

Studies of Neotropical  
Caddisflies, XXVIII:  
The Trichoptera of the  
Río Limón Basin, Venezuela

OLIVER S. FLINT, JR.

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 330

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## ABSTRACT

Flint, Oliver S., Jr. Studies of Neotropical Caddisflies, XXVIII: The Trichoptera of the Río Limón Basin, Venezuela. *Smithsonian Contributions to Zoology*, number 330, 61 pages, 169 figures, 1 table, 1981.—The Río Limón is a small stream that drains from Rancho Grande, by Maracay, into Lago Valencia in northern Venezuela. The fauna at the lower elevations appears to be one generally distributed around the Caribbean Sea or even more widely throughout the lowlands of the Neotropics. However, the fauna at the higher elevations is probably rather narrowly endemic, or more rarely distributed southwardly throughout the Andes. Fifty-six species belonging to 25 genera and 9 families are reported from the basin. Of these, 31 species, 1 subspecies, and the genus *Byrsopteryx* are described as new. New synonymies are made in the genera *Chimarra*, *Polycentropus*, *Oxyethira*, and *Nectopsyche*. All species are keyed, discussed, and illustrated.

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*Oliver S. Flint, Jr.*

## Introduction

To the biologist raised in temperate regions, the tropics bring to mind an impenetrable jungle with sudden torrential deluges and incredible diversity of life. But if his first contact is with the north coast of Venezuela, the part of South America closest to North America, he would be shocked to find behind the shore a dry zone of thorn-scrub and cactus! However, if one has been fortunate enough to start from the coast of the Province of Aragua, a few kilometers takes one from the coconuts and cactus into the forest, at first thorn-scrub, next deciduous and then semi-evergreen. A drive of only 25 kilometers, mostly spent zigzagging back and forth up the front of a spur of the Andes, puts one into the Portachuelo Pass at about 1100 meters elevation, and into everyone's concept of a tropical jungle. Situated just inland of the Pass is Rancho Grande, a fantastic unfinished edifice now in part a museum whose existence and surroundings were well described by William Beebe (Beebe and Crane, 1947; Beebe, 1949). Fortunately this area was set aside in 1937 by the Venezuelan government as a national park, now known as the Parque Nacional "Henri Pittier."

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Draining inland from the Portachuelo Pass, Rancho Grande, and the surrounding peaks, is the Río Limón. Although its headwaters (Figure 1) arise high up on the peaks at 1600 meters or so, it is only about 20 kilometers in length, and is still a rather small stream when it empties into the land-locked Lago Valencia at 404 meters above sea level. For most of its course through the park it is barely touched by man, and where it enters the savanna lowlands below the forest it still maintains a relatively natural gallery forest (Figure 2). At the Estacion Piscicultura de El Limón (540 meters), the Río leaves the protection of the park and traverses urban areas with all the ensuing problems humanity gives its rivers.

As would be expected, biologists have collected this region, especially since the late 1940's for insects as well as other animals. Although the tremendous flights of moths attracted to the lights at Rancho Grande are well known (Beebe, 1949, facing p. 324), these flights include representatives of most orders of nocturnally active insects, including caddisflies. To sample this fauna, my wife and I traveled to Venezuela for the month of February 1976, and although we did not collect at Rancho Grande itself we made numerous collections from the Río Limón basin and similar small streams on the coastal side of the Pass.

ZOOGEOGRAPHY.—Herein treated are 56 species



FIGURES 1, 2.—Habitats: 1, small stream in cloud forest near Rancho Grande; 2, Río Limón at Estacion Piscicultura.

placed in 25 genera and 9 families, a very rich fauna for such a small basin; however, there appear to be two very distinctive parts to this fauna. The lower elevations, the Estacion Pisci-

cultura being the prime example, lie in the Holdridge zone of humid premontane forest that now consists only of a gallery forest in a savanna-like landscape. The upper sites near Rancho Grande

lie in the Holdridge zone of very humid premontane forest (Ewel, Madriz, and Tosi, 1976), commonly called cloud forest. The Trichoptera taken in these two zones are almost totally different. Only *Wormaldia planae*, *Chimarra platyrhina*, *C. creagra*, *Leptonema albovirens*, *L. insulanum*, *Alisotrichia wirthi*, *Atanatolica botosaneanui*, *Oecetis knutsoni*, *Nectopsyche punctata*, *N. aureofasciata*, *Phylloicus angustior*, and *Helicopsyche angulata* are recorded from both elevations. Of these 12 species, *W. planae*, *C. creagra*, *L. albovirens*, *L. insulanum*, and *P. angustior* probably breed at both levels. The others, in general, are represented by a few individuals taken at higher elevations, generally at the light at Rancho Grande, and may well have been carried upward by winds from lowland breeding sites.

Most of the species taken at either level are now known only from one or a few adjacent sites in the basin, and are not instructive in terms of general distributional patterns. A few species, some from each level, are known from several scattered localities and are suggestive of certain overall patterns.

The species *Polycentropus altmani*, *Leptonema albovirens*, *Smicridea bivittata*, *Leucotrichia melleopicta*, *L. fairchildi*, *Costatrichia tripartita*, *Ochrotrichia tenanga*, *Oxyethira azteca*, *Oecetis inconspicua*, *Nectopsyche dorsalis*, and *Helicopsyche vergelana*, all found primarily at the Estacion Piscicultura, show a distribution that surrounds the Caribbean Sea. In its most widespread form this pattern includes the southern United States, Mexico, Central America, all or part of the Antilles, and northern South America south to the level of Ecuador. Only a few species, *W. planae*, *L. albovirens*, *O. azteca*, and *O. inconspicua*, live throughout this whole range. In addition to those species enumerated, others known from only a few localities are suggestive of this pattern.

Several species are very widely distributed, often from northern Argentina to southern Mexico, generally in lowland sites. These include *Leptonema crassum*, *Nectopsyche punctata*, *N. gemmoides*, and *Phylloicus angustior*.

Only two high elevation species are known from enough localities to show distributional pat-

terns. These are *Chimarrhodella ulmeri* and *Chimarra immaculata*, both of which occur southward along the Andes to Bolivia. Most of the species from this elevation have been reported only from a few localities, mostly along the northern coastal range of Venezuela. I expect that many will prove to be endemic to this area.

In summary, it appears that the Trichoptera fauna at the Estacion Piscicultura is one of species generally found around the Caribbean Sea, or even much more widely distributed throughout the lowlands of the Neotropics. The fauna at Rancho Grande is in a few cases one found southwardly throughout the Andes chain, but more frequently one that is endemic to the region.

**MATERIALS AND METHODS.**—I have had the good fortune of studying collections from numerous sources. Most were made at Rancho Grande, this being the site with the most amenities, and consequently the most frequently collected. Such material is in the collections of the Museum of Comparative Zoology, Harvard University (MCZ), the University of California-Riverside, California (UCR), Universidad Central de Venezuela, Facultad de Agronomia, Maracay (Maracay), and the National Museum of Natural History, Smithsonian Institution (USNM, abbreviation for the former United States National Museum).

Of especial value and importance, were those collections made by Prof. Franz H. Weibezahn and his students at the Estacion Piscicultura. As part of their study on the dynamics of the Lago Valencia Basin, they made collections every two weeks for more than a year using an ultraviolet light beside the Río Limón. The Trichoptera of these collections are the backbone of this study, and I am indebted to Prof. Weibezahn for presenting them to me. A full exposition of this material is presented in Table 1.

Treatment of the various taxa on the following pages depends upon their status. Species already described are treated in less detail, although all Venezuelan records available to me are presented, the collection data are condensed, and Table 1 must be consulted to obtain full details of collection dates and numbers for those species

TABLE 1.—Seasonal distribution of caddisflies at the Estacion Piscicultura

| Species                                      | 28-29<br>Aug 74 | 10-11<br>Sep 74 | 8-9<br>Oct 74    | 22-23<br>Oct 74 | 5-6<br>Nov 74 | 19-20<br>Nov 74 | 4-5<br>Dec 74 | 18-19<br>Dec 74 | 3-4<br>Jan 75 | 29-30<br>Jan 75     | 12-13<br>Feb 75     | 25-26<br>Feb 75 |
|--|-----------------|-----------------|------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|---------------------|---------------------|-----------------|
| <i>Protophila fimbriata</i>                  |                 | 1♀              |                  | 2♀              |               | 2♀              | 1♂, 1♀        |                 |               | 3♂, 2♀<br>1♂, 1♀    | 4♂, 1♀              | 1♀              |
| <i>Mexitrichia timona</i>                    |                 | 1♀              |                  | 6♂, 3♀          | 12♂, 3♀       | 9♂, 6♀          | 2♂, 1♀        |                 |               |                     |                     | 1♂              |
| <i>Wormaldia plana</i>                       |                 |                 |                  | 20♂, 20♀        | 78♂, 31♀      | 19♂, 50♀        | 11♂, 17♀      | 13♂, 10♀        | 5♂, 8♀        | 26♂, 21♀            | 43♂, 35♀            | 17♂, 24♀        |
| <i>Chimarra creagra</i>                      | 24♂, 10♀        | 5♂, 18♀<br>1♂   | 7♂, 3♀<br>1♂, 1♀ | 3♂, 36♀         | 38♂, 25♀      | 8♂, 33♀         | 5♂, 17♀<br>1♂ | 6♂, 5♀          | 1♂, 2♀        | 9♀                  | 2♂, 11♀             | 3♂, 9♀          |
| <i>Chimarra playrhina</i>                    |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Chimarra bidens</i>                       |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Polycentropus altmani</i>                 |                 |                 |                  | 2♀              |               |                 | 1♂            |                 |               | 3♂                  |                     | 1♀              |
| <i>Polyplectropus recurvatus</i>             |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Polyplectropus trilobatus</i>             |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Xiphocentron echinatum</i>                |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Leptonema albanum</i>                     |                 |                 |                  |                 | 1♂            |                 |               |                 |               |                     |                     |                 |
| <i>Leptonema insulanum</i>                   |                 |                 |                  | 1♂, 16♀         | 20♂, 37♀      | 3♂, 18♀         | 11♂, 8♀       | 10♂, 5♀         | 2♂, 1♀        | 20♂, 2♀             | 28♂, 6♀             | 20♂, 2♀         |
| <i>Smicridea (S.) bivittata</i>              | 5♂, 1♀          | 3♂, 6♀          | 4♂, 2♀           | 1♂              | 5♂            | 2♂              | 3♂, 1♀        | 2♂              |               | 2♂                  |                     |                 |
| <i>Smicridea (S.) palifera</i>               | 1♂              |                 | 2♂, 1♀           | 5♂, 5♀          | 8♂, 2♀        | 9♂, 7♀          | 7♂, 7♀        |                 | 1♀            | 2♀                  |                     |                 |
| <i>Smicridea (S.) nigripennis</i>            |                 |                 |                  | 4♀              | 13♂, 3♀       | 6♂, 1♀          | 5♂, 7♀        | 1♀              |               | 3♂, 3♀              |                     | 1♀              |
| <i>Smicridea (R.) petasata</i>               |                 |                 |                  |                 | 1♂            |                 |               |                 |               |                     |                     |                 |
| <i>Leucotrichia melleopicta</i>              |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Costatrichia tripartita venezuelensis</i> |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Zumatrichia marica</i>                    |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Alisotrichia wirithi</i>                  |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Byrsopteryx mirifica</i>                  | 1♀              |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Ochrotrichia (O.) tenanga</i>             |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Hydroptila venezuelensis</i>              | 1♀              |                 |                  | 1♀              | 2♂, 1♀        | 1♂              |               | 1♀              |               | 13♂, 4♀<br>17♂, 17♀ | 28♂, 28♀<br>3♂, 17♀ | 3♂, 2♀<br>2♂    |
| <i>Oxyethira azteca</i>                      |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Atamatoica botosaneanui</i>               |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Oecetis knulsoni</i>                      |                 |                 | 1♂               |                 |               | 4♂, 1♀          | 5♂            |                 | 1♀            | 6♂, 1♀              | 1♂, 1♀              | 4♂, 1♀          |
| <i>Oecetis prolongata</i>                    |                 |                 | 1♂               |                 |               |                 | 1♂            |                 |               |                     |                     |                 |
| <i>Neciopsyche punctata</i>                  |                 |                 |                  |                 |               |                 |               |                 |               |                     |                     |                 |
| <i>Neciopsyche aureofasciata</i>             |                 |                 |                  | 1♂              |               | 1♀              | 2♂, 2♀        | 2♂, 1♀          | 1♂            | 1♀                  | 2♂, 2♀              | 1♀              |
| <i>Neciopsyche geminoides</i>                |                 |                 |                  | 1♀              | 1♂, 2♀        | 3♂, 9♀          | 3♂, 9♀        | 5♂, 2♀          | 8♂, 3♀        | 13♂, 9♀             | 16♂, 5♀             | 8♂, 3♀          |
| <i>Phylloicus angustior</i>                  |                 |                 |                  | 1♂              | 4♂, 1♀        | 3♂, 2♀          | 6♂, 2♀        | 3♂, 1♀          | 2♂            | 3♂                  | 1♂, 1♀              | 1♀              |
| <i>Helicopsyche vergelana</i>                |                 |                 |                  | 1♂, 1♀          | 5♀            |                 |               |                 |               | 1♀                  | 1♀                  | 1♀              |
| <i>Helicopsyche angulata</i>                 |                 |                 |                  | 1♀              | 1♂            | 1♂              |               |                 |               | 1♀                  | 1♂, 1♀              | 1♀              |

TABLE 1.—Concluded

| Species                                      | 11-12<br>Mar 75 | 24-25<br>Mar 75 | 7-8<br>Apr 75 | 22-23<br>Apr 75 | 6-7<br>May 75 | 19-20<br>May 75 | 3-4<br>Jun 75 | 17-18<br>Jun 75 | 1-2<br>Jul 75 | 15-16<br>Jul 75 | 11-12<br>Aug 75 | 25-26<br>Sep 75 |
|--|-----------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|-----------------|-----------------|
| <i>Protophila fimbriata</i>                  | 2♂, 3♀          | 1♂              | 2♂            | 1♂              |               | 1♀              |               | 1♀              | 1♀            | 1♂, 2♀          | 1♀              |                 |
| <i>Mexitrichia limona</i>                    |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Wormaldia planae</i>                      |                 |                 |               | 1♀              |               |                 | 2♂, 1♀        | 1♂              | 1♂            | 1♂, 1♀          | 3♂              |                 |
| <i>Chimarra creagra</i>                      | 38♂, 35♀        | 9♂, 5♀          | 60♂, 61♀      | 43♂, 46♀        | 10♂, 11♀      | 35♂, 5♀         | 67♂, 36♀      | 23♂, 28♀        | 161♂, 66♀     | 55♂, 53♀        | 33♂, 44♀        | 67♂, 46♀        |
| <i>Chimarra playrhna</i>                     | 5♂, 3♀          | 17♂, 7♀         | 29♂, 54♀      | 11♂, 18♀        | 1♂, 3♀        | 2♂, 4♀          | 5♂, 7♀        | 16♂, 7♀         | 26♂, 17♀      | 8♂, 10♀         | 23♂, 17♀        | 8♂, 9♀          |
| <i>Chimarra bidens</i>                       |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Polycentropus altmani</i>                 | 1♂              |                 |               |                 |               | 1♂              |               |                 |               |                 | 1♂, 1♀          |                 |
| <i>Polyplectropus recurvatus</i>             |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Polyplectropus trilobatus</i>             |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Xiphocentron echinatum</i>                |                 |                 |               | 1♂              |               |                 |               |                 |               |                 |                 | 1♀              |
| <i>Leptonema albouirens</i>                  | 4♂, 12♂         | 1♂, 6♀          | 34♂, 10♀      | 26♂, 13♀        | 4♂, 18♀       | 13♂, 26♀        | 27♂, 17♀      | 2♂, 18♀         | 15♂, 16♀      | 21♂, 39♀        | 20♂, 37♀        | 28♂, 25♀        |
| <i>Leptonema insulanum</i>                   |                 |                 |               | 1♂              |               |                 |               |                 |               |                 |                 |                 |
| <i>Smicridea (S.) bivittata</i>              | 1♂, 1♀          |                 | 2♂, 2♀        | 2♂, 3♀          | 2♂, 4♀        | 1♂, 6♀          | 1♀            | 1♂, 2♀          | 1♂, 8♀        | 11♂, 52♀        | 2♂, 3♀          | 3♂, 1♀          |
| <i>Smicridea (S.) patifera</i>               | 2♀              |                 |               | 1♀              |               | 1♂, 1♀          | 1♂, 1♀        | 1♂              | 1♂, 2♀        | 1♂              |                 |                 |
| <i>Smicridea (S.) nigripennis</i>            |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Smicridea (R.) petasata</i>               |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Leucotrichia melleopicta</i>              |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Costatrichia tripartita venezuelensis</i> |                 |                 |               |                 |               | 1♂              |               |                 |               | 2♂              |                 |                 |
| <i>Zumatrichia marica</i>                    |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Alisotrichia wirithi</i>                  |                 |                 |               | 1♂              |               | 1♂              |               |                 |               |                 |                 |                 |
| <i>Byrsopteryx mirifica</i>                  |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Ochrotichia (O.) tenanga</i>              |                 |                 |               |                 |               |                 |               | 1♂              |               |                 |                 |                 |
| <i>Hydroptila venezuelensis</i>              | 22♂, 6♀         | 14♂, 5♀         | 31♂, 17♀      | 7♂, 5♀          | 3♂, 1♀        | 29♂, 11♀        | 3♂            | 33♂, 21♀        | 20♂, 4♀       | 32♂, 10♀        | 5♂, 1♀          | 9♂, 6♀          |
| <i>Oxyethira azteca</i>                      | 1♀              |                 | 1♀            |                 |               | 3♀              |               | 1♀              |               |                 |                 |                 |
| <i>Atanaloica bolosaneanui</i>               |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Oecetis knutsoni</i>                      | 9♂, 2♀          | 2♂              | 7♂, 3♀        | 1♂              | 1♂, 1♀        | 1♂              | 1♀            | 1♂              | 1♂            | 6♂, 5♀          | 2♂              | 19♂, 7♀         |
| <i>Oecetis prolongata</i>                    |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Nectopsyche punctata</i>                  |                 |                 |               |                 | ??♀           |                 |               | 1♂              |               |                 |                 |                 |
| <i>Nectopsyche aureofasciata</i>             | 2♀              |                 | 3♂, 1♀        |                 |               |                 |               | 1♂              | 3♀            |                 | 1♂              |                 |
| <i>Nectopsyche gemmoides</i>                 | 30♂, 10♀        | 10♂             | 24♂, 6♀       | 22♂, 7♀         | 19♂, 5♀       | 5♂, 2♀          | 6♂, 4♀        | 1♂, 7♀          | 4♂, 18♀       | 16♂, 29♀        | 3♂, 9♀          | 15♂, 18♀        |
| <i>Phylloicus angustior</i>                  | 10♂             |                 | 5♂, 4♀        | 1♂, 2♀          | 1♂, 1♀        | 1♂, 1♀          | 1♀            |                 |               |                 | 1♀              | 1♂              |
| <i>Helicopsyche vergelana</i>                |                 |                 |               |                 |               |                 |               |                 |               |                 |                 |                 |
| <i>Helicopsyche angulata</i>                 | 1♀              | 1♂              |               | 1♂              |               | 1♂              |               |                 | 1♂, 1♀        | 1♂, 1♀          | 2♀              |                 |

occurring at the Estacion Piscicultura. For all species here described as new, full data are given for all material, regardless of where they were collected. I have also included in the type-series all material presently available, regardless of its country of origin. Because of the quantity and completeness of the material from the Estacion Piscicultura, I have been able to associate the sexes of most species occurring there. Consequently females are described for most species at this site.

The key to families is designed to correctly place all those species known to me to occur in Venezuela. The keys to genera and species are designed only for those species specifically treated in this study. It is quite possible that additional species will yet be discovered in the Río Limón Basin, therefore an identification should only be considered complete when the genitalia of the male (or female for those species figured) under study have been found to agree with the figures.

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#### Key to Families

1. Mesoscutellum with posterior margin forming a triangular, flat area with a vertical posterior margin; forewing length 4 mm or less ..... **HYDROPTILIDAE**  
    Mesoscutellum rounded, without vertical margins; forewing length 3 mm or more ..... 2
2. Ocelli present ..... 3  
    Ocelli absent ..... 5
3. Maxillary palpus with fifth segment 2–3 times as long as fourth ..... **PHILOPOTAMIDAE**  
    Maxillary palpus with fifth segment barely longer than fourth ..... 4
4. Foretibia with apical spurs large and conspicuous ..... **RHYACOPHILIDAE**  
    Foretibia with apical spurs lacking, or small and hair-like ..... **GLOSSOSOMATIDAE**
5. Terminal segment of maxillary palpus several times longer than preceding segment, and generally with suture-like cross-striae ..... 6  
    Terminal segment of maxillary palpus subequal to preceding segment, without cross-striae ..... 7
6. Foretibia often with preapical spur, if without, forewing with  $R_{2+3}$  unbranched ..... **PSYCHOMYIIDAE**  
    Foretibia never with preapical spur, forewing with  $R_{2+3}$  branched ..... **HYDROPSYCHIDAE**

7. Midtibia with a preapical spur ..... 8  
 Midtibia without preapical spur ..... 9  
 8. Mesoscutellum small and rectangular ..... **CALAMOCERATIDAE**  
 Mesoscutellum large, elongate, obliquely angulate anteriorly  
 ..... **ODONTOCERIDAE**  
 9. Hind wing with anterior margin bearing a row of hooked hamuli  
 basally ..... **HELICOPSYCHIDAE**  
 Hind wing lacking hamuli ..... **LEPTOCERIDAE**

### Family RHYACOPHILIDAE

Only a single genus, *Atopsyche*, belonging to the subfamily Hydrobiosinae, occurs in Venezuela. Two species have been taken in the Basin but only at the higher elevations near Rancho Grande.

The larvae are free-living predators that utilize their chelate front legs in the capture of their prey. They are inhabitants of fast-flowing, cooler waters, on rocky substrates, although some species inhabit the dense plant mats growing on the upper surface of larger rocks in the same habitat. The immature stages have been described a number of times (Flint, 1963).

### Key to Species

- Clasper of male in ventral aspect with apical segment almost as long as basal segment (Figures 3-5) ..... **A. caquetia**  
 Clasper with apical segment only a third as long as basal segment (Figures 6-8) ..... **A. choronica**

### *Atopsyche caquetia* Flint

FIGURES 3-5

*Atopsyche caquetia* Flint, 1974b:2.

This species was described from Rancho Grande, but has been found as far west as Merida.

**MATERIAL.**—VENEZUELA, ARAGUA: Rancho Grande, 4 Mar 1967, 1♂; 27 Mar 1967, 1♂; 30-31 Mar 1978, 2♂ 1♀; 1-3 Apr 1978, 1♂ 1♀; 8-11 Jun 1976, 1♂; 25 Jun 1967, 1♂; 16-23 Oct 1966, 1♂. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 1♂. MERIDA: Merida, La Pedregosa, 21 Feb 1976, 1♂.

### *Atopsyche choronica* Flint

FIGURES 6-8

*Atopsyche choronica* Flint, 1974b:3.

This species, described at the same time as the previous one, is still known only from the mountains near Maracay.

**MATERIAL.**—VENEZUELA, ARAGUA: Choroní Pass, 20 Jan 1966, 7♂. Rancho Grande, 4 Mar 1967, 1♂; 8-11 Jun 1976, 1♂. 1 km S Rancho Grande, 5 Feb 1976, 1♂.

### Family GLOSSOSOMATIDAE

The family Glossosomatidae, which is world-wide in distribution, is represented in the Neotropical Region only by the subfamily Protoptilinae. However, this subfamily is large and complex, with the definition of genera becoming more and more difficult with the discovery of more species. Fortunately the two species here described are typical members of their respective genera.

The larvae construct cases made of small mineral grains in the basic form of a turtle shell. The larvae thus protected inhabit firm substrates in flowing water and feed on the periphyton and organic material which they scrape from the rocks.

## Key to Genera

- Two branches to M in forewing ..... *Mexitrichia*  
 Three branches to M in forewing ..... *Protoptila*

Genus *Protoptila* Banks

This is the largest genus of the subfamily, not only in numbers of species, but also in distribution. Many species have been described from North, Central, and South America, with one representative known from the Lesser Antilles. A number of species occur in Venezuela, although only one has been found in the Río Limón. The larvae have been described in numerous papers (Flint, 1963, 1968; Wiggins, 1977; etc.).

*Protoptila fimbriata*, new species

FIGURES 9, 11

This species is clearly a member of Mosely's group 2, but does not seem to be closely related to any other previously described species. The combination of a long, apically bifid eighth sternum, dorsolateral process of the ninth sternum, fimbriate dorsal processes of the tenth tergum, and elongate hooks and processes on the aedeagus is distinctive.

I am identifying as this species a series of one male and five females (Venezuela, Barinas, Puente Parangula, 8 km S of Barinitas, 18 Feb 1976). They agree in structure and general form of male and female genitalia, but differ in details of comparative length and shape of most parts. Material from additional localities is needed to clarify the relationship of these populations.

**ADULT.**—Length of forewing, 4–5 mm. Brown; forewing brown with intermingled yellowish hairs, a slightly paler band along anastomosis and in spots along apical margin. Antenna of male distinctly enlarged and flattened on segments 15–20. Sixth sternum with usual mesal process. *Male genitalia:* Eighth sternum produced into a long mesal process bifid for its apical half; tergum with posterior margin darkened. Ninth sternum bearing a long, slender, dorsolateral process from posterior margin; not produced ventrally. Tenth ter-

gum with a small rectanguloid basal segment; apical section bipartite, a long, arched, basodorsal lobe fimbriate apically, and a twisted, sharply pointed ventral lobe. Aedeagus with a large, mesal, basodorsal lobe, and a pair of ventral, rodlike appendages; midlength complex greatly produced posteriad, scooplike, ending in a pair of mesal points; central tubular portion ending dorsolaterally in a pair of pointed processes, a pair of flat lateral plates, and a pair of slender ventral processes, internally with an indistinct C-shaped spine. *Female genitalia:* Eighth sternum apically bilobed and darkened, with trianguloid lateral lobes. Vaginal sclerites heavily sclerotized and complex, with a slender mesal rod, paired lateral rods, and several central plates.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 3–6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76605.

*Paratypes:* Same data as holotype, 1♂ 9♀; 10–11 Sep 1974, F.H. Weibezahn, 1♀; 22–23 Oct 1974, 2♀; 19–20 Nov 1974, 2♀; 4–5 Dec 1974, 1♂ 1♀; 29–30 Jan 1975, 3♂ 2♀; 12–13 Feb 1975, 4♂ 1♀; 25–26 Feb 1975, 1♀; 11–12 Mar 1975, 2♂ 3♀; 24–25 Mar 1975, 1♂; 7–8 Apr 75, 2♂; 22–23 Apr 1975, 1♂; 19–20 May 1975, 1♀; 15–16 Jul 1975, 1♂ 2♀; 11–12 Aug 1975, 1♀. MARACAY, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 8♀. ZULIA: El Tucuco, 45 km SW Machiques, 5–6 Jun 1976, Menke and Vincent, 1♂ 1♀; 28–29 Jan 1978, J.B. Heppner, 8♂.

Genus *Mexitrichia* Mosely

This genus is widely distributed in the Neotropics, with species recorded from Mexico to Argentina. The species are more frequently encountered in mountainous regions than in lowland areas. There assuredly are a large number of species to be found in Venezuela, although only one has been discovered in this study.

The larvae and pupae are often found in the same stream as are *Protoptila*, but are generally found in different parts of the stream bed. Their cases are constructed of many more smaller sand grains than is that of *Protoptila*. The larvae of



*Mexitrichia aries* Flint has been described (Flint, 1963).

***Mexitrichia limona*, new species**

FIGURES 10, 12, 13

This distinctive new species appears to be generally related to the group of species clustered around *M. unota* Mosely. It is easily distinguished from all known species by the form of the dorsomesal process and the shape and position of the spines of the aedeagus.

**ADULT.**—Length of forewing, 3.5 mm. Brown in alcohol; forewing with an indication of a pale band at anastomosis. Sixth sternum with typical posteromesal lobe. *Male genitalia:* Ninth segment with anterolateral margin evenly rounded. Tenth tergum elongate with paired apicolateral lobes; with a lightly sclerotized ventromesal lobe. Aedeagal complex with dorsomesal process produced in a pointed, erect apical spine and a rounded lobe; lateral process long and slender; central tube with each basolateral lobe bearing a small lateral spine and a ventral hook, ventrally at midlength with a pair of large posteriorly directed processes; internally with two pairs of spines (which when everted reflex so that they point anteriorly rather than posteriorly). *Female genitalia:* Eighth sternum barely produced posteriorly, membranous; with small, strongly sclero-

tized, trianguloid lateral lobes. Vaginal sclerites consisting of a black, heavily sclerotized mesal rod, with lateral process from anterior end, anteriorly of this a lightly sclerotized keyhole-like sclerite.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 30 Jan 1975, F.H. Weibezahn. USNM Type 76606.

*Paratypes:* Same data as holotype 1♀; 25–26 Feb 1975, 1♂; 3–6 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 1♀.

