VIII-1963, WIU(Gerdes).

PUERTO RICO.

N. E. 1, H. R. Telford, November 1968, WIU(Sedman).

No male specimens were identified.

Toxomerus hieroglyphicus (Schiner)

1868. Mesogramma hieroglyphica Schiner,
Reise Novara, Dipt. p. 348.

Head. Face yellow; in female small, medial, brown spot. Antennae brownish-orange. Front in male yellow; in female black mediad, yellow laterad. Face slighter, shorter than antennae. Vertex behind ocelli shining violet. Cheeks black on posterior part.

Thorax. Humeri, margin of scutum, and margin of scutellum, yellow; scutellar disk black with long marginal hairs. Posterior one-half of mesopleuron and dorsal sternopleural spot, yellow; no yellow propleural spot. All femora black, except distal and basal ends. Posterior tibiae black except at bases. Posterior tarsi black.

Abdomen. Almost parallel-sided. Second segment with medial yellow fascia widely interrupted mediad. Distinctive coloration of black and yellow.

Male genitalia (figures 17, 34, 51). Superior lobe in side view long dorso-ventrad; with dorsal extension projecting up to styli and having very few hairs; slender lateral projection with a few small hairs; ventro-distal and ventral margins with over 10 bristles; ventro-lateral surface with a few scattered short hairs. Styli in dorsal view with rounded lateral sides; slightly longer than epandrium; scattered hairs on dorsal surfaces with baso-lateral cluster of hairs projecting same direction; scattered hairs along distal one-half of ventral surfaces. Triangular process slightly less than one-half length of styli;

pointed sharply on distal tip. Ejaculatory hood in side view with dorso-distal projection; dorsal margin gently curved; distal margin rather straight; no prominent flaps. Sustentacular apodeme narrow; gradually widening cephalad; no large keels. Ejaculatory apodeme narrow and arched; distal tip clear. Ejaculatory sac in side view bulbous; with rounded lateral projections in dorsal view.

Female genitalia (figures 69, 88, 107). Hypogynium in ventral view constricted distad; widest mediad; small depression on disto-medial margin; basal margin straight. Dorsal valve in side view one-half length of ventral valve, which is markedly convex on ventral margin and slightly convex on dorsal margin. Genital plate in ventral view triangular; distal tip rounded. Epigynium in dorsal view rounded on lateral and distal margins; basal margin slightly concave; medial sclerotized spot, varying from long, transverse oval to flared laterad; in side view dorsal margin rapidly curved disto-ventrad immediately in front of sclerotized spot.

Male specimens examined:

COLUMBIA.

Popayan. 1, H. F. Schwarz, 1935, WIU(Sedman).

ECUADOR. All, WIU(Gerdes).

Banos. 1, F. M. and H. Brown, 26-XII-1938. 7, Velastiqui, 3-VIII-1963 to 2-I-1967.

Cerro Obitahua. 3, Velastiqui, 1 on 3-IV-1967, 2 on 4-IV-1967.

Obitahua. 1, Velastiqui, 18-III-1965.

Rio Blanco. 1, Velastiqui, 22-VII-1963.

Runtun. 1, Velastiqui, 7-II-1965.

Sanqay Oriente. 1, Velastiqui, 10-III-1966.

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Abitagua Oriente. 1, 20-III-1965.

Banos. 2, 1 on 3-VIII-1965, 1 on 7-IV-1965.

Conquista. 1, 19-V-1967.

Obitahua Oriente. 1, 30-III-1965.

Runtun. 1, 3-V-1965.

Toxomerus lacrymosus (Bigot)

1884. Mesograpta lacrymosa Bigot

Ann. Soc. ent. France 4:108.

Head. Face yellow. Antennae yellow to dark orange. Front yellow in male; in female black mediad, yellow laterad. Face produced only short distance beyond 2nd antennal segment. Vertex shining violet behind ocelli. Cheeks black on posterior part.

Thorax. Humeri, margin of scutum, and margin of scutellum, yellow. Scutellar disk darker yellow to brown. Posterior one-half to two-thirds of mesopleuron and a dorsal sternopleural spot yellow; no propleural yellow spot. Posterior femur with diffuse, brown, subapical band; posterior tibia with similar band subbasad. Posterior tarsi dark brown.

Abdomen. Oval with variable pattern of brown to black fascia and spots on a yellow background. Sublateral spots on 3rd and 4th segments

unattached or only very slightly attached to basal margin.

Male genitalia (figures 18, 35, 52). Superior lobe in side view with dorsal extension, bifurcate distad; baso-lateral protuberance bearing a few short hairs; ventral and disto-ventral margins covered with bristles; a few short hairs on ventral-lateral surface. Stylus in dorsal view gradually narrowed toward base; dorsal surface covered with long hairs, some one-half length of styli; ventral surface with very few hairs. Triangular process acutely triangular but with rounded tip; a little more than one-half length of styli. Ejaculatory hood in side view with slightly upturned disto-dorsal tip, which flares into lateral lobe on both sides; with 2 pairs of ventral lobes, basal pair extending a little more ventrad, and paired, slightly curved, sharp extensions between the lobes on either side. No other species examined possessed 2 pairs of ventro-lateral lobes. Sustentacular apodeme with moderate keels, the dorsal keel more flared cephalad. Ejaculatory apodeme in side view enlarged distad; convex basad and concave distad on dorsal margin; straight disto-ventral margin. Ejaculatory sac bulbous.

Female genitalia (figures 70, 89, 108). Hypogynium in ventral view with small disto-medial depression; in side view rectangular. Dorsal valve two-fifths length of ventral valve, which is very slightly convex on dorsal margin and convex on ventral margin in side view. Genital plate in ventral view concave on basal margin; in side view with lateral margin extending dorsad to posterior edge of ventral valves. Epigynium in side view with fairly straight dorsal margin and triangular;

in dorsal view a pair of small, disto-laterad pointing, sclerotized areas may be evident.

Male specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Napo Oriente. 23, 5-VIII-1963 to 12-VIII-1963.

Obitahua Oriente. 1, 3-V-1965.

Piedrancha. 1, 18-IV-1966.

Sanqay Oriente. 1, 5-III-1966.

Sarayaco. 2, 10-V-1965.

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Napo Oriente. 12, 6-VIII-1963 to 12-VIII-1963.

Sanqay Oriente. 2, 1 on 7-III-1966, 1 on 10-III-1966.

Toxomerus nasutus Sack

1941. Toxomerus nasutus Sack,

Beit. zur Fauna Perus. p. 102.

Head. Face yellow with medially brown smudge. Antennae yellow to orange-brown. Front in male yellow with small dark spot above antennae; in female black mediad, yellow dorsad, with transverse area immediately above antennae shining black. Face produced beyond antennae. Vertex behind ocelli shining violet. Cheeks black and extending onto face baso-laterally.

Thorax. Humeri and margins of scutum and scutellum yellow;

scutellar disk brown. Posterior one-half of mesopleuron and dorsal sternopleural spot yellow; no propleural yellow spot. Posterior femur with subbasal and subapical brown bands, often diffuse or barely evident. Posterior tibia with same pattern. Posterior tarsus dark brown.

Abdomen. Spatulate with medial yellow vitta on 2nd segment. Vitta has black lateral borders and cuts across a transverse yellow fascia.

Male genitalia (figures 19, 36, 53). Superior lobe in side view triangular; ventral corners rounded; dorsal corner pointed; ventral margin covered with hair; disto-dorsal margin and lateral surface more sparsely covered with hair. Stylus in dorsal view rectangular on distal part; barely noticeable depression on medio-distal margin; dorsal surface with scattered hairs, the longer ones mediad. Triangular process short and rounded apically; less than one-half length of styli. Ejaculatory hood in side view slightly concave on dorsal margin; produced disto-dorsad into moderately convex flap on both sides, below which distal margins curve basad and flare disto-ventrad as lateral flaps; 2 very small protuberances on disto-dorsal margin; in dorsal view distal tip concave. Sustentacular apodeme with large ventral keel. Ejaculatory sac slightly enlarged at connection to ejaculatory apodeme and projected distad as a rounded lobe in side view. Chitinous box with rounded small projection distad inside ejaculatory hood.

Female genitalia (figures 71, 90, 109). Hypogynium in ventral view widest mediad and constricted basad and distad; slightly flared on basal tips; distal margin with very small medial depression. Dorsal valve in side view one-half length of ventral valve, which is straight

on dorsal margin and convex ventrad. Genital plate in ventral view with baso-medial depression; disto-lateral margins concave. Epigynum in dorsal view with rounded lateral and distal margins, the latter very slightly produced into a disto-medial projection; transverse sclerotized spot on distal one-half of dorsal surface; basal margin straight except at tips; in side view dorsal margin straight except for small hump over sclerotized spot.

Male specimens examined:

ECUADOR.

Abitagua Oriente. 2, Velastiqui, 20-III-1965, WIU(Gerdes).

Banos. Holotype of T. sylphus, W. C. Macintyre, 13-V-1939, AMNH(Hull).
47, Velastiqui, 25-VII-1963 to 25-IV-1965, WIU(Gerdes).

Cerro Obitahua. 1, Velastiqui, 3-IV-1967, WIU(Gerdes).

Chaupi. 1, Velastiqui, 2-VIII-1963, WIU(Gerdes).

Conquista. 2, Velastiqui, 19-V-1967, WIU(Gerdes).

Naguazo. 4, Velastiqui, 3 on 27-VIII-1963, 1 on 27-VIII-1964, WIU(Gerdes).
1, Velastiqui, 27-VIII-1964, WIU(Sedman).

Napo Oriente. 2, Velastiqui, 9-V-1965, WIU(Gerdes).

Obitagua. 2, Velastiqui, 8-III-1965, WIU(Gerdes).

Obitahua Oriente. 5, Velastiqui, 11-III-1965 to 7-IV-1965, WIU(Gerdes).

Rio Blanco. 3, Velastiqui, 20-VII-1963 to 20-X-1968, WIU(Gerdes).

Rio Negro. 2, Velastiqui, 1 on 16-III-1965, 1 on 27-IV-1965, WIU(Gerdes).

Runtun. 12, Velastiqui, 15-VII-1963 to 7-V-1965, WIU(Gerdes).

Salado. 1, Velastiqui, 17-III-1965, WIU(Gerdes).

San Jose. 1, Velastiqui, 19-XII-1966, WIU(Gerdes).

Sanqay Oriente. 1, Velastiqui, 10-III-1966, WIU(Gerdes).
 Santana. 7, Velastiqui, 2-V-1966, WIU(Gerdes).
 Sarayaco. 3, Velastiqui, 13-II-1965 to 10-V-1965, WIU(Gerdes).
 Sasayaso Oriente. 5, Velastiqui, 18-I-1965 to 21-III-1965, WIU(Gerdes).
 Topo. 2, Velastiqui, 2-IV-1965, WIU(Gerdes).

Female specimens examined:

ECUADOR.

Banos. Allotype of T. sylphus, W. C. Macintyre, 9-VII-1938, AMNH(Hull).
 Paratype of T. sylphus, F. M. and H. Brown, 26-XII-1938, WIU(Fluke).
 47, Velastiqui, 23-VII-1963 to 15-V-1965, WIU(Gerdes).
 Chaupi. 1, Velastiqui, 2-VIII-1963, WIU(Gerdes).
 Conquista. 1, Velastiqui, 19-V-1967, WIU(Gerdes).
 Naguazo. 1, Velastiqui, 27-VIII-1963, WIU(Gerdes).
 Napo Oriente. 1, Velastiqui, 9-V-1967, WIU(Gerdes).
 Obitagua. 1, Velastiqui, 8-III-1965, WIU(Gerdes).
 Obitahua. 5, Velastiqui, 11-III-1965 to 30-III-1965, WIU(Gerdes).
 Rio Blanco. 2, Velastiqui, 1 on 20-VII-1963, 1 on 21-V-1965, WIU
 (Gerdes).
 Rio Negro. 1, Velastiqui, 16-III-1965, WIU(Sedman). 5, Velastiqui,
 14-III-1965 to 20-VI-1965, WIU(Gerdes).
 Runtun. 15, Velastiqui, 15-VII-1963 to 7-V-1965, WIU(Gerdes).
 Salado. 2, Velastiqui, 1 on 3-VIII-1963, 1 on 4-VIII-1963, WIU(Gerdes).
 Sanqay. 2, Velastiqui, 10-III-1966, WIU(Gerdes).
 Santana. 8, Velastiqui, 1 on 22-V-1965, 7 on 2-V-1966, WIU(Gerdes).
 Sarayaco. 1, Velastiqui, 13-II-1965, WIU(Gerdes).

Sasayaso Oriente. 5, Velastiqui, 4 on 18-1-1965, 1 on 28-11, 1965, WIU(Gerdes).

Yunguilla. 1, Velastiqui, 4-V-1966, WIU(Gerdes).

Toxomerus nymphalius (Hull)

1942. Mesogramma nymphalia Hull,

Psyche 49:106.

Head. Face yellow. Antennae orange with distal segment darker dorsad. Front in male yellow with small, dark, ventral spot; in female black mediad, yellow laterad. Face produced to distal end of 2nd antennal segment. Vertex behind ocelli brilliant blue, then violet more posteriorly; area within ocelli golden-brown; area in front of ocelli in male white pollinose. Cheeks brown to black.

Thorax. Humeri, margins of scutum and scutellum, posterior one-half or more of mesopleuron, and dorsal sternopleural spot, all yellow. No propleural yellow spot. Scutellar disk black. Posterior femur with subapical black band. Posterior tibiae dark brown except at basal and distal ends; often lighter brown mediad. First segment of posterior tarsus orange; other segments dark brown.

Abdomen. Subspatulate with complicated pattern of black to reddish-brown and yellow to orange. Basal fascia of 2nd segment and large medial spot of 5th segment often black with other parts reddish-brown.

Male genitalia (figures 20, 37, 54). Superior lobe in side view with dorsal extension that is apically bifurcate; baso-medial rounded

protuberance extending from lateral surface; bristles on ventral margin; lateral surface sparsely covered with short hairs; a few short hairs on dorsal part of baso-medial protuberance; dorsal extension with about 4 hairs. Stylus in dorsal view with most distal extension on medial margin; margins generally rounded; lateral margin covered with short hairs except on distal one-fourth; slightly larger cluster of hairs on baso-lateral margin; a few longer hairs disto-mediad; a few short hairs on disto-ventral surface. Triangular process with almost parallel sides, which form a blunt triangular tip; over one-half length of styli; wider than in most species examined. Ejaculatory hood in side view produced disto-dorsad to a small pointed tip, which flares laterad into convex flaps; with disto-ventral paired flaps, which in ventral view are closely spaced, and a baso-ventral thin ridge which appears in side view as a continuance of the disto-ventral flaps. Sustentacular apodeme with moderate-sized keels, the ventral one extended to the caudal end of the apodeme, the dorsal one not extended so far. Ejaculatory apodeme large; compressed laterad; ventral margin more heavily sclerotized. Ejaculatory sac concave on margin opposite ejaculatory apodeme and bulbous distad. Chitinous box with narrow, disto-dorsally produced extension inside ejaculatory hood.

Female genitalia (figures 72, 91, 110). Hypogynium in ventral view with straight basal margin; roughly rectangular. Dorsal valve two-thirds length of ventral valve, which in side view has a fairly straight dorsal margin and convex ventral margin. Genital plate in ventral view concave basad with rounded distal tip. Epigynium in

dorsal view with fairly straight basal margin that has a very small medial depression; with large medial sclerotized spot, straight basad, convex distad; in side view protuberance on dorsal margin over sclerotized spot.

Male specimens examined:

ECUADOR.

Cerro Obitahua. 18, Velastiqui, 3-IV-1967, WIU(Gerdes).

Obitahua Oriente. 7, Velastiqui, 1 on 19-VIII-1966, 6 on 13-IV-1967, WIU(Gerdes).

Rio Margajitas, Rio Pastaza. Holotype of T. nymphalius, F. M. and H. Brown, 20-III-1939, AMNH(Hull).

Sanqay Oriente. 6, Velastiqui, 4 on 7-III-1966, 2 on 9-III-1966, WIU(Gerdes).

Sasayaco Oriente. 1, Velastiqui, 16-I-1965, WIU(Gerdes).

Female specimens examined:

ECUADOR.

Cerro Obitahua. 4, Velastiqui, 3-IV-1967, WIU(Gerdes).

Puyo Oriente. Paratype of T. nymphalius, F. M. and H. H. Brown, 3 to 15-XII-1938, WIU(Fluke).

Rio Mapeto. Allotype of T. nymphalius, F. M. and H. Brown, 24-III-1939, AMNH(Hull).

Sanqay Oriente. 1, Velastiqui, 7-III-1966, WIU(Gerdes).

Yunguilla. 1, Velastiqui, 1966, WIU(Gerdes).

Toxomerus pictus (Macquart)

1842. Syrphus pictus Macquart, Mem.

Soc. Sci. Agric. Lille 1841:159.

Head. Face and antennae yellow. Front in male yellow; in female black mediad, yellow laterad. Face shorter than distal end of 2nd antennal segment. Vertex shining violet behind ocelli. Cheeks brown posteriorly.