**Family PHILOPOTAMIDAE**

This large and very diverse family of worldwide distribution is represented in the Neotropical Region by four genera and many species. Eleven species and three genera have been discovered in the Río Limón basin up to now. Two of the species of *Chimarra* are among the most abundant species taken in the collections from the Estacion Piscicultura.

The larvae spin elongate, finger-like, silken nets which are generally attached to the undersurface of rocks where current is sufficiently strong to keep the net distended. Some species, however, spin more saclike nets attached to vertical rock surfaces around waterfalls and are completely exposed. The larvae feed on very fine organic matter filtered by the nets from the current (Wallace and Malas, 1976).

**Key to Genera**

1. Forewing with 3 branches to M ..... 2  
Forewing with 4 branches to M ..... ***Wormaldia***
2. Foretibia with 1 small apical spur ..... ***Chimarra***  
Foretibia with 2 apical spurs, one almost twice as long as other ..... ***Chimarrhodella***

**Genus *Wormaldia* McLachlan**

This genus is widespread throughout Europe, Africa, Asia, and the Americas. It is found throughout the mountainous areas of North and Central America, Grenada in the Lesser Antilles,

and northern and western South America. Only a single species, found in this study, is known to occur in Venezuela.

The larvae and pupae have been described many times from European and North American species (Ross, 1944; Wiggins, 1977).

***Wormaldia planae* Ross and King**

FIGURES 14, 15

*Wormaldia planae* Ross and King in Ross, 1956a:64.—Flint, 1968:9; 1971:20.

This species is very widespread, being known from Mexico, Panama, Colombia, Brazil, Trinidad, Grenada, and now Venezuela. It is one of the few species known from the basin that appears to be equally common at both lower and higher elevations.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1. Rancho Grande, 17–26 Jan 1978, 2♂ 2♀. Maracay, El Limón, 2–6 Feb 1976, 1♀. 1

km S Rancho Grande, 5 Feb 1976, 9♂ 10♀. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 1♂ 1♀. BOLIVAR: La Escalera, 108 km S Río Cuyuni, 11–12 Feb 1976, 1♀. BARINAS: 22 km NW Barinitas, 24 Feb 1976, 1♂ 1♀. MERIDA: Río Montalban, rt 4, 19 km W Merida, 20 Feb 1976, 1♂.

**Genus *Chimarrhodella* Lestage**

This is a comparatively small genus limited to the Neotropical Realm. Species are known from Panama south to Bolivia and across northern South America at least as far as Venezuela. Additional species of the genus occur in the Andes of Western Venezuela.

The immature stages are unknown.

**Key to Species**

- Aedeagus with several pairs of internal spines (Figures 16–17) . . . . . *C. ulmeri*  
 Aedeagus without internal spines (Figures 18–19) . . . . . *C. nigra*

***Chimarrhodella ulmeri* (Ross)**

FIGURES 16, 17

*Protarra ulmeri* Ross, 1956a:69.—Flint, 1975:568.

This species has heretofore been known only from the unique male type collected in southern Peru. The discovery of the species in northern Venezuela thus represents a major range extension. In addition I have further material from Ecuador and Panama. The species has only been found at higher elevations where it is rather common.

**MATERIAL.**—VENEZUELA, ARAGUA: Rancho Grande, 11–15 Jan 1966, 2♂; 17–26 Jan 1978, 2♂ 3♀; 6 Mar 1967, 1♂; 1–3 Apr 1978, 3♂; 6–11 Jun 1976, 10♂ 9♀; 3 Aug 1967, 1♀; 12 Aug 1967, 1♂; 24–31 Oct 1966, 5♂ 5♀. 1 km S Rancho Grande, 5 Feb 1976, 5♂ 5♀. 3 km N Rancho Grande, 4 Feb 1976, 7♂ 4♀. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 20♂ 11♀. MIRANDA: Agua Blanca, Parque Nacional Guatopo, 7 Feb 1976, 2♀. BARINAS: 22 km NW Barinitas, 24 Feb 1976, 2♂. CARABOBO: Yuma, 12 Feb 1976, 1♂.

***Chimarrhodella nigra*, new species**

FIGURES 18, 19

Although at first sight the genitalia of this and the preceding species appear identical, *C. nigra*

is readily distinguished by the lack of spines in the aedeagus. In this respect the species appears to be most closely related to *C. peruviana* (Ross). From the latter it is distinguishable by the presence of the basodorsal spine and the longer lateral lobes of the tenth tergum.

**ADULT.**—Length of forewing, 6–7 mm. Color black, ventral areas slightly paler; forewing black. **Male genitalia:** Ninth segment with posterior margin oblique; dorsomesally slightly depressed and produced as a dark short spine upon the base of the tenth tergum; dorsolaterally produced into a heavily sclerotized process ending in a mesally directed hook. Cercus elongate, slender, slightly longer than tenth tergum. Tenth tergum elongate, narrowly divided apicomeresally into a pair of slender, sclerotized apical lobes. Clasper very long and slender, tapering only slightly in either lateral or ventral aspects. Aedeagus tubular, with an apicoventral sclerotized lip and indistinct internal sclerites.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76607.

*Paratype:* MIRANDA: Agua Blanca, Parque Nacional Guatopo, 7 Feb 1976, C.M. and O.S. Flint, Jr., 1♂.

### Genus *Chimarra* Stephens

Species of this genus are known from all faunal realms, although they are notably fewer in the higher latitudes. In Latin America, no species are known from the Chilean subregion and only a single species occurs in western Argentina, but to the north the fauna becomes extremely large and

complex. Species are found on all the major West Indian islands. Venezuela, as would be expected, contains many more species than here recorded.

The immature stages of many species from many areas of the world are described. Larvae of most species can be characterized by the shape of the anterior margin of the frontoclypeus (Flint, 1968; Ross, 1944; Wiggins, 1977).

### Key to Species

1. Tenth tergum consisting of a single, heavily sclerotized, hoodlike structure ..... 2  
Tenth tergum divided or membranous middorsally, resulting in variously formed lateral plates ..... 3
2. Eighth tergum bearing a long, middorsal projection from the posterior margin (Figures 24–26) ..... *C. immaculata*  
Eighth tergum broadly, but slightly produced posteriad (Figures 20–23) ..... *C. fernandesi*
3. Ninth sternum with process 5–9 times as long as broad ..... 4  
Ninth sternum with process no more than twice as long as broad ..... 5
4. Eighth tergum with posterior margin unmodified (Figures 27, 28) ..... *C. rosalesi*  
Eighth tergum with a pair of submesal processes (Figures 29–32) ..... *C. sensillata*
5. Ninth segment dorsolaterally with a pair of long, slender processes (Figures 33–35) ..... *C. poolei*  
Ninth segment lacking such processes ..... 6
6. Tenth tergum with a pair of middorsal processes ending in sharp, upturned hooks (Figures 40–43) ..... *C. creagra*  
Tenth tergum with simple, rodlike middorsal processes ..... 7
7. Clasper consisting of a slender apicodorsal process and a broad, basoventral lobe (Figures 44–47) ..... *C. platyrhina*  
Clasper long and only slightly enlarged basally (Figures 36–39). *C. bidens*

### *Chimarra (Curgia) fernandesi*, new species

FIGURES 20–23

Basically this species is a typical member of the subgenus *Curgia*, however no close relatives have yet been described. The form of the eighth, ninth, and tenth terga is unique as is the internal armature of the aedeagus.

ADULT.—Length of forewing 6.5–7 mm. Uniformly fuscous; forewings of series mostly denuded, but remaining hairs give no indication of

any color pattern. *Male genitalia*: Eighth tergum produced posteriad as a simple, mesal, hoodlike lobe. Ninth segment with ventromesal process about twice as long as wide; dorsal margin flattened, heavily sclerotized, and produced posteriad as a sharp mesal point. Tenth tergum produced into a bilobed dorsomesal lobe, and a distinct ventrolateral lobe. Cercus a small, rectangular lobe. Clasper, elongate, pointed apically, rounded ventrally and laterally. Aedeagus elongate, with two pairs of long spines, dorsalmost

slightly fimbriate and curved, ventralmost very slender and united near base to a short mesal rod.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, El Limón, 450 m, 31 Oct 1948, F. Fernandez Y., and L. Salas. (Maracay).

*Paratypes:* Same data as holotype, 4♂ 5♀ (Maracay and USNM).

### *Chimarra (Curgia) immaculata* (Ulmer)

FIGURES 24–26

*Chimarra immaculata* Ulmer, 1911:15.

This species has heretofore only been known from the holotype from Bolivia. Through the kindness of Dr. H. J. Hannemann of the Humboldt Universität, Berlin, I have been able to study the holotype from which the accompanying drawings were prepared. The discovery of the species in Venezuela represent a major range extension. In addition to the Venezuelan material, I have additional examples from Bolivia, Colombia, and Ecuador.

**MATERIAL.**—VENEZUELA, ARAGUA: Rancho Grande, 10–21 Feb 1969, 1♂ 1♀. Ocumare (de la Costa), 19–20 Feb 1969, 7♂ 10♀.

### *Chimarra (Chimarra) rosalesi*, new species

FIGURES 27, 28

This unusual appearing species seems to be related to *C. simpliciforma* Flint. It may be easily recognized by the very different shape of the claspers and tenth tergum.

**ADULT.**—Length of forewing, 3–4 mm. Body and appendages golden brown; forewing clothed with golden hairs for basal three-fourths, apical fourth fuscous. Forewing without a bulla; hind wing with 3 branches to  $R_s$  and 2 to  $M$ . *Male genitalia:* Ninth segment with anterior margin curved, produced anteriorly ventromesally; posteromesal process very long and slender, arising from a flattened area midventrally. Cercus a small ovate lobe. Tenth tergum elongate, rectanguloid, apex produced posteroventrally. Clasper long and slender, somewhat sigmoid in lateral aspect, in ventral view, broad, mesal margin excised near

midlength, apex obliquely truncate. Aedeagus long and slender, ending in slightly sclerotized dorsal and ventral lobes; internally with a pair of spines basally, one of which is 4 times longer than the other, apically a long extensile membranous tube ending in a complex of sclerites.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76608.

*Paratypes:* Same data as holotype, 1♂ 3♀. 3 km N Rancho Grande, 4 Feb 1976, 1♀. 1 km S Rancho Grande, 5 Feb 1976, 5♀. Rancho Grande, 25–26 Jan 1978, J.B. Heppner, 1♀.

### *Chimarra (Chimarra) sensillata*, new species

FIGURES 29–32

This montane species is a close relative of *C. usitatissima* Flint which is widely distributed near the larger rivers of northern South America. *C. sensillata* is easily distinguished by the upturned apex of the tenth tergum, the serrate inner margin of the clasper, and the long apicoventral spine of the aedeagus.

**ADULT.**—Length of forewing, 4.5–5 mm. Color uniformly fuscous. Forewing without bulla; hind wing with 3 branches to  $R_s$ , 2 to  $M$ . *Male genitalia:* Eighth segment ringlike; posterior margin dorsally produced into a pair of submesal processes. Ninth segment with anterior margin produced into a pair of rounded ventrolateral lobes; ventromesal point, very long and tapering. Tenth tergum divided in broad, slightly upturned, heavily sclerotized lateral plates bearing sensillae apically and ventrally. Cercus a small rounded lobe. Clasper elongate, tapering, rounded laterally and ventrally, mesal margin in ventral aspect serrate. Aedeagus short, apicoventral lip developed into a strong, sharp spine, apicodorsal margin also produced into a short, sharp point; internal structure lightly sclerotized, complex.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, 4 km S Rancho Grande, 5 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76609.

*Paratypes:* Same data as holotype, 1♂. 3 km N Rancho Grande, 4 Feb 1976, 2♂. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 2♂. Rancho Grande, 4 Mar 1967, M.E. Irwin, 2♂ (UCR).

***Chimarra (Chimarra) poolei*, new species**

FIGURES 33-35

This is another species of *Chimarra* that appears to be restricted to the streams of the higher elevations near Rancho Grande. It is related to *C. uara* Flint, from which it is most easily distinguished by the lack of a dorsal process from the tenth tergite, and by small differences in the shape of the clasper, especially in posterior aspect.

**ADULT.**—Length of forewing, 5–6 mm. Color uniformly fuscous. Forewing with bulla involving  $R_s$ ; hind wing with 4 branches to  $R_s$ , and 3 to  $M$ . **Male genitalia:** Ninth segment rounded, and bilobed anteroventrally; with a posteroventral keel; dorsolaterally with a pair of long, slender, semi-erect process. Tenth tergum membranous mesally, with elongate lateral plates, dorsolateral margin bearing 2 sensillae on a dorsolateral flange. Cercus small, ovate. Clasper short and broad; in posterior aspect with a small dorsomesal point and a narrow, lightly sclerotized vertical plate beneath it; posteroventral margin entire. Aedeagus with apex produced into a pointed ventral lip; with 2 internal subequal spines, a large scabrous pouch and a lightly sclerotized rod and ring basally.

**MATERIAL.**—**Holotype, male:** VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76610.

**Paratypes:** Same data as holotype, 7♀. 3 km N Rancho Grande, 4 Feb 1976, 1♀. 1 km S Rancho Grande, 5 Feb 1976, 4♀. Rancho Grande, 11–15 Jan 1966, S.S. and W.D. Duckworth, 3♂; 16–23 Oct 1966, 1♂; 24–31 Oct 1966, 4♂ 1♀; 10–21 Feb 1969, Duckworth and Dietz, 1♂; 23 Apr 1975, Salcedo and Dietz, 1♀ (Maracay); 22–31 Jun 1967, R.W. Poole, 2♂ 2♀; 4 Mar 1967, M.E. Irwin, 2♂ 1♀ (UCR); 17–26 Jan 1978, J.B. Heppner, 2♂; 30–31 Mar 1978, 1♂; 27 Nov 1967, G.I. Stage, 1♂.

***Chimarra (Chimarra) bidens* (Ulmer)**

FIGURES 36-39

*Chimarra bidens* Ulmer, 1909:307

*Chimarra bidens*.—Fischer, 1961:57.

*Chimarra caribea surinamensis* Flint, 1974c:30. [New synonymy.]

Recently, through the kindness of Dr. Anker Nielsen, I was able to borrow the ♂ type of *C.*

*bidens* which is from Caracas. It is clearly the same species that I described as *C. caribea surinamensis*, which I hereby synonymize with *C. bidens*. The species appears to be widespread in northern Venezuela but has been encountered only sporadically in the Río Limón Basin.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 4–5 Dec 1974, 1♂. Maracay, El Limón, 450 m, 23 June 1974, 1♂ (Maracay); 2–6 Feb 1976, 1♂. Cata, 20 Feb 1969, 52♂ 30♀. BOLIVAR: Puente Yocoima 2, 19 km N Upata, 13 Feb 1976, 14♂ 6♀. DISTRITO FEDERAL: Caracas, Jul 1891, 1♂ type (Copenhagen). LARA: 4 km NW La Pastora, 2–3 Mar 1978, 3♂ 1♀.

***Chimarra (Chimarra) platyrhina*, new species**

FIGURES 44-47

This species is very closely related to *C. ortiziana* Flint known from Mexico and Guatemala. From this species *C. platyrhina* is to be recognized by the enlarged and not recurved apices of the tenth tergite, the narrow tip to the clasper, and the presence of a cluster of small spines in the aedeagus.

**ADULT.**—Length of forewing, 5–5.5 mm. Color fuscous, bases of legs and body slightly paler. Forewing with bulla on  $R_s$  well developed; hind wing with 4 branches to  $R_s$  and 3 to  $M$ . **Male genitalia:** Ninth segment with anterior margin oblique; with posteroventral process distinctly longer than wide basally. Tenth tergum with a pair of elongate semimembranous mesal processes; lateral lobe broad at base, constricted subapically, tip rounded. Clasper with a broad scooplike ventral portion with apicodorsal angle developed into an elongate, finger-like process tapering slightly apicad. Aedeagus with an apicoventral spine, a pair of subequal internal spines, a cluster of small spines basally in a scabrous sac, and a long basal rod and ring assembly. **Female genitalia:** Eighth and ninth sterna broadly joined; eighth tergum with a distinct, upturned anterolateral process. Ninth tergum with slender anterolateral process nearly as long as eighth tergum. Ninth sternum with sclerotized area broadened apicad, with a distinct dorsolateral cuplike invagination. Internally with a series of

sclerotized cuplike lobes apically and a single mesal sclerite basally attached by membranous folds.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 24–25 Mar 1975, F.H. Weibezahn. USNM Type 76611.

*Paratypes:* Same data as holotype, 16♂ 7♀; 10–11 Sep 1974, 1♂; 8–9 Oct 1974, 1♂ 1♀; 22–23 Oct 1974, 3♂ 36♀; 5–6 Nov 1974, 38♂ 25♀; 19–20 Nov 1974, 8♂ 33♀; 4–5 Dec 1974, 5♂ 17♀; 18–19 Dec 74, 6♂ 5♀; 3–4 Jan 75, 1♂ 2♀; 29–30 Jan 75, 9♀; 12–13 Feb 75, 2♂ 11♀; 25–26 Feb 1975, 3♂ 9♀; 11–12 Mar 75, 5♂ 3♀; 7–8 Apr 75, 29♂ 54♀; 22–23 Apr 75, 11♂ 18♀; 6–7 May 75, 1♂ 3♀; 19–20 May 75, 2♂ 4♀; 3–4 Jun 75, 5♂ 7♀; 17–18 Jun 75, 16♂ 7♀; 1–2 Jul 75, 26♂ 17♀; 15–16 Jul 75, 8♂ 10♀; 11–12 Aug 75, 23♂ 17♀; 10 Jul 1973, 2♂ 1♀; 25–26 Sep 75, 8♂ 9♀; 3–6 Feb 1976, C.M. and O.S. Flint, Jr., 17♂ 26♀. El Limón, Maracay, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 51♂ 45♀. 3 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. Cata, 20 Feb 1969, P. and P. Sprangler, 1♂. CARABOBO: Yuma, 12 Feb 1976, F. Fernandez Y. and C. J. Rosales, 9♂ 6♀ (Maracay).

### *Chimarra (Chimarra) creagra*, new species

FIGURES 40–43

It appears that this species is somewhat related to *C. emima* Ross. It is very easily recognized by having the dorsomesal plates of the tenth tergum ending in sharp recurved hooks.

**ADULT.**—Length of forewing, 4.5–5.5 mm. Color fuscous, bases of legs slightly paler. Forewing with a bulla below  $R_s$ ; hind wing with 4 branches to  $R_s$  and 3 to  $M$ . *Male genitalia:* Ninth segment with anterior margin oblique; with posteroventral process about as long as wide. Tenth tergum with broad lateral plates bearing a heavily sclerotized, laterally angled, subterminal lobe; with a pair of submesal plates ending in sharp, recurved hooks. Claspers about as long as broad, dorsal margin with a mesally directed process. Aedeagus with an apicoventral spine; internally with a pair of long spines and a short basal rod and ring assembly with a small sclerite laterad. *Female genitalia:* Eighth tergum with a short, almost straight anterolateral process. Ninth sternum separated from eighth segment, almost triangular in lateral aspect; tergum with a slender anterolateral process almost as long as eighth segment. Internally with an elongate lobe lightly

sclerotized ventrally and apicodorsally, a single mesal sclerite attached beneath these lobes.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 24–25 Mar 1975, F.H. Weibezahn. USNM type 76612.

*Paratypes:* Same data as holotype, 8♂ 5♀; 28–29 Aug 1974, 24♂ 10♀; 10–11 Sep 74, 5♂ 18♀; 8–9 Oct 74, 7♂ 3♀; 22–23 Oct 74, 20♂ 20♀; 5–6 Nov 74, 78♂ 31♀; 19–20 Nov 74, 19♂ 50♀; 4–5 Dec 74, 11♂ 17♀; 18–19 Dec 74, 13♂ 1♀; 3–4 Jan 75, 5♂ 8♀; 29–30 Jan 75, 26♂ 21♀; 12–13 Feb 75, 43♂ 35♀; 25–26 Feb 75, 17♂ 24♀; 11–12 Mar 75, 38♂ 35♀; 24–25 Mar 75, 9♂ 5♀; 7–8 Apr 75, 60♂ 61♀; 22–23 Apr 75, 43♂ 46♀; 6–7 May 75, 10♂ 11♀; 19–20 May 75, 35♂ 5♀; 3–4 Jun 75, 67♂ 36♀; 17–18 Jun 75, 23♂ 28♀; 1–2 Jul 75, 161♂ 66♀; 15–16 Jul 75, 55♂ 53♀; 11–12 Aug 75, 33♂ 44♀; 25–26 Sep 75, 67♂ 46♀; 10 Jul 73, 3♂ 2♀; 3–6 Feb 76, C.M. and O.S. Flint, Jr., 47♂ 54♀. El Limón, Maracay, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 31♂ 51♀. Rancho Grande, 24–31 Oct 1966, S.S. and W. D. Duckworth, 1♂. 4 km S Rancho Grande, 5 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. 1 km S Rancho Grande, 5 Feb 1976, C.M. and O.S. Flint, Jr., 17♀. 3 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr., 8♂ 7♀. Ocumare (de la Costa), 19–20 Feb 1969, P. and P. Spangler, 49♂ 75♀. BARINAS: Puente Parangula, 8 km S Barinitas, 18 Feb 1976, C.M. and O.S. Flint, Jr., 2♂.

EUCADOR, PASTAZA: Puyo, 1–7 Feb 1976, Spangler, et al., 1♂. 16 km W Puyo, 3 Feb 1976, Spangler, et al., 20♂. Estacion Fluviométrica, 27 km N Puyo, 4 Feb 1976, Spangler, et al., 2♂.

### Family PSYCHOMYIIDAE

This family is composed of a number of fairly well-defined units that are classified as families, subfamilies, or tribes, depending on the author's preference. I am here retaining the broadest concept. If one wished to divide the family, then *Polycentropus* and *Polyplectropus* would be placed in the Polycentropodidae, and *Xiphocentron* placed in the Xiphocentronidae or kept in the Psychomyiidae. In its broadest sense the family contains 9 genera and many species in all parts of the Neotropical Realm. At least 7 of these genera occur in Venezuela, although only 3 were taken in the study.

The larvae are most frequently encountered in flowing water, although many require only the most gentle currents, and some are found in still

water. They all produce some sort of silken retreat usually with a trap net that is fixed to the substrate and serves to give shelter and collect the

food. Some larvae are often highly predaceous, frequently acting as if they detect the struggle of prey in the strands of the net as do most spiders.

**Key to Genera**

- 1. Foretibia with a preapical spur ..... 2  
    Foretibia lacking preapical spur ..... **Xiphocentron**
- 2. Hind wing with R<sub>2</sub> usually present ..... **Polycentropus**  
    Hind wing with R<sub>2</sub> never present ..... **Polyplectropus**

**Genus *Polycentropus* Curtis**

*Polycentropus* is a large and rather heterogeneous genus, primarily north temperate in distribution. In Latin America species are found throughout Central America, the West Indies, and the Andean areas of South America, especially Chile. They are apparently absent from the lowland basins of the Orinoco, Amazon, and Parana Riv-

ers. Several additional species have been taken in other areas of Venezuela.

The larvae of this genus construct silken retreats consisting of a constricted living part and a variously formed, large, food-trapping portion. The larvae are generally found in flowing water. The larvae of many north temperate and West Indian species have been described (Flint, 1968; Ross, 1944; Wiggins, 1977).

**Key to Species**

- Clasper consisting of a basodorsal lobe and a long, flat apicomeral lobe (Figures 48, 49) ..... ***P. altmani***
- Clasper consisting of a large dorsolateral lobe and 2 strong mesal spines (Figures 50, 51) ..... ***P. connatus***

***Polycentropus altmani* Yamamoto**

FIGURES 48, 49

*Polycentropus altmani* Yamamoto, 1967:130.

*Polyplectropus macrostylus* Flint, 1967a:8. [New synonymy.]

This species, unfortunately described twice within two months, is relatively common and widespread in Central America and northern South America. I have records of the species from Nicaragua, Costa Rica, Panama, Ecuador, and Venezuela.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1.

***Polycentropus connatus*, new species**

FIGURES 50, 51

This species is very distinctive in detail, although all the genital parts are in the typical

*Polycentropus* pattern. The species belongs to the *gertschi* group, but is unique within the group in the union of the lobes of the cercus to the long slender mesal process of the cercus, and the presence of two large mesal spines on the clasper.

**ADULT.**—Length of forewing, 8 mm. Color brown, venter of body and legs stramineous; forewing brown with many scattered small gold spots. *Male genitalia:* Ninth sternum large, only slightly higher than long. Tenth tergum membranous. Cercus with all lobes united; dorsomesal rodlike process long, angled ventrad, apex pointed, with a small elongate lobe united to base of process; an elongate lateral lobe and with basal margin slightly produced. Clasper with a large thin rounded lateral lobe bearing two sharp, dorsally directed teeth on inner face. Aedeagus with a long pointed apicoventral lip, dorsal surface sclerotized with a rounded internal lobe.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Rancho Grande, 1100 m, 16–23 Oct 1966, S.S. and W.D. Duckworth. USNM Type 76613.

*Paratypes*: MERIDA: Merida, La Pedregosa, 21 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. LARA: Yacambu National Park, 13 km SE Sanare, 4800 ft, cloud forest, 4–7 Mar 1978, J.B. Heppner, 1♂.

### Genus *Polyplectropus* Ulmer

This is a rather large and comparatively homogeneous genus within the New World that is found from the southwestern United States into northern Argentina, and in the Lesser Antilles. There are a number of Old World species, mostly

from the Tropics, that are placed in the genus. However, many of these may not be in the same phyletic line as the New World species. Species are found in both the lowland and mountainous areas of Venezuela.

The larvae are very similar in general to those of *Polycentropus*, but may be distinguished by the large teeth ventrally on the anal claw. The two genera inhabit the same rivers on occasion, but the larval shelters of *Polyplectropus* are very firmly made of silk and cover small depressions on the upper surface of rocks in the full current. Larvae of several species have been described (Flint, 1968; Wiggins, 1977).

### Key to Species

- Clasper with a small basoventral lobe and a large apicodorsal lobe (Figures 52–54) ..... *P. recurvatus*  
 Clasper with apicoventral and apicodorsal lobes nearly same size (Figures 55–57) ..... *P. trilobatus*

### *Polyplectropus recurvatus* (Yamamoto)

FIGURES 52–54

*Polycentropus recurvatus* Yamamoto, 1966:912.

*Polyplectropus recurvatus*.—Flint, 1968:21.

It is with some hesitation that I identify these examples as *P. recurvatus*. Upon comparison of the figures here presented and prepared from Venezuelan material with the original figures of the type from Colombia, a number of distinct differences are apparent. The structure of the aedeagus and its internal sclerites and tenth tergum appear to be nearly identical. However, the shape of the claspers, notably the more pronounced ventral lobe, and especially the pronounced apicoventral elongation, is quite distinctive. Pending more material from other areas, I hold the two populations to be variants of the same species.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1.

### *Polyplectropus trilobatus*, new species

FIGURES 55–57

Together with *P. recurvatus* (Yamamoto) and *P. deltoides* (Yamamoto) this species forms a distinc-

tive group that is characterized by the long curved dorsomesal process of the cerci and by the basic shape of the lateral lobes of the cerci and claspers. *P. trilobatus* may be recognized from the other species by the shape of the lateral lobes of the cerci which are united ventrally and bear a small bifid ventromesal process, as well as the very large ventral lobe of the clasper.

**ADULT.**—Length of forewing, 4 mm. Specimen in alcohol, denuded; forewing membrane slightly darker along anterior half. Anterolateral angles of fifth sternum of abdomen with a filamentous process which is as long as sternum and annulate apically. *Male genitalia*: Ninth sternum broad ventrally, tapering to a narrow rounded dorsal margin. Tenth tergum membranous. Cercus with a slender, filamentous dorsal process directed anteriorly at base then curving dorsad and posteriorly; with lateral, platelike lobes, united midventrally, each with a rounded dorsolateral hump, a small ventrolateral process, and a small bifurcate midventral process from the posterior margin. Clasper with a rounded dorsolateral lobe and a slightly smaller posteroventral lobe, each having a number of peglike setae mesally. Aedeagus with a larger basal portion, and a longer, narrower api-



cal tubelike portion whose apicoventral margin is produced into a trilobate plate; internally with a curved platelike sclerite.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 23 Apr 1975, F.H. Weibezhan. USNM Type 76614.

**Genus *Xiphocentron* Brauer**

The genus is known in the New World from the southwestern United States to Argentina, including the West Indian islands. There are closely related genera in the Tropics of the African and Asian continents. The adults are seldom taken at lights, but appear to be generally diurnal, displaying on leaves in the full sun. It is quite probable that other species occur in Venezuela.

The larvae construct long, slender, silken tubes over the substrate. Often these tubes are most common on boulders above the water line, where they are kept wet by spray from adjacent falls or seepage. The larvae of a number of North American and West Indian species have been described (Edwards, 1961; Flint, 1964; Wiggins, 1977).

***Xiphocentron echinatum*, new species**

FIGURES 58–60

This very distinctive species is probably most closely related to *X. trilineatum* (Mosely) with which it shares the characteristic of a two-segmented clasper. In *X. trilineatum* the basal segment bears a long process beneath the apical segment which is reduced to a spiculate pad in *X. echinatum*.