Thorax. Humeri and margin of scutum yellow. Margin of scutellum yellow, disk black. Posterior one-half to two-thirds of mesopleuron and dorsal sternopleural spot yellow. No yellow propleural spot. Sub-apical dark brown band on posterior femur. Subbasal dark brown band on posterior tibia. First segment of posterior tarsus dark brown, other segments yellow to brown.

Abdomen. Oval with complete yellow fascia on 2nd segment; 3rd and 4th segments similar, with sublateral extensions of posterior black fascia and paired medial vittae extending to basal margin of segment. Fifth segment with large baso-medial black spot and sublateral vittae or spots.

Male genitalia (figures 21, 38, 55). Superior lobe in side view with 2 small extensions dorsad; baso-lateral protuberance with a few hairs; bristles along disto-ventral and ventral margins; hairs scattered over lateral surface; generally very wide. Stylus in dorsal view widest on distal one-half; rounded distad with apices directed slightly laterad; dorsal surface covered with scattered hairs, longer hairs disto-medially.

Triangular process rounded distad; more than one-half length of styli. In dorsal view distance between lateral sides of epandrium twice distance between basal and distal sides; epandrium projects laterad beyond styli. Ejaculatory hood in side view with slight hump on medio-dorsal margin; with ventral flaps projecting disto-ventrad. Sustentacular apodeme greatly expanded cephalad with large keels. Ejaculatory apodeme enlarged distad and laterally compressed. Ejaculatory sac bulbous and slightly produced dorso-laterad. Chitinous box with rounded projection disto-ventrad inside ejaculatory hood.

Female genitalia (figures 73, 92, 111). Hypogynium in ventral view slightly constricted basad; widest on distal one-half; with small disto-medial depression. Dorsal valve one-half length of ventral valve, which is slightly concave on dorsal margin and convex ventrad. Genital plate in ventral view very concave on basal margin; slightly concave on lateral margins; with rounded distal tip. Epigynium in dorsal view slightly constricted basad with rather straight basal margin and small medial sclerotized spot varying in shape; in side view small depression on both sides of sclerotized spot. Sclerotized plate large in side view with thin cephalic extension.

Male specimens examined:

ARGENTINA.

Salta, Urundel. 1, M. Aczel, 8 to 12-11-1949, WIU(Fluke).

ECUADOR. All, Velastiqui, WIU(Gerdes).

Cerro Obitahua. 1, 3-IV-1967.

Sanqay Oriente. 1, 7-III-1966.

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Napo Oriente. 1, 8-VIII-1963.

Sanqay Oriente. 1, 9-III-1966.

MEXICO.

Itzimna, Yucatan. 1, J. C. and D. Pallister, 5-IX-1964, WIU(Sedman).

Toxomerus politus (Say)

1823. Scaeva polita Say, J. Acad.

Nat. Sci. Phila. 3:88.

Head. Face yellow. Antennae dark yellow to orange. Front in male yellow; in female black mediad, yellow laterad. Face not produced beyond distal end of 2nd antennal segment. Vertex in male white pollinose in front of ocelli, golden brown within ocelli, shining blue immediately behind ocelli, shining blue more posteriorly; in female area behind ocelli shining blue to violet. Cheeks mainly yellow with smaller brown area posteriorly.

Thorax. Humeri and margin of scutum yellow. Margin of scutellum yellow; disk brown. Propleural spot, posterior one-half of mesopleuron, and dorsal sternopleural spot, all yellow. All femora and tibiae yellow; posterior legs with dark hairs; posterior tarsi orange to brown distad.

Abdomen. Long and oval. Distinct pattern of black and yellow to orange. Second and 3rd segments easily identified by paired, medial, black vittae that form right angles basad and continue almost to the

lateral edges.

Male genitalia (figures 22, 39, 56). Superior lobe in side view generally enlarged dorsad; small, sharp, dorsal extension; baso-lateral protuberance with a few small hairs; distal and disto-ventral margins with bristles; small scattered hairs over lateral surface. Stylus in dorsal view fairly parallel-sided with furthest distal extension toward lateral sides; scattered hairs on dorsal surface with longer distal hairs; cluster of longer hairs on disto-ventral surface. Triangular process very pointed and one-third length of styli. Epandrium about two-thirds length of styli. Ejaculatory hood in side view curves upward on disto-dorsal margin, flares on both sides into flap one-half length of distal margin, then flares disto-ventrad into more produced flap; entire dorsal margin generally concave. Sustentacular apodeme enlarged on ventral keel immediately behind chitinous box; edges of 2 keels proceed parallel but flared near cephalic end. Ejaculatory apodeme very large; compressed laterad; medially almost as wide as sustentacular apodeme; more heavily sclerotized in narrow band running from base to distal end. Ejaculatory sac bulbous in side view; greatly flared laterad in dorsal view with tips heavily sclerotized. Chitinous box with sharp distal projection inside ejaculatory hood.

Female genitalia (figures 74, 93, 112). Hypogynium in side view fairly rectangular and wider than epigynium; in ventral view small depression on disto-medial margin; lateral margins constricted near base but flared laterad at basal margin; basal margin concave. Dorsal valve in side view one-third length of ventral valve, which is gently

convex dorsad and more convex ventrad. Genital plate in ventral view very concave on basal margin; lateral margins slightly concave. Epigynium in dorsal view with concave basal margin; large sclerotized spot on basal one-half, generally convex basad; central area of spot may be less heavily sclerotized; small depression in side view above sclerotized spot.

Male specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Banos. 2, Velastiqui, 1 on 26-VIII-1963, 1 on 27-VIII-1963.

Napo Oriente. 14, 6-VIII-1963 to 12-VIII-1963.

Piedrancha. 5, 1 on 16-IV-1966, 4 on 18-IV-1966.

MEXICO.

Orizaba, Ver. 1, R. and K. Dreisbach, 12 to 22-VIII-1961, WIU(Sedman).

U. S. A.

Florida. 3, H. V. Weems Jr., 26-XII-1951, WIU(Weems).

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Banos. 3, 27-VIII-1963.

Napo Oriente. 11, 5-VIII-1963 to 1-V-1964.

Piedrancha. 5, 1 on 16-IV-1966, 4 on 18-IV-1966.

Sasayaso. 2, 8-III-1965.

Toxomerus productus (Curran)

1930. Mesogramma producta Curran,

Amer. Mus. Novit. 405:5.

Head. Face yellow. Antennae yellow-orange; 3rd segment brownish-orange. Front in male yellow; in female black mediad, yellow laterad. Face not produced beyond antennae. Vertex behind ocelli shining violet. Cheeks yellow anteriorly, black posteriorly.

Thorax. Humeri yellow. Margins of scutum and scutellum yellow to yellowish-brown; scutellar disk yellow to brown. Propleural spot, yellow. Posterior femur with subapical dark brown band; posterior tibia with medial, diffuse, dark brown band; posterior tarsus dark brown; same femur and tibia with dark brown hair.

Abdomen. Oval with black fasciae and spots on orange background. Generally 3rd and 4th segments each with one pair of spots loosely connected to posterior fascia; basal spot on 5th segment.

Male genitalia (figures 23, 40, 57). Superior lobe in side view with short dorsal extension, bifurcate distad; disto-dorsal margin rounded; disto-ventral margin gently convex and bordered by bristles, longest toward disto-dorsal margin; baso-lateral protuberance with about 20 scattered hairs; a few very long bristles on baso-ventral curved margin. Styli in dorsal view gradually wider distad; each with blunt distal tip; scattered short hairs on dorsal surfaces; more closely-spaced short hairs on disto-ventral surfaces. Triangular process three-fourths length of styli and with rounded tip. Ejaculatory hood in side

view with evenly concave dorsal margin; narrowed neck on dorso-distal extension, which enlarges and becomes bulbous at distal end; below the bulbous end very slightly developed lateral flap; larger ventro-basal flap. Sustentacular apodeme with dorsal and ventral keels. Ejaculatory apodeme and ejaculatory sac narrow in side view. Chitinous box with distal hooked extension inside ejaculatory hood.

Female genitalia (figures 75, 94, 113). Hypogynium in ventral view slightly constricted basad and gradually constricted past middle toward distal margin, where each side forms a lateral blunt projection with a medial depression between these 2 projections; more heavily sclerotized on projections. Dorsal valve in side view one-half length of ventral valve, which is fairly straight on dorsal margin and more convex on ventral margin. Genital plate in ventral view with acute baso-medial indentation; straight disto-lateral margins meeting in a rounded tip. Epigynium in dorsal view with continuously rounded lateral and distal margins; baso-medial transverse sclerotized spot; in side view dorsal margin slightly convex.

Male specimens examined:

ECUADOR.

Macas, Rio Upano. Holotype of T. cyrillus, F. M. and H. Brown, 24-I-1939, AMNH(Hu11).

Napo Oriente. 1, Velastiqui, 1-V-1964, WIU(Gerdes).

Obitahua. 3, Velastiqui, 18-III-1965, WIU(Gerdes).

Sanqay. 1, Velastiqui, 10-III-1966, WIU(Gerdes).

Sarayaco. 1, Velastiqui, 1-III-1965, WIU(Gerdes).

Sasayaso. 1, Velastiqui, 28-11-1965, WIU(Gerdes).

Unknown location. Holotype of T. productus, unknown collector and date, AMNH(Curran).

Female specimens examined:

ECUADOR.

Banos. 2, Velastiqui, 1 on 3-III-1965, 1 on 16-III-1965, WIU(Gerdes).

Macas, Rio Upano. Allotype of T. cyrilus, F. M. and H. Brown, 24-1-1939, AMNH(Hull).

Obitagua. 1, Velastiqui, 8-III-1965, WIU(Gerdes).

Obitahua. 3, Velastiqui, 18-III-1965, WIU(Gerdes).

Rio Negro. 2, Velastiqui, 27-III-1965, WIU(Gerdes).

Runtun. 2, Velastiqui, 3-V-1965, WIU(Gerdes).

Sasayaso Oriente. 2, Velastiqui, 28-11-1965, WIU(Gerdes).

Toxomerus steatogaster (Hull)

1941b. Mesogramma steatogaster Hull,

J. Kansas Entomol. Soc. 14:62.

Head. Face yellow; in side view concave above distal end. Antennae yellowish-brown with darker 3rd segments. Front shining black mediad, yellow laterad. Face shorter than antennae. Cheeks black.

Thorax. Humeri and margin of scutum yellow. Scutellum orange-yellow with black hair. Propleural spot, posterior two-thirds of mesopleuron, and dorsal sternopleural spot, yellow. Posterior femur with subapical brown band and black hair apically. Posterior tibia with

faint subbasal band and black hair. Posterior tarsus brown.

Abdomen. Wide and oval. Thin dark-red to black fasciae on orange background. Black large baso-medial spot on 5th segment.

Female genitalia (figures 76, 95, 114). Hypogynium in ventral view widest mediad, constricted basad and distad; with disto-lateral blunt tips and shallow depression disto-mediad. Dorsal valve in side view two-thirds length of ventral valve, which is slightly convex on dorsal margins and more convex ventrad. Genital plate in ventral view concave basad and slightly concave on disto-lateral margins, which are produced into a rounded tip. Epigynium in dorsal view widest mediad with fairly straight basal margin; large sclerotized spot continuously rounded laterad and distad; in side view very large hump over sclerotized spot, much larger than any other species examined.

Female specimens examined:

ECUADOR.

Napo Oriente. 4, Velastiqui, 5-VIII-1963 to 9-VIII-1963, WIU(Gerdes).

No male specimens were identified.

Toxomerus sylvaticus (Hull)

1943b. Mesogramma sylvatica Hull,

Entomol. News 54:34.

Head. Face and antennae yellow. Front in male yellow; in female black mediad, yellow laterad. Face shorter than antennae. Area immediately behind ocelli shining violet; black more posteriorly. Cheeks

black.

Thorax. Humeri, margin of scutum, and entire scutellum, yellow. Posterior two-thirds of mesopleuron and dorsal sternopleural spot yellow; no yellow propleural spot. Posterior femur with subapical brown band; both bands often diffuse. Posterior tarsi brownish.

Abdomen. Subspatulate to oval. Posterior black fasciae of 3rd and 4th segments do not send forward lateral extensions. Brown to black fasciae and spots on orange background.

Male genitalia (figures 24, 41, 58). Superior lobe in side view with dorsal extension, bifurcate apically, and baso-lateral protuberance; continuously curved distal and ventro-basal margins; distal and ventral margins covered with hairs; smaller hairs on lateral surface; a few short hairs on baso-lateral protuberance and dorsal extension. Styli in dorsal view each flared disto-laterad; in side view curved downwards, arcuate and narrow; sparsely covered with hair. Triangular process more than one-half length of styli and with straight lateral margins meeting in rounded point. Epandrium in dorsal view continuously curved on lateral and basal margins. Ejaculatory hood produced into disto-dorsal tip; gently flared on both sides into a lateral flap on disto-medial margin in side view and produced into prominent flap baso-mediad. Sustentacular apodeme with narrow dorsal and ventral keels. Ejaculatory apodeme in side view narrow basad, enlarged distad; disto-dorsal enlarged part unsclerotized. Ejaculatory sac gradually enlarged distad and rounded at distal end. Chitinous box with prominent medio-distal extension inside ejaculatory hood.

Female genitalia (figures 77, 96, 115). Hypogynium in ventral view widest mediad; constricted baso-laterad and flared on basal tips; convex distal margin except for very small medial depression. Dorsal valve in side view one-half length of ventral valve, which has convex margins distally and concave margins basally. Genital plate in ventral view concave basad with small medial incision; disto-lateral margins concave, meeting in rounded point. Epigynium in side view triangular; in dorsal view slightly constricted baso-laterad and flared at basal tips; large medial sclerotized spot with concave distal edge and larger convex basal edge.

Male specimens examined:

ECUADOR.

Banos. 1, W. C. MacIntyre, 5-VII-1938, WIU(Hull). 3, Velastiqui, 2 on 20-VIII-1963, 1 on 23-III-1965, WIU(Gerdes).

Cerro Obitahua. 2, Velastiqui, 4-IV-1967, WIU(Gerdes).

Obitahua Oriente. 4, Velastiqui, 1 on 19-VIII-1966, 3 on 13-IV-1967, WIU(Gerdes).

Rio Blanco. 4, Velastiqui, 16-IV-1966, WIU(Gerdes).

Sanqay Oriente. 1, Velastiqui, 7-III-1966, WIU(Gerdes).

Female specimens examined:

ECUADOR.

Banos. 5, Velastiqui, 28-VII-1963 to 29-XII-1966, WIU(Gerdes).

Cerro Obitahua. 1, Velastiqui, 3-IV-1967, WIU(Gerdes).

Chaupi. 1, Velastiqui, 2-VIII-1963, WIU(Gerdes).

Macas, Rio Upano. Paratype of T. sylvaticus, F. M. and H. Brown,

24-I-1939, WIU(Fluke).

Obitahua Oriente. 1, Velastiqui, 3-V-1965, WIU(Gerdes).

Rio Blanco. 1, Velastiqui, 16-IV-1966, WIU(Gerdes).

Suggested New Species

Head (figure 117). Face yellow and truncate in side view. Antennae yellowish-orange; darker dorsad on 3rd segment. Front in male black centrally with all margins narrowly yellow; in female black mediad, yellow laterad. Face produced slightly beyond antennae. Vertex golden brown in front of and within area of ocelli; shining violet to black behind ocelli; covered with black hair. Black area of cheeks extending onto face baso-laterad.

Thorax. Humeri, margin of scutum, and scutellum yellow to orange. Scutellum covered with long erect black hair. Posterior one-half of mesopleuron and dorsal sternopleural spot yellow; no propleural yellow spot. All femora and tibiae yellow with black hair and no darker colored bands. Posterior tarsi dark brown, other tarsi yellow.

Abdomen (figure 118). Long oval, almost parallel-sided, with 2nd to 4th segments each having a wide black posterior fascia. Wide black basal fascia on 2nd segment. Third and 4th segments each with narrow, medially incised, basal fascia; and same segments each with a pair of subbasal spots, often loosely connected to basal fascia. Linear basal fascia and wider posterior black fascia on 5th segment, which may have a tiny spot attached to the basal fascia. Background color on all segments above yellow to orange.

Male genitalia (figures 25, 42, 59). Superior lobe in side view with convex ventral margin; rounded basal and distal corners; dorsal extension which is bifurcate distad; smaller baso-lateral protuberance; ventral margin and disto-ventral corner covered with short bristles; a few hairs on dorsal extension and baso-lateral protuberance; a few scattered hairs on lateral surface. Stylus in dorsal view with fairly parallel medial and lateral margins; truncate distal end; distal one-half and baso-lateral area of dorsal surface covered with scattered hairs, a few medial hairs appearing longer and thicker; distal one-half of ventral surface covered with a few scattered shorter hairs. Triangular process one-third length of styli and with small rounded distal tip. Epandrium two-thirds length of styli. Ejaculatory hood in dorsal view with straight distal margin; in side view dorsal margin concave distad; disto-dorsal tip formed into a slightly up-turned pointed tip, which proceeds directly ventrad and flares laterad; with baso-medial flap on each side, rounded distad. Sustentacular apodeme with small dorsal and ventral keels. Ejaculatory apodeme in side view enlarged and rounded distad. Ejaculatory sac in side view thin, only slightly enlarged at articulation with ejaculatory apodeme; in dorsal view with prominent lateral projections. Chitinous box with pointed medial projection inside ejaculatory hood.