There is a single female taken at the fish hatchery on 25–26 Sep 1975, which probably belongs to this species, but considering the variety of species in this genus and the lack of specimens, I prefer not to make it part of the type series.

**ADULT.**—Length of forewing, 3.5 mm. Type denuded, in alcohol, uniformly brown. Wings without modification; basal segment of maxillary

palpus with a graduated row of 6–7, long, broad setae apically on anteromesal margin. Hind leg with only one apical tibial spur which is as long as inner preapical spur. **Male genitalia:** Ninth segment dorsally with a pair of elongate submesal lobes posteriorly, posteroventral margin not produced, slightly concave in ventral aspect. Tenth tergum sclerotized laterally, produced, slightly narrowed and rounded in lateral aspect. Cercus very long, parallel-sided, almost straight but with tip curved slightly mesad. Clasper two-segmented, basal segment short, with apex produced into a small, flattened mesal lobe densely spiculate and with inner margin produced posteriad in a small thin lobe; apical segment with a flattened basal section, densely spiculate and slightly produced laterad, apical section a very long, terete rod with a few spicules basally. Aedeagus very long and threadlike, base slightly enlarged, conical.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 5–6 Nov 1974, F.H. Weibezahn. USNM Type 76615.

**Family HYDROPSYCHIDAE**

The family Hydropsychidae is perhaps the dominant caddisfly family of the lotic habitat in the Neotropical Realm, both in numbers of taxa and in abundance of individuals. This is shown in the Río Limón Basin where there are 14 species placed in 3 genera, with the species of the genus *Leptonema* being the largest in biomass of any species of caddisfly in the area. There are 9 genera known from all of South America, all of which occur in Venezuela. For a key to all these genera see Flint, 1978, page 374.

The larvae of this family construct the net-retreat type of shelters with which they trap their food. Many of these nets are extremely complex, intricately constructed structures that serve to trap the microdrift (Sattler, 1963; Wallace, 1975).

**Key to Genera**

- 1. Antenna generally shorter than forewing; size smaller, forewing rarely exceeding 5–6 mm ..... ***Smicridea***

- Antenna several times as long as forewing, whose length is generally over 10 mm ..... 2
2. Maxillary palpus with second segment longer than third; no projecting process from apex of foretibia ..... *Leptonema*
- Maxillary palpus with third segment longer than second; foretibia with a projecting process from apex ..... *Centromacronema*

### Genus *Centromacronema* Ulmer

This genus is exclusively Neotropical in distribution, being known from Mexico to southern Brazil. It is very closely related to *Macronema*, but easily distinguished by having an apical process on the foretibia. A number of additional species

are reported from Venezuela.

Larvae have been attributed to this genus by a number of authors (Marlier, 1964; Ulmer, 1957), but all are correlated on the basis of circumstantial evidence only. I am not convinced that these associations are correct, nor that the generic limits of these closely related genera are correctly drawn.

### Key to Species

- Forewing with a large, oval, pale spot at outer margin (Figures 61, 62, 165) ..... *C. oculatum*
- Forewing without such a spot (Figures 63, 64) ..... *C. nigripenne*

### *Centromacronema oculatum* (Walker)

FIGURES 61, 62, 165

*Macronema oculatum* Walker, 1852:75.

*Centromacronema oculatum*.—Ulmer, 1907:116.—Betten and Mosely, 1940:207.—Fischer, 1963:204.

This very distinctive species was originally described from Venezuela, and is known otherwise only from Colombia. The species is easily recognized by the large pale area on the forewing.

**MATERIAL.**—VENEZUELA, ARAGUA: El Limón, 31 Oct 48, 2♂ 1♀; 24 Nov 50, 1♂. Rancho Grande, 18 May 1949, 1♀. MIRANDA: Aqua Blanca, Parque Nacional Guatopo, 7 Feb 1976, 8♂. TRUJILLO: Camino La Puerta-La Mesa, 12 Feb 1953, 1♂.

### *Centromacronema nigripenne*, new species

FIGURES 63, 64

This is a very small species that does not seem to have been described. It has a very distinctive appearance when alive or pinned, because it normally rolls its wings partially around the body appearing as a small twig rather than holding its

wing flat over the body as do most species in this genus.

In coloration the wings are uniformly fuscous, with the head and thorax ventrally and legs pale yellowish-brown. The male genitalia offer clear differences from that of *C. oculatum*, the only other species presently known from the area, especially in the ninth segment dorsally, the length of the claspers, and apex of the aedeagus.

**ADULT.**—Length of forewing, 10–12 mm. Head and thorax dorsally and abdomen, fuscous; head and thorax ventrally and legs pale yellowish-brown; forewings fuscous. Male fifth abdominal sternum with a narrow, elongate dorsolateral raised lobe whose sides are narrowly enlarged. *Male genitalia:* Ninth segment with anterolateral margin rounded and slightly produced; dorsal margin only moderately elevated above tenth tergum, not produced posteriad. Tenth tergum elongate, apex not produced into a point. Clasper short, barely attaining apex of tenth tergum. Aedeagus with base at right angles to stem; apex enlarged, dorsoapical angle strongly produced into a pointed lobe; internally with a bandlike lateral structure and a small forked mesal rod.

**MATERIAL.**—*Holotype, male:* VENEZUELA, MIRANDA, Parque Nacional Guatopo, Santa Cruz de Río Grande, 7 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76616.

*Paratypes:* Same data as holotype, 1♂. ARAGUA: Rancho Grande, 17–20 Jan 1978, J.B. Heppner, 1♀; 25–26 Jan 1978, 1♀. 1 km S Rancho Grande, 5 Feb 1976, C.M. and O.S. Flint, Jr., 1♀. 3 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr., 1♀.

### Genus *Leptonema* Guerin

This is a large genus found in the Tropics of Africa, Madagascar, and the New World from the southwestern United States to central Argen-

tina and the West Indies. Species may be very abundant in a preferred habitat, and because of their large size also one of the dominant insect species in terms of biomass. In addition to the five species encountered in the Río Limón basin, many more species are known in the country.

The larvae build a net and retreat attached to some solid object as is typical of the family. Different species often construct nets of different mesh size by which they partition the resources of the environment. Larvae of several species have been described (Flint, 1968; Marlier, 1964; Wiggins, 1977).

### Key to Species

1. Forewing with 2 dark spots basally on subcosta, wings brown (Figure 71, 72) ..... *L. crassum*  
Forewing lacking basal dark spots, wings pale green or pale brown . . . . . 2
2. Tenth tergum distinctly longer than high; aedeagus lacking long, free processes (Figures 77–80) ..... *L. pseudostigmosum*  
Tenth tergum about as high as long; aedeagus with at least 1 pair of free processes ..... 3
3. Aedeagus with 1 pair of long processes arising from apex and directed basad (Figures 73–76) ..... *L. araguense*  
Aedeagus with several pairs of short, free processes arising subapically . . 4
4. Aedeagus with a middorsal process arising subapically, directed apicad (Figures 68–70) ..... *L. insulanum*  
Aedeagus without a middorsal process (Figures 65–67) ..... *L. albovirens*

### *Leptonema albovirens* (Walker)

FIGURES 65–67

*Macronema albovirens* Walker, 1852:76.

*Leptonema albovirens.*—Ulmer, 1905a:56.—Mosely, 1933:45.—Fischer, 1963:166.

This is probably one of the commonest and most widely distributed species of the genus. The type-locality is Venezuela and in all probability somewhere in the general area between Puerto Cabello and Caracas. It is known from Texas in the United States south throughout Central America to Colombia, across northern South America to Trinidad, and north in the Lesser Antilles to St. Vincent.

There are many records for the region, and

therefore they are not all given here. The records from the Fish Hatchery are given in Table 1; an equal quantity of records are available from Rancho Grande. Because the other records for Venezuela are fewer they are given in more detail.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1. Rancho Grande, Oct through Jan, ♂♂♀♀. Maracay, El Limón, 2–6 Feb 1976, 18♂; 17–18 Feb 73, 1♂ 1♀; 14 Jun 73, 1♂. Pozo Diablo, near Maracay, 9 Jul 1963, 2♂ 2♀. 10 km S Ocumare, 20 Feb 1969, 1♂ 2♀. MONAGAS: Caripe, Hacienda Las Acacias, 26 Aug 1971, 7♂ 3♀. CARABOBO: San Esteban, 5–8 Nov 1974, 2♀. Trincheras, 28 Mar 1949, 2♂ 1♀. BARINAS: Barinitas, 22–26 Feb 1969, 2♀. Puente Parangula, 8 km S Barinitas, 18 Feb 1976, 10♂. FALCON: Las Dos Bocas, 7 Jun 1969, 1♀. TRUJILLO: Cuicas, 12 Aug 1964, 1♂ 1♀. ZULIA: El Tucuco (45 km SW Machiques), 5–6 Jun 76, 1 ♀.

***Leptonema insulanum* Banks**

FIGURES 68-70

*Leptonema insulanum* Banks, 1924:455.—Flint, 1964:36.*Leptonema ulmeri* Mosely, 1933:39.—Fischer, 1963:174.

This species is very common in the Río Limón Basin but appears to breed most abundantly in the small streams at higher elevations. In contrast to the preceding species with its extensive range, *L. insulanum* appears to be limited to the coastal range of Venezuela in the states of Carabobo and Aragua. The type, a male, is labeled San Juan, P(uerto) R(ico), but this undoubtedly represents either a mislabeled specimen or one that may have arrived on ship.

Comparison of larvae supposedly of this species from Puerto Rico (Flint, 1964) and larvae from Venezuela associated by male metamorphotypes indicates conclusively that the Puerto Rican examples are larvae of a species not *L. insulanum*. At this time the specific identity of these larvae is unknown.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974-1975, see Table 1. Rancho Grande, most months of the year, ♂♂ ♀♀. Portachuelos, 14 Jun 1973, 1♂. Pozo Diablo, near Maracay, 9 Aug 1963, 1♂. Maracay, El Limón, 24 Nov 1950, 1♀. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 1♂ 1♀. 1 km S Rancho Grande, 5 Feb 1976, 7♂ 1♀. 10 km S Rancho Grande, 14 Feb 1966, 1♀. CARABOBO: Puerto Cabello, 11 Jun 1908, 1♀. San Esteban, 5-8 Nov 1974, 1♀; 24 Nov [?], 1♀; 3 Dec [?], 1♀. Borburata, 15 Mar [?], 1♂ 1♀.

***Leptonema crassum* Ulmer**

FIGURES 71, 72

*Leptonema crassum* Ulmer, 1905a:58.—Mosely, 1933:12.—Fischer, 1963:168.

This species has been widely reported from Latin America, being known from central Mexico south throughout Central and South America to northern Argentina. Since it appears generally to breed in the larger rivers I suspect that the examples taken at Rancho Grande represent wind-blown specimens.

**MATERIAL.**—VENEZUELA, ARAGUA: Rancho Grande, 10-21 Feb 1969, 1♂ 1♀. BARINAS: Río Santo Do-

mingo, Barinas, 17 Feb 1976, 16♂ 1♀. Barinitas, 22-26 Feb 1969, 10♂ 6♀. Puente Parangula, 8 km S Barinitas, 18 Feb 1976, 4♂. MERIDA: El Vigia, 2 Jun 1976, 1♂.

***Leptonema araguense*, new species**

FIGURES 73-76

This distinctive new species appears to be related to *L. plicatum* Mosely which is known from Guatemala. The primary differences are found in the structure of the tip of the aedeagus. In *L. araguense* the recurved apicolateral process is extremely long and its base is not covered by a broad platelike lobe, but is subtended by a short pointed spine.

**ADULT.**—Length of forewing, 15-18 mm. Color light green rapidly fading to brown; forewing green, with indication of some slight infuscation along chord. Spurs: 2, 4, 4. **Male genitalia:** Ninth segment bearing a row of large setae along posterolateral margin. Tenth tergum deeply divided dorsomesally, with a large, rounded apicolateral lobe and three long rodlike processes, the dorso-basal and dorsoapical ones being erect and the apicomeral one a bit shorter and directed more posteriad. Clasper without ventral process, apical segment with inner face bearing short peglike setae, in posterior aspect about a third as long as basal segment. Aedeagus with erect basal region poorly developed; apex with a long, scabrous recurved process arising ventrolaterally, subtended by a short spinelike ventrolateral spur; dorsally slightly inflated subapically with this region slightly concave across dorsum.

**MATERIAL.**—**Holotype, male:** VENEZUELA, ARAGUA, Choroni Pass, 1400 m, 20 Jan 1966, S.S. and W. D. Duckworth. USNM Type 76617.

**Paratypes:** Same data as holotype, 1♀. Rancho Grande, 16-23 Oct 1966, S.S. and W.D. Duckworth, 1♂; 10-21 Feb 1969, 1♂; 6 Mar 1967, F. Fernandez Y., et al., 1♂ 1♀ (Maracay); 18 May 1949, 1♂ 1♀; 16 Jun 1949, 1♂ 1♀; 5 Dec 1966, 1♂; 10 Dec 1968, 1♀; 12 Dec 1966, 1♀; 8-11 Jun 1976, Menke and Vincent, 2♂; 1-4 Apr 1978, J.B. Heppner, 1♂.

***Leptomena pseudostigmatosum*, new species**

FIGURES 77-80

This species in coloration is inseparable from *L. stigmatosum* Ulmer, but the structure of the gen-

italia is quite different from that of any other described species although suggestive of the *colombianum* group. The elongate tenth tergum with its incurved apical lobes, and structure of the apex of the aedeagus are fully distinctive.

**ADULT.**—Length of forewing, 16–19 mm. Color brown; forewing brown, irregularly infuscate, with conspicuous dark marks on the two nygmatal spots and more diffusely at several other spots associated with forks in the venation. Spurs: 2, 4, 4. *Male genitalia:* Ninth segment produced mid-dorsally, dorsolateral margin with a row of large setae. Tenth tergum divided dorsomesally, lateral lobe elongate, apex curving mesad, with a rounded basal lobe dorsally, and a small basoventral pouch. Clasper without ventral lobe; apical segment with inner face bearing short, peglike setae, about a third as long as basal segment in posterior aspect. Aedeagus with basal section enlarged and angled to axis of stem, apex strongly inflated with rounded lateral lobes, an apicomeral pincher-like structure and a complex of internal sclerites.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, R. G. [Rancho Grande], Aug 1943, Rene Lichy. MCZ.

*Paratypes:* Carretera Maracay-Choroni, 900 m, 20 Apr 1972, F. Fernandez Y. & J. Terán, 1♂ (Maracay); 17 Jun 1975, R.E. Dietz, 1♀.

### Genus *Smicridea* McLachlan

This, the only hydropsychine genus known in South America, is found throughout the continent, north into the western United States, throughout the Antilles, and in Australia and Tasmania. I recognize two subgenera, *Smicridea* with 2 pairs of internal reticulate sacs in the apical segments of the male abdomen, and *Rhyacophylax* which lacks these sacs. Both subgenera, but especially the latter, contain many more species, both described and undescribed, in Venezuela.

The immature stages which live in lotic situations are often rather tolerant of warm and slowly flowing water conditions. The larvae construct silken retreats and trap nets attached to rocks and logs in the substrate. The larvae and pupae of a number of species from North and Central America and the West Indies are described (Flint, 1968, 1974a; Ross, 1944; Wiggins, 1977).

### Key to Species

1. Abdomen of male with 2 pairs of internal sacs ..... 2  
Abdomen of male without such sacs (Figures 93–96) ..... ***S. petasata***
2. Aedeagus tubular, long, apex with elongate internal sclerites ..... 3  
Aedeagus not tubular, short, open apically with various processes and spurs ..... 6
3. Apex of clasper broad, bifid (Figures 81–83, 97, 98) ..... ***S. bivittata***  
Apex of clasper pointed ..... 4
4. Basal segment of clasper bearing 1 to 3 short, stout spines apicomeresally; apical clasper segment modified ..... 5  
Basal segment of clasper without modified setae; apical segment elongate and pointed (Figures 90–92) ..... ***S. riita***
5. Apical segment of clasper sharply angled mesad, tip attenuate (Figures 84–86) ..... ***S. anaticula***  
Apical segment of clasper evenly curved mesad, tip pointed, with specialized setae (Figures 87–89) ..... ***S. amplispina***
6. Apex of aedeagus ventrally broad, scoop-shaped (Figures 101, 102) ..... ***S. palifera***  
Apex of aedeagus bearing a pair of slender processes (Figures 99, 100) ..... ***S. nigripennis***

***Smicridea (Smicridea) bivittata (Hagen)***

FIGURES 81–83, 97, 98

*Hydrosyche bivittata* Hagen, 1861:291.—Ross, 1952:33.  
*Smicridea bivittata*.—Ulmer, 1913:390.—Fischer, 1963:131.—  
 Flint, 1967b:16; 1974a:90.

This species is common and widespread from northeastern Mexico south throughout Central America and was recently recorded from Surinam. It is here recorded from Venezuela for the first time.

In appearance this species and *S. palifera*, new species, both common at the fish hatchery, are indistinguishable. However the genitalia of both sexes permit ready separation.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1976, see Table 1. Maracay, El Limón, 2–6 Feb 1976, 8♂ 2♀; 6 Jul 1974, 1♀. BARINAS: Río St. Domingo, Barinas, 17 Feb 1976, 1♂. BOLIVAR: El Bochinche, Reserva Forestal Imataca, 6–13 Dec 1974, 1♂.

***Smicridea (Smicridea) anaticula*, new species**

FIGURES 84–86

This is a very distinctive new species probably most closely related to the new species *S. amplispina*. Both species agree in having a modified spine(s) at the inner apex of the basal clasper segment and having the apical clasper segment rather strongly modified. However the nature of the modification of the apical segment is very different in the two species. The very short, angled, and pointed apical segment in *S. anaticula* is unique within the genus.

**ADULT.**—Length of forewing, 5 mm. Color fuscous, some specimens with white hair anteromesally on head and on outer face of basal tarsal segments of midleg; forewing uniformly fuscous. Abdomen with two pairs of reticulate internal sacs. **Male genitalia:** Ninth segment with anterior margin truncate. Tenth tergite in lateral aspect with tip erect; in dorsal aspect tapering to a slightly produced apicomesal lobe. Clasper long, basal segment parallel-sided, apex on inner face bearing a spinelike seta; apical segment very short, sharply angled mesad tapering to a point. Aedeagus tubular, curving directly from base;

apex membranous, dorsal surface slightly thickened; inner sclerite threadlike, slightly sclerotized, apex recurved ventrally.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76618.

*Paratypes:* 4 km S Rancho Grande, 5 Feb 1976, 1♂. MERIDA: Route 4, 27 km W Merida, 20 Feb 1976, C.M. and O.S. Flint, Jr., 6♂ 1♀.

***Smicridea (Smicridea) amplispina*, new species**

FIGURES 87–89

This and the preceding species are clearly related on the basis of general conformation of the genitalia and modification of the clasper segments. However, the angled basal segment of the clasper with its series of enlarged apicomesal spines, and the more elongate tapering apical segment offer distinctive differences.

**ADULT.**—Length of forewing, 5.5–6 mm. Color fuscous, white hair anteromesally on head and on outer face of tarsus of midleg; forewing with 2 narrow, transverse white bands. Abdomen with two pairs of internal reticulate sacs. **Male genitalia:** Ninth segment with anterior margin vertical. Tenth tergite elongate, narrow, tip sharply upturned, slightly produced in dorsal aspect. Clasper long, basal segment angled at midlength, apical half slightly inflated, apex on inner face bearing a cluster of enlarged spines from a darkened area; apical segment elongate, evenly tapered and curved mesad, tip with a few specialized setae. Aedeagus tubular, curving directly from base; apex membranous with a pair of dorsolateral lobes; internal sclerite threadlike, apex recurved ventrally.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76619.

*Paratypes:* 4 km S Rancho Grande, 5 Feb 1976, 1♂. Rancho Grande, 1–3 Apr 1978, J.B. Heppner, 1♂.

***Smicridea (Smicridea) riita*, new species**

FIGURES 90–92

Another species of the *fasciatella* group, *S. riita* belongs to the *albosignata* complex which is char-

acterized by the paired apicodorsal sclerites of the aedeagus. It is characterized by the short, tenth tergite which bears a lateral row of spinules, and the shape of the apical segment of the clasper.

**ADULT.**—Length of forewing 5 mm. Color fuscous, tarsi of midlegs silvery; forewing uniformly fuscous. Abdomen with two pairs of internal sacs. **Male genitalia:** Ninth segment with anterior margin vertical. Tenth tergite short, broad basally, tapering to a narrow upturned apex; in dorsal aspect with lateral margin serrate, tip broad and obliquely truncate. Clasper long, basal segment straight, slightly inflated apicad; apical segment elongate, nearly straight, tip pointed. Aedeagus tubular, angled from base, tip slightly enlarged; apex membranous with a pair of dorsolateral plates; internal sclerite threadlike, apex recurved ventrally with a thin connecting plate between dorsal and ventral arms.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76620.

### *Smicridea (Smicridea) palifera*, new species

FIGURES 101–105

This is a species of the *nigripennis* group, probably most closely related to *S. cornuta* Flint. Both species share the entire, scoop-shaped ventral lobe of the aedeagus. However, the large lateral lobe on the tenth tergite, and rather simple aedeagus with only a lightly sclerotized spine render *S. palifera* readily recognizable.

**ADULT.**—Length of forewing, 4.5–5 mm. Color fuscous; white hair anteromesally on head, and on outer face of midtarsus and basally on midtibia; forewing with two narrow transverse white bands, apical fringe white. Abdomen with 2 pairs of internal reticulate sacs. **Male genitalia:** Ninth segment with rounded anterolateral lobe. Tenth tergite short, broad, tip upright; in dorsal aspect with a small apicomesal point, and a large rounded apicolateral lobe. Clasper long, basal segment inflated apicad; apical segment long, straight, tapering to a point. Aedeagus enlarged basally, open apically; apex with ventral margin produced, entire, broadly scoop shaped; with a small straplike sclerite dorsomesally, internally

with a pair of lightly sclerotized spines, sometimes with a distinct basal tooth. **Female genitalia:** Ninth segment produced anterolaterally. Vagina with anterior and lateral supports broadly connected, U-shaped, with a small central sclerite bearing a rimmed, round, central opening.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76621.

**Paratypes:** Same data as holotype, 1♂ 1♀. Maracay, Río Limón, Estacion Piscicultura, 22–23 Oct 1974, F.H. Weibezahn, 4♀; 5–6 Nov 1974, 13♂ 3♀; 19–20 Nov 1974, 6♂ 1♀; 4–5 Dec 1974, 5♂ 7♀; 18–19 Dec 1974, 1♀; 29–30 Jan 1975, 3♂ 3♀; 12–13 Feb 1975, 1♀; 11–12 Mar 1975, 2♀; 22–23 Apr 1975, 1♀; 19–20 May 1975, 1♂ 1♀; 3–4 Jun 1975, 1♂ 1♀; 17–18 Jun 1975, 1♂; 1–2 Jul 1975, 1♂ 2♀; 15–16 Jul 1975, 1♂. BOLIVAR: Río Caroni at Paso Caruachi, 9 Feb 1976, C.M. and O.S. Flint, Jr., 1♂ 1♀. Puente Yocoima 2, 19 km N Uputa, 13 Feb 1976, C.M. and O.S. Flint, Jr., 2♂ 1♀. BARINAS: Barinitas, 22–26 Feb 1969, Duckworth, Spangler, and Dietz, 2♂ 1♀. Puente Parangula, 8 km S Barinitas, 18 Feb 1976, C.M. and O.S. Flint, Jr., 16♂ 15♀.

### *Smicridea (Smicridea) nigripennis* Banks

FIGURES 99, 100

*Smicridea nigripennis* Banks, 1920:359.—Fischer, 1963:134.—Flint, 1967b:14.

The species was described from Cali and Caldas, Colombia and has not been reported from other localities since. These examples from Venezuela thus represent a major range extension.

There are noticeable differences in the male genitalia between examples from the two regions. The Colombian examples have the dorsal spines of the aedeagus shorter and comparatively stouter and more sharply twisted laterad in dorsal aspect. Yet the basic structure of the aedeagus and spines is identical in all this material, therefore I am calling this one species at this time.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 5–6 Nov 1974, 1♂. CARABOBO: Yuma, 12 Feb 1976, 1♂.

### *Smicridea (Rhyacophylax) petasata*, new species

FIGURES 93–96

This species is a well-marked member of the *peruana* group perhaps closest to *S. (R.) talamanca*

Flint. The large fimbriate lobe overlying the aedeagus is probably a further development of the narrow sclerotized lobe of *S. talamanca*. This fimbriate lobe, the apicolateral processes, and internal sclerites of the aedeagus are distinctive.

**ADULT.**—Length of forewing, 6 mm. Color pale yellowish-brown; forewing with dark marks on crossveins and in a subterminal band beyond which the wing tip is slightly darkened. Fifth sternum with lateral processes long, almost attaining posterior of sixth segment. *Male genitalia:* Ninth segment with a large, rounded anterolateral lobe; no posteroventral process. Tenth tergite in lateral aspect with ventral margin sclerotized, tip narrowly produced posteriad; in dorsal aspect with tip rounded, produced posteriad. Clasper with basal segment long, inflated apicad; apical segment with tip rounded in dorsal aspect. Aedeagus tubular with basal section enlarged and angled to axis of stem which is narrow and arched; with a long, broad, lightly sclerotized lobe which is fimbriate marginally overlying stem; apex with serrate lateral lobes and elongate, threadlike internal structures.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 4-5 Dec 1974, F.H. Weibezhan. USNM Type 76622.

*Paratypes:* ECUADOR, PASTAZA: 27 km N Puyo, Estacion Fluviométrica, 4 Feb 1976, Spangler, et al., 2♂.

### Family HYDROPTILIDAE

The Hydroptilidae are rightly called the microcaddisflies, as most are only a millimeter or two long, although a few may reach five millimeters. The group is very diverse in habits, ecology, and systematics and is found in all parts of the world. The family is interesting also in that the larvae undergo what is almost a hypermetamorphosis. The first four instars are free living, with exceedingly long setae, and passed through quite quickly. The fifth instar larva settles down, builds its case, feeds actively, and produces most of the larval growth.

Genera belonging to two subfamilies have been taken in this survey. The genera *Ochrotrichia*, *Oxyethira*, and *Hydroptila* belong to the subfamily Hydroptilinae, and *Leucotrichia*, *Costatrichia*, *Zumatrichia*, *Alisotrichia*, and *Byrsopteryx* to the Leucotrichiinae. It is highly probable that more species and genera will be found in this family with further collecting. A rather large number of species are diurnal, and are generally not taken in adult nightlight collections.

### Key to Genera

1. Ocelli absent ..... *Hydroptila*
- Ocelli present ..... 2
2. Clasper distinct, broad, as large as or larger than ninth segment in lateral aspect ..... *Ochrotrichia*
- Clasper often highly modified, elongate, smaller than ninth segment in lateral aspect ..... 3
3. Foretibia with an apical spur ..... 4
- Foretibia lacking spurs ..... 7
4. Antenna of male with basal segment enlarged and flattened, covering half of face; ocelli 2 ..... *Zumatrichia*
- Antenna with basal segment terete (segments beyond may be compressed); ocelli 2 or 3 ..... 5
5. Aedeagus without a complex of sclerites attached dorsally at midlength. .... *Alisotrichia*
- Aedeagus with a complex of sclerites, saddle-like, around aedeagus near midlength ..... 6



- 6. Male with claspers contiguous mesally, appearing as a simple elongate lobe ..... ***Leucotrichia***  
 Claspers widely separated mesally, appearing as distinct structures. .... ***Costatrichia***
- 7. Mesoscutellum with a distinct transverse groove ..... ***Byrsopteryx***  
 Mesoscutellum without a transverse groove ..... ***Oxyethira***

**Genus *Leucotrichia* Mosely**

This genus is exclusively New World in distribution. It is known from throughout the United States and Central America, the Greater Antilles and Grenada. One species has recently been described from northern Brazil, otherwise the genus

was not known from South America before now. The genus was revised by Flint (1970).

The larvae construct small, fixed, silken shelters on larger rocks exposed to the full current. They leave a small circular opening at each end, through which the larva extends itself to graze on the surrounding periphyton. Larvae of many species are described (Flint, 1970; Wiggins, 1977).

**Key to Species**

- Forewing with large areas of green hair (Figures 106, 107) ... ***L. melleopicta***
- Forewing mostly fuscous (Figures 108, 109) ..... ***L. fairchildi***

***Leucotrichia melleopicta* Mosely**

FIGURES 106, 107

*Leucotrichia melleopicta* Mosely, 1934:157.—Fischer, 1961: 83.—Flint, 1970:5.

Heretofore this species has been known only from the holotype from Tabasco, Mexico. The male recorded here agrees closely with the figures of the genitalia of the type (Flint, 1970, figs. 9, 10), and I have little hesitation concerning the use of the name.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 19–20 May 1975, 1♂ 3–6 Feb 1976, 1♀.

***Leucotrichia fairchildi* Flint**

FIGURES 108, 109

*Leucotrichia fairchildi* Flint, 1970:10.

Known previously only from Panama, this record from Venezuela represents a significant extension of range. Taken together with the one mature male pupa were a number of larvae and

immature pupae. They may well be the same species, or possibly, in part, those of the preceding species.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 16 Feb 1976, 1♂ pupa.