Female genitalia (figures 78, 97, 116). Hypogynium in ventral view constricted baso-laterad; with straight basal margin, rounded disto-lateral margins, and disto-medial depression. Dorsal valve in side view one-half length of ventral valve, which has straight dorsal

margin and convex ventral margin. Genital plate in ventral view with concave basal margin and slightly concave disto-lateral margins; in side view basal end curves upwards to dorsal margin of ventral valves. Epigynium in dorsal view with fairly straight basal margin, continuously curved lateral and distal margins, and triangular sclerotized spot immediately basal to middle of epigynium; in side view with small hump above sclerotized spot and 2 small distal depressions on dorsal margin.

This is a somewhat variable species. Various paratypes display absence or fusion of abdominal spots, brownish femora or anterior tarsi, or even a faint subapical femoral band. The allotype lacks subbasal spots on the 4th abdominal segment. However, at least one specimen displaying one or more of these anomalies had the genitalia removed. In all cases the paratype genitalia appeared identical to the holotype or allotype genitalia.

All specimens were labelled as coming from an altitude of 2600 meters, although Brown (1941) gives the altitude as 2886 meters for Aloag, Pichincha, which is about 30 km south-southwest of Quito, and located in an arid interandean valley with a mean annual temperature of 10.8° C.

Male specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Aloag, Pichincha. Holotype, 21-VI-1967, genitalia examined. Thirteen paratypes; 9 on 21-VI-1967, 3 with genitalia examined; 3 on 23-VI-1967, 1 with genitalia examined; 1 on 27-VI-1967, genitalia examined.

Female specimens examined:

ECUADOR. All, Velastiqui, WIU(Gerdes).

Aloag, Pichincha. Allotype, 21-VI-1967, genitalia examined. Ten paratypes; 4 on 21-VI-1967, 1 with genitalia examined; 3 on 23-VI-1967, 1 with genitalia examined; 3 on 27-VI-1967, 1 with genitalia examined.

Observations of Holotypes
and Allotypes

Twenty-two holotypes and allotypes from the American Museum of Natural History were examined, and the genitalia of 12 of these holotypes and allotypes were removed and examined.

Toxomerus idalius and Toxomerus eurydice
holotypes

The genitalia of these holotypes appeared to be identical. These specimens should probably be referred to as Toxomerus idalius.

Genitalia (figure 119). Superior lobe in side view with dorso-basal extension, forked distad into 2 sharp-pointed tips; short baso-lateral protuberance; bristles along distal margin and shorter bristles along ventral margin. Stylus in dorsal view with continuously convex lateral and medial margins, which form a distal blunt tip; slightly wider on distal one-half. Triangular process two-thirds length of styli; narrow with rounded tip; in side view there appears below the stylus a medial, triangular, blunt projection ventrad. Epandrium in dorsal view fairly rectangular and about three-fourths length of styli.

Ejaculatory hood in dorsal view with distal tip narrowed, then laterally flared into rounded lobes which form a small disto-medial depression; in side view distal end similarly narrowed, then expanded into a bulbous end; no lateral flaps present but 2 very small, more heavily sclerotized extensions, which are medial to superior lobes and project ventro-distad slightly beyond superior lobes; ventro-basal rounded keel projecting ventro-distad between superior lobes and below the very small sclerotized extensions.

Holotype abdomen (figure 121). As shown in the T. idalius drawing, posterior part of first segment and base of 2nd segment black; posterior part of 2nd segment shining black; 3rd and 4th segments each have a reddish brown posterior fascia and dark brown medial spots; 5th segment with oval black spot. The T. eurydice holotype abdomen is slightly different.

Both specimens were described by Hull (1951).

Exact information on labels:

Toxomerus idalius holotype: Puyo, Oriente,
Ecuador, 1000m
XII-3 to 15-1938
F. M. & H. H. Brown

Toxomerus eurydice holotype (2 labels):

San Francisco
Rio Pastaza, Ecuad.
1200m. 1-X-38

W. C. Macintyre

Toxomerus sylphus allotype and holotype
and Toxomerus ultimus holotype

The allotype of T. sylphus and holotype of T. ultimus appeared to have identical genitalia and probably belong to the same species as T. nasutus, which is described above.

The T. sylphus abdominal pattern was drawn by Hull (1943a). The T. sylphus holotype abdomen has the lateral margins curled ventrad and highly distorted 4th and 5th segments. The T. sylphus allotype is covered with a white fungal growth. However, the abdominal patterns of the T. sylphus allotype and the specimens called T. nasutus in this paper agree closely.

Exact information on labels:

Toxomerus sylphus holotype: Banos, Ecuad.
13-V-39-2500m.
W. C. Macintyre

Toxomerus sylphus allotype: Banos, Ecuad.
9-VII-38-1800m.
W. C. Macintyre

Toxomerus ultimus holotype: Pichincha, Ecuador
Uyumbicho 2700m.
XI-4 to 13-38
F. Martin Brown

Toxomerus productus and Toxomerus cyrillus
holotypes

The genitalia of the types appeared to be identical. These 2 holotypes probably belong to the same species, T. productus, which is described above. The styli, triangular process, and distal end of the

ejaculatory hood are very similar to T. idalius, also described above. The abdomen of T. productus was drawn by Hull (1943a).

Exact information on labels:

Toxomerus productus holotype: Ecuador

Toxomerus cyrillus holotype (2 labels):

Macas, Rio
Upano, Ecuad.
1000m. 24-1-39

F. M. & H. Brown
Collectors

Toxomerus cyrillus allotype

This specimen may belong to the same species as the T. productus and T. cyrillus holotypes, Toxomerus productus.

These 3 specimens are alike in having the humeri, margins of the scutum, propleural spots, dorsal sternopleural spots, and posterior mesopleural spots, all yellow. The face is slightly shorter than the antennae. Both males have a dark brown subapical band on the posterior femur and a medial band on the posterior tibia; the femoral area basad to the band is lighter brown. The female has a light brown subapical band on the posterior femur and a subbasal band on the posterior tibia. The color pattern of the male T. cyrillus abdomen is very obscure and cannot be easily compared to the female T. cyrillus, which is well-marked. Four males and 11 females that were found to have the same genitalia showed considerable diversity of the abdominal patterns.

This specimen was described by Hull (1951).

The allotype has the same labels as the T. cyrillus holotype.

Toxomerus productus allotype and

Toxomerus brevifacies holotype

These 2 specimens may belong to the same species, Toxomerus brevifacies.

They both have a face as long as the antennae; a dark brown, white pilose, 3rd antennal segment; yellow humeri, scutellar margin, dorsal sternopleural spot, and posterior mesopleural spot; yellow, slightly infuscated scutellum with long black hair; and posterior yellow femora and tibiae with black hair. The thorax of the holotype is faded and appears to have a yellow propleural spot; the allotype has none. However, of the 25 males whose genitalia agreed with the holotype, a spot was noticeable on 3.

Sixteen females were found whose genitalia agreed with the allotype. The 25 male and 16 female specimens agreed in several cases closely on the labels as to locality and date.

The abdominal patterns of the 2 types were similar but showed some variation. The T. brevifacies abdominal drawing (figure 124) is slightly asymmetric since the abdomen is twisted on the left posterior side.

Holotype abdomen (figure 124). Posterior margin of first segment light brown but not reaching lateral edges. Second segment with wide, basal, light brown fascia, medially incised and not reaching lateral edges; complete posterior brown fascia. Third and 4th segments each with brown posterior fascia and darker medial spots, unconnected to the posterior fascia. Fifth segment with basal black spot and brown posterior corner spots.

Exact information on labels:

Toxomerus productus allotype: Ecuador

Toxomerus brevifacies holotype: Banos, Ecuador
Runtun Trail
XI-26-38. 2100m.
F. M. & H. H. Brown

Toxomerus ecuadoreus holotype
and allotype

The holotype genitalia were identical to the genitalia of 12 specimens keyed out as the same species, which was described above.

Holotype abdomen (figure 125). In the drawing the first segment is mainly charcoal colored except narrowly on the lateral edges. Second segment with wide basal fascia of the same color except narrowly on the lateral edges; posterior fascia same color on anterior part but shining black near posterior edge. Third segment with 2 thin basal strips and wide posterior fascia, both black; small medial incision in posterior fascia. Fourth segment similar except posterior fascia does not reach lateral edges. Fifth segment with tiny baso-medial spot and large posterior fascia, both reddish black. This holotype possesses no spots on 3rd and 4th segments, while several specimens with identical genitalia show varying degrees of development of spots.

The allotype genitalia were not examined.

Exact information on labels:

Toxomerus ecuadoreus holotype: Pichincha, Ecuador
Hda San Ranfael
Rio San Pedro
2700m XI-5-8'38
F. Martin Brown

Toxomerus ecuadoreus allotype (2 labels):

Cuenca,
Azuay, Ecu.
2500m. 22-11-39

F. M. & H. Brown
Collectors

Toxomerus antiopae holotype

The genitalia of this holotype are very different from those of any other species examined, although the abdominal pattern of this holotype and various specimens of Toxomerus ecuadoreus approaches the suggested new species.

Holotype abdomen (figure 122). In the drawing the first segment is almost completely shining black, only narrowly touching the lateral edges. Second segment black basad and mediad except for narrow yellow medial fascia; shining black on posterior margin. Third and 4th segments each with basal dull black fascia, medially incised; posterior fascia dull black on anterior part and medially incised, but shining black near posterior margin. Fifth segment with large oval black spot mediad and black subbasal areas; posterior black fascia mainly shining black but narrowly separated from surrounding margin of segment.

Holotype genitalia (figure 120). Superior lobes in dorsal view with long baso-lateral extensions reaching almost to lateral margins of styli and gradually tapering to distal edges of superior lobes. Styli in side view closely pressed down on top of superior lobes and ejaculatory hood, making a clear side view impossible. The baso-lateral extension of the superior lobe appears to continue baso-mediad as short dorsal extension; distal and ventral margins covered with bristles.

Toxomerus ecuadoreus allotype (2 labels):

Cuenca,
Azuay, Ecu.
2500m. 22-11-39

F. M. & H. Brown
Collectors

Toxomerus antiopae holotype

The genitalia of this holotype are very different from those of any other species examined, although the abdominal pattern of this holotype and various specimens of Toxomerus ecuadoreus approaches the suggested new species.

Holotype abdomen (figure 122). In the drawing the first segment is almost completely shining black, only narrowly touching the lateral edges. Second segment black basad and mediad except for narrow yellow medial fascia; shining black on posterior margin. Third and 4th segments each with basal dull black fascia, medially incised; posterior fascia dull black on anterior part and medially incised, but shining black near posterior margin. Fifth segment with large oval black spot mediad and black subbasal areas; posterior black fascia mainly shining black but narrowly separated from surrounding margin of segment.

Holotype genitalia (figure 120). Superior lobes in dorsal view with long baso-lateral extensions reaching almost to lateral margins of styli and gradually tapering to distal edges of superior lobes. Styli in side view closely pressed down on top of superior lobes and ejaculatory hood, making a clear side view impossible. The baso-lateral extension of the superior lobe appears to continue baso-mediad as short dorsal extension; distal and ventral margins covered with bristles.

Stylus in dorsal view with convex lateral margin; fairly straight disto-medial margin; distal-most edge located mediad; scattered hairs over dorsal surface; a few bristles on disto-ventral surface. Epandrium in dorsal view almost same length as styli. Triangular process one-third length of styli. Ejaculatory hood in dorsal view with slightly concave distal margin; in side view with rounded disto-dorsal tip leading into straight disto-lateral margin that forms small lateral flap; baso-ventral rounded flap.

The allotype genitalia were not examined.

This species was described by Hull (1951).

Exact information on labels:

Toxomerus antiopae holotype (2 labels):

Urbina, Cerro
Chimorazo, Ecu.
3650m. 18-IV-39

F. M. & H. Brown
Collectors

Toxomerus antiopae allotype (2 labels):

Hda Talahua
Bolivar, Ecu.
3100m. 28-IV-39

F. M. & H. Brown
Collectors

Toxomerus steatornis allotype

and holotype

The allotype genitalia were not identical to the genitalia of any specimens examined. The allotype abdominal pattern appears very similar to the abdominal drawing of T. steatogaster by Hull (1943a), but the genitalia are very different in the latter species, which is described above.

Holotype abdomen. Very faded over all segments with no trace of black. The fasciae are a darker shade of yellow-orange than the background. No spots on 3rd and 4th segments.

Allotype abdomen (figure 123). In the drawing 2nd segment with reddish-brown basal and posterior fasciae, the former not reaching lateral edges. Third and 4th segments each with posterior reddish-brown fascia, medially incised and connected to a pair of medial spots of the same color. Fifth segment with large, oval, baso-medial, black spot that posteriorly touches a fascia that is mainly light colored except for a small, posterior, shining, black streak.

Allotype genitalia. Hypogynium in ventral view widest mediad; with disto-lateral margins straight, disto-lateral blunt tips with a small disto-medial depression. Dorsal valve in side view a little over one-half length of ventral valve, which has fairly straight dorsal margin and convex ventral margin. Genital plate in ventral view with concave baso-medial margin, straight disto-lateral margins, and rounded distal tip. Epigynium in dorsal view with slightly concave basal margin; continuously convex distal and lateral margins; large medial to disto-medial area, apparently heavily sclerotized but most of the sclerotization has been removed, and consisting of 2 partly fused lobes that taper disto-mediad to a point; in side view dorsal margin fairly straight with only a very small hump over the sclerotized spot, unlike T. steatogaster, making the differentiation of these 2 species very easy.

Hull (1943a) described T. steatornis.

The holotype genitalia were not examined.

Exact information on labels:

Toxomerus steatornis holotype (2 labels):

Sueua, Ecuad.
950m. 30-1-39

Rio Blanco
Rio Upano

Toxomerus steatornis allotype: Puyo, Oriente,
Ecuador, 1000m.
XII-3 to 15-1938
F. M. & H. H. Brown

Toxomerus nitidiventris, Toxomerus slossonae,

and Toxomerus tubularius holotypes

No specimens were found similar to these holotypes and the genitalia were not examined. All 3 abdominal patterns have been drawn by Hull (1943a). Curran (1930) first described T. nitidiventris and T. slossonae; Hull (1942) first described T. tubularius.

Exact information on labels:

Toxomerus nitidiventris holotype: Victoria
Brazil
X- ?

Toxomerus slossonae holotype (2 labels):

Bisc. Bay, Fla.

Collection of
Mar. A. T. Slosson
Ac. 26226

Toxomerus tubularius holotype: Banos
2000m.
14-VII-39

The date on the label for the T. nitidiventris holotype is poorly printed.

Toxomerus nymphalius holotype
and allotype

Several specimens were discovered identical to the holotype and allotype, and these specimens were described above. The genitalia of the holotype and allotype were not examined.

Exact information on labels:

Toxomerus nymphalius holotype (2 labels):

Rio Margajitas
Rio Pastaza, Ecuad.
1250m. 20-111-39

F. M. & H. Brown
Collectors

Toxomerus nymphalius allotype (2 labels):

Rio Mapeto
E. Ecuad.
1400m. 24-3-39

F. M. & H. Brown
Collectors

Toxomerus claracuneus holotype

Two male specimens of this species were discovered but no female specimens, which is the sex of the holotype. The holotype genitalia were not examined. The abdominal pattern was drawn by Hull (1943a).

The information on the 2 labels for the holotype is exactly the same as for the T. nymphalius holotype labels, which are given above.