**Genus *Costatrichia* Mosely**

This is a genus of only 6 species (Flint, 1970), previously known only from Central America. Because they are rarely taken, it is difficult to predict if more species may be found in Venezuela.

The immature stages are unknown, but will probably have the same general appearance and habits as *Leucotrichia* or *Zumatrichia*.

***Costatrichia tripartita venezuelensis*, new subspecies**

FIGURES 112, 113

These examples from the Estacion Piscicultura agree with the type of *C. tripartita* in nearly all

respects: modified antennae, costal cell, seventh sternal spine, and genitalia. They do differ radically however in the structure of the eighth sternum. In the typical subspecies the eighth sternum is deeply divided mesally and from the base of this division bears a long spine that curves dorsad and posteriad (Figures 110, 111). In these examples from Venezuela the eighth sternum is only slightly emarginate posteriorly and it bears a short bifurcate process directed posteriad (Figures 112, 113).

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 15–16 Jul 1975, F.H. Weibezhan. USNM Type 76623.

*Paratypes:* Same data as holotype, 1♂; 10 Jul 1973, 1♂.

### Genus *Zumatrichia* Mosely

One species of the genus is known from the western United States, and 18 more from Mesoamerica and the Lesser Antilles (Flint, 1970). The genus has not been previously reported from South America, although its presence is hardly surprising. Undoubtedly more species will be found in Venezuela.

The larvae construct shelters identical to those of *Leucotrichia* and are very similar in appearance (Flint, 1968, 1970; Wiggins, 1977). They inhabit all types of streams except the smallest ones completely shaded by trees.

#### *Zumatrichia marica*, new species

FIGURES 114–117

*Zumatrichia marica* is clearly a member of the *galtena* group closest to *Z. saluda* Flint. From this and other closely related species it may be distinguished by the bilobed apex of the basodorsal process of the clasper, and the structure of the apex of the aedeagus, especially the very heavy dorsomesal hook.

**ADULT.**—Length of forewing, 3 mm. Color fuscous, marked with patches of greenish hair. *Male genitalia:* Eight sternum without processes, truncate apically, without midventral cleft. Ninth segment with anterolateral angle slightly produced, posterolateral process slender, short, with

a single apical seta. Lateral penis-sheath broad, tapering to apicoventral angle; with a basoventral tooth. Clasper with basodorsal process long, slightly sinuate, subapically with a large ventral process; ventral lobe with apicolateral, finger-like processes. Aedeagus with typical midlength complex; apically with a midventral rodlike process, a cluster of spines of various lengths, and a heavy middorsal process whose tip is hooked dorsad.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 23 Apr 1975, F.H. Weibezhan. USNM Type 76624.

*Paratype:* Ocumure [de la Costa], 19–20 Feb 1969, P. and P. Spangler, 1♂.

### Genus *Alisotrichia* Flint

This is a small genus known primarily from the West Indies and Mesoamerica (Flint, 1970). Its presence along the southern rim of the Caribbean is hardly surprising, therefore. It is possible that other species may be found in Venezuela, but the adults must be sought on rocks in the stream during bright sun.

Larvae of several Antillean species of the genus are known (Flint, 1964, 1968). The larvae are free-living on boulders kept wet by the adjacent stream until pupation time when they construct a silken closure beneath which they pupate.

#### *Alisotrichia wirthi* Flint

FIGURES 118–120

*Alisotrichia wirthi* Flint, 1968:46; 1970:29.

This species previously has been known only from the Lesser Antillean island of Dominica. Larvae, pupae, and metamorphotypes of this species were found on large boulders by small cascades where the rocks were kept damp by spray. The larvae were generally found at or just below the fluctuating water line and the pupae just above. The larva appears to be identical to that described as *Alisotrichia* species 2 (Flint, 1968, p. 47). It thus seems probable that species 2 will be synonymized with *A. wirthi* in time. However until the larvae of the closely related *A. dominicensis* are collected and distinguishing characters

found it seems better to leave open the final placement of species 2.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 19–20 May 1975, 1♂; 16 Feb 1976, larvae, pupae, ♂ metamorphotypes. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 1♂. MIRANDA: Santa Cruz de Río Grande, Parque Nacional Guatopo, 7 Feb 1976, 1♂.

### *Byrsopteryx*, new genus

**ADULT.**—Ocelli, 3. Antenna without modified segments, of about 18 segments; very short, scarcely longer than width of head. Head unmodified. Pronotum with anterior surface sclerotized and slightly produced dorsally; Mesoscutellum with a distinct transverse groove; metascutellum nearly triangular, with lateral angles slightly truncate; meso- and metascuta with a mesal longitudinal groove. Wings narrow and attenuate, with long fringes; forewing centrally with membrane thickened, a distinct line of weakness separating a posterobasal area (much as in a Hemipteran wing); hind wing with a short row of hooked setae anteriorly. Spurs 0, 3, 4 (anteapical spur of midleg very small). No sternal processes. *Male genitalia*: ninth segment open ventrally, with several long pointed processes; aedeagus constricted mesally without midlength complex. *Female genitalia*: Eighth and ninth segments bearing anterolateral rods, eighth sternum with an apical row of enlarged setae; vagina rather simple.

**LARVA.**—Head without distinct sutures. All thoracic nota entire; pronotum with a depressed area just dorsad of lateral margin. All pairs of legs similar in structure; short and stout. Abdomen with membranous areas enlarged, but compressed and with segments well defined; with nine tergites, anterior 7 being transversely rectangular and without pores; eight and ninth enlarged and forming a large, almost circular, operculum. Anal prolegs rather short, partially retracted under ninth tergum.

**CASE.**—Case freely movable and enclosing the larva. Silken, compressed, dorsal seam rather poorly closed, slightly undulatory. Anterior and posterior openings round, directed slightly ventrad. At pupation a rather distinct oval cocoon is spun inside the case.

**TYPE-SPECIES.**—*Byrsopteryx mirifica*, new species.

Adults of this genus, when alive, look and behave like those of *Alisotrichia*. However, after study of the larval stages this assignment is totally untenable. In fact the assignment of the genus to the subfamily Leucotrichiinae seems unlikely in view of the portable case constructed by the larva. Nevertheless, the basic morphology of the larva and adult places the genus in this subfamily in spite of the *Hydroptila*-like appearance of the case and larva.

The species *Alisotrichia septempunctata* Flint from Dominica must also be transferred to this genus (new combination). Although the immature stages of *A. septempunctata* are not known and they would provide the strongest evidence of this placement, the adult head, legs, wings, and general form of the male abdomen do agree with the type-species.

The genus is probably most closely related to *Alisotrichia*. The male genitalia in the two groups are very similar, and as is mentioned above, the adult appearance and behavior. The larvae, in terms of the sclerites they bear, are somewhat similar in the two genera, although greatly different in body form. The case of *Byrsopteryx* is unique within the subfamily although the production of an inner cocoon for the pupa is typical of the group. The genus thus rests rather poorly within the Leucotrichiinae, but there seems to be no better placement for it at this time.

### *Byrsopteryx mirifica*, new species

FIGURES 121–126

From the only other species in the genus, *B. septempunctata* (Flint), this species is easily distinguished by the structure of the male genitalia. The claspers are separate and bipartite in *B. mirifica*, whereas they are fused into a single mesal rod in *B. septempunctata*. The maculation of the species is very similar, but the single spot at the apex of the forewing in *B. septempunctata* is divided in a series of marks around the wing margin in *B. mirifica*.

**ADULT.**—Length of forewing, 2 mm. Generally covered with fuscous hairs, except for marks

which are silvery-white as follows: a transverse band on head above base of antennae, a pair of round spots on mesoscutum, an elongate mark basally on forewing, a short, oblique mark from anterior margin of forewing at midlength, and a series of small dots apically on forewing at anterior and posterior margins. *Male genitalia*: Eighth tergum transversely rectangular; sternum elongate, posterior margin with a broad angulate lobe midlaterally, midventrally deeply emarginate. Ninth segment with anterior margin produced lateroventrally, open ventrally; with a pair of parenthesis-like sclerites lying in membrane posterior to hind margin ventrally. Tenth tergum produced posteriad as a slender, terete, rodlike sclerite. Subgenital plate produced apically into a long, slender rod whose tip is hooked ventrad. Claspers separated mesally, each bipartite, consisting of a lateral process angled dorsad and slightly mesad, and mesal process directed more nearly posteriad but with tip curved slightly laterad. Aedeagus tubular, base conically flared, apex membranous, inflated, with a central, complex tubular structure. *Female genitalia*: Eighth segment short, with long anterolateral rods; posterior margin completely ringed with a row of stout setae. Ninth segment with long anterolateral rods; sternum mostly membranous, with lateral sclerotized supports, truncate anteriorly; tergum with anterior margin produced mesally. Tenth segment short, broad with a pair of slender apicolateral papillae. Internally beneath eighth sternum a pair of rounded, complex plates that meet mesally in a dark undulating line; bursa copulatrix lightly sclerotized, somewhat shield shaped.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 3-6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76625.

*Paratypes*: Same data as holotype, 7♂ 8♀; 16 Feb 1978, 25♂, 20♀; 28 Aug 1974, F.H. Weibezahn, 1♀. BOLIVAR:

Parque Llovizna, Río Caroni, Ciudad Guyana, 13 Feb 1976, C.M. and O.S. Flint, Jr., 1♂.

*Others*: ARAGUA: Maracay, Río Limón, Estacion Piscicultura, 16 Feb 1976, C.M. and O.S. Flint, Jr., many larvae, pupae, ♂♀ metamorphotypes.

**BIOLOGY.**—The cases of the larvae and pupae of this species were found on the boulders in the Río Limón. They were almost exclusively above the water line, but where they were kept damp by the water from the stream. The pupal cases were attached by their ventral margins with the dorsal margin upright, generally in large groups on the rocks.

The adults were active only in bright sun on the upper surfaces of the same boulders. When disturbed slightly they would run rapidly in a zigzag course near the tops of the rocks, finally coming to rest in small depressions.

### Genus *Ochrotrichia* Mosely

The genus is exclusively New World in distribution, where it is very widely found. I recognize two subgenera, the typical, lacking an apical spur of the foretibia, is found through both North and Central America, the Greater and Lesser Antilles, and northern South America. The second subgenus, *Metrichia*, possesses an apical spur on the foretibia, and is found from the southwestern United States south to central Chile along the Andean system, and on all the West Indies. *Metrichia* contains many more species in Venezuela, especially in the paramo areas, but the typical subgenus would appear to be much more poorly represented.

The larvae make portable, silken cases, composed of two oval halves broadly joined dorsally and ventrally. A number of species from both subgenera have been described in the larval stage (Flint, 1964; Ross, 1944; Wiggins, 1977).

### Key to Species

1. Foretibia with an apical spur (Figures 131, 132) ..... *O. araguensis*  
Foretibia without a spur ..... 2
2. Tenth tergum terminating in a single mesal process hooked ventrally  
(Figures 127, 128) ..... *O. limonensis*  
Tenth tergum terminating in 3 long spines (Figures 129, 130). *O. tenanga*

***Ochrotrichia (Ochrotrichia) tenanga* (Mosely)**

FIGURES 129, 130

*Polytrichia tenanga* Mosely, 1937:185.—Fischer, 1961:176.*Ochrotrichia tenanga*.—Ross, 1944:275.—Fischer, 1971:298.—Flint, 1972a:8.

This is the first record of the species from South America, although it is the most widely distributed species of the genus in Central America. Previously it has been recorded from Mexico, Guatemala, Honduras, Costa Rica, and Panama.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 17–18 Jun 1975, 1♂.

***Ochrotrichia (Ochrotrichia) limonensis*, new species**

FIGURES 127, 128

This distinctive species, the first of the subgenus to be described from South America, fits best into the *tarsalis* group (Flint, 1972a:3). It is easily distinguished from all its congeners by the single, elongate, mesal process of the tenth tergum which is apically hooked ventrad.

**ADULT.**—Length of forewing, 2.5 mm. Color fuscous; antennae stramineous; forewing with indistinct pale transverse marks. *Male genitalia*: Ninth segment with tergum depressed and produced anteriorly. Tenth tergum with a basodorsal spine curving to one side; with basal plate ending in a short, dark point middorsally; with a long apicomeral process arising from a broad basal area and whose apical half curves ventrad; with an elongate sclerite lateroventrally. Clasper elongate, broad, apex rounded; with a cluster of black peglike setae at apex and another group near ventral margin; midbasal ridge obsolescent. Aedeagus threadlike.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76626.

*Paratypes*: Same data as holotype, 7♂ 11♀. 1 km S Rancho Grande, 5 Feb 1976, 18♂ 10♀.

***Ochrotrichia (Metrichia) araguensis*, new species**

FIGURES 131–132

On the basis of the single spine from the aedeagus, pouches between the fourth and fifth

terga, and hair brushes on the abdominal segments, this species clearly belongs to the *exclamationis* group (Flint, 1972a:11). It would appear to be most closely related to *O. (M.) lemniscata* Flint, but differs in having a shorter spine on the aedeagus and a pointed apex to the clasper.

**ADULT.**—Length of forewing, 1.5 mm. Color in alcohol, dark brown. Male abdomen with a pair of small round pouches between fourth and fifth terga; fifth and sixth terga with large lateral brushes of hair. *Male genitalia*: Ninth segment 2.5 times as long as high in lateral aspect, posterior margin slightly oblique. Cercus elongate, slightly curved. Dorsolateral hook evenly bowed ventrad, with a distinct basolateral scale. Clasper elongate, tip produced into a point directed mesad, ventral margin with a distinct apicoventral notch. Aedeagus with apical trough and tubule long, with a single slightly curved spine almost as long as apical trough and arising from a convoluted base.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76627.

**Genus *Hydroptila* Dalman**

*Hydroptila* is a very large genus found on all major landmasses and islands of the world. There seems, however, to be a diminution of species diversity in the tropical regions compared to the temperate zones. Nevertheless, more species surely will be found in Venezuela.

The larvae construct silken purselike cases indistinguishable from those of *Ochrotrichia* with which they may occur. The immature stages of many species from many regions of the world are known (Nielsen, 1948; Ross, 1944; Wiggins, 1977).

***Hydroptila venezuelensis*, new species**

FIGURES 133–136

This rather common species at the fish hatchery is the first of the genus to be reported from Venezuela. It appears to be most closely related to *H. protera* Ross from the United States. The

aedeagus is very similar in the two species, but the claspers and tenth tergum offer distinctive differences. In *H. venezuelensis* the clasper is much shorter and more expanded apicad, with a dark tooth on the outer face, and the tenth tergum is short with a simple ventrolateral sclerotization.

**ADULT.**—Length of forewing, 2 mm. Color light brown; forewing with several chocolate brown spots along costal margin. Seventh sternum of male with a small apicomeral point. *Male genitalia:* Ninth segment rounded anterolaterally, posterior margin developed into a pointed process laterad to clasper base. Tenth tergum with ventral margin lightly sclerotized, apex slightly emarginate mesally. Clasper in lateral aspect expanded apicad, outer face with a distinct anteapical dark tooth; in ventral aspect short, broad, almost parallel sided. Subgenital plate evenly rounded apically, with 2 small, approximate, apicomeral points. Aedeagus very long, basal three-fourths a simple tube; apical section ending in a thin tubule, around which is wrapped an expanded portion giving rise to a laterally directed process; basad to expanded portion is a tubular section bearing a spiral process which is wrapped once around the tube. *Female genitalia:* Eighth segment with posterior margin rectangularly emarginate dorsally, ventrally produced and slightly bilobed; midventrally with a slightly elongate, three-angled structure bearing in anteromesal area an elongate darkened mark.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 19–20 May 1975, F.H. Weibezahn. USNM Type 76628.

*Paratypes:* Same data as holotype, 28♂; 28–29 Aug 1974, 1♀; 22–23 Oct 1974, 1♀; 5–6 Nov 1974, 2♂ 1♀; 19–20 Nov 1974, 1♂; 4–5 Dec 1974, 1♀; 29–30 Jan 1975, 13♂ 4♀; 12–13 Feb 1975, 28♂ 28♀; 25–26 Feb 1975, 3♂ 2♀; 11–12 Mar 1975, 22♂ 6♀; 24–25 Mar 1975, 14♂ 5♀; 7–8 Apr 1975, 31♂ 17♀; 22–23 Apr 1975, 7♂ 5♀; 6–7 May 1975, 3♂ 1♀; 3–4 Jun 1975, 3♂; 17–18 Jun 1975, 33♂ 21♀; 1–2 Jul 1975, 20♂ 4♀; 15–16 Jul 1975, 32♂ 10♀; 11–12 Aug 1975, 5♂ 1♀; 25–26 Sep 1975, 9♂ 6♀; 16 Feb 1976, C.M. and O.S. Flint, Jr., 3♀.

### Genus *Oxyethia* Eaton

This genus, together with *Hydroptila*, is worldwide in distribution. Its abundance, however,

seems to increase toward the tropics in contrast to *Hydroptila*. Although only one species is reported in the Río Limón, many more occur in Venezuela.

The larval cases are very distinctive, being silken and transparent. The posterior end is broad and compressed, and is connected to a narrow, cylindrical front end. The larvae are well known from many areas of the world (Nielsen, 1948; Ross, 1944; Wiggins, 1977).

### *Oxyethira azteca* (Mosely)

FIGURES 137–139

*Loxotrichia azteca* Mosely, 1937:165.—Fischer, 1961:131; 1971:260.

*Oxyethira azteca*.—Ross, 1944:295.—Flint, 1968:54.

*Protoptila parce* Edwards and Arnold, 1961:405.—Edwards, 1973:496. [New synonymy.]

This species was described from Mexico and subsequently recorded from Surinam and the Lesser Antillean island of Grenada, and redescribed from Texas, U.S.A. under the name *Protoptila parce*. The presence of such a wide-ranging species in Venezuela was to be expected, although no previous records are available.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1. BARINAS: Barinitas, 22–23 Feb 1969, 1♂ 1♀.

### Family LEPTOCERIDAE

Three genera and seven species belonging to this family of worldwide distribution have been taken up to now in the Río Limón Basin. It seems quite possible that species in the genera *Brachysetodes*, *Triplectides*, *Leptocellodes*, and *Triaenodes* may be found with more intensive collecting.

The larvae of all genera construct some type of portable case. The type of case varies greatly between species: certain ones are constructed very uniformly from fine sand grains, others are more loosely constructed from organic materials, *Triplectides* bores into a small twig, and *Leptocellodes* constructs its case entirely from a silken secretion.

## Key to Genera

1. Forewing with M unbranched ..... *Oecetis*  
Forewing with M branched near margin ..... 2
2. Hind wing with  $R_s$  and branches well developed ..... *Atanatolica*  
Hind wing with  $R_s$  and branches virtually indiscernible .... *Nectopsyche*

Genus *Atanatolica* Mosely

The genus, limited to the Neotropical Region, has a rather poorly known distribution. Up to now, species were known from the Antillean island of Dominica and eastern Brazil. The genus is much more widespread, but because the adults are seldom collected it is not recorded in the literature. Other species, probably very similar in appearance, occur in Venezuela.

The immature stages of *A. dominicana* are described (Flint, 1968). The unknown leptocerid larva described by Botosaneanu (1974) from Rancho Grande is undoubtedly a species of *Atanatolica*. However, I possess larvae and a male metamorphotype of *A. botosaneanui*, and they differ from the Rancho Grande larva. It is thus clear that a second species of the genus occurs in the headwaters of the Río Limón Basin.

*Atanatolica botosaneanui*, new species

FIGURES 140-142

This, the third species described in the genus, is very similar to its congeners in form of the male genitalia. The most distinctive characters are on the claspers of the male. The small ventral process of the basal area of the clasper is diagnostic. The rather uniform coloration lacking the white markings of the other species is also characteristic. The venation agrees with *A. dominicana*, in that fork 1 in the forewing is petiolate, and there is no cross-vein in the hind wing between  $R_{2+3}$  and  $R_{4+5}$ .

**ADULT.**—Length of forewing, 9.5–10.5 mm (male), 7.5–8.5 (female). Color generally stramineous (male), or light greyish-brown (female), antennae distinctly annulate basally, brown apically; forewing obscurely mottled with patches of

hair slightly darker than ground color, in female these darker patches are nearly contiguous. *Male genitalia:* Ninth segment, annular, slightly produced posterodorsally. Cercus elongate, narrowing posteriad. Tenth tergum with paired apico-dorsal digitate lobes flanked laterally by slightly shorter lobes. Clasper with basal section enlarged, with a distinct apicoventral process, with inner margin evenly rounded, bearing a small lobe apicoventrally appressed to ventral face of apical section; apical section elongate, terete with inner surface bearing many short spinelike setae. Aedeagus tubular, with apicoventral margin produced and convex. *Female genitalia:* Cercus produced into a small apicomeres point. A thin, ventrally directed plate below cerci, slightly bilobed apically. Ninth sternum bearing a pair of narrow rounded plates apically. Vagina with a single apicomeres support, with a central keyhole-like opening.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76629.

*Paratypes:* Same data as holotype, 3♂ 5♀. 1 km S Rancho Grande, 5 Feb 1976, C.M. and O.S. Flint, Jr., 2♂ 3♀. Maracay, Río Limón, Estacion Piscicultura, 8–9 Oct 1974, F.H. Weibezahn, 1♂; 4–5 Dec 1974, 1♂ 1♀. BARINAS: 22 km N Barinitas, 19 Feb 1976, C.M. and O.S. Flint, Jr. 1♂.

Genus *Oecetis* McLachlan

This is another genus of worldwide distribution, both in tropical and temperate climes, and continental and insular sites. Some species are very widely distributed, covering most of the Holarctic Region or most of New World, for examples. There are other species known from Venezuela.

The larvae make portable cases of sand or plant

matter. Some species are primarily inhabitants of lentic sites, while others are typically inhabitants of fast-flowing small rivers, such as the Río Li-

món. Larvae of many species from various areas of the world are known (Flint, 1968; Ross, 1944; Wiggins, 1977).

### Key to Species

1. Clasper of male broad basally with a slender apical lobe; aedeagus very broad with a curved internal spine (Figures 143, 144). *O. inconspicua*  
Clasper differently formed; aedeagus without a curved internal spine . . . 2
2. Clasper long and slender, tip bifid; ninth and tenth terga with long, slender processes (Figures 148–151) . . . . . *O. prolongata*  
Clasper vertical, with a short posterior projection and a large mesal lobe; no processes dorsally (Figures 145–147) . . . . . *O. knutsoni*

### *Oecetis inconspicua* (Walker)

FIGURES 143, 144

*Leptocerus inconspicuus* Walker, 1852:71.

*Oecetis inconspicua*.—Betten and Mosely, 1940:67.—Flint, 1964:64.—Fischer, 1966:149.

This common North American species is known from Central America, the Greater Antilles, and now northern South America. It has a very extensive bibliography and many synonyms for which one should consult the Fischer reference above.

**MATERIAL.**—VENEZUELA, ARAGUA: Punta Cabito, Lago Valencia, 13 Feb 1974, 31♂ 2♀. BARINAS: Río Santo Domingo, Barinas, 17 Feb 1976, 1♂ 2♀. Puente Parangula, 8 km S Barinitas, 18 Feb 1976, 4♂ 6♀; 22–23 Feb 1969, 1♂. BOLIVAR: Río Caroni at Paso Caruachi, 9 Feb 1976, 3♀. 5 km E Tumeremo, 12 Feb 1976, 9♂ 1♀. CARABOBO: Yuma, 7 Aug 1975, 2♀. GUARICO: 12 km S Calabozo, 6–12 Feb 1969, 13♂ 4♀. Lago de los Patos, 15 km S Calabozo, 9 Feb 1969, 100♂♂ 2♀. MONAGAS: Uverito, 22 Jun 1978, 1♀.

### *Oecetis knutsoni*, new species

FIGURES 145–147

This species is closely related to *O. punctata* (Navas) described from Costa Rica. It is to be distinguished in the male by the structure of the genitalia, especially the claspers. In *O. knutsoni*, the clasper bears a large lobe from the posterolateral margin and another from the dorsomesal margin, and the tenth tergum is reduced to a very minuscule lobe.

**ADULT.**—Length of forewing, 8–9 mm (male), 6–8 mm (female). Color generally stramineous;

forewing with 20 dark spots in membrane at forks and junctions of veins and along apex at ends of veins. Forewing venation with  $R_{2+3}$  forked at s; hindwing with  $R_{2+3}$ , M, and Cu, all deeply forked. *Male genitalia*: Ninth segment annular, dorsally with a pair of small knobs from posterior. Cercus an elongate, ovoid lobe. Tenth tergum virtually lacking, consisting of a small point between cerci and a small flap above aedeagus. Clasper consisting of a lightly sclerotized lateral portion, which is slightly produced ventrally, bears an elongate, spinous lobe from posterolateral margin, ends dorsally in a series of slender seta-tipped processes, and a curved spinous lobe mesally; mesal portion heavily sclerotized and darker, in posterior aspect as broad as high, mesal margin vertical, dorsal margin with a small angular projection centrally. Aedeagus tubular, apex directed slightly ventrad, with a simple C-shaped internal sclerite. *Female genitalia*: Ninth sternum lightly sclerotized, not conspicuously darkened. Vagina with conspicuous lateral supports, roughly conical, with a central keyhole-like opening.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Ocumare [de la Costa], 17 Apr 1972, L.V. Knutson, USNM Type 76630.

*Paratypes*: Same data as holotype, 1♂. Rancho Grande, 1100 m, 11–15 Jan 1966, S.S. and W.D. Duckworth, 1♀. Maracay, Río Limón, Estacion Piscicultura, F.H. Weibezahn, 8–9 Oct 1974, 1♂; 19–20 Nov 1974, 4♂ 1♀; 4–5 Dec 1974, 5♂; 3–4 Jan 1975, 1♀; 29–30 Jan 1975, 6♂ 1♀; 12–13 Feb 1975, 1♂ 1♀; 25–26 Feb 1975, 4♂ 1♀; 11–12 Mar 1975, 9♂ 2♀; 24–25 Mar 1975, 2♂; 7–8 Apr 1975, 7♂ 3♀; 22–23 Apr 1975, 1♂; 6–7 May 1975, 1♂ 1♀; 19–20 May 1975, 1♂; 3–4



Jun 1975, 1♀; 17–18 Jun 1975, 1♂; 1–2 Jul 1975, 1♂; 15–16 Jul 1975, 6♂ 5♀; 11–12 Aug 1975, 2♂; 25–26 Sep 1975, 19♂ 7♀; 3–6 Feb 1976, C.M. and O.S. Flint, Jr., 1♀. **BARINAS:** Barinitas, 22–23 Feb 1969, P. and P. Spangler, 1♂. Puente Parangula, 8 km S Barinitas, 18 Feb 1976, C.M. and O.S. Flint, Jr., 3♂.

### *Oecetis prolongata*, new species

FIGURES 148–151

The relationships of this species would appear to be closest to *O. arizonica* Denning, and perhaps more distantly to *O. falcia* Denning and *O. doesburgi* Flint. The extremely long, slender process of the ninth and tenth segments and the claspers and aedeagus all permit easy recognition of the species.

The female here associated appears to be a logical choice because of similarities in the genitalia to the closely related *O. arizonica* and *O. falcia*, although the association is far from absolutely established.

**ADULT.**—Length of forewing, 7 mm. Color in alcohol, pale yellowish brown; forewing with 4 dark spots on forks of veins basally, a dark zigzag line over crossveins of the chord, and a few small spots at posterior wing margin. Venation of forewing with  $R_{2+3}$  forked at s; hind wing with  $R_{2+3}$ , M, and Cu, all forked apically. **Male genitalia:** Ninth segment expanded antero- and posterolaterally, bearing a long, slender, dark-tipped and pointed process dorsolaterally, that of right side much longer than left side. Tenth tergum deeply divided middorsally with lateral halves

produced into long, slender, dark-tipped and pointed processes; with a long, slender, dorsomesal rodlike process. Cercus elongate, slender. Clasper long, slender, tip divided and fishtail-like in ventral aspect, claspers broadly united mesobasally. Aedeagus tubular, elongate, mostly membranous apically. **Female genitalia:** Ninth sternum not apparently sclerotized. Vagina heavily sclerotized, very complex.

**MATERIAL.**—*Holotype, male:* VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 4–5 Dec 1974, F.H. Weibezahn. USNM, Type 76631.

*Other:* Same data as holotype, 7–8 Apr 1975, 1♀.

### Genus *Nectopsyche* Müller

This is an exclusively New World genus of many species, some of which penetrate northwardly into southern Canada (Haddock, 1977). Most of the species in the genus were described as *Leptocella*, recently synonymized with *Nectopsyche*. The adults have distinctive color patterns on the forewings which are soon lost in alcohol. Therefore, material should be kept dry and mounted on pins for identification. In addition to the four species here recorded, many more species, some undescribed, are known from Venezuela.

The larvae all construct long, slender cases of various types. Many cases are constructed very regularly of small sand grains (*N. gemmoides* for one), and others more irregularly of plant material. Many species from North America and the West Indies are known in the larval stage (Flint, 1968; Haddock, 1977; Wiggins, 1977).

### Key to Species

1. Forewing brown, with a white band along posterior margin (Figures 153, 166) ..... ***N. dorsalis***  
Forewing with brown and white areas intermingled or more strikingly marked with other colors ..... 2
2. Forewing marked irregularly with white and brown patches (Figures 152, 167) ..... ***N. punctata***  
Forewing strikingly marked with bands gold or silver color ..... 3
3. Forewing yellow, with silver cross bands (Figures 156–157, 169) .....  
..... ***N. gemmoides***  
Forewing white, with golden cross bands (Figures 154–155, 168) .....  
..... ***N. aureofasciata***

***Nectopsyche dorsalis* (Banks)**

FIGURES 153, 166

*Leptocella dorsalis* Banks, 1901:368.—Ulmer 1913:402, 410.—Fischer, 1966:54.—Flint, 1967b:21.  
*Leptocella serrei* Navas, 1924:83.—Fischer, 1966:60. [New synonymy.]  
*Nectopsyche dorsalis*.—Haddock, 1977:408.

This species has a widespread range throughout Middle America from the extreme southwestern United States into Panama. This is the first record of the species from South America.

It is easily recognized by the extremely large eyes of the male and coloration, being brown with a line of snow white hairs from the base of the antennae posteriorly over the head, thorax, and along the anal margin of the forewing.

I have studied the female holotype of *L. serrei* Navas located at Paris. Although much rubbed, the white middorsal stripe is still evident as is the basic brown vestiture of the forewings. It is herewith synonymized with *Nectopsyche dorsalis* (Banks).

**MATERIAL.**—VENEZUELA, ARAGUA: Maracay, El Limón, 2–6 Feb 1976, 2♂ 2♀. BARINAS: Puente Parangula, 8 km S Barinitas 18 Feb 1976, 1♀.

***Nectopsyche punctata* (Ulmer)**

FIGURES 152, 167

*Leptocella punctata* Ulmer, 1905b:75; 1913:402, 410.—Fischer, 1966:60.—Flint, 1967b:242.  
*Leptocella fenestrata* Banks, 1913:237.—Flint, 1966:9.  
*Leptocella spegazzinia* Navas, 1920:69. [New synonymy.]  
*Leptocella ambitiosa* Navas, 1933:118.—Schmid, 1949:386.—Flint, 1966:9; 1972b:242.  
*Nectopsyche punctata*.—Flint, 1974c:131.

This species is very widespread over South and Central America, being recorded from Argentina, Paraguay, Brazil, Bolivia, Ecuador, Surinam, and Panama. The widespread occurrence of the species in Venezuela, here recorded for the first time, is to be expected.

The wing coloration, white with brown patches often outlined by darker brown, is produced by scales rather than hairs as is typical of most species of the genus.

Through the courtesy of Dr. John C. Morse, I have had the opportunity to study the male holotype of *Leptocella spegazzinia* Navas. The type is almost wholly denuded, but a few white and brown scales still adhere to the wings. Although no pattern is discernible, the scales together with the male genitalia are all typical of *N. punctata* (Ulmer). Therefore, I synonymize *L. spegazzinia* with *N. punctata*.

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 12–13 Feb 1975, 2♂; 17–18 Jun 1975, 1♂. Rancho Grande, 10–21 Feb 1969, 2♂. Ocumare de la Costa, 4 Jul 1974, 3♂. 10 km S Ocumare, 20 Feb 1969, 1♂. BARINAS: Barinitas, 22–26 Feb 1969, 8♂. Barinas, Río Santo Domingo, 17 Feb 1976, 2♂ 4♀. Reserva Forestal Ticoporo, 26–29 Feb 1968, 6♂ 3♀. Reserva Forestal Caparo, Camp Cachicamos, 6–14 Aug 1969, 2♂. BOLIVAR: Kanarakuni, 2 Feb 1967, 1♂. Río Caroni, Paso Caruachi, 9 Feb 1976, 1♀. Morichal Tauca, 22 km E Río Caura, 8–9 Feb 1976, 1♀. COJEDES: Galeras del Pao, 29 Jul 1967, 1♂. PORTUGUESA: Acarigua, 18 Aug 1945, 1♂.

***Nectopsyche aureofasciata*, new species**

FIGURES 154, 155, 168

The relationship of this species is rather obscure. At first sight the coloration appears to be like that of *N. flavofasciata* (Ulmer), but close examination shows it to be quite different as are the size and male genitalia of the two. However, the presence of metallic silvery scales, black eye-spots along the anal angle and forked dorsolateral processes of the male ninth segment suggest that it is more closely related to the *gemma* section of the genus. The silvery white ground color crossed by golden marks with black eye-spots at the anal angle of the forewings, together with the structure of the male genitalia are, combined, diagnostic for this species.

**ADULT.**—Length of forewing, 8.5–9.5 mm (male), 5.5–6 mm (female). Eyes of male small; not quite one-third width of dorsal interocular distance. Head with white hairs and scales dorsally, antennae white dorsally on basal few segments, dark brown ventrally, then white restricted to a narrow basal annulus, apical three-fourths of the segments totally dark; body stramineous, pro- and mesonota with white scales

laterally, golden mesally; forewing with a very distinctive pattern of white and silver scales and hairs, crossed by golden bands, with distinct black eye-spots posteroapically. *Male genitalia*: Ninth tergum with a very short, truncate, middorsal lobe posteriorly, dorsolateral arms long, apices bearing a distinct ventral process. Tenth tergum with ventral processes long, parallel, and rodlike. Clasper with basodorsal process with apex very slightly elevated, tip hooked laterad; basal portion broad, slightly tapering apicad, apex with a series of enlarged setae, apicomeral process in ventral aspect elongate, not greatly enlarged apicad; basal lobe united to base of clasper, rodlike with several apical setae. Aedeagus sclerotized ventrally, apicodorsally membranous.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76632.

*Paratypes*: Maracay, Río Limón, Estacion Piscicultura, F.H. Weibezahn, 22–23 Oct 74, 1♂; 12–13 Feb 1975, 2♂ 2♀; 25–26 Feb 1975, 1♀; 11–12 Mar 1975, 2♀; 7–8 Apr 1975, 3♂ 1♀; 17–18 Jun 1975, 1♂; 1–2 Jul 1975, 3♀; 11–12 Aug 1975, 1♂; 3–6 Feb 1976, C.M. and O.S. Flint, Jr., 3♂ 1♀. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, C.M. and O.S. Flint, Jr. 1♀.

### *Nectopsyche gemmoides*, new species

FIGURES 156, 157, 169

This species is closely related to *N. gemma* (Müller). In coloration it differs by lacking the lines of silvery scales on the head, mesonotum, and basal fourth of the forewing. The male genitalia of the two species, although very similar, are definitely different. I am unable to find any trace of the basodorsal process of the clasper in the type material of *N. gemma*.

**ADULT.**—Length of forewing, 10–11 mm (male), 6 mm (female). Eyes of male small, about one-third width of dorsal interocular distance. Head, thorax and appendages, stramineous, scape, head dorsally, and mesonotum with yellow scales and hairs; forewing covered mostly with bright yellow hairs marked with metallic silvery patches as follows: costal cell basally (rather sparse scales), a pair of crossbands near midlength more widely separated on anterior margin, a

series of small dots below stigma, and 2 crossbands apically; posteroapical angle with a series of black and silver eye-spots bordered inwardly by white scales; all these marks are underlain by dark marks in the wing membrane. *Male genitalia*: Ninth segment with a small truncate middorsal lobe from posterior; posterolateral arms long, apex distinctly bifid. Tenth tergum with ventral arms long, parallel, and slightly compressed. Clasper with basodorsal process tapering to a point, generally directed laterad, and semimembranous; basal portion not enlarged, barely tapering apicad, apex with a series of enlarged setae, apicomeral process in ventral aspect elongate, only slightly enlarged apicad; basal lobe very broad in ventral aspect, multisetae with posterior margin divided into several lobes. Aedeagus sclerotized ventrally, internally with a small sac of spines and a small sclerite.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 3–6 Feb 1976, C.M. and O.S. Flint, Jr. USNM Type 76633.

*Paratypes*: Same data as holotype, 7♂; 22–23 Oct 1974, F.H. Weibezahn, 1♀, 5–6 Nov 1974, 1♂ 2♀; 4–5 Dec 1974, 3♂ 9♀; 18–19 Dec 1974, 5♂ 2♀; 3–4 Jan 1975, 8♂ 3♀; 29–30 Jan 1975, 13♂ 9♀; 12–13 Feb 1975, 16♂ 5♀; 25–26 Feb 1975, 8♂ 3♀; 11–12 Mar 1975, 3♂ 10♀; 24–25 Mar 1975, 10♂; 7–8 Apr 1975, 24♂ 6♀; 22–23 Apr 1975, 22♂ 7♀; 6–7 May 1975, 19♂ 5♀; 19–20 May 1975, 5♂ 2♀; 3–4 Jun 1975, 6♂ 4♀; 17–18 Jun 1975, 1♂ 4♀; 1–2 Jul 1975, 4♂ 18♀; 15–16 Jul 1975, 16♂ 29♀; 11–12 Aug 1975, 3♂ 9♀; 25–26 Sep 1975, 15♂ 18♀. Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 4♂ 6♀; 3 Jun 1973, C.J. Rosales, 1♂. Ocumare de la Costa, 4 Jul 1974, Gelvez and Olivo, 1♂. BARINAS: Barinitas, 22–23 Feb 1969, P. and P. Spangler, Duckworth and Dietz, 3♂ 1♀. Río Santo Domingo, Barinas, 17 Feb 1976, C.M. and O.S. Flint, Jr., 4♂. BOLIVAR: Río Cuyuni, El Dorado, 10 Feb 1976, C.M. and O.S. Flint, Jr., 4♀.

ECUADOR, PICHINCHA: Santo Domingo de los Colorados, 6 Feb 1958, R.W. Hodges, 1♂ (Michigan State University); 29 km W Santo Domingo de los Colorados, 6 May 1975, Spangler, et al., 4♂ 4♀. NAPO: Lago Agrio, 16 Aug 1975, Spangler et al., 5♂ 25♀; 19 Sep 1975, 2♀. 3 km NE Lago Agrio, 17 May 1975, 2♂ 2♀. 4 km NW Lago Agrio, 23 Aug 1975, 4♀. 5 km N Lago Agrio, 26 Sep 1975, 8♂ 14♀. 18 km NW Lago Agrio, 30 Aug 1975, 3♂ 1♀. 3 km SW Lago Agrio, 25 Aug 1975, 1♂ 1♀. Río Aguatico, 18 km E Lago Agrio, 23 Sep 1975, 1♂ 2♀; 28 Aug 1975, 1♀.

TRINIDAD, Simla, Arima Valley, 13–19 Feb 1966, S.S. and W.D. Duckworth, 1♂; 20–22 Feb 1966, 2♀.

PARAGUAY, 2 km S Cerro Cora, 28 Nov 1973, O.S.

Flint, Jr., 11♂ 1♀. Río Aquidaban, Cerro Cora, 29 Nov 1973, O.S. Flint, Jr., 6♀. Arroyo Tapiracuay, San Estanislao, 27 Nov 1973, O.S. Flint, Jr., 1♀.

COLOMBIA, Río Frio, Magdalena, G. Salt, 1♂ (MCZ).

PANAMA, CANAL ZONE: Barro Colorado Island, 18–28 Apr 1964, S.S. and W.D. Duckworth, 2♂; 10–17 May 1964, 1♂ 1♀. Naval Reserve [Pipeline Road], near Gamboa, 29 Mar 1975, S.S. and W.D. Duckworth, 2♂ 1♀. Pipeline Road, Río Agua Salud, 30 Mar 1965, 5♂; 8–12 Jul 1967, Flint and Ortiz, 1♂ 1♀. Pipeline Road, Río Frijoles, 6–7 Jul 1967, 1♂.

COSTA RICA, Arenal, Quebrada Tronadorcita, 24 Jul 1967, O.S. Flint, Jr., 8♀.

NICARAGUA, Puente Quinama, E Villa Somoza, 29 Jul 1967, O.S. Flint, Jr., 1♂ 14♀.

GUATEMALA, Purulha, Jul, Schaus and Barnes, 1♀. SUCHITEPEQUEZ, Puente Ixtacapa, 18–19 Jun 1966, Flint and Ortiz, 4♀.

MEXICO, VERACRUZ: Río Tacalopan, rt 180, km 551, 25–26 Jul 1966, Flint and Ortiz, 16♂ 6♀. TABASCO: Río Chacamax, Palenque, 6 Dec 1975, C.M. and O.S. Flint, Jr., 1♂ 3♀. Río Puyacatingo, E Teapa, 28–29 Jul 1966, Flint and Ortiz, 4♂ 2♀. CHIAPAS: 7.8 miles E Pichucalco, 27–28 Jul 1966, Flint and Ortiz, 2♂ 9♀; 7 Dec 1975, C.M. and O.S. Flint, Jr., 3♀. San Cristobal las Casas, 6–8 Aug 1965, Flint and Ortiz, 5♀; 1 May 1959, H.E. Evans, 3♂ 1♀ (Cornell University).

#### Family CALAMOCERATIDAE

Although representatives of this family are found in most parts of the world they are by far less common in the more temperate areas than in the Tropics. Even in the Tropics, however, they are not a very diverse group. One genus, *Phyllocius*, is ubiquitous within the Neotropical Region, but the status and placement of the other genera and species is still unresolved. It is virtually certain a second genus is present at higher elevations within the basin, although not yet collected. Currently the species of this second genus are placed in *Ganonema*, with *G. vicarium* (Walker) being the most probable species to be found. However, the placement of Neotropical species in an otherwise Oriental genus is certainly wrong, but the correct generic placement will not be resolved here.

The larvae of all species either construct a case or in certain genera hollow out twigs. They are primarily inhabitants of flowing water, although they often seek out slower areas or spring seeps. They all seem to be detritivores, processing organic debris in the environment. The immature stages

of *Phyllocius* are well known (Flint, 1968, Wiggins 1977, etc.), however these stages of the other Neotropical genera are not yet described.

#### *Phyllocius angustior* Ulmer

FIGURES 158, 159

*Phyllocius angustior* Ulmer, 1905b:78.—Thienemann, 1909: 129.—Fischer, 1965:21.

This is one of the few Trichoptera whose larvae have been described on the basis of Venezuelan material (Thienemann, 1909). The species is widely distributed in South America, being known from northeastern and northwestern Argentina, southern Brazil, Venezuela, and in addition I have seen examples from Paraguay, Bolivia, Peru, and Colombia. The species appears to be widely distributed throughout Venezuela.

MATERIAL.—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974–1975, see Table 1; 3–6 Feb 1976, 5♂ 3♀. Maracay, El Limón, 19 Jan 1968, 1♀; 2–6 Feb 1976, 4♂ 3♀; 17–23 Feb 1973, 3♀; 9 Apr 1973, 2♀; 27 May 1973, 1♂; 14 Jun 1973, 1♂; 23 Jun 1974, 1♀; 21 Jul 1971, 2♂ 1♀. Rancho Grande, 3 Jan 1966, 1♀; 23 Jan 1978, 1♀; 12 Mar 1956, 1♀; 3 Apr 1967, 1♀; 26 Apr 1968, 1♀; 27 Apr 1967, 1♀; 8–11 Jun 1976, 1♂; 11 Jun 1958, 1♂; 16–23 Oct 1966, 1♂; 23 Oct 1968, 1♀; 25 Nov 1949, 1♀. Carretera Maracay–Choroni, 17 Jun 1975, 1♂. 1 km S Rancho Grande, 5 Feb 1976, 4♂. Dos Riitos, 6 km N Rancho Grande, 4 Feb 1976, 1♂. BARINAS: Barinitas, 22–26 Feb 1969, 1♀. 22 km N Barinitas, 24 Feb 1976, 1♀. MERIDA: Merida, La Pedregosa, 21 Feb 1976, 4♂ 2♀; 1 Jun 1976, 1♀. Río Montalban, 19 km W Merida, 20 Feb 1976, 1♂. MIRANDA: Agua Blanca, Parque Nacional Guatopo, 7 Feb 1976, 1♂ 3♀. Santa Cruz de Río Grande, 7 Feb 1976, 1♂. MONAGAS: Río Morichal Largo, puente, 31 Aug–3 Sep 1975, 1♂ 1♀. TRUJILLO: Boconó, 12 Aug 1964, 1♀. Cuicas, 12 Aug 1964, 2♂. DISTRITO FEDERAL: Cumbre de Boqueron, frente a Bajo Seco, 30 Nov 1967, 1♀.

#### Family ODONTOCERIDAE

This family is widely distributed throughout all the regions of the world except the Ethiopian. In the Neotropics there are very few genera and only a few dozen species. The genus *Marilia* occurs in Venezuela, but has not yet been found in the Río Limón Basin.

The larvae of all the known New World genera construct slightly tapered and curved, tubular

cases of small sand grains. They are inhabitants of flowing waters, from large rivers to small streams. The larvae of *Marilia* have been described (Wiggins, 1977).

#### Family HELICOPSYCHIDAE

The typical genus of the family, *Helicopsyche*, is found on most of the continents of the world, but is absent from much of northern and central Europe and Asia. In the tropical regions, however, a few more genera are found and the species diversity is greatest. In Latin America the family is represented by 2 genera, *Helicopsyche* and *Cochliopsyche* (= *Tetanonema*). The latter genus, although found in Venezuela, was not taken in the

Río Limón Basin probably because it is generally taken nearer larger rivers than are found in the area.

The larvae are case makers, constructing the well-known cases of small sand grains formed into the shape of a snail shell. Although lotic situations are their primary habitat, they are also found in rocky lakes or burrowed deeply into the bottom sand and gravel. They apparently feed by scraping organic matter indiscriminately off the substrate, thereby producing a diversity of matter in the gut. The immature stages have been described many times in all the standard trichopterous texts and in special detail by Botosaneanu, 1956 or Wiggins, 1977.

#### Key to Species

- Clasper of male with a large rounded dorsal lobe; basomesal lobe elongate, terete (Figures 160, 161) ..... *H. vergelana*  
 Clasper with dorsal lobe divided into a narrow basal projection and a rounded apical portion; basomesal lobe a small pointed flap (Figures 162-164) ..... *H. angulata*

#### *Helicopsyche vergelana* Ross

FIGURES 160, 161

*Helicopsyche vergelana* Ross, 1956b:440.—Flint, 1974c:144.

Although originally described from Mexico, its subsequent record from Surinam and now Venezuela suggest a wide distribution in the Neotropics. *H. margaritensis* Botosaneanu, described from Isla Margarita, is almost assuredly a synonym. The larvae, pupae, and cases of *H. margaritensis* were described and figured with the original description (Botosaneanu, 1959).

**MATERIAL.**—VENEZUELA, ARAGUA: Estacion Piscicultura, 1974-1975, see Table 1. BARINAS: Puente Parangula, 8 km S Barinitas, 18 Feb 1976, 10♂ 8♀. BOLIVAR: Puente Yocoima 2, 19 km N Upata, 13 Feb 1976, 1♂.

#### *Helicopsyche angulata*, new species

FIGURES 162-164

This species, frequently encountered at the Fish Hatchery, is related to the Peruvian *H. extensa*

Ross. The males of the two species may be distinguished by the shape of the clasper. In *H. angulata* there is long, narrow basodorsal projection, and the mesobasal lobe is pointed in lateral, and angulate with a few spines in caudal aspect. The females of the two species at the Fish Hatchery may be distinguished by the shape of the vaginal sclerites and by the presence of the dark, oblique marks in *H. vergelana*.

**ADULT.**—Length of forewing, 4-4.5 mm. Color pale brown, antennae stramineous; forewing pale brown. Sixth sternum of male with a slender slightly flattened process, about half length of sternum; third through fifth sterna reticulate. **Male genitalia:** Ninth segment broadly rounded anteriorly; ventral strap about as broad as dorsal strap. Tenth tergum with tip truncate in lateral, and shallowly cleft in dorsal aspect. Clasper with a long, narrow, erect dorsal lobe, and a broader posterior lobe which bears a mesal point; mesobasal lobe produced as a pointed process in lateral, and as a broad, angulate shelf with 3-5 spinelike setae in caudal aspect. Aedeagus with

base slightly angled, and tip greatly enlarged. *Female genitalia*: Sixth sternum with a short pointed process, third through fifth sterna reticulate. Ninth sternum with posterior margin evenly convex, with narrow striations; laterally with an ovoid, depressed, darkened area whose surface is densely covered by darkened spinules. Vaginal sclerite shield shaped, with a central opening, supported by two long rodlike sclerites.

**MATERIAL.**—*Holotype, male*: VENEZUELA, ARAGUA, Maracay, Río Limón, Estacion Piscicultura, 3–6 Feb 1976, C.M. & O.S. Flint, Jr. USNM Type 76634.

*Paratypes*: Same data as holotype, 3♂ 2♀; 22–27 Oct 1974, 1♀; 5–6 Nov 1974, 1♂; 19–20 Nov 1974, 1♂; 29–30 Jan

1975, 1♂ 1♀; 12–13 Feb 1975, 2♂ 1♀; 25–26 Feb 1975, 1♀; 11–12 Mar 1975, 1♀; 24–25 Mar 1975, 1♂; 22–23 Apr 1975, 1♀; 19–20 May 1975, 1♂; 1–2 Jul 1975, 1♂ 1♀; 15–16 Jul 1975, 1♂ 1♀; 11–12 Aug 1975, 2♀. Maracay, El Limón, 2–6 Feb 1976, C.M. and O.S. Flint, Jr., 1♀. Rancho Grande, 1100 m, 16–23 Oct 1966, S.S. and W.D. Duckworth, 1♂; 24–31 Oct 66, 1♀; 25 July 67, R.W. Poole, 1♂; 8 Aug 67, 1♂. BARINAS: 22 km NW Barinitas, 24 Feb 1976, C.M. and O.S. Flint, Jr., 1♂. MERIDA: Merida, La Pedregosa, 21 Feb 1976, C.M. and O.S. Flint, Jr., 1♂ 1♀.

COLOMBIA, SANTANDER: San Joaquin, 30 Aug 1965, W.D. Duckworth, 2♂. ANTIOQUIA: Medellin, 8 Jan 1960, Gallego, 2♂. VALLES: Tablones, Finca La Florida, 1300 m, 7 Jan 1959, J.F.G. Clarke, 3♂ 5♀.

ECUADOR, NAPO: San Francisco de Borja, 15 May 1975, Spangler, et al., 1♂.

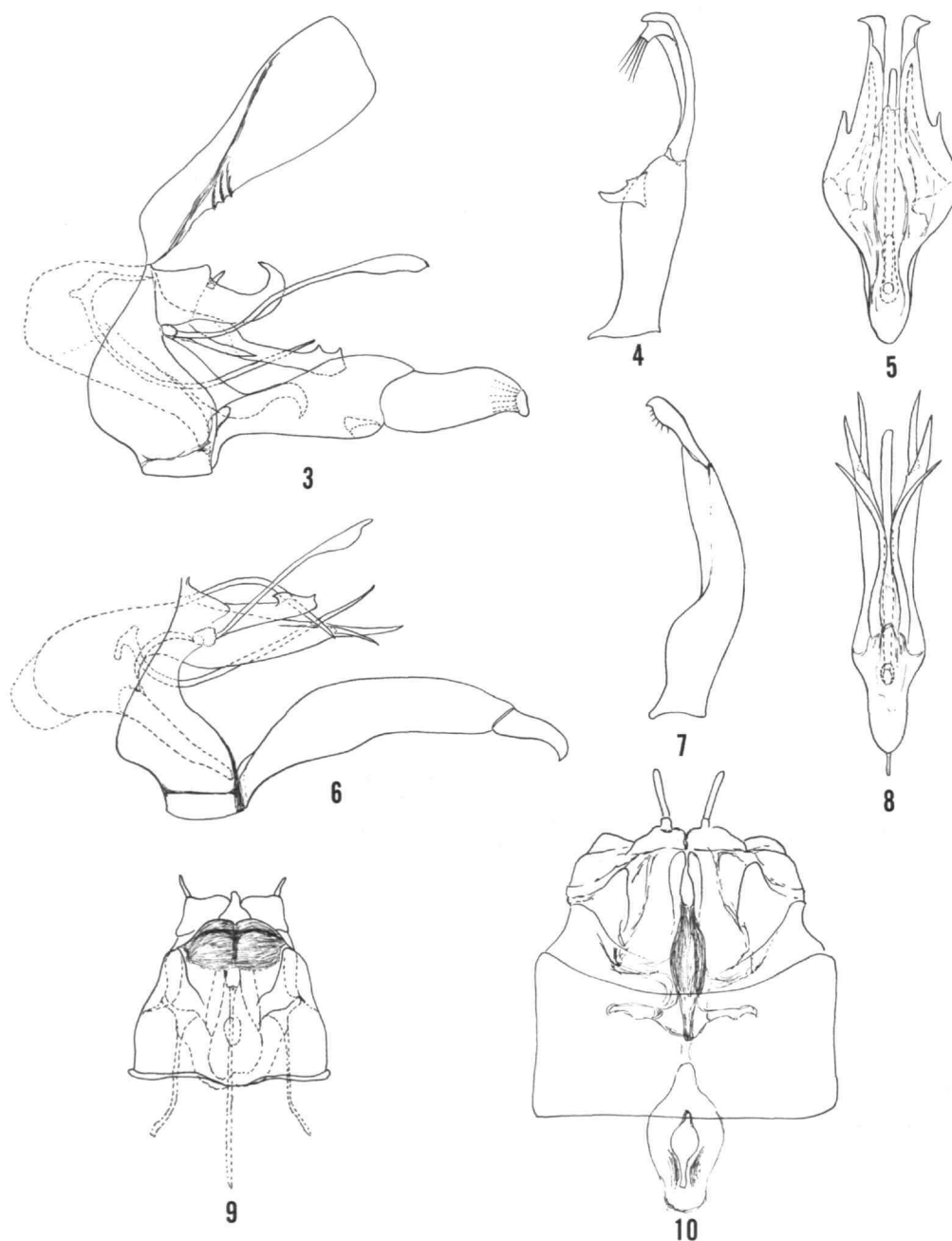
## Literature Cited

- Banks, N.  
 1901. A List of Neuropteroid Insects from Mexico. *Transactions of the American Entomological Society*, 27:361-371, 15 figures.  
 1913. Synopses and Descriptions of Exotic Neuroptera. *Transactions of the American Entomological Society*, 39: 201-242, 42 figures.  
 1920. New Neuropteroid Insects. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 64:299-362, 110 figures.  
 1924. Descriptions of New Neuropteroid Insects. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 65:421-455, 60 figures.
- Beebe, W.  
 1949. *High Jungle*. 379 pages. New York: Duell, Sloan, and Pearce.
- Beebe, W., and J. Crane  
 1947. Ecology of Rancho Grande, a Subtropical Cloud Forest in Northern Venezuela. *Zoologica*, 32:43-60, 10 figures, 5 plates, 3 tables.
- Betten, C.B., and M.E. Mosely  
 1940. *The Francis Walker Types of Trichoptera in the British Museum*. 248 pages. London: British Museum (Natural History).
- Botosaneanu, L.  
 1956. Le développement postembryonnaire, la biologie et la position systématique d'un des Trichoptères les plus intéressants de la faune européenne: *Helicopsyche bacescui* Orghidan et Botosaneanu. *Acta Societatis Zoologicae Bohemoslovenicae*, 20:285-312, 25 figures.  
 1959. *Helicopsyche margaritensis*, Trichoptère nouveau des Petites Antilles. *Studies on the Fauna of Curacao and Other Caribbean Islands*, 9:61-68, figures 84-86.  
 1974. Une remarquable larve de Trichoptère du Venezuela. *Entomologische Berichten*, 34:116-120, 3 figures.
- Edwards, S.W.  
 1961. The Immature States of *Xiphocentron mexico* (Trichoptera). *The Texas Journal of Science*, 13:51-56, 8 figures.  
 1973. Texas Caddisflies. *The Texas Journal of Science*, 24: 491-516, 1 figure.
- Edwards, S.W., and C.R. Arnold  
 1961. The Caddis Flies of the San Marcos River. *The Texas Journal of Science*, 13:398-415, 26 figures.
- Ewell, J.J., A. Madriz, and J.A. Tosi, Jr.  
 1976. *Zonas de Vida de Venezuela*. Second edition, 270 pages, 1 map, 119 figures. Caracas: Republica de Venezuela, Ministerio de Agricultura y Cria, Fondo Nacional de Investigaciones Agropecuarias.
- Fischer, F.C.J.  
 1961. Philopotamidae, Hydroptilidae, Stenopsychidae. *Trichopteronum Catalogus*, 2:1-189.  
 1963. Hydropsychidae, Arctopsychidae. *Trichopteronum Catalogus*, 4:1-223.  
 1965. Calamoceratidae, Philorheithridae, Odontoceridae, Leptoceridae, Pars I. *Trichopteronum Catalogus*, 6:1-242.  
 1966. Leptoceridae, Pars 2. *Trichopteronum Catalogus*, 7:1-163.  
 1971. Supplement to Volumes I and II. *Trichopteronum Catalogus*, 12:1-311.
- Flint, O.S., Jr.  
 1963. Studies of Neotropical Caddis Flies, I: Rhyacophilidae and Glossosomatidae (Trichoptera). *Proceedings of the United States National Museum*, 114: 453-478, 8 figures.  
 1964. The Caddis Flies (Trichoptera) of Puerto Rico. *University of Puerto Rico, Agricultural Experiment Station, Technical Paper*, 40:1-80, 19 figures.  
 1966. Studies of Neotropical Caddis Flies, III: Types of Some Species Described by Ulmer and Brauer. *Proceedings of the United States National Museum*, 120(3559):1-20, 5 figures, 2 plates.  
 1967a. Studies of Neotropical Caddis Flies, IV: New Species from Mexico and Central America. *Proceedings of the United States National Museum*, 123(3609):1-24, 71 figures.  
 1967b. Studies of Neotropical Caddis Flies, V: Types of the Species Described by Banks and Hagen. *Proceedings of the United States National Museum*, 123(3619):1-37, 127 figures, 1 plate.  
 1968. Bredin-Archbold-Smithsonian Biological Survey of Dominica, 9: The Trichoptera (Caddisflies) of the Lesser Antilles. *Proceedings of the United States National Museum*, 125(3665):1-86, 231 figures.  
 1970. Studies of Neotropical Caddisflies, X: *Leucotrichia* and Related Genera from North and Central America (Trichoptera: Hydroptilidae). *Smithsonian Contributions to Zoology*, 60:1-64, 249 figures.  
 1971. Studies of Neotropical Caddisflies, XII: Rhyacophilidae, Philopotamidae, and Psychomyiidae from the Amazon Basin (Trichoptera). *Amazoniana*, 3:1-67, 143 figures.  
 1972a. Studies of Neotropical Caddisflies, XIII: The Ge-