Artificial Key to Toxomerus of Ecuador
Using External Characters

- 1 . Abdomen generally dark without obvious pattern;
hind femora dark; scutellar disk black2
- 1'. Abdomen with pattern of spots or vittae or both,
and fasciae4
- 2 . Abdomen wide; tiny or no yellow dorsal sterno-
pleural spot; face medially brown in male,
black in femaleT. flaviplurus
- 2'. Abdomen long and oval; prominent sternopleural
spot; face medially black or yellow3
- 3 . Front tibiae yellow in both sexes; face medially
yellow in male, black in femaleT. basilaris
- 3'. Front tibiae and face medially black in both
sexesT. anthrax
- 4 . Sublateral spots, vittae, or extensions from
posterior fascia on 4th abdominal segment; band
on posterior femora5
- 4'. No sublateral spots, vittae, or extensions from
posterior fascia on 4th segment12
- 5 . On 3rd abdominal segment posterior fascia is
extended forward on lateral margin6
- 5'. On same segment posterior fascia is not extended
forward on lateral margin and is narrowT. sylvaticus

- 6 . Sublateral spots, often loosely connected to black fascia, or thin sublateral vittae on 3rd and 4th abdominal segments7
- 6'. Large, blunt sublateral extensions of the posterior black fasciae on these segments; no spots or narrow vittae9
- 7 . Very thin and obscure, or no, medial yellow vitta on 3rd and 4th abdominal segmentsT. elongatus
- 7'. Wide yellow medial vitta on 3rd and 4th abdominal segments8
- 8 . On 4th segment posterior fascia is extended forward sublaterally to basal margin; large squarish black area lateral to this vittaT. pictus
- 8'. On same segment posterior fascia gradually widens toward lateral margin; basal sublateral spots sometimes touching base of segmentT. lachrymosus
- 9 . Yellow fascia of 2nd abdominal segment medially interrupted10
- 9'. Yellow fascia of same segment complete11
- 10 . Yellow fascia of second abdominal segment medially interrupted by extension of posterior black fascia; femora black except near articulationsT. hieroglyphicus

- 10'. Yellow fascia of same segment medially interrupted by yellow vitta, which is bordered by black vittae, often very thinT. nasutus
- 11 . Posterior black fascia of 3rd abdominal segment extends forward sublaterally to basal margin or very near itT. claracuneus
- 11'. Posterior black fascia of same segment extends forward very little sublaterallyT. nymphalius
- 12 . Abdomen very wide with thin posterior fasciae; medial spots on 3rd and 4th segments often obscureT. steatogaster
- 12'. Abdomen long and oval; posterior fasciae occupy at least one-fourth length of segment13
- 13 . Third abdominal segment with only small sub-medial spots, sometimes loosely attached to posterior fascia, which is straight or nearly so16
- 13'. Same segment with medial vittae or other dark patterns, but no spots14
- 14 . Paired submedial vittae on 3rd and 4th abdominal segments extend at right angles subbasally to the baso-lateral margin; yellow scutellar diskT. politus
- 14'. No such pattern of vittae; black scutellar disk15

- 15 . Third abdominal segment with black subbasal fascia, which touches basal margin mediad and lateradT. flavus
- 15'. Same segment with black posterior fascia gradually produced forward laterad, occupying over half the lateral marginsT. floralis
- 16 . Base of 4th abdominal segment narrowly black and medially interrupted17
- 16'. Base of same segment yellow18
- 17 . Tiny sublateral spots on 3rd and 4th abdominal segments connected to basal fascia; or no such spots presentSuggested New Species
- 17'. Tiny spots on same segments loosely connected to posterior fascia or freeT. ecuadoreus
- 18 . Dark band on posterior femur19
- 18'. No such dark bandT. brevifacies
- 19 . Baso-lateral margins of 2nd abdominal segment completely yellowT. duplicatus
- 19'. Basal dark fascia of same segment touches baso-lateral marginsT. productus

Artificial Key to Toxomerus of Ecuador

Using Male Genitalia

- 1 . In side view distal end of ejaculatory hood
pointed sharply and more heavily sclerotized2
- 1'. In side view distal end of ejaculatory hood
not as above3
- 2 . Triangular process less than one-half length
of styli; medial margins of styli slightly
convexT. anthrax
- 2'. Triangular process almost two-thirds length
of styli; medial margins of styli slightly
undulateT. basilaris
- 3 . Triangular process one-half or more length
of styli4
- 3'. Triangular process less than one-half length
of styli10
- 4 . In side view dorsal projection of superior lobe
rounded and not forked; triangular process
three-fourths length of styliT. flaviplurus
- 4'. In side view dorsal projection of superior lobe
forked or with one pointed tip5
- 5 . In side view bristles at least one-half length
of the width of the superior lobe project basad
from ventral margin of superior lobe6

- 5'. In side view many bristles project ventrad from ventral margin of superior lobe; no very long bristles7
- 6 . In side view disto-dorsal projection of ejaculatory hood narrowed, then distally expanded into a bulbous end; dorsal projection of superior lobe with 2 pointed tipsT. productus
- 6'. In side view same part of ejaculatory hood bluntly pointed; dorsal projection of superior lobe a small rounded tipT. claracuneus
- 7 . Two pairs of lateral lobes located on ventral margin of ejaculatory hood; in side view very narrow dorso-distal extension from chitinous boxT. lachrymosus
- 7'. One pair of lateral lobes on ventral or distal margin of ejaculatory hood8
- 8 . In side view styli very narrow and curved; in dorsal view lateral margins of styli continuously concaveT. sylvaticus
- 8'. In side view styli wide and slightly expanded on distal half; in dorsal view lateral margins of styli fairly straight9
- 9 . In side view no distal extension from chitinous box; disto-ventral flaps of ejaculatory hood well-produced and roundedT. pictus

- 9'. In side view a small dorsally-pointed extension from chitinous box; disto-ventral flaps little produced and immediately followed on posterior margin by a large medial keel that appears continuous with lobesT. nymphalius
- 10 . Triangular process with fairly straight margins that form distally a small rounded tip; superior lobe with dorsal extension, forked distad, and small medio-basal protuberance; well-produced ventral flaps to ejaculatory hood11
- 10'. Not exactly fitting above description13
- 11 . Ventral flaps of ejaculatory hood having pitted surfaces and distal serrated edgesT. ecuadoreus
- 11'. Ventral flaps of ejaculatory hood having smooth surfaces and distal margins12
- 12 . In side view dorso-distal tip of ejaculatory hood roundly pointed; in dorsal view distal tip of hood with small medial projectionT. brevifacies
- 12'. In side view distal margin of ejaculatory hood straight, forming a tiny dorso-distal pointed tip; in dorsal view distal tip of hood concaveSuggested New Species
- 13 . In side view superior lobes gradually wider dorsad with small sharp dorsal tip; in dorsal view triangular process with sharp distal tip and straight edgesT. politus

- 13'. In side view superior lobes not gradually wider dorsad; in dorsal view triangular process with rounded tip14
- 14 . In side view superior lobe with long dorsal extension having a distal rounded tip15
- 14'. In side view same lobe with no such structure16
- 15 . In side view distal margin of ejaculatory hood straight, not flared laterad into large flaps; baso-medial lateral projection to superior lobeT. hieroglyphicus
- 15'. In side view distal margin of hood flared ventro-laterad into flaps; no baso-medial lateral projection to superior lobeT. elongatus
- 16 . In dorsal view disto-lateral and disto-medial margins of styli concave and form a rounded distal tip on each stylus; styli widely separatedT. flavus
- 16'. In dorsal view disto-lateral and disto-medial margins straight to slightly convex; distal margins with shallow notches; styli narrowly separatedT. nasutus

Artificial Key to Toxomerus of Ecuador

Using Female Genitalia

- 1 . One or 2 sclerotized spots on epigynium2
- 1'. No sclerotized spot on epigynium; in side view
no hump on dorsal margin of epigynium16
- 2 . In dorsal view one small pair of sclerotized
spots, each located baso-laterad and obliquely
to base of epigyniumT. lachrymosus
- 2'. One medial sclerotized spot on epigynium3
- 3 . In side view sclerotized spot forms a hump
directly over itself on dorsal margin of
epigynium4
- 3'. In side view dorsal margin of sclerotized spot
is continuous with dorsal margin of epigynium
or forms a depression; epigynium may be humped
elsewhere9
- 4 . In side view sclerotized spot forms a very
large hump on more than one-half of dorsal
margin of epigynium; dorsal valves two-thirds
length of ventral valvesT. steatogaster
- 4'. In side view sclerotized spot forms a much
smaller hump on less than one-half length
of dorsal margin5
- 5 . In dorsal view sclerotized spot located on
basal half of epigynium6

- 5'. In dorsal view spot located mediad or on distal half of epigynium8
- 6 . In dorsal view slight concavity on baso-medial margin of epigynium; in ventral view distal margin of hypogynium almost straight mediallyT. nymphalius
- 6'. In dorsal view basal margin of epigynium continuously concave; in ventral view noticeable notch on disto-medial margin of hypogynium7
- 7 . Sclerotized spot rectangular and largeT. duplicatus
- 7'. Sclerotized spot pointed basad; straight to slightly concave distal marginSuggested New Species
- 8 . Small, medial, sclerotized spot; in side view hypogynium truncateT. pictus
- 8'. Transversely elongate, distal, sclerotized spot; in side view hypogynium with hump on ventral marginT. nasutus
- 9 . In dorsal view large sclerotized spot located immediately behind medio-distal margin and roundly pointed distad; in ventral view basal margin of genital plate straightT. flavus
- 9'. In dorsal view sclerotized spot located further basad; in ventral view basal margin of genital plate at least slightly concave and sometimes with medial incision10

- 10 . Dorsal valves one-third length of ventral valves11
- 10'. Dorsal valves one-half or more length of ventral valves12
- 11 . In side view large depression above sclerotized spot; in dorsal view spot triangular, pointed basadT. *ecuadoreus*
- 11'. In side view very small depression above sclerotized spot; in dorsal view spot located just above baso-medial marginT. *politus*
- 12 . Sclerotized spot located on basal half of epigynium13
- 12'. Spot located medially and large; basal margin of epigynium slightly concave to straight15
- 13 . In ventral view sclerotized plate bilobate; in side view same lobes dorsally enlargedT. *flavipilurus*
- 13'. No such sclerotized structure14
- 14 . In ventral view disto-lateral projections of hypogynium bluntly pointedT. *productus*
- 14'. In ventral view disto-lateral margins of hypogynium roundedT. *brevifacies*
- 15 . In ventral view basal margin of genital plate concave and hypogynium widest on distal halfT. *sylvaticus*
- 15'. In ventral view basal margin of plate slightly concave and hypogynium widest on basal halfT. *hieroglyphicus*

- 16 . In dorsal view epigynium narrow with 2 small
pairs of plates located between disto-lateral
sidesT. elongatus
- 16'. In dorsal view epigynium wide with no such
pairs of plates17
- 17 . In dorsal view epigynium with notch on baso-
medial marginT. floralis
- 17'. No such notch on epigynium18
- 18 . In side view ventral valves with concave dorsal
margin; in ventral view genital plate with
incision in baso-medial marginT. basilaris
- 18'. In side view valves with only slightly concave
dorsal margin; basal margin of genital plate
completeT. anthrax

Diagrammatic Representations of
Some Fly Morphology

Figure 1. Dorsal View of Male Genitalia

Figure 2. Right Side of Male Genitalia

Figure 3. Axial System of Male Genitalia

Figure 4. Right Side of Female Genitalia

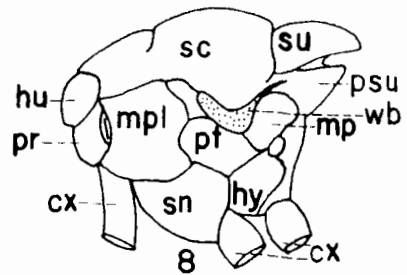
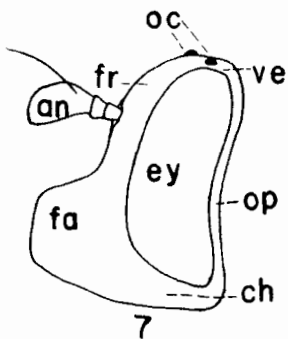
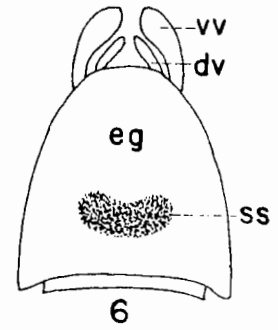
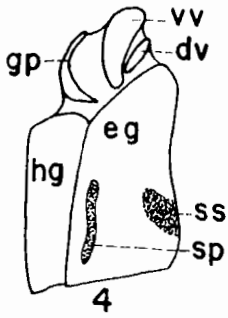
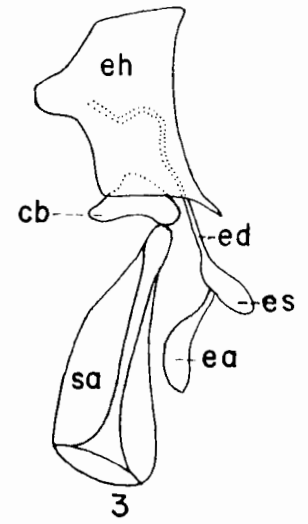
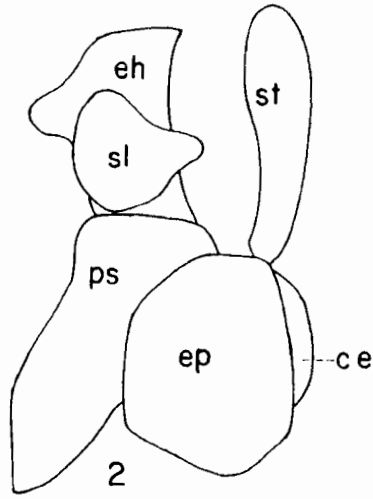
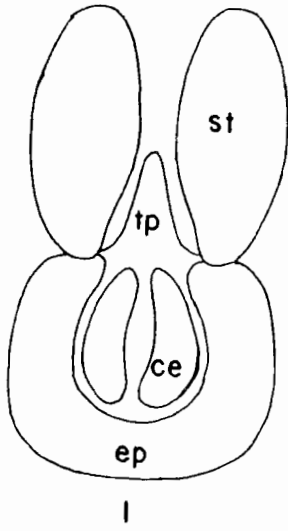
Figure 5. Ventral View of Female Genitalia

Figure 6. Dorsal View of Female Genitalia

Figure 7. Left Side of a Fly Head

Figure 8. Left Side of a Fly Thorax

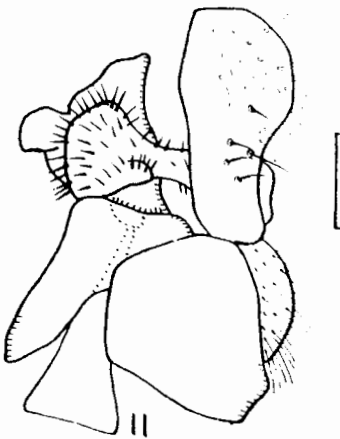
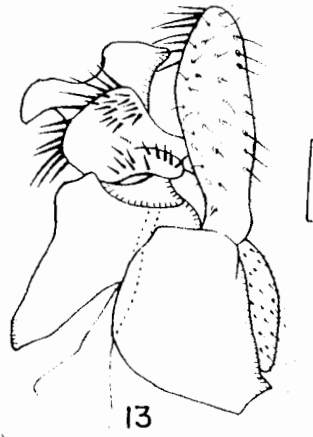
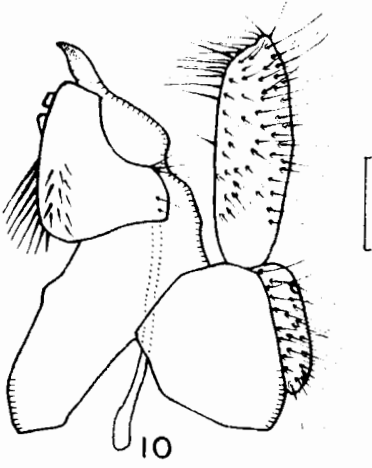
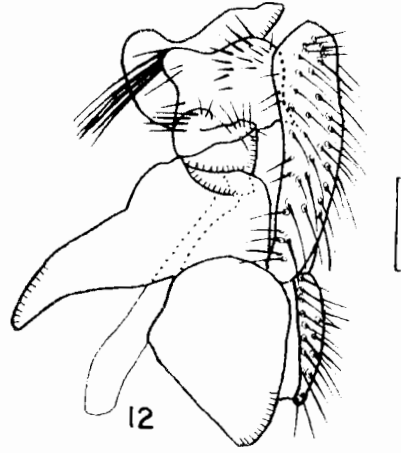
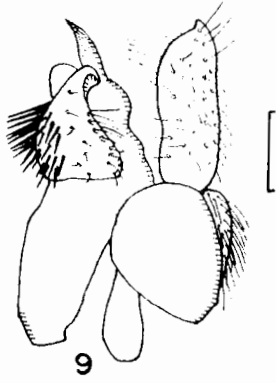
Abbreviations: an, antenna; cb, chitinous box; ce, cercus; ch, cheek; cx, coxa; dv, dorsal valves; ea, ejaculatory apodeme; ed, ejaculatory duct; eg, epigynium; eh, ejaculatory hood; ep, epandrium; es, ejaculatory sac; ey, eye; fa, face; fr, front; gp, genital plate; hg, hypogynium; hu, humerus; hy, hypopleuron; me, mesepimeron; mpl, mesopleuron; oc, ocellus; op, occiput; pr, propleuron; ps, penis sheath; psu, postscutellum; pt, pteropleuron; sa, sustentacular apodeme; sc, scutum; sl, superior lobe; sn, sternopleuron; sp, sclerotized plate; ss, sclerotized spot; st, stylus; su, scutellum; tp, triangular process; ve, vertex; vv, ventral valve; wb, wing base.



Right Side of Male Genitalia

- Figure 9. Toxomerus anthrax
Figure 10. Toxomerus basilaris
Figure 11. Toxomerus brevifacies
Figure 12. Toxomerus claracuneus
Figure 13. Toxomerus ecuadoreus
Figure 14. Toxomerus elongatus

Scale line = 0.17 mm



Right Side of Male Genitalia

Figure 15. Toxomerus flaviplurus

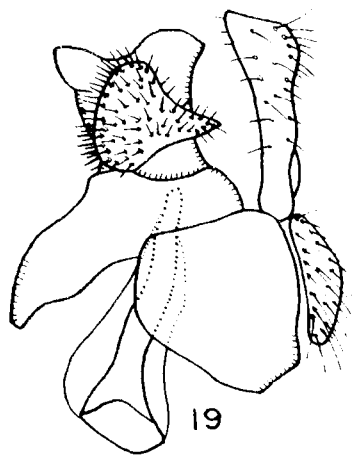
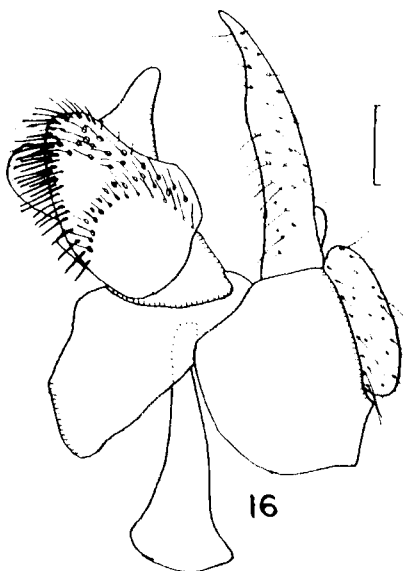
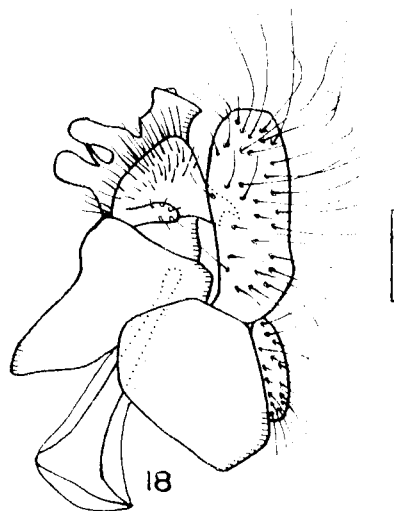
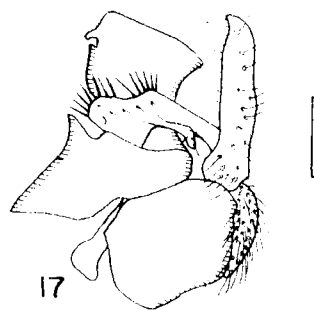
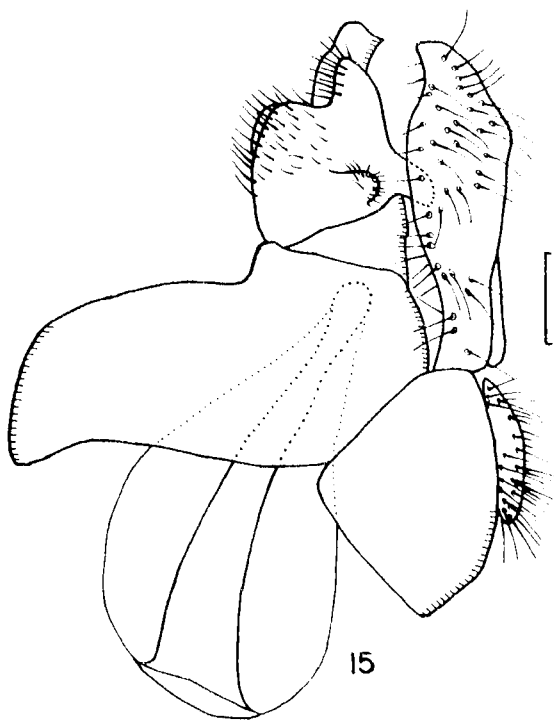
Figure 16. Toxomerus flavus

Figure 17. Toxomerus hieroglyphicus

Figure 18. Toxomerus lacrymosus

Figure 19. Toxomerus nasutus

Scale line = 0.17 mm



Right Side of Male Genitalia

Figure 20. Toxomerus nymphalius

Figure 21. Toxomerus pictus

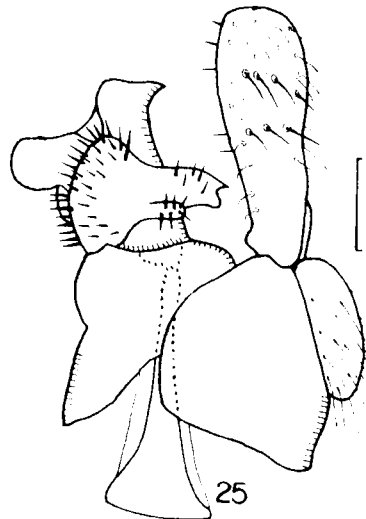
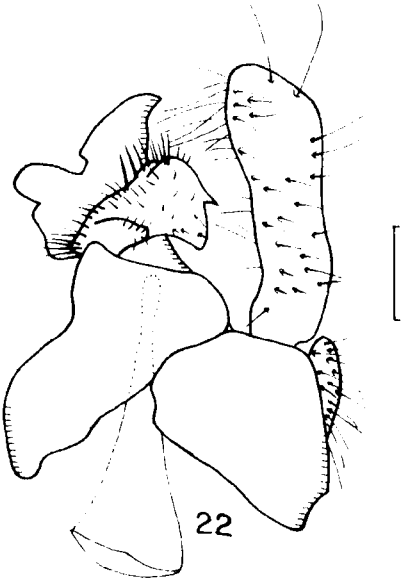
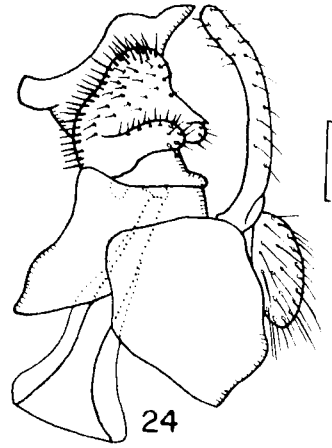
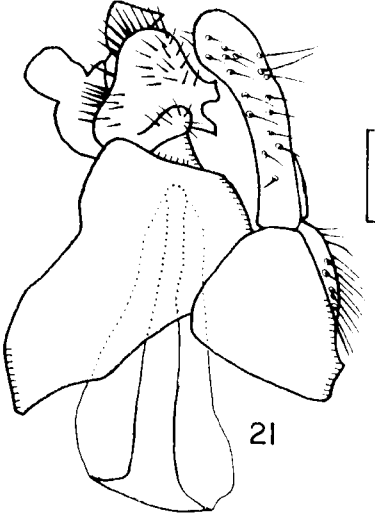
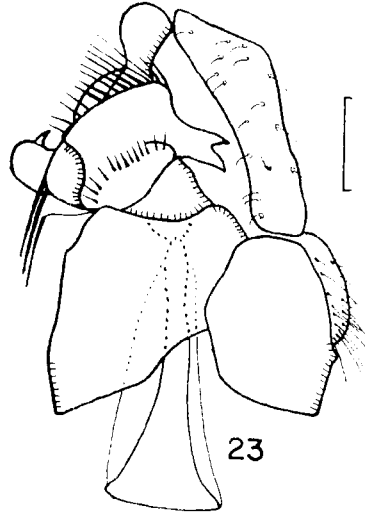
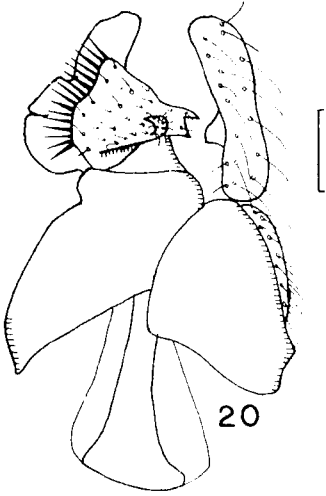
Figure 22. Toxomerus politus

Figure 23. Toxomerus productus

Figure 24. Toxomerus sylvaticus

Figure 25. Suggested New Species

Scale line = 0.17 mm



Dorsal View of Male Genitalia

Figure 26. Toxomerus anthrax

Figure 27. Toxomerus basilaris

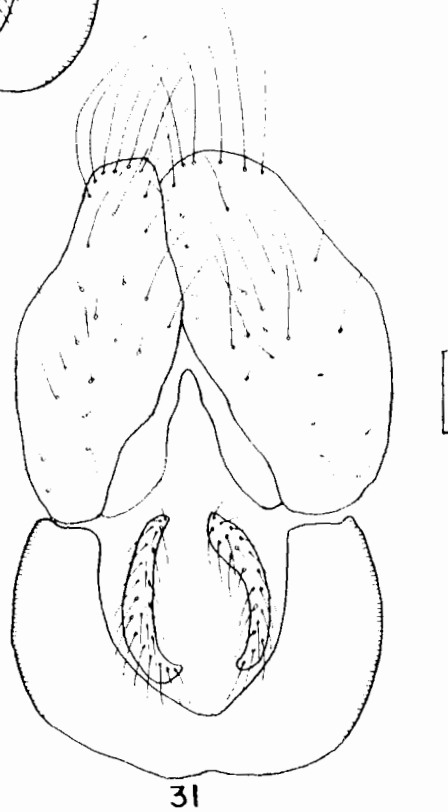
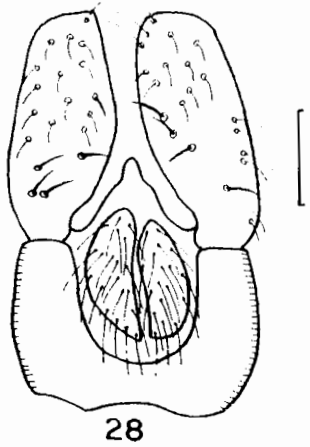
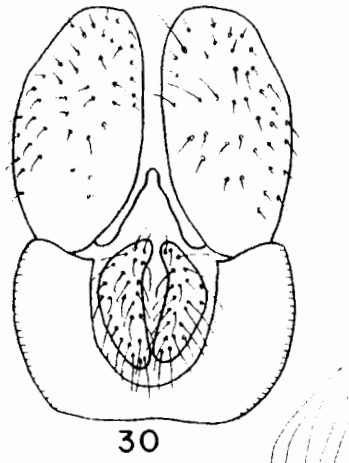
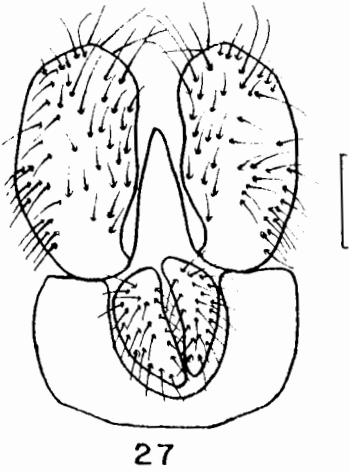
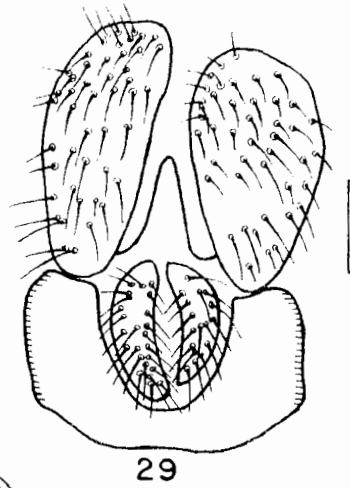
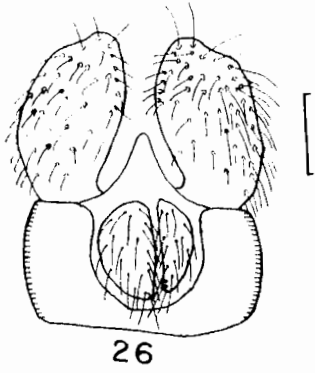
Figure 28. Toxomerus brevifacies

Figure 29. Toxomerus claracuneus

Figure 30. Toxomerus ecuadoreus

Figure 31. Toxomerus elongatus

Scale line = 0.17 mm



Dorsal View of Male Genitalia

Figure 32. Toxomerus flaviplurus

Figure 33. Toxomerus flavus

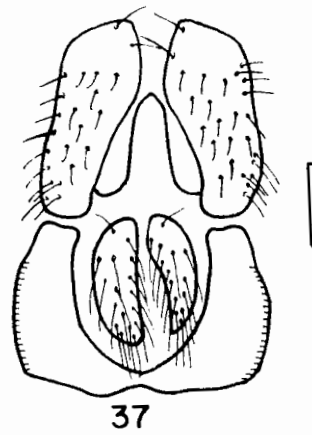
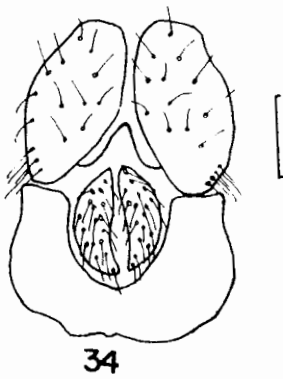
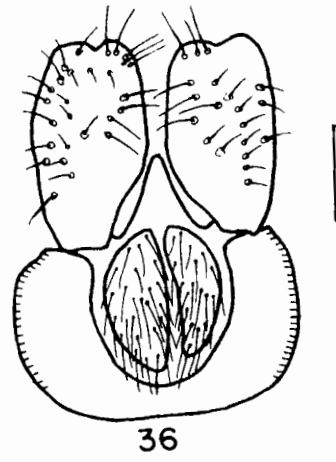
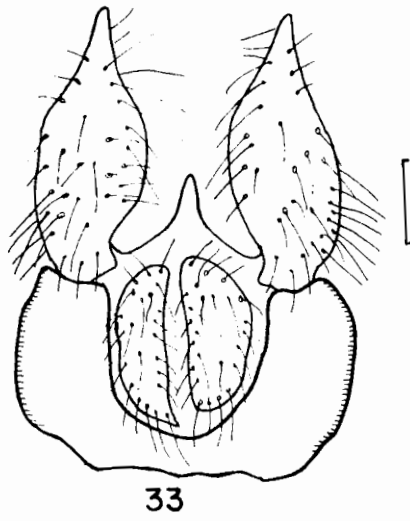
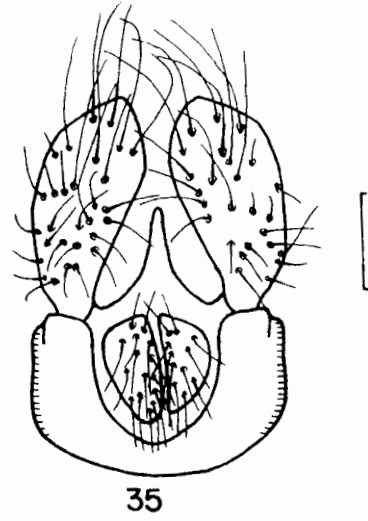
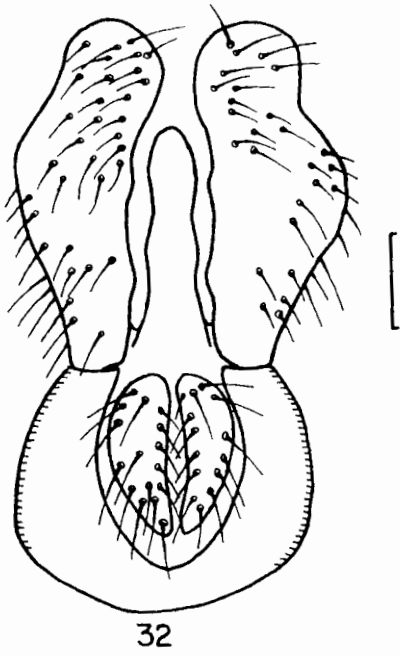
Figure 34. Toxomerus hieroglyphicus