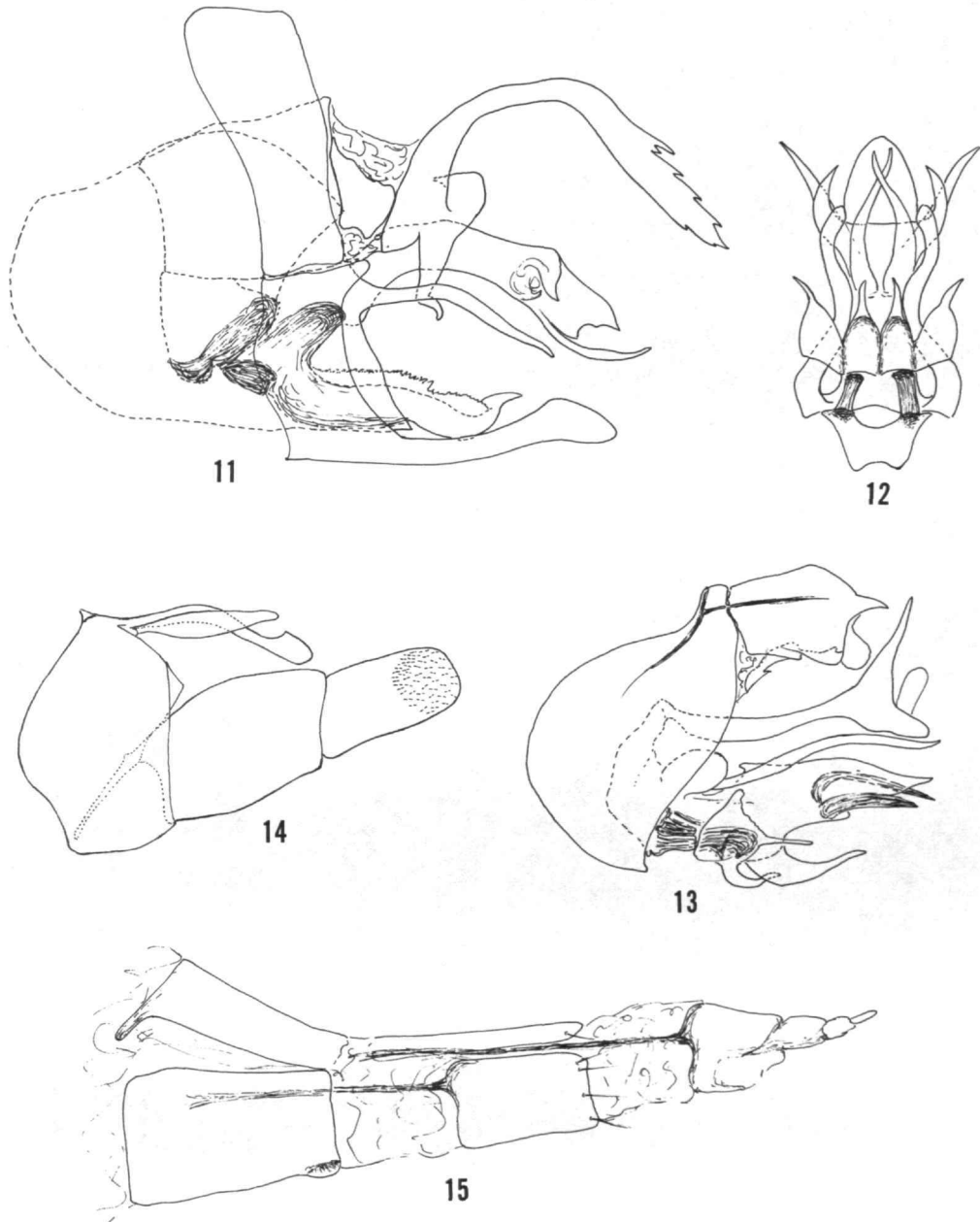
- nus *Ochrotrichia* from Mexico and Central America (Trichoptera: Hydroptilidae). *Smithsonian Contributions to Zoology*, 118:1-28, 78 figures.
- 1972b. Studies of Neotropical Caddisflies, XIV: On a Collection from Northern Argentina. *Proceedings of the Biological Society of Washington*, 85:223-248, 49 figures.
- 1974a. Studies of Neotropical Caddisflies, XVII: The Genus *Smicridea* from North and Central America (Trichoptera: Hydropsychidae). *Smithsonian Contributions to Zoology*, 167:1-65, 225 figures.
- 1974b. Studies of Neotropical Caddisflies, XVIII: New Species of Rhyacophilidae and Glossosomatidae (Trichoptera). *Smithsonian Contributions to Zoology*, 169:1-30, 91 figures.
- 1974c. Studies of Neotropical Caddisflies, XV: The Trichoptera of Surinam. *Studies on the Fauna of Suriname and other Guyanas*, 14:1-151, 299 figures, 4 plates.
1975. Studies of Neotropical Caddisflies, XX: Trichoptera Collected by the Hamburg-South Peruvian Expedition. *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 4:565-573, 9 figures.
1978. Studies of Neotropical Caddisflies, XXII: Hydropsychidae of the Amazon Basin (Trichoptera). *Amazoniana*, 6:373-421, 149 figures.
- Haddock, J.D.  
1977. The Biosystematics of the Caddis Fly Genus *Nectopsyche* in North America with Emphasis on the Aquatic Stages. *The American Midland Naturalist*, 98:382-421, 38 figures.
- Hagen, H.  
1861. Synopsis of the Neuroptera of North American. *Smithsonian Miscellaneous Collections*, 4(1):xx + 1-347.
- Marlier, G.  
1964. Trichopteres de l'Amazonie recueillis par le Professeur H. Sioli. *Institut Royal des Sciences Naturelles de Belgique, Memoires*, 2nd series, 76:1-167, 61 plates.
- Mosely, M.E.  
1933. *A Revision of the Genus Leptonema*. 69 pages. London: British Museum (Natural History).  
1934. New Exotic Hydroptilidae. *Transactions of the Royal Entomological Society of London*, 82:137-163, 58 figures.  
1937. Mexican Hydroptilidae (Trichoptera). *Transactions of the Royal Entomological Society of London*, 86:151-190, 37 figures.
- Navas, R.P.L.  
1920. Insectos Sudamericanos. *Anales de la Sociedad Científica Argentina*, 90:33-72, 11 figures.  
1924. Insectos de la America Central. *Brotéria, Série Zoológica*, 21:55-86, 22 figures.  
1933. Insectos de la Argentina. *Revista de la Academia de Ciencias Exactas, Físico-químicas y Naturales de Zaragoza*, 16:87-120, 22 figures.
- Nielsen, A.  
1948. Postembryonic Development and Biology of the Hydroptilidae. *Det Kongelige Danske Videnskabernes Selskab, Biologiske Skrifter*, 5(1):1-200, 64 figures, 3 plates.
- Ross, H.H.  
1944. The Caddis Flies, or Trichoptera, of Illinois. *Bulletin of the Illinois Natural History Survey*, 23(1):1-326, 961 figures.  
1952. Lectotypes of Hagen Species Belonging to Certain Families of Trichoptera. *Psyche*, 59:31-36.  
1956a. *Evolution and Classification of the Mountain Caddis Flies*. 213 pages. Urbana: University of Illinois Press.  
1956b. New Species of *Helicopsyche* from the Western Hemisphere (Trichoptera: Helicopsychidae). *Journal of the Washington Academy of Sciences*, 46:397-401, 10 figures.
- Sattler, W.  
1963. Über den Körperbau, die Ökologie und Ethologie der Larve und Puppe von *Macronema* Pict. (Hydropsychidae). *Archiv für Hydrobiologie*, 59:26-60, 35 figures.
- Schmid, F.  
1949. Les Trichoptères de la Collection Navas. *Eos*, 25:305-426, 222 figures.
- Thienemann, A.  
1909. Trichopterenstudien, V: Ueber die Metamorphose einiger südamerikanischer Trichopteren. *Zeitschrift für wissenschaftliche Insektenbiologie*, 5:37-42, 125-132, 13 figures.
- Ulmer, G.  
1905a. Zur Kenntniss aussereuropäischer Trichopteren. *Stettiner Entomologische Zeitung*, 66:1-119, 147 figures.  
1905b. Neue und wenig bekannte aussereuropäische Trichopteren, hauptsächlich aus dem Wiener Museum. *Annalen des kaiserlich-königlichen naturhistorischen Hofmuseums*, 20:59-98, 75 figures.  
1907. Monographie der Macronematinae. In *Collections zoologiques du Baron Edm. de Selys Longchamps*, 6(2):1-121, 119 figures, 6 plates.  
1909. Südamerikanische Trichopteren aus dem Kopenhagener Museum, I: Trichopterenimagines aus Venezuela. *Deutsche Entomologische Zeitschrift*, 1909:305-308, 4 figures.  
1911. Einige Südamerikanische Trichopteren. *Annales de la Société Entomologique de Belgique*, 55:15-26, 13 figures.  
1913. Verzeichnis der südamerikanischen Trichopteren, mit Bemerkungen über einzelne Arten. *Deutsche Entomologische Zeitschrift*, 1913:383-414, 21 figures.  
1957. Köcherfliegen (Trichopteren) von den Sunda-Inseln, Teil III. *Archiv für Hydrobiologie, Supplement*, 23(2/4):109-470, 667 figures.



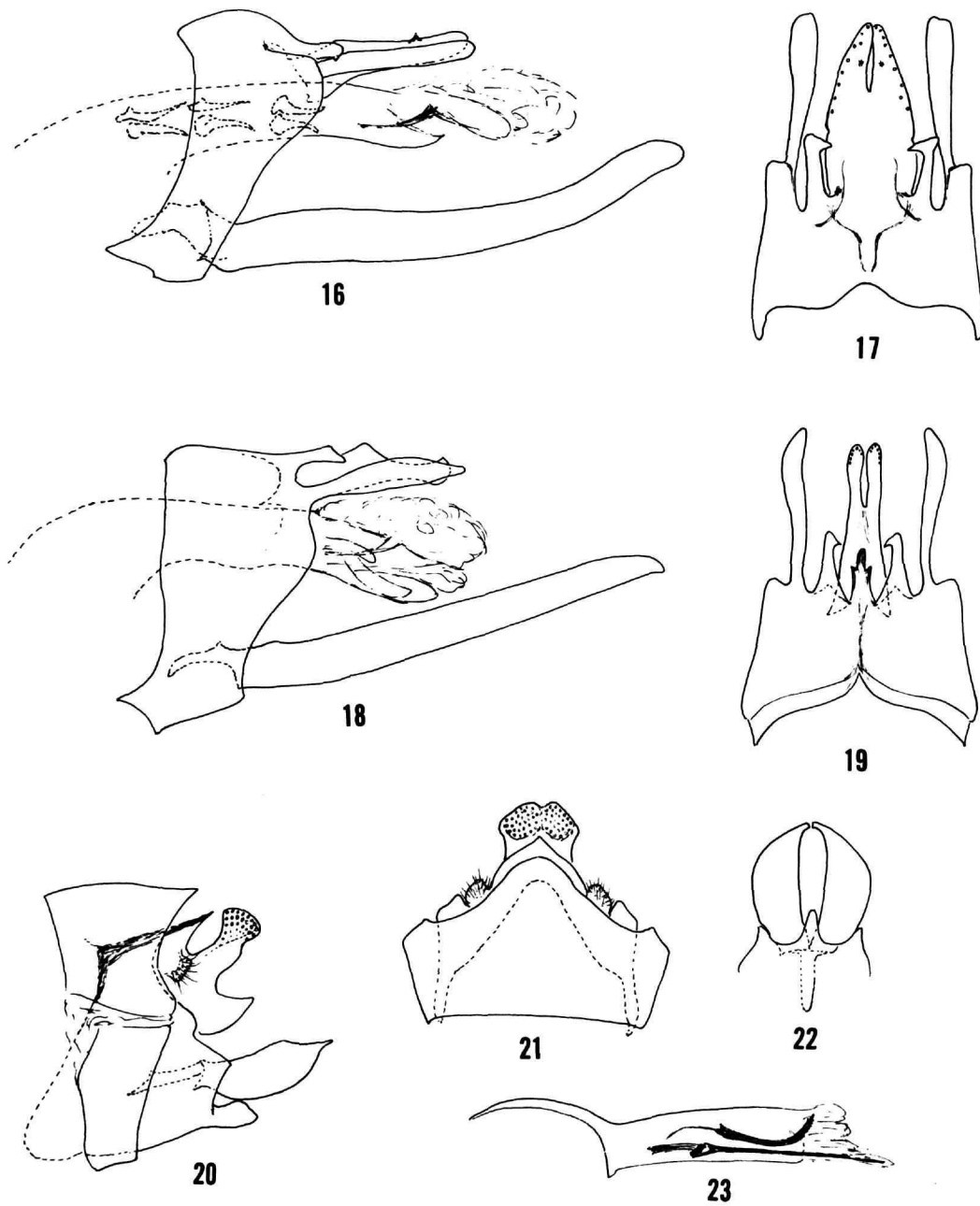
- Walker, F.  
1852. *Catalogue of the Specimens of Neuropterous Insects in the Collection of the British Museum, Part 1: Phryganides-Perlides*. 192 pages. London.
- Wallace, J.B.  
1975. Food Partitioning in Net-Spinning Trichoptera Larvae: *Hydropsyche venularis*, *Cheumatopsyche etrona*, and *Macronema zebratum* (Hydropsychidae). *Annals of the Entomological Society of America*, 68:463-472, 8 figures, 4 tables.
- Wallace, J.B., and D. Malas  
1976. The Fine Structure of Capture Nets of Larval Philopotamidae (Trichoptera), with Special Emphasis on *Dolophilodes distinctus*. *Canadian Journal of Zoology*, 54:1788-1802, 21 figures.
- Wiggins, G.B.  
1977. *Larvae of the North American Caddisfly Genera (Trichoptera)*. 401 pages. Toronto and Buffalo: University of Toronto Press.
- Yamamoto, T.  
1966. Five New Species of the Caddisfly Genus *Polycentropus* from South America (Trichoptera: Polycentropodidae). *Canadian Entomologist*, 98:908-912, 5 figures.
1967. New Species of the Caddisfly Genus *Polycentropus* from Central America (Trichoptera: Polycentropodidae). *Journal of the Kansas Entomological Society*, 40:127-132, 6 figures.



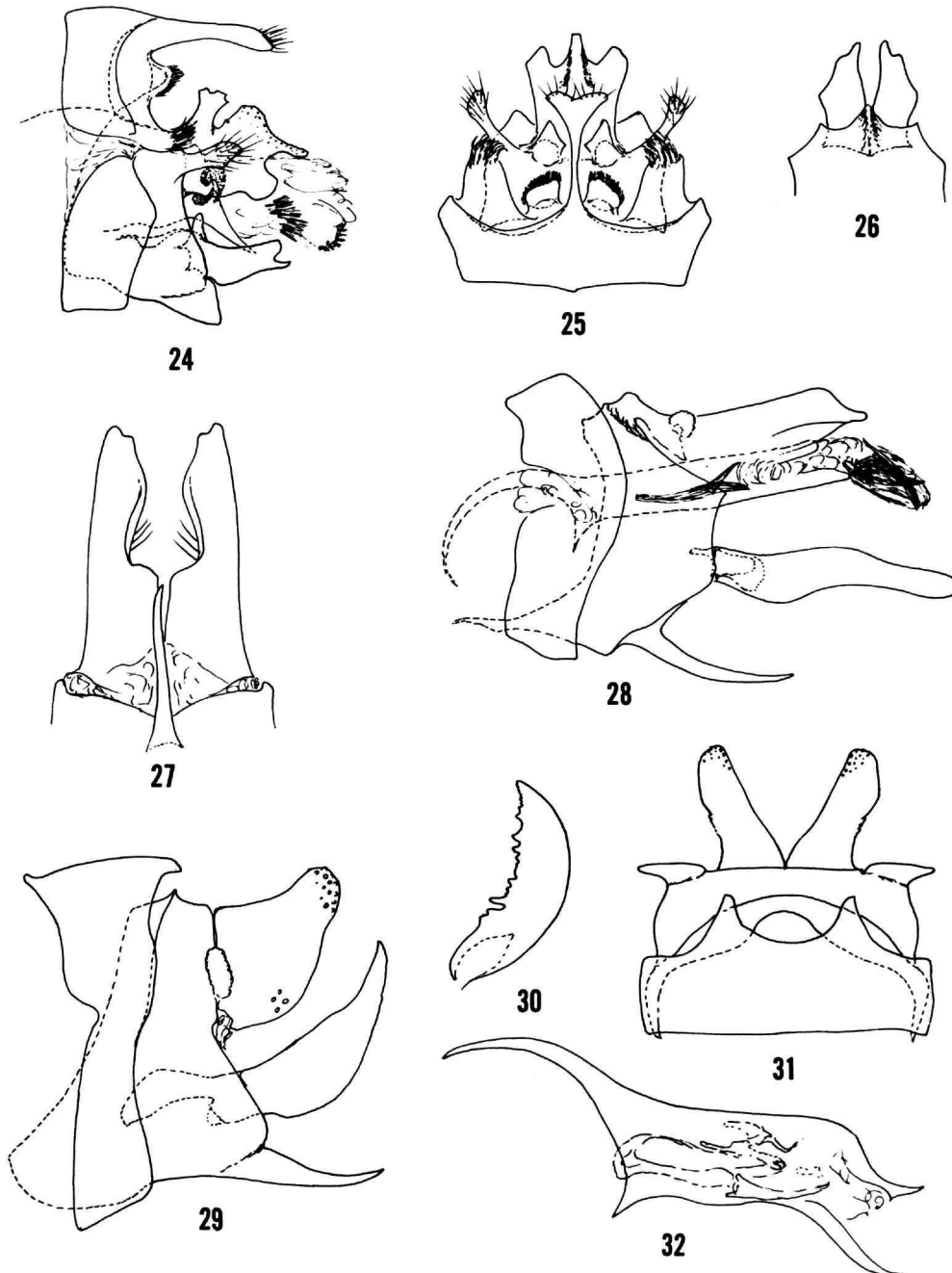
FIGURES 3-10.—*Atopsyche caquetia* Flint: 3, male genitalia, lateral; 4, clasper, ventral; 5, aedeagus, dorsal. *A. choronica* Flint: 6, male genitalia, lateral; 7, clasper, ventral; 8, aedeagus, dorsal. *Protoptila fimbriata*, new species: 9, female genitalia, ventral. *Mexitrichia limona*, new species: 10, female genitalia, ventral.



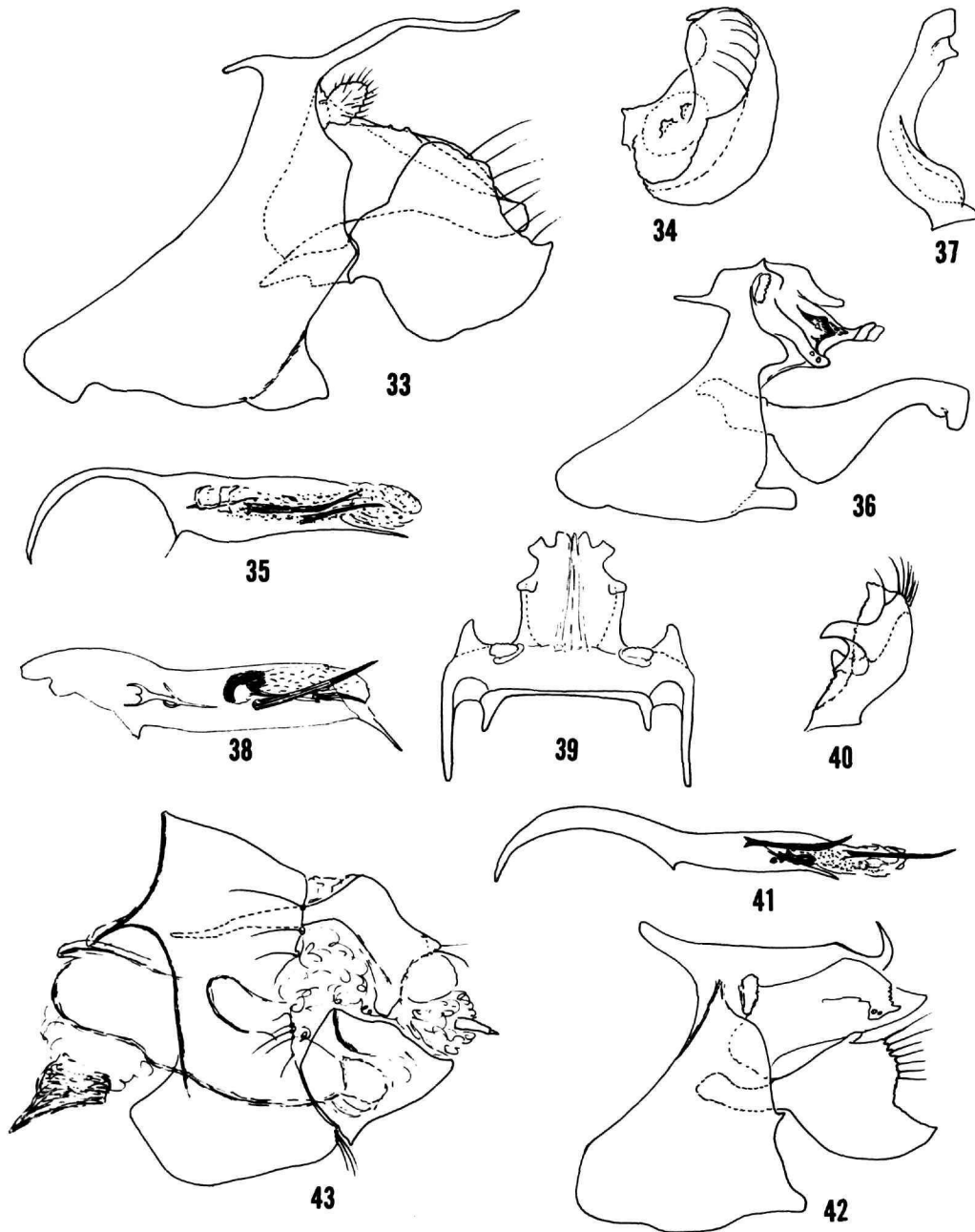
FIGURES 11-15.—*Prooptila fimbriata*, new species: 11, male genitalia, lateral. *Mexitrichia limona* new species: 12, aedeagal complex, ventral; 13, male genitalia, lateral. *Wormaldia planae* Ross and King: 14, male genitalia, lateral; 15, female genitalia, lateral.



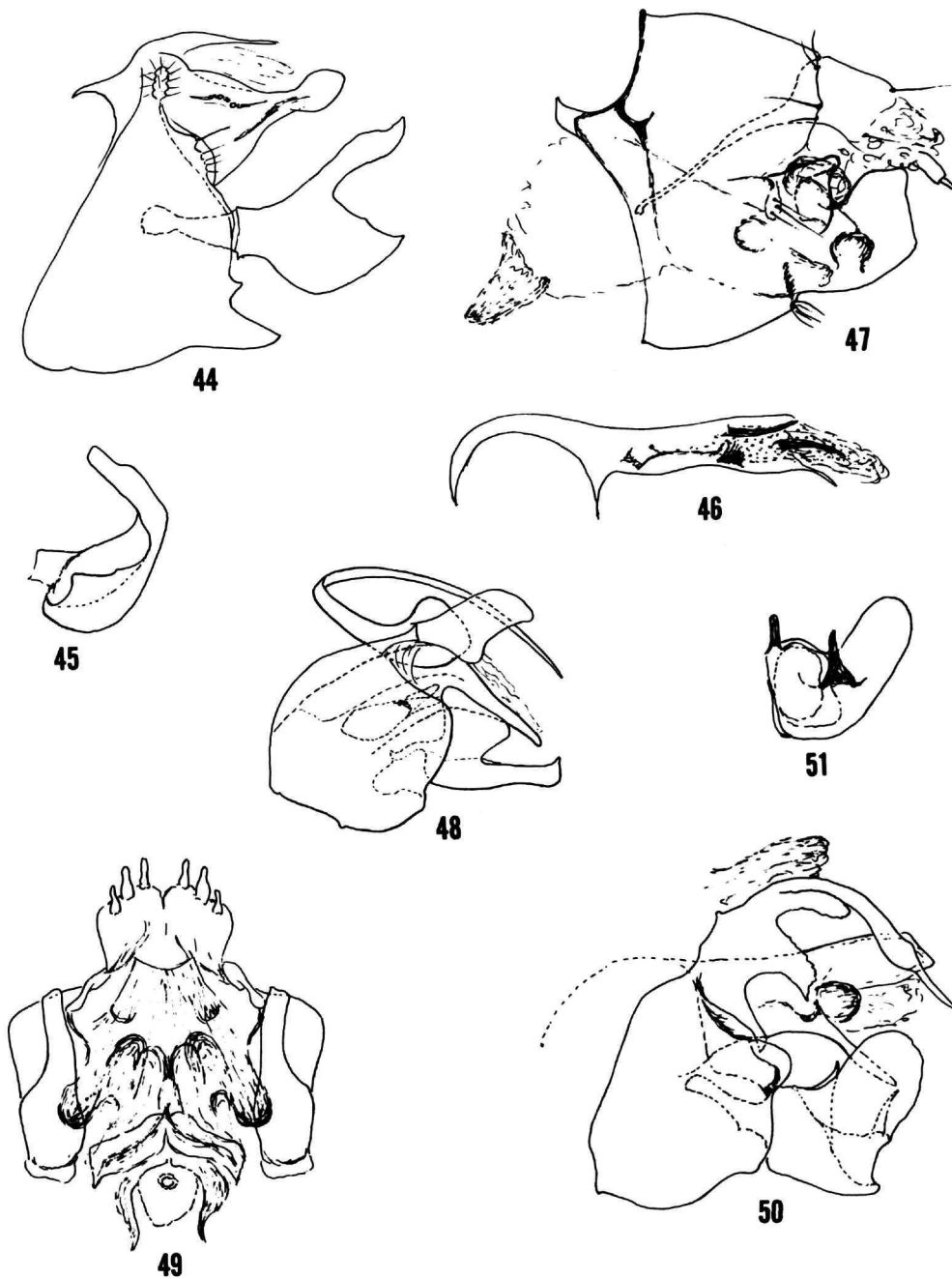
FIGURES 16-23.—*Chimarrhodelia ulmeri* (Ross): 16, male genitalia, lateral; 17, ninth and tenth targa, dorsal. *C. nigra*, new species: 18, male genitalia, lateral; 19, ninth and tenth targa, dorsal. *Chimarra fernandesi*, new species: 20, male genitalia, lateral; 21, eighth, ninth, and tenth targa, dorsal; 22, ninth sternum and claspers, ventral; 23, aedeagus, lateral.