Figure 35. Toxomerus lacrymosus

Figure 36. Toxomerus nasutus

Figure 37. Toxomerus nymphalius

Scale line = 0.17 mm



Dorsal View of Male Genitalia

Figure 38. Toxomerus pictus

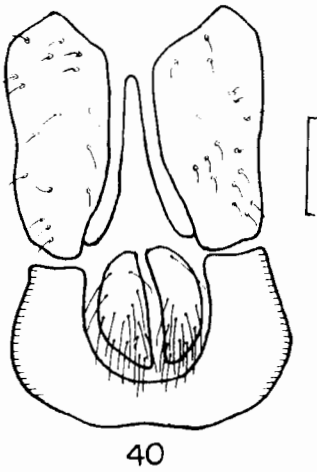
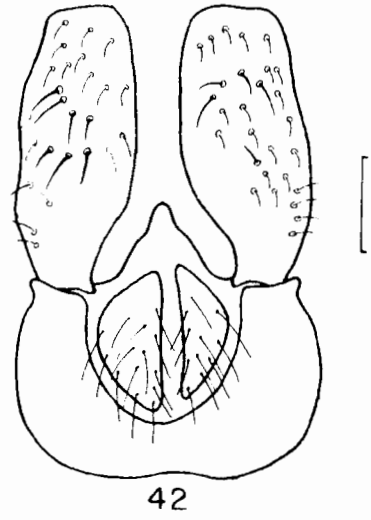
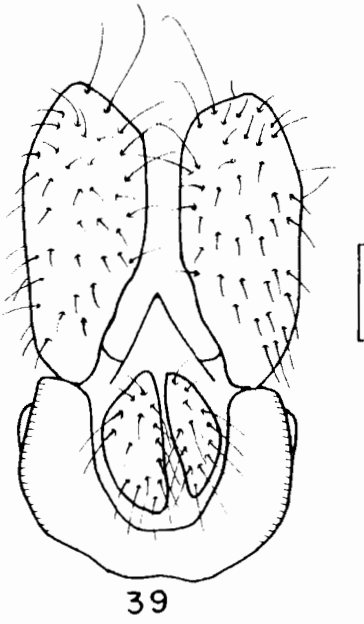
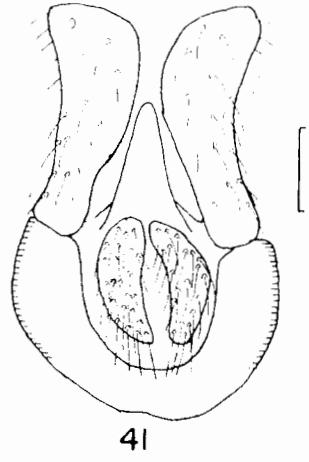
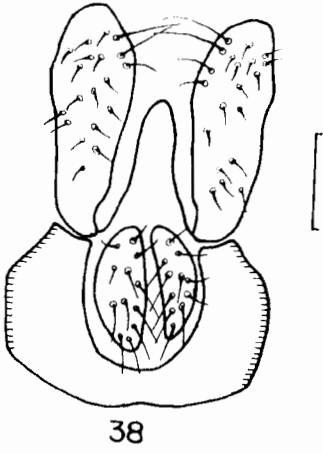
Figure 39. Toxomerus politus

Figure 40. Toxomerus productus

Figure 41. Toxomerus sylvaticus

Figure 42. Suggested New Species

Scale line = 0.17 mm



Axial System of Male Genitalia

Figure 43. Toxomerus anthrax

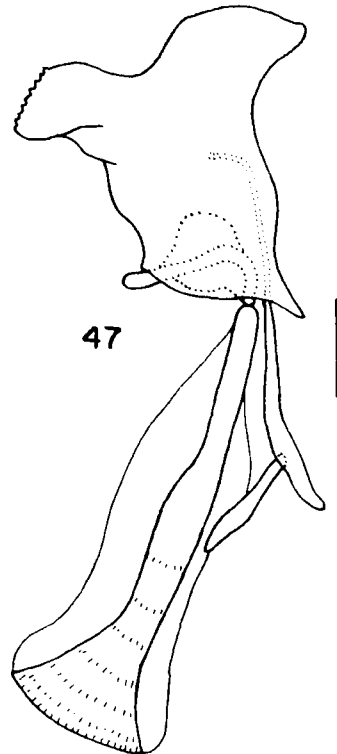
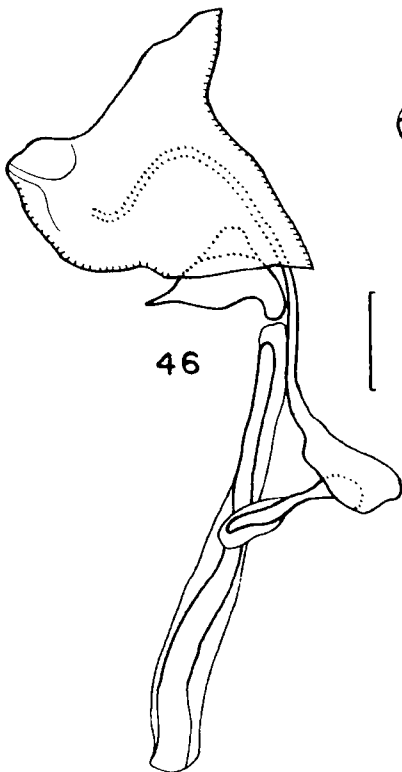
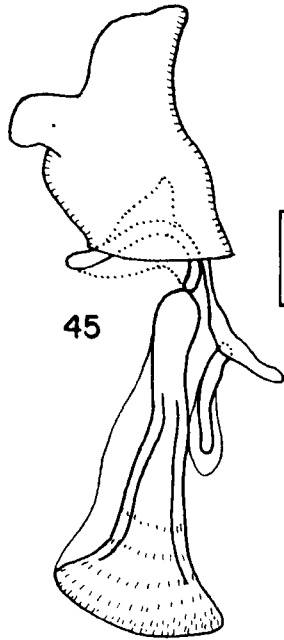
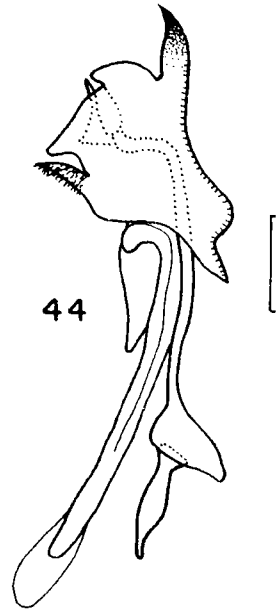
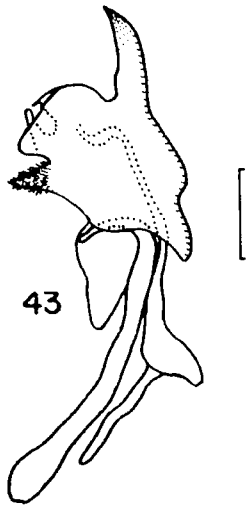
Figure 44. Toxomerus basilaris

Figure 45. Toxomerus brevifacies

Figure 46. Toxomerus claracuneus

Figure 47. Toxomerus ecuadoreus

Scale line = 0.12 mm



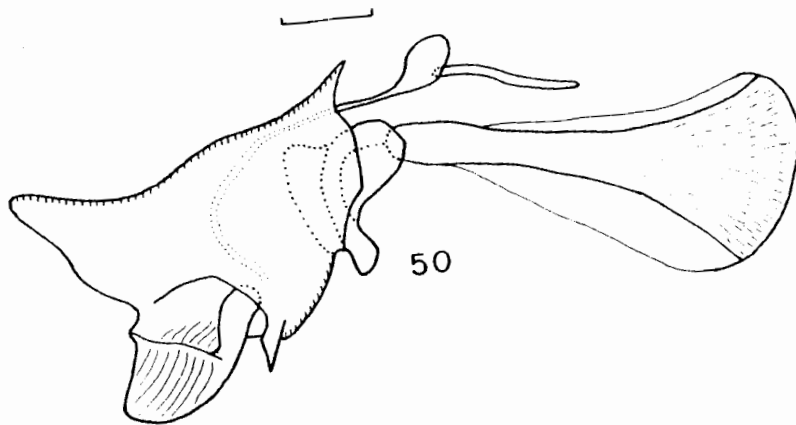
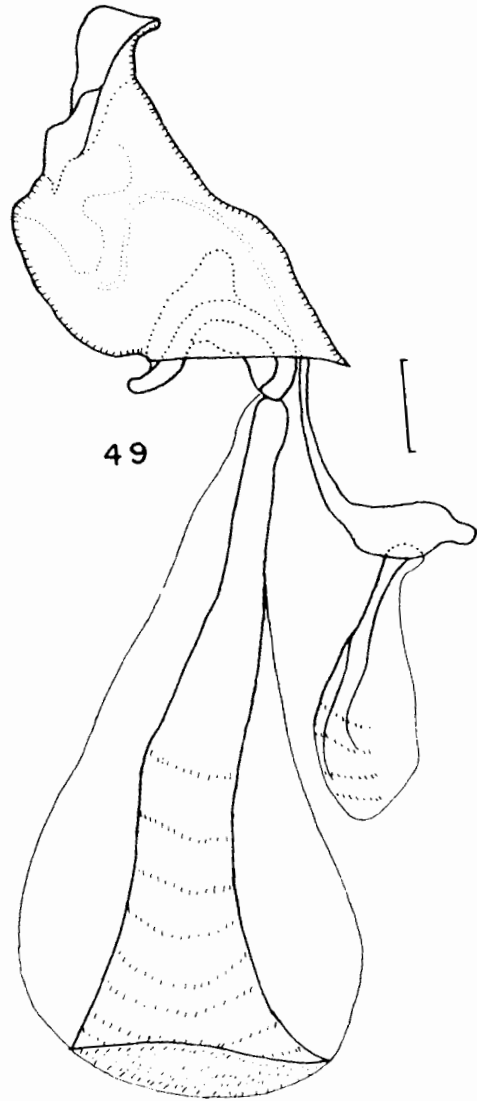
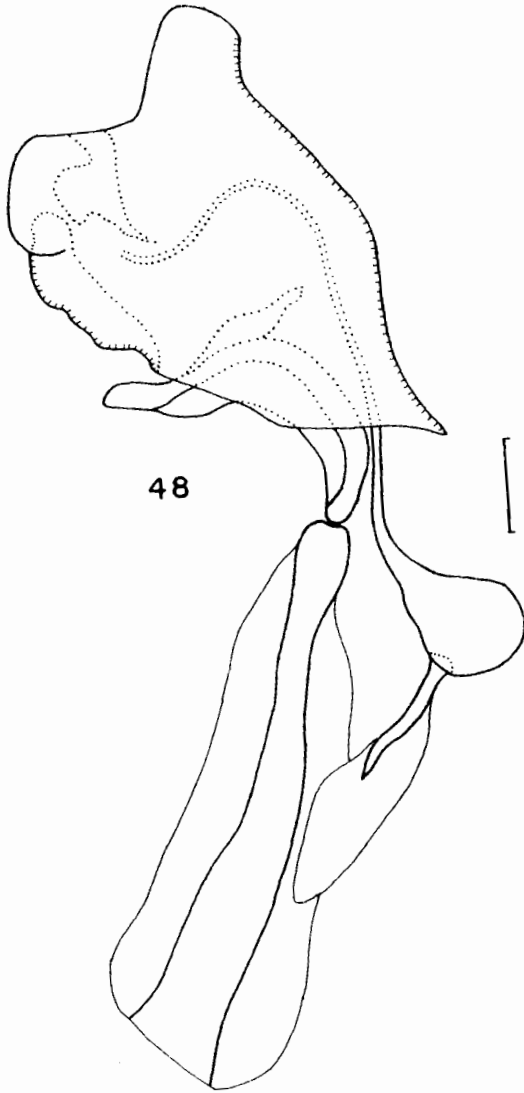
Axial System of Male Genitalia

Figure 48. Toxomerus elongatus

Figure 49. Toxomerus flaviplurus

Figure 50. Toxomerus flavus

Scale line = 0.12 mm



Axial System of Male Genitalia

Figure 51. Toxomerus hieroglyphicus

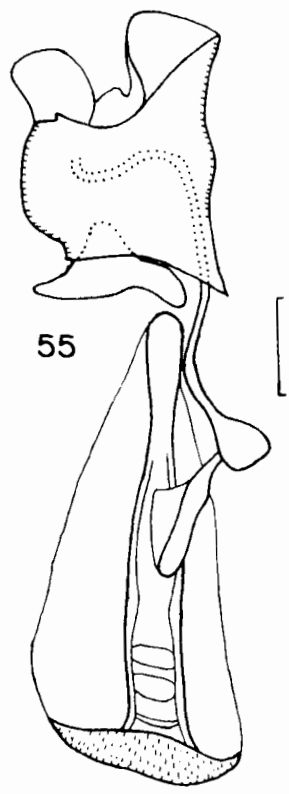
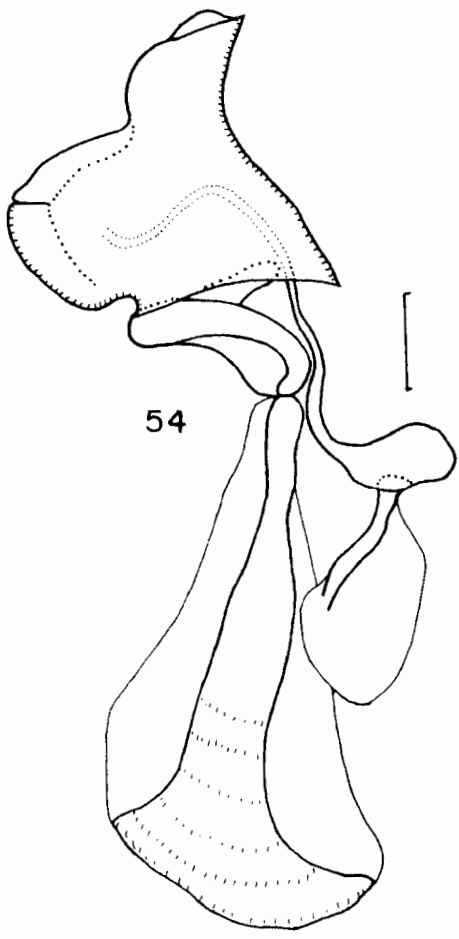
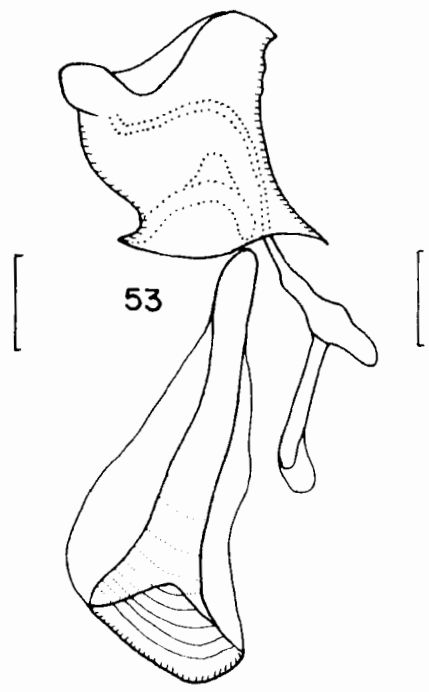
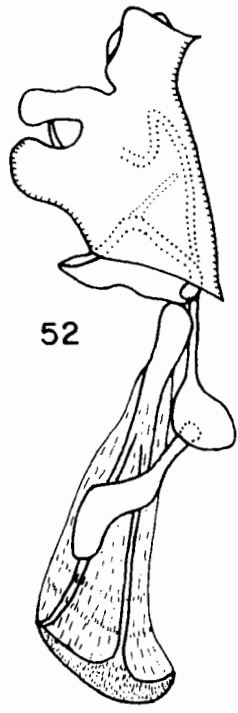
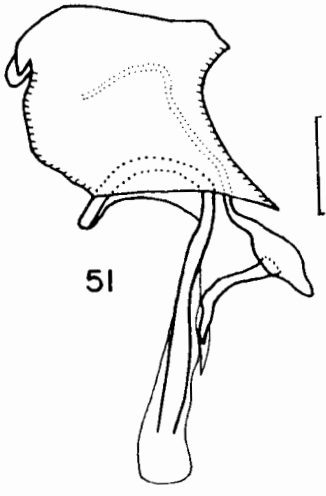
Figure 52. Toxomerus lacrymosus

Figure 53. Toxomerus nasutus

Figure 54. Toxomerus nymphalius

Figure 55. Toxomerus pictus

Scale line = 0.12 mm



Axial System of Male Genitalia

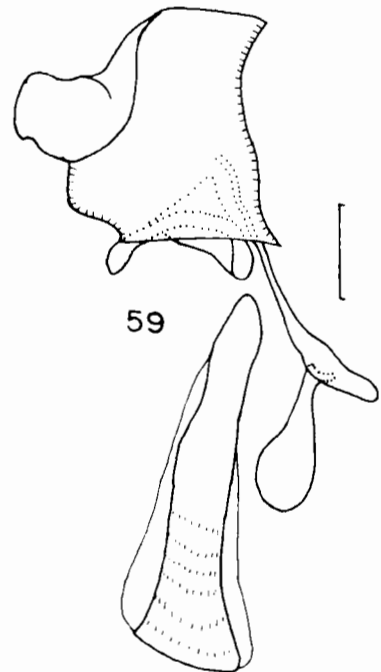
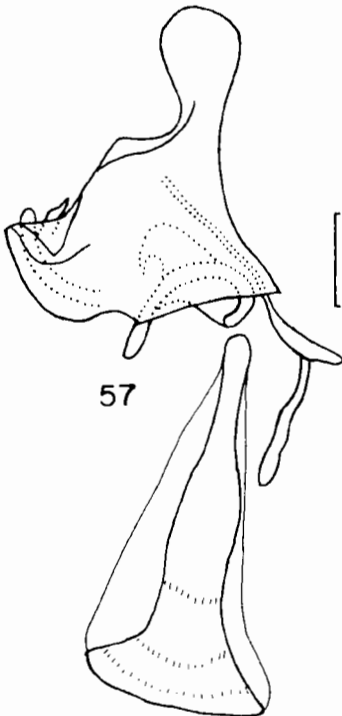
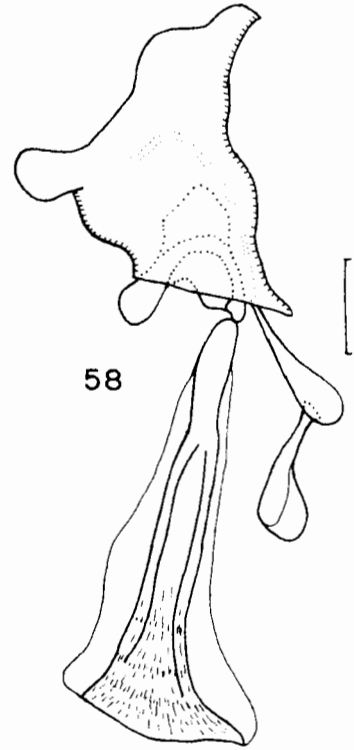
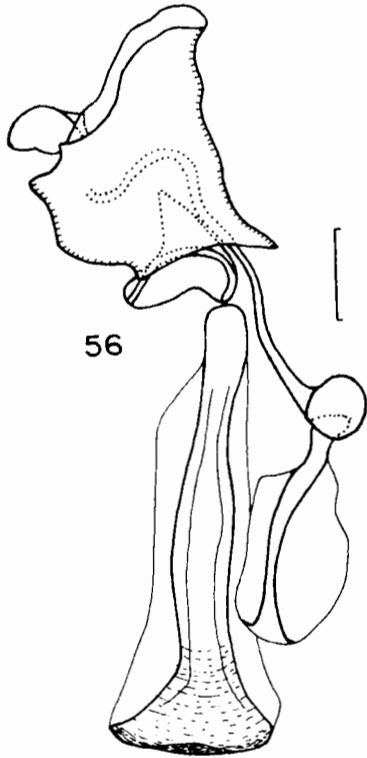
Figure 56. Toxomerus politus

Figure 57. Toxomerus productus

Figure 58. Toxomerus sylvaticus

Figure 59. Suggested New Species

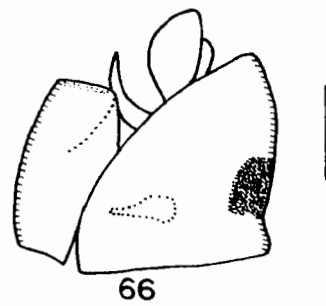
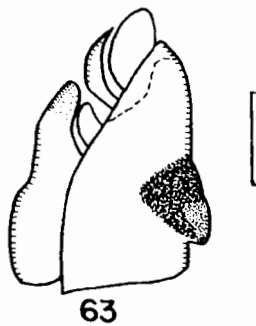
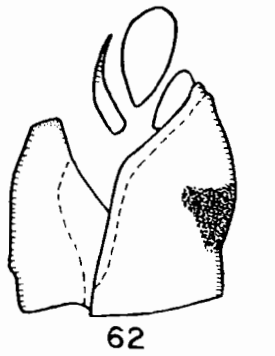
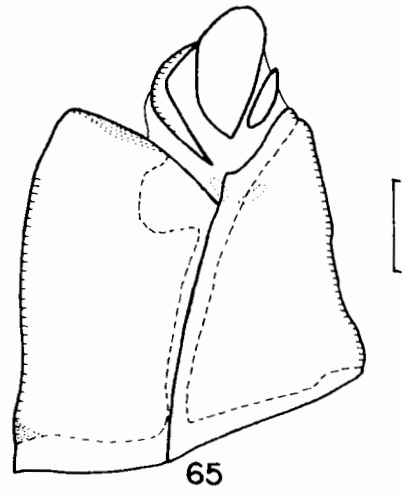
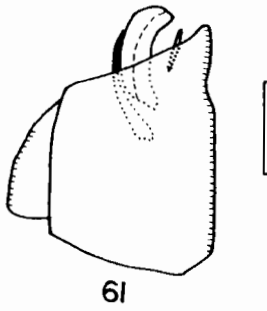
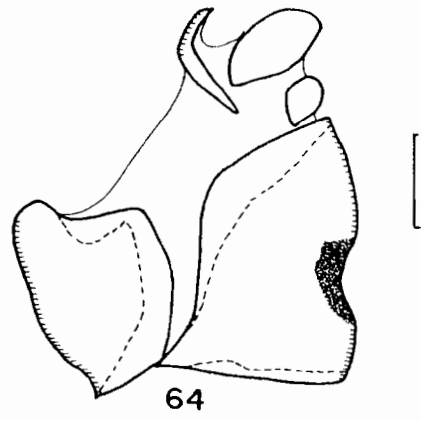
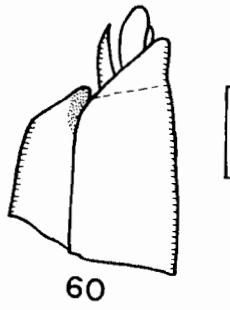
Scale line = 0.12 mm



Right Side of Female Genitalia

- Figure 60. Toxomerus anthrax
Figure 61. Toxomerus basilaris
Figure 62. Toxomerus brevifacies
Figure 63. Toxomerus duplicatus
Figure 64. Toxomerus ecuadoreus
Figure 65. Toxomerus elongatus
Figure 66. Toxomerus flaviplurus

Scale line = 0.17 mm



Right Side of Female Genitalia

Figure 67. Toxomerus flavus

Figure 68. Toxomerus floralis

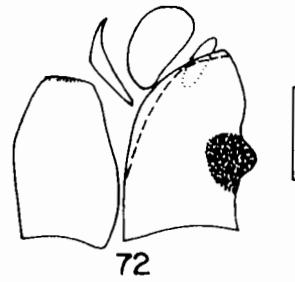
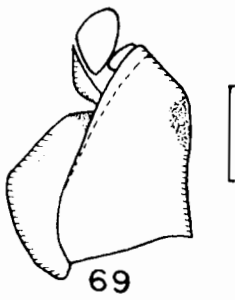
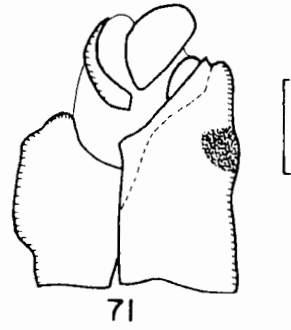
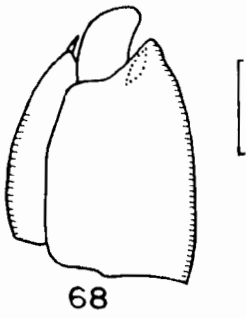
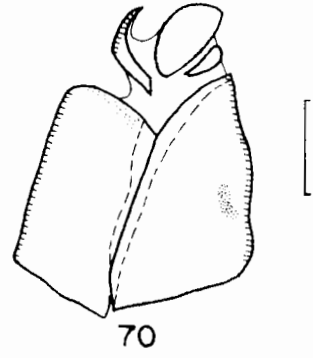
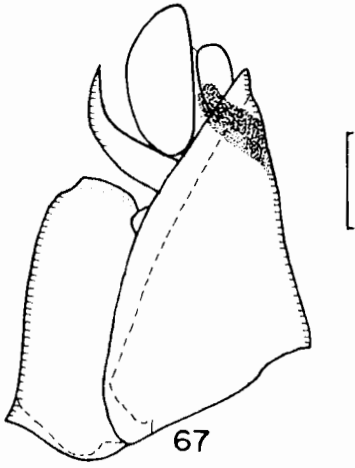
Figure 69. Toxomerus hieroglyphicus

Figure 70. Toxomerus lacrymosus

Figure 71. Toxomerus nasutus

Figure 72. Toxomerus nymphalius

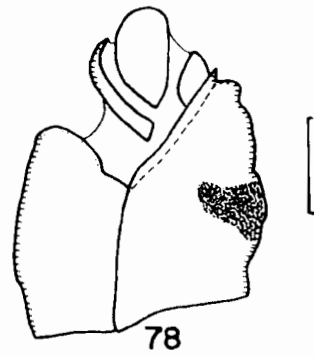
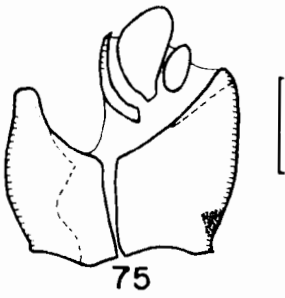
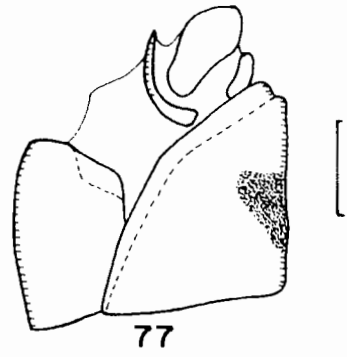
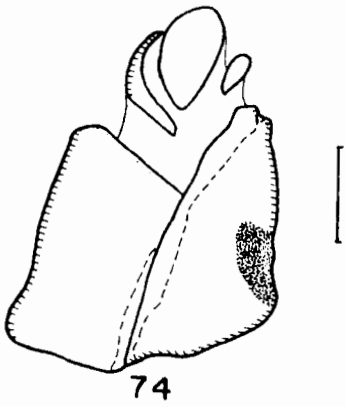
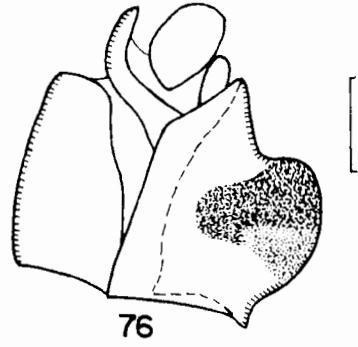
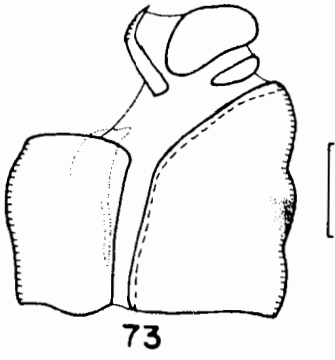
Scale line = 0.17 mm



Right Side of Female Genitalia

- Figure 73. Toxomerus pictus
Figure 74. Toxomerus politus
Figure 75. Toxomerus productus
Figure 76. Toxomerus steatogaster
Figure 77. Toxomerus sylvaticus
Figure 78. Suggested New Species

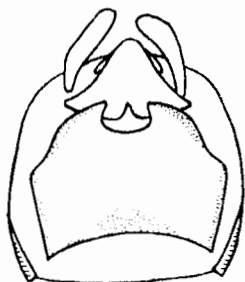
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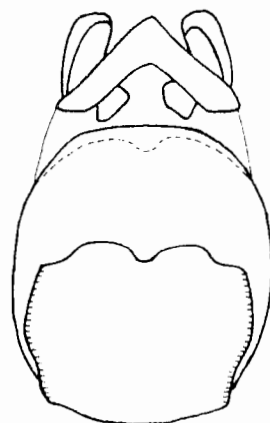
Ventral View of Female Genitalia

- Figure 79. Toxomerus anthrax
- Figure 80. Toxomerus basilaris
- Figure 81. Toxomerus brevifacies
- Figure 82. Toxomerus duplicatus
- Figure 83. Toxomerus ecuadoreus
- Figure 84. Toxomerus elongatus
- Figure 85. Toxomerus flaviplurus

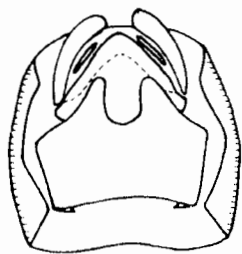
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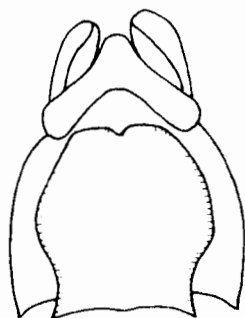
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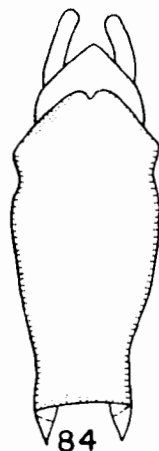
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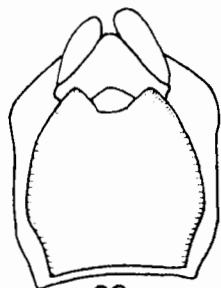
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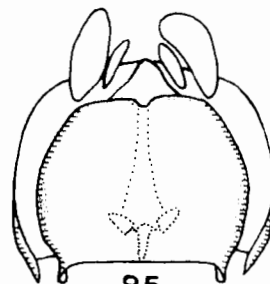
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84



82

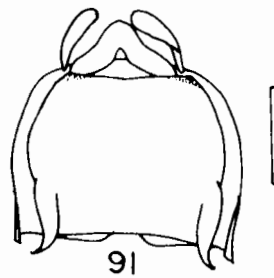
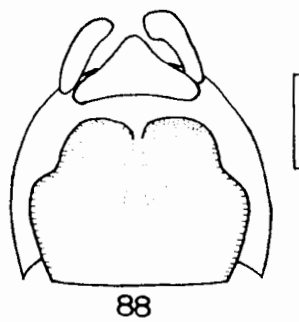
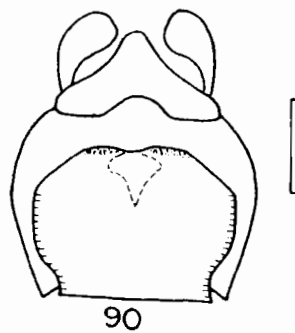
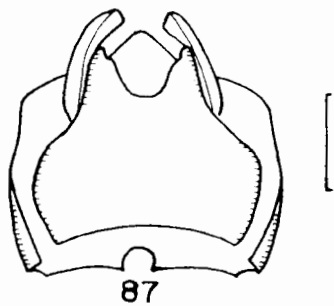
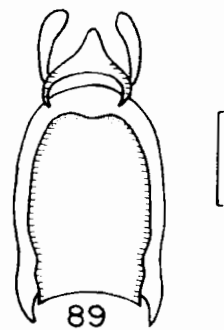
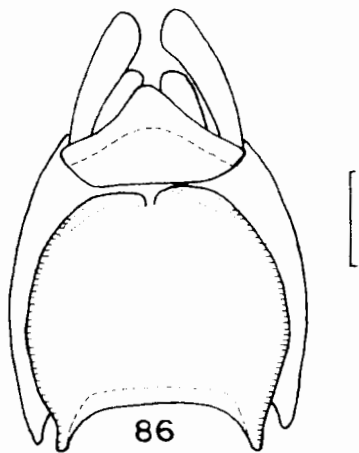


85

Ventral View of Female Genitalia

- Figure 86. Toxomerus flavus
Figure 87. Toxomerus floralis
Figure 88. Toxomerus hieroglyphicus
Figure 89. Toxomerus lacrymosus
Figure 90. Toxomerus nasutus
Figure 91. Toxomerus nymphalius

Scale line = 0.17 mm



Ventral View of Female Genitalia

Figure 92. Toxomerus pictus

Figure 93. Toxomerus politus

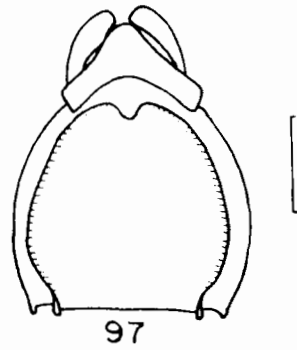
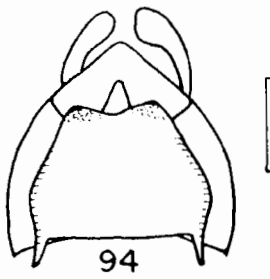
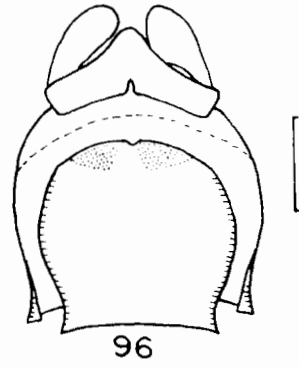
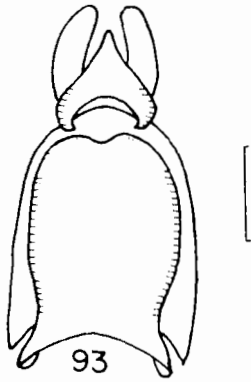
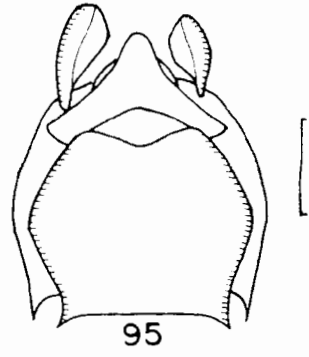
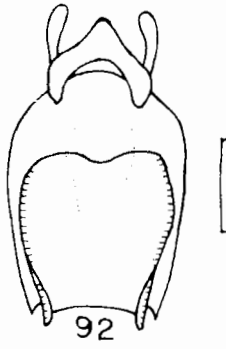
Figure 94. Toxomerus productus