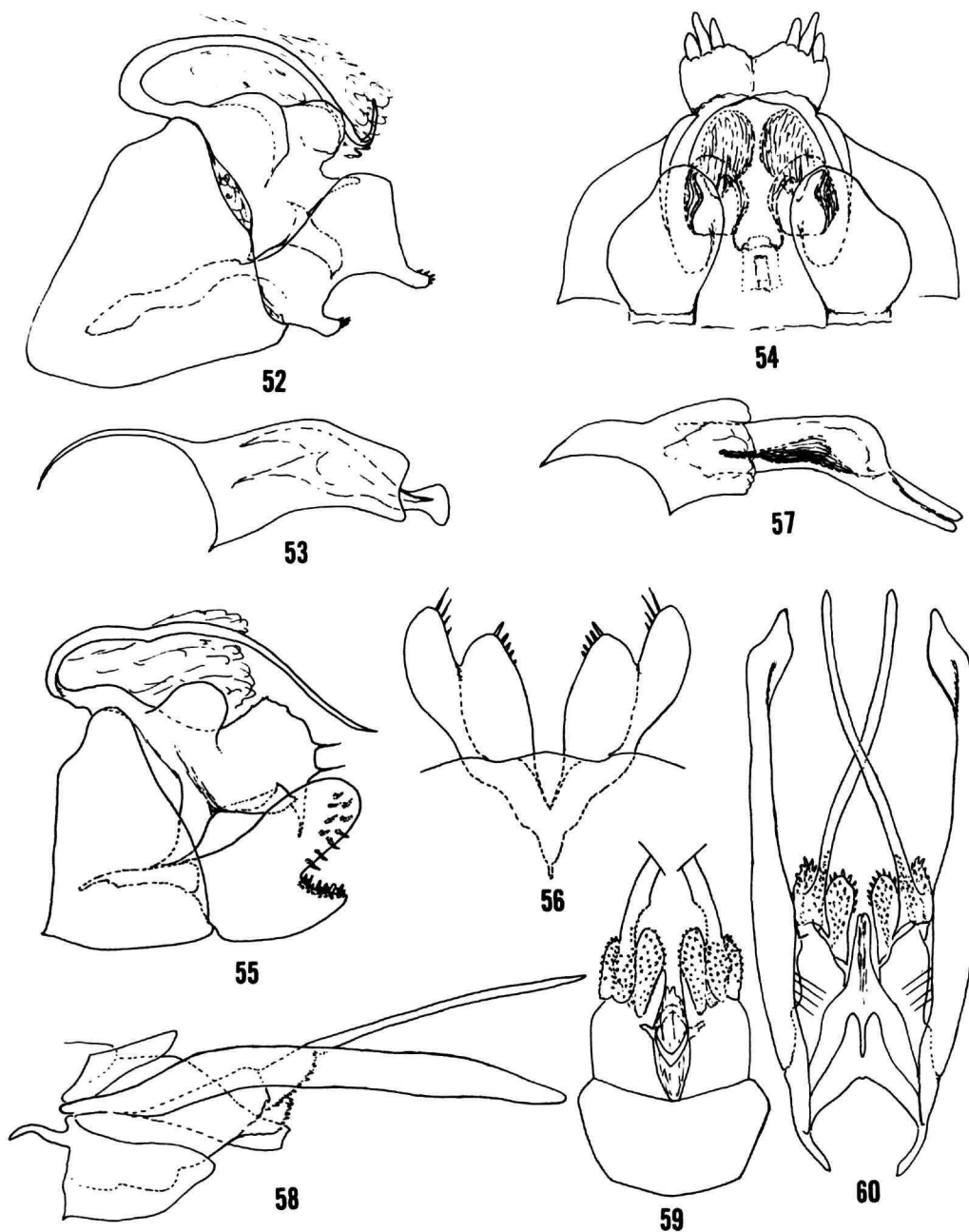
FIGURES 24-32.—*Chimarra immaculata* (Ulmer): 24, male genitalia, lateral; 25, eighth, ninth, and tenth terga, dorsal; 26, ninth sternum and claspers, ventral. *C. rosalesi*, new species: 27, ninth sternum and claspers, ventral; 28, male genitalia, lateral. *C. sensillata*, new species: 29, male genitalia, lateral; 30, clasper, posteroventral; 31, eighth, ninth, and tenth terga, dorsal; 32, aedeagus, lateral.



FIGURES 33-43.—*Chimarra poolei*, new species: 33, male genitalia, lateral; 34, clasper, posteroventral; 35, aedeagus, lateral. *C. bidens* (Ulmer): 36, male genitalia, lateral; 37, clasper, posteroventral; 38, aedeagus, lateral; 39, ninth and tenth terga, dorsal. *C. creagra*, new species: 40, clasper, dorsal; 41, aedeagus, lateral; 42, male genitalia, lateral; 43, female genitalia, lateral.

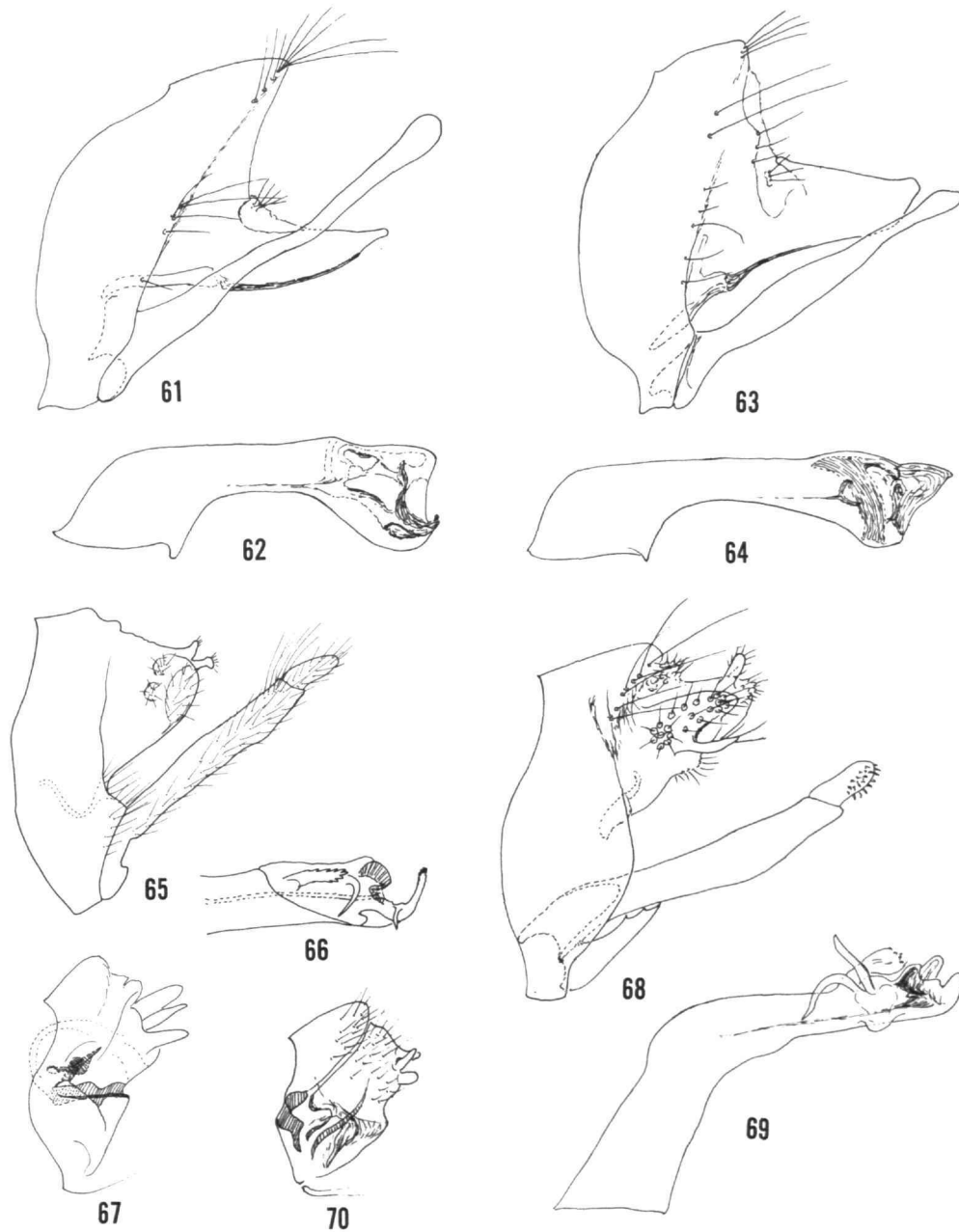


FIGURES 44-51.—*Chimarra platyrhina*, new species: 44, male genitalia, lateral; 45, clasper, posteroventral; 46, aedeagus, lateral; 47, female genitalia, lateral. *Polycentropus altmani* Yamamoto: 48, male genitalia, lateral; 49, female genitalia, ventral. *P. connatus*, new species: 50, male genitalia, lateral; 51, clasper, posterior.

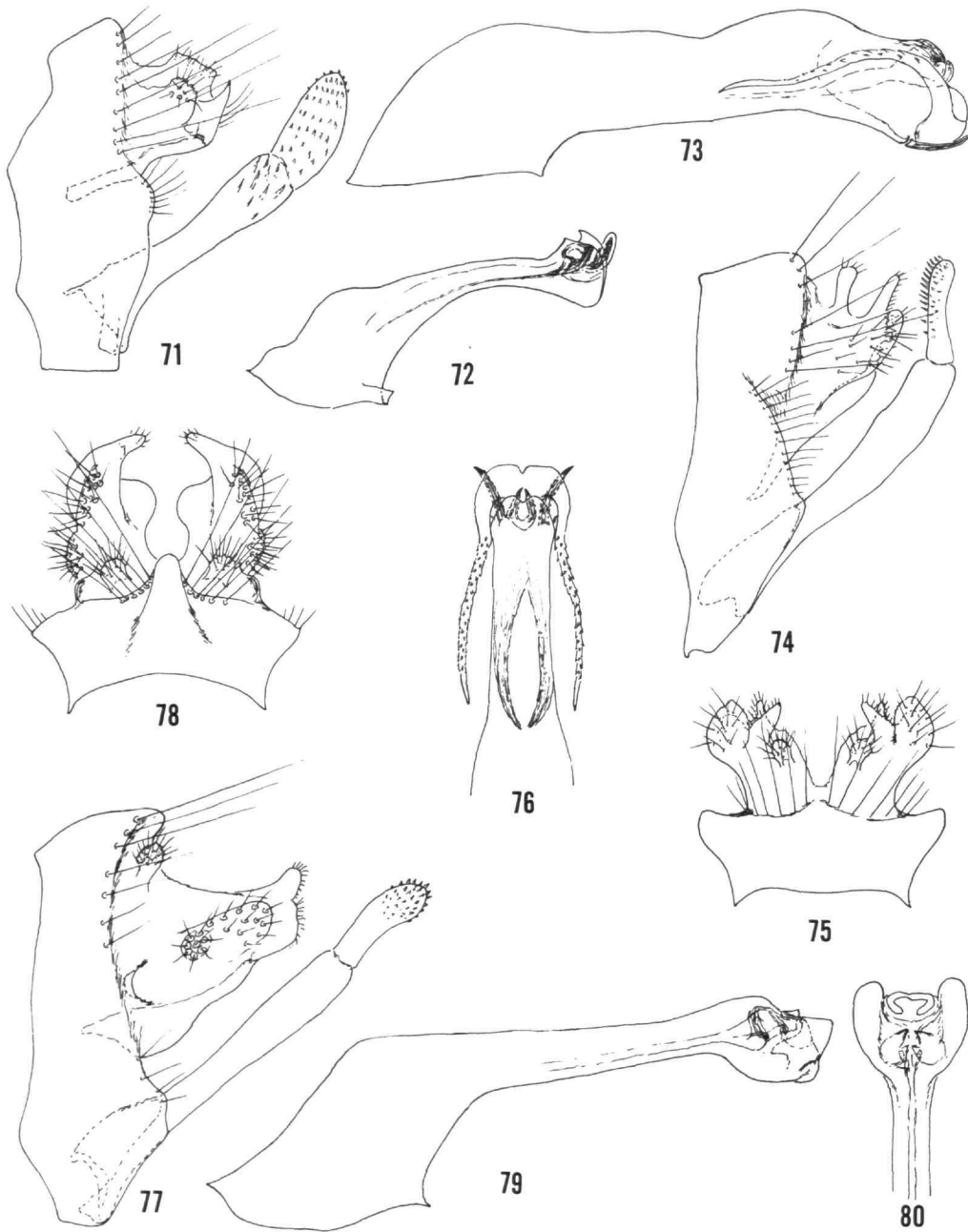


FIGURES 52-60.—*Polyplectropus recurvatus* (Yamamoto): 52, male genitalia, lateral; 53, aedeagus, lateral; 54, female genitalia, ventral. *P. trilobatus*, new species: 55, male genitalia, lateral; 56, claspers, ventral; 57, aedeagus, lateral. *Xiphocentron echinatum*, new species: 58, male genitalia, lateral; 59, ninth sternum and bases of claspers, ventral; 60, male genitalia, dorsal.

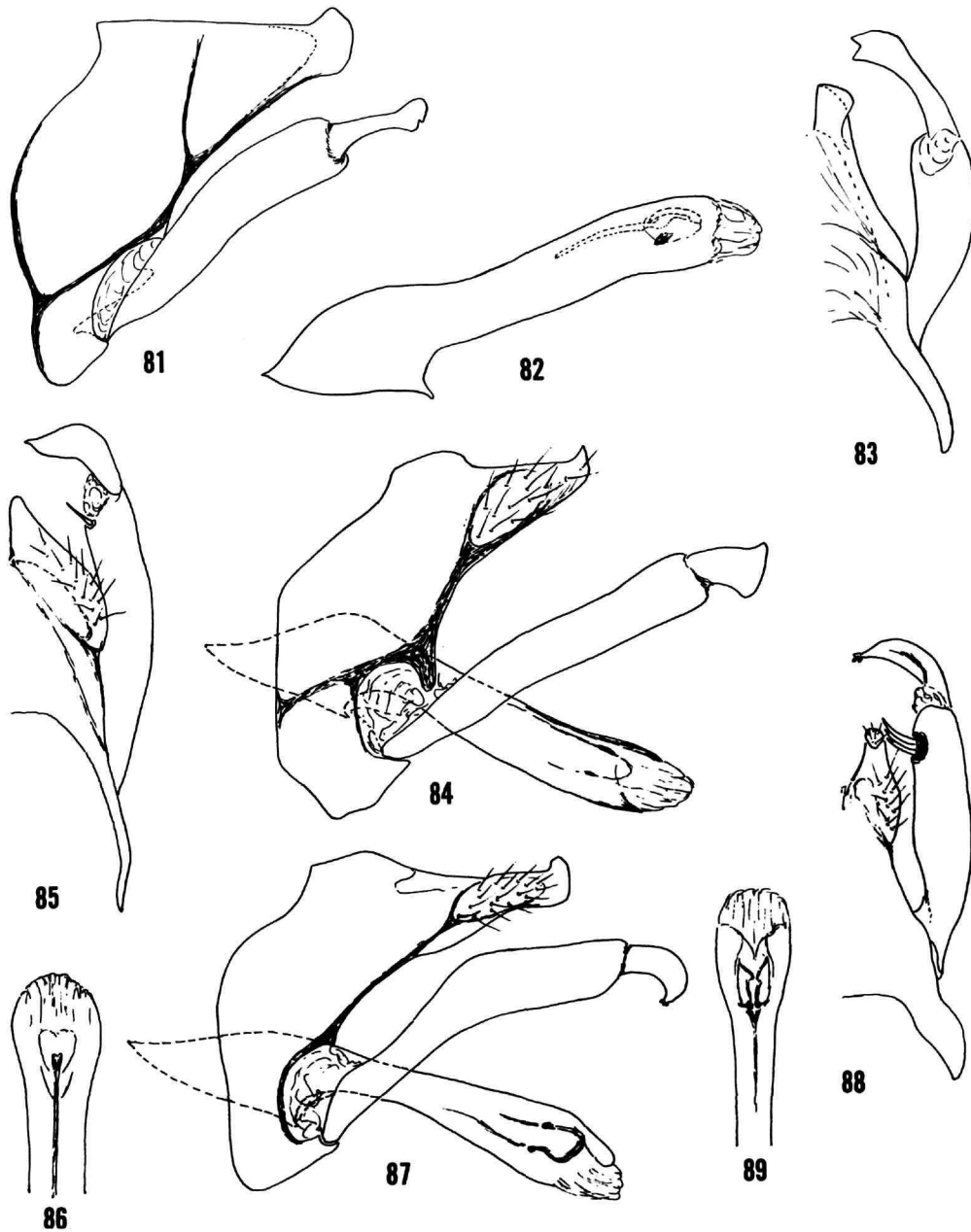




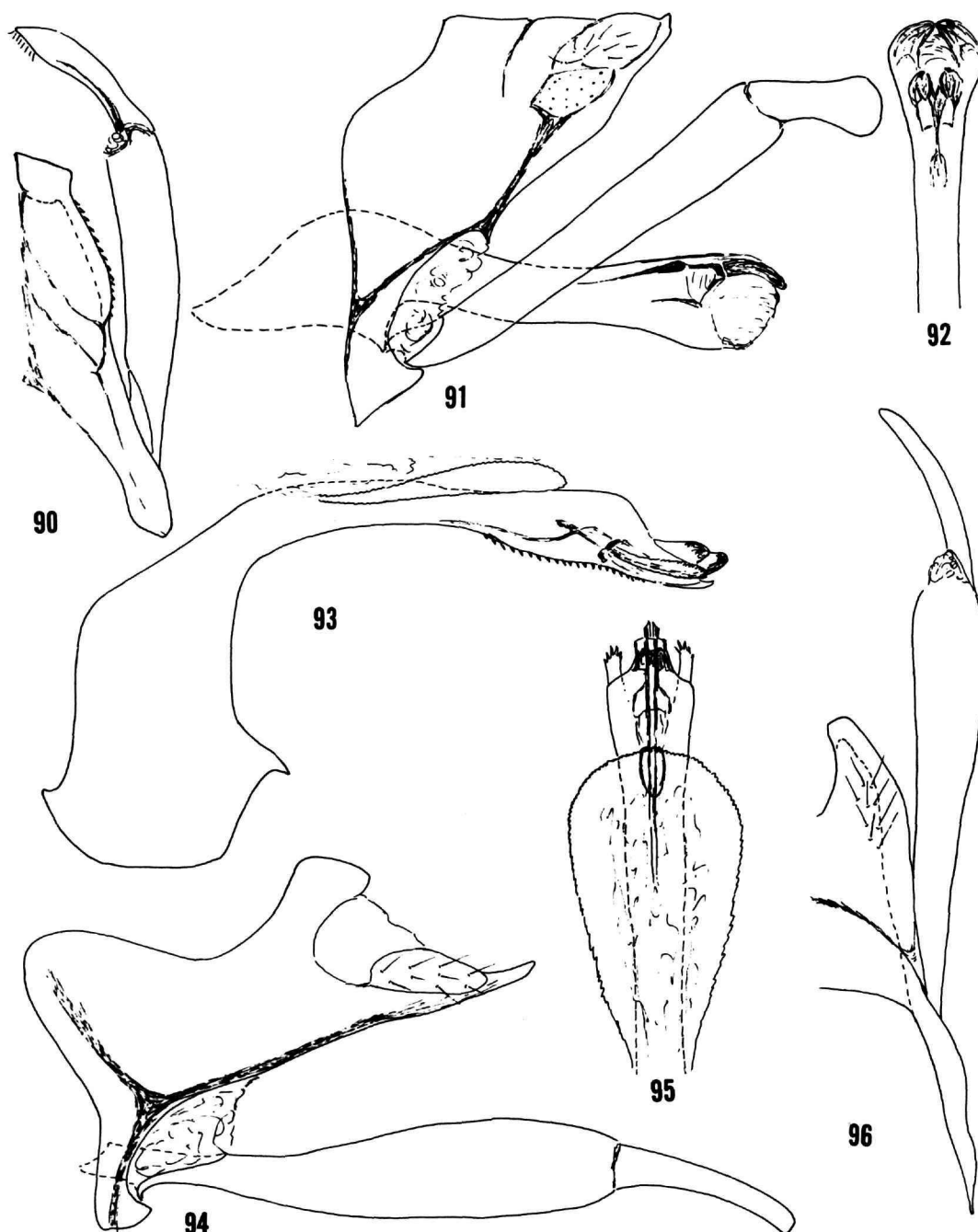
FIGURES 61-70.—*Centromacronema oculatum* (Walker): 61, male genitalia, lateral; 62, aedeagus, lateral. *C. nigripenne*, new species: 63, male genitalia, lateral; 64, aedeagus, lateral. *Leptonema albovirens* (Walker): 65, male genitalia, lateral; 66, tip of aedeagus, lateral; 67, female genitalia, lateral. *L. insulanum* Banks: 68, male genitalia, lateral; 69, aedeagus, lateral; 70, female genitalia, lateral.



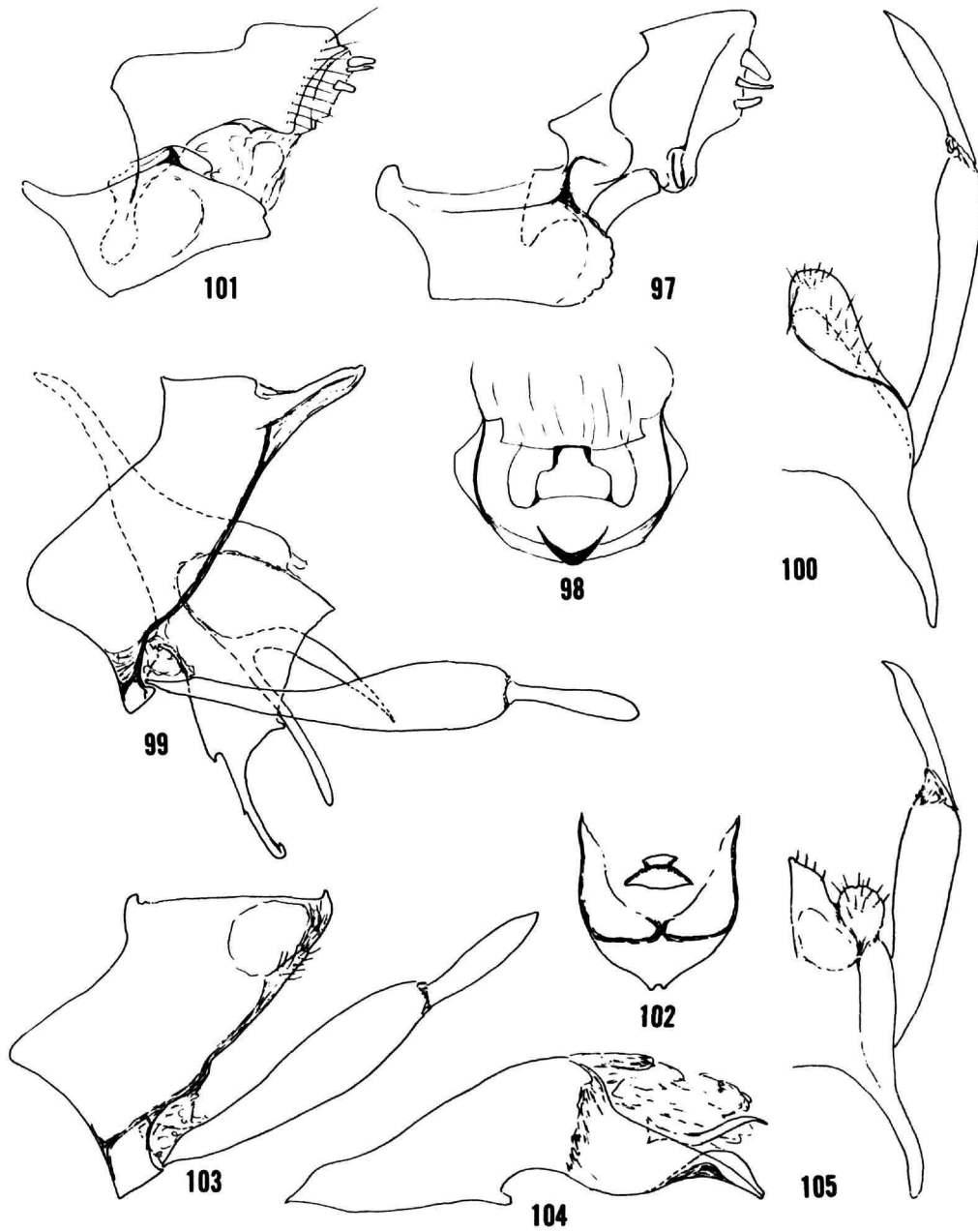
FIGURES 71-80.—*Leptonema crassum* Ulmer: 71, male genitalia, lateral; 72, aedeagus, lateral. *L. araguense*, new species: 73, aedeagus, lateral; 74, male genitalia, lateral; 75, ninth and tenth terga, dorsal; 76, tip of aedeagus, dorsal. *L. pseudostigmatosum*, new species: 77, male genitalia, lateral; 78, ninth and tenth terga, dorsal; 79, aedeagus, lateral; 80, tip of aedeagus, dorsal.



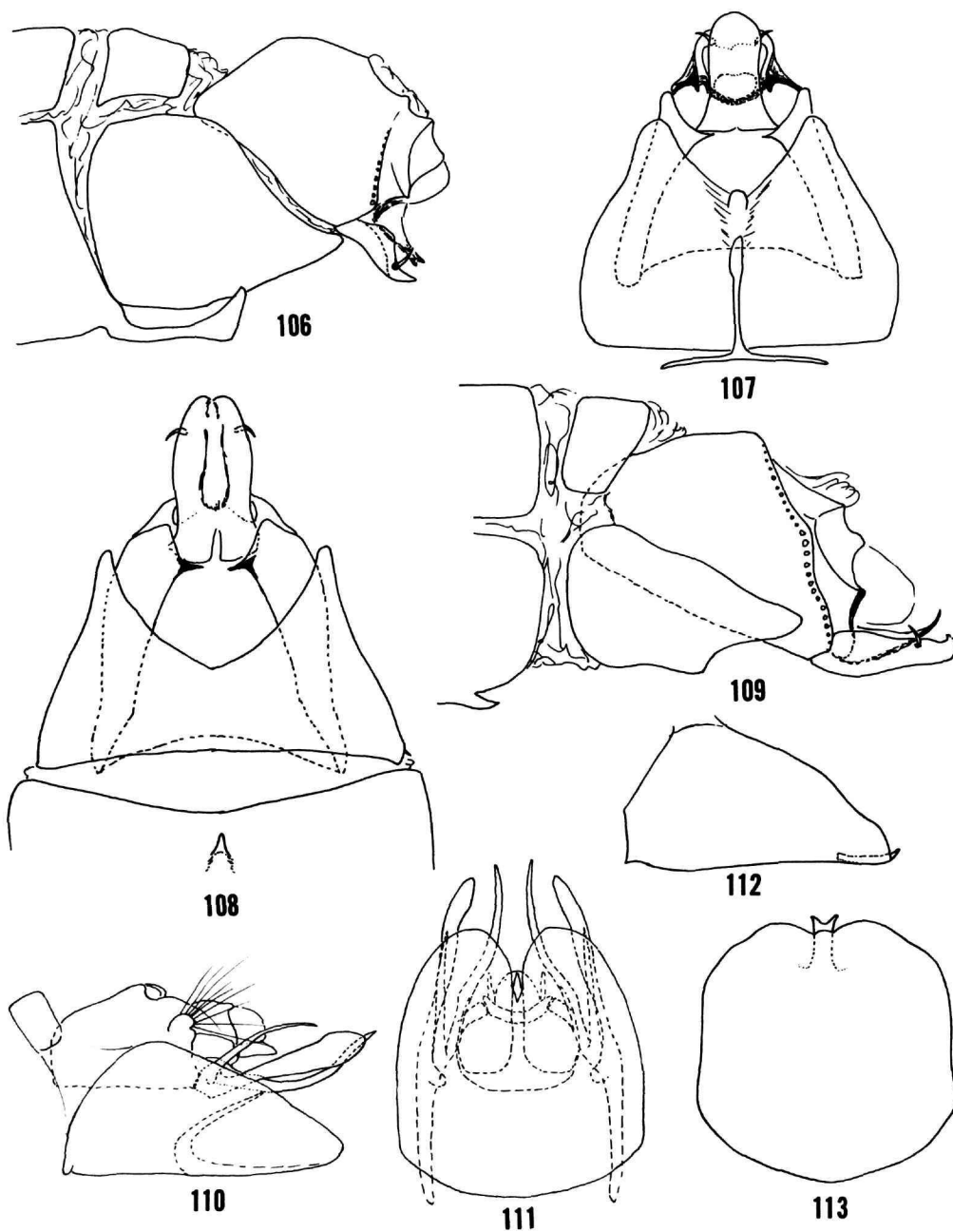
FIGURES 81-89.—*Smicridea bivittata* (Hagen): 81, male genitalia, lateral; 82, aedeagus, lateral; 83, male genitalia, dorsal. *S. anaticula*, new species: 84, male genitalia, lateral; 85, male genitalia, dorsal; 86, tip of aedeagus, dorsal. *S. amplispina*, new species: 87, male genitalia, lateral; 88, male genitalia, dorsal; 89, tip of aedeagus, dorsal.