Figure 95. Toxomerus steatogaster

Figure 96. Toxomerus sylvaticus

Figure 97. Suggested New Species

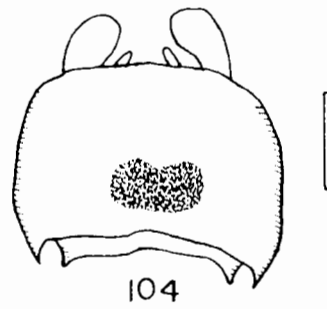
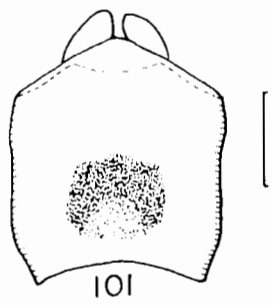
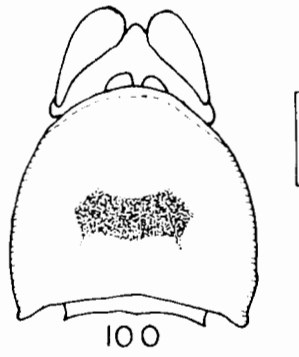
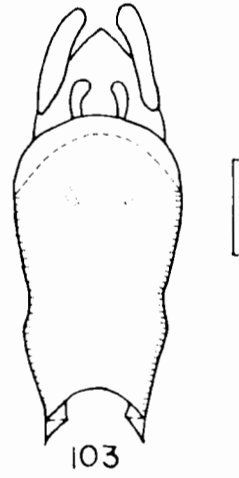
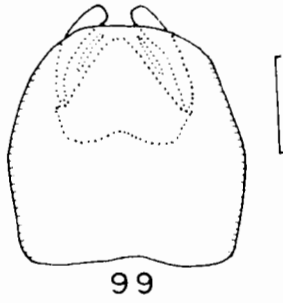
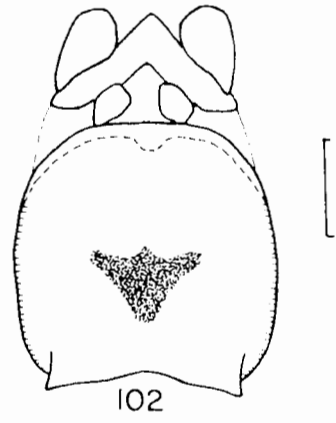
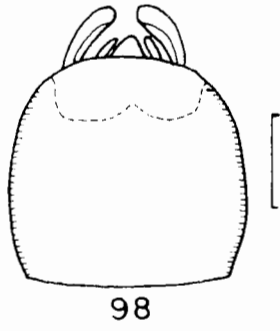
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Dorsal View of Female Genitalia

- Figure 98. Toxomerus anthrax
Figure 99. Toxomerus basilaris
Figure 100. Toxomerus brevifacies
Figure 101. Toxomerus duplicatus
Figure 102. Toxomerus ecuadoreus
Figure 103. Toxomerus elongatus
Figure 104. Toxomerus flaviplurus

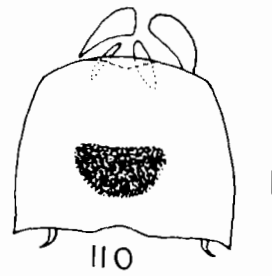
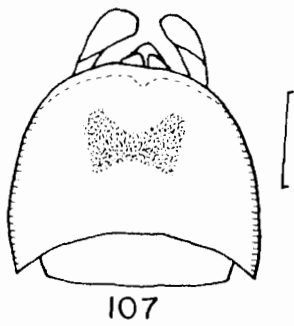
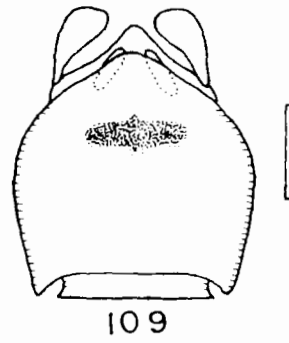
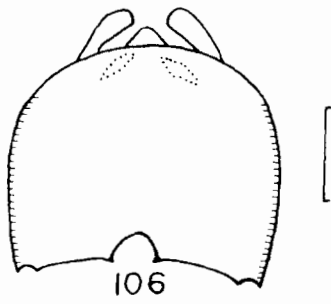
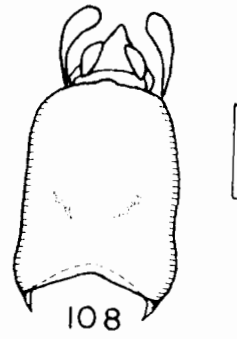
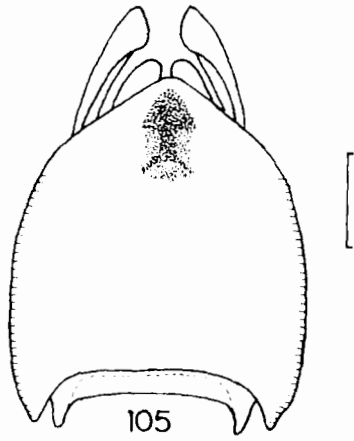
Scale line = 0.17 mm



Dorsal View of Female Genitalia

- Figure 105. Toxomerus flavus
Figure 106. Toxomerus floralis
Figure 107. Toxomerus hieroglyphicus
Figure 108. Toxomerus lacrymosus
Figure 109. Toxomerus nasutus
Figure 110. Toxomerus nymphalius

Scale line = 0.17 mm



Dorsal View of Female Genitalia

Figure 111. Toxomerus pictus

Figure 112. Toxomerus politus

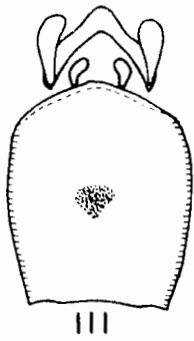
Figure 113. Toxomerus productus

Figure 114. Toxomerus steatogaster

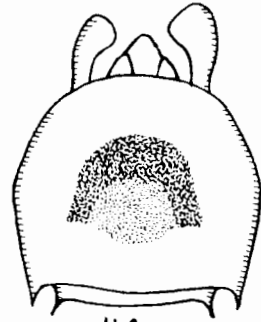
Figure 115. Toxomerus sylvaticus

Figure 116. Suggested New Species

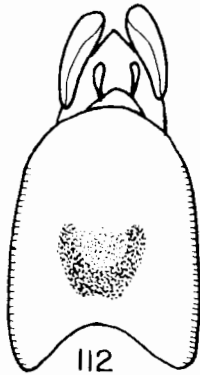
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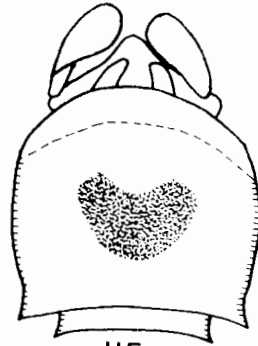
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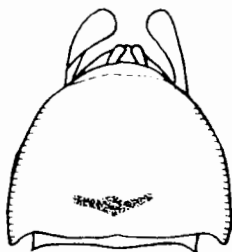
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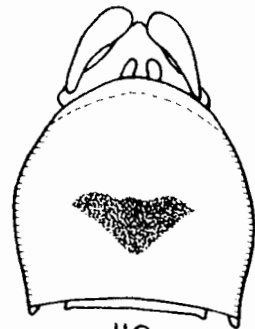
112



115



113



116

Suggested New Species

Figure 117. Left Side of Head

Scale line = 0.3 mm

Color Legend for Figure 117

Heavy stippling posterior to antenna: shining black

Lighter stippling around eye: black

Fine stippling of face and cheek: dark brown

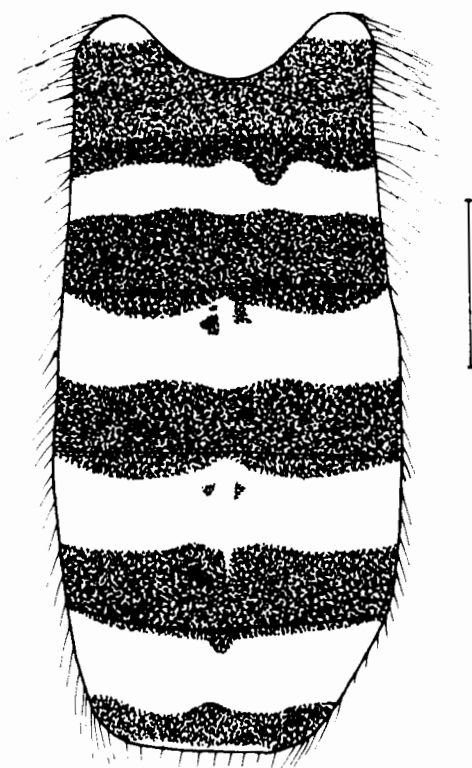
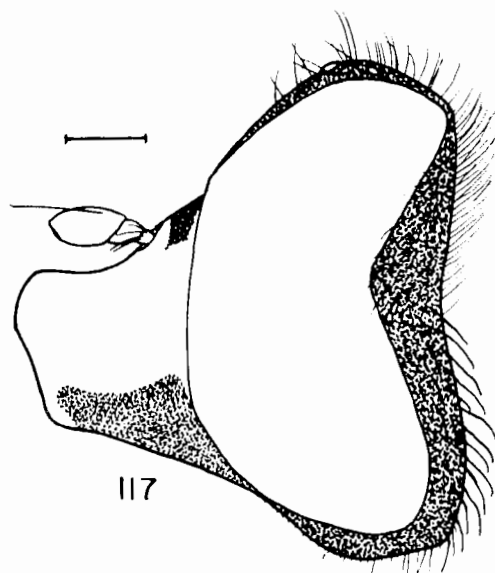
Figure 118. Dorsal Abdominal View

Scale line = 0.8 mm

Color Legend for Figure 118

Heavier stippling: black

Lighter stippling: slate gray



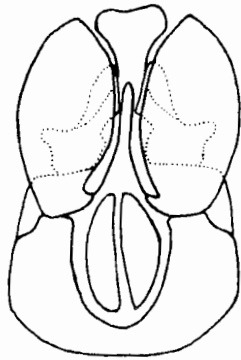
Holotype Figures

Figure 119. Toxomerus idalius, dorsal view of male genitalia

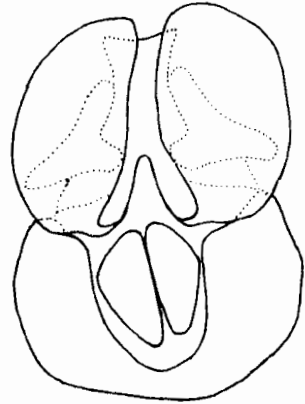
Figure 120. Toxomerus antiopae, dorsal view of male genitalia

Figure 121. Toxomerus idalius, dorsal abdominal view

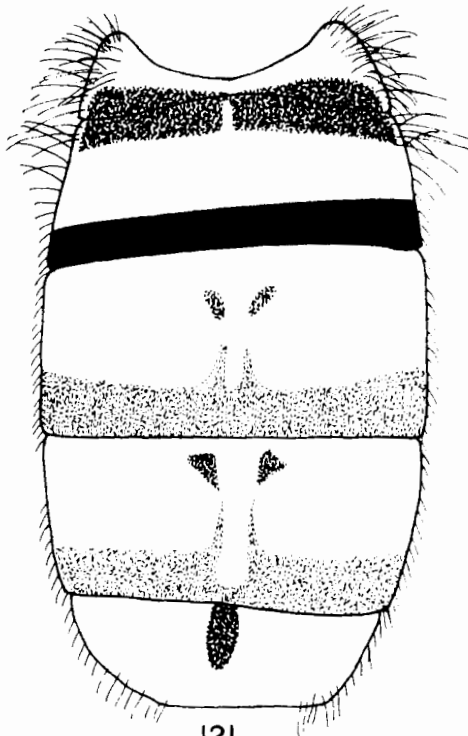
Figure 122. Toxomerus antiopae, dorsal abdominal view



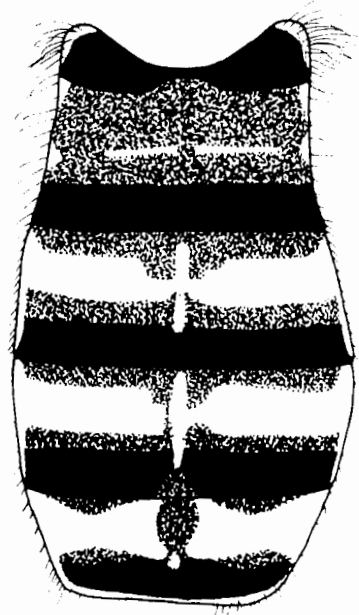
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120



121



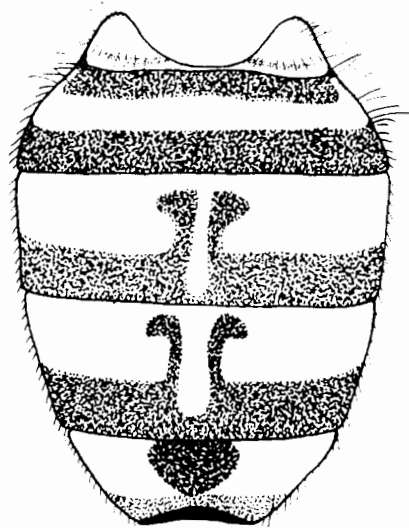
122

Holotype and Allotype Figures

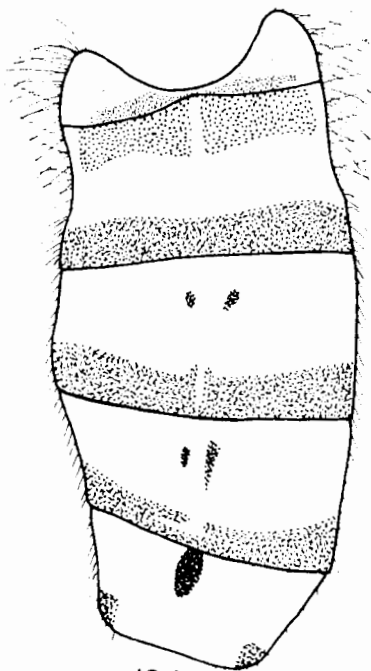
Figure 123. Toxomerus steatornis, allotype, dorsal
abdominal view

Figure 124. Toxomerus brevifacies, holotype, dorsal
abdominal view

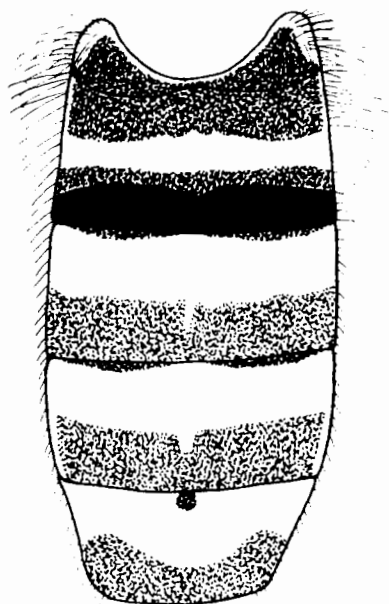
Figure 125. Toxomerus ecuadoreus, holotype, dorsal
abdominal view



123



124



125

DISCUSSION

The purpose of this study has been to examine the taxonomy and morphology of the genus Toxomerus (Diptera:Syrphidae) of Ecuador and to determine if alternatives to abdominal color patterns and morphological features of the head and thorax would be useful. The emphasis was on the genitalia of both sexes in order to determine if their characteristics would be more reliable in separating and identifying species.

The degree of development of spots and vittae and the degree of intensity of abdominal color patterns were the most variable intraspecific features. These features should be avoided in constructing artificial keys. Dark bands on the posterior legs, facial features, and pleural coloration showed more intraspecific uniformity.

The male and female genitalia showed very little intraspecific variation but great differences among species. Especially useful in constructing an artificial key to the male genitalia were the superior lobes, ejaculatory hood, and triangular process. For the key to the female genitalia the sclerotized spot on the epigynium was especially useful. In contrast to the female genitalia, the male genitalia had more features that were subject to interspecific variation. Therefore, the key to the male genitalia was more useful.

The keys and descriptions of Curran (1930) and Hull (1943a and 1951) were useful but limited due to their heavy reliance on fine

differences in both coloration and development of spots and vittae on the abdomen. This can lead to unnecessary synonymy of species.

When the genitalia and morphology of all the species of this genus and related genera have been studied, a better understanding of homologous relationships of the highly diverse anatomical parts among the many species should result.

CONCLUSIONS

External color patterns may be quite variable intraspecifically, but the genitalia of both sexes show very little intraspecific variation and are therefore of greater taxonomic utility. Furthermore, the male genitalia display a greater variety of anatomical features and are most useful in differentiating species and constructing artificial keys, followed in usefulness by the female genitalia, and lastly the external color patterns.

Twenty species of the genus Toxomerus of Ecuador are listed, plus those by other workers, but this should not be construed as a complete listing, since some rather large geographical areas were not represented in the collections available.

LITERATURE CITED

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Dorilaiden-Studien VI. Acta Zoologica Lilloana del Instituto,
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