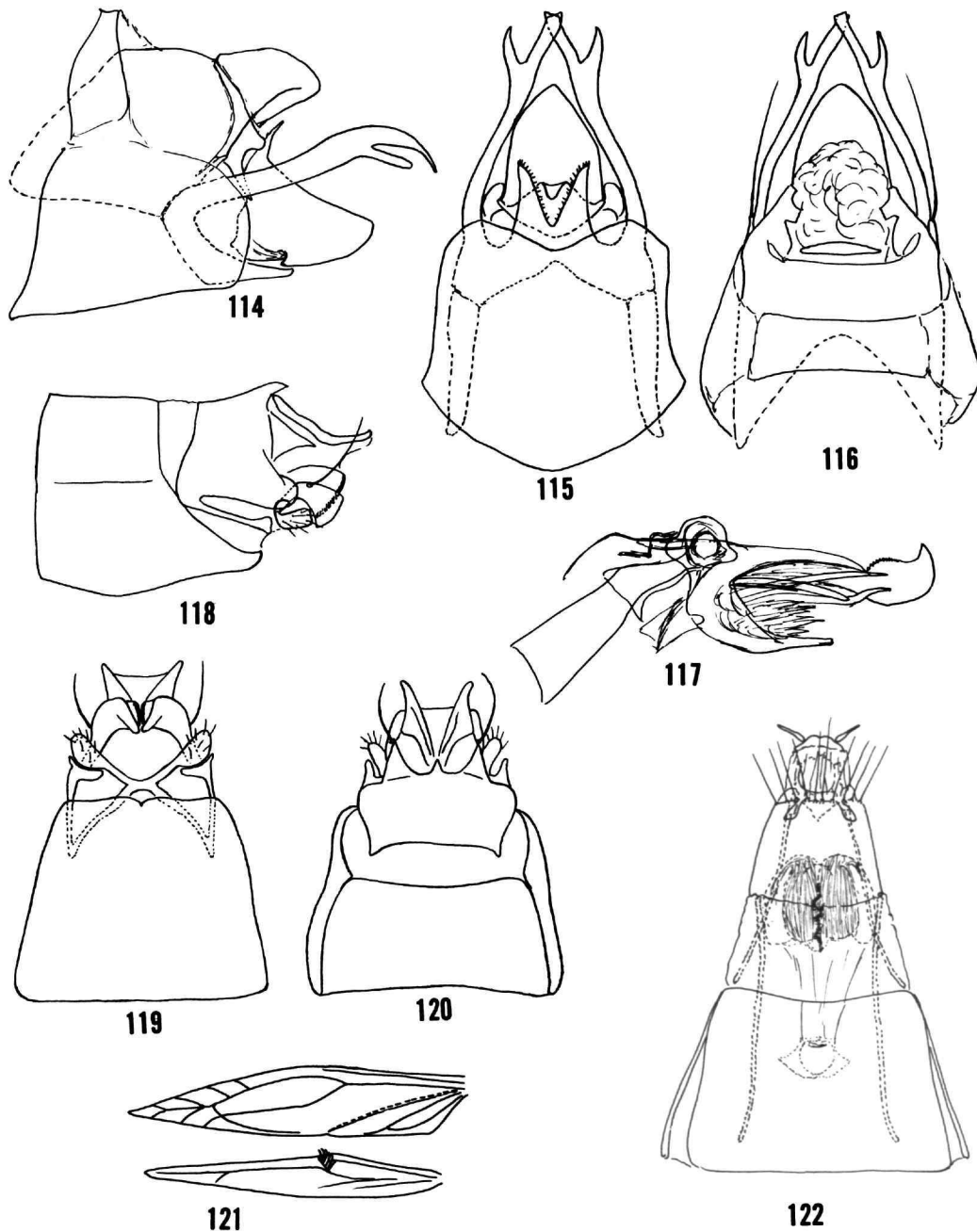
FIGURES 90-96.—*Smicridea riita*, new species: 90, male genitalia, dorsal; 91, male genitalia, lateral; 92, tip of aedeagus, dorsal. *S. petasata*, new species: 93, aedeagus, lateral; 94, male genitalia, lateral; 95, tip of aedeagus, dorsal; 96, male genitalia, dorsal.



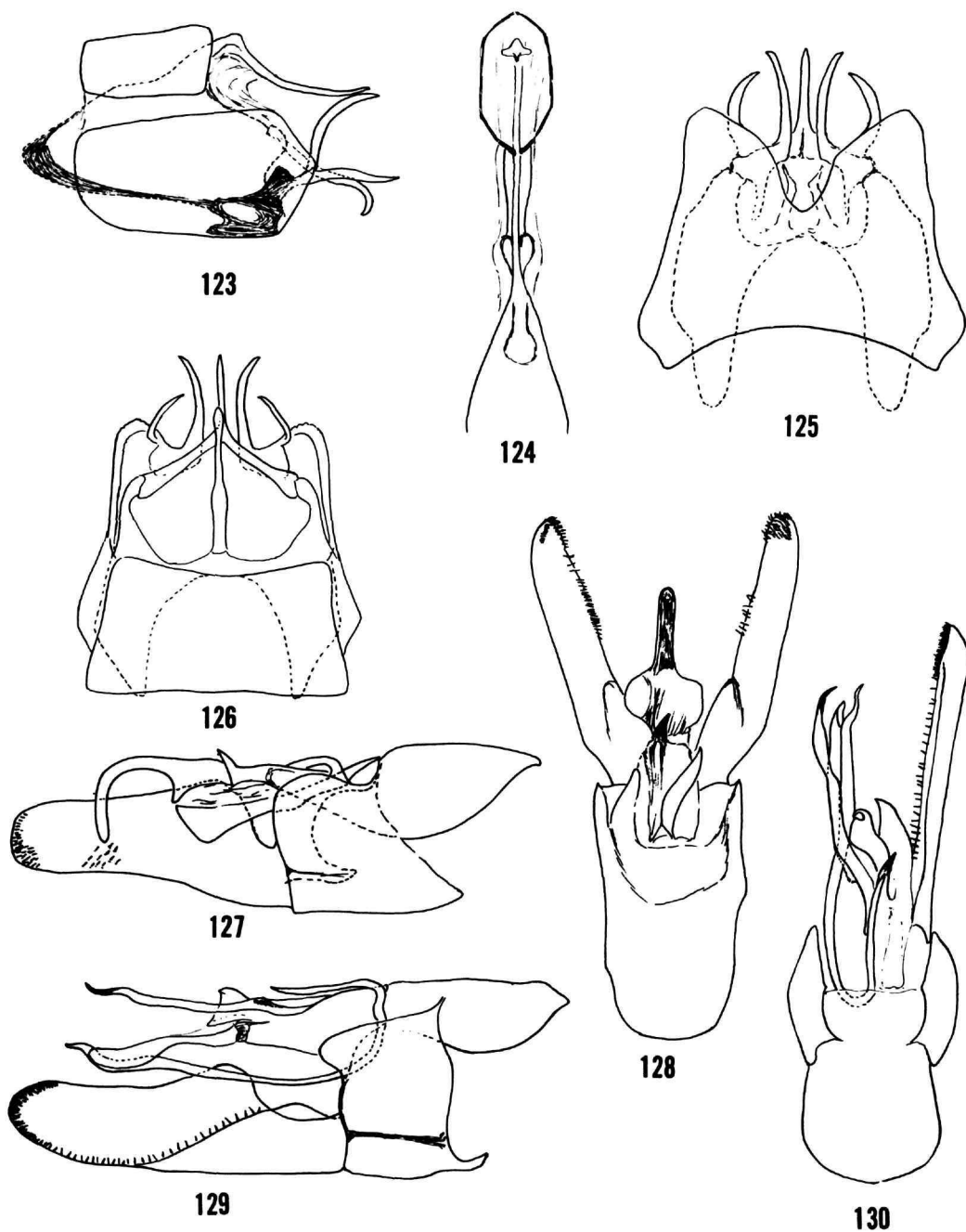
FIGURES 97-105.—*Smicridea bivittata* (Hagen): 97, female genitalia, lateral; 98, vagina, ventral. *S. nigripennis* Banks: 99, male genitalia, lateral; 100, male genitalia, dorsal. *S. palifera*, new species: 101, female genitalia, lateral; 102, vagina, ventral; 103, male genitalia, lateral; 104, aedeagus, lateral; 105, male genitalia, dorsal.



FIGURES 106-113.—*Leucotrichia melleopicta* Mosely: 106, male genitalia, lateral; 107, male genitalia, ventral. *L. fairchildi* Flint: 108, male genitalia, ventral; 109, male genitalia, lateral. *Costatrichia tripartita tripartita* Flint: 110, male genitalia, lateral; 111, male genitalia, ventral. *C. tripartita venezuelensis*, new subspecies: 112, eighth sternum, lateral; 113, eighth sternum, ventral.

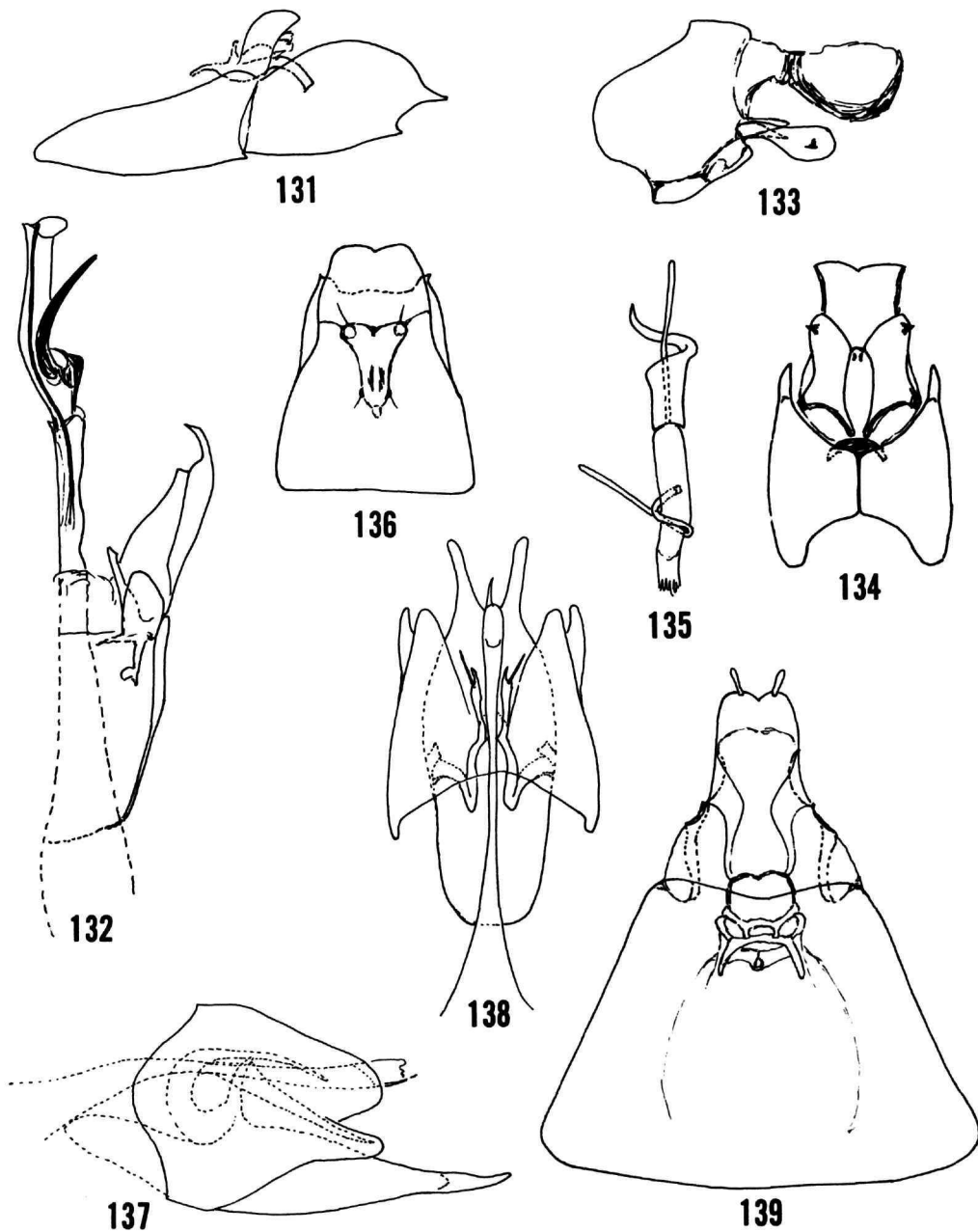


FIGURES 114-122.—*Zumatrichia marica*, new species: 114, male genitalia, lateral; 115, male genitalia, ventral; 116, male genitalia, dorsal; 117, aedeagus, lateral. *Alisotrichia wirthi* Flint: 118, male genitalia, lateral; 119, male genitalia, ventral; 120, male genitalia, dorsal. *Byrospteryx mirifica*, new species: 121, wings; 122, female genitalia, ventral.

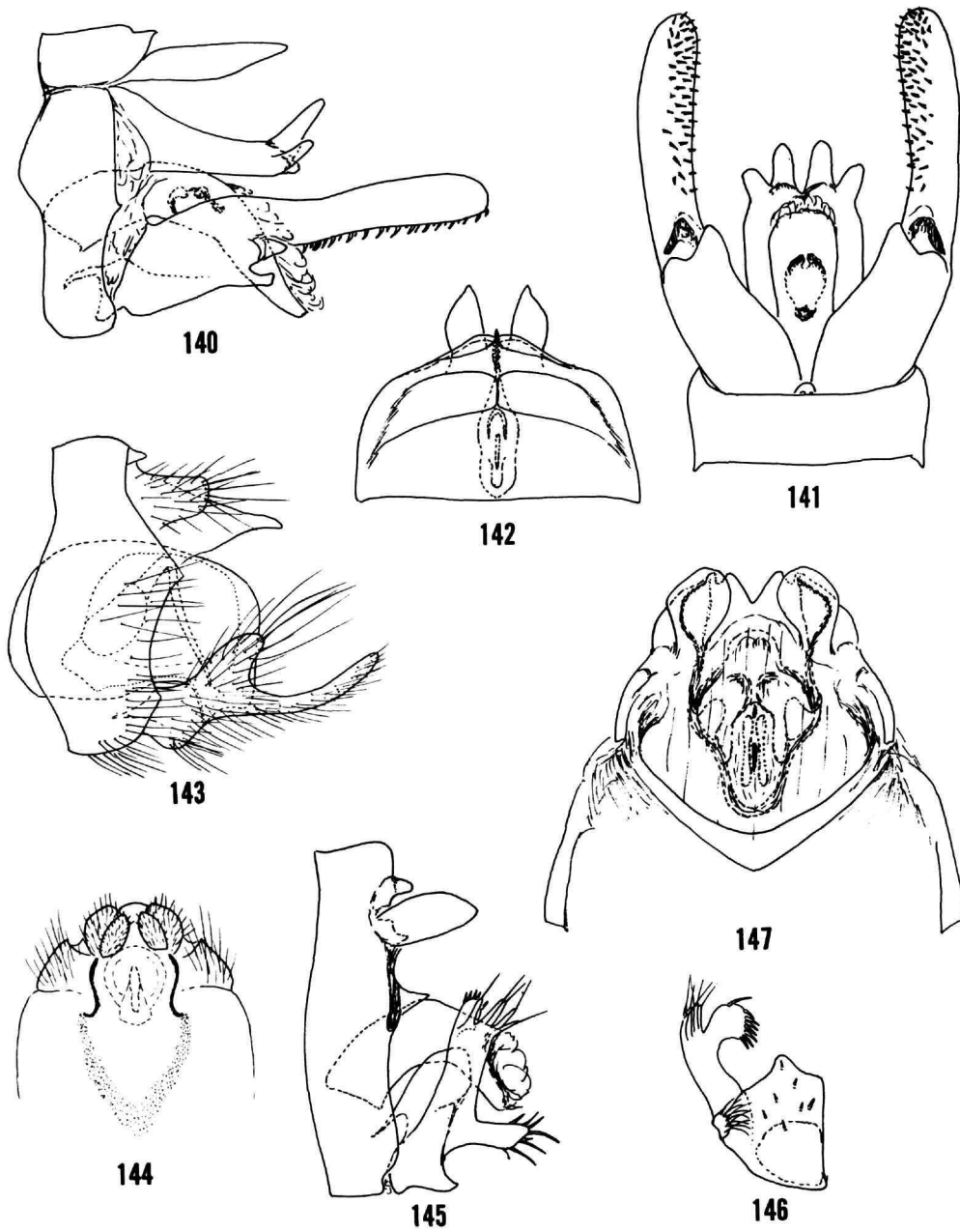


FIGURES 123-130.—*Byrsopteryx mirifica*, new species: 123, male genitalia, lateral; 124, aedeagus, dorsal; 125, male genitalia, ventral; 126, male genitalia, dorsal. *Ochrotrichia limonensis*, new species: 127, male genitalia, lateral; 128, male genitalia, dorsal. *O. tenanga* Mosely: 129, male genitalia, lateral; 130, male genitalia, dorsal.

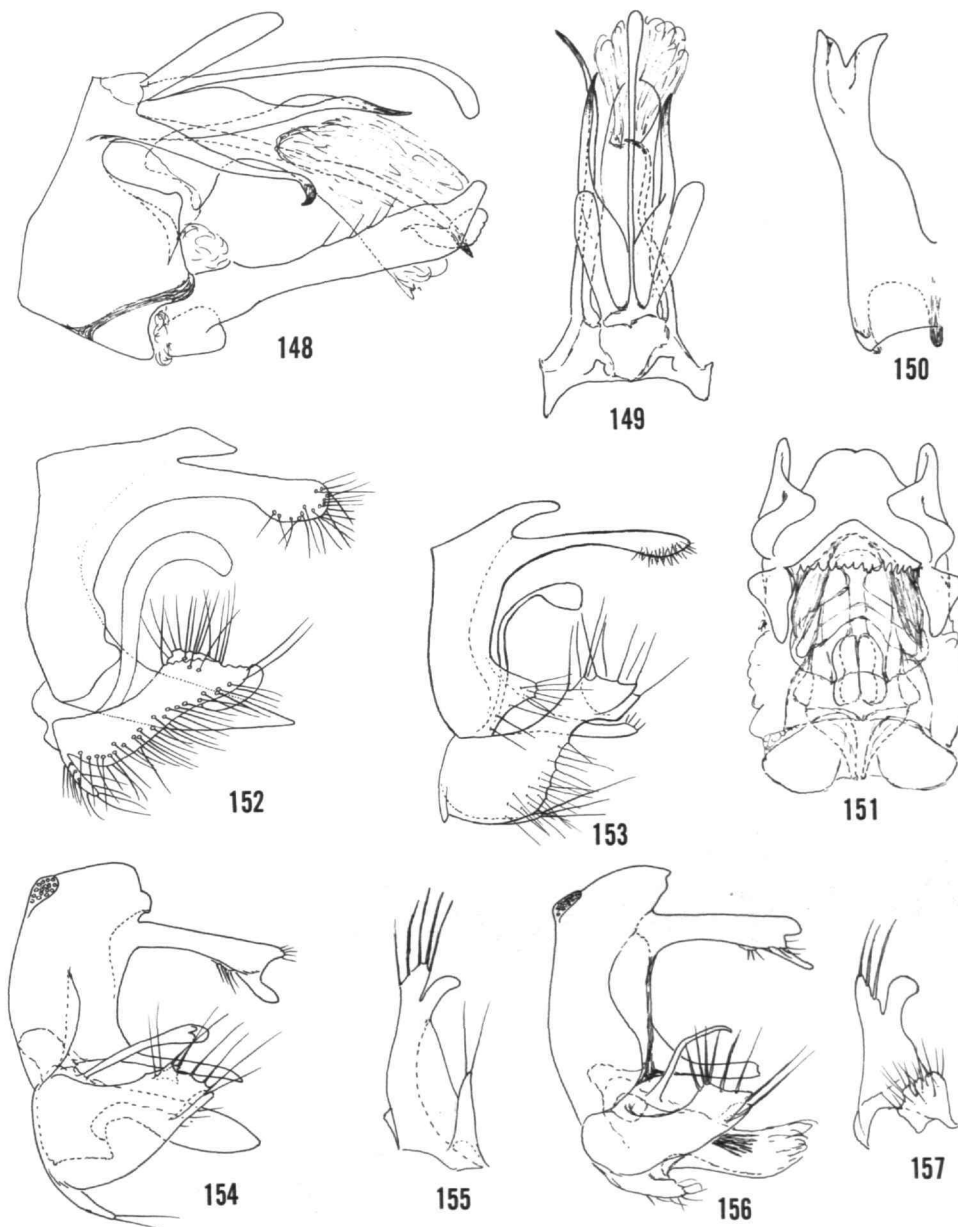




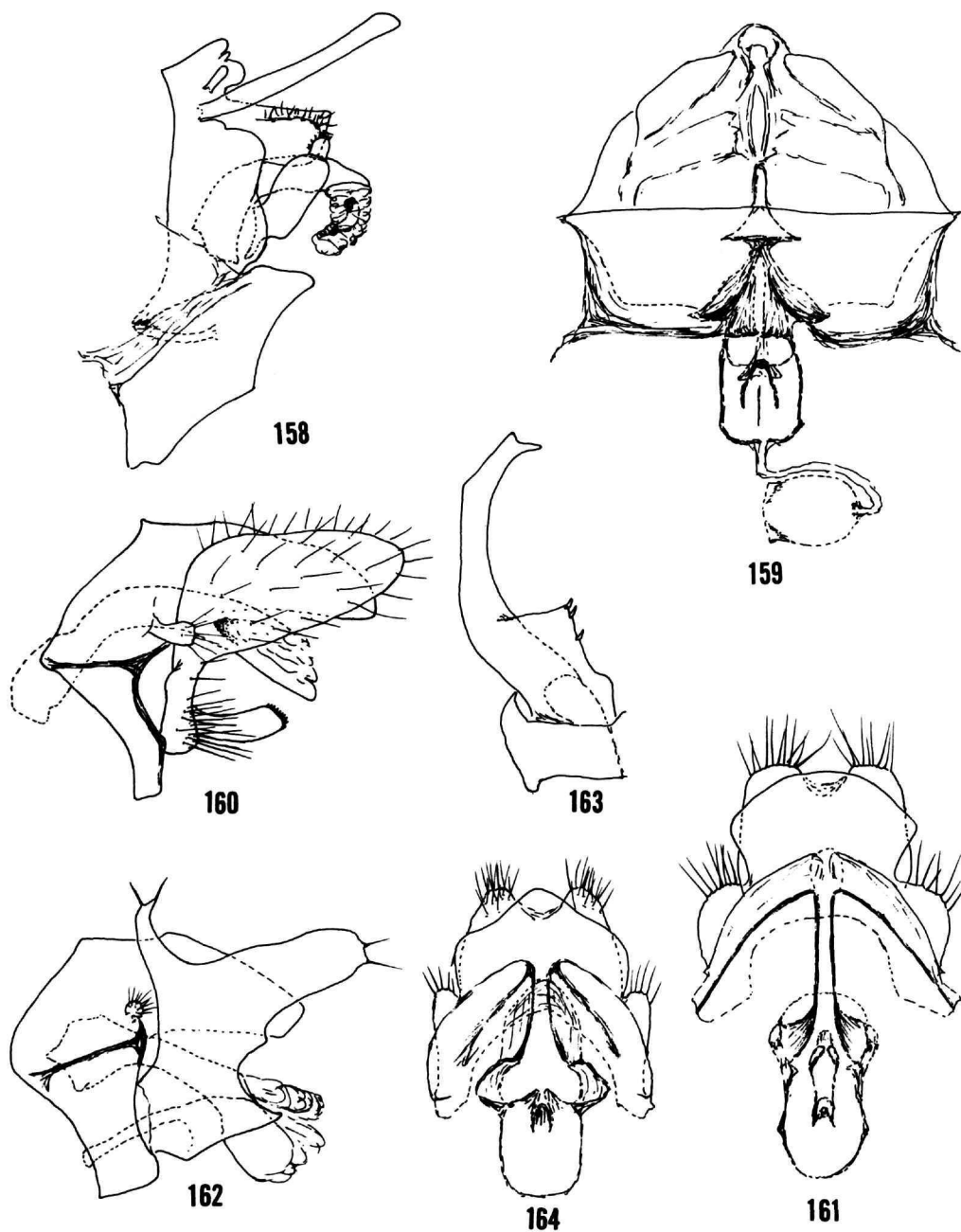
FIGURES 131-139.—*Ochrotrichia araguensis*, new species: 131, male genitalia, lateral; 132, male genitalia, dorsal. *Hydroptila venezuelensis*, new species: 133, male genitalia, lateral; 134, male genitalia, ventral; 135, tip of aedeagus, dorsal; 136, female eighth sternum, ventral. *Oxyethira azteca* (Mosely): 137, male genitalia, lateral; 138, male genitalia, dorsal; 139, female genitalia, ventral.



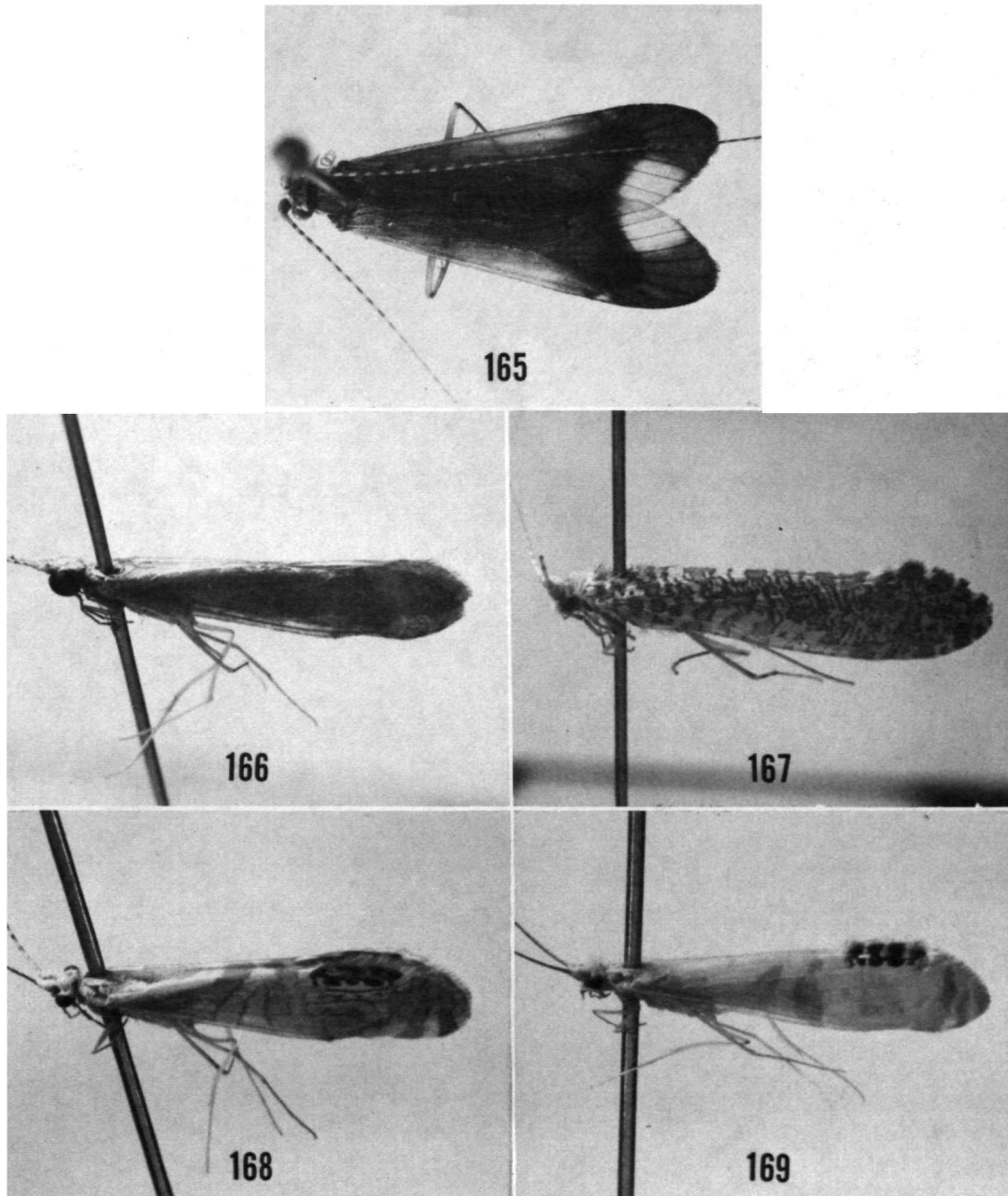
FIGURES 140-147.—*Atanotlica botosaneanui*, new species: 140, male genitalia, lateral; 141, male genitalia, ventral; 142, female genitalia, ventral. *Oecetis inconspicua* (Walker): 143, male genitalia, lateral; 144, female genitalia, ventral. *O. knutsoni*, new species: 145, male genitalia, lateral; 146, clasper, posterior; 147, female genitalia, ventral.



FIGURES 148-157.—*Oecetis prolongata*, new species: 148, male genitalia, lateral; 149, male ninth and tenth terga and aedeagus, dorsal; 150, clasper, ventral; 151, female genitalia (eighth sternum removed), ventral. *Nectopsyche punctata* (Ulmer): 152, male genitalia, lateral. *N. dorsalis* (Banks): 153, male genitalia, lateral. *N. aureofasciata*, new species: 154, male genitalia, lateral; 155, clasper, ventral. *N. gemmoides*, new species: 156, male genitalia, lateral; 157, clasper, ventral.



FIGURES 158-164.—*Phylloicus angustior* Ulmer: 158, male genitalia, lateral; 159, female genitalia, ventral. *Helicopsyche vergelana* Ross: 160, male genitalia, lateral; 161, female genitalia, ventral. *H. angulata*, new species: 162, male genitalia, lateral; 163, ninth sternum and clasper, posteroventral; 164, female genitalia, ventral.



FIGURES 165-169.—Habitus: 165, *Centromacronema oculatum* (Walker); 166, *Nectopsyche dorsalis* (Banks); 167, *N. punctata* (Ulmer); 168, *N. aureofasciata*, new species; 169, *N. gemmoides*, new species.



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